Registrar

National Electric Power Regulatory Authority
Islamic Republic of Pakistan

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No. NEPRA/TRF-405/HPPL-2017/1183-1185
January 25, 2018

Subject: **Determination of National Electric Power Regulatory Authority in the matter of Tariff Petition filed by M/s. Helios Power (Pvt.) Limited for Determination of Reference Generation Tariff in respect of 50 MWp Solar Power Project** (Case No. NEPRA/TRF-405/HPPL-2017)

Dear Sir,

Please find enclosed herewith the subject Determination of the Authority along with Annex-I & II (26 pages) in Case No. NEPRA/TRF-405/HPPL-2017.

2. The Determination is being intimated to the Federal Government for the purpose of notification in the official gazette pursuant to Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

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

Enclosure: As above

25/01/18
(Syed Safeer Hussain)

Secretary
Ministry of Energy
'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 HELIOS POWER (PVT.) LIMITED FOR DETERMINATION OF REFERENCE GENERATION TARIFF IN RESPECT OF 50 MWp SOLAR POWER PROJECT

1. M/s Helios Power (Pvt.) Ltd. (hereinafter referred to as the "HPPL" or "the petitioner/company") filed a tariff petition before National Electric Power Regulatory Authority ("NEPRA/the Authority") on August 7, 2017 for determination of reference generation tariff under NEPRA (Tariff Standards & Procedure) Rules, 1998 ("Tariff Rules") in respect of its 50 MWp solar power project to be set up at Goth Gagrawara, Taluka Saleh Pat, District Sukkur, Sindh.

SUBMISSION OF THE PETITIONER

2. The petitioner submitted that it is a company incorporated with Securities and Exchange Commission of Pakistan ("SECP") and Energy Department, Government of Sindh has issued letter of intent (LOI) to it for establishment of 50 MW solar PV power generation project.

3. Summary of the key information provided in the tariff petition is as follows:

Project company	:	Helios Power (Pvt.) Ltd.
Sponsor	:	Nizam Energy (Pvt.) Ltd and Scatec Sukhur B.V
Capacity	:	50 MWp
Project location	:	Goth Gagrawara, Taluka Saleh Pat, District Sukkur, Sindh
Land area	:	236.7 Acres
Concession period	:	25 years from COD
Purchaser	:	Central Power Purchasing Agency (Guarantee) Ltd.
PV modules	:	BYD330-P6C-36DG – Series 4BB solar modules
Inverter	:	Sungrow SG 3000HV PV inverter
Plant capacity factor	:	22.21%
Annual Energy production	:	97,281.47 GWh for year 1 at P50
EPC contractor	:	Consortium of Scatec Solar ASA (offshore) and Scatec Solar (Pvt.) Ltd. (Onshore)
O&M contractor	:	Scatec Solar (Pvt.) Ltd.
Project basis	:	BOO

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Project cost		**US$ in millions**	
EPC Price	:	43.000	
Non-EPC & Project Development Cost	:	2.832	
Pre-COD Insurance	:	0.215	
Financial Charges	:	0.901	
Interest during construction	:	1.021	
Total project cost	:	**47.969**	
Financing structure	:	Debt: 75% Equity: 25%	
Debt composition	:	100% Foreign loan	
Interest rate	:	3 month LIBOR (0.6%) + 4.3%	
Debt repayment term	:	15 years (door to door)	
Grace period	:	Upto 12 months	
Repayment basis	:	Quarterly	
Return on equity	:	16% IRR based	
Annual Operations cost (US$ million):		**Year 1-14**	**Year 15-25**
O&M cost (foreign)	:	0.634	0.586
O&M cost (local)	:	0.143	0.143
Insurance cost	:	0.215	0.215
Total annual operational cost	:	**0.991**	**0.943**
Tariff:		**PKR/kWh**	**US cents/kWh**
Year (1-14)	:	6.9904	6.6575
Year (15-25)	:	3.0892	2.9421
Levelized Tariff	:	**6.2553**	**5.9574**
Exchange rate	:	1 USD = PKR 105	

PROCEEDINGS

4. In accordance with Rule 4 of Tariff Rules, the tariff petition was admitted by the Authority on August 30, 2017. Notice of Admission was published in the daily national newspapers on

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September 28, 2017 providing salient features of the petition and inviting comments/intervention request from the interested parties. In response to the Notice of Admission, no comments or intervention request was received by NEPRA.

5. Based on the submissions of the petitioner, the issues were framed by the Authority. Notice of Hearing was published in daily national newspapers on October 26, 2017 conveying schedule of hearing and issues framed for the hearing. Individual Notices of hearing were also served to the relevant stakeholders on October 26, 2017 for participation in the hearing. Subsequently, the hearing was adjourned by the Authority and re-scheduled for November 14, 2017. Notice of re-scheduling of hearing was published in daily national newspapers on November 8, 2017 and individual notices were also sent to the petitioner and stakeholder vide letter dated November 9, 2017 accordingly.

6. Post advertisement of Notice of Hearing, Anwar Kamal Law Associates (AKLA) vide letter No. R/NEPRA/780/17 dated October 30, 2017 submitted an intervention request in the instant case. The intervention request of AKLA was considered by the Authority as filing of comments and communicated to AKLA on November 14, 2017. The submissions of AKLA were sent to the petitioner for comments on which the petitioner vide letter dated December 6, 2017 responded to commentator's submissions.

7. The hearing was held on November 14, 2017 (Tuesday) at 12:00 noon at NEPRA Tower, G-5/1, Islamabad which was attended by a large number of participants including the petitioner, representatives of Alternative Energy Development Board (AEDB), Energy Department, Government of Sindh, Punjab Power Development Board ("PPDB") and others. The relevant submissions of the petitioner and commentators are discussed below in related issues.

