KULACHI SOLAR POWER

KULACHI SOLAR POWER (PVT) LTD

The Registrar
National Electric Power Regulatory Authority (NEPRA)
NEPRA Tower,
Attaturk Avenue (East),
Opposite Federal Flood Commission,
Sector G-5/1,
Islamabad, Pakistan

Subject: Application for a Generation License for a 50MW Solar Power Project

I, Aziz Raza Malik, Chief Executive Officer, being the duly authorized representative of Kulachi Solar Power (Private) Limited (the "**Applicant**"), by virtue of Board Resolution dated 20th March, 2018, hereby apply to the National Electric Power Regulatory Authority (NEPRA) (the "Authority") for the grant of a Generation License of 50MW Solar Power Project to the Kulachi Solar Power (Private) Limited pursuant to the Section 15 of the Regulation of Generation, Transmission, and Distribution of Electric Power Act, 1997.

I certify that the documents-in-support attached with this application are prepared and submitted in conformity with the provisions of the National Electric Power Regulatory Authority (Application and Modification Procedures) Regulations, 1999, and undertake to abide by the terms and provisions of the above-said regulations. I further undertake and confirm that the information provided in the attached documents-in-support is true and correct to the best of my knowledge and belief.

A Pay Order (PO) No. 02125186 dated 06th April, 2018 in the sum of Rs. 305,824/- (Rupees Three Hundred, Five Thousand, Eight Hundred and Twenty Four Only), **and** a Pay Order (PO) No. 02153222 dated 06th July, 2018 in the sum of Rs. 8,928/- (Rupees Eight Thousand, Nine Hundred and Twenty Eight Only), being the non-refundable license Application Fee; calculated in accordance with Schedule II to the National Electric Power Regulatory Authority (Application and Modification Procedures) Regulations 1999, are also attached herewith.

Received alongwith Two Copies & and Two Cheques amounting (1) 305,824/- (2) 8,928/-

For information & necessary action

— DRO/Dly-I

Copy to:

— SA(Tech)
— SAT-I
— ADG (Lic)
— LA(Lic)
— MF

10 07 18

c.c. Chairman
M(T)
M(M&E)
M(Lic)

Date: 06th July, 2018

Kulachi Solar Power (Pvt.) Limited

Engr. Aziz Raza Malik
Chief Executive Officer

REGISTRAR
Dy. No: 6875
Dated: 10-07-18

APPLICATION & MODIFICATION/TARIFF PETITION FEE

Upto 31st July, 2018

Period		CPI Rate	Ratio
June, 2018		226.68	1.9672
September, 2008	(Base Rate)	115.23	

Application & Modification Generation License Fee

	Rs. Actual Fee	Rs. Fee with CPI
upto to 1 MW	40,000	78,688
More than 1 MW upto 10 MW	80,000	157,376
More than 10 MW upto 20 MW	120,000	236,064
More than 20 MW upto 50 MW	160,000	314,752
More than 50 MW upto 100 MW	200,000	393,440
Above 100 MW	400,000	786,880

MW Capacity in case of Generation facility shall mean the ISO Gross Capacity as mentioned in the application.

Application & Modification Transmission License Fee

National Grid Co.	200,000	393,440
Special Purpose	120,000	236,064

*** Application & Modification Distribution License Fee**

upto to 1 MW	40,000	78,688
More than 1 MW upto 2 MW	60,000	118,032
More than 2 MW upto 5 MW	160,000	314,752
More than 5 MW upto 10 MW	240,000	472,128
More than 10 MW upto 20 MW	480,000	944,256
More than 20 MW upto 50 MW	800,000	1,573,760
Above 50 MW	1,000,000	1,967,200

* MW Capacity in case of Distribution facility shall mean either (a). 85% of the accumulated installed or expected to be installed Transformation Capacity as mentioned in the application or (b). 0.019% of the annual expected sales in MWh as mentioned in the application.

<u>Fees Pertaining to Tariff Standards and Procedures Regulations 2002</u>

(i) (a) Generation Licensees

	Rs. Actual Fee	Rs. Fee with CPI
upto to 1 MW	60,000	118,032
More than 1 MW upto 10 MW	160,000	314,752
More than 10 MW upto 20 MW	240,000	472,128
More than 20 MW upto 50 MW	320,000	629,504
More than 51 MW upto 100 MW	480,000	944,256
Above 100 MW	800,000	1,573,760

(b) Transmission Licensees

National Grid Co.	800,000	1,573,760
Special Purpose	320,000	629,504

(c) Distribution Licensees

upto to 1 MW	40,000	78,688
More than 1 MW upto 2 MW	60,000	118,032

PAYMENT ORDER

Account Payee Only

SILKBANK

(0002) Islamabad Main Branch

P.O. No. **02125186**

Stationery/Ref No:

FT1809628135

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** Not Over 305,824.00

PKR 305,824.00

Pay to NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

or Order

Rupees THREE HUNDRED AND FIVE THOUSAND EIGHT HUNDRED AND TWENTY FOUR ONLY

Payable at any Silkbank branch in Pakistan.

Please do not write below this line.

Authorised Signatory
PA/Attorney No 112

Authorised Signatory
PA/Attorney No

⑈02125186⑈066000 2⑆ ⑈020⑈

PAYMENT ORDER

Account Payee Only

SILKBANK

(0002) Islamabad Main Branch

P.O. No. **02153222**

Stationery/Ref No:

FT1818744404

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** Not Over 8,928.00

PKR 8,928.00

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Authorised Signatory
PA/Attorney No

Authorised Signatory
PA/Attorney No 1122

⑈02153222⑈066000 2⑆ ⑈020⑈

APPLICATION FOR THE GRANT OF A GENERATION LICENSE

Kulachi Solar Power (Private) Limited

a 50MWp Solar Power Project near Kulachi, District D. I. Khan, Khyber Pakhtunkhwa Province, Pakistan

July 2018

APPLICATION FOR THE GRANT OF A GENERATION LICENSE

This application is for the Grant of Generation License duly filed by M/s Target Energy (Private) Limited for Kulachi Solar Power (Private) Limited (the "**KSP**" and/or the "**Applicant**" and/or the "**Project Company**") for its 50MW Solar Power Project (the "**Project**") in D.I. Khan, Khyber Pakhtunkhwa, Pakistan.

1 The Authority's participation in the process

This Application for the grant of a generation license is made pursuant to Section 15 of the Regulation of Generation, Transmission, and Distribution of Electric Power Act, 1997 (the "**Act**") and Regulation 3 of the National Electric Power Regulatory Authority (Application and Modification Procedure) Regulations, 1999 (the "**AMP Regulations**").

Where;

Section 15 of the Act provides, inter alia, that:

"(1) No person except under the authority of a license issued by the Authority under this Act and subject to the conditions specified in this Act and as may be imposed by the Authority, construct own or operate a generation facility.

(2) An application for the grant of a license for a generation facility shall specify.

- (i) The type of facility for which the license is applied;
- (ii) The location of the generation facility; and
- (iii) The expected life of the generation facility.

Regulation 3 of the AMP Regulations provides that an application for license shall be made in the form specified in the AMP Regulations and also provides a list of documents required to be submitted to the Authority along with the requisite application.

2 Introduction of the Applicant

Kulachi Solar Power (Private) Limited ("**KSP**") is a Pakistan based company with the sole objective of developing, financing, building and operating up to a 50MW solar power project in Pakistan. KSP was issued a Letter of Intent ("**LOI**") on the 20th of October 2016 by Pakhtunkhwa Energy Development Organization ("**PEDO**") for setting up a 50MW solar Power Generation Project (the "**Project**") at D.I. Khan, Khyber Pakhtunkhwa, Pakistan to Target Energy (Private) Limited.

Project site is strategically located which makes the Project of a national interest.

Sponsors have incorporated M/s Kulachi Solar Power (Private) Limited ("**KSP**"), as a Special Purpose Vehicle (SPV) on 14 September 2017 under Companies Act 2017 in Pakistan for the development, construction and operations of the Project.

LOI has not yet been transferred on the name of KSP and will be transferred to the Project Company after getting necessary approvals from PEDO in due course.

3 Introduction of the Sponsors

There are a number of Sponsors of the Project Company, brief introduction of Sponsors is given below;

i. H1 Holdings (Pty) Ltd. ("**H1**") is Main Shareholder of the Project Company, incorporated and headquartered in Cape Town, South Africa. It is an established investment company founded in 2000 with strong balance sheet which is highly liquid and is wholly owned and managed by experienced black individuals. H1 provides expansion and buyout capital to companies in partnership with management. It is focused on the energy sector and is building significant operational and technical capacity in the energy sector.
ii. Atlantic Energy Partners ("**AEP**") is a Shareholder of the Project Company, incorporated under the laws of South Africa. It was incorporated with the vision of providing renewable energy sector with a full turnkey service provider of excellence as a respected Independent Power Producer ("IPP").
iii. Target Energy (Private) Limited ("**Target**") is a Shareholder of the Project Company. Sponsors of Target Energy (Private) Limited are Pakistani nationals. The principle business of Target is to invest in renewable energy projects in Pakistan and to provide key development and operational services to these projects.
iv. Alternative Grid North Africa Limited ("**AGNA**") is a Shareholder of the Project Company, incorporated and headquartered in Dublin, Ireland. AGNA is an international renewable energy developer with an experienced team developing renewable energy and infrastructure projects in Africa and Asia.

4 Introduction of Lead Project Developer

KSP is being developed by "Atlantic Energy Partners", headquartered in South Africa. Atlantic Energy Partners ("**AEP**") was incorporated with the vision of providing renewable energy sector with a full turnkey service provider of excellence as a respected Independent Power Producer ("**IPP**").

AEP team brings diverse experience and a history of success to the company; with expertise in engineering, energy development, procurement and project management. The AEP team offers years of relevant work experience within the financial services industry and unparalleled expertise in: project feasibility assessments; due diligence; legal framework implementations; corporate structuring and tax optimisation; capital raising and structuring for optimal returns on equity investment.

AEP team has a cumulative track record of successfully developing projects from initiation to financial closure of four separate projects totalling 225MW of solar PV and 138MW of onshore wind in the first three rounds of REIPPPP in South Africa which have all reached COD (363MW).

An additional three solar PV projects totalling 225MW (3 x 75MW) have been selected as preferred bidder from bid window four and are will reach financial close in 2018. A total of 590MW in South Africa.

In January 2016 it was awarded a 50MW Solar PV by the Republic of Mali located in Sikasso, Mali. AEP hopes to reach financial close of a 100MW solar PV project in Nigeria in 2018. AEP has a pipeline of renewable energy projects in excess of 2GW in SA and Africa.

5. Progress of the Project

Applicant has successfully completed the feasibility study of the Project and is currently in negotiation with lenders for securing financing for the Project.

Applicant is confident that the Project can achieve financial close by 31 October 2018; and construction can be started in 1 November 2018. Under the terms of the EPC Contract, construction will be completed in 12 months and Commercial Operations Date ("COD") is 31 October 2019.

Kindly find enclosed the following Annexure:

Annexure-1	:	Form of Application
Annexure-2	:	Extracts of minutes of the meeting of the Board of Directors
Annexure-3	:	Affidavit
Annexure-4	:	Prospectus
Annexure-5	:	Schedule I of Generation License
Annexure-6	:	Schedule II of Generation License
Annexure-7		Details of Lender's Facility available for the Project
Annexure-8	:	Bank Statement of Project Company
Annexure-9	:	Company Profile of Applicant and Project Sponsors
Annexure-10	:	CV of Senior Management, Technical and Professional Staff
Annexure-11	:	Certificate of Incorporation & Memorandum and Articles of Association
Annexure-12	:	Last Three Years Financial Statement
Annexure-13	:	Last Filed Annual Return
Annexure-14	:	EPC Contract (Signature Pages only)
Annexure-15	:	Profiles of EPC Contractor
Annexure-16	:	Reference list of EPC Contractor
Annexure-17	:	Electrical Grid Interconnection Study
Annexure-18	:	Health and Safety Policy of Project Sponsors
Annexure-19	:	Decision (NOC) on Initial Environmental Examination (IEE) by Environmental Protection Agency, Government of KPK
Annexure-20	:	Copy of Letter of Intent (LOI)
Annexure-21	:	Check List for Examination New Generation Facility (Solar) License Application Regulation 3(5)

The Applicant would be pleased to provide any other information/assistance that the learned Authority may require in the matter of grant of Generation License.

This Application and its Annexures are being submitted in triplicate.

It is most humbly prayed to the esteemed Authority as follows:

A That the Applicant may be granted a Generation License for the development of the Facility.

B That the Authority may be pleased to treat the Applicant's request for the grant of Generation License on a non-discriminatory basis and any concession offered to comparable projects on the date of filing of this Application and at any stage subsequent to the grant of license may kindly be granted to the Applicant as well.

We hope that the information provided above meets your requirements, and we remain available to assist you if you have any further quarries.

Respectfully submitted for and on behalf of the Applicant.

Aziz Raza Malik
Chief Executive Officer
Kulachi Solar Power (Private) Limited
7th Floor, Green Trust Towers,
Jinnah Avenue, Blue Area,
Islamabad – Pakistan
Landline: +92 51 2813101-103
Fax: +92 51 2813104-105

Annexure – 1

Form of Application

KULACHI SOLAR POWER

KULACHI SOLAR POWER (PVT) LTD

The Registrar
National Electric Power Regulatory Authority (NEPRA)
NEPRA Tower,
Attaturk Avenue (East),
Opposite Federal Flood Commission,
Sector G-5/1,
Islamabad, Pakistan

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I certify that the documents-in-support attached with this application are prepared and submitted in conformity with the provisions of the National Electric Power Regulatory Authority (Application and Modification Procedures) Regulations, 1999, and undertake to abide by the terms and provisions of the above-said regulations. I further undertake and confirm that the information provided in the attached documents-in-support is true and correct to the best of my knowledge and belief.

A Pay Order (PO) No. 02125186 dated 06th April, 2018 in the sum of Rs. 305,824/- (Rupees Three Hundred, Five Thousand, Eight Hundred and Twenty Four Only), **and** a Pay Order (PO) No. 02153222 dated 06th July, 2018 in the sum of Rs. 8,928/- (Rupees Eight Thousand, Nine Hundred and Twenty Eight Only), being the non-refundable license Application Fee; calculated in accordance with Schedule II to the National Electric Power Regulatory Authority (Application and Modification Procedures) Regulations 1999, are also attached herewith.

Date: 06th July, 2018

Kulachi Solar Power (Pvt.) Limited.

Engr. Aziz Raza Malik
Chief Executive Officer

Account Payee Only

PAYMENT ORDER

SILKBANK

(0002) Islamabad Main Branch

P.O. No. 02125186

Stationery/Ref No:

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Please do not write below this line.

Authorised Signatory PA/Attorney No 112 Authorised Signatory PA/Attorney No 459

⑈02125186⑈0660002⑆ ⑈020⑈

Account Payee Only

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(0002) Islamabad Main Branch

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Payable at any Silkbank branch in Pakistan.

Please do not write below this line.

Authorised Signatory PA/Attorney No 153 Authorised Signatory PA/Attorney No 1122

⑈02153222⑈0660002⑆ ⑈020⑈

Annexure – 2

Extracts of minutes of the meeting of the Board of Directors

KULACHI SOLAR POWER

KULACHI SOLAR POWER (PVT) LTD

Extracts of the minutes of the meeting of the Board of Directors
of Kulachi Solar Power (Private) Limited
held at Islamabad on 20th March, 2018

BOARD RESOLUTIONS...

RESOLVED THAT Kulachi Solar Power (Private) Limited, ("**KSP**") be and is hereby authorized to file application for the grant of Generation License for submission at National Electric Power Regulatory Authority (NEPRA) in respect of its 50MW solar power generation project to be located in D.I. Khan, Khyber Pakhtunkhwa, Pakistan (the "Project") and in relation thereto, enter into and execute all required documents, make all fillings and pay all applicable fees, in each case, of any nature whatsoever as required.

FURTHER RESOLVED THAT in respect of application for the grant of Generation License for submission to NEPRA, Engr. Aziz Raza as Chief Executive be and hereby empowered and authorized for and on behalf of the Company to:

I. Review, execute, submit and deliver the Generation License Application (including any modification to the application for the Grant of Generation License) and related documentation required by NEPRA, including any contacts, documents, power of attorney, affidavits, statements, letters, forms, applications, deeds, guarantees, undertakings, approvals, memoranda, amendments, letters, communications, notices, certificates, request, statements and any other instruments of any nature whatsoever;
II. Sign and execute necessary documentation, pay the necessary fees, appear before NEPRA as needed, and do all acts necessary for completion and processing of the Generation License Application (modification to the application for the Grant of Generation License);
III. Do all such acts, matters, and things as may be necessary for carrying out the purposes aforesaid and giving full effect to the above resolution(s).

AND FURTHER RESOLVED THAT Engr. Aziz Raza as Chief executive be and is hereby authorized to delegate all or any of the above powers in respect of the foregoing to any other official of the company as deemed appropriate.

Certified true copy

Kulachi Solar Power (Pvt) Limited

Syed Umair Mumtaz
Company Secretary

Annexure – 3

Affidavit

V608735

100 Rupees

۱۰۰ روپیہ

AFFIDAVIT

BEFORE THE NATIONAL ELECTRIC POWER REGULATORY AUTHORITY

I, Engr. Aziz Raza, Chief Executive, of Kulachi Solar Power (Private) Limited, hereby solemnly affirm and declare that the contents of the accompanying Generation License Application including all supporting documents are true and correct to the best of my knowledge and belief and that nothing has been concealed. I also affirm that all further documentation and information to be provided by me in connection with the accompanying Generation License Application shall be true to the best of my knowledge and belief.

DEPONENT 06/04/2018

Kulachi Solar Power (Pvt.) Limited

Date: 06-04-2018

ATTESTED

ASAD ABBAS JAFRI
NOTARY PUBLIC
ISLAMABAD

21 FEB 2018

Annexure-4

Prospectus

KULACHI SOLAR POWER (PRIVATE) LIMITED

Kulachi Solar Power (Private) Limited ("KSP") is a Pakistan based company with the sole objective of developing, financing, building and operating up to a 50MW solar power project in Pakistan. Sponsors applied for a Letter of Intent ("**LOI**") to Pakhtunkhwa Energy Development Organization (PEDO), Government of Khyber Pakhtunkhwa in December 2015 for setting up a 50MW solar Power Generation Project at D.I. Khan, Khyber Pakhtunkhwa, Pakistan (hereinafter referred as the "**Project**").

The Project is being pursued under the terms of a Letter of Intent ("**LOI**") issued by PEDO on 20 October 2016, and is being developed under the build-own-operate ("**BOO**") scheme, with non-recourse financing.

A. SPONSORS

There are a number of Sponsors of the Project Company, brief introduction of Sponsors is given below;

i. H1 Holdings (Pty) Ltd. ("**H1**") is Main Shareholder of the Project Company, headquartered in Cape Town, South Africa. It is an established investment company founded in 2000 with strong balance sheet which is highly liquid and is wholly owned and managed by experienced black individuals. H1 provides expansion and buyout capital to companies in partnership with management. It is focused on the energy sector and is building significant operational and technical capacity in the energy sector.

ii. Atlantic Energy Partners ("AEP") is a Shareholder of the Project Company. It was incorporated with the vision of providing renewable energy sector with a full turnkey service provider of excellence as a respected Independent Power Producer ("IPP").

iii. Target Energy (Private) Limited is a Shareholder of the Project Company. Sponsors of Target Energy (Private) Limited are Pakistani nationals. The principle business of Target is to invest in renewable energy projects in Pakistan and to provide key development and operational services to these projects.

iv. Alternative Grid North Africa Limited ("AGNA") is a Shareholder of the Project Company, incorporated and headquartered in Dublin, Ireland. AGNA is an international renewable energy developer with an experienced team developing renewable energy and infrastructure projects in Africa and Asia.

B. PROJECT DEVELOPER

KSP is being developed by "Atlantic Energy Partners", headquartered in South Africa. Atlantic Energy Partners ("AEP") was incorporated with the vision of providing renewable energy sector with a full turnkey service provider of excellence as a respected Independent Power Producer ("IPP").

AEP team brings diverse experience and a history of success to the company; with expertise in engineering, energy development, procurement and project management. The AEP team offers years of relevant work experience within the financial services industry and unparalleled expertise in: project feasibility assessments; due diligence; legal framework implementations; corporate structuring and tax optimisation; capital raising and structuring for optimal returns on equity investment.

AEP team has a cumulative track record of successfully developing projects from initiation to financial closure of four separate projects totalling 225MW of solar PV and 138MW of onshore wind in the first three rounds of REIPPPP in South Africa which have all reached COD (363MW).

An additional three solar PV projects totalling 225MW (3 x 75MW) have been selected as preferred bidder from bid window four and are will reach financial close in 2018. A total of 590MW in South Africa.

In January 2016 it was awarded a 50MW Solar PV by the Republic of Mali located in Sikasso, Mali. AEP hopes to reach financial close of a 100MW solar PV project in Nigeria in 2018. AEP has a pipeline of renewable energy projects in excess of 2GW in SA and Africa.

C. THE SITE:

The Project is located near the town of Kulachi in Dera Ismail Khan district of the Khyber Pakhtunkhwa province. The district has an area of 7,326 km2 and borders South Waziristan district in the Federally Administered Tribal Areas (FATA) to the west, the districts of Tank and Lakki Marwat of KP to the northwest, and the districts of Mianwali, Bhakkar and D. G. Khan in Punjab province to the northeast, east and south.

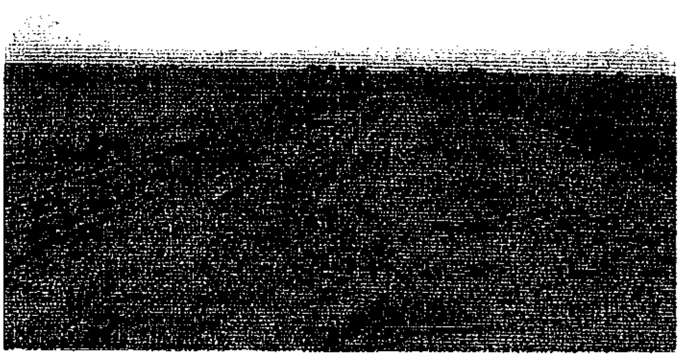
The Project Site is located 15 km west of the village of Kulachi, or 60 km due west of the town of D. I. Khan, the administrative headquarters of the district which, in turn, lies 290 km southwest of the federal capital, Islamabad.

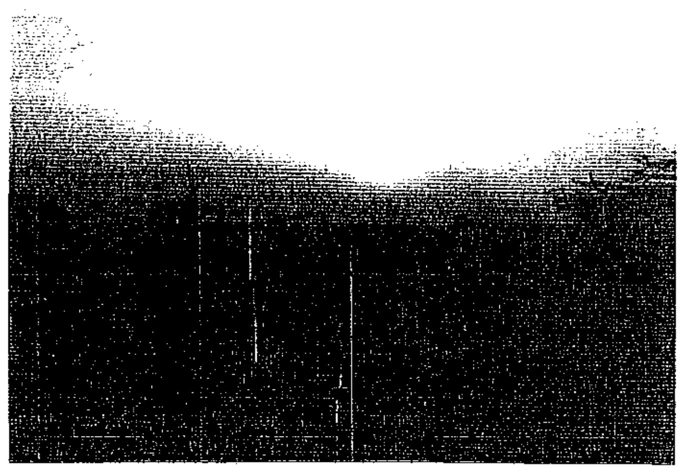
The Site area is approximately 309 acres with rectangular dimensions of 1,118 m by 1,183 m. The land at the location and its surroundings is semi-arid agricultural, with a small village situated some 163 m north of the site's northwestern corner.

The Site selected for the Project is generally flat, with a minor slope towards the southeast, with the slope increasing towards the southern end of the site boundary.

Project Site soils have been generally classified as Type D based on field standard penetration test results according the International Building Code (IBC) 2009

The site pictures are given below;



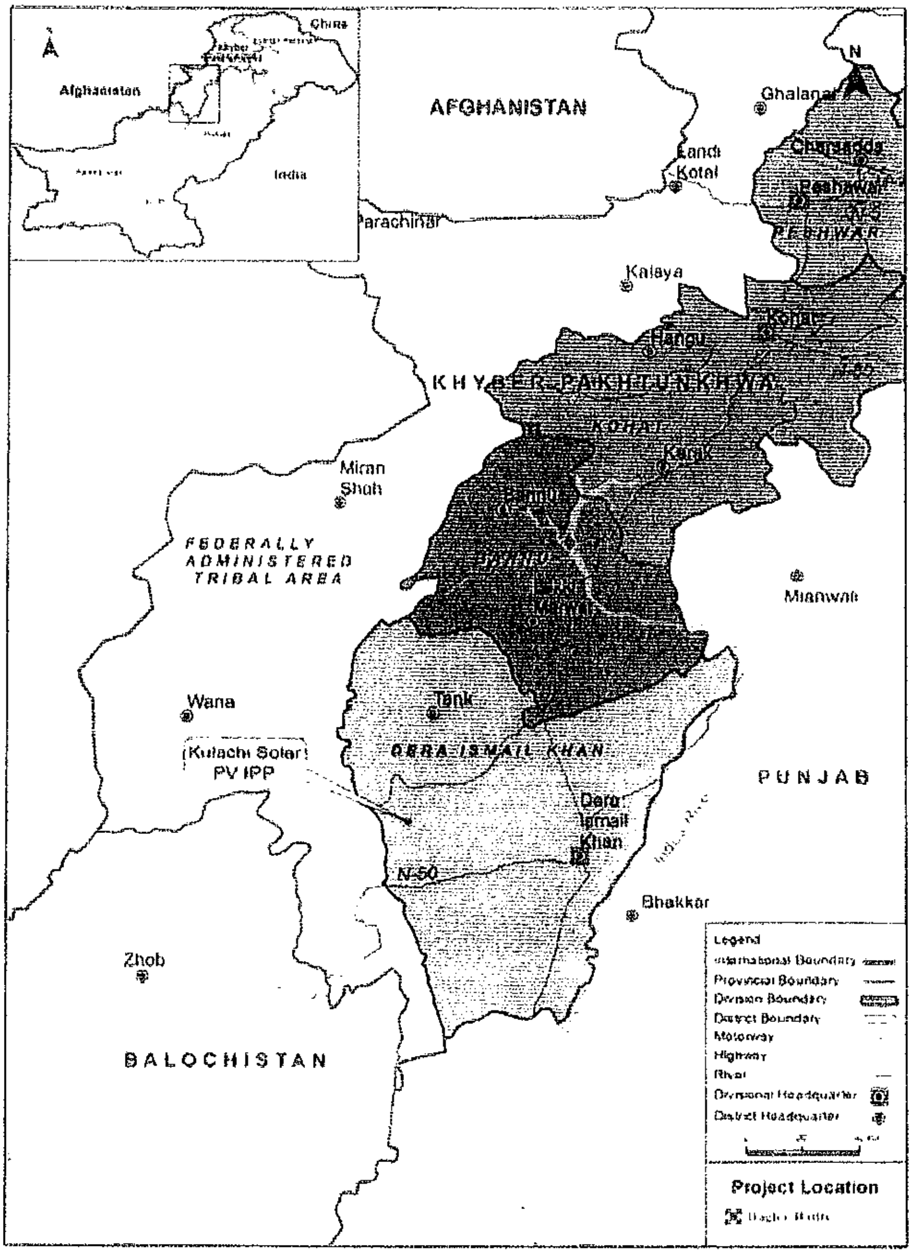


Generally, the soil at the Project location is classified as clayey sand (SC) or poorly graded clayey sand (SP-SC) up to a depth of 4.12 m. Normally, isolated footing is recommended for solar panel mounts.

The Site consists of barren land with wild vegetation and clear signs of minor soil erosion. Before project execution, the site must be cleared of all vegetation and land must be developed in a way that rainwater flows to the nearest artificial drains constructed on site for the same purpose.

Generally, the topography of the area is flat, which makes it suitable for solar installations.

Below image shows the location of KSP;



B. EPC CONTRACTOR, MACHINES AND O&M CONTRACTOR

As different varieties of such solar modules are available in the market; however, therefore selection of good quality module was a challenge while keeping overall project cost at a minimum level. Project Sponsors were of the view to select the best technology while keeping in view the climatic conditions, payback period, and bankability of the EPC Contractor etc.

The Sponsors have run a competitive bidding process to select an EPC Contractor for the Project. ***The selection process of EPC Contractor was run in accordance with the "2017 Guidelines of NEPRA for the selection of EPC Contractors by IPPs".***

KSP engaged an Independent Consultant for thorough evaluation of EPC proposals besides reviewing proposals internally and selected equipment on the basis of better output, efficiency and performance.

KSP advertised in three (03) national and two (02) international newspapers and also advertised on two (02) international tender web sites in October 2017.

- 50 different national and international companies responded and requested to provide them the requirements for pre-qualification ;
- 23 different national and international companies submitted their pre-qualification documents;
- 9 different national and international companies were shortlisted by an Independent Consultant for the issuance of RFP;
- 3 international companies submitted their detailed technical and commercial proposal, in response to the circulated RFP to 9 different shortlisted companies.

Sponsors allowed 60 days to the shortlisted companies to respond with their detailed proposals.

Detailed technical evaluation was carried out and clarifications were also sorted out. All three (03) companies were first invited to discuss the technical specifications and then were also invited for commercial negotiations.

Based on i) detailed technical evaluation, ii) negotiations of term sheet and iii) interest shown by the EPC Contractors on the Project, Sponsors have selected M/s TBEA Xinjiang SunOasis Co., Ltd. as an EPC Contractor for the Project.

TBEA Xinjiang SunOasis Co., Ltd., China will procure brand new plant and equipment including solar panels. Entire plant and equipment will be reliable, efficient and of highest international standard with proven technology.

C OUTSOURCED O&M

O&M will be carried out by the EPC Contractor for the first two (2) years after COD after which, Project Company will take it over. The outsourced parts of O&M will be locked through an agreement with the Original Equipment Supplier for the term of the Project.

D: SOLAR ASSESSMENT

Assessment of the solar resource is a complex process involving several stages of data collection, modeling and statistical analysis. KSP has engaged "3E Renewable Energy Services" to carry out a solar PV long term yield assessment and estimation of Annual Energy Production for the Project.

E GRID INTERCONNECTION

In order to assess the impact of the Project and the National Grid on each other, a detailed grid interconnection study has been carried out. The power from the Project will be delivered to the grid at an approved interconnection point. Grid Interconnection study is provided as Annexure 17 of this Generation License Application.

F ENVIRONMENTAL STUDIES

As per the requirements of Section 12 of Pakistan Environmental Protection Act (PEPA), 1997, Project Company has completed the Initial Environmental Examination ("**IEE**") report for the Project. The Project is not likely to have any significant adverse environmental impacts, which could be irreversible or could affect sensitive eco-system, requires involuntary resettlement, or has an unprecedented impact. The Project has no gaseous and other emissions. Sewerage will be treated and reused at the Project Site for sprinkling on the unpaved site to reduce fugitive dust. The Project is also not located in the vicinity of sensitive location of national importance. Therefore, Project falls under Category "B" according to "Pakistan Environmental Protection Agency, Review of IEE & EIA Regulations 1997/2000 (revised)". KPK Environmental Protection Agency has issued No Objection Certificate ("NOC") reference number EPA/IEE/50MWSolar-Target/707 to the Project Company dated 22 January, 2018.

G SOCIAL RESPONSIBILITY

The Sponsors of KSP always regard corporate social responsibility as an important force in building a harmonious society. They also believe in paying full attention to human factors, exercising environmental protections and conservation, increasing employment, and helping build the community. Every year they support numerous educational, sporting, and charity programs designed to help a wide range of people. Operations of the Plant will provide job opportunities especially to the local people. Poverty alleviation, though at minor scale, will be another benefit besides meeting power shortage in Pakistan.

H PROJECT AGREEMENTS

Project Company will sign following agreements in due course;

i. Implementation Agreement;
ii. Energy Purchase Agreement

Project Company is filing a tariff petition under Cost-Plus Regime in a separate application to the Authority.

I FINANCING

Total Project Cost, expressed in United States Dollars, has been calculated after thorough analyses, evaluation, and understanding of the dynamics that affects the development, construction, and operations of a solar farm in Pakistan.

The Project cost will be financed by a combination of debt and equity. Maximum Debt Equity ratio for the Project is assumed as 75%:25%.

Equity: Sponsors have lined up the required equity for the Project. Sponsors will contribute required equity in their respective shareholdings;

Debt: Project Company is securing financing for the Project from foreign banks. It is expected that 100% of the required financing will be in in US Dollars.

There is no encumbrance on the Facility.

J TARIFF

Estimated Project Cost	USD 48,750,000
Exchange Rate (PKR/USD)	115
Plant Factor	19.43%
Expected Annual Generation (GWh)	85.117 GWh at P90
Estimated Levelized Tariff (US Cents / kWh)	7.6314 US Cents per kWh

K TIMELINE

Project's expected financial close date is 31 October 2018; and construction will start in November 2018. Under the terms of the EPC Contract, construction will be completed in 10 months and tentative Commercial Operations Date ("COD") is 31 August 2019.

Following table shows the progress made so far by the Project;

Activity	Status
Security by Sponsors for Letter of Interest (LOI)	Submitted
Letter of Interest	Issued
Possession of land	Have Possession
Solar related studies - solar resource assessment	Completed
Grid interconnection study	Completed
Submission of grid interconnection study to power purchaser	Submitted
Completion of Soil survey	Completed
Transportation study	Completed
Initial Environmental Examination (IEE)	Completed
Decision (NOC) on Initial Environmental Examination (IEE) by Environmental Protection Agency, Government of KPK	NOC issued
Topographic survey/study	Completed
Completion of feasibility study	Completed
Approval of Feasibility study by PEDO	Approved
NOC from Forest Department D.I. Khan	Issued
NOC from Wildlife Department	Issued
NOC from Pakistan Army	Issued
NOC from Fisheries Department	Issued
Grid Interconnection Study approval by PESCO	Issued
Execution of Land Lease Agreement	Signed
Equity participation from the Sponsors for the Project	Lined Up
Debt for the Project	Term Sheet obtained
Submission of generation license	Submitted

Following are the future milestones;

Activity	Completion Month
Submission of Tariff application	May 2018
Execution of Energy Purchase Agreement	August 218
Execution of Implementation Agreement	August 2018
Execution of Financing Documents	September 2018
Achievement of financial close and issuance of notice to commence	October 2018
Project Construction	November 2018
Commercial Operations Date	August 2019

L. CONTACT DETAILS

Aziz Raza Malik
Chief Executive Officer
Kulachi Solar Power (Private) Limited
7th Floor, Green Trust Towers,
Jinnah Avenue, Blue Area,
Islamabad - Pakistan
Landline: +92 51 2813101-103
Fax: +92 51 2813104-105

* * *

Annexure – 5

Schedule I of Generation License

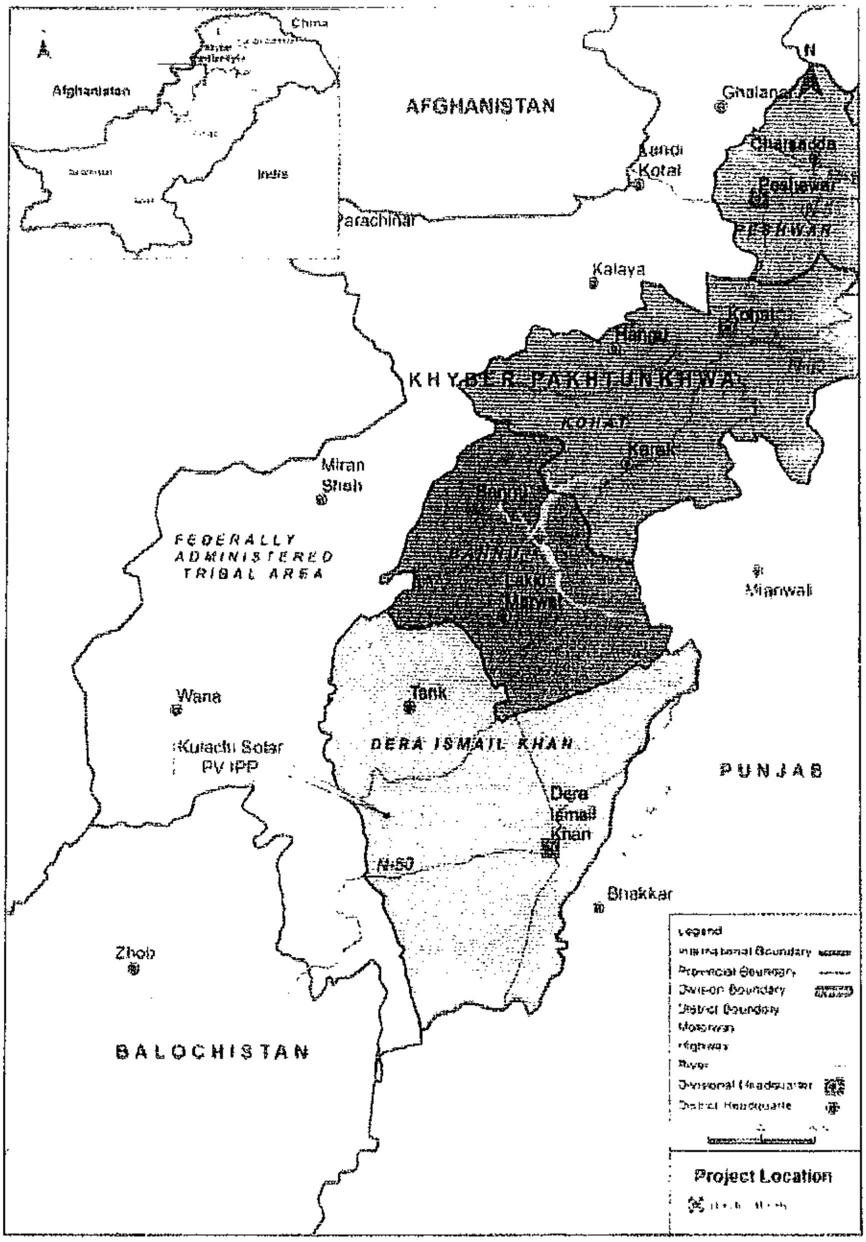
SCHEDULE-I

The Location, Size (i.e. Capacity in MW), Type of Technology, Interconnection Arrangements, Technical Limits, Technical/Functional Specifications and other details specific to the Generation Facilities of the Licensee are described in this Schedule.

Location of the Generation Facility/Solar Power Plant/Solar Farm

The proposed Project site is located near Badshahabad village, about 14 km from Kulachi town in Kulachi tehsil, D.I. Khan.

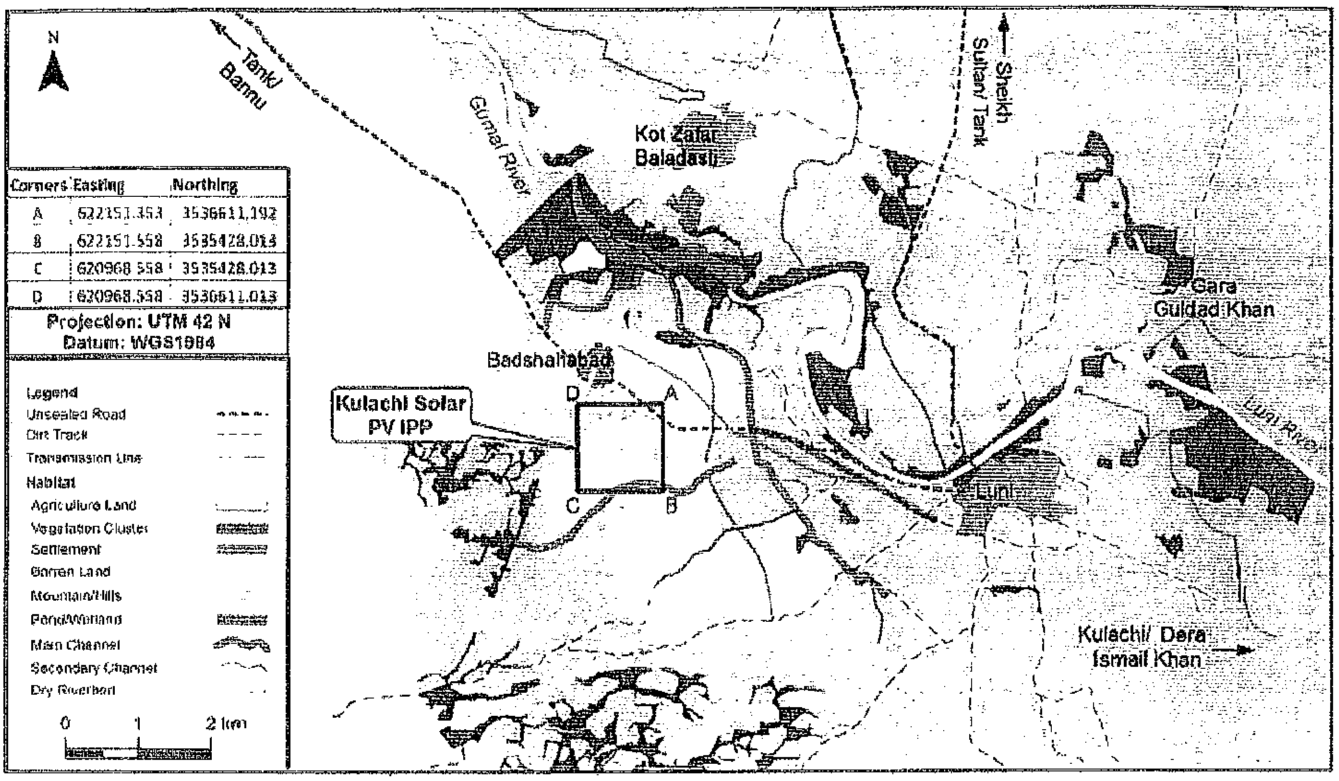
The project site is located 16 km west of the village of Kulachi, or 60 km due west of the town of D.I. Khan, the administrative headquarters of the district which, in turn, lies 290 km southwest of the federal capital, Islamabad.



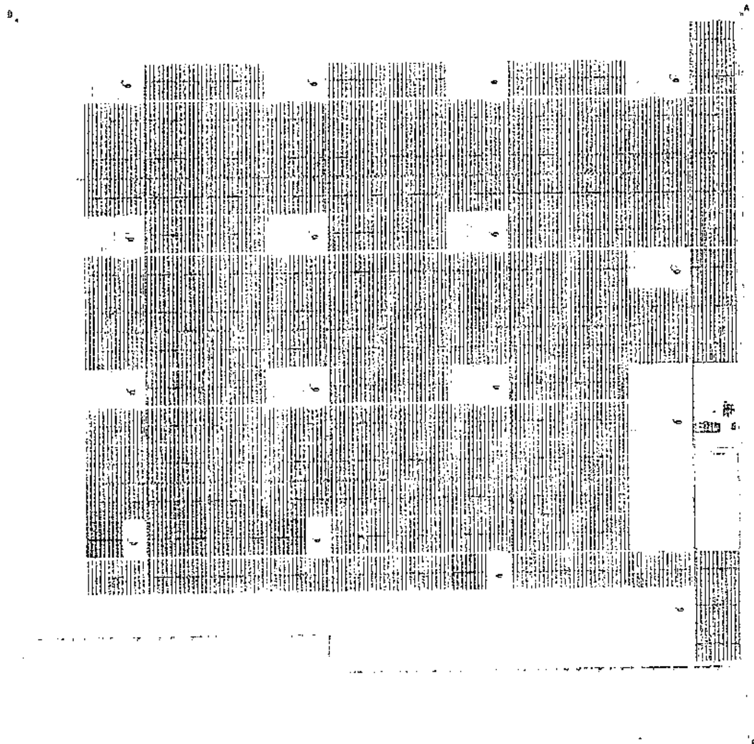
Location Coordinates of the Generation Facility/Solar Power Plant/Solar Farm

Land Coordinates are given below;

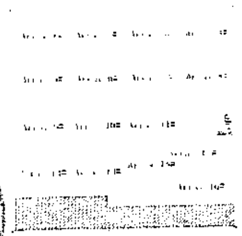
Corners	Easting	Northing
A	622151.353	3536611.192
B	622151.558	3535428.013
C	620968.558	3535428.013
D	620968.558	3536611.013



Layout of the Generation Facility/Solar Power Plant/Solar Farm



GENERAL SITE PLAN



KEY PLAN

NORTH DIRECTION

Inverter	DC Capacity	Number of modules per string	Number of strings	Modules Type	Modules Quantity	Inverters Quantity	Module mounting structures Type	Module mounting structures Quantity
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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	[illegible]		[illegible]		[illegible]	[illegible]		[illegible]

TRACKER LEGENDS

Internal Tracker 14VT-58

External Tracker 14VT-58

External Tracker 11VT-58

Internal Tracker 10VT-58

Internal Tracker 8VT-58

LEGENDS

1 BOUNDARY
2 FENCE
3 GRAVEL ROAD
4 INVERTER COMPACT STATION
5 CONTROL ROOM
6 O&M BUILDING
7 GUARD HOUSE
8 DIESEL GENERATOR HOUSE

CONFIGURATION

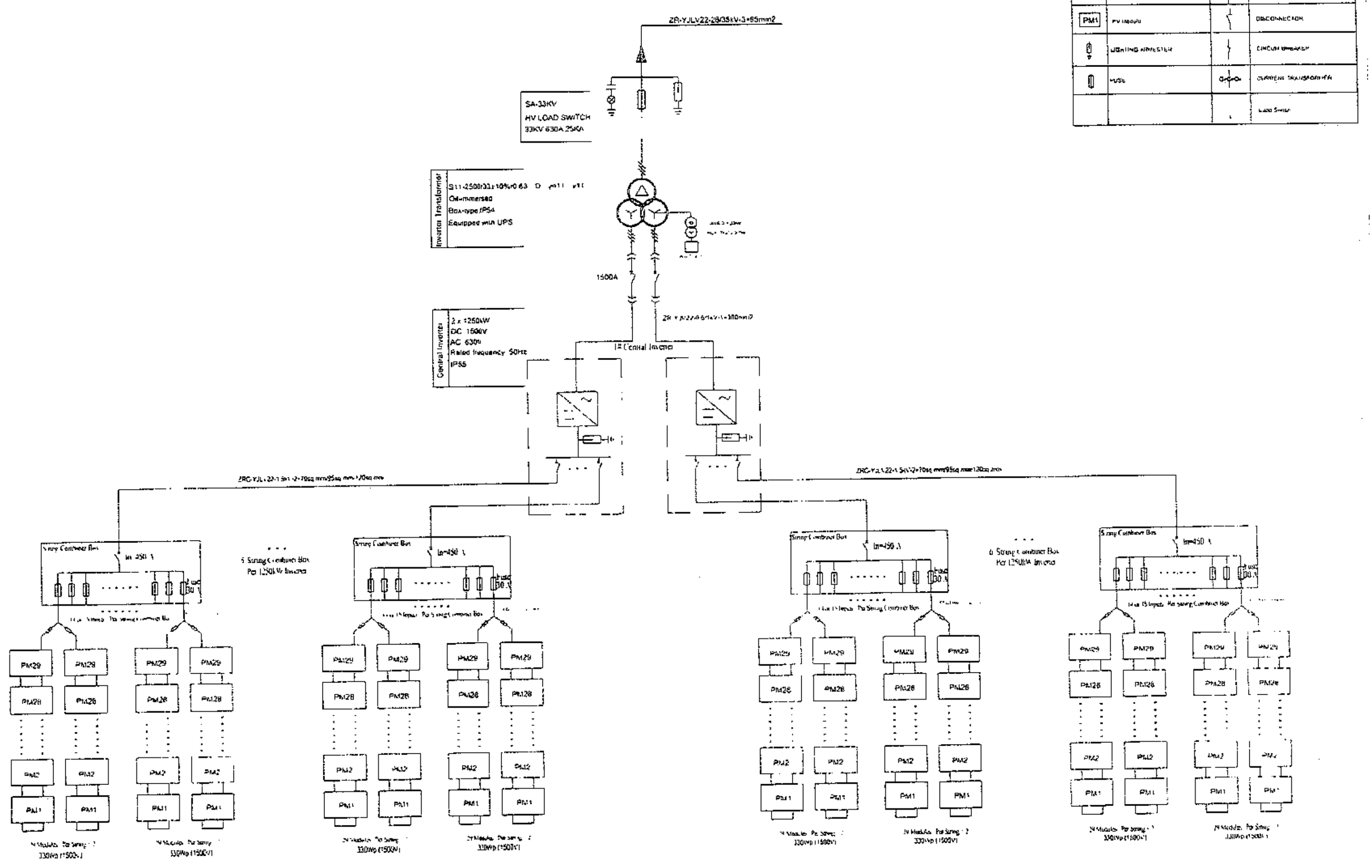
1 ALL DIMENSIONS ARE IN METER	
2 NO OF MODULES PER STRINGS	29 Nos
3 TOTAL NUMBER OF 330Wp STRINGS	5226 Nos
4 TOTAL NUMBER OF 330Wp MODULES	151554 Nos
5 PITCH LENGTH BETWEEN E-W ROWS	7.0 Mtrs
6 TOTAL NUMBER OF INVERTERS	18 Nos
7 AC CAPACITY IN TRACKER SYSTEM	40 MWp
8 DC CAPACITY IN TRACKER SYSTEM	50.01282 MWp
9 BOUNDARY LENGTH	7098.0 Mtrs
10 TOTAL ROAD LENGTH	8593 Mtrs
11 TOTAL SITE AREA	1398489 sq.m
12 TOTAL PLANT AREA	1230489 sq.m
13 FENCE FOR SITE AREA	4724 Mtrs
14 FENCE FOR PLANT AREA	4477 Mtrs

Notes:

1. This drawing is only for Kolachi 50MWp on-grid solar photovoltaic project.
2. All dimensions are in millimeters and levels are in meters
3. The design is merely preliminary design, no permission to used for construction.
4. The mounting structure is horizontal single axis tracker.

TBEA	TBEA Xinjiang Sunoasis Co., Ltd	Kolachi 50MWp Solar Photovoltaic Project
Approve	Check	Design Stage: Preliminary
Design	Review	General Site Plan for HSAT Structure
Draw		
Page	Scale	Drawing No: TBEA-KOLACHI-07-C-016

A1



Notes:
1.This drawing is only bidded for 50MW Kolachi Solar photovoltaic project.
2.The design is merely preliminary design, no permission to used for construction.

	CABLE & TERMINATION		TRANSFORMER
	EARTH SWITCH		VOLTAGE TRANSFORMER
	DISPLAYER		CURRENT TRANSFORMER
PM1	PV MODULE		DISCONNECTOR
	LIGHTING ARRESTER		CIRCUIT BREAKER
	FUSE		CURRENT TRANSFORMER
			Load Switch

PROJECT:

50MW Kolachi Solar photovoltaic project

CONTRACTOR

TBEA

TBEA SUN OASIS CO., LTD

DRAWING NUMBER

TBEA

TBEA-KOLACHI-DW-E-01

SHEET TITLE

STAMP

ORIGINAL SIZE "841X594"
SHEET SIZE "A-1"

[redacted]

A4 A3 A2 A1 A0

TBEA SUN OASIS CO., LTD

FOR INFORMATION

1 OF 1

Interconnection Arrangement / Transmission Facilities for Dispersal of Power from the Generation Facility Solar Power Plant / Solar Farm of Kulachi Solar Power (Private) Limited (KSP)

(1) The electric power generated from the Generation Facility/Power Plant/Solar Farm of KSP shall be sold to CPPA and dispersed to the load center of CPPA.

(2). The proposed Interconnection Arrangement/Transmission Facility for dispersal of electric power for the Generation Facility/Solar Power Plant/Solar Farm comprises the following: -

> 132 kV double circuit (rail conductor, 202 MVA rating) of about 16 km length from the Kulachi Solar Park Switchyard/ Facility Substation to Kulachi Substation.

(3). Any change in the above Interconnection Arrangement/Transmission Facility duly agreed by KSP and CPPA, shall be communicated to the Authority in due course of time.

Details of Generation Facility/Solar Power Plant/Solar Farm

A. General Information:

i.	Name of Company/License	Kulachi Solar Power (Private) Limited
ii.	Registered/Business Office	7th Floor, Green Trust Towers, Jinnah Avenue, Blue Area, Islamabad – Pakistan Landline: +92 51 2813101-103 Fax. +92 51 2813104-105
iii.	Plants Location	The proposed Project site is located near Badshahabad village, about 14 km from Kulachi town in Kulachi tehsil, D.I. Khan.
iv.	Type of Generation Facility	Solar PV Power Plant

B. Solar Power Generation Technology & Capacity

i.	Type of Technology	Solar power
ii.	System Type	Grid connected
iii.	Installed Capacity of Solar Farm (MW)	50MWdc

C Technical Details of Equipment

a)		**Solar Panels — PV Modules**	
i.	Type of Module	330Wp	
ii.	Type of Cell	Poly-crystalline	
iii.	Dimension of each Module	1956×992×40mm	
iv.	Module Surface Area	$1.94m^2$	
v.	No. of Panels / Modules	151554	
vi.	Total Module Area	$294068m^2$	
vii.	Total Land Area Used	$1230489m^2$	
viii.	Panel's Frame	Anodized Aluminium Alloy	
ix.	Weight of one Module	26.5kg	
x.	Module Output Warranty	For 1st year	For 2nd to 25th year
		2.5% degradation	0.7% annual degradation
xi.	Number of Solar Cells in each Module	72	
xii.	Efficiency of Module	17.01%	
xiii.	Maximum Power (P_{max})	330Wp	
xiv.	Voltage (P_{max})	37.8V	
xv.	Current (P_{max})	8.74A	
xvi.	Open Circuit Voltage (V_{oc})	46.9V	
xvii.	Short Circuit Current (I_{sc})	9.14A	
xviii.	Maximum System Open Circuit Voltage	1500V	
b)		**PV Array**	
i.	No. of Sub-Arrays	16	
ii.	Modules in a String	29	

iii.	Total No. of Strings	5226	
iv.	Modules in Sub-Array	9512/9454/9106	
v.	Total No. of Modules	151554	
c)		**PV Capacity**	
i.	Total	50.01282MW	
d)		**Inverters**	
i.	Capacity of each unit	2.5MW	
ii.	Inverter Model	centralized	
iii.	Manufacturer	TBEA	
iv.	Rated Input Voltage	900Vdc	
v.	Input Operating Voltage Range		900Vdc-1250Vdc
vi.	Number of Inverters	16	
vii.	Total Power	40MW	
viii.	Efficiency	European 98.7%	
ix.	Max. Allowable Input voltage	1500V	
x.	Max. Input Current	2×1432A	
xi.	Max. Power Point Tracking Range	900~1250V	
xii.	Output electrical system	AC ,Three-phase	
xiii.	Rated Output Voltage	630Vac	
xiv.	Rated Frequency	50Hz	
xv.	Power Factor	0.9(leading)~0.9(lagging)	
xvi.	Power Control	/	
xvii.	Environmental Enclosures	Protection	IP65
		Dimension	2991mm×2591mm×2438mm
		Cooling Method	Forced air
		Altitude	Max.3000m
		Compliance	
xviii.	Grid Operation Protection	a)	Over/under-voltage Protection
		b)	Over/under-frequency Protection
		c)	ZVRT
		d)	Anti-islanding Protection
		e)	Over-current Protection
		f)	Anti-discharge Protection
		g)	Overload Protection
		h)	Lightning Protection
e)		**Data Collecting System**	
i.	Weather Data	Weather station	
ii.	System Data	SCADA	
f)		**Isolating Transformer**	
i.	Rating	2.5MVA	
ii.	Type of Transformer	oil-immersed	
iii.	Configuration	Enclosure of Cubicle	
iv.	Output Voltage	33kV	
v.	Purpose of Transformer	Step-up	
vi.	Efficiency	99%	

D. Other Details

i.	COD of the Project (Anticipated)	**31 August 2019**
ii.	Expected Life of the Project from COD	25years

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Annexure – 6

Schedule II of Generation License

SCHEDULE-II

The Total Installed/Gross ISO Capacity (MW), Total Annual Full Load Hours, Average Solar PV Generator Availability, Total Gross Generation of the Generation Facility/Solar Farm (in GWh), Array & Miscellaneous Losses (GWh), Availability Losses (GWh), Balance of Plant Losses (GWh) and Annual Energy Generation (GWh) of the Generation Facility /Solar Farm of Licensee is given in this Schedule

SCHEDULE-II

(1).	Total PV Installed Capacity of Generation Facility	50MWp
(2).	Days per Year	365
(3).	PV Plant Generating Capacity Annually	85,117 MWh
(4).	Expected Total Generation in 25 years Life Span	2,127,925 MWh
(5).	Generation per Year from plant keeping 24 Hours Working	50 x 24 x 365 = 438,000 MWh
(6).	Net Capacity Factor (3/5)	19.43%

Note

All the above figures are indicative as provided by the Licensee. The Net energy available to Power Purchaser for dispatch will be determined through procedures contained in the Energy Purchase Agreement.

Kulachi Solar Power (Pvt.) Limited

Annexure – 7

Details of Lender's Facility available for the Project

KFW DEG

DEG, PO Box 100961, 50449 Cologne, Germany

Kulachi Solar Power Project Pvt Ltd
Suite No. 701, 7th Floor
Green Trust Tower
Jinnah Avenue
Islamabad
Pakistan

Date: 12/04/2018

Eric Kaleja
Our ref.: Kal
Phone: +49 221 49861677
Fax: +49 221 49861505
E-mail: Eric.Kaleja@deginvest.de

Re: Financing of 50MW PV Solar Project in Kulachi, Pakistan ("Project")

Dear Sirs,

We understand that Atlantic Renewable Energy Partners (Pty) Ltd ("AEP"), in its capacity as the lead developer, and its partners are currently developing the above mentioned Project and intends to apply to the National Electric Power Regulatory Authority ("NEPRA") for a cost-plus tariff. Target Energy (Pvt) Limited is one of the development partners ensuring that the Project development activities are AEP and its partners also intend to finance, build, own and operate the Project, which will sell power under a 25 year Energy Purchase Agreement ("EPA") to the Central Power Purchasing Agency (Guarantee) Limiter ("CPPA-G").

We are delighted to inform you that DEG – Deutsche Investitions- und Entwicklungsgesellschaft mbH ("DEG") is in principle interested to provide long-term financing of up to USD 25 million (own exposure) for the Project as further outlined in the attached indicative terms and conditions. DEG would also be in a position to offering the mobilization of the whole senior debt package of up to USD 33.5m through European DFIs on a best effort basis.

DEG, a member of the German KfW Banking Group, is one of the largest European Development Finance Institutions (DFIs) with strong activities in the Pakistan energy sector. DEG's total portfolio amounts to ca. EUR 8 billion.

We would like to point out that this letter does not constitute a commitment to finance. We advice that any commitment to finance is subject to a positive outcome of our evaluation of the financial, economic, ecological and other aspects of the Project, the approval of DEG's decision making bodies and to the execution of legally binding contracts.

We look forward to working with you on this Project and wish you good success in being issued a tariff by NEPRA.

Yours sincerely

Ragnar Gerig
Director Energy & Infrastructure
Africa / Latin America

ppa

Eric Kaleja
Vice President Energy & Infrastructure
Africa / Latin America

KFW DEG

Indication of Terms and Conditions – Kulachi Solar Power Project Pvt Ltd, Pakistan

Borrower:	Kulachi Solar Power Project Pvt Ltd a Project Company incorporated in Pakistan
Sponsors:	Atlantic Renewable Energy Partners (Pty) Ltd ("AEP"), H1 Holdings (Pty) Ltd, Target Energy Pvt Ltd and Alternative Grid North Africa Limited ("AGNA"), together holding 100% of the Project equity.
Loan Amount:	Up to USD 33.5m long term senior loan, provided by DEG and other European DFI lenders and ICCF (Interact Climate Change Facility) on a best effort basis; thereof DEG's own amount up to 25m USD
Equity	to be paid in up-front or secured with acceptable corporate guarantees or stand-by letter of credit.
Purpose of the loan:	Development, Construction and Operation of a 50 MW (DC) PV Power Plant in Pakistan
Character:	long term debt
Term:	Up to 14 years including a grace period on principal repayment of up to 1 – 1.5 years commencing on the date of the loan agreement. The grace period will not apply to interest payments and/or commitment fees.
Repayment:	semi-annual installments (mortgage style or sculpted modality of repayment but not back-loaded, based among others, on due diligence (dd) findings)
Interest floating:	margin of 4.5% p.a. + 6-months-LIBOR. Interest is payable semi-annually in arrears.
Appraisal Fee:	120,000 USD non-refundable and deductible from the Front-end Fee. An amount of 60,000 USD (50% of the Appraisal Fee) shall be due and payable 10 days after signing of DEG's letter of interest, but in any event prior to the commencement of any due diligence appraisal. The remaining part of the Appraisal Fee will be due and payable after DEG/the DFI lenders have received their internal approvals to finance the Project. If DEG/the DFI lenders participate in the financing of the Project, the appraisal fee will be set off against the Front-end Fee payable in accordance with the finance agreements.
Arranger Fee:	0.50% on the Loan Amount
Front-end Fee:	1.50% of the Loan Amount, to be paid within 15 days after the signing of the loan agreement, in any case prior to first disbursement (all the fees mentioned in this draft as well as Interest During Construction could be financed as the rest of Investment Cost)

KFW DEG

Agency Fee: tbd

Monitoring Fee: 10,000 USD p.a. (per DFI lender)

Commitment Fee: 0.75 % p.a. on undisbursed Loan Amounts, accruing from the date of signing the loan agreement.

Cancellation and Prepayment fee: 2.0% on the unused committed funds or prepaid funds

Security: Among others, first ranking charge on fixed and movable assets, pledge on all shares in the Project Company, pledge of major project contracts, pledge on project accounts, DSRA-debt service reserve account for 6-9 months debt service (financed as Investment Cost)

Sponsor Support: Cost overrun guarantee amount shall be agreed after due diligence conducted by the lenders and confirmed by independent engineer appointed by the lenders.

Share retention: Sponsors to maintain 100% of the shareholding until a min. of 2 years after commercial operation date ("COD"); thereafter a min. of 75% (final percentage to be agreed prior to the signing of the loan agreement)

Costs of External Advisors and other costs: In addition to any other fee mentioned in this indication, the Project Company or Sponsor will bear the costs of external advisor(s) and expert(s) of DEG/the DFI lenders (including costs of legal advisors in connection with the due diligence and the preparation of legal documents and the costs of environmental and social advisors, tax advisors, insurance advisors, model auditor and lenders' independent engineer) including any travel and out-of-pocket expenses and the costs of a web-based syndication platform, each reasonably incurred by DEG/the DFI lenders and the advisor(s) and expert(s). The Project Company or the Sponsor will also bear any travel, accommodation and out-of-pocket expenses reasonably incurred by DEG/the DFI lenders in the scope of the due diligence of the Project.

Such amounts will be payable either directly to the external advisor(s) (if previously agreed with DEG) or to DEG/the DFI lenders upon receipt of an invoice detailing the costs incurred. DEG/the DFI lenders will not engage any external advisor(s) without your prior consent. The engagement of external advisor(s) other than external legal counsel, tax, insurance and technical as well as environmental and social advisors is not envisaged at the date hereof.

Taxes: Any and all payments to be made by the Borrower to DEG/the DFI lenders in relation to the loan shall be made free and clear of, and without deduction for any present and future taxes, withholdings, levies, charges or other taxes imposed.

Structuring case:	based on banking case financial model: minimum senior DSCR of 1.3 in P90 case; based on a senior debt/equity ratio of 75/25
Dividend distribution:	a) Lock-up: the minimum coverage ratio to be achieved by the borrower in order to effect distributions is a DSCR of [1.25] (current and forward looking DSCR).
Default covenants:	customary for this kind of transaction, including DSCR >= [1.2]
Environmental and Social Requirements:	IFC 2012 Performance Standards, ILO Core Labor Conventions and Terms and Conditions of Employment Compliance with national environmental, health, safety and social laws and regulations.
Other requirements:	KYC / AML specific provisions EPC & O&M contractor to be a reputable and experienced international contractor acceptable to DEG
Governing law:	English Law (e.g. Common Terms Agreement, Accounts Agreement, Sponsor Support Agreement and Intercreditor Agreement) and Pakistan Law (e. g. certain Security Documents) as appropriate. International arbitration

Please note that this indication does not constitute either a binding offer or a commitment to finance on DEG's and/or DFI lenders' part. Such commitment will be subject to (i) a positive result of our evaluation of the commercial, legal, ecological, social and other aspects of the financing, (ii) all relevant approvals of the loan by DEG's/the DFI lenders' decision taking bodies and (iii) the entering into legally binding contracts.

DEG–Deutsche Investitions- und Entwicklungsgesellschaft mbH, Kämmergasse 22, 50676 Köln · Telefon +49 221 4986-0 · Fax +49 221 4986-1290 · www.deginvest.de
Sitz der Gesellschaft: Köln · Amtsgericht Köln: HRB 1005 · USt-IdNr.: DE 123 489 824 · Deutsche Bundesbank, IBAN: DE04370000000037008535 · BIC: MARKDEF1370
Geschäftsführung: Philipp Kreutz, Christiane Laibach, Bruno Wenn (Sprecher) · Vorsitzender des Aufsichtsrates: Hans-Joachim Fuchtel

Annexure - 8

Bank Statement of Project Company

UBL

where you come first

Date: 21-Feb-18

CEO
Kulachi Solar Power (Pvt.) Ltd.
7th Floor, Green Trust Tower, Jinnah Avenue
Islamabad.

Maintenance of bank account

Dear Sir,

It is hereby confirmed that **Kulachi Solar Power (Pvt.) Limited** maintains bank account with **United Bank Limited** since **21-DEC-2017**

It is confirmed that **Kulachi Solar Power (Pvt.) Limited** is a reliable and credible party and has a good history of banking transactions.

This letter is being issued on the request of the Company and bank is not responsible for any intended use of this letter by the Company.

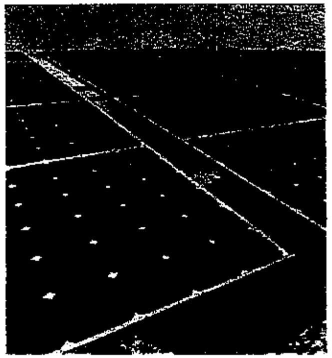
Officer

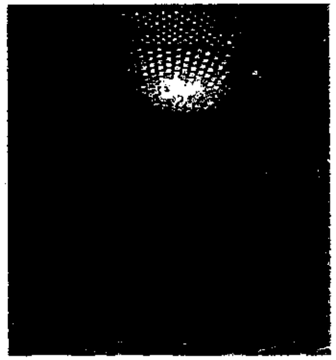
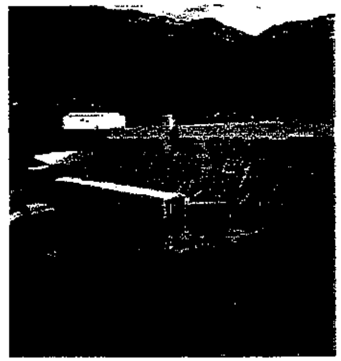
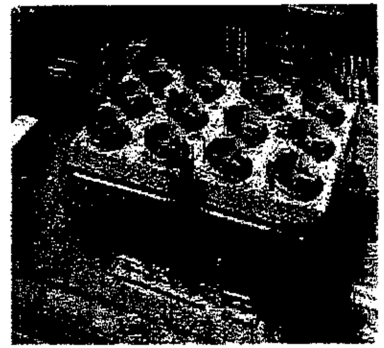
UBL (0239) Corporate Centre Islamabad

Annexure - 9

Company Profile of Applicant and

Project Sponsors



H1 Holdings Profile

HOLDINGS

Confidentiality Undertaking

- This document is confidential. No information contained in this report can be used by any entity without the previous written consent of **H1 Holdings (Pty) Ltd**
- In this document "**H1**" means H1 Holdings (Pty) Ltd and "related entities", including its shareholders, subsidiaries, associates, outsourced entities and its directors, employees and agents

Purpose and BHAG ™

Our Purpose

- We improve the quality of lives by producing cleaner energy

BHAG ™

- To power the equivalent of 2 million households with cleaner energy

Website

- www.h1holdings.co.za

BHAG ™ is a registered trademark of Jim Collins and Jerry Porras

Background

H1's Background

- H1 is an established investment company founded in 2000
- It has a Level 1 BEE status and is wholly owned and managed by experienced black individuals
- Historically H1 provided expansion and buyout capital to companies in partnership with management
- Since 2012 H1 has focused on the energy sector
- H1 is building significant operational and technical capacity in the energy sector with 12 employees directly focused in this area

Executive Directors

Lionel Jacobs

- Founded **H1** as a vehicle to acquire Airport Handling Services
- Led **H1** as a core shareholder in Dinatla Investment Holdings which acquired 15% of **Bidvest Group Ltd** in 2003
- Was an Executive Director at **Bidvest** and Commercial Director at **Bidserv** (following the Bidvest transaction)
- Prior to H1, was CEO of **Siphumelele Investments Ltd**, serving on boards of **PSG**, **Fedics**, **I&J**, **Ster Kinekor** and **Johnnic**
- Currently serving as Non-executive Director of **Bidvest South Africa**, Non-executive Chairman of **Compuclearing Ltd,** Non-executive Chairman of **Vunani Ltd** and Chairman of **Saldanha Foods (Pty) Ltd**

Reyburn Hendricks

- Since 2007 has been a joint controlling shareholder and manager of **H1**
- Founding member of **HJS Advisory Services (Pty) Ltd** ('HJS'), which was acquired by Hosken Consolidated Investments Ltd ('HCI') in 2003. **HJS** concluded R 12.5 billion of transactions from 2002 to 2006 for HCI and other clients.
- Prior to that was a Founding Director of **African Harvest Capital** (now called **Vunani Ltd**), in its investment banking division (1998 to 2002)
- Before that, was an Equity Analyst and Portfolio Manager at SouthernAsset Management (1995 to 1998)

Executive Directors

Elisma Roux

- Elisma is the financial manager for H1
- She is a qualified Chartered Accountant with over 14 years of financial management and audit experience

Gabriele Maraschin

- Gabriele is the head of Business Development for **H1**
- He is an electrical engineer and has 10 years experience in the energy sector in Europe and Africa
- Gabriele has managed and concluded multiple developments in various energy technologies in over 10 countries in Africa and Europe .

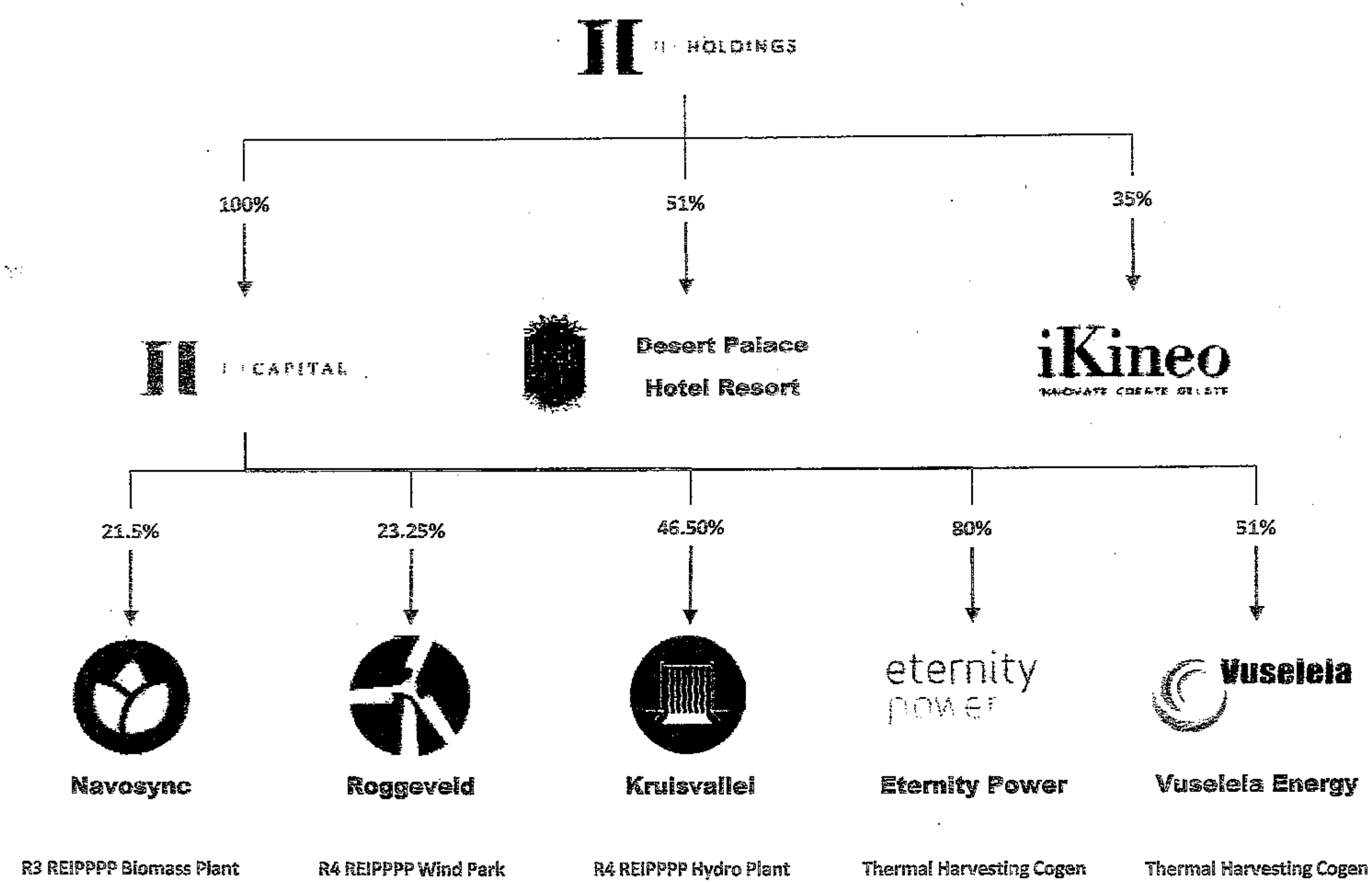
Jacques Malan

- Jacques is a director of Vuselela Energy, a subsidiary of **H1** focussed on cogeneration power projects
- He is a pyro-metallurgical engineer with 20 years experience in the ferrous, base metals, ferro-alloy and refractory industries
- Since 2007 Jacques has been involved in the development, design and construction of co-generation power projects

Financial Standing

- H1 has a strong balance sheet which is highly liquid
- A disciplined investment strategy has resulted in capital growth coupled with above adequate investment income

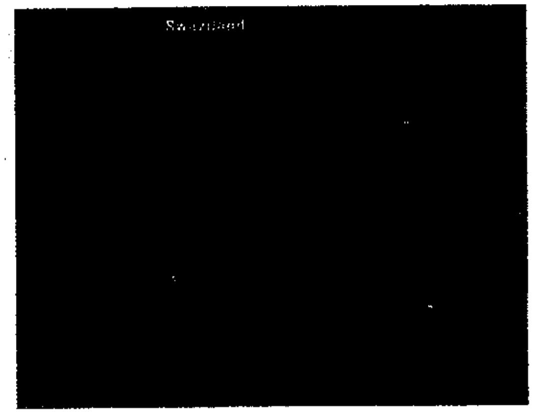
H1 Organogram



Current Energy Asset: Navosync - Biomass

- The **Navosync Biomass** project was bid in Round 3 of the REIPPPP and was successfully awarded Preferred Bidder status
- The project capacity is 14.7 MWe and the site is located near to the town of Mkuze in the Jozini Municipal area, within the province of Kwa-Zulu Natal
- The fuel will be sugarcane rests and other sources of woody, non-woody and invasive plant biomass
- The project has been developed by the **Building Energy**, an Italian company
- **Group Five** is the EPC contractor
- The O&M works will be performed by a joint venture between **Group Five & Building Energy**

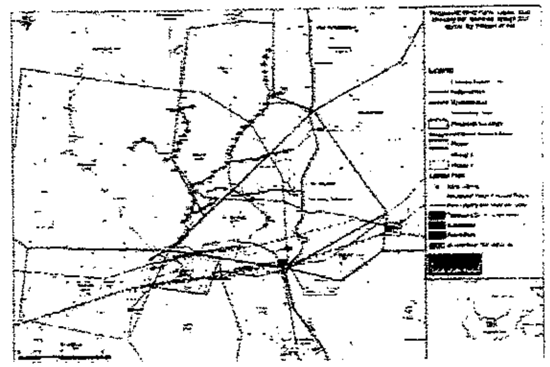
Project Location



Roggeveld - Wind

- The **Roggeveld Wind** project was bid in Round 4 of the REIPPPP and was successfully awarded Preferred Bidder status
- The project has a capacity of 138 MW and is located between Laingsburg and Sutherland in the Northern Cape
- Wind measurements to date rank the site as having one of the strongest wind resources in South Africa
- The project was developed by **G7 Renewable Energies** and was acquired by **Building Energy** to bid
- The EPC and O&M contractor shortlisted is **Acciona Energia**

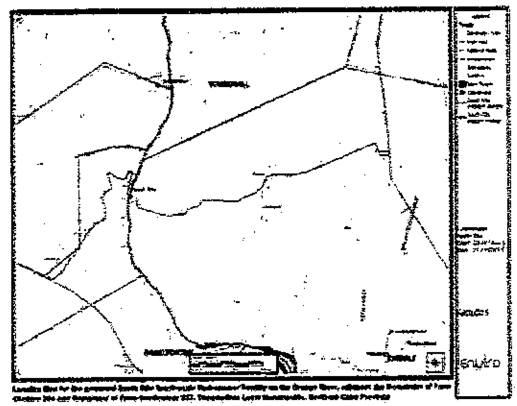
Project Location



Kruisvallei - Hydro

- The **Kruisvallei Hydro** project was bid in Round 4 of the REIPPPP and was successfully awarded Preferred Bidder status early in April 2015
- The project has a capacity of 4.70 MW and is located on the Ash River near the town of Clarens in the Free State province
- The Ash River is fed from the Lesotho Highlands Water Project resulting highly reliable flows
- The project was developed by **Sidala Energy Solutions** and was acquired by **Building Energy** to bid
- **Building Energy** bid with themselves as the EPC and O&M contractor with the intention to replace themselves post-Preferred Bidder award

Project Location



Vuselela Energy – H1 Subsidiary

Background

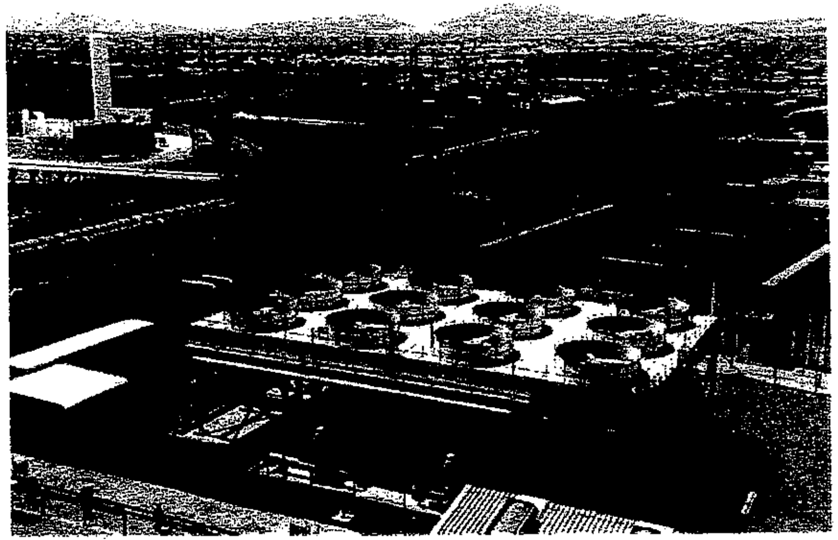
- **Vuselela Energy** was founded in 2009 and became an H1 subsidiary in 2014
- Its focus is to develop clean energy projects based on capturing and utilisation of waste heat sources
- Partners and personnel originate from the pyro-metallurgical sector
- Has strong relationships with a number of technology suppliers, for application at selected targets in the Metallurgical, Mining and Cement sectors

Achievements

- **Vuselela Energy** has secured exclusive use of a suite of patents on Thermal Harvesting Technologies which were developed in conjunction with **EPS-Environmental and Process Solutions**
- The team were instrumental in the establishment of the only two currently operating metallurgical waste gas to energy projects in South Africa, 17 MW and 7 MW respectively
- They were also instrumental in the establishment of a first-of-its-kind ORC based Thermal Harvesting plant (**Eternity Power**) on a smelter in South Africa (4.3 MW in size)

Eternity Power - Cogeneration

- The **Eternity Power Thermal Harvesting ™** is a cogeneration power plant based at the Anglo American Platinum Waterval smelter in Rustenburg and has a 15 year supply agreement with the smelter
- The plant uses waste heat from the smelter and uses an organic rankine cycle ("ORC") system to convert it to electricity
- It is the first cogeneration power plant that uses an ORC system connected to a platinum smelter and has won 3 innovation and energy awards to date
- **Vuselela Energy** is the developer of the project and is the O&M operator to the plant



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H1 HOLDINGS

TARGET ENERGY

Power the future of Pakistan

Target Energy (Pvt) Ltd.

Overview

We are providing our dynamics services to renowned groups of Pakistan. Moreover, we are the leading suppliers of industrial machinery, well-known brand Lifts, Power Generators and spare parts & specialized in Power Sector based in Islamabad, Pakistan. Our major serving areas are Industrial sectors and Power plants.

Corporate Profile

Target Energy (Pvt.) Ltd, is among the leading industrial solar equipment supplier based in Pakistan. Target Energy, as an expanding engineering company has stood for quality, reliability and flexibility, and has earned an industry wide reputation for excellence with goal to deliver the most usable, cost effective and accurate industrial solutions. Target Energy provides services to private and government sectors, dealing in complete range of world-renowned machinery brands, equipments, materials & spares for cement and power industries. Brighter isn't just a word; it's our guiding light. It shapes the way we look at the world and has allowed us to offer cleaner, smarter, and more affordable ways to power everywhere.

Experience matters

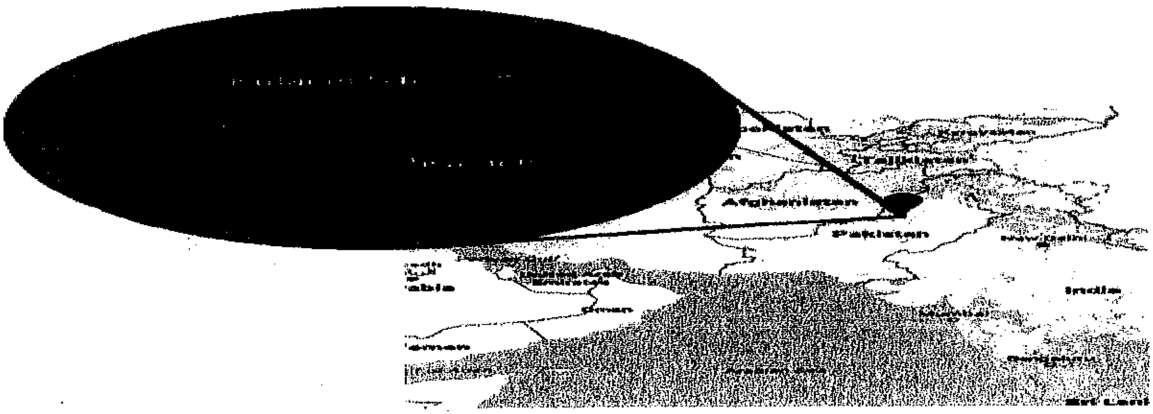
There's a lot to know when it comes to solar. From optimizing system design to connecting with the utility grid, it takes an expert. At Target Energy, we've done more commercial installations than anyone else so we know how to do the job quickly and efficiently. Solar is a long term commitment, so it's important to partner with someone who knows how to maintain the performance of your system and ensure it is operating efficiently. Target Energy was founded in August 2015, and today we maintain the largest operating fleet of solar systems in the world, backed by the industry's most sophisticated hardware and software monitoring platform through our Principal Companies.In partnership agreements with international companies like Atlantic Energy Partners (AEP) and Alternative Grid North Africa (AGNA)

Corporate Services

Target Energy has provided the services for the Project Development for the following Hydro Power Projects

- Sharmai Hydro Power Project (Dist Upper Dir, KPK)
- SHIGO KACH HPP, 102 MW (Lower Dir)
- BARIKOT-PATRAK, 47 MW (Dir Upper)
- Ziarat HPP, 2.5MW, AJK

Target Energy (Pvt) Ltd is developing the 50 MW Solar Power Project in D.I.Khan with its Foreign Consortium. The project is currently at Feasibility Stage

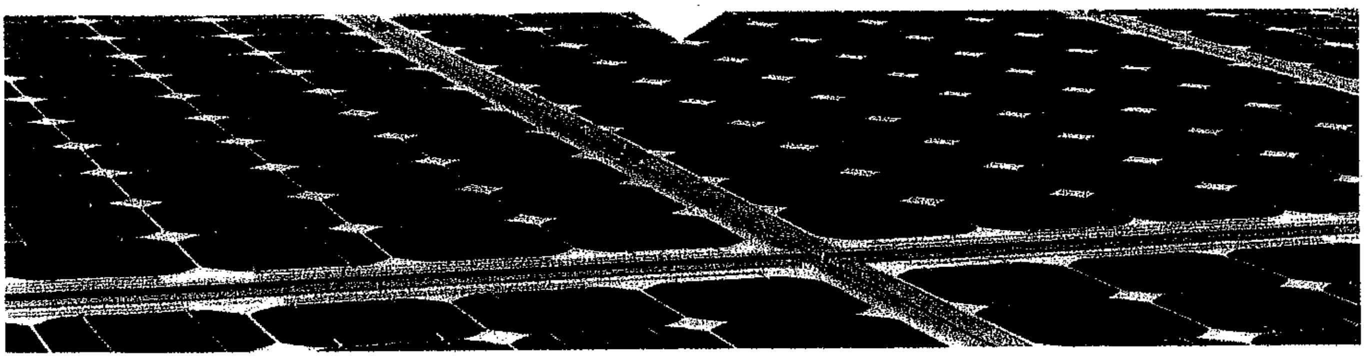


FEASIBILITY

An upfront investment can ensure selecting the right site, the right equipment, and the right resources, all of which maximize energy yield and lead to a successful project.

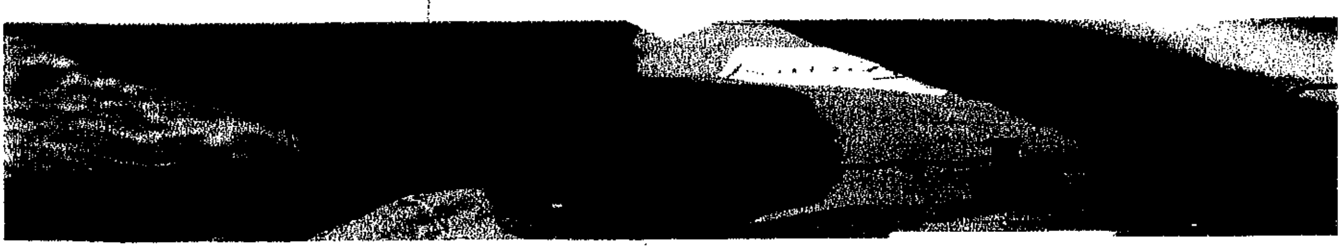
- Site review and considerations
- Design issues and considerations
- Material options for modules, inverters, and balance-of-system components
- Consultation with clients and manufacturers
- Grid interconnection requirements and considerations
- Electrical and building permit requirements
- Utility rebate and incentive documentation, if applicable
- Performance modeling and estimation
- Assist with financial analysis of system
- Assist with decision on whether to proceed with final design, procurement of materials, and construction
- Assist with selection of Construction Contractor(s)
- Optional in-person site visit depending on local design and engineering resources

CONSTRUCTION PLANS:



- Target Energy delivers a complete construction plan set, with the necessary engineering stamps and permits as required. Or we can provide a third-party review of the design proposed by your engineering company.
- Site Plan and Array Layout
- Electrical and Grounding
- Racking Plan
- Balance of System and Labeling
- Equipment Pad and Mechanical Drawings
- Data Acquisition System Plan
- Interconnection Plan
- Medium Voltage Plan
- Others as required

CONSTRUCTION PHASE CONSULTING



Utilize Target Energy's expertise in project management and quality control and assurance, based on industry best practice and relevant Codes and Standards, to ensure a top quality PV installation.

- Initial and on-going consultation with Construction Contractor on design implementation and construction issues.

- On-site quality control (QC) inspections with inspection reports at agreed upon progress intervals.

COMMISSIONING

Detailed commissioning is critical to system performance. Target Energy is providing third party commissioning services on a variety of levels, or can review contractor documentation for accuracy, completeness, and find anomalies that may be present.

- Final commissioning and documentation
- Performance and energy testing of system
- IV curve tracing and analysis
- Creation of or verification of as-built drawings
- Third-party inspections and review of Construction Contractor documentation

OPERATION, MAINTENANCE, AND TRAINING

Ongoing support, preventative maintenance, and, when necessary, reactive maintenance are critical for ensuring system reliability and return on investment. TARGET ENERGY provides a range of services ranging from onsite, to remote analysis, to training of company personnel.

- Remote support and data analysis
- Development of operations manuals and maintenance checklists
- Optional training workshop for on-site maintenance personnel or send maintenance personnel to regularly scheduled TARGET ENERGY workshop(s)
- In-person inspection at first anniversary of final commissioning
- Performance review at first anniversary of final commissioning
- Perform or arrange for required maintenance as per manufacturer specifications in order to meet product warranty requirements
- O&M subcontractor services
- Warranty claim assistance and expert witness testimony

<u>CONTACT DETAILS</u>

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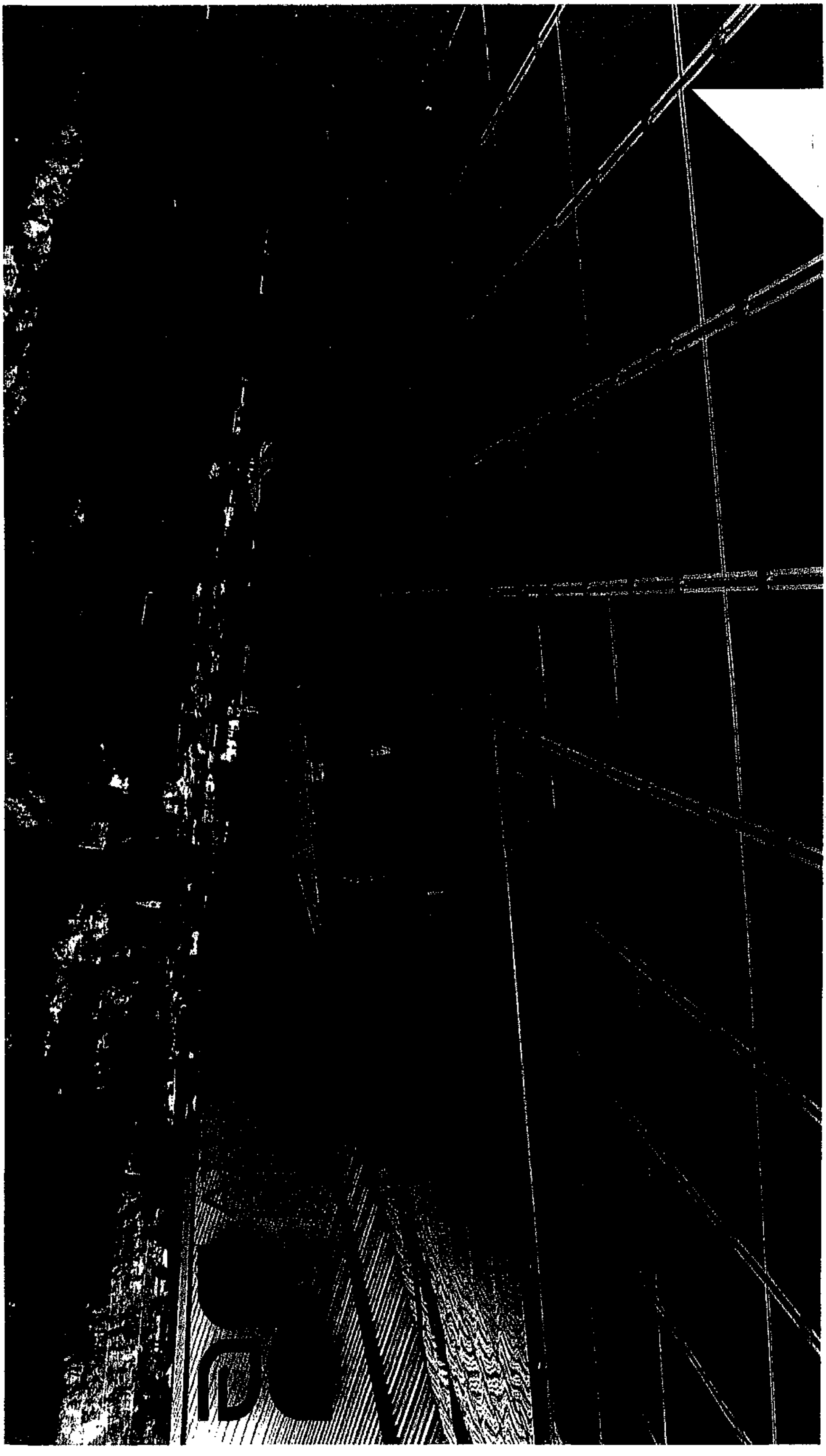
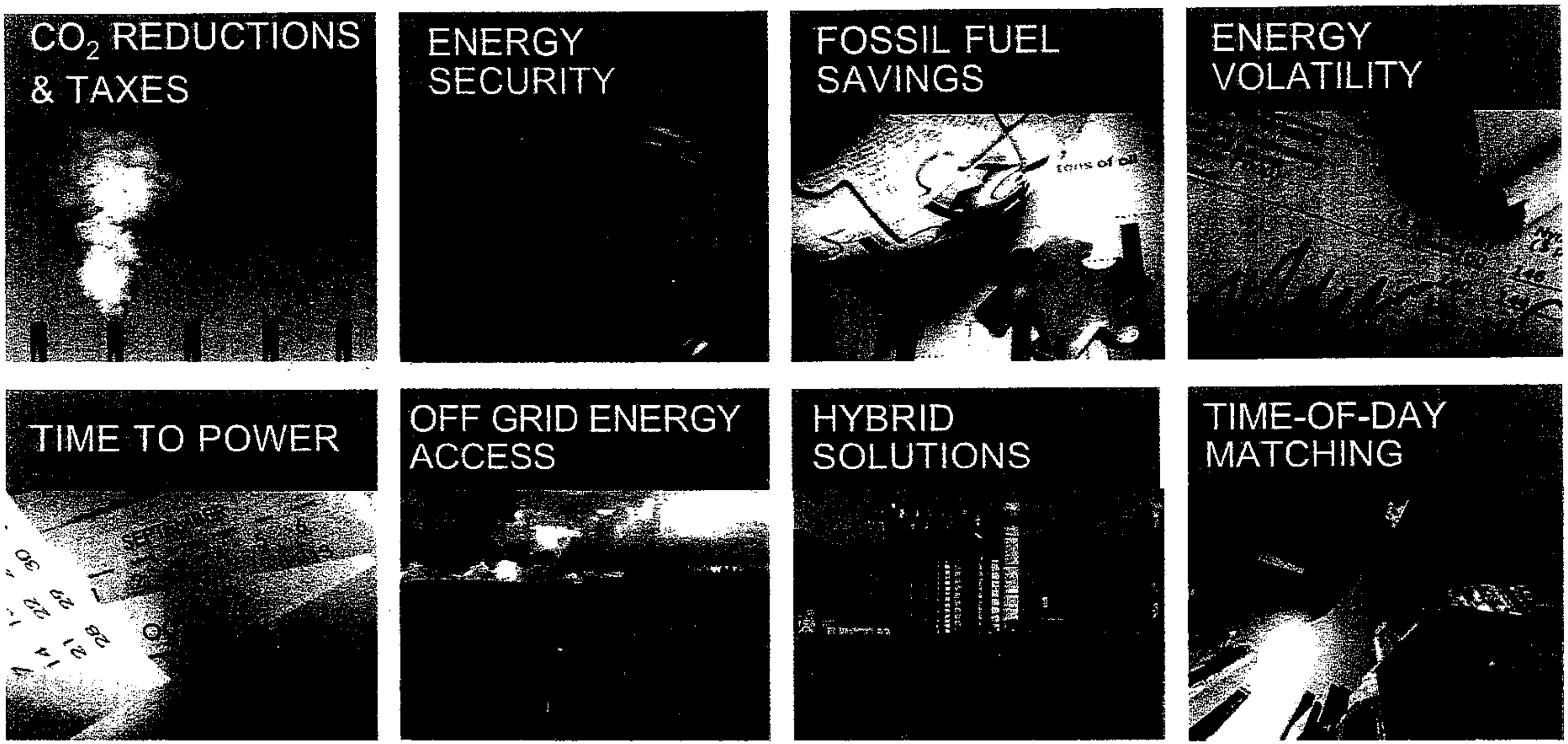
Fax: + 92 51 2813104 – 5
Mobile: + 92 300 500 14 21
URL: www.tarcons.com
Office Address: 7th Floor, Green Trust Tower, Jinnah Avenue, Islamabad - Pakistan

TARGET ENERGY
Power the future of Pakistan

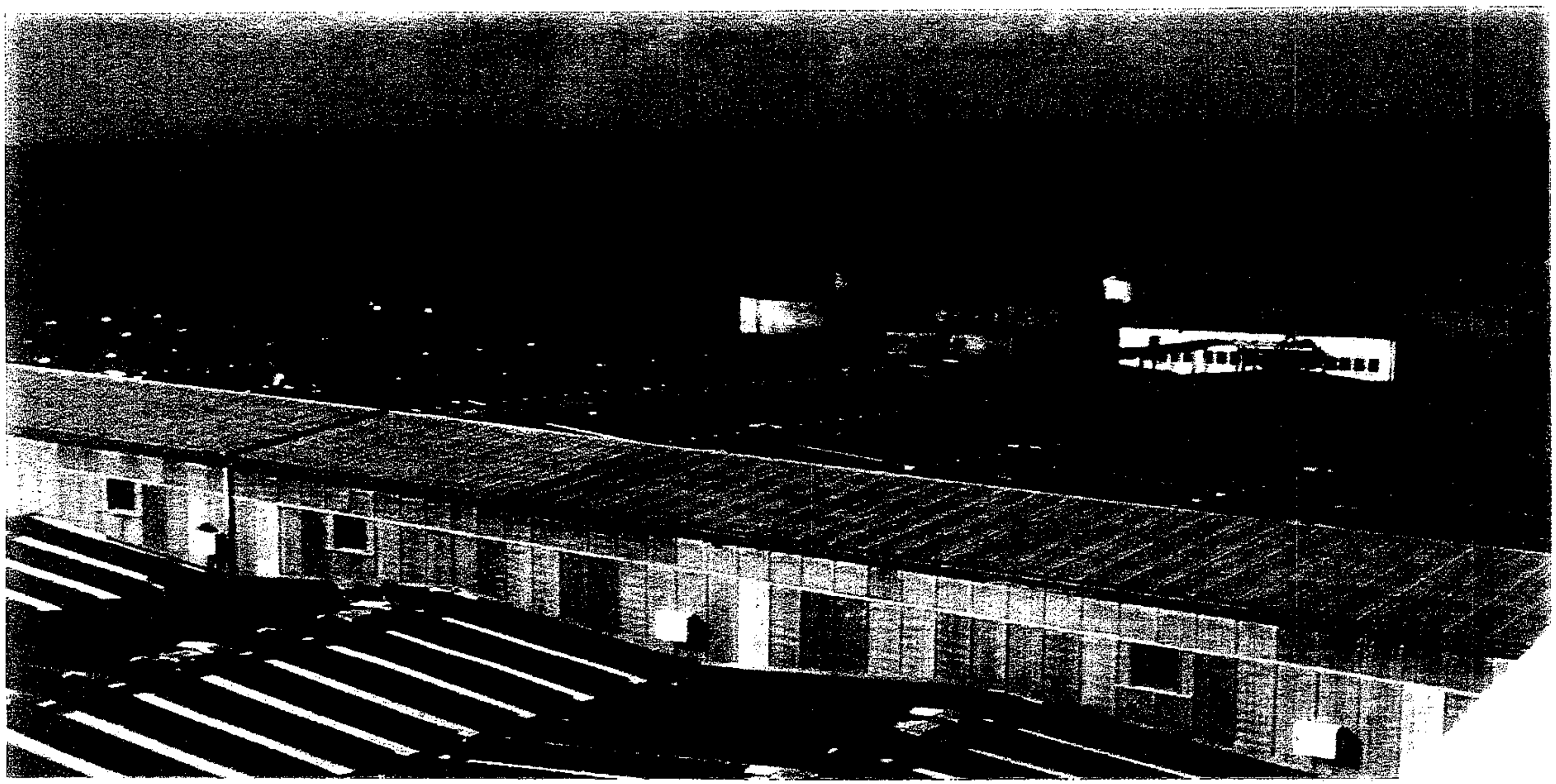


South Africa Solar PV Sector – Market Drivers



Renault Factory – Valladolid - Spain: 2.2MW

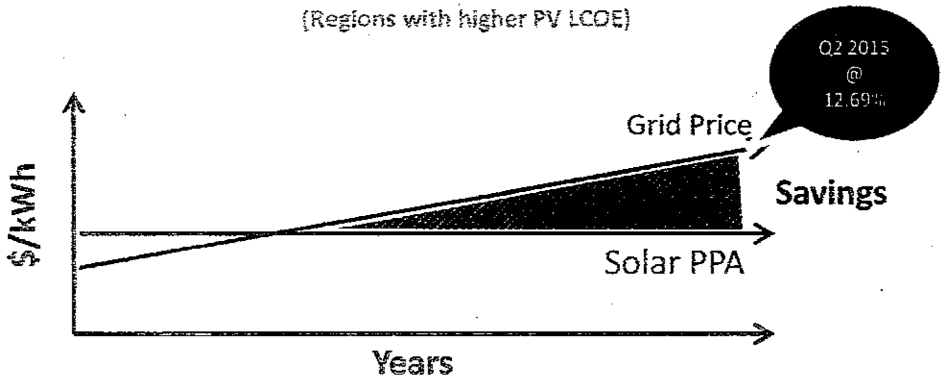
Hessober – Germany 4.6 MW



Hedging Against Higher Energy Prices

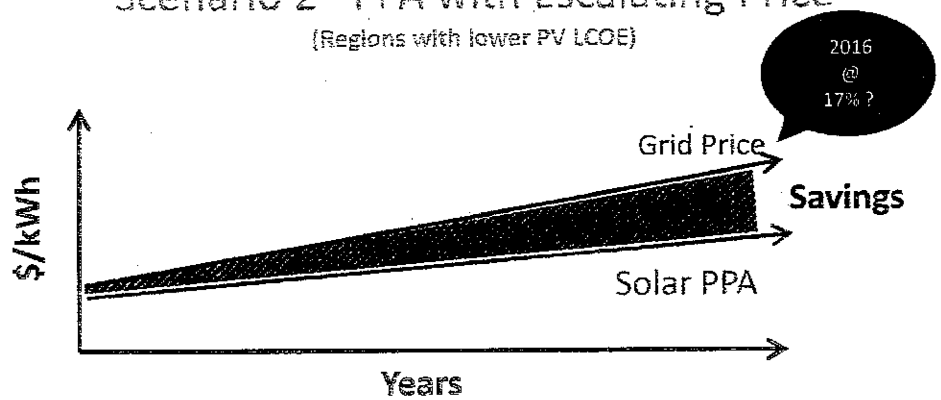
Scenario 1 –PPA with Fixed Price

(Regions with higher PV LCOE)



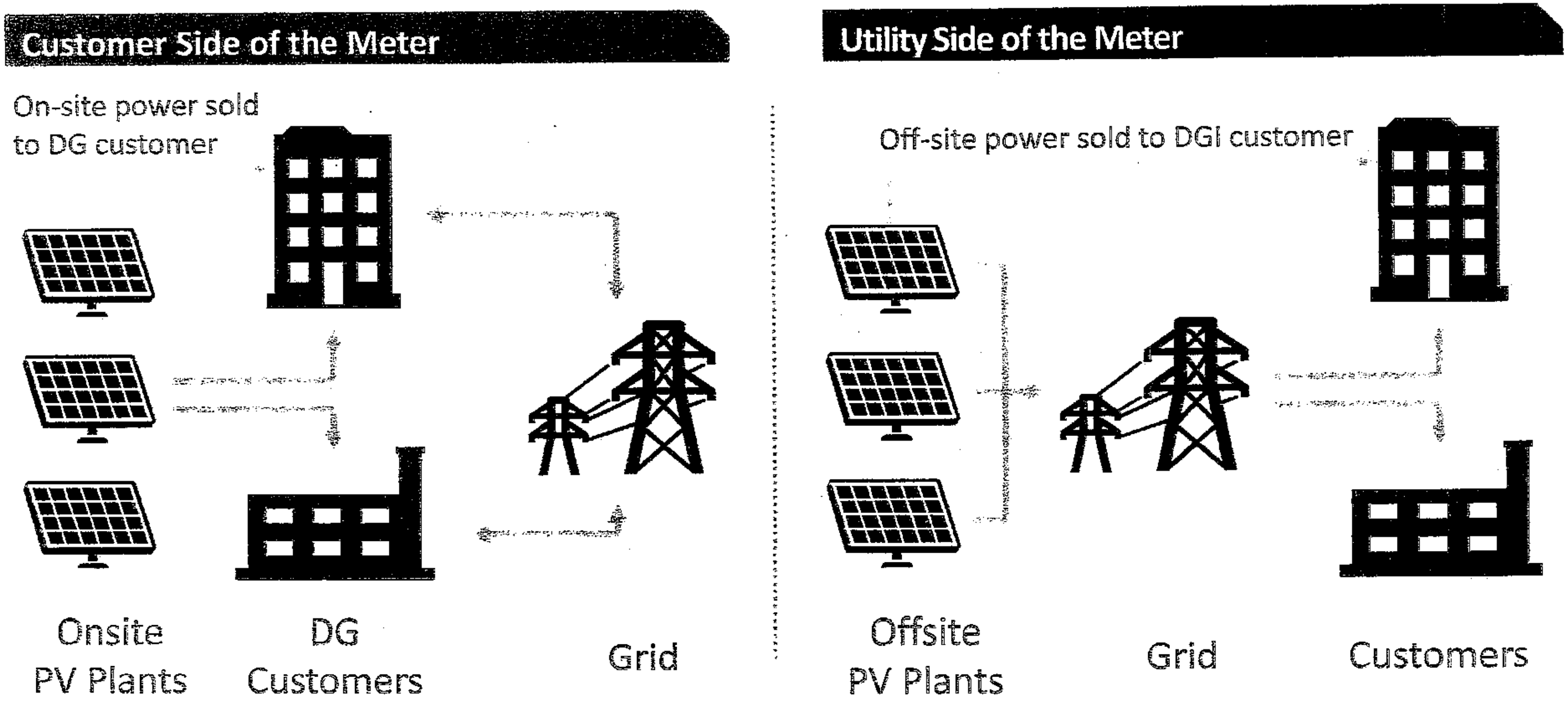
Scenario 2 –PPA with Escalating Price

(Regions with lower PV LCOE)



Benefit from more <u>price certainty</u> over the life of the PV Plant

Distributed Generation Solutions



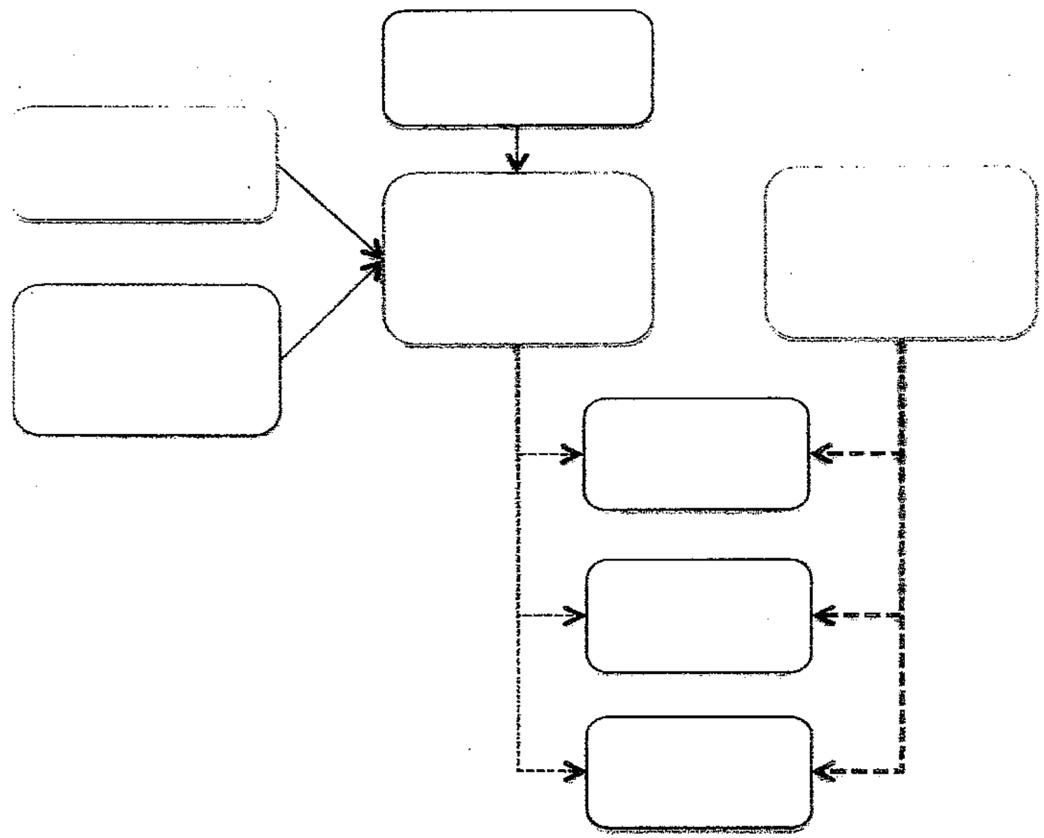
South Africa Solar PV Sector – Executive Summary

- The REIPPP large scale utility program in South Africa has **reached growth maturity** with Window # 4.5 bids submitted and awaiting approval
- The market is now experiencing a **shift towards the development of commercial and industrial (C&I) solar** rooftop projects as major new investment sector
- Recent 'tipping point' created by means of the **development of a 1.5 MW Solar PV Rooftop** installation at Clearwater Mall (Hyprop) in Gauteng
- NERSA has approved a **12.69% electricity tariff increase for Eskom in 2015** whilst Eskom has asked for a 17% increase for 2016. This will create a major industry tipping point to control ones own embedded generation destiny
- Department Treasury seeking to introduce a **Carbon Tax** in 2016/2017
- Atlantic Energy Rooftop Partners seeks to **create a huge market presence** with the aim to be one of the top 4 solar rooftop developers and owners
- A unique opportunity to develop a **dedicated and market specific 'Solar REIT Investment Vehicle' (SRIV)** will provide AEP and will provide the Property REIT with a market advantage unlike any other current REIT

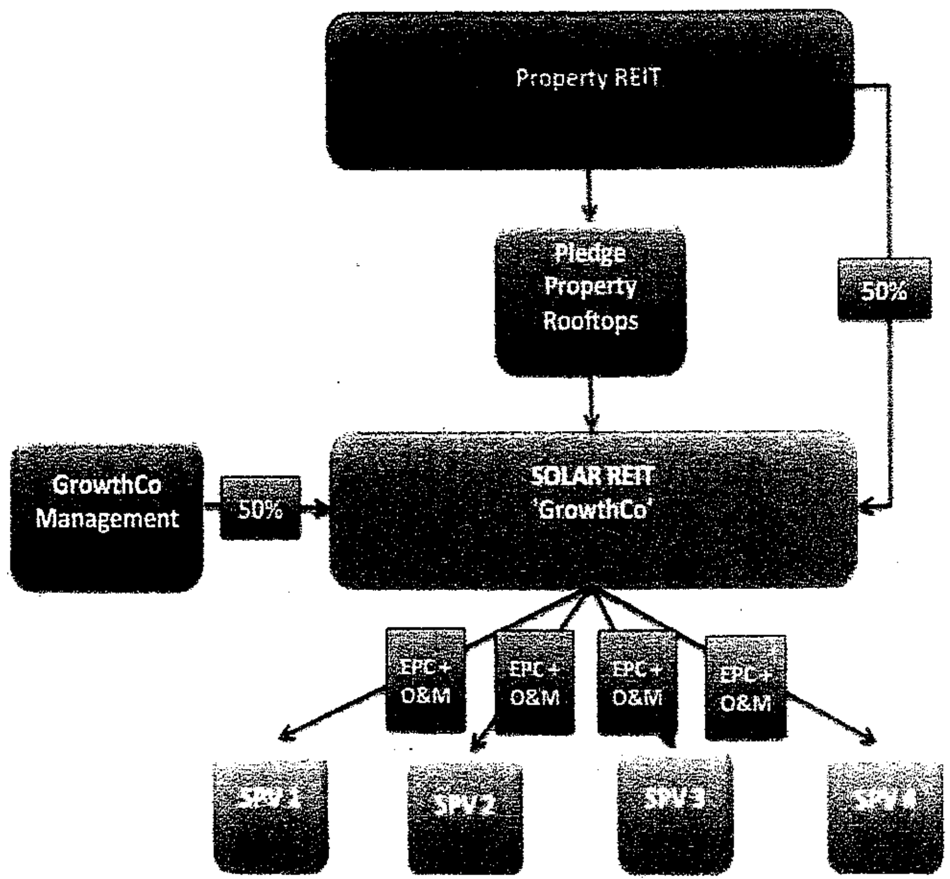
Why develop a Solar REIT / GrowthCo?

