THE CLIMATE
PATHWAY PROJECT

Development and evaluation of Quintana Roo's decarbonisation pathway

FINAL REPORT
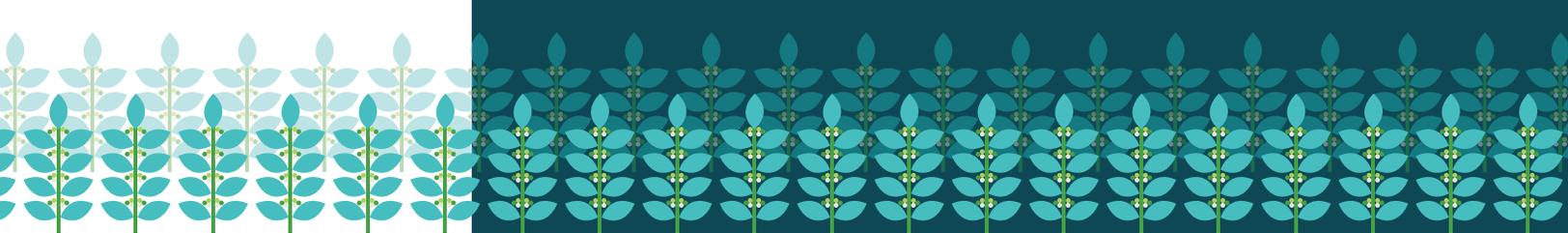
Abbreviatons

AFOLU	Agriculture, forestry and other land use
BAU	Business as usual
C	Celsius
CE	Cost effectiveness
CCS	Center for Climate Strategies
CO$_2$	Carbon dioxide
CONAFOR	National Forestry Commission
FOLU	Forestry and other land use
GHG	Greenhouse gases
Ha	Hectare
HVAC	Heating, ventilation and air conditioning systems
IPCC	Intergovernmental Panel on Climate Change
MCA	Multi-criteria assessment
MWh	Megawatt hour
NDC	Nationally Determined Contribution
NICFI	Norwegian International Climate and Forest Initiative
GDP	Gross Domestic Product
GNI	Gross National income
RCI	Residential, commercial, and institutional
MSW	Municipal Solid Waste
RTQ	Scratch-grab-burn
SAMOF	Forestry Satellite Monitoring System
SEMA	Secretaría de Ecología y Medio Ambiente
TCG	The Climate Group
Tg	Teragrams
G	Grams
t	Metric tonnes
VKT	Vehicle-Kilometres Travelled
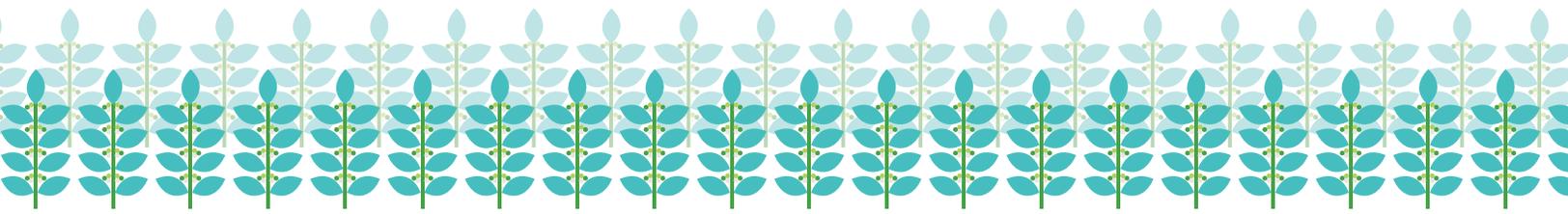
Executive Summary

This report includes a summary of the process of developing and evaluating the priority actions of the decarbonisation pathway of the state of Quintana Roo in Mexico, as well as the results of the main steps of the process, which include:

1. Developing the state baseline;

2. Selecting the state's targets to reduce net GHG emissions by 2030 and 2050;

3. Selecting priority actions for the pathway and their designs; and,

4. Assessing the expected impacts of implementing the actions on GHG emissions, considering the direct costs and savings of the actions, and the macroeconomics of the state.

The decarbonisation pathway is a transformational process to reduce greenhouse gas (GHG) emissions in the long term (2050) through a series of actions in key economic sectors that will change the "business as usual" projection of these GHG emissions (i.e. baselines) through the application of new and improved technologies and practices.

Development and assessment process of the pathway

This was a collaborative process between the Quintana Roo State government and a team of international technical experts. The state government's efforts were led by the Climate Change Directorate of Quintana Roo's Secretariat of Ecology and Environment (SEMA; in Spanish).

The project team consisted of the Climate Group (TCG), Winrock International, the Center for Climate Strategies (CCS), the Governors' Climate and Forests Task Force, and Reforestamos Mexico. Throughout the process, input and feedback from other key public and private sector stakeholders was solicited and incorporated through face-to-face and remote workshops.

