



FROM FARM TO FORK



A SUSTAINABILITY ENHANCEMENT
PROGRAMME FOR THE IRISH
AGRI-FOOD INDUSTRY

Edited By:
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From Farm To Fork

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ISBN: 978-1-907079-09-2

EAN: 9781907079092

Publication designed by Brian Martin

Printed by Swift Print Solutions, Dublin

This report was printed using recycled paper.

The Institute of International and European Affairs receives an annual operating grant from the European Communities.

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ACKNOWLEDGEMENTS

The IIEA would like to gratefully acknowledge the input of experts and stakeholders from across the entire Irish agri-food sector, who contributed to the development of this unique output – a Sustainability Enhancement Programme for the Irish agri-food industry.

We firstly wish to gratefully acknowledge the substantial input of Michael Dowling, former Secretary General of the Department of Agriculture and Head of Agri-Strategy at AIB. Michael provided clear strategic direction and leadership for the project through his chairmanship of the Steering Committee, and took the lead in drafting the introduction and conclusions sections of the programme, as well as co-editing the final report.

The members of the Steering Committee who ably supported him in this endeavour were Aidan Cotter, Bord Bia; Séan O’Leary, IFA; Michel Barry, Irish Dairy Industries Association; Brendan Kearney, Independent Economist; Senator Feargal Quinn; Frank O’Mara, Teagasc; Jill Donoghue, IIEA; and Joseph Curtin, IIEA. This group provided overall oversight of the project, as well as expert feedback to the working groups. All were most generous with their time and expertise, and ensured the delivery of a coherent and viable programme, as well as editing support and advice.

The Primary Agriculture Group was expertly chaired by Séan O’Leary of the IFA. The group members were Ciaran Black, Coillte; Gary Lanigan, Teagasc; Ann Keogh, Green Energy Growers Association; Eugene Hendrick, COFORD; Deirdre Webb, Irish Grain and Feed Association; Eamonn Burke, Macra na Feirme; Kate Carmody, Irish Organic Growers Association; Paddy Casey, Fertiliser Association of Ireland; Paul Nolan, Dawn Meats; and Tommy Boland, UCD. All group members demonstrated a deep commitment to the project by taking time to attend monthly meetings, which were hosted throughout the country and were also most generous with their expertise. Gary Lanigan in particular made a very significant commitment of time and expertise to this project.

The Food Processors Group was chaired by Michael Barry of the Irish Dairy Industries Association who played a vital role at the inception of this project and in collating submissions into a coherent programme. The group was comprised of Cormac Healy, Meat Industry Ireland; John O’Sullivan, Sustainable Energy Ireland; Pádraig Brennan, Bord Bia; Philip O’Brien, Environmental Protection Agency; Ray Doyle, Irish Cooperative Organisation Society; Robert Geraghty, Enterprise Ireland;



Thomas Ryan, IFA; and Audrey O'Shea, Glanbia. The clarity of purpose and focus of the group were evident from the beginning, as was their determination to produce a comprehensive and viable output.

The Retail Group was chaired by Senator Feargal Quinn, whose experience and expertise were invaluable assets to the project. Torlach Denihan from Retail Ireland was instrumental in drawing together the final programme in coordination with the members of retail Ireland.

We would also like to thank the staff within the IIEA who were involved in this project. Brian Martin designed the final publication, David Walker was responsible for the logistics associated with the project, Caitriona Heintl proofed the final draft, and Deirdre Culley helped organise meetings and commented on the final document.

Finally, Joseph Curtin of the IIEA was project leader for this exercise and co-editor of the final report. We wish to record our indebtedness to him for the effort he has put into this initiative, without which the project could not have been successfully completed.



Brendan Halligan
Chairman, IIEA



Jill Donoghue
Director General, IIEA





INTRODUCTION

BACKGROUND

The EU Climate Change Package presents a significant challenge to the Irish agri-food industry to play its part in helping to meet Ireland's target of a minimum 20% reduction in Greenhouse Gas (GHG) emissions by 2020.

The scale of the agri-food industry relative to Ireland's population and economic activity means that a greater effort may be required of agriculture here than in other Member States. Ireland exports in excess of 75% of its total agricultural output and has developed global competitive advantages through its strongly grass-based farming system. Even though the sector, like other sectors such as transport and residential, will have to contribute to GHG reduction, the action required may in fact help to enhance that competitive advantage.

The GHG reduction targets will be applied to food manufacturing. Ireland's larger processing sites will be brought into the European Emissions Trading Scheme (EU ETS), which will seek a minimum 21% reduction in process emissions. Other emissions associated with these operations and those of smaller food processing sites are likely to be controlled through schemes such as the IPPC licensing system. While details of how reductions will be sought from agricultural and food processing emissions not covered by the EU ETS have yet to be decided, it is clear that the costs involved have implications for the development of the entire Irish agri-food industry.

Furthermore, leading retailers and manufacturers are driving the sustainability agenda and setting their own requirements for suppliers. In addition, consumer awareness of these issues is growing, albeit perhaps not yet driving mainstream consumer purchasing decisions.

The potential benefits to the Irish food sector of taking a proactive approach on the issue of sustainability might include an enhancement of our reputation and building market position over the medium to long term.

It is appropriate therefore, that the industry takes a specific approach that runs through the entire food chain in addressing the achievement of the GHG reduction targets set out in the EU Climate Change Package. This proposal is put forward as a contribution to the development of such an approach.



THE WORK OF THE IIEA

In September 2008, the Institute launched a report on the implications of EU climate policy for Ireland entitled “The Climate Change Challenge”.

Following this publication it held a series of workshops on the implications of climate change for individual sectors of the Irish economy, including a major conference in January 2009 on The Greening of Irish Agriculture: Responding to the Challenge of Climate Change.

In the run up to that conference, the Institute conducted a high-level stakeholder survey the results of which indicated that the great majority of senior officials, managers and researchers working in the agri-food sector who participated in the survey see the EU targets as both a significant risk and opportunity for the sector in the period to 2020. The clear majority also saw collaboration among industry peers within the private sector as central to avoiding risks and capitalising on opportunities and felt that private sector consultation in shaping public sector policies is a key factor in achieving success. The process employed in drawing up this proposal was an attempt to respond to those views.

OBJECTIVE AND OUTCOME

The overall objective of the project was to bring together a wide range of stakeholders with the objective of developing a Sustainability Enhancement Programme for the Irish agri-food industry which would identify a range of practical measures that could be implemented from primary production through the entire food and drink chain to consumers.

The programme, which is set out in the following sections, was drawn up through the establishment of working groups representative of the different industry stakeholders and of the academic community, operating under the aegis of a steering committee. That committee had the responsibility for coordinating and producing the final document. Membership of the committee and of the working groups is outlined in the acknowledgements section above.

The Sustainability Enhancement Programme covers the agri-food industry from primary food production to consumer ready products and incorporates all intermediary stages including storage and distribution. It was developed from stakeholder input and is based on existing knowledge – in



that regard we are particularly indebted to the contribution from Teagasc. It focuses on knowledge application and transfer, as well as on the application of international best practice. We believe that it is realistic and implementable and, as such, the Institute is offering it to industry and to policymakers.

Michael Dowling
Chairman, Steering Committee



SUSTAINABILITY

ENHANCEMENT PROGRAMME:

PRIMARY AGRICULTURE

1



INTRODUCTION

Enhancing the environmental sustainability of Irish farming is a significant challenge. As a goal, it must be balanced with achieving a sustainable income for farmers, and enhancing the efficiency, competitiveness - and thereby market share - of Irish agricultural products on global food markets. This is particularly the case within the current context of falling incomes for farmers, but also within the context of projected global increase in demand for food in the period to 2020 and beyond.

This Sustainability Enhancement Programme (SEP) takes as its starting point that these policy goals are not mutually exclusive. Enhancing sustainability can, in the case of many strategies, also raise farm incomes. This is because the measures proposed as part of this programme reduce input costs and increase productive efficiency.

Consumers are becoming increasingly aware of the environmental impacts of their choices, and this pressure is passed right down the food chain from retailers, to processors back to the farmer.

It is therefore in Ireland's collective interest to build on its naturally strong sustainability image associated with its temperate and pastoral farming. It must be noted that this grass-based beef and milk production model in Ireland means that production here is already considered more environmentally sustainable than in many other major exporting nations.

Nonetheless the "green" Ireland brand can be enhanced by adopting measures in our agricultural sector to respond to the global environmental challenges of the 21st Century, such as resource depletion and in particular climate change

18.4 million tonnes of Ireland's CO₂ equivalent - 40% of Irish "domestic" sector emissions - originate on-farm. If the sector is to be in a position to capitalise on the projected increase in global demand for food, the issue of on-farm emissions merits serious consideration.

KEY SUSTAINABILITY CHALLENGES

Sustainable resource management and emissions reductions are two immediate challenges facing the agriculture sector. In the longer term, questions related to the effects of climate change on agriculture (both altered climate and higher CO₂ levels) will have to be addressed. For the purposes of this Sustainability Enhancement Programme, however, the focus is on:



1. On-farm greenhouse gas reduction strategies;
2. Energy crops and on-farm strategies to sequester emissions; and
3. On-farm renewable energy development.

In addition, three additional sustainability areas will be briefly considered:

4. On-farm strategies to enhance biodiversity;
5. On-farm animal welfare on Irish farms; and
6. On-farm strategies to enhance water quality and management.

1. GREENHOUSE GAS EMISSIONS REDUCTION STRATEGIES

On-farm greenhouse gas emissions come from three main sources: enteric fermentation (methane), manure management (methane) and agricultural soils (generally nitrous oxide). There is also a relatively small quantity of emissions from fuel combustion associated with on-farm machinery use (see: Table 1.1. below).

