National Electric Power Regulatory Authority
Islamic Republic of Pakistan

Registrar

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No. NEPRA/R/SA(Tariff)/TRF-477/PEPL-2019/17138-17140
July 8, 2020

Subject: **Determination of National Electric Power Regulatory Authority in the matter of Tariff Petition filed by M/s. P&G Energy (Private) Limited for Determination of Generation Tariff in respect of 62.2 MWp Solar Power Project** (Case No. NEPRA/TRF-477/PEPL-2019)

Dear Sir,

Please find enclosed herewith the subject Determination of the Authority along with Annex-I & II (28 pages) in Case No. NEPRA/TRF-477/PEPL-2019.

2. The Determination is being intimated to the Federal Government for the purpose of notification in the official gazette pursuant to Section 31(7) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

3. Order along with Annex-I & II of the Authority's Determination are to be notified in the official Gazette.

Enclosure: As above

08 07 20

(Syed Safeer Hussain)

Secretary
Ministry of Energy (Power Division)
'A' Block, Pak Secretariat
Islamabad

CC:

1. Secretary, Cabinet Division, Cabinet Secretariat, Islamabad.
2. Secretary, Ministry of Finance, 'Q' Block, Pak Secretariat, Islamabad.

DETERMINATION OF NATIONAL ELECTRIC POWER REGULATORY AUTHORITY IN THE MATTER OF TARIFF PETITION FILED BY M/S P&G ENERGY (PRIVATE) LIMITED FOR DETERMINATION OF GENERATION TARIFF IN RESPECT OF 62.2 MWp SOLAR POWER PROJECT

1. M/s P&G Energy (Pvt.) Limited ("P&GEPL" or "the petitioner" or "the project company") filed a tariff petition before National Electric Power Regulatory Authority ("NEPRA" or "the Authority") on August 29, 2019 for determination of generation tariff in respect of its 62.2 MWp solar PV power project ("Project") to be set up at Gwadar, Baluchistan, Pakistan. The said petition was filed by P&GEPL under Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 ("the NEPRA Act"), NEPRA (Tariff Standards & Procedure) Rules, 1998 ("NEPRA Tariff Rules") and other applicable provisions of NEPRA laws. The petitioner requested for the approval of levelized tariff of US Cents 6.00/kWh over the tariff control period of 25 years.

2. The petitioner submitted that it is a private limited company incorporated under the laws of Pakistan and has been specifically established to undertake power generation business in Pakistan. During the proceedings, P&GEPL submitted a copy of its incorporation certificate issued by Securities and Exchange Commission of Pakistan (SECP) dated October 5, 2018. The petitioner submitted that Letter of Interest (LOI) has been issued to it by Balochistan Power Development Board ("BPDB") on February 23, 2018 in favour of M/s. ib vogt GmbH (Sponsor). The petitioner also submitted that feasibility study of the Project was completed and submitted to the Panel of Experts ("POE") of BPDB vide letter dated December 25, 2018 for their review and approval. The Generation License was granted to P&GEPL by NEPRA on January 17, 2020.

3. Summary of the key information as provided by P&GEPL in the petition is as follows:

Project Company	:	P&G Energy (Pvt.) Ltd.
Main Sponsor	:	ib vogt GmbH
Capacity	:	62.2 MWp (DC)
Project Location	:	Gwadar, Baluchistan
Land Area	:	202 Acres

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Concession Period	:	25 years from Commercial Operations Date	
Purchaser	:	Central Power Purchasing Agency (Guarantee) Ltd.	
PV Modules	:	Bifacial Monocrystalline 360W	
Inverter	:	Sungrow SG2500HV-MV/ SG3000HV-MV	
Plant Capacity Factor	:	24.15%	
Annual Energy Production	:	131.587 GWh per year	
Annual Degradation	:	0.50%	
Construction Period	:	10 months	
Project Cost		**USD in millions**	
EPC Cost (including Degradation)	:	50.659	
Project Development Cost	:	2.239	
Land	:	0.100	
Insurance during Construction	:	0.253	
Financial Charges	:	1.198	
Interest during Construction	:	1.709	
Total Project Cost	:	**56.158**	
Financing Structure	:	Debt 75% : Equity 25%	
Debt Composition	:	100% Foreign Loan	
Interest Rate	:	6 month LIBOR (2.86%) + 4.5%	
Repayment Period	:	14 years	
Return on Equity	:	18%	
Operation & Maintenance Cost	:	USD 18,000/MW/Year	
Insurance Cost	:	0.5% of EPC Cost	
Tariff		**PKR/kWh**	**US cents/kWh**
Year (1-14)	:	8.04	6.698
Year (15-25)	:	3.60	2.996
Levelized Tariff	:	**7.20**	**6.000**
Exchange rate	:	1 USD = PKR 120	

4. In accordance with Tariff Rules, the tariff petition was admitted by the Authority for further processing. Notice of Admission was published in the daily national newspapers on December 06, 2019 stating hearing date as December 19, 2019 while also providing salient features of the petition, issues framed for hearing and invitation for filing

NATIONAL ELECTRIC POWER REGULATORY AUTHORITY NEPRA AUTHORITY comments/intervention request from the interested parties. Individual Notices of Admission were sent to the stakeholders, considered relevant by NEPRA, and to the petitioner on December 18, 2019 for participation in the hearing/proceedings. Tariff petition and Notice of Admission/Hearing were also hosted on NEPRA's website for information of general public.

5. Following issues were framed by the Authority for the proceedings of the subject tariff petition:

- Whether the claimed EPC cost is competitive, comparative and based on the firm and final agreement(s)?
- Whether the NEPRA (Selection of EPC Contractor by IPPs) Guidelines, 2017 have been fully complied with?
- Whether the details provided for Non-EPC cost are sufficient and claimed Non-EPC cost is justified? Also provide justification for land requirement as claimed by the petitioner?
- Whether the claimed O&M costs are justified?
- Whether the claimed insurance during operation cost is justified?
- Whether the claimed annual energy generation and corresponding plant capacity factor are reasonable and justified?
- Whether the petitioner's proposed solar modules technology satisfies the international standards of quality and operation?
- Whether the claimed return on equity is justified?
- Whether the claimed financing/debt terms are justified?
- Whether the claimed construction period is justified?
- Whether the project grid interconnection study is approved by the relevant organization(s) and whether NTDCL has issued power evacuation certificate?
- Any other issue with the approval of the Authority

6. The hearing was held on December 19, 2019 at NEPRA Tower, Ataturk Avenue, G-5/1, Islamabad which was attended by a number of participants including the petitioner, representatives of Central Power Purchasing Agency Guarantee Limited ("CPPAGL") and

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other stakeholders. No comments or intervention requests were received from any stakeholder on subject matter.

