APPENDICES

Base Paper for Working Group (WG) on Energy

1. Introduction

Maurice Ile Durable (MID) is NOT only about Energy. But Energy is meant to be about MID in our context. The ultimate outcome in the form of the MID Policy, supported by related strategies and an action plan, will ensure compliance with the MID vision. This WG on Energy is a crucial step towards the latter goal. It aims at identifying CONCRETE COHERENT COMMON RECOMMENDATIONS that are to be considered by Government in view of defining the MID policy, strategies and action plan.

This WG focuses on the INTEGRATED management of Energy issues (including Generation, Renewables, Distribution, Demand-Side, Efficiency and Conservation) and is closely linked to Climate Change Mitigation. The topics addressed are as follows:

- Energy Sources (including Power Generation and Renewable Energy)
- Buildings (ie Commercial, Industrial and End Uses of Energy)
- Transport
- Housing (including End-Uses of Energy)
- Land Use (including Agriculture-Energy linkages)

Apart from climate change, democratization of the energy sector, green economy, institutional and regulatory aspects, technological dimensions, sensitization, training, capacity-building and research as well as reference to international/regional cooperation, Rodrigues, Agalega / outer-islands will be cross-cutting issues.

2. Relation to existing policies, strategies, frameworks and projects

The WG on Energy positions itself relative to the existing policies, strategies, frameworks and projects in the following way:

i. It is a bottom-up participative approach, systemic in perspective and based on a shared vision of MID instead of a business-as-usual scenario.
ii. Economic, social and environmental dimensions must necessarily be reconciled and cross-sectoral implications are considered holistically at the root of their occurrence.
iii. It will result in CONCRETE COHERENT COMMON RECOMMENDATIONS to be integrated in future policies, strategies, frameworks and programmes as appropriate, including beyond the energy sector.

3. Existing situation and set-up

The following documents have been listed as relevant to the current situation and level of implementation.

- ✓ MID Green Paper, 2011
- ✓ Outline Energy Policy 2007, MPU
- ✓ Long Term Energy Strategy, 2010 Ministry of Energy
- ✓ Renewable Energy Master Plan, 2011 , Ministry of Energy

- ✓ Long-Term Transport Strategy Document, 2011, Ministry of Land Transport
- ✓ Energy Statistics 2009, CSO
- ✓ Blueprint for the Energy Sector, 2010, NESC
- ✓ CEB Strategic Plan
- ✓ Energy Efficiency Act
- ✓ Building Code Bill
- ✓ Environment Protection Act
- ✓ Road Traffic Act
- ✓ Town and Country Planning Act
- ✓ Planning Development Act
- ✓ Business Facilitation Act
- ✓ Morcellement Act

According to the Green Paper on MID, Energy is considered a high priority theme as far as the sustainable development of Mauritius is concerned. In view of the increasing global price of fossil fuel and the known ecological impacts, there is an urgency to move towards a sustainable energy future.

Mauritius imports all of its fossil fuels to meet its energy needs. In 2009, 82.5% of the total primary energy requirement was met by imported fuels, while the remaining 17.5% was supplied by local renewable sources such as bagasse, hydro/wind and fuelwood.

From 1999-2009,

- There has been a decrease of 5% in the energy available from locally available renewable energy sources: bagasse and hydro.
- Import of coal has considerably increased (from 8% to 27%). Coal accounts for more than one quarter of Mauritius primary energy requirement for 2009.
- The largest consumers of energy were the transport and manufacturing sectors which accounted for 48.4 % and 27.7% of the total energy consumption respectively, for 2009. Household consumption accounted for about 14.0% of the total energy consumption.
- The renewable energy input has stagnated while the total energy requirement is steadily growing.

The target for renewable energy for power generation over the period 2010-2025 as per the Long Term Energy Strategy is shown below in Figure 1.

Fuel Source		**Percentage of Total Electricity Generation**			
		2010	**2015**	**2020**	**2025**
Renewable	Bagasse	16%	13%	14%	17%
	Hydro	4%	3%	3%	2%
	Waste to energy	0	5%	4%	4%
	Wind	0	2%	6%	8%

	Solar PV	0	1%	1%	2%
	Geothermal	0	0	0	2%
	Sub-total	**20%**	**24%**	**28%**	**35%**
Non-Renewable	Fuel Oil	37%	31%	28%	25%
	Coal	43%	45%	44%	40%
	Sub-total	**80%**	**76%**	**72%**	**65%**
TOTAL		**100%**	**100%**	**100%**	**100%**

Figure 1.

Projections indicate that under an economic growth of 4%, the expected peak demand in 2020 and 2025 would be about 666 MW and 810 MW respectively. To be able to cope with this ever increasing peak demand, massive investments in the electricity generation sector will be required according to a business-as-usual scenario. A MID vision may envisage a decoupling between economic growth and energy needs.

As far as land transport is concerned, it is noted that:

- At end of December 2010, 384,115 vehicles were registered at the National Transport Authority compared to 366,520 at the end of December 2009, i.e. an increase of 17,595 or 4.8%.
- Some 21,643 vehicles joined the fleet whilst 4,048 were put out of circulation during the year.
- The fleet consisted largely of cars and dual-purpose vehicles (175,634 or 46%) and motorized two-wheelers (159,329 or 41%). The remaining 13% comprised vans, lorries, trucks, buses and other vehicles.
- The number of road accidents increased by 8.8% from 19,542 in 2009 to 21,258 in 2010. Among these accidents, 153 were fatal (caused death) against 129 in the preceding year, up by 18.6%.
- The total number of vehicles (motor and non-motorised) involved in road accidents in 2010 was 41,263, that is, 3,205 or 8.4% higher than the 2009 figure of 38,058.

The Integrated National Transport Strategy Study was initiated by the Ministry of Public Infrastructure, Land Transport and Shipping. It shows that the land transport in Mauritius is in difficulty and is not working within a clear strategy. Related to transport, housing and land use, it can be further emphasised that:

- The National Development Scheme is now the structure plan that sets out broad objectives, strategies and principles to promote an orderly organised development of the overall land resources and also lays down the criteria for an efficient allocation of land for different uses namely for the conurbation, countryside and the coast, housing, social and community facilities, industry and commerce, tourism, agriculture, forestry and natural resources, the environment and fisheries, transport and public infrastructures
- The Outline Planning Schemes, which are regional plans for a Municipal Council or District Council area, provide the framework for local authorities to plan, shape and control the use of land within their area. Outline Schemes set out broad proposals for the physical development of a planning area, including such matters as the location and extent of areas for housing, commerce and industry activities, the reservation of sites for public facilities and community facilities, proposal for new and improved roads, measures

to protect the agricultural areas and areas of attractive landscape. They therefore translate the national strategy to the local level.

- National Planning Policy Guidelines (NPPGs) are written statements which set out guidance on particular planning issues. Communities and Local Government determines national policies on different aspects of planning and the rules that govern the operation of the system. National planning policies are set out in new-style Planning Policy Statements (PPS), which are gradually replacing Planning Policy Guidance Notes (PPG).
- National Strategy for housing in Mauritius is very much guided by the objective of '*un toit pour toi* '; the attainment of this goal not only hinges on Government intervention in the process of facilitating access to housing provision for the lower socio-economic strata of the population, but is also dependent on encouraging increased private sector involvement in the provision for social housing. This is achieved through the provision of appropriate incentives which would both reinforce the traditional role of private companies in upmarket housing provision, and stimulate private sector participation through planning obligations.
- A sustainable diversified agri-food sector strategy for Mauritius (2008-2015) has been finalised. The overall goal of this programme is to facilitate commercial production of crops to ensure food security and quality, foreign exchange savings and sustainable development.

4. PROJECTS IN THE PIPELINE

According to the Government, the following projects are expected.

Renewable Energy Projects

1. **Wind project**

   - **at Plaines des Roches**
   - Wind Farm of 18 MW in two phases: 10 MW in Phase I and 8 MW in Phase II.

   - **at Curepipe Point**
   - Setting up of a 20-30 MW wind farm (with an option of a 10 MW wind farm).

   - **At Bigara**
   - CEB to set up a wind farm of four wind turbines of 200-300 kW each.

2. **Photovoltaic (PV) Project**
   Expressions of Interest for the setting up of grid-connected solar photovoltaic (PV) energy projects of capacity up to 10 MW in Mauritius by private developers have been launched by the CEB.

3. **Micro Hydro Project**
   - A contract has already been awarded for the setting up of a micro hydro plant of similar capacity at Midlands Dam to be commissioned in March 2012 and to generate some 1 GWh.

4. **Landfill Gas Project at Mare Chicose**
   - 3 MW land fill gas-to-energy unit at Mare Chicose by Sotravic/Bilfinger to generate some 110 GWh over a period of 5 years will be operational in July 2011.

5. **Small Scale Distributed Generation (SSDG)**

To democratize the electricity sector, the CEB has embarked on the SSDG Scheme in December 2010 for residential, commercial and industrial consumers to produce their own electricity from renewable energy sources, comprising wind, solar and mini-hydro technologies, and export any excess to the CEB grid.

6. **Geothermal Energy project**

Request for proposals has been sent to 10 shortlisted firms.

Electricity Supply

7. **Fort Victoria Power Station**

The installation and commissioning of 2x 15 MW diesel generating sets at Fort Victoria Power Station have been completed in September 2010. Installation of four additional units is in progress at the Fort Victoria Power Station and commissioning of the units is expected in July 2012.

Some other sectors

Transport:

- Major road construction projects.
- The airport and port

Housing:

- New incentive for residential development – facilities to convert land to for residential purpose
- Government grant of Rs 55000 for casting of slabs
- Government grant for purchase of building materials

Land Use planning: The LAVIMS project

6. The Way Forward

The WG on Energy is expected to establish an état-des-lieux of the current context as understood by the participants, perfom a Strength-Weakness-Opportunity-Threat analysis, identify shared priorities and, hence, define CONCRETE COMMON COHERENT RECOMMENDATIONS. Four one-day sessions involving dedicated participants representing all stakeholders will be held.

Decisions will be adopted on the basis of consensus, if not majority opinion. In case of dissent, the parties concerned can be asked to express their views verbally and also, if needed, concisely in writing to be included in the final report.

The following is a non-exhaustive list of questions that may be raised during the WG workshop:

- What are the win-win measures in the Energy Sector compliant with the MID Vision?
- What are the immediate, short-term, medium-term and long term options?
- Which current policies, strategies and projects are NOT in line with MID?
- What are the constraints in existing frameworks, including institutional and regulatory ones?
- What are the incentives and deterrents, financial and otherwise, needed to promote sustainable energy?
- What are the requirements in terms of human and other resources to achieve set objectives?
- Are the targets set for energy efficiency and renewable energy relevant in the context of MID?
- How can the coordination, monitoring and feed-back on MID Energy programmes be achieved?
- What are the most significant transversal mutual interactions between Energy and other sectors ?

The findings of the WG, after approval by the Steering Committee and Cabinet, will be embodied in the MID policy, strategies and action plan to give shape to our shared MID vision.

Working Group 1

Energy

Report

Outcomes of the first session held on the 20th June 2011

Rapporteurs:

Mrs Y. Baguant-Moonshiram

Mrs V. Dookhun

Important note:

This is a draft. It is meant for comments and discussion. It is not a final document. In no way, are any of the statements concrete coherent recommendations.

Introduction

The first working session of Working Group on Energy was held on Monday 20th June 2011. Representatives from the Governmental, Parastatal and the Private Sector, the local authorities, NGOs, trade unions participated in this event. There were 6 participants from different ministries, 6 from local authorities, 6 from NGO's, 2 from parastatal organisations, 6 participants from private bodies, 6 from trade unions, 2 from Rodrigues, and 12 from other organisations.

The meeting was presided by the Chairperson Dr Khalil Elahee of the University of Mauritius.

Mr Osman Mahomed – Chairman of the MID Steering Committee made an opening speech and gave a brief overview of the MID project (copy of presentation is attached in Appendix I).

The Chairperson thanked Mr Osman for his introductory speech and welcomed the participants, and introduced them to the purpose of the meeting. He presented the topic of the meeting, Energy and the purpose for being in this work group.

