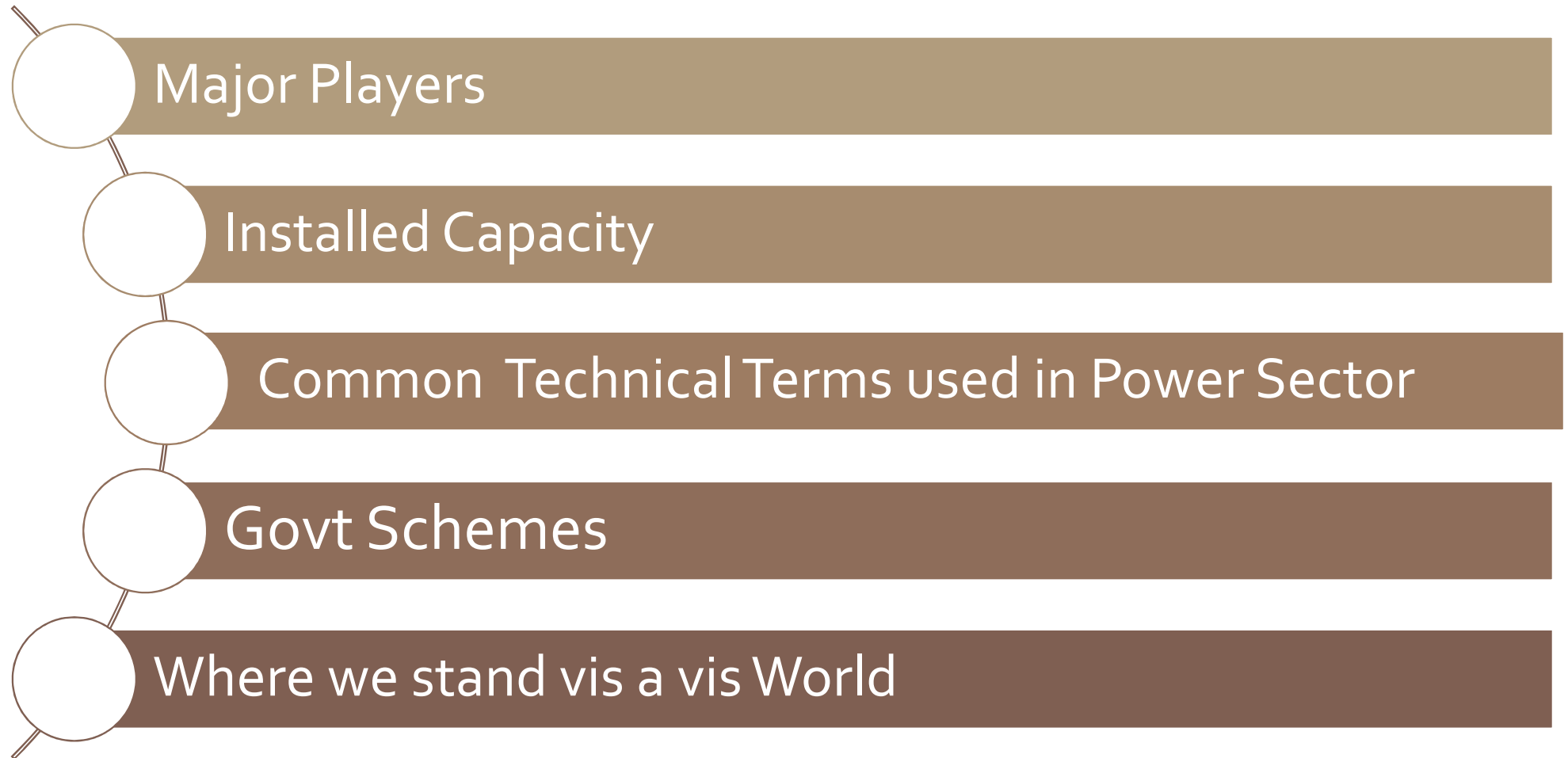




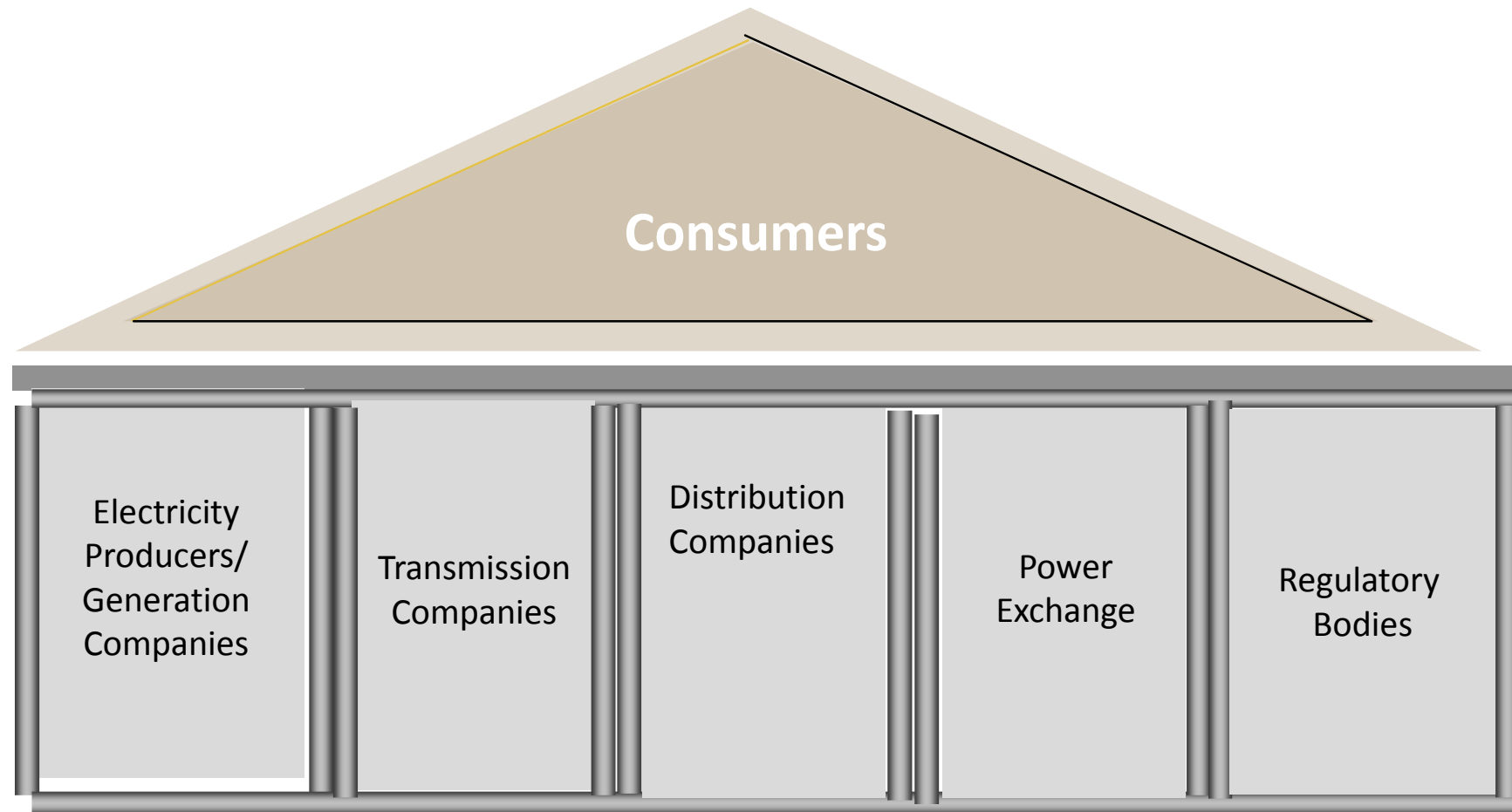
Indian Power Sector

A K Tripathi
AGM & Sr. Faculty
Regional Learning Institute
Sipat

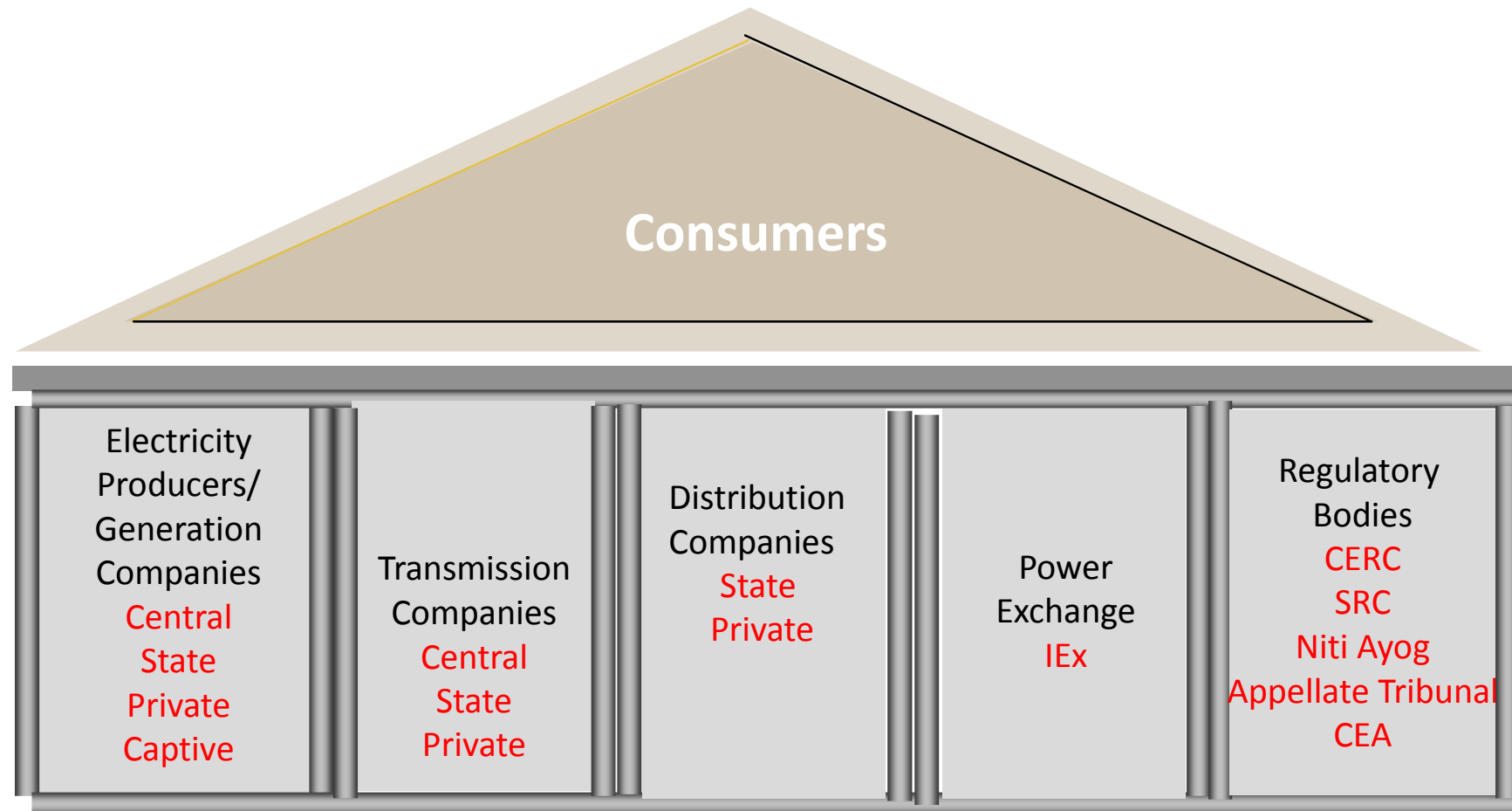
Indian Power Sector



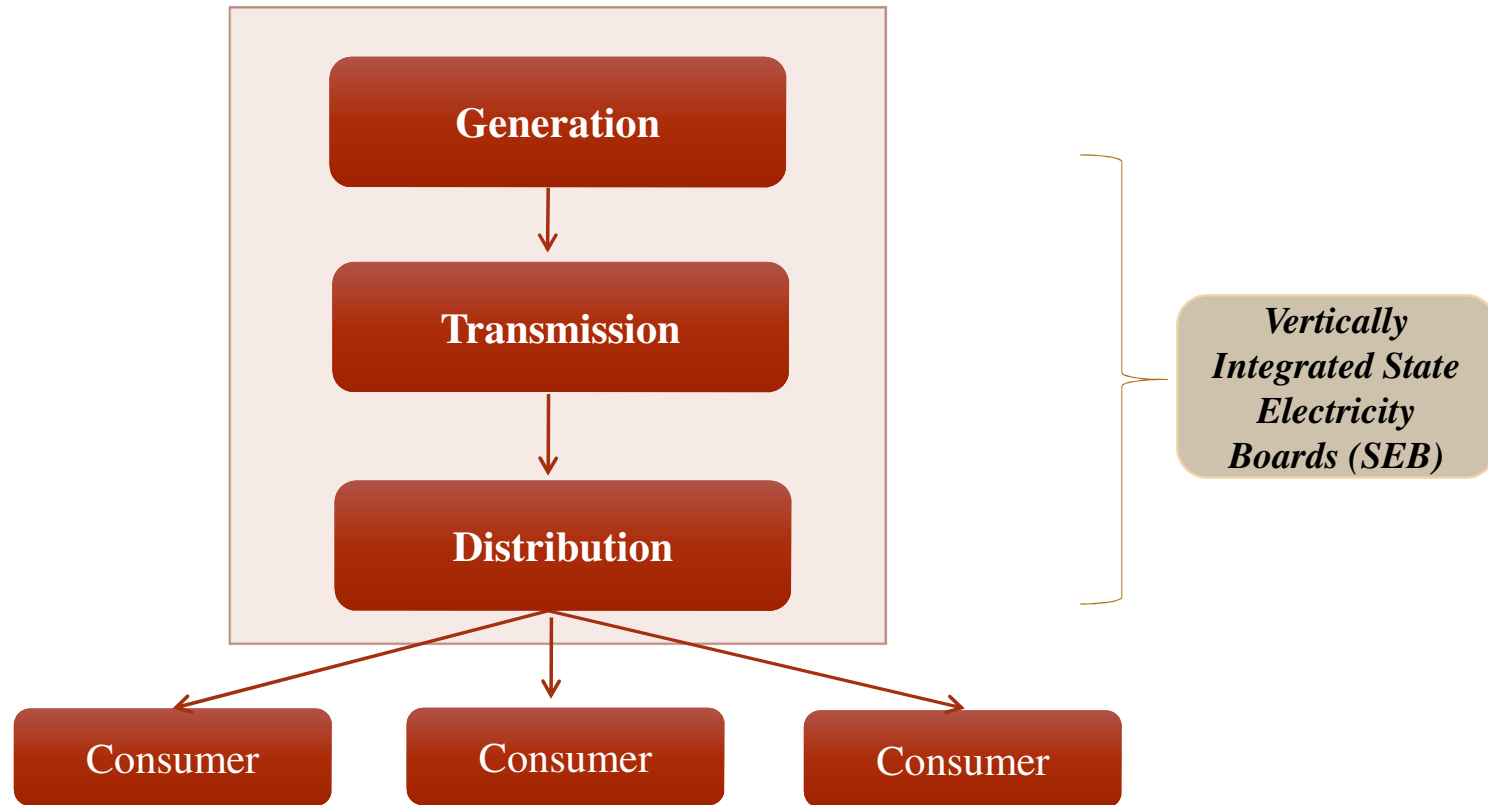
The Major Players in Indian Power Sector



The Major Players in Indian Power Sector



Demerger of Vertically Integrated Structure



India- Installed Capacity – 31 March 2020

Fuel	MW	% of Total
Total Thermal	2,30,600	62.8%
Coal	1,98,525	54.2%
Lignite	6,610	1.7%
Gas	24,955	6.7%
Diesel	510	0.1%
Hydro (Renewable)	45,699	12.4%
Nuclear	6,780	1.9%
RES* (MNRE)	87,269	23.6%
Total	370,348	

India Installed Capacity by Sector – 31 March 2020

Sector	MW	% of Total
Central Sector	93,477	25.2%
State Sector	103,322	27.9%
Private Sector	173,549	46.9%
Total	3,70,348	

Energy and Peak Shortages

	Energy				Peak			
Year	Requirement	Availability	Surplus(+)/Deficits(-)		Peak Demand	Peak Met	Surplus(+) / Deficits(-)	
	(MU)	(MU)	(MU)	(%)	(MW)	(MW)	(MW)	(%)
2014-15	10,68,923	10,30,785	-38,138	-3.6	1,48,166	1,41,160	-7,006	-4.7
