

Challenges in devising Better Environmental Policies in the Indian coal power sector

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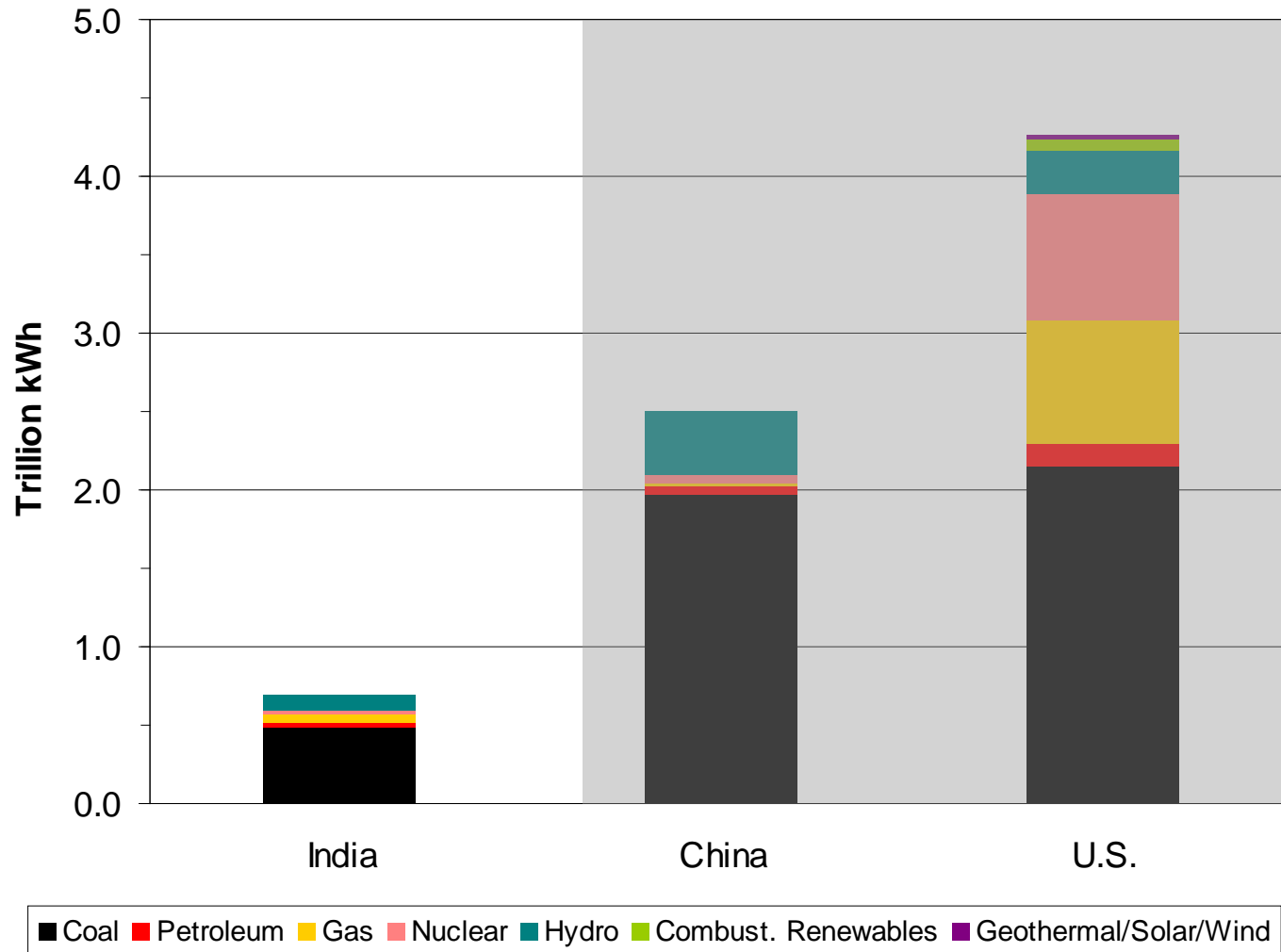
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Outline

