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GHG PROTOCOL
POLICY AND ACTION STANDARD

AN ACCOUNTING AND REPORTING STANDARD FOR ESTIMATING THE GREENHOUSE GAS EFFECTS OF POLICIES AND ACTIONS

GREENHOUSE GAS PROTOCOL

About WRI

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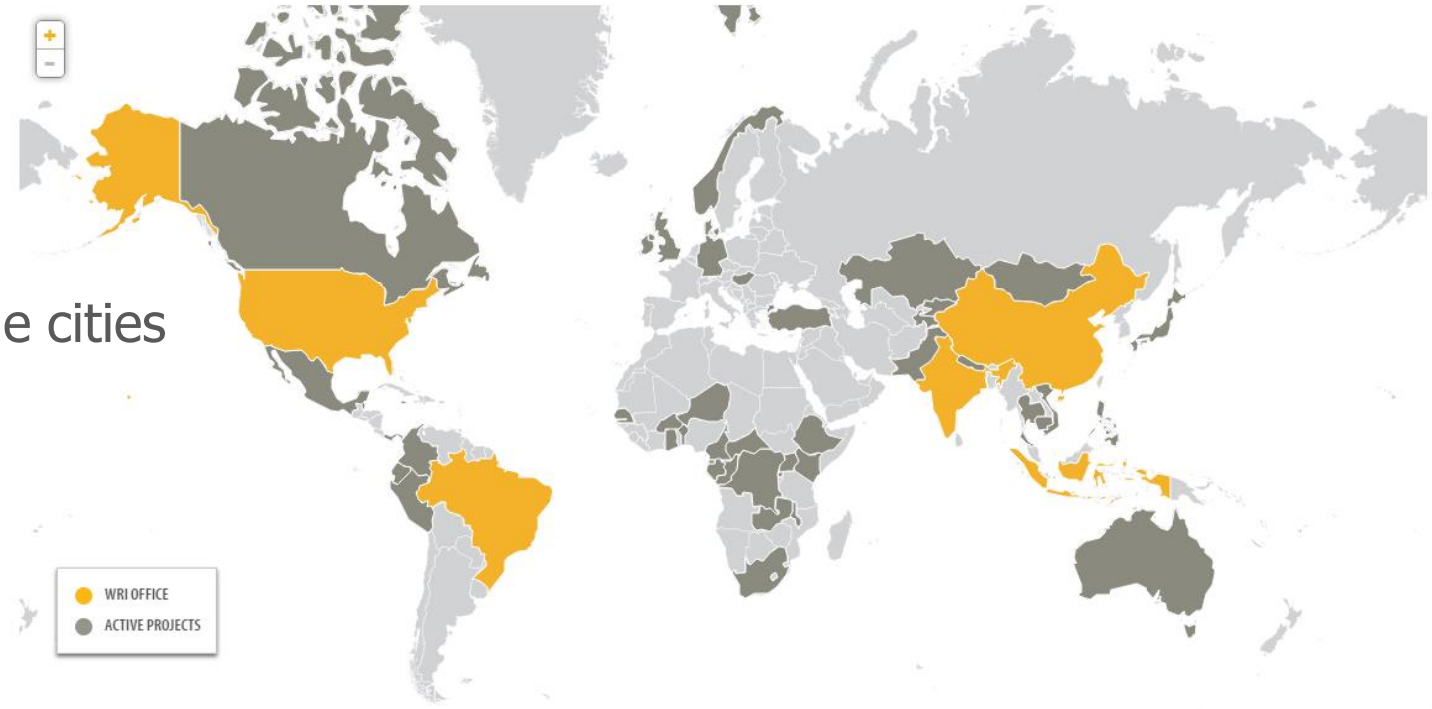
- 450+ staff
- Issue areas:
  - Climate
  - Energy
  - Food
  - Forests
  - Water
  - Sustainable cities



About the Greenhouse Gas Protocol

- The GHG Protocol sets the global standard for how to measure, manage, and report greenhouse gas emissions
- Convened in 1998 by WRI and WBCSD
- Provides:
  - Greenhouse gas accounting and reporting standards
  - Sector guidance
  - Calculation tools
  - Trainings (webinar, e-learning and in-person training)
- Standards and tools available free of charge at www.ghgprotocol.org

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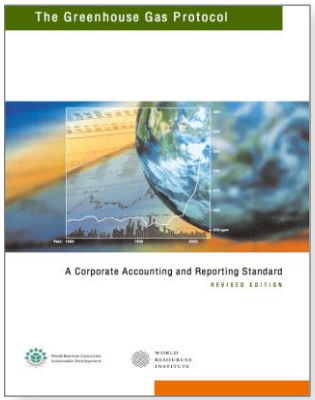
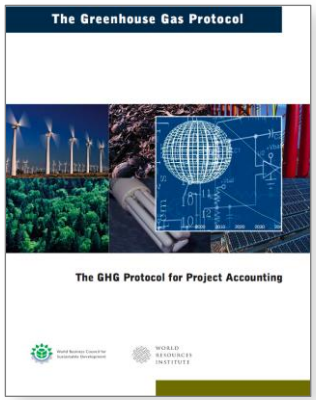
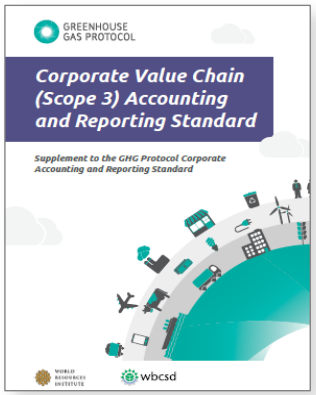
Greenhouse Gas Protocol standards



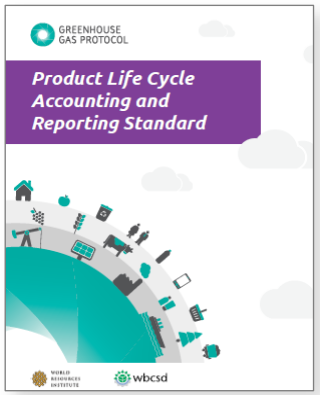
Corporate Standard



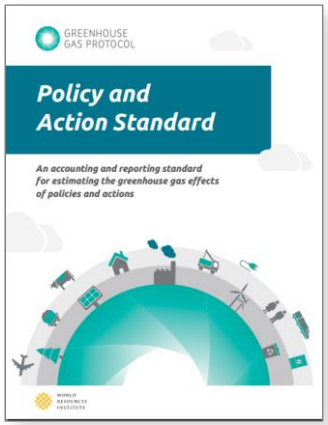
Project Protocol



Corporate Value Chain (Scope 3) Standard

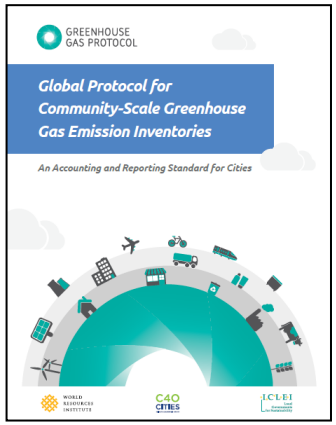


Product Standard



Policy and Action Standard

Mitigation Goal Standard



Global Protocol for Cities (GPC)

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Relationship of different standards

Type of GHG measurement	Countries	Cities and subnational jurisdictions	Companies/ organizations
GHG emissions inventory	IPCC *Guidelines for National Greenhouse Gas Inventories*	WRI/C40/ICLEI *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories*	GHG Protocol *Corporate Standard*
GHG reductions	GHG Protocol *Policy and Action Standard* (for policies and actions) *GHG Protocol for Project Accounting* (for projects)		
Goal progress	GHG Protocol *Mitigation Goals Standard*		GHG Protocol *Corporate Standard*

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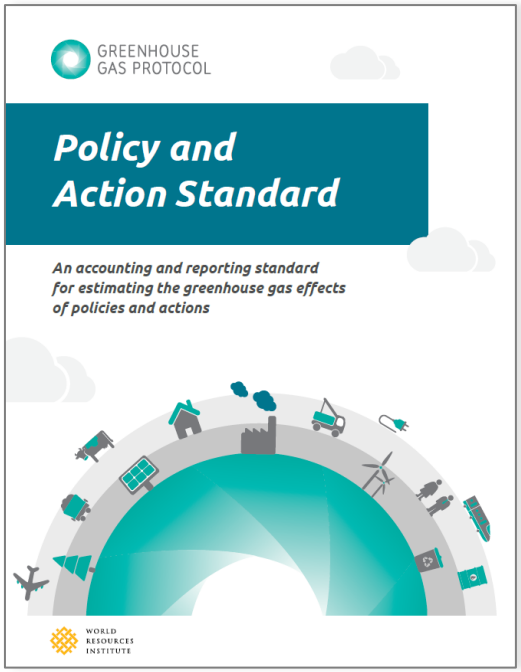
New standards



How to estimate the greenhouse gas effects of policies and actions

How to assess progress toward national or subnational GHG emissions reduction goals

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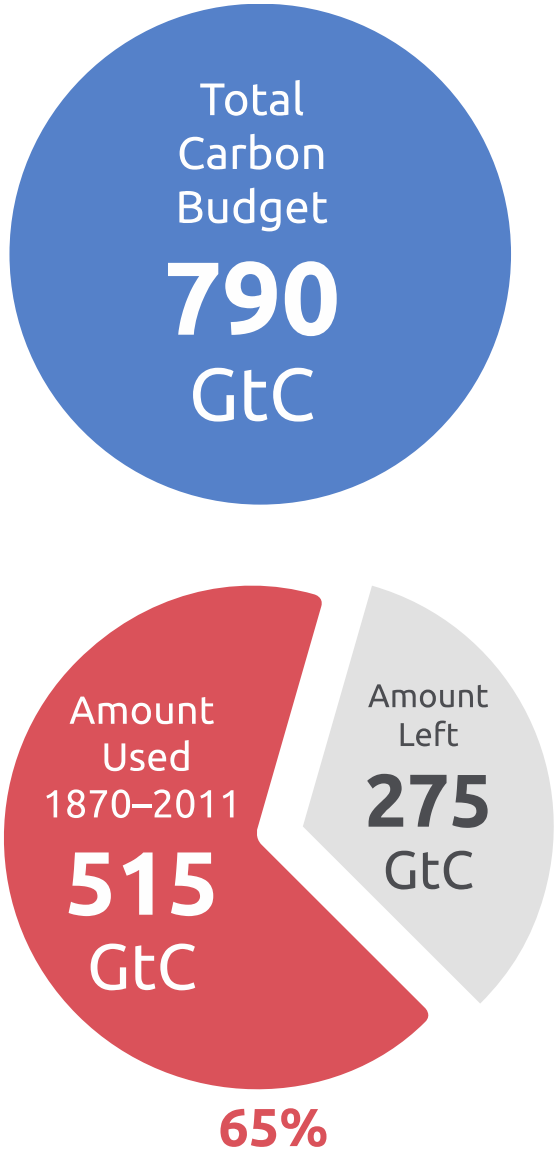
New standards can help answer:

- Are countries on track to meet their climate commitments?
- How effective are local or national policies to drive emissions reductions?
- Will countries' actions add up to limit warming to under 2 degrees Celsius?



