

Wind Energy Sector

Emerging Opportunities

Competitive Bidding & Offshore Wind Potential

**New Delhi
April 26, 2017**

Agenda

- 1. Background & Capacity Trends**
- 2. RPO Norms and Compliance**
- 3. Emerging Tariff trends**
- 4. Draft Bidding Guidelines for Wind Energy Projects Notified by MNRE**
- 5. UDAY: Progress in Implementation**
- 6. Offshore Wind Power in India**

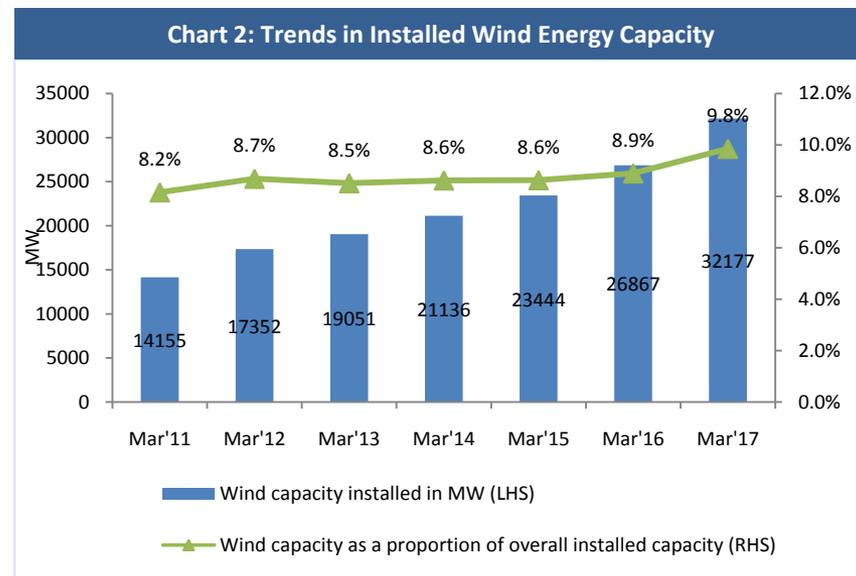
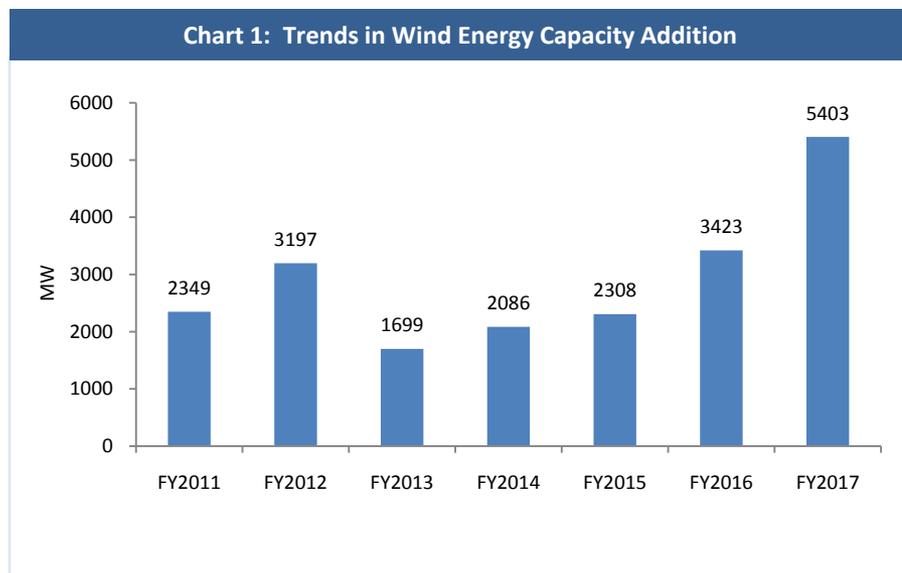
Key Takeaways

- ❑ Long-term demand outlook for wind energy remains strong
 - Wind capacity addition in near term to depend upon bidding plans by state utilities which are likely to prefer bidding route instead of feed-in tariff route. Projects under execution without PPA tie-up to be affected in wind segment ...
- ❑ Viability of competitively bid tariff for wind power projects to depend upon structuring of debt, cost of debt and capital cost
- ❑ Challenges
 - Inconsistency in RPO norms & poor compliance. Implementation of scheduling & forecasting framework which is likely to be approved by SERCs in near term
 - Timely implementation of UDAY by State Governments extremely critical - delays in payments from state utilities remained quite significant towards especially wind IPPs as seen in Rajasthan, Tamil Nadu and Maharashtra; though with improvements seen recently in last 4-5 month period
- ❑ Forced back down by utilities is a concern, given the absence of deemed generation clause; however, the draft bidding guidelines for wind power projects include a clause on compensation for loss of generation due to transmission constraints or grid backdown, which is a positive development
- ❑ While offshore wind power potential is significant in relation to the installed wind power capacity in the country, challenges remain in the form of logistics, transmission connectivity and viability

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Brief Overview on Capacity Addition and RPO Norms

