

Capital Flows Underpinning India's Energy Transformation

Global Capital Is Primed and Ready

Executive Summary

With India recording an 18% year-on-year decline to a new record low solar tariff of Rs1.99/kWh with zero inflation indexation – which translates into a levelised cost of energy (LCOE) of below Rs1.30/kWh – solar continues on its strongly deflationary trajectory. Even the pandemic is unable to stop this momentum, with solar module costs dropping 20% year-on-year. [Hero Future Energies CEO Sunil Jain](#) forecasts that Indian solar will likely reach just Rs1.00/kWh by 2030, delivering India massive energy security and deflation benefits, while also helping to address the need for sustainable growth.

While ongoing economies of scale and technology improvements are driving double digit annual cost reductions in solar modules, the solar deflation of 2020 was equally driven by dramatically lower interest rates – with long term OECD rates hitting six-decade lows of just 0-1%. This in turn is driving global capital managers to seek out higher return opportunities, and the US\$500bn electricity infrastructure opportunity presented by India offers this in spades. Backed by clarity, transparency and relative stability of government energy and climate policy under Prime Minister Narendra Modi, the offer of 25-year power purchase agreements at scale, secured by a central government sovereign guarantee, is mobilising a huge global capital pool.

Whilst 2020 saw economic setbacks in India, the year also saw significant capacity building in the renewable and grid infrastructure sectors, with a deepening of the engineering, procurement and construction (EPC), management and financing capacity across India which will likely pay dividends in 2021 and beyond.

In renewable energy, the major independent power producer (IPP) capacities of ReNew Power, Greenko Energy, Adani Green, Tata Power, ACME, SB Energy, Azure Power, Sembcorp Green Infra and Hero Future Energies were expanded, but also challenged by growing contenders like Vena Energy/Vector Green, O2 Power, Ayana Renewable Power, Torrent Power and Sprng Energy, as well as Government of India fossil fuel majors starting to rise to the decarbonisation challenge e.g. NTPC, NLC.

In the grid transmission sector, consumers are increasingly benefiting from grid expansion and modernisation at lower costs due to private sector challengers to Power Grid Corp, led by Adani Transmission, Sterlite Power and IndiGrid InvIT.

This report identifies the rapidly growing pool of global capital amassing behind these Indian IPPs for new projects, infrastructure investment trust (InvIT) structures and the National Investment and Infrastructure Fund (NIIF) for operational projects from sovereign wealth funds, global pension, private equity and infrastructure funds, as well as global utilities plus oil and gas majors.

As global momentum towards delivering on the Paris Agreement builds, India is well positioned to deliver more than its fair share of the solutions.

Figure 1: Investment in India's Renewable Infrastructure is Global

Key investors are finding opportunity in India's \$500bn renewable energy infrastructure development market. Indian entities with more than 100MW of operational assets are shown.

<p>Renew Power (5,400MW) Goldman Sachs CPPIB (Canada) Abu Dhabi Investment Authority GS E&C (South Korea)</p> <p>Greenko Energy (4,800MW) GIC (Singapore) Abu Dhabi Investment Authority ORIX Corp (Japan)</p> <p>Adani Green Energy Ltd (3,125MW) Adani Family Total (France)</p> <p>Tata Power / Tata Cleantech Capital (2,667MW) Tata Group</p> <p>ACME Group (2,500MW)</p> <p>SB Energy (2,000MW) CPPIB (Canada) Bharti India</p> <p>Azure Power (1,800MW) CDPQ (Canada)</p> <p>Green Infra Wind Energy Limited (1,730MW) Sembcorp (Singapore)</p> <p>NLC Limited (1,421MW) Government of India</p> <p>Hero Future Energies (1,300MW) Hero MotoCorp Masdar Clean Energy (Abu Dhabi) IFC Global Infrastructure Fund</p> <p>NTPC Ltd (1,070MW) Government of India</p> <p>O2 Power (n/a) EQT (Sweden) Temasek (Singapore)</p> <p>Engie of France (813MW) Edelweiss (India)</p>	<p>Torrent Power (787MW) Mehta Family</p> <p>Continuum Wind Energy (757MW) Morgan Stanley Infrastructure Partners</p> <p>Vector Green Energy (652MW) Global Infrastructure Partners</p> <p>Spring Energy (648MW) Actis Capital UK</p> <p>Vena Energy (595MW) Global Infrastructure Partners GIC (Singapore) PSP Investments (Canada)</p> <p>Blueleaf (474MW) Macquarie Group</p> <p>Amplus Energy Solutions (450MW) PETRONAS Group (Malaysia)</p> <p>Actis Long Life Infrastructure Fund (400MW) Actis Capital UK</p> <p>Virescent Infrastructure (317MW) KKR US</p> <p>Green Growth Equity Fund / Ayana Renewable Power (300MW) National Investment and Infrastructure Fund CPPIB (Canada) Ontario Teachers' Pension Plan AustralianSuper Abu Dhabi Investment Authority CDC Group UK Lightsource BP / BP Plc</p> <p>Fortum (250MW) Fortum (Finland)</p>	<p>EDEN Renewables (207MW) Total Eren EDF Renewables</p> <p>ENEL India (172MW) ENEL (Italy)</p> <p>Cleantech Solar (n/a) Shell Climate Fund Managers (Netherlands)</p> <p>Rising Sun Energy (140MW) Yinson Holding / Yinson (Malaysia)</p> <p>NHPC Ltd (100MW) Government of India</p> <p>Fourth Partner Energy (n/a) TPG US ResponAbility Investments (Switzerland)</p> <p>Key Investor Category</p> <p>Private Equity</p> <p>Sovereign Wealth Funds</p> <p>Global Pensions and Infrastructure Funds</p> <p>Global Fossil Fuel Utilities</p> <p>Oil and Gas Majors</p> <p>Indian Power Billionaires</p> <p>Indian Government Finance Organizations</p> <p>Multilateral Development Banks and Development Finance Institutions</p> <p>Indian State-Owned Enterprises</p> <p>Other players</p>
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Note: These figures exclude hydro.

IEEFA

Source: IEEFA.

The Path to Achieving India's Renewable Energy Ambitions

Five years after the Paris Agreement, India is one of the few countries on track to meet its commitments, as evident from two key indicators.¹ First, carbon emissions per dollar of GDP, which have already fallen 14% below 2005 levels (India pledged a 33-35% reduction in emissions intensity on 2005 levels by 2030). Second, energy capacity from renewables (including hydro) now make up 37%, or 139 gigawatts (GW), of India's total energy capacity (the aim is for 40% of installed capacity to come from renewables by 2030). Rapid renewable energy capacity additions over the last four years have propelled India towards achieving these targets.

Buoyed by success in the renewable energy sector and its commitment to climate goals, India in 2018 expanded its ambition to target renewable capacity of 450GW by 2030.² So while the world is not yet on track to meet the Paris goals, The Government of India (GoI) has lifted its own goalposts beyond its Paris commitments, and the rest of the world is eager to see how its renewable energy plans progress and participate.

The renewable energy sector requires \$500bn in order to achieve its 2030 renewable target.

According to the IEA, India will need US\$1.4 trillion in additional funding for low emissions technologies in order to be on a sustainable path over the next 20 years – 70% higher than in a scenario based on current policy.³

These are mammoth goals to strive for. India still requires significant effort and huge amounts of capital to achieve its 2022 target, having hit combined headwinds with the economic slowdown in 2019 followed by the COVID-19 disruptions of 2020, which have seen electricity flatline over the last two years.

One of the major barriers to achieving these targets is the amount of patient capital required. The renewable energy sector in India has received more than US\$42bn in investment since 2014 but requires a further US\$500bn over the next decade in order to achieve its 2030 renewable target.⁴ This includes the capital cost of adding more than 300GW of new renewables infrastructure, plus the associated grid firming (batteries, hydro, blended gas peakers and demand response management) and grid transmission and distribution modernisation and capacity expansions.

In this report we illustrate the strong progress made in 2020 on building out financial and operational capacity with key Indian and global institutions across the financial, corporate, energy, utility and government sectors. Combined with a very

¹ Climate Transparency. [Climate Transparency Report – Comparing G20 Climate Action and Responses to Covid-19 Crisis](#). September 2020.

² CNBC. [India has some huge renewable energy goals. But can they be achieved](#). 3 March 2020.

³ IEA. [India Energy Outlook 2021](#). 9 February 2021.

⁴ IBEF. [Indian Renewable Energy Industry Report](#). October 2020.

clear national policy framework, these firms will play an instrumental role in mobilising this US\$500bn of new infrastructure investment.

We showcase both domestic and international institutions that have already launched Indian renewable infrastructure sector capacity, and are ready to accelerate investment as electricity demand recovers through 2021, as the number of infrastructure transactions during 2020 clearly illustrates. It also sends a message to other global investors about the vast scale of potential investment available in India with attractive relative returns, particularly at a time when OECD interest rates are at a six-decade low (refer Annexure 3).

As India starts to recover from the COVID-19-induced global economic slowdown, and the resulting decrease in movement of capital across sectors, the country must continue to work on resolving policy and legacy issues to prevent these financial institutions losing traction in the deflationary, domestic renewables sector. The GoI has given a positive impetus to the sector by announcing the infusion of Rs1,000crores into SECI and Rs1,500crores capital into IREDA in the Budget of year 2021. The capital infusion would enable SECI to mobilize investments of more than Rs60,000crores into the renewable energy projects as well as an additional investment of Rs17,000crores to set up innovative projects in the RE sector. IREDA would be able to improve its capital adequacy bringing down its on-lending cost as well as extend additional debt financing of Rs12,000crores for RE sector.⁵

Various solutions have been recommended to unlock India's full investment potential, including: demand creation for domestic renewable power (as advocated for under the electrification strategy of Indian Railways and replacement of diesel with solar irrigation pumps); contractual adherence to power purchase agreements (PPAs) to ensure revenue certainty and contractual sanctity; resolution of the growing PPA vs Power Sale Agreement (PSA) tendering gap; more risk capital during the construction and development stage of renewable projects; resolution of distribution companies' (DISCOMs) payment delays; ongoing investment in grid modernisation and capacity expansion; and enhanced system integration capacity of intermittent energy supply through a stronger time of day price signal.⁶ This report does not focus on providing any additional solutions, instead we highlight the key domestic and foreign institutions which can deliver on India's renewable energy aspirations as these issues are resolved.

In the increasingly global race to net zero emissions, India's renewable expansion will be one of the key parameters used to accomplish carbon neutrality.⁷ Even though India has not yet announced a commitment to be a net-zero nation, it is already well advanced when it comes to exceptionally competitive renewable infrastructure installations. India is expected to end the financial year (FY) 2020/21 with a total installed renewable energy capacity since 2016 of ~93GW (39GW solar,

⁵ ETEnergyWorld, [Budget 2021: SECI can float 15 GW tenders on yearly basis with Rs 1,000-cr capital infusion](#), 9 February 2021

⁶ ET Energyworld. [Achieving the 2030 target of 450 GW of renewable energy - A prescription for India](#). 29 November 2020.

⁷ UN Climate Press Release. [Commitments to Net Zero Double in Less Than a Year](#). 21 September 2020.

39GW wind, 10GW biomass and 5GW of small hydro), at a compound annual growth rate (CAGR) of 17%.⁸

In 2020, India stood third globally in terms of total renewable installation. India also improved its ranking to fourth in 2020 from seventh in 2019 in the Renewable Energy Country Attractiveness Index due to its aggressive renewable energy installations and future targets, economic attractiveness leading to record-low tariff bids, investment from foreign and domestic investors, favourable policies and incentives.⁹

The Indian renewable energy sector provides tremendous opportunities for investors in terms of scale. The country's untapped renewable potential (900GW) is equal to any in the world. Furthermore, India is expected to experience a sustained surge in power demand in the coming decades. It is estimated that peak power demand will rise to 295GW by 2021-22 and 690GW by 2035-36.¹⁰ The scale argument becomes even stronger when we analyse the progressive reduction in the share of coal power generation in India's total electricity generation. This is further accentuated by the expected closure of 20-30GW of highly polluting end-of-life coal power plants this coming decade.¹¹

In addition to the scale of capital deployment opportunities and strong, consistent energy policy framework offered, Indian renewable energy projects have historically provided healthy project-level equity returns in the range of 14-16%.¹² Even with some yield compression implied in the successive record low solar tariffs announced in 2020, this return profile is increasingly attractive to global investors in developed markets in the current low to even negative interest rates era (Annexure 3). These returns provide a strong signal to mobilise investment into Indian renewables. Furthermore, the equity returns are underpinned by 25-year central government-guaranteed PPAs, provided by Solar Energy Corporation of India (SECI) and NTPC.

As India requires massive investment of over US\$500bn to reach its 2030 renewable energy target, it needs to keep attracting capital into new projects as well as accelerate existing investment into renewable energy projects.

Over the past two years India's renewable infrastructure sector has experienced significant mergers and acquisitions (M&A) activities,¹³ green bond issuances¹⁴ and spinning-off of operating renewable assets via infrastructure investment trust (InvIT). This has helped unlock and recycle the existing capital, freeing up project developers' capital to take on ever-larger tender opportunities.

⁸ IBEF. [Indian Renewable Energy Industry Report](#). October 2020.

⁹ EY. [Renewable Energy Country Attractiveness Index](#). November 2020.

¹⁰ IBEF. [Indian Renewable Energy Industry Report](#). October 2020.

¹¹ Bloomberg Green. [India May Close Its Dirtiest Coal Plants as Green Focus Grows](#). 6 October 2020.

¹² IEA-CEEW. [Clean Energy Investment Trends 2020](#). November 2020.

¹³ VCCircle. [How Valuations of Solar Energy Assets Changed as Deal-making Perked Up](#). 17 September 2020.

¹⁴ Bloomberg NEF. [Uncovering the Hidden Universe of India's Green Bonds](#). 23 October 2020.

The Institutions Driving India's Renewable Energy Growth

The key institutions that are playing a pivotal role in refinancing existing operating renewable energy assets are **Private Equity, Sovereign Wealth Funds, Global Pensions and Infrastructure Funds, Global Fossil Fuel Utilities, and Oil & Gas Majors**. Significantly, 2021 started with the landmark US\$2bn investment by Total of France to acquire a 20% stake in Adani Green.

The Indian renewable sector is increasingly dominated by the top **Domestic Independent Power Producers (IPP)**: Adani Green, ReNew Power, Greenko, Tata Power, Azure Power and Hero Future Energies. As this report illustrates, each has invested strongly in building capacity in international debt and equity markets. Given its huge renewable infrastructure ambitions, India needs more project developers with even greater balance sheet strength to tap this potential while providing more scope for investors. The local **Infrastructure Investment Trust (InvIT) Market** is increasingly being considered as a key facilitator of this domestic-foreign capital interplay.

India's renewable sector is already witnessing project development and investment commitments from a growing number of global oil & gas majors as well as global fossil fuel utilities which are increasingly looking to redeploy tens of billions of capital annually to transition their asset base to the increasingly low carbon future.

In addition, the role of **Indian State-Owned Enterprises**, such as NTPC, Indian Railways and Coal India, is increasingly constructive in accelerating India's capacity to achieve its renewable energy goals (a strong contrast to fossil fuel incumbents in other markets that deploy an obstructionist strategy of delay and ever-increased public rent seeking). These three power sector behemoths need to aggressively develop renewable energy projects, given their vast experience in the power sector and associated supply chains, building capacity, capital and whole-of-government buy-in to this technology-driven energy transformation.

The other institutions playing an instrumental role – especially in providing development capital, which is also the riskiest form of capital – are **Indian Government Finance Organisations** (with the notable rise of the National Investment & Infrastructure Fund [NIIF], and yet-to-pivot Power Finance Corp¹⁵), **Multilateral Development Banks (MDBs) and Development Finance Institutions (DFIs)**, as well as **Indian Power Billionaires**.

In the subsequent sections, we highlight the recent transactions and investment commitments of these institutions including their role in India's renewable energy growth. To conclude, we also note the rising importance of the global green bond markets for long tenor, low cost US\$ bond access, and the growing list of green bond issuances by these institutions.

¹⁵ IEEFA report: [Is India's PFC financing a herd of white elephants?](#) 7 May 2020.

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Introduction

India's Coal Demand Is Set To Plateau Even as Electricity Demand Doubles by 2035. Renewables Will Power the Gap

India recorded its highest coal-fired power generation in 2018/19 at 1,022TWh, having witnessed a 5% annual growth in on-grid coal power generation in the preceding four years. But slowing national electricity demand growth and the rise in renewable energy generation combined to deliver a coal power generation decline of 2.5% year-on-year (yoy) to 997TWh in 2019/20, and India is on track to see a record coal-fired power generation decline of -4.0-4.5% yoy in 2020/21 (fiscal year to date to January 2021, coal power is -5.9% yoy) – Figure 2.

Coal-fired power generation provides an estimated 69.8% share of India's 2020/21 total generation, down from a peak of 75.5% in 2016/17. This represents a market share of generation loss of 1.5% annually in the last four years. IEEFA estimates coal power's share of generation at 54.5% by 2029/30 (Figure 3), a similar rate of share loss of 1.6% p.a., as the renewable energy investment accelerates.

So the role of domestic coal power providing a critical balancing / firming role in India's electricity system goes hand in hand with the reality that even with a dramatic upturn in India's economic growth, coal-fired power in absolute terms is likely to reach a plateau at some stage during this coming decade, which in turn means coal-fired power generation's share will continue to progressively decline now that the economics for solar are so compelling. As the IEA executive director Dr. Fatih Birol said in the WEO2020, "solar is the new king".

