MAURITIUS 2050 PATHWAYS CALCULATOR

(VERSION 1)

USER'S GUIDE

Ministry of Environment, Sustainable Development, Disaster and Beach Management

June 2015

The Ministry of Environment, Sustainable Development, Disaster and Beach Management developed the Mauritius 2050 Pathways Calculator with the support of public and private institutions. The Mauritius 2050 Pathways Calculator (Pathways Calculator) is a simulation tool for investigating low carbon emission pathways by building different combinations of energy supply and demand scenarios. The Mauritius 2050 Pathways Calculator is a customized version of the UK 2050 Pathways Calculator.[1] The UK Department of Energy & Climate Change (DECC) published the first 2050 Pathways Calculator in 2010. Since then, it has been used as a practical tool by policymakers, academia, the business sector, the general public and teachers at schools to help explore the various options on how the UK can best meet energy needs while achieving the ambitious 80% greenhouse gas emission reduction target by 2050. Mauritius is now one of several countries (China, India, Japan and Republic of Korea) or regions (Wallonia, Belgium) to adopt the 2050 Pathways Calculator

ACKNOWLEDGEMENTS

The Ministry of Environment, Sustainable Development, Disaster and Beach Management fully appreciates the technical assistance provided by the UK Foreign and Commonwealth Office through the British High Commission and the support from the UK Department of Energy and Climate Change and the India Energy Security Scenarios 2047 Team for developing the 2050 Pathways Calculator for Mauritius. We also acknowledge the valuable contribution of all local stakeholders in the implementation of the project, including those from private and public institutions who provided advice from a scientific point of view. The User's Guide has been developed by drawing on similar examples from India and Japan.

[1] https://www.gov.uk/2050-pathways-analysis.

WHY HAS THE MAURITIUS 2050 PATHWAYS CALCULATOR BEEN DEVELOPED?

Although Mauritius does not have any binding greenhouse gas (GHG) emission reduction obligations, it is recognized that the diversification of energy supply away from imported fossil fuels will bring the dual dividends of energy security and a more resilient balance of trade. The energy dependence of Mauritius on imported fossil fuels currently stand at ~85%, representing over 20% of its total import bill. In line with enhancing its energy security, the Ministry of Energy and Public Utilities (MEPU) has set renewable energy and energy efficiency targets in the Long Term Energy Strategy 2009 – 2025. The updated targets are:

- Increase the share of sustainable renewable sources in electricity production by at least 35% by 2025;
- Reduce energy consumption in non-residential buildings by up to 15% by 2025 (in comparison to 2005); and
- Reduce public sector buildings energy consumption on average by up to 15% by 2025 (in comparison to 2005).

These targets result in low-carbon emission pathways. In this context, the Pathways Calculator, supported by its transparent dataset and user-friendly interface for presenting the results, can be a useful tool for engaging domestic policy dialogues among various stakeholders and for education purposes of university students and the general public.

WHAT CAN THE MAURITIUS 2050 PATHWAYS CALCULATOR DO?

As a pathways or scenarios simulation tool, the Pathways Calculator can help policymakers as well as the energy producers and consumers (including the public) to understand the energy and emission-related choices that Mauritius faces. It allows users to develop their own pathway combinations to ensure energy security based on available resources, technologies and behavioural changes, and achieve emissions reduction. This transparent and handy tool can help answer the fundamental questions of how the energy system can evolve over the coming decades and its impact on GHG emissions, energy security, energy mix for electricity generation and related costs. It can provide a platform for engaging in dialogues on the challenges and opportunities of the future energy system and the responses to climate change by addressing such critical issues as:

- What is the implication of the Long Term Energy Strategy targets on GHG emission reductions? What will be the costs associated with this low-carbon pathway?
- If other sectors remain the same, how much GHG emission reduction can be achieved using the most ambitious renewable energy scenarios? What will the costs be?
- If all demand sectors remain the same, how much GHG emission reduction can be achieved using the most ambitious efforts made by the supply side? What will be the costs?
- If all supply sectors remain the same, how much GHG emission reduction can be achieved using the most ambitious efforts made by the demand side? What will be the costs?
- What is the full potential of GHG emission reductions in Mauritius? What does the low-carbon pathway look like, and what is the expected cost of achieving this potential?

The cost functions of the current version of the Mauritius 2050 Pathways Calculator are not fully customized. Hence, the questions related to the costs of achieving pathways will be answered when the cost functionality of the calculator is improved further in the future.

How was the Mauritius 2050 Pathways Calculator developed?

The Mauritius 2050 Pathways Calculator was customized following the general model structure of the UK 2050 Pathways Calculator. Several changes were made to reflect the Mauritian context. Mauritius-specific data on scenario setting, technology specifications, and social (demographic) indicators are used based on literature review, including national statistics, and stakeholder consultations.

