TATA POWER-DDL

TATA POWER DELHI DISTRIBUTION LIMITED

A Tata Power and Delhi Government Joint Venture

Power Sector Overview

Policies, Reforms and Key Challenges

August 2016

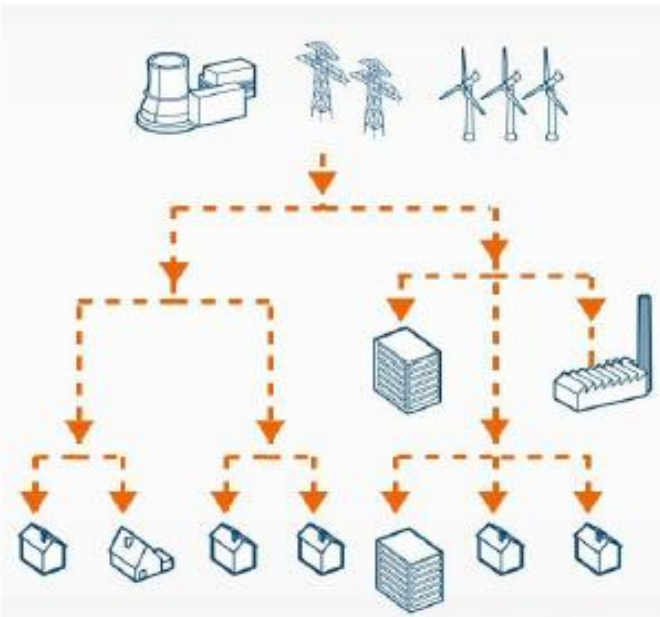
with you Non-Stop

Contents

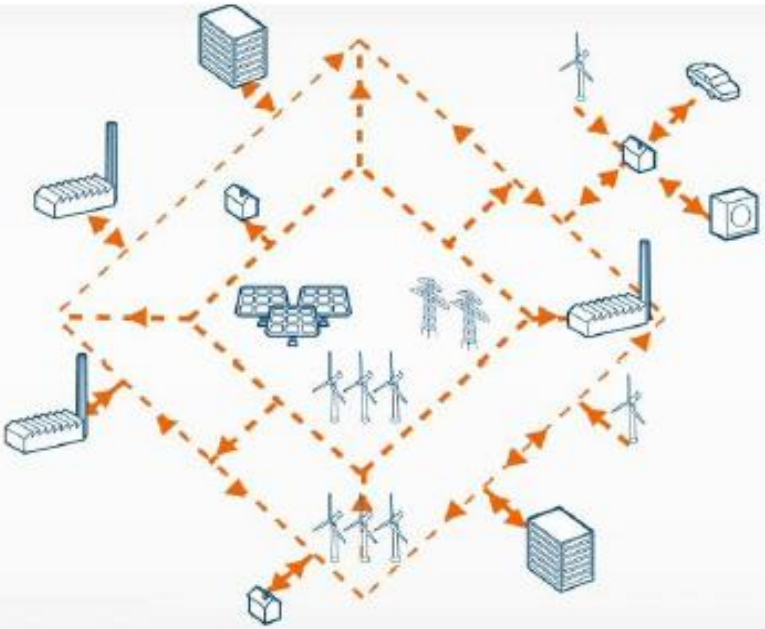
Introduction

The Grid Transition in India

Traditional Grid



New Grid



New Developments are accelerating the Transition

Changing Business Environment (1/3)

Renewable Focus

Home Automation, Automated Demand Response

Energy Efficiency, DSM Focus

Rising Fuel Costs

Infusing Competition

175000 MW by 2022, Renewable Attaining Grid Parity

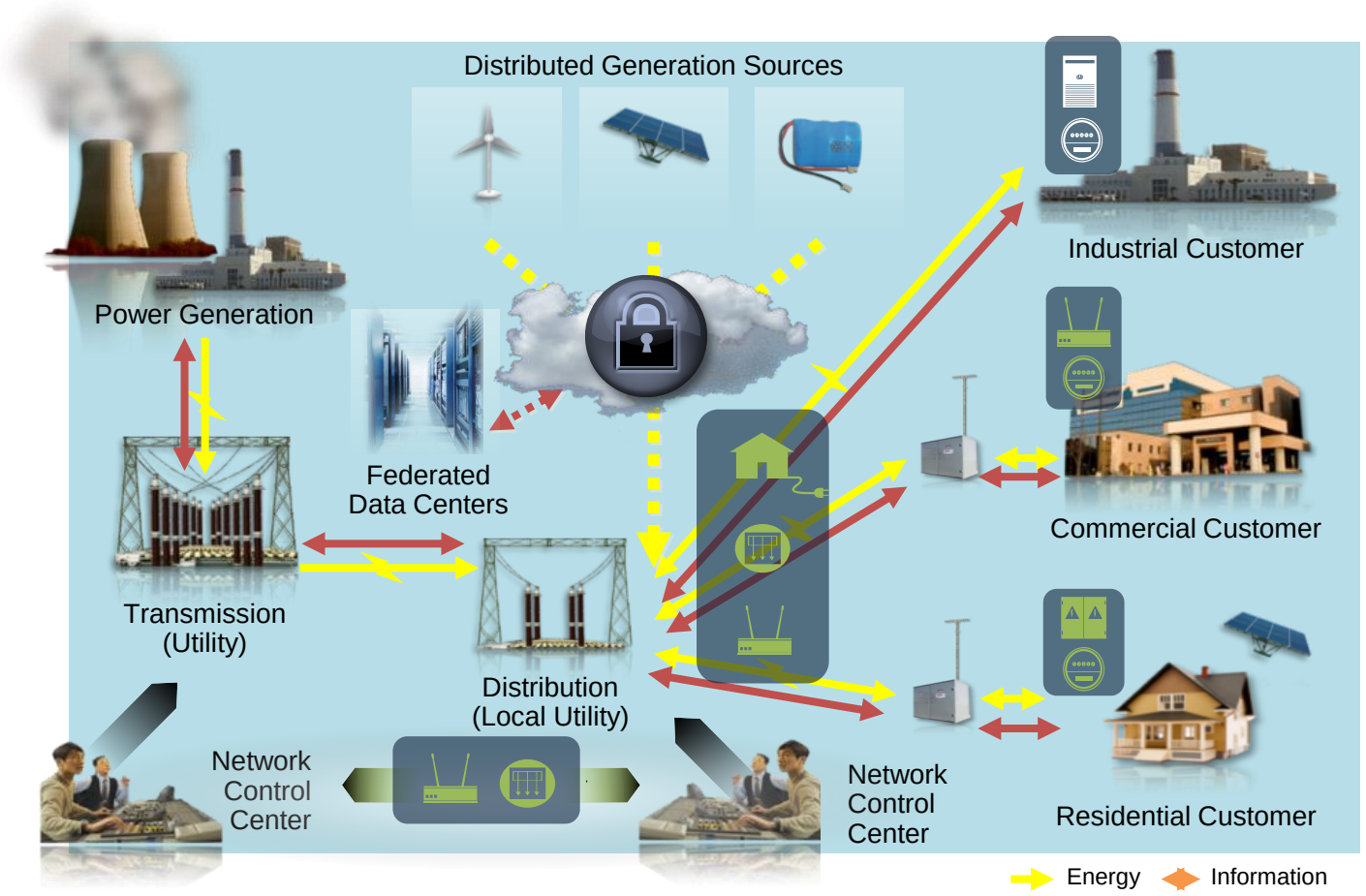
Big Data to play a major role

Smart and Communicating Grid

Separation of Carriage and Content

Reduce dependence on imported coal

Changing Business Environment (2/3)



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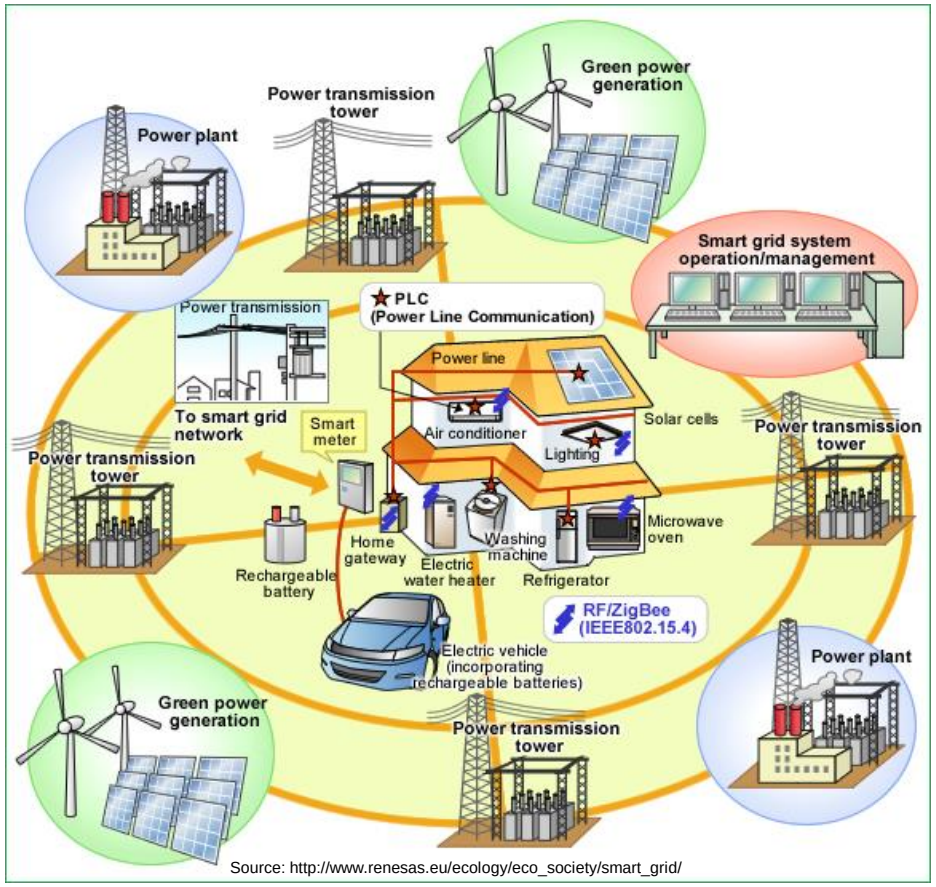
Changing Business Environment (3/3)
…..Utilities of the Future and Future of the Utilities

- Electricity Distribution
- Electricity Markets
- Renewable Energy
- Energy Storage
- Transport
- Industrial Energy Efficiency
- Building Energy Efficiency
- Home Automation and Security
- Smart Cities and Shared Services



