

Future of Coal Based Electricity in India

Rakesh Kacker

AKAM, Ministry of Coal

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Coal and Electricity in India

- Thermal Coal Accounts for about 90% of Coal Produced in India
- Coal Accounts for about 54% of Installed Capacity of Power Generation in India
- Electricity Generation is more dependent on Coal – about 70% of Electricity Generated is from Coal
- The Divergence between Installed Capacity and Generation is mainly because of Renewables – their generation per MW of installed capacity is lower than coal based plants
- Thus both Electricity and Coal are heavily dependent on each other

Dreams and Reality

- In today's scenario what would any right thinking person dream about?
- Quite clearly a world in which the dominance of coal diminishes and coal becomes a part of history
- No harm in dreaming – but our feet have to be planted firmly on the ground as we look at the sky and long for it to turn blue
- How do we turn our dreams into reality?

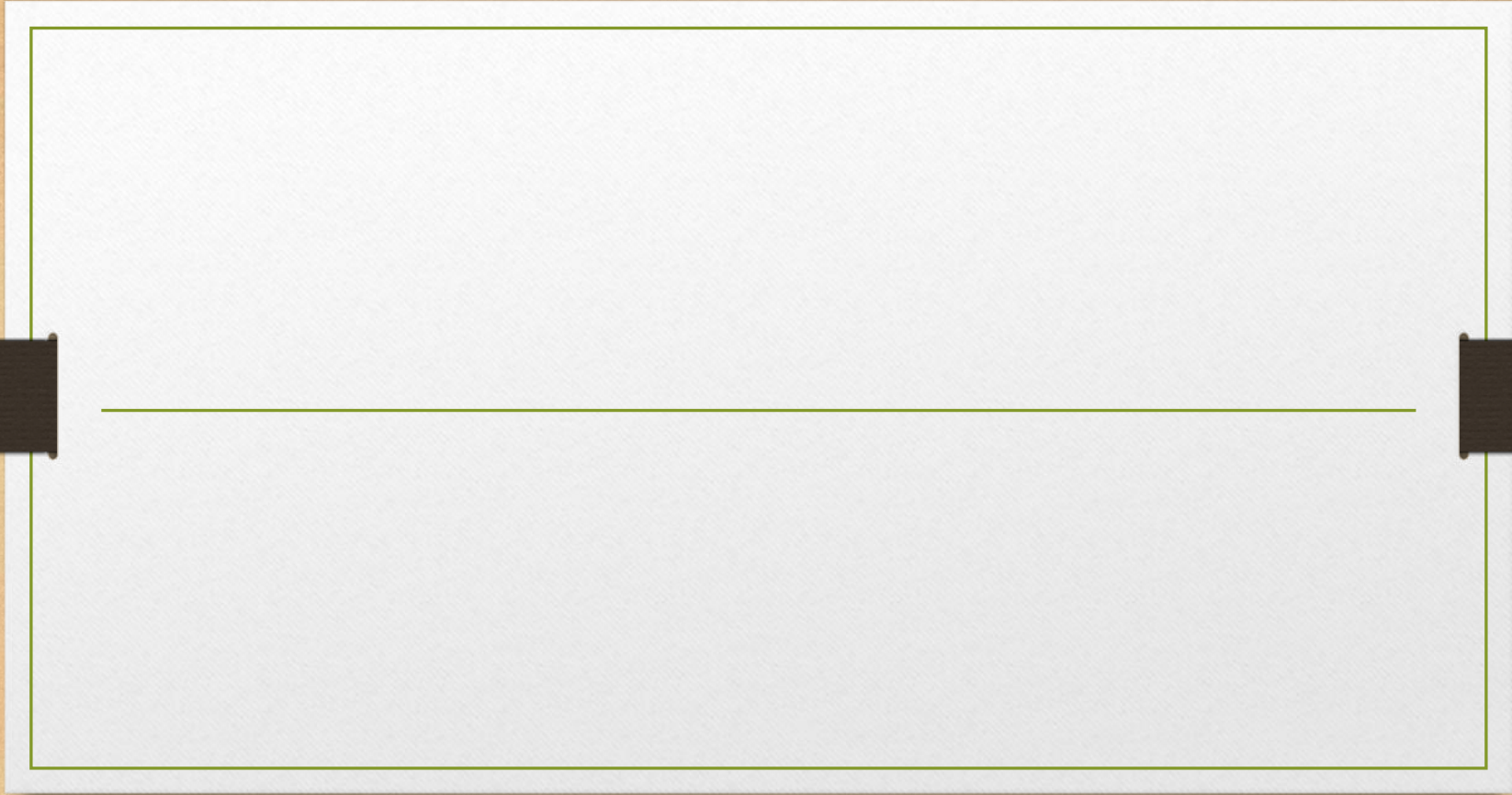
Dream to Reality Options

- Demand for electricity has been steadily growing at 5-6 %
- To meet this demand electricity generation has to grow at a matching rate OR we have to give up our objective of Electricity For All-OPTION I
- Non Coal based generation has to grow at a much faster rate . Then these non coal based options will not only meet the new demand but also some of the existing demand . Option II
- The most promising non coal based option is renewables . Today coal is taking the load of mismatch between generation from these sources and demand. This must be replaced by Storage. Option III

The Generation Story(in MUs)

Year	Coal	Lignite	Gas	Diesel	Fossil Fuel
2010-11	5,35,340	26,417	1,00,257	2,994	6,65,008
2011-12	5,84,787	28,093	93,464	2,461	7,08,806
2012-13	6,59,231	32,324	66,836	2,285	7,60,676
2013-14	7,13,847	32,240	44,522	1,868	7,92,477
