

# ROLE OF POWER TRANSMISSION IN COMBATING CLIMATE CHANGE: POWERGRID'S PERSPECTIVE



**DR. R. K. SRIVASTAVA**  
**POWERGRID, INDIA**

**Manila**

**June 7, 2018**

# POWERGRID-Glance

- ❖ Incorporated in 1989; Commercial operation -1992-93
- ❖ Central Transmission Utility since 1998
- ❖ Accredited “Navratna” status in 2008
- ❖ Listed Company on BSE & NSE
  - IPO in Sept. 2007 and FPOs in Nov. 2010 & Dec. 2013
  - Shareholding (Mar’18): Govt-56.91%; Public: 43.09%

## Vision

*World Class, Integrated, Global Transmission Company With Dominant Leadership in Emerging Power Markets Ensuring Reliability, Safety and Economy*

Gross Fixed Assets  
(as on 31-03-2018)

27.24 bn.\$

Tr. Lines

(as on 31-03-2018)

148,838 ckm

1,162 Nos.

MVA & S/S

(as on 31-03-2018)

332,163 MVA

236 Nos.

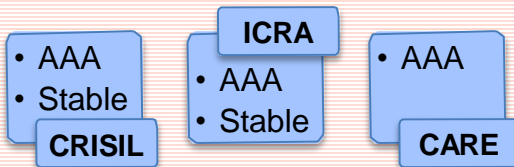
Operating Parameters  
(FY17-18)

Availability: 99.81%

Reliability(\*): 0.60

\* Trippings/ line

## CREDIT RATINGS



# Operational Areas

## Transmission



## Telecom



## Consultancy



- Owns and operates ~90% of India's ISTS.
- Inter-State, Inter-Regional and Transnational links
- Green Energy Corridors.
- Development of 1,200kV UHV-AC.

- Leverages POWERGRID's nationwide transmission infrastructure.
- Owns and operates more than 36,500 kms. of telecom network.
- Implements GOI's strategic initiatives:
  - ✓ National Knowledge Network ("NKN")
  - ✓ National Optic Fiber Network ("NOFN")

- Utilizing in house expertise for providing services in areas of transmission, distribution & Environment & Social Management.
- Provide Domestic Consultancy services to more than 150 clients including State power utilities, private sector and govt. utilities.
- Global footprints in 20 countries with more than 25 clients in Asia, Africa and other SAARC countries.

# Climate Change : Real & Happening

- ❑ After extensive debate in last decade, broad consensus on following has emerged:
  - ✓ Climate change is real & happening;
  - ✓ largely due to anthropogenic activities.
- ❑ Atmospheric CO<sub>2</sub> levels increased from 315.7ppm in 1958 to 409.56 ppm in April'18.
- ❑ According to NASA/NOAA's National Climatic Data Centre, 2016 was the hottest year on record across the globe since 1880 when record keeping began.

## Some testimonies/opinions :

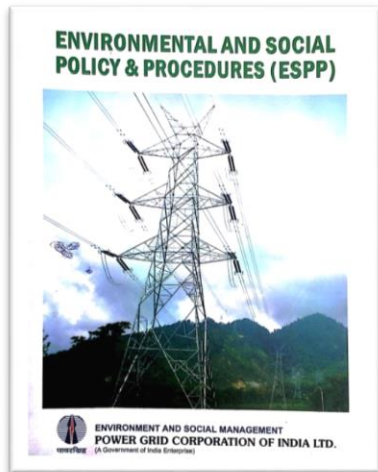
*“Human influence on the climate system is clear, and recent anthropogenic emissions of greenhouse gases are the highest in history. Recent climate changes have had widespread impacts on human and natural systems.”* **Intergovernmental Panel on Climate Change.**

**A meta study (2013) of 11994 peer reviewed papers on climate change concluded that out of 3974 studies which took position on human-influenced climate change, 97.1% agreed that human activity is causing global warming**

- ❑ Enhanced Vulnerability due to its disadvantageous position on followings:
  - ✓ 2.4% of world's surface area
  - ✓ 17.5% of world's human population
  - ✓ 17.5% of world's cattle population
- ❑ 6<sup>th</sup> most vulnerable country as per Global Climate Risk Index (CRI) released by Germanwatch,
- ❑ HSBC ranked **India the most vulnerable country** in the world followed by Pakistan, Philippines and Bangladesh.

## Environmental and Social Policy & Procedures(ESPP)

- Committed to the goal of sustainable development and conservation of nature & natural resources.
- Strictly follows the basic principles of **Avoidance, Minimization and Mitigation** in dealing with environmental and social issues.
- Restoration and enhancement undertaken, wherever necessary.