Source: http://www.renesas.eu/ecology/eco_society/smart_grid/

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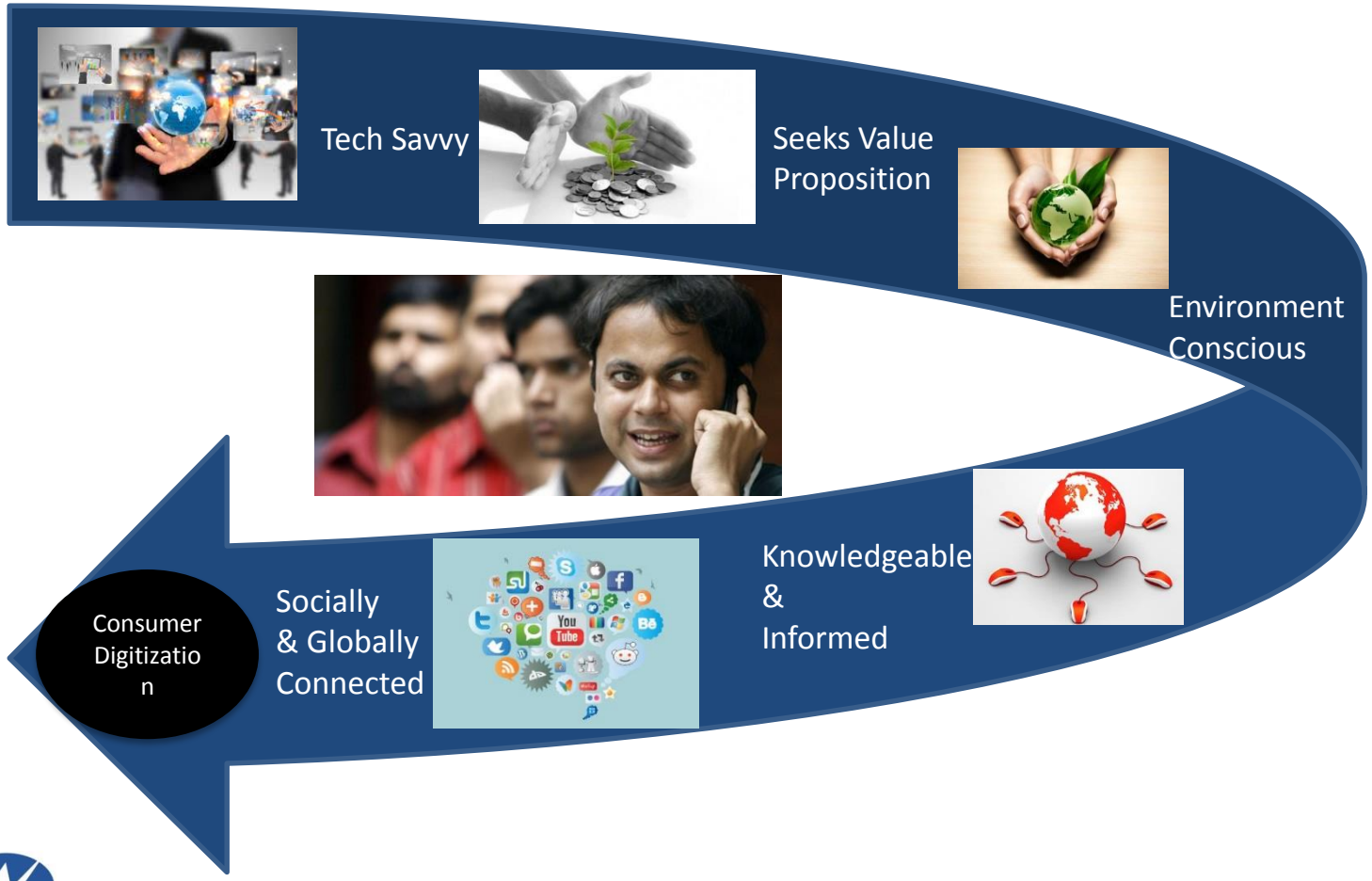
Changing Customer



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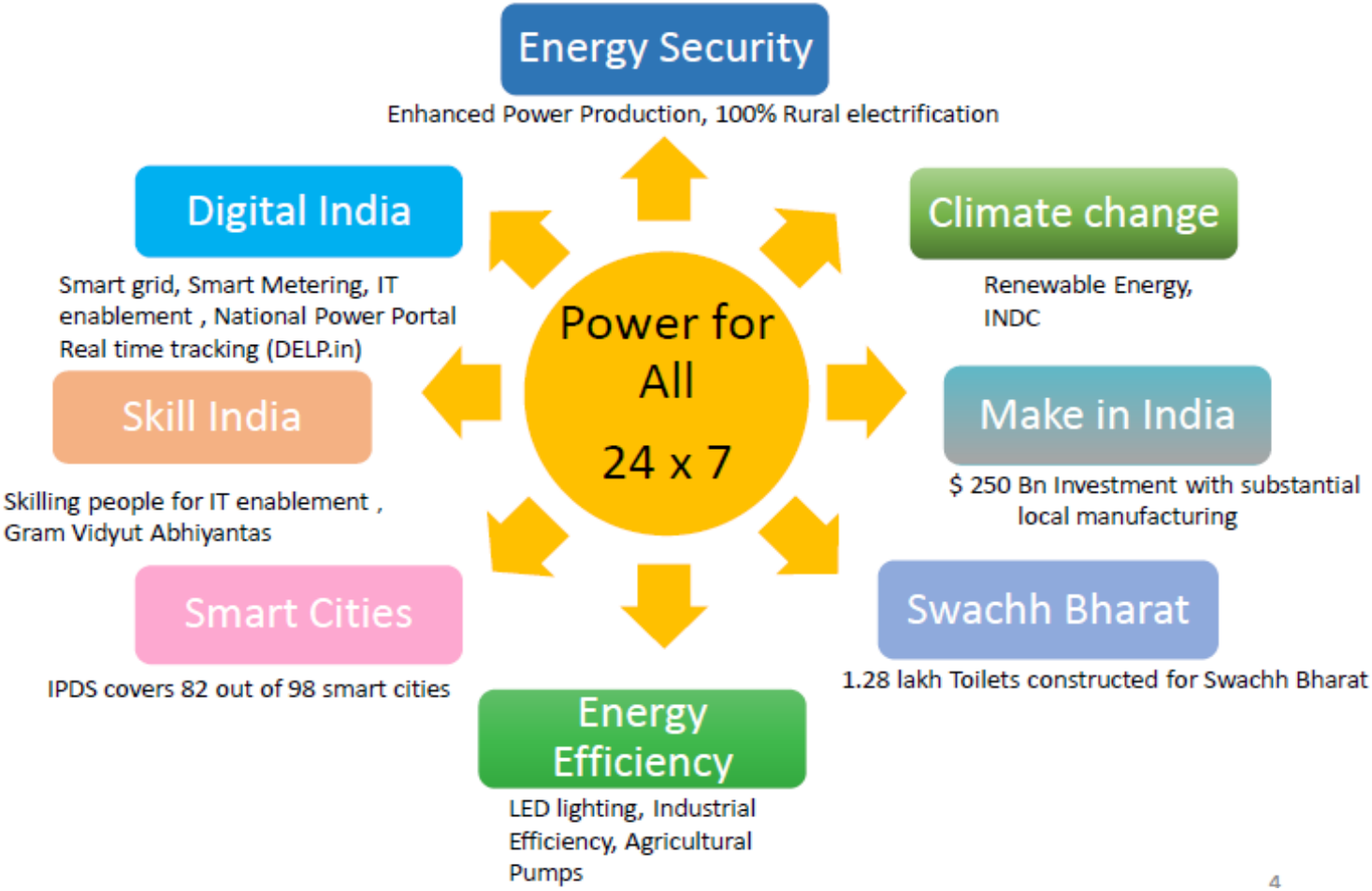
The Buzz Around the Sector….



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Power Sector Overview- Generation

Total Installed Capacity – Source Wise & Sector Wise

(as on 30.06.2016)

Total Capacity	UoM	State Sector	Private Sector	Central Sector	Total	% Share
Coal	MW	64130.50	70692.38	51390.00	186212.88	**61.43%**
Gas		7210.70	9742.60	7555.33	24508.63	**8.08%**
Diesel		363.93	554.96	0.00	918.89	**0.30%**
Hydro		28157.00	3120.00	11571.43	42848.43	**14.13%**
Nuclear		0.00	0.00	5780.00	5780.00	**1.9%**
Total		**99826.37**	**83115.34**	**76296.76**	**259238.46**	-
Renewable Energy Sources		1999.57	418850.17	0.00	43879.75	**14.47%**
Total		**101825.94**	**124995.51**	**76296.76**	**303118.21**	-
% Share		**33.59%**	**41.23%**	**25.17%**		

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Source: CEA Report – Mar 16

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Total Installed Capacity – 5 year Plan Wise

in MW (as on 30.06.2016)

Fuel	Thermal				Nuclear	Hydro	RES	Total	Year Wise Net Addition
	Coal	Gas	Diesel	Thermal Total					
1st Plan (1951 – 56)	1597	0	228	1825	0	1061	0	2886	-
2nd Plan (1956 – 61)	2436	0	300	2736	0	1917	0	4653	**1767**
3rd Plan (1961 – 66)	4417	134	352	4903	0	4124	0	9027	**4374**
4th Plan (1969 – 74)	8652	165	241	9058	640	6966	0	16664	**7637**
5th Plan (1974 – 79)	14875	168	164	15207	640	10833	0	26680	**10016**
6th Plan (1980 – 85)	26311	542	177	27030	1095	14460	0	42585	**15905**
7th Plan (1985 – 90)	41237	2343	165	43746	1565	18308	18	63636	**21052**
8th Plan (1992 – 97)	54154	6562	294	61010	2225	21658	902	85795	**22159**
9th Plan (1997 – 2002)	62131	11163	1135	74429	2720	26269	1628	105046	**19251**
10th Plan (2002 – 07)	71121	13692	1202	86015	3900	34654	7761	132329	**27283**
11th Plan (2007 – 12)	112022	18381	1200	131603	4780	38990	24503	199877	**67548**
12th Plan (2012 – 17)	186212.88	24508.63	918.89	**211640.04**	5780.00	42848.43	43879.75	**303118.21**	**103241.21**
% Share	**61.43%**	**8.08%**	**0.30%**	**69.82%**	**1.9%**	**14.13%**	**14.47%**	-	-

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Source: CEA Report – Mar 16

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Capacity addition during the Eleventh Plan (2007-2012) – Source Wise & Sector Wise

Total Capacity	UoM	State Sector	Central Sector	Private Sector	Total	% Share
Thermal	MW	11691	12158	21739	45588	67.49
Hydro		1594	1523	1219	4336	6.42
Nuclear		0	880	0	880	1.30
Total		13285	14561	22958	50804	75.21
Renewable Energy Sources		2538	0	14205	16743	24.79
Total		15823	14562	37163	67547	100
% Share		23%	22%	55%		

Source - CEA Input Paper 11th Plan and CEA Monthly Report – Mar 12; Captive Generation added during 11th Plan: 9300 MW approx. (Not included in above)

Proposed Capacity addition during XII Plan (FY 2012-17) – Sector Wise

Total Capacity	State Sector (Target)	Achieved till May 16	Central Sector (Target)	Achieved till May 16	Private Sector (Target)	Achieved till May 16
Thermal	13,922.00	18,829.10	14,878.00	12,638.10	43,540.00	50,222.50
Hydro	1,608.00	712.00	6,004.00	2504.02	3,285.00	595.00
Nuclear	0	0	5,300.00	1000.00	0	0
Total	15,530.00	19,541.10	26,182.00	16,142.12	46,825.00	50,817.50

