



Indo-German  
Energy Forum  
Support Office

A blurred background image showing a group of people in a modern office or conference room, engaged in a meeting or discussion. The image is out of focus, emphasizing movement and activity.

# Indo German Energy Forum

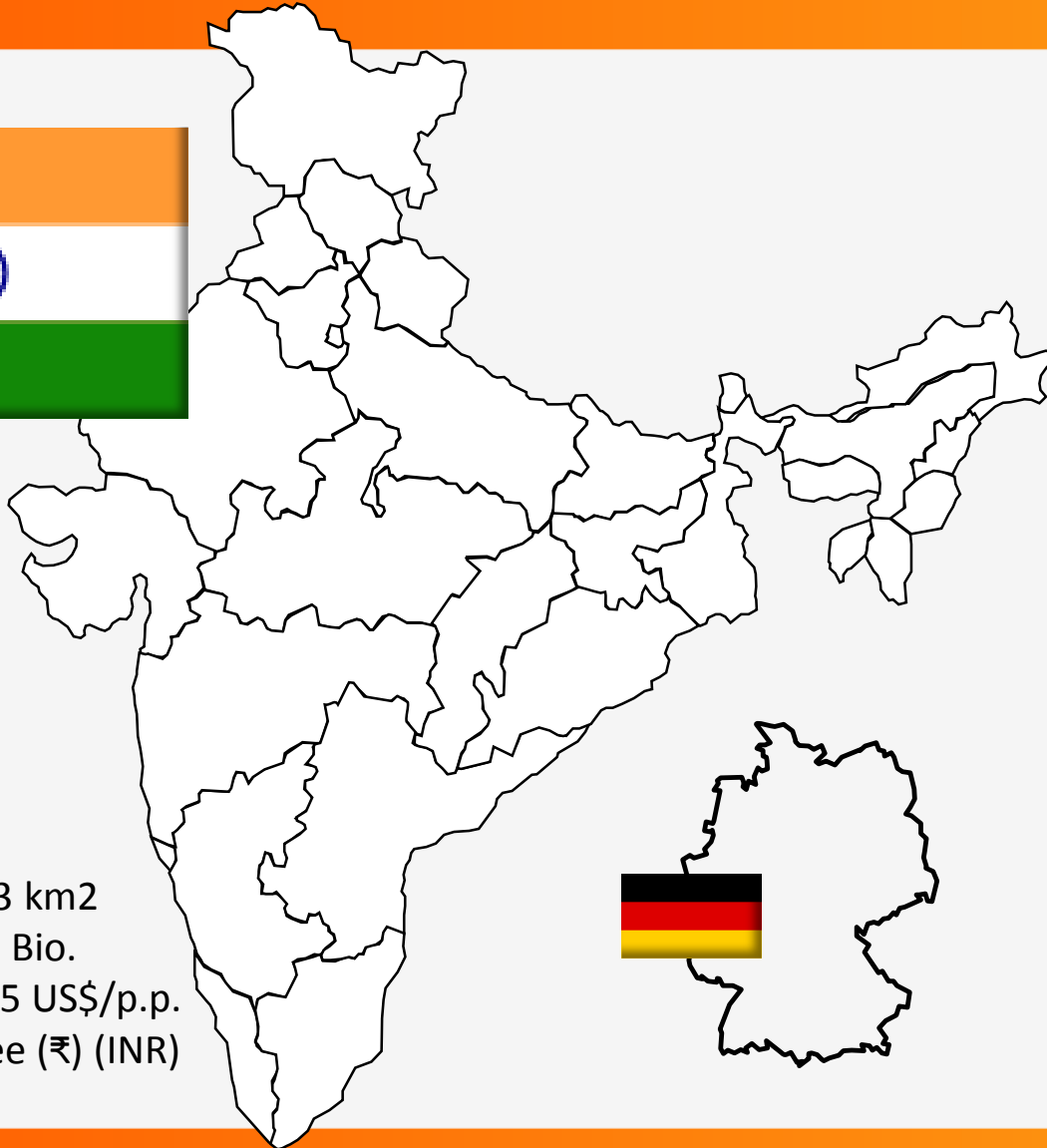


## 100 GW Wind Energy in India

Tobias Winter for Exportinitiative Energy @WindenergyHamburg, 25.09.2018

# India's wind power capacity

Rank 4 worldwide in 2017



Area: 3.287.263 km<sup>2</sup>  
Population: 1,3 Bio.  
GDP nom: 1.965 US\$/p.p.  
Currency: Rupee (₹) (INR)



**+4,6 GW Wind**

**Rank 4 worldwide in 2017**

**32,9 GW Wind**

**Government of India plans**

**60 GW by 2022**

**100 GW by 2030**

# Global new investment in RE by region (bio US\$)

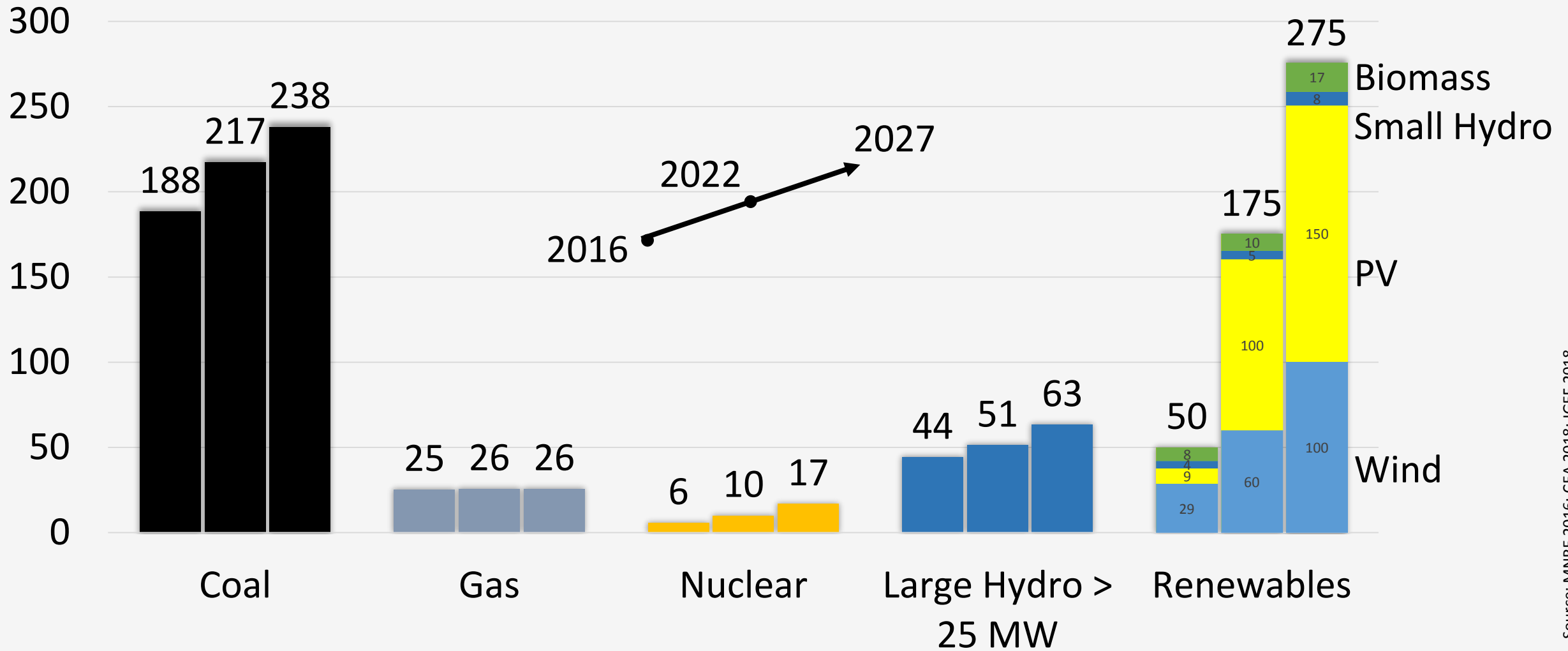
Annual investments in bio US\$ (without projects < 1MW)



