WORKSHOP REPORT

Institutional Strengthening/Capacity Building for Undertaking Mitigation Analysis for Low-Carbon Development Planning Under the Third National Communication

Organised by

Ministry of Social Security, National Solidarity, and Environment and Sustainable Development
(Environment and Sustainable Development Division)

Funded by

Held at

Engineering Lecture Theater and CITS ETB Laboratory (1st Floor),
Prof E. Lim Fat Engineering Tower, University of Mauritius, Reduit, Mauritius,
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Consultant Team (University of Mauritius)

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EXECUTIVE SUMMARY

Whilst mitigation and adaptation are seen as complementary strategies in the context of climate change risk reduction and management, substantial GHG emission reductions by 2100 can significantly lead to long-term risks reduction. Mitigation calls for a concerted global effort in securing a healthier planet. Mitigation initiatives also provide opportunities for countries to move towards modernizing their economies, enhancing competitiveness, stimulating employment and green growth while ensuring socioeconomic benefits of increased energy access and security.

In fulfillment to the reporting requirement under Article 12 of the UNFCCC, Republic of Mauritius prepared its Third National Communications (TNC) Report for the period 2010 to 2016. For the greenhouse gas (GHG) inventory, data for the period 2006 to 2013 were assessed. The climate change mitigation was assessed for a Business-as-Usual (BAU) and other scenarios, after screening exercises to select the most feasible options.

This training workshop, an aftermath of the TNC studies focusing on mitigation analysis for a low-carbon development planning, is targeted for institutional strengthening, enhancement of skill and knowhow of concerned stakeholders in the field of GHG reduction. Toolkits and manuals have been developed to ease the tasks for stakeholders to enable a smooth transition that takes Mauritius along a pathway of low carbon economy and achieving the sustainable development goals. The Toolkits are based on Excel with enhanced features and a plethora of graphics. The need for a mitigation tool to help stakeholders was raised to enable the latter to perform important investigations in their quest to keep abreast with the implementation, monitoring and development of mitigation scenarios proposed in the 2016 TNC studies. As such, the Consultants were called to propose a user-friendly version for that purpose.

Separate Excel-based Mitigation (XL-M) Toolkits were developed for the following sectors: energy industries, transport, livestock, agricultural crop, forestry and other land use (FOLU), solid waste and liquid waste. Users of these XL-M Toolkits can adjust the scenarios by choosing appropriate parameters/assumptions to suit their needs of the mitigation analysis. Supporting XL-M User Reference manuals describe the Toolkits to compute and plot a number of other variables including GHG emissions for different sectors of the economy. The User Reference has been written from an application developer's perspective. A fundamental conceptual and operational knowledge of Excel is assumed. Feedback from the participants on the Toolkits are very encouraging. It is hoped that the Toolkits will prove to be very useful for reporting and policy decisions, as well as for other activities related to climate change.

The Ministry of Social Security, National Solidarity, and Environment and Sustainable Development, together with international partners, namely, the Global Environment Facility and the United Nations Environment Programme, are thanked for the unwavering support and financial assistance for this work and the accompanying capacity building activity.

1. Background

Climate change is a global concern and calls for collective actions and united commitment from all. Despite Mauritius' insignificant contribution to global emissions (~0.01%), the Republic of Mauritius (RoM) was among the first countries to ratify the United Nations Framework Convention on Climate Change (UNFCCC) in 1992 and one among the first 15 countries to sign and ratify the Paris Agreement on 22 April 2016. This gesture of the RoM demonstrates its willingness as a responsible member of the global community to save our planet by seeking and achieving global solutions on climate change matters.

In fulfillment to the reporting requirement under Article 12 of the UNFCCC, RoM prepared its Third National Communications (TNC) Report for the period 2010 to 2016. For the greenhouse gas (GHG) inventory, data for the period 2006 to 2013 were worked out. The climate change mitigation for the Republic of Mauritius was assessed for a Business-as-Usual (BAU) and other scenarios, after screening exercises to select the most feasible options. The TNC Report (2016) reports the findings of the assessment undertaken in line with the provisions of the Project Corporation Agreement signed between the United Nations Environment Programme and the Ministry of the Environment, Sustainable Development, and Disaster and Beach Management in 2013, and the UNFCCC reporting guidelines.

As announced by the Permanent Secretary during the Inaugural session of the Workshop, some of the recent measures identified to abate its GHG emissions include, *inter alia*:

- Setting the target of achieving at least 35% of renewable energy production by 2025;
- Implementation of a new scheme for 2 KW solar PV for small commercial businesses to be financed by the CEB;
- Setting up of a 2 MW solar PV farm by the CEB at Henrietta by March 2018, followed by investment in an additional 13 MW capacity by the end of 2018:
- CEB's investment in battery storage of 8 MW;
- Government's investment of some Rs 700 million in a 'Solar Home Project' comprising the installation of 10,000 roof top solar panels over the next 5 years;
- The coming up of the Deep Ocean Water Application Air-Conditioning system project (Urban Cooling Ltd) - an innovative low-carbon technology that lowers building cooling costs. This process would help to reduce some 13 MW power which amount to an annual reduction of around 40,000 tonnes of CO2 emissions; and
- Green cement production initiative by Omnicane allows the use of some 70,000 tonnes of residues (coal fly ash and bottom ash) which are collected annually from cogeneration power plants in order to generate 42,000 tonnes of cement additives.

In 2016, the Total GHG emission stood at around 5.37 million tonnes carbon dioxide equivalents (CO_2eq), whilst GHG removal by forestry was ~367,000 tonnes CO_2eq (~7%) (ESI, 2017). The energy sector remains the main source of GHG emission, amounting to ~76.4% of overall GHG emissions followed by waste sector (~20.4%) and agriculture (~2.4%) (ESI, 2017). CO_2 was the main GHG (~75.9%) followed by CH_4 (~20.7%) and N_2O (~3.3%).

The need for a mitigation tool to help stakeholders was raised to enable the latter to perform important investigations in their quest to keep abreast with the implementation, monitoring and development of mitigation scenarios proposed in the 2016 TNC studies. As such, the Consultant Team were called to propose a user-friendly version for that purpose. The Consultant Team developed customized toolkits (see section 5 for details). This was made possible following pre-workshop activities such as discussions with relevant stakeholders, bilateral sessions and precursor training sessions. It is hoped that the Toolkits developed for mitigation will prove to be very useful for reporting and policy decisions, as well as for other activities related to climate change.

At its opening session, the workshop was formally inaugurated by Mrs N.D. Goorah, Permanent Secretary, of the Ministry of Social Security, National Solidarity, and Environment and Sustainable Development. The session was chaired by Mr J. Seewoobaduth, Divisional Environment Officer, Environment and Sustainable Development Division, Ministry of Social Security, National Solidarity, and Environment and Sustainable Development. Professor Soonil D.D.V. Rughooputh also addressed the audience laying emphasis on the complementary roles of mitigation and adaptation in confronting sustainable development. Amongst the Distinguished guests and Official delegates was Deputy Permanent Secretary (Mrs M. Ramkhelawon). Also present at the Opening session were Ministry's Administrative staff and Officers of Climate Change Division.

The Ministry of Social Security, National Solidarity, and Environment and Sustainable Development, together with international partners, namely, the Global Environment Facility (GEF) and the United Nations Environment Programme (UNEP), are thanked for the unwavering support and financial assistance for this work and the accompanying capacity building activity.

2. Objectives of Workshop

Mauritius is pledging to abate, by 2030, its greenhouse gas (GHG) emissions by 30% relative to the business-as-usual (BAU) scenario, by transiting to a low-carbon development path through the accrued utilization of renewable energies but subject to provision of grant finances, technology development and transfer, and strengthening capacity building. Adaptation, nevertheless, remains a priority as set out in the Mauritius Intended Nationally Determined Contributions (INDCs).

This training workshop focuses on mitigation analysis for a low-carbon development planning and is targeted for institutional strengthening, enhancement of skill and knowhow of concerned stakeholders in the field of GHG reduction commonly referred to as mitigation (see Annex 1 for the Workshop Programme). The overall aim is to take Mauritius along a pathway of low carbon economy and achieve the sustainable development goals.

