



# **ENVIRONMENTAL STATEMENT – VOLUME 3 – APPENDIX 15.2**

## **Proposed Scheme GHG Emissions Calculation Drax Bioenergy with Carbon Capture and Storage**

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations, 2009 – Regulation (5(2)(a))

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# 1. PROPOSED SCHEME GHG EMISSIONS CALCULATION

## 1.1. PROPOSED SCHEME GHG EMISSIONS CALCULATION

1.1.1. **Table 1.1** presents the full activity and emission factors data used for the Proposed Scheme GHG Emissions calculation.

**Table 1.1 – Proposed Scheme GHG Emissions**

Data Type	Value	Unit	Source
Total electricity generated (net)	931	MW	Aligned with BEIS Annex C submission
Total Proposed Scheme electricity generated (net)	8,153,523,609	KWh	Calculation: Total electricity generated (net)*1000*8760 hours
Boiler efficiency (net)	28.8	%	Net efficiency based on BEIS Annex C submission. Net Efficiency includes unit works power, station works power, CCS works power and process steam power loss. CCS works power does not include high pressure compression.
Total energy in wood	28,279,133,501	kWh	Calculation: ((Total electricity generated*100) / (boiler efficiency))
Calorific value of wood (net cv)	17,600	KJ / kg	Drax Power Ltd Financial Model
Calorific value of wood (net cv)	4.89	kWh / kg	Calculation: 17600/3600
Total wood used	5,784,368,216	Kg / yr	Calculation (Total energy in wood / calorific value of wood)

<b>Data Type</b>	<b>Value</b>	<b>Unit</b>	<b>Source</b>
Wood Emissions Factor	1.675	tCO <sub>2</sub> e / t	Specific emission factor for the Drax Combustion Process
Total Combustion Emissions	9,691,567,307	kgCO <sub>2</sub> e	Calculation: (Total wood used * Wood Emissions Factor)
Total Combustion Emissions	9,691,567	tCO <sub>2</sub> e	Calculation: (Total Combustion Emissions/1000)
CO <sub>2</sub> captured through the Carbon Capture process B1	-9,206,989	tCO <sub>2</sub> / yr	The Applicant estimates the Carbon Capture technology to capture approximately 95% of all CO <sub>2</sub> from two biomass units.
Supply chain GHG Emissions rate	109	KgCO <sub>2</sub> e / MWh	<a href="https://www.drax.com/sustainability/sustainable-bioenergy/sourcing-sustainable-biomass/">https://www.drax.com/sustainability/sustainable-bioenergy/sourcing-sustainable-biomass/</a>
Operational Supply chain GHG Emissions – D	1,223,723	tCO <sub>2</sub> e / yr	Calculation: (total proposed scheme electricity generated (net) * supply chain Emissions rate) / 10 <sup>6</sup> (Drax, 2020)
Construction GHG Emissions (A1-A5)	104,700	tCO <sub>2</sub> e	BoQ provided by the design team Incorporates 212 tonnes of carbon released at construction phase from land use, land use change and forestry (LULUCF). Refer to Table 1.2 for LULUCF data.
Years of operation	25	Years	Provided by the Applicant
Annual Construction GHG	4,188	tCO <sub>2</sub> e / yr	Calculation

