

Ref: No.

Dated:

The Secretary,
Arunachal Pradesh State Electricity Regulatory Commission
A.P. Electrical Circle Office Complex,
A-Sector, Opposite Industrial Area,
NAHARLAGUN – 791110

Sub: Petition for approval of Tariff for DIKSHI Small Hydro-Electric Project of 24 MW capacity of M/s.DEVI ENERGIES PRIVATE LTD.as per APERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources)Regulation 2018. Notification dated 21st May 2018.

Dear Sir,

Kindly find enclosed herewith the Petition for approval of Tariff for DIKSHI Small Hydro-Electric Project of 24 MW capacity of M/s.DEVI ENERGIES PRIVATE LTD.as per APERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources)Regulation 2018. Notification dated 21st May 2018. The petition consists of the following documents: -

- 1) Affidavit verifying the application
- 2) Petition for Determination of Tariff of 24 MW Dikshi Small Hydro Electric Project
- 3) Draft Number..... dated..... amounting to Rs.....
(.....) towards fee for Petition.

Encl: as above

A.L.Nagaraju
Managing Director

TARIFF PETITION
TO
ARUNACHALPRADESH STATE ELECTRICITY
REGULATORY COMMISSION
(APSERC)

FOR
DETERMINATION OF TARIFF

FOR

24 MW DIKSHI SMALL HYDROELECTRIC
PROJECT

PETITIONER

M/s. DEVI ENERGIES PVT. LTD
351,Rupa Village& Town PO&PS Rupa,
West Kameng District,
ARUNACHAL PRADESH

**BEFORE THE HON'BLE COMMISSION
ARUNACHALPRADESH STATE ELECTRICITY REGULATORY COMMISSION
A.P. ELECTRICAL CIRCLE OFFICE COMPLEX,
A-SECTOR, OPPOSITE INDUSTRIAL AREA,
NAHARLAGUN – 791110**

FILE No.

CASE No.....

(To be filled by the Office)

IN THE MATTER OF:

Petition for approval of Tariff for DIKSHI Small Hydro-Electric Project of 24 MW capacity of M/s. DEVI ENERGIES PRIVATE LTD. as per APERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources) Regulation 2018, Notification dated 21st May, 2018.

Petitioner / Applicant

M/s. DEVI ENERGIES PVT. LTD.
351, Rupa Village & Town PO & PS Rupa,
West Kameng District,
ARUNACHAL PRADESH

Respondents:

1. The Commissioner (Power)
Government of Arunachal Pradesh,
Itanagar
2. Department of Power
Government of Arunachal Pradesh
Itanagar
3. In charge State Load Dispatch Centre,
Department of Power,
Government of Arunachal Pradesh
Itanagar

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A.L.Nagaraju
Managing Director
Devi Energies Pvt. Ltd.

**BEFORE THE HON'BLE COMMISSION
ARUNACHALPRADESH STATE ELECTRICITY REGULATORY COMMISSION
O.T Building, 2nd Floor,
Niti Vihar Market, T.T Marg,
ITANAGAR – 791111**

IN THE MATTER OF:

Petition for approval of Tariff for DIKSHISmallHydro-Electric Project of 24 MW capacity of M/s.DEVI ENERGIES PRIVATE LTD.as per APERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources)Regulation 2018. Notification dated 21st May 2018.

AFFIDAVIT

I, A. L. Nagaraju, son of Shri AKLRao, aged 45 years residing at Sri Tulasi Homes, Aurora Colony, Road No. 3, Banjara Hills, Hyderabad – 500034do solemnly affirm and say as follows:

1. I am the Managing Director of Devi Energies Pvt. Ltd. petitioner in the above matter and am duly authorized to make this affidavit for and on its behalf.
2. The Statements made in petition herein are true to my knowledge and belief and nothing has been concealed from the statements so made, or documents or supporting data etc. attached.

I, solemnly affirm at..... on this day of2018 that the contents of this affidavit are true to my knowledge and no part of it is false or nothing material has been concealed there from and misleading material included therein.

A.L.Nagaraju
Managing Director
Devi Energies Pvt. Ltd.

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INTRODUCTION

1. PROJECT AREA

Arunachal Pradesh- The Land of Raising Sun with an area of 83,743 sq.km is the largest state in the North-Eastern Region sharing international boundaries with Bhutan in the West, China in the North and Myanmar in the East. The states of Assam and Nagaland flank Southern and South-Eastern borders. Forest covers about 82% area of the State and numerous turbulent streams, roaring rivers, deep gorges, lofty mountains, snow clad peaks and rich diversity of flora and fauna characterize the landscape. The climate varies from sub-tropical in the south to temperate and alpine in the north with large areas experiencing snowfalls during winter. The heights of the mountain peaks vary, the highest peak being Kangte (7090 m above MSL) in West Kameng district. The major rivers that drain the area with their numerous tributaries are Siang, Kameng, Subansiri, Kamla, Lohit, Dibang, Noa-Dehing and Tirap. River Tenga is one of the tributaries of river Kameng.

2. THE RIVER SYSTEM

Arunachal Pradesh is drained by innumerable rivers and a number of streams that drain the area almost throughout the year. Five major rivers of this state, namely KAMENG, SUBANSIRI, SIANG, TIRAP and LOHIT have been associated with the region from the very early times.

Starting from the west, in the Kameng district the first noteworthy river is the Nyamjang Chu, also called Dargong, drawing the waters of Mela ridge. Then, there is the river Namka Chu, which assumes the name of Tawang Chu. The Kameng River starts at the Kameng range at a height of 3000 mts, which is fed by the Dirang River, which flows through the Se La Pass. Other important rivers of the district are the Bhorelli, the Bichom and the Tengapani rivers. The long and narrow valley at the foot of Bomdila range is intersected by many streams, all of which are not perennial. The important river is the Daphla Kho, which flows into the basin of the largest river of Kameng, the Bhorelli. From the south-west direction, the Rupa River runs through the Sherdukpen Hills and joins the Kameng River. The rivers of the eastern Kameng hills flow in the south-westerly direction and the rivers in the western flow in the south easterly direction.

The main rivers of the Subansiri district are the Subansiri, Kamla, khru, Panior, Par and Dikrang. The life-line of the river system of the district is Subansiri which makes its way across the entire length of the territory flowing from north-west to south-east, also marking approximately the eastern boundary of the district. The headwater of the river in Tibet is formed by Char Chu, Chayal Chu and Yume Chu rivers. The Kamla River forms an important part of the Subansiri drainage system. It immingles from the confluence of a number of small rivers cascading down from the north-western snowy heights of the district. It may not be wrong to say that the Kamla river is the Nile of the Apatani valley. The Khru river is a turbulent river and like the Kamla, cuts through precipitous gorges. River Dikrang is formed by Par, Norochi and Pachin rivers.

Moving to the east, the main rivers in the Siang district are Siang and Siyom, flowing in a north-south direction. The Siang, also called Dihang, is known as Tsangpo in its upper course in Tibet. The river, originating in Tibet, makes its way into the Indian Territory east of Gelling. In Arunachal, the river covers a length of about 250 kms and is fed by many tributaries of which Siyom, Yame and Yang Sang Chu are worth mention. The Siyom river rises from the Pari mountains in the Mechuka area and flowing east through the areas of the Membas, the Ramos, the Pailibos and the Bokars, merges with the Siang river near Pangin. Another river of the District worth note is Simen, which emerges from high hills of Basar, and flowing southwards merges with Brahmaputra.

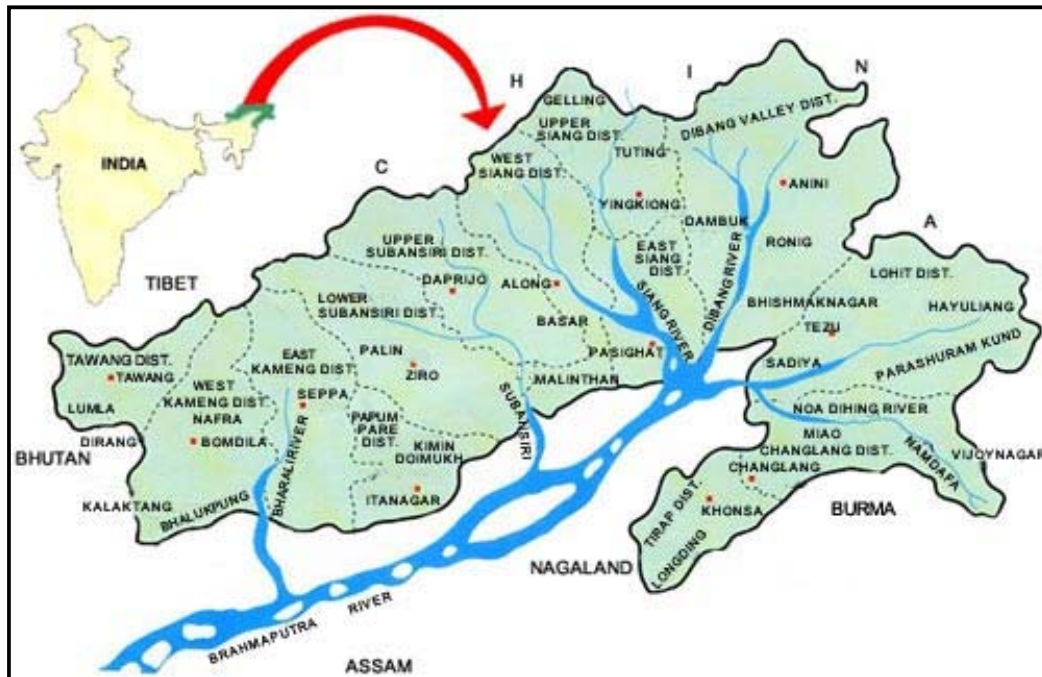
In the Lohit district, the main rivers are the Lohit, the Dibang, the Kamlang and the Nao-Dihing. River Lohit is called Tellu by the Mishmis. It originates from the mountains across the north-east border, i.e. from China where it is called Zayul Chu. River Lohit has a course of about 190 kms. Through steep hills and valleys before it reaches the plains at Parsuramkund. The Dibang is the main river of the western part of the district. Originating from the southern flank of Great Himalayan Ranges, it flows from north to south and finally meets river Lohit near Sadiya. This river is called a Talon by the Indus and changes its course very often in the foothill region, thereby making it almost impossible to bridge it. The plains towards the south of the district are drained by the Kamlang and the Nao-Dihing rivers. The main tributaries of the Nao-Dihing in the Lohit district are Dirak on the left bank and Tengapani on the right bank. The Kamlang rises from the Galo in Wakro and flows in an east-western direction to finally meet the Lohit river.