Source for carbon budget: IPCC AR5 Synthesis Report

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Need for new standards

- New diversity of national and subnational GHG reduction goals (e.g., INDCs)
- New needs for estimating GHG effects of policies and actions (e.g., NAMAs)
- Lack of consistency and transparency in current approaches
- Lack of capacity
- No international guidelines until now

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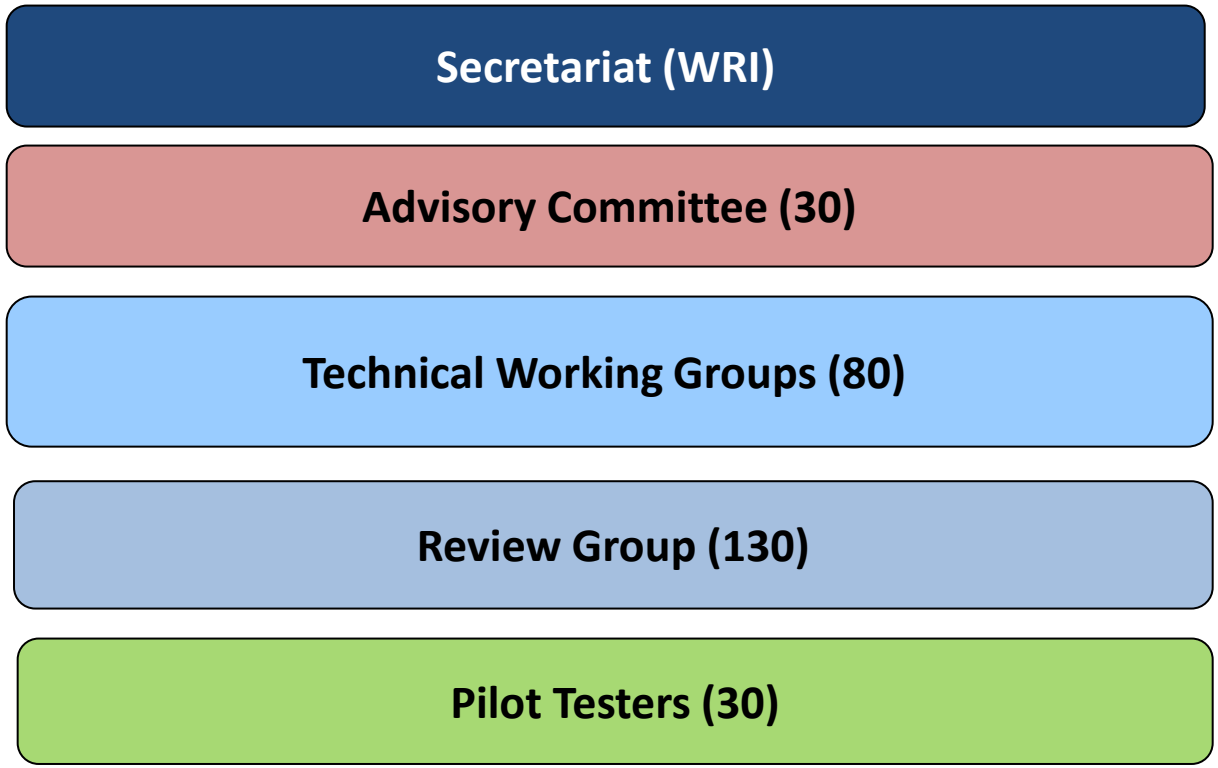
Standard development process

- 270 participants in 40 countries; three year process



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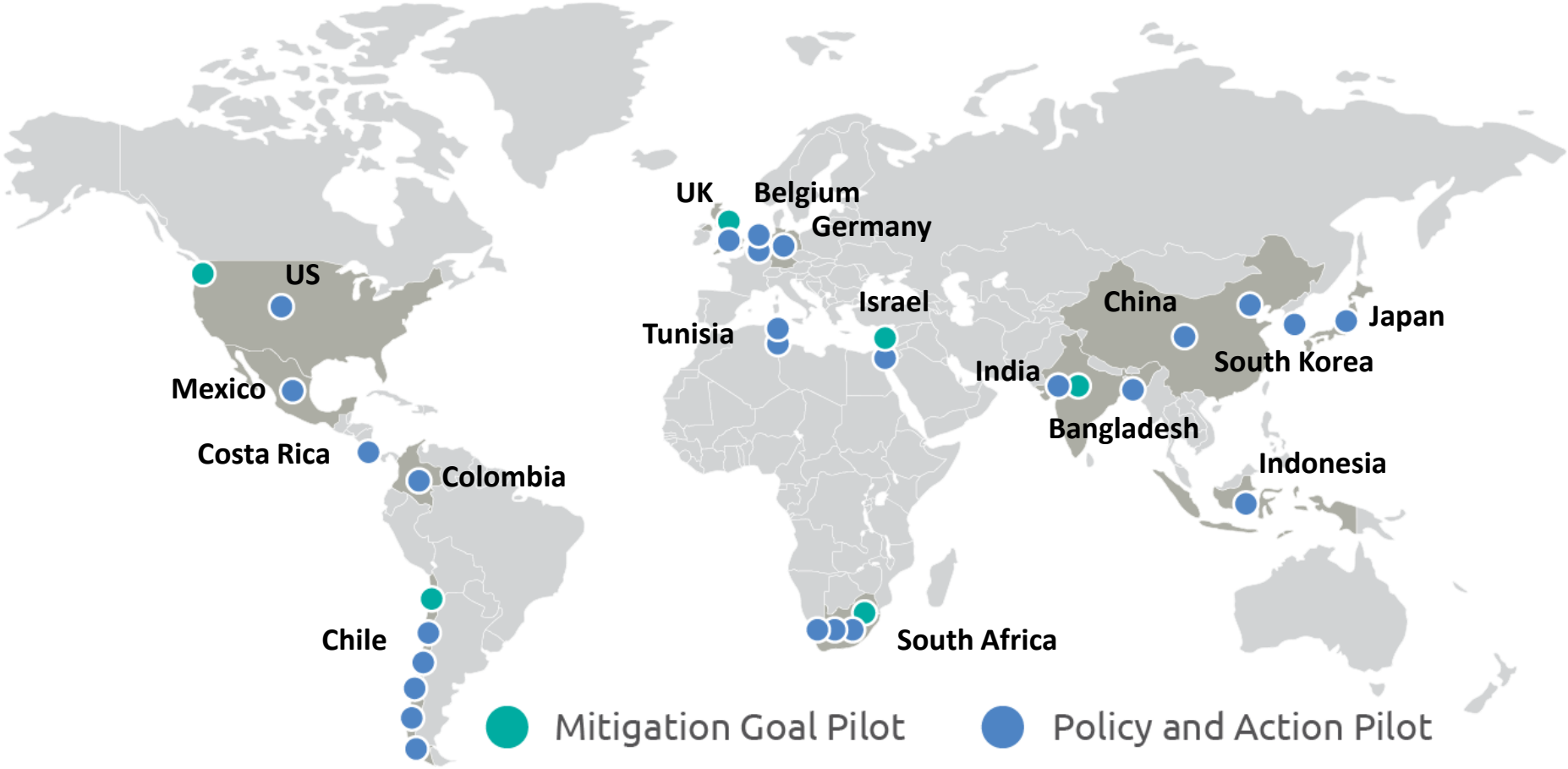
Pilot testing: 32 policies/goals in 20 countries/cities



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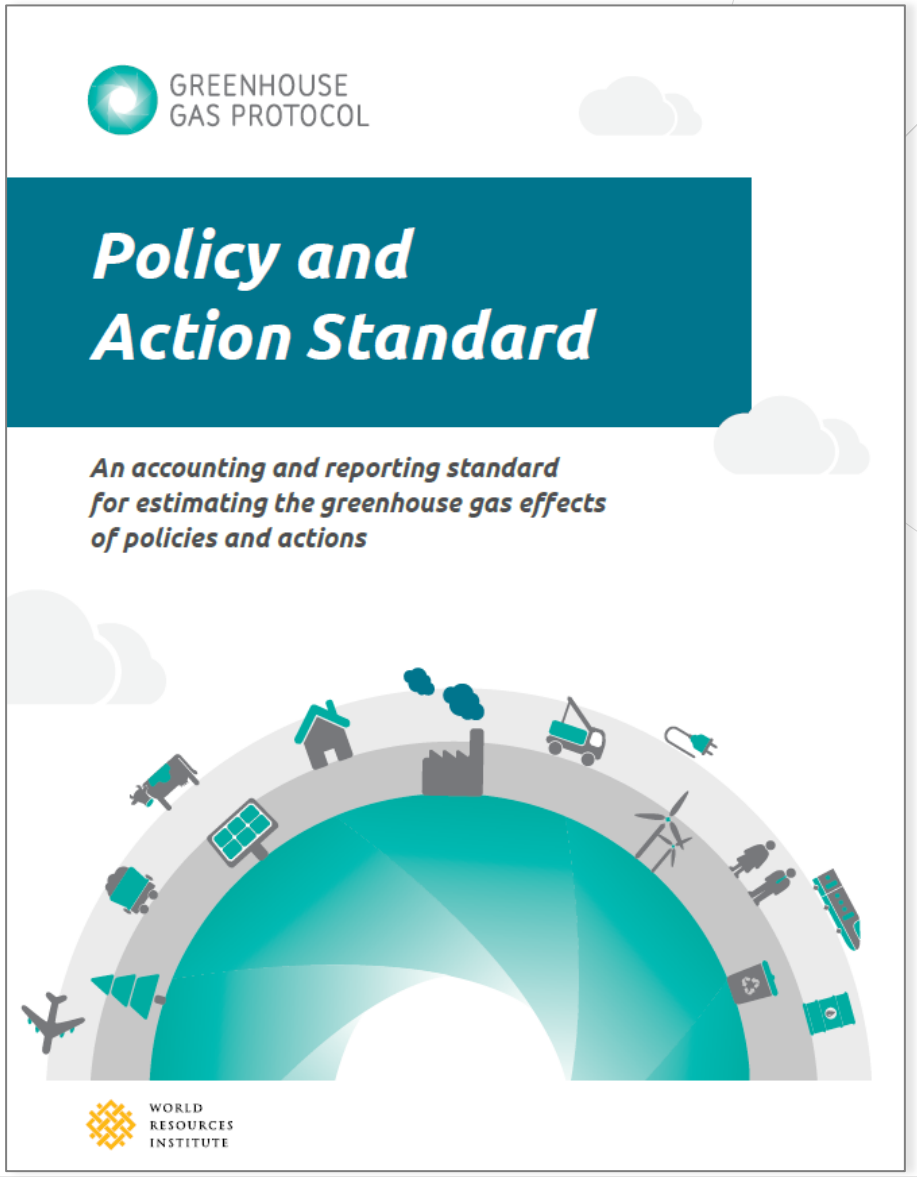

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Purpose of the standard

- To help users **assess** the GHG effects of specific policies and actions in an accurate, consistent, transparent, complete, and relevant way
- To help policymakers **develop effective strategies** for managing and reducing GHG emissions
- To support consistent and transparent **reporting** of emissions impacts and policy effectiveness
- To create more international **consistency and transparency** in the way the GHG effects of policies and actions are estimated

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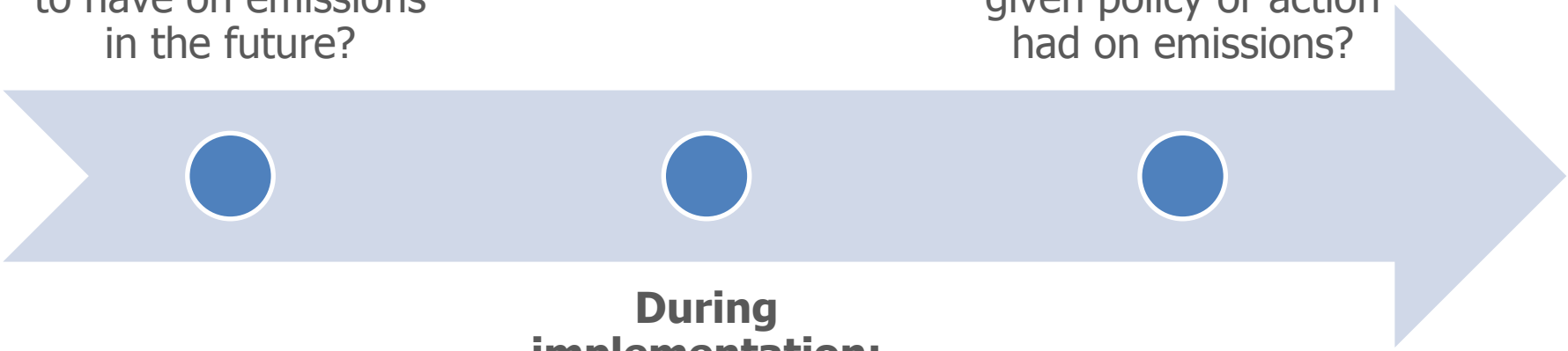
When the standard can be used

Before implementation:
What effect is a given policy or action likely to have on emissions in the future?

