

Global Fuel Economy Initiative

Working Group 3 Findings and Recommendations

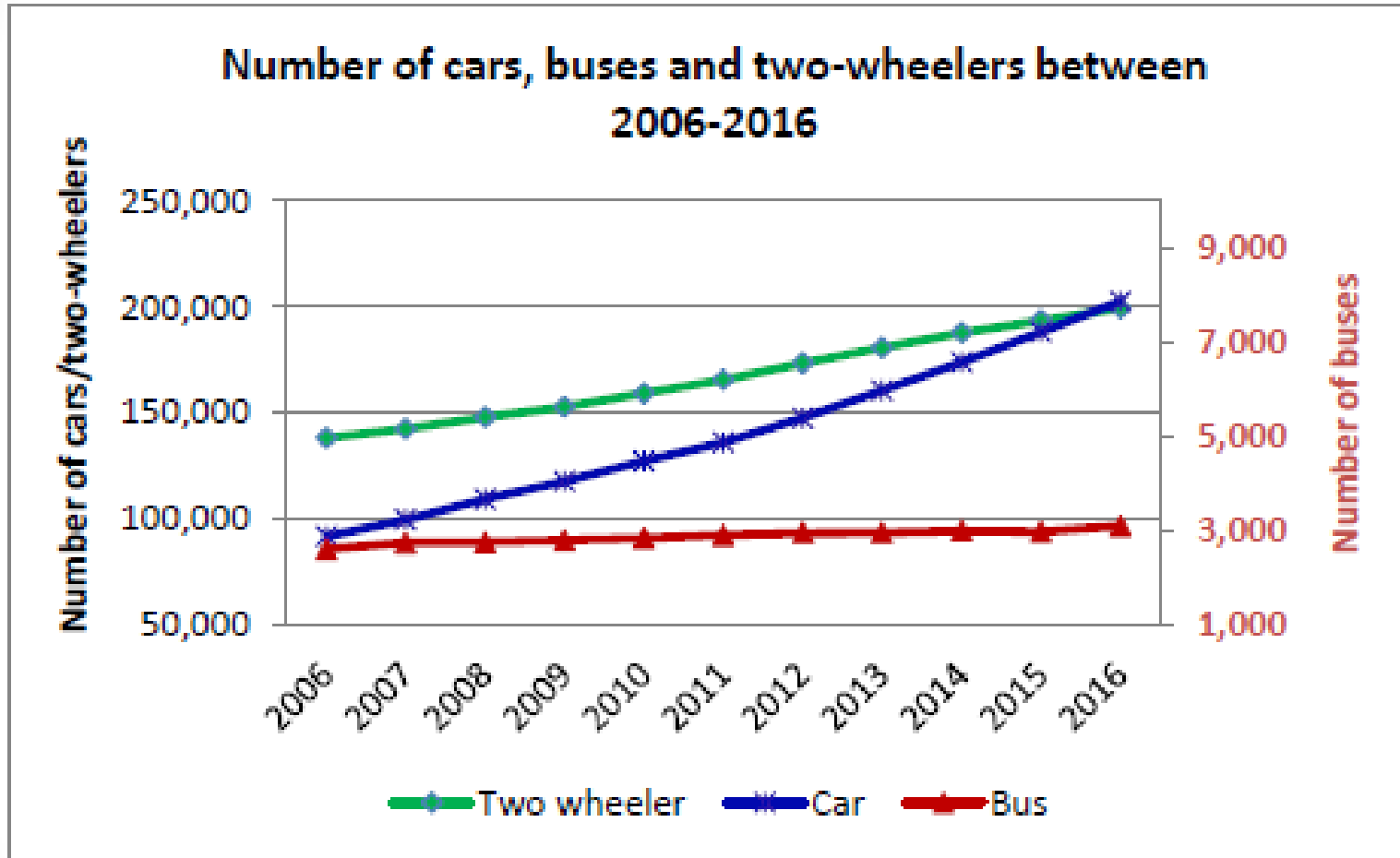
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Structure of presentation

- Background to the Transport Sector in Mauritius
- Background to the GFEI Working Group 3 on
 - “Assessment Study on Socio-economic Impacts of Policies on Low- and No-Emission Vehicles & Introduction of Cleaner Fuels”
- Working Group 3
 - The terms of references (ToRs)
 - The process
- Addressing the Terms of Reference
 - ToRs 1, 2 & 3
 - ToR 4 (Conclusions, Recommendations and Action Plan)