The Chairperson gave a brief presentation of the purpose of the presence of the participants at this meeting and the agenda of the day; the scope of the work, the linkages, the background of MID and the way forward (copy of powerpoint presentation is attached in Appendix II)

Dr Elahee then invited Mr Devarajen Vithilingum , the Representative from the Ministry of Environment and Sustainable Development to present the MID vision, which was presented for all the themes; Energy, Environment, Education, Equity and Employment.

It was proposed to set up two groups to discuss about two sub-themes:

- **Sub-Theme 1:** Transport and Demand-Side

  (including housing, buildings, industry, commercial and agriculture, i.e. **end-uses**)

- **Sub-Theme 2:** Power Generation and Renewable Energy (ie **sources of energy**, including decentralised systems and production of biofuels)

The Chairperson then invited the members of the panel to introduce themselves; the Vice Chairperson, Dr Koshik Reesaul, , the Rapporteurs, Mrs Kirtee Baguant-Moonshiram and Mrs Vimi Dookhun, both academic staff from the University of Mauritius, Representative of the parent Ministry, Dr P.Soonarane, Ministry of Energy and Public Utilities, Representatives from the Ministry of Environment and Sustainable Development – Mr Santaram Mooloo, Mr Devarajen Vithilingum, and Mr Aslam Yadallee.

The Chairperson next invited all the participants to introduce themselves and to voice out their expectations from the WG.

The Chairperson invited the participants to express their interest for adhesion to the sub themes. It was emphasised that there should and would be a fair representation of all sectors in a particular group.

There were several queries from the participants about the time frame of this project and that there was a need to reconcile the time frames given. Mr Osman replied that the vision was 'permanent' and the action plan was for duration of three years and the strategy plan for ten years. Comments were also made about the need to agree upon the red lines and about the financial aspects of MID project. The chairperson explained that the financial aspects and constraints were not to be taken into consideration and that the first session was going to be an 'open session' where all could voice out their opinions.

This exercise was followed by the morning tea break.

After the break, the two sub-groups were constituted and Mr Tony Lee was designated chairperson for subgroup 1 with Mr S. Deenapanray as moderator, while in the second group Mr Sok Appadu was designated chairperson and Mrs Toshima Makoondlall-Chadee the moderator. The focus groups met and discussed until lunch break.

After the lunch break there was a plenary session where each group presented its findings. There were further discussions and comments. It was observed that the two WG approached their working sessions differently and the WG2 worked in more detail.

Concerning the sub-theme 1, it was observed by all that there was a disparity/contradiction between the targets and the actions of the government – for example the Government wanted to encourage mass transportation (with the LRT) and accessibility by public transport while at the same time the ring road and other roads were being constructed encouraging people to use their individual vehicles. The energy being used for the LRT was also a matter a concern for some participants.

It was agreed that during the next session there would be a prioritisation of the ideas that have been proposed in the first session. The members recognised that energy decisions will the backbone of new developments.

The chairperson emphasised that if policy is not socially acceptable, it is difficult to be implemented. He also stressed that peak oil scarcity and cost has to be addressed when considering new transport system and if this is not taken care of, it will be a fatal weakness of the system.

The Chairperson recommended members to make use of the group mailing list and continue the forum of discussion. The next working session was to be held on the 30th June 2011.

Representative from MOE highlighted that Indicators for Sustainable Consumption have been developed and could be consulted on the MOE website.

The chairperson thanked the members for their active participation and closed the meeting at 16 00.

Group Discussion

Sub-theme 1 : Transport and Demand-Side (including housing, buildings, industry, commercial and agriculture, i.e. **end-uses**)

The first sub-group agreed to make a SWOT analysis in order to evaluate the **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats of the actual situation in Mauritius for the different aspects included under the sub theme 'Transport' namely transport, land and housing. After discussions, it was decided to regroup the following : industrial buildings, commercial buildings and warehousing due to their similarities.

Transport

Strengths	Weaknesses
Integrating compatible land use	Traffic congestion
Size of the island	Fossil fuel used
	Remoteness of Mauritius leads to long haul trips
	Limited access to main towns
	Linear traffic is the norm as linear development
	Lack of harmonisation between trips and land use
	Lack of appropriate regulations
	Lack of control of use/efficiency of vehicles
	Infrastructure not in line with parking
	Increase in consumption of energy with new development
	Increasing mobility of cars not of people
	Old cars still on the roads
	Subsidies and incentives to buy cars

Opportunities	Threats
Optimise delivery routes	Sustainability of 24/7 as all stakeholders not available
Balance the sectors	Even if increase in length of roads →still more bottlenecks
Non peak hour deliveries	Not respecting speed limits
Alternate travel vehicles	Number of cars still increasing
Size of the island	Even if increase in efficiency of cars, the number of cars still increasing and no energy reduction (old cars are not scrapped)
Reduce the number of cars on the roads	Transport sector uses 50% of energy and emits 25% CO_2
Delocalisation	
Quality of public transport Turn towards public transport	
Rings roads/access roads	
Education of stakeholders/drivers	
Increase mass mobility of people	
Introduction of energy-efficient vehicles	
Tax imported goods and encourage use of local goods	
Introduce cycle tracks, ecofriendly public transport	
Reduce time of travel to work	
Renewable energy for vehicles	

Land Use

Strengths	Weaknesses
	Misallocation of capital investment
	Acceptability of our current situation
	Economy based society – overexploitation of resources
	Lack of ecological understanding and savvyness
	Guidelines existing but fragmentation and lack of harmonisation
	Lack of holistic approach
	Lack of understanding of dynamics of the country ecosystem
	Mismatch/disparity of scheduling
	Mismatch between income capacity and policies
	Mismatch between strategic planning and implementation (example low density development favoured)

Opportunities	Threats
Individual habits/corporate policies and measures to reduce energy consumption in buildings	Sécurité alimentaire – conversion of agricultural land
Reforestation	Less production of bagasse
Change of existing models to those favouring sustainable opportunities	Political economics way of operating
Carbon emissions measures of buildings – carbon metrics	Existing guidelines are not used to provide sustainable solutions
Higher density development in selected areas	Is decreasing use of energy an implication of reduced growth/development?
Promote sustainable lifestyle / quality of life	Bigger transport flux in the areas of higher density buildings
Lifecycle of a building	
Waste treatment on site to produce energy	
Energy+ buildings should be encouraged	
New technologies to save energy	

Housing

Strengths	Weaknesses
People need to apply for conversion of land	Releasing land away from agriculture and services (morcellements and other schemes)
Guidelines for new buildings	Out of town shopping malls and Morcellement are encouraged
Incentives to save energy	Centralisation of shopping malls
The Mauritian climate – we need to take advantage of the sun, waves, wind, geothermal assets	Lack of enforcement and implementation of legislation and guidelines even if these exist due to lack of resources. Concern also construction and planning guidelines/norms
	Growth rate of development – bigger houses for less inhabitants (people are more affluent)
	Stimulation of development of buildings
	Concentrating only on new buildings – for the new technologies
	Consultancy carried out by foreigners – sometimes their conclusions not compatible to the Mauritian context
	Political system does not allow to emphasize on regulations
	Soil testing not made when constructions are carried out
	Subsidy for concrete roof slabs – not the most effective materials
	Very limited materials for construction (blocks which are not the most effective)
	The costs associated to make buildings more energy-efficient will be a burden to the population
	Any new technology takes lots of time to be established

Opportunities	Threats
New regulations about energy efficiency for new developments	Some developments are exempted from EIA licence
Incentives to people and community	Promoter/developer not investing in energy saving systems
Promotion of mixed-use development	Zoning (segregation of activities)encourages need for travel
Mixed use of buildings	Economic growth can be disadvantageous – encourages conversion of fertile land to concrete
Optimise use of existing buildings	Land assessed in terms of productivity and not in terms of ecological value
Convert existing buildings to green buildings	
Mixed use of residential and agricultural lands	

Industrial buildings/warehousing

Strengths	Weaknesses
Categorisation of land	Lack of technology/know-how
Rain water harvesting	Lack of awareness about efficient use of energy
Planning policy guidelines have a more holistic approach	No framework to encourage energy saving Industries do not implement proven solutions
	Lack of capacity building
	Lack of understanding of embodied energy
	Very limited materials for construction (blocks which are not the most effective)
	Comfort requirements of employees
	Industries paying too cheap for electricity – so not encouraged to make efficient use

Opportunities	Threats
Incentives to establish energy efficiency, for capacity building	Out of scale recommendation
Encouraged to use no carbon fuels with less emissions	Mind set of people
Encourage warehouses to produce their energy	Running costs of buildings – energy audit of buildings can cause higher initial costs. This can result in more capital investment
Replacing permeability of soils specially when large area of concrete so that ground water table will be recharged	
Restoration of old buildings which are more energy efficient	
Use of waste to produce energy	

Group Discussions

Subgroup Theme 2: Power Generation and Renewable Energy

Introduction

Members brainstormed about the term 'Sustainability'

The following questions were raised:

- it is living without or with our means?
- are we heading towards the right direction?
- Was it right to say that 'Sustainability is competitiveness'?
- Is it related to the economic reality and economic system that we have?

There was general agreement that 'sustainability' is the potential for long-term maintenance of well being, which has environmental, economic, and social dimensions.

Debate on Basic Assumptions: How do we define growth? Is it GDP growth or is it more holistic including social, environment and others.

Linking lifestyles and energy use: members observed that there was no clear patterns on how we are expected to change. The current mind set and reaction was questioned.

- ***CURRENT FACTUAL SITUATION – 'Etats des lieux'***
  - There was general consensus that Mauritius is not on a sustainable trajectory at the moment and that our lifestyle was too much Energy intensive.
  - Increasing the pace of consumption moves us towards the depletion of resources

Some members were of the opinion that the decrease in land area available for cultivation did not reconcile with the valorization of the bagasse.

Outer island Developments– For Agalega , fossil fuels were too costly . Alternatives such as coconut oil are used for tractors.

Outer island projects : Wind Power energy – 8 – 10% of energy currently being produced by 2 operational wind farms; Grenade and Trefles (Pilot project)

Rodrigues: Pilot projects are giving results and the island is well exposed to wind. However night-time and daytime patterns of winds were different resulting in a need to reduce output at night.

China is currently producing 50% of world's coal. It is expected that in 10 years China will be the largest consumer of world coal and thus reducing its availability on the market for other users.

One member pointed out that a recent study demonstrated that if the current imports of fossil fuel of 20% * is increased to 30%, the saving rate of the country fall from 12 % to 0 % and this will be disastrous for the local economy.

*(IMFL/EGS %)

- ***Win-win measures in the Energy Sector compliant with the MID vision***
  - Members reflected on the opportunities for Sustainable Consumption and Production;
  - How can we manage fluctuations is Smart Grid the option to improve it ?
  - How can we use our energy sources in a sustainable way?

Sustainable energy growth: whatever the source of energy that we have, we have to look at the optimal use of all the available resources of Mauritius

It is a fact that Mauritius has to go towards Renewable energy but we have many concerns about the current wastage of energy e.g. from the transport industry, domestic.

Data gaps identified: status of the scheme of the solar energy program

Opportunities of sharing of know-how and expertise with sister island was identified and it was reported that exchanges were taking place.

- **On a time plan**

  It was considered important to MID to question the over arching dynamic is the depletion of oil and coal

Optimization of available resources / renewable energy; currently bagasse but maybe we could consider other issues about future potentials like wind and sun, molasses, ethanol (we are exporting about 30 million litres of ethanol). It was also agreed that it is important to take a holistic approach and- not to take a product view or sector view.

The importance of sugar sector was acknowledged. However it was a reality that bagasse will eventually have a physical limit (decrease of cultivation of sugarcane – due to market forces).

- Members were of the opinion that in the long run, the sugar industry could be transformed from a sugar-base industry to be more a bio-mass industry. However there was no guarantee that the resulting industries would be as sustainable and there will need to be more research to respond to such queries.
- Members were of the view that our priority would be to consider a transition away from coal.

- ***Constraints in existing frameworks, including institutional and regulatory ones***

- Observations made by some members that there were legislations that have been passed but not implemented

➢ ***Incentives and deterrents***

- .....

