



# National Electric Power Regulatory Authority

## Islamic Republic of Pakistan

**Registrar**

NEPRA Tower, Ataturk 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

No. NEPRA/R/DL/LAG-284/6265-70

April 22, 2015

Mr. Zaheer Ahmed  
Project Director  
Ramzan Energy Limited  
55-K Model Town,  
Lahore

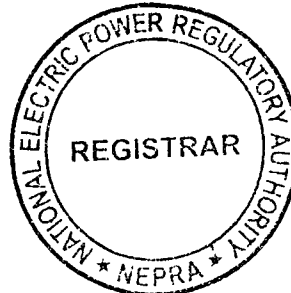
Subject: **Generation Licence No. SGC/110/2015**  
**Licence Application No. LAG-284**  
**Ramzan Energy Limited**

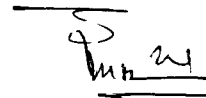
Reference: *Your letter No. nil, dated nil (received on December 03, 2014)*

Enclosed please find herewith Determination of the Authority in the matter of Generation Licence Application of Ramzan Energy Limited (REL) along with Generation Licence No. SGC/110/2015 annexed to this determination granted by the National Electric Power Regulatory Authority to REL for its 1.52 MW<sub>p</sub> Solar Power Plant located at 26 KM, Jhang-Chiniot Road, District Chiniot, Punjab, pursuant to Section 15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act (XL of 1997).

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

Enclosure: **Generation Licence**  
**(SGC/110/2015)**



  
22.04.15  
(Syed Safer Hussain)

Copy to:

1. Chief Executive Officer, Alternative Energy Development Board, 2<sup>nd</sup> Floor, OPF Building, G-5/2, Islamabad
2. Chief Executive Officer, NTDC, 414-WAPDA House, Lahore
3. Chief Operating Officer, CPPA, 107-WAPDA House, Lahore
4. Chief Executive Officer, Faisalabad Electric Supply Company, Canal Bank Road, Abdullahpur, Faisalabad
5. Director General, Environmental Protection Department, National Hockey Stadium, Ferozepur Road, Lahore

**National Electric Power Regulatory Authority**  
**(NEPRA)**

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

**April 21, 2015**  
**Case No. LAG-284**

**(A). Background**

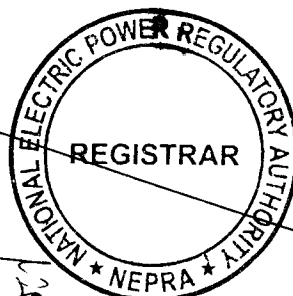
(i). The Electric Power Sector of the country is experiencing a Demand-Supply gap. In view of the said, the utilities are finding it difficult to meet with the demand of their consumers.

(ii). In consideration of the above, the consumers and customers are contemplating to evolve new, different and unconventional methods to meet with their electricity needs/requirements. In this regard, there is a growing trend to tap the available Renewable Energy (RE) resources for electric power generation and consumption. In this regard, Sharif Group decided to set up a Special Purpose Vehicle in the name of Ramzan Energy Limited (REL).

(iii). REL is planning to set up a solar (Photovoltaic-PV Cell) based Generation Facility/Power Plant in District Chiniot, in the Province of Punjab for supplying electric power to associated group companies.

**(B). Filing of Generation Licence Application**

(i). In accordance with Section-15 of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 ("the NEPRA Act"), REL filed an application on December 03, 2014, requesting for the grant of Generation Licence.



(ii). The Registrar examined the submitted application and found the same non-compliant with the NEPRA Licensing (Application and Modification Procedure) Regulations, 1999 ("the Regulations"). In view of the above, Registrar directed REL for submitting the missing information/documentation for complying with the requirement of the Regulations. REL completed the submission of required information/documentation on December 15, 2014. Accordingly, the Authority admitted the application under Regulation-7 of the Regulations on January 13, 2015 for consideration of grant of a Generation Licence. The Authority approved the Notice of Admission (NoA) to be published in daily newspapers, informing and seeking comments of the general public as stipulated in Regulation-8 of the Regulations. Further, the Authority also approved the list of interested/affected parties for inviting comments for assisting the Authority in the matter as stipulated in Regulation-9 (2) of the Regulations. Accordingly, the NoA was published in one Urdu and one English National Newspaper on January 16, 2015, directing the general public for submitting comments.

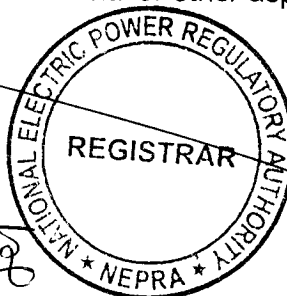
(iii). Apart from the above, separate letters were also sent to various Ministries of the Government, their attached Departments, Representative Organizations and Individual Experts etc. on January 16, 2015, for submitting their views/comments.

### **(C). Comments of Stakeholders**

(i). In reply to the above, the Authority received comments from three (03) stakeholders. These included Pakistan Council of Renewable Energy Technologies (PCoRET), Faisalabad Electric Supply Company Limited (FESCO) and Ministry of Water & Power (MoW&P).

(ii). The salient points of the comments offered by the above stakeholder are summarized in the subsequent paragraphs as following: -

(a). PCoRET expressed its no objection if REL is granted a Generation Licence. Further, PCoRET stated that it cannot comment on the financial or other aspects of the Project;



(b). FESCO commented that its has no objection to the grant of Generation Licence to REL; and

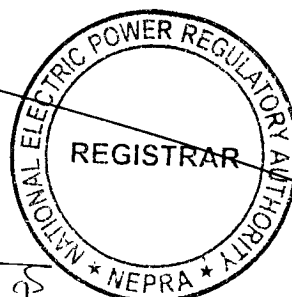
(c). MoW&P remarked that the Authority may process the application of REL for the grant of Generation Licence as per provision of NEPRA Act, relevant rules and regulation.

