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## CDP Technical Note: Fuel definitions

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Climate Change Questionnaire



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## Version

Version	Revision date	Revision summary
1.0	2013	First published version.
1.1	2017	Updated definition for “Distillate fuel oil”.
2.0	2018	Formatting updated.
2.1	April 3, 2020	Minor update to definitions for “Refuse-derived fuel (RDF) and “Municipal wastes (Biomass fraction)”
2.2	July 23, 2020	Correction of errors in the allocation of fuels into the fossil fuel and biomass categories
3.0	January 21, 2022	Minor formatting updates for the release of the 2022 CDP climate change questionnaire
4.0	January 16, 2023	Updates to question numbers for the release of the 2023 CDP climate change questionnaire, and an additional section on reporting fuel use in the CDP questionnaire.

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## Introduction

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All fuels found in the [Greenhouse Gas Protocol Stationary Combustion Tool, Version 4.0](#) have been defined below. CDP has also included other fuels used primarily in mobile combustion, to present companies with a more complete list of possible fuels used in company operations.

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## Solid fossil fuels

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### Anthracite

Anthracite is a high rank coal used for industrial and residential applications. It has generally less than 10% volatile matter and a high carbon content (about 90% fixed carbon). Its gross calorific value is greater than 23,865 kJ/kg (5,700 kcal/kg) on an ash-free but moist basis.

### Asphalt

A dark brown-to-black cement-like material obtained by petroleum processing and containing bitumens as the predominant component; used primarily for road construction. It includes crude asphalt as well as the following finished products: cements, fluxes, the asphalt content of emulsions (exclusive of water), and petroleum distillates blended with asphalt to make cutback asphalts.

### Bitumen

Solid, semi-solid or viscous hydrocarbon with a colloidal structure, being brown to black in color, obtained as a residue in the distillation of crude oil, vacuum distillation of oil residues from atmospheric distillation. Bitumen is often referred to as asphalt and is primarily used for surfacing of roads and for roofing material. This category includes fluidized and cut back bitumen. See tar sand.

### Bituminous coal

A dense coal, usually black, sometimes dark brown, often with well-defined bands of bright and dull material, used primarily as fuel in steam-electric power generation, with substantial quantities also used for heat and power applications in manufacturing and to make coke.

### Brown coal

Brown coal (lignite) is a non-agglomerating coal with a gross calorific value of less than 17,435 kJ/kg (4,165 kcal/kg), and greater than 31 percent volatile matter on a dry mineral matter free basis.

### Brown coal briquettes (BKB)

Brown coal briquettes (BKB) are composition fuels manufactured from lignite/brown coal, produced by briquetting under high pressure. These figures include dried lignite fines and dust.

### Coke breeze

See coke oven coke.

### Coke oven coke

Coke oven coke is the solid product obtained from the carbonization of coal, principally coking coal, at high temperature. It is low in moisture content and volatile matter. Also included are semi-coke, a solid product obtained from the carbonization of coal at a low temperature, lignite coke, semi-coke made from lignite/brown coal, coke breeze and foundry coke. Coke oven coke is also known as metallurgical coke.

## **Coking coal**

Coking coal refers to bituminous coal with a quality that allows the production of a coke suitable to support a blast furnace charge. Its gross calorific value is greater than 23,865 kJ/kg (5,700 kcal/kg) on an ash-free but moist basis.

## **Gas coke**

See coke oven coke.

## **Lignite**

Lignite (brown coal) as a non-aggregating coal with a gross calorific value of less than 17,435 kJ/kg (4,165 kcal/kg), and greater than 31% volatile matter on a dry mineral matter free basis.

## **Lignite coke**

Often referred to as brown coal, or Rosebud coal, is a soft brown fuel with characteristics that put it somewhere between coal and peat. It is considered the lowest rank of coal. Lignite is brownish-black in color and has a carbon content of around 25-35%, a high inherent moisture content and an ash content ranging from 6% to 19% compared with 6% to 12% for bituminous coal.

## **Metallurgical coke**

See coke oven coke.

## **Municipal waste (Non-biomass fraction)**

Non-biomass fraction of municipal waste includes waste produced by households, industry, hospitals and the tertiary sector which are incinerated at specific installation and are used for energy purposes. Only the fraction of the fuel that is non-biodegradable should be included here.

## **Patent fuel**

Patent fuel is a composition fuel manufactured from hard coal fines with the addition of a binding agent. The amount of patent fuel produced may, therefore, be slightly higher than the actual amount of coal consumed in the transformation process.

