ENERGY AND THE ENVIRONMENT

Environmental Impacts

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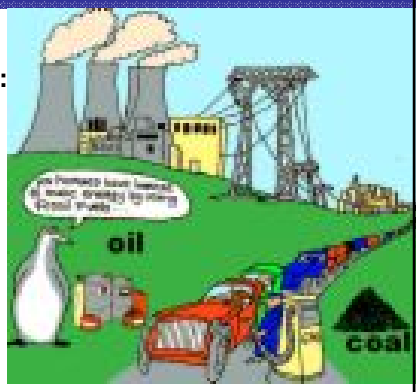
Fuel Consumption in Mauritius

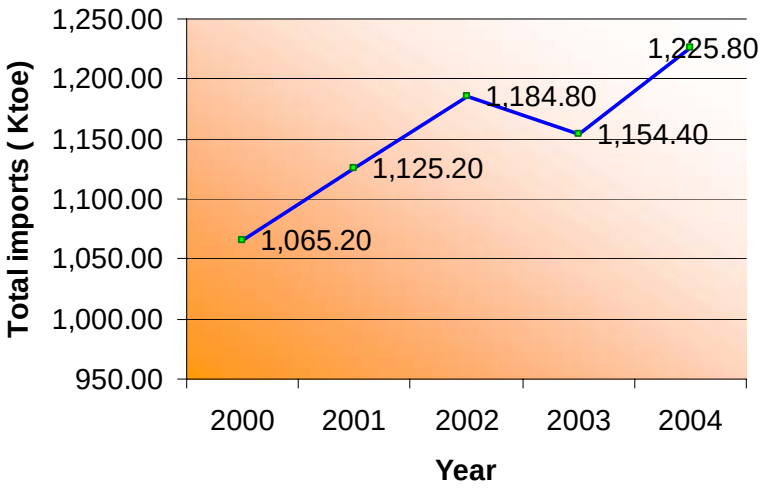
- **Conventional fuel used in Mauritius:**
  - LPG
  - Gasoline
  - Diesel
  - Heavy Fuel Oil (HFO)
  - Coal
  - Biofuel including bagasse



- **Consumption Pattern**

  Fuel consumption has known a steady increase

Trends in fuel consumption



Environmental impacts associated with the use of fossil fuels

Global impacts

Two effects of fossil fuel use are:

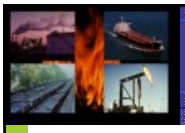
- Greenhouse gases that cause global warming
- By-products which are pollutants that cause global dimming

Local impacts

Emissions associated with the combustion of fuels give rise to health impacts such as lung inflammation, immune system changes, eye, skin, nose and throat irritation.

Climate change and renewable energy

- Increased need and energy from fossil fuels and other human activities contribute to increases in greenhouse gases associated with the warming of the earth surface.
- In Mauritius vehicular emission, industries, electricity production and sanitary landfills are the major generators of greenhouse gases.
- For the year 2004 the total CO_2 emission was **2796 thousand tons**
- Global energy demands are expected to grow by 60 % over the next 25 years
- Over the next 5 years, $16,000 billion will need to be invested in the world's energy system.



Global dimming

- Fossil fuel use, as well as producing greenhouse gases, creates other by-products such as sulphur dioxide, soot, and ash. These pollutants also change the properties of clouds.
- Polluted air results in clouds with larger number of droplets than unpolluted clouds. This then makes those clouds more reflextive. More of the sun's heat and energy is therefore reflected back into space.
- The pollutants that lead to global dimming also lead to various human and environmental problems, such as smog, respiratory problems, and acid rain.
- The environmental impacts of global dimming can be devastating.

Environmental impacts of Fossil Fuels

Fuel	Pollutants emitted
LPG	Carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx)
Gasolene	Carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx) and certain toxic hydrocarbons such as benzene.
Diesel	Carbon monoxide,hydrocarbons (HC), nitrogen oxides and particulate
HFO	Carbon monoxide,hydrocarbons (HC), nitrogen oxides, sulphure oxides, trace elements and particulate
Coal	Particulate Emissions (*ash*), Trace Elements (*mercury, selenium & arsenic*), NOx, SOx, Carbon Dioxide, Incombustible Mineral Matter
Waste to energy	Dust, carbon monoxide, hydrogen fluoride, sulphur dioxide, nitrogen oxides, trace elements, Dioxins and furans