7. The issue wise submissions of the petitioner and the Authority's findings and decision thereon are as under.

8. **Whether the claimed EPC cost is competitive, comparative and based on the firm and final agreement(s) and**
Whether the NEPRA (Selection of EPC Contractor by IPPs) Guidelines, 2017 have been fully complied with?

8.1 The petitioner has claimed USD 48.889 million on account of Engineering Procurement and Construction ("EPC") cost (exclusive of degradation impact of solar modules of USD 1.770 million). On a per MW basis, the claimed EPC cost comes out to be around USD 0.786 million. Break-up of EPC cost as provided by the petitioner is hereunder:

EPC Cost	USD (Million/MW)
Module	0.340
Inverter	0.060
Monitoring	0.025
Mounting Structure	0.144
Civil Works	0.116
Electrical Works	0.085
Transportation/security/staff etc.	0.016
Total	**0.786**

8.2 The petitioner submitted that module price has been targeted at 0.34 USD million per MW even though the average spot price of high-efficiency bifacial mono crystalline solar module price is currently at 0.35 USD million per MW. For inverters, the petitioner has claimed USD 0.085 million per MW which includes monitoring cost of USD 0.025 million per MW. For mounting structure, the petitioner has claimed USD 0.144 million per MW while stating that single axis tracking cost is typically 0.08-0.12 USD million per MW higher than fixed system, however, it said it is assuming an increase of only 0.024 USD million per MW compared to the NEPRA's benchmark for fixed tilt on the basis of its Sponsors' established experience. Further, the petitioner submitted that cable & transformer-Grid price for the Project has been considered as USD 0.085 million per MW which is 15% lower than the NEPRA benchmark provided in the 2015 upfront tariff. For civil & general works, P&GEPL submitted that the piling and installation works of tracking plants are typically more complex as the structural loads of the tracker is higher than the fixed system, hence, USD 0.116 million MW has been considered for this cost item. The petitioner also claimed USD 0.016 million per MW on account of transportation and security cost. During hearing, the petitioner submitted that the equipment for the Project will be imported from Germany and China.

8.3 Detailing the items, the petitioner submitted that the claimed EPC includes the cost of generator step up transformers, MV substation, HV substation, protection system, SCADA system, communication system, metering system and anemometry system, electrical equipment together with ancillary equipment and other goods, systems and machinery and includes the cost of, inter alia, the erection, testing, completion and commissioning of the equipment and construction of the facility that is capable of fulfilling the intended purpose. The petitioner further submitted that the claimed EPC also includes cost for staff accommodation (construction of the camp buildings), supply of drinking water and electricity (to camp buildings), catering services for the staff, certain project vehicles, standby generator (including fuel), site security during construction period and construction of internal access roads.

8.4 In the petition and during hearing, the petitioner apprised the Authority that it intends to develop the Project under the self-EPC mode. Under this approach, the petitioner submitted that it will engage with the Sponsor, i.e. ib vogt GmbH and resultantly will have access to its international technical resources and parts distribution networks. The main sponsor will use its global network to source equipment for the Project from various vendors at competitive rates. The petitioner also submitted that ib vogt GmbH will also assist it in overall management, coordination and implementation of the Project. This approach would also ensure the availability of financing at the least cost from international lenders under the project finance structure. The petitioner submitted that due to above reasons, it has not followed NEPRA (Selection of Engineering, Procurement and Construction Contractor by Independent Power Producers) Guidelines, 2017 ("NEPRA EPC Guidelines") that apply to power projects that intend to award EPC contract(s) for whole or part of the power project. The project company also referred the case of Gharo Solar where NEPRA awarded tariff on self-EPC basis. Supporting this arrangement, the petitioner also submitted that under the self EPC mode, the base EPC cost will be relatively competitive.

8.5 The Authority has noted that the tariff determinations of ten (10) solar PV projects have been issued by NEPRA in last couple of months. Looking at the EPC costs approved in those determinations, the EPC costs claimed by the petitioner is found to be quite on the higher side. In light thereof, the Authority is of the view that EPC cost being claimed by P&GEPL may not be considered prudent and reflective of prevailing prices and therefore requires assessment.

8.6 For this purpose, the Authority has relied upon the EPC cost and project cost data in different countries. The prices of different types of modules, inverters and mounting structures in different parts of the world were researched through a number of reports published by credible organizations. Moreover, a number of online sources providing spot prices data of equipment of solar power system were also surfed. Furthermore, the costs being claimed recently by other comparable projects were also checked.

8.7 It has been noted that the average prices of solar modules of different types and brands have gone as low as USD 0.16 million per MW. Those average prices were at the level of USD 0.32-0.34 million per MW back in January, 2018. This shows that there has been a decline of more than 50% in the cost of modules in two years' time. Even in the last couple of months, the prices of modules have exhibited a decrease of around 10-15%. Nevertheless, the factor of relatively higher cost of bifacial modules has been taken into account. The cost of inverters, inclusive of combiner boxes, has been found reported in different sources and has been claimed in other tariff petitions at or below the level of USD 0.04 million per MW. For mounting structures, the price of as low as USD 0.10 million per MW for single axis tracking has been stated by one of the solar projects. It has also been noted that the cost of around USD 0.11 million per MW for tracking mounting structure has been achieved by a solar PV power project which has recently been commissioned. On these base figures, the factors such as transportation cost, existing local market conditions, local manufacturing base, length of time allowed for achieving financial close etc. were given due consideration. The cost of civil works as allowed by the Authority in the comparable tariff cases has been rationalized for the impact of PKR devaluation and local inflation as well as margins have also been allowed for comparatively higher labor and material cost in that area. The cost of electrical balance of plant equipment has been allowed in line with the comparable projects. It has also been ensured to provide a reasonable amount of profits/margins to the companies carrying out above work. Keeping in view all these factors, the Authority has assessed the EPC cost for P&GEPL as USD 0.5880 million per MW (USD 36.574 million) which is hereby approved. The allowed EPC cost shall be adjusted at Commercial Operations Date ("COD") in accordance with the mechanism given in the Order part of this determination.