➢ ***Financial aspects***

- No financial considerations were taken at this stage.

➢ ***Other needs to promote sustainable energy***

- Diversification of agriculture : investing in composting projects
- Need to manage environmental impacts associated with the Energy Production. Can it be said there is no clean coal – not only CO_2, the boiled water that goes to drain and the impacts of coal ashes
- Need to consider Climate Change and their opportunities/barriers towards low carbon pathways

➢ ***Requirements in terms of human and other resources to meet targets***

- Woman and sustainability? Is it s major step and achievement?
- ***Grass root people should be made aware of SD concept . more awareness campaigns. Websites were reachable to the educated mass whereas it is not much reachable to some.***

➢ ***Are targets set for energy efficiency and renewable energy relevant in the context of the MID?***

Questions raised:

- Is Mauritius making the optimal use of our resources? Wind, photovoltaic, micro hydro, landfill gas, small scale distributed generation, geothermal?
- **Total forecast for 2025 for Renewable energy has been set at 35 % – Why not work towards a REALISTIC higher figure – this will make more sense towards sustainable development – we should consider bringing back the Sustainable equation towards environment and economic.**

➢ ***Current policies, strategies and projects that are NOT in line with MID***

- Has the Decoupling started already with energy growth and demand? To what extent is that feasible;
- There was general agreement that we need to go through the renewable energy sources .

80 % of our energy comes from fossil fuels and fossil fuels is depleting – do we need to go for **a mix of renewable energy**? If so what are the potentials for Mauritius .

Instead of hedging funds to safeguard v/s oil price hikes, why not invest or ''hedge'' in this way on RE?

- Currently in 2010 we need 2300 GWH – around 20 % in 2025 we want to make it 35%, 4000 GWH (including demand side management)
- To consider upcoming ISO national policies and what developing countries and SIDS will be required to do.
- Even with renewable energy we will again have concerns with, which form of Renewables will be the answer to all the above . Was Integrated Development a possible solution?
- Cost of solar panels is going down although in some countries subsidies on fuel have been removed.
- Energy considerations should not be limited to the generation of electricity but rather considered as energy requirement for transport (48-50%), heat (25%) and electricity (25%).

➢ ***Coordination, monitoring and feedback on the MID Energy Programmes***

  - Is it achievable or not?

As highlighted earlier, some members expressed that the target set for Renewable Energy was low.

However incoherence in terms of economic growth from the base paper was observed.
The 4 % growth that was forecasted did not tally within the 6% growth in 2020's.

➢ ***Most significant transversal MUTUAL interactions between Energy and the other sectors***

  - ***……***
  -

➢ ***Uncertainties***

- Energy security- Uncertainty of fossil fuel in terms of future availability
- It was recognised that some infrastructures were already established
- There were much uncertainty with Renewables – in terms of prices and storage
- There was a need to do ''l'arbitrage'' : because we know for sure that there are constraints with fossil fuels – but when we question Renewable options then we have to set how to reach there

Working Group 1

Energy

Report

Outcomes of the second session held on the 30th June 2011

Rapporteurs:

Mrs Y. Baguant-Moonshiram

Mrs V. Dookhun

Important note:

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Introduction

The second working session of Working Group on Energy was held on Thursday 30th June 2011.

The meeting was presided by the Chairperson Dr Koshik Reesaul of the Traffic Management Unit, in the absence of Dr Khalil Elahee who has sent his apologies.

The Chairperson welcomed all participants and thanked them for their presence. He gave a brief overview of the agenda and explained that he had had a request from Mr Richard Munisamy who wanted to make a brief presentation on 'A scenario for energy self-sufficiency'. As there was no objection from the participants, Mr Munisamy was given the floor after the presentation on Rodrigues.

The chairperson also explained that there would be no discussion on the format of final report as there was going to be a homogenous format for all the groups and this was going to be discussed in a meeting chaired by Mr Gomart.

The chairperson then explained that a clip was going to be broadcasted every day after the 'Journal Televisé' and before ECOTV as from the 4th July in relation to the MID project. A clip was then presented to the participants.

The Chairperson next invited Mr Williams and Mr Robert from Rodrigues to give a brief of the deliberations of working group on Energy which was held in Rodrigues on the 22nd and 23rd June 2011.

Mr Williams and Mr Robert explained that the WG had decided to work on a SWOT analysis.

CASE STUDY OF RODRIGUES

SWOT ANALYSIS

- **Strength**
  - 8% annual electricity from wind
  - Topography / wind regime favourable (South East Trade Winds)
  - Solar radiation
  - ARER Report 2007 Rodrigues Ile Solaire
  - Biomass – green waste
  - CFL programme successful e.g Roche Bon Dieu
  - Avoiding air-conditioning so far

- **Weaknesses**
  - No wind map
  - No solar map

  - Small-island grid integration limit
  - Little avail of Solar water heater subsidies
  - Lack of legal framework e.g on land-use and planning
  - Poor enforcement e.g transport-related issues
  - Too centralised on Port-Mathurin

- **Opportunities**
  - Wind power - initial Grenade plans
  - Storage of energy in excess for water pumping /desalination
  - Green waste / compost / biogas
  - Coconut plantation or even jatropha for biodiesel
  - Off-grid applications
  - TOU tariff / pumping at night
  - Energy Management e.g airport and port
  - New buildings to be covered by new regulations and even renewables imposed
  - Hybrid adapted to terrain
  - Port-Mathurin: no parking or pedestrian zone ?
- **Threats**
  - Needs for refrigeration increasing with imports and agro and fish sector
  - Low-income groups excluded e,g solar water heaters
  - Ring-road for Port-Mathurin?
  - Parking problems in Port-Mathurin
  - High-rise building with risk of tremors and with architectural incongruité
  - Space already used up in capital

Recommendations

- To store excess energy from renewables and use for pumping water and desalination
- To produce solar and wind maps (IMMEDIATE)
- To apply Building Code, transport and land-planning regulations (IMMEDIATE)
- To promote hybrid vehicles through incentives, green procurement and CSR
- To make Port-Mathurin a pedestrian and/or restricted parking area within coherent transport and land-planning legislation

- To undertake Energy Management projects in airport, port and cold storage
- To install off-grid applications in all remote areas
- High-rise buildings to be discouraged / banned
- To undertake full study on climate change impacts and adaptation
- To promote energy equity through dedicated programmes with respect to disconnection, low-income groups and woman participation
- To assess the potential of bioenenergy (green waste, biomass, coconut oil, jatropha, etc)

TARGET: to reach 75% of renewables in electricity mix by 2025 and self-sufficiency in energy by 2040

After the presentation, the participants were requested to make their comments. Most of the participants congratulated the working group on the work done. The work was very interesting and the targets were very high. It was also pointed out that as the lack of a wind map was a weakness, the MID project could work on the preparation of the maps.

It was also pointed out that making Port Mathurin become totally pedestrian was going to be a challenge and this could be used as a model for Mauritian towns and villages.

There was also a comment on the lack of legal framework for land-use and planning as there were two consultants who had worked on the Land Development Bill and the National Development Strategy plan for Rodrigues. These projects were still in progress. And it was observed that there should be a good enforcement and implementation of the policies in order to have a sustainable planning and development.

It was proposed that digesters of animal was could be used and there were several studies carried out on this field as there was a need to tap biofuels. It was also proposed that Rodrigues had great potential for international support and funding provided a national mitigation action plan was prepared.

Integrated farming had also been carried as a pilot study in Rodrigues where waste was used to produce biomass and for fish rearing. Entrepreneurs lacked the resources and the know how to carry out such projects and it was proposed that there should be an integrated support to entrepreneurs.

The plantation of jatropha to be used as biodiesel was also discussed. It was explained that this plant had been used in different countries (India, Mozambique) and it had not given the expected yields and it depleted the nutritional resources of the land. As such, the plantation of jatropha was not recommended in small island states and its use should be considered to be a threat instead of an opportunity.

It was also agreed that the decision makers should be very cautious of the fast pace of the development and keep a tight control as there are very scarce resources on the island. And the decision makers should promote an integrated sustainable development on the island.

The chairperson closed this session on Rodrigues thanking the participants from Rodrigues and invited Mr Munisamy to make his presentation.

Mr Munisamy gave a speech on 'a scenario for energy self-sufficiency' – is it possible for Mauritius to reach self-sufficiency? The demand for energy for transport surpasses the demands for the other sectors. Mr Munisamy proposed several steps by which the demand of energy could be decreased in the different sectors – for example – teleworking could be encouraged, increase in low energy buildings, increase in the use of energy in households. He gave an overview of how the renewable sources of energy could be exploited. He emphasised on the fact that the transition to renewable energy requires an integrated approach and it is necessary to have a 'smart grid'.

This exercise was followed by the morning tea break.

After the break, the two sub-groups worked separately in order to prioritise the ideas that have been proposed in the first session. Each group worked on its SWOT analysis and on the prioritisation of their recommendations.

After lunch, the two groups worked separately before the plenary session where each group explained the progress they had made.

Discussions were held on the findings of each group.

Sub-theme 1:

It was observed that the group had not taken ''peak oil' into consideration. And one member pointed out that there was a need to consider the future of transportation system which is actually 100% dependant on the fossil fuel.

There were also queries about how the group had worked and that it should have considered the threats and weaknesses that would lead to opportunities that would bridge the gaps. The members of the group explained that they had effectively worked in this way and that they had assessed the weaknesses and threats that could be 'converted' to opportunities. One participant explained that, then, the term 'opportunity' was not the exact term but rather it could be renamed as a list of measures.

Subtheme 2:

One member proposed to have future focus on the barriers to the MID project and to consider how we can change our weaknesses into opportunities. Proposals of looking at a list of actions that can help attain objectives of the MID project was also considered. One member pointed out that there need to be more discussion on how to compensate for energy needs with respect to mass transport. It was observed that the second group had so far dwelled mostly on the supply of electricity and request was made that this group should have a plenary discussion where the future supply of Energy for the transport sector be discussed.

The chairperson then explained that there was a change in the agenda concerning the format of the report. As all the working groups needed to submit homogenous and coherent reports, a meeting had been scheduled on Friday 1st July 2011 under the chairmanship of Mr Gomart to discuss the different aspects of the final report.

Then Mrs Dookhun gave a brief overview of the contents of the final report. The participants requested that the document concerning the contents of the final report be sent to them so that they could have the opportunity to assess it closely before the next session. But it was noted that The Ministry of Environment was working on the general aspect of the final reports to be submitted. The proposed 'format' was going to be circulated among all members of the working group as soon that the MOE had sent the format.

It was also agreed that during the next session, there would be a prioritisation of the recommendations of the two groups.

The meeting ended at 17 30.

Group Discussion

Sub-theme 1 : Transport and Demand-Side (including housing, buildings, industry, commercial and agriculture, i.e. **end-uses**)

The first sub-group had made a SWOT analysis in order to evaluate the **S**trengths, **W**eaknesses, **O**pportunities, and **T**hreats of the actual situation in Mauritius for the different aspects included under the sub theme 'Transport' namely transport, land and housing.

The group had now to move a step further and start prioritisation of the recommendations. The participants decided to work on the list of opportunities of the different sectors. They also assessed the weaknesses and the threats that could be 'turned into' opportunities – that is what could be done to convert the weaknesses and the threats into opportunities. Then there would be a prioritisation of the opportunities.

While going through the SWOT analysis of the different sectors, some changes were made to the tables and there were other opportunities added to overcome the threats and weaknesses.

The next step was the prioritisation of the opportunities. After some discussions about the best way to proceed, it was agreed that there would be a 'survey' among the members of the sub-theme where each one would assess the opportunities separately and the results would be compiled. This was agreed unanimously and the documents would be sent to the participants of the group by Friday 1st July and they would need to send their feedback by Monday the 4th July 2011. The rapporteur would then compile the results and send it to the participants before the 3rd session of the working group so that they had time to go over the results. These would form the basis of the discussions of the next session.

The participants were also requested to submit relevant statistics during the next to 'support' their views and their recommendations.

