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

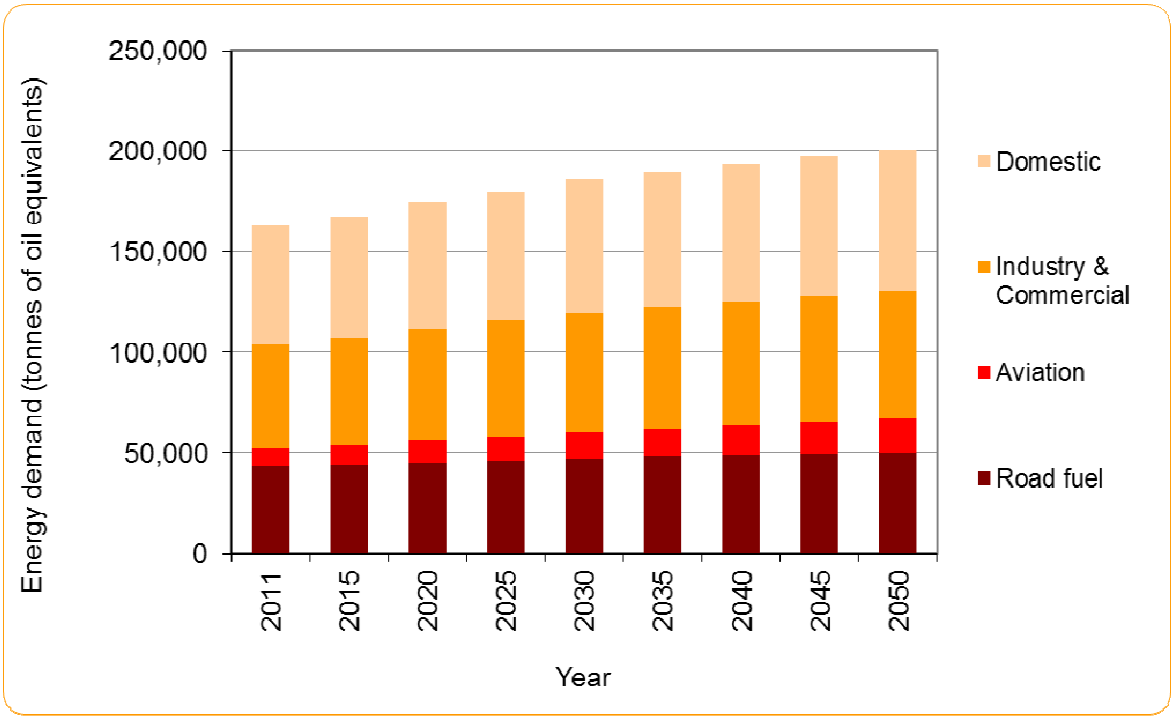


Figure A1 Illustration of patterns of future energy demand using a simple 'business as usual' model.

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.

