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Projections of Greenhouse Gas Emissions and Removals: An Introductory Guide for Practitioners

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Aug. 26th 17:00 CEST

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The Guide

The Guide provides a basic understanding of

- **What are GHG projections?**
- **How are they relevant to NDC mitigation planning?**
- **What are the key steps in compiling GHG projections using a modelling tool?**
- **What modelling tools are available to support the compilation of GHG projections?**
- **How to choose a tool appropriate to national circumstances?**

Additional detail is provided in Annexes to the Guide:

- Reporting requirements under the UNFCCC
- Limitations to models
- Typical data required and data sources



The Guide can be found [here](#).



Projections: What & Why?

What is a projection?

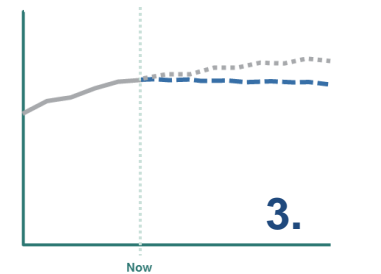
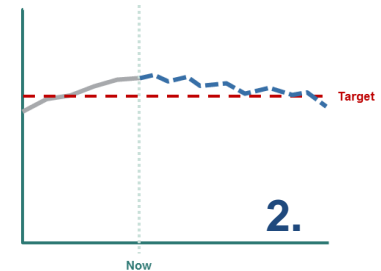
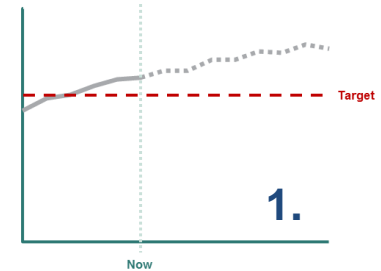
A projection is an estimation of a potential future evolution of a value or set of values (e.g. GHG emissions, tax revenue, food demand)

What are GHG projections?

GHG projections are an estimate of a country's future greenhouse gas (GHG) emissions based on a set of assumptions about how activities in that country, that cause those emissions, might change over time.

What can GHG help you with?

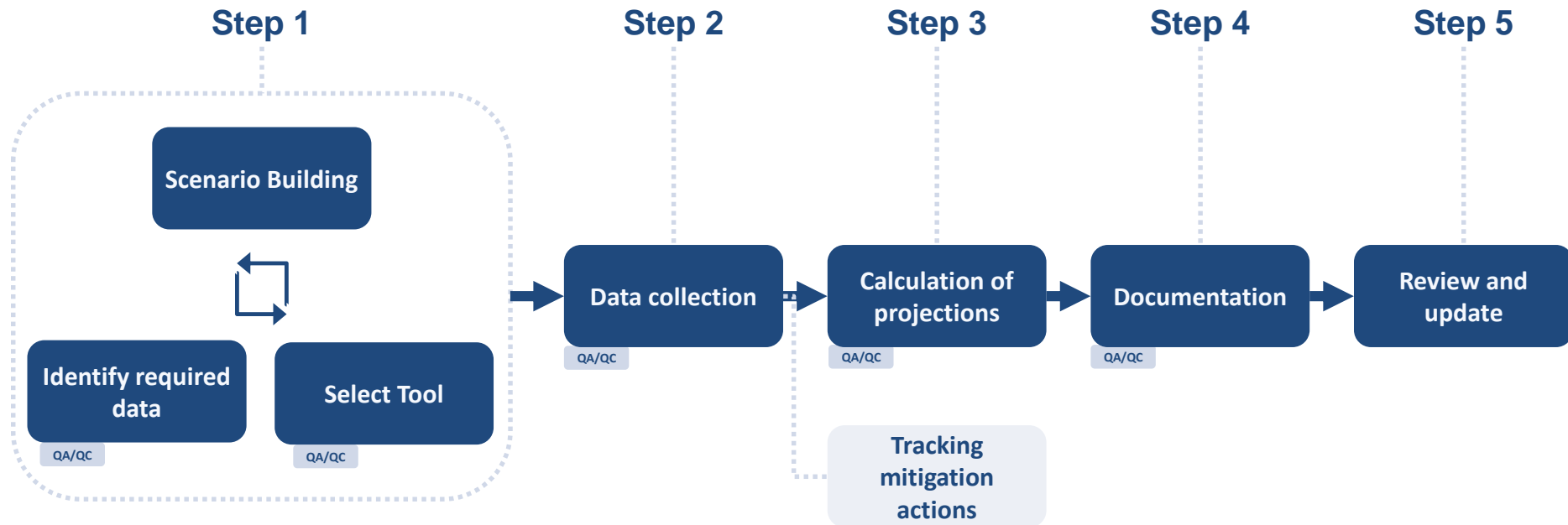
1. Setting a GHG reduction target e.g. under a Nationally Determined Contribution (NDC):
2. Understanding whether an existing GHG reduction target will be met
3. Estimating the impacts of specific mitigation measures on future GHG emissions.
4. Bringing it all together: Developing a long-term low-emission development strategy