Table 1.1: Historical and Projected Agricultural Emissions by Type (Business as Usual)

	CO2e in Gg	1990	2003	2008-2012	2015	2020
Agriculture	Enteric Fermentation	9,494	9,258	8,735	8,521	8,405
	Manure Management	5,528	5,506	5,178	5,029	4,860
	Soils & Indirect Emission	4,207	4,292	3,540	3,581	3,633
	Fuel Combustion	689	875	791	855	888
	Total	19,918	19,931	18,244	17,987	17,786

Source: EPA, 2009



Although projections had forecast a decrease in agricultural emissions by as much as two million tonnes by 2020, the effects of the abolition of milk quotas combined with higher global demand may limit any reductions. While proposed national targets are onerous, GHG mitigation and the application of best management practices can provide opportunities to optimise production efficiency.

Indeed, in relative terms the GHG efficiency (unit product per unit GHG emitted) of Irish agriculture is relatively high, so reducing production in Ireland could lead to a global increase in emissions if demand is met from a country with a less efficient system.

From the above table, it is clear that agricultural emissions are dominated by methane and nitrous oxide. Methane emissions primarily arise from enteric fermentation in the rumen of cattle and sheep and from manure management principally arising in liquid slurry systems due to anaerobic conditions within the slurry. Nitrous oxide emissions may arise directly via three principal sources: animal N deposition in the field, fossil fuel-based fertiliser use, and land spreading of organic manures.

Mitigation of nitrous oxide from agricultural soils and methane from manure management are generally considered to be more achievable in the period to 2020 as measures to reduce enteric methane are often technically and economically challenging.

In general, the optimisation of production efficiency both in terms of obtaining more produce per head and maximising fertiliser use efficiency - particularly nitrogen and phosphorus - offers the best strategy for reducing emissions. Indeed, increasing output per livestock unit through better use of the economic breeding index provides one of the few strategies to significantly reduce enteric methane emissions.

It is important to note that a “whole farm-scale strategy” involving a mosaic of practices and technologies, rather than individual measures in isolation, offers the most promise. Several of the individual measures that might be considered as part of such a comprehensive on-farm strategy are outlined below.



SUSTAINABILITY ENHANCEMENT AT FARM LEVEL

1.1. *EXTENDED GRAZING*

Extending the grazing season reduces emissions. Reductions are attributable to two factors: the lower resultant quantity of stored manure; and the lower enteric methane emissions associated with grazing compared to indoors grass silage-based diets.

For every one-day increase in the grazing season, emissions per unit (milk or beef) output are correspondingly reduced. Up to 600,000 tonnes CO₂ equivalent per annum reduction might accrue from this strategy by 2020, assuming widespread implementation.

It is recommended that, to the greatest extent feasible, farmers extend the grazing season on dairy and beef farms.

1.2. *REDUCED FINISHING TIMES*

Within beef production systems, the production of methane from enteric fermentation is reduced per kg beef carcass where the lifetime daily gain of cattle is increased, i.e. age at finish is advanced, or slaughter weight is increased. Concurrently, farm profitability is also increased. Enteric fermentation methane emissions from a suckler beef system finishing progeny at an average age of 22 months are 15% lower per kg beef carcass relative to a suckler beef system finishing progeny at an average age of 28 months. On a national basis this is equivalent to a reduction of 155,000 tonnes CO₂ equivalent per annum.

It is recommended that beef farmers improve lifetime daily gains for finishing cattle.



1.3. IMPROVED SWARD QUALITY

Grass-based GHG abatement strategies are essential for Irish farming systems. The utilisation of high quality grass will increase the efficiency of sward utilisation, reduce methane emissions per unit of output and increase the efficiency of the production systems.

It should be noted that it is not currently possible to reflect this strategy in emissions inventories.

It is recommended that farmers maximise the quality of grassland swards for livestock production.

1.4. INCREASED USE OF CLOVER IN SWARDS

White clover can reduce artificial fertiliser use, which is fossil fuel dependent, and therefore nitrous oxide emissions would be reduced significantly. It also has the potential to sequester CO₂ and reduce enteric methane emissions. Some indication of the potential of clover is provided by the Teagasc farm at Solohead. On this farm milk production is 1.7 times the national average, using almost half the national average fertiliser N.

On less intensive farms (with stocking rates of less than 1.8 L.U/ha) white clover cultivation can result in dramatic reductions in emissions and result in large financial savings for farmers. For intensive farms, more research is needed into how clover can be used to maintain the sward taking into consideration regional variations in nitrogen fixation and clover persistency.

It is recommended that:

- Clover is used on extensive farms to the greatest extent possible without impacting on production efficiency; and
- Farmers work actively with Teagasc and other research organisations to develop increasingly sustainable farming practices and techniques to optimise artificial fertiliser inputs on all farms without sacrificing productive efficiency.



1.5. SLURRY MANAGEMENT - TIMING AND APPLICATION METHOD

Slurry application using the splashplate (SP) method gives rise to high gaseous losses of N as ammonia if applied under warm, dry conditions, which can also result in indirect nitrous oxide emissions. The level of losses can be reduced either by switching to trailing shoe (TS) application method, or by switching application timing. Earlier spreading can also result in reduced methane emissions due to reduced storage times.

It should be noted, however, that the trailing shoe (TS) application method is only suitable on soils that are well or moderately-well drained, half of which already apply slurry early.

It is recommended that, soils and weather permitting, farmers move to earlier slurry application times.

1.6. TILLAGE

Optimising N fertiliser use in terms of matching timing of application to both crop requirements and weather conditions offers the best strategy to reduce nitrous oxide emissions. In addition, efficient pest and disease management will enhance per hectare yields and ultimately reduce emissions per unit product.

In general, arable soils are a CO₂ source and the utilisation of alternative management techniques, such as minimum tillage, cover cropping and residue incorporation can increase storage of soil organic carbon relative to conventional till practices. These effects may, however, be small and transient unless the practice is maintained indefinitely.

It is therefore recommended that:

- Tillage farmers optimise N fertiliser timing and maintain best practice in terms of pest control; and
- Where possible, tillage farmers move to alternative practices and planting of cover crops where appropriate.



1.7. ORGANIC FARMING

Organic agriculture, at a practical level, is an integrated suite of synergistic farm practices aimed at maximising environmental sustainability. These already include a range of greenhouse gas abatement strategies, for example use of legumes in place of synthetic N fertiliser, and building soil organic matter. Therefore, it is generally concluded that organic agriculture has a lower climate impact than non-organic agriculture.

Current government policy requires a quadrupling of organic land area from 1% to 5% by 2012 (a four percentage point increase). It is assumed that the majority (in excess of 90%) of newly converted land will be livestock production on permanent pasture. It is considered that the greatest reduction in GHG effects from converting to organic agriculture would come from converting cropping land.

Organic farming has lower stocking rates than non-organic, and therefore lower GHG emissions than non-organic farming are based purely on stocking rate, not emissions per unit output. A 4% point increase in organic land area would therefore significantly reduce overall agricultural emissions.

It is recommended that where economically feasible and in line with government targets farms stocked at low stocking rates consider organic farming systems.

1.8. DIETARY MANIPULATION

Several dietary manipulation strategies have demonstrated potential to reduce enteric methane production. These include substitution of forage with concentrates, substituting grass silage with whole-crop cereal silages, the addition of plant oils to ruminant feeds, and the use of condensed tannin additives.

The dominance of grazed grass and silage in the feed budget of Irish ruminants limits the applicability of many of these strategies, as does cost, although increases in performance are also often associated with reduced enteric methane production.



It is recommended that dietary manipulation is only considered to reduce emissions where it is clearly demonstrated to be economically viable.

1.9. USE OF NITRIFICATION INHIBITORS

These chemicals such as DCD and DMPP inhibit the microbes that convert ammonium N into nitrate. As nitrous oxide is a by-product of this conversion, use of these inhibitors can reduce emissions by up to 70% on heavy soils and 30% to 50% on more sandy soils. In order to obtain the maximum benefit of these inhibitors, they should be applied during early and late grazing (in early spring or autumn when soils are most vulnerable to N losses associated with urine deposition).

There is no evidence of adverse environmental impacts of the use of nitrification inhibitors, as DCD is eventually broken down into carbon dioxide. Indeed, the transient nature of the product is something of a drawback as the lifetime of the inhibitor is directly related to soil temperatures and may only be effective over two to three weeks.

In addition, the cost of these inhibitors is high - around €60 per hectare per application.

It is recommended that nitrification inhibitors are only considered to reduce emissions where they are clearly demonstrated to be economically viable.

2. ENERGY CROPS AND ON FARM SEQUESTRATION STRATEGIES

Agricultural carbon sequestration has the potential to substantially mitigate global warming impacts. This is because growing vegetation absorbs carbon dioxide emissions. In this section three areas will be considered:

- Forestry;
- Biomass; and
- Biofuels.



As far as Irish agriculture is concerned, both afforestation and biofuel/biomass cultivation can be used to sequester carbon and enhance the sustainability of the sector, enabling Ireland to meet its emission reduction obligations.

Forests are carbon stores, and they are carbon dioxide “sinks” when they are increasing in density or area. Because marginal land can be used for afforestation, forests tend not to compete with food production for land. Furthermore forest output such as wood products semi-permanently sequesters carbon, and wood fuel displaces fossil fuels in our production systems, thereby enhancing the security and sustainability of our energy system.

Forestry plays a particularly vital role in Ireland’s National Climate Change Strategy. Kyoto compliant forests in Ireland will sequester in excess of 2 million tonnes of CO₂ per annum in Ireland in the period to 2012, and this will have risen to 4 million tonnes by 2020. With the price of carbon credits expected to be in excess of €20 per tonne of carbon, the value of the forest as a sink can be estimated at in excess of €80 million per annum by that time.

