

Sustainable1 Environmental Data – Fossil Fuel Reserves & Power Generation

Methodology

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Introduction and Context

Sustainable1 Environmental Data contains quantitative information on the environmental performance of over 18,000 of the world's largest listed companies, representing 95% of global market capitalization. The dataset is associated with approximately 500 distinct industry sectors across over 100 environmental key performance indicators (KPIs). The data covers hundreds of environmental issues encompassing greenhouse gas emissions, pollution to air, land & water, waste generation, and other natural resource use. In the course of 2012, Sustainable1 made available a new set of indicators to measure portfolios' exposure to fossil fuel, contribution to energy transition and power generation

Definitions

Fossil fuel reserves

Defined as the reserves of energy that have developed on Earth over millions of years. It is formed from dead plants and animals (natural capital) and is found underground. Fossil fuels can be found in the form of coal, oil, and natural gas. Fossil fuel reserves refer to an amount of fossil fuel (natural resources) known to exist at a specific location, and which are economically viable to extract from the ground.

The distinction between proven and probable reserves refers to the likelihood of extraction. Companies' reporting usually distinguishes between proven (1P) and proven and probable (2P) reserves. Proven reserves are defined as the reserves having a 90% or more probability of being extracted, while probable reserves are defined as the reserves having a 50% probability of being extracted.

The embedded emissions held by a company can be defined as the emissions that would be released if all its proven and probable coal, oil and gas reserves were burnt. Now, embedded emissions are expressed in tonnes of CO₂ (industry's best practice).

Power Generation

Power generation is the process of creating electricity from a variety of energy sources. This includes renewable options like solar, wind, and hydro, as well as non-renewable sources such as fossil fuels and nuclear energy. Essentially, power generation refers to the amount of electricity produced at a specific location.

When we talk about different types of power generation, we often categorize them into groups like fossil fuels, hydrogen, and renewable generation. Renewable generation is particularly noteworthy, as it utilizes natural processes to generate electricity while minimizing environmental impact.

It's important to consider the emissions associated with power generation, which are greenhouse gases released during the electricity generation process. These emissions are typically measured in tonnes of CO₂ equivalent, providing insight into how various energy sources contribute to climate change.

Methodology Overview

Environmental Research Process

Sustainable1's process to analyze companies comprises several steps, described in Sustainable1 generic methodology [document](#). In the first step, Sustainable1 will break down a company's total revenue into the relevant business activities according to Sustainable1's classification. This business activity mapping will then determine whether fossil fuel and/or power generation data is material for a company, and we will look for disclosure if the data is deemed relevant.

Fossil Fuel Reserves

Sustainable1 analyzes and collects fossil fuel reserves and CAPEX data for companies engaged in the following fossil fuel extraction business activities:

- crude petroleum and natural gas extraction
- Tar sands extraction
- Natural gas liquid extraction
- Bituminous coal and lignite surface mining
- Bituminous coal underground mining

Embedded Emissions Calculation

Sustainable1's research framework on fossil fuel reserves and embedded emissions is based on international standards such as the ones used in the IPCC Revised 1996 Guidelines for National Greenhouse Gas Inventories available here:

http://www.ipcc-nggip.iges.or.jp/meeting/pdfiles/2006GLs_scoping_meeting_report_final.pdf,

as well as the Greenhouse Gas Protocol.

The following formula is used by the IPCC to calculate embedded emissions:

$$E = R * V * C * F$$

Where,

E: Embedded emissions (in tonnes of CO₂)

R: Reserves disclosed by the company (in million tonnes)

V: Net calorific value C: Carbon content

F: Conversion factor

This formula, which is also used by the Potsdam Institute for Climate Impact Research, applies to the calculation of embedded emissions at a site (mine) level. The carbon content is converted into CO₂ using conversion factors (precisely the carbon storage and oxidation factors). Because Sustainable1 looks at fossil fuel reserves at a higher level (business activity or company level), we need to use direct conversion factors

that already encompass average net calorific values and carbon contents. Therefore, we use a simplified version of the above-mentioned formula:

$$E = R * UF * CF$$

Where,

E: Embedded emissions (in tonnes of CO2)

R: Reserves disclosed

UF: Factors converting reserves units into standardized units

CF: Factors converting standardized reserves units into CO2 emissions

Following best practices in the industry (notably the methodology used by Carbon Tracker and the Potsdam Climate Institute), embedded emissions are expressed in metric tonnes of CO2 (and not in CO2 equivalent). If we were to include the other GHGs related to fossil fuels (notably CH4 and N2O) the level of greenhouse gas emissions would be slightly higher.

The business activity classification used by Sustainable1 to categorize fossil fuel reserves (bituminous surface and underground and lignite coal, conventional oil, unconventional oil, natural gas and shale gas) is aligned with the Potsdam Institute methodology which splits fossil fuel into six classes: bituminous coal, sub-bituminous coal, lignite coal, conventional oil, unconventional oil and natural/shale gas.

Power Generation

Sustainable1 analyzes and collects power generation data for companies engaged in the following power generation business activities:

- Hydroelectric Power Generation
- Coal Power Generation
- Natural Gas Power Generation
- Petroleum Power Generation
- Nuclear Electric Power Generation
- Solar Power Generation
- Wind Power Generation
- Geothermal Power Generation
- Wave & Tidal Power Generation
- Biomass Power Generation
- Landfill Gas Power Generation
- Other Electric Power Generation

For each business activity, Sustainable1 collects the generation data in GWh based on the relevant fuel source. We also estimate the likely greenhouse gas emissions in carbon dioxide equivalent using the following approach:

1. Estimate energy consumption based on power generation and plant efficiency for a fuel source

2. Apply standard emission factors per fuel source to calculate emissions

Secondly, in the absence of GWh we estimate power generation using capacity factors (to calculate annual power plant output, for a company, for various power generation technologies) % i.e. installed capacity x load factor.

Monitoring and Review

All new methodologies and any material changes to existing methodologies are reviewed and approved by an independent methodology governance committee.

Maintenance and Updates

Changes made to this methodology document include the following:

DocumentVersion	Date	Changes
1.0	03/09/2025	Initial version

Related Documentation

If you are linking to other S&P Global Market Intelligence data sets, supporting documents are available on the S&P Global Marketplace [website](#).

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