UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

INTERNATIONAL SUPPORT FOR DOMESTIC CLIMATE POLICIES

Intermediate Indicators: Lessons for their Use in Measurement, Reporting and Effective Policy Implementation

JAMES CUST

Convened by: Climate Strategies

Climate Strategies aims to assist governments in solving the collective action problem of climate change.

Sponsors include departments from European governments and other stakeholders.

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Project Leader: Karsten Neuhoff, Senior Research Associate, University of Cambridge

Contributing Authors:

Name of Author	Institution	
James Cust	University of Cambridge	UNIVERSITY OF CAMBRIDGE | Electricity Policy Research Group

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- Haroldo Machado-Filho. Options for International Support for Low-Carbon Transportation Policies in Brazil.
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About Climate Strategies

Climate Strategies aims to assist governments in solving the collective action problem of climate change. It connects leading applied research on international climate change issues to the policy process and to public debate, raising the quality and coherence of advice provided on policy formation. Its programmes convene international groups of experts to provide rigorous, fact-based and independent assessment on international climate change policy.

To effectively communicate insights into climate change policy, Climate Strategies works with decision-makers in governments and business, particularly, but not restricted to, the countries of the European Union and EU institutions.

Contact Details:
Managing Director: Jon Price
Climate Strategies
c/o University of Cambridge,
13-14 Trumpington Street
Cambridge, CB2 1QA, UK

Office: +44 (0) 1223 748812
www.climatestrategies.org
jon.price@climatestrategies.org

1. Introduction

Drawing on experiences from indicator frameworks across a variety of countries, regions and sectors, the paper discusses lessons emerging from applications of indicators for performance benchmarks, international comparisons and domestic policy design. This paper reviews experience with indicators to explore the role metrics can play in informing and supporting climate policy and enhance reporting under the UNFCCC National Communications.

The paper focuses on the role of intermediate indicators as output metrics from an action or process that can be used as a tool to support policy implementation or facilitate performance-benchmarks. Intermediate indicators can be useful as part of internal or domestic information gathering and presentation for strategy and policy learning. They can enable the adoption of best practice and provide a framework for support and cooperation incorporating transparency, comparability and accountability. Indicators need not be linked to policy objectives or targets to generate learning and improved policy success; informative indicators can facilitate better policy design, ongoing assessment and updating.

The challenges of climate policy require the unprecedented transformation of our energy systems and our economies to deliver growth and prosperity alongside stabilised global greenhouse gas concentrations. Whilst overall emission reductions must occupy a central part of efforts to mitigate the effects of climate change, for developing countries the need for policies and measures to deliver economic growth in a sustainable manner takes priority. The challenge for policy making lies in effective implementation and decisive policies and measures that can be assessed and tracked to ensure public/investor confidence in policy realisation. Transparency, accountability and comparability of efforts are important for assessing global actions and for prioritising international support for developing countries.

Overall emissions stabilisation as the long-term objective for global climate policy will be met through a succession of policies and measures over shorter time horizons. This paper investigates evidence from other policy fields to inform the design of intermediate indicators to measure and monitor the success of policies and actions. Indicators can make a critical contribution to transparency in measuring (and delivering) policy success in addition to leveraging and prioritising effective international cooperation and support.

An example of an intermediate indicator for climate policy might be a measure of Verified Emission Reductions arising from projects under the Clean Development Mechanism (CDM). However other lead-indicators, incorporating implicit carbon-reduction impacts, such as MW installed supercritical coal capacity, energy efficiency appliance standards or rural electrification rates, allow for a greater degree of specificity and flexibility in the measurement of success of actions that may not be exclusively climate-focused. At present quantification of national actions are not required as part of National Communications or National Inventory Reporting (only Annex I parties), and even the required greenhouse gas emissions reporting is often partial and based on non-comparable methodologies.

There is renewed focus on the contribution of indicators to fulfil measurement, reporting and verification commitments of parties under the United Nations Framework Convention on

Climate Change (UNFCCC) as defined in the Bali Action Plan. The decision sets in motion the development of "measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances" (UNFCCC 2007). A clear metric of success is in the interests of all parties; creating opportunities for learning, sharing of best practice, cooperation and policy setting.

This paper draws on experiences with performance metrics and intermediate indicators across countries at the sectoral, national and international levels. This provides insights on the process by which such metrics may be selected, measured and reported. This paper explores the theoretical and practical issues in development, implementation and effectiveness of intermediate indicators across a variety of non-climate change applications and sectors. We do not address indicators linked to explicit policy targets which are explored elsewhere in the project (Neuhoff and Lester 2008) and focus instead on five other indicator experiences where indicators serve as benchmarks or informative metrics for policy debate, design and assessment.

Indicator-systems that include intermediate indicators are examined through experiences with the development of OECD Science, Technology and Innovation indicators (STIs) and the EU Agri-Environmental indicators (AEIs). Experience of performance metrics is drawn from the construction industry, with focus on the use of Key Performance Indicators (KPIs) in the UK. For experiences with policy indicators we examine recent innovations in the use of intermediate indicators for overseas development assistance in sub-Saharan Africa, specifically the European Commission's Special Programme for Africa (SPA).

2. Review of Indicator Methodology and Practice

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 adopts a systems view, focusing on inputs, outputs and outcome measures, or alternatively pressure-state-response[1] and impact metrics.

Applications of intermediate indicators broadly fall under two different approaches; indicator systems and performance-based indicators. The former involves an indicator framework or hierarchy, whereby indicators are chosen to capture different aspects of a process or set of processes. The body of literature on indicator systems is extensive ranging from methodology through to implantation practice, for further detail see Boland and Fowler (2000) and Brignall and Modell (2000) Performance-based indicators typically focus on outcome indicators only for use in benchmarking, performance-related pay or policy making. Performance indicator applications include use for results based management (Black and White 2004; Heinrich 2002;

[1] An indicator framework designed to measure and reflect the *pressures* of human activities, the *state* of human and natural systems and the *responses* of society to changes in those systems.

Wholey 1999). The intermediate indicators discussed in this paper are drawn from both approaches and across a range of applications.

