Toward a Canadian Agenda for Ecological Fiscal Reform:

First Steps

National Round Table on the Environment and the Economy

Table ronde nationale sur l'environnement et l'économie

National Library of Canada Cataloguing in Publication Data

Main entry under title: Toward a Canadian agenda for ecological fiscal reform : first steps

Issued also in French under title: Vers un programme canadien d'écologisation de la fiscalité.

Includes bibliographical references.

ISBN 1-894737-04-0

1. Environmental impact charges—Canada. 2. Environmental impact charges—Canada—Case studies. 3. Fiscal policy—Canada. 4. Sustainable development—Governmental policy—Canada. I. Stratos Inc. II. National Round Table on the Environment and the Economy (Canada)

HJ5375.Z73T68 2002 336.1'6 C2002-901263-5

This book is printed on Environmental Choice paper containing 20 percent post-consumer fibre, using vegetable inks.

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Mandate

The National Round Table on the Environment and the Economy (NRTEE) was created to "play the role of catalyst in identifying, explaining and promoting, in all sectors of Canadian society and in all regions of Canada, principles and practices of sustainable development." Specifically, the agency identifies issues that have both environmental and economic implications, explores these implications, and attempts to identify actions that will balance economic prosperity with environmental preservation.

At the heart of the NRTEE's work is a commitment to improve the quality of economic and environmental policy development by providing decision makers with the information they need to make reasoned choices on a sustainable future for Canada. The agency seeks to carry out its mandate by:

- advising decision makers and opinion leaders on the best way to integrate environmental and economic considerations into decision making;
- actively seeking input from stakeholders with a vested interest in any particular issue and providing a neutral meeting ground where they can work to resolve issues and overcome barriers to sustainable development;
- analysing environmental and economic facts to identify changes that will enhance sustainability in Canada; and
- using the products of research, analysis and national consultation to come to a conclusion on the state of the debate on the environment and the economy.

The NRTEE's state of the debate reports synthesize the results of stakeholder consultations on potential opportunities for sustainable development. They summarize the extent of consensus and reasons for disagreement, review the consequences of action or inaction, and recommend steps specific stakeholders can take to promote sustainability.

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Executive Summary

The decade since the 1992 Rio Summit on Environment and Development has established environmental protection as a mainstream issue and core value for Canadians—for the public, for businesses, and for governments at all levels. Less progress has been made, however, in developing public policy to drive the shift toward more sustainable forms of development. In the past, society has relied mainly on three approaches to solving environmental problems:

- command-and-control approaches to define minimum standards;
- government spending on research and on public infrastructure and services, such as transit, waste management, and water and wastewater treatment; and
- public/peer pressure to enlist responsible environmental behaviour on a voluntary basis.

These approaches have dealt with many of the most tractable environmental problems. The ones that remain are more complex, characterized by, among other things, diffuse sources of pollution, materials and processes that are integral to current systems of industrial production, activities driven by a consumer culture, and interconnected problems entailing difficult trade-offs. There is a new awareness that the policy tools of the past are inadequate to addressing these more complex problems. Command-and-control measures are too rigid, government capacity is too thin, and there is a desire for efficient and effective policies that will stimulate innovation. A new mix of policy instruments is needed.

Ecological fiscal reform (EFR) as a new policy instrument is uniquely appropriate for addressing sustainable development. It is a strategy that redirects a government's taxation and expenditure programs to create an integrated set of incentives to support the shift to sustainable development. The EFR initiatives and formal policies of other countries are often pointed to as models of innovative environmental action, as well as of progress in harmonizing environmental and economic goals. But to what extent has EFR delivered on its theoretical promise of being an environmentally effective, flexible, and cost-effective policy tool? Does the EFR approach apply in Canada? Does it transfer to our nation's economy, jurisdictional frameworks, stakeholder dynamics, and fiscal and environmental policy context? Does it have potential and, if so, with what modifications and in what manner? Is there the public and political will for EFR?

The National Round Table on the Environment and the Economy (NRTEE)'s EFR Program was established to gain insight into the key challenges and opportunities related to EFR, and to explore the potential for EFR in Canada. Phase 1 of the program has reviewed international experience with EFR and initiated three case studies on the potential application of EFR in the Canadian context. This approach is intended to expand the base of knowledge and understanding regarding how an EFR strategy can be useful. It also moves beyond theoretical discussions to assess the practical policy aspects of EFR application, such as instrument design, integration with other policy tools to create a suite of measures, analytical needs, and options for measures design.

Three case studies were undertaken, with the topics chosen to illustrate and explore specific chal-

lenges for the application of EFR. These case studies are listed below:

- ***Agricultural Landscapes***, illustrating redirection of taxation and expenditure programs. The study objective was to determine the feasibility of redirecting governmental (federal, provincial and municipal) taxation and expenditure programs affecting farmers across Canada to meet conservation needs and reduce pollution from farmlands. Three types of programs were researched: environmental farm plans, municipal tax credits for on-farm conservation areas, and conservation cover programs.
- ***Cleaner Transportation***, illustrating how to complement regulations. The objective studied was to facilitate the adoption of cleaner fuels and engines to promote the transition to cleaner transportation in the diesel-based freight and mass transit sectors.
- ***Substances of Concern***, illustrating how to support voluntary programs. The direction of this case study is still in the development stage. It aims to assess the potential for using suites of fiscal instruments to achieve more efficiently an appropriate level of environmental management of chemicals through a global approach.

Lessons learned during these case studies were used to construct a framework for EFR, including guiding principles that can apply to a broader range of sustainable development issues. The research concluded that EFR is a worthy tool—one to be considered each time policy options to achieve a new environmental objective or goal are being assessed. EFR is particularly appealing when seeking to go beyond an environmental improvement objective to a sustainable development objective and achieve positive changes in eco-efficiency, trade competitiveness, innovation, and employment. EFR differs from the more traditional approach to economic instruments in that it is a strategy (it employs several complementary instruments) and works over a long time horizon. EFR options should be evaluated as part of a suite of measures to address an issue, including command-and-control and voluntary measures. The optimal mix of policy tools will be case specific; EFR may have a role to play, either on its own or in combination with other policy instruments.

The case studies led to broad conclusions on the key opportunities and challenges in using EFR in Canada. These lessons can be highlighted as follows:

There is a role for EFR in Canada, and EFR is uniquely appropriate to the challenge of implementing sustainable development.

- EFR can offer many benefits over traditional policy instruments, as well as open new opportunities.
- EFR is a new approach, so using it successfully will require leadership, openness, new actors, and new knowledge.
- EFR will require broad integration between disciplines and across government departments, industry, and diverse stakeholders.
- Clear policy objectives should come first, but EFR options are best considered at an early stage in the definition of management options.
- EFR options should be evaluated using the same process as is used for other policy tools.
- Canada's unique challenges need to be incorporated into the design of EFR from the outset.
- Funding and revenue aspects must be considered and communicated.
- Good data are needed to provide the basis for analysis, modelling, monitoring, evaluation, assessment, and continuous improvement.
- Good EFR design depends on a number of critical components.

In considering future directions, the NRTEE program has concluded that a multi-pronged approach will be needed to realize the full potential of EFR in Canada. A three- to five-year strategy is required to develop awareness of, comfort with, and increased understanding of the EFR approach among government, industry, environmental non-governmental organizations, technical experts, and broader civil society.

A strong leadership signal from senior policy makers will be necessary to assure stakeholders and government policy advisors that EFR is of emerging interest to the government, and that energies invested in exploring innovative, measured, thoughtful approaches to EFR will have a likelihood of implementation. This leadership signal could be provided through a formal mandate, framework, and budget similar to that used for the launch of the Environment and Sustainable Development Indicators initiative in 2000.

There is a need to expand the cadre of people who have experience with EFR approaches and analysis at the applied level. The NRTEE's EFR Program has begun this important process, building awareness, knowledge, and trust among key actors and decision makers. It can continue this work through advancing the recommendations of the case studies completed so far, where appropriate; facilitating further case studies; and providing opportunities for those working on EFR to share their work and have it peer-reviewed. Specifically, the NRTEE should:

- present case study conclusions on agricultural landscapes to the senior policy level in Agriculture and Agri-Food Canada, Environment Canada and Finance Canada;
- develop the case study on substances of concern under the Canadian Environmental Protection Act;
- explore the potential to further experiment in areas connected to the cleaner transportation focus;
- raise awareness of the use of EFR concepts in two major NRTEE programs: Urban Sustainability and Conservation of Natural Heritage;
- explore collaboration between the EFR program and the Environment and Sustainable Development Indicators initiative;
- engage broader stakeholder support and commitment, and build capacity for EFR through an annual forum on EFR.

1 Introduction

The National Round Table on the Environment and the Economy (NRTEE)'s Ecological Fiscal Reform (EFR) Program has arisen from many years of work on individual budget measures. With the release of the report of the Task Force on Economic Instruments and Disincentives to Sound Environmental Practices in 1994, the NRTEE formed an Economic Instruments Committee, which has since made annual budget submissions on sustainable development.

Many of these proposals have been successful: energy efficiency, renewable energy, donations of ecologically sensitive lands, and sustainable development indicators, to name a few.

In 2000, the NRTEE divided its economic instruments work into two streams. One stream, now titled "Greening the Budget," focuses on discrete budget initiatives that derive from recommendations of other NRTEE programs, such as those on non-renewable resource development in the North, brownfield sites, and environmental health. The second stream is exploring the potential of a broader and more integrated approach, ecological fiscal reform. This program's more complex and ambitious agenda is being investigated over a two- to three-year period, and outside the urgency of the annual federal budget development cycle.

The EFR initiatives and formal policies of other countries are often pointed to as models of innovative environmental action, as well as of progress in harmonizing environmental and economic goals. But to what extent has EFR delivered on its theoretical promise of being an environmentally effective, flexible, and cost-effective policy tool? Does the EFR approach apply in Canada? Does it transfer to our nation's economy, jurisdictional frameworks, stakeholder dynamics, and fiscal and environmental

policy context? Does it have potential and, if so, with what modifications and in what manner? Is there the public and political will for EFR?

The goal of the NRTEE's EFR program is to gain insight into the key challenges and opportunities related to EFR and to explore the potential for EFR in Canada. The program has included a review of international experience with EFR and three case studies: on agricultural landscapes, cleaner diesel transportation, and substances of concern. This approach is intended to:

- explore EFR's application specifically in the Canadian context;
- expand the base of knowledge and understanding regarding how an EFR strategy can be useful;
- move beyond theoretical discussions and assess the practical policy aspects of EFR application, such as instrument design, integration with other policy tools to create a suite of measures, analytical needs, and options for measures design;
- identify lessons (arising from the case studies) that can be used in constructing a framework for EFR, including guiding principles that can apply to a broader range of sustainable development issues; and
- identify specific recommendations (arising from the case studies) for governments to consider for their 2002 budgets. (This last item was a welcome, but not essential, secondary objective.)

This report summarizes the lessons and recommendations of Phase 1 of the NRTEE's Ecological Fiscal Reform Program, from June 2000 to October 2001.

2 Background

2.1 Rethinking the toolbox needed for sustainable development

The decade since the 1992 Rio Summit on Environment and Development has established environmental protection as a mainstream issue and core value for Canadians—for the public, for businesses, and for governments at all levels. Less progress has been made, however, in developing public policy to drive the shift toward more sustainable forms of development.

While environmental successes can be celebrated on many fronts—such as the phase-out of ozone-depleting chemicals, the expansion of protected areas, the growth in renewable energy, and the widespread adoption of environmental management systems—these successes are matched by continuing environmental failures. Every summer, air pollution leads to thousands of early deaths and many more illnesses. Chemical-by-chemical approaches to pollution control are unable to catch up with new scientific findings on increasingly subtle human health impacts, such as endocrine disrupters. Ecologically valuable habitat is fragmented and lost, and the species-at-risk list continues to grow. Entire fisheries have been lost. Greenhouse gas emissions are rising, and the global warming trend is already affecting Arctic ecosystems and communities. And the modest gains that have been made—for example, in energy efficiency—are too often outstripped by the pace of economic expansion.

These failures point to a larger breakdown of public policy. Simply put, sustainable development continues to be an uphill struggle because of dissonance between the goal and the context within which we make everyday decisions. The dissonance is expressed every day—in, for example, an individual's decision to buy a sport utility vehicle instead of a

hybrid electric one, in a utility's decision to use coal to fuel new power supply, or in a government's decision to allow incremental urbanization of high-value agricultural lands. Clearly, if choices that favour sustainable development are to be the logical ones, new approaches are necessary.

In the past, society has relied mainly on three approaches to solving environmental problems:

- command-and-control approaches to define minimum standards;
- government spending on research and on public infrastructure and services, such as transit, waste management, and water and wastewater treatment; and
- public/peer pressure to enlist responsible environmental behaviour on a voluntary basis.

These approaches have dealt with many of the most tractable environmental problems. The ones that remain are more complex, characterized by, among other things, diffuse sources of pollution, materials and processes that are integral to current systems of industrial production, activities driven by a consumer culture, and interconnected problems entailing difficult trade-offs. In agriculture, behaviour that maximizes private net benefits may conflict with behaviour that maximizes net social (public) benefits. There is a new awareness that the policy tools of the past are inadequate to address these more complex problems. Command-and-control measures are too rigid, government capacity is too thin, and there is a desire for efficient and effective policies that will stimulate innovation. A new mix of policy instruments is needed. As the Organization for Economic Co-operation and Development (OECD) concluded in Environmental Outlook, its recently released agenda for addressing environmental challenges over the next 20 years:

It is often difficult to design a single policy instrument that will successfully provide the right incentives for a total reduction in resource use or in pollution and waste generation. Instead, it will generally be necessary to employ a mix of policy instruments. The policy mix suggested here involves the combination of a robust regulatory framework with a variety of other instruments, such as stronger pricing mechanisms to influence the behaviour of consumers and producers, voluntary agreements, tradable permits, eco-labels and information-based incentives, land use regulation and infrastructure provision. In particular, the Outlook recommends the removal of environmentally harmful subsidies and a more systematic use of environmental taxes, charges and other economic instruments to get the prices right.[1]

Canada's Minister of the Environment has accepted this need to widen the range of tools used to manage environmentally sustainable development:

…perhaps the most important element (of the new environmental architecture) is an expanded and more sophisticated use of market-based and incentive mechanisms to promote sustainable development. It is time to get serious about aligning economic signals and financial rewards with environmental goals. For starters, governments have to end regulations and subsidies that harm the environment…. Next, we can link taxation to environmental performance. Many other countries are doing this now. New green taxes could be designed to be revenue neutral, complemented by cuts in other kinds of taxation, and would not target on particular regions or industries unfairly. But we can and must get on with the business of redesigning our tax base to reflect environmental costs early.[2]

This alignment of economic signals and financial rewards with environmental goals has come to be known in Canada as ecological fiscal reform, or EFR.

The elevated interest in EFR comes at a time when Canada's overall fiscal system is also being reformed. The political and policy climate is overwhelmingly in favour of tax reductions, and tax levels and social security contributions are being reduced in most Canadian jurisdictions. This is forcing every government to examine the cost-effectiveness and administrative efficiencies of its policies and programs. At the same time, the federal government has shown a readiness to use the tax sys-

1 Organization for Economic Co-operation and Development, "OECD Environmental Outlook," (Paris: 2001), p.24

2 David Anderson, Minister of the Environment, "The Environmental Challenge in the 21st Century," Address to Globe 2000 Opening Plenary," Vancouver, March 2000.

tem as a primary tool to support certain policy objectives, particularly those in the social policy arena, such as poverty alleviation and lifelong learning. The theory suggests that EFR, if properly designed, can help every taxpayer emerge a winner.