1. Background on Indian Coal-Power
2. Current Emissions/Regulations
3. Key Policy Issues
4. Meeting the Challenges

1.0 Power Generation



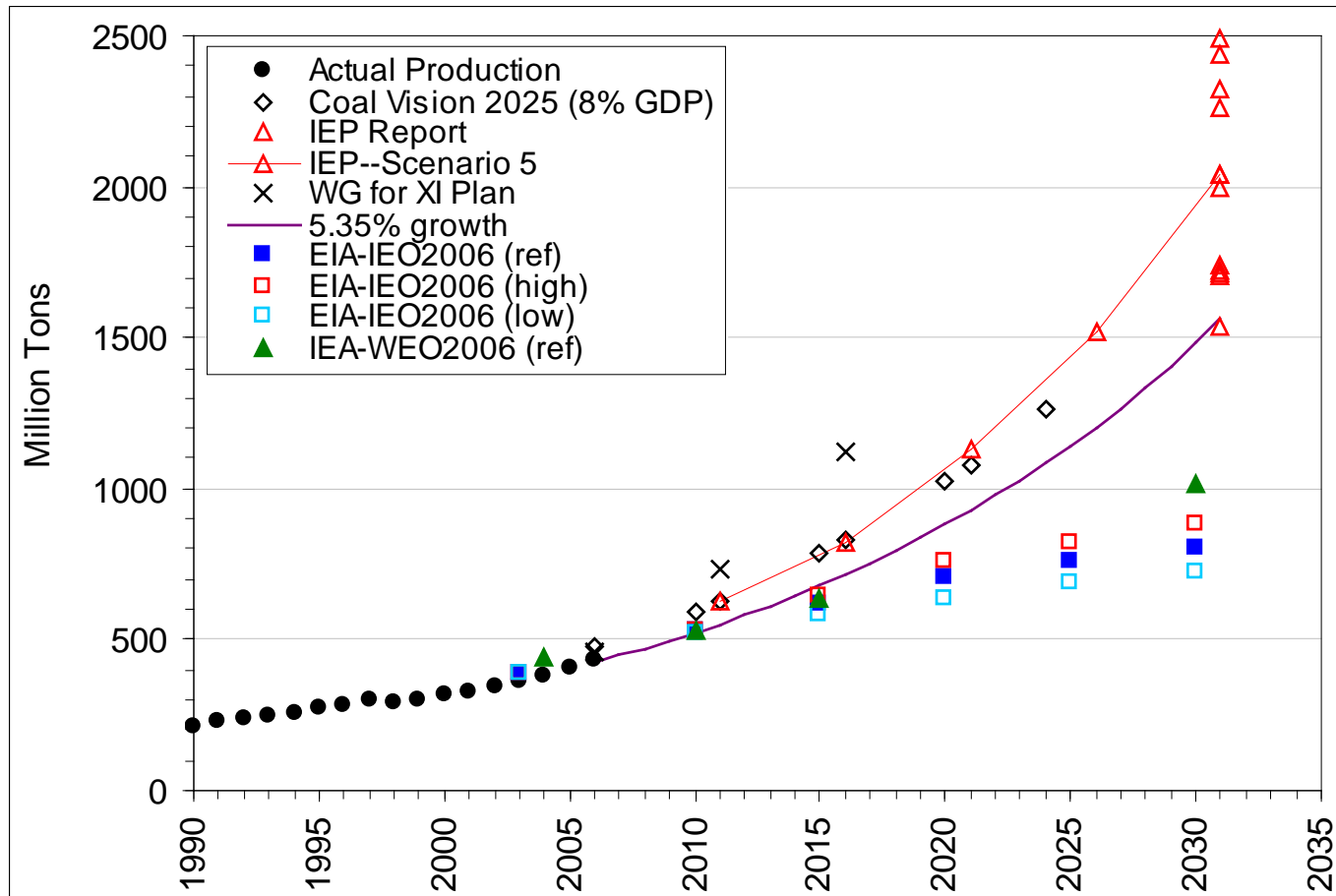
Per capita consumption (kWh)