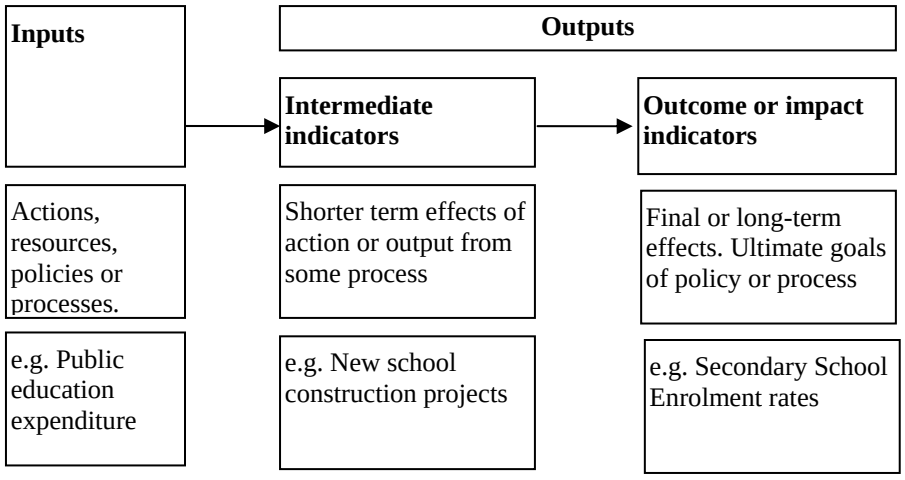

Figure 2: A simplified illustration of the structure of indicator systems (see also Boyle 2005; European Commission 2004 and 2007; HM Treasury et al 2003; Schacter 2002).

Outcome or impact indicators can be subdivided into outputs and intermediate indicators. Intermediate indicators refer to a 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.

Intermediate Indicators are used throughout the economy from within firms, across sectors and at the national policy level to measure, assess and benchmark performance. Indicators can apply to a wide variety of activities from R&D activity, industrial competitiveness, human-environment interactions and policy impacts. Often they are merely measures, used for monitoring or reporting of performance, policy success or status of activity. Composite indicators (often referred to as multiple or index indicators) are compiled from several individual measures and presented as a single metric (Freudenberg 2003). Increasingly intermediate indicators are used for policy making, target setting or performance assessment.

Lead indicators can reflect action or success across a shorter or more policy relevant time-frame, allowing for continued political or financial support for programs that may require longer investment cycles to deliver carbon reductions. This would also allow for policy adjustment or learning across time, particularly where the full benefits of interventions may be unclear. Where success is measured on a shorter-time horizon, recognition and reward for success can be better distributed across government, whilst maintaining consistency with longer term objectives of sustainable development or recognition of successes at earlier intervals.

Key Performance Indicators, as a subset of intermediate indicators, and as measures of non-financial performance by firms, between firms and within firms, are now widely used across all sectors of the economy. Indicators to assess firm performance are a widely adopted managerial practice to help improve efficiency, foster innovation and adopt best practice. Whilst financial

metrics represent the primary concern of shareholders, intermediate performance indicators, taking into account non-financial aspects of the business, allow more immediate, actionable feedback on strategy and processes. Such indicators typically cover aspects such as project completion rates, customer satisfaction and working days lost. Many companies are now legally obliged to report non-financial performance indicators across aspects such as employee wellbeing and environmental sustainability (For example under the 2003/51/EC modernization directive). We examine the experiences in the construction industry with key performance indicators, particularly where they have included the use of intermediate indicators for project performance monitoring.

Benchmarking is closely tied to the development of performance metrics. A widely adopted performance measurement framework for benchmarking is the Balanced Scorecard approach (Kaplan and Norton 1992). This multi-dimensional model includes a set of both financial and nonfinancial measures across managerial levels. The measures are closely aligned with managerial incentives and company strategic objectives. Such performance-based measures provide transparent and comparable intermediate indicators of firm or project activity. There have since been further applications of the approach tying the balanced scorecard to organisational strategy and progress in accomplishing objectives. This has been implemented at organisational and ministerial levels (Kaplan and Norton, 2004).

The use of composite indicators faces many drawbacks, not least the constraints imposed on variable choice by data availability and comparability. Such indicators inherently capture a cross-section of complex and interrelated processes without expressing the processes underling innovation- thus policy makers must exercise caution in interpretation of composite indices and their connection to national economic performance. This creates the potential for bias in policy provision where the development of policies is closely tied to improved indicators. The application of cross-cutting indicators for healthcare provision under the Millennium Development Goals (MDGs) has generated potentially perverse spending priorities as governments focus on narrowly defined objectives at the expense of aspects that are either not targeted or less easily quantified such as health system or infrastructure spending.

At the firm level there has been widespread adoption of both performance-based indicators and sustainable development (or other corporate social responsibility- CSR) motivated metrics[2]. These measuring frameworks are now well entrenched in many organisations with rankings and CSR indexes becoming a visible component of company strategy. The primary benefit of many of these performance measurement approaches has been the voluntary implementation of these systems, demonstrating the relative ease of data collection and reporting and consistency with existing and evolving company strategy whilst building expertise and capacity for firm level indicator systems. Combined with reporting and monitoring cooperation with NGOs and other bodies, these existing approaches already produce informative and reliable outputs across many corporate activities, suggesting it should prove relatively easily to build on existing efforts in these areas for expansion to include more formal climate change indicators.

[2] Examples of these include the Business in the Community (BITC) reporting in the UK, and the Global Reporting Index as indicator frameworks, reporting across a wide variety of non-financial performance metrics related to CSR. Other examples include the Intangible Assets Monitor in Scandinavia where many companies have adopted an approach that seeks to measure and report intangible capital.

3. Experiences with Intermediate Indicators

We examine six different applications of intermediate indicators, drawing on those experiences from implementation and lessons that might be usefully applied to indicators for climate change mitigation. A popular approach, developed in the environmental field, is to situate intermediate indicators within an indicator system capturing a range of inputs, outputs and outcomes and their interactions. Our first two case studies fall broadly under this approach- Sustainable Development indicators and Agri-Environmental indicators. Here the use of indicators is situated within an overarching framework of pressure-state-response or equivalent. The third case study, science and technology indicators, whilst not explicitly designed as a system of indicators, also encompasses a range of input, output and outcome indicators of the innovation process. Finally, case studies four and five explore the use of more functional or streamlined designs based on the use of intermediate indicators for policy or process design. Here, the Key Performance indicators and lead indicators for use in overseas development assistance develop a framework focussed on the identification and measurement of key output indicators tied explicitly to actions and measures taken by parties.

In this section we detail a variety of different indicator approaches and their implementation experiences. In the subsequent section we evaluate these approaches and any lessons that can be drawn from them for climate policy.

	Scale of comparison/ reporting	**V**oluntary/ **C**onditional/ **P**rocedural	Comparable	Co-Benefit (e.g. economic growth and environmental factors	Purpose/Objectives
Sustainable Development indicators (SDIs in the UK)	National	P	+	++	Promote co-benefits of sustainable development polices highlighting non-economic indicators affected by policies and measures
Agri-Environmental Indicators (AEIs for CAP across the EU)	International	P	+	++	Identify environmental pressures and encourage stronger environmental dimensions of countryside management
OECD Science and Technology Indicators	International	P	++		Measure and report relevant indicators to enhance cooperation and policy design targeting technology and innovation
Key Performance Indicators (Construction benchmarks the UK)	Firm	V	++		Project level assessment of performance for benchmarking and cross-firm learning
Aid and Development Indicators (EU Special Programme for Africa)	Bi-lateral, Multi-lateral	C	++	+	To support evidence-based domestic policy design, international dialogue and facilitate better transparency and accountability in expenditures

Table 1. Overview of Indicator case studies.

