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Multi-Actor Partnership Project

DE-RISKING INVESTMENTS IN INDIAN SOLAR SECTOR

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Multi-Actor Partnership (MAP) for De-risking Investments in Solar Energy in India

Review of financial risks affecting investors

The Energy and Resources Institute
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TABLE OF CONTENTS

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ACRONYMS AND ABBREVIATIONS

AD	Accelerated Depreciation
BAU	Business as Usual
CAPEX	Capital Expenditure
CDM	Clean Development Mechanism
CEEW	Council on Energy, Environment and Water
DISCOM	Distribution Company
FDI	Foreign Direct Investment
FPI	Foreign Portfolio Investor
FXHF	Foreign-Exchange Hedging Facility
GB	Green Bond
GHG	Greenhouse Gas
GOI	Government of India
IIFCL	India Infrastructure Finance Company Limited
IREDA	Indian Renewable Energy Department Agency
INR	Indian Rupee
IDF	Infrastructure Debt Fund
InvIT	Infrastructure Investment Trust
IFC	International Finance Corporation
IRENA	International Renewable Energy Agency
InSTS	Intra State Transmission System
JNNSM	Jawaharlal Nehru National Solar Mission
KfW	Kreditanstalt für Wiederaufbau
LLC	Limited Liability Company
MNRE	Ministry of New and Renewable Energy
NTPC	National Thermal Power Corporation
NBFC	Non-Banking Financial Company
PCGM	Partial Credit Guarantee Mechanism
PSM	Payment Security Mechanism
PLF	Plant Load Factor
PFC	Power Finance Corporation
PGCIL	Power Grid Corporation of India Limited
PPA	Power Purchase Agreement
PM-KUSUM	Pradhan Mantri Kisan Urja Suraksha evam Utthan Mahabhiyan
PSL	Priority Sector Lending
PPP	Public Private Partnership

PSB	Public Sector Bank
RE	Renewable Energy
REID	Renewable Energy Infrastructure Development Fund
RPO	Renewable Purchase Obligation
RBI	Reserve Bank of India
RoI	Return on Investment
REC	Rural Electrification Corporation
SEBI	Securities and Exchange Board of India
SECI	Solar Energy Corporation of India
SPV	Special Purpose Vehicle
SBI	State Bank of India
STU	State Transmission Utility
UDAY	Ujwal DISCOM Assurance Yojana
USD	United States Dollar
VGF	Viability Gap Funding
YoY	Year on Year

EXECUTIVE SUMMARY

As India looks towards strengthening its national solar capacity and its position in the global solar energy space, inadequate financing poses a concern. The inadequacy is a consequence of low-performing assets, impending financial distress of electricity distribution companies (DISCOMs), and market uncertainties over time, as well as 'black swan' events, such as the COVID-19 pandemic. Cumulatively, these factors have raised doubts in meeting the sectoral targets and timelines. Thus, for India to see through its 450 GW goal smoothly by 2030 and beyond, wealth promotion and a more collaborative de-risking strategy to boost investor confidence are imminent requirements.

In this regard, the **Multi-Actor Partnership (MAP)** is an approach to review barriers faced by investors across the solar energy sector and to garner solutions by bringing in key stakeholders – government bodies, research and policy centres, financial institutions, and civil societies – to deliberate on the underlying issues impacting the solar sector and frame potential de-risking solutions that could drive forth crucial policy decisions.

This policy paper highlights some of the investors' critical financial risks and concerns that include – currency fluctuations, counterparty payment delays, low returns, poor project ratings, market uncertainties, and evolving policy landscapes. It examines risk mitigants, such as currency hedging, credit guarantees, and payment securities, as well as market-support measures, such as infrastructure debt funds (IDFs), infrastructure investment trusts (InvITs), green banks, and bonds.

However, given the pertinent risks continuing to persist coupled with a growing financing demand, the paper recommends – through the MAP process of consulting experts – additional potential financial offerings, as listed below:

- Alternative currency hedging solutions to minimize the associated hedging cost for the solar developer and thus reduce the effects of currency-borne risks
- Performance-based insurance to offer a broader risk coverage for projects on the lines of climate and infrastructure risks and minimize asset-linked risks
- Alternative green financing fund (modelled on an infrastructure investment trust) to unlock a more comprehensive array of investors and minimize market-capital risks
- Additional solar capital top-up to provide exclusive financial support to the developers, thereby lowering the effects of a capital-borne risk
- Hybrid land-sharing models (similar to the PM-KUSUM scheme) to provide additional revenue opportunities to farmers and reduce the probability of an asset-linked risk
- Transparent and flexible tariff plans to convey an improved risk-mitigation effort and reduce the counterparty risks impacting stakeholders

Further, the MAP recommends a potential de-risking framework to consolidate the measures (as previously discussed) and minimize the impact of the critical risks at various instances of project planning (commissioning to de-commissioning stages). A consortium of all the key MAP actors can design the said framework. For these measures to take effect, the MAP has identified key implementers that include:

electricity regulatory commissions (centre and state), government-recognized agencies in the renewable energy field (Solar Energy Corporation of India (SECI) and Indian Renewable Energy Development Agency (IREDA)), public and private sector banks, financial and non-financial banking institutions. Such an exercise would ensure a more reliable road map and create a desired theory of change, thereby helping India become a prosperous solar energy hub in the future.

1. PRESENT STATUS

India is targeting a 175 GW[1] renewable energy (RE) scenario by 2022. Within the RE energy mix, solar would constitute 100 GW[2] (~60%), providing a strong push for the specified energy source. RE installation stood at 90.39GW[3] in 2020, contributing to ~23% of the total power-generation installed capacity.[4] As per year-on-year (YoY) basis, 2019 witnessed solar installations worth 7.3 GW, making India the third largest solar market, globally[5] (Figure 1).

The transition from a feed-in tariff regime to a tariff-based competitive auction mode of pricing power (coupled with zero indexation) denotes that a low-cost strategy is a new high. As an added benefit, India jumped 14 spots in World Bank's Ease of Doing Business Index rankings (placed 63/190 nations as of 2019), 68/140[6] on the Global Competitiveness Index, and was positioned third in the Renewable Energy Attractive Index[7] in 2020.

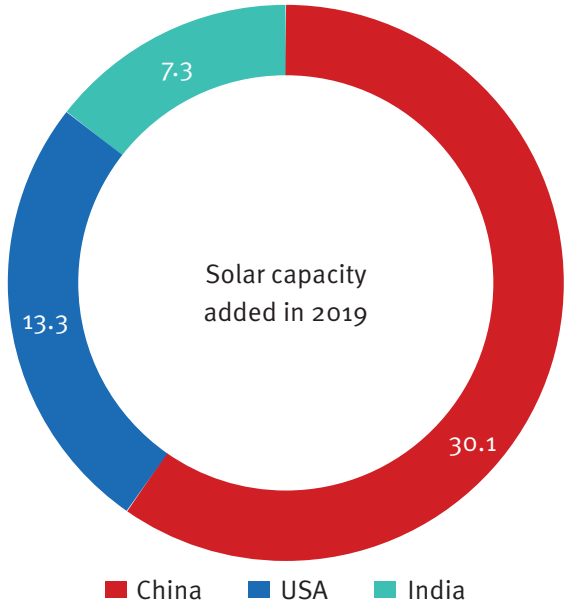

Figure 1: Top three solar markets

1 Ministry of New and Renewable Energy (MNRE). Solar policies and guidelines. Details available at https://mnre.gov.in/Solar/policy-and-guidelines

2 MNRE, 'Solar Policies', n.d., https://mnre.gov.in/Solar/policy-and-guidelines.

3 Verma, Ayush. 2020. 763.47 MW Added in November, India's Total RE Capacity Surpasses 90 GW. In Saur Energy International. Details available at https://www.saurenergy.com/solar-energy-news/763-47-mw-added-in-november-indias-total-re-capacity-surpasses-90-gw

4 Koundal, Aarushi. 2020. Rs 132,626 crore invested in India's renewable energy sector in past three years. In ETEnergyWorld. Details available at https://energy.economictimes.indiatimes.com/news/renewable/rs-132626-crore-invested-in-renewable-energy-in-past-three-years/74192577

5 Mercom India. 2019 Q4 and Annual India Solar Market Update – 7.3 GW Installed in CY 2019. Details available at https://mercomindia.com/product/2019-q4-annual-india-solar-market-update/

6 World Economic Forum, 'The Global Competitiveness Report 2019' (World Economic Forum, 2019), http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf.

7 Ernst & Young (EY), 'Renewable Energy Country Attractiveness Index (RECAI)' (Ernst & Young (EY), 2020), https://www.ey.com/en_in/recai.

These factors have made India a potentially attractive destination for RE investors, both domestically and globally.

2. INVESTMENT SCENARIO

India's solar sector attracted ~USD 30 billion between 2017 and 2019[8] (Figure 2).

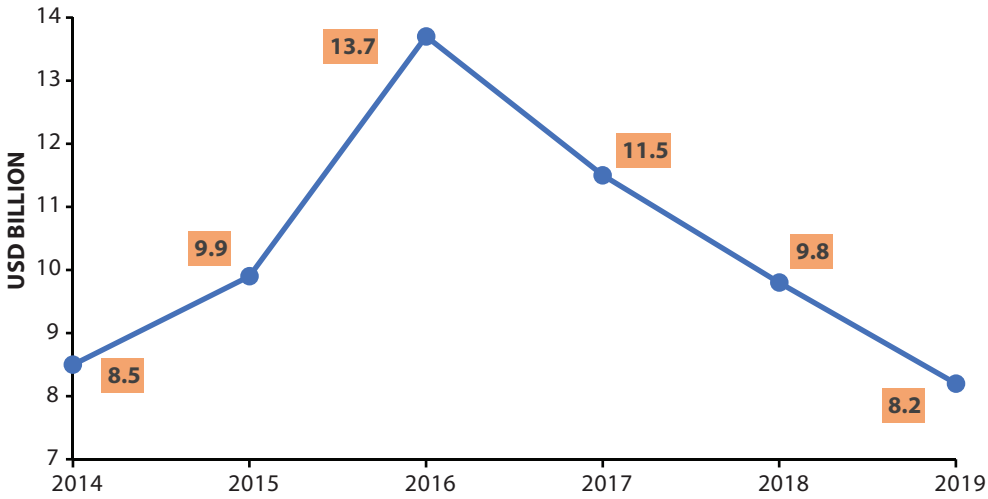

Figure 2: Solar investments in India

Although the same set of years experienced a dip in year-on-year (YoY) investments, courtesy factors such as slowing economy, non-banking financial companies (NBFCs) crisis, power purchase agreement (PPA) re-negotiations, and payment delays. However, India has witnessed a continued increase in its foreign direct investment (FDI) component towards its non-conventional energy space in recent years[9] (Figure 3).

A 100% FDI (coupled with 49% for the power exchange segment)[10] has made the sector more receptive to foreign investments. Presently, debt, equity, and institutional financing are the three basic modes of investment in the Indian solar market, with debt contributing to almost half of the total, while institutional investors contribute around 10%.[11] Moreover, investments in 2019 from the German Investment and Development Company and Netherlands' Entrepreneurial Development Bank turned out to be game-changers in meeting the solar sector's capital demands.[12] The solar sector alone received USD 2.8 billion

8 MERCOM, India, '2019 Q4 and ANNUAL INDIA SOLAR MARKET UPDATE – 7.3 GW INSTALLED IN CY 2019', 2020, 4, https://mercomindia.com/product/2019-q4-annual-india-solar-market-update/.

