National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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Registrar

No. NEPRA/R/DL/LAG-357/16787-93 October 10, 2017

Mr. M. Sohail Shamsi
Chief Executive Officer
Siachen Energy Limited (SEL)
4th Floor, Plot 36-C, Lane 13,
Bukhari Commercial Area,
Phase VI, DHA, Karachi.
Tel # +92 21 3515 6172-3

Subject: **Grant of Generation Licence No. SPGL/24/2017**
Licence Application No. LAG-357
Siachen Energy Limited (SEL)

Reference: *Your application vide letter No. SEL/CEO/NEPRA/16-0007, dated June 06, 2017 (received on June 21, 2017).*

Enclosed please find herewith Determination of the Authority in the matter of Application of Siachen Energy Limited (SEL) for the Grant of Generation Licence along with Generation Licence No. SPGL/24/2017 annexed to this determination granted by the National Electric Power Regulatory Authority (NEPRA) to SEL for its 100 MW Solar Generation Facility located at District Thatta in the Province of Sindh, pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).

2. Please quote above mentioned Generation Licence No. for future correspondence.

Enclosure: Generation Licence (SPGL/24/2017)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY * REGISTRAR * NEPRA *

10/17

(Syed Safeer Hussain)

Copy to:

1. Secretary Ministry of Energy, Power Division, 'A' Block, Pak Secretariat, Islamabad
2. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore.
3. Chief Executive Officer, CPPA-G, ENERCON Building, Sector G-5/2, Islamabad.
4. Chief Executive Officer, Hyderabad Electric Supply Company Limited (HESCO), WAPDA Offices Complex, Hussainabad, Hyderabad.
5. Secretary, Energy Department Government of Sindh 3rd Floor, Statelife Building No.3 Dr. Opposite CM House,, Dr Ziauddin Ahmed Rd, Karachi.
6. Director General, Environment Protection Agency, Government of Sindh, Complex Plot No. ST-2/1, Korangi Industrial Area, Karachi.

National Electric Power Regulatory Authority (NEPRA)

Determination of the Authority in the Matter of Application of Siachen Energy Limited for Grant of the Generation Licence

October 10, 2017
Case No. LAG-357

(A). Background

(i). In order to harness the potential of Renewable Energy (RE) in the country, Government of Pakistan (GoP) has formulated a policy for the development of RE resources. The policy titled "Policy for Development of Renewable Energy for Power Generation 2006 (the "RE Policy") is in field since 2006.

(ii). Under the above mentioned RE Policy, the federal Government or the provincial Governments can support the implementation of RE projects. Energy Department of Government of Sindh (EDGoS) issued Letter of Intent (LoI) to Siachen Energy Limited (SEL) for setting up a 100.00 MW solar based generation facility/Solar Power Plant/Solar Farm at Ghulam Ullah Road, taluka Mirpur Sakro, district Thatta, in the province of Sindh.

(iii). According to the terms and conditions of the above mentioned LoI, the company/SEL carried out a feasibility study of the project. After completion of the said milestone, the sponsors of the project decided to approach the Authority for the grant of generation licence for the proposed generation facility/Solar Power Plant/Solar Farm.

(B). Filing of Application

(i). SEL submitted an application on June 21, 2016 for grant of the generation licence in terms of Section-15 of Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (the "NEPRA Act") read with the relevant provisions of the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 (the "Licensing Regulations").

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY REGISTRAR NEPRA

(ii). The Registrar examined the submitted application to confirm its compliance with the Licensing Regulations and found it compliant with the same. Accordingly, the Registrar submitted the matter for consideration of the Authority seeking admission of the application or otherwise. The Authority considered the matter and found the form and content of the application in substantial compliance with Regulation-3 of the Licensing Regulations. Accordingly, the Authority admitted the application on August 23, 2016 for consideration of grant of the generation licence as stipulated in Regulation-7 of the Licensing Regulations. The Authority approved an advertisement to invite comments of general public, interested and affected persons in the matter as stipulated in Regulation-8 of the Licensing Regulations. Accordingly, notices were published in one (01) Urdu and one (01) English newspapers on August 26, 2016.

(iii). In addition to the above, the Authority also approved a list of stakeholders for seeking their comments for assistance of the Authority in the matter in terms of Regulation-9(2) of the Licensing Regulations. Accordingly, letters were sent to the said stakeholders on August 29, 2016, soliciting their comments for assistance of the Authority.

(C). Comments of Stakeholders

(i). In reply to the above, the Authority received comments from four (04) stakeholders. These included Engineering Development Board (EDB), Anwar Kamal Law Associates (AKLA), EDGoS and Alternative Energy Development Board (AEDB). The salient points of the comments offered by the said stakeholders are summarized below:-

(a). EDB suggested that all efforts should be made to utilize indigenous potential of the country;

(b). AKLA raised various issues being faced by the electric power sector of the country. It was highlighted that there is under-utilization of various existing generation facilities and resultantly there is surplus capacity. Therefore, induction of

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

new power plants on "Take or Pay" basis etc. is not justifiable. AKLA contested that RE based generation facilities have higher upfront tariff and also enjoy the status of "must run" making such facilities not viable financially and economically. AKLA questioned the induction of RE projects in the scenario of reducing oil prices, proposed long term contracts of Re-Gasified Liquefied Natural Gas (RLNG) and under construction coal power projects. AKLA opined that instead of setting up new power plants having higher cost, efforts should be made to utilize the available generation capacity first to its full. Further, efforts should be made to encourage investors to setup new generation facilities under "Take and Pay" regime in a competitive power market;

(c). EDGoS stated that it is actively supporting the project sponsors for early development of environmental friendly and fuel free power projects in line with RE policy, keeping in view the current energy crisis in the country; and

(d). AEDB supported the grant of generation licence.

(ii). The Authority considered the above comments of the stakeholders and decided to seek the perspective of SEL on the observations of AKLA. On the said, SEL submitted that comments offered by AKLA are general in nature and not specifically relate to its application for the grant of generation licence. The points raised relate to policies of the GoP for promotion of RE in the country. Although the professional competence of AKLA in field of law are appreciable however, it is considered that the comments have been filed without fully appreciating the dynamics of the project, energy sector, financial and technical considerations relevant for determining project parameters. SEL stated that mainstreaming of RE and greater use of indigenous resources can help diversify the energy mix of the country thereby reducing the dependence of the country on any single source, particularly imported fossil fuels, thereby mitigating against supply disruptions and price fluctuation risks. Further,

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

additional costs and risks relating to fuel stocking, transportation, and temporary substitute arrangements are also avoided in the case of solar.

(iii). SEL stated that the claim of AKLA that country has surplus generation capacity is based upon a failure to appreciate the distinction between operational capacity and installed capacity. SEL stated that a size-able portion of installed capacity of the country is inefficient and not economically viable to be operated therefore, stating that country has surplus capacity is not correct.