## **Peat**

Combustible soft, porous or compressed, fossil sedimentary deposit of plant origin with high water content (up to 90% in the raw state), easily cut, of light to dark brown color. Peat consists of partially decomposed plant debris. It is considered an early stage in the development of coal. Peat is distinguished from lignite by the presence of free cellulose and a high moisture content (exceeding 70%).

## **Petroleum coke**

A black solid residue, obtained mainly by cracking and carbonizing of residue feedstocks, tar and pitched in processes such as delayed coking or fluid coking. It consists mainly of carbon (90 to 95%) and has a low ash content. It is used as a feedstock in coke ovens for the steel industry, for heating purposes, for electrode manufacture and for production of chemicals. The two most important qualities are "green coke" and "calcinated coke". This category also includes "catalyst coke" deposited on the catalyst during refining processes: this coke is not recoverable and is usually burned as refinery fuel.

## **Refuse-derived fuel (RDF)**

A fuel produced by shredding municipal solid waste (MSW). Non-combustible materials such as glass and metals are generally removed prior to making RDF. The residual material is sold as-is or compressed into pellets, bricks or logs. Only the fraction of the fuel that is biodegradable can be included as renewable energy, when calculating renewable energy consumption totals. RDF processing facilities are typically located near a source of MSW, while the RDF combustion facility can be located elsewhere.

### **Semi-coke**

See coke oven coke.

### **Subbituminous coal**

Non-agglomerating coals with a gross calorific value between 17,435 kJ/kg (4,165 kcal/kg) and 23,865 kJ/kg (5,700 kcal/kg) containing more than 31% volatile matter on a dry mineral matter free basis.

### **Waste tire derived fuels**

Processed tires typically used in very high heat operations like cement, power generation and steel manufacturing. The tire burns completely at 650°C, producing principally carbon dioxide and water. Tire derived fuels have a net calorific value of between 26 and 34GJ per tone, which is similar to that of common fuel sources such as coal.

### **Waxes**

A solid or semi-solid material derived from petroleum distillates or residues by such treatments as chilling, precipitating with a solvent or de-oiling. It is a light-colored, more-or-less translucent crystalline mass, slightly greasy to the touch, consisting of a mixture of solid hydrocarbons in which the paraffin series predominates. Includes all marketable wax, whether crude scale or fully refined.

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# Liquid fossil fuels

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## Aviation gasoline

Aviation gasoline is motor spirit prepared especially for aviation piston engines, with an octane number suited to the engine, a freezing point of  $-60^{\circ}\text{C}$  and a distillation range usually within the limits of  $30^{\circ}\text{C}$  and  $180^{\circ}\text{C}$ .

## Crude oil

Crude oil is a mineral oil consisting of a mixture of hydrocarbons of natural origin, being yellow to black in color, of variable density and viscosity. It also includes lease condensate (separator liquids), which are recovered from gaseous hydrocarbons in lease separating facilities.

## Distillate fuel oil

A general classification for one of the petroleum fractions produced in conventional distillation operations. It includes fuels and fuel oils.

- ▼ No. 1 Distillate: A light petroleum distillate that can be used as either a diesel fuel or a fuel oil.
- ▼ No. 2 Distillate: A petroleum distillate that can be used as either a diesel fuel or a fuel oil.
- ▼ No. 4: A distillate fuel oil made by blending distillate fuel oil and residual fuel oil stocks.

## Diesel/Gas oil

Gas/diesel oil includes heavy gas oils. Gas oils are obtained from the lowest fraction from atmospheric distillation of crude oil, while heavy gas oils are obtained by vacuum redistillation of the residual from atmospheric distillation. Diesel/Gas oil distils between  $180^{\circ}\text{C}$  and  $380^{\circ}\text{C}$ . Several grades are available depending on uses: diesel oil for diesel compression ignition (cars, trucks, marine, etc.), light heating oil for industrial and commercial uses and other gas oil including heavy gas oils which distil between  $380^{\circ}\text{C}$  and  $540^{\circ}\text{C}$  and are used as petrochemical feedstocks.

## Jet gasoline

This includes all light hydrocarbon oils for use in aviation turbine power units. They distil between  $100^{\circ}\text{C}$  and  $250^{\circ}\text{C}$ . It is obtained by blending kerosenes and gasoline or naphthas in such a way that the aromatic content does not exceed 25% in volume, and the vapor pressure is between 13.7 kPa and 20.6 kPa. Additives can be included to improve stability and combustibility.