During implementation:
Is a given policy or action on track and delivering expected results?

After implementation:
What effect has a given policy or action had on emissions?



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Intended users

- Governments (city, sub-national, national)
- Donor agencies and financial institutions
- Businesses
- NGOs/research institutions

Applicability

- All types of policies/actions
- All countries
- Policies and actions that increase or decrease GHG emissions
- All sectors: AFOLU, energy supply, industry, residential and commercial buildings, transport, waste

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Types of policies and actions

Regulations and standards	Taxes	Subsidies
Emissions trading programs	Voluntary agreements	Information instruments
Infrastructure programs	Implementation of new technologies, processes, or practices	Financing and investment

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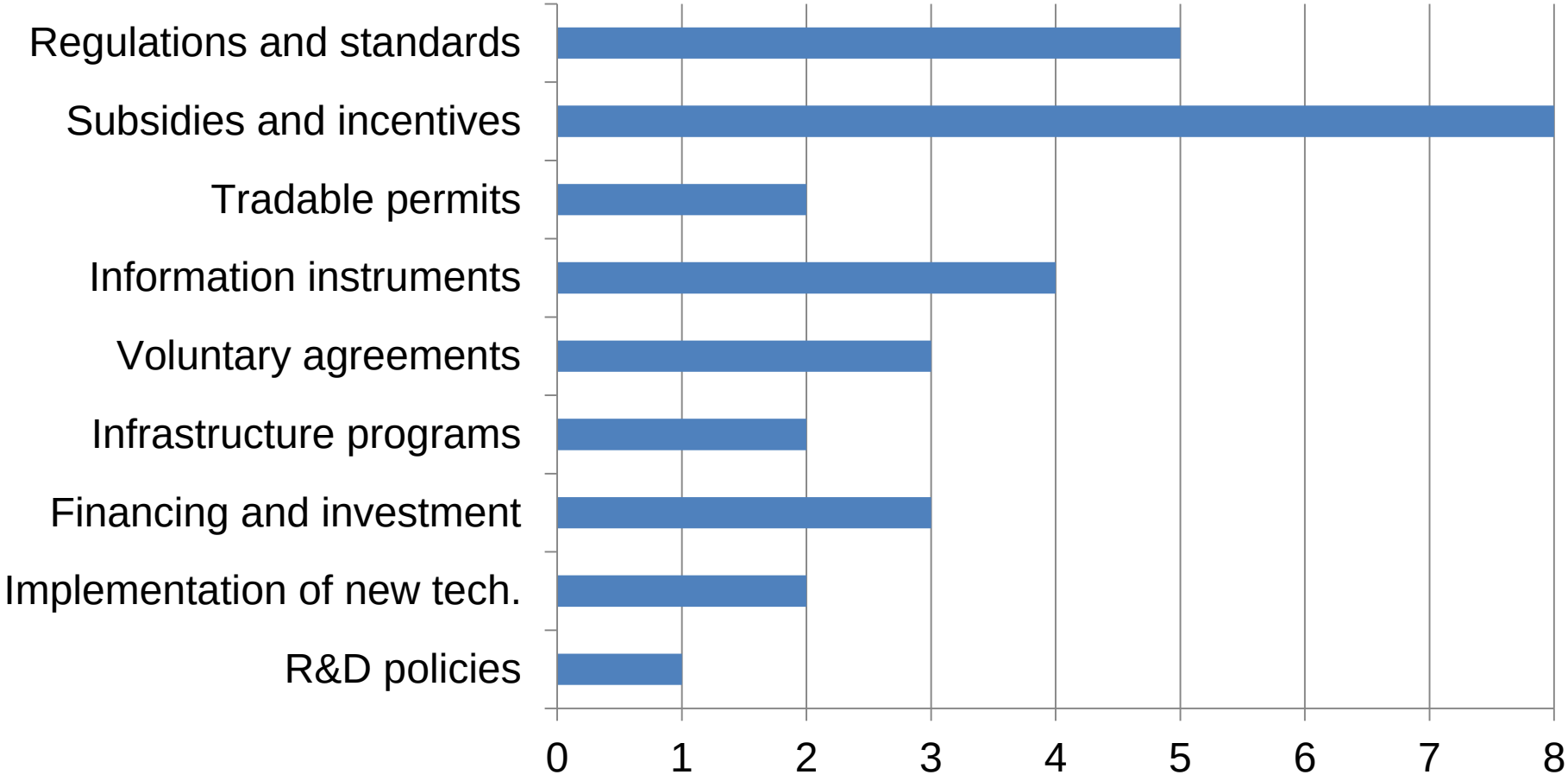
Types of policies and actions piloted



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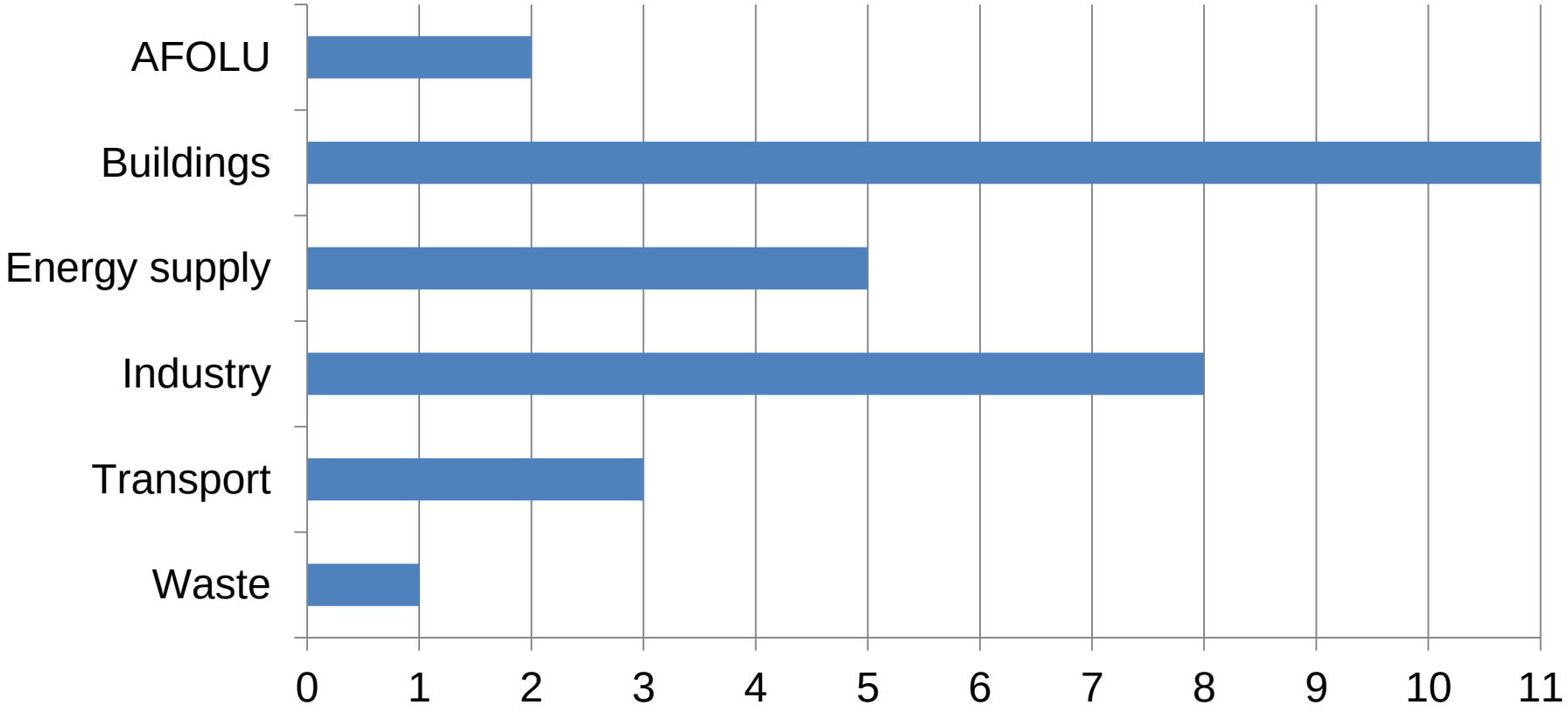
Sectors piloted



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Non-GHG effects (co-benefits) can be assessed

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Overview of presentation

1. Define objectives and define the policy or action
2. Identify effects
3. Estimate effects
4. Report results

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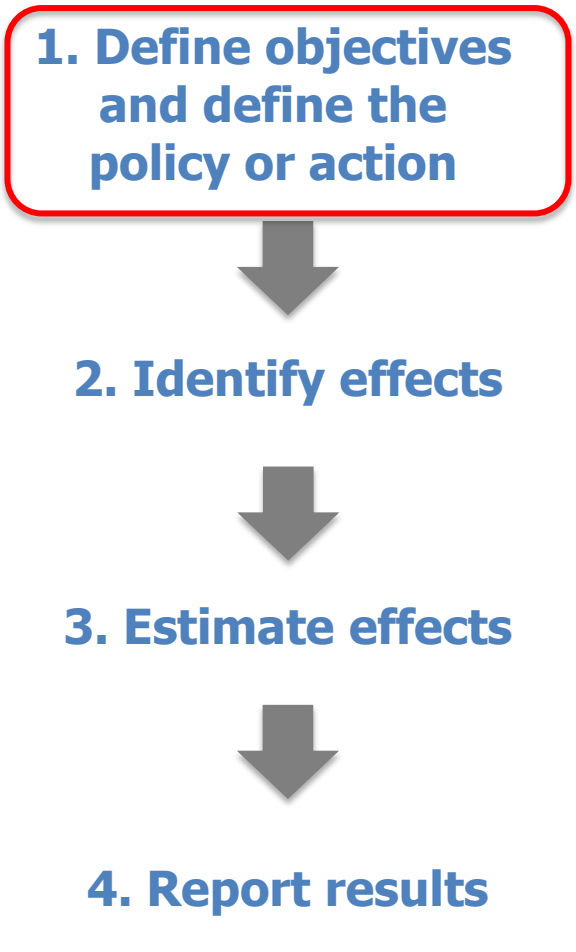
Overview of presentation



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Chapter 2 Objectives

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Objectives of assessing policy/action impact

- **Inform policy selection and design** by comparing policy options based on their expected GHG effects
- **Evaluate policy effectiveness (and cost-effectiveness)** in delivering intended results
- **Report** on GHG effects of policies and actions
- **Attract and facilitate financial support** for mitigation actions by estimating GHG reductions

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Chapter 5 Defining the policy or action

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Overview of steps

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Types of policies and actions

Regulations and standards	Taxes	Subsidies
Emissions trading programs	Voluntary agreements	Information instruments
Infrastructure programs	Implementation of new technologies, processes, or practices	Financing and investment

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Clearly define the policy or action

- The title of the policy or action
- Type of policy or action
- Description of specific interventions

Overview

- The status of the policy or action
- Date of implementation
- Date of completion (if applicable)

Timeline

- Implementing entity or entities
- Objective(s) of the policy or action
- Geographic coverage
- Primary sectors, subsectors, and emission source/sink categories targeted
- Greenhouse gases targeted (if applicable)

Scope

- Other related policies or actions

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Assessing an individual policy/action or a package

- Users may assess either:
  - An individual policy or action
  - A package of related policies or actions

