

GHG Emissions Sources by Sector

Appendix 1 indicates examples of GHG emissions by emission category and industry sectors. These examples are not exhaustive and the reporting company should refer to Chapter 4 and interpret the relevant emissions for its own situation.

<i>Sector</i>	<i>Core Direct Emission Sources</i>	<i>Core Indirect Emission Sources</i>	<i>Optional Emission Sources</i>
Energy			
Energy Generation	<ul style="list-style-type: none"> ■ Stationary combustion (boilers and turbines used in the production of electricity, heat or steam, fuel pumps, fuel cells, flaring) ■ Mobile combustion (trucks, barges and trains for transportation of fuels) ■ Fugitive emissions (CH₄ leakage from transmission and storage facilities, HFC emissions from LPG storage facilities, SF₆ emissions from transmission and distribution) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (mining and extraction of fuels, energy for refining or processing fuels) ■ Process emissions (production of fuels, SF₆ emissions) ■ Mobile combustion (transportation of fuels/ waste, employee business travel, employee commuting) ■ Fugitive emissions (CH₄ and CO₂ from waste landfills, pipelines, SF₆ emissions)
Oil and Gas Industry	<ul style="list-style-type: none"> ■ Stationary combustion (process heaters, engines, turbines, flares, incinerators, oxidizers, production of electricity, heat and steam) ■ Process emissions (process vents, equipment vents, maintenance/ turnaround activities, non-routine activities) ■ Mobile combustion (transportation of raw materials/products/waste; company owned vehicles) ■ Fugitive emissions (leaks from pressurized equipment, wastewater treatment, surface impoundments) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (product use as fuel or combustion for the production of purchased materials) ■ Mobile combustion (transportation of raw materials/products/waste, employee business travel, employee commuting, product use as fuel) ■ Process emissions (product use as feedstock or emissions from the production of purchased materials) ■ Fugitive emissions (CH₄ and CO₂ from waste landfills or from the production of purchased materials)

<i>Sector</i>	<i>Core Direct Emission Sources</i>	<i>Core Indirect Emission Sources</i>	<i>Optional Emission Sources</i>
Energy (continued)			
Coal Mining	<ul style="list-style-type: none"> ■ Stationary combustion (methane flaring and use, use of explosives, mine fires) ■ Mobile combustion (mining equipment, transportation of coal) ■ Fugitive emissions (CH₄ emissions from coal mines and coal piles) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (product use as fuel) ■ Mobile combustion (transportation of coal/waste, employee business travel, employee commuting) ■ Process emissions (gasification)
Metals			
Aluminum	<ul style="list-style-type: none"> ■ Stationary combustion (bauxite to aluminum processing, coke baking, lime, soda ash and fuel use, on-site CHP) ■ Process emissions (carbon anode oxidation, electrolysis, PFC) ■ Mobile combustion (pre- and post-smelting transportation, ore haulers) ■ Fugitive emissions (fuel line CH₄, HFC and PFC, SF₆ cover gas) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (raw material processing and coke production by second party suppliers, manufacture of production line machinery) ■ Mobile combustion (transportation services, business travel, employee commuting) ■ Process emissions (during production of purchased materials) ■ Fugitive emissions (mining and landfill CH₄ and CO₂, outsourced process emissions)
Chemicals			
Nitric acid, Ammonia, Adipic acid, Urea, and Petro-chemicals	<ul style="list-style-type: none"> ■ Stationary combustion (boilers, flaring, reductive furnaces, flame reactors, steam reformers) ■ Process emissions (oxidation/reduction of substrates, impurity removal, N₂O byproducts, catalytic cracking, myriad other emissions individual to each process) ■ Mobile combustion (transportation of raw materials/products/waste) ■ Fugitive emissions (HFC use, storage tank leakage) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (production of purchased materials, waste combustion) ■ Process emissions (production of purchased materials) ■ Mobile combustion (transportation of raw materials/products/waste, employee business travel, employee commuting) ■ Fugitive emissions (CH₄ and CO₂ from waste landfills and pipelines)

