



NETL Life Cycle Inventory Data

Process Documentation File

Process Name: Uranium, Extraction and Transport with US Enrichment

Reference Flow: 1 kg of Uranium Fuel Assemblies

Brief Description: This process includes all inputs for the raw material acquisition and raw material transportation for 1 kg of delivered uranium fuel assemblies, assuming uranium enrichment in the U.S. with gaseous diffusion.

Section I: Meta Data

Geographical Coverage: US **Region:** N/A

Year Data Best Represents: 2008

Process Type: Extraction Process (EP)

Process Scope: Cradle-to-Gate Process (CG)

Allocation Applied: No

Completeness: Individual Relevant Flows Captured

Flows Aggregated in Data Set:

Process Energy Use Energy P&D Material P&D

Relevant Output Flows Included in Data Set:

Releases to Air: Greenhouse Gases Criteria Air Pollutants Other

Releases to Water: Inorganic Emissions Organic Emissions Other

Water Usage: Water Consumption Water Demand (throughput)

Releases to Soil: Inorganic Releases Organic Releases Other

Adjustable Process Parameters:

Africa *The proportion of African mined uranium used in American reactors*

Australia *The proportion of Australian mined uranium used in American reactors*

Canada *The proportion of Canadian mined uranium used in American reactors*

Russia *The proportion of Russian mined uranium used in American reactors*



NETL Life Cycle Inventory Data

Process Documentation File

US *The proportion of American mined uranium used in American reactors*

Transportation Distances By Truck, Train, and Ocean Freighter for each of the following:

Mine to Conversion Facility *The distances to transport from the mine to the conversion facility by each mode of transportation*

Conversion Facility to Enrichment Facility *The distances to transport from the conversion facility to the enrichment facility by each mode of transportation*

Enrichment Facility to Fuel Assembly *The distances to transport from the enrichment facility to the fuel assembly facility by each mode of transportation*

Tracked Input Flows:

Yellowcake (U_3O_8) *The quantity of yellowcake that is produced at the mines which goes to the conversion facility*

Uranium Hexafluoride (UF_6) *The output from the conversion facility that enters the enrichment facility*

Enriched Uranium Hexafluoride (UF_6) *The output from the enrichment facility that enters the fuel assembly facility*

Tracked Output Flows:

Fuel Assembly *Assembled enriched uranium for insertion into the nuclear reactor*

Section II: Process Description

Associated Documentation

This unit process is composed of this document and the data sheet (DS) *DS_CTG_Uranium_US_Enrich_2011.02.xls*, which provides additional details regarding relevant calculations, data quality, and references.

Goal and Scope

The scope of this unit process covers all aspects of raw material acquisition (RMA) and raw material transportation (RMT) to the energy conversion facility as seen in **Figure 1**. At the end, one kilogram of uranium fuel assembly is delivered to the life cycle (LC) Stage #3 boundary. The RMA and RMT are discussed separately below.

Figure 1: Plan for RMA and RMT of Uranium

Uranium - US Pathway

GaBi 4 process plan: Mass [kg]

Included are all types of extraction and processing of uranium through the US enrichment (gaseous diffusion) until it is transported to the energy conversion facility.



Boundary and Description

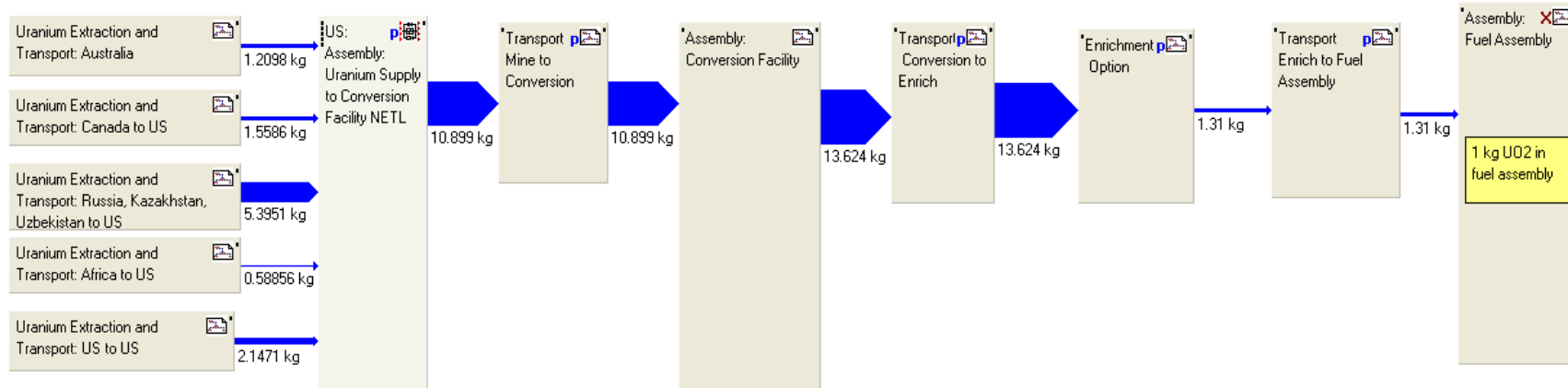
LC Stage #1, RMA of uranium, includes extraction (open pit, in situ, and underground mining) and processing of yellowcake, conversion of yellowcake to uranium hexafluoride, enrichment of the concentration uranium hexafluoride, and the assembly of the enriched uranium hexafluoride into fuel assemblies. The enrichment occurs in the U.S., using gaseous diffusion enrichment technology exclusively.

Each of the steps of the RMA processing includes the construction and operations of the step. The transportation between the steps is considered part of RMA but will be discussed in detail during the RMT section of this document as transportation options were the same regardless where in the life cycle it occurred. With the machinery and facility construction, upstream processes (for example, steel or concrete) are included. The plan with U.S. enrichment is provided in **Figure 2**.

Figure 2: Plan for RMA of Uranium, Including Extraction, Conversion, Enrichment, and Fuel Assembly

LC Stage #1: US Enrichment Chain

GaBi 4 process plan: Mass [kg]



Percent of US (Gaseous Diffusion)
Enriched Fuel:
Australia: 11.1%
Canada: 14.3%
Russia/Kazak./Uzbek: 49.5%
Africa: 5.4%
US: 19.7%

Transport Distances
Ports to Conversion Facilities: 990 km by truck (Imports from Houston, no CA transport)
Conversion to Enrichment: 385 km by truck (Average 23 miles for US converted, 1466 for Port Hope converted)
Transport to fuel fabrication plants (average distance): 1390 km by truck

The construction processes for both machinery and facilities were created. The machinery includes:

- Underground Uranium Mine
(DS/DF_Stage1_C_Underground_Uranium_Mine_2010.01.doc)
- Open Pit Uranium Mine, Construction
(DS/DF_DF_Stage1_C_Open_Pit_Uranium_Mine_2010.01.doc)
- Uranium Milling, Construction
(DS/DF_DS_Stage1_C_Milling_Facility_2010.01.xls)
- In Situ Uranium Mine, Construction
(DS/DF_DF_Stage1_C_In_Situ_Uranium_Extraction_2010_01.doc)
- Uranium Conversion Facility, Construction
(DS/DF_Stage1_C_Conversion_Facility_UF6_2010.01.doc)
- US Enrichment Facility, Construction
(DS/DF_Stage1_C_Nuclear_Enrichment_Facility_2010_01.doc)
- Enrichment, Decommissioning
(DS/DF_Stage1_C_GasDiffusion_Decommissioning_2010.01.doc)
- Fuel Assembly, Construction
(DS/DF_Stage1_C_Fuel_Fabrication_Facility_2010.01.doc)

Each piece of equipment or facility is scaled to the production of one kilogram of fuel assembly. The profiles and processes included in RMA are provided in **Table 1**. Those shown in bold face were developed by NETL.

Table 1: Profiles and Processes Included in RMA for Uranium

Uranium - US Pathway

LC Stage #1: US Enrichment Chain

Assembly: Conversion Facility

Conversion, Construction

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Steel cold rolled PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Thermal energy from heavy fuel oil PE

US: Uranium Conversion Facility, Construction NETL

Conversion, Operation

CA: Uranium Conversion Facility, Operation NETL

North American Average Electricity Mix, 2007 070111 NETL

US: Industrial Boiler, Natural Gas Fired, Over 100 Million BTU/hr NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

US: Assembly: Conversion Facility NETL

Assembly: Fuel Assembly

Fuel Assembly, Construction

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Steel cold rolled PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Fuel Assembly, Construction NETL

US: Thermal energy from heavy fuel oil PE

Fuel Assembly, Operation

North American Average Electricity Mix, 2007 070111 NETL

US: Fuel Assembly, Operation NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

US: Assembly: Fuel Assembly NETL

Enrichment Option

Assembly: Centrifuge Enrichment in US

Centrifuge Enrichment in US, Operation

DE: Chlorine mix PE

EU-15: Lubricants PE

North American Average Electricity Mix, 2007 070111 NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Gas Centrifuge Uranium Enrichment, Operation NETL

US: Industrial Boiler, Natural Gas Fired, Over 100 Million BTU/hr NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

Enrichment Facility, Construction

DE: Copper mix PE

EU-15: Bitumen at refinery PE

EU-15: Diesel ELCD/PE-GaBi

FR: Power grid mix ELCD/PE-GaBi

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Enrichment Facility, Construction NETL

WOR: Steel Pipe, Welded, BF, Manufacture NETL <u-so>

WOR: Steel Plate, BF, Manufacture NETL <u-so>

Enrichment, Decommissioning

North American Average Electricity Mix, 2007 070111 NETL

US: Assembly: Enrichment Facility Centrifuge

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: UF6 Storage Container, Construction NETL

WOR: Steel Plate, BF, Manufacture NETL <u-so>

Assembly: Diffusion Enrichment

Enrichment Facility, Construction

DE: Copper mix PE

EU-15: Bitumen at refinery PE

EU-15: Diesel ELCD/PE-GaBi

FR: Power grid mix ELCD/PE-GaBi

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Enrichment Facility, Construction NETL

WOR: Steel Pipe, Welded, BF, Manufacture NETL <u-so>

WOR: Steel Plate, BF, Manufacture NETL <u-so>

Gaseous Diffusion Enrichment Operations

US: Gaseous Diffusion Enrichment Operation NETL

US: Power from hard coal PE

Enrichment, Decommissioning

North American Average Electricity Mix, 2007 070111 NETL

US: Assembly: Enrichment Facility Gaseous

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: UF6 Storage Container, Construction NETL

WOR: Steel Plate, BF, Manufacture NETL <u-so>

US: Assembly: Enrichment 2 NETL

US: Assembly: Enrichment NETL

Transport Conversion to Enrich

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Ocean Freighter Transport, Operation NETL

US: Tractor-trailer Transport, Operation NETL

US: Train Transport, Operation NETL

Transport Enrich to Fuel Assembly

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Ocean Freighter Transport, Operation NETL

US: Tractor-trailer Transport, Operation NETL

US: Train Transport, Operation NETL

Transport Mine to Conversion

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Ocean Freighter Transport, Operation NETL

US: Tractor-trailer Transport, Operation NETL

US: Train Transport, Operation NETL

Uranium Extraction and Transport: Africa to US

Transport Africa Mine to Port

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Ocean Freighter Transport, Operation NETL

US: Tractor-trailer Transport, Operation NETL

US: Train Transport, Operation NETL

Uranium Mining Mixer: Africa

ASSEMBLY: In Situ Uranium Mine

In Situ Mine, Construction

North American Average Electricity Mix, 2007 070111 NETL

North American Average Electricity Mix, 2007 070111 NETL

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: In Situ Uranium Mine, Construction NETL

In Situ Mining, Operation

DE: Carbon dioxide PE

DE: Soda (Na₂CO₃) PE

DE: Sodium chloride (rock salt) PE

FR: Hydrogen peroxide PE

GB: Chlorine mix PE

GB: Oxygen PE

North American Average Electricity Mix, 2007 070111 NETL

US: In Situ Leach Mining Operation NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

US: Assembly: In Situ Uranium Mine

ASSEMBLY: Open Pit Uranium Mine

Uranium Milling, Construction

DE: Copper mix PE

DE: Pine log with bark ELCD/PE-GaBi

DE: Steel cold rolled PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Diesel Fired Construction Equipment, Variable Horsepower NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Uranium Milling, Construction NETL

Uranium Open Pit Mine, Construction

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Steel cold rolled PE

DE: Styrene-butadiene rubber mix (SBR) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Thermal energy from heavy fuel oil PE

US: Uranium Open Pit Mine, Construction NETL

WOR: Rebar Wire Rod, BF Manufactures NETL

Uranium Open Pit Mining, Operation

DE: Fuel oil light at refinery PE

DE: Limestone hydrate (Ca(OH)₂) PE

DE: Soda (Na₂CO₃) PE

DE: Sulphuric acid (96%) PE

GB: Ammonia (NH₃) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Ammonium nitrate PE

US: Diesel Fired Construction Equipment, Variable Horsepower NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Industrial Boiler, Natural Gas Fired, Over 100 Million BTU/hr NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

US: Uranium Open Pit Mining and Milling Operations NETL

US: Assembly: Open Pit Uranium Mine

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Surface Mine Commissioning / Decommissioning NETL

STAGE #1: I6 RMA

Coal Mine Commissioning/Decommissioning

US: Commissioning and Decommissioning of Illinois No. 6 Coal Mine NETL <u-so>

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: GASOLINE, NATIONAL AVERAGE, 2009 NETL <u-so>

