



Horizon to horizon

**A Pacific Island country guide to
creating long term climate resilience,
net zero emissions development and
a sustainable future.**



Founding partners Monash University
and The Myer Foundation

Why would Pacific Island countries develop a long term low emissions pathway?

All countries are economically, geographically and socially diverse, and many Pacific Island countries face unique challenges and vulnerabilities, resulting from a combination of factors such as having small, open economies, a narrow resource base, disadvantages in economies of scale, remoteness, high export concentration, high dependency on imports with high vulnerability to energy and food price shocks and speculation, and relatively high levels of national debt.

This diversity demands that countries chart their own path towards a desirable, prosperous and sustainable future - one where the leaders and people with most at stake are able to look from 'horizon to horizon', share knowledge and expertise, learn from others' experiences and build on this. A pathway will ensure long term planning informs near term decisions by considering the full implications - including both the opportunities and risks - of each alternative solution.

As the Barbados Declaration and the S.A.M.O.A Pathway state, there is "the need to achieve sustainable development by promoting sustained, inclusive and equitable economic growth". Pathways explore the opportunity to achieve this by enabling "individual governments to design policy responses to the climate challenge that are appropriate to their broader socio-economic objectives".

In addition to reasons outlined in "Why develop 2050 pathways?", there are specific advantages of low emissions development for Pacific Islands countries:

+ **HOLISTIC LONG TERM PLANNING:**

By undertaking mid-century planning across the key policy areas of mitigation, adaptation, climate resilience and sustainable development, countries can design and implement a pathway that considers the interactions, synergies and trade-offs of all its national priorities. This holistic planning approach supports achievement of an optimal development trajectory over the long term, and can guide short and medium term planning and goals (e.g. NDCs, National Adaptation Plans, national development plans, etc.), as well as improve alignment across these often separate planning processes. It can also provide a framework for increased cooperation between different ministries, and between government and civil society, and highlight opportunities for policy harmonisation.

+ **ENERGY SECURITY:**

Pacific Island countries (PICs) are highly dependent on imported fossil fuels to meet their energy needs. Such dependency can debilitate national budgets and revenues, impacting on key productive sectors in the region. By taking a long term view, pathways enable a country to make considered decisions on key infrastructure investments by comparing alternative solutions against their long-term implications, thus supporting a transition towards energy independence.

+ AVOIDING 'LOCK-IN' AND 'LOCK-OUT':

A mid-century pathway that includes an ambitious climate mitigation goal can inform short and medium term investment decisions, and help countries avoid stranding assets or locking in higher levels of emissions in long-lived infrastructure and assets. It can also ensure that key opportunities for achieving net zero emissions over the long term aren't 'locked out', for example by ensuring mangrove forests are protected to maintain carbon sinks that may be needed to achieve net zero.

+ RESILIENCE:

The Framework for Resilient Development in the Pacific (FRDP) notes that pursuing low carbon development will not only bring about energy security and resilient energy infrastructure, it will also increase the conservation of terrestrial and marine ecosystems. The Majuro Declaration makes clear the mitigation opportunities for the Pacific, outlining how the necessary energy revolution and economic transformation that will come with low-carbon development will provide the Pacific with an unprecedented opportunity to enhance their "security (as well as) protect and ensure sustainability of our natural resources and environment and... improve our people's health."

+ SHOWCASE POTENTIAL:

Pathways provide an opportunity to demonstrate leadership in inclusive, low carbon development. PICs can use the final product to build profile through increasingly visible regional centres such as the Pacific Centre for Renewable Energy and Energy Efficiency, and global island networks such as the AOSIS-led SIDS DOCK. Insights from the Pacific Islands can be applied to help other nations striving to accelerate low emissions development. Together, PICs could have significant impact in calling for greater climate ambition from the world's largest emitters. By voluntarily submitting pathways to the UNFCCC under Article 4.19 of the Paris Agreement, PICs can 'walk the talk' and demonstrate the social, environmental and economic wins, heightening the imperative for other countries to increase ambition.

+ ADAPTATION/MITIGATION CO-BENEFITS AND TRADE-OFFS:

Tackling adaptation and mitigation together can create "win-win" outcomes and efficiencies as both take a long term view to avoid locking in vulnerability and risk. Considering them in parallel also supports identification of potential trade-offs (where mitigation actions may undermine adaptation or resilience efforts), providing an opportunity to manage, minimise or avoid trade-offs which might not be identified if adaptation and mitigation planning remain separate processes. This is particularly important where adaptation and climate resilience are currently considered in the short and medium term only, such as through National Adaptation Planning.

+ PIPELINE OF PROJECTS:

Pathways can be used to highlight gaps and identify near-term priority actions for funding from the international donor community. From an aid donor's perspective, financing for climate change programs that also contribute to poverty reduction and development objectives can reduce the risk of fragmenting funding sources.

+ ECONOMIC RESILIENCE AND PLANNING:

Long term development and climate safe pathways can provide a framework to inform short and medium term economic management and development planning. By taking a holistic view, pathways can help to build economic resilience and foster new opportunities for economic growth and jobs creation, such as 'blue carbon' industries, renewables and energy efficiency.

A long term low emissions pathway will only be successful if it is supported by all key stakeholders in the process, and it delivers on multiple objectives. The result then can be transformative, not just for a country's economy and infrastructure, but for its sustainable development, energy systems, the health and wellbeing of its population and its participation in a global climate safe future.

Executive Summary

In addition to their Nationally Determined Contributions (NDCs), the Paris Agreement invited countries to submit long term low GHG emissions development strategies (LT-LEDS) by 2020. These strategies will provide countries with the opportunity to address three pressing and interrelated policy areas; ambitious GHG mitigation, adaptation and climate resilient development. For Pacific Island countries this is particularly relevant. Exposed to extreme weather events and significant climate impacts, many Pacific Island countries have small, open economies, a narrow resource base and the challenges of geographic remoteness. And so any workable Pacific pathway needs to deliver multiple solutions through a more holistic approach.

Ideally therefore, LT-LEDS should support Pacific Island country leaders in the development of an integrated strategy to design and implement a mid-century net zero or very low greenhouse gas emissions pathway that also supports poverty reduction, climate resilience and other sustainable development objectives.

This guide seeks to do just that. It presents an illustrative planning process that aims to support the achievement of mid-century ambitious climate action alongside other socio-economic goals. It is specifically tailored to Pacific Island country audiences, but is also informed by the experience of country teams involved in the Deep Decarbonization Pathway Project, a global collaborative seeking to demonstrate how developed and developing countries can all successfully transition to very low carbon economies, while maintaining economic growth and achieving other sustainable development outcomes. The guide is also designed to complement the [‘2050 Pathways: A Handbook’](#) and [‘Why develop 2050 pathways?’](#) fact sheet, both developed by the 2050 Pathways Platform.

The pathways process within this guide is designed to amplify and harmonise existing short and medium term planning effort, reduce reporting burden and outline a credible pathway to decarbonisation and economic prosperity. Some steps, for instance, will support policy makers to think through the synergies and trade-offs between mitigation and adaptation actions recommended in existing strategic plans (e.g. Master Energy Plans and National Adaptation Action Plans) over a longer time frame. Others outline a process to convene stakeholders from a range of economic sectors and establish national scenarios bringing together economic, climate resilience and sustainable development aspirations over different time horizons or levels of investment.

Ideally, pathways are intended to focus on a 2050 (or mid-century) time horizon, and a high ambition climate mitigation goal. This is key for moving climate action and socio-economic goals beyond the incremental to the transformative. It is also key to ensuring that short and medium targets and goals are consistent with long term ambition (for example, NDCs focus on 2025 or 2030 and NAPs typically focus on a five year time horizon), and for avoiding ‘lock-in’ and ‘lock-out’ of emissions reduction opportunities.

When coupled with strong national ownership, the development of an ambitious mid-century pathway can guide policy and investment decisions, sending long term market signals for entrepreneurs, investors and development partners to support your country to build comparative economic advantage in a rapidly decarbonising world. A pathway can also inform the NDC review process, identifying opportunities to increase ambition and importantly, highlighting risks of ‘lock-in’ and ‘lock-out’ (particularly in sectoral targets included in NDCs), as well as informing medium term climate adaptation and development planning.

THE 'FOUR PILLARS' OF EMISSIONS REDUCTIONS

Horizon to horizon draws specifically on the work of the Deep Decarbonization Pathways Project (DDPP), to ensure that all possible opportunities for reducing GHG emissions are considered across all sectors of the economy. In each sector, the pathways approach looks at four distinct types of actions or 'pillars' to reduce emissions. The first three pillars relate to energy supply and use; ambitious energy efficiency, shifting to zero

or low carbon electricity, and electrification and fuel switching (e.g. switching from fossil fuels to clean electricity in manufacturing processes, or shifting from diesel to biodiesel in transport). The fourth pillar identifies opportunities to reduce or sequester non-energy emissions from industry, waste, agriculture, forests and 'blue carbon' ecosystems, critical to achieving very low, net zero, or even negative emissions.

Figure 1: The four pillar approach recommended to support deep decarbonisation strategic planning



REDUCE ENERGY USE

Choose equipment and assets that use less energy and get more out of the energy that is used in areas such as buildings, manufacturing, transport and infrastructure.



SWITCH TO CLEANER FUELS

Once electricity is powered by clean energy, switch every energy-using activity you possibly can to electricity and everything else to low emissions alternatives (e.g. from diesel to biodiesel in transport).



PRODUCE CLEANER ELECTRICITY

Transition electricity generation away from imported fossil fuels to cleaner, locally produced low emissions sources such as solar, wind, hydro and bioenergy.



SORT OUT AND STORE THE REST

Reduce non-energy emissions like agriculture and refrigerant gases and capture and store remaining emissions through actions like restoring forests and blue-carbon ecosystems.

CO-BENEFITS

- + Ambitious energy efficiency across all sectors significantly reduces the energy intensity of the economy, boosting energy productivity and typically delivering financial and economic savings.
- + Shifting from fossil fuels to renewable electricity improves energy security, can reduce the cost of electricity, and can improve air quality and health outcomes.
- + Switching from fossil fuels to cleaner forms of energy (e.g. moving transport and manufacturing processes from diesel to electricity or - where potential for sustainable domestic biofuel production exists - biodiesel) can improve energy independence and can support the growth of local industries.
- + And addressing non-energy emissions can turn waste into energy, boost agricultural productivity and resilience, deliver biodiversity benefits, and create new opportunities for 'blue carbon' economies.

About this guide

Horizon to horizon outlines a step by step approach to support Pacific Island countries to realise your own pathway to a prosperous, equitable and sustainable net zero emissions future. It is the result of a detailed process of dialogue and exchange, building on extensive experience applying the internationally recognised Deep Decarbonization Pathways Project (DDPP) framework to design ambitious 2050 net zero pathways.

This has evolved into a pathway planning guide specifically relevant to government representatives and planning consultants in Pacific Island countries, through a number of key steps:

- + Between December 2017 and July 2018 in Suva, Fiji, a series of meetings were held with a range of national and regional government organisations and technical experts. These interviews were designed to develop a greater understanding of the unique challenges and opportunities and regional operating context for Pacific Island countries (PICs), as well as lessons from current planning efforts.
- + The interviews also examined the engagement preferences of different stakeholders, and captured learnings from knowledge exchange processes focused on building technical capacity and buy in to climate solutions or whole of economy planning.
- + Research also included collating and assessing existing guidance on the development of Low Emissions Development Strategies (LEDS). This encompassed capacity assessment approaches, and a broad range of Pacific frameworks and plans that are used to inform government decision-making and donor funding.

In tailoring this guide for Pacific Island countries, several practical, country specific case studies were identified and included to share real-world stories and build understanding through the learnings of others. These case studies document the experiences of Fiji in developing its high ambition 2050 strategy and the Republic of the Marshall Islands in developing its 2050 electricity roadmap.

- + The guide aims to reduce planning fatigue and harmonise existing policy and planning efforts, by drawing on existing frameworks and analysis that support scenario planning. These include the 'Framework for Resilient Development in the Pacific', the 'Pacific Climate Change Finance Assessment Framework' and the emerging 'Pacific NDC Hub'.

By taking the long view in co-designing, developing and implementing a pathway plan to 2050, you will be able to create shorter term check ins and measure progress against your country's Nationally Determined Contribution (NDC). Together, these climate actions are central to the UNFCCC's Paris Agreement goal of limiting global temperature rise to well below 2 degrees, and aiming for 1.5 degrees celsius above pre-industrial levels. At the individual country level, a long term pathway will allow the investments, policies, decision making and action essential for the success of this goal.

Many have helped bring this guide together, with the final result compiled and written by ClimateWorks Australia. We hope it will provide you with a helpful framework for decision making and action in designing, building and implementing your country's own long term pathway to a thriving, equitable, low emissions and resilient economy.

About the authors

ClimateWorks Australia is an expert, independent adviser, acting as a bridge between research and action to enable new approaches and solutions that accelerate the transition to net zero emissions for Australia and Asia Pacific.

It was co-founded in 2009 by The Myer Foundation and Monash University and works within the Monash Sustainable Development Institute.

ClimateWorks Australia also benefits from strong relationships with an international network of affiliated organisations that support effective policies, financing and action for greenhouse gas emissions reductions.

Since launch, ClimateWorks has made significant progress, engaging key decision makers from all tiers and sides of politics and business. Our collaborative, end-to-end approach to solutions that will deliver greatest impact is informed by a thorough understanding of the constraints of governments and the practical needs of business. This, combined with philanthropic funding and university ties, has earned the organisation an outstanding reputation as a genuine and impartial adviser.

In the pursuit of its mission, ClimateWorks looks for innovative opportunities to reduce emissions, analysing their potential then building an evidence-based case for action through a combination of robust research and analysis, clear and targeted engagement, and effective capacity strengthening. We support decision makers with tailored information and the tools they need, as well as work with key stakeholders to remove obstacles and help facilitate conditions that encourage and support the transition to a prosperous, net zero emissions future.

ACKNOWLEDGEMENTS

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This guide has been developed as a key resource for the 'Pacific 2050 Pathways Package' which was launched at COP 23 alongside the Fiji Presidency to support and build capacity within the Pacific Small Island Developing States to develop their respective strategy and enable them to carry forward the legacy of 'Majuro Declaration for Climate Leadership'.

We also acknowledge the insights shared by key stakeholders during development of this guide and the related 'Pacific Island Strategic Adaptation, Mitigation and Resilience Tool (SMART)', received through the stakeholder consultation process. In particular, Ministerial representatives from Fiji, technical consultants working with The Republic of the Marshall Islands, as well as technical experts within the Pacific Island Forum Secretariat, United Nations Development Program, Global Green Growth Institute, Secretariat of the Pacific Regional Environment Programme, Pacific Community (SPC), Pacific Island Development Forum, IDDRI, Climate Analytics, World Resources Institute and Griffith University.