## Certifications

- IMS PAS 99 :2012
- EMS ISO 14001 :2015
- QMS ISO 9001 :2015
- OHSAS 18001 :2007
- SAS SA 8000 :2008
- ISO/IEC 27001 :2013

World Bank selected ESPP as the first candidate for 'Use of Country Systems' in India in 2009

Signatory to Integrity Pact of Transparency International since 2009

1<sup>st</sup> Company among Power Sector CPSUs to publish Sustainability Report in 2010

ADB approved ESPP under Country Safeguard System (CSS) in 2017

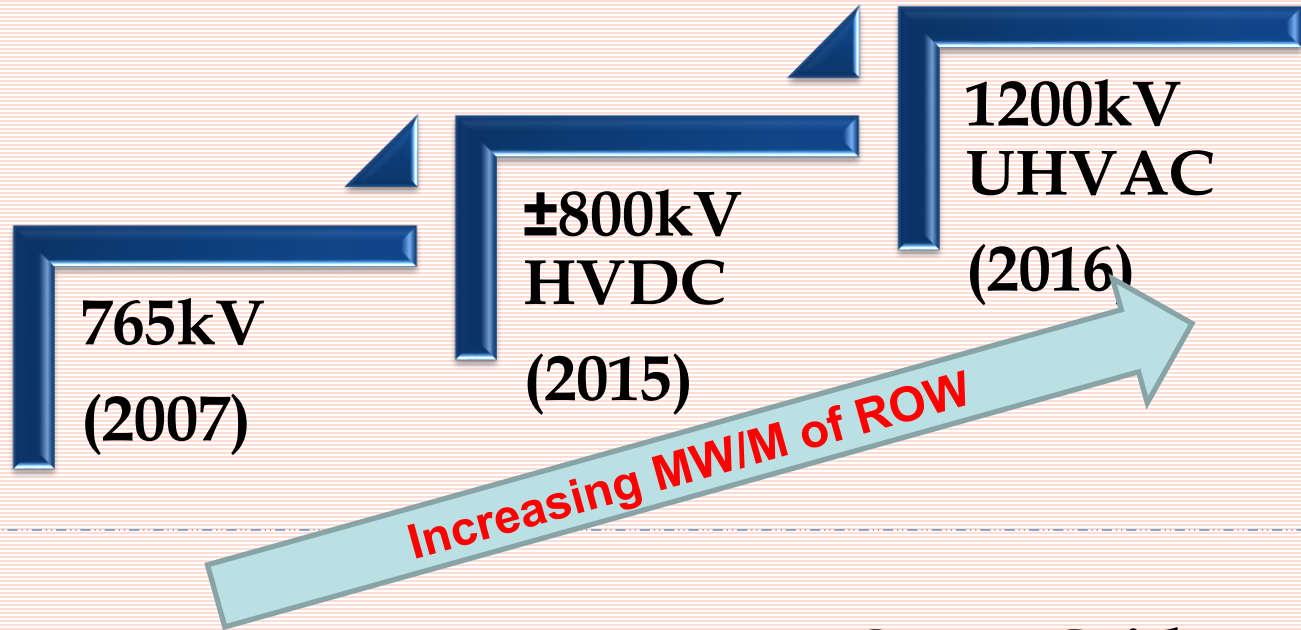
# Sustainability Journey

- ❑ Though Transmission Projects considered environmentally benign still POWERGRID developed a comprehensive “Environmental and Social Policy & Procedures (ESPP)” in 1998 to pre-empt any possible Environment & Social issues with mandated comprehensive E&S Assessment - *Measure beyond National requirement;*
- ❑ Adoption of ESPP not only reduced Environmental and Social risks substantially but also rewarded financially;
- ❑ Forest Involvement in Transmission Lines reduced progressively from 6% in 1998 to less than 2 % in 2016;
- ❑ Approx. 1.25 million tons of CO<sub>2</sub> absorption by saved forest annually.

