NDP
National Development Plan 2007 - 2013

epa
Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

Climate Change Research Programme (CCRP) 2007-2013
Report Series No. 6

Domestic Offsetting Scoping Study for Ireland

SSTI
Strategy for Science, Technology and Innovation

Comhshaol, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government

Environmental Protection Agency

The Environmental Protection Agency (EPA) is a statutory body responsible for protecting the environment in Ireland. We regulate and police activities that might otherwise cause pollution. We ensure there is solid information on environmental trends so that necessary actions are taken. Our priorities are protecting the Irish environment and ensuring that development is sustainable.

The EPA is an independent public body established in July 1993 under the Environmental Protection Agency Act, 1992. Its sponsor in Government is the Department of the Environment, Community and Local Government.

OUR RESPONSIBILITIES

LICENSING

We license the following to ensure that their emissions do not endanger human health or harm the environment:

- waste facilities (e.g., landfills, incinerators, waste transfer stations);
- large scale industrial activities (e.g., pharmaceutical manufacturing, cement manufacturing, power plants);
- intensive agriculture;
- the contained use and controlled release of Genetically Modified Organisms (GMOs);
- large petrol storage facilities;
- waste water discharges.

NATIONAL ENVIRONMENTAL ENFORCEMENT

- Conducting over 2,000 audits and inspections of EPA licensed facilities every year.
- Overseeing local authorities' environmental protection responsibilities in the areas of - air, noise, waste, waste-water and water quality.
- Working with local authorities and the Gardaí to stamp out illegal waste activity by co-ordinating a national enforcement network, targeting offenders, conducting investigations and overseeing remediation.
- Prosecuting those who flout environmental law and damage the environment as a result of their actions.

MONITORING, ANALYSING AND REPORTING ON THE ENVIRONMENT

- Monitoring air quality and the quality of rivers, lakes, tidal waters and ground waters; measuring water levels and river flows.
- Independent reporting to inform decision making by national and local government.

REGULATING IRELAND'S GREENHOUSE GAS EMISSIONS

- Quantifying Ireland's emissions of greenhouse gases in the context of our Kyoto commitments.
- Implementing the Emissions Trading Directive, involving over 100 companies who are major generators of carbon dioxide in Ireland.

ENVIRONMENTAL RESEARCH AND DEVELOPMENT

- Co-ordinating research on environmental issues (including air and water quality, climate change, biodiversity, environmental technologies).

STRATEGIC ENVIRONMENTAL ASSESSMENT

- Assessing the impact of plans and programmes on the Irish environment (such as waste management and development plans).

ENVIRONMENTAL PLANNING, EDUCATION AND GUIDANCE

- Providing guidance to the public and to industry on various environmental topics (including licence applications, waste prevention and environmental regulations).
- Generating greater environmental awareness (through environmental television programmes and primary and secondary schools' resource packs).

PROACTIVE WASTE MANAGEMENT

- Promoting waste prevention and minimisation projects through the co-ordination of the National Waste Prevention Programme, including input into the implementation of Producer Responsibility Initiatives.
- Enforcing Regulations such as Waste Electrical and Electronic Equipment (WEEE) and Restriction of Hazardous Substances (RoHS) and substances that deplete the ozone layer.
- Developing a National Hazardous Waste Management Plan to prevent and manage hazardous waste.

MANAGEMENT AND STRUCTURE OF THE EPA

The organisation is managed by a full time Board, consisting of a Director General and four Directors.

The work of the EPA is carried out across four offices:

- Office of Climate, Licensing and Resource Use
- Office of Environmental Enforcement
- Office of Environmental Assessment
- Office of Communications and Corporate Services

The EPA is assisted by an Advisory Committee of twelve members who meet several times a year to discuss issues of concern and offer advice to the Board.

EPA Climate Change Research Programme 2007–2013

Domestic Offsetting Scoping Study for Ireland

(2010-CCRP-DS-1.2)

CCRP Report

Prepared for the Environmental Protection Agency

by

Ecofys UK Ltd and Energy Services Ltd

Authors:

Siobhan O'Keeffe, Alyssa Gilbert and Kieran Lettice

ENVIRONMENTAL PROTECTION AGENCY

An Ghníomhaireacht um Chaomhnú Comhshaoil
PO Box 3000, Johnstown Castle, Co.Wexford, Ireland

Telephone: +353 53 916 0600 Fax: +353 53 916 0699
Email: info@epa.ie Website: www.epa.ie

ACKNOWLEDGEMENTS

This report is published as part of the Climate Change Research Programme 2007–2013. The programme is financed by the Interdepartmental Committee for Strategy for Science, Technology and Innovation and the Department of the Environment, Community and Local Government. It is administered on behalf of the Department of the Environment, Community and Local Government by the Environmental Protection Agency which has the statutory function of co-ordinating and promoting environmental research.

DISCLAIMER

The EPA CCRP Programme addresses the need for research in Ireland to inform policy makers and other stakeholders on a range of questions in relation to environmental protection. These reports are intended as contributions to the necessary debate on the protection of the environment.

EPA CCRP PROGRAMME 2007–2013

Published by the Environmental Protection Agency, Ireland

PRINTED ON RECYCLED PAPER

ISBN: 1-84095-402-9 08/11/100

Price: Free

Details of Project Partners

Siobhan O'Keeffe
Address: Ecofys UK
1 Alie St
London
E1 8DE
UK
Tel.: +44 (0) 207 4230993
Email: S.OKeeffe@ecofys.com

Alyssa Gilbert
Address: Ecofys UK
1 Alie St
London
E1 8DE
UK
Tel.: +44 (0) 207 423 0976
Email: A.Gilbert@ecofys.com

Kieran Lettice
Address: Energy Services Ltd
Energy House
Ballycurren Cross
Kinsale Road
Cork
Ireland
Tel: +353 (0)21 432 0480
Email: klettice@energy.ie

Table of Contents

A Foreword by the Domestic Offset Committee

Ireland must reduce its greenhouse gas emissions. Under the Kyoto Protocol Ireland's, emissions in 2012 are limited to no more than 13% increase relative to a 1990 baseline. This Kyoto target will be met by a combination of emissions reductions and carbon sinks in Ireland, supplemented, as necessary, by the purchase of carbon credits. Further legally binding reductions, to be achieved in steps by 2020, are now required under the EU Effort Sharing Decision (ESD) for emissions from sectors not covered by the EU Emissions Trading Scheme, that is the non-ETS sectors (e.g. agriculture, space heating, transport and waste). Emissions from these sectors must be reduced each year, starting in 2013 until a total reduction of 20% by 2020 is achieved.

The new EU limits which apply each year from 2013 to 2020 are very challenging, particularly for transport and agriculture. The latest projections published by the EPA (April 2011) show that even if all currently planned mitigation measures deliver to the full, Ireland will exceed ESD limits from around 2015, with a cumulative excess of some 5 Mt–30 Mt likely by 2020. There are flexibilities in the ESD allowing limited use of certain carbon credits from the Kyoto flexible mechanisms, use of credits from Community-level projects and the transfer of annual emission allocations between Member States. Use of these flexibilities comes at a cost. Assuming a price of €20/tonne CO_2 and reliance on the use of credits or allocations to bridge our gap to target, the overall cost could be in the order of €100m–€600m. In addition to being a significant financial outflow, it would also mean a lack of progress in moving towards a low-carbon economy and would not improve Ireland's position in relation to longer-term mitigation target setting. Given the scientific evidence that developed countries should reduce emissions by about 80–95% by 2050, failure to introduce low-carbon measures in the near future will mean ongoing longer-term carbon purchase costs. It is therefore important that all mechanisms that have the potential to address this challenge be examined. While no specific market mechanism is yet in place to facilitate emissions reductions in the non-ETS sectors, the National Climate Change Strategy 2007–2012 identified domestic offsetting as an area for further consideration.

Against this background, the EPA decided to commission a *Scoping Study* to identify what potential, if any, domestic offsetting might have for this country and the options for possible implementation in Ireland, with a particular focus on the non-ETS sectors. The study, which included a public consultation and analysis of submissions, has attempted to:

- Identify potential options for implementation of domestic offsetting in Ireland;
- Detail the barriers likely to inhibit progress, and how they might be overcome; and
- Carry out a high-level assessment of the environmental and economic costs and benefits of the different options.

This study shows that domestic offsetting merits further consideration as a mitigation measure. However, more detailed work would be necessary before a final decision could be made to develop a domestic offsetting scheme for Ireland. When balanced against the potentially very substantial costs of paying others to help us comply with our EU obligations, this committee considers that a moderate investment could be warranted to further explore this approach.

Project Steering Committee

Prof. Frank Convery (Chairman)
Dr Ken Macken, Liam Kinsella, Fred McDarby,
Pat Gernon, Gemma O'Reilly

1 Introduction

In this increasingly climate-conscious world, Ireland is subject to a number of different greenhouse gas (GHG) emissions objectives. Under the Kyoto Protocol, Ireland is required to limit emissions growth to no more than 13% relative to 1990 emissions. Under the EU Effort Sharing Decision (ESD) it is required to reduce its emissions from sectors not covered by the EU Emissions Trading Scheme (ETS) (e.g. agriculture, the built environment, transport and waste) by –20% by 2020. However, no specific mechanism is provided to facilitate emissions reductions in these sectors, and Member States are expected to instigate their own initiatives to realise reductions.

Currently, Irish GHG emissions significantly exceed their Kyoto target. For 2008 and 2009 combined emissions were reported as 6210 kt CO_2eq (carbon dioxide equivalent) higher than target levels.[1] In the European context it is notable that Irish per capita GHG emissions remain among the highest. Agriculture is the largest source of emissions, representing 29.1% of total national emissions in 2009, and approximately 40% of non-ETS emissions in 2020. Currently, Ireland's emissions are projected to be approximately 7.6 Mt CO_2eq higher in 2020 than the ESD target for that year.[2] This means that Ireland will be required to purchase Kyoto-type units from the international market in order to ensure compliance in 2020.

One possible approach to stimulate reductions in the non-ETS sectors is to implement a domestic offset (DO) scheme, driven either by legislation or voluntary commitments. A DO represents an emissions reduction that has taken place outside the boundaries of the entity that pays for the reduction. A DO scheme might be set up in order to provide finance for emissions reductions in a particular project host sector, or to allow for obligated parties to meet their targets through investing in sectors where emissions reductions may be cheaper to realise than on their own.

Similar mechanisms are used at the international level for countries and companies with Kyoto obligations. Using these offset mechanisms, obligated parties can pay for emissions reductions to take place in locations where they will incur less cost than abating internally. These mechanisms are known as the Clean Development Mechanism (CDM) and Joint Implementation (JI).

1.1 Clean Development Mechanism and Joint Implementation

The CDM, defined in Article 12 of the Kyoto Protocol, is an international project-based mechanism that allows a country with an emission-reduction or emission-limitation commitment under the Kyoto Protocol (Annex B Party) to implement an emission-reduction project in developing countries. Such projects can earn saleable Certified Emissions Reduction (CER) credits, each equivalent to one tonne of CO_2, which can count towards Kyoto targets. A partner mechanism, JI, provides a similar framework where Annex B countries can invest in other Annex B countries. Credits generated under JI are called Emissions reduction Units (ERUs).

Figure 1.1 provides a picture representation of the differences between DO and CDM/JI.

Domestic offset schemes can come in several different guises, as can already be seen in operation in other countries. The choice of different design elements can considerably affect the environmental and economic outcome of the scheme. In order to maximise the effectiveness of DO, it's important for policy makers to consider which design elements will be most appropriate for the existing legal, institutional and economic context in the country in question. This report provides an overview of existing DO schemes in other countries around the world, and an explanation of the different design options policy makers can consider when creating a DO scheme. Following this, the report recommends three DO scheme structures most suitable in the context of Ireland.

1 http://www.epa.ie/downloads/pubs/air/airemissions/name,30829,en.html

2 http://www.epa.ie/downloads/pubs/air/airemissions/EPA_GHG_Emission_Projections_2010.pdf

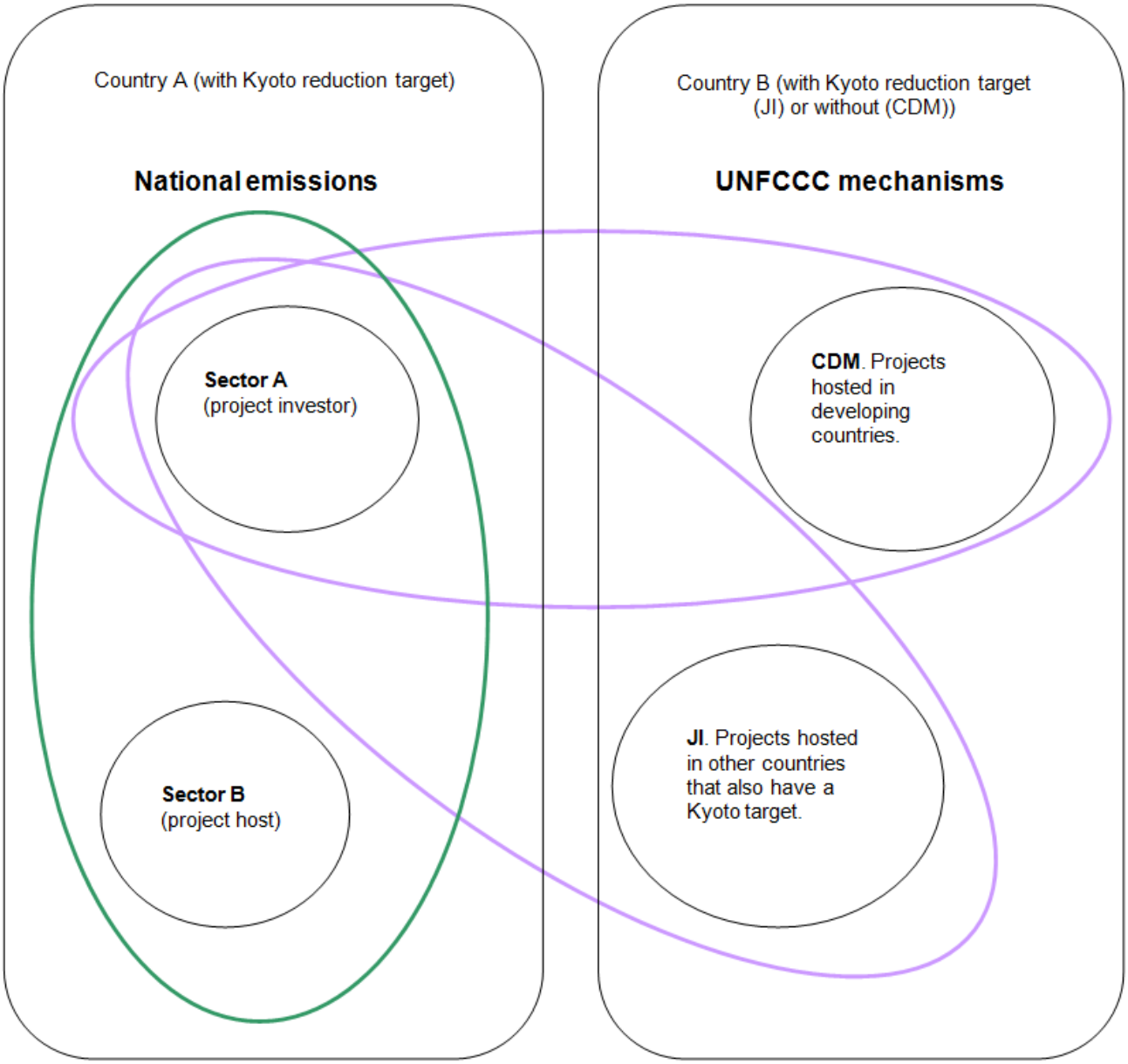


Figure 1.1. An illustration of domestic (green) and international offsetting schemes (purple). JI = Joint Implementation; CDM = Clean Development Mechanism; UNFCCC = United Nations Framework Convention on Climate Change.