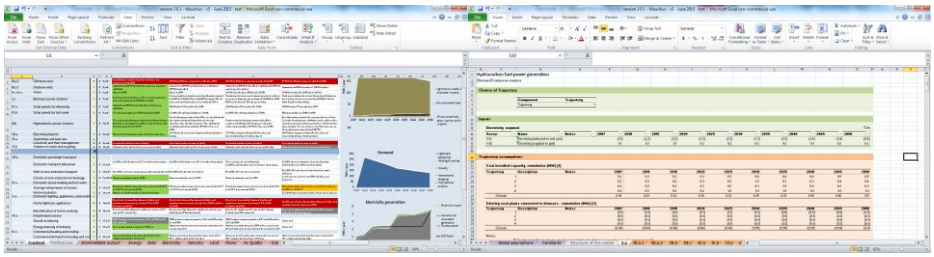
Sectoral coverage is set to reflect national priority sectors for energy supply and demand. Four scenarios for 2050 reflecting future macro-economic and social indicators are set at the top level of the model structure which link with relevant sectoral scenarios for the supply and demand sides. For energy supply sectors, four levels of option are set to reflect the level of efforts ranging from Level 1 (what happens in the absence of current policies), Level 2 (scenarios with current policies – i.e. doing nothing more than what has been planned), Level 3 (ambitious efforts that are realistic and achievable) and Level 4 (extraordinary efforts). Technology options are provided based on expert views of which technologies are feasible in Mauritius.

Energy supply is set to match energy demand by adjusting the imports of hydrocarbon fuels and the amount of electricity generation from fossil fuels (coal, oil and kerosene/gas).

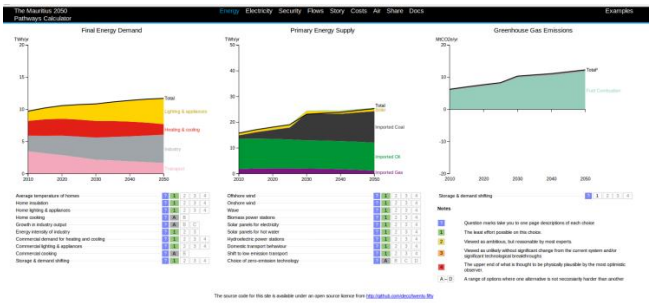
In the current version (i.e. version 1) of the Pathways Calculator, the levels of other air pollutants (PM10, NOx, SO_2 and NMVOC) associated with the users' options on energy supply and demand are not included. Also, the cost functions of the Pathways Calculator are not fully customized. This will be carried out in future updated versions of the Pathways Calculator.

What does the Mauritius 2050 Pathways Calculator look like?

Two versions of the Pathways Calculator were developed, namely: the Excel version and the Web Tool version (see the website at: http://environment.govmu.org/English/Pages/Mauritius-2050-Pathways-Calculator.aspx). The Excel version provides all the functions of the Pathways Calculator, data and calculations. The Web Tool is generated based on the Excel version, and it is, in fact, a user-friendly interface that allows choosing different combination of pathways without needing to know the underlying calculations that are carried out in the Excel version.



Excel Spreadsheet



Web Tool

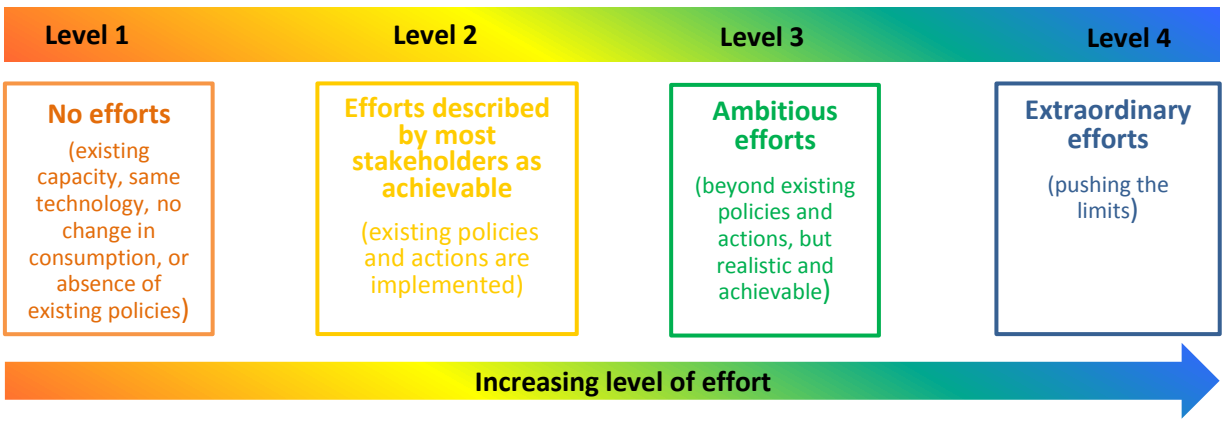
SECTORAL COVERAGE

The main supply and demand sectors of the Mauritian economy have been considered. The Pathways Calculator takes a sector-by-sector approach, and, instead of the changes in the supply and demand sectors being driven by econometrics, the efforts levels or trajectories are defined independently for each sector. A key feature of the model is that supply is equal to demand through the use of a function that balances the supply and demand sides through the importation of fossil fuels.

