

# STAGE 1 RESULTS – DTI EXERCISE TO UPDATE ENERGY AND EMISSIONS PROJECTIONS

## ILLUSTRATIVE PROJECTION RESULTS FROM INITIAL JULY 2003 RUN

### INTRODUCTION

The following results are released to provide an illustrative example of the updated central baseline energy and emissions projection. The assumptions on which this projection is based have been published on the SEPN website<sup>1</sup>. This projection represents a single “central baseline” projection based on these initial assumptions. The next two stages of the DTI exercise, to provide a complete update of Energy Paper 68 (EP68), will provide refined projections available in November 2003<sup>2</sup> and culminating in a complete set of projections expected to be published around March 2004. The further work includes revision of some key assumptions, further modelling development and the inclusion of a number of sensitivities.

There are a number of tables presented here which illustrate the comparisons between the current updated initial projections and the previously published EP68 projections. Table 1: illustrates the headline carbon emission projections, Table 2: carbon emissions by sector, Table 3: fuel use in generation, Table 4: fuel by sector, Table 5: impact of CCP measures by fuel and by sector, and Table 6 will illustrate the assumptions for industrial growth. A revised timetable of the updated projections to reflect the revised NAP process timetable has been included as Annex 3.

### INITIAL RESULTS

These initial results are purely illustrative and dependent on the key assumptions adopted and the current stage of model development. The central baseline carbon emissions projection (UEP) *includes* the impact of the Climate Change Programme measures listed in Annex 1, and is shown below in Table 1. Also illustrated is the central baseline excluding the impact of the majority of CCP measures and the EP68 CH scenario.

Table 1 – Headline central baseline carbon emissions projection (MtC)

	1990	2005	2010
UEP baseline including CCP	159.6	140.0	138.9
UEP baseline excluding CCP	159.6	148.8	151.5
EP68 CH scenario (excluding the CCP)	159.3	146.6	148.7

Direct comparison of these initial projections with the earlier EP68 projections is difficult because the central baseline differs from EP68 in a number of key assumptions and in the range of policy inclusions<sup>3</sup>. However, presenting the initial central baseline projection (UEP) exclusive of the CCP measures as in Tables 2-3 below allows some measure of comparison.

### EMISSIONS BY SECTOR

Table 2 (a & b) illustrates, as far as is possible, a comparison of emissions, by sector, between the central baseline UEP excluding most of the CCP measures, termed “UEP B1” and EP68. Table 2a & Table 2b illustrate the comparison, by sector, between UEP-B1 (i.e. excluding CCP) and EP68 CH and average EP68 CH/CL scenarios. 2005 - 2010. The EP68

<sup>1</sup> [www.dti.gov.uk/energy/sepn/euets/projections.pdf](http://www.dti.gov.uk/energy/sepn/euets/projections.pdf)

<sup>2</sup> See revised time-table Annex 3

<sup>3</sup> The differences in fossil fuel prices suggest that a closer comparison is achieved by comparing the UEP with the EP68 CH scenario. The other major differences are that EP68 largely excludes the CCP, and UEP baseline assumes compliance with NECD and LCPD. Both projections include the renewables obligation.

CH scenario is closer in key assumptions to the central baseline projection, excluding the CCP measures, (UEP B1) in terms of the fossil fuel price assumptions. The EP68 CL/CH “baseline” is not strictly a projection but an average of EP68 CL and EP68 CH projections although is generally referred to as the “Climate Change Programme baseline”.

Table 2a - comparison between UEP-B1 (i.e. excluding CCP) emission projection and EP68 CH projection 2005 – 2010, by sector

	UEP B1		EP68 CH		Differences	
	2005	2010	2005	2010	2005	2010
Power Stations	41.8	41.5	38.0	37.6	3.8	3.9
Refineries	4.9	5.1	6.0	6.3	-1.1	-1.2
Residential	22.4	22.6	21.9	22.0	0.5	0.6
Services	8.9	9.0	9.5	9.8	-0.6	-0.8
Industry	31.0	30.3	32.5	31.8	-1.5	-1.5
Road Transport	35.4	38.5	34.5	36.9	0.9	1.6
Off-road	1.4	1.4	1.2	1.2	0.2	0.2
Other transport	3.0	3.0	3.0	3.0	0.0	0.0
<b>Total</b>	<b>148.8</b>	<b>151.5</b>	<b>146.6</b>	<b>148.6</b>	<b>2.2</b>	<b>2.9</b>