COAL MINE CONSTRUCTION

GAB II, ASPHALT (Medium water content)

DK: GAB II, ASPHALT (Medium water content)

DK: Gravel round: at mine/CH S NETL

EU-15: Bitumen at refinery PE

North American Average Electricity Mix, 2007 070111 NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

BF: Hot-dip Galvanized NETL

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Stainless steel cold roll PE

DE: Steel cold rolled PE

DE: Styrene-butadiene rubber mix (SBR) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: COAL MINE, CONSTRUCTION NETL

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Thermal energy from heavy fuel oil PE

WOR: Rebar Wire Rod, BF Manufactures NETL

WOR: Steel Plate, BF, Manufacture NETL <u-so>

WOR: Steel, Stainless, 316 2B, 80% Recycled NETL <u-so>

Coal Mine, Operation

North American Average Electricity Mix, 2007 070111 NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Underground Mine, Illinois No. 6 Bituminous Coal, Operation <u-so>

US: ASSEMBLY: COAL MINE CONSTRUCTION & OPERATION NETL

US: Uranium Mining Mixer: Africa NETL

Uranium Extraction and Transport: Australia

Transport Australia Mine to Port

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Ocean Freighter Transport, Operation NETL

US: Tractor-trailer Transport, Operation NETL

US: Train Transport, Operation NETL

Uranium Mining Mixer: Australia

ASSEMBLY: In Situ Uranium Mine

In Situ Mine, Construction

North American Average Electricity Mix, 2007 070111 NETL

North American Average Electricity Mix, 2007 070111 NETL

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: In Situ Uranium Mine, Construction NETL

In Situ Mining, Operation

DE: Carbon dioxide PE

DE: Soda (Na₂CO₃) PE

DE: Sodium chloride (rock salt) PE

FR: Hydrogen peroxide PE

GB: Chlorine mix PE

GB: Oxygen PE

North American Average Electricity Mix, 2007 070111 NETL

US: In Situ Leach Mining Operation NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

US: Assembly: In Situ Uranium Mine

ASSEMBLY: Open Pit Uranium Mine

Uranium Milling, Construction

DE: Copper mix PE

DE: Pine log with bark ELCD/PE-GaBi

DE: Steel cold rolled PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Diesel Fired Construction Equipment, Variable Horsepower NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Uranium Milling, Construction NETL

Uranium Open Pit Mine, Construction

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Steel cold rolled PE

DE: Styrene-butadiene rubber mix (SBR) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Thermal energy from heavy fuel oil PE

US: Uranium Open Pit Mine, Construction NETL

WOR: Rebar Wire Rod, BF Manufactures NETL

Uranium Open Pit Mining, Operation

DE: Fuel oil light at refinery PE

DE: Limestone hydrate (Ca(OH)₂) PE

DE: Soda (Na₂CO₃) PE

DE: Sulphuric acid (96%) PE

GB: Ammonia (NH₃) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Ammonium nitrate PE

US: Diesel Fired Construction Equipment, Variable Horsepower NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Industrial Boiler, Natural Gas Fired, Over 100 Million BTU/hr NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

US: Uranium Open Pit Mining and Milling Operations NETL

US: Assembly: Open Pit Uranium Mine

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Surface Mine Commissioning / Decommissioning NETL

STAGE #1: I6 RMA

Coal Mine Commissioning/Decommissioning

**US: Commissioning and Decommissioning of Illinois No. 6 Coal Mine NETL
<u-so>**

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: GASOLINE, NATIONAL AVERAGE, 2009 NETL <u-so>
COAL MINE CONSTRUCTION
GAB II, ASPHALT (Medium water content)
DK: GAB II, ASPHALT (Medium water content)
DK: Gravel round: at mine/CH S NETL
EU-15: Bitumen at refinery PE
North American Average Electricity Mix, 2007 070111 NETL
US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>
US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL
BF: Hot-dip Galvanized NETL
DE: Cast iron part PE <p-agg>
DE: Copper mix PE
DE: Stainless steel cold roll PE
DE: Steel cold rolled PE
DE: Styrene-butadiene rubber mix (SBR) PE
North American Average Electricity Mix, 2007 070111 NETL
RER: Polyvinylchloride pipe (PVC) PlasticsEurope
US: COAL MINE, CONSTRUCTION NETL
US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>
US: Thermal energy from heavy fuel oil PE
WOR: Rebar Wire Rod, BF Manufactures NETL
WOR: Steel Plate, BF, Manufacture NETL <u-so>
WOR: Steel, Stainless, 316 2B, 80% Recycled NETL <u-so>
Coal Mine, Operation
North American Average Electricity Mix, 2007 070111 NETL
US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>
US: Underground Mine, Illinois No. 6 Bituminous Coal, Operation <u-so>
US: ASSEMBLY: COAL MINE CONSTRUCTION & OPERATION NETL
US: Uranium Mining Mixer: Australia NETL
Uranium Extraction and Transport: Canada to US
Transport Canada Mine to Port
US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>
US: Ocean Freighter Transport, Operation NETL
US: Tractor-trailer Transport, Operation NETL
US: Train Transport, Operation NETL
Uranium Mining Mixer: Canada
ASSEMBLY: In Situ Uranium Mine
In Situ Mine, Construction
North American Average Electricity Mix, 2007 070111 NETL
North American Average Electricity Mix, 2007 070111 NETL
RER: Polyvinylchloride pipe (PVC) PlasticsEurope
US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>
US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: In Situ Uranium Mine, Construction NETL

In Situ Mining, Operation

DE: Carbon dioxide PE

DE: Soda (Na₂CO₃) PE

DE: Sodium chloride (rock salt) PE

FR: Hydrogen peroxide PE

GB: Chlorine mix PE

GB: Oxygen PE

North American Average Electricity Mix, 2007 070111 NETL**US: In Situ Leach Mining Operation NETL****US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL**

US: Assembly: In Situ Uranium Mine

ASSEMBLY: Open Pit Uranium Mine

Uranium Milling, Construction

DE: Copper mix PE

DE: Pine log with bark ELCD/PE-GaBi

DE: Steel cold rolled PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>**US: Diesel Fired Construction Equipment, Variable Horsepower NETL****US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>****US: Uranium Milling, Construction NETL**

Uranium Open Pit Mine, Construction

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Steel cold rolled PE

DE: Styrene-butadiene rubber mix (SBR) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Thermal energy from heavy fuel oil PE

US: Uranium Open Pit Mine, Construction NETL**WOR: Rebar Wire Rod, BF Manufactures NETL**

Uranium Open Pit Mining, Operation

DE: Fuel oil light at refinery PE

DE: Limestone hydrate (Ca(OH)₂) PEDE: Soda (Na₂CO₃) PE

DE: Sulphuric acid (96%) PE

GB: Ammonia (NH3) PE
North American Average Electricity Mix, 2007 070111 NETL
RER: Ammonium nitrate PE
US: Diesel Fired Construction Equipment, Variable Horsepower NETL
US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>
US: Industrial Boiler, Natural Gas Fired, Over 100 Million BTU/hr NETL
US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL
US: Uranium Open Pit Mining and Milling Operations NETL
US: Assembly: Open Pit Uranium Mine
US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>
US: Surface Mine Commissioning / Decommissioning NETL

STAGE #1: I6 RMA
Coal Mine Commissioning/Decommissioning
US: Commissioning and Decommissioning of Illinois No. 6 Coal Mine NETL <u-so>
US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>
US: GASOLINE, NATIONAL AVERAGE, 2009 NETL <u-so>

COAL MINE CONSTRUCTION
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DK: GAB II, ASPHALT (Medium water content)
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EU-15: Bitumen at refinery PE
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US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>
US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL
BF: Hot-dip Galvanized NETL
DE: Cast iron part PE <p-agg>
DE: Copper mix PE
DE: Stainless steel cold roll PE
DE: Steel cold rolled PE
DE: Styrene-butadiene rubber mix (SBR) PE
North American Average Electricity Mix, 2007 070111 NETL
RER: Polyvinylchloride pipe (PVC) PlasticsEurope
US: COAL MINE, CONSTRUCTION NETL
US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>
US: Thermal energy from heavy fuel oil PE
WOR: Rebar Wire Rod, BF Manufactures NETL
WOR: Steel Plate, BF, Manufacture NETL <u-so>
WOR: Steel, Stainless, 316 2B, 80% Recycled NETL <u-so>

Coal Mine, Operation
North American Average Electricity Mix, 2007 070111 NETL
US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>
US: Underground Mine, Illinois No. 6 Bituminous Coal, Operation <u-so>

US: ASSEMBLY: COAL MINE CONSTRUCTION & OPERATION NETL**US: Uranium Mining Mixer: Canada NETL**

Uranium Extraction and Transport: Russia, Kazakhstan, Uzbekistan to US

Transport Russia Mine to Port

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>**US: Ocean Freighter Transport, Operation NETL****US: Tractor-trailer Transport, Operation NETL****US: Train Transport, Operation NETL**

Uranium Mining Mixer: Russia

ASSEMBLY: In Situ Uranium Mine

In Situ Mine, Construction

North American Average Electricity Mix, 2007 070111 NETL**North American Average Electricity Mix, 2007 070111 NETL**

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>**US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>****US: In Situ Uranium Mine, Construction NETL**

In Situ Mining, Operation

DE: Carbon dioxide PE

DE: Soda (Na₂CO₃) PE

DE: Sodium chloride (rock salt) PE

FR: Hydrogen peroxide PE

GB: Chlorine mix PE

GB: Oxygen PE

North American Average Electricity Mix, 2007 070111 NETL**US: In Situ Leach Mining Operation NETL****US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL****US: Assembly: In Situ Uranium Mine****ASSEMBLY: Open Pit Uranium Mine**

Uranium Milling, Construction

DE: Copper mix PE

DE: Pine log with bark ELCD/PE-GaBi

DE: Steel cold rolled PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>**US: Diesel Fired Construction Equipment, Variable Horsepower NETL****US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>****US: Uranium Milling, Construction NETL**

Uranium Open Pit Mine, Construction

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Steel cold rolled PE

DE: Styrene-butadiene rubber mix (SBR) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Thermal energy from heavy fuel oil PE

US: Uranium Open Pit Mine, Construction NETL

WOR: Rebar Wire Rod, BF Manufactures NETL

Uranium Open Pit Mining, Operation

DE: Fuel oil light at refinery PE

DE: Limestone hydrate (Ca(OH)₂) PE

DE: Soda (Na₂CO₃) PE

DE: Sulphuric acid (96%) PE

GB: Ammonia (NH₃) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Ammonium nitrate PE

US: Diesel Fired Construction Equipment, Variable Horsepower NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Industrial Boiler, Natural Gas Fired, Over 100 Million BTU/hr NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

US: Uranium Open Pit Mining and Milling Operations NETL

US: Assembly: Open Pit Uranium Mine

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Surface Mine Commissioning / Decommissioning NETL

STAGE #1: I6 RMA

Coal Mine Commissioning/Decommissioning

**US: Commissioning and Decommissioning of Illinois No. 6 Coal Mine NETL
<u-so>**

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: GASOLINE, NATIONAL AVERAGE, 2009 NETL <u-so>

COAL MINE CONSTRUCTION

GAB II, ASPHALT (Medium water content)

DK: GAB II, ASPHALT (Medium water content)

DK: Gravel round: at mine/CH S NETL

EU-15: Bitumen at refinery PE

North American Average Electricity Mix, 2007 070111 NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

BF: Hot-dip Galvanized NETL

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Stainless steel cold roll PE

DE: Steel cold rolled PE

DE: Styrene-butadiene rubber mix (SBR) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: COAL MINE, CONSTRUCTION NETL

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Thermal energy from heavy fuel oil PE

WOR: Rebar Wire Rod, BF Manufactures NETL

WOR: Steel Plate, BF, Manufacture NETL <u-so>

WOR: Steel, Stainless, 316 2B, 80% Recycled NETL <u-so>

Coal Mine, Operation

North American Average Electricity Mix, 2007 070111 NETL

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Underground Mine, Illinois No. 6 Bituminous Coal, Operation <u-so>

US: ASSEMBLY: COAL MINE CONSTRUCTION & OPERATION NETL

US: Uranium Mining Mixer: Russia NETL

Uranium Extraction and Transport: US to US

Transport US Mine to Port

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: Ocean Freighter Transport, Operation NETL

US: Tractor-trailer Transport, Operation NETL

US: Train Transport, Operation NETL

Uranium Mining Mixer:US

ASSEMBLY: In Situ Uranium Mine

In Situ Mine, Construction

North American Average Electricity Mix, 2007 070111 NETL

North American Average Electricity Mix, 2007 070111 NETL

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>

US: In Situ Uranium Mine, Construction NETL

In Situ Mining, Operation

DE: Carbon dioxide PE

DE: Soda (Na₂CO₃) PE

DE: Sodium chloride (rock salt) PE

FR: Hydrogen peroxide PE

GB: Chlorine mix PE

GB: Oxygen PE

North American Average Electricity Mix, 2007 070111 NETL

US: In Situ Leach Mining Operation NETL

US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL

US: Assembly: In Situ Uranium Mine

ASSEMBLY: Open Pit Uranium Mine

Uranium Milling, Construction

DE: Copper mix PE

DE: Pine log with bark ELCD/PE-GaBi

DE: Steel cold rolled PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>**US: Diesel Fired Construction Equipment, Variable Horsepower NETL****US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>****US: Uranium Milling, Construction NETL**