***Giant Step to Combat Climate Change***

# New Technology in Transmission

Adoption  
of Higher  
Voltages



STATCOM

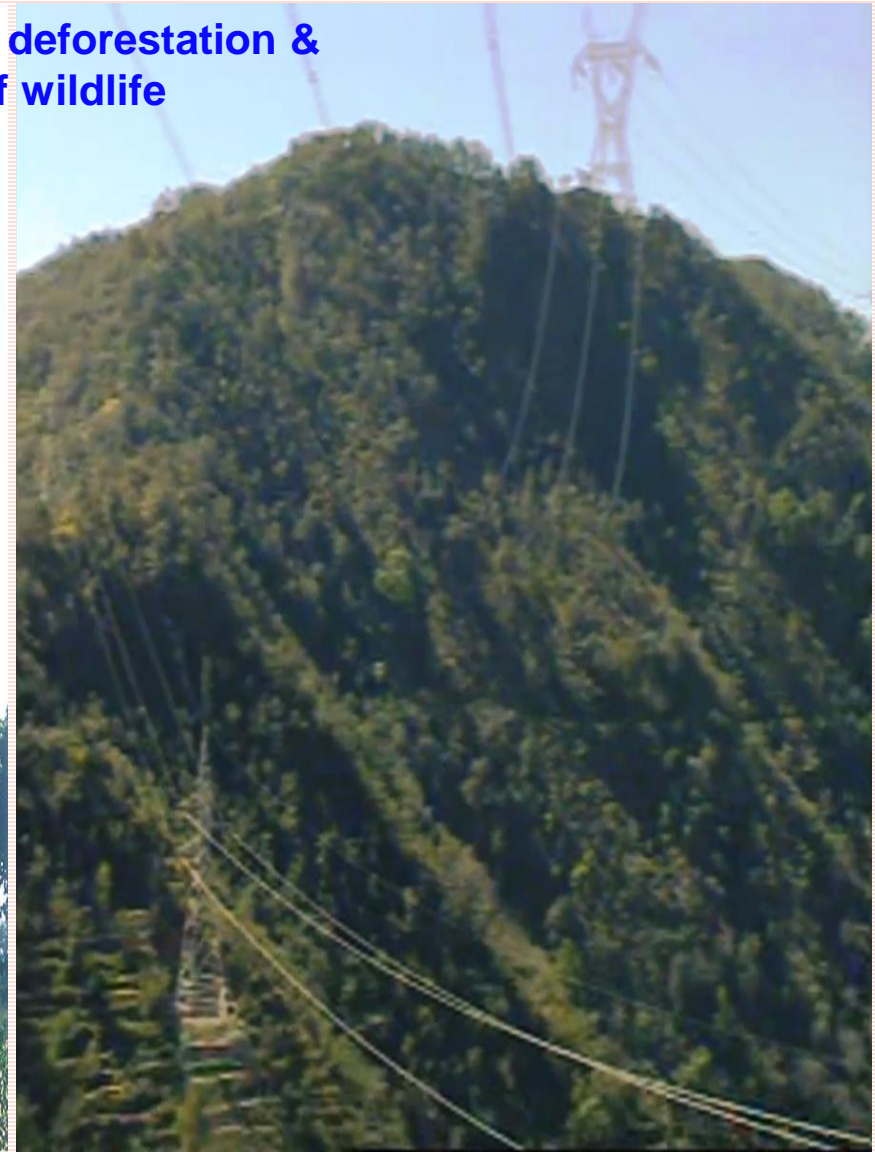
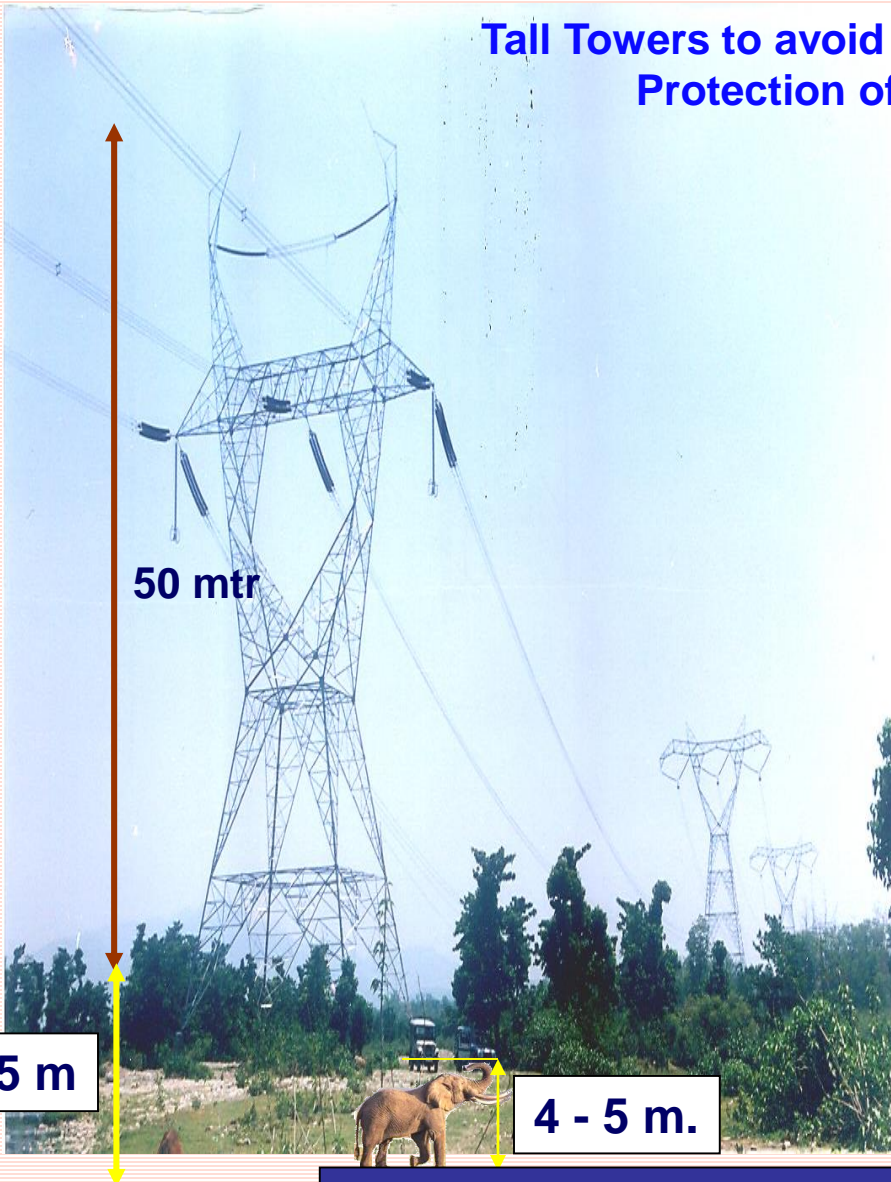
Smart Grid  
(WAMS-PMU)

