

Adani Godda Power Project

Too Expensive, Too Late, and Too Risky for Bangladesh



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April 2018

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Executive Summary

Bangladesh needs to increase its electricity supply, but the proposed Adani Godda project is not the answer: IEEFA's analysis finds that it is too expensive and a poor strategic fit for Bangladesh.

The cost-plus Godda electricity contract, signed with the state-owned Bangladesh Power Development Board, is clearly designed to benefit Adani and is, at least in part, an attempt to prop up Adani Enterprises' troubled Carmichael coal project in Australia. Carmichael was intended to produce coal for Adani's own power plants, predominantly for its economically distressed Mundra plant. Instead, it appears that the Godda project will use Australian coal to export power to Bangladesh, locking Bangladesh into an expensive, long-term, and emissions-intensive source of electricity for decades to come.

Despite what Adani claims, the project will not only fail to alleviate poverty in Bangladesh, it will actually deepen it, in a country amongst the most vulnerable to the impacts of climate change. The proposal will produce high-cost power whilst cheaper, deflationary clean energy production is currently transforming India's electricity system.

Adani Power intends to construct a net 1,496 megawatt (2 x 800 MW less 6.5% internal plant use) coal-fired power plant at Godda in India's Jharkhand state and run the facility with imported coal from Adani's Australian Carmichael coal project. The electricity would be shipped via a dedicated 400 kilovolt DC transmission line to Bangladesh. The plant will cost an estimated US\$2.1 billion (Rs135bn), but where the funding will come from is entirely opaque given that Adani Power's net debt of US\$7.2 billion is more than 16 times equity. The company has so far failed to make the full cash deposit required to secure land acquisition for the project. In a move that is strategically illogical, Adani intends to import coal into Jharkhand, a major coal mining state that is home to the largest coal reserves in India.

IEEFA identifies several issues with the Adani Godda project that make it unsuitable for Bangladesh:

- **The Adani Godda electricity tariff will make the electricity very expensive for the Bangladeshi people.** The power purchase agreement (PPA) for the Godda plant entitles the company to a capacity charge of Rs2.60/kWh, plus full pass through of the cost of the imported coal and a grid transmission charge. IEEFA estimates that the Bangladesh Power Development Board could expect a tariff of around Rs6.65/kWh or around Tk8.71/kWh at current Rupee/Taka exchange rates. This makes it amongst the most expensive sources of new generation capacity for Bangladesh. Recent PPAs signed in Bangladesh for natural gas, imported liquefied natural gas (LNG), coal and solar PV are all lower than this estimated tariff.

Recent Power Purchase Agreement Tariffs for Bangladesh and Estimated Godda Tariff

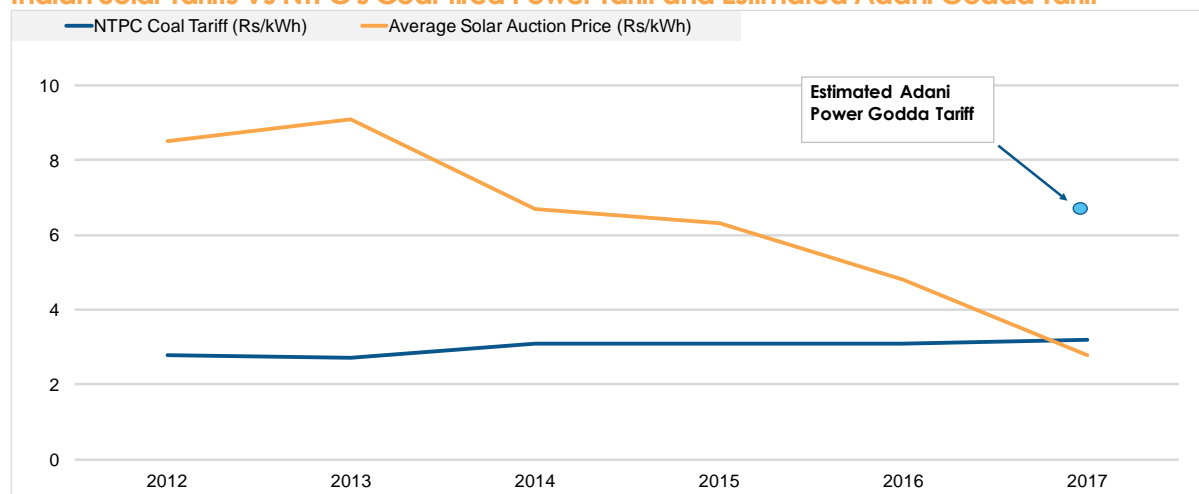
Project	Capacity (MW)	Location	Fuel	Tariff (Taka/kWh)
Adani Power Godda	1,496	India	Imported Coal	8.71
Rampal*	1,320	Bangladesh	Imported Coal	7.78
Mirsarai Power Plant	1,320	Bangladesh	Imported Coal	6.52
Reliance Power Meghnaghat	750	Bangladesh	Imported LNG	5.85
ZTE Kaptai	7	Bangladesh	Solar PV	5.48
Shapoorji Bhola	220	Bangladesh	Natural gas	3.24

*IEEFA estimate net of subsidies, Source: IEEFA estimates, media reports

This tariff estimate is also much higher than what is being charged by other imported coal-fired plants; Adani's import coal-fuelled Udupi power plant in Karnataka had an average PPA realisation of Rs4.80 per kWh in Q3 of FY2018. Indian state-owned power generator NTPC's current average tariff for domestic sourced thermal power is Rs3.21/kWh. In addition, in February 2018 NTPC won a competitive tender to export power to Bangladesh – power that will be far cheaper than that from Adani's Godda proposal and which makes much more sense for Bangladesh. Adani Australia chief executive Jeyakumar Janakaraj has stated that the supply of coal from its Carmichael coal mine project to the Godda power plant will help bring millions of Bangladeshis out of poverty. The very high cost of the estimated Godda tariff makes clear that this project will not alleviate poverty in Bangladesh - it will deepen it.

- India is increasingly turning away from long-term thermal power purchase agreements and this project will lock in polluting power for Bangladesh for 25 years.** Indian electricity distribution companies (discoms) are increasingly reluctant to sign long-term PPAs for thermal power offtake in the face of the increasingly low tariffs available for renewable energy. Approximately 60 gigawatts (GW) of thermal power projects in India currently are under financial stress, with about 26 GW of this total suffering due to their inability to sign long-term PPAs. Instead, India's discoms are looking to secure diversified generation resources, ranging from day ahead procurement to PPAs spanning 3 to 5 years, allowing them to benefit from continued reductions in renewable energy tariffs in the future.