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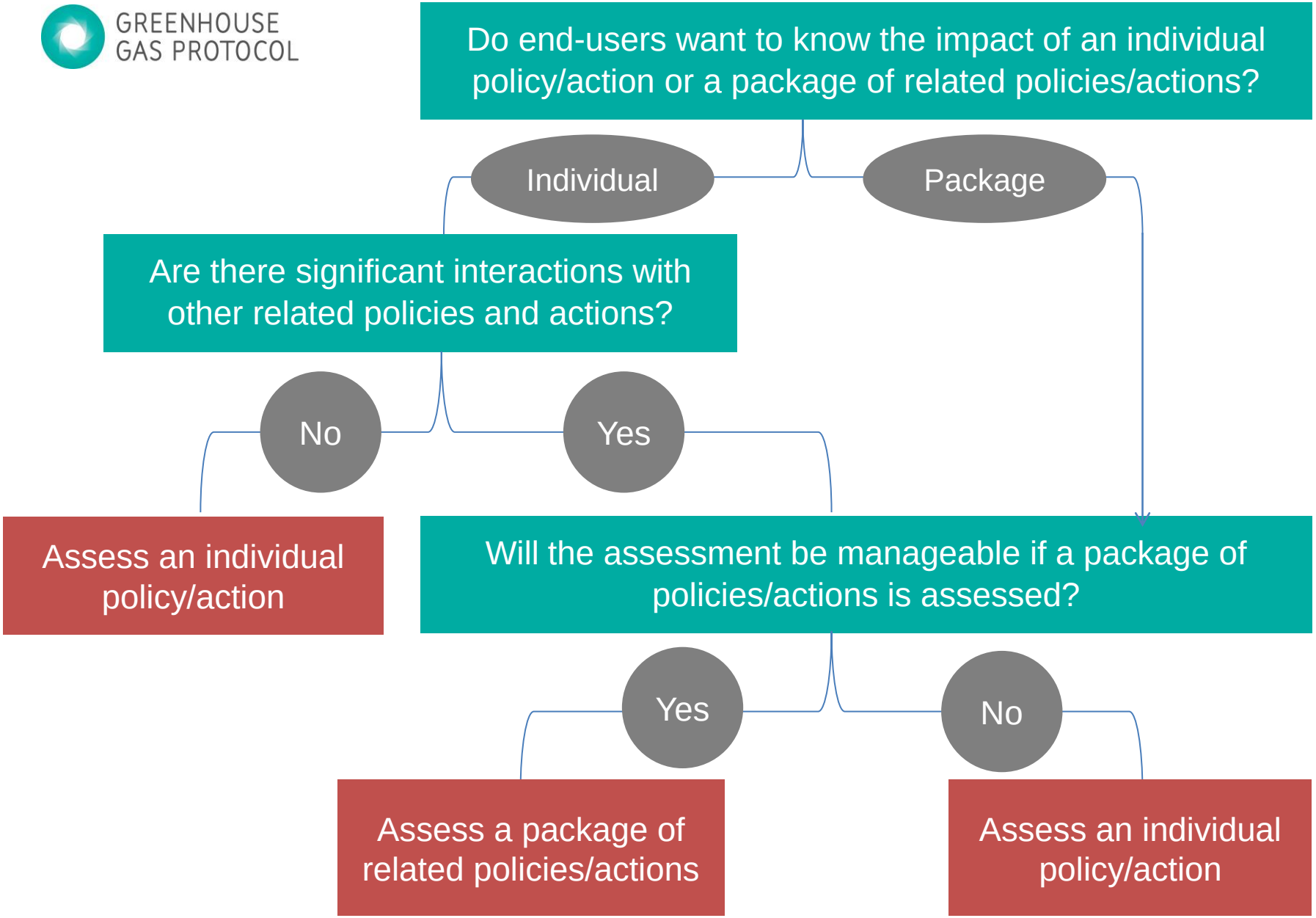

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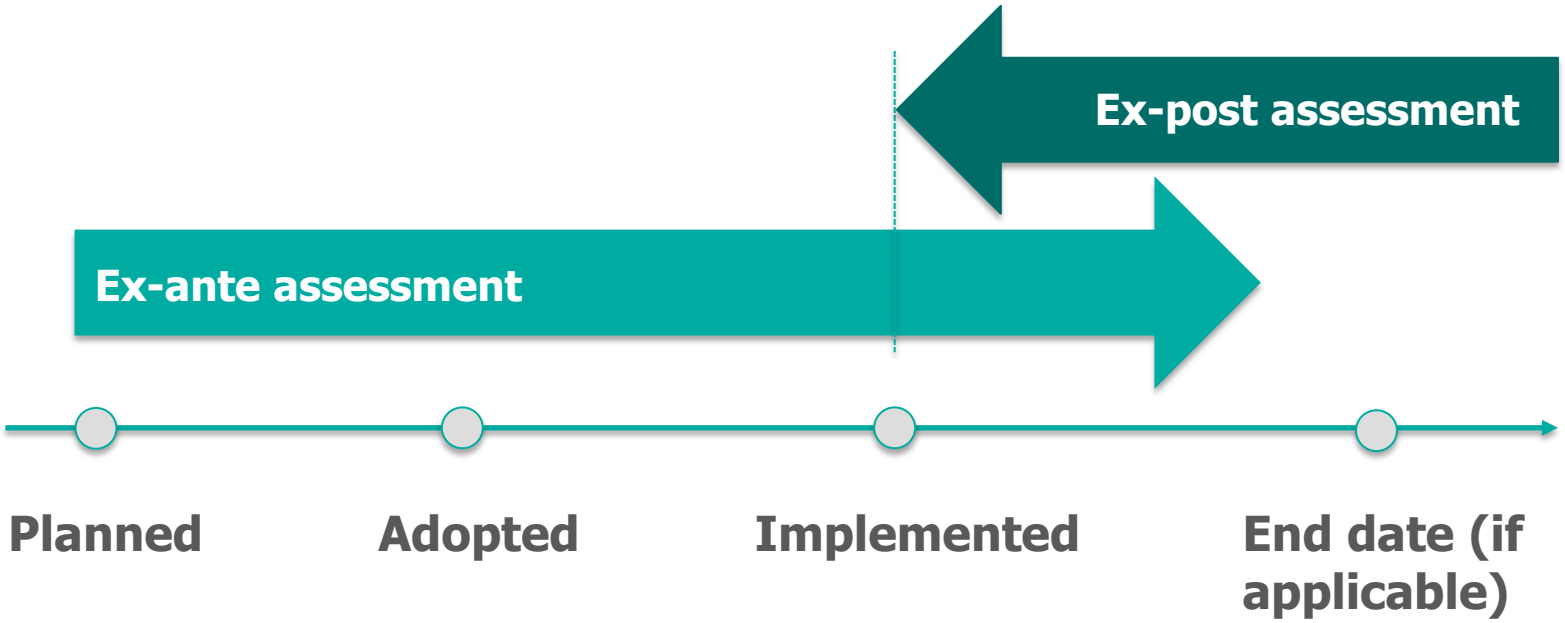
Choose ex-ante or ex-post assessment



Ex-ante assessment: Estimating future GHG effects of policies and actions

Ex-post assessment: Estimating past GHG effects of policies and actions

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Pilot example: combining ex-ante and ex-post

Belgium's federal tax reduction for roof insulation

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Overview of presentation

1. Define objectives and define the policy or action

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4. Report results

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Chapter 6 Identifying Effects and Mapping the Causal Chain

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Types of effects

- Users should consider all possible types of effects:
  - In-jurisdiction and out-of-jurisdiction
  - Short- and long term
  - Intended and unintended
  - Likely, possible, and unlikely
  - GHG increasing and GHG decreasing

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Example for public transit policy

Indicator types	Short-term	Long-term
Intended effects	• **Reduced** emissions from private transport due to shift to public transport	• **Reduced** trip distances due to people moving near transit
Unintended effects (Including rebound effects)	• **Increased** emissions from public transport due to higher use	
Out-of-jurisdiction effects (Leakage and spillover effects)	• **Increased** emissions from manufacturing of public transit vehicles	

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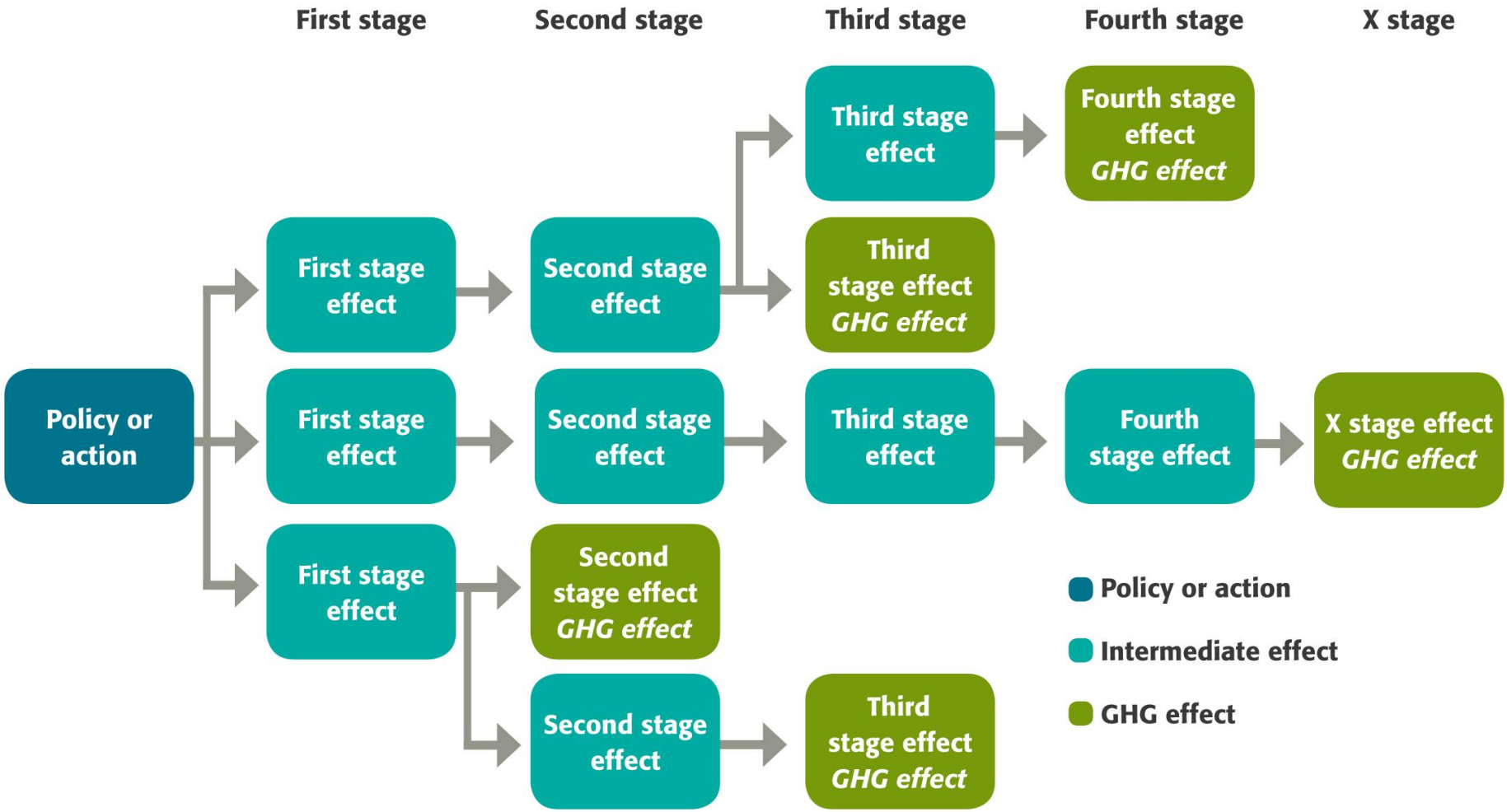
Mapping the causal chain