Acronyms

AOSIS

Alliance of Small Island States

COP

Conference of the Parties

DDPP

Deep Decarbonization Pathways Project

GDP

Gross Domestic Product

GHG

Greenhouse Gas

IAP2

International Association for Public Participation

ICAT

Initiative for Climate Action Transparency

INDC

Intended Nationally Determined Contribution

LECRD

Low-Emissions Climate-Resilient Development

LEDS

Low Emissions Development Strategies

LT-LEDS

Long Term Low Emissions Development Strategies (add UNFCCC context)

LTS

Long Term Strategies

NAP

National Adaptation Plans

NDC

Nationally Determined Contribution (add UNFCCC context)

ODI

Overseas Development Institute

PIC

Pacific Island Country

PSIDS

Pacific Small Island Developing States

SDGs

Sustainable Development Goals

SIDS DOCK

Small Island Developing States Dock, an initiative to connect the energy sector in SIDS with the global market for finance, sustainable energy technologies and international carbon markets

UNFCCC

United Nations Framework Convention on Climate Change

A NOTE ON TERMINOLOGY:

A number of terms are used to describe the process of developing long term net zero or low emissions strategies. These include Long Term Strategies (LTS), Low Emissions Development Strategies (LEDS), Long Term Low Emissions Development Strategies (LT-LEDS), Deep Decarbonization Pathways (DDP), Low-Emission Climate-Resilient Development (LECRD), net zero and low carbon strategies. While all approaches consider actions to address climate change - often in parallel with socio-economic development outcomes - there are nuances to each approach.

Rather than be prescriptive, this guide outlines a best practice approach that draws on elements from a number of these approaches. As such, it uses the term 'pathways' as an all encompassing term to describe long term (mid-century or 2050), net zero or very low GHG emissions, climate resilient and sustainable development pathways that provide "an opportunity to explore long-term policy and technology options without the constraints of near-term inertia".

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How to use this guide

Specifically developed for use by Pacific Island countries, this step by step guide complements the '[2050 Pathways: A Handbook](#)' of the 2050 Pathways Platform, applying tools and resources created by the DDPP network and other LEDS approaches.

It communicates the rationale and usefulness of long term, low emissions development planning processes and provides a practical, step by step guide to building and implementing a country specific, long term pathway.

Horizon to horizon is intended to be utilised by government representatives and planning consultants. Each country's own leaders and key advisers will bring deep knowledge of the policies, plans and frameworks already in use nationally and regionally. The guide also incorporates the engagement interests and preferences of participants at the beginning of the process. All steps are iterative, and their output should be tested and reviewed by key stakeholders throughout the process.

The guide describes an eight step process that delivers a series of interlinked, consensus based outputs to guide policy development. The end-to-end format of the steps encourages Pacific leaders to collaborate with technical experts and develop a dashboard that quantifies the impact of mitigation actions on key indicators related to emissions, economic prosperity (such as GDP, jobs created, reduction in import dependency, energy security) and socio-economic outcomes (such as poverty alleviation, greater health and wellbeing, improved energy access, environmental services and adaptation/resilience).

USING THE GUIDE, PARTICIPANTS CAN:

1. Appoint a pathway team and a pathway Advisory Group
2. Understand stakeholder expectations
3. Assess your country's 'readiness' to develop a pathway
4. Establish a narrative to guide scenario development
5. Identify mitigation options with co-benefits for adaptation and other sustainable development outcomes
6. Iteratively test and socialise the scenario outputs
7. Evaluate and address policy, investment and capacity barriers; and finally
8. Develop an implementation action plan that also considers financing

Stakeholders, including government representatives and the pathway Advisory Group, are engaged at each step through an iterative process that is designed to build ownership and strengthen capacity.

Following the process outlined in this guide will deliver a pathway that helps identify mitigation actions which include adaptation and resilience co-benefits. Such a pathway will also support implementation action planning that strengthens capacity in key sectors, supports enabling policy and investment conditions, and delivers a project pipeline that can unlock scalable investment.

The Pathway Process

—
PATHWAY
PREPARATION

—
PATHWAY
DEVELOPMENT

—
PATHWAY
IMPLEMENTATION

1
BUILD THE
PATHWAYS TEAM

2
PLAN FOR
STAKEHOLDER
ENGAGEMENT

3
ASSESS
"READINESS"

4
SET THE
NARRATIVE

5
DEVELOP + ITERATE
SCENARIOS

6
SOCIALISE LONG
TERM PATHWAYS

7
ANALYSE BARRIERS +
IDENTIFY SOLUTIONS

8
DEVELOP AN
IMPLEMENTATION
PLAN

Designing your pathway

PRINCIPLES COMMON TO ALL PATHWAY PROCESSES

The subsequent sections of this guide outline an eight step process to develop a pathway, represented visually below. Across each step, several guiding principles can help ensure your pathway is relevant, practical and credible.

These include:

- + **Iterative stakeholder engagement**, to ensure pathway development follows a process that engages stakeholders throughout all aspects of the analysis, builds trust and consensus, and promotes robust discussion about findings.
- + **Socio-economic, adaptation, resilience and emissions objectives are considered side by side** as integral parts of the analysis. This can support informed decision making to optimise outcomes across multiple national objectives, highlight opportunities to harmonise policy and help reduce the reporting burden.
- + Ensuring that the **research questions, objectives and boundary considerations of the analysis** are clearly defined early in the process, and the analytical toolkit selected will best support these outcomes.
- + Starting with the desired end state and working backward to the present, or **'backcasting'**, in order that going forward, analysis is consistent with ambition.

Figure 2: The Pathway Process



While these steps are presented as an holistic process, it should be noted that each step is stand alone. Additionally, many can be reordered or undertaken at the same time, depending on local context, degree of similar work done previously or stakeholder interest.

For example, the narrative may be refined iteratively, informed by stakeholder engagement and scenario analysis.

Stakeholder engagement occurs throughout the process, rather than at a single step within the process. And the recruitment of your pathways team will be informed by the narrative and scenarios, which may require added expertise on top of what was initially envisioned.

While these steps are presented as an holistic process, it should be noted that each step is stand alone. Additionally, many can be reordered or undertaken at the same time, depending on local context, degree of similar work done previously or stakeholder interest.

STEP 01

Build the right pathways team

Ideally, the pathway process should be driven by strong national ownership. The pathways team may be comprised of experts and organisations from both inside and outside government.

Ultimately, establishing the right team is critical to the success of the pathway process and for each country, the criteria for selecting team members will be slightly different. Based on best practice approaches used in a number of long term strategy processes, your pathways team needs to have multidisciplinary experience, and understand both the modelling and scenario building process as well as the principles of good stakeholder engagement.

The selected members of your pathways team should all be familiar with the social norms, engagement and learning preferences of your national stakeholders, and be viewed as trusted and impartial experts. Pathways teams can be made up of any combination of analytical and engagement experts from government, academia, NGOs, consultancies, and other international or local organisations with relevant expertise. It matters less which organisation experts come from, and more that they bring the required expertise to contribute to the production of a high quality pathway that has been developed through a robust, consensus building approach.

KEY SKILLS THAT YOUR PATHWAYS TEAM SHOULD INCLUDE ARE:

- + **Mitigation modelling expertise**, including the ability to synthesise sectoral analyses into a whole of economy pathway optimised for key socio-economic outcomes. This expertise is often spread across multiple organisations.
- + **Stakeholder engagement expertise**, in particular the ability to engage and influence key decision makers. This includes familiarity with cultural sensitivities and expectations.
- + **Project management expertise**, to oversee delivery of a complex, multi-stakeholder project.
- + **Communications expertise**, to ensure the project's outputs engage and inspire decision-makers and civil society around a common goal.
- + **Implementation expertise**, to support deep understanding of, and practical solutions to, the policy, governance, financial and capacity barriers to implementation.

IN IDENTIFYING THE RIGHT MITIGATION MODELLING EXPERTISE TO INCLUDE IN YOUR PATHWAYS TEAM, THE FOLLOWING CONSIDERATIONS MAY PROVE USEFUL:

- + What domestic or regional organisations or groups have mitigation modelling expertise? Do they also have expertise in adaptation or resilience analysis or modelling, particularly in relation to long term planning?
- + Have domestic or regional teams used a deep decarbonisation framework or worked at the 'whole of economy' scale previously? Do they have the time and capacity to support the development of a pathway?
- + What other analytical, modelling or planning expertise exists in other priority areas of socio-economic development either domestically or in the region?
- + Are there skills gaps (e.g. in sectoral expertise or knowledge around emissions reduction), and how can these be addressed?



ADDITIONAL RESOURCES

- + The Islands Playbook has a [Project Skills Register](#) which can help to map the skills of those in your pathways team.
- + UNDP's [Low-Emission and Climate-Resilient Development Strategies: Multi-Stakeholder Decision-Making Guide](#) has a useful Terms of Reference - see Annex 6.



STEP 02

Plan stakeholder engagement

This step suggests tools and resources that can help your pathways team to identify key stakeholder groups that need to be considered in the pathway process. It will also help you establish processes on how and when to engage them. This will form the foundations for stakeholder engagement throughout the pathway process, and pathways teams should build stakeholder engagement into each step of the process.

MAINTAINING A TWO WAY PROCESS

The pathways development process engages stakeholders in the analysis and promotes sophisticated two-way communication of progress and results. Pathway analysis needs to start with careful scoping, to ensure the study asks the right research and policy questions from the outset, sets the right objectives and boundaries, and uses the right methods and analytical toolkits in order to answer them. Successful pathways should meet the criteria of clarity, relevance, practicality and credibility at each stage of study scoping, analysis, implementation, as well as in the communication and description of results.

Source: [2050 Pathways: A Handbook](#)

Ideally, your stakeholder engagement planning should identify the aspirations of stakeholder groups for the pathways process, and understand how these objectives align with national, international, donor or legal requirements as well as local communication preferences (see page 22, The Talanoa Dialogue).

The result should be an overview of the significance of each key stakeholder to the outcomes of the pathway process, and an outline of the approaches to, and level of, engagement for each stakeholder. This would draw on methods and approaches that are gender-sensitive and socio-culturally appropriate.

It should also seek to identify terminology and language that is understandable to all participants, drawing on local analogies where appropriate. And it will seek to integrate consultation with existing processes where possible, remaining aware of planning fatigue and workflow peaks in annual policy planning processes.

2.1 IDENTIFY AND MAP STAKEHOLDERS

This step establishes the criteria for identifying your stakeholders. These are the individuals or groups who need to be consulted throughout your pathway process, as well as anyone who will be directly/indirectly or positively/negatively affected by the pathway development process or its subsequent implementation.

This can be done by reviewing previous and current climate change and sustainable development policies and reports, by asking experts and decision makers directly and tracking announcements in local media.

Once your stakeholders are identified, a participatory process should identify their legitimate representatives.

The types of institutions to consider may include those departments or individuals with responsibility or alignment with climate policy objectives or socio-economic development outcomes in:

- + Central and line ministries
- + Sub-national governments
- + Private sector organisations (business and investors)
- + Civil society organisations
- + Academic and research organisations
- + Development partners and donors
- + Coordinating bodies and related working groups

This step also aims to detail a transparent and participatory process for understanding the interests, power and influence of different stakeholder groups, their stake in the pathways process, the extent to which they may be affected by pathway outcomes and their expectations of the process. This is an important activity to:

- + Understand the breadth and scope of relevant stakeholders, and determine the level of communication required throughout the pathway process.
- + Determine the influence of stakeholders over the desired outcome.
- + Determine the interests and concerns from stakeholder groups to inform the choice of indicators that will be presented in the dashboard for each scenario (explained in more detail in step 4.1).
- + Forecast areas where the strongest viewpoints are likely to emerge, and understand locally appropriate conflict resolution approaches.

The following stakeholder analysis template can support the collation and interpretation of this information, and provide recommendations to inform the stakeholder engagement strategy (the output of the next step).

The template should also be revisited during the final steps relating to implementation planning.



Table 1: Template for stakeholder analysis

STAKEHOLDER NAME	KEY INFLUENCER	INFLUENCE	SIGNIFICANCE	INTEREST	RELEVANT POLICIES OR POSITION STATEMENTS
	List any key individuals within stakeholder organisation, their role and brief description of their area of influence	How could this stakeholder influence the project's intended outcome (positively or negatively)?	How important is their influence (low, medium, high)?	What is important to this stakeholder?	What policies, strategies, or position statements has this stakeholder produced that are relevant to the pathway process?



ADDITIONAL RESOURCES

- + Island Playbook's '[Stakeholder Engagement Register](#)' is useful to record stakeholders and their role, interest and engagement in the transition.
- + ODI's '[ROMA: A guide to policy engagement and influence](#)' tool can be used to identify, engage and build coalitions among all parties who make or implement policy, and the intermediaries between them.

It may also be useful to map stakeholders according to their level of interest and impact on the pathways process. Doing so, your pathways team should be able to determine the level of consultation required to manage different stakeholder groups, and identify those needing to be managed closely and kept highly informed. An illustration of a stakeholder mapping matrix is provided in Figure 3. The four categories of engagement used in this approach are:

1. EMPOWER

Stakeholders with high interest in the pathway and high influence over its successful outcome are your project champions. The focus for engagement should be on equipping them with the information and resources needed to advocate on behalf of the pathway, and to ensure that their perspectives are reflected in the pathway narrative and outputs.

2. INVOLVE

Stakeholders with high interest in the pathway can provide knowledge, resources and capacity to support the pathway process.

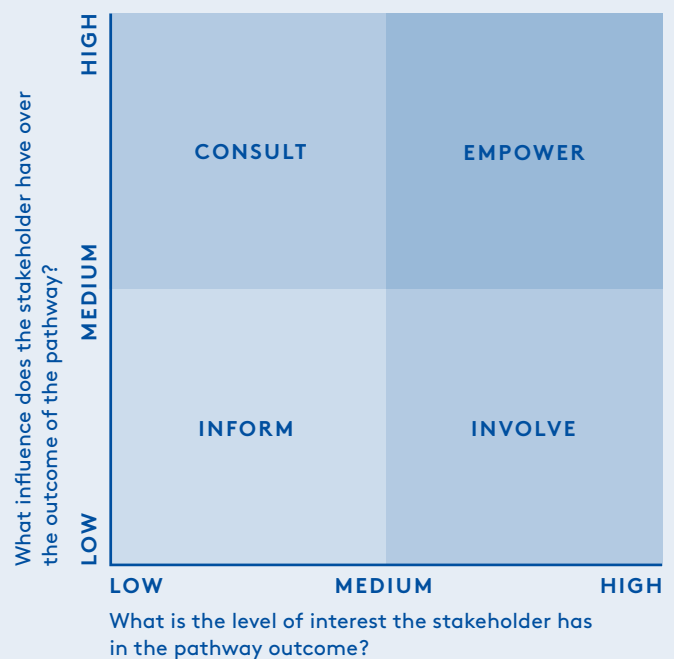
3. CONSULT

Stakeholders with high influence over the outcome of the pathway process should be regularly consulted to ensure their perspectives are reflected in the pathway narrative and outputs, and to build buy-in.

