

Discussion Paper

# **INECE-OECD Workshop on Environmental Compliance and Enforcement Indicators: Measuring What Matters**

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**Environmental Compliance and Enforcement Indicators**

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# Environmental Compliance and Enforcement Indicators: Measuring What Matters

## 1. Introduction

### 1.1 Background and context

In many countries, environmental compliance assurance programmes are emerging as critical mechanisms for implementing environmental policies. These programmes create a framework for monitoring compliance and reacting to non-compliance in a number of sectors of economy. The development of such programmes, however, has generated the increasing demands for reliable, harmonised and easily understandable information on their environmental effectiveness and efficiency. These interests emerge from various audiences, including environmental policy makers, other public authorities, businesses, the general public, environmental NGOs and other stakeholders. The development of meaningful and robust environmental compliance and enforcement (ECE) indicators can help to meet these demands.

Participants at the Sixth Conference of the International Network for Environmental Compliance and Enforcement (INECE)<sup>1</sup> (San Jose, Costa Rica, April 15-19, 2002) called upon INECE to assist in developing indicators to better measure and manage compliance and enforcement programmes. INECE is to develop uniform minimum criteria, in co-operation with its regional networks, and pilot test INECE ECE indicators. INECE is to do this work with a view toward improving performance, public policy decisions, and environmental governance at the national, regional, and global levels, ultimately contributing to environmental improvements.

In response to its mandate stemming from the conference, INECE launched the ECE Indicator Project by forming an expert working group<sup>2</sup> to develop a strategy to assist enforcement agencies in designing environmental compliance and enforcement indicators and in using them for the agencies' performance assessment. The project aims to:

- ◆ Strengthen demand and capacity for performance assessment of environmental compliance and enforcement activities in individual countries;
- ◆ Establish procedures for developing and using both quantitative and qualitative indicators, and for providing regular feedback to managers, political leaders and legislatures;
- ◆ Stimulate cooperative projects between the INECE participants to develop and implement enforcement and compliance indicators; and
- ◆ Promote international harmonisation of environmental compliance and enforcement indicators, thus aiding reporting on national, regional and global progress towards sustainable development.

The project will be supported by a series of expert workshops, with the first one co-hosted by INECE and the OECD<sup>3</sup> in Paris, France on 3-4<sup>th</sup> November 2003. This Workshop will provide a forum for officials and experts to exchange experiences in the development and use of environmental compliance and enforcement indicators. Specific objectives include:

- ◆ Reviewing the rationale, purpose and needs for ECE indicators;

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<sup>1</sup> INECE is a partnership among government and non-government compliance and enforcement practitioners from over 100 countries, bringing together developed, transition and developing economies. Founded in 1989, INECE is a worldwide leader in developing networks for enforcement cooperation, strengthening capacity, and raising awareness to the importance of compliance and enforcement.

<sup>2</sup> The expert working group members are Frank Barrett, Environment Canada; Antonio Benjamin, Law for Green Planet Institute (Brazil); Adriana Bianchi, World Bank Institute; Nick Franco, USEPA; Jo Gerardu, VROM; Davis Jones, USEPA; Donald Kaniaru, Formerly of UNEP; Myriam Linster, OECD; Kenneth Markowitz, INECE Secretariat; Carolina Mauri, Costa Rica; Krzysztof Michalak, OECD; Ladislav Miko, Czech Republic Ministry of Environment; Dave Pascoe, Environment Canada; John Seager, Environment Agency U.K.; Michael Stahl, USEPA; and Durwood Zaelke, INECE Secretariat.

<sup>3</sup> The Organisation for Economic Co-operation and Development (OECD) consists of 30 member countries sharing a commitment to democratic government and the market economy.

- ◆ Advancing the development of common definitions and indicator typology, and explore the relationships with other types of environmental indicators;
- ◆ Sharing experiences with development and use of ECE indicators in OECD, transition and developing economies; and
- ◆ Discussing international and country level follow-up steps.

## 1.2 Purpose of the paper

The objectives of this paper are to:

- ◆ Propose definitions, rationales and intended audiences for ECE indicators;
- ◆ Provide a framework/methodology to aid in their development and implementation;
- ◆ Present key issues likely to arise in their development and implementation; and
- ◆ Present examples of the use of ECE indicators in selected countries where major progress has occurred and the lessons learned.

INECE Expert Working Group on Indicators prepared this paper to serve as a blueprint for discussion at the INECE-OECD Workshop. It is not intended to provide a comprehensive overview of existing practices in using ECE indicators in different countries and regions. The examples presented serve illustrative purposes only; they do not attempt to be representative of all countries. The workshop discussions are expected to assist in developing broader guidance on how best to apply ECE indicators in different political, socio-economic and environmental contexts.

The proceedings from the INECE-OECD workshop will include a number of country-specific examples not included in this Background Paper as well as a summary of the Workshop discussions. They will also recommend various factors that should be taken into account when enforcement and compliance indicators are applied in different political, economic, social and environmental contexts.

The paper proceeds in three parts. Part I describes why ECE indicators are important and for whom they are developed. Part II addresses how to go about developing and introducing new ECE indicators. It proposes a framework, distinguishing between indicators whose development is feasible in the short term and indicators whose development is desirable in the longer-term, but which require additional conceptual and data collection activities. It also reflects on the questions to be addressed, and suggests key considerations for developing and implementing ECE indicators. Part III considers next steps and focuses participants' consideration in preparation for the INECE-OECD Workshop in Paris and beyond.

## 2. Part I: The Need for Informative ECE Indicators

### 2.1 General definitions and terminology

The word "*indicator*" is rooted in the Latin verb *indicare*, which means to disclose or point out, to announce or make publicly known, or to estimate or put a price on (Hammond, 1995 – INECE April 2002). Indicators can be thought of as pieces of evidence that provide information on matters of broader concern. For example, a legendary environmental indicator was "the canary in the coal mine." Miners would bring a caged canary into a coal mine. If the canary perished, it served as an "indicator" that harmful gases were building toward a level unsafe for miners.