- Traditional REIT model does not allow for 'creative' product structuring
- Need to avoid confusing shareholders as to what asset class they have invested in
- Does not prescribe to Property REIT mandate
- Ability to enter the Independent Power Producer (IPP) sector (vs. existing Eskom monopoly)
- Embrace the technology advances and opportunities that Solar offers
- Section 12B – Deduction in respect of certain plant and equipment used in the production of renewable energy (i.e. 100% accelerated depreciation within year 1 based on the cost of the asset)
- Section 12L – Deduction in respect of Energy Efficiency Savings
- Mechanism to curb the proposed Carbon Taxes in 2016/2017
- Ability to aggregate other medium sized property groups into GrowthCo
- Potential new Solar REIT listing on JSE
- Alternative income generating mechanism
- Platform to develop SA and potentially Africa there after

Solar REIT - Organogram



Solar REIT - Implementation



AEP COMPANY OVERVIEW

Team expertise

Our team brings **diverse experience** and a history of success to the company; with expertise in engineering, energy development, procurement and project management

The AEP team **offers years of relevant work experience** in both the renewables & the financial services industry and unparalleled expertise in: project feasibility assessments; due diligence; legal framework implementations; EPCM corporate structuring and tax optimisation; capital raising and structuring for optimal returns on equity investment.

We value our network of capital investors, technology providers and EPC partners that we have worked with over the years

Track record

Our team has a cumulative track record of successfully developing projects from initiation to financial closure of four separate projects totalling **225MW** of large scalesolar PV and **138MW** of onshore wind in the first 3 rounds of the REIPP Procurement Programme in South Africa, and another three solar PV projects totalling **225MW (3 x 75MW)** have been selected as preferred bidder from bid window 4 and the additional allocation to bid window 4.

In addition, our team has an solar C&I industry leading expert that has developed in excess of **10 MW** of solar PV rooftop projects.

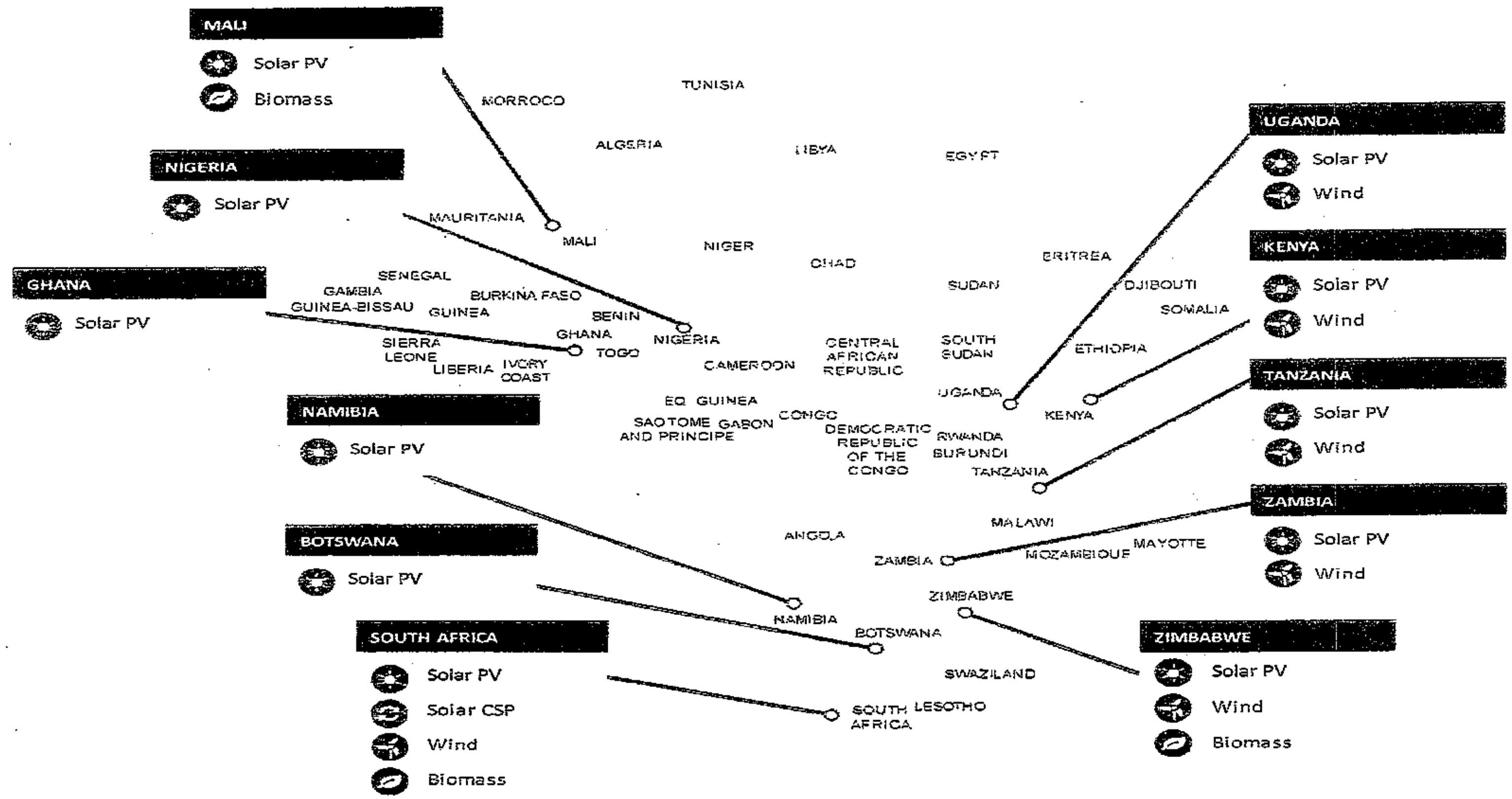
Kevin Anderson – Rooftop CEO

Kevin has extensive structured lending transaction experience following 5 years with **RMB Private Bank.** In 2009 he was a co-founder of one of **SA's leading solar independent Power Producers with 225 MW** of projects won. He has subsequently developed in excess of **800 MW** of projects in both Africa and India.

Kevin **headed up First Solar's (the world's largest Solar company listed on the NASDAQ) commercial & industrial team in South Africa** where they had huge success in tendering and winning some of SA's largest C&I rooftop projects to date.

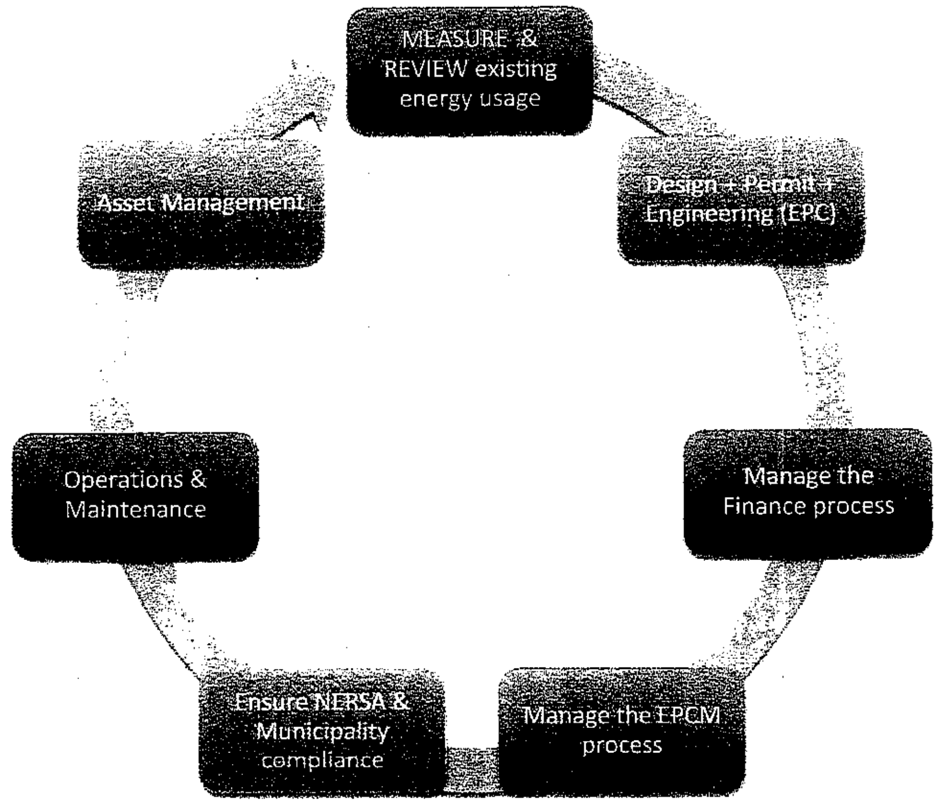
He has extensive knowledge of solar rooftop sector, both from a technology, EPC and finance point of view and oversees the AEP solar rooftop business.

AFRICAN GENERAL DEVELOPMENT PIPELINE



What can Atlantic Energy Partners offer?

- AEP to provide all EPCM (Engineering, Procurement and Construction Management Service)
- Start by reviewing all property assets in the portfolio
- Measure & review the existing energy usage
- Analyze what solar energy impact will be
- Design suitable rooftop solar installation & technology
- Apply different finance models (i.e. local banks vs. DFI's)
- Check if economics and IRR targets are achieved
- Once the Board has approved, proceed with EPCM process
- Ensure that all regulatory requirements are in place
- Pre-commissioning testing and reviews
- Once commissioned, ensure that all operations & maintenance plans in place
- Perform general asset management services
- Ad hoc review of finance structures



Finance Overview – Assuming 1 MW (Pilot) & 10 MW Total

	1 MW (Pilot)		10 MW Total	
Project Size (AC)	1000 kWp		10 000 kWp	
Performance Ratio	85%			
EPC Cost	R	13 000 000,00	R	130 000 000,00
EPCM Cost	R	1 950 000,00	R	19 500 000,00
Total Cost	R	14 950 000,00	R	149 500 000,00
O&M Cost	R	195 000,00	R	1 950 000,00
O&M Escalation	6%			
Energy Yield	1715,63 kWh/kWp/year			
Annual Yieldq	1,902,290 kWh/year			
Nominal Electricity Tarriff	0,7902 R/kWh			
Electricity Escalation	12.7%			
NPV 5% 25 Years	R	38 679 753,56	R	386 797 535,60
NPV 7.5% 25 Years	R	23 844 214,08	R	238 442 140,80
NPV 10% 25 Years	R	14 254 518,87	R	142 545 188,70
Real IRR 25 Years	18%		18%	
Equity IRR (with Tax Benefits)	23%		23%	

Summary

- AEP is a South African **leader in Solar energy solutions**, with a strong management team
- We offer integrated experience & capabilities along the solar value chain, **maximizing value** and **minimizing risks**
- Commercial rooftop installations with AEP have **higher annual energy yields** and performance ratios due to in-depth market and technology knowledge
- Commercial rooftop installations can be **easily deployed** and are **scalable**
- Solar REIT offers various **tax benefits**
- Solar PV Rooftop conversion **offers a new revenue** income generator
- Provides Property REIT the opportunity to develop portfolio **energy independency** and the **Property REIT leader** in the industry through solar energy self-consumption support and reduction of CO_2 emissions
- Solar rooftop and self consumption complies with all **Corporate Social Responsibilities (CSR)** and **Social Responsibility Investments (SRI)** on the JSE

CONTACT DETAILS

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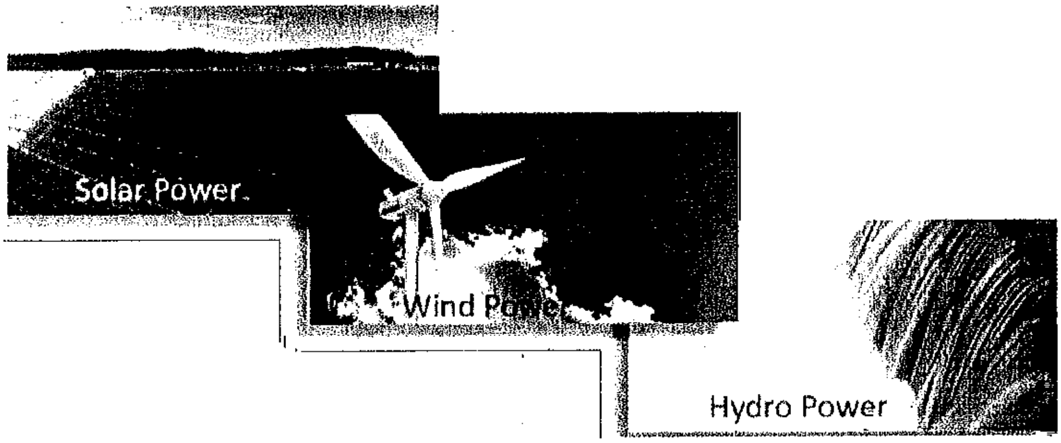
AGNA



Alternative Grid North Africa

Information Memorandum

Pakistan

AGNA

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AGNA

Introduction

Alternative Grid North Africa (AGNA) is an international renewable energy developer with our registered office in Dublin Ireland and branch offices in Tunisia and Libya. AGNA has been active in the North Africa marketplace since 2011.

Our professional team have much experience of international renewable energy and power infrastructure projects. AGNA benefits from the international leadership experiences of our non-executive Chairman, Mr Bertie Ahern, the former Prime Minister of the Republic of Ireland and our advisor Lord Anthony St John of Blesto, Member of the House of Lords and well known businessman.

In Tunisia AGNA been engaging with the Tunisian Government since 2012 and we recently submitted a proposal to the government to develop up to 500MW of renewable energy from renewable technologies. In 2013, AGNA secured a government decree to develop 2000MW of renewable energy in Libya and AGNA also secured 10,000 hectares of government land in Ghadames west Libya to build out the renewable energy facilities.

In the Kingdom of Saudi Arabia we are in talks for the forming a Joint Stock Company with a Middle East partner to deliver hybrid power projects and renewable energy projects. This Joint Stock Company will be incorporated in the 1st quarter of 2016 with first contract secured by the 3rd quarter of 2016. In Algeria AGNA is currently in talks with an Algerian government organisation in relation to forming a Joint Stock Company to deliver renewable energy projects of scale..

AGNA has some other pipeline opportunities in Sao Tome, Ghana, Ukraine and Pakistan and we have sole rights on 1200 hectares of land in the Northern Cape South Africa.

We are in discussions with major European organisations in relation to the exporting of renewable energy from North Africa to Italy.

AGNA

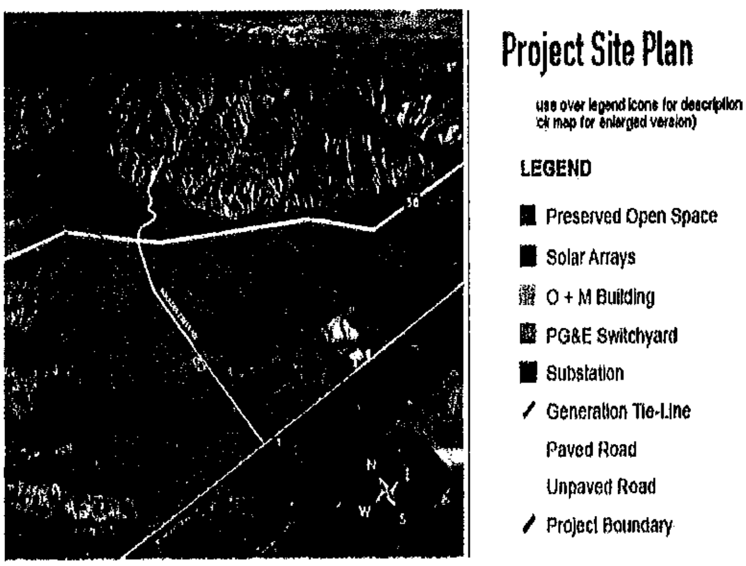
Role of AGNA

AGNA's role is to build relationships at government and utility level. Once these relationships are developed, the next stage is to identify suitable land and negotiate the Power Purchase Agreement (PPA). In essence there are three phases to successful conclusion;

- Phase 1 - Preliminary Design, Land Leases, Permissions, Environmental Study, Grid Connectivity, Power Purchase Agreement
- Phase 2 - Debt & Equity Project Finance Structure
- Phase 3 - Final Design, Construction & Operation

The lifecycle of a solar PV development is explained in the following broad generic phases

- Project Promotion / Development
- Secure Power Purchase Agreement
- Project Finance / Financial Close
- Mobilisation & Construction
- Operation & Maintenance



Our Key People

Bertie Ahern – Non Executive Chairman
Mr Bertie Ahern is a former Irish politician, who served as Prime Minister of Ireland from 26th June 1997 to 7th May 2008. His finest achievement was the Good Friday Agreement in Northern Ireland, negotiated in 1998 with the British Government under Tony Blair and the leaders of the Northern Ireland political parties, where his unrelenting commitment to finding peace and stability resulted in power sharing becoming an enduring reality. Under the Irish Presidency of the European Union in 2004, Bertie Ahern enjoyed a major European success, when he negotiated a new European Constitution, on behalf of the European Union, with the accession of ten member states taking place under his Presidency. His considerable political and business experience on the international stage and his worldwide recognised negotiation skills will be a major asset to growing our business

Lord Anthony St John - Advisor
Anthony Tudor St John, 22nd Baron St John of Bletso is a British peer, politician, businessman and solicitor. He is one of the ninety hereditary peers elected to remain in the House of Lords after the House of Lords Act 1999.Previously he has worked at investment banks County NatWest, Smith New Court and Merrill Lynch. Anthony is well recognised for his understanding of the African marketplace and brings a wealth of commercial and international experience to AGNA.

Dr Mohammed Abdelsalam – Chairman
Dr Mohammed Abdelsalam has a Doctorate (Ph.D.) in Economics and for the main part of his career worked at executive level in the National Oil Corporation of Libya. He represented the Libyan National Oil Corporation of Libya via a joint venture with the Algerian Libyan Exploration and Production Company (ALEPCO) in Algiers. He was also involved with the well-known international French oil company Total Oil where he was a Member of the Operating & Management Committee of Total Libya which was a Joint Venture between the Libyan National Oil Corporation and Total. He was a Member of the Owners Management Committee of Zeuitina Oil Company which was a Joint Venture between OMV, Occidental Petroleum Corporation and the Libyan National Oil Corporation. He is well versed with the intricacies of doing business across North Africa and in particular dealing with the complex requirements of energy organisations. He is passionately committed to the advancement of corporate social responsibility; indeed he brings much focus to the priorities of the North African communities at every opportunity. He concluded a major study for the Libyan Government in relation to youth issues, on employment and entrepreneurship and advised with key strategies to facilitate improving the opportunities for the youth of Libya. In his early career he lectured in finance at Tripoli University, Tripoli Polytechnic and the University of Gharyan. Dr Abdelsalam is fluent in English and Arabic.

James Doyle – Chief Executive Officer
James Doyle has over twenty five years business experience across the UK, Ireland & North Africa. His main areas of expertise are in the construction, technology, consulting and renewable energy sectors. For the past five years James has been predominantly focused on the realisation of business opportunities in the North Africa regions and has engaged extensively with governments at the highest levels. James brings considerable practical experiences of the needs and requirements of doing business in the Maghreb and has been the

main interface in developing viable opportunity. James has a Master's of Business Administration (MBA) and is currently based in North Africa where he continues to develop our business and build upon our early mover status.

Padruig Counihan – Power Infrastructure Director
Padruig is a Chartered Engineer B.E. C.Eng, M.I.E.I. and a graduate of the Harvard Business School. He has over forty years of international electrical power infrastructure experience. In his earlier career he managed one of the first combined cycle power stations in the UK, from inception on a green field site to commissioning and O&M. Subsequently he moved into power generation with emphasis on hydro and thermal generation. Padruig has significant European electrical power experience from financial close of projects to commercial operations. He has particular experience of Joint Ventures in the international power sector including being Director and Chairman of Bizkaia Energia Power Plant, Bilbao, Spain, a JV between ESB International and Osaka Gas of Japan. He was a Director and Chairman of Synergen Power Station, Dublin, Ireland, originally a JV between ESB International and Statoil Norway. Later he led the successful negotiation of the buy-out of Statoil by ESB International. He was a Director of Corby Power Station , Northampton, United Kingdom, a JV between ESB International and E.ON (U.K.) and a Director of Marchwood Power Station, Southampton, United Kingdom, a JV between ESB International and Scottish and Southern Electricity U.K.

John Wootton – Chief Technical Officer
John Wootton is an Electronic Engineer and has over 40 years business and manufacturing experience in Ireland, South Africa and Switzerland. He has been responsible for designing and manufacturing 10 and 23KV substation protection equipment to the Electricity Supply Board in Ireland, power supplies for Aer Rianta Irish airports and programmable microcomputer based motor control and timing equipment for an Irish Government subsidiary. He has been involved in designing and manufacturing led display lighting systems for service stations and car parks and remote solar powered lighting systems for mountain cabins. He also provided modem systems for remote data reporting in South African Escom sub stations. John has a considerable knowledge of radio serial data systems including equipment to interface with mobile phones via SMS and solar panels and grid tie inverter systems.

Rory Mullan MEng MBA – Grid & Electricity Director
Rory is a recognised expert in the connection of renewable generation in Ireland and Northern Ireland. Rory has been working in the Irish electricity industry since 1998. Rory has a background of working in commercial and technical roles in state utilities NIE, ESB and in EirGrid. His main expertise lies in the electrical engineering aspect of renewable energy grid connections and he has a comprehensive understanding of network operations, regulatory frameworks, market operation, connection & charging policies. Rory is a member of the IWEA council and has been chairperson of the IWEA and the NIRIG grid committees. Through his roles in the renewable trade associations he has been at the forefront of the development of connection policy over the past eight years.

Armin Heppner – Solar Director
Armin Heppner is a Master of Business Administration, to be precise Techn. Dipl. Betriebswirt FH, these particular studies had combined engineering and business

management. He has over 25 years business and manufacturing experience in responsible positions. Since more than 10 years he is engaged in renewable energies, especially in engineering, procurement and construction of Photovoltaic-plants. He has separate qualifications in designing 2-axis-tracking CPV-plants, off-grid and hybrid solutions.

Dr Gassem Azzain – Technical Advisor
Dr Gassem has a Ph.D. in Thermal Engineering with special emphasis on the field of solar engineering. He has much experience of working with the state utility GECOL in Libya and liaised with same from a renewable energy interface perspective. He is a leading pioneer of renewable energies in Libya and in a previous capacity worked with the DESERTEC University Network (DUN). He has published many papers on solar energy throughout his career and has lectured extensively on thermal and solar renewable energies in the University of Sebha. His primary degree was in the field of mechanical engineering and his M.Sc. degree was attained from the University of Warsaw in the Investigation of Solar-Thermal Energy Conversion and Storage Process using Flat Plate Solar Collector.

James O'Shea – Chief Investment Officer & Business Development
James has a Bachelor of Engineering Degree in Electronic Engineering and a Diploma from the Law Society of Ireland in Finance & Leasing. James has over thirty years' experience in international business across many sectors, most notably manufacturing, aviation, property development, consulting, financial and legal. James utilises the counsel of local and global legal opinion to negotiate contracts in keeping with the fundamental rules of good practice. He has had business interests in West Africa, Eastern Europe, UK & Ireland and he currently is the lead for our business opportunities in the Far East & Asia

Jeremy Friedlander – Chief Legal Officer & Business Development
Jeremy has a BA LLB from the University of Cape Town and practised as an attorney after completing his articles in Cape Town. He joined Old Mutual as a legal advisor and in 1993 established McCreedy Friedlander, which became one of the premier property practices in South Africa and negotiated an association with Savills. In 1998 he listed McCreedy Friedlander as part of a financial services group on the JSE and shortly afterwards relocated to London. In the United Kingdom, Jeremy has been involved in many real estate transactions. More recently Jeremy was a director of Onslow Resources (Oil and Gas). He has been a business development director of a number of companies involved in uranium, coal, gold, gas and industrial minerals and brings much experience of the energy sectors.

John Lane – Chief Projects Officer
John is a vastly experienced international construction professional with over twenty year's management experience in the UK, Middle East, North Africa, Ireland, Australia & Burma. John has managed projects up to US$ 250 million dollars and has a B.Sc.Eng. in Structural Engineering and is a member of the Professional Bodies Institute of Engineers of Ireland (MIEI). He was most recently the Project Director responsible for the execution of one of the world's largest dewatering operations for Saudi Aramco on their Jeddah storm water drainage project in Saudi Arabia. Previously he has successfully delivered projects across mining, geotechnical, infrastructure (airports, roads, utilities) commercial, residential and the oil and gas sectors.

Our Partners

AGNA has many consortium partners to deliver our turnkey projects.

1. SYBAC Solar is one of the leading international providers of large-scale photovoltaic systems. They have been building solar plants since 2004, and since 2009 their highly experienced team of finance experts, engineers and technicians have been specialising in large-scale solar projects in Germany, France and the USA - covering the entire process from planning and construction, financing and marketing to operation and maintenance.
2. Founded in 1998, is one of the world's leading solar energy companies, specialising in solar installation & PV systems for businesses & solar farms
3. One of the world's most trusted, respected and long-standing solar panel companies. Founded in 1998, we've been around since the early days of the solar industry and have been part of the evolution that has made solar PV the attractive investment it is today. We've put solar on more types of sites than any other company in the industry, and have won multiple awards for product innovation.
4. Alcapi Solartwent Systems GmbH, deliver consulting, engineering and construction of both on and off grid renewable energy solutions including hybrid and fuel save solutions. Their technical expertise cover modules, inverters, mounting systems, energy storages (LeadGel, LiFePo, Redox Flow) and other accessories. Complementing the above services they also offer monitoring, maintenance, performance analysis, optimizing and repair and exchange of defect material
5. ReneSola, founded in 2005, and listed on the New York Stock Exchange in 2008, ReneSola is a leading international manufacturer and supplier of green energy products. Leveraging its global presence with offices and warehouses in more than 16 countries and expansive production facilities and sales network, ReneSola is well positioned to provide the highest quality green energy products and on-time services for EPC, installers and green energy projects around the world.
6. Atlantic Energy Partners offers years of relevant work experience with the financial services industry and unparalleled expertise in: project feasibility assessments; due diligence; legal framework implementations; corporate structuring and tax optimisation; capital raising and structuring.
7. Solar Frontier leverages over 30 years of leadership in solar R&D and over 100 years of energy expertise derived from our parent company, Showa Shell Sekiyu. Solar Frontier began developing solar technologies in collaboration with the Japanese government, academia and early industry leaders such as Arco Solar. In 1993, the endevour with the New Energy and Industrial Technology Development

Organization (NEDO, Japan) led to the exclusive focus on CIS technology. We found that CIS technology had the greatest potential of any PV technology and began commercial production in 2007. By July 2011, it achieved full commercial operation of the world's first gigawatt-scale CIS production facility, the Kunitomi Plant. Solar Frontier has since established itself as a global solar energy provider, with operations from R&D through to manufacturing, comprehensive system services and independent power generation.

8. STEG International Services your partner for better access to electrical power STEG-IS is the international arm of the Tunisia state electricity utility and brings much experience of delivering energy projects in Africa.

9. COMETE engineering that is based throughout Africa for all our engineering consulting, environment analysis, feasibility studies and geotechnical requirements.

10. BECQUEREL CAPITAL Becquerel Capital is a private development and investment company. Participating across the life cycle of renewable energy infrastructure projects, Becquerel maximises returns and mitigates risk through strategic alliances and focusing on environmental and economic fundamentals. The partnership's current primary focus is Latin America and Africa due to the regions' substantial capacity for non-subsidized, grid parity renewable power generation.

11. AGNA is partnering with the Dublin Institute of Technology on solar panel efficiency and storage of renewable energies. Other areas of interest are autonomous lighting systems for buildings, ccombined PV and cellular antenna panel for building façade integration and design of an energy-based controller for an active solar collector.

Annexure - 10

CV of Senior Management, Technical and Professional Staff

Aziz Raza Malik (PMP)

MPEC(Member Pakistan Engineering Council (PE MECH / 11273)
MIEP (Member Institute Of Engineers Pakistan)(PE MECH/11211)
MBHA (Member British Hydropower Association) (BHA01641)

Contact

H.No. # 76 E, St # 7-B, Sector E-11/4 National Police Foundation, Islamabad Pakistan. 44000.

azizrazasambu@gmail.com / azizraza@hotmail.com

+92 0314-5108291, 0335-5108291

Pakistani - Married (06th Septemeber,1966) / (Chakwal – PAK)

CG 9892293 (Valid up to 08th February 2022)

Professional Skills

Hydro power I Solar Power I Erection & Commissioning| Budgets & Forecasting I Project Development I Project Management I Project Planning & Coordination I Project Administration I Project Analysis|Project Teamwork I Field & Site Supervision I Quality Control I Layout & Design |Subcontractor Supervision I Project Proposals I Client Presentations I Cost Controls I Contract Negotiations I Material Procurement I Policy & Procedures I Multiple Location Management I Risk Assessment I Meeting Facilitation I Strategic Planning I Goal Setting I Safety Inspections I Blueprint Reading & Analysis I

Personal Skills

Leadership I Communication I Conceptualizing Execution I Employee Supervision & Training I Managing Tenders and Government Relations

Education

Bachelor in Mechanical Engineering - 1994
University of Engineering and Technology

Certification

Certified Professional Manager in Project management (2009 -2010)

International Exposure

Career Summary

More then 22 - Years in Project development and execution of infrastructure projects mainly related to hydropower, solar , road construction (highways etc.) and buildings by Manage day-to-day operational aspects of projects and project scope by effectively applying methodologies that enforce project standards and by minimizing exposure and risks on projects. Create and execute project work plans and revise as appropriate to meet changing needs and requirements, including the identification of needed resources and assignment to appropriate personnel.

Experience includes the areas of:

Project Development for Hydropower /Solar Projects having in-depth knowledge / experience of handling all the regulatory, commercial and technical issues especially involved in the development of power projects for which financing is to be arranged on the non-recourse principles. Actively involved in completing all the documentation required for financed projects, agreements, power purchase agreements, engineering, procurement, construction and the operations and maintenance.

Professional Experiences

CEO I Kulachi Solar Power (Pvt) Ltd. Islamabad (15th Sept ,2017 till date)

♦Oversee all aspects of multiple, ongoing, Developing, landscaping, operations of Projects as under.

♦**Details of Project:**

♦50 MW solar photovoltaic (PV) independent power producer (IPP) plant in Khyber Pakhtunkhwa (KPK) province as per the Letter of Intent (Ref. 2730- 33/PEDO/CEO/LOI, dated 20/10/2016) issued by the Pakhtunkhwa Energy Development Organization (PEDO) to t h e Consortium jointly formed by Target Energy , Atlantic Energy Partners (South Africa), Alternative Grid North Africa (Ireland) and H1 Holdings (Pty) Ltd (South Africa)

CEO I Target Energy (Pvt) Ltd. Islamabad (1st Dec ,2015 till date)

•Target Energy (Pvt) Ltd which has been founded in 2015 and involved in various huge projects.
•Target Energy is the part of Target Group which are involved in many other initiatives of the company related to National Aviation Support Business provider, CCTV Securities, Communication Systems and Engine Aircraft Buying and Selling of Spare Parts.
•The Target Energy is developing solar and hydro power projects in the private sector.
•The company is one of the main sponsors of the 50MW solar project in Kulachi DI Khan and pursuing some raw sites for hydropower generation.
•Responsible for project development, construct ability , costs, and quality reviewed performance against operating plans and standards, managing of team and to see after the day to day business of the company.

More than 22 Years' Experience in Multinational SAMBU Construction Co., Ltd Korea Responsibilities During Career (March 1995 to date)

Multidimensional Experience in Project Development, Project Execution and, Strategic Planning & Business Operations in Hydropower Projects in Pakistan:

•84 MW New Bong Escape Hydro-Electric Power Complex AJK Pakistan. (Pakistan Ist IPP)
•100 MW Gulpur Hydropower Project in AJK Pakistan. (3rd IPP Project)
•150 MW Patrind Hydropower Project MW AJK Pakistan.(2nd IPP Project)
•106 MW Golen Gol Hydropower Project Chitral in Pakistan. (Wapda)

As Section Chief /Asst. Manager /Manager/ GM Equipment & Plant Experience

•Lowari Rail Tunnel Project (9-KM tunnel from Dir to Chitral)
•Rehabilitation of Sahiwal-Multan ECW N-5 (50-KM)
•Contract No.7 (Mianchannu-Sahiwal N-5) (50-KM)
•Rehabilitation of Multan –Qadirpur Ran (N-5) (15 KM)
•Rehabilitation works of Mianchannu-Sahiwal (46-KM) N-5
•Multan-Mianchannu (87KM/4-Lane) Additional Carriageway N-5

As a Director Project Development & General Manager Project Development

•Led the "project development team" from Sambu side as a part of consortium who successfull achieved the completion of most complex as well as contractually intricate projects, resolutely wit dedication and managed the whole development process starting from the feasibility study to th Financial Closing. Fully responsible for managing all contractual, commercial and legal issues of th contracts including advised on resolving disputes and claims management.
•Actively led the team in the preparation of feasibility study of the projects including financi analysis, cost estimations, hydrological analysis, Power Purchase Agreement, including draftec negotiated and executed all the concession documents including.
•As a Consortium Partner involved with the team to design the Financial Model for tariff an Financing purposes, land acquisition for the Projects in the shortest possible time, tariff negotiation at different stages of the Projects.
•Managed the overall tendering process for the award of EPC Contract including negotiation and execution of EPC Contracts.

Aziz Raza Malik (PMP)

MPEC(Member Pakistan Engineering Council (PE MECH / 11273)
MIEP (Member Institute Of Engineers Pakistan)(PE MECH/11211)
MBHA (Member British Hydropower Association) (BHA01641)

Courses & Training

- CPD Technical lecture on Engineering Project Management
  Certificate from Institution Of Engineers Islamabad.(dated 14th January,2012)
- Construction Claim and Dispute Resolution Course
  Skill Development Council (6th January,2011 –15th January,2011)
- Negotiation Skills Course
  Pakistan Institute of Management (26thJune – 28th June 2007).
- Team Work – Getting People To Work Together Course
  Pakistan Institute of Management (11th June – 16th June 2007).
- Maintenance Management Course
  Pakistan Institute of Management (14thMay 2007 – 18th May 2007).
- 8 weeks Computer Courses in COMPUTER AIDED DESIGN
  U.E.T., Lahore(Pakistan)

Technical Skills

Microsoft Office Suite (Word, Excel, and PowerPoint)
Primavera |AutoCAD | Autodesk |

References:

Can be provided on request

Professional Experiences

•Negotiated and closed the EPC Contracts with major equity holders of 84 MW New Bong Hydropower Project, 150 MW Patrind Hydropower Project and 100 MW Gulpur Hydropower Project.
•As a Consortium Partner Involved with the team for Negotiating the Finance Documents and Security Documents with the Lenders.
•Supervised the process of comprehensive insurance program for the whole projects.
•Responsible for getting various Government approvals and consents including consents from Federal Board of Revenue, State Bank of Pakistan, GOAJK, and Electricity Department etc.
•As a Consortium Partner involved with the team in the tendering process of O&M Contract including drafting and negotiations of O&M Contract.
•As a Consortium Partner involved with the team of the tendering process of Owner's Engineer appointment including drafting and negotiation of OE Contract.
•Supervised in the Preparation of various environmental and other plans including project Management Plan and Project Operational Plan including comprehensive insurance program for the whole projects
•As a Consortium Partner involved with team to Plan and implemented the drawdown schedules by fulfilling the stringent condition precedents attached to each drawdown.

As a Project Manager / Deputy Project Manager /Project Coordinator of 84 MW New Bong Hydropower Project. (Pakistan Ist IPP Project)

•Managed and administered the overall activities of Contractor's EPC contractual obligations and the Client's needs and expectations.
•Monitored overall productivity and efficiency of each Department on the project, forecast trends and anticipate potential problems and difficulties meeting milestones or budgets, coordinate with Management and all supervised staff to resolve problems.
•Coordinated between the HSE Manager, QA/QC Manager, Subcontract Manager, and the Sites Construction Superintendents to make sure that the client scope is implemented and that the contractor's and subcontractors' works and performance are efficiently inspected, supervised and executed and Responsible for claim management with the Client.
•Implemented and ensured timely mobilization of O&M Operator to ensure seam less transfer from Construction, E&M Contractor to operations.
•Assisted the technical department in various technical matters and produced high level reports on pure technical issues like inertia constant, New Bong Escape Gates modifications, Surge Analysis water flow meters etc.
•During construction period ensured the reporting compliances to various parties including lenders like regular progress reporting.
•Responsible for the supervision of Erection of E&M equipment at plant site.
•Currently dealing all the issues related with Defect Liability Period with the Client and O&M Operators.

As Section Chief /Asst Manager /Manager/ GM Equipment & Plant.

•Designed communication network in order to keep up with maintenance activities. Effectively to coordinate the work activities with various sections within the working group.
•Managed the correct provision of technical support to the operating, supervising application of the quality assurance .Supervise joint analyses (processes, mechanical. Electrical and I&C) on the performance and availability of the equipment and preparing reports for the Project Manager.
•Issued periodical reports (performance, consumption, efficiency, safety and reduce costs Coordinate analysis of operative experience and incidents and their incorporation into training plans.
•Controlled all workshop activities, repair & maintenance of equipment i.e (Reconditioning and overhauling of vehicles, graders, dozers, generator sets petrol and diesel engines, sub-systems and tune-up, trouble shooting and testing), office matters and to make it possible to use site repair teams in efficient & effective way.
•Material management, inventory control, indenting of spares and stores, demand procedure scrutiny of indents, inspection, acceptance and rejection procedures. Deal in the procurement of Spare Parts, Fuel & Lubricants, Bitumen and Aggregate Material. Ensuring the availability of material for repairs, materials movement and coordination with the purchase and stores managers for timely purchase of material / spare parts.
•Training of workshop personnel and Heavy Equipment Operators /Drivers on enhancement of skills the use of tools and loss prevention through in-house arrangements / technical courses. Training of under command staff and management.
•Supervised erection and operations of Asphalt Plants, Concrete Batching Plants and Crusher Plants and Project management and control. "Logistics and supply management.
•Budget preparation and forecasting.
•Arrangements for mobilization of equipment between projects and strictly ensured the safety procedures to avoid any loss.
•Security Planning.(Security of men and material)and Coordination with the prospective Government Departments and Civil Contractors.

SALIM KHAN

Chairman Target Group

Office Address:
7th Floor Green trust Tower, Jinnah Avenue, Islamabad.
Residence:
House No. 76-A, Street 17 Sector F-6/2, Islamabad.
Tel: 0300-5001421
E-mail: salimkhan@tarcons.com

Chairman of Target Group of Companies, Target Group of Companies comprises of five different companies under its branch. Companies include: Target Consulting Services (Pvt) Ltd., Target Energy (Pvt) Ltd Target Flight Services (Pvt) Ltd, Target Consulting Services (AOP) and Hussain Khan & Company (AOP).

As chairman of the Target Group, Salim Khan has ensured and successfully seen the company go through significant growth especially in the last decade. He made many pioneering moves that enabled Target Group to solidify its position as a National Aviation Support Business provider. We are also involved in construction sector as well as involved in the energy sector for the past 4 years. The main focus of our Energy Company is in Hydro and Solar Power Projects.

Entered in the field of business in 2004 since then has gained immense experience in many diverse markets including vast experience of 14 years in Aviation Industry. Before that by profession as Pilot and served in Pakistan International Airline (PIA) for 28 Years.

Education:

- Commercial Pilot License & IR Peshawar Flying Club- 1979

Personal Information:

- Father Name: Hussain Khan
- Date of Birth: 03/03/1958
- CNIC No.: 17301-5564690-3
- Passport No: MY4106903

Craig Stanley - Abridged CV

Craig Stanley B Comm, B Compt (Hons), CA (SA), CFA, Masters in Commerce

Specialisms:	Structured Investments, Fund Raising, Financial Management, Valuations, Corporate Finance, Capital Markets, Asset Management, Renewable Energy, Project Finance

After completing his articles with PKF (Chartered Accountants and Business Advisers) and qualifying as a Chartered Accountant in 2005, Craig founded, grew and successfully sold his own financial consultancy practice to a subsidiary of the South African listed financial services group PSG.

Craig then joined Investec Asset Management in 2006 and worked in the high net worth client and advisory teams for 2 years. In early 2008 Craig joined the Investec Capital Markets team where he provides customized structured investment product solutions for retail, corporate and institutional clients. Craig was a senior member of the Investment Products team and, amongst other things, has been instrumental in over 20 local and international listings (ranging from structured investments, credit linked notes, listed equity, commodity, credit, currency, property investment companies to private equity. Various renewable energy opportunities are currently being investigated). Craig has been responsible for raising new assets as well as the ongoing management of assets in excess of US $ 1 billion.

After leaving the Investec Group, Craig founded RE Capital which has achieved significant success in the South African energy in a short space of time. The company looks forward to a bright future with multiple exciting investments currently being developed as standalone RE Capital projects as well as co-developments which global leaders in renewable energy.

Craig is also a founding director and CEO of Atlantic Renewable Energy Partners ("AEP"), the team have a combined success of 590MW of wind and solar in South Africa's REIPPP programme as well as various energy projects under development in Nigeria in a joint venture with their local partner Ledcorp, a 50MW project in financial close in Mali, a 50MW solar project in Financial close in Pakistan. AEP have an energy development pipeline in excess of 2 GW currently.

KEY TEAM MEMBERS AND CREDENTIALS

CRAIG STANLEY
CA(SA)

After articles with PKF, Craig founded, grew and successfully sold his own financial consultancy practice to the PSG Group. Craig has over ten years experience in Asset Management, Capital Markets and Investment Banking with International Banks and Hermes Asset Management. During this period he was responsible for raising new assets, as well as management of assets in excess of ZAR10 billion.

Craig has developed a strong passion for the Renewable Energy sector and the multitude of opportunities the sector presents for the African continent, and is exploiting the various opportunities the sector presents.

A founding partner of Atlantic Energy Partners, Craig manages the deal flow of the firm, as well as project and finance oversight.

ANTHONY DE GRAAF
B.Bus Sci (Finance hons), CA(SA)

Prior to moving full time into the renewables energy sector in 2011, Anthony held the position of Senior Audit Manager during his nine year tenor at Mazars, a global audit and advisory firm.

Anthony has been consulting to various parties in the Renewable Energy industry since 2009, focusing on facilitating the due diligence, transactional structures, and project management of several wind and solar energy facilities.

He has supported key developers in the RE industry including three successful REIPPPP projects totalling 284MW. He has managed and assisted with full permitting of numerous RE projects in both wind and solar technologies. His strengths include financial controls and commercial strategy alignment of clients, suppliers and the projects. He has a strong knowledge of the South African legal, tax, accounting, financial reporting, exchange control, and secretarial compliance frameworks.

ATLANTIC ENERGY PARTNERS

KEY TEAM MEMBERS AND CREDENTIALS

DAVID PENKE
BSc Elec-Mech Eng (UCT), PGDip Proj Man (UCT),
Pr Eng (ECSA), MSAIMechE

David started his career at a nuclear consultancy company, providing specialist project services primarily to the nuclear power industry.

In 2008 David joined a JSE-listed Construction Group in an engineering and project management capacity on major mining and renewable energy projects, with specific experience gained in EPC and EPCM contracting methodologies.

In 2011 he was appointed project manager for bidding the renewable energy project pipeline for a major consortium, and successfully led the team to preferred bidder status for two projects. In January 2013 David joined a Renewable Energy company where he headed up development operations for a distinguished renewable energy pipeline. He was part of a team who has successfully developed and sold projects to a number of listed international utilities and infrastructure groups.

A founding partner of AEP, David manages the overall technical development and programme management for the company.

LOUISE ERASMUS
B.Com, MBA (UCT GSB)

Louise's career commenced in the venture capital industry where she raised seed capital for new ventures, following which she executed pricing and customer strategies to successfully expand a multi-national company's footprint in South Africa and the greater SADC venture markets.

Louise holds an MBA from the University of Cape Town's Graduate School of Business, where she specialised in sustainable investments, developments, and enterprises in Africa. In 2012 she furthered her specialisation through joining the University of Stellenbosch's Sustainability Institute, reading her Masters in Renewable Energy studies.

With an in-depth South African REIPPPP bidding experience and rooftop expertise, Louise is a founding member of AEP and manages the firms operations.

ATLANTIC ENERGY PARTNERS

Annexure - 11

Certificate of Incorporation & Memorandum and Articles of Association

A034055

SECP

SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

COMPANY REGISTRATION OFFICE

CERTIFICATE OF INCORPORATION

[Under section 16 of the Companies Act, 2017 (XIX of 2017)]

Corporate Universal Identification No. 0111656

I hereby certify that **KULACHI SOLAR POWER (PRIVATE) LIMITED** is this day incorporated under the Companies Act, 2017 (XIX of 2017) and that the company is **limited by shares.**

Given under my hand at **Islamabad** this **Fourteenth** day of **September,** Two **Thousand** and **Seventeen.**

Incorporation fee Rs. **1000.0/=** only

Company Registration Office Islamabad
SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN
SECP

Khalida

(Khalida Perveen)
Joint Registrar
Islamabad

CERTIFIED TO BE TRUE COPY

23-11-2017

Additional Joint Registrar
Company Registration Office Islamabad

COMPANIES ACT, 2017

(PRIVATE COMPANY LIMITED BY SHARES)

Memorandum of Association
of

KULACHI SOLAR POWER (PRIVATE) LIMITED.

1. The name of the company is KULACHI SOLAR POWER (PRIVATE) LIMITED (**"Company"**).

2. The Registered Office of the Company will be situated in the Islamabad capital territory.

3. (i) The principal line of business of the company shall be to Construct, Erect, Build and Operate a 50 MW Solar Power plant at Kulachi, Khyber Pukhtunkhwa province of Pakistan.

   (ii) Except for the businesses mentioned in sub-clause (iii) hereunder, the Company shall engage in all the lawful businesses and shall be authorized to take all necessary steps and actions in connection therewith and ancillary thereto.

   (iii) Notwithstanding anything contained in the foregoing sub-clauses of this clause nothing contained herein shall be construed as empowering the Company to undertake or indulge, directly or indirectly in the business of a Banking Company, Non-banking Finance Company (Mutual Fund, Leasing, Investment Company, Investment Advisor, Real Estate Investment Trust management company, Housing Finance Company, Venture Capital Company, Discounting Services, Microfinance or Microcredit business), Insurance Business, Modaraba management company, Stock Brokerage business, forex, real estate business, managing agency, business of providing the services of security guards or any other business restricted under any law for the time being in force or as may be specified by the Commission.

   (iv) It is hereby undertaken that the Company shall not:

      (a) Engage in any of the business mentioned in sub-clause (iii) above or any unlawful operation;

(b) launch multi-level marketing (MLM), Pyramid and Ponzi Schemes, or other related activities/businesses or any lottery business;

(c) engage in any of the permissible business unless the requisite approval, permission, consent or license is obtained from competent authority as may be required under any law for the time being in force.

4. The liability of the members is limited.

5. The Authorized Capital of the Company is Rs. 100,000/- (Rupees One Hundred Thousand only) divided into 10,000 (Ten Thousands) ordinary shares of Rs. 10/- (Rupees Ten only) each.

We, the several persons whose name and address are subscribed, are desirous of being formed into a company, in pursuance of this **Memorandum of Association**, and I hereby agree to take the number of shares in the capital of the company set opposite my name

S. No.	Name and Surname (present & former) in full (in Block Letters)	CNIC No. (in case of foreigner Passport No.)	Father's/ Husband's Name in full	Nationality(ies)	Occupation	Residential address in full	Number of shares taken by each subscriber	Signatures
1	ALTERNATIVE GRID NORTH AFRICA LIMITED	INCORPORATION NO. 565720				LERNIHAN O' NEILL SOLICITORS 6 TERENURE ROAD EAST, RATHGAR VILLAGE, DUBLIN 6, IRELAND	19 (NINTEEN)	
	(THROUGH ITS NOMINEE MR. JAMES DOYLE)	LT8444912	MICHAEL DOYLE	IRISH	BUSINESS	HILLFIELD HOUSE, DROMIN, FOSSA, KILLARNEY, CO KERRY IRELAND		
2.	Mr. JAMES DOYLE	LT8444912	MICHAEL DOYLE	IRISH	BUSINESS	HILLFIELD HOUSE, DROMIN, FOSSA, KILLARNEY, CO KERRY IRELAND	01 (ONE)	
3.	H1 HOLDINGS (PTY) LIMITED	INCORPORTION NO 1996/005471/07				MOORINGS 3, PORTSWOOD RIDGE, PORTSWOOD ROAD, V&A, WATERFRONT, WESTREN CAPE TOWN, 8002, SOUTH AFRICA.	49 (FOURTY NINE)	
	(THROUGH ITS NOMINEE REYBURN LARS HENDRICKS)	M00209560	PHINES HENDRICKS	SOUTH AFRICAN	BUSINESS	258 OCEAN VIEW DRIVE, BANTRY BAY, 8005 CAPE TOWN, SOUTH AFRICA		

4.	REYBURN LARS HENDRICKS	M00209560	PHINES HENDRICKS	SOUTH AFRICAN	BUSINESS	258 OCEAN VIEW DRIVE, BANTRY BAY, 8005 CAPE TOWN, SOUTH AFRICA.	01 (ONE)	
5.	TARGET ENERGY (PRIVATE) LIMITED (THROUGH ITS NOMINEE SALIM KHAN)	INCORPORATION NO. 0094856 17301-5564690-3	HUSSAIN KHAN	PAKISTANI	BUSINESS	7TH FLOOR, GREEN TRUST TOWER, JINNAH AVENUE ISLAMABAD HOUSE 76-A, STREET 17, SECTOR F-6/2, ISLAMABAD	09 (NINE)	
6.	SALIM KHAN	17301-5564690-3	HUSSAIN KHAN	PAKISTANI	BUSINESS	HOUSE 76-A, STREET 17, SECTOR F-6/2, ISLAMABAD	01 (ONE)	
7.	ATLANTIC RENEWABLE ENERGY PARTNERS (Pty) LTD. (THROUGH ITS NOMINEE CRAIG MALCOLM STANLEY)	INCORPORATION NO 2014/078624/07 483544323	MALCOLM STANLEY	SOUTH AFRICAN	BUSINESS	101 BLOCK A, WEST QUAY BUILDING 7 WEST QUAY ROAD, WATERFRONT, 8001, CAPE TOWN, SOUTHAFRICA NO 9 QUARRY HILL ROAD, TAMBOERSKLOOF, CAPE TOWN, 8001, SOUTH AFRICA.	19 (NINETEEN)	
8.	CRAIG MALCOLM STANLEY	483544323	MALCOLM STANLEY	SOUTH AFRICAN	BUSINESS	NO 9 QUARRY HILL ROAD, TAMBOERSKLOOF, CAPE TOWN, 8001, SOUTH AFRICA.	01(ONE)	

Total number of shares taken **100 (ONE HUNDRED)**

Dated the 13th DAY OF SEPTEMBER, 2017

Company Registration Office Islamabad SECURITIES ...

CERTIFIED TO BE TRUE COPY

27-03-2018

33394
28.3.2018

Additional Joint Registrar
Company Registration Office Islamabad

THE COMPANIES ACT, 2017 (XIX of 2017)

(Private Company Limited by Shares)

ARTICLES OF ASSOCIATION

OF

KULACHI SOLAR POWER (PRIVATE)LIMITED

1. The Regulations contained in Table 'A' to the First Schedule to the Companies Act, 2017 (the "Act") shall be the regulations of **KULACHI SOLAR POWER (PRIVATE) LIMITED** the "Company") so far as these are applicable to a private company.

PRIVATE COMPANY

2. The Company is a "Private Company" within the meaning of Section 2(1)(49) of the Act and accordingly:

(1) No invitation shall be made to the public to subscribe for the shares or debentures of the Company.

(2) The number of the members of the Company (exclusive of persons in the employment of the Company), shall be limited to fifty, provided that for the purpose of this provision, where two or more persons hold one or more shares in the company jointly, they shall be treated as single member; and

(3) The right to transfer shares of the Company is restricted in the manner and to the extent herein appearing.

TRANSFER OF SHARES

3. A member desirous to transfer any of his shares shall first offer such shares for sale or gift to the existing members and in case of their refusal to accept the offer, such shares may be transferred to any other person, as proposed by the transferor member, with the approval of the Board of Directors.

DIRECTORS

4. The number of directors shall not be less than two or a higher number as fixed under the provisions of the Act. The following persons shall be the first directors of the Company and shall hold the office upto the date of First Annual General Meeting:

1. **MR. JAMES DOYLE (NOMINEE DIRECTOR ALTERNATE GRID NORTH AFRICA LIMITED.**
2. **REYBURN LARS HENDRICKS (NOMINEE DIRECTOR H1 HOLDINGS (PTY) LIMITED.**
3. **SALIM KHAN (NOMINEE DIRECTOR TARGET ENERGY (PRIVATE) LIMITED.**
4. **CRAIG MALCOLM STANLEY (NOMINEE DIRECTOR ATLANTIC RENEWABLE ENERGY PARTNER (PTY) LTD.**

Company Registration Office Islamabad
SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

We, the several persons whose names and addresses are subscribed below, are desirous of being formed into a company, in pursuance of these articles of association, and we respectively agreeto take the number of shares in the capital of the company set opposite our respective names:

S. No.	Name and Surname (present & former) in full (in Block Letters)	NIC No. (in case of foreigner, Passport No.)	Father's/ Husband's Name in full	Nationality (ies) with any former Nationality	Occupation	Residential address in full	Number of shares taken by each subscriber	Signatures
1	ALTERNATIVE GRID NORTH AFRICA LIMITED	INCORPORATION NO. 565720				LERNIHAN O' NEILL SOLICITORS 6 TERENURE ROAD EAST, RATHGAR VILLAGE, DUBLIN 6, IRELAND	19 (NINTEEN) .	
	(THROUGH ITS NOMINEE MR. JAMES DOYLE)	LT8444912	MICHAEL DOYLE	IRISH	BUSINESS	HILLFIELD HOUSE, DROMIN, FOSSA, KILLARNEY, CO KERRY IRELAND		
2.	Mr. JAMES DOYLE	LT8444912	MICHAEL DOYLE	IRISH	BUSINESS	HILLFIELD HOUSE, DROMIN, FOSSA, KILLARNEY, CO KERRY IRELAND	01 (ONE)	
3.	H1 HOLDINGS (PTY) LIMITED	INCORPORTION NO 1996/005471/07				MOORINGS 3, PORTSWOOD RIDGE, PORTSWOOD ROAD, V&A, WATERFRONT, WESTREN CAPE TOWN, 8002, SOUTH AFRICA.	49 (FOURTY NINE)	
	(THROUGH ITS NOMINEE REYBURN LARS HENDRICKS)	M00209560	PHINES HENDRICKS	SOUTH AFRICAN	BUSINESS	258 OCEAN VIEW DRIVE, BANTRY BAY, 8005 CAPE TOWN, SOUTH AFRICA		

4.	REYBURN LARS HENDRICKS	M00209560	PHINES HENDRICKS	SOUTH AFRICAN	BUSINESS	258 OCEAN VIEW DRIVE, BANTRY BAY, 8005 CAPE TOWN, SOUTH AFRICA.	01 (ONE)
5.	TARGET ENERGY (PRIVATE) LIMITED (THROUGH ITS NOMINEE SALIM KHAN)	INCORPORATION NO. 0094856 17301-5564690-3	 HUSSAIN KHAN	 PAKISTANI	 BUSINESS	7TH FLOOR, GREEN TRUST TOWER, JINNAH AVENUE ISLAMABAD HOUSE 76-A, STREET 17, SECTOR F-6/2, ISLAMABAD	09 (NINE)
6.	SALIM KHAN	17301-5564690-3	HUSSAIN KHAN	PAKISTANI	BUSINESS	HOUSE 76-A, STREET 17, SECTOR F-6/2, ISLAMABAD	01 (ONE)
7.	ATLANTIC RENEWABLE ENERGY PARTNERS (Pty) LTD. (THROUGH ITS NOMINEE CRAIG MALCOLM STANLEY)	INCORPORATION NO 2014/078624/07 483544323	 MALCOLM STANLEY	 SOUTH AFRICAN	 BUSINESS	101 BLOCK A, WEST QUAY BUILDING 7 WEST QUAY ROAD, WATERFRONT, 8001, CAPE TOWN, SOUTHAFRICA NO 9 QUARRY HILL ROAD, TAMBOERSKLOOF, CAPE TOWN, 8001, SOUTH AFRICA.	19 (NINETEEN)
8.	CRAIG MALCOLM STANLEY	483544323	MALCOLM STANLEY	SOUTH AFRICAN	BUSINESS	NO 9 QUARRY HILL ROAD, TAMBOERSKLOOF, CAPE TOWN, 8001, SOUTH AFRICA.	01(ONE)

Total number of shares taken **100 (ONE HUNDRED)**

Dated the 13th DAY OF SEPTEMBER, 2017

CERTIFIED TO BE TRUE COPY

27-03-2018

Additional Joint Registrar
Company Registration Office Islamabad

33394
28.3.2018

Annexure - 12

Last Three Years Financial Statement

H1 HOLDINGS PROPRIETARY LIMITED
(Registration number 1996/005471/07)
Annual Financial Statements
for the year ended 30 June 2017

These annual financial statements have been audited in compliance with the applicable requirements of the Companies Act 71 of 2008.

General Information

Country of incorporation and domicile	South Africa
Nature of business and principal activities	Investment
Directors	RL Hendricks LI Jacobs CC Hendricks
Registered office	Moorings 3 - Portswood Ridge Portswood Road V and A Waterfront Western Cape 8002
Business address	Moorings 3 - Portswood Ridge Portswood Road V and A Waterfront Western Cape 8002
Postal address	PO Box 50095 Waterfront Western Cape 8002
Bankers	Investec Limited
Auditors	Cecil Kilpin & Co. Chartered Accountants (S.A.) Registered Auditors
Company registration number	1996/005471/07
Tax reference number	9645/006/03/3

Index

The reports and statements set out below comprise the annual financial statements presented to the shareholders:

Independent Auditor's Report

To the shareholders of H1 Holdings Proprietary Limited

Opinion

We have audited the annual financial statements of H1 Holdings Proprietary Limited set out on pages 8 to 25, which comprise the Statement of Financial Position as at 30 June 2017, and the Statement of Comprehensive Income, Statement of Changes in Equity and Statement of Cash Flows for the year then ended, and notes to the annual financial statements, including a summary of significant accounting policies.

In our opinion, the annual financial statements present fairly, in all material respects, the financial position of H1 Holdings Proprietary Limited as at 30 June 2017, and its financial performance and cash flows for the year then ended in accordance with International Financial Reporting Standard for Small and Medium-sized Entities and the requirements of the Companies Act 71 of 2008.

Basis for opinion

We conducted our audit in accordance with International Standards on Auditing. Our responsibilities under those standards are further described in the Auditor's Responsibilities for the Audit of the annual financial statements section of our report. We are independent of the company in accordance with the Independent Regulatory Board for Auditors Code of Professional Conduct for Registered Auditors (IRBA Code) and other independence requirements applicable to performing audits of financial statements in South Africa. We have fulfilled our other ethical responsibilities in accordance with the IRBA Code and in accordance with other ethical requirements applicable to performing audits in South Africa. The IRBA Code is consistent with the International Ethics Standards Board for Accountants Code of Ethics for Professional Accountants (Parts A and B). We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Other Information

The directors are responsible for the other information. The other information comprises the Directors' Report as required by the Companies Act 71 of 2008, which we obtained prior to the date of this report, and the supplementary information set out on pages 26 to 27. Other information does not include the annual financial statements and our auditor's report thereon.

Our opinion on the annual financial statements does not cover the other information and we do not express an audit opinion or any form of assurance conclusion thereon.

In connection with our audit of the annual financial statements, our responsibility is to read the other information and, in doing so, consider whether the other information is materially inconsistent with the annual financial statements or our knowledge obtained in the audit, or otherwise appears to be materially misstated. If, based on the work we have performed, we conclude that there is a material misstatement of this other information, we are required to report that fact. we have nothing to report in this regard.

Responsibilities of the directors for the Annual Financial Statements

The directors are responsible for the preparation and fair presentation of the annual financial statements in accordance with International Financial Reporting Standard for Small and Medium-sized Entities and the requirements of the Companies Act 71 of 2008, and for such internal control as the directors determine is necessary to enable the preparation of annual financial statements that are free from material misstatement, whether due to fraud or error.

In preparing the annual financial statements, the directors are responsible for assessing the company's ability to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the company or to cease operations, or have no realistic alternative but to do so.

PARTNERS: N NYBACK CA (SA), RA | M BRANDERS CA (SA), RA | S SCHONEGEVEL CA (SA), RA | M SPENCER CA (SA), RA | D COX CA (SA), RA
TAX: E CONRADIE B.COMPT (HONS), PG.DIP (TAX) | CONSULTANT: A MINNÉ
1 Waterford Mews, Century Boulevard, Century City, 7441 PO Box 74, Century City, 7446 Docex 21, Century City
Tel: 021 527 4060 Fax: 021 551 0508 Email: info@cecilkilpin.co.za Website: www.cecilkilpin.co.za

Cecil Kilpin & Co. Established 1902

Chartered Accountants (SA)

Independent Auditor's Report

Auditor's responsibilities for the audit of the Annual Financial Statements

Our objectives are to obtain reasonable assurance about whether the annual financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with International Standards on Auditing will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these annual financial statements.

As part of an audit in accordance with International Standards on Auditing, we exercise professional judgement and maintain professional scepticism throughout the audit. We also:

- Identify and assess the risks of material misstatement of the annual financial statements, whether due to fraud or error, design and perform audit procedures responsive to those risks, and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion. The risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Obtain an understanding of internal control relevant to the audit in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the company's internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by the directors.
- Conclude on the appropriateness of the directors' use of the going concern basis of accounting and based on the audit evidence obtained, whether a material uncertainty exists related to events or conditions that may cast significant doubt on the company's ability to continue as a going concern. If we conclude that a material uncertainty exists, we are required to draw attention in our auditor's report to the related disclosures in the annual financial statements or, if such disclosures are inadequate, to modify our opinion. Our conclusions are based on the audit evidence obtained up to the date of our auditor's report. However, future events or conditions may cause the company to cease to continue as a going concern.
- Evaluate the overall presentation, structure and content of the annual financial statements, including the disclosures, and whether the annual financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

We communicate with the directors regarding, among other matters, the planned scope and timing of the audit and significant audit findings, including any significant deficiencies in internal control that we identify during our audit.

Cecil Kilpin & Co

Cecil Kilpin & Co.
Registered Auditors
Per Partner: M Branders

Century City
Date: 26 October 2017

PARTNERS: N NYBACK CA (SA), RA | M BRANDERS CA (SA), RA | S SCHONEGEVEL CA (SA), RA | M SPENCER CA (SA), RA | D COX CA (SA), RA
TAX: E CONRADIE B.COMPT (HONS), PG.DIP (TAX) | CONSULTANT: A MINNÉ
1 Waterford Mews, Century Boulevard, Century City, 7441 PO Box 74, Century City, 7446 Docex 21, Century City
Tel: 021 527 4060 Fax: 021 551 0508 Email: info@cecilkilpin.co.za Website: www.cecilkilpin.co.za

Directors' Responsibilities and Approval

The directors are required by the Companies Act 71 of 2008, to maintain adequate accounting records and are responsible for the content and integrity of the annual financial statements and related financial information included in this report. It is their responsibility to ensure that the annual financial statements fairly present the state of affairs of the company as at the end of the financial year and the results of its operations and cash flows for the period then ended, in conformity with the International Financial Reporting Standard for Small and Medium-sized Entities. The external auditors are engaged to express an independent opinion on the annual financial statements.

The annual financial statements are prepared in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities and are based upon appropriate accounting policies consistently applied and supported by reasonable and prudent judgements and estimates.

The directors acknowledge that they are ultimately responsible for the system of internal financial control established by the company and place considerable importance on maintaining a strong control environment. To enable the directors to meet these responsibilities, the board sets standards for internal control aimed at reducing the risk of error or loss in a cost effective manner. The standards include the proper delegation of responsibilities within a clearly defined framework, effective accounting procedures and adequate segregation of duties to ensure an acceptable level of risk. These controls are monitored throughout the company and all employees are required to maintain the highest ethical standards in ensuring the company's business is conducted in a manner that in all reasonable circumstances is above reproach. The focus of risk management in the company is on identifying, assessing, managing and monitoring all known forms of risk across the company. While operating risk cannot be fully eliminated, the company endeavours to minimise it by ensuring that appropriate infrastructure, controls, systems and ethical behaviour are applied and managed within predetermined procedures and constraints.

The directors are of the opinion, based on the information and explanations given by management, that the system of internal control provides reasonable assurance that the financial records may be relied on for the preparation of the annual financial statements. However, any system of internal financial control can provide only reasonable, and not absolute, assurance against material misstatement or loss.

The directors have reviewed the company's cash flow forecast for the year to 30 June 2018 and, in the light of this review and the current financial position, they are satisfied that the company has or has access to adequate resources to continue in operational existence for the foreseeable future.

The external auditors are responsible for independently auditing and reporting on the company's annual financial statements. The annual financial statements have been examined by the company's external auditors and their report is presented on page 3.

The annual financial statements set out on pages 6 to 27, which have been prepared on the going concern basis, were approved and were signed on its behalf by:

Approval of financial statements

RL Hendricks

Century City

Date: 26 October 2017

Directors' Report

The directors have pleasure in submitting their report on the annual financial statements of H1 Holdings Proprietary Limited for the year ended 30 June 2017.

1. Nature of business

H1 Holdings Proprietary Limited was incorporated in South Africa with interests in the Investment holding industry. The company operates in South Africa.

There have been no material changes to the nature of the company's business from the prior year.

2. Review of financial results and activities

The annual financial statements have been prepared in accordance with International Financial Reporting Standard for Small and Medium-sized Entities and the requirements of the Companies Act 71 of 2008. The accounting policies have been applied consistently compared to the prior year.

Full details of the financial position, results of operations and cash flows of the company are set out in these annual financial statements.

3. Share capital

	2017	2016
	Number of shares	
Authorised		
Ordinary shares	10,000	10,000

	2017	2016
	Number of shares	
Issued		
Ordinary shares	7,810	8,129

Refer to note 10 of the annual financial statements for detail of the movement in authorised and issued share capital.

4. Dividends

The dividends already declared and paid to the shareholders during the year are as reflected in the statement of changes in equity, once the appropriate approval was granted by the board.

The local dividends tax rate increased from 15% to 20% for any dividend paid on or after 22 February 2017.

5. Directors

The directors in office at the date of this report are as follows:

Directors
RL Hendricks
LI Jacobs
CC Hendricks

There have been no changes to the directorate for the period under review.

6. Property, plant and equipment

There was no change in the nature of the property, plant and equipment of the company or in the policy regarding their use.

At 30 June 2017 the company's investment in property, plant and equipment amounted to R518,321 (2016: R196,046), of which R465,277 (2016: R61,296) was added in the current year through additions.

Directors' Report

7. Interests in subsidiaries, associates and joint arrangements

Details of material interests in subsidiary companies, associates and joint arrangements are presented in the annual financial statements in notes 3 and 4.

There were no significant acquisitions or divestitures during the year ended 30 June 2017.

8. Events after the reporting period

The directors are not aware of any material event which occurred after the reporting date and up to the date of this report.

9. Auditors

Cecil Kilpin & Co. continued in office as auditors for the company for 2017.

At the AGM, the shareholders will be requested to reappoint Cecil Kilpin & Co. as the independent external auditors of the company and to confirm Mr M Branders as the designated lead audit partner for the 2018 financial year.

10. Secretary

The company had no secretary for the financial year.

11. Liquidity and solvency

The directors have performed the required liquidity and solvency tests required by the Companies Act 71 of 2008.

Statement of Financial Position as at 30 June 2017

	Note(s)	2017 R	2016 R
Assets			
Non-Current Assets			
Property, plant and equipment	2	518,321	196,046
Investments in subsidiaries	3	59,650	58,850
Investments in associates	4	77,778	77,778
Loans to group companies	5	118,064,288	93,358,294
Other financial assets	6	73,481,183	77,176,829
Deferred tax	7	35,338	-
		192,236,558	**170,867,797**
Current Assets			
Trade and other receivables	8	12,988,139	163,980
Current tax receivable		275,914	-
Cash and cash equivalents	9	37,041,143	110,290,684
		50,305,196	**110,454,664**
Total Assets		**242,541,754**	**281,322,461**
Equity and Liabilities			
Equity			
Share capital	10	512,241	512,560
Reserves	11	15,261,848	26,868,425
Retained income		224,487,048	236,062,727
		240,261,137	**263,443,712**
Liabilities			
Non-Current Liabilities			
Deferred tax	7	11,805	-
Current Liabilities			
Trade and other payables	12	2,229,318	6,498,653
Loans from shareholders	13	39,494	8,302
Current tax payable		-	694,676
Dividend payable		-	10,677,118
		2,268,812	**17,878,749**
Total Liabilities		**2,280,617**	**17,878,749**
Total Equity and Liabilities		**242,541,754**	**281,322,461**

Statement of Comprehensive Income

	Note(s)	2017 R	2016 R
Revenue	14	1,881,324	556,775
Other income		-	24,438,296
Operating expenses		(7,219,535)	(5,211,521)
Operating (loss) profit	15	**(5,338,211)**	**19,783,550**
Investment revenue	16	10,302,792	12,022,051
Finance costs	18	(4)	(4,921)
Profit before taxation		**4,964,577**	**31,800,680**
Taxation	19	(32,491)	(7,098,379)
Profit for the year		**4,932,086**	**24,702,301**
Other comprehensive income		-	-
Total comprehensive income for the year		**4,932,086**	**24,702,301**

Statement of Changes in Equity

	Share capital R	Share premium R	Total share capital R	Revaluation reserve R	Retained income R	Total equity R
Balance at 01 July 2015	**9,055**	**504,431**	**513,486**	**35,122,830**	**253,604,561**	**289,240,877**
Profit for the year	-	-	-	-	24,702,301	24,702,301
Other comprehensive income	-	-	-	(8,254,405)	-	(8,254,405)
Total comprehensive income for the year	**-**	**-**	**-**	**(8,254,405)**	**24,702,301**	**16,447,896**
Share buy-back (L Jacobs)	(926)	-	(926)	-	(28,244,135)	(28,245,061)
Dividends	-	-	-	-	(14,000,000)	(14,000,000)
Total changes	**(926)**	**-**	**(926)**	**-**	**(42,244,135)**	**(42,245,061)**
Balance at 01 July 2016	**8,129**	**504,431**	**512,560**	**26,868,425**	**236,062,727**	**263,443,712**
Profit for the year	-	-	-	-	4,932,086	4,932,086
Other comprehensive income	-	-	-	(11,606,577)	-	(11,606,577)
Total comprehensive income for the year	**-**	**-**	**-**	**(11,606,577)**	**4,932,086**	**(6,674,491)**
Share buy-back (L Jacobs)	(319)	-	(319)	-	(10,007,765)	(10,008,084)
Dividends	-	-	-	-	(6,500,000)	(6,500,000)
Total changes	**(319)**	**-**	**(319)**	**-**	**(16,507,765)**	**(16,508,084)**
Balance at 30 June 2017	**7,810**	**504,431**	**512,241**	**15,261,848**	**224,487,048**	**240,261,137**
Note(s)	10	10	10	11		

Statement of Cash Flows

	Note(s)	2017 R	2016 R
Cash flows from operating activities			
Cash receipts from customers		1,881,324	491,054
Cash paid to suppliers and employees		(24,170,027)	1,365,667
Cash (used in) generated from operations	21	(22,288,703)	1,856,721
Interest income		6,400,838	7,590,679
Dividends received		3,901,954	4,431,372
Finance costs		(4)	(4,921)
Tax paid	22	(1,026,614)	(6,011,920)
Net cash from operating activities		**(13,012,529)**	**7,861,931**
Cash flows from investing activities			
Purchase of property, plant and equipment	2	(465,277)	(61,296)
Net movement in group company loans		(24,705,994)	(11,465,762)
Net movement in financial assets		3,695,646	58,574,229
Purchase of shares in subsidiaries		(800)	-
Net movement in revaluation reserve		(11,606,576)	(8,254,406)
Net cash from investing activities		**(33,083,001)**	**38,792,765**
Cash flows from financing activities			
Reduction of share capital or buy back of shares	10	(10,008,085)	(28,245,062)
Repayment of shareholders loan		31,192	8,302
Dividends paid	23	(17,177,118)	(3,322,882)
Net cash from financing activities		**(27,154,011)**	**(31,559,642)**
Total cash movement for the year		**(73,249,541)**	**15,095,054**
Cash at the beginning of the year		110,290,684	95,195,630
Total cash at end of the year	9	**37,041,143**	**110,290,684**

Accounting Policies

1. Presentation of annual financial statements

The annual financial statements have been prepared in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities, and the Companies Act 71 of 2008. The annual financial statements have been prepared on the historical cost basis, and incorporate the principal accounting policies set out below. They are presented in South African Rands.

These accounting policies are consistent with the previous period.

1.1 Significant judgements and sources of estimation uncertainty

In preparing the annual financial statements, management is required to make judgements, estimates and assumptions that affect the amounts represented in the annual financial statements and related disclosures. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results in the future could differ from these estimates which may be material to the annual financial statements.

Key sources of estimation uncertainty

Residual values and useful lives of property, plant and equipment

Property, plant and equipment are depreciated over the useful lives of the assets, taking into account the residual value. Useful lives and residual value is determined on a yearly basis. Useful lives are influenced by development in technology, maintenance programs and future productivity. The future market situation, including the cost to sell the assets, determines the residual values. The residual values and useful lives of assets are based on management estimates. Depreciation is calculated on a straight line basis. This method does not necessarily represent the actual use of the asset.

Impairment testing

The company reviews and tests the carrying value of property, plant and equipment when events or changes in circumstances suggest that the carrying amount may not be recoverable. When such indicators exist, management determine the recoverable amount by performing value in use and fair value calculations. These calculations require the use of estimates and assumptions. When it is not possible to determine the recoverable amount for an individual asset, management assesses the recoverable amount for the cash generating unit to which the asset belongs.

1.2 Property, plant and equipment

Property, plant and equipment are tangible items that are held for use in the production or supply of goods or services, or for rental to others or for administrative purposes; and are expected to be used during more than one period.

Property, plant and equipment is carried at cost less accumulated depreciation and accumulated impairment losses.

Cost include costs incurred initially to acquire or construct an item of property, plant and equipment and costs incurred subsequently to add to, replace part of, or service it. If a replacement cost is recognised in the carrying amount of an item of property, plant and equipment, the carrying amount of the replaced part is derecognised.

Depreciation is provided using the straight-line method to write down the cost, less estimated residual value over the useful life of the property, plant and equipment as follows:

Item	Depreciation method	Average useful life
Furniture and fixtures	Straight line	5 years
Motor vehicles	Straight line	5 years
Office equipment	Straight line	5 years
IT equipment	Straight line	3 years
Computer software	Straight line	3 years

If the major components of an item of property, plant and equipment have significantly different patterns of consumption of economic benefits, the cost of the asset is allocated to its major components and each such component is depreciated separately over its useful life.

The residual value, depreciation method and useful life of each asset are reviewed only where there is an indication that there has been a significant change from the previous estimate.

Accounting Policies

1.2 Property, plant and equipment (continued)

Gains and losses on disposals are recognised in profit or loss.

1.3 Investments in subsidiaries

Investments in subsidiaries are measured at cost less any accumulated impairment losses.

1.4 Investments in associates

Investments in associates are measured at cost less accumulated impairment losses, except for investments in associates for which there is a published price quotation, which are measured at fair value with changes to fair value recognised in profit or loss.

1.5 Financial instruments

Initial measurement

Financial instruments are initially measured at the transaction price (including transaction costs except in the initial measurement of financial assets and liabilities that are measured at fair value through profit or loss) unless the arrangement constitutes, in effect, a financing transaction in which case it is measured at the present value of the future payments discounted at a market rate of interest for a similar debt instrument.

Financial instruments at amortised cost

These include loans, trade receivables and trade payables. Those debt instruments which meet the criteria in section 11.8(b) of the standard, are subsequently measured at amortised cost using the effective interest method. Debt instruments which are classified as current assets or current liabilities are measured at the undiscounted amount of the cash expected to be received or paid, unless the arrangement effectively constitutes a financing transaction.

At each reporting date, the carrying amounts of assets held in this category are reviewed to determine whether there is any objective evidence of impairment. If there is objective evidence, the recoverable amount is estimated and compared with the carrying amount. If the estimated recoverable amount is lower, the carrying amount is reduced to its estimated recoverable amount, and an impairment loss is recognised immediately in profit or loss.

Financial instruments at cost

Commitments to receive a loan are measured at cost less impairment.

Equity instruments that are not publicly traded and whose fair value cannot otherwise be measured reliably are measured at cost less impairment.

Financial instruments at fair value

All other financial instruments, including equity instruments that are publicly traded or whose fair value can otherwise be measured reliably, are measured at fair value through profit and loss.

1.6 Tax

Current tax assets and liabilities

Current tax for current and prior periods is, to the extent unpaid, recognised as a liability. If the amount already paid in respect of current and prior periods exceeds the amount due for those periods, the excess is recognised as an asset.

The tax liability reflects the effect of the possible outcomes of a review by the tax authorities.

Accounting Policies

1.6 Tax (continued)

Deferred tax assets and liabilities

A deferred tax liability is recognised for all taxable temporary differences.

A deferred tax asset is recognised for all deductible temporary differences and for the carry forward of unused tax losses and unused tax credits.

Deferred tax assets and liabilities are measured at an amount that includes the effect of the possible outcomes of a review by the tax authorities using tax rates that, on the basis of enacted or substantively enacted tax law at the end of the reporting period, are expected to apply when the deferred tax asset is realised or the deferred tax liability is settled.

Deferred tax asset balances are reviewed at every reporting date. When necessary, a valuation allowance is recognised against the deferred tax assets so that the net amount equals the highest amount that is more likely than not to be realised on the basis of current or future taxable profit.

Tax expenses

Tax expense is recognised in the same component of total comprehensive income or equity as the transaction or other event that resulted in the tax expense.

1.7 Leases

A lease is classified as a finance lease if it transfers substantially all the risks and rewards incidental to ownership to the lessee. All other leases are operating leases.

Operating leases – lessee

Operating lease payments are recognised as an expense in the period in which they are incurred.

1.8 Impairment of assets

The company assesses at each reporting date whether there is any indication that property, plant and equipment may be impaired.

If there is any such indication, the recoverable amount of any affected asset (or group of related assets) is estimated and compared with its carrying amount. If the estimated recoverable amount is lower, the carrying amount is reduced to its estimated recoverable amount, and an impairment loss is recognised immediately in profit or loss.

If an impairment loss subsequently reverses, the carrying amount of the asset (or group of related assets) is increased to the revised estimate of its recoverable amount, but not in excess of the amount that would have been determined had no impairment loss been recognised for the asset (or group of assets) in prior years. A reversal of impairment is recognised immediately in profit or loss.

1.9 Share capital and equity

An equity instrument is any contract that evidences a residual interest in the assets of an entity after deducting all of its liabilities.

If the company reacquires its own equity instruments, those instruments are deducted from equity. No gain or loss is recognised in profit or loss on the purchase, sale, issue or cancellation of the company's own equity instruments. Consideration paid or received shall be recognised directly in equity.

Accounting Policies

1.10 Employee benefits

Short-term employee benefits

The cost of short-term employee benefits, (those payable within 12 months after the service is rendered, such as leave pay and sick leave, bonuses, and non-monetary benefits such as medical care), are recognised in the period in which the service is rendered and are not discounted.

Defined contribution plans

Payments to defined contribution retirement benefit plans are charged as an expense as they fall due.

1.11 Provisions and contingencies

Provisions are recognised when the company has an obligation at the reporting date as a result of a past event; it is probable that the company will be required to transfer economic benefits in settlement; and the amount of the obligation can be estimated reliably.

Provisions are measured at the present value of the amount expected to be required to settle the obligation using a pre-tax rate that reflects current market assessments of the time value of money and the risks specific to the obligation. The increase in the provision due to the passage of time is recognised as interest expense.

Provisions are not recognised for future operating losses.

Contingent assets and contingent liabilities are not recognised.

1.12 Revenue

Revenue is recognised to the extent that the company has transferred the significant risks and rewards of ownership of goods to the buyer, or has rendered services under an agreement provided the amount of revenue can be measured reliably and it is probable that economic benefits associated with the transaction will flow to the company. Revenue is measured at the fair value of the consideration received or receivable, excluding sales taxes and discounts.

Interest is recognised, in profit or loss, using the effective interest rate method.

Dividends are recognised, in profit or loss, when the company's right to receive payment has been established.

1.13 Borrowing costs

Borrowing costs are recognised as an expense in the period in which they are incurred.

Notes to the Annual Financial Statements

	2017	2016
	R	R

2. Property, plant and equipment

	2017			2016		
	Cost	Accumulated depreciation	Carrying value	Cost	Accumulated depreciation	Carrying value
Furniture and fixtures	23,540	(3,531)	20,009	-	-	-
Motor vehicles	365,801	(48,628)	317,173	-	-	-
Office equipment	193,361	(101,366)	91,995	185,150	(63,652)	121,498
IT equipment	207,990	(121,807)	86,183	140,266	(75,248)	65,018
Computer software	19,711	(16,750)	2,961	19,711	(10,181)	9,530
Total	**810,403**	**(292,082)**	**518,321**	**345,127**	**(149,081)**	**196,046**

Reconciliation of property, plant and equipment - 2017

	Opening balance	Additions	Depreciation	Total
Furniture and fixtures	-	23,540	(3,531)	20,009
Motor vehicles	-	365,801	(48,628)	317,173
Office equipment	121,498	8,211	(37,714)	91,995
IT equipment	65,018	67,725	(46,560)	86,183
Computer software	9,530	-	(6,569)	2,961
	196,046	**465,277**	**(143,002)**	**518,321**

Reconciliation of property, plant and equipment - 2016

	Opening balance	Additions	Depreciation	Total
Office equipment	128,128	29,833	(36,463)	121,498
IT equipment	69,056	31,463	(35,501)	65,018
Computer software	16,100	-	(6,570)	9,530
	213,284	**61,296**	**(78,534)**	**196,046**

Notes to the Annual Financial Statements

	2017 R	2016 R

3. Investments in subsidiaries

Name of subsidiary	% holding 2017	% holding 2016	Carrying amount 2017	Carrying amount 2016
Business Venture Investments No. 1166 (Pty) Ltd	100.00 %	100.00 %	57,690	57,690
H1 Manco (Pty) Ltd	100.00 %	100.00 %	1,000	1,000
H1 Capital (Pty) Ltd	100.00 %	100.00 %	100	100
Northern Cape Casino Consultants Kairo (Pty) Ltd	60.00 %	60.00 %	60	60
H1 Infrastructure Partners (Pty) Ltd	100.00 %	- %	100	-
H1 Partners (Pty) Ltd	100.00 %	- %	100	-
H1 Infrastructure Capital (Pty) Ltd	100.00 %	- %	100	-
H2 Clean Energy (Pty) Ltd	100.00 %	- %	500	-
			59,650	58,850

All the entities are incorporated in South Africa and share the year end of the company.

The carrying amounts of subsidiaries are shown gross of impairment losses.

4. Investments in associates

Name of company	% holding 2017	% holding 2016	Carrying amount 2017	Carrying amount 2016
Mzansila Communications (Pty) Ltd	35.00 %	35.00 %	77,778	77,778

Fair values of equity accounted investments in associates are only presented when there are published price quotations.

All the entities are incorporated in South Africa and share the year end of the company.

The carrying amount of associates is shown gross of impairment losses.

Notes to the Annual Financial Statements

	2017 R	2016 R
5. Loans to (from) group companies		
Subsidiaries		
H1 Capital (Pty) Ltd	60,926,912	42,510,031
Business Venture Investments No. 1166 (Pty) Ltd	41,852,235	47,862,226
H1 Manco (Pty) Ltd	13,056,153	14,040
Vuselela Energy (Pty) Ltd	-	2,960,000
Bassap Ventures (Pty) Ltd	5,379	2,722
Eternity Power (RF) (Pty) Ltd	-	5,000
H1 Biomass (Pty) Ltd	5,743	4,275
Partner Education Services (Pty) Ltd	7,982	-
H1 Roggeveld Wind (Pty) Ltd	6,407	-
H1 Infrastructure Partners (Pty) Ltd	4,902	-
H1 Partners (Pty) Ltd	4,902	-
H1 Infrastructure Capital (Pty) Ltd	4,902	-
Ulco Clean Energy (Pty) Ltd	6,856	-
Vapotouch (Pty) Ltd	156,658	-
H2 Clean Energy (Pty) Ltd	2,025,257	-
	118,064,288	**93,358,294**

The loans are unsecured, bear interest at rates determined by the parties from time to time and have no fixed terms of repayment.

Notes to the Annual Financial Statements

	2017 R	2016 R
6. Other financial assets		
At fair value		
Listed shares	34,515,684	43,832,524
Unlisted shares	30,184,470	27,334,207
	64,700,154	**71,166,731**
At amortised cost		
Loan: iKineo (Pty) Ltd	6,010,097	6,010,098
The loan is unsecured, bears interest at rates determined by the parties from time to time and has no fixed terms of repayment.		
Wespin 32 (Pty) Ltd	2,770,932	-
The loan is unsecured, bears interest at prime rate plus 2% and has no fixed terms of repayment.		
	8,781,029	**6,010,098**
Total other financial assets	**73,481,183**	**77,176,829**
Non-current assets		
At fair value	64,700,154	71,166,731
At amortised cost	8,781,029	6,010,098
	73,481,183	**77,176,829**
Details of investments		
Listed - at fair value		
M1 Capital	22,803,186	23,530,861
Sygnia Limited	11,712,498	20,301,663
Unlisted - at cost		
Phuthuma Nathi	29,631,280	26,943,281
Sasol Inzalo	414,559	390,926
Cadiz Enterprise Development Fund	79,996	-
Cadiz Supplier Development Fund	58,636	-
	64,700,155	**71,166,731**

Notes to the Annual Financial Statements

	2017 R	2016 R
7. Deferred tax		
Deferred tax liability		
Prepayments	(11,805)	-
Deferred tax asset		
Provisions	35,338	-
Deferred tax liability	(11,805)	-
Deferred tax asset	35,338	-
Total net deferred tax asset	**23,533**	**-**
Reconciliation of deferred tax asset \ (liability)		
Taxable / (deductible) temporary difference on provisions	35,338	-
Taxable / (deductible) temporary difference on prepayments	(11,805)	-
	23,533	**-**
8. Trade and other receivables		
Trade receivables	12,786,936	30,026
Employee costs in advance	-	2,875
Prepayments	42,160	39,450
Deposits	159,043	59,280
VAT	-	32,349
	12,988,139	**163,980**
9. Cash and cash equivalents		
Cash and cash equivalents consist of:		
Cash on hand	4,000	2,000
Bank balances	70,734	184,826
Short-term deposits	36,966,409	110,103,858
	37,041,143	**110,290,684**
10. Share capital		
Authorised		
10,000 Ordinary shares of R1 each	10,000	10,000
Reconciliation of number of shares issued:		
Reported as at 01 July 2016 (01 July 2015)	8,129	9,055
Share buy-back	(319)	(926)
	7,810	**8,129**
Issued		
7,810 (2016: 8,129) Ordinary shares of R1 each	7,810	8,129
Share premium	504,431	504,431
	512,241	**512,560**

Notes to the Annual Financial Statements

	2017 R	2016 R
11. Revaluation reserve		
Revaluation of investments to market value	15,261,848	26,868,425
12. Trade and other payables		
Trade payables	3,959	3,961
VAT	38,075	-
Accruals	-	79,496
Provisions	2,187,284	6,415,196
	2,229,318	**6,498,653**
13. Loans to (from) shareholders		
LI Jacobs	(39,494)	(8,302)
The loan is unsecured, bears no interest and is repayable within 12 months.		
14. Revenue		
Sale of goods	1,881,324	556,775
15. Operating (loss) profit		
Operating (loss) profit for the year is stated after accounting for the following:		
Income from subsidiaries		
Dividends	-	4,431,372
Operating lease charges		
Premises		
• Contractual amounts	456,456	421,449
Other financial assets	-	24,438,296
Depreciation on property, plant and equipment	143,002	78,534
Employee costs	3,710,731	2,745,509
16. Investment revenue		
Dividend revenue		
Subsidiaries - Local	-	4,431,372
Listed financial assets - Local	580,048	-
Unlisted financial assets - Local	3,321,906	-
	3,901,954	**4,431,372**
Interest revenue		
Bank	6,390,333	7,590,679
Interest received - SARS	10,505	-
	6,400,838	**7,590,679**
	10,302,792	**12,022,051**

Notes to the Annual Financial Statements

	2017 R	2016 R

17. Profit on sale of shares

	2017 R	2016 R
Capital		
Profit on sale of shares - Bidvest	-	24,076,182
Profit on sale of shares - Hyprop	-	258,495
Loss on sale of shares - Stor-Age	-	(96,344)
Profit on sale of shares - Emira	-	359,121
Profit on sale of shares - Alexander Forbes	-	8,736
Profit on sale of shares - Sygnia	-	482,106
Loss on write off - PB Liquors	-	(650,000)
	-	**24,438,296**

18. Finance costs

	2017 R	2016 R
Non-current borrowings	4	64
Interest paid	-	4,857
	4	**4,921**

19. Taxation

Major components of the tax expense

	2017 R	2016 R
Current		
Local income tax - current period	972,979	6,607,812
Local income tax - recognised in current tax for prior periods	(916,955)	490,567
	56,024	**7,098,379**
Deferred		
Originating and reversing temporary differences	(23,533)	-
	32,491	**7,098,379**

Reconciliation of the tax expense

Reconciliation between accounting profit and tax expense.

	2017 R	2016 R
Accounting profit	4,964,577	31,800,680
Tax at the applicable tax rate of 28% (2016: 28%)	1,390,082	8,904,190
Tax effect of adjustments on taxable income		
Capital gains tax - exclusion @ 20%	-	(1,368,545)
Dividends received (Non-taxable income)	(1,092,547)	(1,240,784)
Prior year adjustments	(916,955)	490,567
Portion of expenses not tax deductible	651,911	312,951
	32,491	**7,098,379**

20. Auditor's remuneration

	2017 R	2016 R
Fees	35,000	60,400
Tax and secretarial services	2,249	-
	37,249	**60,400**

Notes to the Annual Financial Statements

	2017 R	2016 R
21. Cash (used in) generated from operations		
Profit before taxation	4,964,577	31,800,680
Adjustments for:		
Depreciation and amortisation	143,002	78,534
Profit on sale of assets	-	(24,438,296)
Dividends received	(3,901,954)	(4,431,372)
Interest received	(6,400,838)	(7,590,679)
Finance costs	4	4,921
Changes in working capital:		
Trade and other receivables	(12,824,159)	(65,721)
Trade and other payables	(4,269,335)	6,498,654
	(22,288,703)	**1,856,721**

	2017 R	2016 R
22. Tax paid		
Balance at beginning of the year	(694,676)	391,783
Current tax for the year recognised in profit (loss) or loss	(56,024)	(7,098,379)
Balance at end of the year	(275,914)	694,676
	(1,026,614)	**(6,011,920)**

	2017 R	2016 R
23. Dividends paid		
Balance at beginning of the year	(10,677,118)	-
Dividends	(6,500,000)	(14,000,000)
Balance at end of the year	-	10,677,118
	(17,177,118)	**(3,322,882)**

Notes to the Annual Financial Statements

	2017 R	2016 R

24. Related parties

Relationships

Shareholders	Reyburn Hendricks Family Trust
	LI Jacobs
Subsidiaries	Business Ventures Investments No. 1166 (Pty) Ltd
	H1 Capital (Pty) Ltd
	H1 Manco (Pty) Ltd
	Northern Cape Casino Consultants Kairo (Pty) Ltd
	H2 Clean Energy (Pty) Ltd
	H1 Infrastructure Capital (Pty) Ltd
	H1 Partners (Pty) Ltd
	H1 Infrastructure Partners (Pty) Ltd
	Greencap Investments (Pty) Ltd
	H1 Biomass (Pty) Ltd
	H1 Roggeveld Wind (Pty) Ltd
	Vuselela Energy (Pty) Ltd
	Eternity Power (RF) (Pty) Ltd
	Vapotouch (Pty) Ltd
	Partner Education Services (Pty) Ltd
	Ulco Clean Energy (Pty) Ltd
Associates	Mzansila Communicologies (Pty) Ltd
	iKineo (Pty) Ltd

Related party balances and transactions with entities over which the company has control, joint control or significant influence

Related party balances

	2017 R	2016 R
Loan accounts - Owing (to) by related parties		
Business Venture Investments No. 1166 (Pty) Ltd	41,852,235	47,862,226
H1 Capital (Pty) Ltd	60,926,912	42,510,031
Bassap Ventures (Pty) Ltd	5,379	2,722
H1 Manco (Pty) Ltd	13,056,153	14,040
Eternity Power (RF) (Pty) Ltd	-	5,000
H1 Biomass (Pty) Ltd	5,743	4,275
Vuselela Energy (Pty) Ltd	-	2,960,000
Partner Education Services (Pty) Ltd	7,982	-
H1 Roggeveld Wind (Pty) Ltd	6,407	-
H1 Infrastructure Partners (Pty) Ltd	4,902	-
H1 Partners (Pty) Ltd	4,902	-
H1 Infrastructure Capital (Pty) Ltd	4,902	-
Ulco Clean Energy (Pty) Ltd	6,856	-
Vapotouch (Pty) Ltd	156,658	-
H2 Clean Energy (Pty) Ltd	2,025,257	-
iKineo (Pty) Ltd	6,010,097	6,010,097
Amounts included in Trade receivable (Trade Payable) regarding related parties		
Eternity Power (RF) (Pty) Ltd	12,030,643	20,026
Vuselela Energy (Pty) Ltd	10,000	10,000
Greencap Investments (Pty) Ltd	40,000	-
iKineo (Pty) Ltd	7,600	-

	2017 R	2016 R
24. Related parties (continued)		
Related party transactions		
Interest paid to (received from) related parties		
H1 Manco (Pty) Ltd	(1,384,054)	-
iKineo (Pty) Ltd	(747,673)	(657,510)
Purchases from (sales to) related parties		
Eternity Power (RF) (Pty) Ltd	(224,497)	(158,097)
Greencap Investments (Pty) Ltd	(35,088)	-
iKineo (Pty) Ltd	(6,667)	-
Vuselela Energy (Pty) Ltd	(48,943)	(52,632)
Related party balances and transactions with key management personnel of the company or its parent		
Related party balances		
Loan accounts - Owing (to) by related parties		
LI Jacobs	(39,494)	(8,302)

25. Directors' remuneration

Executive

2017

	Emoluments	Total
RL Hendricks	737,960	737,960
CC Hendricks	330,000	330,000
	1,067,960	**1,067,960**

2016

	Emoluments	Total
RL Hendricks	1,136,768	1,136,768

H1 Holdings Proprietary Limited
(Registration number 1996/005471/07)
Annual Financial Statements for the year ended 30 June 2017

Detailed Income Statement

	Note(s)	2017 R	2016 R
Revenue			
Sale of goods		1,881,324	556,775
Other income			
Dividends received	16	3,901,954	4,431,372
Interest received	16	6,400,838	7,590,679
Gains on disposal of assets		-	24,438,296
		10,302,792	**36,460,347**
Expenses (Refer to page 27)		**(7,219,535)**	**(5,211,521)**
Operating profit	15	**4,964,581**	**31,805,601**
Finance costs	18	(4)	(4,921)
Profit before taxation		**4,964,577**	**31,800,680**
Taxation	19	(32,491)	(7,098,379)
Profit for the year		**4,932,086**	**24,702,301**

The supplementary information presented does not form part of the annual financial statements and is unaudited

Detailed Income Statement

	Note(s)	2017 R	2016 R
Operating expenses			
Accommodation		48,524	-
Accounting fees		32,718	6,253
Administration and management fees		-	3,474
Advertising		-	11,290
Auditors remuneration	20	37,249	60,400
Bank charges		19,779	8,518
Brokerage fees		97,911	2,294
Cleaning		6,451	1,285
Computer expenses		308,331	151,626
Consulting and professional fees		675,274	196,300
Consumables		16,107	12,532
Depreciation, amortisation and impairments		143,002	78,534
Donations		17,035	82,488
Employee costs		3,710,731	2,745,509
Entertainment		85,580	64,343
General expenses		74,003	57,813
Insurance		2,430	-
Lease rentals on operating lease		456,456	421,449
Legal expenses		74,175	452,577
Membership fees		48,843	95,714
Motor vehicle expenses		34,634	33,402
Municipal expenses		46,134	81,429
Parking		57,518	3,840
Petrol and oil		10,375	-
Postage		6,608	5,000
Printing and stationery		43,777	43,680
Rates		34,538	-
Repairs and maintenance		327,675	261
Security		10,648	-
Small assets written off		2,606	-
Staff welfare		24,686	51,958
Subscriptions		19,171	49,297
Telephone and fax		132,007	125,798
Training		237,008	104,160
Travel		377,551	260,297
		7,219,535	**5,211,521**

H1 HOLDINGS PROPRIETARY LIMITED
(Registration number 1996/005471/07)
Annual Financial Statements
for the year ended 30 June 2016

These annual financial statements have been audited in compliance with the applicable requirements of the Companies Act 71 of 2008.

General Information

Country of incorporation and domicile	South Africa
Nature of business and principal activities	Investment
Directors	RL Hendricks LI Jacobs CC Hendricks
Registered office	Unit 5 70 Prestwich Street Green Point 8005
Business address	Unit 5 70 Prestwich Street Green Point 8005
Postal address	PO Box 6869 Roggebaai 8012
Bankers	Investec Limited
Auditors	Cecil Kilpin & Co. Chartered Accountants (S.A.) Registered Auditors
Company registration number	1996/005471/07
Tax reference number	9645/006/00/3

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The reports and statements set out below comprise the annual financial statements presented to the shareholders:

The following supplementary information does not form part of the annual financial statements and is unaudited:

Independent Auditor's Report

To the shareholders of H1 Holdings Proprietary Limited

We have audited the annual financial statements of H1 Holdings Proprietary Limited, as set out on pages 7 to 21, which comprise the statement of financial position as at 30 June 2016, and the statement of comprehensive income, statement of changes in equity and statement of cash flows for the year then ended, and the notes, comprising a summary of significant accounting policies and other explanatory information.

Directors' Responsibility for the Annual Financial Statements

The company's directors are responsible for the preparation and fair presentation of these annual financial statements in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities and requirements of the Companies Act 71 of 2008, and for such internal control as the directors determine is necessary to enable the preparation of annual financial statements that are free from material misstatements, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these annual financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance whether the annual financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the annual financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the annual financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the company's preparation and fair presentation of the annual financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the company's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the annual financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the annual financial statements present fairly, in all material respects, the financial position of H1 Holdings Proprietary Limited as at 30 June 2016, and its financial performance and cash flows for the year then ended in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities, and the requirements of the Companies Act 71 of 2008.

Supplementary Information

Without qualifying our opinion, we draw attention to the fact that supplementary information set out on page 22 does not form part of the annual financial statements and is presented as additional information. We have not audited this information and accordingly do not express an opinion thereon.

Other reports required by the Companies Act

As part of our audit of the annual financial statements for the year ended 30 June 2016, we have read the directors' report for the purpose of identifying whether there are material inconsistencies between that report and the audited annual financial statements. The directors' report is the responsibility of the directors. Based on reading that report we have not identified material inconsistencies between it and the audited annual financial statements. However, we have not audited the directors' report and accordingly do not express an opinion thereon.

Cecil Kilpin & Co

Cecil Kilpin & Co.
Registered Auditors
Per Partner: M Branders

Century City
Date: 28 September 2016

PARTNERS: N NYBACK CA (SA), RA | M BRANDERS CA (SA), RA | S SCHONEGEVEL CA (SA), RA | M SPENCER CA (SA), RA | D COX CA (SA), RA
TAX: E CONRADIE B.COMPT (HONS), PG.DIP (TAX) | CONSULTANT: A MINNÉ CA (SA)
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Directors' Responsibilities and Approval

The directors are required by the Companies Act 71 of 2008, to maintain adequate accounting records and are responsible for the content and integrity of the annual financial statements and related financial information included in this report. It is their responsibility to ensure that the annual financial statements fairly present the state of affairs of the company as at the end of the financial year and the results of its operations and cash flows for the period then ended, in conformity with the International Financial Reporting Standard for Small and Medium-sized Entities. The external auditors are engaged to express an independent opinion on the annual financial statements.

The annual financial statements are prepared in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities and are based upon appropriate accounting policies consistently applied and supported by reasonable and prudent judgements and estimates.

The directors acknowledge that they are ultimately responsible for the system of internal financial control established by the company and place considerable importance on maintaining a strong control environment. To enable the directors to meet these responsibilities, the board sets standards for internal control aimed at reducing the risk of error or loss in a cost effective manner. The standards include the proper delegation of responsibilities within a clearly defined framework, effective accounting procedures and adequate segregation of duties to ensure an acceptable level of risk. These controls are monitored throughout the company and all employees are required to maintain the highest ethical standards in ensuring the company's business is conducted in a manner that in all reasonable circumstances is above reproach. The focus of risk management in the company is on identifying, assessing, managing and monitoring all known forms of risk across the company. While operating risk cannot be fully eliminated, the company endeavours to minimise it by ensuring that appropriate infrastructure, controls, systems and ethical behaviour are applied and managed within predetermined procedures and constraints.

The directors are of the opinion, based on the information and explanations given by management, that the system of internal control provides reasonable assurance that the financial records may be relied on for the preparation of the annual financial statements. However, any system of internal financial control can provide only reasonable, and not absolute, assurance against material misstatement or loss.

The directors have reviewed the company's cash flow forecast for the year to 30 June 2017 and, in the light of this review and the current financial position, they are satisfied that the company has or had access to adequate resources to continue in operational existence for the foreseeable future.

The external auditors are responsible for independently auditing and reporting on the company's annual financial statements. The annual financial statements have been examined by the company's external auditors and their report is presented on page 3.

The annual financial statements set out on pages 5 to 22, which have been prepared on the going concern basis, were approved and were signed on its behalf by:

Approval of financial statements

RL Hendricks

Century City

Date: ____________________

Directors' Report

The directors have pleasure in submitting their report on the annual financial statements of H1 Holdings Proprietary Limited for the year ended 30 June 2016.

1. Nature of business

H1 Holdings Proprietary Limited was incorporated in South Africa with interests in the investment holding industry. The company operates in South Africa.

There have been no material changes to the nature of the company's business from the prior year.

2. Review of financial results and activities

The annual financial statements have been prepared in accordance with International Financial Reporting Standard for Small and Medium-sized Entities and the requirements of the Companies Act 71 of 2008. The accounting policies have been applied consistently compared to the prior year.

Full details of the financial position, results of operations and cash flows of the company are set out in these annual financial statements.

3. Share capital

	2016	2015
Authorised		
Ordinary shares	10,000	10,000
Issued		
Ordinary shares	8,129	9,055

Refer to note 10 of the annual financial statements for detail of the movement in authorised and issued share capital.

4. Dividends

The dividends already declared and paid to the shareholders during the year are reflected in the attached statement of changes in equity, once the appropriate approval was granted by the board of directors.

The local dividends tax rate is 15%.

5. Property, plant and equipment

There was no change in the nature of the property, plant and equipment of the company or in the policy regarding their use.

At 30 June 2016 the company's investment in property, plant and equipment amounted to R196,046 (2015: R213,284), of which R61,296 (2015: R227,468) was added in the current year through additions.

6. Events after the reporting period

The directors are not aware of any material event which occurred after the reporting date and up to the date of this report.

7. Interests in subsidiaries, associates and joint arrangements

Details of material interests in subsidiary companies, associates and joint arrangements are presented in the annual financial statements in notes 4.

There were no significant acquisitions or divestitures during the year ended 30 June 2016.

Directors' Report

8. **Directors**

The directors in office at the date of this report are as follows:

Directors
RL Hendricks
LI Jacobs
CC Hendricks

There have been no changes to the directorate for the period under review.

9. **Auditors**

Cecil Kilpin & Co. continued in office as auditors for the company for 2016.