Note: (1) UEP B1 baseline excludes the CCP measures, excludes CCL except in services.  
(2) These are provisional figures, and representing work in progress

## COMMENTS

- Overall increases in emissions in generation
- Reduction in emissions from industry due to lower growth assumptions
- Reductions in emissions from refineries reflect the impact of refinery capacity adjustments
- Higher electricity demand, higher coal use, lower nuclear generation
- Assumed reduction in off-shore gas production
- Higher domestic demand due to higher income assumptions (this is offset by climate change measures, see below)
- Higher service demand due to higher GDP growth assumptions
- Industry growth assumed lower than in EP68
- Higher transport emissions reflect re-estimation of demand equations.

Table 2b - comparison between UEP-B1 (i.e. excluding CCP) emissions projection and EP68 average projections EP68 CH/CL 2005 – 2010, by sector

	UEP B1		EP68 Average CL/CH		Differences	
	2005	2010	2005	2010	2005	2010
Power Stations	41.8	41.5	35.7	35.5	6.1	6.0
Refineries	4.9	5.1	6.0	6.4	-1.1	-1.3
Residential	22.4	22.6	22.1	22.5	0.3	0.1
Services	8.9	9.0	9.5	9.7	-0.6	-0.7
Industry	31.0	30.3	33.0	32.2	-2.0	-1.9
Road Transport	35.4	38.5	34.7	37.2	0.7	1.3
Off-road	1.4	1.4	1.3	1.3	0.1	0.1
Other transport	3.0	3.0	3.0	3.0	0.0	0.0
<b>Total</b>	<b>148.8</b>	<b>151.5</b>	<b>145.3</b>	<b>147.8</b>	<b>3.5</b>	<b>3.7</b>

Note: (1) UEP baseline excludes the CCP measures, excludes CCL except in services.  
 (2) These are provisional figures, and will need to be adjusted

#### GENERATION FUEL SHARES

Table 3 illustrates the generation shares by fuel mix implied the central baseline (UEP B1: excluding CCP impacts) projections and EP68 CH projection in 2010.

Table 3 – the generation fuel mix (TWh) in 2010

	UEP B1 (TWh)	EP68 CH (TWh)
Coal	91	83
Oil	0	0
Gas	191	173
Nuclear	57	66
Renewables	42	41
Imports & other	5	8
<b>Total</b>	<b>385</b>	<b>371</b>

#### COMMENTS

These are provisional fuel share projections of the major power producers. They assume compliance with NECD and LCPD. The figures exclude generation from auto-generation. The LCPD is assumed to be implemented via a national plan. The 10% renewables target is assumed to be met. The higher emissions in 2010 compared with EP68 CH are mainly due to:

- Lower nuclear generation
- Higher electricity demand
- Higher coal generation

There remains further modelling work to be done in this sector to explore the impact of LCPD and NECD. Consideration is also required of the potential impact of IPPC. The potential for new electricity inter-connectors and coal plant and FGD economics are also areas needing refinement in the modelling of this sector.

## PROJECTIONS OF ENERGY DEMAND BY SECTOR

Table 4 illustrates the UEP final energy demand projection by sector including the estimated fuel impact of the CCP compared with EP68 CH (excluding CCP) scenario. The differences represent both the impact of the CCP measures and the difference between the assumptions of UEP and EP68.

Domestic (MTOE)	UEP*			EP 68 CH			Difference: UEP* - EP68		
	2000A	2005	2010	2000	2005	2010	2000	2005	2010
Electricity	9.6	10.2	11.0	9.6	10.6	11.3	0.1	-0.3	-0.3
Gas	31.8	30.9	30.4	30.8	31.4	31.4	1.0	-0.4	-1.0
Oil	3.2	3.3	3.4	3.4	3.4	3.8	-0.2	-0.1	-0.4
Solid Fuel	1.9	0.8	0.5	1.2	0.8	0.6	0.7	0.0	0.0
Renewables	0.2	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.1
Heat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>46.9</b>	<b>45.4</b>	<b>45.4</b>	<b>45.0</b>	<b>46.1</b>	<b>47.0</b>	<b>1.8</b>	<b>-0.8</b>	<b>-1.6</b>