9 Saumy, Prateek. 2019. India's Renewable Industry Attracted FDI Worth $1.4 Billion in 2018-19. In Mercom India. Details available at https://mercomindia.com/india-renewable-attracted-fdi-2018-19/

10 Ministry of Commerce & Industry, Government of India. 2012. Press Note No.8 (2012 Series). Details available at https://dipp.gov.in/sites/default/files/pn8_2012_2.pdf

11 Sen, Vivek, K. Sharma, G. Shrimali. 2016. Reaching India's Renewable Energy Targets: The Role of Institutional Investors: A CPI Report

12 Mercom India, '2019-20 Solar Market Update', 2019, https://mercomindia.com/category/solar/.

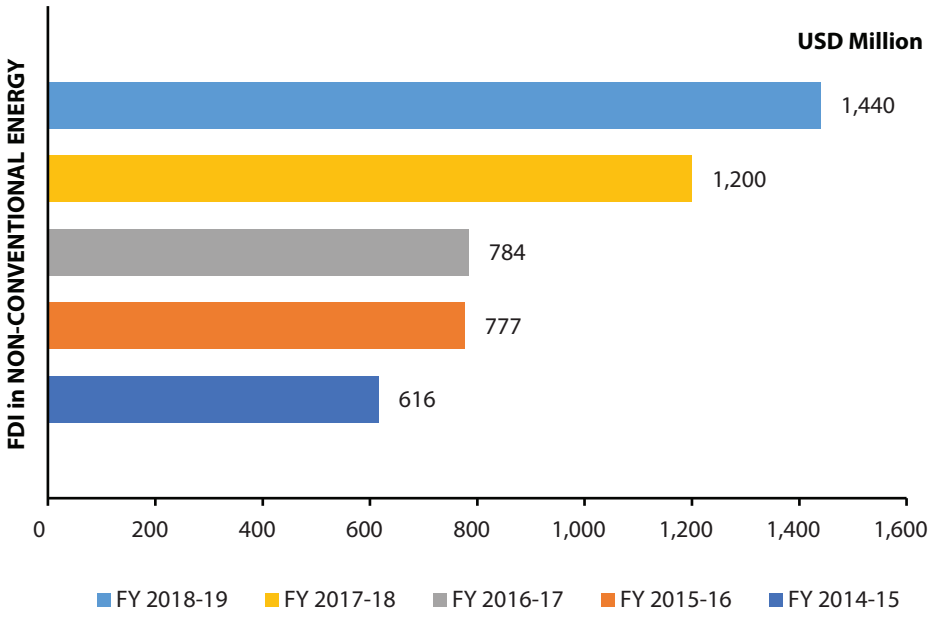

Figure 3: FDI in non-conventional energy

in corporate funding (debt financing, venture capital funding, and public market) in 2018. However, as per GOI's Ministry of Power, India potentially needs approximately USD 60 billion to 80 billion[13] by 2022, and an overall new investment in the range of USD 500 billion to 700 billion[14] (approximately) by 2030 to meet its 450 GW RE targets (40% clean energy breakthrough), implying a growing financing demand. As per a Climate Policy Initiative study,[15] banking institutions hold the key to the bulk of debt financing potential (88%), while foreign institutional investors have the most significant equity financing potential (35%) to finance India's RE targets.

Thus, with a greater need for capital inflow, the focus has to be on unlocking a more significant share of all possible existing mechanisms, in addition to exploring other fund-raising options. The following section highlights critical policies that provide the required assistance to solar developers and potential financing channels for investors.

13 ET Energy World, 'India to Invest Rs 4 Lakh Crore to Meet 175 GW Renewable Energy Target by 2022: R K Singh', December 2019, https://energy.economictimes.indiatimes.com/news/renewable/india-to-invest-rs-4-lakh-cr-to-meet-175-gw-renewable-energy-target-by-2022-r-k-singh/72475254#:~:text=R%20K%20Singh%3A%20India%20to%20invest,Singh%2C%20Energy%20News%2C%20ET%20EnergyWorld.

14 ET Energy World, 'India's Renewable Sector Needs Upto $700 Billion in New Investment by 2030: IEEFA', February 2020, https://energy.economictimes.indiatimes.com/news/renewable/indias-renewable-sector-needs-upto-700-billion-in-new-investment-by-2030-ieefa/74113497#:~:text=New%20Delhi%3A%20India's%20renewable%20energy,will%20also%20require%20domestic%20funding.

15 Climate Policy Initiative, 'Reaching India's Renewable Energy Targets: The Role of Institutional Investors', 2016, https://www.climatepolicyinitiative.org/wp-content/uploads/2016/11/Reaching-Indias-Renewable-Energy-Targets-The-Role-of-Institutional-Investors.pdf.

3. CURRENT POLICY LANDSCAPE

The present government measures have provided sustained support to all key stakeholders (off-takers, developers, and investors) within the solar energy sector. From an investor standpoint, these provisions assist in improving the overall confidence and credibility of the Indian RE markets. Figure 4 provides the policy overview for an investor.

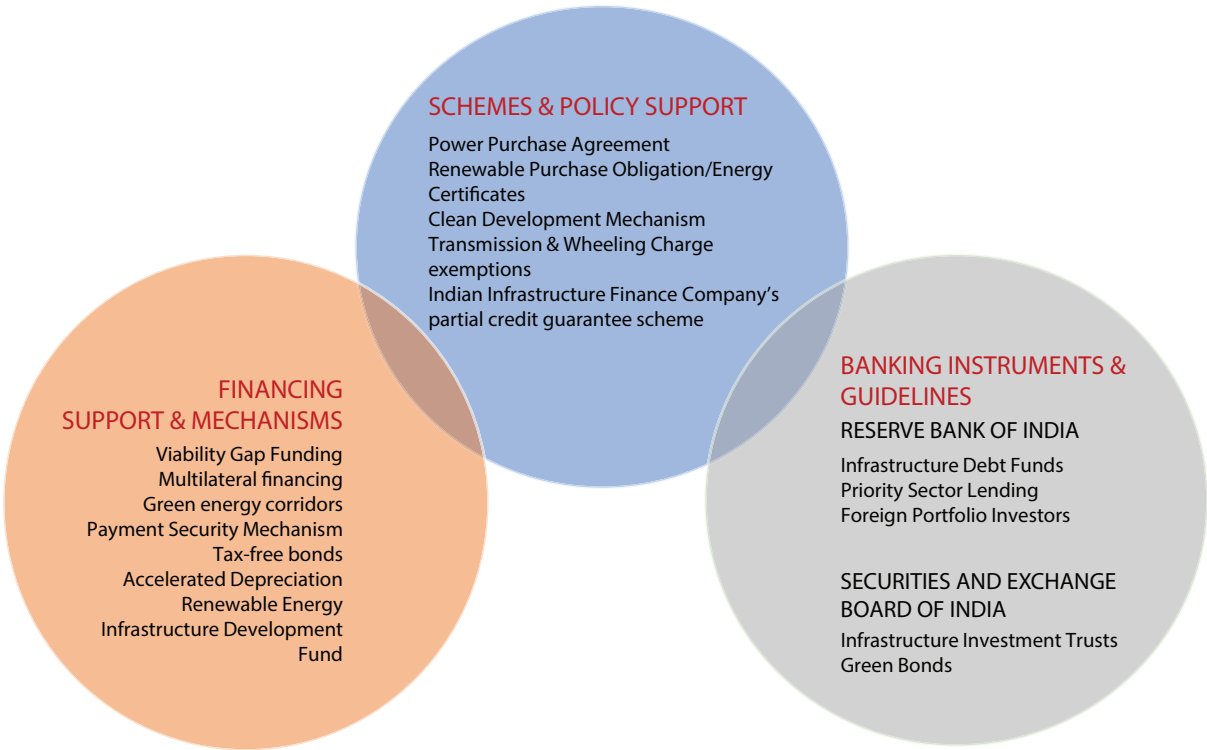

Figure 4: Current policy landscape

3.1 Government-mandated guidelines

Table 1 lists the existing policy mechanisms providing a secure and credible commitment towards RE growth, thereby adding value to the project rating and investor perception.

Table 1: Government-mandated guidelines

Mechanism	Description
Renewable Purchase Obligation (RPO) and Energy Certificates[16,17]	» DISCOMs, large-scale, and commercial consumers are obliged to either purchase a portion of demand from solar power plants or buy RECs (equivalent to clean energy targets from the market)

16 MNRE, 'Solar RPO and REC Framework', n.d., https://mnre.gov.in/solar/rpo/.
17 MNRE, 'National Portal for RPO', n.d., https://rpo.gov.in/.

Mechanism	Description
Power Purchase Agreement (PPA)[18,19]	» Agreement between distribution utility and developer to purchase power from solar plant at predetermined tariff for a specified timeline » Guaranteed evacuation of generated capacity and cash flows under the project
Clean Development Mechanism (CDM)[20]	» CDM is a project-based mechanism that allows public or private entities in developed countries to invest in greenhouse gas (GHG) mitigating activities in developing countries » Aids in earning abatement credits, which can be applied against their GHG emission reduction targets or sold in the open market

3.2 Financing: Government-sponsored or aided measures

The government offers, manages, and regulates several financing measures for large-scale RE adoption. Table 2 lists a few key measures to incentivize and encourage players in the sector.

Table 2: Government-sponsored/aided financing measures

Mechanism	Description
Viability Gap Funding (VGF)[21]	» Government's initial support for the uptake of projects » State-run power producer stands to be eligible provided they set up a solar PV plant for self or government use (directly or via DISCOMs)
Multilateral and Bilateral Financing (for select projects)[22]	» Low-cost financings from multilateral financing institutions like World Bank or KfW » Aids domestic developers to gain technical expertise and experience in due diligence to choose solar projects of categorically large scale » Provision of credit/risk guarantee mechanisms to finance projects. Procurement requirements involve transparent and competitive bidding procedures deemed suitable, quality, and reasonable charges for services. (This information is required for any credit line via IREDA or loan through multilateral financing institutions. Socio-environmental impact assessments are also part of the requirements.)
Payment Security Mechanism[23]	» Ensures timely payment to solar developers or compensate developers in case of tariff changes by the distribution company

18 MNRE, 'Solar Policies'.
19 MNRE, 'Draft Guidelines and Model PPA for Implementation of Off-Grid Solar Power Plants in RESCO Model under MNRE Programme – for Comments of Stakeholders.', May 2020, https://mnre.gov.in/img/documents/uploads/file_f-1589864991781.pdf.
20 Ministry of Communications, 'CDM', n.d., https://dot.gov.in/clean-development-mechanism-cdm.
21 Department of Economic Affairs, 'Scheme for Financial Support to Public Private Partnerships in Infrastructure (Viability Gap Funding Scheme)', n.d., https://www.pppinindia.gov.in/schemes-for-financial-support.
22 IREDA, "IREDA - Solar Sector Financing."
23 CEEW, 'How Payment Security Mechanism Works', n.d., http://cef.ceew.in/masterclass/explains/how-payment-security-mechanism-works.

Mechanism	Description
Green Energy Corridors[24]	» The scheme (under Ministry of Power) synchronises electricity created by various RE sources with the conventional power stations in the grid » Power Grid Corporation of India Ltd (PGCIL) is the nodal agency supervising the state transmission utilities (STUs) for each state » Funding split is: 40% GOI grant, 20% state equity, and 40% loan from KfW, Germany » The central grant is over two time-periods for STUs: a) 70% advance on the award of contract, and b) balance 30% after successful commissioning and three months of performance testing » Intra State Transmission System (InSTS) project sanctioned in 2015–16 for the evacuation of large-scale renewable energy » States covered: Tamil Nadu, Rajasthan, Karnataka, Andhra Pradesh, Maharashtra, Gujarat, Himachal Pradesh, and Madhya Pradesh
Transmission and Wheeling Charge Exemptions[25]	» Exemptions on sale/purchase of electricity within a state » For large-scale stand-alone solar projects set up for sale of power to distribution company or third party or captive use, there is an exemption of 50% on wheeling charges/transmission charges on the intrastate sale of power, while 100% exemption is provided[26] on the intrastate transmission system
Tax-Free Bonds[27]	» Debt instrument issued by agencies such as Indian Renewable Energy Development Agency (IREDA) to raise capital for solar projects, including tax exemptions » AAA credit ratings and attractive coupon rates of 8.8% for investors
Accelerated Depreciation (AD)[28,29]	» GOI offers accelerated depreciation of fixed assets associated with a solar power plant for promoting solar uptake in commercial and industrial segments » Provides solar developers to not only depreciate their investments at a higher rate than general fixed assets but also claim tax benefits on the value depreciated » Current rate of acceleration permitted for an annual claim is 40% (as per the Income Tax Act (Section 32)[30]

24 MNRE, 'Green Energy Corridors', n.d., https://mnre.gov.in/green-energy-corridor#:~:text=It%20is%20being%20implemented%20by,Himachal%20Pradesh%2C%20and%20Madhya%20Pradesh.&text=The%20purpose%20is%20to%20evacuate,grid%20in%20the%20implementing%20states.

25 NREL, 'Wheeling and Banking Strategies for Optimal Renewable Energy Deployment: International Experiences A CLEAN ENERGY REGULATORS INITIATIVE REPORT' (NREL, n.d.), https://www.nrel.gov/docs/fy16osti/65660.pdf.

26 MERCOM, India, 'Transmission, Wheeling, Cross-Subsidy Charges for Captive and Renewable Projects in UP', n.d., https://mercomindia.com/transmission-wheeling-cross-subsidy-charges-for-captive-and-renewable-projects-in-up/#:~:text=All%20renewable%20energy%20generating%20projects,the%20intrastate%20sale%20of%20power.

27 Saikat Das and Indulal PM, 'Government May Raise up to Rs 10,000 Crore via Tax-Free Bonds', Economic Times, 2020, https://economictimes.indiatimes.com/news/economy/finance/government-may-raise-up-to-rs-10000-crore-via-tax-free-bonds/articleshow/75480656.cms?from=mdr.

