7 Assessment of the starting situation

This chapter provides the methodology to assess the starting situation for transformational change. The starting situation describes the state of the system and the status of transformational change characteristics at the beginning of the assessment period. Assessment of the starting situation is useful to understand the extent to which a policy triggers a shift away from carbon-intensive and unsustainable pathways. The starting situation can refer to a historical year of reference in the case of ex-post assessment or the current year (or the most recent year for which data are available) in the case of ex-ante assessment.

Checklist of key recommendations

- Identify indicators to describe the starting situation of characteristics impacted by the policy and provide indicator values

7.1 Describe the starting situation of relevant characteristics

Knowledge of the starting situation – that is, the status of the system and relevant characteristics – helps with assessing change. It can provide useful insights into the existing barriers at the phase of transformation in which the policy operates. It is a *key recommendation* to identify indicators to describe the starting situation of characteristics impacted by the policy and provide indicator values.

The indicators for characteristics considered relevant or possibly relevant in Section 6.5 are identified in this step. Indicators of outcome and process characteristics are useful to assess specific aspects of system change and can be monitored over time to track progress. Examples of qualitative and quantitative indicators are available in Appendix A.

Indicators are important to assess how the policy is leading to a system change that is fundamental, disruptive and sustained. To understand transformational impacts, in addition to indicators for policy monitoring, users should select indicators that provide insight into the magnitude and direction of broader system-level changes occurring over time, recognizing that a number of factors may be contributing to these changes. For instance, system-wide indicators can demonstrate whether an overall employment gain occurred after a policy was implemented, or whether jobs were transferred from one sector or subsector to another.

Users should consult stakeholders in selecting key indicators, and deciding when and how frequently to monitor them. Policies may directly impact only selected characteristics, although transformational policies would be expected to have an indirect impact on several relevant process characteristics. For example, a measure focused on influencing behaviour change towards products with a zero- or low-carbon footprint may indirectly trigger a technological change as a result of increased demand for such products. Users are encouraged to look beyond the expected impact to analyse

FIGURE **7.1**

Overview of steps in the chapter

Identify indicators to describe the starting situation (Section 7.1) → Provide values for indicators to describe the starting situation (Section 7.1) how policies may indirectly affect a wide range of relevant process characteristics. Some of these may be outside the immediate scope of the policy, and proxy indicators may be identified to monitor effects; for example, technology change can be observed in the number of scientific articles published and patent applications.

A well-documented notion in the literature is the use of "SMART" indicators – that is, indicators that are specific, measurable, achievable, realistic and time-bound. The challenge for transformational change is identifying "SSSMART" indicators that also capture the scale and sustained nature of impacts resulting from a policy.

The idea of scale can be captured both horizontally (e.g. innovation spreading across sectors, more people applying solar PV technology) and vertically (e.g. an incentive programme at city level being adopted at regional or national level). The same indicators used to assess the starting situation can be projected for ex-ante assessment and observed for ex-post assessment to assess transformational change. Further information on selection of indicators is provided in Chapter 10.

Users can select indicators for process and outcome characteristics to help describe the starting situation of relevant characteristics impacted by the policy. Tables 7.1 and 7.2 provide a template and an example (for the hypothetical solar PV policy) of using indicators to describe the starting situation of selected process and outcome characteristics. The indicators given here are illustrative and are not a comprehensive list for assessing the solar PV policy. Users' assessments will have many more indicators for monitoring impacts at the policy and system levels to signal systemic shifts over time. (Appendix A provides more examples of indicators that are particularly relevant to the energy sector.) These tables build on the information generated in the earlier step, which is shown in the grey columns. The tables will be further built on as users complete subsequent steps.

TABLE **7.1**

Template for describing the starting situation for selected process characteristics (using hypothetical solar PV example)

Category	Process characteristic	Description (specific to policy)	Indicator	Indicator value at starting situation (2015)[a]
Technology	Research and development (R&D)	Relevant R&D efforts are needed for developing cost-effective energy storage options and to achieve grid interconnectivity that will support more solar PV in the distribution system.	Amount of related public and private R&D investment in the country	$100,000
	Adoption	Relevant Adoption rate for solar grid rooftop is quite low across the country and needs targeted interventions. High capital cost of rooftop systems and longer payback periods have discouraged its widespread adoption by small consumers in various sectors.	Number of new demonstration projects for rooftop solar PV initiated	2

TABLE **7.1,** continued

Template for describing the starting situation for selected process characteristics (using hypothetical solar PV example)

Category	Process characteristic	Description (specific to policy)	Indicator	Indicator value at starting situation (2015)[a]
Technology, continued	Scale-up	Relevant Rooftop solar has a negligible share in the solar energy sector. There is a huge amount of untapped potential in the solar-rich country. Several barriers exist to large-scale deployment of rooftop solar PV (e.g. lack of modern flexible grids that can absorb solar power, need for a range of cost-effective storage options given the intermittent nature of solar power, lack of grid parity, lack of highly skilled workforce, high upfront cost).	Share of installed rooftop solar PV in the solar sector (nationwide or statewide)	5%
			Share of solar power (utility scale, rooftop, off-grid) in the electricity sector	8%
			Share of RE in the country as a percentage of electricity consumption	10%
Agents of change	Entrepreneurs	Relevant These are some of the most important change agents for the solar PV policy in the country. There is acknowledgement that the solar sector should be able to attract private investment and lending to sustain interest from businesses and entrepreneurs, and continue to grow. The government has commissioned a study on how to create an attractive financial environment to attract large-scale investment in the sector.	Volume of venture capital investments	$100 million
	Coalitions of advocates	Possibly relevant It is not clear whether this is an important constituency to catalyse transformational change in solar PV in the country. Business associations and think tanks are active in convening stakeholders and policymakers, and providing a forum to discuss issues relating to renewable energy.	Number of projects/research centres involving university–industry collaboration	1
	Beneficiaries	Not relevant The political context in the country, with constraints on civil society organizations, makes beneficiaries an ineffective group that plays no role in scale-up. Formation of organizations such as advocacy groups, users' associations and lobbying groups is not encouraged.	Users can choose to monitor indicators for "not relevant" characteristics.	-

TABLE **7.1**, continued

Template for describing the starting situation for selected process characteristics (using hypothetical solar PV example)