This sequestration, however, is largely attributable to trees already planted, and to ensure that the forest sink benefit we currently enjoy can be sustained in the long term, an increase in the level of planting is immediately required. Given the average rotation of forests in Ireland is around 40 years, an annual 15,000 ha afforestation programme needs to be maintained from 1995 to 2035 in order to establish a sustainable forest resource in the long run, or almost double the current level of planting.

Ireland must increase afforestation levels immediately in order to fill the “gap” between 2035 and 2050 and provide a sustainable positive level of carbon sequestration. It is not possible to “catch-up” later.

In the case of biomass crops and biofuels, cultivation generally results in switching from pasture because marginal land is not suitable for the cultivation of energy crops. Energy crop cultivation therefore has two environmental benefits:

- It turns agricultural land from a “source” of emissions to a “sink” for emissions by displacing methane emissions from livestock and reducing fertiliser use; and
- Energy crops can also be used to displace fossil fuels in the energy system.



Both EU and domestic targets for biofuels and biomass would suggest increased levels of cultivation in the period to 2020 are necessary. In the case of biofuels, there is an EU target for 10% of transport fuels coming from renewables by 2020. For biomass there is a 30% co-firing target for peat power-generation plants, and a target of 40% of electricity and 12.5% of heating to come from renewables by 2020. There are also policy initiatives to promote increased use of combined heat and power and biomass in domestic heating systems.

SUSTAINABILITY ENHANCEMENT

2.1. AFFORESTATION

Afforestation will play a key role in meeting Ireland's climate change obligations. Current levels of afforestation, however, are less than half the 15,000 ha per annum which is required to meet the objective of a sustainable forestry sector. The current afforestation schemes typically include an establishment grant plus annual premium payments for up to 20 years of the 40-year forest rotation. In effect however, only farmers are entitled to this full range of financial support. The Renewed Programme for Government, however, proposes "to develop a scheme through which some of the monies currently set aside to purchase carbon credits abroad will be diverted for forestry investment in Ireland".

It is recommended that:

- Farmers with marginal or underused land, working independently or with private investors and Coillte, consider increasing levels of afforestation on their land; and
- Stakeholders in the forestry sector, including Coillte, private foresters and farmers, work with government to develop a system whereby the sequestration value (in terms of carbon credits) of afforestation accrue to the tree planter.

2.2. BIOMASS

Research indicates that miscanthus and short rotation coppice are the most suitable biomass plants for cultivation in Ireland and establishment grants are available for these crops. These energy crops are complimentary with forestry in their land-use requirements. Energy crops also appeal to farmers



who require an annual return, which is not currently possible with forestry. Under the Bio-energy Scheme (Phase 3), there is an establishment grant for up to €1450, equating to 50% of the cost of biomass crop establishment.

Overall plantings increased from 694 ha in 2007 to 945 ha in 2008. Finance is available to plant a further 1,800 ha in 2009 and the overall area planted should therefore exceed 4,000 ha by the end of 2009. The Minister for Agriculture, Fisheries and Food also recently announced that €20 million is being provided to assist in meeting Ireland's renewable energy target and to double the area of willow and miscanthus planted by 2012.

There is much to be learned on the agronomy of these crops, and market and supply chain development is also at an early stage. In the medium-term, the development of clusters of biomass farmers close to users in hospitals, hotels and industry would be environmentally and economically optimal. It is estimated that up to 60,000 ha of energy crops might be grown in Ireland in order to meet co-firing and heat production targets, from the relatively low level of less than 3,000 ha today.

It is recommended that farmers with productive land, working in clusters and networks, consider the cultivation of energy crops such as miscanthus and short rotation coppice.

2.3. BIOFUELS

Oilseed rape can be cultivated in Ireland and used to produce pure plant oil and bio-diesel. Bio-diesel can be used to reduce the greenhouse gas content of Ireland's transport fleet. There are currently five crushing plants for pure plant oil in Ireland, located in the south east of the country, and there is one biodiesel plant in New Ross. There is some room for expansion of these facilities.

So-called second-generation biofuels are not economically viable and more research is required in these areas. Further research is also required into ensuring that these biofuels meet the sustainability criteria for these crops as set down by the EU.

It is recommended that farmers within the catchment areas of the processing sites consider the cultivation of oil producing crops only where the environmental and economic viability of these crops can be clearly established.



3. RENEWABLE ENERGY DEVELOPMENT

Much of Ireland's farmland is suitable for the development of micro-wind generation and other forms of renewables such as solar thermal and biomass heating systems. Prices for several micro-generation technologies are now coming into a more realistic range. A key issue for farmers is the level of government support in the form of feed-in tariffs for such technologies. Support for these technologies is not in line with what is available in other countries such as the UK and Germany. Other key impediments include the lack of information available on various technologies, planning restrictions and uncertainty around long-term prices and support.

Another promising on-farm technology is anaerobic digestion. Digesters of this type break down biodegradable waste and can reduce emission of landfill gas into the atmosphere. The by-products – methane and biogas – are renewable energy sources and can be used on-farm to displace fossil fuel usage.

It should be noted, however, that in emission inventories as they are currently calculated, the benefits of renewables would accrue to the energy sector and not technically therefore reduce agricultural emissions. Perhaps there is therefore a case for an emissions permit generating system (or trading system) for agriculture, which would allow farmers to generate emissions permits when environmentally beneficial action such as afforestation or renewable deployment is taken.

SUSTAINABILITY ENHANCEMENT

3.1. ON-FARM MICRO-RENEWABLES

With the confusing proliferation of micro-renewable technologies on the market, there is a need for a more authoritative source of information on technologies to be made available to farmers.

Micro-renewable technologies can be used to reduce input costs for farmers and as a source of income when it is possible to generate and export electricity to the grid. While some investments do not repay the original investment at current levels of support, other technologies such as biomass heaters and solar thermal technologies, can present an attractive proposition for farmers.



It is recommended that farmers consider the use of on-farm renewable technologies where they are found to be economically viable.

3.2. ANAEROBIC DIGESTERS

A feed-in tariff is available of 12c for anaerobic digestion plants in Ireland. There are currently four on-farm anaerobic digestion and several other larger industrial plants in Ireland, which produce bio-gas. Several additional plants are currently planned or under construction.

Because the feed-in tariff, which is available is not sufficient to incentivise smaller facilities, cooperation is generally required between groups of farmers to make anaerobic digestion plants a viable proposition.

It is recommended that where possible, farmers explore the possibility for cooperation on the development of anaerobic digestion plants.

4. BIODIVERSITY ENHANCEMENT

Similar to water, biodiversity is seen as a major emerging issue, with many retailers and manufacturers - ranging from Marks and Spencers to McDonalds - introducing environmental assurance programmes that contain a strong biodiversity focus. These programmes recognise that agriculture, if managed in a sustainable way, can enhance biodiversity and have a positive impact on the environment. The perception of Irish agriculture among both retailers and consumers tends to be that of a green countryside with small farms and a relatively natural form of production.



SUSTAINABILITY ENHANCEMENT

4.1. PARTICIPATION IN SCHEMES TO ENHANCE BIODIVERSITY

REPS places major emphasis on maintaining genetic diversity including the protection of wildlife habitats and endangered species of flora and fauna. On REPS farms there has been a substantial increase in the features, which encourage habitat diversification while the number of habitats has greatly increased. The revisions to the scheme at the end of 2004 included the requirement that all participants must implement at least two biodiversity options. The uptake of options contributing to improved habitat and landscape accounted for the vast majority and the evidence also shows a greater number and variety of bird species on REPS than non-REPS farms.

REPS 4 contains an increased emphasis on biodiversity. In addition to the fundamental measures to protect and maintain habitats, water courses and hedgerows, REPS 4 contains supplementary measures designed to further support biodiversity while the new agri-environment scheme which comes into operation in 2010 has biodiversity as one of its main objectives. Through the delivery of clear credible programmes in relation to biodiversity, there is significant potential for Ireland to gain a competitive advantage in this space.

It is recommended that farmers continue to adopt good environmental practices through participation in schemes like REPS and the new agri-environment scheme, which comes into operation in 2010.

5. ANIMAL WELFARE PROMOTION

Increasingly, leading retailers and manufacturers are engaging with NGOs on the issue of animal welfare. This highlights their recognition of the ongoing importance of the issue for consumers and the need for them to gain credibility in terms of their own activities. While initially the focus was on meat and egg production, there are increasing signs that animal welfare is now becoming a bigger issue for the beef and dairy sectors also. All recipients of EU-funded schemes, including REPS, are required to respect the various Statutory Management Requirements (SMRs) set down in EU legislation on the environment, public, animal and plant health and animal welfare and to maintain land in Good Agricultural and Environmental Condition (GAEC). Detailed checks and



controls are in place to effect compliance with those standards.

SUSTAINABILITY ENHANCEMENT

5.1. PROMOTING IRELAND'S NATURAL ADVANTAGE

In Ireland an extensive form of grassland grazing and conservation predominates in milk, beef and sheep production. This natural form of livestock and dairy production fits well with the standards promoted by NGOs and therefore forms a natural sustainability advantage for the Irish system of grazing livestock production.

It is recommended that farmers work actively with government agencies to promote and leverage this natural advantage.

6. WATER QUALITY AND MANAGEMENT

On-farm fertiliser use and waste management can also have profound implications for water quality in ways that are generally understood in the sector.

The importance of efficient water management is perhaps less well understood but is an issue increasingly coming to the fore. Some 70% of total water consumption is used for agriculture. As fresh water supplies across many parts of the world come under pressure, the need for better management becomes increasingly urgent. Water management has been identified by many retailers and manufacturers as a key issue with some already undertaking measurement exercises similar to the initial work done on carbon footprinting.