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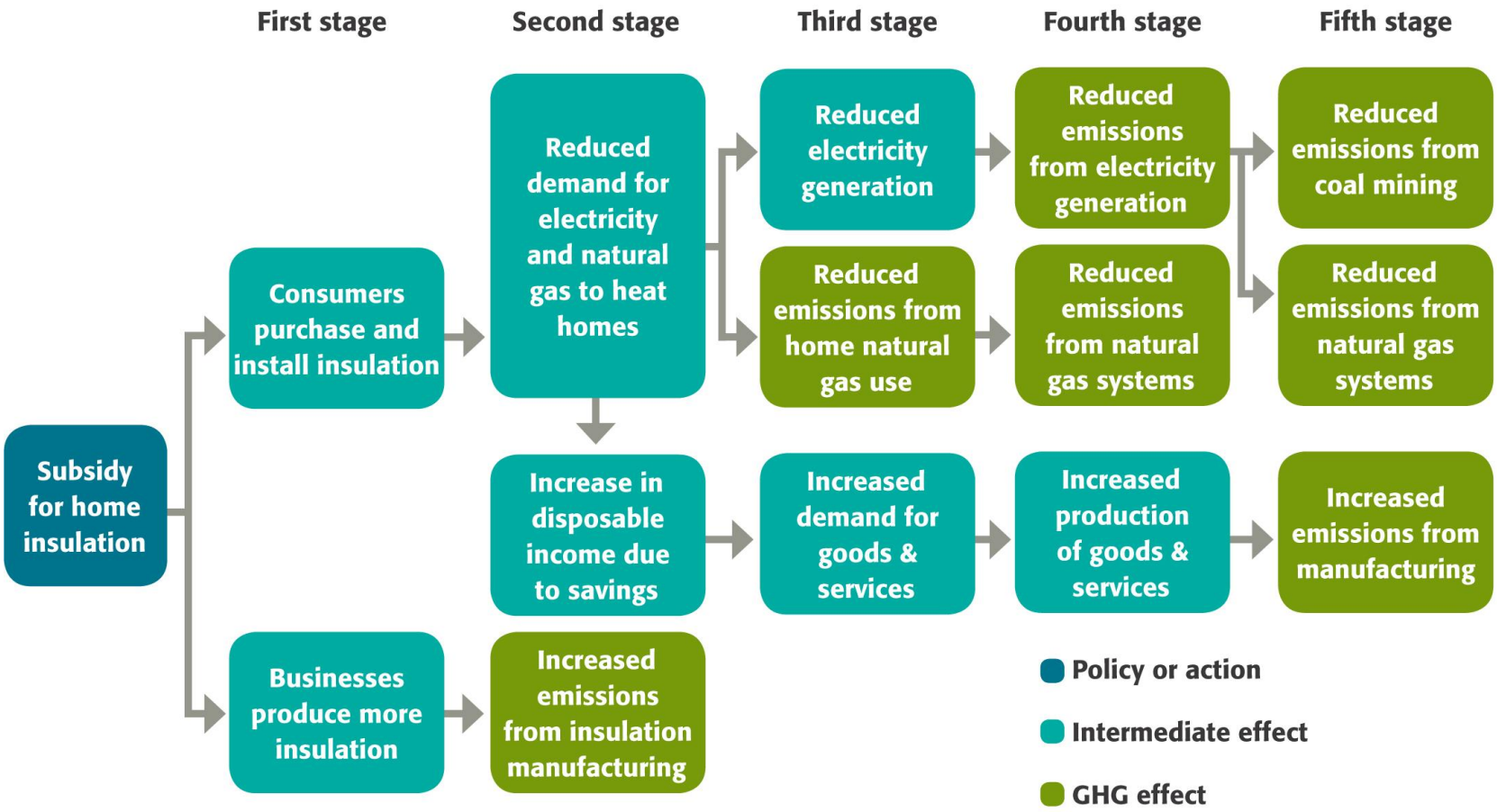
Example: Home insulation subsidy



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Chapter 7 Defining the GHG Assessment Boundary

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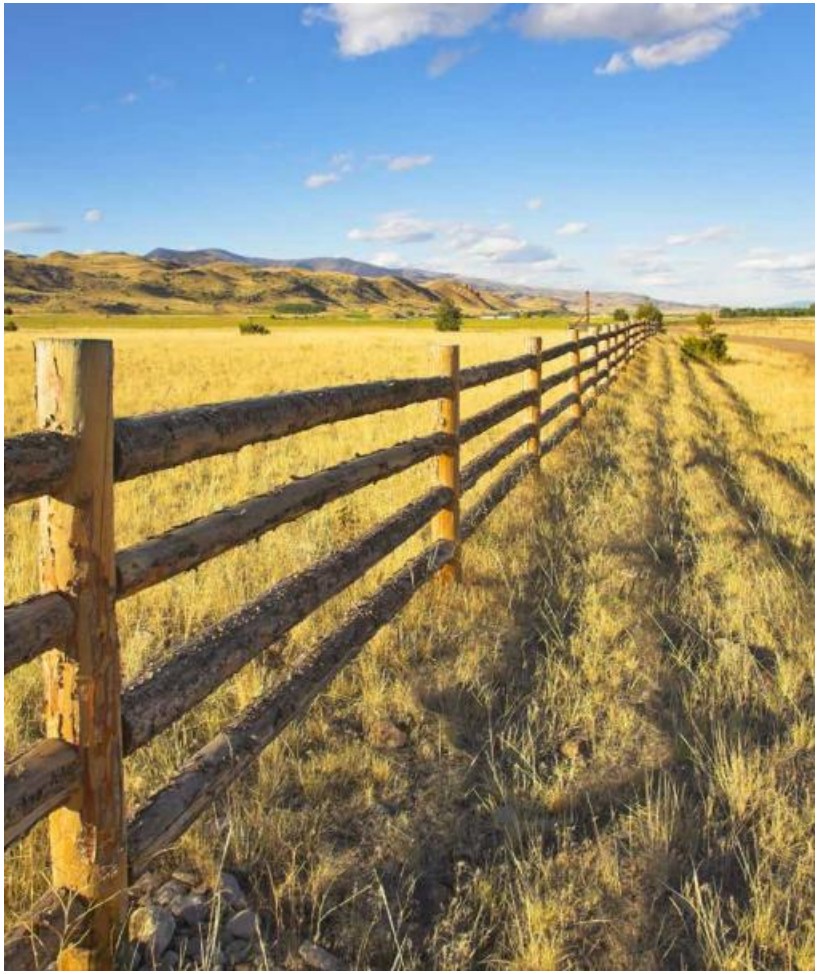
Assessing significance

- In order to identify significant effects, users should assess each potential GHG effect in terms of both:
  - The **likelihood** of each GHG effect occurring
  - The **relative magnitude** of each GHG effect



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Assess likelihood of effects occurring

Source: Adapted from IPCC (2010).

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Assessing relative magnitude of effects

- Effects should be categorized as major, moderate, or minor
- Based on approximation, not detailed calculation

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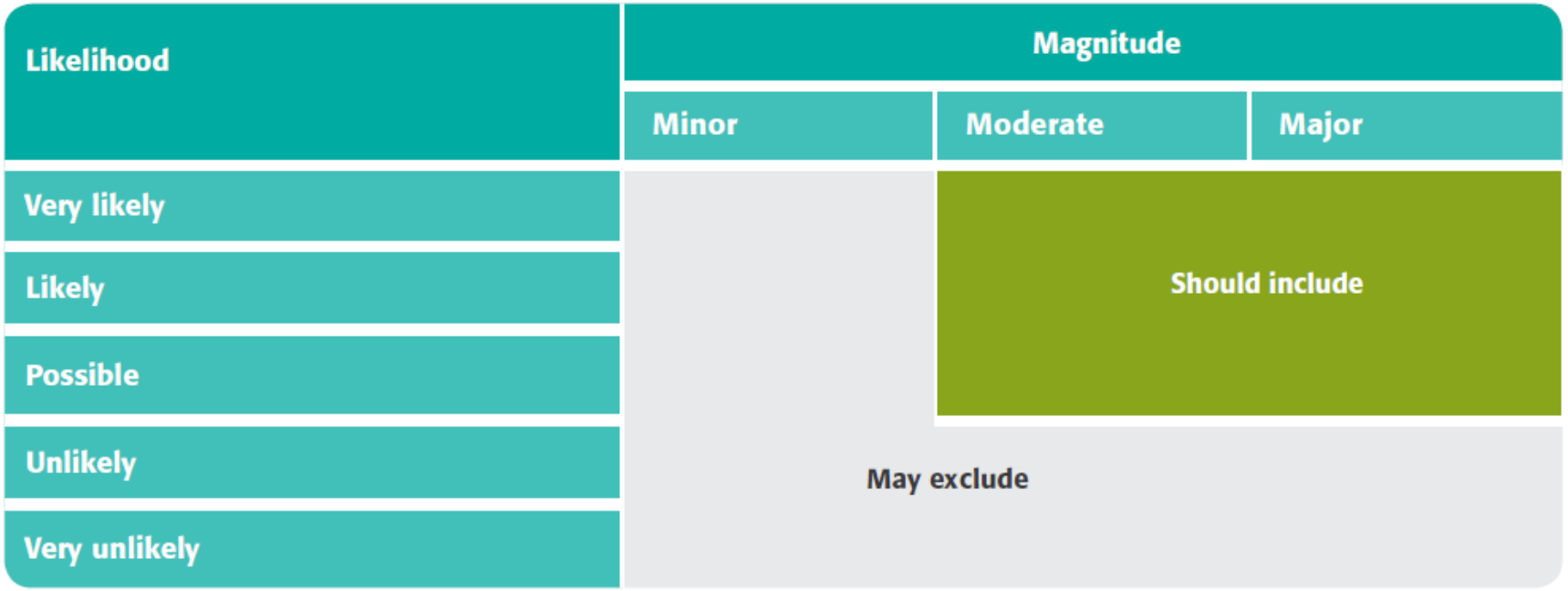
Determine significance of effects



Note: The area shaded green corresponds to significant GHG effects.

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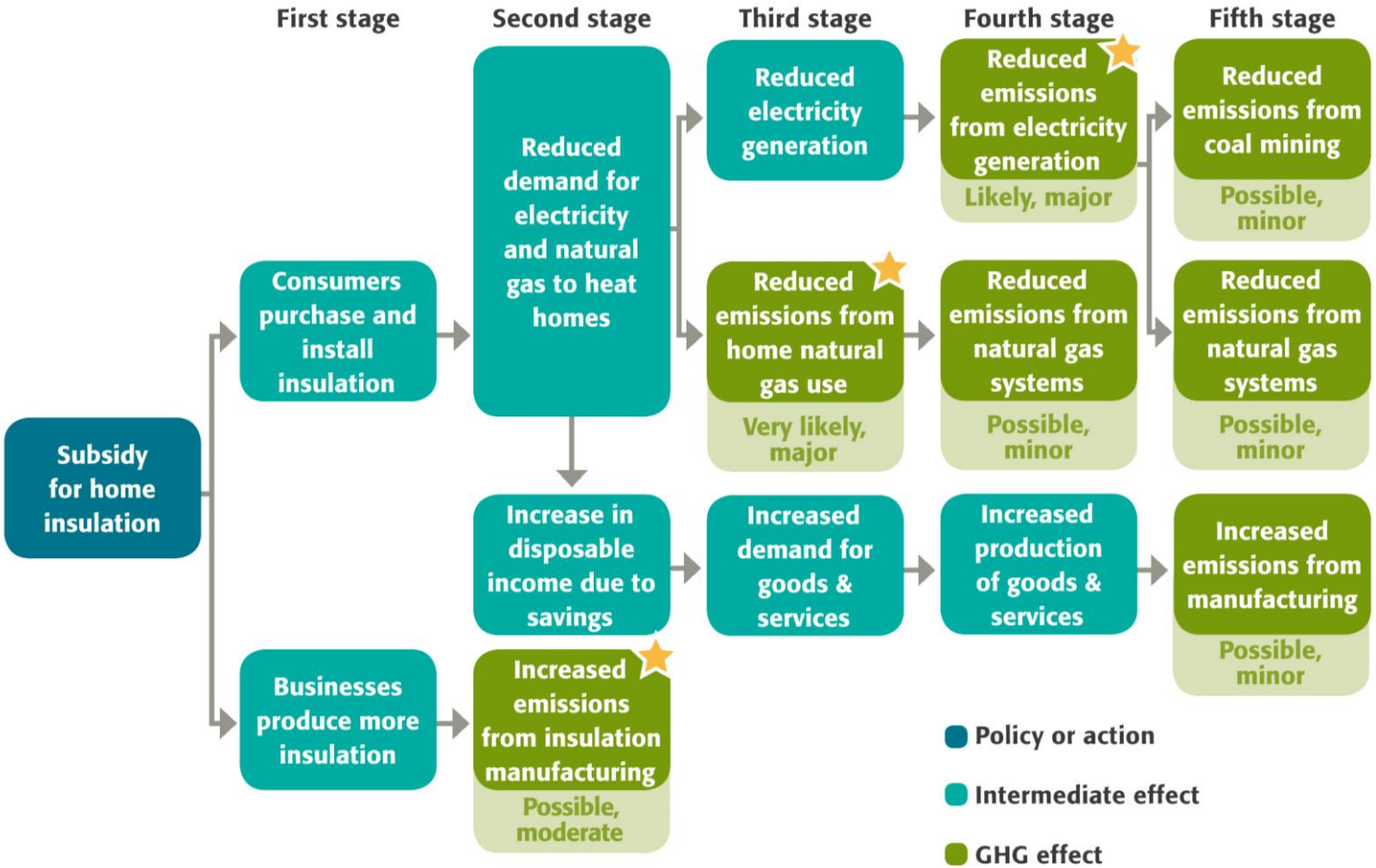
Example: Home insulation subsidy



Note: Stars indicate GHG effects included in the boundary.