Indian Solar Tariffs Vs NTPC's Coal-fired Power Tariff and Estimated Adani Godda Tariff



Source: NTPC, Bloomberg New Energy Finance, Livemint, Bloomberg Gadfly, IEEFA estimates

Signing a 25-year PPA for coal-fired power would lock Bangladesh into expensive electricity with high emissions at a time when cleaner, cheaper alternative sources of energy are rapidly being deployed across India.

- The Godda power plant will not be operational for years.** In March 2017, the Jharkhand Chief Secretary stated that Adani would begin work on the Godda project in June and that the project would take 18 months to complete. Adani disclosed that work had started in January 2018, seven months later. In its most recent financial results, for 31 December 2017, Adani Power said the plant would not be operational until May

2022 — a much longer time frame than previous estimates. By comparison, solar and wind power plants can be completed within 12-18 months. With an EPC contractor yet to be signed, no clarity over funding and Adani Power carrying very large debts, there is significant scope for further delays.

India has many existing power plants that are running at unsustainably low plant load factors (PLF). India Power Minister R. K. Singh has stated that the PLF of existing plants can be improved if exports to neighbouring countries, including Bangladesh, are expanded. This alternative would immediately provide power for Bangladesh without the need for signing a 25-year PPA and having to wait for the plant to be constructed.

- **Adani Power Ltd is in financial distress: the power plant may never be built and financial risk will flow to Bangladesh.** Bangladesh would be exposing itself to significant financial risk by signing a PPA with Adani Power. In its latest financial results, Adani Power Ltd reported a US\$227 million net loss for the nine months to 31 December 2017, continuing a string of losses reported this decade. Financial leverage remains extreme, with net debt of US\$7.2 billion more than 16 times shareholder equity and net interest costs approaching US\$1 billion annually. In addition, the company recently admitted that its 4.6 GW import coal-fired power plant at Mundra is unviable and has stopped supplying electricity from the plant to the state of Gujarat, breaching its PPA.

As a result, Adani Power's auditors have once again raised doubts over the company's ability to continue as a going concern, meaning there is a significant risk that the power plant will never be built.

- **Adani's use of Australian coal for Godda is an attempt to prop up its stranded Carmichael project.** Adani is suggesting it will import coal via the port of Dhamra, Odisha (owned by Adani Ports) some 700 kilometres away from the power plant by rail. This makes little sense strategically. The proposal can only be viable because the PPA gives Adani a full cost pass-through. It follows that the PPA is necessarily unfavourable for Bangladesh. The risk of high prices for imported coal and rail charges will not be borne by Adani, rather they will be passed through to Bangladesh.

With the help of a very favourable PPA agreement, switching to imported coal at Godda to produce power that will be exported is, at least in part, a way of attempting to prop up Adani's stranded Australian Carmichael thermal coal project. With Adani Power's Mundra import coal-fired power plant financially unviable, Adani sees the Godda project as a way to provide an alternative destination for coal from the proposed Carmichael mine. Such a strategy is not in Bangladesh's best interests.

Bangladesh's current energy plan focuses on the construction of a domestic fleet of power plants running on imported coal and LNG. These efforts have not progressed well and much of the construction is already badly behind schedule. The country also hopes to boost electricity imports from neighbouring countries. In IEEFA's view, Bangladesh would be best served by expanding its domestic solar capacity where possible and securing increased technology-agnostic electricity imports from neighbouring countries procured by competitive tenders. India can ramp up exports now using existing generation capacity – building new export capacity when the current thermal fleet is running at an average utilisation rate of just 57% is inefficient and expensive.

Adani's Power Plant Proposal

In November 2017, Adani Power announced that its subsidiary Adani Power (Jharkhand) Ltd had signed a 25-year PPA with the Bangladesh Power Development Board to export power from a new coal-fired power plant to Bangladesh.¹

This PPA is proposed to be fulfilled via the construction of an ultra-supercritical coal-fired power plant to be built at Godda in India's Jharkhand state.² The plant will have a net capacity of 1,496 MW (2 x 800 MW less 6.5% internal plant use); electricity generated at the plant will be shipped to Bangladesh via a dedicated 400 kV DC transmission line.



The plant will cost an estimated US\$2.1 billion, which includes the cost of building the transmission infrastructure from Godda to the Bangladesh border. The project is supposedly being funded by equity and long-term debt. However, IEEFA has serious questions about Adani's ability to finance the project given the company's financial distress (refer to the 'Adani Power in Financial Distress' section below).

Adani's original plans were to build a thermal power plant in Jharkhand using domestic coal and to sell the electricity within Jharkhand state.³ Then, in February 2016, Adani resubmitted its plans, proposing to fuel the plant with imported coal and to export the electricity to Bangladesh.

The continuing, significant reductions in the cost of wind and solar power in India at rates below Rs3/kWh, and the struggles of thermal power plants in terms of utilisation rate and PPA availability, may have contributed to the company's change of plans. In addition, the change is an attempt to justify Adani Enterprises' troubled Carmichael coal project in Australia by providing an export destination for the coal.

In March 2018, Adani Australia's chief executive Jeyakumar Janakaraj made it clear that coal from Adani's struggling Carmichael project would fuel the Godda plant.⁴

¹ <http://www.thehindubusinessline.com/companies/adani-power-inks-power-purchase-agreement-with-bangladesh-power-development-board/article9949195.ece>

² <http://businessworld.in/article/Adani-To-Supply-long-term-Power-To-Bangladesh/08-11-2017-130975/>

³ http://environmentclearance.nic.in/writereaddata/Online/TOR/0_0_22_Dec_2015_1822143601PFRReport_APJL.pdf

⁴ <https://www.themorningbulletin.com.au/news/adani-wants-cgs-coal-to-lift-millions-out-of-pover/3371530/>

Figure 1: Adani Coal-Fired Power Plant Load Factor for Q3 FY2018

Power Plant	Q3 FY2018 Utilization
Mundra	61%
Tiroda	61%
Kawai	43%
Udupi	55%
Adani Average	58%
National average FY2017	60%

Source: ICICI Securities, Bloomberg

Note: India's thermal plant load factor (PLF) runs at 2-3% above the actual capacity utilisation because the PLF discounts any downtime that results from fuel shortages. To IEEFA and a plant owner, any downtime reduces commercial viability, regardless of the reason.

The plant load factor (PLF) of Adani Power's existing coal-fired power plants has averaged 58% recently, in line with the national average across India of just below 60% in FY2017. Meanwhile, Jharkhand state urban development minister, C. P. Singh, has emphasised the need to promote solar energy in the state, citing the pollution caused by coal-fired power and the fact that Jharkhand could save money with a renewables-based electricity system.⁵

The Godda project was reportedly put on hold in May 2017 due to environmental concerns, specifically about the proposed plant's water use and water take from the Chir river.⁶ The project also requires land acquisition and has faced significant opposition from those at risk of losing land to Adani.⁷

In December 2017, an important 175-acre block was handed over to the company, part of the 1,000 acres required for the project overall.⁸ However, in January 2018 it was reported that Adani has failed to make the necessary cash deposit required to complete the full land acquisition,⁹ raising further doubts about the project.

