



2024 | 73rd edition

Statistical Review of World Energy

In collaboration with



KEARNEY

The Energy Institute (EI) is the professional membership body for the world of energy. The EI Statistical Review of World Energy™ analyses data on world energy markets from the prior year. It has been providing timely, comprehensive and objective data to the energy community since 1952.



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- The energy charting tool – view predetermined reports or chart specific data according to energy type, region, country and year.
- Historical data from 1965 for many sectors. Additional country and regional coverage for all consumption tables.
- An Excel workbook and database format of the data.

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The Statistical Review is central to the EI's work to provide the evidence and expertise needed by governments and businesses to navigate the energy transition. Our related events programme culminates each year in London with International Energy Week.

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Enabling industry to make energy lower carbon, safer and more efficient

The EI brings together companies from all parts of the industry, from conventional to renewable, to work in collaboration with regulators, academia and others to solve shared technical challenges. Our extensive catalogue of good practice guidance is relied on by industry worldwide.



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Contents

Introduction

- 2 Foreword
- 4 2023 Key highlights
- 6 Regional overview

P Primary energy and carbon

- 12 Foreword
- 13 Consumption
- 14 Consumption by fuel
- 15 Consumption per capita

Carbon

- 16 Carbon dioxide emissions from energy
- 17 Natural gas: flaring
- 18 Carbon dioxide equivalent emissions
- 18 Carbon capture, usage and storage

Oil

- 20 Foreword
- 21 Production
- 25 Consumption
- 30 Prices
- 31 Refining
- 33 Trade movements

Natural gas

- 36 Foreword
- 37 Production
- 39 Consumption
- 41 Prices
- 41 Hydrogen production capacity
- 44 Trade movements

Coal

- 46 Foreword
- 47 Production
- 49 Trade movements
- 50 Consumption
- 51 Carbon capture

Nuclear energy

- 52 Foreword
- 53 Consumption

Power and renewables

- 54 Foreword

Hydroelectricity

- 55 Consumption

Renewable energy

- 56 Consumption
- 57 Generation wind capacity
- 58 Generation by source
- 59 Solar installed
- 60 Wind installed
- 61 Solar and Wind installed
- 62 Biofuels production

Electricity

- 64 Generation
- 65 Generation by fuel
- 65 Grid-scale battery energy

Key minerals

- 66 Foreword
- 67 Production and reserves
- 68 Prices

Methodology

- 69 More detail on the methodology

Appendices

- 71 Approximate conversion factors
- 72 Definitions
- More information

Foreword

Publishing the 73rd Statistical Review of World Energy is a significant moment for the Energy Institute (EI).

Energy has always been and remains central to human achievement and progress. It is also, increasingly, central to our very survival. With global temperature increases averaging close to 1.5°C, 2023 was the warmest year since records began, and the increasingly severe impacts of climate change were felt across all continents. We also experienced the continued effects geopolitical and economic disruption to energy markets can have on our economies and livelihoods.

As the chartered professional membership body for people working across the world of energy, the Energy Institute is proud to be the home of the Statistical Review of World Energy. Our aim is to provide an objective, independent and comprehensive evidence base for decision makers, as governments, businesses and civil society all grapple with these profound challenges.

We report on another year of highs in our energy hungry world. Record consumption of fossil fuels and record emissions from energy, but also record generation of renewables, driven by increasingly competitive wind and solar energy.

The progress of the transition is slow, but the big picture masks diverse energy stories playing out across different geographies. This year we provide additional visualisations to bring these contrasts to life – from advanced economies where we see signs of demand for some fossil fuels peaking, to economies in the global south for whom

The progress of the transition is slow, but the big picture masks diverse energy stories playing out across different geographies.

economic development and improvements in quality of life continue to drive fossil growth.

In this second Statistical Review under the Institute's custodianship, we introduce new data in areas that will grow in significance over the coming years and decades – in battery storage, carbon capture, hydrogen, ammonia, uranium and additional key minerals. Over the coming months, we'll be engaging with users on further developments, to ensure the way we measure and analyse energy keeps pace as the transition progresses from high carbon to low, from molecule to electron, from supply to demand led.

We are grateful to our co-authors KPMG and Kearney in this vital endeavour, to the essential data compilation undertaken by Heriot-Watt University, and with continued thanks to bp. Together we are able to ensure the Statistical Review remains the respected, go-to source of data for the energy community around the world.



Juliet Davenport OBE HonFEI
President, Energy Institute



Dr Nick Wayth CEng FEI FIMechE
CEO, Energy Institute



[Back to contents ↗](#)

In collaboration with

KPMG

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Simon Virley CB FEI
Vice Chair and Head of Energy and Natural Resources, KPMG

Kearney

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Romain Debarre
Partner and Managing Director Energy Transition Institute, Kearney

[Back to contents ↗](#)

2022 Key highlights

Whilst 2022 saw energy demand continue to recover from the COVID-19 pandemic, legacy supply chain issues, along with conflict in Ukraine, continued to impact the global energy sector.

Energy developments

- 2022 saw a 1% increase in total primary energy consumption taking it to around 3% above the 2019 pre-COVID level.
- Renewables' (excluding hydroelectricity) share of primary energy consumption reached 7.5%, an increase of nearly 1% over the previous year.
- Fossil fuel consumption as a percentage of primary energy remained steady at 82%.

Carbon emissions

- Carbon dioxide emissions from energy use, industrial processes, flaring and methane (in carbon dioxide equivalent terms) continued to rise to a new high growing 0.8% in 2022 to 39.3 GtCO₂e, with emissions from energy use rising 0.9% to 34.4 GtCO₂e.
- In contrast, carbon dioxide emissions from flaring decreased by 3.8% and emissions from methane and industrial processes decreased by 0.2%.

Oil

- Brent crude oil prices averaged \$101/bbl in 2022, its highest level since 2013.
- Oil consumption continued to increase, rising by 2.9 million barrels per day (b/d) to 97.3 million barrels per day (b/d), a smaller increase than was seen between 2020 and 2021. Consumption remained 0.7% below 2019 levels.
- Regionally, OECD consumption increased by 1.4 million b/d and non-OECD by 1.5 million b/d. Most of the growth came from jet/kerosene (0.9 million b/d) and diesel/gasoil (0.7 million b/d).
- Global oil production increased by 3.8 million b/d in 2022, with OPEC+ accounting for more than 60% of the increase. Among all countries, Saudi Arabia (1,182,000 b/d) and the US (1,091,000 b/d), saw the largest increases. Nigeria reported the largest decline in production (184,000 b/d) with production in Libya declining by 181,000 b/d too.
- Refining capacity increased slightly by around 534,000 b/d last year driven by an increase in capacity in non-OECD countries.

Natural gas

- Natural gas prices reached record levels in Europe and Asia in 2022, rising nearly threefold in Europe (TTF averaging \$37/mmBtu) and doubling in the Asian LNG spot market (JKM averaging \$34/mmBtu). US Henry Hub prices rose over 50% to average \$6.5/mmBtu in 2022 – their highest annual level since 2008.
- Global natural gas demand declined by 3% in 2022 dropping just below the 4 Tcm mark achieved for the first time in 2021. Its share in primary energy in 2022 decreased slightly to 24% (from 25% in 2021).
- Global gas production remained relatively constant compared to 2021.
- LNG supply grew 5% (26 Bcm) to 542 Bcm in 2022, similar to 2021. LNG supply increases came mostly from North America (10 Bcm) and APAC (8 Bcm). All other regions made a positive contribution to LNG supply growth in 2022 (8 Bcm).
- The increase in global LNG demand was triggered by Europe (62 Bcm) in 2022. Countries in the Asia Pacific region reduced their LNG imports by 24 Bcm and those in South & Central America by 11 Bcm.
- Japan replaced China as the world's largest LNG importer and accounted for close to 60% of global LNG demand growth in 2022. The Asia Pacific region accounted for around 65% of global LNG demand but fell 6.5% compared to 2021 whilst Europe increased its LNG imports by 57%.
- Overall natural gas pipeline net trade fell ~15% globally in 2022 (78 Bcm). European pipeline imports fell by 35% (82 Bcm), almost entirely attributable to supplies from Russia. Overall, Russian total pipeline exports fell 38%. The Middle East increased its pipeline exports by 12%. China increased its pipeline imports by 5 Bcm.

Coal

- Coal prices reached record levels in 2022, with European prices averaging \$294/tonne and the Japan CIF spot price averaging \$225/tonne (increases of 145% and 45% over 2021 respectively).
- Coal consumption continued to increase, rising 0.6% in 2021 to 161 EJ; the highest level of coal consumption since 2014.
- The growth in demand was largely driven by China (1%) and India (4%). Their combined growth of 1.7 EJ was sufficient to offset declines in other regions by 0.6 EJ.
- Coal consumption in both North America and Europe declined by 6.8% and 3.1% respectively. In 2022, OECD consumption was around 10% less than its 2019 pre-COVID level and non-OECD coal consumption over 6% higher.
- Global coal production increased by over 7% compared to 2021, reaching a record high of 175 EJ. China, India, and Indonesia accounted for over 95% of the increase in global production.

Renewables, hydro and nuclear

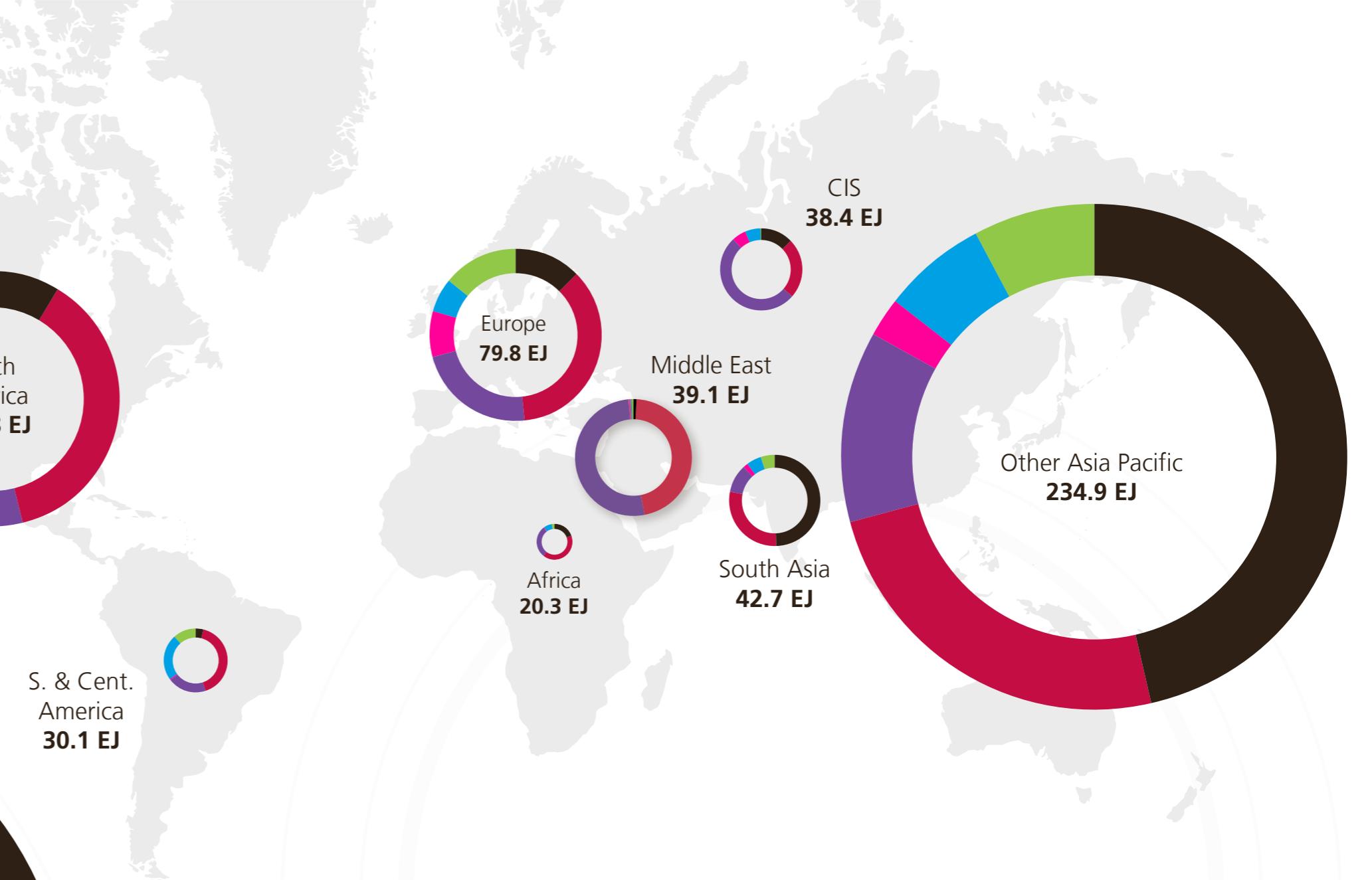
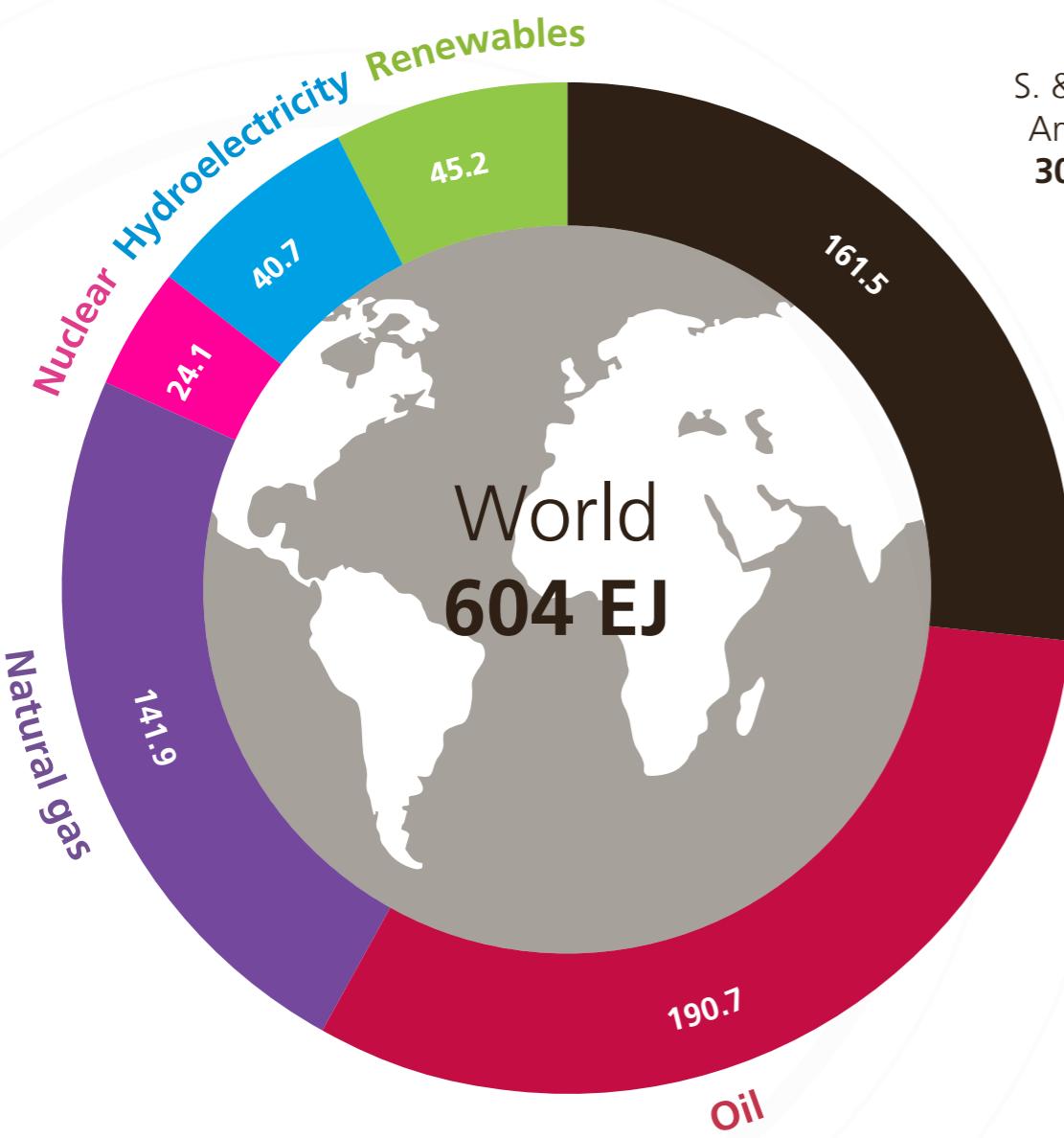
- Renewable power (excluding hydro) rose 14% in 2022 to reach 40.9 EJ. This was slightly below the previous year's growth rate of 16%.
- Solar and wind capacity continued to grow rapidly in 2022 recording a record increase of 266 GW. Solar accounted for 72% (192 GW) of the capacity additions.
- The largest portion of solar and wind growth was in China accounting for about 37% and 41% of global capacity additions respectively.
- Hydroelectricity generation increased by 1.1% in 2022 whilst output from nuclear fell by 4.4%.