Most of the rivers in the Tirap district flow east to west. The major rivers of this area are the Nao-Dihing, the Burhi-Dihing, the Tirap, the Namsang, the Namphuk and the Namphai. The Nao-Dihing flows east-west through the entire north-eastern and northern stretch of the district and meets the Lohit river near Namsai in the Lohit district. One of its major tributaries is Dapha river. River Burhi-Dihing, flowing south-west, joins the Brahmaputra near Borgohingaon in Assam. The Namphuk, the Namchik, the Namsang, the Namphai and the Tirap rivers are its main tributaries. The Tirap river originates from a high peak between Laju and Wakka in the south-western region. It flows from south-west to north-east through Tirap district and then turns north and due west in the plains to join the Burhi-Dihing near Ledo. Some other rivers in the district are the Tisa, the Taken, The Tiking, the Tisingju and Tewai.

The Kameng river which is also known as Jia-Bhareli in its lowest reaches originates in the upper Himalayan ranges at an elevation of 4800 m. The river has a total length of about 198 km and drains about 12500 sq.km. of catchment area into the Brahmaputra river about 10 km of Tezpur town in Assam. During the course of its journey, it is joined by several major tributaries namely Bichom, Digien, Tenga, Pachuk, and Pakke which originates at high altitudes. The rainfall in the basin is quite high and varies from about 1000 mm in higher reaches to about 5750 mm in the foothills spread over 8-9 months except the dry days in the winter. The upper regions also receive precipitations from snow clad mountains which contributes to the river flow during lean period. On this account fairly, high perennial discharge continues to be available in the river all-round the year. Such a favorable discharge pattern and the fact that a total fall of more than

3000 m is available the river system makes it very attractive for developing a series of hydro-electric power stations on the main and its tributaries.

The river system of Arunachal Pradesh is shown in the figure below:



3. PROJECT SYNOPSIS

Development of Small hydro power projects is one of the thrust area of the government. The MNRE has set a goal of 2000MW capacity addition from small hydro power projects by year 2012 / 22.

Dikshi Hydro Electric Project is located in West Kameng district of Arunachal Pradesh, envisages utilization of waters of the river Pudung. The project envisages construction of a Weir near Mukhuthing village, a head race tunnel, a surface power house. Installed capacity of the project proposed is 24 MW. The Weir height and the proposed pondage are designed suitably to avoid submergence. There are no monuments of archaeological or national importance which would be affected by project activities directly or indirectly. The entire catchments of Dikshi as well as the tailrace discharge point in Phudung are within Arunachal Pradesh and, therefore, there are no interstate aspects involved.

The Dikshi Hydro-electric project utilizes the available river flow in Phudung river near Mukuthing village and envisages to produce 112.40GWh of electricity in a 75% dependable year for feeding it into the State grid for consumption within Arunachal Pradesh or wheeling to other areas outside the State. It utilizes a net head of 113.53m and a design discharge of 24.16 cumecs to produce 24 MW power.

The scheme comprises of a 20 m long diversion structure across Phudung river with an intake structure located on the right bank to divert and regulate the waters into 337 m long feeder channel followed by 19 m long, 4 m high and 3.5 m wide twin surface

desilting tank. The silt free water is led to 4133m long D-shaped tunnel through a collection pool. HRT terminates into the underground forebay of 6 m dia and 171 m high. Following the forebay at the exit portal emerges a single steel penstock of 2.75m diameter, 770 m long, which trifurcates into three branches of 2,000 mm dia just before entering the powerhouse. The powerhouse is a surface type, which houses three Francis type turbo-generators – each of 8.0 MW capacity. The tail water emerging out from the three machines is led back to Phudung River via a tailrace channel & tunnel. The project components have been located and designed after detailed techno – economic considerations.

4. PROJECT APPROVALS

4.1 MOA with Govt. of Arunachal Pradesh

M/s. DEVI ENERGIES PVT LTD (DEP) has signed Memorandum of Agreement (MOA) with Government of Arunachal Pradesh on 17th March 2011, copy attached at **Annexure-1**, which envisages: -

- The State Govt. hereby grants permission to the Company Devi Energies Pvt. Ltd. to undertake preliminary investigation for preparation of the Pre-Feasibility Report, detailed investigation for DPR preparation, financing and subsequent development, commissioning, implementation, operation and maintenance of Dikshi Hydro Electric Project (24MW) in West Kameng District, Arunachal Pradesh.
- The project shall be implemented by Devi Energies Pvt Ltd on BOOT (*Build, Own, Operate and Transfer*) basis for a lease period of 50 years from the commercial Operation Date (COD). The project shall be reverted to the State Govt. on expiry of above lease period, free of cost, in good working condition.
- The entire cost of investigation, DPR preparation, project implementation and subsequent operation and maintenance of the project will be borne by Devi Energies Pvt Ltd.
- The project shall be developed as run-off-the-river (RoR) Scheme in tune with the State Govt policy to develop the project in the most environment, eco and people friendly manner.
- State Government shall be given free power @ 10% of the power generated as per Small Hydro Power Policy 2007 with a moratorium period of one year from COD. This free power shall be supplied after completion of the moratorium period. The free power shall be calculated at the bus bar and all taxes, duties, levies and costs in respect of free power and towards its evacuation shall be borne by the State Government.
- The state Government will have the first right to purchase the power generated from this project.

4.2 Techno-Economic Clearance (TEC)

The Detailed Project Report (DPR) was submitted on 14th April, 2012 as acknowledged by Under Secretary (Power), Govt. of AP, Itanagar vide letter No. PWRS/HPD-2063/2010/2036-38 dated 1st May 2012. TEC Approval for Dikshi

Small Hydro Electric Project (3 X 8 MW) by Devi Energies Pvt. Ltd. was accorded vide letter No.CE (M)/W-129/2010-11/554-62 dated 10th June 2013 by The Secretary(Power) Cum-Chairman of System Co-ordination & Techno Economic Clearance Committee, Govt. of Arunachal Pradesh, Itanagar. Copy of the same is attached at **Annexure-2**.

Some of the project components have undergone a change due to poor geology and frequent landslides and the same has been intimated with estimated cost impact to Department of Power and the acknowledgement is attached as **Annexure – 3**.

Further status of the project with details of increase in capital cost has also been informed to the Department of Power. Acknowledgement is attached along with **Annexure -3**.

4.3 POWER PURCHASE AGREEMENT

Department of Power Development, Government of Arunachal Pradesh vide letter No.CEP/WEL/Com-3/PPA(IPP)/20127-28 dated 1st March, 2018 has already conveyed their willingness to buy the power of Dikshi 24 MW HEP and will sign the PPA. The PPA is approved by the Hon'ble Regulatory Commission vide order dated 25.09.2018 against Petition No. TP05 of 2018, copy of the same is attached at **Annexure-4**. Power Purchase Agreement (PPA) with Department of Power Development, Government of Arunachal Pradesh signed on 16th October, 2018, copy of the same is attached at **Annexure-5**.

5. TRANSMISSION CONNECTIVITY

DEP has also received letter of comfort for transmission connectivity from Chief Engineer (Power) TP&M Zone, Department of Power, Government of Arunachal Pradesh vide letter number CE(P)/TPM2/W-37/2015-16/3313-28 Dated 22nd February 2016, copy of the same is attached at **Annexure-6**. Further, the approval for the same was notified by the Department of Power Development, Government of Arunachal Pradesh vide No. PWRS/W.2803/2016 (pt) dated 2nd June 2016, copy of the same is attached at **Annexure-7**. M/s. DEVI ENERGIES PVT LTD (DEPL) has also filed an application for Transmission License with Hon'ble Commission on 10th February, 2018 under sub-section (2) of Section 15 of the Electricity Act, 2003. Hon'ble Commission has granted Transmission License No. 1 dated 12.07.2018 and copy of the same is attached as **Annexure-8**.

6. FINANCIAL TIE UP

DEP has entered into financial arrangements with the following institutions:

- Indian Renewable Energy Development Agency Ltd (IREDA), New Delhi
- India Infrastructure Finance Company Ltd. (IIFCL), New Delhi
- State Bank of Hyderabad (SBH), now known as State Bank of India (SBI), Hyderabad.

The details of total loan amount sanctioned, proportionate loan considered for HEP and sanction letter reference is given in the table below:

Rs. in Lakh				
Name of FII	S No	Ref Document	Amount Rs. Crore	Loan for HEP
IREDA	i	221/2918/SHP/2014/IREDA/753 dated 04.08.2014	120.00	149.54
	ii	221/2918/SHP/2014/IREDA/1075 dated 24.05.2017	24.92	
	iii	221/2918/SHP/2014/IREDA/3723 dated 25.09.2018	33.42	
		Total	178.34	
IIFCL	i	Letter Ref No. IIFCL/Credit/2014-15/7035 dated 19.02.2015	51.00	63.55
	ii	Letter Ref No. IIFCL/DEPL/2016-17/33421 dated 16.03.2018	10.59	
	iii	Loan under process of Sanction	14.20	
		Total	75.79	
SBH / SBI	i	F/DEPL/dated 03.02.2015	7.00	8.72
	ii	Dated 10.01.2018	1.45	
	iii	Loan under process of Sanction	1.95	
		Total	10.40	
Grand Total			264.53	221.81

Copies of the sanction letters as mentioned above are attached at **Annexure-9, Annexure-10, Annexure-11, Annexure-12, Annexure-13, Annexure-14 and Annexure-15** respectively.

