

# Evaluation of a “Proposal” for setting up solar projects of 300 GW to 500GW by 2030

Final Report

**NITI AAYOG**

April 2019



## **Acknowledgement**

**The study was sponsored with the financial support of Niti Aayog, Government of India and conducted by CRISIL Infrastructure Advisory, Gurgaon.**

**DISCLAIMER: “CRISIL Infrastructure Advisory, Gurgaon has received the grant under the Research Scheme of NITI Aayog, 2015 to produce this document. However, NITI Aayog shall not be held responsible for findings or opinions expressed in the document prepared. This responsibility rests with CRISIL Infrastructure Advisory, Gurgaon.”**



## Table of contents

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>Executive summary</b> .....                         | <b>7</b>  |
| <b>2</b> | <b>Introduction</b> .....                              | <b>11</b> |
| 2.1      | Background .....                                       | 11        |
| <b>3</b> | <b>Key meetings and discussions</b> .....              | <b>13</b> |
| <b>4</b> | <b>Energy sector related discussions</b> .....         | <b>15</b> |
| 4.1      | Demand side – 2030 .....                               | 15        |
| 4.2      | Supply side- 2030 .....                                | 15        |
| 4.2.1    | RPO levels .....                                       | 15        |
| 4.3      | Demand Supply position- 2030 .....                     | 15        |
| 4.4      | Merit Order Dispatch for Storage .....                 | 15        |
| 4.5      | Impact on pushing EVs and storage .....                | 16        |
| 4.6      | Key advantages of ESS (Energy Storage Solutions) ..... | 16        |
| 4.7      | Assessment of manufacturing .....                      | 16        |
| 4.8      | Storage solutions & domestic manufacturing .....       | 17        |
| 4.8.1    | Rising need for Energy Storage Solutions (ESS) .....   | 17        |
| 4.8.2    | Indian Energy Storage Market .....                     | 17        |
| 4.8.3    | Key Challenges and their mitigation .....              | 18        |
| 4.8.4    | Interventions required .....                           | 19        |
| <b>5</b> | <b>Other issues of contention</b> .....                | <b>21</b> |
| 5.1      | Bidding structure .....                                | 21        |
| 5.1.1    | Key clauses with merits and demerits .....             | 21        |
| 5.1.2    | 12 years PPA commitment vs different structures .....  | 22        |
| 5.2      | Payment Security Mechanism .....                       | 22        |
| 5.2.1    | View on LC .....                                       | 22        |
| 5.2.2    | View on PSM fund .....                                 | 23        |
| 5.2.3    | View on Tripartite agreement .....                     | 23        |
| 5.2.4    | Guarantees .....                                       | 23        |
| 5.3      | Assessment on Foreign Exchange .....                   | 24        |
| 5.3.1    | Historical analysis on Forex for USD, Yen, Euro .....  | 24        |
| 5.3.2    | Options and assessment .....                           | 26        |
| 5.3.3    | Forex fluctuation liabilities .....                    | 26        |
| 5.4      | Termination .....                                      | 26        |
| 5.5      | Tariff Levels .....                                    | 28        |

# Infrastructure Advisory

|          |  |           |
|----------|--|-----------|
| 5.6      | Potential liabilities .....                                      | 29        |
| 5.6.1    | Contingent liability on account of termination .....             | 29        |
| <b>6</b> | <b>Inspirational Demand for India .....</b>                      | <b>31</b> |
| 6.1      | Demand Scenario .....  | 31        |
| <b>7</b> | <b>National Electricity Distribution Company (NEDC) .....</b>    | <b>33</b> |
| 7.1      | Relevance of setting up NEDC .....                               | 33        |
| 7.2      | Positives .....  | 33        |
| 7.3      | Key Challenges .....   | 34        |
| <b>8</b> | <b>Recommendations .....</b>                                     | <b>35</b> |
| 8.1.1    | Summary highlighting key risks/issues .....                      | 35        |
| <b>9</b> | <b>Annexures .....</b>   | <b>37</b> |
| 9.1      | Annexure 1 - Initial Proposal .....                              | 37        |
| 9.2      | Annexure 2- Revised Proposal 1(18 <sup>th</sup> May 2018) .....  | 38        |
| 9.3      | Annexure 3- Revised Proposal 2 (30 <sup>th</sup> May 2018) ..... | 40        |
| 9.4      | Annexure 4 – Capacity Installations .....                        | 41        |
| 9.5      | Annexure 5 – Contingent Liabilities .....                        | 44        |
| 9.6      | Annexure 6 – Termination .....                                   | 45        |
| 9.6.1    | Existing SECI model PPA .....                                    | 45        |
| 9.6.2    | Rewa Ultra Mega Solar (RUMS) model PPA .....                     | 49        |
| 9.6.3    | International PPAs .....   | 57        |
| 9.7      | Annexure 6 – Key meetings & submissions .....                    | 67        |
| 9.8      | Annexure 7 – Detailed computations .....                         | 131       |

## List of tables

|  |     |
|--|-----|
| Table 1: Key Meetings/ discussions (besides regular meetings) .....              | 13  |
| Table 2: Demand Supply and Curtailment.....                                      | 15  |
| Table 3: Merits and demerits of current bid structure .....                      | 21  |
| Table 4: Termination Coverage – SECI vis a vis RUMS .....                        | 27  |
| Table 5: Key assumptions .....   | 28  |
| Table 6: Comparable economies.....   | 31  |
| Table 7: Power Demand Growth .....   | 32  |
| Table 8: Bidding – 12 year commitment.....                                       | 38  |
| Table 9: Capacity Trajectory.....  | 41  |
| Table 10: Tariff 2019 vs 2030 (Rs. /unit) .....                                  | 41  |
| Table 11: Tariff for plant for 50 year period .....                              | 41  |
| Table 12: Annual Manufacturing Capability.....                                   | 41  |
| Table 13: Energy mix (2030) .....  | 42  |
| Table 14: Energy mix (2030) .....  | 42  |
| Table 15: Contingent liabilities (Termination) .....                             | 44  |
| Table 16: Contingent liabilities (Indirectly on account of PSM) .....            | 44  |
| Table 17: Tariffs (Rs. /kWh), Capacity (GW/ GWh) and energy generated (BU) ..... | 132 |
| Table 18: Solar Payment security (Rs. Crore).....                                | 132 |
| Table 19: Battery Payment security (Rs. Crore).....                              | 133 |
| Table 20: Overall Payment security (Rs. Crore).....                              | 134 |
| Table 21: Costs (Rs. Crore/ MW) .....  | 134 |
| Table 22: Capital structure (Rs. Crore).....                                     | 135 |
| Table 23: 90% Debt due (Rs. Crore) .....   | 135 |
| Table 24: 90% Debt due (Rs. Crore) .....   | 137 |

**List of figures**

Figure 1: Payment security mechanism RUMS..... 22

Figure 2: Euro INR exchange ..... 24

Figure 3: USD INR exchange ..... 25

Figure 4: Yen INR exchange ..... 25

Figure 5: Per Capita Consumption vs Per Capita Income..... 31

Table 6: Key issues/ implications & Analysis..... 35

Figure 7: Ministry and areas of alignment ..... 38

Figure 8: Ministry and areas of alignment ..... 91

# 1 Executive summary

The Government of India has received a “Proposal” for setting up solar projects in India along with Energy storage solutions through Domestic manufacturing.

## ***The proposal augurs well with the Government of India objectives***

The proposal pushes two GOI objectives – firstly “Make in India” with setting up solar and Energy Storage solutions (ESS) manufacturing capacity in India, thereby enhancing the capability of manufacturing in India and generating employment and improving economic growth. Secondly the proposal improves energy security position of the country through clean energy supply (solar along with storage that helps to balance and meet peak) and therefore will help in meeting electricity requirement. Further in due course of time it envisages India to become a leader and hub for battery manufacturing in India, in effect promoting Electric Vehicles (EVs) through localized competitive battery manufacturing in India.

## ***Can consider a solar capacity of 350 GW by FY 30 i.e. over a time span of 12 years***

The initial proposal envisaged a capacity of 910 GW solar and 2265 GWh of Energy Storage Solutions (ESS) up to 2030, which would have required \$1 trillion of investment. However based on various rounds of discussions between Ministry of New and Renewable Energy (MNRE) and Ministry of Power (MoP) on demand and supply position of the various fuel sources in the country in 2030, the solar trajectory has been revised and shared with us is 350 GW<sup>1</sup> (by 2030).

The proposal expected to improve economics for the end consumers with a gradually declining tariff trajectory for new installations of solar with ESS, which would drive the installations.

## ***Sector issues – Single tariff structure, Energy Storage Solution (ESS) & Renewable Purchase Obligation (RPO) trajectory to be addressed***

The proposal provides for two different tariffs in the PPA (separate for solar and solar with ESS) with a higher tariff during peak/night time since it will be supplied through storage battery. This needs to be revised and aligned in a single PPA for both solar and ESS with clear supply from both sources and tariff commitments.

Besides, the supply from energy storage/ batteries needs to be firmed up with the solar trajectory till 2030. A clear vision of the battery capacity to be installed needs to be defined in alignment with MoP and MNRE. Further it is critical to define battery storage in terms of treatment as must run or not and viability of tariff for solar with ESS (since higher proposed tariff is unlikely to compete in Merit Order).

The RPO targets at state levels need to be aligned with expected RPO levels for 2030 (expected to be ~23%, for 350 GW solar level). A separate trajectory for procurement of power through batteries/ ESS may also need to be finalized in consultation with MoP and MNRE<sup>2</sup>.

## ***Guaranteed offtake of manufacturing could restrict advantages of future technology and potential competition***

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<sup>1</sup> Trajectory not validated by CRIS; calculations assuming 350 GW solar by 2030

<sup>2</sup> As per the revised proposal 1200 GWh of ESS capacity by 2030



Proposal expects a contracting for the period of 12 years for assured offtake through manufacturing setup. While commitment ensuring offtake of domestically manufactured goods helps in creation of a conducive manufacturing environment, it restricts potential competition, technology advancement and potential cost/ changes and likely disruptions in future.

Other options like announcing power procurement trajectory for the period of 12 years could be provided. Besides, this trajectory need to be reflected in the RPO levels that need to increase based on the proposed trajectory of procurement from solar as well as storage. This could further be strengthened along with amendment to the Act reflecting this procurement. This is important since electricity is a concurrent subject and State DISCOMs and Regulators need to be aligned through strengthening of the Act for this procurement.

Amended Act reflecting firm market for procurement i.e. potential Power Purchase Agreements (PPAs) that could be signed over the next 12 years, may address the concern of investors for raising debt for setting up the manufacturing in India.

***Rupee depreciation against other currencies could be capped at 3% assuming tariffs discovered will be lower enough to offset this increase through potential low cost of debt, higher CUF levels and economies of scale.***

As per the proposal forex yearly depreciation/ appreciation cap is to be limited to 3% for US\$, Euro, and 3.5% for JPY. Historically the volatility of Yen is much higher as compared to USD and euro, and the CAGR depreciation of rupee against yen for a period of 20 years is higher at 3.27% (as compared to 2.43% for USD and 2.66% for euro). Over and above the premium on Yen based derivatives in the market are higher, thereby leading to higher costs in case the GoI plans to hedge against Yen fluctuations.

Besides a 3 % YoY currency depreciation will result in ~70 paisa increase in levellised tariff but potential reduction in cost of debt, economies of scale and CUF is likely to offset this impact (levellised tariff lower than Rs. 2/unit<sup>3</sup>).

Thus a cap on FOREX depreciation at 3% across currencies could be considered provided the final levellised tariffs discovered are competitive (as compared to levellized tariffs discovered for domestic players post the impact of 3% YoY depreciation) & low enough to capture the low cost of debt, higher CUFs and economies of scale. Bid evaluation criteria needs to include 3% FOREX depreciation while comparing bids from domestic investors investing in Indian Rupee.

***Revolving 1 month Letter of Credit could be continued***

The proposal proposes a LC for 12 month average billing as against a LC of 1 month average billing. Changing the security from one month LC to twelve month, would lead to an incremental burden of Rs. ~5-6 crore/ GW/ year<sup>4</sup> for every percentage point cost of letter of credit. Even successful bids in the recent past such as RUMS, and those by SECI/ NTPC have a revolving letter of credit for 1 month's average billing. The same could be continued.

***Capacity of SECI/ NTPC to operationalize Payment security trust for such a large quantum of investment needs to be relooked***

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<sup>3</sup> Considering a CUF of 22%, lower cost of debt (0.5%), higher tenor of 25 years with a moratorium of 4 years

<sup>4</sup> Considering a CUF of 22% and tariff of Rs. 3/unit as per the proposal

The quantum of 350 GW of solar installations would require a huge corpus for the Payment security fund. The contingent liabilities arising indirectly on account of Payment Security Mechanism (due to outflow of tariffs in foreign currency) are Rs ~2 lac Cr in 2023 and Rs. ~15.7 lac Cr in 2030<sup>5</sup>.

Creation of Payment Security Trust by SECI would not be enough to back the payments and would require SECI to take this up with State DISCOMs for commitments and assurances.

However, the proposal seeks operationalization of this Fund before COD which may be challenge considering DISCOMs poor financial health and already stretched FRBM limits of the various states.

### ***Tripartite agreement as PSM would be a challenge and SECI need to work with State Governments and RBI for the same***

As per the proposal all the states are required to have a tripartite agreement with backing of SECI + NTPC / RBI / state. The successful solar tenders such as RUMS had a tripartite agreement though that was limited to one state (MP).

Without any doubt, a tripartite agreement with Government of India, state Governments and RBI would mitigate payment risk, thereby attracting investors and potentially cheaper cost of debt. However, considering the size of the payment security of Rs ~2 lac Cr in 2023 and Rs. ~15.7 lac Cr in 2030, getting a tripartite agreement with State could be challenge considering FRBM situation of certain states. Besides, this may create a precedent for similar provisioning by other sectors.

It is also observed that if tripartite agreement is signed, need for Payment Security Trust (discussed above) could be avoided.

### ***Contingent liabilities on account of termination need to be secured through proper insurances in place***

The contingent liabilities on account of termination based on the solar trajectory of 350 GW (of which 325GW<sup>6</sup> is new solar addition) assumed to be spread linearly and with ESS picking up post 2021, are estimated to be Rs. ~6.9 lac cr (90% debt due)<sup>7</sup> and Rs. ~3.0 lac cr (150% adjusted equity)<sup>8</sup> for FY 2023 and Rs. ~19.4 lac cr (90% debt due) and Rs. ~8.5 lac cr (150% adjusted equity) for FY 2030.

Insurance can partially offset the liabilities on account of the debt due to the lender. Hence it is critical to include the claim on insurance for debt due in case of termination, as has been prescribed under the definition of debt due in various Model concession agreements as well as the Rewa Ultra Mega Solar (RUMS) solar power project.

### ***Need for robust contracting framework to allow competition***

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<sup>5</sup> Assuming a tariff trajectory of Rs. 3/unit (2020) to Rs. 2/unit (2030) for solar as per the proposal and Rs. 7/unit (2020) to Rs. 6/unit (2030) for solar with battery – includes a YoY tariff appreciation of 2.25% as per the proposal ; ESS efficiency of 88% as per the proposal

<sup>6</sup> Assumed 325 GW new solar capacity addition

<sup>7</sup> Debt tenor assumed to be 20 years

<sup>8</sup> Adjusted equity as per Model Concession Agreement – includes impact of depreciation and adjusted for historical WPI appreciation at 1.1% (FY 13-17)

As per the proposal, a 12 year upfront contracting is required. Since solar energy and ESS fields are new energies and fast growing a 12 year contracting at the very outset is a big commitment. Any change, disruption, improvements in technology is likely to expose the parties to risks.

Instead of a 12 year contracting at a single go, it is imperative that the bidding structure be broken into periods. For instance, four periods of three years each would allow periodic reviews, mid-course correction and a more robust bidding framework. This along with amendment to the Act reflecting proposed pipeline and RPO levels for 12 years could be considered.

While high capacity tenders allow for economies of scale, however suffer from concentration risk and restrict competition. Hence tenders may be in smaller bundles varying from 10 to 20 GW each.

### ***Inspirational demand for the country likely to boost installations***

In terms of power demand, India is second to China only in terms of demand of power. With rising incomes, economic growth and schemes such as Saubhagya for 100% household electrification, the momentum is expected to continue in the future.

At the expected range of growth of 5.5% to 6.5% year on year, the expected demand is likely to be in the range of ~2305 BU to ~2585 BU.

### ***Setting up National Electricity Distribution Company***

The key functions envisaged for the National Discom are to handhold state discoms in electricity distribution activities, ensure time bound implementation of central scheme, and compete with private firms and contractors to bag contracts of state-run distribution companies for appointing franchisees or engineering tenders. Therefore, a national discom can potentially operate as a common platform to ensure all states gain from economies of scale and specialisation of services.

However it could require complete moulding of the current regulatory and operational framework, to enable a new entity to handle the role of existing discoms.

Further, since electricity is a concurrent subject and the existing EA 2003 and subsequent policy does not envisage NEDC or provide legal strength, setting up of a central National Electricity Distribution Company may not be legally tenable. In any scenario, it is critical that DISCOM level viability including viability of power supply to individual retail consumer is critical irrespective of NEDC or state DISCOM for overall better power management and payment on time to generators.

## 2 Introduction

### 2.1 Background

The Government of India (GoI) had announced an ambitious plan to install 175 GW of renewable energy sources (100 GW of solar power capacity, 60 GW of wind power capacity, and 15 GW of other renewable energy sources) by 2022. The GoI has committed at COP 21 to reduce carbon emission intensity by 2030 - emission per unit of GDP by 33-35% from 2005 levels, mainly through arriving at a 40% share of renewables in the electricity generation mix.

As on March'18, the renewable capacity installed in India stood at 69 GW which represents 20% of the total installed capacity (344 GW). Out of the 69 GW capacity installed, majority of the installations have been in the wind and solar sector with 34 GW and 22 GW respectively. While India has seen large capacity addition in wind energy in the recent past, solar capacity is expected to witness a quantum leap and rapidly overtake wind capacity owing to resource availability and solar photovoltaic technology becoming cost-effective.

With this background, a "Proposal" has been submitted for setting up 300-500 GW solar projects in India along with Energy storage solutions through Domestic manufacturing. This proposal pushes two GOI objectives:

- It provides **24x7 power through clean energy option** (solar along with storage that helps to balance and meet peak)
- **"Make in India" to generate employment and economic growth.**

The proposal has undergone various revisions in consultation with various stakeholders over a period of time. The initial proposal, which was submitted in April'2018 was submitted to the Hon'ble PM entailed an investment of \$1 trillion with a capacity of 910 GW solar and 2265 GWh of Energy Storage Solutions (ESS). The same was subsequently revised on 18<sup>th</sup> May 2018 and 30<sup>th</sup> May 2018 – with a proposal of 350 GW of solar. The details of the changes in the proposals have been annexed.

*Considering the scale of the proposed investment and commitment by GOI, it becomes imperative and critical to analyze the impact of the proposal as well as evaluation of key risks & potential mitigants along with overall financial impact on the exchequer.*



### 3 Key meetings and discussions

**Key meetings/ discussions held** – Number of meetings were organized on daily basis during April 26<sup>th</sup> 2018 till 16<sup>th</sup> July 2018. Some of the key meetings and discussions with stakeholders are indicated below:

**Table 1: Key Meetings/ discussions (besides regular meetings)**

| S.No. | Date       | Discussion/ Meeting with                  | Remarks  |
|-------|------------|---|--|
| 1.    | 29.04.2018 | Niti Aayog                                | <b>Presentation</b> - Preliminary review of the initial proposed energy solution – Key insights and analysis |
| 2.    | 02.05.2018 | Niti Aayog                                | <b>Presentation</b> – Revised Preliminary review with view on likely contingent liabilities                  |
| 3.    | 10.05.2018 | Niti Aayog                                | <b>Presentation</b> – Revised presentation - Preliminary review  |
| 4.    | 25.05.2018 | Niti Aayog, SECI, NTPC                    | <b>Meeting</b> – Key issues pertaining to PPA  |
| 5.    | 30.05.2018 | Niti Aayog, MOP, MNRE, Other stakeholders | <b>Meeting</b> – Revised proposal discussed and submitted  |
| 6.    | 30.05.2018 | Niti Aayog                                | <b>Meeting</b> – Resolving issues pertaining to various clauses in the proposal                              |
| 7.    | 30.05.2018 | Niti Aayog                                | <b>Presentation</b> – submitted on the key changes/ issues in the proposal                                   |
| 8.    | 03.06.2018 | Niti Aayog                                | <b>Background Note</b> – with key challenges and open issues for MOF   |
| 9.    | 05.06.2018 | Niti Aayog                                | <b>Presentation</b> – draft covering sector issues & analysis  |
| 10.   | 05.06.2018 | Niti Aayog                                | <b>Note</b> – Discussion points on meeting with MOP  |
| 11.   | 06.06.2018 | Niti Aayog, MOP                           | <b>Meeting</b> - Power supply position by 2030   |
| 12.   | 08.06.2018 | Niti Aayog                                | <b>Presentation</b> - Initial findings of proposed energy solution   |
| 13.   | 11.06.2018 | Niti Aayog                                | <b>Meeting</b> - with CEO  |
| 14.   | 15.06.2018 | Niti Aayog, MOP                           | <b>Meeting</b> - Power supply position by 2030   |
| 15.   | 18.06.2018 | Niti Aayog                                | <b>Revised Presentation</b> - Findings of proposed energy solution   |
| 16.   | 16.07.2018 | Niti Aayog                                | <b>Expansion in Scope of Work</b>  |



## 4 Energy sector related discussions

### 4.1 Demand side – 2030

In discussion with the Ministry of Power, the proposal assumes demand to grow at a **CAGR of 5.7% per annum** going forward with a **demand of ~2600 BU in the year 2030**. As per the proposal, CEA projections for the peak is expected on Oct 7<sup>th</sup> 2030 and lowest peak day is expected on Dec 14<sup>th</sup> 2030. The daily and hourly demand curves have been analyzed for these days and have been tested by against the supply in the proposal.

### 4.2 Supply side- 2030

For analysis of supply side, assumptions made in the proposal as agreed with MoP and MNRE as indicated in Table 14, Annex-1 have been considered. Further for analysis of the solar generation, the proposal has selected 17 districts as per NEP and grouped them into 5 clusters in the north, east, west, south and central zone. The monthly solar variation in these zones has been analyzed. On the basis of solar state profiles (as per MNRE), the proposal has analyzed the peak solar day i.e. Mar 25<sup>th</sup> 2030 and lowest solar day i.e. Aug 8<sup>th</sup> 2030.

#### 4.2.1 RPO levels

As per the national tariff policy 2016, the solar RPO is 8% by 2022 (excluding hydro power). At the assumed level of demand, solar & hydro capacity and CUFs in 2030 – the national solar RPO compliance (excluding hydro power) works out to be ~23%.

Currently the RPO compliance in case of most of the states continues to remain low with the state regulators allowing deferment of the quantum of noncompliance to the next year. In order to ensure that the targets are met, stringent guidelines and penalties may be placed for meeting the RPOs.

***RPO targets at state levels may be aligned with expected RPO levels for 2030.***

### 4.3 Demand Supply position- 2030

The demand supply position for these days along with the level of curtailment (as per revision dated 05/06/2018) are as indicated below -

**Table 2: Demand Supply and Curtailment**

| S.No. | Day  | Demand (BU) | Generation (BU) | Curtailment (BU) | Curtailment (%) |
|-------|--|-------------|-----------------|------------------|-----------------|
| 1.    | Peak demand -Oct 7 <sup>th</sup> 2030          | 7.65        | 7.65            | 0.00             | <b>0%</b>       |
| 2.    | Lowest demand - Dec 14 <sup>th</sup> 2030      | 6.55        | 6.66            | 0.11             | <b>1.65%</b>    |
| 3.    | Peak solar supply-Mar 25 <sup>th</sup> 2030    | 7.45        | 7.70            | 0.25             | <b>3%</b>       |
| 4.    | Lowest solar supply- Aug 8 <sup>th</sup> 2030  | 7.19        | 7.22            | 0.03             | <b>0.5%</b>     |
| 5.    | Peak RE generation – Jun 25 <sup>th</sup> 2030 | 7.15        | 7.98            | 0.84             | <b>10.5%</b>    |

Source: Proposal for setting up Solar & ESS

### 4.4 Merit Order Dispatch for Storage

While thermal power can be utilized to meet the base load, rising solar energy will require adequate grid balancing from storage, hydro and gas power plants. While existing storage technologies such as Pumped storage plants are subject to Merit Order dispatch, there are no existing guidelines for batteries from the MoD angle.



It becomes critical to define the MoD guidelines for battery storage in terms of treatment as must run or not.

## 4.5 Impact on pushing EVs and storage

India has largely been dependent on fossil fuels, with crude oil imports comprising 82% share of the country's fuel requirement. The high dependence on fossil fuels has seen a few Indian cities ranked among the most polluted in the world. The burden on the exchequer is also considerable, with the MoPNG estimating that the country will have to spend \$85 billion on crude oil imports in 2018.

With this backdrop, India has set itself a mammoth task of moving entirely towards electric vehicles by 2030. To provide a boost to the adoption of eco-friendly vehicles in the country, several schemes and initiatives have been undertaken such as FAME [Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India].

The impact of transformative adoption of EVs (40% of private vehicles as EVs and 100% public transit/ services are electric) as per Niti Aayog report "India leaps ahead: Transformative mobility solutions for all", would be a **reduction in petrol & diesel consumption by 156 MTOE** leading to a **saving of ~\$60 billion in energy cost by 2030** for India and **curb emissions of one gigatonne of carbon dioxide between 2017 and 2030**. While with adoption of EVs the dependence on crude is expected to reduce, however owing to the higher initial costs of batteries the overall impact on exchequer is expected to be higher.

## 4.6 Key advantages of ESS (Energy Storage Solutions)

Storage is expected to provide advantages both to the solar system installations as well to the power systems. ESS is capable of **renewable smoothing** and hence allows counteracting variability in the infirm renewable generation. It is also capable of shifting the peak and provides the much needed **advantage of supplying either load or generation** and allows **energy time shift**. It enhances frequency regulation, maintains consistent voltage by varying reactive power and balances grid frequency (<2 seconds) after a sudden change of power consumption or generation.

Further storage is capable of enabling distributed generation and constrained areas of the grid. It protects loads from momentary events such as power interruptions and voltage sags and swells. ESS can also be **utilized to postpone investments in transmission and distribution assets** as against setting up new generation plants, since it allows utilization of the same evacuation infrastructure during a different time of day.

The proposal also envisaged ESS manufacturing and projects in India, thereby allowing the country to utilize the aforesaid advantages of storage.

## 4.7 Assessment of manufacturing

Currently, bulk of India's solar PV industry is dependent on import of critical raw materials and components including silicon wafers. While taking advantage of low entry barriers to the solar power generation market, some Indian manufacturers have vertically integrated their businesses and forayed into solar power plant development so that there is assured offtake for their major capacities. However, Indian manufacturers have not been competitive enough in the fast growing market.

Transforming India into a solar energy hub presumes a **leadership role in low-cost, high-efficiency, high-quality solar manufacturing, including system components like storage, inverters and converters**. The domestic manufacturers must not remain dependent on domestic solar market demand, and aim to export solar panels in a five to ten year horizon. Lessons could be drawn from many European countries like Germany and Denmark. These countries focused on developing an export market for wind turbines by providing export credit assistance and development aid loans to less developed countries purchasing wind technology.

The government has extended the modified special incentive package scheme (MSIPS), which provides capital subsidy of 20% to units engaged in electronics manufacturing within special economic zones (SEZ) and 25% outside SEZs, for five years. The scheme offers additional benefits for investment-heavy projects in the country and extends capital subsidy to electronic products, including consumer electronics items.

Experiences of other countries suggest that domestic manufacturing must be encouraged not just through tariffs or barriers but offer of **cheap loans and financing options** by banks and financial institutions. Incentives by other countries to boost indigenous manufacturing include: **production subsidy, soft loans, excise duty rebate, accelerated depreciation, government procurement, free or below-market-price land allocation, incentives on R&D, import tariffs and quotas**, technical standards and local content requirement.

**Commitment of advanced PPA assurance for manufacturing may result in higher tariff for end consumer. However delinking of manufacturing from project development through production subsidy support to the manufacturer without guaranteed offtake may essentially allow competition in the sector as well as reduction in loading the costs on the end consumer.**

## 4.8 Storage solutions & domestic manufacturing

### 4.8.1 Rising need for Energy Storage Solutions (ESS)

As on Jan'19, India has an installed capacity of ~349 GW. Thermal power plants constitutes ~64% of the installed capacity, followed by renewable, hydro and nuclear energy at around 21%, 13% and 2%, respectively. Coal remains the largest contributor in India's power generation. Over ~70% of generation in energy terms is coal based, signifying the reliance on coal as fuel in Indian power sector.

However in growth terms, renewable energy capacity has risen rapidly at a CAGR of 20% over the past ten years i.e. FY 08-18, as compared to the overall installed capacity growth at a CAGR of 9.2% during the same period. The growth in renewable energy can be attributed majorly to Government focus, improving cost economics (vis-à-vis coal based power) and improvement in technology.

While renewable energy, which is infirm in nature, continues to rise, the existing fuel-mix has limited peaking power generation capacity. Moreover, with rising variable load (led by 24x7 Power for All and the Saubhagya scheme) the peak load is expected to become sharper. With the inability of renewable power (especially solar) to cater to the peak load, there would be a mismatch in demand and supply load curves thereby resulting in frequency and voltage variations in the grid. Further, regional load flows will change as RE rich states will supply power to other states, thus adding to the complexity of grid operations.

Along with RE integration, other emerging market trends – energy time shifting (particularly by commercial and industrial users), potential push towards electric vehicles and gradual replacement of Diesel Generator (DG) sets – would necessitate use of battery based energy storage. The key advantages of ESS have been detailed in the previous sections.

With the above mentioned transition in the electricity market, the energy storage segment is expected to grow exponentially in the future. In fact, as per Indian Energy Storage Alliance (IESA), the energy storage market is expected to reach 200 GWh by 2022.

### 4.8.2 Indian Energy Storage Market

The energy storage market in India is still at a nascent stage.

Existing storage technologies such as pumped storage hydro power plants, have been underutilized (only 2,450 MW is operational as against an installed capacity of 4,785 MW as on FY'18), owing to high costs and operational barriers such as delays in clearances, delay in private land acquisition, interstate disputes and inadequate capabilities of contractors (construction agencies).

On the other hand globally, developed countries (like Europe, USA etc.) have provided for a strong policy and regulatory framework for pumped storage including a favourable compensation mechanism (for the role these plants play in grid balancing). As a result, ~168 GW of pumped storage plants have been installed as on FY'18 to maintain a secure grid in light of increasing renewable penetration rate. These grid scale pumped storage plants accounts for more than 96% among installed energy storage capacity.

Further, newer technologies such as lithium ion batteries, are expected to pick up at a fast pace led by falling costs, rising scale and improving technology. India has already taken steps towards adoption of energy storage solutions for the grid, with a 160 MW solar-wind hybrid project with batteries in Andhra Pradesh.

