

## **National Electric Power Regulatory Authority** Islamic Republic of Pakistan

NEPRA Tower, Attaturk Avenue (East), G-5/1, Islamabad Ph: +92-51-9206500, Fax: +92-51-2600026 Web: www.nepra.org.pk, E-mail: registrar@nepra.org.pk

April 29, 2020

### No. NEPRA/R/DL/LAG-472/11229-35

Mr. Ishtiaq Ur Rehman Malik, Director. Solution De Energy (Private) Limited, C/o Admiral Karamat Rehman Niazi, 96, Khayaban-e-Iqbal (Main Margala Road), F/8-2, Islamabad.

#### Grant of Generation Licence No. SPGL/38/2020 Subject: Licence Application No. LAG-472 Solution De Energy (Private) Limited (SDeEPL)

SDeEPL's application vide letter dated August 15, 2019. Reference:

Enclosed please find herewith Generation Licence No. SPGL/38/2020 granted by National Electric Power Regulatory Authority (NEPRA) to Solution De Energy (Private) Limited (SDeEPL) for its 100.0 MW Solar Power Plant located at Quaid-e-Azam Solar Park (Extension). Village Dharanwala, Tehsil Chishtian, District Bahawalnagar, in the province of Punjab, pursuant to Section 14B of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997/Amendment Act, 2018. Further, the determination of the Authority in the subject matter is also attached.

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

**Enclosure: Generation Licence** (SPGL/38/2020)



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(Syed Safeer Hussain)

Copy to:

- Secretary, Ministry of Energy (Power Division), A-Block, Pak Secretariat, Islamabad. 1.
- Chief Executive Office, Alternative Energy Development Board, 2<sup>nd</sup> Floor, OPF Building, G-5/2, 2. Islamabad
- 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, Multan Electric Power Company Limited (MEPCO), MEPCO Head 5. Quarters, Khanewal Road, Multan.
- Director General, Environmental Protection Department, Government of Punjab, National Hockey 6. Stadium, Ferozpur Road, Lahore

### National Electric Power Regulatory Authority (NEPRA)

#### Determination of the Authority in the Matter of Application of Solution De Energy (Private) Limited for the Grant of Generation Licence

<u>April १९ , 2020 ) April مجروع (</u> <u>Case No. LAG-472</u>

#### (A). Background

(i). In order to attract private investment in the power sector, the Govt. of Pakistan has framed different policies. Further, the provinces have also formulated their own policies in this regard. The Government of Punjab (GoPb) devised a policy titled Punjab Power Generation Policy 2006 as revised/amended in the year 2009 (hereafter called the "Punjab Power Policy") envisaging the utilization of power potential in the province.

(ii). In consideration of the above, GoPb through Punjab Power Development Board (PPDB) issued a Letter of Intent (LoI) to a consortium/joint venture of Crescent Steel & Allied Products Limited Pakistan and Management de Consortium Capital (collectively the Sponsors) for setting up a 100.00 MW<sub>P</sub> solar based generation facility/Solar Power Plant/Solar Farm at Quaid-e-Azam Solar Park (Extension), tehsil Chishtian, district Bahawalnagar, in the province. According to the terms and conditions of the said LoI, the Sponsors were required to carry out a detailed feasibility study of the project at internationally acceptable standards.

(iii). In order to implement the project, the Sponsors got incorporated under the company law, a Special Purpose Vehicle (SPV) in the name of Solution De Energy (Private) Limited (SDeEPL). Further, the Sponsors engaged different consultants and completed the feasibility study of the project. The PPDB appointed Panel of Experts [PoE(s)] approved the said study and accordingly, SDeEPL depicted approach the Authority for the grant of generation licence.



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#### (B). Filing of Application

(i). SDeEPL submitted an application on August 29, 2019 for the grant of generation licence in terms of Section-14B 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").

(ii). The Registrar examined the submitted application to confirm its compliance with the Licensing Regulations and observed that the application lacked some of the required information/documentation. In view of the said, the Registrar directed SDeEPL for submitting the missing information/documentation and the same was received on October 08, 2019. Accordingly, the Registrar submitted the application for the consideration of the Authority to decide the admission of the same 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.

(iii). In view of the above, the Authority admitted the application on October 31, 2019 for consideration of the grant of the generation licence as stipulated in Regulation-7 of the Licensing Regulations. The Authority also approved a notice of admission to be published in the press for inviting comments of general public, interested and affected persons in the matter as stipulated in Regulation-8 of the Licensing Regulations. Accordingly, the said notices were published in one (01) Urdu and one (01) English newspapers on November 02, 2019.

(iv). 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 different stakeholders as per the approved list on November 05, 2019, soliciting their comments for assistance of the Authority.