SUSTAINABILITY ENHANCEMENT

6.1. WATER QUALITY

Experience of the programme suggests a significant relationship between the implementation of REPS measures and improved water quality. For example improvements in water quality over the 1996-99 period were observed more frequently (almost double) in farmed areas with high REPS uptake (over 30%) than in areas with less than 30% uptake. This improvement is mainly due to better waste management and a significant reduction in chemical fertiliser application. Water quality is also addressed through the Good Agricultural Practice for the Protection of Waters Regulations 2006. The Nitrates Regulations place legally binding obligations on the storage and management of fertilisers, sets maximum fertilisers limits and establishes detailed requirements on landspreading of fertilisers that apply to all farmers.

It is recommended that farmers continue to adopt good environmental practices through participation in schemes like REPS and in the new agri-environment scheme, which comes into operation in 2010.

6.2. WATER MANAGEMENT

Given the anticipated rise of water as an issue, it is important for Ireland as a leading food producer to have a clear understanding of our performance and identify water efficient ways of producing and processing food products.

It is therefore recommended that farmers work actively with Teagasc and other research organisations to develop best practice on-farm approaches to maximising water use efficiency.



SUSTAINABILITY

ENHANCEMENT PROGRAMME:

FOOD PROCESSING

2



INTRODUCTION

The EU Climate Change Package as agreed in 2008 will challenge businesses to achieve reductions of at least 20% in the GHGs emitted from their business activities. While the means to achieve these reductions at business level are yet to be decided, it is clear that reductions of this magnitude will have financial consequences for business.

There is therefore a clear business case for the implementation of technologies, the introduction of changes in business practice, and the instigation of cultural adaptations to ensure that competitiveness is not diminished.

Enhancing sustainability can, in the case of many strategies and measures, enhance competitiveness. Furthermore, leading retailers and food manufacturers are increasingly making demands of their suppliers to measure, monitor and improve their environmental sustainability performance. For Irish processors this means that as well as many sustainability measures making sense from an operating efficiency perspective, there is a window of opportunity now to take a proactive approach that could enhance a company's reputation. In the not-too-distant future a lot of these issues will likely be imposed through regulation in any event.

The agri-food industry has a unique operating basis in that processing activities prioritise food safety over all other business objectives. In preparing programmes for GHG reduction, this prioritisation must not be compromised. As an export-oriented industry the agri-food industry competes with low cost economies and must therefore retain business competitiveness while implementing GHG reduction programmes. Finally, as food production and water consumption are intrinsically linked, actions to reduce GHG must not impact on water management and consumption.

The Sustainability Enhancement Programme developed in this section is focused on the primary and secondary food processing industries and has been developed as a practical first step guide for the industry. It serves to introduce the concept of sustainability enhancement in a manner consistent with the priorities of food safety and business competitiveness.



KEY SUSTAINABILITY CHALLENGES FOR INDUSTRY

The food industry is both diverse and complex. It encompasses a wide range of activities and covers operations of varying scale and resource availability. While the sustainability challenges for an artisan food manufacturer are similar to that of a large industrial processor, the steps to address the challenges are vastly different. Recognising this, the Sustainability Enhancement Programme identifies five target areas for consideration in designing a company-specific action programme and defines best practice towards achieving the overall goal of sustainable operations. These are set out in a manner that is appropriate to processing activities irrespective of operational scale, resource availability or product output.

The five elements considered in this Sustainability Enhancement Programme are:

1. Energy Efficiency Strategy
2. Waste Reduction
3. Transport Efficiency
4. Air Quality
5. Water Utilisation

1. ENERGY EFFICIENCY STRATEGY

Increasing energy costs have posed a key competitiveness challenge for Irish businesses over the past number of years. A sustainable energy enhancement programme should be driven by commercial rationale. An energy efficiency strategy must define short and long-term goals for energy efficiency, energy related carbon emissions and the chosen focused means of achieving this ongoing objective. To this end:

- the organisation and senior management should demonstrate a commitment to energy efficiency;
- energy management should be embedded in standard operations;
- action should be based on key energy usage and aligned to targets and objectives defined by the management review process;
- a process of continuous improvement should be required;
- operational control mechanisms should be put in place; and
- processes should be standardised so that improvements are sustained over time.



SUSTAINABILITY ENHANCEMENT AT COMPANY LEVEL

1.1. ORGANISATION AND MANAGEMENT

If senior management has overall responsibility for the setting and delivery of targets, the energy management function is easier to embed into all roles and operations that influence energy usage. Engaging senior management ensures that energy efficiency targets are considered a key business priority, and thereby increases the likelihood of successful implementation.

It is recommended that senior management initiate and monitor energy efficiency actions across the entire business enterprise.

1.2. MAPPING OF ENERGY CONSUMPTION

A detailed analysis and understanding of how energy is used and how it changes with each major process change can reduce costs. It should involve extrapolation of data in different ways, for example: by technology user, by utility, by product, by product line, and by production process. The review should analyse how customer demands, manufacturing strategies, and other factors affect energy usage.

It is recommended that a detailed analysis of how energy is used should be completed annually and with each major process change.

1.3. ENERGY MANAGEMENT AND KEY PERFORMANCE INDICATORS (KPI)

A process of energy management must be in place that continuously monitors and controls significant energy users. Nonconforming and preventative action procedures must be implemented in an effective manner.



It is recommended that a small number of Key Performance Indicators are chosen to monitor and control energy usage.

1.4. PRODUCTION MANAGEMENT

There is a strong link between production management/planning and energy usage. This is particularly the case in the Fast Moving Consumer Goods (FMCG) section. Common production norms such as overtime during non-production hours, batch processing and sizes, line changeovers and special procedures for expediting shipments should be assessed for energy efficiency. Quality management is critical because defective product requires either rework or replacement, and as a result adds an energy requirement. A potentially useful method of improving is by using Overall Equipment Effectiveness (OEE), a measure that includes availability, performance and quality.

It is recommended that Overall Equipment Effectiveness (OEE) is used to reduce production management energy use.

1.5. OPERATION AND MAINTENANCE

Operation and maintenance of production plant is linked to energy usage. Equipment that is well maintained has longer operating life and can have a reduced energy requirement. Process efficiency may be affected by other production variables upstream or downstream and may not necessarily be dependent on the condition or stated efficiency of the equipment. The core principles of Lean Manufacturing should be considered, i.e. understanding where value is added to the product.

It is recommended that the core principles of Lean Manufacturing should be considered to reduce operational energy use.



1.6. ENERGY AUDITS AND SPECIAL INVESTIGATIONS

Energy audits can deliver incremental or step change improvement in energy efficiency. Where an opportunity is detected, a Special Investigation may be required to fully quantify the energy saving potential, the associated cost saving and payback timeframe. These initiatives should be integrated into the energy management system and prioritised in accordance with objectives and targets.

It is recommended that energy audits are carried out periodically to identify energy efficiency improvements.

1.7. RESEARCH AND DEVELOPMENT

Where a company is investing in research and development of new product and process lifecycles, consideration should be given to minimising the energy service needed, thereby minimising the energy intensity per unit of product to be manufactured or processed.

It is recommended that R&D activities, where appropriate, should be directed toward improving energy efficiency.

1.8. ASSESSMENT OF BEST AVAILABLE TECHNOLOGY (BAT)

Identifying BAT for processes and equipment provides a necessary benchmark for potential performance improvement in the future. It also helps identify the gap as to where competitors may be operating.

It is recommended that where a decision has been made to invest in capital, the feasibility study should include an assessment of what is Best Available Technology from an energy efficiency perspective.



1.9. ENERGY EFFICIENCY IN DESIGN

Energy efficiency initiatives can be implemented at least cost at the design stage. Full lifecycle analysis should be completed during the design process. There are many common barriers preventing implementation. The SEI EED methodology developed by SEI¹ addresses these barriers and identifies demonstration projects which have achieved savings of between 20%-50% of annual energy costs. It addresses two primary aspects, project organisational structure and the design process itself.

It is recommended that full life cycle analysis of energy efficiency should be a primary concern at design stage.

1.10. MATERIAL SUPPLY AND FINAL PRODUCTS

Depending on the nature of the operation, consideration of upstream material supply and downstream end products may reduce the energy requirement and/or carbon footprint of the total supply chain.

It is recommended that where appropriate opportunities should be sought to reduce energy requirement along the total supply chain.

1.11. FUELS

Alternative fuels will provide the means to reduce energy related carbon emissions. Biomass or biofuels may have benefits in terms of greenhouse gas emissions reduction. The food processing industry may have opportunity to convert waste streams to useful forms of energy, for example, tallow can be used to manufacture biodiesel and anaerobic digestion of organic waste can be used to generate biogas. Consideration might also be given to switching to fossil fuels that have a lower environmental impact.



Alternative forms of heat and power can be considered in parallel such as CHP (Combined Heat and Power), or heat recovery opportunities e.g. generating hot water for general cleaning requirements.²

It is recommended that alternative non-fossil fuel based energy sources are adopted, and if this is not possible that lighter fuel oils are selected.

2. WASTE REDUCTION

Waste Management requires an understanding of the quantity and type of waste that occurs on site, the reasons why it is generated and the identification of opportunities to prevent or reduce the generation of that waste. Waste streams generated on-site that cannot be avoided should be appropriately stored and transferred to appropriately regulated waste contractors for off-site treatment.