Currently India is largely dependent on import of battery for meeting its storage needs, with only a few domestic firms on the supply side with most being limited to the last leg of the supply chain i.e. assembling and packaging of cells. ***With rising market potential for lithium battery based energy storage, there is an opportunity to manufacture indigenously to cater to the rising market demands. However, establishing a presence across the supply chain, building scale and developing a robust indigenous technology (which is cost effective) would be key monitorables.***

### 4.8.3 Key Challenges and their mitigation

There are key challenges/ constraints across the supply chain of battery manufacturing, which need to be resolved for enabling an ecosystem of manufacturing batteries in India. The key challenges and their mitigation is as follows:

- **Procurement of raw material**

The raw material for manufacturing lithium ion batteries is not available domestically and hence a manufacturer would need to rely on imports for procurement of raw material. Along with the reliance on international market, an additional constraint is the resource availability in limited geographies. As per the US Geological Survey (FY 18), the major chunk of raw materials i.e. lithium reserves is present in only four countries – Chile (47%), China (20%), Australia (17%) and Argentina (13%).

Along with lithium, cobalt is also an important raw material for cell manufacturing which is unavailable domestically. Though in terms of geographies, cobalt is better placed as compared to lithium. As per US Geological Survey (FY 18), cobalt is available in Congo (~49% of reserves), Australia (~17% of reserves) and the rest is spread across various other countries.

These factors ***expose the manufacturer to price risks in the face of unprecedented demand ramp up along with forex risk.*** These risks can be ***mitigated by having sourcing partnerships on long term basis with forward contracts (for hedging their price risk).***

Another notable risk is the acquisition of overseas mines by countries such as China, which increases their control of the lithium market. To avoid this risk, vertical integration across the supply chain is required by Indian firms through acquisition of overseas mining licences/ firms which hold these mining licenses.

- **Processing of raw material and cell manufacturing**

In terms of processing of raw material and cell manufacturing, the crucial constraint/ risk is the technology owing to two reasons. Firstly Indian manufacturers have limited technical know-how of the cell manufacturing processes. Secondly, technology advancements cause rapid changes, which can make a technology obsolete within a short period of time and cause manufacturers to lose their competitive edge.

To cover the technology knowledge risk, the manufacturers would have to either ***acquire the technology license or partner with international firms already having the technology. Alternatively the Government can provide incentives so as to attract foreign manufacturers to set their facilities in the country.***

On the technology advancement front, the manufacturer would also need to ***have in place a proactive research and development (R&D) division*** – which enables to be agile and enables cost competitiveness.

- **Cell Pack Assembly and Packaging**

Finally in the cell pack assembling and packing, there is a risk of demand i.e. clear visibility for sale of manufactured batteries, atleast up to the payback/ breakeven period.

To mitigate this risk, the manufacturer can have **supply partnerships (eg. take or pay) with their consumers** (such as EV manufacturers and mobile manufacturing firms etc.). Further, **Government can ensure demand visibility**, which has been discussed subsequently.

Along with demand visibility, **it is crucial that the manufacturing in India gains cost competitiveness going forward**. This is critical since currently, alternate flexible power solutions such as hydro power, gas power etc. are cheaper than battery solutions and hence better placed in terms of cost economics as compared to battery solutions.

For improving cost competitiveness, the Government of India could consider a phased incentives and subsidies program (as subsidisation is not sustainable over the long-term) as discussed subsequently.

#### 4.8.4 Interventions required

The key aspects which would require Government of India intervention for successfully scaling up manufacturing of batteries in the country have been discussed:

- **Create an enabling policy and regulatory framework**

This is the single most important aspect to boost energy storage since currently there are no policies/ regulations around storage. So first and foremost, defining regulatory mechanism for storage and its role in grid operations needs to be clearly laid out in the Electricity Act, CERC regulations etc. Standards and other operating procedures need to be put in place through the Grid code, while the NEP/ tariff policy can chalk out targets and incentives.

Further the rules/ regulations for storage solutions pertaining to pricing of power and incentives etc. should be clearly defined.

- **Roadmap for demand**

One of the key aspect to make manufacturing in India a success is enhancing the demand and improving its visibility. For this the **Government needs to clearly define a road map for battery requirement over the long term (including an overall Integrated Energy Policy)**.

On the large scale grid front, demand visibility could be provided through a **well-defined trajectory** for procurement of storage (similar to the RPO trajectory) which can be procured through bundled tenders i.e. contracts with renewable + battery so as to enable Round the clock (RTC) power.

On the electric mobility front, the Government should have **well defined targets along with an implementation plan for Electric Vehicles by 2030**.

- **Mechanisms to provide a favourable ecosystem**

For promoting manufacturing an ecosystem would need to be developed where indigenous manufacturing is competitive as compared to imported product. Towards this end the Government would need to consider a **phased plan for incentives and subsidies**, which can create an ecosystem for manufacturing batteries as well as enabling sustainability in the long run.

The Government could consider development of a robust market determined mechanism for ancillary services market (other than only frequency control currently existing in India) in India, which is likely to boost storage.

The Government could also consider soft loans (with longer tenors and moratorium), faster clearances, support in land acquisition, tax breaks, subsidies for EVs / decentralized generation linked to domestic battery manufacturing and schemes such as generation based incentive scheme.

Finally public private partnership (PPP) models could be evaluated and implemented as per requirements of battery manufacturing industry.



## 5 Other issues of contention

The other areas of contention include – structure of the PPA, Forex, Payment security mechanism and potential liabilities arising out of these clauses.

### 5.1 Bidding structure

Initially a structure of integrated solar cum battery manufacturing facility was considered along with assured offtake. While the key merit of the structure is that it enables Make in India and gives boost to the Indian economy, however an assured offtake would lead to higher tariffs for the end consumers and further financial burden on the already stressed Discoms. Hence such a structure was not advisable, which led to revisions in the structure as indicated below.

The revised bidding structure has been devised in 2 parts with Part 1 being the manufacturing setup, while Part 2 is the solar project development.

#### 5.1.1 Key clauses with merits and demerits

The key clauses for both the parts are as indicated in the table below –

**Table 3: Merits and demerits of current bid structure**

| Bid Part                                  | Key Clause  | Merit   | Demerit  |
|---|---|---|--|
| <b>Part 1 (Manufacturing setup)</b>       | PPA assurance for 12 years with each PPA for 25 years                                     | <ul style="list-style-type: none"> <li>• Commitment ensures offtake of domestically manufactured goods thereby creating jobs and economic development</li> <li>• Enables setting up manufacturing hub in India</li> </ul> | <ul style="list-style-type: none"> <li>• Restricts competition and might lead to higher tariffs going forward</li> <li>• Doesn't allow advantages of open market</li> <li>• Limited time period for mid-course correction</li> <li>• Technology advancements may make technology obsolete</li> <li>• No commitment to already existing domestic manufacturers</li> </ul> |
| <b>Part 1</b>                             | New investment tax rate @ 25%   | <ul style="list-style-type: none"> <li>• Enables cost reduction at manufacturing end without loading the power tariff</li> </ul>  | <ul style="list-style-type: none"> <li>• Existing domestic manufacturers would not be able to avail this benefit</li> </ul>  |
| <b>Part 1 (Solar Project development)</b> | Separate day time solar tariff for all years and integrated 24 x 7 tariff for Solar + ESS | <ul style="list-style-type: none"> <li>• Clear demarcation of solar and solar with ESS tariff</li> </ul>  | <ul style="list-style-type: none"> <li>• Currently storage technologies such as PSP have to compete in MoD which may render ESS unviable (in current time)</li> <li>• Pushing higher cost Rs.9/unit power is against 24x7 Power for all goal</li> <li>• Would add to strain of Discoms</li> </ul>  |

Source: Proposal; CRIS analysis

Besides, the proposal provides for two different tariffs in the PPA (separate for solar and solar with ESS) with a higher tariff during night time.

***This needs to be revised and aligned in a single PPA for both solar and ESS with clear supply and tariff commitments (and clearly defining the ESS requirement).***

## 5.1.2 12 years PPA commitment vs different structures

As the proposal clearly mentions, solar energy and ESS fields are new energies and fast growing. In this case, a 12 year commitment in a field which is advancing technologically at a rapid pace and is expected to have technological disruptions in the near future is a big commitment. Any change/ improvements in technology is likely to expose the procurer to risks.

***Instead of a 12 year commitment at a single go, it is imperative that the bidding structure be broken into periods. For instance four periods of three years each would allow periodic reviews, mid-course correction and a more robust bidding framework.***

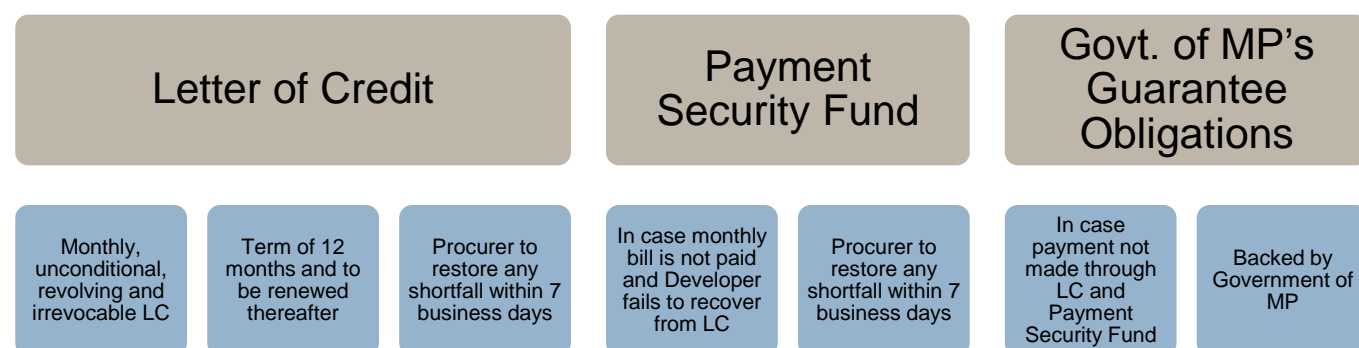
A roadmap for minimum offtake may be defined keeping in mind both domestic and foreign module requirements. While a commitment is a first step to creating a conducive environment for manufacturing, agility and quick adoption of any technology advancements may allow for reduction of risks such as the recent global glut in the solar market leading to a rapid reduction in prices.

Further in our view, ***while high capacity tenders allow for economies of scale, however suffer from concentration risk and restrict competition. Hence tenders may be in smaller bundles varying from 10-20 GW each.***

## 5.2 Payment Security Mechanism

The recent Rewa ultra mega solar (RUMS) bid which was a success had payment risk mitigated through three layers of letter of credit, payment security fund and MP Government's guarantee obligations. The features of the payment security mechanism for RUMS bid are indicated -

**Figure 1: Payment security mechanism RUMS**



Source: CRIS analysis

The security mechanism proposed is similar to the RUMs structure with 3 layers of security as below -

### 5.2.1 View on LC

The letter of credit offered is a revolving letter of credit for 1 month's average billing. As per the proposal, the letter of credit should be increased to cover at least 12 months' average billing.



Changing the security levels from one month LC to twelve month, would lead to an incremental burden of Rs. ~580 crore/ GW/ year (assuming CUF 22%, tariff at Rs. 2.5/unit) to be supported by LC. This would effectively convert to an **additional burden of Rs. ~5-6 crore/ GW/ year for every percentage point cost of letter of credit.**

Even in case of successful bids such as RUMS, and those by SECI/ NTPC the standard practice has been a revolving letter of credit for 1 month's average billing. It was also discussed that neither for NTPC nor SECI bid projects, have these entities ever have to fall back to the 2<sup>nd</sup> layer of payment security.

***Revolving 1 month Letter of Credit is a standard practice and could be continued against the demand of 12 month LC.***

### **5.2.2 View on PSM fund**

As per the proposal, the PPA does not provide any details on how the fund will be set up or its operations and the payment security fund should be established as a condition precedent to the effectiveness of the PPA along with clear guidelines on the manner in which the SPD can take recourse to the payment security fund.

Currently while SECI has an INR 500 crore payment security fund to protect its bidders, the practice is not being followed by NTPC. The quantum of 350 GW of solar installations would require a huge corpus for the Payment security fund. Creation of Payment Security Trust by SECI not be enough to back payments.

The fund needs to be created by SECI, to ensure timely payments on account of tariffs amounting to **Rs ~2 lac Cr in 2023 and Rs. ~15.7 lac Cr in 2030<sup>9</sup>** (as detailed subsequently in Table 16 – Annex 1). For this SECI would need to take commitment assurance from state discoms.

***SECI may need to work in alignment with State DISCOMs for operationalization of such a huge payment security fund. However the proposal seeks operationalization of the fund before COD, which may be a challenge considering the poor health of the Discoms.***

### **5.2.3 View on Tripartite agreement**

As per the proposal all the states are required to have a tripartite agreement with backing of SECI + NTPC / RBI / state. The successful solar tenders such as RUMS had a tripartite agreement which can provide an additional guarantee to the solar tender.

Without any doubt, a tripartite agreement with Government of India, state Governments and RBI would mitigate payment risk, thereby attracting investors and potentially cheaper cost of debt. However, considering the size of the payment security of Rs ~2 lac Cr in 2023 and Rs. ~15.7 lac Cr in 2030, getting a tripartite agreement with State could be challenge considering FRBM situation of certain states. Besides, this may create a precedent for similar provisioning by other sectors.

It is also observed that if tripartite agreement is signed, need for Payment Security Trust (discussed above) could be avoided.

***Tripartite agreement for such a quantum may be taken up with RBI and state governments.***

### **5.2.4 Guarantees**

The additional guarantees under the proposal include offtake guarantee i.e. deemed generation for delay in evacuation, back-down or grid unavailability (must run status) and compensation for any back downs. These are standard for renewable owing to must run status post operation of the project.

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<sup>9</sup> Assuming a tariff trajectory of Rs. 3/unit (2020) to Rs. 2/unit (2030) for solar as per the proposal and Rs. 7/unit (2020) to Rs. 6/unit (2030) for solar with battery – includes a YoY tariff appreciation of 2.25% as per the proposal ; ESS efficiency of 88% as per the proposal



## 5.3 Assessment on Foreign Exchange

The historical analysis of the three currencies US dollar, Euro and Yen has been carried out. Analysis of the Great Britain pound has not been carried out since it is slowly losing ground as a major currency.

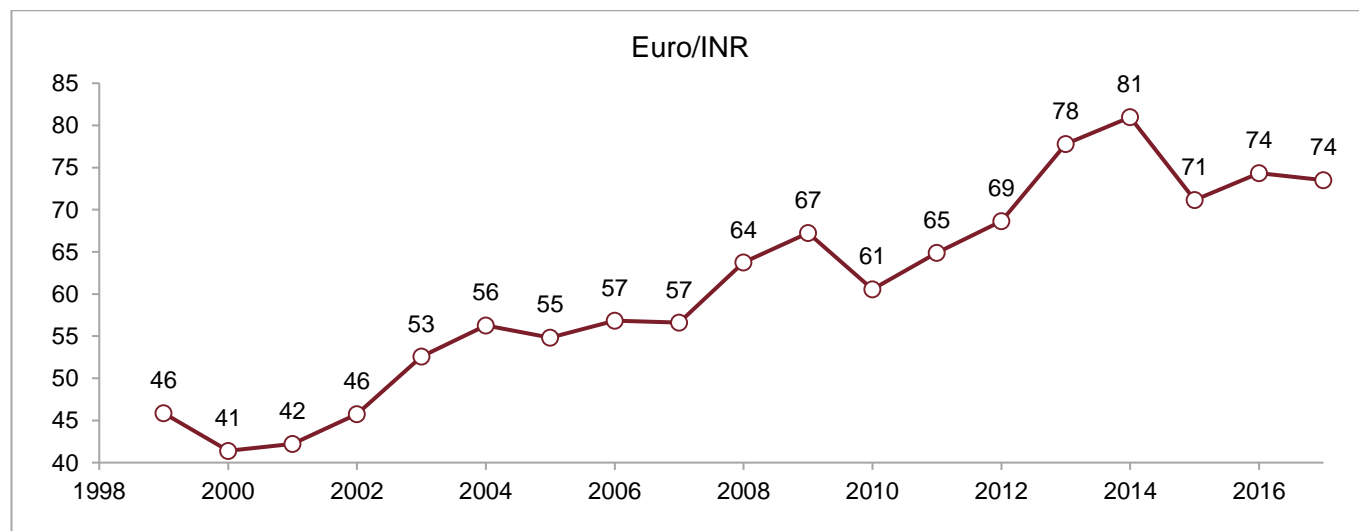
### 5.3.1 Historical analysis on Forex for USD, Yen, Euro.

#### Euro

The rupee has depreciated at a yearly **CAGR of 2.66%** over the past 18 years (1999-2017) with the **highest decrement in a year at 14.9%** and a highest appreciation of rupee at 12.1%. Euro has witnessed a high of Rs.81.0 and a low of Rs.41.4 during this period, with the average exchange rate over the last 19 years at Rs.60.8 / euro.

The currency has been **moderately volatile with the highest value being 133% and 107%** respectively of the average value for last 20 years and 5 years respectively. The figure below shows the depreciation of rupee compared to euro-

**Figure 2: Euro INR exchange**



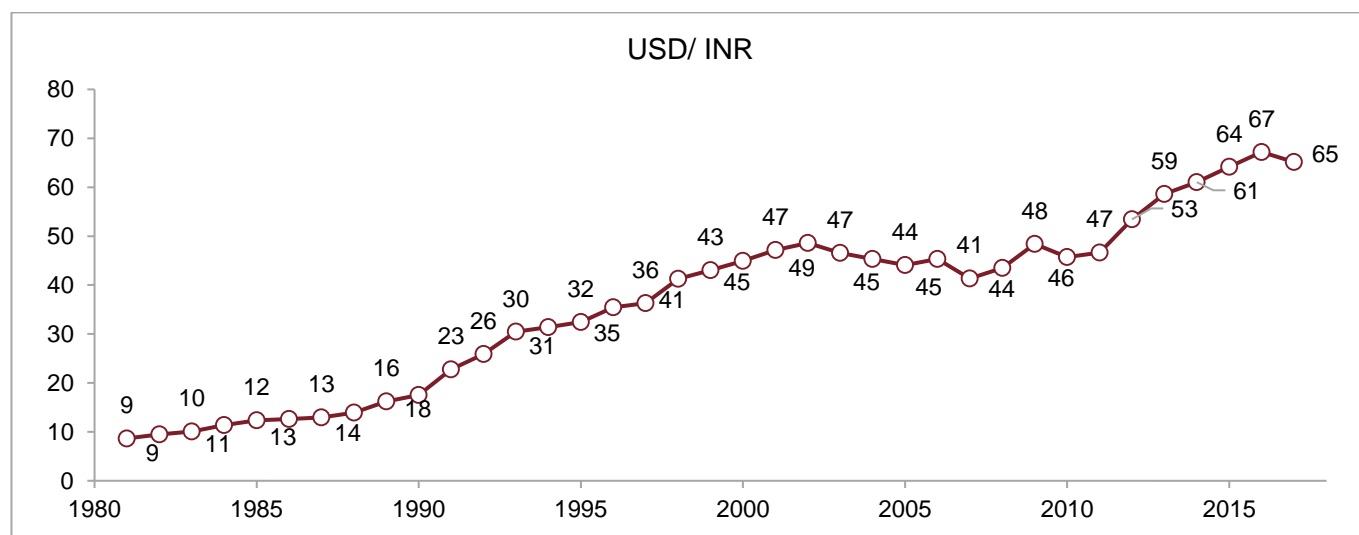
Source: RBI; CRIS analysis

#### US Dollar

The rupee has depreciated at a yearly **CAGR of 2.43%** over the past 19 years (1998-2017) with the **highest decrement in a year at 14.5%** and a highest appreciation of rupee at 8.7%. USD has witnessed a high of Rs.67.2 and a low of Rs.41.3 during this period, with the average exchange rate over the last 20 years at Rs.50.1 / USD.

The currency has shown **least volatility with the highest value being 134% and 106%** respectively of the average value for last 20 years and 5 years respectively. The figure below shows the depreciation of rupee compared to USD-

**Figure 3: USD INR exchange**



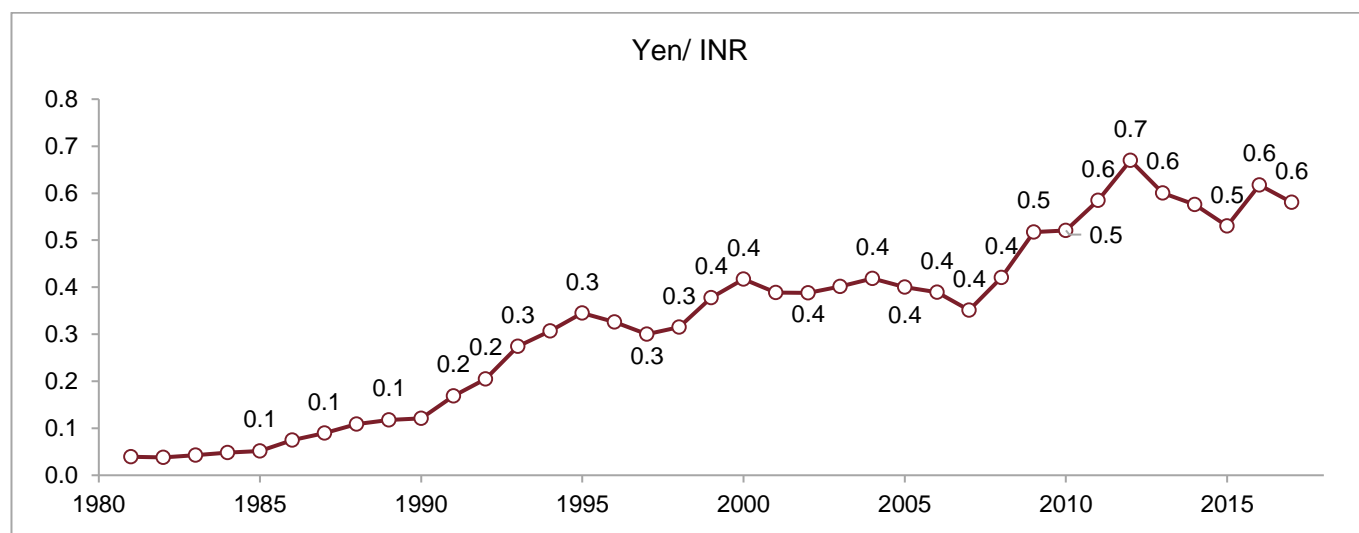
Source: RBI; CRIS analysis

### Yen

The rupee has depreciated at a yearly **CAGR of 3.27%** over the past 19 years (1998-2017) with the **highest decrement in a year at 22.9%** and a highest appreciation of rupee at 10.3%. Yen has witnessed a high of Rs.0.67 and a low of Rs.0.5 during this period, with the average exchange rate over the last 20 years at Rs.0.47 / Yen.

The currency has shown **maximum volatility with the highest value being 142% and 115%** respectively of the average value for last 20 years and 5 years respectively. The figure below shows the depreciation of rupee compared to Yen-

**Figure 4: Yen INR exchange**



Source: RBI; CRIS analysis

## 5.3.2 Options and assessment

The proposal initially came up with Forex indexation with the currency of debt (USD, EUR, JPY or GBP) at RBI rates (to the extent of debt %) and Discom to pay the tariff in INR based on indexation (only if INR depreciates).

However post discussions the Forex indexation has been revised with a cap of 3% (Year on Year weighted average depreciation of INR Vs USD/Euro/Yen/GBP in past 25 years) on rupee depreciation. As per the revised proposal the indexed component of tariff is to be deposited in escrow and the **maximum yearly depreciation/ appreciation cap (compounded) limited to 3% for US\$, Euro, and 3.5% for JPY.**

***The volatility of Yen is much higher as compared to USD and euro, and the CAGR depreciation of rupee against yen for a period of 20 years is higher at 3.27%. Over and above the premium on Yen based derivatives in the market are higher, thereby leading to higher costs in case the Gol plans to hedge against Yen fluctuations.***

## 5.3.3 Forex fluctuation liabilities

**A 3 % YoY currency depreciation will likely result in ~70 paisa increase in levellised tariff.** However factors such as potential reduction in cost of debt (for mature economies such as Europe/ Japan where debt is as low as 0.1-0.5%), economies of scale (trajectory of 350GW as per MoP/MNRE) and high CUF (24.41% as per the proposal) are **likely to reduce the tariff by more than ~80 paise (levellised tariff lower than Rs. 2.2/unit)**, therefore offsetting the impact of currency depreciation.

Further for the purpose of bid evaluation, the INR quoted levellised tariff could be compared with the foreign currency quoted tariff after taking into account the impact of 3% YoY depreciation. This will enable building the complete 3% currency depreciation risk in foreign tariffs at the initial stage itself, and also be beneficial for utilities during the years when the foreign currency depreciation is lower than 3%.

***A cap on FOREX depreciation at 3% could be considered provided the tariffs discovered are competitive (as compared to domestic tariff post impact of 3% YoY depreciation) and low enough to capture the low cost of debt and economies of scale. Thus bid evaluation criteria needs to include 3% FOREX depreciation while comparing bids from domestic investors investing in Indian Rupee.***

## 5.4 Termination

As per the latest Standard Power Purchase Agreement (PPA) for the recent 3GW manufacturing based tender released by SECI, the procedure for cases of buyer event of default has adequately covered the risk of termination and the key clause has been reproduced as follows –

*“After a period of two hundred ten (210) days following the expiry of the Consultation Period and unless the Parties shall have otherwise agreed to the contrary or SECI Event of Default giving rise to the Consultation Period shall have ceased to exist or shall have been remedied, SECI under intimation to the Buying Entity and the SPD shall, subject to the prior consent of the SPD, novate its part of the PPA to any third party, including its Affiliates within the stipulated period. In the event the aforesaid novation is not acceptable to the SPD, or if no offer of novation is made by SECI within the stipulated period, then the SPD may terminate the PPA and at its discretion require Buying Entity to either (i) takeover the Project assets by making a payment of the termination compensation equivalent to the amount of the debt due and 150% (one hundred and fifty per cent) of the adjusted equity or, (ii) pay to the SPD, damages, equivalent to 6 (six) months, or balance PPA period whichever is less, of charges for its contracted capacity, with the Project assets being retained by the SPD.*

*Provided further that at the end of three (3) months period from the period mentioned in this Article 13.4.4, this Agreement may be terminated by the SPD. In the event of termination of PPA, any damages or charges payable to the STU/ CTU, for the connectivity of the plant, shall be borne by the Buying Entity.”*

A comparison of termination compensation for solar power as per the model PPA under SECI vis a vis the model PPA under the Rewa Ultra Mega Solar (RUMS) Power which has been structured keeping in mind the Indian context and in line with international standards with IFC as the lead transaction advisor is indicated:

**Table 4: Termination Coverage – SECI vis a vis RUMS**

| Parameter   | SECI   | RUMS   |
|---|--|--|
| <b>Termination Compensation - Procurer Event of Default</b> | <ul style="list-style-type: none"> <li>In the event the aforesaid novation is not acceptable to the SPD, or if no offer of novation is made by SECI within the stipulated period, then the SPD may terminate the PPA and at its discretion require Buying Entity to either – <ul style="list-style-type: none"> <li>Takeover the Project assets by <b>making a payment of the termination compensation equivalent to the amount of the debt due and 150% (one hundred and fifty per cent) of the adjusted equity OR</b></li> <li><b>Pay to the SPD, damages, equivalent to 6 (six) months, or balance PPA period whichever is less, of charges for its contracted capacity, with the Project assets being retained by the SPD.</b></li> </ul> </li> </ul>  | <ul style="list-style-type: none"> <li>Upon termination of the Agreement due to Procurer Event of Default any time after the commissioning of the Initial Part Capacity and until the Expiry Date the Procurer shall be liable to pay to the SPD: <ul style="list-style-type: none"> <li><b>Debt Due; and</b></li> <li><b>150% (one hundred and fifty percent) of the Adjusted Equity less insurance cover.</b></li> </ul> </li> <li>The Termination Compensation shall become due and payable within 30 (thirty) Days of issuance of the Termination Notice by the SPD</li> </ul>   |
| <b>Termination Compensation - SPD Event of Default</b>      | <ul style="list-style-type: none"> <li>Upon occurrence of a SPD Event of Default, the lenders in concurrence with the Buying Entity and SECI, may exercise their rights, if any, under Financing Agreements, to seek substitution of the SPD by a selectee for the residual period of the Agreement, for the purpose of securing the payments of the total debt amount from the SPD and performing the obligations of the SPD. The SPD shall cooperate with SECI to carry out such substitution and shall have the duty and obligation to continue to operate the Power Project in accordance with this PPA till such time as the substitution is finalized. <b>In the event of Change in Shareholding/ Substitution of Promoters triggered by the Financial Institutions leading to signing of fresh PPA with a new entity, an amount of Rs. 10 Lakh per Project per transaction as facilitation fee (non-refundable) shall be deposited by the SPD to SECI.</b></li> </ul> | <ul style="list-style-type: none"> <li>Upon termination of the Agreement due to a SPD Event of Default any time after the commissioning of the Initial Part Capacity and until the Expiry Date, and if the Procurer or RUMSL decides to exercise its right to seek Transfer of the Unit in favour of the Procurer or RUMSL or their respective nominee, then the <b>Procurer or RUMSL, as the case may be, shall be liable to pay to the SPD an amount equal to 90% (ninety percent) of the Debt Due.</b></li> <li>Upon termination of the Agreement due to a SPD Event of Default any time after the commissioning of the Initial Part Capacity and until the Expiry Date, and if the Procurer or RUMSL decides not to exercise its right to seek Transfer of the Unit in favour of the Procurer or RUMSL or their respective nominee, then the <b>SPD shall be liable to pay to the Procurer an amount equal to, the higher of –</b> <ul style="list-style-type: none"> <li><b>{[average tariff (as set out in the then applicable tariff order issued by MPERC) of power procured by the Procurer in last 3 (three) Financial Years from ground mounted and grid-connected solar PV power projects located within Madhya Pradesh] (minus) [the Applicable Tariff]} x</b></li> </ul> </li> </ul> |

| Parameter | SECI   | RUMS   |
|-----------|--|--|
|           | <ul style="list-style-type: none"> <li>However, in the event the lenders are unable to substitute the defaulting SPD within the stipulated period, <b>SECI may terminate the PPA and the Buying Entity may acquire the Project assets for an amount equivalent to 90% of the debt due or less as mutually agreed, failing which, the lenders may exercise their mortgage rights and liquidate the Project assets.</b></li> </ul> | <p><b>[energy quantum equivalent to Minimum Supply Obligation] x [3 (three) Contract Years];</b></p> <p>OR</p> <p>(b) <b>{[Average Power Purchase Cost or APCC (minus) [the Applicable Tariff]] x [energy quantum equivalent to Minimum Supply Obligation] x [3 (three) Contract Years].</b></p> |

Source: Model PPAs – SECI and RUMS

The detailed clauses for termination for both SECI and RUMS model PPA have been placed in annexures. Also some of the termination clauses for international PPAs have also been reproduced in the annexures.

Further insurance, as under the RUMS PPA structure can partially offset the liabilities on account of the debt due to the lender. Hence it is **critical to include the claim on insurance for debt due in case of termination**, as has been prescribed under RUMS as well as the definition of debt due in various Model concession agreements.

Along with reduction of insurance proceeds in case of termination compensation, SECI documents need to clearly chalk out the political and non-political events of termination as have been spelt out in the RUMS PPA documents (which has been detailed in the annexures).

Also the proposal required a suitable provision in SECI's bid document pertaining to termination in case of compulsory acquisition (of Solar power project) by any Indian/State Governmental. This could be considered at the instance of the Government – with same provisions as in the case of procurer event of Default.