World	2600
U.S.	13,600
China	1800
India	480

Source: IEA 2007; 2005 data

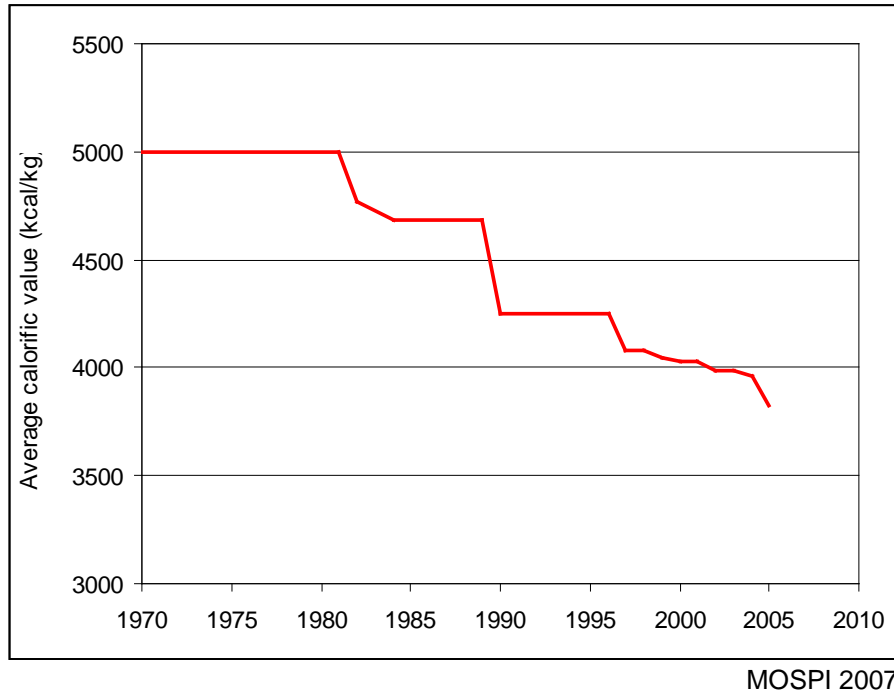
Electricity generation dominated by coal
Most of domestic coal production is for electricity generation

1.1 Future Coal Demand – India



- 10 GW of coal-power installed 2002-2007 (Planned: 20 GW)
- 45 GW of coal-power planned for 2007-2012
- 600 TWh in 2004-05 → 3600-4500 TWh by 2030
- Domestic coal production might be unable to cope with demand → Rising imports (11% to 45% of coal demand by 2030)