The main objective of this workshop was to present the customized excel-based mitigation Toolkits to relevant stakeholders who are expected to use them to perform important investigations in their quest

to keep abreast with the implementation, monitoring and development of mitigation scenarios proposed in the 2016 TNC studies.

The use of the XL-Mitigation Toolkits can contribute significantly in mainstreaming climate change mitigation in relevant sectors as well as offering an opportunity to follow up on measures being contemplated for implementation in the near future.

The workshop further aimed the following:
- Increasing participants' awareness about the respective roles as key players in GHG Emissions;
- Information dissemination of alternative technologies for applications and methodologies of upgrading existing appliances/equipment;
- Enhancing the network development for information sharing;
- Helping the country to achieve, in a planned, coordinated, efficient and cost effective manner, the next National Communications;

3. Expected Results of the Workshop

The expected result of the training programme was to:
- implement the mitigation scenarios proposed in the 2016 TNC studies though use of the Toolkits;
- monitor and track, using the radar dashboard of the XL-M Toolkits, the mitigation scenarios proposed in the 2016 TNC studies;
- evaluate the extent of GHG emissions in important sectors and other underlying trends of related data;
- analyze projections of GHG emissions of different scenarios and continually revisit mitigation targets;
- enhance the mitigation scenarios proposed in the 2016 TNC studies for greater reductions in GHGs through relevant projections;
- study the impact of proposed policies under the different scenarios; and
- develop new policies based on the parameters/assumptions for various scenarios made;

The training is also expected to result in the following:
- Increased awareness of the harmful effects of GHGs through reporting in the media;
- Allow key actors to actively participate in climate change activities;
- Reduction and elimination of uncontrolled GHG emissions (for e.g. through better maintenance practices, recovery & recycling, upgrading of existing appliances/equipment);
- Increased awareness of the importance of enhanced efficiency measures;
- Understand which sector and sub-sector to target for policy making;
- Couple with adaptation measures, e.g. reduce soil erosion or land slide while increasing carbon sinks;
- Smoothed transition to the Fourth National Communications;
- Set the path to adopting of higher Tiers methods;

- Contribute to other National Reporting;
- New R&D directions and exploit R&D opportunities;
- Publications arising from the use of the Toolkits;
- Exploit potential applications of the Toolkits; and
- Collaborations and networking (Africa and beyond);

4. Workshop Participants & Resource Persons

The workshop was well attended with some 80 persons of which 45 were trained on the Toolkits. The participants were invited from relevant ministries, parastatals including universities, and NGOs who are involved in GHG emissions. The list of participants is attached at Annex 2. The Lead Trainer-Consultant for the workshop was Professor Soonil D.D.V. Rughooputh (University of Mauritius) assisted by his colleagues Associate Professor R Boojhawon, Dr Anand Sookun and Mr Swavnil D.A. Rughooputh. The Environment and Sustainable Development Division, Ministry of Social Security, National Solidarity, and Environment and Sustainable Development of the Republic of Mauritius was responsible for the organization of the workshop.

5. XL-Mitigation Toolkits

Excel-based mitigation Toolkits were developed based on Visual Basic Applications (VBA) to perform calculations that take into account mitigating measures reported in the TNC Report (2016).

Whilst the underlying principle is a user-friendly version of the Toolkit that responds to the complexity of individual sectors, the Consultants have found it convenient to develop customized Excel-based Mitigation (XL-M) Toolkits for specific sectors (rather than a single one). Thus, separate Toolkits were developed for the following sectors:

- Energy industries (power sector),
- Transport,
- Livestock,
- Agricultural Crop,
- Forestry and other Land Use (FOLU),
- Solid Waste and
- Liquid Waste (Wastewater).

As such, the sectoral Toolkit allows faster calculations and renders the Toolkit size smaller (typically less than 5 MB). User Manuals were developed to accompany the *Excel*-based mitigation Toolkits (XLM-Toolkits) for the Republic of Mauritius.

The seven (7) sectors and the Toolkit details are shown in Table 1.

Table 1: Sectorial XLM Toolkit details

Sectors		Toolkit names	Number of Scenarios (incl. BAU)	Number of Variable Plots
ENERGY	Energy Industries	XLM-Energy Industries	6	53
	Transport	XLM-Transport	6	158
NON-ENERGY	Agricultural Crop	XLM-Agricultural Crop	5	64
	Livestock	XLM-Livestock	5	111
	FOLU	XLM-FOLU	3	144
	Liquid Waste	XLM-Liquid Waste	2	49
	Solid Waste	XLM-Solid Waste	5	133

The XLM Toolkits perform calculations based on the parameters and assumptions derived from the TNC Report (2016) – see Figure 1. The Query Interface allows data entry where Users can adjust the scenarios by choosing appropriate parameters/assumptions to suit their needs for the mitigation analysis by producing relevant plots and report. Supporting XL-M User Reference manuals describe the Toolkits to compute and plot a number of other variables including GHG emissions for different sectors of the economy. Each sector-specific User Manual discusses briefly individual sectors, the mitigation scenarios proposed under TNC, the targets under different scenarios, and the details of key worksheets (Data, Parameters, and Assumptions). The User Reference has been written from an application developer's perspective. A fundamental conceptual and operational knowledge of Excel is assumed.

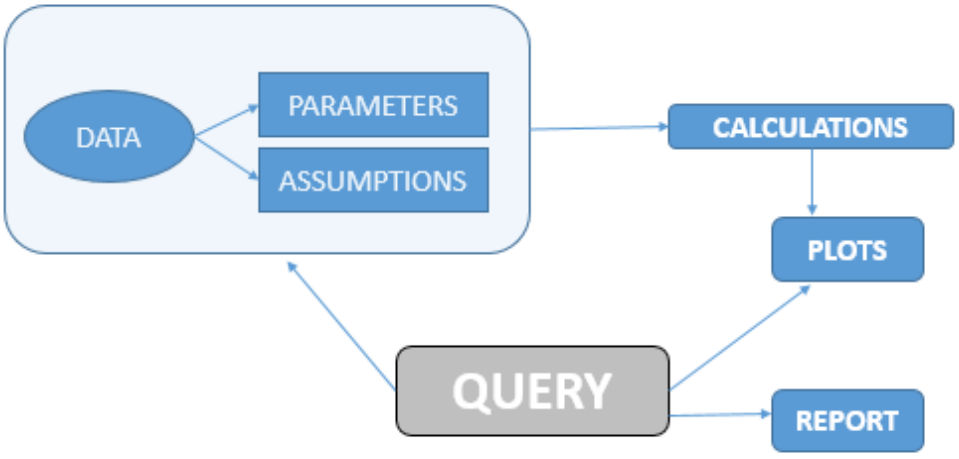

Figure 1: Schematic picture of the XL-M Toolkit functioning

These TNC-budded XLM-Toolkits (Mauritius) work with MS Excel 2013 and above; although successful training was carried out using MS Excel 2010. An operational protocol was also proposed

for data sharing, updating, publishing, and for harmonizing use of crucial parameters common to different sectors.

In the pursuit to make the final user-friendly end-products robust, the design of the seven XL-M Toolkits has been rendered:

- versatile (adaptable from sector to sector),
- modular (so that future versions can easily incorporate new or modified scenarios),
- flexible (to accommodate the results of different models, where relevant),
- simple and elegant (with limited tabs and buttons for easy navigation, useful links),
- efficient and reliable in terms of performance (calculations and results display),
- to allow for analysis and post analysis (using the Excel analytical functions),
- with a radar dashboard (for monitoring purposes),
- secure (for traceability purposes and to prevent any abuse), and
- with a reporting system that captures the parameters/assumptions, the results and all documentary inputs

In the Toolkit development phase, every attempt had been made to conform to stakeholders' expectations and more. Thus, the final Toolkits are rendered usable by all types of Users, from beginners to advanced experts. The version presented is an original and start-up version which is bound to be improved over time to accommodate new features (to address mitigation assessment challenges that may crop up after updated information are made available, for instance, after new policies or legislations).