Sustainable Development Indicators

Sustainable development indicators have been developed in response to the rise of Sustainability concerns following the Rio Summit in 1992 with the call of Agenda 1 for all nations to produce information to monitor sustainable development (UNCED 1992). Sustainable Development indicators are used across the OECD and the EU, and throughout all levels of the economy- local to international, intra-firm to sector-wide.

In 1994 the UK became one of the first countries to adopt sustainable development indicators as part of a pilot phase in response to the 1992 Rio Summit. In 1996 a preliminary set of 130 indicators was published for discussion and consultation. The UK approach, for example, contains 15 headline indicators, covering areas such as economic growth, investment and employment, alongside environmental concerns such as land use, air quality and road use. Beneath these sit 135 core indicators covering diverse aspects of sustainable development concerns. The UK government makes commitments regarding improving the headline indicators and reviewing policy direction as necessary. The annual reporting and five yearly review process draws these indicators together as part of a Quality of Life 'barometer'. This gives information on how much each indicator has improved and where it is relative to historical comparisons (Hall 2005).

Environmental Indicators: National Agri-Environmental Indicators in the EU

In the environmental field, a wide variety of indicators and metrics have been developed in recent years, prompted by concerns about sustainability and the effects of human economic activity on the environment. These indicator efforts include OECD Environmental indicators (1993, 1998), the UN Commission on Sustainable Development (1996), the EU Agri-Environmental Indicators (Eurostat, 1999) and the Environmental Sustainability Index (Esty et al, 2005).

The need to consider the environmental implications of agricultural activity first entered EU policy under the "Single European Act" of 1986. Since then EU member states have implemented a range of Agri-Environmental Programmes (AEPs), in response to EU regulation with the shared objectives of encouraging less intensive production, reducing market surpluses and alleviating environmental pressures.

Agri-Environmental Indicators (AEIs) were developed in response to concerns regarding the challenges of measuring policy success and the limitations in existing monitoring. The hope was to increase the proportion of Common Agriculture Policy spending that was channelled through AEPs, but to do so required more data on the implementation and effectiveness of such programmes. The first proposal for EU-indicators was introduced in 2000 (CEC, 2000) and since then, they have been adjusted in order to reach relevant methodologies for international comparisons (CEC, 2001; EEA, 2003). Under Agenda 2000 propositions, EU member states have developed indicator sets broadly conforming to comparable international approaches to agricultural-environmental measurement (e.g. OECD Environmental Indicators).

OECD Science, Technology and Innovation Indicators

The OECD Science, Technology and Innovation indicators (STI) represent one of the first initiatives to collate and aggregate an internationally comparable measure of technology and innovation activity. Since the 1970s, various members of the OECD have developed their own metrics of science, technology and innovation performance. Starting with the US in 1973, these indicators have since become a key component in measuring, assessing and directing national technology policy. The OECD has since developed internationally comparable aggregated indexes of innovation, thus providing greater feedback on heterogeneous policy regimes and comparative successes, albeit through a rather narrow definition of the innovation process.

The STI indicators have since been supplemented by a Systems of Innovation survey type that is now administered by all OECD economies periodically: following the Oslo Manual's several editions (OECD 1992, 1997, 2006). In the EU these are implemented as the Community Innovation Survey (CIS) series – it tracks a range of factors, including organisational design. Recently it has been extended to cover service sector innovation. In the EU in addition we have the Innovation Barometer. Arguably the primary impact of the Oslo Manual's implementation has been the acceptance of non-linear models of innovation under the Systems of Innovation broad heading.

The need for a wider innovation systems perspective, combined with the strong policy relevance of narrow indicators has generated increased interest in the use of composite measures. The OECD Growth Project (OECD 2001) has been a driver in this regard, identifying innovation and technology diffusion as critical micro-drivers of productivity and growth in OECD countries. Given the broader focus of this study, the index of innovation was constructed based on the policy recommendations emerging from the growth report. These provide a framework for selecting and placing indicators in three performance areas deemed most relevant for OECD economies.

Variables have been selected on the basis of coverage and comparability- as a result the index compares countries only in areas where suitable data exists and omits more intangible aspects of innovation performance. The variables cover three core components of innovation activity- generation of new knowledge (basic research as % of GDP and non-business researchers as % of labour force), industry/science linkages (public/private links in R&D, scientific content of patents and publications), industrial innovation (data on business research, patents and the introduction of new products and processes). This framework however has given a somewhat narrow interpretation of innovation performance. In process terms it imposed a rather linear path through defined channels from government inputs, to industry intermediate outputs, finally to innovation outcomes (Freudenberg 2003). One notable feature of the Science and Technology indicators is that by being intermediate in nature, they can represent an input to an innovation process, whilst representing an output of anther process (e.g. PhD graduation rates in sciences represent an education output metric, but a technology and innovation input).

Key Performance Indicators: Construction Industry Benchmarks

As outlined in Section 2, Key Performance Indicators are now widely used performance metrics for benchmarking, learning and adoption of best practice. They are used to measure incentives

internally , for example within firms or public sector bodies, but also for external comparison and information exchange. We focus on the construction industry where various benchmarking systems have been established in countries such as the Brazil, Chile and the United States. The United Kingdom has seen the introduction of Key Performance Indicators (KPIs), an industry standard for benchmarking performance. Other approaches such as CDT in Chile or ISIND-NET in Brazil also measure lead-indicators such as duration of intermediate phases in the project or percentage completion rates. In the UK the development of the Key Performance Indicators has formed part of the Constructing Excellence productivity program, with the first set of indicators produced in 2000. Munir (2002) defines a KPI as a number or value which can be compared against an internal target or an external target benchmark to give an indication of performance. The KPIs are updated annually and at present consist of lag measures of construction project variables. These include client satisfaction, defects, profitability, safety and productivity.

Lead Indicators in Development Assistance (European Commission's Special Programme for Africa)

The Special Programme for Africa (SPA) and the development of "process-conditional" Poverty Reduction Strategy Papers reflects the recent trend away from ex ante aid conditionality in favour of enhanced 'ownership' by aid recipient countries and performance-based assessment of policy interventions. This has renewed interest in the role of intermediate or lead indicators, as a metric of success and a policy tool (Adam et al 2004).

Since 1999, under the SPA of the European Commission, several new indicator programs have been developed across aid-recipient countries in sub-Saharan Africa. Whilst these and the PRSPs have been implemented as part of a wider move towards performance or process based conditionality, the focus in this paper is on the experience developing the intermediate indicators for measuring and monitoring development activity. See Neuhoff & Sippel (2008) & Neuhoff & Lester (2008) for more details on target-based approaches and broader discussion of aid conditionality.

