APPENDIX B METHODOLOGY FOR CALCULATING SECTOR TOTALS

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Introduction

1. The Government has decided that the allocation of allowances to the sectors will be determined as follows:

   - All sectors covered by the EU ETS other than the Large Electricity Producers (LEP) will be allocated allowances equivalent to their projected Business as Usual (BAU) emissions taking account of contributions to the New Entrant Reserve (NER) as detailed in Table 2.2 of the NAP and Appendix D.

   - The LEP sector will be allocated the remainder of the overall UK cap (set out in Section 2 of the NAP). This means that the LEP sector will receive less than its projected BAU emissions. This amount reflects the agreed carbon savings for the UK. Deductions from the allowances allocated to the LEP will also reflect the decision to auction or otherwise sell 7% of the total UK cap.

2. For Phase II, the UK has decided to extend the scheme to include rock wool, gypsum, flaring from offshore oil and gas production, petrochemicals (crackers), integrated iron and steel, carbon black, and additional activities within glass[1].

3. The UK has decided to create a New Entrant Reserve (NER) of allowances for new entrant installations that open or extend during Phase II and for those that start operation towards the end of Phase I (after 30 June 2006). The emissions projections for each sector take account of growth including new entrants, as the underlying output growth assumptions reflect the demand for a particular industrial product that will

[1] Further information, including definitions is available on the Defra website at: http://www.defra.gov.uk/environment/climatechange/trading/eu/phase2/index.htm#allocate

be met by UK producers, without regard to whether they are new entrants or existing EU ETS installations.

4. A contribution from sector totals is made to provide for expected new entrants to the EU ETS. Allocations to existing (incumbent) installations will come from sector totals after that contribution has been made. See Table 2.2 and Appendix D for details of the contributions each sector makes to the NER.

5. To project emissions from the EU ETS sectors, the UK has used the DTI's energy model (UEP) and independent work from Oxford Economic Forecasting (OEF). The projected emissions for each EU ETS sector are calculated after incorporating the effects of current Climate Change Programme policies and measures and additional measures announced in the Climate Change Programme Review in March 2006. A consultation on these projections was launched in February 2006. The final projections being used for Phase II of the EU ETS are shown in Table B2 and supporting documents are available on the DTI website[2] .

Expansion

6. The Commission published further NAP guidance in December 2005[3], which aims to reduce distortions across the EU arising from the implementation of Phase I and seeks greater harmonisation of scope by highlighting a number of specific activities that should be included in Phase II.

Sector classification

7. The UK has adopted a two-stage allocation approach, which means first distributing allowances to sectors, and then to installations within the sectors. The creation of different sectors allows for recognition of differences in output and emissions growth rates, and requires that installations be classified into sectors.

8. In its Phase I NAP the UK placed installations into 51 sectors. The majority of installations (three quarters) were captured under the Directive activity of 'combustion installations', with 31 sectors falling under this one activity type. For Phase II the UK has revised the sector classification. This is necessary to account for the fact that Climate Change Agreement (CCA) targets are not being used directly to determine emissions projections for Phase II (in part because Phase II will include three CCA milestones and there is no opt-out for CCA participants).

9. The level of aggregation into sectors must balance different objectives:
   - to improve alignment with the Directive and other Member States;
   - to recognise different emissions trends of sectors;

[2] See: http://www.dti.gov.uk/files/file32287.pdf
[3] Available from: http://europa.eu.int/comm/environment/climat/pdf/nap_2_guidance_en.pdf

- to ensure that new entrant calculations and overall projections are, on average, as accurate as possible; and
- to reduce the complexity caused by having a large number of sectors and make the NAP easier to understand.

10. The following features have been taken into account in determining the sector classification:
    - whether the industry is an Annex I activity with the end product distinguished in the Directive, or a product that is used directly as an input to another industrial sector;
    - definition of the LEP sector with reference to the Electricity Generation Licensing Regime, and the creation of a Good Quality Combined Heat and Power (CHP) sector;
    - whether the sector accounts for a significant quantity of emissions (over 1MtCO_2 annually);
    - whether the projected emissions trends diverge sufficiently to justify further disaggregation of industries; and
    - whether the emissions of a sub-sector dominate the remainder in the sector such that any changes to its projections significantly affect the allocations to others.

11. Table B1 lists the 18 sectors in Phase II, in addition to a Good Quality CHP sector. The sectors listed under the heading non-combustion are all activities listed in Annex 1 of the Directive. Offshore, Chemicals, Food and Drink, Services, Other Electricity Producers and Downstream Gas all constitute a significant quantity of emissions (above 1MtCO_2 per year). The remaining sectors are split according to divergences in their emissions growth. Aluminium is removed from these sectors on the basis of its dominance of sector emissions if it were classified within 'Others'.

12. 'Others A' comprises sectors with emissions growth in excess of 50% (2003 – 2008-12 average). 'Others B' comprises sectors with emissions growth of between 0-50%. 'Others C' comprises sectors with declining emissions.