9. **Whether the details provided for Non-EPC cost are sufficient and claimed Non-EPC cost is justified? Also provide justification for land requirement as claimed by the petitioner?**

9.1 The petitioner has claimed USD 5.499 million on account of Non-EPC cost. The break-up of cost components as provided by the petitioner is as follows:

Non-EPC Cost	USD million
Insurance during Construction	0.253
Project Development Cost	2.239
Land	0.100
Financial Fee & Charges	1.198
Interest during construction	1.709
Total	**5.499**

Insurance during construction:

9.2 The petitioner has claimed USD 0.253 million on account of pre-COD insurance cost at rate of 0.5% of claimed EPC cost. The petitioner submitted that claimed cost covers the insurance of the company's assets during construction; prior to COD of the Project. The petitioner has submitted that based on past experience and in accordance with the requirements set out by the lenders, it intends to procure the following insurances during the construction phase of the Project:

- Construction All Risk Insurances
- CAR delay in start-up insurance
- Terrorism Insurance
- Marine and Inland Transit Insurance
- Marine -- delay-in startup insurance
- Comprehensive General Liability

9.3 The petitioner further submitted that in the event the project company cannot arrange the insurance at 0.5% due to any reasons beyond its control, NEPRA is requested to allow the actual pre-COD Insurance Cost at actual up to a maximum of 1% of the EPC cost. P&GEPL also submitted that pre-COD insurances do not include the administrative surcharge, the federal insurance fee and the federal excise duty, and the project company requests that the same may kindly be allowed by NEPRA as part of the one-time adjustments allowed at the time of COD. During hearing, the petitioner submitted that market feedback from leading foreign banks/ insurers indicates their risk perception is relatively higher than other regions on account of security in Gwadar.

9.4 The Authority has noted that NEPRA (Benchmarks for Tariff Determination) Guidelines, 2018 ("NEPRA Benchmarking Guidelines") issued on June 19, 2018 states the provision of Insurance during Construction at the rate of 0.40% of EPC cost for solar PV projects. In accordance therewith, the Authority has decided to allow insurance during construction, inclusive of taxes, charges and/or duties, at the rate of 0.40% of the approved EPC cost to P&GEPL. On this basis, the amount being approved under this head works out to be around USD 0.146 million.

Project Development Cost

9.5 The petitioner has claimed Project Development Cost ("PDC") of USD 2.239 million for the purpose of project development work. The petitioner submitted that PDC includes, inter alia, costs of feasibility studies, grid interconnection studies, environmental studies, topographical survey of land, geotechnical investigation of land, fees of consultants, costs related to the bank guarantee to be furnished to BPDB, costs related to the purchaser letter of credit to be furnished to the power purchaser pursuant to the provisions of the Energy Purchase Agreement ("EPA"), various fees to be paid to the Alternative Energy

Development Board ("AEDB"), NEPRA and other governmental agencies, costs incurred during the project company's formation and capital enhancement, costs relating to various permits for the Project, land cost, post financial close technical supervision and site security. The petitioner submitted that the claimed PDC is 2% lower compared to latest upfront tariff-2016 and slightly higher compared to Gharo Solar Project. Detail description of different cost items being claimed under PDC was also provided by the petitioner in the petition.

9.6 The Authority has examined the cost of PDC that has been allowed in tariff of comparable solar PV projects. The requirement of comparatively higher security and its corresponding costs has also been given due consideration. On these bases, the Authority has decided to approve the PDC of USD 1.60 million for P&GEPL. This amount is being approved on lump sum basis, i.e. the cost incurred on individual heads of PDC may change but should not exceed the overall amount.

Cost of Land

9.7 The petitioner has claimed USD 0.100 million on account of land cost. The petitioner submitted that land will be leased from Revenue Department, Government of Baluchistan ("GOB") for 30 years. The petitioner submitted that GOB has already earmarked 202 acres of the land for the Gwadar solar project and its allocation offer letter is in finalization process. P&GEPL along with the petition submitted a letter of Land Utilization Branch, Board of Revenue, Baluchistan dated August 1, 2019 addressed to Secretary, Energy Department, GOB for allotment of state land for 150 MW solar project in Baluchistan in favour of ib vogt GmbH. On inquiry, the petitioner submitted that land lease document is being executed with GOB and shall be provided in due course to NEPRA.

9.8 It is noted that the cost of land in a number of comparable solar PV projects has been allowed to the extent of lease cost that has been charged by the respective provincial governments from those companies. For example, in case of Zorlu which is a100 MW solar PV Project being setup in province of Punjab, the respective provincial government leased out land at very nominal rate of Rs. 100 per acre per year. For three solar projects in Sindh, lease amount of Rs. 3,000 per acre per year is charged during initial ten years, Rs. 5,000 per acre per year for next ten years and Rs. 8,000 per acre per year during last ten years. For projects in Sindh, the lease amount of initial ten years is made part of the approved project cost as only that part of cost is paid upfront by the project companies. The payment of lease amount for later years of project is managed by the project companies from their O&M cost.

9.9 Considering the approvals given in the comparable cases, the Authority has decided to allow the petitioner the cost of land to the maximum amount of USD 0.1 million, subject to actual at the time COD. The petitioner shall have to submit all the relevant documentary evidence in respect of land for the provision of this cost at the time of COD.

Financing Fee and Charges

9.10 The petitioner has claimed USD 1.198 million on account of financing fee & charges. The petitioner submitted that financial charges includes, inter alia, the advisory and arrangement fee to secure insurance cover, the lenders' up-front fee and commitment fee; mandate and processing fee, fees payable and stamp duty applicable on the financing documents; agency fee, security trustee fee, lenders' project monitoring fee and the fees for the lenders' legal and other advisors customary for a foreign lender to engage in order to carry out the due diligence, drafting of financing documents and monitoring of the Project during the construction period. The petitioner submitted that financing charges are in line with the prevailing market conditions and practices applicable for project financing transactions and as allowed by NEPRA in its other tariff determinations. The petitioner also requested the Authority to allow these charges if they exceed to the level of 3% due to mix of local and foreign financing. It also requested to allow Sinosure fee on foreign loan to the extent of 7% of the debt service amount in accordance with the benchmark established in the coal upfront tariff. Moreover, P&GEPL submitted that it has not considered any duties and taxes on account of financial fees and charges and same be allowed as adjustment for actual cost at the time of COD.