1.2 Drivers of a Domestic Offset Scheme

It is important to understand the main objectives and drivers of a DO scheme before analysing its effectiveness or appropriateness as a policy instrument.

Potential drivers of a DO scheme include:

- **Targeted emissions reductions**. A DO scheme can create financial incentives for emissions reductions in a particular economic sector or sectors. These sectors may be prioritised because of emissions intensity, the fact that emissions reductions are difficult to achieve, or for other reasons due to high costs or limited abatement opportunities;

- **Creating export opportunities**. A DO scheme can create the right environment to develop innovative technical skills and products for emissions abatement that can be exported.
- **International trade opportunities**. A DO scheme can create a programme of emissions reductions for possible crediting in future international climate agreements;
- **Whole economy emissions reductions at least cost**. A DO can create incentives for all non-obligated sectors to contribute as much as possible to national emissions abatement and at the lowest cost to participants.

Depending on the priorities of the scheme owner, a DO scheme can be tailored to best suit the overriding objective(s), as seen in Box 1.1.

Box 1.1. Designing a scheme to reduce emissions.

Priority

Incentivise reductions in a 'difficult' sector: one with few or more costly abatement measures.

Applicable DO types

A scheme with a limited number of eligible 'host' sectors and/or a mechanism to incentivise activity in the priority sector over other host sectors.

Discussion

The larger the scope of a DO scheme in terms of eligible sectors and participants, the greater the liquidity of the scheme and the lower the cost of participation. However, if one particular host sector contains a large number of low-cost project opportunities, so-called quick wins, then it is likely that most of the offsetting activity will take place in this sector.

One possible option is to limit the scope of the scheme and to make participation mandatory so that participants are forced to focus efforts on the priority sector in question. However, this will limit the potential contribution of the scheme to overall national GHG reduction targets, and will also lead to higher costs for participants. Alternatively, a discounting measure could be introduced to a multi-sectoral scheme, whereby the quick-win projects earn fewer credits for equivalent reductions in other projects (e.g. at a 2 to 1 ratio).

2 Identification of Design Options

Domestic offset schemes can come in many different guises, as evidenced by the different structures of existing schemes in operation in other countries around the world. Schemes identified included the New South Wales Greenhouse Gas Abatement Scheme (GGAS), the Regional Greenhouse Gas Initiative, the New Zealand Projects to Reduce Emissions and the French DO project. Other countries such as Germany, Canada, Denmark and the Netherlands have looked at or are currently looking at DO schemes. See Table 2.1.

In considering potential design structures for an Irish DO scheme, an understanding of the main objectives and drivers of such a scheme within Ireland is important, in order to be able to consider which design options could be important. Potential drivers include targeted emissions reductions, the creation of export opportunities and whole economy GHG reductions at least cost. Depending on the balance of these priorities, a DO scheme can be tailored to best support the main objective(s).

There are a number of key design elements affecting the effectiveness of a DO scheme that must be considered when structuring a DO programme. These include:

- Type of scheme;
- Scope;
- Obligation;
- Linkages to other schemes;
- Sectoral- or project-based nature;
- Additionality;
- Administration;
- Use of existing structures.

There are also several different types of DO scheme. One is a scheme that does not rely on market mechanisms but relies entirely on government support instead. Under this scheme, the government commits to purchase credits generated under the DO scheme for a fixed price, thereby guaranteeing demand and removing some of the risk for project developers. This scheme design is referred to as Design Option A throughout this study.

The form most frequently in evidence in existing schemes around the world is that of a DO scheme linked to a domestic emissions trading system (DETS). The offset scheme provides DETS participants with a degree of flexibility in how they comply with their emissions cap. Such a scheme is inherently quite broad in scope, due to the need for market liquidity. This scheme is referred to as Design Option B throughout this report.

Another type of scheme, and that adopted by France, is a unilateral JI approach. The future Danish DO scheme will also follow this approach. In this type of scheme, an Annex 1 country selects and implements projects under the JI framework on its own initiative, and then keeps the JI credits (ERUs) to count towards its own emission-reduction target (rather than that of an investor country as

Table 2.1. Existing or proposed domestic offset schemes around the world

Name	Start date	Type
New Zealand Permanent Forest Sink Initiative (PFSI)	2007	Voluntary crediting mechanism
New Zealand Projects to Reduce Emissions (PRE)	2003	Attached to national ETS
US Regional Greenhouse Gas Initiative (RGGI)	2009	Attached to regional ETS
Canada Offset System for Greenhouse Gases	Proposed 2006, yet to launch	Attached to proposed national ETS
Australia New South Wales Greenhouse Gas Abatement Scheme	2003	Attached to regional ETS
France Domestic Offset Scheme	2007	Unilateral JI
Denmark Domestic Offsets Programme	Under development	Unilateral JI

under traditional JI). The benefit of this scheme is that an existing project-development framework can be used at little cost to the government, and, if a surplus amount of reductions were made, then there exists an established platform on which to sell the associated credits. From this point forward, this is referred to as Design Option C.

A fourth option is a national DO scheme of limited scope (confined to one or two host sectors) that would incentivise reductions in a particularly hard-to-reach sector. However, a limited DO scheme loses one of the key benefits of an offsetting scheme, which is to incentivise innovation, and to provide more cost-effective emissions reductions through greater abatement opportunities and greater liquidity. As such, and in agreement with the EPA, this design option has not been examined further in this study.

A broad scope is preferable in supporting the aim of reducing national GHG emissions as much as possible. However, inclusion of all gases and all sectors can dramatically increase the administration costs of the scheme, whether through the increased number of participants or the increased number of methodologies and projects that require verification and auditing.

When deciding on the scope of the scheme it's important to balance such transaction costs against the benefit to Ireland of the scheme in terms of anticipated emissions reductions and other gains. For example, the outlay of establishing a scheme in all non-ETS sectors under Design Option A could be significant. Furthermore, as agriculture is expected to account for 44% of non-ETS emissions in Ireland in 2020 and transport for 34%,[3] this means that 78% of non-ETS emissions can be included in a DO scheme that covers only these two sectors. However, this needs to be balanced against the risk of being seen to neglect abatement opportunities in other sectors and the extent of opportunities to build up exportable expertise in these different areas. Box 2.1 provides a case study of the New Zealand ETS. This scheme is relevant to the Irish context as New Zealand contains a similar emissions profile to Ireland (high agricultural emissions).

Box 2.1. Agriculture in the New Zealand Emissions Trading Scheme.

The principle behind the New Zealand Emissions Trading Scheme (NZ ETS) is that emitters of GHGs must either reduce their emissions or purchase New Zealand units (NZ ETS units) to pay for those emissions. The NZ ETS (agriculture) accounts for two of the GHGs closely associated with pastoral agriculture, horticulture and arable production: methane and nitrous oxide. Agriculture will enter fully into the NZ ETS from 2015. Compulsory reporting of emissions begins in 2012 and voluntary reporting in 2011.

With some exemptions, participants for agriculture are meat processors, milk processors, exporters of live animals, fertiliser importers and manufacturers, and egg producers. Exemptions apply to live-animal exporters that export less than 20 cattle, sheep or pigs in a calendar year, fertiliser manufacturers that produce one tonne of fertiliser in a calendar year, and retail butchers and farm dairies. Farmers and growers are not required to register and participate directly in the NZ ETS.

Agricultural participants can voluntarily report emissions in 2011 and have to report emissions from 2012 though to 2014, but they are not required to pay for emissions in these years. The requirement to surrender emission units under the scheme does not commence until 2015.

Agriculture will be the last economic sector to join fully the NZ ETS. Agricultural participants will be eligible to receive an allocation of emission units from the New Zealand government from 2015 to help offset the cost of participation in the NZ ETS.

The allocation will be provided on an output intensity basis. This means that a participant's allocation will vary with output. The assistance level will be 90% of an emissions baseline and will phase out at –1.3% per annum from 2016. The baseline will be the industry average emissions per unit of output for a given year or years. The baseline has not yet been determined, but will be established by regulation and will be subject to consultation. The allocation will be

3 http://www.ria.ie/getmedia/7604bd10-61bb-49ec-9e0c-4d637d38068c/FOR-WEBSITE-Ken-Macken.pdf.aspx

uncapped, meaning that there is no set limit on the number of units that may be allocated.

A research and development programme is under way to identify technological solutions to agriculture emissions. This programme is supported by the Centre for Agricultural Greenhouse Gas Research and the Global Alliance on agricultural GHG mitigation research. In particular New Zealand is collaborating in a working group with other countries in the Global Research Alliance for Agricultural Greenhouse Gases on reducing emissions from agriculture.

The NZ ETS highlights a few options available for landowners to mitigate the impact on their farms at present, including:

- Planting forests or trees on farmland (creating carbon sinks);
- Using fertiliser more efficiently, and using nitrification inhibitors;
- Reducing the carbon intensity of outputs by improving productivity.

Participants will need to report emissions for each calendar year. In order to calculate emissions, they will need to record the following information.

Meat processors will need to record the total:

- Number of animals slaughtered in each livestock class;
- Quantity in tonnes of meat (carcass weight) in each livestock class.

Dairy processors will need to record total quantities (in tonnes) of:

- Milk solids processed for cows and goats;
- Butterfat processed for sheep.

Fertiliser manufacturers and importers will need to record:

- The total quantity (in tonnes) of nitrogen fertiliser imported or manufactured;
- Its percentage nitrogen content;
- The quantity exported.

The term 'synthetic fertiliser containing nitrogen' has been defined in a way that targets fertiliser produced or imported for agricultural purposes.

To work out emissions, participants will need to multiply the quantity of a product by an emissions factor for that product. The emissions factors are set out in government regulations.

Every five years, the NZ ETS must be reviewed by an independent panel. The first review of the scheme is scheduled for 2011 (one year before the end of the first commitment period). The review will look at how New Zealand is positioned in international negotiations, what their competitors are doing and what mitigation options are available, as well as a number of other factors. Amendments to the scheme may be made as a result of the review.

It is also important to decide whether to define a sectoral- or project-based baseline. In non-ETS sectors this choice between a sectoral- or project-based baseline can be of particular relevance, due to the dispersed nature of emissions within some of these sectors (e.g. transport and agriculture). Establishing clear project boundaries within which to measure emissions reductions is more difficult within these sectors, as they typically comprise smaller and more mobile emission-reduction locations (e.g. cars and livestock). Although a sectoral approach would potentially allow for greater participation and reduced monitoring, reporting and verification (MRV) costs, it is also less well established than a project-based approach and allows for less accuracy in terms of quantifying the actual emissions reductions achieved. To compensate for the issues surrounding the quantification of emissions within a sectoral approach, policy makers could establish a discounting system for DOs, as per the New Zealand programme or Regional Greenhouse Gas Initiative (RGGI) (see Appendix). Here, the amount of credits generated is less than the amount of emissions reduction achieved. The ratio could be chosen differently for different projects.

Within a sectoral scheme there would also be an opportunity to structure action at a subsectoral level. For instance, in the agricultural sector, farmers could group or bundle (this is the term used later) together to form

cooperatives, which would be able to claim reductions regardless of the individual farm on which the reductions were achieved. Such a sectoral approach that focuses strongly on creating emissions reductions in 'difficult' sectors could prove to be the most expensive approach in terms of cost to participants, but could be the best way to create a new green industry within Ireland.[4] This would be due to the expertise and research and development (R&D) that would be needed to create new abatement opportunities in 'difficult' sectors as discussed above.

Depending on the final design structure chosen, it could be possible to link a DO scheme to other foreign DO schemes or an ETS. In smaller countries where the number of DO or ETS participants is likely to be limited, it can make sense to provide for linkages to other schemes outside the country in question. This creates a larger pool of potential trading partners, which creates greater liquidity, which in turn creates a clearer price signal within the market. However, one must bear in mind that while all internal emission-reduction activities will benefit the host country in the long term, sale of DO credits to external entities will not, in the short term, contribute to the host country's emission-reduction objectives as it will involve the cancellation of an equivalent number of allocated amount units (AAUs) if the credits are exported. Several existing DO schemes (New Zealand and France) have linked their DOs to the international Kyoto project-based JI mechanism (see Appendix). This may have been partly motivated by the existing template for environmental integrity and robustness that the JI offers.

Following consideration of all the above design elements, Ecofys has selected a shortlist of three possible design structures for an Irish DO scheme. For a DO scheme to be successful, the primary requirement is demand for the credits generated through offset projects. Therefore the three schemes selected are characterised by the main driver of demand within each scheme:

- **Design Option A** is supported through commitment from the government to purchase DO credits;
- **Design Option B** is attached to a domestic ETS, thereby creating demand in capped DETS sectors (as long as there is a shortage of DETS allowances);
- In **Design Option C** demand for credits is linked to international offset markets through linkages to the JI framework or to the EU ETS.

Table 2.2 gives an overview of the three options.

Table 2.2. Overview of three different scheme designs selected for assessment.

	Design Option A: Government purchase	**Design Option B: Domestic ETS**	**Design Option C: International linkage**
Type of scheme	The government commits to buy the credits generated by the scheme	Market-driven mandatory DETS	Unilateral participation in the JI
Legislation/Use of existing structures	Legislation linked to national targets within eligible sectors	Existing legislation for the EU ETS would provide an excellent starting point for establishing a DETS framework	Use of the JI structure for project development and eligibility
Who pays?	Government	Obligated sectors in the DETS pay for reductions in non-capped 'host' sectors	Any entity (domestic or external) with an ERU trading account
Scope	Highly variable	As broad as possible	Potentially all non-ETS sectors, depending on compatibility
Sectoral or project based?	Sectoral	Sectoral or project based	Project based
Linkages	None	If project based, could be linked to the EU ETS. A sectoral approach could be useful if international negotiations move towards a sectoral crediting mechanism	Linkages to the JI, potential future linkage to the EU ETS

4 In the context of emission reduction projects, the 'difficulty' of a sector refers to the ability to undertake projects with clear project boundaries, baselines and measurements.

Ecofys has selected three very distinct possible structures so that analysis will allow for a wider-ranging comparison. For Design Option A, the key characteristic is that demand is driven by the government (whether as sole or insurance buyer). Although this scheme represents the simplest and cheapest option for potential participants in a DO scheme, it represents the greatest cost to the government.

In Design Option B the fixed emissions cap provides policy makers with a level of certainty of the overall environmental performance of the scheme, although the cost of compliance may vary. A stringent cap will encourage greater participation in an associated DO component, and therefore design of the DETS and the accompanying offset scheme should be done at the same time.

Design Option C centres around creating an offset scheme that is highly compatible with existing international trading mechanisms, such as the JI or another ETS. Therefore compatibility with other schemes would need to be a dominant design consideration.

3 Assessment of Design Options

Following the selection of three design options for comparison, it is now possible to examine how each of these three designs would perform against a set of technical criteria, including:

- How the scheme would be financed;
- Potential to contribute to EU/international targets;
- Potential costs and abatement;
- Incentive for and ease of participation;
- Interaction with other climate policy instruments;
- Future scenarios;
- Market flexibility;
- GHG leakage;
- Applicability of international MRV standards.

