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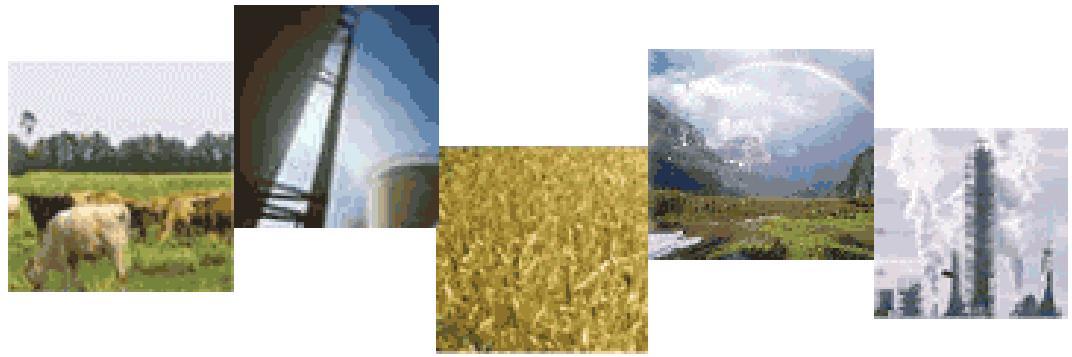

Climate Change 2001: Mitigation

(Reference: IPCC Third Assessment Report)

Climate Change Mitigation

Different aspects of the mitigation of climate change

- **Scientific**
- **Technological**
- **Environmental**
- **Economic**
- **Social**

The Nature of Mitigation Challenge

Type, magnitude, timing & costs of mitigation depend on :

- **National circumstances**
- **Socio-economic, and technological development paths**
- **Desired level of greenhouse gas concentration stabilization in the atmosphere**

Extensive Benefits of Climate Mitigation Policies

- Promote sustainable development
- Reduce health problems
- Increase employment
- Reduce negative environmental impacts (like air pollution)
- Protect and enhance forests, soils and watersheds
- Reduce those subsidies and taxes which enhance greenhouse gas emissions
- Induce technological change and diffusion, contributing to wider goals of sustainable development

Key Considerations for Mitigation

- Differences in the distribution of technological, natural and financial resources among and within nations and regions, and between generations

- Differences in mitigation costs

- Extent to which the impacts of climate change or mitigation policies create or exacerbate inequities both within and across nations and regions

Some Mitigation Options

Technical progress relevant to greenhouse gas emissions reduction encompasses

- **Market introduction of wind turbines**
- **Rapid elimination of industrial by-product gases such as N_2O from adipic acid production and perfluorocarbons from aluminum production**
- **Efficient hybrid engine cars**
- **Advancement of fuel cell technology**
- **Demonstration of underground carbon dioxide storage**

Some Mitigation Options (contd.)

Technological options for emissions reduction include

- Improved efficiency of end use devices and energy conversion technologies
- Shift to low-carbon and renewable biomass fuels
- Zero-emissions technologies
- Improved energy management
- Reduction of industrial by-product and process gas emissions
- Carbon removal and storage

Some Mitigation Options (contd.)

Estimates of potential greenhouse gas emission reductions in the 2010 to 2020 timeframe: *national & regional level*

- **Technologies and practices for end-use energy efficiency in buildings transport and manufacturing industries**

- **Cheap and abundant fossil fuels dominating energy supply & conversion up to 2020**

- **Natural gas, together with conversion efficiency improvement, and greater use of combined cycle and/or co-generation plants**

- **Low-carbon energy supply systems make an important contribution through biomass from forestry & agricultural by-products, municipal & industrial waste to energy, dedicated biomass plantations, landfill methane, wind energy & hydropower, and through the use and lifetime extension of nuclear power plants**

Some Mitigation Options (contd.)

Emissions of fluorinated gases can be minimized through

- process changes
- improved recovery, recycling and containment
- the use of alternative compounds and technologies

Biological mitigation can occur by three strategies:

- Conservation of existing carbon pools
- Sequestration by increasing the size of carbon pools
- Substitution of sustainably produced biological products, e.g. wood for energy intensive construction products and biomass for fossil fuels

Some Mitigation Options (contd.)

- Conservation of threatened carbon pools may help to avoid emissions, if leakage can be prevented, and can only become sustainable if the socio-economic drivers for deforestation and other losses of carbon pools can be addressed.

- Sequestration reflects the biological dynamics of growth, often starting slowly, passing through a maximum, and then declining over decades to centuries.

Some Mitigation Options (contd.)

- Implementation of technological options, achieving atmospheric CO_2 stabilization levels, would require associated socio-economic and institutional changes
  - To achieve stabilization, a very significant reduction in world carbon emissions per unit of GDP from 1990 levels will be necessary
  - Technological improvement and technology transfer play a critical role in the stabilization scenarios
  - Transfer of technologies will widen the choice of options at regional & economies of scale and learning will lower the costs of their adoption
- Social learning and innovation, and changes in institutional structure could contribute to climate change mitigation.

Some Mitigation Options (contd.)

- Current intensive systems can encourage resource intensive production & consumption patterns that increase greenhouse gas emissions in all sectors
- In shorter term social innovations influence individual & organizational behaviours
- In longer term social innovations, combined with technological change, may further enhance socio- economic potential particularly if preferences and cultural norms shift towards lower emitting and sustainable behaviours

Barriers to Mitigation

Barriers to potential mitigation opportunities

- **Technical**
- **Economic**
- **Political**
- **Cultural**
- **Social**
- **Behavioral and**
- **Institutional**

These vary by region and sector, and over time because of wide variation in mitigation capacity.

National Mitigation Policies

The portfolio of national climate policy instruments may include :

- **Emissions/carbon/energy taxes**
- **Tradable or non-tradable permits**
- **Provision and/or removal of subsidies**
- **Deposit/refund systems**
- **Technology or performance standards**
- **Energy mix requirements**
- **Product bans**
- **Voluntary agreements**
- **Government spending and investment and**
- **Support for research and development**

Different evaluation criteria lead to different portfolios of instruments