9.11 It has been noted that NEPRA Benchmark Guidelines states the provision of financing fee & charges, not exceeding 2% of the approved debt amount of the capital expenses. In accordance with the said benchmark, the Authority has decided to allow the captioned cost at the rate of 2% of approved debt portion of allowed capital expenses, inclusive of taxes, charges and/or duties, to the petitioner. Accordingly, this amount works out to be around USD 0.615 million.

9.12 The Authority has noted that it has been allowing export credit/Sinosure fee on foreign loan either by including that fee as a lump sum amount in the project cost or in form of annual payments. In the upfront tariffs, Sinsoure fee was approved as a lump sum amount as part of the project cost. Later, the Authority considering the fact that annual payment of Sinosure has a favourable impact on tariff had allowed that fee at the maximum rate of 0.6% on the respective yearly outstanding amount of foreign debt and interest. Based on above, the Authority has decided to allow the provision of Sinosure fee to the petitioner on its foreign financing, if availed, which shall be made part of the tariff at the time of COD. The said fee shall be allowed as annual payment to the maximum limit of 0.60% on the approved yearly debt servicing amount. It is to be noted that for financing with Sinosure, the spread/margin over LIBOR shall be adjusted to the extent such that the total financing cost (applicable LIBOR + Adjusted Margin + Sinosure) shall not exceed the financing cost without Sinosure (applicable LIBOR + Approved Margin).

Interest during construction

9.13 The petitioner has submitted that Interest during Construction (IDC) has been calculated as USD 1.709 million based on 10 month construction period using 6 month LIBOR of 2.86% plus spread of 4.5%. The petitioner further submitted that claimed IDC shall be subject to change due to fluctuation in base LIBOR rate, drawdown amount for construction period, change in project cost and variations in PKR/USD exchange rate.

9.14 Based on the abovementioned approved costs while considering the drawdown schedule as given in the Order part of this determination; the IDC works out to be around USD 0.712 million and is hereby approved for P&GEPL. The details of financing terms and construction period that have been used to work out the aforesaid amount of IDC is discussed in the ensuing relevant sections. The allowed IDC shall be re-computed at COD as per the mechanism given in the Order part of this determination.

10. Recapitulating above, the summary of the project cost being approved is given hereunder:

Project Cost	USD Million
EPC Cost	36.574
Project Development Cost	1.600
Land Cost	0.100
Insurance during Construction	0.146
Financing Fee and Charges	0.615
Interest during Construction	0.712
Total	**39.747**

11. **Whether the claimed O&M costs are justified?**

11.1 P&GEPL has claimed O&M cost of USD 18,000 per MW per year. The petitioner submitted that it has proposed significantly low O&M cost compared to previous upfront tariffs of NEPRA. In the petition, P&GEPL submitted that the project company will carry out the operation & maintenance works by itself while using the resources from its main sponsor ib vogt GmbH, hence, avoiding high profit expectations and premiums charged by third party O&M contractors. The petitioner informed that the operational cost of the Project will be comparatively higher as tracker moving parts have a higher O&M cost compared to a fixed tilt mounting structure, bifacial solar modules cleaning would be a bit more complex as both the front and back side of the module require regular cleaning, higher spare part cost for central inverter given the extensive stock requirement etc.

11.2 To evaluate this claim of P&GEPL, the O&M cost being allowed in other parts of the world has been referred. Local market and security conditions of the area where Project is being setup, required skilled manpower, spare parts etc. have also been deliberated upon. The cost recently being claimed by other solar power projects based on different technologies has also been compared. The O&M cost as allowed recently to comparable projects has also been examined. Taking into consideration all these factors especially local area conditions, the Authority has decided to approve the O&M cost of USD 0.65 million per year to P&GEPL, i.e. USD 10,500 per MW per year.

11.3 In line with the recent tariffs approved for solar PV projects, the Authority has decided to allow whole of O&M cost in local currency to the petitioner. Additionally, the Authority has decided that it may consider making revisions in the O&M cost, while capping the allowed prevailing level, anytime during the tariff control period. Those revisions may also entail changing the mix of the approved O&M cost (local and foreign) as well as the indexation mechanism (indices, frequency etc.). For that purpose, the Authority may also direct the petitioner to carry out the competitive bidding to select the contractor for the provision of the O&M cost.

12. **Whether the claimed insurance during operation is justified?**

12.1 The petitioner has claimed insurance cost during operation at the rate of 0.5% of the EPC cost. P&GEPL submitted that keeping in view the generally adopted global trends and the magnitude of the Project, a comprehensive operational insurance and reinsurance arrangement is fundamental to ensure bankability of the Project. The petitioner has proposed following risk coverage during operation phase of the Project:

- Property damage and comprehensive machinery insurance (including business interruption insurance)
- Third party liability
- Terrorism insurance
- Group personal accident insurance
- Motor comprehensive insurances.

12.2 The petitioner submitted that insurance cost has been assumed including taxes and duties, however, any increase therefrom up to 1% of the EPC cost may be allowed upon submission of evidences. P&GEPL further submitted that claimed insurance cost does not cover administrative surcharge, federal excise duty and federal insurance fee and the same should be treated as pass through item under the tariff determination.

12.3 The Authority noted that in the recently approved solar tariff determinations, insurance during operation at the rate of 0.4% of the approved EPC cost has been allowed. NEPRA Benchmark Guidelines also provide insurance during operation at the rate of 0.4% of EPC cost for solar PV projects. In view thereof, the Authority has decided to allow insurance during operation at the maximum limit of 0.4% of the approved EPC cost, including all taxes/charges and/or taxes, to the petitioner, subject to adjustment on actual basis as per the mechanism given in the Order part of this determination.

13. **Whether the claimed annual energy production and corresponding plant capacity factor are justified? and**
Whether the petitioner's proposed solar modules and inverter technology satisfies the international standards of quality and operation?