Adani had also applied to create a new Special Economic Zone for the Godda project, which would have secured a 10-year tax holiday and other benefits, but this was rejected by the Commerce Ministry in February 2018.¹⁰

The fact that the electricity generated by the power plant is to be exported to Bangladesh has made the impacts of water use and land acquisition on local communities even more controversial. In addition, a former first minister of Jharkhand has questioned whether the plant's construction is in contravention of India's pledge to the Paris climate agreement, also noting that the cost of solar generation is now lower than the cost of electricity from existing coal-fired power plants.¹¹

⁵ <https://energy.economictimes.indiatimes.com/news/renewable/using-solar-power-is-key-to-environment-protection-jharkhand-minister/62219732>

⁶ <http://www.coalpost.in/power/upcoming-power-projects-in-jharkhand/godda-thermal-power-project-adani/>

⁷ <https://timesofindia.indiatimes.com/city/ranchi/stir-against-adani-project-spreads-across-godda/articleshow/58287338.cms>

⁸ <https://www.telegraphindia.com/states/jharkhand/acre-boost-for-adani-power-192787>

⁹ <https://www.telegraphindia.com/states/jharkhand/adanis-get-cash-deadline-204338>

¹⁰ <https://economictimes.indiatimes.com/industry/energy/power/adani-powers-proposal-for-setting-up-sez-in-jharkhand-rejected/articleshow/62871258.cms>

¹¹ <https://enewsroom.in/babulal-marandi-adani-power-plant-jharkhand/>

With thermal power in India facing strong headwinds,¹² it is unclear how this project will be financed. A recent Axis Capital research report on Adani Power noted that there is “limited clarity on funding”.¹³ Adani Power is already lumbered with large and unsustainable debts. Imported coal-fired power plants are being increasingly undercut by ever cheaper solar and wind energy in India as well as being impacted by rising fuel costs. In addition, the rise in electricity demand has not been as strong as predicted. This has driven the decline in thermal power plants utilisation rates and many operators are struggling to secure long-term PPAs (refer to 'India is Turning Away from Long-Term thermal PPAs' below).

¹² <https://www.bloomberg.com/news/articles/2018-01-01/coal-power-s-pace-slows-in-india-as-glut-leaves-plants-unused>

¹³ Axis Capital: Adani power Quarterly Update, 18 January 2018

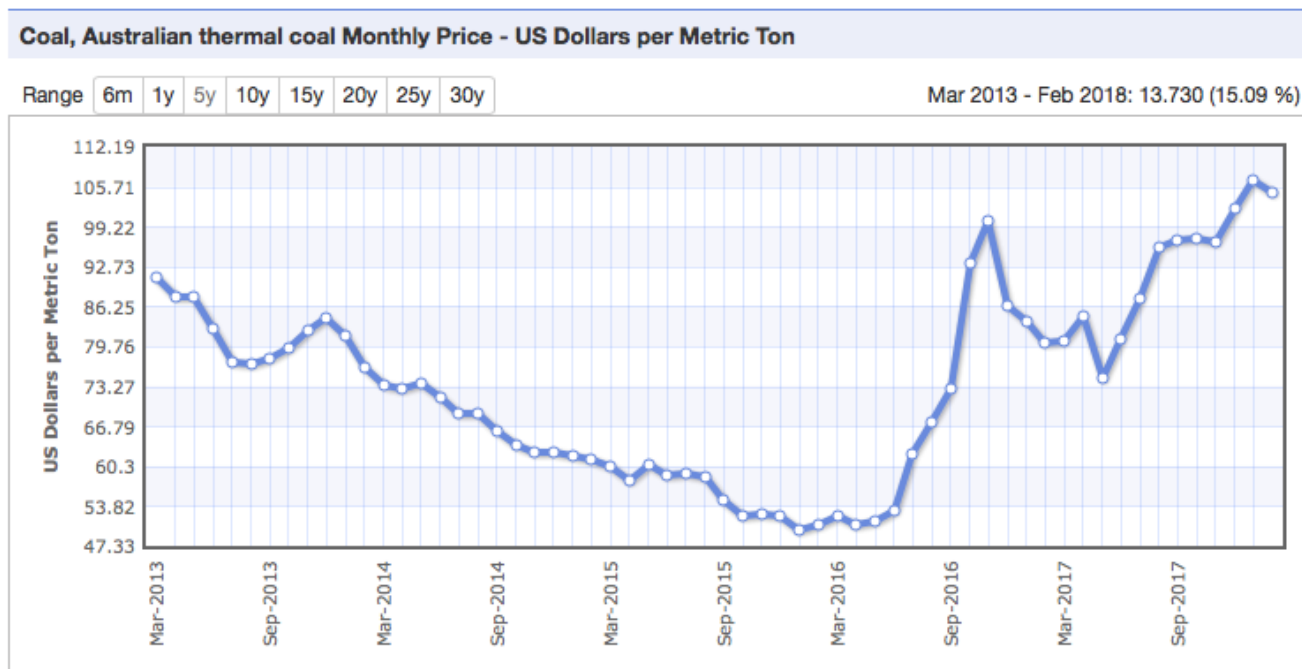
Coal Source: Importing Coal into a Coal-Mining State

When it was initially proposed in 2015, coal for the Godda power plant was to be sourced from Adani's Jitpur coal mine just 16 kilometres away from the project site.¹⁴ However, an updated proposal submitted in May 2016 showed that the plans had changed and the plant would burn imported coal.¹⁵

According to the project's final environmental impact assessment, dated April 2017, domestic coal is not available for thermal power projects that will export electricity to another country.¹⁶ As such, Adani must import coal into a state that is home to the largest coal reserves in India.¹⁷

The final EIA states that 7-9 million tonnes of coal per year (Mtpa) will be required for the plant. Adani is intending to import coal via the port of Dhamra, Odisha (owned by Adani Ports) some 700 kilometres away from the power plant by rail. Adani currently operates coal-fired power plants that use imported coal, however these are located on the coast close to ports meaning they avoid expensive overland transportation costs. The only way a project such as this can be viable with these coal logistics (more expensive imported coal plus long-distance rail transportation) is because the PPA is so favourable to the company. For it to be so favourable to Adani, it follows that it must be unfavourable for Bangladesh.

Figure 2: Newcastle Thermal Coal Price



Source: Indexamundi

¹⁴ Adani Power Godda Proposed Terms of Reference for EIA studies, 22nd December 2015.

¹⁵ Adani Power Godda Proposed Terms of Reference for EIA studies, 31st May 2016.