2015-16	11,14,408	10,90,850	-23,558	-2.1	1,53,366	1,48,463	-4,903	-3.2
2016-17	11,42,929	11,35,334	-7,595	-0.7	1,59,542	1,56,934	-2,608	-1.6
2017-18	12,13,326	12,04,697	-8,629	-0.7	1,64,066	1,60,752	-3,314	-2.0
2018-19	12,74,595	12,67,526	-7,070	-0.6	1,77,022	1,75,528	-1,494	-0.8
2019-20	12,90,247	12,83,690	-6,557	-0.5	1,83,804	1,82,533	-1,271	-0.7
2020-21*	85,608	85,164	-445	-0.5	1,33,315	1,32,779	-536	-0.4

Plant Load Factor (Thermal)

Year	PLF	Sector-wise PLF (%)		
	%	Central	State	Private
2009-10	77.5	85.5	70.9	83.9
2010-11	75.1	85.1	66.7	80.7
2011-12	73.3	82.1	68.0	69.5
2012-13	69.9	79.2	65.6	64.1
2013-14	65.60	76.10	59.10	62.10
2014-15	64.46	73.96	59.83	60.58
2015-16	62.29	72.52	55.41	60.49
2016-17	59.88	71.98	54.35	55.73
2017-18	60.67	72.35	56.83	55.32
2018-19	61.07	72.64	57.81	55.24
2019-20	56.08	65.36	50.26	54.73
2020-21	42.40	49.86	33.48	44.28

Common Terms

- ❖ **Installed Capacity**- Rated Capacity as given by manufacturer in MW
- ❖ **Energy Generated**- Power generated in Kwhr or Units or Million Units (MU)
- ❖ **Plant Load Factor (PLF) %**- $\text{Actual energy generated in a period} \times 100 (\text{MU}) / \text{Total Capacity to generate in that period (MU)}$
- ❖ **Availability Factor (AF)%** – $\text{No of Hrs machine is connected to grid} \times 100 / \text{Total number of hours} - \%$
- ❖ **Declared Capacity (DC)**- Generating Capability declared by Generator in MW
- ❖ **Scheduled Generation (SG)**- The level of power generation in MW as demanded by the power purchaser MW
- ❖ **Actual Generation (AG)**- The power actually generated by the power producer MW
- ❖ **Heat Rate**- $\text{Heat Energy consumed} / \text{Electricity Generated Kcal/KwHr}$
- ❖ **APC %**- $\text{Energy consumed by the power producer while generating power} \times 100 / \text{Gross energy generated}$
- ❖ **Sp Oil- ml/Kwhr** – $\text{Oil consumed by power producer} / \text{Electricity generated}$

Common Terms

Power is the rate at which work is done- 60 Watt (J/Sec)

Mega Watt – 1000 KW

Energy – The work actually done or stored – $60 \times 100 = 6000$

Watt Hour = 6 KWHr= 6 Units

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Major Policies and programmes of Gol

Major Reforms in India in Power Sector

De-licensed generation.