The major capabilities of the XLM-Toolkits are:

- a common structure for all sectors. This structure allows Users to quickly adapt to other sectors;
- use of Graphical User Interface (GUI) as a major assistance;
- graphics to display of all variables relevant to the sector;
- graphics generation and user has the capabilities to generate other relevant type of charts according to taste;
- easy navigation between worksheets;
- file manipulation such as open, close and print features, export or import worksheets;
- innovative dashboards (to keep track of proposed mitigation scenarios);
- simple data manipulations (copy/paste/export);
- use of Excel cell format features (such as cell formatting, inserted comments, etc.); and
- documentary recording and automatic report generation;

6. Methodology

6.1 Pre-Workshop Activities

The User Manuals and the XL Mitigation Toolkits are the result of a collaborative work of key institutions and facilitated by the University of Mauritius, as the Consultant Team. The inputs from the institutions mentioned below are duly acknowledged for their valuable contribution:

- Ministry of Energy and Public Utilities;
- Central Electricity Board;
- National Transport Authority;
- Wastewater Management Authority;
- Solid Waste Management Division;
- Forestry Service;
- Food and Agricultural Research and Extension Institute;
- Mauritius Cane Industry Authority;
- Statistic Mauritius; and
- All other institutions from which data and information were gathered for the mitigation analysis during the TNC.

Interactions with selected stakeholders involved, *inter alia*, bilateral sessions followed by sector-wise capacity-building sessions of the end-products. 14 participants received their training certificates (see Annex 3) at the Inaugural part of the workshop.

6.2 Workshop Training

This workshop aimed largely at introducing the Toolkits to a larger group of potential Users and training them accordingly. In this workshop 45 participants were trained. This two-day workshop covered mainly practical aspects with a number of sessions held to have hands-on experience unleashing the potentials of the Toolkits in analyzing GHG emissions. The nature of the Toolkit design meant that it was easy for the Consultants to perform training of the customized Toolkits simultaneously.

The workshop was thus organized as such following the Inaugural part (see Annex 1):

(1) Introducing the Toolkit - General Features;
(2) Interactive sessions with the participants for using the Toolkits/User manuals;
(3) Familiarization of the Data/Parameters/Assumptions/Graphics for different Sector clusters;
(4) Checking the effects of parameter and assumption changes on the sector "*Total Emissions*' and other variables;
(5) Presentations of assorted cases for selected Sectors;
(6) TNC scenario implication studies and assorted sector-specific case studies (Presentations by Sectoral Chairs); and
(7) Provision of other case studies that can be handled by the Toolkits.

Participants took keen interest in acquiring hands-on experience with the Toolkits. There were very interesting discussions during the workshop on use of good practices in the realistic situations. These trained participants will, no doubt, raise the awareness among other potential Users regarding, amongst others, GHG emissions, enhanced efficiency measures, recovery/recycling, the importance of maintenance and upgrading of appliances/equipment, development of future scenarios. Copies of all the Toolkits, User Reference Manuals, and presentations were provided to each participant.

6.3 Feedback on Workshop

At the end of the two-day workshop, all the participants were called to respond to a feedback questionnaire on the workshop by individually answering the questions in it. The feedback has been analyzed and the salient features are presented in Annex 4. 29 participants responded to the call commending highly, with a positive skew, the workshop presentations, knowledge and information disseminated, the Toolkits and User Manuals, the discussions that took place, the time allocated, and potential applications of Toolkits (Table 2). This is very encouraging and it suggests that stakeholders find the Toolkits useful and provided an overall average score of 4.1 out a total of 5 (Likert Scale: 5 (Excellent) to 1 (Poor)). The presentations from the Consultant Team is attached at Annex 5.

7. Follow-up Action Plan

Dealing with the climate change issues requires a multipronged approach both with regard to its understanding and implementing appropriate actions at different sectorial level. This is why this training workshop is of utmost importance for the implementation of a low-carbon development strategy and for the implementation of the mitigation measures identified under the Mauritius NDCs.

The Excel-based Mitigation Toolkits developed for the sectors such as energy industries, transport, livestock, crop, forestry, solid waste, and wastewater, by respective line institutions (after a grace period of one month after the workshop) will offer an opportunity to follow up on TNC measures being contemplated for implementation in the near future in terms of mitigation.

It is hoped that the outcome of this workshop would be effectively used as a stepping stone to come up with a series of measures and activities related to mitigation of GHG emissions and will help in the elaboration of a low carbon mitigation strategy and action plan for our country, in line with measures announced in the Government Programme.

8. Future Recommendations

A number of recommendations towards potential future development with regards to the Mitigation Toolkits, taking aboard any advancement to Higher Tiers (2/3) are proposed. These include, amongst others:

- Enhanced Features;
- Enhanced Data Management;
- In-depth calculations with Uncertainty;

- QA/QC;
- Sub-Sub sectoral Toolkit Developments;
- Coupled Mitigation and Adaptation Scenarios;
- Integrate with GIS for spatial mapping;
- System Development Model Integration;
- Footprint Mapping;
- Risk confidence level;
- Social cost of carbon;
- Cost-effective risk and co-benefits analyses;
- Enhanced User Collaboration network (Mauritius, Africa and beyond);
- Conference based on Mitigation and use of these Toolkits.

9. References

ESI (2017): Environment Statistics 2016, Statistic Mauritius, 28 July 2017

IPCC (2006): Intergovernmental Panel on Climate Change (IPCC), 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Washington D.C., USA, 2009

TNC (2016): Third National Communication: Report to the United Nations Framework Convention on Climate Change. Republic of Mauritius, Port Louis, 2016

Annex 1. Workshop Programme

Institutional Strengthening/ Capacity Building for Undertaking Mitigation Analysis for Low-Carbon Development Planning Under the Third National Communication

Date: 1st and 2nd August 2017
Venue: CITS ETB Lab, 1st Floor, Prof E. Lim Fat Engineering Tower, University of Mauritius.
(Opening Ceremony: Engineering Lecture Theatre II)

DAY 1:

Time	Addresses / Activities
09h00 – 10h00	Registration/Stakeholders Networking & Tea/Coffee
10h00 – 10h15	Opening Address by Permanent Secretary, Ministry of Social Security, National Solidarity, and Environment and Sustainable Development
10h15 – 10h30	Highlight on Mitigation of Climate Change and General Overview of the Excel-Based Mitigation Toolkits and User Manuals by Prof. Rughooputh
10h30 – 10h45	Handing over of *Certificate of Attendance* for the Training
10h45 – 10h50	SHORT BREAK
10h50 – 12h00	Excel Mitigation Toolkits and User Manuals by Prof. Rughooputh and Team
12h00 – 13h00	LUNCH
13h00 – 15h00	Hands-on Activities using Toolkits (All sectors) *Users will use respective toolkits under the guidance of Consultant Team*
15h00 – 15h10	Instructions for Day 2 *Sub-Groups (sector-wise) will be called to come up with at least 2 Case Studies.*
15h10 – 15h30	CLOSING OF DAY 1 AND TEA/COFFEE BREAK

DAY 2:

Time	Activities
08h45 – 09h00	Participant registration
09h00 – 10h00	Hands-on Activities using Toolkits (All sectors) Users will use respective toolkits under the guidance of Consultant Team
10h00 – 10h15	TEA/COFFEE BREAK
10h15 – 12h00	Onto the Priority setting for TNC (2016) followed by Break-away sessions *Sub-Groups (sector-wise) will work on the case studies, discuss and compare the findings with TNC.* Break-away Groups: (i) Energy Industry (ii) Transport (iii) Solid Waste (iv) Liquid Waste (v) Crop (vi) Livestock (vii) Forestry
12h00 – 12h40	LUNCH