(iv). SEL rebutted the claim of AKLA that fuel prices in the international market are low and are likely to remain so for the next several years and termed it as a pure speculation. SEL stated that the fuel prices are highly volatile and cannot be assumed to remain on the existing low level. SEL expressed that the cost of importing expensive fuel contributes not only to the balance of payments but is also a cause of the circular debt which is adversely affecting the power sector. SEL stated that RE is a means of reducing reliance on purely imported fuel, the price of which fluctuates wildly. SEL also rebutted the claim of AKLA that generation of RE is expensive and stated that solar power generation is becoming cheaper every year. It was stated that AKLA has erroneously ignored the environmental cost of power generation from other sources while considering solar generation of power. SEL stated that tariffs over the past few years for solar power generation determined by the Authority have been reflecting declining price trend of solar power generation and the previous upfront tariff approved by the Authority is affordable and induction of maximum solar power generation at this price will provide necessary safeguard to the country against probability of sudden escalation in oil prices. SEL expressed that the comparison of current tariff of solar power generation with the tariff of thermal power generation gives a misleading picture, as tariff of solar power generation is fixed (except indexations) as against tariffs of thermal power generation which are volatile and dependent on fluctuating fuel cost.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(v). SEL acknowledged that new projects on imported/local coal and RLNG are being constructed however, the demand for electricity will continue to increase therefore, the country has to maintain a size-able share of RE in the overall energy mix. SEL stated that indigenous RE will result in savings of precious foreign exchange. SEL stated that currently the country has the lowest contribution of RE in the energy mix when compared to other developing countries therefore, this trend needs to be improved.

(vi). SEL stated that although the submissions of AKLA are well intentioned but the submissions are premised on a fundamental lack of understanding of the dynamics involved in a viable power policy. The biggest concern expressed by AKLA is the "Take or Pay" which has been suggested to be changed to "Take and Pay". It appears that AKLA does not seem to understand that replacing "Take or Pay" to "Take and Pay" would result projects to be non-bankable.

(vii). In consideration of the above, the Authority observed that AKLA while submitting its comments has referred to its previous correspondences to NEPRA in different licence and tariff matters wherein it raised different issues including (a) surplus capacity; (b) capacity payment without supplying electricity (c); addition of high cost renewable plants (d); underutilization of power plants; and (e) induction of new power plants on "Take or Pay" basis and others etc. In this regard, the Authority has observed that it had duly addressed the aforementioned objections/comments and sent a comprehensive reply to AKLA through letter no. NEPRA/SAT-I/TRF-100/17060, dated December 27, 2016. The Authority reiterates its earlier findings and observations given in the aforementioned letter and is of the considered opinion that in fact there is considerable supply demand gap resulting in load-shedding and load management.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(viii). The aforementioned stance is strengthened from the fact that the proposed generation facility/Solar Power Plant/Solar Farm of SEL is included in the future expansion plan of National Transmission and Despatch Company Limited (NTDC). Regarding the observations of AKLA that RE projects should have "Take and Pay" tariff, it is hereby clarified that through its determination No. NEPRA/SPVPGT-2017/2915-2917, dated March 03, 2017, the Authority has decided to capture the falling prices of solar technology by having a market based competitive tariff instead of upfront tariff. In this regard, it is pertinent to mention that bidding based tariffs are tailored on unit delivered basis meaning thereby that a power producer/generation company is paid only for its delivered energy. In view of the foregoing, the Authority considers that the observations of AKLA stand addressed.

(ix). In consideration of the above and having addressed the comments/objections, the Authority considered it appropriate to proceed further in the matter of application of SEL for the consideration of grant of generation licence as stipulated in the Licensing Regulations and NEPRA Licensing (Generation) Rules, 2000 (the "Generation Rules").

(D). Evaluation/Findings

(i). The Authority has examined the submissions of SEL including the information provided in its application for grant of the generation licence. The Authority has also considered the feasibility study of the project, Grid Interconnection Study (GIS), provisions of the RE Policy and the relevant rules & regulations.

(ii). The Authority has observed that the main sponsor of the project is Mr. Muhammed Sohail Shamsi who has been involved in energy sector for the last three decades. He has his investments in oil refinery, LPG storage and other related businesses. Mr. Shamsi has also set up a captive power plant (thermal) of about 28.00 MW installed capacity for its oil refinery. In order to implement the project, Mr. Shamsi has engaged the services of different consultants and advisors including Going Green PK (Pvt.) Ltd., Sinew

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Associates (Pvt.) Ltd. (financial advisors), OST Energy Pty Ltd. and Integrators (Pvt.) Ltd. (technical advisors) and Mr. Mansoor Ali Ghanghro (legal advisor). Based on the financial strength and other evaluation parameters, EDGoS issued LoI for development of the project in the province of Sindh. In this regard, the sponsor has purchased private land to the tune of 700 acres for the project at taluka Mirpur Sakro, district Thatta in the province of Sindh.

(iii). As explained above, for the implementation of the project, the sponsor has incorporated a SPV in the name of SEL under Section-32 of the Companies Ordinance, 1984 (Corporate Universal Identification No. 0093721, dated June 01, 2015). The Registered/Business office of the SPV is located at 74, J Street, Off Khayaban-e-Muhafiz, Phase VI, DHA, Karachi in the province of Sindh. According to the Memorandum of Association, the objects of the company, inter alia, include business of power generation and its sale thereof. The Authority has observed that a number of financial institutions are considering to finance the project. These included local and foreign banks and other development finance institutions. According to the submitted information, the total outlay of the project will be U.S. $ 119.394 million which will be financed through a combination of debt (U.S. $ 89.545 million) and equity (U.S. $ 29.848 million) in a ratio of 75:25 which is in line with the benchmark set out in the RE Policy and the determinations of the Authority.

(iv). According to the terms and conditions of the LoI, the sponsor carried out a feasibility study of the project including inter alia, solar power plant equipment details, micro-sitting details, power production estimates based on solar irradiation data of the project site, soil tests reports, technical details pertaining to selected photovoltaic (PV) cells and other allied equipment to be used in the solar power plant, electrical studies, environmental study and project financing etc.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(v). The study of the feasibility study reveals that the company has considered various world class manufactures of PV cells/panels including Hanwha Q CELLS Co., Ltd., JA Solar Holdings Co., Ltd, Trina Solar Limited, First Solar, Inc., Jinko Solar Limited, Motech Industries Inc., Tongwei Solar Company Limited, Yingli Solar Limited, Canadian Solar Inc. and Shunfeng International Clean Energy Limited. After duly considering the various factors including (a). Solar resource position of the proposed location (b). Capital cost of equipment/PV cells/panels; (c). Lead time for supply of equipment/PV cells/panels; (d). Expected energy yield of PV cells/panels; (e). Reliability and compliance with Grid Code; (f). Availability of suitable operation and maintenance teams (including easiness/availability spare parts for PV cells/panels etc., the company decided to select Trina Solar Limited. It is pertinent to mention that Trina Solar Limited is one of the largest company in the solar industry and has significant share worldwide. The feasibility study also optimized the size of the proposed generation facility/Solar Power Plant/Solar Farm to 100.00 MW_P, having 400,000 x 250.00 W_P of polycrystalline. The selected technology is proven and has distinctive features including versatility, good performance in different climate and operating conditions. The proposed PV cells/panels have better feedback and control system with good characteristics for grid reliability and stability for grid as required in the Grid Code.