ENERGY SUPPLY SECTORS	ENERGY DEMAND SECTORS
Fossil fuel fired plants • Conventional power plants (e.g. coal, oil and kerosene/gas) • Biomass (e.g. bagasse) ***Renewables*** • Solar PV • Wind (Onshore, offshore and floating) • Hydropower (Small & medium and large) • Ocean power (hydrokinetic but excluding tidal) ***Biomass energy supply*** • Volume of wastes and recycling (partially developed) • Livestock and their management (partially developed)	***Transport*** • Passenger transport ***Residential*** • Space cooling • Hot water supply • Cooking, lighting and appliances ***Commercial*** • Cooling and hot water • Lighting and appliances ***Industry*** • Industrial activity (growth and energy intensity in manufacturing)

LEVELS SETTING IN THE MAURITIUS 2050 PATHWAYS CALCULATOR

For each sector, the Pathways calculator sets out a range of four trajectories for the types of changes that might occur. These trajectories are intended to reflect the whole range of potential future scenarios that might be seen in that particular sector. In the energy supply sectors these trajectories represent a potential roll-out of energy generation infrastructure (e.g. renewable energy technologies). For the energy demand sectors, the trajectories represent the behavioural and technological changes to 2050. In general, these trajectories are described as "levels" as they indicate scales of change or simply the expected levels of efforts. For certain sectors, such as domestic transport, the changes indicate choices (e.g. technologies or modal alternatives) rather than scales, and therefore are described as "trajectories" or "options". The levels/trajectories have been set up on the basis of progressively higher efforts toward transition to a low carbon society.



CALCULATION PROCEDURE

The Pathways Calculator follows a six-step calculation procedure that is iterative (i.e. Step 1 and Step 6 are the same steps for choosing different combinations of trajectories). Using the Excel Spreadsheet model as an example, the calculation procedure is explained as follows:

Step 1: The users select their 2050 society scenarios and sectoral trajectories for both supply and demand sectors to form one low-carbon pathway (see details in the Structure of the model worksheet).

Step 2: Sectoral sheets then calculate the outputs based on the user-defined trajectory selections.

Step 3: Energy balance sheets for each defined years (2010, 2015, 2020, 2025, 2030, 2035, 2040, 2045 and 2050) are generated based on sectoral outputs.

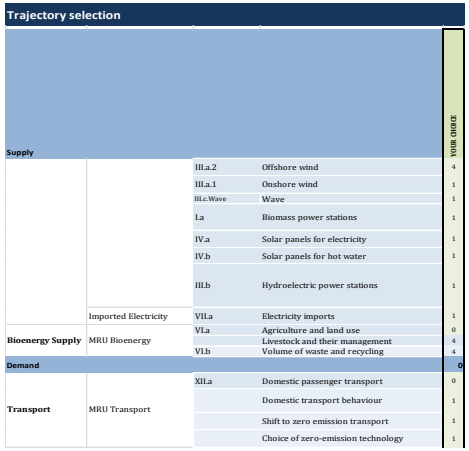
Step 4: A summary sheet is compiled by compiling all yearly energy balance sheets.

Step 5: Results are presented in charts based on the summary sheet for primary energy supply, total final energy consumption, energy mix for electricity generation, emissions and total additional costs.

Step 6: The users modify their trajectory selections to simulate another low-carbon pathway.

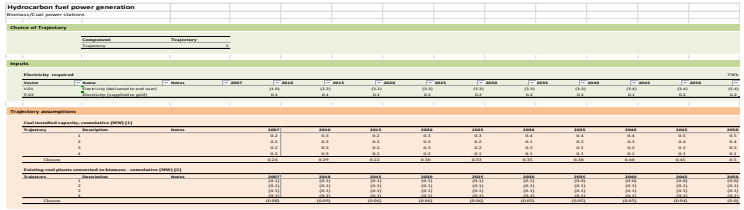
AN EXAMPLE OF THE CALCULATION PROCEDURE

Step 1: Select trajectories



Trajectory selection				
Supply				XXXX CHOICE
		III.a.2	Offshore wind	4
		III.a.1	Onshore wind	1
		III.c.Wave	Wave	1
		I.a	Biomass power stations	1
		IV.a	Solar panels for electricity	1
		IV.b	Solar panels for hot water	1
		III.b	Hydroelectric power stations	1
	Imported Electricity	VII.a	Electricity imports	1
Bioenergy Supply	MRU Bioenergy	VI.a	Agriculture and land use	0
			Livestock and their management	4
		VI.b	Volume of waste and recycling	4
Demand				0
Transport	MRU Transport	XII.a	Domestic passenger transport	0
			Domestic transport behaviour	1
			Shift to zero emission transport	1
			Choice of zero-emission technology	1

Step 2: Calculate the outputs of each sector



Hydrocarbon fuel power generation

Biomass/E-cat power stations

Choice of Trajectory

Component	Trajectory
Trajectory	1

Inputs

Electricity required — TWh

Sector	Name	Notes	2007	2010	2015	2020	2025	2030	2035	2040	2045	2050
V.01	Electricity (delivered to end user)		(1.9)	(2.1)	(2.1)	(1.5)	(1.5)	(1.5)	(1.5)	(1.4)	(1.4)	(1.4)
V.02	Electricity (supplied to grid)		0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