Electricity

- Global electricity generation increased by 2.3% in 2022 which was lower than the previous year's growth rate of 6.2%.
- Wind and solar reached a record high of 12% share of power generation with solar recording 25% and wind power 13.5% growth in output. The combined generation from wind and solar once again surpassed that of nuclear energy.
- Coal remained the dominant fuel for power generation in 2022, with a stable share around 35.4%, marginally down from 35.8% in 2021.
- Natural gas-fired power generation remained stable in 2022 with a share of around 23%.
- Renewables (excluding hydro) met 84% of net electricity demand growth in 2022.
- Key minerals
- Lithium carbonate prices rose 335% to average a record high of \$47,000/tonne. Similarly, the price of cobalt increased 24% in 2021 to average \$64,000/tonne.
- Lithium and cobalt production rose sharply by 21%.

Regional overview

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2023 Regional overview

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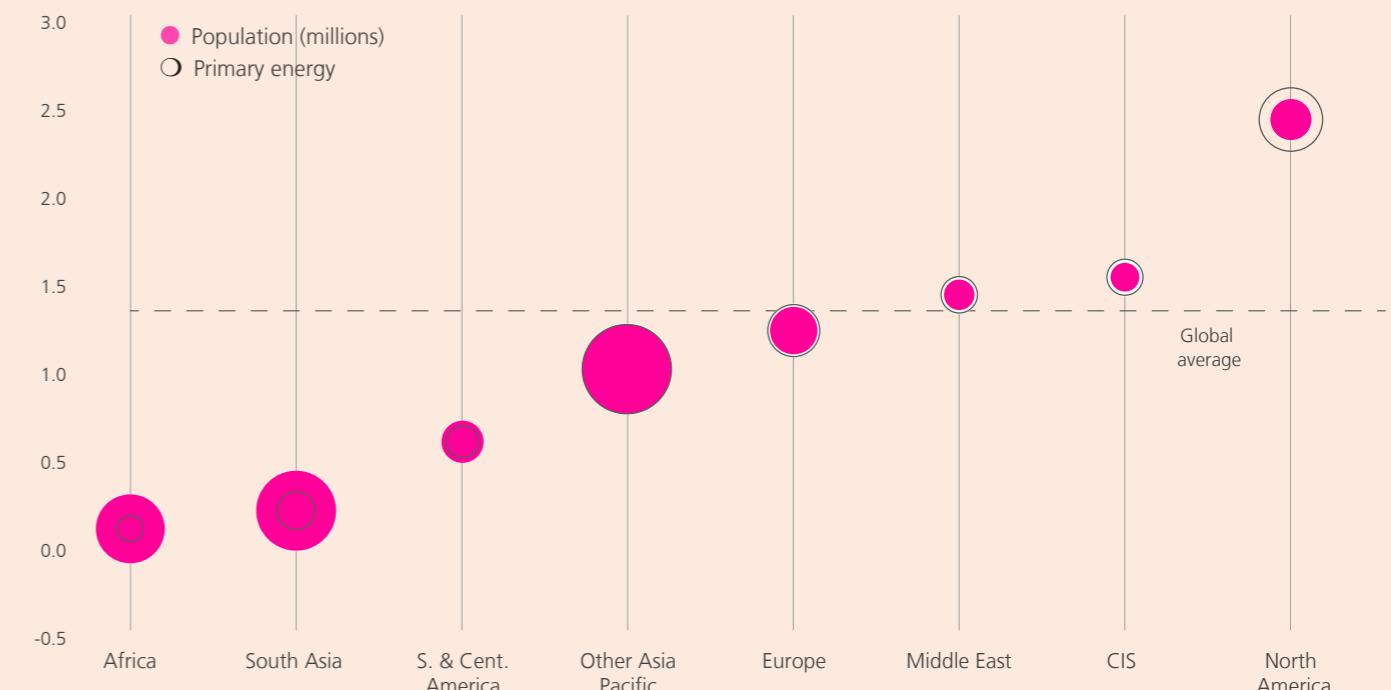
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Global



Chart title

Global



2023 Regional overview

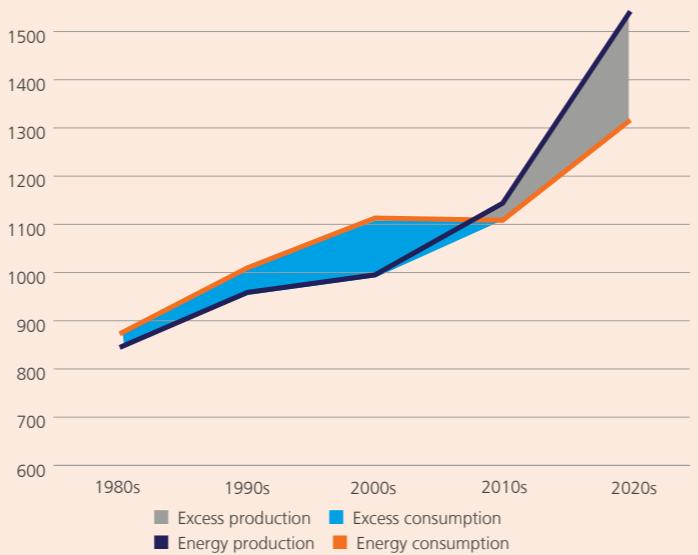
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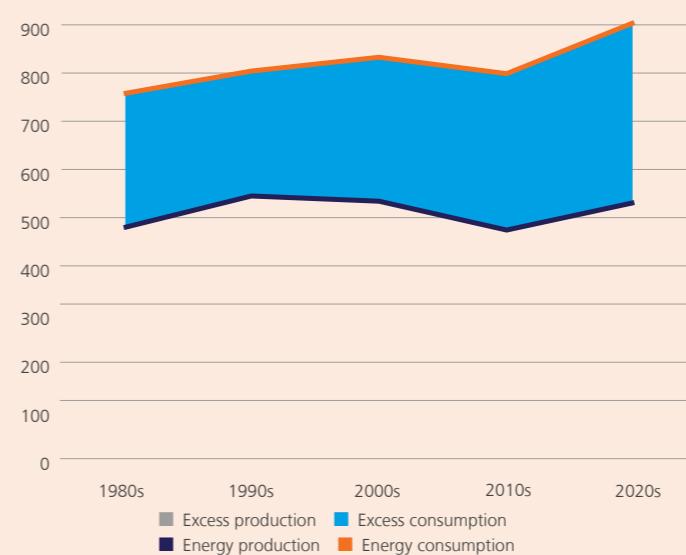
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Production vs consumption by region

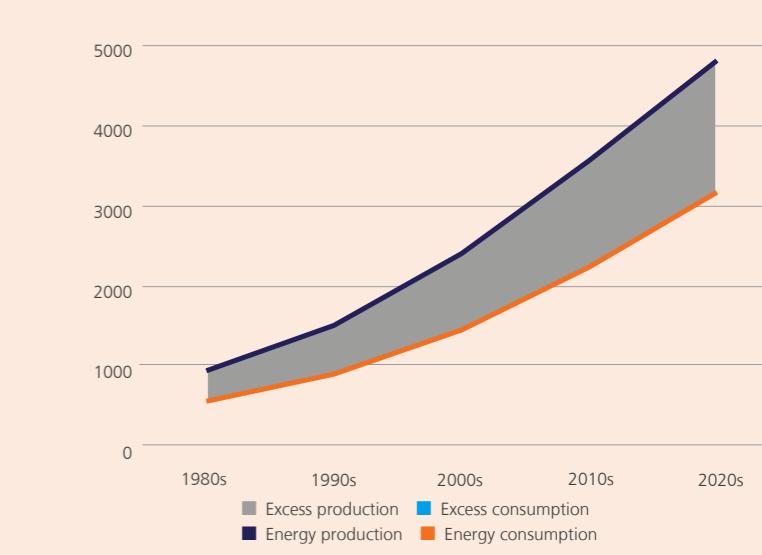
North America



Europe



Asia Pacific



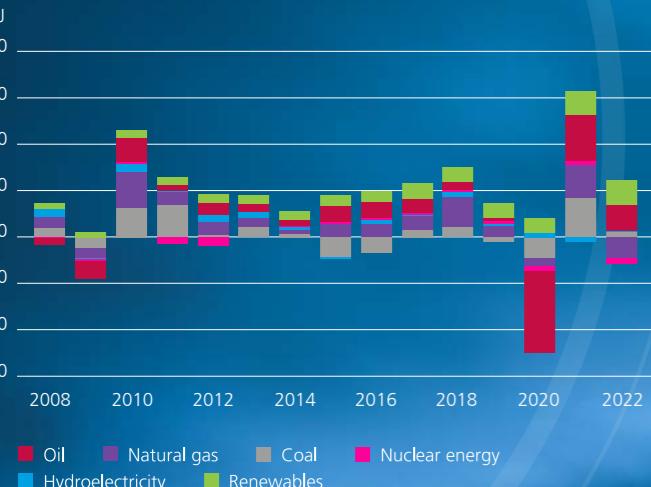
Primary energy and carbon

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P Primary energy Consumption*

Exajoules	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Growth rate per annum	Share
	2023	2012–23	2023										
Canada													
Mexico													
US													
Total North America													
Argentina													
Brazil													
Chile													
Colombia													
Ecuador													
Peru													
Trinidad & Tobago													
Venezuela													
Other S. & Cent. America													
Total S. & Cent. America													
Austria													
Belgium													
Czech Republic													
Finland													
France													
Greece													
Hungary													
Italy													
Netherlands													
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Romania													
Spain													
Sweden													
Switzerland													
Türkiye													
Ukraine													
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South Africa													
Other Africa													
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China													
China Hong Kong SAR													
India													
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Japan													
Malaysia													
New Zealand													
Pakistan													
Philippines													
Singapore													
South Korea													
Sri Lanka													
Taiwan													
Thailand													
Vietnam													
Other Asia Pacific													
Total Asia Pacific													
of which: OECD													
Non-OECD													
European Union [#]													

* In this review, primary energy comprises commercially-traded fuels, including modern renewables used to generate electricity. Energy from all sources of non-fossil power generation is accounted for on an input-equivalent basis. See the appendix or <https://www.energyinst.org/statistical-review> for more details on this methodology.

^A Less than 0.005.

[#] Excludes Estonia, Latvia and Lithuania prior to 1985 and Slovenia prior to 1990.

P Primary energy Consumption by fuel

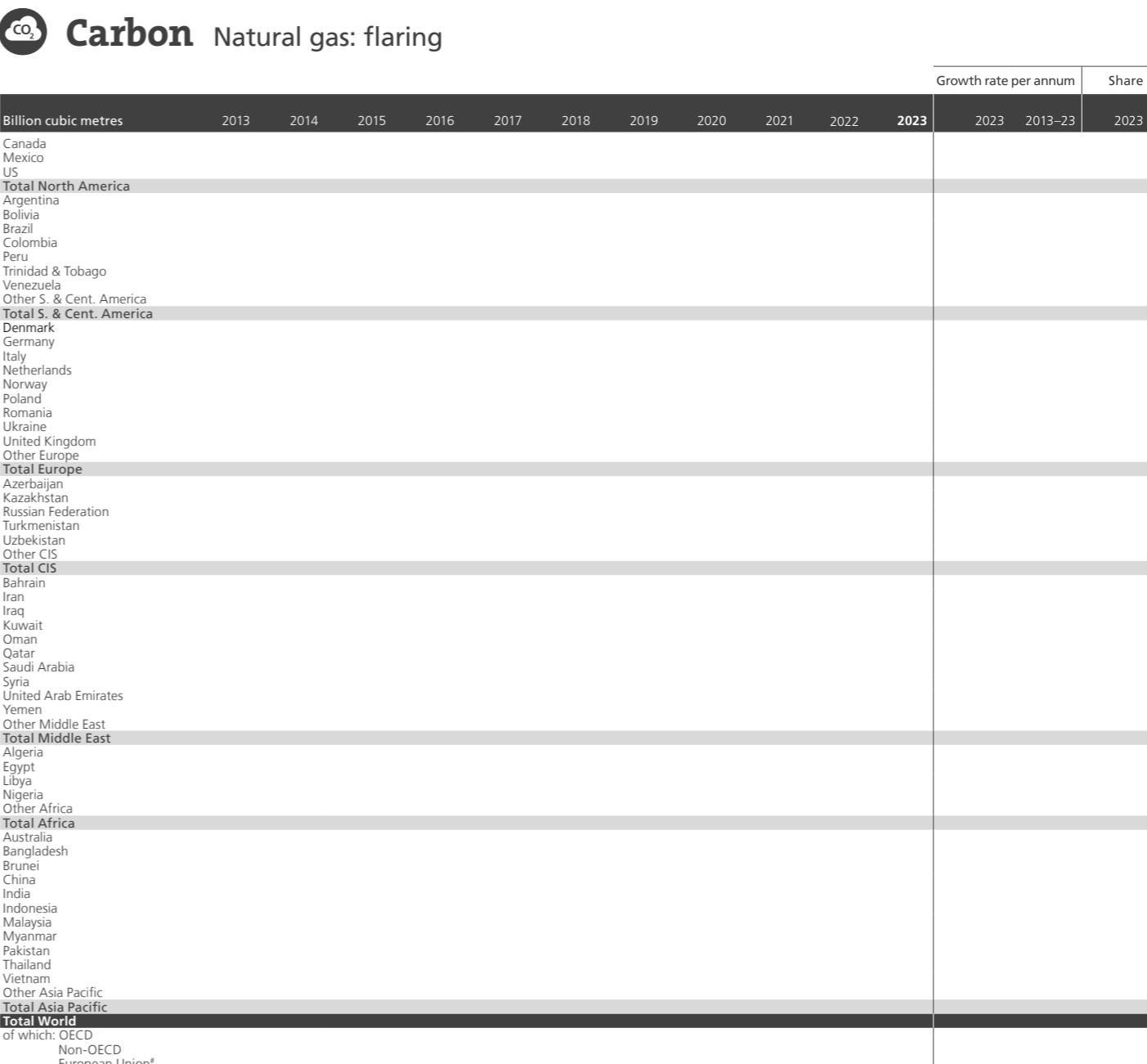
Exajoules	2022						2023						
	Oil	Natural gas	Coal	Nuclear energy	Hydro-electricity	Renewables	Total	Oil	Natural gas	Coal	Nuclear energy	Hydro-electricity	Renewables
Canada													
Mexico													
US													
Total North America													
Argentina													
Brazil													
Chile													
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Peru													
Trinidad & Tobago													
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Portugal													
Romania													
Spain													
Sweden													
Switzerland													
Türkiye													
Ukraine													
United Kingdom													
Other Europe													
Total Europe													
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Other Asia Pacific													
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European Union													

* In this review, primary energy comprises commercially-traded fuels, including modern renewables used to generate electricity. Energy from all sources of non-fossil power generation is accounted for on an input-equivalent basis. See the appendix or <https://www.energyinst.org/statistical-review> for more details on this methodology.