Freedom to captive generation including group captive

Recognizing trading as an independent activity.

Open access in transmission

Open access to consumers above 1 MW

Multiple licenses in distribution.

Regulatory Commissions at the State & Central Level

New Initiatives in Power Sector Development

SAUBHAGHYA

Pradhan Mantri Sahaj Bijli Har Ghar Yojana

- To reach power to all households
- Total outlay: Rs. 16,320 crore (Rs. 14,025 cr. for rural households and Rs. 2,295 cr. for urban households)
- All household electrification by 31st Dec. 2018
- Free connection to BPL and Rs 500 to APL in 10 EMIs (based on SECC-2011 data)
- REC to be nodal agency for the operationalization of the scheme throughout the country.

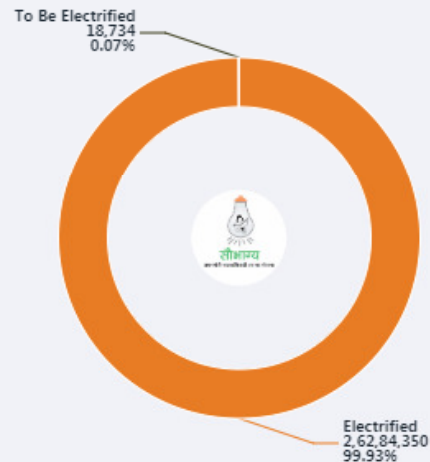
Household Electrification Status

Total Households : 21,44,91,777



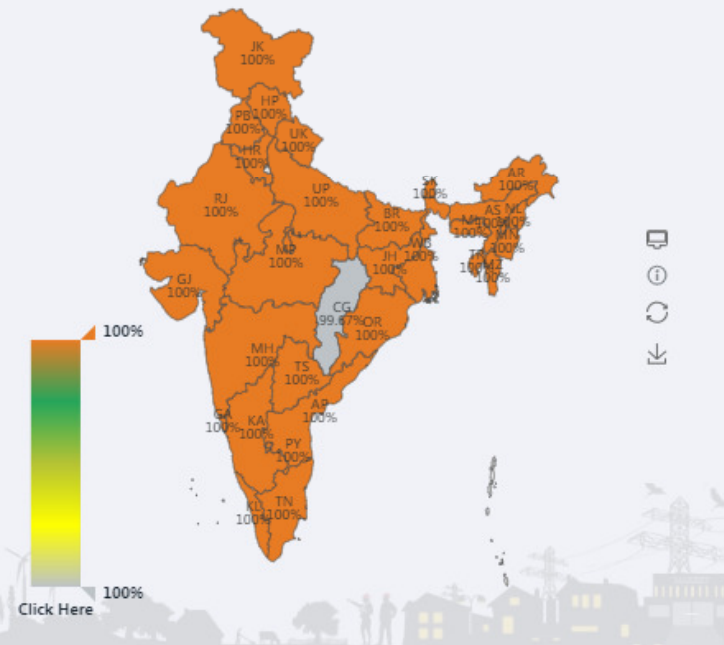
Household Progress From 11-OCT-2017 Out of 2,63,03,084

Household Electrified : 2,62,84,350



Electrified UnElectrified

Electrification Status till 31st March, 2019 (%)



Household Electrification Status (as reported by States)

Household Electrification Progress (as reported by States)

District Saturated in Electrification

Villages Saturated in Electrification

UDAY - Ujjwal DISCOM Assurance Yojana

Poor situation of DISCOMS

- | | |
|---|--|
| <ol style="list-style-type: none">1. Accumulated losses as on 31st March, 2015-Rs.3.80 lac crore.2. Outstanding debt as on 31st March 2015-Rs.4.3 lac Crore3. Interest liability : 80% of annual losses.4. High ATC losses : 22%.5. High ACS-ARR gap (Rs. 0.76 per unit). | <ol style="list-style-type: none">1. Insufficient investment in system improvement.2. Lack of long term PPAs.3. Low capacity utilization of generating plants.4. High cost of power.5. High cost of funds.6. Higher tariff.7. Inadequate power supply for consumers. |
|---|--|

UDAY - For Financial Turnaround of DISCOMS

- States to take over 75% of the DISCOM debt as on Sept 30, 2015 - 50% in FY 2015-16 and 25% in FY 2016-17.
- States to issue bonds, to take over debt and transfer the proceeds to DISCOMs in a mix of grant, loan, equity.
- Balance 25% of debt to remain with the DISCOMs in the following manner:
- States to take over future losses of DISCOMs as per trajectory in a graded manner.
[0% of loss of 14-15 & 15-16; 5% of 16-17; 10% of 17-18; 25% of 18-19 & 50% of 2019-20]
- Balance losses to be financed through State bonds or DISCOM bonds backed by State Govt guarantee, to the extent of loss trajectory finalised with MoP.

UDAY - Benefits to Participating States

- **Reduction in Cost of power through Central Support**
 - ✓ Increased supply of domestic coal
 - ✓ Allocation of coal linkages at notified prices
 - ✓ Coal price rationalization
 - ✓ Coal linkage rationalization & allowing coal swaps
 - ✓ Supply of washed & crushed coal
 - ✓ Additional coal at notified prices
 - ✓ Faster completion of Interstate Transmission lines
 - ✓ Power purchase through transparent competitive bidding
- **Additional priority funding under DDUGJY, IPDS, etc.**