Source: Bloomberg New Energy Finance, March 2017

# Development of Indian Utility Power Capacity (in GW)

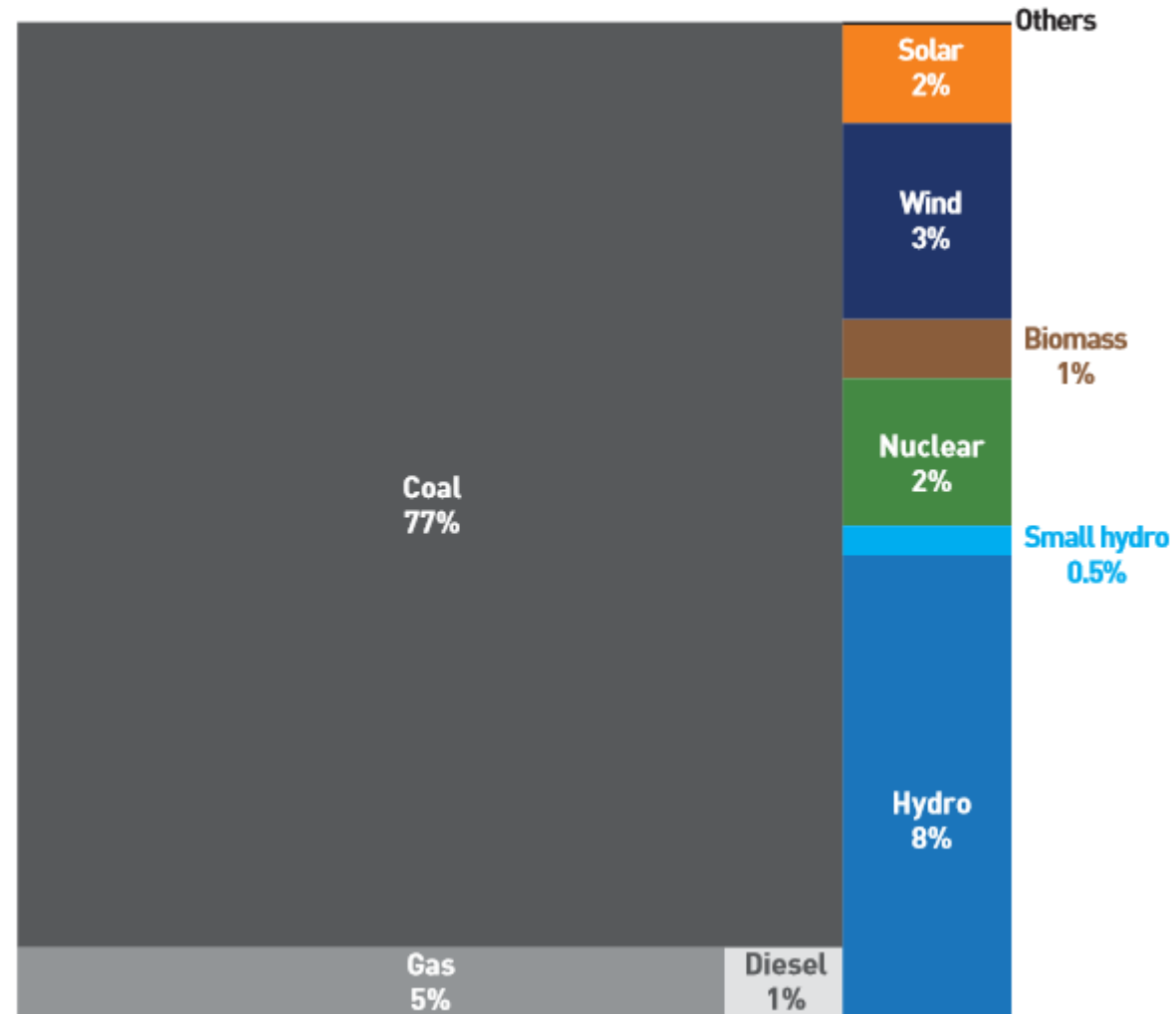
Massive growth of RE incl. 5 GW Offshore Wind in 2022 and 30 GW in 2027 in 07/2018 now 72 GW