## 5.5 Tariff Levels

The following assumptions have been made while assessing the tariff levels for the upcoming projects:

**Table 5: Key assumptions**

| Parameter                      | Unit          | Proposed project under consideration | 'As-is' projects |
|--------------------------------|---------------|--------------------------------------|------------------|
| Capital cost                   | Rs crore / MW | 3.4                                  | 4                |
| CUF                            | %             | 24                                   | 21               |
| Interest rate                  | %             | 0.5                                  | 8.5              |
| Loan tenure                    | No. of years  | 20                                   | 15               |
| Debt equity                    | Ratio         | 80:20                                | 75:25            |
| Principal repayment moratorium | No. of years  | 3                                    | 0                |
| Annual escalation in tariff    | %             | 3                                    | 0                |
| Equity IRR                     | %             | 7                                    | 12               |

Source: CRIS analysis

Based on the above assumptions **the current levellized tariff level range of Rs ~2.8 – 3.0/unit reduces drastically to levellized tariff range of Rs. ~1.65 – 1.90/unit.** In such a case reduction in costs owing to economies of scale, lower cost of foreign capital, and higher CUFs is likely to offset the cost of forex depreciation.

## 5.6 Potential liabilities

### 5.6.1 Contingent liability on account of termination

As per the revised proposal 1, the termination compensation clause states that the developer would receive 90% of net debt and 150% of adjusted equity if the asset is handed over or 2 years revenue if the revenue is retained by the developer in accordance with clause on Termination Payment in the model concession agreements -

*“Upon Termination on account of a Concessionaire Default during the Operation Period, the Authority shall pay to the Concessionaire, by way of Termination Payment, an amount equal to 90% (ninety percent) of the Debt Due less Insurance Cover; provided that if any insurance claims forming part of the Insurance Cover are not admitted and paid, then 80% (eighty percent) of such unpaid claims shall be included in the computation of Debt Due. For the avoidance of doubt, the Concessionaire hereby acknowledges that no Termination Payment shall be due or payable on account of a Concessionaire Default occurring prior to COD. Upon Termination on account of an Authority Default, the Authority shall pay to the Concessionaire, by way of Termination Payment, an amount equal to: (a) 100% (one hundred per cent) of Debt Due less any insurance proceeds to the Concessionaire; and (b) 150% (one hundred and fifty per cent) of the Adjusted Equity.”*

Further SECI is required to compensate developers for termination compensation within 90 days. However considering that NTPC is a PSU and an autonomous entity, it is likely that it would not allow high levels of contingent liability on its balance sheet and hence may not be a procurer under this proposal.

The contingent liabilities are based on the **solar trajectory of 350 GW** assumed to be spread linearly over the period 2020 to 2030, in line with the discussions between MoP and MNRE. For ESS, the trajectory is assumed to pick up post 2021 and reach 1200 GWh by 2030.

The capital costs have considered to be as per the initial proposal.

The contingent liabilities on account of termination are estimated to be (Detailed in Table 15 – Annex 1):

- **FY 2023- Rs.~6.9 lac cr (90% debt due)<sup>10</sup> and Rs.~3.0 lac cr (150% adjusted equity)<sup>11</sup>**
- **FY 2030 - Rs.~19.4 lac cr (90% debt due) and Rs.~8.5 lac cr (adjusted equity)**

The **proposal has left out the insurance claim clause in the Termination payment section** which is an integral part in the model concession agreement.

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<sup>10</sup> Debt tenor assumed to be 20 years

<sup>11</sup> Adjusted equity as per Model Concession Agreement – includes impact of depreciation and adjusted for historical WPI appreciation at 1.1% (FY 13-17)



## 6 Inspirational Demand for India

### 6.1 Demand Scenario

The inspirational demand scenario for India has been based on comparison with the other developing countries. The recent per capita income (PCI) and per capita consumption (PCC) indicates that India lags far behind the other developing countries with a lot of scope of further improvement as indicated in the table below -

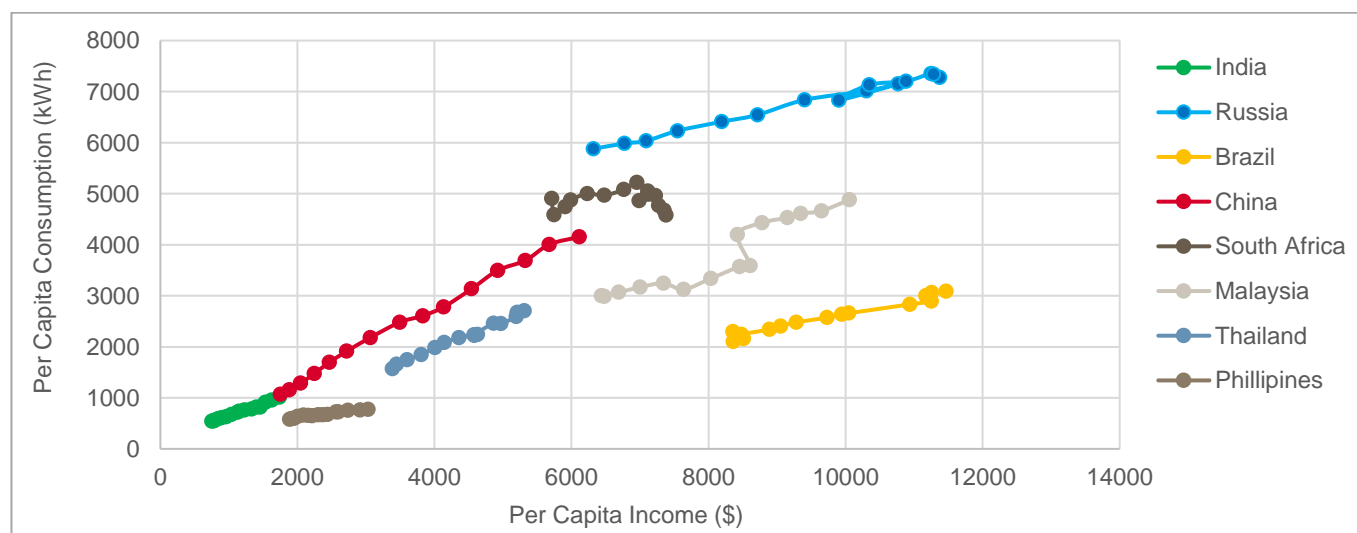
**Table 6: Comparable economies**

| S.No. | Country      | Per capita Income (Constant \$)<br>2016 | Per Capita Consumption (kWh)<br>2014 |
|-------|--------------|---|--------------------------------------|
| 1.    | Brazil       | 10918*                                  | 3089                                 |
| 2.    | Russia       | 10999                                   | 7339                                 |
| 3.    | China        | 6872                                    | 4154                                 |
| 4.    | South Africa | 7309                                    | 4583                                 |
| 5.    | Malaysia     | 10727                                   | 4879                                 |
| 6.    | Thailand     | 5635                                    | 2704                                 |
| 7.    | Philippines  | 3317                                    | 772                                  |
| 8.    | <b>India</b> | <b>1841</b>                             | <b>957</b>                           |

Source: World Bank; CRIS analysis; \* data for FY 15

Further the figure below indicates the growth in the per capita consumption of electricity with rising per capita income over the past 15 years. While India has been at the lower bracket of per capita income and per capita consumption as compared to the other growing economies, there has been a robust growth in both these parameters over the years.

**Figure 5: Per Capita Consumption vs Per Capita Income**



Source: World Bank; CRIS analysis



The historical growth in power demand based on growth of per capita consumption as well as the population over the period FY'00 to FY'14 is as indicated –

**Table 7: Power Demand Growth**

| S.No. | Country      | CAGR – PCC  | CAGR – Population | CAGR – Power Demand |
|-------|--------------|-------------|-------------------|---------------------|
| 1.    | Brazil       | 2.1%        | 1.10%             | 3.3%                |
| 2.    | Russia       | 1.6%        | -0.14%            | 1.5%                |
| 3.    | China        | 10.2%       | 0.55%             | 10.8%               |
| 4.    | South Africa | -0.5%       | 1.27%             | 0.8%                |
| 5.    | Malaysia     | 3.6%        | 1.91%             | 5.5%                |
| 6.    | Thailand     | 3.9%        | 0.60%             | 4.6%                |
| 7.    | Philippines  | 2.1%        | 1.80%             | 3.9%                |
| 8.    | <b>India</b> | <b>4.1%</b> | <b>1.48%</b>      | <b>5.7%</b>         |

Source: World Bank; CRIS analysis

In terms of power demand growth, India is second to China only in terms of demand of power. With rising incomes, economic growth and schemes such as Saubhagya for 100% household electrification and considering the growth of the comparable economies, the momentum is expected to continue in the future.

**At the expected range of growth of 5.5% to 6.5% year on year, the expected demand by 2030 is likely to be in the range of ~2305 BU to ~2585 BU.**

## 7 National Electricity Distribution Company (NEDC)

### 7.1 Relevance of setting up NEDC

There have been multiple attempts by the Indian government in the past two decades to revive the domestic power distribution sector. Despite that, it continues to be the weakest link in the country's electricity value chain. Poor payment records of state-owned electricity distribution companies (discoms) have not only adversely affected power generation companies, but has contributed in the rising stress in the banking sector as well. Rising non-performing assets (NPAs) in the power sector is a cause of serious concern. The problem only multiplies with the states refusing to ink new power purchase agreements (PPAs), as they are not willing to buy more electricity.

Further injection of large quantum of renewables in the grid is likely to have an adverse impact on the financials of the discoms. This is owing to the fact that discoms have tied up long term PPAs through thermal sources, under which they are liable to pay fixed costs for these assets even if these assets are underutilized.

The key role played by NEDC is as outlined:

- Increase the technical and implementation capabilities of discoms
- Implementing central government schemes in the power sector in timely manner

The key functions of the National Discom are:

- Handhold state discoms in electricity distribution activities
- Ensure time bound implementation of central schemes
- Compete with private firms and contractors to bag contracts of state-run distribution companies for appointing franchisees or engineering tenders

***Therefore, a National Discom can potentially operate as a common platform to ensure all states gain from economies of scale and specialisation of services.***

### 7.2 Positives

The key advantages of setting up an NEDC are as detailed below:

- **Economies of scale & optimal utilization**  
Since the various PPAs will be pooled at the NEDC level, it will allow synergies through economies of scale and higher bargaining power to the NEDC. Further the entity would be able to undertake large scale projects and attract wider investment for improving power infrastructure. With operations at the national level, the most optimal supply and demand picture can be obtained. Further optimal usage of transmission facilities and thereby reduction in losses would be a key benefit.
- **Power supply rate stability & PPA rationalization**  
Owing to the above mentioned pooling of PPAs, the entity will be able to handle power supply at a large scale at stable rates. Due to the national presence of the NEDC, the entity will be in a better position to allocate PPA linkages especially on a geographic basis
- **Consolidation of data**  
Further while the entity can provide consumer touch points like call centres, app-based service with local operations, however it will enable a common technology backbone – allowing for a common repository of data and enhancing data quality.

***The key advantages of the NEDC include economies of scale, PPA rationalization and data consolidation.***

## 7.3 Key Challenges

Electricity appears on the concurrent list of the Indian Constitution, meaning that both state and central governments participate in the sector's development. Most of the discoms are owned by the state Govt. and some of the following issues will prove to be operational challenges for setting up a NEDC-

- **Roles and responsibilities of the entities**  
To setup an NEDC, the various functions of the discoms need to be segregated and responsibility matrix for the various entities needs to be chalked out. Some of the key functions include - Commercial loss reduction, ensuring contractual availability of power to customers, demand aggregation of multiple retail supply companies to enable efficient power procurement, handling of unrecognised financial losses, Meter reading etc.
- **Treatment of existing financial losses/ Regulatory Assets**  
The amortization of regulatory assets including the support required from state government needs to be detailed. Further the unrecognised financial losses may be dealt with through either a financial hit to the incumbent entities/ allowing recovery through the consumers.
- **Transfer of existing PPAs**  
Dissolving the existing PPAs/ transferring the PPAs to the NEDC would be another critical aspect for operationalization of the NEDC.
- **Allocation of technical and commercial losses between existing discoms and NEDC**  
Further the allocation of technical and commercial losses, especially with the poor baseline data is another challenge which needs to be overcome.

***Setting up NEDC could require complete moulding of the current regulatory and operational framework, to enable a new entity to handle the role of existing discoms.***

***Since electricity is a concurrent subject and the existing EA 2003 and subsequent policy does not envisage NEDC or provide legal strength, setting up of a central National Electricity Distribution Company may not be legally tenable. In any scenario, it is critical that DISCOM level viability including viability of power supply to individual retail consumer is critical irrespective of NEDC or state DISCOM for overall better power management and payment on time to generators.***

## 8 Recommendations

### 8.1.1 Summary highlighting key risks/issues

The merits of the proposal are that it enhances the capability of manufacturing in India and provides a major boost to the “Make in India” initiative. Further it improves energy security position of the country through clean energy supply. The proposal also established ESS manufacturing capability to enhance grid operations and push Electric vehicles and augurs well with the COP21 commitment of emission reduction.

While most of the points have been discussed there are a few open issues and challenges-

**Table 6: Key issues/ implications & Analysis**

| S.No. | AREAS                         | ANALYSIS  |
|-------|-------------------------------|---|
| 1.    | <b>FOREX impact</b>           | <ul style="list-style-type: none"> <li>The historical average depreciation of INR vis-à-vis Dollar, Euro and Yen is 2.43%, 2.66% and 3.27% (over the past 20 years)</li> <li>Yen has been the most volatile and has less liquidity &amp; instruments like derivatives</li> <li>A 3% YoY currency depreciation will result in ~70 paise increase in levelled tariff but potential reduction in cost of debt, economies of scale and higher CUF is likely to offset this impact (tariff lower than Rs. 2.2/unit)</li> </ul>                     |
| 2.    | <b>Layers of PSM</b>          | <ul style="list-style-type: none"> <li>Contracting authority may be SECI and not NTPC – due to NTPC being a PSU and an independent entity</li> <li>Revolving 1 month LC is a standard practice that could be continued against the demand of 12 months LC</li> <li>Creation of Payment Security Trust by SECI would not be enough to back payments. SECI would need to work with in alignment with State DISCOMs /Government to setup a PSM fund</li> <li>Tripartite agreement needs to be taken up with RBI and state Governments</li> </ul> |
| 3.    | <b>Liabilities and others</b> | <ul style="list-style-type: none"> <li>On account of termination: Rs. ~6.9 lac cr (90% debt due) and Rs.~3.0 lac cr (150% adjusted equity) in FY'23 and Rs. ~19.4 lac cr (90% debt due) and Rs.~8.5 lac cr (150% adjusted equity) in FY'30 (excluding insurance)</li> <li>Indirectly on account of PSM- Rs ~2 lac Cr in 2023 and Rs. ~15.7 lac cr in 2030</li> </ul>  |
| 4.    | <b>Phasing of contracting</b> | <ul style="list-style-type: none"> <li>In place of contracting for 12 years, contracting could be done in 4 phases of 3 years each along with announcement of a firm pipeline for the 12 years.</li> <li>Consortium to be allowed with manufacturing commitment though for the project panel could be sourced from anywhere</li> </ul>  |

Source: CRIS analysis



## 9 Annexures

### 9.1 Annexure 1 - Initial Proposal

The initial proposal was made in April' 2018 to the Hon'ble PM of India. The proposal spans over a period of 12 years from 2018-30 with the following key highlights –

- **Level of Investment** – The new investment infusion in the solar sector in India upto 2030 is proposed to be **\$1 trillion**, which is a massive 40% of the Indian GDP (2017).
- **Energy Landscape** – The investment is expected to completely change the energy landscape in India - from current 70% coal installations to 70% renewable installations by 2030. The cumulative capacity envisaged to be installed was **910 GW** of solar and **2265 GWh** of Energy Storage Solutions (ESS) up to 2030. The detailed trajectory is indicated in Table 9(Annex 1).
- **Make in India:** With the massive quantum of investment, India's manufacturing capacity is expected to be **40% of the world solar manufacturing capacity** and **70% of the world ESS manufacturing capacity** by 2030. This will provide an uplift to the Indian industrial sector (which hasn't picked up), enhance job creation in the industrial sector and contribute to the economic development of the country.

The proposal also provides for improving economics for the end consumers with a gradually declining tariff trajectory for new installations of solar with/ without ESS as against the rising tariffs of new thermal power plants. The detailed tariff trajectory is indicated in Table 10(Annex 1).

Further the tariff appreciation of existing solar with/without ESS plants has been considered at 2.25%. However post 25 years the tariff would be halved from the existing 25<sup>th</sup> year tariff. Details in Table 11(Annex 1).

The proposal has indicated two requirements in the form of International Standard Power Purchase Agreement and Partnership with Ministry of Power.

After the discussion with the Hon'ble PM, the proposal was handed to Niti Aayog for evaluation and discussion & deliberation with the various line ministries.

## 9.2 Annexure 2- Revised Proposal 1(18<sup>th</sup> May 2018)

Niti Aayog and various line ministries have relooked at the proposal for alignment on issues. The areas of alignment taken up by the individual line ministries are as indicated –

**Figure 7: Ministry and areas of alignment**

| Ministry of Power  | Ministry of New & Renewable Energy  | Ministry of Commerce   | Ministry of Finance   |
|--|---|--|---|
| <ul style="list-style-type: none"> <li>•Demand projections up to 2030</li> <li>•Coal capacity and availability factor</li> <li>•Generation profiles for hydro, gas, nuclear, and wind</li> </ul> | <ul style="list-style-type: none"> <li>•Wind capacity in 2030</li> <li>•Locations for solar installation</li> <li>•Power Purchase Agreement (PPA) changes</li> <li>•Forex (FX) indexation</li> <li>•Guarantees</li> </ul> | <ul style="list-style-type: none"> <li>•Make in India for batteries &amp; modules</li> </ul> | <ul style="list-style-type: none"> <li>•Guarantees</li> <li>•Forex (FX) indexation</li> </ul> |

Post discussions with Niti Aayog and line ministries, a revised proposal was submitted on 18<sup>th</sup> May 2018. The following points were discussed and deliberated –

- **Energy Mix**– The energy mix in terms of the various fuel source capacities and their likely parameters (Plant Load Factors/ Availability etc.) in 2030 were discussed and deliberated with MOP and MNRE (indicated in Table 13, Annex 1).
- **Solar Zones** – In coordination with MNRE, solar zones were identified based on waste land availability with a target solar capacity of 900 GW in 7 states across India – J&K, Rajasthan, Gujarat, MP, Maharashtra, Karnataka, AP and TN. The total revenue from solar parks (Year 1) is expected to be US \$18.3 billion. Further development of solar zones would require the following interventions–
  - Central Level – Formulation of a solar zone policy, PGCIL support for evacuation of energy through development of substations and transmission lines.
  - State level - Land identification and infrastructure development including access roads, drainage etc., internal evacuation of power
- **Bidding Process** – Bidding process has been divided into 2 parts, first for setting up of manufacturing facility and secondly for solar project developments. **Part 1 (Manufacturing – Make in India)** – the proposal had proposed setting up manufacturing capacity in India in three phases over a span of 12 years as detailed below.

**Table 8: Bidding – 12 year commitment**

| 2019-20<br>Phase I     | 2021-25<br>Phase II | 2025<br>Mid Term Review  | 2026-30<br>Phase III |
|------------------------|---------------------|--|----------------------|
| Make in India / import | 100% Make in India  | <ul style="list-style-type: none"> <li>• Technology disruption</li> <li>• Operational cost</li> <li>• Major shift in financial costs year</li> </ul> | 100% Make in India   |

Source: Proposal for setting up Solar & ESS

The proposal indicates the following investment and employment–

- 30 GW modules manufacturing would entail an investment of \$12 billion and employment generation potential of 22500
- 90 GWh ESS manufacturing would entail an investment of \$1.5 billion and an employment generation potential of 16200

The initial proposal had an increasing manufacturing capacity trajectory which steeply increased going forward reaching 200 GW of annual solar capacity and 400 GWh of annual ESS capacity in 2030. However post discussions and keeping in mind the needs of country, the manufacturing trajectory has been capped at **100GW of annual solar capacity post 2023 and 285 GWh of annual ESS capacity post 2025**. The same has been detailed in Table 12(Annex 1)

Setting up manufacturing capacity (solar modules and batteries) would require a **firm 12 year commitment from GoI** in the way of PPA assurance for 12 years with each PPA for 25 years and new investment tax rate @ 25%.

**Part 2 (Project Development)** – The second part of the bidding process for project development requires a commitment to tariff for **day time solar tariff** for all years and **integrated 24 x 7 tariff for Solar with ESS**.

- **FDI constraints equity** – The proposal has indicated constraints which need to be eased such as increasing flexibility to structure investments through bringing investments in non-convertible preference share under the ambit of ECB regulations instead of FDI regulations; providing level playing field for Foreign Owned or Controlled Company (FOCC); building a conducive tax regime through corporate tax rate reduction to 25% irrespective of turnover, allowing group income filing and current MAT credit should be allowed to be carried forward indefinitely and power should be rated zero under GST so that the input credit may be claimed as a refund.
- **FDI constraints debt** – The proposal has indicated constraints such as all-in-cost ceiling should be liberalized; easing of masala bond regulations; liberalizing limits for lending & minimum maturity and extending benefits under income-tax Act, 1961.

Over and above, requirement of guarantees, forex indexation and payment security have also been indicated in the proposal. These have been studied in detail in the following sections.



## 9.3 Annexure 3- Revised Proposal 2 (30<sup>th</sup> May 2018)

In continuation to the deliberations with the line ministries and Niti Aayog, the following amendments have been proposed –

- **Energy Mix** – The energy mix inputs have further been further discussed and aligned with MOP & MNRE requirements. Hydro and other renewables which were not included in the earlier proposal have been included and the wind, solar and ESS capacity has been revised as per discussions with MNRE. The PLFs and availability factors have also been revised. Details in Table 14(Annex -1).
- **Bidding Process** – The proposal has amended the investment and employment generation potential–
  - 165 GW modules manufacturing would entail an investment of \$51 billion and employment generation potential of 21500
  - 510 GWh ESS manufacturing would entail an investment of \$20 billion and an employment generation potential of 92000

The key open issues are –

- 12 month LC
- Back-to-back agreements (Indemnity and Late payment surcharge)
- Procurer's liability of designating an alternate DISCOM
- Alternate DISCOM.

Further post this proposal the trajectory of solar has been proposed at **350 GW solar capacity in India (FY30)**.

## 9.4 Annexure 4 – Capacity Installations

**Growth Trajectory (Initial Proposal)** - The capacity installation trajectory for solar and battery is indicated:

**Table 9: Capacity Trajectory**

| S.No. | Type of capacity         | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------|--------------------------|------|------|------|------|------|------|------|------|------|------|------|
| 1.    | Solar YoY (GW)           | 20   | 30   | 40   | 50   | 70   | 80   | 90   | 100  | 120  | 145  | 165  |
| 2.    | Cumulative Solar (GW)    | 20   | 50   | 90   | 140  | 210  | 290  | 380  | 480  | 600  | 745  | 910  |
| 3.    | Battery YoY(GWh)         | 5    | 10   | 30   | 50   | 100  | 150  | 200  | 300  | 400  | 510  | 510  |
| 4.    | Battery cumulative (GWh) | 5    | 15   | 45   | 95   | 195  | 345  | 545  | 845  | 1245 | 1755 | 2265 |
| 5.    | Capex Cumulative (\$ bn) | 14   | 42   | 82   | 131  | 202  | 286  | 385  | 505  | 652  | 831  | 1006 |

**Tariff comparison (Initial proposal)** - The tariffs of capacity setup in 2019 as against capacity setup in 2030 is as depicted –

**Table 10: Tariff 2019 vs 2030 (Rs. /unit)**

| S.No. | Type of capacity  | 2019 (Rs./unit) | 2030 (Rs./unit) |
|-------|-------------------|-----------------|-----------------|
| 1.    | Solar             | 3.0             | 2.0             |
| 2.    | Solar + Battery   | 9.0             | 6.0             |
| 3.    | Coal & Gas        | 3.7             | 5.2             |
| 4.    | Coal & Gas (Peak) | 8.0             | 11.1            |

**Tariff Appreciation (Initial proposal):** The YoY tariff for a power plant over the next 50 years-

**Table 11: Tariff for plant for 50 year period**

| S.No. | Type of capacity | Appreciation | Remarks                                  |
|-------|------------------|--------------|--|
| 1.    | Solar            | 2.25%        | Tariff halved from 26 <sup>th</sup> year |
| 2.    | Solar + Battery  | 2.25%        | Tariff halved from 26 <sup>th</sup> year |
| 3.    | Coal & Gas       | 3.00%        | -  |

Two options have been provided both for solar and ESS installations which are as indicated –

**Table 12: Annual Manufacturing Capability**

| S.No. | Type of capacity     | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------|----------------------|------|------|------|------|------|------|------|------|------|------|------|
|       | <b>Option A</b>      |      |      |      |      |      |      |      |      |      |      |      |
| 1.    | Solar Annual (GW)    | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 150  | 200  |
| 2.    | Battery Annual (GWh) | 5    | 10   | 35   | 50   | 100  | 150  | 200  | 250  | 275  | 300  | 400  |

| S.No. | Type of capacity               | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|
|       | <b>Option B</b>                |      |      |      |      |      |      |      |      |      |      |      |
| 1.    | Solar Annual installation (GW) | 20   | 30   | 40   | 50   | 100  | 100  | 100  | 100  | 100  | 100  | 100  |
| 2.    | Battery Annual (GWh)           | 5    | 10   | 35   | 50   | 100  | 150  | 285  | 285  | 285  | 285  | 285  |

**Energy Mix (Revised proposal)** – The initial energy mix is as per the proposal on 18<sup>th</sup> May, 2018 is as follows –

**Table 13: Energy mix (2030)**

| S.No. | Type of capacity | Capacity installed GW (2030) | PLF/CUF | Availability Factor | Remarks  |
|-------|------------------|------------------------------|---------|---------------------|--|
| 1.    | Coal             | 210 GW                       | 55%     | 80%                 | <ul style="list-style-type: none"> <li>PLF: 55% minimum level</li> <li>Availability factor excludes 6.5% Auxilliary consumption)</li> <li>Ramp rate: (+/-) 1% every 6 minutes</li> </ul> |
| 2.    | Wind             | 100 GW                       | 28.2%   | -                   | <ul style="list-style-type: none"> <li>Capacity as per NEP</li> <li>CUF: 17% for existing 35 GW + 34% for new capacity of 65 GW</li> </ul>   |
| 3.    | Nuclear          | 20 GW                        | -       | 62%                 | <ul style="list-style-type: none"> <li>Based on MoP data</li> </ul>  |
| 4.    | Gas              | 25 GW                        | 28%     | -                   | <ul style="list-style-type: none"> <li>Capacity as per per NEP</li> <li>PLF based on MOP data</li> </ul>   |
| 5.    | Solar            | 500 GW AC                    | 23.81%  | -                   | <ul style="list-style-type: none"> <li>584 GW AC by 2031</li> <li>CUF - 17 district data used as per NEP</li> <li>AC/DC Ratio- 1:1.45</li> </ul>   |
| 6.    | ESS              | 1,500 GWh                    | -       | -                   | <ul style="list-style-type: none"> <li>1,773 GWh by 2031</li> <li>ESS efficiency – 88%</li> </ul>  |

**Energy Mix (revised proposal 2)** – The energy mix was further revised as per the proposal on 30<sup>th</sup> May, 2018 –

**Table 14: Energy mix (2030)**

| S.No. | Type of capacity | Capacity installed GW (2030) | PLF/CUF    | Availability Factor | Remarks  |
|-------|------------------|------------------------------|------------|---------------------|--|
| 1.    | Coal             |                              |            |                     |  |
|       | Pithead          | 90 GW                        | <b>85%</b> | 85%                 | <ul style="list-style-type: none"> <li>Capacity: Existing 57 GW + New 33 GW</li> <li>Availability includes 5% forced outage and 10% scheduled maintenance, excludes 6% Auxilliary consumption</li> </ul> |
|       | Non Pithead      | 120 GW                       | <b>60%</b> | <b>75%</b>          | <ul style="list-style-type: none"> <li>Capacity: Existing 84 GW + New 36 GW</li> <li>Availability includes 5% forced outage and scheduled maintenance, excludes 6% Auxilliary consumption</li> </ul>     |

| S.No. | Type of capacity | Capacity installed GW (2030) | PLF/CUF | Availability Factor | Remarks  |
|-------|------------------|------------------------------|---------|---------------------|--|
| 2.    | Wind             | 140 GW                       | 26.83%  | -                   | <ul style="list-style-type: none"> <li>Capacity as per MNRE</li> <li>CUF: 17% for existing 34 GW + 30% for new capacity of 106 GW</li> </ul>               |
| 3.    | Nuclear          | 20 GW                        | -       | 64%                 | <ul style="list-style-type: none"> <li>Based on MoP data</li> </ul>  |
| 4.    | Gas              | 25 GW                        | 24%     | -                   | <ul style="list-style-type: none"> <li>Capacity as per NEP</li> <li>PLF based on CEA guidelines</li> </ul>   |
| 5.    | Solar            | 515 GW AC                    | 24.41%  | -                   | <ul style="list-style-type: none"> <li>CUF - 17 district data used as per NEP</li> <li>AC/DC Ratio- 1:1.45</li> <li>CUF: 22.33% post ESS losses</li> </ul> |
| 6.    | ESS              | 1,585 GWh                    | -       | -                   | <ul style="list-style-type: none"> <li>1,775 GWh by 2031</li> <li>ESS efficiency – 88%</li> </ul>  |
| 7.    | Hydro            | 67.5 GW                      | 32.98%  |                     | <ul style="list-style-type: none"> <li>Based on MOP data</li> </ul>  |
| 8.    | Other RE         | 10 GW                        | 40%     |                     | <ul style="list-style-type: none"> <li>Only biomass data</li> </ul>  |

**Energy Mix (Revision dated 05/06/2018) –** The following changes have been proposed –

- Coal capacity (2030) has been revised to 250 GW (average PLF – 79.05% and average availability – 72.21%)
- Wind PLF has been revised to 25.21%
- Solar capacity (2030) has been revised to 400 GW
- ESS capacity (2030) has been revised to 1200 GWh.