## Jet kerosene

This is medium distillate used for aviation turbine power units. It has the same distillation characteristics and flash point as kerosene (between  $150^{\circ}\text{C}$  and  $300^{\circ}\text{C}$  but not generally above  $250^{\circ}\text{C}$ ). In addition, it has particular specifications (such as freezing point) which are established by the International Air Transport Association (IATA).

## Kerosene

A petroleum distillate that has a maximum distillation temperature of 401 degrees Fahrenheit (205 degrees Celsius) at the 10% recovery point, a final boiling point of 572 degrees Fahrenheit (300 degrees Celsius) and a minimum flash point of 100 degrees Fahrenheit. Comprises refined petroleum distillate intermediate in volatility between gasoline and gas/diesel oil. Used in space heaters, cookstoves, and water-heaters and suitable for use as an illuminant when burned in wick lamps.

## Lubricants

Lubricants are hydrocarbons produced from distillate or residue; they are mainly used to reduce friction between bearing surfaces. This category includes all finished grades of lubricating oil, from



spindle oil to cylinder oil, and those used in greases, including motor oils and all grades of lubricating oil base stocks.

### **Motor gasoline**

This is light hydrocarbon oil for use in internal combustion engines such as motor vehicles, excluding aircraft. Motor gasoline is distilled between 35°C and 215°C and is used as a fuel for land-based spark ignition engines. Motor gasoline may include additives, oxygenated and octane enhancers, including lead compounds such as TEL (Tetraethyl lead) and TML (Tetramethyl lead).

### **Naphtha**

Naphtha is a feedstock destined either for the petrochemical industry (e.g. ethylene manufacture or aromatics production) or for gasoline production by reforming or isomerization within the refinery. Naphtha comprises material in the 30°C and 210°C distillation range or part of this range.

### **Natural gas liquids**

Natural gas liquids (NGLs) are the liquid or liquefied hydrocarbons produced in the manufacture, purification and stabilization of natural gas. These are those portions of natural gas which are recovered as liquids in separators, field facilities or gas processing plants. NGLs include but are not limited to ethane, propane, butane, pentane, natural gasoline and condensate. They may also include small quantities of non-hydrocarbons.

### **Oil shale and tar sands**

Oil shale is an inorganic, non-porous rock containing various amounts of solid organic material that yields hydrocarbons, along with a variety of solid products, when subjected to pyrolysis (a treatment that consists of heating the rock at high temperature). Tar sands refers to sand (or porous carbonate rocks) that are naturally mixed with a viscous form of heavy crude oil sometimes referred to as bitumen. Due to its high viscosity this oil cannot be recovered through conventional recovery methods.

### **Orimulsion**

A tar-like substance that occurs naturally in Venezuela. It can be burned directly or refined into light petroleum products.

### **Pitch**

Any various thick, dark, sticky substances obtained from the distillation residue of coal tar, wood tar or petroleum and used for waterproofing, roofing, caulking, and paving.

### **Refinery feedstocks**

A refinery feedstock is a product or a combination of products derived from crude oil and destined for further processing other than blending in the refining industry. It is transformed into one or more components and/or finished products. This definition covers those finished products imported for refinery intake and those returned from the petrochemical industry to the refining industry.

### **Residual fuel oil**

This heading defines oils that make up the distillation residue. It comprises all residual fuel oils, including those obtained by blending. Its kinematic viscosity is above 0.1cm<sup>2</sup> at 80°C. The flash point is always above 50°C and the density is always more than 0.90kg/l.

### **Shale oil**

A mineral oil extracted from oil shale.

### **Tar**

A dark, oily, viscous material, consisting mainly of hydrocarbons, produced by the destructive distillation of organic substances such as wood, coal or peat.

### **Waste oils**

Petroleum-based materials that are worthless for any purpose other than fuel use.

### **Waste plastics**

Common plastics broken down into a synthetic fuel. Common processes involved liquefaction, pyrolysis and the catalytic breakdown of plastics.

### **White spirit/SBP**

White spirit and SBP are refined distillate intermediates with a distillation in the naphtha/kerosene range. They are sub-divided as: i) Industrial Spirit (SBP): Light oils distilling between 30°C and 200°C, with a temperature difference between 5% volume and 90% volume distillation points, including losses, of not more than 60°C. In other words, SBP is a light oil of narrower cut than motor spirit. There are 7 or 8 grades of industrial spirit, depending on the position of the cut in the distillation range defined above. ii) White Spirit: Industrial spirit with a flash point above 30°. The distillation range of white spirit is 135°C to 200°C.