2.2 What is ecological fiscal reform?

The NRTEE has defined ecological fiscal reform as:

A strategy that redirects a government's taxation and expenditure programs to create an integrated set of incentives to support the shift to sustainable development.

The NRTEE has chosen to examine ecological fiscal reform, rather than the ecological tax reform (ETR) or tax-shifting approach that is being implemented in many European countries.[3] EFR is a broader approach, using suites of instruments in a reinforcing package, and engaging multiple fiscal policy tools in addition to taxes and tax breaks. EFR involves:

- redirection or introduction of new taxes or tax breaks;
- redirection or introduction of targeted direct expenditures, such as targeted government program expenditures, government procurement, cash subsidies, and grants; and
- other economic instruments, such as tradable permits, permitting charges, and user fees.

By drawing on this broader array of tools, EFR offers greater opportunities to design "win-win" policy packages. The common purpose of these tools is to provide incentives for producers and consumers to alter their decisions and behaviour—either to internalize environmental costs or to reward more sustainable practices.

Taxation and expenditures have been used in Canada in the past to support environmentally sustainable development measures. Examples of this approach include Green Plan funding, the use of differentiated excise taxes on leaded and unleaded gasoline, tax incentives for donations of ecologically sensitive lands, and the Sustainable Development Technology Fund. EFR is differentiated from these discrete measures in a number of ways:

- EFR is a deliberate part of the mix of policy tools used to address environmentally sustainable development issues, reinforcing and complementing regulatory and voluntary/informational tools.
- Unlike past budget measures, which have often been isolated initiatives, EFR entails a deliberate strategy to use taxation, expenditure, and other economic instruments in a package or suite of measures to provide a comprehensive set of reinforcing incentives for taking environmental action.
- EFR includes not only the introduction of new fiscal measures, but also an examination of the influence of the present fiscal framework on sustainable development policy objectives. This requires a coherent, systemic approach to fiscal policy design, and the injection of sustainable development concerns into mainstream fiscal policy.
- At the same time, by employing fiscal rather than regulatory or voluntary tools, EFR inserts a greater consideration of economic and social issues into environmental policy making. In effect, it requires a shift of thinking from environmental protection to sustainable development and greater policy integration.
- EFR often—but not necessarily—involves a "recycling" of revenues. The intention is that EFR constitute not a source of new and incremental revenue for governments but, rather, a shifting of the sources of revenue. Where new taxes or charges are introduced, the revenue is used in one of two ways: to reduce the overall tax burden on the economy through reductions in other taxes (e.g., on labour, income, or investment) or to provide tax incentives or fund programs to induce behavioural changes that support the same objective as the tax or charge.

In tackling EFR, the NRTEE is responding to an identified need for new approaches and more inte-

3 Ecological tax reform is the shifting of taxes onto pollution or energy sources, accompanied by a corresponding reduction of distortionary taxes on labour or capital.

grated policies for sustainable development. This need was established in April 2000, when 26 deputy ministers and assistant deputy ministers met with 40 leaders and executives from a broad spectrum of private and not-for-profit sectors at the NRTEE's Leaders' Forum on Sustainable Development. A principal conclusion of this meeting was that the lack of integration between sectors and government departments is a primary constraint on the implementation of sustainable development in Canada. The group proposed that more integrated decision making could be realized through the development and use of new tools that incorporate the consideration of longer-term implications into decision making. In particular, participants pointed to policy gaps specifically around instruments to internalize environmental costs and around incentives to encourage sustainable development. They also supported the pursuit of eco-efficiency gains, an integral outcome of many EFR measures.[4]

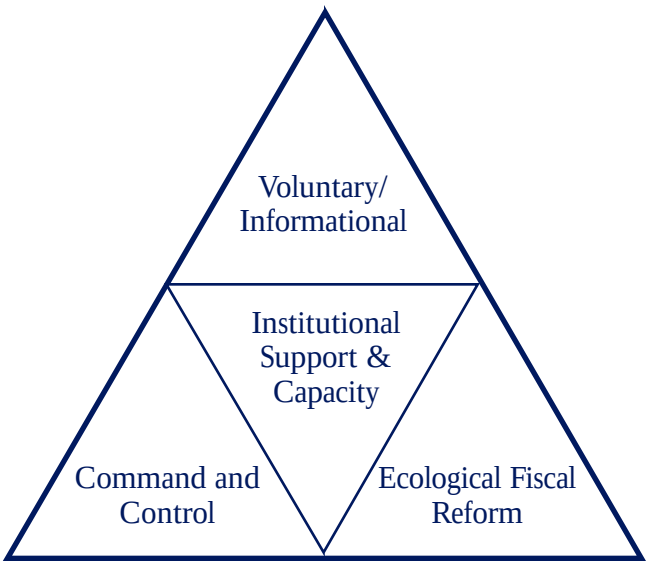
EFR is meant to be used within a policy package that also includes regulatory, informational, and voluntary tools. The optimal policy mix will be specific to the issue being addressed. The criteria for determining the mix include effectiveness, efficiency, distributional effects, flexibility, and political buy-in. In some cases, command-and-control approaches cannot tackle an environmental issue, and EFR offers a cost-effective and flexible alternative. In these instances, EFR is used on a stand-alone basis. Examples include a "cap and trade" on greenhouse gas emissions, government green power procurement combined with tax incentives for renewable energy development, and the redirection of subsidies for agriculture. In these cases, EFR works best when accompanied by voluntary initiatives and information programs that explain the rationale for it and provide information on sustainable behaviour to respond to the incentive. EFR itself also often requires legislation to provide the legal mandate for operation.

4 National Round Table on the Environment and the Economy, "Leaders' Forum on Sustainable Development: Discussion Document," Ottawa, April 4, 2000.

EFR, command-and-control, and voluntary programs can also be designed to reinforce one another, with EFR measures targeting niches missed by other policy tools. For example, EFR can be used to encourage participation in voluntary programs, as illustrated in the environmental farm plan details in Chapter 4. Or, it can be used as a support to regulatory initiatives, as in the early 1990s when a differentiated fuel excise tax was used to encourage a shift to unleaded gasoline use in advance of regulations.

EFR, regulatory, and voluntary tools all need to be supported by an institutional framework that ensures that government agencies, departments, and personnel are informed about sustainable development and empowered to take actions to support this objective. This institutional support and capacity can take the form of internal training, legislation requiring the consideration of environmental impacts in decision making, and accountability mechanisms such as the Commissioner of Environment and Sustainable Development (see Figure 1).

Figure 1: EFR Within the Policy Toolbox



2.3 Ecological fiscal reform: International experience

European countries have been much more active in the implementation of EFR than either Canada or the United States. "Green tax reform" now enjoys

significant momentum across Europe. The Nordic countries were first, with Finland, Norway, Sweden, Denmark, and the Netherlands all introducing green tax reforms in the 1988–1992 period. New taxes on pollution (mainly but not exclusively carbon, fuel, or energy taxes) were introduced, while distortionary taxes on income and social security contributions were reduced. A second wave of green tax reforms began after 1996, with Austria, the United Kingdom, Italy, Germany, France and Belgium launching major initiatives. The magnitude of total tax revenues collected through EFR generally remains modest, ranging in 1999 from 0.1% for Italy, 0.5% for the Netherlands, and 1.0% for Germany to 2.4% for Sweden. The leader is Denmark, which now collects over 6% of its total tax revenue from green taxes.[5]

The primary objective of ecological tax reform in Europe has been to protect the environment, but governments have also been interested in secondary objectives. These include reducing unemployment through lower labour taxation and improving the competitiveness of the economy through eco-efficiency improvements. Recent theoretical research has concluded that the employment dividend can be realized, but only if a number of restrictive conditions are met. To this point, few ex post evaluations of these tax shifts have been done.[6]

The introduction of ETR, like that of many public policy measures, has not been without controversy. In 2000, facing fierce opposition from hauliers and a hike in fuel prices, the U.K. government abandoned its proposed "road fuel duty escalator," which would have raised the fuel excise duty by 6% annually. Under pressure from increasing world oil prices since 1999, the Italian government has postponed ecological tax reforms. A major restructuring of environmentally related taxes and charges approved by the French parliament in 1999 was subsequently ruled unconstitutional.[7] And in a referendum in September 2000, the Swiss electorate rejected two proposals for green tax reforms.[8] The multi-functionality approach used to fund agriculture in Europe has led to challenges at the World Trade Organization. These experiences highlight the political challenges of EFR.

The United States has had an active history of using market-based approaches to environmental protection. However, rather than adopt the broad tax reform approach of the Europeans, the U.S. has used

International Experience

International Experience with EFR: Design and Implementation Issues

- ***Design Issues***
  - Jurisdiction
  - Harmonization with other policy initiatives
  - Acceptability to stakeholders
  - Distributional effects
  - Careful targeting
  - Environmental effectiveness
  - Incentive effects
  - Efficiency
  - Administrative simplicity
  - Budgetary considerations
- ***Implementation Issues***
  - Transition strategy
  - Pace of implementation
- ***Other Effects***
  - Employment
  - Innovation
  - Competitiveness

-- Barg, Brown, Guertin and Troutt, "Issues Relating to Ecological Fiscal Reform," International Institute for Sustainable Development, Winnipeg: May 2001.

5 Environment Policy Committee, "Environmentally Related Taxation in OECD Countries: Issues and Strategies," Paris: Environment Directorate, OECD, March 2001, p. 34.

6 A. Majocchi, "Greening Tax Mixes in OECD Countries: A Preliminary Assessment," Paris: Environment Directorate, OECD, 2000.

7 Note that the fall 2001 French budget nonetheless includes many EFR measures.

8 Environment Policy Committee, "Environmentally Related Taxation in OECD Countries: Issues and Strategies," Paris: Environment Directorate, OECD, March 2001, p. 34.

financial instruments to motivate polluters to reduce the health and environmental risks posed by their facilities, processes, or products. The U.S. uses pollution charges, fees, and taxes; deposit-refund systems; marketable permits; subsidies for pollution control, such as grants, low-interest loans, favourable tax treatment, and preferential procurement policies for products; liability legislation; and information disclosure and voluntary programs. A recent EPA report concluded that:

...there is little doubt that such incentives are providing a new and unique element to environmental management in the United States. In many cases, incentives are generating health and environmental benefits beyond what is possible with traditional regulations, and sometimes they can be applied in situations where regulations might not be possible at all…. Many economic incentives give an impetus to technological change and innovative pollution control because sources can generate profits by finding better, cheaper ways of reducing emissions…. In general, it is clear that economic incentives do provide the opportunity to achieve any given level of pollution control with substantial cost savings.[9]

Background Papers

More Reading on Ecological Fiscal Reform

These NRTEE background papers are available:

- Analysis of Ecological Fiscal Reform Activity in Canada
- Analysis of U.S. Ecological Fiscal Reform Activity
- Background Paper on Ecological Fiscal Reform Activities in Europe
- Issues Relating to Ecological Fiscal Reform

The European and American experiences demonstrate that EFR has real potential as an effective sustainable development policy tool. However, the experiences of other countries cannot be assumed to translate directly to Canada, and it is necessary to explore the practical application of EFR specifically within our context. Both the successful and less successful international experiences offer useful opportunities to learn whether and how to undertake EFR. What was the political experience of introducing and phasing in EFR? What implementation issues were identified? What design options have been used to address these implementation issues? To what extent has EFR delivered on its theoretical promise of being an environmentally effective, flexible, and cost-effective policy tool?

2.4 Ecological fiscal reform: The Canadian experience

Canada's limited use of economic instruments has generally followed the U.S. model of market-based approaches targeted to environmental protection, rather than the revenue-neutral, double-dividend tax-shifting approach dominant in Europe. The federal government has used a tradable allowance system to eliminate methyl bromide (an ozone-depleting substance) and has experimented with a project-based greenhouse gas emissions trading project (GERT) and Pilot Emission Reduction Trading Project (PERT). There have also been a number of environmentally inspired tax incentives, including differentiated excise taxes on leaded and unleaded gasoline, excise tax exemptions for alternative fuels such as ethanol, measures to level the playing field between conventional energy and renewable energy sources, and tax benefits for gifts of ecologically significant land. Environmentally focused program expenditures and subsidies have been more common, beginning with the $3 billion Green Plan in 1990, green procurement policies, grants and loans for research and development of various sustainable technologies, and a range of funds to support education and action programs. The Program Review exercise in the mid-1990s led to the removal of

9 National Centre for Environmental Economics, "The United States Experience with Economic Incentives for Protecting the Environment," EPA-240-R-01-001, Washington, DC: Office of Policy, Economics, and Innovation, U.S. EPA, January 2001.

many agricultural and energy mega-project subsidies with "perverse" environmental effects, although this exercise was driven by deficit reduction, rather than environmental, objectives.

Examples of EFR can also be found at the provincial and municipal levels in Canada, although only rarely are they explicitly presented under this title.[10] In 1999, the then government of British Columbia launched a Green Economy Initiative, including environmental tax shifting. A first pilot project aimed to help phase out the sawmill industry's remaining beehive burners and unmodified silo burners in advance of a regulatory phase-out scheduled for the end of 2004. Permit fees have been increased, and the revenue is recycled to companies through rebates for investments in value-added alternatives to burning wood residue or in research on such alternatives.[11] The Ontario government is launching an emissions credit trading system for smog precursors. Some municipalities provide tax breaks to help conservation objectives, for example, the City of Burlington's tax break for woodlot maintenance. Many provincial governments use economic instruments for product stewardship. Examples include deposit-refund schemes for beverage containers and advance disposal fees for tires and used oil. However, the revenue from some of these instruments, such as the Ontario tire tax, has not been recycled for environmental purposes, contributing to public scepticism and resistance to the use of economic instruments for environmental protection.

Notwithstanding the above examples, Canadian experience with EFR has been limited. A recent OECD Economic Survey of Canada evaluated Canadian policies for sustainable development and noted:

No-cost opportunities for curbing pollution are rare, and a strategy based on voluntary agreements alone cannot be expected to correct completely for the external costs of pollution. Hence there is a need to increase the use of economic instruments (for instance, charges on toxic emissions and waste, and disposal fees for products containing toxic substances) to reinforce the polluter-pays principle.[12]

This gap was the motivation for the NRTEE's EFR program, which examines the potential for EFR in Canada.

10 For a partial listing and description of these, see S. Barg, A. Boame, L. Brown, L. DeRiviere, E. Troutt, D. Wranik-Lohrenz, and M. Roy, "Analysis of Ecological Fiscal Reform Activity in Canada," International Institute for Sustainable Development, Preparatory paper for NRTEE Ecological Fiscal Program, June 26–27, 2000 Meeting, Ottawa.

11 K. Baker, B.C. Green Economy Secretariat, "Tax Shifting in B.C.," Presentation to the NRTEE Ecological Fiscal Reform Program Expert Advisory Group, February 12, 2001. Note the Green Economy Secretariat was disbanded in September 2001, and the status of further tax-shifting initiatives is not clear.

12 Organization for Economic Co-operation and Development, "Economic Survey of Canada," Paris, 2000, p. 7.

3 Why and When to Use EFR

Following is guidance for decision makers on how to choose issues suitable for EFR, how to analyse EFR measures, and how to implement EFR.

3.1 The bottom line

EFR is a tool worthy of consideration each time policy options to achieve a new environmental objective or goal are being assessed. EFR is particularly appealing when striving to go beyond an environmental improvement objective to achieve a sustainable development objective and to achieve positive changes in eco-efficiency, trade competitiveness, innovation, and employment.