¹⁶ Final EIA and EMP Report, Godda Thermal Power Project, p. 5-3

¹⁷ <https://www.coal.nic.in/content/coal-reserves>

Relying on electricity generated from imported coal will expose Bangladesh to volatility in the U.S. dollar-denominated price of seaborne thermal coal. After years of steady declines, seaborne thermal coal prices shot up (see Figure 2) after the Chinese government placed temporary restrictions on its domestic output, leading to increased coal imports into China. If Adani has a tariff that allows it to pass through the full cost of its coal to Bangladesh, the country's Power Development Board will be exposed to volatility in both the coal and foreign currency markets. The recent peak in seaborne thermal coal prices is yet to subside, with spot prices currently at US\$90-100/tonne and in March 2018 the Association of Power Producers stated that, above US\$70/tonne, imported coal is unviable in India.¹⁸

As noted above, the switch to use imported coal and to export power to Bangladesh may be an attempt by the Adani Group to justify Adani Enterprises' stalled Carmichael coal project in Australia.¹⁹ Adani has long maintained that Carmichael coal would be used in its own power plants in India as part of a vertically integrated "pit-to-plug" strategy. Of the Adani Power plants that use imported coal, Mundra is by far the largest. Now that the Mundra plant is unviable based on imported coal (see 'Adani Power in Financial Distress' below), Adani was left without a cornerstone off-taker for its Australian project.

This is of major significance to Adani as the Carmichael proponent, Adani Enterprises, would be forced to write-off its A\$1.4 billion investment in the project if it cannot proceed. With the help of a very favourable PPA agreement that covers the additional cost of importing coal and transporting it 700 kilometres, switching to imported coal at Godda appears to be an attempt to prop up Adani's stranded Australian coal project. While Adani Power remains an unbankable off-taker of Carmichael coal due its highly distressed financial position, an offtake agreement to Godda underwritten by a PPA with the Bangladesh Power Development Board might well be the key objective.

In addition, with Indian thermal power projects seeing decreasing utilisation rates and often failing to secure PPAs,²⁰ the switch is also an opportunistic attempt to take advantage of the growing electricity needs of Bangladesh, with a full pass-through of capital, imported fuel costs and currency risks to Bangladeshi consumers.

¹⁸ <https://www.moneycontrol.com/news/business/companies/power-plants-are-not-suffering-because-of-bad-operations-expert-2537209.html>

¹⁹ <https://economictimes.indiatimes.com/industry/indl-goods/svs/metals-mining/adani-is-said-to-seek-a3-billion-debt-for-aussie-coal-plans/articleshow/62208172.cms>

²⁰ <http://asian-power.com/power-utility/in-focus/indian-thermal-utilities-cant-seal-long-term-power-purchase-agreements>

Bangladesh: In Need of More Power Capacity

Bangladesh is a nation of 163 million people that is developing rapidly; the World Bank reported that the country's gross domestic product (GDP) rose 7.1% in 2016.²¹ The World Bank also has noted that Bangladesh's GDP growth is being held back around 1% per annum by its air pollution problems.²² It also is one of the most climate-vulnerable countries in the world.²³ For both these reasons, one should seriously question the wisdom of the nation relying on more imported fossil fuels to expand its electricity system and meet rapidly growing demand.

Bangladesh has increased its electricity generation by 173% since 2004, to 67.4 terawatt-hours (TWh) in 2016. Electricity consumption has increased at a faster rate, with the difference being covered by declining transmission and distribution (T&D) losses over the same period. Consumption has grown at an average of almost 10% per annum over the 2004-2016 period, significantly outpacing annual GDP growth of 5-7%.

Bangladesh's plan to meet its growing electricity demand is to reduce reliance on increasingly scarce domestic gas supplies by building out generation capacity that runs on imported coal and LNG. This is despite Bangladesh being home to the world's most successful roll-out of small-scale solar power systems,²⁴ a program that could be the foundation of a more ambitious deployment of larger, distributed solar systems going forward,²⁵ complemented by a first generation of utility-scale solar projects.

In addition, Bangladesh has commenced construction of the extremely expensive Rooppur nuclear plant using Russian technology.²⁶ The plant will cost an estimated US\$13 billion and is expected to come online in 2024, obviously not soon enough to address the country's short-term electricity needs. Given the current state of the nuclear industry²⁷ and the fact that nuclear projects now consistently take longer to build than initially forecast, Rooppur is unlikely to be able to meet growing demand in the medium term either (an issue shared with coal-fired power plants that also take years to develop).

It also has been reported that Bangladesh's plans for a fleet of new, import coal-fired power stations are well behind schedule.²⁸ Only one of the 19 planned power plants that are supposed to address the nation's fast-growing electricity needs is running on time. Of the rest, 16 appear to have made little progress beyond the signing of a non-binding memorandum of understanding with a private or public sector proponent.

In an attempt to keep up with demand growth, Bangladesh has also turned to power imports from neighbouring countries. Transmission lines connecting Bangladesh to India have been built and more are planned. Indian Power Minister R. K. Singh recently stated that India will look to foreign markets, including Bangladesh, to utilise its spare generation capacity.²⁹ NTPC,

²¹ <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=BD>

²² <http://www.dhakatribune.com/bangladesh/dhaka/2017/12/10/wb-bangladesh-losing-1-gdp-every-year-due-air-pollution/>

²³ http://www.searo.who.int/entity/water_sanitation/ban_c_h_profile.pdf?ua=1

²⁴ <http://www.thedailystar.net/frontpage/bangladesh-leads-clean-energy-use-1418806>

²⁵ <http://www.dhakatribune.com/tribune-supplements/tribune-climate/2017/08/12/bangladesh-towards-100-renewable-energy/>

²⁶ <http://www.dhakatribune.com/bangladesh/power-energy/2017/11/30/pm-opens-rooppur-nuclear-power-plant-construction-work/>

²⁷ <https://www.worldnuclearreport.org/-2017-.html>

²⁸ <https://www.dhakatribune.com/business/2018/01/21/little-progress-large-coal-fired-power-plant-projects/>

²⁹ <https://energy.economictimes.indiatimes.com/news/power/india-to-explore-foreign-markets-for-surplus-power-power-minister-r-k-singh/62899963>

India's largest power generator, announced in February 2018 that it had won a competitive tender to supply 300 MW of power across the border to Bangladesh.³⁰

There is also the possibility of importing hydropower from countries like Bhutan. Given India's ambitious and rapidly expanding renewable energy program, increased grid interconnection with Bangladesh raises the prospect of Bangladesh being able to import a steadily higher percentage of renewable energy in the future. This would appear to be an ideal prospect for a country so vulnerable to the impacts of climate change. In this context, a decision to import coal-fired electricity on a 25-year PPA seems like a retrograde step that locks in expensive carbon-emitting power generation for decades to come.