ISSUES OF HEARING

8. Following is the list of issues that were framed by the Authority for the hearing:

   - Whether the claimed EPC cost is competitive, comparative and based on the firm and final agreement(s)?
   - Whether the claimed Non-EPC cost is justified?
   - Whether the claimed annual energy production and capacity utilization factor of 22.21% are reasonable and justified?
   - Whether the petitioner's proposed solar modules and inverter technology satisfies the international standards of quality and operation?

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- Whether calculation/study of ground irradiance data was carried out or otherwise?
- Whether the assumed degradation factor of 0.7% per annum is reasonable and justified?
- Whether the claimed O&M costs are justified?
- Whether the claimed insurance during operation cost is justified?
- Whether the claimed return on equity of 16% is justified?
- Whether the financing/debt terms are justified?
- Whether the claimed construction period is justified?
- Whether the consent for power purchase from CPPA-G has been obtained?
- Any other issue with the approval of the Authority

The issue wise discussion is as follows.

Whether the claimed EPC cost is competitive, comparative and based on the firm and final agreement(s)?

9. The petitioner has claimed USD 43.000 million on account of EPC cost comprising of offshore portion of USD 30.530 million and onshore supply & service portion of USD 12.470 million.

10. In its petition, HPPL submitted that the claimed EPC cost includes the cost of 151,530 Nos. PV Modules, 14 PV inverters, trackers, 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.

11. Regarding the process of selection of EPC contractor, HPPL submitted that in early 2017 it had approached different EPC contractors and suppliers to assess their interest in the project. Based on the interest shown during the meetings, HPPL requested bids from the interested parties. In response to Request for Proposal ("RFP"), HPPL received compliant offers from the following entities:

    i) Suzhou Akcome Energy Engineering Technology Co. Ltd.
    ii) Sumec Complete Equipment and Engineering Co. Ltd.
    iii) Scatec Solar, ASA

12. The petitioner stated that based on technical and financial review, the best offer was received from Scatec Solar ASA that was mainly driven by their extensive experience in implementing

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utility scale solar power project EPCs in comparable geographic locations with more than 50% of the operational portfolio based on single axis tracker which has superior electricity production capacity compared to fixed tilt solution. Further, the EPC offer from Scatec Solar, ASA becomes more competitive due to economies of scale of three adjacent solar projects while other bidders were reluctant in taking the risk of sharing the volume savings. The petitioner further stated that Scatec Solar offer included commitment for arrangement of debt financing at lucrative rates from international lenders whereas other bidders did not offer any financing solution. The commitment for long-term financing arrangement as part of EPC package by Scatec solar further ensure achievement of the lowest levelised solar tariff ever awarded in Pakistan's history.

13. In view of the above, HPPL submitted that the company decided to appoint consortium of Scatec Solar ASA for offshore EPC works and Scatec Solar (Pvt.) Ltd. for onshore EPC works. The EPC agreement was signed on May 11, 2017 to develop the project. The petitioner has provided signed copies of offshore supply contract and onshore supply & service contract along with its petition and submitted that EPC agreement is a 'firm prices and fixed commercial operations date' agreement.

14. HPPL submitted that as per the signed EPC agreement, PV module manufacturer "BYD" will provide solar panels. Inverters for the project shall be procured from "Sungrow". The petitioner submitted that BYD is one of the world's top PV manufacturers, produces from wafer to module, and is committed to high quality sustainable products and continuous improvement. Further, HPPL stated that Sungrow is a global leading PV inverter system solution supplier and the selected inverters provide secured yield and flexibility of operations.

15. Justifying its claim, the petitioner submitted that the EPC cost being claimed by the company is significantly lower compared to the EPC costs allowed in previous upfront solar tariff determination issued by NEPRA till date. It is also significantly lower even if compared with the EPC cost assumed in last suo-moto proceedings initiated by NEPRA in May 2016.

16. To evaluate the EPC cost claim of HPPL, 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 by other comparable solar power projects were also examined. It was found that the equipment prices (modules, inverters, mounting structures etc.) in most of the countries were roughly the same. The differences were noticed in total setup cost primarily because of the soft costs such as

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land cost, development cost, available expertise, cost of labour, manufacturing facilities etc. Analysing all this data, the Authority is of the view that cost claimed by HPPL is relatively on the higher side and does not account for the favourable impact of three projects at one place by the sponsor. In view thereof, the Authority has considered that claimed EPC cost is not prudent and requires assessment.

17. It has been noted that the average prices of solar modules of different types and brands have gone as low as USD 0.32 million per MW. The costs of inverters have been reported as low as USD 0.04 million per MW. For mounting structures, the prices were found as USD 0.08 million per MW for fixed tilt and USD 0.15 million per MW for tracking technologies. Nevertheless, the factors such as transportation cost, existing market conditions, local manufacturing base, purchasing from good manufacturer etc. were given due consideration. The costs of civil and electrical works as allowed by the Authority in the previous upfront tariffs were modified slightly only to account for the impact of the scale of the project. It has also been ensured to provide a reasonable amount of profits to the EPC Contractors. Keeping in view all these factors, the Authority has assessed the EPC cost of HPPL as USD 0.746 million per MW (USD 37.275 million) which is hereby approved.

18. The allowed EPC cost is the maximum limit on overall basis. Applicable foreign portion of this cost shall be allowed variations at Commercial Operations Date ("COD") due to change in PKR/USD parity during the allowed construction period, on production of authentic documentary evidence to the satisfaction of the Authority.