There is a significant body of knowledge and experience concerning environmental indicators - measurable pieces of information that inform about the status of an area's environmental health. Policy makers have used these indicators for years to assess and report environmental program performance. They have also been used to communicate information about the state of the environment to the public<sup>4</sup>. Since 1989, the OECD has developed rich literature on environmental indicators and on their use in policy analysis (see Exhibit 1). More recently, environmental compliance and enforcement indicators have been gaining prominence as distinct, but related, measures of program efficiency and effectiveness.

The OECD defines compliance as the behaviour response to regulatory requirements. Similarly, Environment Canada defines compliance as a state of conformity with the law. Hence, compliance indicators include those measurable pieces of information that inform about regulatees' behaviour response to regulatory requirements such that they conform to laws and regulations.

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<sup>4</sup> For more background material on indicators, please visit the INECE Indicators Web Forum at <http://www.inece.org/forumsindicators.html>

The OECD defines enforcement as the application of all available tools to achieve compliance. In a broad sense, the OECD definition of enforcement includes compliance promotion, compliance monitoring and non-compliance response. Enforcement indicators include those measurable pieces of information that inform about compliance promotion, compliance monitoring and non-compliance response.

### Exhibit 1: OECD Development of Environmental Indicators

#### Background

There are two complementary sources of demand that lead to the OECD's development of environmental indicators.<sup>6</sup> First, the OECD Council in 1989 called for further work to integrate environment and economic decision-making. Consecutive G-7 summits reiterated this call, resulting in the approval of an OECD Council Recommendation on Environmental Indicators and Information by OECD governments in 1991. Second, in 1991 the OECD's member countries tasked it with launching a programme of environmental performance reviews with the principal aim of helping member countries improve their individual and collective performance in environmental management.

The OECD work led to the development of several sets of indicators using harmonised concepts and definitions. The OECD approach considers that:

- ♦ there is no unique set of indicators; whether a given set is appropriate depends on its use;
- ♦ Indicators are only one of many tools and have to be interpreted in context.

This work builds on an agreement by OECD countries to:

- ♦ use the pressure-state-response (PSR) model as a common reference framework;
- ♦ identify indicators on the basis of their policy relevance, analytical soundness and measurability; and
- ♦ use the OECD approach at the national level by adapting it to national circumstances.

This work is furthered through continued co-operation between the OECD and its many partners, including UNSD, UNCSD and UN regional offices; UNEP; the World Bank, the European Union (Commission of the European Communities, Eurostat, EEA), INECE and a number of international institutes.

#### Environmental Indicators:

The OECD defines an environmental indicator as a parameter, or a value derived from parameters, which points to, provides information about, or describes the state of a phenomenon/environment/area, with a significance extending beyond that directly associated with a parameter value. Indicators serve two major functions: i) They reduce the number of measurements and parameters that normally would be required to give an "exact" presentation of a situation; and ii) They simplify the communication process by which the results of measurement are provided to the user.

The OECD distinguishes between two categories of performance indicators:

- ♦ PERFORMANCE INDICATORS LINKED TO QUANTITATIVE OBJECTIVES (targets, commitments)  
Examples of such indicators include air emission trends relating to national or international targets and urban air quality relating to national standards;
- ♦ PERFORMANCE INDICATORS LINKED TO QUALITATIVE OBJECTIVES (aims, goals)  
These indicators generally address the concept of performance in two ways:
  - ♦ with respect to the eco-efficiency of human activities, linked to the notions of de-coupling, elasticities (e.g. emissions per unit of GDP, relative trends of waste generation and GDP growth; and
  - ♦ with respect to the sustainability of natural resource use (e.g. intensity of the use of forest resources, intensity of the use of water resources)

#### Pressure-State-Response (PSR) and ECE Indicators

The PSR model provides for a classification of indicators into indicators of environmental pressures, both direct and indirect, indicators of environmental conditions and indicators of societal responses. Indicators of societal responses show the extent to which society responds to environmental concerns. They refer to individual and collective actions and reactions, intended to i) mitigate, adapt to or prevent human-induced negative effects on the environment; ii) halt or reverse environmental damage already inflicted; iii) preserve and conserve nature and natural resources.

Environmental Compliance and Enforcement (ECE) indicators are an example of societal response indicators. As with indicators of environmental expenditures, taxes and subsidies, price structures, market shares of environmentally friendly goods and services, and pollution abatement rates, they inform societal responses to the environmental conditions identified.

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<sup>6</sup> The OECD Working Group on Environmental Information and Outlooks leads work on environmental indicators.

## 2.2 The purpose and types of ECE indicators

In recent years, many countries have made progress in strengthening national environmental compliance and enforcement programmes. To increase these programmes' credibility and accountability, these efforts need to be monitored and assessed as well as evaluated based on how well they are performing in responding to priority environmental problems. ECE indicators can aid in these tasks and, in general, serve three major purposes:

- ◆ ECE indicators assist programme management in **monitoring operations** of their compliance and enforcement programmes. These indicators help to ensure that personnel and resources are being used efficiently and are being used to accomplish the things for which the agency is committed. Such indicators focus on inputs and outputs and count of how many activities of various kinds are being conducted within a given period of time with a given amount of resources. Examples of such indicators include the number of inspections conducted annually and the number of enforcement warnings and charges are issued per year. These indicators also allow for efficiency comparisons among different regions or parts of a programme. ECE indicators provide information on the extent and the level of achievement of an organization with respect to the things it sets out to accomplish and how efficiently it does so (the extent to which an organization is doing things right).
- ◆ ECE indicators **enhance the accountability** of environmental compliance and enforcement programmes. These indicators are used to report results to central budget authorities, legislative bodies, environmental constituency groups, and the general public. Since there are multiple audiences, it is often necessary to use multiple indicators to provide a full account of program performance. Input related indicators identify the allocation of financial and human resources. Output-related indicators show the extent of activities carried out and outcome-related indicators show the results achieved or the effects of those activities. Combined, for example, these indicators relate a given amount of resource allocation to a number of enforcement cases settled and the corresponding reduction in pollution (e.g. kilograms of pollution reduced). These indicators can also be valuable as an internal tool to motivate program staff and managers and to recognize and celebrate accomplishments.
- ◆ ECE indicators help to **assess the performance** of environmental compliance and enforcement programs. These indicators help program managers learn what is working and what is not working and determine what needs to be done differently to achieve desired results – the extent to which the agency is doing the right things. For many, program improvement is the primary purpose of performance indicators and the most important reason to invest in their development and use. A combination of output and outcome indicators is necessary for assessing performance. For example, increased inspection activity in a particular industry sector may lead to greater attention and compliance by regulatees. ECE indicators of inspections by industry sector and corresponding changes in sector compliance rates may help management identify in which industry sectors inspections have the greatest impact. Managers need to look for patterns and relationships between types of activities and results and intervene consciously and actively into program operations to implement specific improvements.

## 2.3 Target audiences for ECE indicators

There are many audiences for ECE indicators. Examples of such audiences and typical questions asked by each group are summarized in Table 1.

**Table 1: Target Audiences for ECE Indicators**

<u>Target Audience Grouping</u>	<u>Examples of Typical Questions</u>
1. <b>Government/State policy-makers</b>	<ul style="list-style-type: none"> <li>• What is the degree of progress in achieving nationally established commitments, targets and standards?</li> <li>• Are existing national and international policies and instruments effective?</li> <li>• What are the costs and benefits of the regulatory framework (including compliance assurance strategies)?</li> <li>• What are the outstanding priorities for future policy and legislation?</li> </ul>
2. <b>Subnational / territorial authorities</b>	<ul style="list-style-type: none"> <li>• What is the state of compliance with local industry sectors?</li> <li>• What are implications of outcomes for planning decisions?</li> </ul>
3. <b>Regulatory bodies</b>	<ul style="list-style-type: none"> <li>• Are regulatory actions working?</li> <li>• What are future priorities for regulation and enforcement?</li> <li>• Is regulation delivering agreed environmental outcomes?</li> </ul>
4. <b>Industry sectors</b>	<ul style="list-style-type: none"> <li>• What is the level of compliance-related environmental performance across industry sectors?</li> <li>• How efficient are we being in complying with environmental regulatory standards?</li> </ul>
5. <b>Stakeholder and interest groups</b>	<ul style="list-style-type: none"> <li>• Are industrial processes in our locality complying with their permits?</li> <li>• Are regulators doing their job in enforcing the law?</li> </ul>
6. <b>General public</b>	<ul style="list-style-type: none"> <li>• How safe is the factory in my backyard?</li> <li>• What are the risks to my family's health and well-being?</li> </ul>
7. <b>International bodies</b>	<ul style="list-style-type: none"> <li>• What is the degree of progress in achieving internationally agreed commitments, targets and standards?</li> <li>• What is the relative performance in different countries and regions in complying with national and international standards?</li> </ul>

The stakeholders for ECE indicators and types of questions they want answered are diverse. It is preferable to seek views on the priority questions and information needs directly from these various groups, perhaps using well-established facilitation processes. This would aid in establishing the relative priorities of users, developing ways to frame the information and selecting and applying basic criteria for ECE indicators. Selection criteria for indicators are addressed in greater detail in Part III (See Sec. 3.2, #2).

## **2.4 Using ECE indicators**

The United States Environmental Protection Agency (USEPA) has made significant progress in developing and effectively using ECE indicators. A few of the many ways that USEPA uses ECE indicators in the management of its programmes include:

- **Monthly Management Reports:** early in 2003 the USEPA began distributing monthly reports to all of its senior managers in headquarters and regional offices. The eight reports cover key areas of enforcement activity and performance (e.g., compliance assistance, enforcement actions, environmental benefits), enabling managers to track and address program performance issues throughout the year. The management reports also provide a common basis for discussing and comparing performance across regions.
- **Regional Performance Analysis:** The USEPA is comprised of a headquarters and ten regional offices, with the Assistant Administrator for the Office of Enforcement and Compliance Assurance (OECA) responsible for oversight of regional compliance and enforcement programmes. The USEPA conducts in-depth analysis of each region's compliance and enforcement outputs and outcomes, their contribution to national priorities, and the performance of states that are contained within each region. USEPA prepares these analyses twice yearly in advance of oversight visits conducted by the OECA Assistant Administrator to serve as the basis for the review of regional performance.

- **In-depth Performance Analysis:** In February 2003, the OECA staff finalized its first OECA Performance Analysis of the Clean Water Act National Pollutant Discharge Elimination System.<sup>7</sup> This analysis represents the first time the US EPA has used performance data to comprehensively analyze the effectiveness of a programme. This pilot report was developed as an internal tool to provide senior managers with an analysis of nationally collected performance-related information. The report drew on information from USEPA's data systems, as well as information from OECA, program and field office management and staff. The analysis provided managers with an overview of USEPA and state performance and trends in compliance, and provided an opportunity to develop and implement meaningful recommendations for programme improvements.

These examples are consistent with a broad-based trend towards increased use of ECE indicators. Particularly within Europe and North America, governments have increasingly focused on efforts to improve the quality of environmental performance reporting. These countries have started programmes that, in addition to the output-type indicators, use "outcome" indicators to measure the results of compliance and enforcement related activities. As discussed more fully below in Section 3.1, these include responses to inspections, rates of compliance and actual impact of compliance assurance efforts on changes in environmental quality. (See examples in Exhibit 2)

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<sup>7</sup> In brief, the NPDES program establishes the rules governing water discharge permits.

