



ANALYSIS OF MITIGATION OPTIONS AND ESTABLISHMENT OF ALTERNATIVE MITIGATION PATHWAYS: ANALYTICAL APPROACHES AND TOOLS

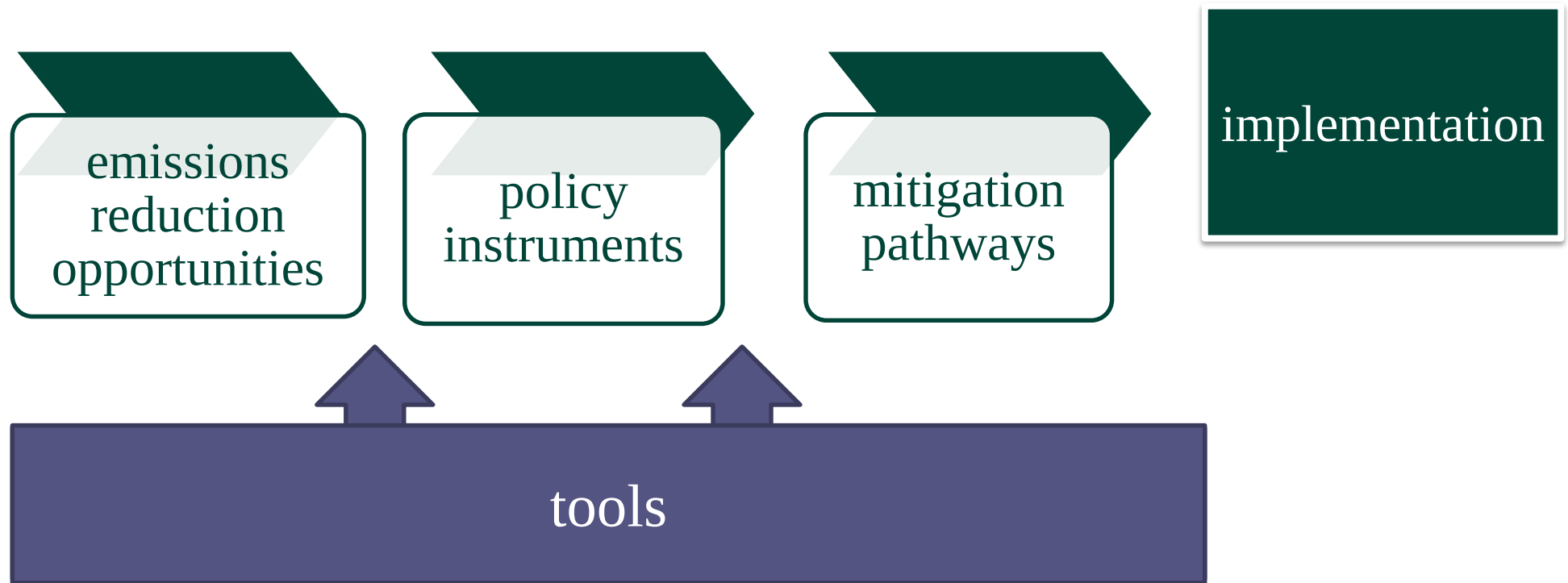
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Key points

- understanding of alternative mitigation pathways is enhanced by using **analytical tools**
- **similar tools** can be used to analyse emissions reduction opportunities and policy instruments
- **uncertainty** analysis and assessment of **barriers** should be considered
- the ‘**checklist**’ contains:
 - overview of tools and their respective uses
 - data requirements
 - how to deal with uncertainty

