

POWER SECTOR

OVERVIEW & ISSUES

Ashok Lavasa Additional Secretary Ministry of Power September 23, 2013

SCHEME OF PRESENTATION

- Legislative and Policy Framework
- Institutional Architecture
- Evolution of Power Sector
- Three 'A' approach:
 - ✓Adequacy
 - ✓ Accessibility
 - ✓ Affordability
- Issues and Challenges

LEGISLATIVE FRAMEWORK

- The Indian Electricity Act 1910 Centralized Administration through Central Electricity Board. No mention of Rural Electrification
- The Electricity (Supply) Act 1948 Coordinated development of electricity in India on a regional basis; setting up of State Electricity Boards; Benefits of electricity to be extended to semi-urban and rural areas.
- Power in Concurrent List Central law prevails in the event of conflicting provisions.
- Electricity Regulatory Commission(ERC) Act, 1998 enacted for setting up of ERCs at Centre and States.
- Energy Conservation Act, 2001 enacted to ensure energy efficiency in consumption and Demand Side Management.
- Electricity Act, 2003 provides liberal framework for power development, facilitates private investment, delicenses thermal generation, creates competitive environment, protects interest of 10/5/2©Onsumer & supplier

POLICY FRAMEWORK

- Private Power Policy 1991- opened up path for private and foreign investment
- Mega Power Policy
- Policy Initiatives under Electricity Act 2003
 - National Electricity Policy
 - Tariff Policy
 - Competitive Bidding Guidelines for procurement
 of electricity
 - Rural Electrification Policy
 - Hydro Policy

INSTITUTIONAL ARCHITECTURE



EVOLUTION

	UNIT	YEAR 1947	PRESENT
INSTALLED POWER CAPACITY	MW	1362	2,27,357 (August 2013)
TRANSMISSION LINE LENGTH	Ckt Km	58	2,90,293 (August 2013)
GROSS INPUT ENERGY	BU	4	912 (2012-13)
PER CAPITA CONSUMPTION	kWh	16	879 (2011-12)
VILLAGE ELECTRIFICATION	Nos	3,061 (1950)	5,59,849 (2013)
PUMPSET ENERGISATION	Nos	2,84,064 (1998)	187,07,829 (2013)
PLANT LOAD FACTOR	%	52 (1985-86)	70 (2012-13)
T&D LOSSES	%	34 (2001-02)	24 (2011-12)
AT&C LOSSES 10/5/2013	%	34 (2004-05)	26 (2010-11) ⁶

PER CAPITA ELECTRICITY CONSUMPTION (2009)*

COUNTRY	kWh
Canada	15467
USA	12884
Australia	11038
Korea	8980
Japan	7833
France	7494
Germany	6781
UK	5693
Russia	6133
South Africa	4532
China	2648
Brazil	2201
India	779
World Average	2730

10/5/2013

*Source: International Energy Agency

POWER SECTOR APPROACH – 3 'A's

•Adequacy	Sufficiency, Reliability & Quality power to all consumers
 Accessibility 	Every citizen to have access to electricity
•Affordability	Competitive pricing of power

ADEQUACY- INSTALLED CAPACITY

(as on 31.08.2013)

(figures in mw)

SECTOR	HYDRO		THERMAL			NUCLEAR	R.E.S	TOTAL
		COAL	GAS	DIESEL	TOTAL		(MNRE)	
STATE	27,437	51,378	5,947	603	57,928	0.00	3,802	89,167
PRIVATE	2,694	37,535	7,368	597	45,501	0.00	24,382	72,577
CENTRAL	9,492	44,275	7,066	0	51,341	4,780	0.00	65,613
TOTAL	39,623	1,33,188	20,381	1,200	1,54,769	4,780	28,184	2,27,357
%	18	59	•	0,5	68.5	2	12	100.00

ADEQUACY – GENERATION CAPACITY

total generation	capacity	addition	(including	RES)
\sim			\mathbf{V}	

1947- 1	992	(45Years)