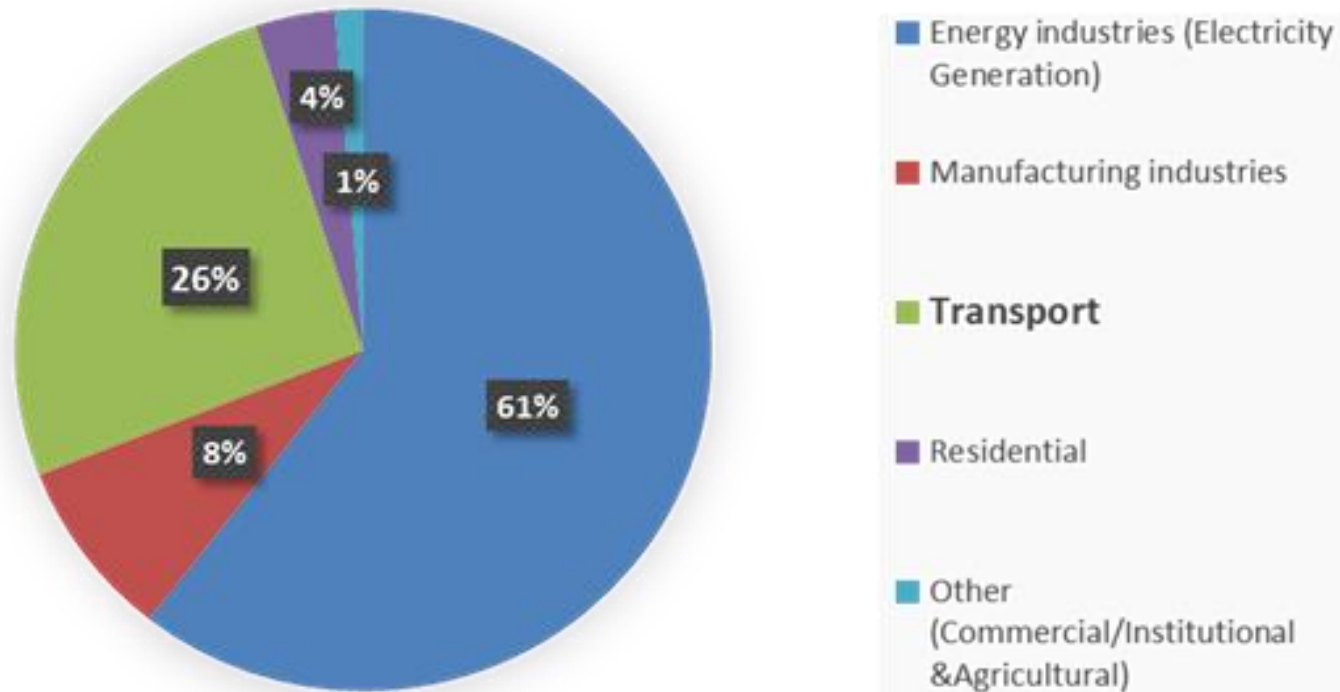
Gist of the Transport Sector in Mauritius



- Rapidly increasing number of vehicles
- Between 2006 and 2016 (over a decade)
 - Overall fleet increase from 319,440 to 507,676 (59 % increase),
 - Cars increased from 91,911 to 202,696 (120% increase),
 - Buses increased from 2,612 to 3,107 (19% increase)
 - Two-wheelers increased from 138,174 to 199,388 (44% increase).

Gist of the Transport Sector in Mauritius

CO₂ Emissions by Energy Sector



- As a result, the transport sector is a major contributor to greenhouse gas emissions in Mauritius
 - Around ¼ of total emissions of greenhouse gases

Background - Working Group 3

- Government commitment to encourage citizens to use more efficient vehicles
- WG3's main objectives
 - come up with policies to promote fuel efficient vehicles
- To be able to devise policy packages to upscale this market segment, it is critical to understand
 - public perception on this topic
 - the range of efficient vehicles available,
 - cleaner fuels options.