Transport (MTOE)	UEP*			EP 68 CH			Difference: UEP* - EP68		
	2000A	2005	2010	2000	2005	2010	2000	2005	2010
Motor Spirit	24.3	21.4	19.2	23.3	23.7	25.0	0.9	-2.2	-5.8
DERV	18.8	20.3	23.9	18.1	21.0	22.9	0.6	-0.8	1.0
Aviation	12.0	12.4	14.8	11.2	12.7	14.9	0.8	-0.3	-0.1
Other	0.8	2.9	2.8	2.4	2.2	2.2	-1.5	0.6	0.6
<b>Total</b>	<b>55.8</b>	<b>56.9</b>	<b>60.6</b>	<b>55.0</b>	<b>59.6</b>	<b>64.9</b>	<b>0.8</b>	<b>-2.7</b>	<b>-4.3</b>

Service (MTOE)	UEP*			EP 68 CH			Difference: UEP* - EP68		
	2000A	2005	2010	2000	2005	2010	2000	2005	2010
Electricity	7.8	8.7	9.4	8.5	9.1	9.4	-0.7	-0.4	0.1
Gas	9.2	10.9	10.6	11.3	11.9	12.6	-2.1	-1.0	-2.0
Oil	1.7	2.0	2.0	2.6	2.2	2.0	-0.9	-0.1	-0.1
Solid Fuel	0.1	0.1	0.1	0.3	0.3	0.2	-0.2	-0.1	-0.1
Renewables	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.0
Heat	1.4	0.0	0.0	0.0	0.0	0.0	1.4	0.0	0.0
<b>Total</b>	<b>20.3</b>	<b>21.8</b>	<b>22.2</b>	<b>22.7</b>	<b>23.5</b>	<b>24.3</b>	<b>-2.4</b>	<b>-1.7</b>	<b>-2.1</b>

Industry (incl. Agric) (MTOE)	UEP*			EP 68 CH			Difference: UEP* - EP68		
	2000A	2005	2010	2000	2005	2010	2000	2005	2010
Electricity	10.2	10.4	10.6	10.0	10.4	10.8	0.2	0.0	-0.1
Gas**	16.1	14.8	14.2	16.9	17.3	17.5	-0.8	-2.5	-3.3
Oil	7.0	6.8	6.5	6.5	5.9	6.1	0.5	0.8	0.4
Solid Fuel	4.8	5.4	5.2	6.2	5.8	5.6	-1.4	-0.4	-0.4
Renewables	0.3	0.2	0.2	0.6	0.7	0.6	-0.3	-0.5	-0.4
Heat	1.1	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0
<b>Total</b>	<b>39.5</b>	<b>37.5</b>	<b>36.7</b>	<b>40.2</b>	<b>40.1</b>	<b>40.5</b>	<b>-0.7</b>	<b>-2.6</b>	<b>-3.8</b>

Note:

(\*) Certain CCP measures, (e.g. UK ETS, HEES, CHP) for which fuel impacts were difficult to measure, are excluded from the fuel shares in UEP. In terms of their share of total carbon savings, these excluded measures amount to 27% in 2005 and 22% in 2010.

(\*\*) Industry "Gas" includes coke oven gas, which was listed separately in EP68

### Domestic sector

- Higher energy demand due to assumptions of higher income is off set by impact of the CCP and the downward revision to population figures from the census

### Transport sector

- Aviation fuel demand is slightly down due to lower OECD growth assumptions

- Road fuel demand is down due to the Transport Voluntary Agreement, the 10 Year Plan and slightly lower population assumed.

Service sector

- Energy demand is down due to building regulations and the Carbon Trust measures

## Industry & Agriculture

- Energy demand is lower due to revised growth assumptions and the CCA
- In 2005, increased electricity demand in the UEP baseline is offset by the reduction in electricity demand due to the CCA
- Also in 1995, the reduction in gas demand due to the CCA has exceeded the increase in demand from the UEP baseline
- The apparent reduction in renewables is due to a difference between UEP and EP68 in accounting for renewables in auto-generation and not a reduction in the level of renewables.