Baseline

The baseline developed revealed that in the baseline year 2015, Quintana Roo's total greenhouse gas (GHG) emissions were 10.4 TgCO2e, and it was projected that by 2030 these emissions would reach 15.9 TgCO2e, and by 2050 they would triple to 33.4 TgCO2e compared to 2015 emissions. According to this analysis the most important drivers of emissions are: energy supply (which includes in-state electricity generation and imports), energy production (which includes in-state electricity generation and imports), and

imports), and energy use (which includes in-state electricity generation and imports).

Decarbonisation target

The selection of a GHG emission reduction target for the state of Quintana Roo was based on the level of emission reductions required globally to limit global warming to less than 2 degrees Celsius (C) above pre-industrial levels.

An assessment of the state-level emission reduction targets needed to achieve consistency with the goal of limiting global warming to 2°C was carried out. These targets also reflect the state's commitments as a member of the Under2 Coalition. Based on this assessment, the state of Quintana Roo selected the following state-level GHG reduction targets consistent with the levels of emissions required to achieve the goal of limiting global warming to 2°C:

- By 2030, 21% reduction of GHG emissions below 2016 emissions level.

- By 2050, 63% reduction of GHG emissions below 2016 emissions level.

Selected actions

Eleven priority actions were selected to be included in the Quintana Roo pathway:

Energy supply sector: two actions were included: 1) centralised solar energy and 2) centralised wind energy.

Residential, commercial, and institutional energy demand sector: two actions were included: 1) urban housing - efficient design and 2) Commercial and institutional buildings: heating, ventilation, and air conditioning.

Transport energy demand sector: one action included: electrification of vehicles.

Agriculture and livestock sector: one action was included: Reduction of agricultural burning.

Forestry and other land use sector: two actions were included: 1) Planning infrastructure and urban growth to minimise deforestation and 2) Reducing the risk of forest fires.

Waste sector: three actions were included: 1) Reduction of municipal source waste. 2) Recycling and composting of industrial solid waste and 3) Use of waste for energy production.

1 teragram (Tg) is equal to 1 billion kg, or 1 million metric tonnes
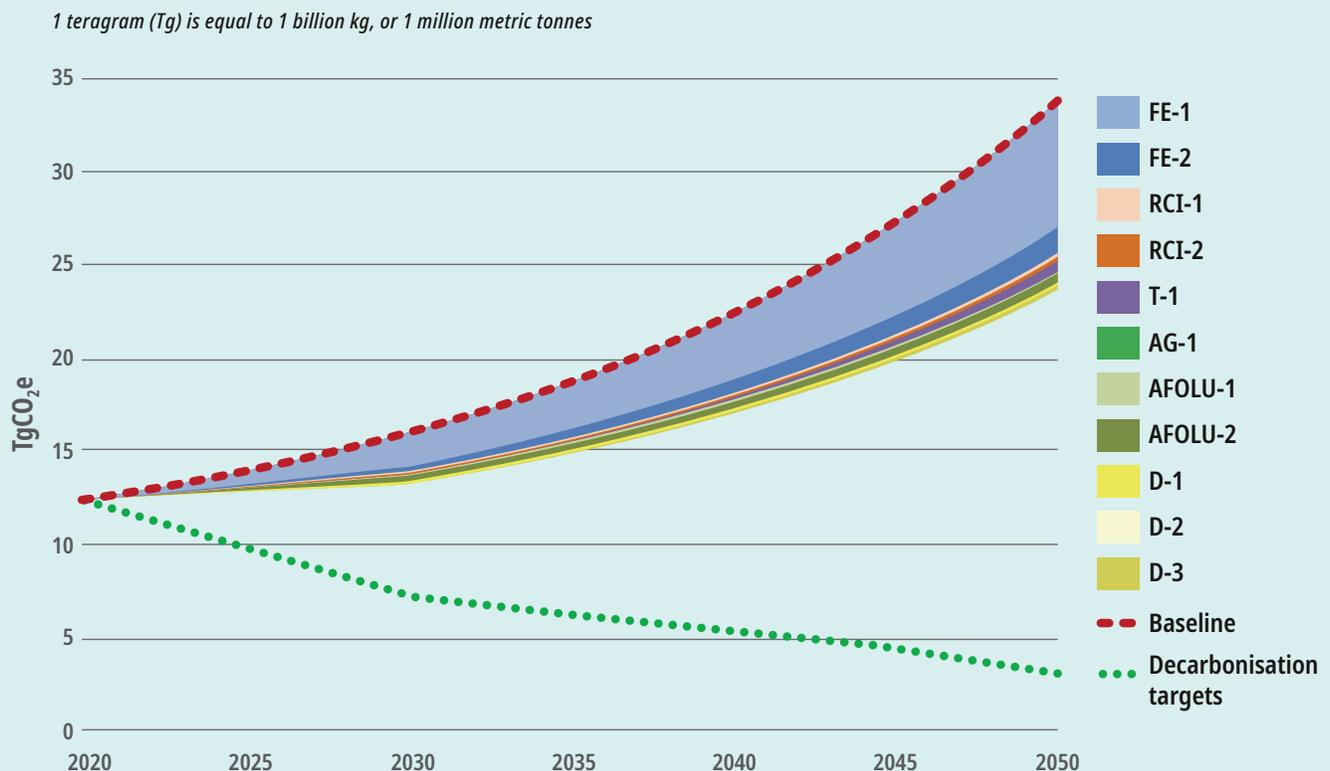
FIGURE 1. GHG REDUCTIONS FROM PRIORITY ACTIONS
Note: FE: energy supply, I: industry, T: transportation, AFOLU: agriculture, forestry and other land use, R: waste management.