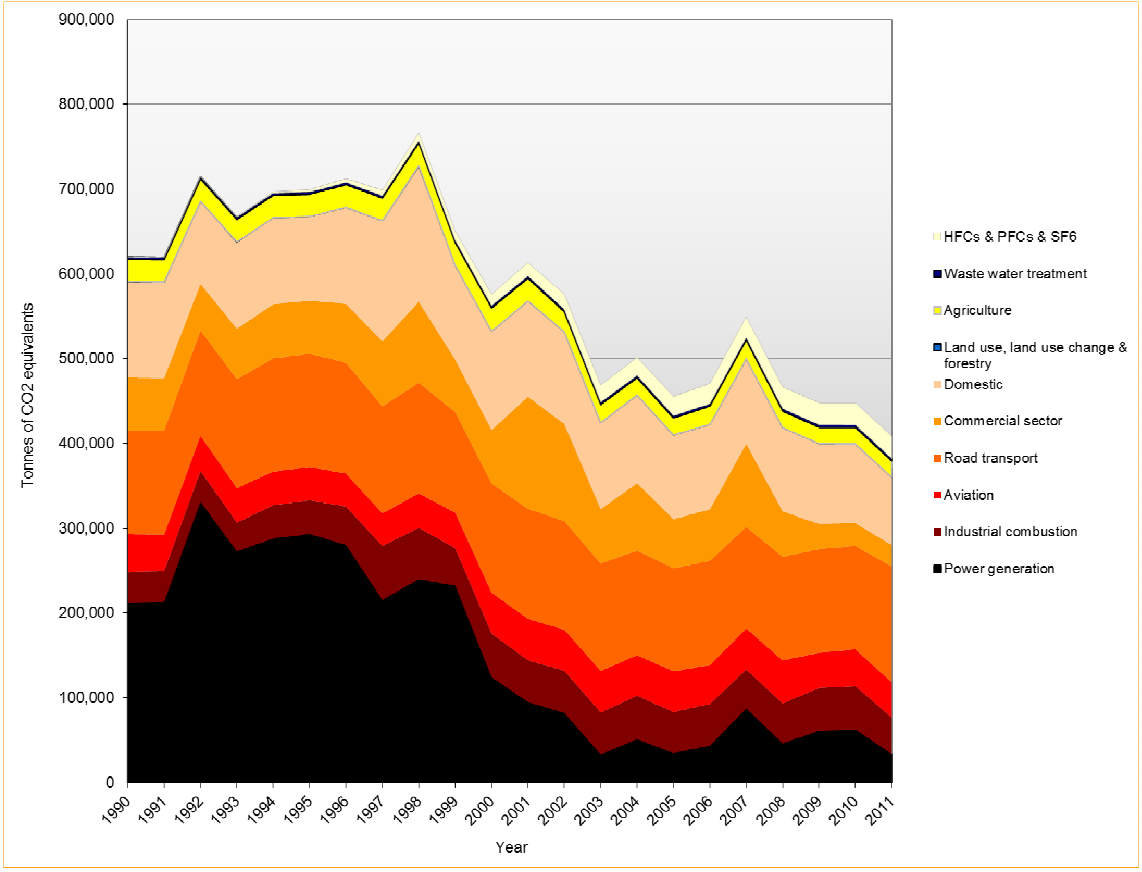
CATEGORIES	1990	2010	2020	2030	2040	2050	Target 20% of 1990 levels
Power stations	211,765	62,875	29,438	32,299	5,789	5,789	42,353
Industrial combustion	36,549	51,151	46,145	41,107	35,794	30,922	7,310
Aviation	44,710	43,144	52,295	63,599	72,726	82,604	8,942
Road transport	122,445	121,940	128,249	133,907	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.

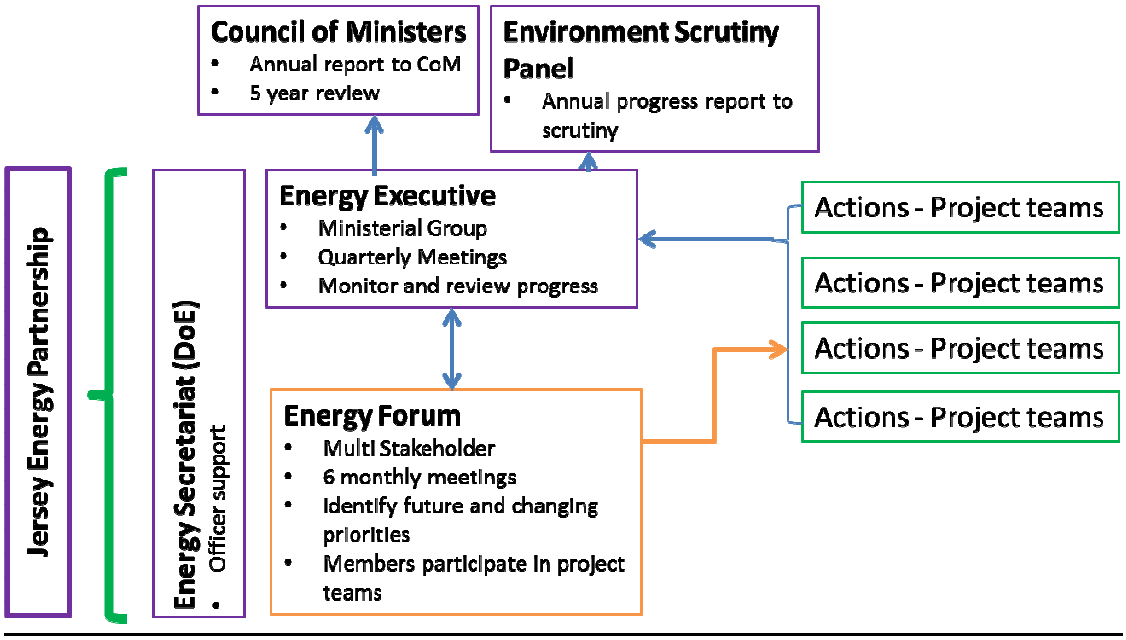
The executive will include representation from the Ministers for the Department of the Environment, Economic Development, Transport and Technical Services and Social Security Departments; secretariat will be provided by the Department of the Environment. The executive will present the 5 year review to 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

