UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

Climate Strategies

Workshop Report: International technology and policy cooperation

Catching the Wave

Summary of discussions during workshop in Cambridge 9th and 10th February 2009

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Summary

Domestic action will be the key to shift developing countries onto low-carbon development trajectories. At the workshop in February 2009 we identified three sets of open questions that have emerged in the international discussion on climate cooperation with developing countries.

A. International support for domestic action and enabling environments

Technology action plans, sustainable development policies and measures and nationally appropriate mitigation actions (NAMAs) are all concepts that rely on domestic policies and actions to shift economies on a low-carbon growth path. We are interested to better understand what are the domestic barriers and drivers for such actions, how international support could unlock some of the domestic discussions, and what type of support would be helpful in the specific circumstances of a country and sector.

B. Indicators to manage implementation of domestic action

While theoretical analysis and initial concepts for policies are often promising, their successful implementation repeatedly turned out to be more challenging. Experience in recent years points to the value of intermediate indicators to monitor, quantify and manage the implementation, to learn from comparison with other countries, and to make governments accountable for their actions or inactions. We are interested to explore the specific indicators that could support the implementation of policies with climate co-benefits, and discuss with stakeholders criteria for their evaluation, and to find categories to allow for the use of such indicators under UNFCCC reporting frameworks

C. International technology cooperation as basis for domestic action

New technologies and the adoption of technologies from other countries and sectors play a central role in many decarbonisation strategies. This has been recognised and is reflected in a variety of proposals for international technology cooperation. We will explore frameworks to categorise the proposed mechanisms; although such an analysis will focus on a limited number of mechanisms, this should be sufficient to address the needs of different countries, sectors and technologies. A repeated feature of programs to enhance technology innovation, adoption and use is the concept of a conducive environment (enabling environment), that requires domestic action and points to the interactions between international support for domestic action and international technology cooperation.

This report summarises some of the ideas that have emerged in the discussion, and provides the basis for research that will be pursued in the coming months.

Introduction

The recent COP 11[1] and COPMOP, alongside the Bali Action Plan[2], launched a two-track approach of multilateral dialogue. Following a 'protocol track', an ad-hoc working group focuses on further emissions reductions under the Kyoto Protocol (AWG-KP). Another ad-hoc working group on long term cooperative action (AWG-LCA)[3] focuses on five issues to be pursued under the broader UN framework convention on climate change (including input from the USA):

- A shared vision for long-term cooperative action
- Enhanced national/international action on mitigation of climate change
- Enhanced action on adaptation
- Enhanced action on technology development and transfer to support action on mitigation and adaptation
- Enhanced action on the provision of financial resources and investment to support action on mitigation and adaptation and technology cooperation

Four contact groups have been set up to discuss these issues in 2009. Of particular interest for the project are:

- the joint contact group for technology development/ transfer and provision of financial resources and investment. The research project aims to contribute to a framework that provides a robust links between both dimensions
- the contact group on mitigation. The research project aims to link mitigation action and cooperation to Measurable, Reportable and Verifiable criteria required by the Bali Action Plan for (i) mitigation commitments of developed countries, (ii) mitigation actions of developing countries, and (iii) support of developed countries for mitigation in developing countries.

Climate Strategies convened a workshop in Cambridge on February 9th and 10th 2009 to identify research questions that need to be addressed to inform the decision of these contact groups. To trigger the evidence based discussion, the project participants from the Climate Strategies project "International Support for Domestic Climate Policy" reported on the results from 2008. The discussion on technology frameworks was further supported by presentations of recent work from ECN, E3G, and the Sussex Energy Group.

The discussions focused on three areas – that are also used to structure this report – and the research agenda in the coming months.

Supporting specific actions and enabling environment: We aim to further explore the drivers and barriers for policies with climate (co)-benefits in developing countries through discussions and workshops with stakeholders, allowing an assessment of the role different types of international support can play in overcoming these barriers. This builds on proposals for Nationally Appropriate Mitigation Actions (NAMAs), which could be domestically driven but might also benefit from international support to enhance implementation.

[1] http://unfccc.int/meetings/cop_11/items/3394.php
[2] http://unfccc.int/documentation/decisions/items/3597.php?such=j&volltext=/CP.13#beg
[3] http://unfccc.int/meetings/items/4381.php

Indicators to manage implementation: We aim to explore the use of intermediate indicators; developing appropriate criteria to evaluate and classify their effectiveness in managing policy implementation, international learning and linking to international incentive schemes. While discussions on Monitoring, Reporting and Verification often focus on final emission outcomes, it is increasingly acknowledged that further quantitative intermediate indicators are required for effective UNFCCC reporting.

