Pathway 2050: An Energy Plan for Jersey

Energy Plan
March 2014

States of Jersey

R.37/2014

Foreword

Pathway 2050: An Energy Plan for Jersey explores what an energy future for Jersey could look like, identifies three framework policies, and outlines an initial set of actions and interventions to contribute to achieving it. This is just one possible pathway for Jersey, there are many other routes that Jersey could take depending on the evolution of a variety of external and local factors such as technological developments. We do not just address the environmental impact of our energy use; The Energy Plan is also about the availability and affordability of energy. Its aim is to achieve 'secure, affordable and sustainable energy'. Alongside this aim, the document highlights that a low carbon future can bring such as new employment opportunities and potentially a more diverse economy.

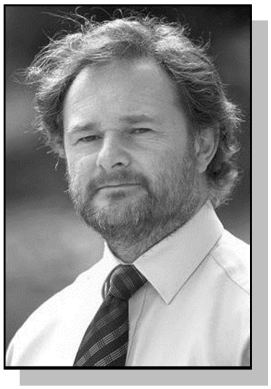
The vast weight of credible evidence is that man-made emissions are accelerating the process of climate change. As a signatory to the Kyoto Protocol, Jersey has affirmed its intention to take action in respect of climate change and the emission of greenhouse gases. When asked in the Jersey Annual Social Survey 2010, 47% of respondents did not think the States of Jersey was doing enough in respect of addressing climate change. Pathway 2050 seeks to address this gap.

Virtually all of Jersey's primary energy is imported, which has some benefits as Jersey has had access to cheaper, more reliable energy than it might otherwise have had. But the global energy market remains unpredictable and Jersey is vulnerable to price shocks and physical failures in supply. Unless energy usage can be reduced and energy costs contained, the most vulnerable in society are likely to be exposed to disproportionate costs in relation to their disposable income. Those living in fuel poverty may experience a reduced standard of living and this often brings about adverse health consequences.

There is a requirement for a multi stakeholder and cross-departmental approach in order to understand and manage the energy challenge ahead. The Energy Green Paper, 'Fuel for Thought?' established the context and rationale for action and this Energy Plan now proposes the policies and actions to work towards the target of an 80% reduction in CO_2 emissions by 2050. The immediate actions outlined in the Energy Plan to begin down this pathway can be implemented with existing funding and delivery mechanisms such as the already successful energy efficiency programme.

The Energy Plan sets out a framework set of policies and supporting actions relating to energy use until 2050. It is the first step on a long journey to a future of sustainable energy use. The policies and actions set out here will start the process but will need to be reviewed and added to as circumstances change, global influences evolve, technology advances and behaviours adapt if the Plan is to remain relevant and appropriate. I call upon the assistance of fellow Ministers in their current and future areas of policy development to support Pathway 2050, for instance in the review of the Sustainable Travel Plan in 2015 and the review of the Solid Waste Strategy in 2014.

I present here a rounded energy future that sets the direction of travel we must take if we are to be a sustainable jurisdiction underpinned with affordable and secure energy. Government cannot make this journey alone, industry and individuals must join us wholeheartedly if we are to succeed in our goals.



Deputy Robert Duhamel
Minister for Planning and Environment,
March 2014

Supporting Volumes:

Pathway 2050: Summary
Pathway 2050: Appendices
Supporting Document A – Energy use model to forecast energy use to 2050
Supporting Document B – Carbon emissions model and sector analysis

Published March 2014
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Chapter 1 - Introduction

The consumption of energy has a profound effect on the economy, quality of life and social equity. Today's population and in particular the developed world, is dependent on hydrocarbon fossil fuels to support industrialised economies and food production.

Yet fossil fuels are finite and distributed unevenly around the globe. The ownership and supply of this precious but limited resource has led to geo-political tensions and creates a risk of rising energy prices in the future.

Jersey is not immune to these fluctuations and impacts, some of which cannot be predicted or forecast, which is why this Energy Plan is presented as a long term pathway with recognition that the route that Jersey follows may change over time.

1.1. Sustainable energy and climatic stability

There is overwhelming evidence and a scientific consensus that accelerated climate change is occurring and Jersey will not be immune to its effects, as outlined in the 'Turning Point' report which outlines the potential impacts to Jersey of a changing climate[1]. The effects on ecosystems and human habitation of the planet in particular are, and will continue to be, significant. To avoid the worst of the potential impacts there needs to be significant action to control the emissions of Greenhouse Gases (GHGs also expressed in this document as CO_{2eq} i.e. equivalents of carbon dioxide) into the atmosphere from *all* nations.

Regardless of the levels of their own emissions, all jurisdictions will feel the effects of climate change through impacts on society and the economy. This is a global problem that requires a collective solution.

The Intergovernmental Panel on Climate Change published its most recent report in 2007 with the 5th Assessment Report to be released in phases between September 2013 and October 2014[2]. Their results were conclusive, with 1,200 authors and contributing scientists working across more than 130 countries, whose work was reviewed by a further 2,500 scientific experts, agreeing that:

- Warming of the climate system is unequivocally happening;
- Most of the observed increase in global average temperature since the mid-20th century is 'very likely' (i.e. at least a 90% likelihood) due to the observed increase in anthropogenic (human) GHG emissions. They state that the probability that this is caused by natural climatic processes alone is less than 5%;
- In the absence of effective international agreement and further efforts to reduce emissions, GHG concentrations would continue to grow rapidly resulting in an increase of between 1.7^{o}C and 4^{o}C in average temperature by 2100.

[1] Turning Point – The Eco-Active Guide to Climate Change, see http://www.gov.je/Environment/GenerateEnergy/Pages/TurningPointGuideToClimateChange.aspx
[2] http://www.ipcc.ch/

- Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would 'very likely' be larger than those observed during the 20th century;
- Accelerated global warming and sea level rise will continue for centuries due to the timescales associated with climate processes and feedbacks, even if GHG concentrations are stabilised.
- The evidence is that the global climate has already changed as a result of increasing carbon dioxide emissions and that the challenge is now to hold carbon dioxide emissions to the upper target of 550 parts per million (ppm) as a matter of urgency.

Further scientific analysis and interim data, since the 2007 report, has not caused the IPCC to change these views. The first instalment of the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC), the 'Summary for Policymakers' was published on 27th September 2013. It reaffirmed the need for action to reduce carbon emissions, finding that there was unequivocal evidence of warming in the climate system and that concerted action will be needed to limit the extent of climate change.

The Kyoto Protocol is the Multi-lateral International Agreement which addresses global climate change and has been ratified by over 190 nations (including Jersey through the UK). This brought forward targets for the reductions in emissions of GHGs for ratified parties. The 15th Conference of Parties was held in Copenhagen in December 2009 with the aim of agreeing the next phase of mitigation. Although the 'Copenhagen Accord'[3] acknowledges the urgency of the situation, legally binding reduction targets could not be agreed upon. In the absence of further international agreement, current European Union targets for reduction in carbon emissions are considered best practice - these require an 80% reduction on 1990 levels of GHGs by 2050.[4]

Despite the 'failure' of the Copenhagen Summit in the eyes of many, Secretary-General Ban Ki-moon[5] welcomed the climate change deal reached by world leaders at the United Nations summit in Copenhagen recognising that "All countries have agreed to work towards a common long-term goal to limit the global temperature rise to below 2^{o}C; many governments have made important commitments to reduce or limit emissions; countries have achieved significant progress on preserving forests; and countries have agreed to provide comprehensive support to the most vulnerable to cope with climate change."

Since 2010 annual summits have built on the decisions taken in the previous year and set out processes for making further progress in the future. These were action-orientated decisions and are a sign that international climate change negotiations are on track. However, many are still disappointed that the 'holy grail' of a legally binding global climate framework is still not being pursued with enough urgency, despite the Durban Conference agreeing to a legally binding deal comprising all countries to be prepared by 2015 and to take effect in 2020. The Doha (COP 18, November 2012)

[3] http://unfccc.int/2860.php
[4] http://www.euco2.org/
[5] http://www.un.org/wcm/content/site/climatechange/lang/en/pid/4307

and Warsaw (COP 19, November 2013) summits continue to pursue this goal with the next meeting being in Lima (COP 20, December 2014).

1.2. Economics and sustainability

Sir Nicolas Stern's report in 2007 examined the effect of accelerated climate change on the global economy. His message was clear – globally, doing nothing is not affordable.

The impacts of climate change will have massive, concurrent global economic impacts to the extent that defence analysts have concluded that the potential for conflict over environmental resources is one of the most significant threats faced in this century.

There is an opportunity for taking action to reduce or minimise carbon emissions below the 500ppm ceiling in order to ensure the impacts of a changing climate can be mitigated or adapted to. If this opportunity is not realised then potentially the effects are likely to become irreversible and massively damaging. More than this, Stern estimates that if no action is taken the global costs and risks of climate change are equivalent to losing 5% of global Gross Domestic Product (GDP) each year, every year, on an ongoing basis.

However, the costs of action to reduce greenhouse gas emissions are far lower at about 1% GDP each year. In other words, it is cheaper to avert climate change than deal with its effects.

From an efficiency perspective, global abatement action should occur first where it is most cost-effective to do so, which is likely to depend on the carbon intensity of individual economies and the technologies in use. However, there is also a role for more advanced economies to lead by example. Dealing with climate change by both the private and public sectors in Jersey could be increased significantly before the costs of mitigating or adapting to climate change exceed Jersey's share of global costs, if other jurisdictions' efforts were in proportion to their national income.

Since publication of the Stern review in 2007, a number of UK municipalities have undertaken 'mini-Stern' reviews, including Leeds and Manchester[6]. These reports have undertaken an assessment of the full costs and benefits to the local economy of implementing a low carbon emissions target. In order to fully understand, monitor and review the Jersey context, a similar approach will be taken to fully understand the economic cost benefit analysis of taking action on climate change. The Energy Partnership will review the recommendations which will inform future decision making on individual policy interventions.

[6] www.leedscityregion.gov.uk www.climatechangenorthwest.co.uk

1.3. What are the challenges for Jersey?

1.3.1. Security and vulnerability of energy supply

Jersey imports nearly all of its energy which, at the present state of technology and the present prices for fossil fuels, has benefits in that it gives the Island access to sources of energy, which are cheaper and more secure and reliable than would be available if Jersey had to be self-sufficient in energy production. This approach also has disadvantages, making supply of energy susceptible to interruptions in global energy supplies and international price volatility, as well as more local breakdowns in the supply lines currently used by Jersey to supply its energy needs.[7] In the short term, the Island is reliant on the continued delivery of energy on a more or less continuous basis given that existing storage facilities on the Island are limited and, whilst it is not a requirement to do so, it is noted that these stock-holdings do not meet EU recommended requirements. In fact some products are held with less than 10 days stock at certain times of the year.

A better understanding of the threats to Jersey's energy security is needed; to understand the impacts on other sectors, such as, food security; the likelihood and costs of potential interruptions, and to explore cost-effective ways of improving energy security.[8]

The Island's security is also likely to be vulnerable to the effects of climate change e.g. experiencing different patterns of temperature and rainfall, impacts on biodiversity and growing seasons, changing sea levels and storminess as the predicted changes in climate exert their effect.

1.3.2. Fuel poverty and affordability of energy

Sufficient, affordable energy is an issue of social equity; if residents cannot afford to heat their home, a household may experience fuel poverty. Fuel poverty is currently defined as spending more than 10% of household income on energy, although the 2012 Hills review recommends that the definition of fuel poverty should be reassessed and refined[9]. Fuel poverty can arise through a combination of factors:

- low household income;
- poor heating and thermal insulation standards in the property;
- high fuel costs;
- A split responsibility for a property with landlord / tenant;
- Under-occupation of a property, which is common amongst the elderly.

[7] In particular the electricity cables to France and Guernsey, the importation of motor fuels and LPG by tanker.
[8] Turning Point - http://www.gov.je/Environment/GenerateEnergy/Pages/TurningPointGuideToClimateChange.aspx
[9] http://www.decc.gov.uk/en/content/cms/funding/fuel_poverty/hills_review/hills_review.aspx

Whatever the combination of factors, the impact is cold, damp, homes which often lead to ill health and even early deaths amongst the most socioeconomically vulnerable people in society.[10]

Fuel poverty can damage peoples' quality of life and imposes wider costs on the community. Although these risks apply to all, older people, young children, and those who are disabled or have a long-term illness are especially vulnerable. Pensioners account for 50% of the lowest income quintile[11] suggesting extra attention must be paid to assisting this group (Chapter 5 addresses this in more detail).

Furthermore, the possibility of a long-term trend of increasing fuel prices will increase the pressure on low income households as energy prices (and hence the cost of heating and electricity) are predicted to rise faster than incomes. Action needs to be taken to understand which members of society energy needs to be affordable for; and steps taken to minimise the exposure of low-income groups to potential fuel poverty.

Although fuel poverty and action to tackle climate change are separate issues (and have separate policy considerations) they are linked through measures to increase the efficiency of energy use. By increasing the efficiency of use (e.g. improving home insulation) the quantity of energy required to achieve a particular standard of living (e.g. to heat a home adequately in winter) is reduced. This helps reduce both greenhouse gas emissions (e.g. less heating oil is burnt) and reduces the cost of achieving that standard (less oil is needed, so the total cost to the consumer is lower).

1.3.3. Jersey – international reputation

By becoming a signatory to the Kyoto Protocol, Jersey has demonstrated a commitment to abide by internationally agreed standards of environmental stewardship and has rejected the 'free-rider' approach. Some may argue that Jersey's contribution to global environmental issues is minimal but this argument is based on the false idea that if each individual or small grouping has a practically negligible effect then the sum total of all individuals' effects is also negligible. Even the smallest groupings should take responsibility for their proportion of the consequences related to energy behaviour, wherever they occur. This political decision has signalled that the Island accepts a moral obligation to act alongside the other responsible signatories to the Protocol and, as such, accepts that Jersey must play its part in reducing global emissions of GHGs.

In economics, unwanted consequences can be the result of the market failing. One way in which markets may fail is a result of negative externalities. Negative externalities exist when individual decision makers do not bear the full costs of their actions or decisions. Since individuals or firms tend to make a decision based on a consideration of the (private) costs and benefits to them, there may be costs that are not considered. As a consequence, markets with un-priced negative externalities, left

[10] http://www.decc.gov.uk/en/content/cms/funding/fuel_poverty/hills_review/hills_review.aspx
[11] Jersey Income Distribution Survey 2009/10 report; http://www.gov.je/Government/Pages/StatesReports.aspx?ReportID=457

to their own devices, will lead to more of the actions and decisions that create negative consequence than would otherwise be desirable when looked at from the perspective of society (or, in this case, the world) as a whole.

For example, using fossil fuels for transportation locally contributes to climate change. The benefit to an individual of using petrol is the convenience of driving from A to B, while the cost is the financial outlay involved in purchasing the petrol. However, there are external consequences, such as the effect on the environment, which in most cases will not be priced into the cost of petrol to the purchaser, and they will not necessarily consider these costs when deciding how much petrol to use as it is not a direct cost to them. Instead the harmful consequences and costs are very widely dispersed both geographically and temporally and some (and in many cases, the vast majority) will fall upon those who did not share the original benefit. The result is that more petrol will be used than is socially optimal, potentially imposing significant costs on society as a whole.

The general effects of addressing problems associated with negative externalities within a small jurisdiction, such as implementing a sustainable transport policy in Jersey, can be summarised as:

- The direct costs of the measures are concentrated locally (e.g. in Jersey) while their benefits are mostly dispersed on a wide geographical basis (e.g. slightly lower average temperature rise across the northern hemisphere);
- The immediate benefits of the measures (to those initiating them) can be limited, the benefits will be seen over a long time scale or to remote communities elsewhere in the world;
- If other jurisdictions take the measures (e.g. the rest of Europe), benefits arise for the global community (including Jersey) without us having to undertake any expenditure (the 'free rider' issue).

Because many energy use issues go beyond the local scale, the impacts on our economy are hard to predict because they partially depend on actions taken by other governments and large organisations. Corporate Social Responsibility (CSR) initiatives are becoming very significant economic, social and environmental drivers in many global corporations; shareholder resolutions are increasingly forcing the creation of environmental and social corporate mission statements, policy and environmental management at verifiable standards.

This raises the possibility that in order to compete with other jurisdictions in future global markets and attract international business, Jersey will need a robust and responsible image in relation to energy policy, which may also help promote tourism and our exported goods. To create such an image we must show that we are contributing effectively to meeting global environmental challenges by taking a pro-active approach to mitigating the Island's environmental impacts wherever and whenever they occur.

1.3.4. EU context

The EU publication Roadmap 2050 provides a practical, independent and objective analysis of pathways to achieve a low-carbon economy in Europe, in line with the

energy security, environmental and economic goals of the European Union. The roadmap examines several decarbonisation scenarios for the power sector and, sets out the near-term implications of this long-term commitment.

The EU Roadmap 2050 project shows that the benefits of the low-carbon transition far outweigh the challenges and that a commitment now to a systemic low-carbon transformation of the energy sector is ultimately the winning economic strategy for competitiveness and low-carbon prosperity in Europe. Achieving at least 80% GHG reductions in 2050 based on zero carbon power generation in Europe is technically feasible, including pathways based on very high contributions from renewables, and makes compelling economic sense.[12]

1.3.5. A changing market place in which to do business

With these challenges come opportunities. Jersey has the opportunity to use its existing experience and credibility in the global market. As markets change and carbon trading schemes mature, Jersey can use its financial and administrative expertise and infrastructure to participate in carbon markets.

Examples of opportunities for Jersey's finance and accounting industry to derive new business from climate change mitigation policies include administering the international financial instruments and vehicles that will be required as the negative externalities are increasingly brought onto the balance sheets of business and government.

Jersey as a destination for international business is in a competitive marketplace and there are many reasons that a company may choose to locate businesses in the Island. The Island successfully markets itself on: its convenient location; a strong regulatory regime; having an accessible, business-focused, independent government; a high quality of life for Islanders and low direct tax rates[13].

As markets expand into 'green business', for example 'Cleantech' funds, demonstrating Jersey's deep commitment to its environmental responsibilities provides another selling point for Jersey as a credible locale. Jersey has the chance to use its experience and credibility in the global market place in a future where certain sectors of business seek to locate in jurisdictions that can demonstrate their sustainability credentials. The recommendations from the Stern review will inform consideration of the types of incentives that may need to be developed in order to attract Cleantech funds and associated services to Jersey.

1.3.6. Next steps: Adapting to climate change

Jersey must be ready to adapt to the challenges that inevitable climate change will bring. Key tools will include the continuing outputs of the UK Climate Impacts Programme and the different scenarios they have modelled. These allow assessments of the impacts that climate change may have on socio-economic

[12] http://www.roadmap2050.eu/
[13] Jersey: Open for Business, www.jerseyenterprise.com

sectors such as infrastructure, agriculture, forestry, water resources and coastal and river flood defences.

The Department of the Environment recognises that the development of a Climate Change Adaptation Strategy is the next step beyond the adoption of the Energy Plan. This action has been identified in the Department of the Environment 2014 business plan and will include risk management, land use and infrastructure planning, natural resource conservation and social equity. The Department has allocated resources for the development of this strategy in 2014/2015.

Parallel with the development of the Climate Change Adaptation Strategy are a number of ongoing work streams that recognise the fundamental nature of the challenges and opportunities that climate change present including:

- Participating in climate change studies and research;
- Preparing the climate sensitive sectors of the economy for climate change;
- Climate change and biodiversity;
- Harnessing the opportunities arising from the climate change challenge including compliance markets and Cleantech.

Chapter 2 – Targets and delivery mechanisms

2. Introduction

If Jersey is to fulfil its international obligations with respect to greenhouse gas emissions in line with other advanced jurisdictions, it needs to reduce its greenhouse gas emissions by 80% compared to 1990. This chapter sets out the targets, policy framework, and initial set of delivery mechanisms to begin on a pathway to achieve the overarching target.

2.1. The Energy Plan target

The overarching target is:

'By 2050, reduce emissions by 80% compared to 1990 levels, by using secure, affordable and sustainable energy.'

This target is underpinned by three interlinked principles:-

2.1.1. Principle of sustainability

Applying the principle of sustainability, that is, "development which meets the needs of current generations without compromising the ability of future generations to meet their own needs" to the provision of secure affordable energy, requires taking a holistic view of the impacts of energy production and its use. [14].

In terms of global sustainability, in the short to medium term this has been recognised and internationally agreed as requiring a reduction in the emissions of GHGs to an 80% reduction of 1990 levels by 2050. This target has been identified as the required reduction to endeavour to prevent an irreversible rise in temperature that would impact on all aspects of the economy, society and the environment.

Working towards this target is likely to mean thinking about both the type of fuel we use and the way in which we use it, moving away from finite sources of fossil based energy and towards more renewable sources.

This is likely to be achieved by:

- Reducing energy use i.e. demand management;
- Using lower-carbon sources of energy;
- Moving towards renewable sources of energy where it can be justified on grounds of economics, security and sustainability;
- Encouraging synergies where energy solutions bring additional benefits, for example the deployment of anaerobic digestion which solves a waste management issue as well as generating renewable energy.

2.1.2. Principle of addressing fuel poverty and affordability of energy

Fuel poverty and affordability issues demand a proper consideration of:

[14] Ref http://www.unece.org/oes/nutshell/2004-2005/focus_sustainable_development.html

(a) Ensuring that the most vulnerable groups in society do not struggle to pay for an acceptable level of energy use i.e. adequate heating, electricity and hot water;

(b) The efficient mix and use of energy supply to keep the cost of energy use to a minimum given global trends, sustainability and security aims; and,

This is likely to be achieved by:

- Supporting vulnerable groups, paid for by other energy customers, taxpayers and others;
- A reduction in energy demand (e.g. through increased efficiency of use or change demand patterns) so reducing consumer's future financial exposure to increased global energy costs than might be the case without action;
- The delivery of energy at best value to the consumer.

2.1.3. Principle of ensuring security of energy supply

Energy security is about being able to maintain adequate energy supplies in Jersey in the face of both external and on-island shocks. An element of security may also relate to the impact of price shocks, as well as its continued availability. However, increasing the level of security will, in nearly all cases, also increase the overall unit costs of that energy. Therefore, an energy security policy involves balancing the risks and costs of threats to the energy supply with the cost of reducing them, and by doing so optimising the continued physical availability of energy at a price that is affordable. The aim of energy security in Jersey should be about achieving the level of energy security that the Island wants.

However, at present the level of risks to energy supply, the costs to the island of interruptions in that supply, and the costs of reducing the risks to the energy supplies are not well understood. It is therefore proposed that a critical first step is for work to be undertaken to gain a better understanding of the potential threats to the availability of energy to Jersey, the costs that these threats could impose on the Island should they materialise, and the specific actions that could be taken to mitigate them. Once energy security is better understood, it will be possible to consider the actions required to improve our energy security position through reducing the likelihood of interruptions to supply and planning for interruptions, making the Island more resilient when they occur.

2.2. Potential contradictions

It is the aim of this Energy Plan to provide a framework in which secure, affordable and sustainable energy can be delivered whilst reducing emissions. However, there are potential contradictions and trade-offs between these three aims. For example sole pursuit of energy efficiency and demand-reduction could stabilise costs to the consumer, but however rigorous and successful demand management programmes are, they are unlikely to be sufficient to achieve the carbon reduction commitments made by Jersey, and can only contribute in a limited way to security of supply.

Meeting the aims of security and sustainability are likely to involve capital investment in the short-run, and potentially higher unit costs in the long-run as well. For example,

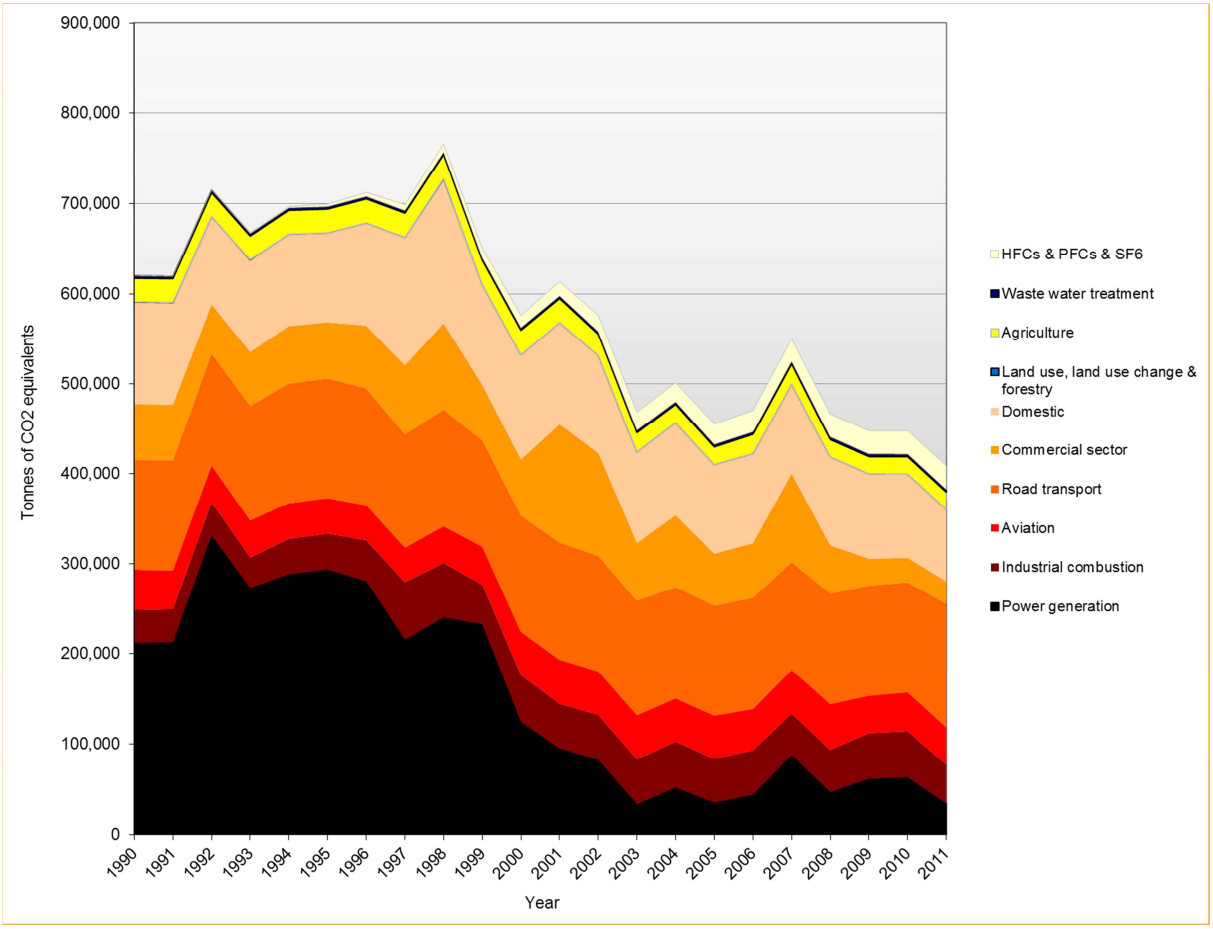
for Jersey to generate offshore renewable energy at the current time when it is more expensive to produce than hydrocarbon based energy, will require someone to pay this higher cost, if the energy is not exported, this will mean islanders. This would arise either through higher unit prices or, if the renewable energy is subsidised by the tax payer, through higher taxes (all other things being equal).

Similarly increased local energy security, for example through increased stockholdings, will require considerable capital outlay for holding facilities and ultimately these costs are passed on to the consumer. Given that such improvements would only affect a small proportion of the Island's energy and likely only improve short-term resilience, the benefits may not be substantial. Achieving the aims of security and sustainability could therefore result in a decrease in affordability to some degree.

These potential contradictions illustrate the cross-disciplinary nature of energy policies and underline how important it is to recognise the appropriate time at which to apply policy, actions or interventions. Furthermore it is important to remain cognisant of all aspects of policy i.e. affordability, security and sustainability to ensure that interventions remain effective and deliver the outcome that they are designed to achieve. It is important to maintain an overview of the external policy horizon in order to inform the ongoing implementation and review of the Energy Plan every five years.

2.3. Jersey's international carbon reduction commitments

By becoming a signatory, through the UK, to the Kyoto Protocol Jersey has committed to take a challenging and pro-active approach to reducing its carbon emissions. The UK and the EU has adopted a Kyoto target of an 80% reduction in emissions from 1990 to 2050. The graph below illustrates the historical trend in Jersey's GHG emissions; these are explained in more detail in appendix 1. It is clear that there has been a decline in emissions compared to the 1990 baseline year used by the Kyoto Convention. Jersey has already made a reduction of 28% (on 1990 levels) but although this is impressive relative to many other jurisdictions, it is nearly all due to the switch from locally generated electricity using an oil burning plant to electricity imported from outside the Island (the emissions associated with imported electricity is not attributed to Jersey, although a substantial portion of the imported electricity is generated from nuclear or hydro power plant, and therefore also represents a net reduction in global emissions). As a result this is a 'one-off' reduction and cannot be repeated.



Graph 1 – Jersey's Greenhouse Gas (GHG) emissions as expressed in tonnes of carbon dioxide equivalents (CO_{2eq}). (Data Source AEA[15] on behalf of the Department for Energy and Climate change as recorded under the International Panel on Climate Change Common Reporting Framework Guidelines 2006). The stacked area graph shows how each sector contributes to the total.

Jersey is an advanced and wealthy jurisdiction. Overall it has lower carbon emissions per capita because the Island has little manufacturing or on-island power generation. The Island's emissions originate principally from the space heating and cooling of residential, commercial and institutional premises as well as from road transport.

Looking across the other categories, emissions remain fairly stable over the whole period. If Jersey is to reduce its emissions in line with the targets set by other comparable jurisdictions, the Island needs to reduce emissions by 493,447 t/$CO_{2\ eq}$.

The energy future outlined in this Pathway 2050 document highlights how emissions savings in line with other jurisdictions could be distributed between sectors of the economy. Jersey has already committed to so doing by becoming a signatory to the Kyoto Protocol.

[15] http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html (Source AEA Technology on behalf of the Department for Energy and Climate Change)

2.4. Electricity

The carbon associated with Jersey's imported electricity from France is accounted for in the French inventory since GHG inventories are production not consumption based. Therefore for carbon accounting purposes, any reduction in imported electricity to Jersey does not equal a reduction in Jersey's GHG emissions. Even if this was not the case, because the electricity sold to Jersey is certified as low-carbon, any impacts would be small.

Nevertheless, we are certainly not concluding that we can be profligate with the Island's electricity consumption. All energy has environmental consequences and should be used wisely and its demand managed. In addition, to the extent that Jersey reduces its electricity consumption this can free-up low carbon electricity capacity to be used in other jurisdictions. For as long as the marginal generation capacity in the electricity system that Jersey is connected to is relatively high carbon, reductions in electricity use in Jersey can have a knock-on impact of reducing carbon emissions. However, notwithstanding this potential impact in other jurisdictions, it is recognised that there is a difference in the carbon reductions achieved from say insulating a house that is heated with an oil system compared to a house that uses electricity for space heating.

Despite the fact that reducing electricity demand on-island does not contribute to Jersey's sustainability aims (although it does contribute in a small way to France's) there are still a number of reasons to reduce local electricity demand in the same way we wish to reduce the demand of hydrocarbon based fuels:

1. Reducing overall electricity use by demand management contributes to the affordability aim by lowering consumer's bills and reduces the impact of fuel poverty;
2. Reducing the amount of electricity consumed, in particular at peak times, makes the load profile more uniform, and potentially more predictable. This allows more economic contracts to be negotiated (i.e. at a lower average price per unit of electricity) since peak load electricity is often provided from smaller, less efficient, power plants that are bought online quickly to top up the 'base load'. Peak generating capacity is generally more expensive to run, as reflected in increased tariffs. In addition, flattening the peak load generation contributes to the sustainability aim since peak load is often met from higher carbon sources (such as oil-fired power plant or relatively low-efficiency gas plant) than base load— which in France is predominately nuclear generation;
3. Overall if less electricity is imported to the island then there is a small increase in security of supply because there is less vulnerability to interruptions in imported energy supply. Similarly reduced demand can lengthen the life of infrastructure.

Therefore, we conclude that although Jersey is not 'credited' with the (minimal) carbon reduction from demand management in the electricity sector, there are several other good reasons for policies and supporting actions that reduce energy demand to be applied to electricity as well as hydrocarbon energy sources.

2.5. Business as usual vs. Pathway 2050 targets

For Jersey to achieve the carbon reduction target described above, and in order to outline actions and interventions to begin to achieve these reductions, first it is important to understand what future emissions are likely to look like without any interventions i.e. a business as usual (BAU) scenario. The scenario is based on a population assumption of +350. It can be assumed that any higher population growth scenario would result in higher levels of emissions which would require more stringent and aggressive interventions in order to achieve the reduction target.

A forecast has been made of how energy demand will change in line with some key assumptions – for full details see Table 1 in appendix 2. From predicted energy demand to 2050, carbon emissions have been forecast to give an estimation of how 'business as usual' will impact on the Island's carbon emissions compared to a reduction target of 80% on 1990 levels by 2050.

The business as usual scenario has been compared with the target emissions levels for each sector, based on an all sectors achieving a uniform 80% reduction in emissions by 2050 (a different set of sector abatement profiles are also outlined in Table 2).[16]

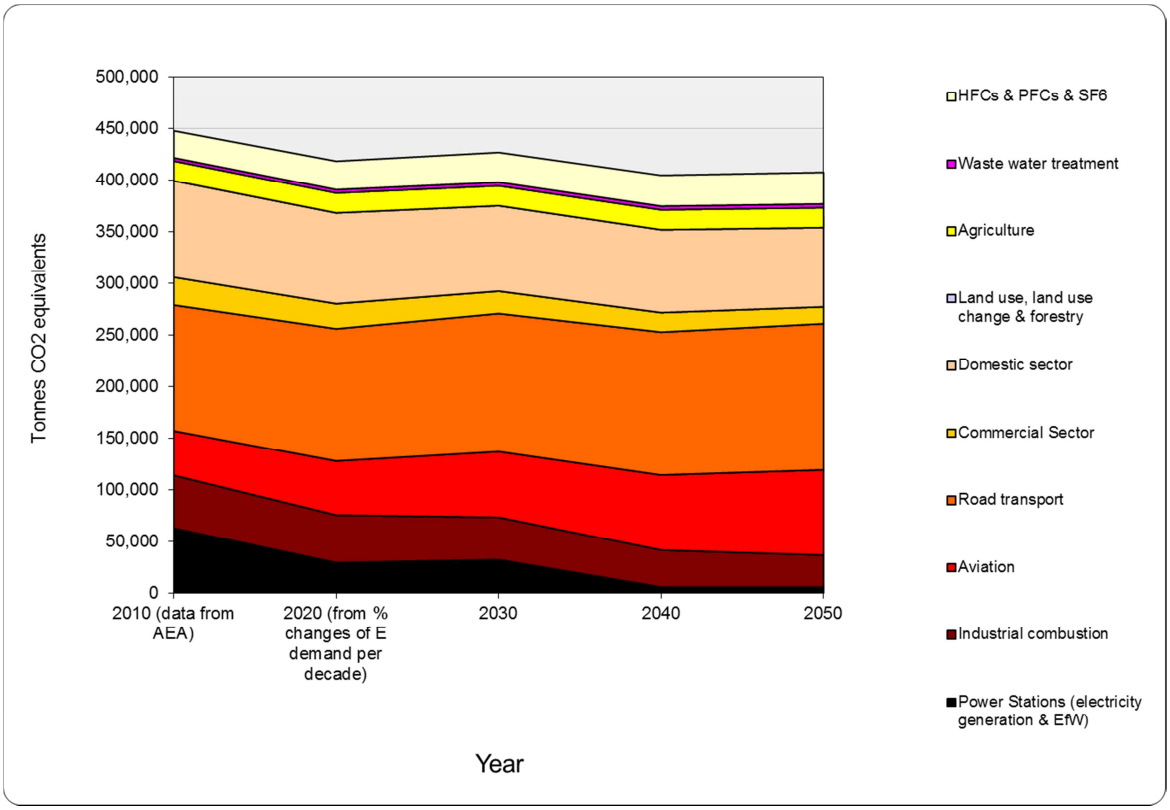
CATEGORIES	1990	2009	2020	2030	2040	2050	Target 80% reduction on 1990 levels
Power stations	211,765	62,875	29,438	32,299	5,789	5,789	42,353
Industrial & Commercial	98,780	78,049	70,410	62,723	54,616	47,182	19,756
Aviation	44,710	43,144	52,295	63,599	72,726	82,604	8,942
Road transport	122,445	121,940	128,249	133,907	138,620	141,762	24,489
Domestic	113,144	104,292	98,761	93,598	91,112	87,570	22,629
Land use, change & forestry	280	-10,729	-10,729	-10,729	-10,729	-10,729	56
Agriculture	26,037	19,331	19,331	19,331	19,331	19,331	5,207
Waste water treatment	2,728	3,079	3,260	3,416	3,536	3,618	546
HFCs, PFCs & SF6	2,755	26,097	27,630	28,954	29,973	30,668	5,219[17]
TOTAL	**622,645**	**448,078**	**418,645**	**427,098**	**404,974**	**407,796**	**129,197**

Table 1: Jersey's forecast carbon emissions under a business as usual scenario compared to a target of 80% reduction, on 1990 levels, by 2050, which shows that

[16] The starting point for the policy has been derived from a uniform reduction by sector. As more information becomes available and as Jersey gains experience of actually implementing these policies, it may be appropriate to change the relative sector abatement contributions, so that where energy demand can be reduced more economically in one sector than another, effort is concentrated into those sectors.