Whether the claimed Non-EPC cost is justified?

19. The petitioner has claimed USD 4.969 million on account of non-EPC cost. The break-up of cost components provided by the petitioner is as follows:

Non-EPC Cost Items	(USD Million)
Non-EPC & Project Development Cost	2.832
Pre-COD Insurance cost	0.215
Financial charges	0.901
Interest during construction	1.021
Total	**4.969**

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Non EPC and Project Development Cost

20. The petitioner has submitted following break-up of non-EPC and project development cost in its tariff petition:

S.#	Non-EPC & Project Development Cost	(USD Million)
i	Consultancy Cost & technical studies-Pre-financial close	0.894
ii	Owner's Engineer supervision-Post financial close	0.100
iii	Independent engineer-pursuant to the EPA	0.150
iv	Permits, permissions and related costs	0.166
v	Site, security and infrastructure	1.115
vi	Administration cost	0.234
vii	Travelling costs	0.173
	Total	**2.832**

i) Consultancy & Technical studies cost of USD 0.894 million has been claimed related to project consultants/advisors engaged for project planning, engineering, financial, legal and technical matters. HPPL has submitted that based on the requirements of the technical consultants, it has already completed site surveys, electrical, geotechnical, topographical, soil and other related studies for the purpose of completing project's feasibility study. The petitioner further claimed that this cost also includes lenders' advisors fee, stamp duty, agency fee, security trustee fee, lender's monitoring fee etc. The Authority has examined this cost in light of the claim of other solar power projects while accounting for the impact of economies of scale and has decided to allow USD 0.34 million to HPPL under this cost head. The cost related to lenders has been accounted for in the financing fee and charges explained below.

ii) Owner's Engineer Supervision cost of USD 0.100 million has been claimed. HPPL has submitted that it will engage an experienced engineering supervision team to ensure the contractors compliance with the relevant contracts, as well as reporting on progress and budget. The construction supervision team will comprise a site engineer supported by technical experts. The Owner's Engineer will also conduct review of proposed designs, construction, monitoring and witnessing of key test to ensure project's success. The Authority has examined this cost in light of the claim of other solar power projects while accounting for

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the impact of economies of scale and has decided to allow USD 0.067 million to HPPL under this head.

iii) Independent engineer cost of USD 0.150 million has been claimed. HPPL has submitted that it is required to engage an Independent Engineer pursuant to the standard EPA. Under the terms of the EPA the independent Engineer will be a firm of engineering consultants that would be appointed and hired by HPPL with the approval of the CPPA-G to monitor the construction of the Complex and Commissioning and to deliver the related certificates and carry out all of the responsibilities specified in the EPA, including certifying the results of the commissioning tests, readiness of interconnection facilities and synchronization. The Authority has examined this cost in light of the claim of other solar power projects and has decided to allow USD 0.10 million to HPPL under this head.

iv) The petitioner has claimed USD 0.166 million on account of Permits, Permissions and related costs. HPPL has submitted that during development and construction of the project, it will incur costs related to various fees and charges payable in respect of permits and permissions required from various authorities and regulatory bodies including but not limited to cost of bank guarantees for LOI and LOS, SBLC in favour of power purchaser, NOC from competition commission, LOI Fee, AEDB/Energy Department facilitation and legal fee, NTDCL vetting charges for Grid Electrical Grid Studies, NEPRA fees and charges, registration and other charges to SECP etc. The Authority has examined this cost in light of the claim of other solar power projects while accounting for the impact of economies of scale and has decided to allow USD 0.025 million to HPPL under this head.

v) The petitioner has claimed USD 1.115 million for site, security and infrastructure. In its petition, HPPL submitted that this cost head include the upfront payment for site lease for first 10 years, site levelling and preparation, site access, infrastructure, electricity connection, fencing cost, access road, staff housing, etc. and security costs for local, foreign personnel and contractor staff. The Authority has examined this cost in light of the claim of other solar power projects. Nevertheless, the differences in the development levels of the sites of other solar project(s) were given due consideration. In view thereof, the Authority has decided to allow USD 1.00 million under this head.

vi) The petitioner has claimed USD 0.234 million on account of administration cost for expenditure such as company registration, salaries of accounting and admin staff, rent, utilities, equipment inspection, communication, vehicle fuel & maintenance and allied expenses during the construction period and SBLC cost to be provided to financiers. The

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Authority has examined this cost in light of the claim of other solar power projects while accounting for the impact of economies of scale and tenor of development. The Authority has decided to allow USD 0.15 million to HPPL under this head.

vii) The petitioner claimed USD 0.173 million on account of travelling costs of Norwegian and local staff for travelling and accommodation expenses. The Authority has examined this cost in light of the claim of other solar power projects while accounting for the impact of economies of scale and has decided to allow USD 0.10 million to HPPL under this head.

21. In view of the above, the Authority has decided to allow Non-EPC and project development cost of USD 1.782 million to the petitioner. Non-EPC and project development (item-wise) cost shall be adjusted at actual, up to the maximum allowed cost, based on production of verifiable documents at the time of COD.