## FUEL USE IMPACT OF CCP

Table 5 – Provides an estimate of the impact on fuel use by sector of the CCP measures (see note below for exclusions)

Domestic (MTOE)	UEP			UEP*			Impact of CCP		
	2000A	2005	2010	2000	2005	2010	2000	2005	2010
Electricity	9.6	10.4	11.2	9.6	10.2	11.0	0.0	0.2	0.2
Gas	31.8	32.0	32.5	31.8	30.9	30.4	0.0	1.0	2.1
Oil	3.2	3.4	3.6	3.2	3.3	3.4	0.0	0.1	0.2
Solid Fuel	1.9	0.8	0.6	1.9	0.8	0.5	0.0	0.0	0.1
Renewables	0.2	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.0
Heat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>46.9</b>	<b>46.7</b>	<b>48.0</b>	<b>46.9</b>	<b>45.4</b>	<b>45.4</b>	<b>0.0</b>	<b>1.3</b>	<b>2.6</b>

Transport (MTOE)	UEP			UEP*			Impact of CCP		
	2000A	2005	2010	2000	2005	2010	2000	2005	2010
Motor Spirit	24.3	23.5	22.6	24.3	21.4	19.2	0.0	2.1	3.4
DERV	18.8	22.3	27.2	18.8	20.3	23.9	0.0	2.0	3.3
Aviation	12.0	12.4	14.8	12.0	12.4	14.8	0.0	0.0	0.0
Other	0.8	2.9	2.8	0.8	2.9	2.8	0.0	0.0	0.0
<b>Total</b>	<b>55.8</b>	<b>61.0</b>	<b>67.3</b>	<b>55.8</b>	<b>56.9</b>	<b>60.6</b>	<b>0.0</b>	<b>4.1</b>	<b>6.7</b>

Service (MTOE)	UEP			UEP*			Impact of CCP		
	2000A	2005	2010	2000	2005	2010	2000	2005	2010
Electricity	7.8	8.8	9.7	7.8	8.7	9.4	0.0	0.1	0.3
Gas	9.2	11.2	11.3	9.2	10.9	10.6	0.0	0.3	0.7
Oil	1.7	2.1	2.1	1.7	2.0	2.0	0.0	0.1	0.2
Solid Fuel	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Renewables	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Heat	1.4	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>20.3</b>	<b>22.4</b>	<b>23.4</b>	<b>20.3</b>	<b>21.8</b>	<b>22.2</b>	<b>0.0</b>	<b>0.6</b>	<b>1.2</b>

Industry (incl. Agric) (MTOE)	UEP			UEP*			Impact of CCP		
	2000A	2005	2010	2000	2005	2010	2000	2005	2010
Electricity	10.2	11.1	11.5	10.2	10.4	10.6	0.0	0.7	0.9
Gas**	16.1	16.2	16.0	16.1	14.8	14.2	0.0	1.4	1.8
Oil	7.0	7.0	6.9	7.0	6.8	6.5	0.0	0.3	0.3
Solid Fuel	4.8	5.6	5.5	4.8	5.4	5.2	0.0	0.2	0.3
Renewables	0.3	0.2	0.2	0.3	0.2	0.2	0.0	0.0	0.0
Heat	1.1	0.0	0.0	1.1	0.0	0.0	0.0	0.0	0.0
<b>Total</b>	<b>39.5</b>	<b>40.1</b>	<b>40.1</b>	<b>39.5</b>	<b>37.5</b>	<b>36.7</b>	<b>0.0</b>	<b>2.6</b>	<b>3.4</b>

Note:

(\*) Certain CCP measures, (e.g. UK ETS, HEES, CHP) for which fuel impacts were difficult to measure, are excluded from the fuel shares in UEP. In terms of their share of total carbon savings, these excluded measures amount to 27% in 2005 and 22% in 2010.

(\*\*) Industry "Gas" includes coke oven gas, which was listed separately in EP68

## CHP CAPACITY ASSUMPTIONS

The central baseline assumes some 5GWh of installed CHP capacity in 2005, and some 8GWh in 2010. Re-modelling represents ongoing revision to the CHP modelling of the energy model.

## ASSUMPTIONS OF INDUSTRIAL GROWTH

Assumptions of individual industry sub-sector growth in the UEP baseline are derived from the historic rates adjusted to the headline GDP and manufacturing rates of growth assumed. (See Process paper on SEPN website) These are shown in Table 6 and illustrated graphically in Annex 2.