GOVERNMENT OF INDIA
MINISTRY OF POWER

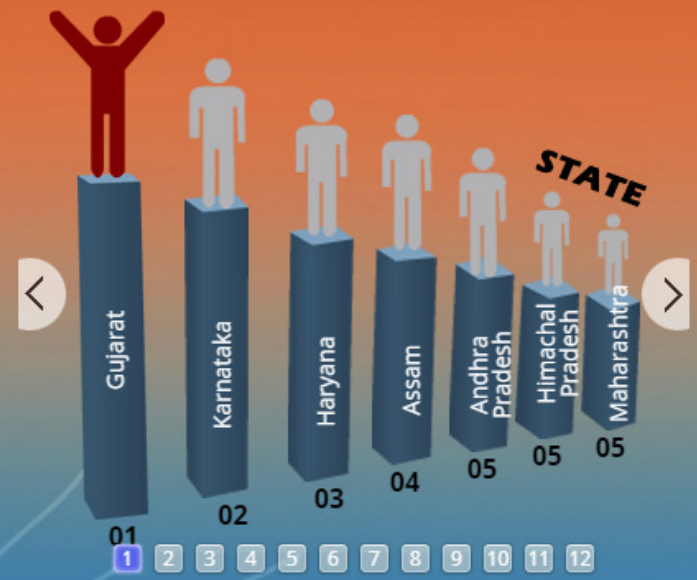
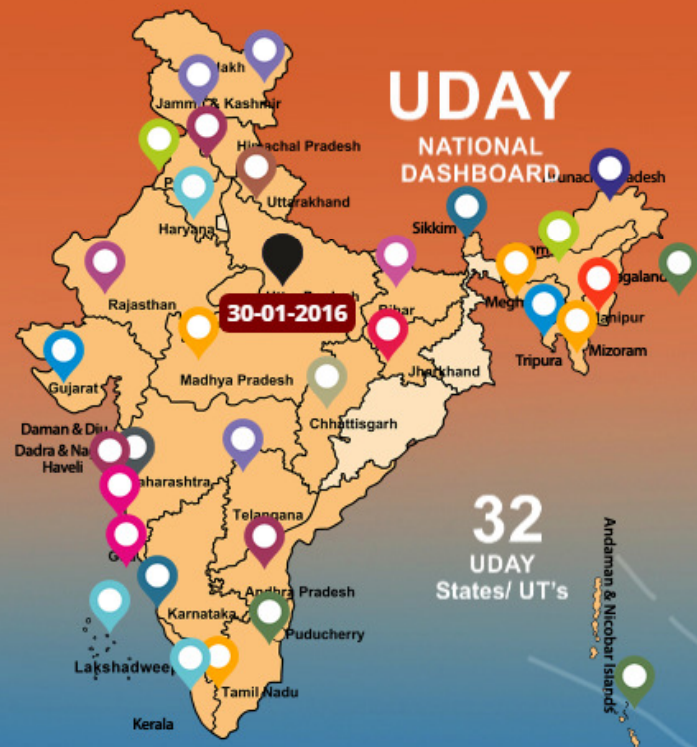
Home | UDAY States + | Login |



Ministry of Power, Gol launched Ujwal DISCOM Assurance Yojana (UDAY) which was approved by Union Cabinet on 5th November, 2015. It envisages Financial & C

Download latest mobile application of UDAY

UDAY State/ DISCOM Quarterly Performance Ranking (as on 31st March 2020)



UJALA- Unnat Jyoti Through Affordable LED for All

- Launched in 2015, the Unnat Jyoti by Affordable LEDs for All (UJALA), in a short span of three years, has emerged as the world's largest domestic lighting programme.
- Aim is to distribute 77 crore LEDs by March 2019 across 100 cities. The UJALA scheme will thus, make an enormous impact by securing: annual energy savings of 10,000 crore kWh, 79 crore tonnes of reduction in CO₂ emissions per year and avoid capacity generation of nearly 20,000 MW.