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Source: CEA Report – Mar 16

Despite record generation capacity addition driven by private sector, acute power shortages coexisting with idle power assets

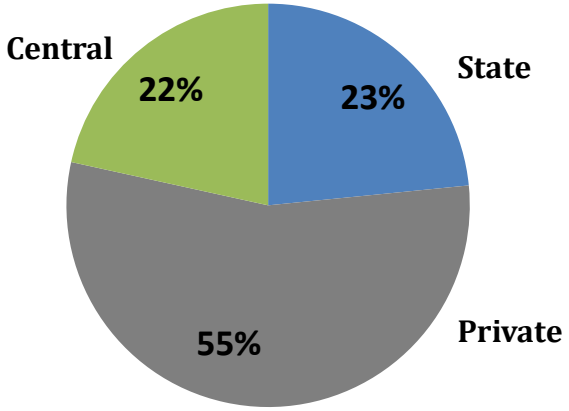
Progress

- record capacity addition
- high level private sector contribution

11th plan - 67547 MW

11th plan

- Capacity added (incl. renewables) - 67,547 MW
- Private sector contribution - 37,163 MW (~55%)
- Private sector share in total capacity - 13% → 27%



12th Plan

- Capacity addition envisaged (incl. renewables) – 107037 MW
- Capacity added (incl. renewable) – 67760 MW
- Private sector contribution – 46825 MW (~53%)

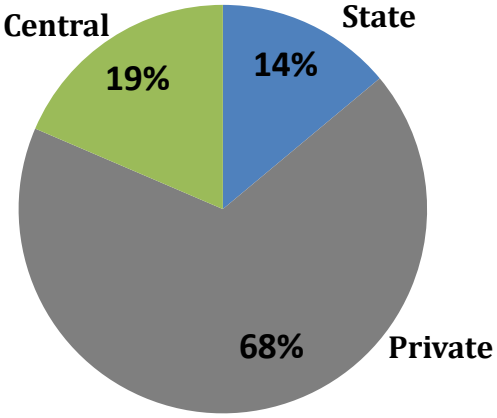
Challenges

- Stranded investment due to financially stressed projects and suboptimal PLF

12th plan - 107037 MW

Major factors causing the distress

- Unviability due to under recovery of costs, caused by
  - Fuel shortage/non availability and higher cost of alternate fuel
  - Change in regulatory norms/ law in coal source countries
  - Abnormal fluctuations in commodity prices/interest rates/foreign exchange
  - Delays in development due to land acquisition/ E&F clearance timelines, etc. Denial of allocated mines
  - Absence of peaking capacities
  - Transmission constraints and low off-take by Discoms
  - Plants operating at ~65% PLF



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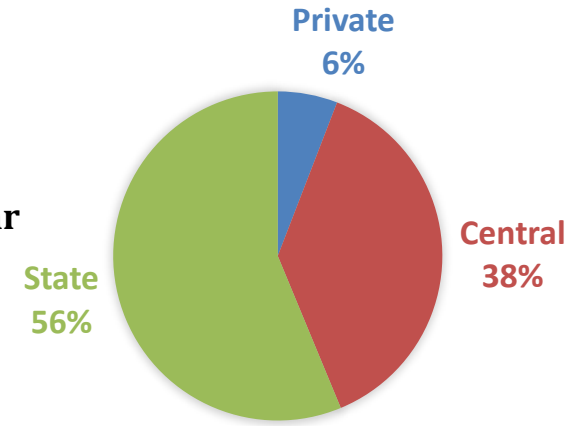
Rescue and revitalize stranded asset and capital before additional capacity plan

Sector Scenario: Transmission

Transmission bottlenecks – improve network availability/ utilization and Regulatory Framework to be in sync with competitive power market

Progress so far

- 341551 ckt. kms. network length stands up to Mar2016
- This is 118.57% of the annual target of 23,712 ckm fixed for this year



Challenges

- Evacuation Constraints –Growing demand in SR has led to severe congestion in W3 region and WR-NR and NEW-SR links. Inadequate new capacity creation aggravating the constraint
- Inadequate Interregional transmission capacity
- Clearances Delay - Right of Way (RoW) / Environment/ Forest.
- Regulatory/Planning Issues
  - High level of uncertainty regarding path of power flow due to lack of bidding opportunities and growing open access users.
  - Generators have to pay committed transmission charges even when projects are delayed for reasons beyond their control

Congestion leading to demand supply mis-match

High safety margins restrict availability.

Transmission planning not in sync with Open Access needs

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Source: CEA Transmission Report – Mar 16

Sector Scenario: Distribution

Financial Performance of Utilities 2012-14

Profit/ (Loss) on subsidy received basis (Rs. Crores, per year)

Region	2013-14	2014-15
Eastern	(3,600)	(3,021)
North Eastern	(1,905)	(2,136)
Northern	(31,576)	(37,538)
Southern	(29,415)	(13,616)
Western	(4,067)	(6,512)
Grand Total	**(70,564)**	**(62,462)**

UDAY States	2012-13	2013-14
Bihar	(1,227)	(367)
Chattisgarh	(502)	(1,317)
Gujarat	589	583
Jharkhand	(2,668)	(1,511)
Harayana	(3,835)	(3,315)
Punjab	253	642
Rajasthan	(12,510)	(15,926)
Uttar Pradesh	(13,154)	(17,678)
Grand Total for all States	**(33,896)**	**(38,889)**

Financial Performance of Utilities 2012-14

Accumulated Profit / (loss) (Rs. Crores)

Region	2012-13	2013-14
Eastern	(17,764)	(21,225)
North Eastern	(9,434)	(11,414)
Northern	(182,579)	(218,010)
Southern	(57,302)	(73,848)
Western	(23,593)	(29,962)
Grand Total	**(290,672)**	**(354,460)**

UDAY States	2012-13	2013-14
Bihar	(1,782)	(2,148)
Chattisgarh	(3,721)	(5,038)
Gujarat	2,077	2601
Jharkhand	(11,958)	(13,468)
Harayana	(23,517)	(24,551)
Punjab	(1,836)	(1,194)
Rajasthan	(55,981)	(71,900)
Uttar Pradesh	(78,371)	(96,200)
Grand Total for All States	**(175,089)**	**(211,898)**

Financial Performance of Utilities 2012-14

ACS, ARR and Gap (Rs/Kwh)

Region	2012-13			2013-14		
	ACS	Avg Revenue (Subsidy Recd basis)	Gap (subsidy recd basis)	ACS	Avg Revenue (Subsidy Recd basis)	Gap (subsidy recd basis)
Eastern	4.93	4.40	0.52	4.68	4.42	0.26
North Eastern	5.23	3.47	1.75	4.94	3.48	1.46
Northern	4.99	3.96	1.03	5.53	4.29	1.24
Southern	5.90	4.54	1.36	5.28	4.62	0.66
Western	4.33	4.10	0.23	4.72	4.40	0.32
Grand Total	**5.04**	**4.19**	**0.85**	**5.15**	**4.41**	**0.73**

UDAY States	2012-13			2013-14		
	ACS	Avg Revenue (Subsidy Recd basis)	Gap (subsidy recd basis)	ACS	Avg Revenue (Subsidy Recd basis)	Gap (subsidy recd basis)
Bihar	5.33	4.67	0.63	5.00	4.78	0.22
Chhattisgarh	3.26	3.04	0.22	5.52	3.79	1.73
Gujarat	4.09	4.08	0.01	5.22	4.57	0.66
Jharkhand	6.10	3.66	2.44	5.52	3.99	1.73
Haryana	5.14	4.23	0.91	5.25	4.6	0.65
Punjab	4.49	4.47	0.02	4.71	4.67	0.06
Rajasthan	5.84	3.58	2.26	6.59	3.82	2.76
Uttar Pradesh	4.92	3.45	1.47	6.19	4.06	2.18
Grand Total	**5.84**	**4.09**	**1.75**	**5.81**	**4.37**	**1.43**

Financial Performance of Utilities 2012-14

AT&C Loss (%)

Region	2012-13	2013-14
Eastern	42.04	38.02
North Eastern	38.31	33.94
Northern	28.89	24.86
Southern	17.40	19.08
Western	23.36	18.37
Grand Total	**25.45**	**22.70**

UDAY States	2012-13	2013-14
Bihar	54.64	46.33
Chhattisgarh	25.12	23.17
Gujarat	19.87	15.93
Jharkhand	47.49	42.17
Haryana	32.55	34.33
Punjab	17.52	17.91
Rajasthan	20.00	26.76
Uttar Pradesh	42.85	24.65
Grand Total for all states	**25.45**	**22.70**

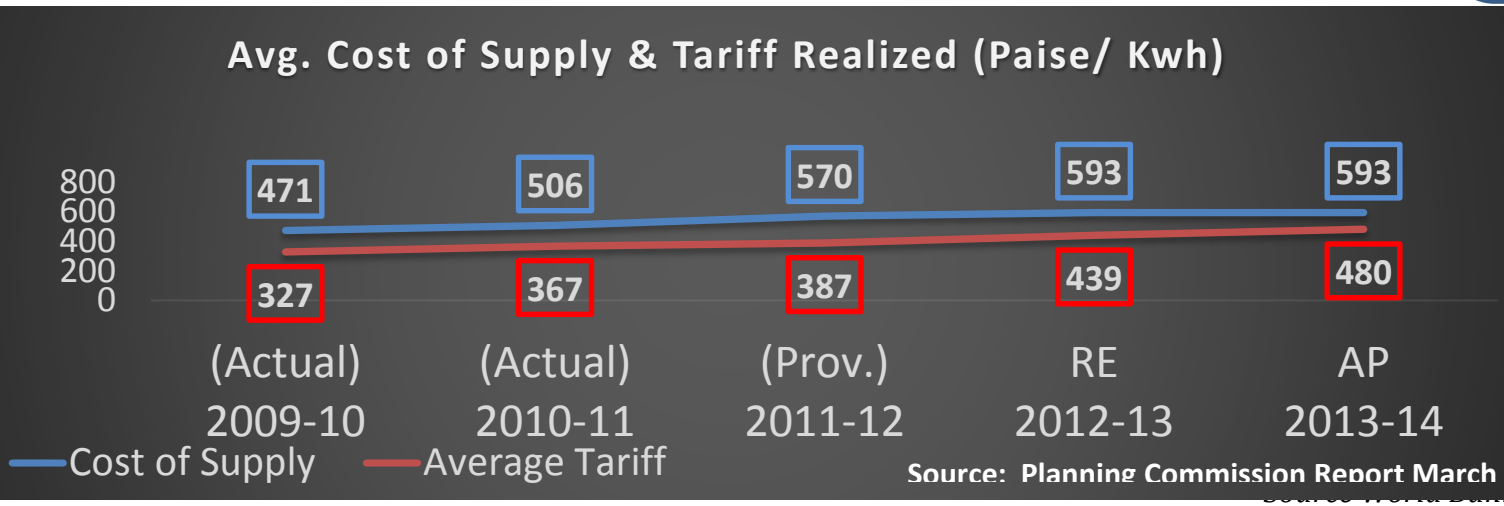
State's resolve and sustainable commitment to distribution reforms process

Challenges

- Discoms are in dire situation due to the following
  - Growing gap between the ACS and tariff realization (113 p/unit)
  - AT&C losses (~25%) and infrequent and inadequate tariff increases . Most states hovering at 40%. 16 utilities had losses below 15 per cent, while 40 had losses below 30 per cent
  - Total exposure amount till date of Indian Banks are Rs. 3,20,238 crs.
- Distribution utilities are preferring load shedding to meeting DSM obligations
- Competition through Open Access – A non-starter
- Increased cross subsidization in last 5 years – an unsustainable trend
- Slow or virtually no Reforms in Distribution Sector despite successful reforms in Delhi in 2002
- State Governments only pursuing the Franchisee Model, whereby O & M contract(s) for 10-15 years in particular areas are tendered to private parties.
- Approx. rise of 40-50% in the cost of Generation over last 2 years and ~100% in last 5 years
- Inefficient Power Procurement and Management

Discoms are in dire financial situation - manifested by unwillingness to serve consumers

Current trends are unsustainable



Source: Planning Commission Report March 2014

Reason for Poor Financial Health of Discoms

1. Under recovery from the highly Subsidized tariff of Agriculture and Domestic Consumers

Solution : The National Tariff Policy 2006 stipulates that the SERCs should endeavour to set the tariffs within ±20% of the average cost of supply latest by the end of year 2010–11. In practice, few States complied with the above guideline.