EFR differs from the more traditional approach to economic instruments in that it is a strategy (entails use of several complementary instruments) and works over a long time horizon. EFR options should be evaluated as part of a suite of measures to address an issue, including command and control and voluntary measures. The optimal mix of policy tools will be case specific. EFR may have a role to play, either on its own or in combination with other policy instruments. Many of the criteria and principles for applying EFR are common to the application of any policy instrument, and EFR options should be assessed and developed using a process of equivalent rigour.

3.2 Establishing the context

The choice of which policy instrument, or combination of instruments, to use should only be considered once the fundamental contextual decisions have been made. That is, it must first be established what the environmental objective or goal is, and what role the policy instrument is to play.

3.2.1 What is the environmental objective or goal?

The first step in the use of any new policy instrument is the identification, through sound science, of an environmental threat that needs to be addressed. An environmental objective or goal would then be established, taking into consideration factors such as scientific certainty, effect thresholds, scale of impact, type of hazard, and social consensus. These factors will determine whether to establish:

- a directional objective (for instance, increasing the use of recycled materials or enhancing conservation cover on agricultural lands); or
- an absolute, target-based goal (for instance, limiting the concentration of PM 2.5 to 30 mg/m3, 24-hour averaging time, by 2010, based on the 98th percentile ambient measurement annually, averaged over three consecutive years, as in the Canada Wide Standard); or
- a dual approach that establishes a minimum target but encourages movement beyond the target over time.

3.2.2 What role is the policy instrument to play, and which instrument best suits this role?

Once the objective or goal is established, a decision is needed about the role(s) the policy instrument(s) are to play. Is it to support relative progress toward a directional objective? If so, voluntary instruments or some fiscal instruments may be most appropriate. Is it to achieve an absolute target? Then a command-and-control approach or a cap-and-trade fiscal instrument might be more appropriate. A dual approach might use command and control to achieve the minimum target, and fiscal or voluntary instruments to encourage performance beyond compliance.

More than one policy instrument for the desired role(s) may be identified. In this case, other constraints should enter the decision. For example, competitiveness and distributional effects are often concerns. If so, EFR instruments may be able to meet the environmental objective or goal with more flexibility and economic efficiency than a command-and-control instrument. Factors such as these will influence the final choice of instrument or suite of instruments.

Discussion Questions

How to select a policy instrument to meet the environmental objective or goal?

- What is the suite of instruments that could be used directly to meet any given target?
- What issues are raised by the choice of policy instrument? Does the choice of instruments address barriers toward making progress on the environmental targets chosen?
- Are there any mitigating instruments/actions that would overcome problems potentially arising from the choice of instrument?

3.3 To what types of issues can EFR be applied?

EFR can be applied to a range of environmental issues and can play a variety of roles within a suite of policy instruments. With creative design, EFR can be part of the policy response to almost any issue. However, EFR seems well suited to environmental issues where:

- flexibility of response from individual actors is acceptable, since each party will determine their own response to the market signal. This means that EFR, used on its own, is not suited to issues for which a minimum threshold performance is required from all actors;
- an end point is difficult to assess or define (as with eco-efficiency), but the direction of progress is known and highly desirable, and EFR can provide incentives for continuous improvement;

- a command-and-control structure is already in place, but there is a desire to support performance beyond compliance, in advance of compliance deadlines, or to support the transition stage of meeting compliance;
- a command-and-control approach is known to be ineffective or impractical,[13] and EFR or voluntary instruments are the only options;
- a voluntary instrument is in place, but there is a need to increase the incentive for participation;
- the intention is to support a transitional stage of performance and behaviour, and it is expected that once this transition has been achieved, a policy instrument will no longer be needed and could be dismantled; and/or
- fundamental, longer-term behavioural change is the objective, and this can be supported by using market signals to change the information on which behavioural decisions are made.

3.4 What EFR instruments can be used?

The list of potential EFR instruments is a long one. They are logically grouped into three general categories:

Market-based or economic instruments directly affect the price that a producer or consumer pays for a product or service, behaviour, or activity. Included in this group are:

- cost-internalizing and revenue-generating instruments—taxes, charges, user fees, and deposit-refund schemes;
- subsidies—cash subsidies, tax incentives and credits, and grants;
- subsidy removal or redirection;
- insurance programs and requirements;
- tax reductions—reduction or elimination of taxes such as capital gains tax and municipal property taxes;
- market creation—creation of a tradable good or service and a market in which it can be traded; and/or
- ecological branding or certification.

Direct program expenditures influence mitigation or prevention options, awareness, and markets. They include:

- research, development, and commercialization programs;
- transfer payments designed for specific environmental needs;
- green procurement; and/or
- information, education, and awareness programs.

Institutional support and capacity involve:

- data collection and analysis;
- tools for assessing and monitoring environmental impacts; and/or
- information, education, and awareness programs internal to government.

The choice among these instruments, or of a suite of instruments from this list, will be case specific. The options should be assessed using the same process and criteria as for any other policy instrument, including consideration of:

- technical feasibility;
- likely environmental effectiveness;
- availability of data for analysis;
- acceptability to stakeholders;
- jurisdiction;
- harmonization with other policy initiatives;
- distributional effects;
- competitiveness effects;
- efficiency and cost-effectiveness;

13 For example, a regulation requiring consumers to return pop cans would likely be unenforceable and, hence, ineffective. When the source of the environmental threat is so pervasive and cross-cutting that it is impossible to design a command-and-control approach, as in carbon dioxide emissions from fossil fuel combustion, regulation is ineffective. Regulation may also be impractical for political and social reasons, for example, if the economic burden of compliance must be borne by a lower income or politically powerful group such as the agricultural sector.

- administrative simplicity and political feasibility;
- comprehensiveness of coverage across sectors, for example, across for-profit as well as MUSH (municipal, university, schools, hospitals) sectors;
- precision of signal targeting;
- market setting (structure, size, industry lead time, actors); and
- fiscal impacts, including balance between revenue and expenditure components.

These criteria are similar to the ones used to assess traditional command-and-control or voluntary instruments. Fiscal impacts may receive slightly stronger consideration when EFR instruments are evaluated, since the nature of the instrument is such that revenue and expenditure components may be larger than for other policy tools.

If problems are identified through the evaluation process, it may be possible to mitigate them. Past experience with EFR instruments has demonstrated that many potential concerns (e.g., over competitiveness, distributional effects, or transitional impacts) can be mitigated through the specific design of the EFR instrument.

4 The Case Studies

Included here is a description of the broad, cross-cutting lessons learned through work at the Expert Advisory Group and working group case study levels, along with a summary of each case study. The three case studies, selected to illustrate specific application challenges, are listed below:

- ***Agricultural Landscapes***, illustrative of redirection of taxation and expenditure programs. The study objective was to determine the feasibility of redirecting governmental (federal, provincial and municipal) taxation and expenditure programs affecting farmers across Canada to meet conservation needs and reduce pollution from farmlands.
- ***Cleaner Transportation***, illustrative of complementing regulations. The objective studied was to facilitate the adoption of cleaner fuels and engines to promote the transition to cleaner transportation in the diesel-based freight and mass transit sectors.
- ***Substances of Concern***, illustrative of supporting voluntary programs. This case study aims to assess the potential for using suites of fiscal instruments to achieve more efficiently an appropriate level of environmental management of chemicals through a global approach.

In addition to these summaries, full reports from each working group and the economic analysis conducted by independent experts, are available.

4.1 Lessons from the case studies

At the start of this first phase of the NRTEE's EFR program, participants set out to gain insight into the key challenges and opportunities related to EFR, and to explore the potential for EFR in Canada. The les-

sons learned can be grouped into the following broad conclusions:

4.4.1 There is a role for EFR in Canada, and EFR is uniquely appropriate for the challenge of implementing sustainable development

There is a role for EFR in Canada. This role will vary according to the specific issue being addressed and the other tools also being applied to the issue. EFR is much broader than economic instruments and tax reform, and this very scope is what makes it new. The range of instruments available provides many options and opportunities to assemble suites of instruments that are mutually supportive, provide environmental benefit, and expand the opportunity for voluntary action or to complement regulatory approaches.

EFR can be a uniquely appropriate tool for addressing sustainable development. This policy field affects many agents in society in complex ways. EFR is an integrative tool, more easily adaptable to the complexity of sustainable development than are other policy tools. It also supports continuous improvement, which underlies the path toward sustainable development.

4.1.2 EFR can offer many benefits and opens up new opportunities

EFR offers certain benefits over command-and-control approaches. It is more amenable to a continuous improvement approach. The market signals being sent can be readily adapted—if monitoring identifies a need to alter the signal to reach the desired objective or if the objective itself changes with time. EFR also allows for more flexibility and more equity, because parties can determine their response. It need not be designed around the "lowest common denominator" as regulations must.

EFR also opens up new opportunities, because it can address niches unfilled by other policy tools. For instance, EFR can facilitate reaching targets that have been established under command and control. EFR can also expand the effectiveness of voluntary programs, by offering incentives for participation or by sending new "information" to decision-makers in the form of a price signal. Industry participants in the Expert Advisory Group felt that the emphasis on the use of suites of measures in EFR—whether complementary suites of regulatory, voluntary, and fiscal measures, or suites of fiscal measures alone—would enable businesses to better meet environmental responsibilities alongside fiscal ones.

4.1.3 EFR is a new approach; using it successfully will require leadership, openness, new actors, and new knowledge

While people have been discussing and applying economic instruments for many years, EFR is a new approach. Using it successfully will require openness to change, the involvement of new actors with new knowledge, and the building of new knowledge among existing actors. Implementation of EFR will require the involvement of, and championing by, senior individuals—from government and the private and non-government sectors—who have sufficient authority to take risks, break down barriers, and mandate the adoption of innovative approaches.

EFR challenges us to think "outside the box"—beyond the current regulatory backdrop, compliance mindset, and fiscal instruments that are familiar and comfortable. Any change is likely to be challenged and resisted by some parties. The introduction of EFR must, therefore, be undertaken as a conscious change-management process. To gain acceptance for EFR, time must be taken to build trust and expand the base of understanding. Forums such as the NRTEE, where people can discuss EFR within a "safe space" and identify shared interests and opportunities, will help to achieve this.

Understanding of the potential for EFR is new to Canada. There is a lack of detailed knowledge among decision makers, stakeholders, and the public about the range of EFR instruments and their operation. There are concerns about feasibility, government revenue implications, additional costs for producers/manufacturers, administrative burdens, and other associated factors. This means there will be a need for change among all actors at the policy

development table—a new mix of issue experts, traditional policy experts, and economists and economic instruments experts, who can join together to explore creative new solutions and approaches.

There will be difficulties in simply communicating between new groups of experts and in defining a common vocabulary. One example is the difficulty encountered when discussing the use of any new fiscal instruments in an era when "no new taxes" has become a widespread mantra. Communication and awareness raising are essential, and the timing is ripe for expanded understanding and implementation of EFR incentives.

4.1.4 EFR will require broad integration between disciplines and across government departments, industry, and diverse stakeholders

An expanded use of EFR will be transformative. It will present a challenge for everyone, because it requires the integration of science, economics, and policy design. This demands new forms of horizontal cooperation across government departments, within industry divisions, and among diverse stakeholders. It will also demand the evolution of new skill sets and job profiles among all stakeholders.

Government will face a special challenge. For tax-based EFR instruments, policy responsibility and tool control are split between line departments and the Department of Finance. Consequently, there is a need for cross-departmental cooperation, and confidence among all actors that this co-operation will be given. This is in contrast to traditional tools, such as regulation or voluntary programs, where authority typically resides within the line department. Line departments usually have authority over instruments, such as permit fees, fines, and expenditure programs, with fewer challenges to their use. Using them in an integrated EFR framework may require coordination between two or three levels of government and among departments within one government. Successful use of EFR depends on unprecedented levels of collaboration. This, in turn, highlights the vital importance of institutional support and capacity that inform and empower action on sustainable development across all departments.

4.1.5 Clear policy objectives should come first, but EFR options are best considered at an early stage in the definition of management options

EFR should not be the driver for establishing environmental objectives and targets—it must not be a "solution in search of a problem." The scientific need to act should be established, and clear policy objectives should be set prior to the consideration of any specific management option or suite of instruments, EFR included. Of course, many issues face competing policy objectives both between federal departments and levels of government. The Agricultural Landscapes and Cleaner Transportation case studies both encountered such competing objectives.

EFR should be among the mix of policy tools considered from the very start of discussions on management options. The focus should be how to make the overall policy package most cost-efficient and environmentally effective. EFR may have a role to play, either on its own or in combination with other policy instruments, and the final policy package may or may not include EFR instruments.

The more the policy framework has been defined, the narrower the potential role for EFR. For instance, the Substances of Concern issue, for which the policy framework is in the early stages of definition by government and other stakeholders, offers the greatest potential for examining the use of EFR strategies without encumbrance from existing policy frameworks or positions. At the other extreme, the Cleaner Transportation issue has a clearly defined policy framework, with the regulatory regime already delineated. Fewer opportunities for EFR were identified in this case study, suggesting that EFR should not be done as an add-on to established policies.

The case studies identified two issues related to the role defined for EFR. The first was the need to identify whether EFR intends to target leaders, or laggards, or both. A *leadership* strategy would focus EFR on early actors, with the goal of pulling the performance curve forward. By design, the incentives in this strategy would not be available to everyone. A *laggard* strategy would provide extra incentive for

low performers to move up the performance curve, but would not be of much benefit to early actors. A strategy could also be designed to target both leaders and laggards. The choice among these approaches will depend on the role identified for EFR within the larger policy package.

The second issue was the trade-off between focusing an EFR instrument on a targeted, specifically defined environmental issue and maintaining the breadth in application that is one of EFR's potential strengths. For example, the Cleaner Transportation Working Group looked specifically at how to reduce emissions from heavy-duty diesel truck and bus transportation (the sector and issue chosen paralleled the forthcoming regulatory framework). But some of the tools—for example, differentiated fuel taxes—could be applied more widely across the petroleum products sector to all fuels. Other tools appeared to work best between sectors (e.g., vehicle scrappage funded by private industry seeking emissions reduction credits). Many issues are extremely interrelated, and it is often difficult to judge where to set boundaries. It may be easier to deal with one element or one sector on its own, but this narrower approach leads to one-off fiscal instruments rather than an integrated EFR approach. Casting more broadly enables key interactions to be considered, but introduces complexity and may be unmanageable.

4.1.6 EFR options should be evaluated using the same process as for other policy tools

The development of well-designed, effective EFR instruments depends on the same conditions as the development of any other policy instrument: broad societal support for action, clarity of objective, sufficient time and adequate analytical resources, and open consultations with stakeholders. The process for analysing and developing EFR should be similar to that used for regulation or for voluntary programs. The hurdle should be no higher and no lower.

In working on policy measures that will be implemented through the federal budget, there is a strong temptation to work toward a submission for the immediate budget. This was evident in the efforts of the Expert Advisory Group, which started with a mandate to work on a longer timeline, but eventually focused on shorter timelines in order to identify possible submissions for Budget 2002. This pull to work within the budget cycle leads to 12-month timelines at the most. Such a lead time contrasts sharply with the lead times used in the development of regulatory options (a 36-month period under the Canadian Environmental Protection Act [CEPA]) and most voluntary programs. In order to develop EFR instruments with similar levels of consideration, consultation, and effectiveness to those used in the development of regulatory or voluntary management tools—and in order to go through a similar process of purpose definition, measures analysis, and refinement of design—lead times longer than a traditional budget cycle may be needed.