Environmental Impacts of Renewable Energies

Renewable Energy Source	Associated impacts
Wind	•Visual intrusion & noise of wind turbines •Impacts on wildlife • Land use
Solar	•Environmental, health & safety issues on the manufacture, use, and final disposal of solar technologies •Fossil fuel input required for solar systems compared to fossil energy consumed by comparable conventional energy systems
Biomass	•Air Pollution •Land Use Management •Impacts dependent on resource management
Hydropower	•Impacts on the aquatic environment • Resource Consumption during construction phase

Environmental Impacts of Renewable Energies

Renewable Energy Source	Associated impacts
Biofuel	• Pollution for the manufacture of ethanol: - Noise - Odour - Air Pollution - Water Pollution - Risk of industrial accidents • Pollution at the sugar factory during production of molasses • Water and air pollution during sugarcane production - Agrochemicals, pesticides and fertilizers - Fly ash, Particulate matter from cane burning. - Destruction of biodiversity through change in land use.

World trend

- Small Island Developing States(SIDS) emit 1.5 % of Green house gases as industrialised countries do.
- Fuel prices are rising
- With the present consumption pattern, it is expected that fuel reserves will be used up in 2074

International commitments in the energy sector

Agenda 21

Barbados Plan of Action (BPOA)
Mauritius strategy

Beijing Declaration on Renewable Energy for Sustainable Development

AGENDA 21- Energy development, efficiency and consumption

Basis of action

All energy sources will need to be used in ways that respect the atmosphere, human health and the environment as a whole.

Objectives

The basic and ultimate objective of this programme area is to reduce adverse effects on the atmosphere from the energy sector by promoting policies or programmes to increase the contribution of environmentally sound and cost-effective energy systems, particularly new and **renewable ones**, through less polluting and more efficient energy production, transmission, distribution and use.

AGENDA 21- Energy development, efficiency and consumption

Activities

Governments should:

(a) Cooperate in identifying and developing economically viable, environmentally sound energy sources to promote the availability of increased energy supplies

(b) Promote the development at the national level of appropriate methodologies for making integrated energy, environment and economic policy decisions for sustainable development, inter alia, through environmental impact assessments

(c) Promote the research, development, transfer and use of improved energy-efficient technologies and practices, including endogenous technologies in all relevant sectors, giving special attention to the rehabilitation and modernization of power systems

(d) Promote the research, development, transfer and use of technologies and practices for environmentally sound energy systems, including new and renewable energy systems

(e) Promote the development of institutional, scientific, planning and management capacities to develop, produce and use increasingly efficient and less polluting forms of energy

AGENDA 21- Energy development, efficiency and consumption

(f) Review current energy supply mixes to determine how the contribution of environmentally sound energy systems could be increased in an economically efficient manner

(g) Coordinate energy plans regionally and sub regionally, where applicable, and study the feasibility of efficient distribution of environmentally sound energy from new and renewable energy sources

(h) Promote cost-effective policies or programmes, including administrative, social and economic measures, in order to improve energy efficiency

(i) Build capacity for energy planning and programme management in energy efficiency, as well as for the development, introduction, and promotion of new and renewable sources of energy

(j) Promote appropriate energy efficiency and emission standards or recommendations at the national level

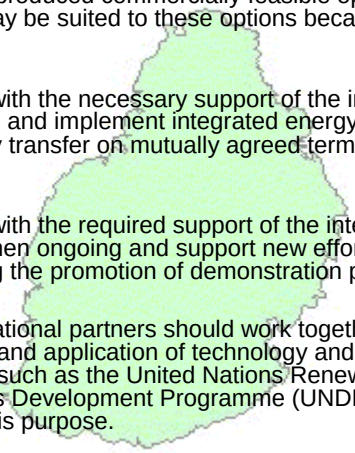
(k) Encourage education and awareness-raising programmes at the local, national, sub regional and regional levels concerning energy efficiency and environmentally sound energy systems

(l) Establish or enhance, as appropriate, in cooperation with the private sector, labelling programmes for products to provide decision makers and consumers with information on opportunities for energy efficiency

Programme of action for Small Island Developing States (SIDS) Challenges and constraints

- SIDS heavily dependent on petroleum products for transport and electricity generation
- Dependency of fossil fuel will continue for the short and medium term.
- Current uses of fossil fuels tend to be highly inefficient
- Potentials for the use of renewable energy are there, however constraints are technology development, investment costs, available indigenous skills and management capabilities.

