



Registrar

National Electric Power Regulatory Authority Islamic Republic of Pakistan

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No. NEPRA/R/DL/LAG-431/ 28681-87

December 27, 2019

Engr. Aziz Raza Malik,
Chief Executive Officer,
Kulachi Solar Power (Private) Limited,
7th Floor, Green Trust Tower, Jinnah Avenue, Blue Area,
Islamabad,

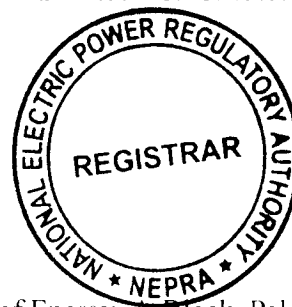
Subject: **Grant of Generation Licence No. SPGL/29/2019
Licence Application No. LAG-431
Kulachi Solar Power (Private) Limited (KSPPL)**

Reference: *KSPPL's application vide letter No. nil dated July 06, 2018 (received on July 10, 2018)*

Enclosed please find herewith Determination of the Authority in the matter of Application of "Kulachi Solar Power (Private) Limited (KSPPL)" for the Grant of Generation Licence along with Generation Licence No. SPGL/29/2019 annexed to this determination granted by the National Electric Power Regulatory Authority (NEPRA) to Kulachi Solar Power (Private) Limited (KSPPL) for its 50.00 MW Solar Power Plant located at Village Badshahabad, Mouza Luni, Tehsil Kulachi, District D.I Khan, in the Province of Khyber Pakhtunkhwa, pursuant to Section 14B of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997/Amendment Act, 2018.

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

Enclosure: As Above



(Iftikhar Ali Khan)

Copy to:

1. Secretary, Power Division, Ministry of Energy, A-Block, Pak Secretariat, Islamabad.
2. Managing Director, NTDC, 414-WAPDA House, Lahore.
3. Chief Executive Officer, CPPA-G, ENERCON Building, Sector G-5/2, Islamabad.
4. Chief Executive Officer, Peshawar Electric Supply Company Limited, PESCO House, Shami Road Peshawar.
5. Director General, Environment Protection Department, Government of KPK, 3rd Floor, Old Courts Building, Khyber Road, Peshawar.
6. Secretary, Energy and Power Department, Government of Khyber Pakhtunkhwa, 1st Floor, A-Block, Abdul-Wali Khan Multiplex, Civil Secretariat, Peshawar.

National Electric Power Regulatory Authority
(NEPRA)

Determination of the Authority
in the Matter of Application of Kulachi Solar Power (Private)
Limited for the Grant of Generation Licence

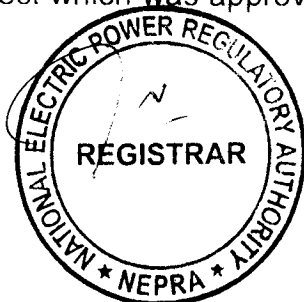
December 27, 2019
Case No. LAG-431

(A). Background

(i). In order to harness the potential of Renewable Energy (RE) resources in the country, the Government of Pakistan (GoP) formulated a policy titled "Policy for Development of Renewable Energy for Power Generation 2006" (the "RE Policy"). The said policy had been in field since 2006 under which both Federal Government and the Provincial Governments had been supporting the implementation of RE projects in the country.

(ii). In consideration of the above, the Federal and Provincial Governments had been issuing Letter of Intent (LoI) to various developers for setting up different type of RE projects across the country. In this regard, Energy Department/ Pakhtunkhwa Energy Development Organization (PEDO) of the province of Khyber Pakhtunkhwa (KPK) issued LoI to Target Energy (Private) Limited-TEPL/the Sponsor(s) for setting up a 50.00 MW_p solar based generation facility/Solar Power Plant/Solar Farm at tehsil Kulachi & district D.I. Khan in the province of KPK. In order to implement the project, the Sponsors got incorporated a Special Purpose Vehicle (SPV) in the name of Kulachi Solar Power (Private) Limited (KSPPL).

(iii). According to the terms and conditions of the LoI, the Sponsors were required to carry out and complete the feasibility study of the project at internationally acceptable standards. In consideration of the said, the Sponsors hired the service of different consultants and completed the feasibility study of the project which was approved by the Panel of Experts (PoE) appointed by PEDO.



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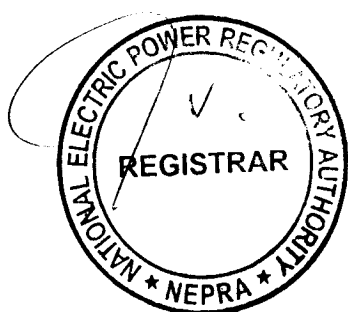
After the said, KSPPL decided to approach the Authority for the grant of generation licence.

(B). Filing of Application

(i). KSPPL submitted an application on July 10, 2018 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 and found the same compliant with the Licensing Regulations. 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. Accordingly, the Authority admitted the application on August 28, 2018 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 August 31, 2018.

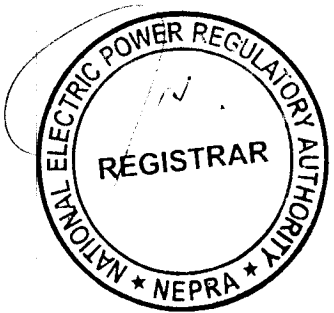
(iii). In addition to the above, the Authority also approved a list of stakeholders for seeking their comments for assistance of the Authority in the matter in terms of Regulation-9(2) of the Licensing Regulations. Accordingly, letters were sent to different stakeholders as per the approved list on September 03, 2018, soliciting their comments for assistance of the Authority.



(C). Comments of Stakeholders

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

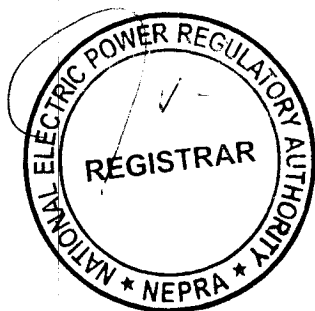
(a). CPPAGL submitted that in light of the provisions of the NEPRA Licensing (Generation) Rules, 2000 (the "Generation Rules"), the Authority/NEPRA is required to scrutinize all applications for the generation license, and if dissatisfied with the application, may refuse to issue a licence. In this regard, the specific reference is made to Rule 3(5) of the Rules which states that the Authority may refuse to issue a 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 that case the Authority shall indicate its preference for alternative sites, technology, design, fuel, tariff or other relevant matters to the applicant and shall, if so desired by the applicant, allow the applicant a reasonable opportunity to amend the application in accordance with the preferences indicated by the Authority. Further to the said, the Rule 3(5) of the Rules provides a non-exhaustive list of the "Least Cost Option Criteria-LCOC" including, *inter alia*, the (a). the costs and rights-of-way considerations related to the provision of transmission and interconnection facilities; (b). the constraints on the transmission system likely to result from the proposed generation facility and the costs of the



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transmission system expansion required to remove such constraints; (c). the short-term and the long-term forecasts for additional capacity requirements; (d). the tariffs resulting or likely to result from the construction or operation of the proposed generation facility; and (e). 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. In light of the above, due consideration should be given to the above mentioned factors prior to the issuance of Generation Licence. It is pertinent to mention that the Authority/NEPRA, in its State of the Industry Report, 2017 ("SIR 2017") has placed the power balance of the NTDC system for each year up to the year 2025. It is evident from the review of the SIR 2017 that the capacity addition in the system in each year, without rationalizing the same with the demand projections, is currently yielding a capacity surplus of 908 MW and this figure is projected to rise to approximately 13,934 MW by the year 2025, which carries a significant financial implications for the end consumer. The excess cost of investment, due to the surplus capacity mentioned in the SIR 2017, is estimated to rise to around U.S. \$ 22.00 Billion in the year 2025. As an entity entrusted with duty to regulate electric power sector of the country, it is obligatory on the part of the Authority to safeguard the interests of both the investors and consumers. Further, in performing its duties under relevant rules, the Authority is required to duly consider the LCOC prescribed thereunder. In light of the above, it is submitted that the Authority/NEPRA must review the proposal in the context of the demand vs. supply situation, coupled with the quantum of RE to be induced in the National Grid



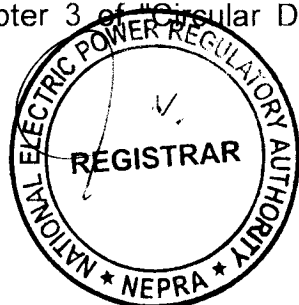
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according to the recommendations of the Grid Code Review Panel (GCRP). It is pertinent to mention that CPPAGL has received several requests for consent of the Power Acquisition Request (PAR) from several developers however, the same has not been acceded to as these requests stand untenable. Furthermore, as per its decision dated December 12, 2017 in case No.CCE-41/10/2017, the Cabinet Committee on Energy (CCoE), *inter alia*, decided, that "...all projects based on wind, solar, small hydel and bagasse energy will be awarded through competitive bidding..." after GCRP determines the quota of RE;

(b). MoST remarked that installation of 50.0 MW_p solar power project will help to prevent/overcome the electricity shortfall in the country up to some extent. Make and model of PV panels/modules are not mentioned in the notice. It is recommended that A-grade PV panels/modules having international certification i.e. IEC-61215, should be utilized in the project.