Pre-COD insurance cost

22. The petitioner has claimed USD 0.215 million on account of pre-COD insurance cost based on 0.5% of EPC cost. HPPL has requested to allow the said cost at actual up to 1.0% of EPC in case it cannot arrange insurance at 0.50% due to any reason beyond its control. Following insurance coverage has been requested by the petitioner:

    a) Construction All Risk Insurances (CAR)
    b) CAR delay in start-up insurance
    c) Terrorism insurance
    d) Marine and inland transit insurance
    e) Marine-delay-in start-up insurance
    f) Comprehensive General Liability

23. The Authority has examined the data of this cost for the comparable operational power projects. Moreover, it has also been noted that one of the solar power project is not even claiming this cost. Also, this cost as allowed in the most recent decisions of comparable renewable technologies was looked at. Based on this information, the Authority has decided to allow insurance during construction at the rate of 0.5% of the allowed EPC cost to HPPL which works out to be around USD 0.186 million. Insurance during construction shall be adjusted at actual, subject to allowed amount as maximum limit, at the time of COD on production of authentic documentary evidence to the satisfaction of the Authority.

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Financial charges

24. The petitioner has claimed USD 0.901 million on account of financial charges which includes lenders up-front fee, arrangement fee and commitment fee including appraisal fee adjustable against front end fee at 2.50% of debt amount. The petitioner has submitted that these financial 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.

25. The Authority noted that financial charges claimed by the petitioner works out to be around 2.5% of debt portion of claimed capital expenses. In line with its most recent decision in the comparable renewable energy projects, the Authority has decided to allow financing fee and charges at the rate of 2.5% on the allowed debt portion of the approved capital cost of HPPL which also included the cost related to lenders claimed by the petitioner under Non-EPC cost. Accordingly, the allowed amount under this head works out to be around USD 0.736 million. Financial Charges shall be adjusted at actual, subject to allowed amount as maximum limit, at the time of COD on production of authentic documentary evidence to the satisfaction of the Authority.

Interest during construction (IDC)

26. The petitioner has claimed USD 1.021 million on account of interest during construction (IDC) based on agreed term sheet with lenders for a construction period of ten (10) months while using 3 month LIBOR (0.6%) plus spread of 4.3%. HPPL has submitted that for the calculation of the IDC, a notional drawdown schedule has been assumed and that actual IDC shall change subject to fluctuation of base interest, actual drawdowns during construction, taxes & duties and variation in PKR/USD exchange rate.

27. Based on the approved EPC cost, drawdowns schedule as provided by the petitioner and taking into account the claimed construction period of ten months, the interest during construction works out to be around USD 0.670 million and is hereby approved. The terms of financing 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, for the allowed construction period starting from the date of financial close, on the basis of actual drawdowns (within the overall debt allowed by the Authority at COD) by applying 3 month LIBOR applicable at the day of the respective drawdowns.

28. Recapitulating above, the approved project cost under various heads is given hereunder:

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Project cost	(USD Million)
EPC Cost	37.275
Non-EPC and Project Development Cost	1.782
Insurance during construction	0.186
Financial Charges	0.736
Interest During Construction	0.670
Total	**40.649**

Whether the claimed annual energy production and net plant capacity utilization factor of 22.21% are justified? Whether the petitioner's proposed solar modules and inverter technology satisfies the international standards of quality and operation? Whether calculation/study of ground irradiance data was carried out or otherwise?

29. The petitioner submitted that in line with AEDB's guidelines, the project's technical consultant has carried out detailed evaluations to estimate the energy production for the project and the summary of the results is as follows:

Project capacity	50 MWp
Annual energy generation	97.281 GWh
Net capacity factor	22.21%

30. HPPL submitted that it has selected one of the world's top PV module manufacturers "BYD Company Ltd.", listed on Hong Kong Stock Exchange and Shenzhen Stock Exchange and PV inverter supplier "Sungrow" for the Project. In its petition, HPPL submitted that polycrystalline silicon, double glass solar modules of BYD shall be installed for this project which has proven energy yield advantage as double glass technology allows better and more efficient cleaning options and improves the thermal characteristics and reduces the potential induces degradation effect of the module. For inverters, HPPL submitted that inverters of Sungrow shall be installed for this project which is a global leading PV inverter system solution supplier. The petitioner submitted that detailed resource assessment was conducted through site surveys as well as commonly used meteorological database were reviewed and modeled. HPPL submitted that based on sixteen years of solar data, the average annual solar resource, i.e. Global Horizontal Irradiation is found to be 1987.6 kWh/m^2. Based on the said solar resource, proposed technology

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31. AEDB during the hearing commented that capacity factor 22.21% claimed by the petitioner is very high being non-achievable. AEDB opined that NPMV benefit may be allowed to the petitioner if power purchaser will not purchase power from HPPL than the payment may be made to the petitioner by the power purchaser on the basis of claimed capacity factor.

32. The Authority has considered the modules and inverters proposed by HPPL with respect to their quality and energy yield. The solar resource figure submitted by the petitioner has also been checked. Considering these factors, the Authority is of the view that the proposed net annual capacity utilization factor of 22.21% 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 capacity utilization factor.

Whether the assumed degradation factor of 0.7% per annum is reasonable and justified?

33. The petitioner stated in the petition that ageing and degradation of PV modules would impact electricity generation and revenue inflows during the project's life. The petitioner requested to allow the actual degradation subject to a cap of 0.7% per annum of initial power through adjustment in reference tariff in respective years.

34. AKLA submitted that solar technology has comparatively achieved much maturity in the last few years; therefore, degradation factor should not exceed 0.5%. AEDB also supported for degradation factor to the maximum of 0.5%. AEDB further suggested that instead of adjustment of tariff on annual basis on account of degradation, its impact may be capitalized as the Authority has already done in upfront tariff for solar PV power projects for the year 2016.

35. It has been noted that the Authority approved degradation factor of 0.5% in the last upfront tariff of solar technology. In view thereof, the Authority has decided to approve annual degradation factor of 0.5%. The Authority has considered the submissions of the petitioner and AEDB with respect to adjustment of degradation factor and has decided to capitalize its impact in the approved project cost. The amount of USD 1.349 million has been made part of the approved project cost while calculating the same at the levelized rate of 3.62% of the allowed EPC cost.