Uranium Open Pit Mine, Construction

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Steel cold rolled PE

DE: Styrene-butadiene rubber mix (SBR) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Aluminum ingot mix PE

RER: Aluminum sheet PE <p-agg>

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>

US: Thermal energy from heavy fuel oil PE

US: Uranium Open Pit Mine, Construction NETL**WOR: Rebar Wire Rod, BF Manufactures NETL**

Uranium Open Pit Mining, Operation

DE: Fuel oil light at refinery PE

DE: Limestone hydrate (Ca(OH)₂) PEDE: Soda (Na₂CO₃) PE

DE: Sulphuric acid (96%) PE

GB: Ammonia (NH₃) PE**North American Average Electricity Mix, 2007 070111 NETL**

RER: Ammonium nitrate PE

US: Diesel Fired Construction Equipment, Variable Horsepower NETL**US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>****US: Industrial Boiler, Natural Gas Fired, Over 100 Million BTU/hr NETL****US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL****US: Uranium Open Pit Mining and Milling Operations NETL****US: Assembly: Open Pit Uranium Mine****US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>****US: Surface Mine Commissioning / Decommissioning NETL**

STAGE #1: I6 RMA

Coal Mine Commissioning/Decommissioning

US: Commissioning and Decommissioning of Illinois No. 6 Coal Mine NETL

<u-so>

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>**US: GASOLINE, NATIONAL AVERAGE, 2009 NETL <u-so>**

COAL MINE CONSTRUCTION

GAB II, ASPHALT (Medium water content)

DK: GAB II, ASPHALT (Medium water content)

DK: Gravel round: at mine/CH S NETL

EU-15: Bitumen at refinery PE

North American Average Electricity Mix, 2007 070111 NETL**US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>****US: Natural Gas RMA/RMT, Mix Nominal, 060911 NETL****BF: Hot-dip Galvanized NETL**

DE: Cast iron part PE <p-agg>

DE: Copper mix PE

DE: Stainless steel cold roll PE

DE: Steel cold rolled PE

DE: Styrene-butadiene rubber mix (SBR) PE

North American Average Electricity Mix, 2007 070111 NETL

RER: Polyvinylchloride pipe (PVC) PlasticsEurope

US: COAL MINE, CONSTRUCTION NETL**US: Concrete, ready mixed, R-5-0 (100% Portland Cement) NETL <u-so>**

US: Thermal energy from heavy fuel oil PE

WOR: Rebar Wire Rod, BF Manufactures NETL**WOR: Steel Plate, BF, Manufacture NETL <u-so>****WOR: Steel, Stainless, 316 2B, 80% Recycled NETL <u-so>**

Coal Mine, Operation

North American Average Electricity Mix, 2007 070111 NETL**US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-so>****US: Underground Mine, Illinois No. 6 Bituminous Coal, Operation <u-so>****US: ASSEMBLY: COAL MINE CONSTRUCTION & OPERATION NETL****US: Uranium Mining Mixer: US NETL****US: Assembly: Uranium Supply to Conversion Facility NETL**

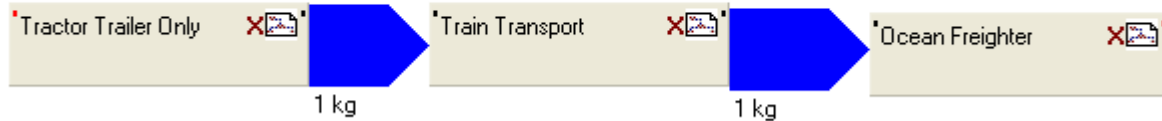
LC Stage #2 (RMT) includes the transport of the fuel assembly facility to the energy conversion facility (LC Stage #3). There are transportation steps between each of the processing steps, but the product of each step undergoes more processing before it reaches the energy conversion facility. The same transportation plan is repeated for each transportation location. The uranium is transported by three modes: truck, ocean freighter, or truck. Each mode has operating emissions. The plan for RMT of uranium is provided in **Figure 3**.

Figure 3: Plan for RMT of Uranium, Including Construction and Operation of Profiles for Transport

Uranium Transport

GaBi 4 process plan: Mass [kg]

Transportation modes are modeled in series. They can be turned on and off with the addition of a distance of transport.



The profiles and processes included in RMT are provided in **Table 2**. Those shown in bold face were developed by NETL.

Table 2: Profiles and Processes Included in RMT for Uranium

Uranium Transport

Ocean Freighter

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-s0>

US: Ocean Freighter Transport, Operation NETL

Tractor Trailer Only

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-s0>

US: Tractor-trailer Transport, Operation NETL

Train Transport

US: DIESEL, NATIONAL AVERAGE, 2009 NETL <u-s0>

US: Train Transport, Operation NETL

Parameters and Balances

The parameters for the highest level modeling plans for RMA and RMT of uranium are shown in **Table 3**. These parameters may or may not include the adjustable parameters shown previously, depending on how the model was created. **Table 4** presents the input and output balances for resources and emissions of interest for the cradle-to-gate plan as well as each of the RMA and RMT plans.

Table 3: Adjustable Parameters for RMA and RMT of Uranium

Plan	Parameter	US	Comment
<i>LC Stage #1</i>			
US: Assembly: Uranium Supply to Conversion Facility NETL	Africa	0.054	[unitless] Adjustable parameter; portion of uranium extracted in Africa.
US: Assembly: Uranium Supply to Conversion Facility NETL	Australia	0.111	[unitless] Adjustable parameter; portion of uranium extracted in Australia.
US: Assembly: Uranium Supply to Conversion Facility NETL	Canada	0.143	[unitless] Adjustable parameter; portion of uranium extracted in Canada.
US: Assembly: Uranium Supply to Conversion Facility NETL	Russia	0.495	[unitless] Adjustable parameter; portion of uranium extracted in Russia.
US: Assembly: Uranium Supply to Conversion Facility NETL	US	0.197	[unitless] Adjustable parameter; portion of uranium extracted in US.
Transport Mine/Port to Conversion	MC_truck_dist	990	[km] distance from the incoming port to conversion facility by truck.
Transport Mine/Port to Conversion	MC_train_dist	0	[km] Distance from the incoming port to conversion facility by train.
Transport Mine/Port to Conversion	MC_ocean_dist	0	[km] Distance from the incoming port to conversion facility by ocean freighter.
Transport Conversion to Enrich	CE_truck_dist	385	[km] Distance from the conversion facility to enrichment facility by truck.
Transport Conversion to Enrich	CE_train_dist	0	[km] Distance from the conversion facility to enrichment facility by train.
Transport Conversion to Enrich	CE_ocean_dist	0	[km] Distance from the conversion facility to enrichment facility by ocean freighter.
Transport Enrich to Fuel Assembly	EF_truck_dist	1390	[km] Distance from the enrichment facility to fuel assembly by truck.
Transport Enrich to Fuel Assembly	EF_train_dist	0	[km] Distance from the enrichment facility to fuel assembly by train.
Transport Enrich to Fuel Assembly	EF_ocean_dist	0	[km] Distance from the enrichment facility to fuel assembly by ocean freighter.

**Table 4: Inputs and Output Balances for Cradle-to-Gate, RMA, and RMT of Uranium
(kg/kg delivered)**

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Inputs			
Flows	2.269E+05	2.269E+05	1.061E+00
Resources	2.265E+05	2.265E+05	6.114E-02
Energy resources	8.532E+03	8.532E+03	1.564E-02
Non renewable energy resources	8.532E+03	8.532E+03	1.564E-02
Crude oil (resource)	1.060E+02	1.060E+02	1.375E-02
Crude oil	4.257E-01	4.257E-01	0.000E+00
Crude oil Algeria	2.766E+00	2.765E+00	4.058E-04
Crude oil Angola	1.971E+00	1.970E+00	4.953E-04
Crude oil Argentina	6.717E-02	6.717E-02	5.989E-07
Crude oil Australia	1.704E-01	1.704E-01	5.210E-06
Crude oil Austria	7.522E-02	7.522E-02	1.459E-07
Crude oil Bolivia	1.799E-06	1.799E-06	1.788E-12
Crude oil Brazil	2.447E-01	2.447E-01	7.542E-06
Crude oil Brunei	9.278E-08	9.278E-08	9.434E-12
Crude oil Bulgaria	1.093E-05	1.093E-05	9.943E-13
Crude oil Cameroon	3.203E-01	3.203E-01	1.100E-06
Crude oil Canada	5.995E+00	5.993E+00	2.290E-03
Crude oil Central Africa	0.000E+00	0.000E+00	0.000E+00
Crude oil Central America	0.000E+00	0.000E+00	0.000E+00
Crude oil Chile	5.068E-05	5.068E-05	7.793E-11
Crude oil China	1.906E-02	1.906E-02	2.686E-06
Crude oil CIS	1.529E+01	1.529E+01	4.012E-05
Crude oil Colombia	1.971E-01	1.971E-01	1.409E-06
Crude oil Czech Republic	5.596E-03	5.596E-03	1.375E-08
Crude oil Denmark	2.527E+00	2.527E+00	8.163E-06
Crude oil Ecuador	8.119E-01	8.116E-01	3.294E-04
Crude oil Egypt	3.023E-01	3.023E-01	9.790E-07
Crude oil France	1.056E-01	1.056E-01	3.395E-07
Crude oil Gabon	1.552E-01	1.552E-01	1.070E-06
Crude oil Germany	7.588E-01	7.588E-01	9.973E-07
Crude oil Greece	1.489E-02	1.489E-02	2.865E-08
Crude oil Hungary	1.433E-03	1.433E-03	1.171E-08

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Crude oil India	1.850E-07	1.850E-07	7.038E-13
Crude oil Indonesia	8.696E-02	8.696E-02	2.583E-06
Crude oil Iran	2.134E+00	2.134E+00	1.126E-05
Crude oil Iraq	2.731E+00	2.731E+00	5.098E-04
Crude oil Ireland	6.055E-07	6.055E-07	7.051E-13
Crude oil Italy	4.884E-01	4.884E-01	1.467E-06
Crude oil Japan	7.676E-10	7.673E-10	3.505E-13
Crude oil Kuwait	1.392E+00	1.391E+00	3.191E-04
Crude oil Libya	4.262E+00	4.262E+00	1.008E-05
Crude oil Malaysia	5.468E-08	5.467E-08	4.846E-12
Crude oil Mexico	4.494E+00	4.493E+00	1.209E-03
Crude oil Middle East	0.000E+00	0.000E+00	0.000E+00
Crude oil Netherlands	3.532E-01	3.532E-01	1.048E-06
Crude oil New Zealand	8.647E-03	8.647E-03	3.321E-07
Crude oil Nigeria	4.624E+00	4.623E+00	1.019E-03
Crude oil North Africa	0.000E+00	0.000E+00	0.000E+00
Crude oil Norway	1.167E+01	1.167E+01	4.524E-05
Crude oil Oman	2.793E-02	2.793E-02	1.126E-06
Crude oil Poland	3.184E-02	3.184E-02	5.629E-08
Crude oil Qatar	1.531E-02	1.531E-02	2.221E-06
Crude oil Romania	3.018E-02	3.018E-02	5.821E-08
Crude oil Saudi Arabia	8.379E+00	8.378E+00	1.115E-03
Crude oil Slovakia	1.060E-05	1.060E-05	7.771E-10
Crude oil South Africa	4.492E-08	4.491E-08	9.442E-13
Crude oil Spain	2.462E-02	2.462E-02	4.826E-08
Crude oil Syria	5.910E-05	5.910E-05	5.567E-12
Crude oil Trinidad and Tobago	5.354E-02	5.354E-02	3.637E-07
Crude oil Tunisia	1.669E-01	1.669E-01	4.534E-07
Crude oil Turkey	2.489E-09	2.489E-09	5.964E-17
Crude oil United Arab Emirates	3.248E-02	3.248E-02	4.586E-06
Crude oil United Kingdom	1.407E+01	1.407E+01	3.938E-05
Crude oil USA	1.436E+01	1.435E+01	4.772E-03
Crude oil Venezuela	4.360E+00	4.359E+00	1.098E-03
Hard coal (resource)	4.269E+03	4.269E+03	3.074E-04
Hard coal	3.215E-02	3.215E-02	0.000E+00
Hard Coal (Illinois No 6)	5.383E+01	5.383E+01	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Hard coal Australia	1.048E+01	1.048E+01	1.379E-06
Hard coal Belgium	7.296E-05	7.295E-05	4.721E-10
Hard coal Bosnia and Herzegovina	2.578E-02	2.578E-02	8.320E-11
Hard coal Brazil	2.816E-03	2.816E-03	4.251E-09
Hard coal Canada	1.287E+01	1.287E+01	1.031E-05
Hard coal Chile	5.283E-03	5.283E-03	8.125E-09
Hard coal China	6.906E-01	6.906E-01	3.593E-07
Hard coal CIS	1.557E+00	1.557E+00	3.300E-07
Hard coal Colombia	3.945E+01	3.945E+01	4.053E-06
Hard coal Czech Republic	4.626E-01	4.626E-01	9.168E-08
Hard coal France	1.701E-02	1.701E-02	1.046E-08
Hard coal Germany	1.121E+01	1.121E+01	1.969E-06
Hard coal India	1.351E-05	1.351E-05	3.624E-11
Hard coal Indonesia	8.177E+00	8.177E+00	6.459E-07
Hard coal Italy	3.876E-04	3.876E-04	8.925E-11
Hard coal Japan	2.563E-08	2.563E-08	1.419E-13
Hard coal Malaysia	2.335E-09	2.335E-09	1.696E-13
Hard coal Mexico	7.311E-04	7.310E-04	1.355E-07
Hard coal New Zealand	4.325E-03	4.325E-03	6.753E-09
Hard coal Poland	3.859E+00	3.859E+00	6.245E-07
Hard coal Portugal	2.286E-07	2.286E-07	9.378E-12
Hard coal South Africa	4.071E+00	4.071E+00	1.171E-06
Hard coal Spain	3.020E-02	3.020E-02	8.553E-08
Hard coal Turkey	1.074E-05	1.074E-05	2.697E-13
Hard coal United Kingdom	3.615E-01	3.615E-01	1.809E-07
Hard coal USA	4.108E+03	4.108E+03	2.847E-04
Hard coal Venezuela	1.401E+01	1.401E+01	1.347E-06
Hard coal Vietnam	6.248E-02	6.248E-02	1.040E-08
Hard Coal, Pure, Fuel	5.705E-04	5.705E-04	0.000E+00
Hard Coal, Raw, Fuel	4.468E-03	4.468E-03	0.000E+00
Lignite (resource)	1.723E+01	1.723E+01	2.593E-05
Lignite	1.215E-04	1.215E-04	0.000E+00
Lignite Australia	1.508E-01	1.508E-01	6.211E-07
Lignite Austria	3.803E-03	3.803E-03	1.261E-08
Lignite Bosnia and Herzegovina	5.955E-02	5.955E-02	1.914E-10
Lignite Bulgaria	1.038E-02	1.038E-02	3.828E-10

