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Energy Efficiency & Technology: Options for a global sustainable energy policy

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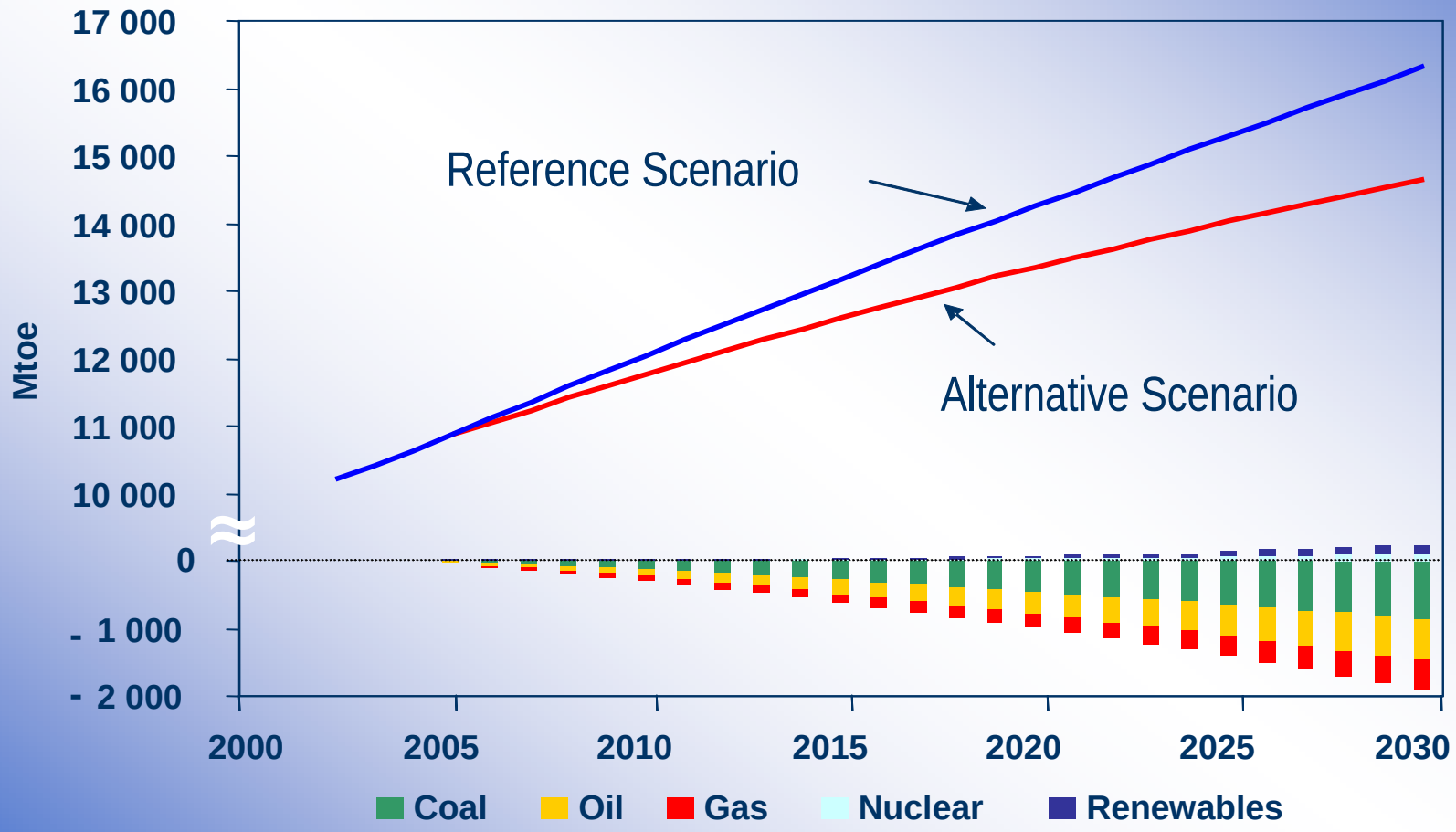
World Primary Energy Demand in Reference & Alternative Scenarios