[17] Nb the target is based on 2010 (not 1990) baseline in line with EU F-Gas regulation phase out

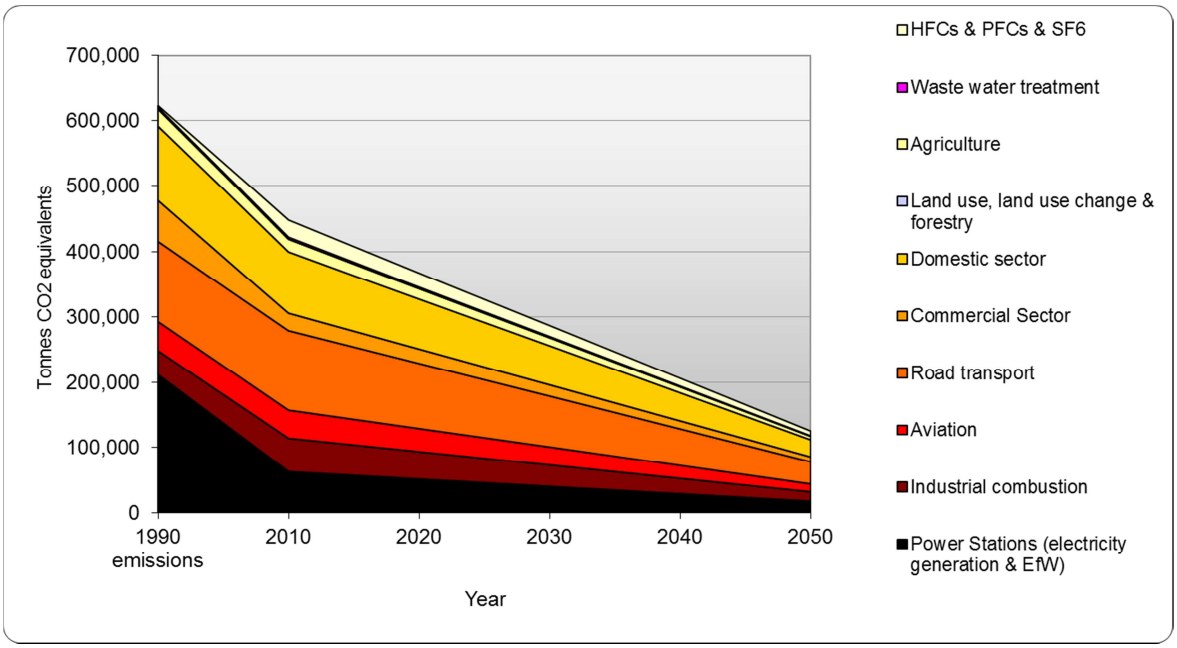
the target will not be achieved[18]. GHG emissions would exceed the 2050 target by 278,599 t/CO_{2eq}. Graph 2 (below) illustrates this scenario.



Graph 2: Pattern of carbon emissions per decade as predicted by a 'business as usual' scenario of energy demand.

It is clear is that without comprehensive action across all sectors, a 'business as usual' scenario means that emissions in all sectors are far above the reduction target, excluding power stations. Graph 3, below, provides an illustration of how emissions across all sectors could be reduced if the Island is to achieve its reduction target.

[18] Note industrial and commercial categories have been combined, in effect in Jersey the 'commercial' category is a subset of the 'industrial' category.



Graph 3: An illustration of the pathway carbon emissions would have to take across all sectors if the Island is to reach a carbon reduction target of 80% on 1990 levels by 2050. Note the graph takes into account actual carbon reductions made between 1990 and 2010.

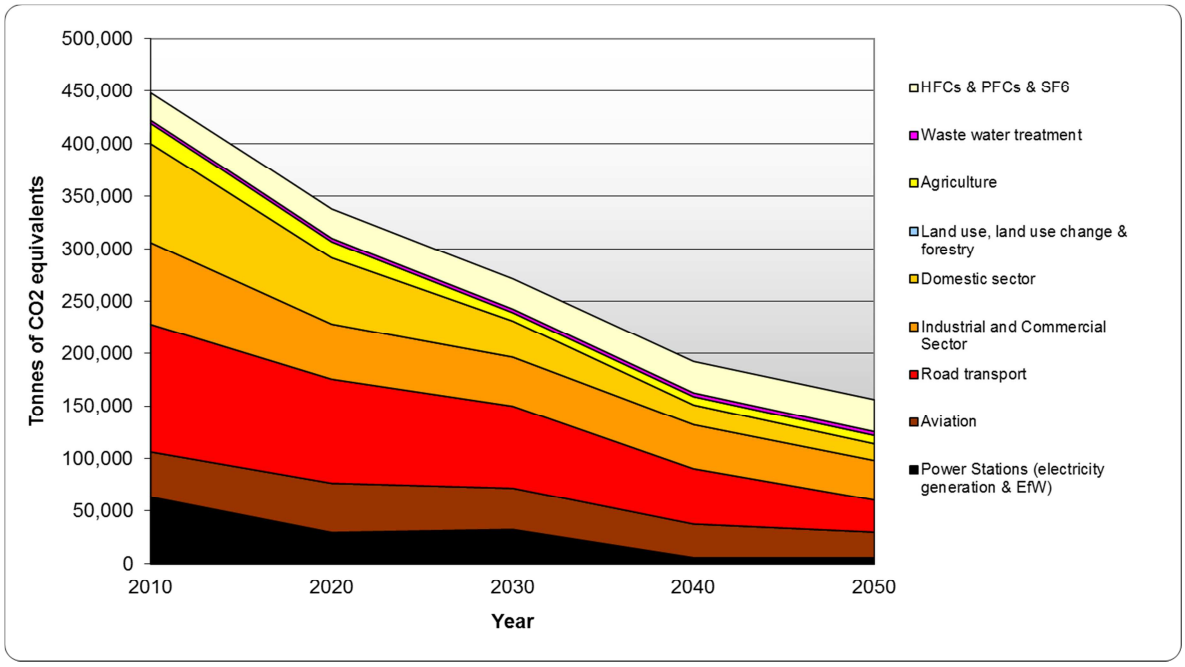
In order to assess the potential for achieving these targets, a set of sector actions have been considered and modelled. Table 2 below illustrates potential emissions abatement within each of the sector categories consistent with the target.

CATEGORIES	1990 Actual emissions	2010 Actual emissions	2020	2030	2040	2050	Target 80% reduction on 1990 levels	% Change
Power stations	211,765	62,875	29,438	32,299	5,789	5,789	42,353	**-97%**
Industrial & Commercial	44,710	43,144	44,100	63,010	65,120	74,998	8,942	**68%**[19]
Aviation	122,445	121,940	107,898	83,932	67,869	35,204	24,489	**-71%**
Road transport	98,780	78,049	47,858	36,408	27,247	19,918	19,756	**-80%**
Domestic	113,144	104,292	73,981	45,303	29,670	26,716	22,629	**-76%**
Land use, change & forestry	280	-10,729	-10,729	-10,729	-10,729	-10,729	56	**see note**[20]
Agriculture	26,037	19,331	15,368	7,984	7,984	7,984	5,207	**-69%**

[19] Note increase is due to forecast increase in air travel; impact is a 4% reduction in overall emissions due to EU aircraft standards. See AS16.
[20] There has been a substantial increase in the amount of permanent pasture since 1990 which has led to a large area of land acting as a carbon sink, which is expressed as a negative value in the table.

Waste water treatment	2,728	3,079	3,260	3,416	3,536	3,618	546	**33%**
HFCs, PFCs & SF6[21]	2,755	26,097	10,439	5,219	5,219	5,219	5,219[22]	**-80%**
Total Change in GHG emissions - Showing t/CO_{2eq} and % reduction against 1990 levels	**622,645**	**448,078 (28%)**	**321,613 (48%)**	**266,840 (57%)**	**201,704 (68%)**	**168,718 (73%)**	**129,197**	**-73%**

Table 2: Jersey's carbon emissions within the 2050 pathway. The actions contribute to a total reduction in emissions of 73% i.e. short of the 80% by 2050 target. Thus there is a residual of 39,521 $t/CO_{2eq.}$ Graph 4 below illustrates this pathway.



Graph 4 An illustration of the pathway carbon emissions will take if all sectors achieve their carbon reduction targets as set out in this plan.

2.6. Structure of the Energy Plan

Achieving the overarching 80% reduction target for Jersey is ambitious and raises a number of challenges for discussion. But this is not a reason for doing nothing. This Energy Plan presents a scenario of what could be achieved based on a set of assumptions and effective monitoring and policy future response. The effects of the actions and interventions on GHGs have been modelled and included for the first 5 years of the Pathway; the longer term sector-level ambitions are shown and included

[21] NB. For the F-gases, the benchmark year is 1995.
[22] Nb the target is based on 2010 baseline in line with EU F-Gas regulation phase out

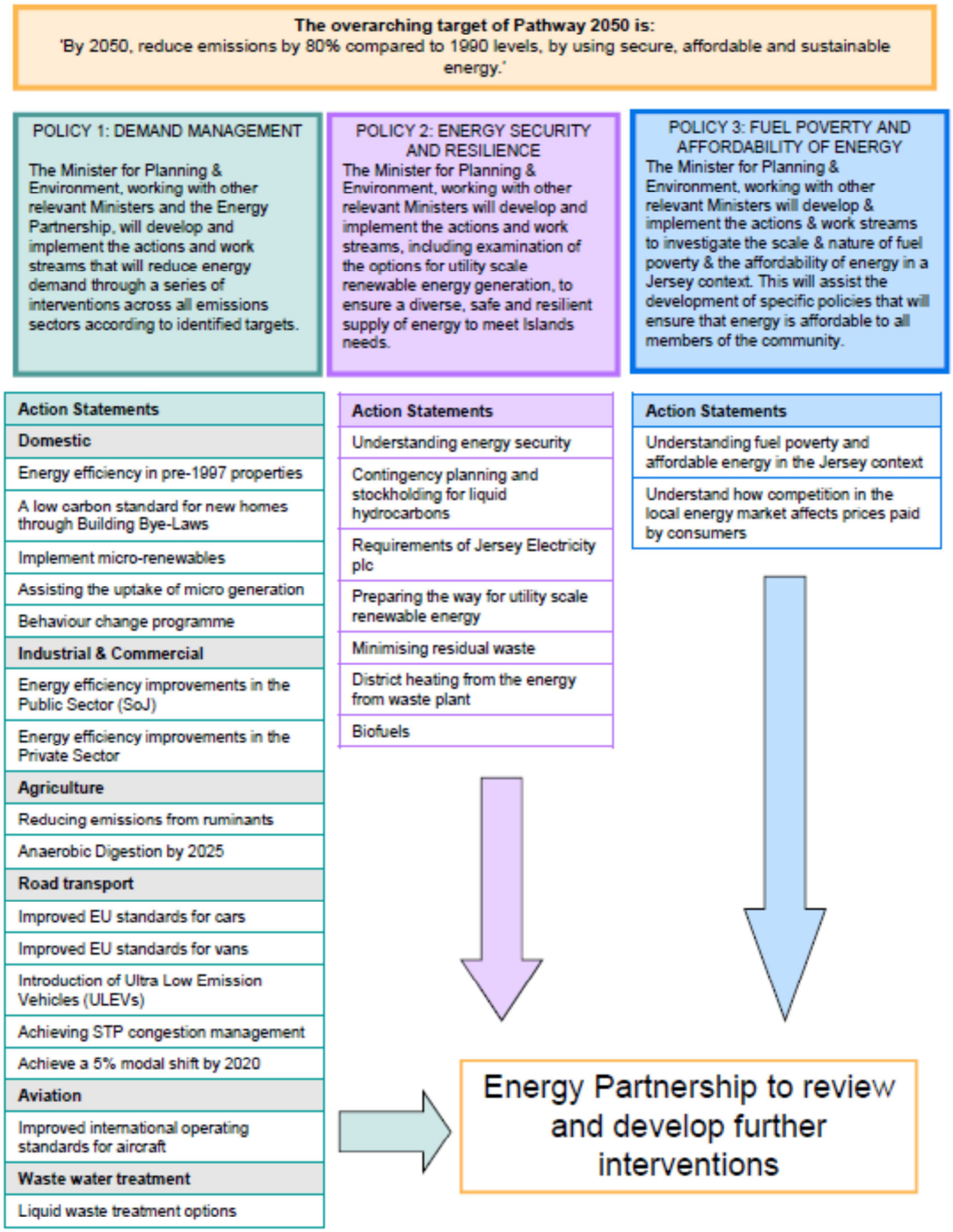
for the purposes of illustrating the route the Jersey pathway may take. Full details for all sectors are included in supporting document B.

Jersey is not embarking upon this journey alone and will benefit from global interventions and market forces that will reduce carbon emissions. Technologies will change and improve during the global journey to 2050 and many products and materials will become considerably more energy efficient than previously. Generating energy from low carbon and renewable sources will also become more common and as a result will be more economically viable. This does not mean that Jersey does not need to make its own real efforts to reduce emissions. The interventions and actions as outlined will only be effective if the stakeholders within each sector can embrace the challenge as outlined, and work proactively in partnership to achieve change.

A low carbon future will bring many benefits to the island. If oil prices continue to rise as many expect, a more energy efficient island will be more resilient to increasing global energy prices. This will be particularly important for the socio-economically vulnerable who spend a larger proportion of their income on energy. By ensuring that Jersey has diverse sources of energy, such as offshore renewable energy, the Island's energy portfolio may be more secure and resistant to events beyond Jersey's control. Whilst improved energy efficiency will bring benefits for the consumer, the process of improving energy efficiency will also provide employment opportunities for energy efficiency installers, energy auditors and so on.

To deliver the target of reducing emissions by using secure, affordable and sustainable energy, actions in the three interlinked policy areas of reducing energy demand through energy efficiency and demand management actions; ensuring affordable energy for all and securing energy supply for the future are all necessary.

The actions and interventions are described as 'Action Statements' in this Energy Plan; some of these can be implemented immediately, while others require monitoring and future responses to global developments. The diagram below illustrates the structure of the plan and shows how the three policy areas work to deliver the target through a set of actions, which may change over time.


The overarching target of Pathway 2050 is:
'By 2050, reduce emissions by 80% compared to 1990 levels, by using secure, affordable and sustainable energy.'
POLICY 1: DEMAND MANAGEMENT
The Minister for Planning & Environment, working with other relevant Ministers and the Energy Partnership, will develop and implement the actions and work streams that will reduce energy demand through a series of interventions across all emissions sectors according to identified targets.
POLICY 2: ENERGY SECURITY AND RESILIENCE
The Minister for Planning & Environment, working with other relevant Ministers will develop and implement the actions and work streams, including examination of the options for utility scale renewable energy generation, to ensure a diverse, safe and resilient supply of energy to meet Islands needs.
POLICY 3: FUEL POVERTY AND AFFORDABILITY OF ENERGY
The Minister for Planning & Environment, working with other relevant Ministers will develop & implement the actions & work streams to investigate the scale & nature of fuel poverty & the affordability of energy in a Jersey context. This will assist the development of specific policies that will ensure that energy is affordable to all members of the community.
Action Statements
Domestic
Energy efficiency in pre-1997 properties
A low carbon standard for new homes through Building Bye-Laws
Implement micro-renewables
Assisting the uptake of micro generation
Behaviour change programme
Industrial & Commercial
Energy efficiency improvements in the Public Sector (SoJ)
Energy efficiency improvements in the Private Sector
Agriculture
Reducing emissions from ruminants
Anaerobic Digestion by 2025
Road transport
Improved EU standards for cars
Improved EU standards for vans
Introduction of Ultra Low Emission Vehicles (ULEVs)
Achieving STP congestion management
Achieve a 5% modal shift by 2020
Aviation
Improved international operating standards for aircraft
Waste water treatment
Liquid waste treatment options
Action Statements
Understanding energy security
Contingency planning and stockholding for liquid hydrocarbons
Requirements of Jersey Electricity plc
Preparing the way for utility scale renewable energy
Minimising residual waste
District heating from the energy from waste plant
Biofuels
Action Statements
Understanding fuel poverty and affordable energy in the Jersey context
Understand how competition in the local energy market affects prices paid by consumers
Energy Partnership to review and develop further interventions

2.7. Delivering the actions

As outlined already, there are 3 areas which form the policy framework for the Energy Plan; reducing energy demand; ensuring energy security and addressing fuel poverty and affordability. Within each section a number of actions and interventions have been identified, based on good practice and experiences from other jurisdictions are considered to be applicable to the Jersey context. Each action has been assessed qualitatively in terms of its contribution to the overall aims (i.e. achieving secure, affordable and sustainable energy), the assessment process has been described at appendix 4 and the modelling assumptions included in Supporting Document B.

An economic and resource assessment has been carried out for the immediate delivery mechanisms. Where known, the direct implementation costs have been included for the implementation of interventions. It should be noted that the resource assessment does not include the benefits to the local economy in terms of market stimulus or creation of employment opportunities, direct savings or pay back or other types of benefit which will in effect offset the cost. A full assessment of the economic and other benefits of following the pathway 2050 as compared to the potential impacts of a 'business as usual' scenario, will be undertaken as part of a 'Jersey Stern Review' which will be overseen by the Energy Partnership.

Key performance indicators have been identified for each intervention which will be used for monitoring and review purposes. These are included with each Action Statement.

2.7.1. Delivery mechanisms

There are a number of existing programmes or work streams that have been identified as an initial set of delivery mechanisms for the interventions outlined. These programmes have been created over time to target specific sectors and have well developed stakeholder engagement and recognition. The programmes are already mature and will be further developed to deliver the interventions outlined in this document.

There is a need to ensure adequate resourcing for the immediate actions that have been identified; the actions identified for the first 5 years are within existing budget, so whilst there is not a requirement beyond the existing allocated funding outlined in the 2013 - 2015 Medium Term Financial Plan[23], there may be a need to re-profile and renew commitment to use the allocated resources to support the interventions to achieve the targets as outlined. As well as the key delivery mechanisms outlined below, some areas are identified where more work is required before policy interventions can be recommended. The next steps are outlined in the Action Statements and the key partners are identified.

[23] Medium Term Financial Plan on gov.je
http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20Medium%20Term%20Financial%20Plan%2020120718%20APC.pdf

Domestic Sector

The Eco-Active Energy Efficiency service (EES)[24] was established in 2009 with a remit to target the socio-economically vulnerable sector of the community by installing a range of energy efficiency measures designed to assist in addressing fuel poverty / affordable warmth. The EES has received independent oversight from the Jersey Energy Trust which has advised the Minister for Planning and Environment, on policy and corporate governance. The EES has been developed with advice and support from the UK Energy Saving Trust who now provide accreditation for the services provided.

In the 2050 pathway, energy efficiency in the domestic sector is projected to contribute over 20% of total emissions savings to 2050. The EES will therefore be a key delivery partner for the domestic sector. The role and remit will need to be expanded. The core target group for the EES will continue to be the domestic sector, but its remit will be extended to provide advice to the 'able to pay' sector as well as the socio-economically vulnerable group, and also the industrial and commercial sector. The EES will review the targets outlined in order to develop a revised business plan. Estimated costs for implementation through the EES have been included at appendix 5.

Revising the Building Bye-Laws will provide the regulatory framework within which the interventions will deliver the change required in the new building stock in this sector as well as in the industrial and commercial sector.

Industry and Commercial Sector

The Eco-Active Business (EAB) programme provides a step by step approach to environmental improvement through a self-assessment toolkit. The toolkit forms the basis of an environmental management system targeting 5 areas including energy use and will be the key delivery mechanisms for private companies in the industrial and commercial sector. In the 2050 pathway, energy efficiency in the industrial and commercial sector is projected to contribute 16% of total emissions savings to 2050. To achieve the targets illustrated in the pathway, the EAB programme will need to provide advice and support to a higher number of local businesses, and those businesses will also need to act on that advice, to achieve International environmental management standards.

Discussions will take place with Jersey Business to identify the opportunity to provide support for businesses embarking on the EAB route, including training and awareness raising programmes. The newly established innovation fund (2013) is available to all sectors, including businesses wishing to develop new Cleantech opportunities.

In parallel, the EAB programme has been adopted by and will continue to be developed within the public sector (States of Jersey).

[24] http://www.gov.je/Environment/GenerateEnergy/Energyefficiency/Pages/AboutEnergyService.aspx

Transport Sector

The Transport and Technical Services department are responsible for development and implementation of the Sustainable Transport Policy (STP) and all its revisions. The STP is funded by £0.5m annually from VED. Nearly 40% of emissions savings in the 2050 pathway are projected to come from the transport sector, although the majority of this is expected to come in future decades, and be critically dependent on, and driven by, global efficiency standards and technological advances that are outside the control of Jersey. When the STP is revised there will be the opportunity to revisit the delivery costs and consider whether increased resources are necessary.

Existing States' policy has already put in place an Eco-Active Travel programme lead by TTS working with the Department of the Environment and the Department for Education, Sport and Culture. This programme will develop and implement travel plans for all States Departments and Schools by 2015.[25] In 2013, 27 schools already had a fully approved School Travel Plan.

Agricultural Sector

The Rural Economy Strategy (RES) 2010-2015, its resourcing and delivery, was agreed by the States in January 2011 and is based upon the triple bottom line 'people, profit and environment'. Over 5% of the emissions savings in the 2050 pathway are projected to come from the agricultural sector by 2050. The deliverables from a number of work streams within the RES, will form the foundation for achieving the projected emissions savings in respect of this sector. The adoption, by these work streams, of the carbon reduction targets set here, will assist in assessing the effectiveness of the policy interventions set within the RES.

Renewable Energy

The Renewable Energy Commission was resourced and mandated by the Minister for Planning and Environment until 2013. It carried out work in a number of areas that began to put in place the technology blind steps framework for the long term deployment of the appropriate and economically feasible offshore renewable energy technologies (yet to be assessed) for Jersey. This independent Commission brought relevant expertise from outside the Public Sector and was supported by officers from the Environment and Economic Development Departments.

The work of the Commission will be integrated into the Energy Partnership and continues to be supported by officers in the Departments of the Environment and Economic Development. Collaboration is underway with the other Channel Islands and the UK through the British Irish Council (energy) sub-groups as well as the Chief Minister's Department where work has cross jurisdictional impacts. In addition, the Channel Islands Marine Renewable Energy Group (CIMREG) has been established and is an officer and political group with representatives from all the Channel Islands and the Isle of Man participates as an observer. This forum allows the exchange of information and collaboration on projects. Importantly it provides a mechanism for the

[25] Jersey's Sustainable Transport Policy 2010.

Channel Islands to speak with one voice to external bodies, such as the UK Department of Energy and Climate Change.

2.8. A joint approach to achieving this aim

The only way Jersey can successfully address the challenges and opportunities outlined in this Energy Pathway is by a concerted approach. Everyone has a part to play:

The States of Jersey must take the lead - it must say 'come on' not 'go on'. It must demonstrate by its actions that the policies and legislative framework it sets for the private sector and the citizen to adopt are achievable and it must provide advice and help where necessary;

The private sector and other organisations - must be prepared to take account of the environmental impact of their business operations and of the supply chains and procurement practices that they operate;

Non-governmental organisations - must engage the community in taking collective responsibility for achieving the targets, recognising the social, economic and health benefits of the interventions;

Citizens must be proactive in making environmentally responsible decisions, be this in their own actions, in choosing their service providers, or in voicing their concerns and expectations through the democratic process.

2.8.1. Monitoring and review

High level emissions monitoring will take place through the annual AEA GHG inventory reporting framework, in line with the UK Government under the UNCCF Kyoto protocol requirements. This information is made public through the publication, '*Jersey in Figures'*, on an annual basis.

In addition, energy consumption figures, carbon emissions and climate change indicators are reported through the 5 yearly State of Jersey Environment report available from www.gov.je.

A multi stakeholder Energy Partnership will be established as set out in Action Statement 1, (see section 2.8.2) which will receive monitoring and review reports.

The implementation of the Pathway 2050 Energy Plan will be monitored at the local level through a set of Key Performance Indicators (KPIs) as outlined. The KPIs have been identified and are listed under each Action Statement.

The following chapters set out the actions and interventions to support each of the 3 policy areas.

2.8.2. Formation of an Energy Partnership

Jersey has 4 decades to achieve the 2050 target, and must therefore establish a policy framework that can deal with significant uncertainty in global macroeconomic and technological developments.

Recognising that a number of Ministries have an important role to play in implementing Pathway 2050, a multi-disciplinary Energy Partnership will be developed to act as a coordinating body for the Plan.

The Partnership will comprise of two parts; a Ministerial Executive and a Multi Stakeholder Forum.

The executive will provide political accountability, a robust framework for delivery and oversight of the implementation of the Plan. The executive will be responsible for the ongoing monitoring of the work streams as outlined in the action statements. The executive will also review the Plan and will develop or commission either new policy interventions or work streams, as appropriate according to review findings.

The forum, which will include representatives from industry, business and NGO's, and will provide an opportunity for key stakeholders to input on the progress of the Energy Plan and raise areas of concern and identify changing or future priorities. In addition the Minister will carry out an analysis of previous advisory groups e.g. Jersey Energy Trust and Renewable Energy Commission (mandated to end of 2013) and invite relevant members to join the forum.

Action Statement 1: Form a multi stakeholder Energy Partnership

ACTION STATEMENT 1
Form a multi stakeholder Energy Partnership
Summary
The Minister for Planning and Environment will appoint members to the energy executive and forum which will form the multi stakeholder Energy Partnership. i. The executive will receive annual updates on Jersey's energy use and GHG emissions, and regular progress reports on the implementation of the action statements. They will review the information to: a. Ensure that Jersey remains on the correct pathway to achieve the agreed demand management targets and carbon reduction emissions; and b. Ensure that the proposed policies and actions remain appropriate and successful to achieve the above, and if these are not delivering the expected outcomes, examine what additional measures should be implemented. This information will be shared with the forum. ii. The executive and forum will contribute to the 5 year review of the Energy Plan.
Delivery mechanism

The structure, role and remit of the Energy Partnership is outlined in appendix 3.					
Impact assessment					
Security √	Affordability √	Sustainability √			
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
Formation of Energy Partnership and annual review of GHG reports	√	√	√	√	√
Five year review completed					√
Jersey Stern Review completed		√			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Include technical advisory support and administrative costs	£5,000	£5,000	£5,000	£5,000	£5,000
Jersey Stern Review (To be funded from Department of the Environment Central Environment Vote)		£25,000			

Chapter 3 – Reducing demand for energy

3. Introduction

Reducing the demand for energy will help to address the challenges associated with energy use, and the associated carbon emissions and their environmental consequences. This is a 'no regrets' step in achieving the aim of secure, affordable and sustainable energy.

POLICY 1: DEMAND MANAGEMENT

The Minister for Planning and Environment, working with other relevant Ministers and the Energy Partnership, will develop and implement the actions and work streams that will reduce energy demand through a series of interventions across all emissions sectors according to identified targets.

This chapter provides details of a set of actions across the emissions sectors that can help reduce energy demand in order to meet the emissions reduction targets. The Energy Partnership will periodically review the impacts of the actions, and it is recognised that the appropriate policy response may evolve over the period of the Plan according to the achieved outcomes through time.

Appendix 1 gives a detailed explanation of these sectors and historic emissions to date. As each sector is addressed, the forecast emissions under a business as usual model are provided in order to outline the scale of the challenge (Appendix 2 provides details on how these forecasts were made).

All the sectors, except for one, are sources of greenhouse gasses i.e. the sector contributes to net emissions. The 'land use change and forestry' category has the potential to be a 'sink' i.e. depending on land use and habitat changes there is the potential for GHG to be absorbed by vegetation and removed from the atmosphere. The finite amount of natural habitat on Jersey, and the fact that proportion of agricultural and semi-natural land is relatively static, means that the potential for carbon reduction from habitat and agricultural changes is limited. It is recognised that improved soil management could make a positive contribution.

3.1. Domestic sector

A number of the immediate interventions outlined below in relation to the domestic sector are already in place and delivering significant savings[26]. In 2011 the EES

[26] EES Phase 1 report on gov.je http://www.gov.je/SiteCollectionDocuments/Environment%20and%20greener%20living/ID%20EESPhase1ExecutiveSummary%20(size%201.26mb)%20DM%20141211.pdf

produced a report of its first 18 months or operation, which has been independently verified by the UK's Energy Saving Trust[27]. The findings of the report have formed the basis for modelling the impact of the interventions outlined in the domestic sector. As described in chapter 2, the EES is the key delivery mechanism for the domestic sector energy efficiency actions identified in this section.

Ensuring a high standard of demand management and reduced energy use are pursued will have many benefits:

- Energy will be used more efficiently;
- There will be a reduced exposure to international energy prices which are likely to follow an upward trajectory. Efficient energy use will protect consumers, to some degree, from increased energy costs relative to what they might have been if no action were taken;
- Economic efficiency and social equity will be underpinned by affordable energy;
- Homes can be adequately and more affordably heated, businesses can run more profitably;
- Investment in energy infrastructure remains within planned limits and existing infrastructure remains sufficient for the Island's needs for longer;
- There is a potential reinvestment of revenue into the local economy associated with the uptake of energy efficient measures and the compliance industry;
- There is likely to be a consequential improvement in the security and resilience of energy supplies since overall demand is held at a level lower than if no action was taken.

However, it has to be acknowledged that in order for energy to be used more efficiently consumers have to change their behaviour (compared to BAU) and may need to:

- Make well informed decisions on how to spend now on increasing their energy efficiency, in order to use less energy in the future;
- Understand this trade-off if they are to make rational decisions;
- Owner occupiers and tenants need to be in a position to implement the energy efficient measures required. e.g. tenants may not be able to install energy efficient measures without the permission of the landlord; owner occupiers may not feel confident to organise the works;
- Know that these advantages to efficient energy exist and are available.

For energy to be used more efficiently, it is likely that professional energy services will be required to support the consumer, thus creating opportunities for re training and up skilling to develop employment opportunities and support economic diversification in the energy services sector. The scale of these employment opportunities is outlined in Action Statement 3. The areas where there is potential for employment creation may include:

- Additional contractors to carry out insulation, plumbing and electrical works;
- Professional development of existing providers to provide extended services such as energy audits and advice;

[27] http://www.energysavingtrust.org.uk/

- Potential for small and medium sized enterprise (SME) start-ups to respond to additional market demand;
- Development of new skills (underpinned by accredited training) to provide micro renewable installation over the longer term.

3.1.1. What the domestic sector comprises

The 2011 census estimates that there are 44,698 households in Jersey. The majority of houses (38,497 estimated) were constructed prior to the 1997 Building Bye-Laws which required a higher standard of construction and insulation, and hence energy efficiency. Of these properties an estimated 19,054 use hydro-carbons (oil or gas, or solid fuel) as their main source of space and water heating, the remaining 19,443 use electricity.

The majority of Jersey's energy use and carbon emissions originate from the commercial and domestic sector. 28% of the Island's imported energy is in the form of kerosene used for space heating by oil-fired boilers (38% of domestic space heating is oil with a further 13% LPG).

Space and water heating and cooling, lighting and domestic appliances constitute a large proportion of energy use, yet the 2006 Jersey Annual Social Survey showed that in more than one third of homes, there are no forms of energy saving measures. In the 2010 Jersey Annual Social Survey the situation had improved somewhat with 80% of respondents reported that they had taken actions to use less electricity at home. However, only 58% agreed at some level that they personally had taken actions to address climate change. Clearly there is room for considerable improvement with associated reductions in emissions and the other related benefits we have described.

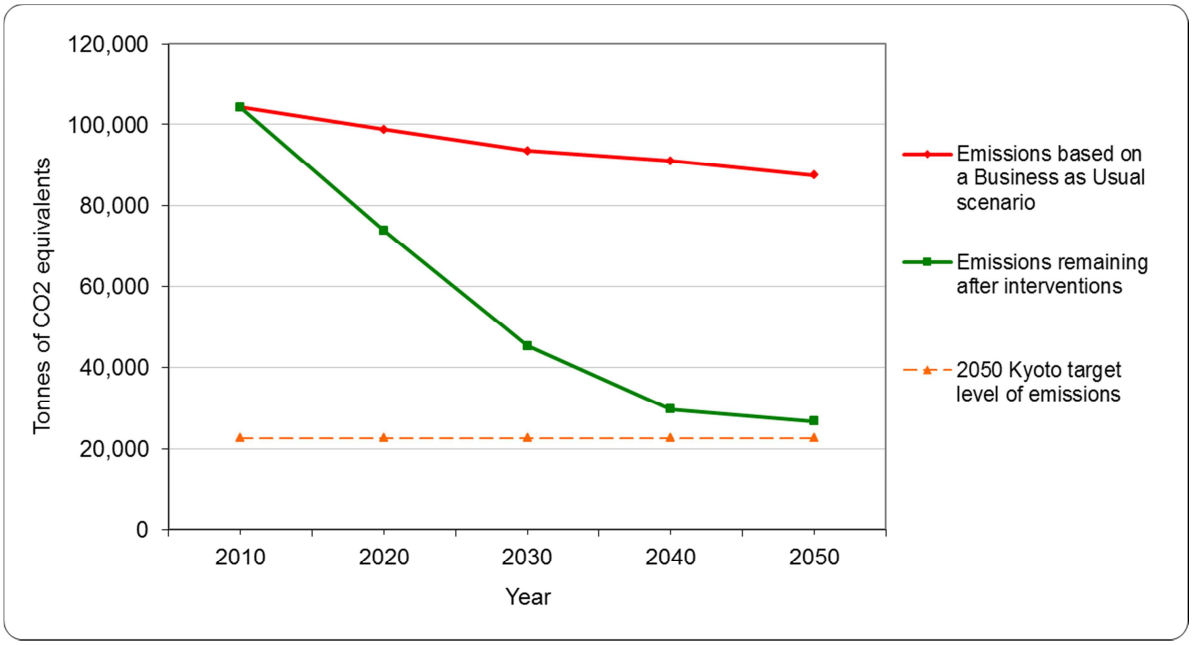
3.1.2. The challenge for the domestic sector

As Table 3 below shows, the challenge for the domestic sector to achieve the 80% GHG emissions reduction target is a total reduction in emissions of 90,515 tonnes of CO_{2eq} by 2050.