At the AGM, the shareholders will be requested to reappoint Cecil Kilpin & Co. as the independent external auditors of the company and to confirm Mr Mynhardt Branders as the designated lead audit partner for the 2017 financial year.

10. **Secretary**

The company had no secretary for the financial year.

11. **Liquidity and solvency**

The directors have performed the required liquidity and solvency tests required by the Companies Act 71 of 2008.

Statement of Financial Position as at 30 June 2016

	Note(s)	2016 R	2015 R
Assets			
Non-Current Assets			
Property, plant and equipment	2	196,046	213,284
Investments in subsidiaries	3	58,850	58,850
Investments in associates	4	77,778	77,778
Loans to group companies	5	93,358,294	81,892,532
Other financial assets	7	77,176,829	111,312,762
		170,867,797	**193,555,206**
Current Assets			
Trade and other receivables	8	163,977	98,255
Current tax receivable		-	391,783
Cash and cash equivalents	9	110,290,684	95,195,630
		110,454,661	95,685,668
Total Assets		**281,322,458**	**289,240,874**
Equity and Liabilities			
Equity			
Share capital	10	512,560	513,486
Reserves	11	26,868,424	35,122,830
Retained income		236,062,724	253,604,558
		263,443,708	289,240,874
Liabilities			
Current Liabilities			
Loans from shareholders	6	8,302	-
Current tax payable		694,676	-
Trade and other payables	12	6,498,654	-
Dividend payable		10,677,118	-
		17,878,750	-
Total Equity and Liabilities		**281,322,458**	289,240,874

Statement of Comprehensive Income

	Note(s)	2016 R	2015 R
Revenue	13	556,775	839,867
Other income	14	-	132,767
Operating expenses		(5,211,521)	(3,607,822)
Operating loss	15	(4,654,746)	(2,635,188)
Investment revenue	16	12,022,051	11,589,084
Profit on sale of shares	17	24,438,296	-
Finance costs	18	(4,921)	(610,339)
Profit before taxation		**31,800,680**	**8,343,557**
Taxation	19	(7,098,379)	(1,688,261)
Profit for the year		**24,702,301**	**6,655,296**
Other comprehensive income		-	-
Total comprehensive income for the year		**24,702,301**	**6,655,296**

Statement of Changes in Equity

	Share capital	Share premium	Total share capital	Revaluation reserve	Retained income	Total equity
	R	R	R	R	R	R
Balance at 01 July 2014	**9,055**	**504,431**	**513,486**	**26,578,598**	**277,849,262**	**304,941,346**
Profit for the year	-	-	-	-	6,655,296	6,655,296
Other comprehensive income	-	-	-	8,544,232	-	8,544,232
Total comprehensive income for the year	-	-	-	**8,544,232**	**6,655,296**	**15,199,528**
Dividends	-	-	-	-	(30,900,000)	(30,900,000)
Total changes	-	-	-	-	**(30,900,000)**	**(30,900,000)**
Balance at 01 July 2015	**9,055**	**504,431**	**513,486**	**35,122,830**	**253,604,558**	**289,240,874**
Profit for the year	-	-	-	-	24,702,301	24,702,301
Other comprehensive income	-	-	-	(8,254,406)	-	(8,254,406)
Total comprehensive income for the year	-	-	-	**(8,254,406)**	**24,702,301**	**16,447,895**
Transfer between reserves	-	-	-	-	(28,244,135)	(28,244,135)
Share buy-back (L Jacobs)	(926)	-	(926)	-	-	(926)
Dividends	-	-	-	-	(14,000,000)	(14,000,000)
Total changes	**(926)**	-	**(926)**	-	**(42,244,135)**	**(42,245,061)**
Balance at 30 June 2016	**8,129**	**504,431**	**512,560**	**26,868,424**	**236,062,724**	**263,443,708**
Note(s)	10	10	10	11		

H1 Holdings Proprietary Limited

(Registration number 1996/005471/07)
Annual Financial Statements for the year ended 30 June 2016

Statement of Cash Flows

	Note(s)	2016 R	2015 R
Cash flows from operating activities			
Cash receipts from customers		491,054	1,363,581
Cash paid to suppliers and employees		1,365,667	(4,111,090)
Cash generated from (used in) operations	21	1,856,721	(2,747,509)
Interest income		7,590,679	8,046,776
Dividends received		4,431,372	3,542,308
Finance costs		(4,921)	(610,339)
Tax paid	22	(6,011,920)	(5,369,818)
Net cash from operating activities		**7,861,931**	**2,841,418**
Cash flows from investing activities			
Purchase of property, plant and equipment	2	(61,296)	(227,468)
Sale of property, plant and equipment	2	-	21,732
Net movement in group company loans		(11,465,762)	(22,883,390)
Net movement in financial assets		58,574,229	(38,478,474)
Net movement in revaluation reserve		(8,254,406)	8,544,235
Net cash from investing activities		**38,792,765**	**(53,023,365)**
Cash flows from financing activities			
Reduction of share capital or buy back of shares	10	(28,245,062)	-
Repayment of shareholders loan		8,302	11,846,049
Dividends paid	23	(3,322,882)	(30,900,000)
Net cash from financing activities		**(31,559,642)**	**(19,053,951)**
Total cash movement for the year		**15,095,054**	**(69,235,898)**
Cash at the beginning of the year		95,195,630	164,431,528
Total cash at end of the year	9	**110,290,684**	**95,195,630**

Accounting Policies

1. Presentation of annual financial statements

The annual financial statements have been prepared in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities, and the Companies Act 71 of 2008. The annual financial statements have been prepared on the historical cost basis, and incorporate the principal accounting policies set out below. They are presented in South African Rands.

These accounting policies are consistent with the previous period.

1.1 Significant judgements and sources of estimation uncertainty

In preparing the annual financial statements, management is required to make judgements, estimates and assumptions that affect the amounts represented in the annual financial statements and related disclosures. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results in the future could differ from these estimates which may be material to the annual financial statements.

Key sources of estimation uncertainty

The following are the key assumptions concerning the future, and other key sources of estimation uncertainty at the end of the reporting period, that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year.

Residual values and useful lives of property, plant and equipment

Property, plant and equipment are depreciated over the useful lives of the assets, taking into account the residual value. Useful lives and residual value is determined on a yearly basis. Useful lives are influenced by development in technology, maintenance programs and future productivity. The future market situation, including the cost to sell the assets, determines the residual values. The residual values and useful lives of assets are based on management estimates. Depreciation is calculated on a straight line basis. This method does not necessarily represent the actual use of the asset.

Impairment testing

The company reviews and tests the carrying value of property, plant and equipment and intangible assets when events or changes in circumstances suggest that the carrying amount may not be recoverable. When such indicators exist, management determine the recoverable amount by performing value in use and fair value calculations. These calculations require the use of estimates and assumptions. When it is not possible to determine the recoverable amount for an individual asset, management assesses the recoverable amount for the cash generating unit to which the asset belongs.

1.2 Property, plant and equipment

Property, plant and equipment are tangible items that are held for use in the production or supply of goods or services, or for rental to others or for administrative purposes; and are expected to be used during more than one period.

Property, plant and equipment is carried at cost less accumulated depreciation and accumulated impairment losses.

Cost include costs incurred initially to acquire or construct an item of property, plant and equipment and costs incurred subsequently to add to, replace part of, or service it. If a replacement cost is recognised in the carrying amount of an item of property, plant and equipment, the carrying amount of the replaced part is derecognised.

Depreciation is provided using the straight-line method to write down the cost, less estimated residual value over the useful life of the property, plant and equipment as follows:

Item	Depreciation method	Average useful life
Office equipment	Straight line	5 years
IT equipment	Straight line	3 years
Computer software	Straight line	3 years

If the major components of an item of property, plant and equipment have significantly different patterns of consumption of economic benefits, the cost of the asset is allocated to its major components and each such component is depreciated separately over its useful life.

Accounting Policies

1.2 Property, plant and equipment (continued)

The residual value, depreciation method and useful life of each asset are reviewed only where there is an indication that there has been a significant change from the previous estimate.

Gains and losses on disposals are recognised in profit or loss.

1.3 Investments in subsidiaries

Investments in subsidiaries are measured at cost less any accumulated impairment losses.

1.4 Investments in associates

Investments in associates are measured at cost less accumulated impairment losses, except for investments in associates for which there is a published price quotation, which are measured at fair value with changes to fair value recognised in profit or loss.

1.5 Financial instruments

Initial measurement

Financial instruments are initially measured at the transaction price (including transaction costs except in the initial measurement of financial assets and liabilities that are measured at fair value through profit or loss) unless the arrangement constitutes, in effect, a financing transaction in which case it is measured at the present value of the future payments discounted at a market rate of interest for a similar debt instrument.

Financial instruments at amortised cost

These include loans, trade receivables and trade payables. Those debt instruments which meet the criteria in section 11.8(b) of the standard, are subsequently measured at amortised cost using the effective interest method. Debt instruments which are classified as current assets or current liabilities are measured at the undiscounted amount of the cash expected to be received or paid, unless the arrangement effectively constitutes a financing transaction.

At each reporting date, the carrying amounts of assets held in this category are reviewed to determine whether there is any objective evidence of impairment. If there is objective evidence, the recoverable amount is estimated and compared with the carrying amount. If the estimated recoverable amount is lower, the carrying amount is reduced to its estimated recoverable amount, and an impairment loss is recognised immediately in profit or loss.

Financial instruments at cost

Commitments to receive a loan are measured at cost less impairment.

Equity instruments that are not publicly traded and whose fair value cannot otherwise be measured reliably are measured at cost less impairment.

Financial instruments at fair value

All other financial instruments, including equity instruments that are publicly traded or whose fair value can otherwise be measured reliably, are measured at fair value through profit and loss.

Accounting Policies

1.6 Tax

Current tax assets and liabilities

Current tax for current and prior periods is, to the extent unpaid, recognised as a liability. If the amount already paid in respect of current and prior periods exceeds the amount due for those periods, the excess is recognised as an asset.

The tax liability reflects the effect of the possible outcomes of a review by the tax authorities.

Deferred tax assets and liabilities

A deferred tax liability is recognised for all taxable temporary differences.

A deferred tax asset is recognised for all deductible temporary differences and for the carry forward of unused tax losses and unused tax credits.

Deferred tax assets and liabilities are measured at an amount that includes the effect of the possible outcomes of a review by the tax authorities using tax rates that, on the basis of enacted or substantively enacted tax law at the end of the reporting period, are expected to apply when the deferred tax asset is realised or the deferred tax liability is settled.

Deferred tax asset balances are reviewed at every reporting date. When necessary, a valuation allowance is recognised against the deferred tax assets so that the net amount equals the highest amount that is more likely than not to be realised on the basis of current or future taxable profit.

Tax expenses

Tax expense is recognised in the same component of total comprehensive income or equity as the transaction or other event that resulted in the tax expense.

1.7 Leases

A lease is classified as a finance lease if it transfers substantially all the risks and rewards incidental to ownership to the lessee. All other leases are operating leases.

Operating leases – lessee

Operating lease payments are recognised as an expense in the period in which they are incurred.

1.8 Impairment of assets

The company assesses at each reporting date whether there is any indication that property, plant and equipment or intangible assets or goodwill may be impaired.

If there is any such indication, the recoverable amount of any affected asset (or group of related assets) is estimated and compared with its carrying amount. If the estimated recoverable amount is lower, the carrying amount is reduced to its estimated recoverable amount, and an impairment loss is recognised immediately in profit or loss.

If an impairment loss subsequently reverses, the carrying amount of the asset (or group of related assets) is increased to the revised estimate of its recoverable amount, but not in excess of the amount that would have been determined had no impairment loss been recognised for the asset (or group of assets) in prior years. A reversal of impairment is recognised immediately in profit or loss.

1.9 Share capital and equity

An equity instrument is any contract that evidences a residual interest in the assets of an entity after deducting all of its liabilities.

If the company reacquires its own equity instruments, those instruments are deducted from equity. No gain or loss is recognised in profit or loss on the purchase, sale, issue or cancellation of the company's own equity instruments. Consideration paid or received shall be recognised directly in equity.

Accounting Policies

1.10 Employee benefits

Short-term employee benefits

The cost of short-term employee benefits, (those payable within 12 months after the service is rendered, such as leave pay and sick leave, bonuses, and non-monetary benefits such as medical care), are recognised in the period in which the service is rendered and are not discounted.

Defined contribution plans

Payments to defined contribution retirement benefit plans are charged as an expense as they fall due.

1.11 Provisions and contingencies

Provisions are recognised when the company has an obligation at the reporting date as a result of a past event; it is probable that the company will be required to transfer economic benefits in settlement; and the amount of the obligation can be estimated reliably.

Provisions are measured at the present value of the amount expected to be required to settle the obligation using a pre-tax rate that reflects current market assessments of the time value of money and the risks specific to the obligation. The increase in the provision due to the passage of time is recognised as interest expense.

Provisions are not recognised for future operating losses.

Contingent assets and contingent liabilities are not recognised.

1.12 Government grants

Grants that do not impose specified future performance conditions are recognised in income when the grant proceeds are receivable.

Grants that impose specified future performance conditions are recognised in income only when the performance conditions are met.

Grants received before the revenue recognition criteria are satisfied are recognised as a liability.

Grants are measured at the fair value of the asset received or receivable.

1.13 Revenue

Revenue is recognised to the extent that the company has transferred the significant risks and rewards of ownership of goods to the buyer, or has rendered services under an agreement provided the amount of revenue can be measured reliably and it is probable that economic benefits associated with the transaction will flow to the company. Revenue is measured at the fair value of the consideration received or receivable, excluding sales taxes and discounts.

Service revenue is recognised by reference to the stage of completion of the transaction at the end of the reporting period. The Stage of completion is determined by surveys of work performed. When the outcome of a transaction involving the rendering of services cannot be estimated reliably, revenue is recognised only to the extent of the expenses recognised that are recoverable.

Interest is recognised, in profit or loss, using the effective interest rate method.

Dividends are recognised, in profit or loss, when the company's right to receive payment has been established.

1.14 Borrowing costs

Borrowing costs are recognised as an expense in the period in which they are incurred.

Notes to the Annual Financial Statements

	2016 R	2015 R

2. Property, plant and equipment

	2016			2015		
	Cost	Accumulated depreciation	Carrying value	Cost	Accumulated depreciation	Carrying value
Office equipment	185,150	(63,652)	121,498	155,316	(27,188)	128,128
IT equipment	140,266	(75,248)	65,018	108,803	(39,747)	69,056
Computer software	19,711	(10,181)	9,530	19,711	(3,611)	16,100
Total	**345,127**	**(149,081)**	**196,046**	**283,830**	**(70,546)**	**213,284**

Reconciliation of property, plant and equipment - 2016

	Opening balance	Additions	Depreciation	Total
Office equipment	128,128	29,833	(36,463)	121,498
IT equipment	69,056	31,463	(35,501)	65,018
Computer software	16,100	-	(6,570)	9,530
	213,284	61,296	(78,534)	196,046

Reconciliation of property, plant and equipment - 2015

	Opening balance	Additions	Disposals	Depreciation	Total
Furniture and fixtures	21,732	-	(21,732)	-	
Office equipment	9,827	139,061	-	(20,760)	128,128
IT equipment	20,752	68,695	-	(20,391)	69,056
Computer software	-	19,712	-	(3,612)	16,100
	52,311	227,468	(21,732)	(44,763)	213,284

3. Investments in subsidiaries

Name of subsidiary	% holding 2016	% holding 2015	Carrying amount 2016	Carrying amount 2015
Business Venture Investments No. 1166 (Pty) Ltd	100.00 %	100.00 %	57,690	57,690
K2012/206/76/3 (South Africa) (Pty) Ltd	100.00 %	100.00 %	1,000	1,000
H1 Capital (Pty) Ltd	100.00 %	100.00 %	100	100
Northern Cape Casino Consultants Kairo (Pty) Ltd	60.00 %	60.00 %	60	60
			58,850	58,850

All the entities are incorporated in South Africa and share the year end of the company.

The carrying amounts of subsidiaries are shown gross of impairment losses.

Notes to the Annual Financial Statements

	2016 R	2015 R

4. Investments in associates

Name of company	% holding 2016	% holding 2015	Carrying amount 2016	Carrying amount 2015
PB Liquor Merchants (Pty) Ltd	- %	30.00 %	-	50,000
Mzansila Communications (Pty) Ltd	35.00 %	35.00 %	77,778	77,778
			77,778	127,778
Impairment of investments in associates			-	(50,000)
			77,778	77,778

Fair values of equity accounted investments in associates are only presented when there are published price quotations.

All the entities are incorporated in South Africa.

The carrying amount of associates is shown gross of impairment losses.

5. Loans to (from) group companies

Subsidiaries

	2016 R	2015 R
H1 Capital (Pty) Ltd	42,510,031	29,946,455
Business Venture Investments No. 1166 (Pty) Ltd	47,862,226	51,936,184
K2012/206/76/3 (South Africa) (Pty) Ltd	14,040	9,893
Vuselela Energy (Pty) Ltd	2,960,000	-
Bassap Ventures (Pty) Ltd	2,722	-
Eternity Power (RF) (Pty) Ltd	5,000	-
H1 Biomass (Pty) Ltd	4,275	-
	93,358,294	81,892,532

The loans are unsecured, bear interest at rates determined by the parties from time to time and have no fixed terms of repayment.

6. Loans to (from) shareholders

	2016 R	2015 R
LI Jacobs	(8,302)	-

The loan is unsecured, bears no interest and is repayable within 12 months.

Notes to the Annual Financial Statements

	2016 R	2015 R

7. Other financial assets

	2016 R	2015 R
At fair value		
Listed shares	43,832,524	77,086,116
Unlisted shares	27,334,207	29,465,203
	71,166,731	106,551,319
At amortised cost		
Loan: Ikineo (Pty) Ltd	6,010,098	4,761,443
Total other financial assets	77,176,829	111,312,762

The loan is unsecured, bears interest of rates determined by the parties from time to time and has no fixed terms of repayment.

	2016 R	2015 R
Non-current assets		
At fair value	71,166,731	106,551,319
At amortised cost	6,010,098	4,761,443
	77,176,829	111,312,762

The fair values of listed or quoted investments are based on the quoted market price at reporting period date.

Details of investments

	2016 R	2015 R
Listed - at fair value		
Bidvest Group Limited	-	50,983,744
M1 Capital	23,530,861	22,444,272
Hyprop Ltd	-	686,662
Emira Ltd	-	2,527,500
Alexander Forbes	-	443,938
Sygnia Limited	20,301,663	-
Unlisted - at fair value		
Phuthuma Nathi	26,943,281	28,774,830
Sasol Inzalo	390,926	690,373
	71,166,731	106,551,319

8. Trade and other receivables

	2016 R	2015 R
Trade receivables	30,023	12,034
Employee costs in advance	2,875	-
Prepayments	39,450	-
Deposits	59,280	59,280
VAT	32,349	26,941
	163,977	98,255

Notes to the Annual Financial Statements

	2016 R	2015 R

9. Cash and cash equivalents

Cash and cash equivalents consist of:

	2016 R	2015 R
Cash on hand	2,000	2,000
Bank balances	184,826	127,519
Short-term deposits	110,103,858	95,066,111
	110,290,684	**95,195,630**

10. Share capital

	2016 R	2015 R
Authorised		
10,000 Ordinary shares of R1 each	10,000	10,000
Reconciliation of number of shares issued:		
Reported as at 01 July 2015	9,055	-
Share buy-back	(926)	-
	8,129	-
Issued		
8,129 (2015: 9,055) Ordinary shares of R1 each	8,129	9,055
Share premium	504,431	504,431
	512,560	**513,486**

11. Revaluation reserve

	2016 R	2015 R
Heading		
Revaluation of investments to market value	26,868,424	35,772,830
Revaluation of loan to associate	-	(650,000)
	26,868,424	**35,122,830**

12. Trade and other payables

	2016 R	2015 R
Trade payables	3,961	-
Accruals	79,496	-
Provisions	6,415,197	-
	6,498,654	-

13. Revenue

	2016 R	2015 R
Sale of goods	556,775	839,867

14. Other income

	2016 R	2015 R
Sundry income	-	132,767

Notes to the Annual Financial Statements

	2016 R	2015 R
15. Operating loss		
Operating loss for the year is stated after accounting for the following:		
Income from subsidiaries		
Dividends	4,431,372	3,490,999
Operating lease charges		
Premises		
• Contractual amounts	421,449	230,182
Depreciation on property, plant and equipment	78,534	44,763
Employee costs	2,745,509	1,867,068
16. Investment revenue		
Dividend revenue		
Subsidiaries - Local	4,431,372	3,490,999
Listed financial assets - Local	-	51,309
	4,431,372	3,542,308
Interest revenue		
Bank	7,590,679	8,046,776
	12,022,051	11,589,084
17. Profit on sale of shares		
Capital		
Profit on sale of shares - Bidvest	24,076,182	-
Profit on sale of shares - Hyprop	258,495	-
Loss on sale of shares - Stor-Age	(96,344)	-
Profit on sale of shares - Emira	359,121	-
Profit on sale of shares - Alexander Forbes	8,736	-
Profit on sale of shares - Sygnia	482,106	-
Loss on write off - PB Liquors	(650,000)	-
	24,438,296	-
18. Finance costs		
Non-current borrowings	64	655
Late payment of tax	-	609,684
Interest paid	4,857	-
	4,921	610,339

Notes to the Annual Financial Statements

	2016 R	2015 R

19. Taxation

Major components of the tax expense

	2016 R	2015 R
Current		
Local income tax - current period	6,607,812	1,677,407
Local income tax - recognised in current tax for prior periods	490,567	10,854
	7,098,379	**1,688,261**

Reconciliation of the tax expense

Reconciliation between accounting profit and tax expense.

	2016 R	2015 R
Accounting profit	31,800,680	8,343,557
Tax at the applicable tax rate of 28% (2015: 28%)	8,904,190	2,336,197
Tax effect of adjustments on taxable income		
Capital gains tax - exclusion @ 20%	(1,362,742)	-
Dividends received (non-taxable income)	(1,240,784)	(991,847)
Prior year adjustments	490,567	10,854
Portion of expenses not tax deductible	312,948	333,057
	7,104,179	**1,688,261**

20. Auditor's remuneration

	2016 R	2015 R
Fees	60,400	
Adjustment for previous year	-	24,142
Tax and secretarial services	-	13,919
	60,400	**38,061**

21. Cash generated from (used in) operations

	2016 R	2015 R
Profit before taxation	31,800,680	8,343,557
Adjustments for:		
Depreciation and amortisation	78,534	44,763
Income from equity accounted investments	(24,438,296)	-
Dividends received	(4,431,372)	(3,542,308)
Interest received	(7,590,679)	(8,046,776)
Finance costs	4,921	610,339
Changes in working capital:		
Trade and other receivables	(65,721)	(85,872)
Trade and other payables	6,498,654	(71,212)
	1,856,721	**(2,747,509)**

22. Tax paid

	2016 R	2015 R
Balance at beginning of the year	391,783	(3,309,774)
Current tax for the year recognised in profit or loss	(7,098,379)	(1,688,261)
Balance at end of the year	694,676	(391,783)
	(6,011,920)	**(5,389,818)**

Notes to the Annual Financial Statements

	2016 R	2015 R

23. Dividends paid

Dividends	(14,000,000)	(30,900,000)
Balance at end of the year	10,677,118	-
	(3,322,882)	(30,900,000)

24. Related parties

Relationships

Shareholders	Reyburn Hendricks Family Trust LI Jacobs Vuselela (Pty) Ltd
Subsidiaries	Business Ventures Investments No. 1166 (Pty) Ltd 3 K2012/206/76/3 (South Africa) (Pty) Ltd H1 Capital (Pty) Ltd Northern Cape Casino Consultants Kairo (Pty) Ltd
Associates	Mzansila Communicologies (Pty) Ltd 4

Related party balances and transactions with entities with control, joint control or significant influence over the company

Related party balances

Loan accounts - Owing (to) by related parties		
Business Ventures Investments No. 1166 (Pty) Ltd	47,862,226	51,936,184
K2012/206/76/3 (South Africa) (Pty) Ltd	14,040	9,893
H1 Capital (Pty) Ltd	42,510,031	29,946,455
Bassap Ventures (Pty) Ltd	2,722	-
Eternity Power (Pty) Ltd	5,000	-
H1 Biomass (Pty) Ltd	4,275	-
Vuselela (Pty) Ltd	2,960,000	-

25. Directors' remuneration

Executive

2016

	Emoluments	Total
RL Hendricks	1,136,768	1,136,768

Detailed Income Statement

	Note(s)	2016 R	2015 R
Revenue			
Sale of goods		556,775	839,867
Other income			
Dividends received	16	4,431,372	3,542,308
Profit on sale of shares	17	24,438,296	-
Interest received	16	7,590,679	8,046,776
Sundry income		-	132,767
		36,460,347	11,721,851
Operating expenses			
Accounting fees		6,253	17,277
Administration and management fees		3,474	19,776
Advertising		11,290	600
Auditors remuneration	20	60,400	38,061
Bank charges		8,518	19,197
Brokerage fees		2,294	2,546
Cleaning		1,285	2,238
Computer expenses		151,626	130,823
Consulting and professional fees		196,300	1,621
Consumables		12,532	1,217
Depreciation, amortisation and impairments		78,534	44,763
Donations		82,488	54,000
Employee costs		2,745,509	1,867,068
Entertainment		64,343	21,078
General expenses		57,813	50,888
Lease rentals on operating lease		421,449	230,182
Legal expenses		452,577	429,406
Membership fees		95,714	-
Motor vehicle expenses		33,402	3,162
Municipal expenses		81,429	-
Parking		3,840	955
Postage		5,000	4,478
Printing and stationery		43,680	43,435
Repairs and maintenance		261	30,341
Staff welfare		51,958	29,333
Subscriptions		49,297	102,091
Telephone and fax		125,798	72,344
Training		104,160	139,891
Travel		260,297	251,151
		5,211,521	**3,607,822**
Operating profit	15	**31,805,601**	**8,953,896**
Finance costs	18	(4,921)	(610,339)
Profit before taxation		31,800,680	8,343,557
Taxation	19	(7,098,379)	(1,688,261)
Profit for the year		24,702,301	6,655,296

The supplementary information presented does not form part of the annual financial statements and is unaudited

H1 Holdings (Proprietary) Limited
(Registration number 1996/005471/07)
Annual Financial Statements
for the year ended 30 June 2015

These annual financial statements have been audited in compliance with the applicable requirements of the Companies Act 71 of 2008.

General Information

Country of incorporation and domicile	South Africa
Nature of business and principal activities	Investment
Directors	RL Hendricks LI Jacobs CC Hendricks
Registered office	Unit 5 70 Prestwich Street Green Point 8005
Business address	Unit 5 70 Prestwich Street Green Point 8005
Postal address	Unit 5 70 Prestwich Street Green Point 8005
Bankers	Investec
Auditor's	Cecil Kilpin & Co. Chartered Accountants (S.A.) Registered Auditors
Company registration number	1996/005471/07

Index

The reports and statements set out below comprise the annual financial statements presented to the shareholders:

Cecil Kilpin & Co.

Chartered Accountants (SA)

Established 1902

Independent Auditor's Report

To the shareholders of H1 Holdings (Proprietary) Limited

We have audited the annual financial statements of H1 Holdings (Proprietary) Limited, as set out on pages 7 to 20, which comprise the statement of financial position as at 30 June 2015, and the statement of profit or loss and other comprehensive income, statement of changes in equity and statement of cash flows for the year then ended, and the notes, comprising a summary of significant accounting policies and other explanatory information.

Directors' Responsibility for the Annual Financial Statements

The company's directors are responsible for the preparation and fair presentation of these annual financial statements in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities and requirements of the Companies Act 71 of 2008, and for such internal control as the directors determine is necessary to enable the preparation of annual financial statements that are free from material misstatements, whether due to fraud or error.

Auditor's Responsibility

Our responsibility is to express an opinion on these annual financial statements based on our audit. We conducted our audit in accordance with International Standards on Auditing. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance whether the annual financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the annual financial statements. The procedures selected depend on the auditor's judgement, including the assessment of the risks of material misstatement of the annual financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the company's preparation and fair presentation of the annual financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the company's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the annual financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

Opinion

In our opinion, the annual financial statements present fairly, in all material respects, the financial position of H1 Holdings (Proprietary) Limited as at 30 June 2015, and its financial performance and cash flows for the year then ended in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities, and the requirements of the Companies Act 71 of 2008.

Supplementary Information

Without qualifying our opinion, we draw attention to the fact that supplementary information set out on page 21 does not form part of the annual financial statements and is presented as additional information. We have not audited this information and accordingly do not express an opinion thereon.

Other reports required by the Companies Act

As part of our audit of the annual financial statements for the year ended 30 June 2015, we have read the directors' report for the purpose of identifying whether there are material inconsistencies between that report and the audited annual financial statements. The directors' report is the responsibility of the directors. Based on reading that report we have not identified material inconsistencies between it and the audited annual financial statements. However, we have not audited the directors' report and accordingly do not express an opinion thereon.

Cecil Kilpin & Co

Cecil Kilpin & Co.
Registered Auditors
Per Partner: M Branders

Century City
Date: 28/09/15

Directors' Responsibilities and Approval

The directors are required by the Companies Act 71 of 2008, to maintain adequate accounting records and are responsible for the content and integrity of the annual financial statements and related financial information included in this report. It is their responsibility to ensure that the annual financial statements fairly present the state of affairs of the company as at the end of the financial year and the results of its operations and cash flows for the period then ended, in conformity with the International Financial Reporting Standard for Small and Medium-sized Entities. The external auditor's is engaged to express an independent opinion on the annual financial statements.

The annual financial statements are prepared in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities and are based upon appropriate accounting policies consistently applied and supported by reasonable and prudent judgements and estimates.

The directors acknowledge that they are ultimately responsible for the system of internal financial control established by the company and place considerable importance on maintaining a strong control environment. To enable the directors to meet these responsibilities, the board sets standards for internal control aimed at reducing the risk of error or loss in a cost effective manner. The standards include the proper delegation of responsibilities within a clearly defined framework, effective accounting procedures and adequate segregation of duties to ensure an acceptable level of risk. These controls are monitored throughout the company and all employees are required to maintain the highest ethical standards in ensuring the company's business is conducted in a manner that in all reasonable circumstances is above reproach. The focus of risk management in the company is on identifying, assessing, managing and monitoring all known forms of risk across the company. While operating risk cannot be fully eliminated, the company endeavours to minimise it by ensuring that appropriate infrastructure, controls, systems and ethical behaviour are applied and managed within predetermined procedures and constraints.

The directors are of the opinion, based on the information and explanations given by management, that the system of internal control provides reasonable assurance that the financial records may be relied on for the preparation of the annual financial statements. However, any system of internal financial control can provide only reasonable, and not absolute, assurance against material misstatement or loss.

The directors have reviewed the company's cash flow forecast for the year to 30 June 2016 and, in the light of this review and the current financial position, they are satisfied that the company has or has access to adequate resources to continue in operational existence for the foreseeable future.

The external auditor's are responsible for independently auditing and reporting on the company's annual financial statements. The annual financial statements have been examined by the company's external auditor's and their report is presented on page 3.

The annual financial statements set out on pages 5 to 21, which have been prepared on the going concern basis, were approved by the board and were signed on its behalf by:

RL Hendricks

Century City
Date: 28/09/2015

Directors' Report

The directors have pleasure in submitting their report on the annual financial statements of H1 Holdings (Proprietary) Limited for the year ended 30 June 2015.

1. Nature of business

H1 Holdings (Proprietary) Limited was incorporated in South Africa with interests in the investment holding industry. The company operates in South Africa.

There have been no material changes to the nature of the company's business from the prior year.

2. Review of financial results and activities

The annual financial statements have been prepared in accordance with International Financial Reporting Standard for Small and Medium-sized Entities and the requirements of the Companies Act 71 of 2008. The accounting policies have been applied consistently compared to the prior year.

Full details of the financial position, results of operations and cash flows of the company are set out in these annual financial statements.

3. Share capital

	2015	2014
Authorised		
Ordinary shares	10 000	10 000
Issued		
Ordinary shares	9 055	9 055

There have been no changes to the authorised or issued share capital during the year under review.

4. Dividends

The dividends already declared and paid to the shareholders during the year are reflected in the attached statement of changes in equity, once the appropriate approval was granted by the board of directors.

The local dividends tax rate is 15%.

5. Directors

The directors in office at the date of this report are as follows:

Directors	**Changes**
RL Hendricks	
LI Jacobs	
CC Hendricks	Appointed 03 June 2015

CC Hendricks was appointed as a director on 03 June 2015. There were no further changes in the directorate for the period under review.

6. Property, plant and equipment

There was no change in the nature of the property, plant and equipment of the company or in the policy regarding their use.

At 30 June 2015 the company's investment in property, plant and equipment amounted to R213 284 (2014:R52 311), of which R227 469 (2014: R53 136) was added in the current year through additions.

7. Interest in subsidiaries, associates and joint arrangements

Details of material interests in subsidiary companies, associates and joint arrangements are presented in the annual financial statements in notes 4 and 5.

There were no significant acquisitions or divestitures during the year ended 30 June 2015.

Directors' Report

8. Events after the reporting period

The directors are not aware of any material event which occurred after the reporting date and up to the date of this report.

9. Auditors

Cecil Kilpin & Co. was appointed as auditors of the company on 01 March 2015.

At the AGM, the shareholders will be requested to reappoint Cecil Kilpin & Co. as the independent external auditors of the company and to confirm Mr Mynhardt Branders as the designated lead audit partner for the 2016 financial year.

10. Secretary

The company had no secretary for the financial year.

11. Liquidity and solvency

The directors have performed the required liquidity and solvency tests required by the Companies Act 71 of 2008.

H1 Holdings (Proprietary) Limited
(Registration number 1996/005471/07)
Annual Financial Statements for the year ended 30 June 2015

Statement of Financial Position as at 30 June 2015

	Note(s)	2015 R	2014 R
Assets			
Non-Current Assets			
Property, plant and equipment	2	213 284	52 311
Investments in subsidiaries	3	58 850	58 850
Investments in associates	4	77 778	77 778
Loans to group companies	5	81 892 532	59 009 142
Loans to shareholders	6	-	11 846 049
Other financial assets	7	111 312 762	72 834 288
		193 555 206	143 878 418
Current Assets			
Trade and other receivables	8	98 259	12 387
Current tax receivable		391 783	-
Cash and cash equivalents	9	95 195 629	164 436 084
		95 685 671	164 448 471
Total Assets		289 240 877	308 326 889
Equity and Liabilities			
Equity			
Share capital	10	513 486	513 486
Reserves	11	35 122 830	26 578 598
Retained income		253 604 561	277 849 262
		289 240 877	304 941 346
Liabilities			
Current Liabilities			
Trade and other payables	12	-	71 213
Current tax payable		-	3 309 774
Bank overdraft	9	-	4 556
		-	3 385 543
Total Equity and Liabilities		289 240 877	308 326 889

Statement of Profit or Loss and Other Comprehensive Income

	Note(s)	2015 R	2014 R
Revenue	13	839 867	804 379
Cost of sales	14	-	(802 306)
Gross profit		839 867	2 073
Other income	15	132 767	49 964 173
Operating expenses		(3 607 820)	(2 308 513)
Operating (loss) profit	16	**(2 635 186)**	47 657 733
Investment revenue	17	11 589 085	9 982 907
Finance costs	18	(610 339)	(406)
Profit before taxation		8 343 560	57 640 234
Taxation	19	(1 688 261)	(3 309 774)
Profit for the year		6 655 299	54 330 460
Other comprehensive income		-	
Total comprehensive income for the year		6 655 299	54 330 460

Statement of Changes in Equity

	Share capital R	Share premium R	Total share capital R	Revaluation reserve R	Retained income R	Total equity R
Balance at 01 July 2013	**10 000**	**557 075**	**567 075**	**49 842 788**	**252 214 336**	**302 624 199**
Profit for the year	-	-	-	-	54 330 460	54 330 460
Total comprehensive income for the year	-	-	-	-	**54 330 460**	**54 330 460**
Transfer between reserves	-	-	-	(23 264 190)	-	(23 264 190)
Purchase of own shares	(945)	(52 644)	(53 589)	-	-	(53 589)
Dividends	-	-	-	-	(28 695 534)	(28 695 534)
Total changes	**(945)**	**(52 644)**	**(53 589)**	**(23 264 190)**	**(28 695 534)**	**(52 013 313)**
Balance at 01 July 2014	**9 055**	**504 431**	**513 486**	**26 578 598**	**277 849 262**	**304 941 346**
Profit for the year	-	-	-	-	6 655 299	6 655 299
Other comprehensive income	-	-	-	8 544 232	-	8 544 232
Total comprehensive income for the year	-	-	-	**8 544 232**	**6 655 299**	**15 199 531**
Dividends	-	-	-	-	(30 900 000)	(30 900 000)
Total changes	-	-	-	-	**(30 900 000)**	**(30 900 000)**
Balance at 30 June 2015	**9 055**	**504 431**	**513 486**	**35 122 830**	**253 604 561**	**289 240 877**
Note(s)	10	10	10	11		

Statement of Cash Flows

	Note(s)	2015 R	2014 R
Cash flows from operating activities			
Cash receipts from customers		1 363 581	60 751 520
Cash paid to suppliers and employees		(4 111 089)	(62 924 918)
Cash used in operations	21	(2 747 508)	(2 173 398)
Interest income		8 046 776	5 762 719
Dividends received		3 542 308	4 220 188
Finance costs		(610 339)	(406)
Tax paid	22	(5 389 818)	(4 352 891)
Net cash from operating activities		**2 841 419**	**3 456 212**
Cash flows from investing activities			
Purchase of property, plant and equipment	2	(227 469)	(53 136)
Sale of property, plant and equipment	2	21 732	
Net movement in group company loans		(22 883 389)	5 059 830
Net movement in financial assets		(38 478 474)	190 670 029
Net movement in revaluation reserve		8 544 232	
Net cash from investing activities		**(53 023 368)**	**195 676 723**
Cash flows from financing activities			
Reduction of share capital or buy back of shares	10	-	(53 589)
Net movement in directors, managers and employees loans		-	(37 331)
Net movement in shareholders loans		11 846 049	(11 808 718)
Dividends paid		(30 900 000)	(28 695 534)
Net cash from financing activities		(19 053 951)	(40 595 172)
Total cash movement for the year		**(69 235 900)**	**158 537 763**
Cash at the beginning of the year		164 431 527	5 893 765
Total cash at end of the year	9	**95 195 627**	**164 431 528**

Accounting Policies

1. Presentation of annual financial statements

The annual financial statements have been prepared in accordance with the International Financial Reporting Standard for Small and Medium-sized Entities, and the Companies Act 71 of 2008. The annual financial statements have been prepared on the historical cost basis, and incorporate the principal accounting policies set out below. They are presented in South African Rands.

These accounting policies are consistent with the previous period.

1.1 Significant judgements and sources of estimation uncertainty

In preparing the annual financial statements, management is required to make judgements, estimates and assumptions that affect the amounts represented in the annual financial statements and related disclosures. The estimates and associated assumptions are based on historical experience and other factors that are considered to be relevant. Actual results in the future could differ from these estimates which may be material to the annual financial statements.

Key sources of estimation uncertainty

The following are the key assumptions concerning the future, and other key sources of estimation uncertainty at the end of the reporting period, that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year.

Impairment testing

The company reviews and tests the carrying value of property, plant and equipment and intangible assets when events or changes in circumstances suggest that the carrying amount may not be recoverable. When such indicators exist, management determine the recoverable amount by performing value in use and fair value calculations. These calculations require the use of estimates and assumptions. When it is not possible to determine the recoverable amount for an individual asset, management assesses the recoverable amount for the cash generating unit to which the asset belongs.

Residual values and useful lives of property, plant and equipment

Property, plant and equipment are depreciated over the useful lives of the assets, taking into account the residual value. Useful lives and residual value is determined on a yearly basis. Useful lives are influenced by development in technology, maintenance programs and future productivity. The future market situation, including the cost to sell the assets, determines the residual values. The residual values and useful lives of assets are based on management estimates. Depreciation is calculated on a straight line basis. This method does not necessarily represent the actual use of the asset.

1.2 Property, plant and equipment

Property, plant and equipment are tangible items that:
- are held for use in the production or supply of goods or services, for rental to others or for administrative purposes; and
- are expected to be used during more than one period.

Property, plant and equipment is carried at cost less accumulated depreciation and accumulated impairment losses.

Cost includes all costs incurred to bring the asset to the location and condition necessary for it to be capable of operating in the manner intended by management.

Costs include costs incurred initially to acquire or construct an item of property, plant and equipment and costs incurred subsequently to add to, replace part of, or service it. If a replacement cost is recognised in the carrying amount of an item of property, plant and equipment, the carrying amount of the replaced part is derecognised.

Depreciation is provided using the straight-line method to write down the cost, less estimated residual value over the useful life of the property, plant and equipment, which is as follows:

Item	Depreciation method	Average useful life
Office equipment	Straight line	5 years
IT equipment	Straight line	3 years
Computer software	Straight line	3 years

Accounting Policies

1.2 Property, plant and equipment (continued)

If the major components of an item of property, plant and equipment have significantly different patterns of consumption of economic benefits, the initial cost of the asset is allocated to its major components and each such component is depreciated separately over its useful life.

The residual value, depreciation method and useful life of each asset are reviewed at each annual reporting period if there are indicators present that there has been a significant change from the previous estimate.

Gains and losses on disposals are determined by comparing the proceeds with the carrying amount and are recognised in profit or loss in the period.

1.3 Investments in subsidiaries

Investments in subsidiaries are measured at cost less any accumulated impairment losses.

1.4 Investments in associates

Investments in associates are measured at cost less accumulated impairment losses, except for investments in associates for for which there is a published price quotation, which are measured at fair value with changes to fair value recognised in profit or loss.

1.5 Financial instruments

Initial measurement

Financial instruments are initially measured at the transaction price (including transaction costs except in the initial measurement of financial assets and liabilities that are measured at fair value through profit or loss) unless the arrangement constitutes, in effect, a financing transaction in which case it is measured at the present value of the future payments discounted at a market rate of interest for a similar debt instrument.

Financial instruments at amortised cost

These include loans, trade receivables and trade payables. Those debt instruments which meet the criteria in section 11.8(b) of the standard, are subsequently measured at amortised cost using the effective interest method. Debt instruments which are classified as current assets or current liabilities are measured at the undiscounted amount of the cash expected to be received or paid, unless the arrangement effectively constitutes a financing transaction.

At each reporting date, the carrying amounts of assets held in this category are reviewed to determine whether there is any objective evidence of impairment. If there is objective evidence, the recoverable amount is estimated and compared with the carrying amount. If the estimated recoverable amount is lower, the carrying amount is reduced to its estimated recoverable amount, and an impairment loss is recognised immediately in profit or loss.

Financial instruments at cost

Commitments to receive a loan are measured at cost less impairment.

Equity instruments that are not publicly traded and whose fair value cannot otherwise be measured reliably are measured at cost less impairment.

Financial instruments at fair value

All other financial instruments, including equity instruments that are publicly traded or whose fair value can otherwise be measured reliably, are measured at fair value through profit and loss.

1.6 Tax

Current tax assets and liabilities

Current tax for current and prior periods is, to the extent unpaid, recognised as a liability. If the amount already paid in respect of current and prior periods exceeds the amount due for those periods, the excess is recognised as an asset.

The tax liability reflects the effect of the possible outcomes of a review by the tax authorities.

Accounting Policies

1.6 Tax (continued)

Deferred tax assets and liabilities

A deferred tax liability is recognised for all taxable temporary differences.

A deferred tax asset is recognised for all deductible temporary differences and for the carry forward of unused tax losses and unused tax credits.

Deferred tax assets and liabilities are measured at an amount that includes the effect of the possible outcomes of a review by the tax authorities using tax rates that, on the basis of enacted or substantively enacted tax law at the end of the reporting period, are expected to apply when the deferred tax asset is realised or the deferred tax liability is settled.

Deferred tax asset balances are reviewed at every reporting date. When necessary, a valuation allowance is recognised against the deferred tax assets so that the net amount equals the highest amount that is more likely than not to be realised on the basis of current or future taxable profit.

Tax expenses

Tax expense is recognised in the same component of total comprehensive income or equity as the transaction or other event that resulted in the tax expense.

1.7 Leases

A lease is classified as a finance lease if it transfers substantially all the risks and rewards incidental to ownership to the lessee. All other leases are operating leases.

Operating leases – lessee

Operating lease payments are recognised as an expense in the period in which they are incurred.

1.8 Impairment of assets

The company assesses at each reporting date whether there is any indication that property, plant and equipment or intangible assets or goodwill may be impaired.

If there is any such indication , the recoverable amount of any affected asset (or group of related assets) is estimated and compared with its carrying amount. If the estimated recoverable amount is lower, the carrying amount is reduced to its estimated recoverable amount, and an impairment loss is recognised immediately in profit or loss.

If an impairment loss subsequently reverses, the carrying amount of the asset (or group of related assets) is increased to the revised estimate of its recoverable amount, but not in excess of the amount that would have been determined had no impairment loss been recognised for the asset (or group of assets) in prior years. A reversal of impairment is recognised immediately in profit or loss.

1.9 Share capital and equity

An equity instrument is any contract that evidences a residual interest in the assets of an entity after deducting all of its liabilities.

If the company reacquires its own equity instruments, those instruments are deducted from equity. No gain or loss is recognised in profit or loss on the purchase, sale, issue or cancellation of the company's own equity instruments. Consideration paid or received shall be recognised directly in equity.

1.10 Employee benefits

Short-term employee benefits

The cost of short-term employee benefits, (those payable within 12 months after the service is rendered, such as leave pay and sick leave, bonuses, and non-monetary benefits such as medical care), are recognised in the period in which the service is rendered and are not discounted.

Defined contribution plans

Payments to defined contribution retirement benefit plans are charged as an expense as they fall due.

Accounting Policies

1.11 Government grants

Grants that do not impose specified future performance conditions are recognised in income when the grant proceeds are receivable.

Grants that impose specified future performance conditions are recognised in income only when the performance conditions are met.

Grants received before the revenue recognition criteria are satisfied are recognised as a liability.

Grants are measured at the fair value of the asset received or receivable.

1.12 Revenue

Revenue is recognised to the extent that the company has transferred the significant risks and rewards of ownership of goods to the buyer, or has rendered services under an agreement provided the amount of revenue can be measured reliably and it is probable that economic benefits associated with the transaction will flow to the company. Revenue is measured at the fair value of the consideration received or receivable, excluding sales taxes and discounts.

Service revenue is recognised by reference to the stage of completion of the transaction at the end of the reporting period. The Stage of completion is determined by surveys of work performed. When the outcome of a transaction involving the rendering of services cannot be estimated reliably, revenue is recognised only to the extent of the expenses recognised that are recoverable.

Interest is recognised, in profit or loss, using the effective interest rate method.

Dividends are recognised, in profit or loss, when the company's right to receive payment has been established.

1.13 Borrowing costs

Borrowing costs are recognised as an expense in the period in which they are incurred.

Notes to the Annual Financial Statements

	2015	2014
	R	R

2. Property, plant and equipment

	2015			2014		
	Cost	Accumulated depreciation	Carrying value	Cost	Accumulated depreciation	Carrying value
Furniture and fixtures	-	-	-	25 703	(3 971)	21 732
Office equipment	155 316	(27 188)	128 128	12 284	(2 457)	9 827
IT equipment	108 803	(39 747)	69 056	40 108	(19 356)	20 752
Computer software	19 711	(3 611)	16 100	-	-	-
Total	**283 830**	**(70 546)**	**213 284**	**78 095**	**(25 784)**	**52 311**

Reconciliation of property, plant and equipment - 2015

	Opening balance	Additions	Disposals	Depreciation	Total
Furniture and fixtures	21 732	-	(21 732)	-	-
Office equipment	9 827	139 061	-	(20 760)	128 128
IT equipment	20 752	68 696	-	(20 391)	69 057
Computer software	-	19 712	-	(3 612)	16 100
	52 311	**227 469**	**(21 732)**	**(44 763)**	**213 285**

Reconciliation of property, plant and equipment - 2014

	Opening balance	Additions	Depreciation	Total
Furniture and fixtures	5 600	18 703	(2 571)	21 732
Office equipment	-	12 284	(2 457)	9 827
IT equipment	11 972	22 149	(13 369)	20 752
	17 572	**53 136**	**(18 397)**	**52 311**

3. Investments in subsidiaries

Name of subsidiary	% holding 2015	% holding 2014	Carrying amount 2015	Carrying amount 2014
Business Venture Investments No. 1166 (Pty) Ltd	100.00 %	100.00 %	57 690	57 690
K2012/206/76/3 (South Africa) (Pty) ltd	100.00 %	100.00 %	1 000	1 000
H1 Capital (Pty) Ltd	100.00 %	100.00 %	100	100
Northern Cape Casino Consultants Kairo (Pty) Ltd	60.00 %	60.00 %	60	60
			58 850	**58 850**

All the entities are incorporated in South Africa and share the year end of the company.

The carrying amounts of subsidiaries are shown gross of impairment losses.

Notes to the Annual Financial Statements

	2015 R	2014 R

4. Investments in associates

Name of company	% holding 2015	% holding 2014	Carrying amount 2015	Carrying amount 2014
PB Liquor Merchants (Pty) Ltd	30.00 %	30.00 %	50 000	50 000
Mzanella Communications (Pty) Ltd	35.00 %	35.00 %	77 778	77 778
			127 778	127 778
Impairment of investments in associates			(50 000)	(50 000)
			77 778	77 778

Fair values of equity accounted investments in associates are only presented when there are published price quotations.

All the entities are incorporated in South Africa.

The carrying amount of associates is shown gross of impairment losses.

5. Loans to (from) group companies

Subsidiaries

	2015	2014
H1 Capital (Pty) Ltd	29 946 455	31 899
Business Venture Investments No. 1066 (Pty) Ltd	51 936 184	58 968 484
K2012/206/76/3 (South Africa) (Pty) Ltd	9 893	8 759
	81 892 532	59 009 142

The loans are unsecured, bear interest at rates determined by the parties from time to time and have no fixed terms of repayment.

6. Loans to (from) shareholders

	2015	2014
LI Jacobs	-	5 908 718
Reyburn Hendricks Family Trust	-	5 937 331

The loans were repaid during the financial year under review.

	2015	2014
	-	11 846 049

7. Other financial assets

At fair value

	2015	2014
Listed shares	77 086 116	46 440 024
Unlisted shares	29 465 203	22 727 293
	106 551 319	69 167 317

At amortised cost

	2015	2014
Loan: Iklneo (Pty) Ltd	4 761 443	3 653 067
Loan: The White Wings Trust	-	13 904
	4 761 443	3 666 971
Total other financial assets	111 312 762	72 834 288

Notes to the Annual Financial Statements

	2015 R	2014 R

7. Other financial assets (continued)

The loans are unsecured, bear interest at rates determined by the parties from time to time and have no fixed terms of repayment.

	2015 R	2014 R
Non-current assets		
At fair value	106 551 319	69 167 317
At amortised cost	4 761 443	3 666 971
	111 312 762	72 834 288

The fair values of shares held are based on the quoted market price at reporting period date.

Details of shares held

	2015 R	2014 R
Listed - at fair value		
Bidvest Group Limited	50 983 744	45 555 650
M1 Capital	22 444 272	-
Hyprop Ltd	686 662	458 374
Emira Ltd	2 527 500	426 000
Alexander Forbes	443 938	-
Unlisted - at fair value		
Phuthuma Nathi	28 774 830	22 632 801
Sasol Inzalo	690 373	94 492
	106 551 319	69 167 317

8. Trade and other receivables

	2015 R	2014 R
Trade receivables	12 038	-
Deposits	59 280	-
VAT	26 941	12 387
	98 259	12 387

9. Cash and cash equivalents

Cash and cash equivalents consist of:

	2015 R	2014 R
Cash on hand	2 000	-
Bank balances	127 519	-
Short-term deposits	95 066 111	164 436 084
Bank overdraft	-	(4 556)
	95 195 630	164 431 528
Current assets	95 195 629	164 436 084
Current liabilities	-	(4 556)
	95 195 629	164 431 528

Notes to the Annual Financial Statements

	2015 R	2014 R
10. Share capital		
Authorised		
10,000 Ordinary shares of R1 each	10 000	10 000
Reconciliation of number of shares issued:		
Reported at beginning of year	9 055	10 000
Shares repurchased by company	-	(945)
	9 055	9 055
Issued		
9,055 Ordinary shares of R1 each	9 055	9 055
Share premium	504 431	504 431
	513 486	513 486
11. Revaluation reserve		
Revaluation of investments to market value	35 772 830	27 228 598
Revaluation of loan to associate	(650 000)	(650 000)
	35 122 830	26 578 598
12. Trade and other payables		
Other payables	-	17 536
Accruals	-	53 677
	-	71 213
13. Revenue		
Sale of goods	839 867	804 379
14. Cost of sales		
Sale of goods		
Cost of goods sold	-	802 306
15. Other income		
Profit and loss on sale of assets and liabilities	-	49 949 173
Sundry income	132 767	
Fees earned	-	15 000
	132 767	49 964 173
16. Operating (loss) profit		
Operating (loss) profit for the year is stated after accounting for the following:		
Income from subsidiaries		
Dividends	3 490 999	3 692 635
Operating lease charges		
Premises		
• Contractual amounts	230 182	453 813

Notes to the Annual Financial Statements

	2015 R	2014 R
16. Operating (loss) profit (continued)		
Profit on disposal of investment	-	49 949 173
Depreciation on property, plant and equipment	44 763	18 397
Employee costs	1 867 067	447 236

	2015 R	2014 R
17. Investment revenue		
Dividend revenue		
Financial assets - Local	3 490 999	3 692 635
Subsidiaries - Local	51 309	527 553
	3 542 308	**4 220 188**
Interest revenue		
Bank	8 046 776	5 762 719
	11 589 084	**9 982 907**

	2015 R	2014 R
18. Finance costs		
Non-current borrowings	655	406
Late payment of tax	609 684	-
	610 339	**406**

19. Taxation

Major components of the tax expense

	2015 R	2014 R
Current		
Local income tax - current period	1 677 407	3 309 774
Local income tax - recognised in current tax for prior periods	10 854	-
	1 688 261	**3 309 774**

Reconciliation of the tax expense

Reconciliation between accounting profit and tax expense.

	2015 R	2014 R
Accounting profit	8 343 560	57 640 234
Tax at the applicable tax rate of 28% (2014: 28%)	2 336 197	16 139 266
Tax effect of adjustments on taxable income		
Portion of expenses not tax deductable	333 057	-
Prior year adjustments	10 854	576 352
Dividends received	(991 847)	(1 181 653)
Tax losses utilised	-	(7 552 944)
Capital gains tax - exclusion @ 33.33%	-	(4 671 247)
	1 688 261	**3 309 774**

	2015 R	2014 R
20. Auditor's remuneration		
Fees	-	5 000
Adjustment for previous year	24 142	54 000
Tax and secretarial services	13 919	34 051
	38 061	**93 051**

Notes to the Annual Financial Statements

	2015 R	2014 R
21. Cash used in operations		
Profit before taxation	8 343 560	57 640 234
Adjustments for:		
Depreciation and amortisation	44 763	18 397
Profit on sale of investments	-	(49 949 173)
Dividends received	(3 542 308)	(4 220 188)
Interest received	(8 046 776)	(5 762 719)
Finance costs	610 339	406
Changes in working capital:		
Trade and other receivables	(85 873)	77 674
Trade and other payables	(71 213)	21 971
	(2 747 508)	**(2 173 398)**

	2015 R	2014 R
22. Tax paid		
Balance at beginning of the year	(3 309 774)	(4 352 891)
Current tax for the year recognised in profit (loss) or loss	(1 688 261)	(3 309 774)
Balance at end of the year	(391 783)	3 309 774
	(5 389 818)	**(4 352 891)**

23. Related parties

Relationships

Shareholders	Reyburn Hendricks Family Trust LI Jacobs
Subsidiaries	Business Venture INvestments No. 1166 (Proprietary) Limited 3 K2012/206/76/3 (South Africa) (Proprietary) Limited H1 Capital (Proprietary) Limited 4 Northern Cape Casino Consultants Kairo (Proprietary) Limited
Associates	Mzansila Communicoligies (Proprietary) Limited PB Liquor Merchants (Proprietary) Limited

Related party balances and transactions with entities over which the company has control, joint control or significant influence

Related party balances

	2015 R	2014 R
Loan accounts - Owing (to) by related parties		
Business Venture Investments No. 1166 (Proprietary) Limited	51 936 184	58 968 484
K2012/206/76/3 (South Africa) (Proprietary) Limited	9 893	8 759
H1 Capital (Proprietary) Limited	29 946 455	31 899

H1 Holdings (Proprietary) Limited
(Registration number 1996/005471/07)
Annual Financial Statements for the year ended 30 June 2015

Detailed Income Statement

	Note(s)	2015 R	2014 R
Revenue			
Sale of goods		839 867	804 379
Cost of sales			
Purchases		-	(802 306)
Gross profit		**839 867**	**2 073**
Other income			
Dividends received	17	3 542 308	4 220 188
Fees earned		-	15 000
Gains on disposal of assets		-	49 949 173
Interest received	17	8 046 776	5 762 719
Sundry income		132 767	-
		11 721 851	**59 947 080**
Operating expenses			
Accounting fees		17 277	25 000
Administration and management fees		19 776	557 035
Advertising		600	65 254
Auditors remuneration	20	38 060	93 051
Bank charges		19 197	4 265
Brokerage fees		2 546	285 270
Cleaning		2 238	-
Computer expenses		130 823	22 082
Consulting and professional fees		1 521	-
Consumables		1 217	-
Depreciation, amortisation and impairments		44 763	18 397
Donations		54 000	43 800
Employee costs		1 867 067	447 236
Entertainment		21 078	16 499
General expenses		50 888	1 421
Insurance		-	455
Lease rentals on operating lease		230 182	453 813
Legal expenses		429 406	44 500
Motor vehicle expenses		3 162	903
Municipal expenses		-	2 709
Parking		955	500
Postage		4 478	7 840
Printing and stationery		43 435	6 060
Repairs and maintenance		30 341	511
Staff welfare		29 333	1 316
Subscriptions		102 091	87 257
Telephone and fax		72 344	44 381
Training		139 891	1 667
Travel - local		251 151	77 311
		3 607 820	**2 306 513**
Operating profit	16	**8 953 898**	**57 640 640**
Finance costs	18	(610 339)	(406)
Profit before taxation		**8 343 559**	**57 640 234**
Taxation	19	(1 688 261)	(3 309 774)
Profit for the year		**6 655 298**	**54 330 460**

Annexure - 13

Last Filed Annual Return

ANNEXURE-IV

COMPANIES (INCORPORATION) REGULATIONS, 2017
[See Regulation 5]

APPLICATION FOR COMPANY INCORPORATION

PART- I

1.1 Name of the Company	KULACHI SOLAR POWER (PRIVATE) LIMITED	
1 2 Fee Payment Details	1.2.1 Challan No	E-2017-632610
	1.2.2. Challan Amount (Rs.)	
	Fee Paid (Rs.)	250.00

PART- II

Section - A - Company Information

2.1 Correspondence Address	Suite 701, 7th Floor, Green Trust Tower, Jinnah Avenue, Islamabad Islamabad Islamabad Capital Territory (I.C. T.) 4400				
City	Islamabad	District	ISLAMABAD	Province	Islamabad Capital Territory (I. C.T.)
Telephone Number	512,813,101			Email Address	info@asifawan.com
Mobile Number	03145108291				

2.2 Registered office Address, if any	Suite 701, 7th Floor, Green Trust Tower, Jinnah Avenue, Islamabad Islamabad Islamabad Capital Territory (I.C. T.) 4400				
City	Islamabad	District	ISLAMABAD	Province	Islamabad Capital Territory (I. C.T.)
Telephone Number	512,813,101			Website (if any)	03145108291
Mobile Number	03145108291			Email Address	info@asifawan com

2.3 Principal line of business	--ALTERNATE ENERGY

Section - B - Capital Structure

	Class / Kind	Face Value	No of Shares	Total Amount
2.4 Authorised Capital	ordinary	10	10000	100000
2 5 Paid Up Capital	ordinary	10	100	1000

Section - C - Special Business Information

(Applicable in case of Banking Company, Non-banking Finance Company, Insurance company, Modaraba management company, Stock Brokerage business, forex, real estate business, managing agency, business of providing the services of security guards*)

2 6 Nature of business in case of specialized business requiring licence / permission / approval (please specify and also attach NOC / approval of the relevant authority)	NOT APPLICABLE

Company Registration Office Islamabad
SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN
SECP

Section - D - Company subscribers, proposed directors, proposed chief executive officer and nominee

2.7 State Number of directors fixed by subscribers:
[Please note that as per law a company must have minimum director as follows:]

		No. of proposed directors
Single Member Company	01	
Private Limited Company	02	4
Public Limited Company	03	

Name	Father/Husband Name	CNIC/Passport No	Incorporation/ Registration No	Nationality	Occupation	Residential/Registered office address	NTN	DESIGNATION	No of shares subscribed	Date of Appointment
Mr. AZIZ RAZA	S/O MEHRBAN KHAN	38103-7261229-7		Pakistan	BUSINESS	POST OFFICE KHAS, JHAMRA, TEHSIL KALAR KAHAR, CHAKWAL		Chief Executive		Since Incorporation.
Mr. SALIM KHAN	S/O HUSSAIN KHAN	17301-5564690-3		Pakistan	BUSINESS	HOUSE 76-A, STREET 17, SECTOR F-8/2, ISLAMABAD ISLAMABAD Islamabad		Director And Subscriber	01	Since Incorporation.
Mr. JAMES DOYLE (NOMINEE DIRECTOR ALTERNATIVE GRID NORTH	S/O MICHAEL DOYLE	LT8444912		Ireland	BUSINESS	HILLFIELD HOUSE, DROMIN, FOSSA, KILLARNEY, CO KERRY		Director And Subscriber	01	Since Incorporation.
Mr. REYBURN LARS HENDRICKS (NOMINEE DIRECTOR H1 HOLDINGS	S/O PHINES HENDRICKS	M00209560		South Africa	BUSINESS	258 OCEAN VIEW DRIVE, BANTRY BAY, 8005 CAPE TOWN, SOUTH AFRICA, South		Director And Subscriber	01	Since Incorporation.
MR. CRAIG MALCOLM STANLEY (NOMINEE DIRECTOR ATLANTIC	S/O MALCOLM STANLEY	483544323		South Africa	BUSINESS	NO 8 QUARRY HILL ROAD, TAMBOERSKLOOF, CAPE TOWN, 8001 SOUTH		Director And Subscriber	01	Since Incorporation
Mr. SALIM KHAN (NOMINEE DIRECTOR TARGET ENERGY	S/O HUSSAIN KHAN	17301-5564690-3	0094856	Pakistan	BUSINESS	7TH FLOOR, GREEN TRUST TOWER, JINNAH AVENUE ISLAMABAD		Subscriber (Company)	09	Since Incorporation.
Mr. JAMES DOYLE (NOMINEE DIRECTOR ALTERNATIVE GRID NORTH	S/O MICHAEL DOYLE	LT8444912	565720	Ireland		LERNIHAN O NEILL SOLICITORS, 6 TERENURE ROAD EAST RATHGAR		Subscriber (Company)	19	Since Incorporation
Mr. REYBURN LARS HENDRICKS (NOMINEE DIRECTOR H1 HOLDINGS	S/O PHINES HENDRICKS	M00209560	1996/005471/07	South Africa	BUSINESS	MOORINGS 3, PORTSWOOD RIDGE, PORTSWOOD ROAD, V and A		Subscriber (Company)	49	Since Incorporation.
Mr. CRAIG MALCOLM STANLEY (NOMINEE DIRECTOR Atlantic	S/O MALCOLM STANLEY	483544323	2014/078624/07	South Africa	BUSINESS	101 BLOCK A, WEST QUAY BUILDING 7 WEST QUAY ROAD, WATERFRONT		Subscriber (Company)	19	Since Incorporation.

2.8 Details of Nominee (only in case of single member company)

Name of Nominee

CNIC of Nominee

Company Registration Office Islamabad
SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN
SECP

CERTIFIED TO BE TRUE COPY

23-11-2017

Additional Joint Registrar
Company Registration Office Islamabad

Next

Previous

Section - E - If the company intends to adopt tables contained in First Schedule to the Companies Act, 2017 (XIX of 2017) as its articles of association

- [x] Table A- Part I (Articles of association of company limited by shares)
- [ ] Table A- Part II (Articles of association of single member company limited by shares)

Section - F - The company limited by shares in case it has not adopted articles contained in First Schedule to the Act company limited by guarantee and unlimited company shall attached the articles of association.

PART- III

Declaration under section 16

3.1 Declarant's Name	Mr SALIM KHAN
3.2 Declarant Profession / Designation	[ ] Authorized Intermediary [x] a person named in the articles as Director of the proposed company
3.3 Declaration	I do hearby solemnly and sincerely declare that: a) I have been authorized as declarant by the subscribers; b) all the requirements of the Companies Act, 2017, and the regulations made there under in respect of matters precedent to the registration of the said Company and incidental thereto have been complied with c) I make this solemn declaration conscientiously believing the same to be true.
3.4 Declarant Signature	
3.5 Registration No of authorized intermediary, if applicable	
3.6 Date	08/09/2017

CERTIFIED TO BE TRUE COPY

23-11-2017

Additional Joint Registrar
Company Registration Office Islamabad

Previous

Company Registration Office Islamabad
SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN
SECP

Company Registration Office
Islamabad
SECP
SECURITIES AND EXCHANGE COMMISSION OF PAKISTAN

Annexure - 14

EPC Contract (Signature Pages only)

For and on behalf of

KULACHI SOLAR POWER (PRIVATE) LIMITED

SIGNATURE

Name: AZIZ RAZA MALIK

Designation: CEO

IN THE PRESENCE OF:

SIGNATURE OF WITNESSES

SIGNATURE

1- Name: SALIM KHAN

Address: SUITE # 701, 7TH FLOOR GREEN TRUST PLAZA JINNAH AVENUE ISLAMABAD

Passport/CNIC No: 17301-5564690-3

2- Name: MUHAMMAD KHURRAM KHAN

Address: SUITE # 701, 7TH FLOOR GREEN TRUST PLAZA JINNAH AVENUE ISLAMABAD

Passport/CNIC No: 37405-6261490-5

For and on behalf of
TBEA XINTE ENERGY (PRIVATE) LIMITED } SIGNATURE

Name: Houpeng

Designation: Representative of TBEA. Pakistan

IN THE PRESENCE OF:

SIGNATURE OF WITNESSES SIGNATURE

1- Name: Li Kaining
Address: House No 715. Street 23 X-Block. DHA. Lahore Pakistan.
Passport/CNIC No: E66764075

2- Name: IRFAN JAMIL
Address: TBEA, Pakistan
Passport/CNIC No: 36302-3918762-3

Annexure - 15

Profiles of EPC Contractor

Annexure - 16

Reference list of EPC Contractor

TBEA `s Experience as EPC and/or O&M contractor

TBEA has the world's first-strongest PV EPC capacity. The PV installation volume is nearly 15 percent of China's total PV demand. With a total PV EPC capacity of over 1.4 GW, and ranked first in the world, the below table are part of TBEA`s PV reference, altogether 87 projects.

No	Project Name	Client	Detail	Location	Period
1	50MW OSPL Gharo,,Sindh costal Highway,PV EPC Project	Oursun Pakistan Limited	50MW PV EPC Contract	Pakistan	Dec.2017-Sep.2018 (In the execution phase)
2	13.68MW photovoltaic solar plant in Chile	GENERADORA DEL PACÍFICO CO.,LTD	13.68MW PV EPC contract	Chile	2.March.2015
3	EPC and O&M Contract for 100MWp PV Solar Project at Quaid-E-Azam Park, Bahawalpur, Pakistan	Quaid-E-Azam Solar Power (Private) Limited	100MW PV EPC and O&M contract	Pakistan	June.2014
4	100MW Solar-Wind Hybrid project	TBEA	100MW EPC Solar-Wind Hybrid	Turpan	May-Oct 2013
5	Jiangsu Dongtai Coastal Economic Zone 50MW PV EPC project	SUMEC ENERGY ENGINEERING CO.,LTD	50MW EPC contract	Jiangsu	Sep-Mar 2013
6	CPIC's Third-phase 20MW On-grid PV project in Tulufan, Xinjiang	CPI Xinjiang Energy Chemical Group Co., Ltd.	20MW EPC contract	Tulufan, Xinjiang	May-Dec 2013
7	CPIC's Second-phase 20MW On-grid PV project in Luopu, Xinjiang	CPI Xinjiang Energy Chemical Group Co., Ltd.	20MW EPC contract	Luopu, Xinjiang	May-Dec 2013
8	CPIC's 20MW PV project in Damaoqi Bailingmiao, Construction	China Power Investment Corporation North China Branch	20MW EPC contract	Damaoqi Bailingmiao	Aug-Nov 2013
9	Datang International 20MWp On-grid PV EPC project in Hongsibu, Ningxia	Datang International Ningxia Qingtongxia PV Power Co., Ltd	20MW EPC contract	Hongsibu, Ningxia	May-Dec 2013
10	Datang 30MW PV EPC project in Huancuishan, Tianzhen county	Datang Shanxi New Energy Co., Ltd	30MW EPC contract	Huancuishan Tianzhen county	Apr-Dec 2013
11	Datang International Second-	Datang	20MW EPC	Gonghe,	Aug-Dec

	phase on-grid PV project in Gonghe, Qinghai	International Qinghai Gonghe PV Power Co., Ltd	contract	Qinghai	2013
12	Datang International First-phase on-grid PV project in Gonghe, Qinghai	Datang International Qinghai Gonghe PV Power Co., Ltd	20MW EPC contract	Gonghe, Qinghai	Aug-Dec 2013
13	Datang International's First-phase On-grid PV EPC Project in Bayin, Zhuozi county, Inner Mongolia	Datang International Inner Mongolia New Energy Co., Ltd	11MW EPC contract	Bayin, Zhuozi county, Inner Mongolia	May-Oct 2013
14	Huaneng first-phase 20MW on-grid PV EPC project in Shanshan	Huaneng Xinjiang Energy Development Co., Ltd	20MW EPC contract	Shanshan	Jun-Dec 2013
15	Huaneng Solar park 20MWp on-grid PV EPC project in Hami Shichengzi	Huaneng Xinjiang Energy Development Co., Ltd	20MW EPC contract	Hami Shichengzi	May-Dec 2013
16	Qinghai Yuhui Wulan Second-phase on-grid PV EPC project	Qinghai Yuhui New energy Co., Ltd	20MW EPC contract	Qinghai Yuhui Wulan	Oct-Mar 2013
17	Jingxin Shaya first-phase 20MW on-grid PV EPC project	Shaya Jingxin Technology Co., Ltd	20MW EPC contract	Jingxin Shaya	Nov-Mar 2013
18	Shanghai Aerospace Automobile Electromechanical Co., Jiayuguan 10MW grid-connected PV project inverter procurement	Shanghai Solar Energy Technology Co., Ltd.	10 MW On-grid inverter procurement	Jiayuguan	Mar-Apr 2013
19	Qinghai Haibei Gangcha second-phase 10MW on-grid PV EPC project	Shanghai Aerospace Automobile Electromechanical Co., LTD	10MW EPC contract	Qinghai Haibei Gangcha	May-Dec 2013
20	Ningxia Zhongwei City 10MW PV grid-connected project inverter procurement	Shanghai Solar Energy Technology Co., Ltd.	10 MW On-grid inverter procurement	Ningxia Zhongwei City	Jun 2013
21	CGNPC's First-phase 30MW On-grid PV EPC Project in Tumushuke, construction and installation(part 2)	CGN Tumushuke Solar Energy Co., Ltd.	30MW EPC contract	Tumushuke	May-Aug 2013
22	CGNPC's First-phase 30MW	CGN Tumushuke	30MW EPC	Tumushuke	May-Aug

	On-grid PV EPC Project in Tumushuke, construction and installation(part 1)	Solar Energy Co., Ltd.	contract		2013
23	CECIC's second-phase 20MW EPC On-grid PV Power Generation Project in Shanshan	CECEP Solar Energy Technology Co., Ltd	20MW EPC contract	Shanshan	May-Dec 2013
24	CECIC's First-stage 20MW EPC On-grid PV Power Generation Project in Da Luntai	CECEP Luntai Solar Energy Technology Co., Ltd	20MW EPC contract	Da Luntai	Oct-Apr 2013
25	CECIC's First-stage 20MW EPC On-grid PV Power Generation Project in Ku'erle	CECEP Ku'erle Solar Energy Technology Co., Ltd	20MW EPC contract	Ku'erle	Oct-Jun 2013
26	Guangwei Industrial Park 10.2MW PV application demonstration EPC project	Guangwei Green energy Co., Ltd	10.2MW EPC contract	Guangwei	May-Aug 2013
27	Longyuan Tibet Ali 10MWp micro- grid PV power generation project, Electrical Installation	Longyuan Tibet New energy Co., Ltd	10MWp Electrical installation	Tibet	Oct-Aug 2013
28	Xinjiang CHC's 20MW on-grid PV EPC project in Awati	Xinjiang CHC Kashi Second-phase power Co., Ltd	20MW EPC contract	Awati, Xinjiang	Sep-Dec 2012
29	Keleqin, Kazakhstan 1MW on-grid PV project	Keleqin, Kazakhstan	1MW EPC contract	КазЭкоВатт, Kazakhstan	Nov 2012
30	Datang International Second-phase 20MW on-grid PV project in Golmud, Qinghai	Datang International Qinghai Golmud PV Power Co., Ltd	20MW EPC contract	Golmud, Qinghai	Sep-Dec 2012
31	China Three Gorges 10MW PV project in Qinghai Golmud (first-phase 5MW)	Three Gorges Golmud new energy power generation Co., Ltd	20MW EPC contract	Qinghai Golmud	Apr 2012
32	CGNPC's First-phase 20MW On-grid PV EPC Project in Qinghe, additional 2MW	CGN Qinghe Solar Energy Co., Ltd.	2MW EPC	Qinghe	Jun-Aug 2012
33	Shanghai Aerospace Automobile Electromechanical Co., 10MW on-grid PV project in Qinghai	Shanghai Solar Energy Technology Co., Ltd.	10MW EPC contract	Qinghai	Sep-Dec 2012

33	Xinjiang Keping first-phase 20MW on-grid PV EPC project	Keping Jiasheng Sun power Co., Ltd	20MW EPC contract	Keping Xinjiang	Oct-Dec 2012
34	Hanergy first-phase first-step 20MW PV EPC project in Xinhe, Akesu	Hanergy Akesu PV power investment Co., Ltd	20MW EPC contract	Xinhe, Akesu	Oct-Dec 2012
35	Liaoyuguan Industrial Zone Golden Sun Demonstration project, EPC general contracting(Part2)	Datang Guanxian PV power Co., Ltd	10MW EPC contract	Liaoyuguan	Jun-Oct 2012
36	Xinjiang CHC's 40MW on-grid PV EPC project in Shitoucheng	Xinjiang CHC Nuoshui Wind Power Co., Ltd.	40MW on-grid PV EPC project	Shitoucheng	Jun-Dec 2012
37	Concessions project (Hetian, Xinjiang) 20MW on-grid power station	CPIC (Xinjiang) Energy Co., Ltd.	20MW on-grid power station contract	Hetian, Xinjiang	Jun 2011-Dec 2012
38	Concession project (Hami, Xinjiang) 20MW on-grid power station	CPIC (Xinjiang) Energy Co., Ltd.	20MW on-grid power station contract	Hami, Xinjiang	Dec 2012
39	Concession project (Hami, Xinjiang) 20MW on-grid power station	CPIC (Xinjiang) Energy Co., Ltd.	20MW on-grid power station contract	Hami, Xinjiang	Jun 2011-Dec 2012
40	Concession project (Wuwei, Gansu) 20MW on-gridpower station	CPI (Xinjiang) New Energy Holding Co., Ltd.	20MW inverters supply	Wuwei, Gansu	Jun 2011-Dec 2012
41	Concession project (Baiyin, Gansu) 20MW on-grid power station	CPI (Xinjiang) New Energy Holding Co., Ltd.	20MW inverters supply	Baiyin, Gansu	Jun 2011-Dec 2012
42	Datang international first-phase 20MW grid-on PV project in Golmud, Qinghai(8KM 110Kv transmission line from 110Kv Substation to Golmud 330Kv Center)	Datang International Qinghai Golmud PV Power Co., Ltd	20MW EPC contract and 110KV transmission line	Golmud, Qinghai	Sep-Nov 2011
43	CPIC's First-phase 30MW On-grid PV Project in Mt. Taiyang	CPIC Ningxia Qingtongxia Energy Aluminum Group Co., Ltd.	30MW on-grid PV EPC project	Mt. Taiyang	Sep-Dec 2011

44	Xitieshan 60MW PV on-grid generation project (thirdphase) construction (B1 bid package)	CGN (Big Qaidam) Solar Energy Developing Co., Ltd.	20MW on-grid power station construction	Xitieshan, Qinghai	Jun-Oct 2011
45	CGNPC's First-phase 20MW On-grid PV EPC Project in Hami	CGN Hami Solar Energy Co., Ltd.	20MW EPC contract	Hami, Xinjiang	Sep-Dec 2011
46	CPIC's First-phase 20MW On-grid PV Power Plant in Shanshan, Xinjiang	CPIC Xinjiang Energy Co., Ltd.	10MW EPC contract	Shanshan, Xinjiang	Aug-Dec 2011
47	CECEP (Taiyangshan, Wuzhong) PV on-grid generation project (second phase) 20MWP program (first bid package) system integration	CECEP (Taiyangshan, Wuzhong) PV Generation Co., Ltd.	10MW on-grid power station system integration	Wuzhong, Ningxia	Jun-Aug 2011
48	CECEP (Big Qaidam, Qinghai) PV on-grid generation Project (first phase) 10MWP program system integration	CECEP (Big Qaidam, Qinghai) Solar Generation Co., Ltd.	10MW on-grid power station system integration	Big Qaidam, Qinghai	May-Aug 2011
49	Xitieshan 30MW PV on-grid generation project (second phase) construction (B1 bid package)	CGN Solar Energy Developing Co., Ltd.	10MW on-grid power station construction	Xitieshan, Qinghai	June-Sep 2011
50	Bronze Valley (Datang, Ningxia) 10MW on-grid generation project	Angli Tiansheng (Shandong) PV Technology Co., Ltd.	10MW on-grid power station contract	Bronze Valley, Ningxia	May 2011
51	Datang New Energy's 10MW EPC Project in Qingtongxia	Shandong Atsun Solar Electric Technology Co., Ltd.	10MW EPC contract	Qingtongxia	May 2011
52	Yijing (Changzhou) 10MW roof PV power station project	Yijing (Changzhou) PE Technology Co.,Ltd.	10MW roof PV power station	Gold Altar, Jiangsu	Sep 2011
53	Shanxi International Electric Power Lvliang BIPV 8MW project	Shan Xi Nake Solar Technology Co., Ltd.	8MW grid-connected power plant general contracting	Lvliang city, Shanxi province	Dec 2011
54	Datang International's First-	Qinhai Datang	20MW EPC	Golmud,	Aug-Sep 2011

	phase 20 MW On-grid PV Project in Golmud	International Energy	contract	Qinghai	
55	Datang International's Second-phase 20MW PV Project in Qingtongxia	Ningxia Datang International Qingtongxia Photovoltaic Power Generation Co., Ltd.	20MW EPC contract	Qingtongxia	Sep-Dec 2011
56	The first phase of Luan Jingtan 10MW grid connected project of CECEP	Alashan Solar Generation Co., Ltd, CECEP	10MW System Integration Installation	Luan Jingtan, Inner Mongolia	Mar2011
57	The second phase of Taiyangshan 20MW solar power project system integration and power transmission and transformation installation, CECEP	Solar Technology Co., Ltd of CECEP	10MW grid connected system integration project	Taiyangshan, Wuzhong, Ningxia province	May 2011
58	CECEPG Xitie Mountain 10MW PV on-grid plant project	CECEPG Co., LTD	Wall, street base, retaining walls, roads, hardening, gutter construction contract	Xitie Mountain Qinghai	Mar 2011
59	Pinglu 5MW, Youyu 10MW PVPower Generation Supervision Project, Shanxi International PV Power Generation Co.	Xinjiang Kunlun Project Supervision Co.	5MW 10MW Project Supervision	Pinglu, Shanxi. Youyu	Feb 2011
60	Xitie Mountain 30MW PV on-grid Construction and Installation Project	CECEPG Co., LTD	10MW Construction and Installation Project	Xitie Mountain Qinghai	Aug 2011
61	CECEPG System Integration of 10MWp Qinghai Dacaidan PV on-grid Project	CECEPG Co., LTD	10MWp on-grid system integration project	Qinghai Xitie mountain	Jun 2011
62	Solar module bracket basic engineering project of the first phase project (20MWp) of	Longyuan Golmud New Energy Development Co.,	Solar module bracket basic engg project of	Golmud, Qinghai	May 2010

	Golmud PV plant, Qinghai	Ltd	20MW grid connected power plant		
63	20MW grid connected power plant of Longyuan Golmud, Qinghai	Longyuan Golmud New Energy Development Co., Ltd	Installation engg of 20MW grid connected power plant	Golmud, Qinghai	Aug 2010
64	First phase of Luan Jingtan 10MW grid connected project of CECEP	Alashan Solar Generation Co., Ltd, CECEP	Civil engineering construction	Luan Jingtan, Inner Mongolia	Sep 2010
65	Xitieshan Qinghai 10MW grid connected project of CECEP	Solar Technology Co., Ltd of CECEP	10MW BIPV inverter	Xitieshan, Qinghai	Aug 2010
66	Qinghai Xitieshan 10MW solar plant 2 kilometers construction water supply, CECEP	Qinghai Qaidam Solar Generating Co., Ltd, CECEP	10MW solar plant 2 kilometers construction water supply	Xitieshan, Qinghai	Sep 2010
67	Qinghai Xitieshan 10MW civil engineering construction project of CGNPC	Solar Developing Co., Ltd of CGNPC	10MW civil engineering construction project	Xitieshan, Qinghai	Jan 2010
68	Xitieshan 10MW solar power grid connected project	Solar Developing Co., Ltd of CGNPC	10MW power substation construction, 10KV switch house, 110KV booster station construction	Xitieshan, Qinghai	May 2010
69	Shanghai Hongqiao Railway Station on-grid Project	The Third Railway Survey and Design Group Corporation	on-grid inverter	Shanghai Hongqiao Railway Station	Apr 2010
70	Xi'an Export Processing Zone 1MW on-grid Project	BP Solar Co.	1MW on-grid inverter	Xi'an	Nov 2010
71	TBEA (Hengyang transformer) Industrial Park, the user side and grid-connected photovoltaic power generation demonstration projects	TBEA Hengyang Transformer Co.	852.12KW on-grid power plant EPC	Hengyang, Hunan Province	Sep 2010

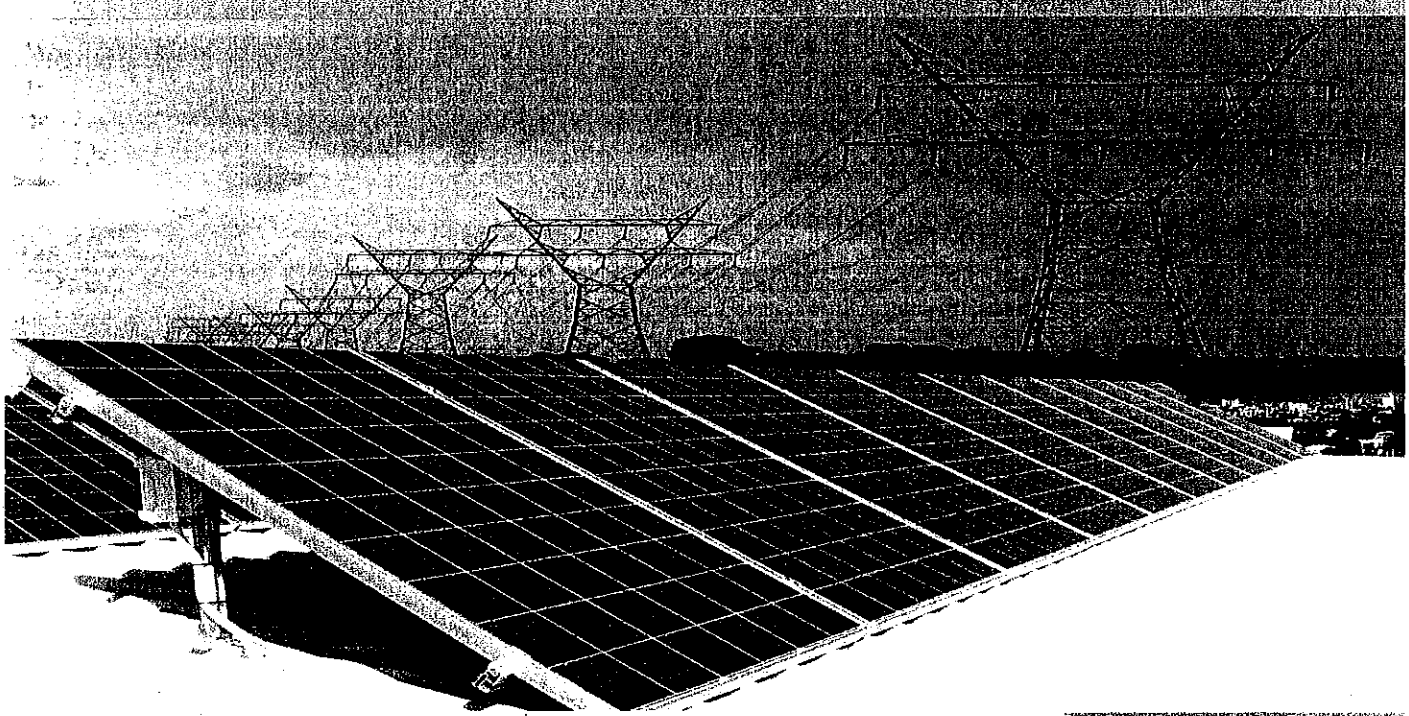
72	Xinjiang Joinworld user-side BIPV Demonstration Project	Xinjiang joinworld Co.	305.83KW on-grid power plant EPC	Urumqi, Xinjiang	Mar 2010
73	TBEA Real Estate BIPV Demonstration Project	TBEA Real Estate Co.	345.27KW on-grid power plant EPC	Changji, Xinjiang	Mar 2010
74	TBEA Xinjiang Transformer Factory user- side and on-grid PV power generation project	TBEA Xinjiang Transformer Co.	204.24KW on-grid power plant EPC	Changji, Xinjiang	Mar 2010
75	Xinjiang Cable Co. user side and on-grid PV power generation project	TBEA Xinjiang Cable Co.	663.04KW on-grid power plant EPC	Changji, Xinjiang	Mar 2010
76	BIPV Demonstration Project	TBEA Shangdong Luneng Taishan Cable Co.	479.57KW on-grid power plant EPC	Xintai city, Shangdong	Mar 2010
77	700KW PV electrical low voltage systems integration demonstration project	Ningbo Youlika Solar Energy Co.	700KW on-grid system integration	Ningbo, Zhejiang	Dec 2010
78	on-grid Roof Project of Xinjiang Silicon	TBEA Xinjiang Silicon Co.	100.6KW on-grid power plant EPC	Fukang, Xinjiang	Aug 2010
79	Xinjiang 2009 Shihezi 5MW Golden Sun PV on-grid project	Xinjiang Yutian New Energy Investment Co.	5MW major electrical equipment supply and system integration	Shihezi, Xinjiang	Oct 2010
80	Xinjiang 2009 Dabancheng 10MW Golden Sun PV on-grid project	Xinjiang Yutian New Energy Investment Co.	10MW major electrical equipments supply and system integration	Dabancheng, Xinjiang	Oct 2010
81	Xinjiang 2010 Hami 3MW Golden Sun PV on-grid project	Xinjiang Yutian New Energy Investment Co.	3MW and step-up transformer network	Hami. Xinjiang	Nov 2010
82	Xinjiang 2009 Shihezi 5MW Golden Sun PV on-grid project	Xinjiang Yutian New Energy Investment	5MW and step-up	Shihezi, Xinjiang	Nov 2010

83		Co.	transformer network		
84	500KW Independent PV Plant in Ruoqiang Town, Ruoqiang County	Power Company of Ruoqiang County Xinjiang	500KW PV off-grid Power Plant	Ruoqiang county Xinjiang	Mar 2010
85	The first phase of Taiyangshan PV grid connected power project, CECEP	Wuzhong Taiyangshan Solar Generating Co., Ltd of CECEP	5MW grid connected system integration project	Taiyangshan, Wuzhong, Ningxia province	Oct 2009
86	Wuhan Railway PV on-grid Project	EPC Project of Hubei power Survey and Design Group	2.2MW on-grid inverter	Wuhan Railway Station	Oct 2009
87	91 Group of No. 9 Agricultural Division Project	91 Group of No. 9 Agricultural Division	39.78KW on-grid power plant EPC	91 Group of No. 9 Agricultural Division Project	May 2009

Annexure - 17

Electrical Grid Interconnection Study

Grid Interconnection Study of 50MW Kulachi Solar PV IPP Project with 132kV PESCO and NTDC Network Hagler Bailly, Pakistan



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Grid Interconnection Study of
50MW Kulachi Solar PV IPP Project with
132kV PESCO and NTDC Network

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Executive Summary

Target Energy (Pvt.) Ltd. has been issued a Letter of Intent (LOI) by the Pakhtunkhwa Energy Development Organization (PEDO) to install 50MW solar photovoltaic (PV) independent power producer (IPP) project (the 'Project') near Kulachi, district D. I. Khan in Khyber Pakhtunkhwa (KPK) province, to provide power to the Peshawar Electric Supply Company (PESCO) at its 132kV grid in the vicinity consisting of substations at Tank, Daraban, D. I. Khan and Kulachi. The plant has 49.92MW$_{dc}$ gross power and 44MW$_{ac}$ net output power as communicated by the project sponsor. The primary nearest point of interconnection for the Project is at PESCO's 132kV Kulachi Grid Station.

- Electricity generated from the Kulachi Solar IPP Project will be fed into the national grid at 132kV voltage level through a 132kV transmission line of approximately 16 km length on rail conductor (202MVA rating) from Kulachi solar park switchyard to Kulachi substation. This 132kV Kulachi substation will be the point of interconnection (POI) between the IPP Project and the national grid. There is adequate existing 132kV transmission infrastructure operated by PESCO in the vicinity of the Project site, as shown in Figure 1.

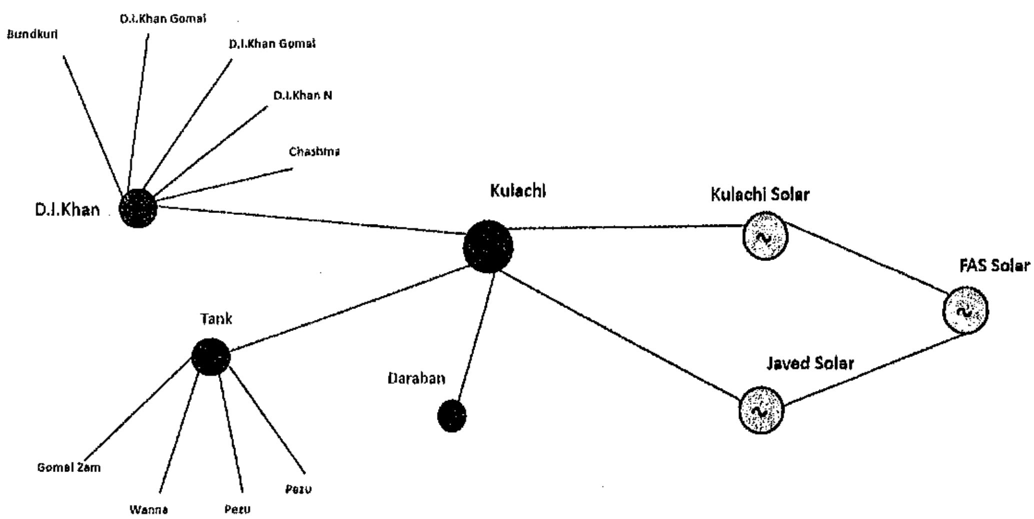


Figure 1: 132kV PESCO transmission network in Kulachi -D.I. Khan Area

Plant Location on Google map is attached in Appendix B. PESCO grid system, after addition of the Solar PV Plant was analyzed for load flow, short circuit and transient stability studies to determine whether the plant connection with the PESCO grid meets the NEPRA Grid Code requirements.

The latest and up-to-date NTDC/PESCO network model basecase have been used. The steady state, sequence and dynamic data for the Kulachi Solar PV Plant is processed to build the steady state, short circuit and dynamic models in PSSE software format.

The analysis has been performed for PESCO September 2019 and September 2022 case of the interconnection year 2018-19 of studies. The power flow analysis shows that the bus voltages and line loadings in all the cases, with and without addition of the Solar PV Plant are within acceptable limit of defined Planning Criteria. The results were also validated as per the standards of line loading and bus voltage limits in associated N-1 post-contingency conditions.

Maximum short circuit levels at HV (POI) buses of '50MW Kulachi Solar PV Plant' in the year 2018-19 was computed. Moreover, in order to see the short circuit current contribution of '50MW Kulachi Solar PV Plant', maximum short circuit levels at the substations located in vicinity of the project were also computed. The results show that fault levels are within the circuit breaker duties with the addition of the subject project to the 132kV network of PESCO.

The transient stability studies were carried out to check the dynamic impact on the Solar PV Plant due to potential faults in PESCO grid system and, in turn, the impact of disturbances in the Solar PV Plant on PESCO grid system. The Solar PV Plant is found to meet all the transient stability requirements as per defined by the NEPRA Grid Code. The results of transient stability analysis shows that the power system is stable for the suggested interconnection scheme of the '50MW Kulachi Solar PV Plant' and it fulfils all the criteria for the generation connection with the power system.

Based on the study results, overall it is concluded that proposed generation connection for '50MW Kulachi Solar PV Plant' meets all the NEPRA Grid Code and Planning Criteria. The PESCO network diagram is attached in Appendix A.

1. Introduction

1.1 Project Background

Target Energy (Pvt.) Ltd. has been issued a Letter of Intent (LOI) by the Pakhtunkhwa Energy Development Organization (PEDO) to install a 50MW Kulachi solar photovoltaic (PV) independent power producer (IPP) project (the 'Project') near Kulachi, district D. I. Khan in Khyber Pakhtunkhwa (KPK) province, to provide power to the Peshawar Electric Supply Company (PESCO) at its 132kV grid in the vicinity consisting of substations at Tank, Daraban, D. I. Khan and Kulachi. The primary nearest point of interconnection for the Project is at PESCO's 132kV Kulachi Grid Station.

Detailed interconnection scheme and related potential issues regarding the proposed power evacuation through a point of common coupling are addressed in the subsequent sections. The '50MW Kulachi Solar PV Plant' can be interconnected with the power system network of Peshawar Electric Supply Company (PESCO) at 132kV voltage level.

1.2 Objective of the Study

The principal objective of this study "Connection assessment of '50MW Kulachi Solar PV Plant' to the PESCO grid system" is to assess the impact of the suggested interconnection for the subject plant on the PESCO transmission system and vice versa. In this study a most appropriate interconnection with the PESCO network is presented for the project.

The following studies and tests are carried out in order to check the robustness of Solar PV Plant and the interconnection strategy of the desired system.

1. Load flow analysis
2. Short circuit analysis
3. Transient stability analysis

The above studies were carried out to demonstrate that the proposed connection plan for subject plant meets the National Electric Power Regulatory Authority (NEPRA) Grid Code and Planning Criteria.

The system operational capability is analyzed by the steady state analysis under normal and contingency conditions. This particular assignment also aims at investigating that the connection of the Solar PV Plant with the PESCO system fulfils the criteria of transient stability. The criteria is that the system should be stable enough that it should return to the normal state following the fading of a momentary actions in current, voltage or frequency, without losing synchronism.

The proposed connection of this Solar PV Plant, operating up to 49.92MW_{dc} gross capacity and 44MW_{ac} net output power as communicated by the project sponsor, subject to the requirements specified in this report, is expected to have no material adverse impact on the reliability of the integrated power system of PESCO.

1.3 Terms of reference

The studies package include, load flow studies, short circuit studies and transient stability studies to determine whether the plant connection with the PESCO grid meets the NEPRA Grid Code requirements.

- The load flow study investigates and addresses the voltage profile and overloading issues of the transmission network as a result of the proposed interconnection scheme, with and without contingencies.
- A short circuit study evaluates the short circuit levels of power plant's switchyard and contiguous network.

- The transient stability study covers the worst case scenario of the three phase faults including stuck breaker conditions, without loss in synchronism of power plant.

2. Methodology and Assumptions

2.1 Methodology

The methodology of the gird interconnection study follows the NEPRA Grid Code planning criteria and the studies are carried out in following sequence:

- All the technical data, relating to the specification of '50MW Kulachi Solar PV Plant' is collected from project sponsor.
- The information and data regarding the interconnection arrangements for the subject power plant involves discussion made with subject plant engineers and site surveys.
- The power plant data is processed and then modelled in the overall PESCO network model. Updated system network is then reviewed and tested for its validity.
- Multiple options for power transfer of subject power plant are prepared and analyzed; however, the most appropriate interconnection proposal is adopted on the basis of results obtained by system studies.
- Comprehensive load flow, short circuit and transient stability analysis have been carried out to determine the adequacy of the proposed interconnection arrangement as per NEPRA Grid Code planning criteria.
- Results are compiled and analyzed in detail for above simulations effectively in order to conclude the study and complete the report accordingly.
- Recommendations are submitted based on study results and findings.
- All the system data processing, modeling and simulations are carried using PSS/E software.

2.2 General assumptions

Following are some of the important assumptions used for this study:

- The generation plan used for the subject study is up-to-date, as it has an important role in planning of power system.
- Dispatch of the generation power plants is taken based on the weather and seasonal conditions.
- The transmission expansion plans of PESCO are the optimal ones as per load demand and generation requirements.
- The transmission plans of PESCO would optimistically be implemented as per their expected CODs, especially around the subject study region.
- Steady state and dynamic data for '50MW Kulachi Solar PV Plant' was provided by the project sponsor. Otherwise, reasonable assumptions are made by POWER-tek based on prudent industry practices for any missing or unavailable data.
- Applicable seasonal conditions and appropriate study year for the subject system study have been incorporated, which is;
    - **Year 2019:**
      September 2019 peak case of the interconnection year 2019-20 was selected as base year case for this study.

- **Year 2022:**
  September 2022 case for the interconnection year 2022-23 was selected as base year case for this study for high hydro scenario.

3. Interconnection Scope

The particular objective of this study is to develop and simulate a grid connection plan for the subject Solar PV Plant with a nearby transmission line/substation such that there is no physical limitation regarding the Right Of Way (ROW) and free available capacity is accessible at the substation. POWER-tek analyzed multiple options for power evacuation of '50MW Kulachi Solar PV Plant' and based on system studies the most feasible interconnection proposal is suggested.

The grid interconnection scope for power transfer of '50MW Kulachi Solar PV Plant' to the PESCO power system network is projected with;

- Electricity generated from the Kulachi Solar IPP Project will be fed into the national grid at 132kV voltage level through a 132kV transmission line of approximately 16 km length on rail conductor (202MVA rating) from Kulachi solar park switchyard to Kulachi substation. This 132kV Kulachi substation will be the point of interconnection (POI) between the IPP Project and the national grid.

4. Data Processing

4.1 Site Surveys and Related Meetings

The '50MW Kulachi Solar PV Plant' is located 16km away from Kulachi 132kV grid station in D.I. Khan district of Knyber Pakhtunkhwa province, Pakistan. The field survey of site was carried out in order to ensure the Right of Way (ROW) and space availability at interconnection points.

4.2 Collection of Data

Power plant's location with coordinates, generation units and transformation requirements, steady state and dynamic data of Solar PV Plant was provided by the project sponsor. However, reasonable assumptions were made by POWER-tek based on prudent industry practices for any missing or unavailable data.

4.3 Processing of Power Plant Data

POWER-tek processed the received raw data from project sponsor into the PSSE software format in order to model the Solar PV Plant in PSSE and to perform the simulation studies.

This processed plant data is modelled in the overall PESCO network model as per proposed connection scheme. Updated PESCO network basecase is then simulated by considering the N-1 contingency analysis for each case using standard checks like convergence, mismatch, number of iterations, voltage and thermal limits, and 15 seconds drift-run tests for dynamics run.

Solar PV plant data is processed to build the following basic models in PSSE software format:

i. Steady state data for load flow analysis

ii. Sequence data for short circuit analysis

iii. Dynamic data for transient stability analysis

4.3.1 Steady State System Modelling

Kulachi Solar PV Plant would have $49.92MW_{dc}$ gross power and $44MW_{ac}$ net output power as communicated by project sponsor.

Steady state models of generator and transformers at Solar PV plant in PSSE software as under:

- As solar PV generator is a full converter based machine, therefore it is identically modelled as a type-4 wind machine having control mode set as 2, which controls a remote bus voltage within the given range of reactive power capability limits [Q_{min}; Q_{max}] in MVAR based on lead and lag power factor. Whereas, schedule voltage controls this reactive power within the limits of power factor offered by the solar PV inverters used.

  Please note the following reference;
  North American Reliability Corporation (NERC) Report on Standard Models for Variable Generation, 2010.
  "The NERC Working Group recommends that grid side structure of the Type 4 WTG model may be used for solar PV technologies since it represents a VSC. This is because PV is typically connected to the grid with a VSC and it will behave electrically similar to a Type 4 WTG that has a similar electrical interface with the grid—this is from a grid perspective looking at the electric response and neglects any of the effects of the energy source.
  From a steady-state, power flow and short-circuit analysis perspective, the behavior of the PV technologies will behave in a similar fashion to a Type 4 WTG because of the VSC interface, and because

its power factor can be controlled based on the control functionality of the VSC design. Its short-circuit response will be limited to the current limit effected by the VSC under grid fault conditions".

- PV panels are decoupled from the grid by a power converter which is actually connected to the grid. As for load flow models of most power electronic devices, the source reactance of this machine is set as infinite: Xsource = 99999.
- Transmission conductor suggested for interconnection of the Solar PV Projects is modelled having it's per unit (p.u) resistance, reactance and susceptance according to line length and MVA rating.
- Positive sequence parameters are employed in the steady state model of the under study power plant.
- G.S.U transformers of apparent power 10 MVA and 50 MVA, transformation voltage level of HV/MV/LV (132/33/0.4 kV).
- 132kV double circuit dedicated feeders, approximately 16 km length on Rail conductor from 132kV bus bar of Kulachi Solar PV Plant to 132kV bus bar of Kulachi has been modelled

4.3.2 Sequence Data Modelling

The short circuit model of the solar PV plant is used to carry out short circuit studies at its own switchyard and existing adjacent substations.

Short circuit model of the solar PV plant has been prepared by representing a solar PV collector group as one generator having a certain MVA rating and by using the following parameters of the generating units;

- Positive sequence data
- Negative sequence data
- Zero sequence data

Since, this is a full converter based type solar PV power plant having X_{+ve}, X_{-ve}, X_{zero}, $X_{source} = \infty$ or in PSSE its value used is 99999. Therefore, ideally, it is not expected to affect the short circuit levels of adjacent substations.

4.3.3 Dynamic Data Modelling of Solar PV Plant

PSSE Solar PV Unit dynamic stability model is developed to simulate performance of a photovoltaic (PV) plant connected to the grid via a power converter. PSSE Solar PV Unit dynamic stability model is largely based on the generic type 4 wind model, WT4, with the added ability to simulate output changes due to solar irradiation.

The generic solar PV model comprises of the following 4 modules. These solar PV modules are conventionally designated as Generic Wind modules as indicated below:

- **PVGU: power converter/generator module**
  Designated as the generator/converter module of wind turbine.
- **PVEU: electrical control module**
  Designated as the electrical control module of wind turbine.
- **PANEL: linearized model of a panel's output curve**
  Designated as the mechanical control module of wind turbine.
- **IRRAD: linearized solar irradiance profile**
  Designated as the pitch control module of wind turbine.

The irradiance module allows the user to enter an irradiance profile in the form of up to ten data points (time, irradiance level) as CONs. The module calculates the radiant energy per unit area of the sun profile and uses it as an input to the panel module.

The panel module calculates the DC power from the PV plant at a given irradiance level. The maximum DC power a panel can produce at its standard irradiance levels is entered in the model.

The PV panel module is separated from the solar power plant by a power converter. The power reference is controlled by the amount of DC power coming from the PANEL module. The DC power is then used as input to the electrical module which then calculates the value of AC power supplied by the solar power plant.

It is the power converter/generator module that calculates the desired value of injected current in the system as a result to the MW and MVAR current commands from the electrical control module. The converter control module develops both active and reactive current control commands.

The reactive control calculates the reactive current command for the various control options, which could be any of the following:

- Remote bus voltage control
- Power factor control
- Reactive power control

However, the real power control does not depend on the idea that in order to fulfil the required real power the machine should work. It compares the active power injected to the bus bar versus the power reference, VAR (L+3), and changes the active component of the injected current accordingly. Hence, the active current signal is set up the produce power output from the power flow.

The converter/generator and electrical control modules for solar PV power plant are very close to respective modules of the generic WT4 wind model. The wind type 4 converter is based on the induction or synchronous generators and generators are decoupled from the grid via back to back converters.

(Reference: Program Application Guide of PSSE Version 32, Volume-II, October 2010).

The Dynamic Model data of the Solar PV Plant in PSS/E format of all the Solar PV plant modules for '50MW Kulachi Solar PV Plant' is attached in Appendix C.

5. Load Flow Analysis

5.1 Load Flow Study Objectives

A power flow study (or load flow study) is an analysis of the magnitude of bus voltages, line loadings, phase angles of the bus voltages and power flows in a power system under steady-state conditions.

The main goal of load flow analysis is to develop a reliable connection arrangement between the '50MW Kulachi Solar PV Plant' and the PESCO grid system, for the evacuation of power from the subject Solar PV Plant thus satisfying the N-1 contingency conditions.

A base case model has been prepared, consisting of all 132kV system, and studies for the entire system have been carried in order to assure that the proposed connection of the Solar PV Plant is realistic for the maximum load settings.

The analysis has been performed for September 2019, peak case of the interconnection year 2019-20 of studies and year 2022-23. The power flow conditions are studied on the system study cases that include up-to-date generation, transmission facilities, and load forecast representing the queue position applicable to this project.

Following are the important objectives of load flow analysis:

- Confirmation that no voltage and thermal loading limits are exceeded as per NERPA Grid Code Planning criteria.
- Voltage profile of PESCO system.
- Transmission line loadings in terms of Active (MW) and Reactive Power (MVAR) flows.
- Active Power (MW) loss in the network.
- Transmission network and transformation reactive losses (MVAR).
- Proposal of remedial solutions to any identified limitations or issues.

A relative approach has been used in the power flow analysis in order to determine the impact of the 50MW Kulachi Solar PV Plant project on the performance of the PESCO power system network. First, performance of the basecase system without Solar PV power project is evaluated in order to establish the baseline. Later, the analysis was performed with the addition of Solar PV Plant and plotted on single line diagrams.

5.2 Load Flow Study Criteria

Load flow analysis is performed under the following conditions;

- Steady state normal (N-0) operating conditions
- N-1 contingency operating conditions around the plant

The gird interconnection studies are carried out by considering the operational data defined by NEPRA Grid Code, which is listed as under;

5.2.1 Voltage limits

For the purpose of system planning, following voltage limits are defined for steady-state load flow analysis;

i. Under normal operating conditions (N-0 condition) all bus voltages shall be within the bandwidth of ±5 % of Nominal System Voltage.
ii. Under N-1 contingency conditions all bus voltages shall be within the bandwidth of ± 10 % of Nominal System Voltage.

5.2.2 Component loading limits

Loading criteria for current carrying components (transmission circuits, transformers, substation bus bars, circuit breakers, disconnect switches and auxiliary equipment) for the purpose of evaluating steady-state load flow studies is as follows;

i. Under normal operating conditions (N-0 conditions), all components shall be loaded below their Normal Continuous Maximum Ratings.
ii. Under contingency conditions (N-1 conditions), all components shall be loaded below their Emergency Ratings.

5.2.3 Frequency limits

The frequency of the PESCO Transmission System shall be nominally 50Hz and shall be maintained within the following limits defined for exceptional circumstances.

i. Frequency Sensitive Mode shall be 49.8 Hz - 50.2 Hz. Such a variation is permissible to allow frequency variations while ramping up generation and load pick-up.
ii. Protected periods of operation of the system at the frequency in the range of 49.5 Hz - 50.5 Hz (Tolerance Frequency Band).
iii. Minimum/Maximum Acceptable Frequency Band shall be 49.4 Hz - 50.5 Hz (Load Shedding Threshold or Contingency Frequency Band), which is well within the applicable IEC Standards.

5.2.4 Power factor

A renewable power project will manage reactive power control to maintain the power factor within the range of ± 0.95 (lagging/leading), at full active power output at its interconnection point.

(Reference: NEPRA/NTDC Grid Code).