1.2 Poor quality coals

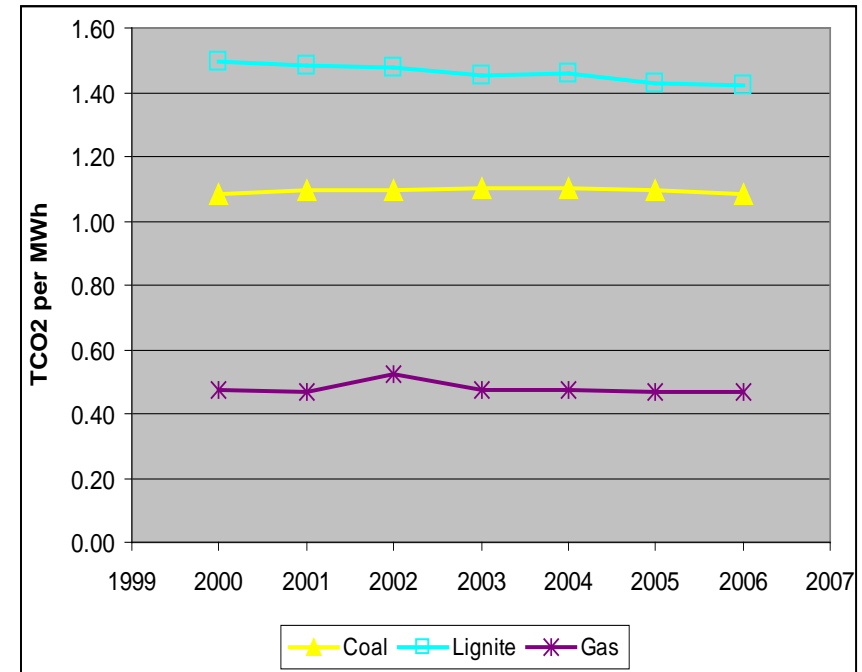
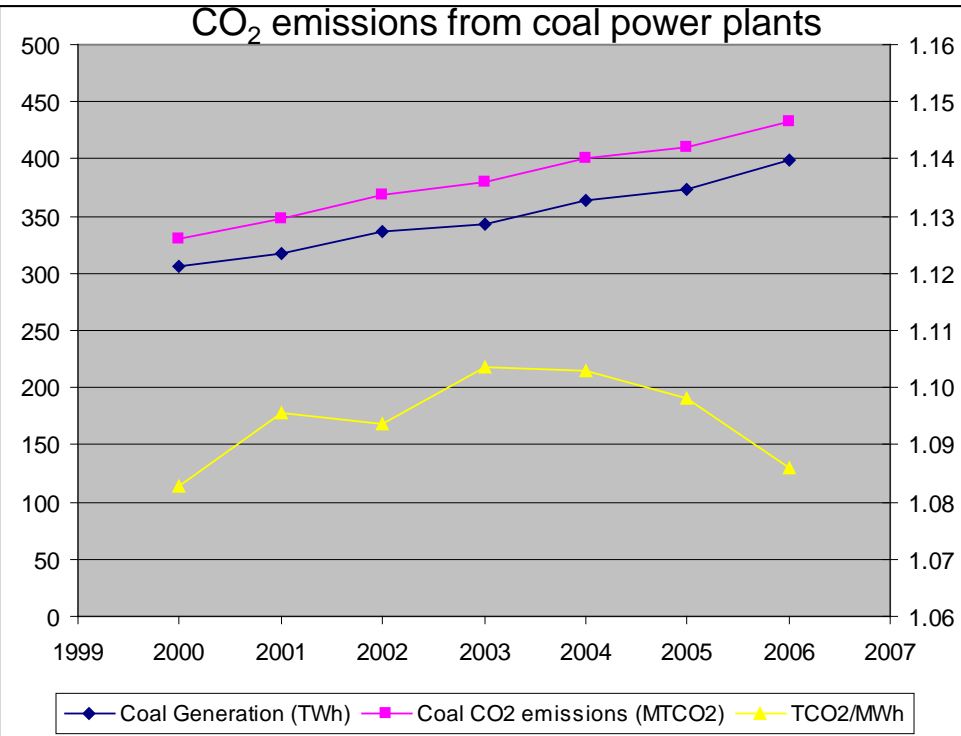


- Quality of Indian coal decreasing
- But, power plants are getting better at using the poor quality coal
- High ash content (40-50%)
- Fairly low S content (0.6% avg)
- High toxic material content (Hg, Cr)
 - 41 T_{Hg} released in 78 MT of ash (1997)
 - 80 T_{Hg} by 2012

Element	Earth's Crust Average	Indian Minimum	Indian Maximum	Indian Average	British Average	US Average	Australian Average	Worldwide Average
As	2.0	0.1	23.0	5.0	18	15	3	5
Hg	0.1	0.0	2.7	0.35	--	0.18	0.1	0.012
Cd	0.15	0.0	13.0	1.3	0.4	1.3	0.1	-
Pb	16.0	0.0	46.5	15.0	38	16	10	25
Cr	200.0	5.0	90.8	70.0	33.6	15	6	10
Ni	80.0	0.0	100.0	45.0	27.9	15	15	15
Co	23.0	2.1	40.0	11.0	--	7	-	5

Masto et al. 2007

2.0 Emissions from coal



Source: CEA 2007

- Increasing coal use → increasing environmental damages
 - Air emissions (flyash, SO₂, NO_x, CO₂, toxics) and water pollution
 - Efficiency improvements not strong enough
- More than 100 MT of ash produced annually
 - Fly ash utilization increasing, but ash content of coals also increasing
- Data on SO₂, NO_x, and toxics emissions not easily available
 - 2 MT of SO₂ in 1996 from coal power plants (Reddy and Venkaraman, 2002)
 - 7 tons SO₂ per GWh (1990-1995) (1996 data; Reddy and Venkaraman, 2002)