2. Non Recovery of Subsidy Disbursed from State Government

Solution : The EA 2003 stipulates that the subsidy from the government should be available to the discom upfront. However, in many cases utilities witness huge gap between the assured amount and actual subsidy received (As Shown in Below Table). Also Utility has to borne additional cost in financing of these Gap. ***Therefore SERCs have to give mandate to utilities, that subsidy can be disbursed only after receiving it upfront from the government.***

Reason for Poor Financial Health of Discoms

TABLE 1: GOVERNMENT SUBSIDY STATUS			
Unit: ₹crores	2009-10	2010-11	2011-12
Subsidy booked	34,014	22,666	30,242
Subsidy received	19,074	20,295	25,832
Gap	14,940	2,371	4,410

3. Huge AT&C Losses

Solution : Through government has started various schemes like RAPDRP and NEF etc for funding of infrastructure, Digitization and Loss reduction , however the losses of discoms remain same in last 10 years. It is necessary that the current monopolized structure of the distribution sector be reformed and competition be encouraged. Few of the ways to manifest this is:

1. Separate carriage and content businesses of the distribution segment
2. PPP model like Delhi with certain modification on ownership of assets etc
3. Complete Performance based Outsourcing of Commercial function of Discoms

Reason for Poor Financial Health of Discoms

4. Segregation of Agriculture Feeders and 100% Metering -

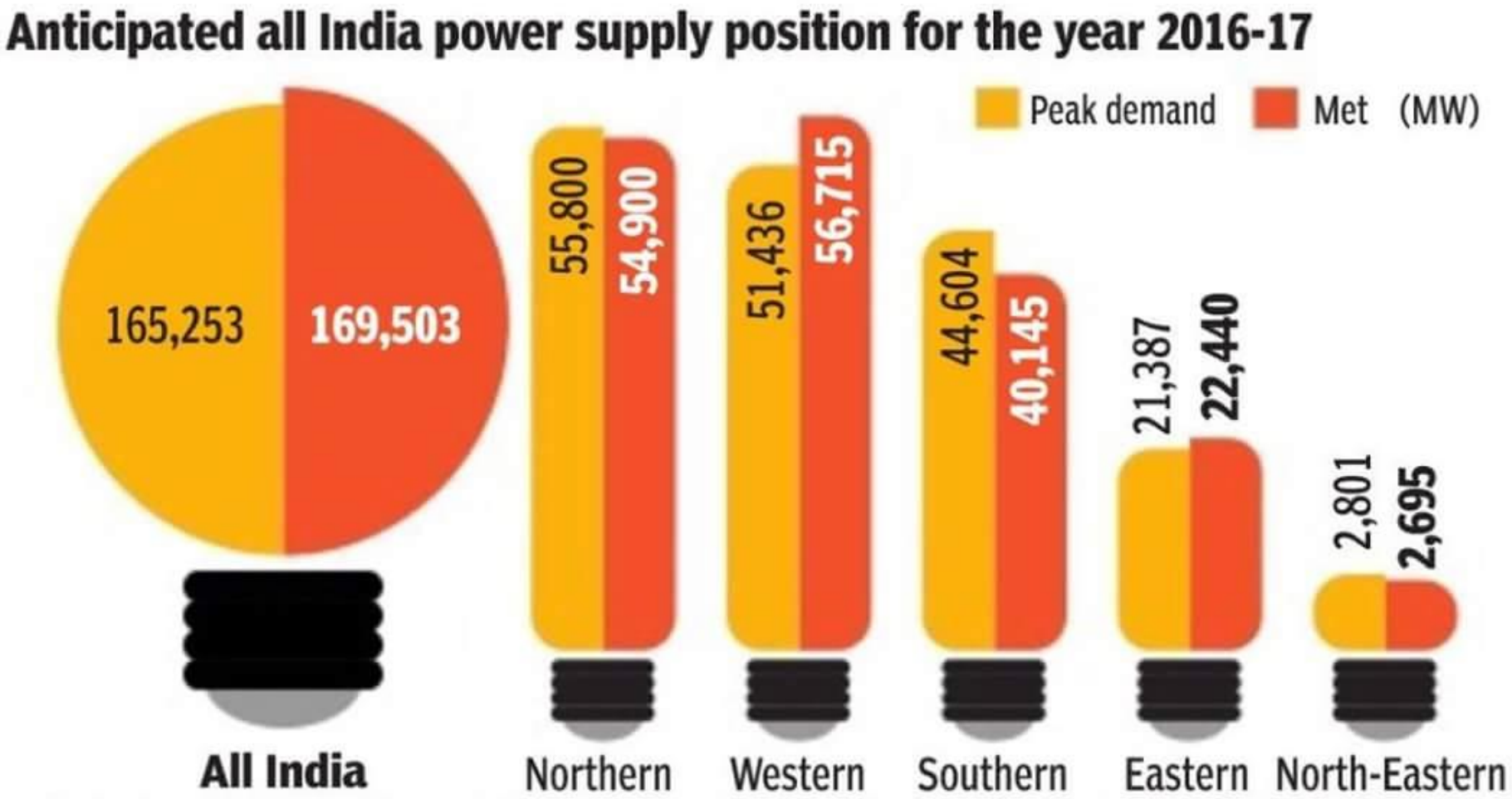
Solution : Agricultural consumers benefit from electricity subsidies provided by the States but these consumers remain unmetered in many cases. Separating the feeder to irrigation pumps from other uses with assured electricity supply during the stipulated hours can contain excessive electricity consumption. ***In the case of low-income households that enjoy subsidized electricity which remain unmetered, prepaid meters can regulate their power consumptions.***

5. Timely Liquidation of Regulatory Assets -

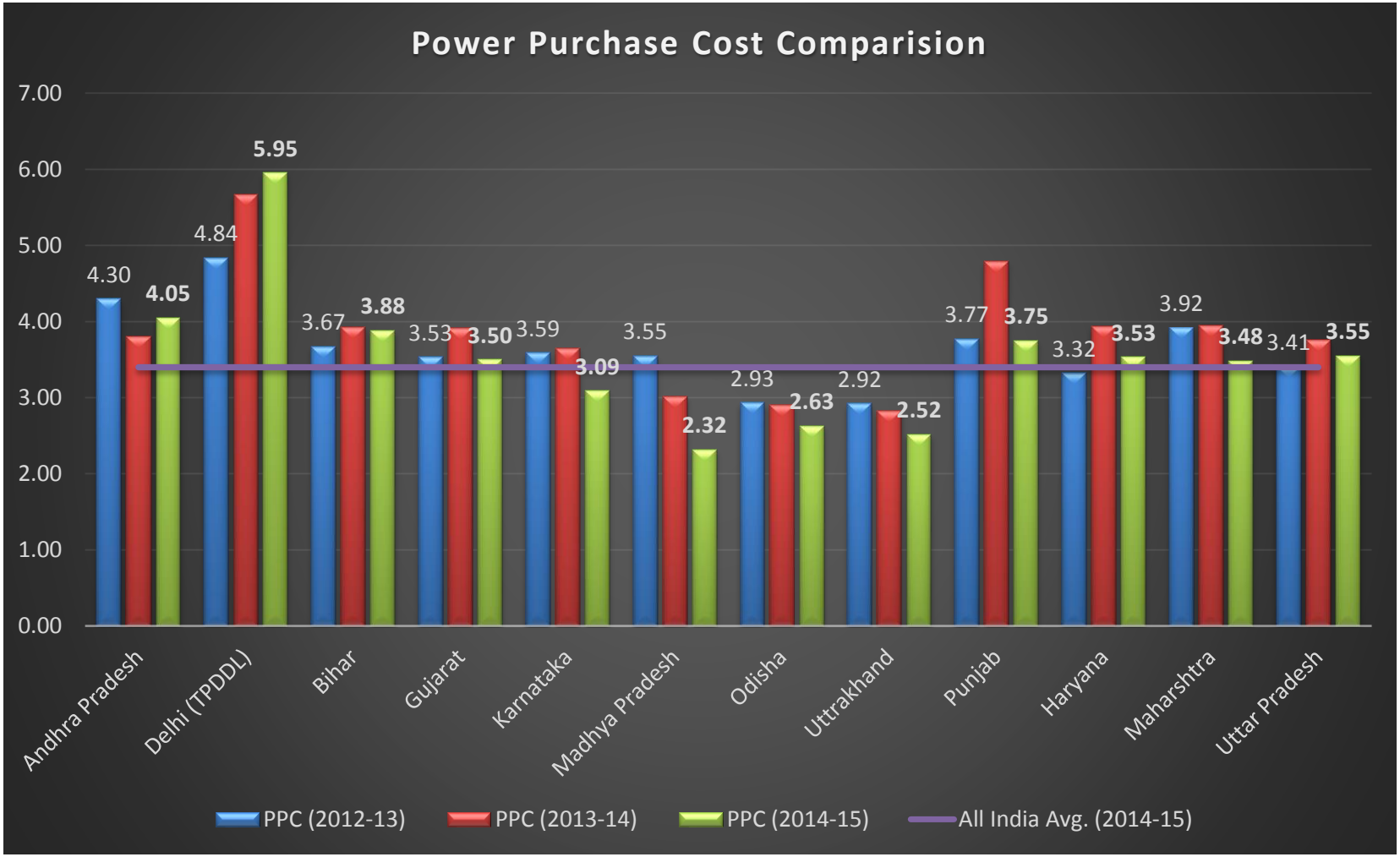
Solution : Discoms in many States are incurring massive losses due to increasing, unchecked regulatory assets. The National Tariff Policy 2006 stipulates that the "recovery of Regulatory Asset should be time-bound and within a period not exceeding three years at the most". Lack of timely cost-reflective tariff revision has resulted in its yearly nationwide magnitude to the tune of more than 70,000 crores and the interest component alone costs around 9,500 crores (The World Bank, 2014). ***It is necessary that the SERCs explore ways to liquidate them in a time-bound manner without further Accumulation.***

