

Applying International Policy Lessons for Sustainable Agriculture to New Zealand

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Abstract

New Zealand's economy is trade-oriented and heavily dependent on its biological and natural resource base. Around 54% of New Zealand's land area is grassland used for pastoral agriculture (as at June 2004) (Statistics New Zealand, 2005). On average, 90% of pastoral production is exported (ABARE and MAF, 2006). This dependence on natural resources for economic development and growth provides a strong incentive to maintain the productive capacity of those resources. The sustainability of New Zealand's agricultural and horticultural sector ("agricultural sector") is therefore important to New Zealand's environment, economy and sense of national identity.

Internationally, there is considerable policy work on the concept of sustainable agriculture. This gives New Zealand the opportunity to interpret that work for the New Zealand context. Specific initiatives such as definitions, strategies and instruments are used to explore the lessons New Zealand can learn from the experience of other countries and which of their initiatives (or elements of these) may be applicable to New Zealand. New Zealand currently favours a voluntary approach to improving environmental performance; however regulation may be used as a backstop where necessary. Central, regional and local government, non-governmental organisations and academic institutions all contribute to sustainable agriculture.

1. Introduction

New Zealand's economy is trade-oriented and heavily dependent on our biological and natural resource base. Agricultural and horticultural products contributed 55% of agricultural export receipts during 2005-2006 (ABARE and MAF, 2006). On average, 90% of pastoral production is exported (ABARE and MAF, 2006). This provides a strong incentive to maintain the productive capacity of those resources. Agriculture is particularly important for sustainability in New Zealand because approximately 54% of New Zealand's land area is grassland, 2.4% is used for grain, seed and fodder crops and 0.8% is used for horticulture (Statistics New Zealand, 2005). Ensuring the sustainability of the agricultural sector is an important step in ensuring the sustainability of New Zealand. This paper explores and explains the various policy instruments that have been used in other countries, to determine which of these initiatives may be relevant for the New Zealand context.

Sources such as the United States' Environmental Protection Agency (USEPA) and Department of Agriculture (USDA), and the United Kingdom's Department for Environment, Food and Rural Affairs (DEFRA) provide useful central government perspectives. Literature produced by the Organisation for Economic Co-operation and Development (OECD) discussing sustainable agriculture (e.g. OECD 2001a, 2001b and 2004) generally focuses on using property rights and economic instruments to correct "market failure", often from the perspective of countries that provide subsidies to farmers. This perspective differs from the New Zealand situation as this country provides very limited financial support to farmers, mainly in the form of research and biosecurity protection. Other OECD publications (e.g. OECD, 2001c) provide an insight into the role of agri-environmental indicators to assist with measuring sustainability.

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This paper is concerned with sustainability in horticulture and agriculture (“sustainable agriculture”) and is intended to explain how sustainable agriculture is being approached by other countries, compared with initiatives that are already occurring in New Zealand. The paper begins with a discussion of selected definitions of sustainable agriculture in section two. This section also includes a brief discussion of agriculture’s recognised environmental impacts and the economic benefits associated with sustainable agriculture. Section three of this paper discusses the main types of policy instruments currently in use and their applicability for New Zealand. The lessons learned and possible directions for future policy development are summarised in section four.

2. Sustainable agriculture

2.1 Defining sustainable agriculture

Sustainable agriculture has been defined in many ways. In New Zealand, the term “sustainable agriculture” relates mainly to reducing the negative environmental effects of agriculture while maintaining its economic viability. The main differences between various definitions are the scope of the definition and the emphasis placed on various social, environmental and economic components.

Scope

The scope of a definition may relate to the mandate of the organisation or to the scope of a particular project being undertaken by the author(s). The Food and Agriculture Organisation of the United Nations (FAO) (2006) states that “[a]griculture and rural development are sustainable when they are ecologically sound, economically viable, socially just, culturally appropriate, humane and based on a holistic scientific approach.” FAO’s Sustainable Agriculture and Rural Development (SARD) project therefore tackles the wider issues of natural resources, the environment, health, social, institutional and economic sectors as well as agriculture (FAO, 2006). SARD also encompasses employment, living and working conditions and attempts to increase self-reliance in the agricultural sector (FAO, 1995).