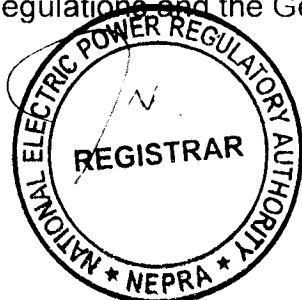
(ii). The Authority reviewed the above comments of the stakeholders and considered it appropriate to seek the perspective of KSPPL on the observations of CPPAGL and MoST. On the comments of CPPAGL, the company submitted that the proposed facility is located at a distance of 16-km from 132kV Kulachi Grid Station and PESCO has approved the proposed interconnection scheme through 2.50 km In/Out arrangement thus the cost related to the provision of transmission and interconnection facilities are minimal and already considered by PESCO. It is pertinent to mention that PESCO has already vetted and approved the Grid Interconnection Study (GIS) of the project for load flow, contingency, short circuit and stability analysis. About the short and long-term forecast for additional capacity requirements, it was explained that as per para 3.1 of Chapter 3 of "Circular Debt-Issues and Solutions" report submitted in



August 2018 to the Senate of Pakistan, the demand supply analysis conducted by the Ministry of Energy (MoE) shows that there will be shortfall of electricity till the end of FY2020. Further, Para 3.2 of the above referred report also indicates that for meeting the shortfall MoE plans to add 1,200 MW (600 MW for FY2018-19 and 600 MW for FY 2019-20) of Solar Power capacity. Therefore, it can be considered that there is a requirement and substantial room available in the system for addition of this 49.5 MW solar power project. About the observations of CPPAGL to hold competitive bidding, it was submitted that the Authority vide its determination/decision issued vide letter No. NEPRA/SPVPGT-2017/2915, dated March 03, 2017, approved and directed the relevant agencies to carry out competitive bidding for award of tariff to new solar PV power projects in the country under NEPRA Competitive Bidding (Approval and Procedure) Regulations, 2014 and directed the relevant agencies to prepare bidding documents and call bidding for the new solar PV power projects. Due to non-finalization of RFP by any agency after the lapse of considerable time period, the process of competitive bidding could not take place till date. Furthermore, the Authority through its decisions dated May 30, 2017 passed in the Review Motion of Govt. of Sindh and in the matter of Motion for Leave for Review tiled against Decision of the Authority dated March 03, 2017 in the matter of Solar PV Power Generation Tariff dated September 20, 2017, clarified that submission of tariff petitions under the NEPRA (Tariff Standards and Procedure) Rules, 1998 is permissible. Therefore, the decision of CCoE in this regard does not have valid grounds in light of previous decisions/determinations of the Authority.

(iii). On the comments of MoST, it was confirmed that the company through its EPC Contractor plans to procure/install solar panels from anyone from the top five (05) manufacturing companies currently available in the world like Jinko Solar (IEC-61215 certificate attached), Trina Solar or Sun Power Crop Panels and all the manufacturers are IEC-61215 Certified.

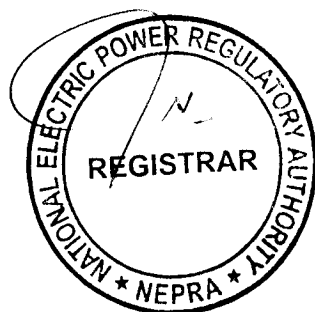
(iv). The Authority considered the above submissions of KSPPL and considered it appropriate to proceed further in the matter as stipulated in the Licensing Regulations and the Generation Rules.



(D). Evaluation/Findings

(i). The Authority has reviewed the submissions of KSPPL 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, interconnection & dispersal arrangement studies etc., provisions of the RE Policy and the relevant rules & regulations.

(ii). The Authority has observed that the Sponsors of the project includes four (04) different companies incorporated in South Africa and Pakistan including H1 Holdings (Pty) Limited ("H1HPL"), Atlantic Energy Partners ("AEP"), Target Energy (Private) Limited (TEPL) and Alternative Grid North Africa Limited ("AGNAL"). In this regard, H1HPL is main shareholder of the Project Company, headquartered in Cape Town, South Africa. It is an established investment company founded in the year 2000 with strong balance sheet which is highly liquid and is wholly owned and managed by experienced individuals. H1HPL provides expansion and buyout capital to companies in partnership with management. It is focused on the energy sector and is building significant operational and technical capacity in the energy sector. AEP provides full turnkey service provider of excellence in renewable energy sector as a respected Independent Power Producer ("IPP"). It has good track record of successfully developing projects. It has developed seven separate projects totaling 450MW of solar PV and 138MW of onshore wind in South Africa. Similarly, the principal business of TEPL is to invest in renewable energy projects in Pakistan and to provide key development and operational services to these projects. It has provided services to private and public sectors, dealing in complete range of machinery, equipment, materials & spares for cement and power industries. AGNAL was incorporated and headquartered in Dublin, Ireland. AGNAL is an international renewable energy developer with an experienced team developing RE and infrastructure projects in Africa and Asia.

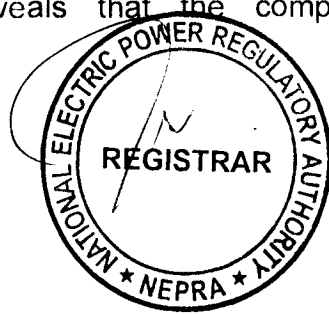


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(iii). Based on the financial strength and other evaluation parameters, PEDO issued Lol for development of the project. In this regard, the Sponsors have acquired a total of 309.00 acres of private land located at Village Badshahabad, Muza Luni, tehsil Kulachi, district D.I. Khan in the province of Khyber PakhtunKhwa. As explained above, for the implementation of the project, the sponsor has incorporated a SPV in the name of KSPPL under Section-16 of the Companies Act, 2017 (XIX of 2017) having Corporate Universal Identification No. 0111656, dated September 14, 2017. The Registered/Business Office address of the company/SPV is 7th Floor, Green Trust Towers, Jinnah Avenue, Blue Area, Islamabad. According to the Memorandum of Association, the principal object of the company includes the construction, building, erecting and operation of the proposed KSPPL generation facility. According to the submitted information, the total outlay of the project will be approximately U.S. \$ 48.75 million which will be financed through a combination of debt (U.S. \$ 36.562 million) and equity (U.S. \$ 12.187 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. It has been observed that KFW Germany has expressed its interest for financing the debt portion of the project. In consideration of the above, the Authority considers that the sponsors have strong financial and technical resources to carry out the project.

(iv). As explained above, the sponsors carried out a feasibility study of the project as stipulated in the term and conditions of the Lol. 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 Photo Voltaic (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.

(v). The Authority has reviewed the feasibility study of the project and same reveals that the company has considered various world class

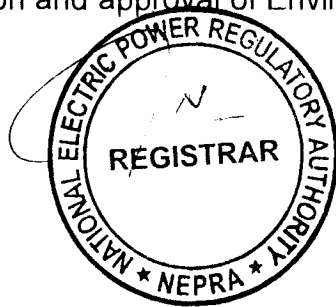


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manufacturers of PV cells including Jinko Solar, Trina Solar or Sun Power Crop Panels and all the manufacturers are IEC-61215 Certified. The feasibility study also optimized the size of the proposed generation facility/Solar Power Plant/Solar Farm to \approx 50.00 MW, having 151554 x 330 W_p Poly Crystalline PV Modules. 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 polycrystalline 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 including versatility, flexibility and good performance.