From INDC to implementation



‘Checklist’ provides suggestions for analysis

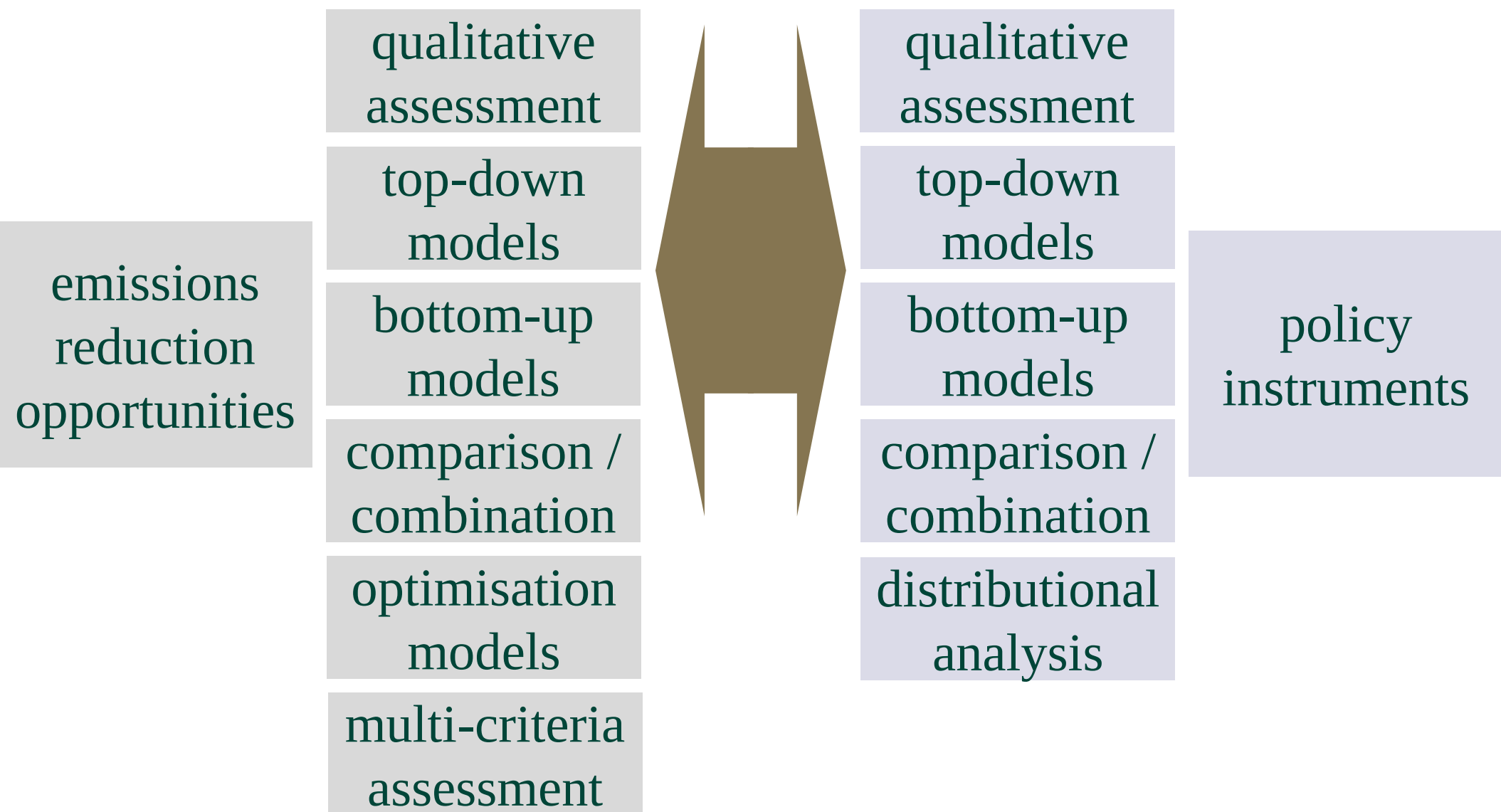
key issues and questions

models and analytical tools

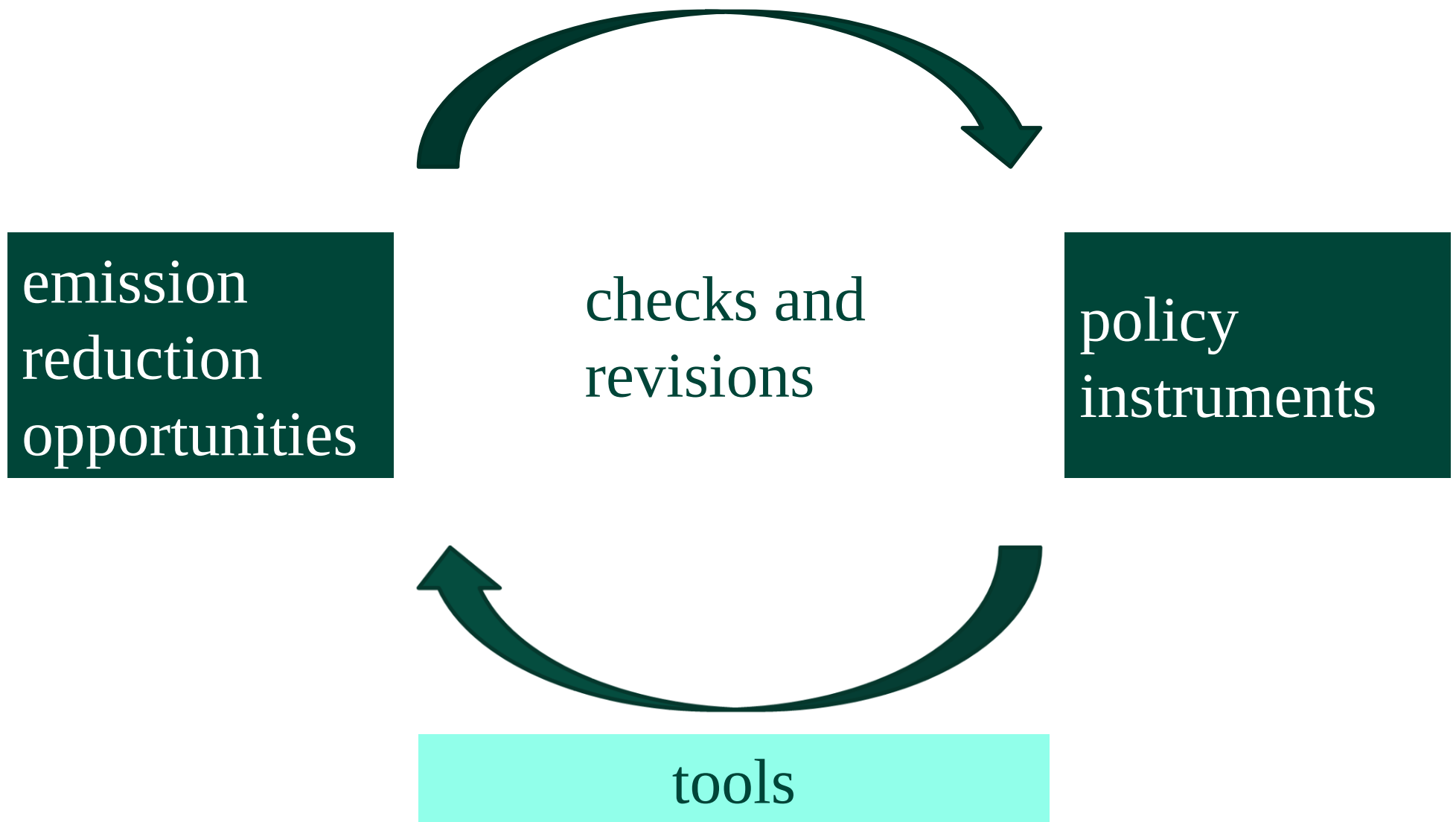
data and assumptions

dealing with uncertainty

Overview of analytical tools



Iterations increase accuracy



Policy packages

suggestions for successful combination of policy instruments

1. meets the target in a lowest cost method
2. integrates into broader economic development agenda
3. is feasible, flexible and robust

Possible steps

Step 1

Identification of policy instruments

- identification based on national planning documents
- shortlist of feasible policy instruments
- consideration of carbon pricing

Step 2

Analysis of costs and impacts

- top-down, bottom-up and distributional models
- understanding the key trade-offs

Step 3

Analysis of interactions

- identification of possible synergies and barriers
- coherent policy package to achieve mitigation target



Selecting policy instruments

policy instruments differ in their mechanisms to achieve mitigation

- **financial:** provide additional returns to private actors
- **fiscal:** set by Government and change prices
- **behavioural:** changes in decision making or habits and preferences
- **direct regulation:** mandates technology or process standards