Because EFR is new and unfamiliar, it may face a higher hurdle than do other policy instruments. There may be a requirement for more analysis and a need to demonstrate stakeholder consensus, effectiveness, and cost-effectiveness at a more stringent level than that demanded of other policy tools. But we already frequently accept the need to take regulatory action in the absence of perfect information or complete consensus. In these circumstances, EFR can be implemented on a continuous improvement model, through the use of pilot projects with clear mechanisms for periodic monitoring, evaluation, and amendment. This "learning by doing" approach can serve to overcome the barriers faced by a new instrument.

4.1.7 Canada's unique challenges need to be incorporated into the design of EFR from the outset

Canadian circumstances may pose barriers to EFR or create unique opportunities. The case studies uncovered factors that may make the use of EFR in Canada a challenge for some issues and in some sectors.

One challenge, revealed in the Agricultural Landscapes case study, is the need for coordination and agreement between levels of government, particularly for issues of shared jurisdiction. Responsibilities for issue management may be fragmented from revenue power, creating a barrier to the

use of EFR. Federal–provincial differences of opinion about program design and funding requirements may make agreement on EFR packages difficult.

Canada's diversity also makes it challenging to design "one size fits all" EFR approaches. Canada is composed of many regions and provinces/territories with substantial differences in ecosystems, policy contexts, regulatory and fiscal philosophies and approaches, and political cultures. These differences pose a unique challenge to any national EFR initiative. It may be necessary to offer EFR programs within a general framework with a specific objective and to negotiate delivery on a tailored, region-by-region basis.

Another challenge, revealed in the Cleaner Transportation case study, is the size and structure of some Canadian markets. For some commodities, Canada is a small portion of a continental market and, hence, becomes a policy taker, not a policy maker. Where there are only a few actors in the Canadian market and/or a few regional sources of environmental impacts, instruments that have been used widely in the United States, such as trading, are more difficult to use.

Finally, the federal government is very concerned about the precedent set by any new fiscal measure, be it ecological or otherwise. This may become a barrier to innovation on the EFR front.

4.1.8 Funding and revenue aspects must be considered and communicated

The EFR agenda in other jurisdictions has often been implemented along a revenue-neutral model. This approach has been necessary, since reaction to a tax instrument is often hostile, particularly in the North American climate of "no new taxes" and even a wish for tax reductions. This was reflected in the EFR program, which met with difficulties in achieving agreement on new charges and taxes. Expenditure-based programs are more appealing to the public and to stakeholders, but they are harder to sell to governments.

What does this entail for revenue-neutrality in Canadian EFR initiatives? Is it feasible? Revenue-neutrality can be implemented through several approaches, either alone or in combination. It can be done:

- through tax reforms, where any new tax revenue is recycled in such a way that the individual party can be no worse off after taking the desired environmental action;
- through subsidy reforms, where existing subsidy envelopes are redirected in order to fund more ecologically focused initiatives; and
- through expenditure reforms, where new expenditures undertaken in one area lead to a reduced need for expenditures in another.

The EFR Expert Advisory Group felt that revenue-neutrality exclusively along a tax-shifting model risks being a red herring. There is a role for new taxes within EFR where these are warranted for behavioural purposes; any new tax revenue should be recycled, and the new tax should be clearly linked to the desired environmental objective. However, EFR is broader than tax reform, and expenditure-based programs do have a role, particularly where they can have no impacts on, or reduce, government revenue requirements. What is essential is that the funding and revenue aspects of an EFR initiative be considered and communicated to the public and to stakeholders.

4.1.9 Good data are needed to provide the basis for analysis, modelling, monitoring, evaluation, assessment, and continuous improvement

The European failure to conduct many ex post studies of EFR programs should not be repeated in Canada. Strategic investment in science, economics, and program assessment is required to support EFR initiatives.

At present, there is little baseline data for most environmental issues, insufficient economic information, and little monitoring of results and outcomes. The ability to do economic analysis was constrained in both case studies due to a lack of necessary data and a lack of access to the information that does exist. However, lack of data must not be blindly used as an excuse for inaction. Research is needed into what kind of and how much information is necessary for good analysis. It may be useful to study what data

are used in the U.S. It is important that both the science and economic aspects be integrated into analysis and assessment of an EFR initiative.

Monitoring, evaluation, and assessment will be essential components in introducing EFR on a continuous-improvement basis, whereby programs are implemented with the clear intent from the outset of evaluating their effectiveness. Monitoring must focus on actual environmental outcomes, as well as economic aspects. These investigations could then be used to adjust or fine-tune programs, so that they are more effective and efficient in achieving their intended targets (e.g., water quality). Unanticipated economic and ecological impacts, positive and otherwise, would also be captured. This may be difficult to do where EFR is only one tool within a suite of measures, including command and control and/or voluntary. In these cases, the analysis should be on the full suite of instruments.

4.1.10 Components critical to good EFR design

Good EFR design depends on a number of critical components. The case study research suggests that these include (but are not limited to) a thorough knowledge of 1) the state of technology and the genuine opportunities available to mitigate or prevent ecological impacts, 2) the market setting, and 3) the policy context within which EFR instruments would be introduced. Other components include attention to transition strategies, delivery capacity, partnership building, and the use of communication and public awareness programs. Attention must be paid to simplicity of design and administration. Programs may need to be tailored to regional policy contexts and philosophies, which vary greatly across the country.

The Agricultural Landscapes case studies suggested that success depends on engaging affected stakeholders and addressing their practical concerns. Constituencies can be built by demonstrating how people can be better off under EFR approaches than under traditional command-and-control methods.

4.2 Agricultural landscapes summary

4.2.1 Issue definition

Within agricultural landscapes, EFR might be applied to provide better incentives for ecologically sound land management and pollution control. The desired long-term outcome is to enhance the ecological integrity of agricultural landscapes—where healthy water, healthy soil, and biodiversity are maintained. This outcome requires the cooperation of private landowners.

Background Papers

More Reading on the Agricultural Landscapes Case Study

These NRTEE background papers are available:

- Ecological Fiscal Reform and Agricultural Landscapes
- Environmental Farm Plans and Ecological Fiscal Reform
- Property Tax Credits for Conservation
- Conservation Cover Incentive Program Case Studies

Incentives may be required, since private owners cannot be expected to pay the full cost of creating and maintaining social goods such as ecological services. However, farming practices must also be carried out in a sustainable fashion, requiring private investments and changes in operating procedures that are worked into the costs of production. Designing the right package of incentives is the challenge. Actual experience is quite varied, as demonstrated by cases in the United States, Europe, New Zealand, and in various farming regions of Canada. And the realities are complex. Political and administrative philosophies can dictate choices of instruments. There are many types of agricultural landscapes, many different aspirations on the part of farmers, and a wide variety of ecological needs. And, importantly, many options are available.

4.2.2 Working group objective

The objective of the Agricultural Landscapes Working Group's activities was to:

Determine the feasibility of redirecting governmental (federal, provincial, and municipal) taxation and expenditure programs affecting farmers across Canada to meet conservation needs and pollution reduction from farmlands.

4.2.3 Working group methodology

The case study followed three lines of inquiry:

- examination of existing efforts within North America, Europe, and other areas such as New Zealand, with some points summarized in the present report;
- identification of analytical needs, including economic analysis and modelling reviews and other studies required to make the case for EFR in terms that are relevant to decision makers at the federal and other levels of government; and
- examination of three approaches in detail, drawing on Canadian initiatives and data. These three cases are summarized here, with the full studies available as annexes.

These three approaches for applying elements of EFR for conservation within agricultural regions show that a suite of instruments will most likely be drawn upon to achieve the desired outcomes. The first two examples, development of environmental farm plans (EFP) and municipal property tax credits (MPTC) for conservation lands, draw upon existing initiatives that were started recently as regional pilot programs but have potential for national application. The third is an economic analysis that could be used for the design of a variety of conservation cover programs (CCP). This example, for the first time in Canada, rigorously investigates the net social benefits of expanding the extent of conservation cover based on watershed-level information.

The EFP case is an example of an expenditure program designed for awareness raising and education at the level of individual farmers and groups of producers. It aims for behavioural change with respect to ecological health and protection at the farm level. The MPTC example is a tax credit for on-farm conservation activities. The CCP example could serve as the analytical basis for designing support/subsidies for conservation and environmental inputs and conservation cover programs. Conservation cover programs can include protection of riparian areas, wetland protection/restoration, and the transfer of cultivated lands with high ecological value to vegetative cover that is not used for agriculture (also called "set-asides"), as well as more generic initiatives for reducing annual cropping.

4.2.4 Research summary

4.2.4.1 Environmental farm plans (EFP)

Starting in the early 1990s, farm organizations and governments began devising new methods of helping farmers become more aware of their impact on the environment. The most comprehensively developed EFP programs are in Ontario and Quebec. Each model is quite distinctive, revolving around environmental farm plan workbooks and peer review processes in Ontario, and agri-environmental advisory clubs in Quebec. Currently, there are seven versions of EFPs in Canada, along with several new ones in the making. EFPs build on voluntary action and link education and action of value to health, safety, and environmental concerns both on and off the farm. Environmental farm planning helps identify the environmental risks, liabilities, strengths, and assets affecting a farmer's operations, as well as on- and off-farm environmental conditions. From this analysis, farmers can flag areas of concern and identify opportunities for improvement. Environmental farm planning also makes farmers more aware about regulations that may apply to their farm.

The Quebec and Ontario programs use incentives quite differently. The private benefits of program content of both are delivered through participation, and a cash transfer or fee. In Ontario, there is a cash transfer of $1,500 *to participants*. The transfer is paid out to farmers, after initiation of their farm plans, to help cover costs of implementation. Quebec's farm "clubs" charge members a $500 annual fee in exchange for information and individ-

ual assistance (25 hours) that has a market value far in excess of $500. The difference in cash incentives (a $1,500 payment versus a $500 fee) may reflect the difference in the valuation of the private benefits provided by the program. Ontario producers face *no* regulatory requirement to produce an EFP or comply with specific environmental management requirements. As a result, the private benefits of the program accrue from the value of the information provided in reducing costs of production and in community relations. In Quebec, as noted, farmers receive technical assistance. This may be of particular benefit to cattle growers, who face regulations for manure management.

A number of factors influence program uptake. The most important include:

- that it is a producer-driven, *voluntary initiative*;
- *confidentiality* to ensure farmers feel that they will not be put at a competitive disadvantage with other farmers or exposed to government fines or other regulatory action;
- *incentives* sufficient to secure farmer interest;
- recognition of *due diligence* that might aid in future loan acquisitions;
- recognition that *profitability* may be enhanced through actual on-farm environmental improvements;
- recognition of potential for improved market access/branding through adoption of environmentally safe practices; and
- *educational benefits* through access to information regarding new and innovative farm technologies and practices.

An EFP is a way to address environmental awareness raising and capacity building within the farm community. But it has potential to go beyond these important needs. Unfortunately, a key gap in these programs is the lack of systematic monitoring of environmental impacts. For example, is water quality actually improved? A University of Guelph farmer survey found risks to the health of the farm family, risks to soil health, and risks to water health as the main environmental issues addressed by farmers (in that order). The $1,500 incentive produced a very substantial private investment.

Environmental farm plans can be unique to each type of farm operation and the distinct geography of farms across Canada. There is considerable latitude in design. They can be tied to other incentive approaches such as awards and peer interaction. And they may backstop other incentive-based or regulatory programs. Support seems to be strongest for voluntary programs that are driven by farmer organizations and provincial considerations. While the greatest interest has been in central and eastern Canada, there is potential for a national program that takes into account these points. In June 2001, Canada's agriculture ministers agreed to work toward a comprehensive plan for accelerated environmental action, fully covering all Canadian farms. This decision provides a significant opportunity for EFPs nationally.

4.2.4.2 Municipal property tax credit (MPTC) for on-farm conservation areas

A municipal property tax credit can encourage various conservation land uses. A variety of examples exist, especially in the U.S. For this case study, a pilot project in Manitoba was examined. The incentive effects of property taxes depend on whether mill rates vary by land use characteristics, on whether property owners know how the rates vary, and on any other specific features of the property tax system. If the assessed value assumes the land is being used for production and the tax rate is uniform across all types of land use, there is a clear incentive to use the land for agricultural products (i.e., crops and livestock production). Any unused land—that set aside for conservation assuming a strict conservation interpretation of no agricultural use—will generate no revenue for the farmer but will incur the property tax. A profit-maximizing/cost-minimizing farmer will then set aside land for conservation only if development for agriculture generates net private losses.

If a rural municipality (RM) offers a tax credit, resulting in a reduction in property taxes for each acre/hectare of land set aside for conservation, the

incentive is now much stronger to set aside land of low market value. The tax credit is a negative tax and as such provides a reward to the landowner for conservation. The incentive will be strongest for lands that have the lowest opportunity cost—those with the lowest value in production.

A three-year pilot study covering two rural municipalities in Manitoba provided a $1 per acre municipal tax credit for landowners who adopt specified environmentally sustainable land use practices. Funding for the project comes from Ducks Unlimited Canada, the Prairie Farm Rehabilitation Administration, and the Northwest Soil Management Association. The two municipalities provide support in-kind. Participation is voluntary. Land is eligible for the tax credit if it is used for conservation initiatives that include tame forage, native grassland, wetlands, riparian buffer zones (trees or grass within 100 metres of a waterway), and annual cropland with a minimum of 40% straw cover.

The size of the tax credit was based on two factors: $1 per acre represented the average property tax paid in Manitoba for wetlands and bush, and it was felt that any smaller amount would not provide a strong enough incentive for farmers to sign up for the program. The tax credit is clearly not sufficient to compensate owners for the total ecological services provided by their land, but it provides a small amount of compensation for allowing society to benefit from conservation. The sponsors of the program also emphasize its educational value—illustrating to farmers the need for conservation practices on their lands and that society does value them.

Landowners must apply for the tax credit each spring, specifying the lands that they consider eligible. RM staff help landowners prepare their applications. Satellite imaging confirms land uses in the appropriate conservation category for each applicant. Ground inspection for a small percentage of each RM's area helps to ensure compliance. Tax credits to those in compliance are paid at the time taxes come due in the fall. In 2000, the program protected some 31% of the land base, including 6,538 acres of wetlands, 15,116 acres of land under conservation tillage, and 39,334 acres of tame forage, native prairie, and riparian zones. The average tax credit payout was $261, with individual farmers receiving between $1 and $1,628. An evaluation of the program via mail survey indicated that 86% of participants felt the program was worthwhile and 88% agreed that the property tax system was effective compensation. The total cost of the program in 1999 was $75,787, of which approximately $61,000 represented the tax credits. The balance was for administrative costs, including satellite analysis, advertising and communications, labour, travel, processing, and program evaluation.

To assess the "value" of the program, the focus should be on the present value of the *social benefits and costs*—that is, those incurred by society as a result of the program. The *social benefits* of using an MPTC are believed to include *improvements in environmental quality* such as:

- preservation of soil quality/reduction in erosion;
- improvements in water quality for drinking and for recreation;
- reduced flooding;
- increase in and maintenance of wetlands;
- protection of air quality (carbon sequestration);
- preservation of riparian ecosystems, with associated benefits;
- biodiversity conservation;
- wildlife habitat enhancement for aquatic and terrestrial species; and
- energy conservation.

Social benefits also include *reduced public expenditures on environmental infrastructure* such as:

- less silt removal needed from waterways;
- lower water treatment costs;
- reduced flood control expenditures;
- lower erosion, culvert, and crossing repairs; and
- less drain clogging.