(iii). The Authority examined the above comments of the stakeholders and generally found the same in favor of the request of REL for the grant of Generation Licence. In view of the said, the Authority considered it appropriate to process the application of REL as stipulated in the Regulations and NEPRA Licensing (Generation) Rules, 2000 ("the Rules").

#### **(D). Grant of Generation Licence**

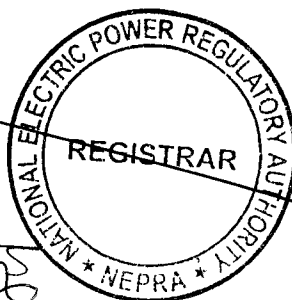
(i). Energy is fundamental input to the economic activities and thus to human welfare and progress. The importance of electricity in the development of the economy of any country is beyond any doubt. The Economic Growth of any country is directly linked with the availability of safe, secure, reliable and affordable supply of electricity.

(ii). In view of the said reasons, the Authority is of the considered opinion that for sustainable development, all indigenous power generation resources including Coal, Hydel, Wind, Solar and other RE resources must be developed on priority basis in the public and private sector. The Authority considers that at present there is considerable Supply-Demand gap due to which Distribution Companies are unable to supply electric power to consumers/customers on a continuous basis. In view of the said, the Authority considers that the proposal of REL for setting up a Solar based Generation Facility for supplying to other companies is worth considering.



(iii). REL plans supplying to other group companies including Sharif Milk Products (Private) Limited (SMPPL), Sharif Dairy Farms (Private) Limited (SDFPL) and Ramzan Sugar Mills Limited (RSML). In this regard it is clarified that pursuant to provisions of Section-21 of the NEPRA Act, a Generation Company (like the instant case of REL) can make sale of electric power to Bulk Power Consumer(s)/BPC(s) within the Exclusive Service Territory of a Distribution Company. Whereas, BPC is a consumer which purchases or receives electric power at one premise in an amount of one (01) MW or more or in such other amount and voltage level and with such other characteristics as the Authority may determine. Further, the Authority may determine different amounts and voltage levels and with such other characteristics for BPC(s) for different areas. It is pertinent to mention that SMPPL, SDFPL and RSML have a connected load of less than 1.00 MW. However, the Authority in terms of the power conferred upon in Section 2(ii) of the NEPRA Act, considers SMPPL, SDFPL and RSML as BPCs of REL. Therefore, the Authority allows REL supplying to the said BPCs as stipulated in Section-21 of the NEPRA Act. In terms of Section 2(v) of the NEPRA Act, where the ownership, operation, management and control of distribution facilities located on private property and used solely to move or deliver electric power to the person owning, operating, managing and controlling those facilities or to tenants thereof is not included in the definition of "distribution". The distribution facilities (i.e. Underground Cables) to be used for delivery of electric power to SMPPL, SDFPL and RSML are located on private property (without involving any public property or any third party) will be owned, operated, managed and controlled by the respective BPC. Therefore, the supply of electric power to BPCs by REL does not constitute a distribution activity under the NEPRA Act and a Distribution Licence will not be required by REL.

(iv). The term of a Generation Licence under the Rules is to be commensurate with the maximum expected useful life of the units comprised in a generating facility. The Authority considers that as per the International benchmarks available, the useful life of a typical PV Solar Power Plant is taken as twenty five (25) years. Therefore, the Authority fixes the term of the proposed Generation

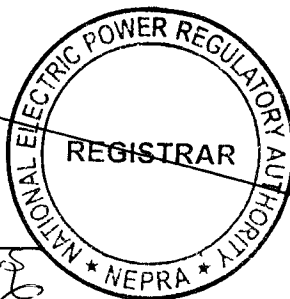


Licence to twenty five (25) years from Commercial Operation Date (COD) of the Generation Facility/Solar Power Plant.

(v). As the proposed Generation Facility/Solar Power Plant of REL will be using RE resource for generation of Power, therefore the project may qualify for the Carbon Credit under the Kyoto Protocol applicable for projects coming into operation upto 2020. The anticipated COD of the project is within the revised deadline of the Kyoto Protocol. In view of this, the Authority has included an article for carbon credit and its sharing with the Power Purchaser(s)/Consumers.

(vi). Regarding the Tariff of the Generation Facility/Solar Power Plant of REL, as explained above the supplying of electric power from REL will be exclusively meant for the associated companies of its group. In accordance with the Rule-6 of the Rules, the licensee is allowed to charge only such tariff for the provision of electric power as may be approved or specified by the Authority. The matter of rates, charges and terms and conditions of tariff between REL and its BPCs, does not affect any other consumer or third party. Therefore, for the purpose of tariff the Authority considers it appropriate directing REL and its BPC(s) to mutually agree some bi-lateral agreement and submit the same for its approval. Subsequent to the grant of the Generation Licence and on the completion of the aforesaid formalities, REL will be allowed to charge its BPCs the agreed tariff, in accordance with Rule-6(1)(b) of the Rules.