28 Bhavin Gajjar, 'How Commercial and Industrial Solar Users Can Get Tax Benefits from Accelerated Depreciation?', 2019, http://www.brightsolar.in/blog/how-commercial-and-industrial-solar-users-can-get-tax-benefits-from-accelerated-depreciation/.

29 Parekh and Muthiyan, 'Accelerated Depreciation Benefit – A Major Incentive for Solar Power' (Green Sun Energy, n.d.), http://www.greensunenergy.co.in/download/depreciation-on-solar.pdf.

30 Income Tax Dept, 'IT Act Section 32', n.d., https://www.incometaxindia.gov.in/_layouts/15/dit/pages/viewer.aspx?grp=act&cname=cmsid&cval=10212000000041574&searchfilter=&k=&isdlg=1.

Mechanism	Description
Credit Guarantees[31]	» Government covers a certain fraction of debt repayment lest the developer defaults/delays » Ministry of Finance has a programme that covers up 20% of debts
Renewable Energy Infrastructure Development Fund (REID)[32]	» Funds for transmission and related infrastructure activities

In continuation to the financing facilitation, the Reserve Bank of India (RBI) and Securities and Exchange Board of India (SEBI) provide guaranteed platforms and means for projects seeking monetary support and investors looking at secure channels. Table 3 and Table 4 list these measures for investors.

Table 3: Guidelines by Reserve Bank of India

Mechanism	Description
Infrastructure Debt Funds (IDFs)[33]	» Financing of long-term solar projects at low-interest rates » Funds are either mutual funds or NBFCs » Sponsor requirement: Net-worth INR 300 crore, CRAR 15% and NPA less than 3%, five years of experience, three years' worth of profits
Priority Sector Lending (PSL)[34]	» Priority lending of 40% by domestic, commercial banks to RE projects, inclusive of INR 150 million for solar and other RE developers
Foreign Portfolio Investors (FPIs)[35]	» Permit investments in government securities, treasury bills, state development loans, and corporate bonds, with an acquisition of 30% stock » Long-term investment: Sovereign funds, endowments, insurance, pension funds to have a cap of 15% stake per FPI » Prohibited to invest in partly paid instruments

Table 4: Guidelines by Securities and Exchange Board of India

Mechanism	Description
Infrastructure Investment Trusts (InvITs)[36]	» Supporting investments via external debt payment and equity buy-backs » Cap of three sponsors per trust (corporate or LLC) with a minimum INR 100 crore and five years of experience » Mode of investing: Special Purpose Vehicles (SPVs)

31 PIB, 'Cabinet Approves Modifications in the Existing "Partial Credit Guarantee Scheme (PCGS)" Portfolio Guarantee for Purchase by PSBs of Bonds or Commercial Papers (CPs) with a Rating of AA and Below' (PIB, 2020), https://pib.gov.in/PressReleasePage.aspx?PRID=1625323.

32 NRDC and CEEW, 'Reenergizing India's Solar Energy Market through Financing', August 2014, https://www.nrdc.org/sites/default/files/renewable-energy-solar-financing-report.pdf.

33 RBI, 'Infrastructure Debt Funds (IDFs)' (Reserve Bank of India, 2011), https://www.infradebt.in/RBI_NBFC.pdf.

34 RBI, 'Priority Sector Lending' (Reserve Bank of India, 2014), https://rbidocs.rbi.org.in/rdocs/notification/PDFs/PSLGUIDoA65BF4EoA884F60999E748C58EA7F88.PDF.

35 RBI, 'Foreign Portfolio Investors' (Reserve Bank of India, 2017), https://rbidocs.rbi.org.in/rdocs/notification/PDFs/NT16864DC2602F2834E29A64D4ADF6D41EA8o.PDF.

36 SEBI, 'SECURITIES AND EXCHANGE BOARD OF INDIA (INFRASTRUCTURE INVESTMENT TRUSTS) REGULATIONS, 2014' (SEBI, September 2014), https://www.sebi.gov.in/sebi_data/attachdocs/1411722495005.pdf.

Mechanism	Description
Green Bonds[37]	» Financing environmentally beneficial projects » Issuer to submit an Environment Impact Assessment report of the project to an investor » Regular monitoring and evaluation of project progress and fund utilization

The summary of the policy environment is given in Box 1:

These measures are facilitating and incentivizing in nature for players in the solar energy sector. However, projects face several financing and investment risks due to challenging work environments, limited use, or knowledge of the existing mechanisms, and evolving policy landscapes. The following section reviews the industry's key risks and potential de-risking measures.

Box 1: Summary of policy environment

- Secure agreement structures provided by the government to support the RE sector
- Government-sponsored/supported/managed financing assistance at various points of the supply chain to provide required financial cushioning and tax benefits
- Potential investment opportunities for foreign players to invest in India to meet the capital requirements

4. RISK PROFILE

This segment is divided into two parts: Section 4.1 discusses some of the key risks affecting the investor, while Section 4.2 reviews suitable de-risking and market instruments to address these concerns. This section draws upon crucial insights and findings by institutions such as Stanford University,[38] Climate Policy Initiative,[39] International Renewable Energy Agency (IRENA),[40] and Council on Energy, Environment and Water (CEEW)[41] (Annexure II provides a list of key findings from their studies). Since 2015–16, these studies have curated various domestic and foreign investor experiences, the government's challenges across RE projects in India, and instruments offered across financial institutions.

4.1 Key risks affecting investors

Figure 5 gives a description of every risk that an investor encounters. The severity of the risk profile varies

37 SEBI, 'DISCLOSURE REQUIREMENTS FOR ISSUANCE AND LISTING GREEN BONDS' (SEBI, n.d.), https://www.sebi.gov.in/sebi_data/meetingfiles/1453349548574-a.pdf.

38 Shrimali, 'Instruments to Mitigate Financial Risk in Indian Renewable Energy Investments', Stanford University, 2016, https://energy.stanford.edu/sites/g/files/sbiybj9971/f/bofa_india_project_paper_4pub_0.pdf.

39 Gireesh Shrimali, 'Reaching India's Renewable Energy Targets Cost-Effectively: A Foreign Exchange Hedging Facility' (Climate Policy Initiative, June 2015), https://climatepolicyinitiative.org/wp-content/uploads/2015/06/Reaching-Indias-Renewable-Energy-Targets-Foreign-Exchange-Hedging-Facility_Technical-Paper.pdf.

40 IRENA, 'Unlocking Renewable Energy Investment: The Role of Risk Mitigation and Structured Finance', 2016, https://www.irena.org/publications/2016/Jun/Unlocking-Renewable-Energy-Investment-The-role-of-risk-mitigation-and-structured-finance.

41 CEEW, 'State of the Indian Renewable Energy Sector: Drivers, Risks, and Opportunities' (CEEW, 2018), https://www.ceew.in/sites/default/files/CEEW_State_of_the_Indian_Renewable_Energy_Sector_report_31Oct18.pdf.

Figure 5: Key risks impacting investors

for domestic and international investors. Studies indicate that risks A, B, and C are critical for a foreign investor. Furthermore, a black swan event such as the COVID-19 pandemic derailed business flow to a greater extent, adding distress to the overall chain of events.

4.1.1 Currency risk

Currency risk is the risk of appreciation or depreciation of the Indian Rupee against the US Dollar. It risks the project and causes a drop in the country's investment flow. Although a currency depreciation may provide exporters with an initial advantage through regulated investment flow,[42] this approach continues to be limited. The present solution in the market is a swap agreement that provides a hedge against currency risk. However, this solution is not too cost-effective, given that the average cost of hedging in India is around 6-7%, whereas, completely hedged foreign loans are ~ 12%.[43] A high price leads to only a small proportion of investors opting for hedging. Overall, three elements hold utmost significance while analysing currency risk: foreign loan cost, hedging cost, and the risk premium (these factors depend on the borrower's credit profile). An outcome of currency risk is a credit risk that depends on the probability of default in obligations by the borrower or the counterparty to the respective swap agreement. In addition, credit risk attracts an extra premium towards currency hedging solutions. As a result, currency risk has proven to be the most challenging concern, impacting foreign investor confidence.

4.1.2 Counterparty risk

Counterparty risk is an outcome of a default by one party in the power purchase agreement between the solar project developer and the off-taker (distribution company or DISCOM). The agreement guarantees that a DISCOM shall purchase an agreed capacity at the contracted tariff. An off-taker risk is a consequence of payment delay, default or non-fulfilment of a contractual obligation by a DISCOM. One reason for an agreement to fail is the cheaper competitive auction which offers better and more dynamic market rate ranges than initially agreed upon in the PPA for the DISCOMs. Moreover, the agreed-upon tariff range is subject to variation from the centre to the state and among states. For instance, in 2018-19, SECI managed a range of INR 2.55–2.71[44] per unit while the state of Uttar Pradesh managed a higher range of INR 3.17–3.23[45] per unit. As a result, the probability of an off-taker defaulting goes up.

42 Saloni Goel, 'So How Can an RBI Rate Hike Help Stem the Rupee Slide?', ET Markets, 2018, https://economictimes.indiatimes.com/markets/forex/so-how-can-a-rbi-rate-hike-help-stem-the-rupee-slide/articleshow/66071179.cms?from=mdr#:~:text=There%20are%20a%20variety%20of,value%2C%20it%20can%20buy%20dollars.

43 Shrimali, 'Instruments to Mitigate Financial Risk in Indian Renewable Energy Investments'.

44 Nitin Kabeer, 'Lowest Tariff of ₹2.55/KWh Wins SECI's 1.2 GW ISTS Solar Auction', 25 February 2019, https://mercomindia.com/lowest-tariff-secis-ists-solar-auction/Fe.

45 Virendra Singh, 'UP Energy Watchdog Cuts Solar Power Tariffs, Clears Bidding for 500 Mw', Business Standard India, 18 September 2019, https://www.business-standard.com/article/economy-policy/up-energy-watchdog-cuts-solar-power-tariffs-clears-bidding-for-500-mw-119091800488_1.html.

The substantial risk emerging (as observed previously in the case of currency risk) is a credit risk when the developer, in turn, defaults in debt payments to the investors. The state governments back a DISCOM in implicit guarantees for expenses in defaults being a public sector entity. Presently, there are many measures being suggested for improving the financial state of DISCOMs, such as economic restructuring through the government's Ujwal DISCOM Assurance Yojana[46] (UDAY) scheme, tariff setting, subsidies, and revenue realization through metering audit and monitoring, and payment security mechanisms to name a few. However, investors continue to be sceptical about the financial health of DISCOMs.

Alternatively, a solar project developer can directly default on their obligations. For example, in 2015, Madhya Pradesh Power Purchase Company had cancelled[47] its agreement for two out of the three 50 MW PPAs signed with the Indian unit of Canadian developer Sky Power. The reason being that the project was not completed within the stipulated time, and as a result, the developer was financially penalized (80% of its bank guarantee) for the delay.

4.1.3 Return on investment risk

As per stakeholder discussions, investors tend to have mixed expectations concerning returns from solar projects, building a return on investment risk. Solar projects are currently generating returns of 3.5% (on a risk-adjusted basis) or 6.6% (without risk-adjusted).[48] As per a rough estimate, if a developer wants a return on investment of 14%, then the solar power tariff needs to be in the range of INR 4.5–5/unit.[49] Often expressed by industry experts, bids quoted below INR 3[50] offer low returns. Domestic pension funds and insurance funds expect a return in the range of 13–20%, while foreign institutional investors (FIIs) expect a return in the range of 13–18%; these are well above the actual returns generated by Indian solar projects.[51] Therefore, a low returns scenario does pose a challenge in acquiring finance for solar projects.

4.1.4 Asset risk

The financial health of solar projects is decided based on both the project and the developer's credit ratings. As assessed by experts, the technical soundness of parameters (track record of stable operations, regular revenue receipts, and debt-service coverage ratio) is vital for positive perception. In contrast, commissioning delays, revenue delays, and underperforming PLF (plant load factor) can lower the project ratings.[52] Implementation can also get delayed due to land acquisition and construction of transmission lines. Moreover, funding delays can arise while raising debt or equity instruments in the project's

46 Ministry of Power, 'UDAY Scheme', n.d., https://www.uday.gov.in/about.php.

47 Anupam Chatterjee, 'Madhya Pradesh Cracks Whip, Cancels Solar PPAs Signed with Canadian Firm's India Unit Sky Power Solar', Financial Express, 7 September 2017, https://www.financialexpress.com/economy/madhya-pradesh-cracks-whip-cancels-solar-ppas-signed-with-canadian-firms-india-unit-sky-power-solar/844434/.

48 Labanya Prakash Jena, Chavi Meattle, and Gireesh Shrimali, 'Getting to India's Renewable Energy Targets: A Business Case for Institutional Investment' (Climate Policy Initiative, 2018), https://climatepolicyinitiative.org/wp-content/uploads/2018/03/Getting-to-Indias-Renewable-Energy-Targets-A-Business-Case-for-Institutional-Investment.pdf.