4. INFORM

Stakeholders with low influence and interest in the project should be kept informed on its progress. This can be light touch, for example through semi-regular email updates.

Figure 3: Stakeholder mapping matrix



ADDITIONAL RESOURCES

- + The Island Playbook has also developed a similar [Stakeholder Matrix](#) included in the Island Playbook's Stakeholder Engagement Register.
- + The Initiative for Climate Action Transparency (ICAT) has tailored a Stakeholder Participation Spectrum (Table 3.1) as part of their '[Stakeholder Participation Guidance](#)' for assessing GHG, sustainable development and transformational impacts.

2.2 DEVELOP A STAKEHOLDER ENGAGEMENT PLAN

This step builds on the information you will have collected through stakeholder analysis and mapping. By identifying the policy influencing, capacity strengthening and communications objectives for identified stakeholder groups, you can then decide a plan that will best achieve these objectives, considering the specific interests, concerns, engagement barriers and expectations of different stakeholders.

When determining the objectives for stakeholder engagement, your pathways team will need to identify outcomes that are realistic, measurable and informed by stakeholder preferences. Common examples include objectives related to building awareness, influencing attitudes, encouraging an action to support an issue or program, identifying change agents and advocates, overcoming opposing views, maintaining or facilitating dialogue and/or monitoring progress towards a successful outcome (in this case pathway development).

The strategies used to achieve these objectives are often multifaceted and informed by the degree of influence each stakeholder group has over the pathway process. For instance, your pathways team may consider including highly influential stakeholders in the Expert Advisory Panel (see Step 2.3), or proactively seeking opportunities to collaborate on new knowledge creation for mutual benefit. For less influential stakeholders, the pathway team may choose to share regular program updates or find opportunities to brief staff or members on selected program learnings, tailored to their identified interests.

Example activities used to engage different stakeholder groups are outlined below:

- + Invite to take on a program strategic role (INVOLVE)
- + Seek advice on areas within expertise (CONSULT)
- + Seek opportunities to present or brief staff or members on areas of key program learnings (EMPOWER)
- + Invite to join communities of practice or organisational working groups (INVOLVE)
- + Organise stakeholder roundtable events based on mutual interests to disseminate key messages (EMPOWER)
- + Author tailored outputs with high level key messages, e.g. policy briefs (INFORM)
- + Tailor business cases based on aligned objectives to mobilise stakeholder action (EMPOWER)

Another key component of this step will be to identify the learning and communication preferences and social customs that will best support inclusive stakeholder discussion and promote local ownership.

A stakeholder engagement plan can take many forms, and pathways teams may already have preferred approaches to developing these plans. If not, the table on the following page provides an illustration of a simple stakeholder engagement plan.

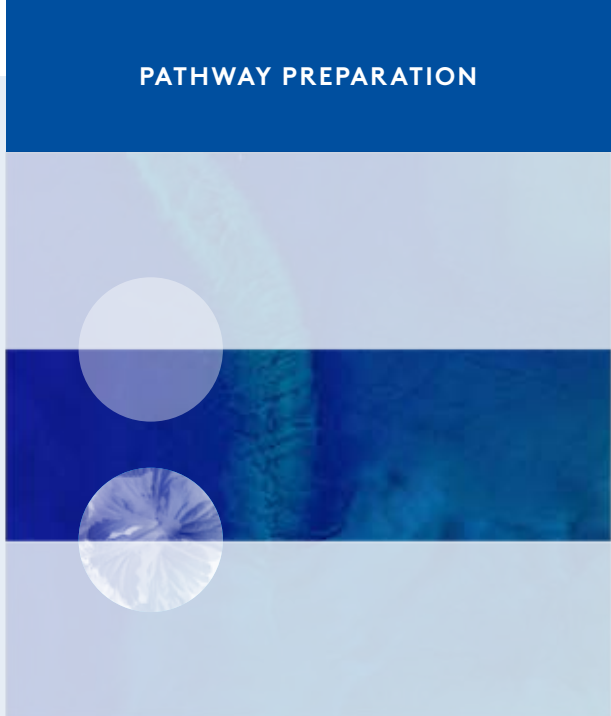


Table 2: Stakeholder engagement plan

	STAKEHOLDER 1	STAKEHOLDER 2	STAKEHOLDER 3	STAKEHOLDER 4
OBJECTIVES FOR ENGAGEMENT (e.g. data sharing, policy change, resourcing, awareness-raising, capacity strengthening)				
KEY MESSAGES (ie. How should you frame key messages about the pathways process to build buy-in from this stakeholder, based on their interests?)				
LEARNING AND COMMUNICATION PREFERENCES and social customs to be taken into consideration in engagement				
APPROACHES TO ENGAGEMENT (e.g. invite to Advisory Group, involve in expert review process, provide regular updates)				
BARRIERS TO ENGAGEMENT (e.g. lack of interest, time constraints, political affiliation)				



ADDITIONAL RESOURCES

- + ODI’s ‘ROMA: A guide to policy engagement and influence’ outlines a step by step process to build a stakeholder engagement strategy.
- + DFID’s ‘Tools for Development’ (Chapter 2. Stakeholder Analysis - details a comprehensive approach to stakeholder analysis).



The Talanoa Dialogue

Under Fiji's UNFCCC Presidency of COP 23, the launch of the Talanoa Dialogue as a facilitative dialogue approach provided an ideal platform for government and relevant decision makers, business, civil society and technical experts to share their visions, priorities and challenges.

The Dialogue design also provided an enabling space to build ownership, understanding and transparency. Such a process can inform the development of pathways by discussing alternative futures, and helping to formulate research and policy questions that will guide the scenario planning.

“The purpose of Talanoa is to share stories, build empathy and to make wise decisions for the collective good. The process of Talanoa involves the sharing of ideas, skills and experience through storytelling.

During the process, participants build trust and advance knowledge through empathy and understanding. Blaming others and making critical observations are inconsistent with building mutual trust and respect, and therefore inconsistent with the Talanoa concept. Talanoa fosters stability and inclusiveness in dialogue, by creating a safe space that embraces mutual respect for a platform for decision making for a greater good.”

Source: UNFCCC 2018 Talanoa Dialogue Platform

2.3 ESTABLISH A MULTI-STAKEHOLDER ADVISORY PANEL

This step is crucial to building trust and credibility in your pathway planning process. Through stakeholder engagement planning (Step 2.2), your pathways team will have identified locally credible decision makers, leaders and experts to take part in an expert Advisory Panel or reference committee to support the pathway process.

Establishing a diverse group of stakeholders is crucial to ensuring equitable and true representation. This is because each individual will bring with them “pre-existing cultural and social beliefs about the roles, functions, responsibilities and social standing of different groups within societies”. It’s a step which is foundational to many processes, including the Framework for Resilient Development in the Pacific (FRDP).

Advisory Panel members will need to be thoroughly consulted throughout the development of narratives and scenarios. It is expected they will evaluate findings and assumptions against their practical, real world knowledge and observations, build community credibility and act as champions for your pathways development, through public, private and civil society sectors.

It is important to ensure the Advisory Panel represents the ‘right mix’ of decision makers and technical experts - from domestic government and non-government organisations, and draws on regional expertise as required. It is also essential to confirm in advance that they can commit adequate time to participating in regular consultation over an extended period (as a pathway process can take between six months and two years to complete, depending on the capacity of the pathways team, the level of granularity of the analysis, and the degree of stakeholder consultation).

In countries where relevant working groups are already in operation, it may be feasible to draw on their expertise and invite some or all members of these groups to support the pathway development process. Technical and modelling experts often consult across multiple countries, so it is recommended to get advice from the regional technical expert agencies, many of which are listed on the next page.



MANAGING STAKEHOLDER RISK

Once the pathway team has determined the makeup of its expert Advisory Panel, a risk and issues analysis should be completed for the Group in order to guide management of any risks identified. Typical risks and issues in a group environment can include:

- + Limited capacity of participants
- + Unrealistic or mismatched expectations
- + Stakeholder tensions
- + Power imbalances amongst participants
- + Power struggles amongst participants
- + Possible current or future conflicts of interest
- + Inability to obtain agreement/consensus
- + Political imperatives, and
- + Unwillingness to contribute solutions

Table 3: Regional and international technical expertise on climate action

<p>ORGANISATIONS AND TECHNICAL PROVIDERS</p> <ul style="list-style-type: none"> + The Secretariat of the Pacific Regional Environment Programme (SPREP) + Pacific Community (SPC) + Pacific Island Development Forum (PIDF) + Pacific Island Forum Secretariat (PIFS) + Global Green Growth Institute (GGGI) + United Nations Development Program (UNDP) + United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) + International Union for Conservation of Nature-Oceania (IUCN) + ClimateWorks Australia + Climate Analytics + World Resources Institute + Global Green Growth Institute + University of the South Pacific (USP) + Food and Agriculture Organisation (FAO) + National statistics offices or bureaus 	<p>NETWORKS</p> <ul style="list-style-type: none"> + Pacific Resilience Partnership + Regional Pacific NDC Dialogue + Regional Pacific NDC Hub + The Sustainable Energy Industry Association of the Pacific Islands + The Low-Carbon Working Group under the Framework for Resilient Development in the Pacific (FRDP) + Climate Action Network (PICAN) + Pacific Climate Change Portal + Pacific Islands Association of Non-Government Organisations (PIANGO) + Regional Pacific NDC Dialogue + Regional Pacific NDC Hub + Pacific Resilience Partnership + Pacific SDG Task Force
<p>DONORS</p> <ul style="list-style-type: none"> + Asian Development Bank (ADB) + World Bank + Green Climate Fund (GCF) + Australia (DFAT) + New Zealand (MFAT) + European Commission + Japan (JICA) + Korea (KOICA) + Germany (GIZ) + French Development Agency (AFD) + US (USAID) 	<p>PRIVATE SECTOR</p> <ul style="list-style-type: none"> + Pacific Islands Private Sector Organisation (PIPSO) + Pacific Power Association (PPA) + Pacific Cooperation Foundation + Pacific Islands Trade and Invest + Business councils e.g. NZ Tonga Business Council and Australia-Pacific Business Council + Banking e.g. Bank South Pacific, Westpac and ANZ + Domestic and inter-island transport services + Agriculture & Fisheries e.g. Forum Fisheries Agency

Once members are appointed to the Advisory Panel, you can use the following sub-steps to determine the group's terms of reference and establish the panel:

- + Define the objectives and scope of the Advisory Panel.
- + Define operational and organisational structure, roles and responsibilities, and budget.
- + Define steps, methods, work plan and timetable.
- + Present multi-stakeholder process to key stakeholders, partners and actors in country.
- + If the panel is large, consider establishing sector working groups e.g. energy, transport and waste.

CASE STUDY

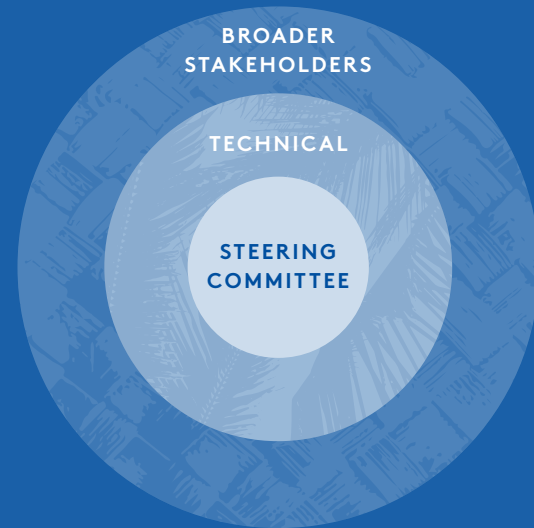
FIJI'S LONG TERM LOW EMISSIONS DEVELOPMENT STRATEGY

In 2018 following on from the development and launch of their NDC Roadmap, the Fijian Government decided to undertake a Long Term Low Emissions Development Strategy (LT-LEDS) planning process with technical assistance from the Global Green Growth Institute (GGGI). It will be one of the first LT-LEDS for a Pacific country and only the fourth for a developing country. The overall aim of developing Fiji's LT-LEDS is to enhance the Fijian Government's ability to plan for decarbonisation of its economy by providing a framework and a pathway for a progressive revision and enhancement of targets under its NDC to reduce CO₂ emissions to 2030 and beyond.

As part of this, the Ministry of Economy Climate Change Division (CCD) established a governance mechanism to support the process:

- + **STEERING COMMITTEE:** Which includes 14 government ministries and agencies. The Steering Committee met on 28th March 2018 to agree that a National Stakeholder workshop should be one of the first steps in the LT-LEDS process.
- + **TECHNICAL:** For each sector one to two consultants have been engaged to lead in their area of expertise. Their role is to help set the vision for their sector, undertake the modelling and coordinate engagement with broader stakeholders. Sectors were: Electricity, Land Transport, Maritime Transport, Agriculture, Forestry, Waste, Blue Carbon & Wetlands and Tourism & Industry.
- + **BROADER STAKEHOLDERS:** This includes sector-specific individuals from private sectors, civil society, sub-national government, development partners and academia.

At the time of publication, Fiji was still in the process of developing its LT-LEDS. Any examples used in this guide reflect this.



ADDITIONAL RESOURCES

- + UNDP's [LECRDS 1.0 'Multi-stakeholder Decision-Making Guide'](#) provides guidance on the benefits of a multi-stakeholder engagement process.
- + OECD's ['LEDS Technical, Institutional and Policy Lessons'](#) report provides a schematic for setting up the institutional arrangements.



It is important to ensure the Advisory Group represents the 'right mix' of decision makers and technical experts - from domestic government and non-government organisations, and draws on regional expertise as required.

STEP 03

Assess readiness for pathway development

3.1 CREATE A READINESS ASSESSMENT FRAMEWORK

In order to design a pathway, your team needs to consider local operational and policy context and capacity. To do this, a number of key areas need to be explored (outlined in Table 4 below). This will help you assess your country's readiness to design and implement a pathway and make informed decisions about:

- + How to engage with and strengthen the capacity of national institutions (referring to the practices, governance structures, donors and social norms that support a country's progress towards NDC implementation and its climate change goals). Your pathway team should be able to determine the compatibility of institutions with policy objectives and identify gaps in technical, financial and human capacity.
- + Ensure that your pathway considers and builds on existing national and regional policy and plans developed to guide a country's energy security, sector roadmaps, climate change adaptation and resilience, NDC implementation and sustainable development objectives.