Source: MNRE 2016; CEA 2018; IGEF 2018

# Electricity Generation 2017-18 by source (in%)

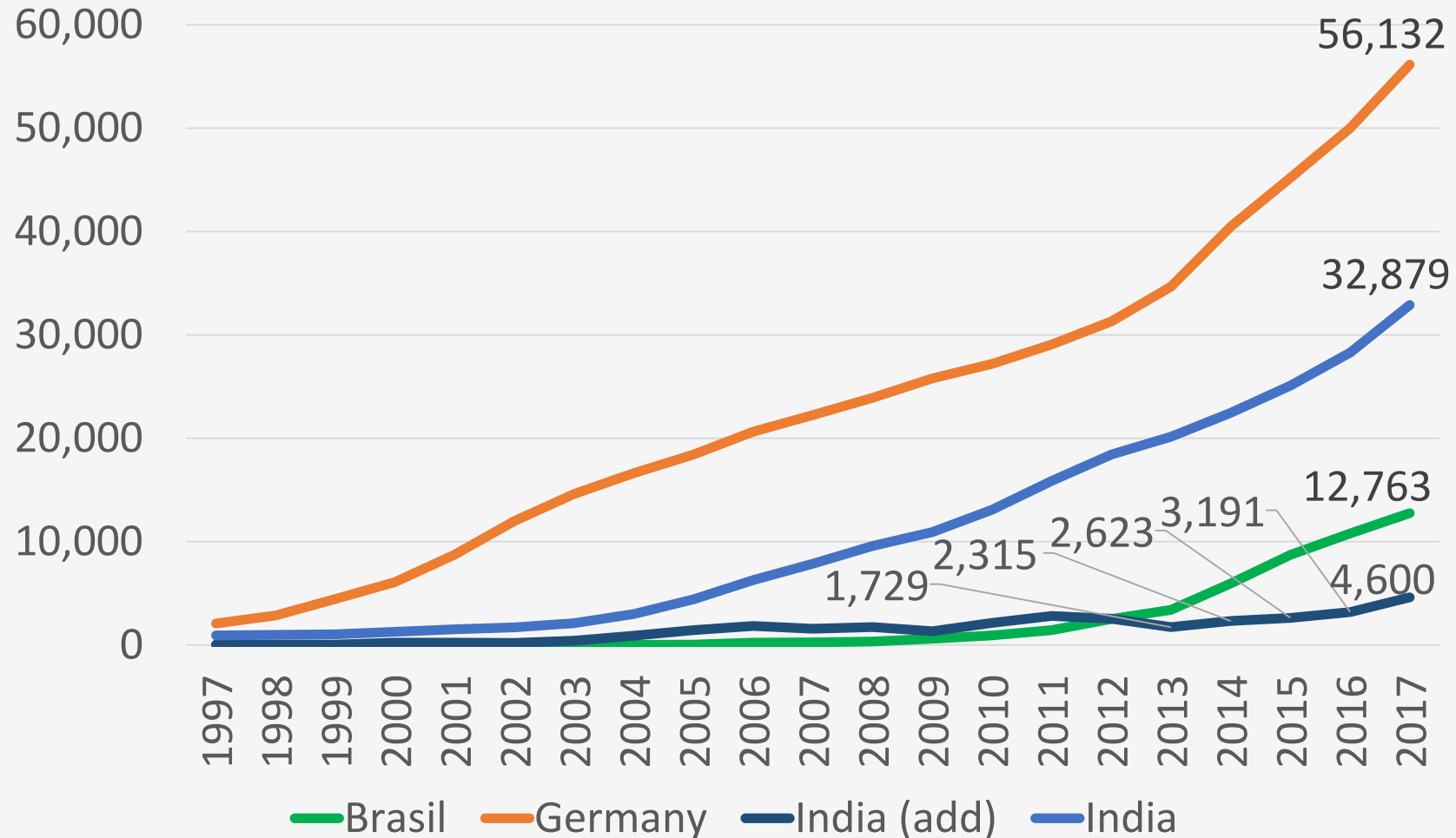
15% from RE Sources



<https://bridgetoindia.com/reports/india-re-map-i-september-2018/>

# Indian Wind Capacity (in MW) until 2017

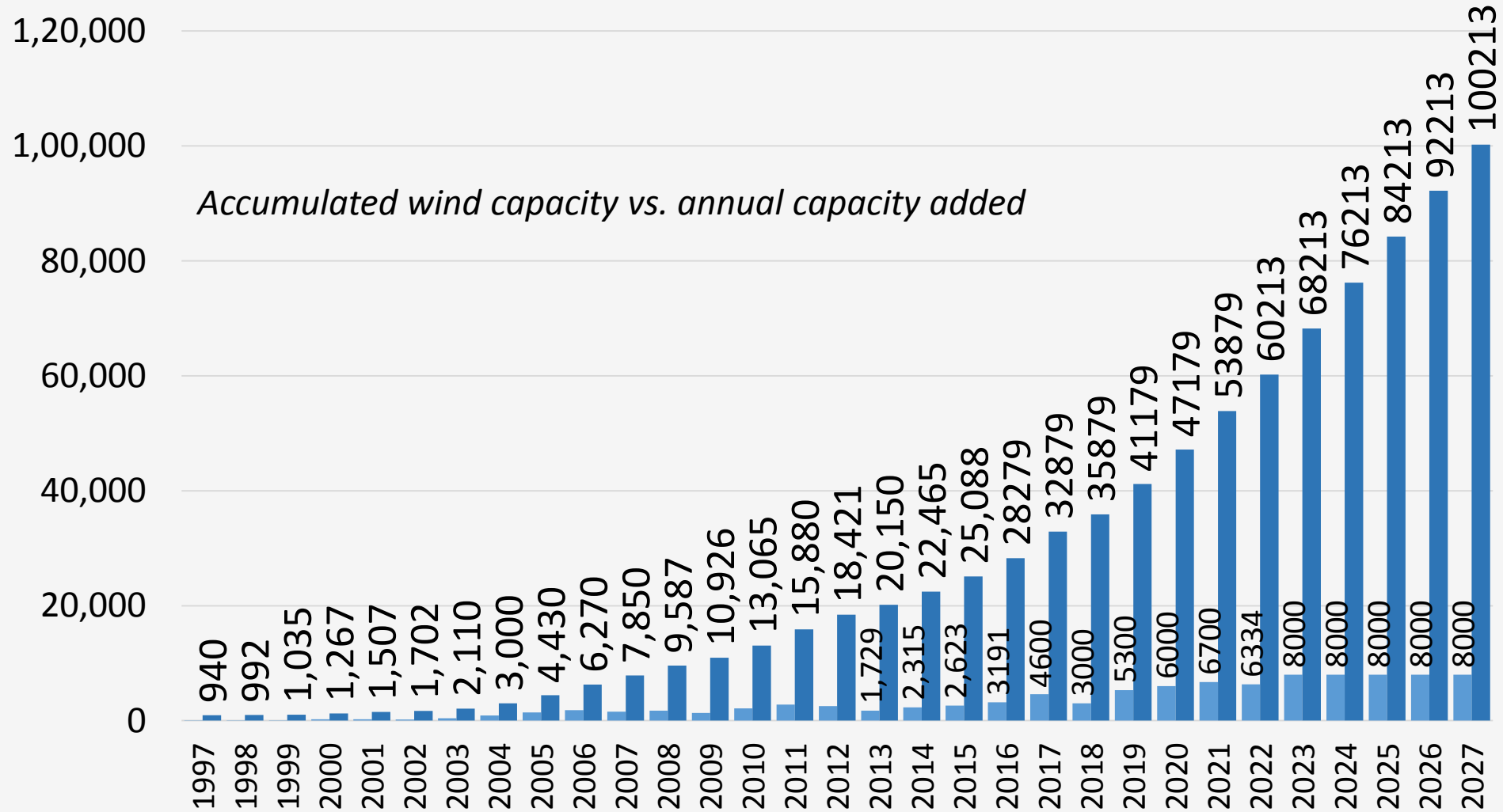
Compared to Brasil and Germany



India 2018  
+3.000 MW?