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Lignite Canada	8.201E-02	8.200E-02	2.679E-06
Lignite CIS	2.988E-02	2.988E-02	4.511E-08
Lignite Czech Republic	2.112E-01	2.112E-01	5.314E-08
Lignite France	5.974E-03	5.974E-03	2.519E-09
Lignite Germany	8.409E-03	8.409E-03	0.000E+00
Lignite Germany (Central Germany)	2.153E+00	2.153E+00	8.359E-06
Lignite Germany (Lausitz)	4.289E+00	4.289E+00	1.283E-06
Lignite Germany (Rheinisch)	8.752E+00	8.752E+00	2.359E-06
Lignite Greece	3.086E-01	3.086E-01	1.961E-08
Lignite Hungary	8.030E-03	8.030E-03	1.220E-09
Lignite India	2.703E-06	2.703E-06	7.250E-12
Lignite Macedonia	6.891E-03	6.891E-03	3.291E-10
Lignite Poland	1.686E-01	1.686E-01	2.349E-08
Lignite Romania	4.118E-04	4.118E-04	7.651E-11
Lignite Serbia and Montenegro	1.549E-02	1.549E-02	1.481E-09
Lignite Slovakia	1.049E-02	1.049E-02	1.931E-10
Lignite Slovenia	7.608E-02	7.608E-02	2.221E-09
Lignite Spain	6.353E-02	6.353E-02	1.798E-07
Lignite Turkey	3.086E-07	3.086E-07	7.391E-15
Lignite USA	8.112E-01	8.112E-01	1.029E-05
Natural gas (resource)	4.140E+03	4.140E+03	1.554E-03
Natural gas	6.386E-02	6.386E-02	0.000E+00
Natural gas Algeria	6.548E-01	6.548E-01	3.254E-05
Natural gas Angola	2.449E-01	2.448E-01	6.061E-05
Natural gas Argentina	3.456E-02	3.456E-02	9.138E-08
Natural gas Australia	2.702E-02	2.702E-02	3.971E-07
Natural gas Austria	8.539E-03	8.539E-03	1.567E-08
Natural gas Bolivia	3.615E-03	3.615E-03	3.593E-09
Natural gas Brazil	3.237E-02	3.237E-02	4.573E-07
Natural gas Brunei	8.434E-04	8.433E-04	8.203E-08
Natural gas Bulgaria	2.378E-06	2.378E-06	1.262E-13
Natural gas Cameroon	7.979E-02	7.979E-02	2.725E-07
Natural gas Canada	1.352E+00	1.352E+00	2.863E-04
Natural gas Chile	1.188E-02	1.188E-02	1.854E-08
Natural gas China	1.838E-03	1.838E-03	1.465E-07
Natural gas CIS	6.490E+00	6.490E+00	3.326E-06

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Natural gas Colombia	2.080E-02	2.080E-02	1.485E-07
Natural gas Czech Republic	4.921E-04	4.921E-04	7.928E-10
Natural gas Denmark	4.759E-01	4.759E-01	4.352E-07
Natural gas Ecuador	5.305E-02	5.303E-02	2.008E-05
Natural gas Egypt	2.689E-02	2.689E-02	7.214E-08
Natural gas France	4.675E-02	4.675E-02	2.307E-08
Natural gas Gabon	2.287E-02	2.287E-02	1.575E-07
Natural gas Germany	3.638E+00	3.638E+00	9.620E-07
Natural gas Greece	9.989E-04	9.989E-04	1.751E-09
Natural gas Hungary	1.743E-03	1.743E-03	4.349E-10
Natural gas India	1.035E-06	1.035E-06	2.798E-12
Natural gas Indonesia	9.795E-03	9.794E-03	1.681E-07
Natural gas Iran	2.201E-01	2.201E-01	8.548E-07
Natural gas Iraq	1.887E-01	1.887E-01	2.068E-05
Natural gas Ireland	1.377E-03	1.377E-03	1.573E-09
Natural gas Italy	8.453E-02	8.453E-02	1.040E-07
Natural gas Japan	2.658E-06	2.657E-06	1.210E-09
Natural gas Kuwait	8.394E-02	8.393E-02	1.155E-05
Natural gas Libyan	1.334E-01	1.334E-01	4.258E-07
Natural gas Malaysia	7.628E-04	7.627E-04	8.360E-08
Natural gas Mexico	3.317E-01	3.316E-01	6.735E-05
Natural gas Netherlands	3.658E+00	3.658E+00	1.221E-06
Natural gas New Zealand	5.714E-04	5.713E-04	2.219E-08
Natural gas Nigeria	8.444E-01	8.442E-01	1.805E-04
Natural gas Norway	4.151E+00	4.151E+00	1.590E-06
Natural gas Oman	5.689E-03	5.689E-03	1.433E-07
Natural gas Poland	3.370E-03	3.370E-03	2.679E-09
Natural gas Qatar	1.538E-02	1.538E-02	1.272E-06
Natural gas Romania	1.719E-03	1.719E-03	3.423E-09
Natural gas Saudi Arabia	5.631E-01	5.631E-01	3.756E-05
Natural gas Slovakia	1.713E-04	1.713E-04	2.387E-11
Natural gas South Africa	1.283E-05	1.283E-05	9.393E-11
Natural gas Spain	2.409E-03	2.409E-03	5.588E-09
Natural gas Syria	6.351E-06	6.351E-06	5.982E-13
Natural gas Trinidad and Tobago	4.699E-02	4.698E-02	5.076E-06
Natural gas Tunisia	2.010E-02	2.010E-02	4.542E-08

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Natural gas Turkey	2.517E-10	2.517E-10	6.031E-18
Natural gas United Arab Emirates	4.255E-03	4.255E-03	1.811E-07
Natural gas United Kingdom	1.959E+00	1.959E+00	2.162E-06
Natural gas USA	3.760E+03	3.760E+03	7.691E-04
Natural gas Venezuela	2.966E-01	2.966E-01	4.693E-05
Natural Gas, Fuel	1.782E-03	1.782E-03	0.000E+00
Natural gas, Raw Material	3.376E+02	3.376E+02	0.000E+00
Pit gas	1.244E-04	1.244E-04	0.000E+00
Pit Methane	1.599E+01	1.599E+01	1.187E-06
Uranium (resource)	8.600E-04	8.600E-04	7.401E-09
Nuclear energy	0.000E+00	0.000E+00	0.000E+00
Uranium natural	8.600E-04	8.600E-04	7.401E-09
Renewable energy resources	3.165E-02	3.165E-02	1.933E-08
Biomass	1.101E-03	1.101E-03	0.000E+00
Energy, gross calorific value, in biomass, primary forest	0.000E+00	0.000E+00	0.000E+00
Primary energy from geothermics	0.000E+00	0.000E+00	0.000E+00
Primary energy from hydro power	0.000E+00	0.000E+00	0.000E+00
Primary energy from solar energy	0.000E+00	0.000E+00	0.000E+00
Primary energy from waves	0.000E+00	0.000E+00	0.000E+00
Primary energy from wind power	0.000E+00	0.000E+00	0.000E+00
Renewable fuels	4.823E-06	4.823E-06	0.000E+00
Wood	3.055E-02	3.055E-02	1.933E-08
Unspecified	0.000E+00	0.000E+00	0.000E+00
Energy unspecified (APME)	0.000E+00	0.000E+00	0.000E+00
Thermal Energy from Diesel Fuel	0.000E+00	0.000E+00	0.000E+00
Material resources	2.179E+05	2.179E+05	4.550E-02
Non renewable elements	2.041E+00	2.041E+00	3.591E-13
Aluminum	1.805E-06	1.805E-06	0.000E+00
Chromium	3.069E-07	3.069E-07	0.000E+00
Copper	1.079E-05	1.079E-05	0.000E+00
Iron	2.030E+00	2.030E+00	8.247E-15
Lead	3.176E-07	3.176E-07	3.478E-19
Magnesium	1.588E-12	1.588E-12	0.000E+00
Mercury	3.081E-07	3.081E-07	0.000E+00
Nickel	4.710E-09	4.710E-09	0.000E+00
Phosphorus	2.147E-07	2.147E-07	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Sulphur	-4.561E-05	-4.561E-05	3.508E-13
Zinc	1.130E-02	1.130E-02	0.000E+00
Non renewable resources	2.137E+04	2.137E+04	5.042E-03
Barium sulphate	8.965E-12	8.965E-12	3.565E-17
Basalt	7.954E-02	7.954E-02	6.830E-07
Bauxite	2.127E+00	2.127E+00	8.480E-08
Bentonite	3.255E-01	3.254E-01	6.309E-05
Calcium carbonate (CaCO ₃)	1.175E-02	1.175E-02	0.000E+00
Calcium chloride	9.179E-10	9.179E-10	3.650E-15
Chalk (Calcium carbonate)	3.099E-32	3.099E-32	0.000E+00
Chromium ore (39%)	7.439E-04	7.439E-04	1.595E-09
Clay	2.306E-01	2.306E-01	4.064E-06
Colemanite ore	1.221E-04	1.221E-04	1.437E-10
Copper - Gold - Silver - ore (1,0% Cu; 0,4 g/t Au; 66 g/t Ag)	7.878E+00	7.878E+00	3.903E-09
Copper - Gold - Silver - ore (1,1% Cu; 0,01 g/t Au; 2,86 g/t Ag)	4.799E+00	4.799E+00	2.378E-09
Copper - Gold - Silver - ore (1,16% Cu; 0,002 g/t Au; 1,06 g/t Ag)	2.709E+00	2.709E+00	1.342E-09
Copper - Molybdenum - Gold - Silver - ore (1,13% Cu; 0,02% Mo; 0,01 g/t Au; 2,86 g/t Ag)	1.215E-03	1.215E-03	3.270E-09
Copper ore (0.14%)	2.353E-02	2.353E-02	3.530E-08
Copper ore (1.2%)	8.169E-01	8.169E-01	4.048E-10
Copper ore (4%)	1.474E-12	1.474E-12	2.313E-17
Copper ore (sulphidic, 1.1%)	8.057E-04	8.057E-04	2.744E-14
Dolomite	1.220E-01	1.220E-01	9.672E-11
Feldspar (aluminum silicates)	7.473E-08	7.473E-08	0.000E+00
Ferro manganese	1.638E-07	1.638E-07	1.739E-19
Fluorspar (calcium fluoride; fluorite)	1.582E-02	1.582E-02	1.147E-10
Granite	2.318E-14	2.318E-14	0.000E+00
Gravel	6.139E-02	6.139E-02	0.000E+00
Gypsum (natural gypsum)	1.446E-01	1.446E-01	2.277E-06
Heavy spar (BaSO ₄)	7.782E-01	7.780E-01	1.526E-04
Ilmenite (titanium ore)	5.336E-04	5.336E-04	0.000E+00
Inert rock	2.079E+04	2.079E+04	4.620E-03
Iron ore (56,86%)	7.208E+00	7.208E+00	4.641E-05
Iron ore (65%)	7.051E-04	7.051E-04	1.955E-09
Kaolin ore	2.182E-04	2.182E-04	2.420E-10