Category	Process characteristic	Description (specific to policy)	Indicator	Indicator value at starting situation (2015)[a]
Incentives	Economic and non-economic	Relevant Financial subsidy and feed-in tariff are key ways to increase technology penetration and promote grid-connected rooftop solar uptake. Incentives for integrating energy storage into the distribution grid can further encourage diffusion of solar. Other economic and non-economic incentives exist to encourage uptake of off-grid solar and large solar power plants, as well as other forms of renewable energy (e.g. wind, biomass).	Number of new economic incentives in place for grid rooftop solar	1
			Number of new incentives for solar (all kinds of technologies)	1
			Number of new incentives to promote different forms of RE	2
	Disincentives	Possibly relevant The assessment is limited to the solar PV sector. It is not clear whether disincentives applied to fossil fuels will be strong enough to cause any impact in the solar PV sector.	Number of new disincentives to discourage use of fossil fuels to generate electricity	1
			Size of fossil fuel subsidy	$10 million
	Institutional and regulatory	Relevant Development of new agencies is needed at the subnational level to promote solar in states. Although there is a dedicated agency at the national level to promote renewable energy, there is no counterpart in states. A robust regulatory and institutional set-up to design and implement measures, enhance coordination and build capacity at all levels does not exist yet.	Number of new regulations and institutions set up to promote solar	3
			Number of new regulations and institutions set up to promote RE	3

TABLE **7.1,** continued

Template for describing the starting situation for selected process characteristics (using hypothetical solar PV example)

Category	Process characteristic	Description (specific to policy)	Indicator	Indicator value at starting situation (2015)[a]
Norms	Awareness	Not relevant There is a high level of awareness in the country, and this is not considered a hindering factor.	Users can choose to monitor "not relevant" characteristics.	-
	Behaviour	Relevant Awareness has not led to change in behaviour, possibly because of factors relating to financing and upfront costs. This is an area that needs more attention.	Number of new measures to influence consumer behaviour in favour of solar/ renewable energy	None
	Social norms	Possibly relevant Societal norms favour less carbon-intensive lifestyles in general, and it is not clear whether norms are holding back solar PV. There is a greater push for green, clean living in urban centres as pollution increases and environmental resources are depleted.	Number of emerging leaders/role models favouring renewables (e.g. states leading the transition to renewable energy)	None

Abbreviation: RE, renewable energy

[a] Indicator values are purely illustrative and only meant to show change over time.

TABLE **7.2**

Template for describing the starting situation for selected outcome characteristics (using hypothetical solar PV example)

Category	Outcome characteristic	Description of the starting situation (same as the Description column in Table 6.7)	Indicators	Indicator value at starting situation (2015)[a]
Scale of outcome – GHGs	Global or international (macro) level	This level is outside the assessment boundary. No description necessary.	Users can choose to monitor characteristics outside the assessment boundary.	-
	National or sectoral (medium) level	The policy has set a goal of annual emissions reductions of 20 million tCO_2e nationally. The 2030 vision is to reduce emissions by 40 million tCO_2 annually. Solar PV has a 5% share in the national electricity mix in 2015.	Installed capacity of grid-connected rooftop solar power plants (up to 500 kW) at national level	1 GW
			GHG emissions avoided (annually) as a result of solar PV deployment (calculated assuming solar PV generation replaced a baseline scenario of fossil fuel mix generation)	50,000 tCO_2e
			Other indicators such as installed capacity disaggregated by state, size, market segment, subsidized vs non-subsidized rooftop solar PV, solar PV installed costs in various segments	-
	Subnational (micro) level	The solar PV policy is implemented at subnational levels, supported by incentives for private sector involvement and knowledge development. In two northern rural provinces of the country, solar PV contributes 20% of the electricity mix in 2015.	% of rooftop solar PV in the electricity mix at a subnational level	5% for state 1 10% for state 2
			Other indicators such as installed capacity disaggregated by size, market segment, subsidized vs non-subsidized rooftop solar PV, solar PV installed costs by state	-
Scale of outcome – sustainable development	Global or international (macro) level	This level is outside the assessment boundary. No description necessary.	Users can choose to monitor characteristics outside the assessment boundary.	-

TABLE **7.2,** continued

Template for describing the starting situation for selected outcome characteristics (using hypothetical solar PV example)

Category	Outcome characteristic	Description of the starting situation (same as the Description column in Table 6.7)	Indicators	Indicator value at starting situation (2015)[a]
Scale of outcome – sustainable development, continued	National or sectoral (medium) level	The solar PV policy aims to create 200,000 new green jobs in the sector (e.g. in solar PV installation and maintenance) by 2022 and up to 2 million new jobs by 2050. There are currently 10,000 jobs in the solar PV sector nationally.	Net employment generation in solar sector at national level (calculated assuming the employment created by alternative technology – fossil fuels – of same capacity)	10,000
			Other indicators related to quality of employment, such as permanent vs temporary jobs), (net) new jobs generated, employment by sector/subsector, national employment data	-
	Subnational (micro) level	In rural districts and towns, new jobs are created through installation and operation of solar PV mini-grids. In the two northern provinces, there are about 600 jobs in the solar PV industry in each province.	Net employment generation in solar sector in province X (calculated assuming the employment created by alternative technology – fossil fuels – of same capacity)	600 in state 1 1,000 in state 2
			Other indicators, such as those related to employment generated in renewable energy vs coal vs natural gas industry (rate), net new jobs in energy sector in the state	-
Time frame over which outcome is sustained – GHGs	Long term: ≥15 years from the starting situation	The period is longer than the assessment period. No description necessary.	Users can choose to monitor characteristics beyond the assessment period.	-
	Medium term: ≥5 years and <15 years from the starting situation	The solar PV policy aims to achieve its mid-term (2030) vision of 30% solar PV in the national electricity mix, and sustain the trend of a growing share of solar PV in the country. Currently, solar PV has a 5% share in the national electricity mix. It is a new policy, and insufficient time has passed to clearly show that the policy impacts are sustained.	Trend in installed capacity of grid-connected rooftop solar power plants (up to 500 kW)	-
			Time-series data for other indicators highlighted above	-

TABLE **7.2,** continued

Template for describing the starting situation for selected outcome characteristics (using hypothetical solar PV example)

Category	Outcome characteristic	Description of the starting situation (same as the Description column in Table 6.7)	Indicators	Indicator value at starting situation (2015)[a]
Time frame over which outcome is sustained – GHGs, continued	Short term: <5 years from the starting situation	The policy aims to install 20 GW of rooftop solar PV by 2022 and trigger increased emissions reductions over the assessment period. There are no clear indications so far that the policy impacts will be sustained.	Trend in installed capacity of grid-connected rooftop solar power plants (up to 500 kW)	-
			Time-series data for other indicators highlighted above	-
Time frame over which outcome is sustained – sustainable development	Long term: ≥15 years from the starting situation	The period is longer than the assessment period. No description necessary.	Users can choose to monitor characteristics beyond the assessment period.	-
	Medium term: ≥5 years and <15 years from the starting situation	The solar PV policy aims to achieve its mid-term (2030) vision of 1 million new green jobs and sustain the trend of increasing jobs in the country. It is too early to see signs of sustained job growth.	Trend in employment generation in solar sector	-
			Time-series data for other indicators highlighted above	-
	Short term: <5 years from the starting situation	The solar PV policy aims to achieve its short-term goal of 200,000 new green jobs in the solar PV installation and maintenance sectors. There is no evidence yet that the policy's impact on jobs is sustained, although jobs are expected to show an upward trend with a rise in the share of solar PV.	Trend in employment generation in solar sector	-
			Time-series data for other indicators highlighted above	-

Abbreviation: -, not applicable

[a] Indicator values are purely illustrative and only meant to show change over time.