2014-15	8,00,334	35,504	41,075	1,407	8,78,320
2015-16	8,62,015	34,244	47,122	406	9,43,788
2016-17	9,10,136	34,725	49,094	275	9,94,230
2017-18	9,51,755	34,836	50,208	261	10,37,059
2018-19	9,87,682	34,584	49,834	125	10,72,224
2019-20	9,61,218	32,979	48,443	108	10,42,748
2020-21	9,50,938	30,506	50,944	126	10,32,514

Nuclear	Renewable Sources (Including Hydro)			Non-Fossil Fuel	Total Generation	
	Hydro	Bhutan Import	Wind, Solar & Other RE			Total RES
26,266	1,14,257	5,611	39,245	1,59,113	1,85,379	8,50,387
32,287	1,30,510	5,285	51,226	1,87,020	2,19,307	9,28,113
32,866	1,13,720	4,795	57,449	1,75,964	2,08,830	9,69,506
34,228	1,34,848	5,598	53,050	1,93,495	2,27,723	10,20,200
36,102	1,29,244	5,008	61,719	1,95,970	2,32,072	11,10,392
37,414	1,21,377	5,244	65,781	1,92,402	2,29,815	11,73,603
37,916	1,22,378	5,617	81,548	2,09,543	2,47,459	12,41,689
38,346	1,26,123	4,778	1,01,839	2,32,741	2,71,087	13,08,146
37,813	1,34,894	4,407	1,26,759	2,66,059	3,03,872	13,76,095
46,472	1,55,769	5,794	1,38,337	2,99,901	3,46,373	13,89,121
43,029	1,50,300	8,766	1,47,248	3,06,313	3,49,342	13,81,855



Option I- Reducing demand

- As can be seen from the previous slide Electricity demand has been steadily growing
- Conserving demand through energy efficiency measures must have slowed down the growth but has not stopped it
- So if electricity generation does not grow adequately demand will have to be cut – INVOLUNTARILY
- This is an Option not worth pursuing so let us drop it
- So either coal has to keep growing or generation from other sources has to grow so fast that we meet demand and slow down coal

Option II- Increasing RES

- This is the most promising option
- Need to accelerate Renewables – the most promising replacement for coal
- In most years growth in renewable generation is less than growth in demand.
- This means higher demand for coal based generation
- Lets turn to the Installation story

The Installation Story (In MW)