Indicators in the development of the performance-based conditionality approach by the European Commission were chosen based on criteria of policy-relevance, importance to economic development and consistency with existing approaches, whilst meeting requirements of "ownership" by recipient countries. As a consequence the indicators are standardised, transparent and widely measured metrics of performance across economic sectors; with those tied to performance-based conditionality situated proximate to policy actions, but without imposing specific policy design (i.e. impact indicators only). The indicators were chosen narrowly to cover health, education and be linked directly to the evolution of poverty (Adam et al 2004).

4. Evaluation: Experiences with Indicator Choice, Measurement and Implementation

Indicators can be evaluated with regard to indicator choice, measurement and implementation. Our case studies offer insights into the analysis of measurement in indicator systems, correct indicator choice and design, and implementation experience, including policy application and relative policy relevance of indicator sets. The section below evaluates the five case studies, first

discussing indicator choice and design, moving onto issues of measurement and implementation, before assessing the policy relevance and a summary of experience of indicators and metrics.

4.1 Experience with Indicator Choice and Measurement and Participation

- Use of and participation in indicator frameworks has become widespread

- There has been a rapid growth in the use of performance metrics and linking policy to quantitative indicators (Sanderson 2000).
- Firm and Government uptake of performance indicators and sustainable development indicators (or other CSR metrics) has established capacity and expertise that can be utilised by climate change indicator frameworks.

- Measurement is a useful first step

- Development and implementation of indicators systems can generate dialogue and learning about the measured actions.
- Measurement of actions and processes can inform debate and even shift discussions such as around the role of environmental management under the Common Agricultural Policy.
- The development of intermediate indicators has facilitated international comparison and learning in some areas such as technology and innovation measures.

- Indicator choice is important for policy relevance

- Intermediate indicators are useful proxies for policy, programme or project success by offering timely feedback and allowing adjustment or re-design of implementation as well as learning and adoption of best practice in future policy iterations.

Experience from the EU using Agri-Environmental Indicators suggest that measuring and reporting alone can be a passive process when not tied to explicit targets or policy actions. Wilson and Buller (2001) argue that the emphasis of the EU-led AEP goals as well as the nature of measurement indicators has created the incentive to *maintain* those practices viewed as environmentally friendly, rather than to seek explicit changes in behaviour by encouraging farmers to *not* make changes in existing management techniques and thereby *not* increase environmental pressures. The risk here is that agricultural de-intensification (the overarching objective) opportunities have been missed. Further they indicate that monitoring has been inadequate without being compulsory, which combined with a diversity of rationales and lack of incentive to measure scheme success has ultimately created a patchwork of different national approaches and differing degrees of uptake and implementation.

According to Wilson and Buller (2001) where indicators are part of a feedback system three problems emerge; the indicator approach can reinforce the design and implementation of policies that are easily quantified, and may therefore increase the ‘implementation gap’; (a purpose of indicators in the first place- the gap between policy making at the top, and the extent to which these are adopted in action and in spirit at the grassroots). Second, easily quantified policy objectives get over emphasised relative to less so ones. Third, any published indicator exerts pressure on policy makers to improve the value over time (but not necessarily the underlying problem- thus endangering the overarching objective)

An important criterion for evaluating the Agri-Environmental Programmes is the extent and underlying motivation for programme participation. Wilson and Hart (2000) find that strong farmer participation in such voluntary programmes is partially dictated by the breadth and depth of the scheme. Where the focus of programmes, and correspondingly indicators, have been deeper and narrower (better targeted) there has been, in general, better goodness of fit between existing farm management and scheme prescriptions. Whilst participation is often driven by financial imperatives, their findings suggest this is not incompatible with rising environmental concerns, nor is it critical that farmers view it as a significant or secure secondary income stream. Farmers have interpreted and engaged with the AE schemes in a variety of ways, ranging from a key income stream as part of an enthusiastic shift in farming practice, to merely an optional extra in income support packages which requires only passive participation.

The development of Science and Technology indicators guided by the OECD has encountered a variety of challenges. It has become increasingly accepted that narrow measures of innovation through proxies such as public R&D spending or patent activity are insufficient measures of innovation per se, but rather serve as critical inputs and outputs from the innovation process. Subsequent development has sought to broaden the scope of STIs from the 'linear model' (Kline and Rosenberg 1986) to an innovation systems perspective.

Indicator selection can be a critical process in order to best define success and for the potential subsequent impact on policy design. Intermediate indicators can be usefully applied to public policy, to inform and shift debates, even where they are not tied explicitly to targets or policy objectives. For example steps have been taken to apply Science and Technology indicators to public policy. The use of composite indicators is being promoted by the European Commission, which argues "by aggregating a number of difference variables, composite indicators are able to summarise the big picture in relation to a complex issue with many dimensions" (European Commission 2003).

Experience with Key performance Indicators in the construction industry suggest it is important to establish capacity and clear responsibilities for selection, measurement and reporting of indicators, whether in projects, across firms or at the sectoral level. Typically Key Performance Indicators are measured and reported as an exercise in internal benchmarking first. This can be completed by employees directly involved in the measured activities or by dedicated staff. One problem encountered by the construction KPIs was lack of clearly defined reporting responsibilities at the outset of a project. Costa et al. (2006) indicate that this created problems across data collection, processing and analysis. The largely project based nature of the construction industry is reflected in the design of performance indicators. As a consequence, organisational learning takes place on a project to project basis, through management practice, rather than through overall adjustments in production methods or objectives. The construction industry initiatives do highlight the need for clearly assigned responsibilities for data collection and reporting at the firm and managerial levels, as well as a strong connection between that which is being measured and the opportunities for learning and best practice.

The process of selecting, measurement and reporting indicators can be useful in itself, even where it is not tied to explicit objectives. According to Costa et al (2006), a range of studies indicate that the development of performance measures forms a critical component in subsequent

benchmarking of firm project performance; when performance is tracked, outdated uncompetitive management practices are identified, and changes are investigated. The benchmarking process can also generate innovation, but only in a receptive environment (Garvin, 1993). Further, collaborative environments or some explicit sharing of benchmarking efforts across firms are required to foster this improvement over time.

Experience with intermediate indicators for KPIs suggest that voluntary participation in measurement and voluntary sharing across companies can work, and can facilitate informed debate, learning and adoption of best practice. In the UK for example, companies themselves are responsible for collecting data, inputting it into the database and keeping it updated. The companies participate in this metric sharing on a voluntary basis, forming local 'clubs' to transfer best practice. Participation offers two distinct benefits; marketing advantages and improved performance opportunities. The indicators, which are project specific, offer little insight into the overall performance of a company, and their lag makes them suitable only for ex post assessment and comparison, rather than as early warning signs of project problems.