(vii). The proposed Generation Facility/Solar Power Plant of REL for which Generation Licence has been sought, is based on PV Cells which will be using solar radiation for generation of electric power. Solar radiation is a RE source which does not cause pollution however, the operation of the generation facility may cause some other type of pollution including Soil Pollution, Water Pollution and Noise Pollution etc. during construction of the Project. The Authority has considered these aspects and has made REL obligatory to comply with the environmental rules and regulations. Further, the Authority directs REL to submit a quarterly/bi-annually report confirming that the operation of the Generation Facility/ Solar Power Plant is

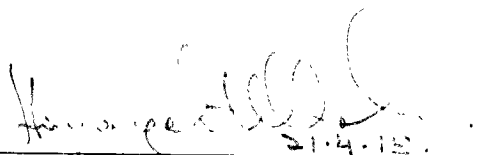


in compliant with the required Environmental Standards of the Environmental Protection Agency of Govt. of Punjab.

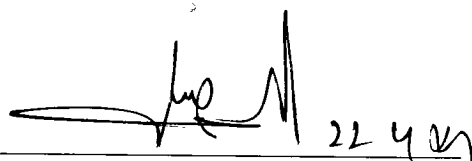
(viii). In view of the above, the Authority hereby decides to approve the grant of Generation Licence to REL on the terms and conditions set out in this determination and the Generation Licence annexed to it. The grant of Generation Licence will be subject to the provisions contained in the NEPRA Act, relevant rules and regulations framed there under including the Grid Code.

**Authority**

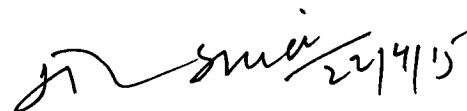
Himayat Ullah Khan  
Member

  
22/4/15

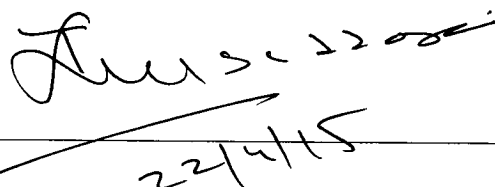
Khawaja Muhammad Naeem  
Member

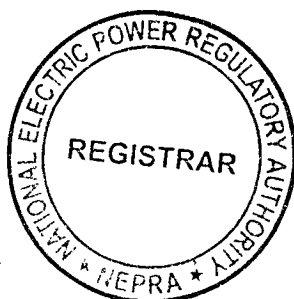
  
22/4/15

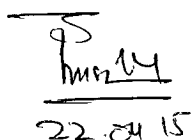
Maj. (R) Haroon Rashid  
Member/Vice Chairman

  
22/4/15

Brig. (R) Tariq Saddozai  
Chairman

  
22/4/15



  
22/4/15

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

**GENERATION LICENCE**

**No. SGC/110/2015**

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

**RAMZAN ENERGY LIMITED**

Incorporated under the Companies Ordinance, 1984

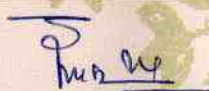
Corporate Universal Identification No. 0072464, dated May 12, 2010

**for its Solar Generation Facility/Solar Power Plant/Solar Farm  
Located at 26-KM Jhang-Chiniot Road, District Chiniot  
in the Province of Punjab**

(Installed Capacity: 1.52 MW<sub>p</sub> Gross ISO)

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

Given under my hand this 22<sup>nd</sup> day of April Two Thousand & Fifteen and expires on 30<sup>th</sup> day of May Two Thousand & Forty

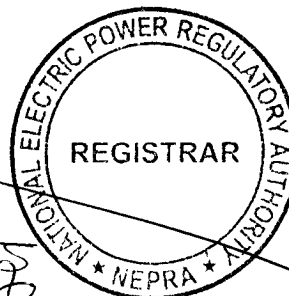
  
Registrar



**Article-1**  
**Definitions**

1.1 In this Licence

- (a). "Act" means "the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997";
- (b). "Authority" means "the National Electric Power Regulatory Authority constituted under Section-3 of the Act";
- (c). "Bus Bar" means a system of conductors in the generation facility of the Licensee on which the electric power of all the photovoltaic cells is collected for supplying to the Power Purchaser;
- (d). "Carbon Credits" mean the amount of Carbon Dioxide (CO<sub>2</sub>) and other greenhouse gases not produced as a result of generation of energy by the generation facility and other environmental air quality credits and related emissions reduction credits or benefits (economic or otherwise) related to the generation of energy by the generation facility, which are available or can be obtained in relation to the generation facility after the COD;
- (e). "Commercial Operations Date (COD)" means the Day immediately following the date on which the generation facility of the Licensee is Commissioned;
- (f). "Energy Purchase Agreement" 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, as may be amended by the parties thereto from time to time;
- (g). "Licensee" means "Ramzan Energy Limited" and its successors or permitted assigns;



- (h). "Policy" means "the Policy for Development of Renewable Energy for Power Generation, 2006 of Government of Pakistan" as amended from time to time;
- (i). "Power Purchaser" means the bulk power consumer purchasing electric power from the Licensee under an Energy Purchase Agreement;
- (j). "Regulation" means "the National Electric Power Regulatory Authority Licensing (Application & Modification Procedure) Regulations, 1999" as amended or replaced from time to time.
- (k). "Rules" mean "the National Electric Power Regulatory Authority Licensing (Generation) Rules, 2000" as amended or replaced from time to time;
- (l). "Solar Power Plant" means "a cluster of photovoltaic cells in the same location used for production of electric power";

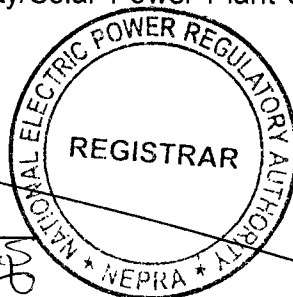
1.2 Words and expressions used but not defined herein bear the meaning given thereto in the Act or in the Rules.