These benefits have not been quantified, but it is not unrealistic to assume that the savings in public expenditures could amount to at least $1 per acre.

The program, therefore, pays for itself in cost savings to municipalities. Over time, improvements in environmental quality may also lead to higher land productivity due to less soil erosion, for example. This could raise land values, and, in turn, generate more property tax revenue, which could be allocated for public goods and services. The MPTC could even lead to a more diversified local economy through more recreational opportunities on conserved lands, more tourism, different crop mixes, and so on. The well-being of residents may rise.

Social costs (to the municipalities) could include:

- forgone revenues;
- incremental administrative costs (above those for normal property tax collection); and
- costs of assessing the program's effectiveness in meeting environmental targets.

Another issue is the jurisdictional level at which the social benefits and costs of the program are measured—municipal, provincial, or national? Normally, one would focus on the jurisdiction doing the decision making, in this case, the municipality. But this is problematic for the MPTC, because the environmental benefits may extend far beyond municipal boundaries. Thus, some costs of the program may logically be borne by governments at the two higher jurisdictional levels.

Lessons from the Manitoba initiative show that a variety of factors contribute to a program's success. For example, a program benefits from:

- *support from a broad spectrum of affected parties*, including local government;
- being *voluntary*;
- *tax credits that can reduce a landowner's property taxes to less than zero*;
- *annual review*, permitting reversible land use and return of cash to the farmer in each year of participation;
- a relatively small minimum acreage required for participation;
- *administrative simplicity*, including fewer and less complex eligibility requirements;
- *public awareness and a favourable political climate*, with no sense that the program is an unwarranted subsidy, but simply a payment that recognizes the social benefits from conservation occurring on private lands;
- a *design that is not likely to initiate any international trade actions*;
- a structure *adapted to local conditions* and more flexible than a "one size fits all" program; and
- being a *stand-alone program* that does not require landowners to participate in other programs, but can be readily integrated with other conservation initiatives.

Based on a review of several MPTCs in North America, the challenges include:

- *sustainable program funding*, since the tax credit affects municipal revenues;
- *low participation rates/lack of awareness of the program*, arising from factors such as size of acreage covered, insufficient advertising/communication, eligibility requirements that are too costly and complex for the landowner to comply with, and program design not well targeted at clear environmental objectives;
- *difficulty in measuring the environmental benefits*;
- determining *whether the tax credit is even necessary* (i.e., whether landowners would have taken action without the incentive);
- *setting the tax credit* at an appropriate rate—too low and it will fail to get participation, too high and the landowner gets unnecessary rents; and
- *integration with other programs to avoid double dipping*.

On this last point, if more than one program operates in a region simultaneously, the challenge is to ensure that the landowner is not collecting two payments for the same activities, unless this is the goal (perhaps resulting from different funding sources).

In summary, the MPTC is an incentive-based policy that merits continuation—and extension beyond the pilot programs—as one of a potential

suite of EFRs designed to improve environmental quality. A MPTC creates a market-like value for conservation activities valued by society but not traded in traditional markets. The landowner looks at the "price" (tax credit) per unit of land if specified conservation activities are undertaken and compares this price with the land's marginal returns in any other use. While typically a modest incentive, it conveys the idea to landowners of valuing non-market environmental benefits. Programs with clear eligibility requirements, low compliance costs, and flexibility in land allocated (through small minimum acreage levels) are more likely to draw participants and deliver environmental benefits. Key challenges are funding the tax credit and measuring net benefits of the programs to ensure that they are successful in improving environmental quality.

4.2.4.3 Conservation cover program (CCP)

In the past year, Ducks Unlimited Canada has proposed a national conservation cover program. Targeted lands would have a number of conservation values, such as those exhibited in riparian zones or wetland areas. A CCP provides for the removal of these lands from agricultural use either permanently or for a period of years. Economic incentives to encourage this land conversion provide a policy instrument that facilitates a public investment into private land use decisions, ensuring that the agricultural landscape provides a range of goods and services valued by society.

These external environmental benefits may involve a number of factors associated with improved water quality, including

- decreased treatment costs;
- lower dredging costs to remove sediment from water conveyance and storage infrastructure; and
- increased recreational opportunities (including fishing and swimming).

Other external benefits may include:

- greater wildlife use;
- biodiversity;
- stewardship for species at risk;
- aesthetic values;
- increased carbon sequestration and decreased net greenhouse gas emissions; and
- mitigation of flooding.

External costs of the conservation cover program may include the extra costs associated with delivering land conversion incentives and compensation required for incremental crop depredation by wildlife.

It is assumed that if the landowner decides to convert a parcel of land to conservation cover, the private benefits (including the economic incentive provided by the institution responsible for delivering the program) are greater than the private costs associated with the conversion. Therefore, quantifying only the external benefits and costs associated with the land conversion will facilitate calculation of the net external benefits (or costs) of the program. The three river basins/watersheds selected for the study are the Upper Assiniboine River Basin of Saskatchewan and Manitoba; the Grand River Watershed located near Guelph, Ontario; and the Mill River Watershed in western P.E.I. These units were selected because they represent agricultural landscapes within different regions, and because reasonable data exist for each one.

While some data problems remain, there is a consistent pattern demonstrating a substantial net external benefit from a conservation cover program. In the case of the Grand River, the best estimate was net external benefits of $195/ha/year (with a range of $79 to $342). The Upper Assiniboine River demonstrated net external benefits in the range of $29 to $106, with a best estimate of $65/ha/year. Information on the Mill River falls in between the other two (range $69 to $236, with a best estimate of $142/ha/year). In the case of the Upper Assiniboine River, it has been possible to determine optimal program impacts using a supply response based on known lease rates. Table 1 shows both the calculated values for the external benefits and the calculated optimal program impacts. Information on the other two watersheds is provided in the main report.

The external benefits in this and the Grand River case show a similar pattern. The largest external benefits arise from a combination of carbon sequestration and greenhouse gas emissions reduction. But the next largest benefit is saved government payments, because land is taken out of agricultural production. In the Grand River case, the figure is even higher ($46.00 compared with $12.00). Also in the Grand River, there are additional benefits such as phosphorus reduction ($23.50), recreational fishing ($26.00) and high non-consumptive wildlife use value. These factors all contribute to the higher net external benefit for a CCP in this river, which flows through areas of relatively high human population density.

The major contribution of this study is the substantial level and quality of information compiled. An economic analysis like this has not been done before. Moreover, the analysis is not based on "back of the envelope" guesses. The figures are rigorously developed from the best available economic and ecological information. They make a compelling case that a conservation cover program would provide a very good return to society in a variety of watershed settings representing different environmental and

Table 1

Estimates of external benefits of a conservation cover program in the Upper Assiniboine River Basin in eastern Saskatchewan and western Manitoba

	High	Best estimate	Low
External benefits (costs) $/ha/yr			
Saved government payments	19.25	12.83	6.42
Saved crop insurance premiums	5.27	3.51	1.76
Water quality—sediment	9.34	4.62	1.34
Water-based recreation	1.37	0.91	0.46
Wind erosion	4.01	2.67	1.34
Change in GHG emissions	14.07	9.38	4.69
Carbon sequestration	29.40	19.60	9.80
Wildlife—consumptive use	19.11	10.71	5.36
Wildlife—non-consumptive use	6.45	4.16	2.08
Gross benefits	*108.25*	*68.39*	*33.23*
Program administration costs	(1.04)	(2.08)	(3.12)
Depredation compensation	(0.32)	(0.64)	(0.96)
Net external benefits	*106.89*	*65.67*	*29.15*
Supply response			
Ha per $35/ha payment	25,000	12,000	6,000
Optimal program impacts			
Area in program (ha)	76,350	22,515	4,996
Gross external benefits	$8,264,888	$1,539,830	$166,002
Program costs	$8,240,465	$1,525,420	$161,205
Administration costs	$79,404	$46,832	$15,588
Payments to producers	$8,161,052	$1,478,588	$145,617
Cost to producers	$4,080,526	$739,294	$72,808
Gain to producers	$4,080,526	$739,294	$72,808
Overall gain	**$4,080,526**	**$739,294**	**$72,808**

regional conditions across Canada. The figures compiled for each case represent an "average" watershed situation—a baseline condition. With more fine-tuning, it would be possible to examine the benefits of particular kinds of conservation cover programs, for example, for riparian zones. This fine-tuning would require more information on the specific impacts of various types of riverside and watershed cover on factors such as sediment trapping by riparian vegetation, nutrient removal, and enhanced fish production. In each instance, such information would have to be translated into economic impacts.

The three watersheds were chosen to represent different agricultural regions and, thus, different climates, farming operations, and farming practices. The information could be refined over time, and the analysis to date has revealed a variety of data gaps. In its own right, this "shortcoming" can add value, because it highlights research needs. There would be high returns to our knowledge by compiling additional and better information around these three rivers, rather than repeating the exercise at a superficial level in other basins.

4.2.4.4 Challenges and opportunities—The way forward

There is little doubt that EFR initiatives can be successfully implemented and help society to safeguard and provide ecological services in agricultural landscapes. Success will come by engaging a substantial portion of the farmers within a region. To do this, it will be necessary to adjust incentives, consider the impact of issues such as cross-compliance, and build a level of understanding about what exactly is to be achieved. The compelling strengths of the examples studied are that they are voluntary and have the potential to save society and governments money. They demonstrate that each level of government can play a role in EFR for agricultural landscapes, yet not every level of government needs to be involved in each case.

The range of instruments available provides many options and opportunities to assemble suites of instruments that are mutually supportive, expand the opportunity for voluntary stewardship action, and lend substance to the notion of the eventual "green branding" of Canadian agriculture. There must be a progression from building awareness and knowledge, to implementation, to adequate assessment of outcomes (especially improved environmental conditions in agricultural watersheds and landscapes). Environmental farm plans can act as a precursor for action—providing the baseline knowledge and "kick-start" for small initiatives at the individual farm level. The municipal property tax credit shows that even a modest incentive can help encourage and reinforce conservation behaviour. The EFP and MPTC are complementary, since the former would help landowners identify which land is best to set aside, and municipalities might wish to extend a MPTC to those with an EFP. Economic analysis of net external benefits can be used not only for CCP design, but also for a range of other purposes, including the monitoring of which lands are most valuable for conservation easements or for determining the most appropriate lands to qualify for incentives such as the MPTC.

The study identified key factors influencing program uptake. One very important matter is to remember that one size will not fit all. Provincial inputs and philosophies, flexibility of designs based on inputs of specific agricultural sectors and regional groups, simplicity in operation and administrative rules (even if this means less capacity for targeting at the initial stage), and modest administrative costs are all hallmarks of a successful program. There is a need to examine how best to tailor EFR to specific regions, especially when several initiatives are layered on current (command and control) regulatory approaches such as zoning. A "one window" approach may be helpful for farm producers faced with a variety of programs and regulatory concerns. It is not clear what level of uptake constitutes success. The notion of continuous improvement will be helped as the participant base expands.

Strategic investment in science and program assessment is required to support the various EFR initiatives. It is difficult to sort out the value of individual programs when several are contributing to changes, so science must be linked in many instances to economic analysis. This is most clearly demon-

strated in the watershed net external benefit analysis. There are years of work ahead, especially for targeted activities such as riparian zone conservation initiatives. But this should not prevent the development and implementation of incentive programs, if, from the outset, a commitment is made to evaluate them through rigorous scientific monitoring. It will be an inexpensive way for society to obtain information about the environmental conditions and ecological dynamics of agricultural landscapes.

The goals of EFR in agricultural landscapes need to be focused on the positive net benefits/externalities for society in terms of enhancing and maintaining ecological integrity. Private benefits may also accrue, but it is not necessary for society to pay for them. In the design of programs, revenue-neutrality may be a goal, keeping in mind that programs may be effectively revenue-neutral if the conservation activities result in lower costs to government for mitigation of environmental degradation. The important point is to be able to demonstrate as clearly as possible that the results truly reflect a cost-effective, positive level of social benefit. The expression of benefits must be easily understood by a range of people and organizations, including producers, stakeholders and decision makers. Failure to communicate benefits effectively will threaten otherwise well-planned initiatives. Often this will mean partnerships that can generate and use knowledge in an adaptive fashion—learning by doing, as outlined above.

EFR for agricultural landscapes will be implemented only to the extent that demand exists to drive programs forward, sometimes in the face of barriers that favour the status quo. At least some of the demand will be generated through global accords such as climate change, where there is interest in carbon sequestration, and through voluntary initiatives such as greener production certification at national or international levels. Unless net societal benefits are clearly articulated and can be verified by monitoring of outcomes, the full value of EFR approaches (which provide farmers with flexible options) is not likely to be achieved.

The following recommendations are proposed for follow-up action to this report:

- The NRTEE should continue to explore EFR, focusing on increasing understanding of the potential applications to the agricultural sector, and providing specific recommendations to federal and provincial governments that would assist in the design and implementation of such initiatives.
- Federal departments, led by Agriculture and Agri-Food Canada, should develop a plan for "green branding" of Canadian agriculture nationally and internationally that fully incorporates EFR, including voluntary initiatives that can be implemented through farmer stewardship.
- The June 2001 ministerial commitment to accelerate the pace of improving environmental practices on-farm should be met by expanding programs based on, among other things, the three EFR examples provided here.
- High-priority conservation cover and environmental initiatives should be developed, based on the watershed ecological–economic analysis presented here, for example, by designing a program for improving water quality associated with farm runoff.
- There should be an increased federal and provincial commitment to the gathering and sharing of information on the effectiveness of EFR initiatives and indicators of success, and to the development of mechanisms for using this information in the design of complementary EFR initiatives employing suites of instruments.
- Farmer organizations should become more involved in the design, promotion, and implementation of EFR initiatives, with a view to becoming active partners in the development of regionally and sectorally focused approaches.

4.3 Cleaner transportation summary

4.3.1 Objective

The Cleaner Transportation Working Group (CTWG)'s mandate was to:

design fiscal instruments to facilitate the adoption of cleaner fuels and engines to promote the transition to cleaner transportation in the diesel-based freight and mass transit sectors.

During the project, the mandate was broadened slightly to also consider off-road trucks and diesel. The CTWG specifically investigated EFR measures to complement the large trucks and buses and diesel components of the February 2001 Canadian *Environmental Protection Act*'s Notice of Intent for Vehicles, Engines and Fuels.[14]

4.3.2 Methodology

The CTWG identified technical opportunities to reduce emissions from diesel-based trucking and transit, barriers to the take-up of these opportunities, and "straw dog" fiscal measures for further research. Four objectives, and fiscal options for addressing them, were identified for further design and research. The research involved:

- a literature survey on the experience with the instrument in other developed economies;
- gathering data bearing on the effectiveness and cost of the instrument in Canada;
- examination of alternative designs for the instrument;
- consideration of implementation problems that might arise in Canada; and
- consideration of the distributional effects of the instrument among those directly affected, including trucking firms, shippers, customers, engine manufacturers, and the petroleum industry.

Background Papers

More Reading, Cleaner Transportation Case Study

These NRTEE background papers are available:

- Cleaner Transportation and Ecological Fiscal Reform: Working Group Report
- Fiscal Instruments for Diesel Emission Reduction: A Preliminary Analysis

Limited time, budget, and readily available data precluded quantitative analysis. Instead, the analysis was descriptive, focusing on design issues, implementation problems, lessons to be learned from similar measures applied elsewhere, and a more subjective assessment of relative costs and effects.

The CTWG reviewed the consultant's report and reached conclusions about the measures, as well as about the lessons the case study offered for the general applicability of EFR in Canada. These are noted in the final part of this section.