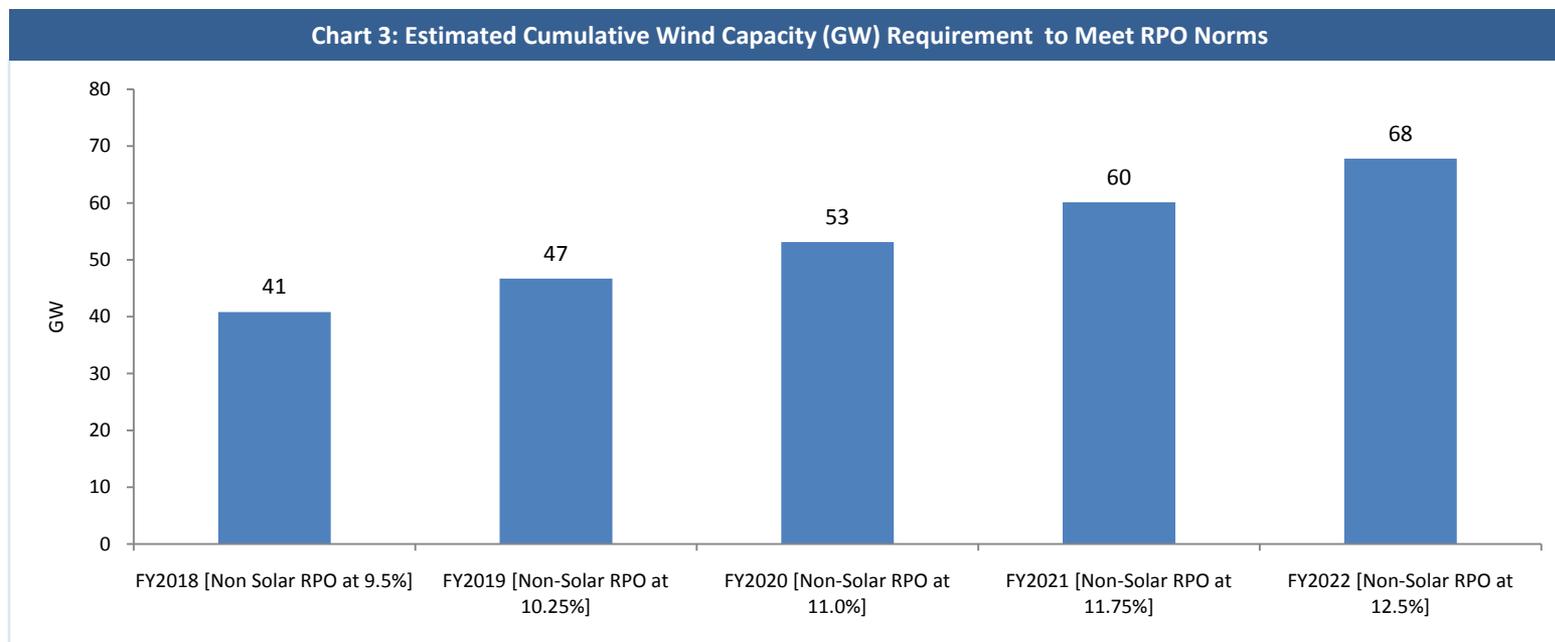
Overview of Wind Capacity Addition



Source: ICRA Research, MNRE , CEA

- ❑ Wind energy sector reported a record capacity addition of 5.4 GW in FY2017 as against the capacity of 3.4 GW in FY2016. The large capacity addition in wind energy sector can largely be attributed to a bunching up of commissioning in March 2017, due to the removal of GBI benefit and reduction in AD benefit with effect from April 1, 2017. These apart, IPPs were trying to utilise the current feed in tariff regimes in states while they were still in place - the apprehension being that in future, tariff based bidding could largely replace the feed-in tariff regime.
- ❑ The installed wind power capacity increased to 32.2 GW as on March 2017 from 26.9 GW as on March 2016 with share in the overall installed capacity at 9.8%.