**Article-2**  
**Application of Rules**

This Licence is issued subject to the provisions of the Rules, as amended from time to time.

**Article-3**  
**Generation Facilities**

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



3.2 The net capacity of the generation facility/Solar Power Plant of the Licensee is set out in Schedule-II hereto.

3.3 The Licensee shall provide the final arrangement, technical and financial specifications and other specific details pertaining to its generation facility/Solar Power Plant before its commissioning.

**Article-4**  
**Term of Licence**

4.1 The Licence is granted for a term of twenty five (25) years from the COD of the generation facility/Solar Power Plant.

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

**Article-5**  
**Licence fee**

After the grant of the Generation Licence, the Licensee shall pay to the Authority the Licence fee, in the amount and manner and at the time set out in the National Electric Power Regulatory Authority (Fees) Rules, 2002.

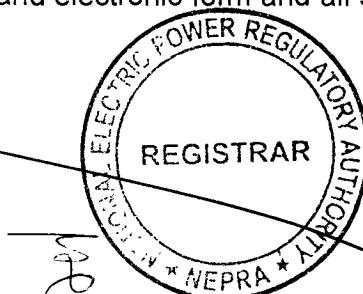
**Article-6**  
**Tariff**

The Licensee is allowed to charge only such tariff which either has been agreed between the Licensee and the Power Purchasers, pursuant to a power purchase agreement or approved, determined, adjusted or specified by the Authority.

**Article-7**  
**Maintenance of Records**

For the purpose of sub-rule (1) of Rule-19 of the Rules, copies of records and data shall be retained in standard and electronic form and all such records and data

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shall, subject to just claims of confidentiality, be accessible by authorized officers of the Authority.

**Article-8**  
**Compliance with Environmental Standards**

The Licensee shall comply with the environmental standards as may be prescribed by the relevant competent authority from time to time.

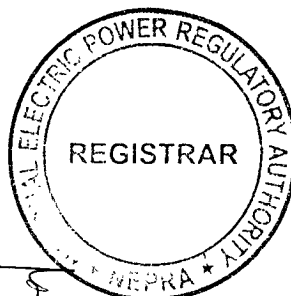
**Article-9**  
**Provision of Information**

9.1 The obligation of the Licensee to provide information to the Authority shall be in accordance with Section-44 of the Act.

9.2 The Licensee shall be subject to such penalties as may be specified in the relevant rules made by the Authority for failure to furnish such information as may be required from time to time by the Authority and which is or ought to be or has been in the control or possession of the Licensee.

**Article-10**  
**Emissions Trading /Carbon Credits**

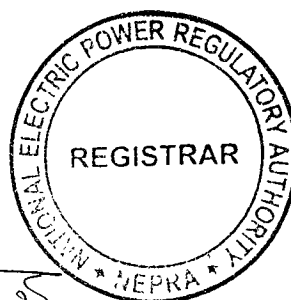
The Licensee shall process and obtain emissions/Carbon Credits expeditiously and credit the proceeds to the Power Purchaser on mutually agreed terms and conditions.