(vi). The Authority has observed that the sponsors of the project carried out the required GIS to determine the arrangement for dispersal of electric power from the proposed generation facility/Solar Power Plant/Solar Farm. According to the said study, the interconnection arrangement for dispersal of electric power will be on 132kV voltage and will be consisting of a Double Circuit (D/C) transmission line (on ACSR Rail conductor measuring around 16.00 km approximately) for connecting the generation facility/Solar Power Plant/Solar Farm to 132 kV Kulachi Grid Station of Peshawar Electric Supply Company Limited (PESCO). In this regard, PESCO has approved the above mentioned GIS, confirming that all the relevant parameters are within permissible limits of the Grid Code.

(vii). The Authority observes 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 operation of the 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 KSPPL 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

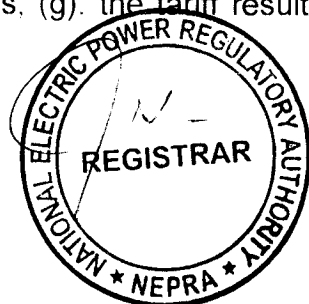


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Khyber Pakhtunkhwa (EPAGoKPK). In this regard, EPAGoKPK had already issued a No Objection Certificate (NOC) to the company for the construction of the project.

(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. The said rule stipulates various conditions pertaining to the grant of generation licence as 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 KSPPL 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 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.

(ix). 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.

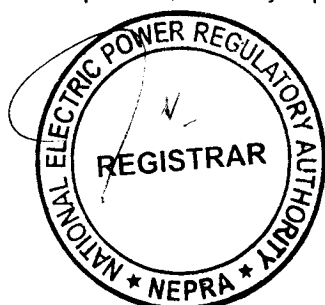
(x). The Authority considers that the proposed project will result in optimum utilization of the RE of the province of KPK which is untapped, resulting in pollution free electric power. It is pertinent to mention that solar is an indigenous RE resource and such resources should have a preference for 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.

(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 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 KSPPL 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.

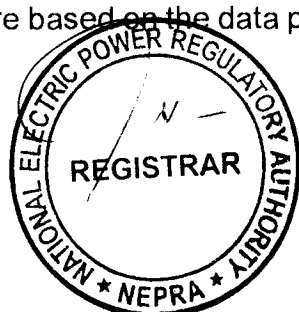
(ii). The existing energy mix of the country is heavily skewed towards thermal power plants, mainly operating on imported fossil fuel. The continuous



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 KSPPL which plans setting up a PV based solar generation facility/Solar Power Plant/Solar Farm at tehsil Kulachi in district D.I. Khan in the province of KPK of an approximate installed capacity of 50.00 MW. As explained in the preceding paragraphs the proposed project not only fulfils the eligibility criteria for grant of generation licence as envisaged in the existing regulatory regime but also majority of the stakeholders are in support of the project except CPPAGL which raised certain concerns which the Authority considers appropriate to address through this determination.

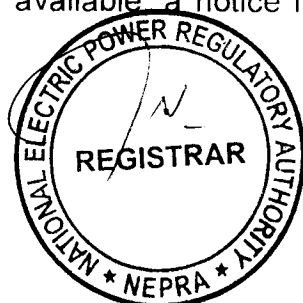
(iv). The concerns of CPPAGL includes (a). availability of surplus capacity as stated in SIR-2017; (b). compliance of eligibility criteria for the grant of Generation Licence; (c). impact of stranded cost due to surplus capacity; (d). GCRP has not determined the quota of the future RE projects; (e). in terms of the decision of CCoE dated December 12, 2017, the future RE projects are to be awarded through competitive bidding. In consideration of the said, the Authority has observed that CPPAGL has made specific reference to SIR-2017 to strengthen its argument of surplus capacity in the years 2018-25. In this regard, the Authority hereby clarifies that the specific provisions of SIR-2017 referred by CPPAGL are based on the data provided by NTDC whereby it has been indicated



that there may be some surplus installed capacity due to addition of various types of power generation facilities including coal, gas, wind, solar, bagasse, hydro and nuclear. However, it has been clearly mentioned in Section 1.1 of said report that "...the capacity surplus in the later years i.e.2022 to 2025 may not be available due to multiple issues, resulting in uncertainties in completion of large hydro-based power projects..." In this regard, the Authority hereby refers to the linked information contained in Table-31, Table-34 and Table-35 of the above mentioned report which when read together gives the capacity and the expected Commissioning Year of future projects pertaining to hydel projects in the Public Sector, hydel, coal and RLNG Projects being set in the Private Sector solar, wind and bagasse/biomass based generation facilities to be set up in the private sector.

(v). A detailed review of these projects reveals that projects like Dasu (Phase-I), Up-gradation of Mangla and Diamer Bhasha having accumulated installed capacity of 6970 MW, were expected to be commissioned by the year 2024. However, the same are delayed and may not achieve the said timelines due to the fact that a number of milestones pertaining to these projects including acquisition of land, preparation/approval of PC-I and award of contract(s) are facing delays for one reason or the other.

(vi). Similarly, projects of coal and hydel in the private sector namely (a). Kohala; (b). Chakothe-Hattian; (c). Azad Pattan; (d). Kaigah; (e). Mahi; (f). Turtonas-Uzghor; and (g). Athmuqam with accumulated installed capacity of 3810 MW, which earlier envisaged expected Commercial Operation Date (COD) by December 2024 and 2025, are facing delays in Financial Close, thus delay in construction and other related activities. In this regard, the Authority has duly considered the latest update available from PPIB which indicates that the above mentioned projects will not be coming online before December 2028. Further, Imported/Local Coal projects of (a). Grange; (b). Shanghai Electric; and (c). Oracle Thar of accumulated installed capacity of 2803 MW having expected COD between September 2019-2021 are also facing delays. According to the information available, a notice for encashment of Guarantee for the project of



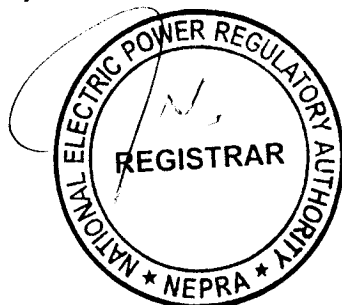
Grange has been issued which is under litigation. Further, the expected COD for projects of Shanghai and Oracle Thar will now be at least 2023.

(vii). Regarding Wind Power Projects (WPPs), the Authority has issued licences and tariff to a number of WPPs which were facing delays due to non-issuance of Letter of Support (LoS) including the projects of (a). Shaheen Renewable Energy 1 (Private) Limited; (b). Western Energy (Private) Limited; (c). Lakeside Energy (Private) Limited; (d). Artistic Wind Power (Private) Limited; (e). Trans Atlantic Energy (Private) Limited; (f). Tricom Wind Power (Private) Limited; (g). Din Energy Limited; (h). Act 2 Wind (Private) Limited; and (i). NASDA Green Energy (Private) Limited, having accumulated installed capacity of 449.3 MW. The said projects were earlier anticipated to be commissioned between 2019-2020, will now be coming online not before September 2021.

(viii). About the various projects pertaining to solar, similar kind of situation is prevailing as the power projects mentioned in the Table-35 of SIR-2017 of (a). Access Solar (Pvt.) Limited; (b). Buksh Solar (Pvt.) Limited; (c). Jan Solar (Pvt.) Limited; (d). Lalpir Solar Power (Pvt.) Limited; (e). Siddiqsons Energy Limited; and (f). Zurlu Energy (Pvt.) Limited of accumulated installed capacity of 191.52 MW have been delayed for same reasons as mentioned in the case of wind power projects.

(ix). With regard to the bagasse based project, the Authority granted generation licences and tariff to different projects including: (a). Hunza Power (Pvt.) Limited; (b). Indus Energy Limited; (c). Faran Power (Pvt.) Limited; (d). Etihad Power Generation Limited; and (e). Bahawalpur Energy (Pvt.) Limited with accumulated installed capacity of 212.90 MW, however, the said projects have shown no progress as Energy Purchase Agreements have not been signed yet due to which these projects are facing delays and their expected COD will now be postponed for at least two (02) years instead of what is given in the SIR 2017.

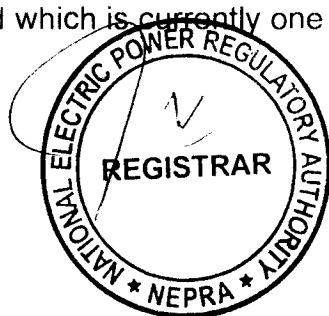
(x). In view of the above explanation, it is clear that around thirty (30) power projects on different fuels with cumulative installed capacity of around



11000 MW are facing delays due to different problems/issues as explained above and their COD is not certain. In view of the said, the Authority considers that instead of making cursory remarks based on the above mentioned report which provides only snapshot of the power sector, CPPAGL and NTDC should carry out a proper demand-supply assessment/analysis truly aligned with the actual implementation schedule of the projects to determine whether practically there is any surplus or not. The Authority is also of the considered opinion that with the delays being experienced by the major projects it is very unlikely that there will be any surplus as being feared by CPPAGL.