Large wind capacity required to meet the RPO norms

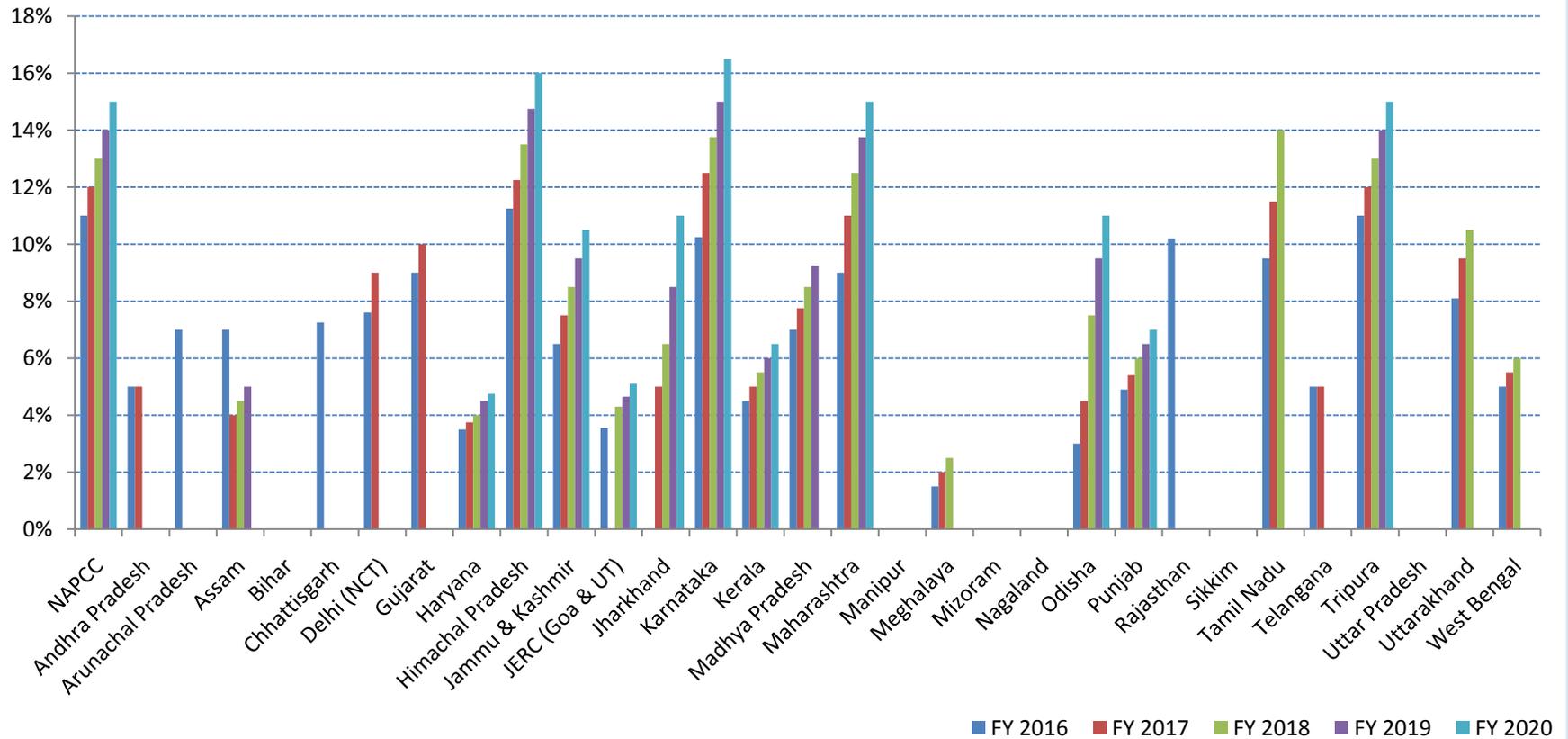


Source: ICRA research

- ❑ The Ministry of Power has issued guidelines for long-term RPO trajectory for a three year period from FY2017 to FY2019, which is set to increase from 11.50% for FY2017 to 17.00% in FY2019 comprising of 10.25% non-solar RPO and 6.75% of solar RPO.
- ❑ Assuming the overall RPO to increase to 20.5% by FY2022 comprising 12.5% non-solar RPO and 8% solar RPO and annual energy demand growth of 6%, the cumulative wind capacity requirement till FY2022 would be 68 GW, as per our estimates. This is assuming wind energy contributing to 70% of non-solar RPO. The incremental wind capacity requirement would be about 36 GW over the five year period leading up to FY2022.

RPO norms notified across the states; however challenges arising from inconsistency in RPO norms...

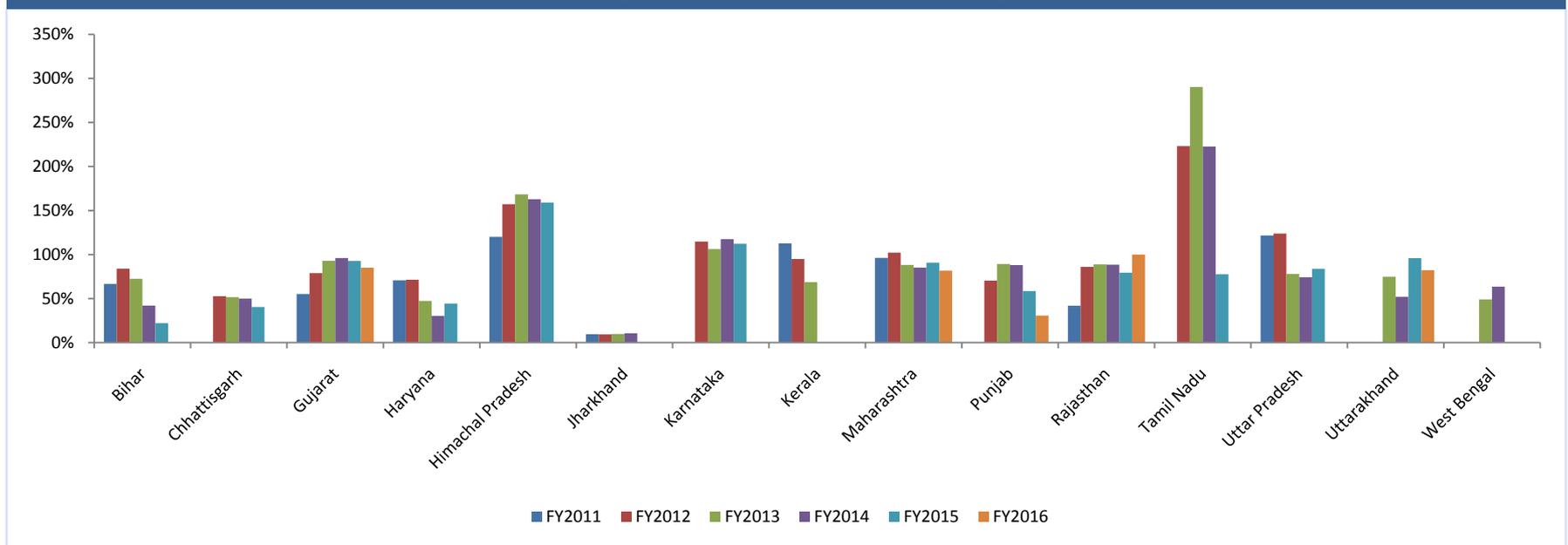
Chart 4: State-wise RPO Trajectory approved by SERCs