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#### (C). Comments of Stakeholders

(i). In reply to the above, the Authority received comments from two (02) stakeholders. These included and Central Power Purchasing Agency (Guarantee) Limited (CPPAGL) and Ministry of Science & Technology (MoST) and Central Power Purchasing Agency (Guarantee) Limited (CPPAGL). The salient points of the comments offered by the said stakeholders are summarized below:-

CPPAGL submitted that the project of SDeEPL is enlisted (a). in category-III of the decision dated March 29, 2019 of the Cabinet Committee on Energy (CCoE) which states that projects issued LOI prior to the expiry of the RE Policy 2006 on March 08, 2018 but have not received Tariff from the regulator, may be allowed to proceed ahead subject to becoming successful in the Competitive Bidding (CB) process to be undertaken by Alternative Energy Development Board (AEDB) based on the quantum ascertained through the Indicative Generation Capacity National (IGCEP) prepared by Expansion Plan Transmission and Despatch Company Limited (NTDCL) by confirming the need of the induction of the additional of system and confirmation its in the power interconnection arrangement including the completion of pre-requisites for the issuance of Power Acquisition Request (PAR). In view of the above, it is clear that future procurement of power from RE projects under category-III and beyond requires at least (a). ascertainment of quantum for each technology & for each year as determined by IGCEP and duly approved by the Regulator; and (b), award of tariff through the CB. In this regard, CPPAGL has already requested the Authority for the initiation of the process leading to the approval of



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already submitted IGCEP to ascertain the yearly quantum of power procurement under various technologies including RE to meet the demand of the distribution companies. It is therefore submitted that fulfilment of the aforesaid pre-requisites are conditions precedent for the issuance of consent of power purchase and subsequent procurement of power. Accordingly, it is submitted that the generation licence of SDeEPL may be modified for excluding CPPAGL from the definition of the "Power Purchaser" as no consent has been issued in this regard.

The Authority reviewed the above mentioned comments of the (ii). stakeholders and considered it appropriate to seek the perspective of SDeEPL on the observations of CPPAGL and MoST. On the said, SDeEPL submitted that PPDB issued it LoI for the development of the project under the Punjab Power Policy which is still valid and has not been replaced or repealed. After completing all the relevant milestones as stipulated in the LoI, it has submitted an application for the grant of Generation Licence as envisaged in the NEPRA Act, relevant rules and regulations made thereunder which are policy neutral. It is pertinent to mention that about the decision of the CCoE, the Authority has already given its determination that the same is not binding on it and therefore, the decision may not form a basis to deny it to have a generation lience after fulfilment of the regulatory process. Further, SDeEPL submitted that as per the latest information available, NTDC prepared and submitted the IGCEP for the approval of the OVER RECONTHORITY but the same was returned due to a number of discrepancies and the same, has not been resubmitted for approval. In the absence of the same, REGISTRABDEPL cannot be denied to have a generation licence for which all the necessary formalities have been completed. SDeEPL stated that the Govt. of \*NEPRA Pakistan is considering to increase the share of RE from existing 5% to 30% by 2030 from the current level of less than 5% in the total energy mix which will result in affordable electricity to the National Grid and reduction in burden to the end consumer (no fuel adjustment charges for solar, no imported fuel cost). This can only be achieved if the investors in general and the local ones in particulars are

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encouraged to set up RE projects without involving them in procedural issues which only result in discouragement of such ventures.

(iii). On the comments of MoST, it was confirmed that the required feasibility study of the project has been carried out to arrive at informed decision for the selection of technology of the project and after going through an extensive iterative process, it has been concluded to deploy Monocrystalline technology which will result in a very cost effective tariff for the project. It was confirmed that the company through its EPC Contractor plans to procure/install PV solar panels from any of the top manufacturing company in the world including JinkoSolar, JA Solar, Trina Solar, LONGi Solar or Canadian Solar, all of which are IEC-61215 Certified.

(iv). The Authority considered the above submissions of SDeEPL and considered it appropriate to proceed further in the matter as stipulated in the Licensing Regulations and the NEPRA Licensing (Generation) Rules 2000 (the "Generation Rules").

#### (D). Evaluation/Findings

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(i). The Authority reviewed the submissions of SDeEPL including the information provided in its application for the grant of generation licence, comments of the stakeholders and the rejoinder in the matter. The Authority has also considered the feasibility study of the project, report on Grid Interconnection Study (GIS) etc., provisions of the relevant RE Policy and the relevant rules & regulations.

(ii). The Authority has observed that the Sponsors of the project include Crescent Steel & Allied Products Limited Pakistan (CS&APLP), Management de Consortium Capital (MdeCC) and Total EREN France. CS&APLP is a conglomerate corporation listed on the Pakistan Stock Exchange, having diversified businesses in steel, engineering, textiles, capital markets and power generation. Similarly, MdeCC is a member of the Ivy Company providing services to meet with the pakistan involved in different portfolio of projects of Information Technology, Solar Energy, Coal Mining and Power Plants, Wind Power Generation, Exclusive Strategic Alliances, Commodities, Export/Import Investment, Management Capital Markets and Foreign Direct Investment. Goldman Ivy Energy Consortium along with sister company MdeCC is currently working on setting up over a gigawatt of conventional and alternate energy power plants in partnership with Goldman Sachs and Ivy alumni owned boutique investment bank WoodRock Securities L.P. Over 2 billion dollars of funding for these projects is to be provided by WoodRock. Further, Total EREN France, is a global Independent Power Producer with a strong experience and expertise in the development, financing, construction and operation of RE Projects of wind and solar worldwide. It holds a diversified portfolio of assets representing an installed gross capacity of over 1150 MW in operation or under construction and an additional 1,500 MW pipeline of projects under development in Asia-Pacific, Africa and Latin America. In view of the above, the Authority considers that the Sponsors of the project have good financial strength and technical expertise to develop the proposed project.