Expected impacts of the implementation of the actions

Expected impacts on greenhouse gas emissions

By implementing the 11 actions, by 2030, GHG emission reductions of 2.7 TgCO2e (i.e. a 17% reduction compared to BAU levels) are expected. By 2050, reductions of 9.9 TgCO2e (i.e. a 29% reduction compared to BAU levels) are expected. Most of the GHG emission reductions will come from priority actions in the Energy Supply sector.

By 2050, GHG emission reductions from the priority actions are estimated to be approximately one-third of the reductions needed to meet the 2050 target (9.9 TgCO2e of the 30 TgCO2e needed). The priority actions will greatly slow the growth of GHG emissions over the next decade; however, they will not produce reductions large enough to meet the state's selected targets. To meet the 2050 target, the state will need to reduce GHG emission levels by about 0.12 TgCO2e/year by 2050.

After the expected implementation of the priority actions in 2050, the majority of emissions will remain in the Transport and Industry sectors.

Through this project, Quintana Roo has set ambitious and transformative decarbonisation targets, and the priority actions represent a major effort by the state to achieve them due to their significant levels of effort (target). To achieve the targets, an additional 5.9 TgCO2e emissions reduction will be needed by 2030 and an additional 20 TgCO2e emissions reduction by 2050.

Expected impacts on the magnitude of direct costs and savings

The implementation of more than half of the priority actions (8 out of 11) is expected to generate net savings over time. These net savings are also expected to be small in magnitude for most of these actions (7 out of 8) compared to expenditure levels in the baseline sectors. Only for the solar power generation action SE-1 is a significant saving estimated. Generally, this is because the savings that accrue over time are higher than the costs needed to implement an action.

It is important to note that the cost and savings analysis did not take into account the social cost of carbon, i.e. the avoided damage that each metric tonne of GHG caused to society due to the negative impacts of climate change. It also did not include the impacts of the services that newly established forest ecosystems and existing conserved forest ecosystems would provide (in addition to carbon dioxide removals).

Expected macroeconomic impacts

An assessment based on previous indicators and empirical models was carried out to determine the potential direction and magnitude of impacts on employment, income and growth economic drivers of the priority actions. The six indicators include: 1) Shifts in favour of technologies and practices with lower net implementation costs than in the BAU scenario; 2) Shifts in energy and natural resource expenditures; 3) Shifts in favour of local energy supply and other local resources; 4) Shifts in favour of local supply chains; 5) Shifts in favour of labour-intensive activities; and 6) Shifts in favour of external sources of investment and income.

The vast majority of the priority actions have positive indicators, meaning that they are likely to generate a positive macroeconomic impact for Quintana Roo's economy if implemented to capitalise on the key drivers of macroeconomic gain. However, it is important to keep in mind that the priority actions do not represent major deviations from economic growth patterns or show the potential for disruptive influence if one considers - as evidenced in the previous section - that the potential direct costs or savings are generally a small percentage of the level of expenditures of the associated sectors.

Conclusion

The eleven priority actions included in the pathway partially help the state to achieve its GHG reduction targets for 2030 and 2050. However, these actions position Quintana Roo very well to advance its decarbonisation process and achieve other important socio-economic objectives for the state. On the one hand, the state will have to identify the specific mechanisms to implement and finance the different actions of the to implement and finance the different actions in a way that can maximise their mitigation potential and socio-economic benefits. On the other hand, it will also be necessary to establish a system for monitoring, reporting, and verifying the impacts of implementing these actions.

The state can achieve the targets by increasing the ambition of priority actions and by identifying and developing additional actions in the economic sectors that are key drivers of emissions. Examples of some ways to increase emission reductions in the state would be to include energy efficiency actions in the RCI sector, on-site renewable energy actions in the industrial sector and, in the transport sector, focus on more fleet electrification and possibly add a biofuels action.

Additional information

In a folder attached to this report, all intermediate outputs of this project are included. Annexes I-VIII are the summaries of the sectoral baselines; Annex IX is the methodology used to develop the decarbonisation targets; Annex X includes the sectoral decarbonisation visions; Annex XI includes the sectoral catalogues of mitigation actions; Annex XII includes the definitions of the criteria used to prioritise actions in the MCA survey; Annexes XIII to XXIII are the design documents for each priority action included in the pathway; Annexes XXIV to XXXII are the Excel tools to calculate the baselines for the different sectors and the impacts of the actions on these sectors; and Annexes XXXIII to XXXV are the modules presenting the detailed methodologies of the impact assessments of the actions.