7. SALIENT FEATURES OF PROJECT

Dikshi Hydroelectric Project has been allotted to M/s Devi Energies Pvt. Ltd. for the development of power potential of Phudung River in West Kameng district of Arunachal Pradesh.

It is proposed to develop this Hydel scheme on the right bank of Phudung River utilizing its reach between EL. 1691.00m and EL 1570.00m. The Detailed Project Report (DPR) has been prepared after in-depth study of hydrology, topography and geo-technical investigations of the site.

The Project details are summarized below: -

- Available gross head for the project is 121 m.
- Rated discharge is 24.16 Cumecs.
- Net head corresponding to the above discharge is 113.53m.
- The Total Installed Capacity is (3 x 8 = 24 MW).

- It has been proposed that Francis Turbines shall have synchronous generators directly coupled to the turbine shaft.
- Power shall be generated at 11kV, stepped-up to 132 kV in an outdoor switchyard and evacuated via 10.5 km long 132 KV single circuit transmission line up to Tenga switching station. From Tenga switching station Power will flow through LILO connection of 21.5 KM, 132 D/C line to Khuppi – Balipara 132 KV line.

8. PRESENT POWER SCENARIO IN ARUNACHAL PRADESH

Arunachal Pradesh a small state in the center of northeastern India blessed with abundant natural resources, is a strategic corridor for the region. The total area of the State of Arunachal Pradesh is 83573 sq. kms. The State is having a population of around 13.82 lakh as per 2011 census. The State of Arunachal Pradesh is bounded by Assam in South, Bhutan in West, China in North, and Nagaland & Myanmar in East. Its Capital Itanagar is about 380 kms from Guwahati.

The Transmission Planning & Monitoring Zone (TPMZ), Department of Power of the State of Arunachal Pradesh is responsible for transmission of power in the state of Arunachal Pradesh. TPMZ transmitted 806 MUs of power during the FY 2016-17 from Central Sector Generating Stations, Unscheduled Injection and Free Power from NEEPCO.

The present Peak Demand for Arunachal Pradesh is 140 MW being met by power from various Central Generating Stations, Power from different Power Trading Companies and State Power Generating Department. TPMZ has about 357 Ckt-Km. of SC/DC line length on the FY 2016-17.

As of March 2018, Arunachal Pradesh had a total installed power generation capacity of 278.97 MW. Out of these central utilities contributed 168.97 MW, private utilities contributed 5.39 MW & state utilities contributed 104.61 MW.

Renewable energy in conjunction with hydropower are the major sources of electricity generation in the state & contributed around 110.00 MW & 97.45 MW to the installed capacity of the state, respectively.

In May 2017, UJAAS received a letter of intent from Arunachal Pradesh Energy Development Agency to design, supply, install, and test and commission a 200 kWp-Grid Connected Solar PV Plant at State Assembly Building in Itanagar.

Arunachal Pradesh's environment ministry panel has approved Nyamjang Chu hydropower project worth US\$ 1.06 billion, in the Tawang region of Arunachal Pradesh. Once built, the plant will produce 780 MW of electricity.

Dibang project in Arunachal Pradesh has received the government's approval for diversion of land. A 3,000 MW Hydel project will be constructed by NHPC (National Hydroelectric Power Corporation), and is expected to get completed by the end of 2019.

9. BENEFITS OF THE PROJECT

- i) The electrical energy generated from this project would meet the needs of the villages in the vicinity and in the backward districts of Kameng which will improve the power availability in the region and help accelerate socio-economic development. The power requirements of the two districts, viz West Kameng and Tawang including power requirements for the Defense establishments and construction power for major projects being undertaken would squarely be addressed. The project since uses renewable resource for power generation would benefit global reduction of carbon-dioxide (Green House Gas) pollution by 93000 tons annually.
- ii) With the shortage of electricity depletion of fossil fuel resources and increasing awareness against pollution caused by use of coal, oil, natural gases in generation of power, global attention has been focused on harnessing renewable sources of energy like small hydro power, wind etc.

iii) Tourism

With the reservoir being created for Power project, the tourism can easily be developed at the site because it will have boating facilities and approach is also good.

iv) Fisheries

The pondage can also be developed for fishery and pisciculture, which will increase availability of local and fresh fish in the villages and towns nearby.

It will be worthwhile to mention that fish is staple food of the state and presently fish is being imported from faraway places like Andhra Pradesh and Uttar Pradesh for meeting the growing demand.

v) Employment Generation

The single most crucial problem, and certainly the most pressing social issue facing the Himalayan states is probably the availability of adequate employment opportunities that needs to be addressed immediately.

This problem has been aggravating over the years and is likely to assume alarming proportion in the near future, given the demographic picture of 55 % of the population comprising young persons under 35 years of age in India. If this is an exciting number, it is equally scary. The matter of real concern is, "How are we going to harness this youthful energy and enthusiasm to be put to good use for the benefit of the nation". As of now, there are thousands in the age group of twenty something with nothing to do and nowhere to go. They drift aimlessly with hopes in their hearts and frustration in their eyes. There is nothing more threatening than a vacant mind. The unemployment scenario, particularly noticeable among the rural educated youth imposes high burden on society in terms of social unrest and deterioration of law & order situation.

Employment generation is no more a simple issue, but an issue of survival for these agriculture dependent societies facing a deteriorating land-man ratio. Even despite attracting substantial fresh investments made in the industrial sector.

Thus, issue of generation of new employment opportunities by the conventional approach would continue to defy solution.

This complex and serious issue of employment generation can only be addressed by adopting a totally fresh approach to alter the present tenets of policy framework on employment generation and rural development, which would require the necessary political will and high administrative acumen. The new approach has been outlined in this paper.

The available SHP potential of 9,500 MW in the Himalayan region developed through a network of about 78,800 SHP sites has the capacity to create new employment opportunities of 2.3 million persons - years on SHP activities such as; surveys, investigation, planning and design, construction and operation and maintenance of these projects.

The availability of affordable and quality power will, in addition, trigger the entire rural economic growth milieu in the region and boost up accelerated generation of additional employment opportunities in sectors like, agriculture, horticulture, manufacturing, construction, mining, trade, hotels, restaurants, transport, communications, etc. Electricity is an essential input for agriculture, no less important than industry and services.

The large proportion of the farm produce, particularly fruit, vegetables, and flowers that perishes, requires establishment of reliable refrigeration and cold chain facilities to be in place.

10. REGULATORY FRAMEWORK

We would like to bring the kind attention of the Commission to some of important provisions of the Electricity Act 2003, National Electricity Policy and National Tariff Policy relating to the promotion of the Non-Conventional Energy.

10.1 Electricity Act 2003:

The Act provides the various guidelines to be followed by the Commission while determining the tariff. Section 61 (h) stipulates *"The promotion of co-generation and generation of electricity from renewable sources of energy"*, whereas Section 61 (i) stipulates that the Commission shall be guided by *"the National Electricity Policy and Tariff Policy"*

Section 86 (1) (a) of the Act empowers the Commission *"to determine the tariff for generation, supply, transmission and wheeling of electricity, wholesale, bulk or retail, as the case may be, within the state"*

Whereas Section 86 (1) (e) of the Act states that the Commission shall “*promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee.*”

10.2 National Electricity Policy:

As per clause 5.2.5 of the policy “*Hydroelectricity is a clean and renewable source of energy. Maximum emphasis would be laid on the full development of the feasible hydro potential in the country. The 50,000 MW hydro initiative has been already launched and is being vigorously pursued with DPRs for projects of 33,000 MW capacity already under preparation*”

Clause 5.2.6 emphasizes about “*Harnessing hydro potential speedily will also facilitate economic development of States, particularly North-Eastern States, Sikkim, Uttaranchal, Himachal Pradesh and J&K, since a large proportion of our hydro power potential is located in these States. The States with hydro potential need to focus on the full development of these potentials at the earliest*”

The policy also promotes the development of Non-Conventional Energy sources and as per clause 5.2.20 “*Feasible potential of non-conventional energy resources, mainly small hydro, wind and bio-mass would also need to be exploited fully to create additional power generation capacity. With a view to increase the overall share of non-conventional energy sources in the electricity mix, efforts will be made to encourage private sector participation through suitable promotional measures*”

Whereas clause 5.12 of the policy broadly outlines the promotional framework to be adopted for the development of Renewable Energy Sources and as per clause 5.12.2 “*The Electricity Act 2003 provides that co-generation and generation of electricity from non-conventional sources would be promoted by the SERCs by providing suitable measures for connectivity with grid and sale of electricity to any person and also by specifying, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee. Such percentage for purchase of power from non-conventional sources should be made applicable for the tariffs to be determined by the SERCs at the earliest. Progressively the share of electricity from non-conventional sources would need to be increased as prescribed by State Electricity Regulatory Commissions. Such purchase by distribution companies shall be through competitive bidding process. Considering the fact that it will take some time before non-conventional technologies compete, in terms of cost, with conventional sources, the Commission may determine an appropriate differential in prices to promote these technologies.*”

10.3 National Tariff Policy

Though the tariff policy mandates that “all future requirement of power should be procured competitively by distribution licensees except in cases of expansion of existing projects or where there is a State controlled/owned company as an identified developer”, it has provided measures for promotion of Non-Conventional Energy

sources and provides relaxations for the licensees while procuring the power from the Renewable sources.

Clause 6.4 (1) of the policy states that *"It will take some time before non-conventional technologies can compete with conventional sources in terms of cost of electricity. Therefore, procurement by distribution companies shall be done at preferential tariffs determined by the Appropriate Commission."*

10.4 Provisions of APERC:

Based on the above Regulatory framework various Regulatory Commissions have already notified the separate tariff structure and operational norms for the mini and small hydroelectric power projects. The various Commissions have also notified the Regulations for obligation of the licensees to purchase a specific percentage of power from the Renewable sources of energy.