(xi). About the comments of CPPAGL of compliance of eligibility criteria for the grant of Generation Licence, the Authority takes a very serious view of the said comments. In this regard, the Authority hereby like to clarify that said comments have been made in total illusion of the previous determinations made in similar cases whereby the Authority had given its proper analysis to justify the grant of generation licenses previously granted. If CPPAGL had reviewed those determinations, it would not have given such irrelevant comments. In this regard, the Authority takes a lenient view of the situation this time and ignore the same which actually may attract panel action for challenging the Quasi-judicial proceedings.

(xii). Regarding the observations of CPPAGL of stranded cost due to surplus capacity, the Authority has serious concerns on this that there may be any surplus in the system as explained in the preceding paragraphs. In this regard, the Authority is of the considered opinion that CPPAGL in consultation with the XW-DISCOs must make concrete efforts and take necessary steps to stimulate the demand of the end consumers/users including industrial, commercial and domestic consumers, etc. In this regard, the Authority will like to highlight that reportedly about 0.50 million connections are pending and are not being provided electricity for one context or the other. The Authority reiterates that instead of propagating about surplus capacity, efforts must be expedited to clear the pendency of new connections so that the electric density of the country is improved which is currently one of the lowest in the region.

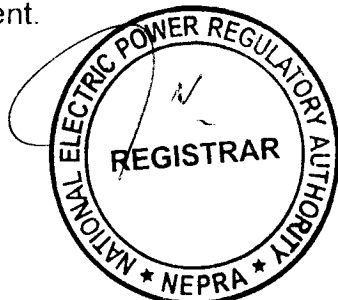


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(xiii). About, the observations of CPPAGL that GCRP has not determined the quota of the future RE projects, the Authority will like to highlight that GoP is contemplating an aggressive plan to increase the share of RE in the energy mix of the country to 20% by 2025 and to 30% upto 2030 from the current level of less than 5%. Therefore, instead of taking the position that GCRP has not determined the quota of RE therefore, the grant of generation Licence may not considered instead 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 portion 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. About the observations of CPPAGL of future RE Projects to be inducted through Competitive Bidding as per decision of CCoE dated December 12, 2017, the Authority hereby clarifies that it considers competitive bidding the most prudent way to add more capacity however, in this regard necessary framework for carrying out the bidding must be in place which is currently not there. In view of the said the Authority considers its regulatory obligation to continue entertaining applications for the grant of licences as stipulated in the applicable laws.

(xiv). Regarding the binding of decision of the CCoE or otherwise, the Authority in its previous determinations for determining the tariff for the wind projects has given its determination and reiterates the same. About the observations of CPPAGL of not entertaining the PAR for different projects including this one, the Authority hereby clarifies that the same is not a requirement for the grant of generation licence.

(xv). In view of the above, the Authority considers that the proposed project of KSPPL will help in diversifying the energy portfolio as well increasing share of RE in 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.

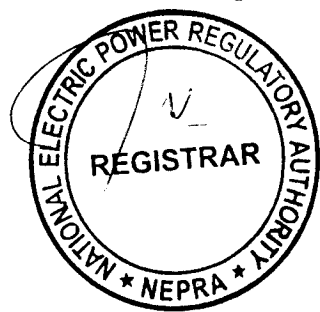


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(xvi). As explained in the preceding paragraphs, KSPPL has provided the details of location, technology, size, net capacity/energy yield, interconnection arrangements, technical details and other related information for the proposed generation facility/Solar Power Plant/Solar Farm. In this regard, the Authority has observed that Sponsors/KSPPL has acquired private land to the tune 309.00 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 KSPPL 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.

(xvii). 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 KSPPL, its generation facility/Solar Power Plant/Solar Farm will achieve COD by June 30, 2020 and will have a useful life of more than twenty five (25) years from its COD. In this regard, KSPPL 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 KSPPL 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.

(xviii). 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 this regard, it is pertinent to mention that KSPPL has filed a tariff petition for determination of its tariff on cost plus basis. The Authority has admitted the same and is expected to be decided in due course of time. Further, to the said, CCoE through its decision dated April 04, 2019 has decided that projects of RE at the stage of Lol will be going through Competitive Bidding (CB).



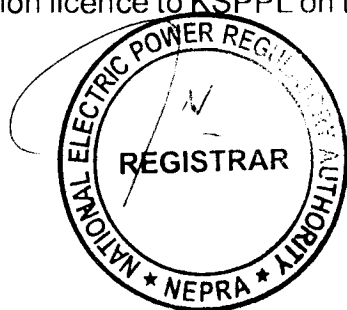
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In view of the said, it is still not clear whether KSPPL will be having a cost plus tariff or a tariff through CB. In view of the said, the Authority considers appropriate to direct KSPPL to charge the power purchaser only such tariff which has been determined, approved or specified by it. In view of the said, the Authority decides to include a specific article in the generation licence. Further, the Authority directs KSPPL to adhere to the said in letter and spirit without any exception.

(xix). About the compliance with the environmental standards, as discussed in the preceding paragraphs, KSPPL has provided the NOC from EPAGoKPK 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 KSPPL to comply with relevant environmental standards at all times. Further, the Authority directs KSPPL 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.

(xx). The proposed generation facility/Solar Power Plant/Solar Farm of KSPPL 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. KSPPL has informed that the project will achieve COD by June 30, 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 KSPPL to initiate the process in this regard at the earliest so that proceeds for the carbon credits are materialized. KSPPL shall be required to share the proceeds of the carbon credits with the power purchaser as stipulated in the generation licence.

(xxi). In view of the above, the Authority hereby approves the grant of generation licence to KSPPL on the terms and conditions set out in the generation



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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)

Rafique
17/12/19

Engr. Rehmatullah Baloch
(Member)

Did Not Attend

Saif Ullah Chattha
(Member)

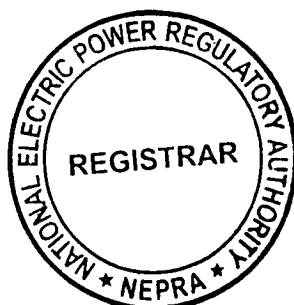
Saif Ullah
19.12.2019

Engr. Bahadur Shah
(Member/Vice Chairman)

Bahadur Shah

Engr. Tauseef H. Farooqi
(Chairman)

Tauseef H. Farooqi



Tauseef H. Farooqi
27/12/19

**National Electric Power Regulatory Authority
(NEPRA)
Islamabad – Pakistan**

GENERATION LICENCE

No. SPGL/29/2019

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:

KULACHI SOLAR POWER (PRIVATE) LIMITED

Incorporated Under Section-16
of the Companies Act 2017 (XIX of 2017) Having Corporate Universal
Identification No. 0111656, dated September 14, 2017

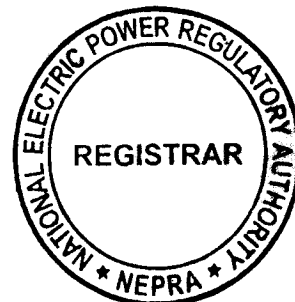
**for its Generation Facility/Solar Farm/Solar Power Plant
Located at at Village Badshahabad, Mouza Luni, Tehsil Kulachi
District D.I. Khan in the Province of Khyber Pakhtunkhwa**

(Total Installed Capacity: ~50.00 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 27th day of December Two
Thousand & Nineteen and expires on 29th day of June Two
Thousand & Forty-Five.