13.1 The petitioner has submitted the following in this regard:

Project capacity	62.2 MWp
Annual power generation	131,587 MWh per annum
Net capacity factor	24.15%

13.2 The petitioner submitted that the Project will use bifacial mono crystalline 360W solar panels with single axis trackers and central inverters SG2500HV-MV. During hearing, the petitioner apprised the Authority that the proposed plant is expected to achieve the highest capacity factor of 24.15% to date in Pakistan (in southern region of Pakistan). During hearing, the petitioner submitted that the energy yield assessment was carried out using PVsyst software.

13.3 The Generation License for the proposed technology has already been approved for P&GEPL which actually addresses the issued with respect to technology. For plant capacity factor, the Authority has considered the modules and inverters proposed by P&GEPL with respect to their quality and energy yield. The energy yield report as submitted by the petitioner has also been examined. On these bases, the Authority is of the view that the proposed net annual capacity utilization factor of 24.15% is reasonable and decided to approve the same. Further, the Authority has decided that the solar resource risk shall be borne by the power producer and a sharing mechanism given in the order part of this determination shall be applied on the energy produced beyond the approved annual capacity utilization factor.

14. **Whether the claimed return on equity is justified?**

14.1 The petitioner has submitted that it has assumed Return on Equity (ROE) of 18% (IRR based). P&GEPL submitted that it is asking for the higher return due to down gradation of credit rating of Pakistan which has increased the country risk premium. Also, it submitted that its Project would be the first venture of this kind to be setup in Gwadar, hence, require higher return as was allowed by NEPRA to Thar coal based power projects. The petitioner also submitted that as allowed in previous solar tariffs, the Return on Equity during Construction (ROEDC) may be allowed adjustment at COD on the basis of actual equity injections, within the overall equity allowed by NEPRA at COD.

14.2 The Authority has noted that in the most recent comparable tariff cases of renewable technologies being setup in all the regions of the country, it has allowed ROE (both during construction and operation) to the limit of 14%. Accordingly, the Authority has decided to approve tariff based on ROE of 14% for P&GEPL also.

14.3 The approved component of ROE/ROEDC shall be adjusted on yearly basis as per the mechanism given in the Order part of this determination. The payment of this component of tariff, applicable to any year, shall be due to be made at the end of that year. It is to be noted that the approved amount of return on equity shall be the maximum limit of the annual return to be earned by the project company. The amount of return of any year, if exceeds by the given limit, shall be shared between the power producer and consumers through claw back formula to be decided by the Authority.

15. **Whether the claimed financing/debt terms are justified?**

15.1 The petitioner claimed following parameters regarding the debt:

Debt	75% (100% foreign)
Interest	6 month LIBOR (2.86%) + Spread of 4.5%
Repayment period	14 years

15.2 During the proceedings, the petitioner submitted a signed copy of Letter of Interest to arrange project finance facility issued by United Bank Limited (UBL) dated January 21, 2020.

15.3 The Authority has noted that NEPRA Benchmarking Guidelines provides that the debt : equity ratio for all renewable power projects will be 80:20 and in case of change in ratio, the return approved on equity shall be adjusted to maintain cost of capital at the same level as under a 80:20 debt-equity ratio capital structure. The debt-equity ratio of 80:20 has also been approved by the Authority in the recent wind and solar tariff determinations. Therefore, the Authority has decided to compute and approve tariff of P&GEPL on debt to equity ratio of 80:20.

15.4 Benchmark Guidelines provide that for renewable energy projects availing foreign financing, the spread not exceeding 4.25% over LIBOR shall be allowed. Therefore, the Authority has decided to approve tariff of P&GEPL at margin of 4.25% over LIBOR. In case of savings in interest rate, the same shall be shared in the ratio of 60:40 between the power purchaser and power producer respectively.

15.5 The petitioner has claimed debt servicing period of fourteen years for foreign financing. The Authority in recently approved wind and solar tariff determinations has allowed foreign debt repayment period of not less than 13 years. In view of approvals given in the recent tariff determinations, the Authority has decided to approve foreign debt repayment period of 14 years as claimed by the petitioner.

16. **Whether the claimed construction period is justified?**

16.1 In its tariff petition, the petitioner proposed 10 month construction period for the Project. The Authority has noted that in other similar scale solar PV projects, the construction period of 10 months has been allowed. Therefore, the construction time of 10 months is hereby allowed to P&GEPL as well.

17. **Whether the project grid interconnection study is approved by the relevant organization(s) and whether NTDCL has issued power evacuation certificate?**

17.1 The petitioner submitted that Grid Interconnection Study (GIS) of the Project was conducted and completed by the M/S. ARCO Energy (Pvt.) Ltd. During the proceedings of the subject petition, P&GEPL submitted approval letter issued by Quetta Electric Supply

Company (QESCO) dated March 21, 2019 with respect to its GIS. QESCO in the said letter stated that current infrastructure of QESCO is reliable for the Project and it has no objection to evacuate power from 50MW solar power project of P&GEPL. Vide subsequent letter dated June 12, 2019, QESCO states that the project capacity may be read 50MW AC instead of 50MW.

17.2 Due to non-submission of NTDCL's approval of GIS/Power Evacuation Certificate (PEC) with the petition, the petitioner vide email dated April 7, 2020 was asked to submit the said approval. In response, P&GEPL vide email dated April 7, 2020 submitted that P&GEPL is located in the area where NTDCL does not have any existing network. QESCO is the main Network Operator in the region and have already provided approval/consent.

17.3 The Authority has noted that approval of project's GIS/power evacuation certificate by NTDCL is not a requirement for the award of tariff as per the Tariff Rules. This issue was framed to confirm that the integration of the subject project does not affect the overall grid system. The Authority has further noted that during the proceedings of the Generation License as awarded to petitioner on January 17, 2020, the matter of interconnection of the Project has already been discussed and addressed. In view thereof, the Authority considered it appropriate to proceed further in the subject matter as per the stipulations given in the Tariff Rules.

Degradation factor

17.4 The petitioner has claimed USD 1.770 million as the impact of degradation as part of the project cost at the rate of 3.62% of the EPC cost. The Authority has noted that degradation factor of 0.5% per year has been taken into account in the recently approved tariff cases of solar PV power projects and decided to approve the same in P&GEPL's tariff. The Authority has decided to capitalize the impact of allowed degradation in the approved project cost. The amount of USD 1.324 million has been made part of the approved project cost while calculating the same at the levelized rate of 3.62% of the approved EPC cost.