Table 6 – Industrial sub-sector annual growth rates assumed in UEP

	2005-07	2008-12
<b>Agriculture</b>	-2.6%	-2.8%
<b>Services</b>	3.4%	3.2%
<b>Iron &amp; Steel</b>	-2.8%	-2.9%
<b>NFM</b>	-2.4%	-2.5%
<b>ENGV</b>	2.4%	2.3%
<b>MIN</b>	1.5%	1.4%
<b>CHM</b>	3.7%	3.6%
<b>FDT</b>	0.9%	0.8%
<b>TLC</b>	-6.0%	-6.2%
<b>PPP</b>	0.7%	0.6%
<b>COI</b>	0.7%	0.5%

It is acknowledged that these assumptions will need adjustment and this work will be carried out in the next stage of the process. It is also anticipated that there may be a need to further disaggregate growth in some sub-sectors.

## CONCLUSIONS

These results remain provisional and are part of an on-going modelling exercise to provide projections in March 2004 (see Annex 3) . Considerable work remains in refining key assumptions and developing modelling approaches to integrating policy developments.

## FURTHER WORK

Will include:

Revision of key assumptions, and sensitivities.

Modelling development-

Refining modelling of LCPD, NECD

Consideration of potential impact of IPPC

Further examination of coal plant and FGD economics

Potential for new electricity inter-connectors

Some further dis-aggregation of industrial sub-sectors.

Revisions to econometric relationships.

Further work on linkages between GVA and output growth.

Further work on energy intensities.

Revisions to CHP modelling.