Not only would the choice of scheme design affect performance, but also the choice of sectors for inclusion in the scheme. Therefore this report separately assesses performance of both the different schemes and different potential sectors, in order to highlight any obstacles to implementation or areas of particular suitability. The results of this structural and sectoral assessment are summarised in Table 3.1 and Table 3.2. Both tables are colour coded to denote the level of suitability of each sector/scheme design against each criteria: green = high suitability; yellow = fair suitability; purple = poor suitability.

3.1 Structural Considerations

3.1.1 Applicability of International MRV Standards

Design Option A takes a sectoral approach to emissions reductions in order to maximise abatement opportunities. However, due to the difficulties in monitoring and verifying reductions in many economic sectors via a sectoral baseline approach and due to the complexity of bundled projects consisting of small sources, a sectoral approach leads to a higher degree of data uncertainty. One method to address this concern would be to apply a 'safety discount' that will serve to make all credit issuances a conservative reflection of the reality. In Design Option A it could also be helpful to use existing international MRV standards or bodies, as that would provide an independent viewpoint, removing any accusation of bias against the government. Use of voluntary offsetting standards for this purpose does, however, present the complication that the government can then be seen to be endorsing voluntary offset standards.

Design Option C (JI/EU ETS linkage), by its nature, relies on international MRV standards, through the JI framework. The project development would consequently also be required to be validated and verified by verifying entities (known as Accredited Independent Entities [AIEs]) accredited by the JI Supervisory Committee (JISC). Design Option B ('classic' DETS) could theoretically use a sectoral- or project-based approach. But as there is a requirement for DO credits to be fully equivalent to DETS allowances, a project-based approach would be advisable. International MRV standards, either from JI or Voluntary Emissions Reduction (VER) standards could then be applied or used to inform a new set of customised standards.

3.1.2 Additionality/Environmental Integrity

Additionality refers to the requirement that project developers must prove that the emissions reductions would not have happened in the absence of the expected carbon credit revenues. Testing additionality is very dependent on the type of project. An additionality test appropriate for one type of project (e.g. a simple regulatory test for methane flaring, where there is no reason to do the project if not required by law) might not be sufficient for other kinds of project (e.g. energy efficiency, where there could be plenty of reasons for doing a project besides complying with regulations).

All three design options face the same issues surrounding additionality. Additionality could be impacted if the scheme does not take into account the availability of other schemes that result in emissions reductions in relevant sectors, and the risk that double counting these could bring about. If there are two schemes under which project owners could claim money for reductions, then the offset project will only be additional for any reductions that it would achieve over and above those that would result as a consequence of the other policy or initiative.

Table 3.1. Assessment of three design options against selected performance criteria. (Key: green = high suitability; yellow = fair suitability; purple = poor suitability.)

	Design Option A: Government buyer	**Design Option B: 'Classic' DETS**	**Design Option C: JI/EU ETS linkage**
Financing? Self-financing and how? Raises government revenues? Scale of costs in setting up scheme	Largest overall cost to the government as commits to funding all offsetting activity. However could hand day-to-day oversight (and costs) to external third party, or could charge a registration fee for participation	Largest administrative costs, although costs can be passed on to participants via auctioning and surrendering of DETS allowances	Administration costs to Ireland are low as largely covered by UNFCCC
Potential to contribute to EU and international legally binding targets (and threat of double counting)	No real risk of double counting		Threat of double counting exists if equivalent AAUs are not cancelled when credits are sold or submitted for compliance externally. Also, if majority of credits are kept for internal reductions, this option then becomes very similar to Design Option A as the government would be the key purchaser
Potential costs and abatement	See sector table (Table 3.2). No structural issues	See sector table (Table 3.2). More limited in relation to other options as not all non-ETS sectors can host offsetting activity. Internal abatement in capped sectors still possible however	See sector table (Table 3.2). No structural issues
Incentive for and ease of participation	Ease of participation similar across all three options. Incentive provided in this option via guaranteed point of sale for project developers. If purchase price is fixed, then there is no incentive for opportunities with an abatement cost higher than this price	Ease of participation similar across all three options. Strong incentive as allows for obligated sectors to mitigate costs of DETS participation	Ease of participation similar across all three options. Incentive for project developers in that there is an established platform for sales and large potential demand via the EU ETS (if the Irish government doesn't arrange for credits to count towards Irish Kyoto compliance)
Interaction with other potential climate policy instruments (e.g. risk of perverse incentives)	Possible overlap in some sectors with other measures/incentives, but this can be addressed by incorporating into final scheme design	DETS participation could serve as opt-out measure to national carbon tax, although host sectors would remain obligated. Other policy conflicts may exist at a specific sector level, but can be addressed in planning	Possible overlap in some sectors with other measures/incentives, but this can be addressed by incorporating into final scheme design
Future scenarios	Sustainability of scheme linked to purchase-commitment threshold. At this point could segue into Design Option C	Scheme could continue indefinitely until abatement opportunities exhausted or no longer economically feasible. Possible later direct or indirect linkage to the EU ETS or other international ETS	Scheme sustainability strongly linked to future of the JI, although potential under the Linking Directive for inclusion of DOs could create a driver separate from UNFCCC mechanisms
Market flexibility	No market flexibility as only one buyer and fixed purchase price	Strong flexibility as level of abatement determined by stringency of DETS cap. Fewer eligible 'host' sectors, although capped sectors can still choose to abate internally	Established platform for sales, abatement incentives fluctuate with ERU price. Activities can take place in all non-ETS sectors
Additionality/ Environmental integrity	Additionality more a sectoral concern. No inherent structural features in any option that would cause significant concerns over additionality		

	Design Option A: Government buyer	Design Option B: 'Classic' DETS	Design Option C: JI/EU ETS linkage
Applicability of international MRV standards	Sectoral approaches still relatively untested in comparison to project-based mechanisms, causing greater risk and uncertainty. Greater scientific uncertainty could allow for free riders	Project-based approach could allow for later linkage of DETS to the EU ETS. Well-established MRV standards that could be adapted to Irish context	JI MRV standards already in existence and would be easily applicable, although for some sectors programmatic approaches would be advisable. MRV activities will need to be carried out by approved JI verifying entities (Accredited Independent Entities)
Carbon leakage issues	Voluntary participation should mitigate risk of international carbon leakage, but accidental intra-sectoral leakage could be a risk in some cases	Risk of international leakage as production could move to non-capped sectors in other EU countries	Voluntary participation should mitigate risk of international carbon leakage, but accidental intra-sectoral leakage could be a risk in some cases

Further additionality issues could arise, dependent on the sectors selected to host offsetting activities. Depending on the uptake of abatement technology that has previously occurred, it may be difficult to justify some measures as additional if a majority of the sector has already undertaken them.

3.1.3 GHG Leakage

Leakage is a term that addresses the impact that the project might have outside its boundaries. This could be due to carbon costs pushing production to countries or sectors with no carbon costs, or could refer to other unforeseen consequences such as conversion of pasture land to forest, resulting in deforestation elsewhere, to create replacement pasture land.

As Design Options A and C are voluntary offsetting initiatives they should not create a threat of international or inter-sectoral GHG leakage, as only those who freely choose to accept any initial project-development costs will be affected. However, leakage could occur internally within certain sectors (mainly agriculture). In agriculture, large projects may shift activities in ways that were not intended, e.g. a land-use change project in one location may displace another project in another area. Market-based leakage can occur where a project may alter the supply and demand forces of agricultural product markets, e.g. where large forestry projects might reduce the supply of timber. The scheme design in Design Option B is the only one of the three options that would constitute a potential GHG leakage threat, as the compliance element inherent in the DETS means that capped sectors could choose to relocate elsewhere to other countries in Europe where non-ETS sectors did not face the associated carbon costs.

3.1.4 Interaction with Other Climate Policy Instruments (Risk of Perverse Incentives)

As well as issues surrounding additionality, interaction of DO programmes with other national climate policies is important. Domestic offsetting can be complementary to other policies, particularly a domestic ETS as already discussed. However, offset projects could also create perverse incentives to stifle more effective regulation.

All non-ETS sectors in Ireland are subject to a carbon tax that in 2014 will reach €30/t CO_2eq (currently €15/t CO_2eq), applying to kerosene, marked gas oil, liquid petroleum gas, fuel oil and natural gas. The application of the tax to coal and commercial peat is subject to a Commencement Order. Within Design Option C, the carbon tax could affect additionality in the eyes of the JISC, the UN body that oversees the JI programme, and international buyers of credits. This creates some need for study of the interaction of a DO scheme with existing climate and energy policies such as the carbon tax and retrofit programmes. For example, interaction of the carbon tax with DOs in the waste sector may be limited since this sector is expected to depend more heavily on electricity-based than non-electricity-based energy carriers. Conversely, the agricultural and transport sectors are likely to face a relatively higher level of taxation as they may depend more heavily on non-electricity-based fuels.

A DO scheme could also interact successfully with the carbon tax, and, indeed, the tax may serve as an incentive for participation in domestic offsetting. This would be achieved by allowing liable parties to reduce their carbon tax bill through offsetting. Companies could opt to invest in methane/N_2O reduction projects and could receive offset credits to count towards their

tax obligations. Allowing DO credits to count as an alternative to payment of the carbon tax would provide greater flexibility for companies to meet their GHG liabilities, and would allow for what would alternatively be carbon tax revenues to lead, instead, directly to emissions reductions in non-ETS sectors. As the elasticity of fuel use is quite low, this approach could lead to increased mitigation if abatement costs are below the tax rate. However, this could also mean a loss of tax revenue for the government.

3.1.5 Incentive for and Ease of Participation

Design Option B represents the scheme with the greatest financial and bureaucratic burden for participants, although it must be said this applies only to the sectors capped under the DETS. The level of incentive for DETS participants to undertake DO activities will depend on the price of DETS allowances and the shortage of allowances in the DETS. The greater the shortage the greater the need for flexibility in terms of eligible abatement activities. A sectoral approach in Design Option B would impose less administrative burden than a project-based one, as it removes the need for ascertaining the project baseline and more intensive monitoring efforts included in a project-based scheme. This would also apply to Design Option A. In Design Option C, participation is boosted by having a well-established framework within which to operate, as well as a large potential demand via the EU ETS.

3.1.6 Future Scenarios

It is likely that Design Option A would be the least sustainable of the three designs. If a purchase-commitment threshold is established, then reductions are likely to continue only until this threshold is reached. However, there is a possibility that the scheme could have instigated the development of new, cost-effective technologies that then continue to be implemented as common practice or as a beneficial long-term investment. The scheme could also continue existence in a different form once the government guarantee expires – with credits becoming fungible with ERUs so that private investors are given an incentive to become involved in the scheme.

Offsets under Design Option B could become eligible for inclusion in the EU ETS, provided the EC felt that the credits were compatible and of a similar quality to existing EU ETS offset units. However, as the offsets are linked to the Irish DETS, this would basically constitute an indirect linking of the DETS to the EU ETS, so this must be taken into account when approving the link. A direct link of the DETS to the EU ETS is unlikely as this would open up the threat of carbon leakage, as non-ETS sectors in other EU countries would not necessarily have the same obligations on them as the capped sectors in Ireland. Linking DO credits under this scheme would also face the similar concern as that of Design Option C – namely that a large amount of eligible DO credits could swamp the EU ETS (making the scheme environmentally ineffective) and damage the price of EU Allowances (EUAs) and credits, or too few credits would not be worth the administrative effort.

3.1.7 Market Flexibility

Design Option A benefits from the least market flexibility in the sense that there is only one purchaser of credits, and the purchase price may be fixed. Although Design Option B would provide sustained demand for offsets, the market flexibility reduces over time as the easiest and cheapest abatement opportunities are used up. Design Option C provides an established platform for sales, and the greatest amount of potential demand for credits as they would be eligible for use in the much wider EU ETS. However, if Ireland is to use the credits generated for its own ESD compliance, then the scheme may, in practice, look very similar to Design Option A, as it will need to purchase the credits generated for its own account.

Table 3.2 examines the suitability of different sectors to a DO scheme.

Table 3.2. Assessment of non-ETS sectors against selected performance criteria. (Key: green = high suitability; yellow = fair suitability; purple = poor suitability.)

	Transport	Waste	Agriculture	Buildings (commercial and residential)	Non-ETS industries
Scale of costs in setting up scheme	Scheme costs more a structural issue (see Table 3.1)	Scheme costs are more a structural issue. Administrative costs should not be overly high – participants more straightforward to identify than for some other sectors. MRV and project boundaries should be reasonably straightforward	Potentially higher administration costs in terms of establishing project boundaries and monitoring reductions (need to address permanence)	Scheme costs are more a structural issue (see Table 3.1)	
Potential to contribute to EU and international legally binding targets (and threat of double counting)	Emissions reductions achieved will count towards Ireland's target under the ESD (and, consequently, Kyoto target). Biofuel projects can count towards the EU Fuel Quality Directive and Renewable Energy Directive	No sector-specific issues: emissions reductions achieved will count towards Ireland's target under the ESD (and, consequently, Kyoto target). Renewable energy projects can also count towards the EU Renewable Energy Directive			
Interaction with other potential climate policy instruments (risk of perverse incentives)	Vehicle registration tax exemption for electric vehicles, Biofuels Obligation (2010), Mineral Oils Tax Relief Scheme for non-fossil fuels, and carbon tax of €15/t CO_2 for non-EU ETS sectors can affect offset additionality. In Design Option A, a purchase price fixed higher than other instruments could negate their value	Carbon tax of €15/t CO_2. Effect of the landfill levy must be included in assessment of the internal rate of return (IRR) of relevant entities	BioEnergy Scheme and national carbon tax should be taken into account during additionality tests. DO scheme can also contribute to national target of 17% forest land cover by 2030	DO can act as a complement to the Energy Map for SMEs. Carbon tax and domestic and commercial grants (Greener Homes Scheme, etc.) need to be factored into tests for additionality	DO can act as a complement to the Energy Map for SMEs. Interaction with the Energy Agreements Programme should be minimal, due to the size of the different entities. The national carbon tax must be taken into account when assessing additionality
Future scenarios	No specific sectoral issues. Project additionality may be threatened by the development and increased uptake of new cleaner vehicle technologies (e.g. electric cars and hydrogen vehicles)	No specific sectoral issues	Widely acceptable offsetting methodologies for forestry and land use could be introduced, leading to greater certainty and confidence in LULUCF offsets	There are no plans for commercial or residential buildings or projects to be included in the EU ETS. A small number of buildings may be included due to combustion. Permanence could be an issue if behavioural change is included in the measures	Some non-ETS industries could see themselves brought into the EU ETS in later phases as the scheme expands. They would then no longer be eligible for inclusion in a domestic scheme. Permanence could be an issue if behavioural change is included in the measures
Market flexibility	Abatement opportunities could be reduced as clean fuel alternatives become more commercial	Limited as small number of potential participants with financially feasible abatement opportunities	International flexibility limited as LULUCF credits not eligible in the EU ETS	Sector holds a large number of potential abatement opportunities (due to large number of properties)	Potential overlap of abatement opportunities with the building sector. However, this could be overcome through careful sector definitions in the final scheme

