Global Energy Outlook 2019

Additional Documentation

Prepared by Daniel Raimi (**raimi@rff.org**) and Gloria Aldana (**aldana@rff.org**), 2019.
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Contents

Variables

Variable name	*Short name*	*Unit*	*Description*
Primary Energy Consumption	pec	Quadrillion British Thermal Units (QBtu)	Displays the estimated energy content of fuels consumed prior to any conversion process. See methodology document for details on assumptions regarding non-fossil fuels.
Final Energy Consumption	fec	Quadrillion British Thermal Units (QBtu)	Displays the estimated energy content of fuels consumed in specific sectors following any conversion process.
Primary Energy Production	pep	Quadrillion British Thermal Units (QBtu)	Displays the estimated energy content of fuels produced prior to any conversion process
Electricity Generation	elg	Terawatt hours (TWh)	Displays the electricity generation on a gross basis (including own consumption).
Electricity Capacity	elc	Gigawatts (GW)	Displays the power generation capacity.
Net Carbon Dioxide Emissions[1]	co2	Million metric tons	Displays total energy-related carbon dioxide emissions minus any reported carbon dioxide removal (e.g., negative emissions from biomass with carbon capture and sequestration).
Carbon Capture and Sequestration	ccs	Million metric tons	Displays captured and stored (or utilized) carbon dioxide emissions.
Gross Domestic Product, PPP[2]	ppp	2017 USD, trillions	Displays gross domestic product in purchasing power parity (PPP) terms.
Gross Domestic Product, MER[2]	mer	2017 USD, trillions	Displays gross domestic product in market exchange rate (MER) terms.
Population	pop	Millions	Displays total population.

Variables Notes

1: Grubler (2008) emissions data originally includes CO_2 emissions from biomass burning, while other sources do not. We subtract out these emissions and present only those emissions from fossil fuel combustion.

2: All GDP data are converted to 2017 USD using an annual implicit price deflator from the U.S. Federal Reserve Economic Data (FRED) system, available online at **https://fred.stlouisfed.org**.

Sectors

Organizations represent end use sectors in different ways. Here, we show how each outlook's specific groupings are mapped onto 6 sectors presented in the GEO visualization tool: All, commercial and residential, electricity, industrial, other, and transportation.

Outlook	*Original sector*	*Global Energy Outlook sector*
BP	All	All
BP	Buildings	Commercial and Residential
BP	Industry	Industrial
BP	Inputs to power	Electricity
BP	Non-combusted	Other
BP	Transport	Transportation
EIA	All	All
EIA	Commercial	Commercial and Residential
EIA	Industrial	Industrial
EIA	Residential	Commercial and Residential
EIA	Transportation	Transportation
Equinor	All	All
Equinor	Transportation	Transportation
ExxonMobil	All	All
ExxonMobil	Industrial	Industrial
ExxonMobil	Power generation	Electricity
ExxonMobil	Residential and Commercial	Commercial and Residential
ExxonMobil	Transportation	Transportation
IEA	All	All
IEA	Buildings	Commercial and Residential
IEA	Industry	Industrial
IEA	Other	Other
IEA	Transport	Transportation
IEEJ	All	All
IEEJ	Buildings, etc.	Commercial and Residential
IEEJ	Electricity	Electricity
IEEJ	Industry	Industrial

IEEJ	Non-energy use	Other
IEEJ	Transport	Transportation
OPEC	All	All
OPEC	Electricity Generation	Electricity
OPEC	Other	Other
OPEC	Transportation	Transportation
Shell	All	All
Shell	Electricity Generation	Electricity
Shell	Gaseous Fuels Production	Industrial
Shell	Heat Generation	Industrial
Shell	Hydrogen Production	Industrial
Shell	Industrial (Agriculture and Other)	Industrial
Shell	Industrial (Heavy)	Industrial
Shell	Liquid Fuels Production	Industrial
Shell	Non-Energy Use	Other
Shell	Residential (Heating and Cooking)	Commercial and Residential
Shell	Residential (Lighting and Appliances)	Commercial and Residential
Shell	Services	Commercial and Residential
Shell	Solid Fuels Production	Industrial
Shell	Transportation (Freight Air)	Transportation
Shell	Transportation (Freight Rail)	Transportation
Shell	Transportation (Freight Road)	Transportation
Shell	Transportation (Freight Ship)	Transportation
Shell	Transportation (Passenger Air)	Transportation
Shell	Transportation (Passenger Rail)	Transportation
Shell	Transportation (Passenger Road)	Transportation
Shell	Transportation (Passenger Ship)	Transportation