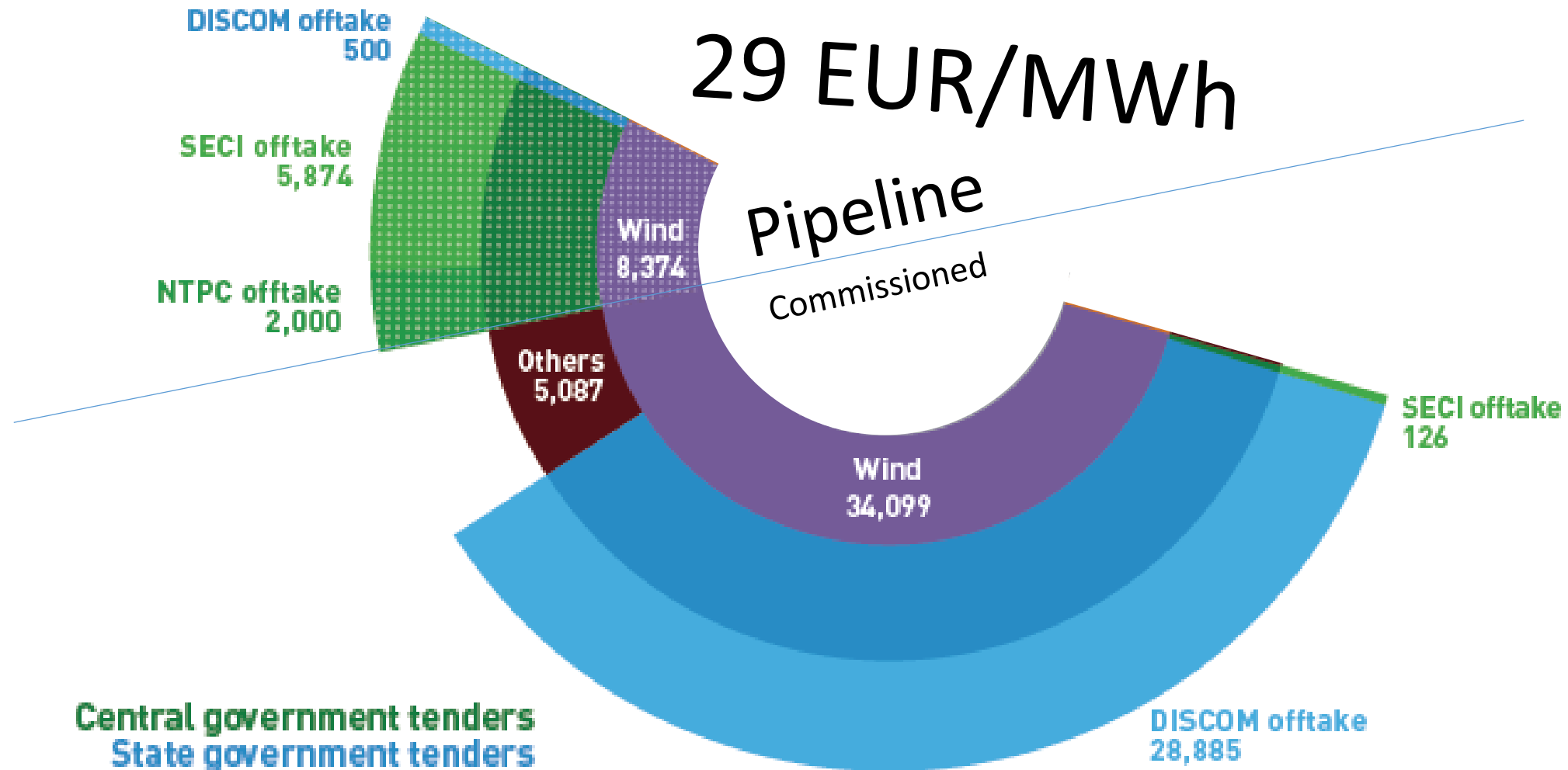
# Indian wind capacity development (in GW) until 2027

4 to 8 GW annual capacity addition foreseen by Government of India



# Total Utility Scale Wind Capacity

Market segments and capacities as per September 2018, all figures in MW



<https://bridgetoindia.com/reports/india-re-map-i-september-2018/>



# Proposed state wise wind capacity targets by 2022

8 states to add 31 GW until 31.03.2022

State	Installed on 30.09.2016	to be added until 31.03.2022	Political target 31.03.2022
Tamil Nadu	7.664	4.236	11.900
Gujarat	4.314	4.486	8.800
Rajasthan	4.145	4.455	8.600
Andhra Pradesh	1.805	6.295	8.100
Maharashtra	4.671	2.929	7.600
Madhya Pradesh	2.227	3.973	6.200
Karnataka	3.143	3.057	6.200
Telangana	99	1.901	2.000
other	46	554	600
<b>Total</b>	<b>28.114</b>	<b>31.886</b>	<b>60.000</b>

Source: [MNRE](#) 2015

# Captive power market?

84 GW in 2017 Captive Power Plants

- Total captive power above 1 MW in India estimated already at **84 GW**
- Captive mix in India: 21% already RE, else mainly coal

Present drivers:

- 1) need for continuous uninterrupted quality power supply for sustainable industrial operations
- 2) high industrial tariffs

- Open Access = buy cheaper RE-power from the open market
- expected to encourage private investment in electricity supply
- Open Access to transmission and distribution grid on payment of charges to the utility - high grid usage charges, no cap defined
- Resistance by local distribution company (DISCOM)
- Varying implementation across states (positive examples mainly in PV)

Renewable energy country attractiveness index ●

# #4 recai

May 2018

# Economic growth of selected wind markets (% of GDP)

*Highest growth rates in India*

Country	2012	2013	2014	2015	2016*	2017*	2018*
Worldwide	2.5	2.5	2.6	3.2	3.1	3.4	3.6
USA	2.0	2.3	2.6	2.6	1.6	1.9	2.0
China	8.0	8.5	7.3	6.9	6.7	6.5	6.0
<b>Germany</b>	<b>1.0</b>	<b>1.4</b>	<b>1.9</b>	<b>1.5</b>	<b>1.7</b>	<b>1.5</b>	<b>1.5</b>
<b>India</b>	<b>6.5</b>	<b>5.4</b>	<b>6.0</b>	<b>7.6</b>	<b>6.6</b>	<b>7.2</b>	<b>7.7</b>
Turkey	3.0	3.5	5.0	3.0	3.1	3.1	3.5
Pakistan	3.7	3.2	3.2	2.5	3.8	3.1	3.5
South Africa	2.6	3.6	2.7	1.3	2.3	0.8	1.6
Chile	5.6	4.6	4.6	4.6	1.7	1.7	2.0
Argentina	1.9	5.0	3.0	3.0	-1.5	2.4	3.0
Brasil	2.5	2.5	0.1	-3.8	-3.5	0.2	1.5
México	3.8	1.5	2.5	2.6	2.2	1.7	2.0

Source: IWF, UN, 2017, \*Estimates

# Credit ratings for selected wind markets

India stable with upward trend

Country	S & P RATING	S and P OUTLOOK	MOODY'S RATING	MOODY'S OUTLOOK	FITCH RATING	FITCH OUTLOOK
USA	AA+	Stable	Aaa	Stable	AAA	Stable
China	AA-	Negative	Aa3	Negative	A+	Stable
<b>Germany</b>	AAA	Stable	Ba3	Stable	BB-	Stable
<b>India</b>	BBB-	Stable	Baa3	Positive	BBB-	Stable
Turkey	BB	Negative	BA1	Stable	BB+	Stable
Pakistan	B	Stable	B3	Stable	B	Stable
South Africa	BBB-	Negative	Baa2	Negative	BBB-	Negative
Chile	AA-	Negative	Aa3	Stable	A+	Negative
Argentina	B-	Stable	B3	Stable	B	Stable
Brasil	BB	Negative	Baa2	Negative	BB	Negative
México	BBB+	Negative	A3	Negative	BBB+	Stable