Coal demand falls most among fossil fuels

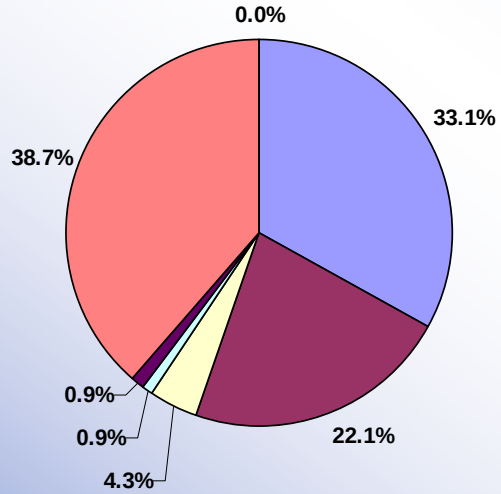
Table 11.8: **Main Policies Considered in the Alternative Scenario in India**

Sector	Programme/measure	Impact
Power	Refurbishment of existing coal-fired plants	More efficient old coal-fired plants
	Support for more efficient and cleaner new coal-fired plants	More efficient new coal-fired plants
	Incentives to promote renewables-based generation	Increased renewables-based generation
	Policies to reduce transmission and distribution losses	Fewer transmission and distribution losses
	More government support for nuclear power	Increased nuclear power production
Transport	Measures to accelerate the introduction of less polluting vehicles and fuels	More efficient new vehicles; faster deployment of CNG, LPG, biofuels Faster replacement of old, polluting vehicles
Industry *	Standards and certification for new motor systems	More efficient motor systems
	Voluntary agreements covering energy auditing, target setting and monitoring	Faster deployment of more efficient technologies
	Tax incentives and low-interest loans for efficient technologies	Accelerated deployment of new boilers, machine drives, and process-heat equipment
	Restructuring of state-owned industries	More investment in larger-scale, more efficient processes
Residential and commercial *	Efficiency standards and new mandatory energy labelling for new appliances and equipment	More efficient appliances and equipment
	Measures to improve the efficiency of lighting equipment	More efficient lighting
	Building codes for commercial and large residential buildings	More efficient buildings, leading to lower lighting and cooling loads
	Financing schemes and promotional campaigns for solar water heaters and improved cook-stoves	More solar water heating, more use of LPG and more efficient biomass cook-stoves

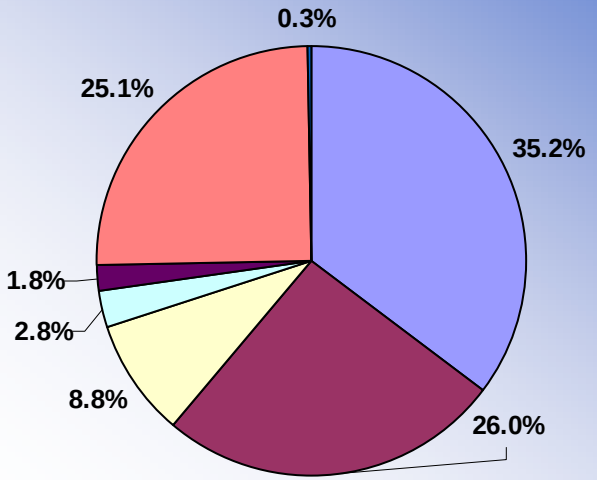
* Policy measures primarily derived from the Energy Conservation Act.