Source: ICRA research

Compliance to the approved RPO norms remains a key issue

Chart 5: Compliance of RPO norms by Discoms in key states



Source: ICRA research

- ❑ The State Accountants General audited the State Nodal Agency (SNA) of 24 states for FY2013 & FY2014 and highlighted that the RPO compliance in most of these states was in wide divergence with the RPO norms and also highlighted that RPO targets in most states were not in line with the target recommended under NAPCC.
- ❑ Further, the RPO compliance continued to remain less than 100% for FY2015 and FY2016 across a majority of the states, based on the data from the orders issued by SERCs and based on data from nodal agencies.

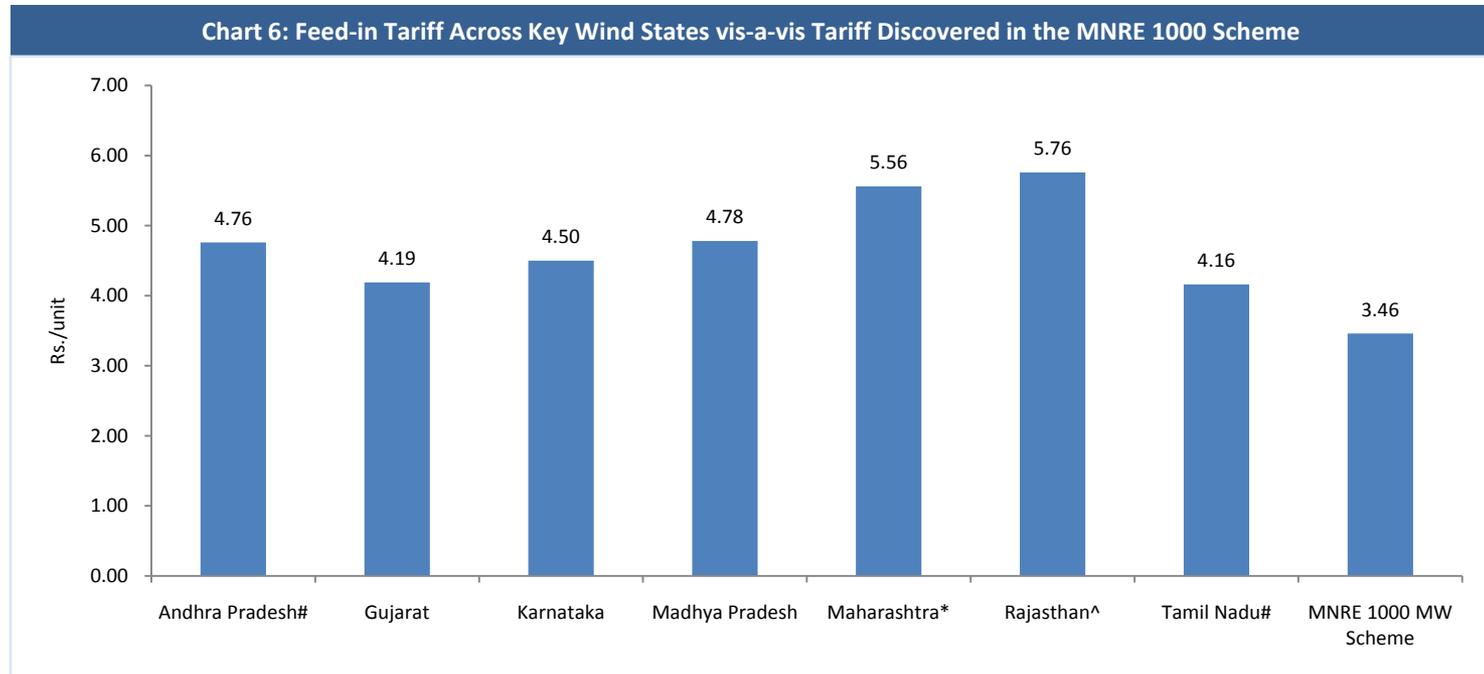
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Emerging Tariff Trends

1000 MW Inter-state MNRE Wind Scheme

- ❑ Reverse auction bid for award of inter-state transmission system connected wind power projects of 1000 MW
 - For the first time in the country so far...
 - Tariff of Rs. 3.46 per unit discovered as the winning bid
 - Much lower than the feed-in tariff rates prevailing in wind sector
 - Significant improvement in the cost competitiveness of wind based energy generation, against the conventional energy sources as well as against solar power
 - Two-stage bidding process has led to cost efficient tariff discovery for wind power projects
 - SECI is nodal agency; PTC is counter-party which will in turn sign PSAs with discoms
 - Choice of location is with the bidder; projects likely to be in states of Tamil Nadu and Gujarat
 - Favorable for distribution utilities and in turn, bidding process likely to be followed by states
 - Should enable improvement in non-solar RPO compliance for states with limited wind power potential
 - Viability for the winning developers would be critically dependent upon the capital cost, availability of long tenure debt at cost competitive rates and PLF at the selected project location