Reconductoring



# Innovative Tower Designs

Tall Towers to avoid deforestation & Protection of wildlife



4 - 5 m.

**Reduced Tree Felling from 99000 to 7612**

# Development of 1200kV UHVAC

- Indigenously developed through Public Private Partnership (PPP) with 35 Indian manufacturers;
- Field trials since 2012;
- Power flow commences in Apr'16;
- Further reduces RoW requirement (as power carrying capacity **about 12 times of 400 kV system and 2.5 times of 800 kV system**)

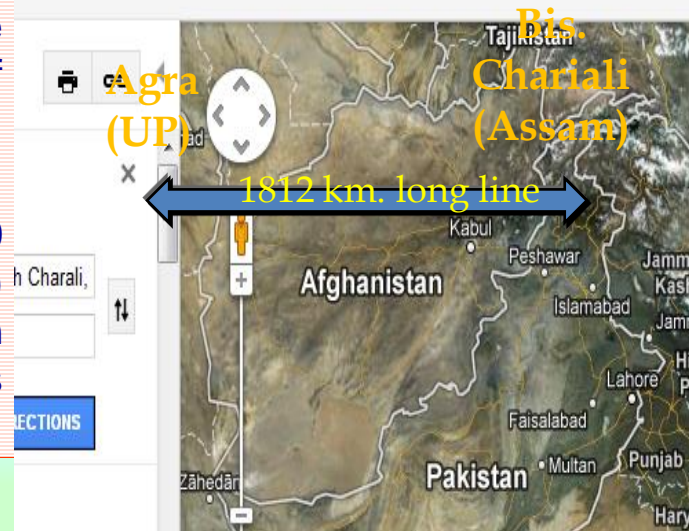
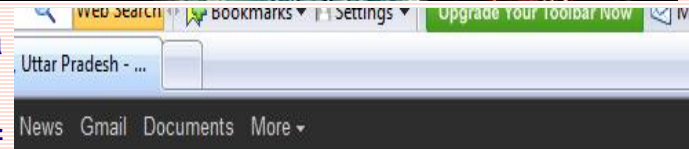


World's highest voltage, **1200kV UHV AC,**

# ±800 kV NER-NR Interconnector – Case Study



- World's longest (~ 1812 km) multi-terminal ±800kV HVDC with a Power Transfer capacity of 6000 MW;
- Project planned to facilitate development of vast hydro potential of 84,000 MW in NE Region by creating high capacity Transmission Highway;
- To Reduce CO<sub>2</sub> emissions by replacing high carbon intensive thermal generation at demand side by transmitting 6000 MW of low carbon intensive hydro power generated in NER;
- Project designed as CDM in association with the World Bank;
- Estimated reduction in **CO<sub>2</sub> emission 257 million tons** in 30 years lifecycle (on a conservative estimate @0.7 t CO<sub>2</sub>/MW) based on 3100 MW transmission, which may go up to **497 million tons of CO<sub>2</sub>** in phased manner, if proposed additional capacity is added.



## ❖ Integration of Renewable Energy to National Grid

### ❑ Development of Green Energy Corridor projects

- ✓ Dedicated scheme for integration of solar/wind power into National Grid;
- ✓ Funded by KfW (Part A-C) and ADB (Part –D);