Table B1: *Phase II Sectors (in addition to a GQ CHP sector)*

Non-combustion	**Combustion**
Refineries	Large Electricity Producers
Iron and Steel	Offshore
Cement	Chemicals
Lime	Food and Drink
Ceramics	Aluminium
Glass	Services
Pulp and paper	Other Electricity Producers
	Downstream Gas
	Others A (Gypsum, Mineral Wool)
	Others B (Aerospace, Vehicles, Semi-conductors, Woodboard)
	Others C (Munitions, Textiles, Tyres, Tobacco,

	Other Non-metallic minerals)

Sector allocations for EU ETS sectors that match UEP totals

13. The UEP model covers energy and CO_2 emissions projections for the whole UK economy (other than from Land Use Change, which is estimated separately). However, Annex I of the Directive covers installations with a capacity above a certain threshold. Since not all installations in each UEP sector fall above the Directive's capacity threshold, only two UEP sectors are fully covered by the EU ETS. These sectors are the LEP and Refineries and the projected emissions are taken directly from UEP. The UEP projection for offshore emissions does not match the installations and emissions covered by the EU ETS exactly and the ETS projection is therefore based on a trend analysis of recent emissions from covered installations.

14. UEP, UK energy and CO_2 emissions projections were published for consultation in February 2006. The projections have since been updated to include revisions to assumptions on economic growth, future fossil fuel prices, and the most recent evaluation of carbon savings from existing measures and new measures proposed in the Climate Change Programme Review. Revised projections following consultation were published alongside the Energy Review in July 2006[4]. A full response to the projections consultation is available on the DTI website[5].

15. Following consultation on installation–level allocations published in August 2006 a number of corrections have been made, which have had a small effect on emission projections, upward for industrial sectors, downward for the LEP, giving a net increase since the August NAP of 230,422tCO_2 per year, on average in Phase II. The total number of allowances to be allocated in the UK remains unchanged, hence the level of the burden on the LEP has increased by this amount.

Large Electricity Producers

16. A "large electricity producer" is any operator of a combustion installation (except a hazardous or municipal waste installation):

    a. which has a thermal rated input of above 20 megawatts;

    b. which generates electricity and is normally capable of exporting more than 100 megawatts of electrical power to either the total system in Great Britain[6] or the total system in Northern Ireland[7]; and

[4] See: http://www.dti.gov.uk/energy/environment/euets/index.html
[5] See: http://www.dti.gov.uk/consultations/page24621.html and http://www.dti.gov.uk/files/file33219.pdf
[6] "The total system in Great Britain" means all transmission and distribution systems located in Great Britain which are operated (in the case of transmission systems) by persons who hold a licence under section 6(1)(b) of the Electricity Act and in the case of distribution systems) by persons who hold a licence under section 6(1)(c) of the Act. (These are licences authorising respectively the transmission and distribution of electricity.)

c. for which the operator is not exempted under section 5 of the Electricity Act 1989[8] or, as the case may be, Article 9(1) of the Electricity (Northern Ireland) Order 1992 from the requirement to hold a generation licence.

17. This differs from the sector definition used in Phase I and mirrors the Electricity Generation Licensing regime. This approach has been adopted to ensure that the LEP sector reflects large-scale generators who are generating for general supply and are more likely to be able to pass on the costs of carbon. The Class Exemptions exempt smaller and on-site generators from the need to hold a licence.

Other Electricity Producers

18. The revised classification for the LEP creates a new category of Other Electricity Producers. The emissions for these installations are assumed to remain flat, as they are largely low emitting, renewable or back-up generation.

Refineries

19. The installations included in the UEP refineries sector match those covered by the EU ETS with the exception of Fawley Cogen (NAP ID 2531), which is modelled in this sector but falls within the scope of the LEP definition, and Sullom Voe (NAP ID 1371) which is classified within the Offshore sector. Fawley Cogen is a fully qualifying CHP plant and an adjustment is made to the Refinery projection to reflect the transfer of the emissions associated with this plant to the GQ CHP sector. Emissions associated with Sullom Voe have been removed from the Refinery sector and included in the Offshore sector. This is a partially qualified CHP plant and emissions have been transferred to the CHP sector to reflect this.

Offshore oil and gas production

20. Although offshore oil and gas production are modelled within UEP, the projection used for EU ETS purposes is based on a trend analysis as coverage differs.

Sector allocations for EU ETS sectors not matching UEP sectors

21. Projected emissions and output growth rates for industrial sectors are based on research by Oxford Economic Forecasting (OEF) and the Carbon Consortium (CC)[9]. This work examined growth rates at a more disaggregated level than those in the UEP. The projections were issued

[7] "The total system in Northern Ireland" means the transmission systems, located in Northern Ireland, which are operated by persons who hold a licence under Article 10(1)(b) of the Electricity (Northern Ireland) Order 1992.
[8] See: http://www.opsi.gov.uk/acts/acts1989/Ukpga_19890029_en_1.htm
[9] See: http://www.opsi.gov.uk/si/si2001/20013270.htm

for consultation in February 2006 and have been revised following this consultation process. A full response to the consultation is available on the DTI website[10].