Figure 2: India's Electricity Capacity, Generation and Share (2020/21)

	Capacity		Generation		Capacity	Increase
	GW	%	TWh	%	Utilisation	GW yoy
Coal-fired	208.2	54.6%	953.8	69.8%	52.7%	3.0
Gas-fired	24.9	6.5%	54.5	4.0%	24.9%	0.0
Diesel-fired	0.5	0.1%	0.5	0.0%	12.0%	0.0
Large Hydro	46.0	12.1%	158.0	11.6%	39.3%	0.3
Nuclear	7.5	2.0%	43.4	3.2%	69.5%	0.7
Renewables	94.2	24.7%	151.7	11.1%	19.1%	7.2
Bhutan (Import)	n.a.	n.a.	4.9	0.4%	n.a.	
Total	381.3	100.0%	1,366.7	100.0%		11.2
Captive power	51.4					
Total	432.7					

Source: Central Electricity Authority (CEA), IEEFA calculations.

IEEFA assumes 6.0% annual GDP growth for India to 2029/30 drives a sustained 5% annual growth in electricity demand, assuming electricity efficiency initiatives will keep electricity demand growth below that of economic growth. We assume

national electricity generation supply will grow 0.5% p.a. less than demand, reflecting ongoing reductions in grid transmission and distribution (T&D) losses.

IEEFA assumes existing coal-fired power plants already under construction are mostly completed, but that no new coal plants are built beyond this. Further, 2-3GW p.a. of end-of-life coal plant closures will continue over the coming decade.

Variable renewable energy infrastructure investments will supply the majority of incremental demand growth, with more incremental expansions of nuclear and large scale hydro, reflective of the very long construction timelines involved and the lack of private capital given the high project risk profiles involved.

With variable renewable energy generation estimated to almost triple to just over 30% market share this coming decade (49% share of installed capacity), coal power will continue to operate just half the time, but this provides a necessary balancing role, along with gas peakers (aided by the promise of blending in cost-competitive domestic-sourced green hydrogen), battery storage, hydro, expanded national and international grid connectivity and demand response management.

Figure 3: India's Electricity Capacity, Generation and Share (2029/30)

	Capacity		Generation		Capacity	Increase
	GW	%	TWh	%	Utilisation	GW vs FY20
Coal-fired	220.0	36.0%	1,110.6	54.5%	57.8%	14.8
Gas-fired peakers	28.0	4.6%	60.9	3.0%	25.0%	3.1
Diesel-fired	0.0	0.0%	0.0	0.0%	10.0%	-0.5
Large Hydro	51.0	8.3%	164.4	8.1%	37.0%	5.3
Nuclear	12.0	2.0%	73.9	3.6%	72.0%	5.2
Renewables	300.0	49.1%	617.3	30.3%	24.5%	213.1
Bhutan/Nepal/Bangladesh (net)	n.a.	n.a.	11.5	0.6%		
Total	611.0	100.0%	2,038.6	100.0%		241.0
Battery Storage	30.0					
Captive thermal power	50.0					
Total	661.0					

Source: Central Electricity Authority (CEA), IEEFA calculations.

Given the energy security implications of India's over reliance on fossil fuel imports – in 2020 India imported some 85% of its oil, 50% of its fossil gas, 50% of its coking coal and 20% of its thermal coal needs – it is entirely understandable that the Government is keen to accelerate its electrification of energy and use an increasing share of domestic coal-fired power to balance the growth in low cost but intermittent renewable energy, driving improved energy security whilst delivering a lower cost, cleaner energy system for India.

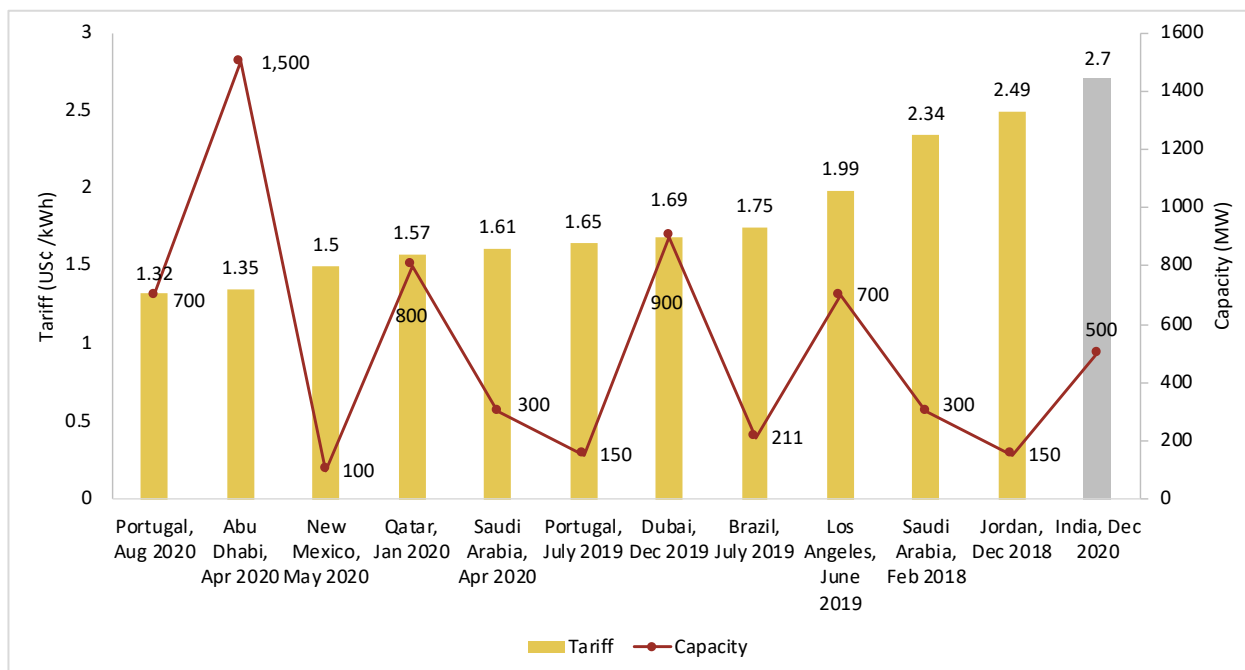
2020 Delivered Repeated New Record Low Solar Tenders

Renewable energy, particularly solar, is delivering increased energy security by reducing India's reliance on imported fossil fuels, improving the current account balance, reducing currency devaluation and hence inflationary pressures, as well as delivering new investments and employment opportunities.

But most importantly, renewable energy is delivering lower energy prices for India. And the deflation is an ongoing trend. 2020 saw three record low solar tenders, dropping India's record low by a cumulative 18% in just one year.

Figure 4 details the series of new record low solar tariffs witnessed globally over the last 18 months, highlighting that solar deflation is a rapid, and ongoing reality, driven by lower solar module prices (dropping 21% yoy to just US\$0.18-185/Wp, according to JMK Research¹⁶) and ever-lower interest rates.

Figure 4: Lowest Solar Tariff Trends Across the World vs. India



Source: JMK Research & Analytics, IEEFA.

July 2020 saw a record low of Rs2.36/kWh for new solar in a 2GW SECI tender, a result 3% below the previous record low of Rs2.43/kWh.¹⁷

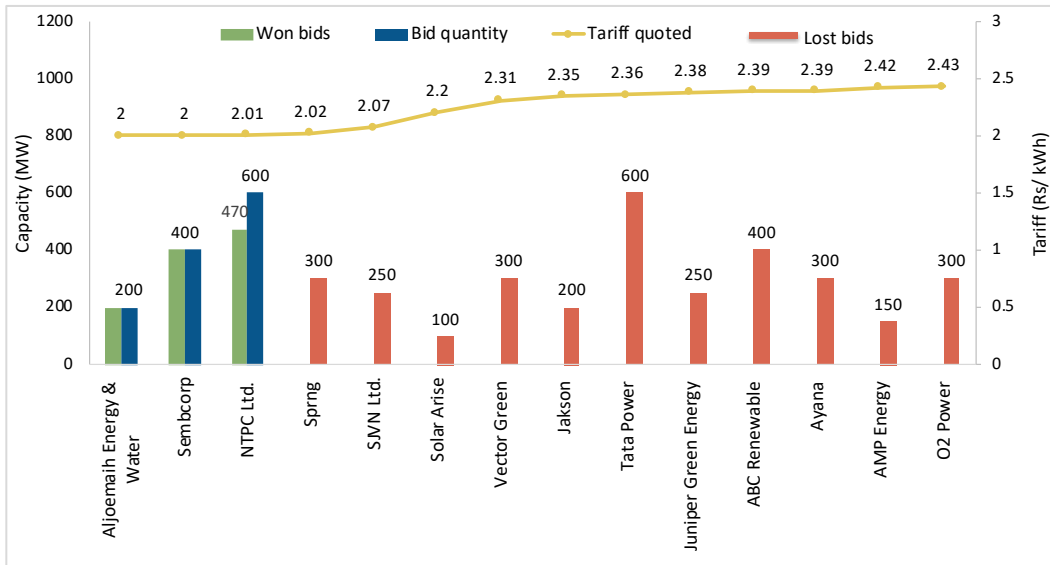
December 2020 saw a new record low of Rs2.00/kWh for solar in a SECI tender of 1.07GW – Figure 5. This was a fall of 15% in just six months, helped by lower solar module prices and ongoing declines in OECD interest rates (Annexure 3).¹⁸

¹⁶ PV Magazine. [India could add 2.5 GW of big solar in second half](#). 19 August 2020.

¹⁷ PV Magazine. [India sets new record-low solar tariff of Rs2.36/kWh](#). 1 July 2020.

¹⁸ JMK Research. [Why India's Solar Tariffs Reached an Historic Low of Rs2/kWh](#). December 2020.

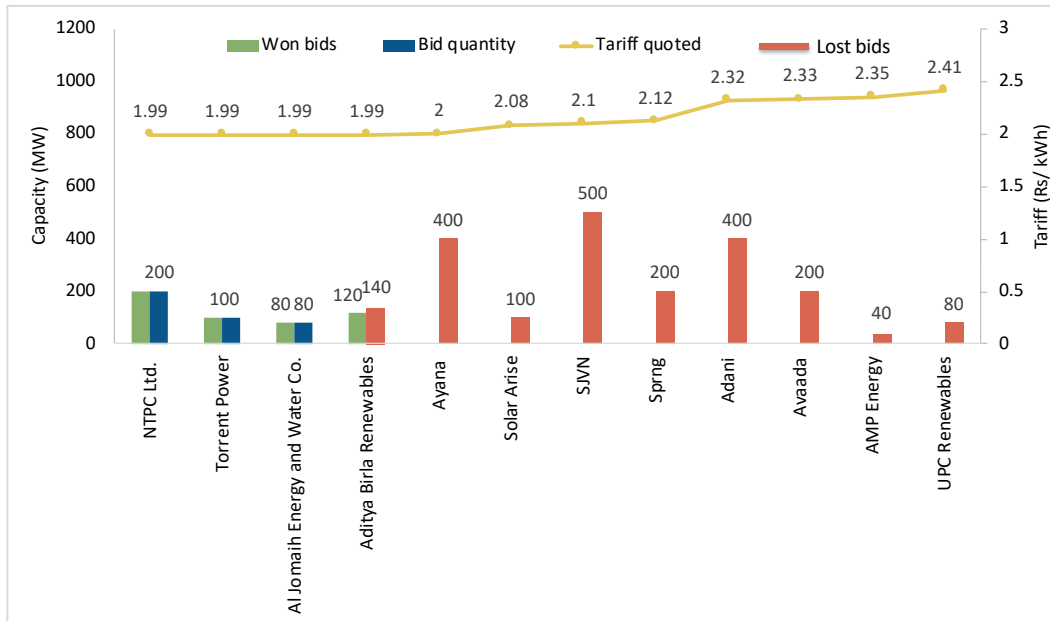
Figure 5: SECI 1,070MW Solar (Tranche-III) Tender Result Details



Source: JMK Research & Analytics.

December 2020 saw a follow-on tender of 500MW of solar in Gujarat deliver a new record low price of just Rs1.99/kWh (US2.7c/kWh) – refer Figure 6.¹⁹

Figure 6: GUVNL 500 MW (Phase IX) Solar Tender Result



Source: JMK Research & Analytics.

Figure 7 details the three major entities involved in the interstate grid transmission sector of India. The majority Government-owned Power Grid Corp has a 40%

¹⁹ PV Magazine. [Indian PV auction delivers record low price of \\$0.0269/kWh](#). 22 December 2020.

national T&D share, but recent years have seen the rapid rise of private competition led by Adani Transmission and the Sterlite Power / IndiGrid InvIT, the latter boosted by the world's largest private equity firm (KKR) and one of the world's largest sovereign wealth funds (GIC). This private competition has brought both global capital and significantly lower capital costs for new interstate transmission project development.²⁰ IEEFA has recently written on the opportunities for opening intra-state transmission to private competition, and the likely benefits that would bring.²¹

Figure 7: Major Investors in the Indian Grid Infrastructure Sector

Indian Entity	Listing	Key Investors	India Transmission Capacity Operational
PowerGrid Corp	BSE	Government of India (51%)	168,140 ckms of transmission
Adani Transmission Ltd	BSE	Adani Family (75%) Qatar Investment Authority (25% of AEML)	15,400 ckms of transmission
IndiGrid InvIT	BSE	KKR US (23%) GIC of Singapore (20%) Sterlite Power AMP Capital (Australia)	6,280 ckms of transmission 100MW / - (solar)

Source: Company Reports, IEEFA calculations.

Note: BSE: Bombay Stock Exchange; ckms: circuit kilometres; InvIT: infrastructure Investment Trust; NYSE: New York Stock Exchange.

Figure 8 details the major entities involved in the renewable energy infrastructure sector, ranked by estimated operational variable renewable energy capacity. Annexure 2 details the major hydro-electricity sector participants.

²⁰ IEEFA report: [India urged to boost competition, modernise and upgrade the grid](#). 5 February 2020.

²¹ IEEFA: [Increasing competition in India's intra-state transmission sector will drive renewables progress](#). 16 December 2020.

Figure 8: Major Investors in the Indian Renewables Infrastructure Sector

Indian Entity	Listing	Key Investors	India VRE Asset Size Operational / MoU
Renew Power		Goldman Sachs (48%) CPPIB of Canada (16%) Abu Dhabi Investment Authority (16%) JERA of Japan (9%) GS E&C of South Korea	5,400MW / 4,600MW
Greenko Energy		GIC of Singapore (57%) Abu Dhabi Investment Authority (14%) ORIX Corp of Japan (20%)	4,800MW / 20MW
Adani Green Energy Ltd	BSE	Adani Family (55%) Total of France (20% + 50% of 2.26GW)	3,125MW / 11,670MW
Tata Power Tata Cleantech Capital	BSE	Tata Group (47%)	2,667MW / 695MW
ACME Group			2,500MW / 2,600MW
SB Energy		CPPIB of Canada (80%) Bharti India (20%)	2,000MW / 2,000MW
Azure Power	NYSE	CDPQ of Canada (51%)	1,800MW / 5,200MW
Green Infra Wind Energy Limited		Sembcorp of Singapore	1,730MW / 400MW
NLC Limited		Government of India (79%)	1,421MW / -
Hero Future Energies		Hero MotoCorp (~60%) Masdar Clean Energy (20%) IFC Global Infrastructure Fund (20%)	1,300MW / 1,500MW
NTPC Ltd	BSE	Government of India (51%)	1,070MW / 2,348MW
O2 Power		EQT Sweden Temasek of Singapore	- / 980MW
Engie of France		Edelweiss of India (74%)	813 MW/-
Torrent Power	BSE	Mehta family	787MW / -

Source: Company Reports, IEEFA calculations.

Figure 8: Major Investors in the Indian Renewables Infrastructure (Cont.)

Indian Entity	Listing	Key Investors	India VRE Asset Size Operational / MoU
Continuum Wind Energy		Morgan Stanley Infrastructure Partners	757MW / 425MW
Vector Green Energy		Global Infrastructure Partners (GIP)	652MW / -
Sprng Energy		Actis Capital UK	648MW / 1,100MW
Actis Long Life Infrastructure Fund		Actis Capital UK	400MW / -
Vena Energy		Global Infrastructure Partners (GIP) GIC of Singapore PSP Investments of Canada	595MW / 562MW
Blueleaf Energy		Macquarie Group	474MW / -
Vibrant Energy Holdings			
Macquarie Asia Infrastructure Fund			
Amplus Energy Solutions		PETRONAS Group of Malaysia	450MW / -
Virescent Infrastructure		KKR US	317MW / -
Green Growth Equity Fund		National Investment and Infrastructure Fund (NIIF)	300MW / 1,100MW
Ayana Renewable Power		CPPIB Ontario Teachers' Pension Plan AustralianSuper Abu Dhabi Investment Authority CDC Group UK Lightsource BP / BP Plc	
Fortum		Fortum of Finland	250MW / 250MW
EDEN Renewables		Total Eren (50%) EDF Renewables (50%)	207MW / 2,066MW
ENEL India		ENEL of Italy	172MW / 300MW
Cleantech Solar		Shell (49%) Climate Fund Managers	n.a.
Rising Sun Energy		Yinson Holding (Yinson) of Malaysia (95%)	140 MW/-
NHPC Ltd	BSE	Government of India (74.5%)	100MW / 2,000MW
Fourth Partner Energy		TPG US ResponAbility Investments (Swiss)	n.a.

Source: Company Reports, IEEFA calculations.

1. Private Equity

EQT Sweden: At the start of 2020 EQT, a major Swedish private equity firm, partnered with Temasek of Singapore, a sovereign wealth fund with Assets under Management (AuM) of S\$313bn (US\$212bn) to establish O2 Power of India²² with a US\$500m initial investment and a target to deliver 4GW of operational renewable energy assets by 2025.²³

O2 Power has lost no time in deploying capital in 2020, with the group in April 2020 winning a 380MW solar tender from NHPC at Rs2.55/kWh.²⁴ This was followed by wins for 400MW of solar in an NTPC tender at Rs2.43/kWh²⁵ and 200MW at R2.81/kWh at the Dholera solar park in Gujarat, both in August 2020.²⁶

KKR & Co US: In April 2019 KKR acquired a majority ownership stake in the Investment Manager of **IndiGrid**, as well as taking a 23% stake in the IndiGrid power transmission infrastructure investment trust ("InvIT"), which has operational grid transmission assets of Rs139bn (US\$1.85bn), with a further Rs65bn in development covering 6,280 circuit kilometres (ckm) and 11,460 MVA capacity transmission network with an average 32-year life.²⁷ GIC of Singapore co-invested with KKR, taking a 20% equity stake in IndiGrid.