The petition is guided by the APERC Terms and Conditions for Tariff Determination from Renewable Energy Source Regulation 2018.

11. SALIENT FEATURES OF THE PROJECT

11.1 Project Location

State	:	Arunachal Pradesh
Distt	:	West Kameng
River	:	PhudungRiver
Location at Diversion site	:	27°12'40.75"N 92°17'17.40"E

11.2 Hydrology

Catchment Area	:	423 Sq. km.
Design Flood	:	850 Cumecs
Design Discharge	:	24.16 Cumecs

11.3 Project Components

A. Trench Weir

Length of Weir	:	20m
Trash Rack EL	:	El. 1695.85m
EL At Start	:	El. 1695.35m
EL At End	:	El. 1691.00m

Bridge Deck Level : El. 1696.00m

Design Flood Discharge : 850 Cumecs

B. Spillway

Type : Gated

No. of Bays : 2 Nos.

Length of Bay : 9.70m

Sill Level : El. 1696.0m

Size of Gates : 4.0m(H)x3.65m(W) each

Type of Gate : Vertical Lift Gate

Energy dissipation arrangement : Stilling Pool type

C. Feeder Channel

Length : 148.14 m

No. of channels : 1Nos.

Width of each channel : 4.0m

Height : 4.0m

Velocity of flow : 1.61m/sec

Pipe :

Pipe Dia : 3.5 dia

Length : 189 m

D. Desilting Tank

Type : Gated

No. of tanks : 2 Nos.

Size of de-silting tank : 4m(H)x3.5m(W) each

Length (Incl. transition) : 19m

Particle size to be excluded : 0.4mm

Velocity in Each Chamber : 3.8 m/sec

Dia. Of silt flushing pipe : 0.5m pipe

E. Head Race Tunnel

Type of tunnel	: D-Shaped
Size of tunnel	: 5.10(H)x4.60m (W)
Design Discharge	: 24.16 cumec
Length	: 4133m
Slope	: 1 in 1000

F. RCC RECTANGULAR CONDUIT

Type	: Rectangular Type
Size of Adit	: 4.50mx4.0m
Length of Adit	: 1550m

G. FOREBAY

Type	: Underground& D-shaped
Size	: 6m diameter
Length	: 171 m

H. Penstock

Size	: 2.75m Dia
Length	: 770m
Type & Thickness of Shell	: IS 2041 Gr. R 260 E 260 (killed quality)
Penstock Tunnel	: 5.25mx4.5m

I. Powerhouse

Type	: Surface
Installed Capacity	: 3 x 8MW
Size	: 50mx21m
Max. gross Head	: 121m
Max. Net Head	: 115.2m
Min. Net Head	: 110.2m
Rated Net Head	: 113.53 m

J. TAILRACE TUNNEL & CHANNEL

Type : Tunnel & RCC Channel
Size : 5mx4m
Length : 250m

K. Turbine Details

No. & type of turbines : 3 Nos. – Horizontal Axis Francis Turbine
Rated discharge : 8.05 Cumecs

L. Generator Details

Type of generator : Horizontal Axis air cooled type
Nos. : 3 Nos.
Rated Capacity : 9.412MVA

M. Transformer Details

Type of Transformer : Oil filled three phase two winding ONANor ONAF type
Nos. : 3 Nos.
Rated Output : 10 MVA
Rated Voltage : 11 kV
Frequency : 50 Hz
Type of cooling : Air cooled type

N. Switchyard

Type : Outdoor Switch yard
Required Area : 80m x 100m

O. Transmission System

Transmission system : 132 kV Double circuit
Terminating station : Switching station at Tenga and LILO at Nichipu
Length of 132kV Transmission line : 10.5 km S/C & 21.5 KM D/C line

12. PROJECT IMPLEMENTATION STATUS

Sr. No.	Description	Time Frame (in months)
1	Reconnaissance	Completed
2	Survey & Investigations	Completed
3	Preparation of DPR	Completed
4	Creation of SPV	Not required
5	Memorandum of Agreement (MoA)	In place
6	Land Lease Agreement (LLA)	In place
7	Power Evacuation Arrangement	In place
8	Power Purchase Agreement (PPA)	Power Purchase Agreement (PPA) signed with the Govt. of Arunachal Pradesh through the Dept of Power, represented by the Commissioner (Power) on 16 th October 2018.
9	Financial Closure of the Project	In place. Further, sanction of increased requirement of loan amount received from IREDA and for other FIIs in process
10	Implementation of the Project	On going to be completed by 31 st December, 2018

The Detailed Project Report along with the Survey and Investigation report is attached as per **Annexure-16** and **Annexure-17**.

13. PROGRESS OF PROJECT WORK AS ON DATE

13.1 Civil Works

- Diversion structure: - All excavation works completed and downstream & upstream concrete and control structure are completed.
- Cut & Cover channel: Channel excavation completed and concrete works both side of wall are completed and top slab works is in progress.
- D-Tank: Excavation works & concrete works are completed.
- Head Race Tunnel: - HRT & Adits excavation works are completed & Lining works 97% completed. Balance works will be completed by the end of Oct'18.
- Forebay: Excavation works completed and concrete works also 80% completed and bell mouth fabrication and erection work in progress and will be completed by Middle of November'18.
- Penstock: Excavation for all anchor blocks& saddle completed and concrete also complete, Penstock tunnel excavation and concrete also completed.
- Power House: Excavation of power house completed and concrete works for unit-I, II and III are completed. Power House super structure works completed.

13.2 Hydro Mechanical Works

- Penstock total steel fabrication completed and Total Erection of penstock except 50 m is completed and the balance will be completed before the end of Oct.'18.
- Intake & All other gates fabrication work is completed and erection in progress and will be completed by the end of Oct.'18

13.3 Main plant & equipment status

Sl. No.	Description of Items	Qty.	Units	Status as on date
1	Generator	3	Nos.	Received at site.
2	Power Transformer	2	Nos.	Received at site.
3	Auxiliary Transformer	2	Nos.	Received at site.
4	Power & Auxiliary Transformer accessories	LS	LS	Received at site.
5	Electrical Panels	1	Set	Received at site.
6	DC System	1	Set	Received at site.
7	SCADA	1	Nos.	Received at site.
8	Switch Yard Equipment	1	Set	Received at site.
9	Switch Yard Structure	1	Set	Received at site.
10	Spiral casing	2	Nos.	Received at site
11	Spiral casing	1	Nos.	Received at site
12	Oil Pump Units	3	Nos.	Received at site
13	Main Inlet Valve & Accessories	3	Nos.	Received at site
14	Cooling water System & Drainage Dewatering system	1	Set	Received at site
15	Strainers	1	Set	Received at site
16	Draft Tube	3	Nos.	Received at site
17	Spiral casing Bend pipe	3	Nos.	Received at site
18	Runner	3	Nos.	Received at site.
19	Cable trays	1	Set	Received at site
20	EOT Crane	1	Nos.	Received at site
21	Cables	Mtrs.	Mtrs.	Received at site.
22	DG Set	1	Nos.	Received at site
23	Illumination Items	1	Lot	Received at site
24	Trifurcation Piece	1	Nos.	Received at site

Erection of 3 nos. of Turbine & Draft Tube etc. completed. Generators of unit –I & II completed for unit III erection is in progress and will be completed by November' 18.

13.4 Switchyard:

Switchyard earth works excavation 90% completed and balance work in progress.

13.5 TransmissionSystem

13.5.1 Single Circuit:

Excavation works and tower foundation work 100% completed and Tower erection also 50% completed, stringing works also 2.5 km completed and the balance work in progress.

13.5.2 Double circuit:

Excavation works and tower foundation also 80% completed and Tower erection also 60% completed, stringing works 10 km completed and the balance work in progress.

13.5.3 Tenga Switching Station:

Excavation works and Tower erection completed. Control room building works completed, other electrical CT & PT and core cables are under erection and all the works will be completed by December end.

13.6 Status of Clearances / NO Objection Certificates (NOC)

The status of various clearances and No Objection Certificate (NOC) received / taken for the project from various agencies is given in table below:

The copies of the same arealso attached at **Annexure-18, Annexure-19, Annexure-20,Annexure-21, Annexure-22and Annexure-23**respectively.

Sl. No.	Particulars
1	Consent for possession of use of explosives from "Petroleum and Explosives Safety Organization (PESO), Ministry of Commerce & Industry, Govt. of India, East Circle, 8 Esplanade East, 1 st Floor, Kolkata - 700069 vide letter No. E/HQ/AR/22/48(E74326) dated04th April, 2016
2	Forest Clearance for diversion of 3.12 ha of forest land forconstruction of Dikshi Hydro Electric Project (24 MW) in favour of M/s Devi Energies Pvt.Ltd. by Department of Environment and Forests, Govt. of Arunachal Pradesh, Itanagar vide letter No. FOR.401/Cons./2011/916-19 dated 10th June 2014
3	Certificate of Registration - granted under Clause (a) of sub-section (2) of Section 4 of Inter-stateMigrant Workmen (Regulation ofemploymentand conditions of services) Act1979 to Devi Energies for execution ofDikshi HEP over Phudung river –fromLabour Commissioner and Registering Officer, Govt. of Arunachal Pradesh vide letter No. LAB(W)98/2011 dated 13-6-11

Sl. No.	Particulars
4	Fisheries - NOC from Department of Fisheries, Govt. of Arunachal Pradesh, Itanagar for implementation of Dikshi HEP (24 MW) on Phudung river in West Kameng District, Arunachal Pradesh by Devi Energies Pvt.Ltd vide letter No. FISH/DEV/HEP-204/2010 dated 9th June 2011
5	Department of Geology – NOC for establishment of Crusher unit issued by Commissioner, Department of Geology & Mining, Government of Arunachal Pradesh, Itanagar vide letter No. DGM/NOC/CU/WK/39/2016/264-68 dated 1st February 2017
6	State Pollution Control - Consent to establish/operate under Section 25/26 of Water (Prevention & Control of Pollution) Act 1974 issued by Arunachal Pradesh State Pollution vide letter no. APSPCB-871/2012/DIKSHI HEP/447-50 Dated 10th Sept 2013

14. CSR ACTIVITIES:

While executing Dikshi HEP, following works/ activities have been carried out towards Corporate Social Responsibility (CSR):

- I. Approach Roads were formed to facilitate villager's access roads to send their agricultural/ horticultural produce besides improving their commuting facilities.
- II. Communication facilities for both Voice & data for adjoining villages around project site
- III. Provided an Ambulance to PHC, Shergaon, West Kameng District
- IV. Provided an Ambulance & Medical Equipment to Community Health Centre, Rupa, West Kameng District
- V. Provided R.O water filters to schools in and around Rupa
- VI. Donated for state level foot ball tournament in Rupa
- VII. Donated for Buddha Mahotsava 2016
- VIII. Provided electrical infrastructure for smart class system for Government Higher Secondary School, Rupa
- IX. Contributed to Law Awareness Camp organized by NGOs
- X. Contributed to village council to celebrate their cultures & traditions.
- XI. Constructed couple of homes with all facilities to couple of very senior citizens in Dikshi Village.
- XII. Local Youth are encouraged to carry out specific works in Hydro & transmission line works.