- + Determine the quality of existing data sources and modelling capability, by reviewing data sources, identifying gaps and evaluating models used previously to support national or sectoral based strategic planning.

In many Pacific Island countries, these types of assessments already exist and are publicly available. The Pacific Climate Change Finance Assessment Framework (PCCAF) provides an example of a similar assessment you may wish to use, to adequately inform this step and save significant time and resourcing.




PCCAFs have now been undertaken in seven Pacific Island countries - Fiji, Vanuatu, Kiribati, Tonga, the Republic of Marshall Islands, Solomon Islands and Tuvalu - with others in the pipeline. All have been nationally endorsed and are publicly available to guide NDCs, unlock climate finance and support climate change adaptation planning.

Recognising that many Pacific leaders feel overburdened with reporting efforts, recent attempts have been made by the Pacific Sustainable Development Taskforce to harmonise policy and planning instruments, and identify common objectives and data that can be used for a number of purposes including pathway development.

The following table can support your pathways team to map the institutional and policy context in which they will be developing their pathways. It can also be used to guide how you choose to approach modelling, based on the plans, data and tools already in use.

Using it, your pathway team can also identify the strengths and gaps of current institutions responsible for climate policy, in order to inform the barriers assessment (Step 7) and the development of an implementation plan (Step 8).

Table 4: Guiding matrix for assessing national 'readiness' to engage with pathway planning

CRITERIA	GUIDING QUESTIONS
 <p>POLICIES AND PLANS</p>	<ul style="list-style-type: none"> + What sectoral and national plans exist to guide current climate mitigation, adaptation and resilience action (e.g. NDCs, energy master plans, transport roadmaps, land use plans, etc.)? + What national plans or analysis have been developed to inform national strategic planning for socio-economic development and SDG planning (e.g. national development plans, SDG roadmaps, sector plans, etc.)? + What coverage does each have (national, subnational), and over what time period? + What studies or modelling was done to inform these? What is their source data? Can this modelling or data be accessed for the pathway? + Who developed each plan? Should they be on the Expert Review Committee or included in a sense check or peer review process? + For each plan, are there lessons or outputs from the consultation process that can be used to inform stakeholder engagement for the pathway? + What action plans have been developed to guide implementation of these policies? Are they working? Are there gaps? + When are the optimal timing windows for informing national or sector based strategic planning or policy review?
 <p>INSTITUTIONS</p>	<ul style="list-style-type: none"> + Are roles and responsibilities clearly delineated between government departments, and between government and non-government institutions? + Have formal cross-ministry mechanisms been established in key policy areas? + Does effective informal cooperation occur in these policy areas between government and non-government institutions?
 <p>CAPACITY AND HUMAN RESOURCES</p>	<ul style="list-style-type: none"> + Are institutional structures compatible with the objectives of existing policies and plans? + Are there gaps and bottlenecks in existing institutional structures? + Does each have sufficient technical, financial and human capacity to undertake their responsibilities? + What support is provided to strengthen institutional capacities? + Where are there key gaps?

3.2 MAP AND REVIEW PREVIOUSLY USED MODELS AND ANALYTICAL APPROACHES

A review of analytical approaches and modelling tools previously used in your country or region should be undertaken to determine whether these could be adapted for your pathways process. To decide whether existing modelling tools can or should be included in your pathway development, ask:

- + Does the modelling tool allow for analysis of the potential for reducing emissions across one or more of the four pillars? If not, can it be adapted to do this?
- + Does the modelling tool allow for comparison of other socio-economic or sustainable development priorities?
- + Can the modelling tool provide detail on the technology actions needed, and the feasibility of those actions in light of other priorities?



ADDITIONAL RESOURCES

- + 'Improving deep decarbonization modelling capacity for developed and developing country contexts' (Pye & Bataille, 2016) outlines a conceptual decision framework to support developing countries to undertake deep decarbonisation analysis.
- + 'Checklist on Establishing Post-2020 Emission Pathways' (World Bank, 2015) presents a "checklist" designed to support countries in the development and presentation of medium and long term low emissions pathways.

MODELLING APPROACHES TO DEVELOP LONG TERM PATHWAYS

DDPP country teams used a wide variety of modelling approaches to develop their 2050 pathways. This partly reflects previous work in each country, and the different methods required to perform the analyses, as required for different pathways narratives.

Teams used (or developed their own) energy system models, macroeconomic models, integrated assessment models, and land use models to investigate various national priorities in their pathways.

Source: [2050 Pathways: A Handbook](#)

A range of modelling tools can be used to support your pathways development, or complement existing modelling. A high level overview of different model types is outlined below, along with the key strengths and weaknesses of each approach.

Note that pathways are not often developed using only one model. Most country approaches build on existing modelling at a sectoral level,

and may also require the creation of a 'whole of economy' model to synthesise sectoral analyses and understand the broader socio-economic impacts of different pathways scenarios. However, for PICs with limited existing sectoral modelling, a simple GHG model such as LEAP or DDP may be sufficient to develop a pathway that can inform climate policy and ambition.

APPROACH	EXAMPLES	STRENGTHS	WEAKNESSES
EXCEL BASED CALCULATORS	DDPP	<ul style="list-style-type: none"> + Transparent calculations + Easy to use and understand + Flexible + Can be tailored to country needs + Good option where energy or GHG mitigation modelling has not previously been undertaken, or is very limited 	<ul style="list-style-type: none"> + Can't calculate secondary economic impacts of change + Dependent on static assumptions + Model doesn't capture whole of economy transformation
ACCOUNTING FRAMEWORKS	LEAP CLEER	<ul style="list-style-type: none"> + Extensively used, including in PICs + Designed for integrated energy planning and GHG mitigation analysis + Low initial data required + Easy to use + Can support different modelling approaches (top down, bottom up) 	<ul style="list-style-type: none"> + Mostly supports energy system modelling (although new land use feature recently added to LEAP) + Unable to deal with complexity + Cannot identify development benefits
OPTIMISATION MODELS	TIMES	<ul style="list-style-type: none"> + Works well with backcasting modelling approaches + Useful for identifying the optimal combination of mitigation actions and policy interventions 	<ul style="list-style-type: none"> + Assumes perfect market competition, therefore not well suited to simulating how systems behave in the real world + Not well suited to examining policy options that go beyond technology choice (e.g. behaviour change) + Relatively complex and data intensive
COMPUTABLE GENERAL EQUILIBRIUM MODELS (CGE)	GTAP_E GEM-E3 ORANI-G	<ul style="list-style-type: none"> + Grounded in economic theory, has potential to capture wide set of economic impacts + Popular methodology for mitigation purposes + Useful where time series data is scarce and can be replaced by strongly tested assumptions + Can be both static and dynamic 	<ul style="list-style-type: none"> + Requires significant data inputs + Time intensive + Relies on traditional approach to economics which may not be applicable in developing country contexts + Assumes current economic structure is static over time + Doesn't assess of the positive spillovers from 'deep carbon reduction'

3.3 ASSESS DATA QUALITY AND GAPS

Gather key information or data you need to develop your pathway. This includes:

- + Historical data for your country (emissions, energy supply and demand by sector, and economic indicators such as population growth trends, GDP, etc.)
- + Future projections (energy supply and demand by sector under BAU, emissions and economic projections which are modelled based on reasonable assumptions of population growth, productivity, commodity prices, etc.)
- + Mitigation potential - modelling of the mitigation solutions that underpin the pathway, which requires reasonable assumptions on the costs and potential limitations of uptake across the economy (including learning rates, adoption curves, etc.)



It is essential that the data you use is credible, comprehensive, recent and robust. When collating and assessing data sources, it can therefore be useful to ask these questions:

- + Based on the national and sectoral plans, analysis and policies identified previously, are robust data series available for each sector and/or at a whole of economy level?
- + Has there been a recent GHG inventory? How credible/recent/transparent is the data?
- + How willing are stakeholders (government, private, civil society) to share their data?
- + What are key data gaps and how will they be addressed?
- + What are the key issues for accessing existing data?
- + What are the main uncertainties identified in previous data analysis? What are the implications for this analysis and how can these be overcome?

KEY CONSIDERATIONS FOR SOURCING AND VALIDATING DATA

Data on emission projections, mitigation potential and costs are not always readily available, and can be a particular challenge for developing countries. Greenhouse Gas Inventories undertaken as part of the UNFCCC National Communications are useful sources but should be tested against other, high quality data sources. It should be noted, however, that much can be done in developing a long term

strategy even where good data doesn't exist today, by 'backcasting' from a clear vision of the climate and socio-economic goals the country aims to achieve by 2050. This in turn can inform where to focus on improving data quality going forward, in order to support achievement of these goals.

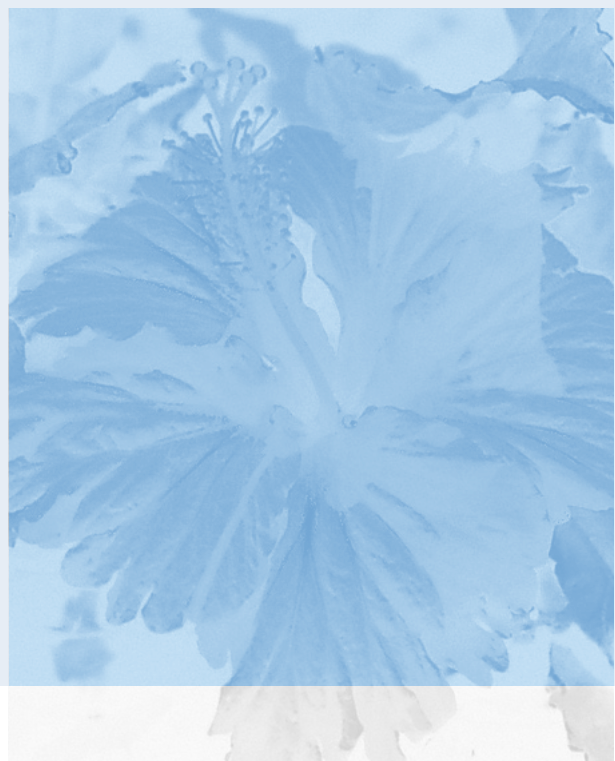
FURTHER SUGGESTIONS:

- + It may require collaboration between national and international data specialists. Academic institutions should be a key source of technical input when undertaking a pathways process and, where needed, should be mentored throughout the approach to build institutional capacity.
- + Call on the pathways Advisory Group and sector technical experts to sense check and validate the quality of the data, as well as expertise in other country teams who have already undertaken their pathways. Domestic working groups, particularly in organisations with Accredited Entity status for access to multilateral climate finance, can also be useful resources for this.
- + Data on mitigation potential and costs can be particularly subject to political influence. Thus, gaining consensus among government ministries on a baseline projection or cost information can be a challenge. Working with ministries to set the narrative, design a 'dashboard' and plan scenarios (see Step 4 below) can help to accommodate this.
- + Estimations of data such as emissions projections, mitigation potential and costs, are predicting future trends and so are inherently uncertain. When possible use a range of projections across a variety of sources to help inform the pathways process.
- + Poor data can hinder a government's ability to make informed decisions on the priorities for climate change mitigation, however there may be lessons that can be shared and learnt between countries. Consider reaching out to other Pacific Island countries that have undertaken similar processes to see how they overcame these challenges.

SOURCES FOR DATA IN THE PACIFIC

In addition to data that underpins the plans, policies and models previously reviewed, key regional or country specific data sources can be found via these links:

- + [Individual country GHG inventories via National Communications submissions to the UNFCCC](#)
- + [Pacific Regional Data Repository](#)
- + [PRISM - Pacific statistics](#)
- + [National Minimum Development Indicators](#)
- + [World Bank's Data for PSIDS](#)
- + [IRENA's 'Pacific Lighthouses: Renewable Energy Roadmaps for Islands' and 'Renewable Energy Country Profiles for the Pacific'](#)
- + [Pacific Climate Change Science](#)
- + [Pacific Climate Change Portal](#)




STEP 04

Set the narrative

'Narrative' in this context, is the story that describes your transition to a mid-century low carbon future that meets your socio-economic goals. It can also be called your 'vision'. The narrative for each Pacific Island country will be unique, building on specific national circumstances and potential future opportunities in infrastructure, natural resources, technology availability, financial capacity and climate vulnerability, as well as priorities in socio-economic development.

The narrative is best developed through a facilitated consensus building, multi-stakeholder process. By guiding the construction of a shared narrative to describe a low carbon, sustainable future, a common desired end point is envisioned, which will directly inform the research question formulation and scenario development undertaken by your pathways team in later steps.



Typically, a pathway narrative is developed by bringing together key stakeholders to create a shared perspective of how their country should achieve low emissions development. The narrative will guide the creation of a 'dashboard' (see Step 4.1) and formulation of the questions that will guide scenario development (see Step 5).

In the Pacific, many countries have already demonstrated high climate ambition and net zero emissions leadership. This is encouraging many other countries to account for their 'fair share' of the finite global carbon budget and their contribution towards the global goal of remaining 'well below' 2 degrees and aiming for 1.5 degrees. Consensus around this level of ambition, and agreement on other socio-economic goals that need to be achieved in parallel, are therefore the cornerstones of a pathways narrative. These two elements are described below:

- 1. NATIONAL SOCIO-ECONOMIC PRIORITIES:** For Pacific Islands this could specifically link to key Sustainable Development Goals, or include clear objectives within broader socio-economic goals such as resilience and climate adaptation, energy security, economic growth and poverty reduction.
- 2. A CLEAR MITIGATION GOAL:** Ideally, net zero emissions or near zero emissions. The experience of others working with a high ambition goal shows that it transforms thinking and inspires the identification of new opportunities, technologies and industries that can catalyse greater emissions reductions, and may also be new drivers of economic growth.

A narrative is usually described at a whole of economy level, creating a vision for national progress over time. However, as the case study on setting the vision for Fiji's Low Emissions Development Strategy shows, visions can also be described at a sectoral level.

CASE STUDY

SETTING THE VISION FOR FIJI'S LOW EMISSIONS DEVELOPMENT STRATEGY

During the First National Stakeholder Workshop, participants broke into sector-based groups to discuss their narratives, or vision, during a two hour session. The following is a summary of this exercise:

- 1. BRAINSTORM DEEP DECARBONISATION:** Participants shared their individual perceptions of deep decarbonisation in the context of sustainable development.
- 2. VISION:** Participants discussed and drafted a vision for their sector.
- 3. BREAKING DOWN THE VISION:** Participants then identified four or more achievable 2050 emission reduction targets for their sector.
- 4. BARRIER/SOLUTIONS BRAINSTORM:** Groups mapped the biggest barriers to achieving the targets and objectives they had identified.