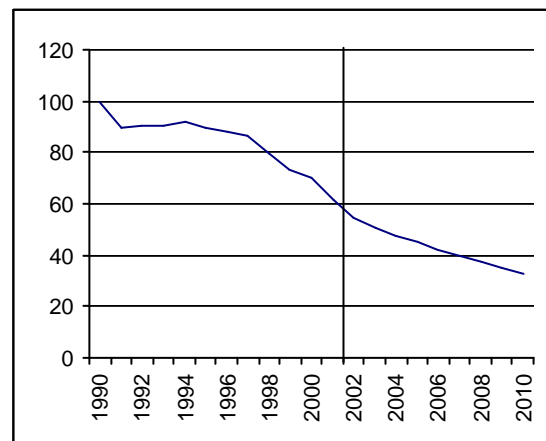
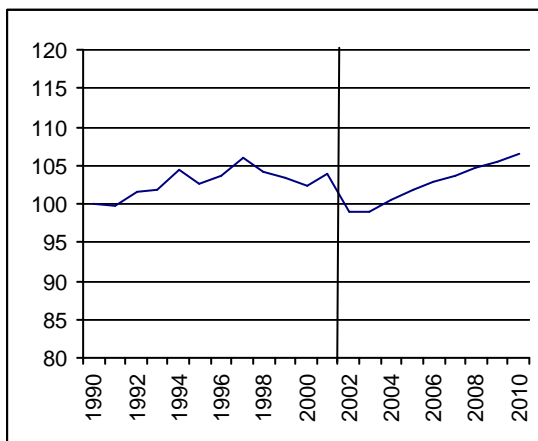
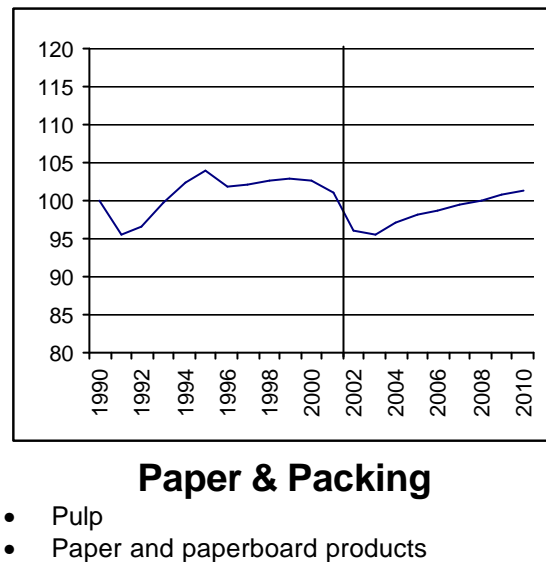
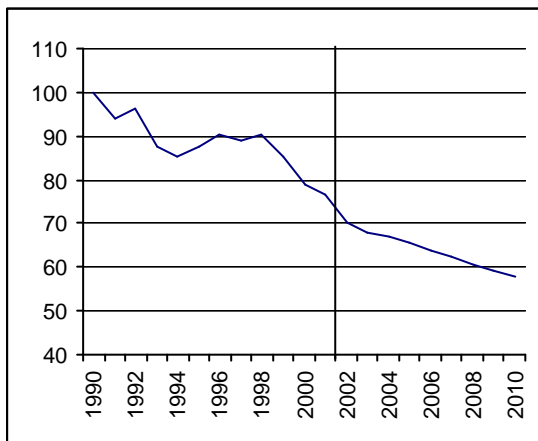
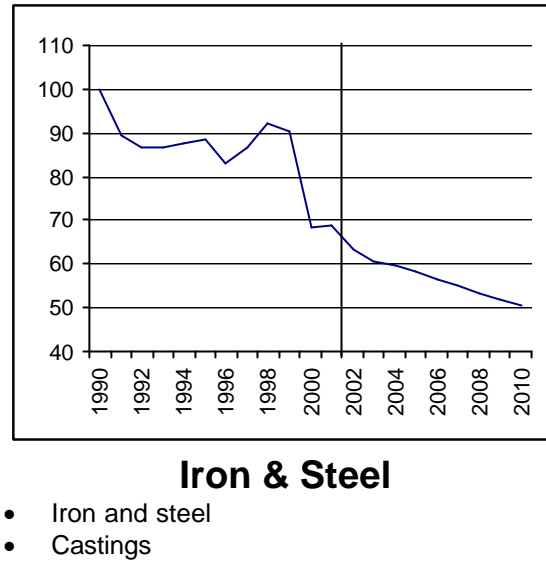
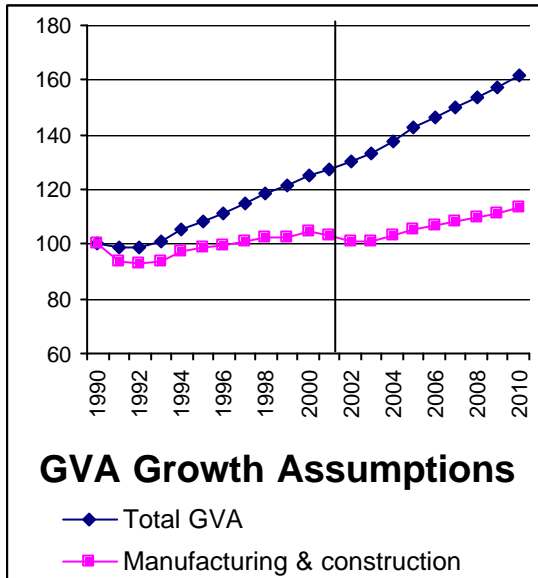
## ANNEX 1 – LIST OF CCP MEASURES INCLUDED IN UEP

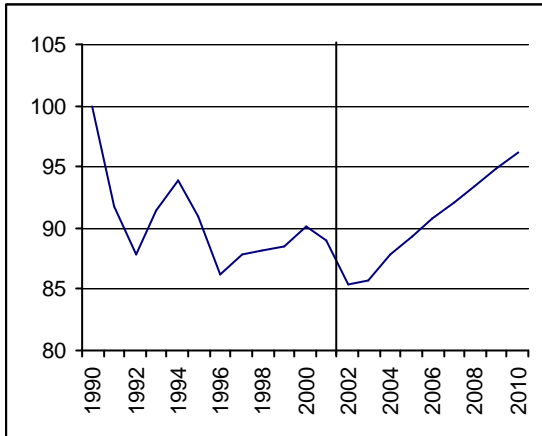
<b>SECTOR</b>	<b>CCP CARBON SAVING MEASURE</b>
Business	Climate Change Levy, including exemption for CHP and renewables