Godda Will Not Be Operational for Years

Like the Rooppur nuclear power project, the timeline for commercial operation at the proposed Godda plant seems highly optimistic. An Adani executive recently stated that electricity exports to Bangladesh should begin before the next national Indian elections, which are due by May 2019.³¹ That schedule seemed overly hopeful given that Adani still has not secured the land needed to build the project or finalised finance. That timetable also seemed anomalous given that the selection of engineering, procurement, and construction (EPC) contractor to build the project still has not been announced.

In March 2017, the Jharkhand Chief Secretary stated that Adani would begin work on the Godda project in June 2017 and that construction would take 18 months.³² It was not until January 2018 that Adani said any work had started, and even then, Adani refused to give details.³³

Most telling, in its latest financial results for 31 December 2017, Adani Power stated that the plant would not become operational until May 2022³⁴— a much longer time frame than originally promised. By comparison, solar and wind plants can be constructed and operational in 18 months.

The Godda Power Tariff Is Too Expensive

The Godda project will deliver the people of Bangladesh one of the most expensive sources of new generation capacity available, failing to alleviate poverty as promised by Adani. According to an ICICI Securities research note on Adani Power, from November 2017, the PPA for the Godda plant entitles the company to a capacity charge of Rs2.6/kWh plus full pass through of the energy charge (fuel costs) of the imported coal, plus we would assume grid transmission costs.³⁵

The same research note stated that Adani Power's fuel cost was Rs2.56/kWh sold. However, that figure is for Adani Power as a whole, which includes a mix of both imported and

³⁰ <https://energy.economictimes.indiatimes.com/news/power/ntpc-power-trading-arm-wins-tender-for-supply-of-300-mw-power-to-bangladesh/62898726>

³¹ <https://www.telegraphindia.com/states/jharkhand/acre-boost-for-adani-power-192787>

³² <https://economictimes.indiatimes.com/industry/energy/power/work-to-start-on-adanis-jharkhand-plant-in-june-jharkhand-chief-secretary-raj-bala-verma/articleshow/57752827.cms>

³³ ICICI Securities: Adani Power Equity Research Note, 18 January 2018

³⁴ Adani Power 3Q FY2018 Financial Results

³⁵ ICICI Securities: Adani Power equity research note, 13th November 2017

domestic coal facilities. The fuel cost for the Godda plant, using imported coal alone, would be higher than this.

In January 2018, IDFC Securities released a research note that outlined details of the Adani Power's Mundra plant, a power station that uses mostly imported coal. The fuel cost per unit for the third quarter of FY2018 was Rs3/kWh.³⁶

The cost of transporting the coal from Dhamra port to the power plant also will be passed through to Bangladesh. The Indian Railways Freight Operations Information System website gives a tariff of Rs1,065/tonne over 600-700 kilometres.³⁷ From this, IEEFA has estimated a cost of Rs1.05/kWh based on an average of 8 Mtpa of coal used at Godda and assuming Adani's current average utilisation rate of 58% is replicated at Godda (see Figure 3).

Figure 3: Godda Estimated Coal Rail Cost Per kWh

	Mmt/year	kWh	Rs	Rs/kWh
Estimated Godda coal consumption per Final EIA and EMP Report April 2017	7-9			
Estimated kWh generated per year (1,600 MW x 8760 hours x Adani average utilisation of 58%)		8,129,280,000		
Estimated total coal freight cost (8mmt/year @ Rs1,065.1/tonne)*			8,520,800,000	
Estimated coal freight cost per kWh (based on 8mmt/year)				1.05

* Indian Railways coal transportation rates: https://www.fois.indianrail.gov.in/FoisWebsite/html/Freight_Rates.htm

Assuming a cost of Rs3/kWh for the imported coal and the estimated Rs1/kWh rail cost, the Bangladesh Power Development Board could expect a tariff of around Rs6.65/kWh, including the capacity charge (see Figure 4). At current Bangladesh taka/Indian rupee exchange rates, this amounts to Tk8.71/kWh, placing it amongst the most expensive sources of new generation capacity for Bangladesh. As shown in Figure 5, this estimated tariff would make power from Godda even more expensive than the highly controversial Rampal (Maitree) coal-fired power project, which is also to use imported coal. Recent PPAs signed in Bangladesh for natural gas, imported LNG and solar PV are all lower than the estimated Godda tariff.

This tariff is also much higher than that being charged for the supply of electricity from other import coal-fired plants; Adani's import coal-fuelled Udupi power plant had an average PPA realisation of Rs4.80 per kWh in Q3 of FY2018.³⁸ Elsewhere, Indian state-owned power generator NTPC's current average tariff for coal-fired power is Rs3.21/kWh.³⁹

Adani Australia chief executive Jeyakumar Janakaraj has stated that the supply of coal from its Carmichael coal mine project to the Godda power plant will help bring millions of Bangladeshis out of poverty⁴⁰ despite plenty of evidence to the contrary.⁴¹ The very high cost

³⁶ IDFC Securities: Adani Power equity research note, 18th January 2018

³⁷ https://www.fois.indianrail.gov.in/FoisWebsite/html/Freight_Rates.htm

³⁸ ICICI Securities, Adani Power Q3 FY18 Quarterly Results Update, 18th January 2018

³⁹ <https://asia.nikkei.com/Business/AC/NTPC-second-quarter-profit-beats-expectations-on-increased-power-generation>

⁴⁰ <https://www.themorningbulletin.com.au/news/adani-wants-cqs-coal-to-lift-millions-out-of-pover/3371530/>

⁴¹ <https://www.theguardian.com/environment/climate-consensus-97-per-cent/2016/oct/31/coal-doesnt-help-the-poor-it-makes-them-poorer>

of the estimated Godda tariff further makes clear that this project is in no position to help alleviate poverty in Bangladesh.

Figure 4: Estimated Cost of Godda Electricity per kWh

Component	Source	Indian Rupees/kWh	Bangladesh Taka/kWh
Capacity Charge	Adani Power broker conference call via ICICI Securities broker report 13/11/17	2.60	3.41
Imported coal cost	Based on cost per unit of imported coal for Adani Mundra reported by IDFC Securities in January 2018	3.00	3.93
Cost of Rail	Estimate based on Indian Rail's freight rates for 8 million tonnes/year over 700km	1.05	1.37
Total		6.65	8.71

Source: IEEFA calculations

Bangladesh is turning to outdated, highly polluting, and expensive forms of power generation at a time when the world is realising the benefits of ever-cheaper renewable energy. Indian Prime Minister Narendra Modi at the World Economic Forum of Davos in January 2018 was unequivocal about the global threat of climate change and the enormous opportunities for solar development.⁴² The Godda project would lock Bangladesh into expensive and polluting coal-fired electricity for decades to come.