Selection of intermediate indicators, not just in terms of coverage, but also timing and strategy relevance can be critical to the success and uptake of indicator systems. A key shortcoming of the existing experience with performance indicators has been their lack of alignment with company strategy. Here choice of indicators in the construction industry could be designed to make the subsequent findings more actionable. Lead, rather than lag indicators has allowed mid-project learning. However it is the indicators themselves, not merely their timing that determines their strategic relevance. According to Beatham et al. (2004), the KPIs have suffered from a lack of external validation, limiting their interpretability. They argue the indicators have been used as marketing tools rather than as an integral part of business management. However, effective external benchmarking and validation has been developed elsewhere. In the manufacturing industry for example, it is relatively common for firms to conduct non-competitive external benchmarking of best practice in other firms (e.g. Xerox and L.L.Bean's warehousing operations -Spendolini 1992).

Experience from the development and application of intermediate indicators for overseas development assistance, particularly under the EC's Special Programme for Africa suggest challenges can be significant in the initial measurement and collection of indicator data. For example, key considerations in the development of performance-based conditionality economic indicators have been the ease and cost of measurement and the role in facilitating international support and transparency of actions; according to the National Statistics and Demography Institute a demographic and health survey (DHS) costs around twice that of one measuring budgetary efficiency. Thus indicator choice, but also refining the number and scope of indicators, is an important process in developing country contexts. In most cases indicators are limited to those aspects for which data is already collected, or is relatively inexpensive to extend measurement for.

Indicators in the development of the performance-based conditionality approach by the European Commission were chosen based on criteria of policy-relevance, importance to economic development and consistency with existing approaches, whilst meeting requirements of "ownership" by recipient countries. As a consequence the indicators are standardised, transparent and widely measured metrics of performance across economic sectors; with those tied to

performance-based conditionality situated proximate to policy actions, but without imposing specific policy design (i.e. impact indicators only). The intermediate indicators were chosen narrowly to cover health, education and be linked directly to the evolution of poverty (Adam et al 2004). Intermediate indicators allow actionable and updatable measures of progress, success or performance.

A key challenge for any approach to intermediate indicators in some developing countries is critical limitations regarding data availability and cost of measurement. A major consideration in the development of Poverty Reduction Strategy (PRS) monitoring has been how best to gather and aggregate data to produce the relative indicators. Some authors have emphasised the importance of PRS monitoring to remain a "second-tier" process, drawing on existing data collection and sectoral reporting (GTZ 2004). Indicators and monitoring have been used in the design of PRSPs as stated objectives and targets agreed between donor and recipient- we focus here on experience with the monitoring itself- discussion of use of indicators as targets can be found in Neuhoff & Lester (2008).

4.2 Experience with Indicator implementation, policy impact and learning benefits

Intermediate Indicators have positive policy and performance applications

- Intermediate Indicators offer distinct advantages over alternative approaches for performance and policy relevance.
- Intermediate Indicators offer proximity to policy choices whilst also aligning with decision-making time frames.
- Composite indicators and other impact or outcome indicator systems do not focus on, or capture the, implications of specific policy actions, measures or projects, but instead give useful indications for overarching strategy and progress.
- Intermediate indicator choice has been shown to allow alternative policy strategies to be pursued whilst remaining consistent with indicator informativeness of intermediate outcomes.

- Implementation and policy relevance has been broadly positive

- The experience with intermediate indicators has allowed greater learning through feedback processes, and adoption of best practice through measurement of comparable efforts.
- Indicator sets help clarify the links between economic and other non-economic dimensions, accelerating quantification of such aspects or integration into cost-benefit analysis.
- The development of robust indicators is often an important step in establishing performance-based targets or monitoring of policy objectives.

The experience in the UK with Sustainable Development Indicators demonstrated that indicator choice was an integral part of the process; with the potential to enhance political bite whilst also offering a learning process. In 1997, following a change of government, the UK reappraised its use of sustainable development indicators. The choice and design of indicators was integrated with or proceeded strategy discussions. This allowed indicators to inform policy and reshape

policy, rather than merely measuring what was done. However there remained problems with potentially superfluous indicators being included and when the discussions were opened up to stakeholders there was additional pressure to include indicators that monitored their individual areas of concern or expertise. The indicator framework created a sense that anything that was not being measured would not be monitored at all, that it would not be covered by policy or would somehow fall outside financial support (Hall in Hak et al. 2007).

The experience with SDIs has been characterised by a rising popularity in their use across public and private sectors, yet a continued gap between the indicators and policy actions remains. This implementation gap further restricts the capacity for such indicators to influence economic activity in adopting sustainable practices. However there remains large potential for SDIs to influence policy making (IISD 2005) in the same way it has already influenced policy discourse.

The rationale behind the reporting and review process is to adjust policy whilst creating transparency and accountability for the public alongside guidance for parallel actions by non-state actors. The measures typically feed into a variety of processes, across government departments and public sector agreements. Despite each indicator possessing inherent deficiencies, they can, especially when examined collectively rather than individually, provide important information to policy-makers about past and present activities. Nevertheless, the policy-guiding value of SD indicators depends very much upon their continuous improvement and, where necessary, the rejection of unworthy indicators (Lawn 2004).

Hall (2007) is conservative about the policy influence of sustainability and quality of life measures, despite their prominence in government discourse, in part due to them already being well-established measures. Other studies have expressed concern at the limited policy application of sustainable development indicators (Hezri 2004) such as the case of Finland (Rosenstrom 2006). In Finland, the policy-makers have expressed desire for indicators to better reflect socio-economic impacts of environmental pressures, thus emphasising the cost of inaction in decision making. They report however, that economic criteria continue to take precedence in policy and strategy despite the wider availability of sustainability data. One notable exception in the UK to this widely observed concern has been the inclusion of wild bird numbers- a previously underreported metric- which highlighted a downward trend in farmland species despite relatively stable population numbers. Media attention and a policy response to address this trend quickly occurred.

Agri-Environmental Indicators (AEIs) in the EU have played an important role in the recent development of Agri-Environmental policy and programmes (AEPs), particularly under the Common Agricultural Policy (CAP). Their introduction was motivated by a need for better measurement and assessment of AEPs, with the accompanying motive to thus facilitate increasing emphasis on AEPs as a share of agricultural support under the CAP. The very act of measuring has been shown across the indicators case studies to be a useful one, but with the AEIs they helped inform and ultimately shift debate from one around intensive agriculture, to an increasing emphasis on environmental stewardship and countryside management.

Despite widespread use, final outcome indicators reveal little more than compliance with contractual obligations imposed, highlighting policy ‘implementation gaps’. Outcome indicators show the effects of AEPs- these are particularly useful to policy makers- however given their

uncertain link to environmental outcomes, the assessment of emphasis on these indicators cannot be updated (learning). Here, AEIs have suffered from drawbacks of emphasising both long-time horizon indicators that do not respond rapidly enough to behaviour shifts for policy learning, but also overarching indicators that may not be sufficiently close to policy or output metrics to ensure policy relevance.