Domestic BAU	**1990**	**2009**	**2020**	**2030**	**2040**	**2050**	**2050 Target**
GHG emissions under a business as usual scenario (t/CO_{2eq})	113,144	104,292	98,761	93,598	91,112	87,570	**22,629**
Domestic PATHWAY 2050	**1990**	**2009**	**2020**	**2030**	**2040**	**2050**	**% reduction on 1990 levels**
GHG emissions pathway after interventions	**113,144**	**104,292**	**73,981**	**45,303**	**29,670**	**26,716**	**76%**

Table 3 – Forecast of GHG emissions from the domestic sector under a 'business as usual' scenario compared to the target emissions in 2050 of an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 90,515 t/CO_{2eq}

The emissions pathway for the domestic sector outlines a scenario in which emissions are reduced by 76% by 2050 as illustrated in the graph below.



Graph 5 - The projected carbon reductions in the pathway (green line) compared to a 'do nothing' scenario ('business as usual', the red line) and the target reductions required to meet Kyoto objectives (orange dashed line).

3.1.3. Pathway 2050 for the domestic sector

The carbon savings outlined above in Table 4 could be achieved through a combination of the following changes in the domestic sector.

Action Statement 2: Introducing a 'low-carbon' standard through Building Bye-Laws

Building Bye-Laws (BBLs) specify the minimum standards that new build properties must reach. They also may apply to material alterations, extensions and the material change of use of a building. The BBLs were updated in 2011 and for the first time require the energy performance of newly constructed buildings to be calculated using approved calculation tools. More stringent energy targets could be set for homes under the bye-laws to encourage a move towards zero carbon buildings through the introduction of a 'low-carbon' standard. The 2011 Island Plan recognises the need to incorporate energy efficiency into the design of new homes and Supplementary Planning Guidance in support of the Plan will be published.

In practice this has meant introducing more challenging standards that result in developers needing to make greater use of energy saving insulation and providing more

efficient heating and lighting systems. The BBLs also encourage the use of low carbon systems such as solar panels and geothermal technology to achieve compliance, and require improvements to existing buildings when alterations, extensions or material change of use occurs by setting performance standards for thermal elements (walls, floor, and roof), windows, doors and all building services. As new technologies are developed, it is likely that new approaches to both thermal performance and energy generation will be incorporated into new build and refurbished properties.

The 2011 Island Plan encourages all developments to incorporate on-site low carbon or renewable energy technologies. However, all non-residential developments with a gross floor space of 1,000 square metres or more and residential developments of ten or more units, whether new build or conversion, will be required to incorporate on-site low carbon or renewable energy production equipment to off-set predicted carbon emissions by at least 10%, unless exceptional circumstances apply.

Exemplar buildings are those that go far beyond the targets sets by the BBLs and are helpful in demonstrating the potential for other developments. They play an important role in raising awareness both for the industry and householder. Training support will be provided as outlined in Action Statements 3 and 4, to ensure that the construction sector are able to respond to revised requirements and standards.

The future development of BBLs will be undertaken as part of the ongoing regulatory work of the Building Control Section within the Department of the Environment. Development of revised building bye-laws will be carried out by the Building Services section of the Department of the Environment in full consultation with the construction industry. The revised BBLs will apply to all new developments and refurbishments, in both domestic and non-domestic buildings, as identified in Action Statement 8.

Embodied carbon emissions will be a significant factor in new development projects. This will need to be addressed in implementing Island Plan Policy GD2 (Demolition and replacement of buildings) and assessing whether proposals to demolish buildings are sustainable (e.g. how will the total emissions - embodied and operational - of demolition and new build compare with refurbishment for various projects).

ACTION STATEMENT 2
Introducing a 'low-carbon' standard for new homes through Building Bye-Laws
Assumptions & dependencies
Assumption - The contribution that Action Statement 2 makes to the target GHG emissions reduction has been modelled in Supporting Document B and assumes that (in accordance with the 2011 Island Plan) an additional 3,000 new homes will be built by 2020. Refurbishment rates from the existing stock have been examined based on 2011 data from building completion notices. *Dependency* – Successful application of existing external standards to Jersey construction industry via Building-Bye laws and availability of higher thermal performing materials to the local marketplace.
Summary

The Minister for Planning and Environment will introduce more stringent energy targets in order to work towards zero carbon buildings: i. By 2014 introduce a low carbon standard to achieve a 60% improvement on 2011 targets for newly constructed dwellings; ii. By 2018, all newly constructed dwellings will be low carbon in respect of space heating.
Delivery mechanism
More stringent Building Bye-laws, to be developed by Department of Environment. Additional requirement for training and awareness of industry in partnership with key stakeholders e.g. Jersey Construction Council
Monitoring
Monitoring to measure impact of time lag in construction industry responding to higher energy efficiency standards with potential risk of not achieving sufficient carbon reductions. If time lag causes underperformance further interventions may need to be developed e.g. further training and awareness.

Impact assessment			**Impact on total CO_2 savings**
Security √	Affordability √	Sustainability √	3%

KPI	**2014**	**2020**	**2030**	**2040**	**2050**
2.1 Number of new build completion certificates issued to higher BBL standards (as identified in the 2011 Island Plan)		3,000			
States of Jersey Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Development of new BBL standards to be met from within Departmental cash limits.		√	√	√	√

Action Statement 3: Apply energy efficiency measures to the pre-1997 stock of properties

Properties built pre-1997 have the most potential to benefit from installing additional energy efficiency measures. Based on the findings of the EES Phase 1 report and Energy Saving Trust information a range of measures that provide the most GHG savings for this category of housing have been identified.

To begin to deliver this action, the EES will develop a revised delivery mechanism and help to put in place the infrastructure that will assist in the take up of these energy efficiency measures. One approach is the development of a subsidised bespoke home energy audit. This will create a requirement for an increased number of installers and energy auditors, in order to respond to the potential increased roll-out of these measures. Preliminary assessments have indicated that there is the potential to create up to 85 employment opportunities, sustained for the next two decades to undertake the energy audits and efficiency installations outlined. The revised business plan for the EES will include the development of training and support for the local construction sector in order to meet the anticipated growth in demand for services and associated business development opportunities. This will be developed in partnership with the Jersey Construction Council and Highlands College and other relevant stakeholders. See Supporting Document B for details of this assessment.

Further intervention may also need to be assessed, including the requirement to investigate a number of finance options for able-to-pay householders including low interest options, pay as you save models etc. The requirement for and suitability of incentives will be researched as part of the ongoing development of new initiatives targeted at the able to pay sector. As outlined, phase 1 will be based on a subsidised home energy audit, depending on take up the requirement for incentives will be considered. The development of any incentive driven programme will include an economic analysis.

A watching brief is being undertaken with regards to the UK 'Green Deal' policy; lessons from the Green Deal will be used to inform the future development of policy interventions in Jersey.

The EES will continue to provide support for the socially vulnerable sector. In addition a study of fuel poverty and energy affordability will be undertaken to inform the development of further policy initiatives. This will be carried out in partnership with relevant stakeholders e.g. CICRA.

The development of new initiatives will be based on good practise and will be subject to an economic evaluation prior to implementation. An audit of the activities of the EES to date was completed in 2013 and will be helpful in developing effective targeted plans for the future.

ACTION STATEMENT 3
Apply energy efficiency measures to the pre-1997 stock of properties
Assumption & dependencies
Assumption - The contribution that Action Statement 3 makes to the target GHG emissions reduction has been modelled in Supporting Document B. The size of the stock and its age and build profile are based on a previous study of Jersey's housing stock and Jersey Annual Social Survey information[28]. EES phase 1 reports insulation measures result in 0.639t CO_2 saved per household per year (not including boiler replacements). 49% households heated by hydrocarbons; assumptions for savings from different energy efficiency measures provided by UK Energy Saving Trust and KEMA.[29] Uptake assumes that energy efficiency measures are NPV (Net Present Value) positive, that able-to-pay sector have access to finance, and that decision making is rational even with long payback periods. *Dependency* - Continued delivery of EES programme and expansion into able-to-pay sector accompanied by review of audit programme and identification of barriers to conversion from audits to implementation of energy efficiency measures in domestic properties.
Summary

28 KEMA report: Energy Efficiency Study G06-1643 Rev 1.2 03/04/07 available on www.gov.je - http://www.gov.je/Government/JerseyWorld/StatisticsUnit/PeopleCommunities/Pages/Socialstatistics.aspx

29 Supporting Document B, Energy Efficiency Data worksheet

The Minister for Planning and Environment will, through the Eco-Active Energy Efficiency Service, identify a programme that will deliver a package of energy efficiency improvements to the property stock built before 1997 which may include some of the following interventions according to the property type and condition:

i) Hot water insulation; ii) Cavity wall insulation; iii) Loft insulation;
iv) Improved heating controls; v) Draught proofing; vi) Solid wall insulation;
vii) Glazing upgrade; viii) Low energy lighting.
ix) Heating upgrade e.g. Boilers, air and ground source heat pumps

The delivery programme will be tailored and modified according to the market sector to which it applies i.e. householders in the able-to-pay sector will not receive 100% grant funds; households within the socio-vulnerable sector will continue to receive grants.

Delivery mechanism

Continued delivery through Energy Efficiency Service, Department of Environment. Development of programmes and examination of possible triggers/ incentives. Revised business plan to expand scheme to able to pay sector. 12 month review of UK green deal to assess success of implementation and applicability to Jersey.

Monitoring

Conversion rate from subsidised audit into actual interventions. If there is a failure to recognise economic benefits by able-to-pay sector in implementing energy efficiency interventions and conversion rate are lower than projected, further interventions may need to be developed e.g. improved customer awareness and access to finance.

Impact assessment				**Impact on total CO_2 savings**	
Security √	Affordability √	Sustainability √		22%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
3.1 Energy efficiency measures applied to pre-1997 stock of properties - Total number of properties treated. NB Targets are based on emissions savings from properties using hydrocarbon fuels built before 1997. Data to be collected through JASS.		6,351	12,702	19,054	
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Grant support to the socio-economically vulnerable, Community not-for profit organisations and subsidised home energy audit scheme for all householders[30]	605,000	927,000	637,000	598,000	620,000

Action Statement 4: Implement micro-renewables in the domestic sector

Decentralised micro-generation involves generating small amounts of heat and power, normally from renewable sources, to meet individual and community needs. Specific technologies include: solar thermal; photovoltaic systems; ground and air source heat

[30] Appendix 5 provides further information about the budget for the provision of the Energy Efficiency Service and its programmes.

pumps; micro wind; combined heat and power; biomass. Good quality, well installed micro generation systems will have numerous benefits that include:

- Lowering carbon emissions (if it is displacing higher carbon energy sources);
- Decreasing the environmental footprint of the displaced power;
- Diversifying the supply of energy;
- Increasing the overall local security of supply to some forms of potential interruption if sufficient volumes of generation are achieved;
- Add value to a property by considerably reducing its running costs;
- Payback themselves (over varying periods of time) as a result of avoided energy costs.

Proven technologies are available and high quality well installed systems can deliver annual cost savings through avoided energy costs once the equipment is installed. However, upfront capital costs are required, and financial incentives are offered in other jurisdictions (such as the UK) to provide consumers with a return (or an increased return) on this investment. In the long term we expect to see market ready solutions that will deliver energy autonomous housing and communities that will contribute to the affordability and security of supply.

Under this Plan the Energy Efficiency Service will provide advice and information for householders on micro-renewables options to assist them in making informed decisions as the costs of these technologies evolve. The EES will also work with industry stakeholders to raise awareness and to provide up skill training to ensure a skilled workforce is available to deliver integrated solutions to householders. The revised business plan for the EES will include the development of training and support for the local construction sector. This will be developed in partnership with the Jersey Construction Council and Highlands College and other relevant stakeholders. The requirement for, and suitability of, incentives will be researched as part of the development of initiatives targeted at encouraging take-up of micro renewables in the domestic sector. This will include an economic analysis of potential incentives.

Uptake of these technologies will provide an opportunity for this sector to diversify, and could create an estimated 36 employment opportunities, sustained over 20 years, either in existing or new start-up SMEs. Further details are available in Supporting Document B.

ACTION STATEMENT 4
Implement micro-renewables in the domestic sector
Assumption & dependencies
Assumptions - The contribution that Action Statement 4 makes to the target GHG emissions reduction has been modelled in Supporting Document B. It assumes replacement boilers in houses, currently using hydro carbon fuel sources, when they reach the end of their lifespan, will be replaced with micro-renewable systems from 2030 e.g. solar thermal, ground source heat pumps etc. which are installed after energy efficiency measures have been installed. The Energy Saving Trust estimates 0.5t CO_2 per year average emissions savings per household, applied to 75% of households currently using hydro carbon fuel source. N.B. these assumptions include assessment for Action Statement 5.

Dependencies – Availability of micro-renewable systems at price parity with traditional hydrocarbon systems by 2030
Summary
The Minister for Planning and Environment will, through the Eco-Active Energy Efficiency Service, implement a programme that will : i. Identify the level of intervention required to encourage and support the replacement of hydrocarbon fuelled space and water heating with micro-renewable systems (e.g. solar thermal or ground-source heat pumps) supported by electricity back-up, from 2030; ii. Identify the level of intervention required to encourage the use of micro-renewable solutions to the heating of swimming pools. iii. Undertake a skills assessment in order to develop training and up skilling programme for local installers, working with the Jersey Construction Council and Economic Development Department skills programme. The delivery programme will be incorporated into and follow on from that outlined in Action Statement 3
Delivery mechanism
Programme to be developed by Energy Efficiency Service, Department of Environment based on good practice and proven life-time emissions savings.
Monitoring
Local availability of micro-renewable systems and if there is insufficient take-up from domestic sector and intervention underperforms further interventions may need to be developed e.g. financial incentives

Impact assessment				**Impact on total CO_2 savings**	
Security √	Affordability X		Sustainability √	4%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
4.1 Number of properties with micro-renewables installed (Based on standard turnover of property improvements).				4764	9527
4.2 Number of private swimming pools using micro-renewables (Based on estimated total no of pools using integrated micro-renewables)			300		
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Initial work to determine future interventions in respect of domestic scale micro-renewables and skills gap assessment on market.				20,000	20,000

Action Statement 5: Assisting the uptake of micro-generation

To inform the best approach to accelerating the installation of micro-renewables and the move towards energy autonomous housing, a pilot project will be undertaken based on a community energy model. This could be incorporated as part of the 'Local Village Plans'[31]. The pilot project as outlined in Action Statement 6 below will lead to the best model for ensuring that Action Statement 5 is effective. The pilot project will be coordinated by the Energy Efficiency Service, working with the Energy Partnership.

[31] 2011 Island Plan SPG Local Village Plans

ACTION STATEMENT 5						
Assisting the uptake of micro-generation						
Assumption & dependencies						
Assumptions - The pilot project as outlined in Action Statement 6 below will lead to the best model for ensuring that Action Statement 5 is effective. The pilot project will be coordinated by the Energy Efficiency Service, working with the Energy Partnership. Nb. CO_2 savings included in Action Statement 4 assessment. *Dependencies* – Sufficient community interest and local support in developing a business case.						
Summary						
The Minister for Planning and Environment, through the Eco-Active Energy Efficiency Service will: i. In 2015 design a pilot study that will demonstrate the potential for community scale micro-renewable schemes and energy autonomous housing e.g. Solar PV and solar thermal, ground/air-source heat pumps, anaerobic digestion and potentially Combined Heat and Power (CHP) schemes This will take the form of a competitive tender process where communities will be invited to submit a proposal for their project. The pilot will be independently verified in order to assess the suitability of the model for further roll-out Island wide. The outcome of the pilot will be to ascertain for Jersey the following: • Economic, social and environmental benefit of community action in respect of micro-renewables; • Options around alternative financial models for project implementation; • Challenges and barriers to implementation; • The appropriate incentives required to accelerate further take up; • Any impacts on local security of supply; • Any requirements for promoting / facilitating training opportunities for operatives within the industry. Provide a report to the Energy Partnership in 2020 addressing the effectiveness of the pilot and market's response. Recommend next steps possibly including incentives to uptake micro-generation or grant aid to address market failures in the uptake of micro-generation technologies.						
Delivery mechanism						
Project to be de developed by Energy Efficiency Service, Department of Environment in partnership with community organisations, based on good practise research e.g. Severn Wye Energy Agency.						
Monitoring						
Ensuring timely community engagement, and efficient project planning and cost management. If a suitable organisation does not come forward additional support will be required to develop the pilot study.						
Impact assessment					**Impact on total CO_2 savings**	
Security √	Affordability X		Sustainability √		Included in Action Statement 4	
KPI		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**

5.1 Assisting the uptake of micro-generation			Pilot project launched	√	√
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Project development and 2 years funding for successful scheme			10,000[32]	50,000	50,000

Action Statement 6: Improved energy efficiency through a behaviour change programme

The contribution of changing behaviour to reducing GHG emissions and energy saving should not be underestimated. The revised scope of the EES will include additional awareness raising and public campaigns in order to encourage implementation of energy efficiency measures in the able to pay sector.

The EES outreach and awareness campaigns will assist in driving a shift in consumer habits not only in purchasing decisions about products and services but also the day to day management of the domestic environment. This will include a wide range of awareness raising activities and provision of accessible information on www.gov.je . These actions will assist the take up and maximise the impact of the energy efficiency support provided through action statement 3.

Jersey Electricity plc. are implementing a smart meter programme, installing remote read meters in all properties in Jersey. The programme will commence with the development of an online smart account which will enable customers to view previous statements and become more aware of the electricity use. In addition, the smart account will enable a number of existing customers, who already have remote read meters installed, to obtain more detailed information about their energy use patterns.
The 3 year installation of over 40,000 smart meters will commence in 2014, once the meters have been installed, customers will be able to obtain a range of electricity consumption data, enabling them to monitor the impact of behaviour changes such as switching to energy efficient appliances and any changes in how they use energy. A recent report by the European Environment Agency[33] identifies the significant role that a smart meter programme plays in providing direct information to the householder or business about the impact of behaviour change programmes.

ACTION STATEMENT 6
Improved energy efficiency through behaviour change programme
Assumptions & dependencies
Assumptions - The contribution that Action Statement 6 makes to the target GHG emissions reduction is modelled in the Supporting Document B. The assumptions are based on experiences from UK based

[32] Funding for pump priming purposes
[33] EEA Achieving energy efficiency through behaviour change: what does it take? EEA Technical report no 5/2013

behaviour change campaigns; intervention is assumed to deliver c. 250kg/CO_2 per household per year, applied to houses using hydro carbons for space and water heating. The Eco-Active behaviour change programmes use the DEFRA behaviour change model, recognising that the catalyst to behaviour change requires an integrated approach across four areas to enable, engage, exemplify and encourage. This approach underpins the behaviour change programme.[34]

Dependencies – Community engagement with behaviour change programme to support conversion from home energy audit information to actual implementation by householder (Action Statement 3). Critical to the achievement of the required reduction in energy demand is that the provision of advice to consumers and the encouragement of providers of energy efficiency services does actually change the behaviour of consumers.

Summary

The Minister for Planning and Environment will, through the Eco-Active Energy Efficiency Service, implement an awareness raising programme that will assist the delivery of GHG reductions in Action Statement 3.

The delivery programme will be incorporated into and follow on from that outlined in Action Statement 3 above. Details of the budget for delivering the Energy Efficiency Service programmes are contained in Appendix 3.

Delivery mechanism

Continued and expanded delivery of ongoing programme through Energy Efficiency Service, Department of Environment

Monitoring

Conversion rate from subsidised audit into actual interventions. If behaviour programme fails to result in satisfactory conversion rates, further interventions may need to be developed in parallel with Action Statement 4.

Impact assessment					**Impact on total CO_2 savings**
Security √	Affordability √	Sustainability √			2%
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
6.1 Number of home energy advice reviews completed		9,527	9,527		
6.2 Number of smart meters distributed		44,698[35]			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Project development and 2 years funding for successful scheme	75,000	75,000	75,000	75,000	75,000

3.2. The industrial and commercial sector

The way GHG emissions are accounted for means that these two sectors can be combined (see appendix 1 for more details)

[34] DEFRA Choosing the Future; Changing behaviour through policy making
[35] Jersey Electricity plc initiative

3.2.1. What the industrial and commercial sector comprises

This sector comprises emissions arising from kerosene (used for smaller scale space heating), fuel oil and gas oil (used in larger scale space heating) as well as coal. The sector comprises the private and public sector and examples include:

- The States of Jersey– all activities of public sector, including for example office functions, the hospital, uniformed services and their headquarters, the prison, sports centres etc.
- Private sector - retail and office buildings, manufacturing and utilities (for example the dairy and Jersey Water), constructions and quarrying

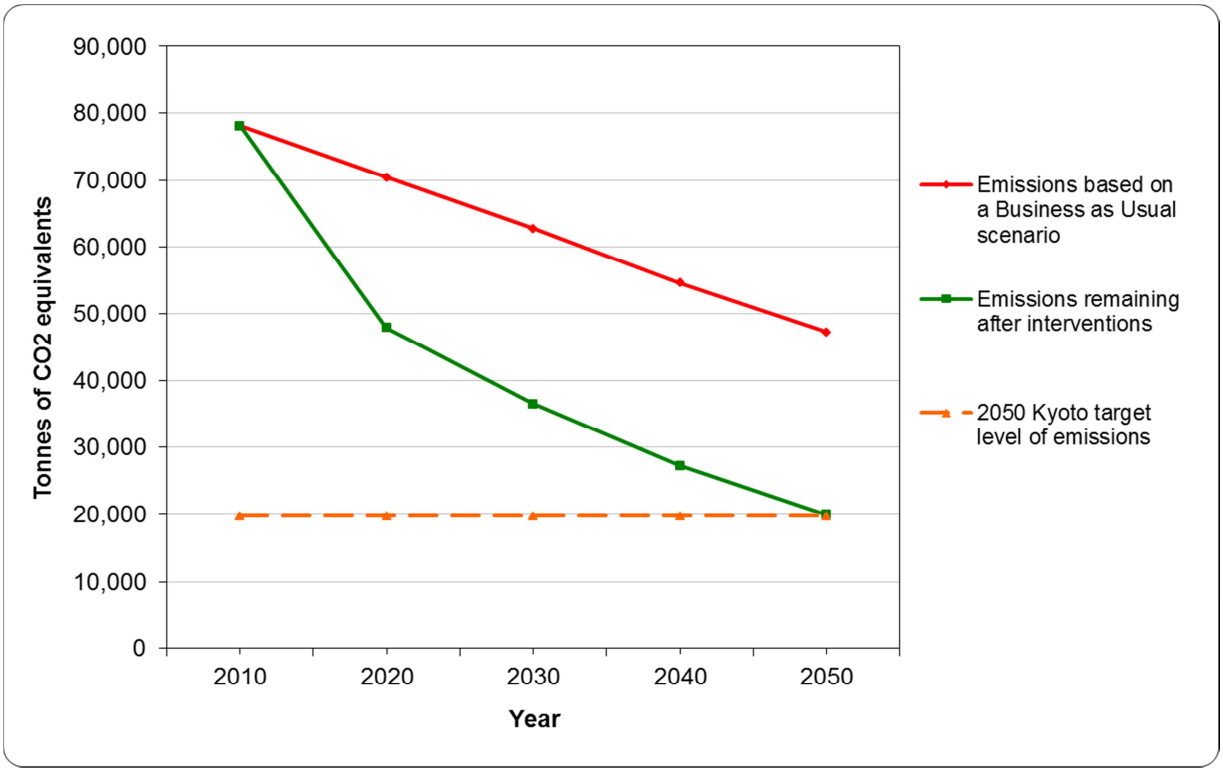
3.2.2. The challenge for the industrial and commercial sector

As Table 4 shows the challenge for the industrial and commercial sector to achieve an 80% reduction in GHG emissions is equivalent to a total saving of 79,024 tonnes of CO_{2eq} by 2050.

Industrial & Commercial BAU	**1990**	**2009**	**2020**	**2030**	**2040**	**2050**	**Target 2050**
GHG emissions under a business as usual scenario (t/CO_{2eq})	98,780	78,049	70,410	62,723	54,616	47,182	19,756
Industrial & Commercial PATHWAY 2050	**1990**	**2009**	**2020**	**2030**	**2040**	**2050**	**% reduction on 1990 levels**
Final emissions pathway after interventions	98,780	78,049	47,858	36,408	27,247	19,918	**80%**

Table 4 – Forecast of GHG emissions from the industrial and commercial sector under a 'business as usual' scenario compared to target emissions in 2050 of an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 79,024 t/$CO_{2eq.}$

The 2050 pathway outlines emissions reductions of 80% as illustrated in the graph below. Further details on the actions and assumptions are presented in appendix 6.



Graph 6 - Projected carbon reductions in the 2050 pathways (green line) compared to a 'do nothing' scenario ('business as usual', the red line) and the target reductions required to meet Kyoto objectives (orange dashed line).

3.2.3. Actions for the industrial and commercial sector

The industrial and commercial sectors include a wide range of activities but all should be able to baseline and work to improve their environmental footprint. If energy prices continue to rise, control of energy costs may become an increasingly significant component of profitability.

The new Building Bye-Law standards (Action Statement 2) will also apply to new or substantially refurbished buildings in the industrial and commercial sector again delivering improved standards and performance from this sector. The 2011 Island Plan is to be accompanied by Supplementary Planning Guidance which will require sustainability statements to accompany all new major developments (i.e. >1,000m^2 floor space). This new requirement will provide opportunities to the construction services sector to gain new skills in energy assessing and forecasting e.g. BREEAM.

Action Statement 7: Energy efficiency improvements in the Public Sector (States of Jersey)

In 2011, The States of Jersey commenced an environmental improvement and behaviour change programme, Eco-Active States. Based on the Eco-Active Business model, Eco-Active States forms the basis of an environmental management system for the States of Jersey. Central to the process is developing a baseline of environmental

impacts across five key areas. These are energy, waste, water, transport and procurement, the latter includes recognising the need for life-cycle analysis in making procurement decisions. The baseline information is used to identify actions to minimise these impacts through the development and review of an environmental action plan.

The programme applies to the full States of Jersey property portfolio and all functions within the operation of the States of Jersey, e.g. airport, harbours, police, fire, hospital, school etc. as well as all the office and depot functions. The programme may be extended to include all Parish Halls and associated operations which are funded through public monies. High performing buildings and centres will be supported to gain external accreditation through national and international schemes. Changing behaviour in terms of energy use in the workplace is a major part of the programme; this also has the potential of influencing employees' energy use at home. Jersey Property Holdings continually review the usage of energy-efficient technology on its managed property portfolio and where the payback on investment is acceptable implement upgrades, which may include the use of renewables where appropriate.

Training support for the construction sector will be provided, as outlined in Action Statements 3 and 4, to ensure that the construction sector are able to respond to revised requirements and standards.

The States of Jersey Housing portfolio is subject to a detailed maintenance programme. The Housing Department has published a White Paper (April 2012) outlining a changed future operational structure of the Housing service. Liaison will continue, through Eco-Active States, to ensure the full energy efficiency actions are incorporated into the property maintenance programme. The Affordable Housing White Paper proposes the introduction of an Affordable Homes Regulator with a requirement to ensure all social housing is brought up to the UK Decent Homes Standard.[36] This includes the energy efficiency and liveability of properties and has been modelled into the assumptions on the improvements in the domestic sector.

Eco-Active Schools is delivered through the Eco-Active Sustainable Schools Framework leading to international Eco-Schools accreditation which requires the development of an energy action plan. Although no specific emissions targets are set, the programme is based on the initial UK programme targets of a 34% reduction in emissions by 2020 and 80% by 2050. By March 2013, all Jersey schools had started to implement the Eco-Schools programme with a target of all schools actively participating and accredited to 'Eco-Schools Bronze' level as a minimum by 2015.

The States of Jersey has an overall energy consumption reduction target of 10% from 2012 to 2015. In line with the UK greening government target of a 25% reduction in greenhouse gas emissions across the Crown Estate by 2015, it is proposed that the States of Jersey adopts this as a good practise target to work towards by 2020. This target is challenging, it is expected it will be achieved through a combination of improved energy efficiency e.g. insulation, behaviour change, improved and upgraded technology e.g. boiler replacement, implementation of LED replacement lighting programme, use of low carbon fuels and possibly micro-renewables, and reduced / realignment of office

[36] http://www.communities.gov.uk/publications/housing/decenthome

space through the office accommodation strategy. Consideration will also be given to the energy demand and location of IT servers.

As part of the States of Jersey energy project, which Eco-Active States supports, States owned buildings on a maximum demand tariff are provided with an energy consumption dashboard, similar to the UK building energy performance certificates[37]. The dashboards are used to raise staff awareness of the energy performance of that property and to monitor energy use. The dashboards provide an overview of the savings achieved following on from energy efficiency actions and behaviours being implemented, and demonstrate an 11% reduction in electricity use in 2012 against a 2010 benchmark.

It is proposed that the revised energy targets are adopted as part of the organisations' key performance indicators. In addition, from 2013, an annual sustainability report will be included with the Financial Accounts in line with the UK reporting requirements followed by the Minister for Treasury and Resources.

The Eco-Active States programme also requires Departments to develop workplace travel plans, and to reduce resource and water consumption.

The Eco-Active States project will continue to roll-out the programme across all Departments working alongside the Energy Efficiency Service and through the estate management service in Jersey Property Holdings and the Harbours, Airport and Home Affairs and Health Departments.

ACTION STATEMENT 7
Energy efficiency improvements in the Public Sector (States of Jersey)
Assumption & dependencies
Assumptions - Annual consumption data from Procurement enables assumption of % of GHG emissions from public sector operations; The States of Jersey has an overall energy consumption reduction target of 10% from 2012 to 2015. In order to achieve the emissions reduction targets required, the States will need to increase this target to 25% reduction in energy use by 2020. The States of Jersey runs an internal 'invest to save' programme to provide support to implement energy saving measures across Departments, this is implemented by Jersey property Holdings based on findings from series of energy audits completed by Henderson Green. *Dependencies* – Continued review and expanded delivery of ongoing EAS programme and Corporate Procurement energy project and ongoing commitment from States of Jersey senior management is maintained.
Summary

37 http://www.communities.gov.uk/planningandbuilding/sustainability/energyperformance/displayenergycertificates/

The Minister for Planning and Environment working with the Minister for Treasury and resources will seek to make energy efficiency improvements in the Public Sector supported by the Eco-Active States programme and set the following GHG reduction targets:

i. A 25% reduction against a 'business as usual' scenario by 2020;
ii. In 2015, consider whether it is appropriate to make a commitment for the States of Jersey to seek accreditation to international environment management standard, ISO14001 or equivalent.

Delivery mechanism
Ongoing implementation of Eco-Active Schools and States programme through Department of Environment, working with all Departments and key stakeholders.

Monitoring
Progress monitored through quarterly reporting and annual review. If SoJ does not achieve energy reduction targets due to insufficient SMT / political support or insufficient investment available from invest to save programme then progress will be slower than projected and further interventions will need to be developed e.g. training and awareness and facility management support.

Impact assessment			**Impact on total CO_2 savings**
Security √	Affordability √	Sustainability √	6%

KPI	**2014**	**2020**	**2030**	**2040**	**2050**
7.1 Number of Departments Registered	6	10			
7.2 Energy savings monitored through building dashboards	68 buildings				
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Capital costs to be met from Departmental budgets and, where appropriate, through Jersey Property Holdings and Treasury through Invest to Save programme for States of Jersey portfolio subject to inclusion in capital programme.	√	To be determined			

Action Statement 8: Energy efficiency improvements in the Private Sector

The measures that can be applied to the public sector also apply to the private sector. The delivery mechanism for delivery will be the Eco-Active Business (EAB) programme. The programme enables businesses; if they feel it is appropriate, to move towards the ISO14001 standard which requires compliance with a recognised Environmental Management System which requires a constant cycle of review and improvement. Increasing progression of organisations through the Eco-Active Business Scheme to reach recognised environmental management standards will help to demonstrate their environmental commitment and responsibility of Jersey's industry and finance sectors to

key stakeholders both on the Island and externally. It is possible that this sector will be able to overachieve on the emissions savings outlined in the pathway, but at the current time there is not enough information about the sector to enable more detailed targets to be set. The need for more detailed information will be picked up by the Eco-Active Business Officer.

As the commercial building stock upgrades there will be energy and GHG reductions in this sector. As previously highlighted, in Action Statement 2, the Building Bye-Laws specify the minimum standards that new builds must reach and also apply to major refurbishment projects over a certain threshold. Building Bye-Laws introduced in 2010, have established the principle of improved thermal efficiency. This direction of travel will continue towards zero carbon buildings, with the following more stringent Building Bye-Laws being introduced:

- In 2014 all new commercial and industrial developments must be 63.5% more efficient than the reference standard as defined by the BBLs;
- In 2018 all new commercial and industrial developments must be low carbon for space heating.

The 63.5% target is based on the reference building described in the Technical Guidance Document 11.2A. Current energy performance targets require new buildings to be 23.5% more energy efficient than that reference building and by 2016 it is proposed targets will set to achieve a further 40% improvement.

Progress towards these standards is also assisted by the 2011 Island Plan which requires:

- All non-residential developments with a gross floor space of 1,000 m^2, whether new build or conversion, to incorporate on-site low carbon or renewable energy production equipment to off-set predicted carbon emissions by at least 10%, unless exceptional circumstances apply. The 2011 Island Plan recognises the need to incorporate energy efficiency into the design of new commercial buildings and will be bringing forward Supplementary Planning Guidance.

The uptake and roll out of buildings of exceptional standards that go beyond the energy targets set under the Building Bye-Laws can be assisted by exemplar buildings which demonstrate the potential and set the standards for other developments. They play an important role in raising awareness both for the industry and a notable example recently has been the Ogier Building at 44, Esplanade that has been built to BREEAM ‘very good’ standards.

ACTION STATEMENT 8
Energy efficiency improvements in the Private Sector
Assumption & dependencies

Assumption - The contribution that Action Statement 8 makes to the target GHG emissions reduction has been modelled in Supporting Document B. Not enough is known about the emissions from the industrial and commercial sector. Eco-Active Business will need to develop an understanding of the opportunities within the sector to deliver 15% saving by 2020 followed by 10% each decade, working with key stakeholders e.g. Sustainable Business Forum, EAB registered businesses. Continue to roll-out EAB programme, supported by training and awareness raising programme to engage sector.

Dependencies – Continued and expanded delivery of ongoing EAB programme. Work with Jersey Business to review progress. Further research on energy use in existing properties, and case studies of energy and carbon savings from recent refurbishment and new builds are required to assess the scope for energy efficiency in this sector. Critical to the achievement of the reduction in energy demand is that the proposed intervention (which largely relates to the provision of information) translates into behaviour change in the private sector.

Summary

The Minister for Planning and Environment will assist the private sector to make energy efficiency improvements through the Eco-Active Business programme which will adopt the following GHG reduction targets for participating organisations:

i. A 15% reduction against a 'business as usual' scenario by 2020;
ii. A further 10% per decade thereafter.

Investigate the potential for energy efficiency savings within the sector and identify whether appropriate fiscal measures are required to incentivise expenditure on energy saving and energy efficiency measures.