Technology cooperation: We survey different frameworks and proposals on technology cooperation in order to provide a more structured approach to understanding the role of such frameworks in different sectors, technologies and countries. A recurrent theme in the discussions is the need for a conducive environment (enabling environment) for the adoption, diffusion and large-scale use of technologies. Domestic policies can thus also play a role in international technology cooperation.

The discussion also suggested that there are strong interactions between these three areas. These interactions will be further investigated in the project:

- A strong role for domestic policies is required in order to create conducive environments for the use and adoption of technologies. This offers an opportunity to link discussions on technology cooperation with discussions on international support for domestic action.
- There is a role for a portfolio of mechanisms and actions – to meet the specific demands across countries and technologies. This suggests a need for better characterisation of the suitability of different mechanisms to address these needs and to assess their interactions, allowing the creation of an appropriate portfolio in order to facilitate a low-carbon transition in individual sectors.
- Quantifying policy implementation can be useful in order to facilitate management, encourage international learning and ensure accountability of Annex 1 and non-Annex I countries. Given the long-time lag and uncertainties of associated with R&D output, intermediate indicators are required.
- New technologies, adopted technologies, and the diffusion of existing technologies play an important part in many of the strategies aiming to shift a sector towards a low-carbon development trajectory. The country policy case studies can further explore whether technology related mechanisms are likely to address domestic needs:

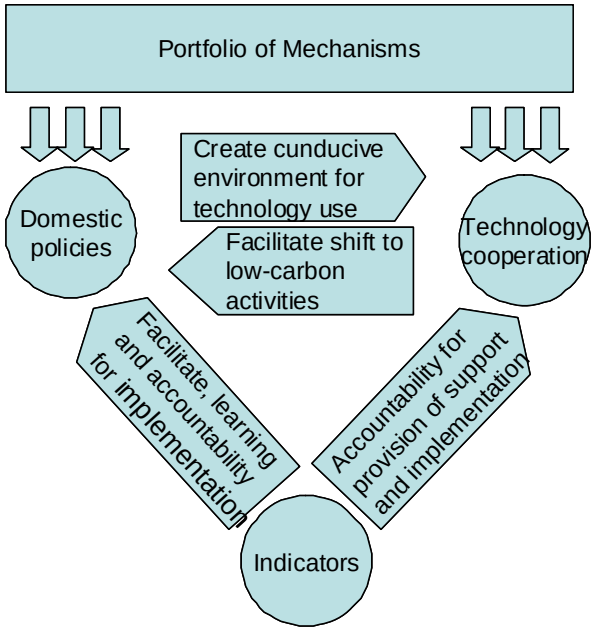


Figure 1. Interaction between project components

A. Drivers and barriers for domestic policies

Domestic climate policies play an important part in shifting countries towards a low-carbon growth trajectory. This has been recognised in concepts like Sustainable Development Policies and Measures, Technology Action Plans, and National Appropriate Mitigation Actions. The workshop explored the details of domestic implementation of policies with climate co-benefits using a bottom-up approach:[4]

- China case study on wind power technology deployment and manufacturing capacity
- India case study on clean and efficient coal-based generation technology; upgrading of the distribution network; and improvements in the efficiency of agricultural pump sets
- Ghana case study on increasing renewable energy and energy efficiency efforts
- Brazil case study on policies to facilitate a modal shift for inter-city and urban transport
- South Africa case study on investment requirements and institutional reforms to enhance energy efficiency

The various barriers for the implementation of such policies are presented in the respective papers – and across a wider set of literature. It is often the case that other government priorities and resource constraints often restrict the scale, scope and speed of the policy implementation. Policy indicators, which are discussed in section B of this report, can be used to quantify the role of policy processes to address such barriers. Indicators can also facilitate better management of policies. Domestic stakeholders that support a policy are critical for implementation success. The aim of this discussion is to move from the identification of non-climate co-benefits to open discussion with stakeholders. The following considerations should be noted:

[4] The case studies from the ISDCP project are described at http://www.climatestrategies.org/our-research/category/40.html

- domestic producers of low-carbon and energy efficiency technologies will support the shift from a support scheme for the initial deployment towards a regulatory framework that ensures the subsequent large scale diffusion.
- co-benefits can ensure energy security, improve industrial profitability and competitiveness
- energy is a bottleneck for growth - energy security has deteriorated, and substantial future demand suggests the incremental costs for the energy system are significant
- co-benefits for low-income households: accessing better energy services at lower cost
- the infrastructure of urban transportation system is a main bottleneck for growth

Energy and the environment have been on the agenda of development cooperation and domestic policies for decades. This raises the question, why domestic circumstances should suddenly change – or what could help to unlock policies?