67,703 MW

1992-2013 (21 Years)

1,54,278 MW

total	deneration	capacity	addition ((excludina	RES)
				\	

<u>1947-1992(45Years)</u>	<u>1992-2013 (21 Years)</u>	
67,671 MW	1,35,742 /	٨W
	8 th PLAN(92-97)	16,423 MW
	9 th PLAN(97-02)	19,119 MW
	10 th PLAN(02-07)	21,180 MW
	11 th PLAN(07-12)	54,964 MW
	12 th PLAN(2012-13)	20,623 MW
	(2013-14)	3,433 MW
	Target 88,537 MW	

Matching capacity addition in transmission and distribution (Investment in ratio 2:1:1) - to focus on both the urban and the rural consumers

Transmission infrastructure to be flexible enough to take care of Open Electricity market and merchant generation.



POWER SUPPLY POSITION

Year	Peak Demand (GW)	Peak Met (GW)	Surp Defic (GW)	lus / it (-) %	Energy Requirement (BII)	Energy Availability (BU)	Surp / Defic (BU)	lus :it (-) %
1991-92	48	39	-9	-19	289	266	23	-8
2012-13	135	123	-12	-9	998	911	87	-8.7

In 2012-13

- Southern Region had highest shortages 18.5% in peak and 15.5% in energy
- Western Region had minimum shortages 1.5% in peak and 3.3% in energy)

ADEQUACY - TRANSMISSION LINES/SUBSTATION CAPACITY ADDITION (220kV and above)

<u>1947-1992(45Years)</u>	<u>1992-2013(21 Ye</u>	ears)	
1,73,761 ckt kms	<u>2,06,345 ckt km</u>		
	8 th PLAN(92-97)	37,921	
	9 th PLAN(97-02)	34,893	
	10 th PLAN(02-07)	46,138	
	11 th PLAN(07-12)	70,286	
	12 th PLAN(1 st Yr)	17,107	
	PLAN TARGET - 1,07,440		

<u>1947-1992(45Years)</u>	<u>1992-2013(21 Years)</u>				
75,322 MVA	3,99,344 MVA				
	8th PLAN(92-97)	49,720			
	9th PLAN(97-02)	56,901			
	10th PLAN(02-07)	75,696			
	11th PLAN(07-12)	1,53,362			
10/5/2013	12th PLAN(1st Yr)	63,665			
	PLAN TARGET - 2,70,000				

Sub-Station Capacity



ACCESSIBILITY - NO. OF VILLAGES ELECTRIFIED PLANWISE (CUMULATIVE)



* Cumulative achievement revised as per definition of Village electrification notified in Oct 1997 ** Cumulative achievement revised as per list of villages 2001 census and as per definition of village electrification notified in 2004 10/5/2013 14

NO. OF VILLAGES ELECTRIFIED PLANWISE (CUMULATIVE)

		Cumulative villages	%age of Village Electrifica	
Period	Year	Electrified	tion	
	1950	3061		
End of 7th Plan	1990	470838	81%	
End of Annual plan	1992	487170	84%	
End of 8th Plan	1997	498836	85%	
End of 9th Plan	2002	489699	83%	*Cumulative achievement have been revised as per definition of village electrification notified by Govt of India in Oct 1997
End of 10th Plan	2007	482864	81%	** Cumulative achievement have been revised as per villages 2001 census and as per definition of village electrification notified by Govt of India in 2004
	2007	402004	01%	111 2004
Ist year of 12th Plan	2012	557439	93%	
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ACCESSIBILITY - DEFINITION OF VILLAGE ELECTRIFICATION

Prior to October 1997

Village classified as electrified if electricity was used within its revenue area for any purpose whatsoever.

• In 1997, definition modified to provide for the use of electricity to village habitations.

A village will be deemed to be electrified if the electricity is used in the inhabited locality within the revenue boundary of the village, for any purpose whatsoever.