(iii). As explained above, based on the financial strength and other evaluation parameters, PPDB issued Lol to the Sponsors for the development of the project. In this regard, the Sponsors have been allocated approximately a total of 500.00 acres of land located at Quaid-e-Azam Solar Park (Extension), Dharanwala, tehsil Chishtian, district Bahawalnagar, in the province of Punjab. As explained above, for the implementation of the project, the Sponsors have incorporated the SPV in the name of SDeEPL under Section-32 of the Companies Ordinance, 1984 (XLVII of 1984), having Corporate Universal Identification No. 0085716, dated November 07, 2013. The Registered/Business Office address of the company/SPV is located at House No. 96, Khayaban-e-Iqbal (Main Margalla Road), F-8/2, Islamabad in the Federal Capital. According to the Memorandum of Association, the principal objects of the company *inter alia* include the business of power generation and its sale thereof.

(iv). According to the submitted information, the total outlay of the project will be submitted U.S. \$ 90.26 million which will be financed through



a combination of debt (U.S. \$ 67.69 million) and equity (U.S. \$ 22.56 million) in a ratio of 75:25 which is in line with the benchmark set out in different determinations of the Authority in similar cases. The Authority has observed that in view of the strength of the Sponsors, a number of multilateral institutions have expressed their interests to finance the project on standard terms and conditions.

(v). As explained above, the sponsors carried out a detailed feasibility study of the project as stipulated in the term and conditions of the LoI. The said study, included, *inter alia*, data collection, detail of equipment of the solar based generation facility/solar power plant, optimization of the selected layout of the details, power production estimates based on solar irradiation data of the project site, technical details pertaining to selected PV cells and other allied equipment to be used in the solar power plant, electrical studies, environmental study, geo technical investigation including soil testing, unit rate analysis, costing, economic & financial analysis and project financing, etc.

(vi). The Authority has reviewed the feasibility study of the project and same reveals that the company has considered various world class manufacturers of PV cells including Hanwha Q Cells Co. Limited, JA Solar Holdings Co., Limited, 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 various factors including (a). Solar resource position of the proposed location; (b). Capital cost of equipment/PV Cells; (c). Lead time for supply of equipment/PV Cells; (d). Expected energy yield of PV Cells; (e). Reliability and source resource position and maintenance in (including easiness/availability of spare/replacement parts for PV Cells REGISTRAPED) the company decided to select JA Solar Holdings Co., Ltd (JA Solar).

\*NEPRA\* generation facility/Solar Power Plant/Solar Farm to ≈ 100.00 MW, having 227304 x 440 W<sub>P</sub> Mono Crystalline PV Modules of JA Solar. It is pertinent to mention that JA Solar was founded in 2005 and is a manufacturer of high-performance

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photovoltaic products. It has 12 manufacturing bases and more than 20 branches around the world, covering business of silicon wafers, cells, modules and photovoltaic power stations. The products of JA Solar are available in over 120 countries and regions and are used extensively in ground-mounted power plants, commercial & industrial rooftop PV systems and residential rooftop PV systems. With its advantages of continuous technological innovation, sound financial performance, and well-established global sales and service networks, JA Solar has been well received and highly recognized by clients from home and abroad. The company has been listed on Fortune China 500 and Global Top 500 New Energy Enterprises for several consecutive years. The company has been ranked high by institutes like Bloomberg, IHS Markit Technology and EuPD Research and has shipped 35 GW of modules by the end of year 2018. In view of the above, it is considered that the sponsors of the project have selected top of the line Tier-I company for supply of the PV panels. Further to said, the technology selected for PV cells for the project is monocrystalline which is a mature technology and is widely used due to its better energy yield to cost ratio. In view of the above, the Authority considers that the sponsors of the project have selected top of the line Tier-I company for supply of the PV panels. Further to said, the technology selected for PV cells for the project is monocrystalline which is a mature technology and is widely used due to its better energy yield to cost ratio. Accordingly, the Authority is of the considered opinion that the selected technology for PV cells is mature, cost effective and time tested. In view of the said, it is considered that the selected technology has distinctive features and good performance.

REGISTRAR (viii). The Authority has observed that the sponsors of the project carried out the required GIS to determine the arrangement for dispersal of electric power NEPRE from the proposed generation facility/Solar Power Plant/Solar Farm. According to the said study, the interconnection arrangement for despatch of electric power will be on 132kV voltage and will consist of a 132 kV D/C transmission line (measuring approx. 40.00 km long on ACSR Rail Conductor) connecting the proposed generation facility/Solar Power Plant/Solar Farm of SDeEPL to 220/132 kV Chishtian-New Grid Station of MEPCO. The One circuit of the above

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 arrangement will directly connect to 220/132 kV Chishtian-New Grid Station whereas the other circuit will connect to 220/132 kV Chishtian-New Grid Station via another generation facility/Solar Power Plant/Solar Farm of Storm Harbour Limited proposed to be developed in the same vicinity. Apart from the above, another 132 kV SDT transmission line (measuring approx. 02.00 km long on ACSR Rail Conductor) connecting the proposed generation facility/Solar Power Plant/Solar Farm of SDeEPL to another generation facility/Solar Power Plant/Solar Farm designated as Solar PP2 will also be laid. In this regard, MEPCO and NTDC has also vetted/approved the above mentioned GIS, confirming that all the relevant parameters are within permissible limits of the Grid Code.