IndiGrid was set up in 2016 by **Sterlite Power Grid Ventures Limited** and operates under a framework agreement to acquire operational assets from Sterlite. In January 2020 IndiGrid invested Rs1,020 crore (US\$135m) to acquire 900ckm of transmission capacity across Assam, Bihar and West Bengal,²⁸ followed by the Gurgaon Palwal Transmission Limited for Rs10.8bn (US\$145m) in the September 2020 quarter, both acquired from Sterlite Power.²⁹

IndiGrid plans to diversify into ownership of renewable energy infrastructure assets, and this process was commenced in December 2020 with the acquisition of Spain's Fotowatio Renewable Ventures (FRV) 100MW Ananthapuramu Ultra Mega Solar Park asset with a tariff of Rs4.43/kWh.³⁰

October 2020 saw KKR launch **Virescent Infrastructure**, a newly-created platform to acquire renewable energy assets in India. It currently owns 317MW of solar assets located in Maharashtra and Tamil Nadu which it acquired from the leading

²² EQT. [EQT and Temasek launch O2 Power, a renewable energy platform in India](#). 22 January 2020.

²³ [O2 Power website](#).

²⁴ Mercom. [SoftBank, O2 Power, EDEN Renewables, Axis Energy, Avaada Win NHPC's 2 GW Solar Auction](#). 16 April 2020.

²⁵ Mercom. [Amp Energy, Tata, Azure, and O2 Power Winners in NTPC's 1.2 GW Solar Auction](#). 6 August 2020.

²⁶ Economic Times. [Vena Energy and Tata Power emerge winners at Gujarat solar auction](#). 14 August 2020.

²⁷ [IndiGrid website](#), accessed December 2020.

²⁸ Economic Times. [IndiGrid to acquire power transmission firm ENCIL for Rs 1,020 crore](#). 29 January 2020.

²⁹ IndiGrid 2QFY2020/21 results [presentation](#).

³⁰ Economic Times. [KKR's India InvIT buys FRV Solar assets in AP](#). 19 December 2020.

infrastructure developer Shapoorji Pallonji Infrastructure Capital for total consideration of US\$204m (Rs15.5bn).³¹ KKR said renewable energy represents a key vertical within its infrastructure strategy and it has invested in 10GW of total renewable energy operational capacity.³² January 2021 saw reports KKR is looking to potentially monetarise its growing Indian renewable energy infrastructure assets portfolio via an InvIT structure.³³

KKR established its global infrastructure team in 2008 and has since invested more than US\$24bn in 40 assets around the world. January 2021 saw KKR raise US\$3.9bn for its first Asia-Pacific infrastructure fund, for investments ranging from waste management and renewable energy to communication towers.³⁴

Global Infrastructure Partners – Vena Energy: In 2018 **Vena Energy** (then called Equis Capital) was **acquired for US\$5bn** by a Global Infrastructure Partners (GIP), CIC Capital Corporation (CIC Capital) and Public Sector Pension Investment Board (PSP Investments) consortium. Vena has an Asian portfolio of 2.2GW of operating wind and solar assets, with a further 19GW of projects under development. Vena entered the Indian market in 2013 with a 54MW wind project in Andhra Pradesh and then in 2015 won a 130MW solar project in Telangana and then the 108MW Fatanpur wind project. The 135MW Karnataka solar project was commissioned in 2018, taking the **total Indian RE portfolio to 595MW** in operation. Vena did a US\$325m green 5-year 3.13% pa fixed rate bond issue in February 2020.

Vena has continued to deploy capital in 2020, with the group winning 100MW at R2.78/kWh at the Dholera solar park in Gujarat³⁵ and a wind-solar hybrid tender 160MW at Rs299/kWh,³⁶ both in August 2020, taking its contracted portfolio under development in India to 562MW.

Global Infrastructure Partners – Vector Green Energy: **Vector** operates a total of 652MW of renewable energy across 19 projects in India. September 2020 saw GIP (AuM of US\$74bn) acquire a 306MW solar portfolio by its Indian subsidiary Vector Green Energy (independent of Vena Energy), marking the vendor RattanIndia's exit from the Indian renewables sector.³⁷ Vector Green Energy had previously in 2017 acquired a 190MW of solar projects from First Solar U.S.

Actis Capital: The UK-based private equity investor **Actis** (AuM US\$10bn, winner of the Environmental Finance **Private Equity Manager of the Year Award 2020**) completed the acquisition of two PV projects in India totalling 400MW from ACME

³¹ Businesswire. [KKR to Acquire 317MWp of Solar Energy Assets from Shapoorji Pallonji Infra](#). 27 April 2020.

³² Economic Times. [KKR launches platform to acquire renewable energy assets in India](#). 29 October 2020.

³³ Livemint. [KKR to float private InvIT in bid to house renewable assets](#). 2 January 2021.

³⁴ Reuters. [KKR raises \\$3.9 billion for its first Asia-Pacific infrastructure fund](#). 11 January 2021.

³⁵ Economic Times. [Vena Energy and Tata Power emerge winners at Gujarat solar auction](#). 14 August 2020.

³⁶ Mercom India. [Vena Energy, JSW Solar – Winners in SECI'S Auction for Blended Solar Wind Projects](#). 14 August 2020.

³⁷ PV Magazine. [RattanIndia sells 306 MW solar assets to GIP](#). 3 September 2020.

Solar in August 2020.³⁸ These assets will be held in the **Actis Long Life Infrastructure Fund** ("ALLIF"), which has funding commitments and co-investment options for US\$2bn of capital for global deployment.³⁹ Actis created **Ostro Energy** for renewable energy investing in India in 2014 which it then sold to ReNew Power in 2018 in one of the largest renewable energy deals in India.⁴⁰

Actis set up **Sprng Energy** in 2017 with an initial equity commitment of US\$450m, and Sprng Energy now has 648MW of operating assets and a further pipeline of 1,100MW which are in various stages of execution to get to its target of 2GW of renewables in India. Sprng Energy is building its 250MW Anantapur solar project in Andhra Pradesh supported by a Rs2.72/kWh PPA from NTPC (awarded May 2018).⁴¹ Sprng Energy acquired a 194MW operating solar portfolio from Shapoorji Pallonji Infrastructure Group (SP Infra) in April 2019.⁴² Sprng Energy was an underbidder at Rs2.02/kWh for 300MW of solar capacity in SECI's November 2020 1,070MW Rajasthan tender that set the new record low tariff of Rs2.00/kWh.

TPG (previously Texas Pacific Group): The global impact fund **The Rise Fund** (AuM of US\$4bn) of TPG in July 2020 acquired a 1GW portfolio of solar projects under various stages of development across Spain, Chile, Columbia, and Mexico from Trina Solar.⁴³ The Rise Fund in June 2018 invested US\$70m in **Fourth Partner Energy**, one of India's leading rooftop solar developers with a portfolio of 251MW. January 2021 saw media reports that Fourth Partner Energy was seeking to raise US\$100m from Norwegian sovereign wealth fund Norfund.⁴⁴

Climate Fund Managers (CFM): **CFM** of Netherlands in July 2020 partnered with **AMPYR Energy** (the renewable energy developer arm of **AGP Sustainable Real Assets**) to develop 38MW as the first of a total of 138MW of wind farms planned for Karnataka.⁴⁵ CFM has renewable energy infrastructure assets of US\$1.7bn, including US\$100m from the Green Climate Fund invested in 2018 and is part owned by the Dutch development bank **FMO**. CFM invested in **Cleantech Solar** in 2018.

NextEnergy Capital (NEC): The UK-based NEC, which manages assets worth US\$2bn with investments in several operating solar plants with a combined capacity of 1GW across the globe, has closed two deals in solar assets in India in 2020. It acquired 27.4MW of operating solar projects in Odisha from IBC Solar Energy GmbH in July 2020⁴⁶ and within 3 months it acquired Samyama Jyothi Solar Pvt. Ltd, which

³⁸ PV Magazine. [UK investor acquires two Acme Solar projects aggregating 400 MW](#). 7 April 2020.

³⁹ Actis Press Release. [Actis raises US\\$1.23 billion in first Long Life Infrastructure Fund](#). 14 August 2019.

⁴⁰ Actis Press Release. [Actis exits Indian renewable platform Ostro Energy to Renew Power](#). 3 April 2018.

⁴¹ PV Magazine. [Sprng Energy buys 165 MW of solar modules from China's Risen](#). 28 August 2020.

⁴² Economic Times. [Actis buys 194 Mw operational solar power assets from Shapoorji Pallonji](#). 1 April 2019.

⁴³ Mercom. [TPG's Rise Fund Acquires 1 GW of Solar Projects from Trina Solar](#). 12 July 2020.

⁴⁴ LiveMint. [Fourth Partner Energy in talks to raise \\$100 million](#). 20 January 2021.

⁴⁵ Mercom. [CFM Partners with AMPYR Energy to Set up 138 MW of Onshore Wind Farms in Karnataka](#). 9 July 2020.

⁴⁶ VCCircle. [UK's NextEnergy Capital snaps up first India solar asset](#). 6 July 2020.

operates a 3MW solar plant at Chitradurga in Karnataka, for US\$1m. NEC plans to acquire eight more solar projects with a total capacity of 800MW.⁴⁷

ResponAbility: The Swiss-based [ResponAbility Investments](#) (US\$3.5bn AuM) has supported three rounds of debt funding for [Fourth Partner Energy](#) of India, including US\$15m in July 2020.⁴⁸ This builds on the US\$70m equity backing Fourth Partner received from the [TPG](#) in June 2018.⁴⁹ In September 2020 Fourth Partner Energy won a contract in West Bengal to build 4.8MW of rooftop solar for self-generation by Titagarh Wagons Limited.⁵⁰ Also in September 2020, Fourth Partner Energy raised another US\$16m from Swiss impact investor Symbiotics and Dutch banks Triodos and ASN.⁵¹

⁴⁷ VCCircle. [UK's NextEnergy Capital strikes second India solar deal](#). 28 October 2020.

⁴⁸ PV Magazine. [Fourth Partner Energy raises US\\$15 million from Swiss investor responsibility](#). 23 July 2020.

⁴⁹ Deal Street Asia. [India: TPG's growth's the rise fund invests \\$70m in solar power co fourth partner energy](#). June 17, 2018.

⁵⁰ PV Magazine. [Fourth Partner Energy bags 4.8 MW rooftop solar project for Titagarh Wagons](#). 10 September 2020.

⁵¹ PV Magazine. [Fourth Partner raises US\\$16 million to fund 150 MW of new solar](#). 17 September 2020.

2. Sovereign Wealth Funds

Abu Dhabi Investment Authority (ADIA): ADIA is a major investor (holding a 16% equity stake) in **ReNew Power**, India's leading renewable energy owner and developer. ADIA also holds a 14% stake in **Greenko** (refer below).

Masdar Clean Energy: Abu Dhabi government-owned Mubadala Investment Company in turn owns Masdar Clean Energy, which acquired a 20% stake in **Hero Future Energies** in November 2019 for US\$150m.⁵² Hero Future Energies is majority owned by Hero MotoCorp and has a 1.3GW operational renewables portfolio across India. Masdar accelerated its renewables push by acquiring a 50% stake in 1.6GW of wind, solar and battery operations in the US in August 2020.⁵³

Qatar Investment Authority (QIA): In December 2019 the QIA invested US\$450m to take a 25.1% stake in Adani Electricity Mumbai,⁵⁴ a key cornerstone investment in a subsidiary of the highly successful Adani Transmission Ltd, which has risen more than 900% since its listing in 2015.

Singapore's GIC: GIC (formerly Government of Singapore Investment Corporation) is the majority shareholder in **Greenko Energy Holdings**. Total operating capacity is 6.5GW with 255MW of wind and hydro under construction, plus another 8GW under development (post ORIX – refer below).

August 2020 saw Greenko announce an MOU with NTPC to explore investment possibilities for integration of renewable energy with pumped hydro storage (PHS). Greenko is looking to develop 40GWh of PHS across India at a proposed US\$85/MWh relative to batteries at an estimated current cost of ~US\$200/MWh (dropping to an estimated US\$100/MWh by 2030).⁵⁵

September 2020 saw the announcement of a deal for **ORIX Corp** of Japan to inject US\$980m into Greenko in the form of 873MW of ORIX wind assets – which ORIX acquired from its bankrupt Indian associate Infrastructure Leasing and Financial Services (IL&FS) – in return for a 20% stake, valuing the Greenko Energy equity at a US\$5.75bn total.⁵⁶ GIC's stake would be diluted to 56% and ADIA would retain a 14% stake in a deal that values Greenko at US\$5.75bn (and an enterprise value at US\$10bn) and an operating Indian renewables portfolio of 6.5GW. Greenko, which was founded by Mahesh Kolli and Anil Kumar Chalamalasetty who would retain a 13% combined stake.⁵⁷

⁵² Hero Future Energies Press Release. [Strategic Investment of US\\$150M Funding Growth Portfolio For HFE](#). 15 November 2019.

⁵³ S&P Global. [EDF Renewables to sell 50% in US renewables to UAE's Masdar](#). 14 August 2020.

⁵⁴ Mercom India. [Qatar Investment Authority to Acquire 25% Stake in Adani Electricity Mumbai](#). 13 December 2019.

⁵⁵ Greenko Media Release. [Greenko enters into partnership with NTPC for energy storage and flexible & despatchable RE power supply solutions](#). 25 August 2020.

⁵⁶ Greenko Media Release. [ORIX agrees to invest USD 980 million to acquire a significant minority stake in Greenko](#). 11 September 2020.

⁵⁷ LiveMint. [Japan' ORIX Corp. set to invest \\$980 million in Greenko Energy Holdings for 17% stake](#). 11 September 2020.

3. Global Pensions and Infrastructure Funds

Canada Pension Plan Investment Board (CPPIB): Canada's largest pension asset manager (AuM C\$457bn), CPPIB is a major investor in **ReNew Power** (holding a 16% equity stake since 2018), India's leading renewable energy owner and developer. In February 2020 CPPIB was reported to be looking to acquire an additional 24% stake ReNew Power from Goldman Sachs, but this did not eventuate.⁵⁸ CPPIB was ranked in 2020 as the world's largest infrastructure investor – refer Annexure 3.

In May 2019 it was announced CPPIB had looked at taking a 60% (US\$360m) stake in India's first proposed renewable energy focussed InvIT, seeded with assets by Indian listed NBFI Piramal Enterprises Ltd,⁵⁹ but this did not proceed.

In May 2020 reports highlighted SoftBank had sought additional equity investors,⁶⁰ and a US\$600m renewables bond issue fell through in July 2020, due to excessive financial leverage in SB Energy, construction issues and financial headwinds facing SoftBank in Japan.⁶¹

Even as the sale process was underway, SB Energy continued to expand its renewable energy footprint in India. In February 2020 SB Energy won a 600MW solar tender at Rs2.50/kWh held by SECI.⁶² In April 2020 SB Energy won a 600MW solar tender from NHPC at Rs2.55/kWh.⁶³ October 2020 saw SB Energy award a 327MW wind turbine order to GE for its new project in Madhya Pradesh.⁶⁴ SB Energy currently has nearly 2GW of operating renewable energy capacity, 2GW under construction, and an additional 3.7GW under "active development" with contracts in hand.

In December 2020 CPPIB acquired SoftBank's 80% equity stake in SB Energy India, an 80:20 joint venture (JV) with Bharti with invested equity capital totalling US\$737m (reported as of December 2019). The sale price was announced as US\$425m, with an additional \$100m to be paid subject to future outcomes.⁶⁵

Caisse de dépôt et placement du Québec (CDPQ): Canada's second largest pension asset manager (AuM C\$340bn), CDPQ owns a 51% controlling stake in NYSE-listed **Azure Power** (market capitalisation of Rs143bn [US\$2.0bn]), having

⁵⁸ Economic Times. [CPPIB looks to go big on ReNew as Goldman cuts stake](#). 15 February 2020.

⁵⁹ Economic Times. [Piramal, CPPIB to set up India's first renewable energy-focused InvIT](#). 8 May 2019.

⁶⁰ Economic Times. [Softbank-Bharti renewable JV looks to raise up to \\$750m](#). 29 May 2020.

⁶¹ Economic Times. [Softbank-backed SB Energy singed; pulls maiden \\$600 million bond after poor investor demand](#). 14 July 2020.

⁶² Economic Times. [SECI solar auction gets good response, auctions 1,200 MW solar projects](#). 28 February 2020.

⁶³ Mercom. [SoftBank, O2 Power, EDEN Renewables, Axis Energy, Avaada Win NHPC's 2 GW Solar Auction](#). 16 April 2020.

⁶⁴ Renewables Now. [GE bags 327-MW Indian turbine deal from SB Energy](#). 15 October 2020.

⁶⁵ Economic Times. [CPPIB to acquire SoftBank's 80% in SB Energy for \\$425m](#). 30 December 2020.

taken a US\$75m stake prior to the IPO in 2016 and lifted their holding progressively over 2019 and again in March 2020.⁶⁶

Azure Power has a 7,115MW portfolio of solar in development, including 1,834MW operational as of September 2020 (with 100MW of this rooftop solar), with another 600MW at Rajasthan 6 expected to be commissioned by March 2021.

Azure Power won a 4GW solar project in December 2019 at Rs2.92/kWh as part of a tender package to also build a 1GW solar module manufacturing facility (the original 500MW manufacturing capacity was upscaled to 1GW under a greenshoe option, and Azure has proposed partnering on the manufacturing unit with Waaree Solar, which operates an existing 2GW solar module manufacturing facility).⁶⁷ However, in December 2020 Azure Power was informed that SECI to-date had been unable to complete the 4GW PPA until and unless it can in turn sign power supply agreements (PSAs) with state discoms, which were balking at the high tariffs relative to record low solar tariffs available elsewhere.⁶⁸ Azure has secured grid connectivity in Rajasthan for the 4GW proposal, along with an interstate transmission system (ISTS) grid access cost waiver that is protected from the PPA / PSA signing delays.