Registrar

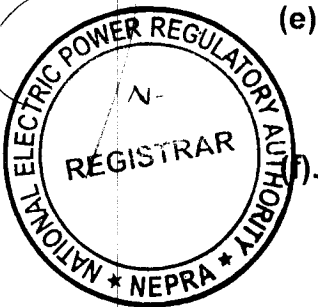




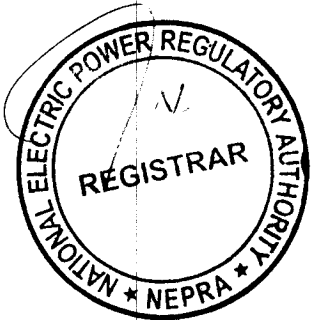
Article-1 **Definitions**

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, 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;
- (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 photovoltaic cells is collected for supplying to the Power Purchaser;



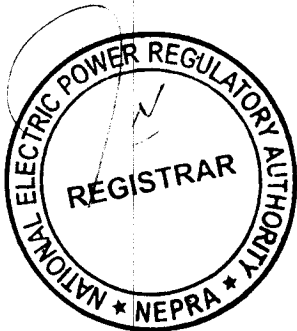
- (g). "Carbon Credits" mean the amount of Carbon Dioxide (CO₂) and other greenhouse gases not produced as a result of generation of electric energy by the generation facility/Solar Power Plant/Solar Farm and other environmental air quality credits and related emissions reduction credits or benefits (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;
- (l). "Distribution Code" means the distribution code prepared by the concerned XW-DISCO and approved by the Authority, as may be revised from time to time with necessary approval of the Authority;
- (m). "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;



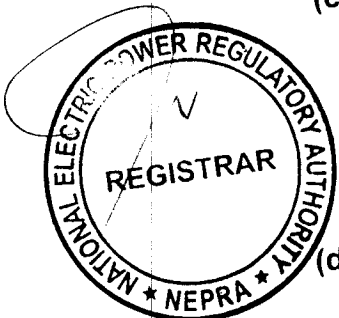
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- (n). "Generation Rules" mean the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000 as amended or replaced from time to time;
- (o). "Grid Code" means the grid code prepared and revised from time to time by NTDC with necessary approval of the Authority;
- (p). "GoKPK" means the Government of the province of Khyber PakhtunKhwa acting through the PEDO 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;
- (t). "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;
- (u). "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 Kulachi Solar Power (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). "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;
- (y). "NTDC" means National Transmission and Despatch Company Limited or its successors or permitted assigns;
- (z). "PEDO" means Pakhtunkhwa Energy Development Organization or any other entity created for the like purpose established by the GoKPK to facilitate, promote and encourage development of private sector participation for development of projects for electric power in the province of Khyber PakhtunKhwa/KPK;
- (aa). "PESCO" means Peshawar Electric Supply Company Limited or its successors or permitted assigns;
- (bb). "Policy" means the Policy for Development of Renewable Energy for Power Generation, 2006 of GoP as amended or replaced from time to time;
- (cc). "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;
- (dd). "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;



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

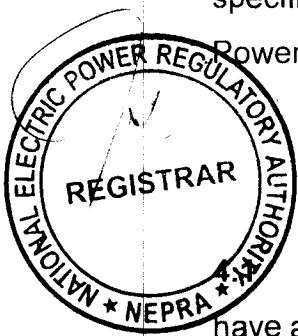
Article-3 **Generation Facilities**

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

Article-4 **Term of Licence**

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.



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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.

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**

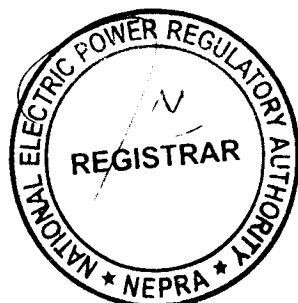
The Licensee shall charge only such tariff from the Power Purchaser which has been determined, approved or specified by the Authority.

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.

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.



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.

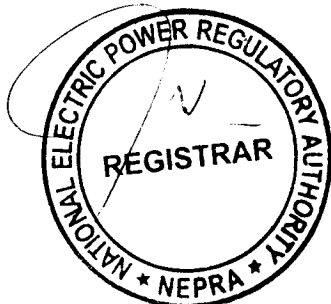
Article-10 **Compliance with Environmental & Safety Standards**

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.

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.

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 shall share the said proceeds with the Power Purchaser as per the Policy.

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.



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Article-16
Power Curve

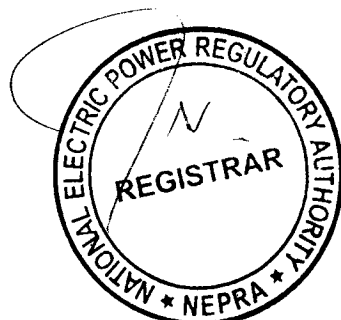
The power curve for the individual photovoltaic cell provided by the manufacturer and as mentioned in Schedule-I of this generation licence, shall form the basis in determining the cumulative power curve of the generation facility/Solar Power Plant/Solar Farm.

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.

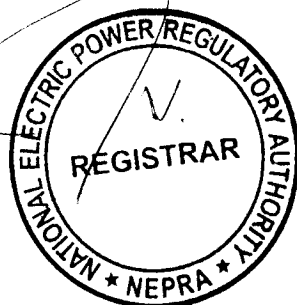
Article-18
Corporate Social Responsibility

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

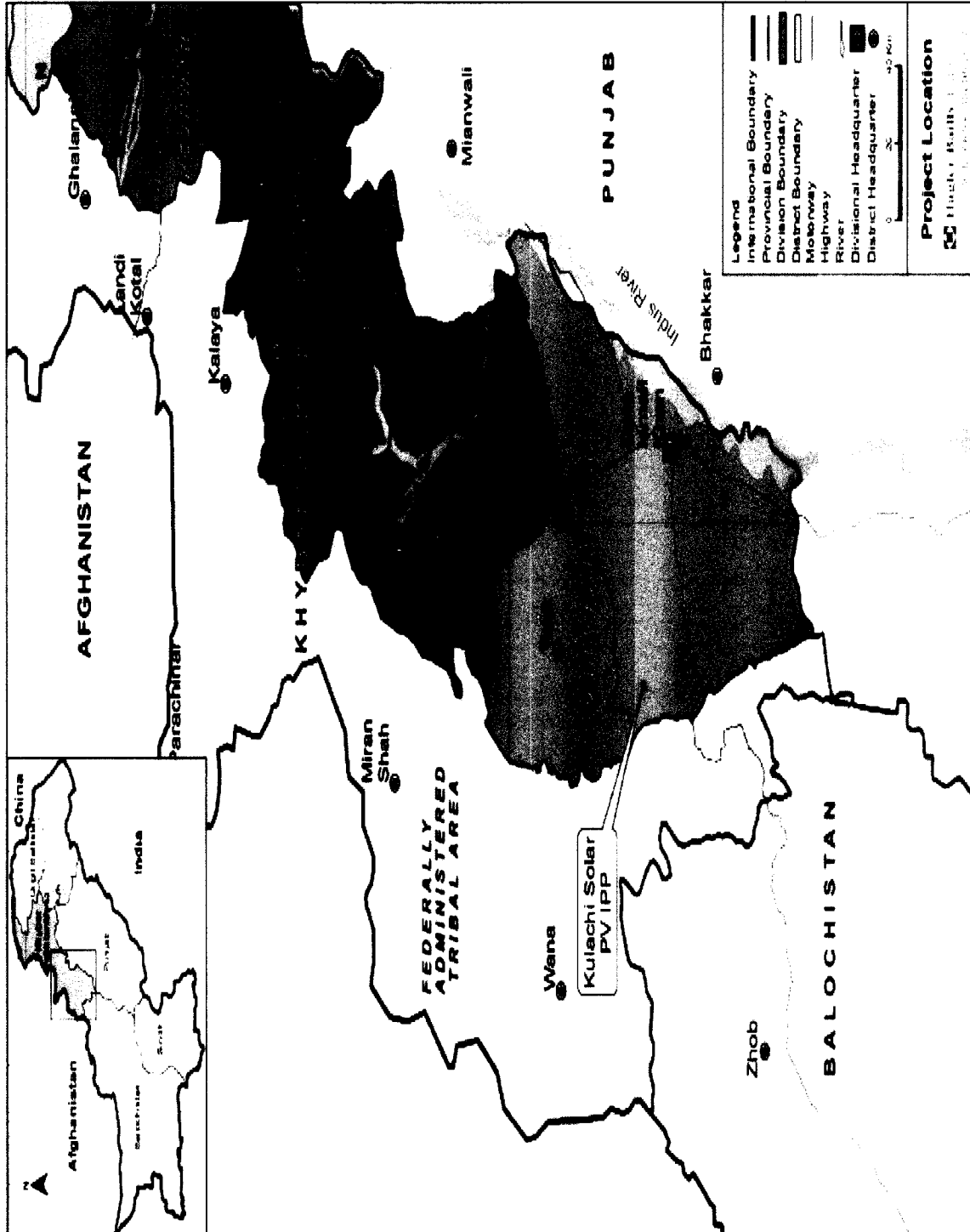


SCHEDULE-I

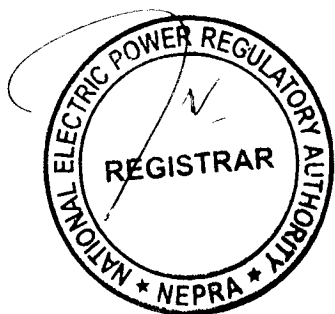
The Location, Size (i.e. Capacity in MW), Type of Technology, Interconnection Arrangements, Technical Limits, Technical/Functional Specifications and other details specific to the Generation Facilities of the Licensee are described in this Schedule.