- International support might be able to provide additional benefits for domestic stakeholders, and thus facilitate the implementation of policies.
- International finance could provide a stimulus to address the lack of private investment and institutional barriers
- In many cases, policies and implementation mechanisms are in place but implementation is not occurring, suggesting a role for technical assistance. Benefits from transparent monitoring as part of international reporting of actions by developed and developing countries are possible.
- Effectiveness, efficiency and equity are key considerations. Possible pairing of polices to remove other issues, could align hard and soft policies to ease political and social implementation. Strong institutions are needed within a country to ensure domestic pairing, implementation and impetus.
- The integration of key policy indicators across energy services, financing and private sector participation.

Of particular interest for the project is the question of what type of international support is most effective in triggering such changes? During the next phase of the project the country policy case studies will explore the role of:

- Technical assistance
- Capacity building
- Financial incentive schemes
- Unconditional financial payments
- Crediting of emission reductions
- Sectoral approaches
- CDM projects

- Funding for licences on IP

International bodies can provide some structure for this analysis, for example the work of the Annex 1 working group. An WRI data base on SD-PAMs provides an example of an – albeit more qualitative – way of describing policies.[5]

International support within such a scheme raises questions regarding external involvement and domestic ownership. A structured analysis will have to differentiate between the various stages from policy design to implementation. An initial assessment suggests the importance of domestic sector reforms to create policies and awareness in a country; this can subsequently drive investment by domestic and international actors. However, the CDM mechanism also illustrates how this process can be inverted where incentives for private actors drive the initial low-carbon projects together with the necessary regulatory framework.

The sensitivities and varying effectiveness of international cooperation on domestic policies points to the importance of designing international mechanisms that respect these sensitivities. As part of the country policy studies we aim to explore whether domestic stakeholders consider international support at the policy level more effective if it is channelled through various institutions, for example:

- World Bank / IMF
- A new multilateral fund
- Bilateral cooperation
- Bilateral cooperation within the framework of UNFCCC
- Bilateral cooperation – with developing country choosing the partner country to cooperate with in a specific sector/policy domain.

B. Indicators and methodological approaches for effective policy implementation

UNFCCC discussions have acknowledged the role of intermediate indicators as output metrics from an action or process that can be usefully used as a tool to support policy implementation[6]. Wider experiences beyond climate policy suggest that intermediate indicators can be useful as part of internal or domestic information gathering and presentation for strategy and policy learning[7]. Metrics can enable the adoption of best practice and provide a framework for support and cooperation, while incorporating transparency, comparability and accountability. Indicators need not be linked to policy objectives or targets to generate learning and improved policy

[5] http://projects.wri.org/sd-pams-database

[6] See the UNFCCC 'Meeting on experiences with performance indicators for monitoring and evaluation of capacity-building in developing countries': http://unfccc.int/cooperation_and_support/capacity_building/items/4493.php
EGTT. Rolling Programme of the Expert Group on Technology Transfer. Available at: http://unfccc.int/ttclear/jsp/EGTTWP.jsp EGTT (2008) Proposed terms of reference for a report on performance indicators and for a report on future financing options for technology transfer. Available online at: http://unfccc.int/resource/docs/2008/sbsta/eng/inf02.pdf
OECD/IEA (2008) Measurement, reporting and verification of mitigation actions and commitments. Available at: http://www.oecd.org/dataoecd/53/57/41762333.pdf

[7] Intermediate indicators: Lessons for their Use in Measurement, Reporting and Effective Policy Implementation. James Cust, University of Cambridge: UK. Available online at: http://www.climatestrategies.org/our-research/category/40.html

success; informative indicators can facilitate better policy design, ongoing assessment and updating.