Unrelated to this, Azure Power won 300MW of solar in an NTPC tender at Rs2.43/kWh in August 2020.⁶⁹

Brookfield Renewable Partners: One of the world's leading renewable energy infrastructure owners with a 19.GW portfolio, [Brookfield Renewable Partners](#) of Canada (majority owned by NYSE listed Brookfield Asset Management), was reported to be looking to invest in ACME in January 2020, but to-date nothing has come of this.⁷⁰ Brookfield Asset Management has a reported US\$16bn invested to-date in India, primarily in property.

Macquarie Group: Stride Climate Investments, a Macquarie Asia Infrastructure Fund company, owns and operates 408MW of solar across India. Macquarie has invested or arranged more than \$A20bn of investment into renewable energy projects with 12,800MW in operation or under management globally.⁷¹ **Blueleaf Energy**, owned by Macquarie's Green Investment Group (GIG), specialises in the development, finance, construction and operation of both C&I rooftop and utility-scale solar systems across the Asia Pacific region. Over its 20-year history, Blueleaf Energy has developed, built and operated almost 2GW of solar capacity, including over 500MW in the Asia Pacific region. In November 2020 Blueleaf Energy acquired a majority stake in Hyderabad-based C&I solar developer Vibrant Energy Holdings

⁶⁶ Economic Times. [Canadian pension fund CDPQ increases its stake in Azure Power](#). 11 March 2020.

⁶⁷ PV Magazine. [Azure Power secures up to 4 GW of solar project capacity under manufacturing-linked tender](#). 13 December 2019.

⁶⁸ Economic Times. [No response from discoms for power offtake from 4 GW tender, SECI tells Azure Power](#). 25 December 2020.

⁶⁹ Mercom. [Amp Energy, Tata, Azure, and O2 Power Winners in NTPC's 1.2 GW Solar Auction](#). 6 August 2020.

⁷⁰ Economic Times. [Brookfield, Actis eye Acme Solar assets](#). 30 January 2020.

⁷¹ PV Magazine. [Macquarie selects Prescinto's IIOT platform to oversee Indian solar assets](#). 4 September 2020.

from the NASDAQ-listed ATN International, giving Blueleaf 66MW of operational solar PV projects, and an active development pipeline of over 400MW across India.⁷²

Morgan Stanley Infrastructure Partners: Continuum Wind Energy, a majority owned Morgan Stanley Infrastructure Partners company, owns and operates 757MW of renewables across India, with another 425MW under construction. Continuum cites the support of many leading financing institutions, including: State Bank of India, International Finance Corporation, Power Finance Corporation, Indian Renewable Energy Development Agency, India Infrastructure Finance Company Ltd, PTC Financial Service, India Infradebt, Tata Capital, L&T Infrastructure Finance and L&T Fincorp.⁷³

Omers Infrastructure Management (OMERS): OMERS is an infrastructure investment management company which manages the investment of Ontario Municipal Employees Retirement System (OMERS). It is in initial stages of discussion to invest in US\$700-750m for a minority stake in Greenko Energy Holdings which is India's third most valuable renewable energy company.⁷⁴

AMP Capital: AMP Capital of Australia announced in December 2020 a joint venture with Sterlite Power to invest US\$150m each into a new investment vehicle to develop US\$1bn across four new power transmission projects of a combined 1,800ckm in length across India (the US\$300m of equity will underpin an additional US\$700m of debt).⁷⁵

⁷² PV Magazine. [Singapore's Blueleaf launches in India with the acquisition of commercial solar developer Vibrant Energy](#). 30 November 2020.

⁷³ Continuum Wind Energy [website](#).

⁷⁴ Economic Times. [Omers Infrastructure Management in talks to invest up to \\$700 million in Greenko Energy](#). 11 December 2020.

⁷⁵ Economic Times. [Sterlite Power and AMP Capital join hands to develop \\$1bn transmission projects](#). 30 December 2020.

4. Global Fossil Fuel Utilities

ENEL of Italy: ENEL entered 2020 as one of the largest coal-fired power electricity owners in Europe. However, it is also the largest investor in zero emissions renewable energy in global emerging markets, with total renewable energy capacity of 46GW (wind, solar, geothermal and hydro). ENEL has a 172MW wind farm in India, but in June 2020 ENEL entered the Indian solar sector at size, winning a 300MW (420MW_{DC}) allocation of a 2GW tender that set the new record low for India of Rs2.36/kWh,⁷⁶ which ENEL intends to build in Rajasthan.⁷⁷ ENEL in July 2020 announced it would develop renewable assets in India and part sell down these once operational to **Norfund**, a Norwegian development finance institution (DFI).⁷⁸

JERA: A 50-50 joint venture between Tokyo Electric Power Company (TEPCO) and Chubu Electric Power, JERA is a major investor (holding a 9% equity stake) in ReNew Power, India's leading renewable energy owner and developer. JERA has a target to own 5GW of renewable energy by 2025 to diversify its existing 76GW of mostly thermal power capacity.

ReNew Power's momentum in deploying capital has accelerated in 2020, with the group winning a 200MW SECI solar tender in February 2020 at Rs2.51/kWh,⁷⁹ a 400MW round-the-clock renewables tender in May 2020 at Rs2.90/kWh,⁸⁰ plus 400MW of the 2GW SECI tender in June 2020 at Rs2.38/kWh⁸¹ and 200MW at Rs2.79/kWh at the Dholera solar park in Gujarat in August 2020,⁸² taking its portfolio to 5.4GW of operational renewable assets plus a 4.6GW development portfolio. July 2020 saw ReNew Power announce plans to invest Rs15-20bn (US\$200-260m) to set up a 2GW solar cell and module manufacturing facility, although a location has not yet been selected.⁸³

June 2019 saw ReNew Power raised US\$300m of new equity, split equally from Goldman Sachs, Abu Dhabi Investment Authority (ADIA) and CPPIB.⁸⁴

ReNew Power's shareholders include Goldman Sachs (48%), ADIA (16%), CPPIB (16%), JERA (9%) and employees the balance.

⁷⁶ PV Magazine. [India sets new record-low solar tariff of Rs2.36/kWh](#). 1 July 2020.

⁷⁷ ENEL press release. [Enel Green Power scores its first solar tender win in India with 420 MW of capacity awarded](#). 30 June 2020.

⁷⁸ Mercom. [Enel Green Power Partners with Norfund to Set up Renewable Projects in India](#). 10 July 2020.

⁷⁹ Economic Times. [SECI solar auction gets good response, auctions 1,200 MW solar projects](#). 28 February 2020.

⁸⁰ PV Magazine. [ReNew Power wins 400 MW 'round-the-clock' renewables auction at Rs2.90/kWh](#). 9 May 2020.

⁸¹ Mercom. [SECI's 2 GW Solar Auction Gets India a New Record-Low Tariff of ₹2.36/kWh](#). 30 June 2020.

⁸² Economic Times. [Vena Energy and Tata Power emerge winners at Gujarat solar auction](#). 14 August 2020.

⁸³ Mercom. [ReNew Power to Set Up 2 GW Solar Cell and Module Manufacturing Facility in India](#). 17 July 2020.

⁸⁴ ReNew Power press release. [ReNew Power raises \\$300 million via rights issue](#). 30 June 2019.

In December 2019 **GS E&C**, one of South Korea's largest listed construction and development firms, formed a 49%:51% joint venture (JV) with ReNew Power to build, own and operate a 300MW solar project in Rajasthan, CS E&C's first venture in India, supported by a 25-year PPA from SECI.⁸⁵

November 2020 saw Renew Power sell a 300MW wind portfolio to Ayana Renewables for US\$205m.

February 2021 saw a continuation of speculation that Renew Power was looking to advance a US stock market listing.⁸⁶

EDF: In July 2019 Total Eren and EDF Renewables set up a joint venture called **EDEN Renewables** to develop a 450MW solar project in Rajasthan with a 25-year SECI PPA, after separately winning 266MW of solar projects backed by PPAs with the Uttar Pradesh Power Corporation.⁸⁷ It has successfully achieved the financial closure in January 2021 for its under construction Rajasthan's 450MW project by securing project term loan of US\$165m from DBS Bank, Standard Chartered Bank, and Sumitomo Mitsui Banking Corporation (Singapore Branch).⁸⁸ Eden already operates 207MW of solar in India. In February 2020 EDF Renewables won a 300MW solar tender from SECI at Rs2.50/kWh.⁸⁹ Eden moved to substantially lift its presence in the Indian market in April 2020 winning a 300MW solar tender from NHPC at Rs2.55/kWh.⁹⁰ Then in June 2020 Eden won a 300MW allocation of a 2GW SECI solar tender at Rs2.37/kWh.⁹¹ Completion of all these tender wins would take EDEN to 2,273MW spread over the states of Rajasthan, Uttarakhand, Uttar Pradesh and Madhya Pradesh. This includes 207MWp operating solar plants, 450MW under construction, and 1,616MW due to be commissioned by 2022.⁹²

Sembcorp Green Energy: Singapore-listed Sembcorp has 12GW of generation capacity globally. Sembcorp entered India in 2013 and then acquired **Green Infra Wind Energy Limited**, which won 400MW of solar capacity at a record low tariff of Rs2.00 (~\$0.0270)/kWh in November 2020. This was a 15% drop from the previous record low tariff in India of Rs2.36/kWh (which itself was only set six months earlier).⁹³ In July 2020 Sembcorp completed three wind farms with 800MW of combined capacity across Tamil Nadu and Gujarat, supported by a 25-year PPA

⁸⁵ Renew Power press release. [ReNew Power announces joint venture with Korean major GS E&C](#). 11 December 2019.

⁸⁶ Economic Times. [Renew Power eyes merger with clean energy SPACs for US listing](#). 1 February 2021.

⁸⁷ PV Magazine. [EDEN Renewables seals power supply agreements for 716 MW of new solar capacity](#). 9 July 2019.

⁸⁸ ETEnergyWorld, [EDEN Renewables India secures USD 165 million finance for 450-MW solar project](#), 28 January 2021

⁸⁹ Economic Times. [SECI solar auction gets good response, auctions 1,200 MW solar projects](#). 28 February 2020.

⁹⁰ Mercom. [SoftBank, O2 Power, EDEN Renewables, Axis Energy, Avaada Win NHPC's 2 GW Solar Auction](#). 16 April 2020.

⁹¹ PV Magazine. [India sets new record-low solar tariff of Rs2.36/kWh](#). 1 July 2020.

⁹² PV Magazine. [EDEN Renewables bags 1.35 GWp of solar projects in the first four months of FY2021](#). 1 October 2020.

⁹³ Mercom India. [India's New Record for Lowest Solar Tariff is ₹2/kWh](#). 23 November 2020.

from SECI at an average tariff of Rs2.83/kWh.⁹⁴ This takes Sembcorp's total Indian renewable energy portfolio to 1.73GW operational today.⁹⁵ Sembcorp moved to 100% ownership of its India subsidiary in December 2019, acquiring the final 6% stake for US\$57m, implying an equity value for the entire business of Rs68bn, but inclusive of two thermal power plants with 2.6GW of capacity.

December 2020 saw Sembcorp win 400MW in SECI's 1.07GW solar tender at the then record low price of Rs2.00/kWh, for construction in Rajasthan.⁹⁶

China Light & Power (CLP): Hong Kong-based energy giant CLP has pivoted its India focus from thermal power to renewables. In April 2020 CLP India announced it would acquire three solar projects in Telangana of 122MW total capacity from Mahindra Susten, the cleantech private equity division of the Mahindra Group.⁹⁷

Mitsui & Co: Japan's Mitsui & Co dipped a toe in the Indian renewables water in June 2019 by investing US\$14m to acquire a 49% stake in 16MW of solar owned by Mahindra Susten. Individually this transaction is immaterial to this global energy giant, but Mitsui operates 10.4GW of power capacity globally, and plans to double its renewable energy share from 15% to 30% by 2030 as the world inevitably shifts away from coal.⁹⁸ Mitsui in July 2019 invested US\$14m in SmartE, India's first three wheeler electric mobility service.⁹⁹ In 2017 Mitsui invested US\$9m in **OMC Power**, a developer and operator of microgrids with 50MW of capacity. October 2020 saw Mitsui & Co commit to exit coal-fired power plant ownership entirely by 2030.¹⁰⁰

Fortum: Finland's largest utility, Fortum, moved into Indian renewables in 2012. In 2018 Fortum sold down a 54% equity stake in its existing 185MW of solar projects in India to UK Climate Investments (now part of Macquarie Group's Green Investment Bank, 40%) and EAB Group Plc (a listed investment management firm in Finland with AuM of €3bn, 14%).¹⁰¹ 2019 saw Fortum commission its 250MW of solar at Pavagada II in Karnataka with an investment totalling €160m. In March 2019, Fortum won the right to build another 250MW solar plant in Rajasthan with a fixed tariff of Rs2.48/kWh for 25 years. The EPC contract was awarded to Germany's Belectric Solar & Battery GmbH in September 2020.¹⁰²

⁹⁴ Economic Times. [Sembcorp commissions three wind power projects with 800 MW capacity](#). 29 July 2020.

⁹⁵ Business Standard. [Interview with Vipul Tuli on India's energy sector and the challenges ahead](#). 19 January 2021.

⁹⁶ PV Magazine. [Singapore's Sembcorp awarded 400 MW solar power project in Rajasthan](#). 8 January 2021.

⁹⁷ PV Magazine. [Mahindra & Mahindra forms a new solar subsidiary](#). 1 September 2020.

⁹⁸ Mitsui & Co Press Release. [Mitsui and Mahindra Susten to co-invest in distributed solar power projects in India](#). 4 June 2019.

⁹⁹ Mitsui & Co press release. [Mitsui invests in India's first and largest three-wheeler electric mobility service SmartE](#). 22 July 2019.

¹⁰⁰ Reuters. [Exclusive: Mitsui & Co to sell all stakes in coal-fired power plants by 2030 – CEO](#). 12 October 2020.

¹⁰¹ Press release. [Fortum to sell share of 185-MW Indian solar portfolio – aiming at further solar investments](#). 8 June 2018.

¹⁰² PV Magazine. [Belectric bags its second 250 MW solar project from Fortum](#). 29 September 2020.

5. Oil and Gas Majors

Total: In May 2020 Total committed to a net-zero emissions by 2050 target for its European businesses, and a 60% reduction in average carbon intensity of its global product range. A key component of this is to build 25GW of renewable energy by 2025,¹⁰³ and in January 2021 referenced a new target of 100GW by 2030.¹⁰⁴

A key part of this pivot to renewable energy involves Total investing US\$500m in February 2020 into a joint venture with **Adani Green Energy** owning 2.05GW of operating renewable energy projects in India.¹⁰⁵ Total has the right to co-invest in additional Adani Green Energy developments, and October 2020 saw Total exercise this right, taking a 50% stake in the 205MW Essel solar portfolio Adani Green acquired (enterprise value of US\$218m).¹⁰⁶ October 2020 saw Total detail its aim to expand its renewable energy portfolio in India to 6GW by 2025.¹⁰⁷

And January 2021 saw a major step towards this objective when Total acquired a 20% stake in Adani Green Energy from the Adani family for US\$2bn, the single biggest transaction to-date in Indian renewable infrastructure.¹⁰⁸ It is noteworthy that Total was able to fund this transaction by raising €3bn of subordinated perpetual hybrids at rates of just 1.625-2.125% p.a. across the two tranches.¹⁰⁹

Total owns 30% of French solar developer **Total Eren**. In July 2019 Total Eren and EDF Renewables set up a joint venture called **EDEN Renewables** to develop renewables in India, and has projects under development totalling 2.27GW.¹¹⁰

BP Plc: BP in February 2020 committed to a net zero emissions by 2050 target, and later in the year lifted its annual renewable energy capex commitment from US\$500m pa to \$5bn pa – setting a \$50bn by 2030 target.

July 2020 saw BP commit US\$70m to the Green Growth Equity Fund (GGEF) in India.¹¹¹ The GGEF is managed by a Lightsource BP and Everstone Capital joint venture called EverSource Capital which has invested in businesses like **Ayana Renewable Power**, Radiance Renewables, GreenCell Mobility and EverEnviro. Radiance Renewable has a target of 1.5GW of renewable energy project

¹⁰³ Total press release. [Total Adopts a New Climate Ambition To Get To Net Zero By 2050](#). 5 May 2020.

¹⁰⁴ Economic Times. [Total targets 100 GW of renewable energy capacity by 2030](#). 28 January 2021.

¹⁰⁵ Total press release. [India: Total Expands Its Partnership With Adani to Renewables and Acquires 50% of a 2 GW Solar Portfolio](#). 6 February 2020.

¹⁰⁶ Economic Times. [Adani Green-Total JV takes over Essel's solar assets acquired by Adani earlier](#). 15 October 2020.

¹⁰⁷ VCCircle. [Adani Green partner Total aims to expand India renewable portfolio to 6 GW](#). 26 October 2020.

¹⁰⁸ Financial Times. [Total deepens ties with India's Adani in \\$2.5bn green energy investment](#). 18 January 2021.

¹⁰⁹ IFR. [Total taps hybrid market for renewable energy financing](#). 19 January 2021 (paywalled).

¹¹⁰ PV Magazine. [EDEN Renewables bags 1.35 GWp of solar projects in the first four months of FY2021](#). 1 October 2020.