Participants of the Electricity group discuss and set their Vision at Fiji's First National Stakeholder Workshop.

Once your pathway narrative has been developed, it's important to revisit the modelling tools and team capabilities (Step 3.2 and Step 1 respectively) to ensure that these are best suited to the task set out in the narrative. The narrative will also help formulate the key research questions that the modelling will need to address.



ADDITIONAL RESOURCES

- + The Island Playbook's '[Phase 1: Setting the Vision](#)'
- + Social Transformation Project's '[Visioning Toolkit](#)'
- + DFID's '[Tools for Development](#)' (Chapter 4. Visioning)
- + [Participatory Methods \(2007\)](#), '[Visualisation in Participatory Programmes: how to facilitate and visualise participatory group processes](#)'

4.1 DEVELOP A DASHBOARD

The success of the pathways process is dependent on ensuring consistent and structured modelling assumptions and outputs across the modelling team, for example, when several sectoral exercises take place in parallel. This ensures key assumptions and outputs are standardised where the modelling effort is split across multiple teams. A useful tool to achieve these goals is a 'dashboard'.

Dashboards also act as a key tool for stakeholder engagement and communication. Driven by standardised data tables that produce simple graphs, they can easily communicate change over time in key 'indicators' of progress - emissions and socio-economic outcomes - under different scenarios.

Commonly used dashboard indicators include:

- + Economy-wide indicators (population, GDP, job creation)
- + Energy demand by sector (which can highlight opportunity for efficiency improvements in key sectors)
- + Energy supply by fuel type (which can show potential improvements in energy security)
- + Changes in land use and their associated emissions over time (which can support identification of non-energy emissions growth, and indicate where the risk of 'lock-out' may exist)

Although dashboards are not meant to be the only communication tool used in pathways analysis, they can provide invaluable communications support across areas ranging from funder reporting to stakeholder engagement.

The common understanding derived from creating and using dashboards can also support many of the benefits of the pathways process, such as mutual support on policy and sharing best practices. They can also be useful to the process to set common assumptions on key indicators (e.g. GDP, population growth) and to report on dimensions that will matter to key stakeholders (e.g. How is poverty reduced? Will mobility be improved? Will it deliver jobs growth?).

Dashboards assist with technical interactions among modelling teams, and provide comparable outputs under a range of scenarios. This enables outputs from the different models used to be easily compared and, based on new information and learnings from this comparison, to be iterated. This iterative process is key to the achievement of ambitious 2050 targets, by allowing for a shared understanding of which scenarios deliver the best outcomes across both climate and socio-economic indicators, and where further effort is needed to ensure all key outcomes are achieved.

They can also reflect the different national social and economic priorities of different national pathways, as seen in the South Africa case study (see next page). For the DDPP exercise, South Africa modelled impact on poverty alleviation and jobs growth, India's national pathway modelled energy access and air pollution, whereas Russia modelled energy diversification and economic resilience. Finally, if desired, dashboards can enable comparison of results between countries. This may be particularly important to Pacific Island countries, where achieving some goals - such as energy security - may be better facilitated through a regional approach.

DASHBOARDS AS COMMUNICATION TOOLS FOR POLICY MAKERS

Dashboards are a key communication tool for a non-technical audience. Because they can produce simple graphs that show changes in key metrics along a timeline to mid-century, stakeholders can easily understand and compare the impact and outcomes of different scenarios.

CASE STUDY

REDUCING EMISSIONS, UNEMPLOYMENT AND POVERTY IN SOUTH AFRICA

The two graphs at right provide examples of dashboard outputs from the deep decarbonisation pathway for South Africa. Given South Africa’s high level of unemployment and high rate of poverty, the team wanted to understand how ambitious emissions reductions could reduce unemployment and poverty. As the graphs illustrate, both scenarios achieved similar levels of emissions reductions, and similar levels of poverty reduction, however the scenario in the top (line) graph, which focused on low skilled job creation, created a better outcome in reducing unemployment. The scenario in the second (bar) graph focused on stimulating the creation of a highly skilled workforce, which required improving education outcomes in early childhood years to achieve a highly skilled workforce in the long term.

This pathway provided several key insights for South Africa’s policy makers. First, there isn’t a choice to be made between reducing unemployment and poverty OR reducing carbon emissions. The South Africa pathway clearly demonstrates that the two can be achieved in parallel, and in fact that reducing emissions can help create new jobs. Second, it suggests a policy trade-off may be required between rapid low skilled job creation, or the creation of a highly skilled workforce more likely to drive sustained economic growth over the long term.

Figure 4: Labour force participation rate over time and unemployment rate over time as calculated from the quantity of labour demanded in the e-SAGE CGE model

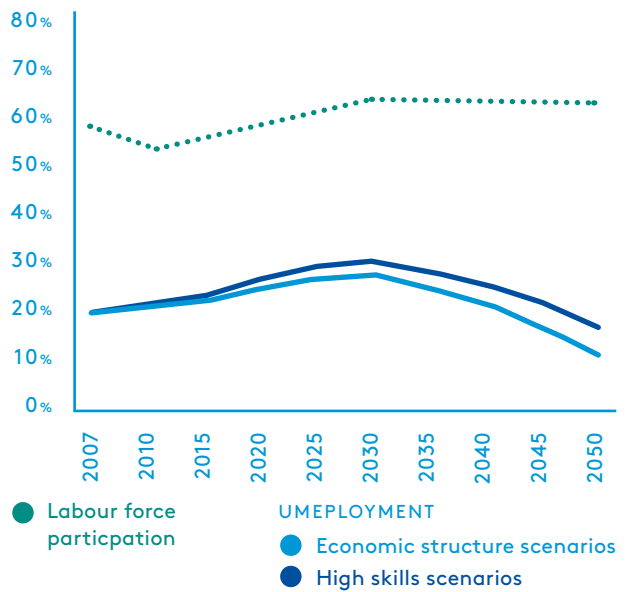
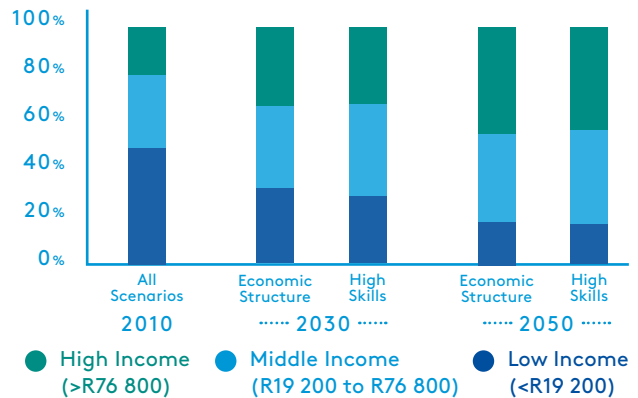


Figure 5: The percentage of the population in the low, middle and high income groups as defined by SATIM



Source: Pathways to Deep Decarbonisation in South Africa

SENSE CHECKING WITH STAKEHOLDERS

Proposed indicators should be tested with the Advisory Panel and also with key stakeholders such as policy makers to ensure they address the research questions identified in Step 4: Set the narrative.

This will provide an opportunity for you to sense check and revise the research questions that will guide analysis before it begins, while also ensuring the pathway will be informative and useful to key decision makers.

4.2 DETERMINE AN APPROACH TO PLANNING SCENARIOS

The scenario planning process establishes the guidance needed for modelling teams and stakeholders to effectively participate and work together throughout the modelling process. During the planning process, your pathways teams need to agree on:

- + Modelling structure
- + Process for harmonisation across the modelling (ensuring interactions are captured between sectors)
- + Decision making criteria to guide the logging of assumptions (and testing with stakeholders)
- + Review process

In general, the approach to developing the scenarios should be consistent with the narrative set out in Step 4 above. For example, if the narrative defines a net zero emissions target by 2050, the decision making criteria and subsequent assumptions underpinning the model will need to ensure that adequate ambition is built into the pathway. Similarly, if there are multiple economic and societal goals that the pathway seeks to achieve, an appropriate process for evaluating trade-offs will need to be agreed in advance.

As this is one of the most technically challenging steps in the pathways process, care should be taken to ensure expert support and input. Depending on the context, a number of pathway scenarios may be developed, however at minimum, any pathway design needs to include a mitigation/high ambition scenario.

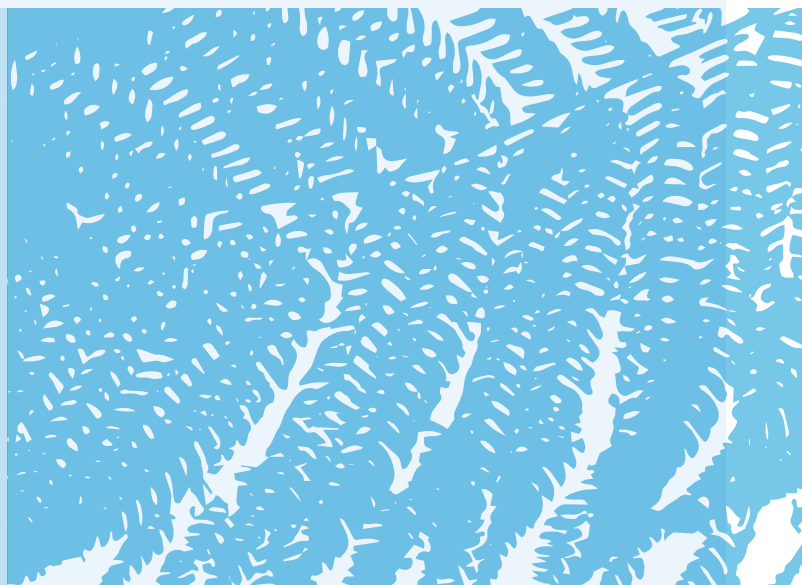
Where countries are looking to address key socio-economic goals alongside emissions reduction, this can also inform scenario development. For example, in the case study of the South African DDPP outlined on page 39, the team developed two scenarios that would each deliver jobs growth and poverty alleviation - and they produced comparable emissions reductions. Scenarios are therefore designed to allow comparison of different ways in which these goals can be achieved, which in turn can inform decision making, policy design, capacity building, development funding and infrastructure investment.

Where countries want to understand the impact on key socio-economic outcomes that different scenarios will have over time compared to business-as-usual, or to measure the costs associated with achieving each scenario, developing a baseline scenario is also useful.



ADDITIONAL RESOURCES

- + ODI has guidance on [Scenario Testing](#) with stakeholders.
- + The World Bank's '[Checklist on Establishing Post-2020 Emission Pathways](#)' outlines an approach to building pathways including data gathering, establishing baseline and alternative economic and emissions pathways, modelling approaches, and presenting pathway results.



CASE STUDY

FIJI'S LT-LEDS AND THEIR APPROACH TO CROSS-SECTORAL ISSUES

During the development of this Guide, Fiji was in the early stages of their LT-LEDS process. During the first national stakeholder workshop, the Fijian government and their technical partner GGI acknowledged the interaction with other cross-sectoral issues. Their approach specifically considered the interaction of mitigation actions with social development, environmental conservation and climate resilience including:

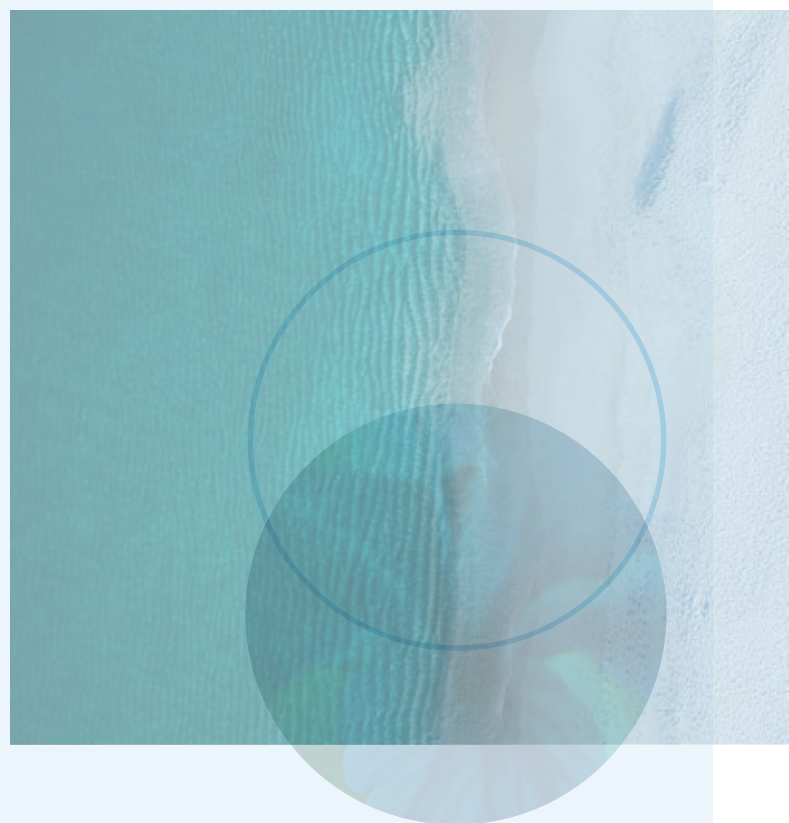
- + Green jobs/employment
- + Gender and equity
- + Education and awareness raising
- + Access to services (energy, water, transport)
- + Green city development
- + Biodiversity conservation
- + Vulnerability, adaptation and resilience

During this workshop held in May 2018, participants were asked to identify how their sectors interacted with these cross-cutting issues, resulting in the following points:

- + Health and Maritime: Health benefits from changing to low carbon/sulphur shipping-cold ironing
- + Green jobs and Land Transport: Job loss from driverless electric vehicles (taxis) and buses in the future
- + Gender and equity and Electricity: Increasing safety through increased electrification e.g. more street lighting
- + Gender and equity and Land Transport: Concerns around a congestion charge and social justice e.g. those that need to drive into the city are often from lower socio-economic backgrounds

As the LT-LEDS continue to be developed, these interactions will need to be accommodated by the Fiji Team.

The 'Pathways to Deep Decarbonization in China' project sought to not only identify low carbon pathways to manage long term climate risk, but also to explore opportunities to assist China to deliver its key social economic objectives of more inclusive growth towards higher income stage, as well as improved air quality, public health and local environment. Scenarios also explored energy systems and infrastructure investment with a view to managing rapid urbanisation and industrialisation. Similarly to Pacific Island countries, China is heavily reliant on imported energy, with up to 70 percent of its oil to be imported by 2020 and around 50 percent of its gas. The DDPP scenario demonstrated that a transformation to a low carbon pathway aligned with social and economic development was feasible.