15. TARIFF STRUCTURE

15.1 Tariff Principles:

A. Approach:

It is proposed to adopt the Cost-plus approach with a levelised tariff, while determining the tariff for the project in view of the following reasons:

- (a) Cost plus methodology will allow the investors to earn reasonable return commensurate to the risks borne by them and will allow to service loan
- (b) The methodology will provide certainty of revenue to the investors,
- (c) which in turn will make financing of the project feasible
- (d) The cost-plus approach to tariff determination would ensure that the investors, to a large extent, are protected for the cost and associated risks, i.e. allow cost to be recovered completely and also allow a return commensurate with the risks borne by the investors.
- (e) However, a strict cost-plus approach would lead to a high tariff during the initial years and result in extra burden on the consumers. Therefore, it is proposed to adopt the strategy of levelised cost

B. Tariff Design:

The petition is guided by the APERC "Terms and Conditions for Tariff Determination from Renewable Energy Sources Regulation- 2018".

However, we would like to propose the single part levelised tariff structure instead of two parts in view of the following reasons:

Single part tariff offers a high level of investment certainty by providing a guarantee of recovery of a fixed price for each kWh of power fed into the grid over a certain period

- (a) This approach would ensure adequate compensatory return and will provide reasonable incentive to developers as it gives stable tariff over a longer period.
- (b) The levelised tariff approach incentivizes to operate and maintain the assets efficiently during the later years of the agreement as against the approach of front-loaded tariff.
- (c) The single part tariff facilitates the easy monitoring and settlement for such small projects.

C. Capital Cost of the Project:

As per Regulation 8 & 12 project specific capital cost has to be determined by the Hon'ble Commission for each project. All the details regarding original estimated cost, revised estimated cost and variation are given in table below:

(Amount in Rs Lakh)

Sl. No.	Items	As per Initial DPR & as appraised by FIs	Revised Estimated Cost & Approved by FIs	Estimated Completion Cost	Variation
1	Infrastructure Works				
1.1	Preliminary including Development	271.90	271.90	271.90	-
1.2	Land	397.10	397.10	397.10	-
1.3	R&R expenditure	-	-	-	-
1.5	Township	-	-	-	-
1.6	Maintenance	-	-	-	-
1.7	Tools & Plants	174.86	174.86	174.86	-
1.8	Communication	1030.00	1313.71	1,313.71	283.71
1.9	Environment & Ecology	230.00	262.19	262.19	32.19
1.1	Losses on stock	37.63	37.35	37.35	(0.28)
1.11	Receipt & Recoveries	(97.89)	(97.89)	(97.89)	-
1.12	Total (Infrastructure works)	2,043.60	2,359.22	2,360.79	315.62
2	Major Civil Works				
2.1	Upstream works: River diversion works, diversion structure, de-silting arrangement, tunnel intake etc.	3,802.32	1,429.09	1,429.09	(2,373.23)
2.2	Head Race Tunnel: HRT incl Adits, Cut & Cover channel, forebay, etc.	4,777.77	12,235.47	12,235.47	7,457.70
2.3	Power House: Penstock, Power house, switch yard, flood protection wall, tail race tunnel, land slide protection works, Hill side protection works etc.	1,729.95	2,689.18	2,689.18	959.23
2.4	Total (Major Civil Works)	10,310.04	16,353.74	16,353.75	6,043.70
3	Hydro Mechanical equipment	1,845.78	1,747.41	1,747.41	(98.37)
4	Plant & Equipment	1,985.58	2,290.26	2,290.26	304.68
4.1	Initial spares of Plant & Equipment & Equipment		-	-	-

Sl. No.	Items	As per Initial DPR & as appraised by FIs	Revised Estimated Cost & Approved by FIs	Estimated Completion Cost	Variation
4.2	Total (Plant & Equipment)	1,985.58	2,290.26	2,290.26	304.68
5	Taxes and Duties				
5.1	Total Taxes & Duties for E&M	330.00	394.00	394.00	64.00
5.2	Total Taxes & Duties for Civil	3,080.00	3,580.50	3,580.50	500.50
5.3	Total Taxes *	3,410.00	3,974.50	3,974.50	564.50
6	Construction & Pre-commissioning				
6.1	Erection, testing & commissioning	334.55	334.55	334.55	-
6.2	Construction Insurance	88.65	88.65	88.65	-
6.3	Site supervision	176.00	176.00	176.00	-
6.4	Total (Const. & Pre-commissioning)	599.20	599.20	599.20	-
7	Overheads				
7.1	Establishment	598.00	598.00	598.11	-
7.2	Design & Engineering	114.98	114.98	114.98	-
7.3	Audit & Accounts	105.69	105.69	105.69	-
7.4	Contingency	-	-	-	-
7.5	Rehabilitation & Resettlement		-	-	-
7.6	Total (Overheads)	818.67	818.67	818.67	-
8	Capital Cost without IDC, FC Cost	21,012.87	28,143.00	28,143.00	7130.13
9	IDC, FC, FERV & Hedging Cost				
9.1	Interest During Construction (IDC)	3,305.90	3,705.30	3,705.30	399.40
9.2	Financing Charges (FC)	165.00	186.29	186.29	21.29
9.5	Total of IDC, FC Cost	3,470.90	3,891.59	3,929.32	420.69
10	Capital cost including IDC, FC, FERV & Hedging Cost	24,483.77	32,034.59	32,034.59	7,550.82

15.2 Reasons for Higher Capital Cost / Increase in Capital Cost

Project is located in Himalayan terrain having very poor geology. Geological surprises are very phenomenal. The following issues have factored in for higher capital cost and also increase in cost while execution of 24 MW Dikshi HEP in Arunachal Pradesh. In addition, the project site has also faced natural calamities like incessant heavy rainfall, flash flood, landslide etc. and this has not only disturbed the execution of project but also increased the cost due to losses suffered due to damage and reconstruction activity.

15.2.1 Change in Civil works

During the execution of the project due to very poor to poor geological conditions there was a change in the alignment of head race tunnel, which leads to a portion of tunnel into RCC cut & cover channel between Adit 1 & Adit 2. Very poor geological conditions in HRT made us to leave about 250 m of already excavated HRT in addition to the loss of couple of human lives. The HRT alignment is changed to make use of part of Adit-1 for water conductor system (otherwise would have been left out) in addition to about 400 m of link tunnel to connect RCC Cut & Cover channel with couple of changes in alignment and layout.

To locate power house on rock terrain and to avoid poor geological conditions at power house site, there is increase of penstock length. With these changes in the civil work coupled with other factors the cost has increased.

15.2.2 Other Factors

- i. Most of the rivers in Arunachal Pradesh are gentle in gradient and this project is no exception. Given this, long approach roads had to be constructed to cover the whole project layout. Project site along with adjoining villages didn't have communication facilities till 2014. Infrastructure to establish communication facilities for Voice & data had to be developed which provided communication infrastructure not only to Project site but also to adjoining villages. Cost of approach roads & communication infrastructure is about 4% of Project cost.
- ii. Given the gentle gradient of the river, length of Head Race Tunnel is more. Cost of construction of HRT itself is more and that too with prevailing poor to very poor geology, cost of construction of HRT is much higher. Geology in Tunnel is poor to very poor which led to formation of numerous cavities which made us go for support systems and concrete apart from costing couple of workers lives & sustaining regular & serious injuries to workers
- iii. Absence of availability of construction power from state government, which pushed us to rely entirely on power from D. G sets. (In the unlikely case of Govt. providing power for construction, power is available for very few hours (there are ample no. of days that entire district is without power) that too at low voltage which doesn't permit machinery & lights to function on. Cost of construction power worked out to be 4.5 % of project cost.

- iv. Given the leads for sourcing construction materials, transportation cost worked out to be 16% of cost of materials which is high. Roads from foot hills to site can only allow about 9 T per truck and requires transshipment. The details of nearest supply centers are given below:
 - a) For items like Cement nearest supply center is Shillong which is about 450 kms from project site
 - b) For items like TMT steel nearest supply center is SAIL, Durgapur which is about 1350 kms from project site
 - c) For items like Special class of steel nearest supply center is SAIL steel plant, Rourkela which is about 1650 kms from project site.
 - d) Sand & Aggregate too had to be purchased from outside Arunachal Pradesh as the quantities available locally are not sufficient which pushed the cost of Sand & Aggregate
- v. As no machinery, construction materials except few quantities of Sand & Aggregate are available in the state of Arunachal Pradesh, almost all construction materials, construction machinery, their spares had to be imported from other states which attracted additional Central Sales Tax (CST) besides entry tax.
- vi. Being remote hilly state, hire charges for construction machinery are more than the double that of the same in other states.
- vii. As no manpower whether skilled or semi-skilled is available in the state, manpower had to be imported from other parts of India & Nepal who demand higher wages.
- viii. Due to closure of Iron ore mines and imposition of Anti-Dumping Duty on import of steel, Steel prices have increased abnormally from May'17 till date. The price hike is about 50-60% vis-à-vis the prices of May'17.
- ix. High Speed Diesel Price is very high (present Rs. 74/ per litre) which has a direct cost impact on transportation, machinery hire charges and construction power.
- x. Post implementation of GST regime, there is overall increase of 2% only on account of Taxes on Steel & 4% increase in service tax (Service tax increased from 12% plus cess in 2013 to 18% in 2017)

15.3 Force Majeure

During the execution of project, due to the following natural calamities like incessant heavy rainfall, flash flood, land slide etc. occurred at the project site and not only disturbed the execution of project but also losses due to damage and reconstruction activity.