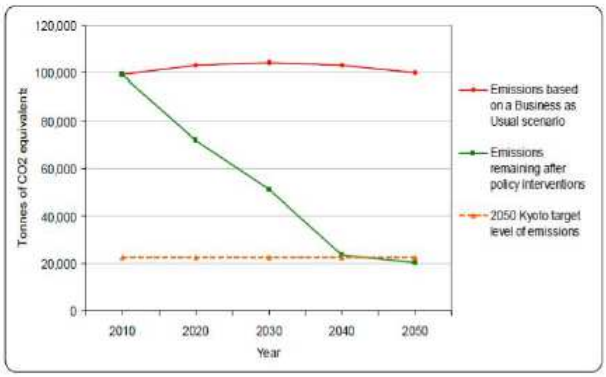
Domestic Sector Interventions	GHG emissions pathway (cumulative) from interventions by decade (t/CO_{2eq}) 2020	2030	2040	2050
Energy efficiency measures applied to pre-2000 stock of properties	81,358	60,570	37,717	34,612
Introducing a 'carbon-neutral' standard for new homes through Building Bye-Laws (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.

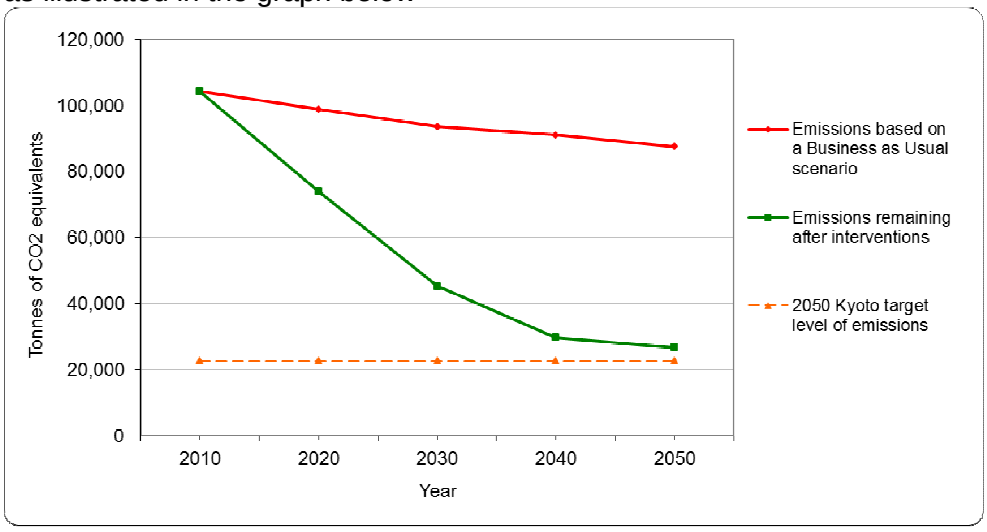
Domestic Sector

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



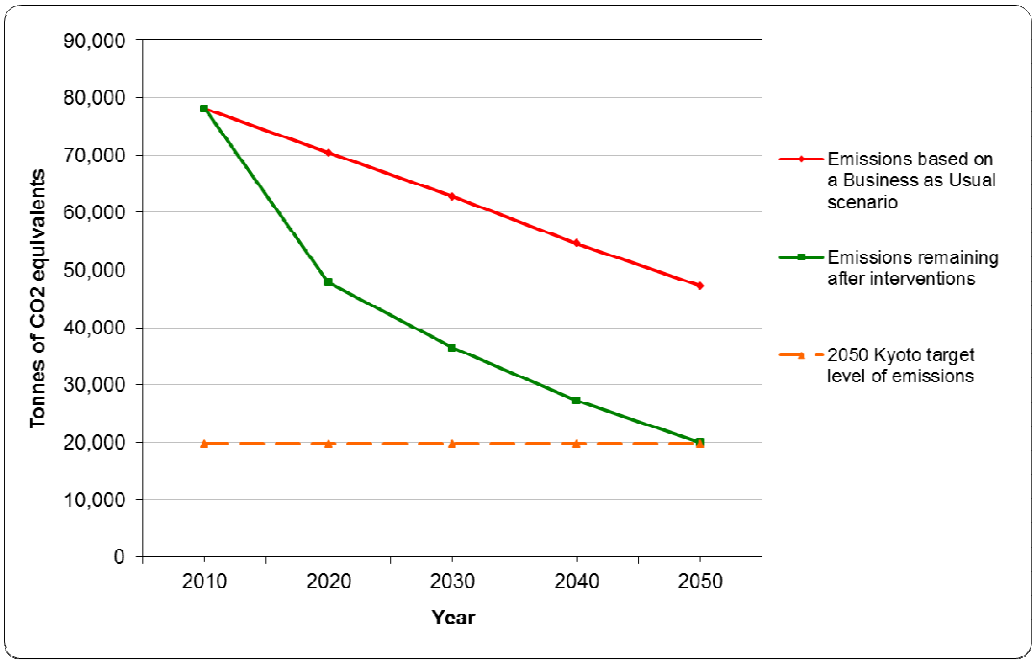
Industrial and Commercial

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.



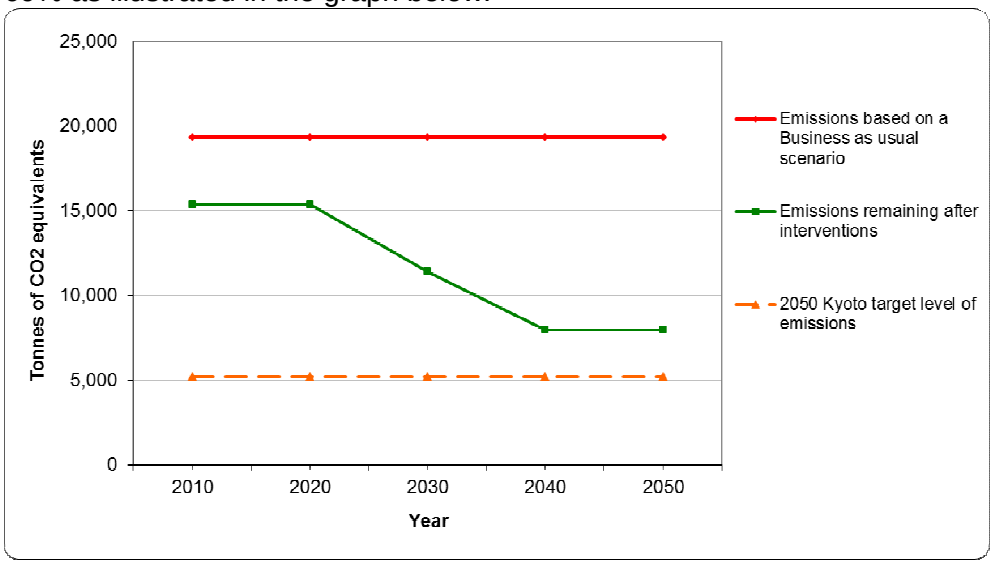
Agriculture

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.