During scenario development it's important for your pathways team to consider how it will build its 'whole of economy' scenario, and whether

a 'top down' or 'bottom up' or combination approach - will best meet your needs.

TOP DOWN OR BOTTOM UP?

Developing a pathway is not a fixed process and your team should customise its approach based on your own context, limitations and targets. 'Top Down' and 'Bottom Up' modelling approaches each have their advantages and disadvantages but in simple terms, a top down approach starts with the economy as a whole and imposes changes on the economy which are then broken down into sectors. A bottom up approach starts with the sectors, modelling each individually, and then aggregating them into a whole.

In the context of decarbonisation planning, an example of a top down approach would be to determine an overall policy objective or emissions reduction target (e.g. net zero by 2050) and then use backcasting to identify the overall system change required across various sectors. This often relies on macro-economic modelling and the development of robust GHG emissions scenarios, and is considered more simple (less detailed) and faster to use, so it allows modellers to run a larger number of scenarios. It can also more easily share and reallocate the effort to decarbonise across different sectors, and indicate the co-benefit and cost sharing opportunities of investment and policy choices made at a national level. On the downside, the model must deal with a large number of uncertainties that may not be transparent, which means the results will be indicative only.


In contrast, a bottom up approach would identify emissions reduction options at a more granular level (typically by sector, but could also be a technology, asset or industry level), before aggregating the sector outputs into a whole of economy model. This approach can draw on more detailed models that are more representative of the real world parameters and enable policy makers to work directly with

specialised teams that have deep knowledge of the sector of interest.

However, these models are also more complex to use. This makes them less suited to a pathways process where 'bottom up' modelling doesn't already exist, or where modelling capability is limited. A key challenge also lies in determining how to consider the interactions between models in a whole of economy pathway. For example, a country may have separate energy sector, industry and transport models. As efficiency improves in industry, this will reduce energy demand. But a shift to electric vehicles will increase electricity demand in the transport sector and these interactions in turn, can have implications for energy infrastructure needs. This requires an iterative approach to ensure such interactions are fully accounted for.

Where country teams want to understand the 'potential' impact of a carbon price (either a domestic carbon price, or the potential value of domestic carbon stores in a global carbon market), scenarios can include a 'shadow carbon cost'. A bottom up approach tends to be better suited for this purpose, as it allows the analysis to consider and account for the constraints of each sector and its ability to respond to a carbon price. It is more difficult to accurately calibrate the price of carbon and its effect on different sectors in a top down approach.

Experience demonstrates that a combination of 'top down' and 'bottom up' approaches can be complementary, provided common assumptions are agreed by modelling teams and are used to guide the scenarios built at a sector scale. This then ensures that the scenarios created at a sector scale produce comparable outputs that can be aggregated, which in turn can indicate the level of effort needed, and costs and benefits involved in each 'whole of economy' pathway scenario.

A tropical beach scene with palm trees and a boat on the water. The background is a clear blue sky and a calm blue sea. In the foreground, there are large, light blue decorative quotation marks.

During scenario development it's important for your pathways team to consider how it will build its 'whole of economy' scenario, and whether a 'top down' or 'bottom up' or combination approach will best meet your needs.

STEP 05

Develop and iterate scenarios

In this guide, the baseline (or reference) scenario is defined as 'the state against which change is measured'. Often called a Business as Usual (BAU) scenario, it estimates emissions growth, and changes in other key socio-economic measures such as GDP or poverty rates which are expected to occur over the given time frame, based on the continuation of current policies and programs.

While a BAU scenario is not a prerequisite to developing a pathway, it can be useful to understand the costs, benefits and trade-offs of a high ambition mitigation scenario compared to current trends, particularly in contexts where there may be some resistance to ambitious action. For example, where the private sector controls emissions reductions opportunities, the high upfront costs of technology change or unfamiliarity with new technology may be significant barriers.

But where technology change can deliver significant medium and long term benefits such as financial savings, providing a BAU scenario as a point of comparison can provide a compelling evidence base for change.

The quality of the data to build a BAU scenario may have already been assessed under Step 3.3, and many Pacific countries already have developed BAU scenarios as part of their national communications to the UNFCCC. These existing scenarios should be assessed to check whether any updates are required to reflect recent changes to economic development and national and sectoral policy decisions, and to consider any other adjustments needed in extrapolating the BAU scenario to mid-century. If there are questions about the quality of the data from the UNFCCC submission or if governments lack their own data in key policy areas or sectors, 'proxy' data from other sources such as other countries with similar conditions can be used in an initial phase.

5.1 IDENTIFY MITIGATION OPTIONS

This step builds on the scenarios developed under Step 4, and identifies options for transforming the development trajectory to one that achieves very low or net zero emissions. Developing a mitigation scenario requires identifying alternative possible projections for long term economic, policy, and market conditions by adjusting assumptions, constraints and inputs to the model.

In the Fiji case study, a net-zero scenario was unanimously agreed at a national level, with technical experts then employed to consider the possible mitigation actions and pathways required to achieve this. The experience of the DDPP process also demonstrated that a number of common factors needed to be decided at the start of their mitigation scenario planning to support analysis, including:

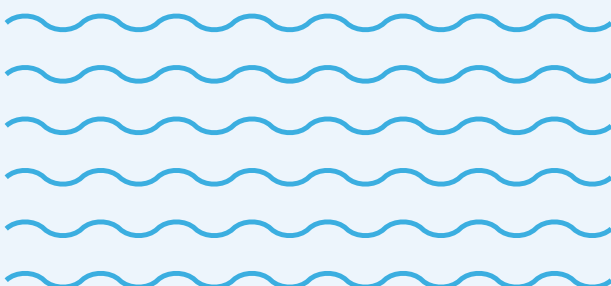
- + Revised results from previous strategies that explore the potential for reductions (to incorporate any technology gains, new information and innovation).
 - + An estimate of the emissions reduction potential (in terms of orders of magnitude) possible for each sector, including residual emissions (emissions difficult to reduce, which may be from waste, agriculture and air or sea transport). It is important that these are in balance with the potential of carbon sinks (through biological and geological sequestration).
 - + A strategy showing how the burden (costs of abatement), as well as co-benefits can be shared across sectors.
- + An understanding of how policy levers can amplify mitigation potential in multiple sectors, enhance co-benefits and avoid tradeoffs. For example, a policy focused on enhancing a country's energy security may deliver emissions reductions in electricity supply, manufacturing and transport, while also providing energy productivity improvements, opportunities for new businesses, and jobs growth. Well considered policy can also minimise the impact on existing industries and businesses, and avoid negative environmental outcomes.

In the DDPP approach, once these factors are agreed, they inform sector-scaled modelling that considers a range of technologies and solutions that can reduce GHG emissions. This approach typically focuses on proven low emissions technologies rather than relying on future technology breakthrough.

By considering opportunities for emissions reductions using the four pillars approach, countries can achieve greater levels of ambition. For example, traditional approaches may focus on improving energy efficiency in manufacturing, but overlook emerging technologies that can enable onsite clean energy generation, or fuel switching from fossil fuels to biogas produced onsite from residual waste from the manufacturing process. While these opportunities may look small at the individual business level, when bundled up to the national level, they can achieve multiple co-benefits in terms of emissions reductions, fuel security and waste reduction. Importantly, for emerging or new technologies, work will need to be done with technical experts to test their feasibility and agree on assumptions for emissions reduction potential, uptake and cost.

Some mitigation options that are particularly relevant to the Pacific are listed below, and have obvious co-benefits for improving resilience (for example, by climate-proofing livelihoods), economic growth (by improving manufacturing infrastructure, creating green jobs and reducing costly energy imports) and climate change adaptation (by protecting natural assets such as mangroves that can alleviate flooding while increasing fish and invertebrate stocks):

- + **ELECTRICITY:** Shifting to renewable electricity, increasing energy storage, increasing efficiency in transmission and distribution and laying the foundation for smart grid technology.
- + **TRANSPORT:** Shifting to hybrids and electric vehicles, improving efficiency in maritime transport and aviation, shifting to biofuels (where potential for sustainable production exists).
- + **RESIDENTIAL AND COMMERCIAL BUILDINGS:** Reducing energy demand through improvements to the thermal efficiency of buildings, more efficient appliances, rooftop solar PV, reducing plug loads, using urban planning to enable efficiency, improved cookstoves.
- + **MANUFACTURING AND INDUSTRY:** Improving energy efficiency of equipment, shifting diesel use to electricity or biofuels, waste heat capture and re-use.
- + **AGRICULTURE:** Employing best practice agricultural practices to improve soil carbon, and reducing emissions from livestock.
- + **FORESTS AND BLUE CARBON:** Protecting and restoring forests and mangroves to increase sequestration.
- + **WASTE:** Recycling and/or reducing waste, waste to energy, production of second generation biofuels from waste.



5.2 DEVELOP AND VALIDATE DATA ASSUMPTIONS

Whether sitting behind each low carbon technology choice, or defining each socio-economic or sustainable development goal your pathway aims to achieve, you will need a set of assumptions that shape the analysis and modelling outputs.

Assumptions are simplified, point-in-time representations of real world phenomena, for example the average rate of per annum GDP growth to 2050, or the projected rate of uptake of a particular technology. There are practical limitations to the extent they reflect current and future real world systems. This can be particularly challenging where there is no real world data to draw on (for example, if a technology has not been tried previously in a Pacific context).

It is therefore critical that you widely test assumptions with relevant experts and stakeholders. This could be achieved through a consensus building process in a stakeholder workshop. Doing so will ensure a broad range of views are considered in formulating assumptions. It will also allow data inputs to be customised to local operational and policy conditions and can account for development objectives and plans already enshrined in national, subnational and sectoral policy. Stakeholder consultation also serves to build trust in the analysis and credibility in the pathway.

Examples of assumptions used in pathway development include:

- + Future technology costs
- + Abatement potential, or rates of efficiency improvement
- + Technology deployment or uptake rates
- + Electricity generation capacity
- + Energy demand (by fuel type)
- + Operating and maintenance costs
- + Sequestration and planting rates for restoring forests and mangroves
- + Projected rate of population and GDP growth
- + Projected distribution of income and poverty rates

Assumptions should be transparent and this is best achieved by logging them and making them widely available in a technical report, once the pathway is complete. Logging assumptions is essential so that all users of this information are able to understand limitations of the modelling, are able to update the model as new information comes to hand and are able to review the performance of the modelling to reflect the system it represents. This may be particularly important in overcoming any data quality issues that could undermine confidence in the pathway. A [best practice guide](#) to logging assumptions has been developed by the UK Government's Department of Energy and Climate Change.

5.3 ASSESS CO-BENEFITS AND TRADEOFFS

Each mitigation option should be considered in light of its potential co-benefits or trade-offs in achieving improved climate change adaptation, socio-economic and sustainable development outcomes. This can inform a richer assessment of each option than one focusing solely on technology costs or emissions reduction potential. For instance, the relationship between increasing renewable energy and improved energy security, energy access, wellbeing, education and economic benefits, is a well understood synergy in the Pacific.

An example is Palau's [Climate Change Policy 2015](#). This integrated framework brings together adaptation, resilience, disaster management and a commitment to "mitigate global climate change by working towards low emission development". More importantly it takes a "no regrets" approach to development priorities and mitigation actions. The Republic of Palau defines this as "an approach that achieves benefits under all possible future climate change and disaster scenarios, including both low emission and high emission (e.g. low impact and high impact) cases and worst case disaster scenarios".

Adaptation and mitigation both aim to reduce the negative impacts of climate change, but are typically addressed separately in different policies and processes and over different time horizons.

Considering either adaptation or mitigation in isolation has limitations, and both perspectives should be considered when aiming to align climate policy with sustainable development. For example, short term actions to protect coastlines from sea level rise and erosion through the construction of seawalls can result in trade-offs through impacts to coastal wetlands such as mangroves. This in turn, can have negative long term consequences for carbon sequestration and reduced livelihood opportunities for fishing communities. Hydro presents another clear example: While it delivers substantial energy security benefits, it may undermine long term water security and negatively affect waterways ecosystems if not planned correctly. With integrated long term planning, such trade-offs can be managed or minimised, but they highlight the importance of an holistic approach to long term planning.

Further, pathways can provide a clear framework for grounding short or medium term National Adaptation Plans as well as other adaptation planning processes in a longer term context - ideally one that considers the broader development objectives of the country. In fact, by framing the long term pathway as a means of exploring how mitigation and adaptation action can support priority development outcomes, the pathway team can build critical ownership of the pathway vision, and embed climate action in existing development planning processes. In other words, development can be the key driver in the pathway process, supported by mitigation and adaptation outcomes under different scenarios.

Most Pacific Island countries have already undertaken extensive adaptation planning, and are only just now focussing on long term mitigation planning. Therefore, developing tools that can support decision-making in addressing both positive linkages and potential trade-offs will be critical to the success of your efforts to address climate change.

Through their work as low carbon modelling experts and an Asia-Pacific based DDPP partner, Climateworks Australia has developed a simple tool (see Figure 4 below) that highlights key interactions between mitigation actions and adaptation and resilience outcomes in a Pacific Island context, showing where countries can expect to find co-benefits and trade-offs. Applying this tool, mitigation actions can be considered ‘no regrets’ actions where co-benefits exist.

Where interactions can vary from positive to negative depending on time scale, location, or technology choice, further work needs to be done to understand and minimise any trade-off. And where interactions are always negative, a decision will need to be made on whether the mitigation or adaptation objective should be prioritised. The Strategic Mitigation, Adaptation and Resilience Tool (SMART) is accompanied by a SMART User’s Guide to support the use of the tool.

Figure 6: Pacific Island Strategic Mitigation, Adaptation and Resilience Tool (SMART) (excerpt)

MITIGATION ACTIONS	ADAPTATION					RESILIENCE		
	Relocate human populations to adapt to climate impacts	Manage vulnerability to water shortages	Manage vulnerability to food shortages	Manage vulnerable ecosystems	Manage increased health risks	Climate resilient infrastructure	Sustained energy security	Economic resilience
BUILDINGS								
Increase energy efficiency		Positive		Positive	Varies	Positive	Positive	Positive
Urban Planning for energy efficiency		Positive		Positive	Positive	Positive	Positive	Positive
Fuel switch away from fossil fuels		Varies		Varies	Varies	Positive	Positive	Positive
TRANSPORT								
<i>ROAD TRANSPORT</i>								
Reduced demand for passenger transport		Positive		Positive	Positive	Positive	Positive	Positive
Passenger transport modal shift		Positive		Positive	Positive	Positive	Positive	Positive
Increase energy efficiency				Positive	Positive	Positive	Positive	Positive
Fuel switch to hybrid vehicles and EVs		Positive		Varies	Positive	Positive	Positive	Varies
Fuel switch to biofuels		Varies		Varies	Varies	Positive	Varies	Varies

● NEGATIVE
 ● VARIES + OR - temporal or spatial scales or dependent on technology choice
 ● POSITIVE (“no regrets” actions)
 ○ NO NOTABLE INTERACTIONS

 **ADDITIONAL RESOURCES**

- + [Climateworks Australia’s ‘Pacific Island Strategic Mitigation, Adaptation and Resilience Tool’ \(SMART\), and SMART User’s Guide.](#)
- + [Climateworks Australia’s issues paper ‘Taking the Long View: Why a long term approach for the developing world is crucial to achieving the sustainable development goals and climate safety’.](#)
- + [SDG Climate Action Nexus Tool](#): A global tool that is designed to provide high level guidance on how climate actions can impact achievement of the SDGs.