### ❑ Dedicated Transmission scheme for Solar Power Parks

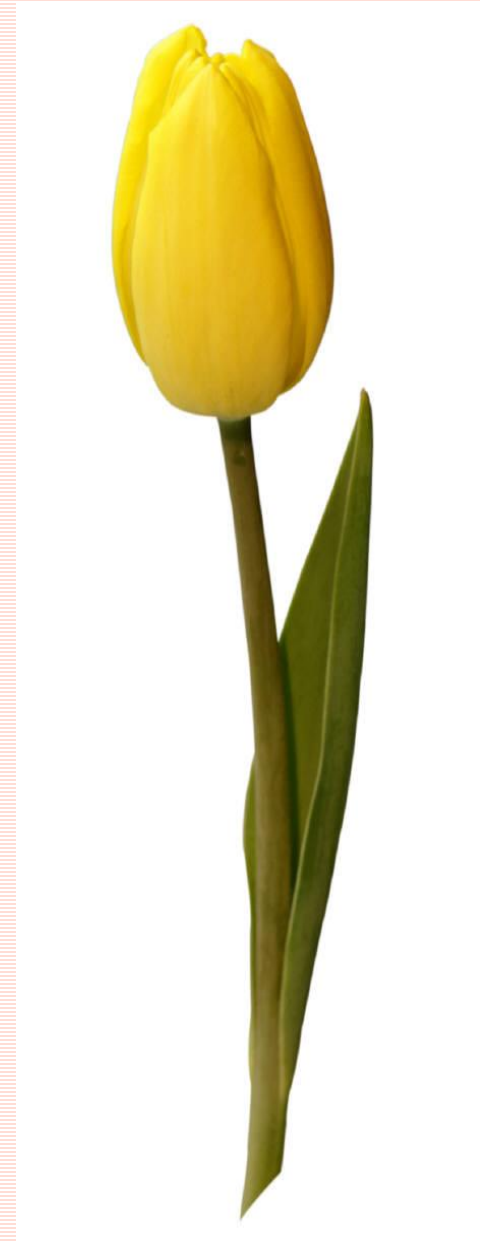
- ✓ Solar Power parks are being established in line with GOI's ambitious plans of generating 100 GW solar energy by 2022;
- ✓ POWERGRID establishing dedicated Transmission systems for 5 solar parks i.e. NP Kunta (1500 MW/AP), Tumkur (2000 MW/Karnataka), Bhadla (1500 MW/Rajasthan), Banaskantha (700 MW/Gujarat), Rewa (750 MW/MP);
- ✓ Funded by ADB including Clean Technology Fund (CTF) of \$50 million.

**Such corridors will facilitate transfer of 43 GW of renewable energy**

- ❑ **Use of Inductive Power in Earth wire for powering telecom Antenna**
- ✓ Pioneering initiative to purposefully utilize induction power;
- ✓ Towers used for mounting the Telecom Antennas, Base Transceiver System (BTS) and associated auxiliary power supply equipment for mobile communication;

**Eliminate use of diesel DG sets-GHG emission source.**

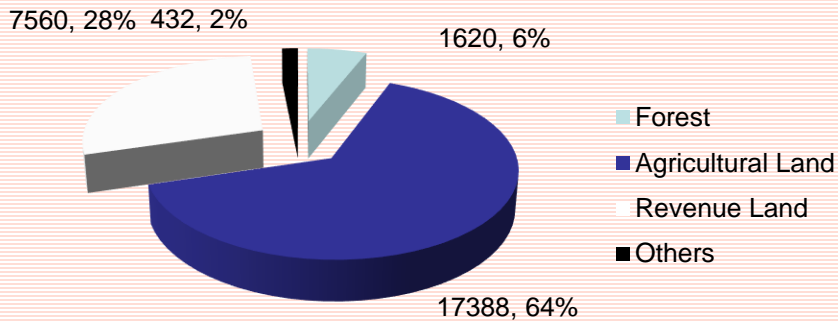
***THANK YOU***



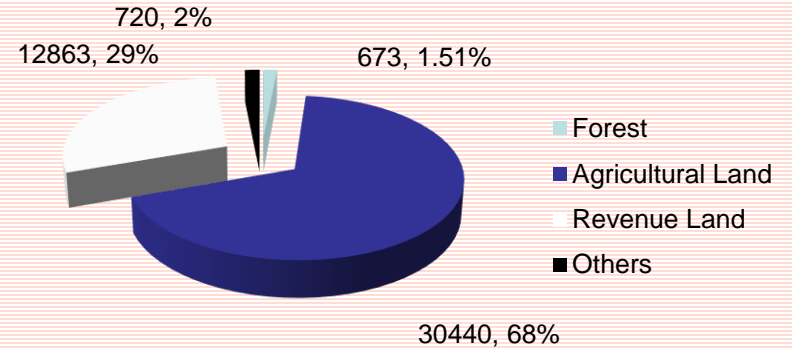
# Encouraging Results : Saving in Forest