Potential screening criteria

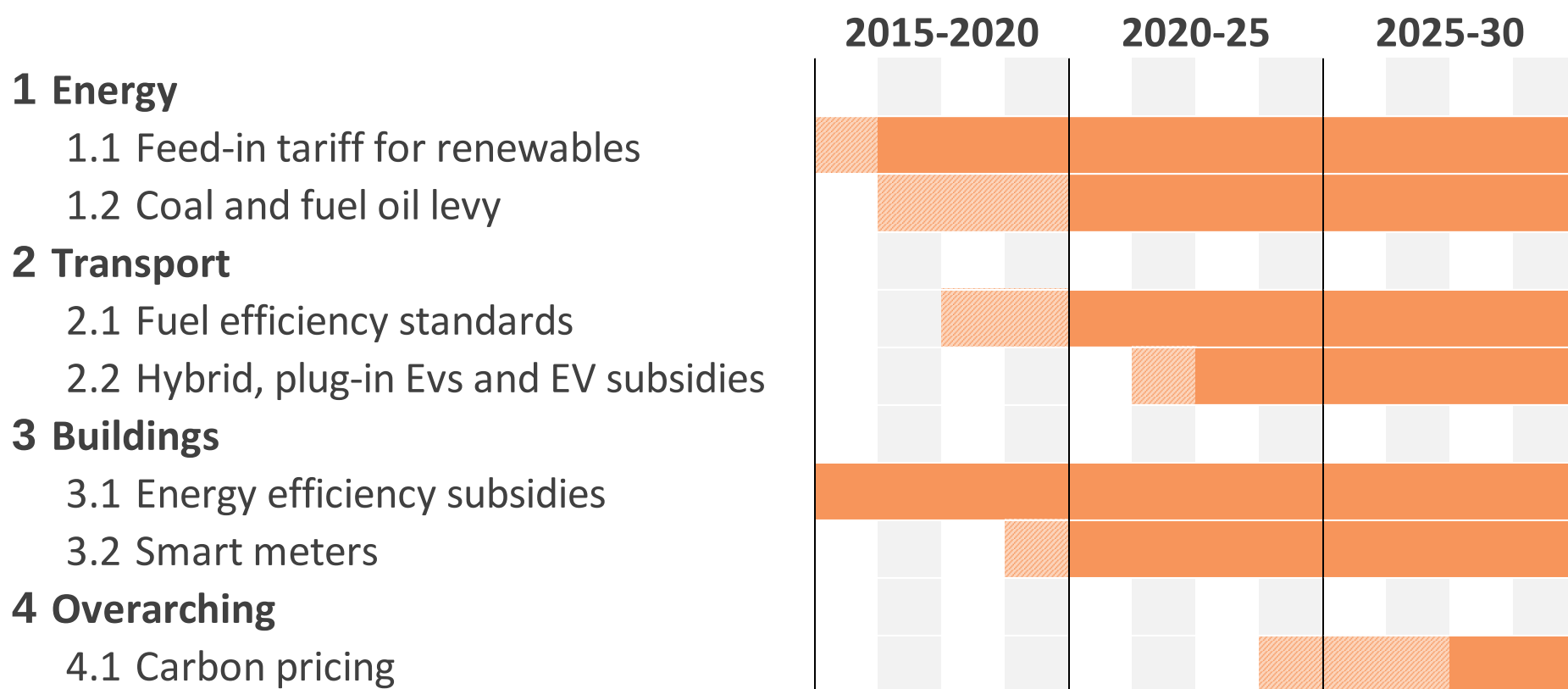
1. effectiveness at addressing market failures
2. understanding of and coherence with existing institutions and regulations
3. consistent with other development and policy objectives
4. international experience
5. political feasibility

Attributes of policy instruments

1. **effectiveness:** CO₂ reduction
2. **efficiency:** cost per CO₂ reduction
3. **feasibility:** social, political, economical
4. **capacity to deliver:** complexity, institutions, regulations

Policy packages can create synergies

integration across sectors of the economy



Uncertainty and barriers are part of the process

- understanding and robustness of analysis of emissions reduction opportunities and policy instruments makes it **easier to explain, defend and justify**
- understanding of **key sensitivities** to consider during an analysis
- evaluating **scenarios** to check the robustness of policies under uncertainty

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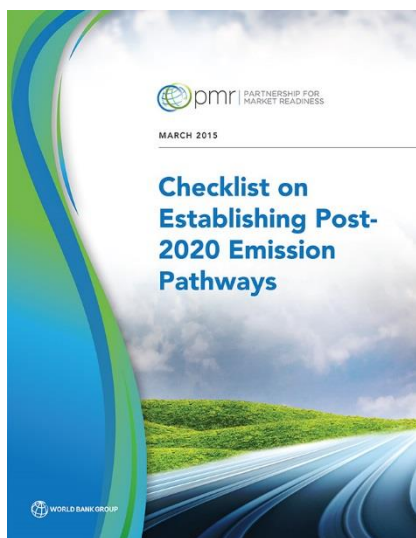
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<https://www.thepmr.org/content/supporting-development-intended-nationally-determined-contributions-indcs>