The USDA’s Sustainable Agriculture Research and Education program (SARE) (undated *b*) considers that sustainable agriculture is about encouraging consumers and producers to consider the ecological, social and economic aspects of agriculture, rather than a specific set of practices. OECD (2001*b*) emphasises that there is no single way for farms to become sustainable, rather the transformation to sustainable systems will depend on management practices, technology and policy frameworks that are appropriate to the local environment. OECD (2001*b*) states that all types of farming systems have the potential to be sustainable.

Emphasis

Many definitions integrate social, economic and environmental concerns relating to agriculture. For example, the United States Congress addressed the question of defining sustainable agriculture in 1990, when the Food, Agriculture, Conservation, and Trade Act (“Farm Bill”) was passed. The Farm Bill defines sustainable agriculture as an integrated system that will produce a range of outcomes, including satisfying demand, improving environmental quality, using resources efficiently, economic viability and enhancing quality of life (FACTA, 1990). Some definitions, such as that by OECD (2001*a*), imply that the most important factor in determining whether agricultural production is sustainable is whether production can meet demand. Food security is a concern for some countries, however satisfying domestic demand may not necessarily be sustainable. Any system must fit within its environmental limits to be considered sustainable. If these limits are exceeded, then an

eventual ecological collapse is likely to result in an abrupt decrease in system productivity. Care must therefore be taken to avoid irreversible damage to the life sustaining capacity of the environment.

2.2 Potential environmental impacts of agriculture

Modern agricultural systems vary, however those in developed countries commonly operate on a large scale, with single crops grown continuously over many seasons (Gold, 1999). Large capital investments are often required to employ new technology (Gold, 1999) and farms are becoming increasingly intensive in their use of natural resources. This means that some types of agriculture have the potential to have a much greater impact on the environment now than in previous times. In 1998, OECD Ministers of Agriculture agreed that Member governments should "... take actions to ensure the protection of the environment and sustainable management of natural resources in agriculture by encouraging good farming practices, and create the conditions so that farmers take both environmental costs and benefits from agriculture into account in their decisions" (OECD, 2000). This statement has led to increased policy activity in the area of agricultural sustainability.

Agriculture has many impacts on the environment and people, both positive and negative. The potential impacts of agriculture on soil quality, land quantity, water quality and quantity, air quality, biodiversity, wildlife and semi-natural habitats, rural landscape and human health are highlighted by OECD (2001a; 2001b) and Gold (1999). It is important to note that the environment is dynamic and the long-term relationships between farming practices and the environment are complex (Gold, 1999). All sectors have environmental impacts but agriculture is significant because of the large area of land involved and the importance of food production for human survival (OECD, 2001a). Agriculture is a major resource user in many OECD countries (OECD, 2001a), particularly of water used for irrigation. In New Zealand, agricultural irrigation utilises approximately 77% of all water taken for use (MAF, 2006). Environmental management in the past has tended to focus on single objectives, such as soil conservation, to improve productivity (OECD 2001b). Many OECD countries are now using an ecosystem management approach to manage natural resources (OECD 2001b). An ecosystem approach integrates the management of land, water and living resources and uses scientific methods to assess the essential processes, functions and interactions among organisms and their environment (OECD 2001b).

OECD (2001a) recognises that "[g]ood farming practices are usually site and farm system-specific." In addition, farming practices that are perceived as "good" vary depending on the local environment, type of farm and social and cultural factors (OECD, 2001a). For example, the environment in Europe has adapted to agricultural systems over thousands of years. This means that the local wildlife has adapted to a modified environment, and human perceptions of what makes a pleasant landscape are different to those in other parts of the world. Some countries consider that features of the agricultural landscape such as hedges play an important role in maintaining biodiversity (OECD, 2001a). The New Zealand landscape has a much shorter history of human modification and our native biodiversity tends to depend on the undeveloped areas of the country, rather than agricultural areas. Organisations such as the Queen Elizabeth II National Trust (QE II) are working to protect significant natural and cultural features on private land (QE II, undated).