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Lead - zinc ore (4.6%-0.6%)	6.084E-02	6.083E-02	1.230E-05
Limestone (calcium carbonate)	2.685E+02	2.685E+02	1.198E-04
Magnesit (Magnesium carbonate)	2.827E-06	2.827E-06	4.492E-11
Magnesium chloride leach (40%)	6.319E-02	6.319E-02	9.556E-07
Manganese ore	1.449E-04	1.449E-04	3.160E-10
Manganese ore (R.O.M.)	5.187E-02	5.187E-02	4.819E-07
Molybdenite (Mo 0,24%)	7.452E-04	7.452E-04	2.011E-09
Molybdenum ore (0.1%)	8.355E-06	8.355E-06	0.000E+00
Natural Aggregate	2.638E+01	2.638E+01	8.975E-06
Nickel ore (1,5%)	1.392E-05	1.392E-05	4.006E-13
Nickel ore (1.6%)	1.801E-01	1.801E-01	1.700E-06
Olivine	1.692E-06	1.692E-06	1.913E-18
Peat	1.463E-02	1.463E-02	1.158E-07
Phosphate ore	1.031E-06	1.031E-06	6.111E-11
Phosphorus minerals	4.338E-06	4.338E-06	4.259E-11
Phosphorus ore (29% P2O5)	1.217E-08	1.217E-08	0.000E+00
Potassium chloride	1.181E-04	1.181E-04	2.052E-11
Precious metal ore (R.O.M)	4.785E-05	4.785E-05	1.220E-10
Quartz sand (silica sand; silicon dioxide)	4.195E-01	4.195E-01	1.606E-06
Raw pumice	1.915E-05	1.915E-05	2.351E-11
Rutile (titanium ore)	2.504E-09	2.504E-09	0.000E+00
sand	6.245E-05	6.245E-05	0.000E+00
Slate	8.124E-07	8.124E-07	3.217E-18
Sodium chloride (rock salt)	2.492E+02	2.492E+02	3.764E-08
Sodium nitrate	1.582E-12	1.582E-12	0.000E+00
Sodium sulphate	2.660E-05	2.660E-05	9.405E-14
Soil	6.329E+00	6.329E+00	3.634E-06
Sulphur (bonded)	6.916E-08	6.916E-08	1.715E-13
Talc	4.451E-06	4.451E-06	2.253E-11
Tin ore	7.775E-13	7.775E-13	3.092E-18
Titanium ore	1.018E-02	1.018E-02	1.581E-07
Zinc - copper ore (4.07%-2.59%)	1.806E+00	1.806E+00	2.050E-06
Zinc - lead - copper ore (12%-3%-2%)	1.351E+00	1.351E+00	8.527E-07
Zinc - lead ore (4.21%-4.96%)	5.032E-13	5.031E-13	7.898E-18
Zinc ore (4%)	-8.017E-03	-8.017E-03	0.000E+00
Zinc ore (sulphidic, 4%)	2.495E-12	2.495E-12	3.627E-17

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Renewable resources	1.966E+05	1.966E+05	4.046E-02
Water	1.415E+05	1.415E+05	3.369E-02
Water	7.431E+01	7.429E+01	2.083E-02
Water (feed water)	1.651E-01	1.651E-01	0.000E+00
Water (ground water)	8.477E+03	8.477E+03	2.118E-03
Water (lake water)	4.108E+02	4.108E+02	0.000E+00
Water (municipal)	5.226E-02	5.226E-02	0.000E+00
Water (municipal)	3.660E+02	3.660E+02	0.000E+00
Water (river water)	0.000E+00	0.000E+00	0.000E+00
Water (sea water)	0.000E+00	0.000E+00	1.339E-04
Water (surface water)	1.322E+05	1.322E+05	1.061E-02
Water (well water)	9.505E-02	9.505E-02	0.000E+00
Water (well-produced water)	9.687E-01	9.687E-01	0.000E+00
Water (with river silt)	1.950E-10	1.950E-10	0.000E+00
Water, turbine use, unspecified natural origin	0.000E+00	0.000E+00	0.000E+00
Air	5.507E+04	5.507E+04	6.766E-03
Carbon dioxide	7.673E+00	7.673E+00	6.091E-06
Nitrogen	8.540E-03	8.540E-03	6.878E-13
Oxygen	0.000E+00	0.000E+00	8.306E-09
Unspecified	5.180E-04	5.180E-04	0.000E+00
Unspecified minerals	1.179E-04	1.179E-04	0.000E+00
Unspecified resources	4.002E-04	4.002E-04	0.000E+00
Valuable substances	4.218E+02	4.218E+02	1.000E+00
Ecoinvent	0.000E+00	0.000E+00	0.000E+00
Others	1.819E-10	1.819E-10	0.000E+00
Cargo	1.819E-10	1.819E-10	0.000E+00
Cargo (Foreign)	0.000E+00	0.000E+00	0.000E+00
Production residues in life cycle	4.787E-01	4.787E-01	0.000E+00
Hazardous waste for recovery	2.601E-12	2.601E-12	0.000E+00
Carcass meal	2.601E-12	2.601E-12	0.000E+00
Waste for recovery	4.787E-01	4.787E-01	0.000E+00
Cast iron scrap	4.036E-02	4.036E-02	0.000E+00
Industrial waste (incineration)	0.000E+00	0.000E+00	0.000E+00
Steel scrap (alloyed)	2.644E-06	2.644E-06	0.000E+00
Steel scrap (St)	4.378E-01	4.378E-01	0.000E+00
Steel Scrap, Carbon	2.482E-04	2.482E-04	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Steel Scrap, Stainless (304 from external supply)	0.000E+00	0.000E+00	0.000E+00
Steel Scrap, Stainless (316 from external supply)	2.416E-04	2.416E-04	0.000E+00
Steel Scrap, Stainless (430 from external supply)	0.000E+00	0.000E+00	0.000E+00
Deposited goods	5.185E-03	5.185E-03	0.000E+00
Consumer waste	5.185E-03	5.185E-03	0.000E+00
Municipal waste	5.185E-03	5.185E-03	0.000E+00
Stockpile goods	0.000E+00	0.000E+00	0.000E+00
Overburden (deposited)	0.000E+00	0.000E+00	0.000E+00
Tailings - Depleted UF6	0.000E+00	0.000E+00	0.000E+00
Output			
Flows	2.209E+05	2.209E+05	1.035E+00
Resources	1.107E+05	1.107E+05	8.195E-03
Energy resources	0.000E+00	0.000E+00	0.000E+00
Non renewable energy resources	0.000E+00	0.000E+00	0.000E+00
Hard coal (resource)	0.000E+00	0.000E+00	0.000E+00
Hard Coal (Illinois No 6)	0.000E+00	0.000E+00	0.000E+00
Natural gas (resource)	0.000E+00	0.000E+00	0.000E+00
Natural gas CIS	0.000E+00	0.000E+00	0.000E+00
Natural gas Denmark	0.000E+00	0.000E+00	0.000E+00
Natural gas Germany	0.000E+00	0.000E+00	0.000E+00
Natural gas Netherlands	0.000E+00	0.000E+00	0.000E+00
Natural gas Norway	0.000E+00	0.000E+00	0.000E+00
Non Renewable Energy	0.000E+00	0.000E+00	0.000E+00
Renewable energy resources	0.000E+00	0.000E+00	0.000E+00
Feedstock Energy	0.000E+00	0.000E+00	0.000E+00
Renewable Energy	0.000E+00	0.000E+00	0.000E+00
Thermal Energy from Diesel Fuel	0.000E+00	0.000E+00	0.000E+00
Total Primary Energy	0.000E+00	0.000E+00	0.000E+00
Land use	0.000E+00	0.000E+00	0.000E+00
Hemeroby	0.000E+00	0.000E+00	0.000E+00
Occup. as Forest land	0.000E+00	0.000E+00	0.000E+00
Material resources	1.107E+05	1.107E+05	8.195E-03
Renewable resources	1.107E+05	1.107E+05	8.195E-03
Water	1.107E+05	1.107E+05	8.195E-03
Water	0.000E+00	0.000E+00	0.000E+00
Water (Evaporated)	9.914E+00	9.914E+00	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Water (feed water)	0.000E+00	0.000E+00	0.000E+00
Water (ground water)	0.000E+00	0.000E+00	0.000E+00
Water (lake water)	0.000E+00	0.000E+00	0.000E+00
Water (river water)	1.045E+05	1.045E+05	8.182E-03
Water (sea water)	7.343E+00	7.344E+00	0.000E+00
Water (wastewater)	5.672E+03	5.672E+03	1.238E-05
Water (wastewater)	4.478E+02	4.478E+02	0.000E+00
Nitrogen	0.000E+00	0.000E+00	0.000E+00
Oxygen	5.746E-02	5.746E-02	0.000E+00
Valuable substances	3.210E+02	3.210E+02	1.000E+00
Ecoinvent	1.315E-01	1.315E-01	0.000E+00
Long-term emission	1.315E-01	1.315E-01	0.000E+00
Fresh water	1.315E-01	1.315E-01	0.000E+00
Chloride	1.315E-01	1.315E-01	0.000E+00
Dissolved organic carbon, DOC (Ecoinvent)	2.140E-08	2.140E-08	0.000E+00
Total organic carbon, TOC (Ecoinvent)	0.000E+00	0.000E+00	0.000E+00
Others	8.984E-01	8.984E-01	0.000E+00
Cargo	0.000E+00	0.000E+00	0.000E+00
Cargo (Foreign)	8.984E-01	8.984E-01	0.000E+00
Production residues in life cycle	6.639E+00	6.639E+00	3.017E-06
Hazardous waste for disposal	6.131E-01	6.131E-01	0.000E+00
Chromium containing slag	7.952E-07	7.952E-07	0.000E+00
Dross (Fines)	4.041E-03	4.041E-03	0.000E+00
Sodium oxide	6.925E-03	6.925E-03	0.000E+00
Red mud (dry)	6.016E-01	6.016E-01	0.000E+00
Soil and sand containing heavy metals	4.063E-05	4.063E-05	0.000E+00
Toxic chemicals (unspecified)	4.282E-04	4.282E-04	0.000E+00
Hazardous waste for recovery	2.694E+00	2.694E+00	0.000E+00
Used oil	1.091E-03	1.091E-03	0.000E+00
Waste water processing residue	2.693E+00	2.693E+00	0.000E+00
Waste for disposal	2.743E+00	2.743E+00	3.017E-06
Incineration good	4.679E-04	4.679E-04	0.000E+00
Sludge from water works (6% dry matter-content)	9.951E-06	9.951E-06	0.000E+00
Waste (solid)	1.334E+00	1.334E+00	3.017E-06
Waste for disposal (unspecified)	1.199E-02	1.199E-02	0.000E+00
Waste from steel works	1.397E+00	1.397E+00	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Waste for recovery	5.886E-01	5.886E-01	0.000E+00
Aluminum scrap	9.425E-12	9.425E-12	0.000E+00
Boiler ash (unspecified)	0.000E+00	0.000E+00	0.000E+00
Chemicals (unspecified)	5.128E-04	5.128E-04	0.000E+00
Cooling water	7.956E-04	7.956E-04	0.000E+00
Cryolite	1.884E-03	1.884E-03	0.000E+00
Dross	1.409E-06	1.409E-06	0.000E+00
Filter dust	1.262E-07	1.262E-07	0.000E+00
Fly ash (unspecified)	0.000E+00	0.000E+00	0.000E+00
Furnace clinker	3.155E-08	3.155E-08	0.000E+00
Gypsum	0.000E+00	0.000E+00	0.000E+00
Gypsum (contaminated)	5.033E-12	5.033E-12	0.000E+00
Gypsum (FDI)	4.537E-04	4.537E-04	0.000E+00
Plastic (unspecified)	5.625E-04	5.625E-04	0.000E+00
Production residues (unspecified)	7.323E-05	7.323E-05	0.000E+00
Rolling gravel	1.257E-02	1.257E-02	0.000E+00
Rolling tinder	1.767E-08	1.767E-08	0.000E+00
Slag	9.794E-02	9.794E-02	0.000E+00
Slag (containing precious metal)	1.167E-08	1.167E-08	0.000E+00
Slag (Iron plate production)	4.482E-01	4.482E-01	0.000E+00
Slag (Mn 6,5%)	2.539E-02	2.539E-02	0.000E+00
Waste paper	1.037E-04	1.037E-04	0.000E+00
Wood	1.039E-04	1.039E-04	0.000E+00
Wooden pallet (EURO)	5.521E-12	5.521E-12	0.000E+00
Mixed Waste (Hazardous or Radioactive)	6.593E-04	6.593E-04	0.000E+00
Neutralized residues	8.594E-05	8.594E-05	0.000E+00
Deposited goods	2.081E+04	2.081E+04	4.339E-03
Consumer waste	9.486E-02	9.486E-02	0.000E+00
Bulky waste	1.186E-03	1.186E-03	0.000E+00
Bulky waste from steel production	1.240E-04	1.240E-04	0.000E+00
Industrial waste for municipal disposal	-1.427E-04	-1.427E-04	0.000E+00
inert chemical waste	0.000E+00	0.000E+00	0.000E+00
Liquid waste	2.768E-06	2.768E-06	0.000E+00
Mineral waste	1.747E-02	1.747E-02	0.000E+00
Municipal waste	0.000E+00	0.000E+00	0.000E+00
Organic waste	4.184E-03	4.184E-03	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Packaging waste (metal)	1.343E-05	1.343E-05	0.000E+00
Packaging waste (plastic)	1.020E-12	1.020E-12	0.000E+00
Paper (unspecified)	7.184E-05	7.184E-05	0.000E+00
Rubber	1.291E-04	1.291E-04	0.000E+00
Waste (unspecified)	7.182E-02	7.182E-02	0.000E+00
Hazardous waste	3.996E+00	3.996E+00	0.000E+00
Carbon (unspecified)	4.412E-03	4.412E-03	0.000E+00
Carbon filter dust	1.037E-03	1.037E-03	0.000E+00
Dust containing heavy metals	2.621E-05	2.621E-05	0.000E+00
Dust containing zinc	1.146E-04	1.146E-04	0.000E+00
Ferrous furnace slags	9.432E-04	9.432E-04	0.000E+00
Filter dust	1.043E-03	1.043E-03	0.000E+00
Filter tar	1.862E-04	1.862E-04	0.000E+00
Furnace clinker	2.792E-03	2.792E-03	0.000E+00
Glass fibres	4.132E-05	4.132E-05	0.000E+00
Hazardous waste (underground deposit)	5.647E-03	5.647E-03	0.000E+00
Hazardous waste (unspec.)	3.005E-02	3.005E-02	0.000E+00
Hazardous waste from steel production	7.417E-05	7.417E-05	0.000E+00
Heavy metal sludge	1.871E-05	1.871E-05	0.000E+00
Inert chemical waste	5.458E-04	5.458E-04	0.000E+00
Liquid hazardous waste	0.000E+00	0.000E+00	0.000E+00
Oxalate (Alumina production)	2.788E-03	2.788E-03	0.000E+00
Refractory	7.566E-03	7.566E-03	0.000E+00
Slag	5.974E-02	5.974E-02	0.000E+00
Sludge	3.878E+00	3.878E+00	0.000E+00
Soot	5.514E-04	5.514E-04	0.000E+00
Radioactive waste	1.285E+01	1.285E+01	1.455E-06
CaF2 (low radioactive)	8.007E-05	8.007E-05	8.180E-10
Highly radioactive waste	2.390E-04	2.389E-04	2.441E-09
Highly-active fission product solution	0.000E+00	0.000E+00	0.000E+00
Jacket and body material	0.000E+00	0.000E+00	0.000E+00
Medium and low radioactive liquid waste	0.000E+00	0.000E+00	0.000E+00
Medium and low radioactive wastes	2.836E-04	2.836E-04	2.897E-09
Plutonium as residual product	4.754E-07	4.754E-07	4.857E-12
Radioactive tailings	1.285E+01	1.285E+01	1.433E-06
Slag (Uranium conversion)	5.303E-04	5.303E-04	5.417E-09