A

## **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**

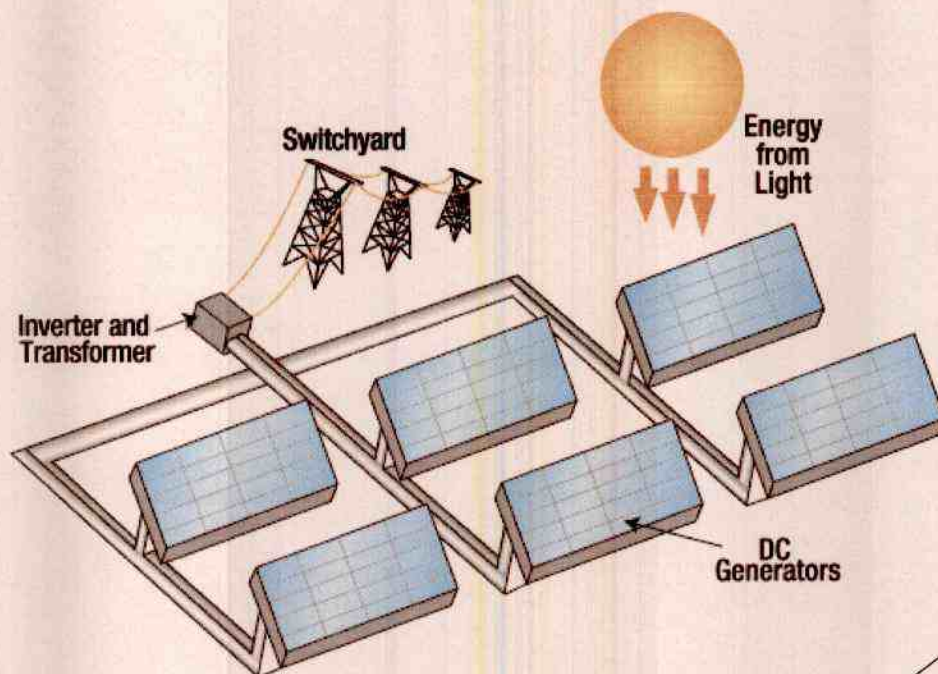


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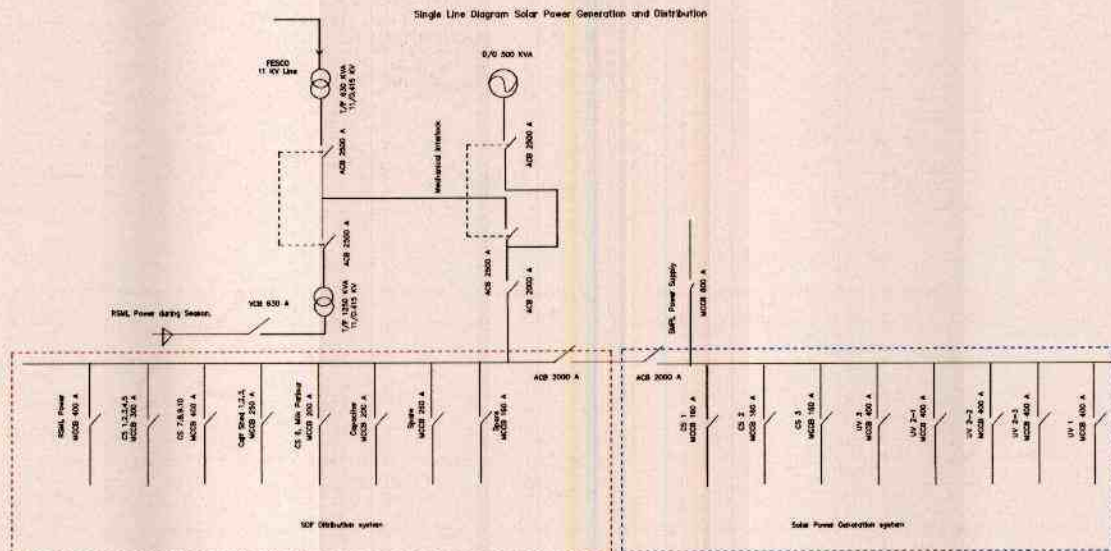
**Location Coordinates**  
**of the Generation Facility/Solar**  
**Power Plant**



## Process Flow Diagram of the Generation Facility/Solar Power Plant



# **Single Line Diagram** **of Electrical System of the Generation Facility/Solar** **Power Plant**

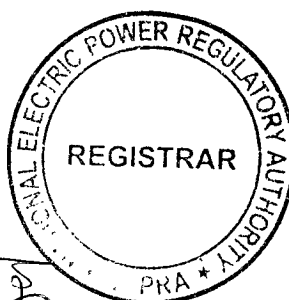


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**Interconnection**  
**Arrangement/Transmission Facilities for Dispersal of**  
**Power from the Generation Facility/Solar Power Plant of**  
**Ramzan Energy Limited (REL)**

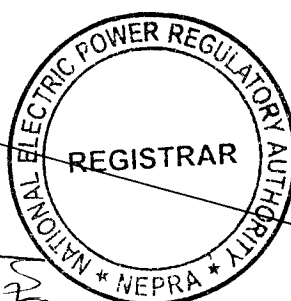
The power generated from the Generation Facility/Solar Power Plant of REL/the Licensee shall not be dispersed to the load center of FESCO and will be used for supplying to the designated Bulk Power Consumers (BPCs) as explained in this Schedule.

(2). If at any time, REL/Licensee intends to change the above supply arrangement and plans supplying to FESCO or adds a new BPC(s), the same shall be communicated to the Authority in due course of time.



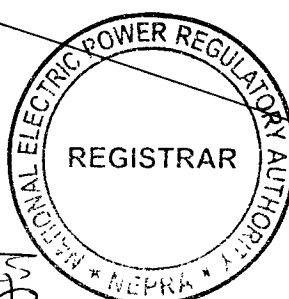
**Information Pertaining**  
**to the Bulk Power Consumer(s) [of the Licensee in the name of**  
**Ramzan Energy Limited –(REL) ]**