2.3 Economic benefits of sustainable agriculture

OECD (2001a) states that producers' and consumers' choices may induce a change to more environmentally friendly production methods, leading to improved environmental

performance. This view is supported by the University of California Sustainable Agriculture Research and Education Program (SAREP). SAREP (1997) believes that consumers, through their purchasing choices, have the opportunity to send strong messages to producers and retailers. Demand for sustainably produced products is increasing in both overseas and domestic markets. Protecting and enhancing New Zealand's natural advantage in a sustainable way is important for the nation's prosperity and wellbeing. Some parts of New Zealand's agricultural sector, particularly the pipfruit industry, have created Integrated Pest Management (IPM), an integrated low chemical use pest management system. This system has economic benefits (from reducing the quantity of inputs required) and is a useful means of achieving the pest-free and residue-free status required by some markets.

3. Organisational roles and policy instruments

Many types of organisations contribute to the international discussion on sustainable agriculture. Non-governmental organisations (NGOs) and academic institutions play an important role in civil society by provoking debate and disseminating information. Central, regional and local levels of government all formulate and implement policies and engage with society at a number of levels. Governments influence society and the economy by adopting various policy interventions. A mix of interventions such as regulatory frameworks, information and economic instruments is generally required (OECD, 2004). Each country has its own local environment and culture which needs to be taken into account when choosing appropriate policy interventions or instruments (OECD, 2004). Some countries have experienced severe and potentially irreversible environmental impacts, which has led varying responses. For example, salinity and desertification are major concerns in some areas.

The main types of agri-environmental policy instruments currently in use are (OECD, 2001a; 2004): regulatory requirements; national strategies; incentive payments and subsidies; taxes and charges; tradeable rights; community-based approaches; voluntary targets and codes of practice; research; extension and education; and awards.

3.1 Regulatory requirements

Regulatory requirements range from prohibitions of specific substances or activities to setting environmental standards and restrictions on resource use (OECD, 2004). Regulation is a widely used tool that can generally be applied in some form by all levels of government. Regulatory requirements are increasingly set by local or regional levels of government to deal with local issues under a national framework (OECD, 2004). Regulation is especially useful in situations where transaction costs are considered to be too high for an efficient market, where greater certainty over future behaviour and the likely consequences is required and to encourage innovation. Regulation is therefore always likely to be a key part of effective environmental and natural resource management.

The United Kingdom's Department for Environment, Food and Rural Affairs (DEFRA) Action Programmes are compulsory in Nitrate Vulnerable Zones (NVZs), which cover 55% of England, and voluntary in all other areas (Amin-Hanjami and Todd, 2006). The Action Programme measures specify best practice in the use and storage of fertiliser and manure (DEFRA, 2004). This programme is linked to the Common Agricultural Policy (CAP) Reform, which replaced production-linked crop and livestock payments with a Single Payment Scheme in 2005 (Amin-Hanjami and Todd, 2006). This is a cross-compliance policy (discussed later in more detail) which requires farmers to demonstrate that they are keeping land in "Good Agricultural and Environmental Condition" and complying with a number of other specified legal requirements (Amin-Hanjami and Todd, 2006). In New Zealand, the

Resource Management Act 1991 and regional and local planning tools under the Act regulate the environmental effects of agricultural and other activities.

3.2 National strategies

Some countries have launched national strategies to promote sustainable agriculture, for example the United Kingdom's *Strategy for Sustainable Farming and Food* (DEFRA, 2002) and the United States' *National Strategy for Agriculture* (EPA, 2006). The *Strategy for Sustainable Farming and Food* outlines how the Government, industry and consumers can co-operate to "secure a sustainable future for our farming and food industries, as viable industries contributing to a better environment and healthy and prosperous communities" (DEFRA, 2002). This contrasts the vision of the US Strategy (EPA, 2006), which promotes the agricultural sector as a source of solutions for improving environmental quality and gives equal weighting to non-traditional, innovative, voluntary and traditional (regulatory) approaches (EPA, 2006).

Strategies are useful for bringing together work strands and projects to make a strong statement about a country's desired policy direction. A national strategy could be useful for New Zealand to show that it is serious about maintaining and enhancing its "clean, green" image. Some industries within the agricultural sector in New Zealand have already developed their own strategies, such as the *Dairy Industry Strategy for Sustainable Environmental Management* (Dairy Environment Review Group, 2006). It is important to ensure some consistency between industries, so an overarching national strategy may be desirable. However, given the diversity between and within industry groups (e.g. dairy and sheep and beef industries) in New Zealand's agricultural sector, it may be more effective for government to work in partnership with each industry group to develop a meaningful strategy for that industry.