	Transport	Waste	Agriculture	Buildings (commercial and residential)	Non-ETS industries
Additionality/ Environmental integrity	Environmental integrity: As a sectoral approach is strongly recommended for domestic offsets in the transport sector, concerns over the greater inaccuracies inherent in sectoral monitoring and baseline setting must be acknowledged	Standard additionality tests are advised. Additionality can still be achieved in the presence of other incentives and policies if clear rules of exemption from other benefits are established	Environmental integrity could be threatened around issues to do with permanence and leakage. The sequestration potential of some land-use projects remains unclear and will need to be assessed in the long term before they can be incorporated into a DO scheme. Existing reforestation and sustainable land-use policies such as the afforestation grant and premium scheme must be taken into account when establishing additionality requirements	Standard additionality tests are advised. Additionality can still be achieved in the presence of other incentives and policies if clear rules of exemption from other benefits are established. One concern over environmental integrity can be drawn from lessons learned in the UK energy efficiency Carbon Emissions Reduction Target (CERT) scheme.[5] Credits for measures such as insulation and compact fluorescent light bulbs (CFLs) could be discounted to account for units not taken up by residents	Standard additionality tests are advised. Additionality can still be achieved in the presence of other incentives/policies if clear rules of exemption from other benefits are established
Applicability of international MRV standards	Monitoring of transport activities within a non-ETS offset project can be burdensome and often only sample-based monitoring is feasible	Several widely accepted methodologies detailing MRV procedures for waste offsetting projects are in existence. These include the Intergovernmental Panel on Climate Change (IPCC) National GHG Inventory Guidelines for waste, as well as CDM/JI and VER offset methodologies. Larger waste facilities may also be captured in the EU ETS and their reporting practices could also serve as a template	Existing international LULUCF methodologies not universally accepted, due to worries over permanence, monitoring and baseline determination. A sectoral approach may be advisable, although greater scientific uncertainty must be accepted. Project-based methodologies for other types of agricultural project (mainly anaerobic digestion of livestock waste) are well established.	Relatively simple CO_2 baselines can be established for building projects. However, projects often have a small scale, so a programmatic approach may be necessary. Again, World Resource Institute GHG Protocol, IPCC GHG guidelines and existing offset methodologies provide useful robust templates for MRV	Non-ETS industries are diverse, not always energy intensive and can be a 'hard-to-reach' sector for policy makers. However, offset activities are likely to relate to the built environment and energy efficiency, for which existing robust MRV guidelines can be implemented
Carbon leakage issues	Carbon leakage could be an issue for some subsectors of transport, particularly those that compete internationally (e.g. some freight companies). However for those subsectors which may be more nationally focused (bus and train transport, car hire companies, vehicle retailers), carbon leakage would be expected to be less of an issue	Low threat of leakage since sector tends to be nationally not internationally focused	Large agricultural projects may shift activities in ways that were not intended, e.g. a land-use change project in one location may displace another project in another area, or lead to clearing of land to replace lost land used for food cultivation. Market-based leakage can occur where a project may alter the supply and demand forces of agricultural-product markets, e.g. where large forestry projects might reduce the supply of timber. Interaction with food imports should also be considered	Carbon leakage would be expected to be less of an issue for this sector. Commercial inhabitants of buildings would not be expected to move countries on account of climate policies, particularly since energy would not be expected to be a significant cost for these companies (compared to other sectors). The same would be expected for residents	For larger, multinational non-energy-intensive organisations (e.g. pharmaceutical or IT sectors) a threat of international leakage exists

5 CERT is the UK energy efficiency scheme focused on energy utilities.

3.2 Sectoral Considerations

3.2.1 Transport

Different sectors present different challenges and opportunities. The transport sector has traditionally been classed as a challenging sector in which to implement offset projects, due to the difficulties in monitoring and verifying emissions reductions to the degree of accuracy normally required by most offsetting standards. As such, successful transport-related offset projects occur predominantly under a programmatic or sectoral approach, with all the benefits and concerns that entails. There are several existing abatement opportunities within the transport sector, such as increased use of biofuels, mobility management, sustainable transport fleets, efficient driving methods and electric vehicles. Of these measures, biofuel production is the most likely to cause concerns over environmental integrity. Biofuel production must be sustainable if it is to truly offset fossil-fuel reduction, and appropriate methodologies examining the life cycle of energy crops should be implemented.

3.2.2 Agriculture and Forestry

Ireland has gone from 1% forest cover to 10% over the course of the twentieth century, indicating strong policies driving reforestation. Existing reforestation and sustainable land-use policies such as the Afforestation Grant and Premium Scheme must be taken into account when establishing additionality requirements.

The agriculture sector presents a mixed bag in terms of the applicability of international MRV standards. For example, while methodologies relating to emissions reduction in livestock (e.g. anaerobic digestion) are well established, international Land Use, Land Use Change and Forestry (LULUCF) project methodologies remain controversial, due to worries over permanence, monitoring and baseline determination. Similarly to the transport sector, the difficulty in capturing emissions in these areas means projects are often best suited to a programmatic or sectoral approach. As mentioned above, GHG leakage is also a concern that will need to be fully explored and prepared for in the establishment of agricultural DO projects.

3.2.3 Waste

The waste sector should present few administrative challenges if included in a DO scheme. Several widely accepted methodologies detailing MRV procedures for waste offsetting projects are in existence, and the reporting practices of larger waste facilities caught under the EU ETS can also provide a guideline for monitoring and reporting emissions. The threat of GHG leakage is low, since the sector is not internationally focused. One issue for consideration, which is discussed in greater detail in the next section, is the overall opportunity for emissions reductions within the waste sector. There are 25 facilities with landfill licences in Ireland, which indicates that if the waste sector were to host offsetting activities under a domestic ETS, its contribution could be limited. However, there is also scope for projects under the remit of waste-to-energy, currently not covered in the EU ETS. Co-combustion of municipal solid waste (MSW) could make a meaningful contribution to Ireland's Kyoto target and the EU Landfill Directive target.

3.2.4 Buildings (Residential and Commercial)

In terms of the potential for offsetting projects. the building sector should present relatively few problems in terms of project implementation (MRV, etc.). However, many measures are small scale, so that an aggregated approach or a programme of projects (known as a programmatic approach) may be recommended. Furthermore, due to European building regulations, many potential offset measures will not apply to 'new build', but instead will focus around opportunities for retrofitting existing housing stock. However, retrofit should hold the majority of abatement opportunities compared to the build rate, particularly as build rates slow down during a recession.

One concern over environmental integrity in programmatic approaches in the building sector can be seen in the lessons learned in the UK energy efficiency Carbon Emissions Reduction Target (CERT) scheme. Within this scheme, measures such as the supply via the post of loft insulation and CFLs were credited to participants, without any monitoring of whether the measures were actually implemented. One solution to this could be to apply a 'discount' to forecast reductions in the programme, in order to keep assumptions conservative.

Greenhouse gas leakage is expected to be less of an issue for this sector. Commercial inhabitants of buildings would not be expected to move countries on account of climate policies, particularly since energy would not be

expected to be a significant cost for these companies (compared to other sectors). The same would be expected for residential tenants.

3.2.5 Non-ETS Industries

The category of non-ETS industries is composed of a diverse range of economic activities, and therefore it is difficult to characterise this sector. When including non-ETS industries in a DO scheme there are a couple of considerations to be remembered. Perhaps the most significant is that for many businesses in this sector it is likely that potential abatement opportunities will centre around business premises and the built environment, which will significantly overlap with the building sector. If this theory is borne out by an examination of eligible entities within the non-ETS sector, then an investigation into the remaining abatement opportunities will be required to understand if the sector merits inclusion in its own right. One must also consider the potential for current non-ETS activities being incorporated into the EU ETS at a later date. Currently it is not expected that any further new sectors will be introduced to the EU ETS before the end of the scheme's third phase in 2020.

3.3 Conclusion

To conclude, all three shortlisted design options could be capable of contributing to Ireland's international climate commitments, although each design has its own strengths and weaknesses that would need to be addressed. These strengths and weaknesses can be of greater or lesser material importance, depending on the overall objectives of the scheme.

As can be seen in the sectoral assessment, transport and agriculture represent the most challenging sectors in which to abate emissions for many of the same reasons that these sectors have not featured heavily in international offsetting schemes. Therefore, in order to really drive reductions in these sectors it would be advisable to implement a mandatory scheme such as the DETS in Design Option B in order to increase and ensure demand.

Although these two sectors appear to contain more negative issues than the other sectors, this observation must be balanced with the potential costs and abatement opportunities in these sectors (examined in Section 4), and the overall objectives of Ireland in establishing a DO scheme. If the government's key priority is to drive emissions reductions in these areas then many of the main 'sticking points' within transport and agriculture, relating to fungibility with external schemes, lose their relevance.

A key area for careful planning and consideration will be the impact of a DO scheme on existing climate instruments. Design Option A provides the benefit that with a fixed purchase price the impact of the scheme could be extrapolated with greater certainty. With Design Options B and C, however, the price is variable depending on demand, which makes the impact of the schemes harder to fully quantify.

Further investigation of the impact of the carbon tax on a DO programme is advisable. In theory, the level of internal abatement under the carbon tax can be taken as a measure of whether the scheme is additional or not. The proposed increase of the carbon tax to €30 in 2014 may significantly alter the financial additionality of potential DO projects, and therefore careful attention must be paid to ensure that GHG reduction projects are not double funded. Low emission-reduction activity prior to the DO programme can be taken as an indication that the DO scheme is additional. However, within Design Option C the carbon tax could affect additionality in the eyes of the JISC and international buyers of credits.

Further assessment of these three options and indicative abatement potentials and costs of a DO scheme are explored in the next section.

4 Barriers and Commercial Assessment

This section will explore some of the key barriers and opportunities a DO scheme in Ireland would encounter, and explores the potential transaction and administrative costs that both participant and administrator would experience within a DO scheme.

4.1 Barriers and Commercial Opportunities

Potential barriers to implementation of a DO scheme include:

- **High transaction costs limit participation of small players**. Participation of individuals or very small non-ETS entities in offsetting is unlikely, due to transaction costs prohibiting small projects. Equally, for small operators, initiatives such as grant schemes are likely to be more attractive than a DO scheme;
- **Costs of future linkage to external schemes**. Barriers to Design Option B (domestic ETS) will be the costly verification, monitoring and reporting requirements of developing a scheme that would be sufficiently rigorous for future link up with the EU ETS;
- **Technological challenges in the agricultural sector**. Due to the challenges in abating agricultural emissions, New Zealand has established an agricultural R&D fund, to drive development of technological solutions for agricultural emissions abatement. This highlights the difficulties this sector will present to Ireland, which has a similar emissions profile to New Zealand (although this can be seen as a commercial opportunity for Ireland to overtake New Zealand and become the global pioneer in this area);
- **Administration issues**. In the New South Wales GGAS concerns over the robustness of the scheme were raised over the arguable conflict of interest of having both the scheme administrator and the compliance regulator responsibilities managed by the Independent Pricing and Regulatory Tribunal (IPART).

Other obstacles include:

- **Potential limited short-term contribution to national climate targets**. In the short term, DO projects may not directly contribute to complying with Member States' mitigation commitments unless the state is the buyer of the credits, as transfer of project credits at installation level is accompanied by transfer of an assigned amount at country level. Non-additionality of projects may worsen the Member States' emissions balance. Applying a discount to the issuance of credits to DO projects of, say, 20% of a maximum crediting period of, say, eight years, may help ensure additionality;
- **Compatibility with national carbon reporting infrastructure**. Domestic offsetting carbon accounting schemes on the project level (i.e. bottom-up) may not match with national carbon accounting (i.e. top-down) practices. The alignment of these different approaches has to be explored;
- **Interaction with other domestic policies and measures**. Domestic offsetting as an incentive scheme has potential positive/negative interactions with 'conventional' domestic policies and measures, which are not yet completely understood;

  For example, within Design Option C the carbon tax could affect additionality in the eyes of the JISC and international buyers of credits. Arguably, the recently proposed rise in the carbon tax may be a sufficient and less administratively burdensome approach to emissions reductions. Exploration of current activity under the carbon tax should be further explored to understand better the extent to which this could true;
- **Competition between private and government actors over credits**. Depending on the scheme type, there is a possible competition between private actors and the government regarding projects.[6]

6 http://www.jiqweb.org/images/stories/articles/Short_statement%20NEON.pdf

Some of the commercial benefits of a DO scheme include:

- **Creation of a price signal**. A DO scheme would create a price signal for non-ETS fields where emissions are growing. Future linkage to the EU ETS would increase the liquidity of the ETS system by broadening the market. In this sense, DO schemes generate an additional incentive for private finance for non-ETS sector initiatives, e.g. decentralised renewable energy systems;[7]
- **Provides an additional/more efficient incentive for abatement**. A DO scheme may provide a market incentive for those activity areas where conventional public policy is relatively ineffective or insufficient;
- **Benefits to early movers**. The EU ESD (2009) sets targets on the non-ETS sectors. To this end, DO stimulates and mobilises early movers in all non-ETS demand sectors. This can create a benefit to countries who are at the forefront of abatement activities in these sectors, as they have an improved point of leverage in the design of future linked non-ETS abatement systems;
- **Clean technology innovation**. Development of innovative emission-reduction technologies in difficult sectors presents clear commercial benefits through export to other countries. The 2009 European Innovation Scoreboard, a European Commission tool established under the Lisbon Strategy, has categorised Ireland an an 'innovation follower' in high-technology innovation. This indicates that Ireland's current innovation performance is above the EU27 (the 27 EU Member States) average, but that it lags behind other countries known as 'innovation leaders', e.g. Germany, Finland, Denmark and the UK. Ireland's rate of improvement in innovation is below the EU27, suffering somewhat from a decrease in R&D innovation expenditure over the last five years (–5.7%) and a lack of collaboration among innovative SMEs (–7%).[8] Through creating a direct financial incentive for project developers to research new and innovative solutions to emissions abatement, a DO programme could play a helpful role in helping to increase the rate of clean-technology innovation within Ireland.

Lessons learned from other carbon-reduction schemes internationally, as distinct from DO, can also help to support initiatives to boost innovation and commercial opportunities within the programme. For example, as part of the UK CERT, innovative energy-saving measures gain an extra 50% credit compared to more established measures, as a way of boosting the incentive for innovation.[9] The UK CERT obligates gas and electricity suppliers to create emissions reductions through energy-saving measures in the residential properties they supply to. Under the scheme, for measures for which accurate carbon savings cannot yet be determined, a translation factor is used to credit participants for their actions. There is also a route for innovative measures for which the carbon savings can be determined accurately, based on a pre-existing list of measures for which carbon 'scores' have been calculated for a number of different properties.

4.2 Estimated Abatement Potentials

Ecofys has developed its own proprietary tool to estimate potential abatement costs and opportunities in different economic sectors in different EU Member States. Some quantitative indicators from this tool (the Sectoral Emissions Reduction Potentials and Economic Costs for Climate Change [SERPEC-CC]) relating to Ireland are included here, below. The SERPEC-CC tool was carried out from 2006 to 2009 by a consortium of institutes under the lead of Ecofys. The study presents a comprehensive, bottom-up estimation of emissions reductions throughout Europe by sector. However, it must be emphasised that these values are estimates only, and cannot in anyway be used as definitive indicators of abatement opportunities and costs. These estimates are not derived from empirical data sources, but largely from extrapolations of EU data and other estimates down to a national and sectoral level. Abatement potentials are measured against a Frozen Technology Reference Line (FTRL). This means that it assumes that in 2020 technologies will have today's efficiencies and only the activity grows.

7 *Ibid*.

8 http://www.finfacts.ie/irishfinancenews/article_1019273.shtml

9 http://www.legislation.gov.uk/uksi/2008/188/contents/made

This means also that part of the abatement potential estimated will already occur anyway under business-as-usual (BAU) conditions.