49 Devjyot Ghoshal, 'Solar Is Now Cheaper than Coal-Based Electricity in India, but the Math Makes No Sense', The Quartz, n.d., https://qz.com/india/984656/solar-power-is-now-cheaper-than-coal-based-electricity-in-india-but-the-math-makes-no-sense/.

50 MERCOM, India, 'SECI's 2 GW Solar Auction Gets India a New Record-Low Tariff of ₹2.36/KWhSECI's 2 GW Solar Auction Gets India a New Record-Low Tariff of ₹2.36/KWh', 30 June 2020, https://mercomindia.com/seci-solar-auction-india-record-low/#:~:text=The%20Solar%20Energy%20Corporation%20of,2.44%20(~%240.032)%2FkWh.

51 Jena, Meattle, and Shrimali, 'Getting to India's Renewable Energy Targets: A Business Case for Institutional Investment'.

52 Subramanian, S., 'India Ratings Assigns Parampujya Solar Energy 'IND A', Outlook India Ratings & Research Press Release, November 2017, https://www.indiaratings.co.in/PressRelease?pressReleaseID=29735&title=India-Ratings-Assigns-Parampujya-Solar-Energy-%E2%80%98IND-A-%E2%80%99%3B-Outlook-Stable.

construction phase. As a result, a mismatch develops between investors' funding requirements and the existing scenario. These aspects can hamper financing courtesy an asset risk.[53]

4.1.5 Capital risk

Lack of investable securities and increasing borrowing are posing a capital risk in the domestic market, causing a drop in domestic investment in the solar sector. Institutional investors prefer to invest in investment vehicles (either debt or equity-type) such as green bonds (GBs) or infrastructure debt funds (IDFs) as debt, and infrastructure investment trusts (InvITs) as equity finance vehicles (description of each of these instruments are provided later in Section 5.2 of this paper). However, these vehicles' efficiency is subject to the availability of operational projects and their credit quality. While IDFs face specialization issues, GBs are only offered for a very few projects and that too at the corporate level. The limited availability is also affected by capital market conditions in both domestic and international markets. Therefore, the capital risk could also be a consequence of asset and credit risks.

4.1.6 Evolving policy landscape

A changing policy (domestic and foreign) environment affects project planning and timelines, potentially impacting investment flow cycles. A recent example of such an instance is in Andhra Pradesh in November 2019 (Box 2).

Box 2: Revisions to solar policy in Andhra Pradesh

In November 2019, the Andhra Pradesh government made several major revisions to its existing 2018 Solar Policy. These changes were based on a statutory audit report that stated that a few of the existing policies had caused a spike in the power purchase costs and affected the financial position of DISCOMs in the state.

Broadly, the amendments made by the government were as follows:

» Transmission and wheeling charges to be determined by Andhra Pradesh Electricity Regulatory Commission (APERC), in contrast to earlier exemptions offered to solar projects

» Energy banking (permitting banking of 100% energy all year round) no longer included given the mechanism's limited benefit to DISCOMs

» APERC to fix tariffs in the range of the difference between pooled variable cost and balancing costs

» Government land procurement allowed only on a lease-hold basis unlike advanced possession as per the PPA

Moreover, courtesy expert consultation, the paper discusses additional challenges affecting foreign investments, which are listed as follows:

» Complexities in taxation and regulation mechanisms that could potentially hinder the investment flow or ongoing projects could face legal concerns

53 Shrimali, 'Instruments to Mitigate Financial Risk in Indian Renewable Energy Investments'.

- Socio-environmental acceptance of projects to minimize excess resource utilization (e.g., water consumption) and control damage to plant infrastructure
- Limited clarity (from an investment standpoint) on RE procurement targets, predictability in charge in terms of open access, curtailment issues, and land availability
- Delay in clearance of Power Sale Agreements (worth 17,500 MW) by State Electricity Regulatory Commission[54] to meet RPO obligations (some payment delays pending due to annual realizable revenue approvals)
- Issues with distributed solar (having insufficient scale), developers (lack of collateral, and satisfactory debt service coverage ratio)
- Trade disruptions, such as a CRISIL report[55] estimated 3 GW of solar projects, worth INR 16,000 crore, missing out on their scheduled commercial operation date (SCOD) owing to the trade and supply chain disruption, specifically with China

Thus, all these risks are interrelated, affecting each other in different ways. Therefore, experts have identified special de-risking measures to address the mentioned risks.

4.2 Potential de-risking and market-based instruments

Risk mitigation is critical for RE projects, given their enormous initial capital costs. The following instruments (Figure 6) can potentially lower risks and attract higher capital inflow. A few of these measures are still evolving, while the rest are fully operational in India.

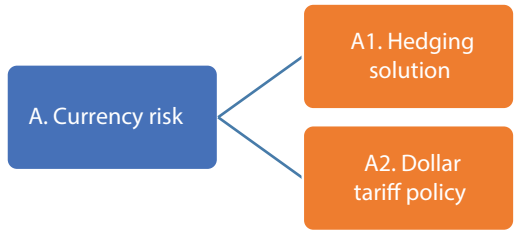

Figure 6: Measures for currency risk

4.2.1 Measures for currency risk

A1: Hedging solution

In addition to interest rate swap agreements, a suggested measure against currency risk is a hedging solution – a third-party agency that aims to buffer any additional cost to the solar developer. The project developer bears the foreign exchange currency risk in usual circumstances, given that they borrow money directly from the investor. However, in the presence of a hedging agency, the borrower can avoid this additional expense. The hedging agency covers the difference between the market price and the contracted exchange rate (if the rate goes up) but receives the difference if the rate goes down. Figure 7 shows the hedging process.

However, the conventional market rate of hedging usually hovers around 6-7%, and an alternate government-recognized hedging process could prove to be a more economical option for India's solar energy sector. Moreover, a CPI study[56] offered a cost-effective hedging method that potentially offers a 10-year hedging rate 50% lesser than the market rate. Therefore, one can infer that the preference for a long-term alternative approach is a much-needed step towards de-risking the currency fluctuation and boosting investment flow.

54 SECI, 'Standard Power Purchase Agreement for Procurement of ..... MW Wind-Solar Hybrid Power on Long Term Basis', n.d., https://www.seci.co.in/Upload/Tender/SECI000016-8821861-StandardSECI-HPDPPA_1200MWT3_finaluploaded.pdf.

55 CRISIL, 'CRISIL's Criteria for Rating Solar Power Projects', 2019, https://www.crisil.com/mnt/winshare/Ratings/SectorMethodology/MethodologyDocs/criteria/Criteria%20for%20rating%20solar%20power%20projects.pdf.

56 Shrimali, 'Reaching India's Renewable Energy Targets Cost-Effectively: A Foreign Exchange Hedging Facility'.

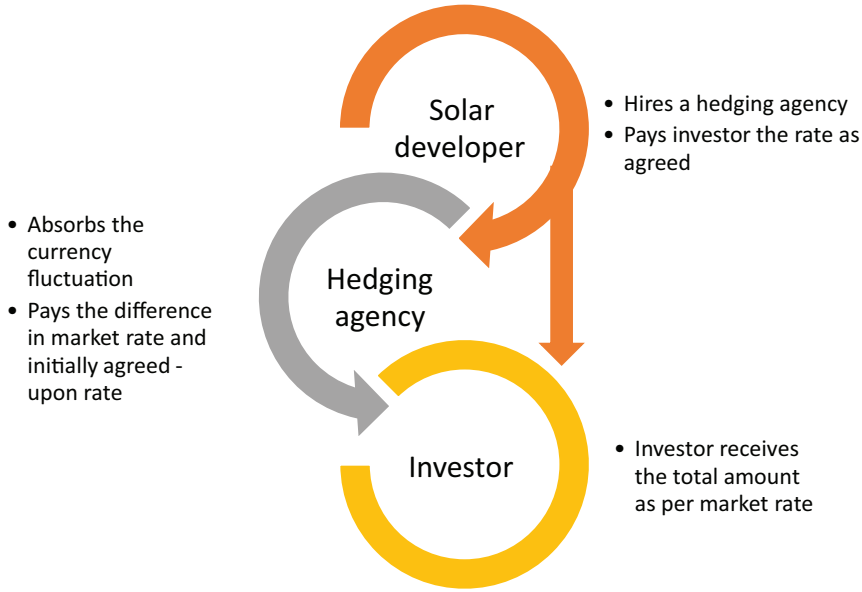

Figure 7: Hedging process

In the eventuality of government-recognized hedging, a potential government nodal agency could be the RBI (eventually overseeing this option) in India; implementers could be the Indian Renewable Energy Department Agency (IREDA), State Bank of India (SBI), and India Infrastructure Finance Company Limited (IIFCL).

A2: Dollar tariff policy

A study[57] identified dollar tariff policy as a potential alternative to hedging. The solution offers a dual arrangement: (a) USD tariff agreement between the developer and the third party, and (b) INR agreement between the third party and the off-taker. Additionally, the third party offers a twin payment buffer (which plays a vital role during the complete project operation) by absorbing exchange rate fluctuations on the developer's side and payment delays on the off-taker's end.

4.2.2 Measures for counterparty risk

Figure 8 lists some of the measures that can be undertaken to address counterparty risks.

B1. Infrastructure debt funds

Introduced by the Reserve Bank of India[58] in 2013, these investment vehicles aim at pushing forth the inflow of long-term debt into the solar energy sector (**Figure 9).**

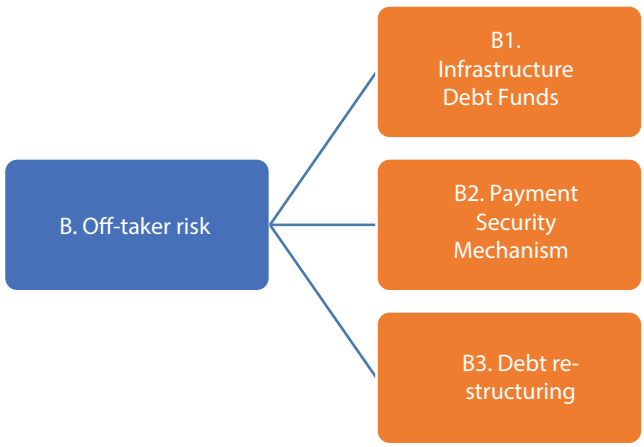

Figure 8: Measures for counterparty risk

57 Chawla, 'Landscape Assessment Of State - Level Climate Financing Options' (SSEF, 2016), https://shaktifoundation.in/wp-content/uploads/2020/04/Landscape-Assessment-of-State-Level-Climate-Financing-Options.pdf.

58 Ministry of Finance, 'The Indian Infrastructure Debt Funds (IDFs)', n.d., https://finmin.nic.in/infrastructure-debt-fund.

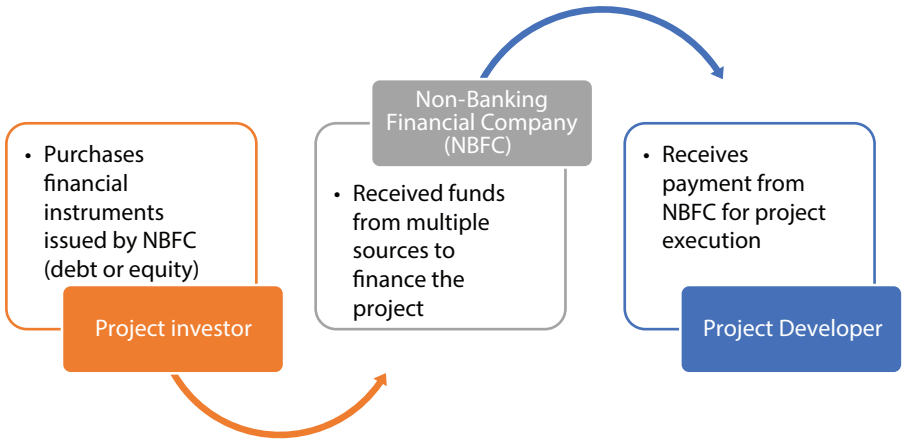

Figure 9: Infrastructure debt funds

IDFs could either be a SEBI-regulated mutual fund or RBI-managed NBFC,[59] serving as financial intermediaries and pooling in long-term saving instruments such as pensions and insurance funds. In addition, they provide due diligence, monitoring, and financial structuring skills for infrastructure projects. IDFs are affected through a tri-partite agreement between the investor, developer, and off-taker.