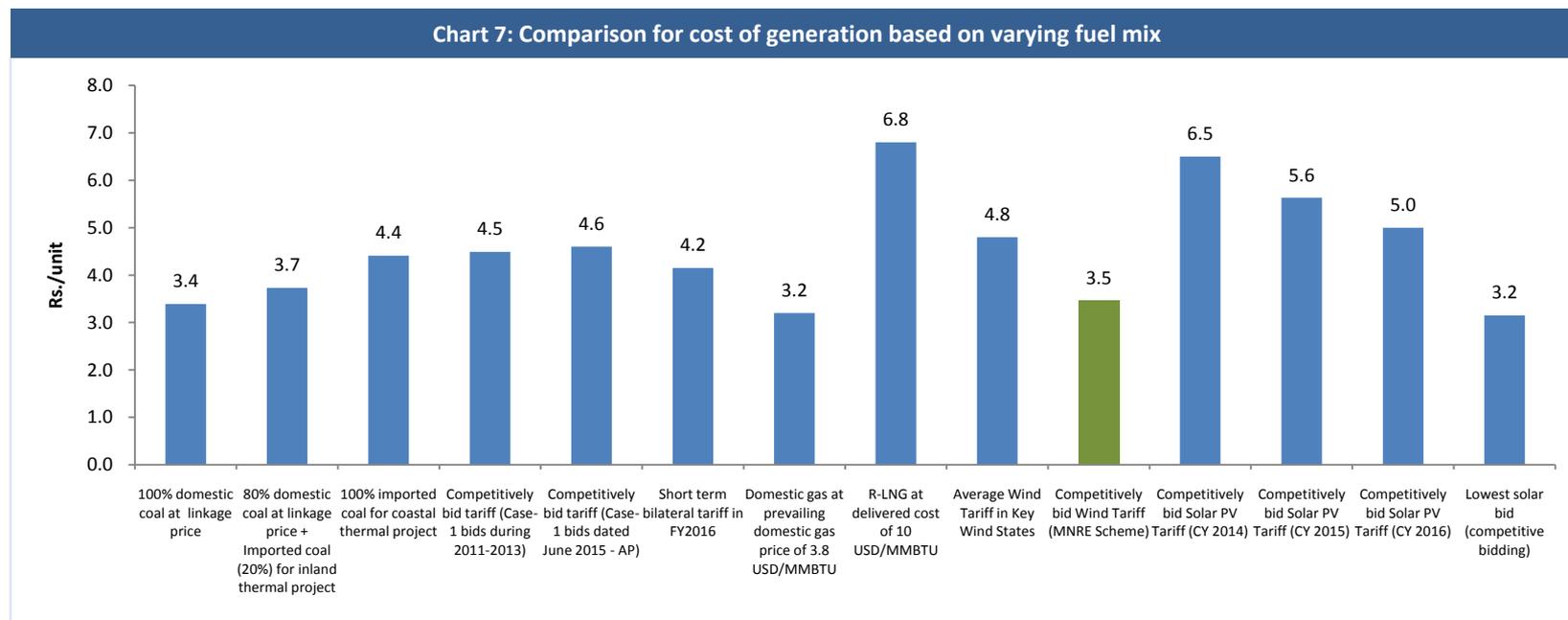
Lowest Tariff in Wind Energy Sector



Source: ICRA research

- ❑ The wind energy tariff discovered through the competitive bidding process of Rs. 3.46 per unit remains much lower than the approved feed-in tariff across the key states with high wind power generation potential, which currently varies from Rs. 4.16 per unit in Tamil Nadu to Rs. 5.76 per unit in Rajasthan.
- ❑ If one considers the availability of generation based incentive of 50 paise per unit for projects commissioned till March 31, 2017, the tariff for existing wind power projects is further higher.

Significant Improvement in Cost Competitiveness of Wind Energy Tariff



Source: ICRA research

- ❑ The wind energy tariff discovered in the reverse auction bid significantly improves the cost competitiveness of wind energy based tariffs against the conventional energy sources, which have been affected by rising capital and fuel costs, dependence on imported fuel and higher environmental cess. This also brings wind energy tariffs closer to the recently discovered tariffs in the solar power sector.
- ❑ In addition, wind power projects remain favourably placed with a relatively much lower construction period in comparison to the thermal and hydro power projects.

Viability of Competitively Bid Wind Energy Projects

.. depends upon structuring of debt, cost of debt & capital cost

Cum Avg. DSCR (time)	Interest rate					
	9.00%	9.5%	10.00%	10.50%	11.00%	11.5%
PLF Level						
20%	0.98	0.95	0.92	0.90	0.87	0.85
22%	1.11	1.08	1.05	1.02	0.99	0.97
24%	1.24	1.20	1.17	1.14	1.11	1.09
26%	1.36	1.32	1.29	1.26	1.23	1.20
28%	1.47	1.43	1.40	1.37	1.34	1.31
30%	1.57	1.54	1.50	1.47	1.44	1.41

Source : ICRA research

- ❑ Viability of tariff from credit perspective to depend upon capital cost, debt tenure, interest rate and PLF level
- ❑ At a given capital cost of Rs. 6.50 crore per MW and the quoted tariff rate of Rs. 3.46 per unit, the cumulative DSCR varies from 0.92 times to 1.50 times, as the PLF varies from 20% to 30%. This is assuming debt tenure of 18 years and interest rate of 10%
- ❑ As a result, the developers' ability to identify sites with high generation potential along with procuring WTGs within the budgeted costs remains critical, to achieve the desired return metrics