3.3 Incentive payments and subsidies

Some countries, particularly in Europe and the United States, use incentive payments to improve the environmental performance of the agricultural sector (OECD, 2004). For example, payments can be made for retiring land, using less intensive farming practices and assisting in the transition of structural changes (OECD, 2004). Total European Union expenditure on agri-environmental payments is projected to be 3.7 billion euros per annum over the 2000-2006 period (OECD, 2004). This type of payment does not occur in New Zealand.

Production linked subsidies, which are provided to farmers in some countries, can inadvertently encourage practices that are harmful to the environment, for example by increasing chemical use (OECD, 2004). Farmers that receive direct payments can be required to adopt certain prescribed conservation practices ("cross-compliance") (OECD, 2001a; 2001b). One of the key limitations of cross-compliance is that the farmers receiving conditional payments are not necessarily those farming on environmentally sensitive land (OECD, 2004). This practice is not applicable in New Zealand, as subsidies are not provided. OECD (2004) has noted that "[t]he cost of protecting the environment would be lower in the absence of production-linked support measures."

3.4 Taxes and charges

OECD (2004) notes the problems with isolating agricultural decisions from real world costs and benefits. Many processes and activities have effects that spill over boundaries and have negative or positive impacts on people or the environment ("externalities") (OECD, 2001a).

Internalising agricultural externalities would provide price signals to farmers that would guide production decisions and create a financial incentive to reduce environmental harm (i.e. implementing the Polluter Pays Principle) or at least remove a reason to create environmental harm (OECD, 2001*a*; 2001*b*). Economic instruments such as taxes and charges are theoretically more flexible and cost-effective than regulation (World Bank Group, 1998).

The Polluter Pays Principle can be difficult to apply in practice: many pollutants from agriculture are discharged in a diffuse manner, so it can be hard to pinpoint the origin of the pollutants and charge the appropriate person (OECD, 2001*b*); and the type and quantity of discharges depend on a number of factors including local climate and geography (OECD, 2001*b*). However, the principle has been accepted as a useful tool for co-ordinating pollution policy (OECD, 1998). In spite of this, OECD (2004) states that the use of taxes and charges to directly internalise environmental costs in agricultural decision-making appears to be limited. The OECD speculates that this may be due to a different perception of property rights in the agricultural sector compared to other sectors, as well as logistical difficulties. OECD (2001*a*; 2004) notes that agriculture is a long standing land use in many countries, and has retained a “presumptive” right to pollute above that accepted by society for other sectors. The issue of agriculture dealing with its environmental impacts is similar to the history of pollution by industry generally. According to OECD (2001*a*), industry initially had a “presumptive” right to pollute, however, once the assimilative capacities of the environment began to be exceeded, the pollution caused by industry began to impose costs on other parts of the economy. At this stage environmental standards were established, to articulate the permitted amount of pollution. The introduction of new environmental standards alters the balance of property rights. Property rights evolve over time for a variety of reasons (see e.g. OECD, 2001*a*). OECD (2004) argues that clearer definition of agricultural property rights would be useful for determining where costs should lie.

In the Netherlands, water boards (self-governing bodies of surface water users responsible for water management) set a water pollution charge based on the revenue required for sewage treatment and for maintaining and improving water quality in general (World Bank Group, 1998). World Bank Group (1998) believes that the scheme works well because the charge is aimed at providing full cost recovery of sewage treatment, it is directly linked to pollution load and the programme is decentralised and transparent for water users. New Zealand’s Resource Management Act 1991 allows regional councils to recover resource consent costs.

3.5 Tradeable rights

Tradeable rights systems are generally set up by local or regional levels of government, which define a limit to the quantity of pollution acceptable within a defined area. The rights to pollute are then allocated in some way (e.g. by auction or grandparenting) and participants in the scheme are allowed to trade the rights among themselves. Using a market situation to internalise externalities could be a useful tool for dealing with a dynamic environment, as markets have the ability to continually adapt to new information (OECD, 2001*b*). Tradeable rights are not used widely in agri-environmental policy, however they have been used in the Netherlands and on a state/regional basis in the United States and Australia (OECD, 2004). The concept of tradeable rights is new to New Zealand. This approach may be useful in specific circumstances, however social and cultural constraints, market size and the issue of who should manage and regulate such a scheme means that the wider applicability of trading schemes in New Zealand requires further consideration. A nitrogen trading scheme is proposed for the Lake Taupo catchment.