Sectors Notes

Non-energy use of fossil fuels, such as feedstocks for petrochemicals production, is included in the “Other” category, following the IEA’s protocol. The US EIA and ExxonMobil include non-energy use of fossil fuels in their “Industrial” category.

Fuels

Some outlooks provide detailed definitions of fuel classifications, while others do not. Below, we describe the general definitions of fuels included in the Global Energy Outlook data tool. These definitions are largely taken from the International Energy Agency's documentation (e.g., International Energy Agency 2018), because they provide the most detailed definitions, and many other organizations follow their classification systems. The IEA's definitions are in turn is informed by reports such as the United Nation's International Recommendations for Energy Statistics (2018).

Fuel	*Description*
Battery	Included only for BNEF, and defined as electricity discharged from stationary batteries with a minimum size of 14kWh for residential systems and several MWh for utility-scale batteries.
Biofuels	Includes liquid fuels derived from plant matter such as corn- or sugar-based ethanol and biodiesel.
Biomass and waste	Includes marketed biomass such as wood and waste used to generate electricity, and non-marketed biomass such as locally-collected and burned wood or dung used for cooking and heating.
Coal	Includes all coal, plus peat for the IEA.
Electricity	Includes final energy delivered as electricity.
Geothermal	Includes production of heat and electricity from geothermal sources.
Heat	Includes final energy delivered as heat.
Hydro	Includes production of electricity from hydroelectric sources.
Hydrogen	Includes final energy delivered in the form of hydrogen.
Liquids	Includes petroleum (including natural gas liquids) and biofuels, and in some cases liquids derived from coal and/or methane (see notes below).
Natural Gas	Primarily includes methane, while natural gas liquids (e.g., ethane, pentane, propane, butane) are grouped with liquids. Excludes flared gas for all outlooks other than ExxonMobil.
Non-hydro renewables	Includes biomass and waste, geothermal, solar, wind, and other renewable sources such as wave or tidal power. Includes biofuels for ExxonMobil only.
Nuclear	Includes production of heat and electricity from nuclear sources.
Oil	Includes products derived from crude oil such as gasoline, diesel, asphalt, and kerosene.
Renewables	Includes biomass and waste, geothermal, hydro, solar, wind, and other renewable sources such as wave or tidal power. Includes biofuels for ExxonMobil only.
Solar	Includes production of heat and electricity from solar photovoltaic and thermal sources.
Wind	Includes production of electricity from wind.

Fuels Notes

Topic	*Description*
Biofuels and liquids	Wherever possible, the GEO category "liquids" includes petroleum (including natural gas liquids) and biofuels. However, regional biofuels data are not available for certain data series, and as a result, regional "liquids" data may not include biofuels for series including IEA historical, and ExxonMobil. Because global biofuels data are available from all outlooks other than IEA historical, "liquids" data includes biofuels for all outlooks other than IEA historical.
Coal-to-liquids	BP includes coal-to-liquids in its "oil" category, and ExxonMobil and the IEA include CTL in its "liquids" category. Detail not available for other outlooks.
Coal gas (i.e., gases derived from coal)	Included as "coal" for BP and IEA. Detail not available for other outlooks.
Coal-seam gas (aka coalbed methane)	Included in "natural gas" for all outlooks.
Electricity	All outlooks reporting electricity do so in terms of gross generation, except for the US EIA, which reports net generation (i.e., gross generation minus on-site consumption). Some outlooks, such as BP and Shell, only provide data on primary energy inputs to produce electricity, which we convert to TWh using the conversion factors provided by each outlook. Because BP assumes a conversion efficiency of 38% for all fuels and all regions, notable differences emerge between their data and other outlooks.
Gas-to-liquids	Included as "liquids" for US EIA and ExxonMobil, "oil" for BP, and "natural gas" for the IEA. Detail not available for other outlooks.
Gross vs. net heating values	All outlooks other than US EIA report primary energy in net calorific values for all fuels, while the US EIA uses gross calorific values for all fuels. Note that when reporting natural gas data in volumetric terms (i.e., bcm), the IEA uses gross calorific values.
Natural gas liquids	Included as "liquids" for all outlooks.
Non-marketed biomass	Included in all outlooks other than BP and US EIA.