Step-by-step approach to compiling GHG projections using a model

A step by step approach to compiling GHG projections using modelling tools is presented in the guide.

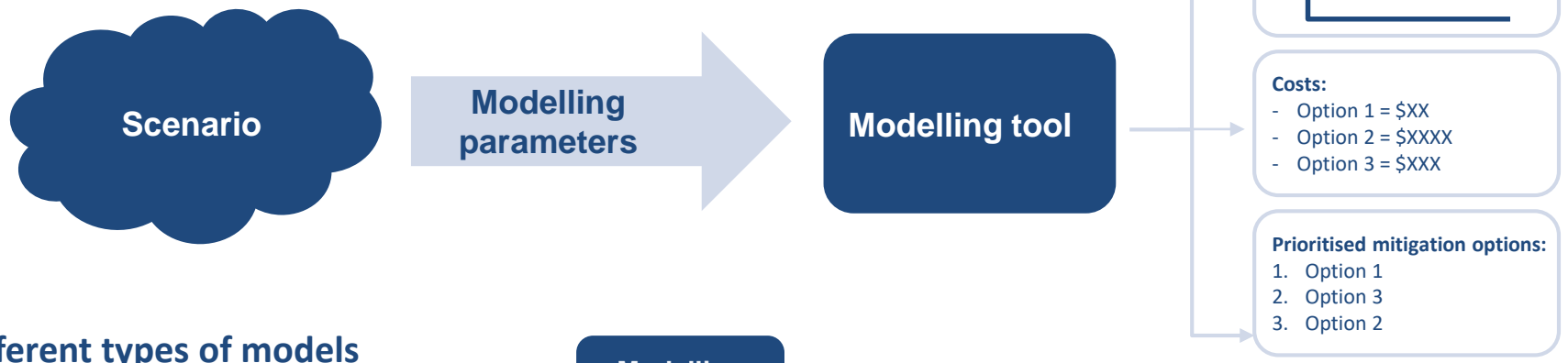




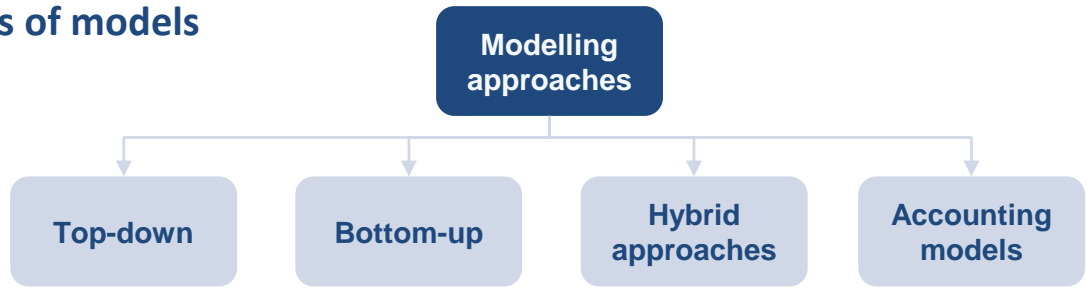
How does modelling work?

The Guide provides a basic understanding how models work and presents a simple categorisation of model types.