Fan Dashboard Tubelight Dashboard हिंदी में अनुवाद FAQs Register your complaint



NATIONAL UJALA DASHBOARD



Total LEDs distributed as on 28 JUN 2020 20:40

36,26,33,940



47,094 mn kWh
Energy saved per year



INR 18,838 Cr
Cost saving per year



9,428 MW
Avoided Peak Demand

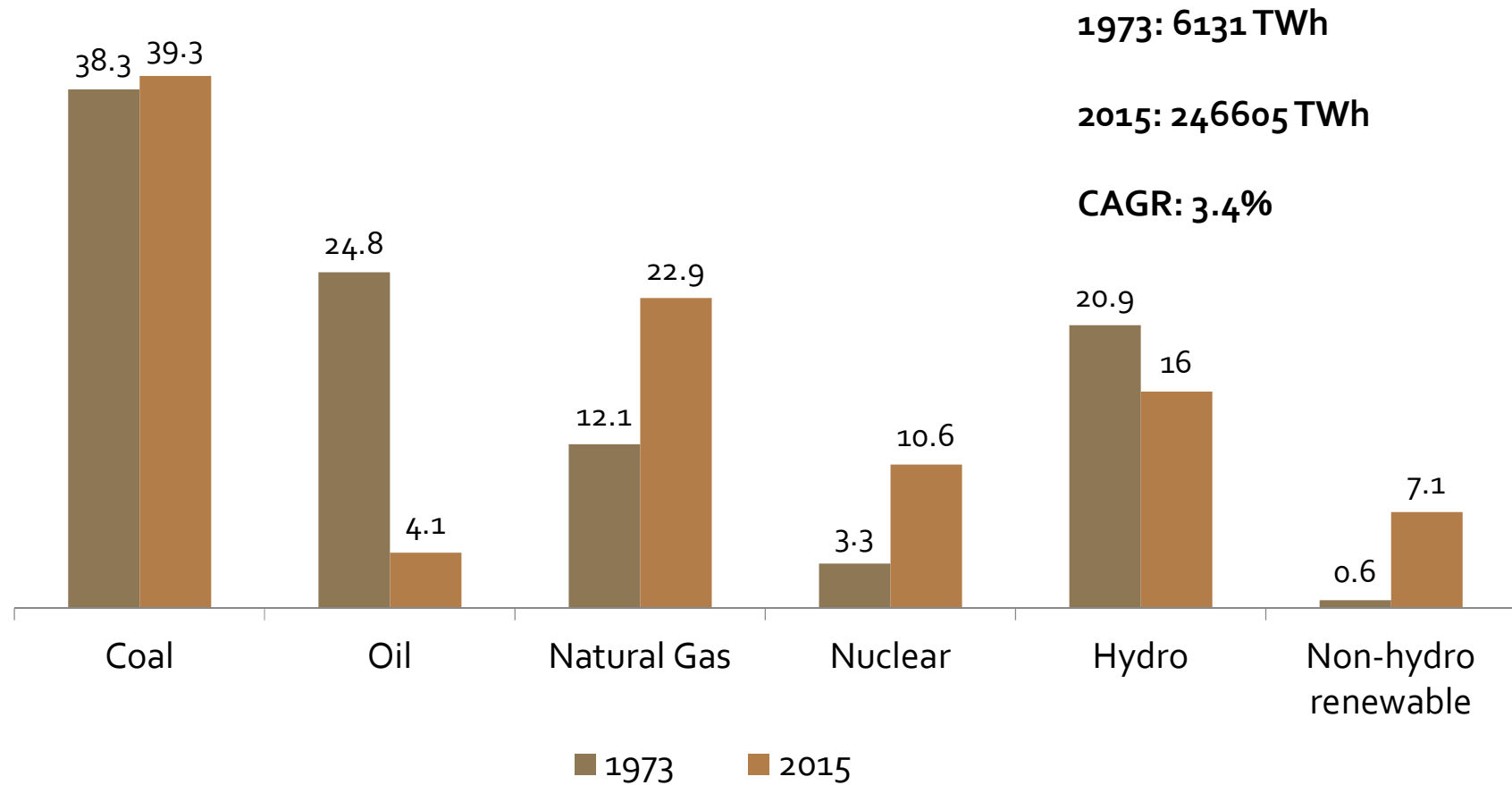


3,81,46,287 t CO₂
CO₂ Reduction per year



Relative Position of India in the World Energy

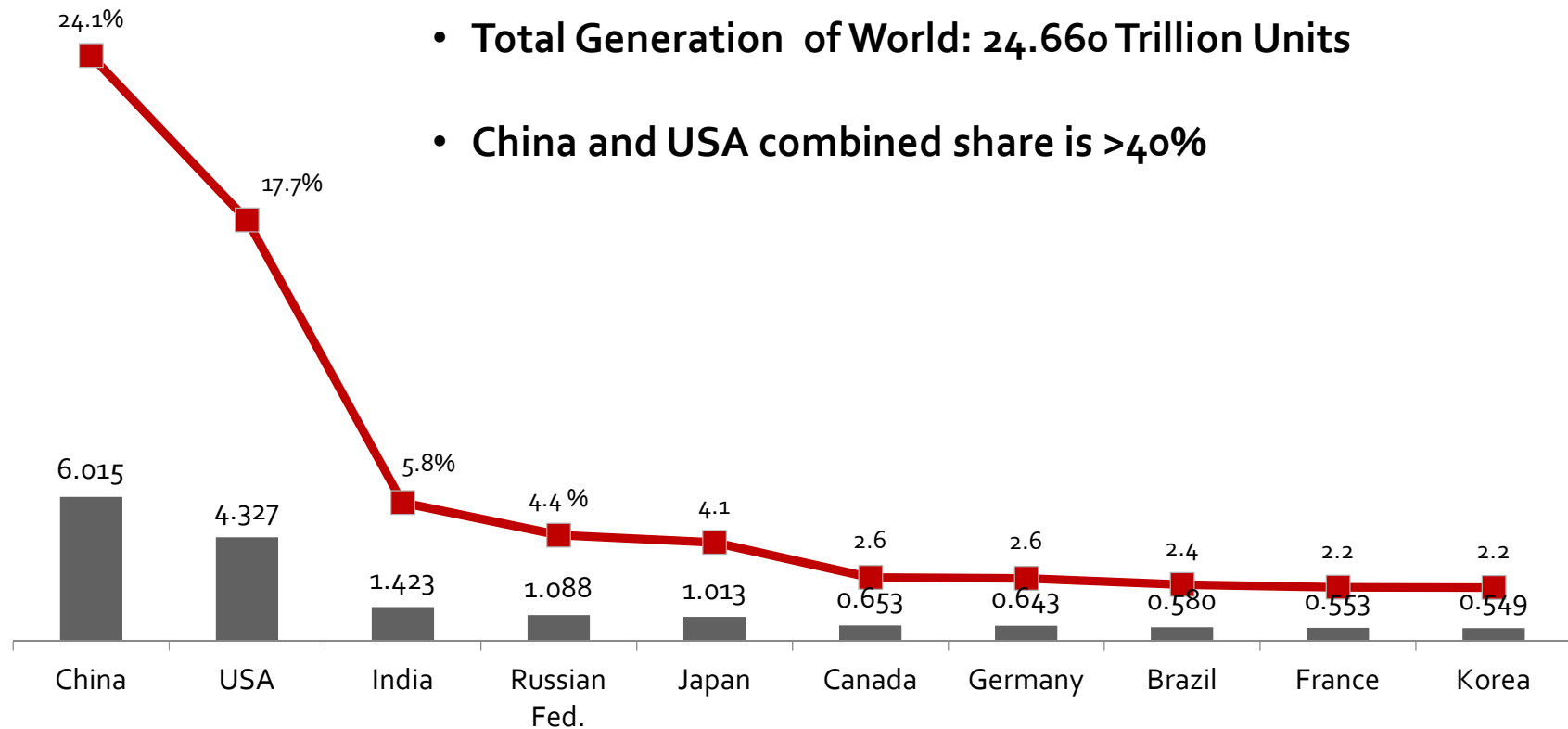
World Electricity Generation by Source



peat and oil shale are aggregated with coal

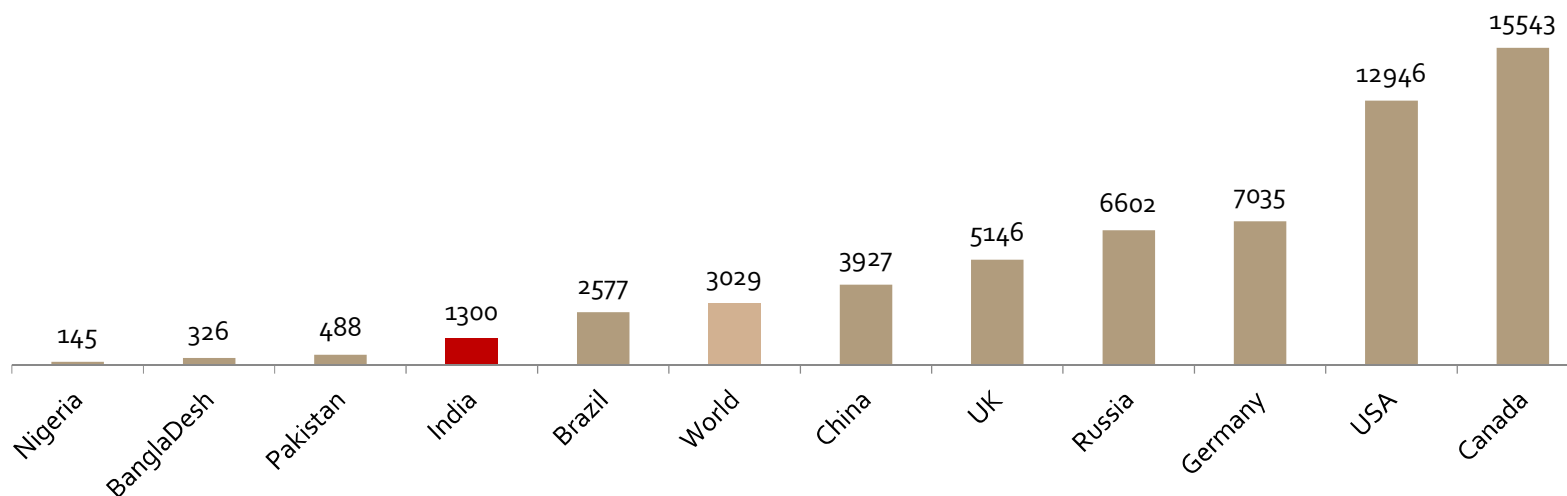
Other include geothermal, solar, wind, tide/wave/ocean, heat and other

India is Third largest Electricity Generating Country in the World



However per Capita electricity consumption of India is less than one-third of the World Average