The process

- **8** local stakeholder institutions involved
 - **Chair and Team Leader:**
 - University of Mauritius
 - **Members:** Ministries responsible for
 - Transport (National Transport Authority & Mechanical Engineering Division),
 - Finance,
 - Commerce,
 - Home Affairs (Strategic Policy and Planning Department) &
 - Mauritius Revenue Authority
 - **Secretariat and Coordination:** Department of Environment
- Meetings conducted
 - **17** sessions between October 2015 and September 2017
- One task sub-contracted to a local consultant
 - Undertaken between September 2016 and July 2017



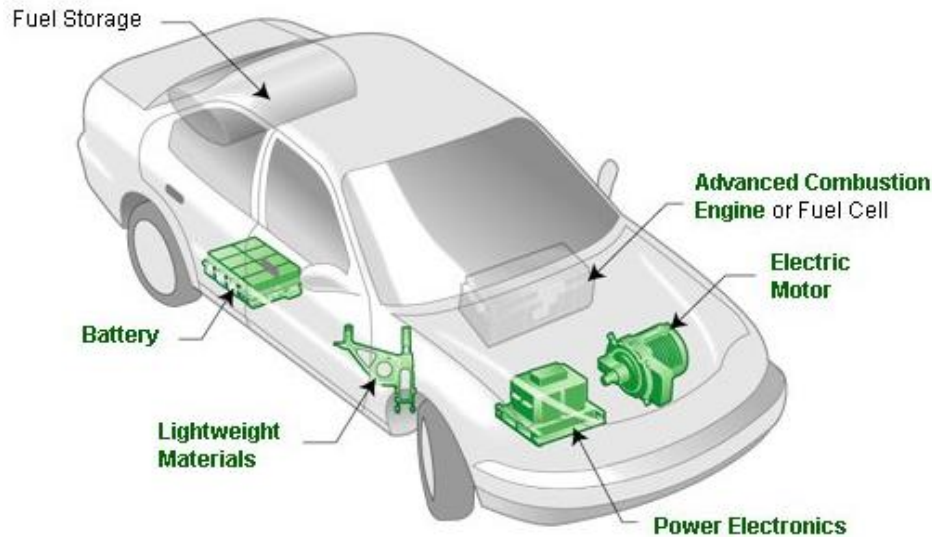
Terms of reference

No	Terms of reference	Methodology
1	Identify “low and no-emissions” vehicles on the global market	Desk Review
2	Undertake an assessment study on the socio-economic impacts of policies on low- and no-emission vehicles, including two-wheelers, by taking into account life cycle costing	Qualitative survey of all stakeholders involved across the life-cycle of a vehicle
3	Propose a list of cleaner fuels	Desk Review
4	Prepare a roadmap for the introduction of cleaner fuels and cleaner vehicles in Mauritius	Multi-stakeholder discussions at WG level



Identification of low and no-emission vehicles on the global market

- Where “low- and no-emission” vehicles
 - are understood as vehicles which emits relatively low levels of greenhouse gases or those which do not produce harmful tailpipe emissions
- Essentially a desk review exercise
 - Research & Development on new vehicle technologies are developing rapidly
- Purpose
 - Important exercise for WG members to have an up-to-date gist of vehicle technologies available
 - e.g. Flexible Fuel Vehicles, Plug-in Hybrids, Fuel Cell Vehicles, etc.



Working Group 3: ToR 2



- A STUDY ON THE SOCIO-ECONOMIC IMPACT OF POLICIES ON LOW AND NO-EMISSION VEHICLES INCLUDING TWO-WHEELERS IN MAURITIUS
 - Presentation on behalf of Prof S. Sobhee, Local Consultant to the Project

- Purpose

- To understand public perception on policies on low- and no-emission vehicles, including two wheelers

Objectives of the Study



- To hold Consultative Meetings with Various Stakeholders for Data Gathering
- To Carry out a Situational Analysis with respect to the Status of Hybrid and Electric Vehicles in Mauritius and Determine their Market Share
- To Apply the Life-Cycle Assessment Framework to Track the Socio-Economic Implications of Government Policies on Hybrid and Electric Vehicles
- To Capture the Expectations of Stakeholders (Public and Private)
- To Write a Comprehensive Report based on Findings and to Include Policy Recommendations

The Policy Review: Fuel-Efficient v/s Conventional vehicles

In line with reducing the average fuel consumption from its current level of 8 litres per 100 km to an average of 4 litres per 100 km by the year 2050 so as to reduce CO₂ level from 180g to 90 g per km by that year

- Budgetary Measures of 2016/17 Adopted
- Fiscal Incentives
- Reduction in Excise Duty on Hybrid and Electric Vehicles
- Lower Motor Vehicle Renewal License Fee (50%)