The modelling process put simply



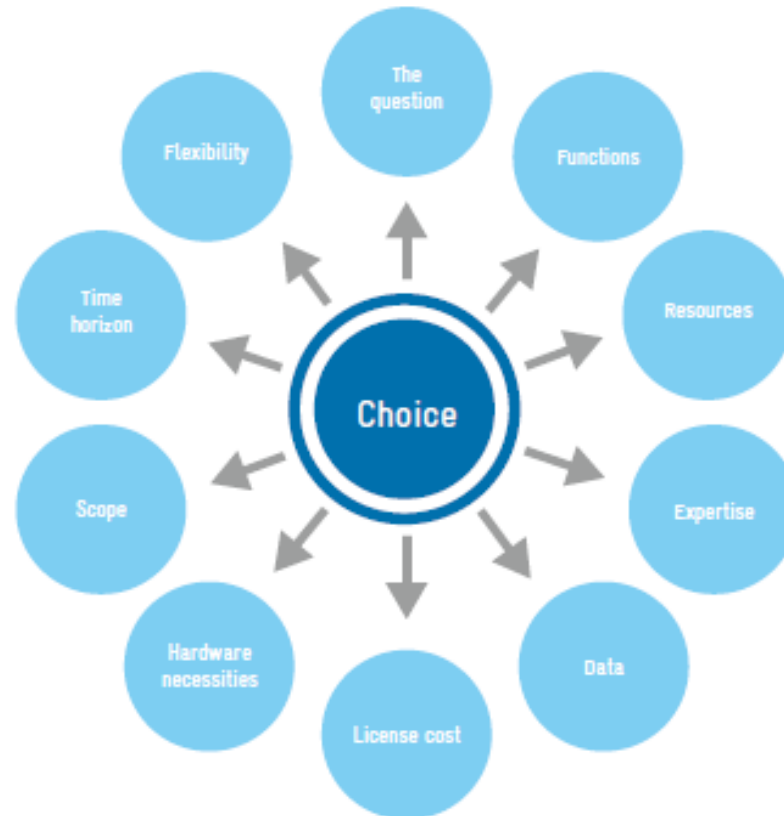
Different types of models





How to choose a model

- The Guide presents relevant criteria in choosing a model

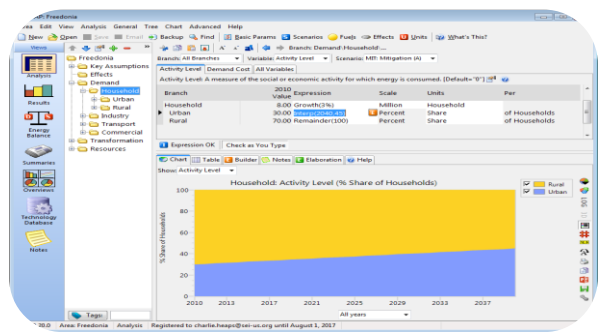




Examples of models

The Guide also presents a number of relevant models and how they relate to key criteria, like required data and expertise.

LEAP



Source: <https://www.energycommunity.org/default.asp?action=figure&url=images/analysis.png&cap=The%20LEAP%20Analysis%20View>

GACMO

Menu for Agriculture options (click links below)

- rice crop CH4 reduction
- tobacco curing (100 t tobacco/yr)
- cover crops (1000 ha)
- cooling slurry stores (1 store)
- nitrification inhibitors (1000 ha)
- fat supplementation in ruminants diets (%DM fat added)
- zero tillage

Rice crop CH4 reduction (1000 ha)			
Costs in US\$	Reduction Option	Reference Option	Increase (Red.-Ref.)
Total investment	1,337,793	26216	
Project life	20	20	
Lev. investment	126,278	2475	123804
Annual O&M	-	-	-
Annual fuelcost	-	-	-
Total annual cost	126,278	26,216	100,062

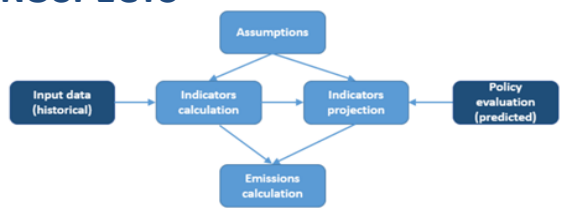
Annual emissions (tons)	Tons	Tons	Reduction
CO2-eq. emission	3,767	6,334	0
CH4 emission	5,767	6,334	5,667

General inputs:	
Discount rate	7%
GWP of CH4	23
Daily CH4 emission factor	1.3 kgCH4/ha/day
Cultivation period	200 days/year
Rice area	1000 ha