Power Supply Scenario in India

Power Supply Scenario in India



State's resolve and sustainable commitment to distribution reforms process



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Tariff Comparison across different utilities of Metro Cities in India

Consumer Category	Units	Delhi (TPDDL)	Mumbai	Kolkata	Chennai
		Rs. / Unit	Rs. / Unit	Rs. / Unit	Rs. / Unit
Dom - 2 Kw*	200	2.20	5.38	6.51	4.15
Dom - 2 Kw*	400	2.58	5.97	7.31	5.13
Non Domestic/ Commercial- 20 kW	1500	9.46	7.40	8.68	8.41
LT Industrial - 20 kW	1500	8.98	8.01	6.95	6.58
HT Industrial - 100kW/108 KVA	15000	8.3	9.79	6.62	8.61
Peak Load	In MW	1704	3192	1856	2000
No of Consumers	In Lakhs	15.15	30	25	11

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* Domestic Tariff upto 400 units include 50% subsidy on energy charges

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Tariff Comparison across different Utilities near Delhi NCR

Consumer Category	Units	Delhi (TPDDL)	Haryana	Uttar Pradesh	Rajasthan
		Rs. / Unit	Rs. / Unit	Rs. / Unit	Rs. / Unit
Dom - 2 Kw*	200	2.20	5.6	5.44	6.02
Dom - 2 Kw*	400	2.58	5.69	5.35	6.03
Non Domestic/ Commercial- 20 kW	1500	9.46	8.25	8.57	7.85
LT Industrial - 20 kW	1500	8.98	6.29	8.27	6.15
HT Industrial - 100kW/108 KVA	15000	8.3	6.26	7.60	7.72
Power Outage During Summer(Avg.)**	Hours/ day	0	4-6	4-6	2-2.5
Peak Demand Met	In MW	1704	8114	8733	10038
No of Consumers	In Lakhs	15.15	50	239	78

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* Domestic Tariff upto 400 units include 50% subsidy on energy charges

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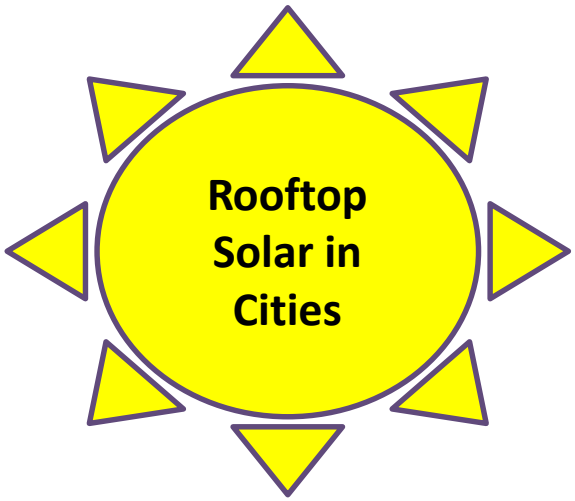
The Rising Sun: Roadmap for Renewables

Distributed Renewable Energy in India



Net Metering:
- ✓ Policy
- ✓ Technology

Smart Metering with Dual Energy Source and Bidirectional Flow

***16 States have come up with their own state solar policies and 30 states RPO mandates 4%- 8%**

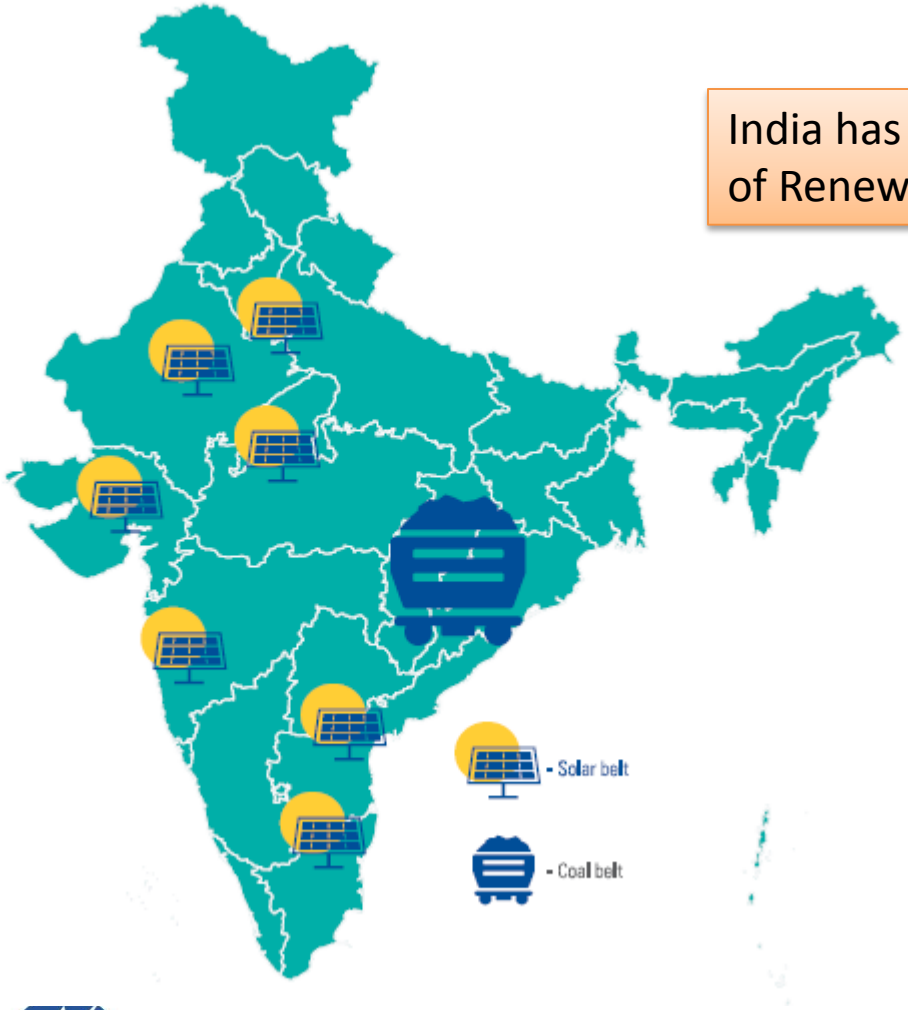
Offgrid Minigrid:
- ✓ Policy
- ✓ Technology

Future integration of Offgrid Minigrid with Discom Grid

***18500 unelectrified villages to come up with Microgrids**

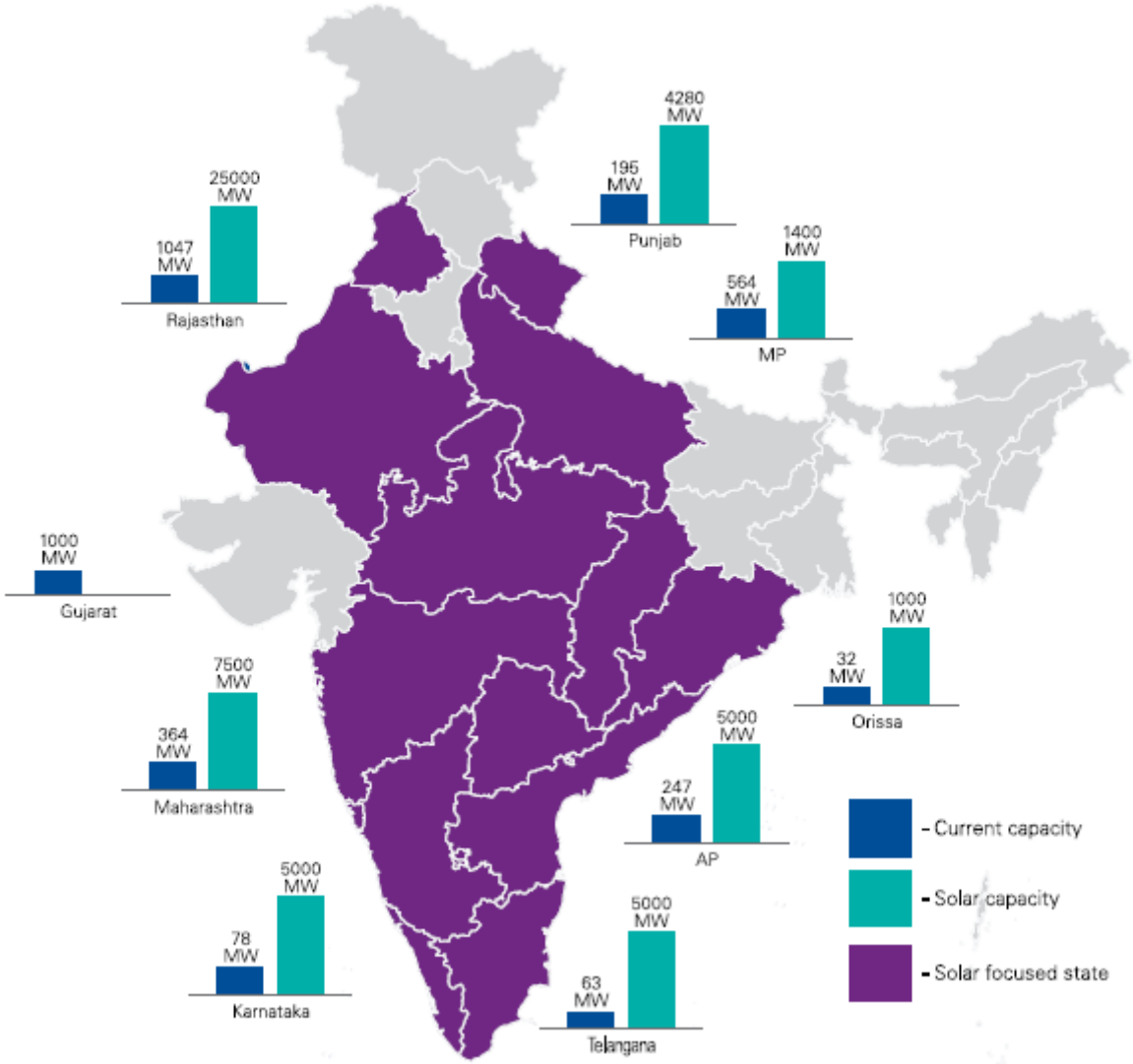
Proximity of Solar Rich States with Major Load Centre

India has ambitious target of setting up **175 GW** of Renewable Energy by **2022**