## Exhibit 2: International Trends towards Developing ECE Indicators

### Europe

The United Kingdom: Much of the demand for compliance and enforcement indicators in Europe stems from the huge array of European directives on the environment agreed within the European Union. There are more than 300 pieces of environmental legislation, many of which contain prescriptive environmental standards and targets and strict implementation dates. Monitoring and reporting against all of these requirements are significant and costly endeavours. Governments are increasingly pressured to streamline environmental reporting requirements throughout Europe; the use of indicators is seen as an important means for targeting and simplifying environmental reporting. This issue has been addressed at several international conferences such as the "Bridging the Gap" Conferences in London and Stockholm. These conferences focused on the importance of bringing together information users and suppliers and the need for targeting policy-relevant information through a common set of indicators. The European Environment Agency, working with member countries and the European Commission, played a major role in this process and produced a regularly updated set of pan-European indicators, "Environmental Signals".

Another European trend is the increased demand by the public for access to environmental information. Web-based technologies, which allow rapid analysis and dissemination of local environmental information, are becoming very powerful tools to raise awareness and facilitate local community involvement. Indicators that simplify complex technical data on compliance and enforcement are becoming increasingly valuable for communicating to the public.

### North America

The United States: In the United States, the demand for more and better performance information has come from the government (Congress and the Executive Branch) and the public and non-governmental organizations. The Government Performance and Results Act (GPRA), passed by Congress in 1993, provided both the motivation and a conceptual framework for the development of performance indicators and measures. GPRA shifts the focus of government decision-making and accountability from activities conducted to the results of those activities. GPRA requires federal agencies to develop strategic plans, and annual performance plans with goals and performance measures associated with them, and annually report results to Congress. More recently, the President's Management Agenda has emphasized performance reviews, performance-based budgets, and the development of high quality outcome measures to monitor program performance. In addition, the Office of Management and Budget has begun reviewing performance of federal programs using the Program Assessment and Rating Tool, which evaluates programs on, among other things, whether they have adequate outcome-based annual and long-term performance measures.

The public and non-governmental environmental organizations have demanded more, and more easily understood compliance and enforcement performance information over the years. This demand has led to the development of websites that provide the public with environmental compliance information and the background and resources to understand the information presented. Greater public availability of environmental compliance information has also led to increased attention from the USEPA and its state partners on ensuring the accuracy of the data presented.

The USEPA's OECA began the National Performance Measures Strategy in 1997 to develop an improved set of performance measures for its enforcement and compliance program. Through this effort a number of lessons were learned that may help others when developing performance measures for their environmental programs.

Canada: The Canadian government has been encouraging meaningful and effective performance reporting for more than a decade. In 1992, the Operational Planning Framework and the Green Plan placed much greater emphasis on the need for outcome-related performance measures than had previously been the case. In 1998 the federal government introduced a Planning Reporting and Accountability Structure, which more explicitly pointed to results-based indicators. The most recent incarnation of central agency direction is with respect to Results-based Management and Accountability Frameworks (RMAF), with the focus shifting from framework development towards implementation.

Environment Canada is developing RMAF's within most of its business lines, including that of ensuring a clean environment. Developing a Clean Environment RMAF necessitates being able to link resource allocation (input) decisions with compliance promotion and enforcement activities (outputs), changes in polluter activities (intermediary outcomes) and, ultimately, changes in the environment (final outcomes).

In 2000 Canada's Office of the Auditor General undertook a review of the lessons from implementing RMAFs in Departments and Agencies where they had been implemented. It concluded that performance measurement is more about changing organizational cultures toward ongoing learning and managing for results than it is about measurement and reporting.

### 3. Part II: Developing Environmental Compliance and Enforcement Indicators

This section addresses how to go about developing meaningful ECE indicators. It first presents a framework for this development. It then focuses the reader on key questions to discuss. Finally, it offers considerations for both developing and implementing ECE Indicators for national, regional and international purposes.

#### 3.1 A framework for developing ECE indicators

Various models can be used to explain what should be measured and why it matters. Typically, these follow a similar structure of measuring inputs, activities, outputs and behavioural changes presumed to accrue from the original activities. In this paper we present the various types of ECE indicators within the framework of a logic model, based on the Canadian government's Results-based Management and Accountability Framework system (see Exhibit 3).

#### **Exhibit 3: Canadian Results-based Management and Accountability Framework**

Within the Canadian government Results-based Management and Accountability Framework (RMAF) system, performance indicators are developed in conjunction with each step of a logic model. The Canadian government's Treasury Board Secretariat describes a logic model as follows:

*The logic model is a graphic representation of the linkages from activities through associated outputs to the sequence of expected outcomes. The model is normally supplemented with explanatory text to describe the logical sequence of these linkages. The logic is a theoretical "road map" of the policy, program or initiative upon which the strategic plan, ongoing performance measurement and evaluation strategies are based. The logic model should establish linkages to departmental objectives or strategic outcomes. It should clearly demonstrate a results chain from activities to outcomes.*

The key to using a logic model is to follow logically linked stages of the programme: inputs, outputs, reach, immediate and intermediate outcomes, and final outcomes. *Inputs* include the resources applied to a given area. *Outputs* include program activities and products, while *reach* is a listing of the audience of those outputs. An *immediate outcome* is the effect of the outputs on those who were reached. For example, an information kit that explains regulatory requirements is a planned "output" to regulatees, who are the "reach." One "immediate outcome" could be raised awareness by regulatees of their regulatory requirements resulting from reading the information kit. An immediate-outcome performance indicator might be developed around regulatee awareness. This indicator might then be captured through a process of ongoing follow up with a representative sample of regulatees asking them about their awareness of the pertinent regulations.

Immediate outcomes would logically lead to *intermediate outcomes* that would then logically lead to final outcomes. In the example below, an intermediate outcome is increased compliance among regulatees while the *final outcome* is: "Prevention of adverse impacts on the environment from existing substances of concern." Only after a logic model has been completed in all of its stages should developers seek to identify appropriate indicators for each stage.