The workshop discussions focused on definitions of appropriate metrics, the use of indicators within existing technology and international support frameworks, and the value of country specific, sectoral and technological indicators. In the selection, use and evaluation of possible metrics, it is important to consider the purpose of indicators for the policy in question. The workshop identified two key purposes for indicators: measuring progress towards:

- Creating an enabling environment
    - Address current and future barriers
    - Institutional set-up
- Development and deployment of low-carbon technologies:
    - Ensuring increasing initial deployment
    - Covering incremental cost
    - Development of adoptive and adaptive capacities

Metrics can be of use for current implementation; using outcome-based policy impacts (measured now) to assess the barriers and implementation difficulties. Indicators to stop unsuccessful policies by identifying aspects of policy that aren't working can be used in connection with best practice sharing to recognize and find solutions to barriers. Use of specific indicators as a component to identify bottlenecks and spur investment could inform problem solving, international support, financial mechanisms and technology transfer.

Metrics can be binary or quantifiable, and measure hard physical outcomes or describe 'soft' institutional aspects. A summary of indicator systems and intermediate measures is provided in the annex. Quantification need not focus on emission reductions data, as many policies provide intermediate outcomes as a good basis for measurement. Intermediate measures have the benefit of being easily quantified, as they are often measured within a 3 to 5-year timeframe. In the case of micro-level measurement a combination of indicators may increase political feasibility, suggesting the use of composite indicators. Such metrics would also avoid lag-times in measurement, which may drive low-carbon investment. A typology of indicators within a systems perspective may be of value to provide examples and case studies of relevant indicators for policy stages.

Use of indicators within existing technology and international support frameworks

The UNFCCC currently use Measurable, Reportable, and Verifiable (MRV) mechanisms to attract international support, based on emissions data. There is, however, scope to widen MRV coverage to include a greater range of non-emission based data within the existing framework[8].
Technical indicators could also be connected to economic instruments through MRV credits, market creation mechanisms, a technology executive agency, technology action plans, global innovation and diffusion funds and protect and share IPR agreements. Inputs for MRV schemes are relatively easy to measure. However, the dangers of perverse incentives and bad baselines should be acknowledged.

[8] http://unfccc.int/essential_background/library/items/3599.php?rec=j&priref=500004777#beg

Indicators for outputs provide more of a challenge, particularly where transformational policies are considered. This suggests that new indicators are required that measure actions rather than emissions, such metrics can be more responsive to policy implementation and allow for faster feedback and learning.

Perhaps a link to sectoral indicators or institutional environments would be beneficial. For example, when reform and implementation are not delivered within a sector, indicators could be used to measure institutional resources, and feed into capacity building measures.

Domestic stakeholder considerations must be examined when discussing indicators in the framework of international support, either through bilateral or multilateral mechanisms.

Technology indicators can be analysed at various stages of the policy and implementation framework to inform international support[9]. Currently there is a particular focus on deployment indicators. A possible connection of innovation systems to indicators using sectoral classifications could provide one approach.

It is expected that the project will explore the role and suitability of intermediate indicators, alongside criteria for their selection and classification, based on the specific examples of the country policy studies. The following table provides illustrative questions. It is also important to understand the extent to which metrics must be tailored to the requirements and conditions of specific sectors and countries.

Criteria for evaluation:	Suitability for:
- Availability of suitable indicators - Are they quantitative or quantifiable? - If no, can a meaningful binary yes/no metric be used? - Cost of Measurement and Reporting - Cost of Verification - Gaming potential - Self reporting interest	- Domestic management of implementation - Best practice learning - International transfer (from a binary, yes/no, or milestone indicator) - Incremental financial transfer (volume or quantitative indicator) - Climate co-benefit (not necessarily direct emission reduction comparison)

Table 1: Evaluating indicators

C. Technology transfer dimensions

Technology, institutional mechanisms and international cooperation

In the technology sessions we discussed five different perspectives with regard to technology transfer:

[9] See for example the programme to develop framework for appropriate indicators to support technology transfer and deployment: http://unfccc.int/resource/docs/2008/sbsta/eng/inf02.pdf and http://unfccc.int/resource/docs/2008/sb/eng/inf06.pdf

- Sussex Energy Group report: Technology Leapfrogging[10]
- E3G and Carbon Trust report: Innovation and Technology Transfer: Framework for a Global Climate Deal[11]
- ECN report: Considering technology within the UN climate change negotiations[12]
- Carbon Trust report: Low carbon diffusion and innovation and diffusion centres[13]
- ISDCP: International Cooperation for Innovation and Use of Low-Carbon Energy Technology[14]

Various proposals and academic literature[15] suggest a large set of potential mechanisms and institutions to address the requirements for technology cooperation. There is the potential for action within and outside the UNFCCC; both to increase absolute level of innovation and to enhance the international technology cooperation, transfer and adaptation. The UNFCCC could also oversee an MRV approach.