Delivery mechanism

Continuation of the Eco-Active Business Programme, through the Department of the Environment working in partnership with Jersey Business and the Economic Development Department.

Monitoring

Private sector does not achieve energy reduction targets due to insufficient engagement. Lack of external drivers (e.g. rising energy costs) / incentives. Alternatively, there is potential to achieve higher carbon savings if further work identifies greater carbon reduction potential.
Impact monitored through annual report with assessment of requirement for further interventions e.g. additional support from Jersey Business.

Impact assessment				**Impact on total CO_2 savings**	
Security √	Affordability √	Sustainability √		10%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
8.1 Number of Eco-Active businesses (Savings based on reduction in emissions of 25% by 2020 – monitored through EAB reviews)	150	500	1,000	1,500	1,500
8.2 Implementation of commercial new build completion notices to higher Building Bye Law Standards		2018 onwards			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Staff and materials to support businesses through an extended Eco-Active Business programme (in particular focussing on SMEs)	80,000	80,000	80,000	80,000	80,000

3.3. The agricultural sector

The agricultural sector has a role to play to mitigate their contribution to GHG emissions. In addition, reducing energy use and GHG emissions has a significant number of opportunities and benefits for this sector including:

- Improved productivity as a result of reduced energy use and a more efficient use of chemicals / fertilizers/livestock feeds;
- Increased productivity from livestock as a result of better husbandry, diet and genetics;
- Better management of livestock wastes through for example anaerobic digestion of agricultural and organic wastes to reduce fossil fuel imports;
- Better management of soil resource and other habitats e.g. Woodlands to act as a 'sink' for GHG emissions as well as improving biodiversity;
- Business opportunities and agricultural diversification, such as the growing and production of biofuels.

3.3.1. What the agricultural sector comprises

Contributions to GHG emissions arise from the agricultural sector in a number of ways;

- Energy use on farms and in farm machinery;
- Land use changes removing or adding to natural carbon sources and sinks (see section 3.9.3);
- The application of fertilizers to land;
- From livestock wastes;
- From enteric fermentation in ruminants.

Emissions arising from agricultural activities include methane and nitrous oxide which are more potent GHGs. However even accounting for this, the contributions of Jersey's agricultural industry to GHGs are relatively small, approximately 3.5% in 2009[38]. Moreover, the best management of the rural resource can increase the capacity of the natural and working countryside to act as sinks for GHGs.

3.3.2. The challenge for the agricultural sector

As Table 5 shows the challenge for the agricultural sector to achieve an 80% reduction in GHG emissions is equivalent to 17,084 tonnes of CO_{2eq} by 2050.

Agriculture BAU	1990	2009	2020	2030	2040	2050	Target 2050

[38] 15,061 t/CO_{2eq} out of 438,751 t/CO_{2eq} total emissions

GHG emissions under a business as usual scenario (t/CO_{2eq})	26,037	19,331	19,331	19,331	19,331	19,331	**5,207**
Agriculture PATHWAY 2050	**1990**	**2009**	**2020**	**2030**	**2040**	**2050**	**% reduction on 1990 levels**
Final GHG emissions pathway after interventions	26,037	19,331	15,368	7,984	7,984	7,984	**69%**

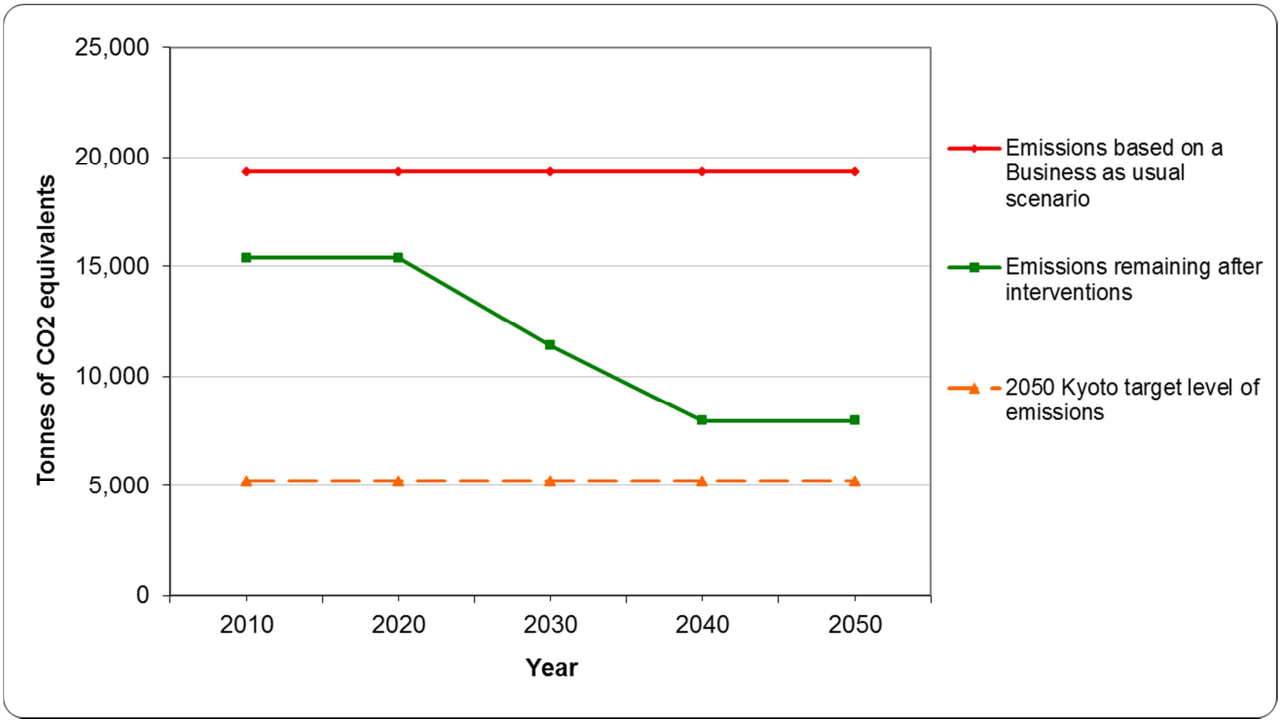
Table 5 – Forecast of GHG emissions from the agricultural sector under a 'business as usual' scenario compared to an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 20,830 t/CO_{2eq}

The Rural Economy Strategy was adopted by the States in early 2011[39] and bought forward detailed policies and support mechanisms to address the GHG impact of this sector. There is considerable current work in this area already for example:

- Green waste composting to assist the building of soil organic matter;
- Genetic improvements to improve the efficiency of milk production (i.e. more milk per cow);
- Diet formulations designed to reduce methane emissions from livestock;
- Implementation of Codes of Good Agricultural and Environmental Practice (CGAEP) ;
- Long-term slurry storage to improve utilisation of greenhouse gas producing compounds and reduce reliance on inorganic fertiliser;
- Green cover crops to minimise soil erosion, nutrient loss to the environment and increase soil organic matter;
- Energy Audits to improve energy efficiency;
- Grants for energy efficiency measures;
- Fertiliser recommendations to optimise use of inorganic fertiliser and to maximise the use of organic manures.

The 2050 pathway outlines emissions reductions of 69% as illustrated in the graph below. Further details on the actions and assumptions are presented in appendix 6.

[39] http://www.gov.je/News/2011/Pages/RuralStrategyLaunched.aspx



Graph 7 - The proposed carbon reductions outlined in the pathway (green line) compared to a 'do nothing' scenario ('business as usual', the red line) and the target reductions required to meet Kyoto objectives (orange dashed line).

3.3.3. Action framework for agricultural sector

In order to contribute to the carbon reduction savings outlined above in Table 8 the following actions are proposed.

Action Statement 9: Reducing emissions from ruminants

Ruminants produce GHGs as a result of their enteric fermentation processes and so emissions are linked to their diet. An area of active investigation internationally is how improvements on feedstock can reduce GHG emissions and Jersey will benefit from progress in this area. The 2011 Rural Economy Strategy recognises the need for mitigation of climate change by providing additional components and criteria within the Countryside Renewal Scheme and Rural Initiative Scheme (see Policy PE9 2011 Rural Economy Strategy)

ACTION STATEMENT 9
Reducing emissions from ruminants
Assumption & dependencies
Assumptions - The contribution that Action Statement 9 makes to the target GHG emissions reduction has been modelled in Supporting Document B, based on 59% of GHG emissions in agriculture sector coming from enteric fermentation, being reduced by 30%. *Dependencies* – Improvements to livestock feed formulations will take place outside Jersey. Passive uptake of external improvements to market.

Summary
The Minister for Planning and Environment working with the Minister for Economic Development working through the agreed Rural Economy Strategy (2011-2015), and subsequent revisions, will seek to reduce emission from ruminants by 30% by 2030 as a result of farmers adopting: i. Improvements in livestock diets; ii. Increased productivity as a result of genetic improvement (cross-ref Policy PE 9 RES); iii. Better husbandry techniques.
Delivery mechanism
Environmental Management and Rural Economy Team, Department of the Environment, implementing the agreed Rural Economy Strategy policies, working in partnership with the agricultural industry.
Monitoring
Review to ensure that the global market delivers suitable feedstock for uptake by local farmers. If global feedstock advances are insufficient or local farmers unwilling to change practice further interventions will need to be developed.

Impact assessment				**Impact on total CO_2 savings**	
Security X	Affordability X	Sustainability √		1%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
9.1 Emissions from ruminants reduced as a result of dietary improvements			30%	30%	30%
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Feasibility study costs already accounted for in Rural Economy Strategy (2011-2015) Policy PE9	√	√	√	√	√

Action Statement 10: The implementation of Anaerobic Digestion systems for waste management of livestock slurry by 2020

Anaerobic digestion (AD) is the process by which anaerobic bacteria convert biomass into biogas and 'digestate' by-products. The methane proportion of the biogas is used to generate energy and importantly methane production is diminished through the process. The digestate is comprised of a solid fraction – the fibre that can be applied to land as a soil conditioner, and a 'liquor' fraction that is high in nutrients and can be used as a fertiliser. The residues from AD of agricultural waste and livestock slurries would be able to be returned to land. A high level study on the feasibility of Anaerobic Digestion of Agricultural wastes shows that there is potential to use this technology locally and the benefits are several-fold:

- Recover energy from waste products - Including livestock (especially dairy) slurries, waste dairy liquid etc.;
- Plant disease management – By providing an alternative disposal route other than back to land for waste potatoes;
- Methane Capture;
- Pollution control – with improved nutrient management and quality assurance;

- Displace imported fertiliser – Which has high embodied energy and GHG emissions.

The challenges to establishing successful AD will require further policy consideration and possible intervention. These include:

- The plant's yield and the associated economic analysis;
- Operation of the plant including the provision of a homogeneous feedstock and storage issues;
- Agreement from the industry to ensure the delivery of slurry and collection and approved return to land of the digestate;
- Location of units.

Despite these challenges there remains sufficient potential to carry out a full feasibility study to explore a number of operating models. This is supported by the findings of a recent report completed by ADAS[40] for the States of Jersey. The report concluded that the generation of gas from AD could contribute to enhanced security of supply, providing a storage facility for generation of electricity from combined heat and power plants at peak times.

ACTION STATEMENT 10
The implementation of Anaerobic Digestion (AD) systems for waste management of livestock slurry by 2020
Assumptions & dependencies
Assumptions - The contribution that Action Statement 10 makes to the target GHG emissions reduction has been modelled in Supporting Document B, based on abating all of the 41% of GHG emissions in agriculture sector coming from slurry. *Dependencies* – Locally applicable options arising from feasibility study and the ability to implement a cost-effective support scheme to improve plant economics.
Summary
The Minister for Planning and Environment working with the Minister for Economic Development working through the agreed Rural Economy Strategy (2011-2015), and subsequent revisions, will: i. Investigate the potential and implementation for the use of the Countryside Renewal Scheme and Rural Initiative Scheme to achieve better management of livestock wastes through anaerobic digestion (cross-ref Policy PE 9 RES) The Minister for Planning and Environment working with the Minister for Transport and Technical Services working through the revision of the Solid Waste Strategy (2012) will: i. Explore the option of a collecting food waste from commercial establishments and households for AD (to be included in revised Solid Waste Strategy 2012)
Delivery mechanism
Environmental Management and rural Economy Team, Department of the Environment, implementing the agreed Rural Economy Strategy policies, working in partnership with the agricultural industry

[40] Feasibility Study into Establishing an Anaerobic Digestion Plant using Substrates from Agriculture Sectors on Jersey, ADAS Dec 2013

Monitoring					
If investigations show that AD is unfeasible at local scale/ with local feedstock then this action will need to be reviewed.					
Impact assessment				**Impact on total CO_2 savings**	
Security √	Affordability X	Sustainability √		4%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
10.1 Amount of slurry being treated through Anaerobic Digestion		50%	100%	100%	100%
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Feasibility study costs already accounted for in Rural Economy Strategy (2011-2015) Policy PE9	√	√	√	√	√

3.4. Road transport sector

Road transport accounts for over one third of final energy consumption and GHG emissions. Overall trends are of gradually reducing energy consumption in this sector due to new vehicles becoming more fuel efficient and even perhaps saturation of vehicles on the road. This will become even clearer as far stricter EU emission standards are applied in the manufacturing process. In addition, effective fuel additives that increase mileage could also reduce emission from this sector.

The Sustainable Transport Policy (STP) was developed by the Transport and Technical Services Department and was accepted by the States Assembly in November 2010. It aims to promote more sustainable travel options such a cycling, safer routes to school, walking, car sharing and bus use as alternatives to single occupancy car use (modal shift) especially at peak travel periods. It also aims to encourage the use of less polluting and smaller vehicles.

The 2011 Island Plan also plays a key role in ensuring that there is a policy framework that minimises the need for commuting.

3.4.1. What the road transport sector comprises

Contributions to GHG emissions arise from the road transport sector from the use of Petrol and diesel in cars and vans, busses and lorries for commuter travel, leisure trips, public transport journeys and commercial activities.

Emissions arising from road transport activities are a result of the burning of hydrocarbon fuels. In order to reduce emissions from these vehicles a suite of a need to address the type of vehicles used, the frequency of use and the efficiency with which they are operated. Smarter travel choices can have a significant impact on transport emissions.

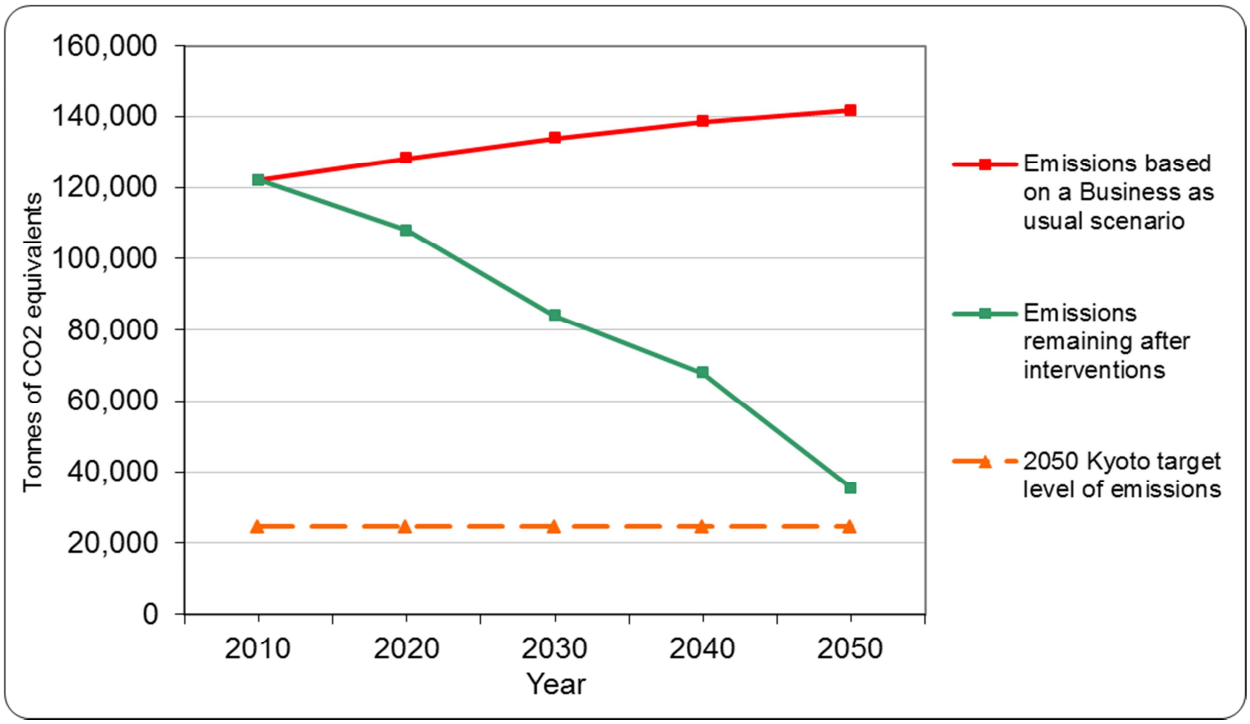
3.4.2. The challenge for the transport sector

As Table 6 shows the challenge for the road transport sector to achieve an 80% reduction in GHG emissions, equivalent to 97,956 tonnes of CO_{2eq} by 2050.

Road transport BAU	1990	2009	2020	2030	2040	2050	Target 2050
GHG emissions under a business as usual scenario (t/CO_{2eq})	122,445	121,940	128,249	133,907	138,620	141,762	**24,489**
Road transport PATHWAY 2050	**1990**	**2009**	**2020**	**2030**	**2040**	**2050**	**% reduction on 1990 levels**
Final emissions pathway after interventions	122,445	121,940	107,898	83,932	67,869	35,204	**71%**

Table 6 – Forecast of GHG emissions from the Road Transport sector under a 'business as usual' scenario compared to an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 97,956 t/CO_{2eq}

The 2050 pathway outlines emissions reductions of 75% as illustrated in the graph below. Further details on the actions and assumptions are presented in appendix 6.



Graph 8 - Projected carbon reductions in the pathway (green line) compared to a 'do nothing' scenario ('business as usual', the red line) and the target reductions required to meet Kyoto objectives (orange dashed line).

3.4.3. Action framework for transport sector

Recognising that the transition to a less car dependent society needs to be supported by the promotion of more sustainable transport options and improved supporting infrastructure.

Vehicle Emissions Duty

In the pathway, the combination of a reduction in overall car use and a move towards low emission vehicles reduces energy demand and diminish carbon emissions. Advances in technology, assisted by a tightening of legislation on emissions levels internationally, have already led to the considerable improvement in the fuel efficiency of new vehicles and a consequential reduction in fuel demand and carbon emissions.

Through differential charges, VED incentivises the purchase of the most fuel-efficient vehicles and also dual-fuel vehicles (e.g. electric cars which have minimum emissions; those running on autogas which has reduced emissions compared to the same model running on petrol; hybrids which have exceptional fuel efficiency). But it penalises those who purchase vehicles with the highest carbon dioxide emissions per mile travelled.

The Energy Partnership will maintain a watching briefing on the effect of VED in incentivising the transition of Jersey's fleet to vehicles with low carbon emissions and maintaining a sufficient revenue stream to support the STP and its future revisions. More punitive charging bands are likely to be needed in future years to accelerate this process if current bands are not effective, as well as exploring other policies that may help to reduce vehicle emissions.

In order to contribute to the delivery of the carbon reduction savings outlined above in Table 10 the following actions are proposed.

Action Statement 11: The effect of improved EU emissions standards for cars

Jersey will benefit from the European policy to reduce the carbon emissions from new cars. The industry is adapting quickly and low emission cars are quickly entering the market place.

ACTION STATEMENT 11
The effect of improved EU emissions standards for cars
Assumption & dependencies

Assumptions - The contribution that Action Statement 11 makes to the target GHG emissions reduction has been modelled in Supporting Document B. Rates of car uptake and turnover are based on 2011 vehicle registrations, applied to 2011 census figure of 55,792 registered cars in Jersey. *Dependencies* – Global market responds to more challenging EU emissions standards for vehicles, as forecast.
Summary
The Minister for Planning and Environment working with the Minister for Transport and Technical Services will: i. Ensure that only new cars that comply with EU emissions standards for cars i.e. 95g/CO_2 per kilometre by 2020 can be registered with Driver and Vehicle Standards for use in Jersey
Delivery mechanism
DVS to monitor uptake of newly manufactured lower emission vehicles driven by more challenging EU emissions standards.
Monitoring
If local turnover of fleet is overestimated and thus uptake of low emission vehicles overestimated, carbon reductions will not be achieved and further interventions will be required to accelerate uptake.

Impact assessment				**Impact on total CO_2 savings**	
Security √	Affordability √	Sustainability √		12%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
11.1 Number of low emission vehicles registered with Driver and Vehicle Standards (Based on fleet renewal over 11 years and assuming c.6,000 new registrations per annum).		30,000 registered by 2020	60,000 registered by 2030 - full fleet turnover		
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Cost neutral to States of Jersey will be borne externally by global vehicle manufacturers	n/a	n/a	n/a	n/a	n/a

Action Statement 12: The effect of improved EU emissions standards for vans

Jersey will benefit from the European policy to reduce the carbon emissions from new vans. The industry is adapting quickly and ultra-low emissions commercial vehicles are quickly entering the market place.

ACTION STATEMENT 12
The effect of improved EU emissions standards for vans
Assumptions & dependencies

Assumptions - The contribution that Action Statement 12 makes to the target GHG emissions reduction has been modelled in Supporting Document B. Rates of vehicle uptake and turnover are based on 2011 van registrations, applied to 2011 census figure of 6664 registered vans in Jersey.

Dependencies – Global market responds to more challenging EU emissions standards for vehicles, as forecast.

Summary

The Minister for Planning and Environment working with the Minister for Transport and Technical Services will:

i. Ensure that only new vans that comply with EU emissions standards for vans i.e. an average of 147g/CO_2 per kilometre by 2020 can be registered with Driver and Vehicle Standards for use in Jersey;
ii. Implement Recommendations 7.8(4) from the Sustainable Transport Policy re considering case for introducing emissions and road worthiness testing for all vehicles above a certain age.
iii. Implement Recommendations 7.8(5) from the Sustainable Transport Policy re introducing commercial vehicle operator licenses by 2015 to ensure such vehicles are regularly checked for road worthiness and emissions.

Delivery mechanism

DVS to monitor uptake of newly manufactured lower emission vehicles driven by more challenging EU emissions standards.

Monitoring

If local turnover of fleet is overestimated and thus uptake of low emission vehicles overestimated, carbon reductions will not be achieved and further interventions will be required to accelerate uptake.

Impact assessment				**Impact on total CO_2 savings**	
Security √	Affordability √	Sustainability √		2%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
12.1 Number of low emission vehicles registered with DVS. (Based on fleet renewal over 11 years and assuming c.600 new registrations per annum).		6,000	6,000		
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Costs neutral to States of Jersey will be borne externally by global vehicle manufacturers. Costs of developing licences and testing to be met from STP.	n/a	n/a	n/a	n/a	n/a

Action Statement 13: The effect of an increase in the number of ultra-low emission vehicles (ULEVs)

The relatively short journey lengths and the availability of low-carbon imported electricity makes Jersey well placed to make use of electric vehicles or other ultra-low emission vehicle technologies. Early issues of performance, safety, ease of use with electric cars have been successfully addressed and unit costs are falling and production has increased with several models now commercially available.

A long-term switch away from vehicles with petrol and diesel engines will make a considerable contribution to overall carbon reductions and to local air quality. In addition, in the long term if renewable energy can be generated from utility scale renewable energy projects, using this electricity to power electric vehicles can be beneficial in a number of ways including:

- Low-carbon electricity will power vehicles instead of hydrocarbons;
- The batteries of electric vehicles act as storage for renewable electricity that is only produced intermittently.

In terms of immediate policies, the Transport and Technical Service Department have introduced the 'eco-permit' scheme which offers a 50% discount on parking card charges for low emissions vehicles (all vehicles with emissions under 100gms CO_2/km). As technological advances occur, a much higher proportion of private cars will qualify, and it is envisaged that other vehicles would then have to pay an increased rate for parking to compensate for the loss of income.

Currently electric vehicles are eligible for the 'eco permit' having zero emissions at street level and it is proposed in the STP that charging points and reserved spaces in advantageous positions will be provided in public car parks to further encourage their use, as they become more commonly available.

Going forward, it will be important to monitor the local and global trends in uptake of ULEVs and their costs relative to convention vehicles. The table below illustrates how the number of electric vehicles registered in Jersey has grown since 2010.

Year	Number of electric vehicle registrations	Number of Hybrid vehicle registrations	Number of registrations of vehicles below 100gCO_2km
2010	2	32	15
2011	14	67	71
2012	47	59	210
2013	20	56	1030

In 2013 there were 76 ULEV's (electric and hybrid) registered, 1.3% of total registrations that year; 1030 vehicles were registered with emissions below the 100gCO_2km threshold, which is equivalent to 16% of all vehicles registered in Jersey during 2013. Further action may be required in response to perceived financial or non-financial barriers to the adoption of ULEVs in Jersey.

ACTION STATEMENT 13
The effect of an increase in the number of ultra-low emission vehicles (ULEVs)
Assumptions & dependencies

Assumptions - The contribution that Action Statement 13 makes to the target GHG emissions reduction has been modelled in Supporting Document B. Rates of vehicle uptake and turnover are based on 2011 vehicle registrations applied to 2011 census data for numbers of cars registered; and an assumption that ULEVs will achieve market parity with petrol and diesel cars and ultimately become the vehicle of choice in Jersey. Targets are consistent with UK Carbon Plan 2011.

Dependencies – Global uptake and cost reductions of ULEVs. Availability of vehicles locally accompanied by infrastructure to support ULEV fleet including maintenance and servicing requirements.

Summary

The Minister for Planning and Environment working with the Minister for Transport and Technical Services through the Sustainable Transport Policy (and its subsequent revisions) will support a modal shift towards Ultra Low Emission Vehicles (ULEVs) to meet the following targets:

i. 10% of new cars registered at Driver & Vehicle Standards (DVS) are ULEVs by 2020;
ii. 30% of new cars registered at DVS are ULEVs by 2030;
iii. 60% of new cars registered at DVS are ULEVs by 2040;
iv. 90% of new cars registered at DVS are ULEVs by 2050.

The nature of the support required, including the establishment of a coordinating body, to achieve these targets will be developed in revisions to the STP.

Delivery mechanism

Sustainable Transport Policy and its subsequent revisions will monitor the uptake of ULEVs and identify barriers and possible incentives to accelerate take-up as required. Key stakeholders include the Department of Transport and Technical Services and Jersey Electricity in respect of infrastructure requirements. Ongoing work includes States of Jersey trial of electric vehicles.

Monitoring

The carbon abatement projected will not be achieved if the local turnover of fleet has been overestimated or, if price parity is not achieved and therefore there is a lack of take up of ULEVs in which case additional interventions may be required e.g. fiscal levers such as incentives.

Impact assessment				**Impact on total CO_2 savings**	
Security √	Affordability X	Sustainability √		22%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
13.1 Number of ULEVs registered with DVS		5,579	16,738	33,475	50,213
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
STP will monitor progress towards targets and consider possible of incentives from STP funds				If applicable, to be determined by STP monitoring	

Action Statement 14: Achieving Sustainable Transport Policy 2010 congestion management targets

The Sustainable Transport Policy 2010 (STP) aims to achieve a significant shift towards more sustainable transport at all times. Currently, the STP only sets a main target of a reduction in peak time congestion, to be achieved by reducing commuter trips to and from St Helier by at least 15% by 2015. This is equivalent to 1,800 avoided commuter return car trips from 'home' into St Helier and back per working day. Monitoring for the STP shows an increasing trend in the use of sustainable modes of transport at commuter times, although this has led to less than a 2% reduction in peak hour vehicular traffic over the last 3 years.

If the overall 80% emission reduction targets from the road transport sector are to be achieved, a significant modal shift is necessary. To assess the contribution of the STP in encouraging modal shift, detailed monitoring and reporting will need to continue. If the monitoring reports demonstrate that the actions as outlined in the STP are not going to achieve the target, it may become necessary to consider developing more challenging incentives and disincentives in order to achieve the necessary modal shift.

The continued commitment to the aims and targets of the STP is vital to ensure that the reductions in emissions from the road transport sector are achieved. The ongoing resourcing of the STP through VED funds is essential to enable the further development and implementation a range of far reaching behaviour change and infrastructure improvements to support modal shift to more sustainable methods of transport.

Whilst the specific 15% reduction in peak time travel target of the STP has a relatively small impact on GHG emissions, extending this to a 5% reduction target in road transport at all times will deliver more significant reductions in emissions (See Action Statement 15 and emissions pathway for road transport, appendix 6).

ACTION STATEMENT 14
Achieving Sustainable Transport Policy 2010 congestion management targets
Assumptions & dependencies
Assumptions - The contribution Action Statement 14 makes to the emissions reduction target has been modelled in Supporting Document B, based on a 15 % reduction in peak time travel equivalent to 3600 avoided trips per day at peak times. *Dependencies* – Ongoing implementation and evolution of Sustainable Transport Plan.
Summary
The Minister for Planning and Environment working with the Minister for Transport and Technical Services will ensure that the congestion management target of a 15% reduction in peak time travel set by the Sustainable Transport Policy is achieved by 2015. In subsequent revisions of the STP further policy interventions will be required in order to achieve the Action Statements above.
Delivery mechanism
Implementation of Sustainable Transport Policy actions by Department of Transport and Technical Services. Monitoring and reporting to assess performance.

Monitoring					
If there is insufficient public engagement and STP targets are not met then recommendations will need to be reviewed and additional interventions proposed.					
Impact assessment				**Impact on total CO_2 savings**	
Security X	Affordability X	Sustainability √		3%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
14.1 - 15% reduction in peak time traffic by 2015 monitored by T&TS manual mode of travel counts		15% by 2015			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
STP funded by VED revenue	√	√	√		

Action Statement 15: Achieve a 5% shift to sustainable modes transport by 2020

This action extends the modal shift target to a 5% reduction in travel at all times as against focussing on peak time travel only (Action Statement 15). The target will be delivered through the Sustainable Transport Policy and a package of measures, which will need to be developed.

The 2011 Island Plan supports this target and the Sustainable Transport Policy by providing a land-use framework that will reduce the need for commuting to work by the following[41]:

- Integration of planning and travel and transport strategies which serves to minimise travel and traffic generation;
- Influencing travel demand and choices of travel mode by achieving development forms and patterns which enable and encourage a range of alternatives and which positively enables and promotes walking, cycling; and public transport as a more sustainable mode of travel than the private car;
- Makes efficient use of existing transport infrastructure and minimise new road construction;
- Reduces pollution, noise and the physical impact and risk to health posed by traffic and transport.

In addition to the impact of land use policies, behaviour change will also have an impact as a result of increasing levels of awareness and rising fuel prices. There are opportunities to reduce the amount of commuter journeys on island by the increased use of technology enabling home working (e.g. Gigabit Jersey) and options such as flexible working.

This is encouraged through the Eco-Active Business scheme whereby participating businesses are encouraged to benchmark and reduce their 'carbon footprint'. This

[41] States of Jersey Island Plan 2011: Chapter 8 Travel and Transport (Objective TT1)

supports the STP which requires large developments, through the planning process, to produce workplace travel plans to reduce commuting and business car trips especially in single occupancy car journeys. In addition the Eco-Active Schools programme requires schools to produce a school travel plan to again minimise car journeys.

ACTION STATEMENT 15	
Achieve a 5% shift to sustainable modes transport by 2020	
Assumption & dependencies	
Assumptions - The contribution Action Statement 15 makes to the emissions reduction target has been modelled in Supporting Document B, based on the UK Carbon Plan 2011 target for modal shift applied to the 2011 census data for numbers of registered cars in Jersey. *Dependencies* – Ongoing and expanded agreed commitment in Transport and Technical Services implementation of the STP and its revisions	
Assumption	
The contribution that Action Statement 15 makes to the target GHG emissions reduction has been modelled in Supporting Document B and assumes as 5% modal shift by 2020 (a reduction in annual mileage of 5%) which is in line with the UK Government's Carbon Plan[42].	
Summary	
The Minister for Planning and Environment working with the Minister for Transport and Technical Services will: Through the Sustainable Transport Policy (and its subsequent revisions) ensure that a modal shift is enabled, resulting in a 5% reduction in total annual mileage is achieved by 2020. This is likely to include a package of measures e.g. I. Improved public transport II. Improved cycling and pedestrian infrastructure III. Increased parking costs IV. Awareness campaigns to encourage sustainable travel V. Changed working patterns (e.g. flexible working) VI. Workplace travel plans (cross ref Island Plan and STP) VII. Eco-Active Schools – travel plans and framework VIII. Reduced commuting by car as a result of better land use planning and use of planning obligations to incentivise solutions IX. Uptake of technological solutions such as Gigabit Jersey to encourage home working X. Increased cycling and walking	
Delivery mechanism	
Implementation of revised set of Sustainable Transport Policy actions; monitoring and reporting to assess performance. Department of Transport and Technical Services. Eco-Active programme working with schools and business sectors to develop travel plans.	
Monitoring	
If there is insufficient public engagement or political support for the ongoing development and delivery of STP measures the forecast carbon reductions will not be achieved and additional interventions will need to be recommended.	
Impact assessment	**Impact on total CO_2 savings**

[42] http://www.decc.gov.uk/en/content/cms/tackling/carbon_plan/carbon_plan.aspx

Security √	Affordability √	Sustainability √	1%		
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
15.1 Reduction in traffic volume recorded at T&TS automatic monitoring sites at 12 main routes		5% reduction			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Funded from STP underpinned by ongoing VED revenue				√	√

3.5. The aviation sector

Aviation emissions have a greater climate impact than the same emissions made at ground level. This is because emissions at altitude can instigate chemical and physical processes that have climate change consequences and this is accounted for in emissions inventories using a multiplier. Carbon dioxide emissions from aircraft can be calculated from knowledge of the amount of fuel consumed during the flight. However, unlike terrestrial transport, fuel consumed does not scale linearly with distance travelled due to the extra fuel burn required to lift the plane up to cruising altitude, and the necessity to carry large quantities of fuel for long distance flights. The emissions of carbon dioxide from an individual flight will depend on many different factors including distance travelled, weather conditions (head or tail wind), cargo and passenger loads and flight altitude.

Mitigating emissions from this sector has long been controversial with much of the industry believing that a global solution is required given the scale of aviation routes and refuelling stops. The European solution is the EU Emissions Trading System (begun in 2005) and EU legislation was adopted in 2009 and air operators were also covered.

From the start of 2012, emissions from all domestic and international flights that arrive at or depart from an EU airport will be covered by the EU Emissions Trading System. The intention is for the EU ETS to serve as a model for other countries considering similar national or regional schemes, and to link these to the EU scheme over time. Therefore, the EU ETS can form the basis for wider, global action.[43]

3.5.1. What the aviation sector comprises

The emissions in this sector comprise those from the local refuelling of national but not international flights which are reported separately and anyway are not common from Jersey Airport. Emissions are calculated using quantities of imported jet fuel as well as from airport traffic data. Significant abatement potential in the sector relates to advances in aircraft fuel efficiency, which is expected to be driven by international standard-setting and the potential fuel savings realised by operators.