The SERPEC-CC tool allows for comparison of the 'bare' costs of technologies across measures, sectors and countries. Some technologies have a negative cost, in other words they imply a net welfare gain from a societal point of view. A positive cost indicates a net welfare loss.

The study showed that in Europe the potential abatement compared to a BAU baseline was 1540 Mt CO_2eq in 2020 and 2370 Mt CO_2eq in 2030. This equates to a 40% reduction in emissions in 2030 compared to 2005, or a 45% reduction compared to 1990 levels.

Of the non-ETS sectors, the built environment was found to have the biggest potential to contribute to emissions reductions within Europe, followed by transport, then agriculture, then waste. This mirrors the potential reductions in these sectors in Ireland. Industrial emissions were not classified as belonging to either ETS or non-ETS sectors or installations, so therefore the potential contribution of non-ETS industry cannot be estimated.

The key levers dictating to the abatement potential in each sector were:

- Stock turnover;
- Maximum growth rates, e.g. of wind power;
- Maximum renovation cycle speed (built environment and industry).

The key message from the study was that the majority of the potential has negative costs, particularly in the built environment sector and industry sectors.

Table 4.1. Overall abatement potentials and average costs of abatement for the EU27.

Name	Description	Mt CO_2	€/t CO_2
Built environment	Abatement relative to FTRL in 2020	820	<0
Industry[10]	Abatement relative to FTRL in 2020	700	<0
Transport	Abatement relative to FTRL in 2020	270	<100
Agriculture	Abatement relative to baseline in 2020	160	190

10 Industry here includes all industry, including fugitive emissions and refineries.

In 2009, the Sustainable Energy Authority of Ireland (SEAI) published a study of marginal abatement costs and potentials in Ireland, *Ireland's Low Carbon Opportunity: An Analysis of the Costs and Benefits of Reducing Greenhouse Gas Emissions*. This study drew on Irish-specific data in consultation with sectoral experts in Ireland, and produced potential abatement estimates for the power, transport, buildings, industry, agriculture and LULULCF sectors. These figures are also referenced in the relevant sections below.[11]

4.2.1 Agriculture

Within the EU the agriculture sector was found to contain a wide range of abatement costs. Figure 4.1 shows the abatement potential for 2020 and 2030.

The historic emissions for agriculture were derived from United Nations Framework Convention on Climate Change (UNFCCC) reporting. This data was used in conjunction with Intergovernmental Panel on Climate Change (IPCC) emission modelling parameters and emission factors. The baseline used is consistent with the agriculture baseline used by the European Commission for the 2008 Energy and Climate Package.

Within Europe the reduction potential against negative cost is 47 Mt CO_2eq for the year 2020. Below €10/t CO_2eq, another 59 Mt CO_2eq can be reduced through addition of nitrification inhibitors. The most expensive measures were better livestock nutrient use efficiency (€3400/t CO_2eq) and replacement of roughage with concentrates for non-dairy cattle (~€1200–2300/t CO_2eq). The total reduction potential for these measures was 10 Mt CO_2eq.

Within Ireland the gross technical abatement potential was found to be 6376 kt CO_2eq. Measures include: reduction of fertiliser application through precision farming, through a fertiliser-free zone and through enhanced distribution geometry; centralised anaerobic digestion; long-term management; reduction of the rate of microbial action; removal of the gas source; addition of nitrification inhibitors; and reduction of grazing on wet areas. Anaerobic digestion of manure measures have a total abatement potential of 970 kt CO_2eq, with marginal abatement costs ranging between –€10 for centralised anaerobic digestion and 171€ for on-farm digestion.

11 http://www.seai.ie/Publications/Low_Carbon_Opportunity_Study/

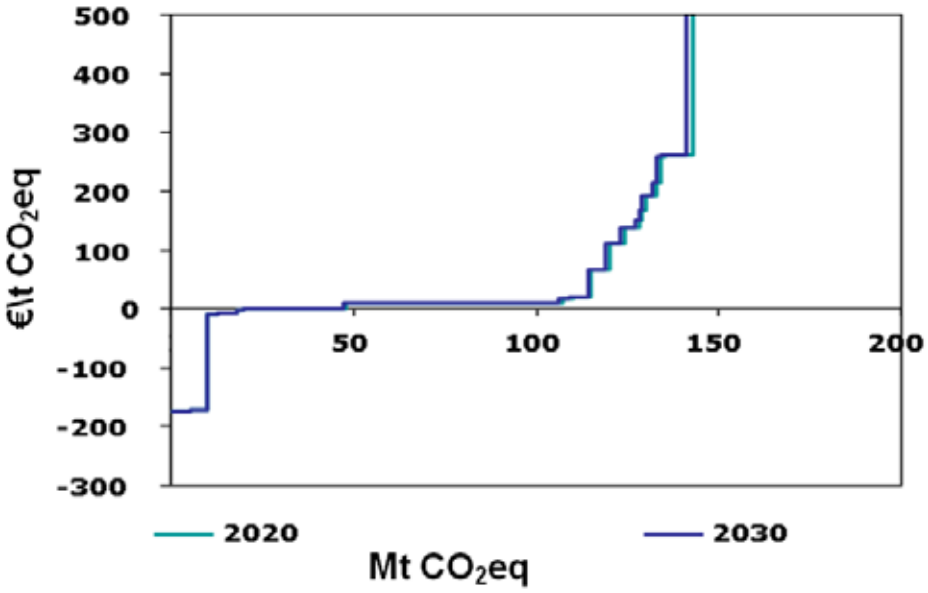


Figure 4.1. Agriculture abatement cost curve for the EU27.

Improved management of genetic resources is a cost neutral measure that has an abatement potential of 870 kt CO_2eq. Reduced nitrogen application through various measures has a total abatement potential of 1329 kt CO_2eq, which comes with a range of abatement costs going from –€215 for improved spreader maintenance to €3432 for better livestock nutrient use efficiency via fertiliser.

Potential barriers to successful implementation of this abatement include lack of training and knowledge, opportunity costs and hidden costs. Examples are given in Table 4.2.

Table 4.2. Example measures and resulting abatement potentials and costs within the EU27.

Type	Option/Measure	Mt CO_2eq	€/t CO_2eq
Soil	Reduced mineral fertiliser application through precision farming	5	–180
Soil	Reduced mineral fertiliser application through spreader maintenance	5	–170
Manure	Centralised anaerobic digestion (except pigs – east – warm)	8	–50 to –3
Soil	Reduced mineral fertiliser application through fertiliser-free zone	1	–1
Manure	Reduce the rate of microbial action and removal of gas source	13	0
Enteric	Long-term management and use of genetic resources	15	0

Using Irish data and in consultation with Irish sectoral experts, the SEAI Low Carbon Opportunity Study found that up to a cost of €60/t CO_2eq the abatement potential in Irish agriculture was approximately 480 kt CO_2eq. The biggest opportunities were found to be grassland nutrients (slurry) and management (clover). Some livestock measures were also found to have mitigation potential at negative cost. The large variation in mitigation potential between the two studies may be related to the application of EU-level measures, in the SERPEC-CC tool, to Ireland's agricultural systems. See Fig. 4.2.

4.2.2 The Built Environment

The study showed that within the EU27 there was an abatement potential of 815 Mt CO_2eq by 2020, with an abatement cost range of –€500 up to €1400/t CO_2eq. 77% of the total abatement potential had an abatement cost at or below €0. Retrofit measures are especially effective until approximately 2020, as in this period the worst buildings in stock are tackled.

By 2030 there is an abatement potential of 1170 Mt CO_2eq within the EU, with a cost range of –€400 up to €990/t CO_2eq. 70% of the abatement potential in this scenario had a potential cost at or below €0.

This cost range also reflects the estimated average abatement costs of potential abatement measures within Ireland. The building sector within Ireland was estimated to have an abatement potential of

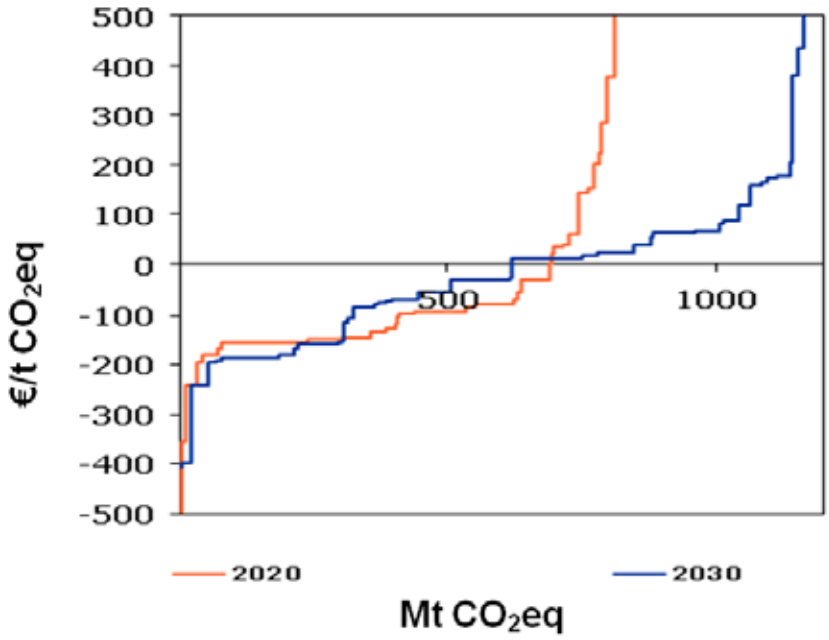


Figure 4.2. Built environment abatement cost curve for the EU27.

10,610 kt CO_2eq by 2020, representing the greatest potential contribution to reductions of any sector within Ireland. Heat-demand measures such as insulation showed particular potential.

In the Irish building sector, appliances are estimated to have a total abatement potential of 1228 kt CO_2eq. 1010 kt CO_2eq comes from the installation of more efficient lighting in new and existing housing stock, and is cost negative (light emitting diode [LED] installation is the most cost-effective measure at –€420 per tonne). Heating and cooling systems offer a further abatement potential of 3789 kt. Marginal abatement costs for these measures range between €765 for micro combined heat and power (CHP) facilities and –€139 for efficient centralised cooling systems. Heat-demand systems (e.g. insulation) offer a total abatement potential of 5138 kt, with almost all measures having a negative marginal abatement cost.

Using Irish data and in consultation with Irish sectoral experts, the SEAI Low Carbon Opportunity Study found that up to a cost of €60/t CO_2eq the abatement potential in Irish buildings was approximately 9Mt CO_2eq up to 2030. Retrofitting and new building efficiency were the most significant contributors to this. Examples are given in Table 4.3.

Table 4.3. Example abatement potentials and average costs of abatement options within the EU27 building sector.

Type	Option/Measure for buildings	Mt CO_2	Average €/t CO_2	Barriers
All	Heat demand (e.g. insulation)	395	–115	Initial investment
All	Appliances	150	–80	
All	Energy conversion (heating/cooling systems)	235	–45	Initial investment
All	Energy conversion (biomass)	35	60	Initial investment

4.2.3 Transport

Within the EU27 there is a 2020 potential abatement of 260 Mt CO_2eq within the transport sector (compared to the FTRL), or 145 Mt CO_2eq compared to the 2005 baseline. In 2030 the potential abatement compared to the FTRL is 555 Mt CO_2eq, or 200 Mt CO_2eq compared to the 2005 baseline.

Measures for passenger cars, passenger aeroplanes and freight trucks included an emission factor for biofuels at 50% of that for diesel/petrol. Increased electricity use from electric cars has been accounted for with an emission factor of 0.5t CO_2/MWh. Behavioural measures (truck driver training and eco-driving for

passenger cars – diesel and petrol) are available at negative costs. Reductions in the upstream emissions of biofuel and electricity production are a prerequisite for further reductions in the transport sector. See Table 4.4 and Fig. 4.3.

Table 4.4. Example abatement potentials and average costs of abatement options within the EU27 transport sector.

Type	Option/ Measure (at negative costs)	Mt CO_2	€/t CO_2	Barriers
Air	Passenger air travel	30	−160	None (already in baseline)
Freight	Efficient freight trucks	18	25	Investment costs given low taxes
Freight	*of which driver training*	*8*	*-130*	*Education/ Investment*
Cars	Passenger cars – biofuels[12]	40	50	None (assuming obligatory 14% in 2030)
Cars	Fuel efficient passenger cars	150	70	Education/Cost sensitivity (NB: Cost-efficient from end-user perspective!)
Cars	Tyre-pressure monitoring system	11	−40	Education/Cost sensitivity
Cars	*Passenger cars (electric)*	*15*	*500*	*Investment/ Technology under development*

Within the Irish transport sector the total abatement potential in 2020 was estimated to be 2000 kt CO_2eq. Within Ireland efficient freight trucks have an abatement potential of 180 kt CO_2eq. Approximately half of this would come through driver training, with a negative marginal abatement cost. However, remaining measures such as improved aerodynamics and wide-based tyres have a marginal abatement cost of up to €350/t CO_2eq. Other potential abatement measures within the transport sector include fuel-efficient passenger cars (e.g. eco-driving, tyre-pressure monitoring systems) and either electric or biofuel-powered passenger cars.

Using Irish data and in consultation with Irish sectoral experts, the SEAI Low Carbon Opportunity Study found that up to a cost of €60/t CO_2eq the abatement potential in Irish transport was approximately 5Mt CO_2eq. The largest potentials were seen to come from improvements for light-duty vehicle (LDV) gasoline internal-combustion engines, electric vehicles and second-generation biofuels.

4.2.4 Waste

Within Europe waste emissions from landfills are declining over time from around 150 Mt CO_2eq in 2005 to just over 60 Mt CO_2eq in 2030.

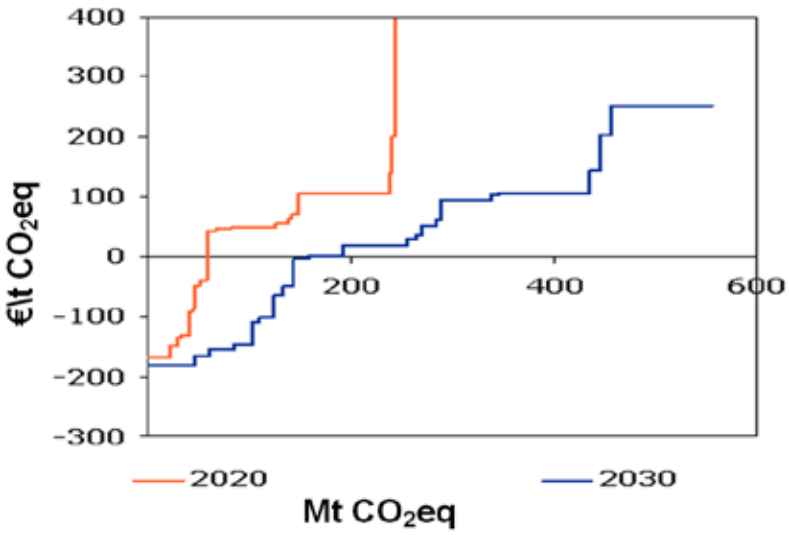


Figure 4.3. Transport sector abatement cost curve for the EU27.

12 Assuming 10% market penetration rate in 2020.

For the waste sector, projections were made using a first-order decay model as recommended in the IPCC guidelines and the subsequent Good Practice Guidelines.[13] The baseline is consistent with the baseline used in the European Commission's 2008 Energy and Climate Package (i.e. it includes the effects of the Landfill Directive).