End of the Year	Coal	Lignite	Gas	Diesel	Total Fossil Fuel
31-3-2011	89,368	4,550	17,706	1,200	1,12,824
31-3-2012	1,06,952	5,070	18,381	1,200	1,31,603
31-3-2013	1,24,611	5,610	20,110	1,200	1,51,531
31-3-2014	1,39,663	5,610	21,782	1,200	1,68,255
31-3-2015	1,58,776	5,860	23,062	1,200	1,88,898
31-3-2016	1,79,313	5,860	24,509	994	2,10,675
31-3-2017	1,85,803	6,360	25,329	838	2,18,330
31-3-2018	1,90,812	6,360	24,897	838	2,22,907
31-3-2019	1,94,445	6,260	24,937	638	2,26,279
31-3-2020	1,98,525	6,610	24,955	510	2,30,600
31-3-2021	2,02,675	6,620	24,924	510	2,34,728
30-9-2021	2,01,995	6,620	24,900	510	2,34,024

Nuclear	Total RES (Including Hydro)			Total Non-Fossil	Total Installed Capacity (MW)
	Hydro	Wind, Solar & Other RES	Total RES (Including Hydro)		
4,780	37,567	18,455	56,022	60,802	1,73,626
4,780	38,990	24,503	63,494	68,274	1,99,877
4,780	39,491	27,542	67,033	71,813	2,23,344
4,780	40,531	34,988	75,519	80,299	2,48,554
5,780	41,267	38,959	80,227	86,007	2,74,904
5,780	42,783	45,924	88,707	94,487	3,05,162
6,780	44,478	57,244	1,01,723	1,08,503	3,26,833
6,780	45,293	69,022	1,14,316	1,21,096	3,44,002
6,780	45,399	77,642	1,23,041	1,29,821	3,56,100
6,780	45,699	87,028	1,32,727	1,39,507	3,70,106
6,780	46,209	94,434	1,40,643	1,47,423	3,82,151
6,780	46,512	1,01,533	1,48,045	1,54,825	3,88,849

How Fast is Fast?

- Fastest growth in renewables was in 2016-18 – about 12 GW per annum
- As per latest target of 500 GW of RES by 2030 we need to do about 400 GW in the next 8 years
- A little more than 60 GW per annum
- This gives us a sense of the huge task before us
- To the extent these targets are not reached Coal will be the fall back option

Option III : Storage

- The need for storage
- Several Options for storage
- Coal is one of them – it has energy stored which can be used when required
- Coal is an imperfect storage option – for more reasons than one
- But it is there – and is being used- and will continue till we find better options

CEA Study – January 2020

- 67,760 MW is the new capacity addition of coal based generation required by 2030
- 27 GW of Battery Storage and 3200 MW of Pumped Storage calculated
- 420 GW of solar and wind by 2030 assumed
- Study is dynamic – broad picture unlikely to change – more coal based capacity is needed in the near future