¹¹¹ BP press release. [BP to invest \\$70 million in India's Green Growth Equity Fund](#). 7 July 2020.

development in next 3-5 years.¹¹² EverSource capital acquired a rooftop solar firm, Origin Renewables, for an undisclosed transaction in February 2020. It is also planning to buy out 168MW of rooftop solar assets of Azure Power at a valuation of US\$112m.¹¹³

Shell: In January 2019, Shell New Energies invested US\$100m in a 49% equity stake in Singapore-based **Cleantech Solar**.¹¹⁴ Cleantech Solar owns, finances, constructs and operates more than 120 solar power plants across India and Asia. Shell in 2017 took a strategic stake in Singapore's Sunseap, a leading Asian rooftop solar developer.¹¹⁵ June 2020 saw Cleantech Solar secure a US\$75m green loan from ING Bank N.V., the largest C&I rooftop solar loan to date. Cleantech Solar has been consistently **ranked the #1 C&I** developer in India. These investments are expected to further enhance with its recent strategy announcement to invest US\$5-6bn annually into green energy globally.¹¹⁶

Eni: In February 2020, Eni pledged to slash its carbon emissions by 80%. A key part of this involves Eni's plans to develop its own renewable energy business where the aim is to install 15GW of capacity by 2030, from 0.2GW last year, before taking it to more than 55GW in 2050.¹¹⁷ Eni has flagged that India is a logical gigawatt-scale destination for the firm.¹¹⁸

PETRONAS Group: PETRONAS of Malaysia in 2019 acquired **Amplus Energy Solutions** for US\$375m (Rs270bn)¹¹⁹ marking an exit of New York-based I-Squared Capital which held 90% of the Amplus assets with total installed capacity of 350MW across 200 locations in India. The Malaysian state-run oil giant has also acquired two solar power plants from Acme Solar Holdings Limited for US\$109m (US\$1.07m/MW) via Amplus in September 2020. The high valuation is due to the quality of the asset as the project is installed in a solar park with a secured PPA in place.¹²⁰ November 2020 saw PETRONAS pledge to reach net zero emissions by 2050, and renewable investments have grown substantially over the last two years as a key priority, taking the group to 850MW (operational and under development).¹²¹

PTT Group: Thailand's state-owned oil and gas giant, PTT Group, was reported in July 2020 to be examining a US\$500m investment in ReNew Power.¹²²

¹¹² VCCircle. [EverSource Capital to acquire solar rooftop firm Origin Renewables](#). 11 February 2020.

¹¹³ Economic Times. [Historic rise in renewable energy M&A deals this year despite COVID-19](#). 19 November 2020.

¹¹⁴ Cleantech Solar press release. [Cleantech Solar and Shell sign strategic investment](#). 19 December 2018.

¹¹⁵ PV Magazine. [Oil giant Shell invests in Singapore solar firm Sunseap](#). 1 August 2017.

¹¹⁶ ETEnergyWorld, [Shell says to invest \\$5-6 billion annually in green energy](#), 11 February 2021

¹¹⁷ Reuters. [Eni committed to 'irreversible path' of going green](#). 18 June 2020.

¹¹⁸ LiveMint. [Italy's Eni eyes foray into Indian clean energy space](#). 19 January 2021.

¹¹⁹ LiveMint. [Petronas of Malaysia buys Amplus Energy in ₹2,700 crore deal](#). 16 April 2019.

¹²⁰ VCCircle. [Why Malaysia's Petronas paid a premium to buy Acme Solar](#). 18 September 2020.

¹²¹ PETRONAS. [Financial Results analysis 3QFY2021](#). November 2020.

¹²² ET EnergyWorld. [Thai energy giant PTT Group eye \\$500 m Renew buy-in](#). 29 July 2020.

6. Indian Power Billionaires

Adani Green Energy: The race to be India's largest renewable energy developer is clearly on between ReNew Power (privately owned) and Adani Green (market capitalisation of Rs1,660bn [US\$22.7bn]). The leading listed entity in the Adani Group, Adani Green has 3.2GW of operational renewables capacity, with another 11.6GW of under-construction and awarded renewable power projects. The company aims to achieve 25GW of renewable power by 2025.

August 2020 saw Adani Green award a 473MW wind turbine order to Siemens Gamesa in the development of a total of 860MW of wind projects across India.¹²³

The Adani Group has also committed to expanding its existing 1.5GW solar cell and module manufacturing facility in Gujarat by building another 2GW of capacity as part of its 2GW manufacturing / 8GW solar installation contract win.¹²⁴ However, it was subsequently reported this 8GW award is a best-efforts effort only,¹²⁵ which is problematic given the Rs2.92/kWh PPA is now 45% out-of-the-money relative to the latest solar tender awards of Rs1.99/kWh.

Adani is opening up global capacity access for Indian renewables at a record high scale, including a US\$1.8bn syndicated loan from a consortium of 10 global banks.¹²⁶

October 2020 saw Adani Green complete the acquisition of a 205MW portfolio of solar projects for Rs1,300 crore from the debt-laden Essel Group, and on-sell 50% to Total.¹²⁷ Adani Green also commissioned a [50MW solar project in Jodhpur](#).

December 2020 saw completion of a [100MW solar project in Kutchh, Gujarat](#). Additionally, Adani Green also won 600MW in a wind-solar hybrid tender by SECI in December 2020 at a tariff of Rs2.41/kWh.¹²⁸

January 2021 kicked off with Adani winning a 600MW wind-solar hybrid award at Rs2.41/kWh from a 1.2GW SECI ISTS tender.¹²⁹

February 2021, Adani Green won 3GW of solar projects out of the 6.4GW solar tender undertaken by the state government of Andhra Pradesh in December 2021, part of an overwhelming total of 14.9GW of Expressions of Interest, despite the state government's legal actions undermining the legal validity of higher priced legacy renewable energy PPAs. Adani Green had bid for the entire 6.4GW tender and won four projects with a cumulative capacity of 2.4GW at a tariff of Rs2.49/kWh while winning an additional 600MW capacity at a tariff of Rs2.58/kWh. Other winners of

¹²³ Saur Energy. [Siemens Gamesa Selected for Adani's 473MW Wind Project in Rajasthan](#). 18 August 2020.

¹²⁴ LiveMint. [India gets 10 GW proposals for setting up solar equipment manufacturing capacity](#). 10 September 2020.

¹²⁵ Reuters. [Adani has no guaranteed customer for \\$6bn Indian solar project](#). 19 November 2020.

¹²⁶ Rediff.com. [Adani Green Energy to raise \\$1.8 bn from foreign banks](#). 12 September 2020.

¹²⁷ PV Magazine. [Adani Green completes acquisition of 205 MW operating solar assets from Essel](#). 1 October 2020.

¹²⁸ Mercom. [SECI's 1.2 GW Solar-Wind Hybrid Auction Gets Tariff of ₹2.41/kWh](#). 23 Dec 2020.

¹²⁹ Economic Times. [Adani Green bags 600MW wind-solar hybrid power project](#). 1 January 2021.

the auction are Torrent Power (300MW) at lowest tariff of Rs2.47/kWh, NTPC (600MW) and Andhra Pradesh-based Sri Sai (1.8GW) at a tariff of Rs2.48/kWh, and HES Infra (600MW) at a tariff of Rs2.49/kWh.¹³⁰ This solar auction produced the lowest solar tariff in the Andhra state till date, a good improvement, but also reflective of the higher tariffs required to account for the higher regulatory and financial risks in this state.¹³¹

January 2021 saw Adani commission a 25MW solar facility in Uttar Pradesh¹³² and a 150MW of solar in Kutchh, the later underpinned by a Rs2.67/kWh 25-year PPA from state discom Gujarat Urja Vikas Nigam Limited (GUVNL).¹³³ February 2021 saw Adani Green commission a 100MW solar project in Uttar Pradesh.¹³⁴

January 2021 also saw Total of France acquire a 20% strategic stake in Adani Green Energy from the Adani family for US\$2bn, building on Total's US\$500m investment into a joint venture holding Adani Green's existing operating capacity in 2020.¹³⁵

Adani Transmission: The Adani Family owns a 75% stake in the NSE-listed [Adani Transmission Limited \(ATL\)](#), which has a market capitalisation of Rs478bn (US\$6.5bn). ATL has a transmission network of 15,400ckm, representing a 3.6% share of India's grid T&D total. Adani Transmission has 12 operating lines and another 9 under construction, with a total regulated asset base of Rs300bn (US\$4.3bn) when fully built, secured by very long dated contracts averaging 31 years, with Rs166bn of net debt (as of September 2020).

February 2020 saw Adani Transmission complete the Qatar Investment Authority investment to acquire a 25.1% stake in Adani Electricity Mumbai Limited (AEML) from ATL (with ATL retaining the 74.9% balance) for Rs3,220 Crore (US\$452m). AEML has recently completed an investment grade, US\$1bn bond issuance, the first by a private integrated utility from India. The issue generated significant interest from international investors and was oversubscribed by 5.9x.¹³⁶ AEML is an integrated business of power generation, transmission and retail electricity distribution. AEML serves over 3 million consumers spread across 400sq. km in Mumbai, meeting close to 2,000MW of power demand with 99.99% reliability.

March 2020 saw ATL complete a US\$400m US private placement (USPP), the first successful US private placement from India for over a decade. ATL has now issued 10-year, 17-year and 30-year paper in the global markets. The underlying assets funded through USPP are rated BBB, one notch higher than sovereign rating, by

¹³⁰ LiveMint. [Adani bids for entire 6.4GW solar tender](#). 31 December 2020.

¹³¹ Mercom India, [Torrent Power Quotes the Lowest Bid of ₹2.47/kWh in Andhra's 6.4 GW Solar Auction](#), 3 February 2021

¹³² PV Magazine. [Adani Green commissions 25 MW solar plant in Uttar Pradesh](#). 12 January 2021.

¹³³ PV Magazine. [Adani Green Energy commissions 150 MW solar power plant in Gujarat](#). 20 January 2021.

¹³⁴ Adani Green. [AGEL Commissions 100 MW Solar Power Plants In Uttar Pradesh, Ahead Of Schedule](#). 1 February 2021.

¹³⁵ Economic Times. [French energy group Total buys 20% stake in Adani Green](#). 18 January 2021.

¹³⁶ Adani Transmission. [Adani Transmission Announces Completion of Qatar Investment Authority Investment In AEML](#). 11 February 2020.

Fitch and Baa2 by Moody's, subject to the issue rating being capped eventually at the sovereign rating of the country i.e. BBB-/ Baa2.¹³⁷

November 2020 saw Adani Transmission complete the acquisition of 650ckm in West Bengal and Bihar, the Alipurduar Transmission, from Kalpataru Power Transmission for an enterprise value of Rs1300 crore (US\$178m).¹³⁸

Tata Power: Having built one of India's largest import coal-fired power plants, 4.0GW at Mundra a decade ago, Tata Power (market capitalisation of Rs247bn [US\$3.4bn]) was one of the first Indian thermal power majors to pivot towards renewables. Tata now has 1,735MW of solar, 932MW of wind and 871MW of hydro operational as at October 2020, in addition to 8,860MW of legacy thermal assets.

This momentum towards renewables has accelerated in 2020, with Tata winning 370MW of solar in an NTPC tender at Rs2.43/kWh¹³⁹ and 100MW at R2.78/kWh at the Dholera solar park in Gujarat, both in August 2020.¹⁴⁰ Tata has also announced a 225MW solar-wind hybrid project development in July 2020 for its sister entity, Tata Power Mumbai Distribution,¹⁴¹ giving Tata Power a 1,237MW solar development pipeline in total.

October 2020 saw Tata Power apply to the market regulator Securities and Exchange Board of India (SEBI) for an in-principal approval for creation of an Infrastructure Investment Trust (InvIT) for its renewable energy assets.¹⁴²

Tata Power runs an inhouse solar engineering, procurement and construction (EPC) firm for both internal and external clients. The total order book as of January 2021 is for 4GW of new solar (Rs12,000 crore/US\$1.6bn).¹⁴³

January 2021 saw Tata Power secure a 110MW solar PPA letter of award from the Kerala State Electricity Board (the state discom).

JSW Group: JSW Group's Indian stock exchange-listed **JSW Energy** (market capitalisation of Rs110bn [US\$1.5bn]) operates 4.56GW of power generation (3.2GW of thermal, 1.4GW of hydro, 0.01GW solar). After a decade of shareholder wealth destruction, in February 2020 JSW Energy announced a major pivot, highlighting that renewable energy would be at the core of the group's new 20GW

¹³⁷ Adani Transmission. [ATL Circles Up Second Tranche of USD90m](#). 31 March 2020.

¹³⁸ Adani Transmission. [Adani Transmission Completes Acquisition of Alipurduar Transmission From Kalpataru Power Transmission For An Enterprise Value Of INR 1300 Cr](#). 27 November 2020.

¹³⁹ Mercom. [Amp Energy, Tata, Azure, and O2 Power Winners in NTPC's 1.2 GW Solar Auction](#). 6 August 2020.

¹⁴⁰ Economic Times. [Vena Energy, Tata emerge winners at Gujarat solar auction](#). 14 August 2020.

¹⁴¹ Mercom. [Tata Power Green Receives Letter of Award for a 225 MW Solar-Wind Hybrid Project](#). 17 July 2020.

¹⁴² Times of India. [Tata Power plans to create InvIT for renewables; shares rise over 2%](#). 17 October 2020.

¹⁴³ PV Magazine India. [Tata Power awarded 320 MW solar project for NTPC](#). 25 January 2021.

capacity target for 2029/30.¹⁴⁴ July 2020 saw JSW Energy walk away from the long proposed acquisition of GMR Kamalanga's 1.05GW coal fired power plant and then in August 2020 win a 810MW wind-solar hybrid tender at Rs3.00/kWh, one of the single largest tender wins of 2020 to-date in India.¹⁴⁵ February 2021 saw JSW Energy walk away from another long delayed coal-power plant acquisition proposal, that being the 700MW Ind-Bharat Energy (Utkal) half-built plant in Odisha.¹⁴⁶

Reliance Group: July 2020 saw Mukesh Ambani flag a shift from oil and gas towards renewable electricity, battery storage and hydrogen as part of a corporate commitment to be net zero by 2035.¹⁴⁷ How this will be achieved is yet to be detailed, with obscure references to carbon recycling. Reliance Power commissioned 210MW of solar, concentrated solar power (CSP) and wind projects in 2012-2014.

Mahindra Group: Mahindra Susten is the cleantech private equity division of India's US\$20bn Mahindra Group, which has an operational solar portfolio of 1.5GW. This renewables business is being marketed for sale.¹⁴⁸

Torrent Power: Majority owned by the Mehta family, Torrent Power operates 787MW of operational renewable energy projects, alongside 3.1GW of thermal power plants.¹⁴⁹ Torrent won a 100MW solar tender in December 2020 at a record low Rs1.99/kWh.¹⁵⁰ Torrent also emerged as the lowest bidder winning a 300MW solar capacity at a tariff of Rs2.47/kWh in February 2021 for a solar auction of 6.4GW conducted by Andhra Pradesh Green Energy Corporation (APGECL).¹⁵¹

Sterlite Power Transmission: Sterlite Power is a developer of power transmission infrastructure with projects of over 13,700ckm in India and Brazil in operation or under development. Of this total, 15 transmission projects are in India, spanning more than 9,246ckm, through a total capex of Rs25,262 crore (US\$3.4bn).

Sterlite Power is the founder and sponsor of **IndiGrid**, India's first power sector InvIT, listed on the National Stock Exchange (NSE). Sterlite Power divested its 15% stake in IndiGrid in August 2020 for Rs840 crore (US\$115m), having expanded in 2019 by equity issues to KKR of the U.S. (23%) and GIC of Singapore (20%).

¹⁴⁴ Economic Times. [Renewable to be at core of 20GW capacity target: JSW Energy CEO](#). 4 February 2020.

¹⁴⁵ Mercom India. [Vena Energy, JSW Solar – Winners in SECI'S Auction for Blended Solar Wind Projects](#). 14 August 2020.

¹⁴⁶ The Hindu. [JSW Energy recalls bid for Ind-Bharat Energy due to Covid outbreak](#). 2 February 2021.

¹⁴⁷ LiveMint. [The aim is to become a net zero-carbon company by 2035: Ambani](#). 16 July 2020.

¹⁴⁸ Deal Street Asia. [Actis, Brookfield eye Mahindra EPC, solar assets in deal valued at \\$500m](#). 22 December 2020.

¹⁴⁹ Torrent Power [2019/20 Annual Report](#).

¹⁵⁰ Mercom. [Gujarat's 500 MW Auction Sets A New Record Low Solar Tariff of ₹1.99/kWh](#). 19 December 2020.

¹⁵¹ Mercom India, [Torrent Power Quotes the Lowest Bid of ₹2.47/kWh in Andhra's 6.4 GW Solar Auction](#), 3 February 2021.

Hero Group: Hero MotoCorp Limited is a leading Indian multinational motorcycle and scooter manufacturer based in New Delhi (with a 45-50% Indian market share), 40% owned by the Munjal family. In 2012 **Hero Future Energies** (HFE) was founded. The current portfolio includes 1.3GW of Indian wind and solar power and an additional 1.5GW under construction or planned. The company has a 2022 growth target of 5GW of installed and operating capacity. HFE also has a pipeline of ~500MW of large-scale grid connected solar projects across Europe and Asia (including Bangladesh, Singapore, Vietnam, Philippines and Indonesia). In November 2020 HFE Chief Executive Officer (CEO) Sunil Jain forecast Indian solar tariffs would be just Rs1/kWh before 2030.¹⁵² The World Bank's IFC Global Infrastructure Fund invested US\$125m in HFE in 2017.¹⁵³ 2019 saw Abu Dhabi Future Energy Company (Masdar) make a US\$150m investment in HFE.¹⁵⁴

Aditya Birla Renewables: This is a new division of the leading Indian conglomerate Aditya Birla Group, which owns 364MW of operational solar projects, and won a 120MW Gujarat solar tender in December 2020 at a record low Rs1.99/kWh.¹⁵⁵

Borosil Renewables: NSE listed alongside its sister company, Borosil Limited, Borosil Renewables is India's only solar glass manufacturer. Borosil Renewables' manufacturing plant is based in Bharuch, Gujarat and recently more than doubled its existing production capacity of high performance solar glass to 2.4GW p.a.