^ Less than 0.005.

P Primary energy World consumption*

Gigajoule per capita	Growth rate per annum										2013-23
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	
Canada											
Mexico											
US											
Total North America											
Argentina											
Brazil											
Chile											
Colombia											
Ecuador											
Peru											
Trinidad & Tobago											
Venezuela											
Other S. & Cent. America											
Total S. & Cent. America											
Austria											
Belgium											
Czech Republic											
Finland											
France											
Greece											



Data from 2013 onward: Made utilising VIIRS Nightfire (VNF) nightly data produced by the Earth Observation Group, Payne Institute for Public Policy, Colorado School of Mines. These data include flaring from upstream, downstream oil and gas.

Data before 2013: Cedeqaz. These data include flaring from upstream.

As far as possible, the calculation has used flared volumes based on standard cubic metres (measured at 15°C and 1013 mbar); as they are derived directly from measures of energy factor and have been standardised using a Gross Calorific Value (GCV) of 40 MJ/m³, they do not necessarily equate with gas volumes expressed in the original databases.

^a Less than 0.05.
[†] Less than 0.05%.

[†] Excludes Estonia, Latvia and Lithuania prior to 1985 and Croatia and Slovenia prior to 1991.

Notes: Annual changes and shares of total are calculated using exajoules figures.

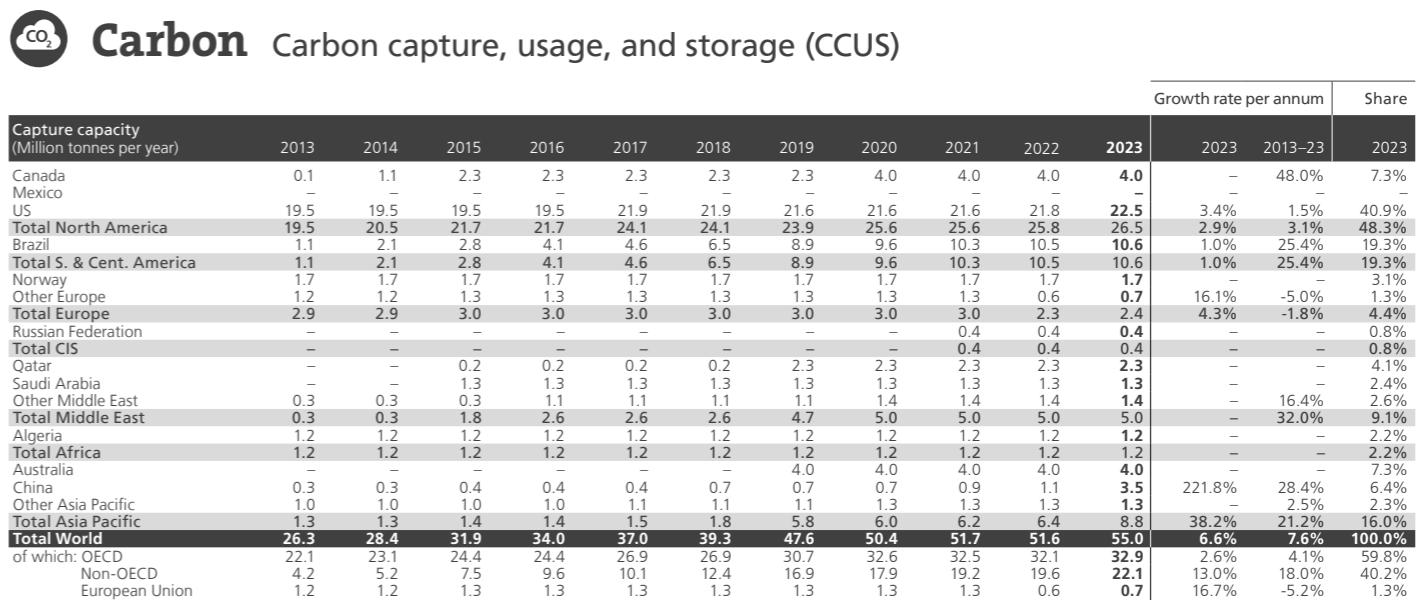
^t Less than 0.05%

Excludes Estonia, Latvia and Lithuania prior to 1985 and Croatia and Slovenia prior to 1990.

Notes: The carbon emissions above reflect only those through consumption of oil, gas and coal for combustion related activities, and are based on estimates for 2005. Data for 2005 are not available for all countries.

'Default CO₂ Emissions Factors for Combustion' listed by the IPCC in its Guidelines for National Greenhouse Gas Inventories (2006). This does not allow for any carbon that is sequestered, for other sources of carbon emissions, or for emissions of other greenhouse gases.

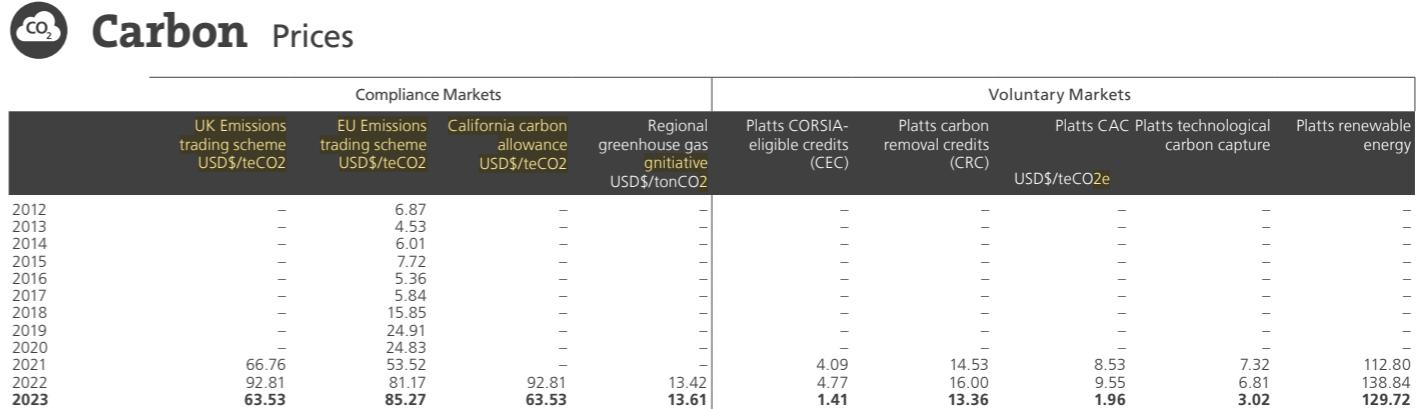
This does not allow for any carbon that is sequestered, for other sources. Our data is therefore not comparable to official national emissions data.



^ Less than 0.005.

[†] Less than 0.05%.

Source: Rystad Energy. For further information visit <https://www.rystadenergy.com/>



Source: S&P Global Commodity Insights, ©2024 by S&P Global Inc.

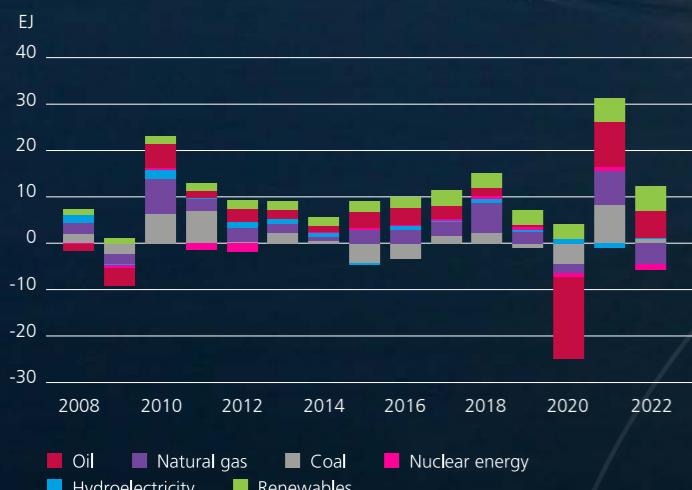
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Oil Production in thousands of barrels per day*

Thousand barrels daily	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013-23	2023
Canada	4000	4271	4388	4464	4813	5244	5372	5130	5414	5575	5653	1.399%	3.5%	5.9%
Mexico	2875	2784	2587	2456	2224	2068	1918	1910	1926	1943	2040	4.980%	-3.4%	2.1%
US	10101	11805	12782	12356	13140	15321	17135	16493	16693	17844	19358	8.487%	6.7%	20.1%
Total North America	16976	18860	19756	19275	20178	22633	24426	23533	24033	25361	27050	6.660%	4.8%	28.1%
Argentina	644	638	646	610	590	592	720	721	797	955	1074	12.463%	5.2%	1.1%
Brazil	2110	2341	2525	2607	2731	2691	2890	3030	2991	3112	3502	12.525%	5.2%	3.6%
Colombia	1010	990	1006	886	854	865	886	781	736	754	777	3.046%	-2.6%	0.8%
Ecuador	527	557	543	548	531	517	531	479	473	481	475	-1.184%	-1.0%	0.5%
Guyana	—	—	—	—	—	—	1	74	117	278	391	40.796%	—	0.4%
Peru	171	175	153	141	136	139	144	131	128	128	123	-3.889%	-3.2%	0.1%
Trinidad & Tobago	116	114	109	97	99	87	82	76	77	74	72	-2.805%	-4.7%	0.1%
Venezuela	2680	2692	2864	2566	2199	1642	1051	680	678	735	853	16.068%	-10.8%	0.9%
Other S. & Cent. America	152	154	146	135	133	128	121	112	114	108	99	-7.819%	-4.2%	0.1%
Total S. & Cent. America	7411	7661	7991	7590	7275	6661	6426	6086	6111	6626	7368	11.201%	-0.1%	7.7%
Denmark	178	167	158	142	138	116	103	72	66	65	60	-8.253%	-10.3%	0.1%
Italy	114	120	113	78	86	97	89	112	100	94	90	-4.367%	-2.3%	0.1%
Norway	1849	1894	1953	2004	1982	1863	1774	2018	2036	1906	2022	6.097%	0.9%	2.1%
Romania	86	84	83	79	76	75	75	72	70	66	63	-4.725%	-3.1%	0.1%
United Kingdom	865	854	964	1015	1005	1092	1118	1049	874	809	715	-11.602%	-1.9%	0.7%
Other Europe	344	341	313	312	308	302	289	274	274	275	275	0.489%	-2.2%	0.3%
Total Europe	3437	3460	3602	3630	3590	3550	3460	3612	3436	3214	3225	0.345%	-0.6%	3.4%
Azerbaijan	878	851	841	828	782	784	763	703	708	669	620	-7.191%	-3.4%	0.6%
Kazakhstan	1720	1701	1672	1637	1813	1900	1903	1796	1805	1891	1771	-6.381%	0.3%	1.8%
Russian Federation	10807	10927	11087	11342	11374	11562	11679	10666	11000	11202	11075	-1.136%	0.2%	11.5%
USSR	256	263	271	270	269	259	254	219	206	203	194	-4.209%	-2.7%	0.2%
Uzbekistan	69	63	60	57	61	64	62	44	46	45	43	-5.302%	-4.6%	†
Other CIS	35	35	36	36	37	38	39	41	43	44	44	3.163%	2.3%	†
Total CIS	13765	13840	13966	14171	14336	14607	14701	13468	13806	14053	13748	-2.174%	†	14.3%
Iran	3609	3714	3853	4578	4939	4720	3510	3230	3766	3945	4662	18.175%	2.6%	4.8%
Iraq	3099	3239	3986	4423	4538	4632	4779	4114	4102	4520	4355	-3.636%	3.5%	4.5%
Kuwait	3134	3106	3069	3150	3009	3050	2976	2721	2706	3036	2908	-4.201%	-0.7%	3.0%
Oman	942	943	981	1004	971	978	971	971	1064	1049	1049	-1.458%	1.1%	1.1%
Qatar	1934	1892	1844	1846	1783	1798	1737	1715	1697	1743	1772	1.648%	-0.9%	1.8%
Saudi Arabia	11393	11519	11998	12406	11892	12261	11832	10954	12191	11389	-6.578%	†	11.8%	
Syria	59	33	27	25	25	24	34	43	43	40	40	-6.599%	-3.8%	†
United Arab Emirates	3540	3592	3876	4020	3880	3894	3984	3679	3640	4020	3922	-2.451%	1.0%	4.1%
Yemen	198	153	54	43	71	94	95	88	83	74	49	-32.841%	-13.0%	0.1%
Other Middle East	208	214	213	214	208	207	214	202	208	209	217	3.702%	0.4%	0.2%
Total Middle East	28117	28405	29901	31709	31316	31658	30132	27782	28171	30844	30362	-1.561%	0.8%	31.5%
Algeria	1485	1589	1558	1577	1540	1511	1487	1332	1353	1443	1408	-2.394%	-0.5%	1.5%
Angola	1738	1701	1796	1745	1671	1519	1420	1325	1177	1191	1150	-3.410%	-4.0%	1.2%
Chad	91	89	111	117	98	116	127	126	116	124	134	8.181%	4.0%	0.1%
Republic of Congo	243	253	234	232	270	330	336	307	274	269	278	3.498%	1.4%	0.3%
Egypt	710	714	726	691	660	674	653	632	608	613	610	-0.417%	-1.5%	0.6%
Equatorial Guinea	282	284	260	223	195									