3.6 Community-based approaches

Community based approaches, such as landcare groups, are often formed by landholders in rural areas to deal with common resource management issues, using local expertise to solve local problems. The groups facilitate greater co-operation and dialogue in farming communities, which can help to improve the uptake of new technologies and practices (OECD, 2001*b*). Community groups are an important method of building social capacity for behaviour change and are widespread in Australia, Canada and New Zealand (OECD, 2004). Australia has a long standing National Landcare Programme (NLP) which is supported by central government (DAFF, 2006). The Department of Agriculture, Fisheries and Forestry (DAFF) (2006) considers that the NLP, which is voluntary, has been highly effective in encouraging farmers to adopt sustainable management practices and improve their productivity and profitability. DAFF (2006) believes that “[t]he partnership between government and the community is critical to encouraging on-ground action to improve natural resource management at the farm, catchment and regional level.” In the United Kingdom, a private organisation, English Farming & Food Partnerships (EFFP), was formed in April 2003 (DEFRA, 2005). The organisation aims to “strengthen the profitability, competitiveness and sustainability of England's farming, food and related farm based industries” (DEFRA, 2005). Developing closer relationships between farmers and between farmers and the food supply chain will help to reach this goal (DEFRA, 2005). Non-governmental organisations such as landcare groups are popular and successful in New Zealand (see e.g. New Zealand Landcare Trust, undated).

3.7 Voluntary targets and codes of practice

Industries prefer voluntary approaches to improve flexibility (by increasing the number and type of options available to meet proposed outcomes) and to reduce potential compliance costs of regulation. However, proposed outcomes from voluntary measures are generally not perceived by some groups, particularly non-governmental organisations, to hold the same level of certainty as those proposed and enforced by government. DEFRA Action Programmes are voluntary for farmers not inside Nitrate Vulnerable Zones (NVZs) (DEFRA, 2004). English farmers are encouraged to use voluntary *Codes of Good Practice* to help prevent nitrate levels from increasing to a level that will require regulation and to reduce discharges of phosphates, pesticides and microbial contamination (DEFRA, 2004). Farmers in England can also apply to Environmental Stewardship Schemes for funding to farm in a more environmentally sensitive manner (Amin-Hanjami and Todd, 2006). New Zealand encourages the adoption of voluntary programmes and targets for improving environmental quality, such as the Dairying and Clean Streams Accord (Fonterra Co-operative Group *et al.*, 2003).

3.8 Research

Research is important for improving the knowledge base relating to agriculture, and environmental issues relating to agriculture in particular (OECD, 2004). Environmental research, science and technology has been found to underpin economic activity, inform government work programmes, contribute to nationally important environmental projects (such as the protection of Lake Taupo) and be important for natural hazard management (MoRST, 2006). Many different types of organisations fund and conduct research, including government agencies, the private sector and academic institutions. Non-governmental organisations often disseminate research to the public. Some countries have set up special units to fund and promote research and education projects. For example, the USDA's SARE programme studies and publicises sustainable agriculture practices (SARE, undated *a*). SARE (initially called LISA – Low-Input Sustainable Agriculture) was formed in 1985 through the

Food Security Act to provide science-based information for farmers seeking to reduce chemical use in crop production (Gold, 1999). In 1990 LISA was renamed SARE and began programmes to research integrated crop and livestock operations and train extension agents to disseminate information about sustainable farming practices (Gold, 1999). Extension programmes (discussed below) are used to communicate research so that research outcomes can be implemented on the ground. SARE has a competitive grant system and since 1988 has worked with farmers and organisations to implement more than 3000 projects (SARE, undated *a*). In New Zealand, the Ministry of Agriculture and Forestry's (MAF) Sustainable Farming Fund (SFF) jointly funds community-initiated projects through a competitive grant system. The Foundation for Research, Science and Technology (FRST) funds a range of research that contributes at both local and global levels, including Sustainable Production Systems research to improve resource use efficiency and reduce environmental impacts (FRST, 2006).

