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Key principles and objectives of MRV for NAMAs: Data and methodologies

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Outline

- Introduction
- Methodology to estimate the effects of NAMAs
- Data and monitoring

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MRV of NAMAs

- Several aspects of NAMAs can be subject to MRV, such as:
  - Implementation of NAMAs
  - GHG effects of NAMAs
  - Non-GHG effects of NAMAs (sustainable development benefits)
  - Financial, technological and capacity building needs and support received
- BURs require developing country Parties preparing NAMAs to submit the following information:
  - National circumstances and institutional arrangements related to the preparation of national communications
  - National inventories
  - Information on NAMAs and their effects, including methodologies, assumptions, and progress towards implementation
  - Finance, technology and capacity building needs and support received
  - Information related to domestic MRV

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Types of NAMAs and available methods

Type of NAMA	Description/examples	Available methods
Projects	Individual mitigation projects	CDM methodologies GHG Protocol for Project Accounting Climate Action Reserve methodologies
Policies	Broader interventions such as laws, regulations and standards; taxes, charges, subsidies and incentives; information instruments; implementation of new technologies, processes, or practices; public or private sector financing and investment	GHG Protocol Policy and Action Standard
Goals	Economy-wide GHG reduction goals (base year goals, intensity goals, baseline scenario goals, fixed level goals)	GHG Protocol Mitigation Goals Standard

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Greenhouse Gas Protocol standards relevant to NAMAs

- ***Policy and Action Standard***
  - How to estimate and report the GHG effects of policies and actions, including NAMAs

- ***Mitigation Goals Standard***
  - How to track progress toward national, subnational, and sectoral mitigation goals

- ***GHG Protocol for Project Accounting***
  - How to estimate GHG reductions from mitigation projects

http://www.ghgprotocol.org/

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Purpose of the Policy and Action Standard

- Guide users in answering the following questions:
  - Before implementation: What effect is a given policy or action likely to have on GHG emissions?
  - During implementation: How to track progress of a policy or action?
  - After implementation: What effect has a given policy or action had on GHG emissions?

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Types of policies and actions

- Regulations and standards
- Taxes and charges
- Subsides and incentives
- Tradable permits
- Voluntary agreements
- Information instruments
- R&D policies
- Public procurement policies
- Infrastructure programs
- Implementation of new technologies, processes, or practices
- Financing and investment

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Applicable sectors

- AFOLU
- Energy supply
- Industry
- Residential and commercial buildings
- Transport
- Waste

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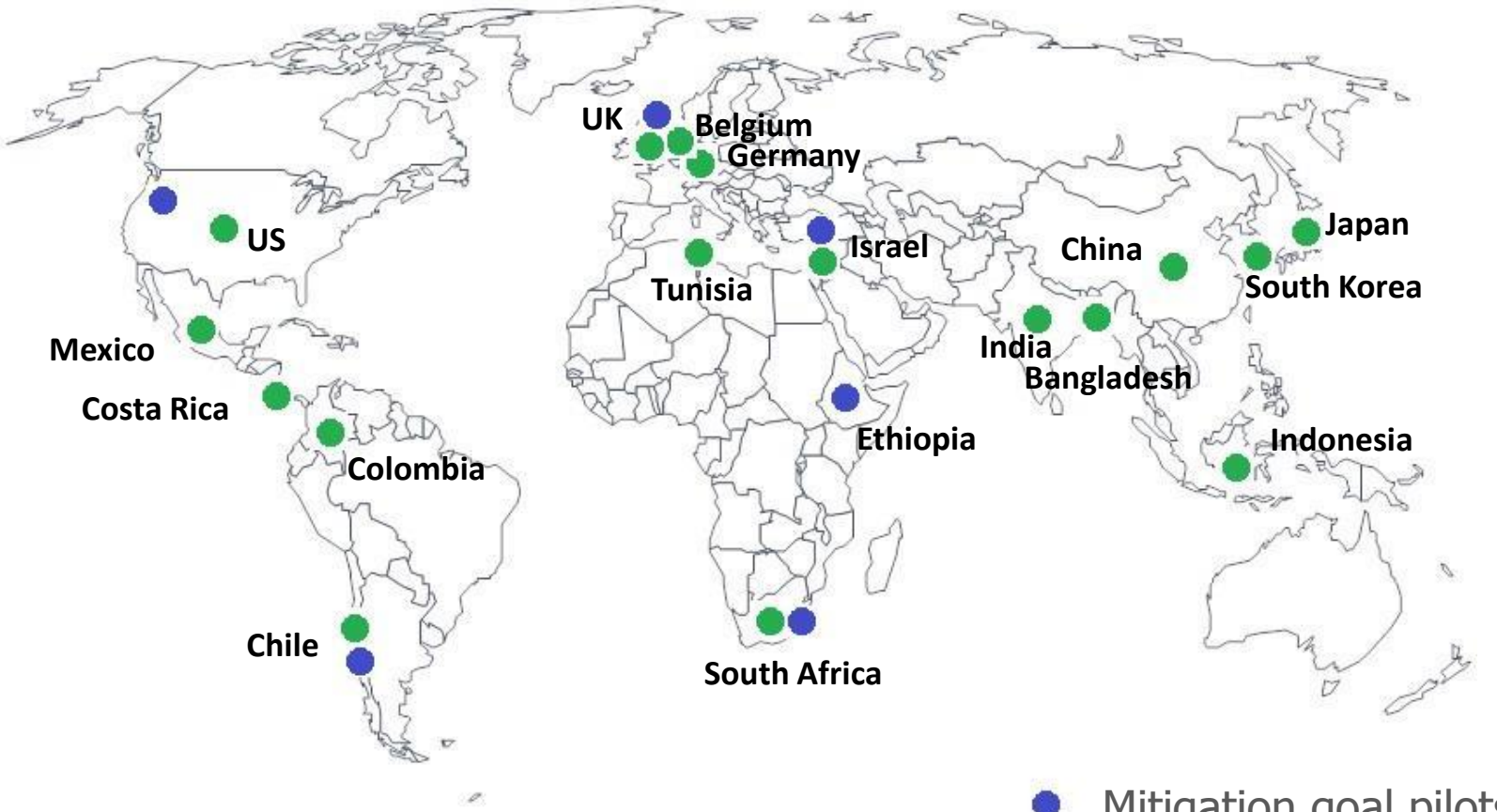
Pilot testing: 32 policies/goals in 20 countries/cities