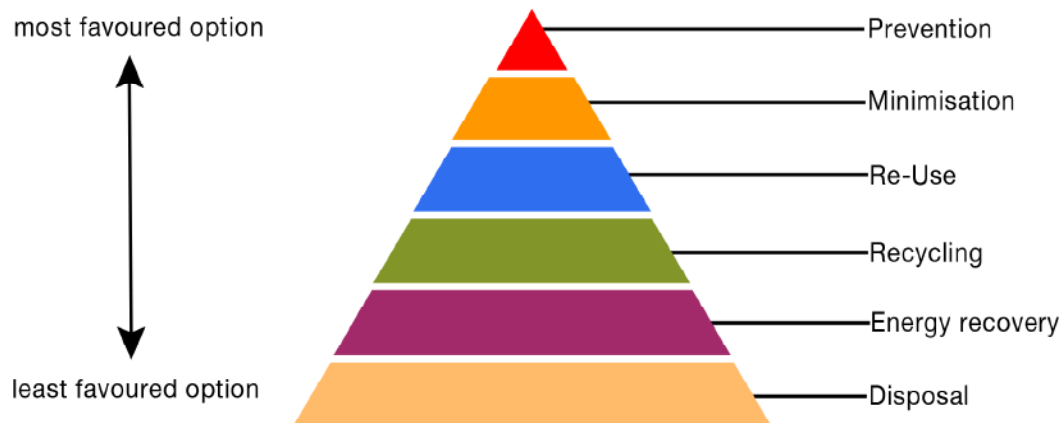
Waste in the food industry occurs for many reasons, including:

- Product rejection prior to acceptance for processing;
- Processing inefficiencies and breakdown;
- Out of specification product;
- Market returns;
- Washing residues; and
- Product rejection after manufacture.

Food waste when managed by appropriate procedures can be a valuable source of animal nutrients, soil nutrients and energy. The development of technologies and supporting legislation can play an important role in reducing the volume of waste generated by the industry and contribute positively to other sectors and society.



The hierarchy of best waste management practice is illustrated below.



SUSTAINABILITY ENHANCEMENT AT COMPANY LEVEL

2.1. DOCUMENTATION AND DETAILING

As a pre-cursor to proper waste management, it is necessary to have an understanding of the quantity, type and location of waste being generated by individual business activities e.g. packaging waste; damaged raw materials; manufacturing or process waste; office paper waste; food and canteen waste; and waste arising from inward packaging.

It is important to detail how resources are consumed and evaluate how this reconciles with the operation; to identify process inefficiencies leading to waste and work processes that produce the most on-site waste.

It is recommended that a detailed understanding of quantities, type and location of waste generated on-site is developed.



2.2. CORRECT ON-SITE WASTE MANAGEMENT

Once the nature and type of on-site waste has been established it is possible to put in place a number of strategies to ensure proper management and reduction.

It is recommended that:

- Containers are set aside for specific waste streams on-site, for example dry recyclable packaging must be separated from liquid or wet waste;
- Waste is securely stored in dry area with minimum possibility of spillage, leakage, or interference; and
- Staff are appropriately trained in handling waste - personal protective equipment may be necessary when handling certain hazardous wastes.

2.3. RELATIONSHIP WITH WASTE CONTRACTOR

It is important to identify the quantities of different waste types being sent off-site for treatment by licensed waste contractors, to ensure documentary evidence of same, to identify what happens to this waste and how much it costs the business.

It is recommended that:

- A clear listing of respective responsibilities is established at the initiation of contact with waste contractors; and
- Detailed records are kept of all waste sent off-site.

2.4. RELATIONSHIP WITH SUPPLIERS AND RETAILERS

Much waste can arise from inward empty packaging and can only be reduced through conversations with suppliers.



Processors also need to work in partnership with retailers to achieve shared sustainability objectives regarding packaging minimisation. Progress has been made in this area and some manufacturers have effective packaging minimisation strategies in place.

While the retailer has much more direct influence when it comes to own-brand goods, processors have more influence when it comes to branded goods.

It is recommended that companies quantify goods inwards packaging and develop strategies with suppliers to reduce excess packaging and waste.

3. TRANSPORT LOGISTICS AND PLANNING

Ireland's total greenhouse gas emissions were 25.5% above 1990 levels by 2006. The transport sector is the sector causing most concern with a 165% increase since 1990 due to the increased use of private cars. The food processing sector must do what it can to help reverse this trend.

Food processors and retailers make extensive use of road transport to move goods to shops, from their distribution centres, and from suppliers' premises. Fresh produce in particular has to be delivered on a daily basis. In view of the large quantity of goods that have to be delivered there is a significant use of fuel and a consequent environmental impact.

Processors and retailers are conscious of this and are developing solutions.

SUSTAINABILITY ENHANCEMENT AT COMPANY LEVEL

Measures to enhance sustainability are common among food processors and retailers, and a common set of strategies have therefore been developed. For sustainability enhancement please see retail sector pages 43-60.



4. AIR QUALITY

The public perception of air emissions from food processing is one of odours, while important other emissions such as particulate, sulphur and nitrous oxide emissions are priority target areas for food processors. A large percentage of food processing sites are licensed under the IPPC system which places limits on all air emissions from licensed sites. Further emission reductions will be sought from these sites but emission limits will also be required from non-IPPC sites.

Air quality is assessed by monitoring the levels of various pollutants. This monitoring is overseen by the EPA, which checks whether air quality meets standards that are considered adequate for the protection of human health and the environment. These pollutants include particulate matter (PM₁₀), sulphur dioxide, nitrogen oxides, ground-level ozone and incomplete combustion.

Emissions of pollutants from vehicles, power stations, industry, domestic fuel burning and agriculture can have local, international or global effects. Air emissions in one country can give rise to problems in other countries notably acid rain and increased levels of ground level ozone. Emissions of carbon dioxide and other greenhouse gases are enhancing the greenhouse effect, changing the global climate system.

Air quality will improve significantly where there is less fuel used thereby generating less emissions.³

SUSTAINABILITY ENHANCEMENT AT COMPANY LEVEL

4.1. THE CARBON FOOTPRINT

Carbon dioxide (CO₂) is the most common greenhouse effect and the primary driver of climate change. A carbon footprint is a measure of the greenhouse gas emissions equivalent attributed to a company, product or service.

For most companies, calculating a carbon footprint provides an internal framework to enable them to minimise greenhouse gas emissions associated with a specific product or the business as a whole. For the vast majority of companies a basic footprint therefore will suffice.

To an increasing extent, however, the carbon footprint of a product is used for external purposes, and many companies are moving towards carbon as a differentiator. In these instances it is likely that a more rigorous process will be required.



The scope of a footprint should depend on the reasons why a company is undertaking the calculations. Emissions are often classified on the basis of the level of control a company has over them.

- **Level 1: Direct Emissions From Activities the Company Controls**

Direct emissions normally result from burning fossil fuels, which emit CO₂, such as the oil used to heat the premises or the gas used to provide hot water. Some companies directly release CO₂ in processes like fermentation while some emit other greenhouse gases such as methane (CH₄) and nitrous oxide (N₂O).

- **Level 2: Emissions From the Use of Electricity**

Electricity is essential for companies to power lighting and equipment. In Ireland almost 90% of electricity generated is from fossil fuels such as peat, coal, oil and gas. The remainder is produced from renewable sources such wind, hydro and biomass. While an organisation is not directly in control of these emissions, by purchasing electricity it is indirectly responsible for the release of CO₂.

- **Level 3: Indirect Emissions from Products and Services**

Emissions are generated upstream each time a company buys a product or service and downstream when products it sells are used and disposed of. These can be indirectly attributed to a company. While upstream and downstream emissions are part of a complete carbon footprint, calculating them is complex. Carbon footprinting for meat and dairy products involves companies measuring footprints at farm level, sometimes described as “behind the farm gate” emissions.

As a global, export-oriented food industry, Ireland should ensure that carbon footprinting methodologies for products are globally acceptable, accurate and comparable and can be implemented at least cost. For larger companies a popular reporting methodology is the Carbon Disclosure Project, which launched its first Irish report in 2009.⁴

It is recommended that:

- Companies address the carbon footprint of their goods and services in conjunction with suppliers and retailers; and
- One single standard for the calculation of carbon footprints is agreed.



4.2. SULPHUR DIOXIDE

Sulphur dioxide (SO₂) is formed when fuel (mainly coal, peat and oil) containing sulphur is burned.

It is recommended that lower SO₂ fuels should be considered for use in processing sites.

5. WATER UTILISATION

Water utilisation is a key element in global sustainability. It is predicted that water availability will be the limiting factor in increasing food production in many global regions. For Ireland, its temperate climate means that there is little discussion on water availability but water quality is becoming an increasing issue for agriculture. Water use and disposal are therefore key elements in a Sustainability Enhancement Programme.

Water usage in food processing is varied and encompasses cleaning, cooling and heating activities. Water utilisation is directly linked to other sustainability considerations such as energy utilisation, where cleaning water must be heated prior to use. It is linked to waste discharge levels and required waste management capacity. Water charges have been a driver for many company level activities but such decisions often have not addressed the wider sustainability agenda.

As in the case of carbon, a number of key players are now beginning to measure the embedded water content of products with a view to developing water footprints.⁵

SUSTAINABILITY ENHANCEMENT AT COMPANY LEVEL

5.1. MONITORING AND REPORTING

A system to continuously monitor water consumption, including fault and failure reporting is required. Usage monitoring should be at activity level to enable evaluation of potential reductions in usage.



It is recommended that companies continuously monitor their water consumption.

5.2. ESTABLISH CONSUMPTION TARGETS

It is recommended that companies establish where reductions in water use are possible, quantifying on a per unit output basis.

5.3. AWARENESS CAMPAIGN

It is recommended that companies actively engage in making staff, customers and suppliers aware of the importance and benefits of water conservation.