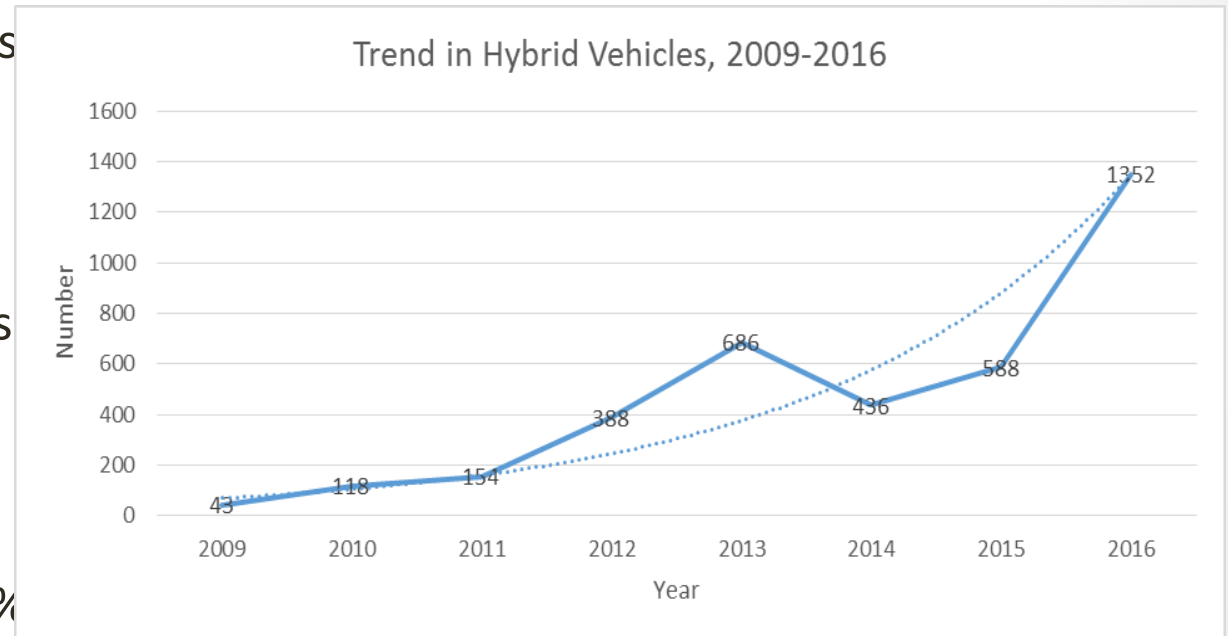


Excise Duty on all Imported cars as provided in the Budget 2016/2017

Type of motor car and cylinder capacity (c.c.)	Previous rates	Actual rates as from 30 July 2016
Conventional motor cars:		
Up to 550 c.c.	15%	0%
551 – 1,000 c.c.	55%	45%
1,001 - 1,600 c.c.	55%	50%
1,601 – 2,000 c.c.	75%	75% (no change)
Above 2,000 c.c.	100%	100% (no change)
Hybrid motor cars:		
Up to 1,600 cc	55%	25%
1,601 - 2,000 cc	75%	45%
> 2,000 cc	100%	70%
Electric cars:		
Up to 180 kW	25%	0%
Above 180 kW	25%	25% (no change)

Findings from Secondary Data Analysis

- **Trends in number of hybrids**
- In April 2017, the fleet of fuel-efficient vehicles comprised of 4,418 hybrid vehicles and 33 electric vehicles, most of which are motor cars.
- Between 2015 and 2016, the number of hybrid vehicles rose from 588 to 1352; a rise of 130%.
- In 2016, the percentage of hybrid vehicles with respect to (i) the total number of cars was 1.8%, and (ii) the overall fleet was 0.7%.
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- In 2016, 8.8% of all cars imported pertained to hybrid cars, compared to 3.9% in 2015.