Transport

Strengths	Weaknesses
Integrating compatible land use	Traffic congestion
Size of the island	Fossil fuel used
	Remoteness of Mauritius leads to long haul trips
	Limited access to main towns
	Linear development encourages linear traffic movements leading to traffic problems
	Lack of harmonisation between trips and land use
	Lack of appropriate regulations
	Lack of control of use/efficiency of vehicles
	Provision of parking facilities not in line with parking demands
	Increase in consumption of energy with new development
	Increasing mobility of cars not of people
	Old inefficient cars still on the roads
	Subsidies and incentives to buy cars

Opportunities	Threats
Optimise delivery routes	Sustainability of 24/7 as all stakeholders not available
Balance the sectors	Even if expansion in road network →possibility of more bottlenecks
Non peak hour deliveries	Not respecting speed limits
Alternate travel vehicles	Number of cars still increasing
Size of the island	Even if increase in efficiency of cars, the number of cars still increasing and no energy reduction (old cars are not scrapped)
Reduce the number of cars on the roads	Transport sector uses 50% of energy and emits 25% CO_2
Delocalisation	Making Mauritius a duty free island

Quality of public transport Turn towards public transport	
Rings roads/access roads	
Education of stakeholders/drivers	
Increase mass mobility of people rather than mobility of vehicles	
Introduction of energy-efficient vehicles	
Tax imported goods and encourage use of local goods	
Introduce/promote safe cycling and pedestrian environment, pedestrian pathways/roads, ecofriendly public transport	
Prioritise pedestrians/cycle pathways	
Reduce time of travel to work	
Renewable energy for vehicles	
Car pooling/shuttle services	
Mass transit system	

Land Use

Strengths	Weaknesses
To explore abandoned agricultural land to be used for renewable energy	Misallocation of capital investment
	Acceptability of our current situation
	Economy based society – overexploitation of resources
	Lack of ecological understanding and savvyness
	Some legislation very old and outdated: example back to 1954
	Guidelines existing but fragmentation and lack of harmonisation Lack of enforcement mechanism
	Lack of holistic approach
	Lack of understanding of dynamics of the country ecosystem
	Mismatch/disparity of scheduling
	Mismatch between income capacity and policies
	Mismatch between strategic planning and implementation (example low density development favoured)
	Lack of resources available
	Shortcomings in assessment of billboard placement

Opportunities	Threats
Individual habits/corporate policies and measures to reduce energy consumption in buildings	Food security – conversion of agricultural land
Reforestation	Less production of bagasse
Change of existing models to those favouring sustainable opportunities	Political economics way of operating
Carbon emissions measures of buildings – carbon metrics	Existing guidelines are not used to provide sustainable solutions
Higher density development in selected areas	Is decreasing use of energy an implication of reduced growth/development?
Promote sustainable lifestyle / quality of life	Bigger transport flux in the areas of higher density buildings
Lifecycle assessment of a building	Impact of tourism on natural resources Study of carrier capacity
Waste treatment on site to produce energy	Interference of Politics and economics can be against sustainability
Energy+ buildings should be encouraged	Abandoned land – safety hazard and pollution as used as dumping ground
New technologies to save energy	
Ecotourism – better management of natural resources	
Promote local production and consumption	
Efficient use of abandoned land	
Bring a TCP which is efficient in cultural and ecological planning	
Increase of road reserve for landscaping	
Better compliance – holistic consultation and planning: strategic environment assessment	
Review strategy on development	

Housing

Strengths	Weaknesses
People need to apply for conversion of land use – control mechanism	Releasing land away from agriculture and services (morcellements and other schemes)
Guidelines for new buildings	Out of town shopping malls and Morcellement are encouraged
Some Incentives to save energy and use of sustainable technologies	Centralisation of shopping malls
The Mauritian climate – we need to take advantage of the sun, waves, wind, geothermal assets	Lack of enforcement and implementation of legislation and guidelines even if these exist due to lack of resources. Concern also construction and planning guidelines/norms
	Growth rate of development – bigger houses for less inhabitants (people are more affluent)
	Stimulation of development of buildings
	Concentrating only on new buildings – for the new technologies
	Consultancy carried out by foreigners – sometimes their conclusions not compatible to the Mauritian context
	Political system does not allow to emphasize on regulations
	Soil testing not made when constructions are carried out
	Subsidy for concrete roof slabs – not the most effective materials
	Very limited materials for construction (blocks which are not the most effective)
	The costs associated to make buildings more energy-efficient will be a burden to the population
	Any new technology takes lots of time to be established
	Lack or research for new local materials
	No architect and legal counselors in LAs
	Lighting used for decorative and functional purposes

Opportunities	Threats
New regulations about energy efficiency for new developments	Some developments are exempted from EIA licence
Incentives to people and community to adopt sustainable technologies	Promoter/developer not investing in energy saving systems
Promotion of mixed-use development	Zoning (segregation of activities)encourages need for travel
Mixed use of buildings	Economic growth can be disadvantageous – encourages conversion of fertile land to concrete
Optimise use of existing buildings	Land assessed in terms of productivity and not in terms of ecological value
Convert existing buildings to green buildings	
Mixed use of residential and agricultural lands	
More and better incentives to save energy and use of sustainable technologies	
Appropriate architectural design to take advantage of Mauritian climate	
Use of local materials for construction	

Industrial buildings/warehousing

Strengths	Weaknesses
Categorisation of land	Lack of technology/know-how
Rain water harvesting	Lack of awareness about efficient use of energy
Planning policy guidelines have a more holistic approach	No framework to encourage energy saving Industries do not implement proven solutions
	Lack of capacity building
	Lack of understanding of embodied energy
	Very limited materials for construction (blocks which are not the most effective)
	Comfort requirements of employees
	Industries paying too cheap for electricity – so not encouraged to make efficient use
	Energy audits rarely undertaken and sometimes their recommendations not taken into consideration
	Processes not managed safely and their by-products not tapped efficiently
	Lack of monitoring of energy consumption of buildings
	Lack of funding for energy efficiency measures
	Lack of professional advice
	More energy efficient equipment more expensive

Opportunities	Threats
Incentives to establish energy efficiency, for capacity building	Out of scale recommendation
Encouraged to use no carbon fuels with less emissions	Mind set of people
Encourage warehouses to produce their energy	Running costs of buildings – energy audit of buildings concerning safety and security
Continuous professional development	More efficient equipments
Replacing permeability of soils specially when large area of concrete so that ground water table will be recharged	
Restoration of old buildings which are more energy efficient	
Use of waste to produce energy	
Professional input on energy efficiency	
Use of by products of processes	
Use of more efficient equipments	
Labelling of equipment	

Theme 2 : Energy

Theme 2 : Energy

Chairperson: Mr Sok Appadoo
Rapporteur for the session: Mr Shaan Kundomal

The chairperson devoted some time to discuss the notes of meeting of the first session.

One member proposed that in order to set a new and achievable target for the renewable energy, a list of the potential renewable energies suitable for Mauritius must be drawn.

During the identification of the sources, the availability of bagasse was discussed.

Given that the land area was to remain same, the potential for increasing energy generation from bagasse was considered and members noted that the cane variety and efficiency of processes could play an important role in increasing the yields.

(4.5 million sugar cane – 1.5 million tonnes of bagasse -350 GWh to the grid in 2010-…. thout taking into consideration new developments??)

The group then proceeded with doing a SWOT for all the listed RE sources.

List of RE and non RE sources:

- Petroleum products
- Coal
- Bagasse and cane thrash
- Waste to Energy and Landfill gas to E
- Wind
- Solar
- PV
- Geothermal
- Wave
- Ocean Currents
- OTC
- Marine Biomass
- Any form of biomass except bagasse
- Cane juice / molasses
- Biogas (methanisation of animal waste)

Other possible future sources being : Liquefied natural gas (LNG), nuclear

Members agreed that in the context of MID, the focus should be on how to increase the RE forms.

The rest of the discussions were focused on doing a SWOT on the RE sources.

BAGASSE

Note :
In a configuration of co-gen, efficiency is 80 % with coal and bagasse For a mixed bagasse coal process, the efficiency of the plant in condensing mode is 26% instead of 30-32% when it is used in a pulverized coal fired boiler with an optimal thermodynamical cycle .

Strengths	Weaknesses
Local resource	Have we reached the maximum potential of bagasse??
Easily available	Availability limited to the crop season
Wide experience of the sugar industry in its use	Limited storage of bagasse
Can be used at will as a source of power	Low efficiency / under - utilised efficiency of coal.
Manageable electricity output from bagasse	Issue of equity and ownership of the resource
Stable source of supply of Energy	
Vast potential to explore other by products of the sugar cane industry	
Bagasse allows improved efficiency through co-generation	

Opportunities	Threats
To cogenerate at higher pressure for bagasse (upgrade efficiency of the plant	Urbanisation, land converted for other developments than sugar cane growing
To convert actual plants into integrated biomass gasification combined cycle (need investment in new technologies)	As bagasse is a by-product of sugar cane industry, it is dependent of the international market price of sugar, fluctuation of which can affect its production
Pelletisation of bagasse (need investment in new technologies –bad experience ar Bagapel)	Sugar cane industry is highly dependent on transport which is in turn dependant on the fossil fuels. Increase in price of fossil fuel will increase production cost of sugar
Torefaction – converting bagasse into coal like pellets (need investment in new technologies)	Politically sensitive
Land use recovery	
To do more research in producing high fibre content cane	
Recover trash and generate electricity (additional biomass)	
Convert actual trash in 'ballot de pailles' for future use	
Can tops still provides as organic nutrient to soil as it is left in the fields	

HYDRO

Note :
It was noted that at this stage, only an enumeration of the Strenghs, weaknesses, threats and opportunities were done, however there will be a need to qualify the elements discussed.

Strengths	Weaknesses
Local resource	Limited potential
Mostly despatchable	Seasonal
Highly flexible	Land use in building dams (consumes large land areas)
Free resource	

Opportunities	Threats
Min / micro hydro	In future we will need to compromise water usage for domestic purposes versus power production from hydro (conflicting use)
Potential of reuse of water downstream	
Pump storage	
Possibility to rehabilitate old mini hydro plants in old sugar mills (existing civil works)	
To exploit hydro potential in Rodrigues (seasonal)	

WASTE TO ENERGY

Note :
The incineration of municipal waste was mainly considered here.

Other existing sources such as incineration of sludge from fuel plants in incinerators together with waste was also considered.

Members took note that medical waste incineration was becoming a problem and as an option, a centralised waste burning plant to incinerate fuel sludge and medical waste in a centralised waste burning plant could become a topic for discussion.

Strengths	Weaknesses
Valorisation of waste	Produces toxic emissions damage to the environment (production of dioxins and toxic ashes) Therefore it is not an environmental friendly option
Reduce need for landfilling	Low efficiency
	Risk of corrosion of tubes
	60% of green waste going to incinerators can be composted Destruction of nutrients if this is incinerated
	Low calorific value will require input of fossil fuel to increase efficiency
	Discourages recycling
	Expensive tipping fee
	Needs subsidies
	Site and location : our island is small and therefore does not provide enough buffer

Opportunities	Threats
Increasing waste per capita every year	Disposal of ashes
It supports electricity generation	Associated health problems with the emissions emanating from the incinerators
Incineration after sorting can have better potential	Siting and location can reduce property value of land in the vicinity of the incinerator
Production of biofuels from thermal depolarisation of waste	Current suggested technologies were not very promising in terms of emission controls
Burning of fuel sludge and clinical waste in a centralised system	Lack of enforcement capacity to control the emissions

Dissenting comments: One member had dissenting views that this energy source had no strength at all.

WIND

Strengths	Weaknesses
Local and free resource	Localised and site dependant
Little environmental impact	Variability
Proven technology	Electricity storage
Minimal carbon footprint	Non despatchable (unless it is stored)
Low maintenance	Noise pollution can be significant
Land use still permissible under the wind mills (dual use of land)	Visual impact
	Beyond specific heights, it is not suitable to be positioned near airports
	Non-availability of a local wind atlas (a requirement for most international promoters)
	Not more than 150 MW
	Need to take into consideration conflicting future land use and land developments
	We do not have off shore technologies

Opportunities	Threats
To tract development of wind technology off-shore	Impact of marine ecosystem for off – shore developments
Can be an incentive for small promoters who are willing to operate Micro wind turbines as an off grid system or hybrid off grid and on grid systems	Extreme weather conditions
To explore higher capacities (50 MW)	Destabilisation of the grid
Open tender	Equity issue (ownership of the system)
	20 MW – land use equivalent is 175 hectares for Curepipe point project ???