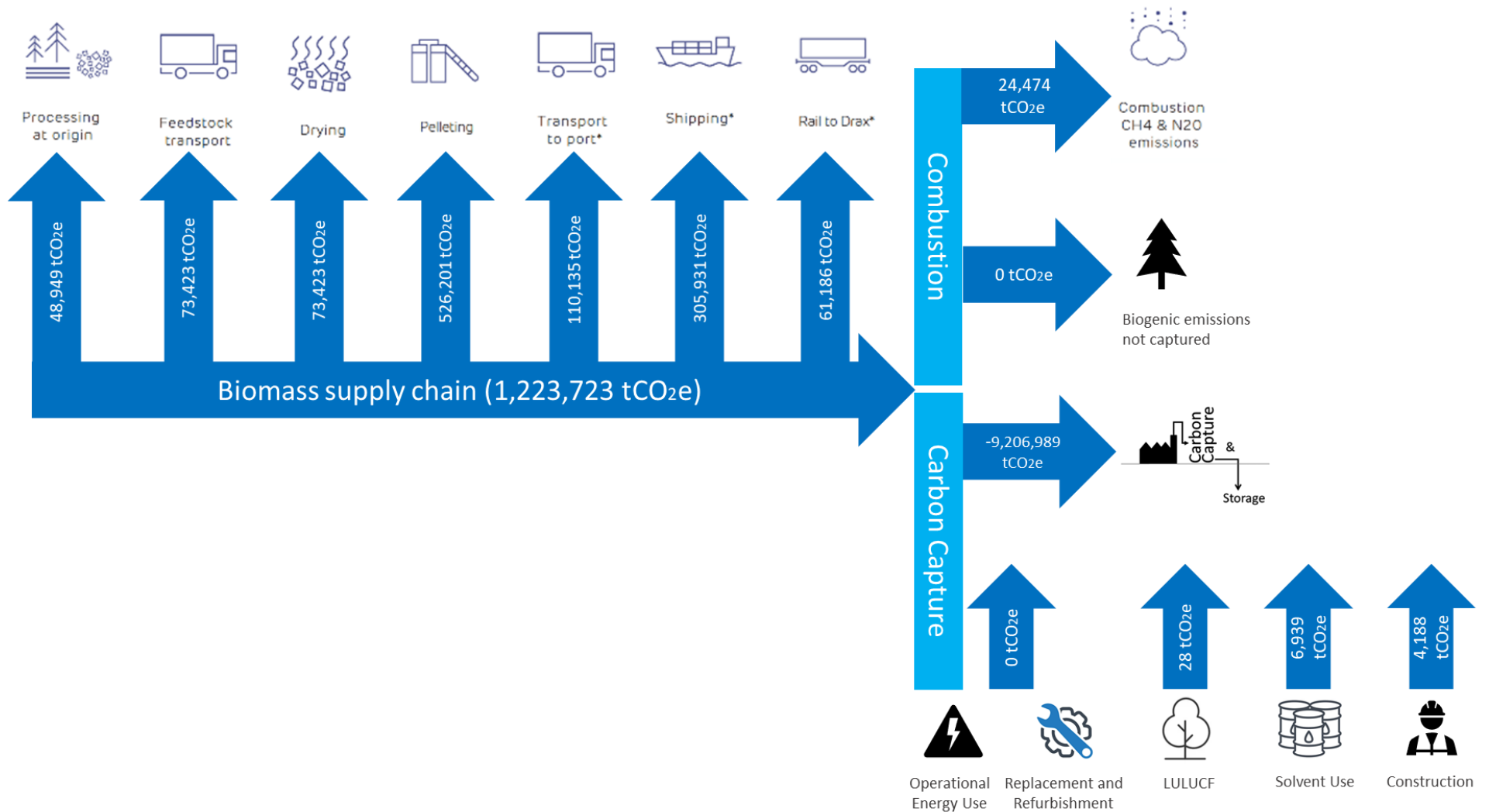
Data Type	Value	Unit	Source
Emissions (C1-C5)			
Annual Solvent GHG Emissions (B8)	6,939	tCO <sub>2</sub> e / yr	Calculation: annual quantity of KS-21 solvent * (NH <sub>3</sub> EF + Ethylene EF)
LULUCF (B8)	707	tC	Habitat data and carbon storage calculation
LULUCF during operation (B8) per annum	28	tC/yr	Habitat data and carbon storage / years of operation
Total GHG Emissions	-7,972,111	tCO <sub>2</sub> e / yr	Total GHG emissions = Operational Carbon (B1-B8) + Biomass supply chain Emissions + construction carbon per annum.
GHG Emissions Rate	-978	gCO <sub>2</sub> e / kWh	GHG emissions rate = (Total GHG emissions*10 <sup>6</sup> ) / total proposed scheme electricity generated

1.1.2. **Table 1.2** shows the LULUCF data for construction and operational phases.

**Table 1.2 – LULUCF Emissions**

Baseline scenario potential carbon storage (tC)	Proposed Scheme scenario potential carbon storage (tC)	Difference in carbon storage (tC)
<b>Construction Phase</b>		
-2,102	-1,890	212
<b>Operational Phase</b>		
-8,760	-8,053	707

1.1.3. **Plate 1.1** provides a schematic view of the total sources of emissions. It follows on from the diagram set out in **Plate 15.1** of **Chapter 15 (Greenhouse Gases)** of this ES (document reference 6.1.15).



**Plate 1.1 – Annual Sources of GHG Emissions from the Proposed Scheme**