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# Gaseous fossil fuels

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## Blast furnace gas

Blast furnace gas is produced during the combustion of coke in blast furnaces in the iron and steel industry. It is recovered and used as a fuel partly within the plant and partly in the other steel industry processes or in power stations equipped to burn it.

## Butane

A normally gaseous straight-chain or branch-chain hydrocarbon extracted from natural gas or refinery gas streams.

## Coke oven gas

Coke oven gas is obtained as a by-product of the manufacture of coke oven coke for the production of iron and steel.

## Ethane

Ethane is a naturally gaseous straight-chain hydrocarbon (C<sub>2</sub>H<sub>6</sub>). It is a colorless paraffinic gas which is extracted from natural gas and refinery gas streams.

## Gas works gas

Gas works gas covers all types of gases produced in public utility or private plants, whose main purpose is manufacture, transport and distribution of gas. It includes gas produced by carbonization (including gas produced by coke ovens and transferred to gas works gas), by total gasification with or without enrichment with oil products (LPG, residual fuel oil, etc), and by reforming and simple mixing of gases and/or air. It excludes blended natural gas, which is usually distributed through the natural gas grid.

## Liquefied petroleum gases (LPG)

These are the light hydrocarbons fraction of the paraffin series, derived from refinery processes, crude oil stabilization plants and natural gas processing plants comprising propane (C<sub>3</sub>H<sub>8</sub>) and butane (C<sub>4</sub>H<sub>10</sub>) or a combination of the two. They are normally liquefied under pressure for transportation and storage.

## Liquefied natural gas (LNG)

Natural gas cooled to approximately -160°C (-256°F) under atmospheric pressure condenses to its liquid form called LNG. LNG is odorless, colorless, non-corrosive and non-toxic.

## Methane

A hydrocarbon that is a greenhouse gas with a global warming potential recently estimated at 21. Methane is produced through anaerobic (without oxygen) decomposition of waste landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production and incomplete fossil fuel combustion.

## Natural gas

Natural gas should include: (1) Blended natural gas (sometimes also referred to as Town Gas or City Gas), a high calorific value obtained as a blend of natural gas with other gases; (2) City Gas, a high calorific value gas obtained as a blend of natural gas with other gases derived from other primary products, and usually distributed through the natural gas grid (e.g. coal seam methane); (3) Substitute natural gas, a high calorific value gas, manufactured by chemical conversion of a hydrocarbon fossil fuel, where the main raw materials are: natural gas, coal, oil and oil shale.

### **Oxygen steel furnace gas**

Oxygen steel furnace gas is obtained as a by-product of the production of steel in an oxygen furnace and is recovered on leaving the furnace. The gas is also known as a converter gas, LD gas or BOS gas.

### **Propane**

A normally gaseous straight-chain hydrocarbon. It is a colorless paraffinic gas that boils at a temperature of -43.67°F (-42.04°C). It is extracted from natural gas or refinery gas streams.

### **Refinery gas**

Refinery gas is defined as non-condensable gas obtained during distillation of crude oil or treatment of oil products (e.g. cracking) in refineries. It consists mainly of hydrogen, methane, ethane and olefins. It also includes gases which are returned from the petrochemical industry.

### **Town gas or city gas**

Natural gas should include blended natural gas (sometimes also referred to as Town Gas or City Gas), a high calorific value gas obtained as a blend of natural gas with other gases derived from other primary products, and usually distributed through the natural gas grid (e.g. coal seam methane). Blended natural gas should include substitute natural gas, a high calorific value gas, manufactured by chemical conversion of a fossil fuel, where the main raw materials are: natural gas, coal, oil and oil shale.

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# Biomass

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## Biodiesels

Biodiesels should only contain that part of the fuel that relates to the quantities of biofuel and not to the total volume of liquids into which the biofuels are blended. This category includes biodiesel (a methyl-ester produced from vegetable or animal oil, of diesel quality), biodimethylether (dimethylether produced from biomass), fischer tropsh (fischer tropsh produced from biomass), cold pressed bio oil (oil produced from oil seed through mechanical processing only) and all other liquid biofuels which are added to, blended with or used straight as transport diesel.

## Biogas

A gas composed principally of methane (50-60%) and carbon dioxide produced by anaerobic digestion of biomass, comprising.