# Anti-Corruption Index (CPI)

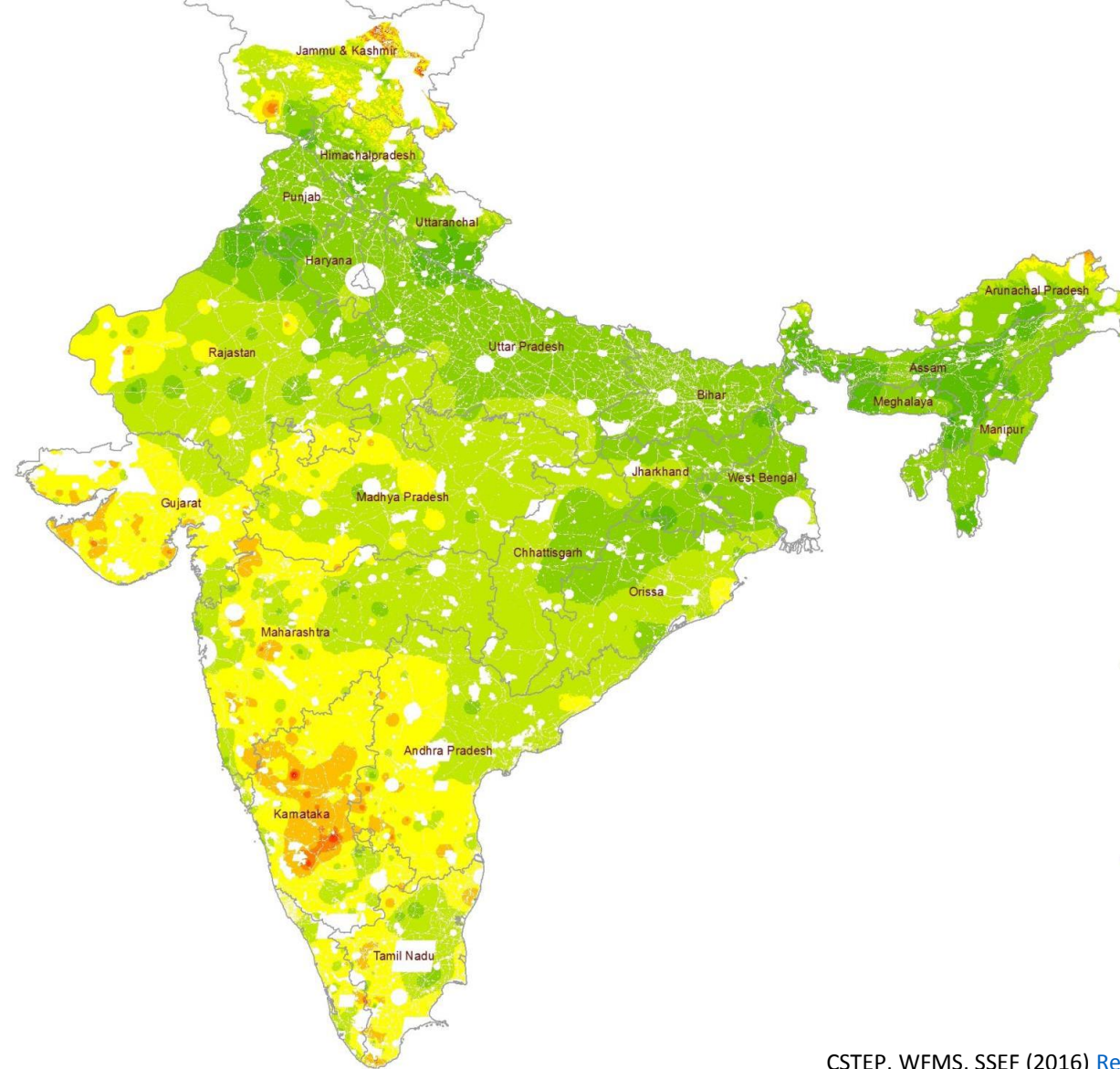
*Challenge to find a partner who is not average, low CPI leads to higher hedging costs*

World Rank	Country	CPI 2017 Score
<b>12</b>	<b>Germany</b>	<b>81</b>
16	USA	75
26	Chile	67
71	South África	43
77	China	41
<b>81</b>	<b>India</b>	<b>40</b>
81	Turkey	40
85	Argentina	39
96	Brasil	37
117	Pakistan	32
135	México	29

