

ELECTRICAL ENERGY USED IN PRIMARY ALUMINIUM SMELTING

FORM ES001

Annual Report for:

Due Date:

Please read the Reporting Guidelines on page 3 very carefully before completing this form.

1. Smelter

Location of Smelter

2. Cell Technology

Cell Technology Category

3. Primary Aluminium Production

Production Relating to this Smelter and Cell Technology

Tonnes

4. Electrical Energy Used for Smelting (a ≈ b + c)

a. Total AC Relating to this Smelter and Cell Technology

MWh

Exclude electrical energy used in anode production and casting. Include electrical energy lost in AC/DC rectification, and the electrical energy used by associated auxiliaries (e.g. pollution control equipment, compressed air generation, heating and lighting) See Reporting Guidelines 2 and 3.

b. Technological Electrical Energy (AC)

MWh

Include electrical energy for smelting processes and electrical energy lost in AC/DC rectification. Exclude electrical energy used in anode production and casting and the electrical energy used by associated auxiliaries (e.g. pollution control equipment, compressed air generation, heating and lighting).

c. Electrical Energy for Auxilliary Processes (AC)

MWh

Exclude electrical energy used in anode production and casting, technological electrical energy for smelting processes and electrical energy lost in AC/DC rectification. Include electrical energy used by smelting associated auxiliaries (e.g. pollution control equipment, compressed air generation, point feeders, heating and lighting).

d. Electrolysis Electrical Energy (DC)

MWh

Include DC electrical energy for electrolysis only.

5. Electrical Energy Used for Smelting

Table 1 – Relating to this Smelter and Cell Technology (From 4a above)

Energy Source	Electrical Energy Used for Primary Aluminium Smelting (GWh)			
	Self generated (a)	Purchased		Total (d) = (a) + (b) + (c)
		From National or Regional Grid (b)	From Other Sources (c)	
Hydro				
Coal				
Oil				
Natural Gas				
Nuclear				
Total				

6. Self-Generated Electrical Energy

(Only complete this Section if appropriate)

a. Table 2 – Total Electrical Energy Self-Generated (See Reporting Guideline 4)

Energy Source	Electrical Energy Self-Generated (GWh)			
	Used in Operating the Smelter		Used for Other Purposes (f)	Total (g) = (a) + (e) + (f)
	As Reported in Table 1 for Smelting (a) From Table 1	Other Smelter Operations (e)		
Hydro				
Coal				
Oil				
Natural Gas				

Note that “Other Smelter Operations” include anode production and casting

b. Table 3 – Quantities of Fuel Used (See Reporting Guidelines 5 and 6)

Energy Source (Fuel)	Total Electrical Energy Self-Generated (GWh) (g) From Table 2	Quantity of Fuel Consumed In Generating Electrical Energy (h)	Calorific Value Of Fuel (j)	Fuel Energy Consumed In Generating Electrical Energy (k) = (h) x (j) x 10 ⁻⁹
Coal		kg	kJ/kg	TJ
Oil		kg	kJ/kg	TJ
Natural Gas		m ³	kJ/m ³	TJ

Reported by:

Name:

Appointment

Company:

Tel No:

Fax No:

E-Mail:

Date:

Please return completed form by email or fax to:

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Reporting Guidelines

1. Primary aluminium production reported in Section 3 is molten (liquid) aluminium as tapped from the pots. It is reported in tonnes (metric tons) and is that production appropriate to the specified smelter and cell technology.
2. Electrical energy reported for smelting is energy used for electrolysis and all associated smelter auxiliaries up to the point where the molten aluminium is tapped from the pots. It includes electrical energy lost in rectification from AC to DC and energy used for pollution control, compressed air generation, heating and lighting. It excludes electrical energy used for anode production (reported on sister Form ES001A) and electrical energy used in the casting plant (reported on sister Form ES001D). If separate forms are completed for Söderberg and prebake technologies employed at the smelter, then the electrical energy included for non-electrolysis functions such as heating and lighting is, if not precisely known, to be an appropriate proportion of the relevant total.
3. The electrical energy reported in Table 1 is that used to produce the quantity of primary aluminium stated in Section 3.
4. The self-generated electrical energy reported in Table 2 is the total electrical energy self-generated at the smelter or associated power plant. It includes the self-generated electrical energy reported in Table 1; that used for other smelter operations (e.g. in carbon, casting and administrative areas and, if the smelter employs both Söderberg and prebake technologies, that reported in Table 1 of the second, associated Form ES001); and that used for other purposes (i.e. purposes unconnected with the actual operation of the smelter, such as the supply of power to the local community or for desalination).
5. The quantities of fuel reported in Table 3 are those used to produce the self-generated electrical energy reported in Table 2. The quantities of fuel entered in Table 3 are reported in the units indicated. If conversion from other units is necessary, then the Form is annotated to show the original units and the conversion factors used. Any conversion of units is carried out as precisely as possible but conversion factors given in the IAI Energy Returns Data Sheet are used as default values.
6. In Table 3, the reported calorific value of the fuel is ideally the actual average gross calorific value of the fuel. If the actual average gross calorific value of a fuel is not known, then the appropriate default value given in the IAI Energy Returns Data Sheet is used. If fuel is supplied by energy content: the 'Fuel Energy Consumed' column is completed first; a precise or default calorific value is entered in the 'Calorific Value of Fuel' column; hence the equivalent quantity of fuel is calculated and entered in the 'Quantity of Fuel Consumed' column; and finally a circle is drawn around the quantity of fuel consumed figure to indicate that it has been calculated from its energy content.

IAI ENERGY RETURNS DATA SHEET

1. Fuel Calorific Values

(Default values to be used when precise values are not known)

Energy Source	Default Calorific Value (kJ/kg or kJ/m ³ for Gas)							
	Area 1 Africa	Area 2 North America	Area 3 Latin America	Area 4 East Asia	Area 5 South Asia	Area 6A West Europe	Area 6B East/Central Europe	Area 7 Oceania
Coal	25 728	23 497	23 312	21 422	23 238	24 237	18 386	21 515
Heavy Oil	42 176	41 868	42 860	42 077	42 695	41 868	42 287	41 868
Diesel Oil	42 176	41 868	42 860	42 077	42 695	41 868	42 287	41 868
Gas	40 000	38 200	38 000	39 300	39 300	37 800	37 700	38 200

2. Electrical Energy Generation Conversion Factors

(Default values to be used when precise values are not known)

Electrical Energy Source	Default Electrical Energy Generation Conversion Factor (kJ/kWh)							
	Area 1 Africa	Area 2 North America	Area 3 Latin America	Area 4 East Asia	Area 5 South Asia	Area 6A West Europe	Area 6B East/Central Europe	Area 7 Oceania
Coal	12 758	10 680	12 939	8 321	12 107	13 498	18 784	15 286
Oil	9 033	8 156	11 776	8 335	12 103	9 018	27 180	11 140
Natural Gas	8 962	6 533	16 837	8 756	10 899	10 529	28 360	10 806

3. Unit Conversion Factors

(Specific Gravity values for oil are default values to be used when precise values are not known)

Category	Conversion Factors		
Weight	1 kg	= 2.20462 lb	
	1 lb	= 0.4536 kg	
Volume	1 m ³	= 35.3147 ft ³	
	1 ft ³	= 0.0283168 m ³	
	1 US Gallon	= 3.7854 litres	
	1 UK Gallon	= 4.546 litres	
Energy	1 J	= 0.2388 cal	
	1 cal	= 4.187 J	
	1 kJ	= 0.948 Btu	
	1 Btu	= 1055 J	
	1 Therm	= 100 000 Btu	
	1 kWh	= 3600 kJ	
Oil (Volume)	1 Barrel	= 42 US gallons = 34.97 UK gallons = 159 litres	
	Oil (Specific Gravity)	1 litre Fuel Oil (Heavy)	= 0.96 kg
		1 litre Fuel Oil (Light)	= 0.87 kg
1 litre Diesel Oil		= 0.87 kg	
1 litre Gas Oil		= 0.87 kg	