Figure 5: Recent Power Purchase Agreement (PPA) Tariffs for Bangladesh

Project	Capacity (MW)	Location	Fuel	Tariff (Taka/kWh)
Adani Power Godda	1,496	India	Imported Coal	8.71
Rampal*	1,320	Bangladesh	Imported Coal	7.78
Mirsarai Power Plant	1,320	Bangladesh	Imported Coal	6.52
Reliance Power Meghnaghat	750	Bangladesh	Imported LNG	5.85
ZTE Kaptai	7	Bangladesh	Solar PV	5.48
Shapoorji Bhola	220	Bangladesh	Natural gas	3.24

*IEEFA estimate net of financing/tax subsidies

Source: IEEFA estimates, media reports

Indian electricity exports to Bangladesh can form a key part of the latter's drive to meet its rising demand and can benefit both countries. However, this benefit will not occur if exports are based on expensive tariffs that pass costs onto Bangladesh, such as under the Godda proposal.

A recent USAID study concluded that increasing electricity imports from India to 30% of total supply was cheaper than all other options for Bangladesh, including domestic coal-fired generation.^{43 44} As well as reducing the cost of power supply, this would also improve energy security through diversification of sources away from dependence on fossil fuel imports. While dependence on one nation for electricity imports could be problematic for energy security

⁴² <https://www.weforum.org/agenda/2018/01/narendra-modi-davos-these-are-the-3-greatest-threats-to-civilization/>

⁴³ IRADe, USAID: Economic Benefits of Bangladesh-India Electricity Trade, October 2017

⁴⁴ <http://www.dhakatribune.com/business/2018/02/27/importing-power-india-may-better-production/>

for amounts beyond 30%, this could be addressed via further international transmission connection involving Bhutan, Nepal and Myanmar.

Further, increasing electricity imports would also benefit India by helping to better utilise existing generating capacity. Building new capacity, such as the Godda facility, would simply worsen the problem for existing plants. According to the USAID study, even under a scenario of increasing power exports to Bangladesh, India would not need any additional capacity until 2025, underscoring questions about the need for Godda.⁴⁵

Electricity exports from India to Bangladesh can begin to be ramped up based on existing Indian capacity. These exports could be fuel agnostic or even tied to renewable energy infrastructure electricity supply contracts, a concept that recently was reported to be under discussion between BPDB and NTPC via the Bangladesh-India Friendship Company.⁴⁶ Such a way forward also would make electricity imports far more affordable for Bangladeshis than the Godda proposal.

Indian Renewable Energy Is Already Cheaper than Thermal Power

The dramatic solar cost reductions that have swept across India in the past several years have pushed Indian solar PV tariffs below the level of NTPC's tariff for its existing coal-fired power generation fleet (see Figure 6). India will clearly benefit from its ambitious build out of renewable energy generating capacity, but Bangladesh has the opportunity to take advantage of these cost reductions as well.

In December 2017, a new, record low tariff made wind power even cheaper than solar in India, falling to Rs2.43/kWh.⁴⁷ Bangladesh could best benefit from its neighbour's success if it focuses on importing electricity on a technology-agnostic basis rather than signing PPAs for new Indian coal-fired power plants. Figure 6 also demonstrates how expensive the PPA for the Godda plant is compared to Indian solar and NTPC's average thermal coal tariff.

The prospect of exporting Indian renewable electricity generation has already been raised by Tulsi Tanti, the new chairman of the Indian Wind Turbine Manufacturers Association.⁴⁸ Tanti, also the managing director at turbine maker Suzlon Energy, has stated that exports of 3-5 GW of Indian wind power capacity are already achievable. Given the relatively low wind resources available to Bangladesh as a whole, the import of Indian wind energy would help diversify the nation's electricity sources and lower its reliance on fossil fuel imports.

One of the key arguments raised in Bangladesh for not building utility-scale solar power plants is the lack of available land in the densely populated country. With Indian and international solar developers looking for opportunities and offtake agreements in India, Bangladesh should be well placed to benefit from its neighbour's renewable energy ambitions.

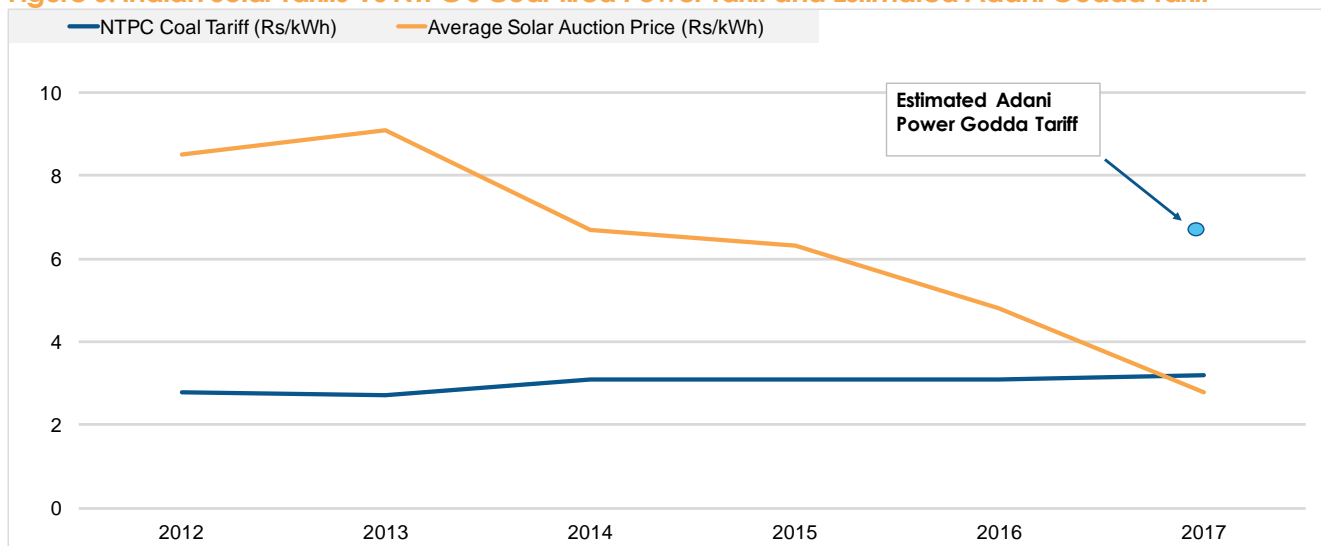
⁴⁵ IRADe, USAID: Economic Benefits of Bangladesh-India Electricity Trade, October 2017, p. 26.

⁴⁶ <http://www.newindianexpress.com/nation/2018/feb/03/bangladesh-to-build-power-plant-in-india-1767646.html>

⁴⁷ <https://cleantechnica.com/2017/12/25/new-low-india-wind-energy-tariff-500-megawatt-auction/>

⁴⁸ <https://www.bloomberqquint.com/business/2018/01/19/india-needs-to-look-at-exporting-wind-power-suzlons-tulsi-tanti-says>

Figure 6: Indian Solar Tariffs Vs NTPC's Coal-fired Power Tariff and Estimated Adani Godda Tariff



Source: NTPC, Bloomberg New Energy Finance, Livemint, Bloomberg Gadfly, IEEFA estimates

India Is Turning Away From Long-Term Thermal PPAs

The Bangladesh Power Development Board has signed a 25-year PPA at a time when Indian electricity distribution companies (discoms) are turning away from such long-term contracts for thermal power.