1300 units/annum/person



CEA number of per capita consumption* for FY 16: 1075

*(Gross Generation + Net Import) / Mid Year Population,

Source: IEA - Key World Energy Statistics-2017

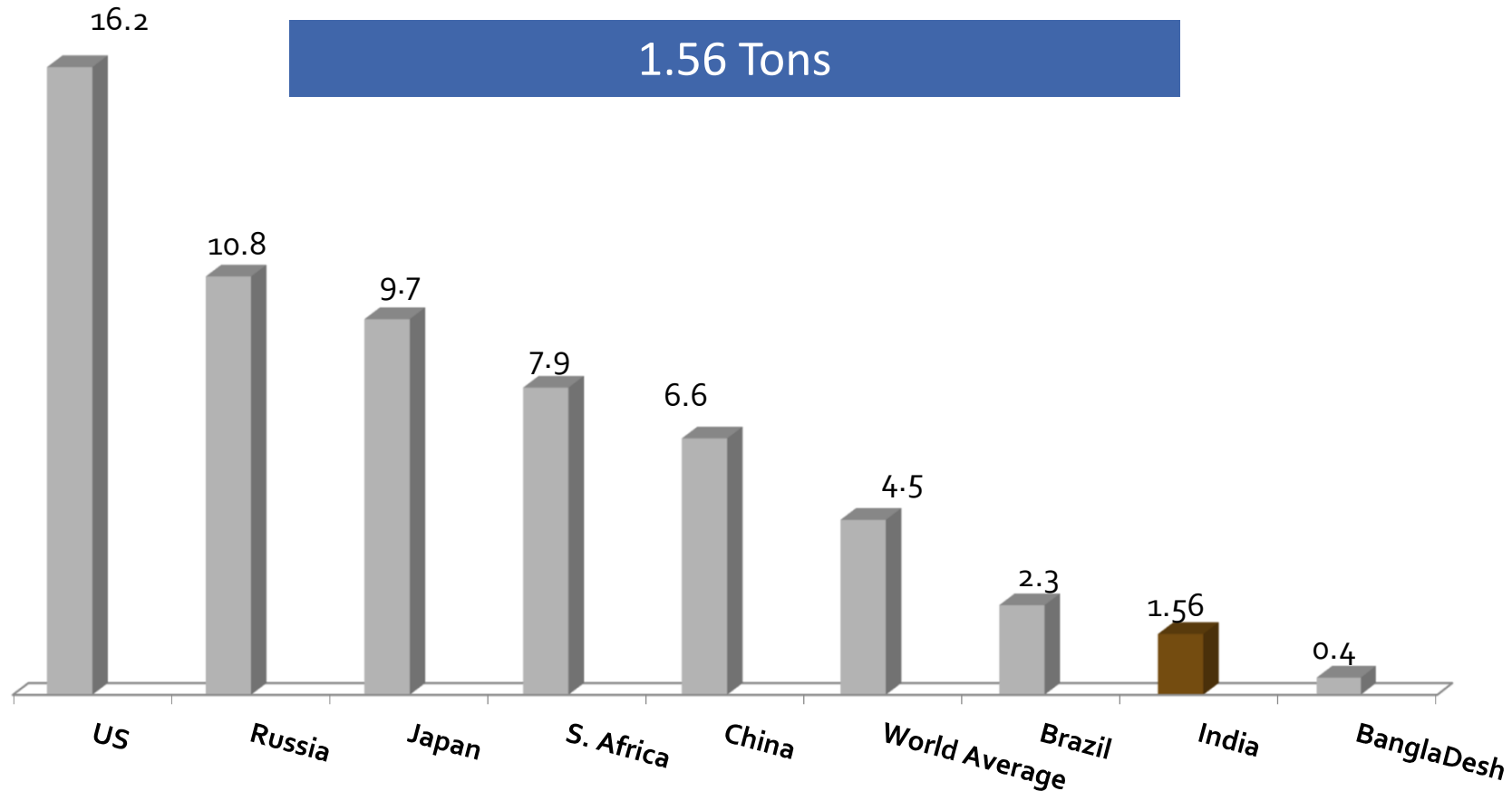
CO₂ Emission Factor

Carbon dioxide released per MWh of energy produced

How much is Emission Factor for Typical Indian Thermal Coal

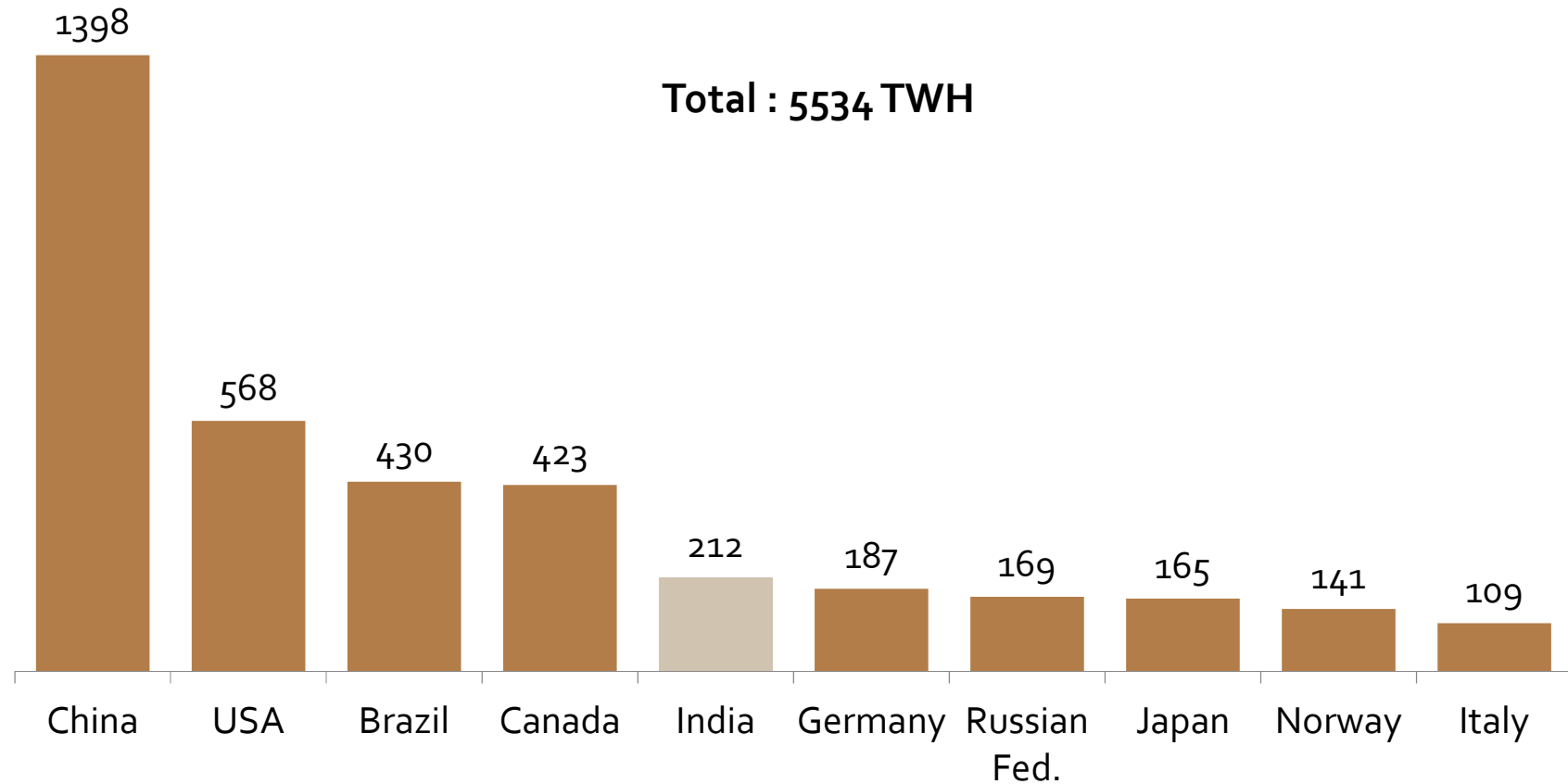
The baseline emission factor as estimated by CEA : **0.944t CO₂/MWh**

Per Capita CO₂ emission of India is also much lower than developed countries