Annex 2. List of Participants

	Name	Designation/ Organisation	E-mail
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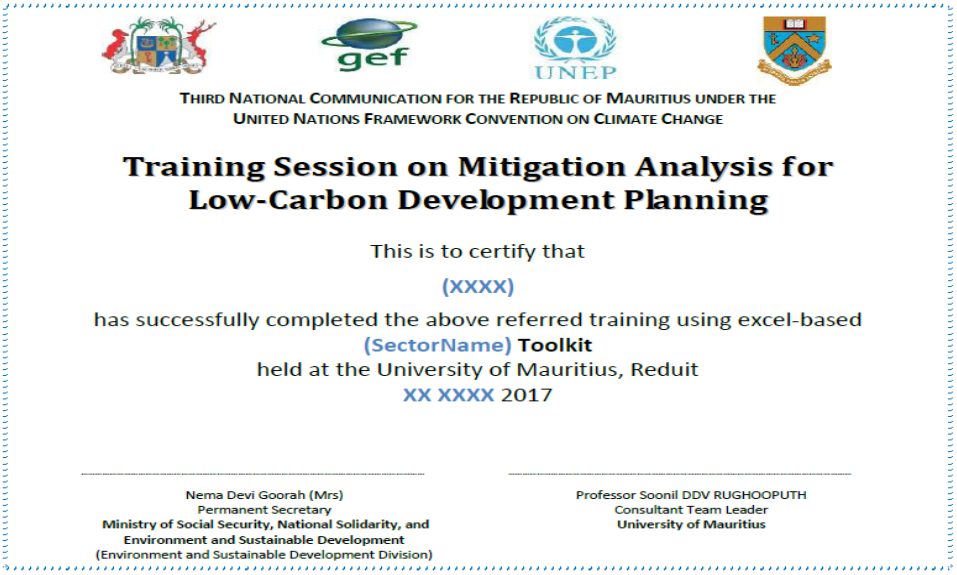
Annex 3. List of Participants Trained

List of Participants Trained on XL-Mitigation Toolkits (Pre-Workshop Training)



THIRD NATIONAL COMMUNICATION FOR THE REPUBLIC OF MAURITIUS UNDER THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

Training Session on Mitigation Analysis for Low-Carbon Development Planning

This is to certify that

(XXXX)

has successfully completed the above referred training using excel-based (SectorName) **Toolkit**
held at the University of Mauritius, Reduit
XX XXXX 2017

Nema Devi Goorah (Mrs)
Permanent Secretary
Ministry of Social Security, National Solidarity, and Environment and Sustainable Development
(Environment and Sustainable Development Division)

Professor Soonil DDV RUGHOOPUTH
Consultant Team Leader
University of Mauritius

SN	Name of Participants	Designation/Institution/Email	Sub-Sectors	Date of Training
1.	Dianendrarao RAMA	SFCEO, Forestry Service soumenrama@gmail.com	Forestry	29 June 2017
2.	Jayshree RAMNAUTH-RAMBURN (Mrs)	Transport Planning Officer, NTA National Transport Authority Nta planning@govmu.org	Transport	29 June 2017
3.	Hemant MULTRA	Ministry of Energy and Public Utilities	Energy Industry	30 June 2017
4.	Prakash RAMPARSAD	Senior Statistical Officer Ministry of Energy and Public Utilities prramparsad@govmu.org	Energy Industry	30 June 2017
5.	Sanjay SOOKHRAZ	Environment Affairs Officer, CEB sanjay.sookhraz@ceb.intnet.mu	Energy Industry	30 June 2017
6.	Prabha RAMDHONY	Central Electricity Board	Energy Industry	30 June 2017
7.	Kalindi Sen GOPAL	Central Electricity Board	Energy Industry	30 June 2017
8.	Mohammad Alfaz ATAWOO	Senior Research Scientist, FAREI alfazatawoo@hotmail.com	Crop	30 June 2017
9.	Sudarsun Singh KOONJAH	MCIA – MSIRI satish.koonjah@msiri.mu	Crop	30 June 2017
10.	Avinash KEESOONY	Re/SRS (AP), FAREI keesoonya@gmail.com	Livestock	3 July 2017
11.	Pritriviraj DOBEE	Senior Extension Officer, FAREI Madam884@yahoo.com	Livestock	3 July 2017
12.	Devika BALGOBIN	Statistician, STATISTICS MAURITIUS dbalgobin@govmu.org	Liquid Waste and Livestock	3 July 2017
13.	Rangeeta JOYSURY	Ag Lab Manager, WMA r.joysury@wma.intnet.mu	Liquid Waste	3 July 2017
14.	Roufida Binte TEEMUL	Environment Officer, MSNSESD rteemul@govmu.org	All sectors	29 - 30 June; ; 3 July 2017

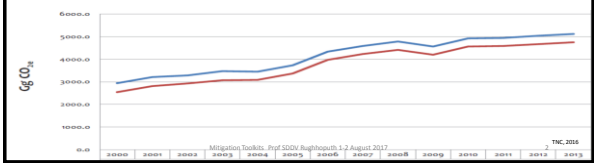
Annex 4. Evaluation by Participants

Questions	Excellent (5)	Good (4)	Average (3)	Below Average (2)	Poor (1)	Total	Index (on 5)
Clarity of Content/presentations	18.0%	64.0%	18.0%	0.0%	0.0%	100.0%	4.0
Knowledge and Information (K&I) dissemination	25.0%	68.0%	7.0%	0.0%	0.0%	100.0%	4.2
Approach used	7.0%	86.0%	7.0%	0.0%	0.0%	100.0%	4.0
Excel-based Toolkit	21.0%	68.0%	11.0%	0.0%	0.0%	100.0%	4.1
User Manuals	14.0%	72.0%	14.0%	0.0%	0.0%	100.0%	4.0
Discussion sessions	14.0%	65.0%	21.0%	0.0%	0.0%	100.0%	3.9
K&I gained will be useful/applicable to NAMA project design	50.0%	29.0%	21.0%	0.0%	0.0%	100.0%	4.3
Time allocated to discussion sessions	18.0%	82.0%	0.0%	0.0%	0.0%	100.0%	4.2
						Average	**4.1**

Annex 5. Workshop PowerPoint

Highlight on Mitigation of Climate Change and General Overview of the Excel-Based Mitigation Toolkits and User Manuals

Prof. Soonil Rughooputh



Contents

- Acknowledgements
- Global Warming
- Adaptation, Mitigation and Sustainable Development
- The Long road to COP21
- RoM: CC Initiatives (Highlights) and TNC Findings
- XL-Mitigation Toolkits – A Quick Overview

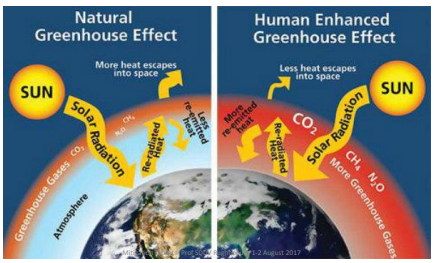
GW is no longer a Myth

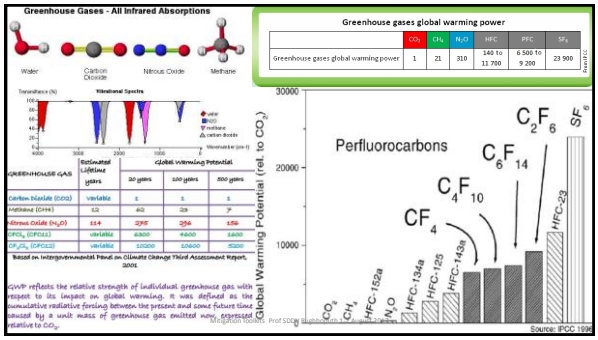
Now that we know that anthropogenic global warming is a reality <*IPCC 5th report says it with 95% certainty*> and is already creating problems for us, we needed to do something about it.

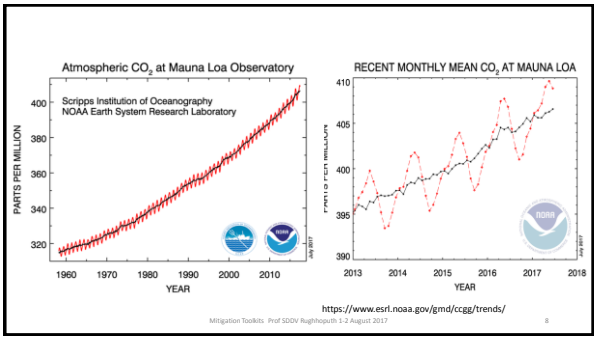
"We must limit global temperature rise to 2 degrees. We are far from there, and even that is enough to cause dire consequences. If we continue along the current path, we are close to a 6 degree increase".