- A. From 11th to 16th October, 2016 there was heavy flood / land slide in Jindikho River Basin resulting in severe damage to Earthen Guide Bund for diversion of river and excavation work of Power Channel which has resulted into delay of construction as well as additional cost for reworking of the work damaged. The certificate issued by Executive Engineer, Water Resource Division, Bomdila dated 19th October 2016 is attached at **Annexure-24**.

- B. On 29th& 30th May 2017 there was incessant heavy rainfall, flash flood in the Dikshi area. The certificate issued by Sub Divisional Officer, Rupa dated 30th January 2018 is attached at **Annexure-25**.
- C. From 11th to 14th June there was heavy flood in the area resulting in damage to number of equipment, which has resulted into delay of construction as well as additional cost for replacement of this equipment. The certificate issued by Deputy Commissioner, West Kameng District, Bomdila dated 31st July 2017 is attached at **Annexure-26**.
- D. On 21st April 2018 landslide occurred on the switchyard side of the power plant resulting in loss of access and stoppage of work and additional cost for the reworking of the work damaged. Letter issued by the sub-divisional officer, Rupa dated 23rd April 2018 is attached at **Annexure-27**.
- E. Due to incessant rainfall and inclement weather, several massive landslides have blocked BCT Road (Balipara – Charidwar– Tawang Road) at multiple locations which forced District Administration to close the road on several instances. This kind of access restrictions suffered movement of construction materials and Diesel and attributed to delay and higher cost of working. Orders issued by the Deputy Commissioner, Bomdila are attached at **Annexure-28**.
- F. Due to bad to very poor geology in the tunnel total 8 no. of workers met with various accidents till date and died during construction of HRT and another 6 workers met with other accidents in the vicinity of the project which caused emotional disturbance among the local tribal which is one more concern for delay in execution and higher cost of working.
- G. A few photographs are also attached at **Annexure-29** to justify the above claim.

15.4 Break up of increased cost

The estimated cost of the project has been slightly increased in different components of the project. Total increase is Rs 75.51 Crore including the increase in taxes and duties (i.e., Rs. 67.61 Crore towards Civil works and Rs. 3.69 Crore towards Electro Mechanical works) and Rs. 4.21 Crore towards increase in Interest During Construction (IDC) & Financial charges.

Civil Works:

During the execution of the project proponent faced challenges due to geological surprises. This resulted in change in the alignment of head race tunnel, which leads to a portion of tunnel into RCC cut & cover channel between Adit 1 & Adit 2 and increase of penstock length to locate power house on rock terrain and to avoid poor geological conditions at power house site. With both of the changes in the civil works, the estimated increase in the civil cost will be around Rs. 67.61 Crore (approx.).

Electro Mechanical Works:

Due to increase in the tax structure there is an increase of cost of about Rs. 2.67 Crore in the supply, transport and erection of electro mechanical works including switch yard. This is mainly due to increase of Excise duty from 10.3% to 12.5% and

Service Tax from 12.5% to 15% & now GST @ 18% and entry tax @ 4% on the total value, which is not considered earlier.

15.4.1 Present status of capital expenditure Incurred & yet to be incurred

The details of expenditure incurred till 31st August, 2018 vis-a-vis revised estimated cost are given in table below:

(Amount in Rs Lakh)

Sl. No.	Items	Estimated Cost	Expenditure Incurred till date	Liabilities/ Provisions
1	Infrastructure Works			
1.1	Preliminary including Development	271.90	271.90	-
1.2	Land	397.10	356.79	40.31
1.3	R&R expenditure	-	-	-
1.5	Township	-	-	-
1.6	Maintenance	-	-	-
1.7	Tools & Plants	174.86	170.63	4.23
1.8	Communication	1313.71	1,313.71	-
1.9	Environment & Ecology	262.19	262.19	-
1.1	Losses on stock	37.35	37.35	-
1.11	Receipt & Recoveries	(97.89)	(51.78)	(46.11)
1.12	Total (Infrastructure works)	2,359.22	2,360.79	(1.57)
2	Major Civil Works			
2.1	Upstream works: River diversion works, diversion structure, de-silting arrangement, tunnel intake etc.	1,429.09	1,410.10	18.99
2.2	Head Race Tunnel: HRT incl Adits, Cut & Cover channel, forebay, etc.	12,235.47	11,855.34	380.13
2.3	Power House: Penstock, Power house, switch yard, flood protection wall, tail race tunnel, land slide protection works, Hill side protection works etc.	2,689.18	2,381.90	307.28
2.4	Total (Major Civil Works)	16,353.74	15,647.34	706.40
3	Hydro Mechanical equipment	1,747.41	881.37	866.04

Sl. No.	Items	Estimated Cost	Expenditure Incurred till date	Liabilities/ Provisions
4	Plant & Equipment	2,290.26	2,163.13	127.13
4.1	Initial spares of Plant & Equipment & Equipment	-	-	-
4.2	Total (Plant & Equipment)	2,290.26	2,163.13	127.13
5	Taxes and Duties			
5.1	Total Taxes & Duties for E&M	394.00	256.70	137.30
5.2	Total Taxes & Duties for Civil	3,580.50	3,543.00	37.50
5.3	Total Taxes *	3,974.50	3,799.70	174.80
6	Construction & Pre-commissioning			
6.1	Erection, testing & commissioning	334.55	224.00	110.55
6.2	Construction Insurance	88.65	94.11	(5.46)
6.3	Site supervision	176.00	176.00	-
6.4	Total (Const. & Pre-commissioning)	599.20	494.11	105.09
7	Overheads			
7.1	Establishment	598.00	246.09	351.91
7.2	Design & Engineering	114.98	107.64	7.34
7.3	Audit & Accounts	105.69	105.69	-
7.4	Contingency	-	-	-
7.5	Rehabilitation &Resettlement	-	-	-
7.6	Total (Overheads)	818.67	459.42	359.25
8	Capital Cost without IDC, FC Cost	28,143.00	25,805.86	2,337.14
9	IDC, FC, FERV & Hedging Cost			
9.1	Interest During Construction (IDC)	3,705.30	2,519.30	1,186.00
9.2	Financing Charges (FC)	186.29	224.02	(37.73)

Sl. No.	Items	Estimated Cost	Expenditure Incurred till date	Liabilities/ Provisions
9.5	Total of IDC, FC Cost	3,891.59	2,743.32	(1,148.27)
10	Capital cost including IDC, FC, FERV & Hedging Cost	32,034.59	28,549.18	3,485.41

The certificate issued by A.M. REDDY & D.R. REDDY, Chartered Accounts, Hyderabad dated 10th September 2018 for the expenditure incurred till 31.08.2018 as per books of accounts is attached at **Annexure-30**.

15.5 Transmission Line Works:

Initially a Bay at sub-station at Wanghoo, near Bomdila connecting proposed 132 kV transmission line (being developed by Department of Power, Govt. of Arunachal Pradesh) from Khuppi to Tawang was allotted to this project for evacuation of power. It is learnt that 132 kV transmission line work from Khuppi – Tawang is not going on as per the expected time lines, which affects the project execution and thereby the Company will not be in a position to evacuate power after achieving commercial operation.

To avoid the bottleneck with the above said situation, the company has obtained Letter of Comfort / permission for Connectivity to connect to the existing 132 kV line from Bhalipara – Khuppi at an intermediate location close to transmission line alignment for DIKSHI HEP. The total length of proposed transmission line from Nechipu (i.e., intermediate location) to Dikshi Power House is about 32 km.

It is to mention here that with the change in the transmission line alignment, the length of transmission line was increased from about 10.5 kms to 32 kms along with development of 132 KV Switching Station at Tenga.

As the proposed transmission system will be used for transmitting power from other Hydro projects planned as well as by the Department of Power for supplying power to nearby villages. A separate petition is being filed for determining the transmission charges for the proposed transmission system.

16. METHODOLOGY OF PLACEMENT OF ORDERS

Open tenders by Papers advertisement and through company web site was given for calling bids for all works including Civil, hydro mechanical, Electro mechanical. LI was selected as for both contracts. Details as here under:

For selection of companies for various contracts, Devi has followed the open tender procedure. Notice for invitation of bids was published in the Business Standard, Hyderabad Newspaper. For Civil and Hydro-mechanical works notice was published on 7th August 2013 and for supply and installation of electro-mechanical equipment's notice was published on 5/6th October, 2013. Copies of newspaper is attached at **Annexure-31** and **Annexure-32**.

M/s Hydrotech Consultants, engineering consultants for hydro power projects, 65/2/8, 8th Main Road, after 9th Cross, Brindavan Nagar, Mattikere, Bangalore – 560054 has evaluated the techno-commercial bids received and order/ contract was finalized accordingly.