India's solar module manufacturing industry has announced capacity expansions aiming to reach 12GW p.a. in total (Adani 4GW, Waaree Energies 3GW, Vikram Solar 3GW and ReNew Power 2GW), showing there is very significant domestic expansion potential for Borosil Renewables under Prime Minister Narendra Modi's "Make in India" initiative.

In December 2020 Borosil Renewables issued 15.8m new shares to institutional investors to raise Rs2.0bn (US\$27m), diluting the promotor group to a 62% shareholding (previously 70%).

¹⁵² RenewableWatch. [Interview with Sunil Jain](#). November 2020.

¹⁵³ IFC Press Release. [IFC Invests in Hero Future Energies to Significantly Scale Up Renewable Capacity in India](#). 5 January 2017.

¹⁵⁴ Hero Future Energies press release. [Strategic Investment of US\\$150 Million Funding Growth Portfolio For HFE](#). 15 November 2019.

¹⁵⁵ Mercom. [Gujarat's 500 MW Auction Sets a New Record Low Solar Tariff of ₹1.99/kWh](#). 19 December 2020.

7. Indian Government Finance Organisations

The September 2020 Lakshmi Vilas Bank (LVB) crisis follows the March 2020 funding crisis at YES Bank, one of India's top funders of renewable energy, which followed the collapse of IL&FS, which has strained risk capital access for India's renewable industry.¹⁵⁶

A key challenge for India in delivering sustained economic growth is the progressive opening of the relatively closed Indian financial markets, and addressing the systemic issues behind the ongoing Indian financial institutions debacles (IL&FS, October 2018,¹⁵⁷ PMC Bank, September 2019,¹⁵⁸ Yes Bank, March 2020¹⁵⁹ and Lakshmi Vilas Bank, September 2020¹⁶⁰).

In January 2018 YES Bank committed to fund US\$5bn of solar projects across India by 2030 as a foundation commitment of the International Solar Alliance (ISA), supported by a US\$400m European Investment Bank (EIB) co-financing commitment.¹⁶¹ The Government of India, in conjunction with the World Bank, has been actively promoting access to debt capital financing for the sector. Rooftop solar is a key area of focus, given the grid strengthening merits of smaller scale distributed generation. However, this can be problematic in terms of financing, given the need for aggregation and the need to build decentralised knowledge capacity in lending organisations to better understand and simplify funding for this growth sector.¹⁶²

IREDA: Established in 1987, the Indian Renewable Energy Development Agency (IREDA) is a Government of India enterprise incorporated as a Non-Banking Financial Company (NBFC). IREDA is the premier NBFC under the Ministry of New and Renewable Energy (MNRE) which provides financial support to renewable energy generation projects, energy efficiency and environmental technology development. To date, IREDA has disbursed more than US\$7.28bn (Rs540bn) of debt to facilitate the installation of over 16GW of renewable energy capacity. It provides commercial loans at highly competitive terms such as repayment periods of up to 25 years, higher debt funding up to 75% of the total project cost and lower interest rates.¹⁶³ GoI has announced in this year's budget to infuse an additional equity of Rs1,500crores (US\$206m) into IREDA which would enable IREDA to extend and additional debt of Rs12,000crores (US\$1.6bn) to fund approximately

¹⁵⁶ Hero Future Energies Press Release, [Crisis at YES Bank limits green financing avenues](#), 6 March 2020.

¹⁵⁷ Economic Times, [IL&FS: The crisis that has India in panic mode](#), 3 October 2018.

¹⁵⁸ Economic Times, [What steps have been taken to help PMC Bank depositors, HC asks RBI](#), 4 November 2019.

¹⁵⁹ Hero Future Energies Press Release, [Crisis at YES Bank limits green financing avenues](#), 6 March 2020.

¹⁶⁰ Bloomberg Quint, [Lakshmi Vilas Bank: A Stitch In Time](#), 22 September 2020.

¹⁶¹ Yes Bank Press Release, [Yes Bank commits US\\$5 billion for solar projects in India at International Solar Alliance \(ISA\)](#), 17 January 2018.

¹⁶² PV Magazine, [Financing in rooftop solar](#), 18 August 2020.

¹⁶³ [Indian Renewable Energy Development Agency](#).

4.5GW of renewable energy projects.¹⁶⁴ IREDA is one of the key domestic institutions that have received concessional credit lines as well as capital grants from several multilateral development banks and international financial institutions such as the World Bank, KfW, AfD, JICA, EIB, ADB and IFC.

National Investment and Infrastructure Fund: The National Investment and Infrastructure Fund (NIIF) was set up by the Indian government in February 2015 as a fund manager that invests in infrastructure and related sectors in India. NIIF's first acquisition in 2018 was IDFC Infrastructure Finance Limited, an NBFC that is registered with the Reserve Bank of India as an Infrastructure Debt Fund.¹⁶⁵ NIIF manages US\$4.4 billion of capital commitments across three funds. It counts CPPIB,¹⁶⁶ Abu Dhabi Investment Authority, ADB,¹⁶⁷ AustralianSuper,¹⁶⁸ Asian Infrastructure Investment Bank (AIIB), Ontario Teachers' Pension Plan, PSP Investments, Temasek, Axis Bank, HDFC Group, ICICI Bank and Kotak Mahindra Life Insurance as investors, alongside the government.

November 2020 saw the Indian cabinet approve a capital infusion by the government of 60bn rupees (US\$0.8bn) in NIIF over the next two years.¹⁶⁹

November 2020 saw **Ayana Renewable Power** acquire a 300MW wind portfolio from Renew Power for US\$205m.

December 2020 saw NIIF, CDC Group UK and EverSource Capital's Green Growth Equity Fund inject additional equity funding of US\$284m, US\$70m and \$36m respectively into **Ayana Renewable Power**, taking the combined cumulative equity investment to US\$721m in support of a 1.14GW portfolio of solar projects under development or in operation in India.¹⁷⁰

In December 2020 it was reported that NIIF had offered an enterprise value bid of Rs3,500 crore (US\$480m) to acquire 617MW worth assets of Mahindra Susten, the solar energy EPC platform owned by the Mahindra group, outbidding global private equity funds Brookfield Asset Management Inc and KKR.¹⁷¹

Power Finance Corporation (PFC): PFC is the largest Public Sector Undertaking financier for the Indian power sector. While it is highly exposed to thermal power

¹⁶⁴ ETEnergyWorld, [Budget 2021: SECI can float 15 GW tenders on yearly basis with Rs 1,000-cr capital infusion](#), 9 February 2021

¹⁶⁵ NIIF press release. [NIIF to acquire IDFC Infrastructure Finance Limited from IDFC](#). 31 October 2018.

¹⁶⁶ NIIF press release. [Canada Pension Plan Investment Board to invest up to US\\$600 million through National Investment and Infrastructure Fund \(NIIF\)](#). 5 December 2019.

¹⁶⁷ NIIF press release. [Asian Development Bank \(ADB\) to invest USD 100 million through National Investment and Infrastructure Fund \(NIIF\)](#). 30 March 2020.

¹⁶⁸ NIIF press release. [AustralianSuper and Ontario Teachers' Pension Plan to invest up to USD 2 billion through National Investment and Infrastructure Fund \(NIIF\)](#). 6 August 2019.

¹⁶⁹ Reuters. [Indian government to invest \\$812 million in NIIF – minister](#). 25 November 2020.

¹⁷⁰ NIIF press release. [Renewable energy platform Ayana hits \\$721m in funding as CDC, NIIF and GGEF agree to inject further capital](#). 17 December 2020.

¹⁷¹ Economic Times. [National Investment and Infra Fund emerges top bidder for Mahindra Susten's solar assets](#). 16 December 2020.

project funding, it has recently started to deepen its lending for renewable energy projects. Currently, it holds renewable energy gross loan assets worth of US\$2.65bn in its balance sheet.¹⁷² PFC's increased participation could be a key facilitator for India to achieve its ambitious renewable energy targets, given its ability to access long dated global debt markets, as illustrated by the February 2021 US\$500m, 10-year bond raising at just 3.35% pa being oversubscribed fivefold illustrates.¹⁷³

Small Industrial Development Bank of India (SIDBI): The SIDBI has a focus on building capacity and capital access for India's micro, small and medium enterprises (MSMEs). SIDBI's asset base grew 20% year-on-year in 2019/20 to a record Rs187,539 crore (US\$26bn), generating a relatively healthy 12-13% annual return on equity to the government given a relatively low level of non-performing loan losses. MSMEs are the backbone of the Indian economy, contributing an estimated 30% and 50% respectively to GDP and overall exports.¹⁷⁴

SIDBI provides a risk mitigation instrument called Partial Risk Sharing Facility (PRSF) for energy efficiency projects in India. PRSF is funded by the World Bank with an outlay of US\$43m. The facility, managed by SIDBI, provides partial credit guarantees to cover a share of the counterparty default risk that participating financial institutions face in extending loans to eligible energy efficiency projects.¹⁷⁵

January 2021 saw SIDBI partner with Tata Power in an innovative financing program providing collateral-free loans at an interest rate less than 10% (and still providing a solid net interest margin vs government of India borrowing costs of 6-7% p.a.) for both off-grid and on-grid rooftop solar connections for MSMEs migrating to rooftop solar systems. Given the installations are entirely self-financing from the electricity bill reductions, this should give the distributed energy sector a significant boost, cutting red-tape to accelerate capital deployment leveraging the quality control systems and national EPC capacities of Tata Power.¹⁷⁶

Reserve Bank of India (RBI): The RBI has further revised the priority sector guidelines for distributed renewable energy during COVID-19, doubling renewable energy lending limits whilst expanding funding for solarisation of grid-connected agriculture solar pumps and loans for setting up compressed bio-gas plants.¹⁷⁷

Indian Railways: Minister of Railways, Piyush Goyal, has an ambitious aim to achieve 100% electrification by 2023, along with a target for generation self-sufficiency and by 2030 to develop 20GW of renewable energy using Indian Railways' landbank of 51,000 hectares plus railway station rooftops. The objective is to make the railways 100% energy self-sufficient and on a path to net zero

¹⁷² Power Finance Corporation Limited, [Performance Highlight](#), 30 June 2020.

¹⁷³ LiveMint. [PFC issues \\$500m senior unsecured bonds for more than 10 years](#). 2 February 2021.

¹⁷⁴ SIDBI [2019/20 Annual Report](#).

¹⁷⁵ Partial Risk Sharing Facility for Energy Efficiency (PRSF), [Project Funding](#).

¹⁷⁶ PV Magazine. [Tata Power partners SIDBI to launch low-cost finance for MSME rooftop solar](#). 5 January 2021.

¹⁷⁷ Economic Times, [Boost for renewable energy: RBI issues revised priority sector lending guidelines](#), 4 September 2020.

emissions.¹⁷⁸ Indian Railways estimates that with 100% electrification the fuel bill saving will be Rs14,500 crore (US\$2.0bn) per annum.¹⁷⁹ Indian Railways Finance Corp is a key subsidiary that undertakes financing for this huge state-owned enterprise (SOE), bringing low cost capital access to renewables infrastructure investments.

IFCI Limited: IFCI, established in 1948 by Government of India, is a publicly listed NBFIs with assets of US\$2.5bn. IFCI provides several innovative financial products and services including risk mitigation instruments such as credit enhancement guarantee schemes for mega infrastructure projects across sectors. It disbursed credit of US\$19m to wind energy generation projects which constituted 19% of the total disbursement in FY2019-20.

IFCI Venture Limited, a subsidiary of IFCI, has a SEBI-registered AIF category II fund of US\$30m called Green India Venture Fund¹⁸⁰ which is mandated to invest in the clean tech and renewable energy space.

¹⁷⁸ Economic Times, [Plan to use surplus land of railways to generate 20 GW of renewable energy: Piyush Goyal](#), 27 August 2020.

¹⁷⁹ The Hindu, [Indian Railways plans to save Rs 14,500 cr per annum with 100% electrification](#), 28 December 2020.

¹⁸⁰ IFCI Venture, [About Fund](#).

8. Multilateral Development Banks and Development Finance Institutions

World Bank Group: In 2016 the World Bank provided a US\$625m facility to SBI for rooftop solar development.¹⁸¹

International Finance Corporation (IFC): The World Bank's IFC was one of the founding shareholders in Azure Power. IFC Global Infrastructure Fund also invested US\$125m in Hero Future Energies in 2017.¹⁸² IFC, one of the largest climate-smart project financiers, has committed US\$2.3bn since 1989 to support Indian power sector across 60 projects out of which 35 are renewable energy projects.

Tata Cleantech Capital: [Tata Cleantech](#) is a green bank set up in 2011 as a joint venture between Tata Capital Limited (80.5% equity stake) and the International Finance Corporation (19.5% equity stake), working across utility scale and distributed solar, wind, power transmission, small hydro, biomass, energy efficiency and electric mobility. To date, Tata Cleantech has provided financing for over 7.7GW of renewable energy across 200 projects in India, with a loan portfolio of US\$830m (as of March 2020).¹⁸³ January 2021 saw CDC Group UK invest US\$30m into [Tata Cleantech](#).¹⁸⁴

World Solar Bank: The International Solar Alliance (ISA) has proposed to establish a World Solar Bank, with the Export-Import Bank of India committing \$2bn and the French Development Agency, AFD, have earmarking \$1.7bn for the ISA as the initial commitments for a hoped for \$10bn of equity commitments (\$2bn of paid up equity capital) for the new MDB to co-finance projects with the likes of the World Bank and the Asian Development Bank.^{185 186}

Asian Development Bank (ADB): ADB has been one of the major MDBs instrumental in the growth of renewable energy in India. It has provided a range of financial products such as concessional credit lines to commercial banks, long-term cost-effective debts to IPPs, and risk mitigation instruments to private developers. Some of its key investments include:

- Providing a US\$500m multi-tranche finance facility for funding C&I rooftop solar in 2017 to Punjab National Bank (PNB).¹⁸⁷

¹⁸¹ World Bank. [Grid-Connected Rooftop Solar Program update](#). December 2019.

¹⁸² IFC press release. [IFC Invests in Hero Future Energies to Significantly Scale Up Renewable Capacity in India](#). 5 January 2017.

¹⁸³ Tata Cleantech, [Year to 31 March 2020 financial results](#).

¹⁸⁴ PV Magazine, [Tata Cleantech secures US\\$30-million from UK investor CDC](#), 28 January 2021.

¹⁸⁵ The Ken. [Solar flair - India's quest to supersede China](#). 10 July 2020.

¹⁸⁶ LiveMint. [ISA to consider solar bank plan](#). 24 January 2021.

¹⁸⁷ ADB. [\\$100M ADB Loan to Punjab National Bank to Finance Solar Rooftop Projects](#). 30 May 2017.

- A US\$750m debt facility in May 2019 to help fund part of Indian Railways' US\$132bn five-year electrification program.¹⁸⁸
- Committing in September 2020 to invest US\$15m in Avaada Energy to facilitate its expansion of solar power generation capacity in India. This second round of equity, in addition to US\$50m in the first round, has placed Avaada in a comfortable to position to expand its current 1GW capacity.¹⁸⁹
- In December 2020 ADB offered a US\$430m multi-tranche financing facility to separate households and agricultural power distribution networks to improve the electricity access in Uttar Pradesh. The funding will also be used to facilitate the use of solar energy to meet agricultural demand, increase in electricity supply duration to rural residential consumers, and energy and water conservation through construction of a parallel network of 11-kilovolt feeders with a total length of 17,000km to separate the distribution of electricity between residential consumers and agricultural consumers.¹⁹⁰
- January 2021 saw ADB provide a US\$100m loan agreement to modernise and upgrade the power distribution system in Bengaluru, the capital city of the state of Karnataka, plus \$90m without a sovereign guarantee loan for the project to Bangalore Electricity Supply Company Limited (BESCOM), one of the five state-owned discoms in Karnataka. As part of the project, overhead distribution lines will be converted into underground cables to reduce AT&C losses and minimise electricity outages resulting from natural hazards such as cyclones and external disturbances to overhead lines. Moving 7,200km of distribution lines underground is expected to reduce AT&C losses by 30%.¹⁹¹

KfW: Germany's KfW in 2015 provided US\$340m to IREDA for funding wind and solar projects. August 2020 saw KfW provide a 15-year term at 0.15% p.a. interest and cover 80% of the overall project cost of Rs750 crore for a 125MW Bengal solar park.¹⁹²

Green Climate Fund (GCF): The GCF in 2019 provided the first half of a US\$100m co-investment alongside **Tata Cleantech**, which also provided a line of credit of US\$100m for rooftop lending.¹⁹³

CDC Group: In March 2019 CDC Group, the UK DFI (AuM £5.8bn), together with the Indian government's NIIF jointly invested \$200m in the Green Growth Equity Fund (GGEF), which was deployed into **Ayana Renewable Power** to develop renewable

¹⁸⁸ ADB press release. [ADB to Provide Largest Ever Non-Sovereign Loan to Fund Railway Track Electrification in India](#). 22 May 2019.

¹⁸⁹ ADB. [ADB to Invest \\$15 Million in Avaada Energy to Expand Renewable Energy Capacity in India](#). 28 September 2020.

¹⁹⁰ ADB. [ADB Approves \\$430 Million to Help Rehabilitate Power Distribution Networks in Uttar Pradesh, India](#). 1 December 2020.

¹⁹¹ PV Magazine. [ADB to provide \\$100m to upgrade power distribution system in Bengaluru](#). 5 January 2021.

¹⁹² PV Magazine. [KfW offers Rs 600-crore loan for 125 MW Bengal solar park](#). 6 August 2020.