**Government Response-**

The GoI has responded with the following installed capacity by 2030–

- Solar – 350 GW
- Wind – 140 GW
- Biomass – 10 GW
- ESS - ~1200 GWh
  
- Coal – 250 GW
- Hydro- 65 GW
- Nuclear – 20 GW
- Gas- 25 GW

## 9.5 Annexure 5 – Contingent Liabilities

**Contingent Liabilities (Termination)** – The Gol will incur the following contingent liabilities in case of termination–

**Table 15: Contingent liabilities (Termination)**

| S.No. | Type of capacity            | 2021            | 2022           | 2023           | 2024           | 2025             | 2026             | 2027             | 2028             | 2029             | 2030             |
|-------|-----------------------------|-----------------|----------------|----------------|----------------|------------------|------------------|------------------|------------------|------------------|------------------|
|       | <b>90% Debt Due</b>         |                 |                |                |                |                  |                  |                  |                  |                  |                  |
| 1.    | Solar Cumulative Rs. cr     | 1,92,334        | 2,76,555       | 3,55,161       | 4,26,406       | 4,90,428         | 5,47,180         | 5,96,582         | 6,39,824         | 6,75,974         | 7,06,223         |
| 2.    | Battery Cumulative Rs. cr   | -               | 179,712        | 334,246        | 480,246        | 612,698          | 743,101          | 870,894          | 993,328          | 1,113,289        | 1,230,638        |
|       | <b>Overall Rs. cr</b>       | <b>1,92,334</b> | <b>456,267</b> | <b>689,407</b> | <b>906,653</b> | <b>1,103,126</b> | <b>1,290,281</b> | <b>1,467,476</b> | <b>1,633,152</b> | <b>1,789,262</b> | <b>1,936,861</b> |
|       | <b>150% adjusted equity</b> |                 |                |                |                |                  |                  |                  |                  |                  |                  |
| 1.    | Solar Cumulative Rs. cr     | 82,207          | 1,21,410       | 1,60,233       | 1,96,164       | 2,29,245         | 2,59,489         | 2,86,836         | 3,11,860         | 3,34,116         | 3,54,103         |
| 2.    | Battery Cumulative Rs. cr   | -               | 74,880         | 143,013        | 207,253        | 265,653          | 319,711          | 369,748          | 414,818          | 456,342          | 494,395          |
|       | <b>Overall Rs. cr</b>       | <b>82,207</b>   | <b>196,290</b> | <b>303,246</b> | <b>403,417</b> | <b>494,898</b>   | <b>579,200</b>   | <b>656,584</b>   | <b>726,678</b>   | <b>790,458</b>   | <b>848,498</b>   |

**Contingent Liabilities (tariff outgo)** – The Gol will incur the following contingent liabilities in case of termination–

**Table 16: Contingent liabilities (Indirectly on account of PSM)**

| S.No. | Type of capacity          | 2021          | 2022           | 2023           | 2024           | 2025           | 2026           | 2027           | 2028             | 2029             | 2030             |
|-------|---------------------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|
| 1.    | Solar Cumulative Rs. cr   | 50,605        | 84,351         | 118,326        | 152,538        | 186,994        | 221,705        | 256,678        | 291,923          | 327,451          | 360,541          |
| 2.    | Battery Cumulative Rs. cr | -             | 28,848         | 85,462         | 168,814        | 277,928        | 411,876        | 569,779        | 750,807          | 954,169          | 1,212,158        |
|       | <b>Overall Rs. cr</b>     | <b>50,605</b> | <b>113,199</b> | <b>203,788</b> | <b>321,352</b> | <b>464,922</b> | <b>633,581</b> | <b>826,457</b> | <b>1,042,730</b> | <b>1,281,620</b> | <b>1,572,699</b> |

The detailed computations of the contingent liabilities have been annexed subsequently.

## 9.6 Annexure 6 – Termination

### 9.6.1 Existing SECI model PPA

Termination events and procedure in case of SPD/ procurer event of default as per the SECI model PPA have been reproduced below –

#### “ARTICLE 13: EVENTS OF DEFAULT AND TERMINATION

##### 13.1 SPD Event of Default

13.1.1 *The occurrence and/or continuation of any of the following events, unless any such event occurs as a result of a Force Majeure Event or a breach by Buyer or Buying Entity (ies) of its obligations under this Agreement, shall constitute an SPD Event of Default:*

- (i) the failure to commence supply of power to Buyer up to the Contracted Capacity, by the end of the period specified in Article 4, or failure to continue supply of Contracted Capacity to Buyer after Commercial Operation Date throughout the term of this Agreement, or*
  - if*
  - (a) the SPD assigns, mortgages or charges or purports to assign, mortgage or charge any of its assets or rights related to the Power Project in contravention of the provisions of this Agreement; or*
  - (b) the SPD transfers or novates any of its rights and/or obligations under this agreement, in a manner contrary to the provisions of this Agreement; except where such transfer*
    - is in pursuance of a Law; and does not affect the ability of the transferee to perform, and such transferee has the financial capability to perform, its obligations under this Agreement or*
    - is to a transferee who assumes such obligations under this Agreement and the Agreement remains effective with respect to the transferee;*
- (ii) if (a) the SPD becomes voluntarily or involuntarily the subject of any bankruptcy or insolvency or winding up proceedings and such proceedings remain uncontested for a period of thirty (30) days, or (b) any winding up or bankruptcy or insolvency order is passed against the SPD, or (c) the SPD goes into liquidation or dissolution or has a receiver or any similar officer appointed over all or substantially all of its assets or official liquidator is appointed to manage its affairs, pursuant to Law, provided that a dissolution or liquidation of the SPD will not be a SPD Event of Default if such dissolution or liquidation is for the purpose of a merger, consolidation or reorganization and where the resulting company retains creditworthiness similar to the SPD and expressly assumes all obligations of the SPD under this Agreement and is in a position to perform them; or*
- (iii) the SPD repudiates this Agreement and does not rectify such breach within a period of thirty (30) days from a notice from Buyer in this regard; or*
- (iv) except where due to any Buyer's failure to comply with its material obligations, the SPD is in breach of any of its material obligations pursuant to this Agreement, and such material breach is not rectified by the SPD within thirty (30) days of receipt of first notice in this regard given by Buyer.*

- (v) *change in controlling shareholding before the specified time frame as mentioned in Article 4.1.1 of this Agreement; or*
- (vi) *occurrence of any other event which is specified in this Agreement to be a material breach/ default of the SPD.*
- (vii) *except where due to any Buyer's failure to comply with its material obligations, the SPD is in breach of any of its material obligations pursuant to this Agreement, and such material breach is not rectified by the SPD within thirty (30) days of receipt of first notice in this regard given by Buyer.*

## **13.2 Buyer Event of Default**

13.2.1 *The occurrence and the continuation of any of the following events, unless any such event occurs as a result of a Force Majeure Event or a breach by the SPD of its obligations under this Agreement, shall constitute the Event of Default on the part of defaulting Buyer:*

- (i) *Buyer fails to pay (with respect to a Monthly Bill or a Supplementary Bill), subject to Article 10.5, for a period of ninety (90) days after the Due Date and the SPD is unable to recover the amount outstanding to the SPD through the Letter of Credit,*
- (ii) *Buyer repudiates this Agreement and does not rectify such breach even within a period of sixty (60) days from a notice from the SPD in this regard; or*
- (iii) *except where due to any SPD's failure to comply with its obligations, Buyer is in material breach of any of its obligations pursuant to this Agreement, and such material breach is not rectified by Buyer within sixty (60) days of receipt of notice in this regard from the SPD to Buyer; or*  
*if*
  - *Buyer becomes voluntarily or involuntarily the subject of any bankruptcy or insolvency or winding up proceedings and such proceedings remain uncontested for a period of sixty (60) days, or*
  - *any winding up or bankruptcy or insolvency order is passed against Buyer, or*
  - *Buyer goes into liquidation or dissolution or a receiver or any similar officer is appointed over all or substantially all of its assets or official liquidator is appointed to manage its affairs, pursuant to Law, provided that it shall not constitute a Buyer Event of Default, where such dissolution or liquidation of Buyer or Buyer is for the purpose of a merger, consolidation or reorganization and where the resulting entity has the financial standing to perform its obligations under this Agreement and has creditworthiness similar to Buyer and expressly assumes all obligations of Buyer and is in a position to perform them; or;*
- (iv) *If Buying Entities are subject to any of the above defaults and SECI does not designate another or other Buying Entities for purchase of power.*
- (v) *Occurrence of any other event which is specified in this Agreement to be a material breach or default of Buyer.*

## **13.3. Procedure for cases of SPD Event of Default**

13.3.1 *Upon the occurrence and continuation of any SPD Event of Default under Article 13.1, Buyer shall have the right to deliver to the SPD, with a copy to the representative of the lenders to the SPD with whom*

*the SPD has executed the Financing Agreements, a notice stating its intention to terminate this Agreement (Buyer Preliminary Default Notice), which shall specify in reasonable detail, the circumstances giving rise to the issue of such notice.*

*13.3.2 Following the issue of a Buyer Preliminary Default Notice, the Consultation period of ninety (90) days or such longer period as the Parties may agree, shall apply and it shall be the responsibility of the Parties to discuss as to what steps shall be taken with a view to mitigate the consequences of the relevant Event of Default having regard to all the circumstances.*

*13.3.3 During the Consultation Period, the Parties shall continue to perform their respective obligations under this Agreement.*

*13.3.4 Within a period of seven (7) days following the expiry of the Consultation Period unless the Parties shall have otherwise agreed to the contrary or the SPD Event of Default giving rise to the Consultation Period shall have ceased to exist or shall have been remedied, Buyer may terminate this Agreement by giving a written Termination Notice of sixty (60) days to the SPD.*

*13.3.5 Subject to the terms of this Agreement, upon occurrence of a SPD Event of Default under this Agreement, the lenders in concurrence with the Buying Entity and SECI, may exercise their rights, if any, under Financing Agreements, to seek substitution of the SPD by a selectee for the residual period of the Agreement, for the purpose of securing the payments of the total debt amount from the SPD and performing the obligations of the SPD. However, in the event the lenders are unable to substitute the defaulting SPD within the stipulated period, SECI may terminate the PPA and the Buying Entity may acquire the Project assets for an amount equivalent to 90% of the debt due or less as mutually agreed, failing which, the lenders may exercise their mortgage rights and liquidate the Project assets.*

*Provided that any substitution under this Agreement can only be made with the prior consent of SECI including the condition that the selectee meets the eligibility requirements of Request for Selection (RfS) issued by SECI and accepts the terms and conditions of this Agreement.*

*13.3.6 The lenders in concurrence with the Buying Utility and SECI, may seek to exercise right of substitution under Article 13.3.3 by an amendment or novation of the PPA in favour of the selectee. The SPD shall cooperate with SECI to carry out such substitution and shall have the duty and obligation to continue to operate the Power Project in accordance with this PPA till such time as the substitution is finalized. In the event of Change in Shareholding/Substitution of Promoters triggered by the Financial Institutions leading to signing of fresh PPA with a new entity, an amount of Rs. 10 Lakh per Project per transaction as facilitation fee (non-refundable) shall be deposited by the SPD to SECI.*

*13.3.7 In the event the lenders are unable to substitute the defaulting SPD within the stipulated period, SECI may terminate the PPA and the Buying Utility may acquire the Project assets for an amount equivalent to 90% of the debt due, failing which, the lenders may exercise their mortgage rights and liquidate the Project assets.*

#### **13.4 Procedure for cases of Buyer Event of Default**

*13.4.1 Upon the occurrence and continuation of any Buyer Event of Default specified in Article 13.2, the SPD shall have the right to deliver to Buyer, a SPD Preliminary Default Notice, which notice shall specify in reasonable detail the circumstances giving rise to its issue.*

*13.4.2 Following the issue of a SPD Preliminary Default Notice, the Consultation Period of ninety (90) days or such longer period as the Parties may agree, shall apply and it shall be the responsibility of the Parties to discuss as to what steps shall be taken with a view to mitigate the consequences of the relevant Event of Default having regard to all the circumstances.*



13.4.3 *During the Consultation Period, the Parties shall continue to perform their respective obligations under this Agreement.*

13.4.4 *After a period of two hundred ten (210) days following the expiry of the Consultation Period and unless the Parties shall have otherwise agreed to the contrary or SECI Event of Default giving rise to the Consultation Period shall have ceased to exist or shall have been remedied, SECI under intimation to the Buying Entity and the SPD shall, subject to the prior consent of the SPD, novate its part of the PPA to any third party, including its Affiliates within the stipulated period. In the event the aforesaid novation is not acceptable to the SPD, or if no offer of novation is made by SECI within the stipulated period, then the SPD may terminate the PPA and at its discretion require Buying Entity to either (i) takeover the Project assets by making a payment of the termination compensation equivalent to the amount of the debt due and 150% (one hundred and fifty per cent) of the adjusted equity or, (ii) pay to the SPD, damages, equivalent to 6 (six) months, or balance PPA period whichever is less, of charges for its contracted capacity, with the Project assets being retained by the SPD.*

*Provided further that at the end of three (3) months period from the period mentioned in this Article 13.4.4, this Agreement may be terminated by the SPD.*

*In the event of termination of PPA, any damages or charges payable to the STU/ CTU, for the connectivity of the plant, shall be borne by the Buying Entity.*

## **13.5 Termination due to Force Majeure**

13.5.1 *If the Force Majeure Event or its effects continue to be present beyond a period as specified in Article 4.5.3, either Party shall have the right to cause termination of the Agreement. In such an event this Agreement shall terminate on the date of such Termination Notice without any further liability to either Party from the date of such termination.”*

## 9.6.2 Rewa Ultra Mega Solar (RUMS) model PPA

Termination events and procedure in case of SPD/ procurer event of default as per the RUMS model PPA have been reproduced below –

### **“TERMINATION**

#### **13.1 Termination for SPD's Event of Default**

- (a) *Without prejudice to any other right or remedy which the Procurer may have in respect thereof under this Agreement or the Applicable Laws, upon occurrence of an SPD Event of Default, the Procurer shall be entitled to terminate this Agreement in the manner provided in this Article.*
- (b) *The Procurer shall issue a Preliminary Notice to the SPD, with a copy to RUMSL, providing 60 (sixty) Days from the date on which the Preliminary Notice is delivered to the SPD to cure the underlying breach set out in Article 12.2. Provided however, if the cure of any breach by the SPD requires any reasonable action by the SPD that must be approved by the Procurer or RUMSL under this Agreement, the applicable cure period shall be extended by the period taken by the Procurer or RUMSL, as the case may be, to grant their approval. If the SPD fails to cure the breach within such period allowed, the Procurer shall, subject to the provisions of Article 13.1(d), be entitled to terminate this Agreement by issuing a Termination Notice to the SPD, with a copy to RUMSL, and to invoke the Performance Bank Guarantee, during its validity.*
- (c) *Without prejudice to any other rights or remedies which the Procurer may have under this Agreement, upon occurrence of an SPD Event of Default, the Procurer shall be entitled to terminate this Agreement by issuing a Termination Notice to the SPD.*
- (d) *The Procurer shall, before issuing the Termination Notice, inform the Lenders of its intention to issue such Termination Notice and grant 30 (thirty) Days to the Lenders for making a representation stating the Lenders' intention to exercise its right to substitute or step-in right in accordance with the Substitution Agreement. If the Procurer receives such representation from the Lenders within the stipulated time period, it shall withhold Termination for a period not exceeding 180 (one hundred and eighty) Days from the date of such representation, for enabling the Lenders to exercise their right(s) in accordance with the Substitution Agreement.*

#### **13.2 Termination for Procurer Event of Default**

- (a) *Without prejudice to any other right or remedy which the SPD may have in respect thereof under this Agreement, upon occurrence of a Procurer Event of Default, the SPD shall be entitled to terminate this Agreement by issuing a Termination Notice to the Procurer, with a copy to RUMSL, in accordance with this Article.*
- (b) *The SPD shall issue a Preliminary Notice to the Procurer, with a copy to RUMSL, providing 60 (sixty) Days from the date on which the Preliminary Notice is delivered to the Procurer to cure the breach set out in Article 12.3. If the Procurer fails to cure the underlying breach within such period allowed, the SPD shall, subject to the provisions of Article 13.2(c), be entitled to terminate this Agreement by issuing a Termination Notice to the Procurer, with a copy to RUMSL.*
- (c) *Without prejudice to any other right or remedy which the SPD may have under this Agreement, upon occurrence of a Procurer Event of Default, the SPD shall, subject to the provisions of the Substitution Agreement, be entitled to terminate this Agreement by issuing a Termination Notice.*

#### **13.3 Termination Notice**

*The Termination Notice shall set out the following:*

- (i) the underlying Event of Default, in sufficient detail;*
- (ii) the Termination Date;*
- (iii) the Termination Compensation as calculated in accordance with Article 14 (if applicable); and*
- (iv) any other relevant information.*

### **13.4 Obligation of the Parties**

*Following issue of the Termination Notice by the Procurer or the SPD, as the case may be, the defaulting party shall promptly take all such steps as may be necessary required to ensure that:*

- (i) until termination, the Parties shall, to the fullest extent possible, discharge their respective obligations so as to maintain the continued operations and maintenance of the Unit, if commenced, including payment of unpaid charges by the SPD to RUMSL under the Implementation Support Agreement, deduction by the Procurer of the above mentioned unpaid charges from Tariff Payments that the Procurer makes to the SPD and payment of charges payable to RUMSL or the relevant authorities under Article 10.5; and*
- (ii) any Termination Compensation is paid in accordance with Article 14.*

### **13.5 Withdrawal of Termination Notice**

*Notwithstanding anything contained in this Agreement, if the Party who has been served with the Termination Notice cures the underlying Event of Default to the satisfaction of the other Party at any time before termination occurs, the Termination Notice shall be withdrawn by the Party which had issued it, provided however that the Party in breach shall compensate the other Party for any direct costs occasioned by the Event of Default.*

### **13.6 Consequences of Termination**

*(a) Upon termination of this Agreement:*

- (i) in the event of a Procurer Event of Default;*
  - (A) Procurer shall return the Performance Bank Guarantee, Additional PBG, Assessment BG and Deemed COD PBG to the SPD, if available, and pay Termination Compensation in accordance with Article 14.1; and*
  - (B) upon payment of the Termination Compensation, the Unit shall Transfer to the Procurer or its nominee, in accordance with Article 24 and the Coordination Agreement.*
  - (C) the SPD may choose to forego its right to receive Termination Compensation and the consequent Transfer of the Unit to the Procurer or its nominee, in accordance with Article 13.6(a)(i)(A) and Article 13.6(a)(i)(B) and sell power with respect to the capacity under this Agreement to a third party for the remaining Term of the Agreement.*

*Provided that, any sale to a third party shall be conditional upon such third party agreeing: (i) to appropriate amendments to the Project Agreements, as may be required in the context of sale to the third party, at no additional cost to [SECOND PROCURER'S NAME] or*

RUMSL; and (ii) shall be without prejudice to rights, obligations and liabilities of [SECOND PROCURER'S NAME] and/or RUMSL under the Project Agreements.

For the avoidance of doubt, it is clarified that the GoMP shall in no manner be liable to the SPD or to the third party under the Guarantee Agreement or otherwise with respect to sale and purchase of power from the Unit between the SPD and the third party.

In the event the SPD decides to exercise its right to sell power to a third party under this Article 13.6(a)(i)(C), then it shall notify the same to the Procurer in the Termination Notice, issued in accordance with Article 13.3, with a copy to [SECOND PROCURER'S NAME] and RUMSL.

- (ii) in the event of an SPD Event of Default, the Procurer shall, subject to rights of the Lender under this Agreement, the Substitution Agreement and the Financing Documents:
- (A) forfeit the Performance Bank Guarantee, Additional PBG, Assessment BG and Deemed COD PBG, during their validity;
  - (B) upon payment of Termination Compensation to the SPD in accordance with Article 14.2(a) have a right to seek Transfer of the Unit in favour of the Procurer or its nominee, in accordance with Article 24;
  - (C) provide a written notice to the SPD and RUMSL within 15 (fifteen) Days of the occurrence of the SPD Event of Default, of its decision on whether it intends to seek a Transfer of the Unit;
  - (D) if the Procurer decides against seeking a Transfer of the Unit, or, fails to notify the SPD or RUMSL of its decision within the time period mentioned in Article 13.6(a)(ii)(C) above, RUMSL (or its nominee) shall have the right, but not an obligation, to pay the same Termination Compensation that would have been payable by the Procurer, to the SPD and seek the Transfer of the Unit by providing a written notice to the SPD within 15 (fifteen) Days of the expiry of the time period mentioned in Article 13.6(a)(ii)(C) above;
  - (E) if RUMSL chooses to seek a Transfer of the Unit, all Project Agreements shall be amended in such a manner so as to allow RUMSL (or its nominee) to continue to supply energy to the Procurer in accordance with the terms and conditions of this Agreement;
  - (F) if the Procurer and RUMSL decide not to exercise their rights under Article 13.6(a)(ii)(B) or Article 13.6(a)(ii)(D), respectively, above (i.e., the right to seek Transfer of the Unit in favour of the Procurer or its nominee or RUMSL or its nominee), then the SPD shall be liable to pay Termination Compensation to the Procurer in accordance with Article 14.2(b).

### **13.7 Accrued Rights and Liabilities**

Notwithstanding anything to the contrary contained in this Agreement, any termination of this Agreement pursuant to its term shall be without prejudice to accrued rights of any Party, including its right to claim and recover damages and other rights and remedies which it may have under the Applicable Laws or under this Agreement. All accrued rights and obligations of any of the Parties under this Agreement, including all rights and obligations with respect to Termination Compensation, shall survive the termination of this Agreement to the extent such survival is necessary for giving effect to such rights and obligations.

### **13.8 Survival**

The expiry or termination of the Agreement shall not affect any accrued rights, obligations and liabilities of the Parties under the Agreement, including the right to receive liquidated damages as per the terms of this

Agreement, nor shall it affect the survival of any continuing obligations for which this Agreement provides, either expressly or by necessary implications, which are to survive after the Expiry Date or termination including those under Article 12 (Event of Defaults and Remedies), Article 15 (Force Majeure), Article 21 (Jurisdiction and Dispute Resolution), Article 22.1 (Indemnity), Article 24 (Miscellaneous) and other Articles, which expressly or by their nature survive the Term or termination of this Agreement and which shall continue and survive any expiry or termination of this Agreement.

## **14. TERMINATION COMPENSATION**

### **14.1 For Procurer Event of Default**

Upon termination of this Agreement due to a Procurer Event of Default any time after the commissioning of the Initial Part Capacity and until the Expiry Date, subject to Article 13.6(a)(i)(C), the Procurer shall be liable to pay to the SPD:

- (a) Debt Due; and
- (b) 150% (one hundred and fifty percent) of the Adjusted Equity less insurance cover.

The Termination Compensation pursuant to this Article 14.1 shall become due and payable within 30 (thirty) Days of issuance of the Termination Notice by the SPD.

### **14.2 For SPD Event of Default**

- (a) Upon termination of this Agreement due to a SPD Event of Default any time after the commissioning of the Initial Part Capacity and until the Expiry Date, and if the Procurer or RUMSL decides to exercise its right under Article 13.6(a)(ii)(B) and Article 13.6(a)(ii)(D), respectively (i.e., the right to seek Transfer of the Unit in favour of the Procurer or RUMSL or their respective nominee), then the Procurer or RUMSL, as the case may be, shall be liable to pay to the SPD an amount equal to 90% (ninety percent) of the Debt Due.
- (b) Upon termination of this Agreement due to a SPD Event of Default any time after the commissioning of the Initial Part Capacity and until the Expiry Date, and if the Procurer or RUMSL decides not to exercise its right under Article 13.6(a)(ii)(B) and Article 13.6(a)(ii)(D), respectively (i.e., the right to seek Transfer of the Unit in favour of the Procurer or RUMSL or their respective nominee), then the SPD shall be liable to pay to the Procurer an amount equal to, the higher of:
  - (i) {[average tariff (as set out in the then applicable tariff order issued by MPERC) of power procured by the Procurer in last 3 (three) Financial Years from ground mounted and grid-connected solar PV power projects located within Madhya Pradesh] (minus) [the Applicable Tariff]} x [energy quantum equivalent to Minimum Supply Obligation] x [3 (three) Contract Years]; or
  - (ii) {[Average Power Purchase Cost or APPC for [FIRST PROCURER'S NAME] (as set out in the then applicable tariff order, issued by MPERC) (minus) [the Applicable Tariff]} x [energy quantum equivalent to Minimum Supply Obligation] x [3 (three) Contract Years].

### **14.3 Full and Final Settlement**

Any Termination Compensation determined pursuant to this Article 14 shall, once paid, be in full and final settlement of any claim, demand and/or proceedings of the Parties against each other, in relation to any termination of this Agreement and the SPD and the Procurer shall not have any other rights and remedies in respect of such termination. The SPD and the Procurer agree and acknowledge that this shall be the sole remedy available to the them on account of termination of this Agreement for a Procurer Event of Default or

an SPD Event of default, as the case may be, and the Termination Compensation shall fully compensate the SPD and the Procurer for any and all damages, losses or claims (whether direct or indirect) that it may have suffered on account of such termination of this Agreement.

## 15. FORCE MAJEURE

### 15.1 Force Majeure Event

(a) A **Force Majeure Event** means one or more of the following acts, events or circumstances or a combination of acts, events or circumstances or the consequence(s) thereof affects, the performance by the Party claiming the benefit of force majeure (the **Affected Party**) of its obligations under this Agreement and which is/are: (i) beyond the reasonable control of any Party; (ii) such that the Affected Party has been unable to overcome or prevent despite exercise of due care, diligence and following Good Industry Practice; and (iii) such that it/they has/have a Material Adverse Effect on the performance of the Affected Party's obligations in whole or in part under this Agreement or makes performance materially more onerous or uneconomic by reason of occurrence of such event.

#### (i) Non-Political Force Majeure Events

A Non-Political Force Majeure Event shall mean one or more of the following acts or events:

- (A) act of God, epidemic, extremely adverse weather conditions, lightning, earthquake, landslide, cyclone, flood, volcanic eruption, chemical or radioactive contamination or ionising radiation, fire or explosion; or
- (B) the discovery of geological conditions, toxic contamination or archaeological remains on the Unit Land that could not reasonably have been expected to be discovered through an inspection of the Unit Land.

It is clarified that a Non-Political Force Majeure Event shall not include the following events:

- (A) unavailability, late delivery or changes in cost of plant, machinery, equipment, materials or spare parts required for constructing, operating or maintaining the Unit;
- (B) a delay in the performance of any SPD Related Parties;
- (C) non-performance resulting from normal wear and tear; or
- (D) non-performance caused by: (I) negligent or intentional acts, errors or omissions, (II) failure to comply with the Applicable Laws or Applicable Permits, or (III) breach of, or default under, this Agreement, as the case may be.

#### (ii) Political Force Majeure Events

- (A) hostilities (whether declared as war or not), riot, civil disturbance, revolution, rebellion, insurrection, act of terrorism;
- (B) invasion, act of foreign enemy, revolution, nuclear explosion or politically motivated sabotage;
- (C) nation-wide strike, lockout, boycotts or other industrial disputes which are not directly and solely attributable to the actions of the Affected Party, but does not include strike or labour unrest limited to the Affected Party or its contractors; or



(D) *any action of the Procurer whether by positive act, omission or otherwise or other exercise of a sovereign or executive prerogative by the procurer any Government Authority that results in expropriation, creeping expropriation, nationalisation or compulsory acquisition of any property, revenues, assets or rights (present or future, actual or contingent) of the SPD or of the Capital held by the shareholders of the SPD, and acts claimed to be justified by executive necessity, pursuant to which or as a result of which the SPD or its shareholders are deprived (wholly or in part) of their direct or indirect rights or entitlements under this Agreement. Provided that such action does not constitute remedies or sanctions lawfully exercised by the Procurer or any other Government Authority as a result of any breach of any of the Applicable Laws or the Applicable Permits by the SPD or the SPD Related Parties.*

(iii) *A force majeure event arising under the Implementation Support Agreement and/or the Unit LUPA(s) shall also be deemed a Force Majeure Event under this Agreement.*

(b) *If the Parties are unable to agree in good faith on the occurrence or existence of a Force Majeure Event, such Dispute shall be finally settled in accordance with the dispute resolution procedure set forth in Article 21, provided however that the burden of proof as to the occurrence or existence of such Force Majeure Event shall be upon the Party claiming relief and/or excuse on account of such Force Majeure Event.*

## **15.2 Notice of Force Majeure Event**

*The Affected Party shall give notice to the other Parties of the occurrence of any of the Force Majeure Events (the **FM Notice**), as soon as it arises or as soon reasonably practicable and in any event within 30 (thirty) Days after the Affected Party knew of its occurrence, the adverse effect it has or is likely to have on the performance of its obligations under this Agreement, the actions being taken in accordance with Article 15.5 and an estimate of the period of time required to overcome the Force Majeure Event and/or its nature and effects (if it is possible to estimate the same).*

*If, following the issue of the FM Notice, the Affected Party receives or becomes aware of any further information relating to the Force Majeure Event, it shall submit such further information to the other Party as soon as reasonably practicable.*

*Any Party claiming to have been affected by a Force Majeure Event shall not be entitled to any relief unless it has complied with all the provisions of this Article 15.2.*

## **15.3 Performance Excused**

*The Affected Party, to the extent rendered unable to perform its obligations or part of the obligation thereof under this Agreement as a consequence of the Force Majeure Event, shall be excused from performance of the obligations, provided that the period shall not exceed 180 (one hundred and eighty) Days for a Non-Political Force Majeure Event and 90 (ninety) Days for a Political Force Majeure Event from the date of issuance of the FM Notice. The Parties may mutually agree to extend the period for which performance is excused due to a Force Majeure Event. The time period, as mutually agreed by the Parties, during which the performance shall be excused, the SPD shall be entitled for a day to day extension of the Term.*

*Provided always that a Party shall be excused from performance only to the extent reasonably warranted by the Force Majeure Event.*

*Provided further that, nothing shall absolve the Affected Party from any payment obligations accrued prior to the occurrence of the underlying Force Majeure Event.*

#### **15.4 No Liability for Other Losses**

*Save and except as expressly provided in this Agreement, no Party shall be liable in any manner whatsoever to the other Parties in respect of any Loss relating to or arising out of the occurrence or existence of any Force Majeure Event or the exercise by it of any right pursuant to this Article 15.*

#### **15.5 Resumption of Performance**

*During the period that a Force Majeure Event is subsisting, the Affected Party shall, in consultation with the other Parties, make all reasonable efforts to limit or mitigate the effects of such Force Majeure Event on the performance of its obligations under this Agreement. The Affected Party shall also make efforts to resume performance of its obligations under this Agreement as soon as possible and upon resumption, shall notify other Parties of the same in writing. The other Parties shall afford all reasonable assistance to the Affected Party in this regard.*

*Occurrence of a Force Majeure Event shall not relieve the SPD from the obligation to pay applicable charges to PGCIL.*

#### **15.6 Termination Due to Force Majeure Event**

(a) *If, prior to the completion of the 180 (one hundred and eighty) Day period (or any extended period) for a Non-Political Force Majeure Event commencing from the date of issuance of the FM Notice, the Parties are of the reasonable view that:*

(i) *a Non-Political Force Majeure Event is likely to continue beyond such 180 (one hundred and eighty) Day period or any extended period agreed in pursuance of Article 15.3; or*

(ii) *that it is uneconomic or impractical to restore the affected Unit,*

*then the Parties may mutually decide to terminate this Agreement, which termination shall take effect from the date on which such decision is taken.*

(b) *Without prejudice to the provisions of Article 15.6(a) above, the Affected Party shall, after the expiry of the period of 180 (one hundred and eighty) Days or any other mutually extended period, be entitled to forthwith terminate this Agreement in its sole discretion by issuing a notice to that effect.*

*On termination of this Agreement pursuant to this Article 15.6(b)*

(i) *no Termination Compensation shall be payable to the SPD;*

(ii) *any bank guarantees, if available, provided by the SPD to the Procurer under this Agreement shall be returned to the SPD;*

(iii) *the SPD shall be entitled to retain all proceeds received under any insurance policies maintained by it in relation to the Unit (subject to the Lenders' rights in respect of such insurance proceeds); and*

(iv) *the SPD shall be paid the undisputed payments under outstanding Monthly*



# Infrastructure Advisory

*Bill(s).*

- (c) *Upon occurrence of a Political Force Majeure Event, the SPD shall, at its discretion, have the right to terminate this Agreement forthwith after the completion of the period of 90 (ninety) Days from the date of the FM Notice.*