Bids received for civil and hydro-mechanical works from following companies: -

- i. Rajanya Infrastructure Pvt. Ltd - Hyderabad
- ii. Basera Designs Pvt. Ltd. - Bhubaneswar
- iii. PhurpaTsering – Rupa, Arunachal Pradesh
- iv. PK Thungon Builders, Rupa, Arunachal Pradesh
- v. MCS Constructions Pvt.Ltd. - Lucknow
- vi. Coastal Projects Ltd.-Hyderabad

For electro-mechanical works following bids were received: -

- i. HPP energy (India) Pvt. Ltd., Noida
- ii. Boving Fouress (P) Ltd., Bangalore
- iii. Andritz Hydro Pvt. Ltd., Mandideep
- iv. FlovelMecamidiEnergy Pvt. Ltd., Faridabad
- v. Voith Engineering Services India Pvt. Ltd, Noida
- vi. HPP Energy (India) Pvt. Ltd. - Noida
- vii. TPSC (India) Pvt. Ltd., Noida

After detailed scrutiny of the bids received and negotiation, the order was placed for construction of civil components Package-I/ Package-II / Package III on M/s PK Thungon Builders, Village Shergaon, West Kameng district, Arunachal Pradesh on 5th March 2014 for a total contract value of Rs.14880.60 Lakh. Although consultant has recommended for Rs. 150.23 Crore in the bid evaluation report yet we have further negotiated with the Contractor and has agreed for 1% discount and arrived at a final contract value of Rs. 148.81 Crore. Subsequent to placement of order M/s PK Thungon Builders have changed the constitution of the company as PK Thungon Builders Pvt. Ltd. on 2nd August 2016. Copy of the Contract Agreements dated 6th August, 2014 & 2nd August, 2016 are attached at **Annexure-33** and **Annexure-34**. Further, Agreement for Rs.4341.20 Lakh was signed for supply of additional material on M/s PK Thungon Builders Pvt. Ltd on 1st July, 2017 and copy of the same is attached at **Annexure-35**.

After negotiations Letter of Award for Electro-mechanical works was placed on M/s TPSC (India) Pvt. Ltd. vide letter dated 14.04.2016 for Rs.2536.00 Lakh. Copy of the contract Agreements both dated 26.04.2016 for Design, Manufacture & Supply and Erection & Commissioning including Transport & Insurance for Rs.23,59,69,436/- & Rs.1,76,39,564/- respectively is attached at **Annexure-36** and **Annexure-37**.

17.DETERMINATION OF TARIFF – DIKSHIHEP

As per Regulations 7 of APERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources) Regulations 2018 project specific tariff shall be determined by the Hon'ble Commission for small Hydro Projects above 1 MW up to 25 MW.

As per Regulations 9 & 10 of APERC (Terms and Conditions for Tariff Determination from Renewable Energy Sources) Regulations 2018, the following components are to be considered for determination of levelised tariff for the use full life. The use full life for small Hydro Plant as per Regulation 2 I (w) is 35 years.

- (i) Capital Cost
- (ii) Debt Equity Ratio
- (iii) Loan & Finance Charges
- (iv) Depreciation including Advance Against Depreciation
- (v) Return on Equity
- (vi) Interest on Working Capital
- (vii) Operation and Maintenance Expenses
- (viii) Subsidy or Incentive by Central / State Government
- (ix) Taxes & Duties
- (x) Capacity Utilization Factor
- (xi) Auxiliary Consumption

17.1 Capital Cost

As per Regulation 8 & 12 of APERC Regulations 2018, to consider project specific actual capital cost of the project all the required information is being submitted for admittance of the capital cost by the Hon'ble Commission. This includes all capital works including Plant & Machinery, Civil Works, Hydro Mechanical Works, and Erection and Commissioning of Project, Financing Charges and Interest During Construction and Evacuation Infrastructure up to Inter-connection point.

The details of capital cost are given above for approval of Hon'ble Commission and works out to be Rs.320.3459 Crore and the same has been considered for calculation of tariff.

17.2 Capacity Utilization Factor (CUF)

As per Regulation 27 of APERC Regulations 2018, the capacity utilization factor has been considered as 45% net of free power to the home state as specified in Regulation.

17.3 Auxiliary Consumption

As per Regulation 28 of APERC Regulations 2018, normative auxiliary consumption factor is taken @1% of net CUF.

17.4 Debt Equity Ratio

As per Regulation 13 of APERC Regulations 2018, the Debt Equity Ratio is to be taken as 70:30. Actually the investment of promoter as equity is slightly more than 30% amounting to Rs.9853.76 Lakh and Debt is also lower than 70% amounting to Rs.22180.83 Lakh. However, for tariff calculation the same is considered as per the norms mentioned above.

The amount of Debt and Equity is shown in table below: considered for tariff calculation

Total cost of the project	32034.59 Lakh
Debt 70%	22424.21 Lakh
Equity 30%	9610.38 Lakh

17.5 Subsidy & Incentives by Central / State Govt.

As per MNRE Circular dated 2.07.2014 Annexure-B, a capital subsidy @Rs 1.5 Crore per MW will be granted for small hydro projects up to 25 MW with a maximum ceiling of Rs.5.0 Crore (Rs.500 Lakh). The amount of subsidy (to be received after COD) has been reduced in the calculation of normative Depreciation and Interest on loan as per Regulation 25.

As the company is a newly established company having no income/ profits, accelerated depreciation will not be claimed and hence no benefit on this account can be passed on for the fixation of tariff.

17.6 Loan & Finance Charges

As per Regulation 14 of APERC Regulations 2018, the following parameters are considered.

- a) Loan Amount: 70 % of Project Cost
- b) Loan Period: 12 Years
- c) Moratorium: 0 months (Repayment of loan is considered from the first year of COD)
- d) Rate of Interest: 10.34% as per details given below:

Interest rate has been considered 200 basis points above the average State Bank of India MCLR (Marginal Cost Lending Rate - one-year tenor) prevalent during the last available 6 months, which works out to 10.34 % as per details given in table below.

SBI MCLR 1-year tenor rates

S No.	Month	1 Year Tenor MCLR Rates (%)
1	1-Jun	8.25
2	1-Jul	8.25
3	1-Aug	8.25
4	1-Sep	8.45
5	1-Oct	8.50
6	1-Nov	8.50
Average of 6 months		8.34

Averages of past 6 months (June 2018 - November 2018) 8.34

Add: 200 basis point 2.00

Net Interest on Loan 10.34

17.7 Depreciation

As per Regulation 15 of APSCRC Regulations 2018, the depreciation has been calculated on admitted capital cost of assets @5.28% for first 13 years and @0.97% from 14th year till 35th year, considering salvage value as 10%. The depreciation for two different periods is as per details given in table below:

Rs. In Lakh

Capital Cost	Depreciation @ 5.28% 1-13 years	Depreciation @ 0.97% 14-35 years
32034.59	1665.03 each year	306.17 each year

17.8 Return on Equity

As per Regulation 16 of APSCRC Regulations 2018, Return on Equity has been considered @14% on Equity portion and 17.56% considering Minimum Alternative Tax (MAT) rate of 20.26% as on 1st April 2017 for useful life of the project.

17.9 Interest on Working Capital

As per Regulation 17 of APSCRC Regulations 2018, interest on working capital has been computed @300 basis points above the average State Bank of India Marginal Cost Lending Rate – one-year tenor taking into consideration Operation & Maintenance Expenses for one month, receivable of two months and maintenance spares @15% of Operation & Maintenance expenses. The interest rate for working capital is calculated after adding 300 basis points in SBI MCLR of 1-year tenure as per details given above works out to 11.34 (8.34 + 3.0).

The working capital requirement has been worked out considering the following:

- a) Operation & Maintenance Expenses for one month,
- b) Receivable of two months and
- c) Maintenance spares @15% of Operation & Maintenance expenses.

17.10 Operation & Maintenance Expenses

As per Regulation 19& 29 of APERC Regulations 2018, the Hon'ble Commission has specified "Normative O&M expenses for the first year of the Control period (i.e. FY 2018-19)" as Rs.28.54 Lakh / MW for small hydro projects from 5 MW to 25MW. The base value for O & M expenses for the first year of operation considering date of commissioning as 31st December, 2018 works out to Rs. 29.7644 Lakh per MW (calculated as 25% for FY 2018-19 and 75% of FY 2019-20 after providing annual escalation) and for further years the same has been escalated @5.72% annually.

17.11 Discounting Factor

The discounting factor considered is equal to the Post Tax Weighted Average Cost of capital on the basis of Normative Debt: Equity Ratio as per Regulation 10 (2). Interest rate considered for the loan component (70%) of capital cost is 10.34%. The net post tax return on equity has been considered as 14%. The discount rate works out to 9.38%.

17.12 Levelised Tariff

The Commissioning Date of Project (COD) is 31st December, 2018. Considering this the levelised tariff has been computed after taking into consideration the discount factor for useful life of 35 years, as Rs.5.85 per kWh

17.13 Local Area Development Fund

As per the notification dated 24th January 2008 of Government of Arunachal Pradesh. The hydropower developer has to pay paisa 1 (one) per unit of power sold to the state Government for raising local area development fund. The same has to be added in the normative tariff calculated and mentioned at 17.12

17.14 Financial Calculations

The financials were calculated based on the above parameters and as per the format specified by Hon'ble Commission the Format 1.1– Assumptions, Format 2.1– Detailed Financial Calculations, Format 3.1–Loan Schedule 4.1–Working Capital Calculations. All these four formats are attached at **Annexure-38** to **Annexure-41** respectively.

17.15 Proposed Tariff:

The Commission is hereby requested to approve the tariff based on the above elaborations and it is proposed to levy a levelised tariff of Rs. 5.86 per kWh fed into the grid for a period of 35 years.

17.16 Dispatch Principles for Electricity Generated from Dikshi HEP

As per Regulation 11 all renewable energy power plants of capacity 10 MW and above shall be treated as "**MUST RUN**" power plants and shall not be subjected to Merit Order Dispatch Principles, which means when the generation is available and if the same is not scheduled by the purchaser or the purchaser is unable to avail the same for reasons not attributable to the generator, the same needs to be paid to the generator as "deemed generation". Our humble request is that Hon'ble Commission may please suitably elaborate the same in the tariff order.