[43] http://ec.europa.eu/clima/policies/transport/aviation/index_en.htm

3.5.2. The challenge for the aviation sector

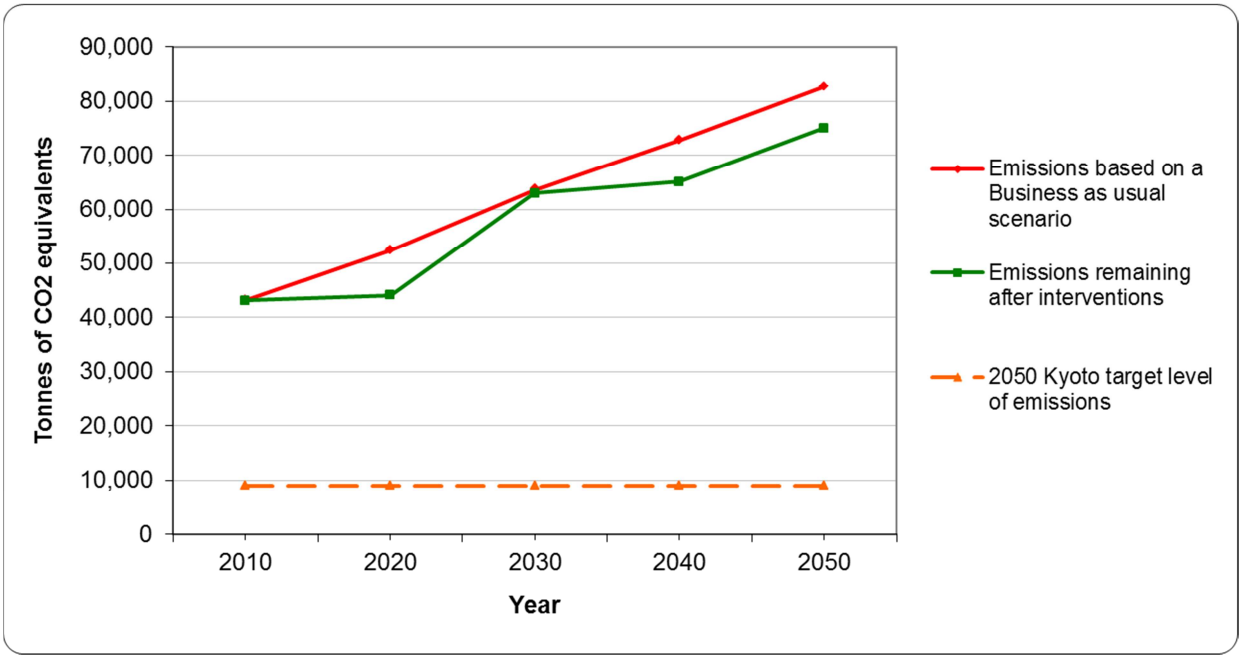
As Table 7 shows the challenge for the aviation sector to achieve an 80% reduction in GHG emissions is equivalent to 35,953 tonnes of CO_{2eq} by 2050.

Aviation BAU	1990	2009	2020	2030	2040	2050	Target 2050
GHG emissions under a business as usual scenario (t/CO_{2eq})	44,710	43,144	52,295	63,599	72,726	82,604	8,942
Aviation PATHWAY 2050	**1990**	**2009**	**2020**	**2030**	**2040**	**2050**	**% reduction on 1990 levels**
Final GHG emissions pathway after interventions	**44,710**	**41,639**	**44,100**	**63,010**	**65,120**	**74,998**	**+68%**

Table 7 – Forecast of GHG emissions from the aviation sector under a 'business as usual' scenario compared to an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 35,768 t/CO_{2eq}

Island economies rely heavily on external transportation links for economic growth. Thus it follows that any intervention that tried to simply reduce emission by reducing the number of flights to the Island is likely to be detrimental to the economy. Nevertheless it does not mean that this sector should not be scrutinised and that some reductions cannot be made.

The 2050 pathway outlines an increase in emissions of 68% against 1990 levels as illustrated in the graph below. The energy model assumes growth in air travel in line with Jersey airport policy based on an increasing population of +350 per annum. Whilst the growth in air travel does result in an increase in emissions, in real terms there is a reduction compared to a business as usual scenario, due to improved aircraft standards.



Graph 9 - The proposed carbon reductions within the pathway (green line) compared to a 'do nothing' scenario ('business as usual', the red line) and the target reductions required to meet Kyoto objectives (orange dashed line).

3.5.3. Action framework for aviation sector

In order to contribute to the carbon reduction savings outlined above in Table 7 the following actions are proposed.

Action Statement 16: The effect of improved international operating standards for aircraft

Jersey will benefit from the international policy to reduce the carbon emissions from new aircraft, and better operating procedures and standards such as when the Jersey airspace redesign project is completed, which will enable aircraft to take off and land in a more fuel-efficient manner.

In parallel with the international community agreeing to tackle emissions associated with inter-jurisdictional travel, there will be an ever-increasing awareness of the environmental impacts of travel at the personal level. Eco-Active will continue to raise awareness and suggest alternatives to the annual long-haul holiday that is the current feature of many people's vacation schedule.

ACTION STATEMENT 16

The effect of improved international operating standards for aircraft					
Assumption & dependencies					
Assumptions - The contribution that Action Statement 16 makes to the target GHG emissions reduction has been modelled in Supporting Document B, based on IATA target of 50% reduction in emissions from aircraft by 2050 against 2005 levels. *Dependencies* – Global aircraft manufacturers deliver lower emission aircraft, and these are used on routes to and from Jersey.					
Summary					
The Minister for Economic Development will ensure that aircraft operating out of Jersey comply with the industry endorsed, international IATA target of: i. A reduction in GHG emissions of 50% by 2050 relative to 2005 levels					
Delivery mechanism					
Jersey Airport to monitor uptake of newly manufactured lower emission aircraft driven by more challenging global emissions standards.					
Monitoring					
If the market does not deliver lower emissions/higher fuel efficiency aircraft then these carbon reductions will not be achieved.					
Impact assessment					**Impact on total CO_2 savings**
Security √	Affordability √		Sustainability √		4%
KPI		**2014**	**2020**	**2030**	**2040**	**2050**
16.1 - Number of aircraft operating in/out of Jersey compliant with emissions standards (NB Airline operators will need to provide this information).			15%	50%	50%	50%
Costs		**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Externalised and borne by global airline industry		n/a	n/a	n/a	n/a	n/a

3.6. The ‘F-gases’ sector

3.6.1. What the ‘F-gases’ sector comprises

This sector comprises three F-gases (hydrofluorocarbons- HFCs, perfluorocarbons - PFCs and sulphur hexafluoride- SF_6), all of which are weighted by global warming potential since they are potent greenhouse gases. Hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) are mainly used as refrigerants in commercial refrigerant systems, air conditioning units and heat pumps, for pharmaceutical aerosols and as firefighting agents. Sulphur hexafluoride (SF_6) is used in high voltage electric switch gear where it is a thermal insulator.

The F-gases were not present in the early part of the reporting periods because they were developed in the 1990s to replace CFCs (chlorofluorocarbons) and HCFCs

(hydrochlorofluorocarbons), which are ozone depleting substances. For this reason 1995 is taken as the baseline year for this category not 1990.

3.6.2. The challenge for the 'F-gases' sector

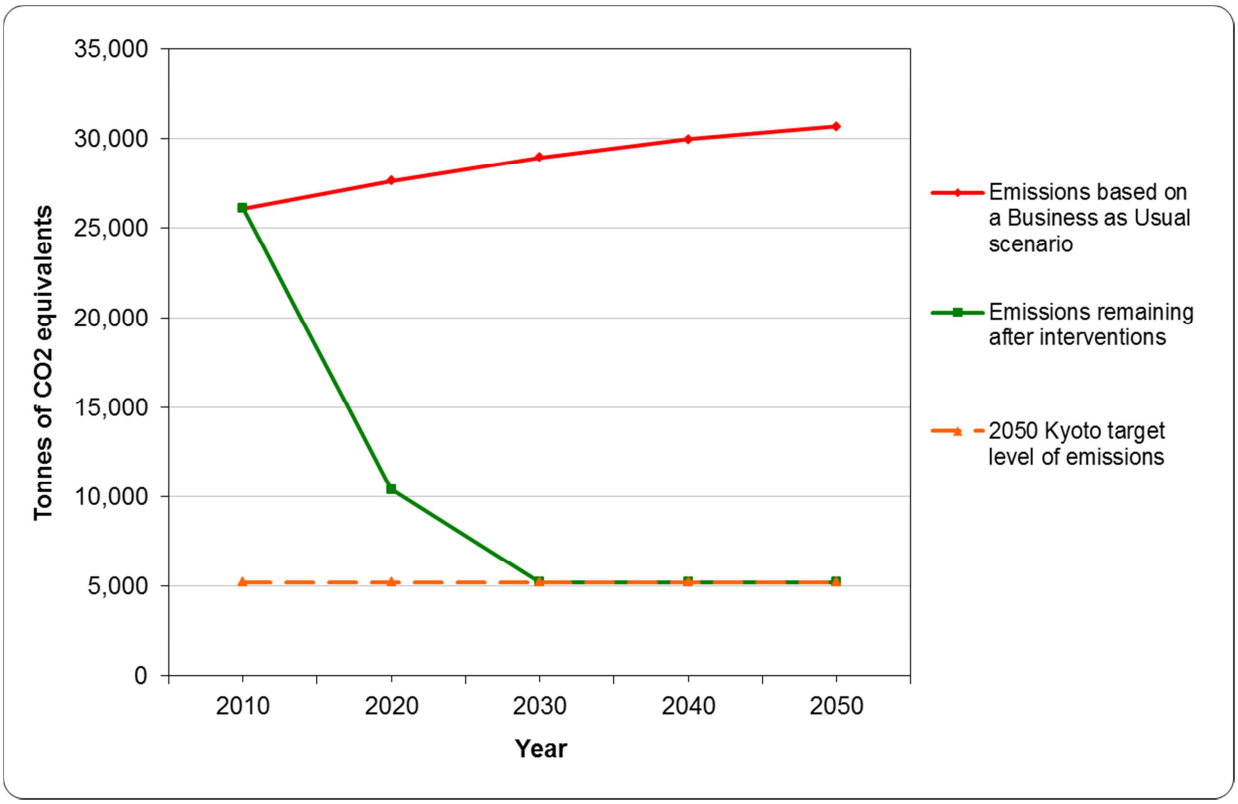
As Table 8 shows the challenge for the HFCs, PFCs & SF6s to achieve an 80% reduction in GHG emissions is equivalent to 2778 tonnes of CO_{2eq} by 2050. The future emissions from the F-gases are calculated in line with an increasing population.

GHG emissions under a business as usual scenario (t/CO_{2eq})	**1990**	**2009**	**2020**	**2030**	**2040**	**2050**	**Target 2050**
HFC, PFCs & SF6s	3,473*	26,097	27,630	28,954	29,973	30,668	5219*
F-gases PATHWAY 2050	1990	2009	2020	2030	2040	2050	% reduction on 2010* levels
Final GHG emissions pathway after interventions	3473	26,097	10,439	5,219	5,219	5,219	**76%**

Table 8 – Forecast of emissions from HFC, PFCs & SF6s under a 'business as usual' scenario compared to an 80% reduction on 1990 levels.

*Note target uses 2010 data for the baseline.

With no interventions there is an estimated shortfall of 20,878 t/CO_{2eq} in the HFC, PFCs & SF6s.



Graph 9 - The proposed carbon reductions within the pathway (green line) compared to a 'do nothing' scenario ('business as usual', the red line) and the target reductions required to meet Kyoto objectives (orange dashed line).

3.6.3. Action framework for the 'F-gases' sector

There is little that can be done to reduce this sector's emissions without technological advances providing alternative non-GHG gases to replace the F-gases.

To control emissions from fluorinated greenhouse gases (F-gases) the European Union has adopted two legislative acts: the "MAC Directive" on mobile air conditioning systems used in motor vehicles, and the "F-gas Regulation" which covers all other key applications in which F-gases are used. Although these have not been directly extended to Jersey, as an importer of the goods containing these products, it can be assumed that Jersey will benefit from the emissions reductions as a result of implementation of the regulations at a European scale.

The MAC Directive prohibits the use of F-gases with a global warming potential more than 150 times greater than carbon dioxide (CO2) in new types of cars and vans introduced from 2011 and in all new cars and vans produced from 2017.

In November 2012 the European Commission proposed a revision of the F-gas Regulation that would tighten up its requirements. As proposed by the Commission, the revised Regulation would reduce F-gas emissions by two-thirds of today's levels by 2030 and ban the use of F-gases in some new equipment where viable climate-friendly alternatives are readily available.

It would introduce a phase-down measure which from 2015 would limit the total amount of hydrofluorocarbons (HFCs) – the most significant group of F-gases - sold in the EU and reduce this in steps to one-fifth of today's sales by 2030. This measure would build on the successful phase-out of ozone-depleting substances which was achieved in the EU 10 years ahead of the internationally agreed schedule[44]. This assumption has been applied to the Jersey emissions estimate.

More work will need to be done to fully understand what comprises this sector (currently estimations are made) and monitor their occurrence and use on the Island. Any interventions, beyond the passive take up of new improved products as a result of international changes that can be realistically proposed are likely to be limited to recommending more robust systems around leakage detection and recovery processes.

Based on the assumptions described above, the impact would be a 3% reduction in overall CO_2 emissions.

3.7. ‘Waste water’ sector

3.7.1. What the ‘waste water’ sector comprises

GHGs such as methane and nitrous oxide emissions arise from the treating and supplying of clean water as well as handling of liquid wastes and sludge from housing and commercial sources (including human waste). Clearly the size of the population (and associated water demand) is strongly correlated with these emissions as well as the method of waste water treatment.

3.7.2. The challenge for the ‘waste water’ sector

As Table 9 shows the challenge for the waste water treatment sector to achieve an 80% reduction in GHG emissions is equivalent to 546 tonnes of CO_{2eq} by 2050. The emissions from the F-gases are forward projected in accordance with per capita emissions.

GHG emissions under a business as usual scenario (t/CO_{2eq})	1990	2009	2020	2030	2040	2050	Target 2050
Waste water treatment	2,728	3,079	3,260	3,416	3,536	3,618	546

Table 9 – Forecast of emissions from waste water treatment under a ‘business as usual’ scenario compared to an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 2182 t/CO_{2eq} in the waste water sector

The UK Environment Agency notes that the following actions can reduce GHG emissions arising from supplying and treating water:

[44] http://ec.europa.eu/clima/policies/f-gas/legislation/index_en.htm

- lower carbon design and treatment, such as optimising high energy activated sludge processes, alternative lagoon treatment making use of wind energy to aerate the water and using a technique that produces no sewage sludge for disposal;
- increased use of renewable energy, such as maximising sewage sludge combustion and digestion, wind and hydropower;
- Use of sustainable drainage to reduce energy use in pumping and treatment.

It will be very difficult to make significant reductions in emissions from this sector if we are limited to current treatment processes and are facing an increasing population. Thus it is not considered realistic to set reduction targets at this time and none have been modelled into the current reduction pathway.

3.7.3. Action framework for ‘waste water’ sector

Currently work is underway to identify a replacement sewage treatment works since the current plant is not able to consistently meet conditions set under its discharge permit (issued under the Water Pollution (Jersey) Law 2000). It will be important to further consider the separation of surface and foul water to improve the efficiency of any new system and the amount of energy required to operate it.

Action Statement 17: Liquid Waste Treatment Options

ACTION STATEMENT 17					
Liquid Waste Treatment Options					
Assumptions & Dependencies					
Assumptions - Further work is necessary to understand the full contribution the supply of drinking water and treatment of waste water makes to GHG emissions. By better understanding of this, the Energy Partnership will be able to set reduction targets. *Dependencies* – Locally applicable options arising from Liquid Waste Strategy.					
Summary					
The Minister for Transport and Technical Services supported by the Minister for Planning and Environment working with key stakeholders such as Jersey Water will: i. Further understand, through the annual reporting process, the contribution water supply and sewage treatment processes make to GHG emissions with the intention to set realistic reduction targets; ii. Ensure all options being examined for liquid waste treatment and secondary treatment are accompanied by a sustainability appraisal that accounts for the carbon emissions and energy use arising from that process.					
Delivery mechanism					
Department of Transport and Technical Services to facilitate development and implementation of liquid waste treatment.					
Monitoring					
If the Liquid Waste Strategy does not gain political support or the lowest carbon option is not adopted, carbon reductions will not be achieved and further interventions will need to be developed. Alternatively there is potential to achieve higher carbon savings if further work identifies greater carbon reduction potential.					
Impact assessment				**Impact on total CO_2 savings**	
Security √	Affordability √	Sustainability √		<1%	
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
17.1 – Reduction targets set for this sector		By 2015			
17.2 Sustainability Appraisal of all liquid waste treatment options completed		√			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Costs – Accounted for by TTS Liquid Waste treatment options	n/a	n/a	n/a	n/a	n/a

3.8. Shipping

Commercial shipping generally does not refuel in Jersey. However, pleasure craft (both visitor and local) do and use mostly diesel (light fuel oil) and a little petrol is still used while all outboards use petrol. Currently GHG reporting does not separate the allocation of products used by shipping or road transport. For this reason, emissions from shipping have not been modelled, but subsequent reporting and reviews will need to take account of this issue.

Similar to the aviation sector, reducing emissions in the shipping sector requires global action. There is currently no international regulation of greenhouse gas emissions from ships (Although other pollutants such as NO_x and SO_x are covered by the MARPOL International Agreement). Despite many years of efforts, in particular in the International Maritime Organization and the United Nations Framework Convention on Climate Change it has not been possible to agree on an effective global approach to regulating these emissions.

The European Union is actively engaged in pursuing international agreement on global measures to reduce greenhouse gas emissions from international maritime transport. Although considerable efforts are being made, primarily in the International Maritime Organization (IMO) and the United Nations Framework Convention on Climate Change (UNFCCC), progress towards effective global reduction measures has so far been limited.

3.9. Residual emissions

3.9.1. Offsetting unavoidable carbon emissions

The pathway illustrates that there are likely to be carbon emissions that the Island cannot avoid, albeit diminishing year on year. To demonstrate Jersey's high levels of international responsibility, the Island could mitigate its irreducible contribution to global pollution by contributing to bona fide carbon reduction projects. The Kyoto Mechanism is currently the only internationally agreed mechanism for regulating carbon credit activities, and, crucially, includes checks for additionality and overall effectiveness. Its' supporting organisation, the UNFCCC, is the only organisation with a global mandate on the overall effectiveness of emission control systems, although enforcement of decisions relies on national co-operation.

Carbon off-setting involves calculating emissions and then purchasing equivalent credits from emission reduction projects that have prevented or removed the emission of an equivalent amount of carbon dioxide somewhere else. 'Off-setting' must be properly regulated to ensure that the money raised pays for *bona fide* projects that result in emission reductions that would not have happened otherwise. Certified Emission Reductions (CERs or carbon credits) are traded in the international market and arise from Clean Development Mechanism Projects or Joint Implementation projects – two of the Kyoto Protocol mechanisms.

International schemes are under development to ensure that this is the case; however, participating in Kyoto Mechanisms already ensures validity. A fundamental component of a project qualifying under the Kyoto mechanisms is that the project must also

generate sustainable development benefits for the host country, even if these benefits do not accrue directly to the project developer. This ensures that the project brings about real community benefits in addition to the contribution they make to negating global carbon emissions.

Jersey therefore has the opportunity to participate in Kyoto (or other emerging validated) mechanisms to offset any remaining emissions that are not abated domestically. There is also an opportunity to off-set personal carbon emissions allowing individuals to off-set their emissions arising from travel and other lifestyle choices. This will be further assisted by the carbon information gathered in Action Statement Proposal 4.

3.9.2. How to negate residual emissions

The issue of residual emissions is how to deal with the balance of emissions remaining, which represents the difference between the 80% 2050 target and domestic abatement. According to the emissions outlined in the pathway, residual emissions would be 39,521t/CO_{2eq} by 2050.

3.9.3. Action framework for residual emissions

Emissions are taken up by ‘carbon sinks’ which are incorporated within the three categories of agriculture and related land use, development, and forestry. This category includes emissions as well as removals resulting from afforestation, reforestation, deforestation and forest management together with changes between grassland, cropland and settlements. Therefore changes in agricultural patterns and semi-natural habitats can impacts on emissions. However, on-island there is limited capacity to substantially increase the area of carbon sinks within land use constraints although the 2011 Island Plan does provide protection for designated areas e.g. Countryside zone, Coastal National Park. Therefore the action proposed seeks to off-set residual emissions through other mechanisms if necessary.

Action Statement 18: Working to negate unavoidable residual carbon emissions after CO_2 targets have been achieved

ACTION STATEMENT 18
Working to negate unavoidable residual carbon emissions after CO_2 targets have been achieved
Summary

The Minister for Planning and Environment, if residual emissions are required to be offset, will:

i. Seeks to off-set emissions in a bona fide partnership with a validated carbon reduction project in another jurisdiction;
ii. Continue to promote, provide and extend opportunities for individual carbon off-setting through the Eco-Active programme in partnership with appropriate organisations such as Durrell;
iii. In conjunction with Policy PE7 & 8 in the States of Jersey Rural Economy Strategy 2011-2015 ensure that on-island natural carbon storage (within vegetation) is protected and enhanced.
iv. Ensure that carbon emissions from all States of Jersey Council of Ministers' travel, is offset in accordance with the requirements of Action Statement 7 - Energy efficiency improvements in the Public Sector. Work towards offsetting carbon emissions from all Departments by 2020 through the Eco-Active States programme.

Delivery mechanism

Long term approach to offsetting final residual emissions to be developed. Short-term personal and States offset opportunities promoted through Eco-Active programme – Department of the Environment. Protecting on-island carbon sinks within natural habitats is core ongoing work of the Environmental Management and Rural Economy team.

Monitoring

If the baseline emissions reduction target is not achieved the requirement to offset will become higher. In addition, review will need to be undertaken of 2050 Carbon prices to ensure this is a feasible approach at that time.

Impact assessment

Security √	Affordability X	Sustainability √

KPI	**2014**	**2020**	**2030**	**2040**	**2050**
18.1 – Amount of carbon offset from public sector travel to be met from Departmental travel budgets		√	√	√	√
18.2 – Amount of residual carbon offset by 2050 (not intended to exceed the 2050 target)					According to monitoring
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Costs to offset carbon will vary according to trading price of carbon and total residual emissions will only be offset in 2050. Cost to offset Public Sector travel to be determined by 2020.	n/a	n/a	n/a	n/a	n/a

Chapter 4 - Energy security and resilience

4. Introduction

A safe and secure supply of energy to the Island is important for both the local economy and the well-being of Islanders. The events of July 2012 with both gas[45] and electricity supplies[46] sharply bought into focus the need for a resilient and secure energy supply. Understanding energy security in the Island context is a key policy area within this Plan and has demanded immediate attention, preliminary work commenced in 2013.

Security of supply could mean many things but providing more resilient and secure energy supplies will usually come with a cost. The more secure the supplies, the higher the price that islanders would be likely to have to pay for their energy use. At one extreme, to reduce the risk of external interruptions to energy supply it could mean that 100% of energy used locally would be sourced and generated in Jersey. However this is unlikely to be the optimal scenario and it would also not guarantee that energy was always available, if the supply interruptions was as a result of activity in Jersey (the 2012 example of the interruption to the gas supply was caused locally).

Instead we must strike the right balance between the benefits of investing in increasing the security of our energy supplies and our resilience to serious interruptions (from whatever cause) against the costs of doing so. Confidence in the economy and vital services depend upon this.

POLICY 2: ENERGY SECURITY AND RESILIENCE

The Minister for Planning and Environment, working with other relevant Ministers, will develop and implement the actions and work streams, including examination of the options for utility scale renewable energy generation, to ensure a diverse, safe and resilient supply of energy to meet the Island's needs.

Policy 2 identifies that work needs to continue to fully understand the risks to the Island's energy supplies, the likelihood and potential costs associated with these risks, and the costs and benefits of actions that could be taken to mitigate these risks.

That is not to say that business continuity management is not being addressed. A Utilities and Essential Services Working Group has been convened to discuss issues such as emergency preparedness, business continuity management (BCM) and resilience in the supply lines etc.

This work promotes BCM, critical incident plans and risk assessment and has led to the signing of a memorandum of understanding with Fuel Supplies (CI) Ltd, Esso

[45] A fire at the St Helier gasometer leading to its decommissioning
[46] The failure of the island's original interconnector (EDF1) leading to is decommissioning

Petroleum Products and La Collette Terminal, and the provision of a weekly report on stockholdings. The group has improved understanding and cooperation with these essential services around emergency preparedness. Currently, fuel companies are licensed and regulated by the Fire and Rescue Service and Health and Safety Inspectorate.

The Islands Emergency Powers and Planning (Jersey) Law 1990 provides provision for intervention with these industries during a crisis. The legislation identifies competent authorities during a crisis; for electricity and fuel this rests with the Minister for Home Affairs.

To address vulnerability in energy supply a greater understanding is needed of two key categories:

1. **Prevention**: Reducing the likelihood that risks become real in the first place; and
2. **Resilience**: Reducing the consequences of any shortfall in, or interruptions of, energy supply

Alongside the need to more fully investigate energy security and resilience, this chapter sets out some immediate proposals to improve resilience and focuses on the following areas:

- Working with the energy suppliers to ensure there is a good understanding of local energy supplies and stocks;
- Improving diversity of supply by utilising local energy resources.

4.1. Energy Supplies

Currently, under business as usual operating conditions, over 95% of energy used on the Island is imported; electricity is imported via subsea cables from France and petroleum products are imported by ship and stockpiled on island. Therefore energy security is usually dependent on the robustness of these supply lines.

4.1.1. Challenge

The direct benefits of increased local security supply arise from the reduction in the time that energy supplies are unavailable to businesses and residents. However, these benefits are likely to be very idiosyncratic, and are likely to be:

a) very time-dependent (i.e. when the interruption occurs) and/or
b) for how long the interruption lasts (i.e. for some users a 24 hour interruption of the electricity supply is more than 24 times as costly as a one-hour interruption).

The benefits of increases in security of supply are very hard to generalise. A detailed analysis which sets the benefits against the costs is required to draw conclusions on whether or not any specific action on increasing security of supply will be effective and is economically feasible.

An increased security of supply depends on the use made of the energy, it does not necessarily follow that the best approach to attaining the benefits of increased security is by reinforcing the *entire* supply system or increasing the general level of stored energy on the island.

In 2013, in recognition of the requirement for progressing the understanding of these issues, a phase one study was commissioned by the States of Jersey to provide an analysis of energy security and resilience in Jersey. An assessment of the Jersey energy sector was undertaken, and a series of risk profiles from the UK National risk register were applied in order to identify a set of specific risks to energy security in Jersey. Based on the risk assessment, the study developed a series of energy security definitions for Jersey. The impacts of a range of different shocks to the energy system were modelled against these definitions and a set of mitigating interventions were identified.

The assessment identified a set of actions to develop an energy resilience strategy for Jersey. Key stakeholders from the energy industry, government and non-governmental organisations contributed to the study and participated in a stakeholder workshop to discuss the findings and develop the recommendations.

These recommendations have been used to develop Action Statement 19. Using the model and data from the phase one report, a sequential approach, as illustrated below, will be taken to formulate a coherent and fit-for purpose energy resilience strategy which will balance the competing demands of emissions reductions, energy costs and achieving security of supply. A copy of the executive summary of the phase one report is available on www.gov.je[48].

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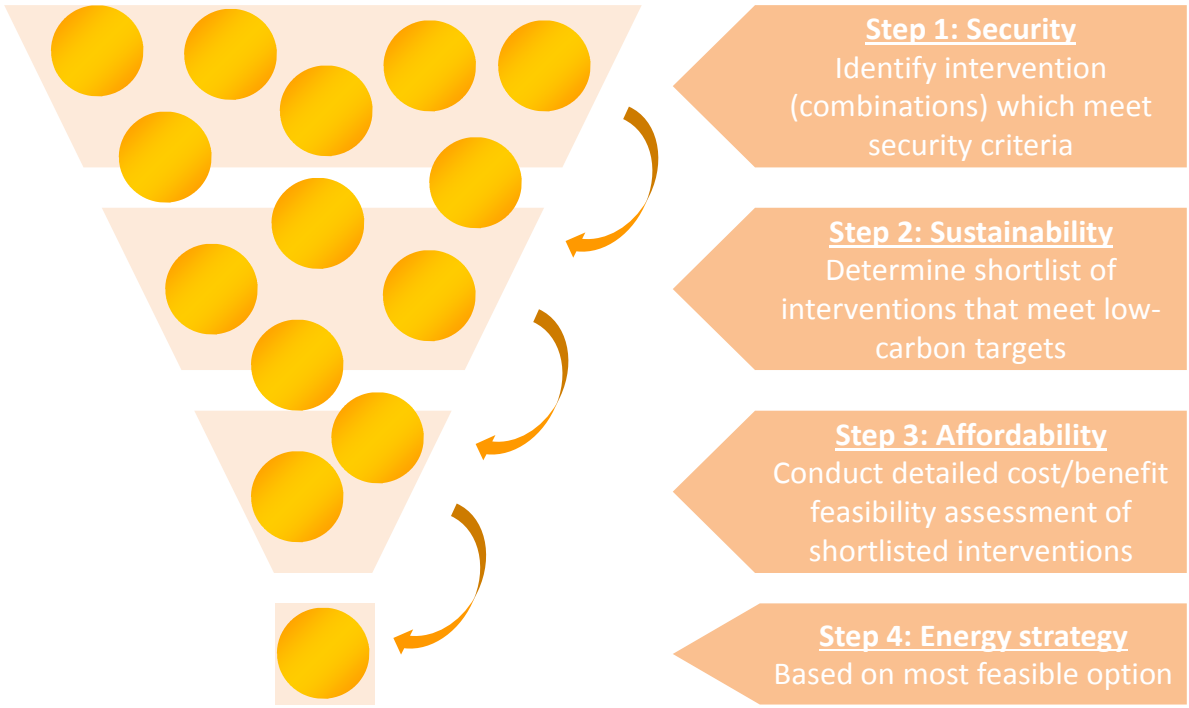
http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20Jersey%20Energy%20Security%20and%20Resilience%20Study%20-20Executive%20Summary%20131101.pdf

48

http://www.gov.je/SiteCollectionDocuments/Government%20and%20administration/R%20Jersey%20Energy%20Security%20and%20Resilience%20Study%20-20Executive%20Summary%20131101.pdf



Action Statement 19: Develop an energy resilience strategy for Jersey

ACTION STATEMENT 19
Develop an energy resilience strategy for Jersey
Summary
By the end of 2015, the Minister for Planning and Environment, supported by the Chief Minister, Minister for Economic Development, and other key stakeholders, will develop an energy resilience strategy for Jersey. This will follow on from the phase one study and is likely to require the following sequential steps: 1) Security – assess the dynamics between identified possible energy security interventions (e.g. additional sub-sea cables, increasing storage capacity at La Collette, utility scale renewables). Then carry out further sensitivity analysis in order to determine a full range of possibilities which will also meet the energy security of supply criteria; 2) Sustainability – identify those interventions which will help Jersey to meet low-carbon targets; 3) Affordability – conduct a detailed feasibility assessment, including cost-benefit analysis, of the shortlisted interventions to determine least-cost solutions, to inform AS 27/28 4) Drafting of energy resilience strategy in conjunction with the development of the climate change adaptation strategy (DoE business plan 2014/15) – to include the selection of interventions and security standards. This study will also be informed by the outputs from Action Statement 20.
Delivery mechanism
Findings of the study to be reported to the Energy Partnership and further actions and recommendations to be developed following analysis.
Impact assessment

Security √	Affordability X	Sustainability X			
KPI	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
19.1 – Report produced and the Energy Partnership to consider the recommendations and their impacts on future policy.		√			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Costs – Security of supply study (To be funded from Department of the Environment and Central Environment Vote)		£100,000			

4.1.2. Resilience for liquid hydrocarbons

To inform the study proposed under Action Statement 19 parallel work will be undertaken to comprehensively draw together and coordinate information about local resilience of supplies and stocks of liquid hydrocarbons.

The Island currently imports liquid hydrocarbons by sea-route supply chains run by the respective parent company. Hydrocarbons including kerosene, liquid petroleum gas, petrol and diesel are stored at the fuel farm at La Collette before being distributed to end-use consumers or intermediaries; for example much of the petroleum stock is held on forecourts across the Island. Additional storage for LPG occurs at Les Ruettes, St John and jet fuel is stored at the Airport.

Given the dependence on importation supply lines, the energy distribution is reliant on the primary supply lines not being disrupted, or at least not being disrupted for longer than the locally stored supplies can satisfy demand.

In relation to local energy security the following three factors have been modelled in order to understand the current levels of security, and what difference increasing the local supply security would make:

- The relationship between the probability of disruption to the supply lines;
- The length of time the supply lines are unavailable (or partially available);
- The local buffer stock of the energy supply.

Although the size of the existing fuel farm limits the stocking capacity of all the products, which are held at volumes well below European mandatory limits[49], good product management by the fuel companies has ensured that this has not caused a significant supply or demand problem for the Island. There is a memorandum of understanding (MoU) in place between the La Collette consortium and the States of Jersey which sets a 5 day minimum stockholding standard, with a 7 day ‘alert’ requirement to notify if stocks fall below this level. Weekly stockholding reports are sent to the SoJ emergency planning officer.

The future energy requirements of the Island will be met with a diverse range of energy products and, for at least the medium term, liquid hydrocarbons will continue

[49] Strategic and Minimum Stockholdings Supply Chain Security – Petroleum Products in Jersey, Consultancy Solutions Oil & Gas, February 2009

to form an important part of the diverse mix of energy and so resilience for all fuels is important for this period.

4.1.3. Action framework for liquid hydrocarbons

The health and safety considerations around the gas storage facility at La Collette effectively represent a constraint on development in the vicinity. As a result of the Buncefield event in the UK, further work has been undertaken to consider all the major hazard risks associated with the hazard installation at La Collette which has led to a revision of the safety zone. As part of the phase 1 energy security and resilience study, the impact of various shocks to gas and oil supply chains were modelled.

As part of the assessment of mitigating interventions identified in the phase one study for action statement 19, it is clear that more work is required to assess future scenarios. For example, consideration was previously given to the feasibility of a hydrocarbon pipeline from France to Jersey. However, there were some significant challenges to this project[50] that relate to the economies of scale of supplying small Island communities. At the level of analysis carried out, there was only economic viability if a combined oil and gas pipeline could be laid. Under this scenario the benefits from the more economically advantageous oil pipeline cross-subsidised the gas pipeline. Nevertheless, other options have been proposed recently, for example the replacement of imported LPG with LNG.

The impacts of these proposals on security of supply need to be better understood and considered alongside the negative effects, in terms of greenhouse gas emissions, of any increase in the use of hydrocarbon fuels. Based on information that has been independently assessed as part of the Scrutiny process for development of the Energy Plan, there is little evidence to suggest that the government should consider large-scale investment in pipeline infrastructure in the near future.

The recommendations from action statement 19 and 20 will be considered by the Energy Partnership in order to establish a clear energy security and resilience policy position.

Action Statement 20: Contingency planning and stock holding for liquid hydrocarbons

ACTION STATEMENT 20
Contingency planning and stock holding for liquid hydrocarbons
Summary

[50] Pöyry Energy (Oxford) Limited 2006 “Economic Feasibility of Supplying Hydrocarbon Fuels to Jersey by Pipeline” and P157/2009 Natural Gas Pipeline : Strategic Study Lodged au Greffe 30/09/09 by Deputy Le Claire

By the end of 2014, The Minister for Planning and the Environment working with the Minister for Economic Development will request that the Jersey Gas Company and the La Collette Consortium working with Jersey Harbours will provide to the Energy Partnership:

i. An updated Contingency Plan (or Business Continuity Plan) that outlines the current response in the event of a serious disruption to the Island's energy provision occurring through a major incident or emergency and the route of recovery to a normal operating state;
ii. An assessment of how the availability of different stocking levels (for example, through a larger or smaller fuel farm) would affect the Island's ability to maintain energy supplies and the costs of this;
iii. A consideration of how proposed specific land use changes / future alternative fuels mixes could impact on stock holdings and emergency blast zones. For example, a relocation of the port, the release of the Jersey Gas site in Tunnel Street and St. John or the importation of Liquid Natural Gas (LNG) instead of LPG.