B2. Payment security mechanism

Government-sponsored guarantee mechanisms such as PSMs help provide interest-free working capital to the projects in the event of off-taker payment delays (Figure 10) and add a risk premium to debt cost.[60]

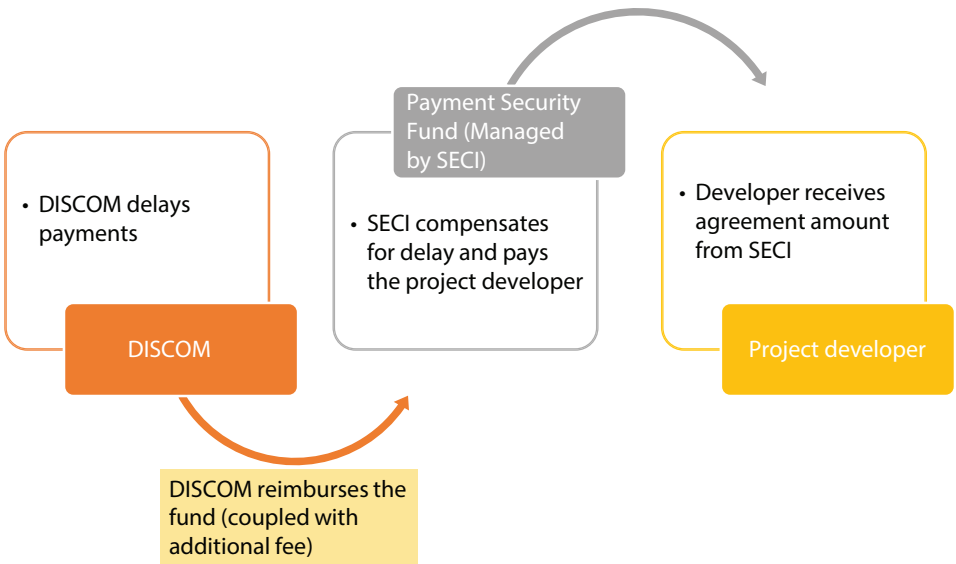

Figure 10: Payment security mechanism

59 RBI, 'Infrastructure Debt Funds', n.d., https://m.rbi.org.in/Scripts/FAQView.aspx?Id=90.

60 Vinit Atal, 'Addressing Off-Taker Risk in Renewable Projects in India: A Framework for Designing a Payment Security Mechanism as a Credit Enhancement Device' (Climate Policy Initiative, May 2018), https://climatepolicyinitiative.org/wp-content/uploads/2018/05/A-Framework-for-Designing-a-Payment-Security-Mechanism-as-a-Credit-Enhancement-Device-4.pdf.

PSM reduces debt cost by improving the overall project credit rating and boosting its investment-grade status. The mechanism involves an agreement between the DISCOM, developer, and SECI. First launched in India under the Jawaharlal Nehru National Solar Mission (JNNSM)-Phase I, the mechanism has evolved under SECI's supervision. SECI had proposed an INR 1500 crore payment security fund to finance solar developers via the VGF scheme,[61] with INR 500 crore (of the allotted INR 1074 crore) disbursed as of November 2020.

B3. Debt restructuring

Government-sponsored schemes like UDAY (as mentioned previously in Section 5.1) focuses on institutionalizing debt restructuring. This scheme aims to reduce the cost of interest and power purchase, enhance operational efficiency, and infuse more financial discipline into DISCOMs. Moreover, the restructuring improves the ability of DISCOMs to honour PPAs, thereby alleviating off-taker risk and influencing investors' risk perception in the Indian solar market. In India, the key initiators are the central and state governments. As per UDAY, a significant share of the debt is absorbed by the state governments, allowing developers' and off-takers' credit ratings to go up and potentially making them more investor-friendly. However, not all states are under the UDAY scheme's ambit, making it more challenging to limit this risk.[62]

4.2.3 Measures for RoI risk

Figure 11 gives a representation of the measures to minimize RoI risks.

Figure 11: Measures for RoI risk

C1. Infrastructure investment trusts ‹H4›

Securities and Exchange Board of India's (SEBI) InvITs[63] are similar to YieldCo financing models (growth-oriented publicly traded corporations created to hold operating assets, generating long-term, low-risk cash flows)[64] (Figure 12).

These instruments manage high financial risks such as: 1) transaction costs while buying assets, 2) aiding in selling these assets, and 3) increased risk absorption in the event of a single investment compared to an investor pool. InvITs ensure that projects are more long-term, investment-friendly with low-fluctuating yields, and distribute project cash flows as dividends to shareholders. Thus, they ensure the liquidity of these assets, providing a higher RoI in the future, which could fund delayed projects. SEBI mandates InvITs' project assets a minimum of 80% revenue-generating status.[65,66]

61 Saur Energy News Bureau, 'SECI Setting up of Rs 1500 Cr Payment Security Fund for VGF Scheme under JNNSM', 2016, https://www.saurenergy.com/solar-energy-news/seci-setting-up-of-rs-1500-cr-payment-security-fund-for-vgf-scheme-under-jnnsm.

62 Ministry of Power, 'UDAY Scheme'.

63 SEBI, 'Securities and Exchange Board of India (Infrastructure Investment Trusts) Regulations, 2014'.

64 RE World, "Understanding the YieldCo Structure for Renewable Energy Project Finance."

65 Bridge to India, 'Is There a Case for Solar InvITs', n.d., https://bridgetoindia.com/press/case-solar-invits/.

66 SEBI, 'SECURITIES AND EXCHANGE BOARD OF INDIA (INFRASTRUCTURE INVESTMENT TRUSTS) REGULATIONS, 2014'.

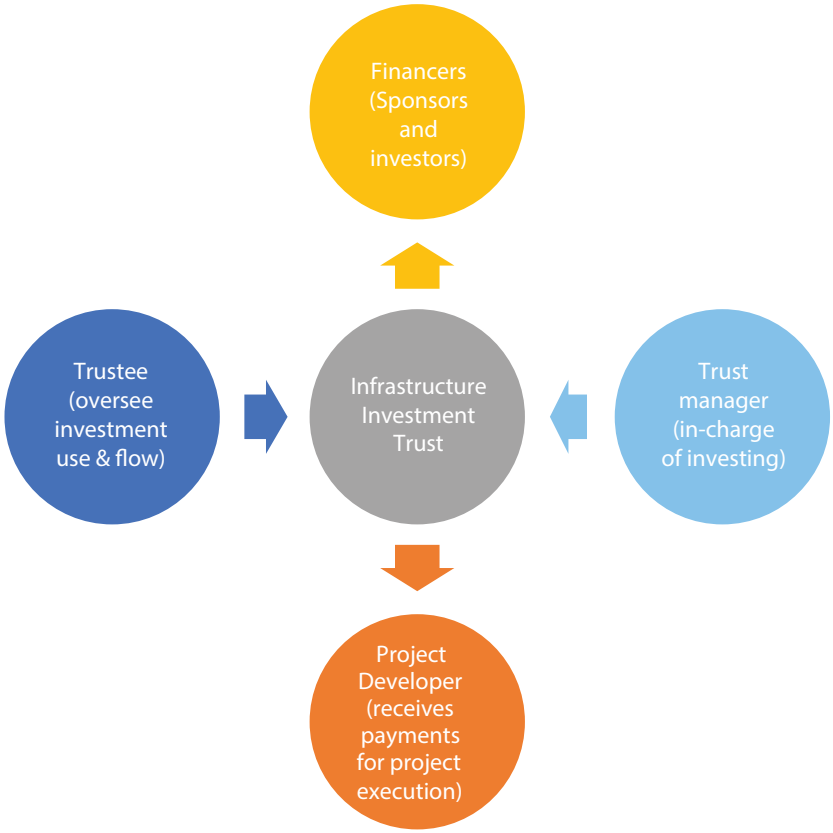

Figure 12: Infrastructure investment trust

4.2.4 Measures for asset risk

In Figure 13, the measures to deal with asset risk are explained.

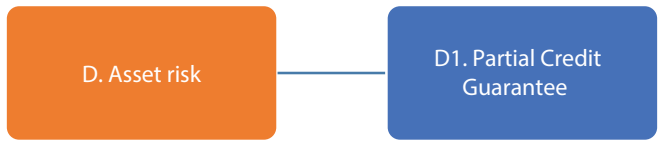

Figure 13: Measures for asset risk

D1. Partial credit guarantee mechanisms

The partial credit guarantee mechanism (PCGM) provides credit enhancements for solar projects (Figure 14). The government offers a payment guarantee over a certain proportion of the borrowings to promote the project's credit rating and lower the risk premium charged by the investor over and above the risk-free rate.

As per the Atmanirbhar Bharat Abhiyaan relief package announced in July 2020 (as a post-COVID-19 measure), the central government initiated the PCGM scheme 2.0. The intent was to provide a portfolio guarantee for the public sector banks (PSBs) purchasing bonds and commercial papers with an AA rating and below.[67] (Refer to Annexure III to see all benefits for the power and RE sectors via the Union Budget FY21-22 and the Atmanirbhar Bharat Abhiyaan). However, institutional investors are still limited to investing in bonds with high credit ratings, coupled with a regulatory restriction on supporting only up to 10% of the offering of renewable bonds with PCGMs, leading to a high transaction cost for investors' low institutional

67 PIB, 'Cabinet Approves Modifications in the Existing "Partial Credit Guarantee Scheme (PCGS)" Portfolio Guarantee for Purchase by PSBs of Bonds or Commercial Papers (CPs) with a Rating of AA and Below'.

funding availability in India.[68] An impact observed previously was the solar project in Gujarat, which acquired USD 58.5 million capital from bonds with AA+ ratings due to the IIFCL-ADB partial credit enhancement facility.[69] In addition to the PCGM scheme 2.0, if more international organizations collaborate as a long-term measure, solar projects in India can leverage higher credit ratings of these institutions to reduce borrowers' risk premium and further lower finance costs in a sustained fashion.

4.2.5 Measures for capital risk

In Figure 15, some measures to combat capital risk are mentioned.

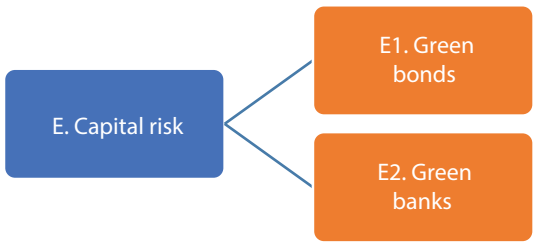

Figure 15: Measures for capital risk

E1. Green bonds

Green bonds or "masala" green bonds are similar to regular bonds except that they are issued to finance only green projects[70] (Figure 16).

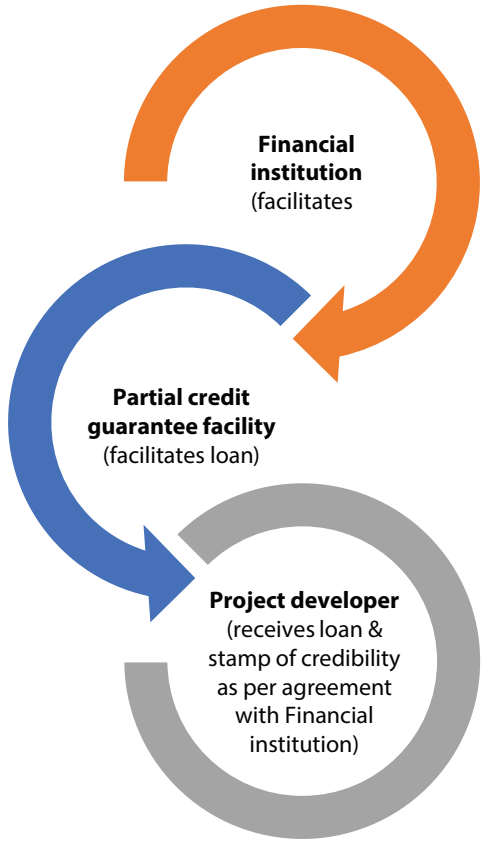

Figure 14: Partial credit guarantee mechanism

These bonds aid in capital raising and addressing financing gaps and banking limitations. Green bonds mobilize debt capital from foreign markets, benefitting projects with lowered interest and longer-term loans. World Bank is a critical green bond issuer at a global level.[71] In India, Yes Bank was the first to launch these bonds, which was later subscribed by IFC and listed on the London Stock Exchange. IREDA, NTPC, and REC are significant players that have issued green bonds with a coupon rate offering of 7.5%.[72] Despite a strong appetite for green bonds, the major challenge for investors is that solar projects may not necessarily provide sustainable outcomes. However, through a government or potential PPP mode of regulation and improved credit enhancement, projects can be better-tuned for green bond issuance. As of 2020, the Luxembourg Stock Exchange's discussions with Indian conglomerates to issue green bonds can prove to be a potential game-changer towards RE investments in India.[73]

68 Chawla, 'Landscape Assessment of State - Level Climate Financing Options'.
69 Ibid.
70 SEBI, 'Disclosure Requirements For Issuance and Listing Green Bonds'.
71 World Bank, 'World Bank's First Green Bonds Denominated in Indian Rupee', 2015, https://www.worldbank.org/en/news/press-release/2015/01/29/world-banks-first-green-bonds-denominated-in-indian-rupee.
72 S Agarwal and T Singh, 'Unlocking the Green Bond Potential in India' (TERI, 2018), https://www.teriin.org/sites/default/files/2018-05/Report%20under%20NFA%20grant_2018.pdf.
73 Kirtika Suneja, 'In Talks with Indian Firms to Issue Green Bonds: Luxembourg Stock Exchange CEO', ET Markets, January 2020, https://economictimes.indiatimes.com/markets/bonds/in-talks-with-indian-firms-to-issue-green-bonds-luxembourg-stock-exchange-ceo/articleshow/73438883.cms?from=mdr.