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Uranium depleted	5.486E-04	5.486E-04	5.604E-09
Uranium spent as residue	0.000E+00	0.000E+00	0.000E+00
Volatile fission products (inert gases;iodine;C14)	0.000E+00	0.000E+00	0.000E+00
Waste radioactive	4.755E-04	4.755E-04	4.857E-09
Stockpile goods	2.079E+04	2.079E+04	4.337E-03
Ash	0.000E+00	0.000E+00	0.000E+00
Demolition waste (deposited)	3.094E+01	3.094E+01	2.889E-06
Overburden (deposited)	2.074E+04	2.074E+04	4.224E-03
Sand (Alumina production)	4.586E-02	4.586E-02	0.000E+00
Slag (deposited)	4.679E+00	4.679E+00	3.269E-07
Spoil (deposited)	8.324E-01	8.323E-01	1.098E-04
Tailings	1.334E+01	1.334E+01	0.000E+00
Tailings - Depleted UF6	0.000E+00	0.000E+00	0.000E+00
Treatment residue (mineral, deposited)	1.610E+00	1.610E+00	0.000E+00
Waste from Steel Manufacturing	2.359E+00	2.359E+00	0.000E+00
Solid Waste (crystal)	0.000E+00	0.000E+00	0.000E+00
Emissions to air	7.714E+04	7.714E+04	2.169E-02
Heavy metals to air	1.094E-02	1.094E-02	2.838E-09
Antimony	1.183E-04	1.183E-04	9.530E-12
Arsenic (+V)	1.327E-03	1.327E-03	1.105E-10
Arsenic trioxide	4.582E-11	4.581E-11	8.467E-15
Cadmium (+II)	7.458E-05	7.458E-05	8.104E-12
Chromium (+III)	1.126E-07	1.126E-07	1.771E-12
Chromium (+VI)	1.875E-11	1.875E-11	0.000E+00
Chromium (unspecified)	1.424E-03	1.424E-03	1.700E-11
Cobalt	4.969E-05	4.969E-05	9.615E-12
Copper (+II)	1.793E-04	1.793E-04	4.483E-11
Heavy metals to air (unspecified)	5.067E-08	5.067E-08	1.225E-13
Hydrogen arsenic (arsine)	3.803E-09	3.802E-09	7.027E-13
Iron	2.436E-05	2.436E-05	2.217E-11
Lanthanides	2.933E-09	2.933E-09	2.656E-15
Lead (+II)	5.554E-04	5.554E-04	2.058E-10
Manganese (+II)	2.796E-04	2.796E-04	7.206E-11
Mercury (+II)	1.298E-04	1.298E-04	1.708E-11
Molybdenum	7.910E-07	7.910E-07	1.468E-12
Nickel (+II)	1.213E-04	1.213E-04	2.776E-10

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Palladium	2.541E-14	2.541E-14	1.010E-19
Rhodium	2.453E-14	2.453E-14	9.753E-20
Selenium	3.427E-03	3.427E-03	2.462E-10
Silver	5.903E-11	5.903E-11	2.378E-20
Tellurium	1.499E-08	1.499E-08	2.361E-13
Thallium	1.792E-07	1.792E-07	1.736E-12
Tin (+IV)	1.315E-03	1.315E-03	9.362E-11
Titanium	4.401E-07	4.401E-07	1.657E-13
Vanadium (+III)	2.398E-04	2.398E-04	1.487E-09
Zinc (+II)	1.675E-03	1.675E-03	2.100E-10
Inorganic emissions to air	3.122E+04	3.122E+04	1.681E-02
Ammonia	1.001E-01	1.001E-01	1.165E-07
Ammonium	3.124E-09	3.124E-09	3.349E-15
Ammonium nitrate	3.549E-10	3.549E-10	1.005E-15
Argon	3.532E-08	3.532E-08	0.000E+00
Barium	2.597E-03	2.597E-03	9.624E-08
Beryllium	1.437E-05	1.437E-05	1.949E-12
Boron compounds (unspecified)	2.307E-02	2.307E-02	1.738E-09
Bromine	1.005E-02	1.005E-02	7.401E-10
Carbon dioxide	1.185E+04	1.185E+04	1.424E-02
Carbon dioxide (biotic)	1.993E-05	1.992E-05	8.011E-09
Carbon dioxide (biotic)	6.753E+00	6.753E+00	1.597E-06
Carbon disulphide	9.919E-09	9.919E-09	1.146E-14
Carbon monoxide	7.037E+00	7.037E+00	2.044E-05
Carbon monoxide (biotic)	1.456E-08	1.456E-08	0.000E+00
Chloride (unspecified)	1.423E-04	1.423E-04	2.488E-10
Chlorine	1.740E-05	1.740E-05	4.678E-14
Cyanide (unspecified)	3.438E-06	3.438E-06	8.723E-12
Fluoride	3.854E-04	3.854E-04	2.004E-10
Fluorides	2.122E-07	2.121E-07	9.460E-11
Fluorine	8.833E-09	8.833E-09	8.921E-14
Helium	8.215E-06	8.215E-06	3.258E-11
Hydrogen	1.926E-03	1.926E-03	7.565E-09
Hydrogen bromine (hydrobromic acid)	2.000E-07	2.000E-07	2.113E-12
Hydrogen chloride	3.749E-02	3.749E-02	1.075E-08
Hydrogen cyanide (prussic acid)	8.393E-07	8.393E-07	7.609E-13

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Hydrogen fluoride	1.234E-02	1.234E-02	1.770E-09
Hydrogen iodide	2.117E-10	2.117E-10	3.285E-16
Hydrogen phosphorous	9.961E-09	9.961E-09	4.947E-16
Hydrogen sulphide	2.214E-03	2.214E-03	7.247E-08
Lead dioxide	2.630E-08	2.630E-08	2.484E-16
Nitrogen (atmospheric nitrogen)	2.828E+00	2.828E+00	1.155E-06
Nitrogen (N-compounds)	6.909E-09	6.909E-09	0.000E+00
Nitrogen dioxide	1.116E-02	1.116E-02	2.848E-06
Nitrogen monoxide	2.458E-08	2.458E-08	3.019E-13
Nitrogen oxides	2.646E+01	2.646E+01	1.252E-05
Nitrous oxide (laughing gas)	1.717E-01	1.717E-01	3.108E-07
Oxygen	6.441E-01	6.441E-01	4.293E-06
Scandium	4.008E-10	4.008E-10	1.294E-15
Steam	1.925E+04	1.925E+04	2.485E-03
Strontium	3.673E-08	3.673E-08	5.023E-14
Sulphur dioxide	7.447E+01	7.447E+01	2.398E-05
Sulphur hexafluoride	4.450E-05	4.450E-05	1.715E-14
sulphur oxide	2.484E-02	2.483E-02	1.109E-05
Sulphuric acid	3.259E-06	3.259E-06	4.528E-11
Tin oxide	6.116E-12	6.116E-12	2.161E-17
Unspecified Particles	9.645E-04	9.645E-04	0.000E+00
Zinc oxide	1.223E-11	1.223E-11	4.322E-17
Zinc sulphate	9.048E-08	9.046E-08	1.770E-11
Organic emissions to air (group VOC)	2.739E+01	2.739E+01	8.757E-05
Group NMVOC to air	2.259E+00	2.259E+00	2.556E-05
Group PAH to air	2.523E-04	2.523E-04	5.166E-10
Anthracene	9.612E-09	9.610E-09	2.389E-12
Benzo(a)anthracene	4.837E-09	4.835E-09	1.202E-12
Benzo(a)pyrene	4.275E-06	4.275E-06	6.093E-13
Benzo(ghi)perylene	4.315E-09	4.314E-09	1.073E-12
Benzofluoranthene	8.630E-09	8.628E-09	2.145E-12
Chrysene	1.188E-08	1.188E-08	2.953E-12
Dibenz(a)anthracene	2.689E-09	2.688E-09	6.683E-13
Indeno[1,2,3-cd]pyrene	3.211E-09	3.210E-09	7.980E-13
Naphthalene	1.009E-06	1.009E-06	2.510E-10
Phenanthrene	3.171E-07	3.170E-07	7.884E-11

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Polycyclic aromatic hydrocarbons (PAH)	2.467E-04	2.467E-04	1.750E-10
Halogenated organic emissions to air	1.054E-04	1.054E-04	1.651E-10
Dichloroethane (ethylene dichloride)	5.393E-06	5.393E-06	0.000E+00
Dichloromethane (methylene chloride)	3.487E-08	3.487E-08	1.412E-18
Dioxins (unspec.)	2.862E-11	2.862E-11	6.921E-17
Halogenated hydrocarbons (unspecified)	1.656E-06	1.656E-06	6.979E-19
Halon (1301)	0.000E+00	0.000E+00	0.000E+00
Polychlorinated biphenyls (PCB unspecified)	8.908E-09	8.907E-09	1.544E-12
Polychlorinated dibenzo-p-dioxins (2,3,7,8 - TCDD)	5.986E-10	5.986E-10	1.035E-16
R 11 (trichlorofluoromethane)	5.886E-06	5.886E-06	5.400E-11
R 114 (dichlorotetrafluoroethane)	6.028E-06	6.028E-06	5.530E-11
R 116 (hexafluoroethane)	7.353E-06	7.353E-06	0.000E+00
R 12 (dichlorodifluoromethane)	1.265E-06	1.265E-06	1.161E-11
R 13 (chlorotrifluoromethane)	7.946E-07	7.946E-07	7.290E-12
R 22 (chlorodifluoromethane)	1.383E-06	1.383E-06	1.269E-11
Tetrafluoromethane	6.623E-05	6.623E-05	1.023E-12
Vinyl chloride (VCM; chloroethene)	9.350E-06	9.350E-06	2.169E-11
Acetaldehyde (Ethanal)	3.833E-05	3.833E-05	4.214E-10
Acetic acid	1.511E-04	1.511E-04	7.725E-10
Acetone (dimethylcetone)	3.729E-05	3.729E-05	3.897E-10
Acrolein	6.783E-08	6.781E-08	1.686E-11
Aldehyde (unspecified)	3.562E-06	3.562E-06	2.049E-11
Alkane (unspecified)	5.489E-02	5.489E-02	4.492E-09
Alkene (unspecified)	5.477E-02	5.477E-02	3.866E-09
Aromatic hydrocarbons (unspecified)	1.466E-05	1.466E-05	6.588E-11
Benzene	2.908E-04	2.908E-04	2.358E-09
Butadiene	2.623E-09	2.623E-09	3.219E-15
Butane	8.849E-03	8.848E-03	1.138E-06
Butane (n-butane)	5.185E-03	5.185E-03	1.194E-09
Caprolactam	5.593E-11	5.593E-11	0.000E+00
Cumene (isopropylbenzene)	1.120E-15	1.120E-15	0.000E+00
Cyclohexane (hexahydro benzene)	2.169E-07	2.169E-07	2.626E-13
Diethylamine	6.689E-14	6.689E-14	8.372E-20
Ethane	3.549E-02	3.549E-02	3.064E-06
Ethanol	6.595E-05	6.595E-05	3.657E-10
Ethene (ethylene)	3.787E-06	3.787E-06	7.140E-11