Oil Production in million tonnes*

Million tonnes	Growth rate per annum												Share	
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013-23	2023
Canada	195.4	209.8	216.1	218.8	236.6	257.7	263.5	252.0	266.6	274	278	1.43%	3.6%	6.2%
Mexico	141.8	137.1	127.5	121.4	109.5	102.3	94.9	95.1	96.4	98	103	5.024%	-3.2%	2.3%
US	448.6	524.6	567.0	542.7	574.2	669.6	751.0	713.3	715.9	762	827	8.536%	6.3%	18.3%
Total North America	785.8	871.6	910.6	882.9	920.3	1029.6	1109.4	1060.4	1079.0	1134	1208	6.517%	4.4%	26.8%
Argentina	30.2	29.8	30.0	28.6	27.3	33.8	33.7	37.6	45	51	12.97%	5.4%	1.1%	
Brazil	110.2	122.5	132.2	136.7	142.6	140.6	151.2	159.3	156.9	163	184	12.546%	5.2%	4.1%
Colombia	53.2	52.2	53.0	46.8	45.0	45.6	46.7	41.3	38.8	40	41	3.046%	-2.6%	0.9%
Ecuador	28.2	29.8	29.1	29.5	28.5	27.7	28.5	25.8	25.3	26	25	-1.184%	-1.0%	0.6%
Guyana	—	—	—	—	—	—	—	—	—	4	19	40.796%	—	0.4%
Peru	7.3	7.5	6.5	5.8	5.7	5.9	6.1	5.5	5.3	5	5	-4.430%	-3.4%	0.1%
Trinidad & Tobago	5.1	5.1	4.8	4.3	4.4	3.9	3.7	3.4	3.5	3	3	-1.828%	-4.2%	0.1%
Venezuela	137.8	138.5	147.6	132.6	113.2	84.3	53.4	34.6	34.5	38	44	16.571%	-10.8%	1.0%
Other S. & Cent. America	7.6	7.7	7.4	6.8	6.7	6.4	6.1	5.7	5.8	5	5	-7.351%	-4.0%	0.1%
Total S. & Cent. America	379.6	393.1	410.7	391.2	373.3	342.0	329.5	313.0	313.5	340	378	11.312%	†	8.4%
Denmark	8.7	8.1	7.7	6.9	6.7	5.6	5.0	3.5	3.2	3	3	-8.253%	-10.3%	0.1%
Italy	5.5	5.8	5.5	3.8	4.1	4.7	4.3	5.4	4.8	5	4	-4.542%	-2.4%	0.1%
Norway	83.5	85.4	88.0	90.7	89.4	83.9	80.3	92.7	94.3	89	95	6.226%	1.3%	2.1%
Romania	4.1	4.1	4.0	3.8	3.6	3.6	3.5	3.5	3	3	3	-4.695%	-3.2%	0.1%
United Kingdom	40.6	39.9	45.3	47.4	46.6	50.9	51.8	49.0	40.9	38	33	-11.407%	-1.9%	0.7%
Other Europe	17.1	17.0	16.5	15.6	15.0	15.2	14.4	14.3	14	14	14	0.620%	-2.2%	0.3%
Total Europe	159.5	160.3	166.9	168.2	165.5	163.9	160.0	168.4	160.9	151	152	0.473%	-0.5%	3.4%
Azerbaijan	43.5	42.1	41.7	41.1	38.7	38.8	37.6	34.6	34.6	33	30	-7.469%	-3.6%	0.7%
Kazakhstan	81.8	80.8	79.5	78.0	86.2	90.4	90.6	85.7	85.9	90	84	-6.383%	0.3%	1.9%
Russian Federation	532.2	537.4	544.6	558.5	558.5	567.9	573.4	524.4	538.8	549	542	-1.250%	0.2%	12.0%
Turkmenistan	12.5	12.9	13.2	13.2	13.1	12.5	12.2	10.4	9.8	10	9	-4.039%	-3.0%	0.2%
USSR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uzbekistan	3.2	2.9	2.7	2.6	2.8	2.9	2.8	2.0	2.1	2	2	-5.157%	-4.6%	†
Other CIS	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2	2	3.163%	2.3%	†
Total CIS	674.9	677.9	683.4	695.2	701.1	714.3	718.5	659.1	673.2	685	669	-2.258%	-0.1%	14.8%
Iran	169.7	174.0	180.2	216.1	234.5	222.6	161.7	147.7	172.2	180	214	18.893%	2.4%	4.8%
Iraq	151.9	158.8	195.6	217.6	222.4	227.0	234.2	202.0	208.8	221	213	-3.737%	3.4%	4.7%
Kuwait	151.4	150.2	148.2	152.7	145.0	146.8	143.4	131.2	130.0	146	140	-4.187%	-0.8%	3.1%
Oman	46.1	46.2	48.0	49.3	47.6	47.8	47.3	46.1	46.8	51	51	-1.696%	0.9%	1.1%
Qatar	81.7	79.9	77.4	77.6	74.8	75.1	72.3	72.2	70.8	73	74	1.974%	-1.0%	1.6%
Saudi Arabia	538.4	543.8	568.0	586.7	559.3	576.8	556.6	519.6	515.0	574	532	-7.410%	-0.1%	11.8%
Syria	2.7	1.5	1.2	1.1	1.1	1.1	1.5	2.0	2.0	2	2	-6.936%	-3.8%	†
United Arab Emirates	161.6	162.9	175.1	181.6	174.9	176.0	179.9	165.9	163.4	181	176	-2.792%	0.9%	3.9%
Yemen	9.1	6.9	2.2	1.6	3.0	4.1	4.1	3.8	3.5	3	2	-37.680%	-14.4%	†
Other Middle East	10.3	10.5	10.5	10.6	10.2	10.4	9.9	10.1	10.2	10	11	3.981%	0.3%	0.2%
Total Middle East	1322.9	1334.8	1406.5	1495.0	1472.8	1487.4	1411.4	1300.3	1314.7	1442	1414	-1.959%	0.7%	31.4%
Algeria	64.8	68.8	67.2	68.4	66.6	65.3	64.3	57.6	58.2	62	60	-2.715%	-0.7%	1.3%
Angola	85.2	83.3	88.2	85.8	81.6	74.1	69.1	64.6	57.1	58	56	-3.452%	-4.1%	1.2%
Chad	4.8	4.7	5.8	6.1	5.2	6.1	6.7	6.6	6.1	6	7	8.181%	4.0%	0.2%
Republic of Congo	12.3	12.9	11.9	11.9	13.8	16.9	17.2	15.8	14.0	14	14	3.525%	1.4%	0.3%
Egypt	34.4	35.1	35.4	33.8	32.2	32.8	31.8	31.1	29.6	30	30	-0.348%	-1.4%	0.7%
Equatorial Guinea	13.2	13.3	12.1	10.3	9.0	8.1	7.4	7.4	6.1	6	4	-27.661%	-11.2%	0.1%
Gabon	10.7	10.5	10.7	11.0	10.5	9.7	10.9	10.4	9.0	10	11	17.031%	0.4%	0.2%
Libya	49.4	24.4	20.5	19.3	43.8	54.9	58.0	19.7	60.4	54	60	11.390%	1.9%	1.3%
Nigeria	109.4	109.2	105.7	91.3	94.4	96.2	100.9	91.4	80.7	69	74	6.711%	-3.8%	1.6%
South Sudan	4.9	7.7	7.3	6.8	7.3	7.1	8.4	8.1	7.5	7	7	4.676%	4.0%	0.2%
Sudan	5.8	5.9	5.4	4.2	3.4	3.7	3.6	3.1	3.2	3				

Oil Natural gas liquids production in thousands of barrels per day*

Thousand barrels daily	Growth rate per annum												Share	
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013–23	
Canada	514	513	525	595	597	647	682	660	669	708	718	1.4%	3.4%	5.3%
Mexico	353	355	320	302	276	235	217	205	170	158	164	3.8%	-7.3%	1.2%
US	2606	3015	3342	3509	3783	4369	4824	5175	5425	5933	6431	8.4%	9.5%	47.2%
Total North America	3473	3883	4187	4407	4656	5252	5724	6040	6263	6800	7313	7.6%	7.7%	53.7%
Argentina	104	105	114	99	110	102	112	120	114	123	128	3.7%	2.0%	0.9%
Brazil	86	87	88	97	110	104	102	90	86	91	101	10.7%	1.6%	0.7%
Colombia	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Ecuador	1	—	—	—	—	—	—	—	—	—	—	—	-100.0%	—
Guyana	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Peru	54	54	49	50	48	47	49	48	46	43	43	1.7%	-2.1%	0.3%
Trinidad & Tobago	34	33	30	25	27	24	23	20	17	15	12	-23.4%	-10.2%	0.1%
Venezuela	116	114	117	105	104	88	80	52	49	47	44	-5.0%	-9.2%	0.3%
Other S. & Cent. America	17	14	13	12	15	14	13	13	13	12	11	-9.7%	-4.0%	0.1%
Total S. & Cent. America	412	407	411	389	414	379	378	342	325	331	339	2.4%	-1.9%	2.5%
Denmark	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Italy	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Norway	306	324	338	349	352	335	301	293	252	197	204	3.6%	-4.0%	1.5%
Romania	3	3	3	4	3	3	4	4	4	4	3	-6.2%	1.8%	†
United Kingdom	55	62	60	82	92	90	99	88	67	67	56	-16.3%	0.1%	0.4%
Other Europe	16	14	14	15	18	18	17	15	16	16	15	-1.0%	-0.3%	0.1%
Total Europe	380	404	415	450	466	446	421	400	339	284	281	-1.3%	-3.0%	2.1%
Azerbaijan	1	2	1	1	1	1	1	1	1	1	2	39.5%	2.2%	†
Kazakhstan	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Russian Federation	278	448	470	479	476	479	493	474	544	533	522	-2.2%	6.5%	3.8%
Turkmenistan	17	17	17	20	21	23	27	30	27	30	28	-6.2%	5.3%	0.2%
Uzbekistan	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Other CIS	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total CIS	297	467	488	500	497	503	521	505	573	565	551	-2.3%	6.4%	4.0%
Iran	418	441	461	488	448	479	497	496	582	633	722	14.1%	5.6%	5.3%
Iraq	41	40	41	48	64	64	68	64	70	74	84	13.3%	7.3%	0.6%
Kuwait	287	276	288	290	305	313	299	283	291	329	318	-3.2%	1.0%	2.3%
Oman	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Qatar	471	466	470	473	450	471	470	427	441	457	461	0.8%	-0.2%	3.4%
Saudi Arabia	1518	1577	1578	1718	1717	1728	1687	1609	1560	1682	1780	5.8%	1.6%	13.1%
Syria	14	10	8	8	8	8	9	10	10	10	10	-3.0%	-3.9%	0.1%
United Arab Emirates	482	539	614	654	630	600	639	608	625	656	671	2.2%	3.3%	4.9%
Yemen	24	25	26	26	27	28	28	28	28	28	28	—	1.2%	0.2%
Other Middle East	10	10	10	10	10	11	19	18	15	16	16	-1.4%	5.0%	0.1%
Total Middle East	3266	3386	3494	3715	3659	3703	3705	3543	3622	3885	4088	5.2%	2.3%	30.0%
Algeria	210	260	268	261	254	252	247	233	248	265	271	2.2%	2.6%	2.0%
Angola	22	30	16	23	39	40	47	47	47	47	47	-0.8%	7.7%	0.3%
Chad	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Republic of Congo	9	8	7	7	7	7	7	7	7	7	7	—	-2.5%	0.1%
Egypt	67	47	64	60	57	58	56	44	47	45	45	1.5%	-3.8%	0.3%
Equatorial Guinea	21	19	17	19	21	19	17	15	12	13	10	-21.8%	-7.1%	0.1%
Gabon	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Libya	22	8	15	15	20	21	27	15	40	40	40	—	6.0%	0.3%
Nigeria	82	86	80	76	77	79	79	61	59	67	70	4.3%	-1.6%	0.5%
South Sudan	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sudan	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tunisia	6	5	5	7	6	5	4	4	5	3	5	45.0%	-2.6%	†
Other Africa	—	—	—	—	—	1	1	3	7	11	15	39.1%	—	0.1%
Total Africa	440	462	472	469	481	486	430	471	497	509	2.4%	1.5%	3.7%	
Australia	66	67	56	64	59	60	97	103	109	101	101	0.9%	4.4%	0.7%
Brunei	13	12	11	12	13	12	12	10	8	9	9	—	-3.9%	0.1%
China	—	—	—	—	—	—	—	—	—	—	—	—	—	—
India	136	136	133	144	153	173	174	159	151	130	123	-5.4%	-1.1%	0.9%
Indonesia	46	58	52	44	36	36	35	34	33	34	35	1.9%	-2.7%	0.3%
Malaysia	39	39	35	59	58	60	62							

 Oil Consumption in thousands of barrels per day*

* Inland demand plus international aviation and marine bunkers and refinery fuel and loss. Consumption of biogasoline (such as ethanol) and biodiesel are excluded while derivatives of coal and natural gas are included.
 † Less than 0.05%.
 # Excludes Estonia, Latvia and Lithuania prior to 1985 and Croatia and Slovenia prior to 1990.
Notes: Differences between these world consumption figures and world production statistics are accounted for by stock changes, consumption of non-petroleum additives and substitute fuels and unavoidable disparities in the definition, measurement or conversion of oil supply and demand data.
Annual changes and shares of total are calculated using thousand barrels daily figures.

Oil Consumption in exajoules*

* Inland demand plus international aviation and marine bunkers and refinery fuel and loss. Consumption of biogasoline (such as ethanol) and biodiesel are excluded while derivatives of coal and natural gas are included.
† Less than 0.05%.
Excludes Estonia, Latvia and Lithuania prior to 1985 and Croatia and Slovenia prior to 1990.
Notes: Differences between these world consumption figures and world production statistics are accounted for by stock changes, consumption of non-petroleum additives and substitute fuels and unavoidable disparities in the definition, measurement or conversion of oil supply and demand data.
Annual changes and shares of total are calculated using exajoules figures. Growth rates are adjusted for leap years.