(vi). The Authority has noted that the sponsor of the project carried out the required GIS for dispersal of electric power from the proposed generation facility/Solar Power Plant/Solar Farm. According to the said study, the dispersal of electric power will be made on 132 KV Voltage. According to the GIS, the interconnection of SEL includes 132 KV D/C transmission line on AASC Greely conductor measuring around 18.00 KM approximately connecting the generation facility/Solar Power Plant/Solar Farm with 220/132 KV New Gharo substation. In this regard, NTDC has also confirmed that necessary arrangements will be made ensuring availability of the dispersal arrangement well before the Commercial Operation Date (COD) of the generation facility/Solar Power Plant/Solar Farm.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(vii). The Authority considers that the proposed project, for which generation licence is being sought, is based on RE source and does not cause pollution as in the case of conventional power plants. However, the Authority considers that the construction and operation of the generation facility/Solar Power Plant/Solar Farm may cause soil pollution and noise pollution. In this regard, the Authority has observed that SEL also carried out the Initial Environment Examination and submitted the same for the consideration and approval of Sindh Environmental Protection Agency, Government of Sindh (EPAGoS). The Authority is satisfied that EPAGoS has issued a No Objection Certificate (NOC) for the construction of the project.

(viii). In terms of Rule-3 of the Generation Rules, the Authority may grant a generation licence to any person to engage in the generation business. In the particular case under consideration, the Authority has observed that SEL has provided details of location, technology, size, net capacity/energy yield, interconnection arrangements, technical limits, technical functional specifications and other details specific to the generation facility/Solar Power Plant/Solar Farm satisfying the provisions of Rule-3(2) and Rule-3(3).

(ix). The Rule-3(5) of the Generation Rules stipulates the least cost option criteria necessary for the grant of generation licence which includes (a). sustainable development or optimum utilization of the renewable or non-renewable energy resources proposed for generation of electric power; (b). the availability of indigenous fuel and other resources; (c). the comparative costs of the construction, operation and maintenance of the proposed generation facility against the preferences indicated by the Authority; (d). the costs and right-of-way considerations related to the provision of transmission and interconnection facilities; (e). the constraints on the transmission system likely to result from the proposed generation facility and the costs of the transmission system expansion required to remove such constraints; (f). the short-term and the long-term forecasts for additional capacity requirements; (g). the tariff resulting or likely to result from the construction or operation of the proposed generation facility; and (h) the optimum utilization of various sites in the context of both the

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

short-term and the long-term requirements of the electric power industry as a whole.

(x). The Authority considers that the proposed project will result in optimum utilization of the RE resources which was earlier untapped, resulting in pollution free electric power. It is relevant to mention that solar is an indigenous resource and such resources have a preference for the energy security. As explained in the preceding paragraphs, the Authority through its determination No. NEPRA/SPVPGT-2017/2915-2917, dated March 3, 2017 has decided to capture the falling prices of solar technology by having a market based tariff for solar power projects which is expected to result in a very competitive tariff due to falling prices of the PV cells/panels and related allied equipment.

(xi). As explained in the preceding paragraphs, the sponsor of the project carried out the GIS which concludes that the project will not face any constraints in transmission system. Further, being located in close proximity to the transmission system, the project will not result in cost and right-of-way issues for the provision of transmission and interconnection facilities. It is pertinent to mention that NTDC has included the project in its long-term forecasts for additional capacity requirements.

(xii). In view of the above, the Authority is of the considered view that the project of SEL fulfills the eligibility criteria for grant of the generation licence as stipulated in the NEPRA Act, rules and regulations and other applicable documents.

(E). Grant of the Generation Licence

(i). The sustainable and affordable energy/electricity is a key prerequisite for socio-economic development of any country. In fact, the economic growth of any country is directly linked with the availability of safe, secure, reliable and cheaper supply of energy/electricity. In view of the said reasons, the Authority is of the considered opinion that for sustainable development, all indigenous power generation resources including RE must be developed on priority basis.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY ★ NEPRA ★ REGISTRAR

(ii). The existing energy mix of the country is heavily skewed towards thermal power plants, mainly operating on imported fossil fuel. The continuous import of fossil fuel not only creates pressure on the precious foreign exchange reserves of the country but is also an environmental concern. Therefore, in order to achieve sustainable development it is imperative that indigenous RE resources are given priority for power generation and their development is encouraged. The Energy Security Action Plan 2005 approved by the GoP, duly recognizes this very aspect of power generation through RE and envisages that at least 5% of total national power generation capacity (i.e. 9700 MW) to be met through RE resources by 2030.

(iii). The Authority considers that the proposed project of SEL is consistent with the provisions of the Energy Security Action Plan 2005. The project will help in diversifying the energy portfolio of the country. Further, it will not only enhance the energy security of the country by reducing the dependence on imported fuel but will also help in reducing in carbon emission by generating clean electricity, thus improving the environment.

(iv). As explained in the preceding paragraphs, SEL has provided the details of location, technology, size, net capacity/energy yield, interconnection arrangements, technical details and other related information for the proposed generation facility/Solar Power Plant/Solar Farm. In this regard, the Authority has observed that sponsor has already acquired private land for setting up the generation facility/Solar Power Plant/Solar Farm. The said details have been incorporated in Schedule-I of the proposed generation licence. The Authority directs SEL to utilize the acquired land exclusively for the proposed generation facility/Solar Power Plant/Solar Farm and not to carry out any other generation activity on the said land except with its prior approval.

(v). The term of a generation licence under Rule-5(1) of the Generation Rules is required to match with the maximum expected life of the units comprised in a generating facility, except where an applicant for a generation licence consents to a shorter term. According to the information provided by SEL, its generation facility/Solar Power Plant/Solar Farm will achieve COD by

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

December 31, 2018 and will have a useful life of more than twenty five (25) years from its COD. In this regard, SEL has requested that the term of the proposed generation licence may be fixed as twenty five (25) years. The Authority considers that said submission of SEL about the useful life of the generation facility/Solar Power Plant/Solar Farm and the subsequent request to fix the term of the generation licence is consistent with international benchmarks therefore, the Authority fixes the term of the generation licence as twenty five (25) years from COD of the project.

(vi). Regarding the tariff, it is hereby clarified that under Section-7(3)(a) of the NEPRA Act, determining tariff, rate and charges etc. is the sole prerogative of the Authority. In view of the said, the Authority through Article-6 of the generation licence directs SEL to charge the power purchaser only such tariff which has been determined, approved or specified by the Authority. The Authority directs SEL to adhere to the Article-6 of the generation licence in letter and spirit without any exception.

(vii). About the compliance with the environmental standards, as discussed in the preceding paragraphs, SEL has provided NOC from EPAGoS and has confirmed that the project will comply with the required standards during the term of the generation licence. In view of the importance of the issue, the Authority has decided to include a separate article (i.e. Article-10) in the generation licence along with other terms and conditions making it obligatory for SEL to comply with relevant environmental standards at all times. Further, the Authority directs SEL to submit a report on a bi-annual basis, confirming that operation of its generation facility/Solar Power Plant/Solar Farm is in compliance with the required environmental standards as prescribed by the concerned environmental protection agency.