Additional slides

A focus on emissions reduction opportunities needs to synthesize technical information with more qualitative assessments

Table 1a. Key questions on mitigation options use similar models as key questions on policy options

	Analytical approaches available	Analytical techniques available (further breakdown)	Key observations about techniques	Data options/ sources
What are plausible alternative emission reduction scenarios?	1. Assessment of technical abatement opportunities and selection of scenarios	a) Optimisation models like MARKAL-TIMES	Comprehensive approaches that identify dynamically optimal emission mitigation strategies and links between different options. However, detailed data requirements and assumptions often difficult to scrutinize.	Depend on particular modelling option but MARKAL models require energy use by source, electricity generation by source, energy use by activity and sector, heating use by sector and activity and, if desired, data on transport energy use.
		b) Bottom-up modelling techniques to identify opportunities (as appropriate supported by diagnostic tools and software packages like MacTool or TRACE)	Flexible approach that can be applied in more contexts. May risk missing synergies between ER opportunities Risk of misinterpretation of results unless clarity over issues such as i) assumed speed of diffusion, ii) discount rates; iii) extent to which institutional barriers have been taken into account.	Typically require bespoke studies collecting data on emission intensities of different options, likely penetration rates, costs of different technologies. May be possible to make use of existing studies with ad hoc adjustments.
		c) Top-down models such as CGE models	Takes into account interaction between different sectors and policies. Can be linked to results from bottom-up models.	Requires detailed input/output database with energy use and emissions, and information about substitution factors, embedded in a suitable economic modelling framework.
		d) Comparison and combination of modelling scenarios	Can identify areas where there is confidence or uncertainty over emissions mitigations options. Can help identify a “most likely” mitigation scenario.	Readily done if different modelling approaches are used.
		e) Scenario selection based on multi-criteria analysis taking account of factors such as consistency with development objectives, costs, political feasibility, administrative ease	Can be helpful to construct multiple scenarios varying in the extent of emission mitigations pursued to get an understanding of the impacts of differing levels of ambition.	Substantively informed by analysis described above

Source: Vivid Economics

A policy-based approach might start with a qualitative selection of preferred policies

Table 1b. Policy analysis often starts with already planned policies; if not, the first step is to select feasible policies

	Analytical approaches available	Analytical techniques available (further breakdown)	Key observations about techniques	Data options/ sources
What are plausible alternative emission reduction scenarios?	2. Identification and selection of policies that will help reduce emissions.	a) Qualitative assessment and selection of policies. Possible to combine with ad hoc quantitative analysis to understand expected emission reduction impact	Most likely approach for identifying shortlist of candidate or proposed policies. Relatively little quantitative analysis needed. Undertaken alone, there is a risk that the impacts of the policies will be poorly understood.	International databases such as IEA Policies and Measures database. Other tools such as TRACE. International comparisons to inform expected changes in emissions factors
		b) Bottom up – partial equilibrium modelling	Helps provides more insight into one or more candidate policies. Most suitable when policy is restricted to small number of sectors or desire to understand detailed sectoral impacts. Does not provide information on macroeconomic aggregates	Sector specific data from national accounts and national and international industry publications
		c) Top-down – CGE modelling	Helps provides more insight into one or more candidate policies. Most suitable when wanting to understanding long-term impact of broad-based policy on key variables.	Input-output tables to provide SAMs Elasticity estimates from existing models or econometric estimation
		d) Top down – macroeconomic modelling	Helps provides more insight into one or more candidate policies. Most suitable when wanting to understanding impact of broad-based policy on key variables in the short-medium term. Data availability is a key challenge and may not be appropriate for long term analysis	Long time series on cross-sectoral economic activity.
		e) Household expenditure and cost models	Can provide detailed assessment on distributional impact on policies but data intensive	Data to populate models often needs to be collected through censuses
		f) Ad-hoc distributional analysis	Relatively simple techniques based on assessment of profile of spending by different members in society	Household expenditure survey data
		g) Policy mapping tools can help identify where there are multiple policy influences. And extent of overlap. This facilitates qualitative analysis of risks of distortion	If more than one policy is affecting emissions or activity within a sector then it can be important to assesse the extent to which policy instruments are supporting or overlapping.	Work from international institutions and academics can help identify likely overlaps