Whilst efforts have been made to bring member states indictors in line with international comparable approaches, they remain non-uniform and vary in their degree of policy relevance. A recent initiative of the EU has been to develop a set of core indicators known as the Proposal on Agri-Environmental Indicators (PAIS). These indicators are to cover the domain of landscape, rural development and agricultural practice with policy applicability at the EU level. The challenge has been to narrow the variety of regional and national metrics to a core set based on considerations of policy relevance, transparency, comparability and reproducibility.

The enhanced reporting of intermediate indicators for Agri-Environment Programmes has highlighted measured successes. Examples include the widespread decline in potential nitrogen loading in the soil, as measured by the nitrogen soil surface balance indicator (OECD 1999). For certain countries, such as Hungary, this reduction in nitrogen surplus is particularly large due to collapse in agricultural support levels and market transition, rather than as an outcome of AEPs themselves. Again this highlights the challenge presented by headline 'outcome' indicators that are distant from actual behaviour or policy design. Whilst there is little doubt in the importance of reducing such indicator levels, the policy insights generated from a trend in this indicator alone are severely restricted.

Clearly assessment of indicator success is not a straightforward process where indicators are not necessarily linked to any specific policy or behaviour, but rather a complex interaction of policies and activities. One study (Yli-Viikari et al 2007) explores the application of agri-environmental indicators in Finland. They focus on a sample of indicators, identified at the national, EU and OECD levels that are important metrics of land use. For example the OECD-developed indicator set for pesticide use encompasses 'pesticide use' and 'pesticide risk'. The EU proposal covers a broader range including quantities used and sold. Evidence from Finland highlights the challenges interpreting intermediate indicators. One example given is for the sales of pesticides- for which good data exists back as far as 1953- where indicators reflect a steadily declining trend. However, two critical drawbacks should be noted- reduction in pesticide use does not equate with reduced environmental risk- and the trend exists in isolation of any specific policy action, and in the context of only relatively recent environmental concerns and establishment of relevant indicator set. The experience has highlighted the importance of inclusion of broader metrics, such as 'pesticide risk' to capture additional facets of the environmental pressures; whilst also recognising the importance of indicators as first and foremost an information source. Only once one measures the issue can one consider action or intervention.

Whilst intermediate indicators can help inform policy discussions, they need not prescribe policy choices or strategy. In the case of OECD Science and Technology indicators there has been less progress in harmonising the direction of technology policy as there has been in harmonisation of technology indicators. "The majority of public initiatives are still developed within national policy arenas…within national boundaries, or at least with a significant relation to their own

economy." (Edler et al 2003). Here a clear set of metrics can be useful; in the absence of harmonised policies, indicators can highlight comparable efforts or successes whilst accommodating heterogeneous approaches. Measurement of these comparable, but differentiated efforts can foster learning and adoption of best practice.

Under Key Performance Indicators for Construction, firms in the UK example were generally receptive to cross-firm comparison for learning and best practice. Indeed, the formation of 'clubs' for benchmark comparisons proved one of the most effective aspects across construction KPIs in UK, Chile and Brazil (Costa et al. 2006). The key drawback identified by the authors was firms' tendency to copy successful managerial practices rather than understanding the principles and concepts involved in those practices. Further they emphasise the need for firms to use the benchmarks more for internal analysis across time, rather than comparison across competitor firms.

The experience of countries implementing Poverty Reduction Strategy monitoring has been mixed. Indicator choice and proximity to policy goals has been poor. The 2005 review of PRS (IMF and World Bank 2005) noted that specifying clear targets, for which data are available, and identifying intermediate indicators remains particularly challenging for countries and that many PRSs would benefit from a more explicit link between targets and the policies needed to achieve them.

The sequencing and coordination of monitoring has faced challenges, along with practical difficulties of data collection, further compounding the lack of evaluation and analysis capacity available to many PRS countries. "Governments in most countries are monitoring results as a requirement, and results are not being used to adjust strategies or to enhance accountability for performance." (World Bank 2004)

The development of indicators has not only contributed to domestic accountability in policy decision making but also evidence-based dialogue with the wider donor community. By supporting measurement activities, donor money has allowed stronger domestic policy design and implementation. For example, better targeted health care spending is possible with improved tracking of disease and outbreaks. The Millennium Development Goals have not only helped consolidate domestic reporting activities, but have allowed policy debates to draw on international comparisons to strengthen efforts or redirect resources.

4.3 Summary of Experience with Intermediate Indicators

The experience in the OECD and the EU of indicator frameworks and intermediate indicator applications provides several insights (Table 2).

In particular is has been observed that the development of indicator sets can provide a valuable learning experience in itself in terms of identifying priority areas and opportunities for learning and adoption of best practice. Where measurement and reporting takes place at the firm level, it is critical that there is sufficient motivation or 'buy-in' by those firms, although evidence from the construction industry indicates that voluntary systems can work where metrics are tied to company strategy. The experience with AE indicators suggests that where measurement and reporting is tied closely to policy, and more importantly, financial support, the uptake can be

considerable. In terms of facilitating changes in behaviour, without imposing specific targets or commitments, AE indicators, through AE programmes, have proved a promising avenue for the development of EU agricultural policy.

Measurement and Implementation	Policy relevance and Performance effectiveness
Use of and participation in indicator frameworks has become widespread - rapid growth in the use of performance metrics - uptake of indicators established capacity and expertise **Measurement is a useful first step** - indicators systems can generate dialogue and learning - measurement of actions and processes can inform debate - intermediate indicators can facilitate international comparison and learning **Indicator choice is important for policy relevance** - indicators are useful proxies for policy success as well as learning and adoption of best practice	**Intermediate Indicators have positive policy and performance applications** - offer distinct advantages over alternative approaches - offer proximity to policy choices - alternatives do not capture the implications of specific policy actions - allows alternative policy strategies to be pursued **Implementation and policy relevance has been broadly positive** - has allowed greater learning through feedback processes, and adoption of best practice - help clarify the links between economic and other non-economic dimensions - often an important step in establishing performance-based targets or monitoring of policy objectives.

Table 2. Evaluation of experiences with intermediate indicators.

In terms of policy relevance, the experiences with indicator systems have varied. Typically, where intermediate indicators were not designed or selected with policy in mind, bringing about policy changes or even engaging policy makers has proved problematic, as with some Science and Technology Indicators. In contrast it may be an explicit objective of intermediate metrics to provide some distance from policy prescription, instead tying measurement to outcomes and shifting behaviour. Experience in International Development, specifically drawn from the European Commission's work on its Special Programme for Africa, highlights these choices. It is possible to allow differential policy choice under a common comparable set of indicators (SPAs) with careful selection and updating of intermediate indicators and their use. In the case of development indicators, this has been encouraged through a shift from intermediate outputs, to which conditionality could be applied, to wider measures of outcomes, over which recipient countries feel ownership over the policy means to achieve these measures. However one should be cautious regarding possible perverse incentives generated by any use of intermediate indicators, where they proxy for some overall objective- least-cost and path of least resistance approaches may not always generate desired outcomes.