Oil Regional consumption – by product group

Thousand barrels daily	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Growth rate per annum	Share		
												2023	2023	2013–23	2023
North America															
Light distillates															
of which: gasoline															
of which: naphtha															
Middle distillates															
of which: diesel/gasoil															
of which: jet/kerosene															
Fuel oil															
Others															
of which: ethane and LPG															
Total North America															
 of which: US															
Light distillates															
of which: gasoline															
of which: naphtha															
Middle distillates															
of which: diesel/gasoil															
of which: jet/kerosene															
Fuel oil															
Others															
of which: ethane and LPG															
Total US															
S. & Cent. America															
Light distillates															
of which: gasoline															
of which: naphtha															
Middle distillates															
of which: diesel/gasoil															
of which: jet/kerosene															
Fuel oil															
Others															
of which: ethane and LPG															
Total S. & Cent. America															
 of which: Brazil															
Light distillates															
of which: gasoline															
of which: naphtha															
Middle distillates															
of which: diesel/gasoil															
of which: jet/kerosene															
Fuel oil															
Others															
of which: ethane and LPG															
Total Brazil															
Europe															
Light distillates															
of which: gasoline															
of which: naphtha															
Middle distillates															
of which: diesel/gasoil															
of which: jet/kerosene															
Fuel oil															
Others															
of which: ethane and LPG															
Total Europe															
 of which: European Union															
Light distillates															
of which: gasoline															
of which: naphtha															
Middle distillates															
of which: diesel/gasoil															
of which: jet/kerosene															
Fuel oil															
Others															
of which: ethane and LPG															
Total European Union *															
CIS															
Light distillates															
of which: gasoline															
of which: naphtha															
Middle distillates															
of which: diesel/gasoil															
of which: jet/kerosene															
Fuel oil															
Others															
of which: ethane and LPG															
Total CIS															
Middle East															
Light distillates															
of which: gasoline															
of which: naphtha															
Middle distillates															
of which: diesel/gasoil															
of which: jet/kerosene															
Fuel oil															
Others															
of which: ethane and LPG															
Total Middle East															

Oil Regional consumption – by product group (continued)

Thousand barrels daily	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Growth rate per annum	Share
2023	2023												
<th

Oil Spot crude prices

US dollars per barrel	Dubai \$/bbl *	Brent \$/bbl †	Nigerian Forcados \$/bbl	West Texas Intermediate \$/bbl‡
2003				
2004				
2005				
2006				
2007				
2008				
2009				
2010				
2011				
2012				
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021				
2022				
2023				

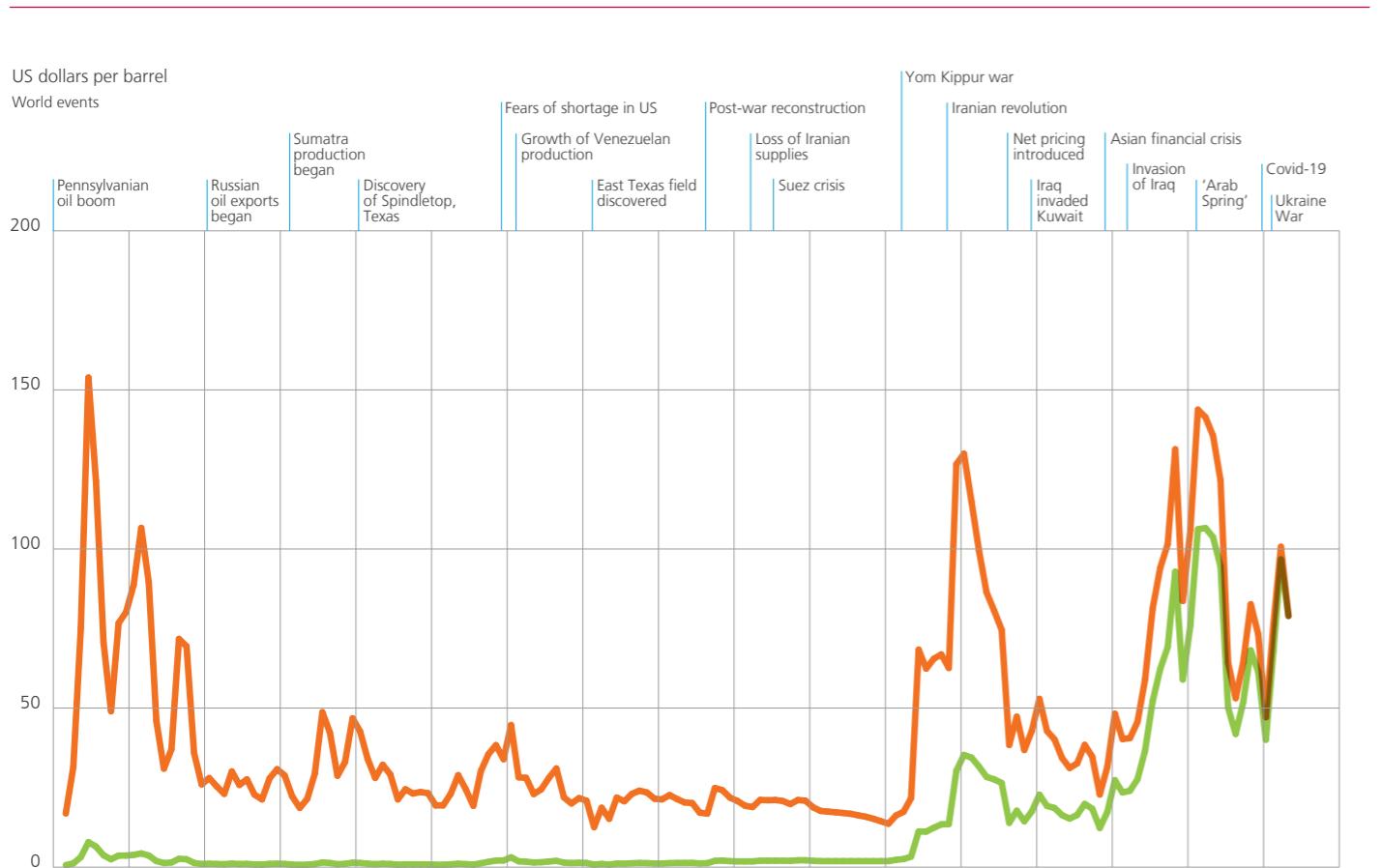
Source: S&P Global Platts, ©2023, S&P Global Inc.

* 1972 – 1985 Arabian Light, 1986 – 2021 Dubai dated.

† 1976 – 1983 Forties, 1984 – 2021 Brent date
‡ 1976 – 1983 P-10 WTI date, 1984 – 2021

‡ 1976 – 1983 Posted WTI prices, 1984 – 2021 Spot WTI (Cushing) prices.

Crude oil prices 1861–2023



— \$ 2023 (deflated using the Consumer Price Index for the US)

— \$ money of the day

1861–1944 US Average

1945–1983 Arabian Light posted at Ras Tanura

1984–2023 Brent dated

\$2023 (deflated using the Consumer Price Index for the US)

Oil Refining capacity

Source: Includes data from ICIS.

* Atmospheric distillation capacity at year end on a calendar-day basis.

† Less than 0.05%.

n/a not available.

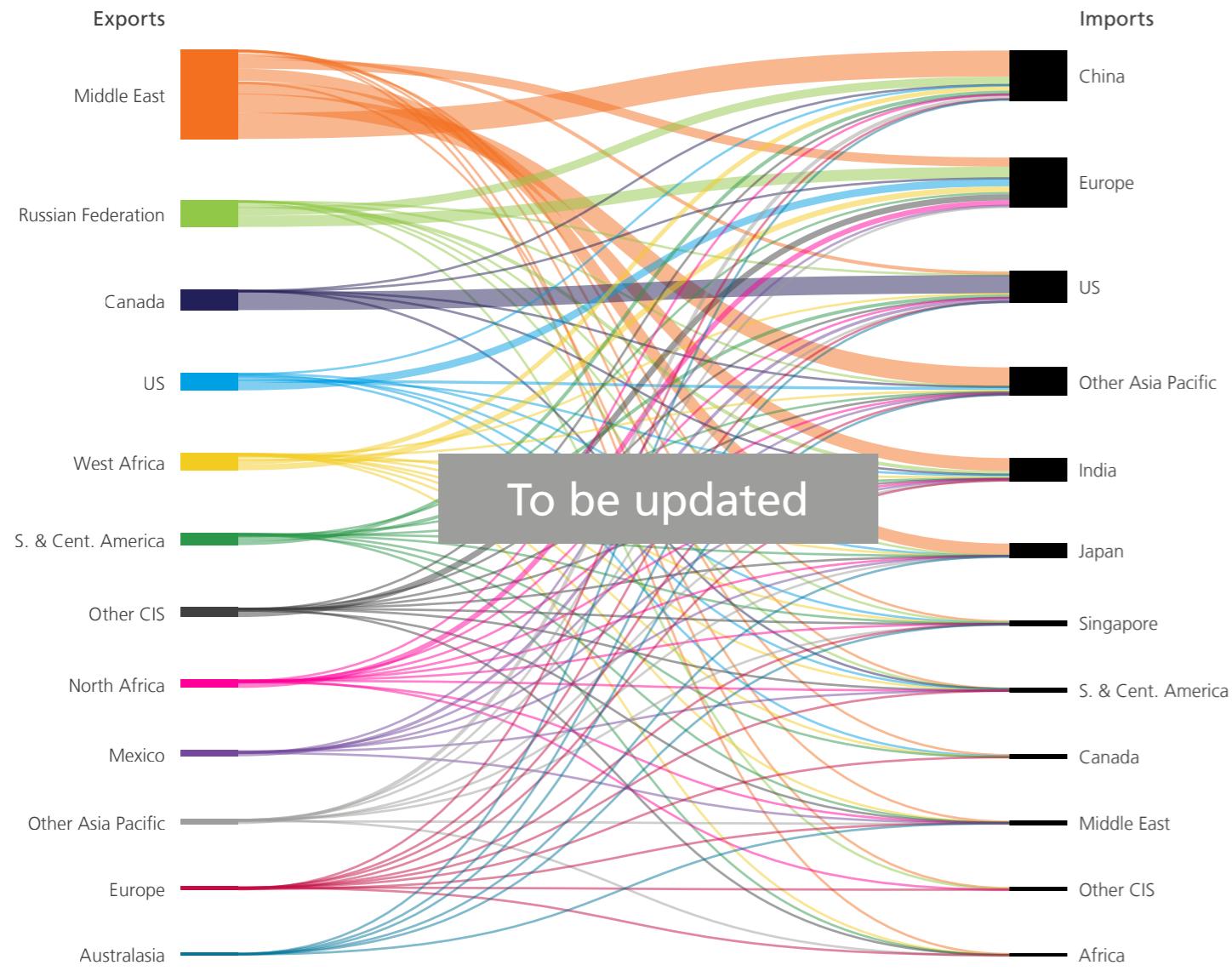
USSR includes CIS, Ge

Excludes Estonia, Latvia and Lithuania prior to 1985 and Cro

Oil Refinery throughput

Thousand barrels daily*	Growth rate per annum												Share	
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013-23	2023
Canada	1719	1615	1640	1594	1757	1653	1822	1585	1653	1696	1716	-1.1%	+ 2.1%	
Mexico	1223	1155	1064	933	767	612	592	591	712	816	792	-2.9%	-4.3%	1.0%
US	15312	15848	16188	16187	16590	16969	16563	14212	15148	15977	15963	-0.1%	0.4%	19.2%
Total North America	18254	18618	18892	18714	19114	19234	18977	16387	17513	18489	18471	-0.1%	0.1%	22.3%
Argentina	527	526	536	511	500	470	476	417	472	489	519	6.1%	-0.2%	0.6%
Brazil	2035	2085	1972	1812	1741	1733	1751	1769	1818	1935	1987	2.7%	-0.2%	2.4%
Chile	174	174	165	163	172	172	186	172	192	174	183	5.1%	0.5%	0.2%
Colombia	284	247	244	339	355	415	415	355	375	388	398	2.7%	3.4%	0.5%
Curaçao	170	189	178	156	84	29	4	—	—	—	—	-100.0%	—	—
Ecuador	141	125	121	150	156	159	142	116	163	170	175	3.0%	2.2%	0.2%
Netherlands Antilles	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Peru	186	188	188	194	213	209	192	105	138	132	131	-0.7%	-3.4%	0.2%
Trinidad & Tobago	132	105	125	148	131	99	—	—	—	—	—	-100.0%	0.0%	—
Venezuela	952	920	863	654	544	306	135	123	135	138	137	-0.3%	-17.6%	0.2%
Other S. & Cent. America	286	277	275	231	197	240	234	240	283	230	237	3.1%	-1.9%	0.3%
Total S. & Cent. America	4887	4836	4667	4359	4093	3832	3537	3298	3577	3655	3767	3.1%	-2.6%	4.5%
Austria	174	173	179	164	162	180	183	162	166	113	160	42.3%	-0.8%	0.2%
Belgium	555	645	644	640	685	663	593	545	577	558	606	8.7%	0.9%	0.7%
Bulgaria	113	104	121	125	136	118	137	97	84	141	126	-10.8%	1.1%	0.2%
Czech Republic	134	151	145	109	158	151	158	122	143	150	150	0.5%	1.2%	0.2%
Denmark	144	139	147	140	151	152	154	142	150	145	150	3.3%	0.4%	0.2%
Finland	227	225	197	226	233	240	219	159	186	197	197	5.7%	-1.4%	0.2%
France	1117	1096	1152	1122	1149	1085	978	665	683	829	913	10.1%	-2.0%	1.1%
Germany	1857	1833	1875	1887	1870	1752	1763	1685	1690	1801	1598	-11.3%	-1.5%	1.9%
Greece	399	416	436	464	483	489	462	445	476	442	469	6.3%	1.6%	0.6%
Hungary	120	131	130	133	131	141	137	135	134	129	139	7.7%	1.5%	0.2%
Ireland	57	55	68	64	64	61	51	57	61	60	56	-7.6%	-0.2%	0.1%
Italy	1259	1198	1347	1293	1399	1346	1355	1105	1224	1317	1292	-1.9%	0.3%	1.6%
Lithuania	192	160	170	187	197	195	191	157	160	165	182	10.0%	-0.5%	0.2%
Netherlands	1065	1090	1157	1172	1180	1192	1217	1103	1151	1129	1201	6.5%	1.2%	1.4%
Norway	292	274	293	230	281	305	265	237	222	145	158	9.1%	-5.9%	0.2%
Poland	488	486	532	517	508	540	546	516	497	535	503	-5.9%	0.3%	0.6%
Portugal	239	217	278	279	284	252	223	218	191	204	185	-9.0%	-2.5%	0.2%
Romania	189	194	208	228	225	232	244	206	193	235	207	-11.9%	0.9%	0.2%
Slovakia	116	105	119	115	112	109	103	112	111	108	105	-3.1%	-1.0%	0.1%
Spain	1168	1185	1306	1302	1326	1363	1318	1105	1143	1273	1243	-2.4%	0.6%	1.5%
Sweden	332	380	401	395	392	406	337	349	366	369	352	-4.5%	0.6%	0.4%
Switzerland	97	98	56	59	57	61	55	56	46	61	57	-6.9%	-5.3%	0.1%
Türkiye	421	406	526	531	542	472	673	655	692	736	726	-1.4%	5.6%	0.9%
Ukraine	85	69	64	64	77	47	50	56	62	49	51	4.0%	-5.1%	0.1%
United Kingdom	1197	1125	1118	1071	1073	1041	1044	880	889	1017	938	-7.8%	-2.4%	1.1%
Other Europe	136	128	141	148	166	123	110	114	122	122	113	-6.8%	-1.8%	0.1%
Total Europe	12173	12082	12810	12666	13032	12751	12699	11139	11383	12018	11878	-1.2%	-0.2%	14.3%
Azerbaijan	132	135	130	120	118	122	124	118	133	126	126	-0.2%	-0.5%	0.2%
Belarus	425	448	462	372	364	366	359	326	327	306	314	2.7%	-3.0%	0.4%
Kazakhstan	341	361	342	339	355	374	392	367	391	457	463	1.2%	3.1%	0.6%
Russian Federation	5636	5926	5773	5715	5703	5864	5824	5504	5723	5534	5668	2.4%	0.1%	6.8%
Turkmenistan	146	136	127	118	125	117	122	118	117	120	121	0.8%	-1.8%	0.1%
USSR	1	1	1	1	1	1	1	1	1	1	1	—	—	—
Uzbekistan	61	50	57	57	58	70	60	57	46	48	56	16.7%	-0.8%	0.1%
Other CIS	2	4	7	8	9	11	7	4	7	7	8	6.6%	13.5%	†
Total CIS	6742	7060	6899	6730	6924	6889	6494	6744	6599	6756	2.4%	†	8.1%	
Bahrain	264	257	266	258	262	260	264	230	223	251	246	-2.1%	-0.7%	0.3%
Iran	2000	1941	1868	1875										