2.1 Current Coal-Power Regulations

- Environmental Impact Assessment (before building)
- Two regulations: Emission limits and Ambient Air Quality Standards (AAQS)
- Particulates
 - No size differentiation (i.e. PM10 vs. PM2.5)
 - 150 mg/m³ for units 62.5 MW or higher
- SO₂
 - Stack height increases with unit size
 - Space to be left for FGD in 500 MW plants
- No regulations on CO₂, NO_x, and toxics emissions
- New draft AAQS has limits on PM2.5, VOC, Pb, and Hg concentrations

Year	Total Number of Operating Plants	Emission Standard		Effluent Standard	
		Comply	Not Comply	Comply	Not Comply
1999-00	74	34	40		
2000-01	76	48	28		
2001-02	78	42	36	49	29
2002-03	79	48	31	52	27
2003-04	78	56	22	63	15
2004-05	78	55	23	63	15
2005-06	78	56	22	63	15
CPCB 2006-07	78	56	22	63	15

- Enforcement is a key issue
- Reasons for not complying
 - Inconsistent coal supply
 - Lack of funds
- Power plants are not shut down for violations

2.2 Control Technology

- Deployment depends critically on regulations and enforcement
- All Indian plants have Electrostatic precipitators (ESP)
 - Modified ESPs necessary for Indian coal
 - Bag filters limited by high ash content
- FGD not required, but space to be left at 500 MW units
 - Might be necessary when using high-S imported coals
- Selective Catalytic Reducers (SCR) not used in India
 - Lack of NO_x standards
- No plans for Hg & other toxic material removal
 - New ambient air standards have some limits
 - Retrofitting?
- CO₂ removal – too expensive (double the cost, while losing 30% power)

3.0 Key Policy Issues for Future

- Understanding what Environment *and* Development means/implies
 - Deployment of CCTs depend crucially on how this relationship is interpreted
- Land-use rights is often *the* critical issue
 - Especially for coal mining
- Dealing with mitigation of GHG emissions (Climate Change)
- Increase public participation in decision-making
 - Broader public needs to seriously engage in env't-development debate
 - Must involve a wide cross-section of society, particularly need to sensitize the urban middle-class (who benefit, but do not pay price)
 - Crucial for building political will
- Need for better data collection and analysis
- Regulations beyond Command-and-Control for faster deployment of pollution control technologies

3.1 Institutional challenges

- Environmental protection derived from legislation
 - Air Act 1981 and Environment (Protection) Act 1986
 - MoEF: 1994—Notification on Environmental Impact Assessment (EIA)
- Judiciary has played key role in enforcement
 - Lately has put “development” ahead of environmental protection
- Ministry of Environment & Forests—doing too many things with too little resources
 - Lack of trained human resources at time when volume of regulation/enforcement is increasing
 - Little/no time for research and data analysis
 - Ministry not given same priority as Industrial ministries
- Industry mainly worried about getting clearances on time
 - Complaints on arbitrary rules and allegations of corruption
- Command-and-control mentality
 - Little/no emphasis of market/performance-based options