8 Estimating transformational impacts ex-ante

This chapter introduces the steps for conducting an ex-ante assessment of policies to understand the extent of transformation expected in the future. The steps include assessing the expected impacts for transformational change through assessment of characteristics in a qualitative way over the assessment period, while considering potential barriers, and aggregating the results of the assessment. The chapter describes a qualitative approach to assessing transformational impacts ex-ante and compiling the assessment towards an overall assessment.

Checklist of key recommendations

- Assess and qualitatively score each characteristic and explain the underlying assessment
- Aggregate the results for all characteristics and barriers to the process and outcome level

8.1 Assess characteristics

Undertaking a forward-looking assessment of outcome and process characteristics is a key step in understanding the extent of transformation expected. It is a *key recommendation* to qualitatively assess each characteristic and explain the underlying assessment. Table 8.1 provides scales for qualitatively assessing each characteristic; different scales are used to assess process and outcome characteristics. Tables 8.2 and 8.3 provide templates for explaining the assessment of process and outcome characteristics.

Ex-ante assessment of transformational change is a qualitative analysis based on comparison of the starting situation with the expected situation over the assessment period. Users can estimate future quantitative or qualitative values for selected indicators and compare these with corresponding values for the starting situation (as described in Section 7.1) to assess the extent of transformation expected.

Appendix A provides examples of indicators for process and outcome characteristics. For outcome characteristics, indicators relating to GHG and sustainable development impacts can be quantified using the ICAT methodologies for GHG impacts and sustainable development impacts.

When scoring individual characteristics, it is important to consider the overall level of ambition (described in Chapter 3), vision of transformational change (described in Chapter 5), alignment with the Paris Agreement temperature goal and the SDGs, and barriers. These are the aspirations against which individual characteristics are assessed while considering potential barriers. Alignment with the Paris Agreement temperature goal and the SDGs should inform the assessment, but users are not expected to translate these aspirational goals into quantitative benchmarks to assess their policies against. When scoring, the question to consider is the extent to which the policy can realistically be

FIGURE **8.1**

Overview of steps in the chapter

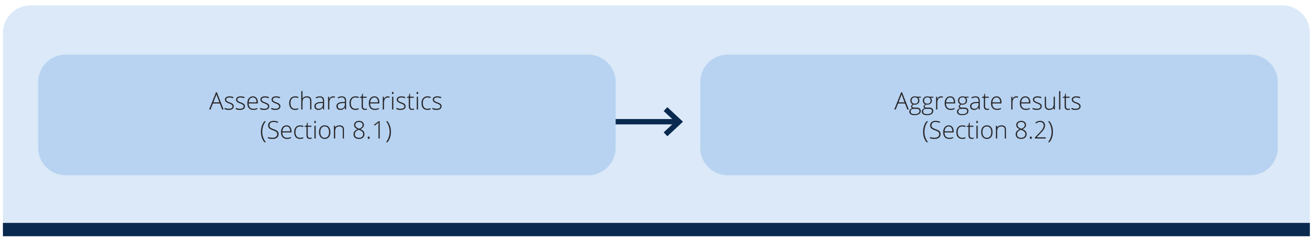


TABLE **8.1**

Scale for scoring characteristics

Score[a]	Description
Process characteristics	
4	It is very likely (e.g. a probability of 90–100%) that the policy will have a significant positive impact on this characteristic over the assessment period.
3	It is likely (e.g. a probability of 66–90%) that the policy will have a significant positive impact on this characteristic over the assessment period.
2	It is possible (e.g. a probability of 33–66%) that the policy will have a significant positive impact on this characteristic over the assessment period. Instances where the likelihood is not fully known or cannot be determined with certainty should be considered possible.
1	It is unlikely (e.g. a probability of 10–33%) that the policy will have a significant positive impact on this characteristic over the assessment period.
0	It is very unlikely (e.g. a probability of 0–10%) that the policy will have a significant positive impact on this characteristic over the assessment period.
Outcome characteristics – scale (for GHG and sustainable development impacts)	
3	The policy will result in GHG impacts that represent large emissions reductions, relative to the starting situation, at the level of assessment targeted. The policy will result in large net positive sustainable development impacts, relative to the starting situation, at the level of assessment targeted.
2	The policy will result in GHG impacts that represent moderate emissions reductions, relative to the starting situation, at the level of assessment targeted. The policy will result in moderate net positive sustainable development impacts, relative to the starting situation, at the level of assessment targeted.
1	The policy will result in GHG impacts that represent minor emissions reductions, relative to the starting situation, at the level of assessment targeted. The policy will result in minor net positive sustainable development impacts, relative to the starting situation, at the level of assessment targeted.
0	The policy will not result in GHG impacts relative to the starting situation at the level of assessment targeted. The policy will not result in sustainable development impacts, relative to the starting situation, at the level of assessment targeted.
–1	The policy will result in GHG impacts that represent a net increase in emissions, relative to the starting situation, at the level of assessment targeted. The policy will result in net negative sustainable development impacts, relative to the starting situation, at the level of assessment targeted.

TABLE **8.1,** continued

Scale for scoring characteristics

Score[a]	Description
Outcome characteristics – time for which outcome is sustained (for GHG and sustainable development impacts)	
3	The policy will result in GHG impacts that are very likely (e.g. a probability of 90–100%) to be sustained over the assessment period. The policy will result in sustainable development impacts that are very likely (e.g. a probability of 90–100%) to be sustained over the assessment period.
2	The policy will result in GHG impacts that are likely (e.g. a probability of 66–90%) to be sustained over the assessment period. The policy will result in sustainable development impacts that are likely (e.g. a probability of 66–90%) to be sustained over the assessment period.
1	The policy will result in GHG impacts that will possibly (e.g. a probability of 33–66%) be sustained over the assessment period. Instances where the likelihood is unknown or cannot be determined should be considered possible. The policy will result in sustainable development impacts that will possibly (e.g. a probability of 33–66%) be sustained over the assessment period. Instances where the likelihood is unknown or cannot be determined should be considered possible.
0	The policy will result in GHG impacts that are less likely (e.g. a probability of 10–33%) to be sustained over the assessment period. The policy will result in sustainable development impacts that are less likely (e.g. a probability of 10–33%) to be sustained over the assessment period.
–1	The policy will result in GHG impacts that are unlikely (e.g. a probability of 0–10%) to be sustained over the assessment period and risk being reversed to negative impacts. The policy will result in sustainable development impacts that are unlikely (e.g. a probability of 0–10%) to be sustained over the assessment period and risk being reversed to negative impacts.