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Pilot tests for the *Policy and Action Standard* (1 of 2)

Country	Description
Bangladesh	Sector-wide replacement of brick kiln technology
Belgium	Offshore wind promotion program
Belgium	Federal tax reduction for roof insulation
Chile	New vehicle energy consumption and CO_2 emissions targets
Chile	Promotion of cogeneration in industry
Chile	Financing of home thermal insulation
Chile	Appliance program for minimum efficiency performance and labeling for light bulbs
Chile	Energy efficiency communication and awareness program
China	Beijing emissions trading system (ETS)
China	Top 1000 enterprises program
Colombia, City of Medellin	Transport sector air quality management plan
Costa Rica	*Coffee sector NAMA*
Germany	Renewable Energy Act (feed-in tariffs for renewable electricity generation)

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Pilot tests for the *Policy and Action Standard* (2 of 2)

Country	Description
Indonesia	REDD+ degraded land policy
Israel	Subsidy program for energy efficiency and GHG reductions
Japan, City of Tokyo	Tokyo Cap-and-Trade Program
Mexico	National light bulb replacement program (incandescent to CFL), part of the Special Program on Climate Change (PECC)
South Africa	*Passenger mode shift from road to rail NAMA*
South Africa	Energy efficiency implementation in the mining sector
South Africa, City of Cape Town	Smart Living Campaign to promote energy conservation
South Korea	1 Million Green Home (renewable energy) program
Tunisia	*PROSOL Elec (solar PV policy), part of Tunisian Solar Plan NAMA*
Tunisia	*Tunisian Building NAMA*
UK, City of London	RE:NEW home energy efficiency program
United States	Keystone XL Pipeline

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Methodology to estimate the effects of NAMAs

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Key concepts

1. Tracking performance indicators versus attributing changes in emissions to NAMAs
2. Key steps in estimating GHG effects of NAMAs
3. Baseline scenario and policy scenario
4. Ex-ante and ex-post assessment
5. GHG effects and non-GHG effects
6. Choosing the desired level of accuracy among a range of methodological options

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Tracking performance indicators versus Attributing changes in emissions to specific NAMAs

- Monitoring trends in performance indicators:
  - Useful to help understand whether a NAMA is on track
  - Does not explain why the changes in indicators are occurring or demonstrate the effectiveness of a NAMA
  - To meet certain objectives, may be sufficient
- Attributing changes in emissions to specific NAMAs:
  - More difficult since GHG emissions change for a variety of reasons
  - Requires estimating the effect of the NAMA versus the effects of other policies/actions and external factors (changes in GDP, energy prices, weather, etc.)
  - Enables users to meet additional objectives

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Objectives of estimating the effects of NAMAs

Before NAMA implementation (ex-ante)

- **Inform NAMA selection** by comparing policy options based on their expected GHG effects
- **Inform and improve NAMA design** by understanding the GHG effects of policy design choices
- **Report** on expected future GHG effects of NAMAs being considered or implemented
- **Attract and facilitate financial support** for NAMAs by estimating potential GHG reductions

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Objectives of estimating the effects of NAMAs

After NAMA implementation (ex-post)

- **Evaluate NAMA effectiveness** and understand whether implemented NAMAs are delivering intended results
- **Learn from experience** to identify and share best practices, improve NAMA design, and decide whether to continue current activities or implement additional policies
- **Ensure NAMAs are cost-effective** (e.g., GHG reduced per dollar) and that resources are invested efficiently
- **Assess contribution** of NAMAs toward GHG reduction goals
- **Report** on the GHG effects of NAMAs over time
- **Meet funder requirements** to estimate GHG reductions from NAMAs

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Overview of steps to estimate the GHG effect of a NAMA

Define objectives and clearly define the NAMA

Identify effects

- Identify potential effects, identify affected sources/sinks, and map the causal chain
- Define the GHG assessment boundary

Estimate effects

- Collect data
- Estimate baseline scenario emissions
- Estimate policy scenario emissions
- Subtract to estimate GHG effect
- Assess uncertainty

Verify (if applicable) and report results

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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 NAMA being assessed

- **Policy scenario**: the events or conditions most likely to occur in the presence of the NAMA being assessed
  - The policy scenario is the same as the baseline scenario except for the NAMA

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Estimating the GHG effect of a NAMA

Change in GHG emissions and removals resulting from the NAMA (t CO_2e) = Policy scenario emissions (t CO_2e) – Baseline scenario emissions (t CO_2e)

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Example: Estimating the GHG effect

- Example: home insulation subsidy

GHG effect included	Affected GHG sources	Baseline emissions	Policy scenario emissions	Change (P – B)
Reduced emissions from electricity use				
Reduced emissions from home natural gas use				
Increased emissions from insulation production				

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Ex-ante and ex-post assessment

- **Ex-ante assessment**: estimation of expected future GHG effects of a policy or action, usually before the policy or action is implemented

- **Ex-post assessment**: estimation of historical GHG effects of a policy or action, after the policy or action has been implemented