**Table 2: Environmental Compliance and Enforcement Indicator Framework**

Examples	Inputs	Outputs (stem from activities)	Reach	Immediate / Intermediate Outcomes	Final (Environmental) Outcome
Actions taken or intended effects	<ul style="list-style-type: none"> <li>- More compliance promotion staff hired</li> <li>- More Enforcement Officers hired</li> <li>- Enhanced training</li> <li>- More extensive technological support</li> </ul>	<ul style="list-style-type: none"> <li>- More compliance promotion campaigns</li> <li>- More inspections</li> <li>- More prosecutions</li> </ul>	<ul style="list-style-type: none"> <li>- All known regulatees</li> <li>- Relevant industry sectors</li> </ul>	<ul style="list-style-type: none"> <li>- Industry better understands how to comply</li> <li>- Industry invests in more environmentally friendly equipment</li> <li>- improved corporate philosophy</li> </ul>	<ul style="list-style-type: none"> <li>- reduction in discharges</li> <li>- reduction in environmental impact</li> <li>- Cleaner air and water</li> </ul>
Performance Measures	<ul style="list-style-type: none"> <li>- # of Compliance promotion officers</li> <li>- # of enforcement officers</li> <li>- Training budget (\$)</li> <li>- Investment in IT</li> </ul>	<ul style="list-style-type: none"> <li>- # of Compliance Promotion campaigns</li> <li>- # of inspections</li> <li>- # of prosecutions</li> <li>- \$\$ of fines/ penalties</li> </ul>		<ul style="list-style-type: none"> <li>- Investment in "greener" industrial processes</li> <li>- Compliance rates</li> <li>- Recidivism rate</li> <li>- Concentration of pollutants from effluent pipes</li> </ul>	<ul style="list-style-type: none"> <li>- Ambient concentrations of pollutants in air and water</li> <li>- Environmental effects monitoring (e.g. pollutants in herring gull eggs)</li> </ul>

As depicted in Table 2, meaningful ECE indicators become easier to identify when they are explicitly linked to actions or intended effects through the use of a logic model. Such a model helps to identify ECE indicators *sensu stricto* and the way they can be related to other environmental indicators to address broader environmental performance questions.

- ◆ **Input indicators** relate to the resources (people, \$\$) applied to different operations (e.g. number of enforcement officers). While of limited usefulness in and of themselves, they speak to the government's commitment and are important components for determining efficiency and return on investment.
- ◆ **Output indicators** are quantitative or qualitative measures of government activities, work products, or actions. In environmental enforcement programs, an example of outputs would be the number of enforcement cases issued or settled in one year. Outputs generally count things produced by the resources of the agency or program. Input and output indicators relate to actions for which the government has direct control.
- ◆ **Outcome indicators** relate to changes that governments try to influence but do not directly control. **Immediate outcome indicators** relate to measuring the immediate effect of those that were reached by the outputs. **Intermediate outcome indicators** measure progress towards achieving final outcomes, such as changes in behaviour, knowledge or conditions that result from program activities. These changes are associated with or are needed to achieve the final outcome. For an environmental compliance and enforcement programme, an example of an immediate outcome would be a change in the understanding of regulatory requirements and importance of complying with a new regulation. An intermediate outcome could be a change in facility management practices resulting from their new understanding and/or fear of inspectors finding them to be out of compliance. Such a change would contribute to the final outcome of cleaner air or water.
- ◆ **Final outcome indicators** measure the ultimate results the program is designed to achieve. Improvements in the condition of ambient air or water quality are examples of final outcomes. Final outcomes are generally costly to measure and may be caused by any number of different forces. They are, thus, very difficult to attribute to compliance and enforcement programs, making them problematic to use as indicators. At present, measuring kilograms (or pounds) of pollution reduced from enforcement actions may be the closest a compliance and enforcement programme has achieved to measuring final outcomes.

### 3.2 ECE indicators: addressing performance questions

Theoretical models of the various types of performance indicators have been developed over numerous years, particularly within the past decade. In relation to the widely used Pressure-State-Response (PSR) model (see Exhibit 1), ECE indicators make an important contribution to addressing some of the five fundamental types of questions:

#### Pressures

1. **What is happening?** What are the current environmental pressures? What do the basic indicators of trends tell us? What is getting better and what is getting worse (e.g. trends in levels of emissions to the environment from different industry sectors)? State of the environment reporting is widely used to inform us of environmental pressures.

#### State

2. **Does it matter?** Do the environmental pressures compel us to act? Is the state of the environment such that we should be concerned? These questions can be addressed by comparing trends and ambient environmental conditions to existing standards (e.g. metals in drinking water as compared to drinking water standards, ambient monitoring of air quality compared to existing standards).

#### Response

As we develop responses to environmental pressures, ECE indicators enable us to address two key questions:

3. **Are we being efficient?** Are resources being applied where they provide the greatest return for our environmental investment (e.g. comparing resource use and waste outputs with economic growth in different industry sectors)? To address this we can develop indicators that assess outputs against inputs, including financial and people resources.
4. **Are we being effective?** Are we making progress in addressing national priorities and objectives? Are we applying sufficient levels of compliance promotion and enforcement activity in the regulated community to change behaviour where appropriate? These indicators assess performance and delivery in comparison to specified outcomes. That is, they assess improvements in environmental quality measured against environmental pressures.

#### Closing the Loop

5. **Are we on the whole better off?** Are we contributing to the goal of sustainable development and protecting human health and the environment through our actions and strategies? Indicators of this nature would assess the contribution of activities to total welfare and overall quality of life (environmental, social and economic).