[a] The scale uses numbers as a simple reference to qualitative scores explained in this table. When aggregating across characteristics, the number scores should not be used in a numerical way (e.g. they should not be averaged to obtain category-level scores).

expected to achieve the desired transformation described by a characteristic within the assessment boundary and assessment period defined by the user. A policy is more likely to impact any given characteristic if the characteristic represents a key element of the policy and the policy includes measures to address existing barriers. Impacts that are expected to happen after the assessment period can be captured by conducting a later analysis covering the relevant period.

The qualitative assessment of expected future developments is challenging and can be subjective. Therefore, a transparent, inclusive process for conducting the assessment – describing individual steps and providing an explicit rationale for decisions – is essential to ensure the robustness of results. To support the qualitative assessment of characteristics and inform the scoring, users are encouraged to use qualitative and quantitative indicators provided in Appendix A and discussed in Chapter 10. It can be helpful to collect data on the current values of selected indicators and assess their expected future values to arrive at the qualitative assessment of characteristics. It may not be necessary to collect information on all indicators required for ex-post assessment and monitoring, particularly when the objective of analysis is to decide between different measures. However, starting with data collection at an early stage of implementation will improve the ability to monitor and evaluate at later stages.

To minimize subjectivity and bias, it is advisable to involve a wide range of stakeholders and experts in the exercise. A multi-stakeholder process to assess individual characteristics adds further value by allowing an in-depth discussion, which can lead to fruitful and effective improvements in the design of policies and measures. The ICAT *Stakeholder Participation Guide* provides information on identifying and understanding stakeholders (Chapter 5), and establishing multi-stakeholder bodies (Chapter 6).

TABLE **8.2**

Template for ex-ante assessment for process characteristics (using hypothetical solar PV policy example)

Category	Character-istics	Score	Rationale for score	Indicator	Indicator value at starting situation (2015)[a]	Indicator value for expected transfor-mation (2030)[a]
Technology	Research and development (R&D)	0	The policy does not channel resources into R&D, although it is recognized that increased investment in R&D for energy storage and grid flexibility is needed to support deployment of solar at larger scales.	Amount of related public and private R&D investment in the country	$100,000	$500,000
	Adoption	3	Financial subsidies and feed-in tariffs have been widely used to increase adoption of clean technology around the world, and a similar result can be realistically expected in this case. These incentives are likely to kick-start the local rooftop industry, thus addressing the barrier of a weak domestic solar industry.	Number of new demonstra-tion projects for rooftop solar PV initiated (annual)	2	10
				% of annual electricity consumption supplied by rooftop solar PV	Less than 1%	10%

TABLE **8.2,** continued

Template for ex-ante assessment for process characteristics (using hypothetical solar PV policy example)

Category	Character-istics	Score	Rationale for score	Indicator	Indicator value at starting situation (2015)[a]	Indicator value for expected transfor-mation (2030)[a]
Technology, continued	Scale-up	2	Financial subsidies and feed-in tariffs have been widely used to scale up clean technology around the world. Together, these will address the barrier of high upfront financial investment needed for rooftop solar PV and improve the payback period on solar. Greater availability of solar panels and skilled workforce for installation and maintenance by kick-starting the local service industry will support the growing demand. But the limited focus on rooftop solar PV does not help in realizing the full potential of solar. It is not expected that this policy alone will facilitate scale-up of a broader set of solar technologies in the country and support grid readiness, which is necessary for systemic transition.	Share of installed rooftop solar PV in the solar sector (nationwide or statewide)	5%	30%
				Share of solar power (utility scale, rooftop, off-grid) in the electricity sector	8%	40%
				Share of RE in the country as a percentage of electricity consumption	10%	50%
Agents of change	Entrepre-neurs	2	The policy is likely to influence entrepreneurs and investors to invest in solar-related businesses and capitalize on the financial incentives available. High upfront financial investment is a significant barrier in the country that is currently preventing businesses and entrepreneurs from investing in rooftop solar technology. The broader solar sector is likely to remain untapped, however, and not likely to see a similar influx of new investments in the absence of targeted measures to fuel growth in the sector.	Volume of venture capital investments	$100 million	$1 billion

TABLE **8.2,** continued

Template for ex-ante assessment for process characteristics (using hypothetical solar PV policy example)

Category	Character-istics	Score	Rationale for score	Indicator	Indicator value at starting situation (2015)[a]	Indicator value for expected transfor-mation (2030)[a]
Agents of change, continued	Coalitions of advocates	1	The solar PV policy is not likely to support the creation of coalitions and networks. It is not likely to facilitate engagement between relevant actors to develop an ecosystem that encourages other forms of solar that are more suitable to achieving scale or increased R&D.	Number of projects/ research centres involving university–industry collaboration	1	10
	Beneficiaries	-	Not relevant	-	-	-
Incentives	Economic and non-economic	3	The solar PV policy will use subsidies and feed-in tariff to increase technology penetration. It is expected that the incentives will promote consumer demand, which in turn will increase the local service industry. This will help address barriers such as lack of technical personnel for installation and maintenance, and give a boost to grid-connected solar.	Number of new economic incentives in place for grid rooftop solar	1	5
				Number of new incentives for solar (all kinds of technologies)	1	15
				Number of new incentives to promote different forms of RE	2	15
	Disincentives	0	The solar PV policy is not likely to use disincentives to achieve its goals, nor does it seem realistic that disincentives will be extensively used over the assessment period to promote clean energy in the country. As identified for barriers, the country lacks a comprehensive strategy to discourage fossil fuel use, and it does not seem likely that there will be political will to overcome this in the foreseeable future.	Number of new disincentives to discourage use of fossil fuels to generate electricity	1	1
				Size of fossil fuel subsidy	$10 million	$15 million

TABLE **8.2,** continued

Template for ex-ante assessment for process characteristics (using hypothetical solar PV policy example)