DSCR and IRR Sensitive to Capital Cost and PLF

Average DSCR at varying PLF and capital cost levels (Under assumption of debt maturity at 18 year and interest rate at 10%)							
		Capital Cost (Rs. Cr./MW)					
		5.75	6.00	6.25	6.50	6.75	7.00
PLF (%)	20%	1.05	1.01	0.96	0.92	0.89	0.85
	22%	1.19	1.14	1.09	1.05	1.01	0.97
	24%	1.32	1.27	1.22	1.17	1.13	1.09
	26%	1.44	1.39	1.34	1.29	1.24	1.20
	28%	1.56	1.50	1.45	1.40	1.35	1.31
	30%	1.67	1.61	1.56	1.50	1.46	1.41

Project IRR at varying PLF and capital cost levels							
		Capital Cost (Rs. Cr./MW)					
		5.75	6.00	6.25	6.50	6.75	7.00
PLF (%)	20%	5.3%	4.7%	4.2%	3.7%	3.2%	2.8%
	22%	6.9%	6.3%	5.7%	5.2%	4.7%	4.2%
	24%	8.2%	7.7%	7.1%	6.6%	6.0%	5.6%
	26%	9.5%	8.9%	8.3%	7.8%	7.3%	6.8%
	28%	10.6%	10.0%	9.4%	8.9%	8.4%	7.9%
	30%	11.7%	11.1%	10.5%	9.9%	9.4%	8.9%

Ability to keep the capital cost as well as the operating parameters within the budgeted levels would hold the key for the credit quality of such wind IPPs having competitively bid tariff based PPAs

Project IRR and DSCR remain highly sensitive to capital cost and PLF level. DSCR also remains sensitive to the interest rate

Source: ICRA research

3

Draft Bidding Guidelines for Wind Power Projects

Overview of the Draft Bidding Guidelines by MNRE

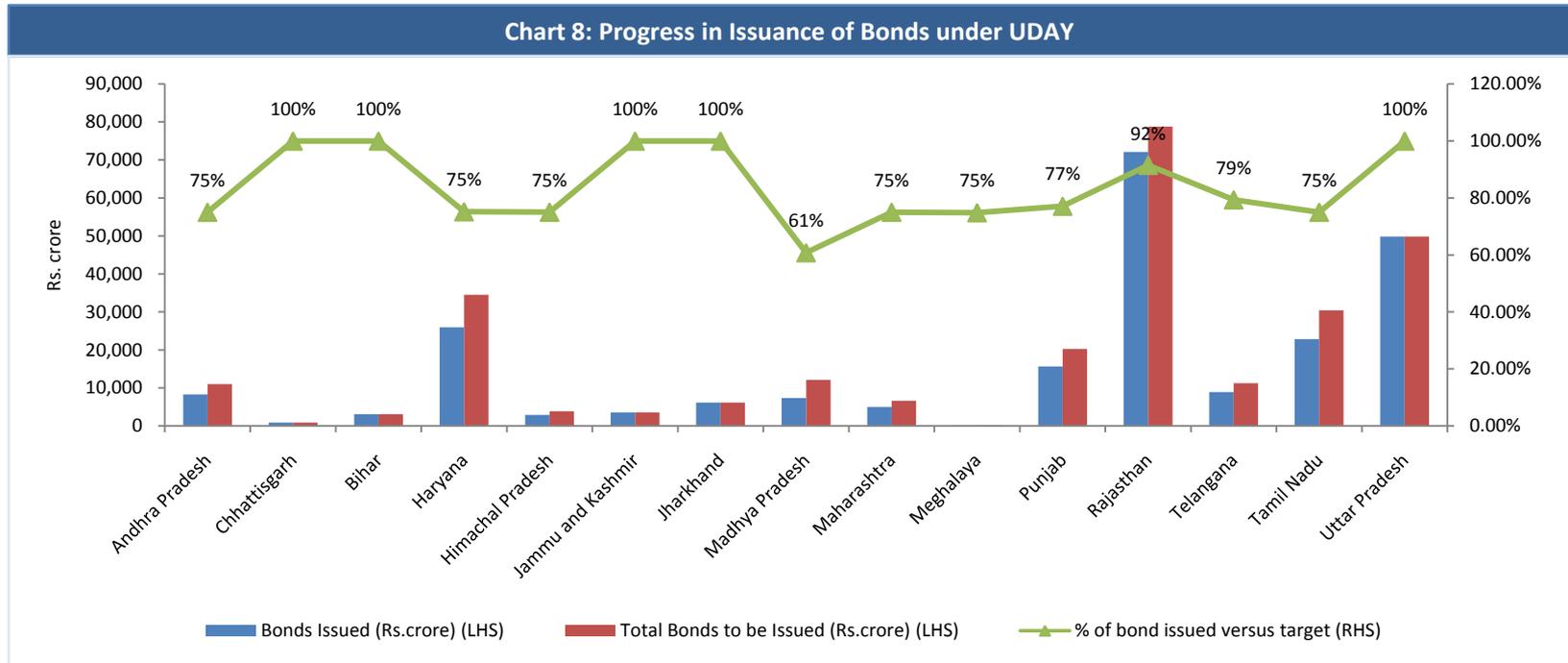
- On April 7, 2017, MNRE has notified the draft bidding guidelines for procurement of wind power through reverse auction based bidding process