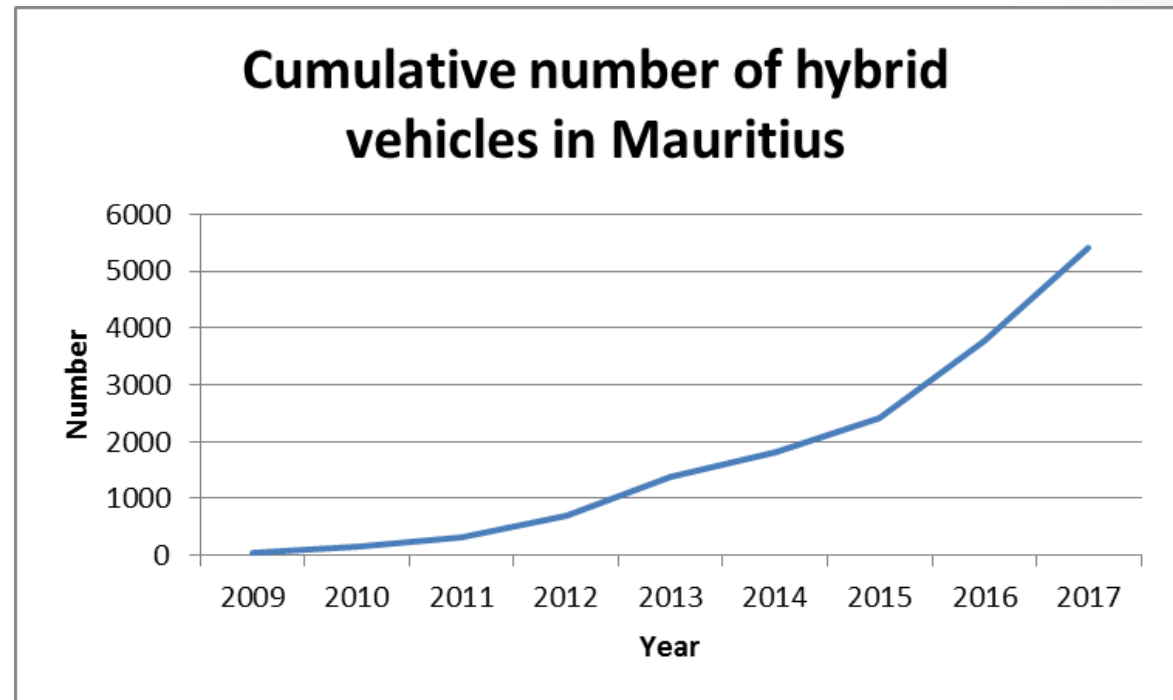
Findings from Secondary Data Analysis

- **Implications of this rise on public sector revenue**
- In case of an annual increase of 130% in the number of hybrid vehicles, expected loss in public sector revenue in 2017 would be MUR 218.1 M,
 - Assuming a baseline scenario, as was the case between 2015 and 2016 where 130 % increase was observed.
 - However, this is an extremely unlikely pattern
- Assuming a more realistic phased increase in number of hybrids:
 - If the proportion of hybrid cars reach 10% of all imported cars in 2020, discounted future loss of public sector revenue in current monetary worth would be MUR 108.3 M.
 - If the proportion of hybrid cars reach 30% of all imported cars in 2030, discounted future loss in public sector revenue in current monetary worth would be MUR 219.4 M.
- To counter the loss in public sector revenue, the MID Levy would have to be increased
 - by 21 cents to reach 51 cents in 2020 and
 - be further increased by 29 cents to reach 80 cents in 2030.



..Findings

- Under a business as usual scenario, forecast consumption levels of fuel for 2050 are expected to attain
 - 778 million litres for petrol and
 - 920.4 million litres for diesel,.
- The reduction in excise duty on hybrid and electric vehicles has acted as a catalyst in boosting the demand and sales of fuel-efficient vehicles, in particular, hybrid ones.
- Government's policy involves an opportunity cost, in terms of foregone revenue from excise duty as a compromise to achieve a green transport sector.



Updated figures as at August 2017:
Stock of 5404 HV & 38E

Methodology: Life-Cycle Assessment Framework of Conventional and Fuel-Efficient Vehicles

Vehicle Engine Capacity with a Cylinder Capacity of <1600	Imported Value (1)	Imported Value inclusive of Excise Duty (2)	Running Cost with same mileage				Private Cost (7) = (2) + (3) + (4) + (5) + (6)	Externality Cost: Pollution and Health Hazards & Disposal Cost (8)	Social Cost ** (9) = (7) + (8)	
			Fuel Cost (3)	Maintenance Cost (4)	Motor Vehicle Renewal Licence Fee (5)	All Other Expenses (6)				
Conventional Vehicle	X	X+T	F	M	L	K	P	E	Z	
Hybrid Vehicle	X	X+T-t	F-f*	M-m	L-l	K	< P (or P-p)	E-e	< Z or (Z-z)	
Potential Stakeholders	MRA (Govt.)	Motor Vehicle Dealers	Household Sector Private Companies as Vehicle Users Governmental Organisations Public Transport System (Private Passenger Buses) Insurance Companies Vehicle Repairs and Maintenance Companies					The Society as a Whole SC (Social Cost) = PC (Private Cost) + EC (External Cost)		