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



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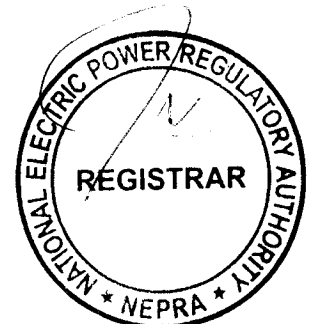
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**Location of the
 Generation Facility/Solar Power Plant/Solar Farm
 of the Licensee**



Project Land Coordinates

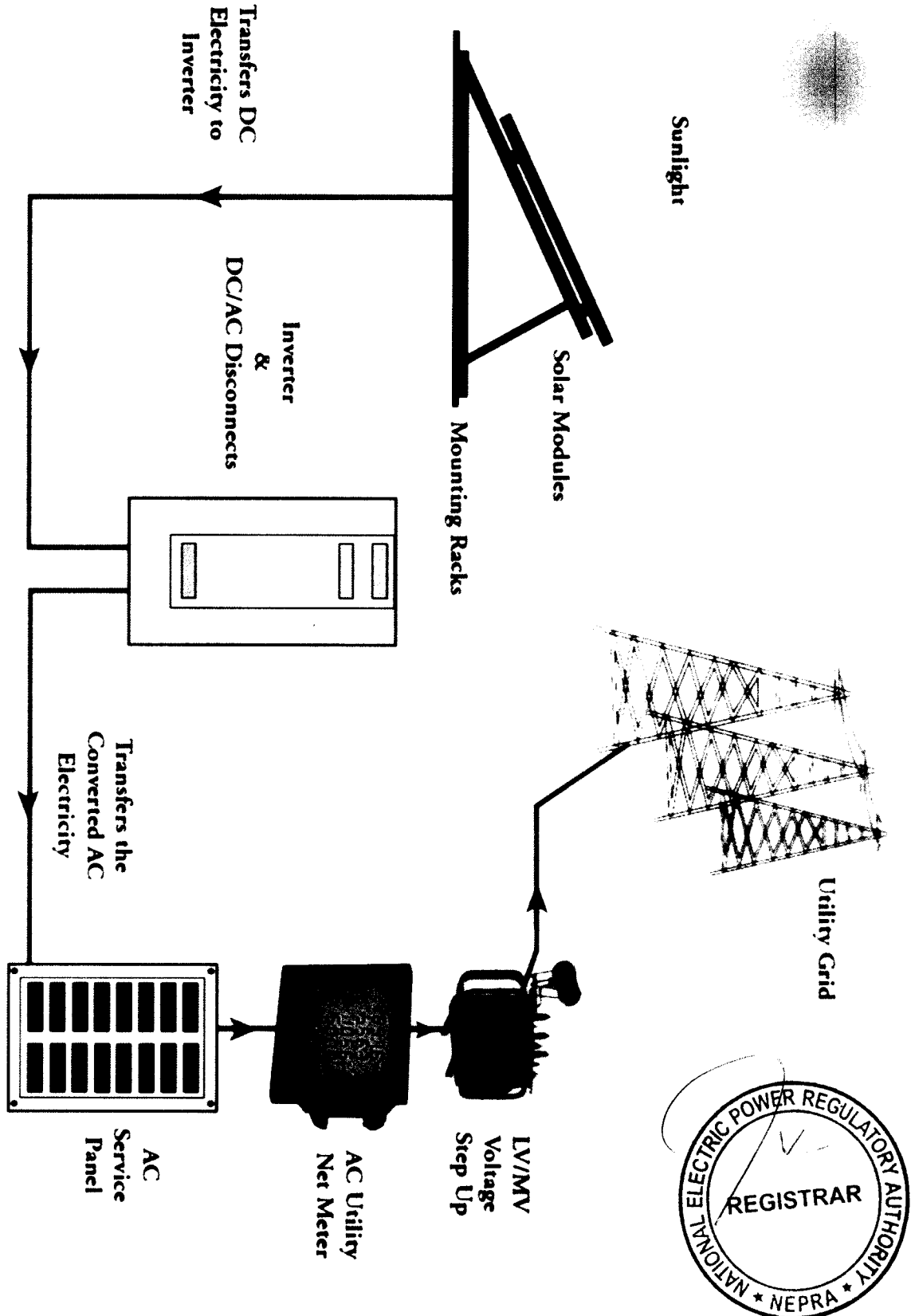
Corners	Easting	Northing
A	622151.353	3536611.192
B	622151.558	3535428.013
C	620968.558	3535428.013
D	620968.558	3536611.013



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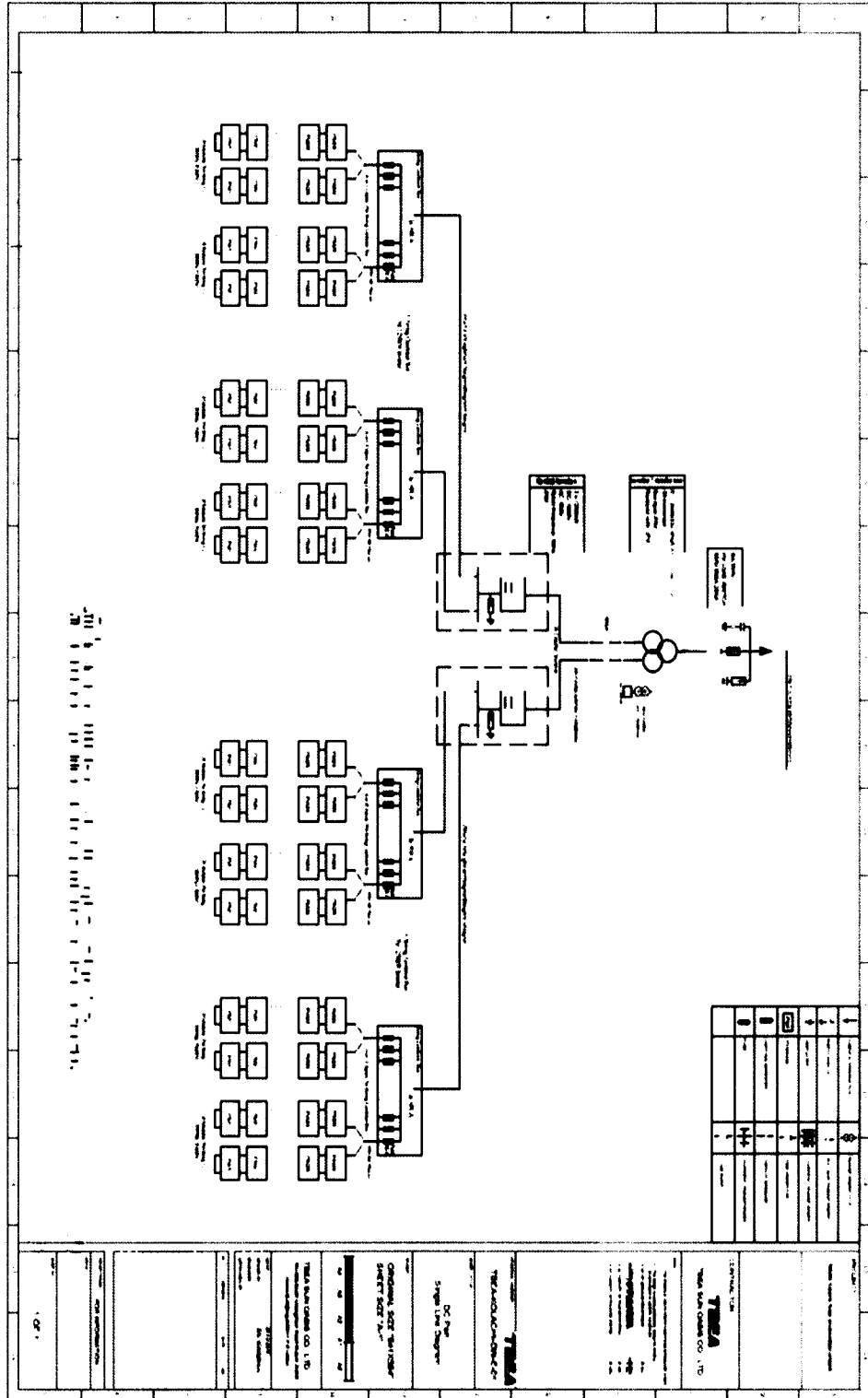
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Process Flow Diagram
of the Generation Facility/Solar Power Plant/Solar Farm
of the Licensee