Source: Corruption Perceptions Index 2017, Transparency International

# Wind speed map of India at 120 m hub height in m/s

Please find study on wind potential at link below

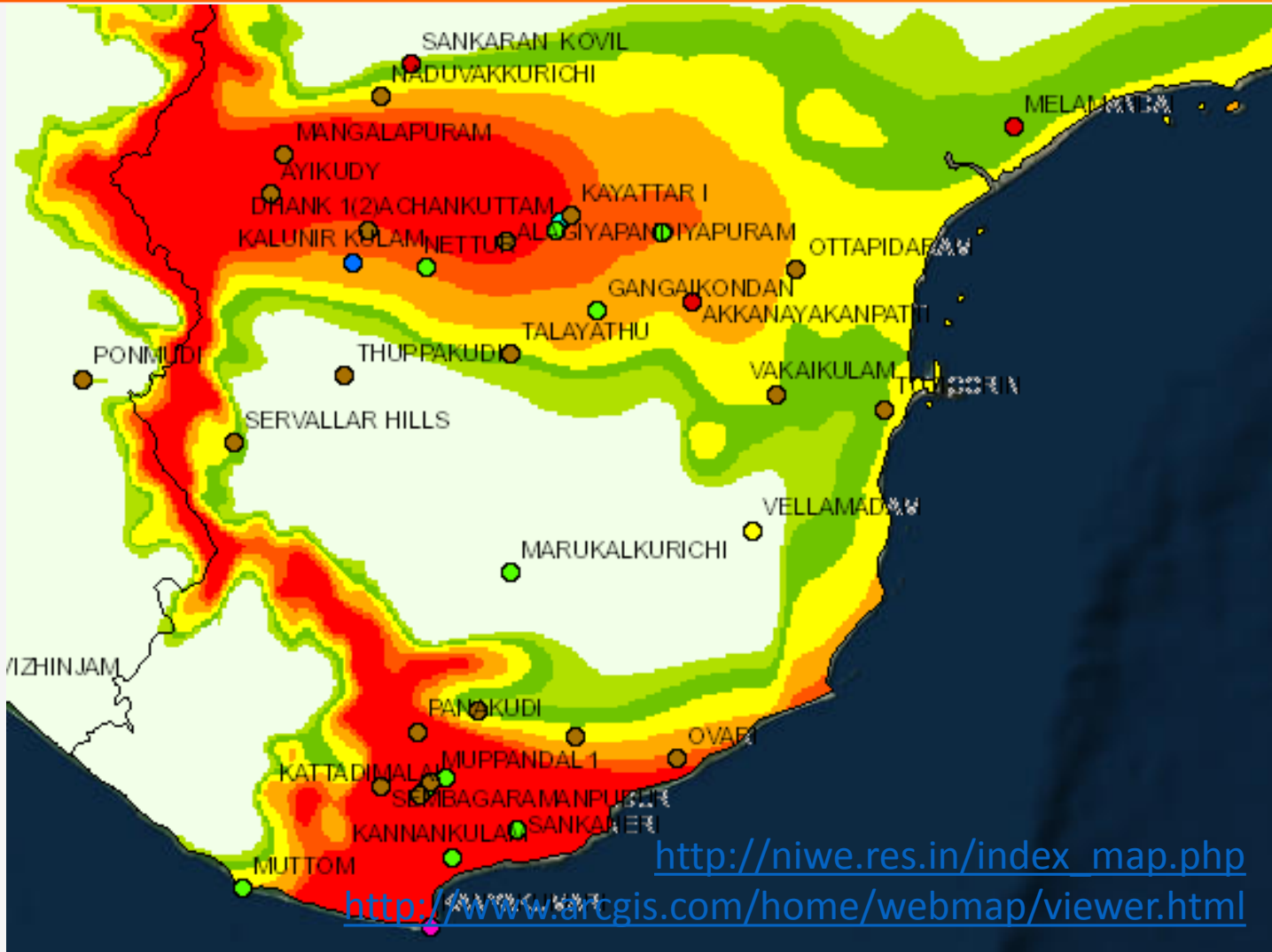


CSTEP, WFMS, SSEF (2016) [Re-assessment of India's On-shore Wind Power Potential](#)



# Indian wind data from public towers

Detailed data of Indian Wind Atlas can be purchased at NIWE, exact position of towers at online map



Color Scale	WS (m/s)	WPD (W/sq.m)	CUF (%)
	0 - 5.4	0 - 180	0 - 18
	5.4 - 5.6	180 - 210	18 - 20
	5.6 - 6.0	210 - 250	20 - 22
	6.0 - 6.4	250 - 300	22 - 25
	6.4 - 6.7	300 - 350	25 - 28
	6.7 - 7.0	350 - 400	28 - 30
	> 7.0	> 400	> 30

[http://niwe.res.in/index\\_map.php](http://niwe.res.in/index_map.php)

<http://www.arcgis.com/home/webmap/viewer.html>



# Indian offshore wind data from public towers

EU funded fowind project with Consortium for “Facilitating Offshore Wind” in Tamil Nadu / Gujarat



- GWEC
- Centre for Study of Science, Technology and Policy (CSTEP)
- DNV GL
- Gujarat Power Corporation Limited (GPCL)
- World Institute of Sustainable Energy (WISE)
- [National Institute of Wind Energy \(NIWE\)](#)
- Indian National Centre for Ocean Information Services (INCOIS-NIOT)

! 2018 tender for 1 GW offshore !



# Indian 1GW offshore tender at coastline of Gujarat

Expected end 2018



## Expression of Interest for 1000 MW Offshore Wind Farm in Gujarat

 <p><b>नीवे NIWE</b> (ISO 9001:2008)</p>	<p><b>राष्ट्रीय पवन ऊर्जा संस्थान</b> (नवीन और नवीकरणीय ऊर्जा मंत्रालय के अधीन स्वायत्त अनुसंधान एवं विकास संस्था, भारत सरकार) <b>NATIONAL INSTITUTE OF WIND ENERGY</b> (An Autonomous R&amp;D Institution under the Ministry of New and Renewable Energy, Government of India) (पूर्व में "पवन ऊर्जा प्रौद्योगिकी केंद्र" Formerly "Centre for Wind Energy Technology") वेलचेरी ताम्बरम प्रमुख मार्ग, पल्लिकरणई, चेन्नै- 600 100, तमिल नाडु, भारत <b>Velachery – Tambaram Main Road, Pallikarapnai, Chennai - 600 100, Tamil Nadu, INDIA</b> Tel No. 044-22463982/83/84, 29001162 / 67 / 95 , Fax No. +91-44-2246 3980, E-mail : <a href="mailto:purchase.niwe@nic.in">purchase.niwe@nic.in</a>, website: <a href="http://www.niwe.res.in">www.niwe.res.in</a></p>
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NIWE/PUR/EOI (Offshore\_GUJ)/18

Date: 10.04.2018

# List of Wind Turbine Models > 1 MW marketed in India

Manufacturers and international Partners (with NIWE type certificate / comply with CEA grid code)

NATIONAL INSTITUTE OF WIND ENERGY (NIWE)  
Wind Turbine Models marketed in India with Type Certificate  
As on October, 2016  
Models possessing valid Type Approval / Certificate & Self Declared that model(s) comply with CEA Technical Standard for Connectivity to the Grid (CONN) GM/CEA dated 15.10.2013 in terms of LVRT (voltage dips) & ...

Wind Turbine Model	Rotor Diameter	Hub Height	Capacity
AW 125 3000 IEC TB TH120 AW 61.2-2 50Hz	125 m	120 m	3000 kW
		49.55/65 m	880 kW
		73.90 m	2000 kW
		78.90 m	2000 kW
		78.90 m	2000 kW
		104.102 m	2000 kW
		80.95/125 m	2000 kW
		106.110 m (with a pedestal)	2000 kW
		73 m	700 kW
GE 1.6-82.5, 50 Hz	82.5 m	80 m	1600 kW
GE 1.6-87, 50Hz, LM62 1P2, 101 80m	87 m	80 m	1600 kW
GE 1.7-103, GE 50.3, 101 79.7 m & 91 m, 50 Hz	103 m	79.7 m & 91 m	1700 kW
GE 2.3-116, LM56.9, GE56.9, 101 94 m, 50Hz	116.7 m	94 m	2330 kW

नीवे NIWE

Prepared only for the purpose of general information. State Electricity Boards / TRANSCO's State Electricity Developers shall continue to refer the RLMD List. Cental-2

- Nordexgroup Acciona Windpower
- **Gamesa Renewable**
- GE Energy India
- Global Wind Power
- **Inox Wind**
- Kenersys India
- Leitwind Shriram Manufacturing
- NuPower Technologies
- PASL Wind Solutions
- PowerWind
- **Regen Powertech**
- RRB Energy
- **Suzlon Energy**
- Vestas Wind Technology
- WinWinD Power Energy
- Wind World India (Issue with Enercon)
- others

## Get Listed!

- ✓ High recognition in public sector
- ✓ Access to public finance
- ✓ Proved CEA grid code compliance

## Turbines Models < 1 MW

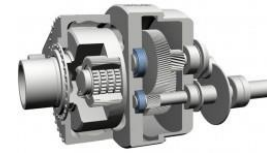
- Chiranjeevi Wind Energy
- Garuda Vaayu Shakti
- Pioneer Wincon
- Shriram EPC
- Siva Wind
- Southern Windfarm
- others