Trajectory assumptions

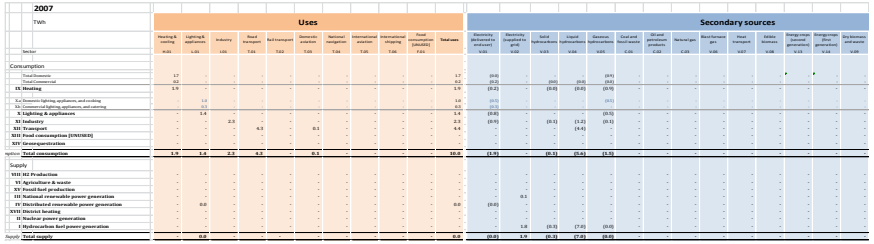
Coal installed capacity, cumulative (MW) [1]

Trajectory	Description	Notes	2007	2010	2015	2020	2025	2030	2035	2040	2045	2050
	1		0.2	0.3	0.2	0.3	0.3	0.4	0.4	0.4	0.5	0.5
	2		0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.4	0.4	0.4
	3		0.2	0.3	0.2	0.3	0.2	0.3	0.3	0.2	0.3	0.3
	4		0.2	0.3	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3
Chosen			0.24	0.29	0.22	0.30	0.33	0.35	0.36	0.40	0.43	0.43

Existing coal plants converted to biomass - cumulative (MW) [2]

Trajectory	Description	Notes	2007	2010	2015	2020	2025	2030	2035	2040	2045	2050
	1		(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
	2		(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
	3		(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
	4		(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)	(0.1)
Chosen			(0.04)	(0.07)	(0.04)	(0.04)	(0.06)	(0.03)	(0.03)	(0.05)	(0.04)	(0.0)

Step 3: Generate the Energy Balance Table for each

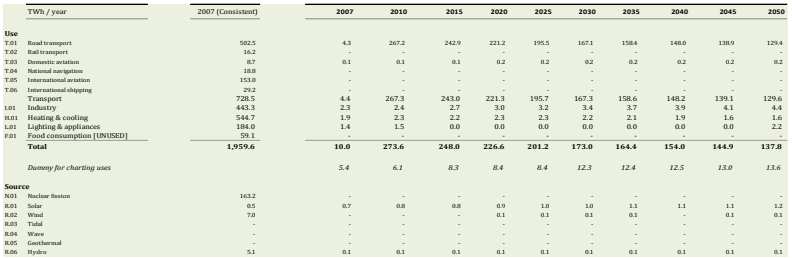


2007

TWh

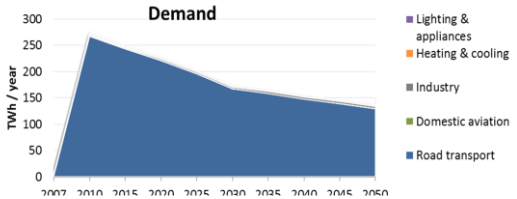
	Uses										Secondary sources												
Sector	Heating & cooling	Lighting & appliances	Industry	Road transport	Rail transport	Domestic aviation	National navigation	International aviation	International shipping	Road consumption [UNUSED]	Total uses	Electricity (delivered to end user)	Electricity (supplied to grid)	Solid hydrocarbons	Liquid hydrocarbons	Gaseous hydrocarbons	Coal and fossil waste	Oil and petroleum products	Natural gas	Wood furnace gas	Heat transport	Kitchen biomass	Energy crops (power generation)	Energy crops (heat generation)	Dry biomass and waste
	H.01	L.01	I.01	T.04	T.02	T.03	T.05	T.06	T.07	T.08		V.01	V.02	V.03	V.04	V.05	V.06	V.07	V.08	V.09	V.10	V.11	V.12	V.13	V.14
Consumption																									
Total Domestic	1.7	-	-	-	-	-	-	-	-	-	1.7	(0.4)	-	-	(0.6)	(0.9)	-	-	-	-	-	-	-	-	-
Total Commercial	0.2	-	-	-	-	-	-	-	-	-	0.2	(0.2)	-	(0.6)	(0.4)	(0.6)	-	-	-	-	-	-	-	-	-
IX. Heating	1.9	-	-	-	-	-	-	-	-	-	1.9	(0.2)	-	(0.6)	(0.4)	(0.5)	-	-	-	-	-	-	-	-	-
X.a Domestic lighting, appliances, and cooking	-	1.0	-	-	-	-	-	-	-	-	1.0	(0.5)	-	-	-	(0.5)	-	-	-	-	-	-	-	-	-
X.b Commercial lighting, appliances, and catering	-	0.5	-	-	-	-	-	-	-	-	0.5	(0.3)	-	-	-	-	-	-	-	-	-	-	-	-	-
X. Lighting & appliances	-	1.4	-	-	-	-	-	-	-	-	1.4	(0.8)	-	-	-	(0.5)	-	-	-	-	-	-	-	-	-
XI. Industry	-	-	2.3	-	-	-	-	-	-	-	2.3	(0.9)	-	(0.1)	(1.2)	(0.1)	-	-	-	-	-	-	-	-	-
XII. Transport	-	-	-	4.3	-	0.1	-	-	-	-	4.4	-	-	-	(4.4)	-	-	-	-	-	-	-	-	-	-
XIII. Food consumption [UNUSED]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
XIV. Geoexportation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total consumption	1.9	1.4	2.3	4.3	-	0.1	-	-	-	-	10.0	(1.9)	-	(0.1)	(5.6)	(1.5)	-	-	-	-	-	-	-	-	-
Supply																									
VIII. H2 Production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
VI. Agriculture & waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
XV. Fossil fuel production	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
III. National renewable power generation	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-
IV. Distributed renewable power generation	-	0.0	-	-	-	-	-	-	-	-	0.0	(0.0)	-	-	-	-	-	-	-	-	-	-	-	-	-
XVII. District heating	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
II. Nuclear power generation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I. Hydrocarbon fuel power generation	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8	(0.3)	(7.0)	(0.0)	-	-	-	-	-	-	-	-
Total supply	0.0										0.0	(0.0)	-	1.9	(0.3)	(7.0)	(0.0)	-	-	-	-	-	-	-	-