Proposed and Actual Sample Size of the Different Stakeholders: Face to Face Interviews

Sector/ Targeted Group	Population Size	Source	Sample Size based* on 95% Confidence Interval and a Margin of Error of 5%	Proposed Number of Interviews*	Actual Interviews Undertaken /Response Rate
Households (Vehicle Owners)	342,000	Statistics Mauritius	384	500	500
Non-Vehicle Owners					74
Private Businesses (Total)	2439	Statistics Mauritius	333	340	318
Of Which:					
• Private Companies (Vehicle Users)					291
• Bus Transport Operators					4
• Vehicle Importers and Dealers					15
• Vehicle Repairs and Maintenance Companies					6
• Insurance Companies					2
Public Sector & Government Organisations	204	Statistics Mauritius	100	60	29
Total Interviews (proposed and conducted)				900	921

Empirical Findings



- Mauritians are very much aware
 - of the pollution created by the transport sector and
 - the types of pollution and hazards that are created.
- All stakeholders were by and large aware of hybrid and electric vehicles,
 - but do not have much information on their characteristics with greater precision.
- Stakeholders were also found to be aware of the fiscal incentives provided,
 - but were not necessarily aware of the significance of the incentives.
- Respondents were willing to purchase these fuel-efficient vehicles
 - but with some degree of reluctance for electric vehicles.

Findings ctd..



- Interviewees who were positive about the policy
 - have shown their high willingness to consider fuel-efficient vehicles as a purchase option in future.
- Those who were apprehensive believed that:
 - Despite the reduction in excise duty, these vehicles may still be expensive to acquire;
 - Current infrastructure may be inappropriate (in terms of charging and recharging spots);
 - High investment may be required to accommodate for charging vehicles batteries;
 - There may be very few mechanics/technicians having the required expertise to service these vehicles in case of breakdown and servicing of engine.
 - Disposal of old or used batteries was also a matter of concern.

Findings Ctd..



- The purpose of having hybrid and electric vehicles may be defeated
 - if the demand for fossil fuel remain the same.
- The transport sector would have to invest in renewable energy or bio-fuel.
- Providing fiscal incentives would not necessarily be the sole solution to make the transport sector fuel-efficient.
- The road transport infrastructure would need to be re-engineered.
- Reference was also made by respondents to the light-rail system:
 - The Metro Express project was viewed as a breakthrough to make the transport sector more efficient.
- With respect to mitigation strategies to address CO₂ emissions,
 - the stakeholders have mentioned again about the light rail system, control over industrial pollution and car-pooling.

SWOT Analysis of the Findings

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> • Individuals and the corporate sector have positively responded to the fiscal incentives provided on fuel-efficient vehicles • Respondents have perceived a potential reduction in the private cost of owning and running a vehicle • Individuals and enterprises have positively perceived that the external cost of the transport sector (pollution and CO₂ emissions) would be lowered • Respondents were also aware of the health hazards that the transport sector currently purports • Respondents have also perceived that a green transport sector could be fuel-efficient 	<ul style="list-style-type: none"> • Lack of awareness across all stakeholders • It is difficult to change the mind-set of people • Adopted measures were found to be limited to cars • There might be other ways of reducing CO₂ emissions from the transport sector other than through fiscal measures • There might be other ways of rendering the transport sector more fuel-efficient 	<ul style="list-style-type: none"> • The Government policy would make it easier to get rid of old and highly polluting vehicles • The fiscal measures would encourage investment in clean energy • More opportunities to review and invest in new infrastructure • Possibility to substitute fossil fuels by renewables 	<ul style="list-style-type: none"> • Rebound effect – the public may end up driving more as the cost of running a vehicle would be reduced • May not solve traffic congestion problems • Lack of expertise to deal with these vehicles • Net cost (after duty) of a fuel-efficient vehicle same or even higher than the cost of a conventional vehicle • Hazardous waste management problem with respect to used batteries

Policy Recommendations to promote fuel efficient vehicles (from the local consultant)