Reduction option: Rice crop with decreased irrigation	
Opportunity cost	1.2 US\$/ton CO2e
O&M	
Scaling factor (double cropping)	1.73 Single aeration
Scaling factor (double cropping)	1.50 Multiple aeration
Scaling factor (double cropping)	0.60 Single aeration

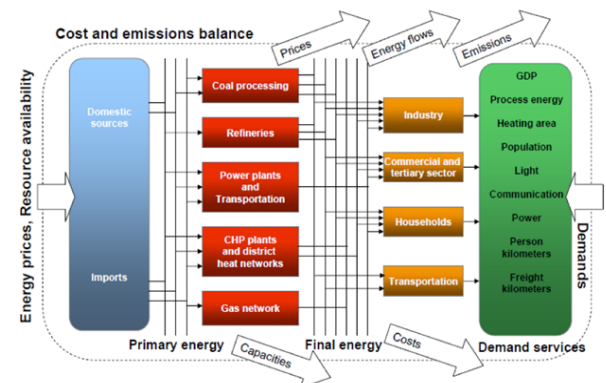
Source: <https://unepdtu.org/publications/the-greenhouse-gas-abatement-cost-model-gacmo/>

PROSPECTS+



Source: https://newclimate.org/wp-content/uploads/2020/02/PROSPECTS_Methodology.pdf

TIMES



Source: <https://iea-etsap.org/index.php/etsap-tools/model-generators/times>



Choosing a model

The Guide uses a list of questions to help you to understand which model might be best suited for your needs

Question	Suggestion
What is the most cost-effective route to achieve our target?	Optimisation models (e.g. TIMES) are built to output an “optimal” pathway based on the criteria selected by the modeller, for example the most cost-effective pathway to an emission reduction target.
What will our future emissions be?	An accounting model could be a good starting point for gathering the data needed to forecast future energy supply, demand and emissions, and to model the likely impact of economic growth, renewable energy and energy efficiency measures on future GHG emissions.
We need a very quick assessment of the potential impact of actions but do not have much expertise or data	Simple accounting tools offering default data like GACMO seem most appropriate in this case.
We have limited data and expertise now and we would like to continue using the same model over time	Accounting tools like LEAP or PROSPECTS+



Example – Step 1 Scenario Building/ Tool Selection

Modelling as basis to set NDC target (2015)

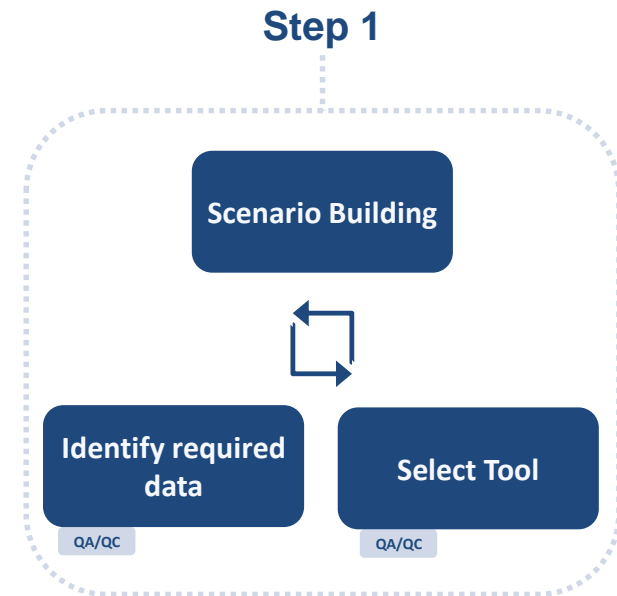
Sectors: All sectors. **Gases:** CO₂, CH₄, N₂O

Scenarios:

- Mitigation measures already agreed at the sectoral level
- Many assumptions needed for projections developed as part of the 2nd Biennial Update Report under preparation at the time

Modelling tool: LEAP.