Existing information sources routinely address some of these questions. For others, the theoretical models are not yet fully developed, let alone the data collected and analyzed in any country. Countries have the most experience with collecting data that inform about environmental pressures and the state of the environment, Questions 1 and 2. Prior to addressing these questions there are no indications that actions are required. With respect to societal responses, knowledge is gradually improving on efficiency issues (Question 3). Many countries have or are developing good processes for tracking their resource allocation in relation to their activities, such as the levels of activity for compliance promotion and enforcement (e.g. number of pamphlets mailed, number of inspections, enforcement actions, prosecutions, fines etc). The reliability of information is also improving on unit costs of compliance and enforcement activities.

Conversely, there is less information and understanding on how to respond to Question 4. Methodology is still emerging on how we relate the contributions of compliance and enforcement activities to national environmental priorities and objectives. To address effectiveness issues, practitioners need to develop robust methods of assigning attribution of compliance and enforcement actions to regulatee behaviour, which is affected by many factors. At present, practitioners have little reliable information by which to

gauge the effectiveness of policies and regulatory activities in terms of delivering real and measurable environmental outcomes. While there is considerable data available on environmental releases (effluent and emission monitoring, regulatory reporting requirements, etc.), the frameworks for analyzing these data are still being developed. As such, our understanding of causality is far from complete; developing meaningful indicators that link compliance and enforcement efforts with environmental improvements remains a challenge.

Finally, as with all environmental programmes, compliance promotion and enforcement activities need to be considered within the much wider context of moving towards sustainable development and improving overall quality of life (Question 5). This remains a significant challenge that will require concerted international collaboration from many related disciplines.

#### **Exhibit 4: International Research on ECE Indicators**

In 2000, Environment Canada undertook a study reviewing the work being carried out by other countries and agencies on ECE indicators. That report concluded that many countries were grappling with the issue, but that advances were being made quickly. Environment Canada re-examined progress in this area in 2003. The review was conducted using the Internet (several thousand web sites), library resources (over 100 journals) and personal contacts. It found that there are many projects currently in progress around the world, many of which are designed to fill gaps in research on performance measures.

The study found that:

- ◆ Many indicator projects have been completed, from which other jurisdictions could profit through the selection or adaptation of performance measures for their own programs;
- ◆ Many indicator programs are underway with results pending, and these need to be tracked so that other jurisdictions can learn from the successes and failures of these programs;
- ◆ Several new and innovative performance measures have been developed;
- ◆ Some agencies have suggested that certain indicators be discarded due to technical difficulties in measurement or interpretation, overlap with other indicators, or their lack of national or regional significance; and
- ◆ There is still no hard evidence that demonstrates whether compliance promotion or enforcement, or a combination of both, yield better results in environmental performance.

International collaboration, coupled with individual government efforts to build in ECE and other performance indicators for managing daily operations, is perhaps the most promising means for learning how to develop ECE indicators that will inform government of their programme efficiencies, effectiveness and overall contribution to sustainable development.

### **3.3 Considerations for developing ECE indicators**

There are several aspects that the practitioner should consider when developing ECE indicators.

1. *Criteria for Developing Meaningful Indicators.* Many things can be measured but not all things measured are of equal value. The OECD (see Box 1), the European Union, the USEPA and others have conducted extensive research on criteria for developing ECE indicators. They have found that there is not a perfect, all encompassing indicator or set of indicators. In general, ECE indicators are more meaningful if they are useful, believable, and reliable. Exhibit 5 presents a list of criteria that should be considered for developing ECE indicators.

### Exhibit 5: Criteria for Meaningful ECE Indicators

a) *Usefulness*

- Policy relevant: usefulness in priority setting, resource allocation and accountability
- Program relevant: to goals, objectives, and priorities
- Functional: encourages constructive behavior
- Timely: measure can be gathered in time to remain relevant
- Comprehensive: covers important operational aspects
- Informative: provides information that various users want and need

b) *Believability*

- Transparent: promotes understanding of program
- Credible: based on data that is complete and accurate
- Simple: easy to measure and interpret

c) *Reliability*

- Technologically sophisticated: incorporating the latest information technology
- Feasible: value to program outweighs cost
- Measurable: the process of collecting analyzing and publishing the data should be feasible and cost-effective.
- Robust: measure produces similar indications in similar circumstances

Two other criteria are considered important for international comparative purposes:

- Compatible: enabling data to be linked with other existing information; and
- Comparable: allowing for international comparisons

2. *Engage the Stakeholder Community* – Stakeholder involvement is key to the success of performance measurement. Recognizing this, the USEPA has conducted extensive outreach to regulatory partners (state and local agencies), environmental organizations, and the public with a view to identifying what matters when developing performance indicators. Outreach and consideration of stakeholder input is critical because it helps to ensure that measures will be accepted as legitimate indicators of program performance, and will have a better chance of meeting the needs of all interested parties. In addition, stakeholder participation aids in identifying of the various expected uses for the measures (e.g., USEPA uses them to evaluate and improve performance, the public uses them to hold USEPA and state partners accountable, legislative bodies use them to inform the budget process).

3. *Involve Internal Stakeholders* - Internal stakeholders are important sources of expertise and can be instrumental in the selection and development of relevant and feasible performance measures. Internal stakeholders may also know of information sources that could be used for developing ECE indicators.

4. *Look Beyond Existing Data* - A potential pitfall is the development of measures around the data that is currently available. The process of choosing and developing performance measures should not be limited by existing data. If performance measures have not been used in the past, existing data will likely be limited to activities or outputs. Conversely, once appropriate indicators have been determined, some of the data needed to develop the indicators may already exist in various forms.

5. *Use Outside Experts* - When sufficient internal expertise does not exist, agencies should not hesitate to bring in outside experts to fill in knowledge gaps when developing performance measures. This can be particularly helpful when developing complex measures, such as statistically valid compliance rates.

### 3.4 Considerations for implementing ECE indicators

Having selected appropriate ECE indicators, several factors must be considered in order to put these indicators in place. They include:

1. *Use Internal Teams to Determine How to Implement* – In developing its indicators, the USEPA used internal teams that involved experts from policy, programs and enforcement. The teams worked on developing plans to implement measures, including the development of new information collection and reporting processes.