Category	Character-istics	Score	Rationale for score	Indicator	Indicator value at starting situation (2015)[a]	Indicator value for expected transfor-mation (2030)[a]
Incentives, continued	Institutional and regulatory	2	The solar PV policy is likely to lead to the development of new agencies and regulations to facilitate implementation in states. However, a time lag is expected, with some front runners leading the way, while other states gradually follow as experience builds. This experience, and creation of institutions and regulatory mechanisms will support the overall sector in the long run.	Number of new regulations and institutions set up to promote solar	3	10
				Number of new regulations and institutions set up to promote RE	3	6
Norms	Awareness	-	Not relevant	-	-	-
	Behaviour	1	The solar PV policy is unlikely to influence consumer behaviour and shift preferences away from carbon-intensive electricity in a significant manner. Further, in the absence of a strategy to discourage fossil fuel use, as identified for barriers, and deployment of solar (or RE) across different technologies to achieve scale, there is not expected to be any widespread change in behaviour.	Number of new measures to influence consumer behaviour in favour of solar/RE	None	1
	Social norms	0	The solar PV policy is not likely to influence societal norms.	Number of emerging leaders/ role models favouring renewables (e.g. states leading the transition to RE)	None	1 or 2

Abbreviations: -, not applicable; RE, renewable energy

Note: The table builds on the information generated in the previous step, which is shown in the grey columns.

[a] Indicator values are purely illustrative and only meant to show change over time.

TABLE **8.3**

Template for ex-ante assessment for outcome characteristics (using hypothetical solar PV policy example)

Category	Characteristics	Score	Rationale for score	Indicator	Indicator value at starting situation (2015)[a]	Indicator value for expected transformation (2030)[a]
Scale of outcome – GHGs	Macro level	-	Outside the assessment boundary	Users can choose to monitor characteristics outside the assessment boundary.	Indicator value if monitoring outside the assessment boundary	Indicator value if monitoring outside the assessment boundary
	Medium level	1	The policy aimed at national-level impacts is likely to achieve its 2022 target and mid-term vision, which are ambitious for rooftop solar PV. But, given the size of the electricity sector and the demand, there is potential to deploy far greater amounts of renewable energy, including solar, to replace fossil fuel–based power.	Installed capacity of grid-connected rooftop solar power plants (up to 500 kW) at national level	1 GW	25 GW
				GHG emissions avoided (annually) as a result of solar PV deployment (calculated assuming solar PV generation replaced a baseline scenario of fossil fuel mix generation)	50,000 tCO_2e	10 million tCO_2e
	Micro level	2	A few states are expected to be front runners and lead in rooftop solar; others are likely to achieve moderate growth in solar over the assessment period.	% of rooftop solar PV in the electricity mix at a subnational level	5% for state 1 10% for state 2	20% for state 1 25% for state 2
Scale of outcome – sustainable development	Macro level	-	Outside the assessment boundary	Users can choose to monitor characteristics outside the assessment boundary.	Indicator value if monitoring outside the assessment boundary	Indicator value if monitoring outside the assessment boundary
	Medium level	1	Growth in solar is expected to be accompanied by a minor boost to employment in this sector at national level.	Net employment generation in solar sector at national level (calculated assuming the employment created by alternative technology – fossil fuels – of same capacity)	10,000	1 million

TABLE **8.3,** continued

Template for ex-ante assessment for outcome characteristics (using hypothetical solar PV policy example)

Category	Charac-teristics	Score	Rationale for score	Indicator	Indicator value at starting situation (2015)[a]	Indicator value for expected transfor-mation (2030)[a]
Scale of outcome – sustain-able develop-ment, continued	Micro level	2	In some regions, a net large positive impact on job creation is expected, whereas in many others the impact is likely to be moderate.	Net employment generation in solar sector in province X (calculated assuming the employment created by alternative technology – fossil fuels – of same capacity)	600 in state 1 1,000 in state 2	40,000 in state 1 30,000 in state 2
Time frame over which outcome is sustained – GHGs	Long term	-	Beyond the assessment period (2015–2030)	Users can choose to monitor characteristics beyond the assessment period.	Indicator value if monitoring beyond the assessment period	Indicator value if monitoring beyond the assessment period
	Medium term	2	In the medium term, no reversal of impacts is expected, and the gains made by the solar PV policy are likely to be sustained over the assessment period.	Trend in installed capacity of grid-connected rooftop solar power plants (up to 500 kW)	-	Sustained growth from 2022 to 2030
	Short term	3	In the short term, no reversal of impacts is expected, and the gains achieved are likely to be sustained over the assessment period and beyond.	Trend in installed capacity of grid-connected rooftop solar power plants (up to 500 kW)	-	Sustained growth through 2022
Time frame over which outcome is sustained – sustainable develop-ment	Long term	-	Beyond the assessment period (2015–2030)	Users can choose to monitor characteristics beyond the assessment period.	Indicator value if monitoring beyond the assessment period	Indicator value if monitoring beyond the assessment period
	Medium term	2	Employment generation is likely to be sustained with increase in rooftop solar projects.	Trend in employment generation in solar sector	-	Sustained growth from 2022 to 2030
	Short term	3	Employment generation is highly likely to be sustained over the short term with increase in rooftop solar projects.	Trend in employment generation in solar sector	-	Sustained growth through 2022

Abbreviations: -, not applicable

Note: The table builds on the information generated in the previous step, which is shown in the grey columns.

[a] Indicator values are purely illustrative and only meant to show change over time.

8.2 Aggregate results

To arrive at a more general conclusion on the transformational potential of a policy, it is necessary to aggregate the results from the in-depth assessment conducted in the previous steps. It is a *key recommendation* to aggregate the results for all characteristics and barriers to the process and outcome level. To do so, users should use Tables 8.4, 8.5 and 8.6, and Figure 8.2.

8.2.1 Aggregating to the category level

Assessment at the category level of processes (i.e. technology, agents of change, incentives, norms – Table 8.4) and outcomes (scale of outcome, time frame over which outcome is sustained – Table 8.5) is based on the assessment of individual characteristics in Tables 8.2 and 8.3.

Users should use the scale in Table 8.1 to score each process and outcome category. This process should include consultation with experts and stakeholders to qualitatively assess each category and assign a score informed by the scores for individual characteristics, with documentation of the rationale. Tables 8.4 and 8.5 provide templates for describing the results. These tables do not assess or score how well the policy is being implemented; rather, they show the potential impact of implementation of the policy in realizing transformational change in a given context.