Whether the claimed O&M costs are justified?

36. The petitioner has submitted following break-up of O&M cost per annum:

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O&M cost	USD (Million)/annum	
	Year 1-14	Year 15-25
O & M (foreign component)	0.634	0.586
O & M (local component)	0.142	0.142
Total	**0.776**	**0.728**

37. The petitioner has claimed indexation with PKR/USD and US CPI for the foreign O&M portion and indexations with respect to local CPI for local portion of O&M. According to the petitioner submission, 81% of O&M cost comprises of foreign component and 19% O&M cost comprises of local component.

38. In its petition, the petitioner submitted that it will execute two separate contracts covering initial O&M contract of 1-14 years for lenders requirement and extended O&M contract (optional) for 15-25 years operational period. The petitioner submitted that it is in process of finalization of O&M arrangement with Scatec Solar (Pvt.) Ltd. (O&M contractor). The O&M contractor shall be responsible for provision or procurement and performance of all the works, services, supplies and other activities including management services necessary to operate and maintain the project to ensure energy production is maximized and that the project is operated and maintained in accordance with the applicable performance standards, agreed environmental-social and monitoring plans and prudent operating practices. Upon completion of the 14 years O&M contract period, HPPL has submitted that it will carry out a cost benefit analysis of carrying out the O&M themselves or again outsourcing the work to an O&M contractor. This decision will depend on a number of factors including level of development of the local solar industry, availability of critical spare parts in the secondary market, presence of skilled manpower in the local market etc.

39. The petitioner stated the claimed O&M cost is quite lower than costs earlier approved by NEPRA in its upfront tariffs. The O&M cost is well within international and local benchmarks. The petitioner submitted that cost of O&M of single axis technology is usually higher compared to fixed tilt technology.

40. AKLA in its submissions highlighted that presently O&M cost for solar power plants is very low, hence the cost needs to be revised downwards.

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41. To evaluate this claim of HPPL, the O&M cost being allowed in other parts of the world has been referred while keeping in view the market conditions, required skilled manpower, spare parts, inverters etc. As this cost component constitutes significant portion of the cost of human resource, hence, it was noted that doing comparison of O&M cost with the developed countries may not be appropriate due to higher labour costs in those countries. The submission of the petitioner regarding higher O&M cost of tracking solar power plants was also given due consideration. Nevertheless, the Authority noted that as the project developer is doing three projects, hence, the approved O&M cost should reflect the impact of economies of scale. Based on these analyses, the Authority has decided to approve USD 0.56 million per year in respect of O&M cost to HPPL. The Authority has noted that the cost of manpower required for management office and site office constitutes quite a large portion of the total O&M cost which can be incurred in local currency. Further, it has also been noted that O&M cost in upfront tariffs were approved allowing major portion in local cost. In view thereof, the allowed O&M cost has been divided into local and foreign components in the ratio of 50:50. This cost has been approved for the entire tariff control period and shall be allowed adjustment on quarterly basis as per the mechanism given in the order part of this determination.

Whether the claimed insurance during operation cost is justified?

42. The petitioner submitted that Insurance Cost during operation consists of the insurances required under the Implementation Agreement and the Energy Purchase Agreement coupled with those customarily required for project financing transactions. HPPL, in view of the practices set by the other IPPs in Pakistan and in accordance with the requirements set by the lenders, proposes to procure the following insurance during the operational phase of the Project:

- Property Damage and Comprehensive Machinery Insurance (including Business Interruption insurance);
- Third Party Liability;
- Terrorism insurance;
- Group Personal Accident Insurance; and
- Motor Comprehensive Insurance.

43. HPPL submitted that it intends to acquire insurance from one of the leading insurance companies in the country. The petitioner submitted that it is standard practice for local insurers to only retain 5% of the risk and acquire reinsurance for the remaining 95% through foreign reinsurer. Further, HPPL submitted that the lenders financing the Project will inevitably require the project

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cost (denominated in US dollars) to be insured on replacement cost basis. Stating these reasons, it has requested the Authority to allow the insurance cost in US dollars.

44. The petitioner submitted that the insurance during operation cost has been estimated at 0.50% of the EPC Cost based on the strength of the Nizam Group, however any increase therefrom up to 0.75% of the EPC Cost may kindly be allowed upon submission of evidence.

45. Based on the data of operational power projects, NEPRA has allowed insurance during operation at the rate of 0.5% of the EPC cost in the recent cases of comparable renewable energy projects. In view thereof, the Authority has decided to allow insurance during operation at maximum limit of 0.5% of the approved EPC cost to HPPL. This cost shall be allowed adjustment on annual basis as per the mechanism given in the order part of this determination.

Whether the claimed Return on Equity ("ROE") of 16% on Internal Rate of Return ("IRR") is justified?

46. The petitioner has submitted that by applying the internationally accepted Capital Asset Pricing Model, the required return for this project works out to be 19.43%. However, the petitioner submitted that it is claiming Return on Equity of 16% (IRR basis) subject to the condition that the claimed project costs is accepted and allowed by NEPRA. The petitioner submitted that if NEPRA reduces the claimed project costs, the requested ROE may proportionately be increased to arrive at a levelized tariff of US Cents 5.9574/kWh. For the calculation of the claimed tariff, the petitioner did not include the impact of Return on Equity during Construction ("ROEDC") and requested the Authority to allow the same at the time of COD.