5.3 Load Flow Analysis without Addition of Kulachi Solar PV Plant

The power flow analysis without connecting the Solar PV Plant to the base year 2019 and year 2022 power network of PESCO system was simulated first. This section summarizes the pre-contingent steady state analysis for the PESCO system load flow study.

System study case of following scenario was analysed and presented on single line diagrams (SLDs);

- September 2019 peak load (high hydro conditions)
- September 2022 peak load (high hydro conditions)

The results of the system are presented for normal (N-0 condition) only, which shows that the power flows on all the circuits are within their defined current carrying capacity and the bus voltages are in the permissible range.

Normal (N-0) load flow study for September 2019 and September 2022 without addition of Kulachi Solar PV Plant is attached in FigureD-1 and D-2 respectively.

It is observed that prior to connecting the Solar PV Plant to the PESCO electrical network, all the current carrying components capacities are within the range. No limitation is seen in any of the MW and MVAR flows.

5.4 Load Flow Analysis with Addition of Kulachi Solar PV Plant

The '50MW Kulachi Solar PV Plant' is modelled in power flow using data supplied by project sponsor. The updated power flow cases are developed in order to determine the impacts resulted from this generator addition with proposed interconnection. The analysis has been performed for the following year and plotted on SLDs.

- September 2019 peak load (high hydro conditions)
- September 2022 peak load (high hydro conditions)

5.4.1.1 Solar PV plant - September 2019 and September 2022 peak load conditions

Load flow analysis with the addition of 50MW Kulachi Solar PV Plant is simulated for 44MW_{ac} power is injected from Kulachi Solar Power Plant at POI with PESCO network after inclusion of inverter and other associated losses.

The results of the power flow after connecting a Solar PV Plant to power system shows that all the MW and MVAR power flows on all the circuits are within the rated capacities and lies within the allowable range.

Normal (N-0) load flow study, single line diagrams for September 2019 and September 2022 with addition of Kulachi Solar PV Plant is attached in Appendix E1 and E2.

Contingency analysis was also carried out to evaluate the power system network under the standard functioning conditions. Contingency conditions were simulated for numerous selected outages. N-1 contingency analysis ensures a power system's capability to meet the demands as well as remain in specified voltage and flow limits even after outage of any one component. The N-1 contingency analysis is carried out for the interconnection of Solar PV Plant with the proposed substation in order to illustrate the maximum impact of the Solar PV Plant on a power system.

Results of contingency analysis demonstrate that the resulting MW and MVAR power flows on the circuits and transformers after N-1 outage of selected components are within the rated capacities.

N-1 contingency load flow study of September 2019 Peak Load conditions is attached in Appendix E1.

N-1 contingency load flow study of September 2022 Peak Load conditions is attached in Appendix E2.

5.5 Conclusions of Load Flow Analysis

No incremental pre-contingent system overloads or voltage violations resulting from interconnection of '50MW Kulachi Solar PV Plant' were found within the local study area or across PESCO transmission system. This finding was also validated through associated pre-contingent steady state system and post-contingency steady state system, overload and voltage violation screening outputs generated for the system model.

Thus, it can be concluded that the power flow on all the circuits in all the cases with and without connecting "50MW Kulachi Solar PV Plant" are within defined limits and the voltages and loadings are in acceptable range of defined study criteria.

It is further observed that all the power generated from "50MW Kulachi Solar PV Plant" is dispersed locally in the region through 132kV Kulachi grid station. This localized generation helps to reduce the losses of distribution network and results in improvement of voltage profile of nearby areas.

6. Short Circuit Analysis

6.1 Short Circuit Study Objectives

This section covers the short circuit analysis performed for the "50MW Kulachi Solar PV Plant". When generation is added to a system, the available fault current of that system increases. Therefore, short circuit study has been performed to determine if the circuit breakers of existing substations near the new generation have adequate short circuit interruption duties.

Short circuit analysis includes the three-phase and single phase-to-ground fault simulations at LV and HV bus bars in the switchyard of subject Solar PV Plant. The fault currents computed at the Solar PV Plant buses would be used for selection of circuit breaker ratings.

Short circuit studies would determine the following;

- Maximum fault current levels at the Solar PV Plant.
- Total fault currents and contribution from the associated network.
- Adequacy of short circuit capacity of switchgears at neighboring existing substations.

6.2 Short Circuit Study Assumptions and Criteria

Short circuit studies were carried out for evaluating the following short circuit levels of power plant's at 132kV bus bar and contiguous network;

- Balanced 3-phase fault
- Un-balanced L-G fault

Analysis was performed for the year of 2022-23, as the case would have all the planned generation and transmission systems components in service, which would produce the worst scenario with extreme fault level calculations.

Short circuit currents were calculated for maximum fault levels according to International Electro technical Commission (IEC) standard IEC-909, with the following assumptions;

- For calculations of maximum fault levels;
    - Bus voltage has been assumed as 1.10 per unit (p.u) i.e. 10 % above the nominal.
    - Maximum dispatch of all the generation in the system has been taken.
    - Taps ratios of all the transformers to be assumed at unity.
    - Charging of all the transmission lines to be assumed at zero.
    - All the shunt compensations to be assumed at zero in positive sequence.

6.3 Short Circuit Study Without Kulachi Solar Plant

In order to analyze the impact/magnitude of the Solar PV Plant on the system, Short circuit analysis is performed before connecting the Solar PV Plant to the system. The base case year September 2022-23 is simulated for the subject study. The total maximum short circuit levels at the bus bars of substations located in the electrical vicinity of the area of interest have been calculated and are tabulated below;

Table – 6.1: Short circuit levels without addition of Kulachi solar plant in year 2022-23.

1.	Kulachi	132kV	4.25	2.89
2.	D. I. Khan	132kV	8.22	5.87
3.	Daraban	132kV	2.73	1.80
4.	Tank	132kV	6.36	4.85
5.	Wana	132kV	2.88	2.14
6.	Pezu	132kV	8.95	7.17

__Note:__ *Short Circuit Study Report of year 2022-23 is attached in Appendix G-1.*

6.4 Short Circuit Study With Kulachi Solar Plant

In order to analyze the impact of the Solar PV Plant on the system, Short circuit analysis is performed after connecting the Solar PV Plant. The base case year September 2022-23 is simulated for the subject study.

The total maximum short circuit levels at the bus bars of substations located in the electrical vicinity of the area of interest have been calculated and are tabulated below;

Table – 6.2: Short circuit levels with addition of Kulachi solar plant in year 2022-23.

1.	Kulachi	132kV	4.61	3.13
2.	Kulachi Solar	132kV	3.92	2.59
3.	D. I. Khan	132kV	8.46	6.04
4.	Daraban	132kV	2.96	1.95
5.	Javed Solar	132kV	3.89	2.57
6.	FAS Solar	132kV	3.89	2.57
7.	Tank	132kV	6.58	5.02
8.	Wana	132kV	2.97	2.21
9.	Pezu	132kV	9.18	7.36

__Note:__ *Short Circuit Study Report of year 2022-23 is attached in Appendix G-2.*

6.5 Conclusions of Short Circuit Analysis

Maximum short circuit levels in 2022-23 year are computed with and without the Kulachi Solar PV Plant for selection of circuit breaker ratings and relay coordination respectively.

Moreover, in order to see the short circuit current contribution of "50MW Kulachi Solar PV Plant", short circuit levels at the substations located in electrical vicinity of the project are also calculated. The findings show that with addition of this project, fault levels do not exceed the standard circuit breaker ratings of existing installed equipment at the neighboring substations.

Therefore it is concluded that the proposed interconnection scheme holds good on the basis of short circuit analysis as well.

7. Transient Stability Analysis

7.1 Transient Stability Study Objectives

The transient phase is the passage from the initial to the final conditions emanating from the disturbances in its operating conditions either on the switchyard of power plant or in the national grid system. In order to analyze these conditions, detailed transient stability studies were carried out for the subject power plant.

These studies begin by matching the specific dynamic model of "50MW Kulachi Solar PV Plant" with the Solar PV Plant model available in PSSE model library by considering the transient behavior characteristics of the equipment (machines, regulation systems, etc.) and then modelling of the subject power plant switchyard for September 2019 and September 2022 year basecases.

The stability studies are carried out to check the dynamic impact on the Solar PV Plant due to faults or disturbance in national grid system and, in turn, the impact of disturbances in national grid system on the Solar PV Plant.

The studies involved choice of equipment and optimum regulation through control strategies which allows the system to remain in stable conditions under potential risks. Transient stability studies provide the basis of power system for the subject power plant as it determines the following;

- Transient stability of the Solar PV Plant after any fault occurs in the system by damping of fluctuations in voltage and frequency etc.
- Risk of dynamic instability (loss of synchronization between the generators).
- The capability of system to damp the oscillations timely.
- Operating limits of frequency and voltage for Solar PV Plant as imposed by the NEPRA Grid Code standards.
- Proposal of remedial solutions in the event of a problem.

7.2 Transient Stability Study Criteria

The benchmark criteria for transient stability analysis are;

- Three phase short circuit fault application at important and selected buses (for N-1 fault contingencies locations) is evaluated as per standards of NEPRA stability criteria.
- Transient stability analysis is simulated for the two following circuit breaker fault clearing time durations;
  - Normal 5 cycles opening time, with opening of the faulted system component.
  - Stuck breaker conditions of delayed breaker opening after 9 cycles.(without opening adjacent breakers and as per PESCO/NTDC requirements and practices of simulations)
- Transient response of the adjacent network system in case of minimum / loss of generation of Solar PV Plant.
- Transient stability of Solar PV Plant after tripping a nearby or significant size of generator among existing surrounding power plants in the national grid system.

7.3 Transient Stability Performance of Solar PV Plant

In order to study the transient behavior of power plant and system towards the disturbances, following faults are subjected:

I. 3 Phase fault at Kulachi Solar PV Plant cleared in 5 cycles.

II. 3 Phase fault at adjacent ends cleared in 5 cycles.

III. 3 Phase fault at Kulachi Solar PV Plant cleared in 9 cycles (stuck breaker case).

IV. 3 Phase fault at adjacent ends cleared in 9 cycles (stuck breaker case).

The following important parameters / quantities are monitored and plotted for these faults in the transient stability studies;

Table – 7.1: Parameters / quantities plotted for the faults.

No.	Description of Plot	Location and Parameter Plotted
1	**Solar PV Plant Parameters** (Active (MW), reactive (MVAR) output, voltage, frequency and rotor angle swings of the Solar PV Plant)	MW generation output of one generator of Kulachi.
		MVAR generation output of one generator of Kulachi.
		Bus Voltage at POI
		Bus Voltage of Kolachi-33kV
		EFD of one generator of Kulachi.
		Eterm of one generator of Kulachi.
2	**Bus Voltages** (Voltage swings of selected adjacent buses).	Bus Voltage of Javed Solar 132kV
		Bus Voltage of FAS Solar 132kV
		Bus Voltage of Kulachi Solar 132kV
		Bus Voltage of Kulachi 132kV
		Bus Voltage of Pezu 132kV
		Bus Voltage of Tank 132kV
3	**Power Flows** (Active (MW) and reactive (MVAR) flows on connecting transmission lines).	Q Flow from Tank 132kV to Kulachi 132kV
		P Flow from Tank 132kV to Kulachi 132kV
		Q Flow of Kulachi 132kV to Kulachi Solar 132kV
		P Flow of Kulachi 132kV to Kulachi Solar 132kV
		Q Flow of Kulachi 132kV to Javed Solar 132kV
		P Flow of Kulachi 132kV to Javed Solar 132kV
4	**Frequencies**	Frequency of Tank 132kV
		Frequency of D.I.Khan 132kV
		Frequency of Javed Solar 132kV
		Frequency of Kulachi 132kV
		Frequency of FAS Solar 132kV
		Frequency of Kulachi Solar 132kV

In order to obtain the results, every simulation is carried for the steady state condition for one second, to ensure that the system is completely stable and steady before the fault is applied in the system (pre fault conditions / drift run test). Then fault is applied and system is simulated for the fault clearance time. After the clearance of the fault from the system (post-fault conditions) followed by a certain contingency, the system is observed for 15 seconds to ensure that oscillations in various quantities are damped and the system has re-instated the stability conditions.

7.3.1 3 Phase fault at Kulachi Solar PV Plant cleared in 5 cycles – September 2019 year basecase

Three-phase fault is applied at '44MWac gross active power and 49.92MWdc gross peak design capacity Kulachi Solar PV Plant', then each fault is removed in 5 cycles (100 m sec) accompanied by a particular N-1 contingency and transient stability response of the system is monitored, which is summarized in the table below:

Table – 7.2: Transient stability results for 3 Phase fault at Solar PV Plant cleared in 5 cycles.

Fault Description	* Plot No.	Contingency / Outage Equipment	Transient Stability Response
3-phase fault at 132 kV bus bar of Kulachi Solar PV Plant cleared in 5 cycles (100 m sec).	F-1	Kulachi 132kV – Kulachi Solar 132kV One Circuit Out.	Stable.

*Plot number refers to the plot file name in the attached plots (e.g. F-1 is plotted with F-1.out file name). *(Transient stability plots of 3 Phase fault at Solar PV Plant cleared in 5 cycles are attached in Plots F-1 of Appendix F).*

7.3.2 3 Phase fault at adjacent end cleared in 5 cycles– September 2019 year basecase

Three phase fault is applied on adjacent end location of the line and the fault is removed in 5 cycles (100 m sec) accompanied by a range of possible outages. Transient stability response of the system is monitored for these conditions, which is summarized in the table below:

Table – 7.3: Transient stability results for 3 Phase fault at adjacent end cleared in 5 cycles.

Fault Description	* Plot No.	Contingency / Outage Equipment	Transient Stability Response
3-phase fault at 132kV Kulachi Solar cleared in 5 cycles (100 m sec).	F-2	Kulachi Solar 132kV – FAS Solar 132kV One Circuit Out.	Stable.
3-phase fault at 132kV FAS Solar cleared in 5 cycles (100 m sec).	F-3	Kulachi 132kV – Daraban 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Javed Solar cleared in 5 cycles (100 m sec).	F-4	Javed Solar 132kV – Kulachi 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Kulachi cleared in 5 cycles (100 m sec).	F-5	Tank 132kV – Kulachi 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Kulachi cleared in 5 cycles (100 m sec).	F-6	D.I.Khan 132kV – Kulachi 132kV One Circuit Out.	Stable.

* Plot number refers to the plot file name in the attached plots (e.g. F-1 is plotted with F-1.out file name). *(Transient stability plots of 3 Phase fault at adjacent end cleared in 5 cycles are attached in Plots F-2 to F-6 of Appendix F).*

7.3.3 3 Phase fault at Kulachi Solar PV Plant cleared in 9 cycles (stuck breaker case) – September 2019 year basecase

Three phase fault is applied at "50MW Kulachi Solar PV Plant" and the fault is cleared in 9 cycles (180 m sec) to simulate stuck breaker situation, followed by a trip of a single circuit. If a system is able to overcome this fault after the stuck breaker time of 9 cycles then it is assumed to be the stable in any of the possible delayed breaker opening conditions up to 180 m sec.

Transient stability response of the system under these special conditions is monitored, which is summarized in the table below:

Table – 7.4: Transient stability results for 3 Phase fault at Solar PV Plant cleared in 9 cycles.

Fault Description	* Plot No.	Contingency / Outage Equipment	Transient Stability Response
3-phase fault at 132 kV bus bar of Kulachi Solar PV Plant cleared in 9 cycles (180 m sec).	F-7	Kulachi 132kV – Kulachi Solar 132kV One Circuit Out.	Stable.

* Plot number refers to the plot file name in the attached plots (e.g. F-1 is plotted with F-1.out file name). *(Transient stability plots of 3 Phase fault at Solar PV Plant cleared in 9 cycles are attached in Plots F-7 of Appendix F).*

7.3.4 3 Phase fault at adjacent end cleared in 9 cycles (stuck breaker case) – September 2019 year basecase

Three phase fault is applied on certain adjacent end locations, the fault is cleared in 9 cycles (180 m sec) accompanied by a range of possible trips. Transient stability response of the system is monitored for these conditions, which is summarized in the table below:

Table – 7.5: Transient stability results for 3 Phase fault at remote end cleared in 9 cycles.

Fault Description	* Plot No.	Contingency / Outage Equipment	Transient Stability Response
3-phase fault at 132kV Kulachi Solar cleared in 9 cycles (180 m sec).	F-8	Kulachi Solar 132kV – FAS Solar 132kV One Circuit Out.	Stable.
3-phase fault at 132kV FAS Solar cleared in 9 cycles (180 m sec).	F-9	Kulachi 132kV – Daraban 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Javed Solar cleared in 9 cycles (180 m sec).	F-10	Javed Solar 132kV – Kulachi 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Kulachi cleared in 9 cycles (180 m sec).	F-11	Tank 132kV – Kulachi 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Kulachi cleared in 9 cycles (180 m sec).	F-12	D.I.Khan 132kV – Kulachi 132kV One Circuit Out.	Stable.

* Plot number refers to the plot file name in the attached plots (e.g. F-1 is plotted with F-1.out file name). *(Transient stability plots of 3 Phase fault at adjacent ends cleared in 9 cycles are attached in Plots F-8 to F-12 of Appendix F).*

7.3.5 3 Phase fault at Kulachi Solar PV Plant cleared in 5 cycles – September 2022 year basecase

Three-phase fault is applied at '44MWac gross active power and 49.92MWdc gross peak design capacity Kulachi Solar PV Plant', then each fault is removed in 5 cycles (100 m sec) accompanied by a particular N-1 contingency and transient stability response of the system is monitored, which is summarized in the table below:

Table – 7.6: Transient stability results for 3 Phase fault at Solar PV Plant cleared in 5 cycles.

Fault Description	* Plot No.	Contingency / Outage Equipment	Transient Stability Response
3-phase fault at 132 kV bus bar of Kulachi Solar PV Plant cleared in 5 cycles (100 m sec).	F-13	Kulachi 132kV – Kulachi Solar 132kV One Circuit Out.	Stable.

*Plot number refers to the plot file name in the attached plots (e.g. F-1 is plotted with F-1.out file name). *(Transient stability plots of 3 Phase fault at Solar PV Plant cleared in 5 cycles are attached in Plots F-13 of Appendix F).*

7.3.6 3 Phase fault at adjacent end cleared in 5 cycles– September 2022 year basecase

Three phase fault is applied on adjacent end location of the line and the fault is removed in 5 cycles (100 m sec) accompanied by a range of possible outages. Transient stability response of the system is monitored for these conditions, which is summarized in the table below:

Table – 7.7: Transient stability results for 3 Phase fault at adjacent end cleared in 5 cycles.

Fault Description	* Plot No.	Contingency / Outage Equipment	Transient Stability Response
3-phase fault at 132kV Kulachi Solar cleared in 5 cycles (100 m sec).	F-14	Kulachi Solar 132kV – FAS Solar 132kV One Circuit Out.	Stable.
3-phase fault at 132kV FAS Solar cleared in 5 cycles (100 m sec).	F-15	Kulachi 132kV – Daraban 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Javed Solar cleared in 5 cycles (100 m sec).	F-16	Javed Solar 132kV – Kulachi 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Kulachi cleared in 5 cycles (100 m sec).	F-17	Tank 132kV – Kulachi 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Kulachi cleared in 5 cycles (100 m sec).	F-18	D.I.Khan 132kV – Kulachi 132kV One Circuit Out.	Stable.

* Plot number refers to the plot file name in the attached plots (e.g. F-1 is plotted with F-1.out file name). *(Transient stability plots of 3 Phase fault at adjacent end cleared in 5 cycles are attached in Plots F-14 to F-18 of Appendix F).*

7.3.7 3 Phase fault at Kulachi Solar PV Plant cleared in 9 cycles (stuck breaker case) – September 2022 year basecase

Three phase fault is applied at "50MW Kulachi Solar PV Plant" and the fault is cleared in 9 cycles (180 m sec) to simulate stuck breaker situation, followed by a trip of a single circuit. If a system is able to overcome this fault after the stuck breaker time of 9 cycles then it is assumed to be the stable in any of the possible delayed breaker opening conditions up to 180 m sec.

Transient stability response of the system under these special conditions is monitored, which is summarized in the table below:

Table – 7.8: Transient stability results for 3 Phase fault at Solar PV Plant cleared in 9 cycles.

Fault Description	* Plot No.	Contingency / Outage Equipment	Transient Stability Response
3-phase fault at 132 kV bus bar of Kulachi Solar PV Plant cleared in 9 cycles (180 m sec).	F-19	Kulachi 132kV – Kulachi Solar 132kV One Circuit Out.	Stable.

* Plot number refers to the plot file name in the attached plots (e.g. F-1 is plotted with F-1.out file name). *(Transient stability plots of 3 Phase fault at Solar PV Plant cleared in 9 cycles are attached in Plots F-19 of Appendix F).*

7.3.8 3 Phase fault at adjacent end cleared in 9 cycles (stuck breaker case) – September 2022 year basecase

Three phase fault is applied on certain adjacent end locations, the fault is cleared in 9 cycles (180 m sec) accompanied by a range of possible trips. Transient stability response of the system is monitored for these conditions, which is summarized in the table below:

Table – 7.9: Transient stability results for 3 Phase fault at remote end cleared in 9 cycles.

Fault Description	* Plot No.	Contingency / Outage Equipment	Transient Stability Response
3-phase fault at 132kV Kulachi Solar cleared in 9 cycles (180 m sec).	F-20	Kulachi Solar 132kV – FAS Solar 132kV One Circuit Out.	Stable.
3-phase fault at 132kV FAS Solar cleared in 9 cycles (180 m sec).	F-21	Kulachi 132kV – Daraban 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Javed Solar cleared in 9 cycles (180 m sec).	F-22	Javed Solar 132kV – Kulachi 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Kulachi cleared in 9 cycles (180 m sec).	F-23	Tank 132kV – Kulachi 132kV One Circuit Out.	Stable.
3-phase fault at 132kV Kulachi cleared in 9 cycles (180 m sec).	F-24	D.I.Khan 132kV – Kulachi 132kV One Circuit Out.	Stable.

* Plot number refers to the plot file name in the attached plots (e.g. F-1 is plotted with F-1.out file name). *(Transient stability plots of 3 Phase fault at adjacent ends cleared in 9 cycles are attached in Plots F-20 to F-24 of Appendix F).*

7.4 Conclusions of Transient Stability Analysis

The transient stability studies are carried out to check the dynamic impact on the Solar PV Plant due to faults or disturbance in national grid system for September 2019 and September 2022 year basecases and, in turn, the impact of disturbances in the Solar PV Plant on the grid system. The results of transient stability analysis shows that the power system is stable for the suggested interconnection scheme of the "50MW Kulachi Solar PV Plant" for the faults on the substations that might be near to or distant from the Solar PV Plant. It is therefore concluded that, with the addition of the 50MW Solar PV Plant in the grid, there are no stability issues seen and it fulfils all the criteria for the generation connection with the power system

8. Overall Conclusions and Recommendations

The "50MW Kulachi Solar PV Plant" has been proposed a generation connection scheme through a POI at 132kV bus bar of Kulachi using 132kV double circuit dedicated feeders, approximately 16 km length on Rail conductor. PESCO grid system with inclusion of the Solar PV Plant was analyzed by studies of load flow, short circuit and transient stability.

The power flow outputs depicts that the power on all the circuits in all the cases with and without connecting Solar PV Plant are within the defined range and the voltages that appears at the bus bars are within acceptable limit of defined study criteria. Load flow analysis is also validated as per the given standards of line loading and bus voltage limits in associated N-1 post-contingency conditions.

The short circuit studies have been carried out in order to see the contribution of "50MW Kulachi Solar PV Plant" to the fault levels of the existing substations in its electrical vicinity, the maximum fault levels in the horizon years, with connecting the Solar PV plant are calculated. The findings show that with addition of this project, fault levels do not exceed the standard circuit breaker ratings of existing installed equipment at the neighboring substations. The study has also quantified the maximum short circuit levels at LV and HV (POI) buses of "50MW Kulachi Solar PV Plant".

The impact of possible disturbances occurring on the system are analyzed by the transient stability analysis and the results of transient stability analysis shows that the assumed power system is stable for the suggested interconnection scheme of '50MW Kulachi Solar PV Plant' for the drastic faults on the substations that might be near to or distant from the Solar PV Solar PV Plant. Thus, there are no constraints found in the stability of the system and it fulfils all the criteria for the generation connection with the power system.

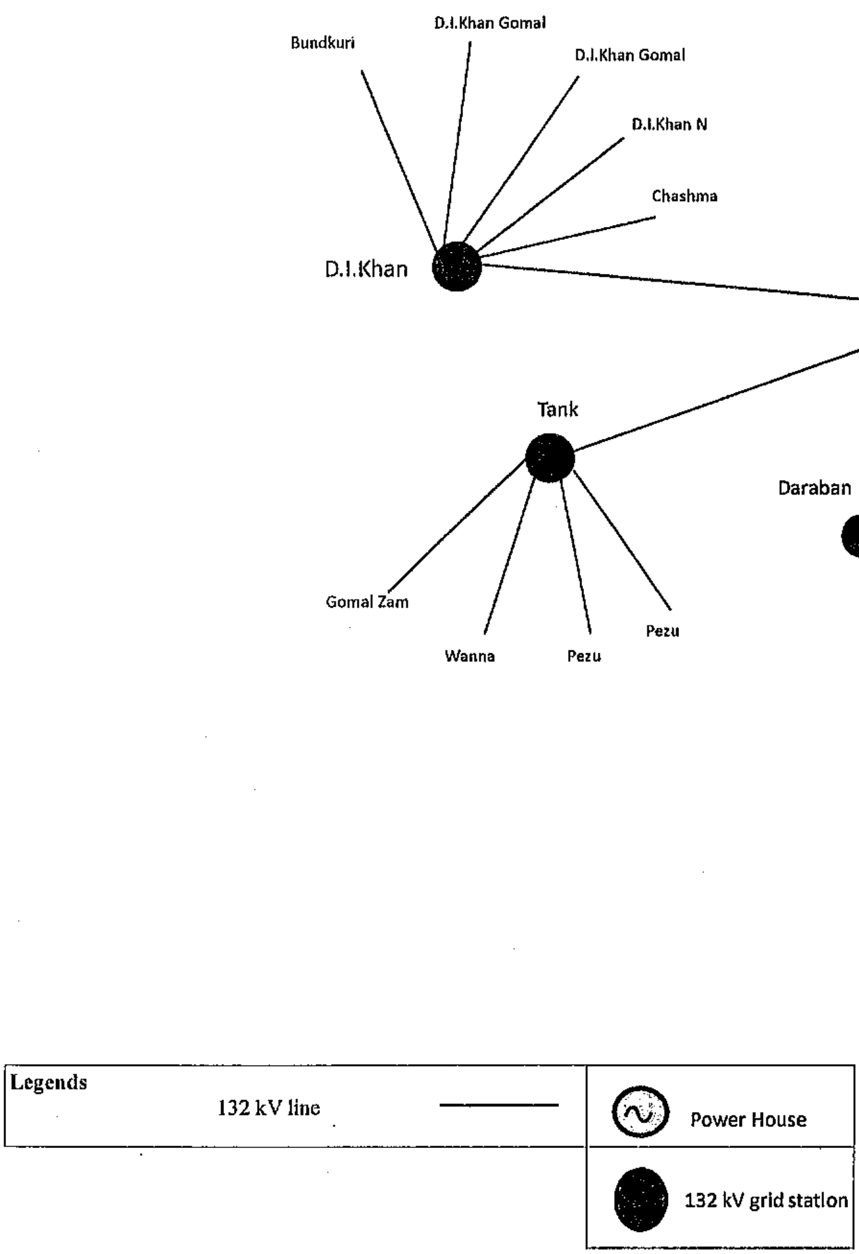
Therefore, it is concluded that the proposed generation connection for "50MW Solar PV Plant" is appropriate on the basis of results of all the system studies.

List of Appendices

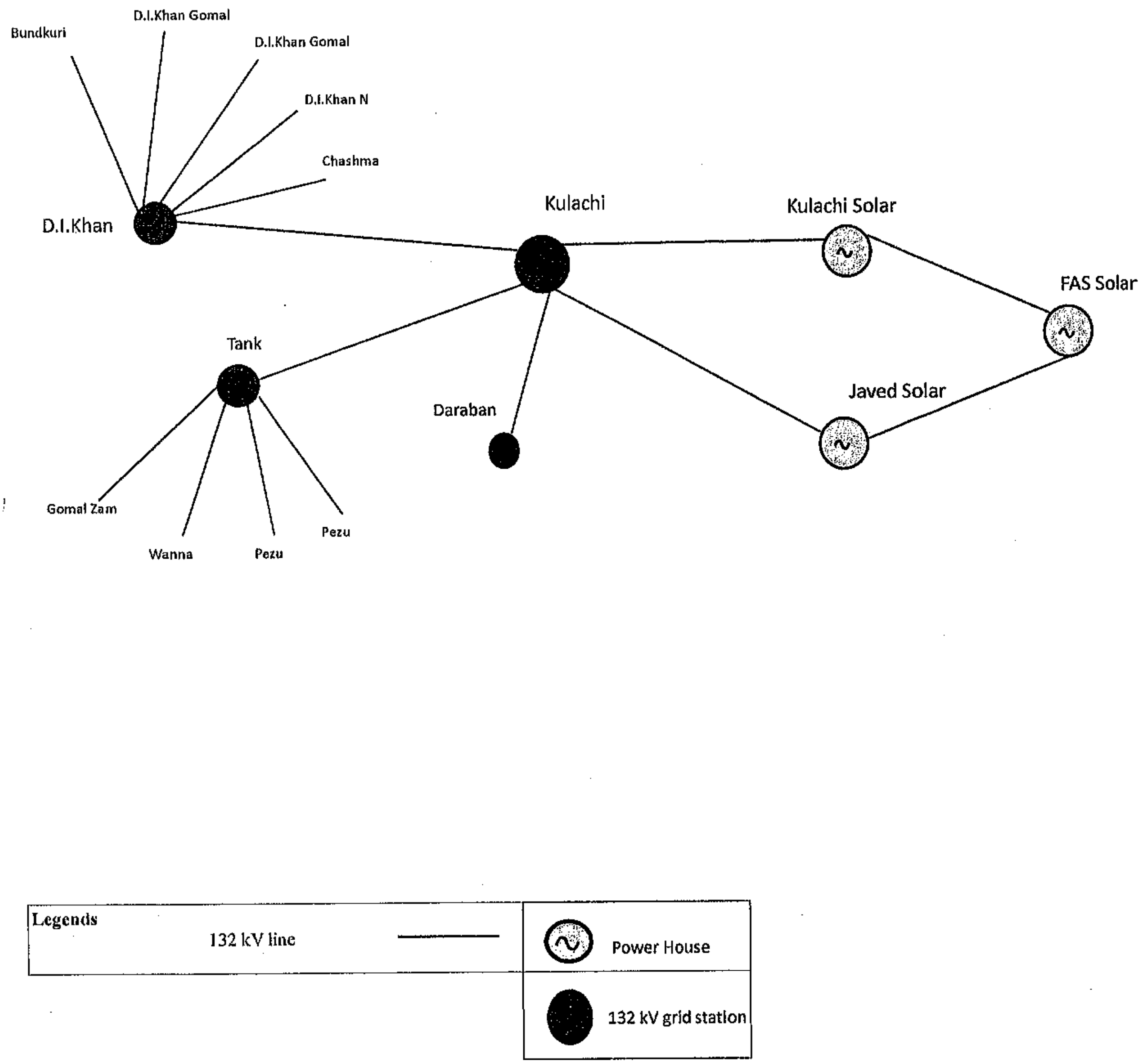
Appendix A:

PESCO Network Around Kulachi Solar PV Power Plant

PESCO Network Before Addition of 50MW Kulachi Solar PV IPP



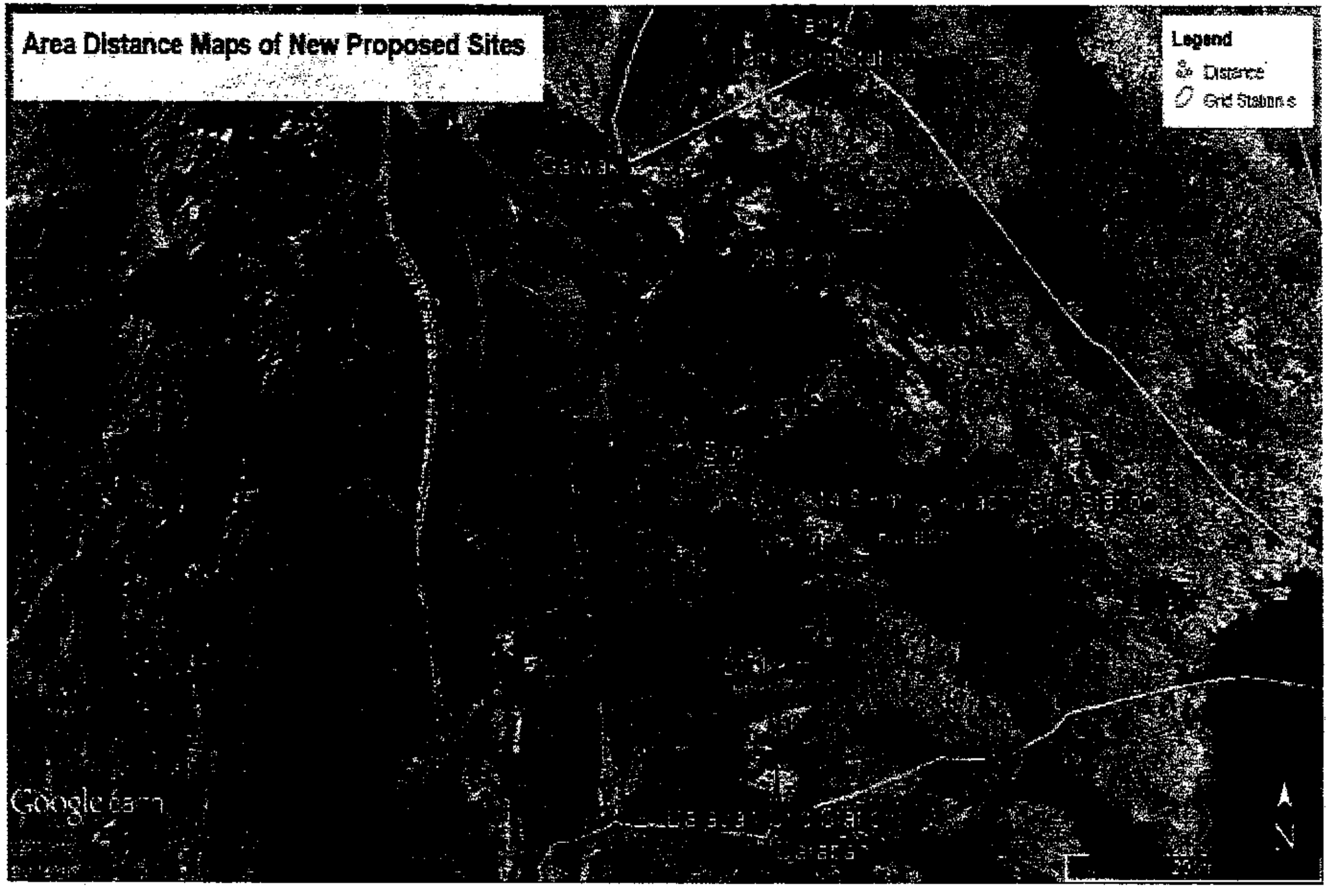
PESCO Network After Addition of 50MW Kulachi Solar PV IPP



Appendix B:

Plant Location on Google map

Exhibit 1: Aerial Distances from Site to Nearest Grid Stations



Appendix C:

Kulachi Solar PV Plant data assumptions

Assumed data for Kulachi Solar PV plant data for network modeling is as follows:

Generator Assumptions

- The generating unit is assumed to have 49.92MWdc gross power and 44MWac net output power, modeled having 5 collector groups of 8.8MWac.
- Each machine is assumed with reactive power capability of ± 0.95 (lagging/leading).
- The X source of each machine is assumed infinite.
- This is a full converter based type solar PV power plant having X+ve, X-ve, Xzero, Xsource= ∞ or in PSSE its value used is 9999.

Transformer Assumptions

- HV/MV (132/33 kV) transformers are modelled having 13% reactance at 50 MVA ratings.
- LV (33/0.4 kV) transformers are modelled having 9% reactance at 10 MVA ratings.
- The tap steps of each GSUT are assumed 33.

Dynamic data model of 49.92MWdc Kulachi Solar Power Plant

PVGU1

TIQCmd, Converter time constant for IQcmd, second	0.0200
TIpCmd, Converter time constant for IPcmd, second	0.0200
VLVPL1 - Low Voltage power Logic (LVPL), voltage 1 (pu)	0.4000
VLVPL2 - LVPL voltage 2 (pu)	0.9000
GLVPL - LVPL gain	1.1100
High Voltage reactive Current (HVRC) logic,voltage (pu)	1.2000
CURHVRCR - HVRC logic, current (pu)	2.0000
RIp_LVPL, Rate of active current change	2.0000
T_LVPL, Voltage sensor for LVPL, second	0.0200

PVEU1

Tfv - V-regulator filter	0.1500
Kpv - V-regulator proportional gain	18.0000
Kiv - V-regulator integrator gain	5.0000
Kpp - T-regulator proportional gain	0.0500
Kip - T-regulator integrator gain	0.1000
Kf - Rate feedback gain	0.0000
Tf - Rate feedback time constant	0.0800
QMX - V-regulator max limit	0.4700
QMN - V-regulator min limit	-0.4700
IPMAX - Max active current limit	1.1000
TRV - V-sensor	0.0000
dPMX - Max limit in power PI controller (pu)	0.5000
dPMN - Min limit in power PI controller (pu)	-0.5000
T_POWER - Power filter time constant	0.0500
KQi - MVAR/Volt gain	0.1000
VMINCL	0.9000
VMAXCL	1.1000
KVi - Volt/MVAR gain	120.0000
Tv - Lag time constant in WindVar controller	0.0500
Tp - Pelec filter in fast PF controller	0.0500
ImaxTD - Converter current limit	1.7000
Iphl - Hard active current limit	1.8000
Iqhl - Hard reactive current limit	1.8000
PMAX of PV plant	8.80000

PANELU1

P200, PDCmax at 200 W/m2, pu	0.1600
P400, PDCmax at 400 W/m2, pu	0.3800
P600, PDCmax at 600 W/m2, pu	0.5900
P800, PDCmax at 800 W/m2, pu	0.8500
P1000, PDCmax at 1000 W/m2, pu	1.0000

IRRADU1

T1, Time of the first data point, second	5.0000
I1, Irradiance at first data point, W/m2	1000.0000
T2, Time of the second data point, second	10.0000
I2, Irradiance at second data point, W/m2	900.0000
T3, Time of the third data point, second	15.0000
I3, Irradiance at third data point, W/m2	850.0000
T4, Time of the fourth data point, second	20.0000
I4, Irradiance at fourth data point, W/m2	800.0000
T5, Time of the fifth data point, second	25.0000
I5, Irradiance at fifth data point, W/m2	700.0000
T6, Time of the sixth data point, second	30.0000
I6, Irradiance at sixth data point, W/m2	600.0000
T7, Time of the seventh data point, second	35.0000
I7, Irradiance at seventh data point, W/m2	700.0000
T8, Time of the eigth data point, second	0.0000
I8, Irradiance at eigth data point, W/m2	0.0000
T9, Time of the ninth data point, second	0.0000
I9, Irradiance at ninth data point, W/m2	0.0000
T10, Time of the tenth data point, second	0.0000
I10, Irradiance at tenth data point, W/m2	0.0000

Appendix D:

Load Flow Analysis without 50MW Kulachi Solar Power Plant

Appendix D-1: Peak Load September 2019 year basecase

Appendix D-2: Peak Load Septemer 2022 year basecase

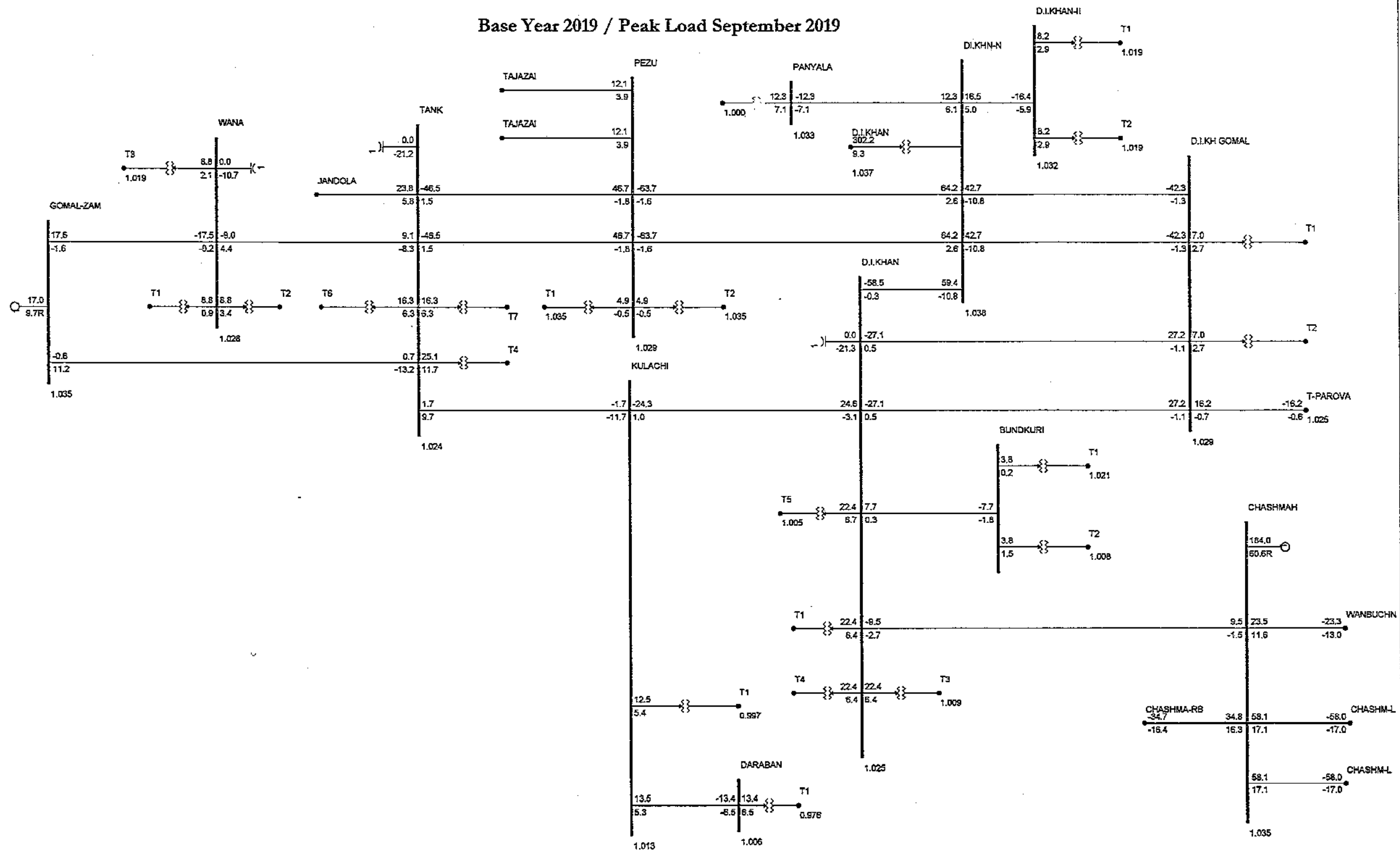
Appendix D:

Load Flow Analysis without 50MW Kulachi Solar Power Plant

Appendix D-1: Peak Load September 2019 year basecase

Grid Interconnection Study Without Addition of 50MW Kulachi Solar PV IPP

Base Year 2019 / Peak Load September 2019



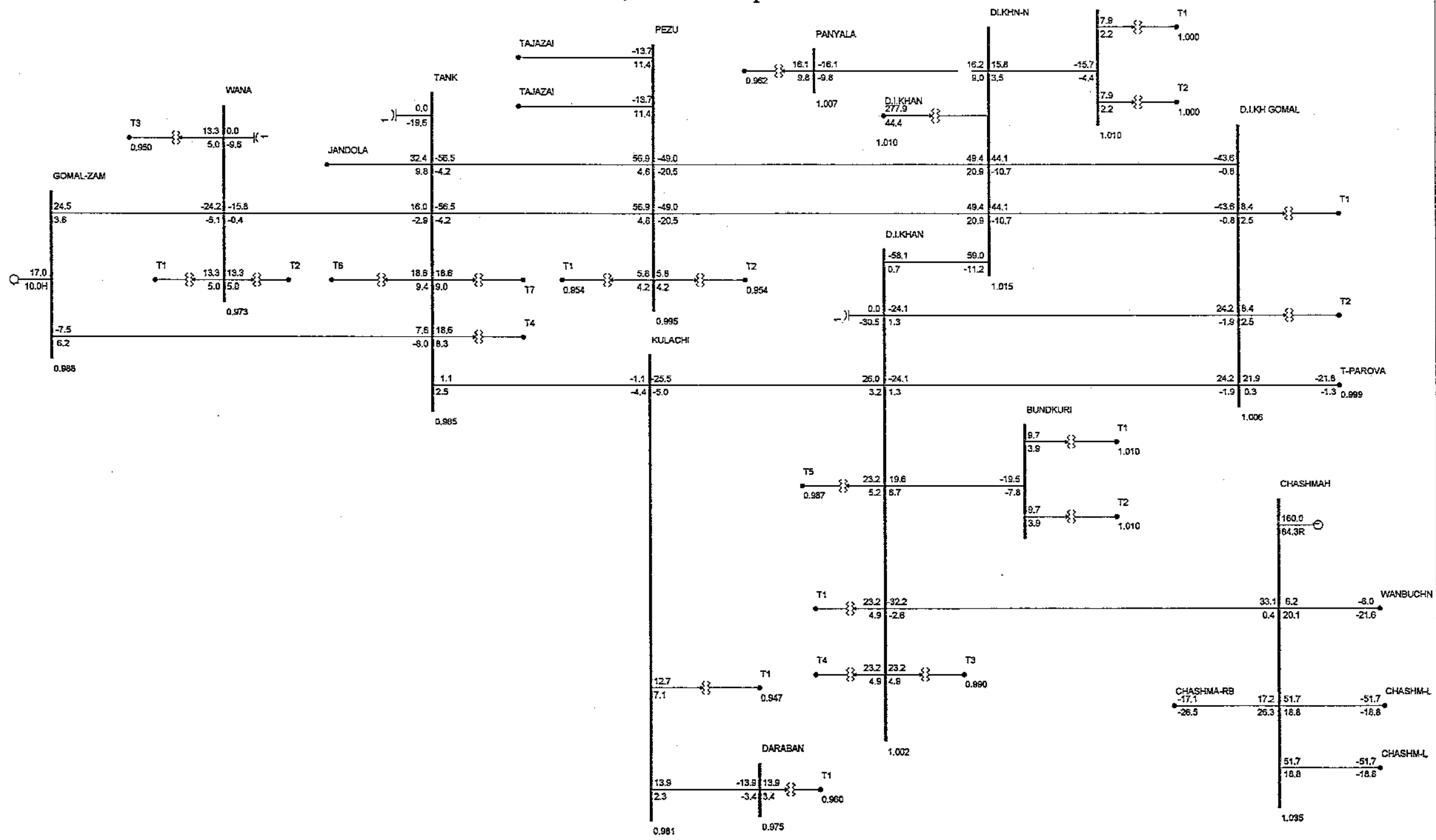
Appendix D:

Load Flow Analysis without 50MW Kulachi Solar Power Plant

Appendix D-2: Peak Load September 2022 year basecase

Grid Interc ection Study Without Addition of 50M ulachi Solar PV IPP

Base Year 2022 / Peak Load September 2022



Appendix E:

Load Flow Analysis with 44MWac Kulachi Solar Plant

Appendix E-1: **Peak Load September 2019 year basecase**

Appendix E-2: **Peak Load Septemer 2022 year basecase**

Appendix E:

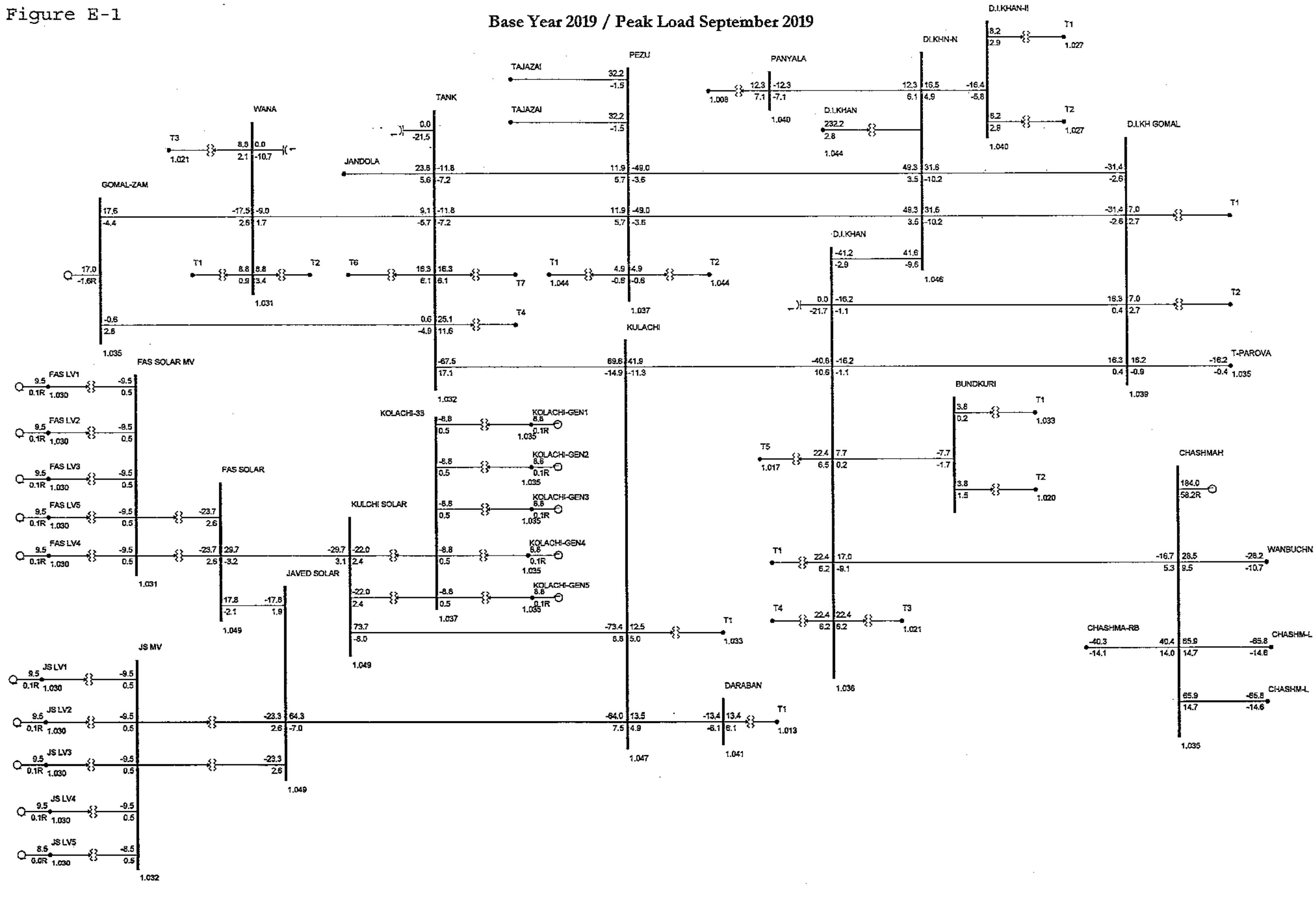
Load Flow Analysis with 44MWac Kulachi Solar Plant

Appendix E-1: Peak Load September 2019 year basecase

Gr[illegible]terconnection Study of 50MW Kulac[illegible]r PV IPP

Figure E-1

Base Year 2019 / Peak Load September 2019

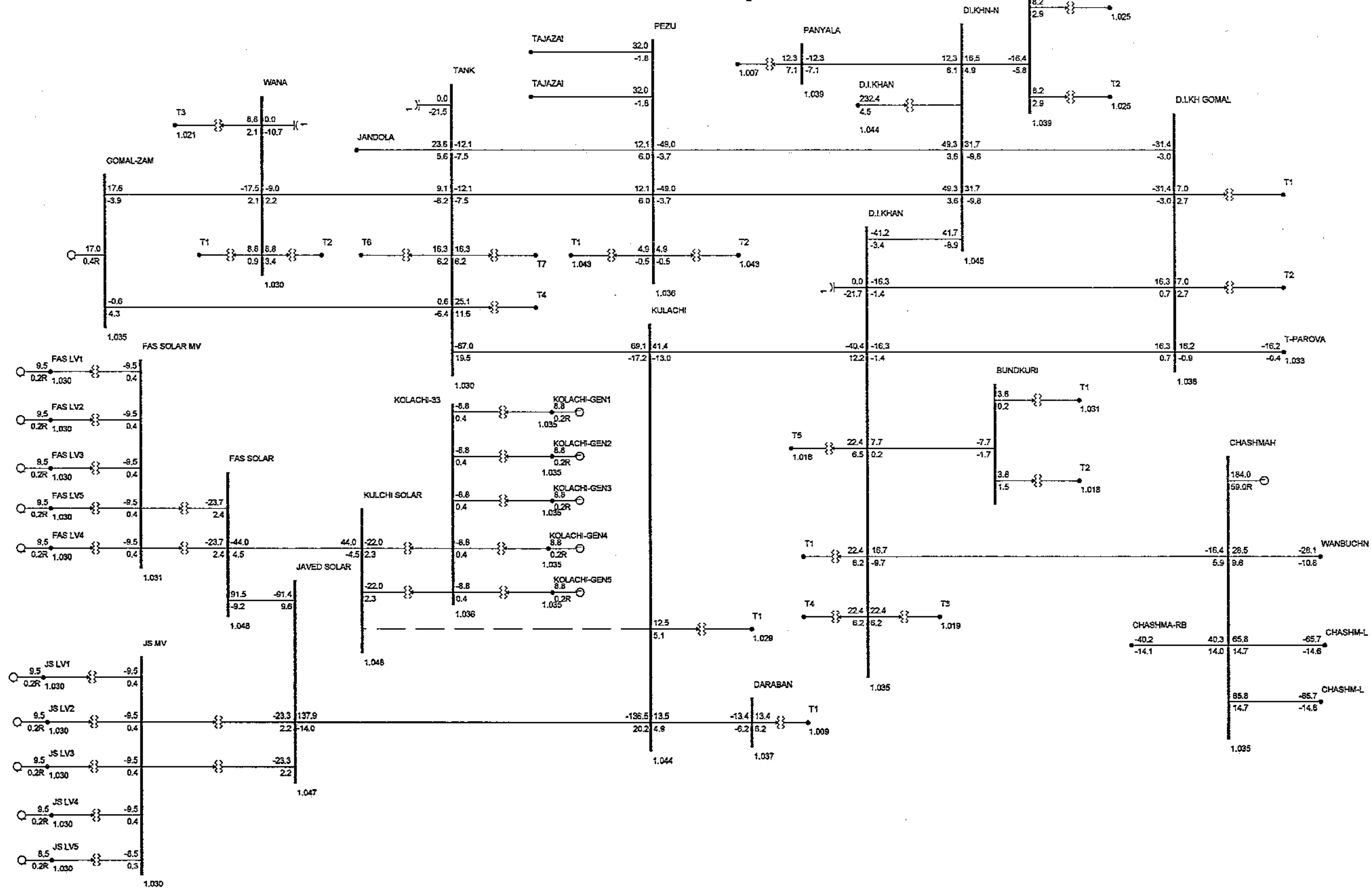


G[illegible]terconnection Study of 50MW Kulac[illegible]ar PV IPP

Kulachi 132kV to Kulachi Solar 132kV out

Figure E-2

Base Year 2019 / Peak Load September 2019



Gr terconnection Study of 50MW Kulac ar PV IPP Kulachi Solar 132kV to FAS Solar 132kV out

Figure E-3

Base Year 2019 / Peak Load September 2019

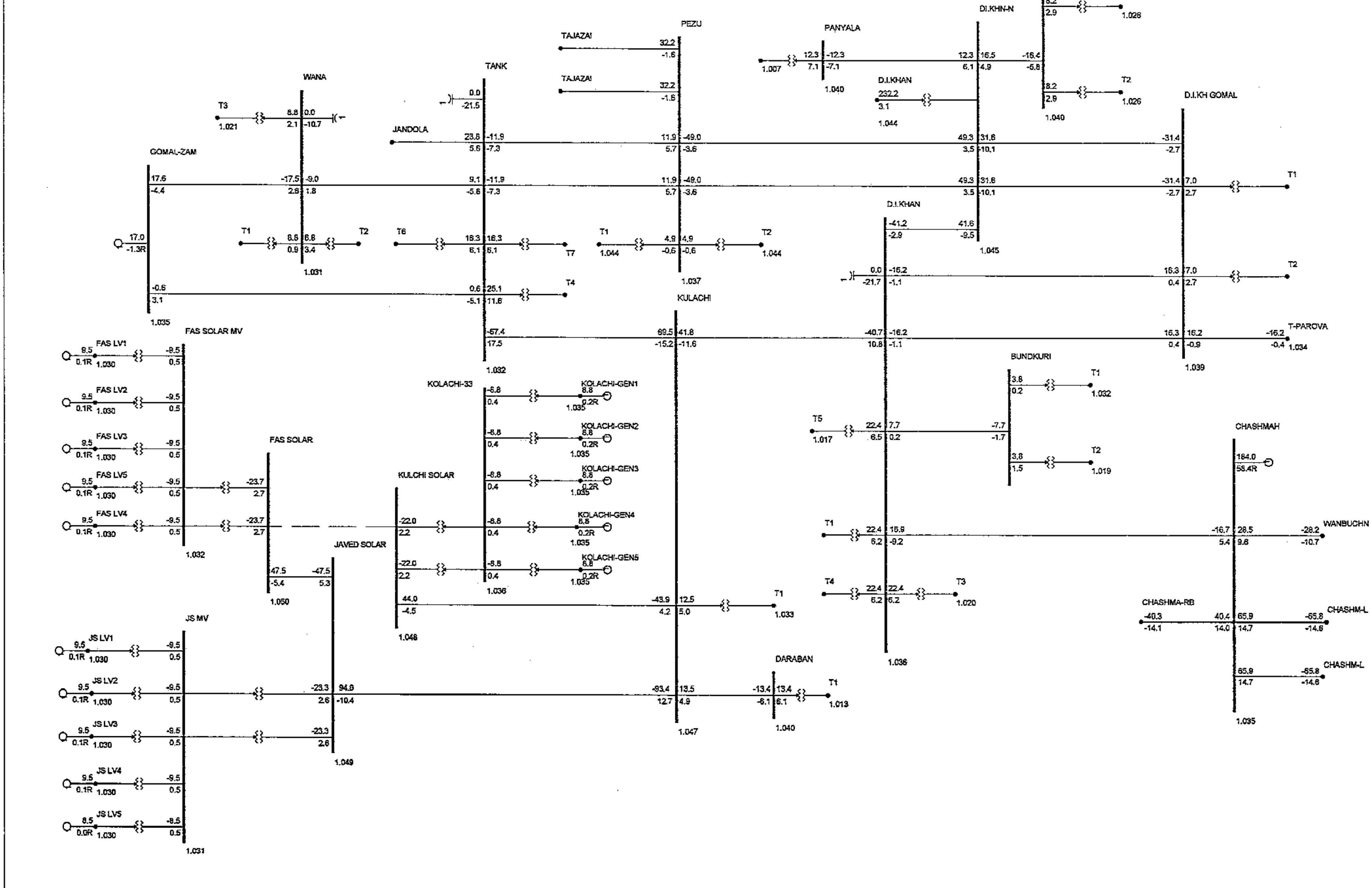
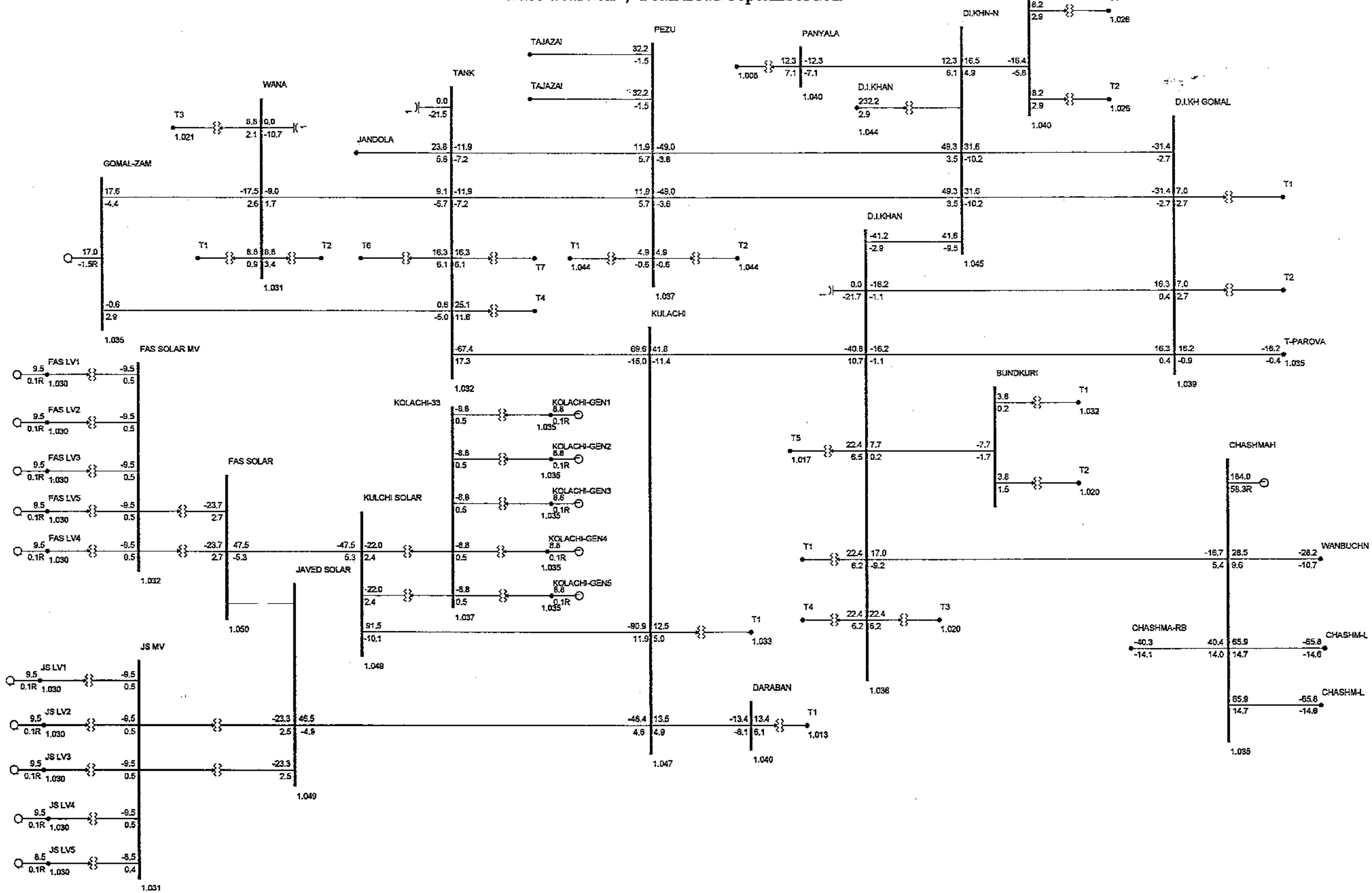


Figure E-4

Base Year 2019 / Peak Load September 2019



Gr terconnection Study of 50MW Kulac r PV IPP Kulachi 132kV to Javed Solar 132kV out

Figure E-5

Base Year 2019 / Peak Load September 2019

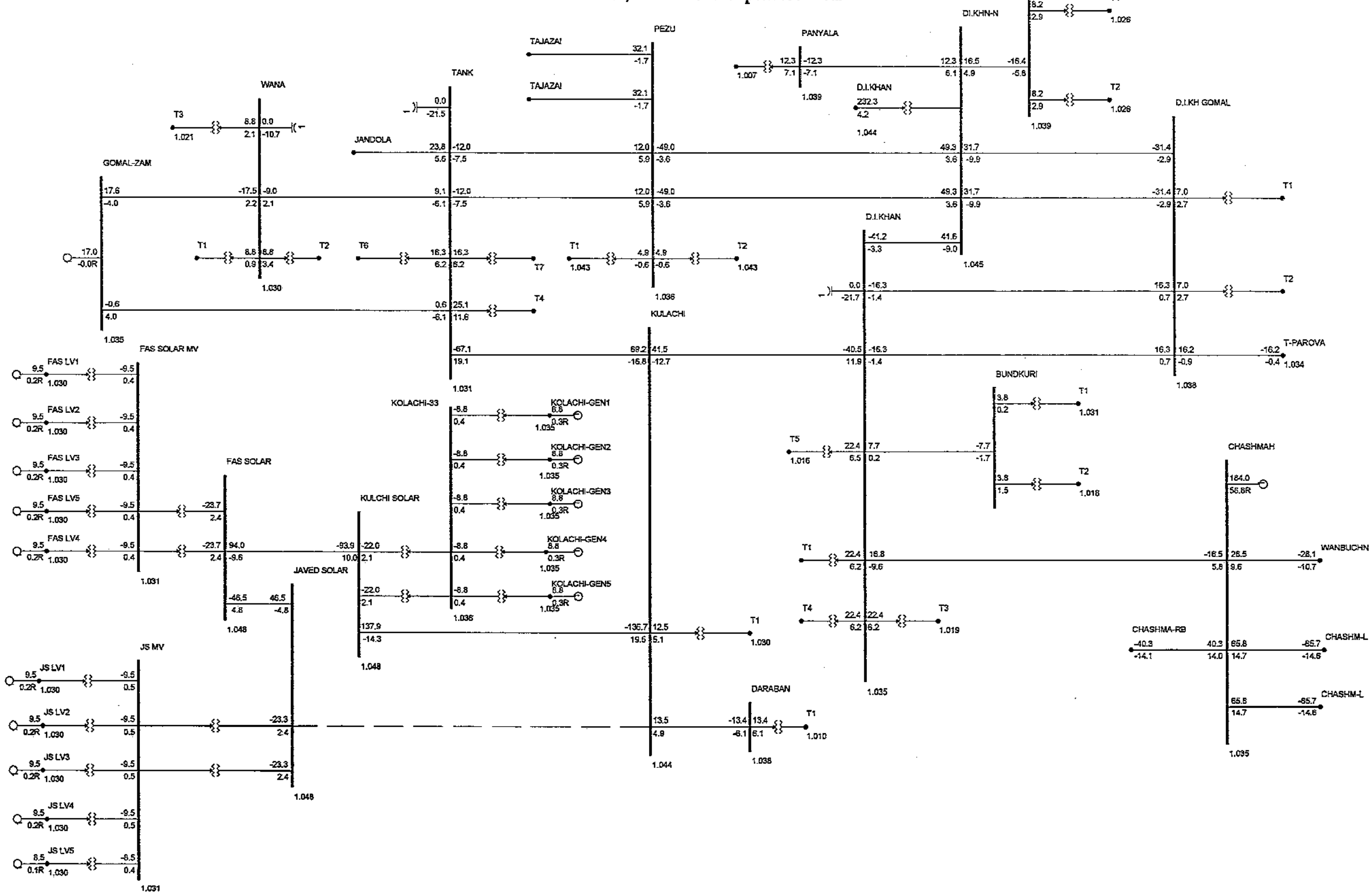
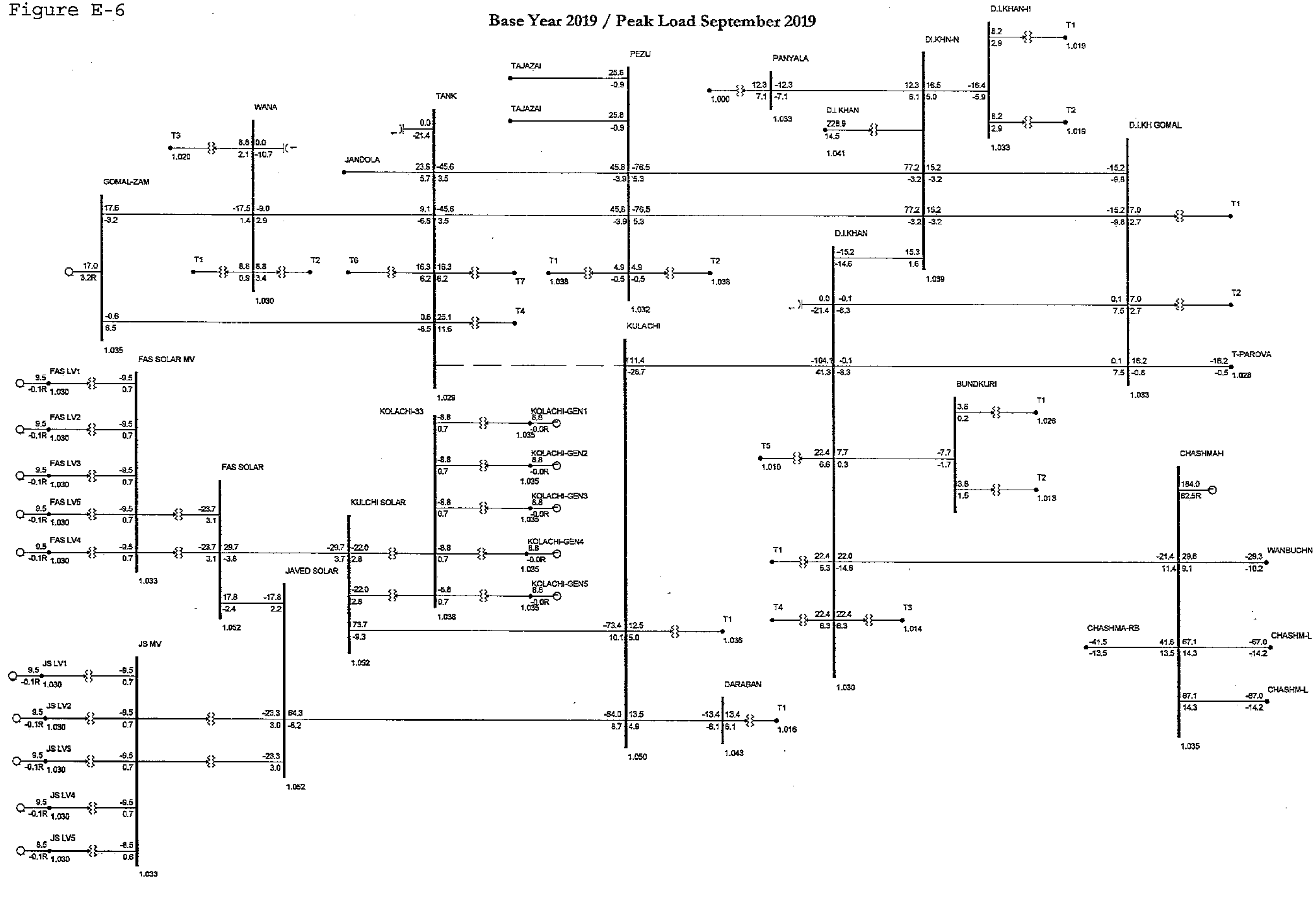


Figure E-6

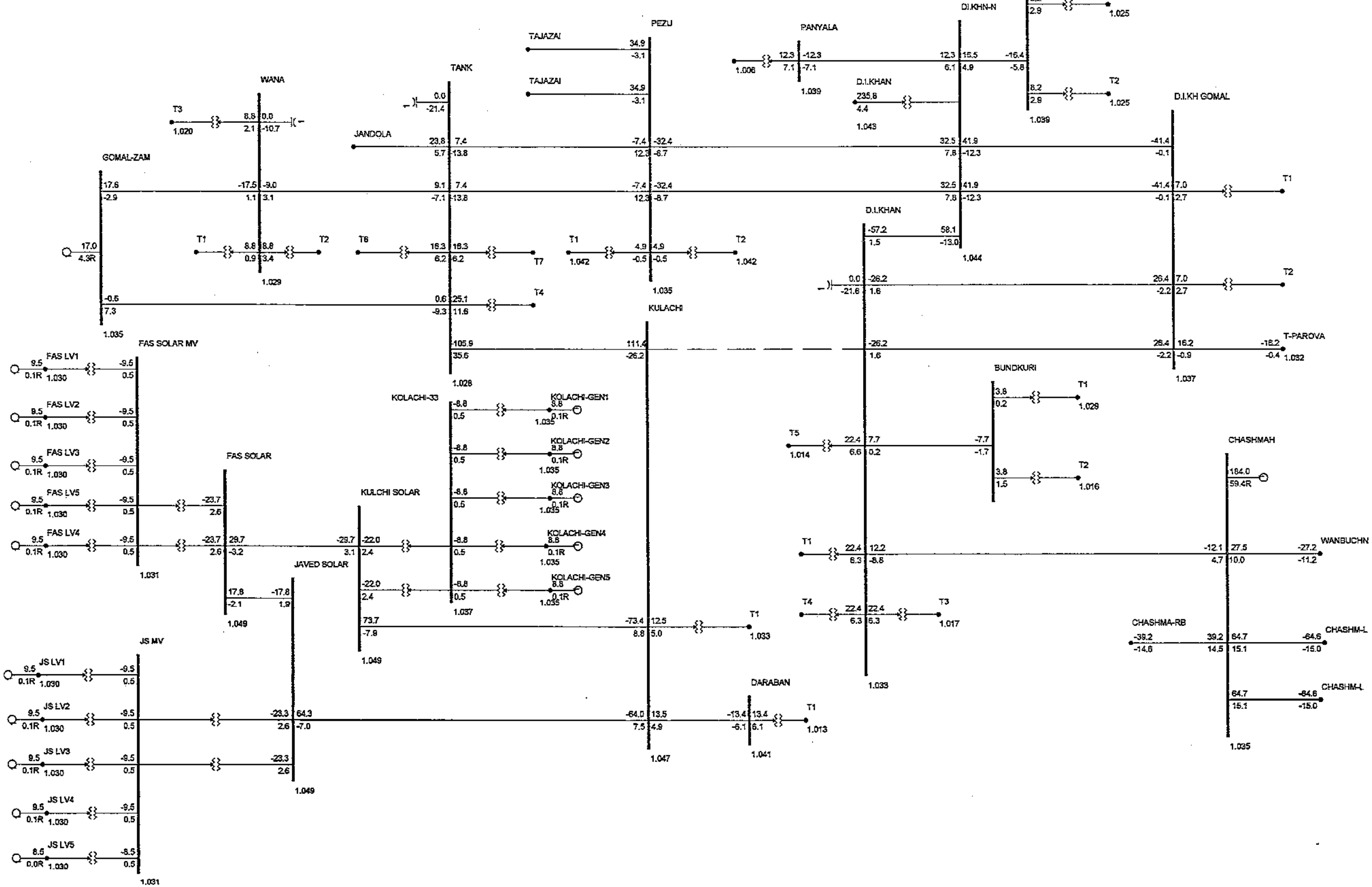
Base Year 2019 / Peak Load September 2019



Gr[illegible]nterconnection Study of 50MW Kulac[illegible]ar PV IPP Kulachi 132kV to D.I.Khan 132kV out

Figure E-7

Base Year 2019 / Peak Load September 2019



Appendix E:

Load Flow Analysis with 44MWac Kulachi Solar Plant

Appendix E-2: Peak Load September 2022 year basecase

Figure E-8

Base Year 2022 / Peak Load September 2022

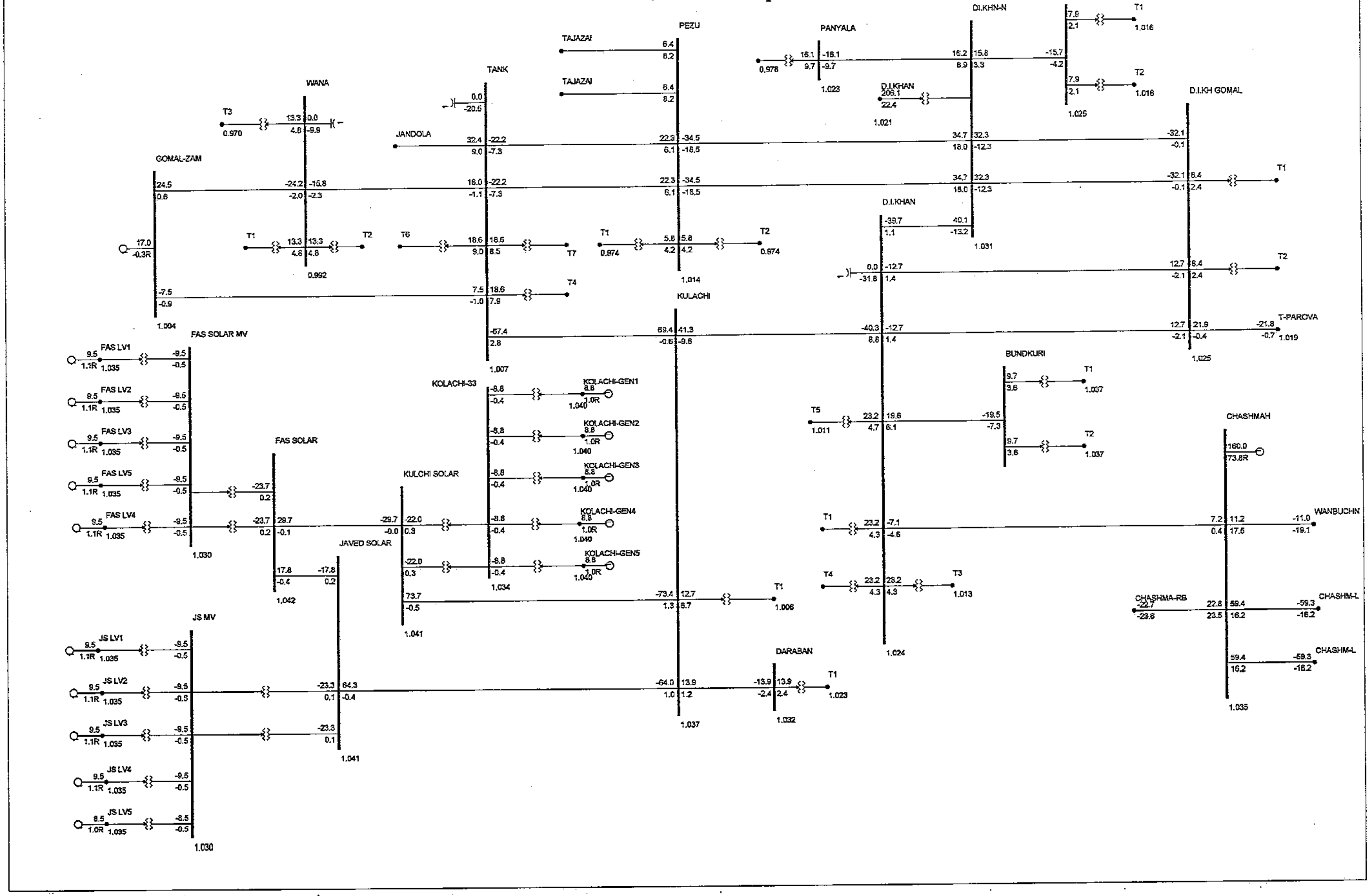


Figure E-9

G nterconnection Study of 50MW Kulac lar PV IPP Kulachi 132kV to Kulachi Solar 132kV out

Base Year 2022 / Peak Load September 2022

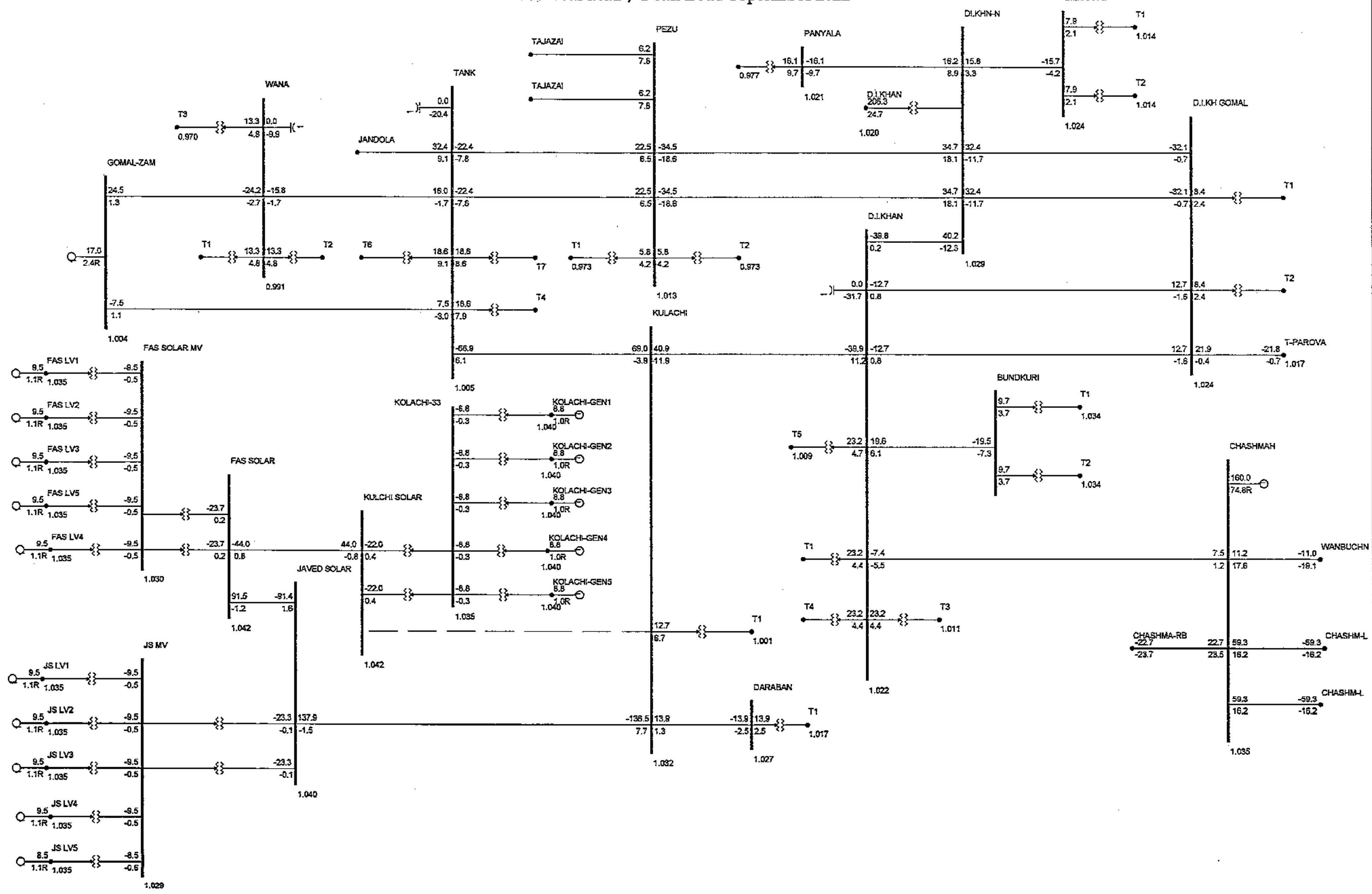


Figure E-10

G. nterconnection Study of 50MW Kulac ar PV IPP Kulachi Solar 132kV to FAS Solar 132kV out

Base Year 2022 / Peak Load September 2022

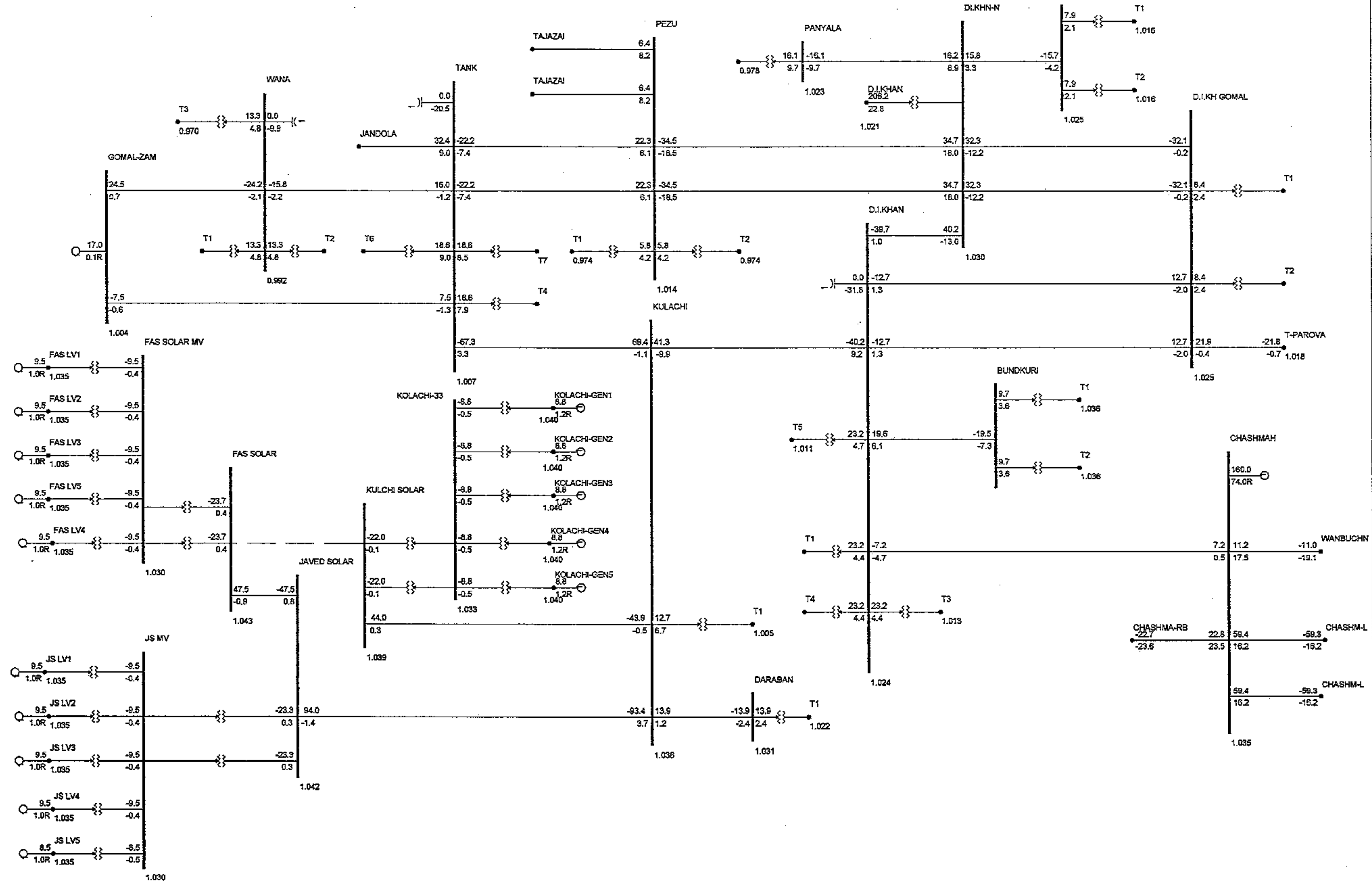


Figure E-11 G. Interconnection Study of 50MW Kulachi Solar PV IPP FAS Solar 132kV to Javed Solar 132kV out

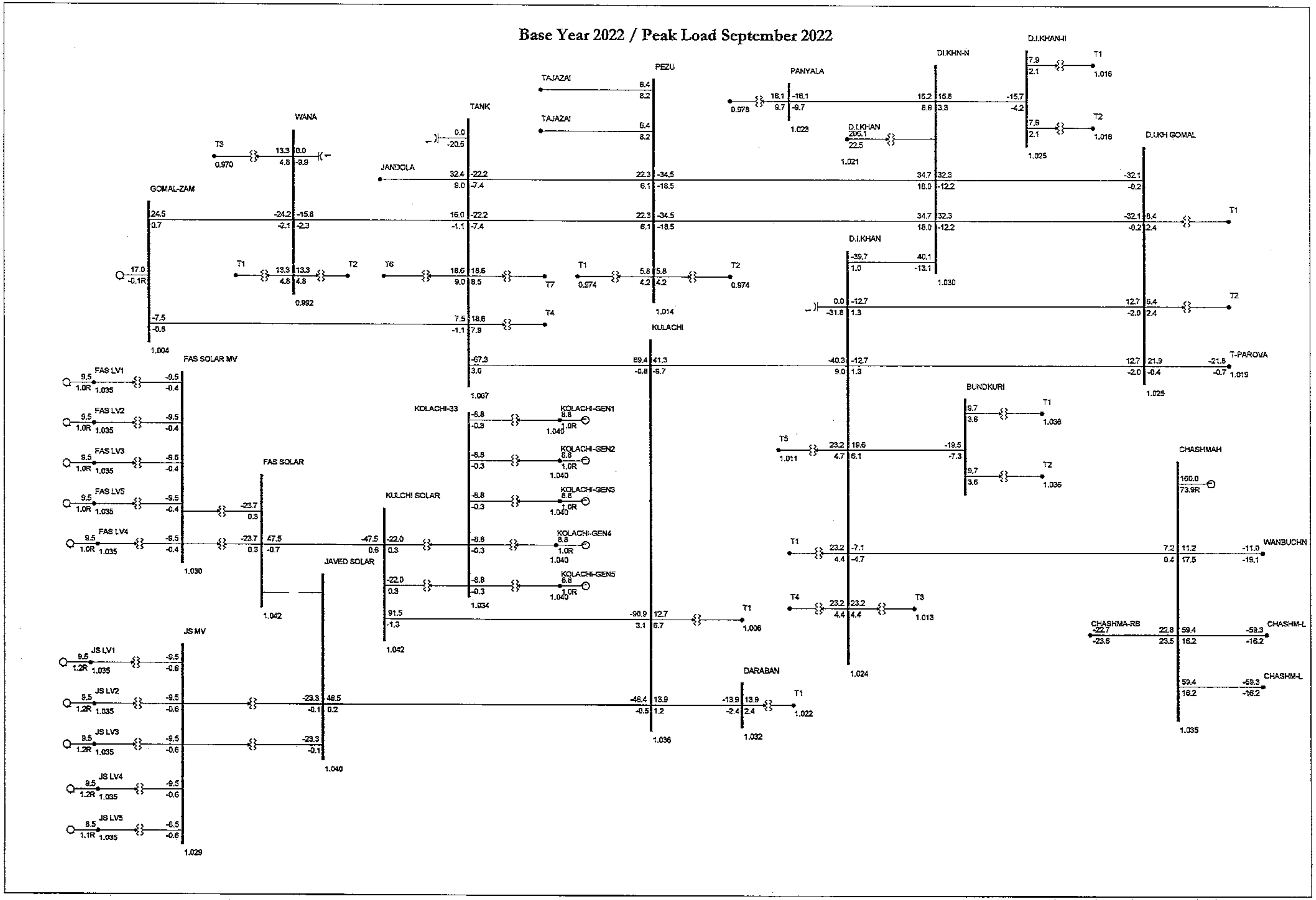


Figure E-12

G terconnection Study of 50MW Kulac ar PV IPP Kulachi 132kV to Javed Solar 132kV out

Base Year 2022 / Peak Load September 2022

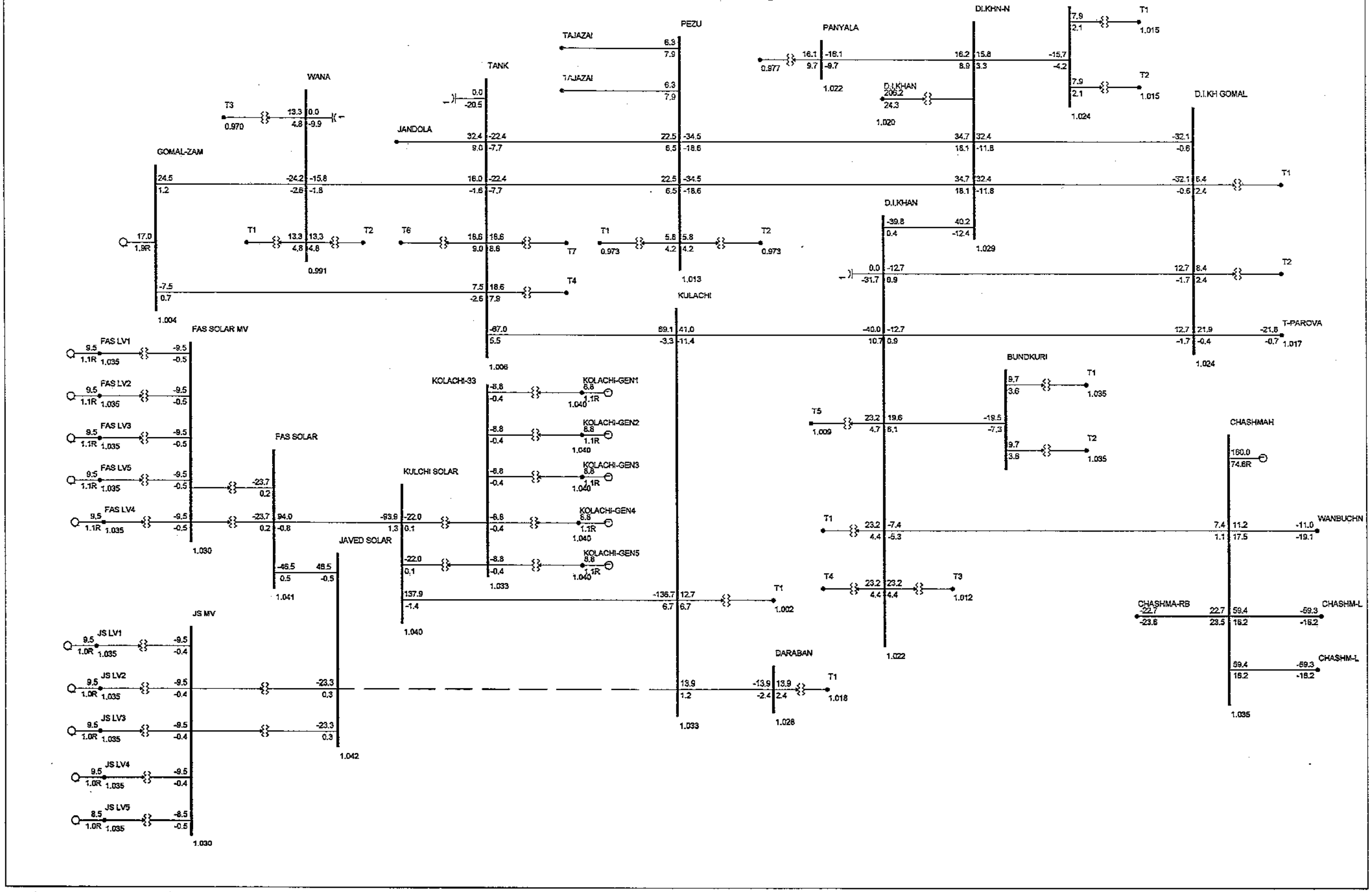


Figure E-13

G nterconnection Study of 50MW Kulac ar PV IPP Tank 132kV to Kulachi 132kV out

Base Year 2022 / Peak Load September 2022

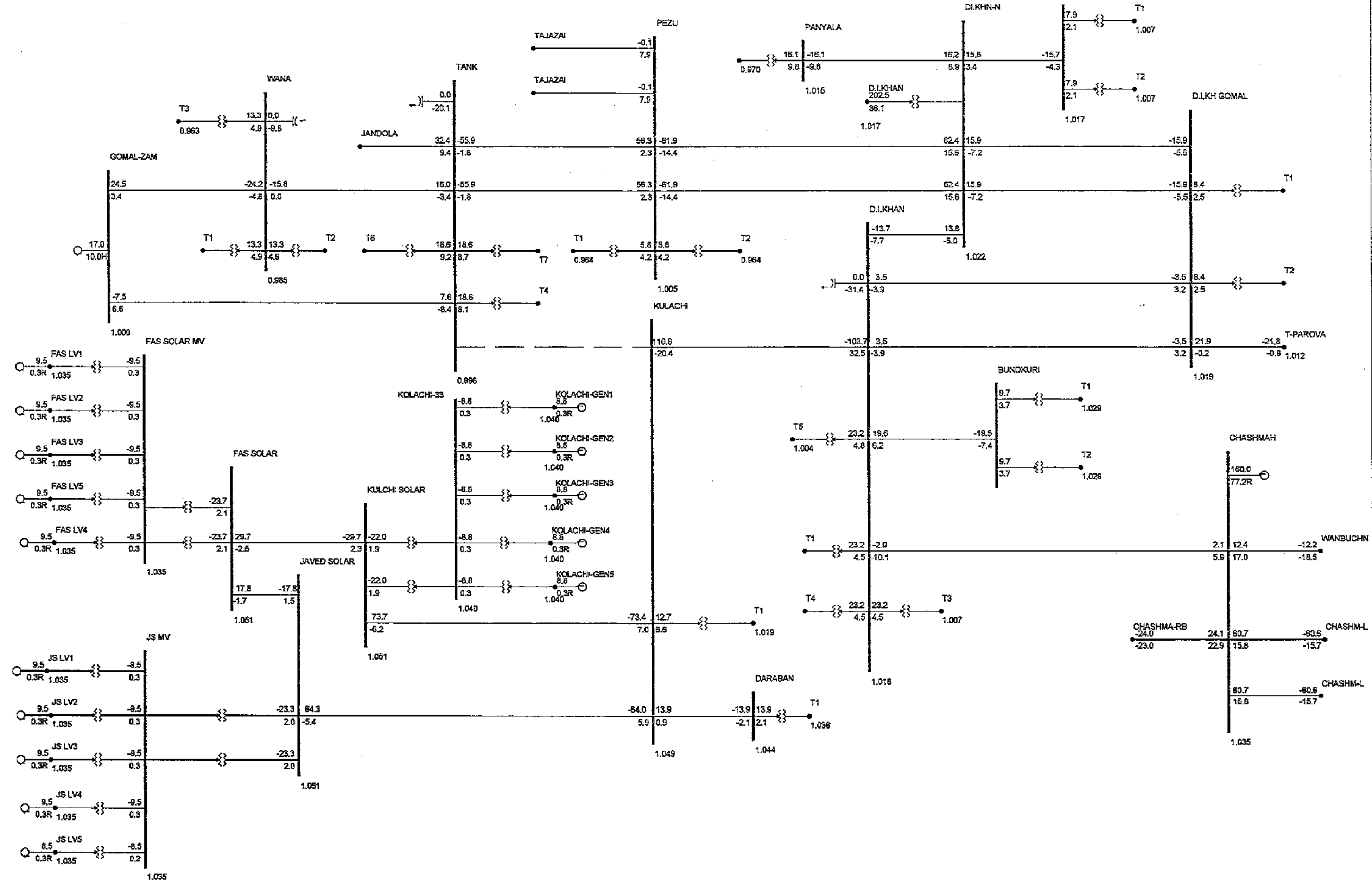
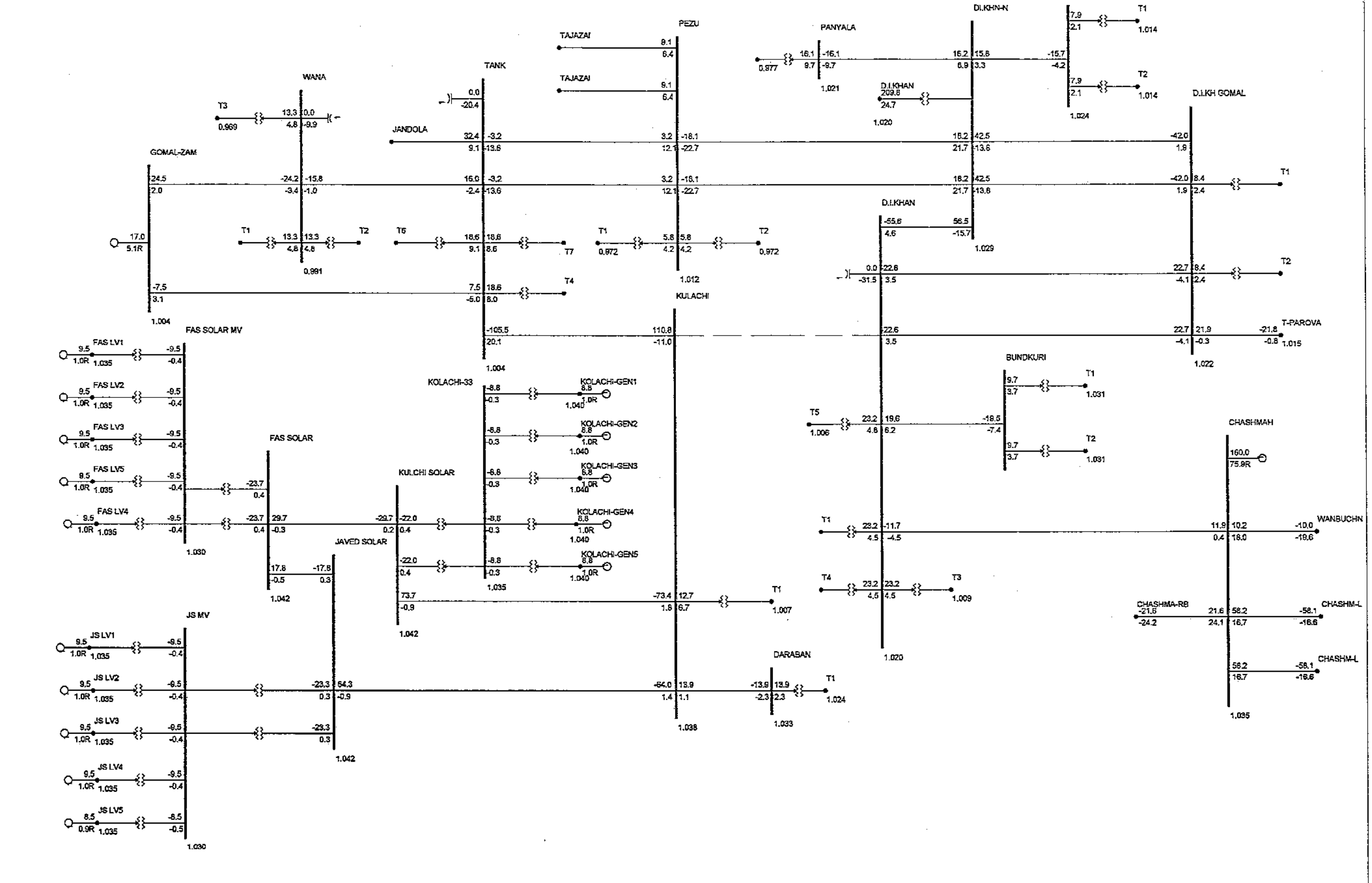


Figure E-14

G nterconnection Study of 50MW Kulac ar PV IPP Kulachi 132kV to D.I.Khan 132kV out

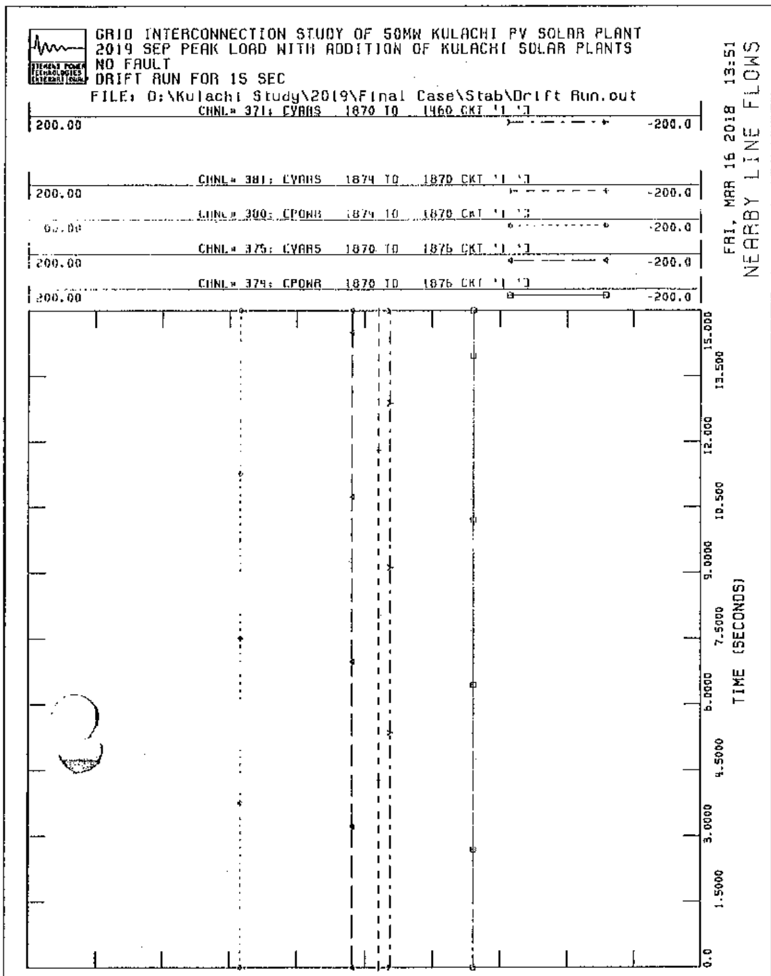
Base Year 2022 / Peak Load September 2022

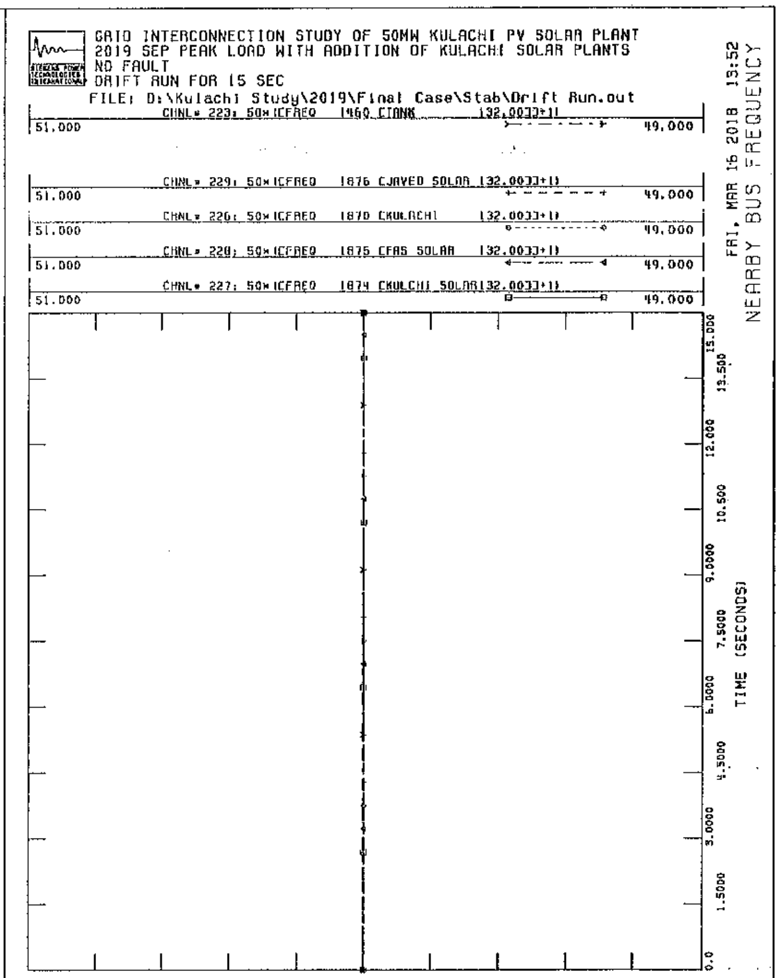


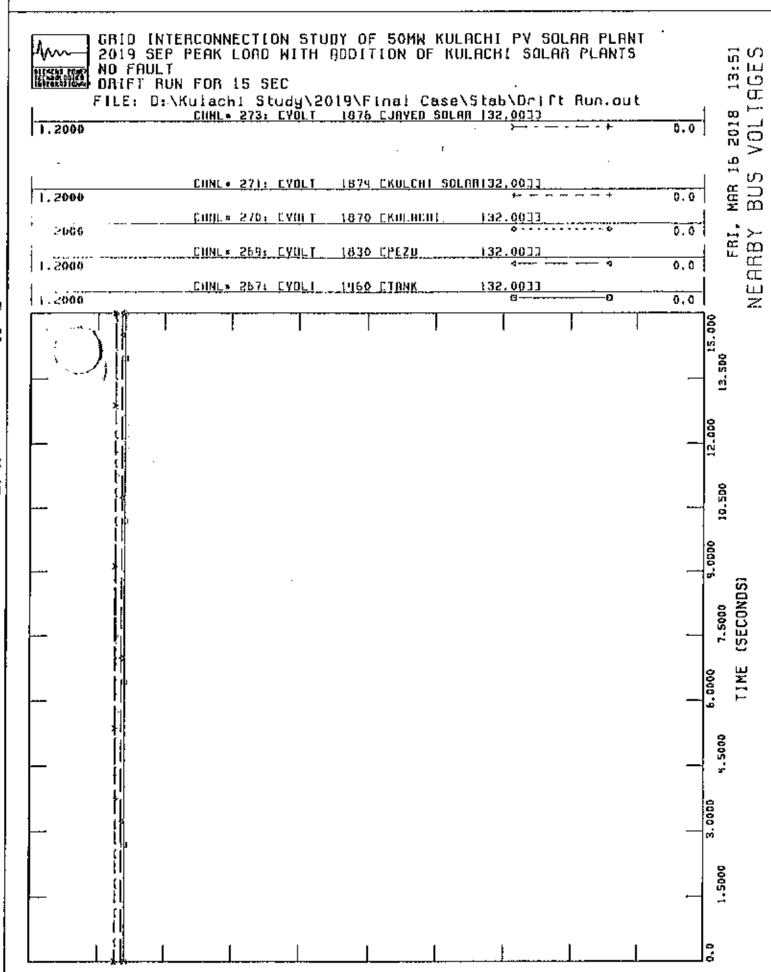
Appendix F:

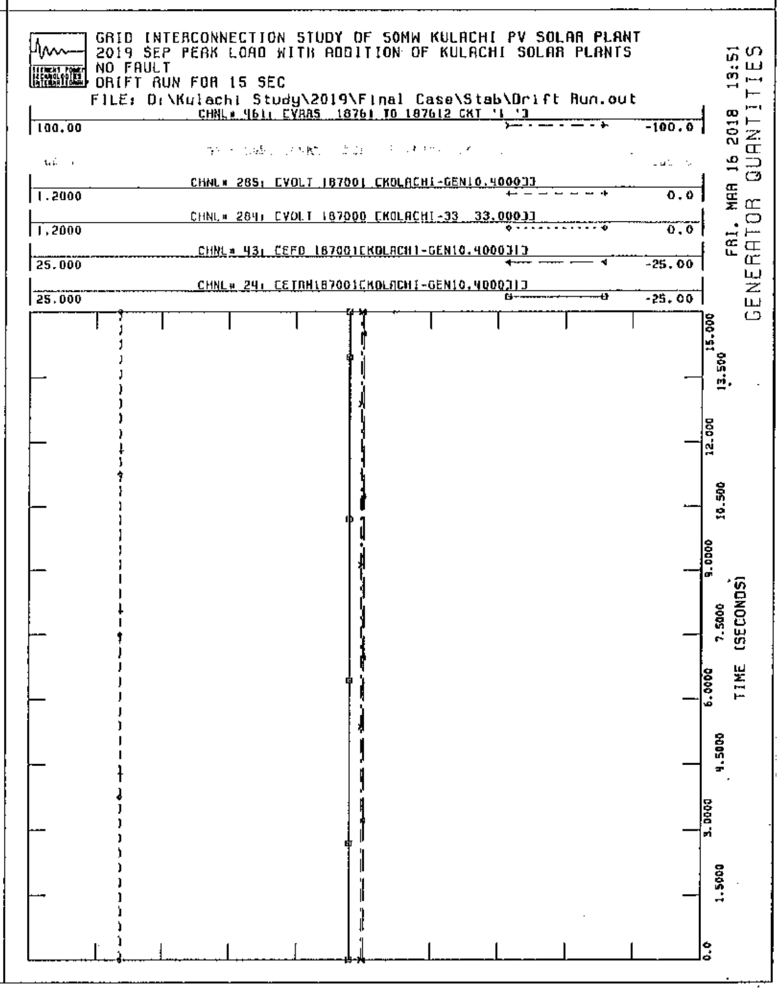
Transient Stability Performance of Solar PV Power Plant

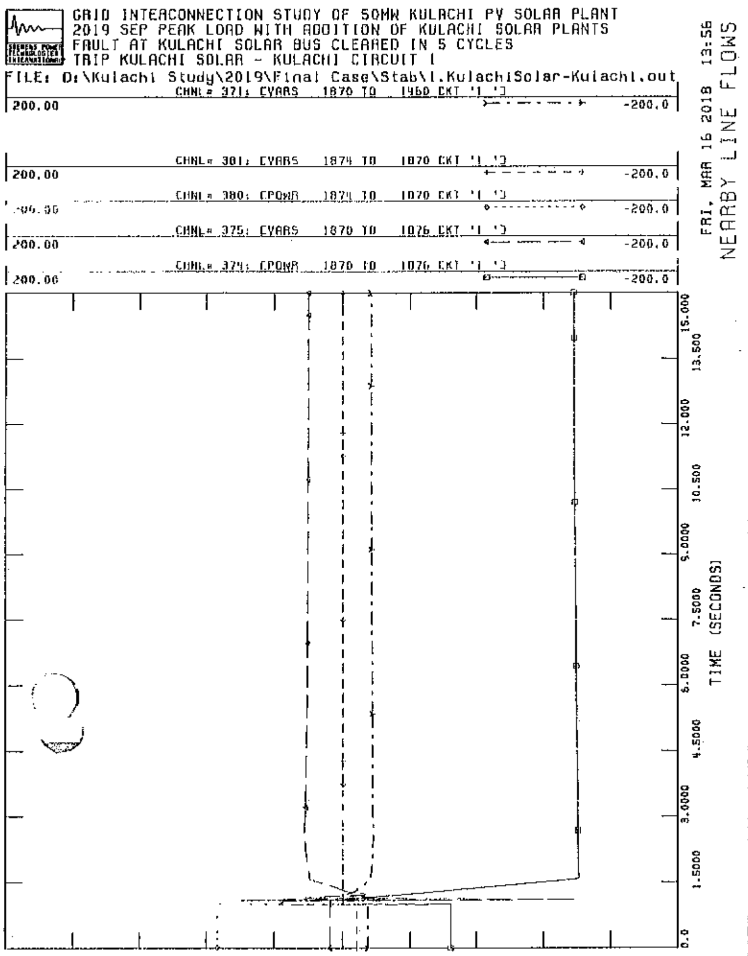
Appendix F-1: Peak load September 2019 year basecase

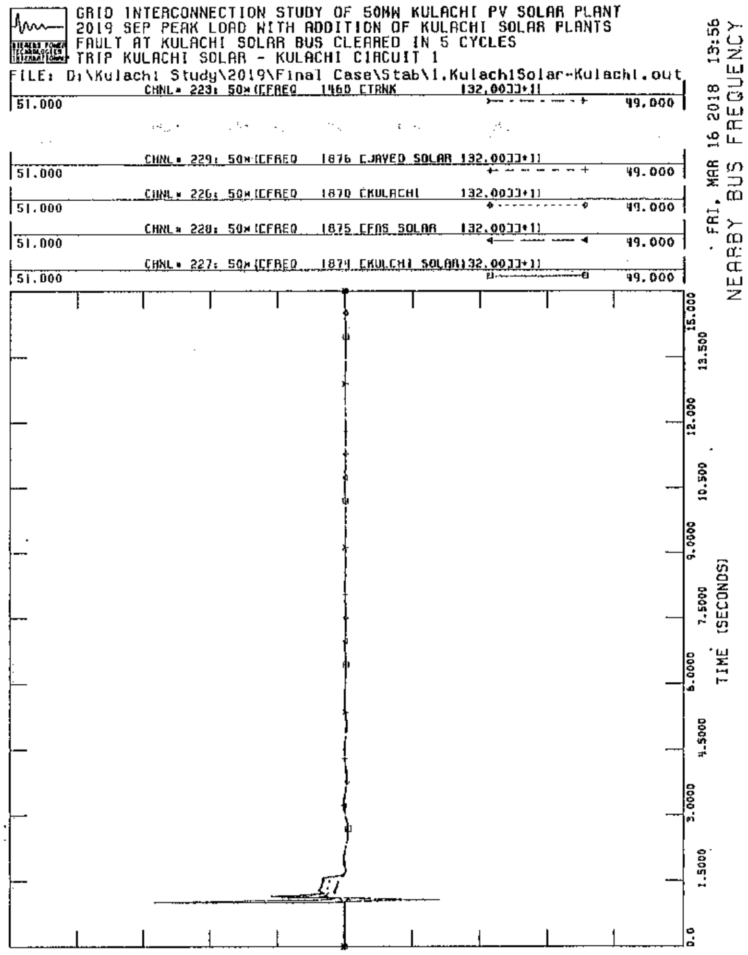

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
NO FAULT
DRIFT RUN FOR 15 SEC
FILE: D:\Kulachi Study\2019\Final Case\Stab\Drift Run.out
CHNL# 371: [VARS 1870 TO 1460 CKT '1 ']
200.00
-200.0
CHNL# 381: [VARS 1874 TO 1870 CKT '1 ']
200.00
-200.0
CHNL# 380: [POWR 1874 TO 1870 CKT '1 ']
-200.0
CHNL# 375: [VARS 1870 TO 1876 CKT '1 ']
200.00
-200.0
CHNL# 374: [POWR 1870 TO 1876 CKT '1 ']
200.00
-200.0
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 13:51
NEARBY LINE FLOWS

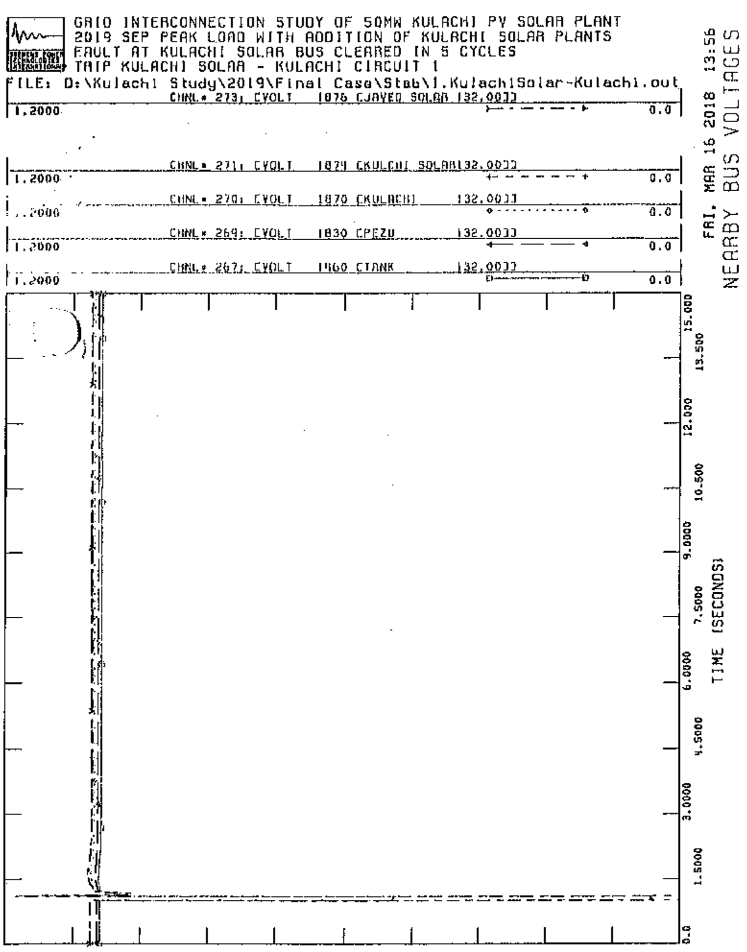

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
NO FAULT
DRIFT RUN FOR 15 SEC
FILE: D:\Kulachi Study\2019\Final Case\Stab\Drift Run.out
CHNL# 223: 50*(1+[FREQ 1460 [TANK 132.00]])
51.000
49.000
CHNL# 229: 50*(1+[FREQ 1876 [JAVED SOLAR 132.00]])
51.000
49.000
CHNL# 226: 50*(1+[FREQ 1870 [KULACHI 132.00]])
51.000
49.000
CHNL# 228: 50*(1+[FREQ 1875 [FAS SOLAR 132.00]])
51.000
49.000
CHNL# 227: 50*(1+[FREQ 1874 [KULCHI SOLAR 132.00]])
51.000
49.000
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 13:52
NEARBY BUS FREQUENCY

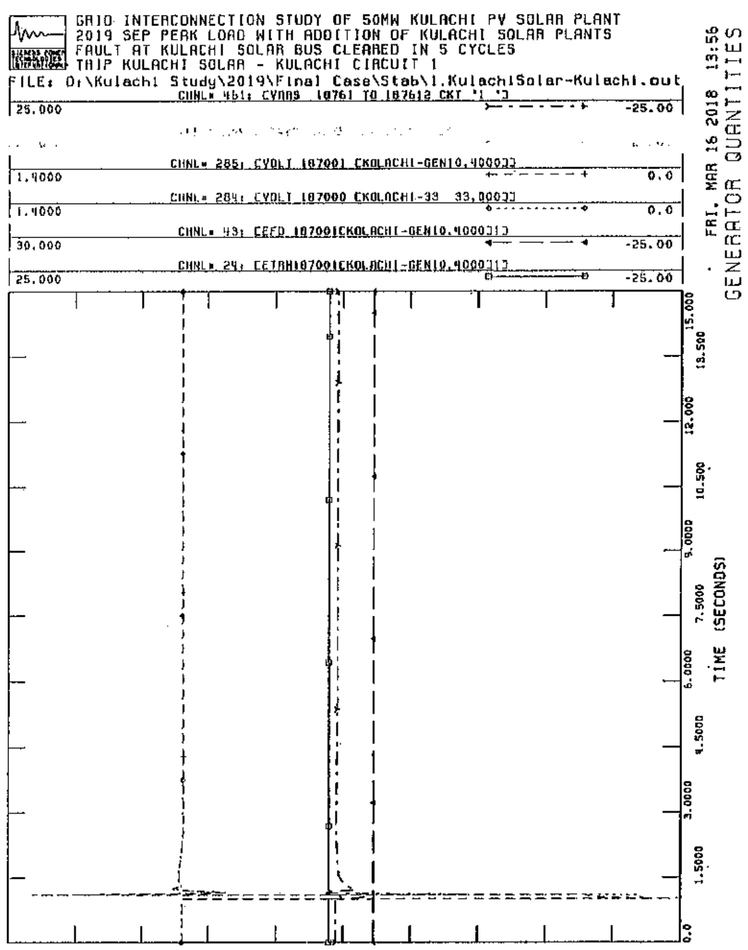

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
NO FAULT
DRIFT RUN FOR 15 SEC
FILE: D:\Kulachi Study\2019\Final Case\Stab\Drift Run.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
1.2000
0.0
CHNL# 271: [VOLT 1874 [KULCHI SOLAR 132.00]]
1.2000
0.0
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
0.0
CHNL# 269: [VOLT 1830 [PEZU 132.00]]
1.2000
0.0
CHNL# 267: [VOLT 1460 [TANK 132.00]]
1.2000
0.0
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 13:51
NEARBY BUS VOLTAGES

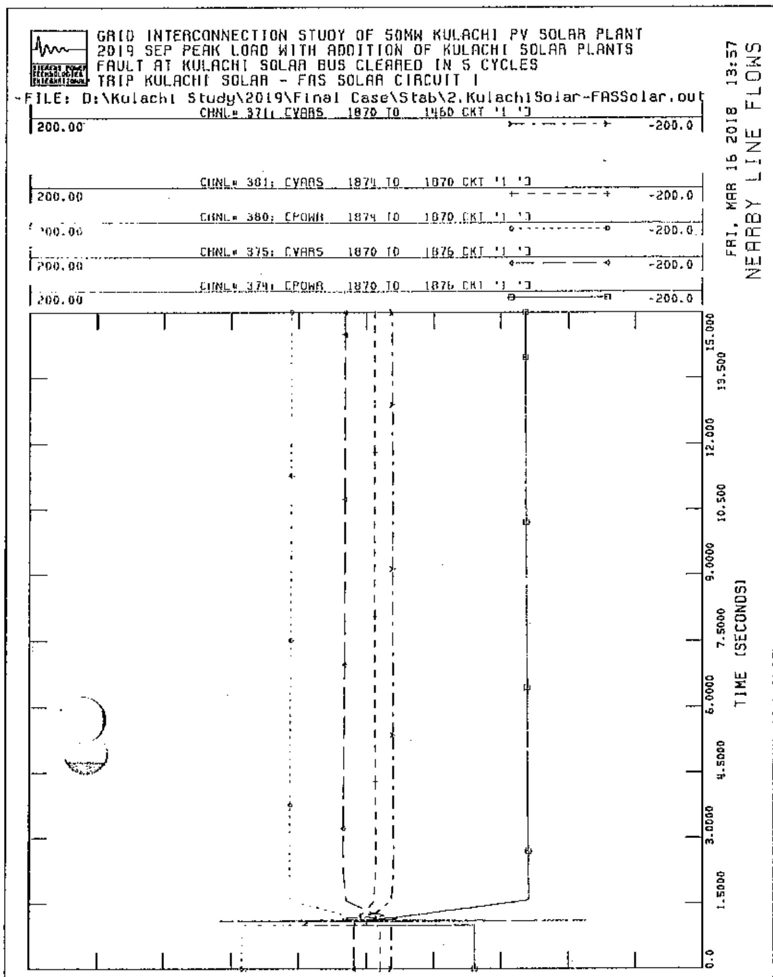

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
NO FAULT
DRIFT RUN FOR 15 SEC
FILE: D:\Kulachi Study\2019\Final Case\Stab\Drift Run.out
CHNL# 461: [VARS 18761 TO 187612 CKT '1 ']
100.00
-100.0
CHNL# 285: [VOLT 187001 [KULACHI-GEN10.400]]
1.2000
0.0
CHNL# 284: [VOLT 187000 [KULACHI-33 33.000]]
1.2000
0.0
CHNL# 43: [EFD 187001[KULACHI-GEN10.400]1]
25.000
-25.00
CHNL# 24: [ETRM187001[KULACHI-GEN10.400]1]
25.000
-25.00
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 13:51
GENERATOR QUANTITIES

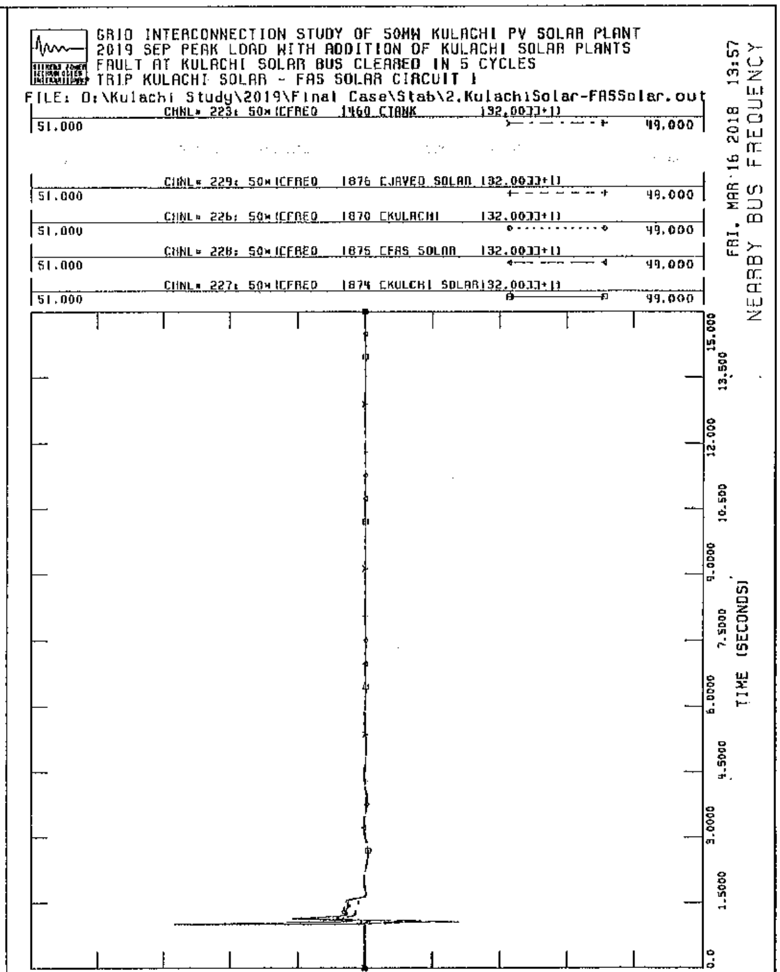

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\1.KulachiSolar-Kulachi.out
CHNL# 371: CVARS 1870 TO 1460 CKT '1 '
CHNL# 301: CVARS 1874 TO 1870 CKT '1 '
CHNL# 380: CPOWR 1874 TO 1870 CKT '1 '
CHNL# 375: CVARS 1870 TO 1876 CKT '1 '
CHNL# 374: CPOWR 1870 TO 1876 CKT '1 '
200.00
-200.0
TIME (SECONDS)
FRI, MAR 16 2018 13:56
NEARBY LINE FLOWS

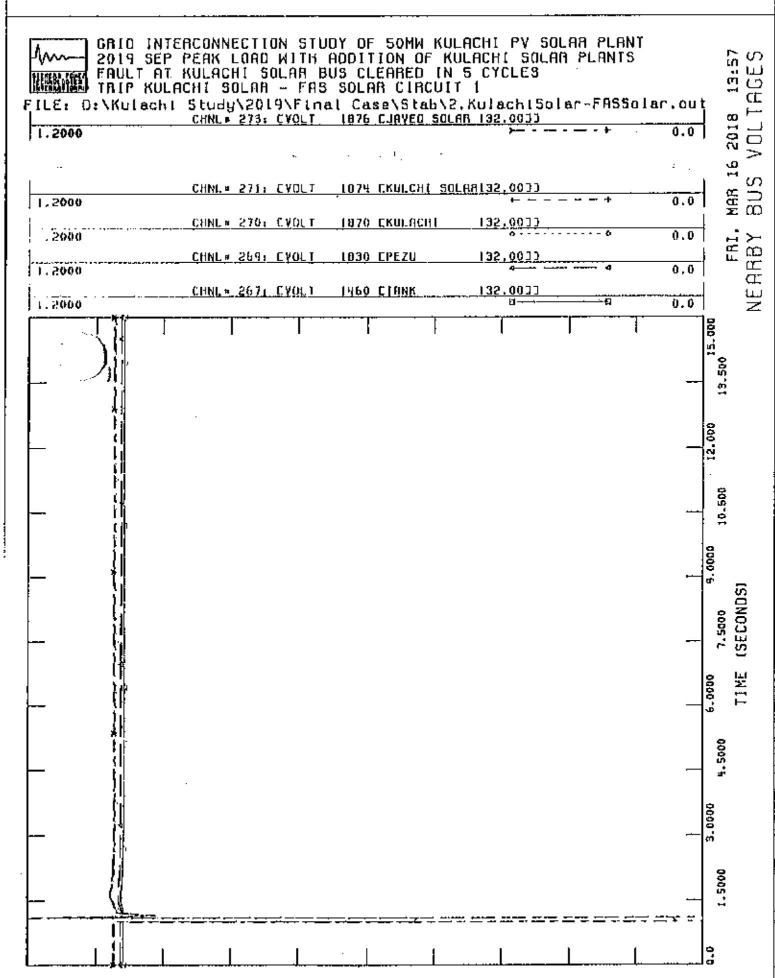

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\1.KulachiSolar-Kulachi.out
CHNL# 223: 50*(CFREQ 1460 CTANK 132.00)+1)
CHNL# 229: 50*(CFREQ 1876 CJAVED SOLAR 132.00)+1)
CHNL# 226: 50*(CFREQ 1870 CKULACHI 132.00)+1)
CHNL# 228: 50*(CFREQ 1875 CFAS SOLAR 132.00)+1)
CHNL# 227: 50*(CFREQ 1874 CKULCHI SOLAR132.00)+1)
51.000
49.000
TIME (SECONDS)
FRI, MAR 16 2018 13:56
NEARBY BUS FREQUENCY

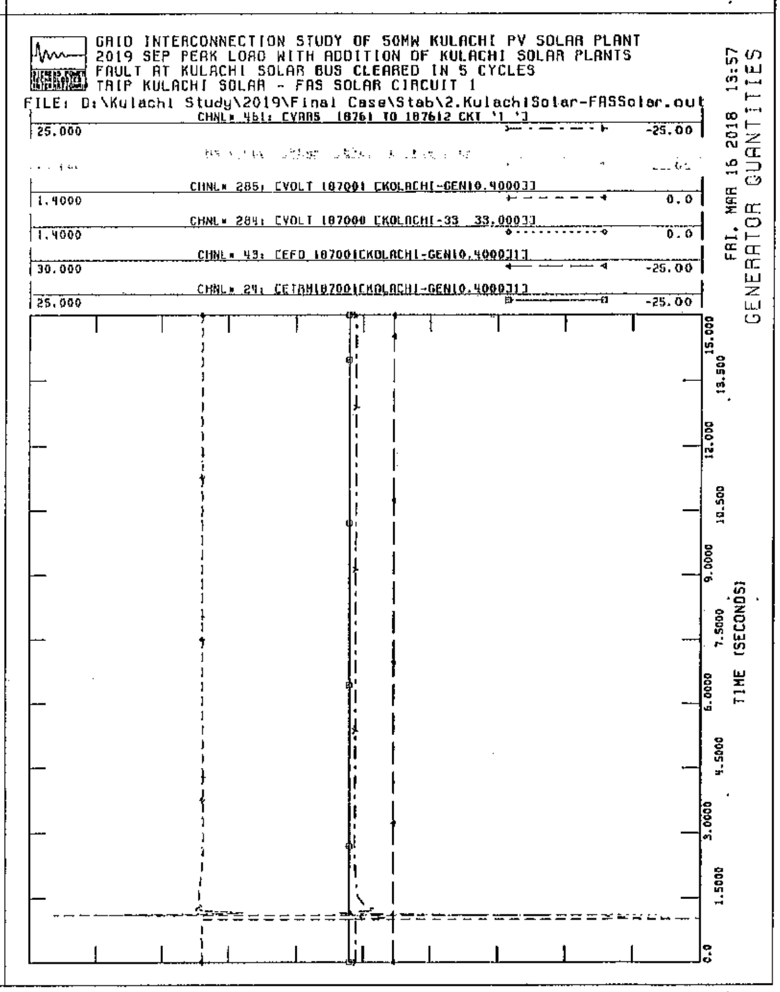

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\1.KulachiSolar-Kulachi.out
CHNL# 273: CVOLT 1876 CJAVED SOLAR 132.00)
CHNL# 271: CVOLT 1874 CKULCHI SOLAR132.00)
CHNL# 270: CVOLT 1870 CKULACHI 132.00)
CHNL# 269: CVOLT 1830 CPEZU 132.00)
CHNL# 267: CVOLT 1460 CTANK 132.00)
1.2000
0.0
TIME (SECONDS)
FRI, MAR 16 2018 13:56
NEARBY BUS VOLTAGES

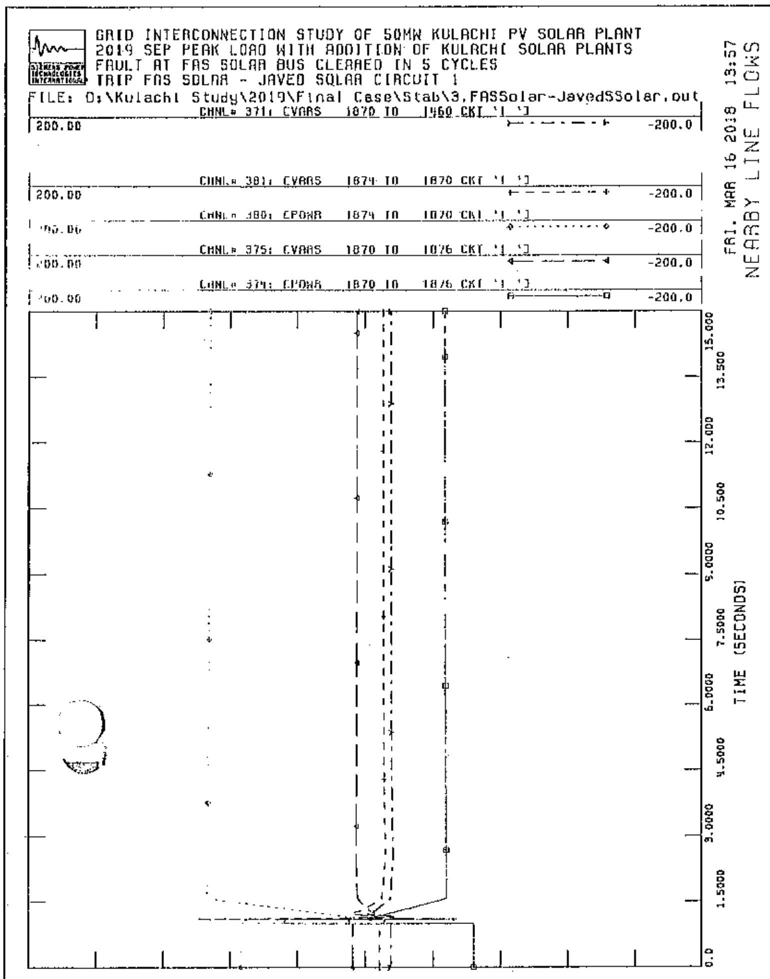
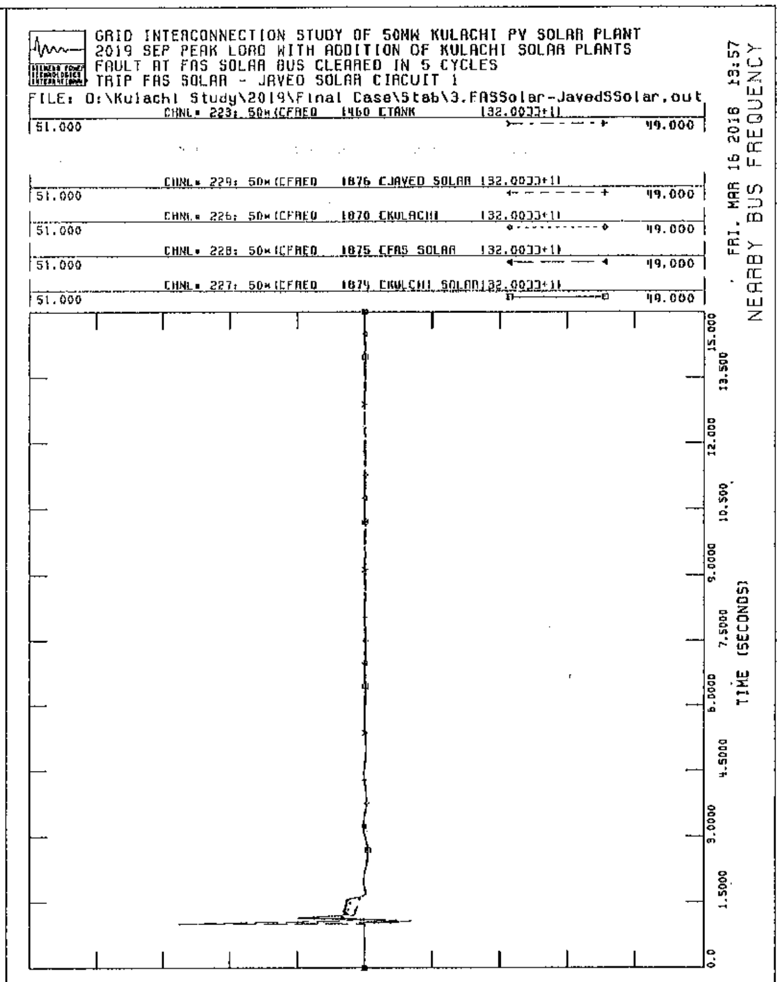
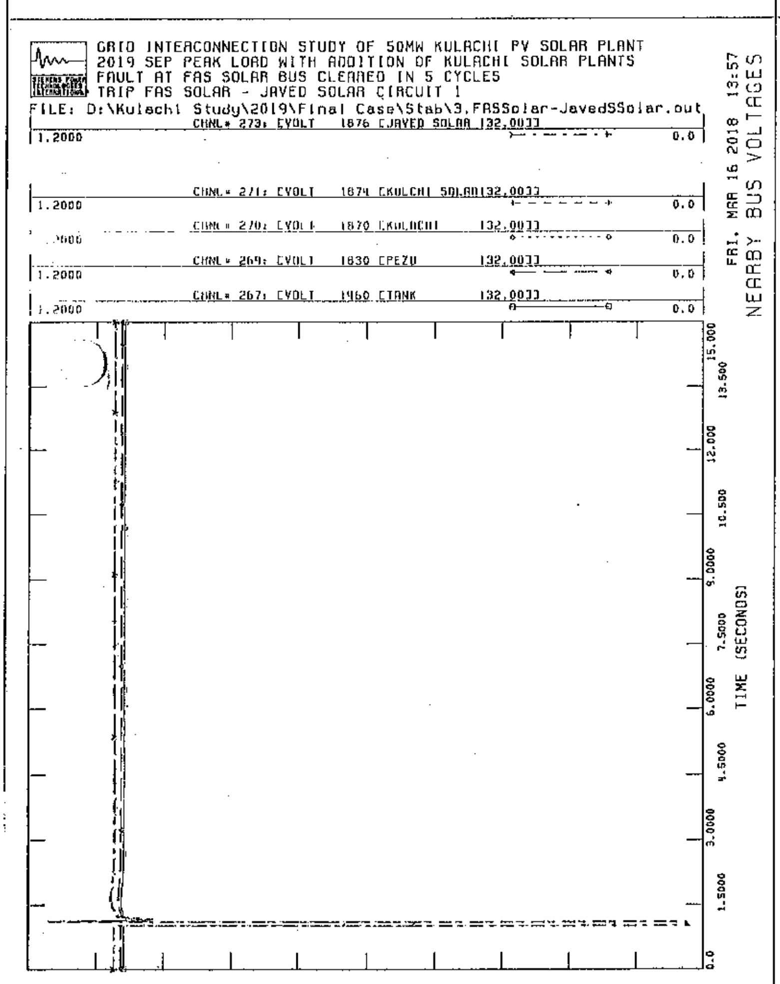
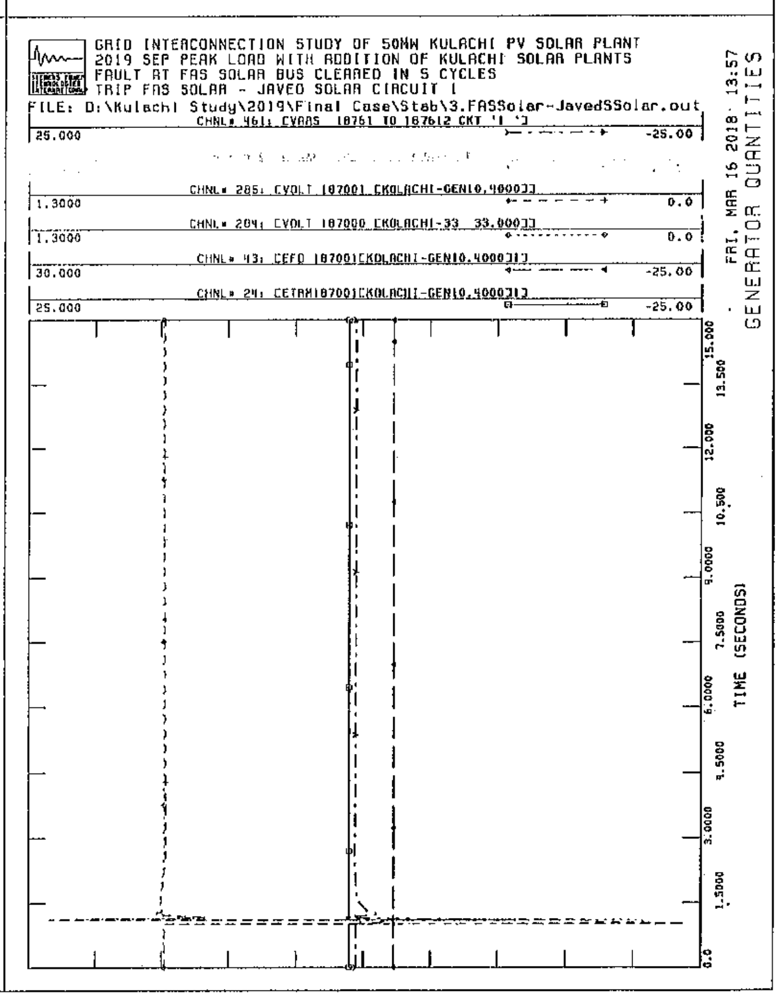

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\1.KulachiSolar-Kulachi.out
CHNL# 461: CVARS 18761 TO 187612 CKT '1 '
CHNL# 285: CVOLT 187001 CKOLACHI-GEN10.400)
CHNL# 284: CVOLT 187000 CKOLACHI-33 33.000)
CHNL# 43: CEFD 187001CKOLACHI-GEN10.400)
CHNL# 24: CETAN187001CKOLACHI-GEN10.400)
25.000
1.4000
30.000
-25.00
0.0
TIME (SECONDS)
FRI, MAR 16 2018 13:56
GENERATOR QUANTITIES


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\2.KulachiSolar-FASSolar.out
CHNL# 371: [VARS 1870 TO 1460 CKT '1 ']
200.00
-200.0
CHNL# 381: [VARS 1874 TO 1870 CKT '1 ']
200.00
-200.0
CHNL# 380: [POWR 1874 TO 1870 CKT '1 ']
200.00
-200.0
CHNL# 375: [VARS 1870 TO 1876 CKT '1 ']
200.00
-200.0
CHNL# 374: [POWR 1870 TO 1876 CKT '1 ']
200.00
-200.0
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 13:57
NEARBY LINE FLOWS


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\2.KulachiSolar-FASSolar.out
CHNL# 225: 50*[FREQ 1460 [TANK 132.00]]+1)
51.000
49.000
CHNL# 229: 50*[FREQ 1876 [JAVED SOLAR 132.00]]+1)
51.000
49.000
CHNL# 226: 50*[FREQ 1870 [KULACHI 132.00]]+1)
51.000
49.000
CHNL# 228: 50*[FREQ 1875 [FAS SOLAR 132.00]]+1)
51.000
49.000
CHNL# 227: 50*[FREQ 1874 [KULCHI SOLAR132.00]]+1)
51.000
49.000
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 13:57
NEARBY BUS FREQUENCY


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\2.KulachiSolar-FASSolar.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
1.2000
0.0
CHNL# 271: [VOLT 1874 [KULCHI SOLAR132.00]]
1.2000
0.0
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
1.2000
0.0
CHNL# 269: [VOLT 1830 [PEZU 132.00]]
1.2000
0.0
CHNL# 267: [VOLT 1460 [TANK 132.00]]
1.2000
0.0
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 13:57
NEARBY BUS VOLTAGES

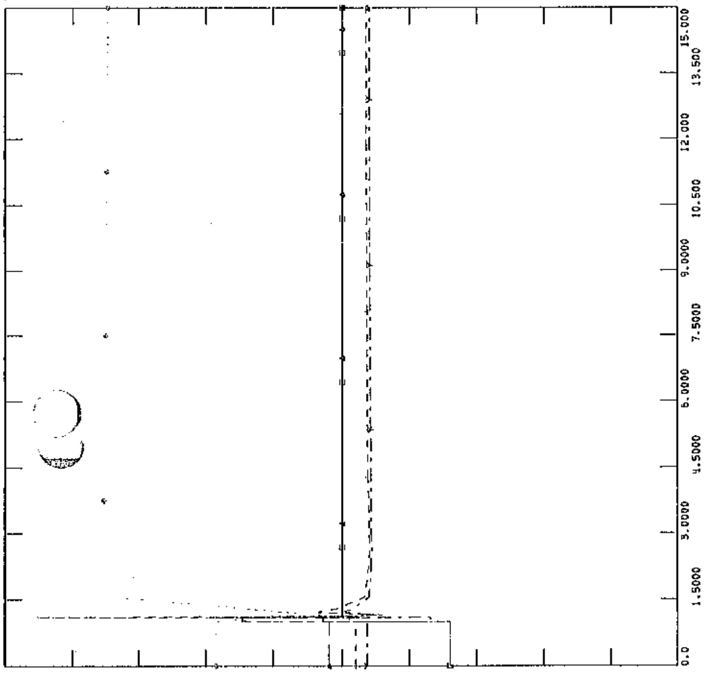

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\2.KulachiSolar-FASSolar.out
CHNL# 461: [VARS 18761 TO 187612 CKT '1 ']
25.000
-25.00
CHNL# 285: [VOLT 187001 [KOLACHI-GEN10.4000]]
1.4000
0.0
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]
1.4000
0.0
CHNL# 43: [EFD 18700[KOLACHI-GEN10.4000]1]
30.000
-25.00
CHNL# 24: [ETRM18700[KOLACHI-GEN10.4000]1]
25.000
-25.00
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 13:57
GENERATOR QUANTITIES


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 5 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\3.FASSolar-JavedSSolar.out
CHNL# 371: [VARS 1870 TO 1960 CKT '1 ']
200.00
-200.0
CHNL# 381: [VARS 1874 TO 1870 CKT '1 ']
200.00
-200.0
CHNL# 380: [POWR 1874 TO 1870 CKT '1 ']
-200.0
CHNL# 375: [VARS 1870 TO 1876 CKT '1 ']
-200.0
CHNL# 374: [POWR 1870 TO 1876 CKT '1 ']
-200.0
FRI, MAR 16 2018 13:57
NEARBY LINE FLOWS
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 5 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\3.FASSolar-JavedSSolar.out
CHNL# 223: 50*(FREQ 1960 [TANK 132.00]]+1)
51.000
49.000
CHNL# 229: 50*(FREQ 1876 [JAVED SOLAR 132.00]]+1)
51.000
49.000
CHNL# 226: 50*(FREQ 1870 [KULACHI 132.00]]+1)
51.000
49.000
CHNL# 228: 50*(FREQ 1875 [FAS SOLAR 132.00]]+1)
51.000
49.000
CHNL# 227: 50*(FREQ 1874 [KULCHI SOLAR132.00]]+1)
51.000
49.000
FRI, MAR 16 2018 13:57
NEARBY BUS FREQUENCY
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 5 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\3.FASSolar-JavedSSolar.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
1.2000
0.0
CHNL# 271: [VOLT 1874 [KULCHI SOLAR132.00]]
1.2000
0.0
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
0.0
CHNL# 269: [VOLT 1830 [PEZU 132.00]]
1.2000
0.0
CHNL# 267: [VOLT 1960 [TANK 132.00]]
0.0
FRI, MAR 16 2018 13:57
NEARBY BUS VOLTAGES
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 5 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\3.FASSolar-JavedSSolar.out
CHNL# 461: [VARS 18751 TO 187612 CKT '1 ']
25.000
-25.00
CHNL# 285: [VOLT 187001 [KOLACHI-GEN10.4000]]
1.3000
0.0
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]
1.3000
0.0
CHNL# 43: [EFD 187001[KOLACHI-GEN10.4000]1]
30.000
-25.00
CHNL# 24: [ETRM187001[KOLACHI-GEN10.4000]1]
25.000
-25.00
FRI, MAR 16 2018 13:57
GENERATOR QUANTITIES
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 5 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\4.JavedSSolar-Kulachi.out

FRI, MAR 16 2018 13:58
NEARBY LINE FLOWS

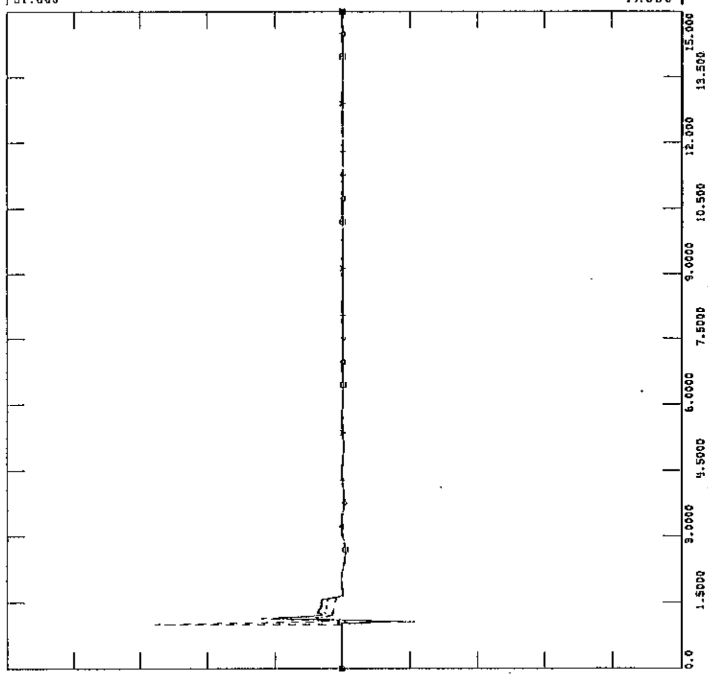
CHNL# 371: [VARS 1870 TO 1960 CKT '1 '] 200.00 / -200.0
CHNL# 38[illegible]: [[illegible]ARS 1074 TO 1870 CKT '1 '] 200.00 / -200.0
CHNL# 380: [POWR 1074 TO 1870 CKT '1 '] 200.00 / -200.0
CHNL# 375: [VARS 1870 TO 1076 CKT '1 '] 200.00 / -200.0
CHNL# 374: [POWR 1870 TO 1076 CKT '1 '] 200.00 / -200.0



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 5 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\4.JavedSSolar-Kulachi.out

FRI, MAR 16 2018 13:58
NEARBY BUS FREQUENCY

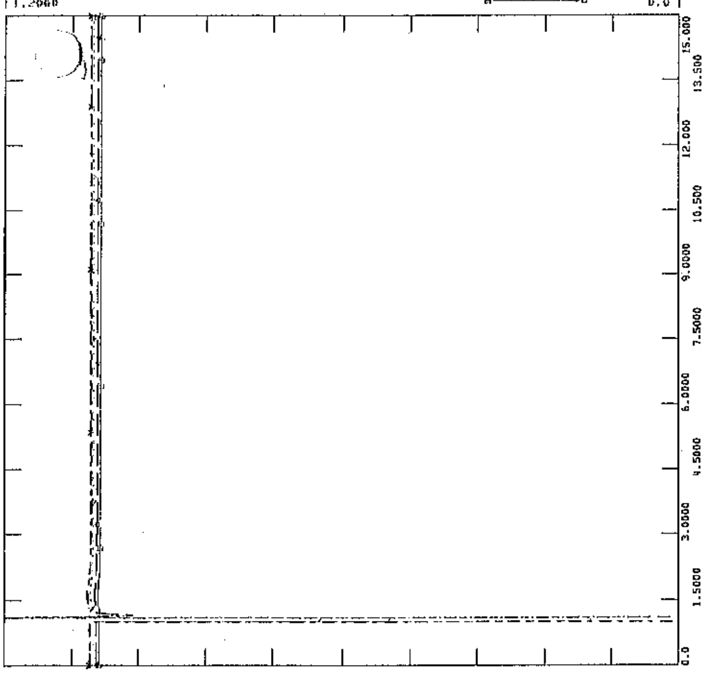
CHNL# 223: 50*([FREQ 1460 [TANK 132.00]]+1) 51.000 / 49.000
CHNL# 229: 50*([FREQ 1876 [JAVED SOLAR 132.00]]+1) 51.000 / 49.000
CHNL# 226: 50*([FREQ 1870 [KULACHI 132.00]]+1) 51.000 / 49.000
CHNL# 228: 50*([FREQ 1875 [FAS SOLAR 132.00]]+1) 51.000 / 49.000
CHNL# 227: 50*([FREQ 1874 [KULCHI SOLAR132.00]]+1) 51.000 / 49.000



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 5 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\4.JavedSSolar-Kulachi.out

FRI, MAR 16 2018 13:58
NEARBY BUS VOLTAGES

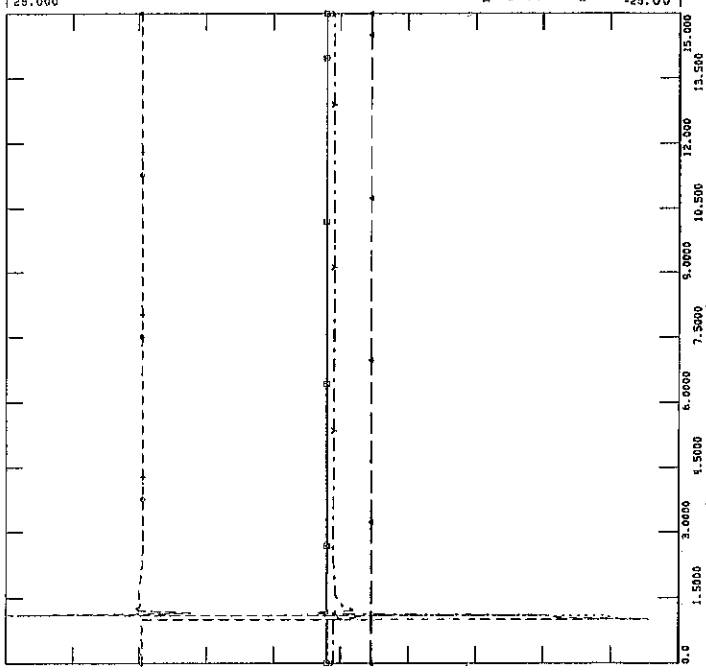
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]] 1.2000 / 0.0
CHNL# 271: [VOLT 1874 [KULCHI SOLAR132.00]] 1.2000 / 0.0
CHNL# 270: [VOLT 1870 [KULACHI 132.00]] [illegible]000 / 0.0
CHNL# 269: [VOLT 1830 [PEZU 132.00]] 1.2000 / 0.0
CHNL# 267: [VOLT 1460 [TANK 132.00]] 1.2000 / 0.0



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 5 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\4.JavedSSolar-Kulachi.out

FRI, MAR 16 2018 13:58
GENERATOR QUANTITIES

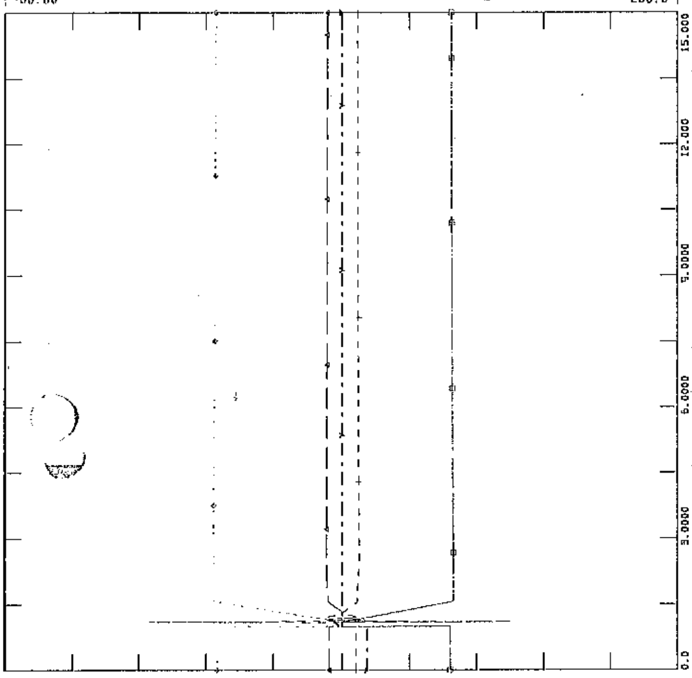
CHNL# 461: [VARS 18761 TO 18762 CKT '1 '] 25.000 / -25.00
CHNL# 285: [VOLT 18700 [KOLACHI-GEN0.4000]] 1.3000 / 0.0
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]] 1.3000 / 0.0
CHNL# 43: [EFD 18700[KOLACHI-GEN0.4000]1] 30.000 / -25.00
CHNL# 24: [ETRM18700[KOLACHI-GEN0.4000]1] 25.000 / -25.00



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\5.Kulachi-Tank.out

FRI, MAR 16 2018 13:59
NEARBY LINE FLOWS

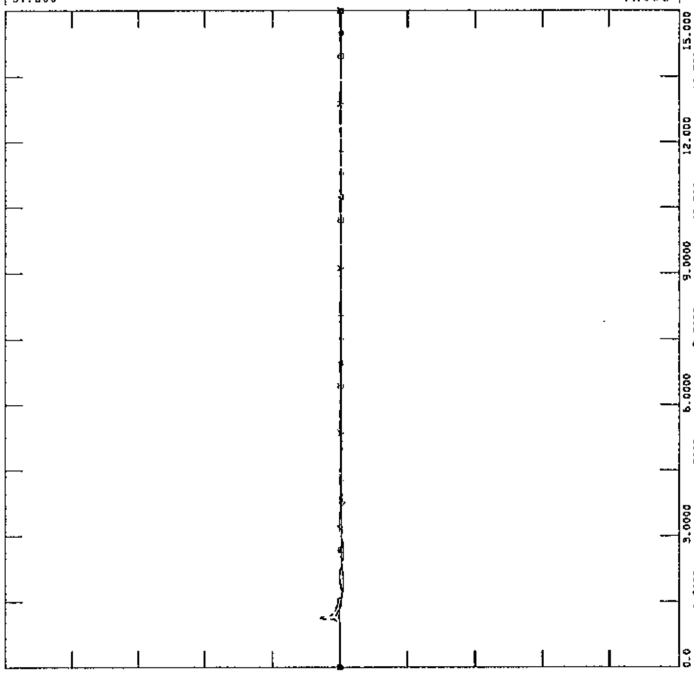
200.00	CHNL# 371: [VARS 1870 TO 1960 CKT '1 ']	-200.0
200.00	CHNL# 381: [VARS 1874 TO 1870 CKT '1 ']	-200.0
200.00	CHNL# 380: [POWR 1874 TO 1870 CKT '1 ']	-200.0
200.00	CHNL# 375: [VARS 1870 TO 1876 CKT '1 ']	-200.0
200.00	CHNL# 374: [POWR 1870 TO 1876 CKT '1 ']	-200.0



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\5.Kulachi-Tank.out

FRI, MAR 16 2018 13:59
NEARBY BUS FREQUENCY

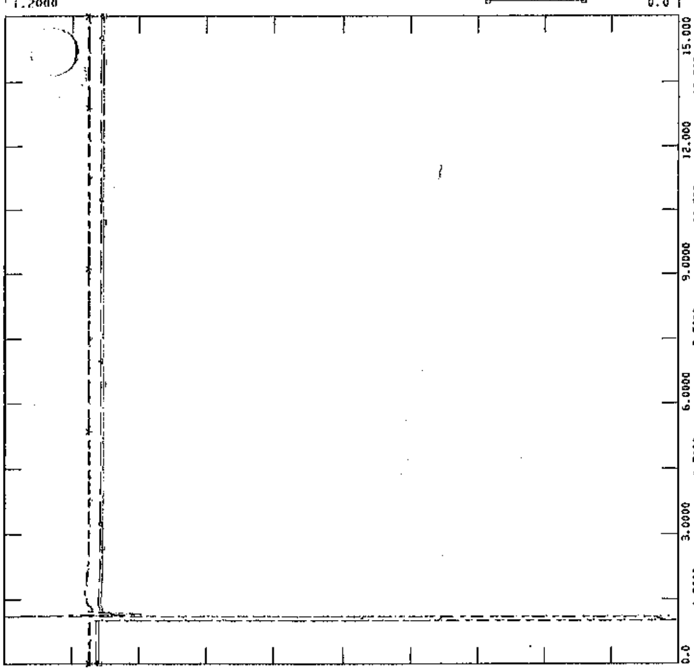
51.000	CHNL# 223: 50*(FREQ 1960 [TANK 132.00]+1)	49.000
51.000	CHNL# 222: 50*(FREQ 1400 [BALAKOT 132.00]+1)	49.000
51.000	CHNL# 225: 50*(FREQ 1830 [PEZU 132.00]+1)	49.000
51.000	CHNL# 217: 50*(FREQ 1342 [BANNU-1] 132.00]+1)	49.000
51.000	CHNL# 218: 50*(FREQ 1380 [MANSEHRA 132.00]+1)	49.000



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\5.Kulachi-Tank.out

FRI, MAR 16 2018 13:59
NEARBY BUS VOLTAGES

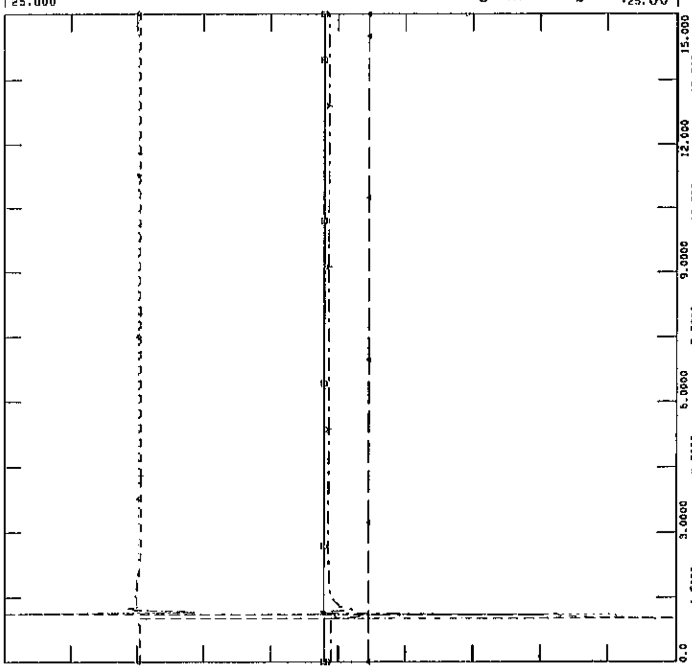
1.2000	CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]	0.0
1.2000	CHNL# 271: [VOLT 1874 [KULCHI SOLAR132.00]]	0.0
1.2000	CHNL# 270: [VOLT 1870 [KULACHI 132.00]]	0.0
1.2000	CHNL# 269: [VOLT 1830 [PEZU 132.00]]	0.0
1.2000	CHNL# 267: [VOLT 1960 [TANK 132.00]]	0.0



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\5.Kulachi-Tank.out

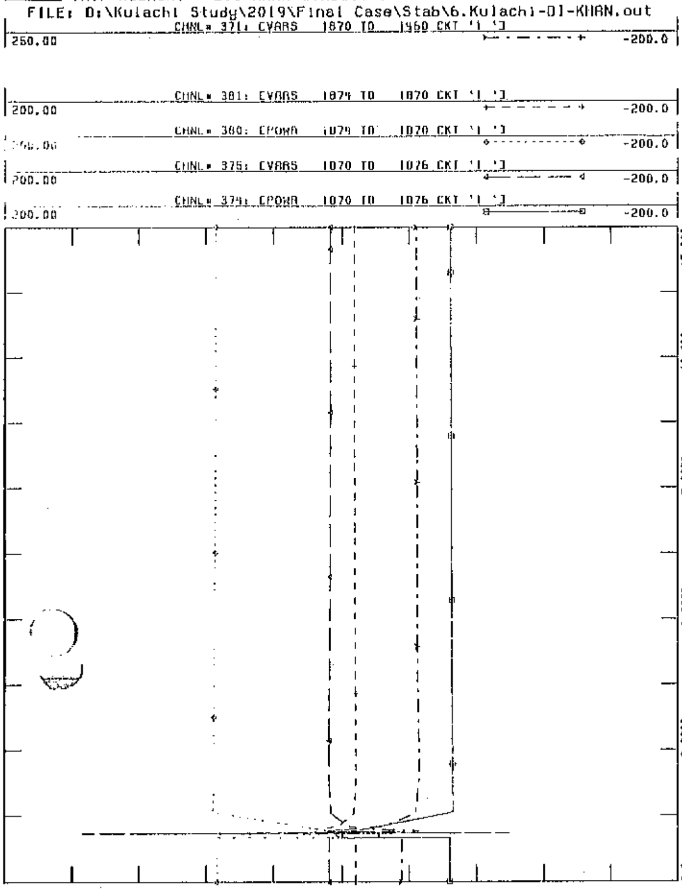
FRI, MAR 16 2018 13:59
GENERATOR QUANTITIES

25.000	CHNL# 461: [VARS 1876] TO 187612 CKT '1 ']	-25.00
1.3000	CHNL# 285: [VOLT 187001 [KULACHI-GEN10.400]]	0.0
1.3000	CHNL# 284: [VOLT 187000 [KULACHI-33 33.000]]	0.0
30.000	CHNL# 43: [EFD 187001[KULACHI-GEN10.400]1]	-25.00
25.000	CHNL# 24: [ETRM187001[KULACHI-GEN10.400]1]	-25.00



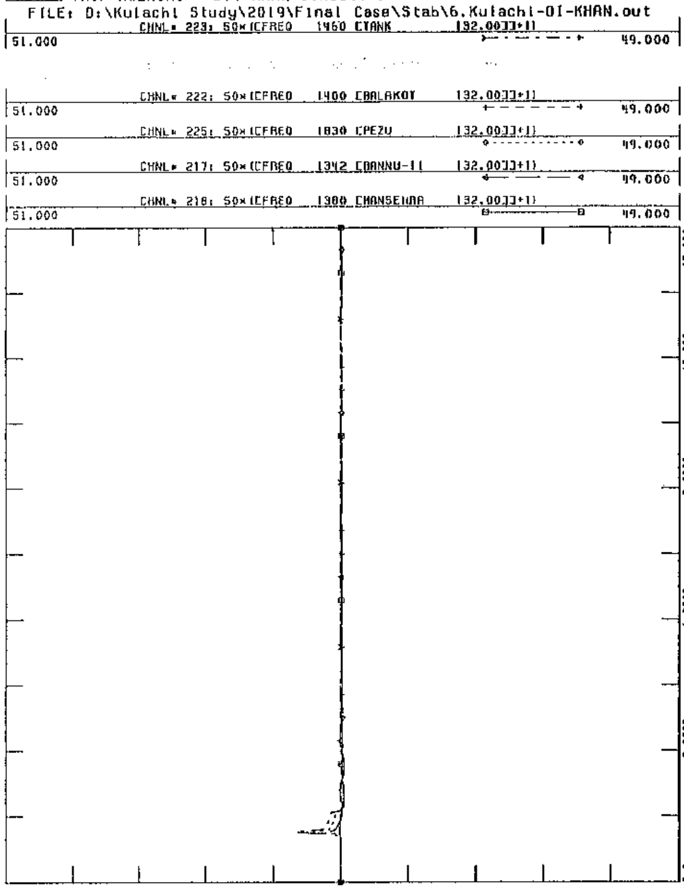
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT I
FILE: D:\Kulachi Study\2019\Final Case\Stab\6.Kulachi-DI-KHAN.out

FRI, MAR 16 2018 14:02
NEARBY LINE FLOWS



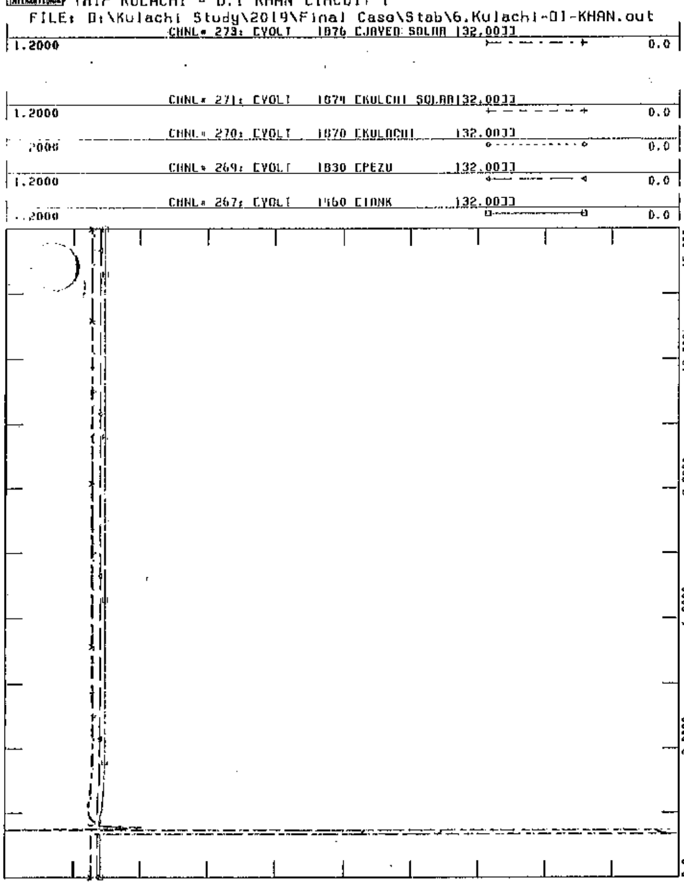
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT I
FILE: D:\Kulachi Study\2019\Final Case\Stab\6.Kulachi-DI-KHAN.out

FRI, MAR 16 2018 14:02
NEARBY BUS FREQUENCY



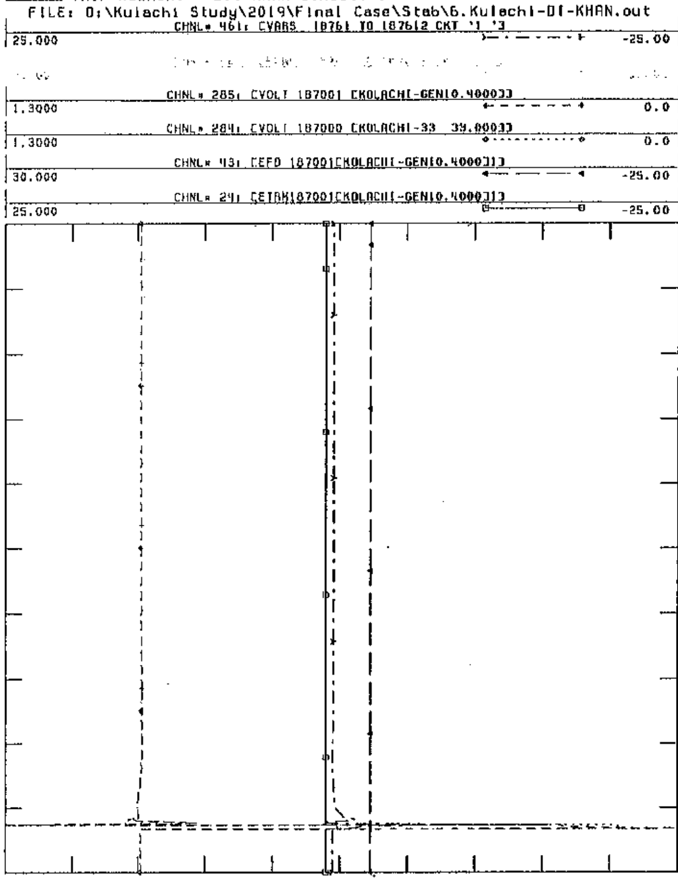
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT I
FILE: D:\Kulachi Study\2019\Final Case\Stab\6.Kulachi-DI-KHAN.out

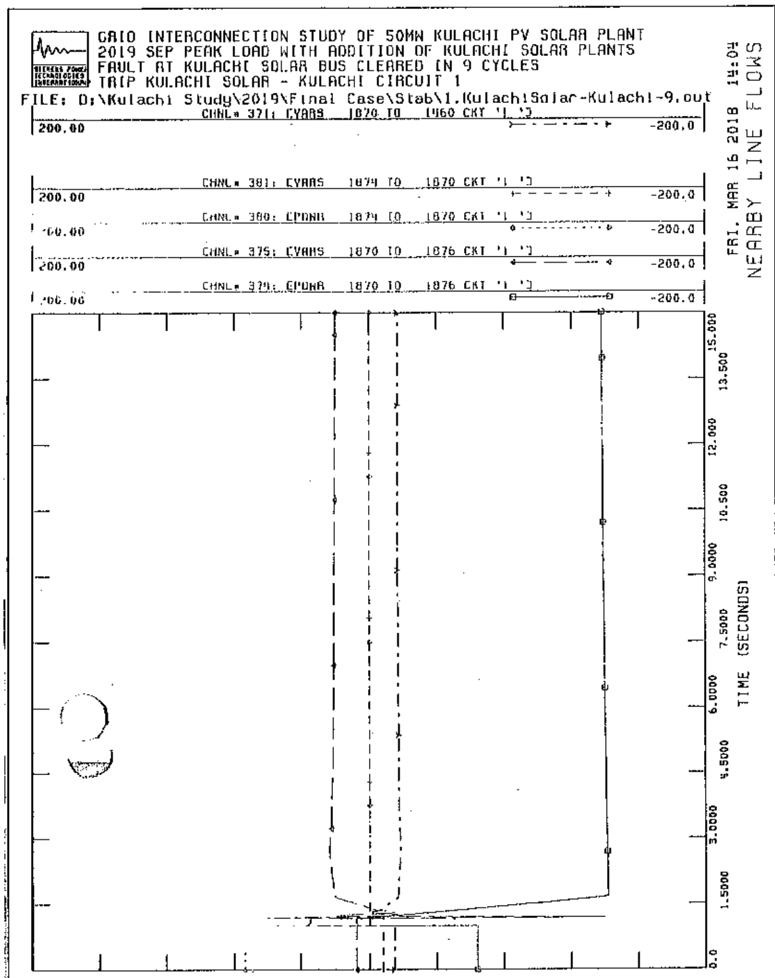
FRI, MAR 16 2018 14:02
NEARBY BUS VOLTAGES

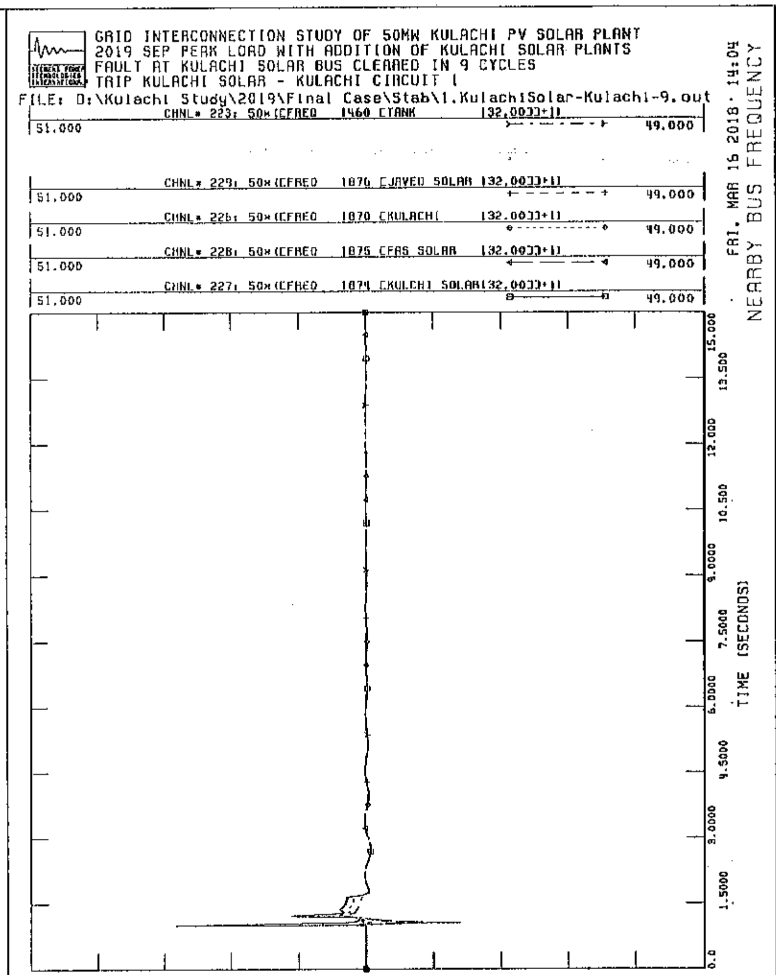


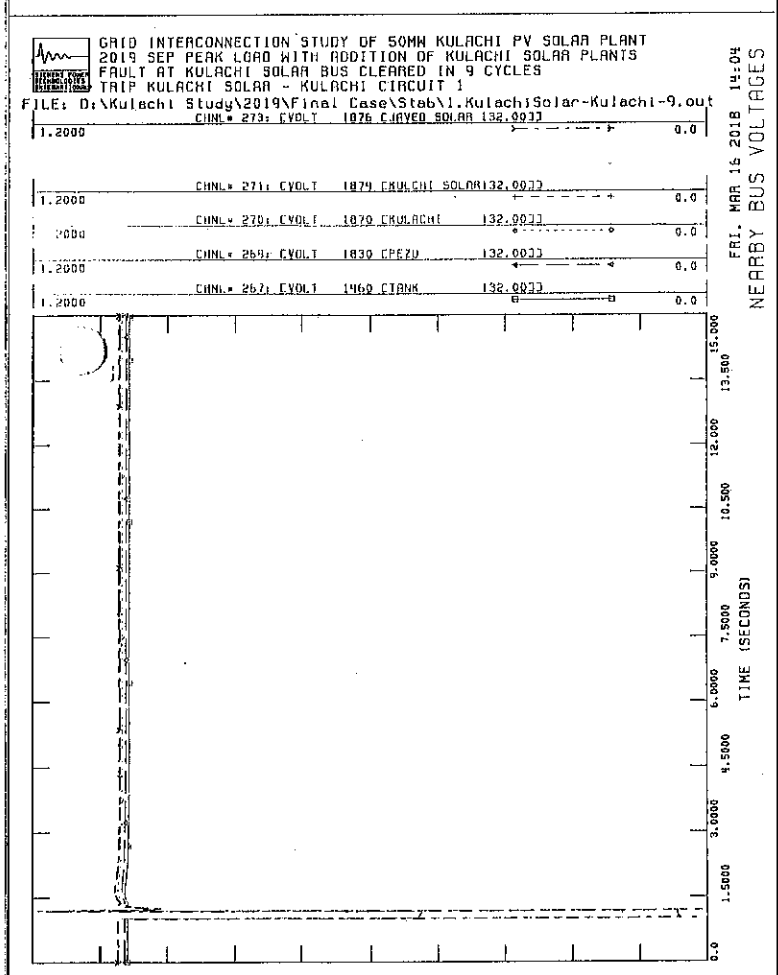
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\6.Kulachi-DI-KHAN.out

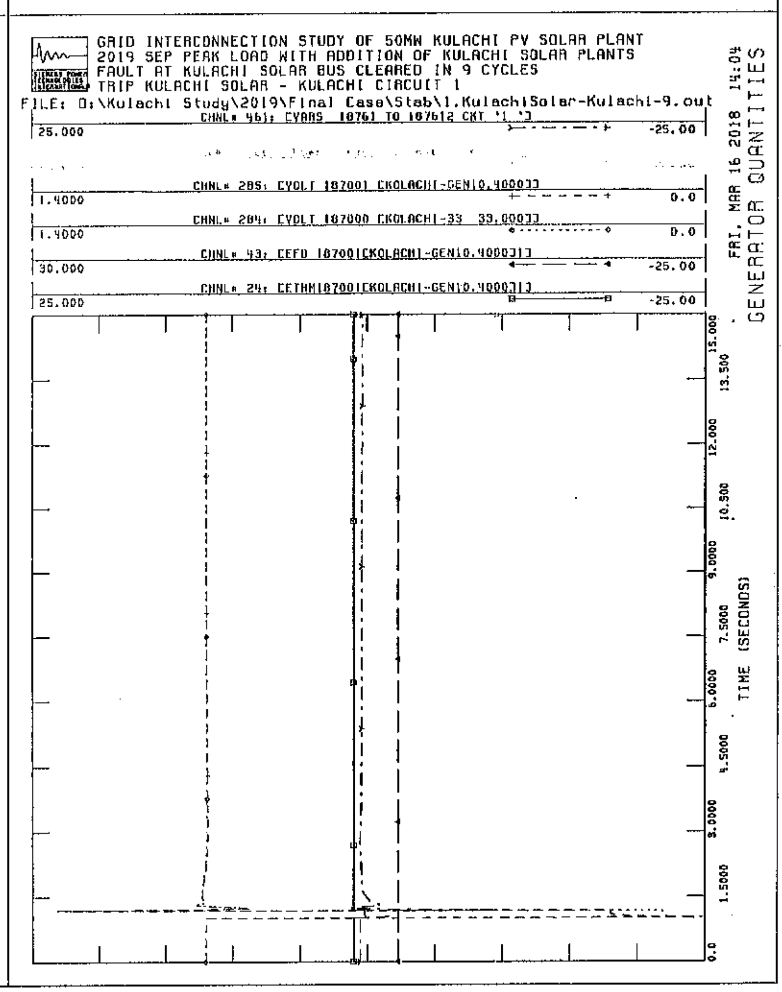
FRI, MAR 16 2018 14:02
GENERATOR QUANTITIES



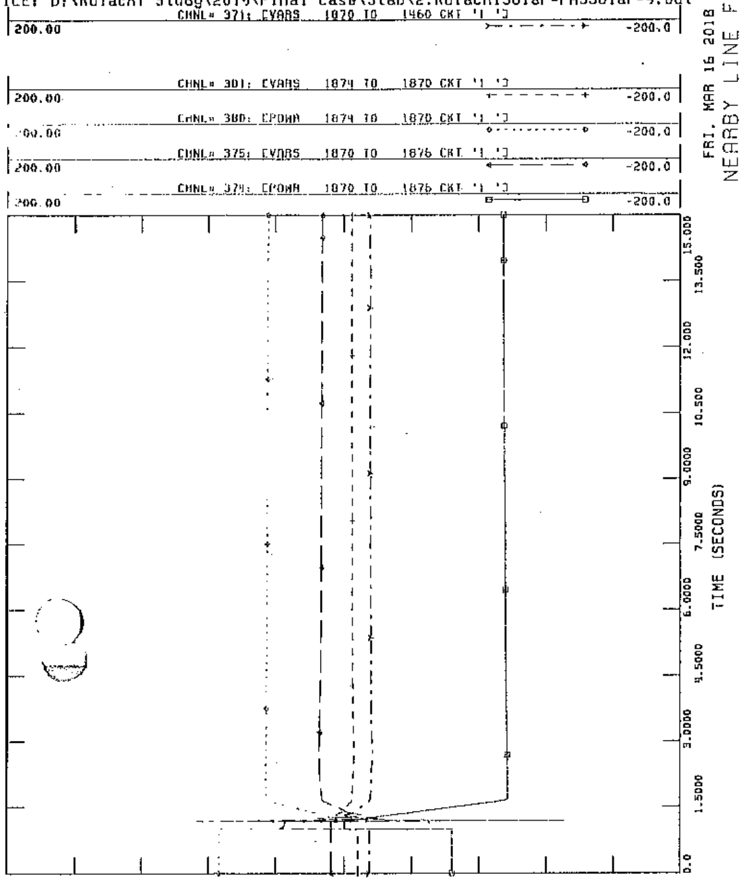

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\1.KulachiSolar-Kulachi-9.out
CHNL# 371: [VARS 1870 TO 1460 CKT '1 ']
200.00
-200.0
CHNL# 381: [VARS 1874 TO 1870 CKT '1 ']
200.00
-200.0
CHNL# 380: [POWR 1874 TO 1870 CKT '1 ']
-200.0
CHNL# 375: [VARS 1870 TO 1876 CKT '1 ']
200.00
-200.0
CHNL# 374: [POWR 1870 TO 1876 CKT '1 ']
-200.0
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 14:04
NEARBY LINE FLOWS


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\1.KulachiSolar-Kulachi-9.out
CHNL# 223: 50*([FREQ 1460 [TANK 132.000]+1)
51.000
49.000
CHNL# 229: 50*([FREQ 1876 [JAVED SOLAR 132.000]+1)
51.000
49.000
CHNL# 226: 50*([FREQ 1870 [KULACHI 132.000]+1)
51.000
49.000
CHNL# 228: 50*([FREQ 1875 [FAS SOLAR 132.000]+1)
51.000
49.000
CHNL# 227: 50*([FREQ 1874 [KULCHI SOLAR132.000]+1)
51.000
49.000
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 14:04
NEARBY BUS FREQUENCY

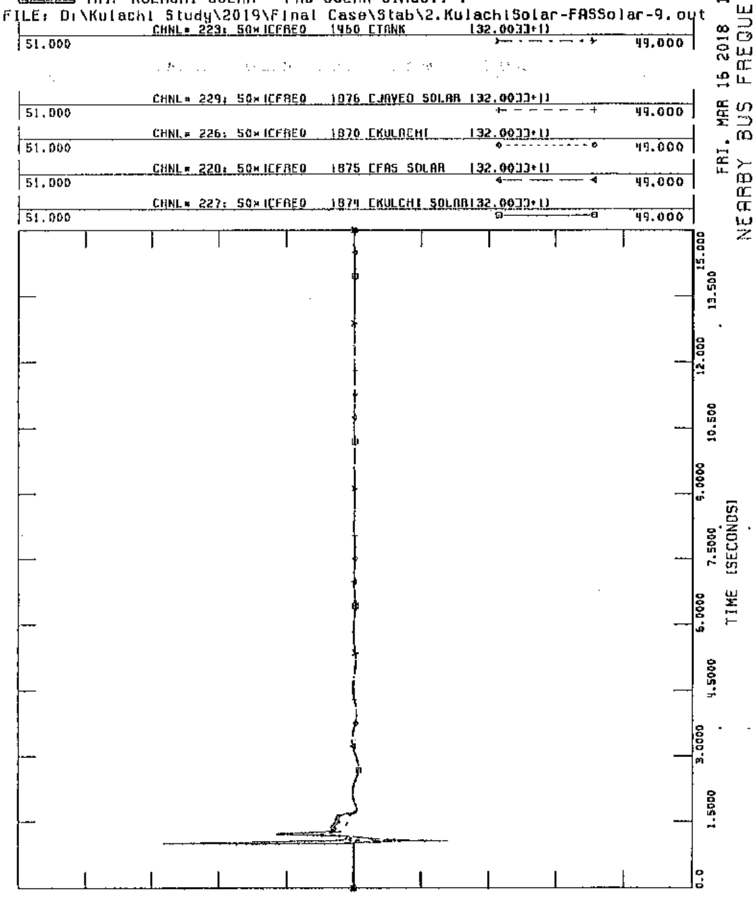

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\1.KulachiSolar-Kulachi-9.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
1.2000
0.0
CHNL# 271: [VOLT 1874 [KULCHI SOLAR132.00]]
1.2000
0.0
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
0.0
CHNL# 269: [VOLT 1830 [PEZU 132.00]]
1.2000
0.0
CHNL# 267: [VOLT 1460 [TANK 132.00]]
1.2000
0.0
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 14:04
NEARBY BUS VOLTAGES


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\1.KulachiSolar-Kulachi-9.out
CHNL# 461: [VARS 18761 TO 187612 CKT '1 ']
25.000
-25.00
CHNL# 285: [VOLT 187001 [KOLACHI-GEN 0.4000]]
1.4000
0.0
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]
1.4000
0.0
CHNL# 43: [EFD 18700[[KOLACHI-GEN0.4000]1]
30.000
-25.00
CHNL# 24: [ETRM 18700[[KOLACHI-GEN0.4000]1]
25.000
-25.00
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)
FRI, MAR 16 2018 14:04
GENERATOR QUANTITIES

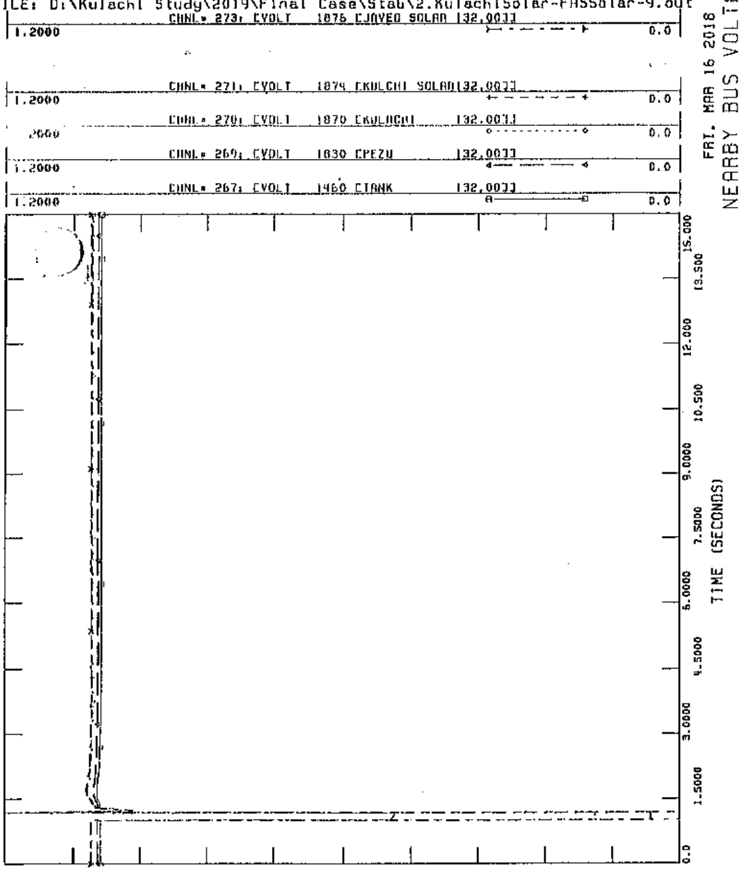
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\2.KulachiSolar-FASSolar-9.out



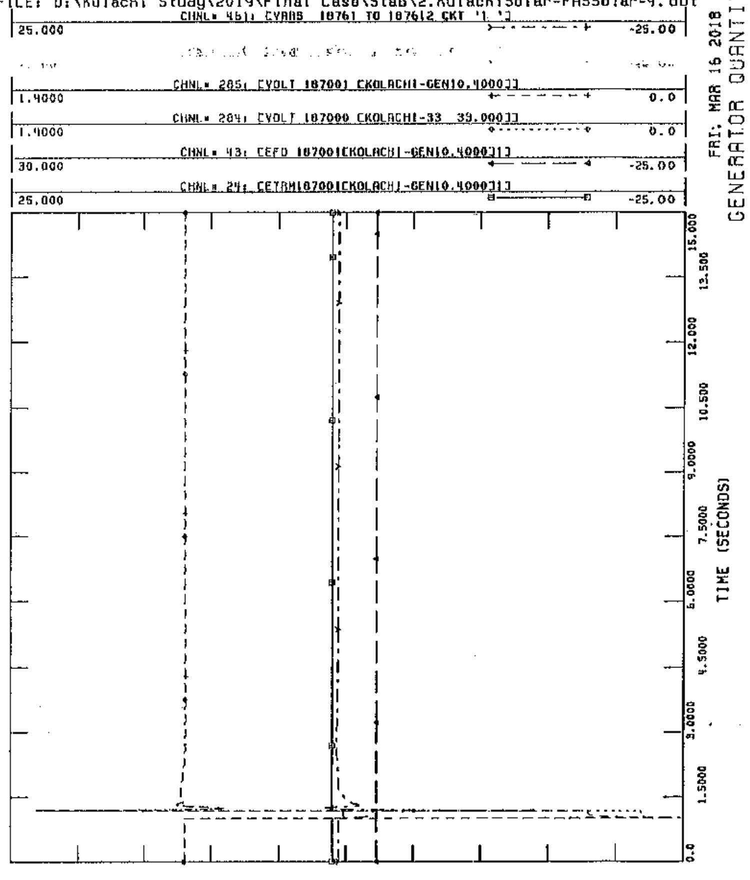
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\2.KulachiSolar-FASSolar-9.out

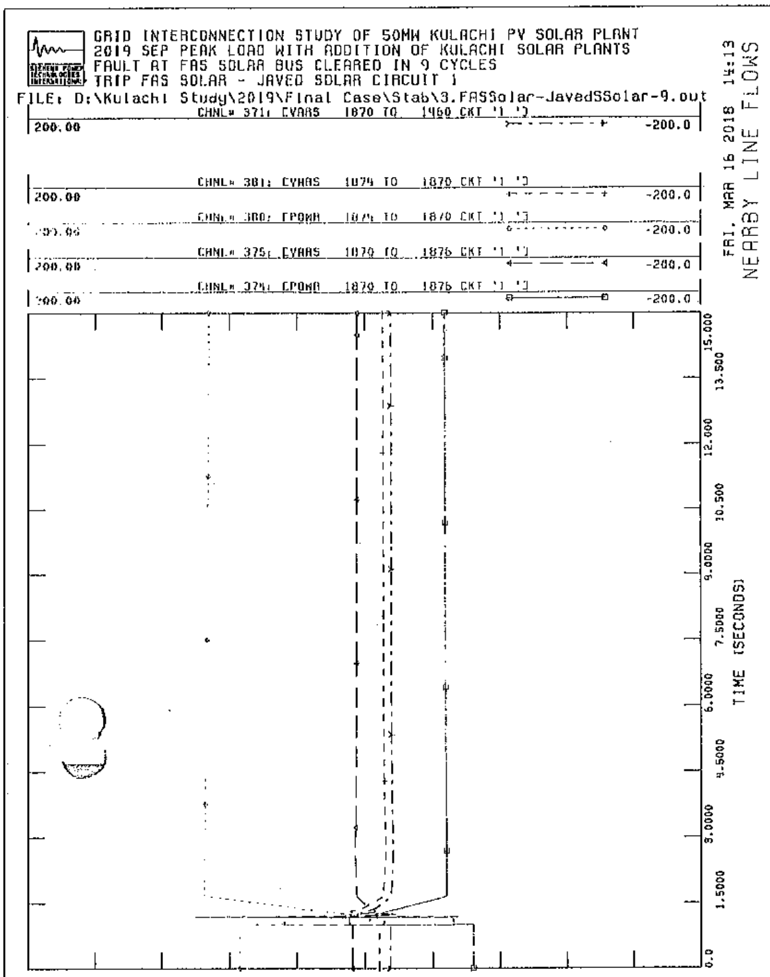
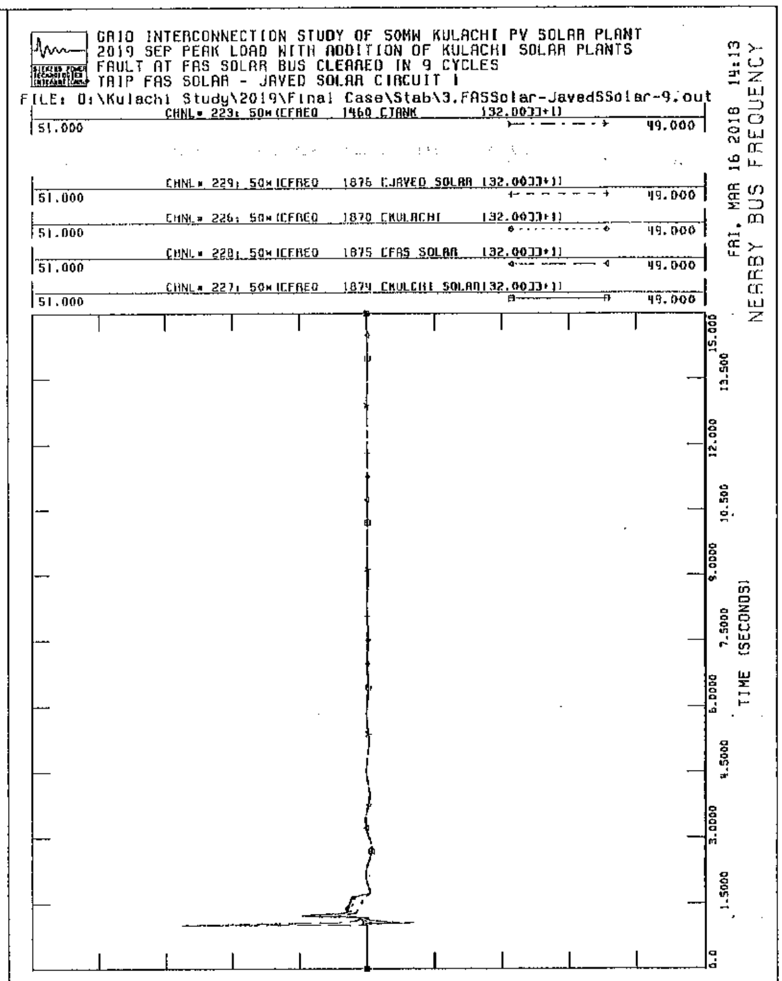
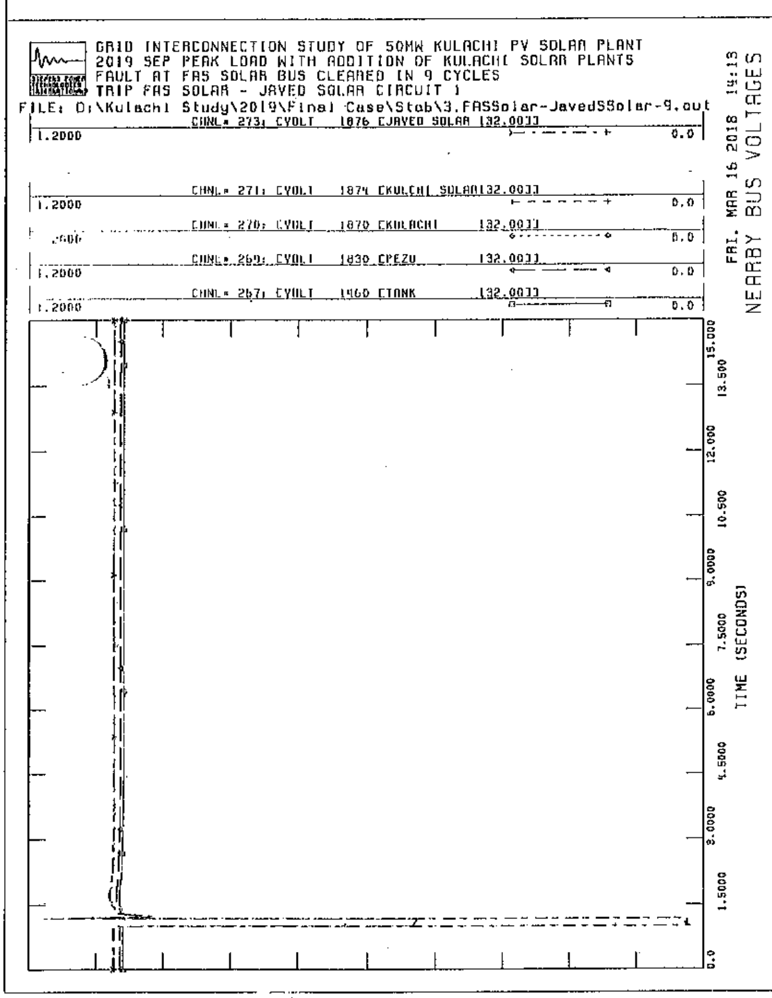
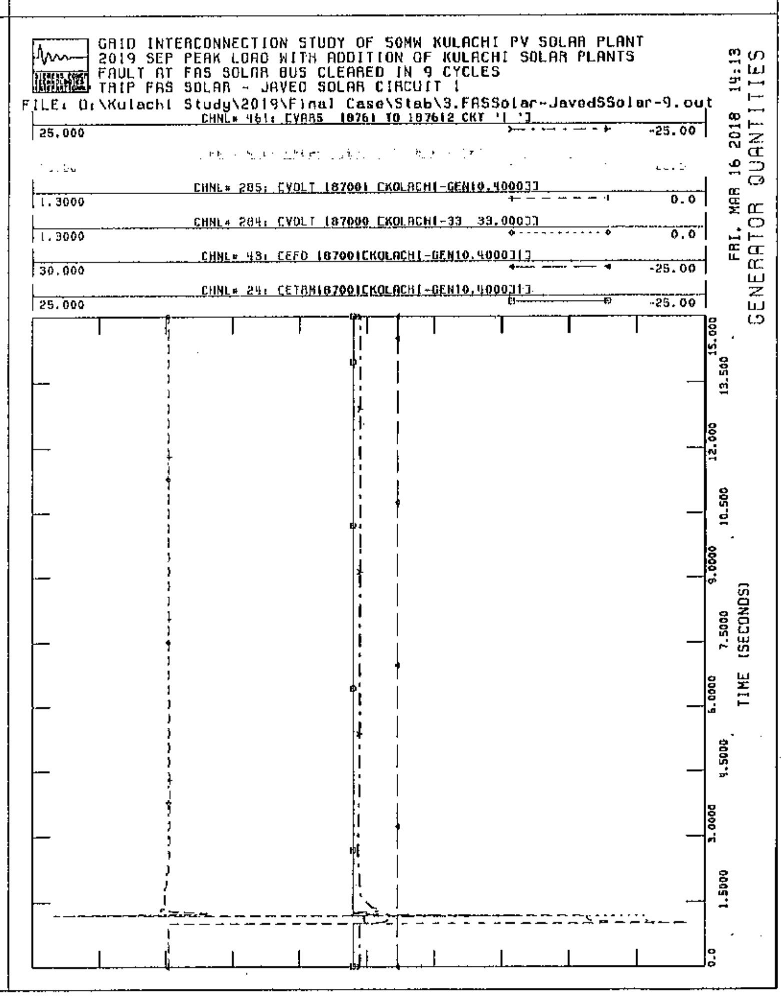


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\2.KulachiSolar-FASSolar-9.out

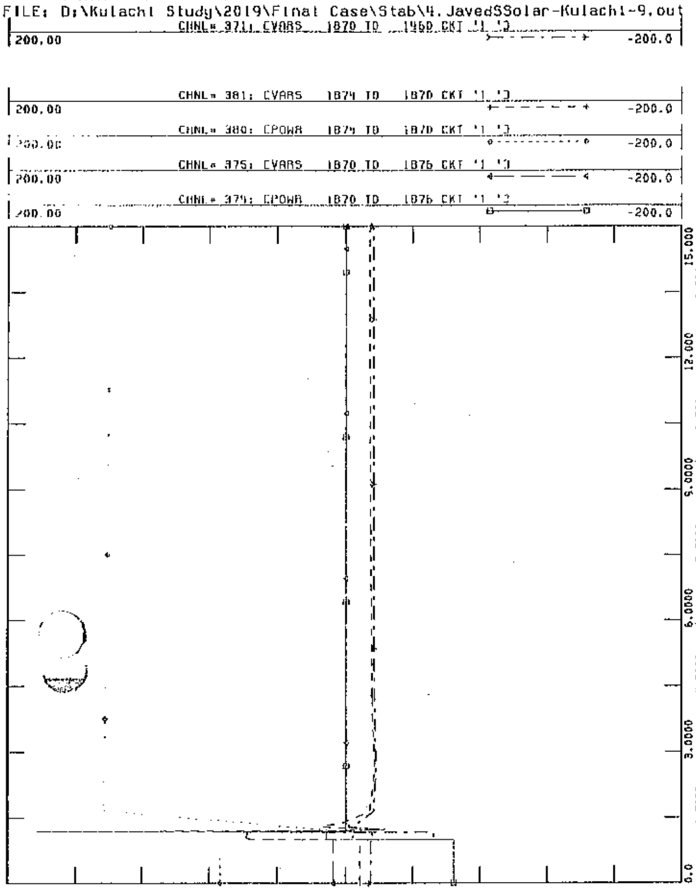


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\2.KulachiSolar-FASSolar-9.out

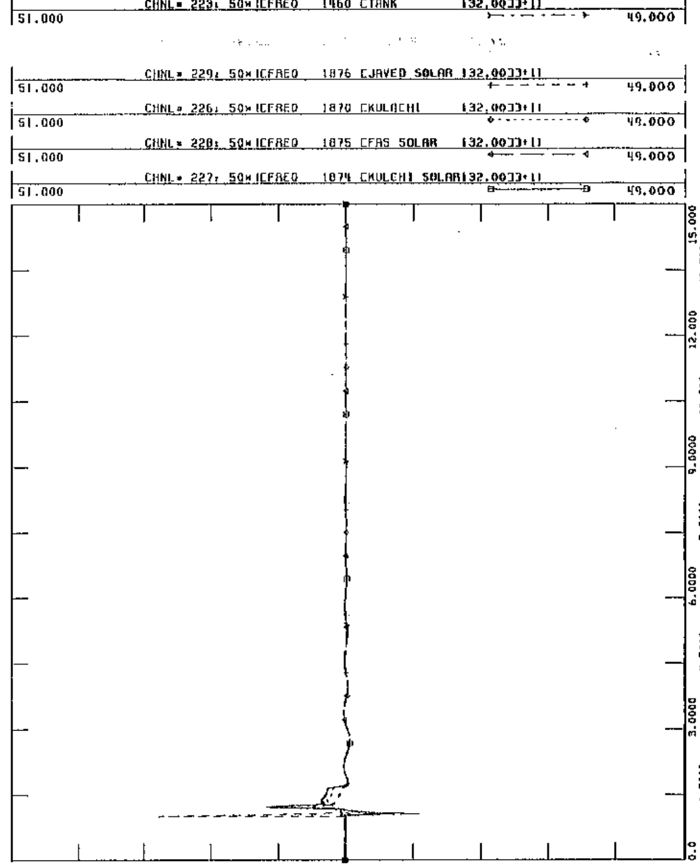



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 9 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\3.FASSolar-JavedSSolar-9.out
FRI, MAR 16 2018 14:13
NEARBY LINE FLOWS
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 9 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\3.FASSolar-JavedSSolar-9.out
FRI, MAR 16 2018 14:13
NEARBY BUS FREQUENCY
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 9 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\3.FASSolar-JavedSSolar-9.out
FRI, MAR 16 2018 14:13
NEARBY BUS VOLTAGES
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 9 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\3.FASSolar-JavedSSolar-9.out
FRI, MAR 16 2018 14:13
GENERATOR QUANTITIES
TIME (SECONDS)

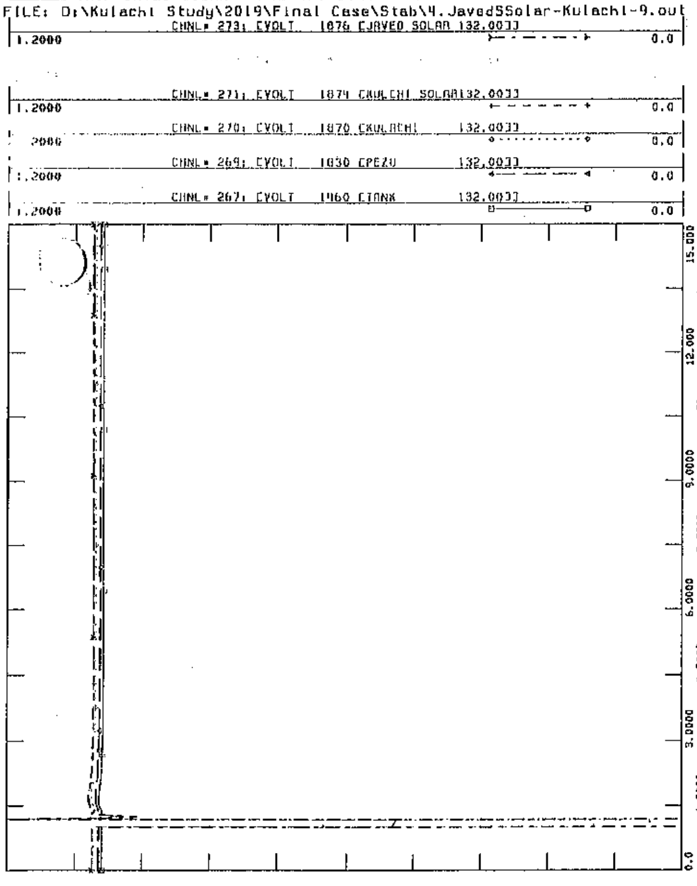
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 9 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\4.JavedSSolar-Kulachi-9.out



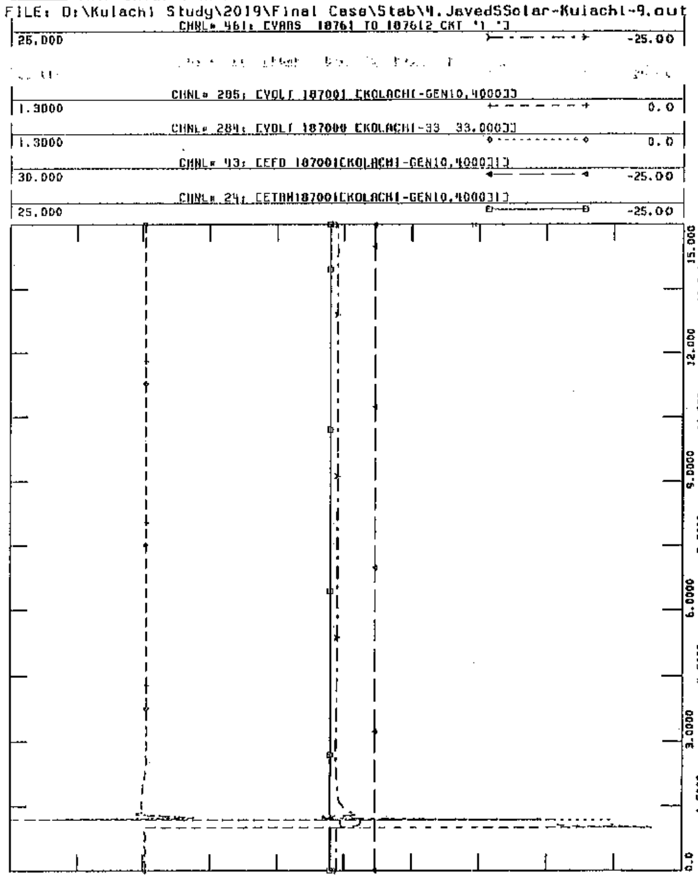
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 9 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\4.JavedSSolar-Kulachi-9.out

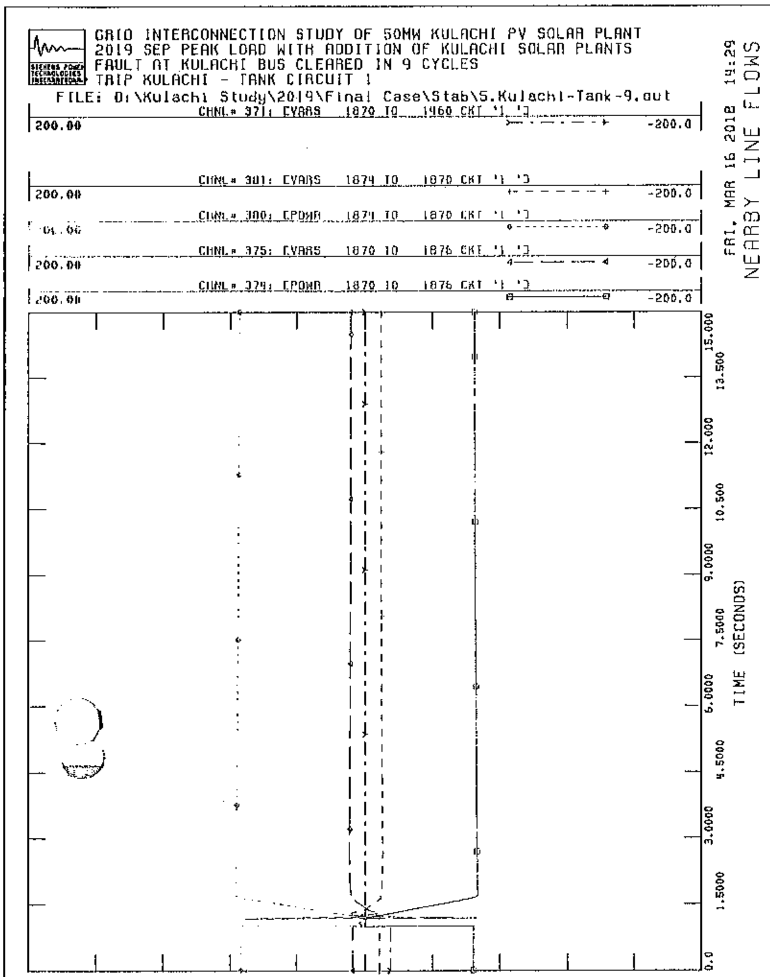


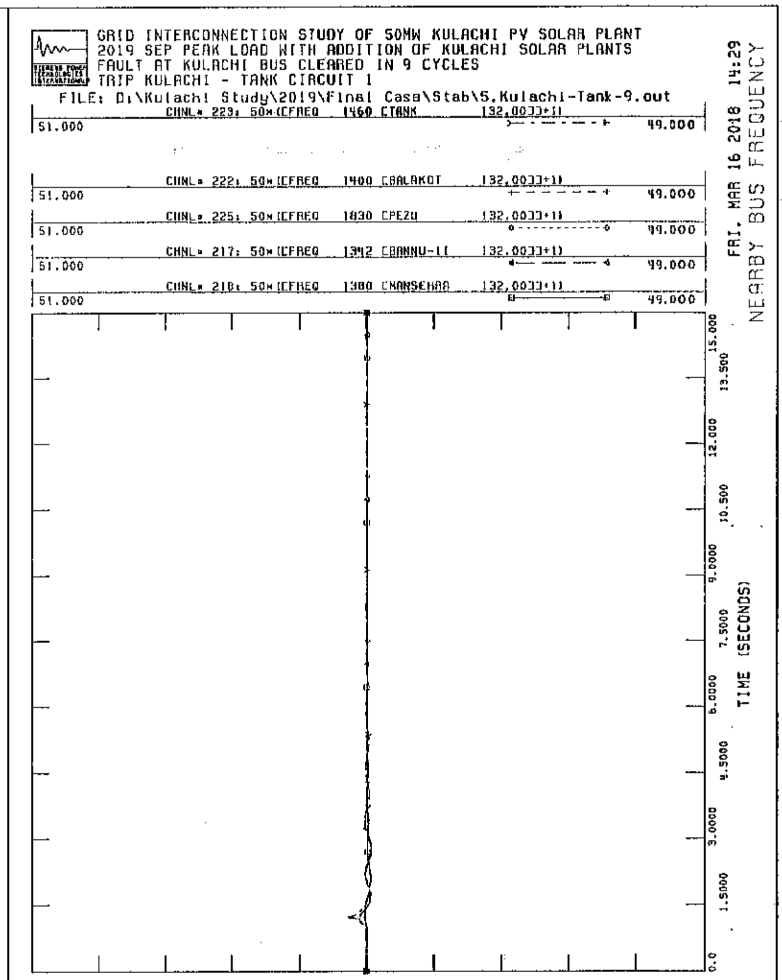
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 9 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\4.JavedSSolar-Kulachi-9.out