Source: KPMG India Analysis

State Wise target and Current Installed Solar Capacity



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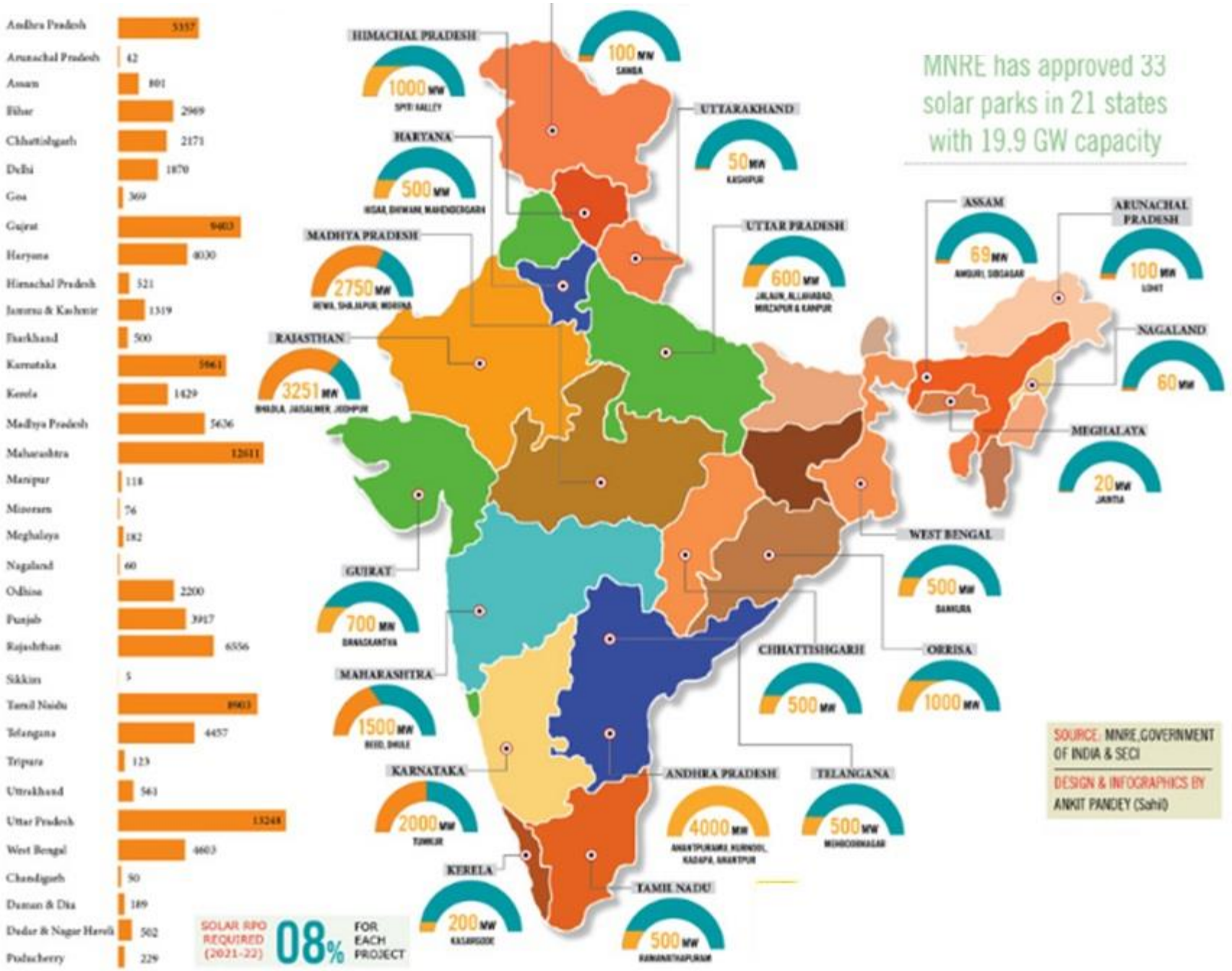
Source: Invest Rajasthan, MNRE


Andhra Pradesh 5357
Arunachal Pradesh 42
Assam 801
Bihar 2909
Chhattisgarh 2171
Delhi 1870
Goa 369
Gujrat 9403
Haryana 8030
Himachal Pradesh 521
Jammu & Kashmir 1319
Jharkhand 500
Karnataka 5961
Kerela 1429
Madhya Pradesh 5636
Maharashtra 12611
Manipur 118
Mizoram 76
Meghalaya 182
Nagaland 60
Odhisa 2200
Punjab 3917
Rajasthan 6556
Sikkim 5
Tamil Nadu 8903
Telangana 4457
Tripura 123
Uttrakhand 561
Uttar Pradesh 13248
West Bengal 4603
Chandigarh 80
Daman & Diu 189
Dadar & Nagar Haveli 502
Puducherry 229
HIMACHAL PRADESH
1000 MW
SPITI VALLEY
100 MW
SAMBA
UTTARAKHAND
50 MW
KASHIPUR
HARYANA
500 MW
HISAR, DHARUHERA, MAHENDERGARH
MADHYA PRADESH
2750 MW
REWA, SHAJAPUR, MORENA
UTTAR PRADESH
600 MW
JALAUN, ALLAHABAD, MIRZAPUR & KANPUR
RAJASTHAN
3251 MW
BHADLA, JAISALMER, JODHPUR
ASSAM
69 MW
AMGURI, SIBSAGAR
ARUNACHAL PRADESH
100 MW
LOHIT
NAGALAND
60 MW
MEGHALAYA
20 MW
JAINTIA
WEST BENGAL
500 MW
BANKURA
GUJRAT
700 MW
BHADRANTHA
CHHATTISHGARH
500 MW
ORRISA
1000 MW
MAHARASHTRA
1500 MW
BEED, DHULE
KARNATAKA
2000 MW
TUMKUR
ANDHRA PRADESH
4000 MW
ANANTPURAMU, KURNOOL, KADAPA, ANANTPUR
TELANGANA
500 MW
MEHBOOBNAGAR
KERELA
200 MW
KASARGODE
TAMIL NADU
500 MW
RAMANATHAPURAM
SOLAR RPO REQUIRED (2021-22) 08% FOR EACH PROJECT
MNRE has approved 33 solar parks in 21 states with 19.9 GW capacity
SOURCE: MNRE, GOVERNMENT OF INDIA & SECI
DESIGN & INFOGRAPHICS BY
ANKIT PANDEY (Sahil)

Electric Vehicle Infrastructure in India

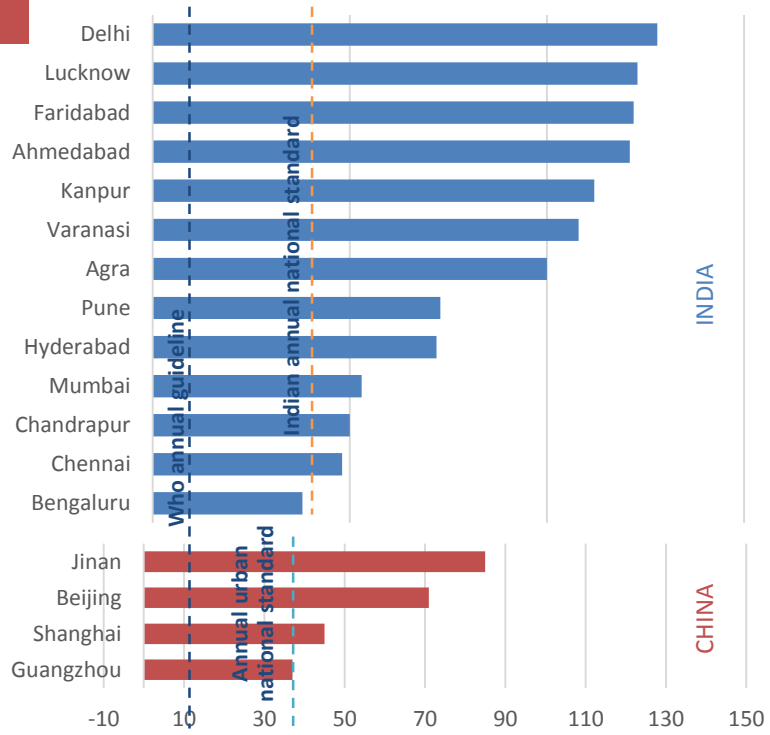
Growth of E-Mobility in India

Accelerated electrification of clean transportation, charging infrastructure, and the 21st century electric grid are key contributors to future-proof global energy security, environment, and clean-air objectives.

1. National Electricity Mobility Mission (NEMM) Plan 2020
   - 6 to 7 Million electric vehicles
2. National Smart Grid Mission (NSGM)
   - Primary driver of grid modernization
3. Renewable generation of 175 GW by 2022
   - 6x from current state-of-generation-mix.
4. **Reduction in greenhouse gas emissions and improved air-quality**
   - 68% power generated from coal.