(ix). The Authority observes that the proposed project, for which generation licence is being sought, is based on RE source and does not cause the types and level of pollution as in the case of conventional power plants. However, the proposed generation facility/Solar Power Plant/Solar Farm may cause soil pollution, water pollution and noise pollution during construction and operation. In this regard, the Authority has observed that SDeEPL carried out the Initial Environment Examination (IEE) study for the project and submitted the same for the consideration and approval of Environmental Protection Agency, Government of Punjab (EPAGoPb). In this regard, EPAGoPb has already issued a No Objection Certificate (NOC) to the company for the construction of the project.

(x). In terms of Rule-3 of the Generation Rules, the Authority may grant a beneration licence to any person to engage in the generation business. The REGISTRAR sale ule stipulates various conditions pertaining to the grant of generation licence explained in Rule-3(2), Rule-3(3), Rule-3(4) and Rule-3(5) of the Generation week explained in Rule-3(2), Rule-3(3), Rule-3(4) and Rule-3(5) of the Generation rules. In the particular case under consideration, the Authority considers that conditions of Rule-3(2) and Rule-3(3) stand satisfied as SDeEPL 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. The

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provision of Rule-3(4) of the Generation Rules regarding holding a public hearing is not applicable as there was no issue which required this exercise.

(xi). The Rule-3(5) of the Generation Rules stipulates that the Authority may refuse to issue a generation licence where the site, technology, design, fuel, tariff or other relevant matters pertaining to the generation facility proposed in an application for a generation licence are either not suitable on environmental grounds or do not satisfy the least cost option criteria. In this regard, the Rule-3(5) of the Generation Rules also stipulates the conditions pertaining to least cost option criteria which include (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 cost 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 short-term and the long-term requirements of the electric power industry as a whole.

(xii). The Authority considers that the proposed project will result in optimum utilization of the RE of the province of Punjab which is untapped, resulting in pollution free electric power. It is pertinent to mention that solar is an indigenous RE resource and such resources should have a preference for the energy security. There is a global trend of reduction in the prices of PV Cells which results in lower tariffs as is evident from various determinations of the Authority. These lower tariffs will result in reduction of the overall basket price which will be beneficial to the public at large.



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(xiii). 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 at reasonable distance from the thin population of the area, the project will not result in cost and right-of-way issues for the provision of transmission and interconnection facilities. In view of the said, the Authority considers that the project of SDeEPL fulfills the eligibility criteria for grant of generation licence as stipulated in the NEPRA Act, rules, regulations and other applicable documents.

#### (E). Grant of 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.

(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 electric power generation and their development is encouraged. Recently, the world market for RE technologies have seen a sharp declining trend in terms of prices, making these technologies very attractive and cost effective for generation of electric power. Further, there are developments in the sector which are paving the way to address the intermittency issues of these technologies. In view of the said, the Authority is of the considered opinion that there is a worldwide trend to increase the share of RE in the energy mix of any country and it is very likely that the Govt. of Pakistan will also be considering to increase the share of RE substantially in the coming years.



(iii). The current case under consideration of the Authority is that SDeEPL which plans setting up a PV based solar generation facility/Solar Power Plant/Solar Farm at Quaid-e-Azam Solar Park (Extension), tehsil Chishtian, district Bahawalnagar in the province of Punjab of an approximate total installed capacity of 100.00 MW<sub>P</sub>. As explained in the preceding paragraphs the proposed project fulfils the eligibility criteria for grant of generation licence as envisaged in the existing regulatory regime. The stakeholders are in support of the project except CPPAGL which has raised certain concerns which the Authority considers appropriate to address through this determination.

(iv). In its comments CPPAGL has raised issues including (a). future projects are to be awarded through the CB as per decision of CCoE; (b) the quantum is to be ascertainment/determined through IGCEP; (c) no PAR for the project has been issued therefore, CPPAGL be excluded as Power Purchaser for the project.

(v). In consideration of the above, the Authority hereby clarifies it performs its functions under the provisions of the NEPRA Act, rules and regulations framed thereunder. It is pertinent to mention that under the NEPRA Act, the Authority is only bound by the directions/decisions of the Counsel of Common Interest (CCI) and not any other forum. The Authority considers induction through CB as one of the most effective tool but despite the strict directions given in this regard, no tangible work has been carried out by the relevant agencies in preparation of the RFP and other related documentation including the security package. Due to the said, it is not clear when the ground work will be completed and when will the relevant agencies be able to carry out the CB.