5.4. WATER FRIENDLY EQUIPMENT

It is recommended that worn out or broken equipment be replaced with systems that use water efficiently.

5.5. CONSERVATION

It is recommended that water pressures and flows should be set at minimum and that unnecessary flows are to be avoided.



SUSTAINABILITY

ENHANCEMENT PROGRAMME:

RETAIL

3



INTRODUCTION

Sustainability is central to modern food retailing in Ireland. While price may remain the core issue, evidence suggests that consumers are increasingly aware of social and environmental issues when shopping.

The following are the core sustainability issues for the retail sector:

1. Energy usage
2. Transport and logistics
3. Waste
4. Sourcing
5. Information and Labelling

Each of the above will be reviewed sequentially and sustainability enhancement measures outlined. These recommendations form the basis of a Sustainability Enhancement Programme for the Irish retail sector.

In order to ensure implementation, this programme might ideally be approved by the company board. The chief executive and top management would all actively support the programme and communicate this support throughout the business.

A head of function who reports directly to the chief executive would be given responsibility for the sustainability enhancement programme and champions could be appointed at regional and functional level.

At a micro-level the sustainability enhancement programme could be integrated into business planning at each level of the organisation with measurable targets and review of outcomes. The results of an annual update of the sustainability enhancement programme should feed into business plans and be used to frame relevant key performance indicators for all business units.



Commitment to the sustainability enhancement programme from senior staff responsible for operations management will be essential to ensure success. A continuous improvement process must be put in place involving both senior operations staff and staff with relevant technical expertise regarding sustainability.

Up-front investment will be required by companies, both in technologies and to collate the information necessary to underpin the sustainability enhancement programme. It should be noted within this context that the retail sector is experiencing very difficult trading conditions - at the time of writing, the value of food sales has fallen year-on-year by over 7%.

1. ENERGY

Retailers are themselves large energy users in-store and many retailers are actively engaged in reducing their own carbon footprints and those of their customers.

With rising energy prices and emissions reduction legislation, there is a real financial imperative for retailers to reduce their carbon footprints. In addition to the reputational gains associated with taking action to reduce one's carbon footprint, there is also a strong business case for improving the efficiency of energy use, as this reduces input costs and generates bottom line savings.

The main areas for attention are summarised below together with some examples of progress to date in an Irish context.

SUSTAINABILITY ENHANCEMENT

1.1. ANALYSIS OF CURRENT ENERGY CONSUMPTION

A starting point is for each company to analyse its current energy consumption in detail. The assessment should identify where energy is being used, what it is used for, how much is used for each purpose, what the patterns are, where it is sourced and how much it costs. is used for each purpose, what the patterns are, where it is sourced and how much it costs.

It is recommended that retailers analyse the energy use of their business.



1.2. PLANNING FOR INCREASED ENERGY SUSTAINABILITY

A company-wide energy efficiency enhancement programme should be devised based on the analysis of consumption, and supplemented by a local implementation plan at each shop, warehouse and distribution centre. These plans should be updated annually.

It is recommended that a company-wide energy efficiency enhancement programme should be created and updated regularly.

1.3. TARGETS AND PERFORMANCE REVIEW

The results of the annual update of the analysis of energy consumption should feed into business plans and be used to devise targets. The Musgrave Group, for example, has a target of a 25% reduction in energy usage over the period 2008-2012 and is on target, while Tesco Ireland has reduced energy consumption by 18% over the last 3 years.

It is recommended that energy saving targets should be adopted.

1.4. IMPROVED BUILDING DESIGN

The optimum scenario is when energy efficiency is planned for at the design stage of retail premises where it is most cost effective to incorporate best practice. Prominent recent examples include Musgrave Group's Headquarters in Cork (energy usage of the office premises is 27% of the initial conventional design load), and Tesco Ireland's store in Tramore, Co Waterford (energy saving of 45%).

It is recommended that energy use considerations be incorporated as a primary concern at building design stage.



1.5. LIGHTING

Design should maximise the use of natural light thereby minimising energy consumption for lighting. Lighting control systems should be used to further reduce associated energy consumption. Examples include occupancy detection sensors, timers and daylight compensation auto-dimming systems. Low energy use lighting should be selected at all times.

It is recommended that use of natural light, low energy lighting and other technologies be used to reduce energy use associated with lighting.

1.6. INSULATION

Most retail premises are legacy buildings. Retrofitting these buildings for energy efficiency is more expensive than incorporating measures at the design stage. Nevertheless, insulation interventions in attics, pipes, walls and water heating systems can be among the most cost effective ways to save energy.

Informed choices need to be made so that the areas selected for priority are those where the largest gains in energy efficiency can be made. This can be done through energy surveys. In a recent example, Musgrave Group installed new light fittings in four of its existing Irish warehouse sites and more than 1 million kilowatt hours were saved.

Energy efficiency should be incorporated into any refurbishment or extension of retailers' premises.

It is recommended that heat loss and gain should be minimised through insulation.



1.7. HEATING

The most energy efficient heating systems should be selected. The scope to incorporate heat from renewable energy such as geothermal systems, solar water heating technology etc. should be explored for all buildings. It is also possible to implement innovative strategies in shops such as recycling hot air produced as a by-product by fridges to provide heating elsewhere in the premises.

It is recommended that renewables and efficiency be considered in selection of heating and cooling systems.

1.8. REFRIGERATION

Energy use for refrigeration forms a large portion of retailers' overall energy costs. Musgrave Group has enhanced the energy efficiency of refrigeration through the use of smart controllers (which can reduce energy consumption by up to 30%) and low energy fan motors (which use 40% less energy than a standard motor). Further energy savings can be made through the use of twin air screens to protect the refrigerated area with a secondary ambient air curtain that reduces air spill and the consequent cold aisle effect. Tesco Ireland has redesigned its fridges and cut energy use by 10%.

It is recommended that refrigeration systems which are highly energy efficient should be selected.

1.9. COOKING AND OTHER EQUIPMENT

The most energy efficient ovens should be selected as a priority because they are significant users of energy in retailers' bakery and delicatessen operations. Energy efficiency should be one of the criteria used when selecting any equipment from meat slicers at cold meat counters to lift systems in warehouses.



1.10. MAINTENANCE

Regular maintenance of all equipment that consumes energy will help maximise its energy efficiency.

It is recommended that equipment is maintained and serviced regularly.

1.11. ENERGY METERING

Energy metering equipment can be used in a targeted way to itemise and monitor energy consumption on a daily basis to help identify unnecessary usage. While there is a cost to such equipment the energy efficiency gains can also be significant. This can be deployed to good effect in either small convenience stores or across a chain of large supermarkets.

Centra in Griffeen, Co Dublin reduced energy consumption by 14% within 3 months of installing energy metering equipment. Tesco Ireland has significantly reduced energy consumption through the use of an energy management and monitoring system across a range of premises.

It is recommended that energy-metering equipment be used to eliminate wasteful energy usage.

1.12. STAFF EDUCATION AND AWARENESS

It is critical to educate all staff on how they can become more energy efficient. Awareness can also be raised through the use of information from energy metering and monitoring systems. Staff should be given regular feedback on performance.

It is recommended that each company building should have an 'energy champion', with appropriate training, resources and authority to raise awareness and educate on energy efficiency.



1.13. COMBINED HEAT AND POWER (CHP) UNITS

Combined Heat and Power units can be highly efficient and lead to significant savings on energy costs. Tesco Ireland, for example, achieved a 25% saving on energy costs at its store in Nutgrove, Dublin through its prototype CHP unit.

It is recommended that consideration should be given to commissioning CHP units in large supermarkets.

1.14. ENERGY SUPPLY SUSTAINABILITY ENHANCEMENT

Sustainability in energy supply will be an extremely important dimension in the overall future sustainability of the food retail sector. The retail sector receives the bulk of its energy via the national grid from third party energy providers. These providers generate energy mainly from fossil fuels, which have a significant carbon impact on the environment and are set to become more expensive in the medium term.

While retailers will never be able to determine the overall pattern of national energy generation they must make progress in diversifying to renewable energy sources where possible. This can be done by sourcing power from providers of renewable energy. For example all Musgrave Group facilities currently use electricity from renewable sources.

It is recommended that retailers source energy from renewable sources where available.

2. TRANSPORT AND LOGISTICS

Ireland's total greenhouse gas emissions were 25.5% above 1990 levels by 2006. The transport sector is the sector causing most concern with a 165% increase since 1990 due to the increased use of private cars. The food retail sector must do what it can to help reverse this trend.

Food processors and retailers make extensive use of road transport to move goods to shops, from their distribution centres and from suppliers' premises. Fresh produce in particular has to be



delivered on a daily basis. In view of the sheer amount of goods that have to be delivered there is a significant use of fuel and a consequent environmental impact.

Processors and retailers are conscious of this and are developing solutions. For example, both Musgrave Group and Tesco Ireland have documented a reduction in the emissions of their truck fleets in 2007 and 2008 and others have made similar progress. This progress needs to be consolidated and built on.

SUSTAINABILITY ENHANCEMENT

2.1. ANALYSIS OF CURRENT FUEL CONSUMPTION

A starting point is for each company to analyse the current fuel consumption of its transport fleet in detail. Questions that should be addressed include: where it fuel used, what is it used to transport, how much is used for each journey by distance and by vehicle, what are the patterns, where is it sourced and how much does it cost?

It is recommended that companies analyse their own fuel consumption

2.2. PLANNING FOR INCREASED TRANSPORT AND LOGISTICS SUSTAINABILITY

Coherent logistics and planning can reduce fuel bills significantly. Musgrave Group plans to reduce the carbon dioxide emissions per case of goods delivered by 15% by 2012.