*On termination of this Agreement pursuant to this Article 15.6(c):*

- (i) the Procurer shall pay Termination Compensation equivalent to the amount payable in a case of a Procurer Event of Default, after deducting termination compensation paid or payable by [SECOND PROCURER'S NAME] under the [SECOND PROCURER'S NAME] PPA for the same event.*
- (ii) any bank guarantees, if available, provided by the SPD to the Procurer under this Agreement shall be returned to the SPD;*
- (iii) the SPD shall be entitled to retain all proceeds received under any insurance policies maintained by it in relation to the Unit (subject to the Lenders' rights in respect of such insurance proceeds); and*
- (iv) the SPD shall be paid the undisputed payments under outstanding Monthly Bill(s)."*

## 9.6.3 International PPAs

### 9.6.3.1 Tioga sample PPA (USA)

Termination events and procedure in case of SPD/ procurer event of default as per the Tioga sample PPA have been reproduced below –

#### **“Section 17 - FORCE MAJEURE**

##### **(a) Excuse for Force Majeure Event**

*Except as provided in Section 17(b) or otherwise specifically provided in this Agreement, neither Party shall be considered in breach of this Agreement or liable for any delay or failure to comply with this Agreement, if and to the extent that such delay or failure is attributable to the occurrence of a Force Majeure Event;*

*("Party" means either Host or Provider, as the context shall indicate, and "Parties" means both Host and Provider claiming relief as a result of the Force Majeure Event. "Force Majeure Event" means any act or event that prevents the affected Party from performing its obligations in accordance with this Agreement, if such act or event is beyond the reasonable control, and not the result of the fault or negligence, of the affected Party and such Party had been unable to overcome such act or event with the exercise of due diligence (including the expenditure of reasonable sums. Subject to the foregoing, Force Majeure Event may include but are not limited to the following acts or events: (i) natural phenomena, such as storms, hurricanes, floods, lightning and earthquakes; (ii) explosions or fires arising from lightning or other causes unrelated to the acts or omissions of the Party seeking to be excused from performance; (iii) acts of war or public disorders, civil disturbances, riots, insurrection, sabotage, epidemic, terrorist acts, or rebellion; and (iv) strikes or labor disputes. Force Majeure Events shall not include equipment failures or acts or omissions of agents, suppliers or subcontractors, except to the extent such acts or omissions arise from a Force Majeure Event. Changes in prices for electricity shall not constitute Force Majeure Events.)*

*provided that the Party shall promptly (i) notify the other Party in writing of the existence and details of the Force Majeure Event; (ii) exercise all reasonable efforts to minimize delay caused by such Force Majeure Event; (iii) notify the other Party in writing of the cessation of such Force Majeure Event; and (iv) resume performance of its obligations hereunder as soon as practicable thereafter.*

*[(17a) In the event of a Force Majeure, the affected party will not be liable for non-performance so long as it notifies the other party, makes efforts to minimize the effect of a Force Majeure event and resumes performance as soon as possible.]*

##### **(b) No Excuse for Payment for Prior Services.**

*Obligations to make payments for services already provided shall not be excused by a Force Majeure Event.*

*[(17b) The customer will not be excused from making payments for service rendered (e.g. last month's bill).]*

##### **(c) Restoration.**

*In the event of a casualty event, to the extent that such casualty event is attributable to the occurrence of a Force Majeure Event, which destroys all or a substantial portion of the Premises, Host shall elect, within ninety (90) days of such event, whether it will restore the Premises ("Premises" means the portions of the Site described on Exhibit D), which restoration will be at the sole expense of Host. If Host does not elect to restore the Premises, then Provider shall not restore the Project and this*

*Agreement will terminate. If Host does elect to restore the Premises, Host shall provide notice of such election to Provider and Provider shall then elect, within ninety (90) days of receipt of such notice, whether or not to restore the Project, subject to the Parties agreeing on a schedule for the restoration of the Premises and an equitable extension to the Term of this Agreement. If the Parties are not able to so agree or if Provider does not elect to restore the Project, Provider shall promptly remove any portions of the Project remaining on the Premises, and this Agreement shall terminate. If Provider does elect to restore the Project, it shall do so at its sole expense. In the event of termination of this Agreement pursuant to this Section 17(c), (i) the Parties shall not be released from any payment or other obligations arising under this Agreement prior to the casualty event; and (ii) the confidentiality provisions of Section 14, the indemnity obligations under Section 15 hereof, and the dispute resolution provisions of Section 23 hereof shall continue to apply notwithstanding the termination of this Agreement.*

*[(17c) This section describes the procedures if the host site is significantly damaged or destroyed by a force majeure event. Neither Customer or Tioga is obligated to rebuild.]*

#### **(d) Termination for Force Majeure Event.**

*Notwithstanding anything to the contrary in this Section 17, if nonperformance on account of a Force Majeure Event continues beyond a continuous period of three hundred and sixty-five (365) days, then either Party shall have the right to terminate this Agreement upon thirty (30) days' notice to the other. Upon such termination, Provider shall be required to decommission and remove the Project ("Project" means an integrated system for the generation of electricity from solar energy consisting of the photovoltaic panels and associated equipment to be installed on each of the Premises in accordance with this Agreement) from the applicable Site in accordance with the provisions of Section 9(d) (unless there has been a casualty event, in which case the provisions of clause (c) above shall apply to the removal of the Project). In the event of such a termination of this Agreement with respect to the Project, the Parties shall not be released from any payment or other obligation arising under this Agreement which accrued prior to the shutdown of the Project or the Premises, and the indemnity, confidentiality and dispute resolution provisions of this Agreement shall survive the termination of this Agreement.*

*[(17d) If non-performance under this contract due to a Force Majeure Event continues for more than 1 year, either party can terminate this contract.]*

## **Section 19 - PROVIDER DEFAULT AND HOST REMEDIES**

### **(a) Provider Events of Default.**

*Provider shall be in default of this Agreement ("Agreement" means this Power Purchase Agreement, including all exhibits attached hereto, as the same may be amended from time to time in accordance with the provisions hereof) if any of the following ("Provider Events of Default") shall occur:*

*[(19a) Tioga's financial parties must be given the opportunity to rectify a default by Tioga, although they are not required to do so. If the financing parties do not cure the default, the customer may terminate this agreement, seek to recover damages, or pursue other remedies against Tioga.]*

- (i) Misrepresentation. Any representation or warranty by Provider ("Provider" means Tioga Solar [\_\_\_\_], LLC, a [\_\_\_\_\_] limited liability company, and all successors and assigns) under Section 16 hereof, is incorrect or incomplete in any material way, or omits to include any information necessary to make such representation or warranty not materially misleading, and such defect is not cured within fifteen (15) days after receipt of notice from Host identifying the defect.*

- (ii) *Abandonment during Installation.* After commencement of installation of the Project, Provider abandons installation of the Project for thirty (30) days and fails to resume installation within thirty (30) days after receipt of notice from Host stating that, in Host's reasonable determination, Provider has abandoned installation of the Project;
- (iii) *Failure to Operate.* After the Commercial Operation Date, Provider fails to operate the Project for a period of 90 days which failure is not due to equipment failure, or damage to the Project, act of governmental authority, or exercise of Provider's rights under this Agreement, or otherwise excused by the provisions of Section 17(b) (relating to Force Majeure Events); and Provider fails to resume operation within thirty (30) days after receipt of notice from Host stating that, in Host's reasonable determination, Provider has ceased operation of the Project, provided, however, that the cure period shall be extended by the number of calendar days during which Provider is prevented from taking curative action if Provider had begun curative action and was proceeding diligently, using commercially reasonable efforts, to complete such curative action.
- (iv) *Obligation Failure.* Provider fails to perform any obligation hereunder, such failure is material, such failure is not excused by the provisions of Section 17(b) (relating to Force Majeure Events), and such failure is not cured within: (A) ten (10) days if the failure involves a failure to make payment when due or maintain required insurance; or (B) sixty (60) days if the failure involves an obligation other than payment or the maintenance of insurance, after receipt of notice from Host identifying the failure.
- (v) *Insolvency.* Provider (A) applies for or consents to the appointment, or the taking of possession by, a receiver, custodian, trustee or liquidator of itself or a substantial portion of its property; (B) admits in writing its inability, or is generally unable, to pay its debts as such debts become due; (C) makes a general assignment for the benefit of its creditors; (D) commences a voluntary case under any bankruptcy law; (E) files a petition seeking to take advantage of any other law relating to bankruptcy, insolvency, reorganization, winding up, or composition or readjustment of debts; (F) acquiesces in, or fails to contest in a timely manner, any petition filed against Provider in an involuntary case under bankruptcy law or seeking to dissolve Provider under other Applicable Law; or (G) takes any action authorizing its dissolution.

**(b) Financing Party Opportunity to Cure; Host Remedies.**

*Upon an Event of Default by Provider, provided that Host complies with its obligations under Section 21 and Financing Party does not cure such Event of Default by Provider, Host may terminate this Agreement, seek to recover damages for costs of replacement electricity and pursue other remedies available at law or equity.*

*[(19b) Tioga's financial parties must be given the opportunity to rectify a default by Tioga, although they are not required to do so. If the financing parties do not cure the default, the customer may terminate this agreement, seek to recover damages, or pursue other remedies against Tioga.]*

**Section 20 - HOST DEFAULT AND PROVIDER REMEDIES**

**(a) Host Events of Default.**

*Host shall be in default of this Agreement if any of the following ("Host Events of Default") shall occur:*

- (i) *Misrepresentation.* Any representation or warranty by Host under Section 16 hereof, is incorrect or incomplete in any material way, or omits to include any information necessary to make such

*representation or warranty not materially misleading, and such defect is not cured within fifteen (15) days after receipt of notice from Provider identifying the defect.*

- (ii) Obstruction. Host obstructs commencement of installation of the Project or fails to take any actions necessary for the interconnection of the Project, or fails to take electric energy produced by the Project, and fails to correct such action within ten (10) days of when such payment was due.*
- (iii) Payment Failure. Host fails to make any payment due under the terms of this Agreement, and fails to make such payment within ten (10) days after receipt of notice thereof from Provider.*
- (iv) Obligation Failure. Host fails to perform any obligation hereunder, such failure is material, such failure is not excused by the provisions of Section 17(b) (relating to Force Majeure Events), and such failure is not cured within: (A) ten (10) days if the failure involves a failure to maintain required insurance; or (B) sixty (60) days if the failure involves an obligation other than payment or the maintenance of insurance, after receipt of notice from Provider identifying the failure.*
- (v) Insolvency. Host (A) applies for or consents to the appointment, or the taking of possession by, a receiver, custodian, trustee or liquidator of itself or a substantial portion of its property; (B) admits in writing its inability, or be generally unable, to pay its debts as such debts become due; (C) makes a general assignment for the benefit of its creditors; (D) commences a voluntary case under any bankruptcy law; (E) files a petition seeking to take advantage of any other law relating to bankruptcy, insolvency, reorganization, winding up, or composition or readjustment of debts; (F) acquiesces in, or fails to contest in a timely manner, any petition filed against Host in an involuntary case under bankruptcy law or seeking to dissolve Host; or (G) takes any action authorizing its dissolution.*

**(b) Default Damages.**

*Upon an Event of Default by Host, Provider may require Host to pay to Provider the Early Termination Amount, sell electricity produced by the Project to persons other than Host, and recover from Host any loss in revenues resulting from such sales; and/or pursue other remedies available at law or in equity. After Provider's receipt of such Early Termination Amount pursuant to this Section 20(b), Provider shall collect no additional damages resulting from lost revenues from sales of electricity from the Project.*

### 9.6.3.2 Bedford PPA (USA)

Termination events and procedure in case of SPD/ procurer event of default as per the Bedford draft PPA have been reproduced below –

#### **“ 7.02 Early Termination by Provider.**

*Provider may terminate this Agreement as to any System and its related Site and Property in the event that any of the following events or circumstances occur prior to the Commercial Operation Date, in which case neither Provider nor Customer will have any liability for such termination, except that no such termination shall act to relieve Provider from any obligation hereunder regarding the removal of such System and the restoration of such Site:*

- (a) There exist environmental conditions at the Property that were not known, and not reasonably knowable, by Provider as of the Effective Date, which will materially increase the cost of constructing the System or will materially and adversely affect the electricity production from the System, and Customer has not agreed either to remediate such conditions at the Property or to a fully-compensatory increase in the kWh Rate.*
- (b) There is a material, adverse change in the Environmental Attributes of the System or the regulatory environment, incentive program or federal or state tax code (including the expiration of any incentive program or tax incentives in effect as of the effective date of this Agreement) that will materially and adversely affect the economics of the installation for Provider and its investors, and Customer has not agreed to a fully-compensatory increase in the kWh Rate.*
- (c) Provider, despite using commercially-reasonable efforts, has not received all Governmental Approvals.*

#### **7.03 Early Termination by Customer.**

*Customer shall have the right to unilaterally terminate this Agreement with respect to any System and its related Site and Property only (i) upon Customer's purchase of such System as provided in Section 7.04, or (ii) at any time after the end of the sixth year of commercial operation of the System, on not less than ninety (90) days prior written notice, with respect to (ii), and upon meeting the following conditions:*

- (a) Customer pays Provider or its designee the applicable Early Termination Fee as of the Early Termination Date, including all costs (including liquidated damages and penalties) required to terminate such System's arrangements with the Local Electric Utility, purchasers of Environmental Attributes and other related System contractors, and Customer obtains a full waiver of claims from such entities in form reasonably satisfactory to Provider and directed to Provider; and*
- (b) Customer waives all claims against Provider with respect to such System or by reason of this Agreement as it applies to such System.*

#### **7.04 Customer Purchase Option.**

- (a) So long as a Customer Default shall not have occurred and be continuing, Provider grants to Customer an option to purchase the Systems (the "Purchase Option") as of (1) the Expiration Date, (2) any Purchase Option Date, or (3) an Early Termination Date resulting from Provider's or Customer's termination of this Agreement after the System has begun to produce electricity pursuant to Section 7.02.*
- (b) The purchase price (the "Option Price") shall be equal to the greater of: (i) the Fair Market Value of such System, as determined pursuant to Section 7.05, or (ii) the Early Termination Fee.*
- (c) If Customer elects to exercise the Purchase Option, then, not less than one hundred eighty (180) days prior to the Expiration Date or Purchase Option Date, as applicable, Customer shall provide written notice to Provider of*



*Customer's intent to exercise the Purchase Option, which election shall be irrevocable. Following its receipt of Customer's notice, Provider shall determine and notify Customer of the Fair Market Value. In the event Customer disagrees with any determination of Fair Market Value (to the extent in excess of the Early Termination Fee) it shall notify Provider in writing and the Parties shall determine the Fair Market Value in accordance with Section 7.05. Upon final determination of the Fair Market Value, but in any event on or before the Purchase Option Date, (i) the Parties shall promptly execute all documents necessary to (A) cause title to such System to pass to Customer, free and clear of any Liens, immediately subsequent to the Expiration Date or the Purchase Option Date (as applicable), and (B) assign any warranties for such System to Customer, and (ii) Customer shall pay the Option Price to Provider in immediately available funds. Customer shall also execute such documents reasonably necessary for Customer to accept, assume and perform all then-existing agreements relating to such System or the Solar Services, including but not limited to operations and maintenance agreements, and agreements for the sale of Environmental Attributes.*

### **7.05 Determination of Fair Market Value.**

*If the Customer does not agree with Provider's determination of Fair Market Value pursuant to Section 7.04, as applicable, then the Parties shall select a nationally recognized independent appraiser with experience and expertise in the solar photovoltaic industry or the real estate industry, respectively. Such appraiser shall act reasonably and in good faith to determine Fair Market Value and shall set forth such determination in a written opinion delivered to the Parties within twenty (20) days of the initial request for appraisal. The valuation made by the appraiser shall be binding upon the Parties in the absence of fraud or manifest error. The costs of the appraisal shall be borne by the Parties equally.*

### **9.01 Provider Defaults.**

- (a) Provider Default Defined. If Provider breaches any material term of this Agreement and (i) if such breach can be cured within thirty (30) days after Provider's receipt of Customer's notice of such breach and Provider fails to so cure, or (ii) Provider otherwise fails to commence and diligently pursue and complete said cure within ninety (90) days of receipt of Customer's notice, then a "Provider Default" shall have occurred.*
- (b) Customer's Remedies. If a Provider Default described in Section 9.01(a) has occurred and is continuing, Customer may terminate this Agreement immediately upon the expiration of the respective grace periods set forth in such provisions, and otherwise exercise any other remedy that Customer may have at law or equity or under this Agreement.*
- (c) Actions to Prevent Injury. If any Provider Default creates an imminent risk of damage or injury to any Person or any Person's property, then, in addition to any other right or remedy that Customer may have, Customer may (but shall not be obligated to) take such action as Customer deems appropriate to prevent such damage or injury.*

### **9.02 Customer Defaults.**

- (a) Customer Default Defined. The following events shall be defaults with respect to Customer (each, a "Customer Default"):*
  - (i) Customer fails to pay Provider any undisputed amount due Provider under this Agreement within ten (10) Business Days from receipt of notice from Provider of such past due amount;*
  - (ii) Customer breaches any material term of this Agreement if (A) such breach can be cured within thirty (30) days after Customer's receipt of Provider's notice of such breach and Customer fails to so cure, or (B) Customer otherwise fails to commence and diligently pursue and complete said cure within ninety (90) days of receipt of Customer's notice; or*

- (iii) (A) Customer admits in writing its inability to pay its debts generally as they become due; (B) Customer files a petition or answer seeking reorganization or arrangement under the federal bankruptcy laws or any other applicable law or statute of the United States of America or any state, district or territory thereof; (C) Customer makes an assignment for the benefit of creditors; (D) Customer consents to the appointment of a receiver of the whole or any substantial part of its assets; (E) Customer has a petition in bankruptcy filed against it, and such petition is not dismissed within ninety (90) days after the filing thereof; (F) a court of competent jurisdiction enters an order, judgment, or decree appointing a receiver of the whole or any substantial part of Customer's assets, and such order, judgment or decree is not vacated or set aside or stayed within ninety (90) days from the date of entry thereof; or (G) under the provisions of any other law for the relief or aid of debtors, any court of competent jurisdiction shall assume custody or control of the whole or any substantial part of Customer's assets and such custody or control is not terminated or stayed within ninety (90) days from the date of assumption of such custody or control.
- (b) *Provider's Remedies.* If a Customer Default described in Section 9.02(a) has occurred and is continuing, then in addition to (and not in lieu of) any other remedy Provider may have in law or equity, Provider may: (i) require Customer to pay to Provider the Early Termination Fee and (ii) and terminate this Agreement immediately.
- (c) *Actions to Prevent Injury.* If any Customer Default creates an imminent risk of damage or injury to any Person or any Person's property, then in any such case, in addition to any other right or remedy that Provider may have, Provider may (but shall not be obligated to) take such action as Provider deems appropriate to prevent such damage or injury.

### **9.03 Force Majeure.**

A "Force Majeure Event" means any event which wholly or partly prevents or delays the performance of any obligation arising under this Agreement, but only if and to the extent (i) such event is not within the reasonable control, directly or indirectly, of the Party affected, (ii) such event, despite the exercise of reasonable diligence, cannot be prevented, avoided or overcome by such Party, (iii) the Party affected has taken all reasonable precautions and measures in order to avoid the effect of such event on such Party's ability to perform its obligations under this Agreement and to mitigate the consequences thereof, and (iv) such event is not the direct or indirect result of a Party's negligence or the failure of such Party to perform any of its obligations under this Agreement or to comply with Applicable Law. A Party claiming a Force Majeure Event shall not be considered in breach of this Agreement or liable for any delay or failure to comply with the Agreement, if and to the extent that such delay or failure is attributable to the occurrence of such Force Majeure Event; provided that the Party claiming relief shall immediately notify the other Party in writing of the existence of the Force Majeure Event, exercise all reasonable efforts necessary to minimize delay caused by such Force Majeure Event, and resume performance of its obligations hereunder as soon as practicable thereafter."



## 9.6.3.3 Kenya standardized PPA (Africa)

Termination events and procedure in case of SPD/ procurer event of default as per the Kenya Standardized PPA have been reproduced below –

### **“10. DEFAULT AND TERMINATION**

#### **1. Events of Default**

*A Party shall be deemed to be in default under this Agreement if it experiences each or any of the Events of Default including:*

- 1. The Seller fails to complete, abandons or cancels construction of the Plant, or does not achieve the Long Stop Full Commercial Operation Date, unless such failure is attributable primarily to the failure of the government of the Republic of Kenya or instrumentalities of the government of the Republic of Kenya to issue necessary permits to the Plant.*
- 2. The adjudged bankruptcy, dissolution or liquidation of either Party in which case the bankrupt, dissolved, or liquidated Party shall be deemed to be the Party in default hereunder.*
- 3. Either Party fails to perform or observe any of the covenants, terms, conditions or provisions of this Agreement and the appendices hereto, and such failure shall not be rectified or cured within sixty (60) days after written notice thereof to the non-performing Party, provided, that if such failure cannot reasonably be cured within such sixty (60) day period, such further period, not to exceed one (1) year after written notice thereof, as reasonably as shall be required to effect such cure, provided that the defaulting Party commences within such sixty (60) day period reasonably to effect such cure and at all times thereafter proceeds diligently to complete such cure as quickly as possible, subject to the provisions of Clause 10. It shall not be an Event of Default if such failure of a Party to perform is proximately caused by an action or inaction of the other Party.*
- 4. Without reasonable excuse, the failure of any Party to make an undisputed payment when due and non-payment continues for more than ninety (90) days.*
- 5. Either Party contests and denies the enforceability of the Agreement, in which case the Party contesting enforceability shall be deemed to be the Party in default hereunder.*
- 6. Failure to achieve the Full Commercial Operating Date by the Long Stop Full Commercial Operating Date.*
- 7. The dissolution or reorganization of the Buyer such that the Buyer or its successor cannot perform its obligations hereunder, either of which shall be deemed to be an event of default on the part of the Buyer.*

#### **2. Default Procedure and Cure**

##### **1. Notice**

*Upon the occurrence of an Event of Default, in each and every case, the non-defaulting party shall give written notice to the defaulting Party and may pursue any remedies provided for in this Agreement by giving such written notice to the other Party: provided that should the Buyer claim any Event of Default against the Seller, it shall notify and afford Lenders reasonable time, access and opportunity to remedy or cure any event giving rise to the default, and shall cooperate with Lenders to this end.*

##### **2. Step-In Rights**

*If an Event of Default or Emergency occurs and the Party experiencing such event of Default or Emergency is prevented temporarily from satisfying its obligations hereunder despite its best efforts, including but not limited to restoring the operation of the Plant the Lender (hereinafter called "the Person") may elect to provide notice to all parties as provided herein, of its intention to step into the rights and obligations of the Party experiencing the Event of Default and attempt during a reasonable time to remedy such event of Default or Emergency (the Step – In - Rights). The lender shall only exercise the Step – In – Rights under this Clause if it has the skills and means to carry out the work necessary to remedy the Event of Default or Emergency in accordance with the laws of Kenya and Prudent Operating Practice. Such step- in rights shall require the consent of ERC.*

### **3. Step –In - Costs**

*The Indemnity provisions of this Agreement shall apply to the exercise of the Step – in – Rights, provided that the person exercising the Step – In – Rights shall be indemnified by the seller experiencing the Event of Default or Emergency for all reasonably incurred expenses that benefit the seller experiencing the Event of Default or Emergency or its assets, and shall be indemnified and held harmless by the seller experiencing the event of Default or Emergency from and against all claims of whatsoever nature lodged against such Person arising out of or associated with reasonable actions consistent with Prudent Operating Practice to cure or remedy such Event of Default or Emergency. The Person exercising the Step – In – Rights shall as soon as possible return control of operations of any facilities over which it has assumed control or operation to the seller experiencing the Event of Default. The Person exercising the Step – In – Rights shall maintain and produce records of costs incurred to attempt to cure or remedy the Event of Default or emergency, and the seller experiencing the Event of Default shall reimburse such reasonable and documented expenses incurred by such person.*

### **4. Specific Performance**

*If money damages would not be a sufficient remedy in the Event of Default or breach of this Agreement, each Party acknowledges that the Party not in breach shall be entitled to specific performance, including, without limitation, injunction and specific performance, to remedy such breach or threatened breach, and that such remedy shall not be deemed the exclusive remedy for breach hereunder.*

### **3. Termination Due to the Buyer's Default**

*In the event that there is a termination of this Agreement due to a the Buyer's Default pursuant to Clause 11.1, the Buyer shall, within ninety (90) days of the termination date, pay to the Seller by way of liquidated damages and in one lump sum in United States Dollars being the aggregate of the amounts computed as set out in Appendix F (the "Transfer Amount") and upon receipt of such Transfer Amount the Seller shall transfer the Plant to the Buyer. Notwithstanding the foregoing, the seller and the buyer may agree on alternative arrangements including selling the plant to another party or continuing to generate and selling the energy directly to a consumer.*

### **4. Remedies**

*The remedies expressly provided for the Parties in this Agreement are not exclusive, they are cumulative and may be exercised concurrently or consecutively and will be in addition to other remedies under this Agreement, the law or in equity, with the exception of the payment of damages and losses that will be treated according to what is established under this Agreement. This section will remain effective after termination of this Agreement.*

### **5. Sole Remedies**

*The Parties agree that their rights and remedies expressly provided in their favour in this Agreement constitute their sole remedies against each other in respect of any breach by a Party of its obligations hereunder and neither Party shall have any additional liability to the other for any loss or damage or other liability, whether arising in contract, tort or otherwise, in connection with this Agreement.*

## **APPENDIX F - TRANSFER AMOUNT SPECIFIED IN CLAUSE 11.3**

*Such amount which after deducting any Tax which the Seller must pay on the lump sum received or which is withheld from such lump sum leaves a net amount equal to the Total Project Cost (as hereafter defined) where service of the Termination Notice takes place after the Full Commercial Operations Date, or such portion of the Total Project Cost as will have been incurred by the Seller up to the date of the Termination Notice, where the Termination Notice is served before the Full Commercial Operations Date.*

*For the purposes of this Agreement, the "Total Project Cost" shall mean the total cost (whether direct, indirect or incidental) of completing the development, design, financing, construction, installation, testing, commissioning, operation and maintenance (other than operation and maintenance costs incurred in relation to a Unit after such Unit has been Commissioned) of the Plant (as more particularly set out in the final audited financial model for the Project approved by the Lenders (the "Audited Financial Model") immediately prior to disbursement of funds to the Seller, including (without limitation) development, construction and commissioning costs, financing costs and fees, interest during construction, insurance costs, development fees, construction management costs, start -up costs and contingencies.*

*Where service of the Termination Notice takes place after the Full Commercial Operations Date, the Total Project Cost shall be reduced from the Full Commercial Operation Date by deducting there from an assumed depreciation rate equivalent to five per cent (5%) per annum (or pro rata for any part of a year) for each year (or part thereof) from the Full Commercial Operation Date to the date of the Termination Notice. Where service of the Termination Notice takes place before the Full Commercial Operations Date no such reduction in the Total Project Cost (by way of depreciation) shall be made and Total Project Costs shall only be in relation to those costs which have been incurred as at the date of service of the Termination Notice (whether or not such costs have become due and payable)."*

## **9.7 Annexure 6 – Key meetings & submissions**

**Key submissions** – CRIS assisted Niti Aayog in various meetings and deliberations with Niti Aayog & various other stakeholders. During these meetings & discussions, various changes were suggested which have been incorporated in the submissions made by CRIS to Niti Aayog over a period of time.