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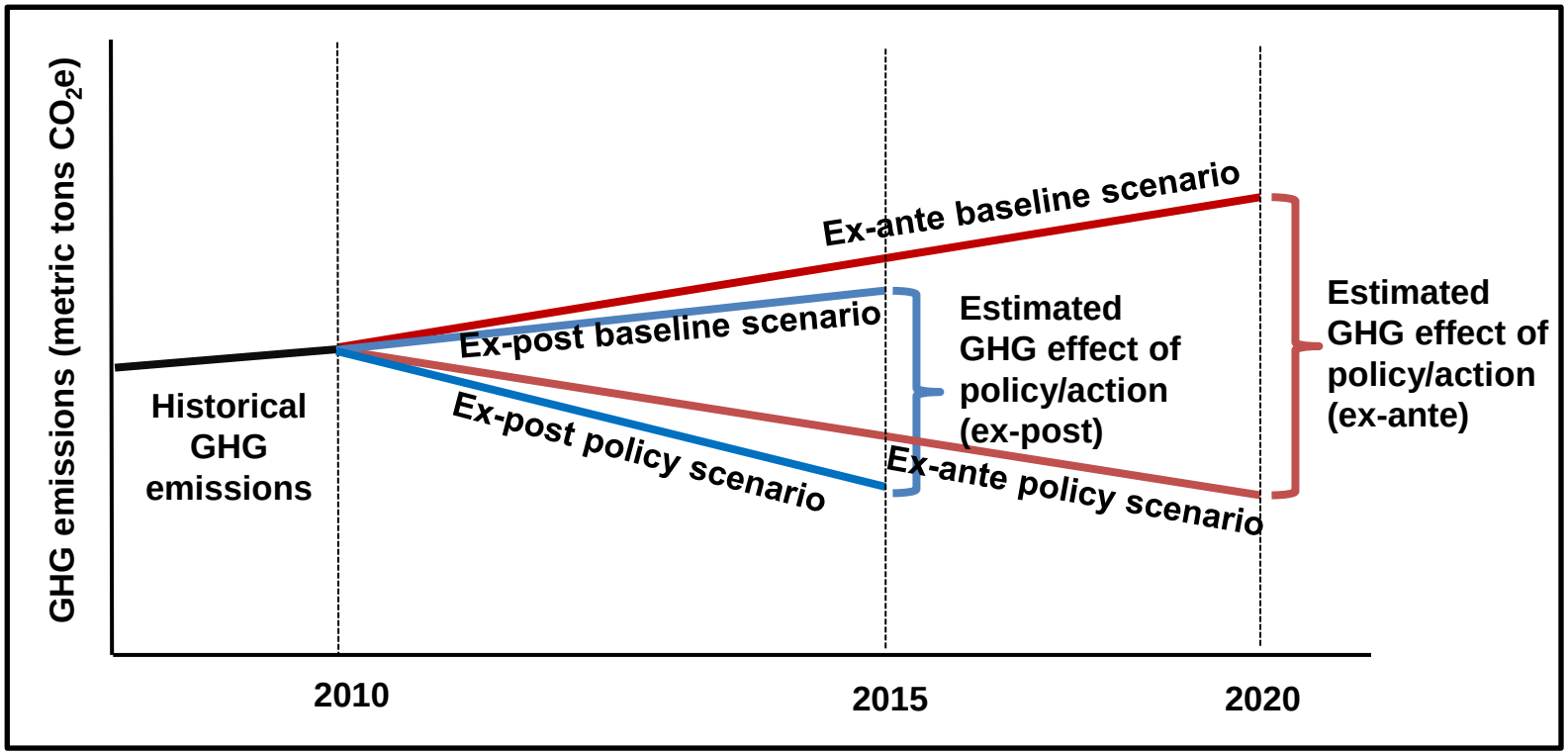
Ex-ante and ex-post assessment



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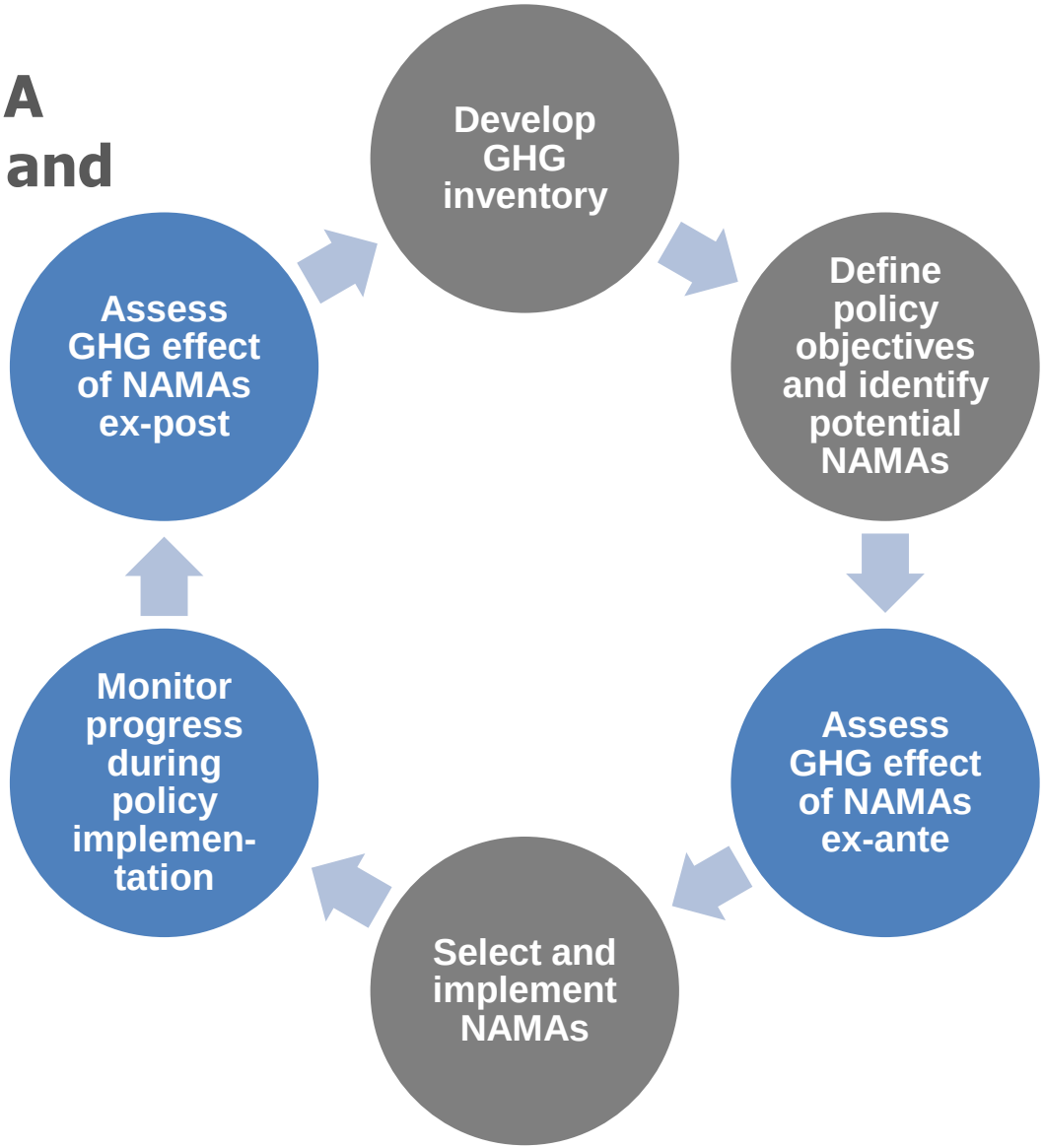
Example of NAMA implementation and MRV process



Key:

Addressed by the standard

Not addressed by the standard

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Non-GHG effects (sustainable development benefits)

- GHG effects: changes in GHG emissions or removals that result from a NAMA

- Non-GHG effects: changes in other environmental, social, or economic conditions that result from a NAMA
  - E.g., air quality improvement, poverty reduction, health benefits, job creation, etc.