In 2020 the total abatement potential in Europe compared to the 2005 baseline is estimated to be ~15 Mt CO_2eq. Related abatement costs range from –€160 to €40/t CO_2eq. In 2030 the potential is 34 Mt CO_2eq. These reductions assume that by 2020 50% of biodegradable municipal solid waste (BMSW) will be diverted from landfill. The remaining BMSW is split over the remaining options.

This matches with the potential abatement and estimated costs of abatement within Ireland. In the Irish waste sector, the annual abatement potential in 2020 is 202 kt CO_2eq. Potential measures include anaerobic digestion, composting, incineration with CHP, mechanical biological treatment and recycling of paper. Recycling of paper has an estimated abatement potential of 72,000 t/CO_2eq and has a negative marginal abatement cost of –€154/t CO_2eq. The remaining waste measures have an aggregate abatement potential of ~130 kt CO_2eq, with specific abatement costs lying between €27.50 and just over €37/t. See examples in Table 4.5.

Table 4.5. Example abatement potentials and average costs in the EU27 of abatement options within the waste sector.

Option/ Measure	Mt CO_2eq	€/t CO_2eq	Barriers
Recycling of paper	3.5	–160	Very dependent on recycled paper market value and public contribution to recycling
Anaerobic digestion	3	35	
Composting	3	30	Relies on public participation in sorting waste; value of compost varies greatly
Incineration with CHP	3	40	Public opposition ('not-in-my-back-yard' effect)
Mechanical biological treatment	3	30	Dependent on the refuse derived fuel (RDF) price and landfill taxes for cost effectiveness

13 http://www.ipcc-nggip.iges.or.jp/public/gp/english/

4.3 British Columbia Offset Scheme Costs

There are also potential one-off and ongoing costs associated with a DO scheme that can be attributed to either the project administrator (the government or a government agent) or the participant. Government costs relate to set-up, administration, and scheme and project scrutiny, while, for participants, costs relate to project identification, development and reporting.

The way in which the system is designed will have an effect on the number of the above factors that will be relevant to the cost of a DO programme, and the related costs of each. Design choices may also result in a difference in the division of costs between the government and project developers, without always altering the total system costs. The report found that limiting the scope of the project had the greatest impact on the overall price of a DO scheme. For such systems, costs are expected to be higher, especially in the instances where the scope is limited to projects that are difficult to quantify and monitor. From findings from a study of predicted costs associated with a federal Canadian offset scheme, it was seen that administration costs were not greatly impacted by scheme design, varying by only 10%, while transaction costs varied more.

Ecofys has also undertaken previous work on an earlier DO scheme in the province of British Columbia in Canada in 2008 (see Appendix for more details of the scheme). This project entailed consultation with offset project developers and standards based in the region to gather feedback on the typical transaction costs encountered. Respondents provided information on costs relating to different components, the results of which can be seen in Table 4.6.

Table 4.6. Averages and total of costs (Canadian dollars) for different project components.

	Low (CDN$)	Average (CDN$)	High (CDN$)
Project plan and report verification	5,263	53,810	170,060
Plan validation	3,158	30,667	70,000
Plan validation new methodology	*5,263*	*22,176*	*47,367*
Monitoring	3,158	22,016	77,300
Report verification	4,210	21,762	70,000
Total	15,789	128,255	387,360
Total (validation new methodology)	*17,894*	*119,764*	*364,727*

In line with the results of the federal study, there was a high degree of variation in estimated transaction costs. For example, there were differences of opinion on whether costs varied with project type or with project size. The largest cost related to initial project-plan preparation, which is unsurprising as this would encompass project origination, baseline setting and methodology selection.

Overall it appears a DO scheme could provide a clear financial incentive for emissions reductions in non-ETS sectors within Ireland, by providing both a clear pricing signal and a stimulus for early action. Such a scheme could also present wider economic opportunities for Ireland by boosting research into innovative clean technology solutions that would then be available to export to other countries.

Ecofys' own tool for estimating national abatement potentials and costs predicts that there are significant abatement opportunities present in the non-ETS sectors in Ireland, with the exception of the waste industry (due to the small number of installations). However, there are also a number of potential barriers to the successful establishment of such a scheme. Chief amongst these are prohibitive participation costs for small entities (especially if subject to rigorous international MRV requirements) and a lack of clear-cut abatement opportunities in sectors such as agriculture.

5 Public and Stakeholder Consultation

Alongside the literature-based assessment, carried out in Sections 2–4, was a public consultation that sought to gain an understanding of perceptions of a DO scheme by stakeholders. The consultation, led by Energy Services, began with a public announcement in *The Irish Times*, and a total of 19 written responses were received during the course of the consultation process (8 October to 17 November 2010). Eighteen were received by email and one was received by post. A focus group was held on 25 November at which there were 14 attendees with whom the main questions of the consultation were discussed in more detail. The attendees represented an informed group of carbon practitioners, academics, industry association representatives and civil servants.

Recurring themes from the public consultation and focus group are set out below:

- The general view was that a well-defined and structured DO scheme for Ireland could lead to GHG emissions reductions, and provide inward investment, technology innovation and increased awareness of environmental issues;
- Robustness, accounting rigour and ability to verify emissions baselines, BAU claims and reductions are critical;
- Possibility of using ISO 14064 as a basis for accounting and verification;
- Importance of ensuring additionality of any emissions reductions;
- A DO scheme could provide a potential for business development and technology innovation;
- Concern in the agricultural sector and others regarding potential capping of emissions. This, it is claimed, will lead to leakage of business and GHGs to less regulated (uncapped) jurisdictions;
- Within the agricultural sector there is concern over the threat of burdensome administration requirements for participation in any DO scheme;
- A number of respondents point out a need for a reconciliation between food security/agricultural policy (e.g. Food Harvest 2020, which calls for an increase in agricultural output and value) and energy/climate-change policy, which, it is claimed, incentivises a move from food production to sequestration or energy crops. Most respondents take the view that food production should be prioritised, but this is not a universal viewpoint;
- Many respondents commented on the need to ensure cost effectiveness of any scheme on a macro level (cost to the State of achieving emission savings) and on a micro or project level (cost of participation, MRVs, etc.);
- A majority of respondents would like to see all sectors and all GHGs applicable under any DO scheme;
- There is a split in respondents' views regarding linkage to international schemes. While some welcome the assurance of quality and additionality given by using JI or CDM mechanisms, others note the resource and cost burden of compliance with these schemes, along with the potential loss of AAUs if reductions are exported;
- Respondents generally suggest that existing organisations (e.g. the EPA) should manage and operate a DO scheme, perhaps with some private-sector involvement.

The focus group also raised the point that a further consultation following greater finalisation of a DO scheme's structure and scope would be welcome.

6 Transformative Potential of an Irish Domestic Offset Scheme

This section draws together the analysis in the preceding parts of this report to look at the overall merits of DO in Ireland.

Certainly, there is a clear driver for demand for emissions reductions in Ireland as the country faces a significant shortfall in meeting its 2020 target under the ESD. This demand creates an incentive for the government to impose requirements on all aspects of society to help in the reduction of GHGs. This could be reinforced by a future climate-change bill. Ireland's emissions are currently projected to be approximately 7.6m tonnes of CO_2eq higher in 2020 than its 2020 ESD reduction target of –20% relative to 2005 levels.

Currently, Ireland is purchasing allowances from abroad through the UNFCCC flexible mechanisms (CDM, JI and intergovernmental trading of AAUs). However, as well as the cost of credits, there is concern that external purchases of credits do nothing to alter the emissions profile of Ireland in the long term, therefore perpetuating the need to buy emission offsets. While the recession has reduced the need for further purchases in the present phase (2008–2012), stringent future reductions are needed to meet the scientifically agreed objective to reduce national emissions by 80% by 2050.

Domestic offsetting is one of the policy options that Ireland could use to help to beat this shortfall and to facilitate reductions in the non-ETS sectors. These sectors, particularly transport and agriculture, have traditionally been seen as 'hard-to-reach' sectors due to the diffuse nature of their emissions and the lack of cost-effective abatement options. As part of the original invitation to tender, the EPA posed three questions that together would help to ascertain the overall potential merit of a DO scheme in meeting Ireland's GHG objectives in an effective way:

- Could domestic offsetting encourage best practice?
- Could domestic offsetting assist in the long-term transformation to a low carbon society?
- Could domestic offsetting promote the development of enterprises involved in generating and trading offsets?

6.1 Could Domestic Offsetting Encourage Best Practice?

The adoption of best-practice products and practices offers multiple benefits in terms of increased energy efficiency, reduced GHG emissions and stimulation of a new market for sustainability. However, the initial capital outlay necessary to upgrade to best-practice measures can often prove an obstacle to their implementation. As seen in existing international markets, offsetting can be used to provide a financial incentive for GHG reduction projects that would not otherwise take place.

In a similar vein, DO does have the potential to encourage best practice in energy and GHG management through the allocation of a market price to GHG savings in the non-ETS sector. This market may also stimulate measures in previously 'hard-to-reach' sectors, encouraging entrepreneurs and those other than owners or operators of, for example, a farm or transport system, to consider emission-reduction opportunities. Furthermore, DO provides a financial incentive that extends beyond that of grant or loan programmes on the potential uptake of measures. The limit will be established by the balance of supply and demand. It can also increase GHG literacy by increasing interest in GHG reduction projects and offset credits.

To maximise encouragement of best practice and the transformation to a low GHG economy, a scheme with a large scope and number of participants will be important. However, a more limited scope may serve to focus research and development into best-practice technologies and initiatives in certain sectors with high abatement and/or export potential. As seen in Section 5, abatement potentials and costs could vary significantly between sectors. Ultimately, the overall cost effectiveness of abatement in potential participating sectors must be balanced against the overall abatement potential within non-ETS sectors.

Although the respondents to the public consultation were largely supportive of a DO scheme, they also acknowledged some of the challenges that it would face in supporting the uptake of best-practice measures.

These difficulties include the predominant role of agriculture and the difficulties in relation to cost and additionality in this sector. They noted that any such scheme would need to avoid the risk of transfer of AAUs abroad, thereby restricting it to a domestic Irish market, which would have limited attraction for investors. However, the establishment of a DETS with mandatory reductions imposed on some of the largest sectors (in terms of scope) could achieve a significant level of demand within a domestic-only scheme.

Another broader challenge would be that of balancing GHG reduction aims and other objectives in an already crowded policy environment. Whilst a DO scheme could indeed potentially facilitate the adoption of best-practice GHG reduction measures in non-ETS sectors, its impact must be balanced against other objectives. There may be a conflict between best-practice approaches towards different objectives. One example given was that of the Food Harvest 2020 initiative, which has an objective of increasing the volume of milk output by 50% and the value of primary agricultural output by 33% by 2020. Adopting a DETS and imposing mandatory caps on the agricultural sector, for example, could potentially endanger achievement of the Food Harvest objective.

The final design of the DO scheme will play an important role in how the programme would interact with other policies and objectives. For example, a baseline and credit DO scheme would be one way of rewarding GHG reductions below a baseline without imposing penalties on entities in non-ETS sectors that do not manage to reduce emissions to this baseline; in other words, a 'no-lose' target. This would allow for sectors to continue to grow, whilst, nevertheless, providing a financial incentive for them to reduce their emissions. Alternatively, relative (e.g. emissions per tonne of product) targets as opposed to absolute targets can provide a similar flexibility, but carry the risk that no actual net reductions will be achieved.

Although interaction with other policy initiatives may present challenges, it can also present opportunities for a DO scheme to complement other existing or potential policies. Linking DO schemes with White Certificate Schemes (WCS) can also provide an incentive for firms and energy suppliers to go beyond their energy-saving targets rather than merely complying with them. White Certificate Schemes are an energy-saving policy tool in place in France, Italy and the UK in various forms. In a WCS, energy producers or retailers are obligated to increase the energy efficiency of the buildings they supply, and, for each unit of GHG reduction achieved, a supplier is given an offset credit to count towards its compliance target. By allowing the credits earned by energy suppliers as part of a WCS to be fungible with DO credits, creates an incentive for the utilities to go beyond compliance with their targets and accelerates a move to best-practice measures.

Of the three scheme designs selected in Section 2, the domestic emissions trading scheme option (Design Option B) appears to encourage best practice best within Ireland. This is due to the large scope of participation and the mandatory caps driving demand for reductions to take place via the scheme. The effort involved in developing GHG reductions can be extensive, and therefore a DO scheme will need to be supported by as strong an incentive for participation as possible. The government buyer and the unilateral JI scheme are both voluntary in nature, and therefore create a smaller incentive for participation.

6.2 Could Domestic Offsetting Assist in the Long-Term Transformation to a Low Carbon Society?

The long-term transformation to a low carbon society will entail not only the implementation of GHG reduction measures, but also a permanent change in attitudes and behaviour across all sections of society. Domestic offsetting does, indeed, have the potential to assist in the long-term transformation to a low carbon society as it will establish a new financial incentive to develop low GHG or GHG reduction projects, particularly in sectors that have experienced few GHG reductions to date. The price of GHGs within the DO market would be expected to increase revenues for projects and therefore incentivise a number of similar projects in a given sector. Another important result of a DO scheme will be the capacity-building effect. An increase in low GHG R&D and employment should create a virtuous circle which invigorates the 'green-collar economy'. This should be evident both within sectors where new projects are established, as well as across the economy.

The benefits of a DO scheme seem suited to medium- and long-term time frames as, in the short term, reductions may not be eligible for compliance if traded

externally, and the associated financial savings of reductions will only be felt once the project pay-off has been completed. Furthermore, increased activity and innovation in the clean-energy sector, driven by the incentives of a DO programme, will also, increasingly over time, have an knock-on effect on overall awareness in Ireland of the benefits of saving energy, and of implementing renewable energy initiatives.

Initiatives to reduce GHG emissions in non-ETS sectors already exist, notably the good work being undertaken by the SEAI, and a DO scheme can be designed to complement rather than conflict with these existing programmes. The SEAI offers a number of grants relating to clean-energy measures and R&D, and this existing infrastructure can help to contribute significantly to the establishment of an effective DO scheme. While, for example, domestic building grants would allow for end-users of energy with, likely, no significant interest in the trading of carbon/GHG credits to participate in GHG reductions, commercial building grants can be subtracted from the final offset credit revenues generated by a project, and can therefore be counted as a loan while avoiding double counting. The combined incentive of the existing R&D grant and potential offset credit revenues will dramatically increase activity in this area, and will contribute towards Ireland becoming a centre of excellence for 'green' R&D.

However, the question of whether DO can encourage the deeper, more dramatic infrastructure changes that are necessary for a society to truly transition to a low carbon pathway, is less clear. There is a risk that DO will create low GHG bubbles within sectors where project methodologies capture emissions around certain emission points or technologies, but fail to tackle other GHG emissions that are not so easily ring-fenced or implementable due to their small size or diffuse nature. Nevertheless a project-based approach is that with which existing offset project developers and administrators are most familiar. Furthermore, a project-based approach provides greater assurances that GHG reductions are real and robust as full monitoring and verification takes place. Therefore, a phased approach may be recommendable – a project-based scheme lasting possibly five years, followed by a transition to a more substantial community-based approach. See Box 6.1 for an example.

A crucial factor in the extent to which participation in DO takes place and to which DO as a whole is successful is the matter of how the concept and scheme is presented to stakeholders and wider society. It is essential that the

Box 6.1. A community-based domestic offset scheme.