(viii). The proposed generation facility/Solar Power Plant/Solar Farm of SEL will be using RE resource for generation of electric power. Therefore, the project may qualify for the carbon credits under the Kyoto Protocol. Under the said protocol, projects coming into operation up to the year 2020 can qualify for the carbon credits. SEL has informed that the project will achieve COD by December 31, 2018, which is within the deadline of the Kyoto Protocol. In view

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

of the said, an article (i.e. Article-14) for carbon credits and its sharing with the power purchaser has been included in the generation licence. Accordingly, the Authority directs SEL to initiate the process in this regard at the earliest so that proceeds for the carbon credits are materialized. SEL shall be required to share the proceeds of the carbon credits with the power purchaser as stipulated in Article-14 of the generation licence.

(ix). In view of the above, the Authority hereby approves the grant of generation licence to SEL on the terms and conditions set out in the generation licence annexed to this determination. The grant of generation licence will be subject to the provisions contained in the NEPRA Act, relevant rules, regulations framed thereunder and other applicable documents.

Authority:

Maj. (R) Haroon Rashid
(Member)

Syed Masood-ul-Hassan Naqvi
(Member)

Himayat Ullah Khan
(Member)

Saif Ullah Chattha
(Member/Vice Chairman)

6.10.2017

Tariq Saddozai
(Chairman)

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan

GENERATION LICENCE

No. SPGL/24/2017

In exercise of the Powers conferred upon under Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, the Authority hereby grants a Generation Licence to:

SIACHEN ENERGY LIMITED

Incorporated Under Section-32 of the Companies Ordinance 1984 (XLVII of 1984) Having Corporate Universal Identification No. 0093721, dated June 01, 2015

for its Generation Facility/Solar Farm/Solar Power Plant Located at Deh Sukhpur/Bhalki Rayati/Morjhar Tapo Sukhpur/Karampur, Taluka Mirpur Sakro, District Thatta in the Province of Sindh

(Total Installed Capacity: 100.00 MW_P Gross)

to engage in generation business subject to and in accordance with the Articles of this Licence.

Given under my hand this on 10th day of October Two Thousand & Seventeen and expires on 30th day of December Two Thousand & Forty Three.

10/X/17

Registrar

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-1
Definitions

1.1 In this licence

(a). "Act" means the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 as amended or replaced from time to time;

(b). "AEDB" means the Alternative Energy Development Board or any other entity created for the like purpose established by the GoP to facilitate, promote and encourage development of renewable energy in the country;

(c). "Applicable Documents" mean the Act, the rules and regulations framed by the Authority under the Act, any documents or instruments issued or determinations made by the Authority under any of the foregoing or pursuant to the exercise of its powers under the Act, the Grid Code, the applicable Distribution Code, if any, or the documents or instruments made by the Licensee pursuant to its generation licence, in each case of a binding nature applicable to the Licensee or, where applicable, to its affiliates and to which the Licensee or any of its affiliates may be subject;

(d). "Applicable Law" means all the Applicable Documents;

(e). "Authority" means the National Electric Power Regulatory Authority constituted under Section-3 of the Act;

(f). "Bus Bar" means a system of conductors in the generation facility/Solar Power Plant/Solar Farm of the Licensee on which the electric power from all the WTGs is collected for supplying to the Power Purchaser;

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(g). "Carbon Credits" mean the amount of Carbon Dioxide (CO_2) and other greenhouse gases not produced as a result of generation of electric energy by the generation facility/Solar Power Plant/Solar Farm and other environmental air quality credits and related emissions reduction credits or benefits (economic or otherwise) related to the generation of electric energy by the generation facility/Solar Power Plant/Solar Farm, which are available or can be obtained in relation to the generation facility/Solar Power Plant/Solar Farm after the COD;

(h). "Commercial Operations Date (COD)" means the day immediately following the date on which the generation facility/Solar Power Plant/Solar Farm of the Licensee is commissioned;

(i). "CPPA-G" means Central Power Purchasing Agency (Guarantee) Limited or any other entity created for the like purpose;

(j). "Distribution Code" means the distribution code prepared by the concerned XW-DISCO and approved by the Authority, as it may be revised from time to time with necessary approval of the Authority;

(k). "Energy Purchase Agreement (EPA)" means the energy purchase agreement, entered or to be entered into by and between the Power Purchaser and the Licensee, for the purchase and sale of electric energy generated by the generation facility/Solar Power Plant/Solar Farm, as may be amended by the parties thereto from time to time;

(l). "Generation Rules" mean the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000 as amended or replaced from time to time;

(m). "Grid Code" means the grid code prepared and revised from time to time by NTDC with necessary approval of the Authority;

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(n). "GoP" means the Government of Pakistan acting through the AEDB which has issued or will be issuing to the Licensee a LoS for the design, engineering, construction, insuring, commissioning, operation and maintenance of the generation facility/Solar Power Plant/Solar Farm;

(o). "HESCO" means Hyderabad Electric Supply Company Limited or its successors or permitted assigns;

(p). "IEC" means "the International Electrotechnical Commission or its successors or permitted assigns;

(q). "IEEE" means the Institute of Electrical and Electronics Engineers or its successors or permitted assigns;

(r). "Implementation Agreement (IA)" means the implementation agreement signed or to be signed between the GoP and the Licensee in relation to this particular generation facility/Solar Power Plant/Solar Farm, as may be amended from time to time;

(s). "Letter of Support (LoS)" means the letter of support issued or to be issued by the GoP through the AEDB to the Licensee;

(t). "Licensee" means **Siachen Energy Limited** or its successors or permitted assigns;

(u). "Licensing Regulations" mean the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time;

(v). "Net Delivered Energy" means the net electric energy expressed in kWh generated by the generation facility/Solar Power Plant/Solar Farm of the Licensee at its outgoing Bus Bar and delivered to the Power Purchaser;

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

(w). "NTDC" means National Transmission and Despatch Company Limited or its successors or permitted assigns;

(x). "Policy" means the Policy for Development of Renewable Energy for Power Generation, 2006 of GoP as amended from time to time;

(y). "Power Purchaser" means CPPA-G which will be purchasing electric energy from the Licensee either on behalf of all XW-DISCOs or any single XW-DISCO, pursuant to an EPA for procurement of electric energy;

(z). "SCADA System" means the supervisory control and data acquisition system for gathering of data in real time from remote locations to control equipment and conditions;

(aa). "Solar Power Plant/Solar Farm" means a cluster of photovoltaic cells in the same location used for production of electric power;

(bb). "XW-DISCO" means "an Ex-WAPDA distribution company engaged in the distribution of electric power".

1.2 The words and expressions used but not defined herein bear the meaning given thereto in the Act or Generation Rules and Licensing Regulations issued under the Act.

Article-2
Applicability of Law

This licence is issued subject to the provisions of the Applicable Law, as amended from time to time.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-3
Generation Facilities

3.1 The location, size (capacity in MW), technology, interconnection arrangements, technical limits, technical functional specifications and other details specific to the generation facility/Solar Power Plant/Solar Farm of the Licensee are set out in Schedule-I of this licence.

3.2 The net capacity/Net Delivered Energy of the generation facility/Solar Power Plant/Solar Farm of the Licensee is set out in Schedule-II of this licence. The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility/Solar Power Plant/Solar Farm before its COD.