2. *Pilot Projects & Phased Implementation* - Pilot projects can be useful for testing new measures and resolving implementation issues. The feedback from their implementation can be used to adjust the design and application at the nation-wide level. Phased implementation of a large set of new measures may also be helpful because it provides more time to test and evaluate new measures, and gives managers more time to become familiar with and begin using new measures.
3. *Implementation is an Ongoing Activity* - It is natural to assume that implementation is a one-time activity; however, implementation of a new measure requires ongoing management attention to ensure that data is collected, the measures are produced in a timely manner, and that they provide the understanding of program performance anticipated.
4. *Develop a Plan That Describes How the New Measures Will Be Used* - It is important that a plan is developed that describes the uses for the new measures (e.g., reporting, program evaluation, budgeting), who will use them, and on what schedule. A new measurement program will fail if it cannot be shown that it is being used and adds value.
5. *Success of Measures Requires Management Discipline* - Success requires management to use the new measures in a structured, consistent way to monitor key outputs and outcomes, identify and address performance issues, and facilitate in-depth analysis of specific program components.
6. *Timely and Accurate Data Are Essential to Success* - it has been USEPA's experience that constant pressure must be put on both internal and external parties who are responsible for reporting data to ensure that the data is timely and accurate. This is particularly true when a measure results in the collection of a new stream of data.
7. *Data Quality* - Real and perceived data quality problems present a roadblock to the use of measures that rely on the data. Regulated entities are particularly concerned, since the data reflects directly on their compliance. Other regulators for which the data indicates the performance of their compliance programs are also often concerned. Steps need to be taken to ensure the quality of the data (e.g., random data audits) and to address data quality concerns of stakeholders.

### **Exhibit 6: Current Efforts to Get it Right: New Initiatives in Canada**

In recent years, Environment Canada has begun a number of initiatives to implement ECE indicators. In 2002 it initiated two pilot projects to measure outputs, outcomes and environmental indicators associated with compliance promotion and enforcement activities for two sectors: agriculture and mining. Environment Canada identified over 40 performance indicators for application in the two pilot field studies. This initiative includes indicators of outputs, intermediary outcomes and final outcomes. The department recognized that success might not be achieved for all of the proposed measures. However, the department decided that it was time to test as many as it could; to move into the "real world" and apply some of the lessons learned from other jurisdictions.

Environment Canada designed the two pilot projects to continue for a 3-year period. In the first year (2002), the department took baseline measurements for numerous outputs, outcomes and environmental indicators. This was followed by a full year of compliance promotion, during which compliance promotion staff and enforcement officers visited the regulated community. Environment Canada staff provided advice regarding techniques to improve environmental practices as well as the legal requirements associated with each industrial sector. In cases where staff found violations, they responded to the violations through compliance promotion activities rather than enforcement actions.

In 2003, Environment Canada staff revisited all sites and measured the same output, outcome, and environmental indicators. This time, the staff addressed violations found through enforcement tools. All sites will be revisited in 2004 and the output, outcome, and environmental indicators will again be re-measured.

The intent of the study is to gather sufficient data to determine which performance measures are effective for each sector studied. The department also hopes that the ECE indicators being measured will provide an indication of the relative success of compliance promotion and enforcement efforts in achieving the desired results.

On a broader level, in March 2002 Environment Canada began an initiative to bring together all of the data sources in the department that lists companies or facilities that might be subject to regulations or other risk management tools. This Compliance Analysis and Planning (CAP) data warehouse incorporates facility-descriptive information, updated through live links or with extracts generated automatically or manually. This facility descriptive information is being merged with a risk factor model that tracks numerous health, environmental, and compliance-related risks for each facility. At the time of this writing, CAP is in Phase 1 of a three Phase project scheduled for inclusion of all Environment Canada compliance-related databases by fall 2004.

CAP is intended to assist the department to improve its priority setting, planning, and reporting capabilities and will be available to program managers in a comprehensive GIS format. In a parallel effort, in March 2003 Environment Canada also organized a Performance Measures Workshop for Environment Canada staff. Canadian government, USEPA, and INECE representatives provided detailed experiences in performance indicator efforts being pursued in various environmental protection organizations.

A major outcome of the workshop has been the development of four pilot projects on measuring performance. Two pilot projects involve the compliance indicators of regulations while the other two relate to developing performance indicators for a pollution prevention plan and code of practice.

The development of the pilot projects was a multi-party effort involving several organizations within headquarters and the regions. The process has been successful to date with performance measures having been identified and considered for their usefulness as indicators. Once the logic model was developed and stakeholders had identified what performance indicators would be appropriate, participants often found that much of the data was already being collected from different sources and for different purposes. The results of these pilot projects will be presented at a second performance indicators workshop scheduled for February 2004 in Ottawa.

### **3.5 Developing common indicators for international comparisons**

ECE indicators can be developed for assessing progress in implementing national programs. There are many advantages, however, in developing indicators that can be used for international comparisons of individual country efforts in meeting national and international objectives. The OECD, when initiating its programmes on environmental indicators, recognised that there is no universal set of indicators; rather, several sets exist, corresponding to specific purposes and uses. Within this framework, Core Environmental indicators (CEI) have been designed to help track environmental progress and the factors involved in it, and analyse environmental policies. The OECD countries commonly agreed upon the use of the OECD Core Set, which is published regularly. The Core Set contains of some 50 indicators and covers issues that reflect the main environmental concerns in OECD countries. It incorporates core indicators derived from sectoral sets and from environmental accounting. Indicators are classified following the PSR model: indicators of environmental pressures, both direct and indirect; indicators of environmental

conditions; indicators of society's responses. This approach has also been embraced by other international framework programmes, including the United Nations Headquarters and United Nations regional offices; United Nations Environment Programme; the World Bank, and the European Union.