(vi). Further to the above, the Authority has been directing NTDC for finalization and submission of IGCEP so that the future procurement can be made in a more scientific way however, the said plan is still under preparation and has not been re-submitted for approval of the regulator. It is pertinent to mention that



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in the year 2018 NTDC submitted IGCEP but the same was not found upto the mark and the Authority after reviewing the same returned it back to NTDC for incorporation of a list of observations made which is still awaited. In the absence of the IGCEP, the Authority cannot stop performing its regulatory functions and considers it appropriate to process and grant generation licence and tariff to a company which has fulfilled the requirements of the NEPRA Act, rules and regulations framed thereunder.

(vii). In consideration of the above, one of the observation of CPPAGL was that it has not issued PAR to the project therefore, it may not be considered as a Power Purchaser. In this regard, the Authority hereby clarifies for the grant of the generation licence there is no such requirement envisaged in the NEPRA Act, relevant rules and regulation framed thereunder, to have a PAR before the issuance of the generation licence. Regarding the observation of CPPAGL that in the absence of PAR it should not be considered Power Purchaser, the Authority hereby clarifies that under the current status of the market in the country, whether explicitly stated or otherwise, all the procurement is made by CPPAGL on behalf of XW-DISCO(s) which act as Power Purchaser therefore, the observation of CPPAGL is not acceptable.

(viii). In consideration of the above, the Authority will like to highlight that GoP is contemplating an aggressive plan to increase the share of RE in the energy mix of the country to 20% by 2025 and to 30% upto 2030 from the current level of less than 5%. Therefore, instead of taking the position that IGCEP has not been approved and the quota of RE has not been determined therefore, the grant of generation licence may not considered, the Authority considers that CPPAGL must liaison with all the relevant stakeholders so that the share of RE is ascertained in light of initiatives being taken to increase the share of RE in the overall energy mix of the country which is now very attractive in terms of decreasing cost and will result in reduction of the overall energy cost for the system thus benefitting the end consumers of all kind.



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(ix). In view of the above, the Authority considers that the proposed project of SDeEPL will help in diversifying the energy portfolio as well as increasing the share of RE in the energy mix 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 carbon emissions by generating clean electricity, thus improving the environment.

(x). As explained in the preceding paragraphs, SDeEPL 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 Sponsors/SDeEPL has been allocated land to the tune of 500.00 acres for setting up the generation facility/Solar Power Plant/Solar Farm. The said details are being incorporated in the generation licence. The Authority directs SDeEPL to utilize the allocated land exclusively for the proposed generation facility/Solar Power Plant/Solar Farm and not to carry out any other activity on the said allocated land except with the prior approval of the competent authority.

(xi). The term of a generation licence under Rule-5(1) of the Generation Rules is required to commensurate 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 SDeEPL, its generation facility/Solar Power Plant/Solar Farm will achieve Commercial Operation Date (COD) by December 31, 2020 and will have a useful life of more than twenty five (25) years from its COD. In this regard, SDeEPL 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 SDeEPL 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.



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(xii). 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 considers appropriate to direct SDeEPL to charge the power purchaser only such tariff which has been determined, approved or specified by it. Accordingly, the Authority decides to include a specific article in the generation licence. Further, the Authority directs SDEEPL to adhere to the said in letter and spirit without any exception.

(xiii). About the compliance with the environmental standards, as discussed in the preceding paragraphs, SDeEPL has provided the NOC from EPAGoPb 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 specific article in the generation licence along with other terms and conditions making it obligatory for SDeEPL to comply with relevant environmental standards at all times. Further, the Authority directs SDeEPL to submit a report on 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.

(xiv). The proposed generation facility/Solar Power Plant/Solar Farm of SDeEPL 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. SDeEPL has informed that the project will achieve COD by December 31, 2020, which is within the deadline of the Kyoto Protocol. In view of the said, an article for carbon credits and its sharing with the power purchaser has been included in the generation licence. Accordingly, the Authority directs SDeEPL to initiate the process in this regard at the earliest so that proceeds for the carbon credits with the power purchaser as stipulated in the generation licence.

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(xv). In view of the above, the Authority hereby approves the grant of generation licence to SDeEPL 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:

Engr. Rafique Ahmed Shaikh (Member)

Engr. Rehmatullah Baloch (Member)

Saif Ullah Chattha (Member)

utullaly 22.4.2020

Engr. Bahadur Shah (Member/Vice Chairman)

Engr. Tauseef H. Farooqi (Chairman)



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In exercise of the powers conferred upon the National Electric Power Regulatory Authority (NEPRA) under Section 14B of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997/Amendment Act, 2018, the Authority hereby grants a Generation Licence to:

#### SOLUTION DE ENERGY (PRIVATE) LIMITED

Incorporated Under Section-32 of the Companies Ordinance 1984 (XLVII of 1984) Having Corporate Universal Identification No.0085716, dated November 07, 2013

for its Generation Facility/Solar Farm/Solar Power Plant Located at Quaid-e-Azam Solar Park (Extension), Village Dharanwala, Tehsil Chishtian, District Bahawalnagar in the Province of Punjab

(Total Installed Capacity: ≈ 100 MW<sub>P</sub> Gross)