The Energy Partnership will consider the outputs from i-iii in order to assess the economic, social and environmental implications of maintaining secure energy supplies and will inform the study undertaken under Action Statement 19.

Delivery mechanism

Chief Minister's Department (Emergency Planning Officer) working with key industry stakeholders. Department of Environment to advise on relevant planning issues.

Impact assessment

Security √	Affordability X	Sustainability X

KPI	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
20.1 – Revised SLA with agreed energy supply standards (review period to be determined).	√				
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Land use assessment costs to be met as part of master planning process and to be met by planning obligations or developer. Costs associated with provision of continuity plan met by operators from within existing business planning frameworks.	√	√			

4.1.4. Electricity Security and Supply Standards

The large 'sunk costs' of transmission infrastructure make Jersey Electricity plc (JE) a natural monopoly for the Island's electricity provision (as is the Jersey Gas Company for LPG gas).

However, the Island relies on continued uninterrupted affordable electricity and this is reliant on considerable investment by JE in a further sub-sea interconnector after the planned downsizing of the La Collette oil-fired power plant by 2015.

The decision made by JE to switch from on-island power generation to imported, low carbon[51], electricity has been instrumental in Jersey's carbon reductions to date. In addition, JE currently having a self-imposed CO_2 emission target of 100g/kWh/CO_2

[51] The EdF legally declared figure for electricity supplied to Jersey, taking account all of its portfolio of generation and supply was 0.086 kg/C/kWh in 2010

which they achieve when the majority of the energy they provide has been sourced from low-carbon French generation. This has been formalised in the recent renegotiation of the Channel Island Electricity Grid's contract whereby certified low-carbon electricity is guaranteed for Jersey (and Guernsey) until 2023. It also allows JE to access renewable sources of energy within EDFs generation fleet. Under the new contract with EDF, customers will benefit from being able to purchase from a 'renewable' tariff that would guarantee that their choice represents renewably generated electricity; it is recognised that there might be increased costs associated with this tariff.

Ordinarily, JE generate less than 10% per annum of electricity on-island from their plant at La Collette which is fossil fuel derived and of high carbon content. Under normal operating procedures they ensure this is minimal so that they achieve their carbon emission target. The permanent loss of Jersey's first submarine cable in the summer of 2012 has meant that until the third interconnector has been completed and commissioned (c.2015) there will be a period of increased on-Island generation from hydrocarbon fuels in order to meet the Island's electricity demand. Consequently there will be a temporary increase in Jersey's GHGs during this period.

4.1.5. Feed-in tariffs (Buy-back tariffs) for micro generated electricity

'Incentive feed-in tariffs' are where the price paid by the utility for energy supplied to it as surplus energy from micro generation projects are more than the wholesale price of electricity (avoided cost).

When buy-back prices are greater than the wholesale prices, a premium is being paid by the retail customer for the micro generated electricity. If the retail customer is paying more than the cheapest available electricity costs, effectively a subsidy is being applied across the market in favour of those supplying micro generated electricity. Thus, under the above scenario, all electricity customers are subsidising those who have micro generation technologies installed and export energy into the grid.

It might be appropriate to subsidise renewable energy micro generators for the 'common-good'. One such scenario would be if the micro generated electricity is from renewable sources and it is displacing high-carbon centralised generation from say, a coal-fired power station and thus lowering the jurisdictions' carbon emissions.

However, as discussed above, in Jersey the Island's electricity is imported (see section 2.4) and has very low carbon intensity. The carbon intensity of energy generated in France (and indeed the entire EU) will continue to diminish as a result of stringent carbon reduction targets.

If Jersey Electricity were required by the States to pay more than the avoided cost for micro generated electricity, customers who are not micro generating electricity would have to cross subsidise this purchase. However, no overall carbon emission reductions would be achieved since one form of low-carbon electricity would simply be displacing another. Therefore at the current time it is not currently considered appropriate to ask Jersey Electricity to pay incentive Feed-in Tariffs to micro generators.

However the effect of other Action Statements (see Chapter 3, Action Statement 4 and 5) to incentivise micro generation uptake will be carefully monitored by the Energy Partnership. If they are not sufficiently effective at increasing the uptake of decentralised renewable energy in the marketplace then the introduction of incentive feed-in-tariffs and their consequences will be more carefully examined.

4.1.6. Action framework for electricity supply standards

The majority shareholder of JE is the States of Jersey at 61%, although the Company operates at arm's length with no government representative on the Board. To clarify the relationship between government and JE the following actions will need to be monitored by the Energy Partnership.

Action Statement 21: Working with Jersey Electricity to set supply standards

ACTION STATEMENT 21
Working with Jersey Electricity to set supply standards
Summary
The States of Jersey will work with Jersey Electricity plc. to ensure that: i. In line with the work streams outlined in Action Statement 19, define the appropriate security standard for the importation of electricity ii. They provide by the end of 2015, a contingency plan that outlines the response in the event of a serious disruption to the Island's electricity provision occurring through a major incident or emergency and the route of recovery to a normal operating state; iii. They continue to supply the Island in the long-term with low carbon-intensity electricity. This must remain a material consideration in future renegotiations of the Channel Island Electricity Grid's contract with European electricity providers; iv. They bring forward the option for customers to purchase at the appropriate tariff, 'renewable' electricity' i.e. that electricity that is generated from renewable sources e.g. hydro or wind generation. v. They will not currently require JE to pay more than the avoided cost for surplus micro generated electricity that is sold back into the grid. However, JE will be required by 2014 to: a. Make available easily understood buy-back rates that price electricity at avoided cost; b. Continue to provide advice and assistance in the installation of the appropriate metering equipment to enable micro generators to sell surplus electricity back to the grid; c. Provide transparent and proportionate tariffs for buy-back rates for commercial and industrial scale Combined Heat and Power (CHP) plants on a case by case basis. The Energy Partnership will monitor the uptake of decentralised renewable energy as a result of the other enabling actions (Action Statements 4 & 5). If uptake is not considered to be sufficiently contributing to carbon reduction targets then the Energy Partnership will work with CICRA to further research incentive feed-in tariffs.
Delivery mechanism

Department of the Environment working with the Energy Partnership, CICRA and Jersey Electricity plc.					
Impact assessment					
Security √	Affordability X	Sustainability √			
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
21.1 Green Tariff available	√				
21.2 Feed in Tariff assessment completed by Energy partnership		√			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
None to the States of Jersey, costs to JE plc. are covered within their business planning framework	√	√	√	√	√

4.2. Offshore utility scale renewable energy

4.2.1. Introduction

As well as making the supply lines more robust and resilient, increased local security of supply could also be achieved by using locally produced primary energy input either at the utility and/or local scale. Such inputs could include wind, wave, tidal power, and biomass into the longer term. However, unless the locally produced energy inputs can deal with the *total* demand, the impact of any increase in supply from these sources on the *benefits* that can be delivered is not necessarily straight forward and will need further investigation (see Action Statement 22).

In addition, energy generation from renewable sources will be more sustainable than the use of hydrocarbon energy. However, it is important to make the distinction between local sources of sustainable energy and imported sustainable energy. Either would achieve the aim of sustainability. However there may be other arguments for preferring one or the other. For example, local sources of renewable energy could provide greater protection from external threats to energy supplies, and may in the future be financially attractive if technological advances mean that it becomes relatively inexpensive to exploit Jersey's local energy sources.

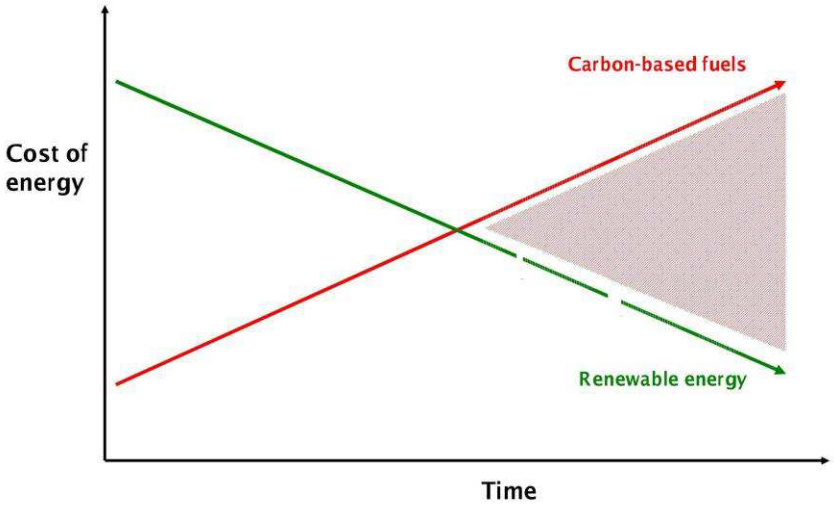
4.2.2. The challenge of generating energy from renewable sources

A challenge for the near term is that it seems likely that imported energy will be cheaper than local generation. Thus, the point at which the amount of renewable energy generated can increase is likely to be driven, to a large extent, by changes in relative energy prices. The costs of carbon-based fuels are expected to rise over time as the remaining reserves become less accessible and less plentiful. This is particularly true if the price of hydrocarbons becomes subject to 'carbon pricing'.[52] If the price of non-renewable but low carbon electricity follows the price path of carbon

[52] Carbon pricing is the generic term for efforts to put a price on carbon through subsidies, a carbon tax, or an emissions trading ("cap-and-trade") system.

based generation, Jersey's electricity customers will also face rising electricity prices in relation to electricity imported from France, notwithstanding that it is already low carbon.

In addition, as technology advances and new technologies such as tidal stream move into the commercial marketplace, the costs of renewable energy generation are likely to fall. Thus there is likely to be a crossover point where renewable energy becomes equal to carbon-based fuels and then cheaper than them; shown in the area shaded on the right in Graph 10.



Graph 10 Illustrative cost curves for both renewably generated energy and carbon based fuels. Note that in reality the curves are unlikely to be straight or smooth.

The area of the graph to the left of the crossover point represents the situation now where in most instances renewable energy is more expensive than traditional carbon-based fuels and must be supported through subsidies. Hence, any move by Jersey to locally produce renewable electricity for its own consumption at this point is likely to lead to a significant increase in the price of electricity if Jersey were to substitute locally produced renewable energy for that which it currently imports.

However, in the future, if the Island is able to harness its primary renewable energy at an equal or lower cost than imported hydrocarbon fuels it can supply the local market with renewable energy that would displace imported hydrocarbon fuels (e.g. LPG, fuel oil, petrol) and most likely bring about the following benefits:

- A reduction in Jersey's carbon emissions;
- Increased long-term local security of supply against some interruption risks;
- Improved local air quality.

It may also:

- Provide opportunities for diversifying the local economy;

- Create the opportunity for local businesses to take advantage of new low-carbon / renewable technologies as and when they are proven and economically viable;
- Lead to financial benefits from tax revenue from generating companies and any lease arrangements in respect of the sea bed;
- Enhance Jersey's international reputation proving that Jersey is a good place to live, work and do business.

As we have discussed, in jurisdictions where technologies such as wind power are exploited, they are subsidised relative to the prevailing price (cost) of available alternatives. If Jersey was to enter the renewable energy marketplace before the price of this energy reaches parity with the costs of alternatives, it could export that energy to jurisdictions who would be willing to pay a premium (most likely in the form of subsidy of 'Feed-in Tariff') for the renewable energy.

The benefits in this scenario are different:

- Jersey's carbon emissions are not reduced since the importing jurisdiction who are paying the premium for the renewable energy claim the 'carbon-credits' that this energy carries (although this is still an overall benefit to society in general);
- The Island's energy mix is not materially affected since the energy is being exported although there is an argument that increasing the diversity of supply does provide a natural hedge against global energy supplies and gives greater options to switch into this energy source at some point in the future;
- The Island's economy benefits from being the location of a large infrastructure project potentially diversifying the local economy by providing support and maintenance services. It is considered unlikely that large scale Research and Development would relocate in Jersey when there are numerous heavily government subsidised test bed areas in other jurisdictions;
- The Island is (albeit in a small way) contributing to global security of supply;
- The Island benefits from the tax revenue from the generating companies and any lease arrangements in respect of the seabed.

When the feasibility has been assessed, the generation of RE for on-island use or export will be decided and the associated benefits from that scenario realised.

4.2.3. The most likely technology options for Jersey

Even though it is recognised that a move towards generating renewable energy is a longer-term goal this work stream has already been significantly progressed by the Renewable Energy Commission[53]. Although the benefits of renewable energy are some way in the future, the Commission have concluded that it is essential that the journey towards locally renewable energy is begun now[54]. Lead in times for large

[53] This group have been advising the Minister since 2008 and are mandated on a number of work streams until 2013 MD-PE-2011

[54] 'Tidal Power for Jersey – The Next Steps' A report containing recommendations to the Minister for Planning and Environment January 2011

infrastructure projects are long and Jersey must be ready to act well before the cost of carbon-based energy rises above that of renewably generated energy.

Preliminary assessments of both the wind resources and tidal stream resources[55] have shown there are reasonably good resources that the Island could take advantage of.

4.2.3.1. Wind turbines

Both on and off-shore wind resources could yield significant amounts to energy for the Island. However, it is considered that there are insurmountable planning barriers to exploiting on-shore wind resources. For example, the recommended minimum distance of 500m of dwellings from (current technology) turbine installations, is not achievable in Jersey and there would be further significant 'exclusion zones' to ensure that turbines do not interfere with radar or aircraft take-off and landing paths. The presumption against on-shore utility scale windfarms is outlined in the 2011 Island Plan (see Chapter 9 - Natural Resources)

However, there is good physical potential for exploiting off-shore wind and this is more attractive in the short term since the technology is commercially ready and proven in many locations globally. But, electricity generated by off-shore wind farms is currently more expensive than the electricity purchased from the French Grid[56].

Nevertheless, technology is evolving and techniques are becoming more established which serve to continually close the gap in the costs between conventional and renewable technologies. In the EU, developments are being supported by incentive funding for capital development costs and premium tariffs for electricity produced coupled with an obligation on energy suppliers to supply a minimum percentage from these sources.

Given the current necessity for subsidies to underpin the harvesting of renewable electricity at commercially acceptable rates, for off-shore wind developments in Jersey's waters to be economically viable (at least in the short term) it will be essential for Jersey to be able to gain access to EU subsidies by selling renewable energy generated in Jersey waters into the European grid. This strategy would also overcome the problem of intermittency of supply which could be problematic if Jersey wanted to consume the electricity from these local sources itself.

4.2.3.2. Tidal Technologies

Jersey's very large tidal range, high tidal stream velocities and shallow seas, makes it attractive to proven technologies such as tidal barrages and nascent technologies such as marine tidal turbines and tidal lagoons.

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[55] .'*Development of Jersey Energy Policy'* A report commissioned by the States of Jersey AEA Energy and Environment Ltd March 2007 & Recommendations to the Minister for Planning and Environment Minister from the Tidal power Commission January 2011

[56] A 90MW offshore wind farm costs in the region of c.£135-160M. Jersey Electricity plc advises that to supply just 20% of local electricity from off-shore wind, tariffs would need to rise by 20% to all customers.

The impact of tidal barrages is considered insurmountable for Jersey at this time. For example, a tidal barrage across a bay would have effects that could not be satisfactorily mitigated on sensitive inter-tidal areas and marine ecosystems whilst other significant effects would be on navigation, sediment transport regimes, the visual impact and amenity and fisheries uses.

The Island can offer attractive resource conditions for research and development especially in the rapidly developing area of tidal turbine technologies; for example shallow waters, good connection with the grid and comparatively benign weather conditions. Early technology set ups in the Island would offer the potential to move to commercial arrays as technology develops. However, most cutting edge Research and Development occurs in locations or regions that can offer financial incentives for incoming developers and it is unlikely that Jersey will be in a position to offer such a regime and infrastructure (for example see the European Marine Energy Centre ltd[57]).

It is considered that the harvesting of energy from tidal stream turbines is seen as potentially one of the best routes for Jersey to exploit its natural energy resources in the long term when these technologies reach commercialisation over the next decade.

4.2.4. Action framework for renewable energy

Regardless of which renewable energy technology is finally chosen for Jersey e.g. tidal stream and/or wind power, it is important to recognise that the delivery mechanism for renewably generated energy is in the large part likely to be electricity. Thus the maintenance and upgrading of the electricity infrastructure must remain a long-term objective.

The Renewable Energy Commission has commenced a number of work areas that prioritise a 'technology non-specific' approach that simply sets out the practicalities for renewable energy generation in Jersey (Figure 1). The development of a legal and consenting framework is required as well as the consideration of commercialisation strategies by the States of Jersey and the eligibility of Jersey to EU / UK subsidy for exported renewable energy.

[57] http://www.emec.org.uk/standards.asp

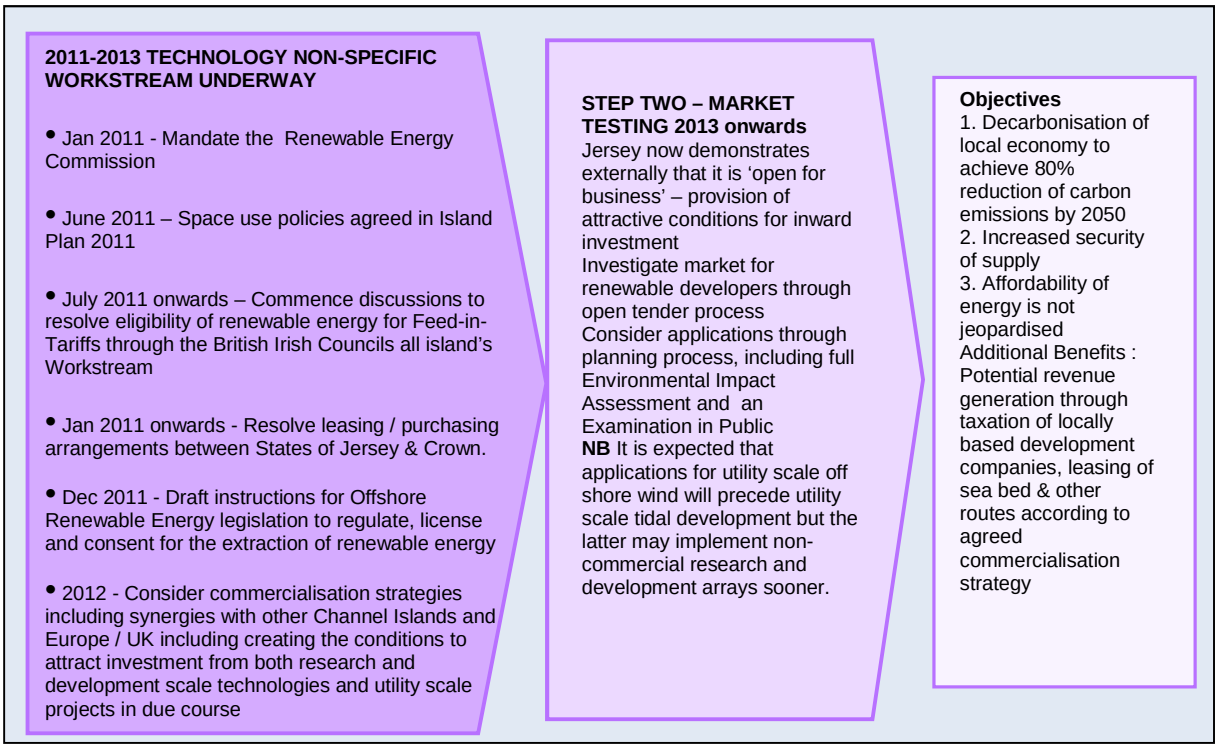


Figure 1 – A phased approach for achieving off-shore utility scale renewable energy

Key work streams are already underway as follows (Figure 1, 2011-2012):

a. Economic

Assessing the economic costs and benefits of renewable energy opportunities, and how they compare to the alternatives such as using imported low-carbon energy. The ongoing dialogue must be continued to ascertain whether electricity generated in Jersey might be eligible for financial incentives such as Feed-in-Tariffs from both the European Continent and the UK. If Jersey is not eligible for such assistance, the timescale at which renewable energy might be developed will be constrained unless alternative funding can be found. Any support from the Jersey government or Jersey customers, and any other incentives, would need to be assessed carefully from an economic perspective as well as the impacts it might bring on security of supply.

b. Legal

The uncertainties in terms of generic environmental issues, consenting, leasing requirements and associated costs of energy extraction must be removed. Ownership of the seabed to the 12 mile limit lies with the Crown in the right of Jersey i.e. the Duchy of Normandy as represented by the office of Her Majesty's Receiver General and discussions must be concluded in respect of leasing terms and conditions. The conclusion of these investigations will inform the drafting of an Offshore Renewable Energy Law for ultimate consideration by the States of Jersey;

c. Partnerships

There must be Inter-Channel Island co-operation to ensure that the highest degree of jurisdictional consistency within the Channel Islands is achieved[58]. Continuing and developing Jersey's roles within the British Irish Council's Energy sub-groups and the All-Island Grid work stream as an opportunity to share knowledge and ensure that Jersey's (along with other Channel Islands) interests are optimised across BIC Member Administrations and in particular with European Union.

d. Environmental

High level identification of potential sites for projects will be carried out in 2013 by the Environment Department in association with stakeholders through the production of a Marine Spatial Plan. Drafting instructions for legislation are being prepared that will require a potential developer to obtain a renewable energy licence in a pre-identified area. This licence will regulate the environmental, health and safety and navigational risks associated with a utility scale project. Policies in the 2011 Island Plan ensure that the environmental and social aspects of any project are rigorously and transparently tested through the production of an Environmental Impact Assessment which will accompany the application for a renewable energy licence.

e. Commercialization strategy

In 2012 the format of the lease arrangements that will accompany a renewable energy licence will be considered. It will include the financial and due diligence arrangements necessary in respect of advancing a project with a developer of renewable energy. This work stream will also consider the funding models that will underpin a commercial development for instance a public-private partnership or community co-funding.

Step Two (of Figure 1) moves closer to the marketplace when developers will need to be able to assess their projects within the legal and consenting framework that will have been then agreed by the States of Jersey.

However the level of 'risk and reward' will need to be carefully considered. If Jersey wishes to externalize the risks associated with speculative projects then it cannot expect to benefit so greatly from the potential long-term financial rewards. A key part of this step is in understanding the marketplace in its context of global oil prices and recommending the point at which Jersey should enter a commercial arrangement and whether this is for the provision of local energy for the local market or for export.

It is anticipated that any mitigation required to the airport radar and software facilities would probably be met by the developer bringing forward a project. This will be subject to negotiation at the time and according to planning requirements.

4.2.5. Action framework for offshore utility scale renewables

It is recognised that the deployment of offshore renewable energy is a long term aim and is subject to a number of enabling steps such as clarification in respect of

[58] A Statement of joint working was signed by political representatives from Jersey, Guernsey and Sark in February 2012

subsidies, technological advances and commercial viability and more detailed environmental and stakeholder assessment. Thus the recommended actions centre on the 'technology non-specific' enabling steps already begun by the Renewable Energy Commission that will prepare the way for a future project so that Jersey is prepared at the appropriate time to offer itself as a de-risked jurisdiction that is open for business. The Island Plan 2011 already presents a space use framework for the deployment of offshore renewable energy and there is ongoing work within the Department of Environment to further understand the competing priorities for the marine environment using Marine Spatial Planning techniques.

A Channel Island Renewable Energy Group was established in 2011, which is underpinned by a Ministerial joint policy statement to exchange knowledge and to work together on renewables projects where appropriate. Officers meet regularly and there is an annual Political summit.

In addition, Jersey participates in the British Irish Council 'marine renewables' work stream as well as the 'grid' work stream where it is represented alongside England, Ireland, Scotland, Wales and the other Crown Dependencies. These forums allow cross-jurisdictional discussions in respect of renewable energy and transmission systems.

Jersey is represented on a number of French working groups e.g. Ille et Vilaine, La Manche, where renewable energy is a key topic due to the development of the St. Brieuc windfarm in French territorial waters as well as the development of the port of Cherbourg into a hub for renewable energy.

Action Statement 22, below, refers to the enabling steps required to put in place the regulatory and commercial framework for the long term exploitation of renewable energy in Jersey waters. The Energy Partnership will bring to the States, in due course, a proposition for a commercialisation model.

Current realistic estimates are that an offshore renewable project could be in place by 2030. However, if technological advances enable the timescale to be accelerated, this is not precluded.

Action Statement 22: Preparing the way for utility scale renewable energy

ACTION STATEMENT 22
Preparing the way for utility scale renewable energy
Summary

The Minister for Planning and Environment will work with the Minister for Economic Development, other appropriate Ministers and key stakeholders to continue the existing work stream on renewable energy that will: i. Put in place the technology-blind legal and policy framework to encourage utility scale offshore renewable energy projects in the future that will either generate energy for export or on-island use; ii. Carry out an economic assessment and examine funding options for such projects accepting that final decision will be made in conjunction with the States Assembly; Examine the effect of the proposals on local security and affordability of supply and diversifying and stimulating the local economy.					
Delivery mechanism					
Department of Environment to continue ongoing work streams in respect of environmental regulation of potential offshore projects. Economic Development Department to begin work on commercialisation opportunities. Advice and recommendations to be considered by the Energy Partnership and bring forward to the States as appropriate. Jersey participates in the British Irish Council marine renewables work stream where it is represented alongside England, Ireland, Scotland, Wales and the other Crown Dependencies. Jersey is represented on a number of French working groups e.g. Ille et Vilaine, La Manche, where renewable energy is a key topic due to the development of the St Brieuc windfarm in French territorial waters.					
Impact assessment					
Security √	Affordability X	Sustainability √			
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
22.1 – By 2025 at the latest, consideration by the States of an offshore renewable energy project accompanied by an economic analysis and appraisal of funding options and the impacts on security and affordability of supply.			√		
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Continuation of Renewable Energy Work stream already covered within Departmental cash limits	√	√	√	√	√

4.3. On-Island energy generation.

Additional to potentially harvesting offshore renewable energy there are other options for generating energy on-island, some of which are likely to be more achievable in the shorter term e.g. anaerobic digestion, combined heat and power and already underway, the generation of energy from waste.

4.3.1. The replacement Energy from Waste Plant

In 2005 The States of Jersey chose a modern mass burn Energy from Waste plant as the waste management solution to replace the existing incinerator at Bellozanne.

Electricity and heat can be generated from waste, the recovery of energy from waste in the new plant will provide up to 7% of the Island's electricity requirements, contributing to the security and diversity of the Island's energy supply.

The incineration of waste creates carbon emissions and those arising from the non-biogenic fraction contribute to the Island's carbon budget. Moreover, the volume of residual waste predicted to require incineration is expected to grow over the period of the plant's life because of the predicted increase in the number of households[59].

Current recycling targets, at 36%, are relatively conservative compared to what has been achieved elsewhere but reflect for instance the increased cost of shipping off the Island to mainland recyclate markets. Nevertheless, since the introduction of the Solid Waste Strategy, the very good support for the bring bank system has shown that the citizens of Jersey will engage in recycling if the means of doing so are made available.

Calls for improved recycling facilities and a kerbside collection are common. Of the questions asked in the Environmental Taxes consultation (2009), the one with the highest support (98%) was 'Do you agree that more should be done to encourage greater levels of waste recycling?' Of the question 'What new facilities or services would help you to recycle more waste?' nearly 30% answered, 'Collection of sorted waste from your house'.

An increase in the number of recycling initiatives since 2010 has meant that recycling has increased ensuring that overall volumes and types of residual waste going to the Energy from Waste are minimised with the associated benefits for carbon emissions.

To reduce the emissions arising from waste management process there is a need to minimise the volumes of waste from the consumer. Eco-Active will continue to support the Department for Transport and Technical Services in their efforts to increase recycling. The Eco-Active awareness and education programme will concentrate on information regarding improved environmental purchasing and decision making through campaigns such as 'Love Food- Hate Waste', and new domestic scale technological solutions. In addition, Eco-Active will raise greater understanding in respect of the embodied energy of imported products and the economic, social and environmental benefits of supporting locally produced products.

4.3.2. Action framework for minimising residual waste

Action Statement 23: Minimising residual waste

ACTION STATEMENT 23
Minimising residual waste
Summary

[59] See the Solid Waste Strategy 2005 (currently under review and to be released in 2012)

The Minister for Planning and Environment working with the Minister for Transport and Technical Services, through the review of the Solid Waste Strategy 2005: i. Ensure that recycling rates are increased (and exceeded beyond the current 36% target by 2018) and supported by appropriate collection mechanisms so that the throughput and types of waste entering the EfW are minimised; ii. Further categorise the local waste stream to ensure that only wastes that have no other disposal route, according to the waste hierarchy, are treated by the EfW plant. iii. The carbon impacts of handling any imported waste from other jurisdictions will be assessed and accounted for.
Delivery mechanism
Revision of the solid waste strategy by Department for Transport and Technical Services in 2014 will incorporate Action Statement requirements.
Impact assessment

Security √	Affordability X	Sustainability √			
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
23.1 – Recycling rates in accordance with those recommended in the revision of the Solid Waste Strategy		To be determined			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Covered by current agreed funding for Solid Waste Strategy and its future revisions	√	√	√	√	√

The replacement for the EfW at the end of its design life in approx. 2035 should be seen as an opportunity to replace it with a method of waste treatment that is not only appropriate to the Island but has a lower carbon footprint.

The potential to use the heat and electricity generated from the EfW plant should be maximised. At the time of the installation of the replacement EfW no solid proposals for the East of Albert development involving use of low-grade heating or cooling was in place. Therefore, the existing turbine is not currently Combined Heat and Power (CHP) ready.

4.3.3. Action framework for investigating district heating from the energy from waste plant

The EfW turbine could be modified to be 'Combined heat and Power ready' and still fulfil the minimum electricity generation guarantee levels in place with Jersey Electricity. Therefore the potential for CHP will need to be considered within the framework for the development in this area as this is progressed.

Action Statement 24: Investigating district heating from the energy from waste plant

ACTION STATEMENT 24
Investigating district heating from the energy from waste plant

Summary
The Minister for Planning and Environment working with the Minister for Transport and Technical Services and the Minister for Housing through the review of the solid waste strategy will: i. Carry out a feasibility study, which includes a cost-benefit analysis, of the potential of Combined Heat and Power / District heating and its potential end-uses in the nearby areas. The study is likely to include the following: • An assessment of the technical, commercial and environmental viability, considering the capital costs of the project against the anticipated rate of uptake to determine the necessary 'heat price' for the project to be successful; • A direct comparison to be drawn with future oil and electricity prices; • An investigation into uses such as district cooling and desalination to optimise the efficiency of the scheme across seasonal variations in energy use.
Delivery mechanism
To be determined following on from feasibility study and assessment findings.

Impact assessment					
Security √	Affordability X	Sustainability √			
KPI	**2014**	**2020**	**2030**	**2040**	**2050**
24.1 – District Heating Study initiated as part of review of the Solid Waste Strategy. Once produced, the Energy Partnership to consider the recommendations and their impacts on future energy and waste policy.		√ (by 2015)			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Feasibility study to be included and costed within the review of the Solid Waste Strategy			√		

4.4. Biofuels

4.4.1. Importing biofuels

Biofuels commonly refer to the liquid transport fuels biodiesel and bioethanol and are manufactured from plant oils and commonly sugar cane respectively. As an alternative to hydrocarbon fuels or blended at various percentages with traditional petrol and diesel (typically 5%), biofuels have been embraced by many as a low carbon alternative to petrol and diesel.

There is some evidence that their widespread growth can displace food crops or natural habitats or that these fuels are not as carbon neutral as they might first seem. For example, biofuel crops often need fertilisers and pesticides which are made from oil whilst the machinery used to grow, transport and process the crop is also often powered by fossil fuels. It will be important to ensure that any imported biofuels are sustainably produced.

Given the ongoing international debate and scrutiny of the production of biofuels there are no proposals to currently set Jersey-specific targets for the importation of biofuels blended with petrol or diesel. However, it is acknowledged that some companies already import petrol and/or diesel that are blended with biofuels as a small percentage of their total volume and it is accepted that this will continue at blends dictated by the petroleum manufacturers.

4.4.2. Producing biofuels locally

There is some scope for growing biofuels locally but the low gross margins and impacts on food security mean that they are not viable if grown instead of food crops. Nevertheless, they do have some potential if they can be grown as a follow-on crop for example, spring oilseed rape or maize after the harvest of the potato crop. There are some further advantages to growing such follow-on crops in addition to the production of biodiesel:

- Diversification in the rural economy if they were grown locally on appropriate land;
- Residues have the potential to be used as animal feed e.g. oil seed rape cake.

The Agricultural Statistics Return indicated that there were approximately 2,000 vergees of ‘uncultivated’ agricultural land in Jersey in 2010 which could be available for biofuel production if owners / tenants were willing to diversify.

A traditional biofuel that is in common use but frequently overlooked is wood such as wood originated from woodland management; recovered wood from building and pallets; fuel logs from pressed sawdust and woody biomass crops like miscanthus.

The volumes of biodiesel (or bioethanol from crops such as wheat) that could be produced locally even with exceptional effort are low and arguably would require an unrealistic shift in farming practices. Therefore, at this stage it is not considered appropriate to set targets for local biofuel production.

The States will continue to support and assist the industry on a case-by-case basis. Mechanisms of support include the Countryside Renewal Scheme and the Rural Initiative Scheme administered by the Environment and Economic Development Departments respectively.

Internationally, advancements are being made converting wastes like municipal solid waste and waste water into renewable, profitable products, such as biofuels, ethanol, butanol, methane, and yeast proteins. These technologies use high pressures created by gravity and offer interesting possibilities for the long term and should be assessed.

4.4.3. Action framework for biofuels.

Action Statement 25: Investigating and supporting the use of biofuels

ACTION STATEMENT 25

Investigating and supporting the use of biofuels

Summary

The States of Jersey will not currently set targets for the importation of biofuels either concentrated or blended with traditional fuels. However the Minister for Planning and Environment, working with the Minister for Transport and Technical Services will:

i. Review periodically the international situation in respect of biofuels. If satisfactory progress is made in the certification of biofuels, importation targets will be considered by the Energy Partnership.

The Minister for Planning and Environment, in together with the Minister for Economic Development through the RES and its subsequent revisions and the agricultural industry will:

i. Continue to investigate the feasibility of locally produced biofuels and their potential in respect of homogenising feed-stock for an Anaerobic Digestion system.

The Minister for Transport and Technical Services will:

i. Investigate the opportunities to use biodiesel made from recycled oils is used in the States commercial fleet wherever possible to underpin the local production of biodiesel from waste cooking oil.

The Minister for Treasury and Resources will:

i. Maintain the exemption from fuel duty on locally produced biofuels.

Delivery mechanism

Findings of the study to be reported to the Energy Partnership and further actions and recommendations to be developed following analysis.