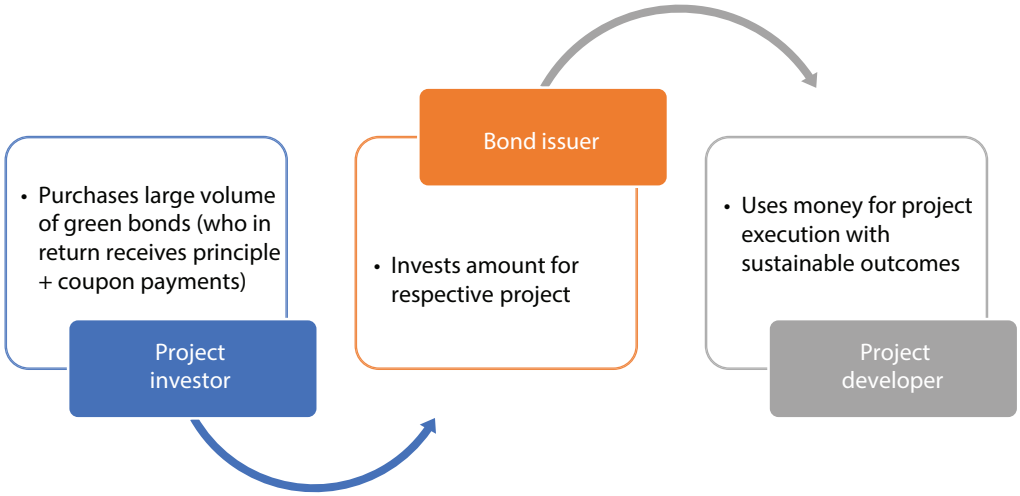

Figure 16: Green bond mechanism

E2. Green banks

Partnering with private lenders, green banks are public/quasi-public institutions created to mitigate several financial risks and pave the way for better future financing opportunities. They are focused on green financing projects through offerings of revolving loan funds, long-term-low-interest loans, insurances-like loans, risk guarantees, to name a few. Additionally, they bundle small solar projects to lower financing costs and risks and provide bond securitization at investment. Further, green banks can mitigate currency risks through escrow account mechanisms that absorb payment defaults. Thus, they help mitigate the gap between perceived threats in the coming future associated with clean energy projects. Citing an example, the United Kingdom (UK) Green Investment Bank has invested in over 70 projects globally, including India. Presently, in India, IREDA (a pioneer in solar financing), Indian Infrastructure Finance Company Limited (IIFCL), Power Finance Corporation (PFC), and Rural Electrification Company (REC) function on similar green bank lines.

4.2.6 Insurance

Insurance provides the necessary cover against specific risks at various project operations points, namely, loss or damage to material and infrastructure. For instance, PV modules (making up 50–60% of the project cost) have a supplier's performance warranty coverage for 25 years.[74] Each project's insurance ensures the risk transfer mechanism approach in solar parks would benefit all the owners, making business more sustainable. The MoFN (Financial Services Department) and Insurance Regulatory and Development Authority of India (IRDAI) recognize insurance providers including IFFCO-Tokio GICL, HDFC Ergo GICL, The New India Assurance Co. Ltd, ICICI Lombard GICL, and Cholamandalam MS GICL. [75]

4.3 Summary of suggested risk mitigation measures

Table 5 summarizes the suggested measures, listing the benefits and limitations (wherever applicable) for de-risking financial and investment risks.

74 Jenny Heeter, 'What to Know about a Solar Panel Warranty', n.d., https://news.energysage.com/shopping-solar-panels-pay-attention-to-solar-panels-warranty/.

75 Manu Tayal, 'MNRE Shares List of Insurance Providers for Solar Power Plants', Saur Energy International, January 2020, https://www.saurenergy.com/solar-energy-news/mnre-shares-list-of-insurance-providers-for-solar-power-plants#:~:text=Further%2C%20the%20various%20products%20offered,plant%20protect%20policy%20among%20others.

Table 5: Summary of risks and mitigation measures

Risk	De-risking instrument/ market measure	Benefits	Limitations
Currency risk	Currency hedging	» Lowers cost to the developer	» Market hedging cost is high in India
	Dollar tariff policy	» Twin buffer absorption of rate fluctuations	» Applicable for select projects
Counterparty risk	Infrastructure debt fund	» Regulated mechanism » Robust oversight » Openness to foreign funds	» Limited effect of measure owing to the financial health of DISCOMs
	Payment security mechanism	» Interest-free working capital » Enhances project credit rating » Well-regulated system in India	» Presently offered to select projects
	Debt restructuring	» Full-fledged government scheme » Reduced interest cost » Enhancement of operational efficiency » Push forth honouring PPAs	» Select states have adopted the scheme
RoI risk	Infrastructure investment trust	» Ensures projects are more long-term investment secure » Dividends to shareholders	» Contingent on specific revenue-generating status (applicable for select projects)
Asset risk	Partial credit guarantee mechanism	» Lowers risk premium cost to the developer » Enhances project credit rating	» Institutional investors presently limited to investing in AA and above » Cap on investing only up to 10% of RE bond offerings
Capital risk	Green bond	» Exclusivity for green projects » Lower risks than conventional bonds	» Limited means to unlock institutional capital
	Green bank	» Exclusivity for green projects » Bundling of projects to reduce cost » Sizeable number of investments in India	» Limited means to unlock institutional capital
Overall financial and investment risk	Insurance	» Performance warranty coverage for long term » Government-recognized insurance providers	» Specific risk coverage

As we see, these instruments aid in curtailing risks to some extent but need strengthening and more regulation. A potentially more robust de-risking framework could be worked out with the help of the government's intervention and multilateral financing institutions. Additionally, given limited public resources for investments, these instruments could gain more traction in the coming years with a growing demand for RE and RE-based solutions. With the added financing stress courtesy the COVID-19 pandemic, the government, policymakers, and financial institutions would need to re-think the BAU in the coming times and bolster the economy through improved reforms.

5. THE ROAD AHEAD

Power Technology (Global Data Energy) projected a revised estimate for India's total solar PV installation capacity – from 11.35 GW to 9.08 GW (Figure 17).

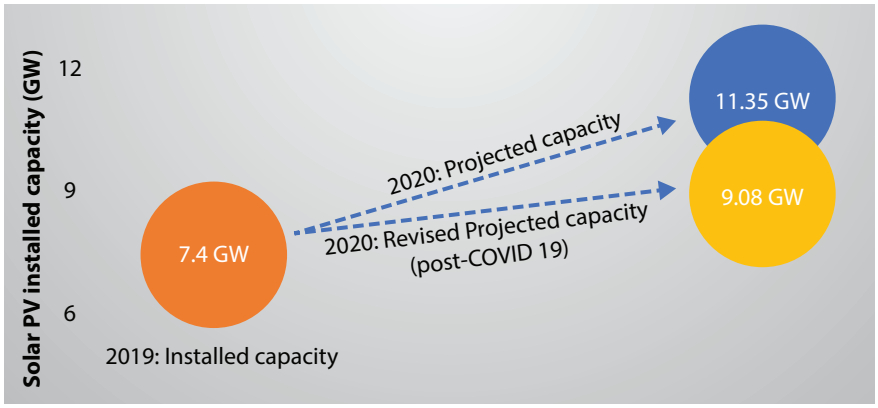

Figure 16: Green bond mechanism

The reason impacting a revised projection was the series of lockdowns and supply chain disruptions courtesy the COVID-19 outbreak, stalling and affecting further domestic development and technology imports, thereby adding to the developers' financial stress. As the world continues to grapple with the pandemic and an overall strained economy, there is a greater need to re-instil investor confidence[76] in the solar energy sector and address the various challenges simultaneously.

In order to re-instil investor confidence[77] and address the different challenges, this paper advocates the following measures as suggested via the MAP approach, i.e. through expert consultation with subject experts and industry players. The actors identified are electricity regulatory commissions (centre and state), government-recognized agencies in the renewable energy field (SECI and IREDA), public and private sector banks, and financial and non-financial banking institutions.

76 Gagan Sidhu and Kashish Shah, 'The Case for Indexed Renewable Energy Tariffs: An Interim Solution To Buy Time for Indian Discoms To Make Durable, Long-Term Reforms' (CEEW, October 2020), https://cef.ceew.in/solutions-factory/publications/the-case-for-indexed-renewable-energy-tariffs.

77 Ibid.

5.1 Minimizing existing risks

The existing de-risking instruments and supporting market mechanisms play a critical role in addressing the challenges associated with investments. The following recommendations build on existing measures and seek to strengthen them further:

5.1.1 Alternative currency hedging solutions

In addition to existing currency swaps and currency position measures for long-term lending, experts suggest a few alternate hedging options, as listed below:

A government-recognized nodal agency (such as IREDA) to:

» Issue USD bonds/mutual funds overseas and provide USD loans well. The mechanism would involve a hedging cost at the prescribed hedging rate (2020 experienced one of the lowest hedging rates in the past nine years.)[78] The developer could be charged a reduced risk premium at a government-regulated rate, and the nodal agency's presence would boost the credit towards the entire hedging process;

» Issue USD bonds overseas. The currency exposure is centrally hedged by the government, with the agency issuing INR loans to the project developer. The mechanism would rule out the whole added cost of hedging to the developer – who would only be charged a reduced risk premium at a government-regulated rate;

» Offer long-term INR loans (similar to the "masala" bond issuance design) offsetting the hedging costs for the solar developers.

5.1.2 Expanding of market options

Markets would need a sincere capital infusion to overcome the economic contraction[79] and revive investor confidence. Lowering the cost of guarantee and transaction fees, and increasing the cap for foreign players' holdings for the RE sector are necessary steps in this regard. Additionally, domestic banks and other financial and non-financial banking companies must play a more significant role in deepening financial inclusion by providing lucrative financial incentives and loan offerings to the developers and investors.[80]

Among market-based options, solar-based insurance is an evolving area, with listed players (as indicated in Section 5.2 of this paper) providing select financial products. In addition, based on expert consultation, procurement agencies could include a project performance-based insurance guarantee/product within their bidding guidelines (Figure 18). The financial product would address two major concerns of the volatilities of solar radiation and solar equipment performance. First, the insurance premium charged to the developer would factor in the required due diligence process by the insurance provider for this product. Second, such a financial product would help address the asset risk (due to a drop in performance) and improve the overall credit rating of the project. Moreover, the financial offering could provide an additional cover to the project developers concerning other climate-borne risks.

78 Anurag Joshi, 'Hedging Costs at Decade Low Lure India Firms Back to Dollar Debt', 24 July 2020, https://www.bloombergquint.com/economy-finance/hedging-costs-at-decade-low-lure-india-firms-back-to-dollar-debt.

79 'India's Economy Rebounds at Faster Pace than Expected in Q2 as GDP Contraction Slows to 7.5%', Economic Times, November 2020, https://economictimes.indiatimes.com/news/economy/indicators/economy-rebounds-at-faster-pace-than-expected-in-q2/articleshow/79456372.cms.

80 Expert consultation

Figure 18: Solar insurance

Solar insurance process

1. **Request for insurance**: Given the selective nature of financial products offered, the solar developer needs to factor in performance-based insurance as part of the project bidding guidelines. By doing so, the project developer ensures a secure working environment and offers credibility to investors upfront from the time of commissioning to de-commissioning the project.
2. **Selecting insurance provider**: An insurance provider is selected based on their market credibility, past performance, pay-out times, product offerings, and agreed-upon price among the parties involved. Section 5.2 lists out some of the best market players identified by the Indian government, who would tailor an insurance package for the project.
3. **Insurance specifics**: Upon selecting a suitable provider, the insurance agreement/document drafted for the complete project life cycle would include insurance for (not limited to) the following:
    - Solar radiation volatilities
    - Solar equipment performance (technical and material aspects)
    - Warranty insurance against insolvency and bankruptcy
    - Climate-borne risks

The trigger for coverage and pay-out is subject to the scale and scope of damage per aspect.

4. **In**surance premium: There would be an annual/quarterly/monthly premium cycle with the developer paying a ~0.15% to 1% of the total project cost to the insurer.
5. Project review: The insurer would provide a guaranteed amount subject to the scale and scope of damage through a third-party review of the project.