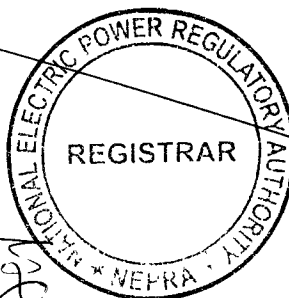
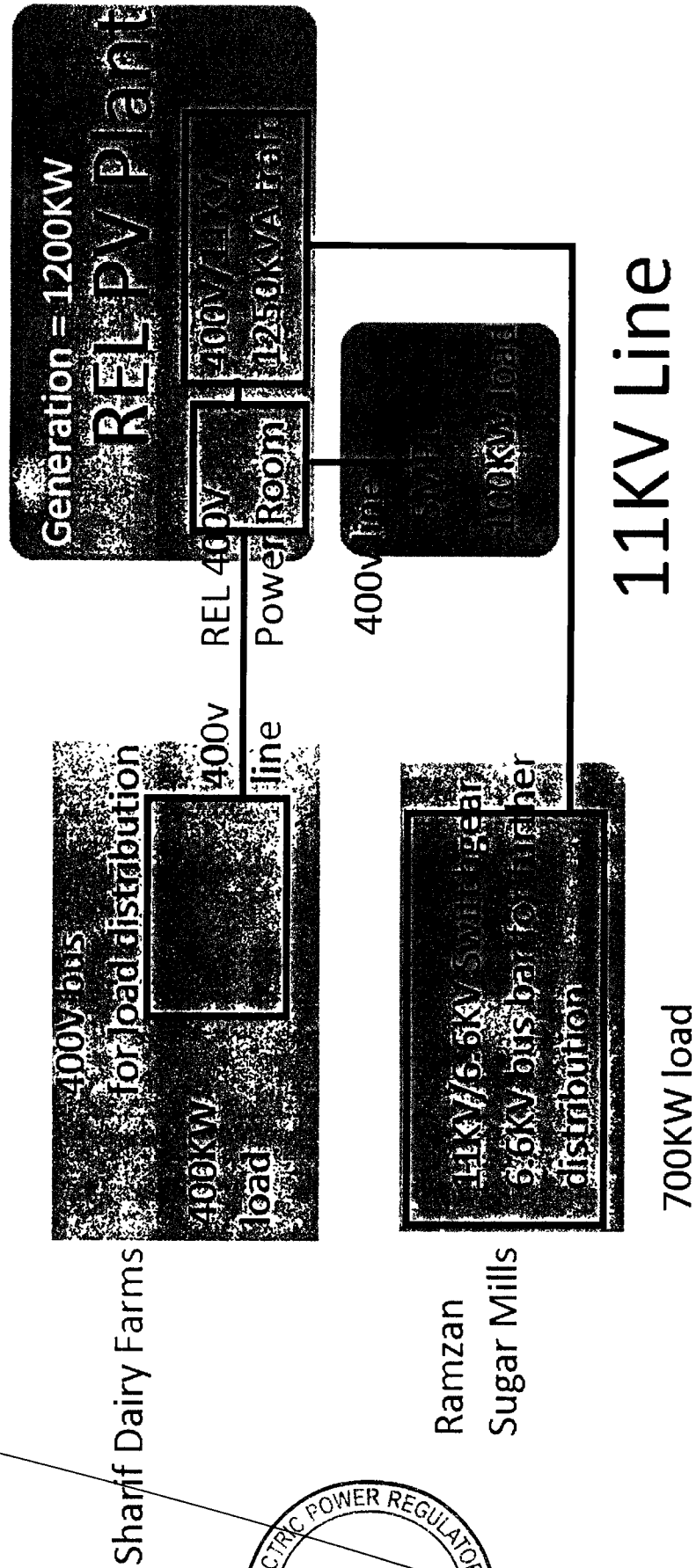
(a).	No. of Consumers	Three (03)		
(b).	Location of consumers (distance and/or identity of premises)	26-KM Jhang-Chiniot Road		
(c).	Contracted Capacity and Load Factor for consumer	Sharif Dairy Farms (Private) Limited	Sharif Milk Products (Private) Limited	Ramzan Sugar Mills Limited
		400 KW	100 KW	700 KW
(d).	Specify Whether			
	(i)	The consumer is an Associate undertaking of the REL-If yes, specify percentage ownership of equity;	No	
	(ii)	There are common directorships:	No	
	(iii)	Either can exercise influence or control over the other.	No	
(e).	Specify nature of contractual Relationship			
	(i).	Between each Consumers and REL.	Supplying Electric Power on mutually settled terms and conditions	
	(ii).	Consumers and FESCO.	Yes./ Sharif Dairy Farms (Private) Limited, Sharif Milk Products (Private) Limited and Ramzan Sugar Mills Limited are Industrial Consumers of FESCO with B (2) Connections.	
(f).	Any other network information deemed relevant for disclosure to or consideration by NEPRA.		N/A	



**Information Regarding  
Distribution Network for Supply of Electric Power to Bulk Power Consumer(s)  
[from the Licensee in the Name of Ramzan Energy Limited -(REL) ]**

(a).	No. of Feeders	03		
(b).	Length of Each Feeder (Meter)	Feeder - I	Feeder - II	Feeder - III
		35	300	550
(c).	In respect of all the Feeders, describe the property (streets, farms, Agri land, etc.) through, under or over which they pass right up to the premises of customer, whether they cross-over.	Feeder - I	Feeder - II	Feeder - III
		No Crossing of any Public or Private Property	No Crossing of any Public or Private Property	No Crossing of any Public or Private Property
(d).	Whether owned by REL, Consumer or FESCO-(deal with each Feeder Separately)			
	(i).	If owned by FESCO, please furnish particulars of contractual arrangement	Not Applicable	
	(ii).	Operation and maintenance responsibility for each feeder	Consumer(s)	
(e).	Whether connection with network of FESCO exists (whether active or not)- If yes, provide details of connection arrangements (both technical and contractual)		Yes/B-2 Consumers	
(f).	Any other network information deemed relevant for disclosure to or consideration by NEPRA.		N/A	





## Detail of the Generation Facility/ Solar Power Plant

### (A). General Information

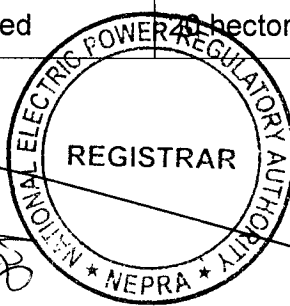
(i).	Name of the Company/Licensee	Ramzan Energy Limited.
(ii).	Registered/Principal Office of the Company/Licensee	55-K Model Town Lahore
(iii).	Location of the Generation Facility/Solar Power Plant	26-KM Jhang-Chiniot Road, District Chiniot, in the Province of Punjab
(iv).	Type of Generation Facility/Solar Power Plant	Thermal

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

(i).	Type of Technology of Generation Facility/ Solar Power Plant	Photovoltaic (PV) Cell
(ii).	System Type	Isolated System Not Connected to Grid
(iii).	Installed Capacity of Generation Facility/ Solar Power Plant (MW)	1.52 MW <sub>p</sub>