Article-4
Term of Licence

4.1 This licence shall become effective from the date of its issuance and will have a term of twenty five (25) years from the COD of the generation facility/Solar Power Plant/Solar Farm of the Licensee.

4.2 Unless suspended or revoked earlier, the Licensee may apply for renewal of this Licence ninety (90) days prior to the expiry of the above term, as stipulated in the Licensing Regulations.

Article-5
Licence fee

The Licensee shall pay to the Authority the licence fee as stipulated in the National Electric Power Regulatory Authority (Fees) Rules, 2002 as amended or replaced from time to time.

Article-6
Tariff

The Licensee shall charge only such tariff from the Power Purchaser which has been determined, approved or specified by the Authority.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

Article-7
Competitive Trading Arrangement

7.1 The Licensee shall participate in such manner as may be directed by the Authority from time to time for development of a Competitive Trading Arrangement. The Licensee shall in good faith work towards implementation and operation of the aforesaid Competitive Trading Arrangement in the manner and time period specified by the Authority. Provided that any such participation shall be subject to any contract entered into between the Licensee and another party with the approval of the Authority.

7.2 Any variation or modification in the above-mentioned contracts for allowing the parties thereto to participate wholly or partially in the Competitive Trading Arrangement shall be subject to mutual agreement of the parties thereto and such terms and conditions as may be approved by the Authority.

Article-8
Maintenance of Records

For the purpose of sub-rule(1) of Rule-19 of the Generation Rules, copies of records and data shall be retained in standard and electronic form and all such records and data shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

Article-9
Compliance with Performance Standards

The Licensee shall comply with the relevant provisions of the National Electric Power Regulatory Authority Performance Standards (Generation) Rules 2009 as amended or replaced from time to time.

Article-10
Compliance with Environmental & Safety Standards

10.1 The generation facility/Solar Power Plant/Solar Farm of the Licensee shall comply with the environmental and safety standards as may be prescribed by the relevant competent authority from time to time.

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR
NEPRA

10.2 The Licensee shall provide a certificate on a bi-annual basis, confirming that the operation of its generation facility/Solar Power Plant/Solar Farm is in conformity with required environmental standards as prescribed by the relevant competent authority.

Article-11
Power off take Point and Voltage

The Licensee shall deliver the electric energy to the Power Purchaser at the outgoing Bus Bar of its generation facility/Solar Power Plant/Solar Farm. The Licensee shall be responsible for the up-gradation (step up) of generation voltage up to the required dispersal voltage level.

Article-12
Performance Data

12.1 The Licensee shall install properly calibrated automatic computerized solar radiation recording device(s) at its generation facility/Solar Power Plant/Solar Farm for recording of data.

12.2 The Licensee shall install SCADA System or compatible communication system at its generation facility/Solar Power Plant/Solar Farm as well as at the side of the Power Purchaser.

Article-13
Provision of Information

In accordance with provisions of Section-44 of the Act, the Licensee shall be obligated to provide the required information in any form as desired by the Authority without any exception.

Article-14
Emissions Trading /Carbon Credits

The Licensee shall process and obtain expeditiously the Carbon Credits admissible to the generation facility/Solar Power Plant/Solar Farm. The Licensee shall share the said proceeds with the Power Purchaser as per the Policy.

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REGISTRAR
NEPRA

Article-15
Design & Manufacturing Standards

The photovoltaic cells and other associated equipment of the generation facility/Solar Power Plant/Solar Farm shall be designed, manufactured and tested according to the latest IEC, IEEE standards or any other equivalent standard in the matter. All the plant and equipment of generation facility/Solar Power Plant/Solar Farm shall be unused and brand new.

Article-16
Power Curve

The power curve for the individual photovoltaic cell provided by the manufacturer and as mentioned in Schedule-I of this generation licence, shall form the basis in determining the cumulative power curve of the generation facility/Solar Power Plant/Solar Farm.

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NEPRA

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.

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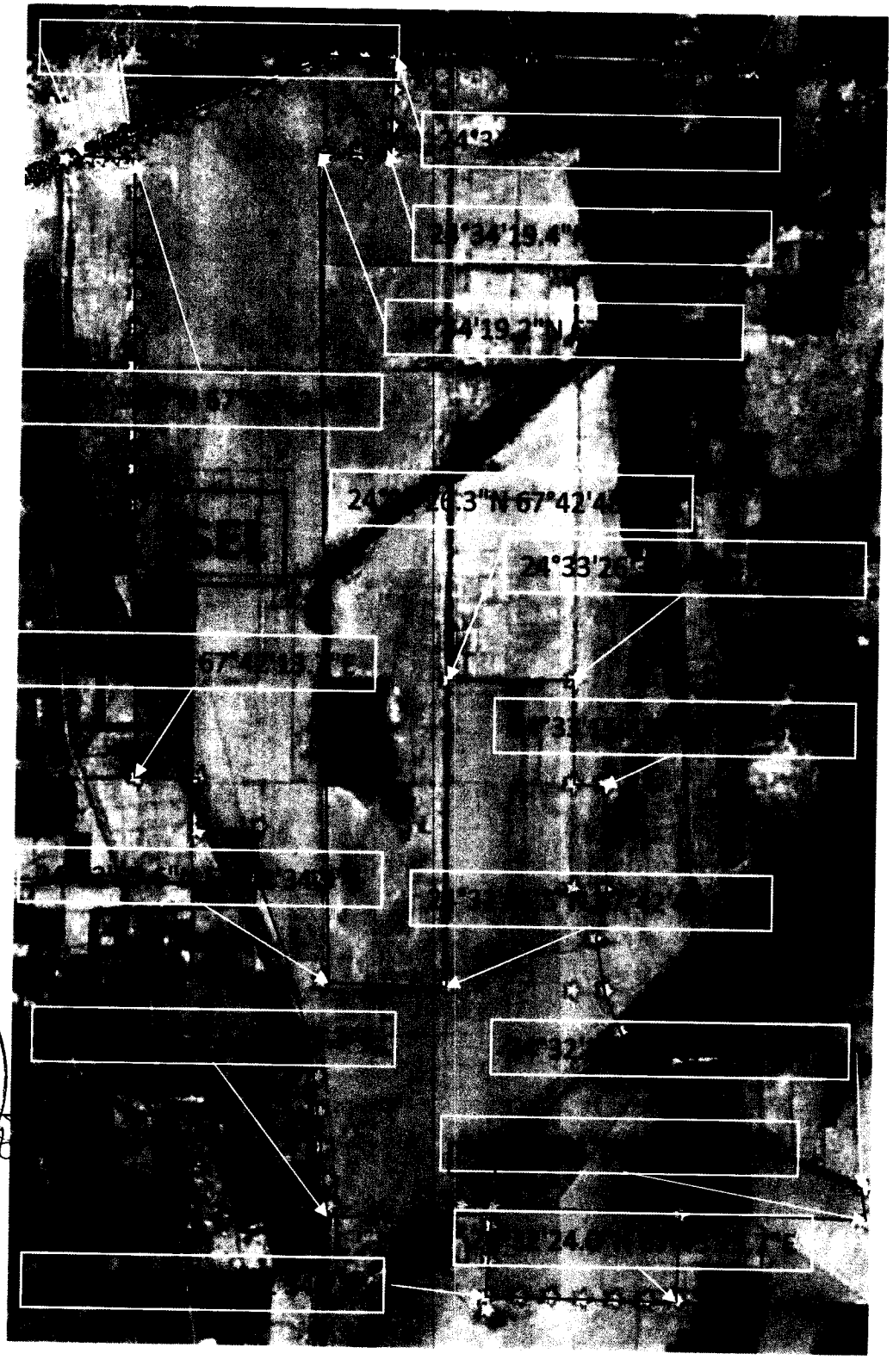
Location of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee

Land Coordinates of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee



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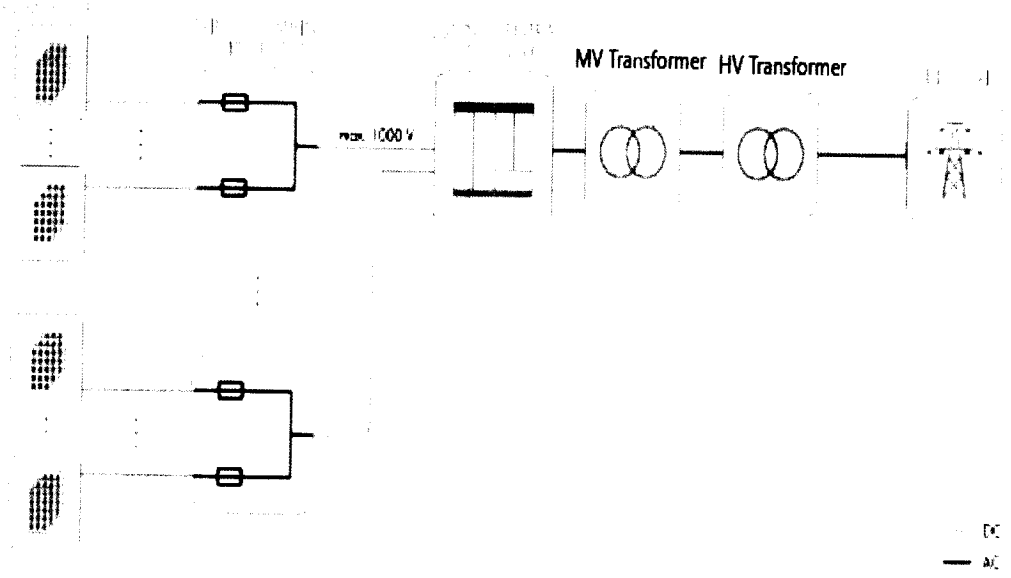
Process Flow Diagram of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee



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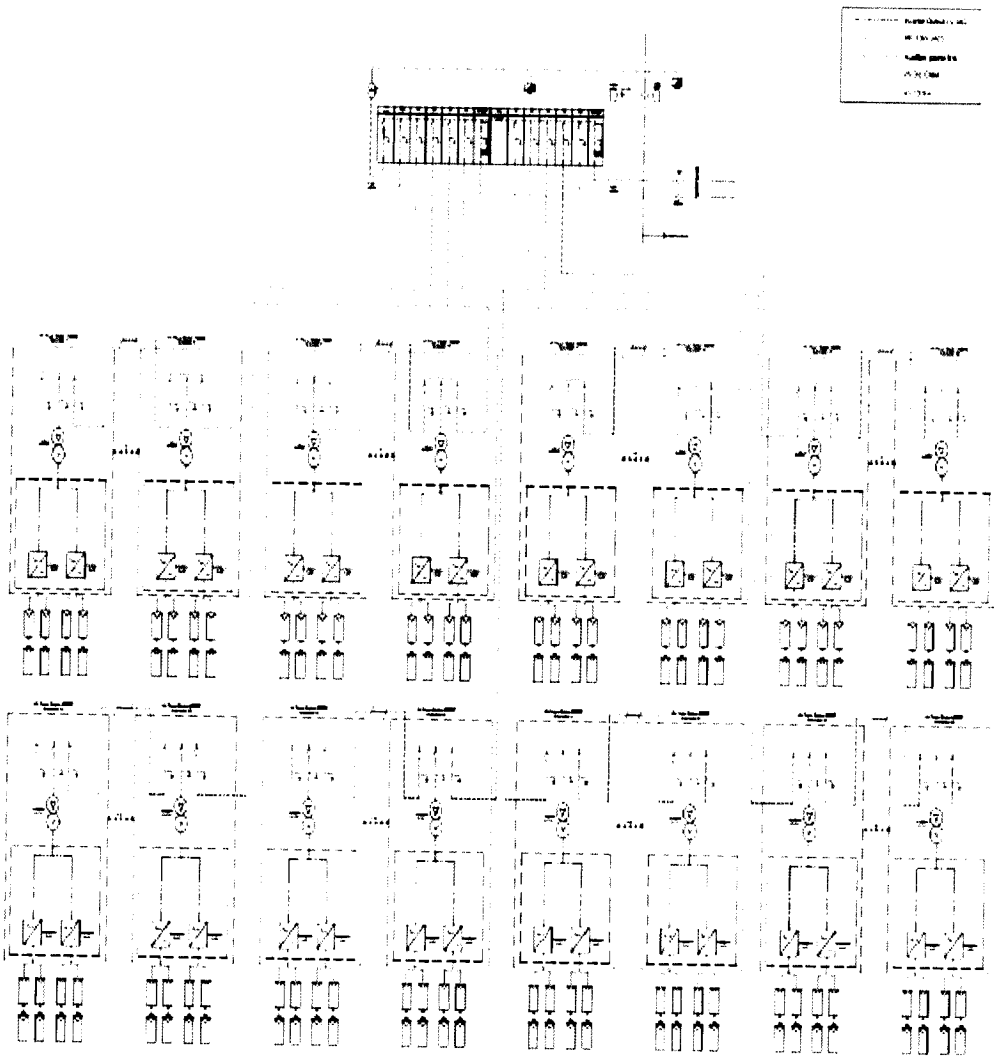
Single Line Diagram of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee



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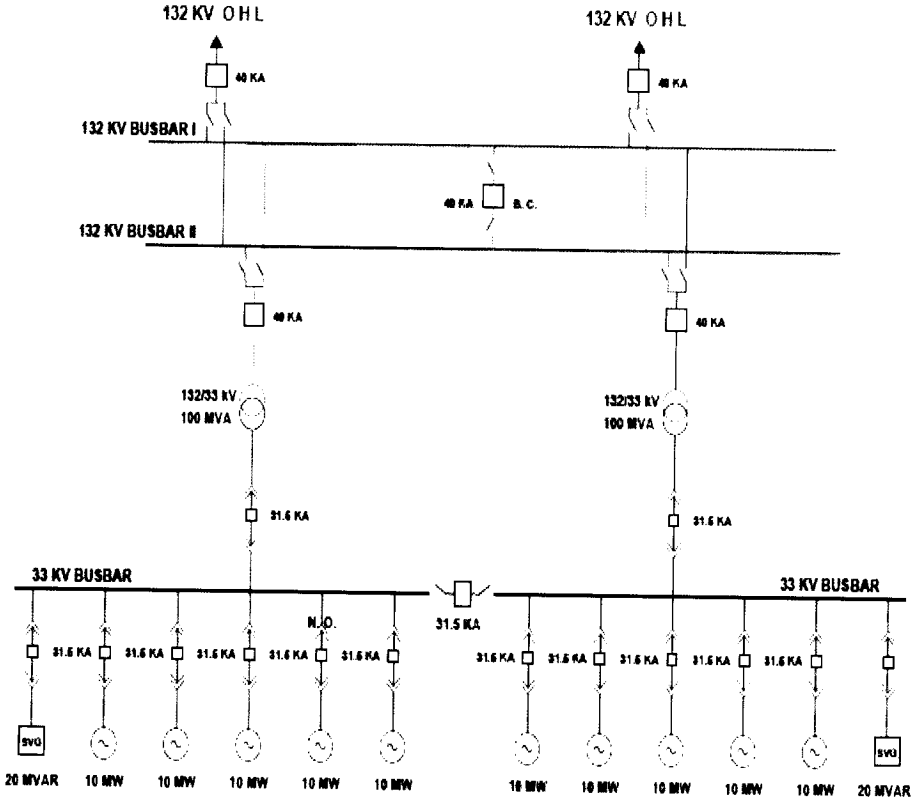
REGISTRAR
NEPRA

Single Line Diagram of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee



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Interconnection Arrangement for Dispersal of Electric Energy/Power from the Generation Facility/ Solar Power Plant/Solar Farm

The electric power generated from the generation facility/Solar Power Plant/Solar Farm of the Licensee/Siachen Energy Limited/SEL shall be dispersed to the load center of HESCO.

(2). The proposed Interconnection Arrangement/Transmission Facilities for dispersal of power from generation facility/Solar Power Plant/Solar Farm of the Licensee/SEL will consist of the following:-

(i). A 132 kV D/C transmission line (measuring approx. 18.00 km long on AASC Greely conductor) connecting directly with 220/132kV New Gharo grid station/substation;

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

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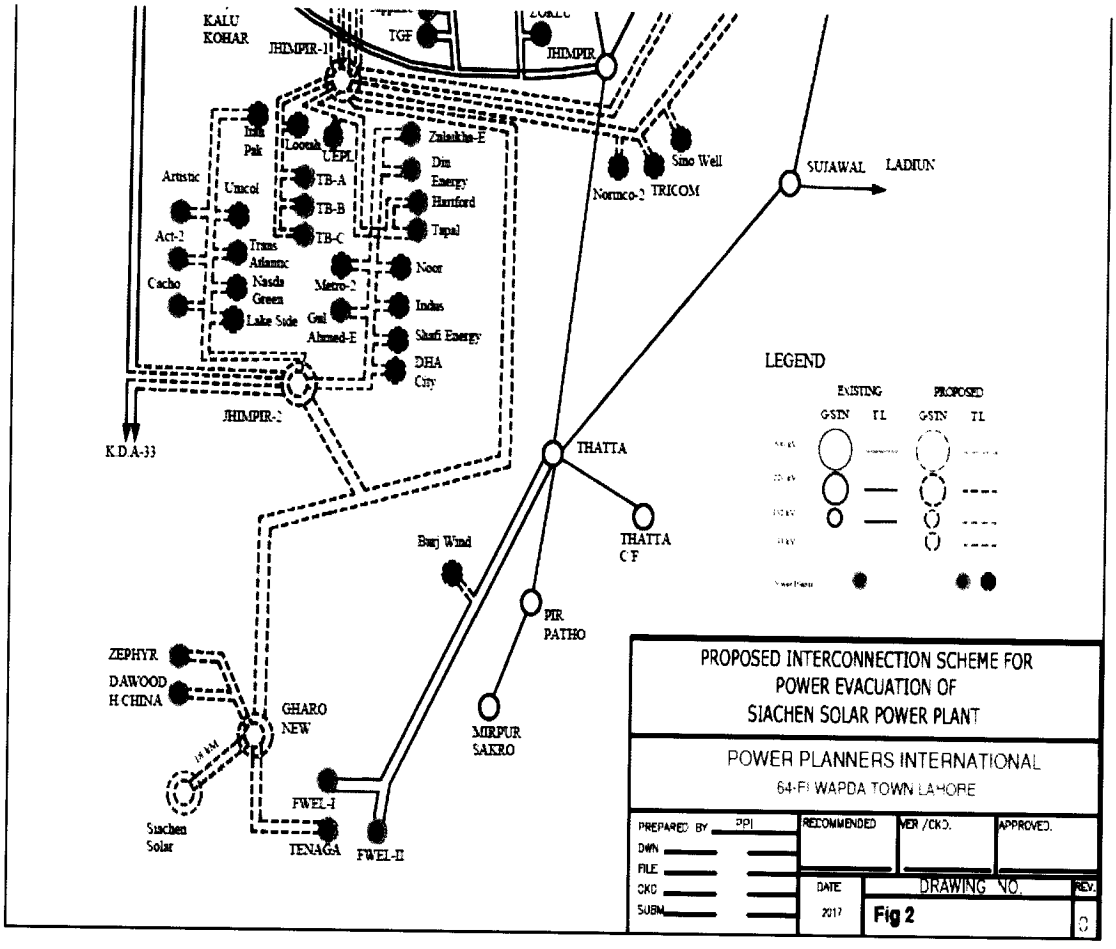
Schematic Diagram of the Interconnection Arrangement/Transmission Facility for Dispersal of Power from the Generation Facility/Solar Power Plant /Solar Farm



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REGISTRAR
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Detail of Generation Facility/Solar Power Plant/ Solar Farm

(A). General Information

(i).	Name of Company/ Licensee	Siachen Energy Limited
(ii).	Registered/Business Office of the Company/Licensee	74 J Street, Off Khayaban-e-Muhafiz, Phase VI, DHA, Karachi, Pakistan
(iii).	Location of the Generation Facility	Ghulam Ullah Road, Taluka Mirpur Sakro, District Thatta, Sindh
(iv).	Type of Generation Facility	Solar Photovoltaic (PV)

(B). Solar Technology & Capacity

(i).	Type of Technology	PV Cell
(ii).	System Type	Grid Connected
(iii).	Installed Capacity of the Generation Facility/Solar Power Plant/Solar Farm (MW)	=100.00 MW_p

(C). Technical Details of Equipment

(a).	**Solar Panels – PV Modules**	
(i).	Type of Module	Polycrystalline PV Module 250 Watt
(ii).	Type of Cell	Polycrystalline
(iii).	Dimension of each Module	1650 mm x 992 mm x 35 mm
(iv).	No. of Panel/Modules	400,000
(v).	Total Module Area	445 Acres
(vi).	Total Land Area used	500 Acres