The innovation chain, stages of technology development and capacity building

A key theme of the workshop discussions was the question of where institutions, international cooperation, capacity building and financial resources can be matched to the specific needs of technologies across their evolution (development; research and development, demonstration, deployment and diffusion). There are a wide variety of technology mechanisms available to support innovation and technological development. The workshop discussions suggested that a portfolio of measures, and the various institutions arising from such measures, should be further considered in connection with specific domestic environments.

Intellectual Property Rights are only one specific problem: even if this barrier was removed, it is likely that multifaceted barriers would still exist. Innovation often stalls at the 'valley of death'; closing the gap between demonstration and commercialisation presents many difficulties even in developed countries, suggesting similarly substantial barriers within emerging economies. There is a need for appropriate mechanisms for the removal of barriers at different policy and implementation levels – including specific situations aspects associated with Intellectual Property Rights. Discussion currently exists at the abstract level, but it is important to have case studies examining actual policies and barriers. International support can help to alleviate such barriers through financial assistance and capacity building.

To overcome barriers and promote technology transfer and development there is a need to use a dynamic approach for capacity development and the creation of an enabling environment. Enhancing local knowledge behind technologies is important as a first step before markets, operation and maintenance, and diffusion of technology is required. Effective institutions and private sector incentives are particularly significant in driving technology transfer.

Technology mechanisms can include different types of capacity development and supporting environments for low-carbon investment and financial support. The capacity development requirements according to the technology characteristics and the level of development of the

[10] http://www.sussex.ac.uk/sussexenergygroup/documents/dfid_leapfrogging_reportweb.pdf
[11] http://www.e3g.org/images/uploads/E3G_Innovation_and_Technology_Full_Report.pdf
[12] http://www.ecn.nl/docs/library/report/2008/e08077.pdf
[13] http://www.carbontrust.co.uk/Publications/publicationdetail.htm?productid=CTC736&metaNoCache=1
[14] http://www.climatestrategies.org/our-research/category/29/101.html
[15] The proposals include those published by WRI, E3G, ECN, Carbon Trust.

recipient countries are explained in the figure below. The type of support they can provide differs for technologies according to the stages of their development. Figure 2 illustrates that the type of support that is required can also differ across countries with different income levels.

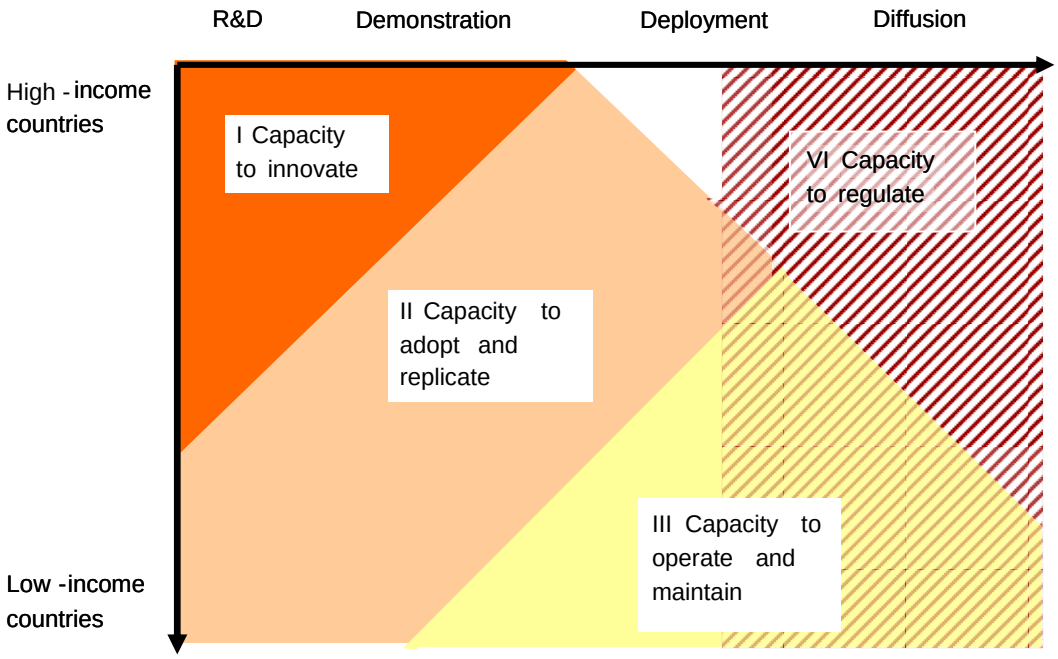


Figure 2: Capacity constraints at various stages of the innovation chain

Table 2 summarises the different actions and mechanisms that can be used to provide support.