It is recommended that retailers work out a detailed plan with targets to reduce the fuel consumption of their transport fleets.



2.3. DRIVER TRAINING

Substantial reductions in fuel consumption and emissions can be made through training, even of the most experienced drivers. Best practice involves:

- Increasing driver awareness of average kilometres per litre so that each driver can benchmark his performance.
- Carrying out a daily check before using the vehicle.
- Parking to minimise early morning manoeuvring of the vehicle when the engine is cold as this is particularly wasteful of fuel.
- Filling fuel tanks carefully (e.g. never filling to the brim, avoiding spillages etc.)
- Pulling away in the correct gear and block shift gears when safe to do so.
- Using cruise control.
- Driving as much as possible at speed where the engine performs at its best in terms of fuel efficiency.

It is recommended that companies invest in driver training.

2.4. DRIVER ASSESSMENT

Drivers should be assessed on fuel consumption performance to provide an incentive to maximise efficiency and they should be given regular feedback to help with this, where possible using in-cab technology to give real time information.

It is recommended that drivers are assessed on fuel consumption.



2.5. MAINTENANCE

Efficient and timely maintenance of the transport fleet helps maximise efficiency regarding fuel consumption.

It is recommended that vehicles are serviced regularly.

2.6. SCHEDULING

Scheduling should be used to decrease mileage and to improve trailer utilisation. A strategic backhaul system should be developed so that after loads are delivered the vehicle is used to collect other goods before returning to base. Bulking up products at central distribution centres for onward distribution is also used to reduce fuel consumption.

It is recommended that attention be paid to optimal scheduling.

2.7. APPLICATION FACTORS

Fuel efficiency of transport fleets can be improved by making modifications to truck and trailer bodies, loading and engine size. Refrigeration trailer units should be white so that they reflect light and are cooler, thus reducing energy consumption. Double-decker trucks carry 50% more per load and can be used to reduce the number of journeys.

It is recommended that all aspects of the fleet be reviewed systematically to reduce fuel consumption.



2.8. BIO-DIESEL AND ALTERNATIVE FUELS

By 2010, 4% of petrol and diesel used in Ireland must be in the form of biofuels and 10% of all transport fuel must come from renewables by 2020. The Government has a target of a 10% penetration of electric vehicles into the transport fleet by 2020.

Transport fleets are mostly comprised of diesel trucks. Increasing use should be made of bio-diesel from sustainable sources to help reduce the environmental impact of fuel consumption.

Musgrave Group currently aims for 10% sustainably sourced bio-diesel by 2012 and Tesco Ireland is also moving to bio-diesel. The development of alternative fuel vehicles (hybrid, electric and flexi-fuel etc.) should be monitored with a view to early adoption if viable.

It is recommended that sustainably sourced bio-fuels and alternative fuel vehicles are used where possible and economically viable.

2.9. MOVING GOODS BY RAIL

Approximately 94% of Irish companies transport their goods by road and a mere 6% by rail. The use of rail freight has declined in Ireland by more than 45% since 1990. Given the current economic factors contributing to our GDP (low volume, high value goods and a strong services industry) and the limited number of high volume bulk movements, it is unlikely that a suitable alternative to road freight will present itself.

Unless major political, economic or technological changes emerge, it is doubtful that Ireland's reliance on road freight will change in the future. Recognising the strong influence of the climate change agenda on government policy, a situation may arise where rail freight is in a position to gain market share.

It is recommended that rail freight be considered where possible.



2.10. VEHICLE WEIGHTS AND HEIGHTS

To maximise efficiencies, it is vital to make full use of HGV weights and heights as unused weights per axle and vehicle heights can have a negative impact on the environment and sustainability. Policies to encourage longer and heavier vehicles are being pursued by a number of European countries, including the Netherlands, Denmark and the UK. These initiatives will lead to greater load consolidation and cut the cost per tonne and per cubic meter travelled.

It is recommended that larger vehicles transport goods to the greatest extent possible.

3. WASTE MANAGEMENT

Retailing, like most human activity, generates waste and waste depletes the earth's natural resources. It is obvious that disposing of waste to landfill is not a sustainable option, not least because as biodegradable waste decomposes at landfill sites it generates methane, a powerful greenhouse gas.

Retailers are striving to minimise the amount of waste they generate through the use of strategies based on the waste management hierarchy (prevention, minimisation, re-use, recycling, energy recovery and disposal) that underpins national waste management policy.

Substantial progress has been achieved in terms of segregation of waste, recycling and minimisation of packaging. These initiatives need to be developed and built upon. Most of the large volumes of waste in retailing arise from secondary and tertiary packaging as opposed to the more visible primary packaging (i.e. what is given to the consumer).

SUSTAINABILITY ENHANCEMENT

3.1. ANALYSIS OF WASTE GENERATED

A starting point is for each company to analyse the waste it generates in detail. Where does the waste arise, what is it from, is it primary or secondary or tertiary, how much is generated, what are the materials, what are the patterns over time, and how much does it cost to dispose of? Significant



information should be available to companies from their waste management contractors.

It is recommended that companies document the waste they generate in detail.

3.2. PLANNING FOR INCREASED WASTE MANAGEMENT SUSTAINABILITY

A plan needs to be worked out with detailed targets to reduce the amount of waste generated and maximise the diversion from landfill. The development of new technology using secondary processing is helping to increase the amount of waste suitable for recovery. This plan should take account of the waste management hierarchy so that waste prevention and minimisation at source is the focus rather than waste treatment solutions.

It is recommended that a plan be developed to reduce the amount of waste generated.

3.3. RECYCLING

Musgrave Group has a target in place to achieve 100% recycling of recoverable waste by 2012. Significant progress can be achieved as can be seen from the experience of one SuperValu shop in Ballincollig, Co. Cork where the amount of total waste recycled was increased from 16% in 2003 to 78% in 2007 and the associated waste disposal costs were reduced by 70%.

It is recommended that retailers develop a plan to increase the proportion of waste to recycling.

3.4. INFORMATION AND EDUCATION

It is recommended that staff and customers be informed as to best practice regarding recycling.



3.5. WORKING IN PARTNERSHIP WITH SUPPLIERS

Retailers need to work in partnership with suppliers to achieve shared sustainability objectives regarding packaging minimisation - extensive progress has been made in this area.

The retailer has much more direct influence when it comes to own brand goods because the goods are mainly manufactured to a specification determined by the retailer. Retailers in Ireland have much less influence when it comes to branded goods, particularly when an international brand is involved. However it should be pointed out that manufacturers generally have effective packaging minimisation strategies in place.

It is recommended that retailers work in tandem with suppliers to reduce waste across the supply chain.

3.6. PACKAGING MINIMISATION

Targets should be put in place to reduce packaging. Primary packaging (i.e. what the consumer receives) has been made lighter for several years due to the efforts of manufacturers and retailers. Efforts in this direction continue under a voluntary agreement being worked on by retailers to minimise packaging waste arising from own brand goods. Larger gains can be made by reducing secondary and tertiary packaging. A 12.5% target for the reduction of this type of packaging has been adopted by several retailers in Ireland. All packaging should be subject to a packaging needs assessment.

It is recommended that retailers work with suppliers to reduce packaging.

3.7. REUSABLE CRATES

The scope to increase the use of reusable crates should be explored. One retailer has documented a saving of 20,000 tonnes of additional transit packaging in Ireland by the increased use of reusable crates. Retailers work with suppliers to increase the utilisation of reusable crates. Targets of 30% utilisation for own brand goods and 5% for branded goods by 2012 have been put in place by



Musgrave Group.

It is recommended that scope to increase the use of reusable crates should be explored.

3.8. CRATE SPACE UTILISATION

Full crate space utilisation has significant benefits in terms of reducing waste crates and saving carbon emissions on transport and should be aimed for by all parties concerned.

It is recommended that crates are filled to the greatest extent possible.

3.9. FOOD WASTE

Food waste on retailers' premises must be minimised through efficient logistics and stock control systems. Where food waste occurs for short dated and out of date products it must be recovered and redirected for use by the pet food, animal food and bio-diesel industries. Suitable foodstuffs include meat, yogurt, milk, butter, cheese, soups and cereals. In excess of 95% of all such foodstuffs collected can be successfully reused for alternative non-food purposes, thereby minimising by-product low-grade residues for landfill.

It is recommended that food waste be reduced through use of efficient logistics and reused for non-food by-products where possible.

3.10. RECYCLING FACILITIES FOR CONSUMERS

Retailers are major contributors to the funding of REPAK which in turn helps fund the cost of the green bin kerbside collection service from households, thereby incentivising higher levels of recycling.



It is recommended that retailers engage with consumers to increase levels of recycling.

4. SUSTAINABLE SOURCING

Supply chain issues threaten to become increasingly urgent as globalisation, population growth and climate change combine to make the sustainable sourcing of products challenging for retailers. Responsible procurement brings with it many dilemmas and trade offs for retailers and collaborative efforts seem to be the most effective type of response to supply chain issues.

SUSTAINABILITY ENHANCEMENT

4.1. SUSTAINABLE SOURCING

Examples of sustainability sourcing among leading retailers include Musgrave Group's Ethical and Sustainable Sourcing Policy and Tesco's plan to reduce the number of airfreighted products on its shelves to 1%. An important initiative in sustainable sourcing introduced by WalMart is given in Appendix 1 as an example of best practice.

It is recommended that all retailers consider developing a sustainability sourcing programme.

5. INFORMATION AND LABELLING

Information on the carbon footprint or sustainability of a product is now also seen as an important step in enabling retailers to understand and mitigate their impacts on climate change and resource depletion. The European Commission has indicated in the past that this is an area that it may consider as part of its Sustainable Consumption and Production strategy and the majority of leading retailers are also now looking at carbon labelling individually.