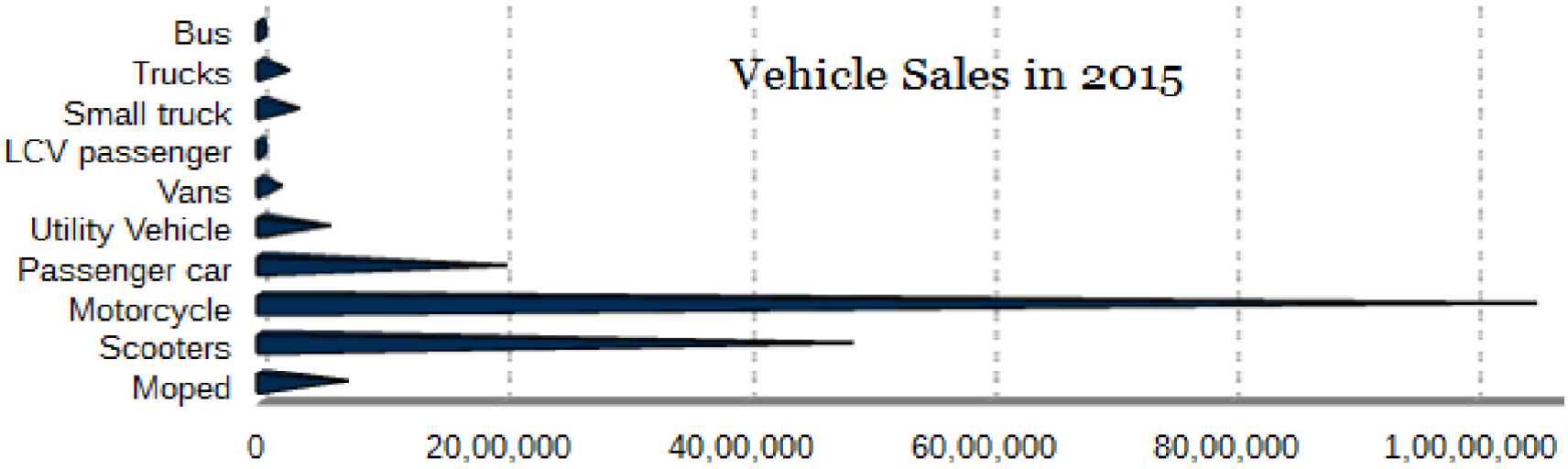
India now overshadowing China

Average PM2.5 concentration, micrograms per m^2
July-November 2015



Source: Greenpeace, Economist.com

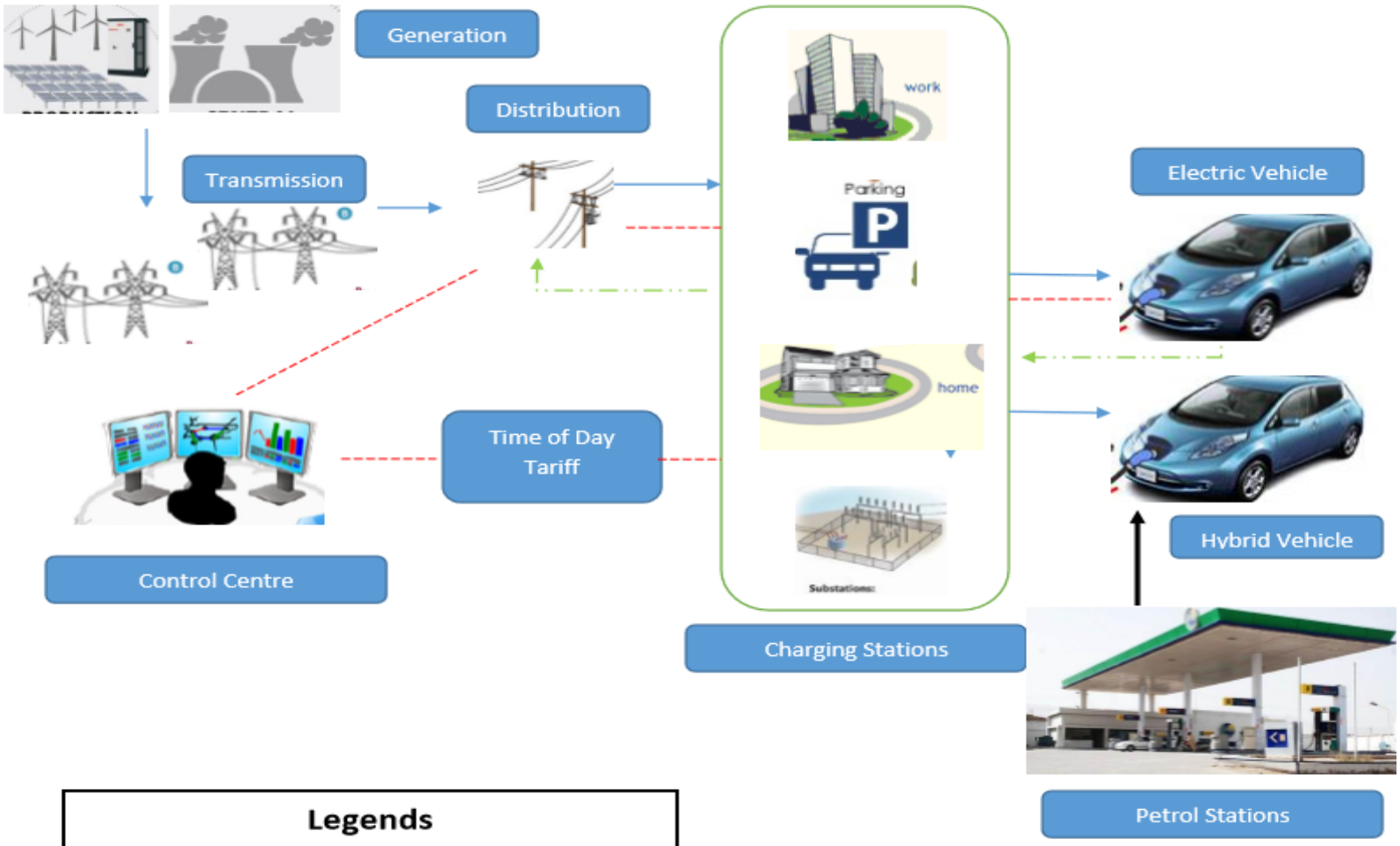
Market Analysis: Vehicle Growth



Source: DHI-DST Survey for India, 2015

- **Indian market expectations in vehicle size, purchasing costs and driving patterns.**
  - **Mostly 2 wheelers – 15 million/ yr**
  - **Small cars – 2 million/ year**
    - **(<4 m /ICE 1.2 litre petrol or 1.4 litre diesel)**
  - **Commercial vehicles**
    - **Three wheelers, SUV, Vans, Minibus, Buses, Trucks**

EV System Architecture



Major Policies and Reforms of Power Sector

UDAY Scheme for Discoms

UDAY (Ujjwal Discom Assurance Yojna) scheme helps in reduction in tariff by facilitating operational improvements. It's key highlights are:

- States shall take over 75% of DISCOM debt as on 30 September 2015 over two years - 50% of DISCOM debt shall be taken over in 2015-16 and 25% in 2016-17.
- Achievement of 24X7 Power for All
- Speedy achievement of electrification of remaining 18,500 villages
- Reduce Current Account Deficit (CAD) from higher diesel import (current annual imports of around Rs. 50,000 crore)
- Lower cost of power -Typical 3,000 MW NTPC plant running at 60% Plant Load Factor (PLF) has a fixed cost of Rs. 2.67 / unit, vs Rs. 1.80 at 90% PLF
- Avoid banking contagion (Rs, 40,000 crore of repayments due to banks in 2015-16) which will create significant NPAs
- Increased procurement of power by DISCOMs revives existing power projects suffering from low PLFs

Scope of UDAY Scheme

Improvement of Operational Efficiency

- Compulsory smart metering
- Energy efficiency measures like efficient LED bulbs, agricultural pumps fans etc.
- Upgradation of transformers, meters etc.

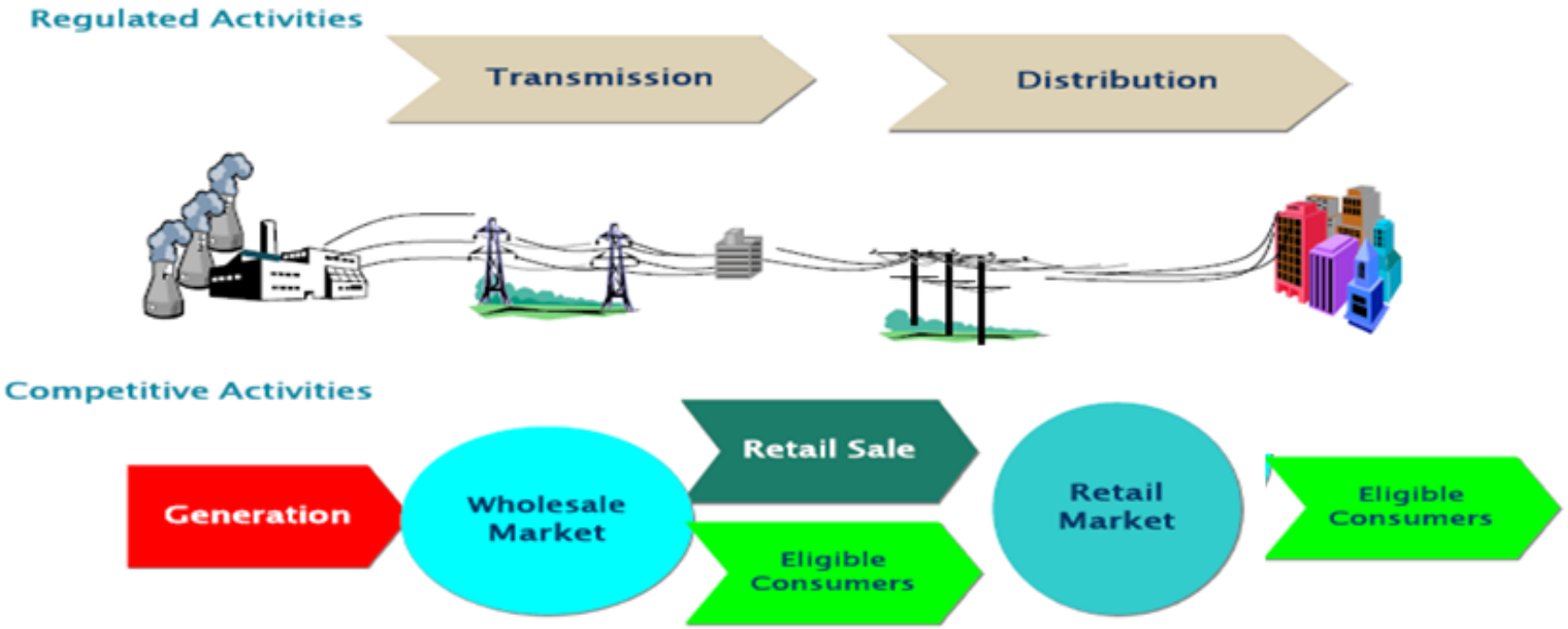
Reduction of Cost of Power

- Increased supply of cheaper domestic coal
- Coal linkage rationalization
- Liberal coal swaps from inefficient to efficient coal plants
- Coal price rationalization based on GCV and supply of washed and crushed coal

Reduction in Cost of Interest to DISCOMs

- States to take over 75% of DISCOM debt
- Government of India will not include debt taken over by the state in circulation of fiscal deficit

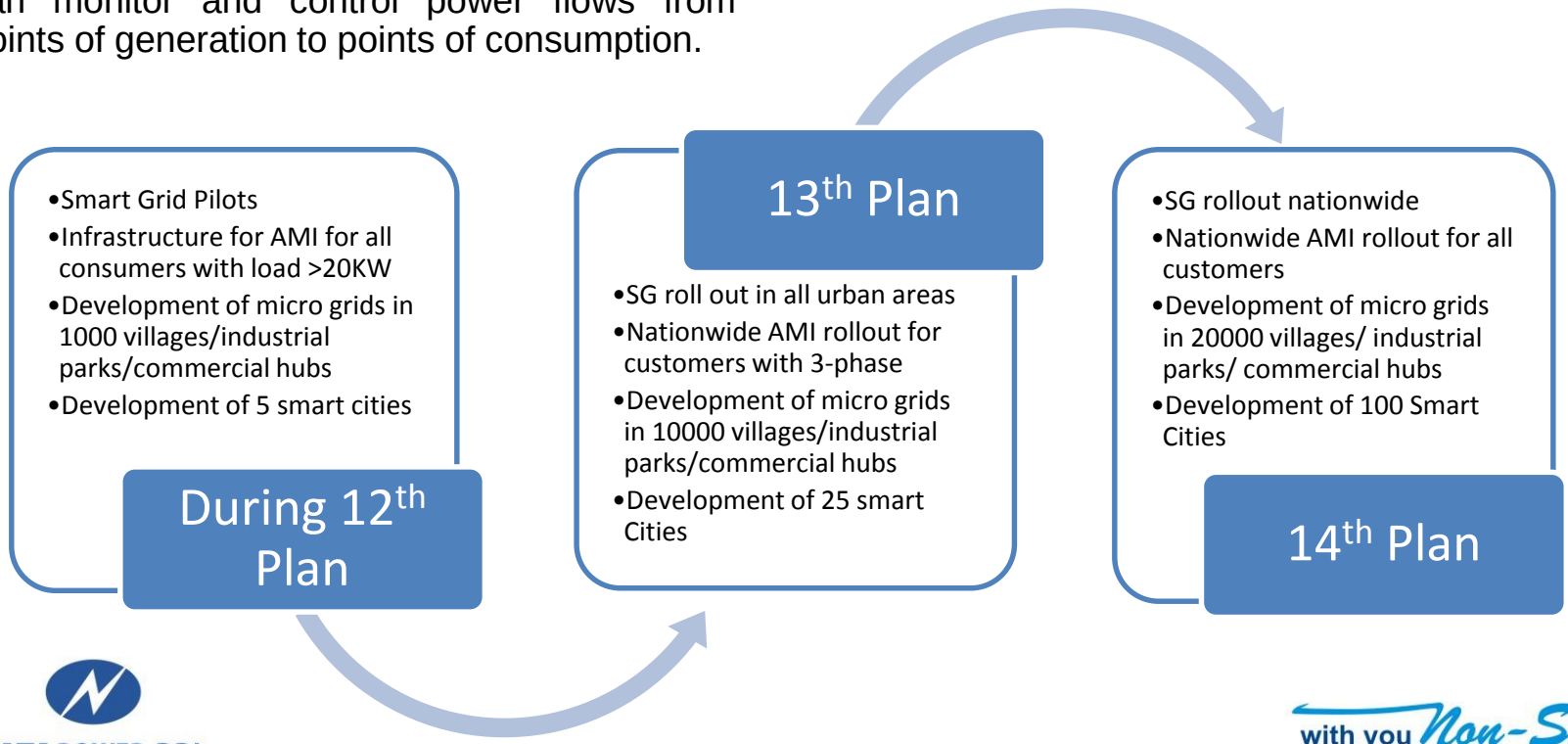
Separation of Content & Carriage…



Are We Ready for the Competition ??

