ANNEX B – DATA ON FURNACES AND OVENS PRODUCT LIFE, REFURBISHMENT AND ENERGY SOURCES (EXCERPT FROM ECODESIGN PREPARATORY STUDY DATA, 2012)

1. Installed ovens' and furnaces' average product life

The numbers of ovens and furnaces installed in EU for some industry sectors is published, with useful data included in IPPC BREF (best available technology reference) guidance. Available data is listed below with estimates of typical life and time between refurbishment or rebuild.

Table 31. Average lifetimes of examples of furnaces and ovens in the EU

Industry sector	Typical life	Source of data
Iron and steel production	Heat treatment furnaces can be up to 40 years, coke ovens up to 100 years Up to c.25 years between blast furnace refurbishing Average age of EU-15 plant 21 – 28 years BOF average = 100 years EAF and coke ovens average = 67 years Others = 34 years	Communication from Corus and IPPC guidance, BREF (best available technology reference). Average lifetimes of BOF, EAF (electric arc furnace), coke oven and others from ref. [1]
Cement and lime production	Cement ~40 years, lime up to 60 years	IPPC guidance, BREF (best available technology reference)
Glass	Life typically 20 – 40 years depending on process and type of glass. Container glass furnaces are refurbished typically every 12 years and flat glass furnaces c.10 years	IPPC guidance, BREF (best available technology reference), draft 2009 guide
Ceramics – bricks and roof tiles	~30 years (15 – 60 years depending on quality and use conditions)	IPPC guidance, BREF (best available technology reference) and IPPC study plus data from industry (brick, ceramic tile and sanitary ware furnaces)
Ceramics – wall tiles, sanitary ware	Wall tile kiln c.10 years Sanitary ware kiln c.15 years	From stakeholder. Lifetimes shorter than brick kilns due to higher operating temperature
Oil refineries	> 40 years	IPPC guidance, BREF (best available technology reference).
Incinerators	35 years (refurbished after 10 – 15 years)	CEWEP and ESWET

[1] E. Worrell and G. Biermans, "Move over Stock turnover, retrofit and industrial energy efficiency", Energy Policy 33 (2005), p949 - 962

Industry sector	Typical life	Source of data
Production and processing of metals	>20 years Heat treatment furnaces c. 40 years	IPPC data summary[2] Data on heat treatment furnaces from manufacturer
Electric tunnel furnace with conveyer	20 years	Furnace manufacturer
Foundries	20 – 40 years (rotary melting furnace = 30 years)	Stakeholders
Laboratory ovens and furnaces	Lab ovens, furnaces and incubators c. 15 years life. Pressurised steam sterilisers life limited to 7 years	Data from manufacturers

(Note that more lifetime data is given in Section 5.3, ENTR Lot 4 Preparatory Study)

2. Energy consumption

Estimates for energy consumption by sector are needed for this study; some estimated data can be calculated from IPPC BREF guidance (and other published sources) by multiplication of the average energy consumption per tonne by the number of tonnes produced in the EU, as shown in Table 32:

Table 32. Calculated energy consumption by furnaces and ovens by main industry sectors and type of energy source used

Industry sector	Estimated annual EU energy consumption (assumes most is energy used by furnaces and ovens) TWh/ year	Main energy sources
Iron and steel production	435 (based on IPPC BREF data –from EU annual production and energy consumed per tonne)	Blast furnaces use predominantly coal with some oil, gas and electricity. Other furnaces in steel installation use blast furnace gases and other fuels
Cement and lime production	277 for cement kilns and 30 for lime kilns (IPPC BREF – from EU annual production and energy consumed per tonne)	Coal and petroleum coke, some oil and also uses wastes. Electricity used for proves control
Glass	64 (using data from IPPC BREF Guide – from EU annual production and energy consumed per tonne)	Fuel oil and gas

[2] http://eea.eionet.europa.eu/Public/irc/eionet-circle/reporting/library?l=/ippc/ippc_permitting/permitting_eu27xls/_EN_1.0_&a=d

Industry sector	Estimated annual EU energy consumption (assumes most is energy used by furnaces and ovens) TWh/ year	Main energy sources
Ceramics	113 (using data from IPPC BREF Guide – from EU annual production and energy consumed per tonne)	Natural gas
Oil refineries	329 – 1050 (using data from IPPC BREF Guide – however not all of this energy is used by furnaces)	Oil
WtE (Waste to Energy) Incinerators	Consumes 5 TWh/year but generates 76TWh/year of energy	Electricity *
Large steel re-heating furnaces	10 (estimated using data from stakeholders and other sources)	Gas
Industrial ovens	130 (stakeholders and other sources)	Electricity, gas and oil
Medical and hazardous waste incinerators, etc.	0.2 – 0.5 (data from stakeholders)	Electricity, diesel and natural gas
Food production	60 TWh (data from DG ENER Lot 22 study, from IPPC BREF and from stakeholders)	Electricity, gas and some oil.
Non-ferrous metals	Copper = 15TWh, Al = 3 TWh (plus many other metals, Zn, Pb, etc. – IPPC BREF data)	Coal, oil, gas, electricity

*Note that waste to energy incinerators generate energy. Data from CEWEP states[3] that total renewable energy produced by EU incinerators in 2006 was 38 TWh (electricity and heat) from an estimated 5 TWh electricity consumed[4]. It is assumed that 50% of the energy generated is from renewable sources and so total energy generated (electricity and heat – renewable plus fossil fuel energy) was c.76 TWh. Smaller hazardous waste incinerators use energy at start-up and also to destroy toxic emissions, but incineration of waste is self-sustaining. The generated heat is usually not used unless a nearby use is identified, such as heating buildings.

More detailed energy consumption data have been obtained from furnace and oven manufacturers, some from users of furnaces and from publications including IPPC BREF guides and data for large industrial and small/ medium industrial is given in the ENTR Lot 4 Preparatory Study, Tables 54 and 55.

[3] Confederation of European Waste to Energy Plants (CEWEP), E. Stengler and J. Manders "Energising waste: how waste-to-energy helps to reach the EU's renewable energy targets"

[4] The principal energy source for waste to energy incinerators is the waste materials feedstock. Electricity is used to operate the equipment such as for air pumps, controllers, hygiene etc but there is a net surplus of electricity generated. Electrical energy consumed is 0.1MWh / tonne waste. C. 20% of EU municipal waste = c. 50 million tonnes / year is incinerated by 903 incinerators. Thus, one average incinerator consumes 55 000 tonnes waste / year at 0.1 MWh/tonne = 5 500 MWh/year. 50 million tonnes waste x 0.1 MWh/tonne = 5 TWh/yr (stock energy consumption)