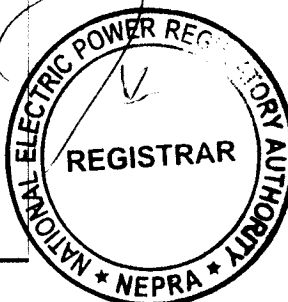


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Single Line Diagram of the Generation Facility/Solar Power Plant/Solar Farm of the Licensee



KULACHI SOLAR POWER PLANT
 BADSHAHABAD, LUNI, D.I. KHAN
 PROJECT NO: KSP/2011/151
 SHEET NO: SP/01



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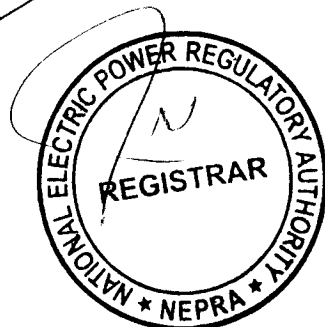
**Interconnection Arrangement for
Dispersal of Electric Energy/Power from the Generation
Facility/ Solar Power Plant/Solar Farm**

The electric power generated from the generation facility/Solar Power Plant/Solar Farm of the Licensee/ Kulachi Solar Power (Private) Limited/KSPPL shall be dispersed to the load centre of PESCO.

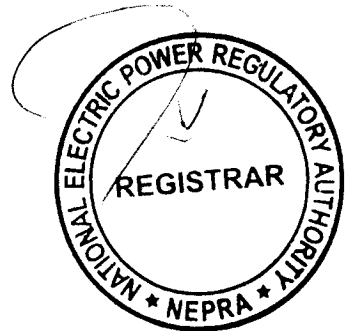
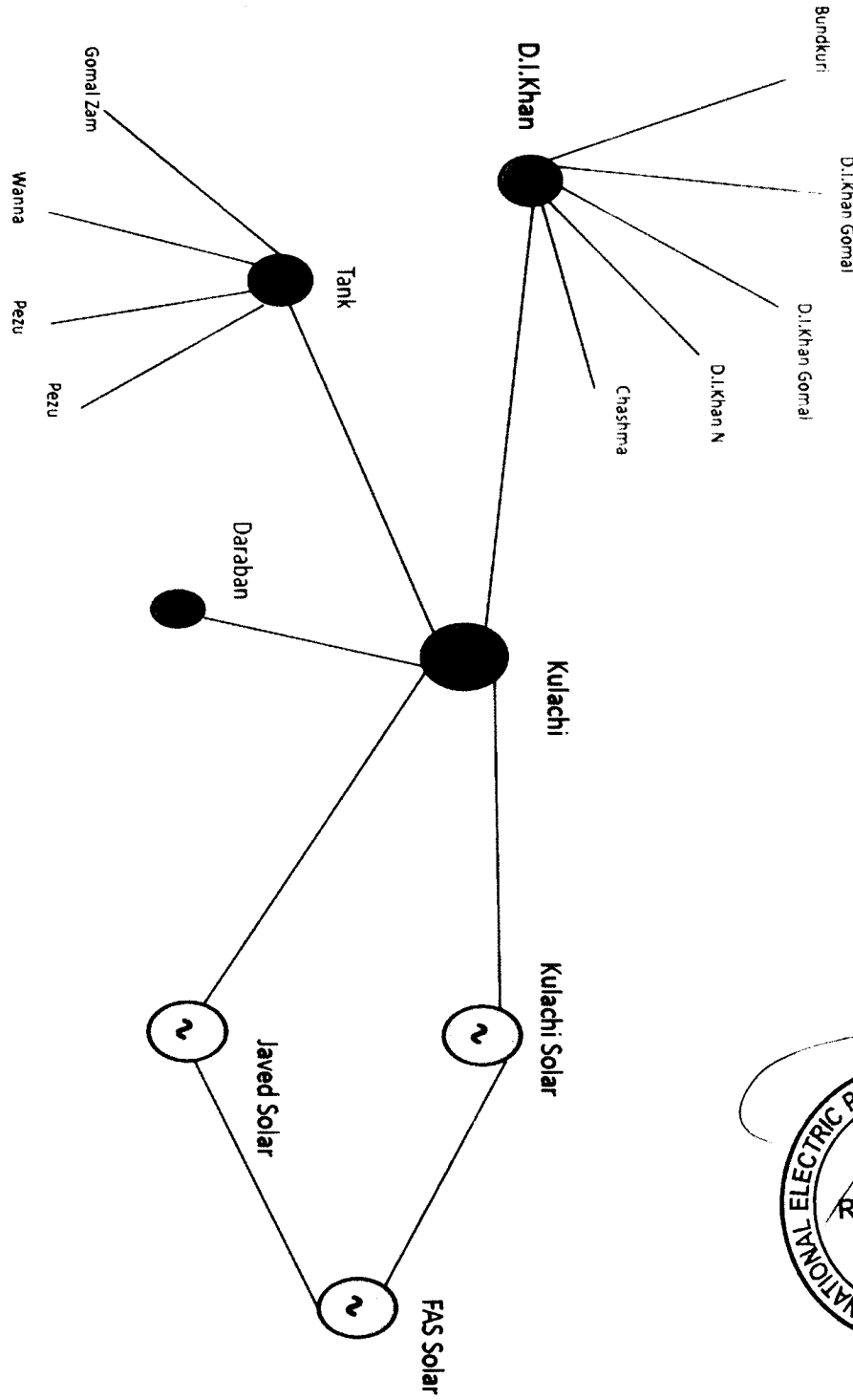
(2). The proposed Interconnection Arrangements/Transmission Facilities for dispersal of power from generation facility/Solar Power Plant/Solar Farm of the Licensee/KSPPL will consist of the following: -

(a). A 132 kV D/C transmission line (measuring approx. 16.00 km long on ACSR Rail Conductor) connecting the proposed generation facility/Solar Power Plant/Solar Farm with 132 KV Kulachi Grid Station of PESCO;

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



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

(A). General Information

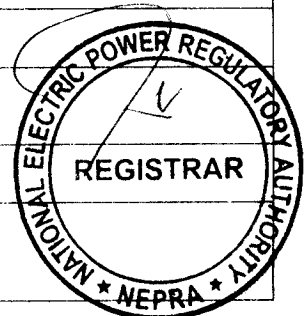
(i).	Name of the Company/ Licensee	Kulachi Solar Power (Private) Limited
(ii).	Registered/Business Office of the Company	7 th Floor, Green Trust Towers, Jinnah Avenue, Blue Area, Islamabad – Pakistan
(iii).	Location of the Generation Facility/Solar Power Plant/Solar Farm	Village Badshahabad, Mouza Luni, Tehsil Kulachi, District D.I. Khan in the Province of Khyber PakhtunKhwa
(iv).	Type of Generation Facility Solar Power Plant/Solar Farm	Solar Photovoltaic (PV)

(B). Solar Power Generation Technology & Capacity

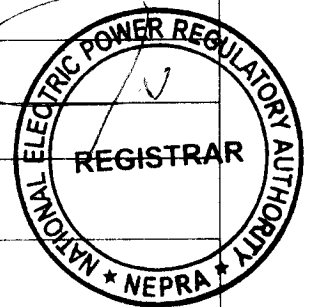
(i).	Type of Technology	Poly Crystalline PV Cell
(ii).	System Type	Grid Connected
(iii).	Installed Capacity of Solar (MW)	≈50.00 MW _P

(C). Technical Details of Equipment

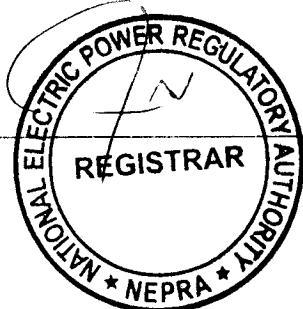
(a).	<u>Solar Panels – PV Modules</u>	
(i).	Type of Module	330W _P
(ii).	Type of Cell	Poly-Crystalline
(iii).	Dimension of each Module	1956 mmx992mm
(iv).	No. of Panels /Modules	151554
(v).	Module Area	1.94 m ²
(vi).	Frame of Panel	Anodised Aluminium Alloy
(vii).	Weight of one Module	26.5kg
(viii).	No of Solar Cells in each module	72 Cells
(ix).	Efficiency of module	17.01%
(x).	Maximum Power (P _{max})	330W _P