The date wise submissions have been detailed below –

### **1. Preliminary review of the proposed solar solution Submission Date- 29<sup>th</sup> April 2018**

The preliminary review of the proposed solar solution was carried out by CRIS. On this basis a preliminary report was submitted which is indicated below:

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## Preliminary review of proposed energy solution (Solar with battery)

NITI Aayog



## Key Message

### Key Message

***Suppressed demand can be released with appropriate energy solution***

***Integration with other supply option required***

***Potential of meeting 40% percentage of overall energy mix***

***Proposal in totality can have adverse impact on other options***

***Overall cost of solution can be made competitive specially considering it is a dollar denominating tariffs***

### Analysis

- Potential for Per capita consumption to grow from ~1100 to 2660 kWh in a high growth and unconstrained scenario by providing competitive energy solution
- Supply is considered to increase with current capacity addition plan, decommissioning of older plants (19th EPS), gradual increase in PLF of thermal power plants and RE capacity based on 175 GW target
- Under high growth scenario, the potential market for proposed energy solution (solar plus battery) is expected to increase to 934 TWh by 2030, against the proposed generation target of 1265 TWh by Solar and 520 TWh by battery
- Targets under the proposal can potentially have economic & financial impact of INR 251,500 Crores because of displacement of thermal capacities of 850 TWh for which fixed cost will have to be born as well as variable cost difference
- Dollar based tariff offered at for Solar 0.04 \$/kWh (3.17 Rs/kWh) looks to be comfortable considering manufacturing in India. However, overall energy solution (Solar + Battery) tariff (with hedging cost) can see more decline considering the past trend of lithium battery cost & potential other solutions



## Key Message

### Key Message

***IPPs preference for imports of panel because of cost competitiveness***

***Domestic manufacturing could be made competitive***

***No precedent for sovereign guarantee but can structure other payment security options***

***Analysis of proposed solution and phasing is required***

***Land banks need to be evaluated***

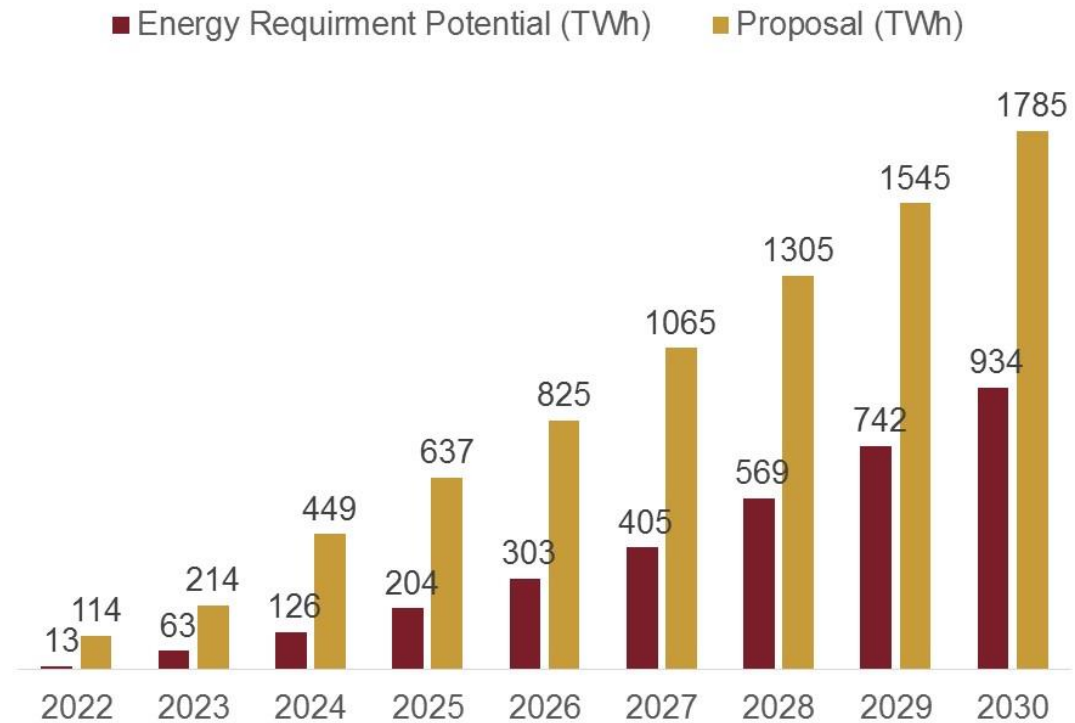
### Analysis

- Impact on other new IPPs backed by international investors and IPOs need to be factored in since they may not have manufacturing base in India
- Further to make domestic manufacturing competitive, the government may allow power procurement at through open market. Potential of tariffs from DCR based solar plants to reduce by 17%
- Sovereign guarantee unlikely considering similar demands. However other options for mitigating payment risks like centralized procurement, escrow of DISCOMs areas, allowing them to sell in open market etc. need to be explored
- Solar + Battery solution need to be phased out and understood considering the demand pattern, supply hours along with the cost competitiveness of the proposed solution vis-à-vis other options like gas, hydro for meeting peak.
- Land Requirement (25,200 Sq km) for such huge capacity will require Central Government intervention

## Demand Supply Scenario 2030

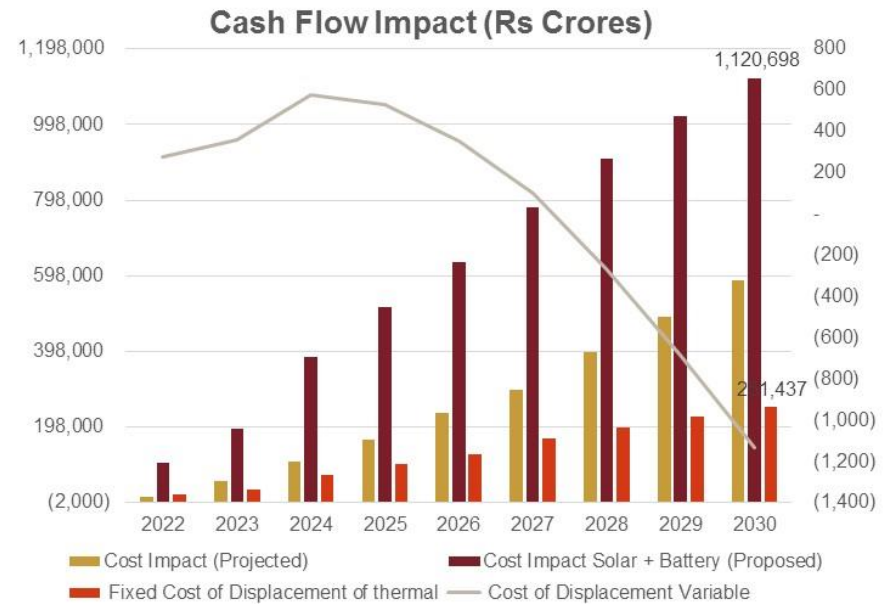
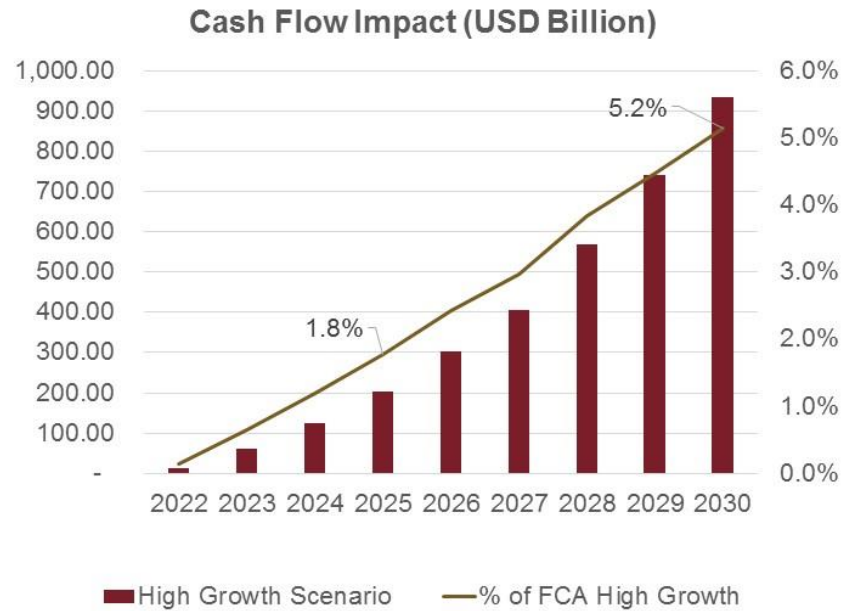
*Based on the existing plan the shortfall in energy requirement will start to emerge from 2023 which will increase upto 934 TWh (40% of the total energy requirement)*

*In comparison to the proposal the expected gap is lower by almost 15%*





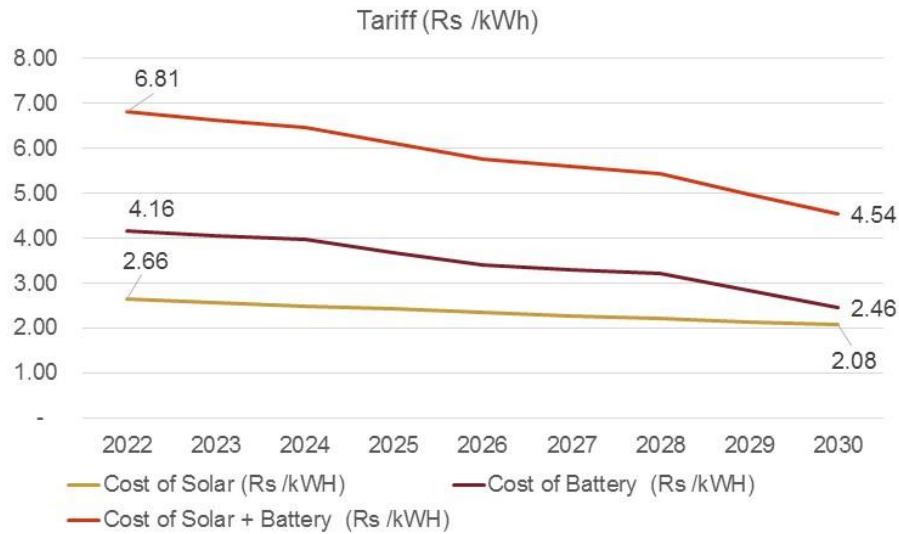
## Cash Flow 2030



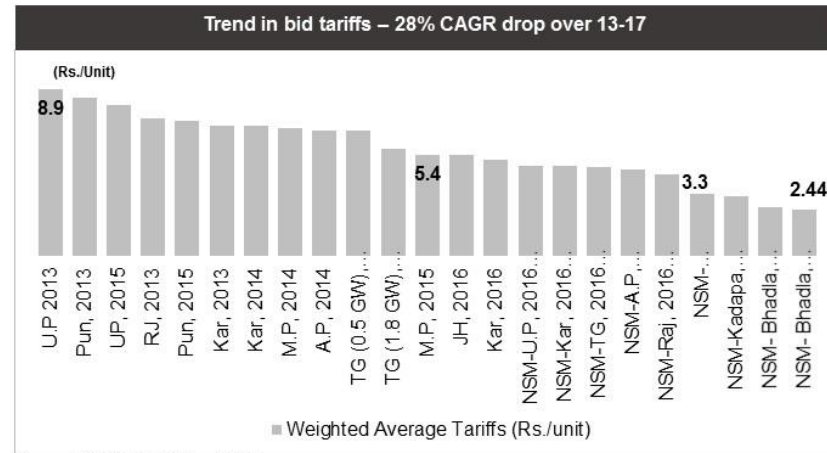
*\*marginal variable cost will loose its cost competitiveness from 2028 in comparison to the offered price, However, if trend observed in solar tariff is considered this might happen in 2027*

*\*\* Marginal cost increased at 2% from 2018 at 6 Rs/ Kwh*

## Tariff Offered



Tariff projected based on LCOE for battery for 2022 and reducing based on decreasing Lithium prices  
Solar prices reduced by 3% YOY from 3 Rs/kWh at current level



Source : DISCOMs Notifications, CRISIL

Pun–Punjab; Raj–Rajasthan; Kar.–Karnataka; M.P–Madhya Pradesh; T.S–Telangana; A.P–Andhra Pradesh; NSM–National Solar mission; RUMSL–REWA ultra megasolar park

Storage cost is expected to reduce due to reduction in lithium prices from 200 \$ /kWh to 110 \$/kWh in 2022. Energy solution need to be understood and discussed.

## Cost Competitive Make In India

If Manufacture of solar panel are provided with open market and allowed to procure power at cheaper rate, the cost of solar panel will reduce by ~17%

The cost competitiveness of DCR based solar panel will benefit from such measure and effective tariff can reduce from 3.14 Rs /kWh to 2.62 Rs /kWh

|                             | 2017 |
|-----------------------------|------|
| Solar Tariff DRC based      | 3.14 |
| Cost of Electricity 30%     | 0.94 |
| Industrial Tariff (Rs /kWh) | 9.00 |
| Tariff at competitive rate  | 4.00 |
| Reduction due to power cost | 0.42 |
| Tariff (Rs /kWh)            | 2.62 |

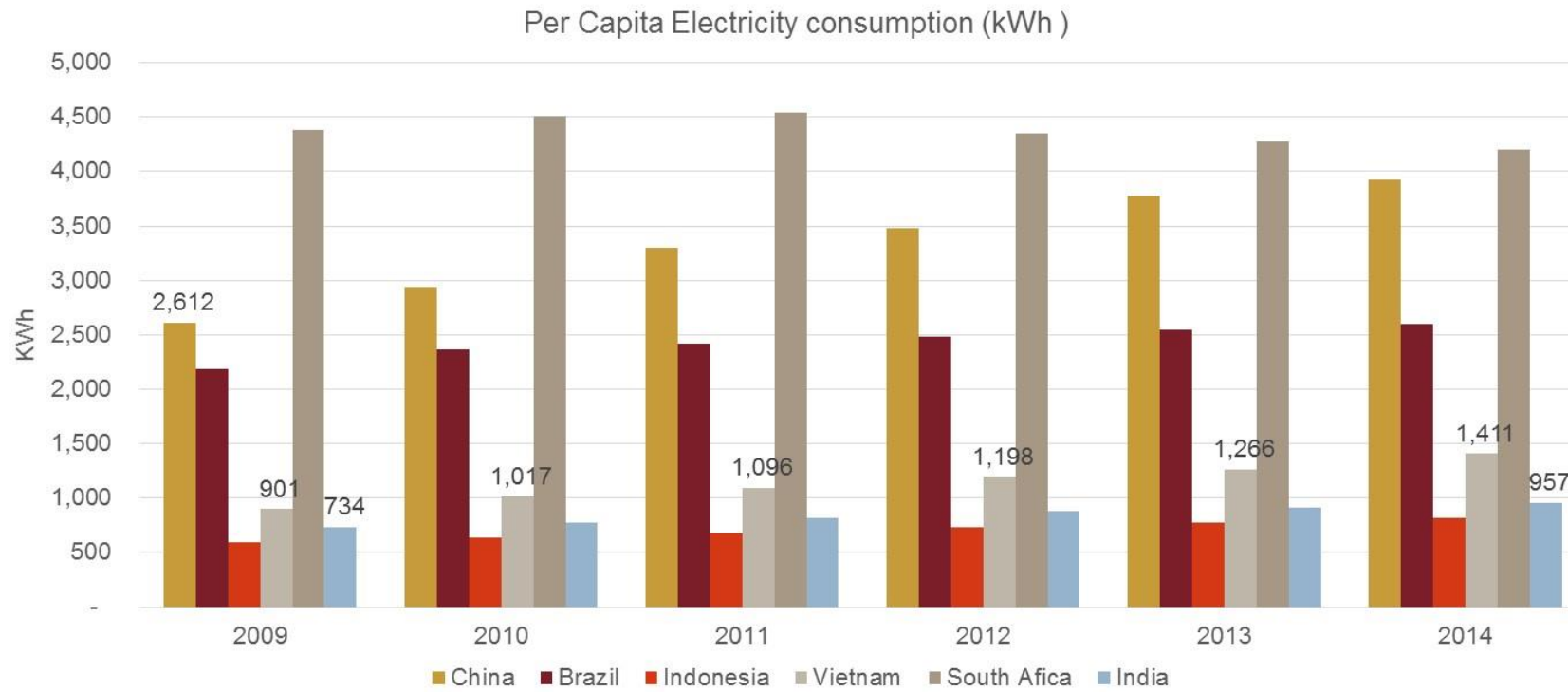
*\*3.14 Rs/kWh was realized in DCR based bid in Sep 2017*

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### Points for Discussion on Proposal

1. There is a mismatch in the Demand projected and proposed supply by the investor. In case total proposal is accepted, we may have to back-down thermal capacities which have financial implication of almost Rs 250,000 Crores.
2. We would also have to evaluate whether we have to bid out this capacity immediately or should be phase-out and at what tariff ceiling?
3. The storage cost proposed also looks to be on the higher side, however a detailed discussion with the investor needs to be undertaken for understanding their assumptions.
4. Identification of such huge land will also needs to be looked at.
5. The proposal requests for \$ denominated tariff with 3% reduction and hedging cost of 5% will lead to increase in net tariff.

## PCC (kWh)



<https://data.worldbank.org/indicator/EG.USE.ELEC.KH.PC>

10

## **2. Revised preliminary review of the proposed solar solution** **Submission Date- 10<sup>th</sup> May 2018**

Based on various deliberations and analysis carried out with Niti Aayog, the revised preliminary report was submitted on 02<sup>nd</sup> May 2018, which was further fine-tuned and presented on 10<sup>th</sup> May 2018 which is indicated below:

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## Preliminary review of proposed energy solution (Solar with battery)

NITI Aayog



1

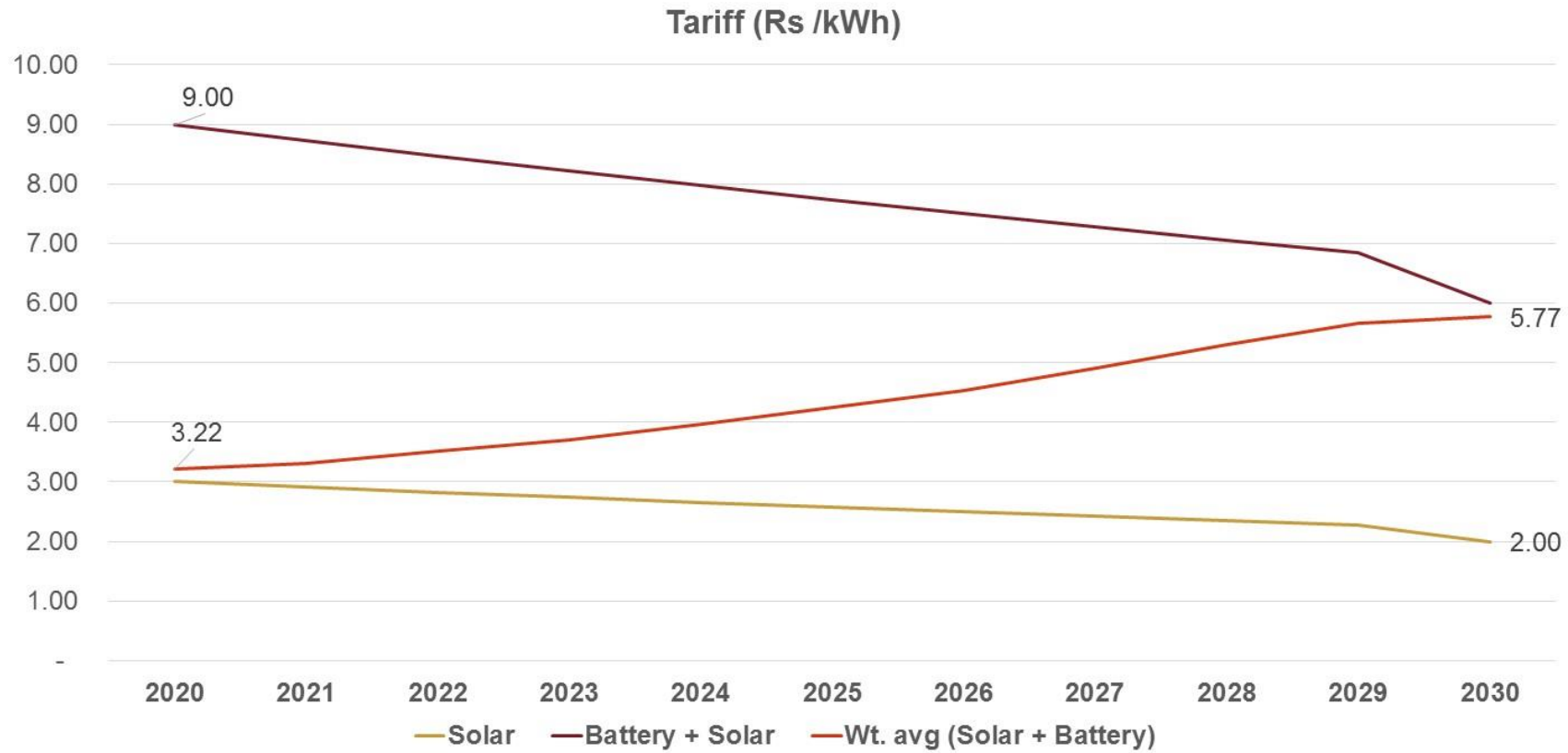
## **Points for Discussion (TOR)**

1. Considering the proposed tariff (Solar + Battery), contingent liability on account of sovereign guarantee in the year 2030 will be INR ~7.4 lac. Crores (Annual).
2. In case of termination, potential liability towards debt in the year 2030 will be almost INR 53 lac. Crores (Solar + Battery projects).
3. There is a mismatch in the Demand projected and proposed supply by the investor. In case total proposal is accepted, we may have to back-down thermal capacities which have financial implication of almost Rs ~81,000 Crores. Therefore, we would have to evaluate, to extent we can accept the model proposed?
4. The entire proposal needs to be integrated with other energy plans, to understand the impact on the overall sector and economy.
5. We would also have to evaluate whether we have to bid out this (Solar + Battery) capacity immediately or should it be phase-out and at what ceiling price?
6. The storage cost proposed also looks to be on the higher side, however a detailed discussion with the investor needs to be undertaken for understanding their assumptions.
7. Identification of such huge land needs to be looked at.

2



## Proposed Tariffs



3

## Proposed Solar Tariffs with INR depreciation by 2.25%

| Solar       | Generation (TWh) | 2020         | 2021          | 2022          | 2023          | 2024          | 2025           | 2026           | 2027           | 2028           | 2029           | 2030           |
|-------------|------------------|--------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Project 1   | 31.5             | 3.00         | 3.07          | 3.14          | 3.21          | 3.28          | 3.35           | 3.43           | 3.51           | 3.58           | 3.67           | 3.75           |
| Project 2   | 46.3             |              | 2.91          | 2.98          | 3.04          | 3.11          | 3.18           | 3.25           | 3.33           | 3.40           | 3.48           | 3.56           |
| Project 3   | 55.6             |              |               | 2.82          | 2.89          | 2.95          | 3.02           | 3.09           | 3.15           | 3.23           | 3.30           | 3.37           |
| Project 4   | 65.0             |              |               |               | 2.74          | 2.80          | 2.86           | 2.93           | 2.99           | 3.06           | 3.13           | 3.20           |
| Project 5   | 80.0             |              |               |               |               | 2.66          | 2.72           | 2.78           | 2.84           | 2.90           | 2.97           | 3.04           |
| Project 6   | 78.4             |              |               |               |               |               | 2.58           | 2.63           | 2.69           | 2.75           | 2.82           | 2.88           |
| Project 7   | 76.8             |              |               |               |               |               |                | 2.50           | 2.56           | 2.61           | 2.67           | 2.73           |
| Project 8   | 56.9             |              |               |               |               |               |                |                | 2.42           | 2.48           | 2.53           | 2.59           |
| Project 9   | 53.7             |              |               |               |               |               |                |                |                | 2.35           | 2.40           | 2.46           |
| Project 10  | 55.2             |              |               |               |               |               |                |                |                |                | 2.28           | 2.33           |
| Project 11  | 88.5             |              |               |               |               |               |                |                |                |                |                | 2.00           |
| <b>Cost</b> | <b>Rs Crores</b> | <b>9,439</b> | <b>23,119</b> | <b>39,341</b> | <b>58,015</b> | <b>80,570</b> | <b>102,580</b> | <b>124,079</b> | <b>140,673</b> | <b>156,471</b> | <b>172,578</b> | <b>194,156</b> |

4

## Proposed Solar + Battery Tariffs with INR depreciation by 2.25%, along with potential contingent liability on account of Govt Guarantee

| Battery   | (TWh)  | 2020          | 2021          | 2022          | 2023          | 2024           | 2025           | 2026           | 2027           | 2028           | 2029           | 2030           |
|---|--------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Project 1   | 1.83   | 9.00          | 9.20          | 9.41          | 9.62          | 9.84           | 10.06          | 10.29          | 10.52          | 10.75          | 11.00          | 11.24          |
| Project 2   | 3.65   |               | 8.73          | 8.93          | 9.13          | 9.33           | 9.54           | 9.76           | 9.98           | 10.20          | 10.43          | 10.67          |
| Project 3   | 10.95  |               |               | 8.47          | 8.66          | 8.85           | 9.05           | 9.26           | 9.46           | 9.68           | 9.90           | 10.12          |
| Project 4   | 18.25  |               |               |               | 8.21          | 8.40           | 8.59           | 8.78           | 8.98           | 9.18           | 9.39           | 9.60           |
| Project 5   | 36.50  |               |               |               |               | 7.97           | 8.15           | 8.33           | 8.52           | 8.71           | 8.91           | 9.11           |
| Project 6   | 54.75  |               |               |               |               |                | 7.73           | 7.90           | 8.08           | 8.26           | 8.45           | 8.64           |
| Project 7   | 73.00  |               |               |               |               |                |                | 7.50           | 7.67           | 7.84           | 8.01           | 8.19           |
| Project 8   | 109.50 |               |               |               |               |                |                |                | 7.27           | 7.44           | 7.60           | 7.77           |
| Project 9   | 146.00 |               |               |               |               |                |                |                |                | 7.05           | 7.21           | 7.37           |
| Project 10  | 186.15 |               |               |               |               |                |                |                |                |                | 6.84           | 7.00           |
| Project 11  | 186.15 |               |               |               |               |                |                |                |                |                |                | 6.00           |
| <b>Liability Battery</b>                                  |        | <b>1,478</b>  | <b>4,379</b>  | <b>12,823</b> | <b>26,603</b> | <b>53,376</b>  | <b>92,659</b>  | <b>143,998</b> | <b>218,902</b> | <b>316,512</b> | <b>438,263</b> | <b>548,645</b> |
| <b>Contingent Liability (Solar + Battery) (Rs Crores)</b> |        | <b>10,917</b> | <b>27,499</b> | <b>52,164</b> | <b>84,618</b> | <b>133,945</b> | <b>195,240</b> | <b>268,077</b> | <b>359,575</b> | <b>472,983</b> | <b>610,841</b> | <b>742,801</b> |

## Key Message

### Key Message

***Suppressed demand can be released with appropriate energy solution***

***Integration with other supply option required***

***Potential of meeting 40% percentage of overall energy mix***

***Proposal in totality can have adverse impact on other options***

***Overall cost of solution can be made competitive specially considering it is a dollar denominating tariffs***

### Analysis

- Potential for Per capita consumption to grow from ~1100 to 2660 kWh in a high growth and unconstrained scenario by providing competitive energy solution
- Supply is considered to increase with current capacity addition plan, decommissioning of older plants (19th EPS), gradual increase in PLF of thermal power plants and RE capacity based on 175 GW target
- Under high growth scenario, the potential market for proposed energy solution (solar plus battery) is expected to increase to ~900 TWh by 2030, against the proposed generation target of ~1200 TWh (647 TWh by Solar and 561 TWh by solar + battery)
- Targets under the proposal can potentially have economic & financial impact of INR~81,500 Crores because of displacement of thermal capacities of 274 TWh for which fixed cost will have to be born as well as variable cost difference
- Dollar based tariff offered for Solar 0.04 \$/kWh (3.00 Rs/kWh) looks to be comfortable considering manufacturing in India. However, overall energy solution (Solar + Battery) tariff (with hedging cost) can see more decline specially since it is a \$ denominated tariff

## Key Message

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***IPPs preference for imports of panel because of cost competitiveness***

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***Analysis of proposed solution and phasing is required***

***Land banks need to be evaluated***

### Analysis

- Impact on other new IPPs backed by international investors and IPOs need to be factored in since they may not have manufacturing base in India
- Further to make domestic manufacturing competitive, the government may allow power procurement at through open market. Potential of tariffs from DCR based solar plants to reduce by 17%
- Sovereign guarantee unlikely considering similar demands. However other options for mitigating payment risks like centralized procurement, escrow of DISCOMs areas, allowing them to sell in open market etc. need to be explored
- Solar + Battery solution need to be phased out and understood considering the demand pattern, supply hours along with the cost competitiveness of the proposed solution vis-à-vis other options like gas, hydro for meeting peak.
- Land Requirement (25,200 Sq km) for such huge capacity will require Central Government intervention

### 3. MoM for meeting between Niti Aayog, CRIS and SBG

Submission Date- 30<sup>th</sup> May 2018

A meeting was held on 30<sup>th</sup> May 2018, for resolution of the key issues between Niti Aayog, SBG and CRIS, details of which have been indicated below -

#### Meeting with Niti Aayog, CRIS & SBG

|                        |  |
|------------------------|--|
| <b>Agenda</b>          | Resolving issues pertaining to clauses in SBG proposal |
| <b>Time &amp; Date</b> | 3 pm; 30th May 2018                                    |
| <b>Place</b>           | Niti Aayog   |

| Participants – Niti Ayog, CRIS, SBG  |  |   |
|--|--|---|
| Niti Ayog  | Consultant Team (CRIS)   | Softbank Energy   |
| 1. Mr. R.P.Gupta , AS (Energy)<br>2. Mr. Surinder Sur<br>3. Mr. Aman Hans<br>4. Mr. Manoj Upadhyay | 1. Mr. Vivek Sharma , Sr. Director<br>2. Mr. Sparsh Manchanda, Lead Consultant | 1. Mr. Manoj Kohli, Executive Chairman<br>2. Mr. Chockalingam |

#### Points of Discussion

| S.No.                     | Issue   | Remarks/ View/ Modifications   |
|---------------------------|---|--|
| <b>PENDING ISSUES</b>     |   |  |
| 1.                        | Manufacturing component - Commitment for guaranteed procurement from manufacturing facility.<br>PPA assurance for 12 years with each PPA for 25 years | Niti Ayog – Commitment for procurement of panels would lead to violation of CCI/ WTO guidelines  |
| 2.                        | Make in India with guaranteed offtake – Loaded at the PPA end (with commitments for offtake)  | Niti Ayog - Costs should be loaded at the manufacturing end through subsidies. This will prevent costs being loaded in the PPA and hence lead to lower tariffs for consumers.<br><br>SBG – Schemes such as M-Sips which provide incentives to manufacturing have failed to pickup and hence there should be commitment for PPA |
| <b>ISSUES agreed upon</b> |   |  |
| 3.                        | Procurement of energy for manufacturing facility – Banking provisions   | Banking of energy would be permitted for first 2 years and no banking allowed post that  |



# Infrastructure Advisory

| S.No. | Issue   | Remarks/ View/ Modifications               |
|-------|---|--|
| 4.    | Procurement of energy for manufacturing facility – Wheeling of energy   | Wheeling charges to be minimized           |
| 5.    | Corporate tax rate should be reduced to 25% irrespective of turnover  | Agreed                                     |
| 6.    | Forex Indexation - Tariff indexed to currency of debt (USD, EUR, JPY or GBP)  | Agreed                                     |
| 7.    | Forex Indexation - Discom's liability capped upfront (3% Y-o-Y - weighted average depreciation of INR Vs USD/Euro/Yen/GBP in past 25 years) | 3% upside and downside sharing for Discoms |

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#### 4. PPT submitted to Niti Aayog based on the meeting Submission Date- 30<sup>th</sup> May 2018

Based on meeting above (Niti Aayog, SBG and CRIS), the following presentation was prepared and submitted to Niti Aayog–



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# Discussions and developments on Solar Proposal

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NITI Aayog

## Meeting 30/05/2018

| S.No.                 | Issue  | Remarks/ View/ Modifications   |
|-----------------------|--|--|
| <b>PENDING ISSUES</b> |  |  |
| 1.                    | <p><b>Manufacturing component</b><br/>After 2025, the domestic manufacturing capacities which have been set up will get guaranteed offtake of those panels</p> | <p><b>Niti Ayog –</b><br/>1. This will restrict the bidding and may not lead to advantages of open bidding<br/>2. Commitment for procurement of panels would lead to violation of CCI/ WTO guidelines</p> <p><b>SBG – Requirement of assured offtake</b></p>   |
| 2.                    | <p><b>Make in India</b><br/>Subsidy vs PPA assurance</p>   | <p><b>Niti Ayog –</b><br/>1. Prefer to give production subsidies for 5 years (no capital subsidy)<br/>2. Relief in electricity tariff for solar manufacturing<br/>3. Loading of costs at PPA end would make energy costly &amp; reduce competitiveness of economy.</p> <p><b>SBG – Schemes such as M-Sips which provide incentives to manufacturing have failed to pickup and hence there should be commitment for PPA</b></p> |

## Meeting 30/05/2018

| S.No. | Issue   | Remarks/ View/ Modifications   |
|-------|---|--|
|       | <b>ISSUES agreed upon</b>   |  |
| 3.    | <b>Procurement of energy for manufacturing facility</b><br>Banking provisions   | <ol style="list-style-type: none"> <li>1. Banking for night time (day night banking of energy) for a period of 2 years</li> <li>2. No banking permitted post 2 years, however electricity can be procured from open market/ own plant</li> </ol> |
| 4.    | <b>Procurement of energy for manufacturing facility</b><br>Wheeling of energy   | Wheeling charges to be minimized   |
| 5.    | <b>Corporate tax rate</b><br>Should be reduced to 25% irrespective of turnover  | Agreed. However to be discussed & decided with department of revenue.  |
| 6.    | <b>Forex Indexation</b> - Tariff indexed to currency of debt (USD, EUR, JPY, 2GBP)  | <ol style="list-style-type: none"> <li>1. Bidder will upfront declare currency of indexation</li> <li>2. Discount factor for normalization</li> </ol> Further consultation with RBI  |
| 7.    | <b>Forex Indexation</b><br>Discom's liability capped upfront (3% Y-o-Y - weighted average depreciation of INR vs USD/Euro/Yen/GBP in past 25 years) | 3% appreciation and depreciation both on account of discoms  |
| 8.    | <b>Termination</b>  | <ol style="list-style-type: none"> <li>1. Post termination ownership of Govt. so that portion of amount can be recovered</li> <li>2. Notional linear depreciation/ amortization for 20 years (as per debt tenor)</li> </ol>                      |

## Other issues

| S.No. | Issue  |
|-------|--|
| 1.    | <p><b>Payment Security Mechanism</b></p> <ol style="list-style-type: none"> <li>1. Letter of Credit</li> <li>2. Payment Security Fund</li> <li>3. Tripartite Agreement – State Govt. fund</li> </ol> <p>The letter of credit offered is a revolving letter of credit for 1 month’s average billing. This should be increased to cover at least 12 months’ average billing</p>  |
| 2.    | <p><b>Procurer’s Liability</b></p> <p>Presently, it appears under the PPA that for all items / aspects which can be covered by insurance, Procurer will not be liable for any damages for the same, Therefore, the SPD will have to obtain all insurances / require the contractors to obtain comprehensive insurances.</p> <p>It should be clarified that Procurer’s exclusion of liability for a breach by Procurer will be limited to risks that are typically insured by the project and to the extent the SPD has received the insurance proceeds for such an event</p> |
| 3.    | <p>Post PPA period - ownership of Government</p>   |

## 5. Note for discussion with MoF Submission Date- 03<sup>rd</sup> June 2018

For the meeting between Niti Aayog and MoF – CRIS assisted Niti Aayog in preparation of a background note which would brief MoF about the key aspects of the proposal as well as enable discussion between both Niti Aayog and MoF. The note is presented below:

### Background

Softbank Energy had submitted a “Proposal” for setting up solar projects in India along with Energy storage solutions through Domestic manufacturing.