- + [ClimateWatch’s NDC-SDG Linkages](#): Identifies potential alignment between a country’s NDC and their SDG targets. Using the NDC as a starting point it identifies potential linkages with SDGs based on a key words found in the NDC text. This tool can be filtered to look at particular countries or particular SDGs.
- + [The ‘Development Impacts Assessment \(DIA\) Toolkit’](#) helps decision makers qualitatively and quantitatively analyse policy options to achieve low-emissions development that supports national development goals. Unfortunately guidance on how to use this tool is limited, so it is recommended that you contact the developers for support.

5.4 UNDERTAKE A HIGH LEVEL BARRIER ANALYSIS

A barrier can be any identifiable reason why a specific emissions reduction opportunity struggles to enter a market or be taken up in a given economy. While this step will provide some initial work to understand barriers to inform modelling of the potential for uptake of different technologies, a more detailed analysis of barriers and solutions should be undertaken to inform implementation planning (Step 7).

You should include a high level barriers analysis and implementation roadmap in the pathway report (Step 6) to demonstrate initial thinking and present case studies that illustrate how these barriers can be overcome. It will help to ground the analysis while ensuring that the pathway a) acknowledges key barriers so your team can pre-empt any criticism that the pathway is not feasible due to barriers, and b) provide key recommendations and applied examples of how barriers could be overcome to support key recommendations.

A high level barrier analysis involves categorising technologies/opportunities into three categories, creating a high level roadmap of action:

1. ACCELERATE ACTION:

Often called 'least regrets actions', these actions are relatively easy to implement and offer strong benefit and relevance over other options (in other words, they offer a strong 'value proposition'). They will typically deliver positive outcomes for climate mitigation, adaptation and sustainable development when implemented. For example, improving energy efficiency in commercial and public buildings can reduce energy use, GHG emissions and exposure to extreme temperatures through efficient cooling systems and improving the thermal efficiency of buildings. Protecting valuable coastal ecosystems such as mangroves and seagrasses can help protect against extreme weather events and rising sea levels, sequester carbon, reduce coastal erosion, and provide nursery habitat for fish species, improving livelihoods for fishing communities.

2. AVOID LOCK-IN/LOCK-OUT:

These actions may not have a strong value proposition and may require greater effort to implement but are important to address in the short term to avoid 'lock-in' (long-lived technologies or assets that may undermine future efforts to reduce emissions, or become stranded assets) or 'lock-out' (actions that prevent opportunities from contributing to the achievement of the pathway in future).

In some cases, investment in key technologies comes with a high near term cost, in order to meet growing demand for the medium and long term, and achieve impact, accelerate growth and incentivise benefits. These investments may not reflect the 'least cost' objectives that traditionally dominate economic decision making, but for many Pacific Island countries, they may be achievable through co-financing. Examples of such investments include electric vehicle charging infrastructure, low or zero emissions marine transport and building electricity distribution networks to reduce the levelised cost of energy. Delaying these types of investments in favour of standard technologies, can 'lock in' higher levels of GHG emissions, or strand infrastructure assets before the investment has been recouped. In contrast, sending clear market signals in favour of low emissions technologies can stimulate opportunities to bundle projects and investment, lowering project and transaction costs. 'Lock-out' occurs when opportunities to avoid or sequester emissions aren't protected, for example through conversion of forests (which can provide a key means of achieving very low or net zero emissions) to agricultural land.

3. PREPARE FOR THE FUTURE:

These actions don't necessarily have a strong value proposition, they may not be ready to be implemented (i.e. they may require further research and development or capacity building to ensure they are implemented effectively in future), and are not at risk of 'lock-in' or 'lock-out'. However, work needs to be done in the short term to prepare for ramping up in future years to achieve a very low or net zero emissions target. This includes technologies that are unproven or uncommercialised in a Pacific Island context, or where local skills and supply chains don't exist, making them too costly.

STEP 06

Socialise long term pathways



6.1 PRESENT A CLEAR AND COMPELLING PATHWAY

The output of most long term planning processes is a written report. Ideally, your report should be succinct and engaging, focused on selling the vision of the long term transformation through well thought out visuals and accessible language. It should also clearly link to existing national strategic development priorities, strategic plans and national commitments (such as NDCs, National Adaptation Plans and national development plans). By creating an holistic mid-century vision of progress, the pathway can act as an overarching framework to guide short and medium term planning for climate action and socio-economic development.

Importantly, your mid-century pathway can also be submitted to the UNFCCC under Article 4.19 of the Paris Agreement, which invites all parties to formulate and communicate long-term low greenhouse gas emission development strategies by 2020. Doing so will help to demonstrate the social, environmental and economic wins that come with deep decarbonisation, heightening the imperative for other countries to increase their own ambition.

In the interests of transparency, pathways teams are also encouraged to make a technical report publicly available, which details the underpinning assumptions (from the assumptions log developed in Step 5.2) and key data sources behind the main report. This helps to reinforce the credibility of the work.

STAKEHOLDER ENGAGEMENT

The public release of your pathway report presents a key opportunity for stakeholder engagement, enabling briefings at varied levels of technical detail for different audiences.

Technical briefings can help build understanding of, and confidence in, the pathway for policy makers, donors and industry experts. To build widespread civil society support for the pathway (often critical in creating enabling conditions for policy change), the pathway should also be promoted to NGOs, businesses and the broader public.

CASE STUDY

REPUBLIC OF MARSHALL ISLANDS
ELECTRICITY ROADMAP

PROJECT DESCRIPTION:

The development of the Republic of Marshall Islands' (RMI) Electricity Roadmap provides a useful case study of a long-term, participatory planning process to prepare a coordinated and comprehensive framework for the whole of RMI's Electricity Sector from 2018-2050. The overall objective of the project is to improve energy sector planning and coordination to support achievement of the RMI's renewable energy and climate change goals.

METHODOLOGY:

Whilst still under development at time of publication of this guide, the RMI Electricity Roadmap includes two broad categories of activities ('Stakeholder Processes' and 'Information gathering, analysis and expert advice') across two project phases:

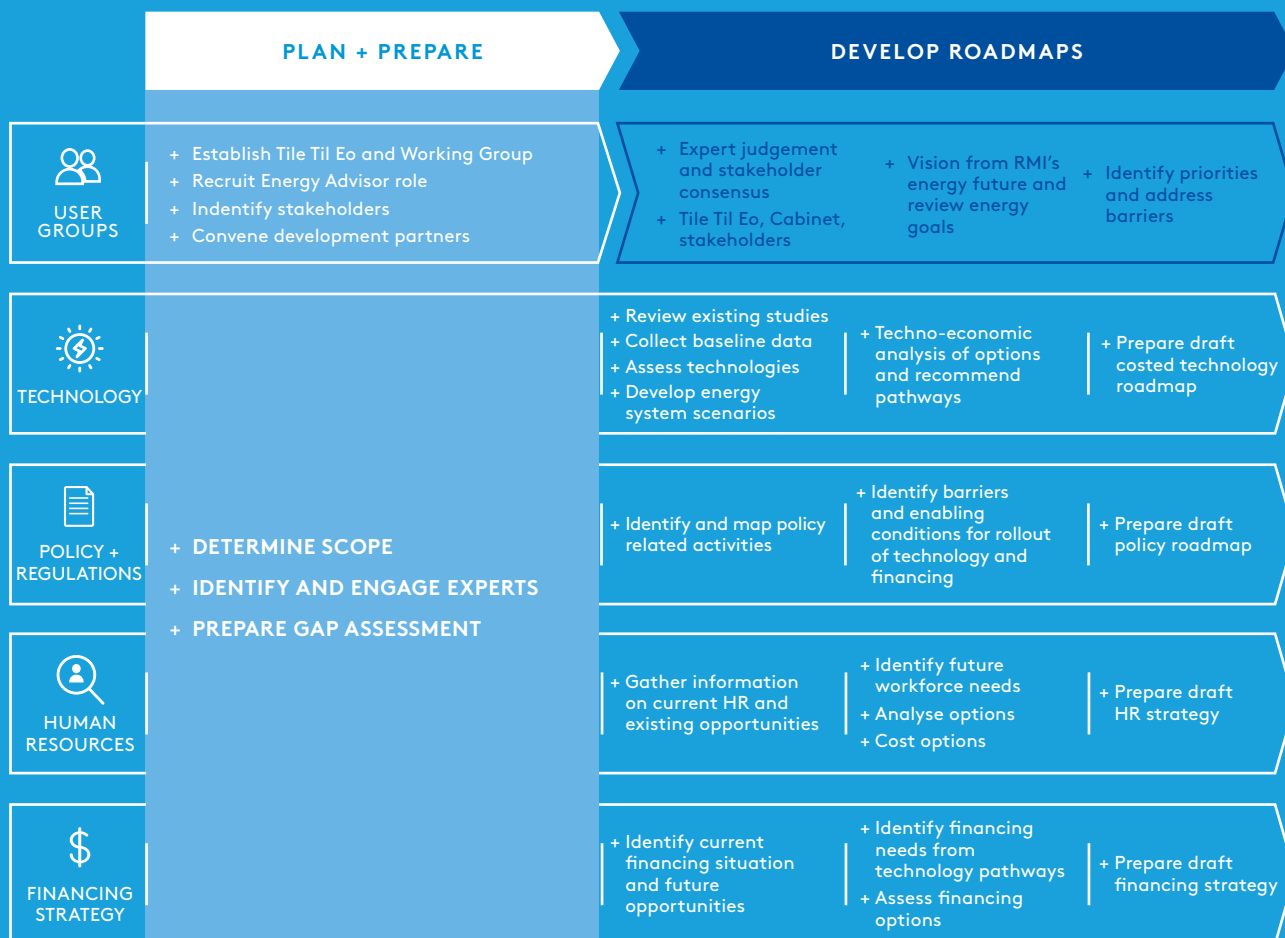
PHASE 1:
PLAN AND PREPARE

- + Establish the core Working Group and request that the Tile Til Eo Committee (a group of high-level RMI officials, with a mandate to oversee the implementation of the RMI's NDC) become a Steering Committee
- + Recruitment of key personnel and experts
- + Identify stakeholders and convene development partners
- + Determine scope and boundaries
- + Prepare gap assessment (to identify the current activities, gaps and needs for the development of the RMI electricity sector as it transitions to renewable energy)

PHASE 2:
DEVELOP ROADMAPS

- + Identify technology pathways to RMI achieving their 2025, 2030 and 2050 electricity targets, with analysis including cost, diesel savings and greenhouse gas reductions
- + Develop a policy, institutional and regulatory roadmap, that will identify key barriers to, and enabling conditions required for the rollout of technology pathways and key financing options
- + Develop a Human Resource Strategy to estimate future workforce requirements and identify preferred strategies for meeting these requirements
- + Develop Financing Strategy by estimating financing needs based on costs from the technology pathways and associated human resource needs, and identify preferred financing options

Figure 7: A snapshot of RMI’s Electricity Roadmap process



Source: RMI Long Term Electricity Roadmap Project Description

SUCCESS FACTORS:

+ BUILDING THE RIGHT TEAM:

Whilst technical skills are important (e.g. modelling, data analysis) the RMI Electricity Roadmap team also hired for complementary skills such as stakeholder engagement and collaborative strategy development. It's worth considering recruiting team members skilled in storytelling and building a narrative.

+ CONTEXT:

As much as possible the team should be locally based and have deep, culturally specific experience of the country. If external advisors are required, prioritise those with in-country or at least Pacific experience. Building a pathway can be a challenging process for all members involved, so having a team that is local and face-to-face will help to work through this.

+ GOVERNANCE:

Consider establishing a Working Group that is small but well-staffed. This small group should contain members who are actively involved and represent key functions such as the Heads of agencies for Energy, Environment and International Development, along with a representative from the technical team.

+ PEER REVIEW PROCESS:

Once the implementation plan/options have been drafted in consultation with your broader stakeholders, consider sharing them with key donors for review. Donors have useful and detailed insights into a country's context. If feedback is sought, be sure to provide detailed responses to each donor.

STEP 07

Analyse barriers and identify solutions

This step seeks to understand what needs to change to ensure that an emissions reduction opportunity can succeed over the long term. Answering this question may include examining additional barriers that weren't explored in detail in the technical analysis, and adopting a 'blue sky' approach to thinking through systemic problems (for example, if no supply chains currently exist to enable this opportunity, what would it take to build those supply chains?).

Step 7 often focuses at a sector or sub-sector level and takes a deeper dive into the high level barriers analysis outlined in Step 5.4. It involves working with stakeholders to identify short and medium term strategies and interventions that can analyse and address barriers in greater depth.

Key stakeholders you should include are any organisations, institutions or individuals who have a key stake in the outcome. This will include both those who are committed to change, and those who are invested in the status quo. Ensuring all voices are heard is critical to driving genuine understanding of why a barrier should be overcome, as well as agreement around how is best achieved. The process requires consensus building, and often compromise. Ultimately, the best solution is one that will work because it has buy-in from the people who can make or break the outcome.

Each area of your pathway plan may face a range of barriers. The following table can be useful for analysing barriers and determining a strategy for intervention.

Typically, you'll find some barriers are more impactful than others, and by addressing these barriers, other barriers are likely to become less problematic. Economic and financial barriers often fall into this category. For example, a low carbon technology may face several barriers, such as high upfront cost, lack of technical capacity to install and use the technology, and lack of awareness. A program that addresses the cost barrier (such as a subsidy) can sometimes be enough to unlock the opportunity, as businesses will then make an effort to learn about the technology and build internal capacity to use the technology, once they can access it at an affordable price.

Once all key barriers and their potential solutions have been identified, it may be useful to map them using a problem mapping or mind mapping approach.