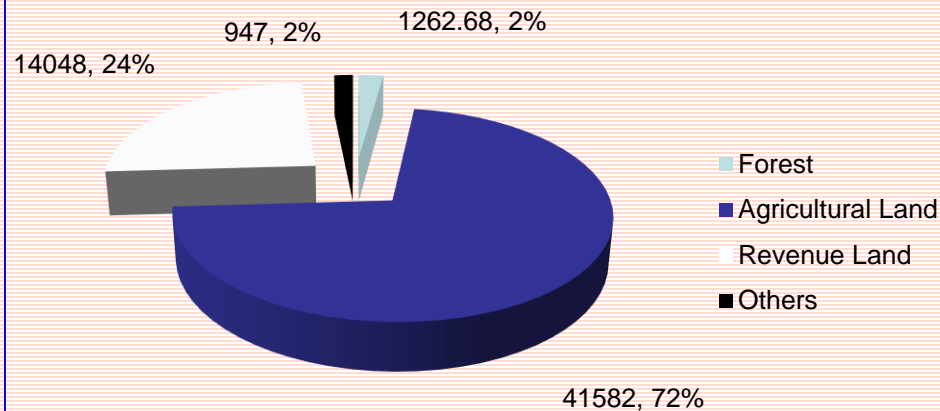
**Land Use pattern traversed in 27000 ckm till 1998**



**Land Use pattern traversed in 44696 ckm during 1998-2009**



**Land Use pattern traversed in 57658 ckm during 2009-2016**



# Forest Saving vis-à-vis impact



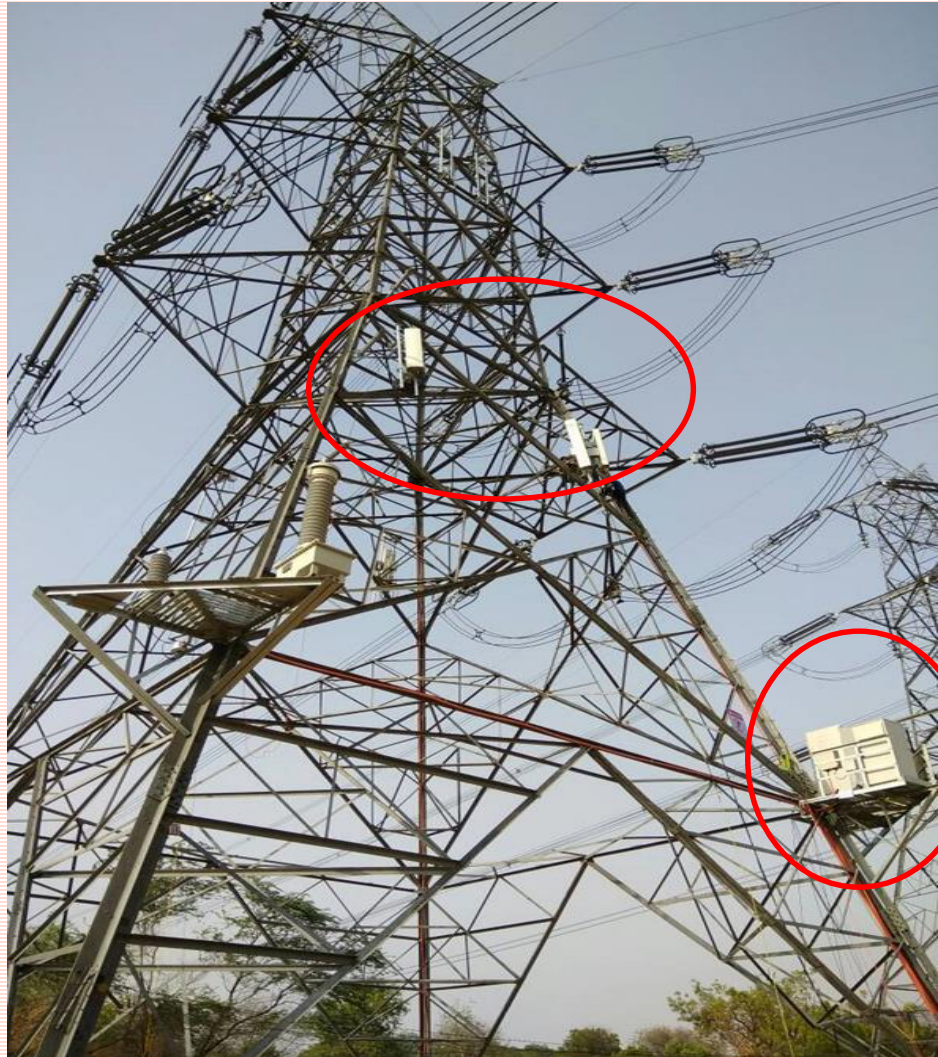
Description	1998-2009		2009-2016		Total	
	In km.	In ha.	In km.	In ha.	In km.	In ha.
Saving in forest	2006	9227.6	2196	10101.6	4202	19329.2
Compensatory Afforestation (CA) cost saving in INR (million)	1845 (\$ 28.3m)		2020 (\$ 31.1m)		3865 (\$ 59.47m)	
Cost of Net Present Value (NPV) in INR (million)	7382 (\$ 113.5m)		8081 (\$ 124.3m)		15463 (\$ 237.9m)	
Anticipated CO <sub>2</sub> absorption by saved forest *(tons)	599794		656604		1256398	
Likely O <sub>2</sub> Generation by saved forest **(tons)	32296		35355		67652	

\* Estimated about 65 tonnes CO<sub>2</sub> absorbed by one ha. forest annually.