### Proposal & amendments

The initial proposal was made during the meeting between Hon’ble PM of India and SBG chairman. The proposal spans over a period of 12 years from 2018-30 with the following key highlights –

- **Level of Investment** – SBG has proposed to invest heavily in India in the solar and Energy storage solutions domain.
- **Energy Landscape** – As per the initial proposal the investment was expected to completely change the energy landscape in India - from current 70% coal installations to 70% renewable installations by 2030. The cumulative capacity envisaged to be installed as per the original proposal was **910 GW** of solar and **2265 GWh** of Energy Storage Solutions (ESS) up to 2030.
- **Make in India:** The proposal originally proposed Indian manufacturing capacity setup to reach **40% of the world solar manufacturing capacity** and **70% of the world ESS manufacturing capacity** by 2030. This will provide an uplift to the Indian industrial sector (which hasn’t picked up), enhance job creation in the industrial sector and contribute to the economic development of the country.

The proposal also provides for improving economics for the end consumers with a gradually declining tariff trajectory for new installations of solar with ESS. SBG expects a long term consistent PPA for the period of 12 years, guarantee from the GOI and international standard PPA.

To carve the various aspects of the proposal, SBG interacted with the Niti Aayog and various line ministries for alignment. The areas of alignment taken up by the individual line ministries are as indicated –

**Figure 8: Ministry and areas of alignment**

| Ministry of Power   | Ministry of New & Renewable Energy   | Ministry of Commerce  | Ministry of Finance   |
|---|--|---|---|
| <ul style="list-style-type: none"> <li>• Demand projections up to 2030</li> <li>• Coal capacity and availability factor</li> <li>• Generation profiles for hydro, gas, nuclear, and wind</li> </ul> | <ul style="list-style-type: none"> <li>• Wind capacity in 2030</li> <li>• Locations for solar installation</li> <li>• Power Purchase Agreement (PPA) changes</li> <li>• Forex (FX) indexation</li> <li>• Guarantees</li> </ul> | <ul style="list-style-type: none"> <li>• Make in India for batteries &amp; modules</li> </ul> | <ul style="list-style-type: none"> <li>• Guarantees</li> <li>• Forex (FX) indexation</li> </ul> |

Based on the number of rounds of discussion, the revised trajectory in-principally agreed is 370 GW for solar as against originally proposed 910 GW for solar. **Supply from Energy storage/batteries need to be farmed up with solar trajectory till 2030.** Besides, the proposal provides for two different tariffs in the PPA (separate for solar and solar with ESS) with a higher tariff during night time. **This need be revised and aligned in a single PPA for both solar and ESS with clear supply and tariff commitments.**

## Positives

Overall this proposal pushes two GOI objectives:

- It provides **24x7 power through clean energy option** (solar along with storage that helps to balance and meet peak) and therefore will help in meeting electricity requirement
- **“Make in India” to generate employment and economic growth.**

Besides, it provides opportunity to become a leader and hub for battery manufacturing in India. It will also push other objectives of promoting Electric Vehicles (EVs) through localized competitive battery manufacturing in India.

## Challenges

While most of the points were discussed there are a few open issues and challenges-

| AREAS                         | Analysis   |
|-------------------------------|--|
| <i>FOREX impact</i>           | <ul style="list-style-type: none"> <li>▪ Historical average depreciation of INR vis-à-vis Dollar, Euro and Yen is 2.43%, 2.66% and 3.27%</li> <li>▪ Yen being most volatile and has less liquidity &amp; instruments like derivatives</li> <li>▪ A 3% YoY currency depreciation will result in ~70 paise increase in levelised tariff but potential reduction in cost of debt, economies of scale and CUF likely to offset this impact (tariff lower than Rs. 2.2/unit)</li> </ul> |
| <i>Layers of PSM</i>          | <ul style="list-style-type: none"> <li>▪ Contracting authority may be SECI and not NTPC</li> <li>▪ Revolving 1 month LC is a standard practice that could be continued against the demand of 12 months LC</li> <li>▪ Creation of Payment Security Trust by SECI not enough to back payments. SECI need to work with State DISCOM/Government</li> <li>▪ RBI Tripartite agreement</li> </ul>   |
| <i>Liabilities and others</i> | <ul style="list-style-type: none"> <li>▪ On account of termination: Rs.~4.9 lac cr (90% debt due) and Rs.~2.2 lac cr (150% adjusted equity) in FY'23 and Rs.~12.5 lac cr (90% debt due) and Rs.~5.8 lac cr (adjusted equity) in FY'30 (excluding insurance)</li> <li>▪ Indirectly on account of PSM- Rs ~1 lac Cr in 2023 and Rs. ~11.9 lac cr in 2030</li> </ul>  |
| <i>Phasing of contracting</i> | <ul style="list-style-type: none"> <li>▪ In place of contracting for 12 years, contracting could be done in 4 phases of 3 years each along with announcement of a firm pipeline for the 12 years.</li> <li>▪ Consortium to be allowed with manufacturing commitment though for the project panel could be sourced from anywhere</li> </ul>   |

## 6. Presentation covering key aspects and analysis of the proposal

**Submission Date- 05<sup>th</sup> June 2018**

Post several meetings and discussions with Niti Aayog & other relevant stakeholders the following presentation was submitted to Niti Aayog—

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## Proposed energy solution (Solar with battery)

NITI Aayog





## Theme of the proposal

---

Augurs well with the Government of India objectives

Meeting COP21 commitments

Make in India

24x7 power

Clean energy  
- solar

Energy  
storage  
solutions

Global  
competitor in  
solar and  
energy storage

Generate  
employment

Boost to  
economic  
growth

**Potential first mover advantage for India in the Energy Storage Solutions –  
benefitting both power sector and mobility (Electric Vehicles)**

## Key considerations – sector issues

| AREAS  | View   |
|--|--|
| <b><i>Tariff structure</i></b>                                   | <ul style="list-style-type: none"> <li>• <b>Proposal</b> - provides for two different tariffs in the PPA (separate for solar and solar with ESS) with a higher tariff during peak/night time</li> <li>• <b>View</b> - A single PPA for supply on RTC basis (both solar and ESS) at a single integrated tariff commitments (along with efficient utilization of transmission corridor) may be considered</li> </ul>   |
| <b><i>Advance PPA/ contracting of domestic manufacturing</i></b> | <ul style="list-style-type: none"> <li>▪ <b>Proposal</b> - Proposal expects an advance PPA/ contracting for the period of 12 years for assured offtake of equipment produced through manufacturing setup</li> <li>▪ <b>View</b> – Commitment could be in the form of revised RPO trajectory (upto 2030) and amendment of the Electricity Act 2003 - since guaranteed offtake restricts potential competition, technology advancement and impact of likely disruptions in future.</li> </ul>  |
| <b><i>Firming up of ESS capacity</i></b>                         | <ul style="list-style-type: none"> <li>▪ The solar trajectory has been revised and is 370 GW* (by 2030), ESS capacity is to be firmed up. Further as per discussions it is proposed that Solar with ESS cost would be lower than variable cost of non pithead plants.</li> <li>▪ <b>View</b> – Quantum of the ESS capacity to be installed needs to be firmed up in alignment with MoP and MNRE. It is critical to define battery storage as must run or not and tariff competitiveness for solar with ESS (post 2022).</li> </ul> |

\* Trajectory as provided by MoP and MNRE

## Findings - financial impact & contracting structure

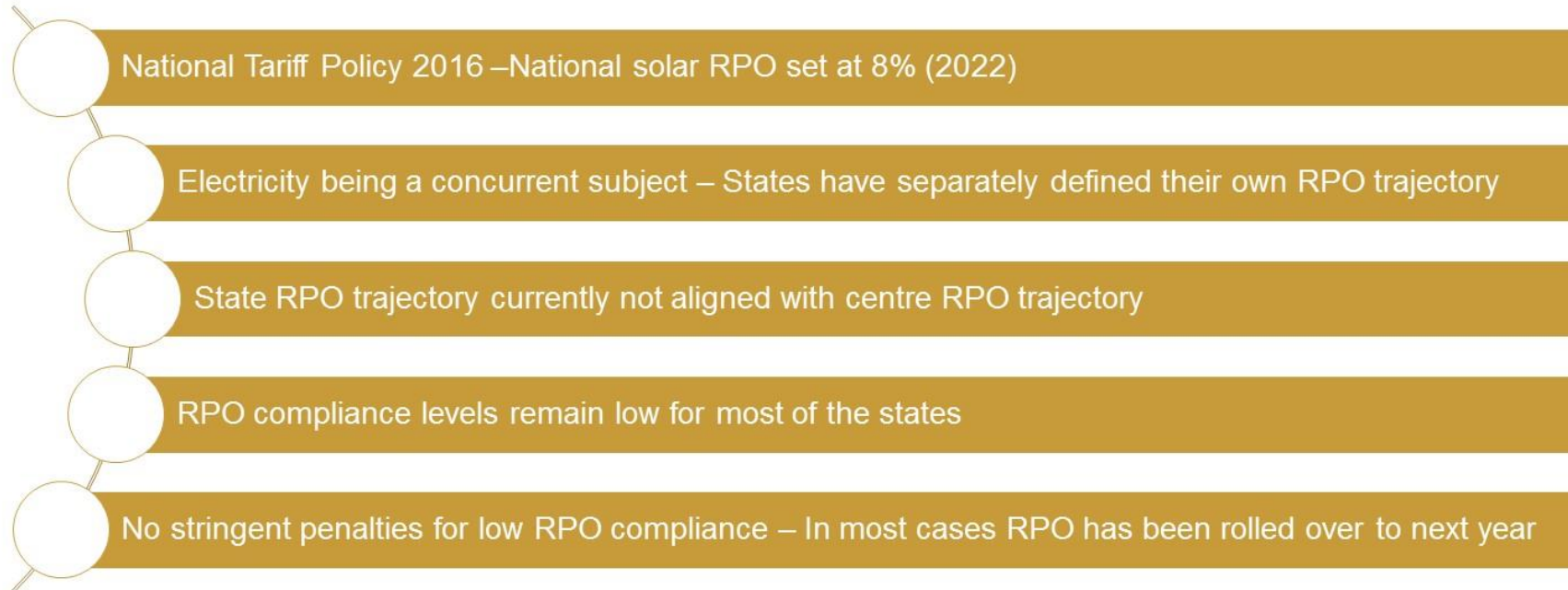
| AREAS                         | Analysis  |
|-------------------------------|---|
| <b>FOREX impact</b>           | <ul style="list-style-type: none"> <li>▪ Historical average depreciation of INR vis-à-vis Dollar, Euro and Yen is 2.43%, 2.66% and 3.27%</li> <li>▪ Yen being most volatile and has less liquidity &amp; instruments like derivatives</li> <li>▪ A 3% YoY currency depreciation will result in ~70 paisa increase in levellised tariff, however this increase is likely expected to be offset by potential reduction in cost of debt, economies of scale and higher CUF</li> </ul>                                      |
| <b>Layers of PSM</b>          | <ul style="list-style-type: none"> <li>▪ Contracting authority may be SECI and not NTPC</li> <li>▪ Revolving 1 month LC is a standard practice that could be continued against the demand of 12 months LC</li> <li>▪ Capacity of SECI to operationalize Payment security trust needs to be relooked - SECI to take this up with State DISCOMs for commitments and assurances</li> <li>▪ Tripartite agreement with Gol, RBI &amp; state Govt. could be challenge considering FRBM situation of certain states</li> </ul> |
| <b>Liabilities and others</b> | <ul style="list-style-type: none"> <li>▪ On account of termination: Rs.~4.9 lac cr* (90% debt due**) and Rs.~2.2 lac cr (150% adjusted equity) in FY'23 and Rs.~12.5 lac cr (90% debt due) and Rs.~5.8 lac cr (adjusted equity) in FY'30 (excluding insurance)</li> <li>▪ Indirectly on account of PSM- Rs ~1.3 lac Cr in 2023 and Rs. ~14.7 lac cr in 2030</li> </ul>  |
| <b>Phasing of contracting</b> | <ul style="list-style-type: none"> <li>▪ In place of contracting for 12 years, contracting could be done in 4 phases of 3 years each along with announcement of a firm pipeline for the 12 years.</li> <li>▪ Consortiums to be allowed for manufacturing; though during the initial phase imports could be allowed partially</li> </ul>   |

\*Assuming trajectory of 370 GW solar as provided by MoP and MNRE (without validation); ESS picking up post 2021 (final trajectory still to be defined); CUF – 24.41%, Capex and tariff levels as per the Proposal (without validation)

\*\* Notional repayment of debt due could be considered in case of termination of concession agreement

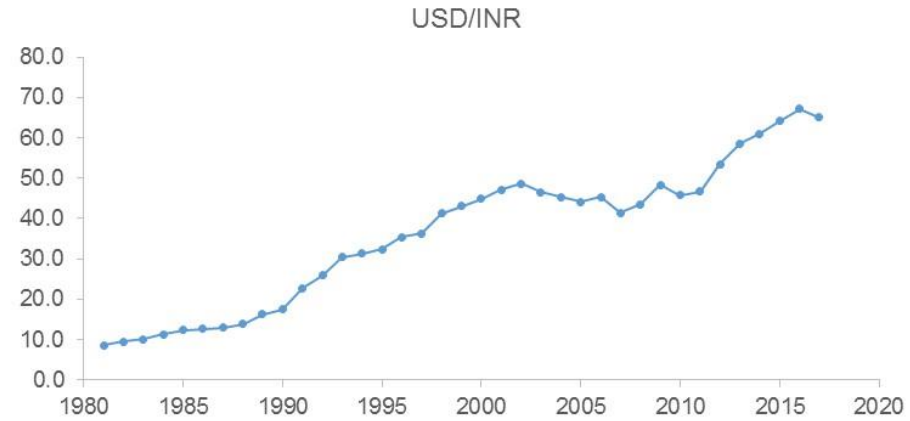
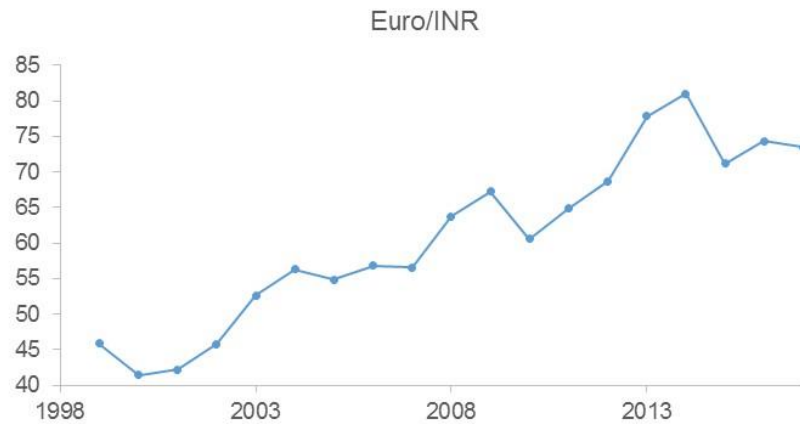
4

## Proposed RPO Mechanism



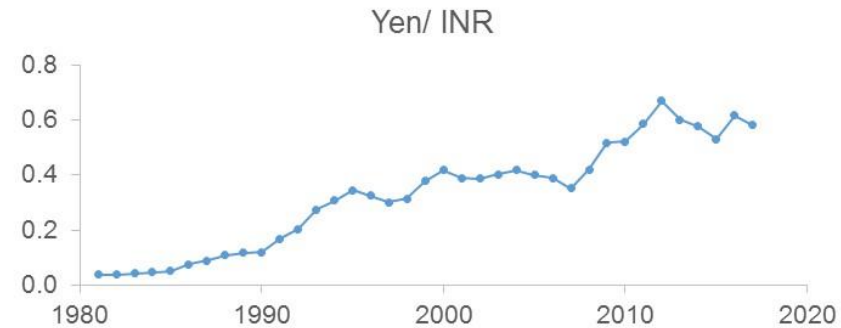
**RPO trajectory to be defined till 2030 along with alignment of states & formulating a stringent penalty mechanism**

## Annexure - Forex Indexation



CAGR –

- **EURO** - 2.66% over the past 18 years (1999-2017)
- **USD** - 2.43% over the past 19 years (1998-2017)
- **Yen** - 3.27% over the past 19 years (1998-2017)



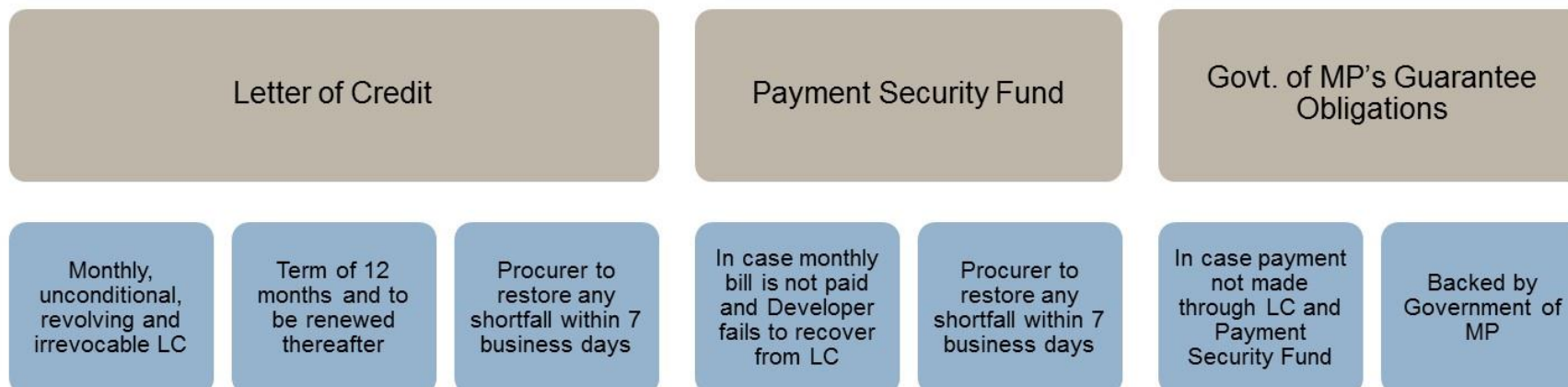
**Yen has depreciated faster than the other currencies and has highest volatility**

8



## Annexure - Payment Security

### Rewa Ultra Mega Solar - Payment Security Mechanism



Payment Security Mechanism (As per the proposal)–

- **LC** – Additional LC cost would effectively convert to Rs. ~5-6 crore/ GW/ year for every percentage point cost of letter of credit
- **Payment Security Fund** - SECI has a INR 500 crore payment security fund to protect its bidders, the practice is not being followed by NTPC
- **Tripartite Agreement**

**Payment Security very similar to RUMS, 1 month coverage is standard for the successful solar bids**

9

**Proposal with potential contingent liability but insurances need to cover the most..**

| Solar & Battery      | 2021     | 2022     | 2023     | 2024     | 2025     | 2026     | 2027     | 2028      | 2029      | 2030      |
|----------------------|----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| <b>90 % debt due</b> |          |          |          |          |          |          |          |           |           |           |
| Solar (Rs Crores)    | 2,18,965 | 3,14,847 | 4,04,337 | 4,85,447 | 5,58,333 | 6,22,943 | 6,79,185 | 7,28,415  | 7,69,570  | 8,04,008  |
| Battery (Rs Crores)  | -        | 32,383   | 84,570   | 1,32,612 | 1,76,195 | 2,32,820 | 2,87,626 | 3,40,133  | 3,91,580  | 4,41,907  |
| Total (Rs Crores)    | 2,18,965 | 3,47,231 | 4,88,907 | 6,18,059 | 7,34,529 | 8,55,764 | 9,66,811 | 10,68,548 | 11,61,150 | 12,45,915 |

*Solar trajectory – 370 GW (as per MOP/MNRE) assumed in a phased manner (till FY 30) (not validated)*

*Battery trajectory – 393 GWh assumed till FY 30 with installations post 2021 (trajectory yet to be finalized)*



## Annual payment liability of State

| Solar & Battery                                 | 2020   | 2021   | 2022     | 2023     | 2024     | 2025     | 2026     | 2027     | 2028      | 2029      | 2030      |
|---|--------|--------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|
| Solar (Rs Crores) @ 24.41 % CUF as per proposal | 21,578 | 63,923 | 1,23,793 | 1,98,566 | 2,87,711 | 3,90,725 | 5,05,919 | 6,32,887 | 7,71,249  | 9,20,644  | 10,67,360 |
| Battery (Rs Crores)                             | -      | -      | 5,198    | 19,565   | 42,759   | 74,456   | 1,16,897 | 1,69,694 | 2,32,479  | 3,04,904  | 3,98,795  |
| Total (Rs. Crore)                               | 21,578 | 63,923 | 1,28,992 | 2,18,131 | 3,30,470 | 4,65,181 | 6,22,816 | 8,02,581 | 10,03,728 | 12,25,548 | 14,66,156 |

*Solar trajectory – 370 GW (as per MOP/MNRE) assumed in a phased manner (till FY 30) (not validated)*

*Battery trajectory – 393 GWh assumed till FY 30 with installations post 2021 (trajectory yet to be finalized)*

*CUF – 24.41% as per the proposal (not validated)*

*Tariff trajectory – Rs. 3/unit to Rs. 2/unit from 2020 to 2030 as per the proposal (not validated)*

**7. Questions/ discussion points for meeting with Ministry of Power (MoP)****Submission Date- 05<sup>th</sup> June 2018**

A meeting between MoP and Niti Aayog was confirmed for 06<sup>th</sup> June 2018. The key discussion points prepared by CRIS to facilitate the meeting are as below -

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**Key Questions**

1. Demand side (values and assumptions)
2. Supply side
  - a. Yearly trajectory –
    - i. Solar (upto 2030)
    - ii. ESS (upto 2030)
  - b. Decommissioning of thermal power plants
  - c. CUF/PLF levels
3. Shortage of power, if any
4. Curtailment levels considered
5. Expected tariffs (solar +ESS, thermal , gas, hydro)
6. Tariff viability of solar +ESS vs pithead/ non pithead coal/ gas power plants – in the coming years
7. Maximum yearly trajectory (based on technical constraints, commercial constraints etc.)
8. Variations in thermal PLF
9. Transmission constraints if any (due to injection of RE)
10. Type of contracting expected for battery (Design energy/ capacity terms)

---

**8. Revised Presentation based on meeting with MoP****Submission Date- 08<sup>th</sup> June 2018**

Based on discussions with MoP (06/06/2018) and other stakeholders, a revised presentation was submitted to Niti Aayog, which has been attached below–

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# Solar Energy (Including Storage Solution)- Roadmap for Promoting “Make in India”

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NITI AAYOG



## KEY ENERGY RELATED ISSUES – INDIA IS FACING

---

**Power situation has improved in the past, though deficit still continues -**

- Peak Demand deficit – 2.0%\* (2018)
- Energy supply deficit – 0.7%\* (2018)
- Per Capita Consumption (PCC) of India – 1122 Kwh (2017)\* [~a fourth of China's PCC]

**Environmental issues continue**

- **Pollution** – 14 Indian cities\*\* among the world's 20 most polluted
- **Energy mix** - Thermal constitutes ~64%\* of the total capacity

**Inflated Import Bills**

- **Forex outflow due to Crude oil imports** – Estimated by MoPNG at \$85 billion (2018)

\*Source – CEA

\*\* Source- World Health Organization (WHO)

## CLEAN & RENEWABLE ENERGY SOLUTION

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### ROADMAP\*

- **Project Development**
  - **Solar Capacity** - ~370 GW (2030)\*\*
  - **Energy Storage Solution (“ESS”)** – Estimated installation trajectory based on detailed demand supply position\*\*\*
- **Promotion of Domestic Manufacturing**

\* Post detailed deliberation between NITI, MOP and MNRE

\*\* Formal communication from MOP awaited

\*\*\* To be finalized by MOP & MNRE

## BENEFITS

---

Aligned with GoI Long-term Objectives

Meeting COP21  
commitments

Make in India

Power For All (24X7)

Clean  
energy -  
solar

Energy  
storage  
solutions

Global  
competitor in  
solar and  
energy storage

Generate  
employment

Connecting  
all  
households

Boost to  
economic  
growth

**Manufacturing Energy Storage Solutions (“ESS”) and Solar in India - Potential first mover advantage (ESS); benefits both power sector and reduction in oil imports through Electric Vehicles**

## NITIs PROPOSAL

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### Incremental Solar + ESS Capacity Addition till 2030

- **Solar Capacity** – 34 GW addition yearly \*
- Out of 370 GW, 100 GW (as part of 175 GW target) till 2022
- **Storage Requirement** – Storage could be required post 2022\*\*

### Framework for Channelizing Foreign Investment in ESS & Solar

- Risks and their mitigation

*\*370 GW trajectory provided by MoP and MNRE (formal communication awaited)*

*\*\* To be finalized by MOP and MNRE*



## KEY CHALLENGES TO BE ADDRESSED

---

### **Capacity Addition Pipeline:**

- Firming up of Solar and ESS trajectory

### **Foreign Investment:**

- Bid and Tariff Structure
- Manufacturers Offtake Risk
- Forex Indexed tariffs
- Payment Security
- Termination Liabilities

## FIRMING UP OF TRAJECTORY

---

### Key challenges:

- Detailed generation profiles of supply sources need to be assessed (MoP/MNRE/CEA)
- Impact on utilization of transmission network
- Impact on other Generation assets
- Merit order dispatch for storage solutions (Must run or not?)

### NITI View:

- Year wise trajectory of solar, solar + ESS needs to be firmed up by MOP and MNRE

## TARIFF STRUCTURE

---

### Key challenges:

- Single PPA with separate tariffs for day and night - Not sure if it has happened anywhere in the world
- PPA management monitoring issue
- May create lot of uncertainties
- Bidding parameters for Solar + ESS needs to be structured
- Grid integration costs to be studied

### NITI View:

- A single PPA for supply on RTC (round the clock) basis (both solar and ESS) could be considered if energy cost (solar+ESS) becomes cheaper than greenfield pithead plant cost

## ADVANCE PPA FOR MANUFACTURING

---

### Key challenges:

- Bidding in advance/ tying up manufacturing with bidding restricts potential competition (WTO/CCI)
- Technology disruption risk passed to the Govt.

### NITI View:

- Commitment could be in the form of revised RPO trajectory – In Electricity Act 2003 - Suggested by MoF
- Proposal of 12 years bidding in one go needs further examination
- Alternatively we can consider 4 bids for 3 years each

## FOREX INDEXED TARIFFS

Effective returns for foreign investors post hedging costs and taxes haven't been attractive.