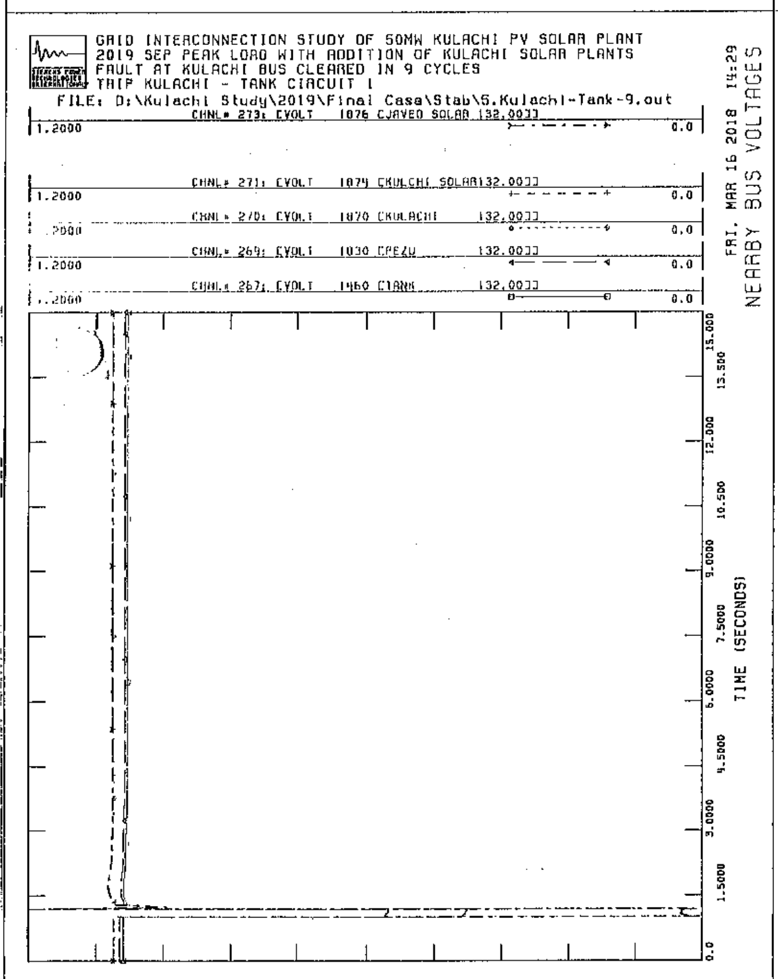


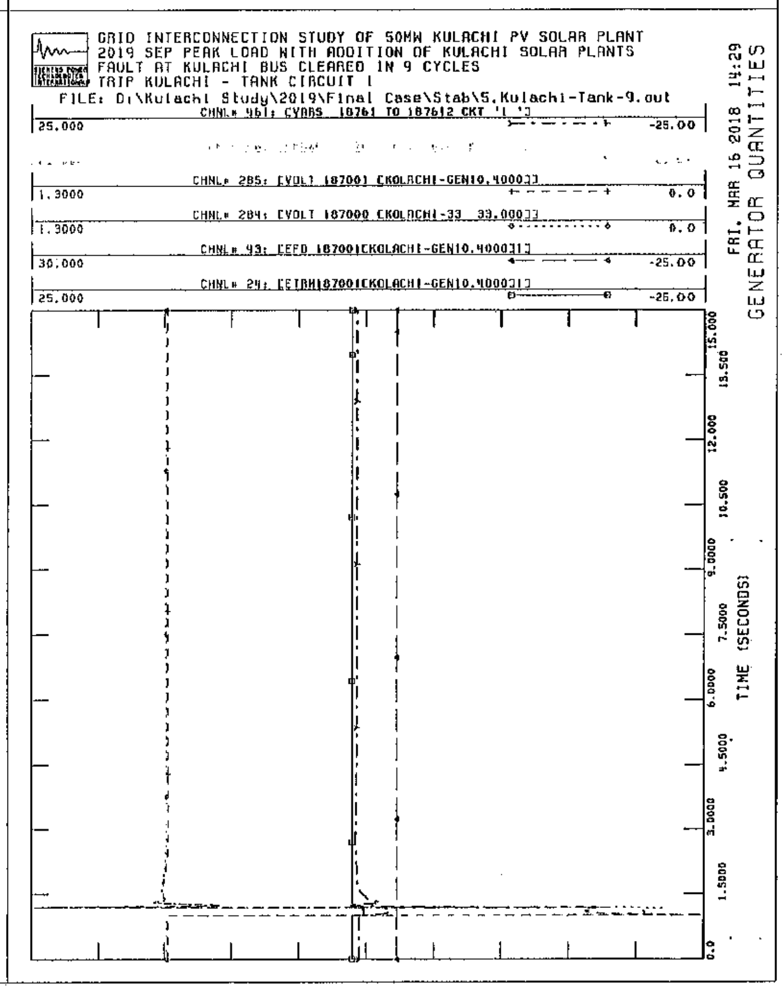
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 9 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\4.JavedSSolar-Kulachi-9.out

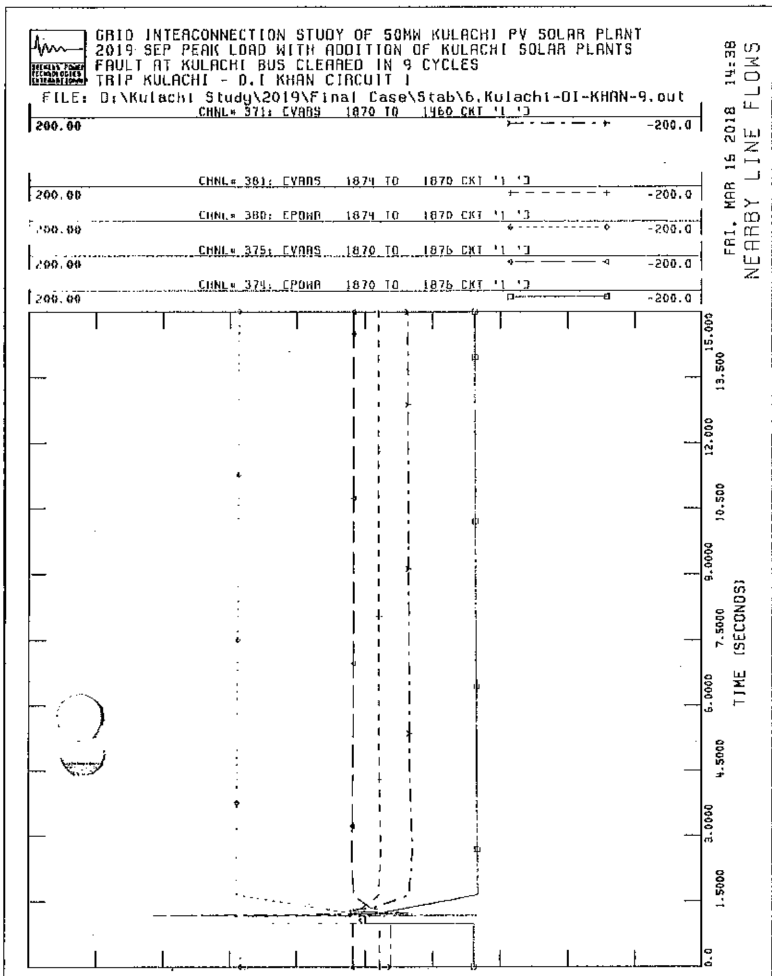
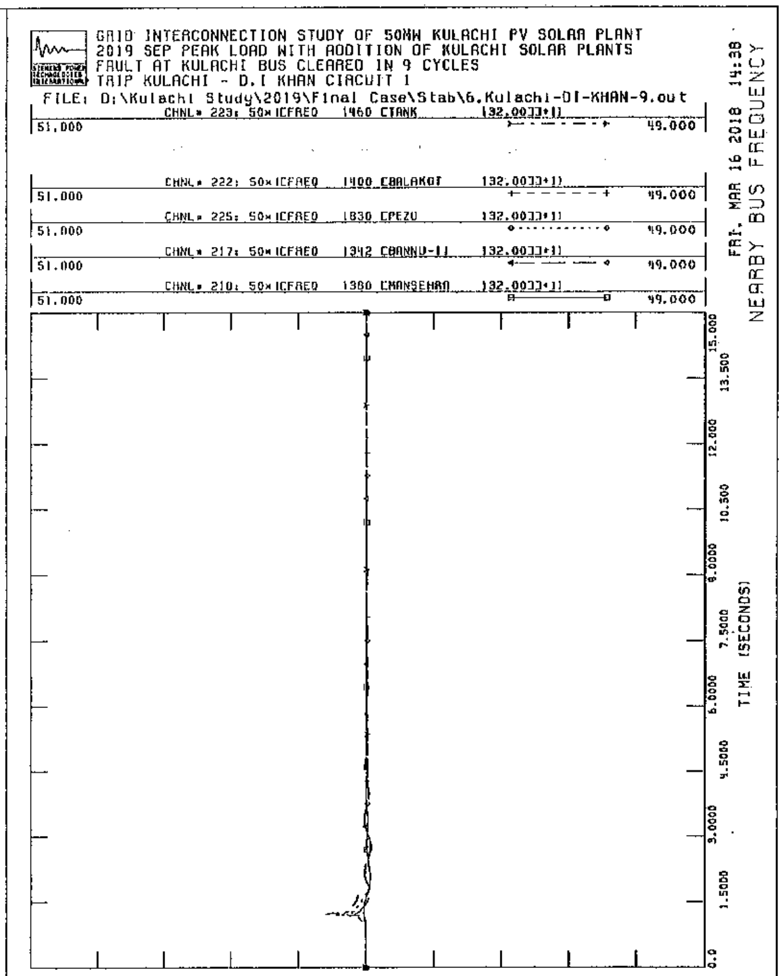
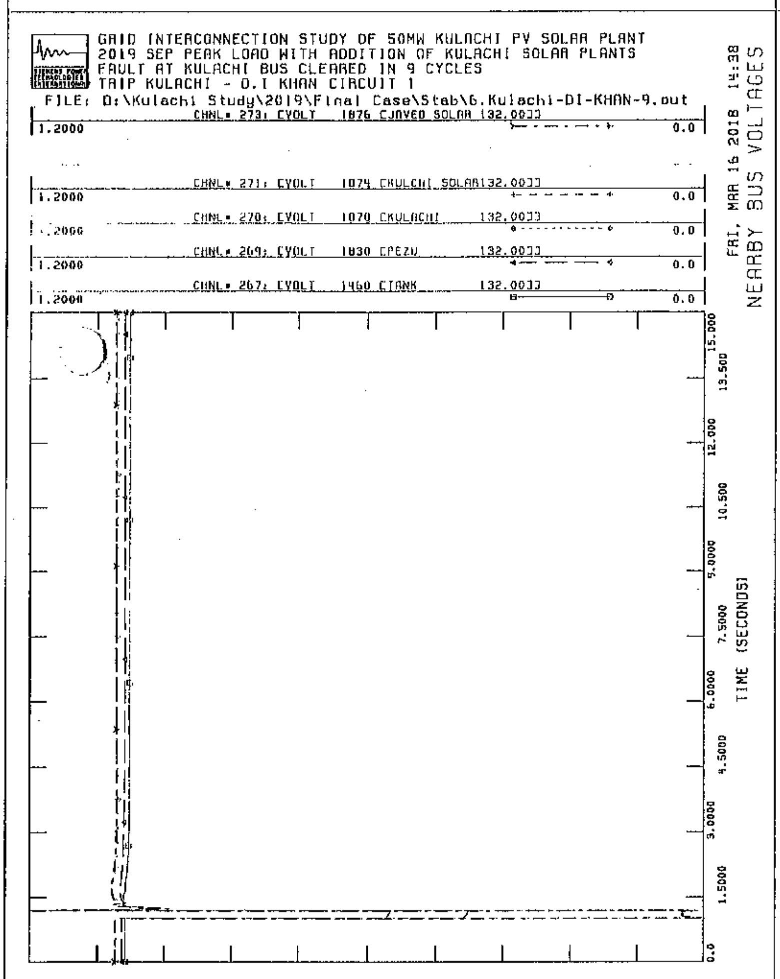
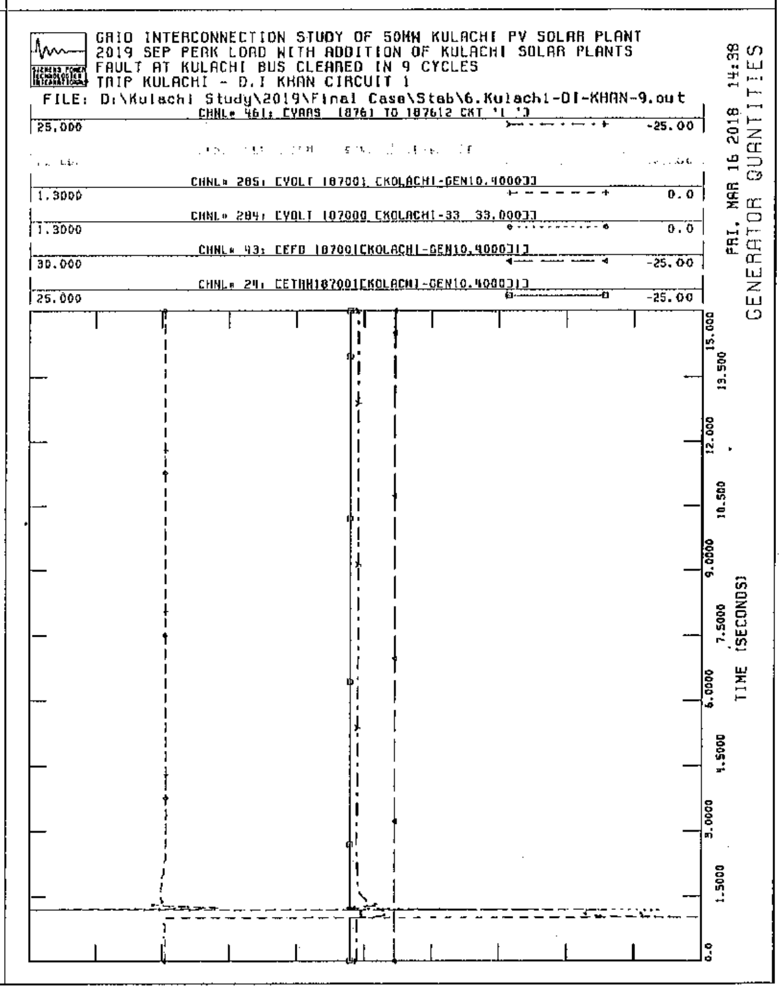



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\5.Kulachi-Tank-9.out
CHNL# 371: [VARS 1870 TO 1960 CKT '1 ']
CHNL# 301: [VARS 1874 TO 1870 CKT '1 ']
CHNL# 300: [POWR 1874 TO 1870 CKT '1 ']
CHNL# 375: [VARS 1870 TO 1876 CKT '1 ']
CHNL# 374: [POWR 1870 TO 1876 CKT '1 ']
200.00
-200.0
TIME (SECONDS)
FRI, MAR 16 2018 14:29
NEARBY LINE FLOWS


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\5.Kulachi-Tank-9.out
CHNL# 223: 50*(FREQ 1460 [TANK 132.00]+1)
CHNL# 222: 50*(FREQ 1400 [BALAKOT 132.00]+1)
CHNL# 225: 50*(FREQ 1030 [PEZU 132.00]+1)
CHNL# 217: 50*(FREQ 1342 [BANNU-II 132.00]+1)
CHNL# 218: 50*(FREQ 1300 [MANSEHRA 132.00]+1)
51.000
49.000
TIME (SECONDS)
FRI, MAR 16 2018 14:29
NEARBY BUS FREQUENCY


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\5.Kulachi-Tank-9.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
CHNL# 271: [VOLT 1874 [KULCHI SOLAR132.00]]
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
CHNL# 269: [VOLT 1030 [PEZU 132.00]]
CHNL# 267: [VOLT 1460 [TANK 132.00]]
1.2000
0.0
TIME (SECONDS)
FRI, MAR 16 2018 14:29
NEARBY BUS VOLTAGES


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\5.Kulachi-Tank-9.out
CHNL# 461: [VARS 18761 TO 187612 CKT '1 ']
CHNL# 285: [VOLT 187001 [KOLACHI-GEN10.4000]]
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]
CHNL# 93: [EFD 187001[KOLACHI-GEN10.4000]1]
CHNL# 24: [ETRM187001[KOLACHI-GEN10.4000]1]
25.000
-25.00
1.3000
0.0
30.000
TIME (SECONDS)
FRI, MAR 16 2018 14:29
GENERATOR QUANTITIES


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\6.Kulachi-DI-KHAN-9.out
CHNL# 371: [VARS 1870 TO 1460 CKT '1 ']
200.00 -200.0
CHNL# 381: [VARS 1874 TO 1870 CKT '1 ']
200.00 -200.0
CHNL# 380: [POWR 1874 TO 1870 CKT '1 ']
200.00 -200.0
CHNL# 375: [VARS 1870 TO 1876 CKT '1 ']
200.00 -200.0
CHNL# 374: [POWR 1870 TO 1876 CKT '1 ']
200.00 -200.0
FRI, MAR 16 2018 14:38
NEARBY LINE FLOWS
0.0 1.5000 3.0000 4.5000 6.0000 7.5000 9.0000 10.500 12.000 13.500 15.000
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\6.Kulachi-DI-KHAN-9.out
CHNL# 223: 50*(FREQ 1460 [TANK 132.00]+1)
51.000 49.000
CHNL# 222: 50*(FREQ 1400 [BALAKOT 132.00]+1)
51.000 49.000
CHNL# 225: 50*(FREQ 1830 [PEZU 132.00]+1)
51.000 49.000
CHNL# 217: 50*(FREQ 1342 [BANNU-II 132.00]+1)
51.000 49.000
CHNL# 210: 50*(FREQ 1380 [MANSEHRA 132.00]+1)
51.000 49.000
FRI, MAR 16 2018 14:38
NEARBY BUS FREQUENCY
0.0 1.5000 3.0000 4.5000 6.0000 7.5000 9.0000 10.500 12.000 13.500 15.000
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\6.Kulachi-DI-KHAN-9.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
1.2000 0.0
CHNL# 271: [VOLT 1874 [KULCHI SOLAR132.00]]
1.2000 0.0
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
1.2000 0.0
CHNL# 269: [VOLT 1830 [PEZU 132.00]]
1.2000 0.0
CHNL# 267: [VOLT 1460 [TANK 132.00]]
1.2000 0.0
FRI, MAR 16 2018 14:38
NEARBY BUS VOLTAGES
0.0 1.5000 3.0000 4.5000 6.0000 7.5000 9.0000 10.500 12.000 13.500 15.000
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2019 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2019\Final Case\Stab\6.Kulachi-DI-KHAN-9.out
CHNL# 461: [VARS 1876] TO 187612 CKT '1 ']
25.000 -25.00
CHNL# 285: [VOLT 187001 [KOLACHI-GEN10.400]]
1.3000 0.0
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]
1.3000 0.0
CHNL# 43: [EFD 187001[KOLACHI-GEN10.400]1]
30.000 -25.00
CHNL# 24: [ETRM187001[KOLACHI-GEN10.400]1]
25.000 -25.00
FRI, MAR 16 2018 14:38
GENERATOR QUANTITIES
0.0 1.5000 3.0000 4.5000 6.0000 7.5000 9.0000 10.500 12.000 13.500 15.000
TIME (SECONDS)

Appendix F:

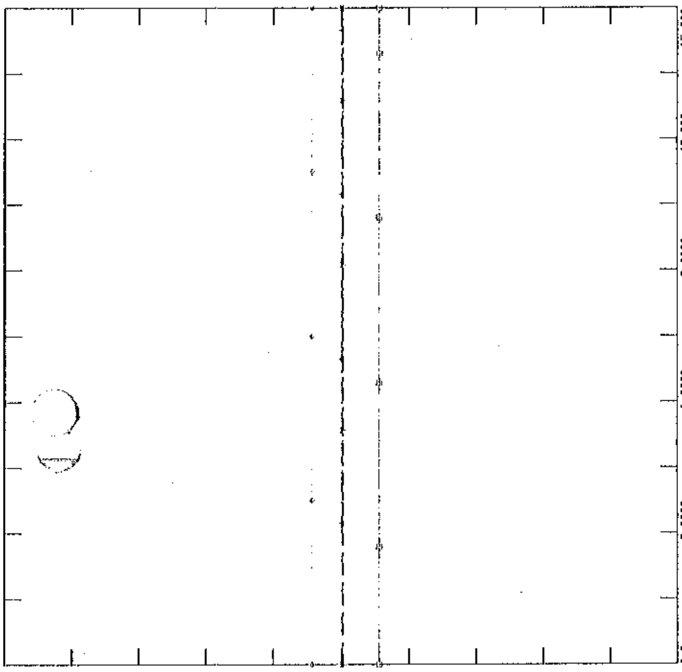
Transient Stability Performance of Solar PV Power Plant

Appendix F-2: Peak load September 2022 year basecase

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
NO FAULT
DRIFT RUN FOR 15 SEC
FILE: D:\Kulachi Study\2022\Stab\Drift Run.out

FRI, MAR 16 2018 14:48
NEARBY LINE FLOWS

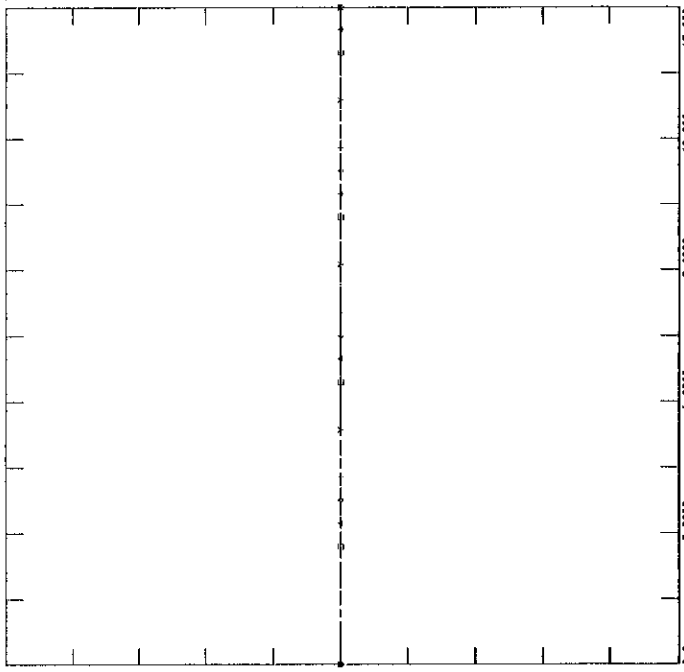
Channel	Min	Max
CHNL# 371: [VARS 1079 TO 1070 CKT '1 ']	200.00	-200.0
CHNL# 381: [VARS 1075 TO 1076 CKT '1 ']	200.00	-200.0
CHNL# 380: [POWR 1075 TO 1076 CKT '1 ']	50.00	-200.0
CHNL# 375: [VARS 1079 TO 187000 CKT '1 ']	200.00	-200.0
CHNL# 374: [POWR 1079 TO 187000 CKT '1 ']	60.00	-200.0



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
NO FAULT
DRIFT RUN FOR 15 SEC
FILE: D:\Kulachi Study\2022\Stab\Drift Run.out

FRI, MAR 16 2018 14:48
NEARBY BUS FREQUENCY

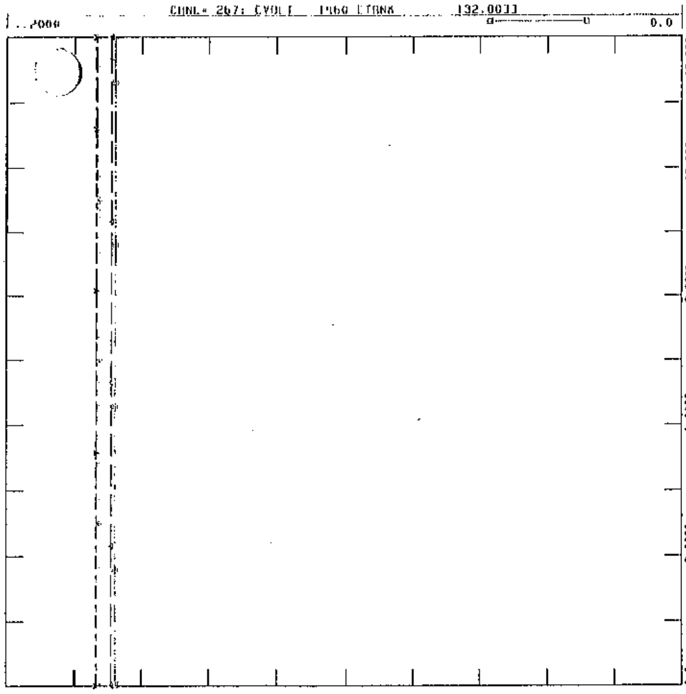
Channel	Min	Max
CHNL# 223: 50*([FREQ 1460 [TANK 132.00]]+1)	51.000	49.000
CHNL# 229: 50*([FREQ 1876 [JAVED SOLAR 132.00]]+1)	51.000	49.000
CHNL# 226: 50*([FREQ 1070 [KULACHI 132.00]]+1)	51.000	49.000
CHNL# 228: 50*([FREQ 1875 [FAS SOLAR 132.00]]+1)	51.000	49.000
CHNL# 227: 50*([FREQ 1079 [KULCHI SOLAR132.00]]+1)	51.000	49.000



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
NO FAULT
DRIFT RUN FOR 15 SEC
FILE: D:\Kulachi Study\2022\Stab\Drift Run.out

FRI, MAR 16 2018 14:47
NEARBY BUS VOLTAGES

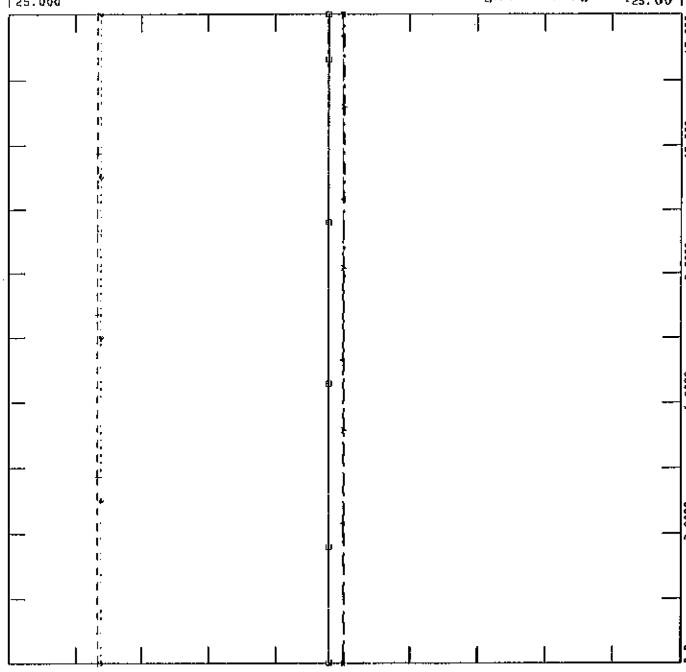
Channel	Min	Max
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]	1.2000	0.0
CHNL# 271: [VOLT 1079 [KULCHI SOLAR132.00]]	1.2000	0.0
CHNL# 270: [VOLT 1070 [KULACHI 132.00]]	[illegible]	0.0
CHNL# 269: [VOLT 1030 [PEZU 132.00]]	1.2000	0.0
CHNL# 267: [VOLT 1460 [TANK 132.00]]	1.2000	0.0

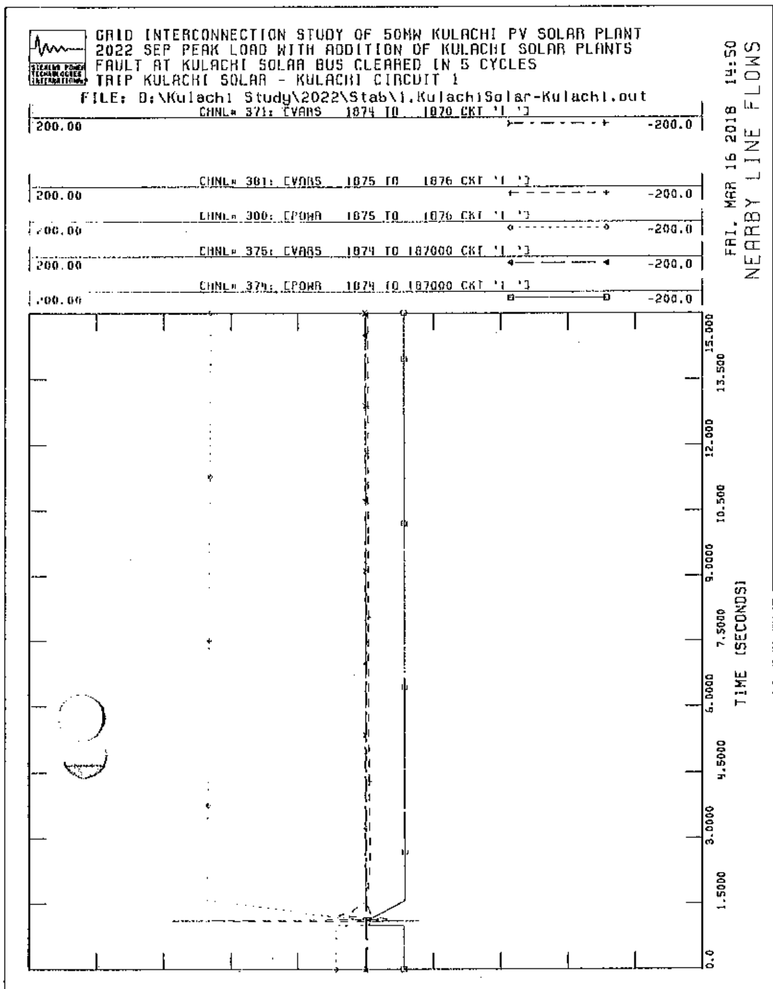


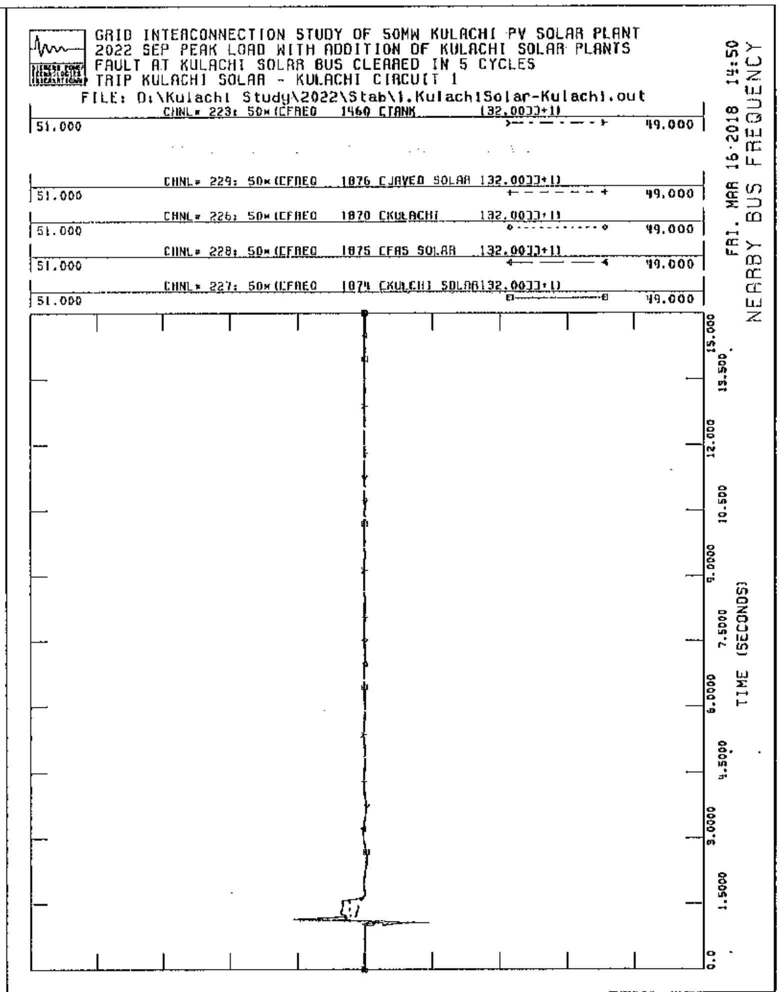
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
NO FAULT
DRIFT RUN FOR 15 SEC
FILE: D:\Kulachi Study\2022\Stab\Drift Run.out

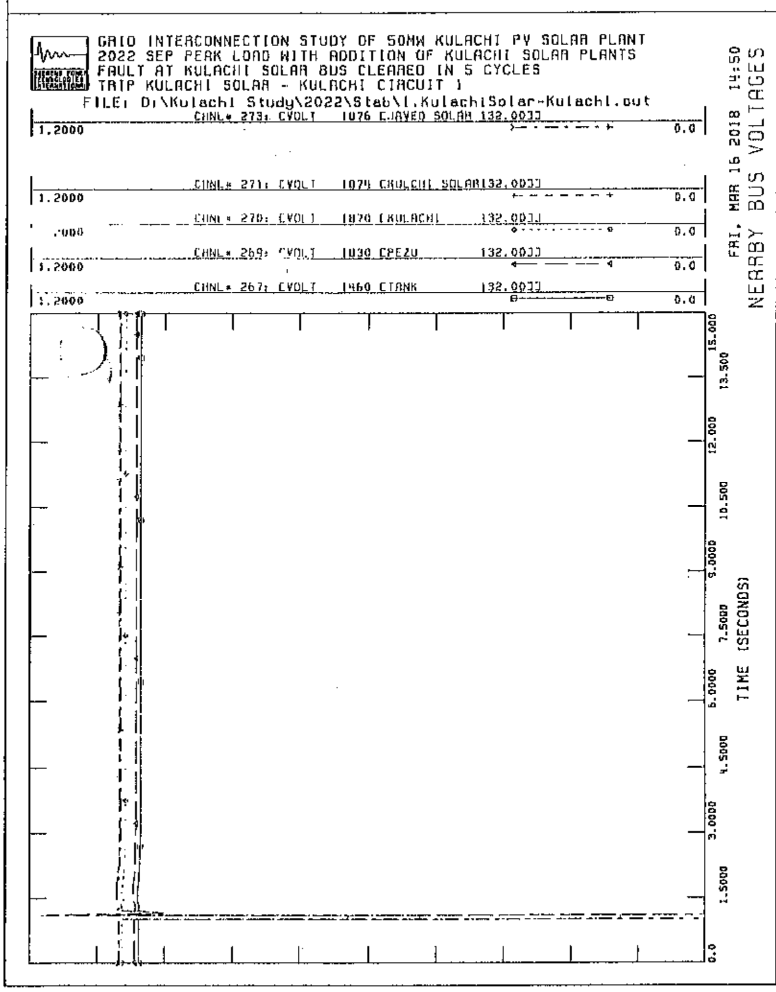
FRI, MAR 16 2018 14:48
GENERATOR QUANTITIES

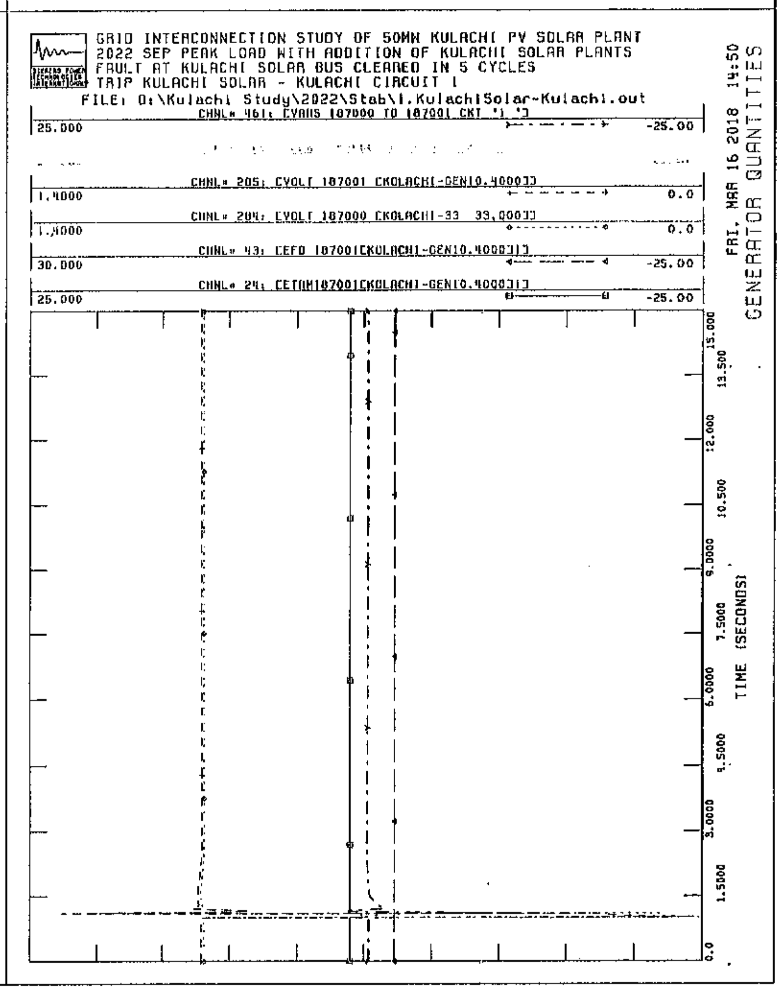
Channel	Min	Max
CHNL# 461: [VARS 187000 TO 187001 CKT '1 ']	100.00	-100.0
CHNL# 285: [VOLT 187001 [KOLACHI-GEN0.4000]]	1.2000	0.0
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]	1.2000	0.0
CHNL# 43: [EFD 187001[KOLACHI-GEN0.4000]1]	25.000	-25.00
CHNL# 29: [ETRM187001[KOLACHI-GEN0.4000]1]	25.000	-25.00

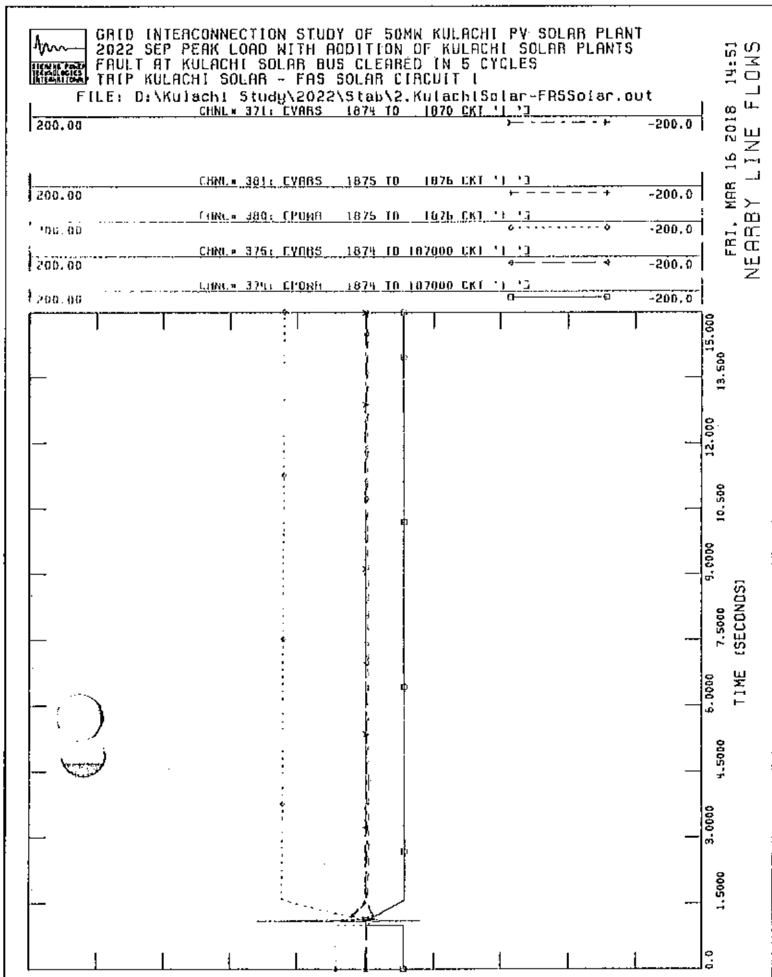


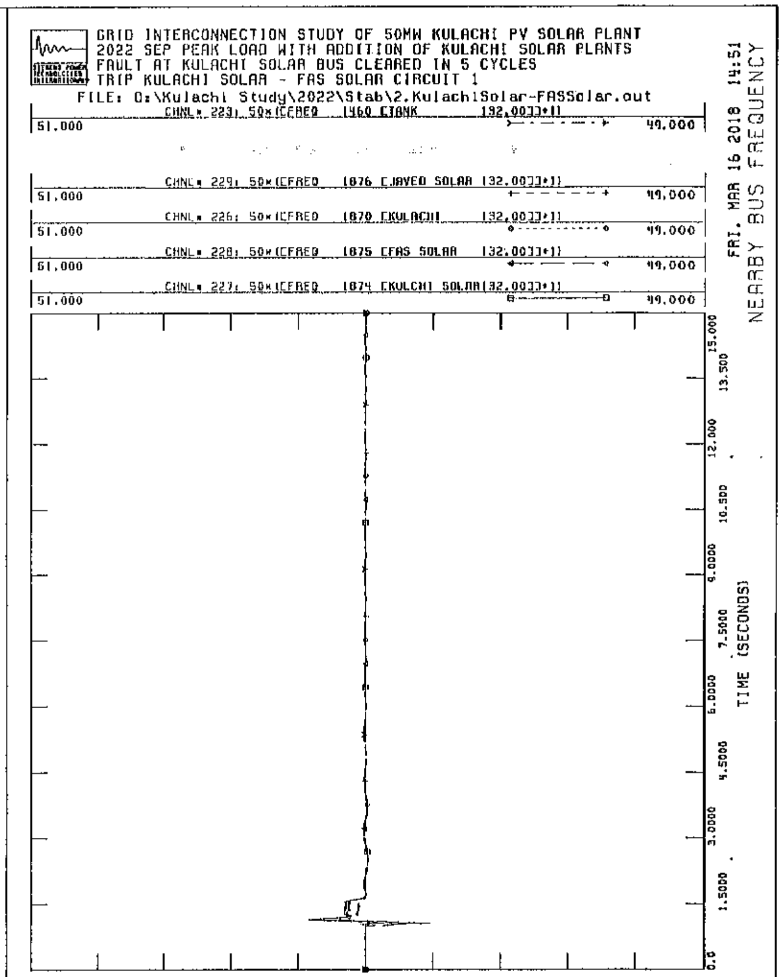

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\1.KulachiSolar-Kulachi.out
CHNL# 371: [VARS 1074 TO 1070 CKT '1 ']
200.00 -200.0
CHNL# 301: [VARS 1075 TO 1076 CKT '1 ']
200.00 -200.0
CHNL# 300: [POWR 1075 TO 1076 CKT '1 ']
200.00 -200.0
CHNL# 375: [VARS 1074 TO 187000 CKT '1 ']
200.00 -200.0
CHNL# 374: [POWR 1074 TO 187000 CKT '1 ']
200.00 -200.0
0.0 1.5000 3.0000 4.5000 6.0000 7.5000 9.0000 10.500 12.000 13.500 15.000
TIME (SECONDS)
FRI, MAR 16 2018 14:50
NEARBY LINE FLOWS

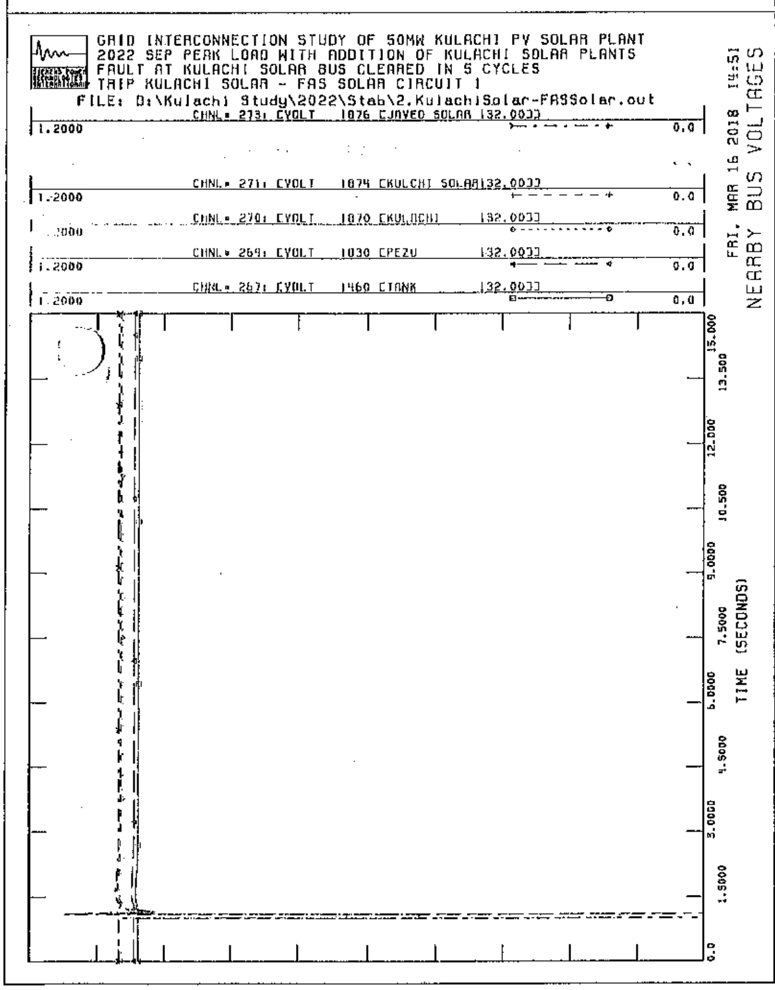

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\1.KulachiSolar-Kulachi.out
CHNL# 223: 50*(FREQ 1460 TANK 132.00)+1)
51.000 49.000
CHNL# 229: 50*(FREQ 1876 JAVED SOLAR 132.00)+1)
51.000 49.000
CHNL# 226: 50*(FREQ 1870 KULACHI 132.00)+1)
51.000 49.000
CHNL# 228: 50*(FREQ 1875 FAS SOLAR 132.00)+1)
51.000 49.000
CHNL# 227: 50*(FREQ 1074 KULCHI SOLAR132.00)+1)
51.000 49.000
0.0 1.5000 3.0000 4.5000 6.0000 7.5000 9.0000 10.500 12.000 13.500 15.000
TIME (SECONDS)
FRI, MAR 16 2018 14:50
NEARBY BUS FREQUENCY

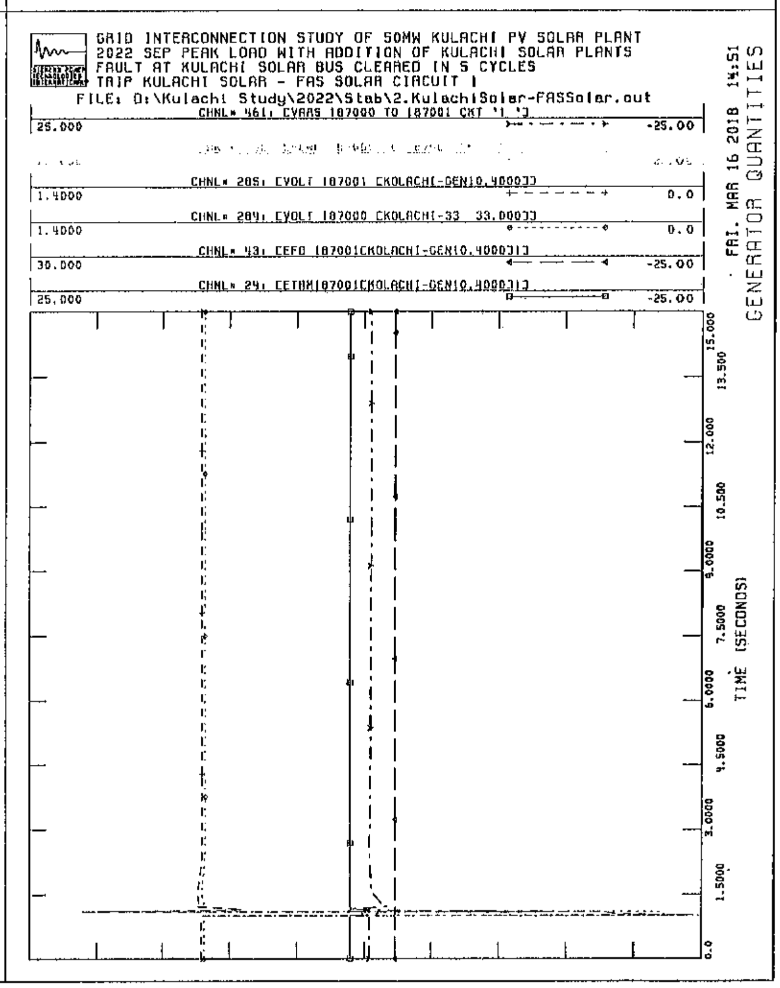

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\1.KulachiSolar-Kulachi.out
CHNL# 273: [VOLT 1076 JAVED SOLAR 132.00]
1.2000 0.0
CHNL# 271: [VOLT 1074 KULCHI SOLAR132.00]
1.2000 0.0
CHNL# 270: [VOLT 1870 KULACHI 132.00]
1.2000 0.0
CHNL# 269: [VOLT 1030 PEZU 132.00]
1.2000 0.0
CHNL# 267: [VOLT 1460 TANK 132.00]
1.2000 0.0
0.0 1.5000 3.0000 4.5000 6.0000 7.5000 9.0000 10.500 12.000 13.500 15.000
TIME (SECONDS)
FRI, MAR 16 2018 14:50
NEARBY BUS VOLTAGES

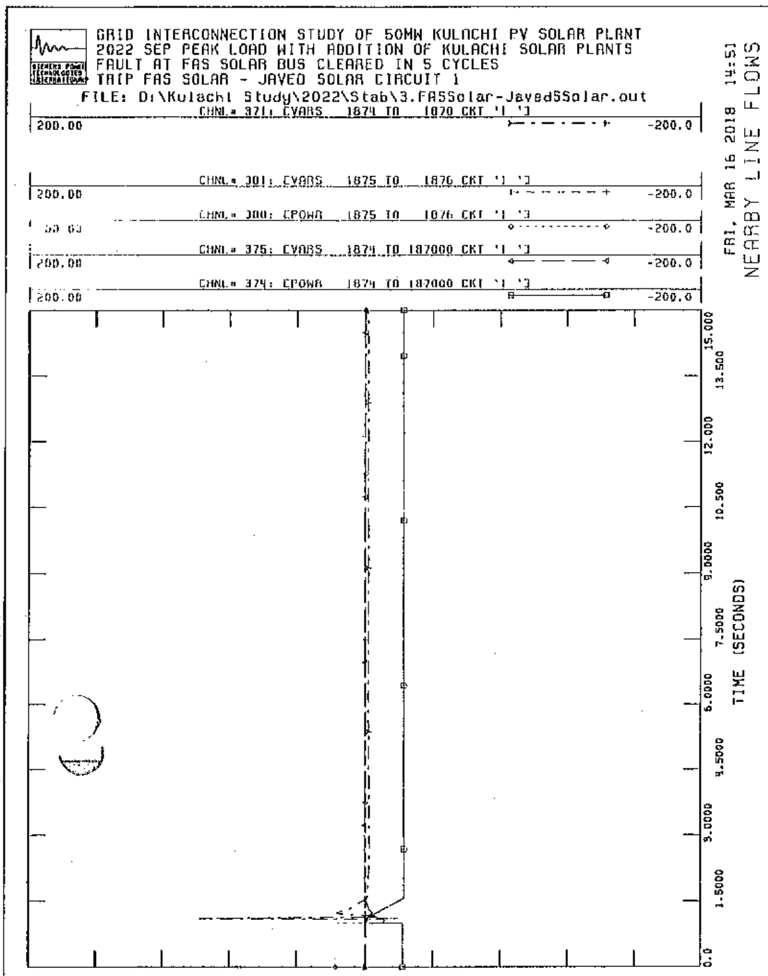

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\1.KulachiSolar-Kulachi.out
CHNL# 461: [VARS 187000 TO 187001 CKT '1 ']
25.000 -25.00
CHNL# 205: [VOLT 187001 KULACHI-GEN10.400]
1.4000 0.0
CHNL# 204: [VOLT 187000 KULACHI-33 33.000]
1.4000 0.0
CHNL# 43: [EFD 187001[KULACHI-GEN10.400]1]
30.000 -25.00
CHNL# 24: [ETRM187001[KULACHI-GEN10.400]1]
25.000 -25.00
0.0 1.5000 3.0000 4.5000 6.0000 7.5000 9.0000 10.500 12.000 13.500 15.000
TIME (SECONDS)
FRI, MAR 16 2018 14:50
GENERATOR QUANTITIES

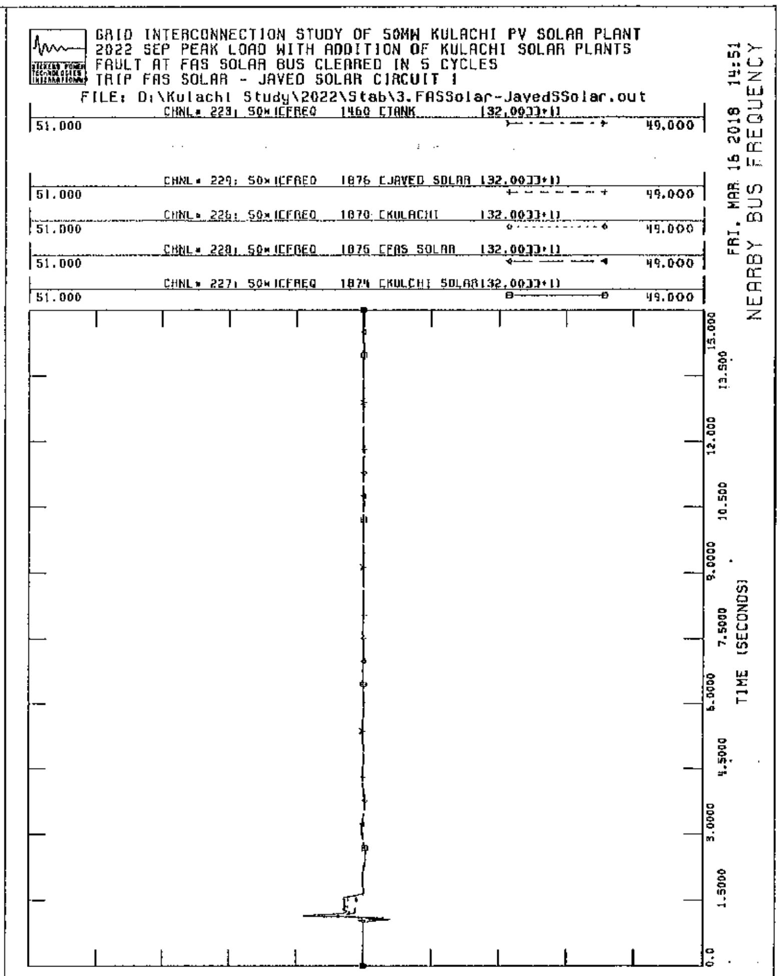

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\2.KulachiSolar-FASSolar.out
CHNL# 371: [VARS 1874 TO 1870 CKT '1 ']
CHNL# 381: [VARS 1875 TO 1876 CKT '1 ']
CHNL# 380: [POWR 1875 TO 1876 CKT '1 ']
CHNL# 375: [VARS 1874 TO 187000 CKT '1 ']
CHNL# 374: [POWR 1874 TO 187000 CKT '1 ']
200.00
-200.0
TIME (SECONDS)
FRI, MAR 16 2018 14:51
NEARBY LINE FLOWS

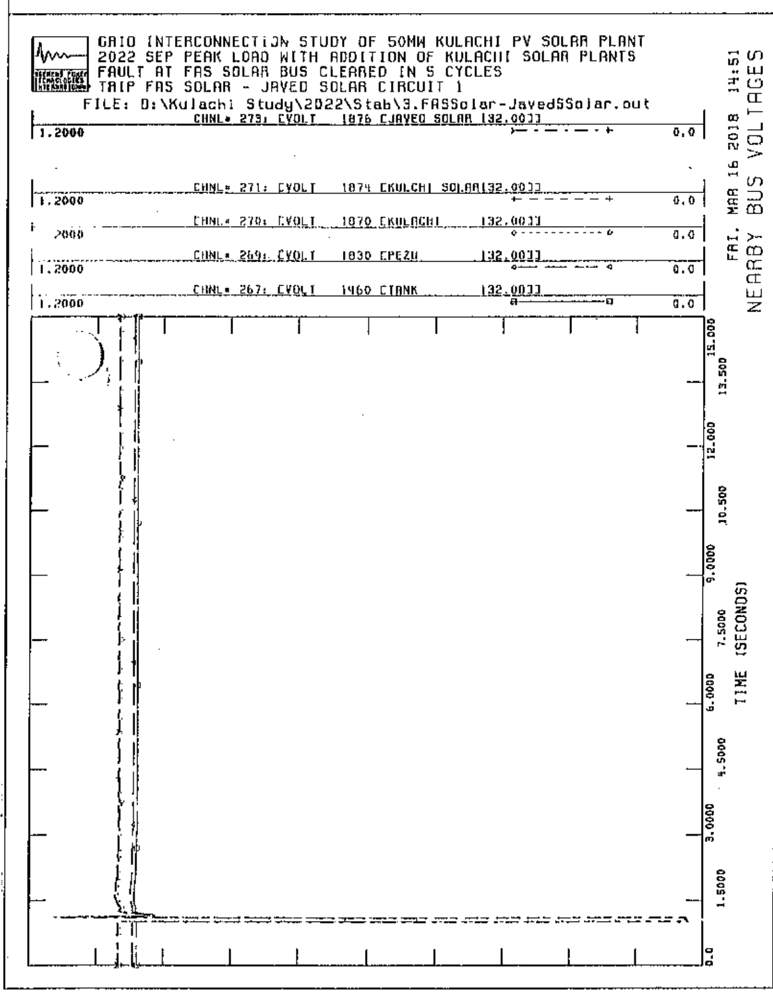

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\2.KulachiSolar-FASSolar.out
CHNL# 223: 50*(FREQ 1460 [TANK 132.00]+1)
CHNL# 229: 50*(FREQ 1876 [JAVED SOLAR 132.00]+1)
CHNL# 226: 50*(FREQ 1870 [KULACHI 132.00]+1)
CHNL# 228: 50*(FREQ 1875 [FAS SOLAR 132.00]+1)
CHNL# 227: 50*(FREQ 1874 [KULCHI SOLAR 132.00]+1)
51.000
49.000
TIME (SECONDS)
FRI, MAR 16 2018 14:51
NEARBY BUS FREQUENCY

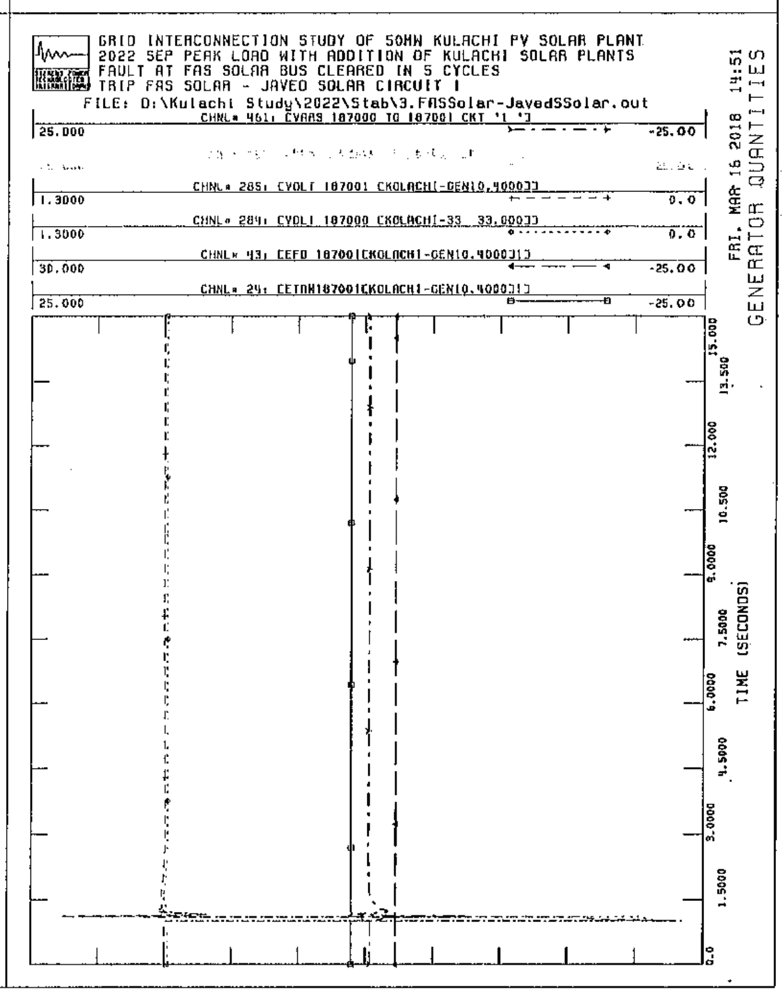

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\2.KulachiSolar-FASSolar.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
CHNL# 271: [VOLT 1874 [KULCHI SOLAR 132.00]]
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
CHNL# 269: [VOLT 1030 [PEZU 132.00]]
CHNL# 267: [VOLT 1460 [TANK 132.00]]
1.2000
0.0
TIME (SECONDS)
FRI, MAR 16 2018 14:51
NEARBY BUS VOLTAGES

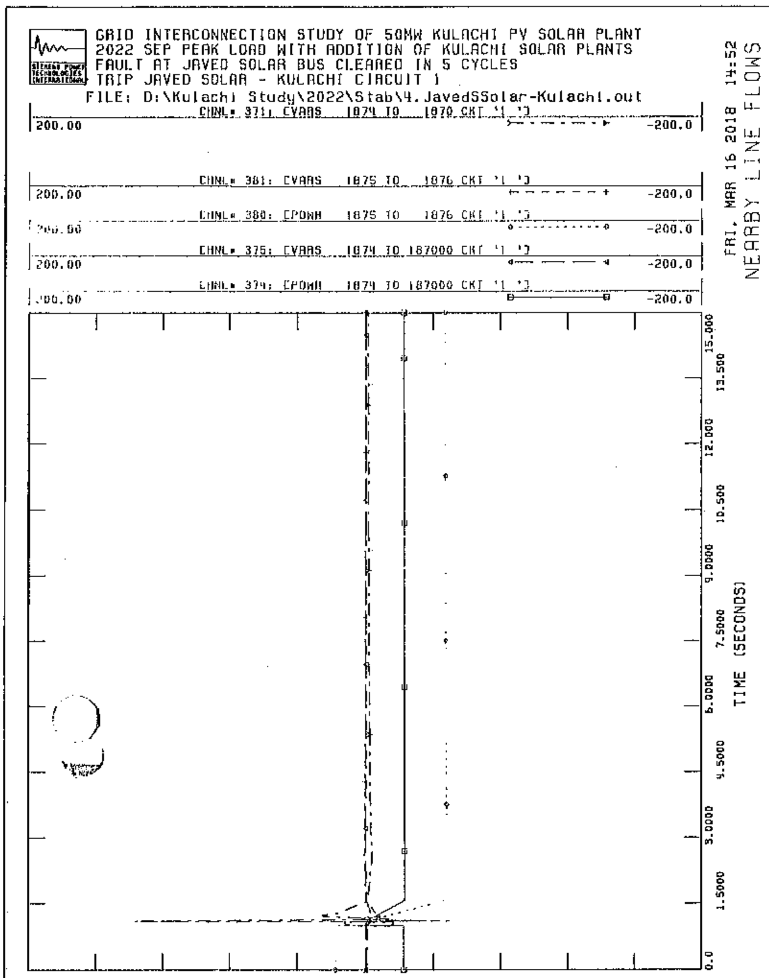
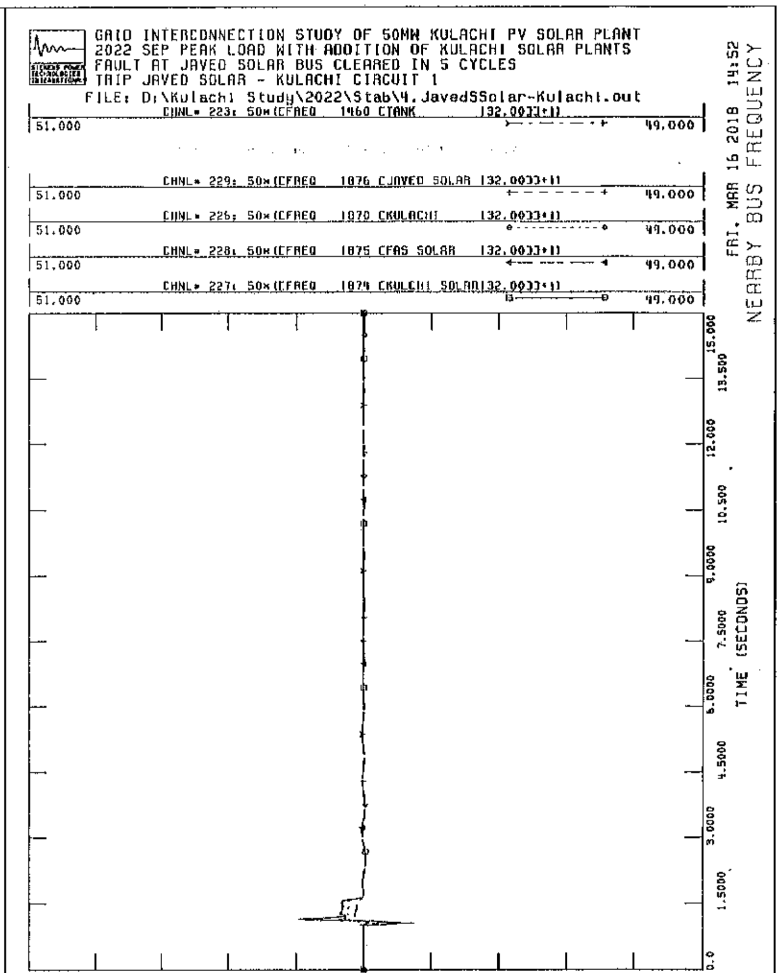
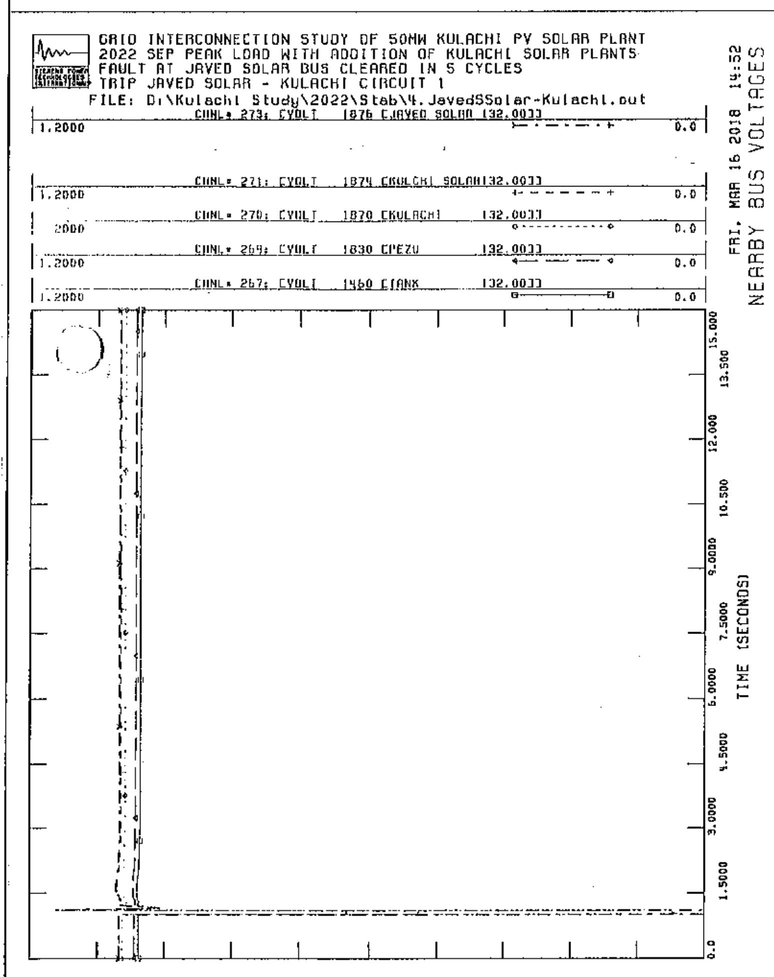
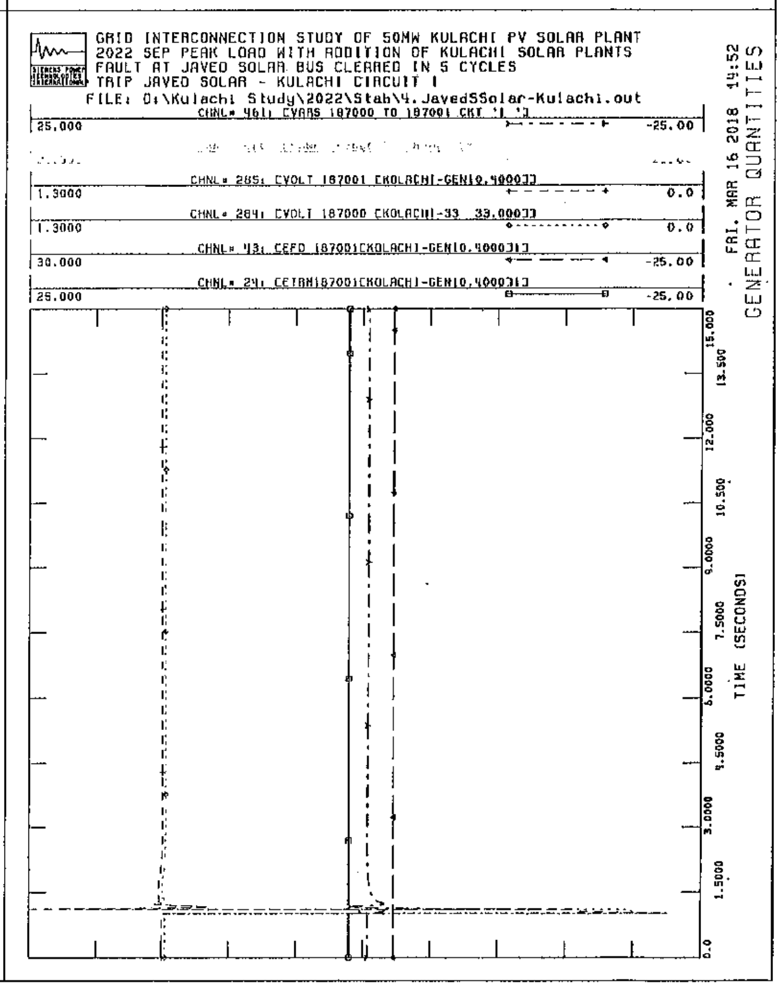

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 5 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\2.KulachiSolar-FASSolar.out
CHNL# 461: [VARS 187000 TO 187001 CKT '1 ']
CHNL# 285: [VOLT 187001 [KULACHI-GEN 0.4000]]
CHNL# 284: [VOLT 187000 [KULACHI-33 33.000]]
CHNL# 43: [EFD 187001[KULACHI-GEN 0.4000]1]
CHNL# 24: [ETRM 187001[KULACHI-GEN 0.4000]1]
25.000
-25.00
1.4000
0.0
30.000
TIME (SECONDS)
FRI, MAR 16 2018 14:51
GENERATOR QUANTITIES


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 5 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\3.FASSolar-JavedSSolar.out
CHNL# 371: [VARS 1874 TO 1870 CKT '1 ']
200.00
-200.0
CHNL# 301: [VARS 1875 TO 1876 CKT '1 ']
200.00
-200.0
CHNL# 300: [POWR 1875 TO 1876 CKT '1 ']
-200.0
CHNL# 375: [VARS 1874 TO 187000 CKT '1 ']
200.00
-200.0
CHNL# 374: [POWR 1874 TO 187000 CKT '1 ']
200.00
-200.0
FRI, MAR 16 2018 14:51
NEARBY LINE FLOWS
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

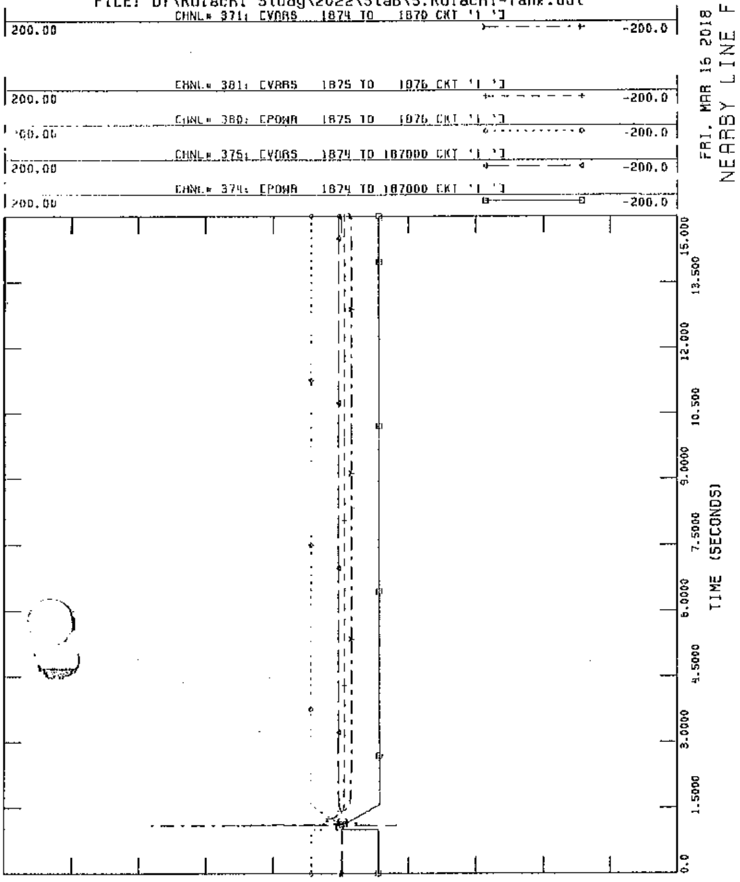

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 5 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\3.FASSolar-JavedSSolar.out
CHNL# 223: 50*(1+FREQ 1460 [TANK 132.00]]+1)
51.000
49.000
CHNL# 229: 50*(1+FREQ 1876 [JAVED SOLAR 132.00]]+1)
51.000
49.000
CHNL# 226: 50*(1+FREQ 1870 [KULACHI 132.00]]+1)
51.000
49.000
CHNL# 228: 50*(1+FREQ 1875 [FAS SOLAR 132.00]]+1)
51.000
49.000
CHNL# 227: 50*(1+FREQ 1874 [KULCHI SOLAR[132.00]]+1)
51.000
49.000
FRI, MAR 16 2018 14:51
NEARBY BUS FREQUENCY
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 5 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\3.FASSolar-JavedSSolar.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
1.2000
0.0
CHNL# 271: [VOLT 1874 [KULCHI SOLAR[132.00]]
1.2000
0.0
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
0.0
CHNL# 269: [VOLT 1830 [PEZU 132.00]]
1.2000
0.0
CHNL# 267: [VOLT 1460 [TANK 132.00]]
1.2000
0.0
FRI, MAR 16 2018 14:51
NEARBY BUS VOLTAGES
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

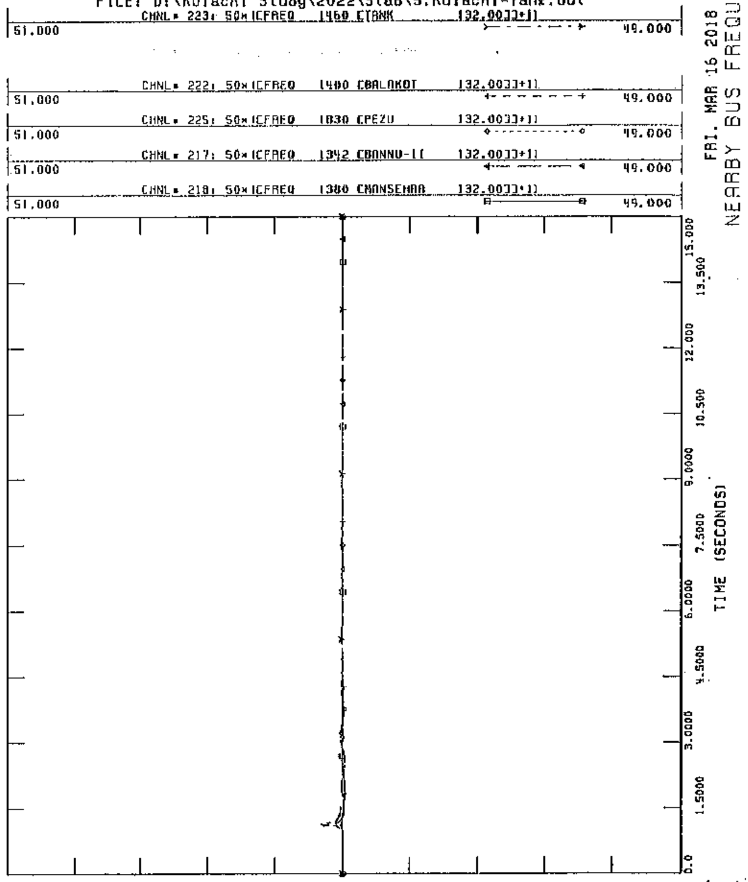

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 5 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\3.FASSolar-JavedSSolar.out
CHNL# 461: [VARS 187000 TO 187001 CKT '1 ']
25.000
-25.00
CHNL# 285: [VOLT 187001 [KOLACHI-GEN[0.40000]]
1.3000
0.0
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]
1.3000
0.0
CHNL# 43: [EFD 187001[KOLACHI-GEN[0.40000]]]
30.000
-25.00
CHNL# 29: [ETRM187001[KOLACHI-GEN[0.40000]]]
25.000
-25.00
FRI, MAR 16 2018 14:51
GENERATOR QUANTITIES
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 5 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\4.JavedSSolar-Kulachi.out
CHNL# 381: CVARS 1875 TO 1876 CKT '1 '
CHNL# 380: CPOWR 1875 TO 1876 CKT '1 '
CHNL# 375: CVARS 1874 TO 187000 CKT '1 '
CHNL# 374: CPOWR 1874 TO 187000 CKT '1 '
200.00
-200.0
TIME (SECONDS)
FRI, MAR 16 2018 14:52
NEARBY LINE FLOWS

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 5 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\4.JavedSSolar-Kulachi.out
CHNL# 223: 50*(CFREQ 1460 CTANK 132.00)+1)
CHNL# 229: 50*(CFREQ 1876 CJAVED SOLAR 132.00)+1)
CHNL# 226: 50*(CFREQ 1870 CKULACHI 132.00)+1)
CHNL# 228: 50*(CFREQ 1875 CFAS SOLAR 132.00)+1)
CHNL# 227: 50*(CFREQ 1874 CKULCHI SOLAR(132.00)+1)
51.000
49.000
TIME (SECONDS)
FRI, MAR 16 2018 14:52
NEARBY BUS FREQUENCY

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 5 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\4.JavedSSolar-Kulachi.out
CHNL# 273: CVOLT 1876 CJAVED SOLAR 132.00]
CHNL# 271: CVOLT 1874 CKULCHI SOLAR(132.00]
CHNL# 270: CVOLT 1870 CKULACHI 132.00]
CHNL# 269: CVOLT 1830 CPEZU 132.00]
CHNL# 267: CVOLT 1460 CTANK 132.00]
1.2000
0.0
TIME (SECONDS)
FRI, MAR 16 2018 14:52
NEARBY BUS VOLTAGES

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 5 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\4.JavedSSolar-Kulachi.out
CHNL# 461: CVARS 187000 TO 187001 CKT '1 '
CHNL# 285: CVOLT 187001 CKOLACHI-GEN(0.4000]
CHNL# 284: CVOLT 187000 CKOLACHI-33 33.000]
CHNL# 43: CEFD (187001CKOLACHI-GEN(0.4000)]
CHNL# 29: CETRM187001CKOLACHI-GEN(0.4000)]
25.000
-25.00
1.3000
0.0
30.000
TIME (SECONDS)
FRI, MAR 16 2018 14:52
GENERATOR QUANTITIES

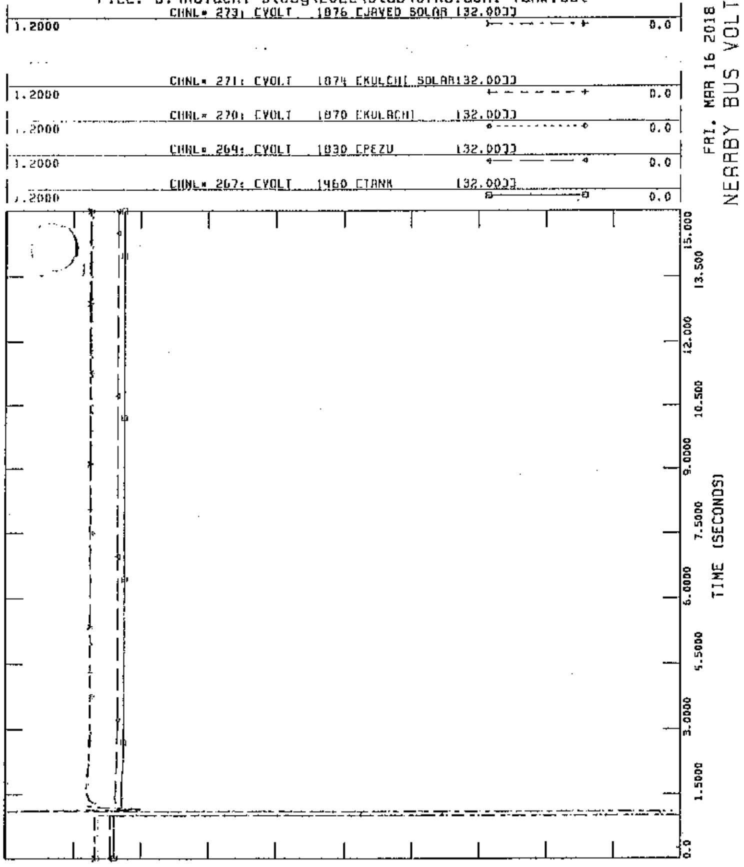
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\5.Kulachi-Tank.out



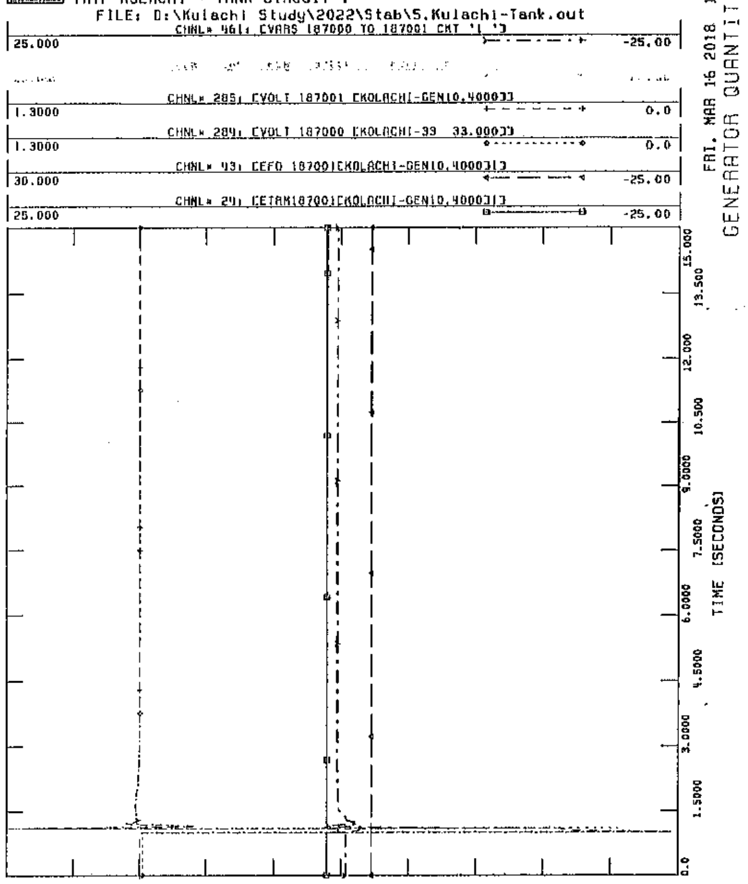
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\5.Kulachi-Tank.out

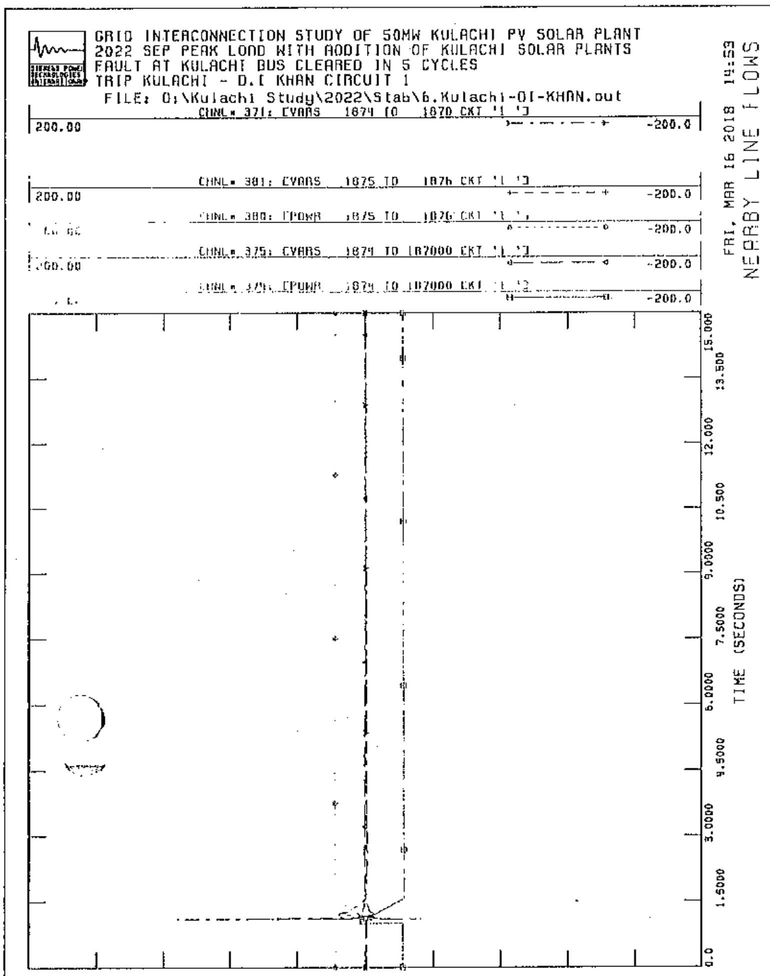
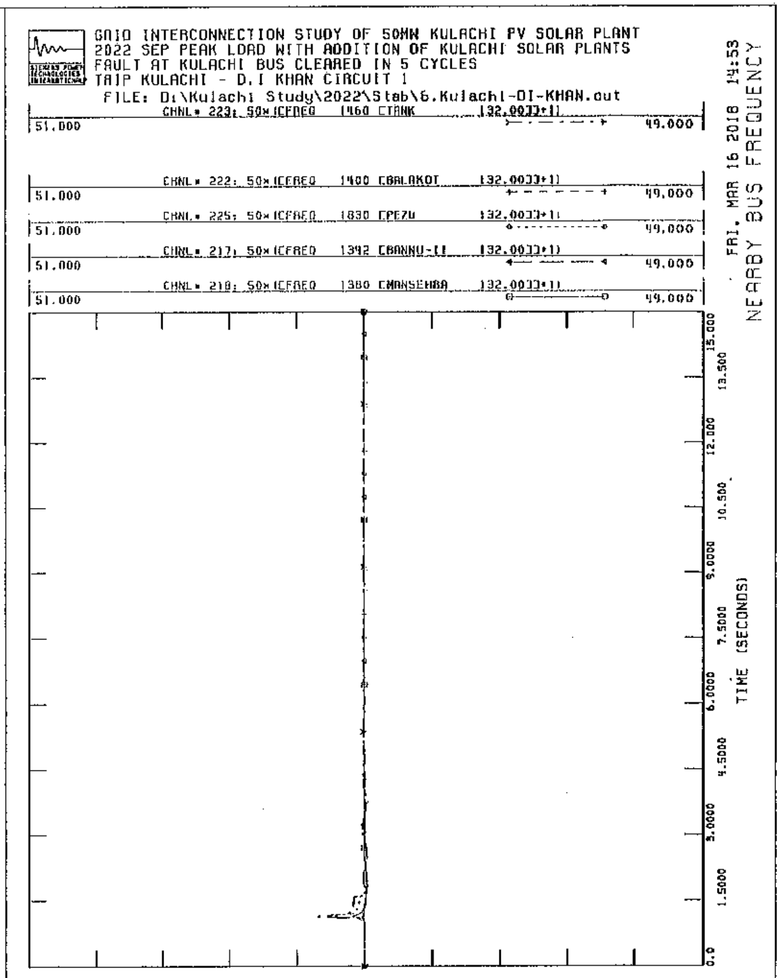
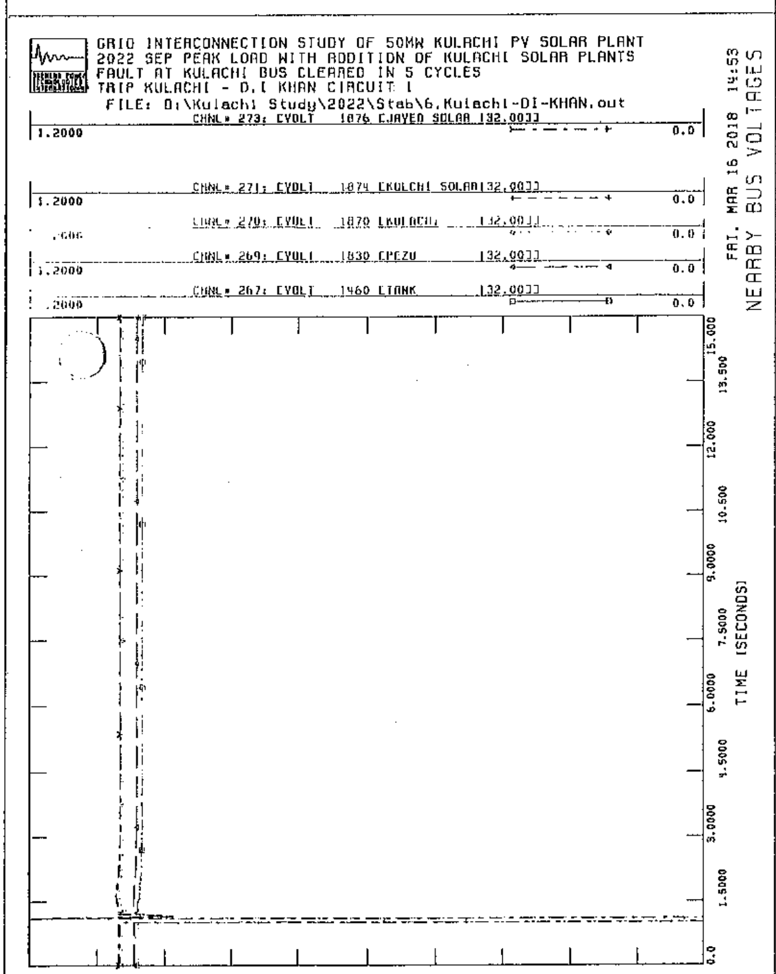
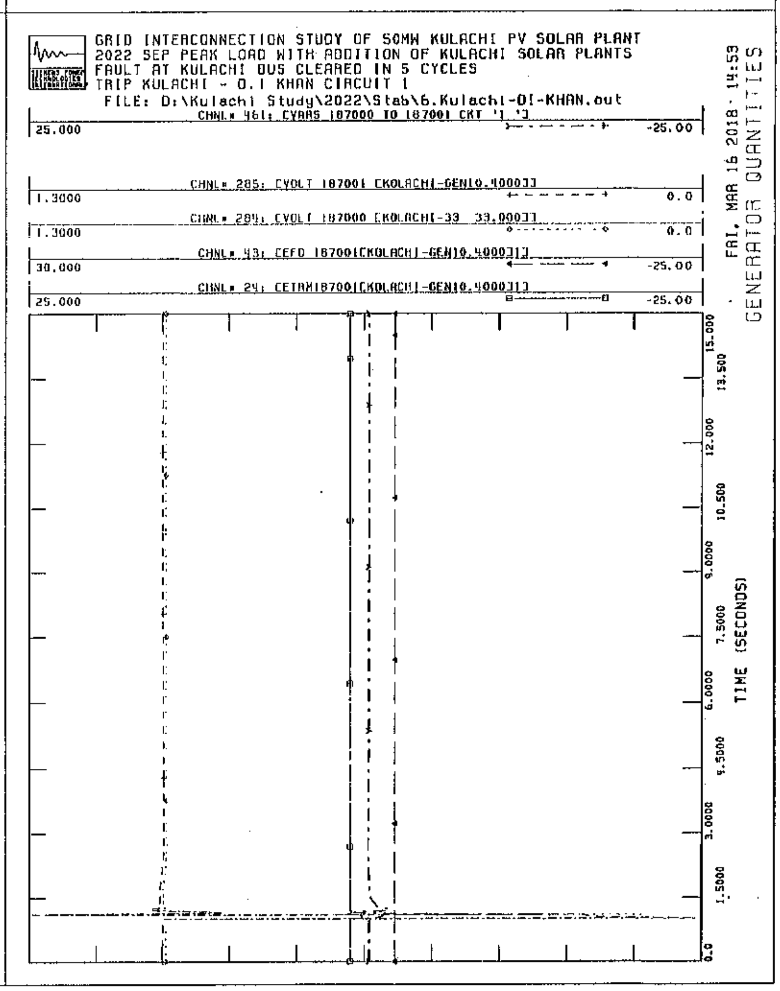


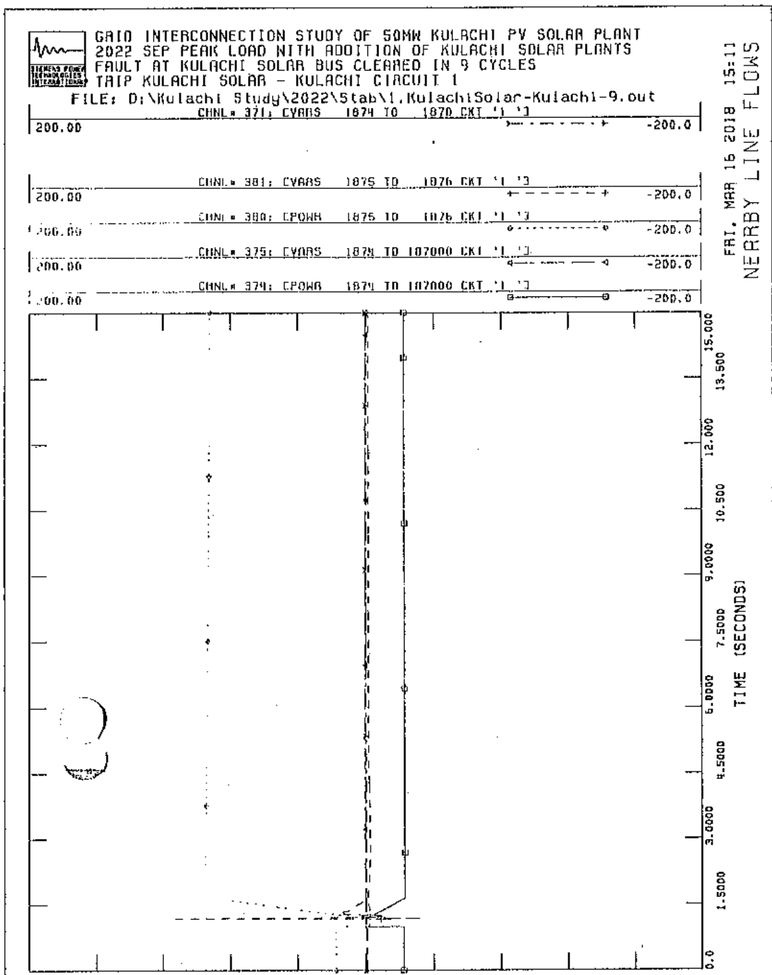
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\5.Kulachi-Tank.out

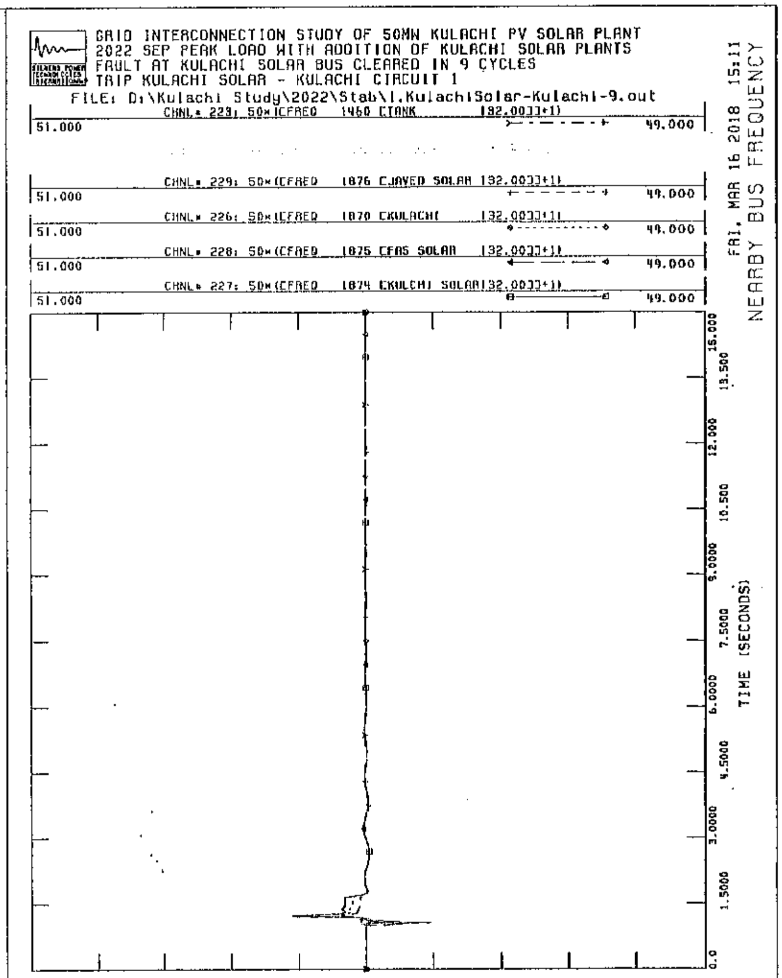


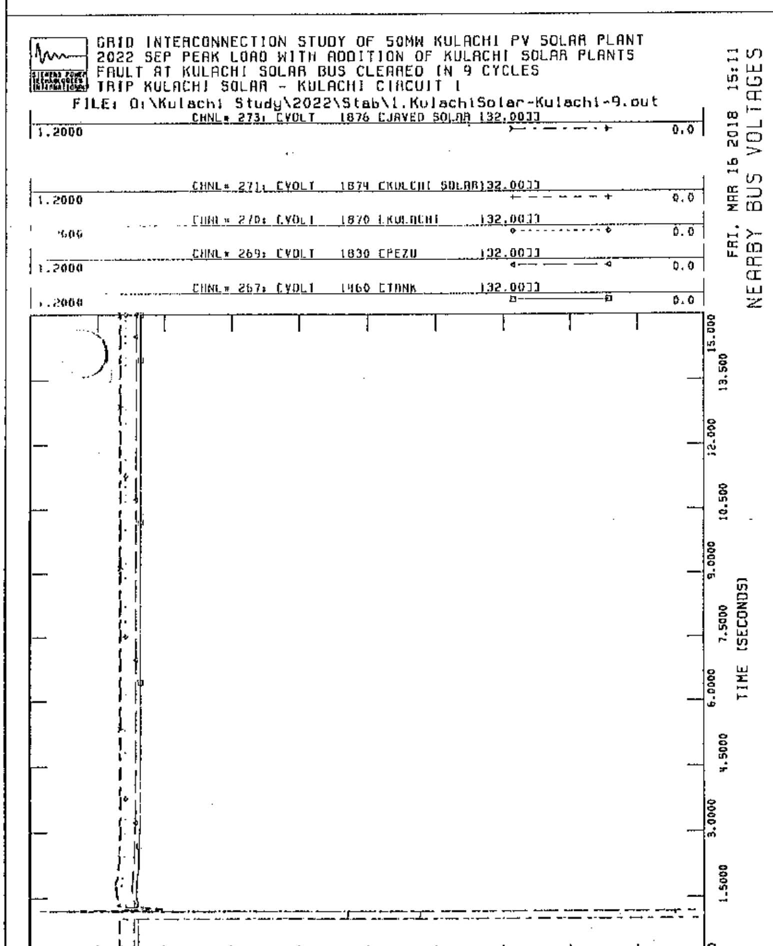
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\5.Kulachi-Tank.out

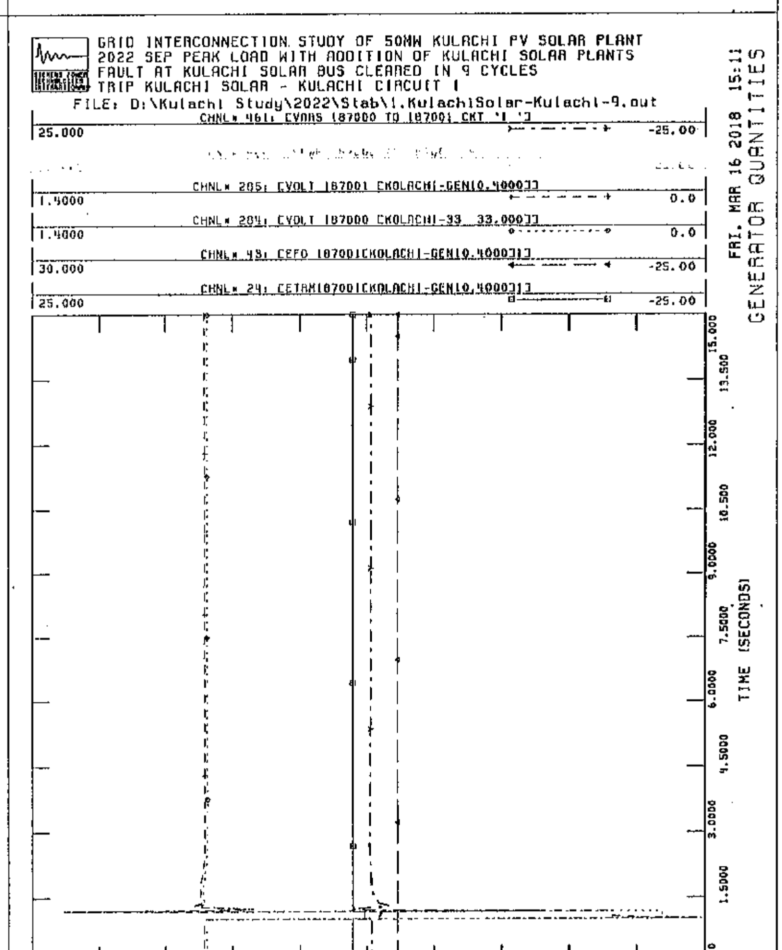



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\6.Kulachi-DI-KHAN.out
CHNL# 371: CVARS 1874 TO 1870 CKT '1 '
CHNL# 381: CVARS 1875 TO 1876 CKT '1 '
CHNL# 380: CPOWR 1875 TO 1876 CKT '1 '
CHNL# 375: CVARS 1874 TO 187000 CKT '1 '
200.00
-200.0
FRI, MAR 16 2018 14:53
NEARBY LINE FLOWS
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\6.Kulachi-DI-KHAN.out
CHNL# 223: 50*(CFREQ 1460 CTANK 132.00))+1)
CHNL# 222: 50*(CFREQ 1400 CBALAKOT 132.00))+1)
CHNL# 225: 50*(CFREQ 1830 CPEZU 132.00))+1)
CHNL# 217: 50*(CFREQ 1392 CBANNU-II 132.00))+1)
CHNL# 218: 50*(CFREQ 1380 CMANSEHRA 132.00))+1)
51.000
49.000
FRI, MAR 16 2018 14:53
NEARBY BUS FREQUENCY
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\6.Kulachi-DI-KHAN.out
CHNL# 273: CVOLT 1876 CJAVED SOLAR 132.00])
CHNL# 271: CVOLT 1874 CKULCHI SOLAR(132.00])
CHNL# 270: CVOLT 1870 CKULACHI 132.00])
CHNL# 269: CVOLT 1830 CPEZU 132.00])
CHNL# 267: CVOLT 1460 CTANK 132.00])
1.2000
0.0
FRI, MAR 16 2018 14:53
NEARBY BUS VOLTAGES
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 5 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\6.Kulachi-DI-KHAN.out
CHNL# 461: CVARS 187000 TO 187001 CKT '1 '
CHNL# 285: CVOLT 187001 CKOLACHI-GEN10.400])
CHNL# 284: CVOLT 187000 CKOLACHI-33 33.000])
CHNL# 43: CEFD 187001CKOLACHI-GEN10.4000]1)
CHNL# 24: CETRM187001CKOLACHI-GEN10.4000]1)
25.000
-25.00
1.3000
0.0
30.000
FRI, MAR 16 2018 14:53
GENERATOR QUANTITIES
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000

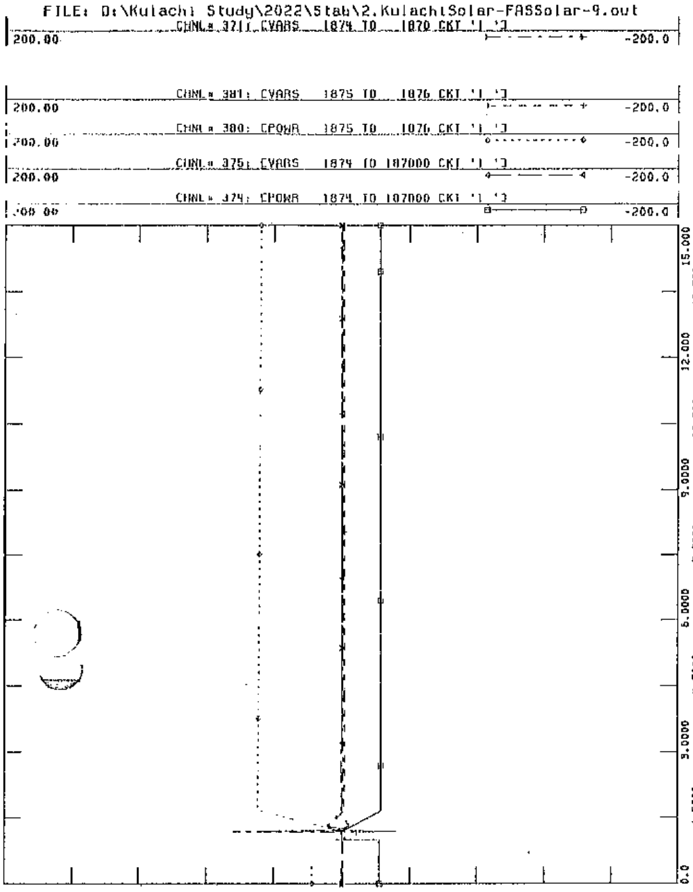

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\1.KulachiSolar-Kulachi-9.out
CHNL# 371: [VARS 1874 TO 1870 CKT '1 ']
CHNL# 381: [VARS 1875 TO 1876 CKT '1 ']
CHNL# 380: [POWR 1875 TO 1876 CKT '1 ']
CHNL# 375: [VARS 1874 TO 187000 CKT '1 ']
CHNL# 374: [POWR 1874 TO 187000 CKT '1 ']
200.00
-200.0
TIME (SECONDS)
FRI, MAR 16 2018 15:11
NEARBY LINE FLOWS


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\1.KulachiSolar-Kulachi-9.out
CHNL# 223: 50*(FREQ 1460 [TANK 132.00]]+1)
CHNL# 229: 50*(FREQ 1876 [JAVED SOLAR 132.00]]+1)
CHNL# 226: 50*(FREQ 1870 [KULACHI 132.00]]+1)
CHNL# 228: 50*(FREQ 1875 [FAS SOLAR 132.00]]+1)
CHNL# 227: 50*(FREQ 1874 [KULCHI SOLAR]32.00]]+1)
51.000
49.000
TIME (SECONDS)
FRI, MAR 16 2018 15:11
NEARBY BUS FREQUENCY