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Non-GHG effects (sustainable development benefits)

- The same basic steps can be used to estimate non-GHG effects
  - Especially those linked to GHG emissions in terms of data (e.g., energy use, waste generation, local air pollution)
  - Example: promotion of public transit
    - To calculate GHG reductions: need to calculate fuel savings based on passengers switching from cars to public transit
    - The same data can be used to estimate energy savings, money saved from fuel savings, and reduced air pollution from fuel savings (e.g., PM, ozone, SO_2, NO_x)
- Additional methods/models and data sources will likely be necessary (e.g., economic models/data)

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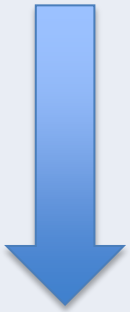
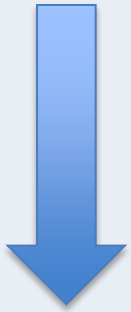
Range of methodological options

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

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 among a range of methodological options

- The appropriate level of accuracy and completeness depends on a range of factors:
  - Intended uses of the results, and the level of accuracy and completeness required to meet stated objectives
  - Funder/program requirements
  - Data availability
  - Capacity, resources, and time available to carry out the assessment
- Among the pilots, the NAMAs used more rigorous approaches

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Data and monitoring

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Monitoring

- Two related functions:
  1. Monitoring trends in key indicators to understand whether the policy or action is on track, being implemented as planned, and delivering the expected results
  2. Collect data needed to estimate GHG effects ex-post

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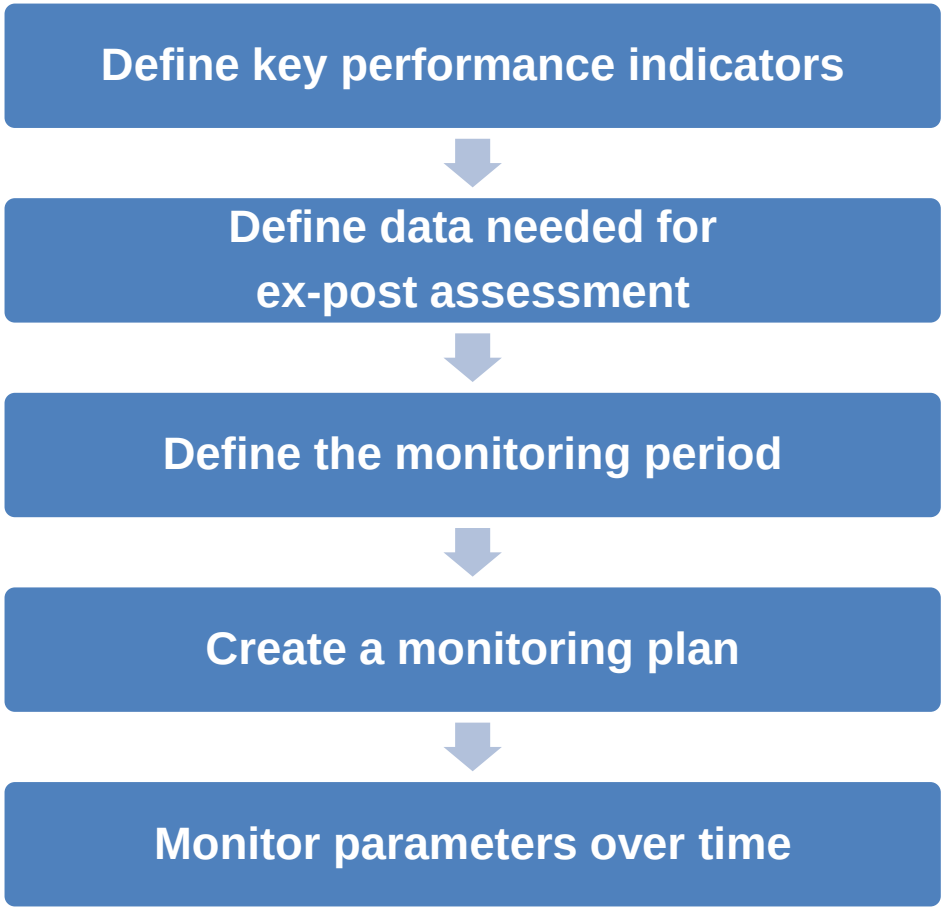
Monitoring steps



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Defining indicators

Indicator types	Definitions	Examples for a home insulation subsidy program
Inputs	Resources that go into implementing a policy or action	Money spent to implement the subsidy program
Activities	Activities that are involved in implementing the policy or action (undertaken by the authority or entity that implements the policy or action)	Number of energy audits carried out, total subsidies provided
Intermediate effects	Changes (e.g., in behavior, technology, processes, or practices) that result from the policy or action	Amount of insulation installed by consumers, fraction of homes that have insulation, amount of natural gas consumed in homes
GHG effects	Changes in GHG emissions and removals that result from the policy or action	CO_2 emissions from home energy use
Non-GHG effects	Changes in relevant environmental, social, or economic conditions that result from the policy or action	Household disposable income from energy savings

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Examples of data needs from NAMA MRV plans

Country and Sector	Examples of data to be monitored
Mexico (Buildings)	• Electricity use (annual, direct metering) • Emission factor from grid electricity • Gross floor area of building units
South Africa (Energy supply)	• Capacity of CSP installed through program • Electricity produced from funded CSP installations • Capacity of wind power installed through program
Chile (Transport)	• Number of electric vehicles (quarterly) • Passenger figures (monthly) • Km traveled (monthly)
Tunisia (Energy supply)	• Power installed (MW) • Solar panels produced each year • Amount of exchanged refrigerators

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Define the monitoring period

- Three relevant time periods:
  - NAMA implementation period
  - NAMA monitoring period
  - GHG assessment period

Example	Years						
	2005 – 2009	2010 - 2014	2015 - 2019	2020 - 2024	2025 - 2029	2030 - 2034	2035 - 2039
NAMA implementation period							
NAMA monitoring period							
GHG assessment period (ex-ante)							