18. **ORDER**

In pursuance of section 7(3)(a) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 and NEPRA (Tariff Standards & Procedure) Rules, 1998, the Authority hereby determines and approves the following generation tariff along with terms and conditions for P&G Energy (Pvt.) Limited for its 62.20 MWp solar PV power project for delivery of electricity to the power purchaser:

- Levelized tariff works out to be Rs. 6.1731/kWh (US Cents 3.7020/kWh).
- The tariff has been worked out on Build, Own and Operate basis.
- EPC cost of USD 36.574 million has been approved.
- Project Development Cost of USD 1.600 million has been approved.
- Land Cost of USD 0.100 million has been approved
- Insurance during constriction at the rate of 0.4% of the approved EPC cost has been allowed.
- Financing fee & charges at the rate of 2% of the debt portion of the capital cost has been approved.
- Debt to Equity ratio of 80:20 has been approved.
- Tariff has been computed using 100% foreign financing.
- The cost of debt of 6 month LIBOR (1.91213%) + spread (4.25%) has been used for foreign financing.
- Debt servicing period of 14 years from COD has been used for foreign financing.
- Annual ROE and ROEDC of 14% has been allowed.
- O&M Cost of USD 10,500 per MW per year has been allowed.
- Insurance during Operation has been calculated as 0.40% of the allowed EPC Cost.
- Construction period of 10 months has been allowed.
- Net Annual Plant Capacity Factor of 24.15% has been approved.
- Reference Exchange Rate of 166.75 PKR/USD has been used.
- IDC and ROEDC have been worked out using following drawdown schedule:

Month 1	5.00%
Month 2	5.00%
Month 3	5.00%
Month 4	15.00%
Month 5	15.00%
Month 6	15.00%
Month 7	6.67%
Month 8	6.67%
Month 9	13.33%
Month 10	13.33%

- Detailed component wise tariff is attached as Annex-I of this determination.
- Debt Servicing Schedule is attached as Annex-II of this determination.

A. One Time Adjustments at COD

- The EPC Cost shall be verified and adjusted at actual considering the approved amount as the maximum limit. Applicable foreign portion of the EPC cost will be adjusted at COD on account of variation in PKR/USD parity during the construction period, on production of authentic documentary evidence by the petitioner to the satisfaction of the Authority. The adjustment in applicable portion of the EPC cost shall be made only for the currency fluctuation against the reference parity values.
- PDC, Insurance during construction, Land cost and Financing Fee and Charges shall be adjusted at actual at the time of COD considering the approved amount as the maximum limit. The amounts allowed on these accounts in USD will be converted in PKR using the reference PKR/USD rate of 166.75 to calculate the maximum limit of the amount to be allowed at COD.

- Duties and/or taxes, not being of refundable nature, relating to the construction period directly imposed on the company up to COD will be allowed at actual upon production of verifiable documentary evidence to the satisfaction of the Authority.

- The tariff has been determined on debt : equity ratio of 80 : 20. The tariff shall be adjusted on actual debt : equity mix at the time of COD, subject to equity share of not more than 20%. For equity share of more than 20%, allowed ROE shall be neutralized for the additional cost of debt : equity ratio.

- IDC will be recomputed at COD on the basis of actual timing of debt draw downs (for the overall debt allowed by the Authority at COD) for the project construction period of 10 months starting from the date of financial close. IDC shall also be allowed adjustment for change in applicable LIBOR.

- The savings in the approved spreads shall be shared between the power purchaser and power producer in the ratio of 60:40.

- ROEDC will be adjusted at COD on the basis of actual equity injections (within the overall equity allowed by the Authority at COD) during the project construction period of 10 months from the date of financial close.

B. Indexations during Operations

ROE, ROEDC and Insurance shall be allowed adjustment on yearly basis starting from either 1st July or 1st January. Debt Servicing Components shall be adjusted on bi-annual basis to be applicable from 1st July and1st January. O&M component shall be allowed on quarterly basis starting from 1st July, 1st October, 1st January and 1st April. The indexation mechanisms are given hereunder:

i) **Operation and Maintenance Costs**

O&M component of tariff shall be adjusted on account of change in local Inflation (CPI) as notified by the Pakistan Bureau of Statistics according to the following mechanism:

L. O&M (REV)	=	L. O&M (REF) * CPI (REV) / CPI (REF)
Where;		
L. O&M (REV)	=	The revised O&M Local Component of Tariff
L. O&M (REF)	=	The reference O&M Local Component of Tariff
CPI (REV)	=	The revised CPI (General)
CPI (REF)	=	The reference CPI (General) of 266.200 for the month of February, 2020

Note: The reference index of CPI shall be revised for making the required adjustments in O&M component at the time of COD. For the adjustment of O&M component at COD, the revised CPI value for the middle month of preceding quarter prior to the date of COD shall be considered. Thereafter, the CPI value taken at COD shall become reference for subsequent adjustments in the O&M component.

ii) **Insurance during Operation**

The actual insurance cost for the minimum cover required under contractual obligations with the power purchaser, not exceeding 0.4% of the approved EPC cost, will be treated as pass through. Insurance component of reference tariff shall be adjusted annually as per actual upon production of authentic documentary evidence according to the following formula:

AIC	=	Ins (Ref) / P (Ref) * P (Act)
Where;		
AIC	=	Adjusted insurance component of tariff
Ins (Ref)	=	Reference insurance component of tariff
P (Ref)	=	Reference premium @ 0.4% of approved EPC Cost at Rs. 166.75/USD
P (Act)	=	Actual premium or 0.4% of the approved EPC Cost converted into Pak Rupees on exchange rate prevailing on 1st day of the insurance coverage period whichever is lower

iii) **Return on Equity**

The ROE (ROE + ROEDC) component of the tariff will be adjusted annually on account of change in USD/PKR parity. The variation relating to these components shall be worked out according to the following formula:

ROE (Rev)	=	ROE (Ref) * ER (Rev) / ER (Ref)
Where;		
ROE (Rev)	=	Revised ROE Component of Tariff
ROE (Ref)	=	Reference ROE Component of Tariff
ER (Rev)	=	The revised TT & OD selling rate of US dollar as notified by the National Bank of Pakistan
ER (Ref)	=	The reference TT & OD selling rate of Rs. 166.75/USD