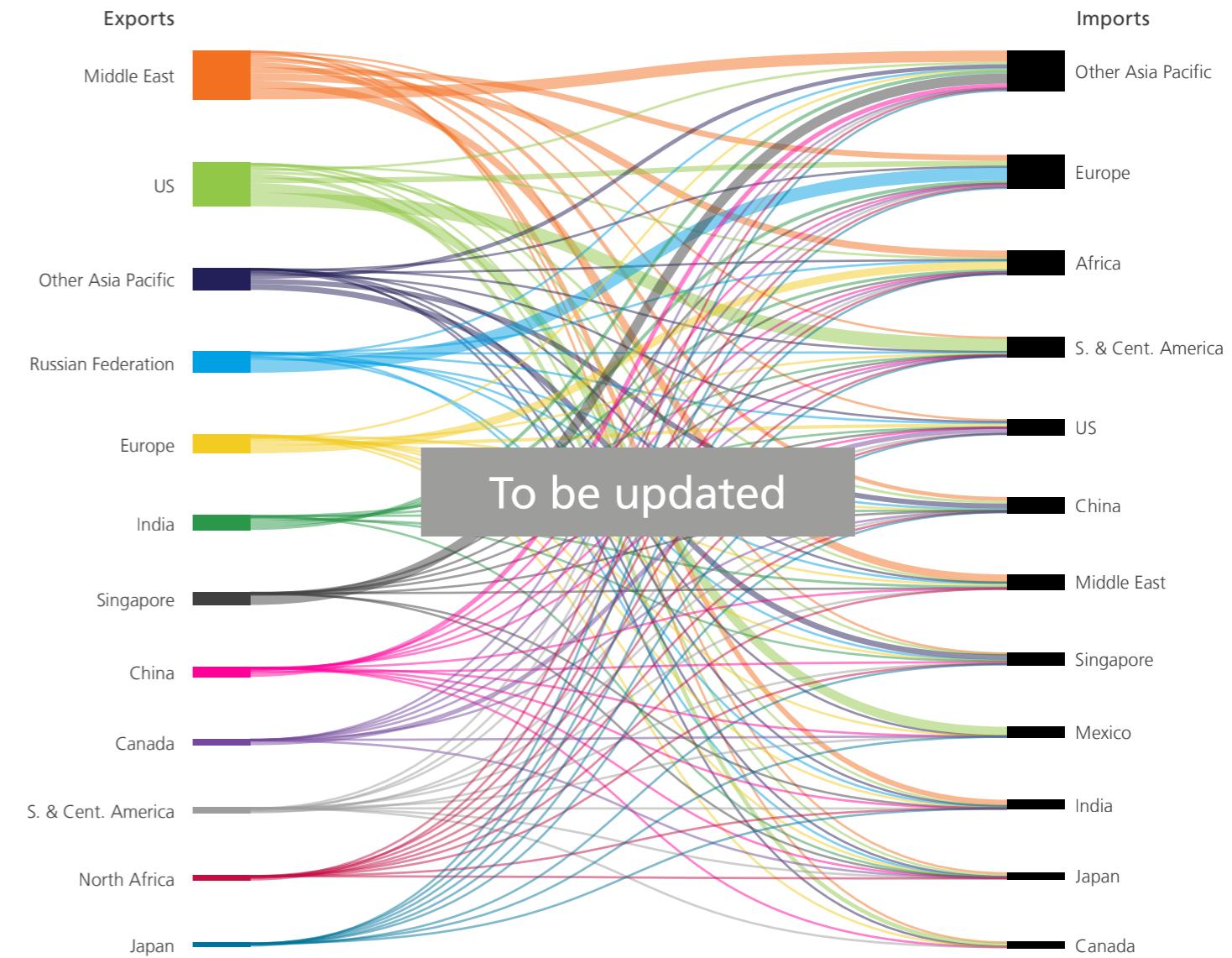
Oil Inter-area movements 2023 – Crude trade



International trade of crude oil was 2.1 billion tonnes in 2022, an increase of around 4% over 2021. The Middle East dominated exports accounting for 43% of the total followed by Russia at 12%. On the import side, the Asia Pacific

region accounted for nearly 60% of the total. China, India, and Japan were responsible for nearly 75% of the regions' total. At 0.5 billion tonnes, Europe was the second largest destination, representing around 24% of the total.

Oil Inter-area movements 2023 – Refined product



At 1.2 billion tonnes, international trade of refined product was around 40% that of crude oil in terms of volume and only 2.5% higher than it recorded in 2021. Between them, the Middle East and the US accounted for 45% of the total exports at 0.29 and 0.25 billion tonnes respectively. At 0.5

billion tonnes, Asia Pacific region accounted for around 40% of total imports. Europe was the second largest importer of refined products at 0.2 billion tonnes, 60% below Asia Pacific region.

Oil Inter-area movements 2023 – Crude trade

From	Crude (million tonnes)												Total		
	Canada	Mexico	US	S. & Cent. America	Europe	Russia	Other CIS	Middle East	Africa	Australasia	China	India	Japan	Singapore	Other Asia Pacific
Canada															
Mexico															
US															
S. & Cent. America															
Europe															
Russia															
Other CIS															
Iraq															
Kuwait															
Saudi Arabia															
UAE															
Other Middle East															
North Africa															
West Africa															
East & S. Africa															
Australasia															
China															
India															
Japan															
Singapore															
Other Asia Pacific															
Total imports															

† Less than 0.05.

Notes: Does not include biofuels trade. Bunker fuel use is not included as exports. Intra-area movements (for example, between countries within Europe) are excluded. Crude imports and exports include condensates.

Oil Inter-area movements 2023 – Refined product

From	Product (million tonnes)												Total		
	Canada	Mexico	US	S. & Cent. America	Europe	Russia	Other CIS	Middle East	Africa	Australasia	China	India	Japan	Singapore	Other Asia Pacific
Canada															
Mexico															
US															
S. & Cent. America															
Europe															
Russia															
Other CIS															
Iraq															
Kuwait															
Saudi Arabia															
UAE															
Other Middle East															
North Africa															
West Africa															
East & S. Africa															
Australasia															
China															
India															
Japan															
Singapore															
Other Asia Pacific															
Total imports															

† Less than 0.05.

Notes: Does not include biofuels trade. Bunker fuel use is not included as exports. Intra-area movements (for example, between countries within Europe) are excluded. Crude imports and exports include condensates.

Natural gas

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Natural gas Production in billion cubic metres*

Billion cubic metres	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Growth rate per annum	Share
Canada													
Mexico													
US													
Total North America													
Argentina													
Bolivia													
Brazil													
Colombia													
Peru													
Trinidad & Tobago													
Venezuela													
Other S. & Cent. America													
Total S. & Cent. America													
Denmark													
Germany													
Italy													
Netherlands													
Norway													
Poland													
Romania													
Ukraine													
United Kingdom													
Other Europe													
Total Europe													
Azerbaijan													
Kazakhstan													
Russian Federation													
Turkmenistan													
Uzbekistan													
Other CIS													
Total CIS													
Bahrain													
Iran													
Iraq													
Kuwait													
Oman													
Qatar													
Saudi Arabia													
Syria													
United Arab Emirates													
Yemen													
Other Middle East													
Total Middle East													
Algeria													
Egypt													
Libya													
Nigeria													
Other Africa													
Total Africa													
Australia													
Bangladesh													
Brunei													
China													
India													
Indonesia													
Malaysia													
Myanmar													
Pakistan													
Thailand													
Vietnam													
Other Asia Pacific													
Total Asia Pacific													
Total World													
of which:													
OECD													
Non-OECD													
European Union ^a													

Source: Includes data from Cedigaz, FGE MENAgas service.

* Excludes gas flared or recycled. Includes natural gas produced for Gas-to-Liquids transformation.

^a Less than 0.05.

^t Less than 0.05%.

Excludes Estonia, Latvia and Lithuania prior to 1985 and Croatia and Slovenia prior to 1990.

Notes: As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar); as they are derived directly from measures of energy content using an average conversion factor and have been standardised using a Gross Calorific Value (GCV) of 40 MJ/m³, they do not necessarily equate with gas volumes expressed in specific national terms.

Annual changes and shares of total are calculated using billion cubic metres figures.



Natural gas Consumption in exajoules*

Exajoules													Growth rate per annum	Share
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023			
	2023	2013–23	2023											
Canada														
Mexico														
US														
Total North America														
Argentina														
Brazil														
Chile														
Colombia														
Ecuador														
Peru														
Trinidad & Tobago														
Venezuela														
Central America														
Other Caribbean														
Other South America														
Total S. & Cent. America														
Austria														
Belgium														
Bulgaria														
Croatia														
Cyprus														
Czech Republic														
Denmark														
Estonia														
Finland														
France														
Germany														
Greece														
Hungary														
Iceland														
Ireland														
Italy														
Latvia														
Lithuania														
Luxembourg														
Netherlands														
North Macedonia														
Norway														
Poland														
Portugal														
Romania														
Slovakia														
Slovenia														
Spain														
Sweden														
Switzerland														
Türkiye														
Ukraine														
United Kingdom														
Other Europe														
Total Europe														
Azerbaijan														
Belarus														
Kazakhstan														
Russian Federation														
Turkmenistan														
Uzbekistan														
Other CIS														
Total CIS														
Iran														
Iraq														
Israel														
Kuwait														
Oman														
Qatar														
Saudi Arabia														
United Arab Emirates														
Other Middle East														
Total Middle East														
Algeria														
Egypt														
Morocco														
South Africa														
Eastern Africa														
Middle Africa														
Western Africa														
Other Northern Africa														
Other Southern Africa														
Total Africa														
Australia														
Bangladesh														
China														
China Hong Kong SAR														
India														
Indonesia														
Japan														
Malaysia														
New Zealand														
Pakistan														
Philippines														
Singapore														
South Korea														
Sri Lanka														
Taiwan														
Thailand														
Vietnam														
Other Asia Pacific														
Total Asia Pacific														
Total World														
of which: OECD														
Non-OECD														
European Union*														

Source: Includes data from Cedigaz, FGE MENAgas service.
* Excludes natural

Natural gas Major trade movements 2023 – LNG



In 2022, international trade of natural gas as liquified natural gas (LNG) represented 56% of all inter-regional traded gas. At a total of 542 Bcm, it was up 5% on the previous year. The Middle East was the largest exporter of LNG and, together with Australia and the US, represented 65% of total

LNG exports. At 98 Bcm, Japan was the largest importer of LNG. Along with China, it accounted for 35% of total global imports. As a region, Asia Pacific imported around 65% of total LNG, followed by Europe at just over 30%.

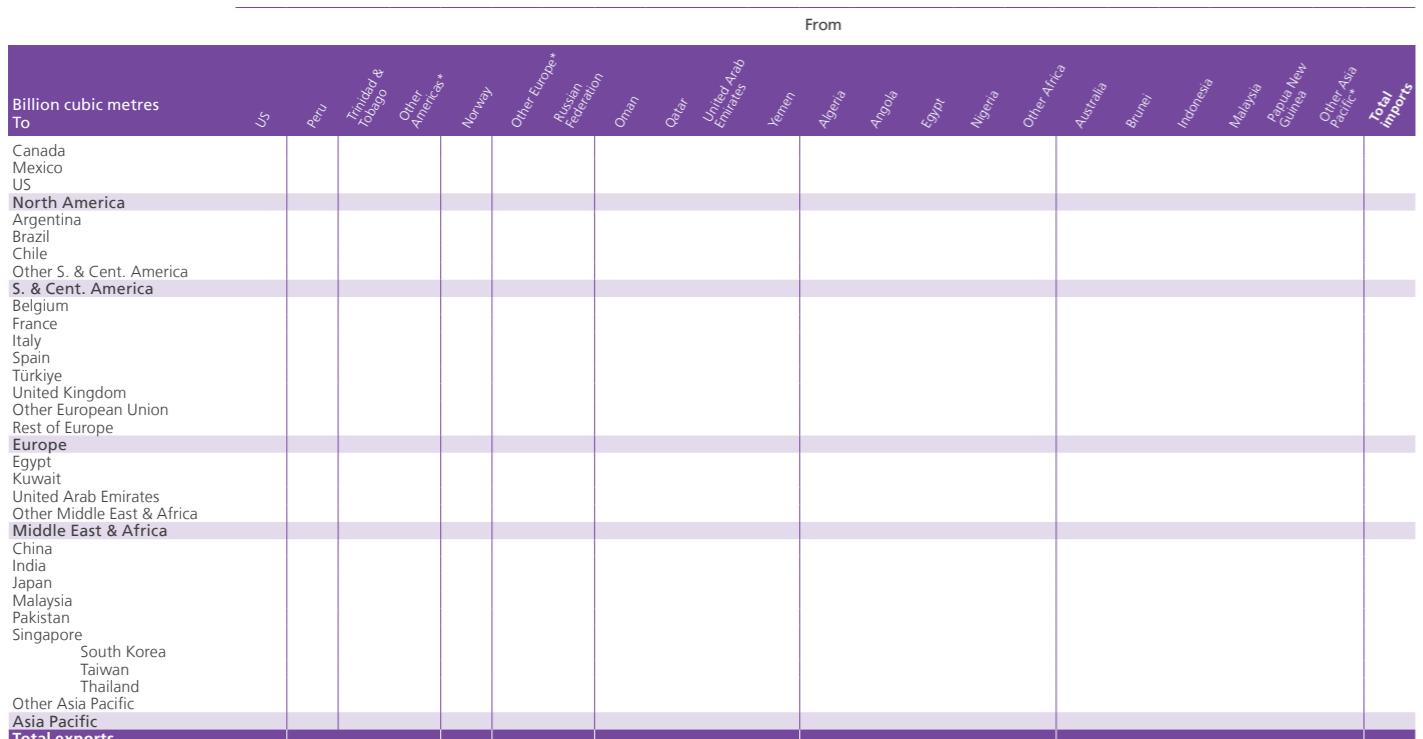
Natural gas Major trade movements 2023 – pipeline



Unlike LNG trade that grew in 2022, international trade of natural gas via pipelines declined by around 15%, falling 78 Bcm compared to 2021. Over the past 10 years Russia has, on average, been responsible for around 43% of total

global gas exports via pipelines. In 2022, its share of total global pipeline exports fell to 29%, a drop of around 76 Bcm. Despite this, it still ranked highest at 25% of total global exports, followed by Norway at 23%.

Natural gas Trade movements 2023 as LNG*



Source: Includes data from GIGNL, IHS.
* Includes re-exports.
† Less than 0.05.
Note: As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar) and has been standardised using a gross calorific value (GCV) of 40 MJ/m³.