4.3.3 Issue context

The United States has proposed regulations for on-road heavy-duty diesel (HDD) vehicles that will substantially reduce emissions of particulate matter (PM) in the 2007 model year and will phase in substantial reductions of nitrogen oxides (NOX) and non-methane hydrocarbons (NMHC) between 2007 and 2009. During that time, half of the engines sold must meet the 2007 standard for NOX and NMHC (full Phase II), while the other half may meet previous standards plus the 2007 standard for PM (Phase II PM). The engines that will meet these "Phase II" standards will require fuel with less than 15 ppm sulphur (i.e., ultra-low sulphur diesel fuel—ULSD), so a limit of 15 ppm will be imposed on on-road diesel fuel sulphur content in 2006. Canada has announced its intention to match these standards, although it is not clear that Canada will apply the 50% market share rule in 2007–2009.

4.3.4 Research and discussion summary[15]

The set of instruments selected for investigation fell into two groups: those affecting engines and those affecting fuels. Emissions from vehicles and engines depend upon vehicle/engine technology and the properties of the fuels. In some cases, vehicle emissions control systems cannot operate properly without the right fuels. Fuels and engine emissions were therefore approached as an integrated system,

14 Environment Canada, "Taking Action on Vehicles, Engines and Fuels to Clean the Air and Protect Human Health," www.ec.gc.ca/air/taking-action_e.shtmlhttp://www.ec.gc.ca/air/taking-action_e.shtml

15 For the full research report, see Dewees Consulting Limited, "Fiscal Instruments for Diesel Emission Reduction: A Preliminary Analysis," Report to the Cleaner Transportation Working Group, NRTEE, Toronto, October 1, 2001.

consistent with the approach being taken under CEPA. For engines, the intent was to accelerate take-up of new generation clean engines and retrofit technologies, and to encourage scrappage of more polluting engines. The measures analysed were:

- accelerated capital cost allowance (ACCA) for cleaner engines and retrofit technologies, fee/rebate for new vehicles, or tax credit for cleaner engines and retrofit technologies; and
- fiscal instruments to accelerate the scrappage of older vehicles.

For fuels, the intent was to accelerate penetration of ULSD. The two approaches studied were:

- a tax on the sulphur content of diesel fuels; and
- ACCA for refinery and infrastructure upgrades to supply cleaner diesel.

These fiscal instruments operate by changing the after-tax prices of engines, retrofit devices, and fuels for the buyer, thereby creating incentives to change behaviour. The effectiveness of the instrument depends on the responsiveness of buyers (trucking companies) and sellers (vehicle manufacturers and fuel refiners) to price changes, which depends on the structure of the market. Since the Canadian market for trucks and truck engines is only 10% of the North American market, the markets are integrated and the industry is reasonably competitive. Prices should, therefore, be similar in both countries and should reflect production costs in the absence of regulations. However, the emissions control regulations considered here will substantially alter some prices.

4.3.4.1 Encouraging the purchase of Phase II PM prior to 2007

To induce production and sales of Phase II PM engines prior to 2007, Canada would require a fiscal incentive at least as large as the extra cost of producing these engines. Current estimates of these costs range from about $1,100 for a light HD truck to over $1,700 for an urban bus. If the ULSD fuel required by these Phase II PM engines is more costly than regular diesel fuel, the fiscal incentive to induce truckers to buy these engines would increase to between $1,350 and $3,660. If there is a serious intention to encourage the early sale of these engines in Canada, a substantial fiscal incentive will be required, and it will be very helpful if another fiscal incentive is used to eliminate any price penalty for using ULSD fuel.

Table 2

Summary Evaluation of Instruments

Goal	Preferred Instruments - Ranked
Accelerate Phase II PM before 2007	1. Fee/rebate—effective, revenue neutral 2. Tax credit—costly, omits non-profit sector 3. ACCA—costly, omits non-profit sector, imprecise
Increase full Phase II during 2007-2009	1. Fee/rebate—effective, revenue neutral 2. Tax credit—very costly, omits non-profit sector 3. ACCA—very costly, omits non-profit sector, imprecise
Accelerate cleaner off-road	1. Fee/rebate—effective, revenue neutral 2. Tax credit—effective but costly 3. ACCA—costly, imprecise
Encourage retrofit	1. Subsidy or rebate—effective, costly
Encourage scrapping	1. Subsidy—effective, costly 2. Registration fee—problematic
Early ULSD fuel	1. Tax differential

Whether or not Phase II PM engine production could be advanced prior to existing regulatory timelines was not known. Sufficient time would be needed to test for roadworthiness in addition to actual production. This is a key consideration. Unless there is the ability to supply market-ready engines, no fiscal instrument will work.

Use of the full Phase II vehicles and engines requires access to ultra-low sulphur diesel. Some operations, such as municipal transit or off-road operations, function in a limited geographic area and could use cleaner vehicles and engines as long as ULSD were available regionally or locally. Other operations, such as long-haul trucking, would require access to ULSD across large territories and sometimes into the U.S. Since the supply of ULSD will not be required under regulation until 2006, this may present a significant barrier.

4.3.4.2 Increasing sales of full Phase II above the 50% requirement, 2007–2009 period

When manufacturers are required to meet the full Phase II standards in half of the engines they sell, they will have to price them no higher than Phase II PM engines or they will not sell. This means that manufacturers will make high profits on Phase II PM engines and low profits or losses on full Phase II engines during 2007–2009. If Canada does not adopt a market share requirement to match the U.S. requirement, we should expect to see few full Phase II engines offered for sale here and more higher-emission Phase II PM engines. It is, therefore, assumed that Canada will adopt a 50% market share requirement to match the U.S. situation.

Increasing sales of full Phase II engines during 2007–2009 will be more difficult because the manufacturers will already be constrained by the 50% market share requirement. If manufacturers cannot supply half of the market with full Phase II engines in 2007, no fiscal instrument will increase their sales in Canada. If there is excess full Phase II capacity, a fiscal incentive applied to the price of a vehicle will still not induce manufacturers to increase their production of full Phase II engines unless it fully compensates for the increased costs associated with this engine compared with a Phase II PM engine. The incentive would have to be worth between $2,000 for a light HD truck and $3,200 for a heavy HD truck based on recent cost estimates. This assumes that ULSD fuel is the only on-road fuel available or that ULSD is priced no higher than higher sulphur diesel fuel if the latter is also available. However, with ample manufacturer capacity, a fiscal instrument that more than offsets these costs could greatly increase the proportion of full Phase II engines sold in the Canadian market.

The cost to the federal treasury of a fiscal instrument for the pre-2007 period will be proportional to the number of vehicles sold with Phase II PM engines, so it will be modest unless the program is very successful. In the 2007–2009 period, the instrument will apply to all full Phase II engines sold, and half of all engines must be of this type. Thus, the fiscal cost of the policy for 2007–2009 may be as high as $100 million per year even if the program fails to increase market share beyond 50%, unless the instrument is revenue-neutral.

In looking at the specific fiscal instruments to achieve the above goals, there does not appear to be a federal excise tax that could be reduced to have this effect. The GST is not appropriate, since trucking firms reclaim their GST through an input tax credit and the non-profit MUSH (municipal, university, schools, hospitals) sector pays only a fraction of the GST. A new tax on high-emission vehicles would be administratively feasible but perhaps politically difficult. A fee/rebate would require a new tax, but at least the taxes on high-emission vehicles would be balanced by rebates on low-emission vehicles, so it could be designed to be revenue-neutral. The fee/rebate could be tailored precisely to give the desired incentive for any number of vehicle classes. An income tax credit could work well for new vehicle purchases and could be tailored to match the incentive needed for different vehicle classes; however, it would not affect the MUSH sector. An accelerated capital cost allowance would be feasible, but it would be hard to tailor to the incentive needed for different vehicle classes and would not affect the MUSH sector. The rigidity of the ACCA makes it appear inferior to the tax credit. Both

the income tax credit and the ACCA involve pure tax expenditures; they are not revenue-neutral. Subsidies are also feasible. They could affect both the for-profit and MUSH sectors and could be tailored as precisely as a tax credit. Emission-reduction credits can be tailored precisely and are feasible in jurisdictions where there is an active market, which does not include most of Canada. The fee/rebate, therefore, seems the dominant instrument, with subsidies ranking next, the tax credit third, and ACCA and emission-reduction credits last.

Discussion within the working group centred on the design challenge for a fiscal instrument to encourage the sale of full Phase II engines above the 50% threshold mandated by regulation. The challenge was how to avoid a "windfall" situation, where buyers of the first, mandated, 50% would qualify for an incentive intended to motivate buyers beyond that threshold. One option discussed was for a tax credit whose size would be estimated retroactively, based on the increment of sales above 50% achieved in the overall market. This approach was criticized because it could not provide consumers with certainty about the size of the incentive they would obtain and would, therefore, lose much of its motivating value. Another option was to move the incentive up the supply chain, from the purchaser to the point of manufacture or point of sale. A manufacturer or seller's incentive could be designed to apply in proportion to the amount by which manufacturer's sales exceeded the 50% mandated threshold. Unfortunately, the CTWG did not have enough time to explore this idea in more detail.

The majority of operators in the trucking sector are small companies and family businesses, which often run at a very small margin of profitability. It would be critical, therefore, to ensure that any EFR instrument be both effective and equitable in its application to small businesses.

4.3.4.3 Encouraging retrofits and accelerating scrappage

Today's heavy-duty diesel engines emit far less pollution than engines built a decade ago, and the engines of 2007 will be far cleaner still. The emissions of old, dirty engines, therefore, represent an increasing proportion of total vehicle emissions. This problem can be attacked through the retrofit of pollution control devices on old engines and by encouraging scrapping.

Some of the fiscal instruments that can influence the purchase of new vehicles are less effective for retrofit. There is no federal excise tax to reduce, and even if there were it could not make retrofit economical. A fee/rebate seems inapplicable to retrofit costs. A new excise tax cannot induce the purchase of retrofit devices. Income tax credits could be effective for for-profit owners, but not for the MUSH sector. An annual registration fee or tax could be used to help induce retrofit, but the amount of the tax would have to be large and a federal registration tax would be problematic in Canada. Subsidies and rebates have been effective elsewhere in encouraging retrofit and could work here, but they are not revenue-neutral. Of these alternatives, a subsidy program seems best, as it would appeal to all types of vehicle owners and it could be designed to provide just the right amount of incentive for different vehicle classes and ages.

Scrapping the oldest or dirtiest vehicles can be a cost-effective means of reducing emissions. The principal instrument used to encourage scrapping of old vehicles is the "buy back" program. Automobile buy-back programs have retired tens of thousands of vehicles in the U.S., while smaller numbers were retired in British Columbia under its Scrap-It program. Firms that wanted to create emissions reduction credits for their stationary sources developed many of the U.S. programs, but some have been publicly funded. A buy-back program for trucks could be effective, but it might be useful to conduct further study and perhaps run a pilot program before launching such an initiative. Age-based registration fees could also be used to encourage scrapping of the oldest vehicles, but there is little experience with this instrument and it would be problematic at the federal level in Canada.

The working group concluded that the instruments for encouraging retrofits and accelerating scrappage seem to hold the most potential for reducing emissions from HDD trucks and engines. From the purchaser's perspective, the equal increase in the

price of all new vehicles forecast for the 2007–2009 period (as the economic analysis concludes, above) may lead the purchaser to decide not to purchase a new truck at all. Accordingly, an EFR instrument to encourage scrappage is an essential component of an overall cleaner HDD package. Vehicles qualifying for pilot scrappage programs have usually been those failing to meet provincial emissions tests. A federal program might want to allow more vehicles to qualify, in order to accelerate the shift toward adoption of the cleaner HDD trucks and engines. Any cost-benefit analyses of the retrofit and accelerated scrappage programs should include evaluation of the health benefits and greenhouse gas emissions impacts in addition to clean-air benefits.

While the analysis of the working group was conducted from a national perspective, looking at clean air issues from a regional health perspective might lead to greater emphasis on specific EFR instruments. Where there exist regional and local air pollution "hot spots," more costly subsidy or expenditure programs, such as scrappage and retrofits, could be considered for targeted implementation. These could be part of a regional package that would also include transit system improvements. There are also regional variations in the provincial policies being used to address clean air issues. For example, emissions reduction credits (ERCs) are in place in some parts of the country, notably in southern Ontario. ERCs enable private firms to participate in financing retrofit and scrappage programs. Another example is the pilot scrappage programs in B.C. A national retrofit or scrappage program would need to include some sort of equivalency clause to allow existing provincial or municipal programs to substitute for the national program.

4.3.4.4 Accelerating demand and supply of ULSD

It was assumed that Canada would adopt regulations requiring that all on-road diesel fuel sold beginning in September 2006 contain no more than 15 ppm sulphur, with no exception for small refiners. In this case, the role of a fiscal instrument could be to encourage the introduction of this ULSD fuel prior to 2006 or to encourage the reduction of sulphur in fuels other than on-road diesel fuel. A number of countries have found differential fuel taxes that increase the cost of high-sulphur fuel relative to low-sulphur fuel to be effective. The pace at which the industry responded in Europe and Asia, however, is not very relevant to Canada, because the different refining and shipping situation there allowed them to cross-ship available low-sulphur fuel from one country to another more readily than can be done in North America. It was determined that an increase in the tax on on-road diesel fuel that has more than 15 ppm sulphur might accelerate the date of introduction of that fuel. This increase could be coupled with a temporary reduction in the tax on ULSD fuel, to maintain revenue-neutrality. With respect to off-road diesel fuel, its sulphur content is likely to fall when ULSD becomes mandatory, because some companies may find it uneconomical to supply two different fuels to all locations. Further reductions could be achieved by applying a tax to off-road diesel fuel that had more than a specified sulphur content, perhaps 50 or 100 or even 500 ppm. There is some advantage to maintaining a higher sulphur level in off-road fuel than in on-road fuel, as significant costs may be saved with little loss in benefits. Further U.S. regulations of off-road diesel fuel are expected to be proposed toward the end of 2001, which may influence plans here in Canada.

The application of an accelerated capital cost allowance as a way to accelerate or broaden the reduction of sulphur in fuels would be unlikely to have much effect and may be complex to administer. The discussion on accelerating demand for ULSD centred on the logistical issues associated with advancing its supply. As noted above, certainty of ULSD supply is a determinant for the successful introduction of cleaner engines.

The early supply of ULSD may run up against two barriers. First, the majority of fuel in Canada is distributed through common-carrier pipelines. These pipelines cannot distribute ULSD through the system at the same time as higher sulphur diesel without contamination. However, in some parts of the country, notably Atlantic Canada, fuel is also distributed through proprietary pipelines or by truck.

This means that ULSD can be distributed in advance of the 2006 timeline, but in limited quantities and only in limited geographic areas. Second, the 2006 deadline for ULSD supply will be implemented in Canada at the same time as in the United States, requiring the upgrading of 194 refineries on the continent—18 in Canada, and 176 in the U.S. These upgrades draw on the same labour supply as the expansions of the oil sands and offshore sites. A continental labour shortage is already being felt in this sector. The 2006 deadline will put Canadian refineries in competition with U.S. refineries, the oil sands, and offshore oil developments. Members of the CTWG had different views as to whether Canadian refineries would be able to advance their construction dates to provide an early supply of ULSD in response to a market signal. Some felt it was not possible, while others thought that an instrument to encourage the staggering of refinery upgrading would be beneficial.