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

Given under my hand this on  $\frac{29^{\text{th}}}{2}$  day of April Two Thousand & Twenty and expires on <u>30<sup>th</sup></u> day of <u>December</u> <u>Two</u> Thousand & Forty-Five. 4 04 20

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#### <u>Article-1</u> 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, the Commercial 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;



"Applicable Law" means all the Applicable Documents;

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

"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 Photo Voltaic Cells is collected for supplying to the Power Purchaser;

- (g). "Carbon Credits" mean the amount of Carbon Dioxide (CO2) 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 Code" means the National Electric Power Regulatory Authority (Market Operator, Registration, Standards and Procedure) Rules, 2015 as amended or replaced from time to time;
- (i). "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;
- (j). "Commissioning" means the undertaking of the Commissioning Tests of the generation facility/Solar Power Plant/Solar Farm as stipulated in the EPA;
- (k). "CPPA-G" means Central Power Purchasing Agency (Guarantee)Limited or any other entity created for the like purpose;



- "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:
- "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;

- (n). "Generation Rules" mean the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000 as amended or replaced from time to time;
- (o). "Grid Code" means the grid code prepared and revised from time to time by NTDC with necessary approval of the Authority;
- (p). "GoPb" means the Government of the province of Punjab acting through the PPDB which has issued letter of intent to the Licensee for the design, engineering, construction, insuring, commissioning, operation and maintenance of the generation facility/Solar Power Plant/Solar Farm;
- (q). "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;
- (r). "IEC" means "the International Electrotechnical Commission or its successors or permitted assigns;
- (s). "IEEE" means the Institute of Electrical and Electronics Engineers or its successors or permitted assigns;



- "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;
- "Letter of Support (LoS)" means the letter of support issued or to be issued by the GoP through the AEDB to the Licensee;
- (v). "Licensee" means Solution De Energy (Private) Limited or its successors or permitted assigns;

- (w). "Licensing Regulations" mean the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999 as amended or replaced from time to time;
- (x). "MEPCO" means Multan Electric Power Company Limited or its successors or permitted assigns;
- (y). "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;
- (z), "NTDC" means National Transmission and Despatch Company Limited or its successors or permitted assigns;
- (aa). "Policy" means the Policy for Development of Renewable Energy for Power Generation, 2006 of GoP as amended from time to time;
- (bb). "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;
- (cc). "PPDB" means Punjab Power Development Board or any other entity created for the like purpose established by the GoPb to facilitate, promote and encourage development of private sector participation for development of projects for electric power in the province of Punjab;



- "Punjab Power Policy" means the "Punjab Power Generation Policy
  2006" of GoPb as amended from time to time;
- e). "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;

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

#### 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 infications and other specific details pertaining to its generation facility/Solar Power Plant/Solar Farm before its COD.

#### Article-4 Term of Licence

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**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 subject to Section 14-B of the Act.

**4.2** Unless suspended or revoked earlier or Licence ceases to have effect, 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.

#### <u>Article-5</u> 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.

#### <u>Article-6</u> <u>Tariff</u>

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

#### <u>Article-7</u> 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.

**7.2** 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.

**7.3** 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.



#### <u>Article-8</u> 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.

#### <u>Article-10</u> 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.

**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.



#### <u>Article-12</u> 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.

**12.3** The Licensee shall transmit the solar radiation data and power output data of its generation facility/Solar Power Plant/Solar Farm to the control room 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

#### Article-15 Design & Manufacturing Standards

REGISTRAR

The photovoltaic cells and other associated equipment of the generation received 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.

#### Article-17 Compliance with Applicable Law

The Licensee shall comply with the provisions of the Applicable Law, guidelines, directions and prohibitory orders of the Authority as issued from time to time.

#### <u>Article-18</u> <u>Corporate Social Responsibility</u>

The Licensee shall provide the descriptive as well as monetary disclosure of its activities pertaining to corporate social responsibility (CSR) on an annual basis.



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## 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.



# <u>Location of the</u> <u>Generation Facility/Solar Power Plant/Solar Farm</u> <u>of the Licensee</u>



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## <u>Location of the</u> <u>Generation Facility/Solar Power Plant/Solar Farm</u> <u>of the Licensee</u>



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# <u>Layout of the</u> <u>Generation Facility/Solar Power Plant/Solar Farm</u> <u>of the Licensee</u>



cont

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

<u>Sr. No.</u>	<u>Latitude</u>	Longitude
P <sub>1</sub>	29.31694	72.50822
P <sub>2</sub>	29.31694	72.51234
P <sub>3</sub>	29.31531	72.50615
P4	29.31531	72.50822
P <sub>5</sub>	29.31531	72.51234
P <sub>6</sub>	29.31531	72.51443
P <sub>7</sub>	29.31368	72.50615
P <sub>8</sub>	29.31368	72.51029
P <sub>9</sub>	29.31205	72.51443
P <sub>11</sub>	29.3055	72.51029
P <sub>12</sub>	29.3055	72.51650



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#### <u>Single Line Diagram</u> of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee



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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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## 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/Solution De Energy (Private) Limited/SDeEPL shall be dispersed to the load centre of MEPCO.