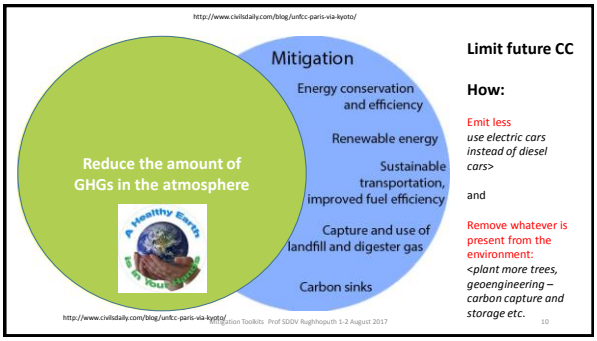
- UN Secretary-General Ban Ki-moon
Remarks at the Council on Foreign Relations (February 2013)

GW is no longer a Myth









Mitigation Benefits

In a very real sense, mitigation of GHGs would contribute to improving the regional environment and would be a gift that could be enjoyed in our lifetimes and those of our children.

Immediate to Near-Term	Remarks
'Reduction of Global Climate Change'	Slow process
Improvements in local environmental quality Air Quality Improvements Water Quality Improvements	
Improvements in local public health and well-being Reducing the incidence of asthma and other upper respiratory diseases.	Public funds spent on improving water quality could be used for other beneficial purposes
Stimulation of the local economy Sustainable Building Practices • Healthier indoor environments • Lower Energy Use • Reduced Pollution and GHG emissions	Changes would be observable in a few years (decadal) rather than century timescale

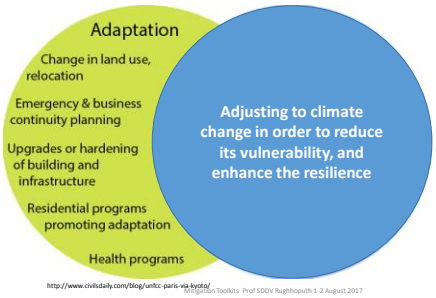
Pros and Cons of Mitigation

Mitigation: Problem Areas

- CC is a global phenomenon
- GHG lifetimes are long
- Mitigate efforts will take years and require concerted and expensive international cooperation
- Mitigation strategies will only indirectly affect our local climate

→ Not a Priority

At a first glance: instead develop strategies for adaptation focusing on direct impacts of cc and var)



so we know there would be more droughts so producing drought-proof seeds,

more cyclones so early warning systems and cyclone shelters,

http://www.civilsdaily.com/blog/unfcc-paris-via-kyoto/

Dangers of low priority to mitigation measures

- Current trends in the global climate will continue and may even accelerate, causing more severe direct and indirect impacts in local areas.
- Focusing on adaptation to local impacts of climate change without attempting to reduce future changes to Earth's climate is not a responsible position for a country. *Mitigation is an issue of good governance and responsible stewardship of the Earth, not an issue that speaks to the self interest of local governments or even the nation.*

Many adaptation and mitigation options can help address climate change, but no single option is sufficient by itself.

Adaptation and Mitigation: Complementary Partnership

Effective mitigation measures
>>> Lesser will be the impacts to which we will need to adapt.

Strong adaptation measures (or the degree of preparedness)
>>>> Lesser might be the impacts associated with any given degree of climate change <*if we reduce GHGs and global warming is less, we would need to produce less drought-proof crops*>

Effective implementation depends on policies and cooperation at all scales and can be enhanced through integrated responses that link mitigation and adaptation with other societal objectives.

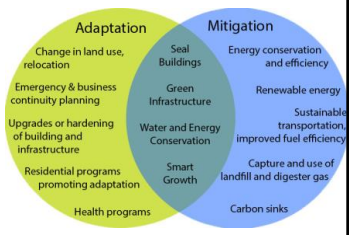
IPCC

Adaptation, Mitigation and Sustainable Development

Adaptation and mitigation are complementary strategies for reducing and managing the risks of climate change.

Substantial emissions reductions over the next few decades can

- reduce climate risks in the 21st century and beyond,
- increase prospects for effective adaptation,
- reduce the costs and challenges of mitigation in the longer term
- contribute to climate-resilient pathways for sustainable development.



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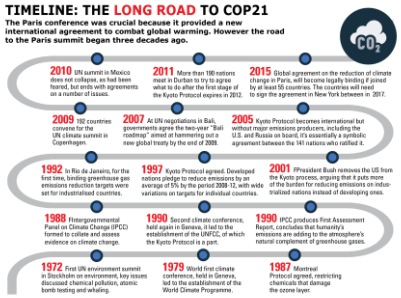
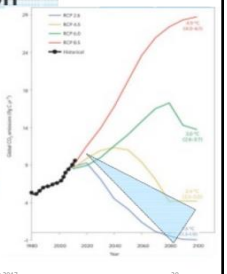


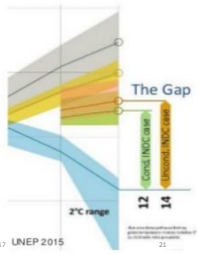
The Paris Agreement: Huge ambition

- Global goal of keeping warming between 2° and 1.5° C (Art. 2)
- Global peaking "as soon as possible" (Art. 4.1)
- Achieve balance of emissions and sinks by second half of century (Art. 4.1)
  - Excludes solar radiation management
- Global stocktake on progress towards these goals every 5 years from 2023 (Art. 14.1 and 2)

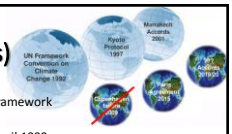


The Paris Agreement: Mitigation by everyone

- All countries account for their emissions (Art. 4.13)
  - Environmental integrity, transparency, accuracy, completeness, comparability and consistency of inventories
- Countries can set up a joint NDC (Art. 4.16-18)
- REDD+ (Art. 5) : results-based payments "encouraged" (Art. 5.2)
  - Link to market mechanisms unclear
- *Challenge*: Huge gap to 2° path under current INDCs (17 dec.)



RoM: CC Initiatives (Highlights)



- Among the first countries to ratify the United Nations Framework Convention on Climate Change (UNFCCC) in 1992;
- Submitted# its Initial National Communication (INC) in April 1999;
- A Climate Change Division established on the 1st March 2010 at MoESDDBM (UNFCCC Focal Point);
- Submitted# its Second National Communication (SNC) in November 2010;
- Among the first 15 countries to sign and ratify the Paris Agreement in New York on 22 April 2016;
- Submitted# its Third National Communication (TNC) in October 2016;

In fulfillment to the reporting requirement under Article 12 of the UNFCCC

National GHG Inventory

- For INC: GHG inventory was compiled for the year 1995;
- For SNC: GHG inventory was compiled for the period 2000 to 2006;
  - A stand-alone National Inventory Report (NIR), which was the first NIR compiled for RoM accompanied SNC.
- For TNC: Inventory for the period 2006 to 2013 and a series as from the year 2000 for the general sectors such as energy, agriculture, Forestry and Land Use (AFOLU), and waste among a few others, for which data were available;

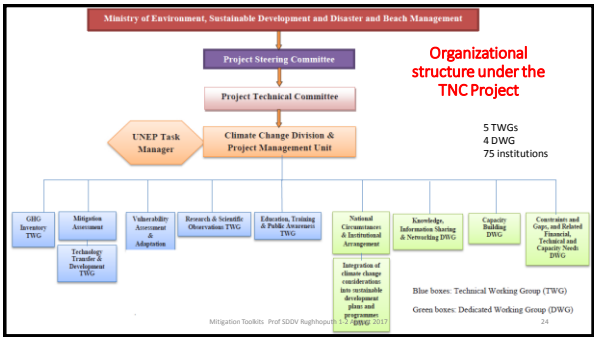
Prepared in line with Articles 4 and 12 of UNFCCC and the Guidelines for National Communications of non-Annex I Parties to the UNFCCC.