Impact assessment

Security √	Affordability X	Sustainability √

KPI	**2014**	**2020**	**2030**	**2040**	**2050**
25.1 – Production of feasibility study on production of local biofuels (within Rural Economy Strategy work streams)		√			
25.2 – Amount of locally produced biofuel used in States of Jersey fleet (target to be determined according to local production volumes)		√			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Feasibility study for local biofuels accounted for in Rural Economy Strategy 2011-15		√			

Chapter 5 – Fuel poverty and affordability of energy

5. Introduction

When a household needs to spend more than 10% of their income on fuel to maintain a satisfactory heating regime, as well as meeting their other fuel needs (lighting and appliances, cooking and water heating) it has previously been termed 'fuel poverty'[60]. In 2009/10, it is estimated that 6% of households in Jersey were in fuel poverty, corresponding to about 2,500 households. This definition does not reflect the additional number of households struggling on the shoulders of the 10% margin, which would increase the numbers.

The publication of the Hills' Review in April 2012[61] on the definition of 'fuel poverty' argues that a more sophisticated definition should be made, which may impact on the number of households falling into this category.

In order to develop appropriate interventions and actions, understanding what fuel poverty and affordability mean, and who is affected, in a Jersey context is a crucial first step.

Given that it is the lowest income households that are most vulnerable to rising energy prices, affordability of energy means developing support programmes to ensure that these groups are able to afford adequate supplies of heat, light and hot water.

Improving thermal performance of properties and investing in sustainable energy solutions require a level of initial investment that is not readily available to these households. Although there is a payback over time in terms of reduced energy bills and increased comfort in living conditions, this requirement for up front financial resources creates a real barrier to addressing fuel poverty. In addition the trend in the price of fossil fuels is likely to be upwards, so the proportion of income spent on meeting energy requirements will continue to rise, thus exacerbating the problem and increasing the number of households within this group.

Affordability of energy does not mean cheaper unit costs of energy, but by providing access to energy efficiency measures which reduce the amount of energy consumed in a household, it is possible to offset some of the impact of rising costs.

Whilst low income and 'fuel poverty' are undoubtedly linked, 'fuel poverty' is exacerbated in certain vulnerable groups that have contributory factors in addition to simply a low income. For example, under-occupation of larger properties in the elderly age group when children have grown and left the property. Additionally those in the private rented sector may be more vulnerable since they often have no control over the maintenance and thermal performance of the property; conversely, their landlord may have little incentive to ensure the higher standards of thermal efficiency since they do not pay the energy bills.

[60] http://www.statistics.gov.uk/hub/business-energy/energy/fuel-poverty
[61] http://www.decc.gov.uk/en/content/cms/funding/fuel_poverty/hills_review/hills_review.aspx

POLICY 3: FUEL POVERTY AND AFFORDABILITY OF ENERGY

The Minister for Planning and Environment, working with other relevant Ministers will develop and implement the actions and work streams to investigate the scale and nature of fuel poverty and the affordability of energy in a Jersey context. This will assist the development of specific policies that will ensure that energy is affordable to all members of the community.

As Policy 3 outlines, in order to address fuel poverty, those affected must be identified and assisted to access affordable energy. This assistance may be in the form of improving the energy efficiency of the dwelling and / or the provision of financial support e.g. tax-funded benefits as well as ensuring the energy market is delivering lowest cost energy to its most vulnerable customers subject to the decarbonisation trade-offs. This chapter describes the work that must be undertaken to identify investigate the scale and nature of fuel poverty and the affordability of energy in a Jersey context. The findings will be reviewed by the Energy Partnership in order to recommend cross-sectoral policy actions.

5.1. Affordable energy in a global marketplace

Secure and affordable energy underpins economic growth and contributes to social equity. As discussed in Chapter 4, a secure and sustainable local supply has associated costs and can add to the problem of affordability because it raises the price of energy to customers. It is expected that global energy costs will increase, at least in the short term. The issue of affordability is therefore pulled sharply into focus.

‘Affordability’ means a combination of:

1. Improved efficiency in the use of energy leading to lower prices in the future than might otherwise be the case without any action;
2. Ensuring that the local energy market is functioning fairly and delivering the best possible value to its customers;
3. Given that future energy prices are likely to be higher to some degree, “affordability” might require that certain (likely to be low income) customer groups receive a subsidy either from other energy consumers or from non-energy sectors or taxpayers.

Chapter 3 outlines a number of actions that reduce energy demand and increase energy efficiency which will protect consumers from future price rises greater than if no action were to occur. However, because future prices are still likely to be higher than they are today, the proposed actions can only work to reduce the exposure of consumers and it is accepted that the most socioeconomically vulnerable customers may require continued additional assistance in meeting their energy costs.

Government assistance is in place for socioeconomically vulnerable groups through the provision of monthly Cold Weather Payments, which are available to some

recipients of Income Support upon threshold weather conditions between October and April, and a tax funded Cold Weather Bonus, paid twice a year, and equal in value to the total of the Cold Weather Payments, which is provided to pensioner households with incomes below tax thresholds. Whilst the Statistics Unit does not currently keep statistics on fuel poverty; currently defined as being more than 10% of income before housing costs on fuel[62], they have estimated that approximately 6% of households in Jersey could be defined as being within this category which is equivalent to 2,500 properties.

The work of the Energy Efficiency Service assists those less able to afford energy through grant assistance to implement energy efficiency improvements. There is a dual benefit of assistance with energy costs as well as an environmental benefit.

However, in a global environment of increasing energy costs there are likely to be increasing numbers of householders who may well struggle with any increase in fuel costs even when their property has been fully upgraded given its age and construction type.

There is a need to define fuel poverty in a Jersey context and to investigate the level of fuel poverty and the nature of the affordability of energy in Jersey. Consideration of the role of the benefits system and provision of social housing in addressing these issues must be made. Given the expected long term rise of energy prices there is the potential for the number of those in 'fuel poverty' and those at its margins to increase.

5.2. Initial work with the fuel poor in Jersey

The Energy Efficiency Service (EES) has now been working with the energy needs of the socio-economically vulnerable since mid-2009 targeting assistance at the private rental sector and owner-occupiers with limited income. A key lesson from the work carried out in this sector is the provision of a turnkey service that the elderly (or otherwise vulnerable) require in addition to the financial grant. Feedback comments state for example, that removing the need for a client to empty their own loft before a contractor carried out insulation works was an important enabling factor. Furthermore, the provision of verified contractors combined with one point of consistent contact through the EES allowed multiple treatments to be applied in a way that the homeowner would have been unlikely to manage themselves.

As discussed in Chapter 3 the interventions required to encourage the 'able-to-pay' sector are very different from a 100% grant funded turnkey service. However, it is clear that for the socio-economically vulnerable, the turnkey service is the model that must continue to be available to both new entrants and those currently eligible but that have not yet taken up the energy efficiency interventions that the service can offer (some 70% in 2011).

More difficult to define is the level of vulnerability of those on the fringes of the socio-economically vulnerable groups i.e. those just beyond Income Support. The eligibility

[62] not as strictly defined in the full definition of the term since this calculation doesn't account for maintaining the dwelling temperature at prescribed levels in line with the UK definition

criteria of the EES were expanded in 2011 to those with very limited savings and the applications from this sector have increased significantly[63].

Another key learning point has been in understanding the assistance needed for the target group to take-up the opportunities on offer. The provision of outreach support work has significantly increased the take up from the client group and therefore has a greater impact in addressing fuel poverty in the eligible sector. In order to ensure continued uptake a core part of the service is in awareness-raising and support activities.

5.2.1. Action framework for understanding affordable energy

Although the work of the EES has provided some information on the problems that some sectors of the local community face, defining fuel poverty and energy affordability is still a challenge. It is not possible to enumerate the number of those to whom fuel poverty may be a very real issue. Without a greater understanding of the problem it is difficult to target social policy more successfully. Work initiated by the Department of Housing[64] in respect of the provision and structure of social housing and the Department of Social Security in order to understand the role of benefits will inform this process.

Action Statement 26: Understanding affordable energy

ACTION STATEMENT 26		
Understanding affordable energy in the Jersey context		
Summary		
In 2015, the Minister for Planning and Environment and the Minister for Social Security and the Minister for Housing, working with the appropriate stakeholders (e.g. CICRA and Jersey Consumer Council) carry out further investigation into the issues of energy affordability whose scope will: i. Define fuel poverty and energy affordability in the local context i.e. the owner-occupier, social housing and private rented sectors; ii. Identify the fuel poor and those at its margins; iii. Investigate detailed tariff design structures and issues, ensuring the protection of vulnerable householders while providing fair and transparent tariff structures to deliver the policy aims iv. Examine the success of interventions aimed at providing the vulnerable group with affordable energy in all housing sectors.		
Delivery mechanism		
Findings of the study to be reported to the Energy Partnership and further actions and recommendations to be developed following analysis.		
Impact assessment		
Security X	Affordability √	Sustainability √

[63] Further information is available from the Energy Efficiency Service Phase 1 report (see www.gov.je)
[64] http://www.gov.je/News/2012/Pages/AchievingDecentHomesWhitePaper.aspx

KPI	Year 1	Year 2	Year 3	Year 4	Year 5
26.1 – Study carried out and a full consideration of the recommendations carried out by the Energy Partnership and translated into the future development of policy (see links to Action Statement 27).	√				
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Costs – Affordable Energy study. (To be funded from Department of the Environment Central Environment Vote)	£25,000				

5.2.2. The Challenge

As a price-taker for imported energy there are likely to be limited actions the Island can take to minimise future energy prices that are driven externally. Furthermore the local market functions in a relatively unique situation. There is fuel competition among the fuel types but both the gas and electricity company run as natural monopolies as is common in small jurisdictions. Jersey Electricity is also majority owned by the States of Jersey. Conversely there is competition among the three petroleum distributors for heating oil, petrol and diesel.

High levels of import dependence mean that planning and supervision of the energy market is vital to ensure efficient functioning of the supply chain from procurement to retail. There are very real challenges for the gas and oil distributors who import product via sea routes and subject to the increased costs of these logistics compared to Mainland suppliers; for this reason Jersey consumers should not expect to pay prices comparable to the UK mainland. Similarly, Jersey Electricity plc. has made substantial investment in sub-marine connectors to ensure a secure and resilient supply.

There is currently no sector specific local regulator for energy, although there is sector specific legislation which governs the activities of the electricity and gas company. Regulation is carried out by the Jersey Competition and Regulatory Authority (CICRA[65]), with responsibility for promoting competition and consumer interests through economic regulation and competition law. Currently the CICRA would only intervene in the energy markets if a complaint was made to them alleging abuse of a dominant position; or engagement in collusive behaviour.

Keen to ensure that the market is working to the benefit of Jersey consumers, in August 2011 and February 2012 the CICRA carried out a review of the road fuel market[66] and heating oil supply[67] respectively. For the road fuel market, they concluded that ‘some retail forecourts have higher gross margins than we might expect if competitive pressures were greater’. Also, Jersey was ‘over-supplied with forecourts’ with 2.6 times the number of forecourts per person compared to the UK

[65] Established in 2001
[66] Review of the Jersey Market for Road Fuels August 2011, Jersey Competition Regulatory Authority
[67] Review of the supply of heating oil in Jersey February 2012 Jersey Competition Regulatory Authority

and half as many again as the Isle of Man. They conclude ‘The presence of many low volume forecourts in Jersey, compared to other markets, is an indicator that competitive forces could be greater’.

In respect of the heating fuel market, the CICRA concluded that although historically islanders ‘have paid a premium over UK prices for heating oil, worryingly, the price difference appears to be increasing over time, with Jersey becoming more expensive relative to the UK’. Comparative prices of LPG for space and water heating of a standard house, also appears to be a more expensive option than heating oil. They conclude that ‘there is room for improvement in the state of competition in the Jersey market for heating oil, and the trends in prices are a cause for some concern’.

The CICRA did not conclude that price regulation was necessarily the answer to increasing competitive forces with the aim of driving prices down for the consumer. For both market sectors they acknowledge that price regulation is a ‘significant and costly step’. They proposed further monitoring of trends and more transparent pricing information for the consumer to enable more informed decision making and to increase competitive forces. In respect of heating oil they conclude that ‘it would facilitate an accurate and reliable data record for the future, and provide a continuous flow of information which may act as a trigger for regulatory action to be reconsidered’.

The CICRA reviews of the electricity and gas sector provide information on how competition in the local situation influences pricing. Clearly the ideal outcome is one where competitive forces mean that customers are paying the best prices for their energy (and associated energy services).

If further work is required on tariff structures, it is proposed that CICRA are asked to participate in undertaking research on structure options and their potential effects on the affordability and use of energy.

5.2.3. Action framework for understanding competition

Given the expected closeness of vulnerable groups to 'fuel poverty' (see above) and the likelihood of increased global energy prices, there is considerable scope to further understand how the lowest income groups are vulnerable to energy prices and what assistance they might need.

Action Statement 27: Understanding competition

ACTION STATEMENT 27
Understanding how competition in the local energy market affects prices paid by consumers
Summary
By 2015, and in the context of the two further reviews planned by the CICRA in 2012, the Minister for Planning and Environment and the Minister for Social Security (in particular for iii), working with the appropriate stakeholders (e.g. CICRA) will assess the following: i. Is the local energy market delivering affordable, secure and sustainable energy without

excessive margin building or excessive pricing? Regard will be made to the following: the unique supply chain and associated geographic constraints; the tendency for natural monopolies to operate in Island jurisdictions and the costs associated with the infrastructure required for strategic resilience?

ii. Is the market functioning adequately and fairly? This may include research on tariff structure options and their potential effects on the affordability and use of energy. In the event that the market is not able to deliver secure, affordable and sustainable energy, Ministers will consult with the industry and other key stakeholders to establish the most appropriate and proportionate solutions;

iii. Are the challenges identified by the 'Fuel Poverty and Affordability Study' (Action Statement 26) being addressed by the current market structure and assistance from government or is some form of further intervention required?

Delivery mechanism					
Findings of the study to be reported to the Energy Partnership and further actions and recommendations to be developed following analysis.					
Impact assessment					
Security X	Affordability √	Sustainability X			
KPI	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
27.1 – Study carried out and a full consideration of the recommendations carried out by the Energy Partnership and translated into the future development of policy in respect of the energy market and fuel poverty (x-ref Action Statement 26).		√			
Costs	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Costs – Energy market competition study (To be funded from Department of the Environment Central Environment Vote)		£20,000			

Pathway 2050:
An Energy Plan for Jersey

APPENDICES

States of Jersey

Appendix 1 – Carbon accounting

1.1 The Kyoto Protocol

It is recognised that there are limitations to the methods employed to account for carbon under Kyoto; some would argue that they are not stringent enough. Nevertheless, it is the internationally adopted methodology by which Jersey must demonstrate its progress and should be the first level against which we measure progress.

In April 2007, the UK's ratification of the Kyoto Protocol was extended to Jersey at the request of the Chief Minister. Jersey was not awarded binding carbon reduction targets in the 2008 to 2012 period (carbon reduction is measured against the 'baseline year' of 1990). Despite not having an 'allocated allowance' under the Kyoto Protocol, at the time of the extension of the ratification, Jersey was asked by the Department of Constitutional Affairs:-

'to introduce, where possible, and having taken into account local circumstances, policies in line with the objectives of the UK Climate Change Programme. In relation to any subsequent commitment periods, Her Majesty's Government agrees that any obligation upon the Government of Jersey for the reduction of emissions shall be as determined by the Government of Jersey, in conjunction with Her Majesty's Government, to be what Jersey can reasonably deliver'

Extending the ratification of the Kyoto Protocol signalled Jersey's intent to set challenging carbon dioxide reduction targets. These will be implemented alongside energy reduction targets.

Current EU and UK carbon emission reduction targets are an 80% reduction on the 1990 baseline year by 2050.

1.2 Jersey's carbon emissions

The Island has reported its emissions information to the agency that collates the UK's information where the historical and current data was aggregated into the total UK carbon emissions[1]. Because until 2009, the data Jersey provided was not available separately, the States of Jersey Statistics Unit made provisional carbon estimates based on the carbon emitted from imported energy and published these annually in the Jersey Energy Trends Report.

However, in late 2009 Jersey's emissions data was disaggregated and made available to the Island. The data is very similar to the provisional estimates made by the Statistics Unit but is more comprehensive and categorised in source and sink categories according to the International Panel on Climate Changes Guidelines for National Greenhouse Gas Inventories. Table A1 below shows the source data used to construct Graph 1, Section 2.1 of the Plan.

[1] http://www.ipcc-nggip.iges.or.jp/public/2006gl/vol2.html (Source AEA Technology on behalf of the Department for Energy and Climate Change)

Table A1 Green house gas inventory for Jersey expressed in tonne of carbon dioxide equivalents 1990-2011

CATEGORY	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Power Stations	211,765	212,841	331,095	272,826	287,991	293,356	280,243	215,570	240,143	232,516	124,369
Industrial Combustion	36,549	36,549	36,549	33,921	39,144	39,792	45,353	63,652	60,414	44,071	51,632
Aviation	44,710	43,037	41,408	40,793	39,776	39,364	38,898	38,384	40,648	41,891	48,046
Road transport	122,445	122,445	124,529	128,271	133,582	133,599	130,596	126,326	130,458	118,709	128,894
Commercial	62,231	62,251	54,597	59,639	63,681	62,239	69,514	76,631	95,568	61,810	62,940
Domestic	113,144	113,144	98,313	101,863	103,429	104,254	115,400	142,373	159,835	112,001	119,871
Land use, land use change & forestry	280	280	-632	568	-1,280	-4,928	-1,374	-139	546	-641	-3,342
Agriculture	26,037	26,027	26,155	26,243	26,203	26,212	26,512	26,631	26,614	26,599	27,200
Waste water treatment	2,728	2,667	2,779	2,774	2,825	2,780	2,814	2,860	2,902	2,878	2,917
HFCs & PFCs & SF6* (see footnote for info on data from 1990 to 1995	51	67	101	570	1,481	2,755	4,434	6,539	9,140	10,581	13,417
Total	**619,940**	**619,307**	**714,893**	**667,467**	**696,833**	**699,425**	**712,392**	**698,827**	**766,268**	**650,415**	**575,943**

CATEGORY	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Power Stations	95,128	82,302	33,364	51,347	35,016	43,649	87,491	46,494	61,279	62,875	33,829
Industrial Combustion	49,291	49,770	49,581	51,201	48,454	49,236	46,072	46,937	50,574	51,151	42,969
Aviation	48,881	48,406	48,928	47,801	47,911	45,725	48,384	50,654	41,461	43,144	41,584
Road transport	129,684	128,011	126,569	123,370	121,549	123,142	119,621	122,299	122,177	121,940	136,568
Commercial	132,165	114,594	64,136	79,524	57,854	60,580	98,207	53,620	29,666	26,898	25,250
Domestic	120,597	117,009	112,525	115,105	110,950	111,759	111,950	109,625	105,498	104,292	90,830
Land use, land use change & forestry	-7,549	-8,240	-10,414	-11,081	-11,516	-11,516	-11,516	-10,729	-10,729	-10,729	-10,729
Agriculture	26,508	23,424	21,215	20,135	19,683	21,387	21,900	19,247	19,127	19,331	18,991
Waste water treatment	2,926	2,935	2,938	2,942	2,966	2,996	3,042	3,072	3,088	3,079	3,070
HFCs & PFCs & SF6	15,836	17,884	20,077	21,173	22,754	23,705	24,524	25,526	25,862	26,097	26,440
Total	**613,466**	**576,096**	**468,919**	**501,516**	**455,620**	**470,663**	**549,675**	**466,745**	**448,003**	**448,078**	**408,802**

The categories are defined as follows and key information in the Jersey context has been added. The numbers in brackets refer to the IPCC category that is used:

Power Stations (1A1a) - Carbon dioxide, nitrous oxide and methane emissions arising from the generation of on-island electricity by the Jersey Electricity at La Collette Power Station using Heavy fuel oil and the Combined Gas Turbines at Queens Road using Gas Oil. This category also includes combustion for the generation of energy and heat, in the Jersey context this includes emissions from the Energy from Waste plant.

Carbon emissions arising from Energy from Waste plants are dealt with very specifically under the Kyoto Protocol. Only the proportion of carbon emitted from non-biogenic material is accounted for since that which arises from 'recently photosynthesised' or 'non-fossil carbon' is not counted as a greenhouse gas for the purposes of the protocol. AEA have advised that there have been recent changes in the way emissions are calculated from Jersey (and the other Crown Dependencies and Overseas Territories) to make it more integrated with the UK system. This led to a change in the emission factor for carbon from MSW combustion and the emissions factor used is 75kt carbon/Mt waste.

It must be noted that the updated figure provided by AEA is much lower than that advised in 2006 by the National Inventory for Greenhouse Gas Emissions and was used in Energy Policy Green Paper. That is why EfW emissions appear as a lesser proportion of GHGs emissions than have been previously described.

Whilst in policy terms we must adapt to the external advice given to us in respect of international reporting mechanisms, it is recognised that Energy from Waste contributes to carbon emissions even if Kyoto does not recognise it all for the purposes of the convention. Thus, there is significant overall benefit in fully investigating alternatives to EfW technology at the end of the replacement plant's life. In addition, ongoing work with AEA and an on-island project to more fully categorise the local waste stream is expected to lead to Jersey-specific MSW emissions factors being available in the future.

Industrial Combustion (1A2f) - Carbon dioxide, nitrous oxide and methane emissions arising from the combustion of kerosene (burning oil) fuels in the commercial sector. Jersey's kerosene emissions are partly attributed to this category since the overall accounting methodology finds it difficult to account for in the way our small jurisdiction burns heating oil in the commercial sector. We are advised that he emissions from this category are essentially from kerosene in the commercial sector and it is acceptable to combine emissions from the 'Commercial (1A4a) category and this category.

Aviation (1A3a) - Carbon dioxide, nitrous oxide and methane emissions arising from national but not international flights (which are reported separately).

Road transport (1A3b) - Carbon dioxide, nitrous oxide and methane emissions arising from all road vehicles.

Commercial (1A4a) - Carbon dioxide, nitrous oxide and methane emissions from fuel combustion in commercial and institutional buildings. It includes kerosene for space heating as well as gas oil and fuel oil which power larger scale heating plant in sectors such as retail, agricultural and

Domestic (1A4a) - Carbon dioxide, nitrous oxide and methane emissions from fuel combustion in residential buildings (i.e. space heating from kerosene & LPG gas)

Land use change and forestry (5G) - Carbon dioxide, nitrous oxide and methane emissions and removals from forest and land use change activities. This sector shows a net sink between 1991 and 2004 although the size of the sink is variable over time, depending on the land use change to grassland and there is no clear trend. Activity data on land use is available since 1990: only land use change between cropland and grassland and liming contribute to the inventory.

Agriculture (4b14)- Carbon dioxide, nitrous oxide and methane emissions from agriculture including the carbon dioxide and methane emissions from the enteric fermentation from cattle (4A1), sheep (4A3), goats (4A4), horses (4A6) and pigs (4A5). Also includes carbon dioxide, and methane arising from the wastes from cattle (4B1), sheep (4B3), goats (4B4), horses (4B6), pigs (4B8) and poultry (4B9)

Waste water treatment (6B2)- The methane and nitrous oxide emissions arising from the handling of liquid wastes and sludge from housing and commercial sources (including human waste).

HFCs, PFCs & SF_6 - Emissions from the potent greenhouse gases, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) (these two being used mainly as refrigerants and air conditioning units) and sulphur hexafluoride (SF_6 - particularly from high voltage electric switch gear where SF_6 is used as a thermal insulator). *SF6 was not used in the early part of the reporting periods but becomes a more significant portion of this category as its use increased replacing CFCs in aerosols. For this reason 1995 is taken as the baseline year for this category not 1990.

Appendix 2 Predicting energy growth to 2050 & projecting carbon emissions

A simple energy growth model has been used to show how the Island's energy demand (expressed in tonnes of oil equivalents - toe) is likely to change into the future if we continue in a 'business as usual'[2].

This model is helpful to understand how energy use is likely to rise under a 'do-nothing' or 'business as usual' scenario and makes a number of key assumptions as follows:

1. Immigration – using a scenario of net nil immigration per annum. The population projections are calculated by the Statistics Unit[3] in 2009 and have been adjusted to take into account the 2011 census figure which demonstrated a higher population than predicted in the between census periods.

2. Motor Fuel - Continuing trend of improved energy efficiency and small growth in the use of diesel for cars. Growth assumes a current near-saturation of car use on Island. Lead replacement fuel declines to residual figures by 2010.

3. Gas oil - Continuing trend of decline with an assumed switch to gas and electricity

4. Heavy Fuel Oil - Assumed use for electricity generation at 32% efficiency and comprising 3% of total electricity supply until 2015 falling to 2% of supply post 2015

5. Kerosene - Continued use as heating oil with a slight decline in use post 2011 as new builds continue to be smaller apartments and more likely to be powered by electric heating (the trend to date)

6. Electricity - Continued increasing use in all sectors because of the ability to fix long term price contracts with more certainly and ease compared to hydrocarbon fuels which are expected to become significantly more expensive as a result of developments in global fossil fuel prices

7. Gas - Bottled and mains gas remains an important part of fuel mix for existing customers, whilst small growth potential is expected for industry as a result of Combined Heat and Power

8. Aviation - Small long-term increase in aviation traffic to and from the Island. The energy model assumes growth in air travel in line with Jersey airport policy based on an increasing population of +350 per annum. Whilst the growth in air travel does result in an increase in emissions, in real terms there is a reduction compared to a business as usual scenario, due to improved aircraft standards.

[2] This model is available as an Excel Worksheet (Supporting document A)
[3] http://www.gov.je/ChiefMinister/Statistics/Population/ (2009 population model)

Energy demand under a 'business as usual' scenario

A 'business as usual' scenario predicts the following trends in each energy sector as measured by tonnes of oil equivalents (Table A1 below). NB The sectors comprise demand as a result of all the different energy products. For example 'road fuel' comprises toe of petrol (leaded and unleaded) and diesel and 'domestic' comprises coal, and LPG, kerosene and electricity for the domestic market. All the details are available in Supporting Document A

YEAR	Population	Road Fuel	Aviation	Commercial & Industrial	Domestic	On-Island Electricity Generation	Total Energy Demand
2000	88,400	46,161	14,806	36,078	47,052	34,395	144,098
2005	91,000	43,116	17,225	57,016	68,387	3,779	185,744
2010	97,100	42,950	8,853	50,343	65,817	5,453	167,963
2015	100,033	43,923	9,693	53,146	60,675	5,620	167,436
2020	102,804	45,172	10,731	55,640	62,859	5,620	174,402
2025	105,387	46,275	11,851	57,592	64,477	5,620	180,194
2030	107,730	47,165	13,050	59,675	66,177	5,620	186,067
2035	109,783	48,064	13,977	60,603	67,444	5,620	190,088
2040	111,522	48,825	14,923	61,500	68,597	5,620	193,846
2045	112,944	49,448	15,884	62,361	69,625	5,620	197,318
2050	114,108	49,932	16,950	63,488	70,677	5,620	201,048

Table A1 Historic and projected energy demand by sector based on an energy model that assumes growth of +350 per annum. Data is shown in tonnes of oil equivalents (toe)

The data shown above is also presented in the Figure A1 (below). Overall between 2000 and 2050 there is a projected c.39% rise in energy demand (of 56,950 toe from 144,098 toe to 201,048 toe). This is based on an increasing population of +350 people per annum which brings the total population to 114,108 people by 2050.s

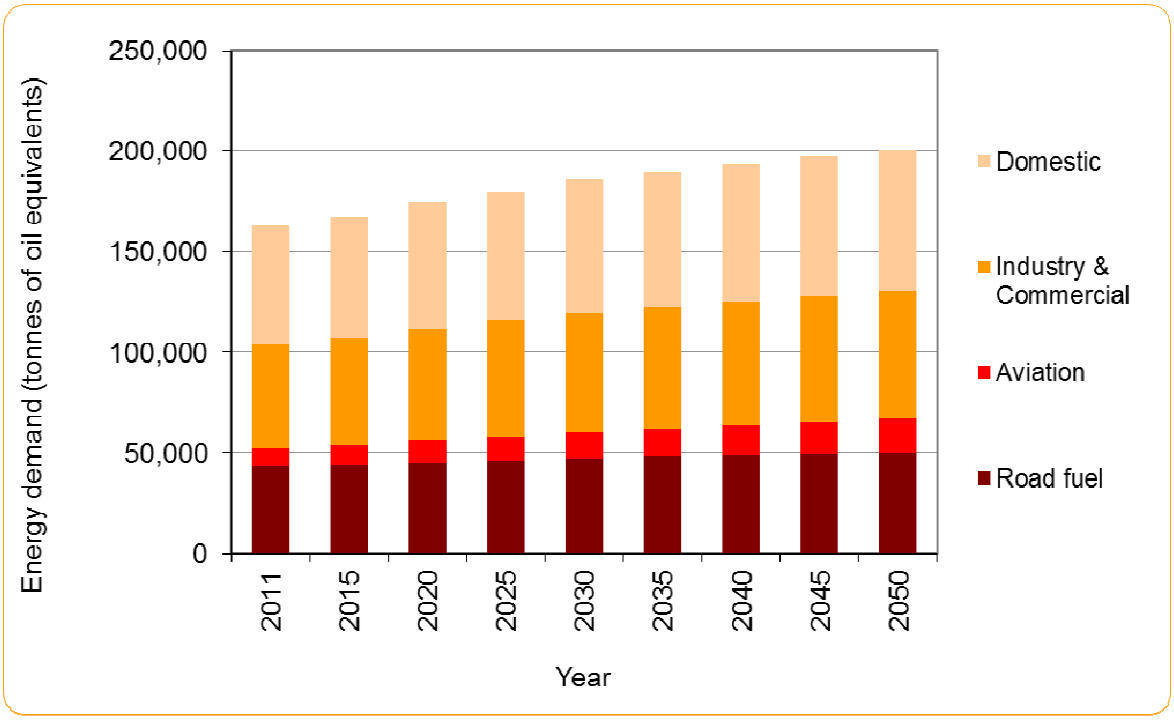


Figure A1 Illustration of patterns of future energy demand using a simple 'business as usual' model.

Carbon emissions under a 'business as usual' scenario

The 'business as usual' energy growth model allows an estimation to be made of the overall trend in energy use to 2050. Using this information, the impact on emissions each decade to 2050 can be forecast. There are differences in the carbon intensities of the different products comprising the categories so this must be accounted for during this calculation (see Spread sheet for full details).

Table A2 shows a summary of the forecast emissions under a business as usual model and Figure A2 below it shows the same information graphically.

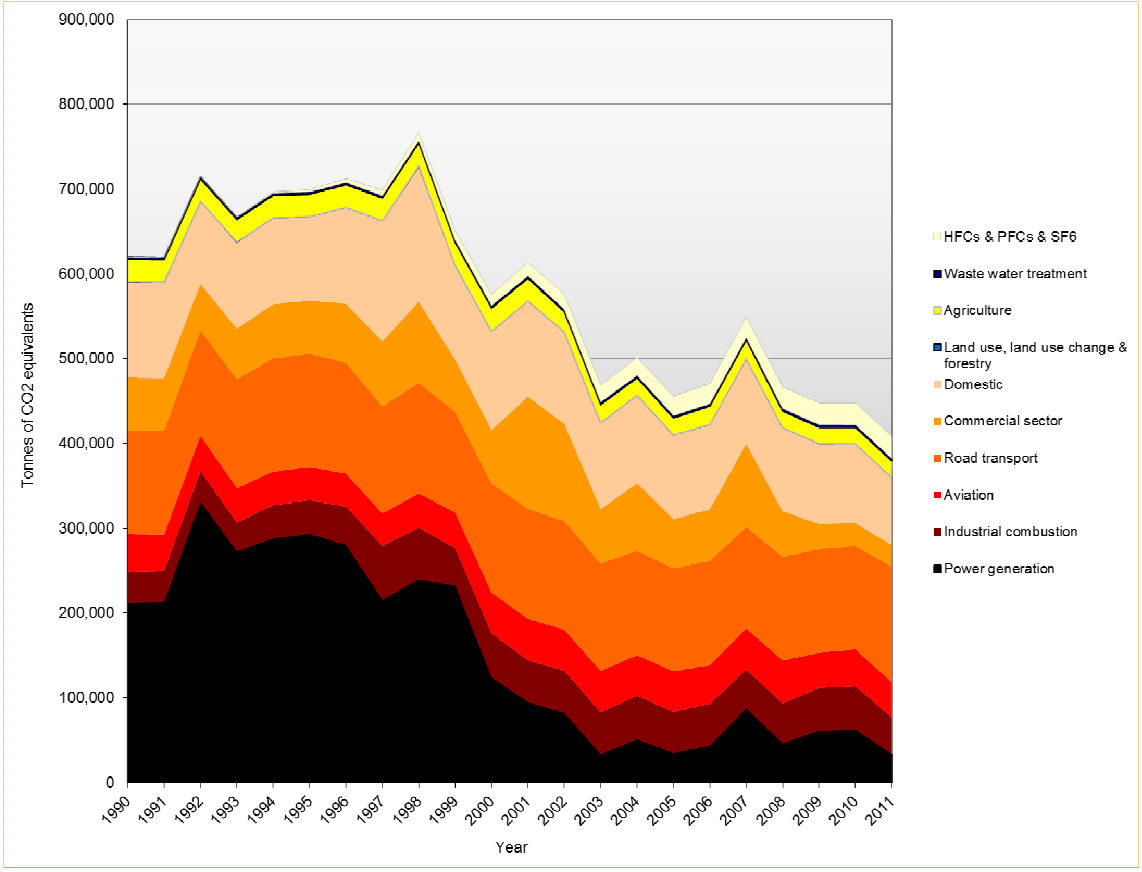
CATEGORIES	1990	2010	2020	2030	2040	2050	Target 20% of 1990 levels
Power stations	211,765	62,875	29,438	32,299	5,789	5,789	42,353
Industrial combustion	36,549	51,151	46,145	41,107	35,794	30,922	7,310
Aviation	44,710	43,144	52,295	63,599	72,726	82,604	8,942
Road transport	122,445	121,940	128,249	133,907	138,620	141,762	24,489
Commercial	62,231	26,898	24,265	21,616	18,822	16,260	12,446
Domestic	113,144	104,292	98,761	93,598	91,112	87,570	22,629
Land use, change & forestry	280	-10,729	-10,729	-10,729	-10,729	-10,729	56
Agriculture	26,037	19,331	19,331	19,331	19,331	19,331	5,207

Waste water treatment	2,728	3,079	3,260	3,416	3,536	3,618	546
HFCs, PFCs & SF6	2,755	26,097	27,630	28,954	29,973	30,668	5,219[4]
TOTAL	**622,645**	**448,078**	**418,645**	**427,098**	**404,974**	**407,796**	**129,197**

Table A2 Pattern of carbon emissions per decade as predicted by a simple 'business as usual' scenario of energy demand with the target amount of emissions illustrated in the far column. This information is shown graphically in Graph 2 Section 2.3 of the main Plan.

What is clear is that without comprehensive action across all sectors, a 'business as usual' scenario means that emissions in all sectors are far above the target. Graph 3, Section 2.3 of the main Plan shows graphically what emissions across all sectors must do if the Island is to achieve its reduction target.

Figure A2



[4] F Gas calculations based on 2010 baseline.

A number of assumptions were made in order to predict the carbon growth figures as well as those made in respect of population growth in Table A3:

CATEGORIES	Assumptions underpinning each sector's carbon emissions
Power stations	Assumed growth in emissions from EfW according to predicted levels of municipal solid waste to 2030. Retained on-island power generation at 2009 levels into future (standby levels only)
Industrial combustion	Applied sector growth per decade as predicted from the energy demand model
Aviation	Applied sector growth per decade as predicted from the energy demand model
Road transport	Applied sector growth per decade as predicted from the energy demand model
Commercial	Applied sector growth per decade as predicted from the energy demand model
Domestic	Applied sector growth per decade as predicted from the energy demand model
Land use, change & forestry	Remains static at 2009 level since little scope for significant scale landscape / agricultural changes
Agriculture	Remains static at 2009 level since assumed present levels of agriculture and livestock levels
Waste water treatment	Calculated as a function of population change per decade
HFCs, PFCs & SF6	Calculated as a function of population change per decade on 1995 baseline

Table A3 Assumptions underpinning forecasts of carbon emissions to 2050. For further detail see supporting worksheet.