<i>Sector</i>	<i>Core Direct Emission Sources</i>	<i>Core Indirect Emission Sources</i>	<i>Optional Emission Sources</i>
Minerals			
Cement and Lime	<ul style="list-style-type: none"> ■ Process emissions (calcination of limestone) ■ Stationary combustion (clinker kiln, drying of raw materials, production of electricity) ■ Mobile combustion (quarry operations, on-site transportation) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (production of purchased materials, waste combustion) ■ Process emissions (production of purchased clinker and lime) ■ Mobile combustion (transportation of raw materials/products/waste, employee business travel, employee commuting) ■ Fugitive emissions (mining and landfill CH₄ and CO₂, outsourced process emissions)
Waste			
Landfills, Waste combustion, Water service	<ul style="list-style-type: none"> ■ Stationary combustion (incinerators, boilers, flaring) ■ Process emissions (sewage treatment, nitrogen loading) ■ Fugitive emissions (CH₄ emissions from waste and animal product decomposition) ■ Mobile combustion (transportation of waste/products) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (recycled waste used as a fuel) ■ Process emissions (recycled waste used as a feedstock) ■ Mobile combustion (transportation of waste/products, employee business travel, employee commuting)
Pulp and Paper			
Pulp and paper	<ul style="list-style-type: none"> ■ Stationary combustion (production of steam and electricity, fossil fuel-derived emissions from calcination of calcium carbonate in lime kilns, drying products with infrared dryers fired with fossil fuels) ■ Mobile combustion (transportation of raw materials, products, and wastes, operation of harvesting equipment) ■ Fugitive emissions (CH₄ and CO₂ from waste) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (production of purchased materials, waste combustion) ■ Process emissions (production of purchased materials) ■ Mobile combustion (transportation of raw materials/products/waste, employee business travel, employee commuting) ■ Fugitive emissions (landfill CH₄ and CO₂ emissions)

Sector	Core Direct Emission Sources	Core Indirect Emission Sources	Optional Emission Sources
HFC, PFC, SF4, and HCFC 22 Production			
HCFC 22 production	<ul style="list-style-type: none"> ■ Stationary combustion (production of electricity, heat or steam) ■ Process emissions (HFC venting) ■ Mobile combustion (transportation of raw materials/products/waste) ■ Fugitive emissions (HFC use) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (production of purchased materials) ■ Process emissions (production of purchased materials) ■ Mobile combustion (transportation of raw materials/products/waste, employee business travel, employee commuting) ■ Fugitive emissions (fugitive leaks in product use, CH₄ and CO₂ from waste landfills)
Semiconductor Production			
Semi-conductor production	<ul style="list-style-type: none"> ■ Process emissions (C₂F₆, CH₄, CHF₃, SF₆, NF₃, C₃F₈, C₄F₈, N₂O used in wafer fabrication, CF₄ created from C₂F₆ and C₃F₈ processing) ■ Stationary combustion (oxidation of volatile organic waste, production of electricity, heat or steam) ■ Fugitive emissions (process gas storage leaks, container remainders/heel leakage) ■ Mobile combustion (transportation of raw materials/products/waste) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (production of imported materials, waste combustion, upstream T&D losses of purchased electricity) ■ Process emissions (production of purchased materials, outsourced disposal of returned process gases and container remainder/heel) ■ Mobile combustion (transportation of raw materials/products/waste, employee business travel, employee commuting) ■ Fugitive emissions (landfill CH₄ and CO₂ emissions, downstream process gas container remainder/heel leakage)
Other Sectors*			
Service sector/Office-based organizations	<ul style="list-style-type: none"> ■ Stationary combustion (production of electricity, heat or steam) ■ Mobile combustion (transportation of raw materials/waste) ■ Fugitive emissions (mainly HFC emissions during use of refrigeration and air-conditioning equipment) 	<ul style="list-style-type: none"> ■ Stationary combustion (consumption of purchased electricity, heat or steam) 	<ul style="list-style-type: none"> ■ Stationary combustion (production of purchased materials) ■ Process emissions (production of purchased materials) ■ Mobile combustion (transportation of raw materials/ products/ waste, employee business travel, employee commuting)

* Businesses in “other sectors” can estimate GHG emissions using cross-sectoral estimation tools—stationary combustion, mobile (transportation) combustion, HFC use, measurement and estimation uncertainty, and waste.