Despite being historically dependent on coal-fired power, Indian discoms are increasingly reluctant to sign long-term PPAs in the face of the low tariffs seen for solar and wind power projects.⁴⁹ It makes little sense to lock in thermal power tariffs for 20 or 25 years if they are already being undercut by cheaper renewable energy that will only get cheaper in the future. For example, NextEra Energy, the world's largest installer of renewable energy, has stated that after a 30% reduction in wind costs in 2017, it expects costs to fall by an additional 10% annually through 2020.⁵⁰ Around 60 GW of thermal power projects in India (including Adani's 4.6GW Mundra plant) are under financial stress, with about 26 GW of the total under duress because they have been unable to sign long-term PPAs.⁵¹

Instead, discoms are looking at securing a portfolio of diversified generation sources ranging from day ahead procurement to PPAs spanning 3 to 5 years, allowing them to be best positioned to benefit from further reductions in renewable energy tariffs that will occur in the future.

By signing a 25-year PPA for thermal power, the Bangladesh Power Development Board is locking itself into expensive electricity at a time when new, alternative sources of energy are already cheaper than coal-fired power in many areas. This, and the plan to build out domestic coal-fired power stations fuelled by imported coal, means Bangladesh will miss the opportunity to tap into the low and falling costs of renewable power generation.

⁴⁹ <http://www.livemint.com/Industry/FEAceKAOaxB5ToKjWHI5bO/Shortterm-contracts-find-favour-with-power-discoms.html>

⁵⁰ <https://www.vox.com/energy-and-environment/2018/1/29/16944178/utility-ceo-renewables-cheaper>

⁵¹ <https://timesofindia.indiatimes.com/business/india-business/ipps-60000-mw-thermal-generation-in-trouble/articleshow/61771669.cms>

Adani Power Is in Financial Distress

In signing a PPA with Adani Power, Bangladesh is exposing itself to the risk that this financially distressed company will not be able to provide the contracted electricity. Adani Power recently ceased supply of electricity from its loss-making Mundra coal plant to the state of Gujarat, in breach of its contracted PPA.⁵²

In its latest results, Adani Power Ltd reported a US\$227 million net loss for the nine months to 31 December 2017, continuing a string of losses this decade. The company also remains extremely leveraged, with net debt of US\$7.2 billion – or more than 16 times shareholder equity – which has pushed net interest costs close to US\$1 billion annually. Adani Power's auditors also remain extremely concerned about the continuing losses at the company's Mundra power plant. Mundra has carried forward losses of US\$1.8 billion whilst its current liabilities exceed current assets by US\$1.9 billion.⁵³ According to Bloomberg data, the Adani listed companies together had debts totaling US\$15.6 billion as of September 2017.⁵⁴

By the end of March 2018, Adani Power's share price had reached a near 10-year low (see Figure 9 below).

Figure 7: Adani Power's Third Quarter FY2018 Results – Clear Financial Distress

US\$ million	3QFY2018	3QFY2017	% Change
Revenue	775	856	-9%
EBITDA	126	215	-41%
Depreciation & Amortisation	(106)	(96)	-11%
EBIT	20	119	-83%
Net interest	(222)	(225)	1%
Net profit	(203)	(105)	-93%
EBIT/Net interest	0.09	0.53	

Source: Adani Power 3Q FY2018 Financial Results, IEEFA calculations

In 2017, Credit Suisse listed larger stressed Indian companies that are yet to see their loans classified as non-performing assets (NPAs) in its Indian Corporate Health Tracker research report.⁵⁵ Adani Power was third on the list sorted by gross borrowing with gross debt of more than US\$8 billion. Its operating earnings are insufficient to cover interest payments on this debt.⁵⁶

⁵² <http://www.financialexpress.com/economy/power-crisis-looms-in-gujarat-as-adani-essar-stop-supply/1109522/>

⁵³ Adani Power 3Q FY2018 Financial Results

⁵⁴ http://www.business-standard.com/article/current-affairs/bjp-s-subramanian-swamy-calls-adani-biggest-npa-trapeze-artiste-118030600488_1.html

⁵⁵ https://research-doc.credit-suisse.com/docView?language=ENG&format=PDF&sourceid=emblast&document_id=x754328&serialid=zlxSn4xZTOJCZ921PyMcyqKWxHK+d2Zxu0xhtt2oXt0=

⁵⁶ <https://newsclick.in/house-debt-adani-drowning-debt-and-nobody-helping>

Given its high debt to equity ratio of 16.5 times and its continuing losses, Adani Power is not in any financial position to undertake a major new greenfield project. This poses the obvious question of how Adani Power intends to fund the Godda project. A major equity raising of up to US\$1 billion would seem to be a prerequisite to any developments on this front.

Figure 8: Adani Power's September 2017 Balance Sheet Shows Financial Distress

Current share price (2nd April 2018)	23.95	Rs
Issued shares	3,857	million
Market capitalisation	92,375	Rs million
Market capitalisation	1,456	US\$ million
Share price - Five year high (July 2014)	66	Rs
Share price decline	-63%	
Net debt	7,297	US\$ million
Net debt to market cap of equity	5.0	times
Shareholders equity	443	US\$ million
Net debt to book equity	16.5	times

Source: Adani Power Ltd Interim FY2018 Results Report, IEEFA calculations

Mundra 4.6GW Imported Coal Power Plant: A Distressed Sale Pending

Adani Power's predicament has been exacerbated by the unsustainable situation at its largest import coal-fired power plant at Mundra. The company's 2016/17 net loss was US\$954 million, reflecting the implications of the Supreme Court ruling that the Mundra power plant's contracts to supply electricity were valid and tariffs could not be raised to compensate for the higher-than-expected cost of imported coal. As a result, Adani Power Ltd has stated that its core asset at Mundra is no longer viable.⁵⁷

With the price of imported coal meaning Adani Power is losing money for every unit of electricity generated at Mundra, the company has now discontinued its contracted output of 2,000 MW for the state of Gujarat.⁵⁸ This has forced Gujarat to purchase power on the market in order to meet demand, which will likely lead to higher electricity bills for consumers.