SOLAR PV

Strengths	Weaknesses
Local and free resource	Quality of supply
Little environmental impact	Variability
Proven technology	Efficiency over the years / at the end of lifetime decrease of 20 % ??
Minimal carbon footprint	
More widely installed	
Less susceptible to damage by cyclone	
Scalable	
Wider applications	
Can be used on roof tops	
Much higher energy density	
Minimal technical maintenance	

Opportunities	Threats
New technologies even more efficient	Large solar power plants can have conflicting land use with other future land developments
Recyclable PV after decontamination	
Massive potential at all scales, must be further explored in Mauritius	

GEOTHERMAL

Note :
One study will be launched?

Pre-feasibility study

Can do 300 MW – quite ambitious

Strengths	Weaknesses
Source of firm power	Potential unknown
Can be applicable to heating	High cost of energy production
	Ongoing study

Opportunities	Threats
	Exploitable sites can be protected sites and thus permit for development will be restricted
	Digging can emanate gases to the atmosphere

BIOGAS

Strengths	Weaknesses
Feedstock available	Mostly for local application
Flexible generation	
Firm power	
Proven technology	
Can be used in existing coal boiler	
Can have decentralised generation	
Environment friendly	
Possibility of Energy storage	
Local experience available	
Residue is a good fertiliser	

Opportunities	Threats
Use of residue in agriculture	Industrial compost
Wastewater pre-treatment	Competing use of vinasse (vinasse can be used for electricity production) Actually vinasse is being used in fertiliser production
Methanisation from vinasse	
Use of vinasse for other purposes	

The chairperson pointed out that the way forward will be to do a prioritisation of the available options.

Members took note that among the overall objectives, we also have to consider the contribution Mauritius will need to make in order to reduce the impact on climate change.

Discussion on the REPORT STRUCTURE

Comments received

- To consider ‘ criteria’ that will determine success of the MID project
- To insert a list of recommendation between the SWOT analysis and the priority list
- A document on the working progress in annex
- To report the methodology of the work
- To study other possible methodologies to do the work and to give justification on why the current methodology was adopted
- To include some success stories of the MID projects and some case studies (attempts of energy savings made through change of technologies)
- To address the different energy scenarios
- To consider the problem in the international context as well as the national context
- To bring in more concrete objectives

Working Group 1

Energy

Report

Outcomes of the Third session

held on the 14th July 2011

Rapporteurs:

Mrs Y. Baguant-Moonshiram

Mrs V. Dookhun

Important note: This is a draft. It is meant for comments and discussion. It is not a final document. In no way, are any of the statements concrete coherent recommendations.

Introduction

The third working session of Working Group on Energy was held on Thursday 14th July 2011 as from 9 25.

The meeting was presided by the Chairperson Dr Khalil Elahee of the University of Mauritius.

The Chairperson welcomed all participants and thanked them for their presence which was very important for the MID process.

He gave a brief overview of the agenda and explained that during this session there should be more focus on concrete proposals.

It was also observed that some key issues were not addressed during the last sessions and that there needed to be more fine tuning.

The key issues that needed to be emphasised on were:

- Climate change – mitigation
- Transport and energy to fuel the sector
- Land use – agriculture and the energy sector
- Democratisation of the energy sector
- Institutional and regulatory aspects
- Cross-sectoral dimensions to be addressed
- Identify priorities and resources
- Measurable – concrete definitions and targets
- Agreeable – discussions and majority on major decisions
- Realistic – feasibility, conditions to be spelt out
- Time bound – ST/MT/LT

There were queries about the inclusion of financial and quantification of other resources in the proposals. The chairperson replied that it was not necessary to give exact financial resources needed but an approximation of resources required could be included.

There were also concern about what is 'MID' and what is 'non-MID' and that the proposals should take into account the main vision of the MID into consideration.

With respect to the methodology used for sub-theme 1, one member suggested to consider weighted average to the ranking of technologies.

The members were then invited to join their respective sub-groups to continue on the discussions to work on concrete coherent and common recommendations.

After the tea-break both sub-groups fine tuned the findings in the previous group works.

The lunch break was followed by a plenary session where each group presented their findings.

Mr Le Breton acted as rapporteur for Sub-group 1 and gave a presentation on the findings .

Mrs Dookhun who acted as raporteur for the morning session presented the findings of Sub-theme 2 . The power point presentation is annexed.

Group Discussion

Sub-theme 1 : Transport and Demand-Side (including housing, buildings, industry, commercial and agriculture, i.e. **end-uses**)

The chairperson for Sub-theme 1 congratulated his team on the work that it had done.

There was a query from a member about the targets of the Group1 concerning the reduction of electricity, but this issue had not been addressed by the members. The chairperson explained that this issue should be included in the recommendations.

There were queries about the time frame of the recommendations and these clarifications were given

ST – 0-3 yrs

MT -3-7 yrs

LT – 7-10 yrs

Some of the members were not agreeable with the way the 'survey' was carried out and did not approve of the proposed methodology. As there was lots of controversy about this issue, the chairperson of the sub group decided to let the group members discuss among themselves and to come up with an appropriate methodology for the way forward.

After the time allotted to them, the members decided to go through the list of opportunities in order to regroup some of the issues and to decide the time frame for the recommendations and to make a priority list.

Mr Ramajooloo was not agreeable to the way that the group was working and wanted his objection to be duly noted. According to him, the economic development of the country had to be taken into consideration before addressing the other issues.

The criteria to be taken into consideration for the prioritisation of the recommendations:

- Decrease on the fossil fuel demand
- Job creation

- Quality of life
- Environmental impacts

ST – 0-3 yrs MT 3-7 yrs LT 7-10 yrs

	Transport Opportunities	Time frame/ resources	Recommendations
1	Encourage non peak hour deliveries Optimise delivery routes	ST Low	
2	Alternate travel vehicles, Renewable energy for vehicles, Car pooling/shuttle services	MT Medium	1. Promotion of shuttle service in offices 2. Introduction of toll fee based on car occupancy 3. Lower prices of appropriate hybrid and electric cars (supported by renewable energies) 4. Taxation of vehicles based on car emissions
3	Reduce the number of cars on the roads, Introduce/promote safe cycling and pedestrian environment, pedestrian pathways/roads, ecofriendly public transport, Reduce time of travel to work	MT Medium	1. Mass transport system! 2. Mixed-use areas 3. Create dedicated cycle paths/pedestrian areas/towns 4. Prioritise pedestrians/cycle pathways
4	Delocalisation, Integrated holistic approach to development	LT High	1. Creation of sustainable new cities 2. Decentralisation of public sector 3. Mixed use development 4. Coherent and holistic land use planning (cross sectoral)
5	Quality of public transport, Turn towards public transport	ST →LT High	1. Mass transit system, Mass transport system, LRT
6	Education of stakeholders/drivers, awareness, ecodriving	ST →LT Medium	1. Awareness campaigns using CSR 2. Renewal of licence – courses on 'mid concepts'
8	Rings roads/by-pass roads supporting the mass transport and if thought in a holistic manner	LT High	1. Review the transport management system in a holistic, systemic, ecological manner

9	Better fiscal policy	LT Low to high	1. Remove VAT on selected products (bicycles…) 2. Subsidise selected products 3. Discourage imported goods and encourage use of local goods
10	Better regulations and policies/ enforcement	ST Low	1. capacity building 2. stricter regulations
11	Increase mass mobility of people rather than mobility of vehicles	LT High	1. Mass transit system, Mass transport system, LRT
12.	Reduce maritime/air transport		1. Encourage production and consumption of local products (at micro level)

	Land use Opportunities	Time frame, resources	recommendations
1	Energy+ buildings should be encouraged Individual habits/corporate policies and measures to reduce energy consumption in buildings Education, awareness, new philosophy, Promote sustainable lifestyle / quality of life	LT, high	1. Awareness campaigns using CSR 2. Public sector to pave the way 3. Promote and Reward best practices 4. Create awareness on orientation and ventilating buildings and bio-climatic architecture 5. Development of exemplary designs/guidelines for the different micro-climates of the republic
2	Reforestation, carbon offset	ST, Medium	1. Campaigns for reforestation 2. Awareness on carbon impacts

			specially on climate change
3	Integrated holistic and ecological approach to development	LT, high	1. Change of existing models to those favouring sustainable opportunities 2. Higher density development in selected areas 3. Efficient use of abandoned land, 4. Increase of road reserve for landscaping, 5. Bring a Town and Country Planning which is efficient in cultural and ecological planning, 6. Review strategy on development, 7. Better timing of projects
4	carbon metrics, New technologies to save energy	ST →MT medium	1. Carbon emissions measures of buildings 2. Lifecycle assessment of a building 3. Use of sensors in public areas 4. Domotics – smart control in electrical appliances
5	Consultation and planning using strategic, environmental, social and ecological assessment	MT Low	1. Implementation of Strategic Environmental and social impact assessment 2. Consultations with stakeholders to be led in a pro-active and preventive manner
6	Better monetary /fiscal policy for better planning	LT, high	1. Reduce fees (development, building,…) for sustainable buildings 2. Better loan rates for sustainable buildings

7	Better management of natural resources	ST/ medium	1. Better integration of landscape and ecological activities in the strategic plan
8	Policies and measures to favor allocation of capital according to the needs of the people	LT High	
9	Promote local production and consumption	LT, low	1. Encourage local planters 2. Measures to assist small planters to adapt to climate change 3. To have an agricultural diversification policy linked with land use and distribution 4. Diversification of agriculture 5. Review the distribution policy and find markets for local goods
10	Better regulations and policies and enforcement,	LT Low	1. Streamline administrative procedures & organisations to facilitate the decision making process 2. Appropriate/severe sanctions against non-compliance 3. No political interference in decision-making process
11	Replacing permeability of soils specially when large area of concrete so that ground water table will be recharged	ST Medium	

	Housing Opportunities	Time frame, resources	Recommendations
1	New regulations about energy efficiency for new developments Review policies, regulations and enforcement. EIA regulations more strict Minimum energy performance standards for equipments	ST →MT, low	

2	Incentives to people and community to adopt sustainable technologies, More and better incentives to save energy and use of sustainable technologies, Use of more efficient materials,	ST Low/high	
3	Promotion of mixed-use development, Mixed use of buildings Integrated holistic approach to development, Mixed use of residential and agricultural lands	ST →MT, low	
4	Convert existing buildings to green buildings, Optimise use of existing buildings	ST →MT, medium	
5	Appropriate architectural design to take advantage of Mauritian climate	ST, low	
6	Use of local materials for construction,	ST, medium	
7	Capacity building , Education, awareness, Allocation of resources and training, Local consultants for new projects	LT, high	
8	Recruitment of architect in local authorities, Legal counselor... in order to empower the local authorities	ST, low	
9	Better fiscal policy in line with energy efficiency, taxes	ST, high	
10	Conservation of heritage building	ST, high	

	Industries Opportunities	Time frame, resources	Recommendations
1	Incentives to establish energy efficiency process, Fiscal policy	MT, medium	
2	Encouraged to use lesser carbon fuels with less emissions Encourage warehouses to produce their energy,	Medium medium	
3	Continuous professional development, capacity building, Education, awareness	LT, high	
4	Use of waste to produce energy, Use of by products of processes	ST high	
5	Professional input on energy efficiency	ST medium	
6	Use of more efficient equipments, Labelling of equipment Minimum energy standards for equipments		
7	Review regulations and policies	LT, low	
8	Assistance in implementation of recommendation, Energy audit	ST medium	
9	Clustering of shared facilities	MT-LT medium	

Subtheme 2:

2.1 Introduction

Chairperson: Dr K Elahee

Rapporteur: Mrs V Dookhun

Introductory remarks

- According to some studies peak oil crisis will occur in 2020 and some minority group of researchers reports the date 2030
- Resulting in important impacts on economy, transport and food security of the country
- It was reiterated that 95 % transportation energy for Mauritius is derived from fossil fuels
- Members agreed to focus discussions on land transport rather than marine and air transports
- There is a need to reduce energy consumption patterns and reduce the number of cars on our roads
- Comfortable, reliable and cost competitive forms of common transport can provide an incentive to make a paradigm shift
- There was general consensus that we need a transit away from oil (Dissenting views expressed, as the member believed that domestic production of biodiesel can be a solution. With this type of diesel, it can be used straight away and no mixing was required.)
- Sustainability Criteria - To consider the triple bottom line (Environment , Economic and Social components)
    - A project satisfies the sustainability criteria if it has elements related to the three components

- Members wanted the focus on discussions to be on the different renewable forms of energies, RE
- Consideration to Climate change adaptation was an important aspect that need not be neglected

2.2 The method used

Chairperson directed members to

- Develop SMART objectives
    - Specific
    - Measurable
    - Agreeable
    - Realistic
    - Time Bound
- Difficulties highlighted at this stages
    - It was not clear in which subgroup water issue need to be addressed
    - Members were aware that some incoherence in recommendations can occur given that the two groups were working separately
    - Whether the focus should be limited to Supply Side Mgt only in this Sub-group

      Decision taken was that the demand side of energy will not be considered in this sub-group

2.3 Discussions

- Chairperson advised to look at each form of RE and make suggest the recommendations making sure they were
    - Concrete
    - Coherent
    - common

Consensus was reached that RE will form the crux of the debate.