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Ethyl benzene	5.477E-02	5.477E-02	3.874E-09
Fluoranthene	3.131E-08	3.130E-08	7.782E-12
Fluorene	9.934E-08	9.932E-08	2.469E-11
Formaldehyde (methanal)	1.522E-02	1.522E-02	2.483E-09
Heptane (isomers)	2.563E-04	2.562E-04	3.892E-08
Hexamethylene diamine (HMDA)	1.543E-10	1.543E-10	1.894E-16
Hexane (isomers)	3.821E-04	3.820E-04	5.775E-08
Mercaptan (unspecified)	8.019E-06	8.018E-06	2.880E-10
Methanethiol	2.453E-05	2.453E-05	0.000E+00
Methanol	7.711E-05	7.711E-05	3.310E-10
NMVOOC (unspecified)	1.681E+00	1.681E+00	1.496E-05
Octane	1.410E-04	1.410E-04	2.141E-08
Pentane (n-pentane)	3.830E-02	3.830E-02	3.875E-07
Phenol (hydroxy benzene)	3.108E-09	3.108E-09	1.222E-14
Propane	5.041E-02	5.040E-02	5.847E-06
Propene (propylene)	4.979E-03	4.979E-03	3.485E-10
Propionic acid (propane acid)	6.402E-09	6.402E-09	1.965E-13
Styrene	2.407E-10	2.407E-10	2.909E-16
Toluene (methyl benzene)	2.490E-02	2.490E-02	2.397E-09
Trimethylbenzene	5.958E-11	5.958E-11	2.105E-16
Xylene (dimethyl benzene)	2.290E-01	2.290E-01	1.649E-08
Hydrocarbons (unspecified)	3.427E-04	3.427E-04	0.000E+00
Methane	2.512E+01	2.512E+01	5.843E-05
Methane (biotic)	5.316E-04	5.316E-04	0.000E+00
Organic chlorine compounds	1.153E-06	1.153E-06	5.034E-16
Unspecified Organic Compounds	6.704E-10	6.704E-10	0.000E+00
VOC (unspecified)	7.098E-03	7.095E-03	3.583E-06
Other emissions to air	4.589E+04	4.589E+04	4.793E-03
Aldehydes, unspecified	3.352E-10	3.352E-10	0.000E+00
Exhaust	4.573E+04	4.573E+04	4.779E-03
non used primary energy from wind power	0.000E+00	0.000E+00	0.000E+00
Particulate Matter, unspecified	1.886E-03	1.885E-03	7.175E-07
Sand (Silica) (SiO2)	6.391E-06	6.391E-06	0.000E+00
Unused primary energy from solar energy	0.000E+00	0.000E+00	0.000E+00
Used air	1.593E+02	1.593E+02	1.412E-05
Waste heat	0.000E+00	0.000E+00	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Particles to air	2.704E+00	2.704E+00	1.201E-06
Dust (PM10)	2.347E-01	2.347E-01	7.686E-08
Dust (PM2,5 - PM10)	1.639E-03	1.638E-03	7.021E-07
Dust (PM2.5)	6.340E-01	6.340E-01	2.127E-07
Dust (Portland cement kiln)	3.296E-01	3.296E-01	0.000E+00
Dust (unspecified)	1.505E+00	1.505E+00	2.096E-07
Metals (unspecified)	4.259E-07	4.259E-07	2.464E-15
Unspecified Organic Chlorine Compounds	4.423E-09	4.423E-09	0.000E+00
Wood (dust)	2.257E-09	2.257E-09	7.976E-15
Radioactive emissions to air	6.672E-05	6.672E-05	6.361E-11
Antimony (Sb124)	0.000E+00	0.000E+00	0.000E+00
Argon (Ar41)	0.000E+00	0.000E+00	0.000E+00
Carbon (C14)	0.000E+00	0.000E+00	0.000E+00
Cesium (Cs134)	0.000E+00	0.000E+00	0.000E+00
Cesium (Cs137)	0.000E+00	0.000E+00	0.000E+00
Cobalt (Co58)	0.000E+00	0.000E+00	0.000E+00
Cobalt (Co60)	0.000E+00	0.000E+00	0.000E+00
Hydrogen (H3)	0.000E+00	0.000E+00	0.000E+00
Iodine (I129)	0.000E+00	0.000E+00	0.000E+00
Iodine (I131)	0.000E+00	0.000E+00	0.000E+00
Krypton (Kr85)	0.000E+00	0.000E+00	0.000E+00
Krypton (Kr85m)	0.000E+00	0.000E+00	0.000E+00
Plutonium (Pu alpha)	0.000E+00	0.000E+00	0.000E+00
radionuclides	0.000E+00	0.000E+00	0.000E+00
Radon (Rn222)	0.000E+00	0.000E+00	0.000E+00
Uranium (total)	6.672E-05	6.672E-05	6.361E-11
Uranium (U234)	0.000E+00	0.000E+00	0.000E+00
Uranium (U235)	0.000E+00	0.000E+00	0.000E+00
Uranium (U238)	0.000E+00	0.000E+00	0.000E+00
Xenon (Xe131m)	0.000E+00	0.000E+00	0.000E+00
Xenon (Xe133)	0.000E+00	0.000E+00	0.000E+00
Xenon (Xe133m)	0.000E+00	0.000E+00	0.000E+00
Xenon (Xe135)	0.000E+00	0.000E+00	0.000E+00
Xenon (Xe135m)	0.000E+00	0.000E+00	0.000E+00
Xenon (Xe137)	0.000E+00	0.000E+00	0.000E+00
Xenon (Xe138)	0.000E+00	0.000E+00	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Unspecified Heavy Metals	3.454E-13	3.454E-13	0.000E+00
Emissions to fresh water	6.709E+02	6.709E+02	2.279E-04
Analytical measures to fresh water	7.627E+00	7.627E+00	1.179E-06
Adsorbable organic halogen compounds (AOX)	8.096E-05	8.096E-05	2.829E-09
Biological oxygen demand (BOD)	8.969E-02	8.969E-02	6.229E-08
Chemical oxygen demand (COD)	4.411E+00	4.411E+00	1.036E-06
Nitrogenous Matter (unspecified, as N)	2.073E-04	2.073E-04	0.000E+00
Solids (dissolved)	6.879E-01	6.879E-01	9.276E-09
Total Biochemical Oxygen Demand	0.000E+00	0.000E+00	0.000E+00
Total dissolved organic bounded carbon	2.547E-02	2.547E-02	1.086E-14
Total Dissolved Solids	2.385E+00	2.385E+00	0.000E+00
Total organic bounded carbon	2.803E-02	2.803E-02	6.769E-08
Total Suspended Solids	0.000E+00	0.000E+00	0.000E+00
Heavy metals to fresh water	2.646E+02	2.646E+02	2.956E-05
Aluminium	1.515E-03	1.515E-03	0.000E+00
Antimony	1.424E-04	1.424E-04	5.891E-08
Arsenic (+V)	1.930E-03	1.929E-03	1.896E-07
Cadmium (+II)	2.524E-04	2.523E-04	1.937E-08
Chromium (+III)	2.055E-06	2.055E-06	1.456E-11
Chromium (+VI)	6.667E-07	6.667E-07	9.774E-19
Chromium (unspecified)	1.271E-03	1.271E-03	3.277E-07
Cobalt	3.083E-08	3.083E-08	6.917E-13
Copper (+II)	1.332E-03	1.331E-03	2.777E-07
Heavy metals to water (unspecified)	1.386E-01	1.386E-01	1.395E-12
Iron	9.515E-02	9.514E-02	1.416E-05
Lead (+II)	1.620E-03	1.619E-03	6.383E-07
Manganese (+II)	6.288E-02	6.288E-02	8.506E-10
Mercury (+II)	3.139E-05	3.138E-05	3.219E-09
Molybdenum	2.506E-04	2.506E-04	1.589E-10
Nickel (+II)	6.614E+01	6.614E+01	5.052E-06
Selenium	4.781E-04	4.781E-04	2.826E-11
Silver	1.390E-04	1.389E-04	5.745E-08
Strontium	2.135E-02	2.135E-02	4.655E-09
Thallium	1.689E-09	1.689E-09	2.968E-13
Tin (+IV)	7.137E-08	7.137E-08	5.965E-13
Titanium	2.823E-06	2.823E-06	2.013E-11

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Unspecified Substance	2.988E-09	2.988E-09	0.000E+00
Uranium	1.981E+02	1.981E+02	0.000E+00
Vanadium (+III)	6.670E-06	6.670E-06	5.175E-11
Zinc (+II)	2.599E-02	2.598E-02	8.768E-06
Inorganic emissions to fresh water	3.875E+02	3.875E+02	1.477E-04
Acid (calculated as H+)	4.257E-04	4.257E-04	2.985E-11
Acidity	0.000E+00	0.000E+00	0.000E+00
Aluminum (+III)	1.969E-02	1.968E-02	6.649E-06
Aluminum ion (+III)	6.380E-12	6.380E-12	0.000E+00
Ammonia	4.466E-01	4.466E-01	7.196E-05
Ammonia, as N	7.935E-09	7.935E-09	0.000E+00
Ammonium (total N)	1.641E-02	1.641E-02	0.000E+00
Ammonium / ammonia	1.527E+02	1.527E+02	1.694E-08
Barium	1.058E+00	1.058E+00	1.055E-08
Beryllium	2.084E-08	2.084E-08	1.905E-13
Bicarbonate	6.783E+00	6.783E+00	0.000E+00
Boron	3.175E-02	3.175E-02	1.839E-09
Bromate	4.633E-08	4.633E-08	0.000E+00
Bromine	2.035E-08	2.035E-08	9.097E-13
Calcium (+II)	3.487E+01	3.487E+01	2.877E-07
Carbonate	7.057E-01	7.057E-01	6.632E-07
Chlorate	2.688E-05	2.688E-05	0.000E+00
Chloride	1.120E+02	1.120E+02	5.741E-05
Chlorine (dissolved)	1.517E-03	1.517E-03	7.484E-09
Copper ion (+II/+III)	3.772E-10	3.772E-10	0.000E+00
Cyanide	1.294E-03	1.293E-03	5.347E-07
Fluoride	1.184E+01	1.184E+01	8.228E-07
Fluorine	5.328E-06	5.327E-06	9.279E-11
Hydrogen chloride	4.912E-07	4.912E-07	1.784E-12
Hydrogen fluoride (hydrofluoric acid)	2.865E-08	2.865E-08	9.135E-13
Hydrogen Ions (H+)	6.671E-07	6.671E-07	0.000E+00
Hydroxide	1.303E-03	1.303E-03	4.937E-11
Inorganic salts and acids (unspecified)	2.989E-13	2.989E-13	0.000E+00
Iron ion (+II/+III)	4.844E-08	4.844E-08	0.000E+00
Magnesium (+III)	7.899E-01	7.899E-01	6.721E-08
Magnesium chloride	6.911E-09	6.911E-09	2.748E-14