India Primary Energy Demand

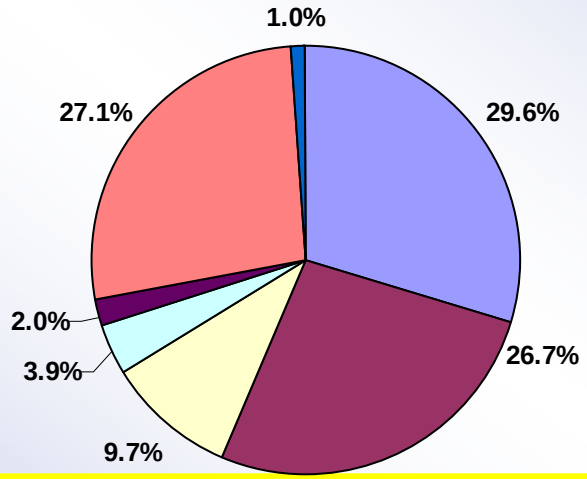
Total Primary Energy Supply in 2002
538 Mtoe



Reference Scenario, 2030
1026 Mtoe



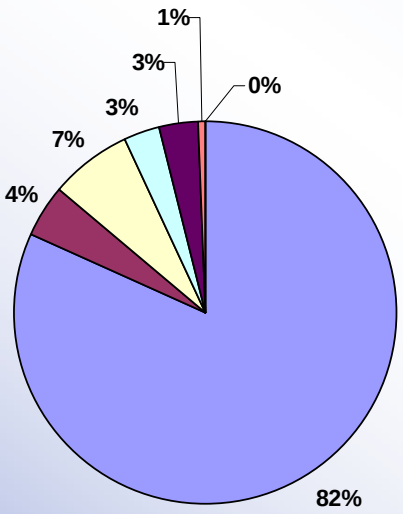
Alternative Scenario, 2030
902 Mtoe



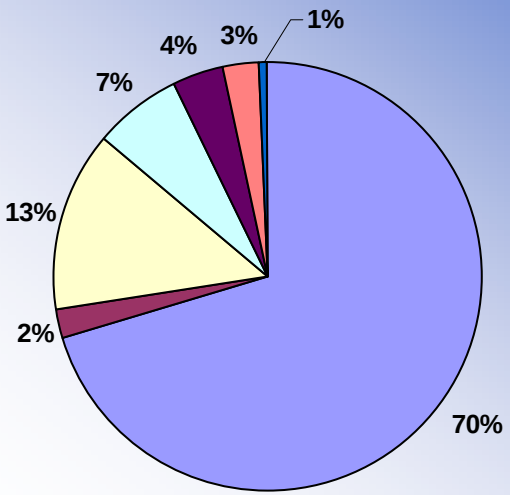
Coal
Oil
Gas
Nuclear
Hydro
Biomass and waste
Other renewables

Power Generation & Heat Plants

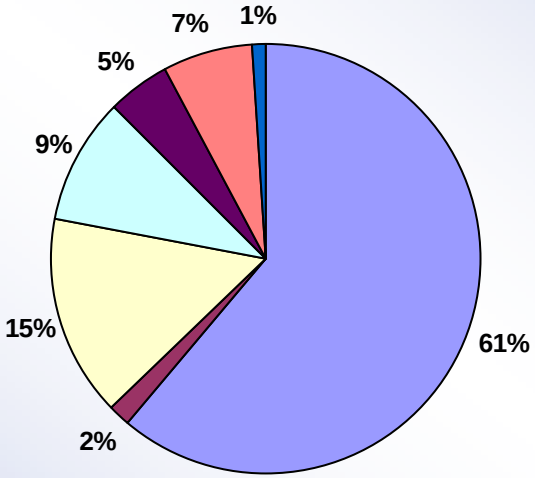
Power Generation and Heat Plants, 2002
160 Mtoe