Adani Power is now seeking to sell a 51% stake in Mundra to the Gujarat government.⁵⁹ It is hard to foresee a scenario where the Gujarat government would not then seek a domestic coal supply deal with Coal India Ltd to lower fuel costs and try to restore profitability. The Mundra power plant has US\$3.5 billion of debt attached to it. Costing almost US\$5 billion to build, IEEFA estimates a US\$1.0-1.5 billion write-down is pending. However, such a write-down

⁵⁷ <http://energy.economictimes.indiatimes.com/news/power/gujarat-writes-to-centre-over-electricity-crisis-as-adani-says-mundra-project-becoming-unviable/58603194>

⁵⁸ <https://timesofindia.indiatimes.com/city/ahmedabad/gujarat-model-runs-partly-on-outside-power/articleshow/63061240.cms>

⁵⁹ <http://economictimes.indiatimes.com/industry/energy/power/adani-power-urges-gujarat-government-to-bail-out-mundra-power-plant/articleshow/59008598.cms>

would cause problems as it would more than wipe out the company's current US\$443 million equity book value.⁶⁰

The Mundra plant uses 16 Mtpa of imported coal and as such was touted as the key coal buyer from Adani's Carmichael coal mine proposal in Queensland, Australia. Since Adani's "pit-to-plug" strategy has unraveled, the question arises as to who will purchase coal from Carmichael. Switching the Godda project to run on imported coal is a way for Adani to shore up offtake and help justify the troubled Carmichael project, which continues to struggle to find financiers.

Despite the adverse Supreme Court ruling, Adani Power has also claimed compensatory tariffs for its Tiroda and Kawai power plants. This is despite the fact that a long-term coal supply contract is a prerequisite for such a claim, according to the Supreme Court finding. Neither Tiroda or Kawai have such a supply contract covering their full coal requirement, yet Adani is claiming compensation for the entire plant capacity.⁶¹ Even though the success of such a claim seems dubious, Adani Power has booked compensatory tariff receivables amounting to more than Rs 5,000 crore across the two plants. If the claim is not upheld, it seems likely that Adani Power would have to write off most of this amount, which equals almost US\$800 million, just as it did for Mundra. This amounts to a further significant risk to the company's going-concern status.

Figure 9: Adani Power Share Performance (Orange) Vs S&P BSE Sensex Index (Purple) Over 10 Years



Source: Thompson Reuters

In addition to problems at Mundra, Adani Power's plans to expand elsewhere have struck problems. The company announced the acquisition of Korba West more than two years ago and has paid more than US\$354 million in part-payment for this 600 MW coal-fired power plant. However, Adani now reports the acquisition is in dispute due to equipment failures and disagreements with project financiers. This situation further clouds Adani Power's financial viability. Korba West and Udupi, another coal-fired power plant owned by Adani Power,

⁶⁰ <https://www.bloombergquint.com/business/2017/09/04/adani-loses-entire-investment-in-mundra-indias-biggest-thermal-power-plant>

⁶¹ <https://thewire.in/203744/despite-sc-ruling-adani-pushes-compensatory-tariff-tiroda-kawai-plants/>

were recently added to a list of 34 stressed power plants in an Indian parliamentary panel report, due to the size of their debts.⁶²

Adani Power also recently submitted a bid for a majority stake in GMR Infrastructure's 1,370 MW coal-fired power plant in Chhattisgarh,⁶³ potentially placing the company's debt even further into unsustainable territory.

Taken as a whole, Adani's financial problems mean Bangladesh, trying hard to keep up with rising power demand, is taking on a significant risk that it will never receive any of the contracted electricity from the Godda project. An Axis Capital quarterly update on Adani Power noted that the Godda plant was not being included in its assumptions for future company performance due to a "lack of clarity over funding".⁶⁴ In IEEFA's opinion, even if Adani Power continues to limp on, there is a strong likelihood that the company will be unable to obtain funding for the Godda project, meaning it may never get off the ground.

⁶² http://www.business-standard.com/article/companies/adani-essar-jaypee-lanco-power-plants-in-list-of-34-stressed-projects-118030801003_1.html

⁶³ <https://energy.economictimes.indiatimes.com/news/power/adani-jsw-tatas-bid-for-stake-in-gmrs-chhattisgarh-power-plant/62389572>

⁶⁴ Axis Capital: Adani Power Quarterly Update, 18th January 2018

Conclusion

By signing a long-term PPA for the acquisition of imported coal-fired power from Adani, the Bangladesh government is missing an opportunity to benefit from the continually declining cost of renewable energy. This is also true of Bangladesh's plan to build domestic generation capacity fuelled with imported coal and LNG. These projects are being encouraged by nations such as Japan whose power construction companies are seeing opportunities to build such power plants at home dry up in the face of declining electricity demand and the spread of renewable energy technology. Making financing available to build fossil fuel-based plants in Bangladesh is in the interest of countries such as Japan and its companies, but not necessarily in the best interests of Bangladesh.

Similarly, the Russian nuclear power agency Rosatom is making finance available to build Bangladesh's first nuclear power plant. This is clearly in Russia's interests as it supports its nuclear power industry, but the enormous cost of the plant and the inevitable delays in construction will make it a huge burden on the people of Bangladesh for decades to come.

The Godda power project follows this trend. In IEEFA's view it is entirely designed to benefit Adani, not Bangladesh. The PPA allows Adani to push the high cost of importing and transporting coal into India, plus the cost of transmitting the electricity across the border onto the people of Bangladesh. Given the deflationary trend for renewable energy, IEEFA believes that providing Adani full cost recovery does not represent a fair risk-return profile for Bangladesh. The Godda proposal is at least in part designed to prop up Adani's troubled Carmichael coal project in Australia.

Whilst Bangladesh certainly needs to expand its electricity capacity to support its growing economy, locking in expensive and polluting generation for decades is inappropriate for a developing nation that is so vulnerable to the impacts of climate change. This is especially true given the rate at which the cost of clean, renewable energy is dropping, a trend set to continue.

Bangladesh has the world's most successful solar home system program and an opportunity to make this the foundation of a far more ambitious distributed solar energy agenda. It could also take advantage of the rapidly declining cost of utility-scale solar panels as has been seen in India and around the world.

The nation's population density and need for productive farmland limits the spread of utility-scale solar to some extent. However, with India rushing to meet its ambitious renewable energy installation targets, Bangladesh will have plenty of opportunities to import low-cost renewable electricity from its neighbour. Going forward, it is in Bangladesh's best interests to support the continuing development of solar and wind power in India, which can then provide it with cheap, sustainable energy imports.

With electricity demand falling in places like Japan and with lower-than-expected demand in India, companies in these nations are looking to export their fossil fuel technology or fossil-generated electricity to power-deficient nations like Bangladesh. Russia is doing the same with its nuclear technology. While Bangladesh needs new power supplies, these developments are overwhelmingly biased in favour of the richer countries. Bangladesh needs to take a longer-term view of its power system and maximise the implementation of flexible and clean renewable technology. This offers the best opportunity to secure an energy system that works in Bangladesh's best interests.

Institute for Energy Economics and Financial Analysis

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