[Link](#) to estimate of sales in India



# or buy?

Tier-I WTG Component Suppliers producing in India



Bearing	Blades	Forging and casting	Gearbox	Generator	Tower
<ul style="list-style-type: none"> <li>▪ FAG</li> <li>▪ Timken</li> <li>▪ SKF</li> <li>▪ NTN</li> <li>▪ other</li> </ul>	<ul style="list-style-type: none"> <li>▪ Gamesa</li> <li>▪ Inox Wind</li> <li>▪ Kemrock</li> <li>▪ Leitner Shriram</li> <li>▪ LM Wind</li> <li>▪ RRB Energy</li> <li>▪ Nu Power</li> <li>▪ Suzlon</li> <li>▪ Wind World</li> <li>▪ other</li> </ul>	<ul style="list-style-type: none"> <li>▪ Bharat Forge</li> <li>▪ L&amp;T (Forging)</li> <li>▪ L&amp;T (Casting)</li> <li>▪ SE Forge (Casting)</li> <li>▪ SE Forge (Forging and Machining)</li> <li>▪ Premier</li> <li>▪ Patel Alloy</li> <li>▪ other</li> </ul>	<ul style="list-style-type: none"> <li>▪ Winergy</li> <li>▪ ZFWind</li> <li>PowerAntwerpen</li> <li>▪ other</li> </ul>	<ul style="list-style-type: none"> <li>▪ ABB India</li> <li>▪ Leitner</li> <li>Shriram</li> <li>▪ Regen</li> <li>Powertech</li> <li>▪ Suzlon</li> <li>▪ The Switch</li> <li>WindWorld</li> <li>▪ other</li> </ul>	<ul style="list-style-type: none"> <li>▪ Gestamp</li> <li>▪ Global</li> <li>▪ WindPower</li> <li>▪ Inox Wind</li> <li>▪ Premier</li> <li>▪ Suzlon</li> <li>▪ Tool Fab</li> <li>▪ Windar</li> <li>▪ WindWorld</li> <li>▪ other</li> </ul>

! More Info: CSTEP 2015, [Addressing the Challenges of RE Manufacturing in India: Horizon 2032](#) !



# Indian national wind power associations

Gain visibility and power at reasonable cost



World Wind Energy Association



World Wind Energy Association



## IWPA

helping mankind with energy from nature



## IWTMA

INDIAN WIND TURBINE  
MANUFACTURERS ASSOCIATION



INDIAN WIND ENERGY ASSOCIATION



# Indian Wind Turbine Manufacturers Association

And its members



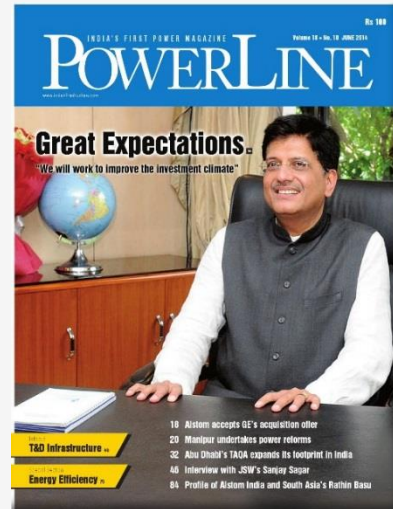


# Selection of print media for electricity with focus on RE

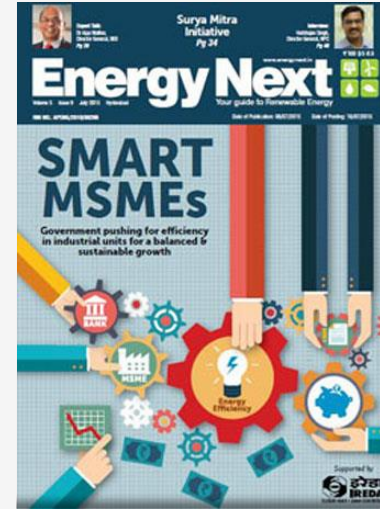
For more info please click on cover of publication



6.500 prints to all stakeholder



17.000 prints to all stakeholders



4.000 prints on behalf of IREDA Government of India

Market studies Now Available

WIND POWER IN INDIA 2016

- ◆ Report
- ◆ Data-set (Excel)

Cost: 1.000 EUR

[link](#) to more info

Get listed!

India Infrastructure:  
Powerline Directories  
for Wind and Power



Alternatives:



# How to finance

“Publikationen” available in German language and free of cost at <http://www.export-erneuerbare.de>



**KFW** DEG



# Make In India Business Support Programme

for German Mittelstand and family owned enterprises



MAKE IN INDIA MITTELSTAND!



Indo-German Chamber of Commerce  
Deutsch-Indische Handelskammer  
Mumbai · Delhi · Kolkata · Chennai  
Bengaluru · Pune · Düsseldorf

**Knowledge Partner**

**Legal & Tax Partner - India**

**Legal & Tax Partner - Germany**

**Banking Partners**

**Facilitation Partners**

**Incubation Partner**

**Partner Chamber**

**Technology Partner**

**Exhibition Partner**

**Associate Partner**

**Industry Associations**





MITTELSTAND  
**GLOBAL**  
EXPORTINITIATIVE ENERGIE

18.-20. September, 2019; India Expo Centre, New-Delhi

[www.renewableenergyindiaexpo.com](http://www.renewableenergyindiaexpo.com)

Total exhibitors: 800+ from 40 countries; 16.000 sqm

Visitors: 30.000+

German exhibitors: 36 + German Pavilion by Exportinitiative Energy

2 OCTOBER 2018

**SHRI NARENDRA MODI**

Hon'ble Prime Minister of India

will preside over the

**INAUGURAL CEREMONY**

First Assembly of the ISA

2nd IORA RE Ministers' Meet

2nd Global RE-INVEST 2018



*Come, be a part of*

**NEWINDIA**  
**NEWENERGY**

2.-5. October, 2018; India Expo Centre, New-Delhi

<https://re-invest.in>

Total exhibitors: 80+

Visitors: 2.500+

German exhibitors: 7

# Informationsveranstaltung in Deutschland und AHK-Geschäftsreise nach Indien

Energieeffizienz und Eigenversorgung mit Erneuerbaren Energien für Industriekunden in Indien

Ort: Deutschland

Technologie: Bioenergie, Solarenergie, Windenergie

Zielmarkt: Indien



- ✓ **Kostenfreie Vermittlung potenzieller Geschäftspartner**
- ✓ **Kontakt mit Entscheidungsträgern aus Politik und Wirtschaft**
- ✓ **Insider-Wissen durch persönliche Gespräche**
- ✓ **Vortrag auf Veranstaltung in Indien um Bekanntheit Ihres Unternehmens zu steigern**
- ✓ **Ihr Unternehmen trägt die Reisekosten**
- ✓ **Mehr Infos <http://www.export-erneuerbare.de>**

INTERNATIONAL  
CONFERENCE &  
EXHIBITION

13-15 February 2019

150+  
Exhibitors

5000+  
Business  
Visitors

2 Day  
Conference on  
Innovation and  
Technology



Organised by:



Exhibition Partner:



Conference Partner:



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Platinum  
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Associate  
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Sponsors:



Bronze  
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# Events - B2G Roundtable TODAY