Reference Scenario, 2030
438 Mtoe

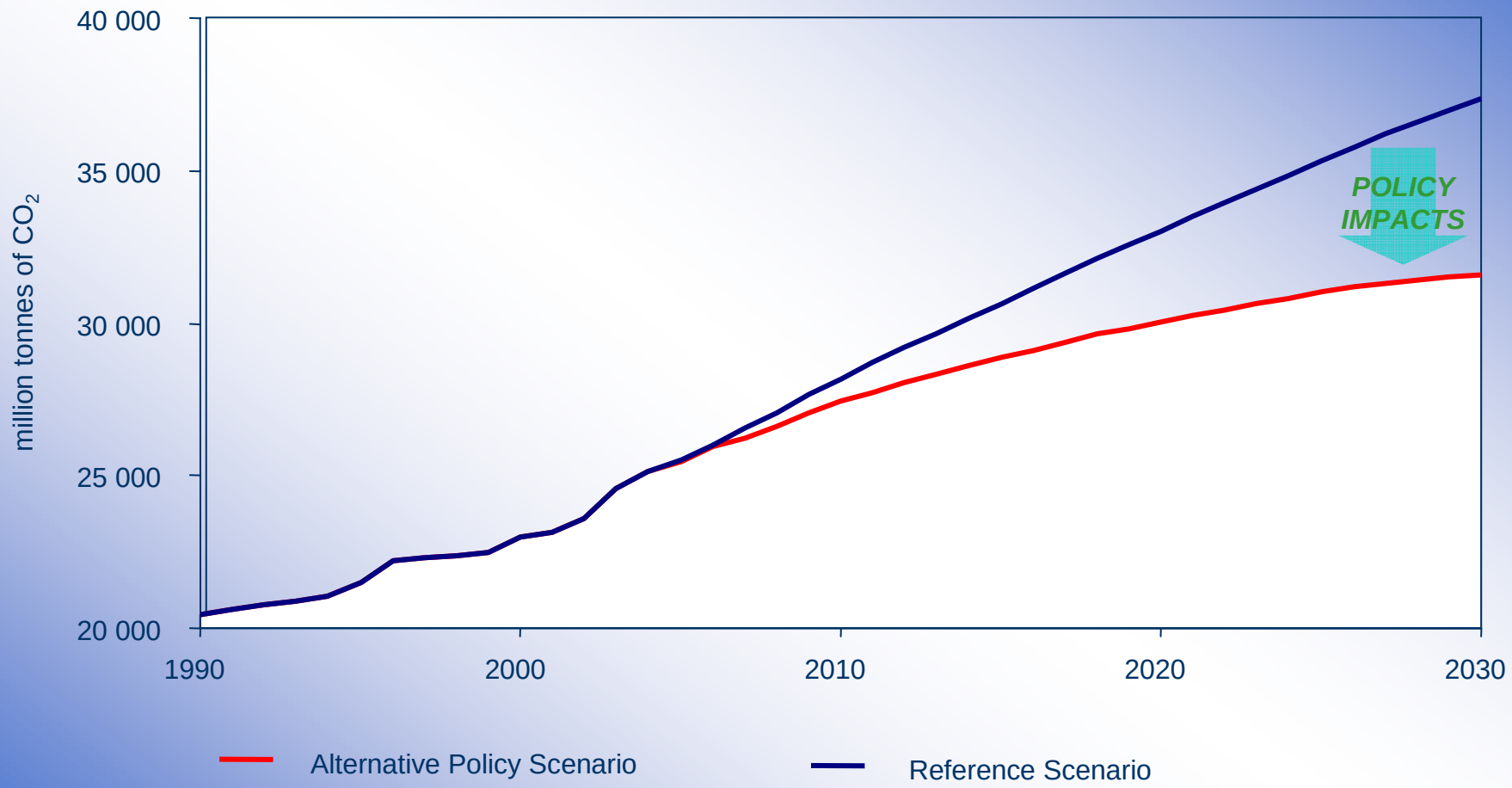


Alternative Scenario, 2030
372 Mtoe



Coal
Oil
Gas
Nuclear
Hydro
Biomass and Waste
Other Renewables

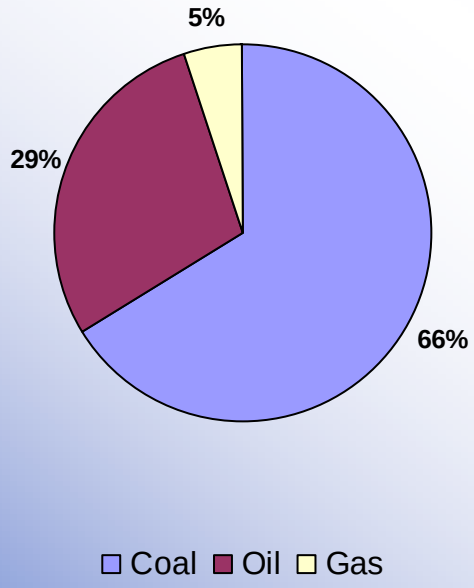
Part of the investment challenge is changing the CO_2 emission path



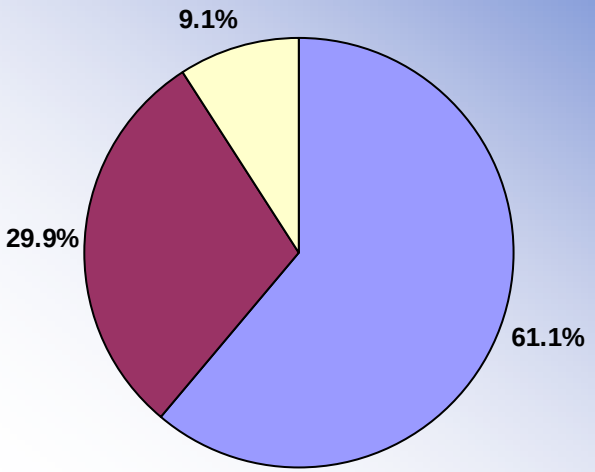
In 2030, CO_2 emissions in the *Alternative Policy Scenario* are 16% lower than *Reference*, but still 50% higher than 1990