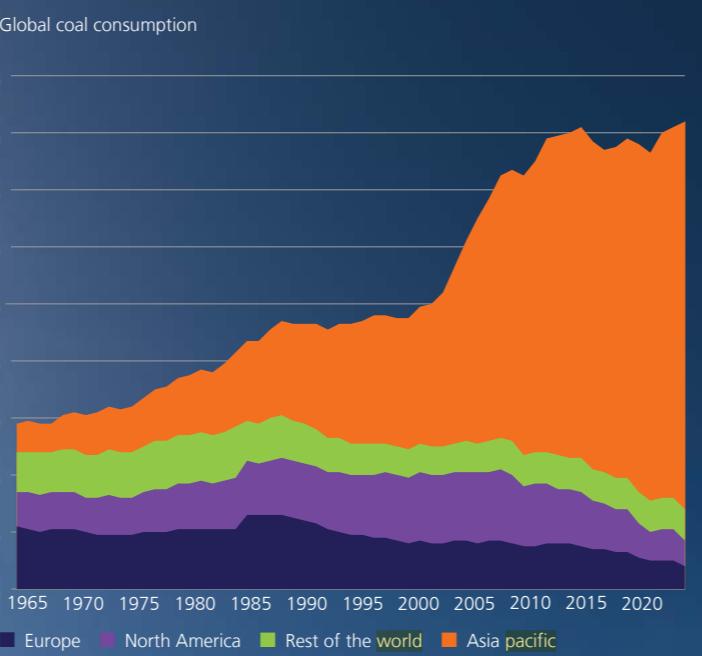
Natural gas Trade movements 2023 by pipeline



Coal

In 2023, global coal production reached its highest ever level (179 EJ), beating the previous high set the year before. The Asia Pacific region accounted for nearly 80% of global output with activity concentrated in just four countries, Australia, China, India, and Indonesia (jointly responsible for 97% of the region's output). China alone was responsible for just over half of total global production. North America, Southern and Central America, Europe and the Commonwealth of Independent States all saw their production fall relative to 2022 levels.

Global coal consumption breached 164 EJ for the first time ever. An increase of 1.6% over 2022 was 7 times higher than the previous ten-year average growth rate. Whilst China is by far the largest consumer of coal (56% of the world's total), in 2023 India exceeded the combined consumption of Europe and North America for the first time ever. Coal consumption in both Europe and North America fell below 10 EJ, their lowest levels since 1965.



Coal consumption in India exceeds the combined consumption of Europe and North America for the first time ever

Coal Production*

Million tonnes	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Growth rate per annum	Share	
	2023	2013-23	2023											
Canada	68.4	68.3	62.4	62.4	60.6	55.0	53.2	46.1	47.6	46.7	48.6	4.0%	-3.3%	0.5%
Mexico	14.6	14.9	12.3	11.4	11.9	9.8	9.8	7.7	5.5	5.5	5.6	0.1%	-9.2%	0.1%
US	893.4	907.2	813.7	660.8	702.7	686.0	640.8	485.7	523.8	539.0	526.5	-2.3%	-5.1%	5.8%
Total North America	976.5	990.4	888.3	734.5	776.2	752.9	703.7	539.6	577.0	591.3	580.6	-1.8%	-5.0%	6.4%
Brazil	9.5	9.4	8.0	7.5	5.8	6.4	5.8	7.1	8.0	7.6	6.8	-10.1%	-3.2%	0.1%
Colombia	86.1	89.4	86.5	91.2	91.5	86.9	85.9	54.4	59.1	58.0	54.5	-5.9%	-4.4%	0.6%
Venezuela	1.2	0.8	0.8	0.7	0.7	0.7	0.4	0.3	0.2	0.8	0.8	-	-4.1%	†
Other S. & Cent. America	3.2	4.5	3.4	2.8	1.8	1.6	1.1	0.4	0.2	0.3	0.3	11.8%	-21.5%	†
Total S. & Cent. America	99.9	104.0	98.8	102.3	99.9	95.6	93.3	62.2	67.6	66.6	62.5	-6.2%	-4.6%	0.7%
Bulgaria	28.6	31.3	35.9	31.3	34.3	30.6	28.3	22.6	28.4	35.6	21.0	-40.9%	-3.0%	0.2%
Czech Republic	49.1	47.1	46.5	45.5	44.9	43.8	41.0	31.6	31.5	35.1	30.0	-14.7%	-4.8%	0.3%
Germany	190.6	185.8	184.3	175.4	175.1	168.8	131.3	107.4	126.3	130.8	102.3	-21.8%	-6.0%	1.1%
Greece	53.9	50.8	46.2	32.6	37.7	36.5	27.4	14.1	12.4	14.3	10.9	-23.6%	-14.8%	0.1%
Hungary	9.6	9.6	9.3	9.2	8.0	7.9	6.8	6.1	5.0	4.9	4.1	-17.4%	-8.2%	†
Poland	142.9	137.1	135.8	131.0	127.1	122.4	112.4	100.7	107.6	107.8	88.7	-17.7%	-4.6%	1.0%
Romania	24.7	23.6	25.5	23.0	25.8	23.7	21.7	15.0	17.7	18.2	14.8	-18.8%	-5.0%	0.2%
Serbia	40.3	29.8	37.8	38.5	39.8	37.6	38.9	39.7	36.4	35.1	31.9	-9.1%	-2.3%	0.4%
Spain	4.4	3.9	3.1	1.7	3.0	2.4	0.1	0.1	0.1	0.1	0.1	-	-33.7%	†
Türkiye	60.4	65.2	58.4	73.0	74.1	83.9	87.1	74.7	86.5	95.3	66.4	-30.4%	1.0%	0.7%
Ukraine	64.9	45.7	30.4	32.2	24.7	26.8	26.1	24.4	26.2	24.1	23.3	-3.3%	-9.7%	0.3%
United Kingdom	12.8	11.6	8.6	4.2	3.0	2.8	2.6	1.7	1.1	0.7	0.5	-22.3%	-27.6%	†
Other Europe	70.7	67.2	64.5	61.7	65.1	66.3	56.8	50.2	47.6	50.7	46.2	-8.9%	-4.2%	0.5%
Total Europe	752.8	708.8	686.3	659.4	662.6	653.5	580.5	488.3	526.7	552.6	440.1	-20.4%	-5.2%	4.8%
Kazakhstan	119.6	114.0	107.3	103.1	112.3	118.5	115.0	113.4	116.2	117.8	116.4	-1.2%	-0.2%	1.3%
Russian Federation	355.2	357.5	372.5	386.6	411.0	441.3	440.7	399.8	434.1	439.0	432.5	-1.5%	2.0%	4.8%
USSR	355.2	357.5	372.5	386.6	411.0	441.3	440.7	399.8	434.1	439.0	432.5	-1.5%	2.0%	4.8%
Uzbekistan	4.1	4.4	3.5	3.9	4.0	4.2	4.0	4.1	5.1	5.4	6.2	15.5%	4.3%	0.1%
Other CIS	4.2	4.1	4.0	4.6	5.7	7.7	7.9	6.2	6.6	8.6	8.4	-2.4%	7.2%	0.1%
Total CIS	483.1	480.0	487.3	498.1	533.0	571.6	567.6	523.5	561.9	570.8	563.4	-1.3%	1.6%	6.2%
Total Middle East	1.5	1.5	1.6	1.8	1.8	2.2	2.0	2.1	2.4	4.9	10.3	110.1%	21.1%	0.1%
South Africa	256.3	261.4	252.2	249.7	252.3	250.0	254.4	248.1	233.7	229.9	228.5	-0.6%	-1.1%	2.5%
Zimbabwe	3.1	5.8	4.3	2.7	2.9	3.3	2.6	2.7	3.2	3.9	5.0	26.6%	4.9%	0.1%
Other Africa	8.3	9.4	9.7	9.2	16.7	20.3	15.1	13.2	17.3	23.3	23.6	1.1%	11.1%	0.3%
Total Africa	267.7	276.6	266.2	261.7	271.9	273.7	272.2	264.0	254.3	257.2	257.1	†	-0.4%	2.8%
Australia	472.8	505.3	503.7	502.1	487.2	502.2	505.6	470.0	460.3	440.1	455.8	3.6%	-0.3%	5.0%
China	3974.3	3873.9	3746.5	3410.6	3523.6	3697.7	3846.3	3901.6	4125.8	4558.6	4710.0	3.3%	1.7%	51.8%
India	608.5	646.2	674.2	689.8	711.7	760.4	753.9	760.2	812.1	910.8	1010.9	11.0%	5.2%	11.1%
Indonesia	474.4	458.1	461.6	456.2	461.2	557.8	616.2	563.7	614.0	687.4	775.2	12.8%	5.1%	8.5%
Japan	1.2	1.3	1.2	1.3	1.4	1.0	0.8	0.8	0.7	0.7	0.6	-8.8%	-6.2%	†
Mongolia	33.3	24.4	24.1	35.1	49.5	54.6	57.1	43.1	32.3	39.3	83.2	111.6%	9.6%	0.9%
New Zealand	4.6	4.0	3.4	2.9	2.9	3.2	3.0	2.8	2.9	2.6	2.6	-1.4%	-5.6%	†
Pakistan														

Coal Production*

Exajoules	Growth rate per annum												Share	
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013-23	2023
Canada	1.53	1.51	1.36	1.37	1.33	1.22	1.20	1.15	1.21	1.19	1.24	4.1%	-2.0%	0.7%
Mexico	0.30	0.30	0.29	0.25	0.31	0.28	0.23	0.19	0.14	0.14	0.14	0.1%	-7.5%	0.1%
US	20.05	20.33	17.99	14.70	15.66	15.40	14.29	10.73	11.62	12.07	11.84	-1.9%	-5.1%	6.6%
Total North America	21.87	22.15	19.64	16.33	17.30	16.90	15.72	12.07	12.97	13.40	13.21	-1.4%	-4.9%	7.4%
Brazil	0.15	0.15	0.12	0.11	0.09	0.10	0.09	0.10	0.12	0.11	0.10	-11.1%	-4.4%	0.1%
Colombia	2.48	2.57	2.49	2.62	2.63	2.50	2.47	1.57	1.70	1.67	1.57	-5.9%	-4.4%	0.9%
Venezuela	0.04	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	-	-6.8%	†
Other S. & Cent. America	0.07	0.12	0.10	0.08	0.05	0.05	0.03	0.01	0.01	0.01	0.01	12.3%	-20.0%	†
Total S. & Cent. America	2.74	2.87	2.84	2.80	2.67	2.61	1.69	1.83	1.80	1.69	1.61	-6.1%	-4.7%	0.9%
Bulgaria	0.20	0.21	0.25	0.21	0.24	0.21	0.20	0.16	0.20	0.25	0.15	-40.9%	-3.1%	0.1%
Czech Republic	0.74	0.71	0.71	0.67	0.64	0.62	0.56	0.43	0.44	0.48	0.40	-15.2%	-5.9%	0.2%
Germany	1.89	1.85	1.79	1.66	1.65	1.58	1.19	0.98	1.15	1.19	0.92	-23.2%	-7.0%	0.5%
Greece	0.28	0.27	0.24	0.17	0.19	0.18	0.13	0.07	0.06	0.07	0.05	-23.6%	-15.4%	†
Hungary	0.07	0.07	0.06	0.06	0.05	0.04	0.04	0.03	0.03	0.03	0.03	-17.4%	-8.7%	†
Poland	2.39	2.26	2.22	2.18	2.08	1.98	1.87	1.68	1.76	1.71	1.48	-13.2%	-4.6%	0.8%
Romania	0.19	0.19	0.20	0.18	0.19	0.17	0.16	0.11	0.13	0.12	0.09	-18.8%	-7.0%	0.1%
Serbia	0.32	0.24	0.30	0.30	0.28	0.29	0.30	0.26	0.25	0.25	0.23	-9.1%	-3.4%	0.1%
Spain	0.07	0.07	0.05	0.03	0.05	0.04	^	^	^	^	^	-	-32.7%	†
Türkiye	0.65	0.68	0.54	0.65	0.63	0.69	0.73	0.66	0.75	0.83	0.58	-29.7%	-1.0%	0.3%
Ukraine	1.60	1.09	0.72	0.76	0.57	0.61	0.60	0.53	0.57	0.53	0.51	-3.3%	-10.8%	0.3%
United Kingdom	0.32	0.29	0.21	0.11	0.08	0.08	0.07	0.05	0.03	0.02	0.01	-22.3%	-26.8%	†
Other Europe	0.72	0.64	0.59	0.59	0.60	0.60	0.52	0.46	0.44	0.45	0.42	-8.3%	-5.2%	0.2%
Total Europe	9.45	8.57	7.88	7.58	7.28	7.08	6.36	5.47	5.82	5.92	4.88	-17.7%	-6.4%	2.7%
Kazakhstan	2.15	2.09	1.66	1.75	1.92	1.98	1.88	1.86	1.92	1.95	1.92	-1.2%	-1.1%	1.1%
Russian Federation	7.25	7.39	7.80	8.12	8.62	9.23	8.42	9.25	9.35	9.21	9.21	-1.5%	2.5%	5.1%
USSR	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.07	15.5%	4.3%	†
Uzbekistan	0.05	0.05	0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.13	-3.6%	8.8%	0.1%
Other CIS	0.06	0.06	0.07	0.07	0.09	0.12	0.12	0.11	0.11	0.14	0.13	-0.6%	-1.1%	3.0%
Total CIS	9.51	9.60	9.57	10.00	10.68	11.37	11.28	10.43	11.34	11.50	11.34	-1.4%	1.8%	6.3%
Total Middle East	0.03	0.03	0.03	0.04	0.04	0.05	0.04	0.04	0.04	0.06	0.09	37.4%	11.2%	†
South Africa	6.08	6.20	5.96	6.01	5.97	6.01	6.02	5.88	5.53	5.44	5.41	-0.6%	-1.1%	3.0%
Zimbabwe	0.08	0.16	0.12	0.07	0.08	0.09	0.07	0.07	0.09	0.11	0.13	26.6%	4.9%	0.1%
Other Africa	0.21	0.24	0.25	0.24	0.43	0.53	0.39	0.34	0.45	0.60	0.61	1.6%	11.0%	0.3%
Total Africa	6.38	6.59	6.33	6.32	6.49	6.63	6.48	6.29	6.06	6.15	6.15	0.1%	-0.3%	3.4%
Australia	11.97	12.81	12.80	12.83	12.50	13.10	13.18	12.09	11.75	11.24	11.66	3.8%	-0.2%	6.5%
China	79.32	78.05	76.59	70.82	73.17	76.87	79.76	80.51	83.44	91.32	93.10	2.0%	1.6%	51.9%
India	10.71	11.28	11.77	11.89	11.99	12.80	12.60	12.59	13.38	15.05	16.75	11.3%	4.6%	9.3%
Indonesia	10.44	10.15	10.19	9.87	9.69	11.44	12.84	11.78	12.68	13.95	15.73	12.8%	4.2%	8.8%
Japan	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	-5.0%	-5.8%	†
Mongolia	0.64	0.47	0.46	0.67	0.94	1.04	1.09	0.82	0.62	0.75	1.59	111.6%	9.6%	0.9%
New Zealand	0.12	0.10	0.09	0.07	0.07	0.08	0.07	0.07	0.07	0.07	0.07	-0.3%	-5.9%	†
Pakistan	0.06	0.06	0.06	0.08	0.08	0.08	0.13	0.18	0.19	0.19	0.32	71.0%	19.1%	0.2%
South Korea	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.01	-21.1%	-9.4%	†
Thailand	0.20	0.19	0.16	0.18	0.17	0.16	0.15	0.14	0.15	0.14	0.13	-6.1%	-3.8%	0.1%
Vietnam	0.96	0.96	0.98	0.91	0.90	0.99	1.09	1.05	1.13	1.17	1.13	-3.4%	1.6%	0.6%
Other Asia Pacific	1.08	1.09	1.13	1.40	1.33	1.22	1.38	1.30	1.21	1.35	1.37	1.1%	2.5%	0.8%
Total Asia Pacific	115.55	115.25	114.27	108.78	110.91	117.83	122.33	120.55	124.66	135.26	141.88	4.9%	2.1%	79.2%
Total World	165.52	165.06	160.45	151.88	155.49	162.52	164.82	156.54	162.73	174.09	179.24	3.		