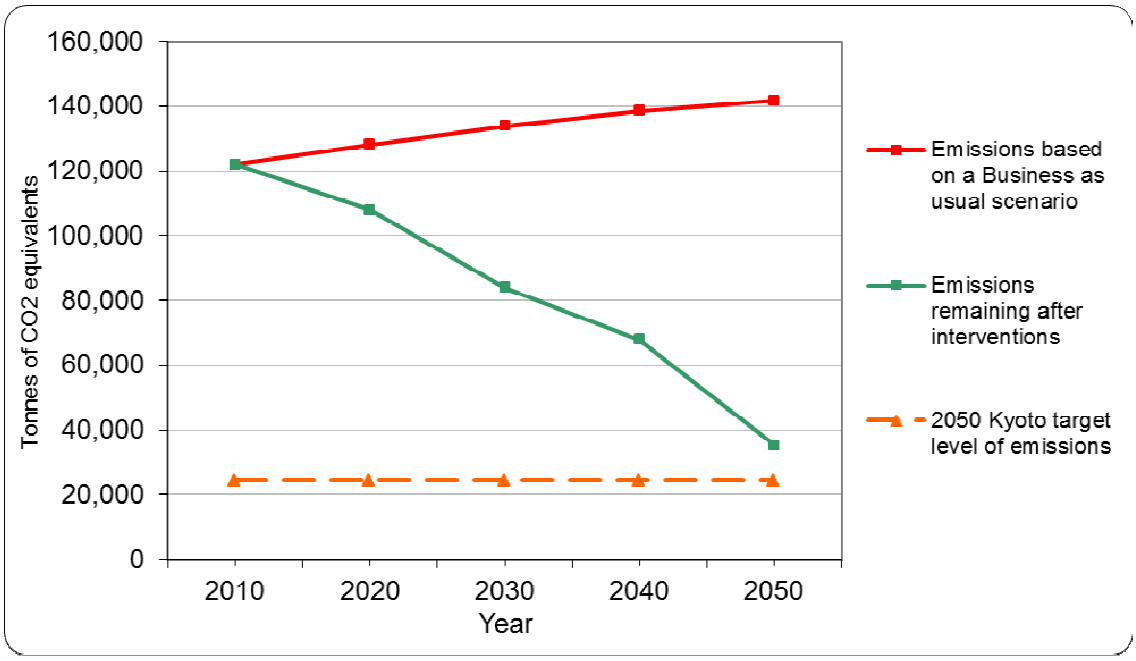
Road Transport

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

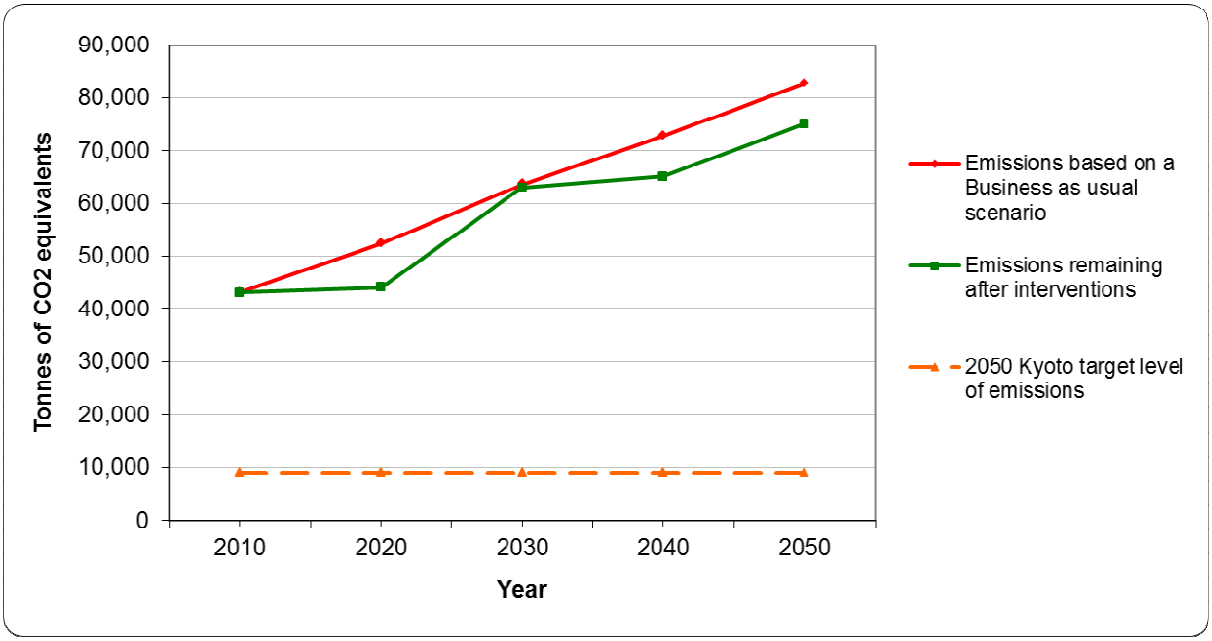
Aviation

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.