India Total C02 Emissions

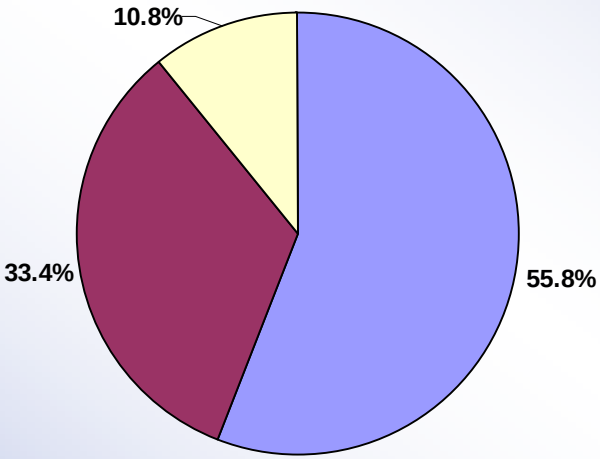
Total Co2 Emissions, 2002
1016 Mt



Reference Scenario, 2030
2254 Mt

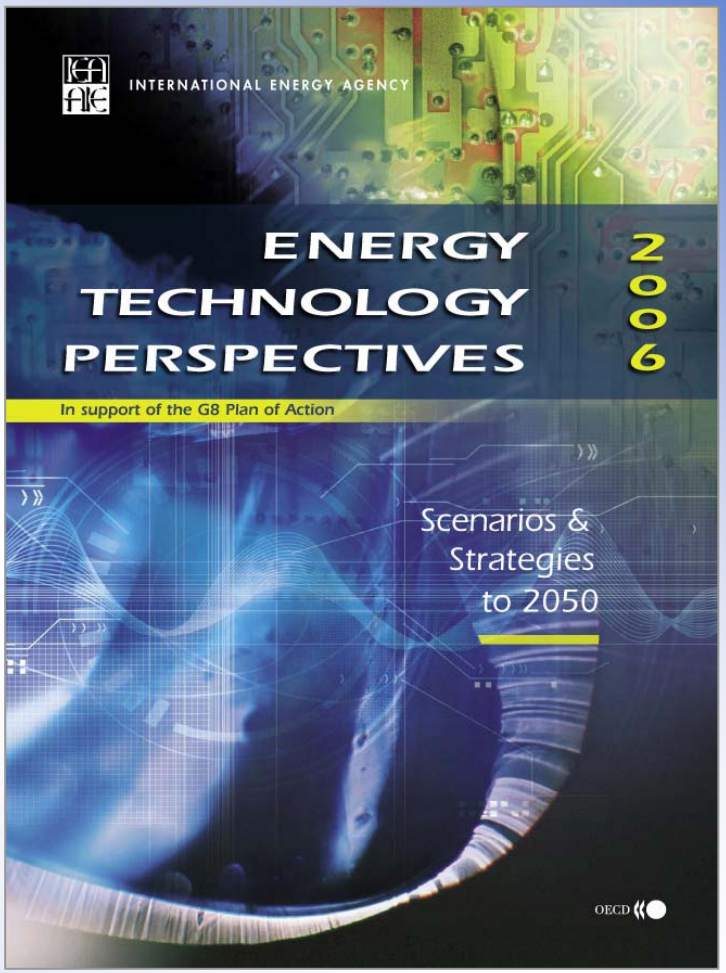


Alternative Scenario, 2030
1818 Mt



Energy Technology Perspectives 2006

ETP 2006 presents a groundbreaking review of technologies across all sectors and assess how they together can make a difference



Energy Technology Perspectives Presents

- Status and perspectives for key energy technologies in:
  - Power Generation
  - Transport
  - Buildings and Appliances
  - Industry
- Global scenarios to illustrate potentials for different technologies under accelerated policies
- Strategies for helping key technologies make a difference

Scenario Analysis
Key Findings

- Most energy still comes from fossil fuels in 2050
- CO_2 emissions can be returned towards today's level by 2050
- Growth in oil and electricity demand can be halved
- Power generation can be substantially de-carbonised by 2050
- De-carbonising transport will take longer but must be achieved in the second half of the century

Energy Efficiency - A top Priority

- Improved energy efficiency saves about 15 000 Mt CO_2 by 2050 - equivalent to 60% of current emissions
- Improved efficiency halves expected growth in electricity demand and reduces the need for generation capacity by a third
- In a scenario with less progress in efficiency, CO_2 emissions increase more than 20%
- Lower efficiency progress increases supply-side investments and costs of reducing CO_2 emissions

Electricity Generation

CO_2 Capture and Storage a Key Option

- CCS is crucial for the role coal can play in a CO_2 constrained world – without CCS coal-fired generation in 2050 drops below today's level
- By 2050 more than 5 000 TWh electricity globally can be produced by coal-plants equipped with CCS
- There is an urgent need for more R&D and for full-scale CCS demonstration plants
- Generation from renewables can quadruple by 2050
- Nuclear can gain a much more important role in countries where it is acceptable

Transport
Key to Reduce Growth in Oil Demand

- Share of biofuels by 2050 is 13% and average 2050 vehicle is almost 50% more efficient than today
  - Reduce expected growth in transport oil demand by almost 50%
- Transport accounts for 62% of the 42 mbpd total oil savings by 2050, which more than halves the expected growth in total oil demand
- Hydrogen and Fuel Cells can reduce transport oil demand and CO_2 emissions even further and can be crucial for long-term sustainability

Key Technologies

- A technology portfolio will be needed
- Improving energy efficiency is top priority
- CCS is key for a sustainable energy future
- Other important technologies:
  - Renewables, including biofuels
  - Nuclear
  - Efficient use of natural gas
  - In time and with effort, hydrogen and fuel cells

Policy Implications

- A more sustainable energy future is possible with known technology
- The costs are not out of reach
- But urgent action is needed in public and private sectors:
  - Overcome barriers for adoption of energy efficient technologies
  - Enhance R&D
  - Accelerate demonstration and deployment
  - Provide clear and predictable incentives
- Collaboration between developed and developing countries essential