National Smart Grid Mission

- An institutional mechanism for planning, monitoring and implementing policies and programmes related to smart grids in India.
- It entails implementation of a Smart Grid based on state-of-the art technology in the fields of automation, communication, IT systems that can monitor and control power flows from points of generation to points of consumption.



National Renewable Mission

Government of India has taken a number of measures to promote sustainable development and address the threat of climate change at national and sub-national level.

(40 % Renewables by 2030)

Revisiting the National Missions under the National Action Plan on Climate Change. Government is proposing to set up new missions on Wind Energy, Health, Waste to Energy, Coastal Areas and redesigning the National Water Mission & National Mission on Sustainable Agriculture.

Mitigation Strategies (for e.g. More than 5 times increase in Renewable capacity from 35 GW to 175 GW by 2022)

Adaptation Strategies (For e.g. National Mission for clean Ganga)

Climate Finance Policies (For e. g. Coal cess quadrupled from INR 50 to INR 200 per tonne to help finance clean energy projects, Reduction in subsidies on fossil fuels including diesel, kerosene and domestic LPG)

The Rising Sun…

NSM bids have been between INR 5.21/kWh and INR 6.45/kWh which are c… le to the cost at which new gene… willing t…

…ween …dules.

Solar power tariff hits new low in Raj: ₹4.34 per unit

Fortum India's Quote Still Much Higher Than NTPC's Rate

Times News Network

Declining solar power tariffs have raised concerns among industry players about its long-term sustainability

What is the bottom-line in Solar Tariff ?

Solar in Delhi	
Solar Energy Potential of 2.5GW	
49% Potential in Domestic Sector	
1 GW by 2020 and 2 GW by 2025 from rooftops in Delhi	
Solar Energy Tariffs has fallen by 6-8% per year since 1998	

Source: KPMG- The Rising Sun 2015

COP21 PARIS: U.N. CLIMATE TALKS

PARIS2015
UN CLIMATE CHANGE CONFERENCE
COP21·CMP11

- COP 21 will aim to achieve a legally binding and universal agreement on climate with aim of keeping global warming below 2°C.
- Before COP 21, all countries will publish details of what they will do to contribute to the 2°C goal, known as Intended Nationally Determined Contributions (INDCs).
- Another objective is to mobilize flow of US $100 billion per year from developed countries to developing countries to help reduce emissions and adapt to the effects of climate change. The funds will come from public and private sources 2020 onwards.

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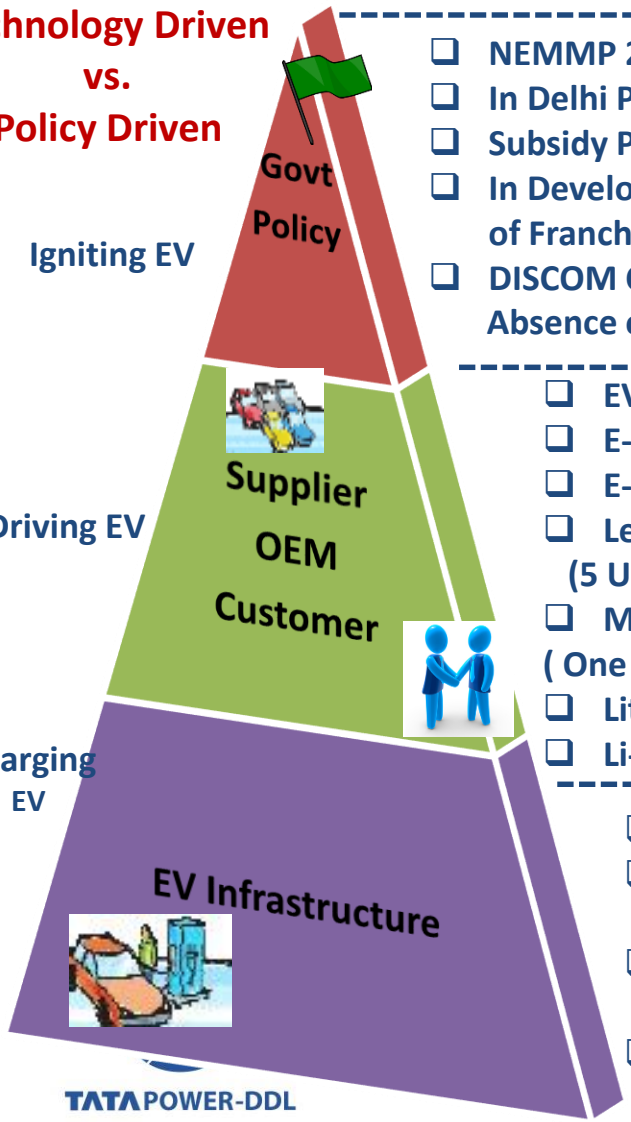
National Mobility Mission

EV Industry is Technology Driven vs. Policy Driven



- NEMMP 2020 Central Govt Policy on EV Development in India.
- In Delhi Policy Framing is under Process. MCD will be nodal body for Licensing.
- Subsidy Planned for HEV/BEV (25-35 %) to improve EV penetration
- In Developed Countries, Regulated Asset Base & Public Space are used with mix of Franchisee & OEM Model.
- DISCOM Concern/Submission :
  Absence of Guidelines on Charging Infrastructure, Tariff & Standardization

- EV 2-Wheeler has highest Share (92 %) among 2W/3W/4W EV (NEMMP)
- E-Rickshaw Market Size in TPDDL Area : 48000
- E-Rickshaw Cost : 85,000 to 105,000.
- Lead Acid Battery with Life of 1 Yr.(400 Cycles) Charging Time : 8-10 Hrs. (5 Unit/charge).
- M/s Hero Electric ambitious plan to Setup 10,000 Charging kiosk pan India (One at Jangpura)
- Lithium-ion used worldwide for faster charging, superior performance & life.
- Li-ion battery cost 5-7 times to Pb-Acid which is Rs 20000 for 48V/100 AH

- Private EV owner use Home Charging through Domestic Tariff.
- Absence of Public EV Kiosk Charging (Except Pilots-Hero Electrical & M/s Mahindra Reva at Bangalore)
- Commercial EV Charging in Delhi- Home Charging, Park-n Charge & Direct Theft of Electricity.
- EV Infrastructure Development Approach Worldwide- OEM, Franchisee, Municipality & Utility.

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DDUGJY- Rural Electrification

Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY): (launched- Nov ’14)

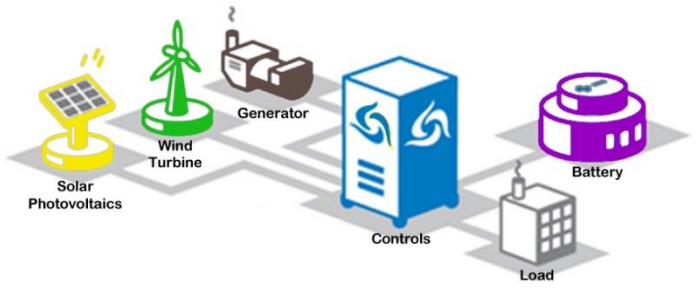
(i) to separate agriculture and non agriculture feeders facilitating judicious rostering of supply to agricultural and non-agricultural consumers in rural areas and

(ii) strengthening and augmentation of sub transmission and distribution infrastructure in rural areas, including metering of distribution transformers/feeders/consumers.

The estimated cost of the scheme for above two components is Rs.43,033 crore which includes the requirement of budgetary support of Rs.33,453 crore from Government of India over the entire implementation period.

The scheme would bring in more opportunities for TPDDL in terms of:

- **Micro Grid based REM**
- **Storage solution for Off-Grid location in villages**
- **Smart Appliances and Inverters**



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IPDS Scheme

Integrated Power Development Scheme (IPDS) is one of the flagship programme of the Ministry of Power launched on **28th June 2015** which will be at the core attempt to ensure 24x7 power for all.

- The Scheme, announced in the Union Budget 2014-15, aims at strengthening of sub-transmission network, Metering, IT application, Customer Care Services, provisioning of solar panels and the completion of the ongoing works of Restructured Accelerated Power Development and completion of the Reforms Programme(RAPDRP).
- Government of India will provide budgetary support of Rs. 45,800 crore over the entire implementation period of IPDS.
- The Scheme includes upgradation of the electrical assets at Sub – centers, lines and distribution transformers, capacity enhancement and renewal of the old sub – stations and installation of roof-top solar panel in government buildings.

Source: http://www.powermin.nic.in/

National Tariff Policy 2016

4 E's of Electricity**: Electricity** for all, **Environment** for a sustainable future, Efficiency to **Ensure** affordable tariffs, Ensure financial viability and **Ease of doing business** to attract investments.

Key Highlights of New Amendments in National Tariff Policy 2006: (Approved: 20th Jan 2016)

Electricity

- 24X7 power supply will be ensured to all consumers. In this case state governments and regulators will devise appropriate power supply trajectory to achieve this.
- Micro Grids will provide power to remote unconnected villages. It will have provision for purchase of power into the grid.
- People near coal mines will be provided with affordable power through procurement of power from coal washery reject based plants.

Efficiency

- Reduce power cost to consumers through expansion of existing power plants.
- For reduction in overall power cost, benefit from sale of un-requisitioned power to be shared.

National Tariff Policy 2016

Efficiency

- Through competitive bidding process, transmission projects will be developed in order to ensure faster completion at lower cost.
- To enable Time of Day metering installations of smart meters will be fasten. It will help to reduce theft and allow net-metering.
- Creating transmission capacity for accessing power from across India for lower power cost.

Environment

- Renewable Power Obligation (RPO): By March 2022, 8% of electricity consumption shall be from solar energy in order to promote renewable energy and energy security.
- Renewable Generation Obligation (RGO): New thermal plants based coal/ligniteto establish/purchase/ procure renewable capacity. Transmission charges and losses will be not levied for solar and wind power between inter-State power transmission. 100% power procurement produced from Waste-to-Energy plants in order to give big boost to Swachh Bharat Mission.

Ease of Doing Business

- Investments will be encouraged in coal rich states like West Bengal, Odisha, Jharkhand and Chhattisgarh to generate employment.

Thank You

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