For policy-relevance, intermediate metrics offer clear benefits over broader or less focussed indicator frameworks. As noted above, outcome indicators (or pressure indicators in the OECD framework) reflect an overall, and often long-term, indication of 'success' or action. Lead indicators can reflect action or success across a shorter or more policy relevant time-frame, allowing for continued political or financial support for programs that may require longer investment cycles to deliver carbon reductions. This would also allow for policy adjustment or learning across time, particularly where the full benefits of interventions may be unclear. Where

success is measured on a shorter-time horizon, recognition and reward for success can be better distributed across government, whilst maintaining consistency with longer term objectives of sustainable development or recognition of successes at earlier intervals.

In addition to performance indicator sets and broader indicator systems, there exists a continuing interest in the development of aggregate indicator indices. Recent examples include the Human Development Index of the UNDP and the Environmental Sustainability Index (ESI) under the World Economic Forum. The popularity of this approach reflects the usefulness of headline indicators for policy and cross-comparisons between firms, countries or regional groups.

Alongside the rise of indicator indices, goal-oriented intermediate indicators have become increasingly widespread across personnel management, firm benchmarking, national environmental management and international policy. Here the emphasis has been a combination of developing better measurement of outcomes from human activity to understand policy or process options, but also on making better use of indicators in performance measurement and comparison. Whilst numerous indicator systems have been developed with potential overlaps and common objectives (e.g. MDGs and SDIs), there has been little in the way of integration across indicator frameworks, either in methodology or in practical applications.

There has been a recent trend to link indicators to specific goals and targets to enable their use in tracking performance and establishing (or adjusting) policy priorities. The Millennium Development Goal Indicators are one of the highest profile examples of this, but they exist at international, national and sub national levels. The use of such targets is explored in more depth in Neuhoff & Lester (2008), where examples cited include the DFID Public Service Agreements (PSAs), Local PSAs, the US Government Performance Results Act and Best Value Indicators.

5 Intermediate Indicators for Climate Change Co-benefits

In this section we discuss the options for use of intermediate indicator for climate change policy, drawing on experiences up to now with reporting and measurement methods. Indicators have already played an important role in international processes, through national emissions reporting; however experience elsewhere suggests many advantages from shift to greater use of intermediate indicators. We situate this discussion in present reporting requirements and options falling within the UNFCCC framework.

At present there exist different reporting requirements for Annex I and Non-Annex I parties. Under National Inventory Reporting (NIR) Annex I countries are required to submit emission inventories to the UNFCCC secretariat, including all greenhouse gases. In contrast, Non-Annex I parties provide GHG emission information through the National Communications (NC) which are submitted periodically. There exists some flexibility in choice of gases reported. Reporting was required for the years 1994 and 2000, although some countries have submitted more frequent NCs voluntarily. Given the flexibility in reporting, the coverage across different countries can vary and the reporting standards are not always consistent, limiting the scope for comparison across Non-Annex I parties. National activity data varies even more widely with many Non-Annex I counties reporting lack of activity data as the critical constraint on developing complete national GHG inventories.

The National Communications do not include wider reporting requirements, such as intermediate indicators for climate change mitigation. Indeed, as discussed by Monni et al. (2006), a lack of availability of wider quantitative activity metrics such as LULUCF (Land-use, Land-use change and forestry) has constrained completion of national GHG emission inventories. There may exist strong complementarities between existing reporting requirements and a widening of focus to include non-emission related intermediate indicators for climate change mitigation. Monitoring of intermediate outcomes has already formed part of international cooperation on climate change mitigation. Under the CDM, project monitoring has been used to assess ongoing project performance. Such measures can been used to inform parties, adjust project development, identify measures to improve project quality, make the project more cost effective, improve planning and measuring processes and contribute to a learning process for all participants (Vine & Sathaye, 1999).

Recent work on proposed policy-CDMs has explored the use of quantitative measurement and targeting of policy impacts as intermediate indicators- rather than market mechanism for overall emission reductions (Schmidt et al 2006, Coseby et al 2007, Lewis and Diringer 2007). Several options related to policy CDMs have been suggested including the indicator requirements for so called 'action targets'. Each of the proposed approaches build on some requirement for enhanced and comparable reporting and measurement of policy impacts, typically quantification of non-emission data such as energy efficiency standards. The discussions of indicators for target setting is beyond the scope of this paper, however the use of intermediate indicators for any such policy and measures based approach will be important.

Previous experience with attempts to improve reporting of policy actions, such as under the European Climate Change Programme suggests that quantification of policy and measures is challenging (EEA 2005). Here for example only a limited number of member states successfully quantified policies impacts in the form of emissions savings and therefore the overall effect of Common and Coordinated Policies and Measures (CCPMs) could not be assessed. In the 'Synthesis of reports' (FCCC/SBI/2006/INF.2) only five Annex-I parties (Denmark, the Netherlands, Switzerland, Sweden and the United Kingdom) provided ex-post evaluation on the effects of policies and measures for the years before 2005, and this evaluation did not necessarily cover the effect of all implemented measures. One specific experience is drawn from EU efforts to improve reporting under the Combined Heat and Power (CHP) Directive. In order to set a framework for promotion of CHP it was necessary to develop a method for quantifying CHP electricity from cogeneration, a methodology for determining efficiency, a criteria for efficiency of cogeneration and establish a criteria for the analysis of national potentials for cogeneration. Thus, the establishing of general targets at technology or policy level can require a significant amount of additional international technical harmonisation (Monni et al 2006).

Methodological problems, particularly in addressing harmonisation of methods and resulting indicators is one of the key challenges faced during the efforts of parties up to now. The transition from reporting of PAMs to quantitative measures or indicators will require some international coordination. A 2002 UNFCCC report on 'Good practices in PAMs' (FCCC/SBSTA/2002/INF.13) records difficulties encouraged in Annex I 3rd National Communications. Here parties were unable to provide comprehensive assessment of efforts due to shortfalls in methodology relating to ex-post and ex-ante assessment, data quality and uncertainties associated with estimates of mitigation.

Some lessons for the way forward can be drawn from Annex I country experiences such as EU work with CCPMs and reporting under EU-wide policy targets (e.g. renewable targets, CHP, energy efficiency standards for appliances and benchmarking under the EU ETS). Other examples include the sophisticated reporting systems developed for Annex-I reporting under Land Use, Land Use Change and Forestry (LULUCF). Here Annex-I countries are required to report geo-referenced land-use activity under the so-called 'patchwork approach'. The methodology reflects the only partial requirement of LULUCF reporting under the Kyoto Protocol. Here parties are obliged to report emissions and removals from afforestation, reforestation and deforestation (ARD) activities since 1990. Further reporting of sinks and sources are optional.