47. The Authority has noted that in the most recent comparable cases of renewable technologies, it has allowed IRR to the limit of 15%. In view thereof, the Authority has decided to approve the ROE at the rate of 15% on IRR basis for HPPL.

Whether the financing/debt terms are justified?

48. The petitioner has submitted that the capital structure of the Project is envisaged at 75:25 (Debt: Equity). FMO Entrepreneurial Development Bank will provide 100% of the loan requirement. The door to door tenor of the loan agreed with the lenders is 15 years. The financing will be based on 3-month LIBOR plus a margin of 4.3%. To support the claim of its financing cost, the petitioner submitted the indicative term sheet with the petition.

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49. The Authority has noted that the premiums of 4.25% over base LIBOR has been allowed in the most recent cases of comparable renewable technologies. In view thereof, the Authority has decided to allow financing cost at the rate of LIBOR plus premium of 4.25% to HPPL. The claimed debt to equity ratio of 75:25 and debt servicing tenor of fourteen years are found reasonable and hereby approved.

Whether the claimed construction period is justified?

50. During hearing the petitioner apprised the Authority that the construction period for developing the project is 10 months. AKLA in its approved comments submitted that construction period of solar power plant is quite low and it should not be more than 9 months. The Authority has found that the claim of the petitioner is reasonable and has decided to allow the same.

Whether the consent for power purchase from CPPA-G has been obtained?

51. With its petition, the petitioner submitted approval of grid connectivity of project issued by Sukkur Electric Power Company (SEPCO) letter dated March 3, 2017 and certificate of approval of system studies issued by National Transmission & Despatch Company (NTDC) vide letter dated June 20, 2017. SEPCO vide another letter dated March 3, 2017, inter alia, gave its consent to CPPA-G for the purchase of solar power from HPPL. However, certificate of consent of power purchaser i.e. CPPA-G was not submitted with the tariff petition.

52. For the submission of the consent letter, NEPRA vide letter dated September 26, 2017 directed the petitioner to submit consent certificate of CPPA-G. In response, the petitioner vide letter dated October 12, 2017 requested the Authority to process the tariff petition without the pre-requisite of the consent of power purchaser as there is no such requirement stipulated in the Tariff Rules. During the hearing also, the petitioner emphasized that NEPRA should award the tariff without consent letter of CPPA-G as Tariff Rules, 1998 do not require the said letter.

53. It was noted that in its decision dated September 20, 2017 regarding review motion filed by two solar projects, the Authority had decided that the solar power projects may file petition under Tariff Rules, 1998, subject to submission of power evacuation letter and power purchase consent letters. These requirements were put in place to ensure the availability of technical and commercial arrangements post award of tariff to the project companies. However, the Authority has observed that this condition has been exploited by CPPA-G's as it has not been following a uniform policy for the issuance of consent letters. It was noted that certain projects are issued consent to purchase power whereas other projects are not issued the said letter without any

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plausible justifications. Further, the Authority has noted that there is no requirement of submission of purchaser's consent letter under Tariff Rules, 1998. In view thereof, the Authority has decided to award tariff to HPPL without the requirement of consent of power purchaser.

Permanent Working Capital Cost Component

54. HPPL has requested to allow a permanent working capital cost component in the tariff of the company at the time of COD. It has requested the said component to cover the lag of receipts and payments. The Authority has considered this submission of the petitioner and found that the working capital component has never been allowed for the tariffs of solar technology by the Authority. In view thereof, the Authority has decided to disallow this claim of the petitioner.

ORDER

55. The Authority hereby determines and approves the following generation tariff along with terms and conditions for M/s Helios Power (Private) Limited for its 50 MWp power project for delivery of electricity to the power purchaser:

Rs./kWh

Tariff Components	Year 1-14	Year 15-25
Operations and Maintenance Cost	0.6044	0.6044
Insurance during Operation	0.2012	0.2012
Return on Equity	1.8025	1.8025
Debt Servicing	3.5945	-
Total	**6.2026**	**2.6081**

- Levelized tariff works out to be US Cents 5.2622/kWh.
- The aforementioned tariff is applicable for twenty five (25) years.
- Debt Service shall be paid in the first 14 years of commercial operation of the plant.
- Debt Servicing has been worked out using three months LIBOR (1.694%) + Spread (4.25%).
- Debt to Equity of 75:25 has been used.
- Return on Equity during construction and operation of 15% has been allowed.
- Construction period of ten (10) months has been allowed for the workings of ROEDC and IDC.
- Insurance during Operation has been calculated as 0.50% of the allowed EPC Cost.
- Reference Exchange Rates of 105 PKR/USD has been used.

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

A. <u>One Time Adjustments at COD</u>

- Applicable foreign portion of the allowed EPC cost will be adjusted at COD on account of variation in PKR/USD parity, on production of authentic documentary evidence to the satisfaction of the Authority. The adjustment in approved EPC cost shall be made only for the currency fluctuation against the reference parity values.
- For cost items other than EPC cost, the amounts allowed in USD will be converted in PKR using the reference PKR/USD rate of 105 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.
- 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), applicable LIBOR and premium.
- The tariff has been determined on debt : equity ratio of 75 : 25. The tariff shall be adjusted on actual debt : equity mix at the time of COD, subject to equity share of not more than 25%. For equity share of more than 25%, allowed IRR shall be neutralized for the additional cost of debt : equity ratio.
- The reference tariff has been worked out on the basis of 3 months LIBOR of 1.694% plus a premium of 425 basis points. In case negotiated spread is less than the said limits, the savings in the spread over LIBOR shall be shared between the power purchaser and the power producer in the ratio of 60:40 respectively.
- 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 ten months allowed by the Authority.