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\1.KulachiSolar-Kulachi-9.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
CHNL# 271: [VOLT 1874 [KULCHI SOLAR]32.00]]
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
CHNL# 269: [VOLT 1830 [PEZU 132.00]]
CHNL# 267: [VOLT 1460 [TANK 132.00]]
1.2000
0.0
TIME (SECONDS)
FRI, MAR 16 2018 15:11
NEARBY BUS VOLTAGES

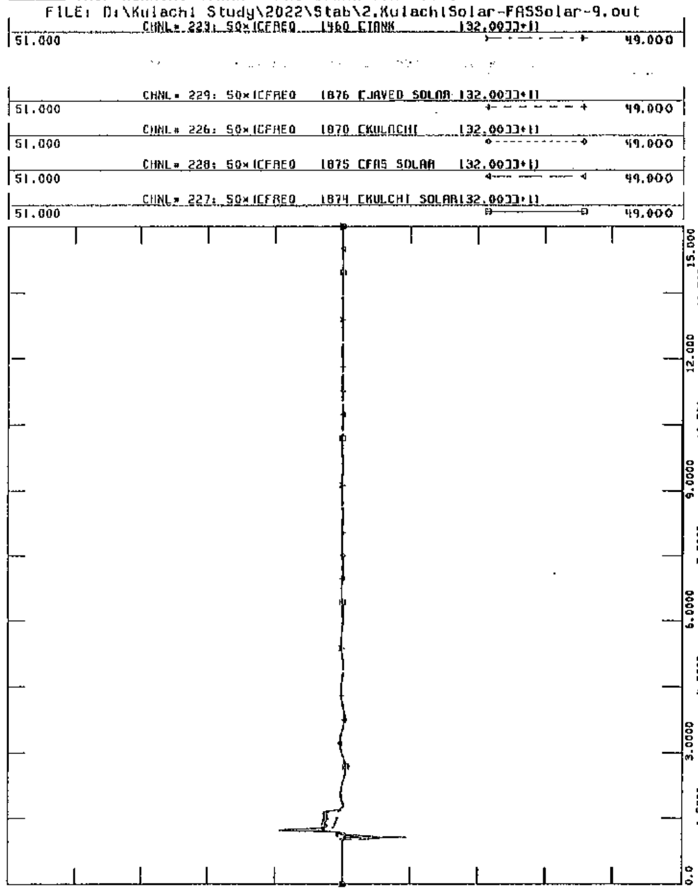

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\1.KulachiSolar-Kulachi-9.out
CHNL# 461: [VARS 187000 TO 187001 CKT '1 ']
CHNL# 285: [VOLT 187001 [KOLACHI-GEN0.4000]]
CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]
CHNL# 43: [EFD 187001[KOLACHI-GEN0.4000]]
CHNL# 24: [ETRM187001[KOLACHI-GEN0.4000]]
25.000
-25.00
1.4000
0.0
30.000
TIME (SECONDS)
FRI, MAR 16 2018 15:11
GENERATOR QUANTITIES

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\2.KulachiSolar-FASSolar-9.out



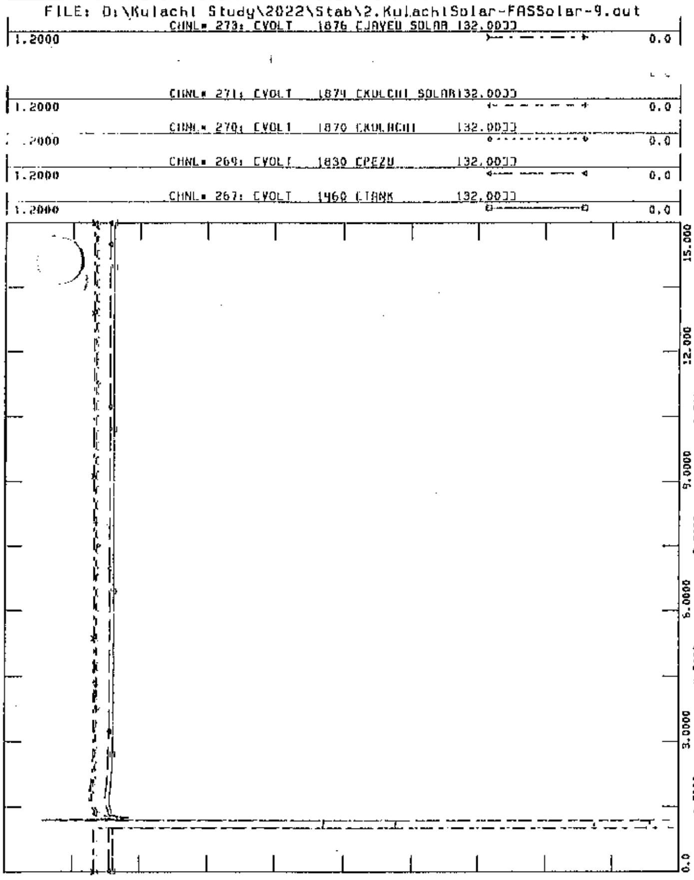
FRI, MAR 15 2018 15:11
NEARBY LINE FLOWS

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\2.KulachiSolar-FASSolar-9.out



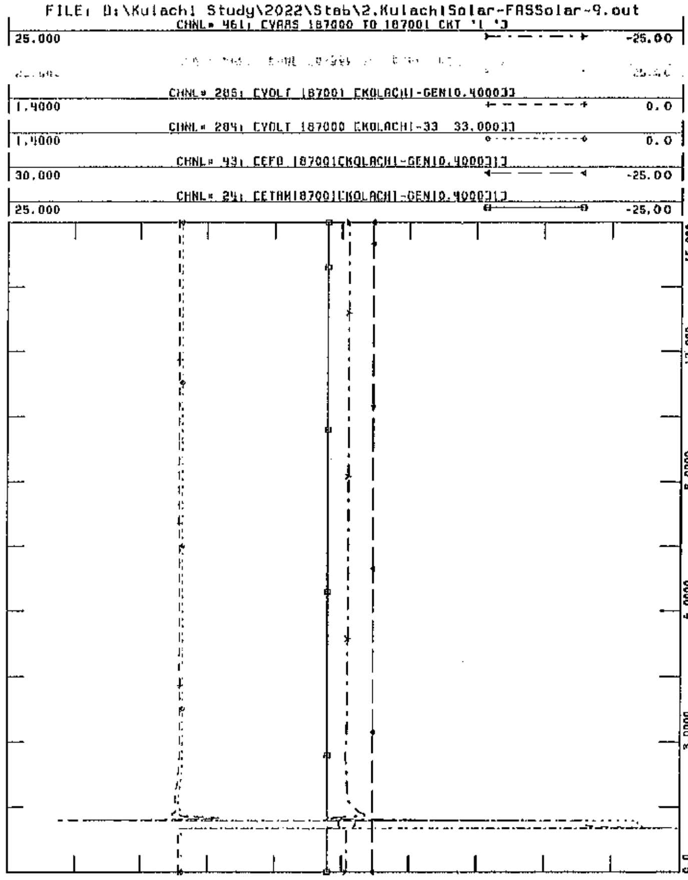
FRI, MAR 15 2018 15:11
NEARBY BUS FREQUENCY

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\2.KulachiSolar-FASSolar-9.out

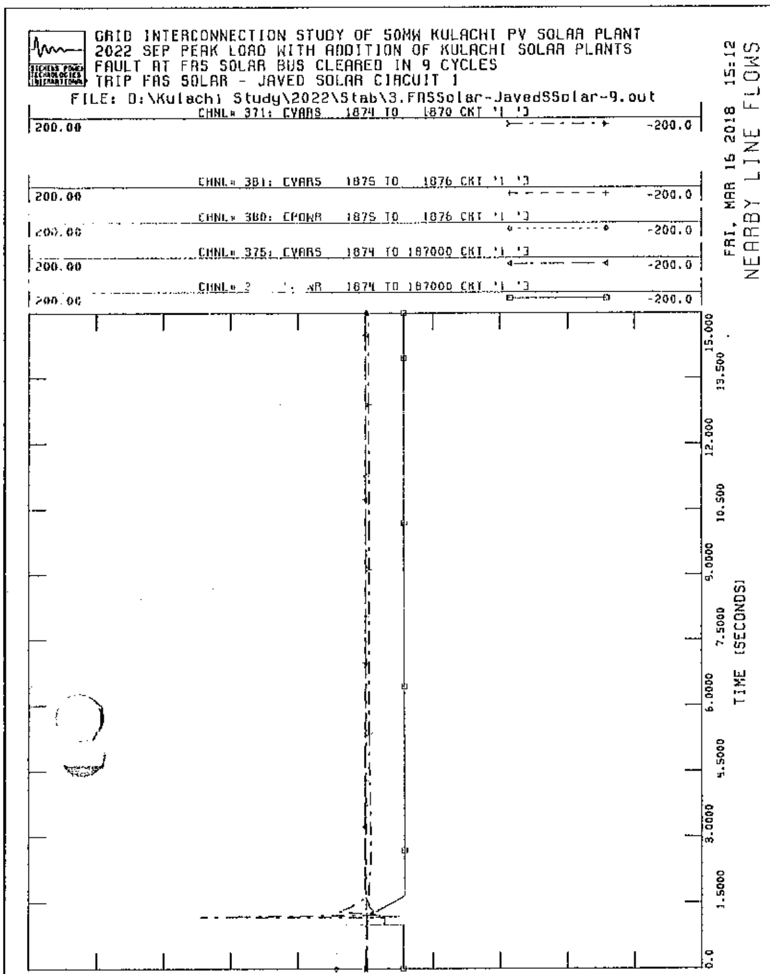


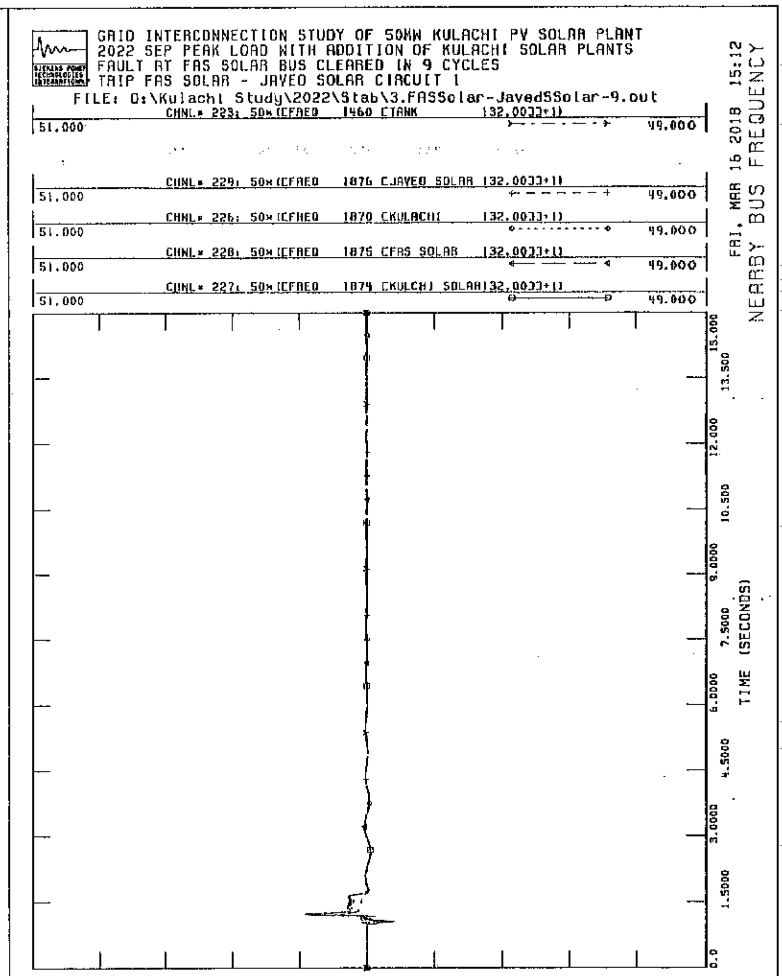
FRI, MAR 15 2018 15:11
NEARBY BUS VOLTAGES

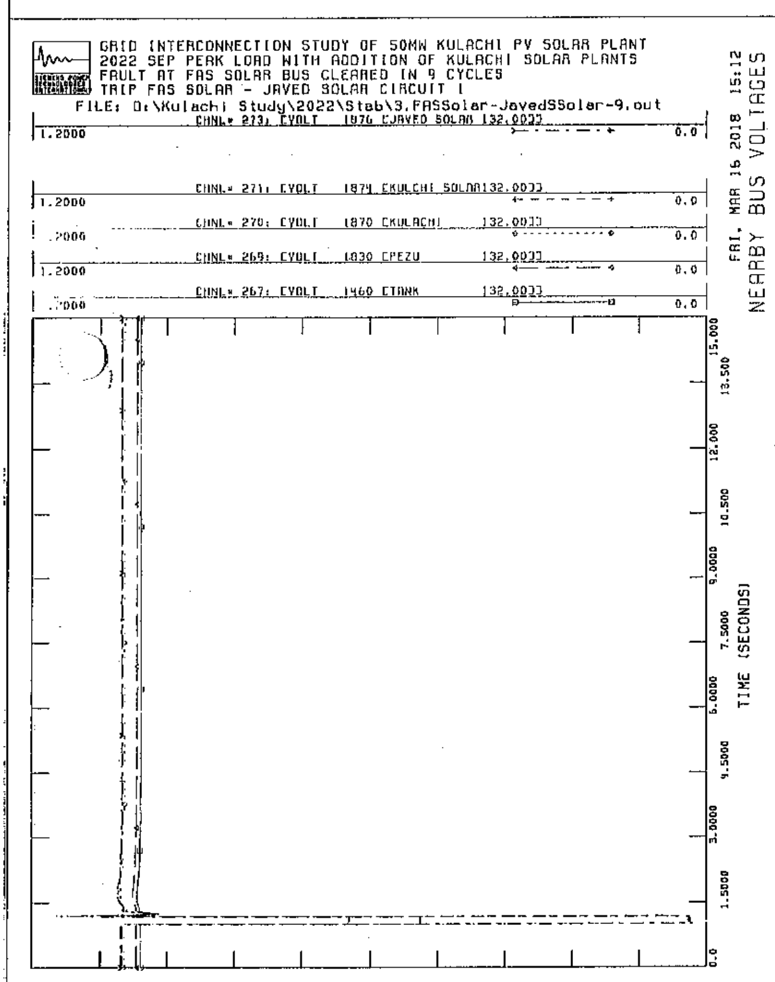
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI SOLAR BUS CLEARED IN 9 CYCLES
TRIP KULACHI SOLAR - FAS SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\2.KulachiSolar-FASSolar-9.out

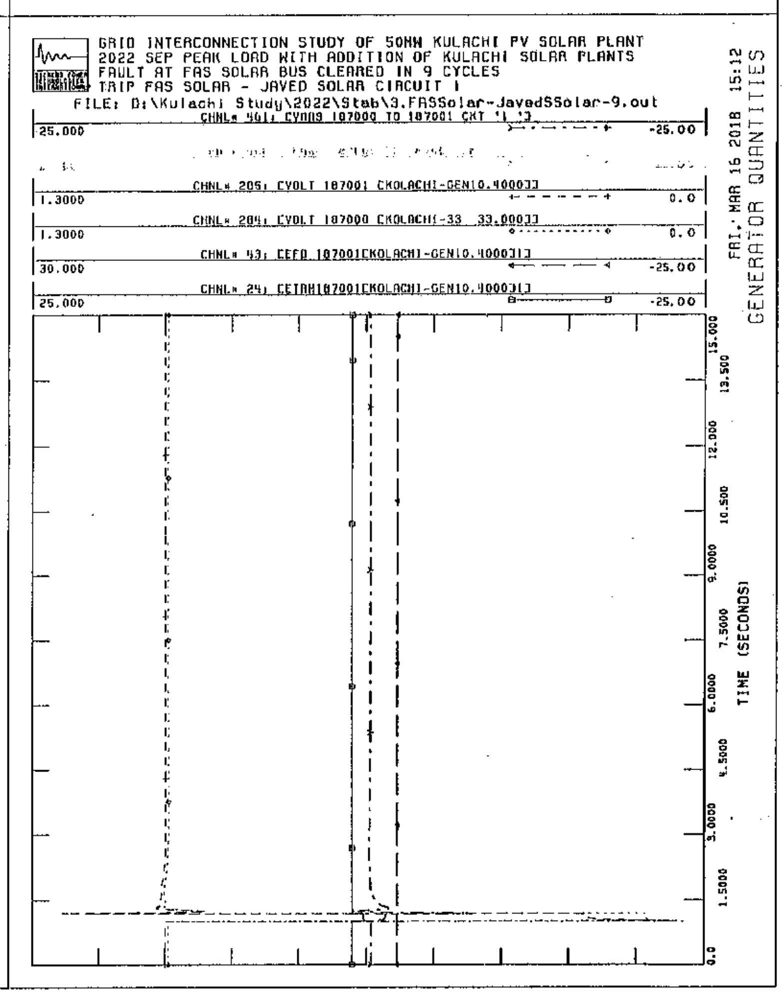


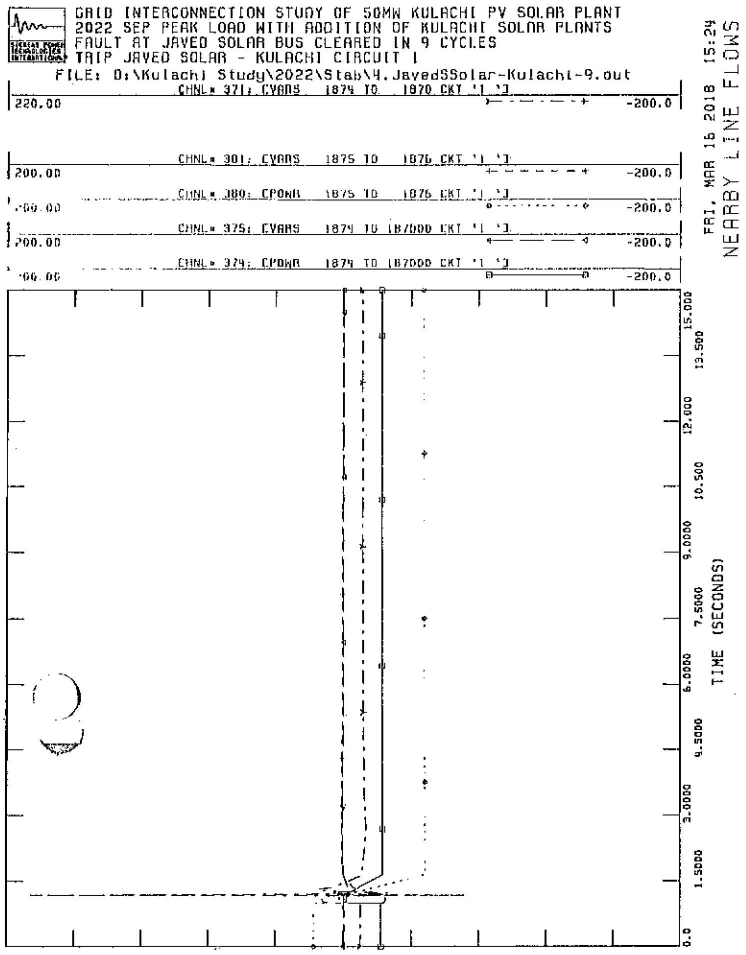
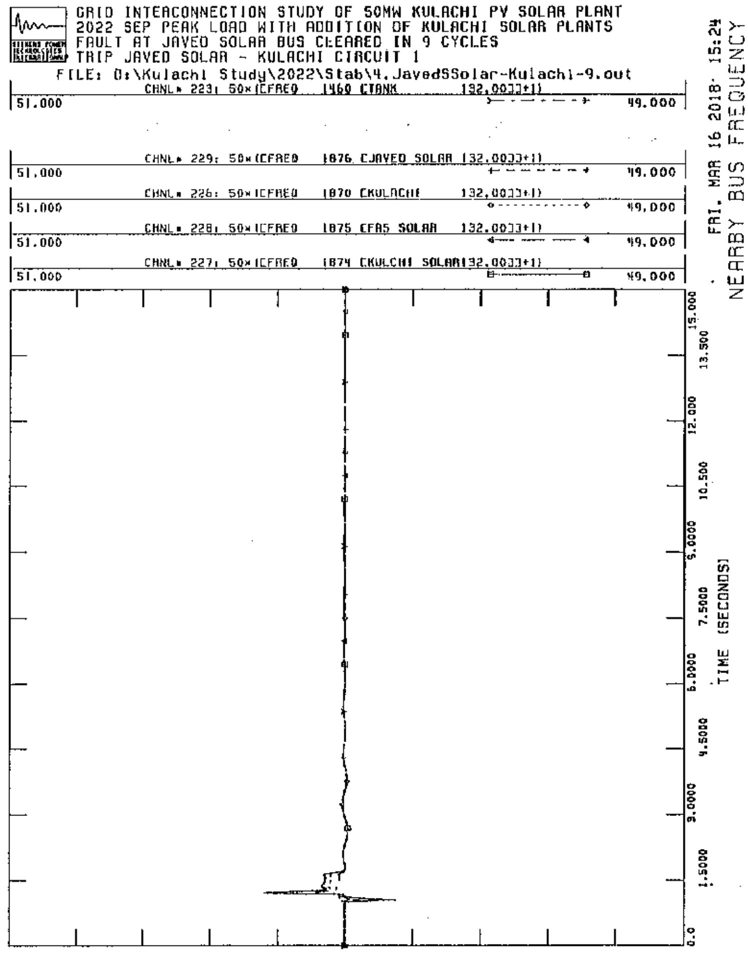
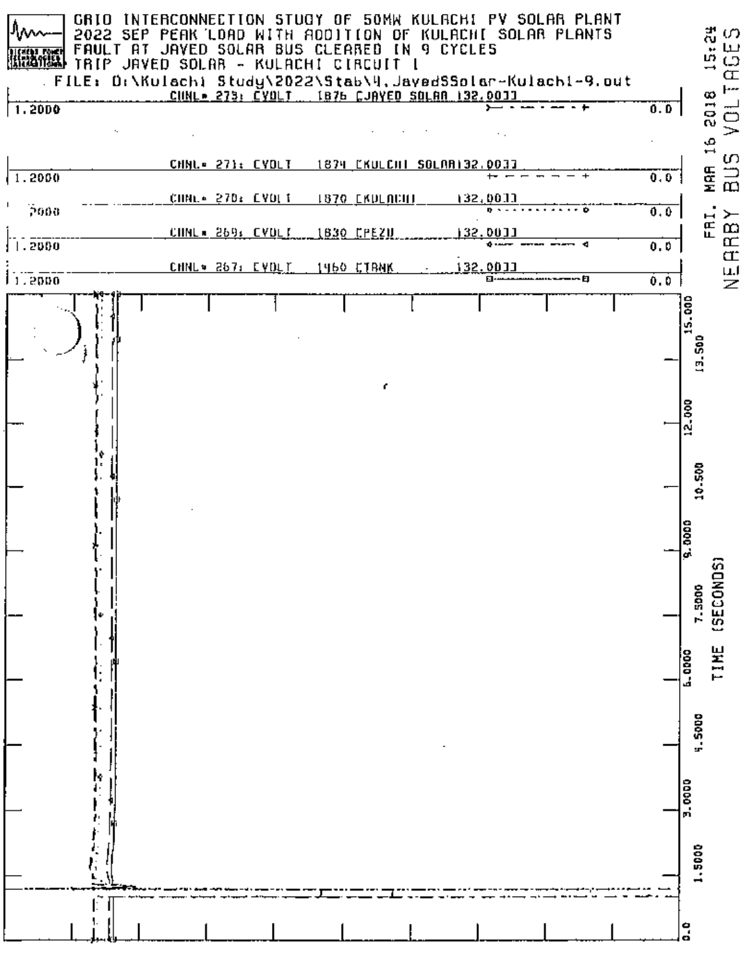
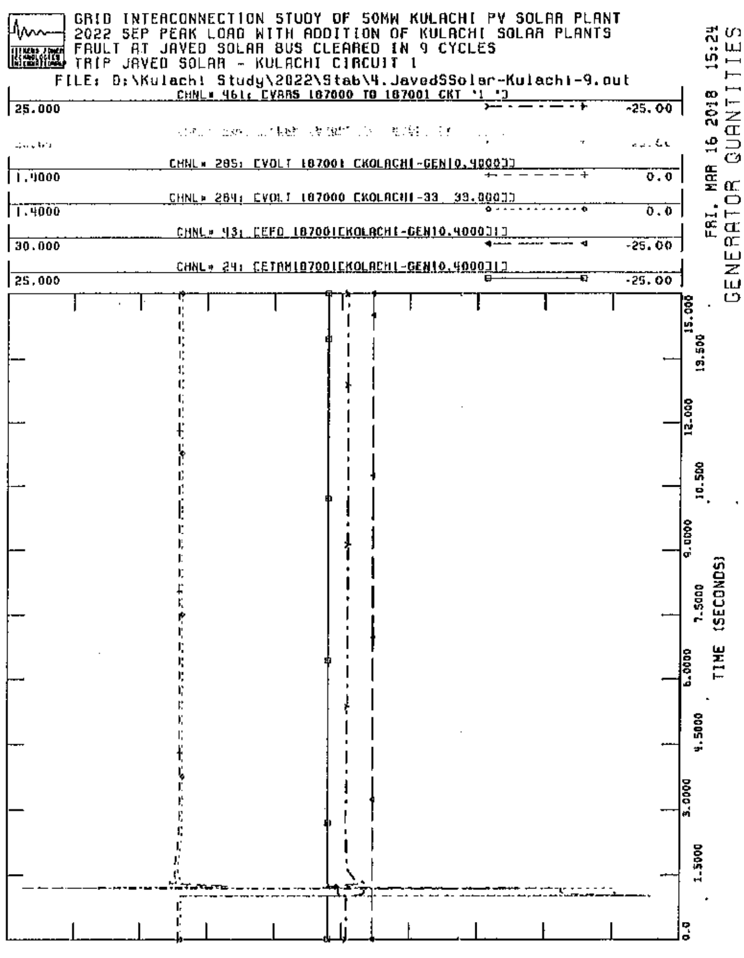
FRI, MAR 15 2018 15:11
GENERATOR QUANTITIES


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 9 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\3.FASSolar-JavedSSolar-9.out
CHNL# 371: CVARS 1874 TO 1870 CKT '1 '
200.00
-200.0
CHNL# 381: CVARS 1875 TO 1876 CKT '1 '
200.00
-200.0
CHNL# 380: CPOWR 1875 TO 1876 CKT '1 '
-200.0
CHNL# 375: CVARS 1874 TO 187000 CKT '1 '
200.00
-200.0
-200.0
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
FRI, MAR 16 2018 15:12
NEARBY LINE FLOWS


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 9 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\3.FASSolar-JavedSSolar-9.out
CHNL# 223: 50*(CFREQ 1460 CTANK 132.00]]+1)
51.000
49.000
CHNL# 229: 50*(CFREQ 1876 CJAVED SOLAR 132.00]]+1)
51.000
49.000
CHNL# 226: 50*(CFREQ 1870 CKULACHI 132.00]]+1)
51.000
49.000
CHNL# 228: 50*(CFREQ 1875 CFAS SOLAR 132.00]]+1)
51.000
49.000
CHNL# 227: 50*(CFREQ 1874 CKULCHI SOLAR]32.00]]+1)
51.000
49.000
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
FRI, MAR 16 2018 15:12
NEARBY BUS FREQUENCY


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 9 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\3.FASSolar-JavedSSolar-9.out
CHNL# 273: CVOLT 1876 CJAVED SOLAR 132.00]]
1.2000
0.0
CHNL# 271: CVOLT 1874 CKULCHI SOLAR132.00]]
1.2000
0.0
CHNL# 270: CVOLT 1870 CKULACHI 132.00]]
0.0
CHNL# 269: CVOLT 1830 CPEZU 132.00]]
1.2000
0.0
CHNL# 267: CVOLT 1460 CTANK 132.00]]
0.0
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
FRI, MAR 16 2018 15:12
NEARBY BUS VOLTAGES

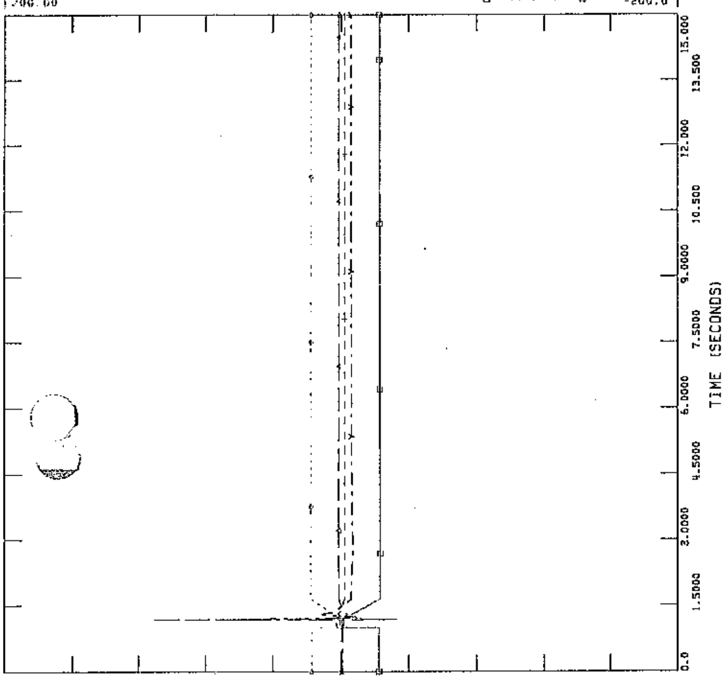

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT FAS SOLAR BUS CLEARED IN 9 CYCLES
TRIP FAS SOLAR - JAVED SOLAR CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\3.FASSolar-JavedSSolar-9.out
CHNL# 461: CVARS 187000 TO 187001 CKT '1 '
25.000
-25.00
CHNL# 205: CVOLT 187001 CKOLACHI-GEN10.400]]
1.3000
0.0
CHNL# 204: CVOLT 187000 CKOLACHI-33 33.000]]
1.3000
0.0
CHNL# 43: CEFD 187001CKOLACHI-GEN10.4000]1]
30.000
-25.00
CHNL# 24: CETRM187001CKOLACHI-GEN10.4000]1]
25.000
-25.00
TIME (SECONDS)
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
FRI, MAR 16 2018 15:12
GENERATOR QUANTITIES


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 9 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\4.JavedSSolar-Kulachi-9.out
CHNL# 371: CVARS 1874 TO 1870 CKT '1 '
220.00
-200.0
CHNL# 381: CVARS 1875 TO 1876 CKT '1 '
200.00
-200.0
CHNL# 380: CPOWR 1875 TO 1876 CKT '1 '
-200.0
CHNL# 375: CVARS 1874 TO 187000 CKT '1 '
200.00
-200.0
CHNL# 374: CPOWR 1874 TO 187000 CKT '1 '
-200.0
FRI, MAR 16 2018 15:24
NEARBY LINE FLOWS
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 9 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\4.JavedSSolar-Kulachi-9.out
CHNL# 223: 50*(CFREQ 1460 CTANK 132.00)+1)
51.000
49.000
CHNL# 229: 50*(CFREQ 1876 CJAVED SOLAR 132.00)+1)
51.000
49.000
CHNL# 226: 50*(CFREQ 1870 CKULACHI 132.00)+1)
51.000
49.000
CHNL# 228: 50*(CFREQ 1875 CFAS SOLAR 132.00)+1)
51.000
49.000
CHNL# 227: 50*(CFREQ 1874 CKULCHI SOLAR132.00)+1)
51.000
49.000
FRI, MAR 16 2018 15:24
NEARBY BUS FREQUENCY
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 9 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\4.JavedSSolar-Kulachi-9.out
CHNL# 273: CVOLT 1876 CJAVED SOLAR 132.00
1.2000
0.0
CHNL# 271: CVOLT 1874 CKULCHI SOLAR132.00
1.2000
0.0
CHNL# 270: CVOLT 1870 CKULACHI 132.00
0.0
CHNL# 269: CVOLT 1830 CPEZU 132.00
1.2000
0.0
CHNL# 267: CVOLT 1460 CTANK 132.00
1.2000
0.0
FRI, MAR 16 2018 15:24
NEARBY BUS VOLTAGES
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT JAVED SOLAR BUS CLEARED IN 9 CYCLES
TRIP JAVED SOLAR - KULACHI CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\4.JavedSSolar-Kulachi-9.out
CHNL# 461: CVARS 187000 TO 187001 CKT '1 '
25.000
-25.00
CHNL# 285: CVOLT 187001 CKOLACHI-GEN10.400
1.4000
0.0
CHNL# 284: CVOLT 187000 CKOLACHI-33 33.000
1.4000
0.0
CHNL# 43: CEFD 187001CKOLACHI-GEN10.400
30.000
-25.00
CHNL# 24: CETAM187001CKOLACHI-GEN10.400
25.000
-25.00
FRI, MAR 16 2018 15:24
GENERATOR QUANTITIES
TIME (SECONDS)

GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\5.Kulachi-Tank-9.out

FRI, MAR 16 2018 15:25
NEARBY LINE FLOWS

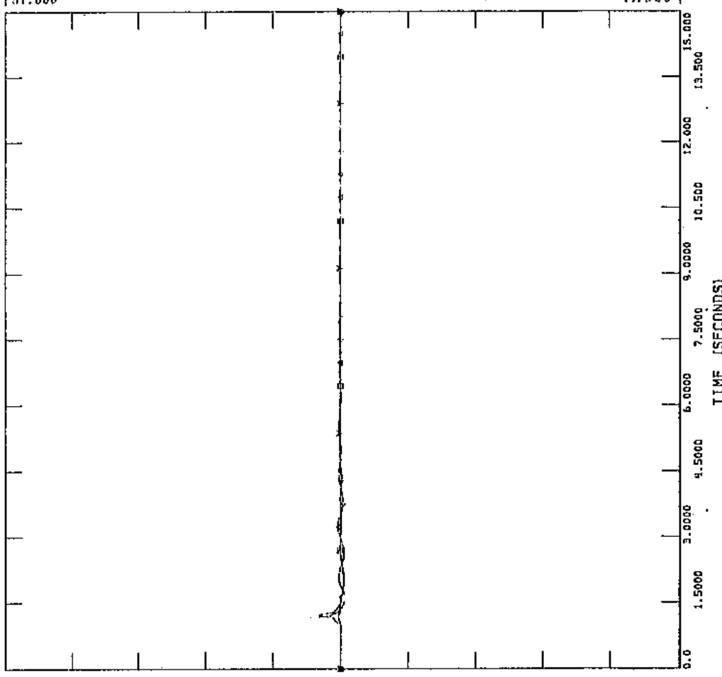
200.00	CHNL# 371: [VARS 1874 TO 1870 CKT '1 ']	-200.0
200.00	CHNL# 361: [VARS 1875 TO 1876 CKT '1 ']	-200.0
200.00	CHNL# 360: [POWR 1875 TO 1876 CKT '1 ']	-200.0
200.00	CHNL# 375: [VARS 1874 TO 187000 CKT '1 ']	-200.0
200.00	CHNL# 374: [POWR 1874 TO 187000 CKT '1 ']	-200.0



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\5.Kulachi-Tank-9.out

FRI, MAR 16 2018 15:25
NEARBY BUS FREQUENCY

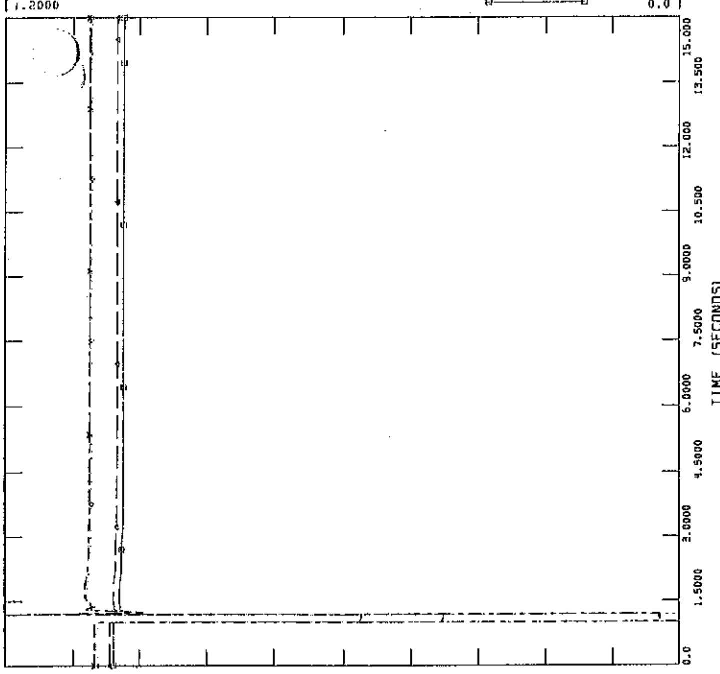
51.000	CHNL# 223: 50*(1+FREQ 1960 [TANK 132.00])	49.000
51.000	CHNL# 222: 50*(1+FREQ 1400 [BALAKOT 132.00])	49.000
51.000	CHNL# 225: 50*(1+FREQ 1830 [PEZU 132.00])	49.000
51.000	CHNL# 217: 50*(1+FREQ 1342 [BANNU-II 132.00])	49.000
51.000	CHNL# 218: 50*(1+FREQ 1380 [MANSEHRA 132.00])	49.000



GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\5.Kulachi-Tank-9.out

FRI, MAR 16 2018 15:24
NEARBY BUS VOLTAGES

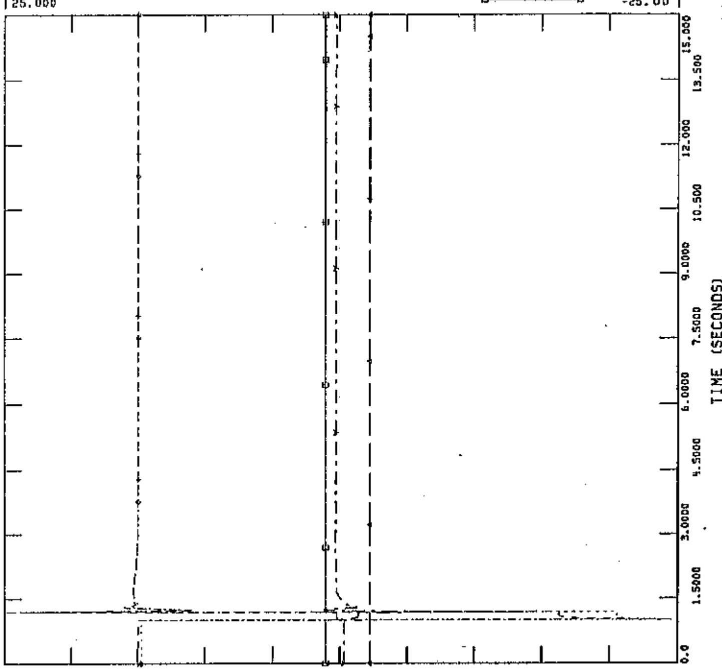
1.2000	CHNL# 273: [VOLT 1076 [JAVED SOLAR 132.00]]	0.0
1.2000	CHNL# 271: [VOLT 1074 [KULCHI SOLAR 132.00]]	0.0
1.2000	CHNL# 270: [VOLT 1870 [KULACHI 132.00]]	0.0
1.2000	CHNL# 269: [VOLT 1830 [PEZU 132.00]]	0.0
1.2000	CHNL# 267: [VOLT 1960 [TANK 132.00]]	0.0

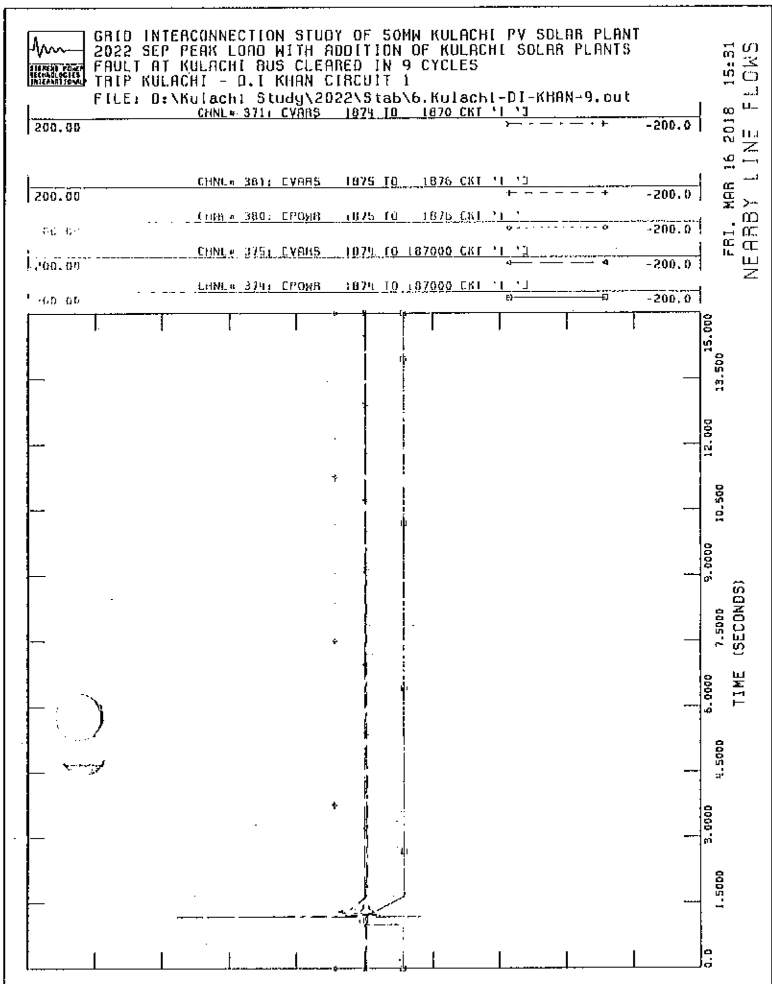


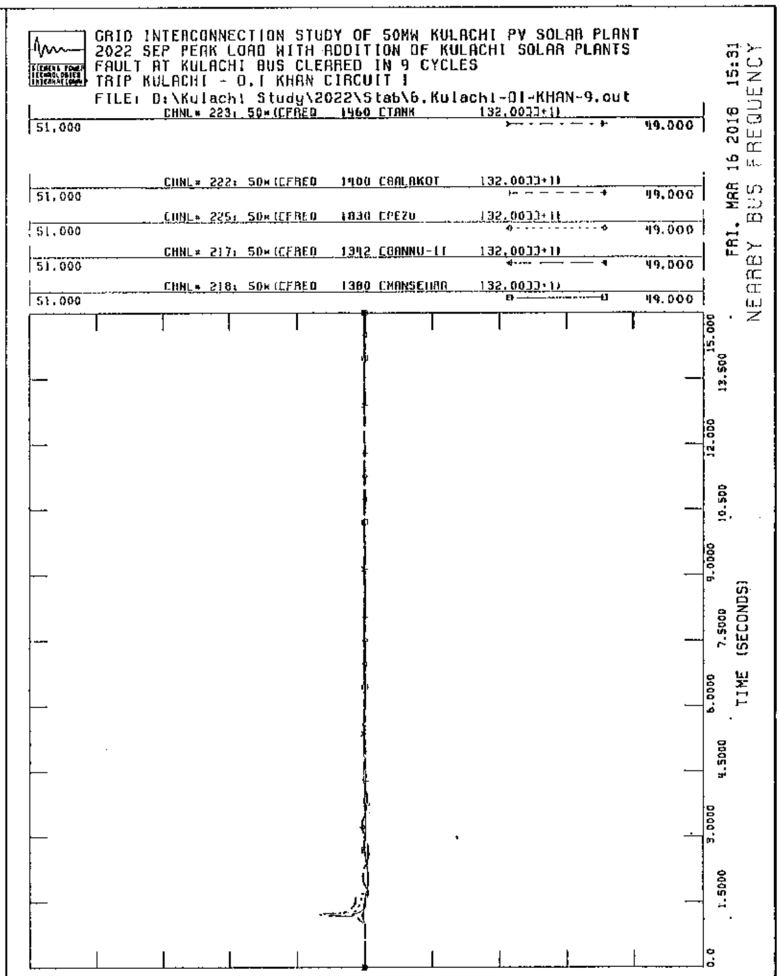
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - TANK CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\5.Kulachi-Tank-9.out

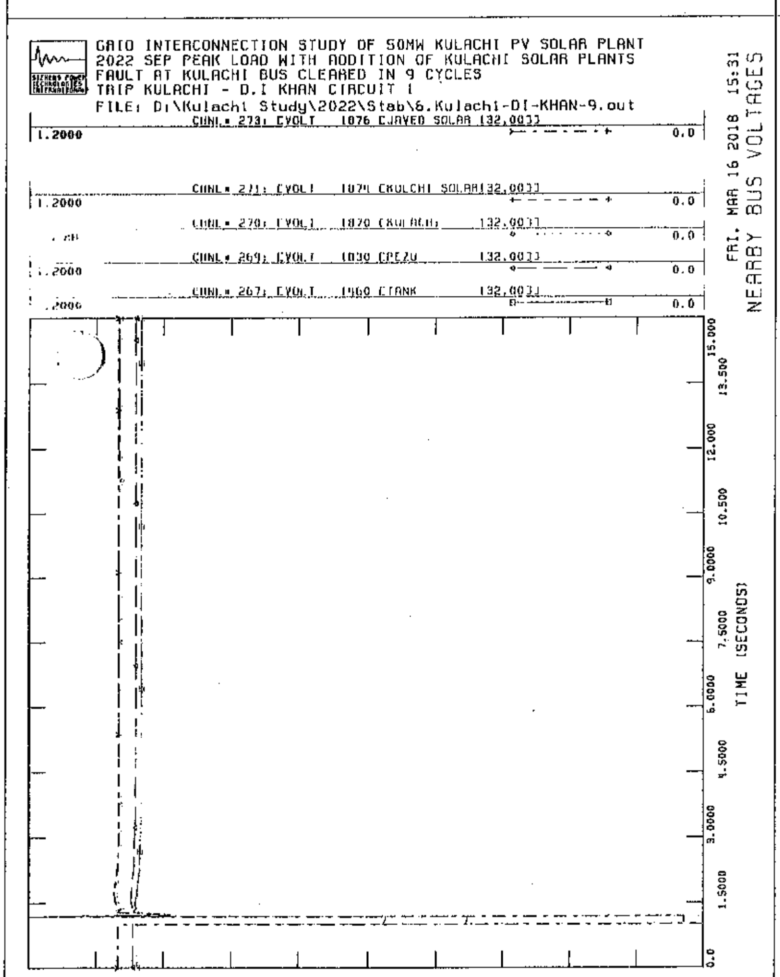
FRI, MAR 16 2018 15:25
GENERATOR QUANTITIES

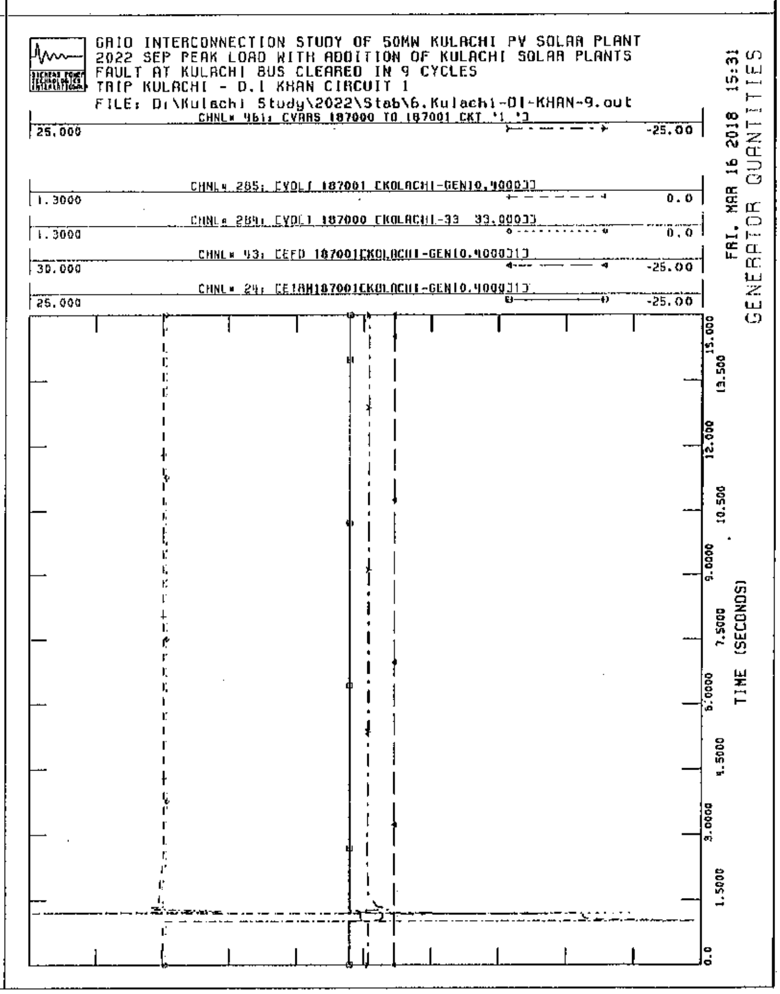
25.000	CHNL# 461: [VARS 187000 TO 187001 CKT '1 ']	-25.00
1.3000	CHNL# 285: [VOLT 187001 [KOLACHI-GEN 0.4000]]	0.0
1.3000	CHNL# 284: [VOLT 187000 [KOLACHI-33 33.000]]	0.0
30.000	CHNL# 43: [EFD 187001[KOLACHI-GEN 0.4000]1]	-25.00
25.000	CHNL# 24: [ETRM 187001[KOLACHI-GEN 0.4000]1]	-25.00




GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\6.Kulachi-DI-KHAN-9.out
CHNL# 371: [VARS 1874 TO 1870 CKT '1 ']
200.00
-200.0
CHNL# 381: [VARS 1875 TO 1876 CKT '1 ']
200.00
-200.0
CHNL# 380: [POWR 1875 TO 1876 CKT '1 ']
-200.0
CHNL# 375: [VARS 1874 TO 187000 CKT '1 ']
-200.0
CHNL# 374: [POWR 1874 TO 187000 CKT '1 ']
-200.0
FRI, MAR 16 2018 15:31
NEARBY LINE FLOWS
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\6.Kulachi-DI-KHAN-9.out
CHNL# 223: 50*(CFREQ 1960 CTANK 132.00]+1)
51.000
49.000
CHNL# 222: 50*(CFREQ 1400 CBALAKOT 132.00]+1)
51.000
49.000
CHNL# 225: 50*(CFREQ 1830 CPEZU 132.00]+1)
51.000
49.000
CHNL# 217: 50*(CFREQ 1342 CGANNU-II 132.00]+1)
51.000
49.000
CHNL# 218: 50*(CFREQ 1380 CMANSEHRA 132.00]+1)
51.000
49.000
FRI, MAR 16 2018 15:31
NEARBY BUS FREQUENCY
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\6.Kulachi-DI-KHAN-9.out
CHNL# 273: [VOLT 1876 [JAVED SOLAR 132.00]]
1.2000
0.0
CHNL# 271: [VOLT 1874 [KULCHI SOLAR132.00]]
1.2000
0.0
CHNL# 270: [VOLT 1870 [KULACHI 132.00]]
0.0
CHNL# 269: [VOLT 1830 [PEZU 132.00]]
1.2000
0.0
CHNL# 267: [VOLT 1960 [TANK 132.00]]
1.2000
0.0
FRI, MAR 16 2018 15:31
NEARBY BUS VOLTAGES
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)


GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
FAULT AT KULACHI BUS CLEARED IN 9 CYCLES
TRIP KULACHI - D.I KHAN CIRCUIT 1
FILE: D:\Kulachi Study\2022\Stab\6.Kulachi-DI-KHAN-9.out
CHNL# 461: [VARS 187000 TO 187001 CKT '1 ']
25.000
-25.00
CHNL# 285: [VOLT 187001 [KULACHI-GEN10.4000]]
1.3000
0.0
CHNL# 284: [VOLT 187000 [KULACHI-33 33.000]]
1.3000
0.0
CHNL# 43: [EFD 187001[KULACHI-GEN10.4000]1]
30.000
-25.00
CHNL# 24: [ETRM187001[KULACHI-GEN10.4000]1]
25.000
-25.00
FRI, MAR 16 2018 15:31
GENERATOR QUANTITIES
0.0
1.5000
3.0000
4.5000
6.0000
7.5000
9.0000
10.500
12.000
13.500
15.000
TIME (SECONDS)

Appendix G: Short circuit study for 2022 – 23 Year Scenario

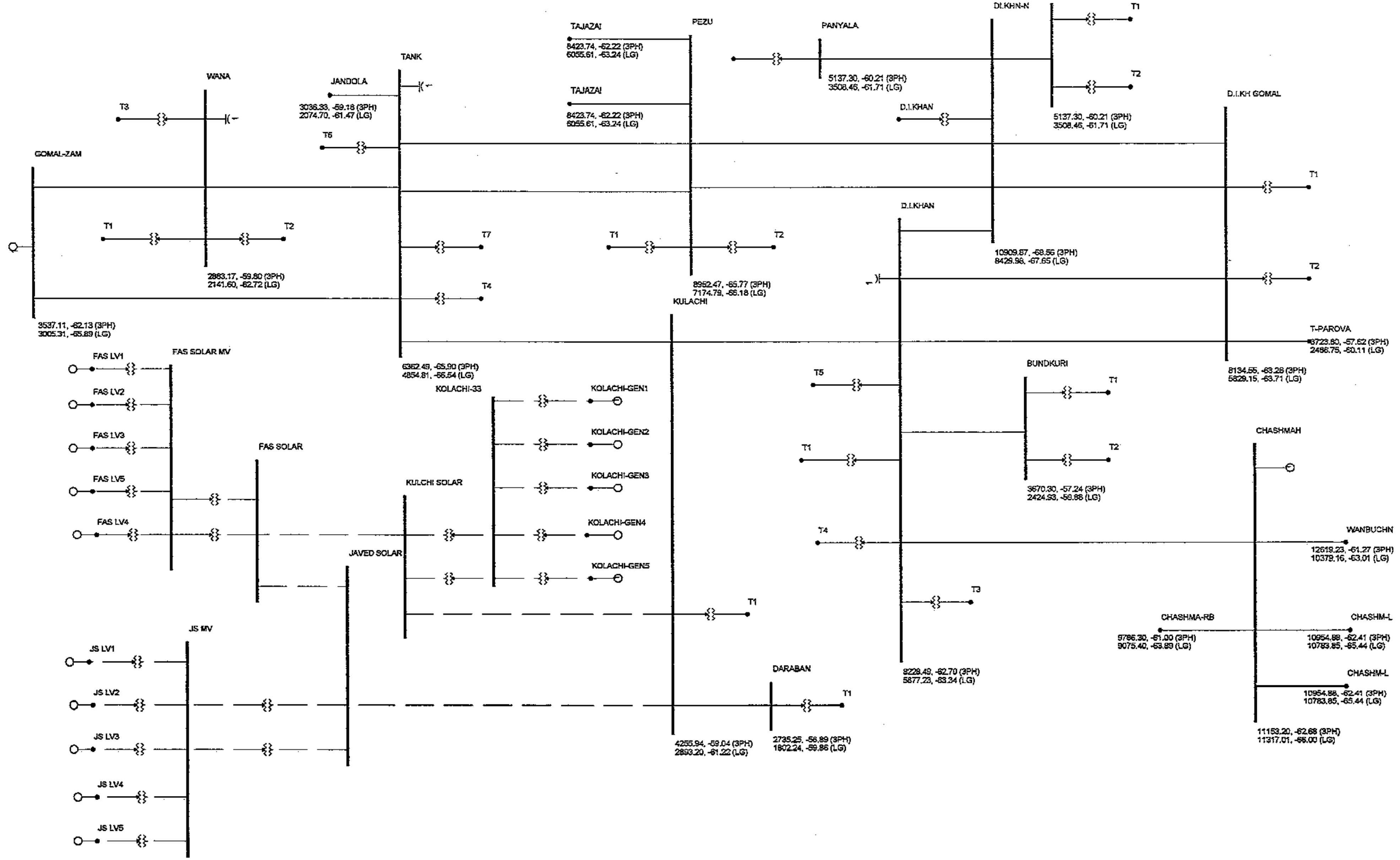
Appendix G1: Short Circuit Study Without Kulachi Solar Plant
Appendix G2: Short Circuit Study With Kulachi Solar Plant

Appendix G: Short circuit study for 2022 – 23 Year Scenario

Appendix G1: Short Circuit Study Without Kulachi Solar Plant

Short Circuit Study without Addition of 50MW Kulachi Solar PV IPP

2022-23 Year Scenario



```
                    PSS®E-32.2.0 ASCC SHORT CIRCUIT CURRENTS           MON, MAR 19 2018  14:25
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITHOUT ADDITION OF KULACHI SOLAR PLANTS
                    OUTPUT FOR AREA 1 [PESCO        ]

OPTIONS USED:
  - DC LINES AND FACTS DEVICES BLOCKED

                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1069 [DOBIAN       132.00] 3PH    3333.35   14579.6   -60.79
                            LG     2375.33   10389.4   -62.16
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/5.896/73.553, 3.38752  Z-:/5.897/73.555, 3.38797  Z0:/13.036/76.157, 4.05815
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1070 [MARDAN       132.00] 3PH    4812.22   21048.0   -66.23
                            LG     3761.62   16452.8   -66.57
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/4.083/78.972, 5.13095  Z-:/4.083/78.974, 5.13206  Z0:/7.503/79.677, 5.49005
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1071 [MARDAN III   132.00] 3PH    3620.09   15833.8   -58.56
                            LG     2455.01   10737.9   -60.78
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/5.418/70.940, 2.89442  Z-:/5.418/70.943, 2.89491  Z0:/13.145/74.993, 3.73016
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1072 [HUSSAI       132.00] 3PH    2352.24   10288.4   -58.44
                            LG     1612.90    7054.6   -60.51
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/8.354/71.194, 2.93651  Z-:/8.355/71.196, 2.93678  Z0:/19.863/75.011, 3.73482
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1074 [MARDAN II    132.00] 3PH    4116.66   18005.7   -65.41
                            LG     3078.01   13462.8   -65.85
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/4.773/78.170, 4.77405  Z-:/4.773/78.172, 4.77491  Z0:/9.605/79.046, 5.16689
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1075 [KATLANG      132.00] 3PH    1882.62    8234.3   -57.42
                            LG     1266.44    5539.2   -59.86
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/10.438/70.177, 2.77412  Z-:/10.438/70.178, 2.77432  Z0:/25.707/74.604, 3.63149
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1077 [MARDAN-SP    132.00] 3PH    4436.32   19403.9   -60.92
                            LG     3305.08   14456.0   -64.06
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/4.419/73.215, 3.31519  Z-:/4.420/73.218, 3.31588  Z0:/8.982/79.440, 5.36409
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1078 [DAGGAR       132.00] 3PH    2535.11   11088.2   -59.32
                            LG     1761.86    7706.1   -61.14
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/7.750/72.067, 3.09005  Z-:/7.751/72.069, 3.09036  Z0:/17.968/75.448, 3.85220
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1080 [SWABI        132.00] 3PH    1997.85    8738.3   -55.43
                            LG     1322.91    5786.2   -58.58
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/9.857/68.276, 2.50984  Z-:/9.858/68.277, 2.51002  Z0:/24.998/73.910, 3.46692
------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                /I/    AN(I)
X--------- BUS ----------X           MVA        AMP     DEG
 1090 [CHARSADA     132.00] 3PH    3610.91   15793.7   -61.62
                            LG     2418.67   10579.0   -62.50
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/5.427/73.835, 3.44995  Z-:/5.428/73.838, 3.45066  Z0:/13.455/75.426, 3.84627
```

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-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1095 [RAJJAR        132.00] 3PH            2139.12    9356.2   -57.32
                                LG            1370.26    5993.3   -60.02
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/9.160/69.495, 2.67395  Z-:/9.161/69.498, 2.67429  Z0:/24.614/74.206, 3.53543

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1100 [PPCCHARS      132.00] 3PH            3113.66   13618.7   -60.36
                                LG            2109.86    9228.3   -61.70
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/6.294/72.584, 3.18793  Z-:/6.295/72.587, 3.18849  Z0:/15.283/75.028, 3.73933

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1102 [GOMAT NAR     132.00] 3PH            1195.53    5229.1   -70.95
                                LG            1196.16    5231.9   -71.05
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/16.517/84.540, 10.46220  Z-:/16.517/84.540, 10.46248  Z0:/16.491/84.828,
11.04895

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1110 [TANGI         132.00] 3PH            2230.39    9755.4   -57.51
                                LG            1382.94    6048.8   -60.49
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/8.784/69.648, 2.69576  Z-:/8.785/69.650, 2.69615  Z0:/24.972/74.721, 3.66064

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1115 [SHABQDAR      132.00] 3PH            3158.87   13816.5   -65.80
                                LG            2115.68    9253.7   -65.64
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/6.201/77.907, 4.66745  Z-:/6.202/77.910, 4.66857  Z0:/15.373/77.622, 4.55655

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1117 [HASAN ZAI     132.00] 3PH            2480.89   10851.1   -61.31
                                LG            1620.01    7085.7   -62.66
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/7.896/73.436, 3.36215  Z-:/7.897/73.439, 3.36272  Z0:/20.491/75.812, 3.95554

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1118 [JALALA        132.00] 3PH            1553.11    6793.1   -55.29
                                LG            1070.69    4683.1   -57.43
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/12.731/68.645, 2.55757  Z-:/12.732/68.646, 2.55772  Z0:/29.973/72.597, 3.19033

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1119 [JABBAN PH     132.00] 3PH            1555.60    6804.0   -56.28
                                LG            1062.36    4646.6   -58.46
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/12.744/69.901, 2.73283  Z-:/12.745/69.902, 2.73299  Z0:/30.529/73.897, 3.46395

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1120 [DARGAI        132.00] 3PH            1558.94    6818.6   -57.12
                                LG            1144.27    5004.9   -60.19
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/12.824/71.398, 2.97115  Z-:/12.825/71.399, 2.97133  Z0:/26.838/77.395, 4.47205

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1122 [MALAKAND III132.00] 3PH              1540.18    6736.5   -56.80
                                LG            1123.85    4915.6   -60.05
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/12.986/71.093, 2.91962  Z-:/12.986/71.094, 2.91979  Z0:/27.498/77.411, 4.47788

-------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                    MVA       AMP      DEG
  1123 [DARGAI P      132.00] 3PH            1549.30    6776.4   -57.09
                                LG            1136.67    4971.6   -60.17
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/12.904/71.372, 2.96660  Z-:/12.904/71.373, 2.96670  Z0:/27.029/77.390, 4.46993
```

```
--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1124 [BATKHELA     132.00] 3PH            1710.00     7479.3    -57.98
                               LG           1203.13     5262.3    -60.06
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/11.646/72.026, 3.08246  Z-:/11.647/72.027, 3.08267  Z0:/26.394/75.925, 3.98854

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1125 [TIMERGARA    132.00] 3PH            1544.53     6755.6    -58.50
                               LG           1115.63     4879.6    -59.80
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.968/73.092, 3.28974  Z-:/12.968/73.093, 3.28994  Z0:/27.937/75.597, 3.89383

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1126 [MUNDA        132.00] 3PH             954.26     4173.8    -55.26
                               LG            649.73     2841.8    -57.65
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/20.989/69.858, 2.72637  Z-:/20.990/69.858, 2.72647  Z0:/50.568/74.216, 3.53776

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1127 [LAL QILA     132.00] 3PH             915.29     4003.4    -55.05
                               LG            620.89     2715.7    -57.51
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/21.883/69.645, 2.69536  Z-:/21.883/69.645, 2.69545  Z0:/53.084/74.136, 3.51881

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1130 [CHAKDARA     132.00] 3PH            2812.52    12301.6    -64.74
                               LG           2049.16     8962.7    -64.02
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.044/78.467, 4.90069  Z-:/7.045/78.468, 4.90131  Z0:/14.919/77.058, 4.35147

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1131 [CHAKDARA NEW132.00] 3PH             2883.76    12613.2    -66.29
                               LG           2117.43     9261.4    -65.05
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/6.862/79.953, 5.64430  Z-:/6.863/79.955, 5.64507  Z0:/14.318/77.511, 4.51492

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1135 [BARIKOT      132.00] 3PH            1285.87     5624.2    -57.76
                               LG            856.16     3744.7    -59.40
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/15.389/71.414, 2.97379  Z-:/15.390/71.415, 2.97394  Z0:/38.584/74.366, 3.57344

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1140 [SWAT         132.00] 3PH            1224.23     5354.6    -57.43
                               LG            812.43     3553.5    -59.20
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/16.164/71.089, 2.91885  Z-:/16.165/71.089, 2.91899  Z0:/40.770/74.267, 3.54970

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1142 [K.KHELA      132.00] 3PH             788.66     3449.5    -55.14
                               LG            512.03     2239.5    -57.87
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/25.091/68.804, 2.57862  Z-:/25.092/68.804, 2.57870  Z0:/65.859/73.611, 3.40017

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1144 [MADYAN       132.00] 3PH             581.38     2542.9    -54.06
                               LG            373.74     1634.7    -57.26
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/34.037/67.719, 2.44051  Z-:/34.038/67.719, 2.44057  Z0:/90.952/73.317, 3.33686

--------------------------------------------------------------------------------------------------------------------
                                            <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
  1146 [SHANGLAP     132.00] 3PH             545.57     2386.3    -53.87
                               LG            350.12     1531.4    -57.16
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/36.271/67.528, 2.41760  Z-:/36.272/67.529, 2.41765  Z0:/97.226/73.268, 3.32635
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-------------------------------------------------------------------------------------------------------------------------
                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1150 [JEHANGRA     132.00] 3PH        2444.11    10690.2   -56.13
                             LG         1731.68     7574.1   -59.30
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/8.027/68.595, 2.55102  Z-:/8.027/68.597, 2.55125  Z0:/17.980/74.604, 3.63144

-------------------------------------------------------------------------------------------------------------------------
                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1152 [GOLENGOL     132.00] 3PH         532.28     2328.1   -60.69
                             LG          654.72     2863.7   -62.17
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/39.190/80.335, 5.87167  Z-:/39.190/80.335, 5.87179  Z0:/17.348/88.520, 38.69643

-------------------------------------------------------------------------------------------------------------------------
                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1155 [AWT          132.00] 3PH        3902.47    17068.9   -58.14
                             LG         2685.36    11745.4   -60.20
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/5.025/70.507, 2.82508  Z-:/5.025/70.510, 2.82550  Z0:/11.868/74.318, 3.56191

-------------------------------------------------------------------------------------------------------------------------
                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1160 [NIZAMPUR     132.00] 3PH        3682.08    16104.9   -57.87
                             LG         2524.41    11041.4   -60.00
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/5.325/70.244, 2.78436  Z-:/5.326/70.247, 2.78476  Z0:/12.665/74.168, 3.52640

-------------------------------------------------------------------------------------------------------------------------
                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1165 [NOWSHCTY     132.00] 3PH        3049.77    13339.3   -58.17
                             LG         2091.56     9148.2   -60.48
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/6.427/70.435, 2.81372  Z-:/6.427/70.437, 2.81412  Z0:/15.278/74.685, 3.65165

-------------------------------------------------------------------------------------------------------------------------
                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1167 [RIDI- BEHRAM132.00] 3PH         4005.04    17517.5   -56.64
                             LG         2750.39    12029.9   -61.09
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/4.895/68.924, 2.59486  Z-:/4.895/68.928, 2.59533  Z0:/11.647/77.106, 4.36822

-------------------------------------------------------------------------------------------------------------------------
                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1168 [LOCOMOTV     132.00] 3PH        1953.59     8544.7   -56.19
                             LG         1296.37     5670.1   -59.19
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/10.033/68.448, 2.53191  Z-:/10.033/68.450, 2.53214  Z0:/25.340/73.823, 3.44709

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1169 [NOWSHR-N     132.00] 3PH        7213.94    31552.8   -66.59
                             LG         5606.18    24520.7   -67.01
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/2.716/78.820, 5.05940  Z-:/2.717/78.824, 5.06134  Z0:/5.053/79.684, 5.49404

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1170 [NOWSHR-I     132.00] 3PH        6555.24    28671.7   -62.51
                             LG         4678.34    20462.4   -63.50
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/2.990/74.759, 3.67034  Z-:/2.990/74.764, 3.67149  Z0:/6.589/76.650, 4.21398

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1172 [KAKASAIB     132.00] 3PH        2713.98    11870.6   -56.71
                             LG         1223.32     5350.6   -59.59
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/7.222/68.992, 2.60403  Z-:/7.223/68.994, 2.60432  Z0:/33.649/73.111, 3.29368

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/    AN(I)
X---------- BUS ----------X                 MVA        AMP     DEG
  1173 [CHOTA LAHOR 132.00] 3PH         2163.99     9465.0   -56.01
                             LG         1478.74     6467.8   -59.03
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/9.069/68.557, 2.54602  Z-:/9.070/68.558, 2.54623  Z0:/21.723/74.087, 3.50750
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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1175 [CHERATCE     132.00] 3PH     1925.87     8423.5    -55.50
                              LG    1256.33     5495.0    -58.59
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/10.176/67.754, 2.44476  Z-:/10.176/67.755, 2.44497  Z0:/26.497/73.217, 3.31562

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1180 [PABBI        132.00] 3PH     3988.96    17447.2    -63.85
                              LG    2654.42    11610.1    -64.10
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.912/75.981, 4.00507  Z-:/4.913/75.985, 4.00630  Z0:/12.320/76.431, 4.14320

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1182 [CHIRAT IND   132.00] 3PH     1691.13     7396.8    -57.30
                              LG    1082.37     4734.2    -59.95
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/11.586/69.433, 2.66516  Z-:/11.587/69.436, 2.66548  Z0:/31.177/74.060, 3.50132

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1183 [TARU JABA    132.00] 3PH     4064.13    17775.9    -63.36
                              LG    2713.16    11867.0    -63.75
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.821/75.477, 3.86038  Z-:/4.822/75.482, 3.86162  Z0:/12.021/76.192, 4.06884

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1185 [PESH CTY     132.00] 3PH     5565.64    24343.3    -66.17
                              LG    3910.90    17105.8    -65.72
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.519/78.236, 4.80191  Z-:/3.520/78.242, 4.80446  Z0:/7.985/77.381, 4.46679

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1187 [DALZAK       132.00] 3PH     4136.16    18091.0    -60.66
                              LG    2864.96    12531.0    -62.10
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.736/72.767, 3.22396  Z-:/4.737/72.772, 3.22488  Z0:/11.045/75.443, 3.85102

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1189 [SHAIBG-N     132.00] 3PH     6362.24    27827.6    -67.90
                              LG    5065.04    22153.8    -67.75
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.079/79.983, 5.66125  Z-:/3.080/79.988, 5.66438  Z0:/5.443/79.658, 5.47985

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1190 [SHAHIBAGH    132.00] 3PH     5254.03    22980.4    -66.77
                              LG    4032.27    17636.6    -66.56
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.728/78.847, 5.07239  Z-:/3.729/78.852, 5.07456  Z0:/7.116/78.407, 4.87469

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1191 [SHAHI BAG SP132.00] 3PH      6266.08    27407.0    -65.91
                              LG    4810.78    21041.7    -66.14
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.126/77.987, 4.69945  Z-:/3.127/77.993, 4.70191  Z0:/5.962/78.456, 4.89601

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1192 [SAKHI-CH     132.00] 3PH     3439.37    15043.3    -61.75
                              LG    2554.82    11174.4    -62.87
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/5.693/73.796, 3.44109  Z-:/5.694/73.800, 3.44196  Z0:/11.610/76.026, 4.01865

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                       /I/     AN(I)
X---------- BUS ----------X                  MVA        AMP      DEG
 1193 [WARSAK ROAD 132.00] 3PH      4579.13    20028.5    -67.31
                              LG    3341.04    14613.3    -66.89
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.277/79.388, 5.33731  Z-:/4.278/79.392, 5.33937  Z0:/9.032/78.564, 4.94325
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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1195 [PESCO COLONY132.00] 3PH           4506.96   19712.8   -66.24
                             LG           3235.46   14151.5   -66.13
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/4.346/78.306, 4.83124  Z-:/4.347/78.310, 4.83314  Z0:/9.468/78.105, 4.74756

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1196 [PESHFORT     132.00] 3PH          4262.70   18644.5   -66.21
                             LG           3054.97   13362.0   -66.09
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/4.595/78.270, 4.81629  Z-:/4.596/78.275, 4.81811  Z0:/10.043/78.039, 4.72047

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1200 [WARSAK P     132.00] 3PH          4221.13   18462.7   -64.33
                             LG           4248.92   18584.2   -67.14
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/4.636/76.316, 4.10702  Z-:/4.637/76.320, 4.10847  Z0:/4.578/84.801, 10.98995

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1210 [WARSAK       132.00] 3PH          3683.49   16111.1   -62.76
                             LG           3272.01   14311.4   -64.73
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/5.314/74.754, 3.66894  Z-:/5.314/74.758, 3.67001  Z0:/7.333/79.588, 5.44230

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1240 [JAMRUD-I     132.00] 3PH          6298.49   27548.8   -69.05
                             LG           4915.45   21499.5   -68.45
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/3.109/81.064, 6.35972  Z-:/3.110/81.071, 6.36448  Z0:/5.733/79.818, 5.56804

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1245 [HAYATABD     132.00] 3PH          5906.04   25832.2   -69.16
                             LG           4372.98   19126.8   -68.16
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/3.316/81.179, 6.44411  Z-:/3.317/81.186, 6.44897  Z0:/6.804/79.190, 5.23714

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1257 [R-BABA       132.00] 3PH          5883.40   25733.2   -67.92
                             LG           4221.60   18464.7   -67.17
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/3.329/79.949, 5.64211  Z-:/3.330/79.957, 5.64629  Z0:/7.260/78.513, 4.92079

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1260 [PESHCANT     132.00] 3PH          5154.62   22545.6   -65.40
                             LG           4075.30   17824.8   -65.65
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/3.800/77.451, 4.49257  Z-:/3.800/77.457, 4.49468  Z0:/6.818/77.974, 4.69413

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1261 [DI.KHN-N     132.00] 3PH          2494.33   10909.9   -68.56
                             LG           1927.35    8430.0   -67.65
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/7.846/80.302, 5.85116  Z-:/7.865/80.318, 5.86105  Z0:/14.756/78.408, 4.87517

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1262 [PANYALA      132.00] 3PH          1174.54    5137.3   -60.21
                             LG            802.14    3508.5   -61.71
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/16.663/71.953, 3.06919  Z-:/16.682/71.970, 3.07227  Z0:/39.873/74.692, 3.65330

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                                          <-SCMVA-> <-Sym I''k rms-->
                                                        /I/    AN(I)
X---------- BUS ----------X                  MVA         AMP     DEG
  1270 [PESH UNI     132.00] 3PH          5372.41   23498.2   -66.78
                             LG           4074.04   17819.3   -66.71
THEVENIN IMPEDANCE, X/R  (OHM)        Z+:/3.645/78.804, 5.05214  Z-:/3.646/78.810, 5.05507  Z0:/7.129/78.664, 4.98803
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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1280 [PESH.IND     132.00] 3PH                   5162.37    22579.5    -65.10
                              LG                   3612.10    15798.8    -65.08
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.794/77.128, 4.37614  Z-:/3.795/77.136, 4.37871  Z0:/8.677/77.087, 4.36175

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1290 [SH-MUHDI     132.00] 3PH                   6248.93    27332.0    -69.56
                              LG                   4845.36    21192.9    -69.32
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.134/81.576, 6.75232  Z-:/3.135/81.584, 6.75865  Z0:/5.857/81.071, 6.36504

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1291 [SHMUHDI-1    132.00] 3PH                   6024.45    26350.2    -69.56
                              LG                   4681.88    20477.9    -69.39
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.251/81.570, 6.74779  Z-:/3.252/81.578, 6.75412  Z0:/6.046/81.214, 6.47013

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1293 [BADABER      132.00] 3PH                   4362.54    19081.1    -67.91
                              LG                   2995.31    13101.1    -67.16
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.489/79.947, 5.64052  Z-:/4.491/79.952, 5.64352  Z0:/10.637/78.569, 4.94561

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1294 [MATANI       132.00] 3PH                   2706.03    11835.8    -58.59
                              LG                   1795.64     7853.9    -60.77
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.237/70.582, 2.83676  Z-:/7.238/70.589, 2.83788  Z0:/18.262/74.490, 3.60332

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1300 [KOHAT        132.00] 3PH                   4179.61    18281.1    -61.03
                              LG                   2748.68    12022.4    -61.94
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.685/72.979, 3.26651  Z-:/4.687/72.995, 3.26985  Z0:/12.003/74.594, 3.62909

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1302 [GURGURI      132.00] 3PH                   1747.23     7642.2    -58.57
                              LG                   1122.83     4911.1    -60.84
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/11.193/70.293, 2.79187  Z-:/11.216/70.315, 2.79513  Z0:/29.875/74.255, 3.54697

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1305 [KOHATCEM     132.00] 3PH                   2598.61    11366.0    -57.94
                              LG                   1676.84     7334.3    -60.02
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.536/69.888, 2.73087  Z-:/7.537/69.899, 2.73246  Z0:/19.978/73.539, 3.38449

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1306 [K.T SHIP     132.00] 3PH                   3663.21    16022.4    -60.15
                              LG                   2399.32    10494.3    -61.44
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/5.345/72.097, 3.09546  Z-:/5.348/72.112, 3.09820  Z0:/13.795/74.377, 3.57601

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1307 [GUMBAT       132.00] 3PH                   1369.15     5988.5    -55.50
                              LG                    906.28     3964.0    -58.73
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/14.302/67.455, 2.40891  Z-:/14.304/67.461, 2.40961  Z0:/36.296/73.222, 3.31685

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                                                    <-SCMVA-> <-Sym I''k rms-->
                                                                  /I/     AN(I)
X---------- BUS ----------X                           MVA         AMP      DEG
  1312 [HANGU        132.00] 3PH                   1846.26     8075.3    -57.12
                              LG                   1184.05     5178.9    -59.82
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/10.601/68.996, 2.60456  Z-:/10.609/69.008, 2.60624  Z0:/28.422/73.702, 3.42012
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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1315 [TALL          132.00] 3PH         1997.03    8734.7   -61.12
                                LG        1291.72    5649.8   -62.49
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/9.794/72.871, 3.24473  Z-:/9.814/72.885, 3.24745  Z0:/25.827/75.288, 3.80852

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1320 [LACHI         132.00] 3PH         1269.19    5551.3   -55.46
                                LG         808.01    3534.1   -58.88
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/15.416/67.239, 2.38349  Z-:/15.431/67.258, 2.38561  Z0:/41.891/73.166, 3.30510

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1332 [BANNU-N       132.00] 3PH         3572.66   15626.3   -70.32
                                LG        2617.75   11449.7   -69.22
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/5.466/81.697, 6.85211  Z-:/5.540/81.692, 6.84772  Z0:/11.378/79.547, 5.42039

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1335 [KARAK         132.00] 3PH         1378.89    6031.1   -57.84
                                LG         894.88    3914.1   -60.48
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/14.172/69.354, 2.65396  Z-:/14.221/69.398, 2.66016  Z0:/37.170/73.988, 3.48468

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1336 [SABIR ABAD    132.00] 3PH          740.28    3237.9   -55.66
                                LG         472.06    2064.7   -59.18
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/26.397/67.178, 2.37630  Z-:/26.446/67.205, 2.37952  Z0:/71.516/73.280, 3.32891

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1338 [SIRAJ BABA    132.00] 3PH          977.55    4275.7   -56.47
                                LG         627.35    2744.0   -59.66
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/19.990/67.986, 2.47329  Z-:/20.039/68.020, 2.47760  Z0:/53.524/73.537, 3.38406

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1340 [BANNU         132.00] 3PH         1704.28    7454.3   -68.33
                                LG        1105.57    4835.6   -66.18
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/11.458/79.696, 5.50051  Z-:/11.531/79.707, 5.50645  Z0:/30.028/75.905, 3.98274

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1342 [BANNU-II      132.00] 3PH         2103.11    9198.7   -69.04
                                LG        1389.07    6075.6   -66.66
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/9.285/80.416, 5.92257  Z-:/9.359/80.424, 5.92723  Z0:/23.560/76.137, 4.05210

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1345 [S.NURANG      132.00] 3PH         1656.32    7244.5   -60.32
                                LG        1125.88    4924.5   -61.99
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/11.797/71.779, 3.03779  Z-:/11.848/71.832, 3.04729  Z0:/28.437/74.810, 3.68306

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1360 [ABBOTABD      132.00] 3PH         2910.85   12731.7   -62.21
                                LG        2309.28   10100.5   -63.22
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/6.757/74.847, 3.69254  Z-:/6.757/74.848, 3.69280  Z0:/12.041/76.979, 4.32431

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                                         <-SCMVA-> <-Sym I''k rms-->
                                                      /I/     AN(I)
X---------- BUS ----------X                 MVA       AMP      DEG
  1361 [ATHMUQAM      132.00] 3PH         1940.38    8487.0   -73.44
                                LG        1875.23    8202.0   -70.03
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/10.169/86.905, 18.49623  Z-:/10.169/86.906, 18.49735  Z0:/11.329/77.363, 4.46007
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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1365 [HAVELIAN     132.00] 3PH              2359.97   10322.2   -51.04
                              LG             1464.19    6404.2   -57.03
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/8.326/63.583, 2.01302  Z-:/8.326/63.585, 2.01315  Z0:/23.762/73.775, 3.43652

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1370 [AYUB M.C     132.00] 3PH              2483.12   10860.8   -60.45
                              LG             1859.58    8133.5   -61.69
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/7.922/73.102, 3.29187  Z-:/7.922/73.103, 3.29207  Z0:/15.897/75.571, 3.88644

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1375 [NATIAGLI     132.00] 3PH              1273.69    5571.0   -56.53
                              LG              876.69    3834.5   -59.14
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/15.442/69.168, 2.62814  Z-:/15.442/69.169, 2.62822  Z0:/36.479/73.986, 3.48426

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1379 [MANSHR-N     132.00] 3PH              3780.32   16534.6   -68.46
                              LG             3313.50   14492.8   -67.58
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/5.206/81.165, 6.43379  Z-:/5.206/81.166, 6.43441  Z0:/7.408/79.032, 5.15989

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1380 [MANSEHRA     132.00] 3PH              3008.24   13157.7   -64.79
                              LG             2422.81   10597.1   -64.45
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/6.540/77.456, 4.49433  Z-:/6.540/77.457, 4.49463  Z0:/11.280/76.718, 4.23615

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1385 [OGHI         132.00] 3PH              2256.76    9870.7   -61.78
                              LG             1694.01    7409.4   -62.21
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/8.720/74.483, 3.60171  Z-:/8.720/74.484, 3.60188  Z0:/17.411/75.340, 3.82258

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1390 [BATAL        132.00] 3PH               872.73    3817.2   -55.74
                              LG              582.17    2546.3   -58.49
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/22.549/68.442, 2.53117  Z-:/22.549/68.443, 2.53121  Z0:/56.404/73.386, 3.35135

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1391 [DBR-KHWR     132.00] 3PH              1570.78    6870.4   -69.54
                              LG             1718.37    7515.9   -69.02
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/12.824/86.616, 16.91245  Z-:/12.825/86.616, 16.91301  Z0:/9.524/84.691, 10.76181

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1392 [KHANKHWR     132.00] 3PH              1708.18    7471.4   -70.03
                              LG             1466.57    6414.6   -61.72
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/11.729/86.342, 15.64268  Z-:/11.729/86.342, 15.64328  Z0:/18.094/67.216, 2.38073

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1393 [ALAI-KHR     132.00] 3PH              2143.01    9373.2   -71.57
                              LG             2011.00    8795.8   -64.76
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/9.302/87.183, 20.31937  Z-:/9.302/87.183, 20.32063  Z0:/11.480/69.283, 2.64402

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                                             <-SCMVA-> <-Sym I''k rms-->
                                                            /I/    AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
 1394 [THAKOT       132.00] 3PH               416.95    1823.7   -53.77
                              LG              268.76    1175.5   -57.44
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/47.197/66.466, 2.29606  Z-:/47.197/66.466, 2.29608  Z0:/125.608/72.905, 3.25157
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1398 [KYALKHWR    132.00] 3PH        1464.90     6407.3    -69.32
                            LG        1622.71     7097.5    -69.32
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/13.744/86.359, 15.71430  Z-:/13.744/86.359, 15.71475  Z0:/9.734/86.367, 15.74996

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1400 [BALAKOT     132.00] 3PH        2594.65    11348.6    -66.02
                            LG        2014.16     8809.7    -65.61
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.568/78.472, 4.90303  Z-:/7.569/78.473, 4.90331  Z0:/14.113/77.624, 4.55753

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1410 [HARIPUR     132.00] 3PH        3870.48    16928.9    -58.14
                            LG        2571.98    11249.5    -60.00
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/5.072/70.644, 2.84663  Z-:/5.073/70.646, 2.84694  Z0:/12.763/73.983, 3.48340

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1411 [TARNAWAN    132.00] 3PH        3019.51    13206.9    -57.00
                            LG        1549.80     6778.6    -59.61
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/6.500/69.483, 2.67219  Z-:/6.500/69.485, 2.67242  Z0:/25.012/73.451, 3.36530

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1415 [HARIPUR-II  132.00] 3PH        2079.20     9094.1    -56.55
                            LG        1393.90     6096.8    -59.04
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.448/69.100, 2.61878  Z-:/9.448/69.101, 2.61892  Z0:/23.415/73.605, 3.39881

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1420 [HATTAR      132.00] 3PH        3407.51    14904.0    -57.06
                            LG        2315.20    10126.4    -59.40
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/5.760/69.559, 2.68306  Z-:/5.760/69.561, 2.68333  Z0:/13.929/73.836, 3.45013

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1421 [BEST-W-C    132.00] 3PH        2323.05    10160.7    -55.52
                            LG        1543.21     6749.8    -58.36
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.448/68.025, 2.47814  Z-:/8.449/68.026, 2.47831  Z0:/21.293/73.121, 3.29577

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1422 [SADI-C-F    132.00] 3PH        2453.18    10729.9    -55.71
                            LG        1634.02     7147.0    -58.48
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.000/68.209, 2.50137  Z-:/8.001/68.211, 2.50155  Z0:/20.066/73.204, 3.31297

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1440 [TARBELA-R   132.00] 3PH        2089.71     9140.1    -55.39
                            LG        1386.03     6062.3    -58.61
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.426/68.227, 2.50362  Z-:/9.427/68.229, 2.50380  Z0:/23.836/73.986, 3.48426

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1442 [GHAZI-IS    132.00] 3PH        2540.56    11112.1    -56.10
                            LG        1700.00     7435.6    -59.02
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.747/68.860, 2.58613  Z-:/7.747/68.861, 2.58635  Z0:/19.273/74.127, 3.51677

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP       DEG
 1445 [G.AMAZAI    132.00] 3PH        2185.37     9558.5    -55.59
                            LG        1457.50     6374.9    -58.77
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.018/68.467, 2.53431  Z-:/9.018/68.468, 2.53450  Z0:/22.578/74.192, 3.53208
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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1448 [PEHUR POWER 132.00] 3PH             1835.00     8026.0    -55.03
                           LG              1217.61     5325.7    -58.49
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/10.750/67.981, 2.47274  Z-:/10.750/67.982, 2.47289  Z0:/27.172/74.171, 3.52700

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1450 [TARBELA-N   132.00] 3PH             2235.25     9776.7    -55.62
                           LG              1485.95     6499.3    -58.72
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/8.808/68.411, 2.52708  Z-:/8.808/68.412, 2.52727  Z0:/22.178/73.983, 3.48351

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1455 [NAUSERY     132.00] 3PH             1454.13     6360.2    -62.59
                           LG              1141.30     4991.9    -64.42
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/13.427/74.419, 3.58630  Z-:/13.427/74.420, 3.58639  Z0:/24.496/78.266, 4.81424

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1457 [HATTIAN     132.00] 3PH             1286.81     5628.3    -56.15
                           LG               865.75     3786.7    -58.87
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/15.267/68.682, 2.56245  Z-:/15.267/68.682, 2.56252  Z0:/37.603/73.625, 3.40309

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1460 [TANK        132.00] 3PH             1454.66     6362.5    -65.90
                           LG              1109.96     4854.8    -66.54
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/13.437/77.425, 4.48294  Z-:/13.456/77.449, 4.49169  Z0:/25.939/78.729, 5.01761

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1461 [GOMAL-ZAM   132.00] 3PH              808.69     3537.1    -62.13
                           LG               687.11     3005.3    -65.89
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/24.108/73.443, 3.36363  Z-:/24.112/73.471, 3.36960  Z0:/37.141/82.088, 7.19565

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1792 [KURRAM GAHRI132.00] 3PH             1031.73     4512.6    -62.33
                           LG               655.86     2868.6    -62.79
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/18.927/73.695, 3.41871  Z-:/19.000/73.725, 3.42527  Z0:/51.398/74.494, 3.60450

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1830 [PEZU        132.00] 3PH             2046.81     8952.5    -65.77
                           LG              1640.38     7174.8    -66.18
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/9.555/77.365, 4.46094  Z-:/9.579/77.400, 4.47363  Z0:/16.634/78.229, 4.79883

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1870 [KULACHI     132.00] 3PH              973.04     4255.9    -59.04
                           LG               661.47     2893.2    -61.22
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/20.102/70.680, 2.85228  Z-:/20.119/70.698, 2.85522  Z0:/48.543/74.660, 3.64543

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1880 [DARABAN     132.00] 3PH              625.36     2735.3    -56.89
                           LG               412.05     1802.2    -59.86
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/31.278/68.524, 2.54179  Z-:/31.295/68.537, 2.54349  Z0:/79.987/73.816, 3.44563

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                                            <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                   MVA        AMP      DEG
 1890 [BUNDKURI    132.00] 3PH              839.14     3670.3    -57.24
                           LG               554.41     2424.9    -59.88
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/23.333/69.025, 2.60854  Z-:/23.348/69.039, 2.61035  Z0:/59.354/73.744, 3.42942
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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  1940 [DOABA        132.00] 3PH      1180.38     5162.8   -56.43
                             LG        750.98     3284.7   -59.52
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/16.576/68.241, 2.50541  Z-:/16.589/68.252, 2.50679  Z0:/45.080/73.598, 3.39731

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  1941 [SHKDRA       132.00] 3PH      1969.26     8613.3   -56.56
                             LG       1260.60     5513.7   -59.42
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.941/68.450, 2.53210  Z-:/9.947/68.464, 2.53399  Z0:/26.742/73.427, 3.36026

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2000 [JAGRAN-III   132.00] 3PH      1640.73     7176.3   -69.97
                             LG       1513.37     6619.3   -67.93
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.026/83.444, 8.70131  Z-:/12.026/83.444, 8.70161  Z0:/15.101/78.130, 4.75782

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2005 [JHING-I      132.00] 3PH      1369.42     5989.7   -60.72
                             LG       1120.33     4900.2   -63.85
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/14.297/72.820, 3.23445  Z-:/14.297/72.820, 3.23452  Z0:/23.927/79.694, 5.49929

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2006 [JHING-II     132.00] 3PH      1334.36     5836.3   -60.73
                             LG       1080.98     4728.0   -63.73
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/14.667/72.789, 3.22832  Z-:/14.667/72.790, 3.22839  Z0:/25.067/79.297, 5.29074

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2009 [LUAT         132.00] 3PH      1570.88     6870.8   -72.23
                             LG       1584.28     6929.4   -71.27
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.567/85.771, 13.52387  Z-:/12.567/85.771, 13.52442  Z0:/12.259/82.847, 7.96799

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2014 [MZ.ABAD-II   132.00] 3PH      2343.39    10249.7   -67.42
                             LG       1933.85     8458.4   -67.56
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.360/79.567, 5.43105  Z-:/8.361/79.568, 5.43130  Z0:/13.672/79.876, 5.60026

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2015 [MUZAFBAD     132.00] 3PH      2125.55     9296.9   -62.64
                             LG       1645.03     7195.1   -63.63
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.225/74.909, 3.70839  Z-:/9.225/74.909, 3.70853  Z0:/17.315/76.961, 4.31798

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2017 [PATRIND      132.00] 3PH      2275.03     9950.7   -70.07
                             LG       2201.59     9629.4   -71.50
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.604/82.080, 7.18840  Z-:/8.605/82.081, 7.18874  Z0:/9.480/86.095, 14.65015

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2018 [JAGRAN       132.00] 3PH       870.66     3808.1   -63.28
                             LG        702.33     3071.9   -66.64
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/22.256/74.397, 3.58091  Z-:/22.256/74.397, 3.58095  Z0:/38.422/81.645, 6.80906

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                                       <-SCMVA-> <-Sym I''k rms-->
                                                     /I/    AN(I)
X---------- BUS ----------X              MVA         AMP     DEG
  2024 [132 KV GRID  132.00] 3PH      1620.35     7087.2   -61.00
                             LG       1239.79     5422.7   -62.91
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.094/73.197, 3.31157  Z-:/12.094/73.198, 3.31166  Z0:/23.258/77.101, 4.36674
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
 2090 [MUSTHKCF     132.00] 3PH     2669.63    11676.6    -56.88
                            LG      2907.22    12715.8    -59.17
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.350/69.385, 2.65840  Z-:/7.350/69.387, 2.65863  Z0:/5.590/77.685, 4.58079

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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
 5015 [TAJAZAI      132.00] 3PH     1925.93     8423.7    -62.22
                            LG      1384.50     6055.6    -63.24
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/10.149/73.738, 3.42808  Z-:/10.187/73.786, 3.43882  Z0:/22.025/75.675, 3.91611

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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
 7415 [T-PAROVA     132.00] 3PH      851.37     3723.8    -57.62
                            LG       563.97     2466.8    -60.11
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/22.994/69.383, 2.65806  Z-:/23.011/69.397, 2.65998  Z0:/58.208/73.847, 3.45263

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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
 7420 [PAROVA       132.00] 3PH      827.03     3617.3    -57.49
                            LG       546.98     2392.4    -60.04
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/23.671/69.256, 2.64028  Z-:/23.688/69.269, 2.64213  Z0:/60.095/73.805, 3.44321

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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
 7424 [D.I.KH GOMAL132.00] 3PH      1859.81     8134.6    -63.26
                            LG      1332.72     5829.1    -63.71
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/10.526/75.023, 3.73806  Z-:/10.543/75.044, 3.74348  Z0:/22.999/75.891, 3.97840

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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
 7425 [D.I.KHAN-II 132.00] 3PH      1174.54     5137.3    -60.21
                            LG       802.14     3508.5    -61.71
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/16.663/71.953, 3.06919  Z-:/16.682/71.970, 3.07227  Z0:/39.873/74.692, 3.65330

-------------------------------------------------------------------------------------------------------
                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
 7430 [D.I.KHAN     132.00] 3PH     1881.28     8228.5    -62.70
                            LG      1343.72     5877.2    -63.34
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/10.407/74.486, 3.60258  Z-:/10.424/74.508, 3.60779  Z0:/22.884/75.705, 3.92470

-------------------------------------------------------------------------------------------------------
                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
13310 [KT_4         132.00] 3PH     1526.39     6676.2    -63.77
                            LG       889.18     3889.2    -63.81
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.688/74.366, 3.57332  Z-:/13.025/74.076, 3.50495  Z0:/39.629/74.528, 3.61281

-------------------------------------------------------------------------------------------------------
                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
13311 [ KT_1        132.00] 3PH     1627.11     7116.7    -65.03
                            LG       925.86     4049.6    -64.37
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/11.888/75.515, 3.87096  Z-:/12.290/75.055, 3.74630  Z0:/38.497/74.588, 3.62740

-------------------------------------------------------------------------------------------------------
                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
13312 [KT_2         132.00] 3PH     1647.07     7204.1    -64.91
                            LG       943.81     4128.1    -64.34
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/11.747/75.422, 3.84518  Z-:/12.137/74.979, 3.72661  Z0:/37.617/74.636, 3.63943

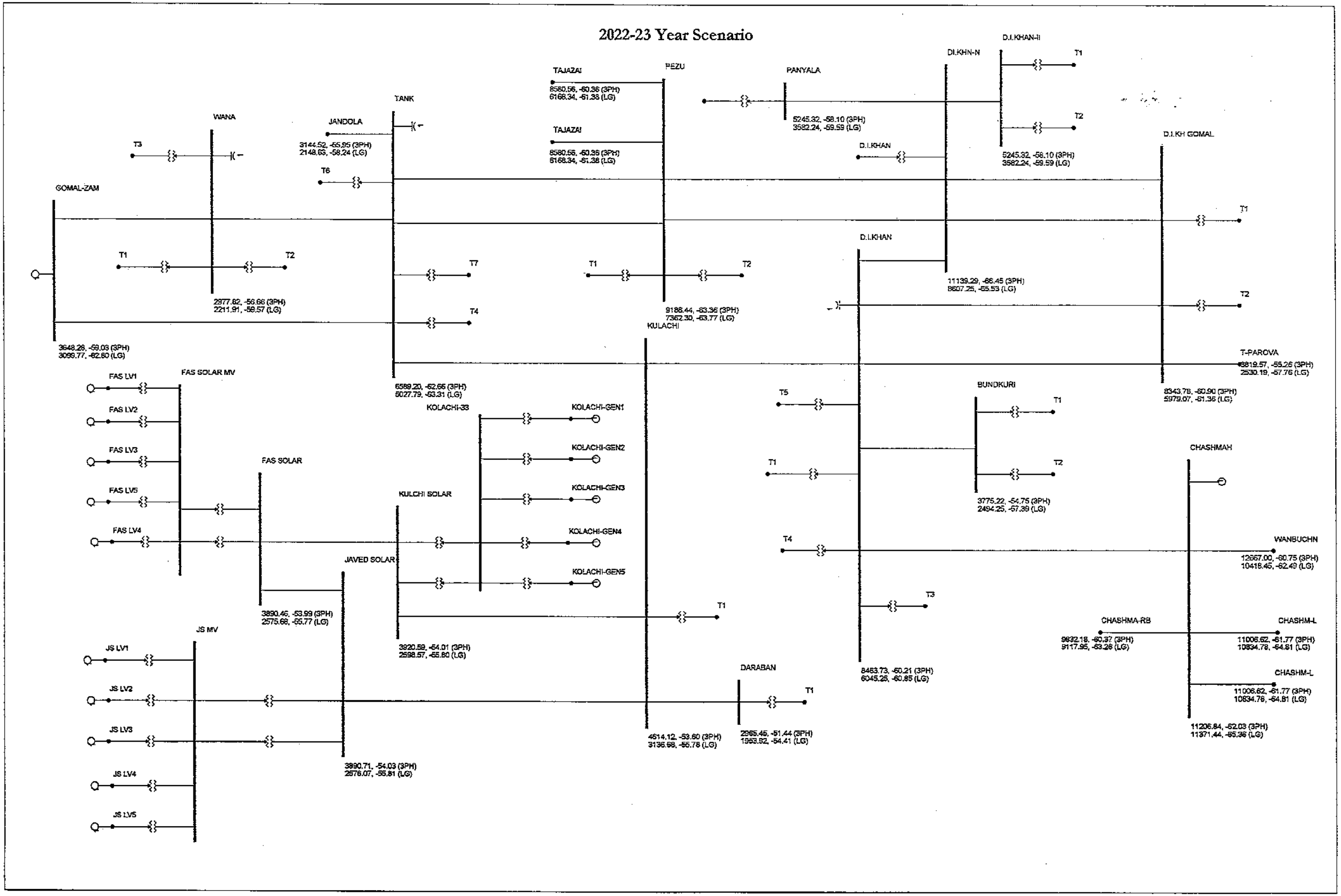
-------------------------------------------------------------------------------------------------------
                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X           MVA         AMP      DEG
13313 [KT_3         132.00] 3PH     1707.53     7468.5    -64.58
                            LG       999.64     4372.3    -64.26
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/11.344/75.195, 3.78337  Z-:/11.684/74.827, 3.68758  Z0:/35.102/74.788, 3.67763
```

Appendix G: Short circuit study for 2022 – 23 Year Scenario

Appendix G2: Short Circuit Study With Kulachi Solar Plant

Short Circuit Study of 50MW Kulachi Solar PV IPP

2022-23 Year Scenario



```
                         PSS®E-32.2.0 ASCC SHORT CIRCUIT CURRENTS            MON, MAR 19 2018  14:02
GRID INTERCONNECTION STUDY OF 50MW KULACHI PV SOLAR PLANT
2022 SEP PEAK LOAD WITH ADDITION OF KULACHI SOLAR PLANTS
                       OUTPUT FOR AREA 1 [PESCO        ]

OPTIONS USED:
  - DC LINES AND FACTS DEVICES BLOCKED

                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1069 [DOBIAN       132.00] 3PH   3334.28   14583.7   -60.73
                              LG   2376.00   10392.3   -62.09
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/5.896/73.553, 3.38752  Z-:/5.897/73.555, 3.38797  Z0:/13.036/76.157, 4.05815

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1070 [MARDAN       132.00] 3PH   4813.63   21054.2   -66.16
                              LG   3762.73   16457.7   -66.50
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/4.083/78.972, 5.13095  Z-:/4.083/78.974, 5.13206  Z0:/7.503/79.677, 5.49005

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1071 [MARDAN III  132.00] 3PH    3621.30   15839.1   -58.48
                              LG   2455.83   10741.5   -60.70
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/5.418/70.940, 2.89442  Z-:/5.418/70.943, 2.89491  Z0:/13.145/74.993, 3.73016

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1072 [HUSSAI       132.00] 3PH   2352.91   10291.3   -58.37
                              LG   1613.36    7056.6   -60.44
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/8.354/71.194, 2.93651  Z-:/8.355/71.196, 2.93678  Z0:/19.863/75.011, 3.73482

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1074 [MARDAN II    132.00] 3PH   4117.87   18011.0   -65.34
                              LG   3078.92   13466.8   -65.78
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/4.773/78.170, 4.77405  Z-:/4.773/78.172, 4.77491  Z0:/9.605/79.046, 5.16689

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1075 [KATLANG      132.00] 3PH   1883.17    8236.7   -57.35
                              LG   1266.81    5540.8   -59.79
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/10.438/70.177, 2.77412  Z-:/10.438/70.178, 2.77432  Z0:/25.707/74.604, 3.63149

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1077 [MARDAN-SP    132.00] 3PH   4437.72   19410.0   -60.84
                              LG   3306.12   14460.5   -63.98
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/4.419/73.215, 3.31519  Z-:/4.420/73.218, 3.31588  Z0:/8.982/79.440, 5.36409

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1078 [DAGGAR       132.00] 3PH   2535.85   11091.5   -59.25
                              LG   1762.37    7708.4   -61.07
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/7.750/72.067, 3.09005  Z-:/7.751/72.069, 3.09036  Z0:/17.968/75.448, 3.85220

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1080 [SWABI        132.00] 3PH   1998.27    8740.2   -55.37
                              LG   1323.19    5787.5   -58.52
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/9.857/68.276, 2.50984  Z-:/9.858/68.277, 2.51002  Z0:/24.998/73.910, 3.46692

-----------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                               /I/     AN(I)
X---------- BUS ----------X          MVA       AMP      DEG
  1090 [CHARSADA     132.00] 3PH   3612.38   15800.1   -61.51
                              LG   2419.65   10583.2   -62.40
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/5.427/73.835, 3.44995  Z-:/5.428/73.838, 3.45066  Z0:/13.455/75.426, 3.84627
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                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1095 [RAJJAR       132.00] 3PH              2140.08      9360.4    -57.21
                              LG              1370.87      5996.0    -59.91
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.160/69.495, 2.67395  Z-:/9.161/69.498, 2.67429  Z0:/24.614/74.206, 3.53543

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1100 [PPCCHARS     132.00] 3PH              3114.92     13624.2    -60.26
                              LG              2110.72      9232.0    -61.60
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/6.294/72.584, 3.18793  Z-:/6.295/72.587, 3.18849  Z0:/15.283/75.028, 3.73933

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1102 [GOMAT NAR    132.00] 3PH              1195.57      5229.3    -70.93
                              LG              1196.21      5232.1    -71.03
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/16.517/84.540, 10.46220  Z-:/16.517/84.540, 10.46248  Z0:/16.491/84.828,
11.04895

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1110 [TANGI        132.00] 3PH              2231.48      9760.2    -57.40
                              LG              1383.61      6051.7    -60.38
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.784/69.648, 2.69576  Z-:/8.785/69.650, 2.69615  Z0:/24.972/74.721, 3.66064

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1115 [SHABQDAR     132.00] 3PH              3160.55     13823.8    -65.68
                              LG              2116.81      9258.6    -65.52
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/6.201/77.907, 4.66745  Z-:/6.202/77.910, 4.66857  Z0:/15.373/77.622, 4.55655

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1117 [HASAN ZAI    132.00] 3PH              2482.17     10856.7    -61.20
                              LG              1620.85      7089.4    -62.54
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.896/73.436, 3.36215  Z-:/7.897/73.439, 3.36272  Z0:/20.491/75.812, 3.95554

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1118 [JALALA       132.00] 3PH              1553.62      6795.3    -55.22
                              LG              1071.04      4684.6    -57.35
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.731/68.645, 2.55757  Z-:/12.732/68.646, 2.55772  Z0:/29.973/72.597, 3.19033

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1119 [JABBAN PH    132.00] 3PH              1556.13      6806.3    -56.21
                              LG              1062.72      4648.2    -58.38
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.744/69.901, 2.73283  Z-:/12.745/69.902, 2.73299  Z0:/30.529/73.897, 3.46395

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1120 [DARGAI       132.00] 3PH              1559.38      6820.5    -57.05
                              LG              1144.60      5006.3    -60.12
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.824/71.398, 2.97115  Z-:/12.825/71.399, 2.97133  Z0:/26.838/77.395, 4.47205

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1122 [MALAKAND III132.00] 3PH               1540.61      6738.4    -56.73
                              LG              1124.16      4916.9    -59.98
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.986/71.093, 2.91962  Z-:/12.986/71.094, 2.91979  Z0:/27.498/77.411, 4.47788