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Create 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
  - Entity or person responsible for monitoring and roles and responsibilities of relevant personnel
  - Methods for generating, storing, collating, and reporting data on monitored parameters
  - Databases and tools (e.g., software) to be used
  - Procedures for internal auditing, QA, and QC

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Example of monitoring plan: Tunisia buildings NAMA

Indicator or parameter (and unit)	Data source	Monitoring frequency	Measured/ modelled/ calculated /estimated (and uncertainty)	Responsible entity
Number of houses insulated and insulated area by type (roof, wall, glazing) and m^2	ANME information system (to be created)	Annual	Measured (Low uncertainty)	National Agency for Energy Conservation (ANME)
For existing dwellings: historic annual electricity and primary thermal energy consumption (kWh/m^2)	Energy bills	Annual	Measured (Low uncertainty)	Collected by energy counsellors; fed into ANME information system
For new dwellings: annual electricity and primary thermal energy consumption (kWh/m^2) of dwellings that do not apply to the program	Sampled metering on 50 new dwellings and survey to assess energy profile (BAU)	Annual verification	Measured for 50 dwellings and estimated for the rest (Medium uncertainty)	Collected by ANME control officers to build a BAU scenario for new dwellings
Annual electricity and primary thermal energy consumption (kWh/year) per m^2 and per dwellings	ANME information system	Every 5 years	TBD	ANME

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Example of monitoring plan: Tunisia buildings NAMA

Indicator or parameter (and unit)	Data source	Monitoring frequency	Measured/ modelled/ calculated/ estimated (and uncertainty)	Responsible entity
Job creation Number of employees in new and existing companies that provide energy services for buildings	ANME accreditation system and human resources department	Annual	Measured (Low uncertainty)	ANME
Creation of new companies Number of new companies created to provide energy services for buildings	ANME accreditation system and human resources department	Annual	Measured (Low uncertainty)	ANME
Saved energy costs Energy savings by source from GHG ex-post assessment x Energy prices for electricity, natural gas, LPG, kerosene, wood, charcoal	GHG ex-post assessment and ANME sources on energy prices and subsidies	Annual	Measured and calculated (Low uncertainty)	ANME

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Data challenges highlighted during pilot testing

- Data availability was a limiting factor for some pilots
- Technical expertise required
- Capacity building may be necessary
- Challenging to apply methodology retrospectively, if appropriate data has not been collected
  - Best to put systems in place to collect data and apply the methodologies before the policy or action is implemented
- Once systems are in place, future assessments require less time and resources

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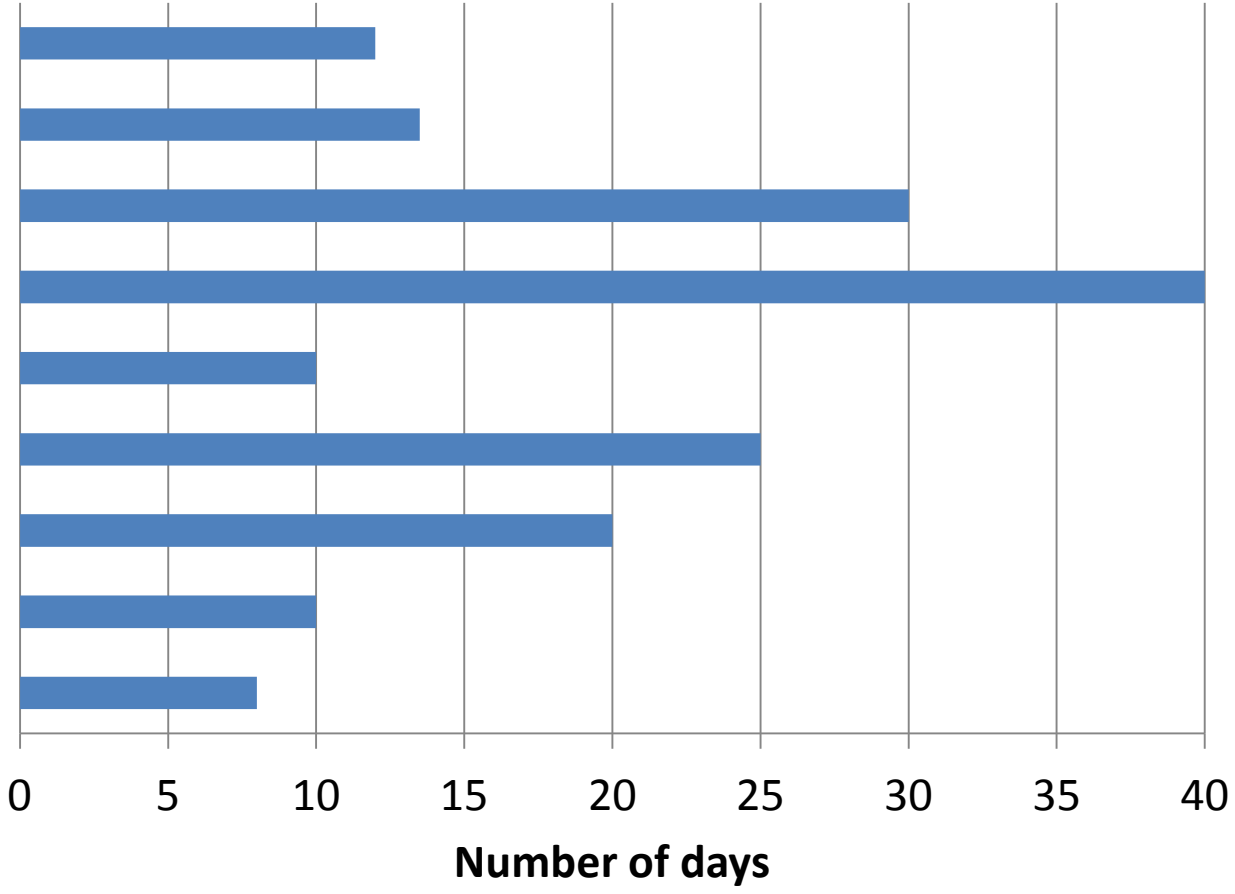
Level of effort (*Policy and Action Standard* pilots)



- Average = 19 days (excluding outliers on either end)
- Varies depending on:
  - Whether data has already been collected
  - Whether any previous analysis has been done
  - Complexity of the policy/action
  - Level of accuracy and completeness required by the objectives