- To implement Life Cycle Costing in the Public Procurement Act for the acquisition of vehicles;
- To increase the penalty on high emitting conventional vehicles;
- To develop a policy to phase out old vehicles which are high emitters;
- To invest in renewable energy to serve the purpose of the transport sector;
- To provide loanable facilities to small enterprises for the purchase of fuel-efficient vehicles financed by green bonds;
- To encourage taxi and tour operators to go green and to restrict their access to duty free to fuel-efficient vehicles;



Further Recommendations (from the local consultant)

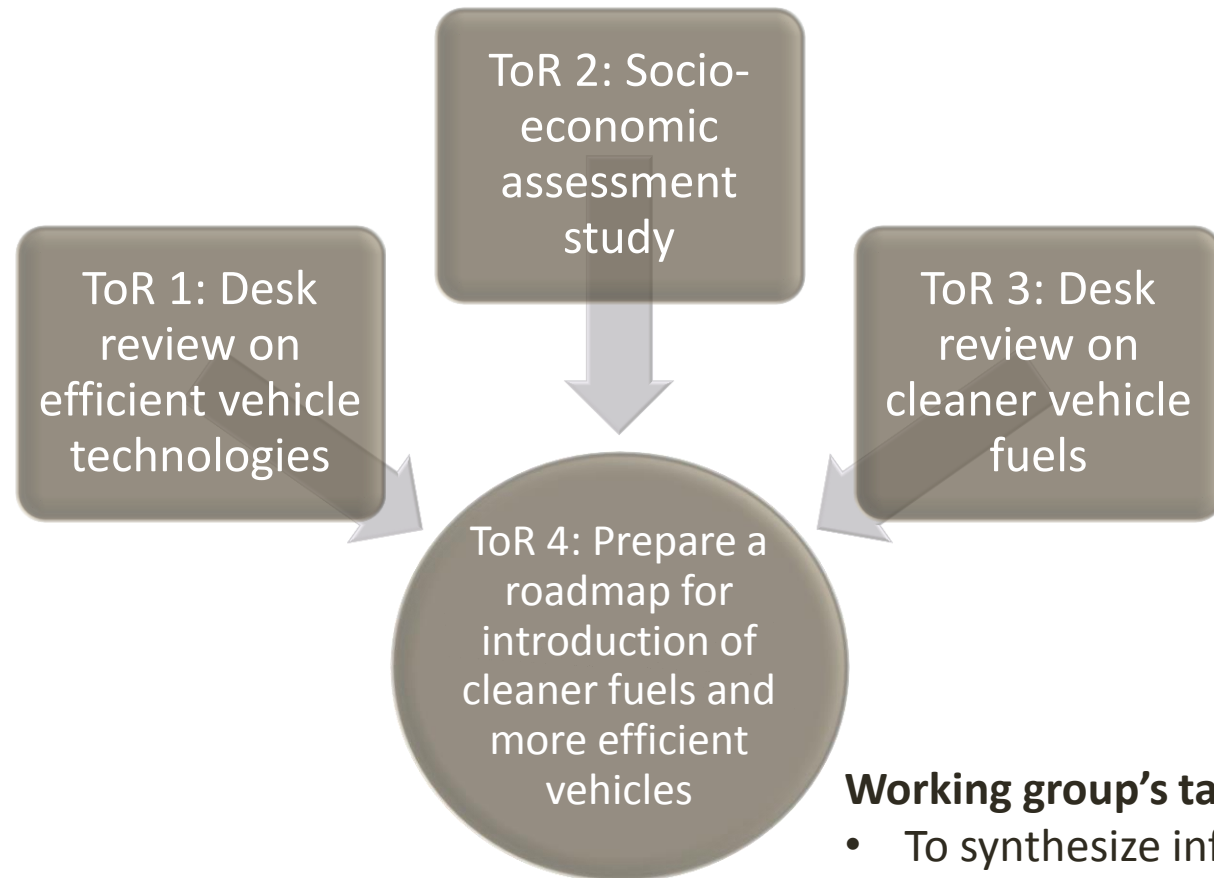
- To invest in infrastructure
 - that would support energy-efficient vehicles such as chargeable spots
- To develop a plan to get rid of used batteries in the immediate run;
- To develop an awareness campaign
 - on the fiscal incentives provided;
- To encourage vehicle dealers
 - to provide more information and sensitization on hybrid and electric vehicles;
- To set targets for the share of energy-efficient vehicles to the overall fleet of vehicles
 - to ensure continuous progress and review fiscal and related measures accordingly; and
- To commission a study by Government
 - on the life-cycle cost of vehicles (comparison between energy-efficient vehicles and conventional vehicles).