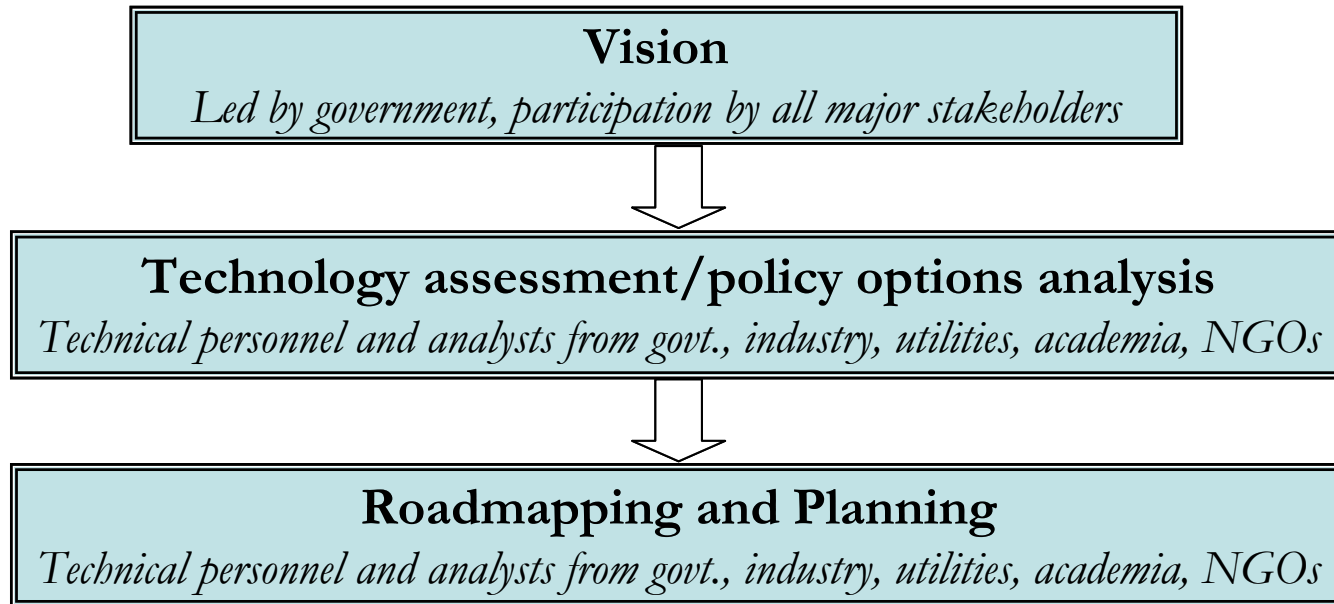
3.2 Public Pressure

- Local environmental and community groups becoming more opposed to coal-based power plants
 - Unlike in U.S. and Europe, focus is more on local environment and not GHG emissions
 - Main focus is on land-use and displacement issues
- EIA process is usually the first venue for public hearings and participation
 - But, EIA often considered as a hindrance to project development
 - Industry pays for and influences EIA preparation
 - Lack of proper data collection and analysis; lack of information at local level
 - Lack of “meaningful” public participation
- “Fraudulent” EIAs → protests
 - 1990s: Cogentrix in coastal Karnataka (location in sensitive area)
 - 2008: Chamalapura power plant in Karnataka (water availability)

4.0 Meeting the challenges

- Bureaucracy and government to consider environmental issues in practice, not just in theory or law
 - Environment ministry must be given higher importance
- Stricter enforcement of standards and *polluter pays* principle
 - More transparency in the standard-setting process
 - Shutting down power plants for violations (especially older plants)
 - Critical for CCT for deployment (else status-quo technologies prevail)
- Industries to take a long-term approach rather than pushing for quick-fix solutions
 - Eliminate corruption for quick gains
 - Take EIA's seriously!
 - Be conducive to “no-build” decisions
 - Work with environmental groups
- Project EIAs to be reviewed in the context of larger regional conditions/impacts/other projects
- Increased environmental education (pollution impacts)

4.1 Decision-making Process



- Environmental and social costs need to be included in the decision-making process
- Process must include local people (tribals, forest-dependent communities, villagers)
 - Must receive equitable share of benefits from industrial activities (employment, revenue sharing, etc.)
 - Involve local people in preparation of EIA (local knowledge)

4.2 Common Consensus Vision

Planning Commission-KSG-ASCI Workshop Series on Coal and Coal-Power in India:

Consensus Vision:

“Generate coal-based power competitively, to reliably meet integrated energy demand, while maximizing energy efficiency, enhancing India’s energy security, and ensuring social and ecological sustainability.”

- “competitively” – allows for low economic cost of generation
- “reliably” – critical for high-quality generation of power, which lowers economic costs
- “integrated energy demand” – includes electricity and other energy demands, such as industrial heat
- “social and ecological sustainability”— generation should also be at low socio-environmental costs, and make optimal use of byproducts

This Vision needs to become integrated within the decision making process to affect real change!

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