The co-operation within OECD countries focused on identifying commonalities and comparable elements. OECD countries have used the indicators within the framework of OECD "peer reviews," in which a group of like-minded countries work together on improving their individual and collective performances in environmental management. These reviews assist individual governments to assess progress, promote continuous policy dialogue among the countries and stimulate greater accountability of their governments towards public opinion within their OECD region and beyond.

The list of issues covered by the OECD Core Set of Indicators was not considered as final and exhaustive. The measured characteristics have been undergoing changes as scientific knowledge and policy concerns evolved. Furthermore, since the issues have been of varying relevance for different countries and different contexts, a certain balance had to be kept between the need for flexibility and the need for longer term monitoring and analysis. In this context, each country supplements the core set with additional indicators of its own particular interest. Over time the list will be expanded with indicators of progress of both social and environmental factors. Common international work on ECE indicators is expected to contribute to this process.

#### **4. Part III: International Cooperation to Develop Environmental Compliance and Enforcement Indicators**

In November 2001, the INECE Executive Planning Committee (EPC) adopted the Secretariat's proposal to launch a project to develop indicators for environmental compliance and enforcement. The proposal recognized that measurement of environmental enforcement programs is critical to achieving sustainable development goals. The first major steps forward for the project were to develop a background paper and an interactive, Web-based "Indicators Forum," which provides access to key INECE documents, links to other indicators projects, and a news section. The concept of enforcement indicators was a focal issue of a series of workshops ("Measuring Success Through Performance") at the 6th INECE Conference in San Jose, Costa Rica and was further emphasized in a special edition of the INECE Newsletter that was distributed at the World Summit on Sustainable Development in Johannesburg, South Africa, August 2002.

##### **Exhibit 7: Discussion on Indicators at the 6th INECE Conference in San Jose, Costa Rica**

Two workshops at the 6th INECE Conference in San Jose, Costa Rica focused on "*Measuring Success Through Performance: Defining Environmental Enforcement Indicators*." Based on extensive and insightful discussions, the workshop participants, representing a diverse range of geographic and socio-economic perspectives, concluded that the INECE Enforcement Indicator Project is important and should move forward and that:

- Particular attention must be paid to challenges of developing indicators.
- Identification of the driving pressures and real needs that the indicators are working to address is necessary.
- Consultation must occur early in the development stage and include regional and national input.
- Indicators should be accessible to a variety of users while focusing on core environmental issues.
- There is a need to look for practical outcomes of indicators development and use.
- There is a need to link the indicators project with auditing bodies.
- There is a need to ensure that the indicators project is sustainable and that funding is strongly considered in the development.

The Co-Chair's Final Conference Statement calls upon INECE to develop uniform minimum criteria and pilot test INECE Environmental Compliance and Enforcement Indicators, in cooperation with regional networks, with a view to improving performance, public policy decisions, and environmental governance globally, as well as the quality of the environment.

In October 2002, the EPC formally agreed to implement the INECE Compliance and Enforcement Indicators Project, and an Expert Working Group was established to guide the development process. The INECE indicators project has gained significant support from regional networks and from environmental compliance experts. Representatives from the USEPA, OECD, Environment Canada, Czech Environmental Inspectorate, the World Bank Institute, and United Kingdom Environment Agency participated in an Indicators Roundtable Discussion at the May 2003 EPC Meeting, which resulted in plans to establish leadership for regional enforcement indicators pilot programs. Supporting documents for the enforcement indicators project can be found on the INECE Web site at <http://inece.org/forumsindicators.html>.

In November 2003, INECE and OECD are co-hosting the first expert workshop to discuss experience with developing and implementing environmental compliance and enforcement indicators and further steps in widening their application and use. The Workshop will bring together senior experts working on compliance and enforcement issues who are also involved in performance measurement from OECD, developing and transition economies. In addition, experts involved in the development of environmental indicators will share their methodological approaches to indicators development as well as some key opportunities and problems they have encountered in their efforts.

In preparation for this workshop, participants are asked to consider the following questions:

1. What compliance and enforcement indicators are presently being used in measuring your compliance and enforcement program?
2. Are there any on-going programmes that aim to develop more sophisticated performance indicators? What are the key elements of such programmes? What data and information systems do you have available for developing ECE indications?
3. How are performance indicators being used for management decision-making in your country?
4. What stakeholders in your organization are most interested developing ECE indicators?
5. What are the main challenges to overcome to begin implementing ECE indicator pilot projects in your country? What pilot projects would you like to develop with international partners?

All participants are encouraged to identify their country's specific needs and programme priorities for developing ECE indicators. Several countries will be presenting papers focussed around a number of themes related to developing and implementing ECE initiatives. The greater the familiarity of participants with their country's objectives and constraints in this field, the more progress can be made over the two-day workshop.

One of the Workshop's objectives is to foster the development of ECE pilot projects. This can be done at the country level and through international partnering. Subsequent to the Workshop, participants will be encouraged to develop their own pilot projects and other initiatives and to partner with other countries to develop practical means of implementing ECE indicators. The INECE Secretariat and EPC will seek to encourage, monitor and support these initiatives throughout their development and implementation. The results of the pilot projects will be reviewed at subsequent expert workshops.

## **5. Conclusion**

INECE and OECD actively supported the development and implementation of environmental compliance and enforcement indicators. In recent decades, governments in many countries have been interested in developing meaningful ECE indicators and some, notably the US, have made great strides in this direction. Nonetheless, truly meaningful indicators that link compliance and enforcement activities and outputs with overall environmental and societal improvements have yet to be developed. This paper provides a roadmap for beginning this process. It presents a framework to develop a logic model and meaningful performance indicators at all stages of the logic model, from inputs to final outcomes. It also articulates several other issues that should be considered when developing and implementing performance indicators within an existing system. Finally, it suggests next steps both in preparation for and subsequent to the INECE-OECD Environmental Compliance and Enforcement Indicators Workshop in November 2003.