### (C). Technical Details of Equipment

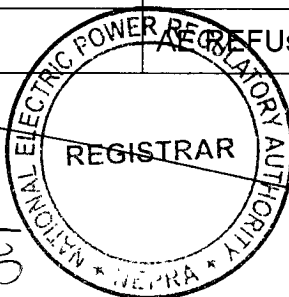
(a).	<b>Solar Panels – PV Modules</b>	
(i).	Type of Module	Polycrystalline PV Module Type Peak Energy 250W
(ii).	Type of Cell	Polycrystalline
(iii).	Dimension of each Module	1640mm x 992mm x 40mm
(iv).	Module Surface Area	1.62m <sup>2</sup>
(v).	No. of Panel/ Modules	6080
(vi).	Total Module Area	9,849m <sup>2</sup>
(vii).	Total Land Area Used	24.20 hectares (approximately)



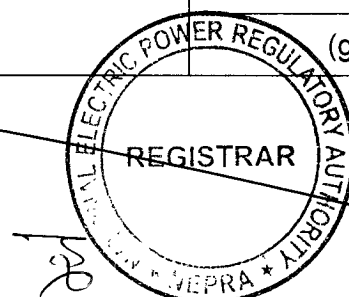
in the Province of Punjab

(viii).	Frame of Panel	Anodised Aluminium	
(ix).	Weight of one Module	18.5Kg	
(x).	Module Output Warranty	For 1 <sup>st</sup> year	For 2 <sup>nd</sup> to 25 <sup>th</sup> year
		97% or above	Not more than 0.7% Output Reduction Each Year
(xi).	Number of Solar Cells in each module	60 Cells	
(xii).	Efficiency of module	15.1%	
(xiii).	Environment Protection System	Encapsulation and sealing arrangements for protection from environment.	
(xiv).	Maximum Power ( $P_{max}$ )	250W +5W and -0W	
(xv).	Voltage @ ( $P_{max}$ )	30.1 V	
(xvi).	Current @ $P_{max}$	8.31 A	
(xvii).	Open circuit voltage ( $V_{oc}$ )	37.4 V	
(xviii).	Short circuit current ( $I_{sc}$ )	8.83 A	
(xix).	Maximum system open Circuit Voltage	1000VDC	
(b).	PV Array		
(i).	No. of Sub-arrays	70	
(ii).	Modules in a string	22	
(iii).	Total No. of Strings	280	
(iv).	Modules in Sub-Array	88(22 modules in 4 strings)	
(v).	Total Modules	6080	
(c).	PV Capacity		
(i).	Total	1.52 MW <sub>P</sub>	
(d).	Inverters		
(i).	Capacity of each unit	22kW (@50°C)	
(ii).	Inverter Model	AECSFUsol 020K+	

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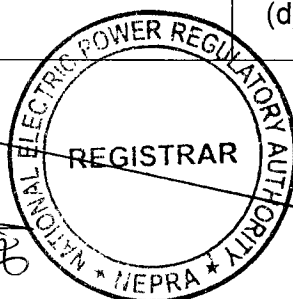
(iii).	Manufacturer	Advanced Energy, Germany	
(iv).	Rated Input Voltage	620 V DC	
(v).	Input Operating Voltage Range	DC 535V-850V	
(vi).	Number of Inverters	70 units	
(vii).	Total Power	19,200kW AC	
(viii).	Efficiency	97.8% (euro: 98.4%; CEC:98.5%)	
(ix).	Max. Allowable Input voltage	DC 1,000V	
(x).	Max. Current	DC 41 A	
(xi).	Max. Power Point Tracking Range	480-850V DC (@50°C)	
(xii).	Output electrical system	3-phase, 4-wire	
(xiii).	Rated Output Voltage	AC 400 V	
(xiv).	Rated Frequency	50 Hz	
(xv).	Power Factor	Adjustable 0.9 Induction to 0.9 Capacitance	
(xvi).	Power Control	MPP Tracker	
(xvii).	Environmental Enclosures	Operating Temperature Range	-25° C to 62° C
		Relative Humidity	15% - 95% non-condensing
		Audible Noise	<45 dB(A)
		Operating Elevation	<2000 m
		Warranty Period	5 Years
(xviii).	Operation Protection	(a).	DC circuit breaker
		(b).	AC circuit breaker
		(c).	DC overvoltage protection
		(d).	Lightning protection level III
		(e).	Monitoring
		(f).	Insulation monitoring
		(g).	Anti-Islanding



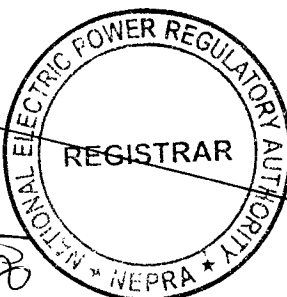
in the Province of Punjab

(e).	Junction Boxes Installed and fixed on main steel structure in Array Yard.		
(i).	Number of Junction Box units	17	
(ii).	Input circuits in each box	3,4,5,7	
(iii).	Max. Input current for each circuit	40 A	
(iv).	Max. Input voltage	1000 V	
(v).	Power at each box	350kW <sub>p</sub>	
(vi).	Protection Level	IP 54	
(vii).	Over-Current protection	Fuse	
(viii).	Output switch	125A, 1000V disconnector	
(ix).	Surge protection	1000V, Type II	
(x).	Purpose of Junction Box	(a).	Combine groups of modules into sub-arrays that will be wired into the inverter.
		(b).	Provide arrangement for disconnection for each of the groups.
		(c).	To provide group array isolation.
		(d).	The current carrying ratings of the junction boxes shall be suitable with adequate safety factor to inter-connect the Solar PV array.
		(e).	Up to 7 protected inputs at 40A to prevent backflow of short circuit current
(f).	Data Collecting System		
(i).	Weather Data	(a).	NA
		(b).	NA
(ii).	System Data	(a).	700 VDC, 32A
		(b).	21.1kW DC.
		(c).	400VAC, 29A
		(d).	19.2kW AC