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Example: Summary of effects, sources/sinks and gases included

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Disclosing and justifying exclusions

- Excluding significant effects may be necessary in certain cases based on limitations related to:
  - Measurability or data availability
  - Relevance to policy objectives and context
  - User resources and capacity

- Where possible, instead of excluding significant effects, users should:
  - Use simplified methods to estimate the effect
  - Use proxy data to fill data gaps

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Overview of presentation

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Estimating GHG effects: Key concepts

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Attributing changes in emissions to specific policies/actions

- Attribution is difficult since GHG emissions can change due to a variety of factors, including:
  - The policy/action being assessed
  - Other policies/actions that affect the same emissions sources
  - External factors, such as changes in GDP, energy prices, weather, etc.

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Baseline scenario and policy scenario

- **Baseline scenario**: A reference case that represents the events or conditions most likely to occur in the **absence** of the policy or action being assessed

- **Policy scenario**: A scenario that represents the events or conditions most likely to occur in the **presence** of the policy or action being assessed
  - The same as the baseline scenario except that it includes the policy or action being assessed

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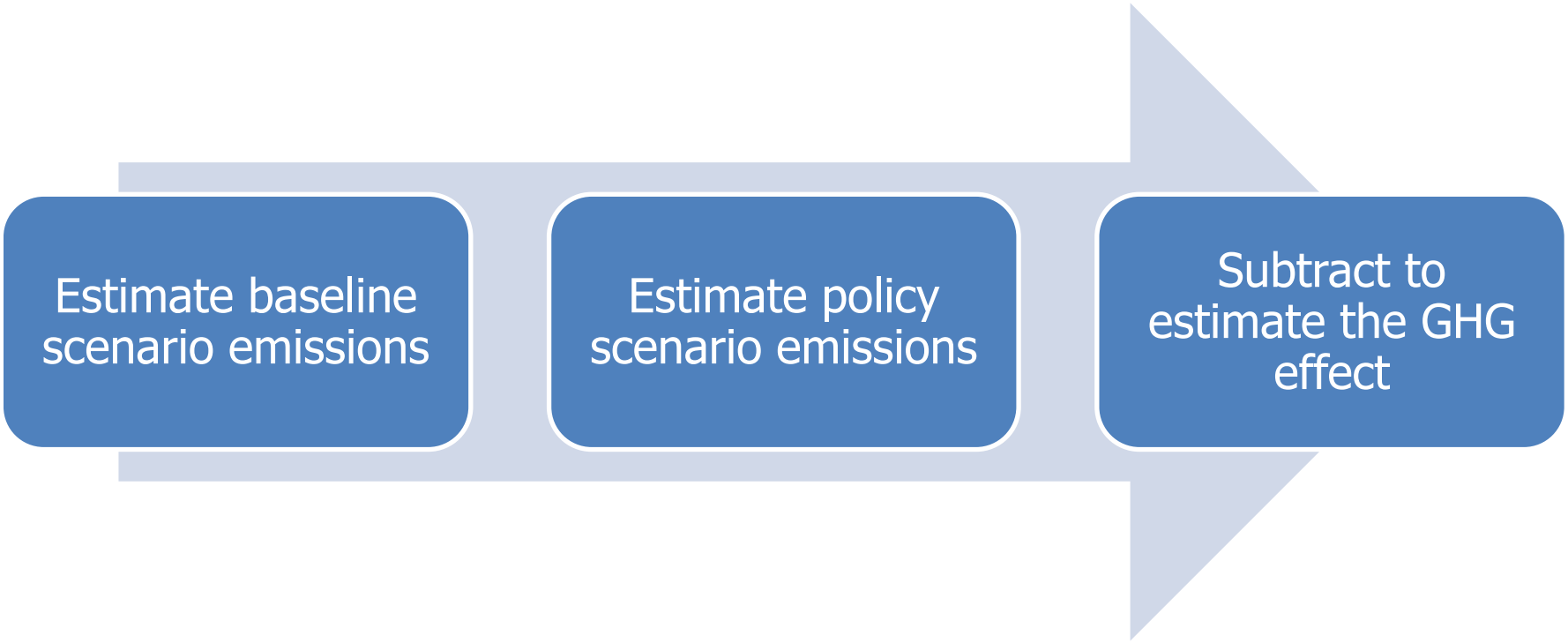
Basic steps



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Estimating the GHG effect of a policy/action

Total change in GHG emissions resulting from the policy or action (t CO_2e) = Total policy scenario emissions (t CO_2e) – Total baseline scenario emissions (t CO_2e)

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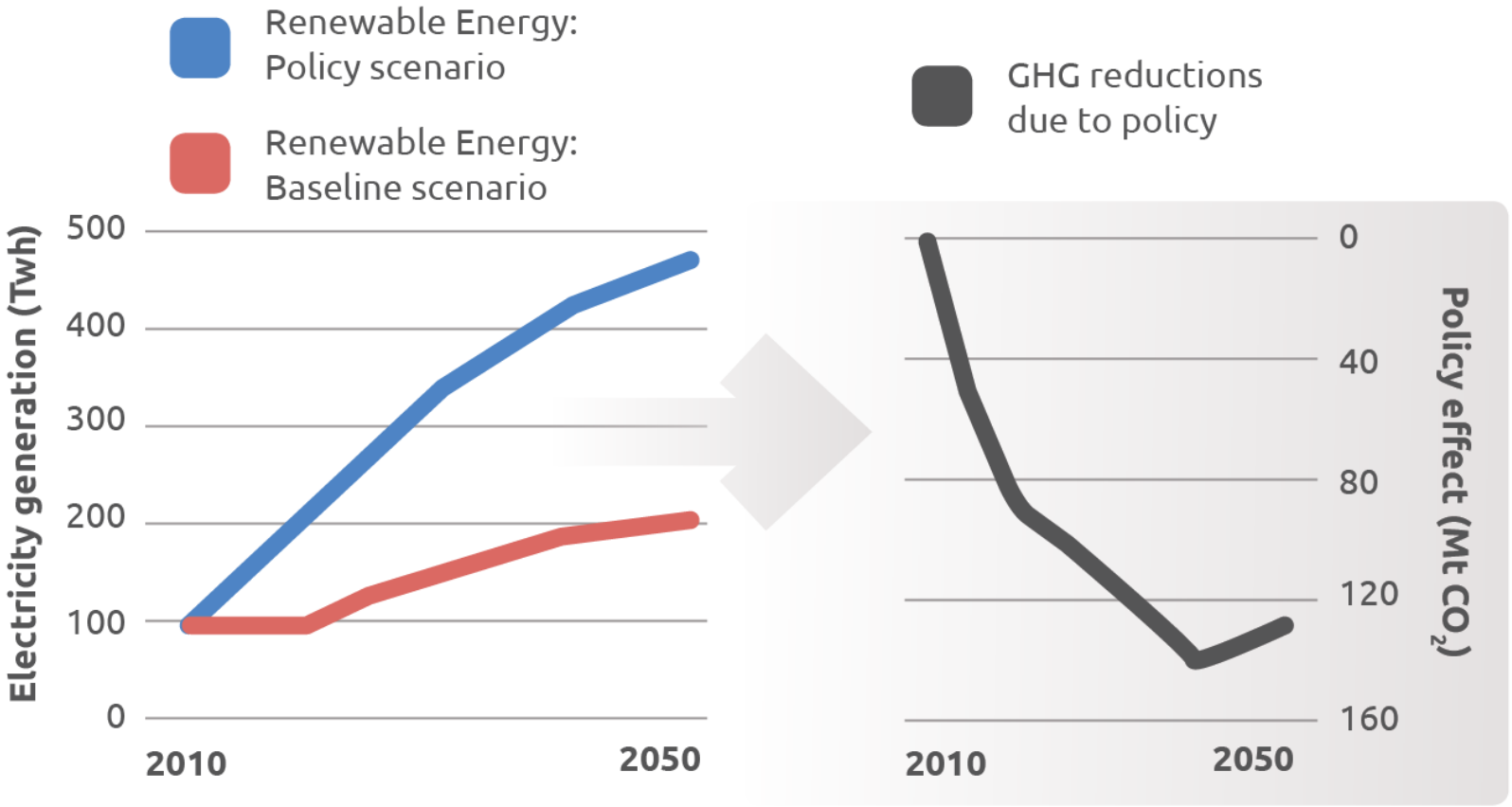
Pilot example: German renewable energy law



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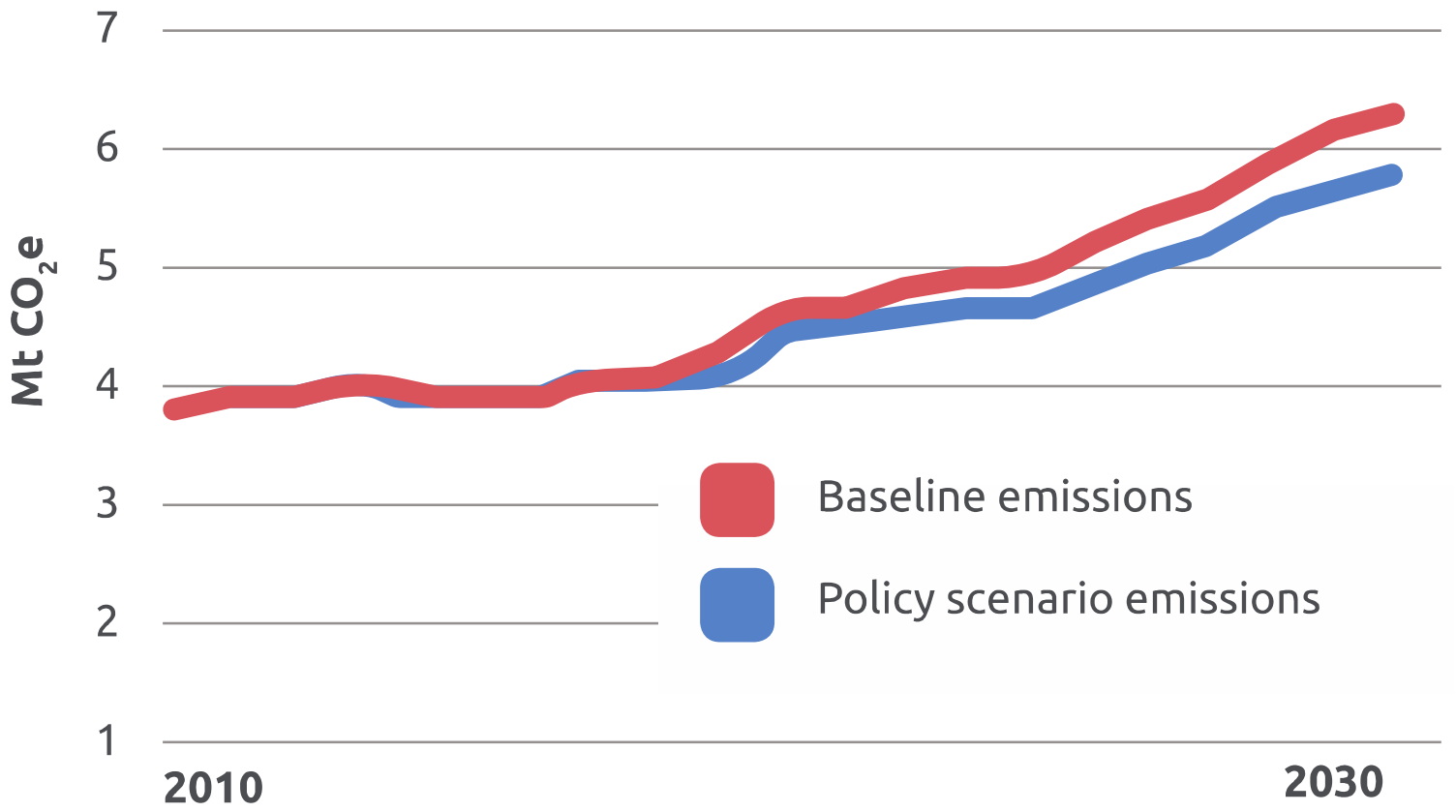
Pilot example: Tunisia solar energy program