Limited expertise + can be enhanced as data is improved over time





Example – Step 2 Data Collection

Starting point: Most recent national GHG inventory year (2010)

Data sources:

- Activity data + emission factors from the national GHG inventory where appropriate
- Detailed information on power generation capacities from 2nd BUR
- Emission drivers e.g. GDP, population projections from 2nd BUR

Step 2

Data collection

QA/QC



Example – Step 3 Calculating Projections

Modelling approach

- **Energy:** Power sector: detailed data of capacities, fuels, costs, power demand, share of renewables to be used
- **Transport:** Vehicle numbers / km driven modelled outside of LEAP
- **Waste:** GHG emission from waste and waste water modelled with Excel and entered directly into LEAP
- **LULUCF:** GHG emissions from forestry modelled with Excel and entered directly into LEAP

Step 3

Calculation of
projections

QA/QC



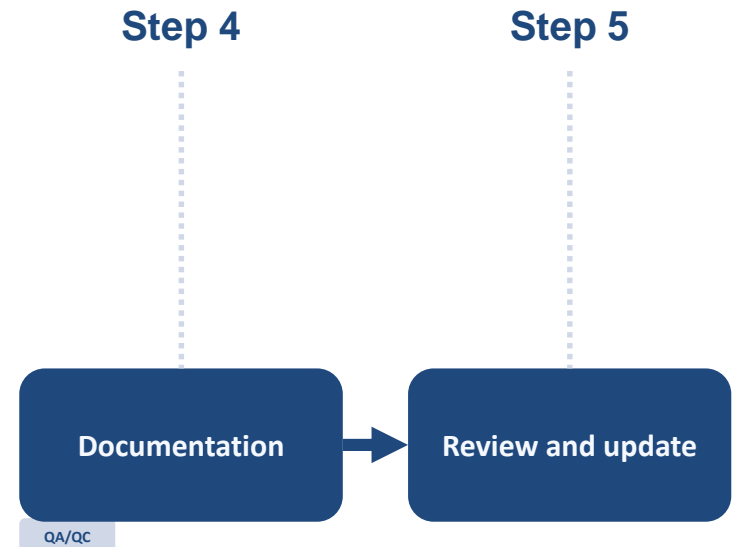
Example – Steps 4+5 Documentations + Review

Documentation:

- Saved LEAP files and Excel calculation document

Review:

- Review currently taking place for the purposes of NDC update

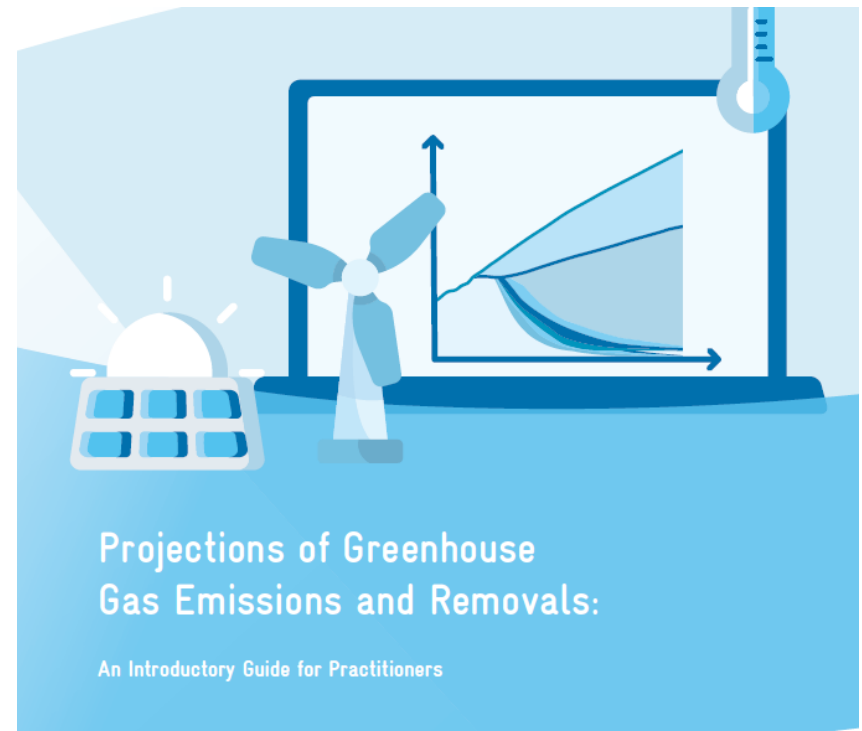




The Guide

The Guide provides a first introduction and overview into GHG emission projection modelling and its connection to GHG inventory compilation so you can get started.

Now we have 20 mins time for questions & answers



The Guide can be found [here](#).