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Magnesium ion (+II)	6.074E-02	6.074E-02	0.000E+00
Metal ions (unspecific)	6.607E-08	6.607E-08	0.000E+00
Neutral salts	5.426E-07	5.426E-07	4.106E-19
Nickel ion (+III)	2.180E-09	2.180E-09	0.000E+00
Nitrate	1.103E+00	1.103E+00	2.987E-08
Nitrate (as total N)	1.071E-08	1.071E-08	0.000E+00
Nitrogen	9.122E-01	9.122E-01	3.128E-11
Nitrogen (as total N)	3.720E-03	3.720E-03	0.000E+00
Nitrogen organic bounded	8.575E-04	8.575E-04	1.760E-09
Phosphate	1.589E-03	1.589E-03	2.106E-10
Phosphorus	1.552E-02	1.551E-02	6.350E-06
Potassium	1.837E-05	1.837E-05	4.017E-10
Salinity (dissolved salts)	1.953E+00	1.953E+00	0.000E+00
Silicate particles	2.905E-04	2.905E-04	3.851E-13
Sodium (+I)	1.807E+01	1.807E+01	1.378E-06
Sodium chloride (rock salt)	1.966E+00	1.966E+00	7.835E-14
Sodium hypochlorite	1.274E-06	1.274E-06	1.716E-14
Sulfates	1.566E-01	1.566E-01	0.000E+00
Sulphate	1.552E+01	1.552E+01	1.378E-06
Sulphide	1.171E-03	1.171E-03	1.211E-07
Sulphite	7.801E-03	7.801E-03	5.478E-10
Sulphur	1.987E-06	1.987E-06	1.678E-11
Sulphur dioxide	0.000E+00	0.000E+00	0.000E+00
Sulphuric acid	6.333E-05	6.333E-05	2.300E-10
Total Dissolved Solids	2.650E+01	2.650E+01	0.000E+00
Unspecified Iron Oxides	7.651E-09	7.651E-09	0.000E+00
Unspecified Oil	2.711E-08	2.711E-08	0.000E+00
Unspecified Organic Chlorine compounds	6.143E-11	6.143E-11	0.000E+00
Unspecified Salt	2.458E-07	2.458E-07	0.000E+00
Unspecified Solids (Suspended)	9.542E-07	9.542E-07	0.000E+00
Organic emissions to fresh water	2.027E-01	2.027E-01	2.283E-07
Halogenated organic emissions to fresh water	4.964E-05	4.964E-05	1.272E-12
1,2-Dibromoethane	5.094E-11	5.094E-11	6.170E-17
Chlorinated hydrocarbons (unspecified)	4.808E-05	4.808E-05	7.144E-19
Chloromethane (methyl chloride)	2.612E-07	2.612E-07	1.271E-12
Dichloroethane (ethylene dichloride)	2.259E-07	2.259E-07	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Dichloropropane	1.239E-13	1.239E-13	1.520E-19
Polychlorinated dibenzo-p-dioxins (2,3,7,8 - TCDD)	7.355E-10	7.355E-10	3.383E-24
Vinyl chloride (VCM; chloroethene)	1.066E-06	1.066E-06	1.174E-16
Hydrocarbons to fresh water	2.019E-01	2.019E-01	3.595E-08
Acenaphthene	1.784E-08	1.784E-08	1.727E-12
Acenaphthylene	7.489E-09	7.488E-09	7.415E-13
Acetic acid	5.112E-05	5.112E-05	7.661E-11
Acrylonitrile	9.058E-09	9.057E-09	1.112E-14
Anthracene	2.856E-08	2.856E-08	3.212E-12
Aromatic hydrocarbons (unspecified)	9.574E-06	9.573E-06	6.250E-10
Benzene	3.875E-05	3.875E-05	3.962E-09
Benzo(a)anthracene	2.359E-09	2.359E-09	1.989E-13
Benzo(a)fluoranthene	9.563E-10	9.563E-10	2.638E-14
Chrysene	9.978E-09	9.977E-09	7.328E-13
Cresol (methyl phenol)	5.118E-08	5.118E-08	4.346E-13
Ethyl benzene	2.318E-06	2.318E-06	2.164E-10
Fluoranthene	2.828E-09	2.827E-09	2.260E-13
Hexane (isomers)	5.592E-09	5.592E-09	4.746E-14
Hydrocarbons (unspecified)	8.423E-02	8.423E-02	6.756E-11
Methanol	6.549E-02	6.549E-02	1.220E-09
Oil (unspecified)	5.193E-02	5.193E-02	2.235E-08
Phenol (hydroxy benzene)	5.378E-05	5.377E-05	4.020E-09
Polycyclic aromatic hydrocarbons (PAH, unspec.)	2.173E-05	2.173E-05	7.514E-11
Toluene (methyl benzene)	2.363E-05	2.363E-05	2.412E-09
Xylene (isomers; dimethyl benzene)	2.247E-05	2.247E-05	9.122E-10
Carbon, organically bound	6.858E-04	6.857E-04	1.922E-07
Naphthalene	1.133E-06	1.133E-06	1.243E-10
N-unspecified (N)	2.121E-08	2.121E-08	0.000E+00
Organic chlorine compounds (unspecified)	7.018E-08	7.018E-08	5.087E-16
Organic compounds (dissolved)	2.191E-06	2.191E-06	6.525E-16
Organic compounds (unspecified)	1.759E-05	1.759E-05	4.752E-26
Unspecified wastewater	1.604E-05	1.604E-05	0.000E+00
Other emissions to fresh water	0.000E+00	0.000E+00	0.000E+00
Detergent (unspecified)	0.000E+00	0.000E+00	0.000E+00
non used primary energy from water power	0.000E+00	0.000E+00	0.000E+00
Unused primary energy from geothermal	0.000E+00	0.000E+00	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Waste heat	0.000E+00	0.000E+00	0.000E+00
Waste water	0.000E+00	0.000E+00	0.000E+00
Particles to fresh water	1.095E+01	1.095E+01	4.922E-05
Metals (unspecified)	4.646E-06	4.646E-06	3.732E-14
Silicon dioxide (silica)	1.156E-07	1.156E-07	0.000E+00
Soil loss by erosion into water	2.755E-07	2.755E-07	1.648E-11
Solids (suspended)	1.095E+01	1.095E+01	4.922E-05
Suspended solids, unspecified	2.544E-04	2.544E-04	0.000E+00
Unspecified Oxides	6.361E-09	6.361E-09	0.000E+00
Radioactive emissions to fresh water	0.000E+00	0.000E+00	0.000E+00
Americium (Am241)	0.000E+00	0.000E+00	0.000E+00
Antimony (Sb124)	0.000E+00	0.000E+00	0.000E+00
Antimony (Sb125)	0.000E+00	0.000E+00	0.000E+00
Carbon (C14)	0.000E+00	0.000E+00	0.000E+00
Cesium (Cs134)	0.000E+00	0.000E+00	0.000E+00
Cesium (Cs137)	0.000E+00	0.000E+00	0.000E+00
Cobalt (Co58)	0.000E+00	0.000E+00	0.000E+00
Cobalt (Co60)	0.000E+00	0.000E+00	0.000E+00
Curium (Cm alpha)	0.000E+00	0.000E+00	0.000E+00
Hydrogen (H3)	0.000E+00	0.000E+00	0.000E+00
Iodine (I129)	0.000E+00	0.000E+00	0.000E+00
Iodine (I131)	0.000E+00	0.000E+00	0.000E+00
Manganese (Mn54)	0.000E+00	0.000E+00	0.000E+00
Plutonium (Pu alpha)	0.000E+00	0.000E+00	0.000E+00
Radionuclides	0.000E+00	0.000E+00	0.000E+00
Radium (Ra226)	0.000E+00	0.000E+00	0.000E+00
Ruthenium (Ru106)	0.000E+00	0.000E+00	0.000E+00
Silver (Ag110m)	0.000E+00	0.000E+00	0.000E+00
Strontium (Sr90)	0.000E+00	0.000E+00	0.000E+00
Thorium (Th234)	0.000E+00	0.000E+00	0.000E+00
Uranium	0.000E+00	0.000E+00	0.000E+00
Bromide	0.000E+00	0.000E+00	0.000E+00
Radionuclide	0.000E+00	0.000E+00	0.000E+00
Sulfite	0.000E+00	0.000E+00	0.000E+00
Unspecified Solids (Dissolved)	1.839E-06	1.839E-06	0.000E+00
Uranium (total)	2.872E-05	2.872E-05	0.000E+00

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Emissions to sea water	3.680E+00	3.680E+00	2.765E-04
Analytical measures to sea water	7.412E-03	7.410E-03	1.733E-06
Adsorbable organic halogen compounds (AOX)	3.196E-10	3.194E-10	1.195E-13
Biological oxygen demand (BOD)	3.525E-04	3.524E-04	1.318E-07
Chemical oxygen demand (COD)	6.707E-03	6.705E-03	1.470E-06
Total organic bounded carbon	3.525E-04	3.524E-04	1.318E-07
Heavy metals to sea water	2.747E-02	2.747E-02	4.046E-07
Arsenic (+V)	1.543E-05	1.543E-05	1.986E-09
Cadmium (+II)	3.368E-05	3.368E-05	1.011E-09
Chromium (unspecified)	2.465E-05	2.465E-05	3.053E-09
Cobalt	1.519E-05	1.519E-05	1.899E-10
Copper (+II)	4.164E-05	4.163E-05	1.013E-08
Iron	2.307E-04	2.307E-04	2.140E-08
Lead (+II)	1.058E-05	1.058E-05	2.997E-09
Manganese (+II)	2.386E-05	2.386E-05	2.119E-09
Mercury (+II)	2.164E-07	2.164E-07	4.305E-11
Molybdenum	2.592E-02	2.592E-02	1.483E-10
Nickel (+II)	1.936E-05	1.936E-05	3.037E-09
Silver	1.018E-06	1.018E-06	4.399E-10
Strontium	8.260E-04	8.256E-04	3.544E-07
Tin (+IV)	1.220E-06	1.219E-06	5.269E-10
Titanium	1.242E-07	1.242E-07	5.367E-11
Vanadium (+III)	1.057E-05	1.057E-05	1.974E-10
Zinc (+II)	3.020E-04	3.020E-04	2.866E-09
Inorganic emissions to sea water	3.363E+00	3.362E+00	1.693E-04
Aluminum (+III)	3.999E-06	3.997E-06	1.728E-09
Ammonia	1.188E-04	1.188E-04	5.135E-08
Barium	6.588E-04	6.588E-04	3.148E-08
Beryllium	8.488E-07	8.488E-07	2.661E-12
Boron	6.467E-05	6.464E-05	2.794E-08
Calcium (+II)	7.062E-03	7.059E-03	3.051E-06
Carbonate	4.143E-02	4.143E-02	1.980E-06
Chloride	3.279E+00	3.279E+00	1.596E-04
Magnesium	1.766E-03	1.765E-03	7.595E-07
Nitrate	5.372E-05	5.372E-05	2.567E-09
Sodium (+I)	7.039E-03	7.037E-03	2.632E-06

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Sulphate	1.752E-02	1.751E-02	8.375E-07
Sulphide	7.532E-03	7.532E-03	3.605E-07
Sulphur	3.460E-05	3.459E-05	1.495E-08
Organic emissions to sea water	1.969E-03	1.968E-03	1.042E-07
Hydrocarbons to sea water	1.946E-03	1.946E-03	1.037E-07
Acenaphthene	6.824E-07	6.824E-07	1.030E-11
Acenaphthylene	2.601E-07	2.601E-07	4.042E-12
Acetic acid	1.960E-06	1.960E-06	5.813E-12
Anthracene	1.837E-07	1.837E-07	6.455E-12
Aromatic hydrocarbons (unspecified)	3.525E-06	3.524E-06	1.318E-09
Benzene	1.513E-04	1.513E-04	1.251E-08
Benzo(a)anthracene	1.527E-07	1.527E-07	2.054E-12
Benzo(a)fluoranthene	1.692E-07	1.692E-07	2.014E-12
Chrysene	8.617E-07	8.616E-07	1.108E-11
Cresol (methyl phenol)	8.963E-07	8.959E-07	3.872E-10
Ethyl benzene	1.611E-05	1.611E-05	4.905E-10
Fluoranthene	1.780E-07	1.780E-07	2.384E-12
Hexane (isomers)	9.785E-08	9.781E-08	4.228E-11
Oil (unspecified)	1.317E-03	1.317E-03	7.039E-08
Phenol (hydroxy benzene)	2.821E-04	2.821E-04	7.734E-09
Toluene (methyl benzene)	8.918E-05	8.917E-05	8.993E-09
Xylene (isomers; dimethyl benzene)	8.155E-05	8.155E-05	1.798E-09
Naphthalene	2.248E-05	2.247E-05	4.826E-10
Particles to sea water	2.805E-01	2.804E-01	1.049E-04
Solids (suspended)	2.805E-01	2.804E-01	1.049E-04
Emissions to industrial soil	6.247E+03	6.247E+03	5.554E-07
Heavy metals to industrial soil	6.247E+03	6.247E+03	1.464E-07
Antimony	1.546E-15	1.546E-15	0.000E+00
Arsenic (+V)	3.463E+00	3.463E+00	1.593E-13
Cadmium (+II)	6.809E-08	6.809E-08	1.633E-12
Chromium (+III)	1.145E-09	1.145E-09	1.668E-14
Chromium (+VI)	5.601E-15	5.601E-15	0.000E+00
Chromium (unspecified)	1.075E-05	1.075E-05	3.799E-10
Cobalt	1.898E-07	1.898E-07	6.774E-12
Copper (+II)	1.092E-07	1.092E-07	3.631E-12
Iron	6.196E+03	6.196E+03	5.334E-10

Process or Category	Cradle to Gate	Cradle to Gate (RMA)	Gate to Gate (RMT)
Lead (+II)	2.476E+01	2.476E+01	1.197E-13
Manganese (+II)	2.379E-06	2.379E-06	7.969E-11
Mercury (+II)	6.404E-02	6.404E-02	7.285E-15
Nickel (+II)	3.591E-06	3.591E-06	1.063E-10
Selenium	4.113E-01	4.113E-01	0.000E+00
Strontium	3.542E-03	3.542E-03	1.452E-07
Thallium	2.994E+00	2.994E+00	0.000E+00
Vanadium (+III)	1.890E+01	1.890E+01	0.000E+00
Zinc (+II)	1.205E-06	1.205E-06	4.016E-11
Inorganic emissions to industrial soil	1.085E-02	1.085E-02	4.087E-07
Aluminum (+III)	1.215E-05	1.215E-05	4.073E-10
Ammonia	5.589E-03	5.588E-03	2.235E-07
Bromide	1.627E-06	1.627E-06	5.805E-11
Calcium (+II)	7.231E-05	7.231E-05	2.568E-10
Chloride	1.902E-03	1.902E-03	6.774E-08
Chlorine	1.307E-12	1.307E-12	0.000E+00
Fluoride	5.422E-05	5.422E-05	1.935E-09
Magnesium (+III)	1.001E-05	1.001E-05	3.623E-11
Phosphorus	5.760E-04	5.760E-04	2.362E-08
Potassium (+I)	1.380E-03	1.380E-03	4.534E-08
Sodium (+I)	6.323E-06	6.323E-06	2.234E-11
Sulphate	1.779E-04	1.779E-04	6.535E-09
Sulphide	1.067E-03	1.067E-03	3.921E-08
Organic emissions to industrial soil	6.775E-05	6.775E-05	3.379E-10
Oil (unspecified)	6.775E-05	6.775E-05	3.379E-10
Radioactive emissions to industrial soil	0.000E+00	0.000E+00	0.000E+00
Uranium	0.000E+00	0.000E+00	0.000E+00
Calcium Fluoride	7.490E-01	7.490E-01	0.000E+00
Radionuclide	0.000E+00	0.000E+00	0.000E+00
Waste Flow	5.051E+03	5.051E+03	0.000E+00
Slag and Ashes from Energy Production	2.032E-04	2.032E-04	0.000E+00
Slag and Ashes from Waste Incineration	5.785E-04	5.785E-04	0.000E+00
Slags Containing Manganese	4.054E-08	4.054E-08	0.000E+00
Unspecified Furnace Slag	3.586E-04	3.586E-04	0.000E+00
Uranium Tailings	5.051E+03	5.051E+03	0.000E+00

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None.

Section III: Document Control Information

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