**Historical depreciation in INR (as compared to key currencies)–**

| Currency | Historical CAGR (20 years) | Volatility |
|----------|----------------------------|------------|
| USD      | 2.66%                      | Low        |
| EURO     | 2.43%                      | Medium     |
| JPY      | 3.27%                      | High       |

### **NITI View:**

Forex indexed to USD, EURO, JPY could be considered if below advantages outweigh the risks of currency depreciation –

- Upfront capping of contingent liabilities on account of depreciation
- Attracting cheaper sources of foreign funding
- Tariff during bidding are low enough to compensate for INR depreciation



## PAYMENT SECURITY

---

### Key challenges:

- NTPC – issues pertaining to minority shareholders
- Capacity of SECI to operationalize Payment security trust needs to be relooked
- Indirect liabilities on account of PSM\*- Rs ~1.3 lac Cr in 2023 and Rs. ~14.7 lac cr in 2030

### NITI View:

- 1 month LC is a standard practice and could be continued
- Back to back LC with Discoms would be required
- SECI payment security trust - Back to back escrow account
- As per MNRE tripartite agreement is being done



*\*Assuming trajectory of 370 GW new solar as provided by MoP and MNRE (without validation); ESS picking up post 2021 (final trajectory still to be defined); CUF – 24.41%, Capex and tariff levels as per NITIs assumptions (without validation)*

11

## TERMINATION LIABILITIES (1/2)

### Liabilities:

- Termination payment of
  - 90% to 100% Debt Due
  - 0 to 150% adjusted Equity

### Key challenges:

- High liabilities on account of termination:
  - FY 2023 - Liability can be Rs.~4.9 lac cr\* (90% debt due\*\*) and Rs.~2.2 lac cr (150% adjusted equity)
  - FY 2030 - Rs.~12.5 lac cr \* (90% debt due) and Rs.~5.8 lac cr (adjusted equity) (excluding insurance)

*Solar trajectory – 370 GW (as per MOP/MNRE) assumed in a phased manner (till FY30) (not validated)*  
*Battery trajectory – 393 GWh assumed till FY 30 with installations post 2021 as per NITIs assumptions (trajectory yet to be finalized)*  
*CUF – 24.41% as per NITIs assumption (not validated)*  
*Tariff trajectory – Rs. 3/unit to Rs. 2/unit from 2020 to 2030 as per NITIs assumption (not validated)*

12



## TERMINATION LIABILITIES (2/2)

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### Mitigating Factors:

- Debt Insurance
- Proceeds from sale of assets

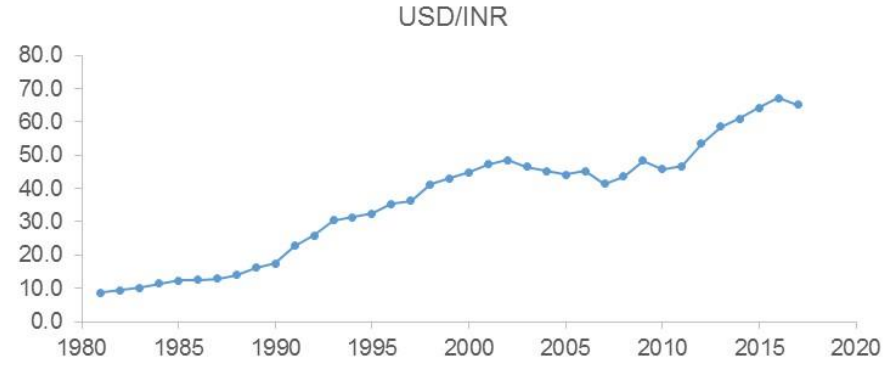
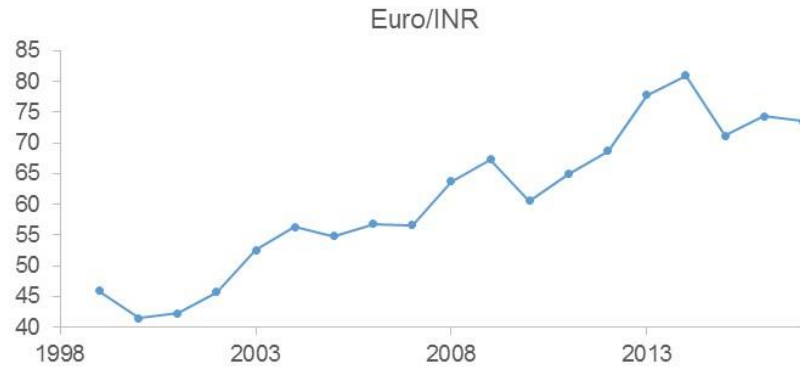
### NITI View:

- MoF needs to take a view on the termination liability issues
- Pre specified notional repayment of debt (Net of Insurance) should be considered for termination payment

*Solar trajectory – 370 GW (as per MOP/MNRE) assumed in a phased manner (till FY30) (not validated)*  
*Battery trajectory – 393 GWh assumed till FY 30 with installations post 2021 as per NITIs assumptions (trajectory yet to be finalized)*  
*CUF – 24.41% as per NITIs assumption (not validated)*  
*Tariff trajectory – Rs. 3/unit to Rs. 2/unit from 2020 to 2030 as per NITIs assumption (not validated)*

13

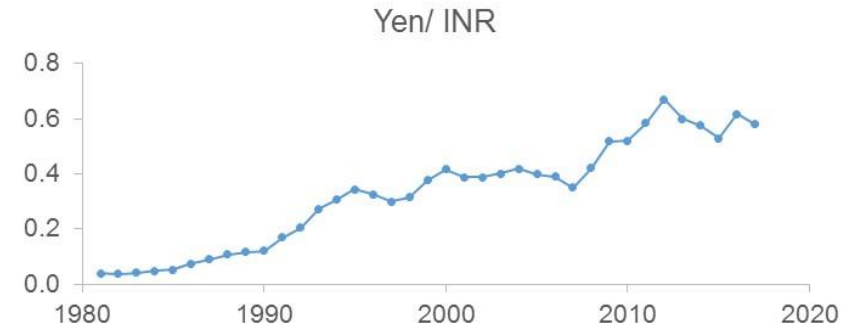
## Forex Indexation



CAGR –

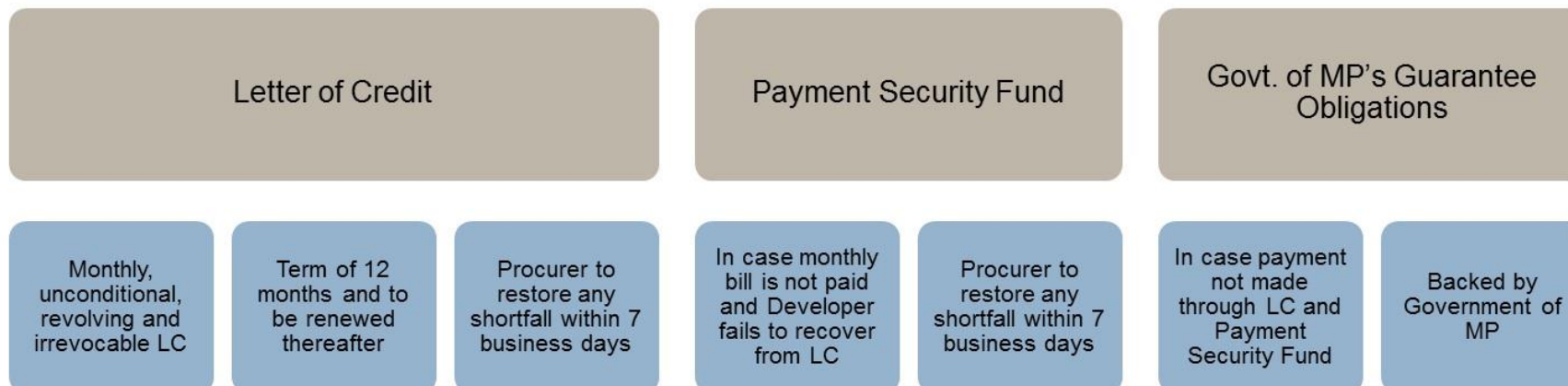
- **EURO** - 2.66% over the past 18 years (1999-2017)
- **USD** - 2.43% over the past 19 years (1998-2017)
- **Yen** - 3.27% over the past 19 years (1998-2017)

**PROPOSAL – Cap of 3% on USD, Euro & 3.5% on Yen**



## Payment Security

### Rewa Ultra Mega Solar - Payment Security Mechanism



#### Payment Security Mechanism (As per the proposal)–

- **LC** – Additional LC cost would effectively convert to Rs. ~5-6 crore/ GW/ year for every percentage point cost of letter of credit
- **Payment Security Fund** - SECI has a INR 500 crore payment security fund to protect its bidders, the practice is not being followed by NTPC
- **PROPOSAL** - 12 months LC



**Payment Security very similar to RUMS, 1 month coverage is standard for the successful solar bids**

16

**9. Revised Presentation (based on meeting & changes suggested)  
Submission Date- 18<sup>th</sup> June 2018**

Based on discussions with MoP (on 15<sup>th</sup> June 2018) and other stakeholders revised presentation was submitted to Niti Aayog, which has been attached below–

---

## Proposed energy solution (Solar with battery)

NITI Aayog



## Theme of the proposal

---

Augurs well with the Government of India objectives

Meeting COP21 commitments

Make in India

24x7 power

Clean energy  
- solar

Energy  
storage  
solutions

Global  
competitor in  
solar and  
energy storage

Generate  
employment

Boost to  
economic  
growth

**Potential first mover advantage for India in the Energy Storage Solutions –  
benefitting both power sector and reduction in oil imports through Electric Vehicles**

## Background

---

### Initial Proposal of Soft Bank

- **Solar Capacity** - 910 GW ( 2030)
- **Energy Storage Solutions (ESS)** - 2265 GWh
- **Investment** - \$1 trillion

### Revised (post detailed deliberation with NITI, MOP and MNRE)

- **Solar Capacity** - ~370 GW (2030) (formal communication from MOP awaited)
- **ESS** – Estimated trajectory to be finalized by MOP & MNRE



## Presumptions

---

### Year wise solar trajectory

- **Solar Capacity** – 34 GW addition yearly \*
- Out of 370 GW, 100 GW (as part of 175 GW target) till 2022
- **Storage Requirement** – Storage could be required post 2022 (to be finalized by MOP/ MNRE)

*\* 370 GW trajectory provided by MoP and MNRE (formal communication awaited)*

## Key Issues

---

- **Firming up of Solar and ESS trajectory**
- **Bid and Tariff Structure**
- **Advance PPA for Manufacturing**
- **Forex Indexed tariffs**
- **Payment Security**
- **Termination Liabilities**

## Firming up of Trajectory

### During discussion Soft Bank has indicated:

2020 – 22 → Solar will be cheaper than variable cost of existing non pithead coal plants

2022 – 27 → Solar + ESS cheaper than total cost of new pithead

2027 – 30 → Solar + ESS cheaper than variable cost of pithead coal plants

} **270 GW Solar + ESS**

### Key issues:

- Detailed generation profiles of supply sources need to be assessed (MoP/MNRE /CEA)
- Impact on utilization of transmission network
- Impact on other Generation assets

**View** - Year wise trajectory of solar, solar + ESS needs to be firmed up by MOP and MNRE

## Tariff Structure

---

**Proposal** - Single PPA with two tariffs (only solar for the day and solar + ESS during night)

**Key issues –**

- Not sure if it has happened anywhere in the world
- PPA management issue
- May create lot of uncertainties
- Bidding parameters for Solar + ESS needs to be structured – *Detailed technical assessment required*
- Grid integration costs to be studied

**View** - A single PPA for supply on RTC (round the clock) basis (both solar and ESS) could be considered if energy cost (solar+ESS) becomes cheaper than greenfield pithead plant cost

## Advance PPA for Manufacturing

---

### Proposal –

Bidding for 12 years to be done in the beginning at one go

OR

Mid term review after 5 years and PPAs post 2025 to be tied up with existing manufacturing capacity

### Key issues –

- Restricts potential competition (WTO/CCI)
- Technology disruption risk passed to the Govt.

### View –

- Commitment could be in the form of revised RPO trajectory – In Electricity Act 2003 - Suggested by MoF
- Proposal of 12 years bidding in one go needs further examination
- Alternatively we can consider 4 bids for 3 years each

## Forex Indexed tariffs

**PROPOSAL** – Tariff to be Fx indexed - payment in INR

Cap of 3% on USD, Euro & 3.5% on Yen (debt component to be indexed)

**Key reasons**– Cheaper foreign funding and be assured of hedging (transfer hedging risk to Gol)

| Currency | Historical CAGR (20 years) | Volatility |
|----------|----------------------------|------------|
| USD      | 2.66%                      | Low        |
| EURO     | 2.43%                      | Medium     |
| JPY      | 3.27%                      | High       |

**View** – It can be agreed to subjected to –

- Cap of 3% on yearly depreciation of rupee
- Tariff during bidding are low enough to compensate for INR depreciation



## Payment Security

### **PROPOSAL – 3 LAYERS with SECI & NTPC as off-takers**

- 12 months revolving LC
- Payment security trust
- Tripartite agreement between RBI, State Government and SECI (or developer)

### **Key Issues-**

- NTPC – issues pertaining to minority shareholders
- Capacity of SECI to operationalize Payment security trust needs to be relooked
- Indirect liabilities on account of PSM\*- Rs ~1.3 lac Cr in 2023 and Rs. ~14.7 lac cr in 2030

### **View –**

- 1 month LC is a standard practice and could be continued
- Back to back LC with Discoms would be required
- SECI payment security trust - Back to back escrow account
- As per MNRE tripartite agreement is being done



*\*Assuming trajectory of 370 GW new solar as provided by MoP and MNRE (without validation); ESS picking up post 2021 (final trajectory still to be defined); CUF – 24.41%, Capex and tariff levels as per the Proposal (without validation)*

10



## Termination Liabilities

### Proposal –

- Termination payment of
  - 90% to 100% Debt Due
  - 0 to 150% adjusted Equity

### Key Issues –

- On account of termination:
  - FY 2023 - Liability can be Rs.~4.9 lac cr\* (90% debt due\*\*) and Rs.~2.2 lac cr (150% adjusted equity)
  - FY 2030 - Rs.~12.5 lac cr (90% debt due) and Rs.~5.8 lac cr (adjusted equity) (excluding insurance)

*Solar trajectory – 370 GW (as per MOP/MNRE) assumed in a phased manner (till FY30) (not validated)*  
*Battery trajectory – 393 GWh assumed till FY 30 with installations post 2021 (trajectory yet to be finalized)*  
*CUF – 24.41% as per the proposal (not validated)*  
*Tariff trajectory – Rs. 3/unit to Rs. 2/unit from 2020 to 2030 as per the proposal (not validated)*

11

## Termination Liabilities

---

### Mitigating Factors –

- Debt Insurance
- Proceeds from sale of assets

### View –

- MoF needs to take a view on the termination liability issues
- Pre specified notional repayment of debt (Net of Insurance) should be considered for termination payment

*Solar trajectory – 370 GW (as per MOP/MNRE) assumed in a phased manner (till FY30) (not validated)*  
*Battery trajectory – 393 GWh assumed till FY 30 with installations post 2021 (trajectory yet to be finalized)*  
*CUF – 24.41% as per the proposal (not validated)*  
*Tariff trajectory – Rs. 3/unit to Rs. 2/unit from 2020 to 2030 as per the proposal (not validated)*

12

## **9.8 Annexure 7 – Detailed computations**

**Detailed computations of Liabilities** – The detailed assumptions for the payment security fund are as below –

### **Solar & battery capacity, energy generated and power tariffs**

The solar power and energy storage capacity, energy generation and tariffs as per the proposal are as indicated below –

**Table 17: Tariffs (Rs. /kWh), Capacity (GW/ GWh) and energy generated (BU)**

| S.No.                   |                                | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------------------------|--------------------------------|------|------|------|------|------|------|------|------|------|------|------|
| <b>Tariffs</b>          |                                |      |      |      |      |      |      |      |      |      |      |      |
| 1.                      | Solar                          | 3.0  | 2.9  | 2.8  | 2.7  | 2.7  | 2.6  | 2.5  | 2.4  | 2.4  | 2.3  | 2.0  |
| 2.                      | Battery                        | 7.0  | 6.8  | 6.6  | 6.4  | 6.2  | 6.0  | 5.8  | 5.7  | 5.5  | 5.3  | 6.0  |
| <b>Capacity</b>         |                                |      |      |      |      |      |      |      |      |      |      |      |
| 1.                      | Solar (GW)                     | 30   | 59   | 89   | 118  | 148  | 177  | 207  | 236  | 266  | 295  | 325  |
| 2.                      | Battery (GWh)                  | 0    | 0    | 133  | 267  | 400  | 533  | 667  | 800  | 933  | 1067 | 1200 |
| <b>Energy Generated</b> |                                |      |      |      |      |      |      |      |      |      |      |      |
| 1.                      | Solar @ CUF – 22%              | 57   | 114  | 171  | 228  | 285  | 342  | 399  | 456  | 512  | 569  | 626  |
| 2.                      | Solar energy stored in battery | -    | -    | 49   | 97   | 146  | 195  | 243  | 292  | 341  | 389  | 438  |
| 3.                      | Net solar for Sale             | 57   | 114  | 116  | 117  | 119  | 120  | 122  | 124  | 125  | 127  | 129  |

Source: Proposal, MoP

**Payment security fund requirements for Solar & battery**

On the basis of the capacity installed and hence energy generated, the overall payment security required for the project has been computed as indicated -

**Table 18: Solar Payment security (Rs. Crore)**

| S.No. | Generation (BU) | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
| 1.    | 57              | 3.00 | 3.07 | 3.14 | 3.21 | 3.28 | 3.35 | 3.43 | 3.51 | 3.58 | 3.67 | 3.75 |
| 2.    | 114             |      | 2.91 | 2.98 | 3.04 | 3.11 | 3.18 | 3.25 | 3.33 | 3.40 | 3.48 | 3.56 |
| 3.    | 116             |      |      | 2.82 | 2.89 | 2.95 | 3.02 | 3.09 | 3.15 | 3.23 | 3.30 | 3.37 |

| S.No. | Generation (BU)   | 2020          | 2021          | 2022          | 2023           | 2024           | 2025           | 2026           | 2027           | 2028           | 2029           | 2030           |
|-------|-------------------|---------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 4.    | 117               |               |               |               | 2.74           | 2.80           | 2.86           | 2.93           | 2.99           | 3.06           | 3.13           | 3.20           |
| 5.    | 119               |               |               |               |                | 2.66           | 2.72           | 2.78           | 2.84           | 2.90           | 2.97           | 3.04           |
| 6.    | 120               |               |               |               |                |                | 2.58           | 2.63           | 2.69           | 2.75           | 2.82           | 2.88           |
| 7.    | 122               |               |               |               |                |                |                | 2.50           | 2.56           | 2.61           | 2.67           | 2.73           |
| 8.    | 124               |               |               |               |                |                |                |                | 2.42           | 2.48           | 2.53           | 2.59           |
| 9.    | 125               |               |               |               |                |                |                |                |                | 2.35           | 2.40           | 2.46           |
| 10.   | 127               |               |               |               |                |                |                |                |                |                | 2.28           | 2.33           |
| 11.   | 129               |               |               |               |                |                |                |                |                |                |                | 2.00           |
|       | <b>Rs. crores</b> | <b>17,082</b> | <b>50,605</b> | <b>84,351</b> | <b>118,326</b> | <b>152,538</b> | <b>186,994</b> | <b>221,705</b> | <b>256,678</b> | <b>291,923</b> | <b>327,451</b> | <b>360,541</b> |

Source: CRIS analysis; Yearly tariff escalation of 2.25% as per the proposal

**Table 19: Battery Payment security (Rs. Crore)**

| S.No. | Generation (BU) | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------|-----------------|------|------|------|------|------|------|------|------|------|------|------|
| 1.    | -               | 7.00 | 7.16 | 7.32 | 7.48 | 7.65 | 7.82 | 8.00 | 8.18 | 8.36 | 8.55 | 8.74 |
| 2.    | -               |      | 6.79 | 6.94 | 7.10 | 7.26 | 7.42 | 7.59 | 7.76 | 7.93 | 8.11 | 8.30 |
| 3.    | 49              |      |      | 6.59 | 6.73 | 6.89 | 7.04 | 7.20 | 7.36 | 7.53 | 7.70 | 7.87 |
| 4.    | 97              |      |      |      | 6.39 | 6.53 | 6.68 | 6.83 | 6.98 | 7.14 | 7.30 | 7.47 |
| 5.    | 146             |      |      |      |      | 6.20 | 6.34 | 6.48 | 6.62 | 6.77 | 6.93 | 7.08 |
| 6.    | 195             |      |      |      |      |      | 6.01 | 6.15 | 6.28 | 6.43 | 6.57 | 6.72 |
| 7.    | 243             |      |      |      |      |      |      | 5.83 | 5.96 | 6.10 | 6.23 | 6.37 |
| 8.    | 292             |      |      |      |      |      |      |      | 5.66 | 5.78 | 5.91 | 6.05 |

| S.No. | Generation (BU)   | 2020 | 2021 | 2022          | 2023          | 2024           | 2025           | 2026           | 2027           | 2028           | 2029           | 2030             |
|-------|-------------------|------|------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|
| 9.    | 341               |      |      |               |               |                |                |                |                | 5.49           | 5.61           | 5.74             |
| 10.   | 389               |      |      |               |               |                |                |                |                |                | 5.32           | 5.44             |
| 11.   | 438               |      |      |               |               |                |                |                |                |                |                | 6.00             |
|       | <b>Rs. crores</b> | -    | -    | <b>28,848</b> | <b>85,462</b> | <b>168,814</b> | <b>277,928</b> | <b>411,876</b> | <b>569,779</b> | <b>750,807</b> | <b>954,169</b> | <b>1,212,158</b> |

Source: CRIS analysis; Yearly tariff escalation of 2.25% as per the proposal

On the basis of the above overall payment security has been computed as below –

**Table 20: Overall Payment security (Rs. Crore)**

| S.No. |                   | 2020          | 2021          | 2022           | 2023           | 2024           | 2025           | 2026           | 2027           | 2028             | 2029             | 2030             |
|-------|-------------------|---------------|---------------|----------------|----------------|----------------|----------------|----------------|----------------|------------------|------------------|------------------|
| 1.    | Solar (Rs. Cr.)   | 17,082        | 50,605        | 84,351         | 118,326        | 152,538        | 186,994        | 221,705        | 256,678        | 291,923          | 327,451          | 360,541          |
| 2.    | Battery (Rs. Cr.) | -             | -             | 28,848         | 85,462         | 168,814        | 277,928        | 411,876        | 569,779        | 750,807          | 954,169          | 1,212,158        |
| 3.    | Overall (Rs. Cr.) | <b>17,082</b> | <b>50,605</b> | <b>113,199</b> | <b>203,788</b> | <b>321,352</b> | <b>464,922</b> | <b>633,581</b> | <b>826,457</b> | <b>1,042,730</b> | <b>1,281,620</b> | <b>1,572,699</b> |

Source: CRIS analysis

### Termination and contingent liabilities

The termination liabilities have been computed on the basis of the 90% debt due and 150% adjusted equity, in line with the proposal are as indicated below -

**Table 21: Costs (Rs. Crore/ MW)**

| S.No. |                             | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------|-----------------------------|------|------|------|------|------|------|------|------|------|------|------|
|       | <b>Costs (Rs. Cr. / MW)</b> |      |      |      |      |      |      |      |      |      |      |      |
| 1.    | Solar                       | 4.67 | 4.61 | 4.42 | 4.38 | 4.25 | 4.13 | 3.99 | 3.84 | 3.75 | 3.60 | 3.50 |

|                          |               |      |      |      |      |      |      |      |      |      |      |      |
|--------------------------|---------------|------|------|------|------|------|------|------|------|------|------|------|
| 2.                       | Battery       | -    | -    | 5.13 | 4.67 | 4.40 | 4.00 | 3.92 | 3.84 | 3.69 | 3.61 | 3.53 |
| <b>Capacity Addition</b> |               |      |      |      |      |      |      |      |      |      |      |      |
| 1.                       | Solar (GW)    | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 | 29.5 |
| 2.                       | Battery (GWh) | -    | -    | 133  | 133  | 133  | 133  | 133  | 133  | 133  | 133  | 133  |

Source: Proposal

The capital structure considered for the deployment of these assets, as per the proposal has been considered as 80:20 (Debt: Equity).

**Table 22: Capital structure (Rs. Crore)**

| S.No.                   |        | 2020    | 2021    | 2022    | 2023    | 2024    | 2025    | 2026    | 2027    | 2028    | 2029    | 2030    |
|-------------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| <b>Solar (Rs. Cr)</b>   |        |         |         |         |         |         |         |         |         |         |         |         |
| 1.                      | Debt   | 110,303 | 108,916 | 104,540 | 103,527 | 100,526 | 97,526  | 94,325  | 90,874  | 88,573  | 85,122  | 82,822  |
| 2.                      | Equity | 27,576  | 27,229  | 26,135  | 25,882  | 25,132  | 24,381  | 23,581  | 22,718  | 22,143  | 21,281  | 20,705  |
| <b>Battery (Rs. Cr)</b> |        |         |         |         |         |         |         |         |         |         |         |         |
| 1.                      | Debt   | -       | -       | 199,680 | 181,689 | 171,307 | 155,733 | 152,680 | 149,626 | 143,519 | 140,465 | 137,412 |
| 2.                      | Equity | -       | -       | 49,920  | 45,422  | 42,827  | 38,933  | 38,170  | 37,407  | 35,880  | 35,116  | 34,353  |

Source: CRIS Analysis

The 90% debt due as per the proposal has been considered as contingent liabilities for termination -

**Table 23: 90% Debt due (Rs. Crore)**

| S.No.   |         | 2020 | 2021  | 2022  | 2023  | 2024  | 2025  | 2026  | 2027  | 2028  | 2029  | 2030  |
|---|---------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>Solar – Yearly debt repayment (Rs. Cr)</b> |         |      |       |       |       |       |       |       |       |       |       |       |
|   | 110,303 |      | 5,515 | 5,515 | 5,515 | 5,515 | 5,515 | 5,515 | 5,515 | 5,515 | 5,515 | 5,515 |
|   | 108,916 |      |       | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 | 5,446 |



| S.No. |   | 2020 | 2021           | 2022           | 2023           | 2024           | 2025           | 2026           | 2027           | 2028           | 2029           | 2030           |
|-------|---|------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|       | 104,540   |      |                |                | 5,227          | 5,227          | 5,227          | 5,227          | 5,227          | 5,227          | 5,227          | 5,227          |
|       | 103,527   |      |                |                |                | 5,176          | 5,176          | 5,176          | 5,176          | 5,176          | 5,176          | 5,176          |
|       | 100,526   |      |                |                |                |                | 5,026          | 5,026          | 5,026          | 5,026          | 5,026          | 5,026          |
|       | 97,526  |      |                |                |                |                |                | 4,876          | 4,876          | 4,876          | 4,876          | 4,876          |
|       | 94,325  |      |                |                |                |                |                |                | 4,716          | 4,716          | 4,716          | 4,716          |
|       | 90,874  |      |                |                |                |                |                |                |                | 4,544          | 4,544          | 4,544          |
|       | 88,573  |      |                |                |                |                |                |                |                |                | 4,429          | 4,429          |
|       | 85,122  |      |                |                |                |                |                |                |                |                |                | 4,256          |
|       | 82,822  |      |                |                |                |                |                |                |                |                |                |                |
|       | <b>YoY Repayment</b>                            |      | <b>5,515</b>   | <b>10,961</b>  | <b>16,188</b>  | <b>21,364</b>  | <b>26,391</b>  | <b>31,267</b>  | <b>35,983</b>  | <b>40,527</b>  | <b>44,956</b>  | <b>49,212</b>  |
|       | <b>Debt Due (Post repayment)</b>                |      | <b>213,704</b> | <b>307,284</b> | <b>394,623</b> | <b>473,785</b> | <b>544,920</b> | <b>607,978</b> | <b>662,869</b> | <b>710,915</b> | <b>751,082</b> | <b>784,692</b> |
|       | <b>90% Debt Due</b>                             |      | <b>192,334</b> | <b>276,555</b> | <b>355,161</b> | <b>426,406</b> | <b>490,428</b> | <b>547,180</b> | <b>596,582</b> | <b>639,824</b> | <b>675,974</b> | <b>706,223</b> |
|       | <b>Battery – Yearly debt repayment (Rs. Cr)</b> |      |                |                |                |                |                |                |                |                |                |                |
|       | 199,680   |      |                |                | 9,984          | 9,984          | 9,984          | 9,984          | 9,984          | 9,984          | 9,984          | 9,984          |
|       | 181,689   |      |                |                |                | 9,084          | 9,084          | 9,084          | 9,084          | 9,084          | 9,084          | 9,084          |
|       | 171,307   |      |                |                |                |                | 8,565          | 8,565          | 8,565          | 8,565          | 8,565          | 8,565          |
|       | 155,733   |      |                |                |                |                |                | 7,787          | 7,787          | 7,787          | 7,787          | 7,787          |
|       | 152,680   |      |                |                |                |                |                |                | 7,634          | 7,634          | 7,634          | 7,634          |
|       | 149,626   |      |                |                |                |                |                |                |                | 7,481          | 7,481          | 7,481          |
|       | 143,519   |      |                |                |                |                |                |                |                |                | 7,176          | 7,176          |

| S.No. |                                  | 2020 | 2021    | 2022    | 2023    | 2024    | 2025      | 2026      | 2027      | 2028      | 2029      | 2030      |
|-------|----------------------------------|------|---------|---------|---------|---------|-----------|-----------|-----------|-----------|-----------|-----------|
|       | 140,465                          |      |         |         |         |         |           |           |           |           |           | 7,023     |
|       | 137,412                          |      |         |         |         |         |           |           |           |           |           |           |
|       | <b>YoY Repayment</b>             |      | -       | -       | 9,984   | 19,068  | 27,634    | 35,420    | 43,054    | 50,536    | 57,712    | 64,735    |
|       | <b>Debt Due (Post repayment)</b> |      | -       | 199,680 | 371,385 | 533,607 | 680,775   | 825,668   | 967,660   | 1,103,698 | 1,236,987 | 1,367,376 |
|       | <b>90% Debt Due</b>              |      | -       | 179,712 | 334,246 | 480,246 | 612,698   | 743,101   | 870,894   | 993,328   | 1,113,289 | 1,230,638 |
|       |                                  |      |         |         |         |         |           |           |           |           |           |           |
|       | <b>Overall 90% Debt Due</b>      |      | 192,334 | 456,267 | 689,407 | 906,653 | 1,103,126 | 1,290,281 | 1,467,476 | 1,633,152 | 1,789,262 | 1,936,861 |

Source: CRIS Analysis

The 150% adjusted equity as per the proposal has been considered as contingent liabilities for termination -

**Table 24: 90% Debt due (Rs. Crore)**

| S.No. |   | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|-------|---|------|------|------|------|------|------|------|------|------|------|------|
|       | <b>Solar – Adjusted equity reduction (Rs. Cr)</b> |      |      |      |      |      |      |      |      |      |      |      |
|       | 27,576  |      |      |      |      | 882  | 882  | 882  | 882  | 882  | 882  | 882  |
|       | 27,229  |      |      |      |      |      | 871  | 871  | 871  | 871  | 871  | 871  |
|       | 26,135  |      |      |      |      |      |      | 836  | 836  | 836  | 836  | 836  |
|       | 25,882  |      |      |      |      |      |      |      | 828  | 776  | 776  | 776  |
|       | 25,132  |      |      |      |      |      |      |      |      | 804  | 804  | 804  |
|       | 24,381  |      |      |      |      |      |      |      |      |      | 780  | 780  |

| S.No.   |   | 2020 | 2021   | 2022    | 2023    | 2024    | 2025    | 2026     | 2027     | 2028     | 2029     | 2030     |
|---|---|------|--------|---------|---------|---------|---------|----------|----------|----------|----------|----------|
|   | 23,581                                  |      |        |         |         |         |         |          |          |          |          | 755      |
|   | 22,718                                  |      |        |         |         |         |         |          |          |          |          |          |
|   | 22,143                                  |      |        |         |         |         |         |          |          |          |          |          |
|   | 21,281                                  |      |        |         |         |         |         |          |          |          |          |          |
|   | 20,705                                  |      |        |         |         |         |         |          |          |          |          |          |
|   | <b>YoY reduction</b>                    |      | -      | -       | -       | 1,177   | 2,328   | 3,419    | 4,487    | 5,460    | 6,443    | 7,381    |
|   | <b>Adjusted Equity (Post reduction)</b> |      | 54,805 | 80,940  | 106,822 | 130,776 | 152,830 | 172,992  | 191,224  | 207,907  | 222,744  | 236,069  |
|   | <b>150% Adjusted Equity</b>             |      | 82,207 | 121,410 | 160,233 | 196,164 | 229,245 | 259,489  | 286,836  | 311,860  | 334,116  | 354,103  |
| <b>Battery – Adjusted equity reduction (Rs. Cr)</b> |   |      |        |         |         |         |         |          |          |          |          |          |
|   | 49,920                                  |      |        |         |         |         |         | 1,597.44 | 1,597.44 | 1,597.44 | 1,597.44 | 1,597.44 |
|   | 45,422                                  |      |        |         |         |         |         |          | 1,453.51 | 1,453.51 | 1,453.51 | 1,453.51 |
|   | 42,827                                  |      |        |         |         |         |         |          |          | 1,370.45 | 1,370.45 | 1,370.45 |
|   | 38,933                                  |      |        |         |         |         |         |          |          |          | 1,245.87 | 1,245.87 |
|   | 38,170                                  |      |        |         |         |         |         |          |          |          |          | 1,221.44 |
|   | 37,407                                  |      |        |         |         |         |         |          |          |          |          |          |
|   | 35,880                                  |      |        |         |         |         |         |          |          |          |          |          |
|   | 35,116                                  |      |        |         |         |         |         |          |          |          |          |          |
|   | 34,353                                  |      |        |         |         |         |         |          |          |          |          |          |
|   | <b>YoY reduction</b>                    |      | -      | -       | -       | -       | -       | 2,132    | 4,048    | 5,834    | 7,434    | 8,984    |

| S.No. |   | 2020 | 2021   | 2022    | 2023    | 2024    | 2025    | 2026    | 2027    | 2028    | 2029    | 2030    |
|-------|---|------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
|       | <b>Adjusted Equity (Post reduction)</b> |      | -      | 49,920  | 95,342  | 138,169 | 177,102 | 213,141 | 246,499 | 276,545 | 304,228 | 329,597 |
|       | <b>150% Adjusted Equity</b>             |      | -      | 74,880  | 143,013 | 207,253 | 265,653 | 319,711 | 369,748 | 414,818 | 456,342 | 494,395 |
|       |   |      |        |         |         |         |         |         |         |         |         |         |
|       | <b>Overall 150% Adjusted Equity</b>     |      | 82,207 | 196,290 | 303,246 | 403,417 | 494,898 | 579,200 | 656,584 | 726,678 | 790,458 | 848,498 |

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