When assessing the potential impact of a policy at the category level, it is important to assess the degree to which categories of transformational processes are important to achieving the vision for transformational change in the particular context. For example, technology may be more important in the pre-development phase when a lack of available solar PV hardware is preventing a shift to modern lighting in remote areas. In contrast, a focus on norms may be more critical in a context where solar PV technology is available but vested interests promote coal-based electricity for lighting. Users can document the relative importance of each process category by using percentages, as shown in Table 8.4. The relative importance of each category is expressed as a share of 100%. The relative importance of all four process categories should add up to 100%.

Users should arrive at a score at the category level in Table 8.5 based on the individual scores for outcome characteristics in Table 8.3, and provide adequate justification. They should consider the relative importance of each characteristic within a category to arrive at a score for the category. For example, large-scale emissions reductions in one or two subnational regions with very little impact at the national level may not translate to a high score for the GHG category. Changes that are sustained over the long term, even though there may have been some challenges in the short and medium terms, may receive a higher score at the category level. This is because the outcome suggests that challenges are being overcome and changes are becoming more entrenched over time.

TABLE **8.4**

Template for describing results of the ex-ante analysis at process category level (using solar PV policy example)

Category	Score	Rationale for scoring	Relative importance of category and rationale
Technology	2	The policy will possibly positively influence the penetration of rooftop solar PV in the country. However, with the narrow focus on rooftop solar, it is not likely to result in adoption and scale-up of other forms of solar technologies, which can bring about a large-scale, systemic change in the sector. Research and development on issues such as grid integration and energy storage options are not likely to be addressed as part of the policy, and this further prevents large-scale deployment of solar (and other renewable energy technologies).	30% The country is still in the pre-development phase, which emphasizes the importance of introducing solar PV technology.

TABLE **8.4,** continued

Template for describing results of the ex-ante analysis at process category level (using solar PV policy example)

Category	Score	Rationale for scoring	Relative importance of category and rationale
Agents of change	2	Overall, the policy is likely to engage entrepreneurs in deploying rooftop solar PV.	30% Entrepreneurs and coalitions who can introduce and lead technology penetration are equally important to technology change.
Incentives	2	The policy is likely to fully use financial incentives, and institutions and regulations; however, it is not likely to use disincentives to discourage use of fossil fuels. Incentives that focus on rooftop solar are not likely to give a boost to utility-scale solar.	30% In a developing country context, financial incentives and institutional capacity at all levels are crucial to support technology and agents of change.
Norms	0	The policy is not likely to bring about significant shifts in this category.	10% Demonstrating the benefits of solar PV technology is more important than changing norms in society at this early stage of transition.

TABLE **8.5**

Template for describing results of the ex-ante analysis at outcome category level (using solar PV policy example)

Category	Score	Rationale for scoring
Scale of outcome – GHGs	1	The policy is expected to result in minor GHG and sustainable development impacts, relative to the starting situation, at national level.
Scale of outcome – sustainable development	2	A net positive moderate increase in jobs is likely, even though some regions in the country are expected to experience below-average employment generation.
Time frame over which outcome is sustained – GHGs	3	Based on the policy's expected impact on adoption and scale-up, it is highly likely that the policy will lead to sustained reductions in emissions through increasing rooftop solar PV over time.
Time frame over which outcome is sustained – sustainable development	2	It is likely that all regions will experience sustained growth in employment in the solar sector over time.

8.2.2 Aggregating to the impact level

Next, users should arrive at an overall assessment at the impact level, informed by the assessment of processes and outcomes at the category level (as described in Tables 8.4 and 8.5). Users apply the scale provided in Table 8.6 to qualitatively score the extent of transformation expected from the policy at both the outcome level and the process level. Users should arrive at the final result based on the scores in Tables 8.4 and 8.5 through objective analysis of these scores, and with inputs from stakeholders and experts. The final assessment result indicates the extent and sustained nature of transformation expected from the policy, and how likely it is that this expected transformation can be realized, given the design of the intervention (which contributes to both the scale and entrenchment of the change).

Figure 8.2 illustrates the matrix of possible qualitative scores for process and outcome impacts. If the final result for the policy falls in the green area, the policy is expected to be transformational. If it is in the red area, the policy is not expected to be transformational. The colour gradient of the matrix reflects the qualitative nature of the analysis and the high level of uncertainty of the assessment.

Users can illustrate their final result in the figure, as has been done in Figure 8.2 for the hypothetical solar PV policy example. Users should also document the underlying rationale for their final assessment result and explain the contribution of process characteristics to achieving (or not) the transformational outcome.

For the hypothetical solar PV policy example, it is possible that the policy will facilitate transformation, even though the extent of potential transformation is expected to be minor (Figure 8.2). The policy is likely to give a boost to solar PV in the country, particularly within the rooftop solar subsector, and is expected to be well implemented and produce sustained results. An increase in solar PV penetration can create the foundation for institutional and regulatory structures to support renewables more broadly, contribute to energy access, engage entrepreneurs and markets, develop relevant skills, generate jobs and make solar power more visible. However, the policy is expected to fall short of bringing about a systemic transition across the solar or renewable energy sector. Systemic changes across the broader solar/renewable energy sector may be aided by some of the developments under the rooftop policy, but this policy alone is not able to drive further transformative changes in the sector. Complementary policies that facilitate solar energy deployment at a utility scale, and technological advances in grid integration and energy storage to absorb increased amounts of intermittent renewable power are needed to potentially scale up the share of solar in the country. It would be useful to assess a potential package of policies in the sector that go beyond rooftop solar to understand their collective impact on transforming the renewable energy sector.

Box 8.1 provides a case study example of how results of an ex-ante assessment of transformational impacts are presented and illustrated, for the Tonga Energy Efficiency Master Plan.