5.1.3 Minimizing PPA-linked defaults

As per experts,[81] disregarding PPA guidelines – or worse, the absence of proof of agreement itself – hurts the capital inflow and sustainability of the sector at large. The key reasons (as discussed in Section 4 of this paper) are cheaper competitive tariffs, varying tariff ranges between the centre and the state, evolving policy landscapes, and market fluctuations that cause contracts to fail.

As per expert consultation, SECI (in conjunction with the DISCOMs and developers) could ensure PPAs mandatorily include a project-specific de-risking plan (similar to World Bank's Sustainable RE Risk

81 Pratha Jhawar, 'Renewable Energy: It Is Crucial to Honour Signed Contracts', Down To Earth, January 2020, https://www.downtoearth.org.in/blog/energy/renewable-energy-it-is-crucial-to-honour-signed-contracts-68935.

Mitigation initiative).[82] This plan could factor in possible contingencies upfront. For instance, a certain percentage of guarantee/buffer amount is offered as a penalty to the parties involved - based on the severity of the deviation from the agreement - than creating any future uncertainties. Such a measure would boost investor confidence and credibility of the project workflow.

Additionally, experts also suggest that capping solar tariffs could prove vital in preventing rates from falling too low during auctions, thereby overcoming concerns faced by several solar developers who have no takers for the agreed-upon tariff rates in the past.

Moreover, to promote an overall RE awareness and transparency on tariffs for the consumers, the California State Energy Commission is pushing forth renewable-energy-sourced power across California (that sources 50% of its power from RE)[83] through mandates and incentives beneficial to the state consumers. One such action is the **"Power Source Disclosure"**[84] – a programme that provides a complete break-up of the power sources (as purchased by the utility) to the end-consumer in the form of power content labels. **A similar disclosure by DISCOMs** would facilitate consumers' understanding of the growing demand for renewables and encourage a greater RE preference. Moreover, with the Union Budget proposal[85] for consumers to decide on the DISCOMs, this could create a consciousness to choose a utility that offers a more significant share of clean energy in its mix. In effect, this could result in a greater demand for renewable-energy-sourced power – benefitting more developers and DISCOMs who would procure more RE-based power.

5.2 Promoting wealth and job creation

Sustainable Development Goal (SDG) 8 focuses on increasing sustainable economic growth and improved employment scenarios going into the future.[86] With the global economy still grappling with the pandemic, there is a greater need to push forth SDG Goal 8 through improved sustainable financing, promotion of job opportunities, maintaining the overall quality of energy access across the country, and risk mitigation. Experts suggest the following measures:

5.2.1 Providing an impetus to green financing

There is a greater need to unlock the institutional investment potential into green or sustainable financing and expand the overall investor pool. Experts suggest an alternative investment fund (modelled on an infrastructure investment trust or Yield Co mechanism as indicated in Section 4.2.3 of this paper). This green debt financing mechanism would provide stable capital, revenues, and promote cost-effectiveness. A government-recognized agency (such as NBFC) could act as the portfolio/fund manager and provide the required regulatory oversight. The fund could be financed via a platform – offering financial products (such as bonds) with a range of tenors (that serve as lock-in periods) and coupon rates to attract a broader range of investors, as indicated in Table 6.

82 World Bank, 'Sustainable Renewables Risk Mitigation Initiative (SRMI)', n.d., https://www.worldbank.org/en/topic/energy/brief/srmi.

83 USEIA, 'California Profile State Profile and Energy Estimates', n.d., https://www.eia.gov/state/analysis.php?sid=CA#:~:text=The%20California%20renewable%20portfolio%20standard,%2C%20and%20100%25%20by%202045.

84 California Energy Mission, 'Power Source Disclosure', n.d., https://www.energy.ca.gov/programs-and-topics/programs/power-source-disclosure.

85 PTI, 'Union Budget 2021: Govt Proposes Rs 3.05 Lakh Cr Scheme to Revive Discom, Framework to Choose Distributors', Financial Express, 1 February 2021, https://www.financialexpress.com/budget/union-budget-2021-govt-proposes-rs-3-05-lakh-cr-scheme-to-revive-discom-framework-to-choose-distributors/2184642/.

86 United Nations, 'SDG Goal 8', n.d., 8, https://sdgs.un.org/topics/green-economy.

Table 6: Alternative investment fund offerings

Alternative investment fund offerings	Institutional investors/financers	Corporate investors	Unitholders
Coupon/interest rates per annum (Percentage)	8–9%	6–7%	4–5%
Tenor (Years)	10–15	3–6	1–2

Additionally, these financial offerings could provide tax exemptions to its investors: more significant investments (with longer tenors) can be tax-free (in line with Section 10[87] of the Income Tax Act for bond premiums), and smaller investments (with shorter tenors) can be tax-saving (in line with Section 80CCF[88] of the Income Tax Act for tax-saving bonds).

5.2.2 Providing additional solar capital

Experts suggest a dedicated solar-centric capital/Capex provision under the Ministry of Micro, Small, and Medium Enterprises (MSME) thereby deepening the solar-sector financing across the country. Specified lending institutions (banks, financial and non-financial banking companies) facilitate the lending process (similar to MSME's Credit Linked Capital Subsidy for Technology Upgradation)[89] as given in Figure 19. The additional headroom would serve as a de-risking measure for small-scale solar developers to factor in potential financial risks throughout the project timeline and minimize capital risk.

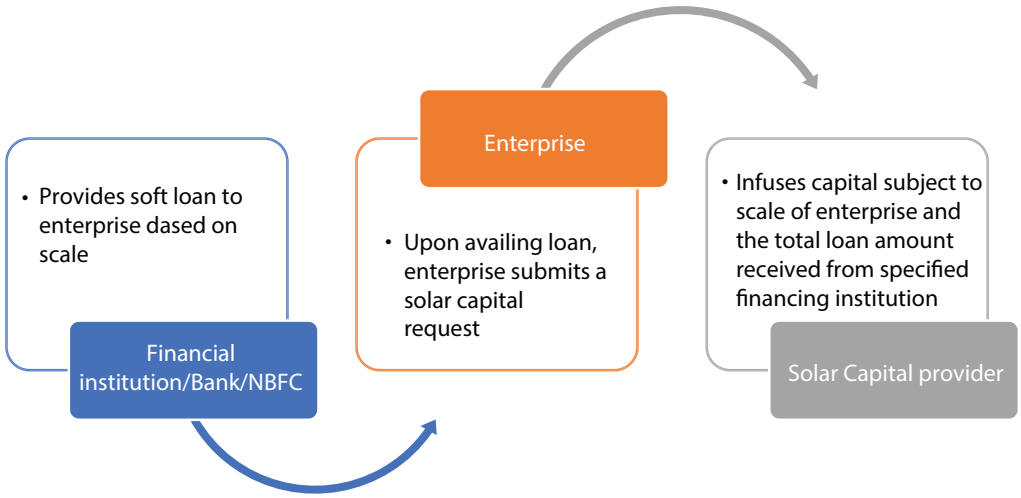

Figure 19: Solar capital provision

87 Income Tax Dept, 'Section - 10, Income-Tax Act, 1961-2018 CHAPTER III INCOMES WHICH DO NOT FORM PART OF TOTAL INCOME', n.d., https://www.incometaxindia.gov.in/_layouts/15/dit/mobile/viewer.aspx?path=https://www.incometaxindia.gov.in/acts/income-tax%20act,%201961/2018/102120000000071009.htm.

88 Income Tax Dept, 'Insertion of New Section 80CCF - Income Tax Department', n.d., https://www.incometaxindia.gov.in/Acts/Finance%20Acts/2010/102120000000010274.htm.

89 MSME, 'Government of India Development Commissioner (MSME) Ministry of Micro, Small & Medium Enterprises Credit Linked Capital Subsidy Scheme', n.d., https://clcss.dcmsme.gov.in/.

The solar capital itself could be disbursed as per Table 7.

Table 7: Solar manufacturing capital provisions

Solar capex	Micro enterprises	Small enterprises	Medium enterprises
Percentage of capital provision	25% of the loan amount	20% of the loan amount	15% of the loan amount
Upper capital limit (as per maximum investment under MSME)	INR 6.25 lakh (for an INR 25 lakh investment)	INR 1 crore (for an INR 5 crore investment)	INR 1.5 crore (for an INR 10 crore investment)

5.2.3 Creating more potential land-sharing models

The PM KUSUM scheme[90] advocates the scaling up of solar energy for the agriculture sector. One of the scheme's key components – Component A – pushes forth additional farmer income by installing grids/ plants via land-lease agreements with the farmers. Similar prospective hybrid business models in the future could create more RE uptake by overcoming land-linked constraints and providing farmers with an opportunity in the equity share for power purchase (as an additional income source) without disrupting their agricultural occupation.

Table 8 indicates the measures as previously discussed along with a list of potential actors.

Table 8: Summary of recommendations

Recommendation	Expected outcome	De-risking effect	Potential actors
Alternative currency hedging	Government-driven hedging options to buffer cost to a solar developer	Minimizes currency risk for the solar developer by reducing or eliminating hedging cost	IREDA or government-recognized agency as a nodal body
Performance-based insurance	Address concerns of solar volatility and equipment failure	Minimizes asset risk by covering losses due to performance drop Minimizes credit risk by boosting the overall credit ratings by timely loss coverage	Insurance providers (such as HDFC, ICICI)
Green financing instrument	Unlock a greater potential of investors through an alternative green financing/ investment fund	Minimizes capital risk through a more extensive and more diversified investor pool that could address the present limitation of clean energy financing Offers an array of returns for each category of investor, thereby addressing RoI risk	IREDA (initiator/ issuer), NBFC (portfolio manager)

90 MNRE, 'PM KUSUM', 2020, https://mnre.gov.in/img/documents/uploads/8065c8f7b9614c5ab2e8a7e30dfc29d5.pdf.

Recommendation	Expected outcome	De-risking effect	Potential actors
Solar capital provision	Exclusive financing support to the solar sector	Minimizes capital risk for the small-scale developers through an assured top-up amount as Capex for any expenses	MSME, public sector banks
Land-sharing models	Revenue improvement via land-sharing with farmers	Minimizes asset risk through a more transparent and collaborative approach	SECI, DISCOM, and farmers (similar to PM KUSUM scheme)
Minimizing PPA-linked defaults	Capped rates, risk plans, and tariff awareness to minimize losses to a solar developer and prevent PPA defaults	Minimize counterparty and consequent credit risk by ensuring a more transparent and credible risk mitigation effort between the parties that would minimize payment defaults	Central and State Electricity Regulatory Commissions, SECI, allied regulatory bodies

Conclusion

With India taking significant strides towards its decarbonising agenda and attaining a net-zero status on emissions, the 450 GW goal of clean energy becomes all the more imperative. The government of India is pushing forth for more programmes and schemes towards the RE space, and it is also paving the way for more market players to work towards the clean energy agenda. As a result, a financial impetus is the need of the hour. And an immediate step is the de-risking of this financing goal. In conjunction with existing policies, expert-suggested measures would help minimize the concerning risks. An alternative hedging solution could bring down the borrowing costs for the developers. A performance-based insurance product considers minimizing a broader range of project risks. A solar capital top-up aims at incentivizing the small-scale solar segment. A push to sustainable financing would yield a broader range of investors. Alternative land-sharing models would be generating more revenue for the farming sector. And finally, overcoming the present PPA-linked concerns provides stronger cooperation and discipline among the players.

Collectively, these suggestions can bring about an all-inclusive solution towards curtailing financial risks and boosting investor capital. In this regard, MAP recommends a potential de-risking framework in the future project plans – one that captures all the listed risks and appropriate measures impacting the sector at various stages. A consortium of all the key MAP actors – investors, government, financial and banking institutions, policymakers, and other industry experts can design this framework. Such a plan would ensure a more credible pathway to project completion and help create a desired theory of change.