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(vii).	Frame of Panel	Anodized Aluminum alloy	
(viii).	Weight of one Module	18.6 Kg.	
(ix).	Module Output Warranty	For 1st year	For 2nd to 25th year
		Not more than 2.5% output reduction	Not more than 0.5% output reduction per annum
(x).	Number of solar cells in each module	60 cells	
(xi).	Efficiency of Module	15.30%	
(xii).	Environment protection system	Encapsulation and sealing arrangements for protection from environment	
(xiii).	Nominal Maximum Power (P_{max}) at STC	250 W	
(xiv).	Power Tolerance at STC	0 / +3W	
(xv).	Optimum Operating Voltage at STC	30.30V	
(xvi).	Optimum Operating Current at STC	8.28A	
(xvii).	Open circuit voltage (Voc) at STC	37.60 V	
(xviii).	Short circuit current (ISC) at STC	8.76A	
(xix).	Maximum system Voltage at STC	600 V DC (IEC)	
(b).	**PV Array**		
(i).	No. of PV modules	400,000	
(ii).	Modules in a string	22	
(iii).	Total number of strings	18,182	
(c).	**PV Capacity**		
(i).	Total	100 MW_P	
(ii).	Junction boxes	IP 67 rated	
(d).	**Inverters (Central)**		
(i).	Inverter Model	1000CP XT	

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY
REGISTRAR

(e).	**Input (DC)**		
(i).	Max. input voltage	1000 V	
(ii).	MPP voltage range [@ 25°C/@ 40°C/@ 50°C]	688 to 850V/ 625 to 850 V/ 596 to 850V	
(iii).	Rated input voltage	688V	
(iv).	Maximum input current	1,635 A	
(v).	Max. DC short-circuit current	2,500 A	
(f).	**Output (AC)**		
(i).	AC power [@ 25°C/@ 40°C/@ 50°C]	1,100 kVA/ 1,000 kVA / 900 kVA	
(ii).	AC power frequency/ range	50 Hz,60 Hz /47...63Hz	
(iii).	Rated power frequency/rated grid voltage	50 Hz / 405 V	
(iv).	Power factor at rated power/ Displacement power factor, adjustable	1 / 0.9 leading to 0.9 lagging	
(v).	Feed-in phases/ connection phases	3/3	
(g).	**Efficiency**		
(i).	Max. efficiency/ European efficiency/ CEC efficiency	98.7% / 98.4% / 98.5%	
(h).	**Protective Devices**	(a). Input-side disconnection device (b). Output-side disconnection device (c). DC overvoltage protection (d). Stand-alone grid detection active/passive (e). Grid monitoring (f). Ground fault monitoring (g). Insulation monitoring (h). Surge arrester for auxiliary power supply	
(i).	**Environmental Enclosures**	Operating temperature range	-25° C to +62° C/-13° .....144°F
		Maximum permissible value for relative humidity (non-condensing)	15... 95 %
		Noise emission	68 dB(A)

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(j).	**Data Collection System**		
(i).	Weather Data	(a).	Pyranometer – Sets (Incline to record irradiation level) [Yes]
		(b).	Thermometer – Sets (to record ambient temp) [Yes]
(i).	System Data	(a).	DC input voltage (V) & current (A) of each inverter (phase, line) [Yes]
		(b).	Total DC power (kw) generated by PV array [Yes]
		(c).	AC output voltage (V) and current (A) of each Inverter (Phase, Total) [Yes]
		(d).	AC output power (kW) and energy (kwh) of each inverter [Yes]
		(e).	Frequency (Hz) [Yes]
		(f).	Power Factor (PF) [Yes]
		(g).	Temperature inside inverter station [Yes]
(k).	**Isolating Transformer**		
(i).	Model	TCS-1600-SC-IT	
(l).	**Medium-Voltage side**		
(i).	Rated power (@25°C)	1760 kVA	
(ii).	Nominal AC power @ 45°C)	1600 kVA	
(iii).	Rated grid voltage	20 kV	
(iv).	Nominal AC voltage range	18 kV ... 22 kV	
(m).	**Low-Voltage side**		
(i).	Nominal input voltage	360 V	

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(n).	**Outdoor Cubicle Control Room**	
(i).	Data record	Continuous logging with data logging software [Yes]
(ii).	Control room system	Computerized data acquisition system [Yes]
(iii).	Control room system detail	Interfacing hardware & software, Industrial type PC, which will be robust & rugged suitable to operate in the control room environment [Yes]
(o).	**Mounting Structure**	
(i).	Application	Ground Mounted
(ii).	Model	Sigma I XL
(iii).	Module Layout	Multi-variation, maximum table length 20 m
(iv).	Module inclination	25°
(v).	Quantity	400,000
(vi).	Structure Profile/s	Steel Zinc –flake-coated Stainless Steel Extruded aluminum
(vii).	Foundation structure	Reinforced concrete pile or Spiral steel piles

(D). Other Details

(i).	Expected COD of the Generation Facility/Solar Power Plant/Solar Farm (Anticipated)	December 31, 2018
(ii).	Expected Useful Life of the Generation Facility/Solar Power Plant/Solar Farm (Anticipated) from COD	25 Years

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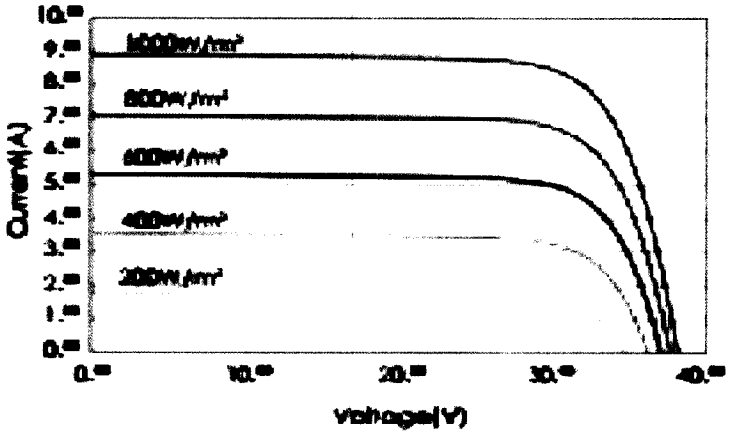
V-I Curve of Solar Cell



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SCHEDULE-II

The Total Installed Gross ISO Capacity of the Generation Facility/Power Plant/Solar Plant (MW), Total Annual Full Load (Hours), Average Sun Availability, Total Gross Generation of the Generation Facility/Solar Farm (in kWh), Annual Energy Generation (25 years Equivalent Net Annual Production-AEP) KWh and Net Capacity Factor of the Generation Facility/Power Plant/Solar Farm of Licensee is given in this Schedule.

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SCHEDULE-II

(1).	Total PV Installed Capacity of Generation Facility	≈100.00 MW_P
(2).	Average Sun Hour Availability/Day (Irradiation on Inclined Surface)	6.0 Hours
(3).	Days per Year	330
(4).	PV Plant Generating Capacity Annually (As Per Simulation)	168,689 MWh/year
(5).	Expected Total Generation in 25 years Life Span	4,217,225 MWh
(6).	Generation per Year from plant keeping 24 Hours Working	100.00 x 24 x 365 = 876,000 MWh
(7).	Net Capacity Factor (4/6)	19.25%

Note

All the above figures are indicative as provided by the Licensee. The Net Delivered Energy available to Power Purchaser for dispatch will be determined through procedures contained in the Energy Purchase Agreement (EPA) or the Applicable Document(s).

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