3.9 Extension and education

Farmers are more likely to consider the environmental impacts of their practices if they have access to good information and the capacity to understand and use the information (OECD, 2001*b*). Government agencies, non-governmental organisations and academic institutions all play an important role in educating the agricultural sector and the public. Extension services use trained staff to communicate science-based information to farmers in a way that is meaningful to those on the ground. OECD (2001*b*) states that government extension programmes can provide farmers with the skills and information they need to make informed decisions about the most appropriate technologies and practices for their situation. Education and training can also make it easier for farmers to change the type of activities that they undertake (OECD, 2001*b*). The USDA's Cooperative State Research, Education, and Extension Service helps states to identify and meet research, education, and extension priorities and provides research funding to academic institutions (USDA, 2006). FAO's SARD Initiative builds social capacity in rural communities by sharing information, holding training events and community exchange visits (FAO, 2006). Kenya will be the first country to pilot SARD at a national level (FAO, 2006). In New Zealand, government extension services were fully privatised in 1995 (MAF, 1997). Extension services for farmers are now mainly provided by regional councils, industry organisations, fertiliser companies, Crown research institutes, landcare groups and private consultants. The SFF gives preference to projects that share results or benefits across the rural community (MAF, undated). The SFF also runs field days to promote project outcomes and raise awareness in the rural community. However, there is concern in the agricultural sector that the number of people trained in extension services in New Zealand is decreasing.

3.10 Awards

Regional or national awards from government and non-governmental organisations can help to raise the profile of environmental and social issues by providing positive publicity and encouragement to farmers trying to be more sustainable. SARE sponsors the biennial Madden Award, which recognises farmers who "1) have conducted innovative research that explores ways to make farming more profitable, environmentally sound and good for communities and/or 2) who have served as effective educators about sustainable agriculture practices and systems with their peers or others in the community" (SARE, undated *a*). Award winners receive \$1,000 cash prizes and travel scholarships to a SARE regional/national conference (SARE, undated *a*). There are several environmental award schemes currently operating in New Zealand, including the Ballance Farm Environment Awards (Ballance Agri-Nutrients, 2006), Deer Farmers' Environmental Awards (Deer Industry New Zealand, 2003), the

Ministry for the Environment Green Ribbon Award for Rural Sustainability (MfE, 2006) and some regional council schemes.

4. Conclusions

Approaches taken by the horticultural and agricultural sector, as a major resource user with significant potential environmental and social impacts, will be important determinants for sustainability in New Zealand. The economic success of the sector depends heavily on the condition of the natural environment and this should be recognised and provided for in any future definition. Care must be taken to avoid irreversible damage to the life sustaining capacity of the environment. It makes good economic sense to protect the resource base that New Zealand's export industry and economy depends on.

All types of policy instruments need to be considered in each situation. The role of government and the mix of policy instruments employed will depend on the local environment, political and cultural perceptions. Several sources stress the importance of choosing instruments that are appropriate to the local natural environment. This approach is consistent with the devolution of many environmental management decisions in New Zealand to regional government under the Resource Management Act 1991. Some instruments, such as taxes and charges, rely on knowledge of where the costs of environmental management should lie. Clear definition of property rights is important for resolving this issue in any particular set of circumstances. Research is also important to underpin regulatory requirements and other activities. The extension of research out to people on the ground is a vital component of education and changing behaviour.

New Zealand is already using, to some extent, many of the tools and approaches commonly in use overseas to tackle the issue of agricultural sustainability. The key for the future will be for New Zealand to integrate these tools and approaches in a smart and coherent manner. New Zealand currently favours a voluntary and community-based approach to changing behaviour, as this is seen to be more effective in the long-term. Regulation is always likely to be a key part of effective environmental and natural resource management because of its efficiency and the greater certainty that it offers. It provides an effective backstop which will be necessary in some situations to ensure certain outcomes in an appropriate timeframe. Tradeable rights and other economic instruments are possible in New Zealand under current legislation and are used in specific circumstances; however their wider applicability requires further consideration. It would be useful to undertake further work to consider the potential roles of specific indicators and targets for sustainable agriculture in New Zealand. The usefulness of a national strategy for promoting sustainable agriculture should also be investigated. To achieve consistency between and within industry groups, and demonstrate a national interest in maintaining and enhancing New Zealand's "clean, green" image, it may be appropriate for the government to work with industry groups to create strategies and national outcomes and/or targets suitable for each industry.

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