• February 2004 – Scope Enlarged

A village would be declared electrified if:

- Basic infrastructure such as distribution transformer and distribution lines are provided in the inhabited locality as well as the dalit basti/hamlet where is exists. (For electrification through non-conventional sources a distribution transformer may not be necessary)
- Electricity is provided to public places like schools, panchayat offices, health centres, dispensaries, community centres etc, and
- Number of households electrified should be at least 10% of the total number of households in the village.

Census Data

Census	Total Households (Crores)	Electrified* Households (Crores)	Urban Households (Crores)	Electrified* Urban Households (Crores)	Rural Households (Crores)	Electrified* Rural Households (Crores)
2001	19.19	10.72 (55.8%)	5.37	4.70 (87.61%)	13.82	6.02 (43.52%)
2011	24.67	16.59 (67.2%)	7.89	7.31 (92.7%)	16.78	9.28 (55.3%)

*Households using electricity as main source of lighting

• As per National Sample Survey Organization (NSSO) Report 2009 - 75% households at all-India level had electricity for domestic use while only 66 % households in rural areas and 96% in urban areas had this facility.

ACCESSIBILITY - RURAL ELECTRIFICATION PROGRAMS

- Minimum Needs Program
 - Started in Vth Plan
 - Targeted states with village electrification lower than national average
 - 100% loans for last mile connectivity
 - Discontinued in 2004-05 because of lack of response from States
- Kutir Jyoti Programme
 - Initiated in 1988-89
 - Single point connection to BPL households
 - 100% grant
 - 71.7 lakh BPL household connected in 16 years
 - Merged with scheme "Accelerated Electrification of one lakh villages and one Crore households" in 2004 and later with RGGVY
- Pradhan Mantri Gramodaya Yojana (PMGY)
 - Launched in 2000-2001
 - Funding provided for minimum services in rural areas (health, education, drinking water and electrification etc)
 - Funding as ACA on 90% loan and 10% grant principle
 - Flexibility to states to decide on inter-allocation amongst basic services
 - Discontinued from 2005 when RGGVY was launched

- Accelerated Rural Electrification Program (AREP)
 - Launched in 2002
 - Interest subsidy of 4%
 - Applicable on loans given through PFC/REC and NABARD for RE works
 - Merged with scheme "AEOLV&OCH" in 2004
- Accelerated Electrification of one lakh villages and one Crore households
 - Launched in 2004
 - 40% capital subsidy and 60% loan
 - AREP and Kutir Jyoti schemes merged with the program
 - Merged with RGGVY in 2005
- Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) launched in April 2005
 10th Plan (continued in 11th Plan and approved for continuation during 12th & 13th Plan)
 - Scheme for creation of Rural Electricity Infrastructure and Household Electrification

ACCESSIBILITY - RAJIV GANDHI GRAMEEN VIDYUTIKARAN YOJNA (RGGVY)

- 90% capital subsidy to states for creating infrastructure for providing access to all households in villages. BPL households provided free connections.
- Present Status (as on 31-8-2013)
 - Electrification of 1.08 Lakh un-electrified villages
 - > Intensification of 3 Lakh partially electrified villages
 - Electricity connections to 2.12 Crore BPL Households
- Provision of Decentralised Distributed Generation (DDG) projects for remote villages where grid connectivity is either not possible or not feasible.

Now also extended to electrified villages where electricity is available for less than 6 Hrs/day.

 Under DDG, 586 projects at an Est. cost of Rs 263 Crores for 10 states covering electrification of 1054 remote villages/ hamlets have been approved.

This is in addition to villages being electrified by MNRE.

10/5/2013

AFFORDABILITY

- Improving Efficiency in Generation
- Introduction of Open Access
- Procurement of Power through competitive bidding
- Modernisation of transmission & distribution infrastructure for reduction of AT&C losses
- Introduction of power exchange for trading of electricity
- Rationalisation of Tariff
- Upfront payment of subsidy by the State Govt.