Those against a tax differentiation felt that such a measure would be in conflict with the one-step regulatory approach, which the industry has supported in Canada. This system requires all refiners to meet the same standard on the same date, unlike the U.S. system. Concerns about distribution and about capacity to implement the refinery upgrades are reasons why the Canadian refinery industry has supported this one-step approach. Another argument was that it would not be possible to precisely tailor a tax to the exact sulphur levels found in diesel. The tax could differentiate fuels with concentrations of sulphur above 15 ppm from those with concentrations below this level, but there exists a wide variation in the sulphur content of diesel fuels above the 15 ppm level. It varies by refinery, by season, and by batch. It would be administratively complex for a tax to reflect these actual levels.

Members of the CTWG who supported a tax differentiation focused on reasons for providing incentives for an advance ULSD supply. These are as follows: earlier health benefits from reductions in the sulphate contribution to PM; providing market signals that reward firms making an early transition to ULSD production; early availability makes possible more aggressive retrofits of existing HDD trucks and buses, and enables lower-emission vehicles to be operated sooner; and providing incentives for earlier construction of ULSD production facilities encourages staggered construction prior to the 2006 deadline.

Unless it is well designed, it is possible that a tax differential could simply lead fuel suppliers to pass on price differentials to consumers, negating any after-tax price differential at the pump. This scenario is plausible since the drivers of Phase II vehicles are "captive" to their need for ULSD and must buy it whatever the price. The intensely competitive fuel market will determine the price at retail, based on many factors of which taxes are only one. Thus, it cannot be predicted with certainty how a tax differential would affect final price at the pump.

4.3.5 Areas of agreement and disagreement

The working group agreed that the following EFR instruments should undergo further analysis:

- either a tax credit or a fee/rebate instrument, to encourage sales of the full Phase II engines above mandated thresholds in the period prior to 2009. For fiscal and policy reasons, the instrument would need to be designed to avoid a "windfall" for the Phase II engines required by law in the 2007–2009 period;
- a subsidy program for vehicle retrofits; and
- a buy-back program to accelerate the scrappage of more polluting HDD trucks and buses.

All of these instruments should be designed to be effective and equitable for the large number of small operators in the trucking industry.

The CTWG was not able to reach agreement on a recommendation regarding the use of a differentiated tax to accelerate demand and supply of ULSD prior to 2006.

4.3.6 Key observations

Three key context factors were found to have intense influence on the "real life" applicability of the instruments that were explored:

- For some issues and in some sectors, it may be more difficult to use EFR in Canada than in the U.S. The continental nature of the truck and engine manufacturing industry, combined with the comparatively modest size of the Canadian market, leaves little room for autonomous Canadian policy. We are effectively policy takers in this field. But having fewer actors in the Canadian market and/or fewer regional sources of environmental impacts makes some of the economic instruments being used in the U.S. clean air agenda (such as averaging, banking, and trading) less relevant here.
- In the context of a highly competitive market and a regulatory requirement for 50% of engines sold to meet the full Phase II standard during the 2007–2009 period, the market will move to eliminate any price differential between traditional engines and the full Phase II engine, and maintain their production at the 50% balance. In order to be effective, an economic instrument would have to send a signal larger than the increased cost of manufacturing full Phase II engines. In order to be equitable, the economic instrument would likely have to apply to all purchases of full Phase II engines, not only those above the 50% quota, since these would not be readily identifiable. This begins to look like a very costly program.
- Even if this issue is addressed, technological rigidities—such as the state of technologies, or the lead times required to road test and produce the new engine lines or to bring ULSD on-line—may preclude a rapid market response. In the CTWG's case study, the vehicle technology depends on parallel action on the fuels side. There is no point in speeding up production of cleaner vehicles if the cleaner fuels are unavailable. The U.S. EPA estimates that ULSD must have an 80% market availability in order to ensure that misfuelling of new engines does not occur.

These "real life" factors have a strong influence on the effectiveness of EFR tools.

While the sector focus of the CTWG's mandate encouraged it to delve in some depth into market and technology characteristics, it excluded consideration of some broader measures. For example, the CTWG looked specifically at how to reduce emissions from HDD truck and bus transportation. But some tools, such as differentiated fuel taxes, could be applied more widely within the petroleum products sector to all fuels. Other tools, such as vehicle scrappage funded by private industry seeking emission-reduction credits, may work best between sectors. The case study also revealed the importance of thinking through where in the supply chain it is most effective to target the EFR instrument. In the case of a market with few, large actors, engine manufacturers and fuel refiners are in a position to determine what product is supplied. Demand from individual purchasers is much less able to effect changes. The challenge for EFR analysis and design is to maintain breadth in the application of possible instruments.

Market characteristics matter, and attention must be given to the availability of close substitutes, especially where fiscal measures are contemplated that would encourage or discourage purchase of a given class of goods. Due attention must be given to supply-and-demand conditions. An example is the case of differential taxes on low- versus high-sulphur fuels. If relatively few people are operating vehicles that require the low-sulphur sort, the representative user will be indifferent between types. This means that, whatever the tax regime, consumers will not permit price differences between the two to persist. And presuming different cost structures, this means that two fuels will not coexist on the market.

The economic analysis revealed that the backdrop of the existing and planned regulations has a significant influence on the effectiveness of EFR measures. They should, therefore, be designed to take into account known features of pending regulations and be consistent with them. Some of the EFR options proved difficult to introduce in advance of the regulations coming into effect in 2006 and 2007. This suggests a long lead time is needed if EFR is being used to accelerate incrementality—to move beyond compliance. This means that EFR must be considered at the inception of the policy maker's discussions of management options.

The experience in exploring the potential use of EFR as a complement to regulation might have been different had the regulatory framework not already been largely determined and, in fact, set by U.S. initiatives. If Canada were able to exert more policy independence, and if the management options were still in development, more opportunities for EFR as a substitute for certain aspects of the regulations might have been found. For instance, could EFR substitute for the mandated 50% sales of full Phase II engines in the 2007–2009 period? Could it do so in a way that would avoid the apparent rigidity of this 50% target and create an incentive for continuous improvement beyond 50%?

Another useful role for EFR measures would be to ensure that they continue to deliver on the incrementality front even if the regulatory backdrop fades away. "Error-tolerant design" would allow for the fact that regulatory targets might be postponed or cancelled (indeed, successful EFR could trigger just such a thing by obviating the regulatory target).

4.4 Substances of concern summary

Note: The direction of this case study is still in the development stage.

Unlike the two EFR case studies documented above—both of which were quite advanced in the areas of issue definition, potential actions (such as regulatory procedures), and available instruments—the issue of substances of concern relating to CEPA legislation is at a much earlier stage of development.

This has made it more difficult to define objectives for this case study, but it also allows more room to explore a comprehensive suite of fiscal instruments. In fact, incorporating EFR tools at this early stage of discussion on implementing CEPA may provide the ideal circumstances in which to fully explore the practical applications of the EFR approach.

4.4.1 Issue statement

From an environmental standpoint, certain substances may raise concerns because of the inadequacy of environmental management at various stages of their life cycle. Concerns may arise, for example, about emissions from the manufacturing processes (either for the substances themselves or the unintended by-products), about the use of the substances in subsequent industrial processes or their eventual consumption, or about their disposal. While CEPA regulatory approaches may achieve reductions in environmental impacts through definition of management plans, these processes are expected to be time-consuming and resource-intensive, because of the need to reach decisions on a chemical-by-chemical basis.

4.4.2 Objective

The Substances of Concern Working Group identified its objective as being to:

assess the potential for using suites of fiscal instruments more efficiently to achieve an appropriate level of environmental management of chemicals through a global approach.

4.4.3 Proposed approach

The substances of concern issue represents both an opportunity and a problem in the context of an EFR case study approach. The opportunity resides in the fact that, being in the early stages of definition by government and other stakeholders, the issue offers the greatest potential for examining the use of EFR strategies without encumbrance from existing policy frameworks or positions. On the other hand, it appears that not all the stakeholders in this issue are equally seized with the magnitude and scope of the problem to be addressed.

The approach chosen for this case study allows for the broadest review of the potential EFR instruments that could be applied. The proposal is to use a matrix framework to develop a comprehensive picture of the challenges and opportunities for using EFR instruments to address management problems associated with substances of concern. This matrix is designed with the stages of life-cycle management on one axis and the economic instruments that could be applied to address management problems on the other. While the emphasis in this study will be placed on fiscal instruments such as emissions trading, incentive programs, or tax treatment, it will also

contemplate the role of other instruments such as voluntary programs and covenants. Overall, the focus will be on identifying novel and innovative approaches to solving the management problems identified in the matrix.

In order to gain early experience about the practical application of economic instruments, a second and concurrent study focus will be on the final disposal component in the life cycle. Specifically, this study will consider the question of how economic instruments could help to manage the disposal of hazardous waste. This research would be conducted in a similar fashion to the matrix approach described above, but with the emphasis on identifying in more detail how potential fiscal and other instruments apply to this specific issue. The narrower focus will allow testing of the broader matrix conclusions. It will also allow the group to reach some conclusions about the practical applications of EFR in this area at an early stage. Both the broad matrix approach, described above, and this more specific focus on hazardous waste are intended to complement each other and to mutually reinforce the content and substance of the case study.

4.4.4 Considerations

The working group identified the following considerations in contemplating the use of EFR for the management of substances of concern:

- Economic instruments should be considered on their own or as complementary to other instruments, including voluntary measures. Where instruments are designed to provide support for and enhance the voluntary efforts of industry, particular attention will be needed to ensure that early voluntary actions are not adversely affected by incentives granted for subsequent actions by competitors.
- Particular attention will have to be given to the fact that not all substances have equal environmental impacts. Consideration will be required of the need to create differentials in incentives and constraints to reflect this range of impacts. In exploring this, there will be a need to assess the extent to which any required degree of risk assessment would defeat the concept of having a streamlined process.
- The range of instruments considered should include both incentives to accelerate responses and constraints to prevent negative impacts. All-incentive approaches may also be evaluated. Included should be an analysis of the potential for emissions trading.
- Some industrial projects are undertaken strictly with an environmental objective, while others are broader in nature and incorporate both environmental and economic objectives (such as the construction of a totally new plant, which incorporates environmental improvements in its basic design). There will be a need to analyse how instruments could be applied to such broad projects.
- Instruments should focus on global approaches rather than individual chemicals. However, to facilitate analysis, smaller groupings of chemicals, and even single chemicals such as mercury, could be selected for analysis providing that results can be extrapolated to a global approach.
- Sub-groups could be formed for each element to be analysed in the manner set up for the Agricultural Landscapes Group. This would enable the appropriate network of interested stakeholders to be structured for each element with support from policy and economics experts. The combined group could then draw general conclusions.

5 Future Directions for Ecological Fiscal Reform

5.1 General directions for EFR in Canada

There is a role for EFR in Canada, and EFR can offer many benefits and opportunities. To realize its full potential a multi-pronged approach is needed.

A three- to five-year strategy is required to develop awareness of, comfort with, and increased understanding of the EFR approach among government, industry, environmental non-governmental organizations, technical experts, and broader civil society.

A strong leadership signal from senior policy makers will be necessary to assure the community of stakeholders and government policy advisors that EFR is of emerging interest to the government, and that energies invested in exploring innovative, measured, thoughtful approaches to EFR will be well received and likely to be implemented.

In Budget 2000, the federal government sent a strong leadership signal when it funded the NRTEE's Environment and Sustainable Development Indicators initiative. It did this with a statement of interest and commitment from responsible ministers, a three-year timeline for research and development of proposals, a budget to engage in original research, and a commitment of direct participation in the project of several government departments. A similar mandate, framework, and budget are needed to move the EFR agenda forward.

There is a need to expand the cadre of people who have experience with EFR approaches and analysis at the applied level. The NRTEE's EFR Program has begun this important process, building awareness, knowledge, and trust among key actors and decision makers. More such capacity building will be needed.

5.2 Recommendations for future EFR work by the NRTEE

The NRTEE should continue its important work on exploring the potential for using EFR in Canada. It can do so by advancing the recommendations of the case studies completed so far (where appropriate), facilitating further case studies, and providing opportunities for those working on EFR to share their work and have it peer-reviewed. Specifically:

The NRTEE should present case study conclusions on Agricultural Landscapes to the senior policy level in Agriculture and Agri-Food Canada, Environment Canada, and Finance Canada.

The purpose of this would be to solicit support in government to pursue the case in a coordinated manner. Other elements could be added to the work already done, but the work is sufficiently advanced to proceed to the specific design of instruments and defining of costs. This work could be pursued by the departments concerned. The NRTEE could ask that Finance Canada declare, in the Budget Statement, its interest in considering a final proposal on this work.

The NRTEE should explore the potential to further experiment in areas connected to the Cleaner Transportation focus.

The case study dealing with sulphur in diesel was seriously constrained by the fact that Environment Canada had already decided to adopt a regulatory approach to the problem by 2006–2009. As a result, there would not have been sufficient time left to put in place other fiscal measures to alter timing or depth of actions. However, two other issues surfaced that attracted interest because the analysis and options were at a much earlier stage of development and offered greater scope for exploration. These issues are:

- reduction or elimination of sulphur and other contaminants in heavy fuel oils. Being at the bottom of the barrel, this refinery cut absorbs much of the sulphur and will eventually be targeted, because it is used in heavy industrial facilities and also contributes to deterioration of clean air.
- implementation of new engine technologies, including hybrid-electric and fuel cells. Much research is going on in this field, but the problem of market penetration is ongoing.

It is recommended that this case study be pursued in partnership with federal departments involved in these two issues.

The NRTEE should develop the case study on Substances of Concern under CEPA.

This case offers an opportunity to truly integrate EFR thinking when an issue is initially considered and it allows comparison with a more regulatory approach. It will enable a fundamental examination of a broader array of potential instruments. The case offers specific potential for actions in an issue area, as well as providing further experiences to test the concept of EFR and build on the specific lessons learned from the Agricultural Landscapes and Cleaner Transportation cases.

The NRTEE should raise awareness of the use of EFR concepts in two major NRTEE programs.

The Urban Sustainability and Conservation of Natural Heritage programs are planning to explore the potential for an EFR approach to a coordinated solution of issues they will identify.

The NRTEE should explore collaboration between the EFR Program and the Environment and Sustainable Development Indicators initiative (ESDI).

The EFR program and the ESDI initiative are both cross-cutting, integrative programs addressing innovative approaches to sustainable development. There is a unique opportunity for the NRTEE to explore the opportunity for shared research and combined initiatives between these programs.

The NRTEE should engage broader stakeholder support and commitment and build capacity for EFR through an annual forum on the subject.

There is a need to build a critical mass of analysts and policy makers in the area of EFR. A key initiative in this regard could be to organize and convene a series of NRTEE conferences on EFR. These

conferences would be conducted in partnership with other organizations active in EFR research and implementation. They could be held on an annual basis for a period of three to five years, serving as a forum where people can compare notes and experiments to advance knowledge of EFR. A forum of this kind would also establish the NRTEE in a central (and visible) position in this new subject area.

Appendix A: The NRTEE's EFR Program: Goal and Process

The goal of the NRTEE's EFR program is to gain insight into the key challenges and opportunities related to EFR, and to explore the potential for EFR in Canada. The program has included a review of the international experience with EFR, along with the use of three case studies: on agricultural landscapes, cleaner diesel transportation, and substances of concern. This approach is intended to:

- explore EFR application specifically in the Canadian context;
- expand the base of knowledge and understanding regarding how an EFR strategy can be useful;
- move beyond theoretical discussions on EFR and assess the practical policy aspects of EFR application, such as instrument design, integration with other policy tools to create a suite of measures, analytical needs, and options for measures design;
- draw lessons from the case studies to construct a framework for EFR, including guiding principles that can apply to a broader range of sustainable development issues; and
- identify specific recommendations arising from the case studies for governments to consider for their 2002 budgets. This was a welcome, but not essential, secondary objective.