Time frame were set as follows to be consistent with the first subgroup:

- Immediate, Short term (3yrs), medium term (4-7)
- Long term (10 yrs perspective)

However the Vision 2025 for Energy will also be considered.

Information gathered on some projects under consideration at the level of NTA

- Toll system(electronic pricing , area licensing)
- Bus lane
  - Dedicated lanes on actual road infrastructure for buses in peak hours
- Park and Ride
  - Secured parking space for cars and linking it with main towns with shuttles as a means to reduce congestions

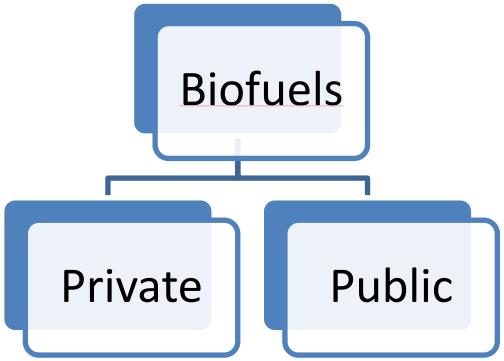
Note: Recent surveys demonstrated that:

- people in Mauritius are willing to shift from private cars to common transport provided it is reliable, comfortable and cost competitive
- many cars travel with single occupants in peak hours

One member pointed out that it was important to consider the overall impact of buses on our road network system as compared to cars.

Members were concerned on how to differentiate between proposals which are in line with **MID strategies and those which did not tally with the principles of MID.**

The sub group was of the opinion that bio-fuels are reliable sources of energy for both private cars and public transportation in Mauritius.



Members suggested that the public transport sector can run on biofuels and we can consider electrification of private cars.

People should make more use of bicycles and the human energy potential for mobility should be fully exploited.

All renewable forms of energy should be consider for electricity production for the private transport otherwise this will impact with peak demand problems being faced currently.

- Given that there can be shifts of Energy usage patterns in the near future (less private cars), the demands for energy will also be changed
- Chair mentioned that his recent participation in an international conference indicated that second generation of fuels were on the way and entering into picture by 2050
- Members had lengthy discussion on possible utilisation of sugar cane juice for production of ethanol and some equity issues were raised.
- Members deliberated on land use for biodiesel production and using of waste for biodiesel production

2.4 Recommendations formulated

- Recommendation 1

- To promote the use of ethanol or synthetic biofuels for public transport rather than private owned vehicles

- Recommendation 2
  - To maintain (increase if possible) the current land area of 60,000 hectares under agriculture
  - To maximize yield from land (by using crops yielding more biomass)
    - Need to bear in mind that there will be competing land use (food production + biomass for energy + other land developments)
    - It will be important to maintain the forest cover in Mauritius
      - Also to address any biodiversity issues that will arise
- Recommendation 3 (Wind /Solar)
  - By 2025 to increase our target for power production from Wind Energy and Solar Energy to 20 %
    - Subject to conditions: land use , sustainability criteria, accessibility and stability criteria (e.g storage)
  - Consider off-shore wind systems
  - Material scarcity may occur and hence increase price of solar panel
    - New design of panel and new tech can lower future costs
- Recommendation 4 (Waste to Energy)
  - Solid waste and liquid waste
  - Need for an ISWM (expected sorting of solid waste at source)
  - Energy potential of remaining SW to be considered
    - Biomethane is a clean form of energy that can be used off-grid
    - Take into account all the SD criteria

- Liquid waste to Energy
  - Use of more appropriate technologies
  - Centralised collection of waste water ,
  - Consider production of energy of order of 5 % from biomethane by 2025

- Recommendation 5 (Hydro)
  - set target of power production from hydro to 2 % by 2025
    - Improve efficiency of actual production plants
    - Taking into account change in rainfall patterns
    - Conflicting water use with other sectors have also to be considered
  - Recommendation 6 (Fossil Fuel)
    - Currently transport sector is 100% dependant on Fossil fuels
    - We target a 50 % reduction by 2030
    - To attain 0% dependence on fossil fuels by 2050

- Recommendation 7 (Bagasse)
  - Target will depend on the policy which is to be driven by MID recommendations
  - Within the framework there is a need to encourage producers to produce more bagasse
  - Ambitious but realistic targets were set to 17 % power production from bagasse and up to 25% electricity production from bagasse by 2025

- Recommendation 8 (Geothermal)
    - To continue to investigate in this field and more future studies

      (It was acknowledged that the is no generation of electricity from this source currently)

2.5 Conclusion

- There is a need for a MID energy policy / framework
- All investors need to consider renewable energy sources while investing
- It was generally agreed to shift from fossil fuels to non fossil fuels
- Imposing of an environmental tax on the users can be an option
- Need a premium for RE , to promote RE
    - Climate change mitigation
    - Internalisation of cost to be considered
    - CDM opportunities to be considered
- Members agreed that a levy should be imposed on the users of heavy oil
- Subsidy for fossil fuel need to be revised
    - To be more effective, we need to have a net figure to compare cost of E fossil v/s RE

Notes:

- LAVIMS report for land use need to be considered

- Need for exploitation of marginal lands for cultivation of crops for biomass rather than competing for land use under sugar cane and other agricultural land use.
- From an Energy perspective we need to keep current land use
- Existence of a policy vacuum and need for capacity building for the policy makers and decision makers
- For future bio-fuels utilization: how long will it take to become fully operational and any need for technology transfer ?
- Currently fertile land are being converted and utilized for new buildings e.g. at Ebene
- Important discussions on land mass available for cultivation(23.3% ?)

For the next session members will need to :

. IDENTIFY THE MAIN PILLARS FOR <MID>

. Define a list of priorities

. Clearly stipulate SD criteria

ANNEX:

MEMO SUR LE RENDEMENT D'UNE TRANCHE THERMIQUE

Le rendement d'une tranche thermique est obtenu en suivant la chaine de transformation du combustible (charbon ou biomasse) en électricité :

-foyer et chaudière entre 85 et 90 % selon l'excès d'air ,les imbrulés solides ,gazeux et les pertes par rayonnement

-turbine et poste d'eau entre 35 et 45 % selon le nombre de réchauffeurs HP,BP ,l'existence ou non d'une resurchauffe ,la qualité du vide qui dépend de la source froide .

-l'alternateur de l'ordre de 98 -99 %

-la consommation des auxiliaires entre 6 et 8 % de la puissance totale

On voit que le rendement net peut varier entre 26 % et 37 % mais il s'agit essentiellement du choix de l'optimisation du cycle et non du type de combustible

Le fait de pouvoir faire fonctionner une tranche en cogénération ne dépend pas non plus du type de combustible et le rendement net devient supérieur a 80 % .

Il est donc intéressant de regarder le rendement global d'une tranche dans son fonctionnement sur une année pour avoir son rendement net moyen .

Prepare le 11/7/2011,par P.Sagnier pour l'atelier du MID sur l'energie

Working Group 1

Energy

Report

Outcomes of the fourth session

held on the 28th July 2011

Rapporteurs:

Mrs Y. Baguant-Moonshiram

Mrs V. Dookhun

Important note: This is a draft. It is meant for comments and discussion. It is not a final document. In no way, are any of the statements concrete coherent recommendations.

Introduction

The fourth working session of Working Group on Energy was held on Thursday 28th July 2011 as from 9 30.

The meeting was presided by the Chairperson Dr Khalil Elahee of the University of Mauritius.

The Chairperson welcomed all participants to this last session and thanked them for their presence as their input was very important for the MID process.

He thanked the members for their interaction through mail and the documents that had been circulated. He gave a special thanks to Mr Munisamy for the work that he had done and which had been circulated to all members.

He also gave a special thanks to the 'animation group' – the Vice Chairperson, Dr Koshik Reesaul; the Rapporteurs: Mrs Kirtee Baguant-Moonshiram and Mrs Vimi Dookhun; representatives from the Ministry of Environment and Sustainable Development; Mr Devarajen Vithilingum, and Mr Aslam Yadallee : the representative of the parent Ministry and the support of the PMOs office and to Mr Gomart from the PMO's office.

He gave a brief overview of the agenda and explained that the two groups were going to work separately in order to identify the priority recommendations and were going to meet after the tea-break.

The chairman then invited Mr Gomart to give some clarifications regarding the report to be submitted. Mr Gomart explained that there was a need for concrete recommendations which would lead to a MID action plan.

The two sub-groups worked separately till lunch. After lunch, the groups met in a plenary session where each group presented its findings. Discussions were held concerning the recommendations of each group.

Mr Toni Lee, chairperson of Sub-group 1 explained that the group had changed the term 'buildings' to 'built-up' and 'industries and warehouses' to 'industrial processes' as these terms were more expressive. It also explained that the group had added a column explaining what is non-MID in the different sub-themes in the local context actually.

There were queries from members regarding some of the recommendations of the sub-group:

1. Limiting the number of cars: some members queried the ways in which this were going to be achieved, one member expressed his feelings regarding the fact that this would make people poorer. Other members replied that this was not related to poverty but to improving the quality of life of Mauritian citizens as the carrying capacity of the road network was rapidly reaching (if not reached) its limit. The strategy of the group was to encourage mass mobility of people by improving the quality and accessibility of public transport. The members were proposing a mass transport system and not encouraging the use of individual cars. They were also proposing ways to reduce the distance of travel, and thus the use of energy;

so did not see how this step was correlated to standard of living. More stress was on quality of living of the Mauritian people. One member explained that as per actual government policy, it was not possible to put additional taxes on cars in order to reduce the number of cars.

2. Delocalisation : some members wanted to know how this was going to impact on the amount of energy used. The members of the sub-group explained that as 'jobs' were going to get closer to the 'people', there would be less need for travel and that the number of trips and the distance travelled would be reduced, thus reducing the amount of energy used.

3. Decentralisation: the members expressed their doubts regarding this recommendation concerning the public sector and how it was going to help in the MID context. They thought that for the public at large, it was preferable if the governmental offices were centralised. There was a debate regarding this issue and the chairperson took note of these discussions and proposed that this should be further investigated.

4. Some members expressed their doubts regarding some of the proposals of sub-group 1 as they did not find it coherent with the other Working Groups (Equity,...). The chairperson (or Mr Gomart???) agreed that some issues were cross-sectoral but that this working group could not take al l these issues into consideration. These were going to be taken into consideration in the next phase; when the consultants were going to compile the recommendations of all the working groups.

5. Land use:

   - Increase forest cover to 33% with endemic species (location, biodiversity, ecosystem functioning,)

     The members queried about the trees that were going to be planted. The sub-group explained that it was going to be endemic plants and the areas to be reclaimed would be close to the existing forests.