PPA period	25 years
Bidding parameter	Fixed tariff over 25 years or escalating tariff with predefined annual escalation quantum and number of years of escalation
Capacity utilisation factor (CUF)	Range of CUF to be indicated in the bidding document; declared CUF should not be less than 20% over a year. Penalty in case of shortfall in energy supply as against the minimum CUF, subject to a minimum of 25% of cost of this shortfall in energy terms, calculated at PPA tariff. In case of availability more than maximum CUF, the generator is free to sell to other entities, provided the first right of refusal with the procurers
Payment security	Letter of credit, payment security fund and/or state government guarantee
Generation compensation for off-take constraints	Compensation to be available to the generators in case of off-take constraints due to grid unavailability or due to grid backdown
Commissioning schedule	Projects shall be commissioned within a period of 15 months from the date of execution of PPA. Projects with capacity of 100 MW and above shall be commissioned within 18 months
Event of default & Termination payments	In case of procurer event of default on account of failure to make monthly bill payments within stipulated time period or repudiation of the PPA, the procurer subject to prior consent of generator may novate the PPA to any third party. If this does not happen or is not acceptable by the generator, the generator may terminate the PPA and require the defaulting procurer to takeover the project assets by paying debt due and 150% of adjusted equity or pay damages equal to six months or balance PPA period (whichever is less) of charges for its contracted capacity, with projects assets being retained by the developer

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Progress in Implementation of UDAY

UDAY: Satisfactory Progress So Far



Source: ICRA research, UDAY website

- ❑ Bonds worth Rs 2.32 lakh crore have been issued by states & discoms towards refinancing the debt on the books of the discoms under the UDAY scheme, representing 85% of the total bonds to be issued as per MoUs signed. This in turn has improved the liquidity profile of the discoms in these states.
- ❑ The bonds issued so far constitutes state bonds of Rs. 2.09 lakh crore towards discom debt takeover and discom bonds of Rs. 0.24 lakh crore towards the leftover debt

AT&C Loss Reduction and Tariff Adequacy to Remain Key

Chart 9: AT&C Loss Trajectory proposed under UDAY between FY2015-FY2019

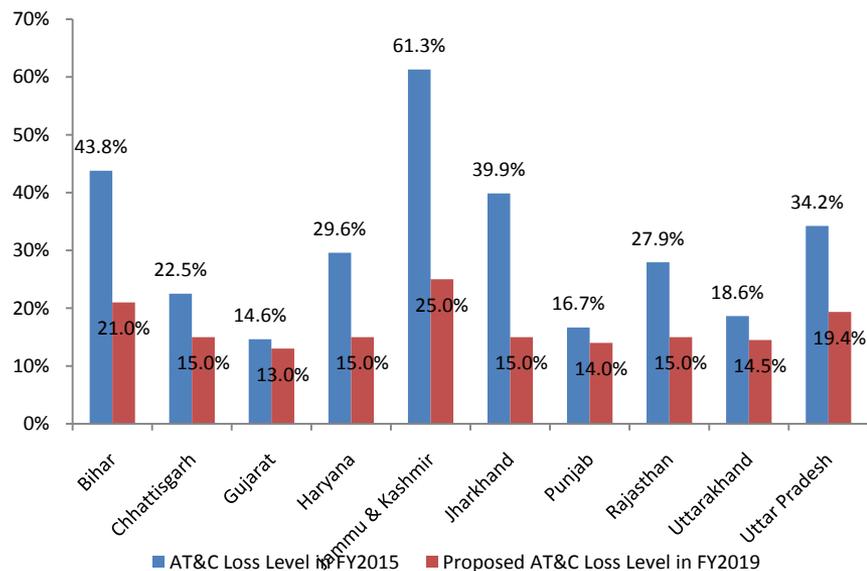
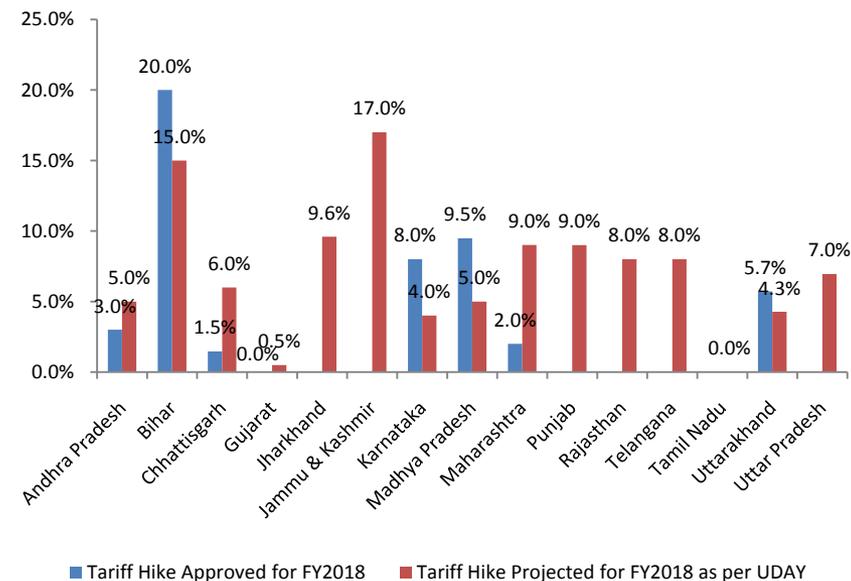