Regional Groupings

The following table documents how each organization creates regional groupings in its published data and which nations are detailed specifically in each outlook. Note that limited data availability for certain outlooks prevents us from presenting regional data for all outlooks and variables.

Region	BP	ExxonMobil	Equinor	IEA
OECD / Non-OECD	OECD Non-OECD	OECD Non-OECD		OECD Non-OECD
Americas	N. America S. and C. America	N. America Latin America	N. America Other Americas	N. America C. and S. America
Europe and Eurasia	Europe European Union Commonwealth of Independent States (CIS)	Europe Russia/Caspian	European Union Other Europe CIS	Europe European Union Eurasia
Asia and Oceania	Asia Pacific Other Emerging Asia	Asia/Pacific	Industrial Asia Pacific South East Asia Other Asia Pacific	Asia Pacific Southeast Asia
Africa	Africa	Africa	Africa	Africa
Middle East[1]	Middle East	Middle East	Middle East	Middle East
Country Detail	**BP**	**ExxonMobil**	**Equinor**	**IEA**
	United States[2]	United States	China	United States
	China	China	India	China[3]
	India	India		India
	Russia			Russia
	Brazil			Brazil
				Japan
				South Africa

Region	IEEJ	OPEC	Shell	US EIA
OECD /	OECD	OECD		OECD
Non-OECD	Non-OECD			Non-OECD
Americas	N. America[4]	OECD America[5]	N. America[4]	OECD Americas[5]
	Latin America	Latin America	Latin America	Non-OECD Americas
Europe and Eurasia	OECD Europe	OECD Europe	Europe	OECD Europe
	Non-OECD Europe	Eurasia	Eurasia	Non-OECD Europe and Eurasia
	European Union	Other Eurasia		
Asia and Oceania	Asia	OECD Asia Oceania	Developed Asia Pacific	OECD Asia
	ASEAN	Other Asia	Developing Asia Pacific	Non-OECD Asia
	Oceania			
Africa	Africa	Africa and Middle East	Africa	Africa
Middle East[1]	Middle East		Middle East	Middle East
Other		OPEC members Developing countries		OPEC Non-OPEC
Country Detail	**IEEJ**	**OPEC**	**Shell**	**US EIA**
	United States	United States	China	United States
	China	China	India	China
	India	India		India
	Japan	Russia		Russia
	South Korea	Mexico and Chile		Mexico and Chile
	Chinese Taipei	Australia		Australia and NZ
	Indonesia	Canada		Canada
	Malaysia			Brazil
	Myanmar			Japan
	Philippines			South Korea
	Thailand			
	Vietnam			

Regional Groupings Notes

1: There is some variation in how the outlooks define the Middle East region. IEA includes the following countries in its definition of the Middle East: Bahrain; Islamic Republic of Iran; Iraq; Jordan; Kuwait; Lebanon; Oman; Qatar; Saudi Arabia; Syrian Arab Republic; United Arab Emirates and Yemen. EIA includes the 12 countries in IEA's Middle East region, as well as Palestinian Territories. IEEJ and Shell expand further on the EIA definition of the Middle East and include Israel. In contrast, IEA counts Israel as part of OECD Asia Oceania. EIA includes Israel in OECD Europe.

2: Puerto Rico is grouped with Central and South America or Latin America for all outlooks.

3: The IEA includes Hong Kong in China, while the other outlooks separately count Hong Kong.

4: The IEEJ and Shell include Mexico in “Latin America,” whereas other outlooks include Mexico in “North America.” Shell also includes Greenland in “North America,” while other outlooks include Greenland in “Europe.”

5: Because OPEC and the US EIA provides regional groupings in terms of OECD status, GEO data includes Chile (which is part of the OECD) in “North America” for OPEC and the US EIA.