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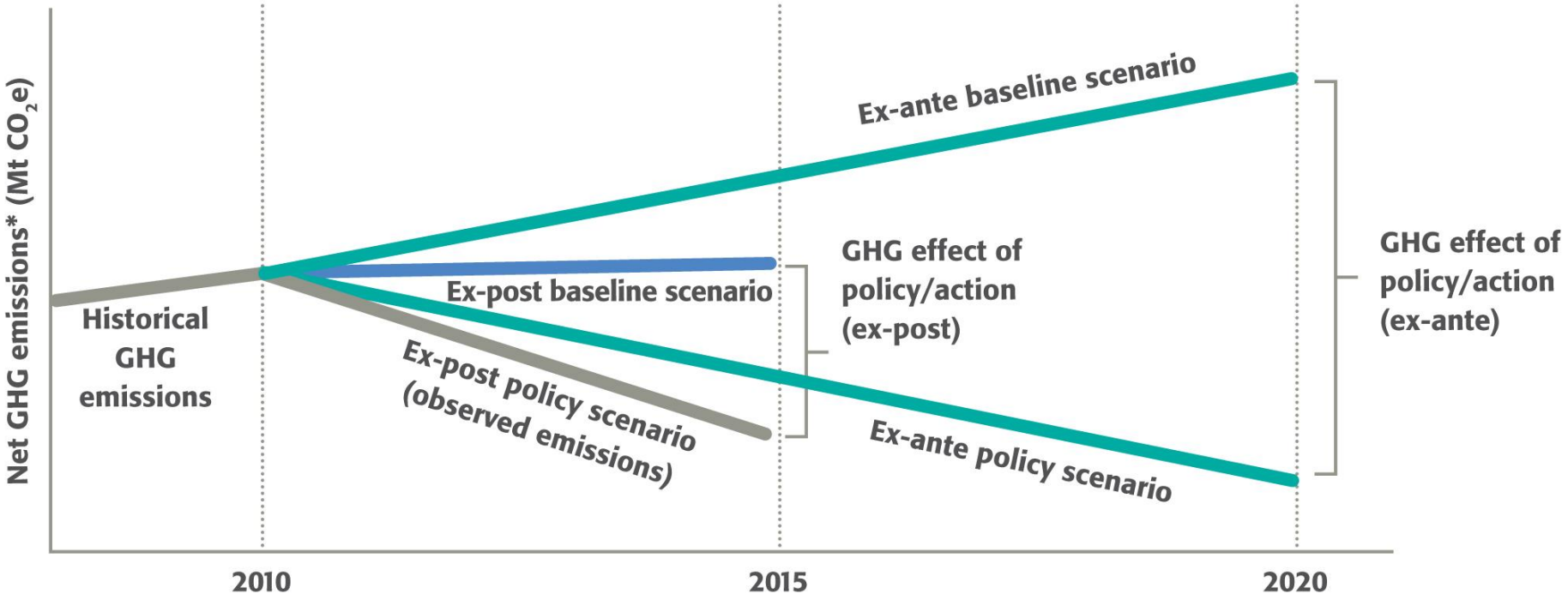
Ex-ante and ex-post assessment



Note: * Net GHG emissions from sources and sinks in the GHG assessment boundary.

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Bottom-up and top-down data and methods

- Data:
  - Bottom-up data are measured, monitored, or collected
  - Top-down data are macro-level statistics collected at the jurisdiction or sector level
- Methods:
  - Bottom-up methods calculate or model the change in GHG emissions for each source, project, or entity affected by the policy or action, then aggregate
  - Top-down methods use statistical methods

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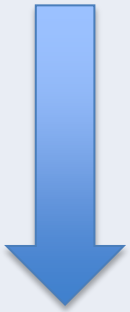
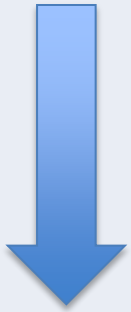
Choosing a level of accuracy

A range of methods are available to estimate the GHG effect of policies

Level of accuracy/ completeness	GHG assessment boundary	Estimation methods	Data sources
Lower  Higher	Less complete  More complete	Less accurate methods (e.g., simplified approaches)  More accurate methods (e.g., complex approaches)	International default data  Source-specific or jurisdiction-specific data

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Choosing a level of accuracy

- Users should determine the desired level of accuracy and completeness of the GHG assessment based on a range of factors, including:
  - Objectives of the assessment, intended uses of the results, and the level of accuracy and completeness required to meet stated objectives
  - Relative significance of the policy or action being assessed
  - Data availability
  - Capacity, resources, and time available to carry out the assessment

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Chapter 8 Estimating baseline emissions

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Choose type of baseline comparison

- For ex-post assessment, two methods are available:
  - **Scenario method**: A comparison of a baseline scenario with a policy scenario for the same group or region
  - **Comparison group method**: A comparison of one group or region affected by the policy or action with an equivalent group or region that is not affected by the policy or action

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Guidance for choosing the type of comparison

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Scenario method: Defining the most likely baseline scenario

- Possible options include:
  - The continuation of current technologies, practices, or conditions
  - Discrete baseline alternatives, practices, technologies, or scenarios
  - A performance standard or benchmark that is indicative of baseline trends

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Defining the most likely baseline scenario

- The most likely scenario depends on drivers that would affect emissions in the absence of the policy or action being assessed
- Two types of drivers:
  - **Other policies or actions:** Other policies, actions, and projects expected to affect the same emissions sources and sinks
  - **Non-policy drivers:** Other conditions such as socioeconomic factors and market forces expected to affect the same emissions sources and sinks
- Should include drivers that are significant

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Examples for non-policy drivers in the baseline scenario

Examples of non-policy drivers	Specific examples
Economic activity	GDP, household income
Population	National population, city population
Energy prices	Prices of natural gas, petroleum products, coal, biofuels, electricity
Other relevant prices	Commodity prices
Costs	Costs of various technologies
Weather	Heating degree days, cooling degree days
Autonomous technological improvement over time	Ongoing decarbonization of economic sectors, energy efficiency improvements, long-term trends in the carbon- or energy-intensity of the economy
Structural effects	Structural changes in economic sectors, shifts from industry to service sector jobs, shifts of industrial production between countries
Consumer preferences	Changes in preferences for types of vehicles, household size, commuting practices

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Select a desired level of accuracy

Level of accuracy	Emissions estimation method	Other policies or actions included	Non-policy drivers included	Assumptions about drivers and parameters	Source of data for drivers and parameters
Lower ↓ Higher	Lower accuracy methods (such as Tier 1 methods in the IPCC *Guidelines for National GHG Inventories*)	Few significant policies	Few significant drivers	Most assumed to be static or linear extrapolations of historical trends	International default values
	Intermediate accuracy methods	Most significant policies	Most significant drivers	Combination	National average values
	Higher accuracy methods (such as Tier 3 methods in the IPCC *Guidelines*)	All significant policies	All significant drivers	Most assumed to be dynamic and estimated based on detailed modeling or equations	Jurisdiction- or source-specific data

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Example: Estimating baseline emissions

- GHG sources to be estimated (from home insulation subsidy example):

GHG effect included in the GHG assessment boundary	Affected sources	Baseline emissions
Reduced emissions from electricity use	Fossil fuel combustion in grid-connected power plants	?
Reduced emissions from home natural gas use (space heating)	Residential natural gas combustion	?
Increased emissions from insulation production	Insulation manufacturing processes	?
Total baseline emissions		?

Note: The table provides data for one year in the GHG assessment period.

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Example: Estimating baseline emissions

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Total baseline emissions		?

Note: The table provides data for one year in the GHG assessment period.

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Example (cont'd): Estimating baseline emissions

- **Step 1**: Define an emissions estimation method and all parameters to calculate baseline emissions

Baseline emissions for residential natural gas use in 2020 (t CO_2e) =

baseline natural gas use (MMBtu) x baseline emission factor (t CO_2e/MMBtu)

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Example (cont'd): Estimating baseline emissions

- **Step 2**: Determine baseline values for each parameter by identifying policy and non-policy drivers and assumptions

Parameter	Baseline value(s) applied over the GHG assessment period	Methodology and assumptions to estimate value(s)	Data sources
Natural gas used for space heating	1,000,000 MMBtu/ year from 2010–25	Historical data • Average annual natural gas used for space heating over the previous 10 years is 1,250,000 MMBtu/year • The trend over the past 10 years has been constant (after normalization for variation in heating degree days and cooling degree days) rather than increasing or decreasing Implemented and adopted policies included in the baseline scenario: • Federal energy efficiency standards (expected to reduce natural gas use by 10% in the baseline scenario) • Federal energy tax (expected to reduce natural gas use by 7.5% in the baseline scenario, taking into account overlaps with the federal energy efficiency standards) Non-policy drivers included in the baseline scenario: • Natural gas prices are projected to increase by 20% (expected to reduce natural gas use by 2% in the baseline scenario based on price elasticity of natural gas) • Free rider effect: 10% of households that receive the subsidy are expected to install insulation even if they did not receive the subsidy (expected to reduce natural gas use by 3% in the baseline scenario, given 30% expected reduction in energy use per home insulated)	National energy statistical agency; peer-reviewed literature: Author (Year). Title. Publication.

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Example (cont'd): Estimating baseline emissions

- **Step 3**: Estimate baseline emissions

Baseline emissions for residential natural gas use in 2020 =

1,000,000 MMBtu x 55 kg CO_2e/MMBtu = 55,000,000 kg CO_2e

*= **55,000 t CO_2e***

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Example (cont'd): Estimating baseline emissions

- Reporting results:

GHG effect included in the GHG assessment boundary	Affected sources	Baseline emissions
Reduced emissions from electricity use	Fossil fuel combustion in grid-connected power plants	**?**
Reduced emissions from home natural gas use (space heating)	Residential natural gas combustion	**55,000 t CO_2e**
Increased emissions from insulation production	Insulation manufacturing processes	**?**
Total baseline emissions		**?**

Note: The table provides data for one year in the GHG assessment period.

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Example: Estimating baseline emissions

- **Step 4**: Aggregate baseline emissions across effects/sources

GHG effect included in the GHG assessment boundary	Affected sources	Baseline emissions
Reduced emissions from electricity use	Fossil fuel combustion in grid-connected power plants	**50,000 t CO_2e**
Reduced emissions from home natural gas use (space heating)	Residential natural gas combustion	**55,000 t CO_2e**
Increased emissions from insulation production	Insulation manufacturing processes	**5,000 t CO_2e**
Total baseline emissions		**110,000 t CO_2e**

Note: The table provides data for one year in the GHG assessment period.