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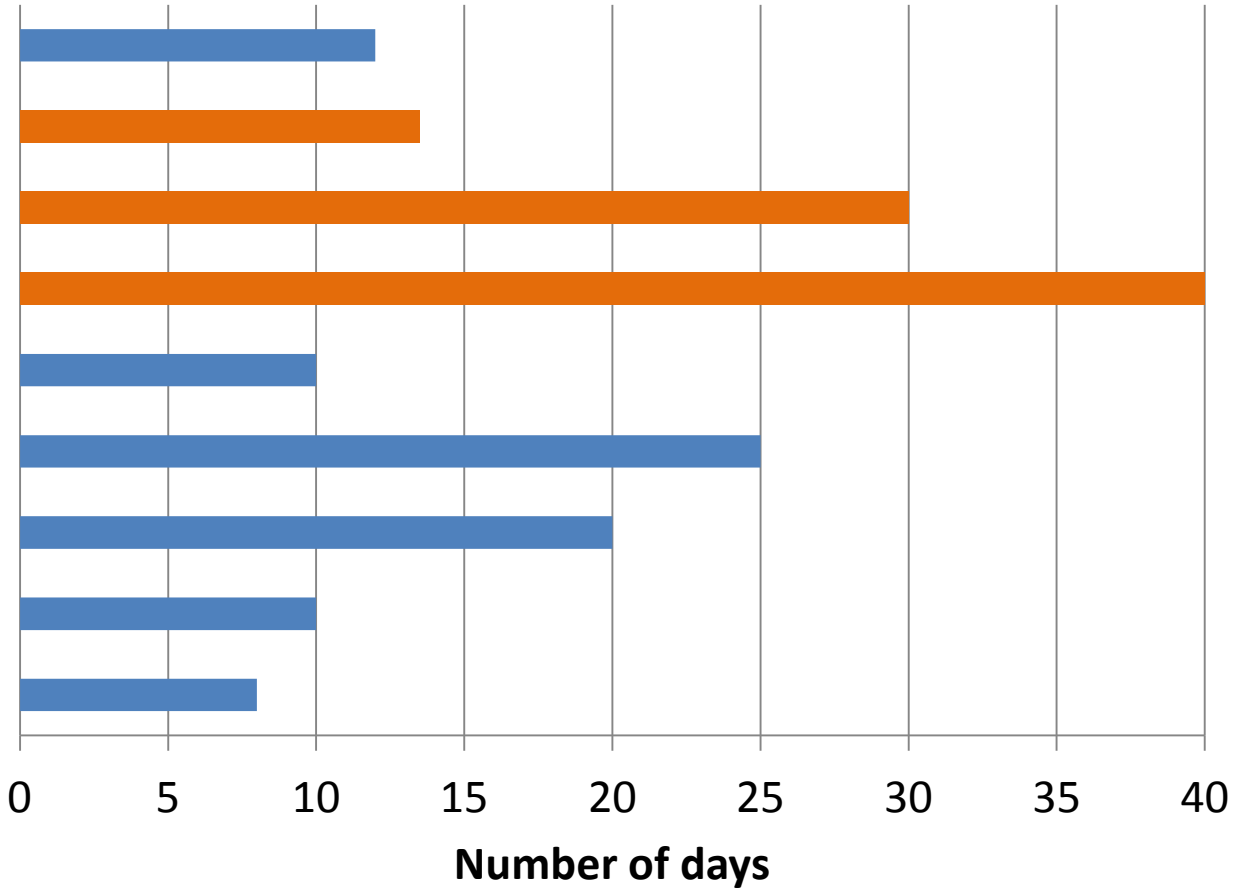
Level of effort (*Policy and Action Standard* pilots)



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  - Complexity of the policy/action
  - Level of accuracy and completeness required by the objectives

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Frequency of NAMA estimation

- How often would you estimate the GHG effect of policies/actions using the Policy and Action Standard?
  - Developed countries
    - Annually as part of national policy reporting process
    - Every 5 years (research institute)
  - Developing countries
    - Annually
    - Every 2 years as part of BUR/NC reporting
    - Every 2 years or as needed
    - Once off, as needed
  - NAMAs
    - Annually
    - Once before policy implementation (ex-ante), annually during implementation, once after implementation (ex-post)

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Thank you

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To download GHG Protocol standards and tools, visit:

www.ghgprotocol.org/mitigation-accounting

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Extra slides

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Examples of existing standards/methodologies

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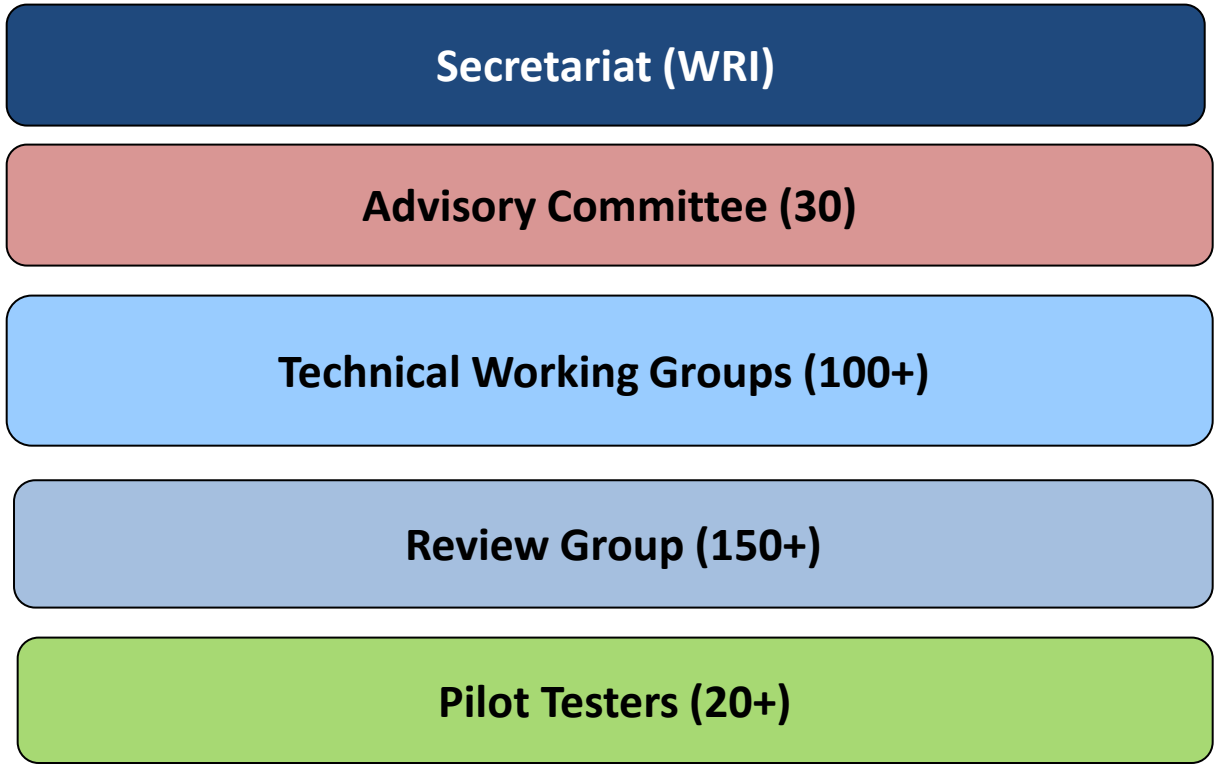
Standard development process