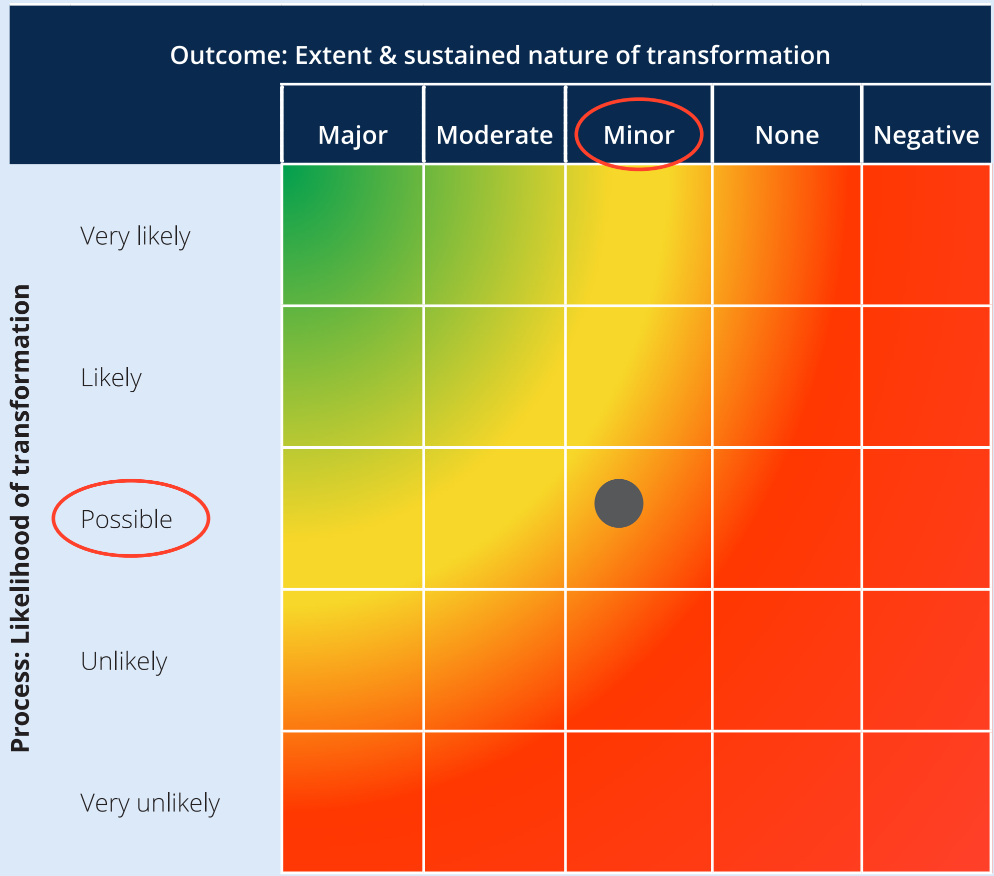
TABLE **8.6**

Scale for scoring process and outcome

Outcome – extent and sustained nature of transformation	Score	Process – likelihood of transformational outcome	Score
Major	3	Very likely	4
Moderate	2	Likely	3
Minor	1	Possible	2
None	0	Unlikely	1
Negative	–1	Very unlikely	0

FIGURE **8.2**

Transformational impact matrix (using the solar PV policy example)



BOX **8.1**

Case study – Tonga Energy Efficiency Master Plan

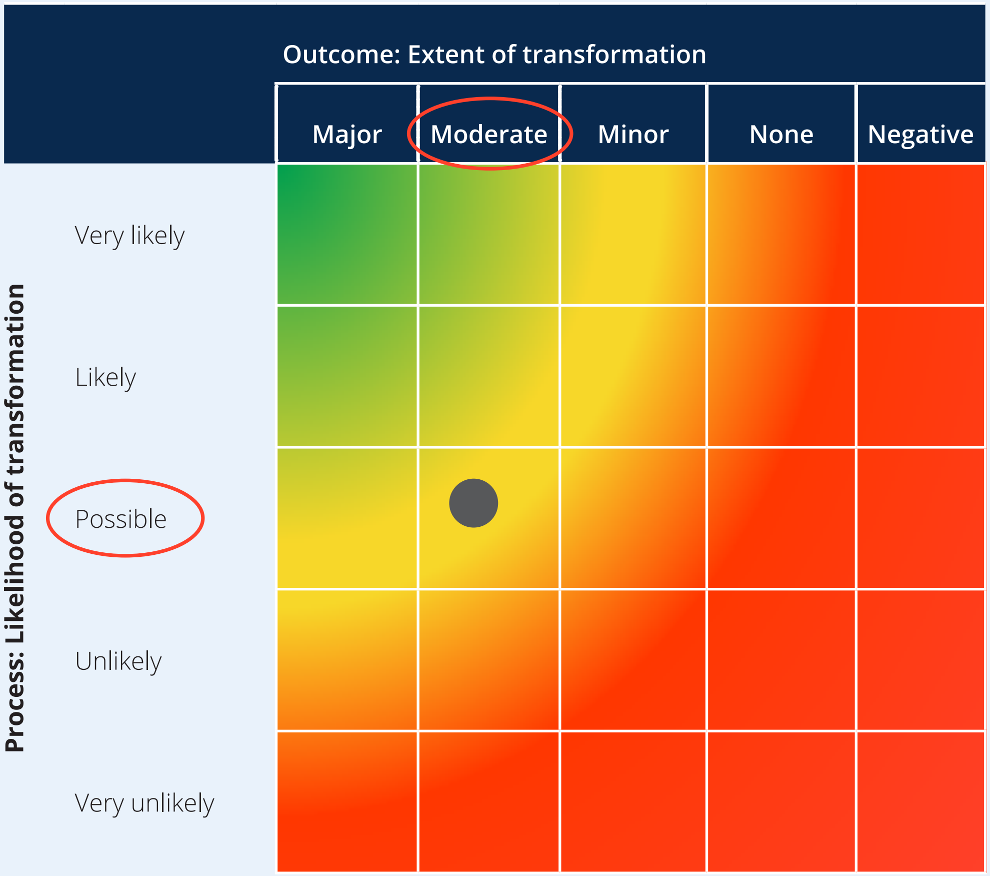
At the request of the Government of Tonga, the Climate Technology Centre and Network (CTCN) worked closely with the Tongan Energy Department in 2018 to develop a Tonga Energy Efficiency Master Plan (TEEMP) for adjustment and adoption by the relevant Tongan entities. The TEEMP encompasses electricity use and ground transportation, and complements the approach of the 2009 Tonga Energy Road Map 2010–2020 (TERM). The TERM focuses on reducing Tonga's fossil fuel dependence through increased energy efficiency and improved supply chains, to mitigate the price volatility of imported products, reduce GHG emissions and improve national energy security.

The CTCN applied the ICAT *Transformational Change Methodology* to assess the expected transformational impact of TEEMP. In doing so, the CTCN also gained insights into how the Technology Mechanism can play a strategic role in promoting transformational change, as requested in the Technology Framework of the Paris Agreement to the United Nations Framework Convention on Climate Change. The assessment was performed ex-ante from January to April 2019.

The assessment concluded that the extent of transformation expected to be achieved by the TEEMP is moderate, and the outcome will possibly be sustained over time, as shown below.

FIGURE **8.3**

Transformational impact matrix for the Tongan example



BOX **8.1,** continued

Case study – Tonga Energy Efficiency Master Plan

The basis for this conclusion on the expected transformational impact of the policy is the aggregation of results in the previous steps. Assessment at the category level of processes and outcomes (i.e. technology, incentives, norms, scale of outcome, sustained nature of outcome) is based on the assessment of individual characteristics. Figures 8.4–8.6 illustrate a breakdown of the overall assessment result to the level of disaggregated process and outcome characteristics.