¹⁹³ Green Climate Fund. [GCF funded India solar rooftop programme kicks off](#). April 2019.

energy projects in India.¹⁹⁴ Everstone Group (an Indian private equity fund) and Lightsource BP via their joint venture EverSource Capital were selected as the Investment Manager for the GGEF.¹⁹⁵

Ayana Renewable Power won 300MW of the 2GW SECI tender in July 2020 at Rs2.38/kWh,¹⁹⁶ giving it a renewable energy development portfolio of 1.1GW across India. BP in July 2020 invested \$70m in the GGEF.¹⁹⁷ Ayana Renewable also acquired ReNew Power's 300MW wind project for US\$205m (Rs16bn) in November 2020. The projects are located in the Raichur, Bijapur, Belgaum, and Bellary districts of Karnataka.¹⁹⁸

December 2020 saw NIIF, CDC Group UK and EverSource Capital's Green Growth Equity Fund inject additional equity funding of US\$284m, US\$70m and US\$36m respectively into Ayana Renewable Power, taking the combined cumulative equity investment to US\$721m in support of a 1.14GW portfolio of solar projects under development or in operation in India.¹⁹⁹

January 2021 saw CDC Group invest US\$30m into **Tata Cleantech**, to offer loans to businesses across India that focus on e-mobility solutions and water and energy efficiency.²⁰⁰

UK Climate Investments invested US\$39m in equity into **CleanMax Solar** in April 2019.

Norfund: The state-owned Norwegian Investment Fund (Norfund) in June 2020 signed a long-term agreement with ENEL of Italy to allow it to buy into ENEL's renewable projects in India.²⁰¹ January 2021 saw media reports that Fourth Partner Energy was seeking to raise US\$100m from Norfund.²⁰²

US International Development Finance Corporation (US DFC): US DFC (erstwhile Overseas Private Investment Corporation [OPIC]) is the U.S. government's DFI which provided US\$350m of debt funding for ReNew Power in February 2019.²⁰³

Japan International Cooperation Agency (JICA): JICA has been an important partner of Government of India in supporting India's electricity infrastructure

¹⁹⁴ PV Magazine. [UK, India strengthen solar ties with new commitments](#). 19 April 2018.

¹⁹⁵ Lightsource BP. [Lightsource BP's Indian Platform Leads \\$330 Million Investment In India's Ayana Renewable Power](#). 28 February 2019.

¹⁹⁶ Mercom, [SECI's 2 GW Solar Auction Gets India a New Record-Low Tariff of ₹2.36/kWh](#), 30 June 2020.

¹⁹⁷ BP, [BP to Invest \\$70 Million in India's Green Growth Equity Fund](#), 7 July 2020.

¹⁹⁸ Economic Times, [ReNew Power sells Karnataka wind farms to Ayana Renewable for Rs 1600 crore](#), 10 November 2020.

¹⁹⁹ NIIF press release. [Renewable energy platform Ayana hits \\$721m in funding as CDC, NIIF and GGEF agree to inject further capital](#). 17 December 2020.

²⁰⁰ PV Magazine, [Tata Cleantech secures US\\$30-million from UK investor CDC](#), 28 January 2021.

²⁰¹ PV Magazine, [Enel joins the Indian solar gold rush](#), 9 July 2020.

²⁰² LiveMint. [Fourth Partner Energy in talks to raise \\$100 million](#). 20 January 2021.

²⁰³ Renew Power Press Release, [ReNew Power Secures Additional OPIC Debt Funding of up to \\$350M](#), 19 February 2019.

development. It has played an instrumental role in the development of 1GW of renewable energy projects, modernisation of transmission and distribution lines and financing energy efficiency projects. It provided Official Development Assistance (ODA) loans of US\$577m to IREDA between 2011-2014 for 36 renewable energy projects across wind, solar, and small hydro power. Furthermore, it provided another ODA loan of US\$866m to SIDBI to improve the energy efficiency of companies in India.²⁰⁴

US-India Clean Energy Finance (USICEF): The USICEF²⁰⁵ is India's first project preparation financing facility for distributed solar project development. It was formed from a partnership between the MNRE and the US-DFC (erstwhile OPIC), and a consortium of foundations and investors and is managed by Climate Policy Initiative.

USICEF has so far been instrumental in mobilising a debt of US\$200m from 14 different international and domestic lenders with a committed grant capital of US\$5.1m between 2017-2020.²⁰⁶ USICEF targets early-stage businesses such as solar home systems, rooftop solar, solar mini-grids, small ground-mounted solar projects, and financial intermediaries.

²⁰⁴ JICA, [Press Release](#), 14 December 2019.

²⁰⁵ USICEF, [Background](#).

²⁰⁶ USICEF. [Impact and Lesson Learned](#). October 2020.

9. Indian State-Owned Enterprises

NTPC Limited: NTPC (market capitalisation of Rs980bn [US\$13.4bn], 51% owned by the Government of India) has an ambitious target to develop 32GW of renewable energy and 5GW of hydro projects, a planned 29% combined share of its 130GW total capacity target for 2032. However, having led the charge early into facilitating renewable energy, NTPC is yet to demonstrate that it can move nimbly. Used to developing individual multibillion-dollar coal-fired power plants with an implementation timeframe approaching a decade, NTPC has to-date failed to deploy significant capital inhouse into renewables – except for the March 2020 transfers from the Government of North Eastern Electric Power Corp Ltd (NEEPCO) and THDC India Ltd for a combined Rs11,500 crore (US\$1.6bn).²⁰⁷

NTPC has 1,070MW of renewable energy and 3,425MW of hydro in operation, with a further 2,348MW of solar and 2,555MW of hydro under construction.

July 2020 saw NTPC open up a tender to acquire 1GW of operational solar projects.²⁰⁸ Given renewable infrastructure is a capital-intensive investment area, this move looks sensible, providing scope for capital recycling by existing players who can then move on to develop new projects.

July 2020 saw NTPC announce an MoU with the central government's strategic investment fund NIIF (AuM of US\$4.3bn) for a joint venture to invest in renewable energy and power distribution in India.²⁰⁹ NTPC's proposed renewable InvIT aims to monetise its 1GW of operational renewable assets, allowing capital recycling.²¹⁰

August 2020 saw NTPC award 1,170MW of projects in its latest auction for 1.2GW of the interstate transmission system (ISTS) connected solar projects, delivering India a very competitive Rs2.43/kWh, fixed flat for 25 years.²¹¹

September 2020 saw NTPC ask for expressions of interest (EoI) for grid-connected floating solar projects.²¹²

In October 2020 NTPC emphasised its development priorities are renewable energy, batteries and green hydrogen.²¹³

In November 2020 NTPC participated in SECI's Rajasthan tender of 1,070MW and won 470MW of solar projects at the second lowest tariff of Rs2.01/kWh

²⁰⁷ LiveMint. [NTPC to acquire THDC & Neepeco for Rs11,500 crore](#). 26 March 2020.

²⁰⁸ PV Magazine, [NTPC opens tender to acquire 1 GW of operational solar projects](#), 9 July 2020.

²⁰⁹ Business Standard, [NTPC joins hands with NIIF for investing in RE, power distribution](#), 17 July 2020.

²¹⁰ Saurenergy. [NTPC Planning for Renewable InvIT in JV With NIIF](#). 21 December 2020.

²¹¹ Mercom, [Amp Energy, Tata, Azure, and O2 Power Winners in NTPC's 1.2 GW Solar Auction](#), 6 August 2020.

²¹² PV Magazine, [NTPC seeks to enlist solar project developers and EPC contractors](#), 3 September 2020.

²¹³ ETEnergyWorld, [We are looking at both green hydrogen and battery storage: Mohit Bhargava, executive director, NTPC](#), 26 October 2020.

(US\$0.0272), bringing the lowest solar tariff in India down a further ~15% from the earlier low of Rs2.36/kWh.²¹⁴

NTPC won a 200MW solar tender in December 2020 at a record low Rs1.99/kWh.²¹⁵

December 2020 saw NTPC bid for an aggressive 1.8GW out of a massive 6.4GW solar tender undertaken by the state government of Andhra Pradesh, part of an overwhelming total of 14.9GW of EoI.²¹⁶

January 2021 saw NTPC tender for 190MW of new solar at the Nokh Solar Park in Rajasthan.²¹⁷ February 2021 saw Vikram Solar complete a 140MW solar farm for NTPC at Bilhaur, Kanpur Nagar, Uttar Pradesh.²¹⁸

NTPC reported in January 2021 its first 92MW floating solar project in Kayamkulam, Kerala is due on-line towards the end of the 2021 calendar year (with EPC implemented by **Tata Power**), leveraging NTPC's existing grid connection at its NTPC Kayamkulam coal-fired power plant.

NTPC emerged as the second lowest bidder (Rs 2.48/kWh) for 600MW solar capacity in the solar auction conducted by APGECL for the state of Andhra Pradesh in February 2021.

NHPC Ltd: NHPC (previously National Hydroelectric Power Corporation, market capitalisation of Rs233bn [US\$3.2bn], 74.5% owned by the Government of India) operates 6,971MW of hydro-electricity – 15% of India's 45.7GW total – with 4.9GW under construction. NHPC has 50MW of wind and 50MW of solar operational. In FY20 NHPC delivered hydro-electricity at an average cost of supply of Rs3.34/kWh.

NHPC completed a 2.0GW procurement of new solar projects by issuing a letter of award (LoA) in June 2020 at Rs2.55-2.56/kWh.²¹⁹

NHPC is pursuing the development of floating solar. June 2020 saw NHPC invite bids for the development of a 50MW floating solar project in West Kallada, Kerala. In July 2020 NHPC signed an MoU with Green Energy Development Corporation of Odisha Limited to set up 500MW of floating PV project capacity in Odisha in a phased manner of 50MW each.²²⁰ October 2020 saw a similar proposal for 500MW of floating solar in Telangana in partnership with Telangana State Renewable Energy Development Corporation.²²¹

²¹⁴ Mercom India. [India's New Record for Lowest Solar Tariff is ₹2/kWh](#). 23 November 2020.

²¹⁵ Mercom. [Gujarat's 500 MW Auction Sets A New Record Low Solar Tariff of ₹1.99/kWh](#). 19 December 2020.

²¹⁶ LiveMint. [Adani bids for entire 6.4GW solar tender](#). 31 December 2020.

²¹⁷ PV Magazine. [Global bids invited for 190 MW capacity in Rajasthan's Nokh Solar Park](#). 13 January 2021.

²¹⁸ AsianPower. [Vikram Solar reveals new solar power plant in Uttar Pradesh](#). 1 February 2021.

²¹⁹ Mercom. [NHPC Issues Letter of Award for 400 MW of ISTS-Connected Solar Projects](#). 14 July 2020.

²²⁰ PV Magazine. [NHPC, GEDCOL sign MoU to develop 500 MW floating solar in Odisha](#). 21 July 2020.

²²¹ PV Magazine. [NHPC mulling 500 MW floating solar in Telangana](#). 30 September 2020.

SVJN Ltd: SJVN, a company under administrative control of the Ministry of Power, is a joint venture of the Government of India and the Government of Himachal Pradesh which operates 1,912MW of hydro facilities across India, plus 48MW of wind. Aiming to leverage the grid balancing synergies of hydro and renewable energy, SVJN has won 100MW of new solar at R2.80/kWh at the Dholera solar park in Gujarat²²² even as it continues to slowly progress the development of new hydro-electricity capacity. Disappointingly, the Gujarat government has reneged on the contract agreement in light of lower subsequent solar tariff outcomes.²²³

PowerGrid Corp of India: PowerGrid (51.3% government owned, market capitalisation of Rs991bn [US\$13.6bn]) is the monopoly owner of the vast majority (>90%) of India's interstate grid transmission infrastructure, 168,140ckm in total (as of September 2020), 39.7% of India's total grid T&D assets. PowerGrid has Rs410bn (US\$5.5bn) of projects under development.

September 2020 saw the Cabinet Committee on Economic Affairs (CCEA) approve a planned monetisation of assets of PowerGrid through a proposed InvIT model to raise Rs8,000 crore in a new asset recycling program to attract domestic public investors as well as global investors including sovereign wealth funds.²²⁴
²²⁵However, given the strong equity market standing of PowerGrid and a cost of borrowing in 2020/21 of just 6.1% p.a. (7.0% in 2019/20), this capital recycling might prove to be an inefficient shuffle that fails to unlock significant value. IEEFA has written on the larger opportunity for increased private sector competition in both inter-state²²⁶ and intra-state²²⁷ T&D).

Coal India Ltd: The world's largest coal mining firm, with 2019/20 production of 602Mtpa (market capitalisation of Rs834bn [US\$11.4bn]) has clearly acknowledged both the threats and the opportunities of renewable energy. In December 2020 Chairman of Coal India Limited, Pramod Agarwal said:²²⁸

"As coal has a limited future of 20-30 years we need to look ahead and explore the other verticals where we can spend and long strategy has to be formalised to diversify in other areas which could be either aluminium or solar power or lot more other things."

Coal India announced in July 2020 it was working with NLC (India's largest lignite miner) in a joint venture to develop 3GW of solar as the core of plans to become a

²²² Economic Times. [Vena Energy and Tata Power emerge winners at Gujarat solar auction](#). 14 August 2020.

²²³ Saur Energy. [After 1.99/kWh, Gujarat Cancels Results of two Earlier Solar Auctions](#). 2 February 2021.

²²⁴ Financial Express. [CCEA approves asset monetisation by PGCIL, to garner Rs 7,000 crore in first lot sale](#). 8 September 2020.

²²⁵ LiveMint. [Power Grid files offer document for InvIT IPO, first ever by a PSU](#). 27 January 2021.

²²⁶ IEEFA report: [India urged to boost competition, modernise and upgrade the grid](#). 5 February 2020.

²²⁷ IEEFA: [Increasing competition in India's intra-state transmission sector will drive renewables progress](#). 16 December 2020.

²²⁸ Telegraph India. [Coal India chairman meets BCCL officials, discusses production target](#). 28 December 2020.

net zero energy company. Given energy use accounts for 4% of the firm's total, there is scope for significant use of rooftop and utility-scale solar to move to self-reliance and decarbonisation, whilst leveraging spare land that Coal India has.²²⁹ December 2020 saw Coal India announce board approval to set up an integrated solar wafer manufacturing facility to help build India's energy self-reliance, as well as a possible diversification into aluminium smelting.²³⁰

However, unlike NLC (refer below), we note no material progress has been achieved on renewable energy to-date at Coal India Limited, instead the firm is looking to invest in high emissions coal gasification and coal-to-fertiliser proposals that have systematically failed to deliver on investment expectations.

NLC India Limited (NLC): Majority Government of India controlled (79%) but National Stock Exchange-listed NLC (previously the Neville Lignite Company) is India's largest lignite mining firm, with 50.6Mtpa of lignite and thermal coal capacity (market capitalisation Rs73bn [US\$1.0bn]).

NLC has diversified into power generation, with 3.1GW of lignite-fired power capacity, 1.0GW of coal-fired power capacity, 1.37GW of solar and 0.05MW of wind capacity – 5.7GW in total. With 1.42GW of solar and wind energy infrastructure operational, NLC is the largest renewables operator of any state-owned enterprise. NLC has another 2.83GW of renewables under development, even as it continues to persevere with developing 4.96GW of lignite and coal-fired capacity expansion.

The Singareni Collieries Company Limited (SCCL): SCCL is a leading Indian coal mining firm jointly owned by the central government and the state of Telangana. It has turned to solar energy in recent years to become more sustainable. In 2018 it announced plans to use existing coal mine land to build 300MW of solar projects across Telangana.²³¹ SCCL reported in January 2021 that the first phase of 129MW will be fully completed by March 2021.²³² January 2021 saw SCCL detail plans to establish a 300 MW floating solar plant on Manair Dam reservoir in the Karimnagar district of the Indian State of Telangana.²³³

India's Oil & Gas Majors: Five state-run firms – Oil and Natural Gas Corporation Ltd, Indian Oil Corporation Ltd, Bharat Petroleum Corporation Ltd, Hindustan Petroleum Corporation Ltd and GAIL (India) Ltd – will join ISA's Coalition for Sustainable Climate Action (ISA-CSCA) as corporate partners and will contribute to ISA's Corpus Fund. Collectively they have 270MW of installed solar capacity, with another 60MW due online in 2020/21.²³⁴

²²⁹ Economic Times. [NLC India, CIL sign pact to form JV to develop 5,000 MW solar, thermal power assets](#). 4 July 2020.

²³⁰ Mercom India. [Coal India to Set Up Integrated Solar Wafer Manufacturing Facility](#). 29 December 2020.

²³¹ Mercom. [Singareni Collieries to Start the Third Phase of its 300 MW Solar Project](#). 6 October 2020.

²³² Telanganatoday. [SCCL synchronises 15MW of solar power with Transco](#). 20 January 2021.

²³³ PV Magazine. [Coal miner Singareni Collieries mulling 300MW floating solar](#). 27 January 2021.

²³⁴ LiveMint. [India gets 10 GW proposals for setting up solar equipment manufacturing capacity](#). 10 September 2020.

November 2020 saw reports that GAIL was negotiating to buy a 700MW renewables portfolio from Renew Energy.²³⁵

PTC India Limited: India's largest electricity trader announced in January 2021 plans to divest to a government-owned entity its 289MW of wind assets spread across seven locations in India. NTPC and SJVN are reported as front-runners.²³⁶

²³⁵ Economic Times. [ReNew Power in talks to sell wind, solar assets to GAIL](#). 21 November 2020.