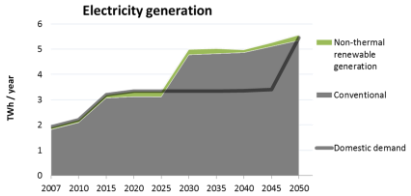
Step 4: Compile the Intermediate Output Sheet



TWh / year		2007 (Consistent)	2007	2010	2015	2020	2025	2030	2035	2040	2045	2050
Use												
T.01	Road transport	502.5	4.3	267.2	242.9	221.2	195.5	167.1	158.4	148.0	138.9	129.4
T.02	Rail transport	16.2	-	-	-	-	-	-	-	-	-	-
T.03	Domestic aviation	8.7	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2
T.04	National navigation	18.8	-	-	-	-	-	-	-	-	-	-
T.05	International aviation	153.0	-	-	-	-	-	-	-	-	-	-
T.06	International shipping	29.2	-	-	-	-	-	-	-	-	-	-
	Transport	728.5	4.4	267.3	243.0	221.3	195.7	167.3	158.6	148.2	139.1	129.6
I.01	Industry	443.3	2.3	2.4	2.7	3.0	3.2	3.4	3.7	3.9	4.1	4.4
H.01	Heating & cooling	544.7	1.9	2.3	2.2	2.3	2.3	2.2	2.1	1.9	1.6	1.6
L.01	Lighting & appliances	184.0	1.4	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.2
F.01	Food consumption [UNUSED]	59.1	-	-	-	-	-	-	-	-	-	-
	Total	**1,959.6**	**10.0**	**273.6**	**248.0**	**226.6**	**201.2**	**173.0**	**164.4**	**154.0**	**144.9**	**137.8**
	Dummy for charting uses		*5.4*	*6.1*	*8.3*	*8.4*	*8.4*	*12.3*	*12.4*	*12.5*	*13.0*	*13.6*
Source												
N.01	Nuclear fission	163.2	-	-	-	-	-	-	-	-	-	-
R.01	Solar	0.5	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.1	1.1	1.2
R.02	Wind	7.0	-	-	-	0.1	0.1	0.1	0.1	-	0.1	0.1
R.03	Tidal	-	-	-	-	-	-	-	-	-	-	-
R.04	Wave	-	-	-	-	-	-	-	-	-	-	-
R.05	Geothermal	-	-	-	-	-	-	-	-	-	-	-
R.06	Hydro	5.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