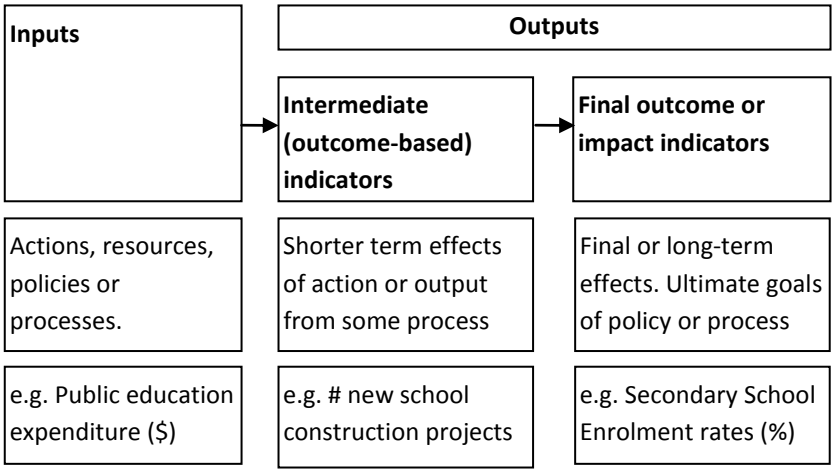
Contributes to Actions and mechanisms	Capacity to innovate	Capacity to adopt and replicate	Capacity to operate and maintain	Capacity to regulate	Enabling environment	Financial assistance
R&D cooperation and technology partnerships	X	X				
IPR sharing agreements or royalty fund	X					
Innovation centres		X	X			
Global fund on technology demonstration	X					X
Technical assistance / capacity building			X	X		
Technology standards				X	X	
Regulatory cooperation and policy learning				X	X	
Bilateral policy implementation support					X	X

Table 2: Actions and mechanism to support capacity building

Annex: Using Intermediate Indicators for Domestic Climate Policy

Indicator systems

Indicators are defined by the OECD as "a parameter (a property that is measured or observed), or a value derived from parameters (index) which points to, provide information about, describe the state of a phenomenon, with significance extending beyond that direct associated with a parameter value" (OECD 1998). Indicator terminology typically falls under two different approaches; indicator systems and performance-based indicators. The systems view focuses on inputs, outputs and outcome/impact measures. This usually involves an indicator framework or hierarchy, whereby indicators are chosen to capture different aspects of a process or set of processes, for further detail see Boland and Fowler (2000) and Brignall and Modell (2000). Performance-based indicators typically focus on intermediate outcome-based indicators as a shorter term metric with an action-relevant timeframe. Performance-based indicator applications include use in benchmarking, performance-related pay or policy making and for results based management (Black and White 2004; Heinrich 2002; Wholey 1999).



Annex Figure 1. A simplified illustration of the structure of indicator systems (see also Boyle 2005; European Commission 2004 and 2007; HM Treasury et al 2003; Schacter 2002).

Intermediate indicators

Intermediate indicators refer to measure of activity or service provision which contributes to an overarching final outcome, where final outputs are the ultimate consequences and achievements of the action or service (Boyne and Law 2005). Typically they refer to the human action, policy or response that can be measured and assessed as an intermediate step towards meeting some larger or less responsive metric. The design and implementation of policy targets often suffers from a 'missing middle' problem, whereby the link between policy objectives and final outcome indicators is not fully established; the use of intermediate outcome indicators is useful to assess progress at regular, policy relevant intervals.

Intermediate indicators for Domestic Climate Policy

Where domestic policies have non-emission specific intermediate outcomes, or identifiable and measurable barriers, intermediate indicators could be usefully applied for managing and enhancing policy implementation. Alternatively a policy may have a specific five year objective which could be met through a series of intermediate targets or milestones, indicators providing a useful framework to support this.

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