18. PRAYER

The Hon'ble Commission is hereby requested to kindly:

- (1) Approve the capital cost of the project.
- (2) Approve the proposed levelised tariff.
- (3) Elaborate MUST RUN clause so as to avoid future dispute, if any.
- (4) Allow furnishing of additional data and information and / or to modify the information submitted.
- (5) Condone any of errors, omissions and deletions in the petition and give a chance to provide any other necessary information as deemed fit by the Commission.
- (6) Any other directives as deemed suitable by the Commission.

Enclosures

Clause No.	Annexure Name	Annexure No.
4.1	Memorandum of Agreement with Government of Arunachal Pradesh on 17th March 2011	Annexure-1
4.2	Copy of the Letter No. CE (M)/W-129/2010-11/554-62 dated 10th June 2013	Annexure-2
4.2	Acknowledgement letter from Department of Power	Annexure-3
4.3	Copy of the Order dated 25th September 2018 against Petition No. TP 05 in which PPA is approved.	Annexure-4
4.3	Copy of the Power Purchase Agreement (PPA) with Department of Power Development, Government of Arunachal Pradesh signed on 16th October, 2018	Annexure-5
5	Comfort letter received for transmission connectivity from Chief Engineer (Power) TP&M Zone, Department of Power, Government of Arunachal Pradesh vide letter number CE (P)/TPM2/W-37/2015-16/3313-28 Dated 22nd February 2016	Annexure-6
5	The approval for transmission connectivity was notified by the Department of Power Development, Government of Arunachal Pradesh vide No. PWRS/W.2803/2016 (pt) dated 2nd June, 2016.	Annexure-7
5	Copy of Transmission License No. 1 dated 12th July 2018 granted by the Hon'ble Commission	Annexure-8
6	IREDA letter for Sanction of Term Loan Letter No. 221/2918/SHP/2014/IREDA/753 dated 04.08.2014	Annexure-9
6	Sanction of Additional Term Loan IREDA letter No. - 221/2918/SHP/2014/IREDA/1075 dated 24.05.2017	Annexure-10
6	Sanction of Additional Term Loan IREDA letter No. - 221/2918/SHP/2014/IREDA/3723 dated 25.09.2018	Annexure-11
6	IIFCL Letter for Modification in terms of Sanction of Term loan Letter Ref No. IIFCL/Credit/2014-15/7035 dated 19/02/2015	Annexure-12
6	IIFCL, Sanction of Additional Term Loan Letter Ref No. IIFCL/DEPL/2016-17/ 33421 dated 16/03/2018	Annexure-13
6	State Bank of Hyderabad - Commercial branch, Secunderabad - Sanction of Term Letter No. F/DEPL dated 03/02/2015	Annexure-14
6	State Bank of India, Commercial Branch, Secunderabad- SME Advances: Sanction of (Fund based Limit) of Additional Term Loan Dated 10/01/2018	Annexure-15
12	The DPR Vol – I, II & III	Annexure-16
12	Survey and Investigation Report	Annexure-17
13.6	Consent for possession of use of explosives from "Petroleum and Explosives Safety Organization (PESO), Ministry of Commerce & Industry, Govt. of India, East Circle, 8 Esplanade East, 1 st Floor, Kolkata - 700069 vide letter No. E/HQ/AR/22/48(E74326) dated 04th April, 2016	Annexure-18
13.6	Forest Clearance for diversion of 3.12 ha of forest land for construction of Dikshi Hydro Electric Project (24 MW) in favour of M/s Devi Energies Pvt. Ltd. by Department of Environment and Forests, Govt. of Arunachal Pradesh, Itanagar vide letter No. FOR.401/Cons./2011/916-19 dated 10th June 2014	Annexure-19
13.6	Certificate of Registration - granted under Clause (a) of sub-section (2) of Section 4 of Inter-state Migrant Workmen (Regulation of employment and conditions of services) Act 1979 to Devi Energies for execution of Dikshi HEP over Phudung river - from Labour Commissioner and Registering	Annexure-20

Clause No.	Annexure Name	Annexure No.
	Officer, Govt. of Arunachal Pradesh vide letter No. LAB (W) 98/2011 dated 13.06.11	
13.6	Fisheries - NOC from Department of Fisheries, Govt. of Arunachal Pradesh, Itanagar for implementation of Dikshi HEP (24 MW) on Phudum river in West Kameng District, Arunachal Pradesh by Devi Energies Pvt. Ltd vide letter No. FISH/DEV/HEP-204/2010 dated 9th June 2011	Annexure-21
13.6	Department of Geology – NOC for establishment of Crusher unit issued by Commissioner, Department of Geology & Mining, Government of Arunachal Pradesh, Itanagar vide letter No. DGM/NOC/CU/WK/39/2016/264-68 dated 1st February 2017	Annexure-22
13.6	State Pollution Control - Consent to establish/operate under Section 25/26 of Water (Prevention & Control of Pollution) Act 1974 issued by Arunachal Pradesh State Pollution vide letter no. APSPCB-871/2012/DIKSHI HEP/447-50 Dated 10th Sept 2013	Annexure-23
15.3 A	The certificate issued by EE, Water Resource Division, Bomdila dated 19th October, 2016	Annexure-24
15.3 B	The certificate issued by Sub Divisional Officer, Rupa dated 30th January, 2018	Annexure-25
15.3 C	The certificate issued by Deputy Commissioner, West Kameng District, Bomdila dated 31st July, 2017	Annexure-26
15.3 D	The letter issued by the sub-divisional officer, Rupa dated 23rd April 2018 for the additional cost for the reworking of the work damaged during landslide	Annexure-27
15.3 E	Various Orders issued by the Deputy Commissioner, Bomdila during June, July & August 2018 for closure of Road	Annexure-28
15.3 G	Photographs showing Damages	Annexure-29
15.4	The certificate issued by A. M. REDDY & D. R. REDDY, Chartered Accounts, Hyderabad dated 23rd May, 2018	Annexure-30
16	Copies of newspaper cutting for Civil and Hydro-Mechanical works notice published on 7th August 2013	Annexure-31
16	Copies of newspaper cutting for supply and installation of electro-mechanical equipment's notice published on 5/6th October 2013.	Annexure-32
16	Copy of the Contract Agreements dated 5th August, 2014 with PK Thungon	Annexure-33
16	Copy of the Contract Agreements dated 2nd August, 2016 with PK Thungon	Annexure-34
16	Agreement was signed for supply of additional material on M/s PK Thungon Builders Pvt. Ltd on 1st July, 2017	Annexure-35
16	Copy of the Contract Agreements dated 26.04.2016 for Design, Manufacture and Supply with TPSC	Annexure-36
16	Copy of the Contract Agreements dated 26.04.2016 for Erection & Commissioning including Transportation & Insurance in Transit.	Annexure-37
17.14	Format 1.1 for Assumption for Levelised Tariff for 35 Years	Annexure-38
17.14	Format 2.1 for Detailed Financial Calculations for Levelised Tariff for 35 Years	Annexure-39
17.14	Format 3.1 for Detailed Financial Calculations with Loan Schedule	Annexure-40
17.14	Format 4.1 for Detailed Financial Calculations - Working Capital Calculations	Annexure-41

LIST OF ABBREVIATIONS

Amp	Ampere
AP	Arunachal Pradesh
APPWD	Arunachal Pradesh Public Work Department
APSERC	Arunachal Pradesh State Electricity Regulatory Commission
ARR	Annual Revenue Requirement
BIL	Basic Insulation Level
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
Cfm	Cubic Feet per minute
COD	Commissioning Date of Project
CTs	Current Transformers
CUF	Capacity Utilization Factor
Cum	Cubic meter
Cumec	Cubic Meter per second
d/s	Downstream
DEM	Digital Elevation Model
DEPL	Devi Energies Pvt. Ltd.
DPR	Detailed Project Report
EHV	Extra High Voltage
EI	Elevation
EOT	Electric Overhead Travelling
EPS	Electric Power Survey
FRL	Full Reservoir Level
FRP	Financial Restructuring Plan
FY	Financial Year
FY 19	Financial Year 2018-2019
FY 20	Financial Year 2019-2020
GFA	Gross Fixed Assets
GIS	Geographical Information System
GoAP	Government of Arunachal Pradesh
GOI	Government of India
GSI	Geological Survey of India
GSS	Grid Sub Station
Ha-m	Hectare Meter
HEP	Hydro Electric Project
HFL	Highest Flood Level
HRT	Head Race Tunnel
HT	High Tension
HV	High Voltage
Hz	Hertz
ID	Internal Diameter
IDC	Interest During Construction
IRR	Internal Rate of Return

KM	Kilometer
kWh	Kilo Watt Hour
LAVT	Lightning Arrestor and Voltage Transformers
LD/SLDC	State Load Dispatch Centre
LT	Low Tension
LU	Lakh Units
m	Meter
MCLR	Marginal Cost Lending Rate of State Bank of India (SBI)
MDDL	Minimum Draw Down Level
MKW	Metric Kilowatt
MU	Million Units
MVA	Mega Volt Ampere
MVAR	Mega Volt Ampere Reactive
MW	Mega Watt
MWL	Maximum Water Level
MYT	Multi Year Tariff
NFA	Net Fixed Assets
NSL	Natural Surface Level
O&M	Operation & Maintenance
OA	Open Access
OD	Outer Diameter
OPU	Oil Pressure Unit
PCC	Plain Cement Concrete
PCD	Pitch Circle Diameter
PFR	Pre-Feasibility Report
PGCIL	Power Grid Corporation of India Limited
PLCC	Power Line Carrier Communication
PLF	Plant Load Factor
PPA	Power Purchase Agreement
PTs	Potential Transformers
Pu	Per Unit
PX	Power Exchange
R&M	Repairs and Maintenance
RD	Reduced Distance
RES	Renewable Energy Sources
RoE	Return on Equity
ROI	Rate of Interest
RPM	Revolution per Minute
Rs. / INR	Indian Rupees
Sqm	Square Meter
TWL	Tail Water Level
u/s	Upstream
UCB	Unit Control Board
XLPE	Cross Linked Polyethylene