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Standard development process

Activities	2012				2013				2014			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Convene stakeholder groups	■	■										
Develop first drafts			■	■								
Workshops (Doha, Washington, Beijing) and review period				■								
Develop second drafts					■	■						
Pilot test standards							■	■				
Develop third drafts									■			
Public comment period										■		
Publish standards											■	

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Advisory Committee members

- Asian Development Bank
- Australia, Department of Climate Change and Energy Efficiency
- Brazil, Ministry of Environment
- California Air Resources Board
- CCAP
- Chile, Ministry of Environment
- China, NDRC
- Colombia, Ministry of Environment and Sustainable Development
- Costa Rican Institute of Electricity
- Ecofys
- Ethiopia, EPA
- European Commission
- Godrej & Boyce Mfg Co. Ltd., India
- India, BEE (TBC)
- Japan, Ministry of Environment
- Johnson Controls
- Maersk Group
- New York City, Mayor's Office
- OECD
- Siemens
- South Africa, Department of Environmental Affairs
- State of Rio de Janeiro
- Stockholm Environment Institute – US
- Thailand Greenhouse Gas Management Organization
- Tsinghua University
- UK DECC
- United Nations Climate Change Secretariat
- UNDP
- US EPA
- WBCSD
- World Bank

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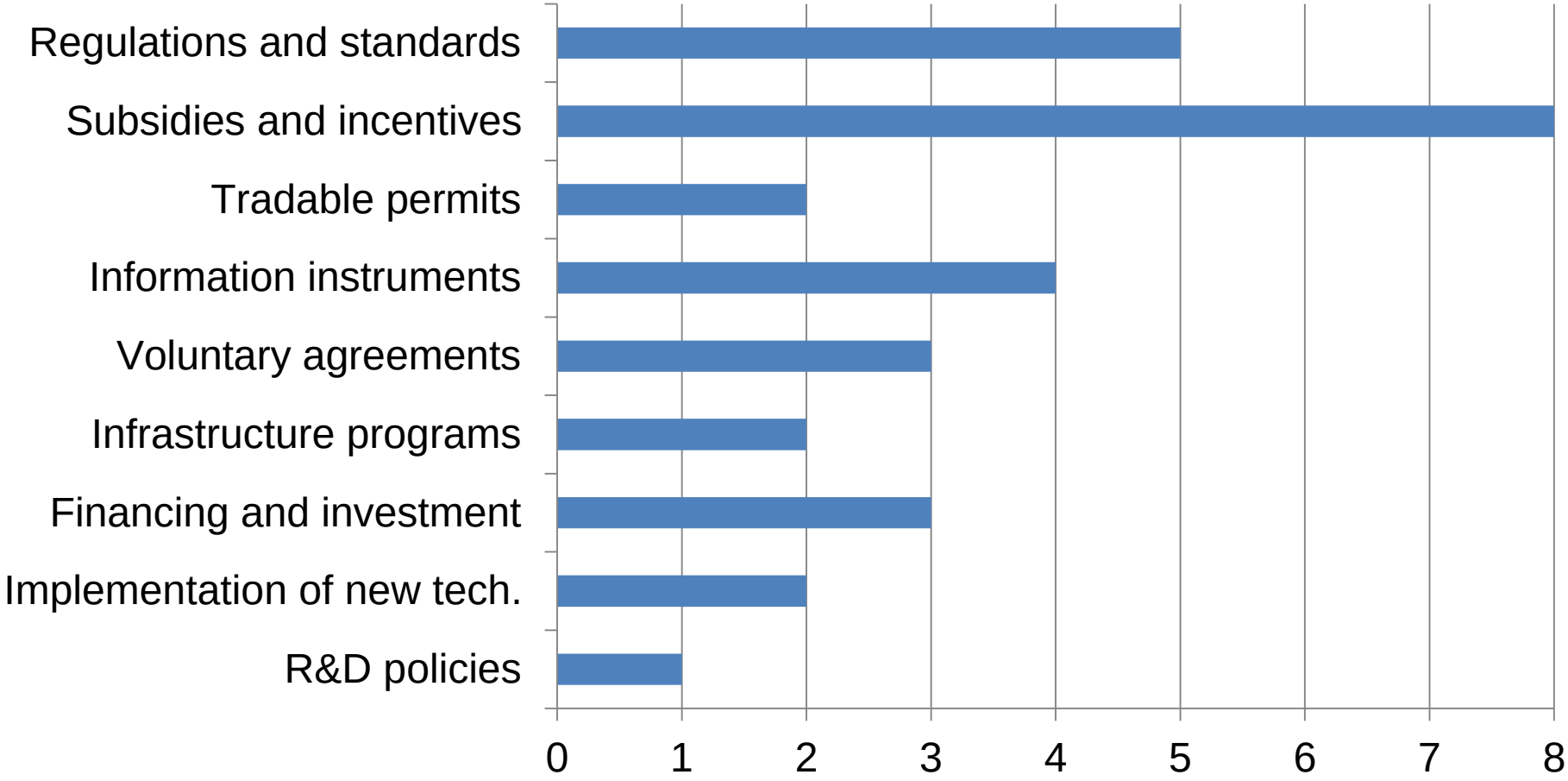
Types of policies and actions piloted