As an example of a community-based approach, the emissions of a town or village across all aspects of life (buildings, transport, waste, etc.) may be monitored and/or extrapolated over a period of up to five years, and the average seasonal amounts can be used as a baseline against which to measure all emission-reduction activities within the town. Community action could be coordinated by existing project developers or municipal authorities. Project developers could contract with local councils that, for undertaking all project accreditation and implementation work, they receive a substantial share of the credits generated. Other entities could also invest, through investment in offset funds (e.g. banks or private-equity funds), and would receive a proportion of credits relative to the proportion of their investment in the total amount of financing invested into the community. The local authorities can use the revenues from the credits that they receive to fund other beneficial community measures (investments in schools, hospitals, leisure facilities, etc.).

As with all sectoral GHG reduction initiatives, there may be a concern that some of the reductions that take place against the scheme are non-additional. Therefore, ex ante and ex post behavioural surveys and declarations of intent for physical measures could be required. The five-year period for establishing a baseline could run simultaneously alongside the initial project-based scheme. In order to accurately calculate emissions reductions, a number of measures can be utilised – the use of emission-reduction factors based on the type of house in which a measure is implemented, for example as used as part of the UK government's WCS.

full benefits of the scheme are laid out, in particular that the money will have to be extracted from the national budget through one method or another, and will be more beneficial for the country in the long term. In these economically challenging times, further financial obligations are likely to be strongly resisted unless the reasons for their imposition are clearly explained. What's more, a DO scheme may initially appear to be a complex and administratively more expensive way of achieving emissions reductions (as opposed to, for example, a carbon tax). However, this complexity will bring returns over time (improved efficiencies and reduced emissions) that simply paying a carbon tax would not achieve.

All of the options shortlisted in Section 3 have the potential to contribute to the transition of Ireland to a low GHG society. A sectoral approach to emissions reductions will offer the greatest scope for potential projects, and therefore, arguably, is the scheme design that best contributes to Ireland becoming a low GHG society. A sectoral approach could form the basis of either the government buyer scheme (Design Option A) or the domestic emissions trading scheme (Design Option B). However, as existing international offset mechanisms such as the CDM and JI follow a project-based approach, any intention of future fungibility with these schemes would present a significant challenge to the implementation of a sectoral DO scheme. On the other hand, a sectoral scheme would also present an easy opportunity to segue into a community-based GHG reduction scheme (see Box 6.1.).

6.3 Could Domestic Offsetting Promote the Development of Enterprises Involved in Generating and Trading Offsets?

A DO scheme would promote the development of enterprises involved in the generation and trading of offsets, although the design of the scheme would affect the extent to which this occurred. Existing or potential offset project developers will look to the DO market as an additional pool from which to originate their low GHG projects. Boutique investment houses or existing consultants will react to the new scheme to facilitate the generation and trade in offsets. Validation and verification will be essential to ensure the permanence of offsets and their acceptability in the wider emissions trading market. This will generate high-skill, green-collar jobs in addition to project-development jobs.

As was stated in some responses to the public consultation, the non-ETS sectors of waste, transport, agriculture and building are well regulated, and several easily measurable and verifiable project options exist under existing regulatory regimes.

Furthermore, existing voluntary offset standard methodologies can be easily applied or adapted, and used as the basis for project activities as part of a DO scheme.

A DO scheme can provide exportable services and intellectual property through the development and research required for the implementation of a DO scheme. Domestic offsetting would also contribute to the development of the renewable and energy efficient R&D sectors and the 'smart economy'. Domestic offsetting could improve the cash flow into the renewable arena through the guarantee of carbon finance. A DO scheme can be the perfect test bed for new carbon financing products, methodologies and new technologies.

By boosting investment into R&D and creating a favourable environment for entrepreneurs to develop and profit from new technologies, Ireland would see itself well placed to adopt a leadership role in the world of innovative renewable energy and energy-saving technologies.

A key question when assessing the potential of a DO scheme to promote an offset market is that of how a DO market both within Europe and internationally may develop. For example, Article 24a of the revised EU Emissions Trading Directive leaves the door open for the creation of DO scheme(s) for compliance with the EU ETS. Early action in the creation of an Irish DO scheme would provide Ireland with useful leverage in subsequent negotiations on the design of EU-approved DO legislation.

However, future linkage to the EU ETS and to other DO markets could have an impact on the potential for DO to create employment within Ireland. Existing offset credits that are currently eligible within the EU ETS

are project based, and undergo strict project-specific baseline establishment and verification. If Irish DOs were to be internationally accepted through future linkage to the EU ETS, they would need to provide a similar level of robustness and fungibility that these existing credits provide. A sectoral Irish DO scheme would present some challenges in this regard, due to the traditional concerns over accuracy attached to a sectoral approach. The approach to additionality requirements will also impact on the potential for Irish DO credits to join in with future international linking. A strict approach when setting additionality requirements is recommended, both to lend Ireland a strong position in negotiations on the allowance of DO credits into the EU ETS or linkage to other schemes, and in order to ensure that reductions are not double counted.

Overall commitment to a DO scheme would be likely to yield several benefits in terms of job creation within Ireland. In particular, development of a community-based approach, which would be highly innovative, could place Ireland in a leadership role in the creation of deep, infrastructural GHG reductions, and could lead to a large amount of exportable intellectual property and skills. Furthermore, Ireland's highly competitive rate of corporation tax would attract foreign clean-energy innovators to base themselves in Ireland and help work towards this aim. In all, a DO scheme would help to contribute significantly to Ireland becoming a green technology 'hub' with significant investment opportunities for entrepreneurs and venture capitalists.

Of the three scheme designs selected in Section 2, Design Option A or B seems best equipped to promote a new offsetting industry within Ireland. Design Option A, the government buyer scheme, would be attractive to project developers as it provides a price and buyer guarantee for GHG reductions generated. Design Option B, the domestic ETS, would also help to facilitate this market, although the extent to which it did so would depend on the stringency of the cap placed on obligated sectors. Design Option C, the unilateral JI approach, would be the least effective scheme to create new jobs and opportunities around offsetting. JI activity has been very low since the creation of the scheme, due to the heavy bureaucracy and long project-development time. Additional demand created by adoption of a unilateral JI scheme would most likely be consumed by existing offset project developers based throughout Europe.

7 Conclusion

In conclusion, a carefully-designed Irish DO scheme could facilitate the uptake of best practice and the creation of new employment/export opportunities, and could also assist Ireland in the transition to a low-carbon society.

Of the three designs shortlisted in Section 2, it is Design Option B (the domestic ETS) that would provide the best support for each of these three aims. This is due to its large scope and the mandatory emission-reduction targets that will help to ensure demand for credits, albeit depending on the stringency of the caps. However, Design Option A (government buyer) also has the potential to encourage successfully the creation of new businesses involved in the generation and trading of offsets, due to the price guarantee for credits it provides. As demand for credits will be the key determiner of the success of a DO scheme, an option for administrators could be to combine these two factors by placing a floor price on credits and allowances traded within a domestic ETS. Design Option C (unilateral JI scheme) would be the least suitable scheme to achieve the aims of the questions posed at the beginning of Section 6, as there would be a high administrative and financial burden on the government, and project opportunities would be restricted to those with approved JI methodologies.

It is important to understand the effectiveness of a DO scheme in comparison to alternative policy measures such as taxes or direct reduction targets. As the current carbon tax is not yet achieving the reductions required, and direct regulation would be a less flexible and less cost-effective alternative, a market-based approach is advisable. An emissions tax wherein revenues were directly hypothecated into emission-reduction objectives could arguably also lead to significant reductions. However, this would be unlikely to create the employment and innovation opportunities that a market-based approach would create, as it would provide only a limited incentive for project developers to participate in R&D or project origination. It would also not allow reductions to take place where they would be most cost effective.

The distribution and scale of the costs of DO will depend on the final scheme design. Design Option A would represent the biggest cost to the Irish government, as it would face both administration costs and the requirement to purchase all reductions generated under the scheme. Design Option B would also entail administration costs, but purchase costs would be passed on to operators within participating non-ETS sectors. Design Option C represents the smallest administration costs, as project registration and oversight would be largely overseen by the UNFCCC JI Supervisory Committee (JISC), who administer the JI mechanism. If the generated JI credits were to be used to meet Ireland's ESD target, then the government would need to budget for the purchase of generated credits.

Meeting Ireland's ESD 2020 target will not be easy, due to the scale of the additional effort that is required. Furthermore, the agricultural sector, which is projected to contribute about 40% of Ireland's ESD emissions is a notoriously difficult sector in which to generate emissions reductions that can be verified by existing offset methodologies. What's more, existing GHG reduction measures by themselves will not achieve a transition towards a low GHG society. However, a DO scheme can provide a cost-effective and, arguably, more progressive alternative to taxes or direct reduction regulation, as it provides flexibility for reductions to take place where they will be cheapest. Furthermore, one of the key benefits of a DO scheme is that potential reductions under the scheme are uncapped. Also, DO provides a financial incentive to develop new ways of reducing GHG emissions and creating new jobs. The previous sections have shown that there are several benefits to a DO scheme for Ireland, and these include increased environmental literacy among non-ETS companies (or among communities).

The real benefits of DO will only truly be seen from the medium term onwards. While DO offers a way of reducing Ireland's GHG emissions both now and in the long term, it can also provide a new source of reductions in the short term.

One of the main objectives of an Irish DO scheme would be to meet Ireland's obligations under the ESD. As it stands, there is a significant shortfall in meeting this objective, and ways must be found to facilitate emissions reductions in non-ETS sectors, particularly agriculture. Whilst other methods such as grants and taxes may help to do this, a DO scheme provides an incentive for offset project developers and clean-technology innovators to participate in reducing emissions. They have the existing knowledge and capacity to drive emissions in a way that a grants-based scheme would be less likely to achieve. However, as trading would take place at a private-entity level, there is a risk with external fungibility that the government loses control over whether Ireland would be able to retain the rights to those reductions over the lifetime of the credits generated.

External factors could present a significant risk to an Irish DO scheme should Ireland decide to pioneer a national DO scheme. Different national circumstances could mean that a DO initiative, fungible Europe wide, would look significantly different to that in existence in Ireland, and would therefore limit the potential benefits of early action.

While DO can have a positive impact on Ireland's ability to reach its ESD 2020 target, future ESD targets should be a consideration for any future DO scheme. From 2013, EU Member States will receive a capped amount of Annual Emissions Allocations (AEAs) that correspond to their non-ETS target under the ESD. This allocation will decrease in a linear fashion until 2020. Member States will be able to trade these AEAs among themselves, based on each individual country's surplus or deficit. As external trade of DO credits (at the private-entity level rather than governmental level) would require the cancellation of an AEA. This could impact on whether the final design of an Irish DO should allow for external trading. The risk of immediate external linkage is that Ireland would not be able to claim the reductions towards its own targets over the full lifetime of credits.

In the stakeholder focus group, the general view was that a well-defined and structured DO scheme for Ireland could lead to GHG emissions reductions and provide inward investment, technology innovation and increased awareness of environmental issues. Existing regulatory regimes could be used at little extra cost to administer the scheme. However, some concerns were raised about the ability of a DO scheme to successfully interact with other domestic policies, and careful balancing of priorities will be crucial if a DO scheme is to be effective.

In summary, an Irish DO scheme has the potential to make a highly positive contribution to Ireland's national and international climate-policy objectives, provide impetus for the development of an innovative clean-technology sector with highly exportable intellectual property, and support the implementation of best-practice measures across the range of non-ETS sectors. However, the design of the DO scheme would require careful consideration of the interaction with other objectives in other policy areas and the potential for future European-wide DO initiatives, although the benefit of early action should not be ignored. The complexity of the final scheme design, and the wide distribution and scale of potential transaction costs could prove onerous if not sufficiently prepared for.

Appendix: Overview of Domestic Offset Schemes around the World

There are currently already a number of DO programmes in operation in countries around the world. These schemes vary in scope, ambition, and structure. The following are the most prominent existing initiatives.

New Zealand. The New Zealand Projects to Reduce Emissions (PRE) scheme began in mid-2003, and was replaced by an all-sector cap and trade scheme in 2010. It used a competitive bidding process to award projects with AAUs or ERUs for their emissions reductions. These Kyoto-compliant credits could then be sold in the regular Kyoto-compliant market.

Australia. The New South Wales Greenhouse Gas Abatement Scheme (GGAS) has been in operation since early 2003 in the eastern states of Australia and aims to reduce GHG emissions associated with the production and use of electricity. Electricity providers receive an emissions ceiling based on their market share. Project-based activities can generate tradable New South Wales Greenhouse Gas Abatement Certificates (NGACs) that can then be sold to suppliers with excess emissions. In addition to NGACs, suppliers also have the option to surrender 'green' certificates or pay a fine. New South Wales authorities passed legislation that the scheme would cease to exist once a national Australian ETS was introduced. However, this national ETS has yet to achieve approval in the Australian parliament and the GGAS continues to operate. As demand-side activities will not be part of the potential Australian ETS, a White Certificate Scheme (domestic energy saving) has been proposed, based on the GGAS structure.

Canada. A detailed plan for a Canadian DO scheme, known as Canada's Offset System for Greenhouse Gases, was first proposed by the Canadian government in February 2006. To date, no scheme has been implemented, as Canada waits to align any such scheme to potential federal US schemes. Under the proposed scheme, credits can be sold to the government-funded Climate Fund or to other buyers, such as participants in the Canadian emissions trading system for large final emitters (LFE).

USA (regional). The North American Regional Greenhouse Gas Initiative (RGGI) came into existence in December 2005, in seven states in north-east USA. The scheme has since expanded to cover ten states. The mandatory scheme takes the form of a 'cap-and-trade' system covering CO_2 emissions from power plants within the region. The first compliance period started in 2009, and participants were offered the option of using credits from DO projects to meet their target. Together the ten participating states have capped, and will reduce power-sector CO_2 emissions 10% by 2018. Projects located outside the RGGI region can qualify under certain conditions, but emissions reductions are discounted.

Germany. Germany also undertook an in-depth academic study on the potential for a 'National Projects' (DO) scheme. The study was published in 2003 and examined the feasibility of DO projects in Germany according to their environmental effectiveness, their static and dynamic efficiency, their transaction cost, and their social and political feasibility. The study is now quite old, and, as the EU ETS had not yet begun, there is no discussion of the relationship between that and a potential DO scheme. Nevertheless, the study is still useful as an examination of approaches not linked to the EU ETS. The main approach considered was that of linkage to the JI. The credits generated would be called National ERUs (NERUs) and would be tradable and fungible with other Kyoto credits.

France. The French proposal for a DO scheme is based on the JI framework. Projects conducted at national level and approved by the JI Designated Focal Point are recognised by the partner country serving as the investor country without the investor country conducting its own assessment of the projects. The host country issues the emission-reduction certificates and transfers them to the investor country which then immediately passes them back to the host country. The French scheme includes a five-year crediting period (2008–2012) and

is designed by several sectoral working groups, such as the government, France's environment agency (ADEME), the French GHG inventory (CITEPA) and industrial branches.

Denmark. At the end of 2010, Denmark also announced that it would be launching a unilateral JI-based DO scheme. The Danish government has issued a tender to establish specific abatement projects in which to invest.