(xi).	Voltage @ P_{max}	37.8V	
(xii).	Current @ P_{max}	8.74A	
(xiii).	Open circuit voltage (V_{oc})	46.9V	
(xiv).	Short circuit current (I_{sc})	9.14A	
(xv).	Maximum system open Circuit Voltage	1500V	
(b).	<u>PV Array</u>		
(i).	Nos. of Strings	5226	
(ii).	Modules in a string	29	
(c).	<u>Inverters</u>		
(i).	Capacity of each unit	2.5MW	
(ii).	Manufacturer	TBEA	
(iii).	Input Operating Voltage Range	900 V_{dc} -1250 V_{dc}	
(iv).	Number of Inverters	16	
(v).	Efficiency of inverter	European 98.7%	
(vi).	Max. Allowable Input voltage	1500V	
(vii).	Max. Current	2×1432A	
(viii).	Max. Power Point Tracking Range	900~1250V	
(ix).	Output electrical system	AC , Three-phase	
(x).	Rated Output Voltage	630V _{ac}	
(xi).	Power Factor (adjustable)	0.9(leading)~0.9(lagging)	
(xii).	Power control	-	
(xiii).	Rated Frequency	50Hz	
(xiv).	Environmental Enclosures	Relative Humidity	5-95%
		Audible Noise	45 db
		Operating Elevation	Below 3000 m
		Operating temperature	-25 C to +60C
(xv).	Grid Operating protection	(a). Over/under-voltage Protection	



		(b).	Over/under-frequency Protection
		(c).	ZVRT
		(d).	Anti-islanding Protection
		(e).	Over-current Protection
		(f).	Anti-discharge Protection
		(g).	Overload Protection
(d).	<u>Junction Boxes Installed and fixed on main steel structure in Array yard.</u>		
(i).	Number of J/Box units	166	
(ii).	Input circuits in each box	16	
(iii).	Max. input current for each circuit	18	
(iv).	Protection Level	IP65	
(v).	Over current protection	Yes	
(vi).	Surge protection	Yes	
(e).	<u>Data Collecting System</u>		
(i).	Weather Data	(a).	Global horizontal irradiation pyranometer
		(b).	Tracking irradiation pyranometer
		(c).	Ambient Air Temperature Sensor
		(d).	PV Panel Temperature Sensor
		(e).	Anemometer
		(f).	Relative Humidity
		(g).	Rain Gauge
(ii).	System Data	(a).	DC input voltage(V) & current (A) of each Inverter (Phase, Line)
		(b).	Total DC power (kW) generated by PV array.
		(c).	AC output voltage (V) and current (A) of each Inverter (Phase, Total)



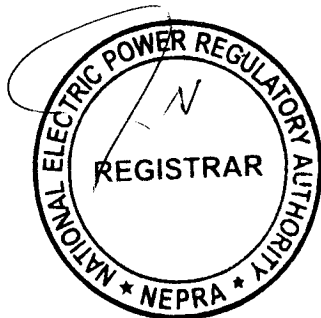
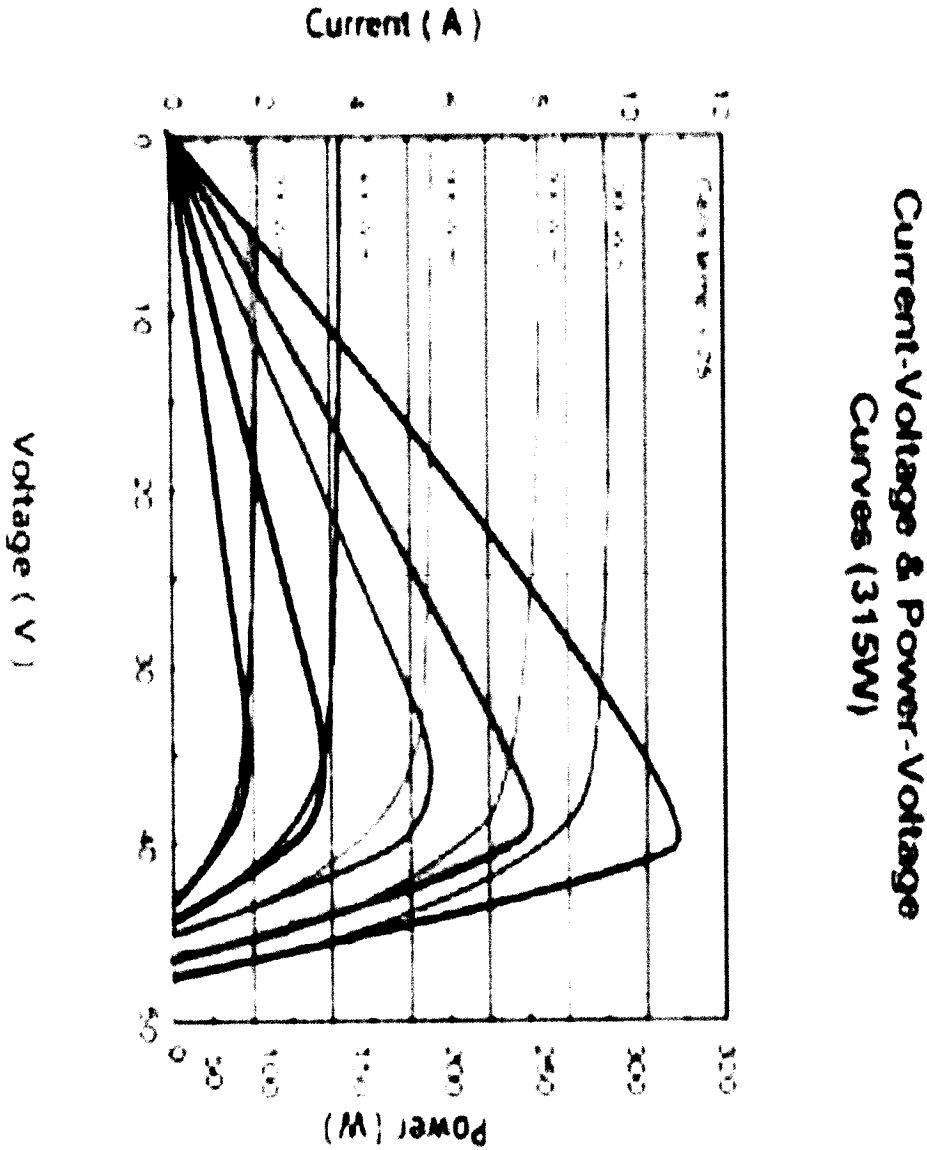
		(d).	AC output power (kW) and energy (kWh) of each Inverter
		(e).	Frequency (Hz)
		(f).	Power Factor (PF)
(f).	<u>Power Transformer</u>		
(i).	Rating	50MVA	
(ii).	Type of transformer	oil-immersed	
(iii).	Purpose of transformer	Step-up	
(iv).	Output Voltage	132kV	
(g).	<u>Unit Transformer</u>		
(i).	Rating	2.5MVA	
(ii).	Type of transformer	oil-immersed	
(iii).	Purpose of transformer	Step-up	
(iv).	Output Voltage	33kV	

(D). Other Details

(i).	COD of the Generation Facility/Solar Power Plant/Solar Farm (Anticipated)	June 30, 2020
(ii).	Expected Useful Life of the Generation Facility/ Solar Power Plant/Solar Farm from the COD	25 Years



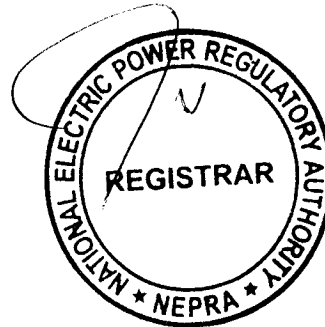
**V-I Curve of PV Solar Cell of the
Generation Facility/Solar Power Plant/
Solar Farm**



120

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.



SCHEDULE-II

(1).	Total PV Installed Capacity of Generation Facility	50.00 MW _P
(2).	Average Sun Hour Availability/Day (Irradiation on Inclined Surface)	8 Hours
(3).	Days per Year	365
(4).	PV Plant Generating Capacity Annually (As Per Simulation)	85,117 MWh
(5).	Expected Total Generation in 25 years Life Span	2,127,925 MWh
(6).	Generation per Year from plant keeping 24 Hours Working	$50 \times 24 \times 365 = 438,000$ MWh
(7).	Net Capacity Factor (4/6)	19.43%

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).