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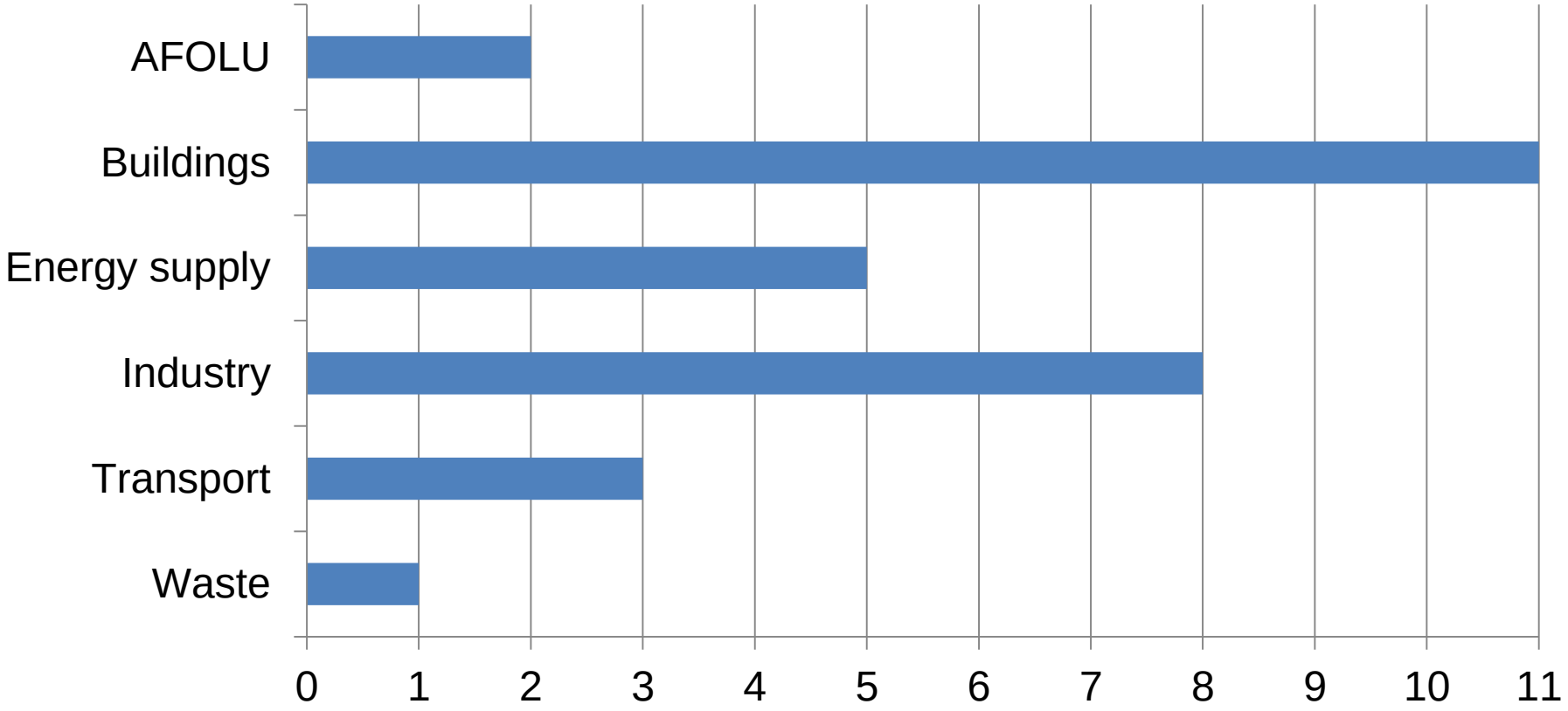
Sectors piloted (Policy and Action Standard)



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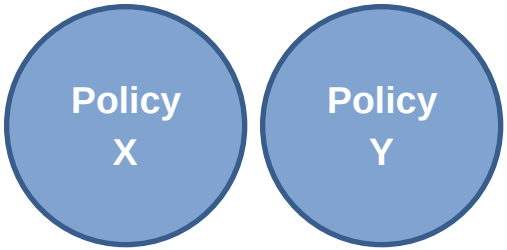
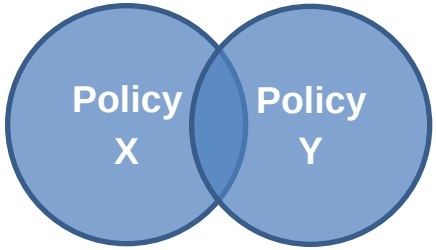
Policy interactions (and avoiding double counting of reductions)

Independent



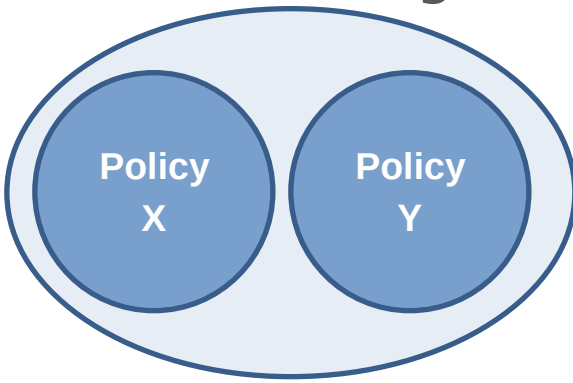
Combined GHG effect = X + Y

Overlapping



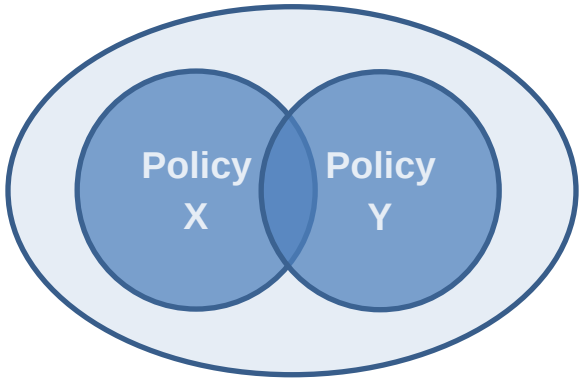
Combined GHG effect < X + Y

Reinforcing



Combined GHG effect > X + Y

Overlapping and reinforcing



Combined GHG effect could be lower or greater than X + Y