To accomplish this, a 40-member Expert Advisory Group was created. It was composed of high-level representatives from industry, non-governmental organizations (NGOs), and provincial and federal governments. Their mandate was to guide the framework for selecting policies and measures, define the key issues and objectives to be used for the case studies, and provide intermittent feedback to the

working groups struck to conduct these case studies. Members of the three working groups, who had specific subject issue expertise, were also drawn from industry, NGOs, and federal and provincial governments. Their task was to select the family of fiscal instruments to be used to meet the objective established by the Expert Advisory Group, to analyse the issues raised by the choice of these instruments, and to consider mitigating instruments and actions to overcome the problems potentially arising from this choice of instrument. Technical advisors assisted the Expert Advisory and working groups, and NRTEE staff provided program direction and secretariat assistance.

The exploration of EFR was conducted in six steps:

- establishing the scope of EFR to be pursued;
- identifying potential issues for EFR;
- identifying candidate fiscal instruments;
- independent economic/policy analysis of candidate fiscal instruments;
- expert/stakeholder recommendations on a package of fiscal instruments; and
- drawing lessons and guiding principles for general application.

Because a major purpose of the program is to learn about the application of EFR in Canada, consensus was not a necessary objective. Where different views existed, these were described and recorded.

Appendix B: Membership of the Expert advisory and working groups

Note: These lists contain the names of people who attended one or more meetings of a given group within the Ecological Fiscal Reform (EFR) Program as group "members" or "alternate" representatives of their organizations. As this first phase of the EFR program has been conducted over the period of June 2000–December 2001, some participants' titles/organizations may have changed.

The conclusions reached in this report reflect the collective input of the participants in the Ecological Fiscal Reform Program. They do not necessarily reflect the personal opinions of individuals listed here or the views of an individual's respective organization.

Expert Advisory Group

- Mark Anielski, *Director, Pembina Institute for Appropriate Development*
- Elizabeth Atkinson, *Senior Consultant, Marbek Resource Consultants Ltd.*
- Ken Baker, *Assistant Deputy Minister, B.C. Green Economy Secretariat*
- Stephan Barg, *Associate and Senior Program Advisor, International Institute for Sustainable Development*
- Gilles Beaudet, *Fondation québecoise de l'environnement*
- Jerry Beausoleil, *Director General, Strategic Policy Branch, Industry Canada*
- Jean Bélanger, *NRTEE Member and Chair, Economic Instruments Committee*
- Jack Belletrutti, *Vice-President, Canadian Petroleum Products Institute*
- Steve Blight, *Project Leader, Environmental Economics Branch, Environment Canada*
- Mark Bowlby, *Economist, Resources, Energy and Environment, Finance Canada*
- Lise Brousseau, *NRTEE Member*

- Stephanie Cairns, *Environmental Strategies and Management Consultant, Stratos Inc.*
- Jim Campbell, *Director, Economic and Fiscal Analysis, Energy Sector, Natural Resources Canada*
- Krista Campbell, *Resources, Energy and Environment, Finance Canada*
- Daniel Cayen, *Director, Environmental Partnerships, Ministry of Environment and Energy, Government of Ontario*
- Nathalie Chalifour, *Senior Advisor, Trade, Investment and Policy, World Wildlife Fund*
- Mike Cleland, *Senior Vice-President, Canadian Electricity Association*
- Fiona Cook, *Vice-President, Government Relations and International Trade, Forest Products Association of Canada*
- John Dillon, *Vice-President, Environment and Legal Counsel, Business Council on National Issues*
- Richard Dixon, *Policy Secretariat, Alberta Environment*
- Stephen Dobson, *Economic Analyst, Alberta Environment*
- David Goffin, *Secretary Treasurer and Vice-President, Business and Economics, Canadian Chemical Producers' Association*
- Dan Goldberger, *Senior Financial Advisor, Canadian Electricity Association*
- Peter Globensky, *Director General, Canadian Council of Ministers of the Environment*
- Martin Green, *Director, Economic Framework Policies, Industry Canada*
- Frédéric Guay, *Analyses économique, Ministère de l'Environnement du Québec*
- Chantal Guertin, *Energy Economist, International Institute for Sustainable Development*
- Brian Guthrie, *Director, Innovation and Knowledge Management Practice, Conference Board of Canada*
- Arlin Hackman, *Vice-President, Conservation, World Wildlife Fund Canada*
- Arthur Hanson, *Distinguished Fellow and Senior Scientist, International Institute for Sustainable Development; Strategic Advisor, EFR Program*
- Michael Harcourt, *NRTEE Member, Senior Associate, Sustainable Development Research Institute*
- Doug Horswill, *Vice-President, Environment and Public Affairs, Cominco Limited*
- Allan Howatson, *Principal Research Associate, Business and Environment Research Program, Conference Board of Canada*
- Rick Hyndman, *Senior Policy Advisor, Climate Change, Canadian Association of Petroleum Producers*
- Colin Isaacs, *President, Contemporary Information Analysis Ltd.*
- Michael Kelly, *Director of Sustainable Development, TransAlta Corporation*
- Sue Kirby, *Associate Assistant Deputy Minister, Natural Resources Canada*
- Luis Leigh, *A/Director, Environmental Economics Branch, Environment Canada*
- Eric Leviten, *Senior Researcher, Caledon Institute of Social Policy*
- Ingrid Liepa, *Senior Environmental Legal Advisor, TransAlta Corporation*
- Gordon Lloyd, *Vice-President, Technical Affairs, Canadian Chemical Producers' Association*
- Kerry Mattila, *Vice-President, Canadian Petroleum Products Institute*
- Elizabeth May, *Executive Director, Sierra Club of Canada*
- Stephen McClellan, *Director General, Economic and Regulatory Affairs, Environment Canada*
- Margaret McCuaig-Johnston, *General Director, Economic Development and Corporate Finance, Finance Canada*

- Patricia McCunn-Miller, *NRTEE Member, Managing Director, Environment and Regulatory Affairs, PanCanadian Energy Limited*
- Barry McFarlane, *Economic Consultant, Government of Ontario*
- David J. McGuinty, *President and CEO, NRTEE*
- Robert McLean, *Director, Wildlife Conservation Branch, Canadian Wildlife Service, Environment Canada*
- Jack Mintz, *President and CEO, C.D. Howe Institute*
- Bob Mitchell, *Vice-President, Climate Change Central*
- Ronald Nielsen, *Manager, Environmental Affairs and Sustainability, Alcan Inc.*
- Gene Nyberg, *Corporate Secretary and Director of Operations, NRTEE*
- Kenneth B. Ogilvie, *NRTEE Member, Executive Director, Pollution Probe Foundation*
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- David Pollock, *Executive Director, Pembina Institute for Appropriate Development*
- Hugh Porteous, *Director, Research and Corporate Relations, Alcan Inc.*
- Arthur R. Price, *Chairman and CEO, Axia Net Media Corporation*
- Gilles Rheaume, *Vice-President, Conference Board of Canada*
- Chris Rolfe, *Staff Counsel, West Coast Environmental Law*
- Sara Rose-Carswell, *Policy Advisor, NRTEE*
- Angus Ross, *NRTEE Member, Chairman, L&A Concepts*
- Jack H. Ruitenbeek, *H.J. Ruitenbeek Resource Consulting Limited*
- Kai Schlegelmilch, *Consultant, Nature Conservation and Nuclear Safety, Federal Ministry for the Environment, Germany*
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- Joe Thwaites, *President, Taylor Munro Energy Systems Inc.*
- Glen Toner, *Facilitator for EFR Program, Professor, Department of Environment, Carleton University*
- Sherri Torjman, *Vice-President, Caledon Institute of Social Policy*
- Alexandre Turgeon, *Premier vice président, Vivre en Ville*
- Barry Turner, *Director of Government Relations, Ducks Unlimited Canada*
- Thomas Van Camp, *Senior Policy Analyst, Strategic Policy Branch, Industry Canada*
- Peter Victor, *Dean, Faculty of Environmental Studies, York University*
- Hassan Yussef, *Executive Vice-President, Canadian Labour Congress*

Agricultural Landscapes Working Group

- Gilles Beaudet, *Fondation québecoise de l'environnement*
- Jean Bélanger, *NRTEE Member and Chair, Economic Instruments Committee*
- Kenneth Belcher, *Assistant Professor, Centre for Studies in Agriculture, Law and the Environment, Department of Agricultural Economics, University of Saskatchewan*

- Steve Blight, *Project Leader for CEA, Environment and Regulatory Affairs, Environment Canada*
- Richard Dixon, *Policy Secretariat, Alberta Environment*
- Bob Dobson, *Conservation Farmer, Cobden, Ontario*
- Jan Dyer, *Associate Director General, Agriculture and Agri-Food Canada (AAFC)*
  (AAFC Alternates: Jackie Holden, *Cross Sectoral Policy Development*
  Asim Maqbool, *Research Economist*
  Roger Martini, *Economist, Special Projects)*
- Brian Gray, *Director of Conservation Programs, Ducks Unlimited Canada*
- Frédéric Guay, *Analyses économique, Ministère de l'Environnement du Québec*
- Arthur Hanson, *Distinguished Fellow and Senior Scientist, International Institute for Sustainable Development; Strategic Advisor, EFR Program*
- Jennifer Higginson, *Policy Analyst, Canadian Federation of Agriculture (CFA)*
  (CFA Alternate: Nicole Howe, *Policy Analyst*)
- William Johnstone, *NRTEE Member, Moose Jaw, Saskatchewan*
- Robert McLean, Director, *Wildlife Conservation Branch, Canadian Wildlife Service, Environment Canada*
- Nancy Olewiler, *Department of Economics, Simon Fraser University*
- Sara Rose-Carswell, *Policy Advisor, NRTEE*
- Thomas Shenstone, *Chief, Agriculture and Fisheries, Department of Finance*
  (Finance Alternates: Shamika Sirimanne, *Senior Economist, Economic Development Policy Division*
  Krista Campbell, *Resources, Energy and Environment*)

Expert Presenters:

- David Armitage, *Senior Researcher, Ontario Federation of Agriculture*
- Geri Kamenz, *Chair, Environment, Canadian Federation of Agriculture*
- Alexandra Leroux, *Agente de développement, Clubs-conseils en agro-environnement*
- Robert Stephenson, *Director, Conservation and Environmental Programs, United States Department of Agriculture*

Cleaner Transportation Working Group

- Jean Bélanger, *NRTEE Member and Chair, Economic Instruments Committee*
- Steve Blight, *Project Leader for CEA, Economic and Regulatory Affairs, Environment Canada*
- Eric Boudreault, *Fuels Policy/Oil Division, Natural Resources Canada*
- David Bradley, *CEO, Canadian Trucking Alliance*
- Stephanie Cairns, *Environmental Policy Consultant, Stratos Inc.*
- Donald Dewees, *Department of Economics, University of Toronto*
- Richard Gilbert, *Research Director, Centre for Sustainable Transportation*
- Michael Hanrahan, *Legal Department, Irving Oil Inc.*
- Sue Kirby, *Associate Assistant Deputy Minister, Natural Resources Canada*
- Ron Lennox, *Vice-President, Regulatory Affairs, Canadian Trucking Alliance*
- Bob Lyman, *Senior Director, Oil Division, Natural Resources Canada*
- Kerry Mattila, *Vice-President, Canadian Petroleum Products Institute*
- Steve McCauley, *Director, Oil, Gas and Energy Branch, Environment Canada*

- Mark Nantais, *President, Canadian Vehicle Manufacturers' Association*
- Kenneth Ogilvie, *NRTEE Member, Executive Director, Pollution Probe Foundation*
- Beatrice Olivastri, *Executive Director, Friends of the Earth*
- Finn Poschmann, *Senior Policy Analyst, C.D. Howe Institute*
- Peter Reilly-Roe, *Assistant Director, Transportation Energy Use Division, Natural Resources Canada*
- Sara Rose-Carswell, *Policy Advisor, NRTEE*
- Angus Ross, *NRTEE Member, Chairman, L&A Concepts*
- Helen Ryan, *Senior Advisor, Ecological Instruments, Environment Canada*
- Amelia Shaw, *Manager of Public Affairs, Canadian Urban Transit Association*
- Mark Tushingham, *Acting Head, Refinery Processes, Oil, Gas and Energy, Environment Canada*

Substances of Concern Working Group

- John Arseneau, *Director General, Toxics Pollution Prevention, Environmental Protection, Environment Canada*
- Jean Bélanger, *NRTEE Member and Chair, Economic Instruments Committee*
- David Bennett, *National Director, Environment Committee, Canadian Labour Congress*
- Ed Berry, *Vice-President, Canadian Manufacturers of Chemical Specialties Association*
- Mark Bowlby, *Economist, Resources, Energy and Environment, Finance Canada*
- Kevin Brady, *Consultant, Five Winds International*
- Daniel Cayen, *Director, Environmental Partnerships, Ministry of Environment and Energy, Government of Ontario*
- Michael Cloghesy, *Président, Centre patronal de l'environnement du Québec*
- Rick Findlay, *Director, Ottawa Office, Pollution Probe Foundation*
- Barry Lacombe, *President, Canadian Steel Producers Association*
- Justyna Laurie-Lean, *Vice-President, Mining Association of Canada*
- Gordon Lloyd, *Vice-President, Technical Affairs, Canadian Chemical Producers' Association*
- Stephen McClellan, *Director General, Economic and Regulatory Affairs, Environment Canada*
- Patrick O'Neill, *Senior Policy Advisor, Executive Director's Office, Natural Resources Canada*
- Sara Rose-Carswell, *Policy Advisor, NRTEE*
- Jackie Scott, *Environment and Health Project Manager, International and Domestic Market Policy, Natural Resources Canada*
- Mimi Singh, *General Counsel and Director, Environment, Health and Safety, Canadian Plastics Industry Association*
- Dean Stinson O'Gorman, *Senior Economist, Environmental Economics Branch, Environment Canada*
- Val Traversy, *Director General and Manager, Industrial Analysis and Strategies, Industry Canada*

Appendix C: EFR Program Meetings

1. ***Expert Group, Ottawa, June 2000***

- Building a common base of knowledge: international experience and EFR in theory
- Preliminary identification of key challenges and opportunities for EFR in Canada
- Approval of a program agenda and process

2. ***Expert Group, Vancouver, December 2000***

- Development of a selection process to choose issues suitable for EFR
- Preliminary scoping of candidate case studies
- Identification of suite of fiscal instruments to be used in EFR

3. ***Expert Group, Ottawa, February 2001***

- Briefings on ecological, technological, and policy aspects of candidate case studies
- Application of December selection process, to choose three case studies, and respective policy objectives and terms of reference

4. ***Case Study Working Groups, March-June 2001***

- Refinement of policy objective
- Identification of approaches, opportunities, and barriers to meeting policy objective
- Identification of the package of fiscal instruments for economic analysis

5. ***Expert Group, Ottawa, June 2001***

- Feedback to working groups on progress to date
- Preliminary discussion on observations and lessons regarding application of EFR in Canada

6. Case Study Working Groups, June-November 2001

- Independent economic analysis of suite of fiscal instruments
- Identification of case study observations and lessons learned
- Approval of working group report, including recommendations on suite of fiscal instruments for specific issue being studied

7. Expert Group, Ottawa, October 2001

- Approval of Guiding Principles and Framework arising from the case studies
- Conclusions on observations and lessons regarding application of EFR in Canada
- Approval of Phase 1 Report

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