Acronyms and Annotations

AAU	Allocated amount unit. A tradable unit corresponding to one tonne of carbon dioxide equivalent (1t CO_2eq). Countries with quantified emission-reduction targets under the Kyoto Protocol are allocated a number of these units that correspond to the cap on emissions required to meet that target.
AEA	Annual emissions allocation. A tradable unit corresponding to one tonne of carbon dioxide equivalent of an EU country's cap on non-ETS emissions under the Effort Sharing Decision (ESD).
AIE	Accredited Independent Entity. AIEs are independent auditors that assess whether a potential project meets all the eligibility requirements of the JI and whether the project has achieved greenhouse gas emissions reductions.
Annex B	Countries with quantified emission-reduction targets under the Kyoto Protocol.
BAU	Business as usual
CDM	Clean Development Mechanism. The CDM is an arrangement under the Kyoto Protocol that allows industrialised countries with a greenhouse gas reduction commitment (called Annex 1 countries) to invest in projects that reduce emissions in developing countries as an alternative to more expensive emissions reductions in their own countries.
CER	Certified Emissions Reduction. A CER is a unit issued under the CDM that is equal to one tonne of carbon dioxide equivalent, calculated using global warming potentials defined by the Kyoto Protocol.
CERT	Carbon Emissions Reduction Target. A UK energy-efficiency scheme.
CFL	Compact fluorescent light bulb. CFLs use less power and have a longer life than incandescent light bulbs that offer the same visibility.
CH_4	Chemical symbol for methane, a potent greenhouse gas.
CHP	Combined heat and power. The use of a heat engine or a power station to simultaneously generate both electricity and useful heat.
CO_2	Carbon dioxide
CO_2eq	Carbon dioxide equivalent
DETS	Domestic Emissions Trading Scheme. An emissions trading scheme whose participants are all located within the same country.
DO	Domestic offset/Domestic offsetting. An offset/offsetting credit generated by investment within one sector by another sector located within the same country.
EPA	Environmental Protection Agency (Ireland)
ERU	Emissions Reduction Unit. This is the basic unit of Joint Implementation (JI) projects. One ERU represents the successful emission-reduction equivalent to one tonne of carbon dioxide equivalent (1t CO_2eq).
ESD	Effort Sharing Decision. Establishes annual binding greenhouse gas emission targets for Member States for the period 2013–2020. These targets concern the emissions from sectors not included in the EU Emissions Trading System (EU ETS) – such as transport, buildings agriculture and waste.
ETS	Emissions Trading Scheme. A flexible mechanism created by the Kyoto accords which is intended to allow the exchange of emission rights between countries or companies to achieve their objectives in reducing emissions of greenhouse gases.

EUA	European Unit Allowance. Tradable emission credits from the EU Emissions Trading Scheme (EU ETS). Each allowance carries the right to emit one tonne of carbon dioxide.
EU ETS	EU Emissions Trading Scheme. The first and largest international scheme for the trading of greenhouse gas emission allowances, the EU ETS covers some 11,000 power stations and industrial plants in 30 countries.
EU27	The 27 Member States included in the European Union.
FTRL	Frozen Technology Reference Line. Baseline emission scenario, assuming no new technologies beyond those in current use are implemented.
GHG	Greenhouse gas. An atmospheric gas that absorbs and captures heat within the Earth's atmosphere, warming the Earth.
IPCC	Intergovernmental Panel on Climate Change
IRR	Internal rate of return
JI	Joint Implementation. A programme under the Kyoto Protocol that allows industrialised countries to meet part of their required cuts in greenhouse gas emissions by paying for projects that reduce emissions in other industrialised countries.
JISC	Joint Implementation Supervisory Committee. The body that oversees implementation of the Joint Implementation (JI) mechanism, and awards credits to successful projects.
LDV	Light-duty vehicle
LED	Light emitting diode
LULUCF	Land Use, Land Use Change and Forestry
MRV	Monitoring, reporting and verification. The processes for measuring and verifying emissions reductions achieved.
MS	Member State. A country belonging the European Union.
MSW	Municipal solid waste
N_2O	Chemical formula for nitrogen dioxide, a potent greenhouse gas.
R&D	Research and development
SEAI	Sustainable Energy Authority Ireland
SERPEC-CC	Sectoral Emissions Reduction Potentials and Economic Costs for Climate Change. An Ecofys tool to estimate emission-reduction potentials and costs in different non-ETS sectors in the EU27.
UNFCCC	United Nations Framework Convention on Climate Change. The UNFCCC is an international treaty signed by 189 countries. The treaty, to which the USA is party, considers what can be done to reduce global warming and to cope with the inevitable increases in temperature.
VER	Voluntary Emissions Reduction [a standard]
WCS	White Certificate Scheme. A scheme requiring energy providers to implement energy efficiency measures among their customers.

An Ghníomhaireacht um Chaomhnú Comhshaoil

Is í an Gníomhaireacht um Chaomhnú Comhshaoil (EPA) comhlachta reachtúil a chosnaíonn an comhshaol do mhuintir na tíre go léir. Rialaímid agus déanaimid maoirsiú ar ghníomhaíochtaí a d'fhéadfadh truailliú a chruthú murach sin. Cinntímid go bhfuil eolas cruinn ann ar threochtaí comhshaoil ionas go nglactar aon chéim is gá. Is iad na príomh-nithe a bhfuilimid gníomhach leo ná comhshaol na hÉireann a chosaint agus cinntiú go bhfuil forbairt inbhuanaithe.

Is comhlacht poiblí neamhspleách í an Ghníomhaireacht um Chaomhnú Comhshaoil (EPA) a bunaíodh i mí Iúil 1993 faoin Acht fán nGníomhaireacht um Chaomhnú Comhshaoil 1992. Ó thaobh an Rialtais, is í an Roinn Comhshaoil, Pobal agus Rialtais Áitiúil.

ÁR bhFREAGRACHTAÍ

CEADÚNÚ

Bíonn ceadúnais á n-eisiúint againn i gcomhair na nithe seo a leanas chun a chinntiú nach mbíonn astuithe uathu ag cur sláinte an phobail ná an comhshaol i mbaol:

- áiseanna dramhaíola (m.sh., líonadh talún, loisceoirí, stáisiúin aistrithe dramhaíola);
- gníomhaíochtaí tionsclaíocha ar scála mór (m.sh., déantúsaíocht cógaisíochta, déantúsaíocht stroighne, stáisiúin chumhachta);
- diantalmhaíocht;
- úsáid faoi shrian agus scaoileadh smachtaithe Orgánach Géinathraithe (GMO);
- mór-áiseanna stórais peitreail;
- scardadh dramhuisce.

FEIDHMIÚ COMHSHAOIL NÁISIÚNTA

- Stiúradh os cionn 2,000 iniúchadh agus cigireacht de áiseanna a fuair ceadúnas ón nGníomhaireacht gach bliain.
- Maoirsiú freagrachtaí cosanta comhshaoil údarás áitiúla thar sé earnáil - aer, fuaim, dramhaíl, dramhuisce agus caighdeán uisce.
- Obair le húdaráis áitiúla agus leis na Gardaí chun stop a chur le gníomhaíocht mhídhleathach dramhaíola trí comhordú a dhéanamh ar líonra forfheidhmithe náisiúnta, díriú isteach ar chiontóirí, stiúradh fiosrúcháin agus maoirsiú leigheas na bhfadhbanna.
- An dlí a chur orthu siúd a bhriseann dlí comhshaoil agus a dhéanann dochar don chomhshaol mar thoradh ar a ngníomhaíochtaí.

MONATÓIREACHT, ANAILÍS AGUS TUAIRISCIÚ AR AN GCOMHSHAOL

- Monatóireacht ar chaighdeán aeir agus caighdeáin aibhneacha, locha, uiscí taoide agus uiscí talaimh; leibhéil agus sruth aibhneacha a thomhas.
- Tuairisciú neamhspleách chun cabhrú le rialtais náisiúnta agus áitiúla cinntí a dhéanamh.

RIALÚ ASTUITHE GÁIS CEAPTHA TEASA NA HÉIREANN

- Cainníochtú astuithe gáis ceaptha teasa na hÉireann i gcomhthéacs ár dtiomantas Kyoto.
- Cur i bhfeidhm na Treorach um Thrádáil Astuithe, a bhfuil baint aige le hos cionn 100 cuideachta atá ina mór-ghineadóirí dé-ocsaíd charbóin in Éirinn.

TAIGHDE AGUS FORBAIRT COMHSHAOIL

- Taighde ar shaincheisteanna comhshaoil a chomhordú (cosúil le caighdéan aeir agus uisce, athrú aeráide, bithéagsúlacht, teicneolaíochtaí comhshaoil).

MEASÚNÚ STRAITÉISEACH COMHSHAOIL

- Ag déanamh measúnú ar thionchar phleananna agus chláracha ar chomhshaol na hÉireann (cosúil le pleananna bainistíochta dramhaíola agus forbartha).

PLEANÁIL, OIDEACHAS AGUS TREOIR CHOMHSHAOIL

- Treoir a thabhairt don phobal agus do thionscal ar cheisteanna comhshaoil éagsúla (m.sh., iarratais ar cheadúnais, seachaint dramhaíola agus rialacháin chomhshaoil).
- Eolas níos fearr ar an gcomhshaol a scaipeadh (trí cláracha teilifíse comhshaoil agus pacáistí acmhainne do bhunscoileanna agus do mheánscoileanna).

BAINISTÍOCHT DRAMHAÍOLA FHORGHNÍOMHACH

- Cur chun cinn seachaint agus laghdú dramhaíola trí chomhordú An Chláir Náisiúnta um Chosc Dramhaíola, lena n-áirítear cur i bhfeidhm na dTionscnamh Freagrachta Táirgeoirí.
- Cur i bhfeidhm Rialachán ar nós na treoracha maidir le Trealamh Leictreach agus Leictreonach Caite agus le Srianadh Substaintí Guaiseacha agus substaintí a dhéanann ídiú ar an gcrios ózóin.
- Plean Náisiúnta Bainistíochta um Dramhaíl Ghuaiseach a fhorbairt chun dramhaíl ghuaiseach a sheachaint agus a bhainistiú.

STRUCHTÚR NA GNÍOMHAIREACHTA

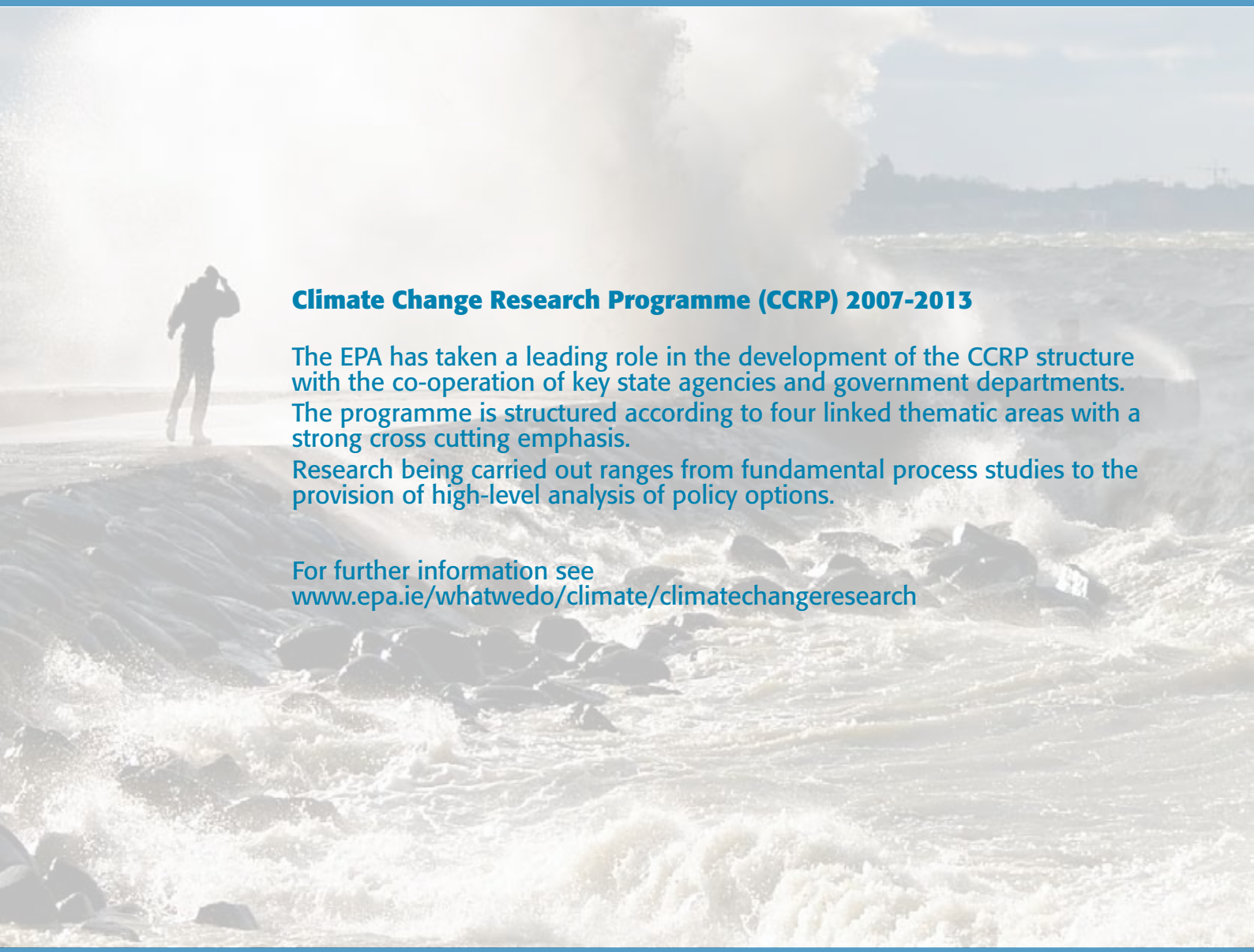
Bunaíodh an Ghníomhaireacht i 1993 chun comhshaol na hÉireann a chosaint. Tá an eagraíocht á bhainistiú ag Bord lánaimseartha, ar a bhfuil Príomhstiúrthóir agus ceithre Stiúrthóir.

Tá obair na Gníomhaireachta ar siúl trí ceithre Oifig:

- An Oifig Aeráide, Ceadúnaithe agus Úsáide Acmhainní
- An Oifig um Fhorfheidhmiúchán Comhshaoil
- An Oifig um Measúnacht Comhshaoil
- An Oifig Cumarsáide agus Seirbhísí Corparáide

Tá Coiste Comhairleach ag an nGníomhaireacht le cabhrú léi. Tá dáréag ball air agus tagann siad le chéile cúpla uair in aghaidh na bliana le plé a dhéanamh ar cheisteanna ar ábhar imní iad agus le comhairle a thabhairt don Bhord.

NDP
National Development Plan 2007 - 2013



Climate Change Research Programme (CCRP) 2007-2013

The EPA has taken a leading role in the development of the CCRP structure with the co-operation of key state agencies and government departments.

The programme is structured according to four linked thematic areas with a strong cross cutting emphasis.

Research being carried out ranges from fundamental process studies to the provision of high-level analysis of policy options.

For further information see
www.epa.ie/whatwedo/climate/climatechangeresearch

epa
Environmental Protection Agency
An Ghníomhaireacht um Chaomhnú Comhshaoil

ENVIRONMENTAL PROTECTION AGENCY
PO Box 3000, Johnstown Castle Estate, Co. Wexford, Ireland
t 053 916 0600 f 053 916 0699
LoCall 1890 33 55 99
e info@epa.ie w http://www.epa.ie

SSTI
Strategy for Science, Technology and Innovation

Comhshaol, Pobal agus Rialtas Áitiúil
Environment, Community and Local Government