B. <u>Indexations</u>

i) **<u>Operation and Maintenance Costs</u>**

O&M components of tariff shall be adjusted on account of change in local Inflation (CPI), foreign inflation (US CPI) and exchange rate quarterly on 1st July, 1st October, 1st January and 1st April

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based on the latest available information with respect to CPI notified by the Pakistan Bureau of Statistics (PBS), US CPI issued by US Bureau of Labor Statistics and revised TT & OD selling rate of US Dollar notified by the National Bank of Pakistan as per the following mechanism:

$$F.\ O\&M_{(REV)} = F.\ O\&M_{(REF)} * US\ CPI_{(REV)} / US\ CPI_{(REF)} * ER_{(REV)} / ER_{(REF)}$$

$$L.\ O\&M_{(REV)} = L.\ O\&M_{(REF)} * CPI_{(REV)} / CPI_{(REF)}$$

Where;

F V. O&M $_{(REV)}$	=	The revised O&M Foreign Component of Tariff
L. O&M $_{(REV)}$	=	The revised O&M Local Component of Tariff
F. O&M $_{(REF)}$	=	The reference O&M Foreign Component of Tariff
L. O&M $_{(REF)}$	=	The reference O&M Local Component of Tariff
US CPI $_{(REV)}$	=	The revised US CPI (All Urban Consumers)
US CPI $_{(REF)}$	=	The reference US CPI (All Urban Consumers) of 246.669 for the month of November, 2017
CPI $_{(REV)}$	=	The revised CPI (General)
CPI $_{(REF)}$	=	The reference CPI (General) of 220.420 for the month of November, 2017
ER $_{(REV)}$	=	The revised TT & OD selling rate of US dollar
ER $_{(REF)}$	=	The reference TT & OD selling rate of RS. 105/USD

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

ii) **Insurance during Operation**

The actual insurance cost for the minimum cover required under contractual obligations with the Power Purchaser, not exceeding 0.5% of the 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

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$P_{(Ref)}$	=	Reference premium @ 0.5% of EPC Cost at Rs. 105
$P_{(Act)}$	=	Actual premium or 0.5% of the EPC Cost converted into Pak Rupees on exchange rate prevailing at the time of insurance premium payment of the insurance coverage period whichever is lower.

iii) **<u>Return on Equity</u>**

The ROE component of the tariff will be adjusted on quarterly basis on account of change in PKR/USD 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. 105/USD

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

iv) **<u>Indexations applicable to debt</u>**

Foreign debt and its interest will be adjusted on quarterly 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 quarter, over the applicable reference exchange rate.

v) **<u>Variations in LIBOR</u>**

The interest part for the tariff shall remain unchanged throughout the term except for the adjustment due to variation in interest rate as a result of variation in LIBOR according to the following formula;

$$\Delta I = P_{(REV)} * (LIBOR_{(REV)} - 1.694\%) / 4$$

Where;

ΔI	=	The variation in interest charges applicable corresponding to

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variation in 3 month LIBOR. ΔI can be positive or negative depending upon whether 3 month LIBOR $_{(REV)}$ per annum > or < 1.694%. The interest payment obligation will be enhanced or reduced to the extent of ΔI for each quarter under adjustment.

$P_{(REV)}$ = The outstanding principal (as indicated in the attached debt service schedule to this order), at the relevant quarterly calculations date. Quarter 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 quarter after commercial operations date).

$LIBOR_{(REV)}$ = Revised 3 month LIBOR as at the last day of the preceding quarter

Note: The reference tariff component shall be revised after making the required adjustments 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 22.21% net annual plant capacity factor. Net annual energy generation supplied to the power purchaser in a year, in excess of 22.21% net annual plant capacity factor will be charged at the following tariffs:

Net annual plant capacity factor	% of the prevalent tariff
Above 22.21% to 23.21%	80%
Above 23.21% to 24.21%	90%
Above 24.21%	100%

- The risk of solar resource shall be borne by the power producer.

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- In the tabulated 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.

- In case the company shall secure full or certain portion of debt under any concessionary financing including one introduced by State bank of Pakistan, the tariff of the company shall be adjusted at COD on the terms of the said financing.

- 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 this tariff determination. The tariff granted to the company will no longer remain applicable/valid,if financial close is not achieved by the company in the abovementioned timeline or its generation license is declined/revoked by NEPRA.

- The targeted maximum construction period after financial close is ten 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 ten 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 50% of the applicable tariff. However, pre COD sale will not alter the required commercial operations date 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.

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56. The Order part along with two Annexures is recommended for notification by the Federal Government in the official gazette in accordance with Section 31(4) of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997.

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Case No.NEPRA/TRF-405/HPPL-2017

January ________, 2018

Petitioner:

Helios Power (Pvt.) Limited

Authority:

Himayat Ullah Khan
Member

Syed Masood-ul-Hassan Naqvi
Member

Saif Ullah Chattha
Vice Chairman

23.1.2018

Brig (R) Tariq Saddozai
Chairman

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Annex-I

Helios Power (Pvt.) Ltd.
Reference Tariff Table

Year	O&M Local	O&M Foreign	Insurance During Operation	Return on Equity	Loan Repayment	Interest Charges	Tariff
	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh	Rs. / kWh
1	0.3022	0.3022	0.2012	1.8025	1.6090	1.9855	6.2026
2	0.3022	0.3022	0.2012	1.8025	1.7068	1.8877	6.2026
3	0.3022	0.3022	0.2012	1.8025	1.8105	1.7840	6.2026
4	0.3022	0.3022	0.2012	1.8025	1.9205	1.6740	6.2026
5	0.3022	0.3022	0.2012	1.8025	2.0373	1.5572	6.2026
6	0.3022	0.3022	0.2012	1.8025	2.1611	1.4334	6.2026
7	0.3022	0.3022	0.2012	1.8025	2.2925	1.3020	6.2026
8	0.3022	0.3022	0.2012	1.8025	2.4318	1.1627	6.2026
9	0.3022	0.3022	0.2012	1.8025	2.5796	1.0149	6.2026
10	0.3022	0.3022	0.2012	1.8025	2.7364	0.8581	6.2026
11	0.3022	0.3022	0.2012	1.8025	2.9027	0.6918	6.2026
12	0.3022	0.3022	0.2012	1.8025	3.0791	0.5154	6.2026
13	0.3022	0.3022	0.2012	1.8025	3.2663	0.3282	6.2026
14	0.3022	0.3022	0.2012	1.8025	3.4648	0.1297	6.2026
15	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
16	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
17	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
18	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
19	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
20	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
21	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
22	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
23	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
24	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
25	0.3022	0.3022	0.2012	1.8025	-	-	2.6081
Levelized Tariff	**0.3022**	**0.3022**	**0.2012**	**1.8025**	**1.8009**	**1.1163**	**5.5253**

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Annex-II

Helios Power (Pvt.) Ltd.
Debt Servicing Schedule

Relevant Quarter	Principal (USD)	Principal Repayment (USD)	Interest (USD)	Balance Principal (USD)	Total Debt Service (Million USD)	Annual Principal Repayment Rs./kWh	Annual Interest Rs./kWh
1	31,498,623	364,461	468,092	31,134,162	832,553	1.6090	1.9855
2	31,134,162	369,878	462,675	30,764,285	832,553		
3	30,764,285	375,374	457,179	30,388,910	832,553		
4	30,388,910	380,952	451,600	30,007,958	832,553		
5	30,007,958	386,614	445,939	29,621,344	832,553	1.7068	1.8877
6	29,621,344	392,359	440,194	29,228,985	832,553		
7	29,228,985	398,190	434,363	28,830,795	832,553		
8	28,830,795	404,107	428,446	28,426,688	832,553		
9	28,426,688	410,112	422,440	28,016,576	832,553	1.8105	1.7840
10	28,016,576	416,207	416,346	27,600,369	832,553		
11	27,600,369	422,392	410,161	27,177,976	832,553		
12	27,177,976	428,669	403,884	26,749,307	832,553		
13	26,749,307	435,040	397,513	26,314,268	832,553	1.9205	1.6740
14	26,314,268	441,505	391,048	25,872,763	832,553		
15	25,872,763	448,066	384,487	25,424,697	832,553		
16	25,424,697	454,724	377,829	24,969,973	832,553		
17	24,969,973	461,482	371,071	24,508,492	832,553	2.0373	1.5572
18	24,508,492	468,340	364,213	24,040,152	832,553		
19	24,040,152	475,299	357,253	23,564,852	832,553		
20	23,564,852	482,363	350,190	23,082,490	832,553		
21	23,082,490	489,531	343,022	22,592,959	832,553	2.1611	1.4334
22	22,592,959	496,806	335,747	22,096,153	832,553		
23	22,096,153	504,189	328,364	21,591,964	832,553		
24	21,591,964	511,681	320,872	21,080,283	832,553		
25	21,080,283	519,285	313,268	20,560,998	832,553	2.2925	1.3020
26	20,560,998	527,002	305,551	20,033,996	832,553		
27	20,033,996	534,834	297,719	19,499,162	832,553		
28	19,499,162	542,782	289,771	18,956,380	832,553		
29	18,956,380	550,848	281,705	18,405,532	832,553	2.4318	1.1627
30	18,405,532	559,034	273,519	17,846,498	832,553		
31	17,846,498	567,342	265,211	17,279,157	832,553		
32	17,279,157	575,773	256,780	16,703,384	832,553		
33	16,703,384	584,329	248,224	16,119,055	832,553	2.5796	1.0149
34	16,119,055	593,013	239,540	15,526,043	832,553		
35	15,526,043	601,825	230,728	14,924,217	832,553		
36	14,924,217	610,769	221,784	14,313,449	832,553		
37	14,313,449	619,845	212,708	13,693,604	832,553	2.7364	0.8581
38	13,693,604	629,056	203,497	13,064,547	832,553		
39	13,064,547	638,405	194,148	12,426,143	832,553		
40	12,426,143	647,892	184,661	11,778,251	832,553		
41	11,778,251	657,520	175,033	11,120,731	832,553	2.9027	0.6918
42	11,120,731	667,291	165,262	10,453,440	832,553		
43	10,453,440	677,208	155,345	9,776,232	832,553		
44	9,776,232	687,271	145,282	9,088,961	832,553		
45	9,088,961	697,485	135,068	8,391,476	832,553	3.0791	0.5154
46	8,391,476	707,850	124,703	7,683,626	832,553		
47	7,683,626	718,369	114,184	6,965,258	832,553		
48	6,965,258	729,044	103,509	6,236,213	832,553		
49	6,236,213	739,878	92,674	5,496,335	832,553	3.2663	0.3282
50	5,496,335	750,874	81,679	4,745,461	832,553		
51	4,745,461	762,032	70,521	3,983,429	832,553		
52	3,983,429	773,356	59,197	3,210,073	832,553		
53	3,210,073	784,849	47,704	2,425,223	832,553	3.4648	0.1297
54	2,425,223	796,512	36,041	1,628,711	832,553		
55	1,628,711	808,349	24,204	820,362	832,553		
56	820,362	820,362	12,191	0	832,553		

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