Step 5: Results

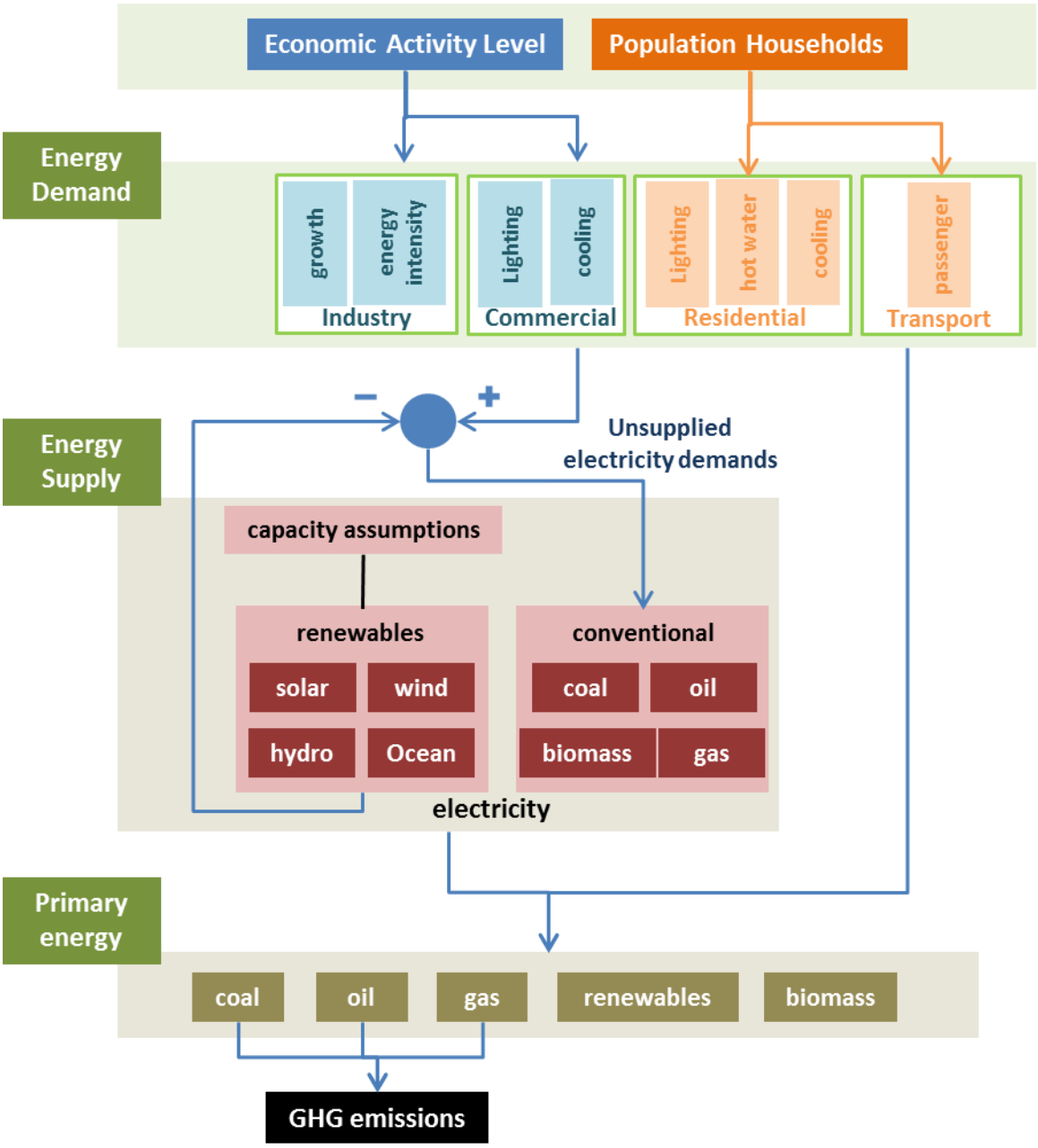




Step 6: Rebuild pathway

STRUCTURE OF THE MAURITIUS 2050 PATHWAYS CALCULATOR

The structure of the Pathways Calculator is illustrated below.



First, at the top of sectoral trajectory setting are the economic indicators in terms of sectoral output levels and social indicators in terms of population size and number of households. These indicators will then impact on energy demand sectors. In particular, the sectoral output levels are linked with industrial sectors, and commercial sectors, while the population size and the number of households are linked with residential sectors and the passenger transport sector.

Second, for energy demand, four categories of energy end users are considered, i.e. industry (or manufacturing), residential, commercial and transport sectors. The activity levels of each sector, such as consumption behaviours, technology penetration (technology options) and energy efficiency advancement will influence the sectoral outputs in terms of energy demand, and GHG emission levels.

Third, for energy supply, secondary energy supply in the form of electricity generation is included in the model. Electricity is generated from conventional power plants using fossil fuels and biomass, and renewable energy.

Fourth, primary energy resources include hydrocarbon energy carriers (coal, oil products and gas), renewable energy, and biomass.

Both primary energy and secondary energy transformed from primary energy will be provided to satisfy energy demand. Emissions are generated from fossil fuel combustion influenced by way of energy supply and energy demand levels.

HOW TO INSTALL AND START UP THE EXCEL SPREADSHEET MODEL

(i) If you install from the Internet (available at http://environment.govmu.org/English/Pages/Mauritius-2050-Pathways-Calculator.aspx), find "Excel Spreadsheet version", click the icon of the Excel Spreadsheet model, download the Excel file and save on your PC. If you use USB or CD, please copy the Excel file and save on your PC.

(ii) Open the Excel file.

(iii) Find the "Control" sheet, click and open.

(iv) From the manual bar, you can select "Formulas" and click, and then select "Calculation Options" and click on "Manual". This will deactivate automatic calculation unless you press "F9" on the keyboard to enable the calculation.

(v) On the "Control" sheet, you can select your own choices for the trajectory setting of the society scenarios and for each sector of the demand side and the supply side.

- Columns A-D: Given definition of technology, energy efficiency, and behavioural drivers influencing sectoral trajectory settings;
- Column E: Levels of efforts which require the users to input;
- Column F: The upper limits (most are 4 or D) set for each corresponding selection in Column E;
- Column G: Gives the links to one-pagers that defines assumptions about each lever;
- Columns H-L: Explanations on the level setting for Column E;
- Columns AF-AO: Calculation results of energy supply and demand including three figures, i.e. Primary Energy Supply, Total Final Energy Consumption by Sector and Total Final Energy Consumption by Fuels;
- Columns AF-AO: Calculation results of electricity generation;
- Columns AQ-BA: Calculation results of GHG emissions.

(vi) You can select one among several options provided in Columns H-L and then input the value of selection (e.g. 4) into the corresponding cell in Column E.

(vi) Upon the completion of all selections required for Column E, press F9 on the keyboard. The Pathways Calculator will run calculations based on your selection. You can find the information on the status of calculating in terms of percentage of completion on the right of the bottom bar. Upon 100% completion of the calculation, the results will be shown on the right side in Columns AF-AO, and AQ-BA.