Source: IEA - Key World Energy Statistics-2017

India is fifth largest country in Renewable (incl Hydro) Generation

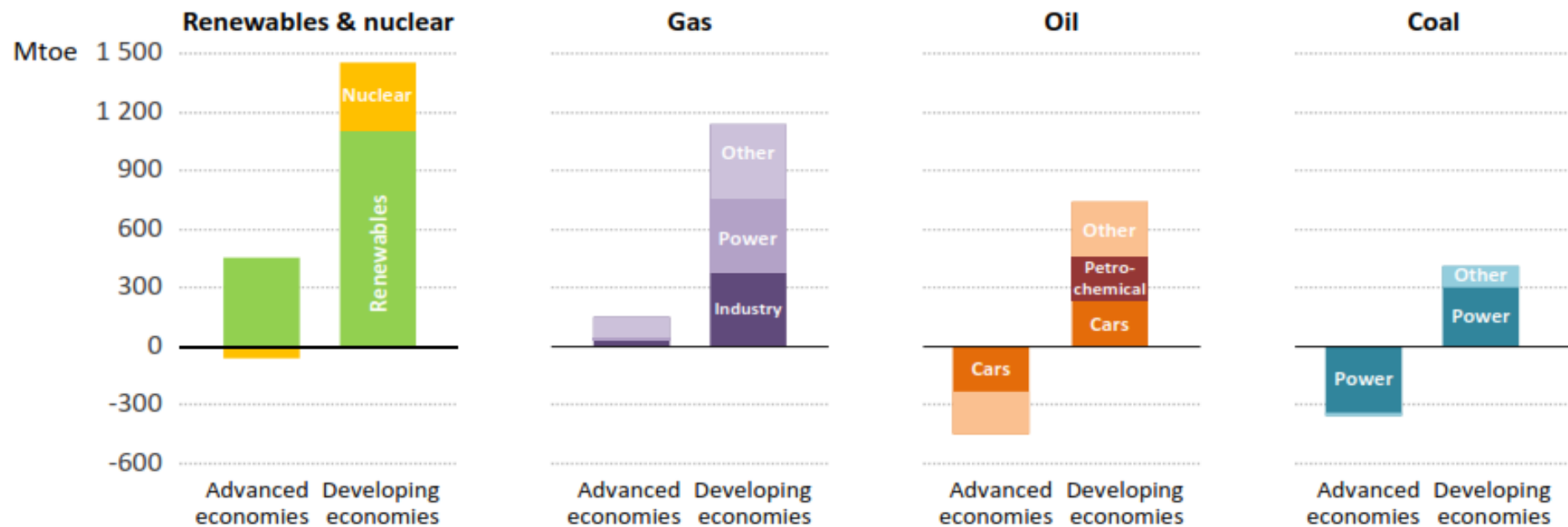


What will meet the future energy demand

Fuelling the demand for energy

Energy
Outlook
2018

Change in global energy demand, 2017-2040



The increase in demand would be twice as large without continued improvements in energy efficiency, a powerful tool to address energy security & sustainability concerns



Important Terms

Thank You