NGHGI

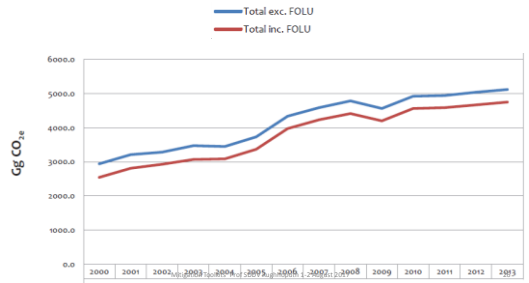
MAURITIUS
Covers:
- Energy
- Industrial Processes and Product Use (IPPU)
- Agriculture, Forestry and other Land Use (AFOLU),
- Waste.
- Also takes into account: CO2; CH4; N2O, and HFCs.

RODRIGUES
Covers:
- Energy (electricity generation and transport),
- AFOLU (livestock and forestry)

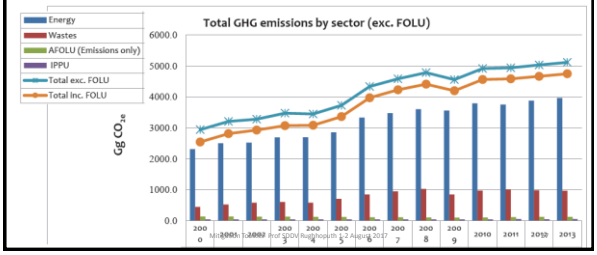
Organizational structure under the TNC Project

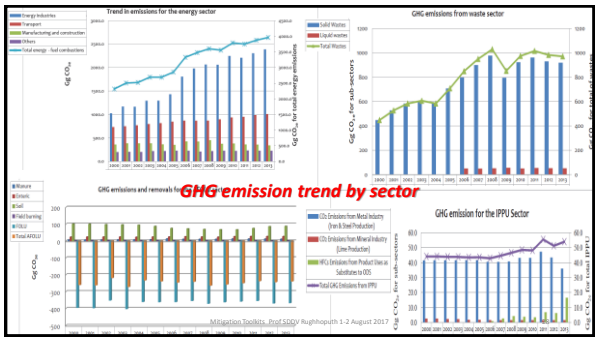


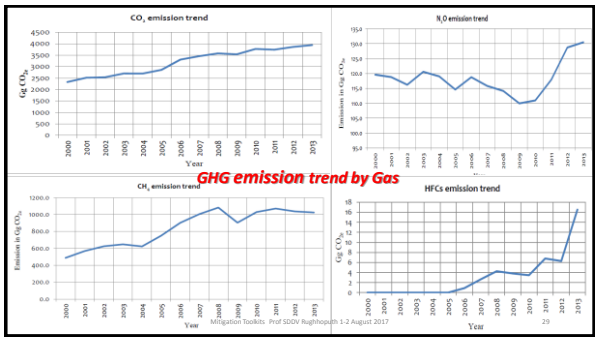
Trend of total aggregated GHG emissions (GgCO2e) from 2000 to 2013



GHG emissions and removals in GgCO2e by sector (2000-2013)







Excel-based Mitigation (XL-M) Toolkits

- Mitigation for the Republic of Mauritius: TNC report (2016)
- Need to develop a Tool to help stakeholders in their quest to keep abreast with the implementation, monitoring and development mitigation scenarios proposed.
- Consultants called to propose a user-friendly version for the purpose.

Challenges, Considerations, and Constraints:

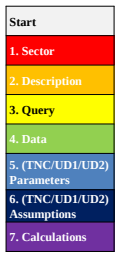
- ***Excel Versions***
- ***One vs Many Toolkits***
- ***Calculations***
- ***Design Considerations***
- ***Limitations (Time, Timely Meetings, Resources)***

Products

Sector	Number of Scenarios (including BAU)	Type of Inputs (TNC)
Energy Industries	6	Modelled Data
Transport	6	Modelled Data
Solid Waste	6	Per Capita based Model
Liquid Waste	2	Connectivity-based Model
Agricultural Crop	5	Estimated Data
Livestock	5	Expert Estimates
FOLU	3	Expert Estimates

Toolkit Features

- Navigation between worksheets with relevant guidelines; (tab/buttons)
- Use of Graphical User Interface (GUI) as a major assistance;
  - Quick selection of variables (by clustering)
  - Graphics to display of all variables relevant to the sector;
  - Interplay of GUI Graphics and Excel analytical functions; (charts)
- File manipulation (open, close and print features, export/import worksheets);
  - Simple data importing structure;
  - Data manipulation;
  - Cell formatting;
  - Inserted comments (help feature);
  - Innovative radar dashboard;
- Automatic report generation as one document (pdf); (Consisting of the User/Project Details, Parameters, Assumptions, Plot Generations)
- Security (login, data/datasheet protections)



Other Capabilities of the XLM-Toolkits

- Comparative Studies (Two user-defined Cases vs TNC);
- Percentage Difference Plots (Impact studies);
- Radar dashboard (as a function of time) (to keep track of proposed mitigation scenarios);
- Use of Excel functionalities;
- Data Protocol;

XL-M Toolkits: Highlights

- Versatile (General Structure)
- Modular Implementation
- Flexible
- Simple
- Efficient and Reliable
- Fast Computations/Graphics
- Documentary capability
- Security (updating, sharing)
- Robust (bug-free)

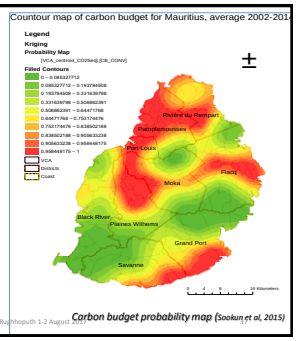
Sector	Number of Variable Plots
Energy Industries	53
Transport	158
Solid Waste	133
Liquid Waste	25
Agricultural Crop	144
Livestock	111
FOLU	48

XLM Toolkits will help us to:

- evaluate the extent of GHG emissions in important sectors and other underlying trends of related data;
- analyze the future trend of sectors bringing more reductions of GHG emissions;
- understand which sector and sub sector to target for policy making;
- Investigate policy implications;
- couple with adaptation measures, e.g. reduce soil erosion or land slide while increasing carbon sinks;
- allow key actors to actively participate in climate change activities;
- continually revisit mitigation targets;
- exploit R&D opportunities;
- exploit potential applications of the toolkits;
- develop collaborations and networking (Africa and beyond);

Future Development Potentials

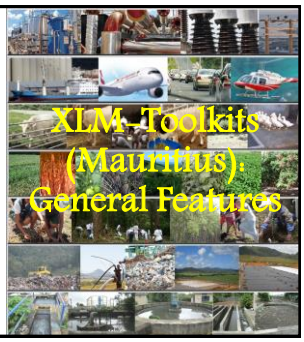
- Enhanced Features;
- Enhanced Data Management;
- Uncertainty;
- QA/QC;
- Sub-Sub sectoral Toolkit Developments;
- In-depth calculations;
- Advance to Higher Tier (2/3);
- Coupled Mitigation and Adaptation Scenarios;
- Integrate with GIS for spatial mapping;
- System Development Model Integration;
- Footprint Mapping;
- Risk confidence level;
- Social cost of carbon;
- Cost-effective risk and co-benefits analyses;



Carbon budget probability map (Sookun et al, 2015)

Thank You

Excel Toolkits for Mitigation Analysis for Low-Carbon Development Planning



TOC

- Introduction
- Tasks
- Constraints, Considerations & Challenges
- Major capabilities of the XLM-Toolkits
- User Manuals

XLM-Toolkits (Mauritius)

- Mitigation Toolkits developed for the Republic of Mauritius.
- Mitigation for the Republic of Mauritius: Assessed in the TNC report (2016)
- Need for a Tool to help stakeholders in their quest to keep abreast with the implementation, monitoring and development mitigation scenarios proposed in the 2016 TNC (UNFCCC) studies.
- Consultants called to propose a user-friendly version for the purpose.

