

Bottom up approaches for India

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*How could positive incentives work
to facilitate a global climate change agreement*



Outline

- Status and trend of economic development and energy use in India
- Potential mitigation opportunities
- Addressing the barriers and realizing the mitigation potential
 - Domestic action
 - Additional funding/support through bilateral collaboration
 - Wider international policy support

Developmental challenges/priorities

- Providing adequate access to basic amenities & services
 - 44 per cent household do not have access to electricity
 - Development of Infrastructure (Roads, Railways, Power, Electricity transmission, Water supply)
- Need for energy for meeting the MDG target – ‘improving the condition of world’s poor by 2015’

Rapid economic development can only provide a lasting solution to the problems of the country

India in the global energy scenario

- Economic reforms and growing Indian economy
- India ranks fifth in world in terms of TPEC accounting for about 4% world's commercial energy demand in 2006
- Per capita commercial energy consumption is quite low
- Energy intensity is reducing

Growth of Indian economy and increasing energy use – an important element in global energy scenario

Energy supply demand scenario

- Coal contributed 52% of TCES in 04-05 while oil contributed 36%
- Industry accounted for 42%, transport 18% and residential sector 14% of the final commercial energy use during the year

How to meet the growing energy need in a sustainable manner

GHG emissions

1229 mt of CO₂e

- Energy 61%
- Agriculture 28%
- Industrial processes 8%
- Waste 2%
- LULUCF 1%

GHG Mitigation Options

<div data-bbox="300 341 549 472" style="border: 1px solid black; padding: 2px;">Mitigation potential</div> Cost	Low	Medium	High
Low	Super critical Advanced gas turbine R & M	Small hydro Labeling of consumer appliances Green buildings	Industrial energy efficiency Transport sector interventions (public transport, road to rail & efficiency improvement) Efficient lighting
Medium	Renewable energy options	Ultra super critical power plants	
High		Hybrid vehicle for city transport	IGCC CCS Hydrogen based IC engine for transport

Low cost mitigation options

Option	Barriers	Drivers
Power R&M Advanced gas turbine Coal super critical	Financially sick state utilities, Opportunity cost of capital, financing, tech limitation Availability of technology High initial cost, confidence on technology	Energy security Air quality improvement / health
Transport Higher share of public transport Higher share of rail transport Eff improvement in road transport	Investment, myopic urban planning Investment, stressed infrastructure Lack of eff standard, huge investment requirement	Air quality improvement / health, Reduction of urban congestion , Access to transport services, Connectivity, energy security
Residential & commercial Lighting (CFL, electronic chokes) Labelling of appliances Energy efficient buildings	High initial cost, consumer confidence, performance, quality of power New initiative, awareness Know-how, mindsets, applicable only in new buildings, institutional coordination	Energy (bill) savings, energy security
Industries Industrial EE improvement Higher share of fly ash blended cement Higher share of Natural Gas based ammonia production	Opportunity cost of capital, Tech dumping, capital constraints, variety of raw materials and products Limited applicability, high transport cost of fly ash and slag Natural Gas availability	Energy (bill) savings Increase in productivity and economic competitiveness

Low cost options *contd...*

- Almost all the options happening
 - Impacts are small
 - Prime driver – energy bill, air quality, health, etc.
 - Awareness about energy security, environment, CC increasing
- Barriers
 - Finance, high upfront cost
 - Access to technology, raw material
 - Know how, mind set
 - Lack of incentives

Need for up scaling these activities several folds through appropriate enabling environment, investment framework and international mechanisms

Medium cost options

Option	Barriers	Drivers
Power Coal ultra-supercritical	Access to technology, high capital cost, confidence in project developer (only 24 plants operating globally),	Energy security Air quality improvement / health
Renewables Small hydro	Dispersed (maintenance problems), limited potential	Access to energy services, quality of life, economic development
Industries Cogeneration in cement plant Efficient improvement in industries	High capital cost, Opportunity cost of capital, lower technical capability in small plants High upfront cost of technology, large capacity plant	Energy (bill) savings Increase in productivity and economic competitiveness

High cost mitigation options

Option	Barriers	Drivers
Power IGCC – imported coal	High capital cost, forex burden, confidence (only around 10 plants operating world wide, adoption to Indian condition)	Energy security Air quality improvement / health
Renewables Biomass gasifier Solar PV Wind	High capital cost, O&M Suitable technology development, limited potential	quality of life, economic development
Transport Biodiesel	Land availability, coemption with food crops, penetration, cost, procurement policy, involvement of oil companies	Air quality improvement / health Energy security
High-end technologies IGCC – domestic coal CCS Hydrogen-based IC engine for transport Hybrid vehicle for city transport	High ash content, tech development, R&D cost, high capital cost High capital and O&M costs, info on storage sites, confidence High cost, hydrogen production, storage, transport, safety Nascent technology	Energy security, air quality improvement / health Energy saving, competitiveness

Domestic actions

Great emphasis on EE improvement

- Large industries already participating actively
 - EC Act 2001 notifies 9 energy intensive industries
- Intervention in SMEs
 - Significant role in Indian economy
 - Faced with obsolete tech, low awareness, access to tech and finances
 - Schemes like Tech Upgradation Fund, Credit Linked Capital Subsidy Scheme, Credit Guarantee Fund etc. initiated
- Policy and regulatory regimes
- Large awareness generation

Additional funding and support through bi-lateral collaboration

- Clean Investment Framework and Fund
 - Financial support from Annex I countries
 - Mobilizing public and private sector funds
 - Venture capital
- Training and capacity building

Wider international policy support

- Carbon markets and Carbon Funds
- Intellectual Property Rights
- Technology Transfer and Adaptation
- Collaborative R & D

Thank you

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