Note: The reference tariff component shall be revised after making the required adjustments at the time of COD.

iv) **Indexations applicable to debt**

For foreign debt, respective principal and interest components will be adjusted on bi-annual (quarterly/yearly, if applicable) basis, on account of revised TT & OD selling rate of US Dollar, as notified by the National Bank of Pakistan as at the last day of the preceding period, over the applicable reference exchange rate as approved at COD.

v) **Variations in LIBOR**

The interest part of tariff component for the foreign loan shall also be subject to variation in interest rate as a result of variation in LIBOR according to the following formula:

Δ I	=	P (REV) * (LIBOR (REV) – 1.91213%) / 2
Where;		

ΔI	=	The variation in interest charges applicable corresponding to variation in 6 month LIBOR. ΔI can be positive or negative depending upon whether 6 month LIBOR (REV) > or < 1.91213%. The interest payment obligation will be enhanced or reduced to the extent of ΔI for each period under adjustment.
P (REV)	=	The outstanding principal (as indicated in the attached debt service schedule to this order), at the relevant bi-annual calculations date. Period 1 shall commence on the commercial operations date (i.e. the first figure will be used for the purposes of calculation of interest for the first period after commercial operations date)
LIBOR (REV)	=	Revised 6 month LIBOR as at the last day of the preceding period.

Note: The reference tariff component shall be revised after making the required adjustments at the time of COD. These variations may also be approved on quarterly/yearly basis depending on the final terms approved at the time of COD.

C. Terms and Conditions

The following terms and conditions shall apply to the determined tariff:

- All plant and equipment shall be new and of acceptable standards. The verification of the plant and equipment will be done by the Independent Engineer at the time of the commissioning of the plant duly appointed by the power purchaser.
- This tariff will be limited to the extent of net annual energy generation supplied to the power purchaser up to 24.15% net annual plant capacity factor. Net annual energy generation supplied to the power purchaser in a year, in excess of 24.15% net annual plant capacity factor, will be charged at the following tariffs:

Net annual plant capacity factor	% of prevalent tariff allowed to power producer
Above 24.15% to 24.90%	-
Above 24.90% to 25.50%	20%
Above 25.50% to 26%	40%
Above 26% to 26.50%	60%
Above 26.50%	70%

- The risk of solar resource shall be borne by the power producer.
- The maximum plant PV capacity shall not exceed as given in the Generation License.
- In the above tariff, no adjustment for certified emission reductions has been accounted for. However, upon actual realization of carbon credits, the same shall be distributed between the power purchaser and the power producer in accordance with the applicable GOP Policy, amended from time to time.
- The petitioner is required to ensure that all the equipment is installed as per the details/specifications in the generation license/tariff as awarded by NEPRA.
- The savings in the approved limit of spread over foreign loan shall also be shared between power purchaser and power producer in the ratio of 60:40 at the time of COD or during any time of loan tenor, as applicable.
- In case the company shall secure full or part of local conventional loan then the tariff of company shall be adjusted at the time of COD at applicable KIBOR + spread of 2.25%. The savings in the approved spreads during the loan tenor shall be shared between the power purchaser and power producer in the ratio of 60:40. The tenor of the debt servicing shall not be less than thirteen years for this loan.
- In case the company shall secure foreign loan under any credit insurance (Sinosure etc.) then the cost of that insurance shall be allowed to the maximum limit of 0.6% of the approved yearly outstanding principal and interest amounts. For financing with Sinosure, the spread/margin over LIBOR shall be adjusted to the extent such that the total financing cost (applicable LIBOR + Adjusted Margin + Sinosure) shall not exceed the financing cost without Sinosure (applicable LIBOR + Approved Margin).
- The Authority may consider making revisions in the O&M cost, while capping the allowed prevailing level, anytime during the tariff control period. Those revisions may also entail changing the mix of the approved O&M cost (local and foreign) as well as the indexation mechanism (indices, frequency etc.). For that purpose, the Authority may direct the petitioner to carry out the competitive bidding to select the contractor for the provision of the O&M cost.

- The payment of ROE (including ROEDC) components of tariff shall be due to be made at the end of respective years.

- In case the company earns annual profit in excess of the approved return on equity (including ROEDC), then that extra amount shall be shared between the power producer and consumers through claw back formula to be decided by the Authority. For that purpose, the share of producer as given in the bonus energy mechanism shall be taken into account.

- Allowed limit of degradation has been made part of the approved project cost. No extra financial compensation shall be provided in the EPA.

- The company will have to achieve financial close within one year from the date of issuance of tariff determination. The tariff granted to the company will no longer remain applicable/valid, if financial close is not achieved by the company, for whatever reason, in the abovementioned timeline or its generation license is declined/revoked by NEPRA.

- The targeted maximum construction period from prescribed date/time of financial close is 10 months. No adjustment will be allowed in this tariff to account for financial impact of any delay in project construction. However, the failure of the company to complete construction within 10 months will not invalidate the tariff granted to it.

- Pre COD sale of electricity is allowed to the power producer, subject to the terms and conditions of EPA, at the applicable tariff excluding debt servicing and return components. However, pre COD sale will not alter the required COD stipulated in the EPA in any manner.

- In case the company is obligated to pay any tax on its income from generation of electricity, or any duties and/or taxes, not being of refundable nature, are imposed on the company, the exact amount paid by the company on these accounts shall be reimbursed on production of original receipts. This payment shall be considered as a pass-through payment. However, withholding tax on dividend shall not be passed through.

- No provision for the payment of Workers Welfare Fund and Workers Profit Participation has been made in the tariff. In case, the company has to pay any such fund, that will be treated as pass through item in the EPA.

- The approved tariff along with terms & conditions shall be made part of the EPA. General assumptions, which are not covered in this determination, may be dealt with as per the standard terms of the EPA.