------------------------------------------------------------------------------------------------------------------------
                                                <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1123 [DARGAI P     132.00] 3PH              1549.74      6778.4    -57.03
                              LG              1136.99      4973.0    -60.11
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.904/71.372, 2.96660  Z-:/12.904/71.373, 2.96678  Z0:/27.029/77.390, 4.46993
```

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-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1124 [BATKHELA     132.00] 3PH            1710.55     7481.7    -57.91
                             LG             1203.51     5264.0    -59.98
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/11.646/72.026, 3.08246  Z-:/11.647/72.027, 3.08267  Z0:/26.394/75.925, 3.98854

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1125 [TIMERGARA    132.00] 3PH            1545.09     6758.0    -58.43
                             LG             1116.04     4881.4    -59.72
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.968/73.092, 3.28974  Z-:/12.968/73.093, 3.28994  Z0:/27.937/75.597, 3.89383

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1126 [MUNDA        132.00] 3PH             954.61     4175.3    -55.19
                             LG              649.97     2842.9    -57.57
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/20.989/69.858, 2.72637  Z-:/20.990/69.858, 2.72647  Z0:/50.568/74.216, 3.53776

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1127 [LAL QILA     132.00] 3PH             915.62     4004.8    -54.98
                             LG              621.12     2716.7    -57.44
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/21.883/69.645, 2.69536  Z-:/21.883/69.645, 2.69545  Z0:/53.084/74.136, 3.51881

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1130 [CHAKDARA     132.00] 3PH            2813.58    12306.2    -64.67
                             LG             2049.93     8966.1    -63.94
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.044/78.467, 4.90069  Z-:/7.045/78.468, 4.90131  Z0:/14.919/77.058, 4.35147

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1131 [CHAKDARA NEW132.00] 3PH             2884.87    12618.0    -66.22
                             LG             2118.25     9265.0    -64.97
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/6.862/79.953, 5.64430  Z-:/6.863/79.955, 5.64507  Z0:/14.318/77.511, 4.51492

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1135 [BARIKOT      132.00] 3PH            1286.36     5626.4    -57.68
                             LG              856.49     3746.2    -59.32
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/15.389/71.414, 2.97379  Z-:/15.390/71.415, 2.97394  Z0:/38.584/74.366, 3.57344

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1140 [SWAT         132.00] 3PH            1224.70     5356.7    -57.35
                             LG              812.75     3554.9    -59.13
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/16.164/71.089, 2.91885  Z-:/16.165/71.089, 2.91899  Z0:/40.770/74.267, 3.54970

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1142 [K.KHELA      132.00] 3PH             788.97     3450.8    -55.07
                             LG              512.23     2240.4    -57.80
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/25.091/68.804, 2.57862  Z-:/25.092/68.804, 2.57870  Z0:/65.859/73.611, 3.40017

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1144 [MADYAN       132.00] 3PH             581.60     2543.9    -53.98
                             LG              373.89     1635.3    -57.19
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/34.037/67.719, 2.44051  Z-:/34.038/67.719, 2.44057  Z0:/90.952/73.317, 3.33686

-------------------------------------------------------------------------------------------------------------------
                                              <-SCMVA-> <-Sym I''k rms-->
                                                             /I/     AN(I)
X---------- BUS ----------X                     MVA        AMP      DEG
  1146 [SHANGLAP     132.00] 3PH             545.78     2387.2    -53.79
                             LG              350.25     1532.0    -57.08
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/36.271/67.528, 2.41760  Z-:/36.272/67.529, 2.41765  Z0:/97.226/73.268, 3.32635
```

```
------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1150 [JEHANGRA    132.00] 3PH      2444.71    10692.8    -56.06
                           LG       1732.10     7576.0    -59.24
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/8.027/68.595, 2.55102  Z-:/8.027/68.597, 2.55125  Z0:/17.980/74.604, 3.63144

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1152 [GOLENGOL    132.00] 3PH       532.46     2328.9    -60.63
                           LG        654.94     2864.6    -62.11
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/39.190/80.335, 5.87167  Z-:/39.190/80.335, 5.87179  Z0:/17.348/88.520, 38.69643

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1155 [AWT         132.00] 3PH      3903.47    17073.3    -58.07
                           LG       2686.05    11748.4    -60.13
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/5.025/70.507, 2.82508  Z-:/5.025/70.510, 2.82550  Z0:/11.868/74.318, 3.56191

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1160 [NIZAMPUR    132.00] 3PH      3683.02    16109.0    -57.80
                           LG       2525.05    11044.2    -59.93
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/5.325/70.244, 2.78436  Z-:/5.326/70.247, 2.78476  Z0:/12.665/74.168, 3.52640

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1165 [NOWSHCTY    132.00] 3PH      3050.83    13343.9    -58.09
                           LG       2092.28     9151.4    -60.40
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/6.427/70.435, 2.81372  Z-:/6.427/70.437, 2.81412  Z0:/15.278/74.685, 3.65165

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1167 [RIDI- BEHRAM132.00] 3PH      4006.32    17523.1    -56.56
                           LG       2751.27    12033.7    -61.01
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/4.895/68.924, 2.59486  Z-:/4.895/68.928, 2.59533  Z0:/11.647/77.106, 4.36822

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1168 [LOCOMOTV    132.00] 3PH      1954.27     8547.7    -56.10
                           LG       1296.82     5672.1    -59.10
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/10.033/68.448, 2.53191  Z-:/10.033/68.450, 2.53214  Z0:/25.340/73.823, 3.44709

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1169 [NOWSHR-N    132.00] 3PH      7216.69    31564.8    -66.50
                           LG       5608.32    24530.0    -66.92
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/2.716/78.820, 5.05940  Z-:/2.717/78.824, 5.06134  Z0:/5.053/79.684, 5.49404

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1170 [NOWSHR-I    132.00] 3PH      6557.52    28681.7    -62.42
                           LG       4679.97    20469.5    -63.42
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/2.990/74.759, 3.67034  Z-:/2.990/74.764, 3.67149  Z0:/6.589/76.650, 4.21398

------------------------------------------------------------------------------------------------------------------------
                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1172 [KAKASAIB    132.00] 3PH      2714.78    11874.1    -56.63
                           LG       1223.68     5352.2    -59.51
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/7.222/68.992, 2.60403  Z-:/7.223/68.994, 2.60432  Z0:/33.649/73.111, 3.29368

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                                   <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1173 [CHOTA LAHOR 132.00] 3PH      2164.55     9467.5    -55.94
                           LG       1479.13     6469.5    -58.96
THEVENIN IMPEDANCE, X/R  (OHM)   Z+:/9.069/68.557, 2.54602  Z-:/9.070/68.558, 2.54623  Z0:/21.723/74.087, 3.50750
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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1175 [CHERATCE   132.00] 3PH             1926.54     8426.4    -55.42
                                      LG             1256.77     5496.9    -58.51
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/10.176/67.754, 2.44476  Z-:/10.176/67.755, 2.44497  Z0:/26.497/73.217, 3.31562

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1180 [PABBI        132.00] 3PH             3990.98   17456.0    -63.72
                                      LG             2655.77   11616.0    -63.97
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/4.912/75.981, 4.00507  Z-:/4.913/75.985, 4.00630  Z0:/12.320/76.431, 4.14320

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1182 [CHIRAT IND  132.00] 3PH             1691.99     7400.5    -57.17
                                      LG             1082.92     4736.6    -59.83
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/11.586/69.433, 2.66516  Z-:/11.587/69.436, 2.66548  Z0:/31.177/74.060, 3.50132

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1183 [TARU JABA   132.00] 3PH             4066.36   17785.7    -63.23
                                      LG             2714.65   11873.5    -63.62
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/4.821/75.477, 3.86038  Z-:/4.822/75.482, 3.86162  Z0:/12.021/76.192, 4.06884

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1185 [PESH CTY     132.00] 3PH             5569.60   24360.7    -66.02
                                      LG             3913.69   17117.9    -65.56
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/3.519/78.236, 4.80191  Z-:/3.520/78.242, 4.80446  Z0:/7.985/77.381, 4.46679

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1187 [DALZAK       132.00] 3PH             4138.36   18100.6    -60.53
                                      LG             2866.48   12537.6    -61.98
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/4.736/72.767, 3.22396  Z-:/4.737/72.772, 3.22488  Z0:/11.045/75.443, 3.85102

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1189 [SHAIBG-N     132.00] 3PH             6365.66   27842.5    -67.77
                                      LG             5067.76   22165.7    -67.62
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/3.079/79.983, 5.66125  Z-:/3.080/79.988, 5.66438  Z0:/5.443/79.658, 5.47985

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1190 [SHAHIBAGH   132.00] 3PH             5256.73   22992.2    -66.65
                                      LG             4034.34   17645.7    -66.43
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/3.728/78.847, 5.07239  Z-:/3.729/78.852, 5.07455  Z0:/7.116/78.407, 4.87469

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1191 [SHAHI BAG SP132.00] 3PH             6269.66   27422.7    -65.78
                                      LG             4813.53   21053.7    -66.01
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/3.126/77.987, 4.69945  Z-:/3.127/77.993, 4.70191  Z0:/5.962/78.456, 4.89601

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1192 [SAKHI-CH     132.00] 3PH             3441.04   15050.6    -61.63
                                      LG             2556.06   11179.9    -62.75
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/5.693/73.796, 3.44109  Z-:/5.694/73.800, 3.44196  Z0:/11.610/76.026, 4.01865

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                              /I/     AN(I)
X---------- BUS ----------X                       MVA         AMP      DEG
  1193 [WARSAK ROAD 132.00] 3PH             4581.54   20039.0    -67.18
                                      LG             3342.80   14620.9    -66.76
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/4.277/79.388, 5.33731  Z-:/4.278/79.392, 5.33937  Z0:/9.032/78.564, 4.94325
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1195 [PESCO COLONY132.00] 3PH     4509.55   19724.1    -66.10
                             LG     3237.32   14159.6    -66.00
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.346/78.306, 4.83124  Z-:/4.347/78.310, 4.83314  Z0:/9.468/78.105, 4.74756
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1196 [PESHFORT     132.00] 3PH     4265.15   18655.2    -66.07
                             LG     3056.73   13369.7    -65.95
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.595/78.270, 4.81629  Z-:/4.596/78.275, 4.81811  Z0:/10.043/78.039, 4.72047
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1200 [WARSAK P     132.00] 3PH     4222.91   18470.4    -64.21
                             LG     4250.71   18592.0    -67.01
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/4.636/76.316, 4.10702  Z-:/4.637/76.320, 4.10847  Z0:/4.578/84.801, 10.98995
-------------------------------------------------------------------------------------------------------------------------
                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1210 [WARSAK       132.00] 3PH     3685.08   16118.0    -62.64
                             LG     3273.42   14317.5    -64.61
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/5.314/74.754, 3.66894  Z-:/5.314/74.758, 3.67001  Z0:/7.333/79.588, 5.44230
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1240 [JAMRUD-I     132.00] 3PH     6303.03   27568.6    -68.89
                             LG     4918.99   21515.0    -68.29
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.109/81.064, 6.35972  Z-:/3.110/81.071, 6.36448  Z0:/5.733/79.818, 5.56804
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1245 [HAYATABD     132.00] 3PH     5910.43   25851.4    -69.00
                             LG     4376.23   19141.1    -67.99
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.316/81.179, 6.44411  Z-:/3.317/81.186, 6.44897  Z0:/6.804/79.190, 5.23714
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1257 [R-BABA       132.00] 3PH     5887.94   25753.1    -67.75
                             LG     4224.87   18479.0    -67.00
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.329/79.949, 5.64211  Z-:/3.330/79.957, 5.64629  Z0:/7.260/78.513, 4.92079
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1260 [PESHCANT     132.00] 3PH     5157.61   22558.7    -65.27
                             LG     4077.66   17835.1    -65.51
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.800/77.451, 4.49257  Z-:/3.800/77.457, 4.49468  Z0:/6.818/77.974, 4.69413
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1261 [DI.KHN-N     132.00] 3PH     2546.78   11139.3    -66.45
                             LG     1967.88    8607.2    -65.53
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.846/80.302, 5.85117  Z-:/7.865/80.318, 5.86106  Z0:/14.756/78.408, 4.87517
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1262 [PANYALA      132.00] 3PH     1199.24    5245.3    -58.10
                             LG      819.01    3582.2    -59.59
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/16.663/71.953, 3.06919  Z-:/16.682/71.970, 3.07227  Z0:/39.873/74.692, 3.65330
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                   /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
  1270 [PESH UNI     132.00] 3PH     5376.24   23515.0    -66.62
                             LG     4076.94   17832.0    -66.56
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/3.645/78.804, 5.05214  Z-:/3.646/78.810, 5.05507  Z0:/7.129/78.664, 4.98803
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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1280 [PESH.IND      132.00] 3PH              5166.34    22596.9    -64.93
                               LG              3614.88    15811.0    -64.91
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/3.794/77.128, 4.37614  Z-:/3.795/77.136, 4.37871  Z0:/8.677/77.087, 4.36175

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1290 [SH-MUHDI      132.00] 3PH              6253.91    27353.8    -69.38
                               LG              4849.22    21209.8    -69.14
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/3.134/81.576, 6.75232  Z-:/3.135/81.584, 6.75865  Z0:/5.857/81.071, 6.36504

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1291 [SHMUHDI-1     132.00] 3PH              6029.36    26371.6    -69.38
                               LG              4685.69    20494.6    -69.21
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/3.251/81.570, 6.74779  Z-:/3.252/81.578, 6.75412  Z0:/6.046/81.214, 6.47013

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1293 [BADABER       132.00] 3PH              4365.86    19095.7    -67.74
                               LG              2997.59    13111.1    -66.99
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/4.489/79.947, 5.64052  Z-:/4.491/79.952, 5.64352  Z0:/10.637/78.569, 4.94561

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1294 [MATANI        132.00] 3PH              2709.50    11851.0    -58.35
                               LG              1797.94     7863.9    -60.53
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/7.237/70.582, 2.83676  Z-:/7.238/70.589, 2.83788  Z0:/18.262/74.490, 3.60332

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1300 [KOHAT         132.00] 3PH              4188.29    18319.0    -60.69
                               LG              2754.39    12047.3    -61.61
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/4.685/72.979, 3.26651  Z-:/4.687/72.995, 3.26985  Z0:/12.003/74.594, 3.62909

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1302 [GURGURI       132.00] 3PH              1753.94     7671.5    -58.02
                               LG              1127.14     4930.0    -60.29
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/11.193/70.293, 2.79187  Z-:/11.216/70.315, 2.79513  Z0:/29.875/74.255, 3.54697

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1305 [KOHATCEM      132.00] 3PH              2604.00    11389.5    -57.60
                               LG              1680.32     7349.5    -59.69
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/7.536/69.888, 2.73087  Z-:/7.537/69.899, 2.73246  Z0:/19.978/73.539, 3.38449

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1306 [K.T SHIP      132.00] 3PH              3670.83    16055.7    -59.82
                               LG              2404.31    10516.1    -61.11
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/5.345/72.097, 3.09546  Z-:/5.348/72.112, 3.09820  Z0:/13.795/74.377, 3.57601

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1307 [GUMBAT        132.00] 3PH              1371.99     6000.9    -55.17
                               LG               908.17     3972.2    -58.40
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/14.302/67.455, 2.40891  Z-:/14.304/67.461, 2.40961  Z0:/36.296/73.222, 3.31685

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                                               <-SCMVA-> <-Sym I''k rms-->
                                                           /I/     AN(I)
X---------- BUS ----------X                      MVA        AMP      DEG
  1312 [HANGU        132.00] 3PH              1851.29     8097.3    -56.72
                               LG              1187.28     5193.0    -59.41
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/10.601/68.996, 2.60456  Z-:/10.609/69.008, 2.60624  Z0:/28.422/73.702, 3.42012
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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1315 [TALL          132.00] 3PH                 2004.63     8768.0    -60.59
                                LG                1296.64     5671.3    -61.97
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/9.794/72.871, 3.24473  Z-:/9.814/72.885, 3.24745  Z0:/25.827/75.288, 3.80852

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1320 [LACHI         132.00] 3PH                 1273.16     5568.6    -54.97
                                LG                 810.54     3545.2    -58.39
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/15.416/67.239, 2.38349  Z-:/15.431/67.258, 2.38561  Z0:/41.891/73.166, 3.30510

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1332 [BANNU-N       132.00] 3PH                 3592.41    15712.7    -69.46
                                LG                2632.22    11513.0    -68.37
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/5.466/81.697, 6.85211  Z-:/5.540/81.692, 6.84771  Z0:/11.378/79.547, 5.42039

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1335 [KARAK         132.00] 3PH                 1385.40     6059.6    -57.11
                                LG                 899.11     3932.6    -59.75
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/14.172/69.354, 2.65396  Z-:/14.221/69.398, 2.66016  Z0:/37.170/73.988, 3.48468

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1336 [SABIR ABAD    132.00] 3PH                  743.78     3253.2    -54.93
                                LG                 474.29     2074.5    -58.45
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/26.397/67.178, 2.37630  Z-:/26.446/67.205, 2.37952  Z0:/71.516/73.280, 3.32891

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1338 [SIRAJ BABA    132.00] 3PH                  982.17     4295.9    -55.74
                                LG                 630.32     2756.9    -58.92
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/19.990/67.986, 2.47329  Z-:/20.039/68.020, 2.47760  Z0:/53.524/73.537, 3.38406

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1340 [BANNU         132.00] 3PH                 1713.62     7495.1    -67.48
                                LG                1111.63     4862.1    -65.33
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/11.458/79.696, 5.50051  Z-:/11.531/79.707, 5.50645  Z0:/30.028/75.905, 3.98274

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1342 [BANNU-II      132.00] 3PH                 2114.69     9249.4    -68.19
                                LG                1396.72     6109.1    -65.80
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/9.285/80.416, 5.92257  Z-:/9.359/80.424, 5.92722  Z0:/23.560/76.137, 4.05210

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1345 [S.NURANG      132.00] 3PH                 1677.92     7339.0    -58.88
                                LG                1140.56     4988.7    -60.55
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/11.797/71.779, 3.03779  Z-:/11.848/71.832, 3.04729  Z0:/28.437/74.810, 3.68306

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1360 [ABBOTABD      132.00] 3PH                 2910.99    12732.3    -62.18
                                LG                2309.39    10101.0    -63.19
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/6.757/74.847, 3.69254  Z-:/6.757/74.848, 3.69280  Z0:/12.041/76.979, 4.32431

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                                                  <-SCMVA-> <-Sym I''k rms-->
                                                                /I/     AN(I)
X---------- BUS ----------X                          MVA        AMP      DEG
  1361 [ATHMUQAM      132.00] 3PH                 1940.48     8487.4    -73.42
                                LG                1875.32     8202.4    -70.01
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/10.169/86.905, 18.49623  Z-:/10.169/86.906, 18.49735  Z0:/11.329/77.363, 4.46007
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1365 [HAVELIAN     132.00] 3PH     2360.14    10322.9    -51.00
                             LG     1464.29     6404.6    -57.00
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.326/63.583, 2.01302  Z-:/8.326/63.585, 2.01315  Z0:/23.762/73.775, 3.43652
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1370 [AYUB M.C     132.00] 3PH     2483.23    10861.3    -60.42
                             LG     1859.66     8133.9    -61.66
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.922/73.102, 3.29187  Z-:/7.922/73.103, 3.29207  Z0:/15.897/75.571, 3.88644
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1375 [NATIAGLI     132.00] 3PH     1273.75     5571.2    -56.50
                             LG      876.74     3834.7    -59.11
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/15.442/69.168, 2.62814  Z-:/15.442/69.169, 2.62822  Z0:/36.479/73.986, 3.48426
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1379 [MANSHR-N     132.00] 3PH     3780.48    16535.3    -68.44
                             LG     3313.64    14493.4    -67.55
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/5.206/81.165, 6.43379  Z-:/5.206/81.166, 6.43441  Z0:/7.408/79.032, 5.15989
-------------------------------------------------------------------------------------------------------------------
                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1380 [MANSEHRA     132.00] 3PH     3008.36    13158.2    -64.77
                             LG     2422.91    10597.5    -64.43
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/6.540/77.456, 4.49433  Z-:/6.540/77.457, 4.49463  Z0:/11.280/76.718, 4.23615
-------------------------------------------------------------------------------------------------------------------
                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1385 [OGHI         132.00] 3PH     2256.85     9871.2    -61.76
                             LG     1694.08     7409.7    -62.18
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.720/74.483, 3.60171  Z-:/8.720/74.484, 3.60188  Z0:/17.411/75.340, 3.82258
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1390 [BATAL        132.00] 3PH      872.76     3817.4    -55.72
                             LG      582.19     2546.4    -58.46
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/22.549/68.442, 2.53117  Z-:/22.549/68.443, 2.53121  Z0:/56.404/73.386, 3.35135
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1391 [DBR-KHWR     132.00] 3PH     1570.84     6870.7    -69.52
                             LG     1718.44     7516.2    -69.00
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.824/86.616, 16.91245  Z-:/12.825/86.616, 16.91301  Z0:/9.524/84.691, 10.76181
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1392 [KHANKHWR     132.00] 3PH     1708.27     7471.7    -70.02
                             LG     1466.64     6414.9    -61.70
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/11.729/86.342, 15.64268  Z-:/11.729/86.342, 15.64328  Z0:/18.094/67.216, 2.38073
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1393 [ALAI-KHR     132.00] 3PH     2143.12     9373.7    -71.55
                             LG     2011.11     8796.3    -64.74
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.302/87.183, 20.31937  Z-:/9.302/87.183, 20.32063  Z0:/11.480/69.283, 2.64402
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                                    <-SCMVA-> <-Sym I''k rms-->
                                                 /I/    AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 1394 [THAKOT       132.00] 3PH      416.97     1823.7    -53.74
                             LG      268.77     1175.6    -57.42
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/47.197/66.466, 2.29606  Z-:/47.197/66.466, 2.29608  Z0:/125.608/72.905, 3.25157
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1398 [KYALKHWR    132.00] 3PH        1464.96     6407.5   -69.30
                           LG         1622.77     7097.8   -69.31
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/13.744/86.359, 15.71430  Z-:/13.744/86.359, 15.71475  Z0:/9.734/86.367, 15.74996

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1400 [BALAKOT     132.00] 3PH        2594.71    11348.9   -66.00
                           LG         2014.22     8809.9   -65.59
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.568/78.472, 4.90303  Z-:/7.569/78.473, 4.90331  Z0:/14.113/77.624, 4.55753

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1410 [HARIPUR     132.00] 3PH        3870.88    16930.7   -58.10
                           LG         2572.24    11250.7   -59.96
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/5.072/70.644, 2.84663  Z-:/5.073/70.646, 2.84694  Z0:/12.763/73.983, 3.48340

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1411 [TARNAWAN    132.00] 3PH        3019.83    13208.3   -56.96
                           LG         1549.97     6779.4   -59.57
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/6.500/69.483, 2.67219  Z-:/6.500/69.485, 2.67242  Z0:/25.012/73.451, 3.36530

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1415 [HARIPUR-II  132.00] 3PH        2079.38     9094.9   -56.51
                           LG         1394.02     6097.3   -59.01
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.448/69.100, 2.61878  Z-:/9.448/69.101, 2.61892  Z0:/23.415/73.605, 3.39881

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1420 [HATTAR      132.00] 3PH        3407.92    14905.8   -57.01
                           LG         2315.48    10127.6   -59.35
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/5.760/69.559, 2.68306  Z-:/5.760/69.561, 2.68333  Z0:/13.929/73.836, 3.45013

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1421 [BEST-W-C    132.00] 3PH        2323.33    10161.9   -55.48
                           LG         1543.40     6750.6   -58.32
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.448/68.025, 2.47814  Z-:/8.449/68.026, 2.47831  Z0:/21.293/73.121, 3.29577

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1422 [SADI-C-F    132.00] 3PH        2453.48    10731.2   -55.66
                           LG         1634.22     7147.9   -58.44
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.000/68.209, 2.50137  Z-:/8.001/68.211, 2.50155  Z0:/20.066/73.204, 3.31297

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1440 [TARBELA-R   132.00] 3PH        2090.09     9141.8   -55.34
                           LG         1386.28     6063.4   -58.55
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.426/68.227, 2.50362  Z-:/9.427/68.229, 2.50380  Z0:/23.836/73.986, 3.48426

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1442 [GHAZI-IS    132.00] 3PH        2540.99    11114.0   -56.04
                           LG         1700.29     7436.8   -58.96
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/7.747/68.860, 2.58613  Z-:/7.747/68.861, 2.58635  Z0:/19.273/74.127, 3.51677

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 1445 [G.AMAZAI    132.00] 3PH        2185.78     9560.3   -55.53
                           LG         1457.77     6376.1   -58.72
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.018/68.467, 2.53431  Z-:/9.018/68.468, 2.53450  Z0:/22.578/74.192, 3.53208
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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1448 [PEHUR POWER 132.00] 3PH               1835.34    8027.5   -54.98
                              LG               1217.84    5326.7   -58.43
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/10.750/67.981, 2.47274  Z-:/10.750/67.982, 2.47289  Z0:/27.172/74.171, 3.52700

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1450 [TARBELA-N   132.00] 3PH               2235.64    9778.4   -55.56
                              LG               1486.21    6500.5   -58.67
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/8.808/68.411, 2.52708  Z-:/8.808/68.412, 2.52727  Z0:/22.178/73.983, 3.48351

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1455 [NAUSERY     132.00] 3PH               1454.13    6360.1   -62.57
                              LG               1141.30    4991.9   -64.40
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/13.427/74.419, 3.58630  Z-:/13.427/74.420, 3.58639  Z0:/24.496/78.266, 4.81424

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1457 [HATTIAN     132.00] 3PH               1286.85    5628.5   -56.12
                              LG                865.78    3786.8   -58.85
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/15.267/68.682, 2.56245  Z-:/15.267/68.682, 2.56252  Z0:/37.603/73.625, 3.40309

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1460 [TANK        132.00] 3PH               1506.49    6589.2   -62.66
                              LG               1149.51    5027.8   -63.31
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/13.437/77.425, 4.48295  Z-:/13.456/77.449, 4.49171  Z0:/25.939/78.729, 5.01761

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1461 [GOMAL-ZAM   132.00] 3PH                834.11    3648.3   -59.03
                              LG                708.70    3099.8   -62.80
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/24.108/73.443, 3.36363  Z-:/24.112/73.471, 3.36960  Z0:/37.141/82.088, 7.19565

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1792 [KURRAM GAHRI132.00] 3PH               1037.38    4537.4   -61.48
                              LG                659.45    2884.4   -61.94
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/18.927/73.695, 3.41871  Z-:/19.000/73.725, 3.42527  Z0:/51.398/74.494, 3.60450

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1830 [PEZU        132.00] 3PH               2100.30    9186.4   -63.36
                              LG               1683.25    7362.3   -63.77
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/9.555/77.365, 4.46095  Z-:/9.579/77.400, 4.47364  Z0:/16.634/78.229, 4.79883

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1870 [KULACHI     132.00] 3PH               1054.93    4614.1   -53.60
                              LG                717.14    3136.7   -55.78
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/20.102/70.680, 2.85230  Z-:/20.119/70.698, 2.85524  Z0:/48.543/74.660, 3.64543

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1874 [KULCHI SOLAR132.00] 3PH                896.37    3920.6   -54.01
                              LG                594.11    2598.6   -55.80
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/23.929/72.017, 3.08078  Z-:/23.946/72.031, 3.08343  Z0:/60.474/75.226, 3.79170

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                                              <-SCMVA-> <-Sym I''k rms-->
                                                          /I/     AN(I)
X---------- BUS ----------X                      MVA       AMP      DEG
  1875 [FAS SOLAR   132.00] 3PH                889.48    3890.5   -53.99
                              LG                588.88    2575.7   -55.77
THEVENIN IMPEDANCE, X/R  (OHM)       Z+:/24.138/72.078, 3.09196  Z-:/24.156/72.092, 3.09460  Z0:/61.127/75.250, 3.79830
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  1876 [JAVED SOLAR 132.00] 3PH         889.54    3890.7   -54.03
                             LG         588.97    2576.1   -55.81
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/24.122/72.073, 3.09111  Z-:/24.140/72.087, 3.09375  Z0:/61.076/75.248, 3.79780

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  1880 [DARABAN     132.00] 3PH         677.99    2965.4   -51.44
                             LG         446.73    1953.9   -54.41
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/31.278/68.524, 2.54180  Z-:/31.295/68.537, 2.54350  Z0:/79.987/73.816, 3.44563

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  1890 [. JN LKURI  132.00] 3PH         863.13    3775.2   -54.75
                             LG         570.26    2494.2   -57.39
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/23.333/69.025, 2.60854  Z-:/23.348/69.039, 2.61035  Z0:/59.354/73.744, 3.42942

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  1940 [DOABA       132.00] 3PH        1184.24    5179.7   -55.96
                             LG         753.43    3295.4   -59.05
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/16.576/68.241, 2.50541  Z-:/16.589/68.252, 2.50679  Z0:/45.080/73.598, 3.39731

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  1941 [SHKDRA      132.00] 3PH        1974.16    8634.7   -56.17
                             LG        1263.73    5527.4   -59.03
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.941/68.450, 2.53210  Z-:/9.947/68.464, 2.53399  Z0:/26.742/73.427, 3.36026

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  2000 [JAGRAN-III  132.00] 3PH        1640.81    7176.7   -69.95
                             LG        1513.45    6619.6   -67.90
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.026/83.444, 8.70131  Z-:/12.026/83.444, 8.70161  Z0:/15.101/78.130, 4.75782

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  2005 [JHING-I     132.00] 3PH        1369.43    5989.7   -60.70
                             LG        1120.34    4900.2   -63.83
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/14.297/72.820, 3.23445  Z-:/14.297/72.820, 3.23452  Z0:/23.927/79.694, 5.49929

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  2006 [JHING-II    132.00] 3PH        1334.36    5836.3   -60.71
                             LG        1080.98    4728.1   -63.71
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/14.667/72.789, 3.22832  Z-:/14.667/72.790, 3.22839  Z0:/25.067/79.297, 5.29074

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  2009 [LUAT        132.00] 3PH        1570.95    6871.1   -72.21
                             LG        1584.35    6929.7   -71.25
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/12.567/85.771, 13.52387  Z-:/12.567/85.771, 13.52442  Z0:/12.259/82.847, 7.96799

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  2014 [MZ.ABAD-II  132.00] 3PH        2343.41   10249.8   -67.40
                             LG        1933.87    8458.5   -67.54
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/8.360/79.567, 5.43105  Z-:/8.361/79.568, 5.43130  Z0:/13.672/79.876, 5.60026

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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X               MVA       AMP      DEG
  2015 [MUZAFBAD    132.00] 3PH        2125.58    9297.0   -62.61
                             LG        1645.06    7195.3   -63.61
THEVENIN IMPEDANCE, X/R  (OHM)     Z+:/9.225/74.909, 3.70839  Z-:/9.225/74.909, 3.70853  Z0:/17.315/76.961, 4.31798
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 2017 [PATRIND      132.00] 3PH        2275.04    9950.7   -70.06
                            LG         2201.60    9629.5   -71.48
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/8.604/82.080, 7.18840  Z-:/8.605/82.081, 7.18874  Z0:/9.480/86.095, 14.65015
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 2018 [JAGRAN       132.00] 3PH         870.63    3808.0   -63.26
                            LG          702.32    3071.8   -66.62
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/22.256/74.397, 3.58091  Z-:/22.256/74.397, 3.58095  Z0:/38.422/81.645, 6.80906
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 2024 [132 KV GRID 132.00] 3PH         1620.36    7087.3   -60.98
                            LG         1239.81    5422.7   -62.89
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/12.094/73.197, 3.31157  Z-:/12.094/73.198, 3.31166  Z0:/23.258/77.101, 4.36674
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 2090 [MUSTHKCF     132.00] 3PH        2669.99   11678.2   -56.84
                            LG         2907.62   12717.5   -59.12
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/7.350/69.385, 2.65840  Z-:/7.350/69.387, 2.65863  Z0:/5.590/77.685, 4.58079
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 5015 [TAJAZAI      132.00] 3PH        1961.78    8580.6   -60.36
                            LG         1410.27    6168.3   -61.38
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/10.149/73.738, 3.42808  Z-:/10.187/73.786, 3.43882  Z0:/22.025/75.675, 3.91611
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 7415 [T-PAROVA     132.00] 3PH         873.27    3819.6   -55.26
                            LG          578.48    2530.2   -57.76
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/22.994/69.383, 2.65806  Z-:/23.011/69.397, 2.65998  Z0:/58.208/73.847, 3.45263
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 7420 [PAROVA       132.00] 3PH         848.30    3710.3   -55.14
                            LG          561.05    2453.9   -57.68
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/23.671/69.256, 2.64028  Z-:/23.688/69.269, 2.64213  Z0:/60.095/73.805, 3.44321
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                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 7424 [D.I.KH GOMAL132.00] 3PH         1907.64    8343.8   -60.90
                            LG         1367.00    5979.1   -61.36
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/10.526/75.023, 3.73807  Z-:/10.543/75.044, 3.74349  Z0:/22.999/75.891, 3.97840
-------------------------------------------------------------------------------------------------------------
                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 7425 [D.I.KHAN-II 132.00] 3PH         1199.24    5245.3   -58.10
                            LG          819.01    3582.2   -59.59
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/16.663/71.953, 3.06919  Z-:/16.682/71.970, 3.07227  Z0:/39.873/74.692, 3.65330
-------------------------------------------------------------------------------------------------------------
                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
 7430 [D.I.KHAN     132.00] 3PH        1935.07    8463.7   -60.21
                            LG         1382.13    6045.2   -60.85
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/10.407/74.487, 3.60258  Z-:/10.424/74.508, 3.60780  Z0:/22.884/75.705, 3.92470
-------------------------------------------------------------------------------------------------------------
                                        <-SCMVA-> <-Sym I''k rms-->
                                                    /I/     AN(I)
X---------- BUS ----------X              MVA        AMP      DEG
13310 [KT_4         132.00] 3PH        1532.02    6700.9   -63.01
                            LG          892.46    3903.5   -63.05
THEVENIN IMPEDANCE, X/R  (OHM)    Z+:/12.688/74.366, 3.57332  Z-:/13.025/74.076, 3.50495  Z0:/39.629/74.528, 3.61281
```

```
------------------------------------------------------------------------------------------------------------------------
                                     <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 13311 [ KT_1        132.00] 3PH     1632.77     7141.5   -64.29
                              LG      929.08     4063.7   -63.63
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/11.888/75.515, 3.87096  Z-:/12.290/75.055, 3.74630  Z0:/38.497/74.508, 3.62740
------------------------------------------------------------------------------------------------------------------------
                                     <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 13312 [KT_2         132.00] 3PH     1652.93     7229.7   -64.16
                              LG      947.17     4142.8   -63.59
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/11.747/75.422, 3.84518  Z-:/12.137/74.979, 3.72661  Z0:/37.617/74.636, 3.63943
------------------------------------------------------------------------------------------------------------------------
                                     <-SCMVA-> <-Sym I''k rms-->
                                                  /I/     AN(I)
X---------- BUS ----------X            MVA        AMP      DEG
 13313 [KT_3         132.00] 3PH     1714.01     7496.9   -63.81
                              LG     1003.44     4388.9   -63.49
THEVENIN IMPEDANCE, X/R  (OHM)      Z+:/11.344/75.195, 3.78337  Z-:/11.684/74.827, 3.68758  Z0:/35.102/74.788, 3.67763
------------------------------------------------------------------------------------------------------------------------
```

Annexure - 18

Health and Safety Policy of Project Sponsors

The issue of safety and emergency plan has great importance for the Applicant. The Applicant has dealt these issues in detail in its EPC and O&M Contracts as per the requirements of Government of Pakistan. The Applicant would like to assure NEPRA that the matters relating to the Safety and Emergency would be handled by the Applicant under the best practices.

Project's Environment & Social Policy

- Complying with applicable legal and other requirements to which our company subscribes.
- Embedding the Health, Safety, Environment, & Quality requirements in our routine and non-routine activities.
- Preventing injuries and ill health to personnel affected by our activities through a proactive system of risk management.
- Conserving natural resources and reducing the Carbon footprint of activities by proactively assessing their environmental impact and mitigating their adverse effects.
- Improving our operational performance by setting HSEQ objectives and targets with their regular monitoring and evaluation.
- Improving competence and skill through training and awareness.
- Ensuring continual improvement through a system of performance, planning, measurement, & reviews.

Karachi Solar Power (Pvt.) Limited

Annexure - 19

Decision (NOC) on Initial Environmental Examination (IEE) by Environmental Protection Agency, Government of KPK

DIRECTORATE
OF ENVIRONMENTAL PROTECTION AGENCY
SOUTHERN REGION D.I.KHAN.
FORESTRY, ENVIRONMENT & WILDLIFE DEPARTMENT
GOVT.OF KHYBER PAKHTUNKHWA.

NO. EPA/IEE/50MWSolar-Target/ 707 Dated: D. I. Khan the 22/01/2018.

To,

Engr. Aziz Raza Malik,
Chief Executive Officer,
Target Energy (Pvt) Limited.
Suit No. 701, 7th Floor, Green Trust Tower,
Jinnah Avenue, Islamabad,
Contact: 03145108291.

Subject: **SUBMISSION OF IEE REPORT FOR GRANT OF APPROVAL/ NO OBJECTION CERTIFICATE.**

I am directed to refer to the subject cited above and to enclosed herewith Environmental Protection Approval/Decision Note on IEE Report of "50MW Solar Power Project at Badshahabad village, Mosa Luni, Tehsil Kulachi, District D. I. Khan" for your information and further implementation.

Moreover, Shedule VII must be submitted to this Agency within a month on Stamp Paper as an undertaking for the compliance of terms and conditions as mentioned in the Environmental Approval as well as mitigation measures in the IEE Report. (Copy enclosed).

M. Shah

Assistant Director

Copy for information to;

- **PA to Director General, EPA, Govt. of Khyber Pakhtunkhwa, Peshawar.**
- **PA to Director, EPA, Govt. of Khyber Pakhtunkhwa, Peshawar.**

V565923

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UNDERTAKING

I Engr. Aziz Raza as proponent for 50 MW Kulachi Solar Power Project do hereby solemnly affirm and declare that I fully understand and accept the conditions contained in the approval accorded by Provincial Agency through letter No. EPA/IEE/50MWSolar-Target/707 dated 22nd January 2018 and undertake to design, construction and operate the project strictly in accordance with the said condition and the IEE/EIA.

Target Energy (Pvt) Ltd
Islamabad

25/01/2018
Engr. Aziz Raza Malik
Chief Executive Officer
Target Energy (Pvt) Ltd
36103-7261229-7

Witnesses:

(1) Khan
Mohammad Khurram Khan
37405-6261490-5

(2)
M. Bilal
37402-5231950-1

ATTESTED
NUSRAT MASOOD QURESHI
NOTARY PUBLIC
ISLAMABAD
ADVOCATE HIGH COURT
25/01/2018.

Annexure - 20

Copy of Letter of Intent (LOI)

PEDO

PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION

Government of Khyber Pakhtunkhwa Peshawar

No. 1277-78/PEDO/DRE/TE/Kulachi
Dated: 23/04/2018

To

Engr. Aziz Raza Malik (CEO)
M/s Target Energy (Pvt) Ltd.
Suit # 701, 7th Floor, Green Trust Tower, Jinnah Avenue
Islamabad, Pakistan

Subject: **Extension of Letter of Intent (LOI) for 50 MW Solar PV Project in Kulachi, D.I. Khan**

This is with reference to your letter No. Target/ISB//PEDO/014-18 dated 21st February 2018 on the subject cited above.

PEDO is pleased to inform that, in pursuant to clause 5 of the LOI, a day-to-day extension in the validity of LOI No. 2730-33/PEDO/CEO/LOI dated 20th October 2016 from its expiry i.e. 20th April 2018 is granted till the time the Grid Interconnection Study is approved by NTDCL and subsequently obtain Letter of Support (LOS) from AEDB after completing all procedural requirements as per RE Policy and accomplishing milestones as per LOI, within two months after approval of Grid Interconnection Study.

Director (Renewable Energy Projects)
(Private Power)

Copy for information to:

1. PS to CEO, PEDO, Peshawar

Director (Renewable Energy Projects)
(Private Power)

Room No. 329, PEDO House, 38/B-2, phase-V, Hayatabad, Peshawar. Tel: (+92-91) 9217331, Fax (+92-91) 9217489

PEDO

PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION

Government of Khyber Pakhtunkhwa Peshawar

No.2730-33 /PEDO/CEO/LOI
Dated Peshawar the 20/10/2016

To,

Mr. Salim Khan (Chairman)
M/s Target Energy (Pvt) Ltd,
Suit # 701, 7th Floor, Green Trust Tower,
Jinnah Avenue, Islamabad.

Subject: **LETTER OF INTEREST (LOI) FOR DEVELOPMENT OF [50] MW SOLAR IPP POWER IN KOLACHI, DISTRICT DI KHAN KPK.**
Reference: ***NOC No.2468-69/. PEDO/PP/TEPL Dated 26.09.2016.***

In terms of the Policy for Development of Renewable Energy for Power Generation 2006 ("Policy"), the Energy and Power Department / Pakhtunkhwa Energy Development Organization (PEDO) hereby confirms its interest in your proposal for establishing a 50 MW solar PV power generation project in Khyber Pakhtunkhwa province. The Sponsor(s) is responsible for arranging the land for the project. PEDO may facilitate the Sponsor(s) in arranging the land for the project; however, PEDO has no obligation to provide land to the Sponsor(s) for the project. PEDO acknowledges receipt of the bank guarantee No. **01836247 dated 10.10.2016** in the sum of **US Dollar 25,000/- (US $ Twenty Five Thousand)**.

2. The Sponsor(s) is required to complete the feasibility study and achieve the milestones listed at the **Annex-I** to this LOI ("LOI Milestones") for the subject project, at no risk and at no cost to, and without any obligation on the part of the PEDO, the Government of Pakistan, any Provincial Government or their respective agencies, within a period of Eighteen (18) months from the date of issuance of this Letter of Intent ("LOI").

3. The Sponsor(s) is required to carry out and complete the feasibility study at internationally acceptable standards and in accordance with the terms and conditions stipulated in the Policy and this LOI. The feasibility study must include, inter alia, Solar PV Plant equipment site details, detailed power production estimates based on solar irradiance data of project site, soil tests reports, technical details pertaining to solar PV panels and other allied equipment to be used in the Solar PV Plant, grid tied solar PV project, electrical studies (including but not limited to short-circuit study, power quality study, load flow study and stability study), environmental study, project costing, financing plan, carbon credits, financing terms, tariff calculations and assumptions for financial calculations including economic/financial analysis. The Sponsor is also advised to liaise with the power purchaser while determining the site, project layout, sub-station design and layout, the transmission line, interconnection arrangements, and other related matters.

4. The validity of this LOI is not more than 18 months from the date of its issue. where after it will automatically lapse immediately (unless extended pursuant to clauses 5 or 6), being the **20.04.2018** (the "**Expiry Date**"). Issuance of this LOI or the lapsing of its validity, or your conducting a feasibility study there under, cannot form the basis of any claim for compensation or damages by the Sponsor(s) or the project company or any party claiming through or under them against the Government of Pakistan, the Provincial Government, PEDO or any of their agencies, employees or consultants on any grounds whatsoever, during or after the expiry of the validity of the LOI.

5. The Sponsor(s) is therefore required to complete the feasibility study and achieve the LOI Milestones for the subject project within the validity of this LOI. The Sponsor(s) is also required to submit quarterly progress reports. Provided the Sponsor(s) meets the LOI Milestones on the stated dates, the Expiry Date of this LOI shall be extended on a day-for-day basis for the number of days of delay by which the approval or review by the relevant public sector entity listed in the LOI Milestones is delayed beyond the corresponding period stated in the LOI Milestones. In case there is a delay in completion of the feasibility study within the validity of this LOI for reasons not attributable to a public sector entity, a one-time extension may be granted up to a maximum period of one hundred eighty (180) days if PEDO is satisfied that the feasibility study is being conducted in a satisfactory manner and is likely to be completed shortly, and provided the Sponsor(s) enhance the amount of the bank guarantee to twice its original amount and extend its validity for a period six (6) months beyond the extended Expiry Date. Furthermore, if the said feasibility study is technically approved by the Panel of Experts and later the tariff awarded by NEPRA is not agreed by the Sponsor(s) (such decision to be made within thirty (30) days of the award of the tariff, and in any event within the validity of the LOI), the bank guarantee less 10% deduction for administrative and ancillary charges, would be returned to the Sponsor(s).

6. The Sponsor(s) shall apply to NEPRA for award of tariff within the period of validity of this LOI. Upon tariff being given, the Sponsor(s) shall forthwith submit a new Performance Guarantee in the sum of **US Dollars 125,000 (USD One Hundred Twenty Five Thousand Only)** and obtain the Tripartite Letter of Support ("LOS") from AEDB within the validity period of this LOI, provided, if the award of the tariff is delayed beyond the initial validity of the LOI, the Sponsor(s) shall extend the bank guarantee for a further period of six (6) months and the Expiry Date shall be extended *ipso facto* for a further period of six (6) months, and the Sponsor(s) shall obtain the LOS and submit the Performance Guarantee within the extended period afore-said. For the avoidance of doubt, the afore-said extension process may be repeated if the tariff is not announced (including on any review petition filed by the Sponsor(s), such review (if any) to be filed within the period prescribed in the NEPRA (Tariff Procedures and Standards) Rules) up to fifteen (15) days before the then prevailing Expiry Date.

7. In case the Sponsor(s) fails to meet the LOI Milestones or perform any other obligations set forth in the Policy and this LOI, including the extension of the date of expiry of bank guarantee as provided herein, PEDO will terminate this LOI and encash the bank guarantee.

8. (A) Pending the nomination of the Main Sponsor per sub-clause (B), the CEO, Target Energy (Pvt) Limited is liable for all obligations and liabilities of and on behalf of all other shareholders/ Sponsor(s) (without relieving the other shareholders/Sponsor(s) of their obligations and liabilities under this LOI). Accordingly CEO, Target Energy (Pvt) Limited shall not transfer or assign its shareholding (or other participatory interest, if the project company is not formed by the date of issue of the LOI) in the project or the project company without the prior written approval of PEDO, which approval may be declined by PEDO in its discretion if the proposed transferee's financial and other relevant credentials are found unsatisfactory.

(B) The Sponsor(s) is advised to nominate the Main Sponsor *(being the individual or group holding at least 20% equity or participatory interest in the IPP project)* no later than the Expiry Date of the LOI. In default of nomination as aforesaid, the CEO, Target Energy (Pvt) Limited will be deemed the Main Sponsor for all intents and purposes. The Main Sponsor, together with other initial project shareholders/Sponsor(s) (which shall, subject in each case to sub-clause (A) above, be firmly settled and announced to PEDO by the Expiry Date of the LOI), must hold 51% of the project equity for a period up to the project's Commercial Operations Date (COD).

(C) Any actual or purported transfer or assignment of the shares or other participatory interests by the Sponsor(s) / shareholders in contravention of the foregoing restrictions without prior written consent of the PEDO shall render this LOI void and the bank guarantee will be enchased in such case by PEDO.

9. This LOI is not assignable and non-transferable. This LOI shall be void upon any actual or purported assignment or transfer hereof without the prior written consent of PEDO.

10. This LOI is issued subject to the grant of a generation license and award of tariff by the National Electric Power Regulatory Authority ("NEPRA") to the subject project under the provisions of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1996 (the "NEPRA Act"). While PEDO shall extend its offices to support applications by the subject project before NEPRA under the current or any amended policy framework, by granting this LOI, PEDO does not make any representation or warranty on behalf of itself or the Government of Khyber Pakhtunkhwa that the subject project will be granted a generation license or a tariff acceptable to the subject project or at all.

11. This LOI is issued in duplicate on the date hereof, and it shall come into effect when one copy is received by PEDO after being duly countersigned by you. Nevertheless, this LOI shall lapse if the countersigned copy is not received at PEDO within 15 days of its issuance.

For and on behalf of
(Name & Signature of CEO, Target Energy (Pvt) Limited)

AZIZ RAZA
CEO
TARGET ENERGY

Chief Executive Officer
PEDO

CC.

1. PS to Secretary, Energy & Power Department, Peshawar.
2. Chief Executive Officer, AEDB, Islamabad.
3. PS to GM (Hydel), PEDO Peshawar.

Chief Executive Officer
PEDO

Annex-I

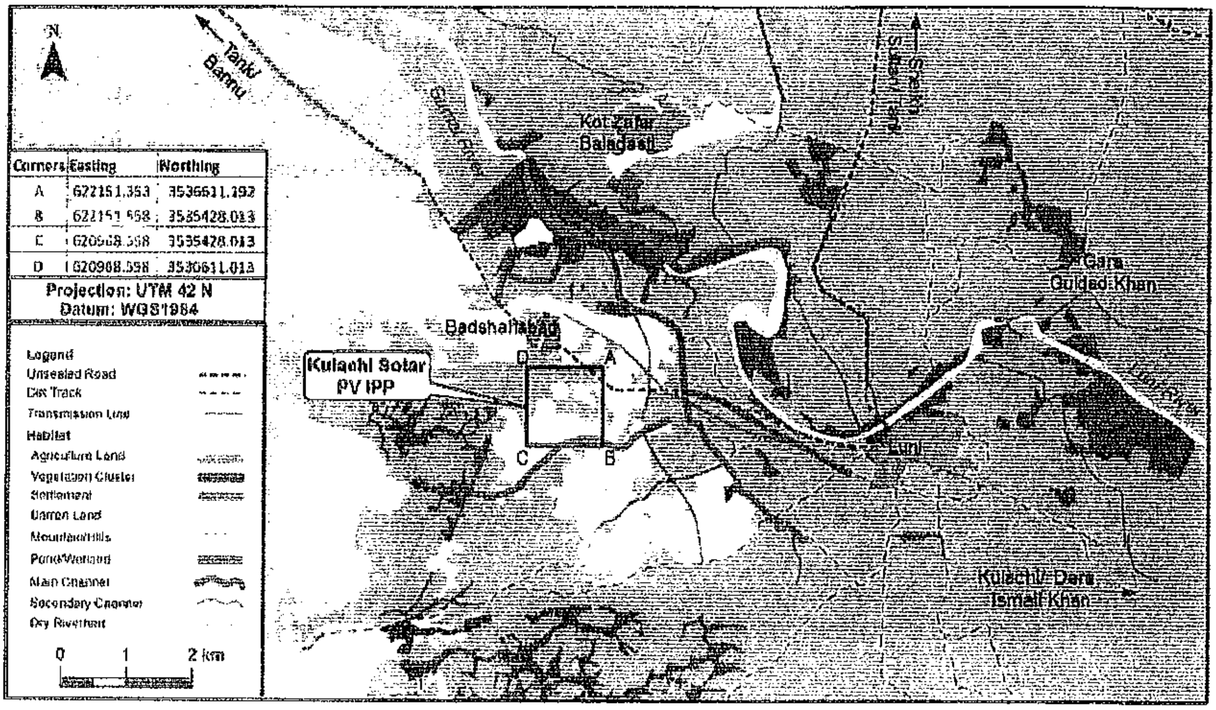
Milestones for the Letter of Intent (LOI)

Sr. No.	Milestones	Time Frame (in Months)
1.	Issuance of Letter of Intent (LOI)	T0
2.	Submission of complete Feasibility Study to AEDB, comprising of; (i) Technical study including resource assessment, plant & equipment details, layout and energy production analysis. (ii) Grid Interconnection Study (approved by NTDC) (iii) EIA / IEE study (approved by provincial Environmental Protection Agency)	No later than ten (10) months after issuance of LOI
3.	Vetting and approval of Feasibility Study by AEDB *(including verification of production estimates through third party consultant, if required, cost of which shall be borne by the Sponsor(s))*	Within two (2) months after submission to AEDB. *(provided any requisite modifications are timely made by the Sponsor(s) and the modified feasibility study is resubmitted within 15 days of a letter by AEDB requiring the modifications)*
4.	Tariff and Generation from NEPRA	Within four (4) months of approval of Feasibility Study by AEDB
5.	Acceptance of Tariff by IPP	Within fifteen (15) days of determination of tariff by NEPRA
6.	Posting of Performance Guarantee for Issuance of Letter of Support (LOS)	Within fifteen (15) day of acceptance of Tariff by IPP
7.	Issuance of Letter of Support (LOS) by AEDB	Within fifteen (15) days of posting of Performance Guarantee (PG)

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company : **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity : 50MW, Solar power plant

Annexure A: *Location maps, site maps, land*



Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company : **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity : 50MW, Solar power plant

Annexure B: *Point 2; Technology, size of plant, number of units*

Type of Technology	Solar power
System Type	Grid connected
Installed Capacity of Solar Farm (MW)	50MWdc
Type of Module	330Wp
Type of Cell	Poly-crystalline
Dimension of each Module	1956×992×40mm
Module Surface Area	1.94m^2
No. of Panels / Modules	151554
Total Module Area	294068m^2
Total Land Area Used	1230489m^2
Number of Solar Cells in each Module	72
Efficiency of Module	17.01%

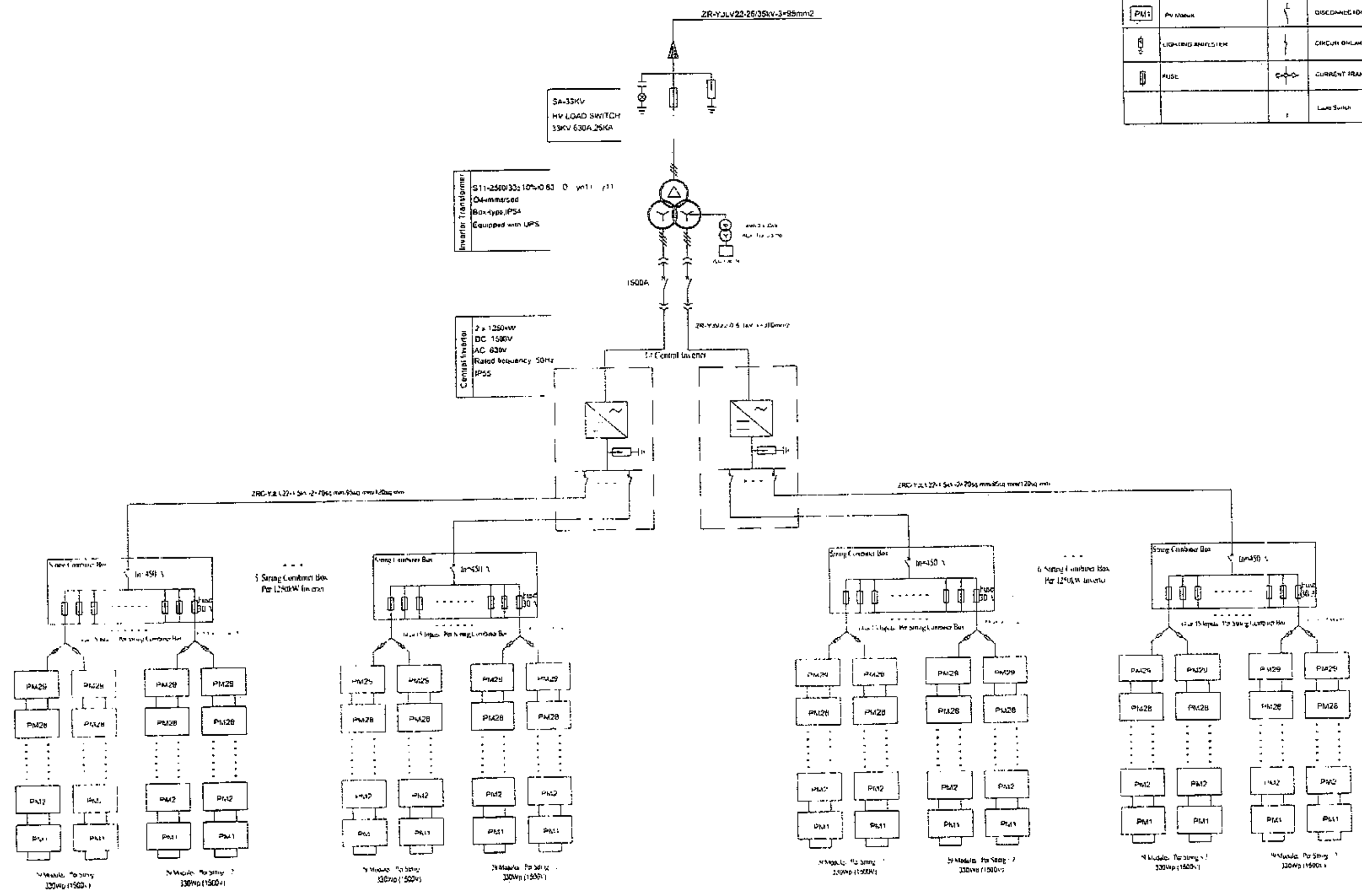
Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company	: **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity	: 50MW, Solar power plant

Annexure C: *Point 6; Interconnection with National Grid Co. distance and name of nearest grid, voltage level (single line diagram)*

Interconnection distance to Kulachi sub-station from our facility is 16 kilometers and shall be a double circuit line.

Name of nearest grid	:	Kulachi Substation / PESCO Grid
Voltage level	:	132kV
Single Line diagram	:	Annexure C.1 & Annexure C.2



	CABLE & TERMINATION		TRANSFORMER Ynd11
	EARTH SWITCH		VOLTAGE TRANSFORMER
	DISPLAYER		CURRENT TRANSFORMER
PM1	PV Module		DISCONNECTOR
	LIGHTING ARRESTER		CIRCUIT BREAKER
	FUSE		CURRENT TRANSFORMER
			Load Switch

PROJECT:

50MW Kolachi Solar photovoltaic project

CONTRACTOR

TBEA

TBEA SUN OASIS CO., LTD

DRAWING NUMBER: TBEA

TBEA-KOLACHI-DW-E-01

SHEET TITLE

ORIGINAL SIZE "841X594"
SHEET SIZE "A-1"

A4 A3 A2 A1 A0

TBEA SUN OASIS CO. LTD

DATE: 26.12.2017
DRAWN BY: ZHU KONGSHUO
ENGINEER:
APPROVED BY:

Notes:
1.This drawing is only bidded for 50MW Kolachi Solar photovoltaic project.
2.The design is merely preliminary design, no permission to used for construction.

FOR INFORMATION

1 OF 1

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company	: **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity	: 50MW, Solar power plant

Annexure D: *Point 7; Infrastructure: roads, rail, staff colony, amenities*

Staff colony	:	Annexure D.1
Project layout	:	Annexure D.2

Community Development Plan

Purpose

The purpose of preparing community Development Plan (CDP) is to identify, prioritize development issues and prepare an action plan for the development of directly and indirectly affected communities. The CDP is mainly based on the physical, social, economic, and livelihood analysis of the communities.

The CDP will largely help the Communities in developing a future vision and road map for their overall socio-economic wellbeing and prosperity. The CDP will be encouraging a lead role of Community Institutions in the efficient delivery of development services at household, neighborhood, and village levels.

Guiding Principles of CDP Making Process

The guiding principles of CDP making process is as under:

Guiding Principles	*Input Activities*
Participation	▸ Broad based meetings at village level ▸ Included representatives from all community sections and hamlets ▸ Landless and poor in the community contributed in the village plan making process ▸ Poor and remotely located households within village also represented ▸ All community sections including women and youth participated
Integrated Approach	▸ Information on all aspects of integrated development collected ▸ Interventions identified for various land uses, infrastructure and public facilities, poverty reduction and livelihood enhancement ▸ Responsibilities of the Community Institutions and beneficiaries identified
Pro-poor	▸ Household typology conducted to identify different socio-economic groups in the village ▸ Poor and poorest identified and involved in CDP making activities ▸ Interventions included in the plan which specially benefit the poorest / poor
Accountability and Transparency	▸ The entire planning process will be inclusive and participatory ▸ Communities will be involved in the implementation of the CDP. ▸ The plan document will be shared with the local communities. ▸ Executing agency will be responsible for the Periodic monitoring of the CDP.

Methodology for need Assessment

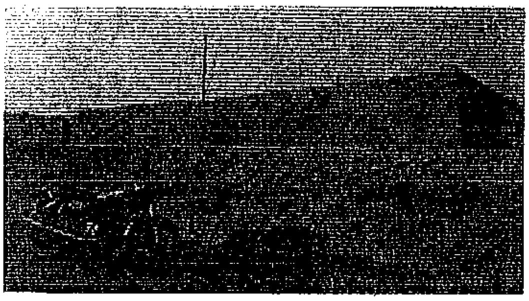
This CDP has been developed based on community needs assessments observed during socioeconomic survey carried out between March 18 and 19, 2017, to document the prevailing socioeconomic conditions of the people within the Study Area. As it is an IEE, need assessment was made on a rapid assessment basis therefore a detailed need assessment will be required and CDP will be updated before implementation. **Exhibit 1** presents the details of the surveyed settlements and **Exhibit 2** shows photographs of the local socioeconomic setting.

Exhibit 1: Details of Surveyed Settlements

Settlement	*Coordinates*	*Area m²*	*Approximate Distance from Project Site (km)*
Badshahabad	31° 57' 44.3" N 70° 17' 03.7" E	198,121	0.2
Kot Zafar Baladasti	31° 59' 29.8" N 70° 18' 01.5" E	752,528	3.0
Luni	31° 56' 46.6" N 70° 20' 29.1" E	1,168,667	4.0

Data was collected through a combination of primary and secondary sources. Key secondary sources of information for the baseline study includes maps, census reports and previous IEE studies conducted in the area. Reference to data sources have been provided, as appropriate. Primary data was collected from three settlements within the Study Area using data forms.

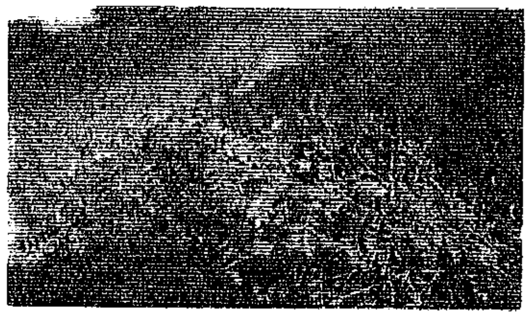
Exhibit 2: Socioeconomic Environment in the Study Area



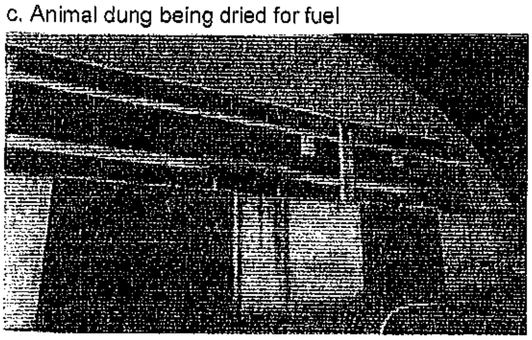
a. House in Kot Zafar Baladasti

b. A street in Luni

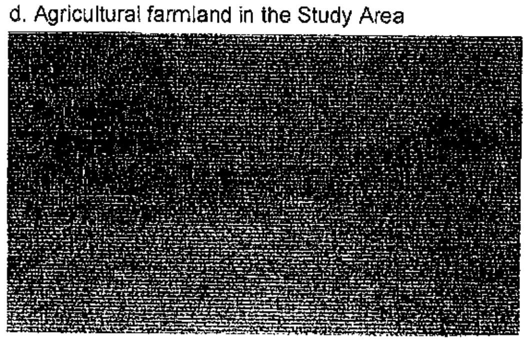
c. Animal dung being dried for fuel



d. Agricultural farmland in the Study Area



e. School in Luni



f. Unsealed road, Badshahabad and Luni

Source: Photographs taken during survey conducted in March 2017

Needs Assessment and Prioritization

During field survey local communities identified and prioritized their needs which mainly include;

- Health and hygiene facilities
- Infrastructure facilities in Education
- Sealed roads and paved streets
- Safe drinking water facilities

Besides the prioritization of major development needs of the study area, local community also identified and prioritized non-structural interventions which mainly include trainings for men and women of the area to enhance livelihood opportunities, quality of education and agriculture.

Community Development Plan CDP

In line with identified and prioritized structural and non-structural development needs of the study area following actions shall be implemented during construction and operation phases.

- Exploration and utilization of local resources
- Gender equality and mainstreaming
- Incorporation of Disaster Risk Reduction (DRR) and Climate Change Approaches
- Promotion of public-private partnerships
- Trainings on income generation skills and livelihood enhancement opportunities for the poorest and un-employed youth
- Capacity building trainings will be arranged in agriculture and livestock management sector
- Arrangement of teachers skills enhancement trainings
- Arrangement of women vocational skills trainings.

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company : **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity : 50MW, Solar power plant

Annexure E: *Point 8; Project cost, information regarding sources and amounts of equity, debt*

Project Cost	:	Up to US$ 48.750 million
Debt	:	Up to US$ 36.562 million
Equity	:	Up to 12.187 million

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company : **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity : 50MW, Solar power plant

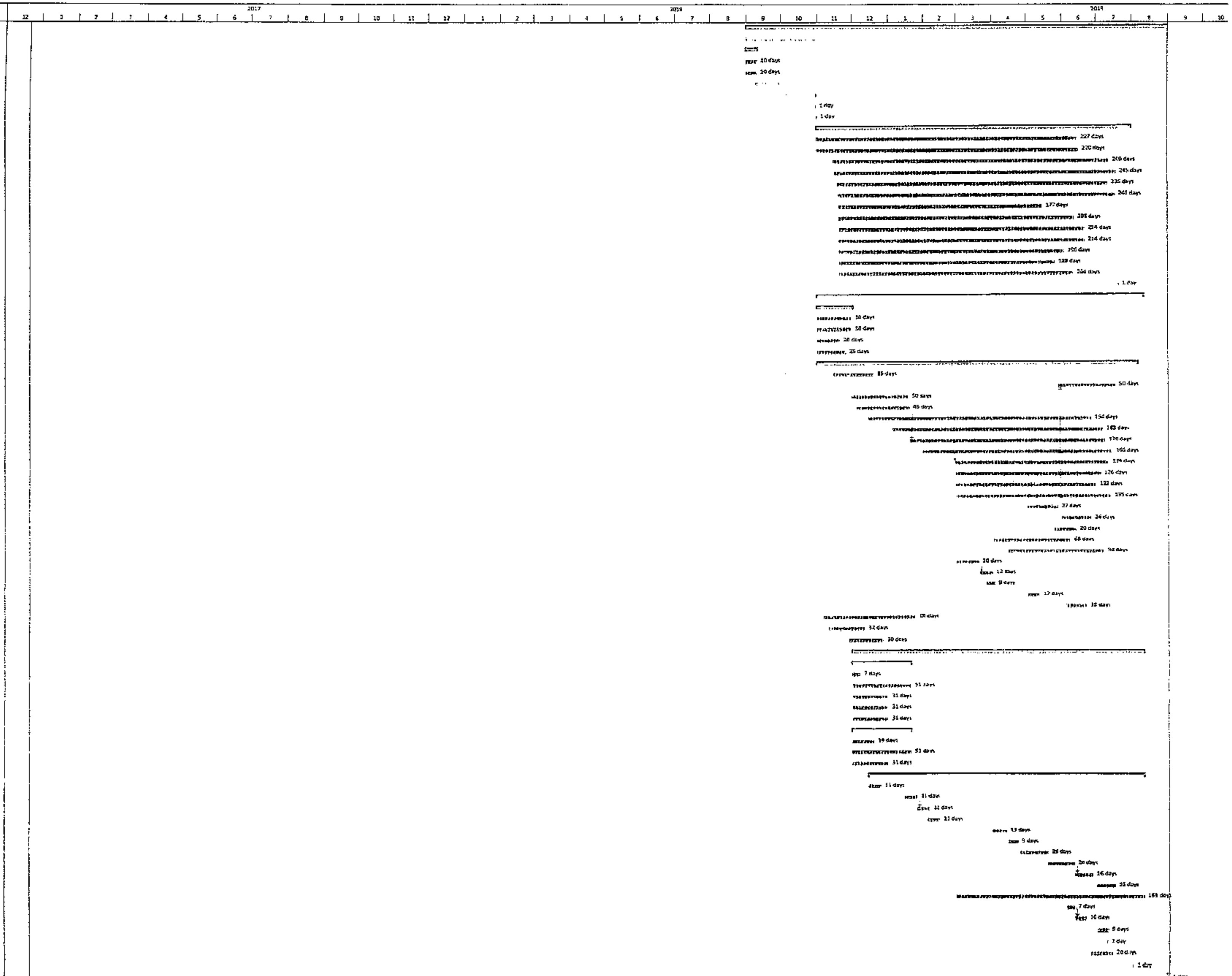
Annexure F: *Point 9; Project commencement and completion schedule with milestones*

Project Construction Commencement : *1 November 2018*
Completion schedule with milestone : Annexure F.1

TBEA

TIME SCHEDULE

ID	TASK	TIME	START TIME	FINISH TIME
1	1 Project Duration	365 days	2018/9/1	2019/8/31
2	1.1 Design		2018/9/1	
3	1.1.1 Topographical and Geotech	10 days	2018/9/1	2018/9/10
4	1.1.1.1 Topographical drawing	10 days	2018/9/1	2018/9/10
5	1.1.1.2 Geological and Hydrological stu	10 days	2018/9/1	2018/9/10
6	1.1.2 preliminary design of civil work	20 days	2018/9/10	2018/9/29
7	1.1.3 Detailed design of civil work and	31 days	2018/10/1	2018/10/31
8	1.1.4 Detailed design completed	1 day	2018/10/31	2018/10/31
9	1.2 Commencement date	1 day	2018/11/1	2018/11/1
10	1.3 Purchase	275 days	2018/11/1	2019/7/31
11	1.3.1 Pile foundation	227 days	2018/11/1	2019/6/15
12	1.3.2 Structure production,transportat	228 days	2018/11/1	2019/6/16
13	1.3.3 Modules transportation custome	240 days	2018/11/15	2019/7/12
14	1.3.4 Combiner Box	245 days	2018/11/16	2019/7/18
15	1.3.5 Inverter production,transportat	235 days	2018/11/19	2019/7/11
16	1.3.6 Transformer	240 days	2018/11/20	2019/7/17
17	1.3.7 Cable production,transportat	177 days	2018/11/20	2019/5/15
18	1.3.8 LV/HV Cabinet	205 days	2018/11/20	2019/6/12
19	1.3.9 33/132kV transformer	214 days	2018/11/20	2019/6/21
20	1.3.10 132kV equipments	214 days	2018/11/20	2019/6/21
21	1.3.11 CCTV system production	196 days	2018/11/20	2019/6/3
22	1.3.12 SCADA system production	180 days	2018/11/20	2019/5/26
23	1.3.13 Other equipment and accessorie	204 days	2018/11/20	2019/6/11
24	1.3.14 Delivery completed	1 day	2019/7/20	2019/7/20
25	1.4 Construction	283 days	2018/11/1	2019/8/10
26	1.4.1 Preparation of construction	31 days	2018/11/1	2018/12/1
27	1.4.1.1 Mobilization	30 days	2018/11/1	2018/11/30
28	1.4.1.2 Trees cutting and transportation	30 days	2018/11/1	2018/11/30
29	1.4.1.3 Road	20 days	2018/11/1	2018/11/20
30	1.4.1.4 Site infrastructure	25 days	2018/11/1	2018/11/25
31	1.4.2 Formal construction	270 days	2018/11/1	2019/8/5
32	1.4.2.1 Fence	35 days	2018/11/15	2018/12/19
33	1.4.2.2 Site formation	50 days	2018/5/29	2019/7/17
34	1.4.2.3 Support foundation constructio	50 days	2018/11/30	2019/1/18
35	1.4.2.4 Support installation	46 days	2018/12/5	2019/1/19
36	1.4.2.5 Installation of solar modules	194 days	2018/12/15	2019/6/26
37	1.4.2.6 Solar module cable connection	183 days	2019/1/5	2019/7/6
38	1.4.2.7 Support,formation ground conn	170 days	2019/1/20	2019/7/8
39	1.4.2.8 Combiner box foundation	166 days	2019/1/30	2019/7/14
40	1.4.2.9 Inverter foundation	134 days	2019/2/28	2019/7/11
41	1.4.2.10 Transformer foundation	126 days	2019/3/1	2019/7/4
42	1.4.2.11 MV LV tension cable duct co	122 days	2019/3/1	2019/6/30
43	1.4.2.12 Ground grid construction	135 days	2019/3/1	2019/7/13
44	1.4.2.13 Optical construction	27 days	2019/5/2	2019/5/28
45	1.4.2.14 SCADA system construction	26 days	2019/6/1	2019/6/26
46	1.4.2.15 CCTV system construction	20 days	2019/5/25	2019/6/13
47	1.4.2.16 Control room construction	66 days	2019/4/2	2019/6/6
48	1.4.2.17 Control room equipment	84 days	2019/4/15	2019/7/7
49	1.4.2.18 Switchgear installation , cable	20 days	2019/3/1	2019/3/20
50	1.4.2.19 SVG foundation construction	12 days	2019/3/21	2019/4/1
51	1.4.2.20 SVG equipment installation	8 days	2019/3/27	2019/4/3
52	1.4.2.21 Arrester foundation	12 days	2019/5/1	2019/5/12
53	1.4.2.22 Storage building	18 days	2019/6/5	2019/6/22
54	1.4.2.23 Road construction	80 days	2018/11/6	2019/1/24
55	1.4.2.24 Drainage construction	32 days	2018/11/10	2018/12/11
56	1.4.2.25 Ancillary facilities construction	30 days	2018/11/28	2018/12/27
57	1.4.3 132kV Booster station constructi	253 days	2018/12/1	2019/8/10
58	1.4.3.1 Outdoor Civil Work	51 days	2018/12/1	2019/1/20
59	1.4.3.1.1 Gantry Structure Foundation	7 days	2018/12/1	2018/12/7
60	1.4.3.1.2 Power Transformer Foundat	52 days	2018/12/1	2019/1/20
61	1.4.3.1.3 Equipment Structure Found	31 days	2018/12/1	2018/12/31
62	1.4.3.1.4 Cable Trench	31 days	2018/12/1	2018/12/31
63	1.4.3.1.5 Switchyard Lighting Founda	31 days	2018/12/1	2018/12/31
64	1.4.3.2 Switchgear Building	52 days	2018/12/1	2019/1/20
65	1.4.3.2.1 Piling work	19 days	2018/12/1	2018/12/19
66	1.4.3.2.2 Construction Work	51 days	2018/12/1	2019/1/20
67	1.4.3.2.3 Fitment Work	31 days	2018/12/1	2018/12/31
68	1.4.3.3 Erection and Installation Wor	235 days	2018/12/15	2019/8/10
69	1.4.3.3.1 132kv Gantry Structure	11 days	2018/12/15	2018/12/25
70	1.4.3.3.2 132kv Equipment Structure	11 days	2019/1/16	2019/1/26
71	1.4.3.3.3 60 MVA Transformer	11 days	2019/1/26	2019/2/5
72	1.4.3.3.4 Bus Conductor & Earthing	11 days	2019/2/4	2019/2/14
73	1.4.3.3.5 Cable Try Erection	13 days	2019/4/1	2019/4/13
74	1.4.3.3.6 132KV Pole	9 days	2019/4/15	2019/4/23
75	1.4.3.3.7 Cable Laying	25 days	2019/4/25	2019/5/19
76	1.4.3.3.8 Lighting System	24 days	2019/5/19	2019/6/11
77	1.4.3.3.9 Battery	16 days	2019/6/12	2019/6/27
78	1.4.3.3.10 Panel Installation	16 days	2019/7/1	2019/7/16
79	1.4.3.3.11 Cable Connection	163 days	2019/3/1	2019/8/10
80	1.5 PPA test	7 days	2019/6/5	2019/6/11
81	1.6 Single equipment commissioning	20 days	2019/6/12	2019/6/21
82	1.7 Power system commissioning	9 days	2019/7/2	2019/7/10
83	1.8 Electromechanical Completion	1 day	2019/7/10	2019/7/10
84	1.9 Punch list	20 days	2019/6/25	2019/7/14
85	1.10 PR test	1 day	2019/8/1	2019/8/1
86	1.11 COD	1 day	2019/8/31	2019/8/31



Project Name Nigeria SOKOTO 55MW Solar Plant | Activity | Activity manuale | Due date | Milestone | Replogo | Avanzamento | Manual Progress | Manual Progress

* the schedule is only for preliminary proposal according to estimated NTP Time, could be updated / optimized in accordance with further input

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company : **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity : 50MW, Solar power plant

Annexure G: *Point 10; ESSA (Environmental and Social Soundness Assessment)*

Executive Summary

Kulachi Solar Power (Private) Limited (KSPL) intends to develop a 50 MW grid-connected solar photovoltaic (PV) independent power producer (IPP) plant ('the Project') in Dera Ismail Khan District of Khyber Pakhtunkhwa (KP) province of Pakistan (**Exhibit 1**). This document presents the results of an initial environmental examination (IEE) conducted for the construction and operation of the proposed Project. The IEE was commissioned by KSPL and prepared by Hagler Bailly Pakistan (Pvt.) Limited (HBP).

The proposed Project site is located near Badshahabad village, about 14 km from Kulachi town in Kulachi tehsil.[1] The Project has assessed 140 hectares of land, but out of this the final footprint of the project is not likely to exceed 125 hectares. The Project will be developed as a standalone IPP, connected to the transmission grid of Peshawar Electric Supply Company (PESCO) at 132 kV for sale of power to the Central Power Purchasing Agency (Guarantee) Limited (CPPA-G).

This IEE has been conducted to meet the regulatory requirements set out by the KP Environmental Protection Agency (KP-EPA) and constitutes **Volume 4** of the Project Feasibility Study. Wherever appropriate, reference is also made to the International Finance Corporation's (IFC) Performance Standards (PS) and Environmental, Health, and Safety (EHS) Guidelines. The guidelines provided by these documents are considered as 'best practice' in the environment sector.

1 *Tehsil* is the term for an administrative unit under Pakistan's governance regime. In the administrative hierarchy, it represents the fourth tier after the province, division, and district levels.

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company	: **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity	: 50MW, Solar power plant

Annexure H: *Point 11; Safety plans, emergency plans*

KPS will adopt EPC Contractors 'Environment, Health and Safety Management Manual'.

Environment, Health and Safety Management Manual	Annexure H.1

The issue of safety and emergency plan has great importance for the Applicant. The Applicant has dealt these issues in detail in its EPC and O&M Contracts as per the requirements of Government of Pakistan. The Applicant would like to assure NEPRA that the matters relating to the Safety and Emergency would be handled by the Applicant under the best practices.

Project's Environment & Social Policy

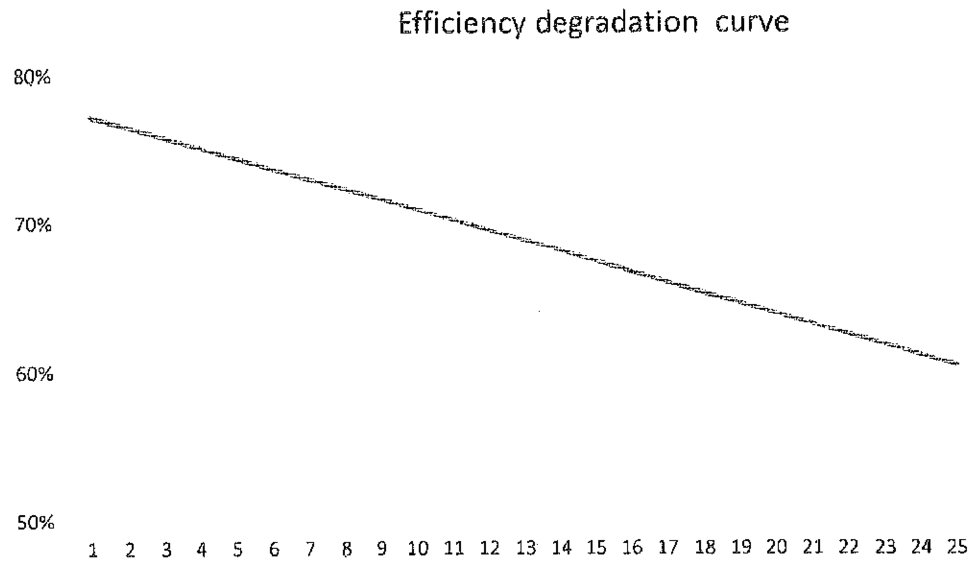
- Complying with applicable legal and other requirements to which our company subscribes.
- Embedding the Health, Safety, Environment, & Quality requirements in our routine and non-routine activities.
- Preventing injuries and ill health to personnel affected by our activities through a proactive system of risk management.
- Conserving natural resources and reducing the Carbon footprint of activities by proactively assessing their environmental impact and mitigating their adverse effects.
- Improving our operational performance by setting HSEQ objectives and targets with their regular monitoring and evaluation.
- Improving competence and skill through training and awareness.
- Ensuring continual improvement through a system of performance, planning, measurement, & reviews.

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company : **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity : 50MW, Solar power plant

Annexure I: *Point 13; Plant characteristics: generation voltage, power factor, frequency, automatic* generation control, ramping rate, control metering and instrumentation

Generation voltage	:	0.4KV at generator terminal and 132kV at the point of interconnection with the grid
Power factor	:	0.95 leading and 0.95 lagging. At point of interconnection with the grid at 132kV level the power factor will be maintained at [0.95] lagging/leading, Frequency: 50Hz±2Hz
Control, Protection & Supervision	:	A control and monitoring system shall be provided for monitoring operation of the Complex and providing telecommunication and tele-metering to the Control Room.
Metering system	:	Metering system shall be installed as per NTDC and PESCO approved specifications. Metering System on the high voltage side of the Power Transformer(s) at the substation shall be provided for export and import metering. Independent current transformers of accuracy class [0.2]s and voltage transformers of accuracy class [0.2] shall be provided at the Substation for providing input to the Energy Meters. A separate air-conditioned room in the Complex's Substation shall be provided for metering system. All cabling between the Meters and associated Current Transformers and Voltage Transformers shall be laid as per prudent engineering practices. Backup metering system shall also be provided.
Power Curve	:	Annexure I.1



Efficiency degradation curve
80%
70%
60%
50%
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

Efficiency degradation and curve of 50MW Kulachi Solar PV Project

Performance Ratio degradation

	Meteonrom
	single axis
	PR
1year	77.19%
2year	76.49%
3year	75.79%
4year	75.09%
5year	74.39%
6year	73.69%
7year	72.99%
8year	72.29%
9year	71.59%
10year	70.89%
11year	70.19%
12year	69.49%
13year	68.79%
14year	68.09%
15year	67.39%
16year	66.69%
17year	65.99%
18year	65.29%
19year	64.59%
20year	63.89%
21year	63.19%
22year	62.49%
23year	61.79%
24year	61.09%
25year	60.39%

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company	: **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity	: 50MW, Solar power plant

Annexure J: *Point 14; Control, metering, instrumentation and protection*

Control, Protection & Supervision	:	A control and monitoring system shall be provided for monitoring operation of the Complex and providing telecommunication and tele-metering to the Control Room. A complete and comprehensive protection system for the Complex and inter-tripping provisions between Project's substation and the connected Grid Station shall be provided by the Project Company
Metering system	:	The metering points to record the MWh and MVARh exchange between the Complex and the PESCO or NTDC's Grid System shall be at the HV Side (132kV) of the Power Transformer of the Complex. An exclusive set of current and voltage transformers (0.2s & 0.2 accuracy class respectively) to feed the current and voltage to the metering system shall be provided. The meters will be located within the substation in a separate room as per NTDC's specifications. Back-up Metering System shall also be installed, *Protection system:* A suitable protection system to ensure system stability and reliability in the event of faults contributed by the solar power project, substation and the grid as per requirement of NTDC shall be provided.

Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company : M/s Kulachi Solar Power (Private) Limited (KSP)
Capacity : 50MW, Solar power plant

Annexure K: *Point 15; Training and development*

KSP will adopt EPC Contractors 'Training Plan'.

KSP Training Plan Annexure L.1

1. Organization and Duties and Authorities of Project Management Personnel

1.1 Organization Chart of Project Department

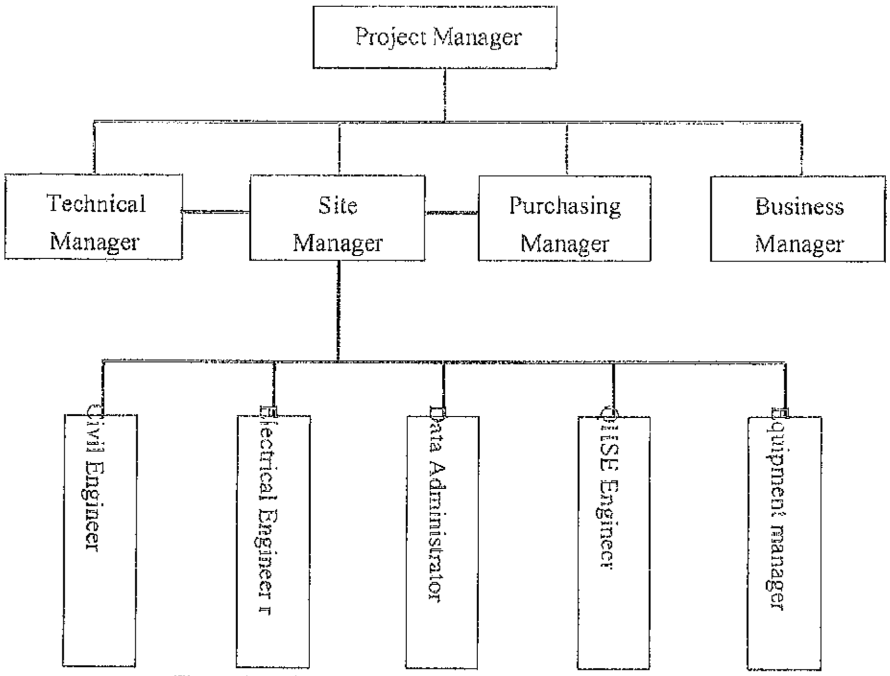


Figure 2- 1 Organization Chart of Project Department

1.2 Major Responsibilities of Project Management Personnel

Position	Major Responsibilities
Project Manager	1. Directing construction and production, directly responsible for construction quality, construction term and safe production, and implementing various production planning schemes of the Project. 2. Responsible for implementing various engineering objectives, and coordinating the cooperation of various engineering disciplines and sub-contractors; 3. Finishing varied control objectives as the engineering contract. 4. Responsible for external contact and internal coordination, and effectively monitoring the entire course of construction. 5. Risk control of General contract and subcontract. 6. Organize relevant departments to deal with the claim and variation of owners, responsible for reviewing claim reports submitted by suppliers and

	subcontractors. 7. Responsible for the design, subcontractor engineering payments, materials, equipment suppliers to pay for the application review.
Business Manager	1. Responsible for establishing and maintaining external relationships, maintaining good communication with local government, owners, subcontractors, etc. 2. Coordinate the project manager for dealing with the claims 3. Coordinate with other departments to complete the relevant work such as invoice and payment etc. 4. Coordinate to complete the contract negotiations.
Site Manager	1. Responsible for safe and civilized construction and production coordination of the Project. 2. Organize the compilation of safe and environmental and special schemes. 3. Organize the admission of equipment and materials,and coordinate the relationship between subcontractors on site. 4. Responsible for safe and civilized construction and the operating cost of the Project.
Technical Manager	1. Responsible for the design and engineering of the solar project. Compliance with the requirements as the contract and with the relevant international engineering codes. 2. Responsible for promotion and application of the four new technologies,and organizing the summary and analysis work of the new technology application. 3. Responsible for communicating with the owners and supervisors on the design concept, design drawings and other content. 4. Organize the drawing self-examination, participate in drawing joint examination, responsible for design alteration and negotiation, and deliverto relevant personnel.
Purchasing Manager	1. Organization of equipment, materials, tender and calibration related work according to the project progress requirement. 2. Responsible for subcontractor bidding evaluation, contract signing matters. Supervise subcontractors to handle the corresponding of guarantee; 3. Establish materials procurement records; communicate with material and equipment supplier regularly to confirm the manufacture, delivery and payment progress. 4. Establish the product supervise plan, and responsible for inspection, supervision and other work of the equipment, materials. 5. Coordinate with the owner to make FAT (Factory Acceptance Test) inspections about the important material or equipment manufacturing and delivering. 6. Coordinate with the supplier about the site services, technical guide, installation, commissioning, manage with relative staff. 7. Responsible for customs declaration, customs clearance information, taxes and other work truly, accurately and in time.
Constructi	1. Responsible for implementing the construction organization design,

on Engineer (civil ,electrical)	construction scheme and technical measures. 2. Responsible for the construction of related sub-divisional works as per the construction organization design, scheme and disclosure 3. Responsible for the implementation and technical review of the "Three Inspection System" concerning the sub-divisional works. 4. Responsible for the technical disclosure of the construction team.and monitoring its implementation. 5. Responsible for the compilation of the engineering technical data related to duty. 6. Responsible for organizing and coordinating the acceptance, commissioning and handover of subcontractors and suppliers.
QHSE Engineer	1. Responsible for the safe construction check and control on site,and organizing safety education and activities of the Project. 2. Responsible for the compilation of the safety management and civilized construction measures, and monitoring and checking the implementation of varied subcontractors. 3. Responsible for safety, quality and technical information compilation. 4. Responsible for the acceptance, check and management of the mechanical equipment, the quality check, monitoring and application for inspection of the sub-divisional works and inspection batch, Participating in the quality acceptance of the received material and components. 5. Responsible for organizing emergency exercise. 4. Taking relevant measures against potential accidents on site timely.
Data Administrator	1. Responsible for the uploading, receiving, dispatching, collating, compiling, reviewing and storing of the documents and data of the Project. 2. Direct the compilation of the technical engineering data. 3. Responsible for the printing of daily data of the Project. 4. Responsible for the commencing and completion of document for thisproject.
Equipment Manager	1. Responsible management for site material in and out of the warehouse. 2. Equipment entry, material received and acceptance for management. 3. Management for warehouse inventory, and equipment and material safety report monthly. 4. Responsible for the establishment of project logistics management, make records for goods according to the batch of goods distribution.

2. Major Mechanical Equipment and Personnel Involved in this Project

2.1 Major Construction Machine and Equipment List

S/N	Equipment Name	Model Specifications	Qty.	Country: Place of Origin	Manufacturer Year	Rated parameter	Use

1	Hydraulic vehicle	CYB-JC	2	Pakistan	2010	123.6ps/rpm	Material handling
2	forklift	6,598.3 A	2	Pakistan	2010	65 kW	Material transportation
3	Loader	ZL50F	1	Pakistan	2009	155/77.2kw	Equipment handling
4	Dump truck	Double axles	1	Pakistan	2009	74 kW	Material handling and transportation
5	Auto crane	6,598.3 A	1	Pakistan	2009	100T	Equipment handling
6	Truck with crane	6,598.3 A	1	Pakistan	2008	20T	Equipment handling
7	Excavator	TY220	2	Pakistan	2010	115.9ps/rpm	Ground excavation
8	Welding machine	UN1-100	4	Pakistan	2010	315KW	Body
9	Sprinkler	8t	1	Pakistan	2010	120 hp	Construction environment improvement
10	Spiral drilling machine	DGN-2	8	Pakistan	2013		Pile foundation drilling
11	Road roller	SEM8220	1	Pakistan	2012		Road construction

2.2 Major Construction Tools

S/N	Name of Machine or Tool	Qty.	Remarks
1	Hydraulic clamp	12	
2	Bushing (#10, 8, 12)	20 for each	
3	Diagonal pliers	30	
4	Nipper pliers	30	
5	Screw driver	30	
6	Wire stripping plier	5	
7	Electrician knife	30	
8	Pincer pliers	20	
9	Open spanner	30	
10	Socket spanner	30	
11	Hexagon spanner	30	
12	Iodine tungsten lamp	20	

2.3 Tool and Instrument List for Surveying and Installation on Site

S/N	Name of instrument and equipment	Specification & Model	Unit	Qty.	Remarks
1	Theodolite	J2-1, J2-2	Set	2	Normal
2	Level gauge	DS3-A, DS3	Set	2	Normal
3	Vernier caliper	0-200	Nr.	5	Normal
4	Universal angle meter	0-270	Nr.	10	Normal
5	Engineering surveyor	JZC-2/2M	Nr.	20	Normal
6	30M tape	0-30000	Nr.	5	Normal
7	5M tape	0-5000	Nr.	30	Normal
8	Welding inspection ruler	HJC40	Nr.	5	Normal
9	Multimeter		Pcs.	5	Normal

2.4 Table for labor force planned to be input

Manpower plan on forecasting period											
Type of workers	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEP
Mechanical manipulator	2	5	6	5	5	5	2	2	2		
Line measure worker			3	3	3	2	1				
Skilled worker		2	15	60	80	90	50	40	20	20	10
Electrical installation workers			2	3	15	20	20	15	10	5	2
Ordinary worker	15	30	50	100	120	150	100	70	20	20	20
Total number	17	37	76	171	223	267	173	127	52	45	32

Work Description

*Mechanical manipulator：Responsible for the operation of various machinery and equipment (such as: piling machines, loaders, forklifts, excavators, cranes, off-road cars, etc.)

*Line measure worker：Responsible for working with field measurement engineers

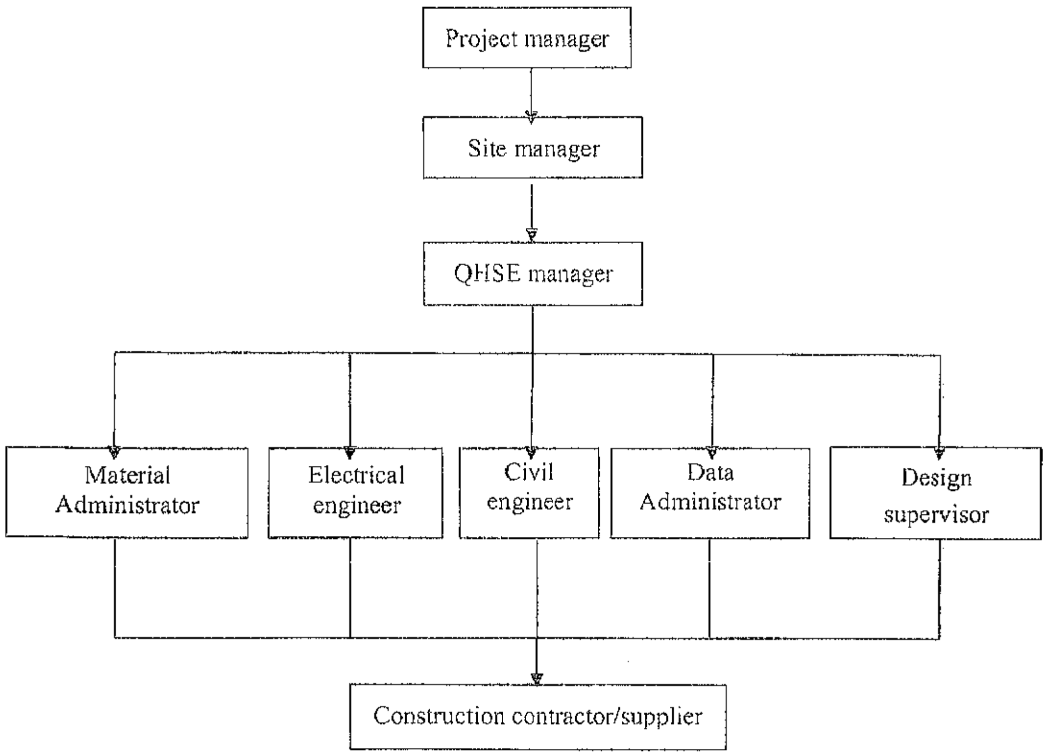
*Skilled worker：With the installation of stents, components, fencing and skilled workers, steel workers, concrete and woodworking and other technical trades

*Electrical installation workers：Installation of electrical equipment and other wiring and other electrical related technical workers

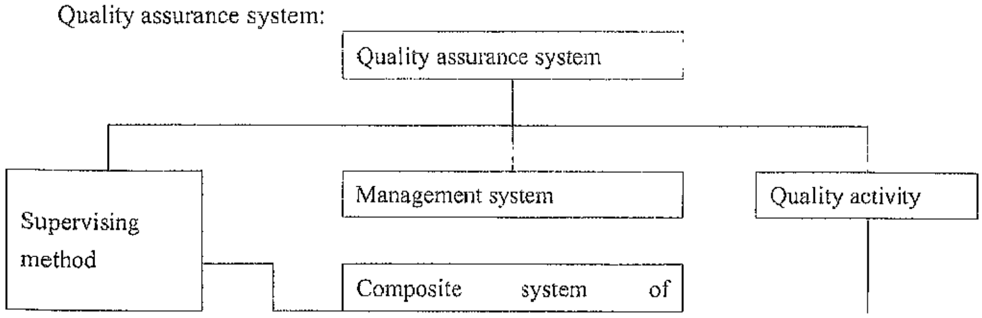
*Ordinary worker：No technical expertise of ordinary workers

2.5 Quality management organization and its main responsibilities

Quality management organization:

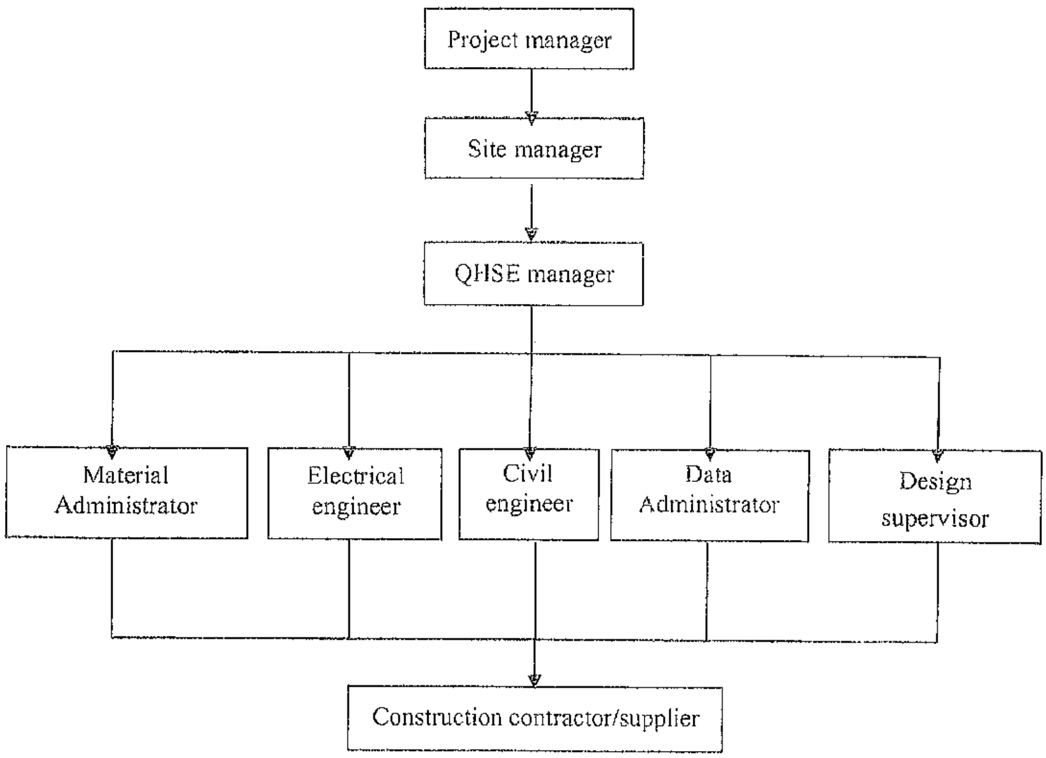


Quality assurance system:

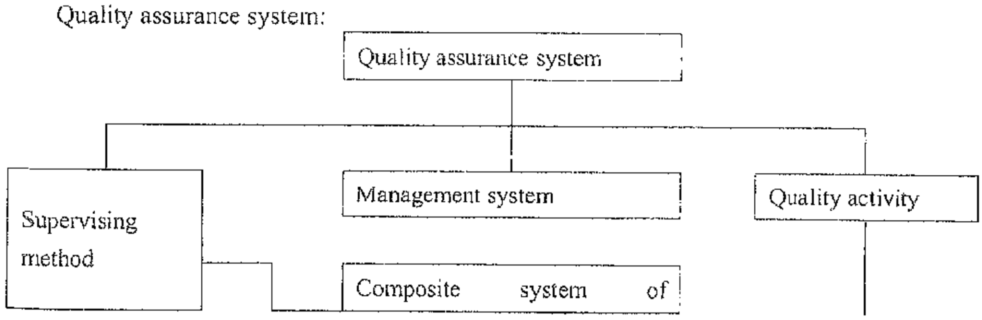


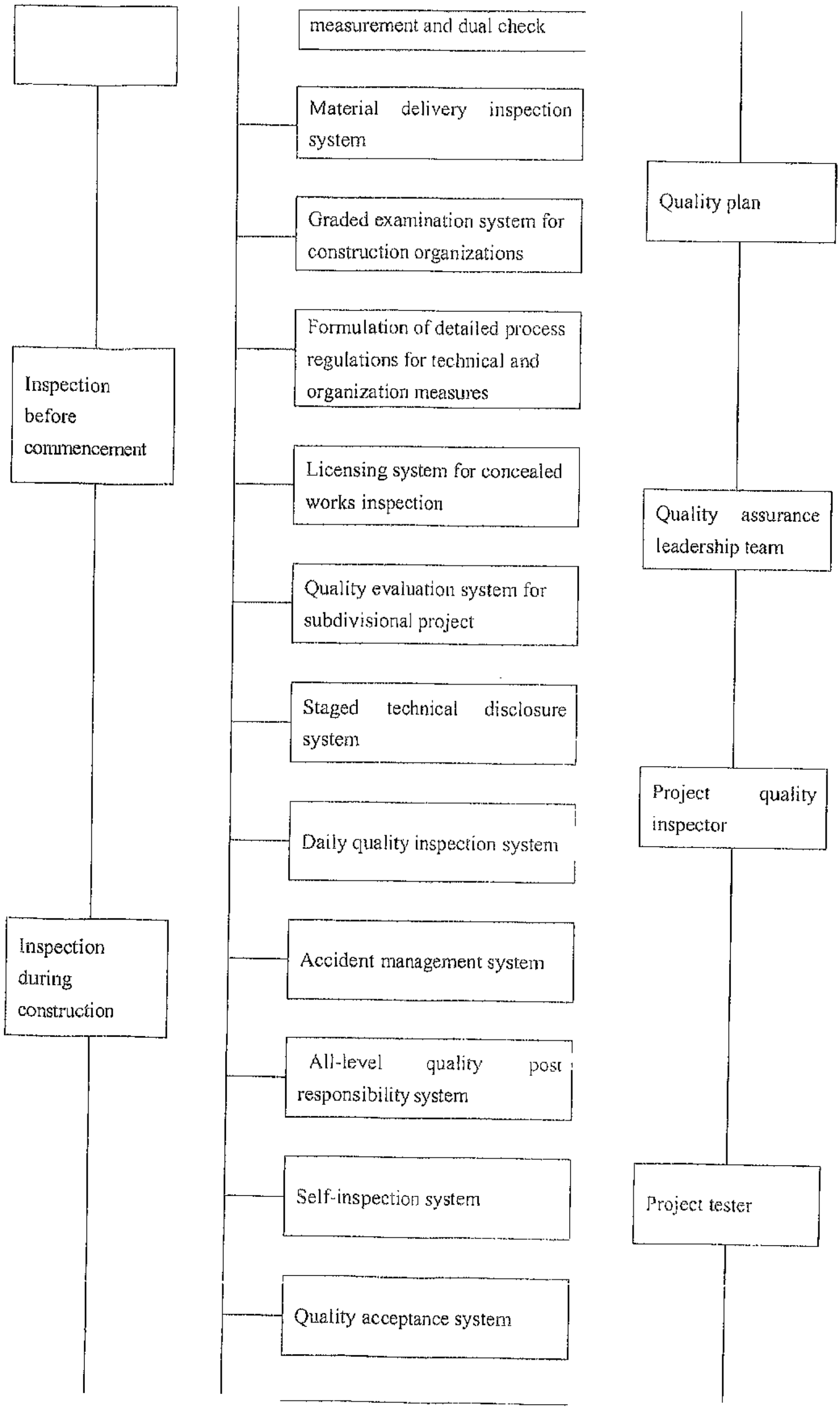
2.5 Quality management organization and its main responsibilities

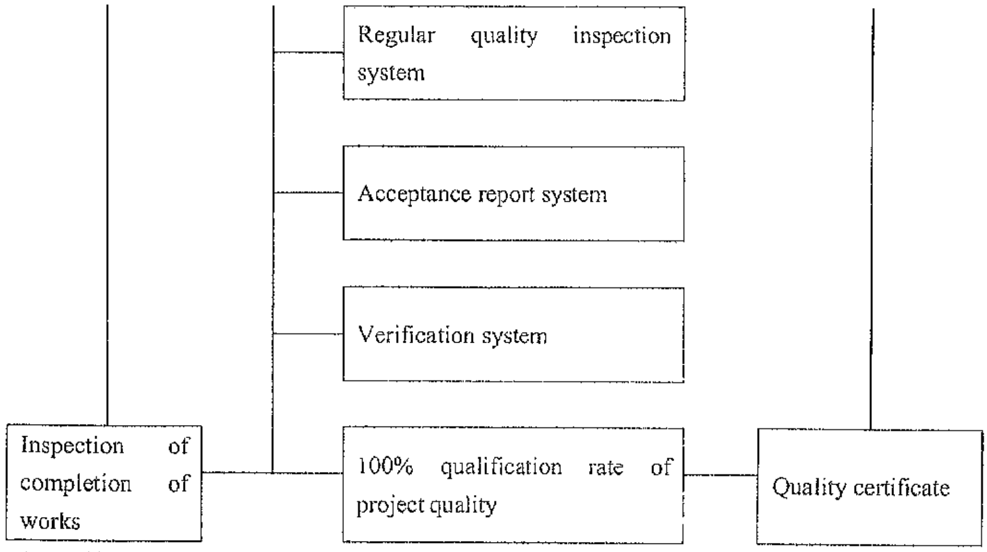
Quality management organization:



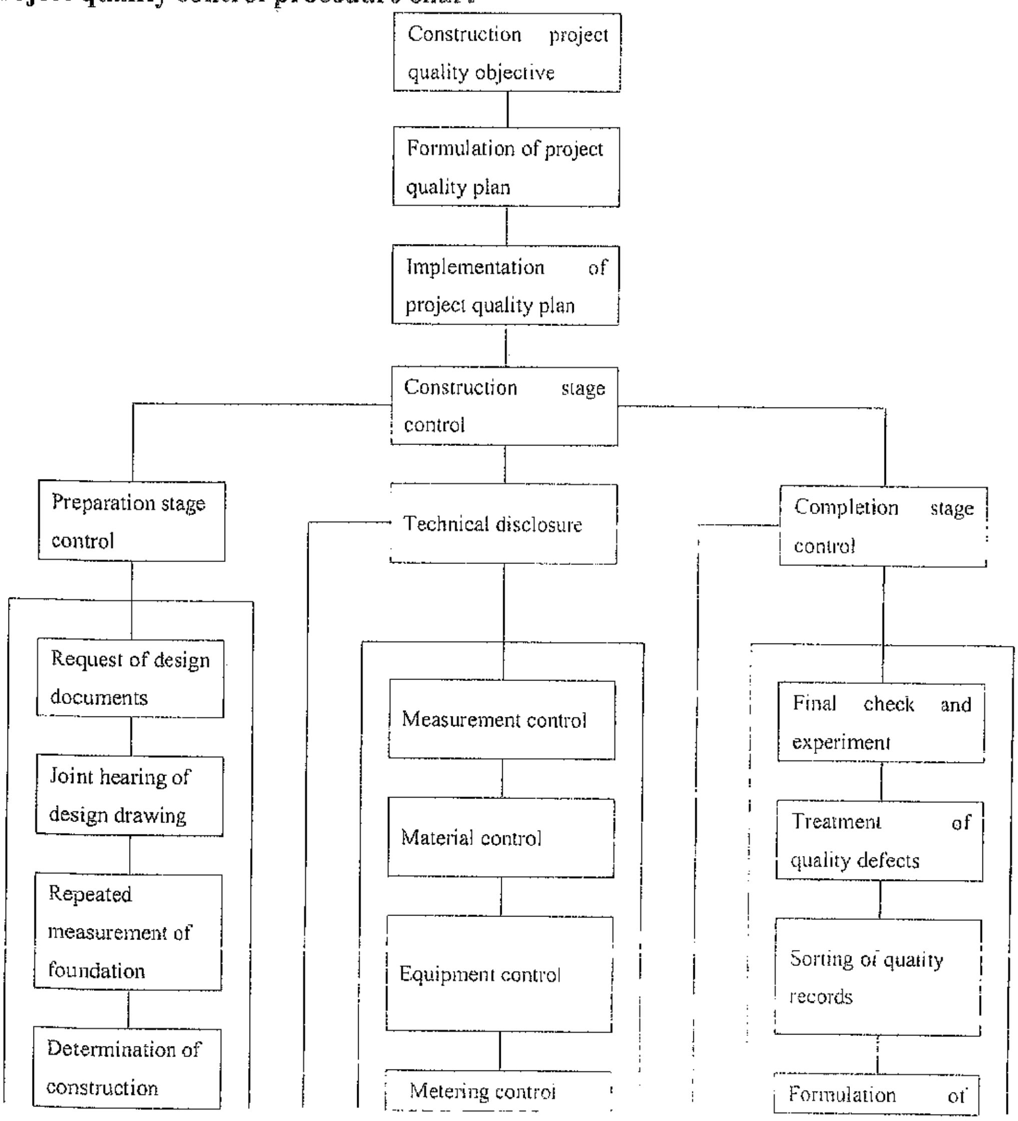
Quality assurance system:




measurement and dual check
Material delivery inspection system
Graded examination system for construction organizations
Formulation of detailed process regulations for technical and organization measures
Licensing system for concealed works inspection
Quality evaluation system for subdivisional project
Staged technical disclosure system
Daily quality inspection system
Accident management system
All-level quality post responsibility system
Self-inspection system
Quality acceptance system
Inspection before commencement
Inspection during construction
Quality plan
Quality assurance leadership team
Project quality inspector
Project tester



Project quality control procedure chart



Check List for Examination of License Application
For New Generation Facility (Solar)
(Regulation 3 read with 3(6)(A) of AMPR)

Name of Company : **M/s Kulachi Solar Power (Private) Limited (KSP)**
Capacity : 50MW, Solar power plant

Annexure L: *Feasibility Study*

PEDO has approved the feasibility study of the Project. NOC is attached as Annexure L.1

PEDO

PAKHTUNKHWA ENERGY DEVELOPMENT ORGANIZATION

Government of Khyber Pakhtunkhwa Peshawar

No. 344-47/PEDO/DPP/FI
Dated Peshawar 13/02/2018

To,

M/s Target Energy (Pvt.) Limited,
Suite [illegible] Green Trust Tower, Jinnah Avenue,
Islamabad.
Tel: [illegible]

Subject: Approval of Technical Feasibility Study submitted by M/s Target Energy (Pvt.) Ltd. for its 50 MW Solar Power Project at Kolachi, District DI Khan, KP

This is with reference to Panel of Expert Meeting held on December 21st, 2017 at PEDO House Peshawar to review the draft Feasibility Study submitted by M/s Target Energy (Pvt.) Limited for their 50 MW Solar PV Power Project under RE Policy 2006.

PEDO is pleased to inform you that the Technical Feasibility Study of M/sTarget Energy (Pvt.) Limited50 MW Solar PV Power Project has been reviewed and approved.

Manager Renewable Energy
(Private Power)

Copy for information to:

1. Mr. Irfan Yousuf, Director (CDM/IC/Solar), AEDB, Islamabad
2. PS to Secretary to Govt. of KP, E&P Department.
3. PS to CEO PEDO, Peshawar.

Manager Renewable Energy
(Private Power)