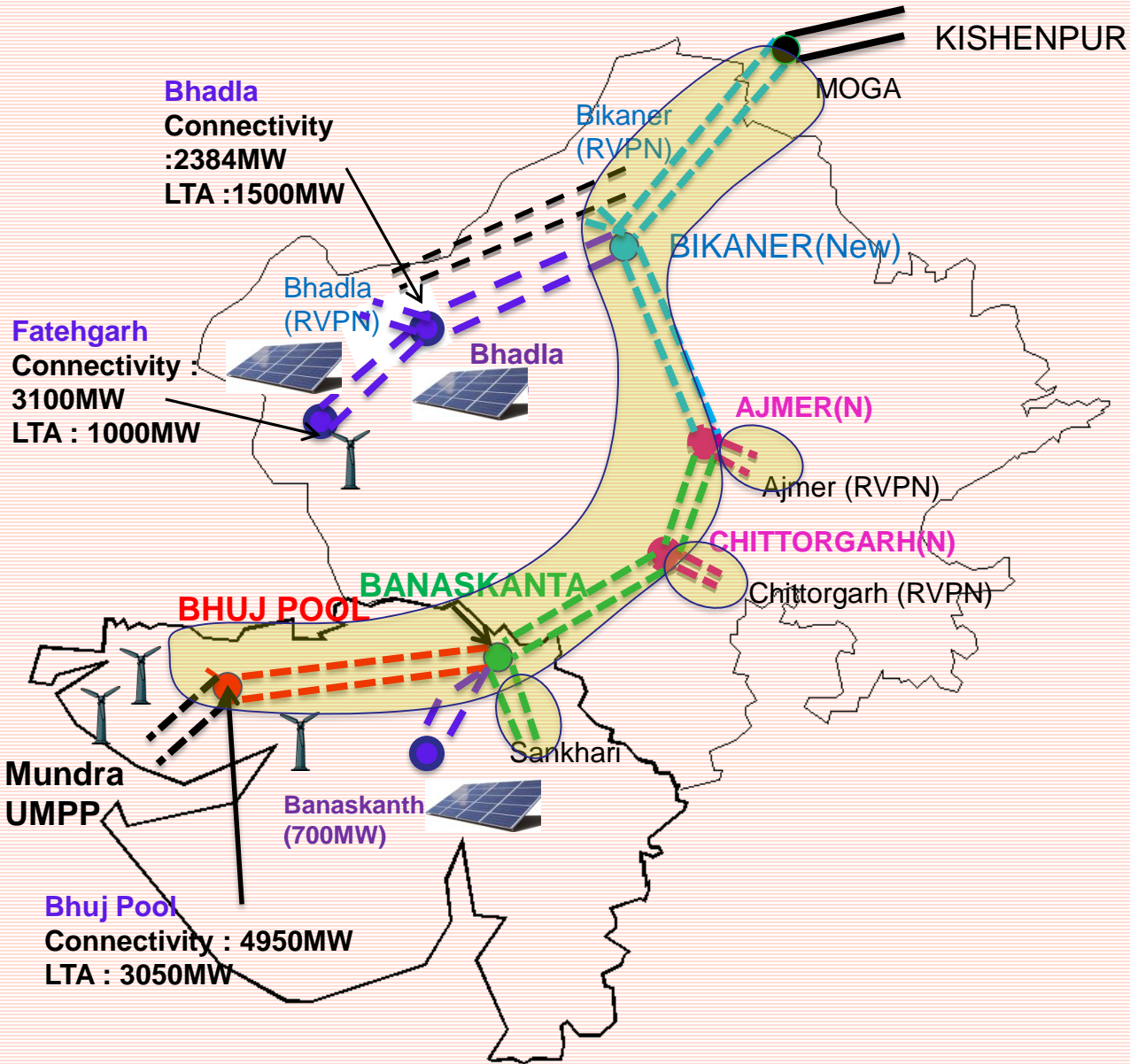
\*\* Estimated about 3.5 tonnes O<sub>2</sub> generated by one ha. forest annually.