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

(i). A 132 kV D/C transmission line (measuring approx. 40.00 km long on ACSR Rail Conductor) connecting the proposed generation facility/Solar Power Plant/Solar Farm of SDeEPL to 220/132 kV Chishtian-New Grid Station of MEPCO. The One circuit of the above arrangement will directly connect to 220/132 kV Chishtian-New Grid Station whereas the other circuit will connect to 220/132 kV Chishtian-New Grid Station facility/Solar Power Plant/Solar Farm of Storm Harbour Limited proposed to be developed in the same vicinity;



Apart from the above, another 132 kV SDT transmission line (measuring approx. 02.00 km long on ACSR Rail Conductor) connecting the proposed generation facility/Solar Power Plant/Solar Farm of SDeEPL to another generation facility/Solar Power Plant/Solar Farm designated as Solar PP2 will also be laid.

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

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

## (A). General Information

(i).	Name of the Company/ Licensee	Solution De Energy (Private) Limited
(ii).	Registered/Business Office of the Company	96-Khyaban-e-Iqbal, F8/2, Islamabad
(iii).	Location of the Generation Facility/Solar Power Plant/Solar Farm	Quaid-e-Azam Solar Park (Extension), Village Dharanwala, Tehsil Chishtian, District Bahawalnagar in the Province of Punjab
(iv).	Type of Generation Facility Solar Power Plant/Solar Farm	Solar Photovoltaic (PV)

## (B). Solar Power Generation Technology & Capacity

(i).	Type of Technology	Monocrystalline Crystalline PV Cell	
(ii).	System Type	Grid Connected	
(iii).	Installed Capacity of Solar (MW)	≈100.00 MWP	える

## (C). <u>Technical Details of Equipment</u>

(a).	<u>Solar Panels – PV Modules</u>		
(i).	Type of Module	TR P-type Mono-facial, 78M 425-440 Watt Monocrystalline Module Or Equivalent	
(ii).	Type of Cell	Monocrystalline	
(iii).	Total number of PV Modules	227304	
(:	Arrey Clebel Dewer	Nominal (STC)	88
(IV).	Array Global Power	At operating cond	80

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	Array Operating	<40°C	88 MW
(v).	Characteristics (50°C)	>40°C	80 MW
(vi).	Total Module Area	112 Acre	
(vii).	Manufacturer	JA Solar Holdings	Company Limited
(viii).	Model	Mono-perc	
(ix).	Panel power	440Wp	
(x)	No. of Panels	227304	······································
(xi).	Frame of Panels	Aluminium	· · · · · · · · · · · · · · · · · · ·
(xii).	Solar Cells	156(6^26)	
(xiii).	Warranty of Panels	12 years	
(xiv).	Efficiency of module	20.3%	
(xv).	Environment Protection System	Glass lamination	
(xvi).	Panels power generating efficiency	Degradation @ 0.6	SO %
(xvii).	Maximum Power (P <sub>max</sub> )	440Wp	
(xviii).	Voltage @ (P <sub>max</sub> )	44.15V	
(xix).	Current @ P <sub>max</sub>	9.97A	
(xx).	Open circuit voltage (V <sub>oc</sub> )	54.25V	
(xxi).	Short circuit current (Isc)	10.44A	
(xxii).	Power Tolerance	0~+5W	
(xxiii).	Maximum system Voltage	DC1500V	
(xxiv).	Series fuse rating	20A	
(xxv).	No. Of cells & connections	28 pcs in series	SPON RESULT
(xxvi).	Efficiency of module	20.3% / 19.9%	REGISTRAR
(xxvii).	Temperature coefficient of P <sub>max</sub>	-0.350%/°C	* NEPRA Y LU
(xxviii).	Temperature coefficient of $V_{oc}$	-0.289%/°C	

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(xxix).	Temperature coefficient of Isc	+0.051%/°C	
(b).	PV Array		
(i).	No. of PV modules	227304	
(ii).	Modules in a string	84	
(iii).	Total number of strings	2706	
(c).	PV Capacity		
(i).	Total	<sup>≈</sup> 100 MW <sub>P</sub>	
(d).	Inverters		
(i).	Inverters Model	TC5000KF	
(ii).	Manufacturer	TBEA/ABB/Sun grow	
(iii).	Operating Voltage	DC1500V	
(iv).	Unit Nom Power	5000kW	
(v).	Number of Invertors	16	
(vi).	Total Power	80MW	
(vii).	Specification	TC5000KF	
6		Peak Efficiency 99%	
(VIII).	Emclency	Euro Efficiency 98.7%	
		(a). Single Axes Tracker	
(111)	Factures	(b). 40 DC inputs	
(IX).	reatures	(c). Anti-PID	
		(d). 99% inverter efficiency	
( <b>x</b> ).	Maximum AC apparent power	5500kW@40°C	
(xi).	Maximum DC Voltage	1500Vdc	
(xii).	MPP Voltage Range	900-1300Vdc	
(xiii).	Start-up Voltage	900-1300Vdc	
(xiv).	Start-up Power	1 × I.EPRAX	