Mauritius Strategy



- Many SIDS do not have modern and affordable energy services even though modern research has produced commercially feasible options of energy supply. Many SIDS may be suited to these options because of their geographical location.
- SIDS are committed, with the necessary support of the international community, to develop and implement integrated energy programmes. Support for technology transfer on mutually agreed terms and for capacity-building are important.
- SIDS are committed, with the required support of the international community, to strengthen ongoing and support new efforts on energy supply and services, including the promotion of demonstration projects.
- SIDS and other international partners should work together to promote greater dissemination and application of technology and to strengthen existing mechanisms, such as the United Nations Renewable Energy Fund and the United Nations Development Programme (UNDP) thematic trust Fund on energy, for this purpose.
- SIDS SIDS cooperation should be further pursued in areas where success has been achieved

Beijing Declaration on Renewable Energy for Sustainable Development

Was held in 2005 and involved 78 countries

Reaffirmation of governments commitment to the Earth summit, world summit on sustainable development (WSSD) and the UN 2005 Millennium review Summit, to increase the share of renewable energy in the total energy supply.

Beijing Declaration on Renewable Energy for Sustainable Development

Benefits of energy efficiency and use of renewable energy:

- **Eradication of Poverty**
- **Increasing job opportunities**
- **Improving air quality and public health**
- **Reducing Greenhouse gas emissions**
- **Enhancing energy security**
- **Offering a new paradigm for international cooperation**

Beijing Declaration on Renewable Energy for Sustainable Development

Need for enhance international cooperation for capacity building for:

- Strengthening national policy frameworks and integration of renewable energy use into national sustainable development strategies
- Enhancing national capacity for R&D and transfer and diffusion of renewable energy
- Establishing markets for renewable energy
- Increasing access to finance
- Enterprise development for installation, operation and maintenance of energy systems
- Combining the increased use of renewable energy , energy efficiency and cleaner fossil fuel technologies

National Environment Policy 1991

In the energy sector, the Government shall strive for clean energy which has the least detrimental impact on the environment.
Therefore, conservation of energy and the environment shall be the cornerstone of future energy policy.

Draft National Environment Policy

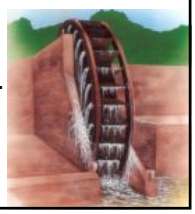
Objective

To meet national energy needs with increase efficiency and environmental sustainability.

National Targets

(i) Achieve significant energy conservation in all sectors of economy in the short to medium term.

(ii) Increase the share of renewable energy in the energy mix.



Action taken at the Ministry of Environment

The MoE has implemented the following activities to promote renewable energy:

- Financial incentives to adopt solar energy. E.g solar water heaters
- Support to the use of ethanol as fuel.
- CDM unit at DOE
- Development promotion through EIA: Centrale Thermique de Belle Vue, the Centrale du Sud and presently the Central Thermique Savannah.

Action taken at the Ministry of Environment

Action taken by the Ministry of Environment to maintain air quality:

Environment Protection (Standards for Air) Regulations 1998

- Stack emission

-Ambient air quality

Road Traffic (Control of Vehicular Emissions) Regulations 2002

Standards for exhaust and noise emission are now applicable for new, second hand imported and in-use petrol and diesel driven motor vehicles

Smoke opacity shall be less than 70 %

Ambient Air Quality Standards and Measurement Methods

Ambient Pollutant	Standard (ug/m^3) maximum	Averaging Time	Measurement Method*
Total suspended particles	150 50	24-hour Annual average	Hi-volume Sampler
PM10	100	24-hour	Hi-volume Sampler
Sulphur Dioxide	350 200 50	1-hour 24-hour Annual average	Fluorescence SO_2 Analyser, Colorimetry
Nitrogen Dioxide	200	24-hour	Sodium Arsenite, Chemiluminescence
Carbon Monoxide	25,000 10,000	1-hour 8-hour	Nondispersive Infrared Photometry
Lead	1.5	3-month average	Hi-volume Sampler with Atomic Absorption
Ozone	100	1-hour	Ozone Analyzer, Chemiluminescence

Energy policy

There is an increasing need to shift towards:

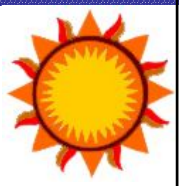
- Cleaner energy
- Renewable energy
- Improved energy efficiency and conservation
- Improved consumption pattern

Conclusion

High time to shift from dirty to clean fuel

**Renewable energy is a must,
the international context and the local context
is the right one to shift to cleaner energy**

Our dependency will be significantly reduced



Thank You for Your Attention