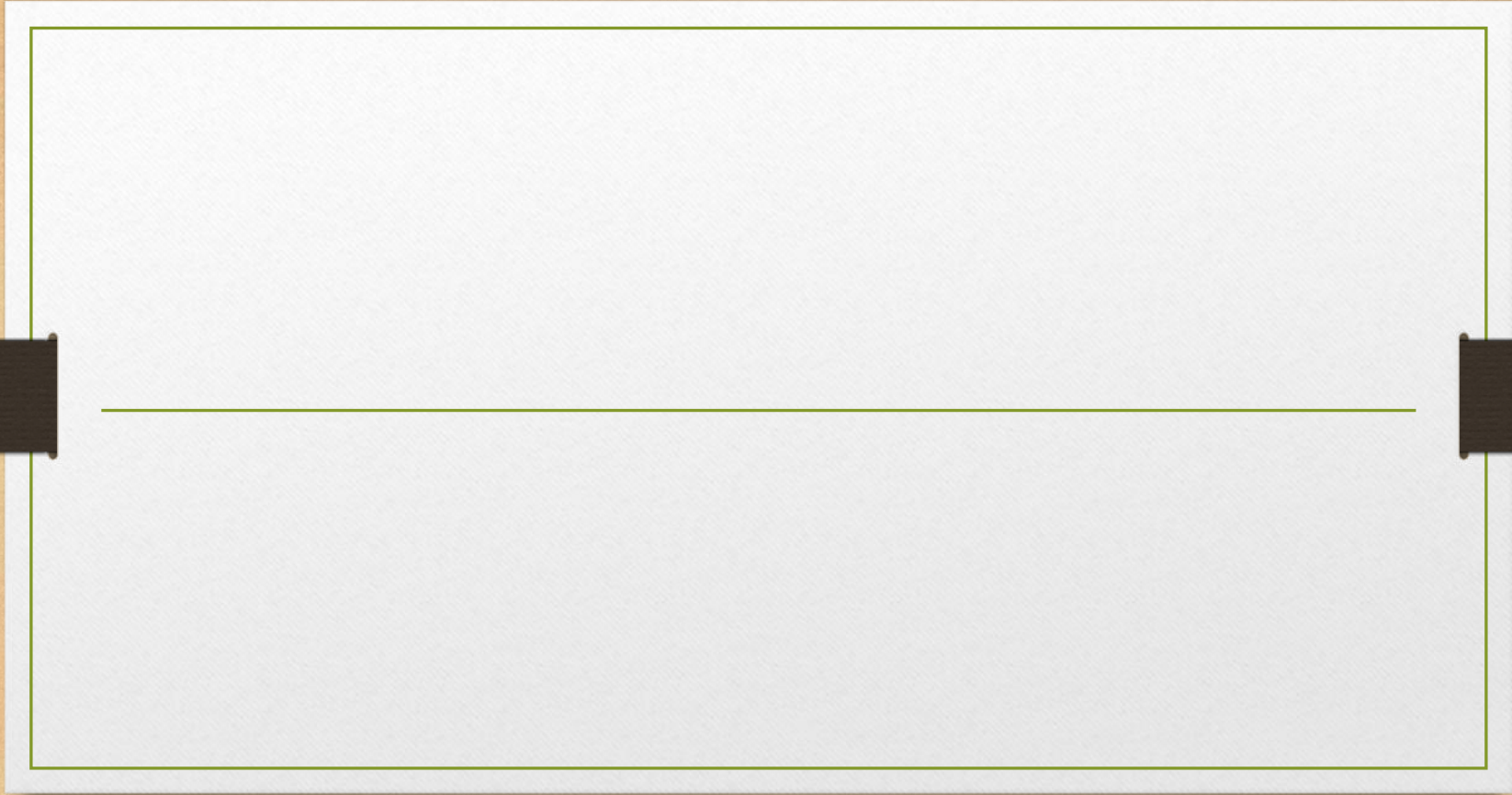
Implications – Environment

- We need to redouble our efforts to improve emissions control
- New Plants with Efficiencies of 50% and more
- Retire Old plants with lower efficiencies
- Reduce CO₂ Emissions as well as Sulphur, Particulates
- Coal Washing to be encouraged as it is no longer mandatory

Implications – Pricing

- Review pricing structure to promote coal washing
- We will have 3 pricing sources – CIL/SCCL; Private and Import
- Move to unified pricing – already done for e-auctions
- Merge WPI and NCI





Implications : Industry Structure

- Need to reduce dependence on CIL
- Commercial Mining – 42 mines auction completed
- Reopen Closed mines
- Captive Mining – can we move towards greater liberalization?
- Imports – How to make domestic mining more attractive ? Coal quality, pricing and railway freight

Implications: Regulation

- Need for a National Statutory Regulator
- Use the Coal Controller as the Core
- Make it clear Regulator will not fix prices – only pricing structure
- Disputes between Miner, State Govts. and Nominated Authority
- Encourage formation of one National Coal Market

Implications: Finance

- Financial Markets are increasingly shying away from Coal
- For India this does not make any sense
- Premature to turn away from coal at this stage
- Imperative to engage with Banks and educate them
- GOI, Mining States, CIL, SCCL, Captive Miners and Commercial miners need to get together in this effort

The Future

- Coal is here to stay for decades not years
- A healthy coal market will help the coal based electricity markets
- Study other energy sectors and move towards more efficient market structures
- Similarly we will need a healthy power market also
- Weak Discoms are the greatest problem