SUSTAINABILITY ENHANCEMENT

In the UK Tesco have worked with the Carbon Trust to develop and trial a carbon labelling methodology: since 2006 a number of products have appeared with labels and the scheme has now expanded to include many of Tesco's own brand products. Several other retailers are working on their own methodologies.

It is recommended that retailers explore options for developing a meaningful carbon labelling methodology.





SUMMARY AND CONCLUSIONS

The Sustainability Enhancement Programme covers all links in the food chain from farm to consumer. It is based on the assumption that action in any one sector on its own will not be sufficient to meet the challenge that faces us.

Of necessity we begin at the farming level. Further enhancing the sustainability of Irish agriculture is a significant challenge. It must be balanced with achieving a sustainable income for Irish farmers and enhancing the efficiency and competitiveness of Irish agriculture. These are not incompatible aims. Strategies to increase sustainability can in many cases also raise farm incomes and improve competitiveness. Many of the measures suggested in this programme should reduce input costs and increase productive efficiency.

It is in Ireland's collective interest to build on the strong sustainability image associated with our grass-based production. Responding to the 'new' challenges of climate change and resource depletion can only enhance our green Ireland brand. There is also, of course, the clear requirement to reduce on-farm emissions, an issue which is central to the development of national policy on climate change as well as to the enhancement of a sustainable model of agriculture.

In the longer term there are questions relating to the effects of climate change on agriculture (for instance the effects of climate change on production conditions, yields and choice of enterprise). In this programme, however, we address the key sustainability challenges in the more medium term and focus in particular on:

- On-farm mitigation strategies to reduce methane and nitrous oxide emissions;
- Energy crops and on-farm strategies to sequester emissions; and
- On-farm renewable energy development, and on-farm strategies to enhance biodiversity and enhance water use efficiency.

The detailed recommendations under these headings are outlined in the section on primary agriculture and listed in the check lists. Some – for example, strategies to mitigate nitrous oxide production from the soil – are more achievable in the period up to 2020 than others. Many, such as the use of clover in swards or extending the grazing season, can be implemented on individual farms. Others, for instance, the cultivation of energy crops or the development of anaerobic digesters, would almost certainly require cooperative effort by groups of farmers and the relevant industry sector.



Finally, some, such as the proposal that the sequestration value of afforestation accrue to the tree planter, would require action from State agencies.

Virtually all of the recommendations would require action in one way or another by farmers and support from the farming and related organisations. In many cases this action would have to be on a whole farm basis. But farmers are unlikely to be successful without significant support. The following would be required in particular:

- State support through the implementation of agri-environmental schemes geared specifically towards sustainability and the establishment of flexible mechanisms to ensure that the carbon credit value of afforestation accrues to the tree planter
- Support from research institutions, and particularly Teagasc, in developing technologies to enhance sustainability and, critically, from the advisory services in ensuring the effective transfer of existing and new technologies to Irish farms
- Effective action from the processing industry and Bord Bia to ensure the achievement of the maximum market return from the enhancement of our green image.

We believe that the combination of the measures suggested in this programme, together with a coordinated support effort from public authorities and industry, can greatly enhance the sustainability of Irish agriculture and contribute significantly to Ireland meeting its climate change targets.

As in the case of agriculture, there is a clear need for agri-business to meet its targets in ways which enhance its competitiveness rather than increase its costs. This requires new technologies, change programmes and cultural adaptation. It also requires, of course, that the prioritisation of food safety should not be compromised by the preparation of programmes for GHG emission reductions. The programme developed here, therefore, attempts to deal with the concept of sustainability in a manner consistent with food safety and business competitiveness.

The food industry is diverse and complex. The sustainability challenges are the same for all businesses irrespective of scale, but the steps to be taken to meet them vary from one business to another. Accordingly, the programme identifies areas for consideration in designing company specific action plans and defines best practice in achieving the goal of sustainability. It highlights five areas in particular:

- Energy Efficiency
- Waste Reduction
- Transport Efficiency



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- Air Quality
 - Water Utilisation

The recommendations outlined in the section on the processing industry, and listed in the check lists, are intended as practical guidelines for businesses of all sizes in the agri-food sector.

The recommendations under the different headings are diverse and wide ranging. Most require changes in company operations; some can be introduced very quickly, others only over time; many are relatively simple to implement, some will need considerable effort. But one thing is very clear – little can be achieved unless the culture of sustainability is embedded in a company's culture. It is the responsibility of management to ensure that this is the case and the task of the various support agencies to operate programmes to assist management in this regard.

The final section in the proposal deals with the retail sector. While price is at present the core retail issue, evidence suggests that many consumers are increasingly aware of the social and environmental issues relevant to shopping. It is likely that these concerns will more and more influence purchasing patterns in the future, particularly as the world comes out of recession. In this section we have suggested strategies to respond to these concerns through enhancing the sustainability of the sector. We have done this in the first instance by suggesting a series of measures under five areas:

- Energy usage
- Transport and logistics
- Waste management
- Sourcing
- Information and labelling

Secondly, we have suggested ways in which enhancing sustainability might be embedded in each retail company's planning process and how the resultant programmes might be managed. We regard this aspect as being critical to success.

It is clear that concern for the environment is increasing among consumers. Retailers are responding to that concern in their own practices and in their relationships with their suppliers. These reactions cover information to consumers; reduction of packaging and increase in recycling; sustainable sourcing and the reduction of the retailer's own carbon footprint (the detailed suggestions outlined under the five key areas in this section are based on those responses or are intended to augment or reinforce them). Those responses will increasingly have implications for Irish producers and processors. That is why we have highlighted what is, or is likely to be, best international retail



sustainability practice. We have also highlighted the current, or intended, practices in these areas of a number of significant retailers operating in Ireland. These are selected examples known to the group. There are undoubtedly others from both the companies mentioned here or other companies which could be cited if we had been able to do a more comprehensive survey.

It is inevitable, and in many ways desirable, that these practices will become very much more prevalent in the Irish retail market, although in the current, or foreseeable, environment some form of targeted public financial support may be required to give greater impetus to the retail sustainability agenda. Indeed some portion of the revenue from a carbon tax might be earmarked for a short defined period to support a limited range of measures aimed at enhancing sustainability in this and other sectors.

There are clear implications from the developments in the retail sector for the Irish food industry both from the domestic and export standpoints. Pressure from consumers at retail level invariably works its way down the supply chain. Collaboration between retailers and suppliers is essential to respond to that pressure. Knowledge of what is likely to be required is essential and there is a definite need for Bord Bia to be proactive in providing the necessary information, especially to small and medium-sized food processing enterprises. Successfully following programmes, such as those set out in the primary agriculture and processing sections of this proposal, is, however, the best way to be prepared for retailer and consumer pressure. Furthermore it is essential if the industry is to play its part in adequately responding to the challenges of sustainability and climate change.

APPENDIX

A comprehensive sustainability sourcing initiative was launched by WalMart in 2009 which may have implications for retailers and suppliers globally. It requires of top tier US suppliers to fill out a Supplier Sustainability Assessment from 2009, and all others thereafter.

WalMart, the largest retailer globally, has explicitly stated its objective to make this a global standard for retailers and suppliers. As well as encouraging suppliers to improve and enhance the sustainability of their products, the final step of the sustainability programme is to provide customers with product information in a simple, convenient, easy to understand manner, so they can make choices and consume in a more sustainable manner.

The Supplier Sustainability Assessment is given below.

Here are the 15 questions WalMart (Asda in UK) will ask of suppliers:

Energy and Climate: Reducing Energy Costs and Greenhouse Gas Emissions

1. Have you measured your corporate greenhouse gas emissions?
2. Have you opted to report your greenhouse gas emissions to the Carbon Disclosure Project (CDP)?
3. What is your total annual greenhouse gas emissions reported in the most recent year measured?
4. Have you set publicly available greenhouse gas reduction targets? If yes, what are those targets?

Material Efficiency: Reducing Waste and Enhancing Quality

1. If measured, please report the total amount of solid waste generated from the facilities that produce your product(s) for Walmart for the most recent year measured.
2. Have you set publicly available solid waste reduction targets? If yes, what are those targets?
3. If measured, please report total water use from facilities that produce your product(s) for WalMart for the most recent year measured.
4. Have you set publicly available water use reduction targets? If yes, what are those targets?

Natural Resources: Producing High Quality, Responsibly Sourced Raw Materials

1. Have you established publicly available sustainability purchasing guidelines for your direct suppliers that address issues such as environmental compliance, employment practices and product/ingredient safety?
2. Have you obtained 3rd party certifications for any of the products that you sell to WalMart?

People and Community: Ensuring Responsible and Ethical Production

1. Do you know the location of 100 percent of the facilities that produce your product(s)?
2. Before beginning a business relationship with a manufacturing facility, do you evaluate the quality of, and capacity for, production?
3. Do you have a process for managing social compliance at the manufacturing level?
4. Do you work with your supply base to resolve issues found during social compliance evaluations and also document specific corrections and improvements?
5. Do you invest in community development activities in the markets you source from and/or operate within?

ENDNOTES

¹See: http://www.sei.ie/Your_Business/Energy_Agreements/Special_Working_Groups/EED_SWG_2008

²Further information and business advice can be found at: http://www.sei.ie/Your_Business/

³Further information on Air Quality in Ireland can be found by accessing the Environmental Protection Agency web-site at: <http://www.epa.ie/whatwedo/monitoring/air/data/>

⁴See: <https://www.cdproject.net/en-US/Pages/HomePage.aspx>

⁵Further information on water quality in Ireland can be found by accessing the Environmental Protection Agency website at: <http://www.epa.ie/whatwedo/monitoring/water/>

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