Constraints, Considerations & Challenges:
(1) ***Programme***

- MS Excel versions: Excel-based Toolkit (versions 2013 and above)

No doubt, newer versions of XLM-Toolkits (Mauritius) will call for not only to the latest editions of Excel but also be updated with the findings of the periodic NCs.

Constraints, Considerations & Challenges:
(2) One vs Many

- Complexity of each sector: separate toolkits
  - The seven (7) sectors:

Sectors		Toolkit names
ENERGY	Energy Industries	XLM-Energy Industries
	Transport	XLM-Transport
NON-ENERGY	Agricultural Crop	XLM-Agricultural Crop
	Livestock	XLM-Livestock
	AFOLU	XLM-FOLU
	Liquid Wastes	XLM-Liquid Wastes
	Solid Wastes	XLM-Solid Wastes

- Advantages:
  - Smaller in size (typically less than 5 MB)
  - Faster calculations

Constraints, Considerations & Challenges:
(3) Calculations

- Given the time constraint, XLM Toolkits considered only calculations derived from the TNC Report (2016).
- XLM Toolkits distinguishes between
  - Data (normally entered periodically)
  - Parameters (normally fixed – constants or set by strategic policies)
  - Assumptions
- Users of the XLM Toolkits can adjust the scenarios by choosing appropriate parameters/assumptions to suit their needs of the mitigation analysis once all data have been entered.

Constraints, Considerations & Challenges:
4. Toolkit Design

- Versatility (General Structure)
- Modular Implementation
- Flexibility
- Simplicity
- Efficiency and Reliability (in terms of deliverables)
- Fast Computations/Graphics
- Security (updating, sharing)
- Robust (bug-free)

Constraints, Considerations & Challenges:
5: Others

- Time Constraints (one month)
- Meeting schedules with stakeholders (Contact details, Bilateral sessions and Training)
- Materials requested from stakeholders (Specific expectations, Data, Pictures, Links, Glossary, Sectoral Facts, etc.)

Toolkit Features

- Navigation between worksheets with relevant guidelines; (tab/buttons)
- Use of Graphical User Interface (GUI) as a major assistance;
  - Quick selection of variables (by clustering)
  - Graphics to display of all variables relevant to the sector;
  - Interplay of GUI Graphics and Excel analytical functions; (charts)
- File manipulation (open, close and print features, export/import worksheets);
  - Simple data importing structure;
  - Data manipulation;
  - Cell formatting;
  - Inserted comments (help feature);
  - Innovative radar dashboard;
- Automatic report generation as one document (pdf); (Consisting of the User/Project Details, Parameters, Assumptions, Plot Generations)
- Security (login, data/datasheet protections)

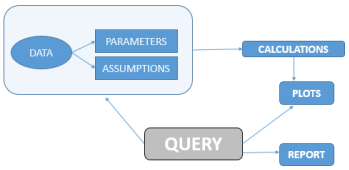
Other Capabilities of the XLM-Toolkits

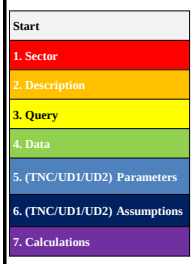
- Comparative Studies (Two user-defined Cases vs TNC);
- Percentage Difference Plots (Impact studies);
- Radar dashboard (as a function of time) (to keep track of proposed mitigation scenarios);
- Propose revised mitigation targets;
- Projections of GHG emissions under different scenarios as defined by TNC (2016);
- Investigate policy implications;
- In-depth analysis for research purposes;

Input and Output Details of XLM-Toolkits

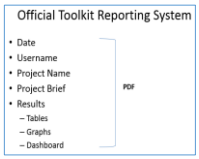
Sector	Number of Scenarios (including BAU)	Type of Inputs (TNC)	Number of Variable Plots
Energy Industries	6	Modelled Data	53
Transport	6	Modelled Data	158
Solid Waste	6	Per Capita based Model	133
Liquid Waste	2	Connectivity-based Model	25
Agricultural Crop	5	Estimated Data	144
Livestock	5	Expert Estimates	111
FOLU	3	Expert Estimates	48

Methodology





Report Generation



User Manuals

Simple and concise
Avoid duplications
List of all parameters
Full list of variable

- Two parts: One **General** and Seven **Specific**
- **General**: Discusses the General Aspects of the Toolkits
- **Specific**: Brief introduction of sector, the mitigation scenarios proposed under TNC, the targets under different scenarios, and the details of key worksheets (Data, Parameters, and Assumptions) with snapshots of the worksheet where appropriate.

Versions: XL-MT- Sector - v17.1

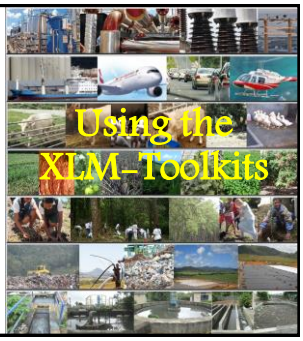
- XL: Excel
- MT: Mitigation Toolkit
- Sector
- V: Version
- 17: 2017
- .1: number (next upgrade: 0.2, etc)

Grace Period

- 1 month (to sort out any remaining bugs).

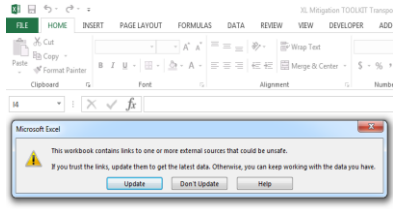
Thank You

Excel Toolkits for Mitigation Analysis for Low-Carbon Development Planning



Accessing Toolkit

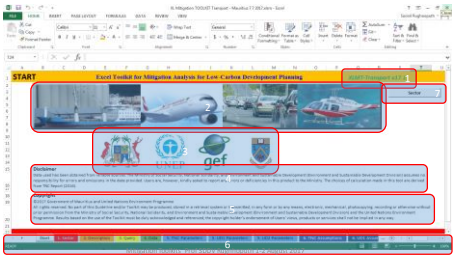
Double-click at the Microsoft Macro Enabled Worksheet Toolkit and then click *Update*.



Login

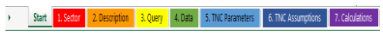
- Each sector has ….. with an accompanying password. These are provided by the Ministry to sectoral chairs.
- The sectoral chairs distributes the Toolkits to Users.

Start: User welcome page.

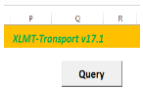


Navigating: Two ways.

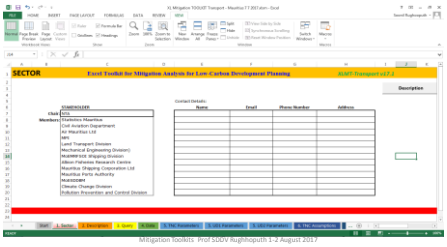
Rainbow-configured tabs (bottom of worksheets):



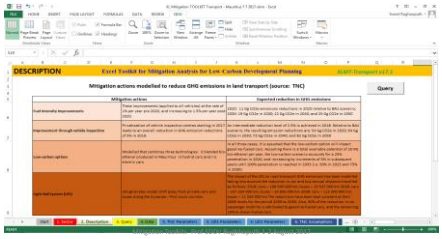
Use grey buttons (within worksheets):



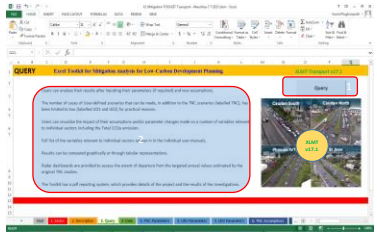
Sector: The *Sector* worksheet caters for the record of the Registered Users; this sheet is maintained by the sectoral chair.



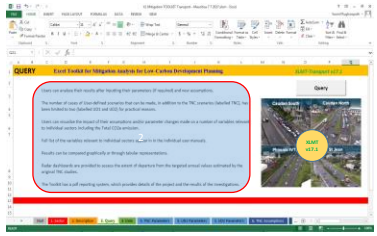
Description: The *Description* worksheet contains relevant information with respect to the mitigation scenarios and other relevant details – such as links to useful sites and glossary.