FIGURE **8.4**

Ex-ante assessment of process characteristics

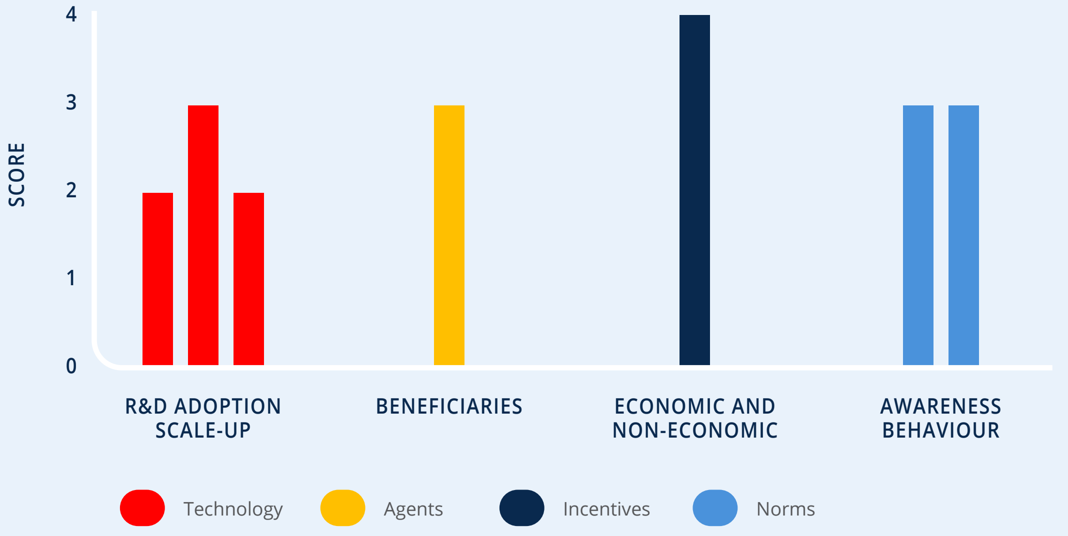
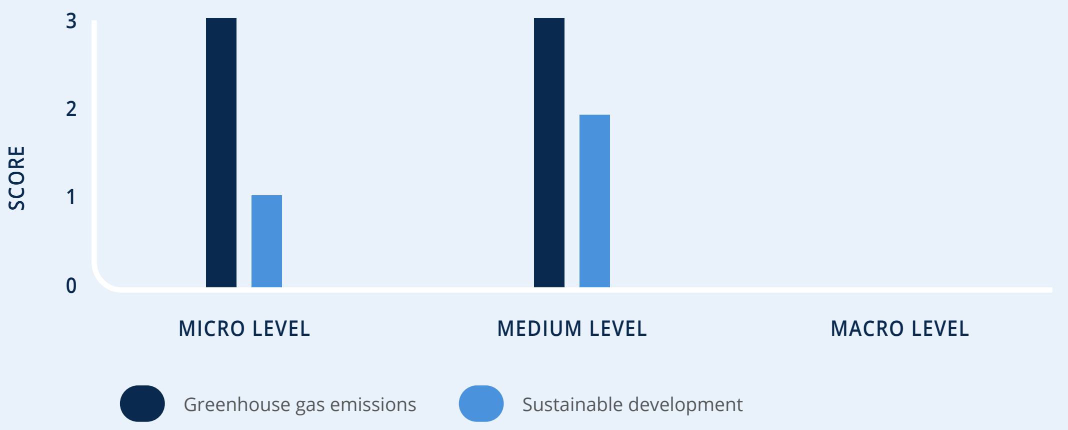


Figure 8.5 illustrates the extent to which the TEEMP may result in GHG and sustainable development impacts, relative to the starting situation, at the levels of assessment targeted.

FIGURE **8.5**

Scale of outcome



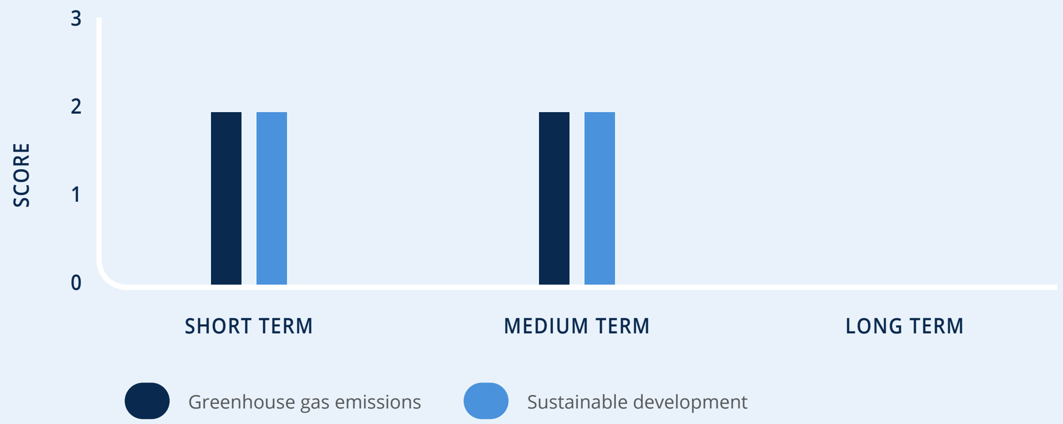
BOX **8.1**, continued

Case study – Tonga Energy Efficiency Master Plan

Figure 8.6 illustrates the extent to which policies may result in GHG or sustainable development impacts that are likely to be sustained over the assessment period.

FIGURE **8.6**

Likelihood of outcome being sustained over time



The overall and disaggregated assessment results indicate that the TEEMP, if implemented, is expected to result in GHG emissions reductions and moderate sustainable development impacts, such as job creation, energy security and reduced energy intensity at multi-scale levels.

The expected transformational impact may be achieved through:

- scaling up national capacity
- increasing access to energy efficiency technologies and conservation measures
- engaging agents of change such as consumers and beneficiaries
- using financial and other incentives and regulations for behavioural change
- strengthening national institutions to implement the proposed policies in the TEEMP.

The results suggest that the TEEMP is potentially transformational if some critical local conditions are met:

- The TEEMP is adopted, adjusted and implemented by relevant Tongan entities.
- Further attention is given to some of the process and outcome characteristics to ensure sustained technical capacity-building.
- A more comprehensive focus on adoption and scale-up of proposed energy efficiency technologies and conservation measures is put in place, to avoid a relapse to a high-carbon pathway.