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Chapter 9 Estimating GHG effects ex-ante

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Ex-ante assessment

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Estimating policy scenario values for parameters

- For GHG sources or sinks not affected by the policy or action:
  - Use baseline values
- For GHG sources or sinks that are affected by the policy or action:
  - Estimate policy scenario values

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Example: Estimating policy scenario emissions (ex-ante)

- **Step 1**: Identify parameters to be estimated

Policy scenario emissions for residential natural gas use in 2020 (t CO_2e) = Policy scenario natural gas use (MMBtu) x baseline emission factor (t CO_2e/MMBtu)

- In this example the only parameter affected by the policy is the amount of natural gas used

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Example (cont'd): Estimating policy scenario emissions

- **Step 2**: Estimate policy scenario values for parameters

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Example (cont'd): Estimating policy scenario emissions

- **Step 3**: Estimate policy scenario emissions

Policy scenario emissions for residential natural gas use in 2020 =

900,000 MMBtu x 50 kg CO_2e/MMBtu = 50,050,000 kg CO_2e

*= **45,000 t CO_2e***

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Example: Estimating the GHG effect ex-ante

- **Step 4**: Aggregate policy scenario emissions and subtract to determine change across effects/sources

GHG effect included	Affected GHG sources	Baseline emissions	Policy scenario emissions	Change
Reduced emissions from electricity generation	Grid-connected power plants	50,000 t CO_2e	48,000 t CO_2e	-2,000 t CO_2e
Reduced emissions from home natural gas use	Residential natural gas use	55,000 t CO_2e	45,000 t CO_2e	-10,000 t CO_2e
Increased emissions from insulation production	Insulation manufacturing facilities	5,000 t CO2e	6,000 t CO2e	+1,000 t CO_2e
Total		**110,000 t CO_2e**	**99,000 t CO_2e**	**-11,000 t CO_2e**

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Chapter 10 Monitoring performance

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Purpose of monitoring

1. Monitor trends in key performance indicators to understand whether the policy or action is on track and being implemented as planned
2. Collect data needed to estimate GHG effects

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Key performance indicators for monitoring performance

Indicator types	Definitions	Examples for a home insulation subsidy program
Inputs	Resources that go into implementing a policy or action, such as financing	Money spent to implement the subsidy program
Activities	Administrative activities involved in implementing the policy or action (undertaken by the authority or entity that implements the policy or action), such as permitting, licensing, procurement, or compliance and enforcement	Number of energy audits carried out, total subsidies provided
Intermediate effects	Changes in behavior, technology, processes, or practices that result from the policy or action	Amount of insulation purchased and installed by consumers, fraction of homes that have insulation, amount of natural gas and electricity consumed in homes
GHG effects	Changes in greenhouse gas emissions by sources or removals by sinks that result from the intermediate effects of the policy or action	Reduced CO_2, CH_4, and N_2O emissions from reduced natural gas and electricity use
Non-GHG effects	Changes in relevant environmental, social, or economic conditions other than GHG emissions or climate change mitigation that result from the policy or action (see Appendix C for examples)	Household disposable income from energy savings

Source: Adapted from W. K. Kellogg Foundation 2004.
Notes: GHG effects are typically not monitored directly but instead are estimated based on changes in various other parameters. In other frameworks, intermediate effects are called "outcomes" and GHG effects and non-GHG effects are called "impacts."

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Examples

Examples of policies	Examples of intermediate effect indicators
Renewable portfolio standard	Total electricity generation by source (such as wind, solar, coal, natural gas)
Public transit policies	Passenger-kilometers traveled by mode (such as subway, bus, train, private car, taxi, bicycle)
Waste management regulation	Tonnes of waste sent to landfills, tonnes of waste sent to recycling facilities, tonnes of waste sent to incineration facilities
Landfill gas management incentive	Tonnes of methane captured and flared or used
Sustainable agriculture policies	Soil carbon content, tonnes of synthetic fertilizers applied, crop yields
Afforestation/reforestation policies	Area of forest replanted by type
Grants for replacing kerosene lamps with renewable lamps	Number of renewable lamps sold, market share of renewable lamps, volume of kerosene used for domestic lighting
Subsidy for building retrofits	Number of buildings retrofitted, energy use per building
Information campaign to encourage home energy conservation	Household energy use (sample of households or average use)

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Collecting data to estimate GHG effects

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Creating a monitoring plan

- The monitoring plan should describe:
  - Measurement or data collection methods and procedures
  - Sources of data
  - Monitoring frequency
  - The level of uncertainty in any measurements or estimates
  - Sampling procedures (if applicable)
  - Whether the data is verified, and if so, verification procedures used
  - Entity or person responsible for monitoring and roles and responsibilities of relevant personnel
  - Procedures for internal auditing, quality assurance, and quality control

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Chapter 11 Estimating GHG effects ex-post

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Ex-post assessment

- Should update baseline emissions every time an ex-post assessment is undertaken
- Should assess whether the effects identified in the causal chain actually occurred

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Pilot example: Energy efficiency policies in the South African mining sector

Comparison of ex-post and ex-ante results

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Policy interactions

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Situations to consider policy interactions

- Deciding whether to assess an individual policy/action or a package of policies/actions
- Estimating the GHG effect of the policy or action when the policy or action assessed interacts with other policies/actions
- Aggregating GHG effects across multiple policies/actions

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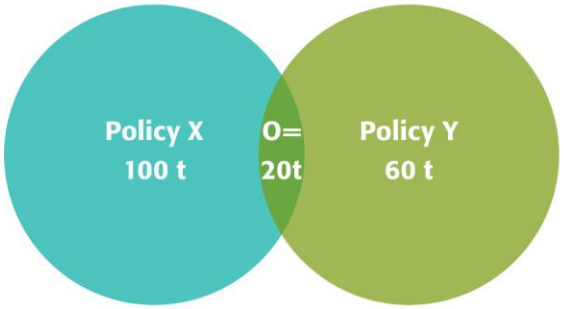
Types of policy interactions

Independent

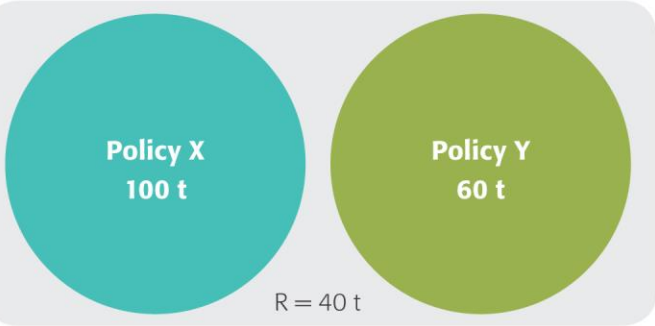
Combined effect = X + Y
Combined effect = 100 + 60 = 160 t CO_2e

Overlapping



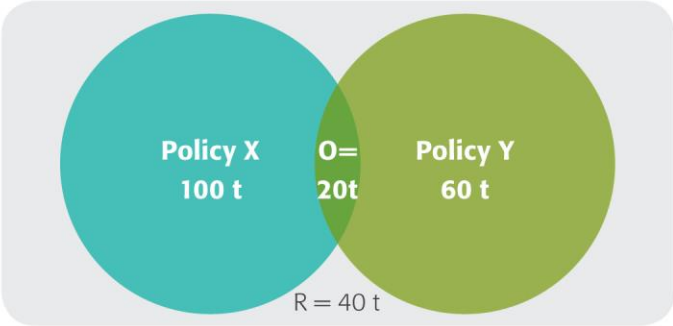
Combined effect < X + Y
Combined effect = 100 + 60 - 20 = 140 t CO_2e

Reinforcing



Combined effect > X + Y
Combined effect = 100 + 60 + 40 = 200 t CO_2e

Overlapping and reinforcing



Combined effect may be > or < X + Y
Combined effect = 100 + 60 - 20 + 40 = 180 t CO_2e

Note: Effect O represents an overlapping effect. Effect R represents a reinforcing effect.

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Example: Subsidy and information campaign for home insulation

Scenario	Number of households that install insulation	Total GHG reduction
A. Subsidy alone is introduced	20,000	40,000 t CO_2e/year
B. Information campaign alone is introduced	10,000	20,000 t CO_2e/year
C. Independent case: Both the subsidy and information campaign are introduced. Separate sets of households respond to each policy.	30,000	60,000 t CO_2e/year
D. Overlapping case: Both the subsidy and information campaign are introduced. Some households would install insulation if *either* policy were in place.	25,000	50,000 t CO_2e/year
E. Reinforcing case: Both the subsidy and information campaign are introduced. Some households would only install insulation if *both* policies were in place.	50,000	100,000 t CO_2e/year
F. Overlapping and reinforcing case: Both the subsidy and information campaign are introduced. Some households would install insulation if either policy were in place, while other households would only install insulation if both policies were in place.	45,000	90,000 t CO_2e/year

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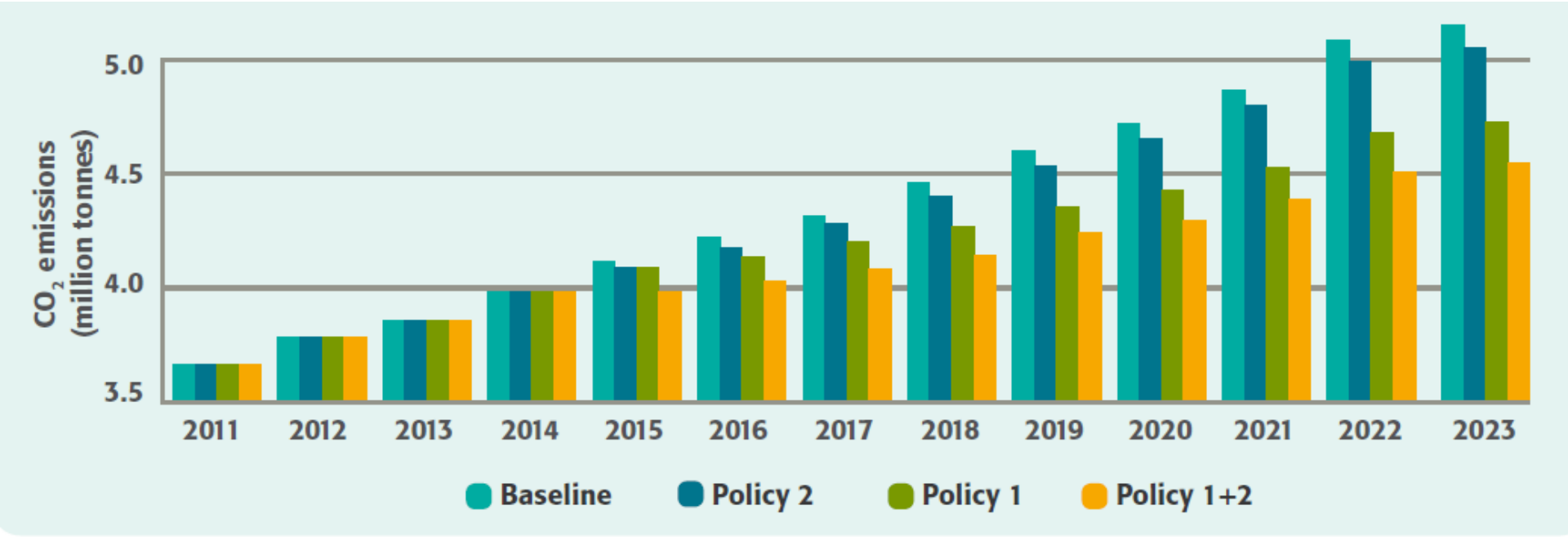
Pilot example: Air Quality Management Plan in Colombia

- The plan consists of two transportation policies:
  1. Regulations to improve vehicle technologies
  2. Incentives to reduce trips from private cars and motorcycles and increase trips by bicycle, walking, and public transportation



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Overview of presentation

1. Define objectives and define the policy or action

2. Identify effects

3. Estimate effects

4. Report results

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Chapter 14 Reporting

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Reporting requirements

- Five parts to the reporting requirements and template:

1. GHG assessment information
2. Description of the policy or action
3. Estimated change in GHG emissions and removals
4. Methodology
5. Optional reporting information

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Excerpt from sample reporting template

Year	Total net change in emissions and removals	Uncertainty range (quantitative estimate or qualitative description)
Year 1		
Year 2		
Year 3		
Year 4		
Year …		
Total cumulative emissions and removals		

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Additional resources online

- Sample reporting template
- List of available calculation tools and methods
- Sector guidance documents
  - AFOLU
  - Energy supply
  - Residential and commercial buildings
  - Transportation
  - Waste

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For more information

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