HOW TO ACCESS AND USE THE WEB TOOL

i) Connect to the internet;

ii) Type in the website address: http://environment.govmu.org/English/Pages/Mauritius-2050-Pathways-Calculator.aspx

iii) Find "Web Tool version", click the icon of "Web Tool", and open the web page of Mauritius 2050 Pathways Calculator;

iv) Select between 1 to 4 for the Society Scenario setting on the top;

v) Switch to different pages on Energy, Electricity, Security, Flows, Costs and Share by clicking on the top bar under the Society Scenario selection;

vi) On the lower part of each page, you can select your own sectoral choices from Level 1 to Level 4. On the left side are energy demand-related levers and on the right side are energy-supply related levers. Upon the completion of selection, the results calculated based on your unique sectoral selections will then be presented immediately on the upper part of the webpage.

vii) When you make your sectoral selections on one of the webpages, e.g. the Energy page, the same selections will be reflected on all other pages (i.e. Electricity, Security, Flows, Costs and Share). If you want to change your selections on another page (for example, Electricity page), the same changes will be reflected on all pages again.

Several functions designed for the convenience of the users include: On the right of the available controls, there is a question mark ?, and if you click this, the descriptions on the sector and trajectory settings will appear in PDF. To select the level of effort for each control, click on the number 1, 2, 3 or 4 or A, B or C.

CAVEATS FOR USING THE PATHWAYS CALCULATOR

Several caveats need to be noted when using the Pathways Calculator. The Pathways Calculator is a user driven model. The user specifies energy supply and demand across the economy by selecting effort levels for specified sectors. The Pathways Calculator therefore demonstrates the scale of changes that are likely to be required for Mauritius to make the transition to a low-carbon economy, as well as the choices/trade-offs available to the country. However, it does not make predictions or projections for the future

The Pathways Calculator does not adopt a cost-optimization approach. Instead of focusing on identifying the least-cost pathway to meet 2050 emissions reduction target, it looks at what might be achievable in each of the covered sectors under different assumptions. In this respect, the Calculator is fundamentally different from cost optimisation models such as MARKAL. Models such as MARKAL examine the costs of different technologies and work out the least cost pathway to achieving an emissions reduction target.

The Pathways Calculator is not a model driven by econometrics. There is no price elasticity function, which adjusts energy demands in response to prices in pathways. This is because the pathways are user led and the costs work, emissions and energy are shown as consequences of a user's chosen pathway. Therefore, in a high-level way a user can decide to replicate demand side response by increasing the level of demand reduction through the user choices but this response is not modelled endogenously, since the Pathways Calculator has no optimisation function.

The Pathways Calculator does not measure the impact on consumer bills. It works out the cost to society of a particular energy system, but does not specify who pays.

EXAMPLE PATHWAYS

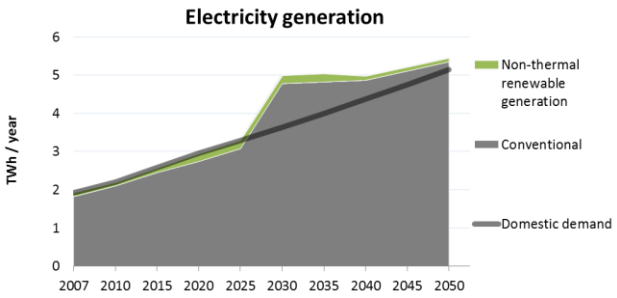
Two example pathways are presented to explain how to understand and interpret the results from the Pathways Calculator. The first pathway demonstrates what is likely to happen if no effort is made in mitigating emissions and combatting climate change, while the second one shows what could happen if Mauritius puts extraordinary efforts toward transitioning to a low-carbon society. For both pathways, the population size will be 1,002,715; and the number of households will be 520,028 in 2050. The "No Effort" pathway consists of all Level 1 settings, whereas the "Extraordinary Effort" pathway consists of all Level 4 settings.

Under the "No Effort" pathway, all the sectors are set at the Level 1, reflecting the continuation of existing capacity, technology and no change in consumption behaviour. In the "Extraordinary Effort" pathway, all the sectors are set at the Level 4, reflecting increased use of renewable energy, advanced technology, and reduction of energy service demand.

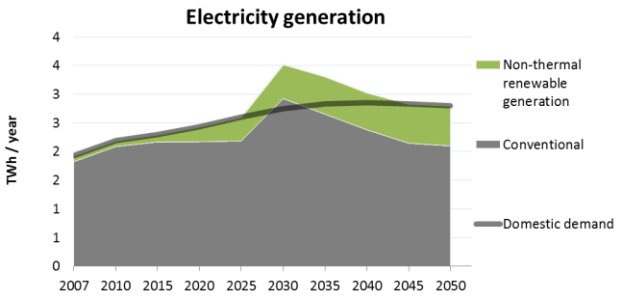
Results: Electricity mix

The electricity mix varies significantly under the two scenarios. In the "No Effort" pathway, the use of fossil fuels, particularly coal and oil, dominate power generation and electricity production increases over the years. The share of renewables such as renewable biomass, solar PV, wind energy and hydroelectricity decrease over the years. On the other hand, in the "Extraordinary Effort" scenario, first there is a considerable decrease in electricity demand over the years due to behavioural change and enhanced energy efficiency. In addition, the share of all the renewables increases significantly. There is still a sizeable share of conventional power generation in 2050. This shift to renewable energy sources will facilitate the development of a low-carbon economy in Mauritius.