Appendix 3 The Energy Partnership

Government, industry and the third sector will monitor, review and work towards a low carbon Jersey in line with the actions outlined in Pathway 2050.

The Partnership will comprise of two parts;

- Ministerial energy executive,
- Multi stakeholder energy forum.

The energy executive will be responsible for the ongoing monitoring of the work streams as outlined in the action statements. The executive will also review the Plan and will develop or commission either new policy interventions or work streams, as appropriate according to review findings.

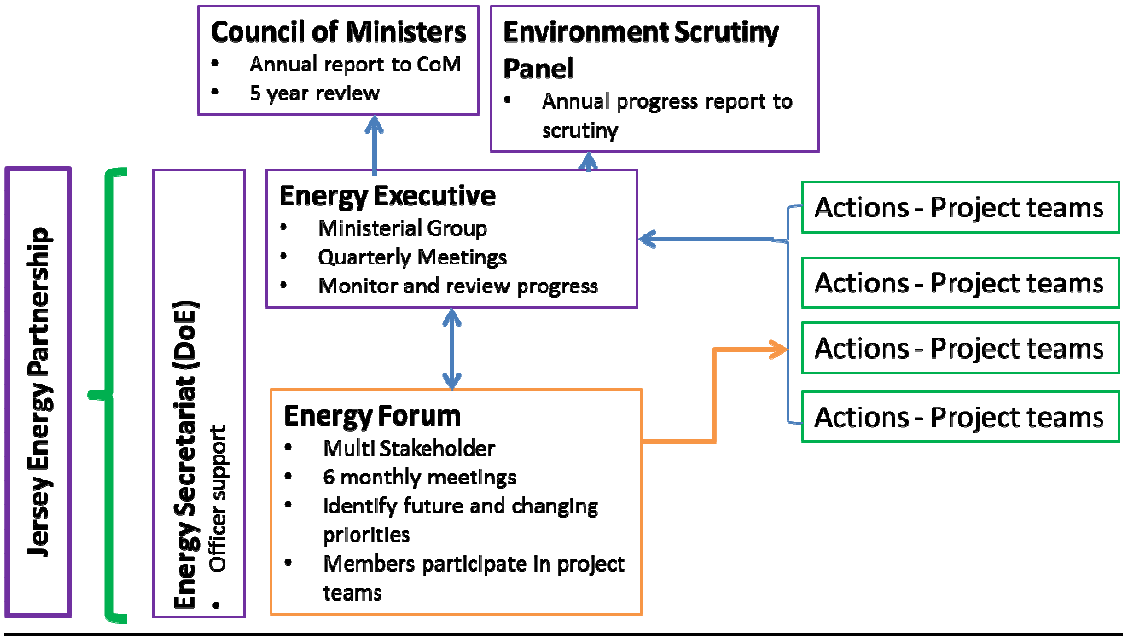
The executive will include representation from the Ministers for the Department of the Environment, Economic Development, Transport and Technical Services and Social Security Departments; secretariat will be provided by the Department of the Environment. The executive will present the 5 year review to the States Assembly and will provide an annual progress update to the Environment Scrutiny Panel.

The energy executive will receive reports from project teams and also relevant research studies commissioned to support the energy Plan. The energy executive will also receive, for consideration, reports from the Statistics Unit including the annual GHG inventory data.

The energy forum, with a Chair elected on an annual basis, will include representatives from the energy industry, businesses and the third sector, and will provide an opportunity for key stakeholders to input on the progress of the Energy Plan and raise areas of concern and identify changing or future priorities.

Project teams, which will include officers and key stakeholders who may also be participants on the forum, will work together to deliver individual action statements and will report progress against KPI’s to the energy executive annually.

The draft terms of reference of the whole Energy Partnership will be confirmed at the first meeting of the executive.



Draft terms of reference

Terms of Reference for the **Energy Executive**:

1. Objectives

1.1 Oversee the implementation of the Action Statements and work streams as identified in the adopted Pathway 2050:Energy Plan, with the aim of ensuring that Jersey meets its international obligations.
1.2 Report progress annually on implementation of the Plan to the Council of Ministers to ensure energy considerations are incorporated into long term strategy.

2. Operational

2.1 Receive monitoring information of progress of implementation against the key performance indicators set out in the Energy Plan.
2.2 Provide guidance if performance is 'off target'
2.3 Report to the Council of Ministers performance against KPIs and highlight any areas at risk.

3. Development

3.1 To review new opportunities and works streams for projects that are proposed by the Energy Forum which meet the aims and objectives of the Energy Plan.
3.2 Receive annual reports from project teams
3.3 Undertake annual review of progress of implementation of the Energy plan to identify any gaps in delivery.

4. Governance

4.1 The Minister for Planning and the Environment will Chair the Energy Executive.
4.2 The Membership of the Executive will comprise those Ministers with major responsibilities in terms of Energy.
4.3 Quarterly meetings will take place.
4.4 Should a vote be taken, the casting vote of the Chair will be binding.
4.5 Minutes from the meetings will be circulated within 7 working days.

4.6 The Department of the Environment will provide the secretariat service for the Energy Executive.

Terms of reference for the **Energy Forum**:

1. Objectives

1.1 Assist with the identification of stakeholders and partnership working opportunities.
1.2 Act as an ambassador for Pathway 2050 and provide introductions where possible.
1.3 Act as a source of inspiration and as sounding board for the development of new projects
1.4 Propose new projects to the Energy Executive Group to influence strategy.

2. Governance

2.1 The Energy forum is a non-political body
2.2 Meetings will be held every 6 months.
2.3 A Chair will be nominated and elected from the group for a term of 12 months.
2.4 Members of the Energy forum may participate in Action Statement project teams.
2.5 The Department of the Environment will provide the secretariat service for the Energy Forum.

Appendix 4: Impact Assessments

All of the Proposed Action Statements have been assessed against the following criteria for their contribution to the goals of the Energy Plan (i.e. to provide secure, affordable and sustainable energy):

Sustainability

Sustainability means that activities associated with energy and energy use meet the needs of the present without compromising the ability of future generations to meet their needs. Specifically this means not causing environmental harm and moving away from diminishing sources of energy and towards renewable sources.

Likely to be achieved by:

- Reducing emissions of GHGs in line with our international commitments to reduce emissions to 20% of 1990 levels by 2050, an 80% reduction.
- Moving towards renewable sources of energy where it can be justified on grounds of economics, security and sustainability
- Bringing forward other environmental benefits (e.g. improved biodiversity)

Affordability

Affordability means:

- Ensuring that the most vulnerable groups in society do not struggle to pay for an acceptable level of energy i.e. adequate heating, electricity and hot water and;
- Efficient mix and use of energy to keep the cost of energy to a minimum given sustainability and security objectives.

Could be achieved by:

- Redistribution to these vulnerable groups from some other source (be it other energy customers, taxpayers, or other)
- A reduction in energy demand so reducing consumer's future exposure to increased global energy costs than might be the case without action;
- The delivery of energy at best value to the consumer.

Security

Security of energy supply means the uninterrupted physical availability at a price which is affordable.

Could be achieved by:

- Prevention:
    - A reduction in energy demand and thus reducing imported energy and lengthened lifespan of existing energy infrastructure and need for infrastructure upgrades to cope with increased demand;
    - More diverse sources of energy;
    - Increased potential for locally generated energy, where appropriate

- Planning: More effective resilience planning.

However energy security is about balancing the risks and costs of threats to the energy supply with the cost of reducing them. At present the risks to energy security in Jersey are not well understood. It is proposed that work is undertaken to gain a better of the potential threats to the availability of energy to Jersey, the costs that these threats could impose on the Island should they materialise, and the specific actions that could be taken to mitigate them.

	ACTION STATEMENT	SECURITY			AFFORDABILITY		SUSTAINABILITY	
		Reduction in energy demand & so reduction in imported energy	More diverse sources of energy	More effective resilience planning	Reduction in energy demand	Increased competition in the marketplace	Reducing emissions of GHGs	Other benefits
1	The formation of an Energy Partnership	√	√	√	√	√	√	√
2	Introducing a low-carbon standard through Building ByeLaws	√	√		√	√	√	√
3	Energy efficiency measures applied to pre-1997 stock of properties	√			√	√	√	√
4	Implement micro-renewables in the domestic sector	√	√				√	
5	Assisting the uptake of microgeneration	√	√				√	
6	Improved energy efficiency through behaviour change programme	√			√		√	
7	Energy Efficiency improvements in the public sector	√			√		√	
8	Energy Efficiency improvements in the private sector	√			√		√	
9	Reducing emissions from ruminants						√	√
10	The implementation		√				√	

	of Anaerobic Digestion systems for waste management of livestock slurry by 2020							
11	The effect of improved EU emissions standards for cars	√			√		√	
12	The effect of improved EU emissions standards for vans	√			√		√	
13	The effect of an increase in the number of ultra low emission vehicles (ULEVs)	√	√				√	
14	Achieving Sustainable Transport Policy 2010 congestion management targets						√	√
15	Achieve a 5% shift to sustainable modes transport by 2020	√			√		√	
16	The effect of improved international operating standards for aircraft	√			√		√	√
17	Liquid Waste Treatment Options	√	√		√		√	
18	Working to negate unavoidable residual carbon emissions after CO_2 targets have been achieved	√						√
19	Understanding energy security in the local			√				

	context							
20	Contingency planning and stock holding for liquid hydrocarbons			√				
21	Working with Jersey Electricity to set supply standards			√			√	√
22	Preparing the way for utility scale renewable energy		√	√			√	
23	Minimising residual waste		√	√			√	√
24	Investigating district heating from the energy from waste plant		√	√			√	√
25	Investigating and supporting the use of biofuels	√	√				√	√
26	Understanding affordable energy in the Jersey context				√			√
27	Understanding how competition in the local energy market affects prices paid by consumers				√			

Appendix 5 Resource assessments to deliver energy efficiency in the domestic sector

Action Statements 3 to 8 apply to the domestic and business sector and are based on the delivery of a series of energy efficiency interventions.

The delivery mechanism will be the extended activity of the Eco-Active Energy Efficiency Service which receives revenue funding of approx £900,000 per annum.

The direct costs for implementation of the action statements, where known, are included within the main Energy Plan document. This appendix provides an overview of the budget for the provision of the Energy Efficiency Service in recognition of the interdependent nature of the work to deliver the actions to both the domestic and commercial sector. The table below provides an illustrative re-profiled budget for the Energy Efficiency Service for the next 5 years. If additional resources were made available, the implementation of the programmes outlined could be accelerated and the reach extended to a wider section of the community.

The costs outlined represent the direct delivery costs, for the first 5 years only, based on the actions as outlined in the Energy Plan, they do not include external costs such as skills based training for the construction sector.

	Year 1	Year 2	Year 3	Year 4	Year 5
Energy efficiency measures applied to pre-1997 stock of properties	627,000	637,000	598,000	620,000	654,100
Implement micro-renewables in the domestic sector	0	0	20,000	20,000	20,000
Assisting the uptake of microgeneration	0	10,000	50,000	50,000	50,000
Improved energy efficiency through behaviour change programme	75,000	75,000	75,000	75,000	75,000
Energy efficiency improvements in the Private Sector	80,000	80,000	80,000	80,000	80,000
Running the Energy Efficiency Service	131,000	131,000	131,000	131,000	131,000
SUBTOTAL (excluding Energy partnership)	£908,000	£928,000	£949,000	£971,000	£1,005,160
TOTAL (including Energy partnership)	£913,000	£933,000	£954,000	£976,000	£1,010,160

Note: Revenue figures based on medium term financial plan limits for years 1-2 and forecasts for years 3-5 based on 2.5% growth and 1% increase in staffing costs.

Appendix 6: Interpretation of Emissions savings by Sector to support Chapter 3.

This illustration shows how to read the information on the tables on the following pages.

Domestic BAU	1990	2009	2020	2030	2040	2050	2050 Target 20% of 1990 levels
Emissions under a business as usual scenario (t/CO_{2eq})	113,144	99,210	103,178	104,210	103,168	100,073	22,629

Step 1

Step 2

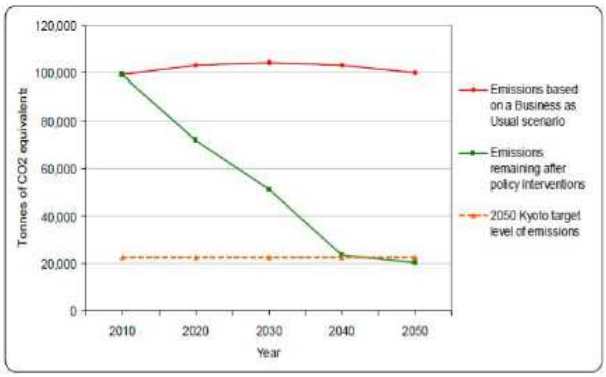
Domestic Sector Interventions	GHG emissions pathway (cumulative) from interventions by decade (t/CO_{2eq}) 2020	2030	2040	2050
Energy efficiency measures applied to pre-2000 stock of properties	81,358	60,570	37,717	34,612
Introducing a 'carbon-neutral' standard for new homes through Building Bye-Laws (by 2014 60% more efficient homes and 2018 carbon neutral for space heating)	76,696	55,908	33,045	29,950
Implement micro-renewables in the domestic sector (solar thermal)	76,696	55,856	25,848	22,753
Improved energy efficiency through behaviour change programme	71,932	51,093	23,466	20,371
Final emissions pathway after all interventions and % reduction	71,932	51,093	23,466	20,371 82%

Step 3

Step 4

Step 5

Step 6



Step 1 – Table 3 shows the projected emissions under Business as Usual scenario (Supporting Document A). This example follows the projected emissions for 2020 of 103,178 t/CO_{2eq}

Step 2 – Table 4 shows the emissions as a result of applying all the policies. Policy 1 reduces emissions from 103,178 t/CO_{2eq} by 21,820 t/CO_{2eq} to give reduced emissions of 81,358 t/CO_{2eq} in 2020. Supporting document B shows how the reduction in emissions was calculated.

Step 3 – By reading down the column, the effect in emission's reductions from the next policy can be seen. The impact of Policy 2 is to further reduce the 81,358 t/CO_{2eq} by 4,662 t/CO_{2eq} to give reduced emissions of 76,696t/CO_{2eq} in 2020.

Step 4 – As above, the impact of the next policy (3) is calculated. However, because this policy is not enacted until 2030, no emissions reduction is recorded in 2020 - hence the emissions remain at 76,696 t/CO2eq

Step 5 – As above, the impact of the next policy is shown. The impact of Policy 4 is to further reduce the 76,696 t/CO_{2eq} by 4,764 t/CO_{2eq} to give reduced emissions of 71,932 t/CO_{2eq} in 2020. Because all the impacts of the policies have been accounted for, this gives the final 2020 residual emissions total

Step 6 – Reading across the rows shows the cumulative effect of all the policies over the decades to 2050 as shown by the green line in Graph 5. The red line represents the Business as Usual projections as shown in Table 3.

Emissions Pathway for each sector

The following pages present the cumulative emissions savings for the interventions for each sector.

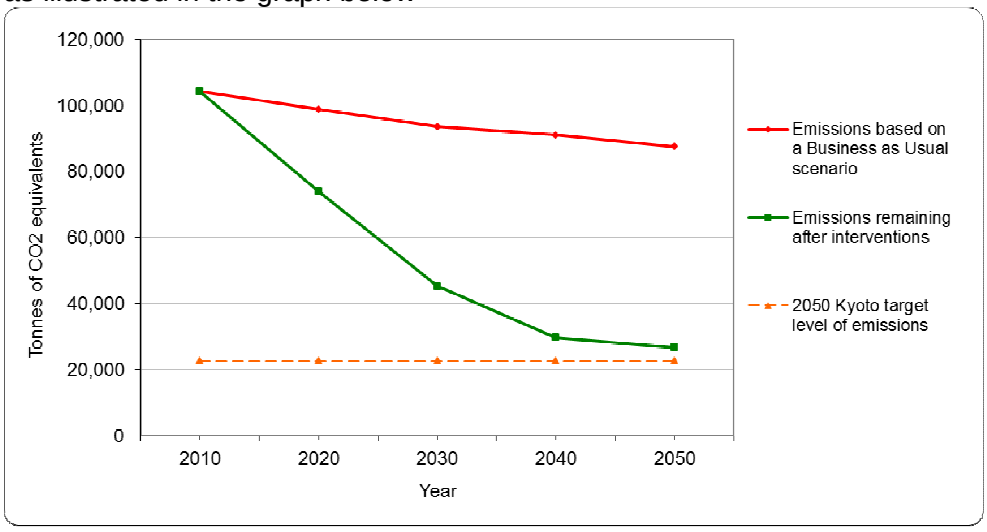
Domestic Sector

Domestic BAU	1990	2009	2020	2030	2040	2050	2050 Target 80% reduction on 1990 levels
Emissions under a business as usual scenario (t/CO_{2eq})	113,144	104,292	98,761	93,598	91,112	87,570	22,629

Table above: Forecast of GHG emissions under a 'business as usual' scenario compared to the target emissions in 2050 of an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 90,515 t/CO_2eq.

Domestic Sector Interventions	GHG emissions pathway (cumulative) from interventions by decade (t/CO_{2eq})				Impact on total CO_{2eq} savings
	2020	2030	2040	2050	%
Energy efficiency measures applied to pre-1997 stock of properties	83,407	54,780	49,867	46,913	22%
Introducing a low-carbon standard through Building Bye-Laws (by 2014 60% more efficient homes and 2018 carbon neutral for space heating)	78,745	50,118	45,205	42,251	3%
Implement micro-renewables in the domestic sector (solar thermal)	78,745	50,066	32,052	29,098	4%
Improved energy efficiency through behaviour change programme	73,981	45,303	29,670	26,716	2%
Final emissions pathway after all interventions and % reduction	**73,981**	**45,303**	**29,670**	**26,716 (76%)**	

Table above: The emissions pathways as a result of the each intervention in the domestic sector. Note that after the interventions emissions can be reduced by 76% as illustrated in the graph below



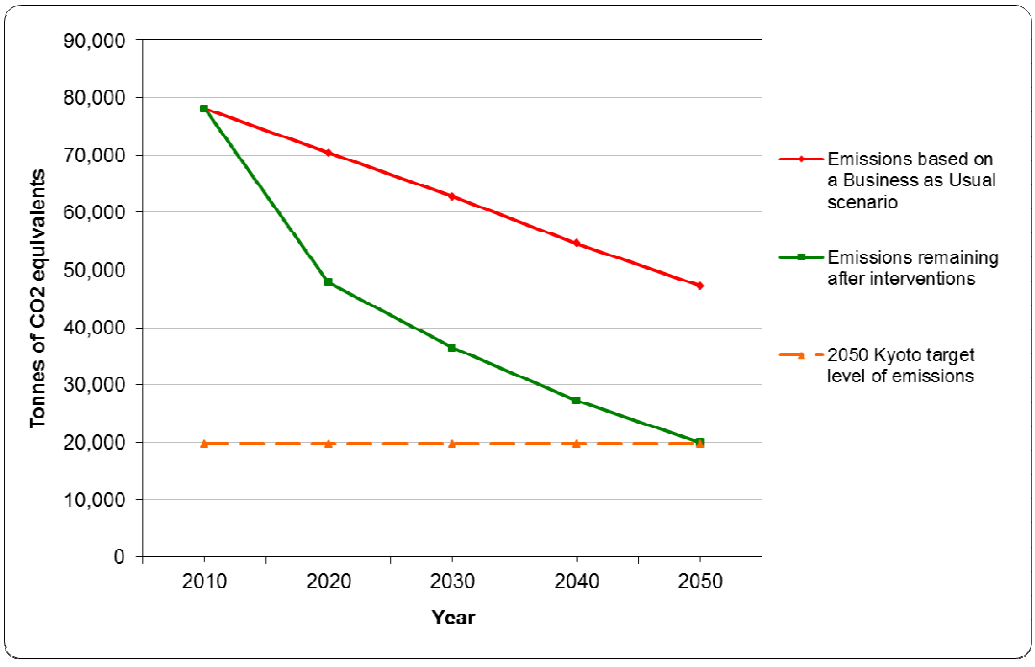
Industrial and Commercial

Industrial and Commercial BAU	1990	2009	2020	2030	2040	2050	Target 20% of 1990 levels
Emissions under a business as usual scenario (t/CO_{2eq})	98,780	78,049	47,858	36,408	27,247	19,918	19,756

Table above: Forecast of GHG emissions from the industrial and commercial sector under a 'business as usual' scenario compared to the target emissions in 2050 of an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 79,024 t/CO2eq.

Industrial and Commercial Interventions	GHG emissions pathway (cumulative) from interventions by decade (t/CO_{2eq})				Impact on total CO_{2eq} savings
	2020	2030	2040	2050	%
Energy efficiency improvements in the Public Sector (States of Jersey). 10% reduction to 2010-2015 and then a 15% reduction to 2020 and a further 10% per decade thereafter)	70,410	62,723	54,616	47,182	6%
Energy efficiency improvements in the Private Sector (15% by 2020 and a further 10% per decade thereafter)	61,014	53,327	45,220	37,786	10%
Final emissions pathway after all interventions and % reduction	**47,858**	**36,408**	**27,247**	**19,918 (80%)**	

Table above: The emissions pathways as a result of the each intervention in the industrial and commercial sector. Note that after the interventions emissions can be reduced by 80% as illustrated in the graph below.



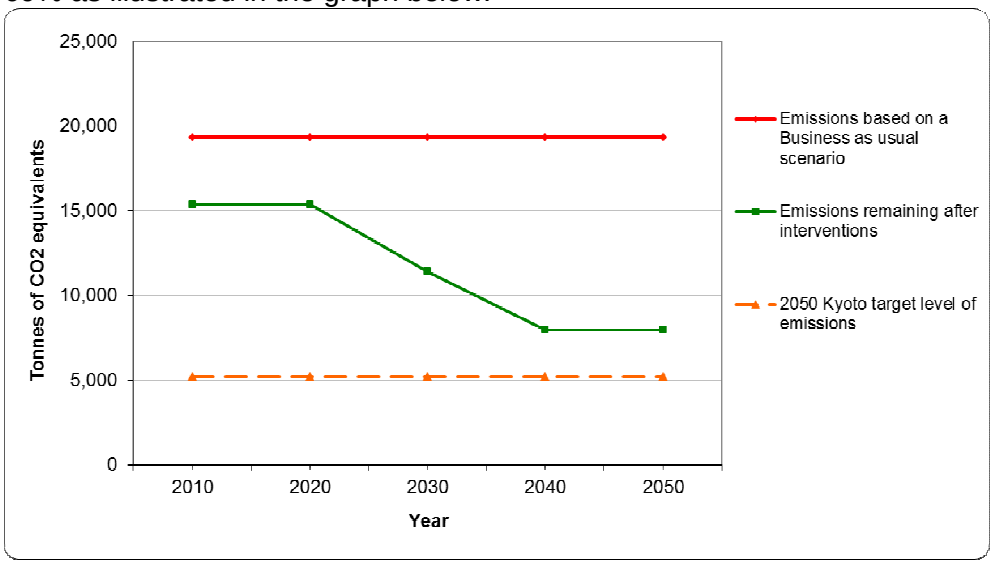
Agriculture

Agriculture BAU	1990	2009	2020	2030	2040	2050	Target 20% of 1990 levels
Emissions under a business as usual scenario (t/CO_{2eq})	26,037	19,331	19,331	19,331	19,331	19,331	**5,207**

Table above: Forecast of GHG emissions from the agricultural sector under a 'business as usual' scenario compared to the target emissions in 2050 of an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 20,830 t/CO_{2eq}

Agriculture Interventions	GHG emissions pathway (cumulative) from interventions by decade (t/CO_{2eq})				Impact on total CO_{2eq} savings
	2020	2030	2040	2050	%
Reduction in emissions from ruminants (30% by 2030)	19,331	19,331	15,910	15,910	1
Implementation of Anaerobic Digestion systems for waste management of livestock slurry by 2020	15,368	11,405	7,984	7,984	4
Final emissions pathway after all interventions and % reduction	**15,368**	**11,405**	**7,984**	**7,984 (69%)**	

Table above: The emissions pathways as a result of the each intervention in the Agriculture sector. Note that after the interventions emissions can be reduced by 69% as illustrated in the graph below.



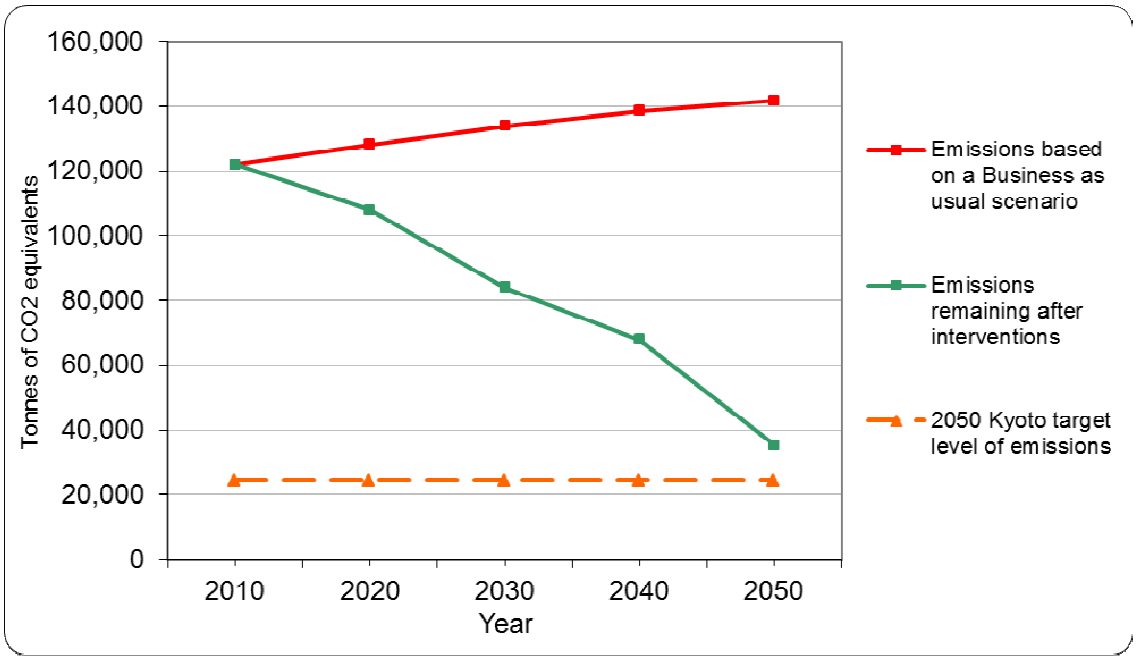
Road Transport

Road Transport BAU	1990	2009	2020	2030	2040	2050	Target 20% of 1990 levels
Emissions under a business as usual scenario (t/CO_{2eq})	122,445	121,940	128,249	133,907	138,620	141,762	24,489

Table above: Forecast of GHG emissions from the Road Transport sector under a 'business as usual' scenario compared to the target emissions in 2050 of an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 97,956 t/CO2eq

Road Transport Interventions	GHG emissions pathway (cumulative) from interventions by decade (t/CO_{2eq})				Impact on total CO_{2eq} savings
	2020	2030	2040	2050	%
Savings from improved EU standards for **car** emissions (fleet turns over and emissions reduced by 32% on BAU by 2030)	128,249	110,473	114,362	116,954	12
5% Modal shift i.e. Mileage redn of 5%	122,638	109,302	113,149	115,714	2
Savings as a result of low emission cars - ULEVs replace EU compliant vehicles	114,642	90,789	74,820	42,219	22
Emissions accounting for STP measures by 2020	110,463	86,610	70,641	38,039	3
Forecast emmissions from vans and lorries (accounting for fleet change & Eu redn)	107,898	83,932	67,869	35,204	1
Final emissions pathway after all interventions and % reduction	**107,898**	**83,932**	**67,869**	**35,204 (71%)**	

Table above: The emissions pathways as a result of the each intervention in the Road Transport sector. Note that after the interventions emissions can be reduced by 71% as illustrated in the graph below.


160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Tonnes of CO2 equivalents
2010
2020
2030
2040
2050
Year
Emissions based on a Business as usual scenario
Emissions remaining after interventions
2050 Kyoto target level of emissions

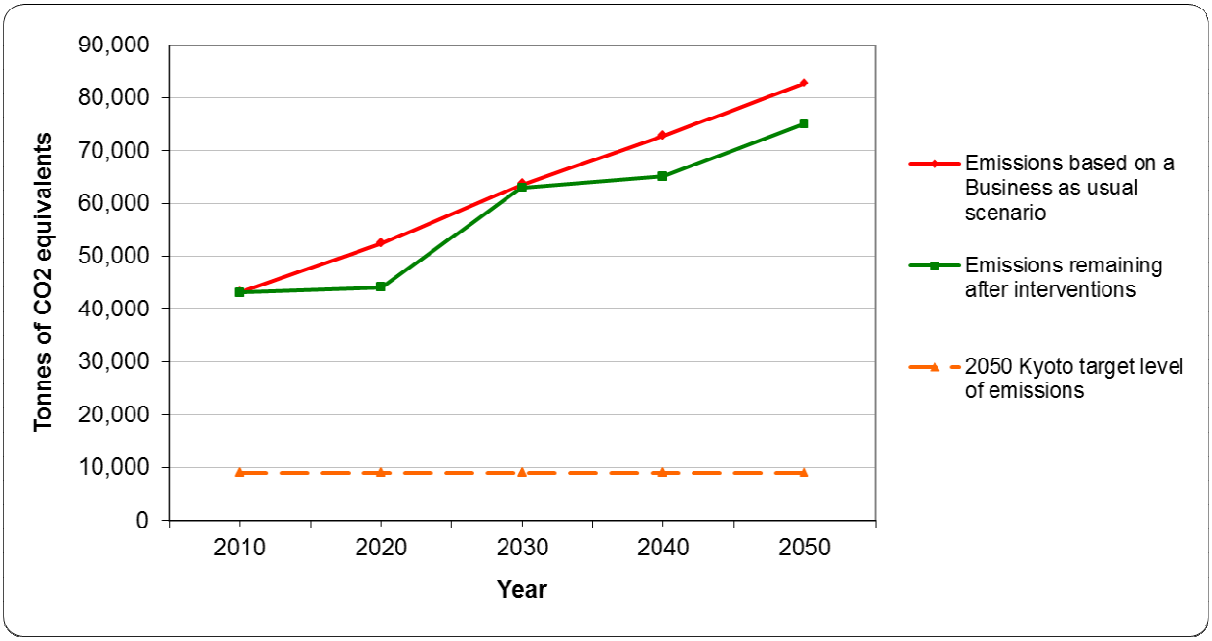
Aviation

Aviation BAU	1990	2009	2020	2030	2040	2050	Target 20% of 1990 levels
Emissions under a business as usual scenario (t/CO_{2eq})	44,710	43,144	52,295	63,599	72,726	82,604	8,942

Table above: Forecast of GHG emissions from the aviation sector under a 'business as usual' scenario compared to the target emissions in 2050 of an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 35,768 t/CO_{2eq}

Aviation Interventions	GHG emissions pathway (cumulative) from interventions by decade (t/CO_{2eq})				Impact on total CO_{2eq} savings
	2020	2030	2040	2050	%
Improved international operating standards for aircraft (By 2050 reduce emissions by 50% on 2005 levels)	44,100	63,010	65,120	74,998	4%
Final emissions pathway after all interventions and % reduction	**44,100**	**63,010**	**65,120**	**74,998 (+68%)**	

Table above: The emissions pathways as a result of the each intervention in the aviation sector. Note that after interventions emissions will increase by approximately 68% as illustrated in the graph below.



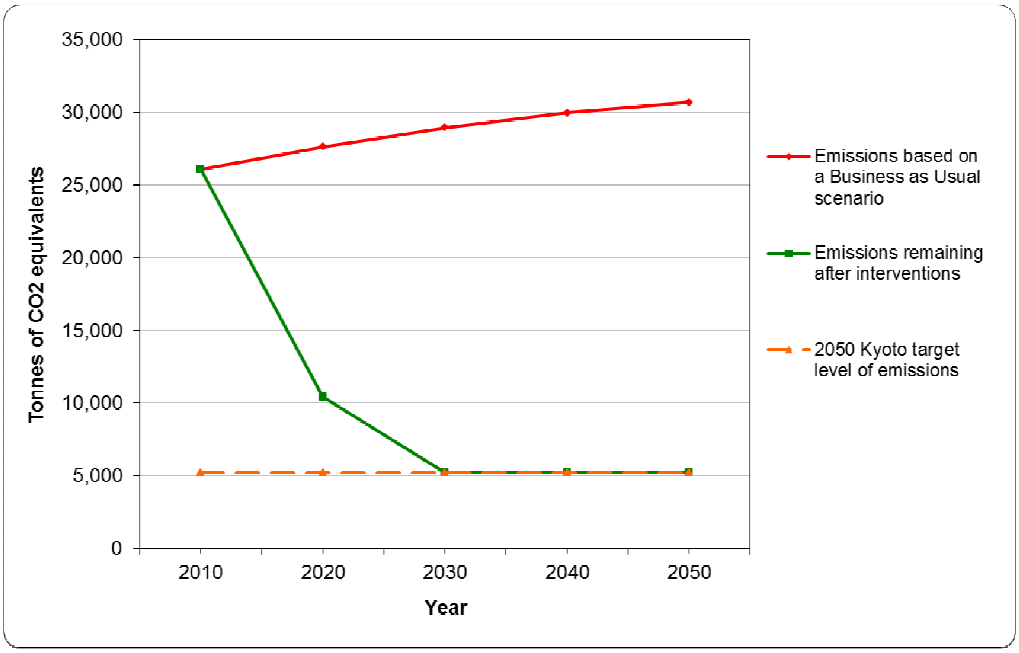
F-gases

F-gases BAU	1990	2009	2020	2030	2040	2050	Target 20% of 1990 levels
Emissions under a business as usual scenario (t/CO_{2eq})	2,755	26,097	27,630	28,954	29,973	30,668	5,219

Table above: Forecast of GHG emissions from the aviation sector under a 'business as usual' scenario compared to the target emissions in 2050 of an 80% reduction on 1990 levels. With no interventions there is an estimated shortfall of 20,878 t/CO_{2eq}

Aviation Interventions	GHG emissions pathway (cumulative) from interventions by decade (t/CO_{2eq})				Impact on total CO_{2eq} savings
	2020	2030	2040	2050	%
Improved international operating standards for aircraft (By 2050 reduce emissions by 50% on 2005 levels)	10,439	5,219	5,219	5,219	3%
Final emissions pathway after all interventions and % reduction	**10,439**	**5,219**	**5,219**	**5,219 (80%)**	

Table above: The emissions pathways as a result of the each intervention in the F-gas sector. Note that the intervention of the F-gas regulation reduces emissions by 80% as illustrated in the graph below. It is assumed that market availability and compliance of producers with the regulation will drive this intervention. It is anticipated that there will be a small legacy amount of material which will decline over time as products and equipment is replaced following the phase out.



Energy Plan: Pathway 2050

R.37/2014

Presented to the States on 24th March 2014
by the Minister for Planning and Environment

Members are asked to note, in relation to this Report, that 2 supplementary documents (spreadsheets containing detailed data on carbon emissions) are available to them on request, from the Department of the Environment.