Business	Renewable Obligation to 10%
Business	Climate Change Agreement/ Implementation of IPPC
Business	UK ETS
Business	Carbon Trust
Business	Building Regulations (England & Wales only)
Transport	Transport Voluntary Agreement. Backed up by changes to company car taxation and vehicle excise duty
Transport	10 Year Plan
Transport	Sustainable distribution in Scotland & Wales
Transport	Fuel Duty Escalator to 1999
Domestic	Community Heating to March 2004
Domestic	New HEES to March 2005
Domestic	1st EEC
Domestic	Building Regulations (England & Wales only)
Agriculture, Forestry and Land Use change	Afforestation
Public Sector	New central Government, schools and NHS targets
Scottish Executive	Building Regulations, new central estate target, and NHSIS target



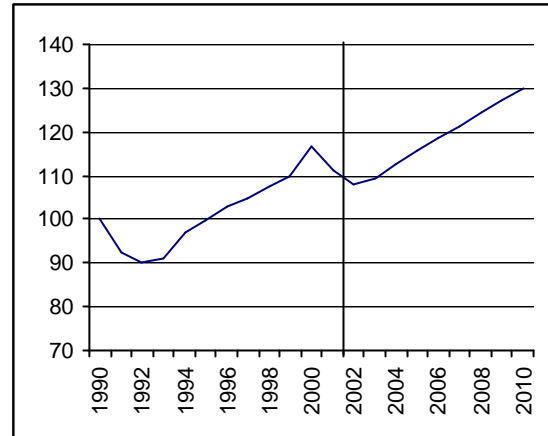
ANNEX 2 – INDUSTRIAL SUB-SECTOR GROWTH PROJECTIONS





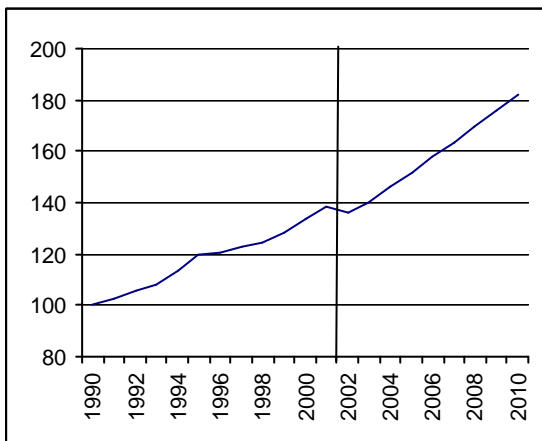
### Mineral Products

- Mining and quarrying of non-energy producing materials
- Glass products
- Ceramic goods
- Other non-metal products



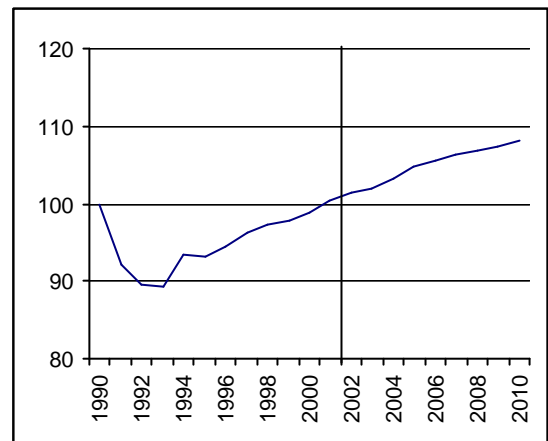
### Engineering & Vehicles

- Metal products
- Electrical and optical equipment
- Transport equipment
- Other machinery and equipment



### Chemicals

- Industrial gases and chemicals
- Pharmaceuticals
- Agri-chemicals
- Paints and vanishes
- Toiletries



### Construction & Other Industries

- Construction
- Wood and wood products
- Rubber and plastic products
- Water Supply
- Sports goods and toys
- Jewellery

### ANNEX 3 – REVISED PROJECTIONS TIME-TABLE

The projections time-table has been revised to reflect changes in the NAP process time-table as follows:

August 2003 – Initial central baseline projections published on SEPN website.

August- Oct 2003 – Continued model development, including revision of key assumptions, including industrial growth assumptions plus range of sensitivities to central baseline.

November 2003 – Detailed provisional central baseline projections, plus a range of sensitivities published on SEPN website.

Nov 03 -Feb 2004 – Finalising process, developing modelling approaches to integrating policy developments, exploring uncertainty, further sensitivities.

March 2004 ( approximately) – full publication of finalised energy and emissions projections representing a full update of EP68.