   - Not release additional green field sites for built up – encourage clustered development

     The members queried about this could be achieved and if this was going to hinder development and growth in the country. It was explained that development should be encouraged in in-fill sites in existing built-up areas and not outside limits of settlement as this put an additional stress on the existing infrastructure.

   - Agriculture: minimum to reach 60% food security for 1.4 million people – study to assess the cover needed

     The members queried about the area that was going to be needed as land was a scarce resource in Mauritius and that there was demand from other sectors including energy – for the growing of bio-fuels. It was explained that as the sub-group did not have the available data, they had requested for a study and for them food security was more important, and this would also impact on the amount of energy used for import of food to Mauritius. The chairperson then explained that even if land was a limited resource, Mauritius could use the help of its regional partners (Madagascar, Mozambique...) and cross-border agreements in order to cater for its needs.

- Strategies : there was a query regarding the fact the there was already a strategy plan – the National Development Strategy (NDS) plan which was in force in Mauritius and which had given importance to sustainability and was in line with the MID vision. The reply was that this document had been prepared in 2003 and that it was indeed a strategy plan leading to sustainable development: but that the major problem was the implementation and the enforcement of the guiding principles of the NDS. As such, the group was proposing to give more resources and capacity to Local Authorities in order to ensure implementation and enforcement of existing regulations and guidelines.

6. Energy efficiency targets: there were queries about the targets proposed by the sub-group. The members of the sub-group explained that they had based their assumptions on the figures of energy consumption from 1990 to 2008, had looked at the trends of economic growth and had come up with these targets.

7. 24/7: the group had flagged this issue and regarded it with serious concern and wanted it to be discussed in the plenary session. All members supported this idea, and agreed that economic growth was important but not at the expense of socio-economic concerns.

8. Triple GDP to 1 trillion rupees in 2020: the members agreed that this target was not in line with the MID vision and that this was going to put a lot of stress on resources specially water and land – which are already scarce resources in the country.

9. 2 million tourists in 2015???: the members all agreed that this objective was not compliant with the MID vision and viewed this target also with serious concern. They again stressed that economic growth was important but not at the expense of socio-economic welfare of the Mauritian population.

Sub-theme 1:

Transport and Demand-Side (including housing, buildings, industry, commercial and agriculture, i.e. **end-uses**)

The WG continued the work that they had started during the last session and that they had not completed during the last session. They completed the table for housing and industries.

Changes were made to some of the titles and recommendations of subthemes.

Then the WG tried to quantify the targets for the different subthemes and there were discussions about the methodology to be adopted in relation to the data available, feasibility studies available, and the trends and projections per sector.

There were also discussions about the standard designs which are being proposed by the consultants ...and about the practicability and the implementation of these designs in the local context.

Targets for 2020:

Reduce consumption by 35%

Base year 2010:

Bio-fuel = 20%

	Transport Opportunities	Time frame/ resources	Recommendations	Non MID
1	Promote alternate travel vehicles	MT Medium	5. Promotion of shuttle service in offices and outside town centres with shuttle service 6. Promotion of car pooling by introduction of toll fee based on car occupancy 7. Lower prices of appropriate hybrid and electric cars (supported by renewable energies) 8. Taxation of vehicles based on car emissions 9. Capping the number of motor vehicles in Mts	Provision of parking in city centres and villages
2	Reduce the number of cars on the roads Promote ecofriendly public transport	MT Medium	5. Mass transport system 6. Mixed-use areas 7. Create dedicated cycle paths/pedestrian areas/towns 8. Prioritise pedestrians/cycle pathways	Ever increasing number of cars No consideration given to bicycle paths network and pedestrians
3	Delocalisation Integrated holistic approach to development in relation to land use Decentralisation	LT High	1. Making towns sustainable 2. Mixed use development 3. Coherent and holistic land use planning (cross sectoral) 4. Integrate transport and land use planning 5. Reduce time of travel to work	Having a town with an ecological footprint of more than 2.5 gha per person
4	Improve quality and accessibility of public transport Increase mass mobility of people rather than mobility of vehicles	ST →LT High	1. Mass transit/transport system	
5	Education of stakeholders/drivers	ST →LT Medium	1 Awareness campaigns on ecodriving using CSR 2 Renewal of licence – courses on 'mid concepts'	
6	Review the transport management system in a holistic, systemic, ecological manner	LT High	Rings roads/by-pass roads supporting the mass transport and if thought in a holistic manner	

7	Better fiscal policy	LT Low to high	1. Remove VAT on selected products (bicycles…) 2. Subsidise selected products 3. Discourage imported goods and encourage use of local goods	
8	Better regulations and policies/ enforcement	ST Low	1. capacity building 2. stricter regulations 3. allocation of more resources 4. more resources to local authorities	
9	Reduce maritime/air transport		Encourage production and consumption of local products (at micro level)	

Land use

1. Increase forest cover to 33% with endemic species (location, biodiversity, ecosystem functioning,)
2. Not release additional green field sites for built up – encourage clustered development
3. Agriculture: minimum to reach 60% food security for 1.4 million people – study to assess the cover needed
4. Reduction of number of kilometres travelled per person (to be investigated through a study)

	Land use Opportunities	Time frame resources	recommendations	Non MID practices
1	Individual habits/corporate policies and measures to reduce energy consumption in buildings Education, awareness, new philosophy, Promote sustainable lifestyle / quality of life	LT, high	1.Awareness campaigns using CSR 2.Public sector to pave the way 3.Promote and Reward best practices 4.Create awareness on orientation and ventilating buildings and bio-climatic architecture 5.Energy+ buildings should be encouraged by giving incentives 6.Development of exemplary designs/guidelines for the different micro-climates of the republic	
2	Increase forest cover for carbon offset	ST, Medium	3.Campaigns for reforestation 4.Awareness on carbon impacts specially on climate change	Conversion of greenfields and prime agricultural areas to concrete
3	Integrated holistic and ecological approach to development Better regulations and policies and enforcement	LT, high	8.Change of existing models to those favouring sustainable opportunities 9.Higher density development in selected areas 10. Efficient use of abandoned land 11. Increase of road reserve for landscaping 12. Bring a land use planning which is efficient in cultural and ecological planning 13. Review strategy on development 14. Better timing of projects 15. Streamline administrative procedures &	Shopping malls outside centres Morcellements projects where no infrastructure available and environmentally sensitive areas

			organisations to facilitate the decision making process 16. Appropriate/severe sanctions against non-compliance 17. No political interference in decision-making process 18. Provision of adequate resources to concerned authorities	
4	Promote carbon metrics Promote new technologies to save energy	ST →MT medium	5.Carbon emissions measures of buildings 6.Lifecycle assessment of a building 7.Use of sensors in public areas 8.Domotics – smart control in electrical appliances	
5	Consultation and planning using strategic, environmental, social and ecological assessment	MT Low	3.Implementation of Strategic Environmental and social impact assessment 4.Consultations with stakeholders to be led in a pro-active and preventive manner	
6	Better monetary /fiscal policy for better planning	LT, high	3.Reduce fees (development, building,…) for sustainable buildings 4.Better loan rates for sustainable buildings	
7	Better management of natural resources	ST/ medium	2.Better integration of landscape and ecological activities in the strategic plan 3.Review of land use for water shed management taking into account climatic changes	Non sorting of waste
8	Promote local production and consumption	LT, low	6.Encourage local planters 7.Measures to assist small planters to adapt to climate change 8.To have an agricultural diversification policy linked with land use and distribution 9.Diversification of agriculture 10. Review the distribution policy and find markets for local goods	Increasing dependency and affinity on imported goods Use of poor quality and Non recyclable goods
10	Replacing permeability of soils specially when large area of concrete so that ground water table will be recharged	ST Medium	1.Include the tarred surfaces in the soil occupancy with a limited plot cover	

Targets for built-up: 20% energy reduction of energy consumption in existing buildings

35% energy reduction of energy consumption in new buildings

Housing – 300 000 households actually – forecasted at 405 000 in 2025

	Buildings- Opportunities	Time frame, resources	Recommendations	Non MID
1	Minimum energy performance standards for equipments	ST →MT, low	New regulations about energy efficiency for new developments Review policies, regulations and enforcement. EIA regulations more strict	Bad design Lack of enforcement Illegal developments BFA No solar passive / bioclimatics design
2	Promotion of energy efficient housing, bioclimatic design	ST Low/high	Use of more efficient materials Use of local materials for construction, Incentives to people and community to adopt sustainable technologies, More and better incentives to save energy and use of sustainable technologies Appropriate architectural design to take advantage of Mauritian climate Better fiscal policy in line with energy efficiency, taxes	
3	Land use planning for housing	ST →MT, low	Promotion of mixed-use development, Mixed use of buildings Integrated holistic approach to development, Mixed use of residential and agricultural lands	
4	Capacity building , Education	LT, high	Creation of awareness, Allocation of resources and training, Local consultants for new projects Recruitment of architect in local authorities, legal counselor... in order to empower the local authorities	
5	New buildings	ST, low	Star rating – related fiscal policies New guidelines – to promote people to adhere to	

			guidelines – fiscal incentives Encourage Rain harvesting	
6	Existing buildings Conservation of heritage building	ST, low	Convert existing buildings to green buildings, Optimise use of existing buildings	

Industrial processes – Energy consumption will be equal or less than of the 2010 level in spite of an expected annual growth of 4% in this sector

(Based on pilot studies where an effective reduction in energy use after an energy audit)

	Industrial processes - Opportunities	Time frame, resources	Recommendations	Non MID
1	Increase energy efficiency	MT, medium	Incentives to establish energy efficiency process, Fiscal policy – remove or lower VAT Professional input on energy efficiency Use of more efficient equipments, Labeling of equipment Minimum energy standards for equipments Assistance in implementation of recommendation, Energy audit	Subsidisation of polluting fuels
2	Use low carbon fuels	Medium medium	Facilitate the administrative process Industries should produce part of their energy Technological improvements to encourage IPPs Encourage to use lesser carbon fuels with less emissions Encourage warehouses to produce their energy Use of waste to produce energy, Use of by products of processes	
3	Creating awareness		Continuous professional development, capacity building	
4	Review regulations and policies	LT, low	Review perverse incentives for the use of high carbon energy Funding mechanism to foster the energy efficiency	

5	Adopt Industrial ecology principles and design	MT-LT medium	Clustering of shared facilities A circular economy	A linear throuput economy (cradle to grave)

Non sustainable/ Not in line with MID vision

To be discussed in plenary session

- 24/7 economy
- 2 million tourist
- Triple GDP to 1 trillion rupees in 2020

Subtheme 2

Theme 2:

The recommendations formulated by Dr Munisawmy and which was based on the previous discussions of the WG were lengthily discussed.

The new set of recommendations with the corrections are attached in Annex (See Annex WG4 revised)

Some main points that have been retained during the discussions were as follows:

Rodrigues

Mr Salomon informed members that some of the SIDPR recommendations presented have already been implemented.

Members expressed that they wanted to include recommendation for Rodrigues in the core of the report and not as a stand-alone set of recommendations .

It was suggested that the word 'hydraulic' in the recommendations be replaced by 'hydro-electric' .

Mr Sok Apadu requested that information/ recommendations for Algalega, St Brandon should also be included in this report.

Members took note that the visit to Agalega could not take place, as the flight was cancelled.

Representative from OIDC was requested to supply necessary information for Agalega and the outer islands.

It was pointed out that Agalega had no other option than to go for 100% renewable energy.

Air and maritime transport

With respect to replacing fossil fuels with biofuels, members suggested to consider carbon-offsetting for the airline industry.

There was a proposal that a levy should be charged to passengers travelling to Mauritius and this levy be earmarked to finance projects on RE in the country. (the sum of £15 / passenger was quoted).

One member suggested that this should be accompanied by voluntary mechanisms for passengers that will help in the energy development of the island.

Local electrical energy consumed by ships visiting the port was provided by CEB. Recommendation s were made that the ships use clean energy to meet their needs. A higher charge can be imposed on them and the environmental tax be earmarked for renewable energy projects.

GPD Growth

Consensus was reached that a 5 % annual growth o f Energy Demand was not sustainable .