The implications of data availability and reporting capacity are very real for many Non Annex-I countries. For example applying current Annex-I LULUCF system to Non-Annex I countries would probably limit participation for many developing countries. Establishment of a comparable reporting system as used in Annex-I countries would require major resources, technology transfer and time (Monni et al. 2006). The geo-referencing required for Annex I reporting would have serious resource implications if extended for some Non-Annex I parties. Proposals do exist however for more manageable standards without geo-referencing requirements such as the net-net accounting approach for managed lands (Schlamadinger et al. 2007).

National circumstances affect to a large extent the implementation of policies and measures, potentially limiting the scope for harmonisation of measurement and reporting. Developing acceptable international standards for the carbon-abatement impact of policies and measures may prove challenging, not least for the amount of technical detail required for estimation of policy impacts. In the case of SD-PAMs, data on sustainability or consequent changes in GHG emissions (e.g. compared to baseline) would be needed, which may be difficult to obtain (Monni et al. 2006). However, intermediate indicators offer a more readily available, quantitative and broadly comparable set of metrics for policy reporting, assessment and even comparison.

Intermediate indicators for climate change mitigation at the national or sectoral levels offer strong complementarities with the existing UNFCCC framework. Harmonised reporting of a broader set of indicators beyond greenhouse gas emission inventories, in particular where extended to cover quantitative reporting of SD PAMs, could support dialogues, improve effectiveness of domestic action and facilitate international cooperation. Whilst recognising both the global nature of the challenge and the principle of common yet differentiated responsibilities for action, intermediate indicators offer potential for better monitoring and reporting of mitigation efforts. As explored in the previous section, experiences with intermediate indicators suggest they can be well suited to process and policy learning and benchmarking- thus helping improve efficacy of mitigation efforts.

6 Conclusions

Evidence from indicator systems applied elsewhere suggests that informative indicators can help dialogue, policy design and performance improvements. Establishing a set of transparent, relevant and measurable metrics can represent an important first step in shifting sectoral,

domestic and international policy debates, informing stakeholders and giving quantitative evidence to comparisons and assessments. Intermediate indicators provide shorter-lag feedback on policy interventions, processes or other actions, allowing for updating in design, benchmarking and learning. Cost of measurement and defining the roles and responsibilities in measurement and reporting can be critical to overall success and uptake of an indicator framework. However, where real learning or performance benefits can be pursued, widespread voluntary uptake by firms, sectors or governments can be possible.

Intermediate indicators can:

- Better fit with political cycles- align with political incentives and timings of actions;
- Allow for accountability by electorates or stakeholders for actions or policy measures;
- Provide indicators that are cognisant of the fact that carbon reductions may require longer term measurements and shifts in investment patterns;
- Provide learning opportunities from regular feedback where shorter timeframes are adopted;
- Overcome the fact that uncertainty of policy or climate impacts implies that compliance-based approaches may be undesirable even where best-practice is adopted. Here policy uncertainty, particularly where there exist sanctions or rewards for compliance, could endanger initial actions;
- Produce metrics that are mindful that the complexity of effective structural changes requires policy synergies over longer horizons. Shorter term targets can help ensure synergies are activated and prioritised- similarly attributing emissions reductions to single actions becomes problematic;
- Connect together non-linearities/lags in meeting overall emissions objectives; and,
- Provide metrics that are appropriate, relevant, selective, simplified, and outcome-oriented and capture cross-cutting outcomes.

There must however, be some confidence that policy targets are achievable to encourage actors to pursue the necessary activities.

Common standards for comparable efforts allows for strong intermediate actions that can be measured, reported and verified on a policy relevant time-frame, whilst ensuring contribution to the twin objectives of continued economic growth and emission stabilisation. Indeed the focus of Non-Annex I mitigation efforts will likely be centred on growth-enhancing policy action with a climate co-benefits. Where 1.6 billion people remain without basic electricity infrastructure, and industrial processes require modernization and efficiency improvements, there exist opportunities for significant efforts to promote development whilst avoiding both additional GHG emissions and technological 'lock-in' through sustainable development policies and measures (SD-PAMs).

The implications for the use of intermediate indicators for climate policy are:

- Intermediate indicators offer strong advantages for performance and policy relevance over other approaches such as composite indexes or outcome indicators.
- There is extensive experience in organisations and firms that can be built upon for climate change indicators.
- Voluntary uptake and integration with organisation and corporate strategies for environmental indicators imply a bold approach to climate change indicators may be possible.

- Use of 'second order' measures may be appropriate in some circumstances, particularly where successfully established measurement and reporting is already in place. This may also help any potential proliferation of climate change and sustainable development indicator systems.
- Cost of measurement and availability of data constraints imply international support will be required for extension of indicators to some developing country contexts.
- Choice of indicators should be internationally comparable but tailored to allow country-specific policy choices and strategies to meet policy objectives- such scope can be achieved through careful indicator choice.
- Choice of indicators must be sufficiently proximate, however, to project or policy implementation to avoid 'implementation gaps' between overarching objectives and specific implementation and performance.

Experience from other indicator approaches suggest that the application of intermediate indicators to climate change mitigation efforts and policies would be a useful first step in establishing a dialogue around policy learning and adoption of best practice. Whilst it is beyond the scope of this paper to draw conclusions on the use of such indicators for targets or financial transfers, the growing importance of policy CDM and SD-PAMs supports a move towards broader quantitative measurement and the reporting of intermediate outputs of actions and efforts. Experience suggests such measurement can be achieved voluntarily or as part of some wider framework. Similarly although measurement, monitoring and verification can be demanding in both resources and organisational capacity terms, such barriers can be overcome relatively easily. This does however imply an important role for international cooperation and coordination, in particular technical and financial assistance for some developing countries to meet the needs of internationally comparable measures.

Measurement and reporting of intermediate indicators, such as quantitative reporting of SD-PAMs (sustainable development policies and measures) would require extensive broadening of existing reporting requirements under the National Communications and will require strong international coordination and cooperation. In particular the resource requirements for some developing countries in establishing quantitative measures of SD-PAMs will be prohibitive without active involvement (and transfers) by Annex I countries. International cooperation has been an important part of the UNFCCC agenda under the Kyoto Protocol.

The future role for international cooperation was emphasised at COP13 with the 'Bali Action Plan' (UNFCCC 2007). The decision sets in motion the development of measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission mitigation and reduction objectives, while ensuring the comparability of efforts among countries, taking into account differences in their national circumstances. The existing framework under the UNFCCC offers the ideal location for any broadening of metrics beyond quantified emission reductions. In particular, focus should widen to include intermediate indicators of comparable efforts through quantification of intermediate outputs from domestic policies and measures. International cooperation will be required to establish a set of consistent, comparable and feasible intermediate indicators, particularly where implementation support will be needed in some developing countries. The development of a set of strong intermediate indicators will be a useful step in facilitating greater cross-country cooperation, transfers and policy learning.

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Contact: Contact: Jon.price@climatestrategies.org
Climate Strategies
C/O University of Cambridge
13-14 Trumpington Street,
Cambridge, CB2 1QA

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