ANNEXURES

Annexure I3 (Refer to 3.Current Policy Landscape)

Examples of government-issued policies and guidelines

Policy	Observations/comments
Viability Gap Funding (VGF)	As part of the Central Public Sector Undertaking scheme in 2019, the MNRE sanctioned a VGF worth INR 8580 crore for projects (expected to be generating investment of INR 48,000 crore) and support domestic manufacturing[91] for the next four years
Long-Term Power Purchase Agreement (PPA)	Shapoorji Pallonji Infrastructure Capital signed a long-term PPA to sell 317 MW of solar assets to private equity firm KKR at INR 1554 crore (USD 204 million)[92]
Renewable Purchase Obligation (RPO)	Only states such as Karnataka, Rajasthan, and Tamil Nadu have met over 60% of their RPO targets. Most states do not comply,[93] given a lack of enforcement
Renewable Energy Certificate (REC)	REC sales jumped up by 79% for March 2020 vs 2019 (Power Exchange of India sold 0.32 million RECs vs 0.24 million)[94]
Multilateral & Bilateral Financing	World Bank is providing USD 100 million as concessional finance to push for solar projects in India[95]
Credit Guarantees	Indian Infrastructure Finance Company Limited (IIFCL)'s partial credit guarantee scheme improves bond credit ratings by infrastructure companies to AA (or higher) for refinancing The institution offers a 20% guarantee of the total project cost /40% in the case of a backstop guarantor (e.g., ADB, IFC, AIIB) but subject to an upper cap of 50% of the total cost[96]

91 MNRE, 'CPSU Scheme Phase II', n.d., https://mnre.gov.in/solar/schemes.
92 Dhanjal, 'Shapoorji Pallonji Arm to Sell Solar Assets Worth 1,554 Crore to KKR', April 2020, https://www.livemint.com/news/india/shapoorji-pallonji-to-sell-solar-assets-worth-rs-1-554-crore-to-kkr-11587965093987.html.
93 Saumy Prateek, 'Most States Fail to Meet RPO Targets with 27 Achieving Less Than 60%', January 2019, https://mercomindia.com/most-states-fail-rpo-targets/.
94 PTI, 'Green Certificate Sales up 79% at 8.38 Lakh Units in March', ET Markets, April 2020, https://economictimes.indiatimes.com/markets/stocks/news/green-certificate-sales-up-79-at-8-38-lakh-units-in-march/articleshow/75108201.cms.
95 World Bank, 'India: Developing Solar Energy to Meet Rising Demand for Electricity', October 2019, https://www.worldbank.org/en/about/partners/brief/india-developing-solar-energy-meet-rising-demand-electricity.
96 Ministry of Finance, 'India Infrastructure Finance Company Ltd (IIFCL)', n.d., https://financialservices.gov.in/banking-divisions/Financial-Institutions-and-others/India-Infrastructure-Finance-Company-Ltd-%28IIFCL%29?page=1.

Policy	Observations/comments
Payment Security Mechanism	The 750 MW Rewa Ultra Mega Solar Ltd (RUMS) is a joint venture of Madhya Pradesh Urja Vikas Ltd and SECI, with the MNRE as the project implementation agency and World Bank as one of the critical funding agencies. The novel four-tier REWA Payment Security Model is a remarkable example. The four layers are as follows: Tier 1: Letter of credit provided by off-takers, DMRC, and MPPMCL Tier 2: Payment security fund managed by Rewa Ultra Mega Solar (RUMS) Ltd Tier 3: MP government offering a state guarantee Tier 4: Payment security by agreeing to bear the cost in cases where a transmission outage lasts beyond 50 hours[97]
Green Energy Corridors	MNRE ensured an additional 10.3 GW renewable energy capacity added in 2019 to its transmission network under the Green Energy Corridor project[98]
Tax-Free Bonds	Government plans to raise INR 10,000 crore through its first-ever tax-free bond issuance (a post-COVID-19 economic measure). The mode of allotment would be done directly or via companies (REC, Power Finance Corp, NTPC)[99]
Accelerated Depreciation (AD)	Bidders allowed to claim income tax benefits as AD for the 4 MW Floating Solar Plus BESS tender at the Andaman Islands' post-SECI's fifth extension[100]
Renewable Energy Infrastructure Development (REID) Fund	As per Rajasthan's new solar policy, the government has successfully used this fund towards financing transmission lines, aiming at a 30 GW solar capacity[101]
Transmission & Wheeling Charge Exemptions	For projects set up for captive, third-party sale within the state of Rajasthan, or ones with a capacity of 500 MW (solar, wind, and wind-solar hybrid, with or absence of any storage), the charges are as follows: Solar projects set up for captive use and third-party sale: 50% over seven years Solar power projects with a storage system as well as repowered wind projects set up for captive use and third-party sale: 25% for seven years[102]

97 MERCOM, India, 'The Four-Tier REWA Payment Security Model Responsible for Low Bids', 2017, https://mercomindia.com/four-tier-rewa-payment-security-model-responsible-low-bids/.

98 Saumy Prateek, 'Nearly 10 GW of Renewable Capacity Added to Green Energy Corridor: RK Singh', July 2020, https://mercomindia.com/renewable-capacity-green-energy-corridor/.

99 Das and PM, 'Government May Raise up to Rs 10,000 Crore via Tax-Free Bonds'.

100 Ayush Verma, '5th Extension for SECI's 4 MW Floating Solar Plus BESS Tender', Saur Energy, May 2020, https://www.saurenergy.com/solar-energy-news/5th-extension-for-secis-4-mw-floating-solar-plus-bess-tender.

101 Rakesh Ranjan, 'Rajasthan Captive Solar Projects to Pay 50% of Standard Transmission & Wheeling Charges', March 2020, https://mercomindia.com/rajasthan-captive-solar-standard-transmission-wheeling-charges/.

102 Ibid.

Policy	Observations/comments
Subsidies	India's RE subsidy share for FY 2019[103]: Accelerated depreciation for wind and solar (INR 2778 crore) Solar parks and sizeable solar power (INR 1400 crore) Solar rooftop and other applications (INR 1667 crore) Viability Gap Funding scheme under the Jawaharlal Nehru National Solar Mission Phase-II (INR 1335 crore)
Clean Development Mechanism (CDM)	3.7 MW bundled wind power project at Priyadarshini Polysacks Ltd in Maharashtra[104]

Annexure II: Summary of critical findings from critical studies

Institution	Study	Key findings
Stanford University	Instruments to mitigate financial risk in Indian renewable energy investments	» Currency and off-taker risks identified as top two investment risks affecting RE sector financing » Currency risk can be reduced through steps such as decreased government borrowing and improving the balance of payment » Improving the financial health of DISCOMs can lower off-taker risk concerns » Policymakers to consider short-to-mid-term measures, i.e., potentially financing de-risking instruments (not currently in India) towards better risk mitigation
Climate Policy Initiative (CPI)	Solving India's renewable energy financing challenge: instruments to provide low-cost, long-term debt	» Well-designed financial instruments reducing debt cost, on a cost-effective basis, viewed vital for improving RE financing » Robust government-regulated mechanisms to minimize the risk of crowding out of private investments (reduces debt cost by 4.5% points and provide 10-year tenor) » IDF-Mutual Funds key to diversify risk, subject to a strong bond market (reduces debt cost by 3% points and provide 5-year tenor) » Partial credit guarantees viewed as potential de-risking instruments against policy risk and mobilizing private capital (reduces debt cost by 1.9% points and provide 5-year tenor) » FOREX liquidity facility is a suggested model for developers to avail low-cost, long-term foreign capital

103 ET Energy World, 'INFOGRAPHIC: Total Subsidies to Renewables in India for FY14-FY19', ET Energy World, April 2020, https://energy.economictimes.indiatimes.com/news/renewable/infographic-total-subsidies-to-renewables-in-india-for-fy14-fy19/75195882.

104 UNFCCC, 'Project 1009 : 3.7 MW Bundled Wind Power Project at Priyadarshini Polysacks Ltd. Dhulia District Maharashtra', 2010, https://cdm.unfccc.int/Projects/DB/RWTUV1174400034.93.

Institution	Study	Key findings
Council on Energy, Environment and Water (CEEW)	State of the Indian renewable energy sector: drivers, risks, and opportunities	» Off-taker risk, as a result of payment delays and PPA non-compliance and re-negotiations – a significant concern for developers and investors » Stricter measures such as enforcing contracts, retail tariff reforms, power deficit scenarios, and improved counterparty creditworthiness for scaling up RE uptake and improved financing » SAARC Framework Agreement for Energy Cooperation for improved energy security » Lowering curtailment risks through provisions in PPAs such as minimum off-take guarantees and monetary compensation for non-compliance » RE management centres (under the Green Energy Corridor) for improved RE forecasting and dispatch » Insurance and credit guarantees suggested de-risking instruments for private investments » Green investment banks are market-making institutions/ vehicles that facilitate the development of underserved clean energy market segments » Common Risk Mitigation Mechanism (CRMM) is a one-stop-guarantee for political underwriting risk, off-taker risk, and foreign currency risk of solar projects in emerging economies » CEEW's model – Grid Integration Guarantee (GIG) helps address tail-end curtailment risks and quantify the cost of grid integration for policymakers » Development of risk framework to address risks and risk-linked perceptions (ongoing work at CEEW)
International Renewable Energy Agency (IRENA)	Unlocking renewable energy investment: role of risk mitigation and structured finance	» Global RE investments to ideally touch USD 500 billion (2020) and 900 billion (2030), with a significant chunk through private investment » Financial policies, structured financing, and risk mitigation critical towards cost-effective RE financing » Hybrid mode of using de-risking instruments, suited to each country, to address a variety of risks from start to maturity » Structure framework and barriers from an investor's viewpoint » Redirect institutional incentives to enable the more generous provision of risk mitigation instruments » Climate financing for a risk mitigation fund at a global level (broaden the scope of Green Climate Fund)

Institution	Study	Key findings
Natural Resources Defense Council & CEEW	Re-energizing India's solar energy market through financing	» Innovative financing mechanisms by various state governments (for example, Gujarat's accelerated depreciation measure) have proven useful » RPO is the most untapped potential in the RE sector (stricter enforcement needed) » Green bonds, green banks, and IDFs observed as pivotal towards mobilizing RE financing » Domestic banks to step up in times of financing deficit » Quicker VGF payments, generation-based incentives refinancing, and securitization by IREDA needed to boost investor confidence » Establishing a contractual link between SECI and NCEF viewed as a push to the solar market rating » Continuously improving market transparency

Annexure III: Benefits to power and solar energy sectors via the Union Budget FY2021-22 and Atmanirbhar Bharat Abhiyaan

Nature of benefit	Details
Financial Stimulus[105,106,107,108]	» Budgetary allocation of INR 1000 crore to SECI and INR 1500 crore to IREDA » Ministry of Power's INR 90,000 crore Atmanirbhar DISCOM financial package to address DISCOMs' stresses across all states and union territories » INR 3.05 trillion worth electricity distribution reform scheme to improve the energy efficiency of DISCOMs » Allocation of INR 8100 crore to boost private sector investments in the social infrastructure projects » Centre's plan to augment the quantum of Viability Gap Funding (VGF) to 30%
Waivers[109]	» Initial deferral of fixed charges for central power generation companies (Gencos) on power not scheduled during the lockdown period and permitting repayment over three-month instalments » 20–25% waiver by Gencos on fixed charges to DISCOMs

105 Aarushi Koundal, 'Budget 2021: FM Sitharaman Puts Focus on Solar Energy Sector', ET Energy World, 1 February 2021, https://energy.economictimes.indiatimes.com/news/renewable/union-budget-2021-fm-sitharaman-puts-focus-on-solar-energy-sector/80630737.

106 Money Control, 'Power Ministry Writes to States about Rs 90,000 Crore Package to Discoms', May 2020, https://www.moneycontrol.com/news/india/power-ministry-writes-to-states-about-rs-90000-crore-package-to-discoms-5276971.html.

107 Saggi, "Highlights Of the Structural Reforms to the Energy and Infrastructure Sector under the AtmaNirbhar Bharat Abhiyan."

108 Utpal Bhaskar, 'India Gets ₹3.05 Trillion Power Discom Reform Scheme', The Mint, 2 February 2021, https://www.livemint.com/budget/news/budget-2021-india-gets-3-05-trillion-electricity-distribution-reform-scheme-11612160538721.html.

109 Money Control, 'Power Ministry Writes to States about Rs 90,000 Crore Package to Discoms'.

Loan Provisions[110]	» REC Ltd and Power Finance Corporation to extend unique long-term loan transitions for DISCOMs » Additionally, states can request the centre for relaxations on the current limits, in the case of the DISCOMs that do not have: a) receivables or b) UDAY's working capital limit
Strategic Push for Solar Manufacturing[111,112,113,114]	» 15% hike and 10% hike in basic customs duty for solar inverters and lanterns, respectively » Phased manufacturing plan announced in Budget FY21–22 for solar cells and panels » INR 4500 crore allocated for High-Efficiency Solar PV Modules under the Centre's Performance Linked Incentive (PLI) scheme » Centre's proposal proposed to privatize the DISCOMs in all of India's union territories and encourage public-private partnership options for DISCOMs in states » Centre's proposal to introduce incentive schemes for the promotion of new 'champion sectors' such as solar PV manufacturing and advanced cell battery storage » MNRE's proposal to levy 20–25% basic customs duty: 15% duty on solar cells (low manufacturing capacity) while overtime a 40% duty on solar panels
Tariff Policy[115]	» Centre's plan to roll out a new tariff policy focusing on industry promotion, consumer rights, and sustainability

110 Ibid.

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