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(xv).	Nominal DC Voltage	1500Vdc	
(xvi).	Maximum Input Current	6236A	
(xvii).	Power Control	Single tracking T	racker
(xviii).	DC Connector	40 DC inputs	
(xix).	Output Power	5000kW	
(xx).	Maximum Power	5500kW@40°C	
(xxi).	Maximum Output Current	5040A	
(xxii).	Output Voltage Range	0.63 kV	
(xxiii).	Nominal Grid Frequency/Grid Frequency Range	50Hz / 48Hz-51I	Hz
(xxiv).	Power Factor at nominal power/adjustable power factor	0.8 leading - 0.8	B lagging
( <b>xxv</b> ).	Total Harmonic Distortion	<3 (at nominal power)	
(xxvi).	Feed-in phases / Connection phases	3P	
(xxvii).	Mechanical Information	Dimensions (W x L x H) Net Weight Packing Size	4300*1678*2274 mm 6000kg /
		Protection Level Casing Material Operating	IP54/IP65(electronics) steel
(xxviiii)	Environmental	Temperature Range Storage Temperature Range	-25°C60° C -20° C60° C
Enclosures	Enclosures	Relative Humidity Operating	0 - 95% non-condensing 4000 m
		Elevation Warranty Period	5years
(xxix).	Invertors protection performance against	(a).	Over voltage both at input & output.

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		(b).	Over current both at input & output.
		(C).	Over/under grid frequency.
		(d).	Over temperature.
		(e).	Short circuit
		(f).	Protection against lightning
		(h)	Earth Fault protection.
(e).	Junction Boxes		
(i).	Specification	DC Distribution	(Junction) Box
(ii).	Number of units	540	
(iii).	Type of Junction Boxes	AC and DC junction Box	
		(a).	Combine groups of modules into independent charging sub-arrays that will be wired into the controller.
		(b).	Provide arrangement for disconnection for each of the groups.
(iv).	Purpose of Junction Box	(c).	Provide a test point for each sub-group for quick fault location.
	REGISTRAD	(d).	To provide group array isolation The current carrying
	*NEPRA * MI	(e).	ratings of the junction Boxes shall be suitable with adequate safety factor to inter- connect the Solar PV array
(f).	AC MP Panel		
(i).	AC MP Panel Detail	With available A	C breakers designed
(ii).	Number of units	1	
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(g).	Monitoring System		
(i).	Irradiation meter	pyranometers, Top tier standard according to ISO 9060-1990	
(ii).	Temperature meter	2 units (Surface temperature, air temperature, ambient temperature)	
(iii).	PC +Monitor	Data logging using software and hardware provided by TBEA	
(h).	<b>Transformers</b>		
(i).	Transformer Power	5000 kVA	
(ii).	Type of Transformer	Step-up Out door type	
(iii).	Purpose of Transformer	Step up voltage, galvanic isolation and eliminate DC current injection	
(i).	Lightning Protection and	Ear thing and Grounding System	
(i).	Number of Light arrestors	as per design	
(j).	Testing and measurement Equipment		
(i).	Mustimeter (voltampere ,resistor )	As per design	
(ii).	Irradiation meter	As per design	
(iii).	Temperature meter	As per design	
(iv).	Mega resistor meter	As per design	
(v).	Earth resistor meter	As per design	
(k).	Control Room	The second se	
(i).	Type of Control Room	Brick	
(ii).	Data record	Continuous logging with data logging software	
(iii).	Control Room System	Computerized data acquisition system	
(iv).	Control room System Detail	A/D converter, Multiplexer, De- multiplexors, Interfacing Hardware & Software, Industrial Type PC, which will be robust & rugged suitable to operate in the Control Room environment	

(I).	Mounting Structure		
(i).	Structure use	Array frames	
(ii).	Tilt of Array Frame	±60°	
(iii).	Array Specification	Certified for wind and seismic requirements	
(iv).	Mounting Structure	Single Axel Tracker System	
(m).	Foundation Pillars		
(i).	No. of Foundations	35178	
(ii) <i>.</i>	Foundation Structure	Reinforced concrete pile	
(iii).	Array Specification	Certified for wind and seismic requirements	
(iv).	Mounting Structure	Parallel series generating DC output	
(n).	Grid Connection		
(i).	Type of Control Room	Brick	
(ii).	Data record	Continuous logging with data logging software	
(iii).	Control Room System	Computerized data acquisition system	
(iv).	Control room System Detail	A/D converter, Multiplexer, De-multiplexors, Interfacing Hardware & Software, Industrial Type PC, which will be robust & rugged suitable to operate in the Control Room environment	

## (D). <u>Other Details</u>

(i).	Expected COD of the Generation Facility/Solar Power Plant/Solar Farm (Anticipated)	December 31, 2020	REGISTRAR
(ii).	Expected Useful Life of the Generation Facility from COD	25 Years	* LEPRIN * MAR

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Voltage (V)



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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 MWP
(2).	Average Sun Hour Availability/Day (Irradiation on Inclined Surface)	7.00 Hours
(3).	Days per Year	365
(4).	PV Plant Generating Capacity Annually (As Per Simulation)	175,200 MWh/year
(5).	Expected Total Generation in 25 years Life Span	4,127,003 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)	21.30 %

#### 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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