"No Effort"



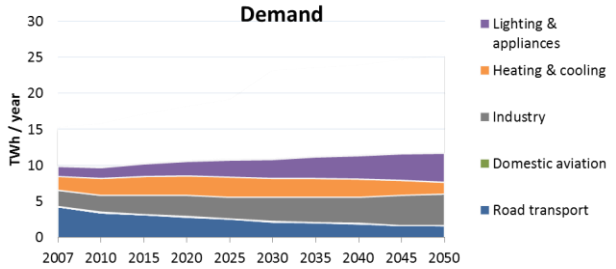
"Extraordinary Effort"



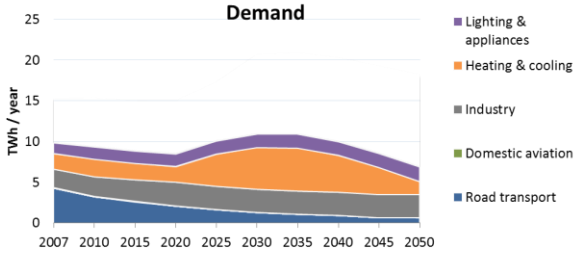
Results: Energy used by end consumers

The overall total of final energy consumption increases marginally until 2050 under the "No Effort" scenario, whereas there is a substantial drop in final energy consumption in 2050 under the "Extraordinary Effort" scenario. A combination of factors, including policy intervention, efficiency enhancement as well as behavioural change is reflected in this reduction of energy consumption. In terms of comparison between the sectors, most changes are seen in energy consumption for road transport, and lighting and appliances. More and more people will use public transport such as buses, and nearly all of the privately-owned vehicles will be low-emission ones.

"No Effort"



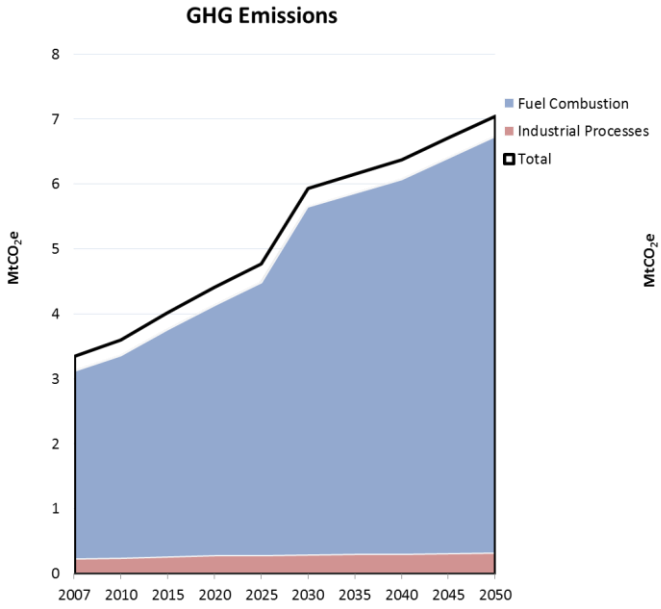
"Extraordinary Effort"



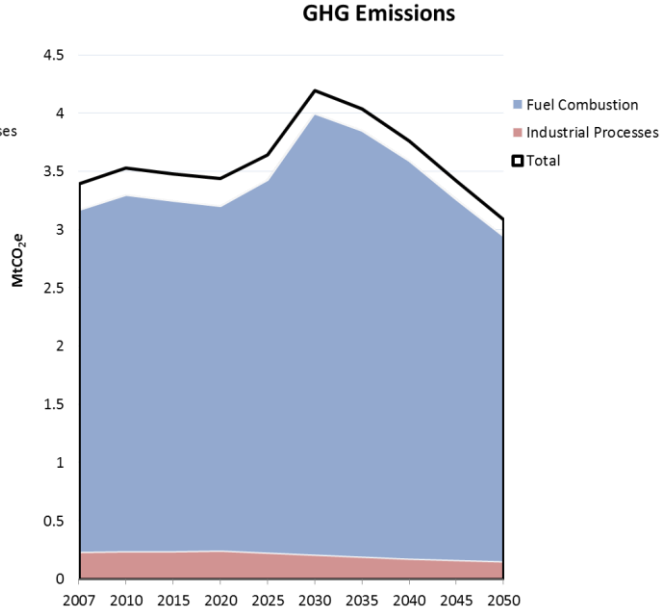
Results: GHG Emissions

Under the "No Effort" scenario, GHG emissions close to double between 2010 and 2050. On this pathway, Mauritius is stuck with carbon intensive technologies, and consumption patterns do not change much relative to the baseline. This is despite a reduction in total population. On the other hand, the "Extraordinary Effort" pathway yields GHG emissions in 2050 that are lower than in 2010. The use of low-carbon technologies significantly enhance efficiency and reduce emissions. In both scenarios, GHG emission is dominated by the combustion of fossil fuels.

"No Effort"



"Extraordinary Effort"



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