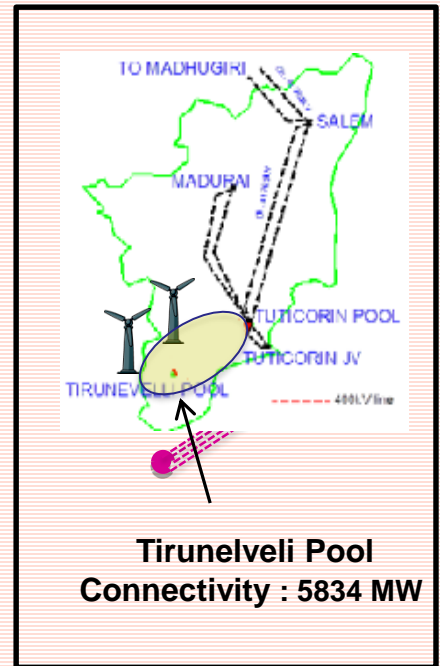




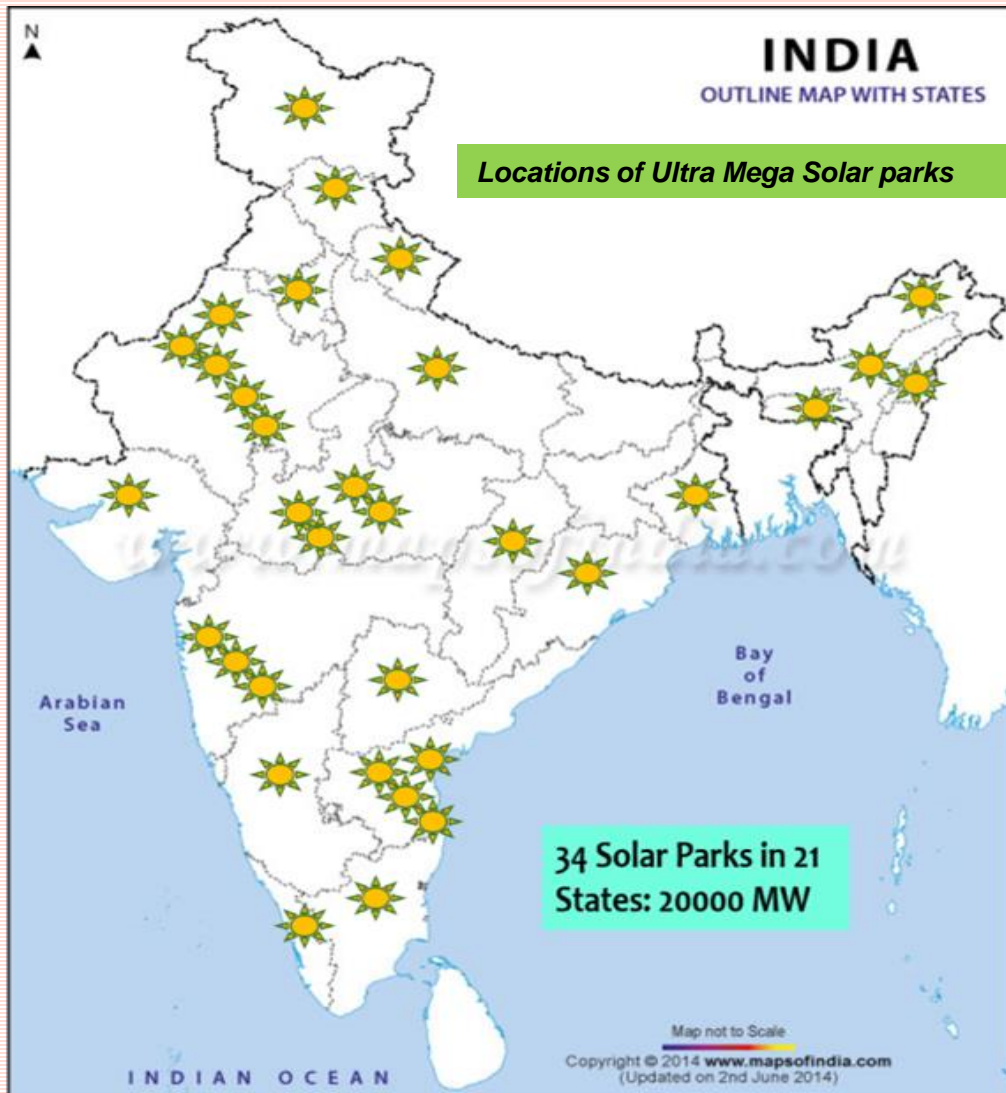
# PROPOSED GREEN ENERGY CORRIDOR



- GEC Part A: KfW Tr-I
- GEC Part B: KfW Tr-II
- GEC Part C: KfW Tr-III
- GEC Part D: ADB
- Tr. Scheme for Solar Parks



# Solar Parks Integration



- ❑ POWERGRID evolved comprehensive transmission plan for evacuation of about 20GW Solar Park capacity as part of GEC-II
- **Inter State transmission for 13 solar parks (about 9220MW capacity)**
- **Intra State transmission for 21 solar parks (about 10,780MW capacity)**