Chair commented that low energy demand was observed in 2009, probably because energy intensive sectors had been replaced by less energy intensive processes (e.g. decrease in energy consumption for textile industry , activities more towards IT sector which is less energy intensive than textile sector), lower economic growth and also demand-side measures related to high energy prices.

Increase in fuel price also made people realise the cost impacts of energy use and a shift in consumption patterns are noted.

LNG

LNG supply will not be affected in the near 30 years

Oil will become scarce and this can disrupt consumption patterns of LNG

There is no local infrastructure for LNG

Need to have local expertise to manage LNG and safety aspects related to transport of LNG were highly important.

LNG is ranked behind biomethane and is not a biofuel as such.

It is difficult to assign a target for LNG, but the key recommendation is that we need to shift to zero fossil fuel.

LNG can be a transition fuel

One member expressed that should the group be recommending LNG, it should be clearly spelt out in our recommendations.

Others, were of the view that it is understood that an intermediate fuel was needed and this was clearly understood, however, it will not be a MID proposal if we stated it as a clear recommendation. !

Technical aspects of LNG were discussed.

Members queried whether it was wise to invest in LNG infrastructure when it was to be used as intermediate fuel.

‘Recommendation’ v/s ‘proposal ‘

Members debated on using the word ‘recommendation’ .

Dissenting views received from two members on using the word ‘recommendation’.

Some members suggested to use the word ‘proposal ‘ instead of the word ‘recommendation’.

The rapporteurs were requested to explain clearly in the report the idea behind using the word ‘recommendation’.

One member pointed out that these recommendations had to be supported with sufficient technical calculations.

Another member from an NGO commented that some initial calculations were performed before the figures had been reported.

Rapporteurs were asked to point out in the final report, where they would consider that it is the responsibility of the government to do calculations and feasibility studies prior to implementing the recommendations.

A good preamble in the report was needed to support the arguments that follow in the core report.

One representative from the sugar sector pointed out that it is important to consider sustainability criteria (env, eco and social) before the phase out of coal is considered. Replacement of sugar cane with other biomass crops have to be dealt with , with greater caution.

Good governance

Need to inform promoters on how the government want to spend the money in RE

MID is about to create a new political dimension.

Targets and figures

Rapporteurs noted that the table of targets will not be submitted in the main report.

Members debated lengthily on the use of arbitrary figures in the recommendations, and noted that a sufficient manoeuvre margin was catered for.

Members were brought to understand that this was not a government document that is being produced. The use of the report to draft the future MID policy was reiterated.

Members did not agree with **Building of an oil refinery**

A recommendation on having a moratorium on new coal fired plants was considered not helpful by some as this would limit the possibility of bagasse-coal cogeneration plants.

This point was also raised at the plenary and same comments were received.

Electricity from Wind

Dr Munisamy was requested to provide more information on how he came to the figure of 500MW.

Some members were of the view that the reported figure was unrealistic.

Later this information was provided and this is annexed in the report.

It was noted that Wind Atlas for some regions of the island have been worked out.

Electricity from energy crops:

Efficiency of 70% expected in fuel cells was queried.

Electricity for transport

All recommendation followed by : subject to sustainability criteria being met!

Queries -from members from sugar sector as to why ethanol has to be restricted to the public transport only.

The idea of optimisation of the available ethanol fuel for mass transport as compared to private transport supported the recommendation. (given the **curren**t ethanol production can be a limited supply if it is to be used in the transport sector.)

Members foresee other sources for the production of ethanol.

Smart Grid

The importance of a Smart Grid and a Grid Code were discussed.

Subsidies on fossil fuel

Direct and indirect forms of subsidies were not helpful when LPG is being used to warm swimming pools and by ships.

Idea of hidden subsidies were evoked.

PLENARY SESSION

Member from a promoter of biodiesel gave presentation. He reported his recent visit to China where he studied the production of biodiesel from Giant king grass. He reported that the yield per hectare for this crop was higher than sugar cane in terms of biomass.

One member pointed out that land requirement for the production of this plant will be considerable if we want to be sustainable in biodiesel.

Plantation is expected to be very modular and spread across the island and the cost implications for transportation can be significant.

The promoter suggested that the new plant can be cultivated on abandoned plots of land.

Water requirement for irrigation of the crop was questioned.

Promoters mentioned pellets of this plant can be used to replace coal .

Other forms of agro-carburant or advanced bio-fuels were evoked.

The production of biodiesel will have economical sense as long as the price of diesel on the market is high .

Rappoteurs were asked to highlight where areas of further studies were required.

Example to increase forest cover, we need further studies to determine what type of trees were needed (endemic trees) and no monoculture even for reclaimed areas.

Rapporteurs were requested to explain carefully the term : sustainability!

Strong opposition from one member: unless we have explored other potentials and are fully satisfied with other forms of RE, no moratorium can be imposed. Moratorium will also prevent optimisation of bagasse-coal cogeneration.

Another member expressed that if moratorium has to be imposed, it should be consistent with other fuels e.g kerosene and heavy oil and not restricted to only coal.

Members reached to a point of agreement for the order of priority for the energy sources for power generation in the immediate/short term in terms of base-load :

1. Biomass

2. Bagasse or biomass / coal
3. LNG
4. Coal (high efficiency generation)

   The last option was not approved by several members as it was considered contrary to the MID vision. Applying sustainability criteria to coal was not meaningful. Besides, in the long term coal-only power generation will prove to be inflexible and will have to be phased out.

With respect to mass transport: members took note that the recommendation from this working group will be helpful in guiding the future form of energy to be used to power the mass-transit system. The issue was discussed during Session 3 where it was agreed that the energy source should be in line with the MID vision.

One recommendation of this WG can be for instance: we request for a comparative study to propose the best system on various suitable LRTs~~.~~

CLOSING SESSION

The chairperson again expressed his gratitude to all the members for their hard work and thanked them for being present for the last session of the working group on Energy.

As the deadline for the submission of the report was set for the 12th August 2011, it was agreed that the rapporteurs would submit a draft report to all the members through the mailing list on the 5th August 2011. A meeting to finalise the report with the WG was fixed for the 8th August 2011 at 13 00 at the Ministry of Environment and Sustainable development. The corrections, if any, would be carried out by the rapporteurs and the final document submitted on the 12th August 2011 to the PMO's office.

The meeting ended at 17 00.

The chairperson again expressed his gratitude to all the members for their hard work and thanked them for being present for the last session of the working group on Energy.

As the deadline for the submission of the report was the 12th August 2011, it was agreed that the rapporteurs would submit a draft report to all the members through the mailing list on the 5th August 2011. There would be a meeting held on the 8th August 2011 at 13 00 at the Ministry of Environment and Sustainable development where all the members of WG 1 are invited in order to 'ratify' the report. The corrections, if any, would be carried out by the rapporteurs and the final document submitted on the 12th August 2011 to the PMO's office.

The meeting ended at 17 00.

List of participants

Contact name	Organisation	Designation
Ahtion Patrice Mr	Municipal Council of Vacoas Phoenix	Civil Engineer
Baguant- Moonshiram K. Mrs	Rapporteur	Lecturer
Bangaroo Pyranah Vijay Mr	Municipal Council of Beau-Bassin/ Rose-Hill	Head Planning Department
Boullé Thierry Mr	Association of Mauritian Manufacturers	Group Supply Chain Business Partner
Bundhoo Mohammed Mr	Municipal Council of Port-Louis	Planning Officer
Chacoory Nundeo Mr	Mauritius Trade Union Congress	Director Of ANSA-Mauritius
Deak Vanina Ms,	DONOR	Project Officer, Afd
Deenapanray Sanju Dr	ELIA-Ecological Living in Action Ltd	Director
Dookhun Vimi Ms,	Rapporteur	Lecturer
Dooreemeah Oomar Ahad Mr	Student Association (University of Mauritius)	
Elahee K. Dr	Chairperson	Associate Professor, University of Mauritius
Eliott Alixe	Action Civique Albion Plage	Member
Ghurburrun Ravin Kumar Mr.	Representative of Outer Islands Development Corporation (OIDC)	Development Officer
Goburdhun Dineshsing Mr	Planters Association	General Manager, Mauritius Cooperative Agricultural Federation
Gujadhur Devdass Girish Mr	National Transport Corporation	Senior Technical And Mechanical Manager
Gunessee Lakshmi Mrs	National Women Council	Representative
Jaufeerally Karim Mr	Institute for Environment and Legal Studies	Researcher On Environmental And Energy Issues
Jeetah Vikram Mr	Institute for Consumer Protection	Member O
Jugduth Himmunt Mr	Mauritius Chamber of Commerce and Industry	General Manager,
Kawol Anita Mrs	Ministry of Environment and SD	Environment Officer
Khoodaruth A. Mr	University of Mauritius	Lecturer
Korimbocus Abdool Azaad Mr	Democratic & Progressive Unions	Representative

Contact name	Organisation	Designation
	Federation	
Kwok Jocelyn Mr	Mauritius Chamber of Agriculture	Director
Lachkar Serge Mr	KGTEX	Director
Lafond Rene Mr	Confederation des Travailleurs du Secteur Privé - CTSP	
Lau Ah Wing A.F. Mr	Mauritius Sugar Industry Research Institute	Chartered Engineer And Chartered Energy Manager
Le Breton Thierry Mr	SOS Patrimoine en Péril	Consultant In Sustainable Corporate Strategies
Lee Luen Len Tony Mr	ECOSIS Ltd	Director
Leelodharry Rajan Mr	Federation of Public Sector and Other Unions (FPSOU)	Representative
Li Yuen Fong Jean Mr	MSPA	
Luximon R. Mr	Ministry of Environment & SD	Environment Officer
Makoond Raj	Joint Economic Council	Director
Makoondlall-Chadee Toshima Dr	University of Technology, Mauritius	Lecturer
Mukoon S. Mr	Central Electricity Board	
Mungur R Mr	Ministry of Energy and Public Utilities	Principal Engineer
Munisamy Richard Dr	We love Mauritius	Director
Peermamode Aboo Bakar Mr,	Institution of Engineers	Senior Engineer
Perrine Davy Williams Mr	Commission for Public Infrastructure RRA	
Poligadu Tavina Mrs	Mauritius Bankers Association	Manager Procurement
Ramanjooloo Ghovadarajah Naidoo Mr	The Moka Flacq District Council	Ag. Chief Executive
Ramduny Dhinesh Mr	Municipal Council of Curepipe	Engineering Assistant
Ramjeeawon P.V Mr	Mauritius Research Council	Research Coordinator
Ramjit, L. Mr	Ministry of Public Infrastructure, National Development Unit, Land Transport and Shipping (Public Infrastructure Division)	Senior Architect
Rammah Jairaj Mr	The Moka Flacq District Council	Chief Inspector Of Works
Ramsohok Vivek Mr	TESA- CITU	Senior Telecom Engineer
Reesaul K. Dr	Vice Chairperson	Principal Engineer
Romooah. D Mr	National Transport Authority	Transport Planner

Contact name	Organisation	Designation
Rosunee Geeta Mrs	Ministry of Housing and Lands	Principal Planner
Rugbur. K Mr	Ministry of Industry and Commerce	Senior Industrial Analyst
Ruttun Ashvind Mr	Association des Hoteliers and Restaurateurs de l'Ile Maurice	Maintenance Manager
Sagnier Pierre Mr	Mauritius Chamber of Agriculture	Project Development Manager
Salomon Albert Alex Mr	Commission for Public Infrastructure and others, RRA	Chief Inspector of Works
Seewoobaduth J. Mr	Ministry of Environment and Sustainable Development	Divisional Environment Officer
Shaan Kundomal Mr	Eco-Biotech	Chief Operating Officer
Sok Appadu.S .N Mr	Mauritius Council of Social Service/ Association pour les Developpements Durables	Member
Sookun A Mr	Central Statistics Office	Statistician
Soonarane Pradeep Mr	Ministry of Energy and Public Utilities	Deputy Director
Thomas Fritz Mr	Mauritius Labour Congress	Member
Vithilingum. D Mr	Ministry of Environment and Sustainable Development	Environment Officer
Yadallee. A Mr	Ministry of Environment and Sustainable Development	Divisional Environment Officer
Zuel Nicolas Dr	Mauritian Wildlife Foundation	Fauna Manager