Overview of output projection methodology

22. The OEF output projections are based on the New International Industry Service (NIIS) model. The NIIS model is a statistical model that uses macroeconomic variables and inter-industry linkages to forecast sectoral output. In a number of sectors, forecasts have been adjusted to take account of industry specific factors that have, or are expected to, impact upon output, but would not otherwise be picked up in the model. An important feature of the sectoral output projections in this work is that they are consistent with HM Treasury's GDP and manufacturing output growth projections to 2008.

Overview of emissions projection methodology

23. The emissions projections are based on OEF's Macro Industry Energy Model (MIEM), which contains projections for sectoral output, fuel use and CO_2 emissions. These projections are then adjusted using the Energy End-Use Simulation Model (ENUSIM). ENUSIM is a technology-based, 'bottom up', industrial energy end-use simulation model which simulates the uptake and retrofit of energy saving and/or fuel switching technologies in industry, by specific sector and technology. The model provides projections of energy use, CO_2 emissions and carbon saving potentials from UK manufacturing industry, and produces abatement cost curves.

24. The CHP sector is not specifically modelled within ENUSIM. For this reason, the projections of CHP emissions are based on the most recently available bottom up information on planned projects. The latest forecast of GQ CHP capacity by Cambridge Econometrics has been used to ensure consistency with the DTI UEP projections.

25. Some EU ETS sectors included in this report are not modelled in the MIEM or in the existing ENUSIM model. For the munitions and tobacco sectors, direct CO_2 emissions projections were produced by extrapolating historic trends in energy use intensity and applying these to projected output. These emissions growth projections are then applied to aggregated installation-level baseline emissions figures, taken from the Phase I NAP (or from estimates of coverage for expansion activities). Historic figures for fuel use are not available for Gypsum and Mineral wool. For these sectors information was provided by the sectors and the projections are based on these data.

26. Table B2 presents the emissions projections for Phase II sectors.

[10] See: http://www.dti.gov.uk/consultations/page24621.html and http://www.dti.gov.uk/files/file33219.pdf

***Table B2**: Phase II emissions projections for EU ETS sectors*

Phase II sector	Annual projected emissions $ktCO_2$	Annual Allocation tCO_2[11]	Contribution to NER (%)	Allocation to existing installations
Large Electricity Producers	154,218	107,421,556	7.3%	99,534,205
CHP	24,745	24,745,437	13.3%	21,462,484
Refineries	15,418	15,417,590	2.1%	15,098,072
Offshore [1]	20,197	20,197,232	11.4%	17,886,325
Iron and Steel [1]	24,381	24,380,992	2.7%	23,727,929
Cement	11,248	11,247,642	2.7%	10,948,556
Lime	2,760	2,760,069	2.1%	2,702,868
Glass	2,292	2,291,758	2.7%	2,230,818
Ceramics	1,898	1,898,407	2.9%	1,842,944
Pulp and Paper	1,054	1,054,135	2.1%	1,032,289
Aluminium	2,854	2,854,101	2.1%	2,794,952
Chemicals [1]	5,588	5,587,626	3.9%	5,369,160
Food and Drink	1,735	1,734,773	3.0%	1,681,889
Services	1,549	1,549,424	8.1%	1,424,524
Downstream Gas	2,157	2,157,406	35.2%	1,398,823
Other Electricity Producers	1,317	1,316,558	2.1%	1,289,273
Others A [1] [2]	951	950,551	10.1%	854,845
Others B [2]	1,088	1,088,282	2.7%	1,059,344
Others C [2]	290	290,141	2.1%	284,128
Total	**275,740**	**228,943,678**	**7.1%**	**212,623,428**
Allowances to be auctioned		17,232,320		
Total allowances		**246,175,998**	**6.6%**	

[1] Including expansion to offshore flaring, integrated iron and steel works, crackers and carbon black, rock wool and gypsum

[2] 'Others A' comprises Mineral Wool and Gypsum. 'Others B' comprises Aerospace, Vehicles, Semi-conductors and Woodboard. 'Others C' comprises Tobacco, Textiles, Other non-metallic minerals, Tyres, and Munitions.

Sector caps

27. The ability of EU ETS sectors to take a reduction in allocation below BAU has been analysed against the following criteria:
    - the extent to which a sector can pass on costs of reducing emissions, if allocations are set below BAU;
    - the extent to which it is technically and economically feasible to make reductions beyond BAU in a sector (ability to abate); and
    - the extent to which the level of the sector cap impacts on incentives for new investment that is important to maintain security of energy supply, or impacts on the competitiveness of the UK as a destination for investment in any sector (minimise distortions in costs and prices).

[11] The sector figures are rounded to the nearest integer. For this reason, figures do not sum to the total.

28. For Phase II, the sector most able to manage reductions in its allocation below business as usual without compromising competitiveness is the LEP, as it faces very little competition from abroad, and also demonstrates very low electricity use intensity. Further information is available in the Regulatory Impact Assessment.