POWER REGULATIONS

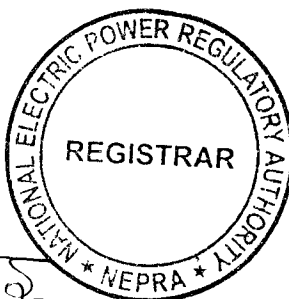


		(e).	50 Hz
		(f).	1
		(g).	38 deg C
(g).	Isolating ACB		
(i).	Rating	2000Amp 400V	
(ii).	Type of Breaker	Air Circuit Breaker	
(iii).	Input voltage	400V	
(iv).	Output Voltage	400V	
(v).	Purpose of Breaker	Isolation of PV system	
(vi).	Efficiency	100%	
(h).	Outdoor Cubicle Control Room		
(i).	Data record	Continuous logging with data logging Software	
(ii).	Control Room System	Computerized Data Acquisition System	
(iii).	Control room System Detail	Interfacing Hardware & Software, Industrial Type PC, which will be robust & rugged suitable to operate in the Control Room Environment	
(i).	Mounting Structure		
(i).	Structure	Aluminium substructure on corrugated galvanized sheet	
(ii).	Tilt of Array Frame	30°	
(iii).	Array Specification	Certified for wind and seismic requirements	
(j).	Foundation Pillars		
(i).	No. of Foundations	450	
(ii).	Foundation Structure	Reinforced concrete	

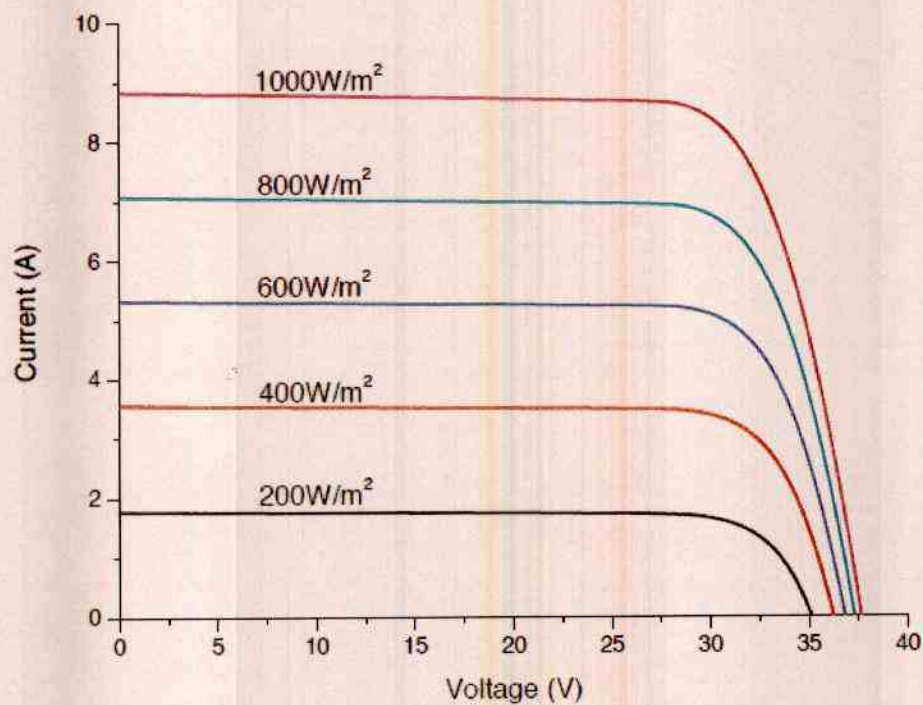


(D). **Other Details**

(i).	COD of the Generation Facility/ Solar Power Plant	May 31, 2015 (Anticipated)
(ii).	Expected Useful Life of the Generation Facility/ Solar Power Plant from the COD	25 Years

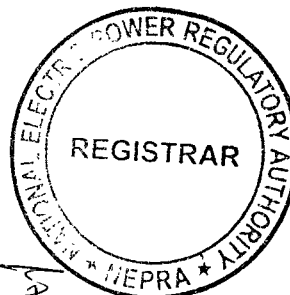


## I-V Curves



## **SCHEDULE-II**

The Total Installed Gross ISO Capacity of the Generation Facility/Solar Power 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/Solar Power Plant of Licensee is given in this Schedule.



## **SCHEDULE-II**

(1).	Total Installed Capacity of the Generation Facility/Solar Power Plant	1.52 MW <sub>p</sub>
(2).	Average Sun Hour Availability/Day (Irradiation on Inclined Surface)	6.3 Hrs
(3).	No. of Days per Year	365
(4).	Electric Power Generation Capacity of the Generation Facility/ Solar Power Plant (Annually As Per Simulation)	1,293 MWh
(5).	Total Expected Electric Power Generation Capacity of the Generation Facility/Solar Power Plant Generation (in 25 years Life Span)	32,325 MWh
(6).	Electric Power Generation Capacity of the Generation Facility/ Solar Power Plant per Year (keeping 24 Hours Working)	$1.52 \times 24 \times 365 = 13,315$ MWh
(7).	Net Capacity Factor (4/6)	9.7%

### **Note**

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