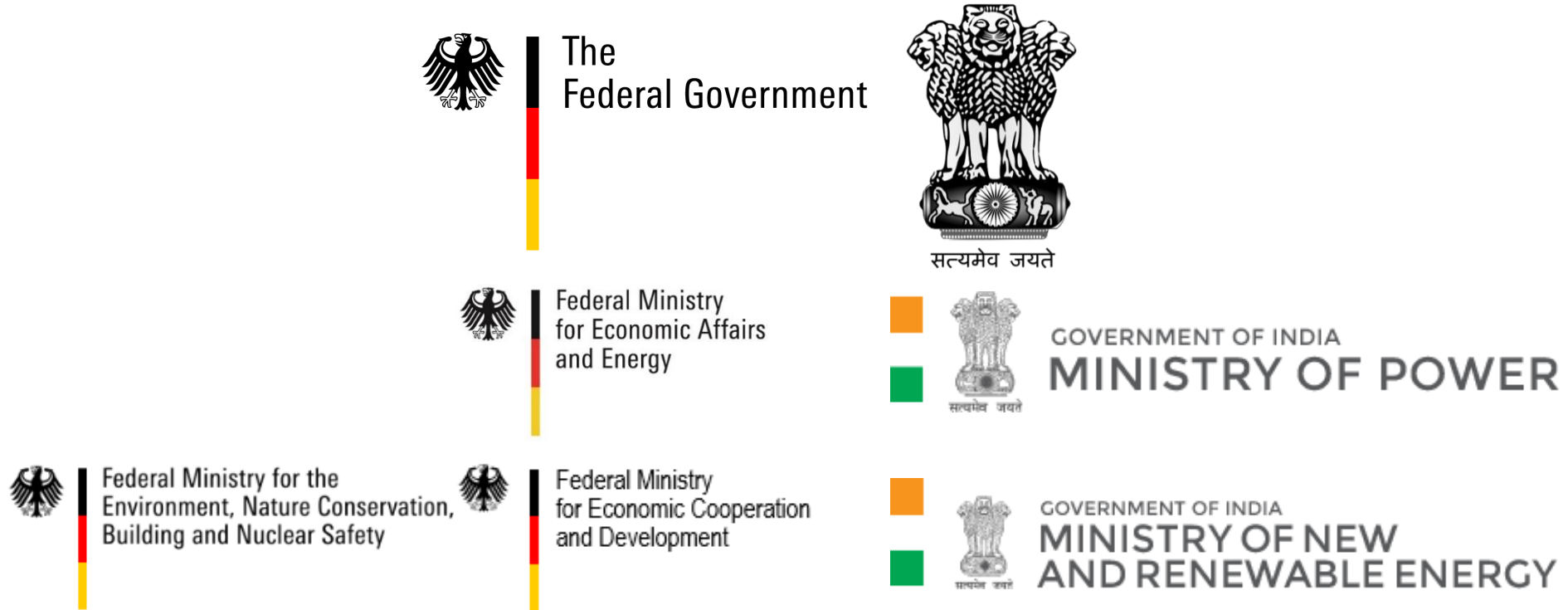
*In cooperation with energy associations from Germany and India at WindEnergy Hamburg*





# Stakeholder of IGEF

IGEF is the platform for dialogue on energy issues for GOI and Federal Government of Germany



Indo-German Energy Forum Support Office implemented by:



**Thank you**

**धन्यवाद**

## New Delhi

### Indo-German Energy Forum (IGEF)

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**W** [www.energyforum.in](http://www.energyforum.in)

# Commitments given at RE-Invest 2015

*Wind sector committed itself to more than 45 GW until 2022*

• Sun Edison Energy India Pvt. Ltd.	5.200 MW
▪ Axis Wind Energy Limited	7.000 MW
▪ Renew Power	4.500 MW
▪ Welspun Renewables Energy Pvt. Ltd.	2.341 MW
▪ Hindustan Clean Energy Ltd.	3.000 MW
▪ Greenko Energies Pvt. Ltd.	5.900 MW
▪ Mytrah Energy	7.000 MW
▪ Hero Future Energies	2.300 MW
▪ Green Infra Ltd.	1.500 MW
▪ Orange Renewable Power Pvt. Ltd.	1.400 MW
▪ Continuum Wind Energy India Pvt. Ltd.	1.000 MW
▪ Energon Power Resources Pvt. Ltd.	1.000 MW
▪ Ostro Energy Pvt. Ltd.	800 MW
▪ Harness Energy Pvt. Ltd.	700 MW
▪ Acciona Energy India Pvt. Ltd.	600 MW
▪ Surya Vidyut Limited	200 MW
▪ Powerica Limited	224 MW
▪ Pioneer Wincon Pvt. Ltd.	200 MW
▪ Indian Energy Ltd.	200 MW
▪ National Hydroelectric Power Corporation Ltd. (NHPC)	80 MW
▪ Gujarat Industries Power Company Ltd.	151 MW

**+45.296 MW**  
**until 2022**

# Independent wind power producer (IPP)

*With commitments made at RE-Invest 2015*

- CLP India
- Greenko Group
- IL&FS Energy Development Company Limited
- Inox Renewables
- Mytrah Energy
- Orange Renewable
- Orient Green Power Limited
- Ostro Energy
- Reliance Power
- ReNew Power
- Sembcorp Green Infra
- Tata Power Renewable Energy Limited
- Techno Electric & Engineering Company
- Welspun Renewables
- others

# Commitments given at RE-Invest 2015

*Wind sector committed itself to more than 45 GW until 2022*

## Policy (in place and to come)

- Impact of Reduction in AD Benefit
- Renewable Purchase Obligations
- Forecasting, Scheduling and Deviation Settlement Regulations
- Amendments to Tariff Policy
- CERC-determined Tariffs and Cost Components
- SERC-determined Tariffs for Key States
- Tax Incentive Options Driving Project Economics
- Draft Guidelines for Development of Onshore Wind Power Projects
- Wind-Solar Hybrid Concept
- National Offshore Wind Energy Policy
- Draft Policy for Repowering of Wind
- SECI tender and shift from FIT to bidding
- ED, CCD and SAD exemption
- Other generation based incentives
- Viability gap funding
- Concessional excise and customs duties
- Capital subsidies for off-grid systems
- Subsidies for R&D
- Income tax holiday
- Draft amendments to captive and group captive regulations
- Exemption of interstate transmission charges
- New Wind tariff order of MNRE
- other

## Example for scheme ruled out:

Textile and jute plants were allowed to obtain reimbursements for 25% of the cost of machinery in energy saving devices and captive power plants (including non-conventional sources). This scheme has been currently discontinued for wind turbines.

More Info at [Wind Power Policy in India](#), MNRE 2016



Husum Wind India  
December 5–7, 2017  
Exhibition & Conference,  
Mumbai, India  
[www.intersolar.in](http://www.intersolar.in)

Lars Kessler  
Sales Director HUSUM Wind  
Messe Husum & Congress  
Tel.: +49 4841 902-336  
Email: [kessler@messehusum.de](mailto:kessler@messehusum.de)