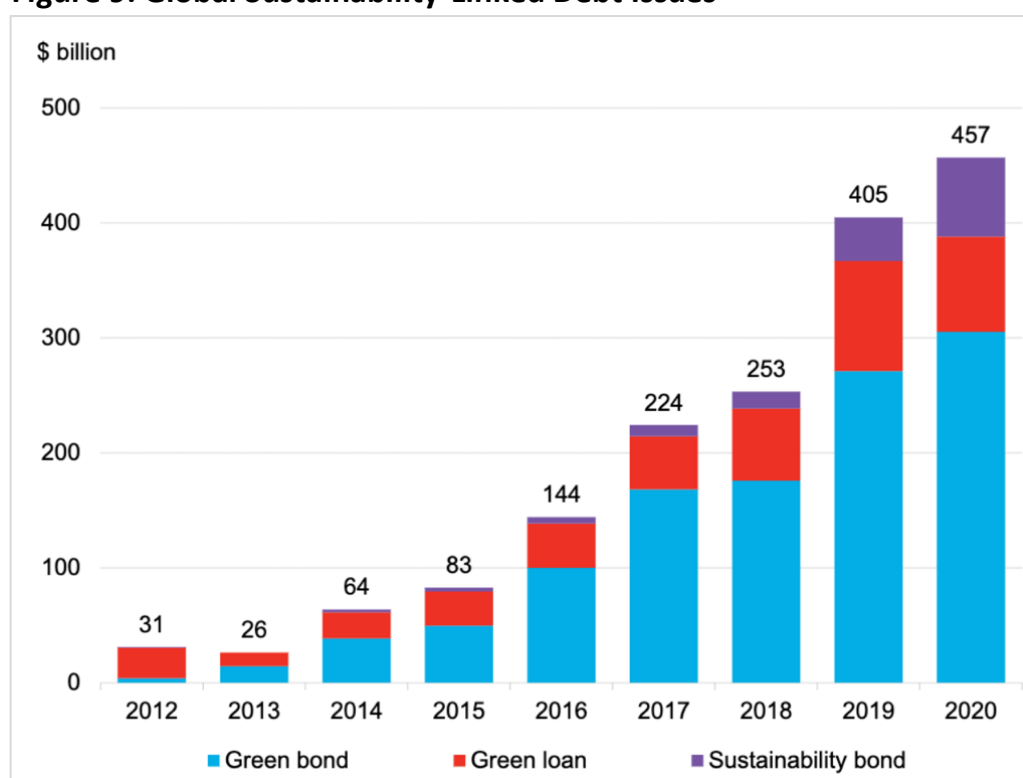
²³⁶ LiveMint. [NTPC and SJVN in fray to buy PTC's wind power assets](#). 25 January 2021.

10. Green Bonds Issued by These Institutions

India stood fourth in Asia-Pacific in terms of total green bond issuance (US\$11.4bn) by the end of the first half of 2020.²³⁷ The rapid growth in renewable energy projects in India over the past few years has led to an increase in the issuance of green bonds. India has issued more than US\$28.2bn of labelled and unlabelled green bonds since January 2014, with two-thirds of the total bonds issued by the private sector led by IPPs.²³⁸

Figure 9 details the significant growth over the last decade of sustainability linked debt issuance globally. This is increasingly available to leading Indian renewable infrastructure firms.

Figure 9: Global Sustainability-Linked Debt Issues



Source: Bloomberg NEF: Energy Transition Investment Trends, 2021.

October 2020 saw CLP Wind Farms raise green bonds worth US\$41m.²³⁹ The bond, arranged by Standard Chartered and DBS Bank India, plays a key role for CLP India in sustaining the expansion of its renewable energy portfolio in India.

²³⁷ Climate Bonds Initiative. [Green Bonds H1 2020 Update](#). 31 August 2020.

²³⁸ Bloomberg NEF. [Uncovering the Hidden Universe of India's Green Bonds](#). 23 October 2020.

²³⁹ The Hindu. [CLP Wind Farms \(India\) raises ₹297 crore via green bonds](#). 14 October 2020.

ReNew Power issued a green bond worth US\$325m in October 2020. The bond, raised in dollar denomination with a rating of Ba3, will offer a 5.375% rate till maturity in 2024.²⁴⁰

State Bank of India, the largest commercial bank in India, raised its third green bond in March 2020 via the private placement route at a coupon rate of 80 basis points (bps) above the three-month Libor.²⁴¹ The third green bond of US\$100m has increased its total issued green bond tally to US\$800m so far.

Vena issued a US\$325m green 5-year 3.13% pa fixed rate bond in February 2020.

ReNew Power, one of the largest renewable IPPs in India, raised US\$460m of dollar denominated green bonds in February 2021. The bond issued at a competitive cost of 4% p.a. and tenor of six years would reduce the ReNew's overall debt interest cost by 20% by refinancing its existing offshore bond raised in 2017. This is the second green bond raised by ReNew within six months and got oversubscribed by 3.7 times.²⁴² In January 2020, ReNew raised US\$450m of 5.5-year green bonds at 5.9% pa.²⁴³ This builds on the US\$375m of 5-year 6.7% p.a. green bonds ReNew Power issued in March 2019.²⁴⁴

Greenko, a privately owned IPP in the wind, solar and hydro sector, has issued 23% (US\$6.6bn) of India's green bonds making it the largest green bond issuer in the country.²⁴⁵

Hero Group's Hero Future Energies in April 2019 did its second green bond issue,²⁴⁶ after raising US\$500m in 2017.

Azure Power (controlled by CDPQ) did a US\$350m 2024 5.65% pa certified green bond issue in September 2019, having issued India's first green bond in 2017.²⁴⁷

Continuum Green Energy which has a portfolio of 1GW of renewable energy projects has successfully raised a green bond worth US\$560m in February 2021. The bond, facilitated by Deutsche Bank, Standard Chartered Bank and JP Morgan bank, witnessed a massive oversubscription of 5.1 times with an order book of US\$3bn. The dollar denominated bond has a fixed coupon of 3.35% annually with a tenor of 10 year.²⁴⁸ IFC is one of the prominent investors which subscribed to 10% of the bond which is listed in Singapore exchange.

²⁴⁰ LiveMint. [ReNew Power's \\$325 million dollar bond offering sees strong demand](#). 21 October 2020.

²⁴¹ LiveMint. [State Bank of India raises \\$100 million in green bonds](#). 28 March 2020.

²⁴² LiveMint. [ReNew raises \\$460 million through dollar bond issuance](#), 9 February 2021

²⁴³ Mercom. [Solar Developer ReNew Power Raises \\$450M Through Dollar Bond Issue](#). 24 January 2020.

²⁴⁴ Renew Power press release. [ReNew Power concludes US\\$ 375m Green Bond Issue](#). 7 March 2019.

²⁴⁵ Bloomberg NEF. [Uncovering the Hidden Universe of India's Green Bonds](#). 23 October 2020.

²⁴⁶ Economic Times. [Hero arm, Azure Power to raise \\$1 bn from bond sale](#). 18 April 2019.

²⁴⁷ Azure Power press release. [New US\\$350 Million Green Bond to be Issued](#). 17 September 2019.

²⁴⁸ LiveMint, [Continuum's \\$560 mn bond sale sees over \\$3bn demand](#), 2 February 2021.

Indian SOEs IREDA and NHPC have issued green bonds worth US\$1.6bn and US\$2.6bn respectively between 2014-2020.²⁴⁹

Indian Railway Finance Corporation (IRFC), the financing arm of Indian Railways, issued its maiden green bond worth US\$500m in December 2017.²⁵⁰ The Climate Bonds Certified issuance achieved the tightest spread over the U.S. Treasury of any Indian public sector undertaking for a 10-year transaction. The bond has an annual yield of 3.835% with a tenor of 10 years.

Power Finance Corporation (PFC) issued a US\$400m green bond in December 2017 to refinance its existing solar and wind loan portfolio. The bond was listed on London Stock Exchange with a tenor of 10 years and an annual coupon of 3.75%.²⁵¹

Rural Electrification Corporation Limited (RECL), a SOE under the Ministry of Power, issued 10-year tenor green bonds of US\$450m with an annual yield of 4.0% in June 2017 as part of its US\$1bn Medium Term Note program.²⁵² The proceeds of the bonds are used for several environmentally friendly projects such as solar, wind and biomass assets, sustainable water and waste management projects.

²⁴⁹ Bloomberg NEF. [Uncovering the Hidden Universe of India's Green Bonds](#). 23 October 2020.

²⁵⁰ Climate Bonds Initiative. [Indian Railways IRFC Launches Inaugural \\$500m Green Bond](#). 6 December 2017.

²⁵¹ Economic Times. [Power Finance Corp lists green bond on London Stock Exchange](#). 30 November 2017.

²⁵² London Stock Exchange Group. [Rural Electrification Corporation of India launches first green bond in London](#). 30 June 2017.

11. Other Players

ACME Group is one of the top developers of solar energy in India, with 2.5GW commissioned and another 2.6GW in development. Founded by Manoj Kumar Upadhyay in 2003. One of the world's leading renewable energy infrastructure owners, Brookfield of Canada, was reported to be looking to invest in ACME in January 2020, but to-date nothing has come of this.²⁵³ **Actis** completed the acquisition of 400 MW from Acme Solar in August 2020.²⁵⁴ ACME Group won 90MW in a wind-solar hybrid tender by SECI in December 2020 at a tariff of Rs2.41/kWh.²⁵⁵

Solarpack, a newly-listed company based in Spain, substantially lifted its presence in the Indian market in June 2020, winning a 300MW allocation of a 2GW tender that set a record low for India of Rs2.36/kWh.²⁵⁶ Solarpack already operates a 157MW solar project in India.

In April 2020 **Axis Energy Ventures** reports it has commissioned 1,024MW of renewable energy projects and that it has a tender pipeline of over 1.1GW, having won a 400MW solar tender from NHPC at Rs2.55/kWh.²⁵⁷ Axis won 380MW in a wind-solar hybrid tender by SECI in December 2020 at a tariff of Rs2.41/kWh.²⁵⁸

In April 2020 **Avaada Energy** won a 320MW solar tender from NHPC at Rs2.56/kWh.²⁵⁹ Avaada also received a commitment of US\$10m from Germany's KfW. The funding will be used across the lifecycle of new and existing projects.²⁶⁰

In February 2020 **AMP Energy** of Canada won a 100MW solar tender from SECI at Rs2.50/kWh²⁶¹ and a 100MW of solar in NTPC's tender awarded in August 2020 at Rs2.43/kWh.²⁶² AMP Energy won 130MW in a wind-solar hybrid tender by SECI in December 2020 at a tariff of Rs2.41/kWh.²⁶³ January 2021 saw the parent of AMP Energy, AMP Solar Group of Canada, raise \$374m from the **Carlyle Group**.

²⁵³ Economic Times. Brookfield, Actis eye Acme Solar assets. 30 January 2020.

²⁵⁴ PV Magazine. UK investor acquires two Acme Solar projects aggregating 400 MW. 7 April 2020.

²⁵⁵ Mercom. SECI's 1.2 GW Solar-Wind Hybrid Auction Gets Lowest Tariff of ₹2.41/kWh. 23 December 2020.

²⁵⁶ PV Magazine. India sets new record-low solar tariff of Rs2.36/kWh. 1 July 2020.

²⁵⁷ Mercom. SoftBank, O2 Power, EDEN Renewables, Axis Energy, Avaada Win NHPC's 2 GW Solar Auction. 16 April 2020.

²⁵⁸ Mercom. SECI's 1.2 GW Solar-Wind Hybrid Auction Gets Lowest Tariff of ₹2.41/kWh. 23 December 2020.

²⁵⁹ Mercom. SoftBank, O2 Power, EDEN Renewables, Axis Energy, Avaada Win NHPC's 2 GW Solar Auction. 16 April 2020.

²⁶⁰ Mercom India. Avaada Secures \$10 Million Funding from German Investor DEG. 30 October 2020.

²⁶¹ Economic Times. SECI solar auction gets good response, auctions 1,200 MW solar projects. 28 February 2020.

²⁶² JMK Research. NTPC 1.2 GW ISTS solar tender saw aggressive tariff of INR 2.43/ kWh. 6 August 2020.

²⁶³ Mercom. SECI's 1.2 GW Solar-Wind Hybrid Auction Gets Lowest Tariff of ₹2.41/kWh. 23 December 2020.

AlJomaih Energy and Water (AEW) is a subsidiary of AlJomaih Holding Company, an automotive business in Saudi Arabia. In December 2020 AEW won 200MW of the 1,070MW Rajasthan tender that set the then record low Rs2.00/kWh solar tariff. AEW then won a 80MW solar tender in December 2020 at the new record low Rs1.99/kWh.²⁶⁴

Yinson Holding Berhad (Yinson) of Malaysia in 2020 acquired a controlling stake (95%) in **Rising Sun Energy** which has two operational solar power projects in the Bhadla Solar Park in Rajasthan with a total capacity of 140MW. Yinson marked its entry into India's solar energy sector with an investment of US\$30m in Rising Sun which also includes an additional infusion of US\$7m to repay certain outstanding debt.²⁶⁵

Edelweiss, an Indian financial services conglomerate, announced it is buying a 74% stake in solar projects owned by ENGIE, a French multinational utility. Edelweiss will acquire the stake in 12 solar assets with operating capacity of 813MW via Edelweiss Infrastructure Yield Plus and the fund's portfolio company Sekura Energy Ltd. While there is no disclosure of the deal value, ENGIE mentioned that the transaction will reduce its net debt by US\$443m.²⁶⁶

Vikram Solar is a leading solar manufacturing and EPC firm in India, with annual module capacity of 1.2GW and having built 1.36GW of utility scale and rooftop solar projects.

AriseSolar has 206MW of operational solar projects in India, with another 27MW in Karnataka in development. AriseSolar is funded by the Core Infrastructure India Fund (managed by Kotak Mahindra (UK) Limited); the Global Energy Efficiency & Renewable Energy Fund (GEEREF) (managed by the European Investment Bank (EIB)); and the ThomasLloyd Group UK.

AC Energy Inc., the subsidiary of Ayala Corporation of Philippines, has announced to expand its renewable energy portfolio in India with the development of a US\$36m solar farm. The 70 MW solar farm would be developed in Gujarat by the first half of 2021 through a joint venture with UPC Solar Asia Pacific (UPC). UPC is a Hong-Kong based project developer which has developed and operates more than 4.5 GW of wind and solar projects across China, Philippines and Indonesia with a development pipeline of more than 6GW.²⁶⁷

²⁶⁴ Mercom. [Gujarat's 500 MW Auction Sets A New Record Low Solar Tariff of ₹1.99/kWh](#). 19 December 2020.

²⁶⁵ Mercom India. [Malaysia's Yinson Increases its Stake in Indian Solar Developer Rising Sun to 95%](#). August 2020.

²⁶⁶ VCCircle. [Edelweiss fund to acquire 74% stake in Engie's India solar assets](#). 23 January 2020.

²⁶⁷ EQ International, [AC Energy, UPC Solar develops solar farm in India](#), 20 October 2020.

Annexure 1

Figure 10: Market Capitalisation of Indian-Listed Firms

	Issued Capital (M)	Share Price* Rs	Market Capitalisation of Equity RsBn	Market Capitalisation of Equity US\$Bn
Adani Green	1,557	1,066.00	1,660.0	22.7
PowerGrid Corp of India	5,232	189.45	991.1	13.6
NTPC	9,890	99.05	979.6	13.4
Coal India Ltd	6,163	135.35	834.1	11.4
Adani Transmission	1,100	434.24	477.8	6.5
Tata Power	3,195	77.35	247.2	3.4
NHPC Limited	10,089	23.10	233.1	3.2
Torrent Power	481	320.85	154.2	2.1
Azure Power Global **	48	40.77	142.5	2.0
JSW Energy	1,643	66.80	109.7	1.5
NLC Ltd	1,386	52.45	72.7	1.0
India Grid Trust	583	121.74	71.0	1.0
Borosil Renewables	130	285.00	37.0	0.5

Source: Yahoo Finance, IEEFA calculations.

* All prices as at 2 January 2021, using an exchange rate of Rs73.1/USD.

** US\$ share price.

Annexure 2

Figure 11: Operational Hydro-Electricity Assets (MW)

Firm	MW
NHPC Ltd	6,971
NTPC Ltd	3,425
Bhakra Beas Management Board (BBMB)	2,918
SVJN Limited	1,912
Greenko	1,689
JSW Energy	1,300
Jammu & Kashmir State Power Development Corp	1,212
Tata Power	871
Jaypee Group	400
Other	25,401
Total	45,699

Source: Company Reports, IEEFA calculations.

Annexure 3

Figure 12: Long-Term Interest Rates – US, Germany & Japan (1960-2020)



Source: OECD.

Annexure 4

Figure 13: Top 25 Global Infrastructure Investors

Rank	Institution	HQ	Infra allocation (%)	Infra allocation (US\$m)
1	Canada Pension Plan Investment Board	Toronto	10.4%	33,793
2	Abu Dhabi Investment Authority*	Abu Dhabi	3.0%	24,840
3	Caisse de dépôt et placement du Québec	Québec	8.1%	21,253
4	Allianz Global Investors	Munich	3.3%	20,543
5	National Pension Service of Korea	Jeollabuk-do	3.1%	19,726
6	APG	Amsterdam	2.8%	17,115
7	Ontario Municipal Employees Retirement System	Toronto	19.0%	15,977
8	China Investment Corporation (CIC)	Beijing	1.8%	15,000
9	BCI (formerly British Columbia Investment)	Victoria	10.1%	13,887
10	Ontario Teachers' Pension Plan	Toronto	8.3%	13,115
11	Public Sector Pension Investment Board	Ottawa	10.0%	12,961
12	Legal & General Investment Management	London	0.8%	12,073
13	Pensioenfondns Zorg en Welzijn	Zeist	4.0%	10,705
14	Australia Future Fund **	Melbourne	7.0%	8,326
15	AustralianSuper	Melbourne	6.9%	7,984
16	Alberta Investment Management Corporation	Edmonton	8.1%	7,201
17	QSuper	Brisbane	8.7%	7,052
18	Samsung Life Insurance	Seoul	2.9%	6,889
19	Manulife Investment Management	Toronto	2.3%	6,817
20	ATP	Hillerød	5.1%	6,776
21	Hanwha Life Insurance	Seoul	7.8%	6,497
22	Universities Superannuation Scheme (USS)	Liverpool	6.3%	6,127
23	Washington State Investment Board ***	Olympia	4.9%	5,643
24	Aberdeen Standard Investments	Edinburgh	1.7%	5,307
25	Employees Provident Fund of Malaysia	Kuala Lumpur	2.3%	5,267

Source: Infrastructure Investor.

* Allocation is an average of the institution's range to infrastructure.

** Includes allocation to timber.

*** Includes allocation to real assets.

About IEEFA

The Institute for Energy Economics and Financial Analysis conducts research and analyses on financial and economic issues related to energy and the environment. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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