19. The Order part along with 2 Annexures is recommended for notification by the Federal Government in the official gazette in accordance with Section 31(7) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

AUTHORITY

(Rafique Ahmed Shaikh)
Member
2/7/20

(Rehmatullah Baloch)
Member
2/7/2020

(Eng. Bahadur Shah)
Member

(Saif Ullah Chattha)
Vice Chairman
2.7.2020

(Tauseef H. Farooqi)
Chairman

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Annex-I

P&G ENERGY (PVT.) LIMITED
REFERENCE TARIFF TABLE

Year	O&M	Insurance	Return on Equity	Return on Equity during Construction	Principal Repayment	Interest Charges	Tariff
	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh
1	0.8276	0.1854	1.4573	0.0826	1.9392	2.5215	7.0136
2	0.8276	0.1854	1.4573	0.0826	2.0614	2.3992	7.0136
3	0.8276	0.1854	1.4573	0.0826	2.1914	2.2692	7.0136
4	0.8276	0.1854	1.4573	0.0826	2.3296	2.1310	7.0136
5	0.8276	0.1854	1.4573	0.0826	2.4765	1.9841	7.0136
6	0.8276	0.1854	1.4573	0.0826	2.6327	1.8280	7.0136
7	0.8276	0.1854	1.4573	0.0826	2.7987	1.6619	7.0136
8	0.8276	0.1854	1.4573	0.0826	2.9752	1.4855	7.0136
9	0.8276	0.1854	1.4573	0.0826	3.1628	1.2978	7.0136
10	0.8276	0.1854	1.4573	0.0826	3.3623	1.0984	7.0136
11	0.8276	0.1854	1.4573	0.0826	3.5743	0.8864	7.0136
12	0.8276	0.1854	1.4573	0.0826	3.7997	0.6610	7.0136
13	0.8276	0.1854	1.4573	0.0826	4.0393	0.4214	7.0136
14	0.8276	0.1854	1.4573	0.0826	4.2940	0.1666	7.0136
15	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
16	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
17	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
18	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
19	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
20	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
21	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
22	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
23	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
24	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
25	0.8276	0.1854	1.4573	0.0826	-	-	2.5529
Levelized Tariff	0.8276	0.1854	1.4573	0.0826	2.1983	1.4219	6.1731

Annex-II

P&G ENERGY (PVT.) LIMITED

Debt Servicing Schedule - Foreign

Relevant Quarters	Base amount (USD)	Principal Repayment (USD)	Interest (USD)	Balance Principal (USD)	Total Debt Service (USD)	Annual Principal Repayment Rs./kWh	Annual Interest Rs./kWh
1	32,857,058	373,833	506,174	32,483,225	880,006	1.9392	2.5215
2	32,483,225	379,592	500,415	32,103,633	880,006		
3	32,103,633	385,440	494,567	31,718,193	880,006		
4	31,718,193	391,377	488,629	31,326,816	880,006		
5	31,326,816	397,407	482,600	30,929,409	880,006	2.0614	2.3992
6	30,929,409	403,529	476,478	30,525,881	880,006		
7	30,525,881	409,745	470,261	30,116,135	880,006		
8	30,116,135	416,058	463,949	29,700,078	880,006		
9	29,700,078	422,467	457,539	29,277,610	880,006	2.1914	2.2692
10	29,277,610	428,975	451,031	28,848,635	880,006		
11	28,848,635	435,584	444,423	28,413,051	880,006		
12	28,413,051	442,294	437,712	27,970,757	880,006		
13	27,970,757	449,108	430,899	27,521,649	880,006	2.3296	2.1310
14	27,521,649	456,027	423,980	27,065,623	880,006		
15	27,065,623	463,052	416,955	26,602,571	880,006		
16	26,602,571	470,185	409,821	26,132,386	880,006		
17	26,132,386	477,429	402,578	25,654,957	880,006	2.4765	1.9841
18	25,654,957	484,783	395,223	25,170,174	880,006		
19	25,170,174	492,252	387,755	24,677,922	880,006		
20	24,677,922	499,835	380,171	24,178,087	880,006		
21	24,178,087	507,535	372,471	23,670,552	880,006	2.6327	1.8280
22	23,670,552	515,354	364,653	23,155,198	880,006		
23	23,155,198	523,293	356,713	22,631,905	880,006		
24	22,631,905	531,355	348,652	22,100,550	880,006		
25	22,100,550	539,540	340,466	21,561,010	880,006	2.7987	1.6619
26	21,561,010	547,852	332,154	21,013,158	880,006		
27	21,013,158	556,292	323,715	20,456,866	880,006		
28	20,456,866	564,862	315,145	19,892,004	880,006		
29	19,892,004	573,564	306,443	19,318,440	880,006	2.9752	1.4855
30	19,318,440	582,400	297,607	18,736,041	880,006		
31	18,736,041	591,372	288,635	18,144,669	880,006		
32	18,144,669	600,482	279,525	17,544,187	880,006		
33	17,544,187	609,733	270,274	16,934,455	880,006	3.1628	1.2978
34	16,934,455	619,126	260,881	16,315,329	880,006		
35	16,315,329	628,664	251,343	15,686,665	880,006		
36	15,686,665	638,348	241,658	15,048,317	880,006		
37	15,048,317	648,182	231,824	14,400,135	880,006	3.3623	1.0984
38	14,400,135	658,168	221,839	13,741,967	880,006		
39	13,741,967	668,307	211,699	13,073,660	880,006		
40	13,073,660	678,602	201,404	12,395,058	880,006		
41	12,395,058	689,057	190,950	11,706,001	880,006	3.5743	0.8864
42	11,706,001	699,672	180,335	11,006,330	880,006		
43	11,006,330	710,450	169,556	10,295,879	880,006		
44	10,295,879	721,395	158,611	9,574,484	880,006		
45	9,574,484	732,508	147,498	8,841,976	880,006	3.7997	0.6610
46	8,841,976	743,793	136,214	8,098,183	880,006		
47	8,098,183	755,251	124,755	7,342,931	880,006		
48	7,342,931	766,886	113,120	6,576,045	880,006		
49	6,576,045	778,700	101,306	5,797,345	880,006	4.0393	0.4214
50	5,797,345	790,696	89,310	5,006,648	880,006		
51	5,006,648	802,877	77,129	4,203,771	880,006		
52	4,203,771	815,246	64,760	3,388,525	880,006		
53	3,388,525	827,805	52,201	2,560,720	880,006	4.2940	0.1666
54	2,560,720	840,558	39,449	1,720,162	880,006		
55	1,720,162	853,507	26,500	866,655	880,006		
56	866,655	866,655	13,351	0	880,006		