TRANSMISSION & DISTRIBUTION (T&D) LOSSES



AFFORDABILITY - R-APDRP

- Central Scheme (Rs. 51,577 crore) approved in July 2008 focus on actual demonstrable performance of AT&C loss reduction
- Coverage of urban towns and cities with population greater than 30,000 (10,000 for special category states)
- Part-A establishment of baseline data and IT applications for energy accounting/auditing & IT based consumer service centers.
 - ✓1402 projects approved
 - ✓ SCADA projects for 65 towns of 16 states
- Part-B Strengthening and augmentation of distribution infrastructure
 - ✓1171 projects approved
- Govt. of India has approved continuation of RAPDRP during 12th & 13th Plan period

- Fuel adequacy for power generation
- Distribution Improving financial viability of DISCOMs
- Development of competitive electricity market
- Increase renewable power and its integration in electricity grid
- Reliable operation of expansive grid
- Minimizing carbon footprint of power sector development

Fuel adequacy –

	(MT)	GAS (MMSCMD)				
	2007- 08	2012-13	2016-17	2007-08	2012-13	2016-17
REQUIREMENT	360	500	842	66	82	112
AVAILABILITY	296	407	612	38*	52*	42
IMPORT	10.2	62.6	171			

* includes 4.82 MMSCMD of LNG (Long term tie up)

Impact of imported fuel

- Imported Coal Increase in cost of generation by 5 to 45 paise per unit (for 15% blending) depending on location of plant
- LNG Increase in cost of generation by about Rs 9 per unit (full on LNG)
- Supply of coal hampered due to coal blocks falling in "No-Go" areas and problems in evacuation of coal from mines.

Improving financial viability of DISCOMs

- Poor financial health of distribution utilities due to
 - Inadequacy of tariff, Gap between ACS & ARR
 - High AT&C losses
 - Obligation to supply electricity to low paying consumers
- Steps to improve financial viability of DISCOMS
 - Financial Restructuring Package
 - Model State Electricity Distribution Responsibility Bill
 - Gap between average cost of supply and average revenue realized to be narrowed
 - Model Tariff Regulations

Development of competitive electricity market

- Introduction of **Open access** for development of free market mechanism
- Possibility of separation of carriage and content being considered in distribution
- Need to increase depth of **short term** market

Renewable energy sources (RES) – integration with grid

- Existing IC of RES about 25,000 MW i.e. 12% of total IC; energy from RES about 5%. 12th and 13th Plan capacity addition expected to be about 30,000MW in each Plan.
- Challenge
 - > To achieve economies of scale to make RES power competitive
 - Integration with grid as concentration of 86% generation in 5 states
 - ➢ Renewable Purchase Obligation (RPO)
 - ➢Renewable Energy Certificate (REC) mechanism
 - Implementation of Green Corridors transmission system planned to evacuate RES power

- Reliable operation of grid deficit power situation about 8.7% deficit in energy and 9% deficit in peak power)
- Necessary to monitor grid closely Indian Electricity Grid Code (IEGC) details principles of grid operation
- Location of electricity resources and demand unevenly distributed - Surplus availability of power and energy during some seasons in certain Regions necessitates robust transmission network
- Need for National Power Grid NEW grid to be integrated with Southern Grid by 2014.

Minimizing carbon footprint

- Increasing environmental concerns could impact Indian power sector in multiple ways - influencing price and availability of fuel, fuel mix and demand for power.
- Overall per capita CO₂ emission higher in developed economies. India's per-capita emission is among lowest in the world but overall CO₂ generation is high.
- Bureau of Energy Efficiency (BEE) and Ministry of Power are setting up initiatives to enable low Carbon growth strategies through facilitation of their activities under the NMEEE (through Perform Achieve and Trade mechanism) and other programs (including Bachat Lamp Yojana and Standards and Labeling).
- Energy Efficiency and Conservation

Thank you