Working Group 3 – TOR 3



- Prepare a list of cleaner vehicular fuels available globally
- Essentially a desk review exercise
- Purpose
 - To appraise committee members of the range of fuel options that could be considered
- Fuels examined include:
 - Natural Gas
 - Compressed Natural Gas (CNG)
 - Liquefied Natural gas (LNG)
 - Liquefied Petroleum Gas (LPG)
 - Biofuels
 - Ethanol
 - Biodiesel
 - Hydrogen Fuel Cells

Working Group 3: ToR 4



Working group's task:

- To synthesize information gathered, devise policies and measures, identify implementing partners and possible timelines

Recommendations and Action Plan

No	Recommendation	Rationale	Implementing Agency	Time Frame
1	To conduct Consumer Awareness Programs	Findings from the study indicate a lack of awareness on characteristics of efficient vehicles, their savings, environmental benefits and lack of knowledge on Government tax incentives	M/Environment	Short term (0-2 years)
2	To undertake fiscal adjustments through Motor Vehicle License Fee and Carbon tax	To compensate for a loss of revenue for Government due to an increase in sale of hybrid and electric vehicles	M/Finance & M/Land Transport	Short term (0-2 years)
3	To provide incentives for fuel-efficient vehicle owners such as free parking space/lower charges, green cards	To further incentivise consumers to shift from conventional vehicles to more efficient ones	M/Land Transport	Medium term (0-4 years)

Recommendations and Action Plan

No	Recommendation	Rationale	Implementing Agency	Time Frame
4	To invest in infrastructure for charging and recharging electric vehicles from renewable sources	The electric grid is mainly fossil-fuel based; charging an electric car will merely shift the emissions to power plants	M/Land Transport	Long term (> 4 years)
5	To undertake capacity building on the maintenance and operation of hybrid and electric vehicles	Current capacity on maintaining hybrid and electric vehicles is low	Mauritius Institute of Training and Development	Medium term (0-4 years)
6	To review the duty remission scheme on vehicles by introducing a differential rate of taxation favouring fuel efficient vehicles	To encourage beneficiaries of duty free facilities to go green	M/Finance	Medium term (0-4 years)

Recommendations and Action Plan

No	Recommendation	Rationale	Implementing Agency	Time Frame
7	To develop Purchase Agreements with ethanol producers and make blending mandatory	Technical feasibility of E10 have been conclusive (development of an Ethanol Framework is also underway)	M/Agro Industry & State Trading Corporation	Medium term (0-4 years)
8	To provide soft/green loans for purchase of fuel-efficient vehicles	To further incentivise consumers to shift from conventional vehicles to more efficient ones	M/Finance	Short term (0-2 years)
9	To amend the Bus Modernisation Scheme to provide incentives for bus operators to purchase hybrid and electric buses	To promote fuel efficient buses	M/Land Transport	Medium term (0-4 years)
10	To encourage sustainable procurement practices across Government & parastatal bodies	To incentivise Government and Parastatal bodies to shift from conventional vehicles to more efficient ones	Procurement Policy Office	Short term (0-2 years)

Recommendations and Action Plan

No	Recommendation	Rationale	Implementing Agency	Time Frame
11	To commission a study (a) on Life Cycle Costing of hybrid & electric vehicles compared to conventional ones and (b) To determine a cut-off age limit for highly polluting vehicles	<ul style="list-style-type: none"> - Actual cost of hybrid & electric vehicles over their lifetime are unknown - Rationale for setting up an age limit of old vehicles needs to be sought 	M/Land Transport	Short term (0-2 years)
12	To come up with a scheme to encourage owners of plug-in vehicles to produce their energy from a clean source (e.g. PV)	The electric grid is mainly fossil-fuel based; charging an electric car will merely shift the emissions to power plants	Mauritius Renewable Energy Agency (MARENA)	Medium term (0-4 years)
13	To develop a plan for the disposal of used batteries from hybrid and electric vehicles	An increase in use of hybrid and electric vehicles will incur disposal of used batteries (hazardous)	M/Environment (Solid Waste Management Division)	Short term (0-2 years)

THANK YOU FOR YOUR ATTENTION