Chart 10: Analysis of Tariff Hikes approved as against stipulated hike under UDAY MoUs for FY2018



Source : ICRA research, MoUs signed between MoP, Gol and State Governments

- Key objectives of UDAY is to improve operating & financial performance of the utilities by tariff adequacy & reduction in AT&C losses
 - Given the high AT&C loss levels (28-61%) for the discoms in Bihar, Chattisgarh, Haryana, J&K, Jharkhand, Rajasthan and Uttar Pradesh, the ability of these discoms to reduce losses to stipulated levels in a timely manner remains critical
 - The average tariff hike stipulated for the period FY2016-FY2019 as per UDAY MoUs remains in the range of 5% to 10% across majority of the states. However, tariff orders for FY2017 and FY2018 have not been issued in all the states where MoUs are signed. Further, the tariff hike approved has remained lower than the proposed hike under UDAY in states like Andhra Pradesh, Punjab, Maharashtra and Uttar Pradesh.

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Offshore Power in India

Offshore Wind Power in India

Policy notified in October 2015

- Government has notified the National Offshore Wind Energy Policy with the primary objective of exploring and promoting development of offshore wind farms in the exclusive economic zone (EEZ) of the country i.e. up to a seaward distance of 200 Nautical Miles

Nodal Ministry

- MNRE has been notified as the nodal ministry responsible for issuing policy guidelines, monitoring development of the offshore wind and also coordinating with other ministries etc

Nodal Agency

- NIWE will be the nodal agency for development of offshore wind farms, responsible to call for proposals for development of offshore wind power projects in the specified blocks under international competitive bidding and entering into contracts with project developers for setting up of offshore wind power projects.

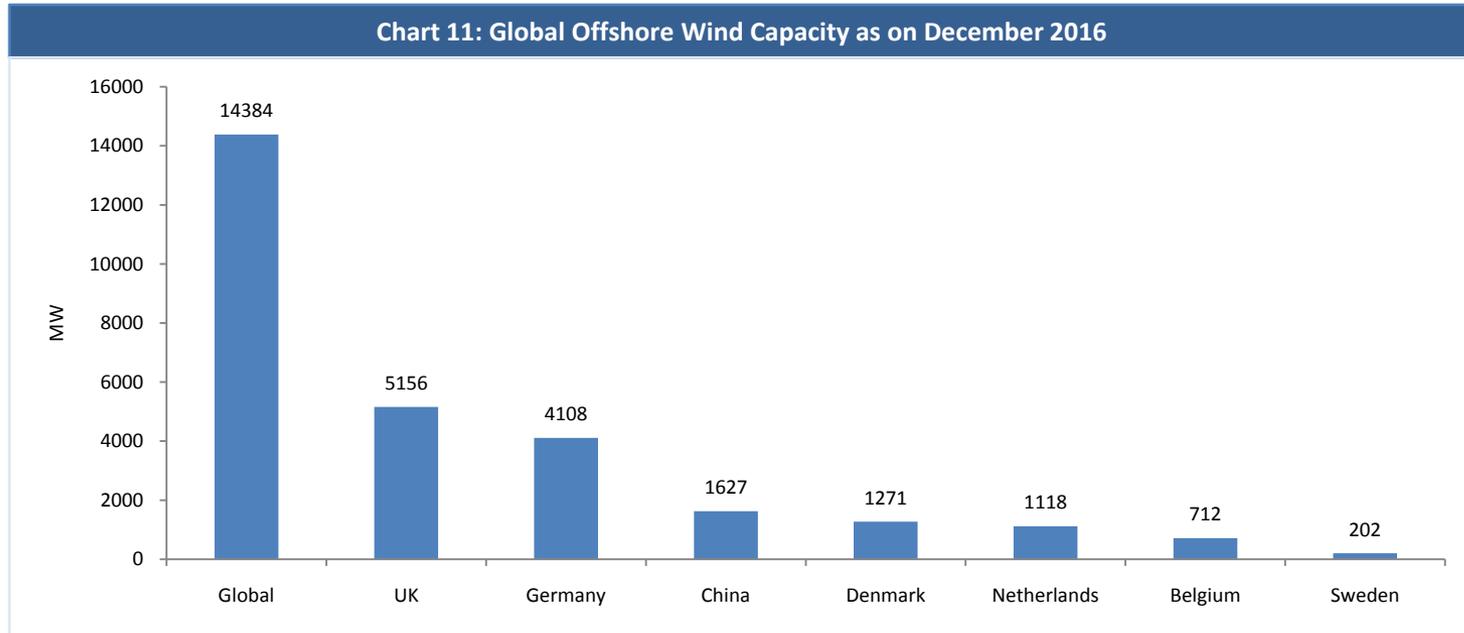
Potential

- Preliminary estimates indicate a offshore wind power potential of 106 GW along Gujarat coastline and 60 GW along Tamil Nadu's coastline

Challenges

- Identification of resource potential, setting up of turbines including logistics, development of transmission infrastructure and integration with the national grid

Global Offshore Wind Capacity



Source : ICRA research, GWEC

- Installed offshore wind power capacity is about 14.4 GW globally at the end of 2016, with 88% of this in the European countries
- Global offshore capacity has increased from 4.2 GW at the end of 2011 to 14.4 GW at the end of 2016
- United Kingdom , Germany, China and Denmark lead the offshore wind power installations

Q&A

Thank You

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