This will help your pathways team to understand links between different barriers and their potential solutions, and identify those barriers and solutions that are likely to be most effective in unlocking the emissions reduction opportunity.

Table 5: Barriers analysis framework

MITIGATION ACTION/CATEGORY (to be undertaken for each key mitigation action, or category of actions)					
CATEGORIES OF BARRIERS	IDENTIFIED BARRIERS	SOLUTIONS TO OVERCOME BARRIERS	CO-BENEFITS OR TRADE-OFFS TO SOLUTIONS	DEGREE OF EFFORT REQUIRED	WHO HOLDS RESPONSIBILITY FOR THIS ACTION?
ECONOMIC + FINANCIAL					
MARKET CONDITIONS					
LEGAL AND REGULATORY					
NETWORK STRUCTURES					
INSTITUTIONAL + ORGANISATIONAL CAPACITY					
HUMAN SKILLS					
SOCIAL, CULTURAL + BEHAVIOURAL					
INFORMATION + AWARENESS					
TECHNICAL					

Source: Adapted from UNEP-DTU Partnership's 'Enhancing Implementation of Technology Needs Assessments'

It is also critical to consider the right 'mix' of proposed solutions, the interactions between them and their potential co-benefits. For example, policy and regulatory interventions such as legislating a net zero target or introducing a carbon tax, would send clear signals across the economy to reduce emissions and stimulate new markets for carbon sinks (such as forest or mangrove restoration). Introducing a feed-in tariff incentivises new renewables to enter the market, creating new business opportunities and jobs. And shifting public procurement policy can stimulate markets for low emissions vehicles and energy efficiency technologies, creating market demand, building local capacity and reducing technology costs.

A single policy or regulatory change that can unlock multiple low emissions technologies along with co-benefits can be considered a 'keystone solution'.

Consideration should also be given regarding how to embed the pathway into a country's overarching legal frameworks. For example, embedding a long term emissions reduction target (e.g. net zero by 2050) into legislation gives it significantly more power and will ensure it filters down across all areas of government and is considered in all policy making. Without legal recognition, it risks remaining a lofty goal, and one that may be deprioritised against other regulatory obligations or ministerial priorities.

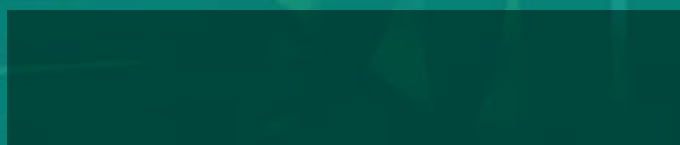
Finally, barriers and their solutions should be prioritised. The categories described in Step 5.4 (i.e. 'accelerate action, avoid lock-in/out and 'prepare for the future') provide a good initial framework for prioritisation. However this should be further informed by more detailed consideration of the degree of effort required, any co-benefits or trade-offs, and identification of any keystone solutions.

STEP 08

Develop an implementation plan

Your implementation plan should bring together guidance from the pathway regarding the time horizon for scaling up low carbon technologies (and phasing out high carbon technologies), along with the detailed barriers analysis, in order to identify short, medium and long term actions required for a mid-century transition to very low or net zero emissions. It also needs to consider what's required to implement short term actions, and identify any risks that need to be mitigated. Finally, it needs to outline how to develop a financing plan for implementing these actions.

Implementation plans can be developed at the whole of economy or sectoral level, depending on your country's preference.



8.1 PRIORITISE IMPLEMENTATION ACTIONS

The following steps outline a process for prioritising the mitigation actions that will form the basis of your implementation plan:

1. Divide mitigation actions into ‘short term’, ‘medium term’ or ‘long term’ depending on the time horizon needed to pilot and scale up each technology in order to achieve emissions reduction goals at the required time step.
2. You can use the table below to arrange mitigation actions according to the categories identified in the barriers analysis (‘accelerate action’, ‘avoiding lock-in/lock-out’, ‘preparing for the future’).
3. Identify who’s responsible for implementing each mitigation action and what resources will be required to enable implementation. Resources can include human resources, supply chains, infrastructure, and finance.
4. Identify any risks that may prevent a mitigation action from being implemented effectively, and how those risks can be managed.
5. Finally, formulate an approach to prioritising implementation actions, which will include a combination of both mitigation actions, and barrier solutions (identified in Step 7). Different stakeholders will want to prioritise actions in different ways, and this process should be undertaken in consultation with whoever will be responsible for these actions. For example, policy makers responsible for setting renewable energy targets (barrier solution ‘owners’) will have different priorities and constraints to renewable energy developers (mitigation action ‘owners’). However, both perspectives will need to be considered and accounted for in the implementation plan.

Table 6: Categorisation of mitigation actions

	ACCELERATE ACTION	AVOID LOCK IN/LOCK OUT	PREPARE FOR THE FUTURE
SHORT TERM			
MEDIUM TERM			
LONG TERM			

8.2 DEVELOP A FINANCING PLAN

CONSIDER THE ENABLING ENVIRONMENT

It is critical to ensure you have an environment that will attract and drive investment towards the priority climate actions identified through your pathways process. And so this step involves bringing together potential public and private partners, supported by relevant technical and financial experts, to jointly assess and develop priority options identified for financing. Doing so can support government to adopt the right policy, regulatory and governance requirements to facilitate lowest emissions development, direct public expenditure towards priority goals, and provide clear guidance to donors and investors on key opportunities for financing.

ASSESS THE COSTS

Once your priority measures have been identified, implementation and financing costs need to be determined. This will include both the technology deployment costs, as well as the costs associated with policy change processes, capacity building, designing and establishing programs, project feasibility studies, monitoring, enforcement costs, etc, and will form the basis of a financing plan.

IDENTIFY AVAILABLE DOMESTIC FINANCES

Once overall financing needs have been quantified, the pathways team (or implementing agency) should evaluate domestic sources of finance that are available to support any priority policy changes, capacity building requirements and technology deployment. Financing available from different entities (i.e. from the government, private sector or households) should be considered, including domestic equity and debt.

In order to understand financial flows within your country, the pathways team (or implementing agency) should request access to your country's Pacific Climate Change Finance Assessment. This is a robust and participatory process, led by the Pacific Island Forum Secretariat to assess Pacific Island member countries' ability to access and manage climate change resources. At time of print, assessments had been completed for Vanuatu, Samoa, Fiji, Solomon Islands, Nauru, Palu, Tonga, Federated States of Micronesia, and Kiribati, with plans for completion of Papua New Guinea and Tuvalu assessments.

DETERMINE THE NEED FOR EXTERNAL FINANCIAL SUPPORT

Having analysed the domestic financial resources available for the implementation of the pathway, you will be able to determine whether external resources are required in the form of debt, equity or financial support through an available channel. If external financial support is required, your sources of support need to be considered.



ADDITIONAL RESOURCES

- + UNDP's '[Methodology Guidebook for the Assessment of Investment and Financial Flows to Address Climate Change](#)' provides guidance on establishing a framework and approach to assessing investment needs.

The following summarises categories of funding including a more detailed description of the emerging finance options.

PUBLIC FUNDS	<ul style="list-style-type: none"> + Official Development Assistance e.g. bilateral aid, multilateral banks or Green Climate Fund + Rebates and Subsidies + National and regional banks + Tax Incentives to attract foreign direct investment
PRIVATE FUNDS	<ul style="list-style-type: none"> + Non-government organisations + Philanthropy + Superannuation Funds + Institutional Investors e.g. Insurance Funds and Private Investors
MARKET-BASED MECHANISMS	<ul style="list-style-type: none"> + Carbon Finance + Capital Markets - currently in early stages in Fiji and PNG
EMERGING	<ul style="list-style-type: none"> + ANGEL INVESTORS An angel investor provides an injection of capital to a business, most often in the early stages but post start-up. + CROWD FUNDING Small amounts of money are solicited from a large number of individuals in order to raise funds for a smaller project or venture. + BLUE BONDS Work in a similar way to Green bonds but are instead applied to ocean-based activities. They offer the opportunity for private capital firms to diversify their investment portfolio into products that generate a financial return as well as deliver marine environmental benefits. For example, Seychelles has already offered a sovereign blue bond to attract private capital firms to invest in fisheries management. + VALUE (SUPPLY) CHAIN FINANCE Relevant for the agricultural sector, this involves finance being provided within the value chain from an internal actor (e.g. a farmer or supplier) or externally (e.g. a bank provides credit secured by a contract with a trusted purchaser). + RISK SHARE FACILITY Already operating in PNG at BSP (the country's largest bank), this facility is working with International Finance Corporation to guarantee 50% of commercial loans provided by partner institutions to Small and Medium Enterprises that meet the selection criteria. + IMPACT INVESTING This type of investment bears some similarity to established models of venture capital investment.

Source: adapted from Pacific Islands Forum Secretariat's 'Developing a Regional Finance Facility for the Pacific', UNDP's 'Financing the SDGs in the Pacific Islands' and UNDP's 'Charting A New Low-Carbon Route To Development'.

It is important to note the potential for new opportunities for climate finance. For example, in October 2017, Fiji became the first emerging economy to issue a sovereign green bond, raising \$50 million to fund both mitigation and adaptation actions. The proceeds of the bond will be exclusively applied to projects that have clear environmental benefits and promote low carbon, climate resilient growth.



ADDITIONAL RESOURCES

- + UNDP's '[Catalysing Climate Finance: A guidebook on policy and financing options](#)'.
- + UNFCCC's '[Preparing and presenting proposals: A guidebook on preparing technology transfer projects for financing](#)'.

8.3 CONSIDER ALIGNMENT WITH EXISTING PLANNING PROCESSES

Given the the benefits of aligning short and medium term planning processes with the vision of a climate safe, prosperous future that your pathway outlines, consideration should be given to opportunities to embed the long term goals identified in the pathway through scheduled reviews to national development plans, NAPs, NDCs, energy roadmaps and other planning processes.

The timing of these review processes may further inform prioritisation of implementation actions. For example, if a required policy change has been identified to unlock a mitigation opportunity, it may be possible to prioritise or reflect the policy outcome in a short or medium term planning process.

8.4 COLLATE INFORMATION INTO AN IMPLEMENTATION PLAN

This process brings together the regulatory and policy changes, capacity building, supply chain, infrastructure needs and finance requirements over different time horizons to enable a smooth transition to a climate safe, prosperous future.

A decision should also be made about governance for the implementation of the pathway. For example, it could rest with the pathways team and multi-stakeholder advisory panel (which would need to be institutionalised to oversee implementation), or it could be mainstreamed into existing government administration. Whichever option is chosen, this body will play a critical role in driving the implementation plan and coordinating action across government, civil society and the financing sector. It will also include ensuring the required regulatory and policy changes are achieved to support implementation and will therefore need to be empowered with the credibility, public leadership and authority to do so.

The information compiled in this step can now be summarised into an implementation plan. While the format of this may be specific to your country, it should at minimum include:

- + Short/medium/and long term implementation priorities
- + Investment required and a financing plan
- + Regulatory, institutional and operational framework for implementation
- + Alignment with existing planning processes
- + Monitoring and evaluation mechanisms
- + Timeline for review and updating of the plan (to ensure it remains current)

Once finalised, the implementation plan should be presented to key public and private financial actors, then made publicly available.

USING REGULATION TO SEND MARKET SIGNALS

Some Pacific countries have already sought to introduce renewable energy policy instruments and incentives. For example, in mid-2014, Vanuatu set feed-in-tariffs and net-metering for residential renewable energy customers. Additionally, Vanuatu's Utilities Regulatory Authority is developing Power Purchase Agreement formats for the private generation of power.

Source: [Vanuatu: Renewables Readiness Assessment](#).



ADDITIONAL RESOURCES

- + UNDP's '[Preparing Low-Emission Climate-Resilient Development Strategies](#)' provides guidance that may be useful in developing an implementation (or action) plan.

Once finalised, the implementation plan should be presented to key public and private financial actors, then made publicly available.

GLOSSARY

ADAPTATION

Is the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.

ASSUMPTIONS

Are simplified, point-in-time representations of real world phenomena, for example the average rate of per annum GDP growth to 2050, or the projected rate of uptake of particular technology.

BACKCASTING

Is an approach to modelling that starts with the desired end state and works backward to the present, to ensure that analysis is consistent with ambition at key time steps along the pathway to net zero by mid-century.

BASELINE (OR REFERENCE) SCENARIO

Is defined as 'the state against which change is measured'. Often called a Business as Usual (BAU) scenario, it estimates emissions growth, and changes in other key socio-economic measures such as GDP or poverty rates which are expected to occur over the given time frame, based on the continuation of current policies and programs.

DASHBOARDS

Are data tables describing pathways in quantitative terms. A common dashboard allows the assumptions and results of different pathways studies to be communicated and compared, even when different models are used to produce them.

KEYSTONE SOLUTION

Describes a barrier solution that, when implemented, can unlock multiple mitigation opportunities and co-benefits. Examples may include legislating a net zero target or introducing a carbon tax to send clear signals across the economy to reduce emissions and stimulate new markets for carbon sinks (such as forest or mangrove restoration), or implementing a low carbon public procurement policy which stimulate markets for low emissions vehicles and energy efficiency technologies, creating market demand, building local capacity and reducing technology costs.

'LOCK IN'

Occurs where investment in long-lived technologies or assets (typically fossil fuel-dependent assets) undermines future effort to reduce emissions, or increases the risk of stranded assets (where assets need to be abandoned before the end of their economic life).

'LOCK-OUT'

Occurs when actions - such as policy change - create conditions that prevent opportunities from contributing to emissions reductions in future, for example where land use change prevents carbon sequestration activities in future.

MITIGATION

Is human intervention to reduce the sources of, or enhance the sinks (absorption) of greenhouse gases (GHG).

MODELS

Are mathematical representations of physical and economic systems used to explore and test 2050 pathways scenarios. Models are chosen based on their fit with research and policy questions and their ability to produce the necessary quantitative outputs.

NARRATIVES

Are stories that describe the transition to a low carbon future that meets socio-economic goals. The exact form of a narrative depends on the participants and circumstances but, in general, they should aim to be qualitative descriptions of long term transformation accessible to a wide audience.

RESILIENCE

Is the ability of a system, community or society exposed to climate change impacts to resist, absorb, accommodate or recover from the consequences of these impacts in a timely and efficient manner.

SCENARIO

Is a plausible and often simplified description of how future climate and socio-economic development goals may be achieved, based on a coherent and internally consistent set of assumptions.

VALIDATING

Is the process of testing and refining data and assumptions with technical and policy experts to improve the accuracy and credibility of the analysis.

VALUE PROPOSITION

Provides an assessment of a mitigation opportunity, based on its attractiveness to key stakeholders. Opportunities with a strong value proposition will typically be relatively easy to implement and offer strong co-benefits.

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