- ▼ Landfill gas, formed by the digestion of landfill wastes;
- ▼ Sewage sludge gas, produced from the anaerobic fermentation of sewage sludge;
- ▼ Other biogas, such as biogas produced from the anaerobic fermentation of animal slurries and of wastes in abattoirs, breweries and other agro-food industries

## Biogasoline

Biogasoline should only contain that part of the fuel that relates to the quantities of biofuel and not to the total volume of liquids into which biofuels are blended. This category includes bioethanol (ethanol produced from biomass and/or the biodegradable fraction of waste), biomethanol (methanol produced from biomass and/or the biodegradable fraction of waste), bioETBE (ethyl-tertio-butyl-ether produced on the basis of bioethanol: the percentage by volume of bioETBE that is calculate as biofuel is 47%) and bioMTBE (methyl-tertio-butyl-ether produced on the basis of biomethanol: the percentage by volume or bioMTBE that is calculated as biofuel is 36%).

## Charcoal

Charcoal combusted as energy covers the solid residue of the destructive distillation and pyrolysis of wood and other vegetal material.

## Landfill gas

Landfill gas is derived from the anaerobic fermentation of biomass and solid wastes in landfills and may be combusted to produce heat and/or power.

## Municipal wastes (Biomass fraction)

Biomass fraction of municipal waste includes waste produced by households, industry, hospitals and the tertiary sector which are incinerated at specific installations and used for energy purposes. Only the fraction of the fuel that is biodegradable should be included as renewable energy, when calculating consumption totals.

## Sludge gas

Sludge gas is derived from the anaerobic fermentation of biomass and solid wastes from sewage and animal slurries and combusted to produce heat and/or power.

## Sulfite lyes (Black liquor)

Sulfite lyes is an alkaline spent liquor from the digesters in the production of sulphate or soda pulp during the manufacture of paper where the energy content derives from the lignin removed from the wood pulp. This fuel in its concentrated form is usually 65-70% solid.

## Turpentine

A thin volatile essential oil, obtained by steam distillation or other means from the wood or exudates of certain pine trees and used as a paint thinner, solvent and medicinally as a liniment.

## Vegetable oils

Lipid materials derived from plants. Although many different parts of plants may yield oil, in commercial practice oil is extracted primarily from seeds. Oils are composed of triglycerides and used in lubricants, paints, cosmetics, pharmaceuticals and other industrial processes.

## Wood or Wood waste

Wood and wood waste combusted directly for energy. This category also includes wood for charcoal production but not the actual production of charcoal (this would be double counting since charcoal is a secondary product).

# Reporting fuel use in the CDP questionnaire

In the CDP climate change questionnaire companies are requested to disclose their consumption of fuels by type (C8.2c, C-CE8.2c), feedstock source (C-CH8.3b), or by power generation technology or source (C-EU8.2d, C-EU9.5a). In each of these questions, substances derived from coal should be reported in the row "Coal", substances derived from crude oil should be reported in the row "Oil", and substances derived from natural gas should be reported in the row "Gas". The table below contains a list of substances derived from coal, crude oil, and natural gas, as well as biomass and non-biomass fuels. Companies may contact their fuel suppliers for further information about the specific fuels they are using and whether they are derived from coal, crude oil, or natural gas.

Fuel Type	
Crude oil & derived substances	Crude oil
	Orimulsion
	Natural Gas Liquids
	Motor Gasoline
	Aviation Gasoline
	Jet Gasoline
	Jet Kerosene
	Other Kerosene
	Shale oil
	Gas/Diesel oil
	Residual Fuel oil
	Liquefied Petroleum Gases
	Ethane
	Naphtha
	Bitumen
	Lubricants
	Petroleum coke

Fuel Type	
	Refinery feedstocks
	Refinery Gas
	Paraffin waxes
	White Spirit & SBP
	Other petroleum products
<b>Coal &amp; derived substances</b>	Anthracite
	Coking coal
	Other bituminous coal
	Sub-bituminous coal
	Lignite
	Oil shale and tar sands
	Brown coal briquettes
	Patent fuel
	Coke oven coke & lignite coke
	Gas coke
	Coal tar
	Gas works gas
	Coke oven gas
	Blast furnace gas
	Oxygen steel furnace gas
<b>Natural gas</b>	Natural Gas
<b>Non-biomass waste fuels</b>	Municipal wastes (non-biomass fraction)
	Industrial wastes
	Waste oils
<b>Biomass fuels</b>	Wood/Wood waste
	Sulphite lyes (Black liquor)
	Other primary solid biomass fuels
	Charcoal
	Biogasoline
	Biodiesels
	Other liquid biofuels
	Landfill gas
	Sludge gas
	Other biogas
	Municipal wastes (biomass fraction)