Query - The *Query* worksheet has the following features:

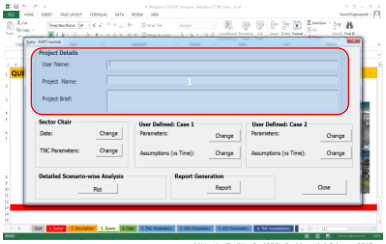


1. Query Button: Provides a pop-up menu for User to insert information about the project.
2. Help Features about the Query worksheet.



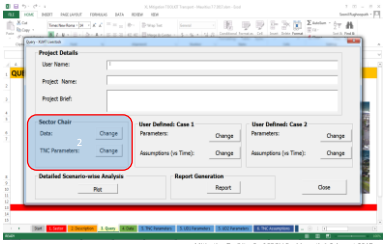
- Users can analyze their results after inputting their parameters (if required) and new assumptions.
- The number of cases of User-defined scenarios that can be made, in addition to the TNC scenarios (labelled TNC), has been limited to two (labelled UD1 and UD2) for practical reasons.
- Users can visualize the impact of their assumptions and/or parameter changes made on a number of variables relevant to individual sectors including the Total CO2e emission.
- Full list of the variables relevant to individual sectors appear in in the individual user manuals.
- Results can be compared graphically or through tabular representations.
- Radar dashboards are provided to assess the extent of departure from the targeted annual values estimated by the original TNC studies.
- The Toolkit has a pdf reporting system, which provides details of the project and the results of the investigations.

Query Button. Pop-up Menu



1. Project Details:
User Name
Project Name
Project Brief

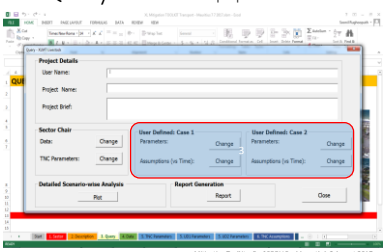
Query Button. Pop-up Menu



2. Sectoral chair (Data/Parameter)

The Chair for each sector has access to change Data and/or TNC parameters subject to a protection password. Links are provided to navigate.

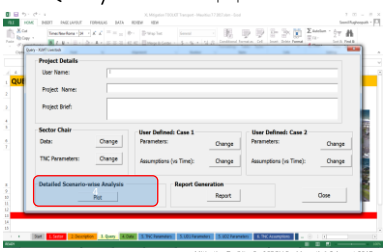
Query Button. Pop-up Menu



3.
User-Defined Cases
UD1 and UD2
(Parameters/Assumptions)

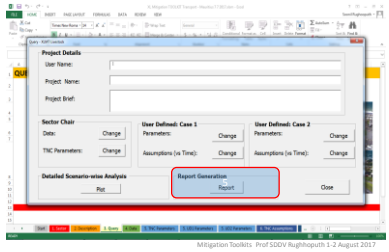
Using links, Users can navigate to change parameters and assumptions to enable them to do their simulations using a maximum of two scenarios (UD1 and UD2) and compare their results with respect to the TNC results.

Query Button. Pop-up Menu



4.
Scenario Analysis through the Plot button

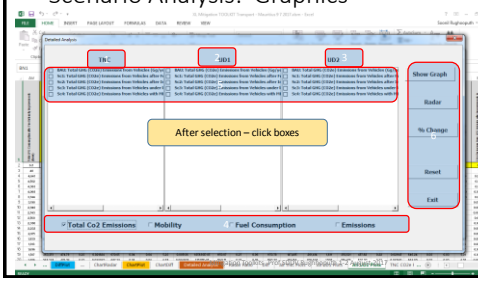
Query Button. Pop-up Menu



5. pdf Report

Scenario Analysis: Graphics

Scenarios:
1. TNC/2. UD1/3. UD2



SELECTION (4-5)

4. Click CLUSTERS (or Reset for All)

5. Click choices

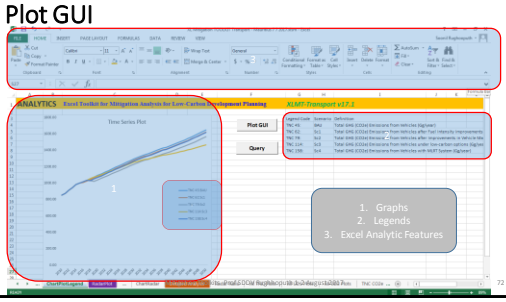
6.

Show Graphs (Plot GUI)

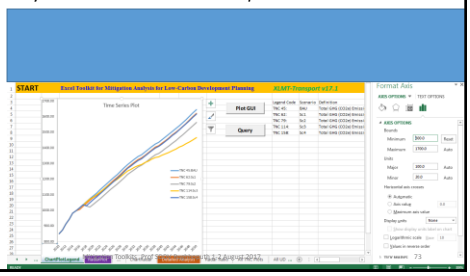
Show Plot: % Difference / Radar - for any 2 selected plots

Reset/Exit

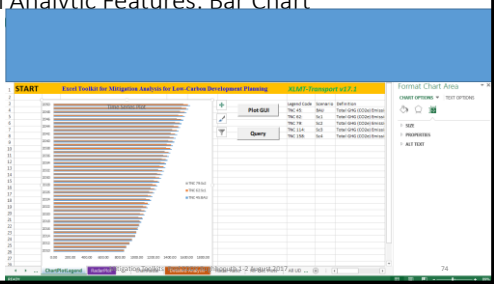
Plot GUI



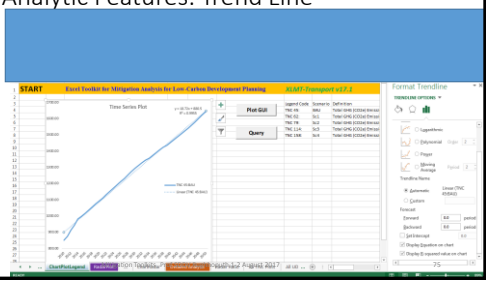
Excel Analytic Features: *Axis Option*



Excel Analytic Features: Bar Chart

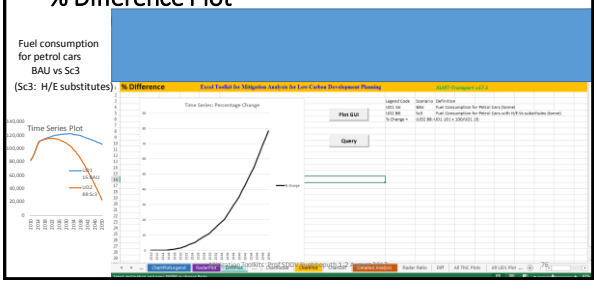


Excel Analytic Features: Trend Line

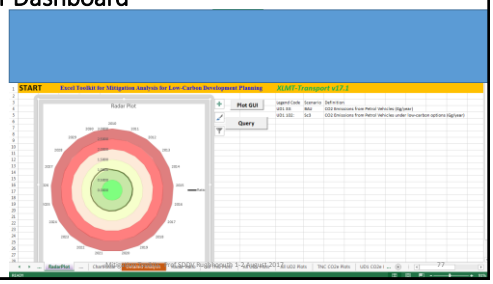


% Difference Plot

Fuel consumption for petrol cars BAU vs Sc3 (Sc3: H/E substitutes)



Radar Dashboard



Report Generation

Official Toolkit Reporting System

- Date
- Username
- Project Name
- Project Brief
- Results
  - Tables
  - Graphs
  - Dashboard

PDF

Thank You

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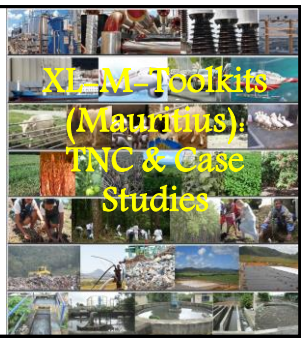
UNEP

gef



Series of Exercises based on TNC (2016) and Case Studies

Using the Toolkits

- Prioritizing
- Ranking
- Impact Studies
- Towards policy decisions
- Etc.

Thank You