Coal Trade movements

Exajoules	Growth rate per annum												Share		
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013–23	2023	
Imports															
Canada	0.22	0.26	0.22	0.19	0.22	0.23	0.21	0.17	0.19	0.18	0.19	6.7%	-1.3%	0.5%	
Mexico	0.20	0.22	0.23	0.21	0.32	0.32	0.25	0.13	0.05	0.05	0.08	72.5%	-8.4%	0.2%	
US	0.24	0.28	0.28	0.25	0.19	0.15	0.17	0.65	0.14	0.16	0.11	-34.8%	-7.6%	0.3%	
S. & Cent. America	1.08	1.08	1.03	1.08	1.20	1.18	1.12	1.04	1.25	1.05	0.96	-8.3%	-1.1%	2.7%	
Europe	5.84	6.08	6.02	5.38	5.83	6.34	5.08	3.93	4.44	4.94	3.56	-27.9%	-4.8%	10.0%	
CIS	0.58	0.59	0.58	0.52	0.60	0.65	0.70	0.66	0.64	0.49	0.50	1.3%	-1.6%	1.4%	
Middle East	0.44	0.49	0.39	0.34	0.36	0.37	0.34	0.38	0.34	0.24	0.27	9.4%	-4.9%	0.8%	
Africa	0.82	0.37	0.46	0.50	0.63	0.82	0.92	0.52	0.68	0.73	0.82	11.7%	+	2.3%	
China	7.62	6.62	4.69	5.65	5.87	6.00	6.40	6.61	6.68	5.83	10.16	74.3%	2.9%	28.7%	
India	3.66	4.65	4.92	10.11	5.25	5.68	4.70	4.74	4.67	4.99	5.35	7.3%	3.9%	15.1%	
Japan	5.06	5.00	5.05	5.01	5.06	5.00	4.90	4.56	4.84	4.82	4.39	-9.0%	-1.4%	12.4%	
South Korea	3.32	3.43	3.54	3.53	3.89	3.90	3.73	3.28	3.35	3.36	3.19	-4.9%	-0.4%	9.0%	
Other Asia Pacific	3.49	3.58	3.79	4.47	4.90	5.34	5.22	6.36	6.22	5.53	5.86	6.0%	5.3%	16.5%	
Total World	32.57	32.66	31.19	37.25	34.32	35.99	33.72	33.03	33.51	32.37	35.43	9.5%	0.8%	100.0%	
Exports															
Canada	1.12	1.03	0.85	0.78	0.95	1.03	1.02	0.95	0.96	0.97	0.99	1.5%	-1.3%	2.8%	
US	2.88	2.37	1.90	1.53	2.41	2.89	2.21	1.74	2.18	2.23	2.47	10.6%	-1.5%	7.0%	
Colombia	2.05	2.27	2.19	2.33	2.48	2.42	2.09	1.82	1.67	1.59	1.59	+	-2.5%	4.5%	
Europe	0.68	0.13	0.10	0.13	0.19	0.25	0.24	0.21	0.22	0.15	0.23	49.4%	-10.4%	0.6%	
Russia	3.54	3.91	4.10	4.45	5.09	5.76	5.79	5.66	6.03	5.31	5.39	1.4%	4.3%	15.2%	
Other CIS	0.53	0.54	0.53	0.48	0.50	0.49	0.55	0.63	0.65	0.72	0.65	-8.9%	2.1%	1.8%	
South Africa	2.11	2.19	2.27	2.14	2.68	2.95	1.41	1.73	1.62	1.72	1.74	1.0%	-1.9%	4.9%	
Other Africa	0.11	0.18	0.28	5.68	0.66	0.24	0.28	0.74	0.37	0.47	0.53	12.5%	16.5%	1.5%	
Australia	9.16	9.89	9.91	9.84	9.63	9.71	9.60	9.33	9.60	8.21	9.00	9.6%	-0.2%	25.4%	
China	0.28	0.37	0.45	0.50	0.40	0.41	0.31	0.18	0.28	0.31	0.31	-0.2%	1.1%	0.9%	
Indonesia	8.51	8.35	7.41	7.69	8.01	8.49	8.49	8.79	8.98	9.19	10.00	8.8%	1.6%	28.2%	
Mongolia	0.49	0.53	0.41	0.73	0.95	0.99	1.04	0.83	0.49	0.90	1.96	116.8%	14.8%	5.5%	
Other Asia Pacific	0.96	0.80	0.67	0.79	0.32	0.29	0.60	0.34	0.36	0.44	0.46	5.5%	-7.1%	1.3%	
Rest of World	0.15	0.09	0.13	0.17	0.06	0.08	0.09	0.08	0.08	0.14	0.13	-13.0%	-1.6%	0.4%	
Total World	32.57	32.66	31.19	37.25	34.32	35.99	33.72	33.03	33.51	32.37	35.43	9.5%	0.8%	100.0%	

^a Less than 0.005.
^t Less than 0.05.

Notes: Commercial solid fuels only, i.e. bituminous coal and anthracite (hard coal), and lignite and brown (sub-bituminous) coal, and other commercial solid fuels.

Intra-area movements (for example between countries in Europe) are excluded.

	Coal								Uranium				
	US dollars per tonne								\$/lb	\$/lb	\$/lb		
	United States ¹	Colombia ²	Northwest Europe ³	South Africa ⁴	Indonesia ⁵	South China ⁶	Japan ⁷	Australia ⁸	Canada ⁹				
1987	—	—	31.30	—	—	—	—	—	—	—	—	—	—
1988	—	—	39.94	—	—	—	—	—	—	—	—	—	—
1989	—	—	42.08	—	—	—	—	—	—	—	—	—	—
1990	31.59	—	—	43.48	—	—	—	—	—	—	—	—	—
1991	29.01	—	—	42.80	—	—	—	—	—	—	—	—	—
1992	28.53	—	—	38.53	—	—	—	—	—	—	—	—	—
1993	29.85	—	—	33.68	—	—	—	—	—	—	—	—	—
1994	31.72	—	—	37.18	—	—	—	—	—	—	—	—	—
1995	27.01	—	—	44.50	—	—	—	—	—	—	—	—	—
1996	29.86	—	—	41.25	—	—	—	—	—	—	—	—	—
1997	29.76	—	—	38.92	—	—	—	—	—	—	—	—	—
1998	31.00	—	—	32.00	—	—	—	—	—	—	—	—	—
1999	31.29	—	—	28.79	—	—	—	—	—	—	—	—	—
2000	29.90	—	—	35.99	—	—	27.52	—	—	—	—	—	—
2001	50.15	—	—	39.03	—	—	31.78	37.69	—	—	—	—	—
2002	33.20	—	—	31.65	—	—	33.19	31.47	—	—	—	—	—

Nuclear energy

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 Nuclear energy Generation*

	Growth rate per annum											Share		
Terawatt-hours	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013-23	2023
Canada	102.7	106.5	101.1	100.7	100.6	100.0	100.5	97.5	92.0	86.6	89.0	2.8%	-1.4%	3.3%
Mexico	11.8	9.7	11.6	10.6	10.9	13.6	11.2	11.2	11.9	10.8	12.4	14.2%	0.5%	0.5%
US	830.5	839.1	839.1	848.1	847.3	849.6	852.0	831.5	820.7	812.1	816.2	0.5%	-0.2%	29.8%
Total North America	945.1	955.3	951.8	959.4	958.8	963.1	963.7	940.1	924.6	909.6	917.6	0.9%	-0.3%	33.5%
Argentina	6.2	5.5	7.0	8.3	6.1	6.9	8.4	10.0	10.2	7.5	9.0	20.0%	3.7%	0.3%
Brazil	15.4	15.4	14.7	15.9	15.7	15.7	16.1	14.1	14.7	14.6	14.5	-0.3%	-0.6%	0.5%
Chile	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Colombia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ecuador	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peru	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trinidad & Tobago	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Venezuela	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Central America	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Caribbean	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other South America	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total S. & Cent. America	21.7	20.9	21.8	24.1	21.8	22.5	24.6	24.1	24.9	22.0	23.5	6.6%	0.8%	0.9%
Austria	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belgium	42.6	33.7	26.1	43.5	42.2	28.6	43.5	34.4	50.3	43.9	32.9	-25.0%	-2.6%	1.2%
Bulgaria	14.2	15.9	15.4	15.8	15.5	16.1	16.6	16.6	16.5	16.5	16.2	-1.7%	1.3%	0.6%
Croatia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyprus	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	30.7	30.3	26.8	24.1	28.3	29.9	30.2	30.0	30.7	31.0	30.4	-2.0%	-0.1%	1.1%
Denmark	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Estonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Finland	23.6	23.6	23.2	23.2	22.5	22.8	23.9	23.3	23.6	25.3	34.2	35.2%	3.8%	1.3%
France	423.7	436.5	437.4	403.2	398.4	412.9	399.0	353.8	379.4	294.7	338.2	14.7%	-2.2%	12.4%
Germany	97.3	97.1	91.8	84.6	76.3	76.0	75.1	64.4	69.1	34.7	7.2	-79.2%	-22.9%	0.3%
Greece	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hungary	15.4	15.6	15.8	16.1	16.1	15.7	16.3	16.1	16.0	15.8	15.9	0.7%	0.4%	0.6%
Iceland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ireland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Italy	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Latvia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lithuania	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Luxembourg	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Netherlands	2.9	4.1	4.1	4.0	3.4	3.5	3.9	4.1	3.8	4.2	4.0	-4.1%	3.3%	0.1%
North Macedonia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Portugal	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Romania	11.6	11.7	11.6	11.3	11.5	11.4	11.3	11.5	11.3	11.1	11.2	0.9%	-0.4%	0.4%
Slovakia	15.7	15.5	15.1	14.8	15.1	14.8	15.3	15.4	15.7	15.9	18.3	15.2%	1.6%	0.7%
Slovenia	5.3	6.4	5.6	5.7	6.3	5.8	5.8	6.4	5.7	5.6	5.6	-0.6%	0.2%	-
Spain	56.7	57.3	57.3	58.6	58.1	55.8	58.3	58.3	56.6	58.6	56.8	-3.0%	-	2.1%
Sweden	66.5	64.9	56.3	63.1	65.7	68.5	66.1	49.2	53.0	51.9	48.4	-6.8%	-3.1%	1.8%
Switzerland	26.2	27.8	23.3	21.3	20.5	24.4	25.3	23.0	18.5	23.1	23.3	1.0%	-1.1%	0.9%
Türkiye	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ukraine	83.2	88.4	87.6	81.0	85.6	84.4	83.0	76.2	86.2	62.1	52.4	-15.6%	-4.5%	1.9%
United Kingdom	70.6	63.7	70.3	71.7	70.3	65.1	56.2	50.3	45.9	47.7	40.7	-14.6%	-5.3%	1.5%
Other Europe	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Europe	986.2	992.4	968.0	941.9	935.9	935.8	929.7	833.0	882.3	742.2	735.9	-0.8%	-2.9%	26.9%
Azerbaijan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Belarus	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4%
Kazakhstan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Russian Federation	172.5	180.8	195.5	196.6	203.1	204.6	209.0	215.9	222.4	223.7	217.4	-2.8%	2.3%	7.9%
Turkmenistan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
USSR	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Uzbekistan	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other CIS	2.4	2.5	2.8	2.4	2.6	2.1	2.2	2.8	2.0	2.8	2.7	-4.8%	1.4%	0.1%
Total CIS	174.9	183.2	198.3	199.0	205.8	206.7	211.2	219.0	230.2	231.2	231.8	0.3%	2.9%	8.5%
Iran	4.3	4.1	3.5	6.5	7.0	6.9	6.4	6.3	3.5	6.6	6.6	1.1%	4.5%	0.2%
Iraq	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Israel	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kuwait	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oman	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Qatar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saudi Arabia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
United Arab Emirates	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2%
Other Middle East	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Middle East	4.3	4.1	3.5	6.5	7.0	6.9	6.4	8.0	14.1	26.7	38.9	45.9%	24.8%	1.4%
Algeria	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Egypt	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Morocco	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Africa	14.1	13.8	12.2	15.0	14.2	11.6	13.3	9.9	12.4	10.1	8.9	-11.9%	-4.5%	0.3%
Eastern Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Middle Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Western Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Northern Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Southern Africa	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Africa	14.1	13.8	12.2	15.0	14.2	11.6	13.3	9.9	12.4	10.1	8.9	-11.9%	-4.5%	0.3%
Australia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bangladesh	-	-	-	-	-	-	-	-	-	-	-	-	-	-
China	111.5	133.2	171.4	213.2	248.1	295.0	348.7	366.2	407.5	417.8	434.7	4.1%	14.6%	15.9%
China Hong Kong SAR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
India	33.3	34.7	38.3	37.9	37.4	39.1	45.2	44.6	43.9	46.2	48.2	4.4%	3.8%	1.8%
Indonesia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Japan	14.6	-	4.5	17.7	29.1	49.1	65.6	43.0	61.2	51.8	77.5	49.6%	18.2%	2.8%
Malaysia	-	-	-	-	-	-	-	-	-	-	-	-	-	-
New Zealand	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pakistan	4.3	4.7	4.3	5.3	8.1	9.2	9.2	9.5	15.7	22.2	22.4	0.6%	18.0%	0.8%
Philippines	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Singapore	-	-	-	-	-	-	-	-	-	-	-	-	-	-
South Korea	138.8	156.4	164.8	162.0	148.4	133.5	145.9	160.2	158.0	176.1	180.5	2.5%	2.7%	6.6%
Sri Lanka	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taiwan	41.6	42.4	36.5	31.7	22.4	27.7	32.3	31.4	27.8	23.8	17.8	-25.1%	-8.1%	0.7%
Thailand	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vietnam	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other Asia Pacific	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total Asia Pacific	344.1	371.4	419.7	467.7	493.6	553.6	646.9	655.0	714.1	737.8	781.1	5.9%	8.5%	28.5%
Total World	2490.3	2541.1	2575.3	2613.7	2637.0	2700.2	2795.8	2689.0	2802.5	2679.6	2737.7	2.2%	1.0%	100.0%
of which: OECD	1975.7	1988.3	1974.5	1973.0	1959.6	1969.7	1994.1	1872.0	1912.2	1790.0	1831.7	2.3%	-0.8%	66.9%
Non-OECD	514.6	552.9	600.9	640.7	677.4	730.5	801.6	817.0	890.4	889.6	906.0	1.8%	5.8%	49.5%
European Union [#]	806.2	812.5	786.8	767.9	759.5	761.9	765.3	683.5	731.7	609.3	619.4	1.7%	-2.6%	68.4%

* Based on gross generation and not accounting for cross-border electricity supply.

^a Less than 0.05
[†] Less than 0.05

+ Less than 0.05%.
n/a not available.

USSR includes CIS

Excludes Estonia, Latvia and Lithuania prior to 1985 and Croatia.

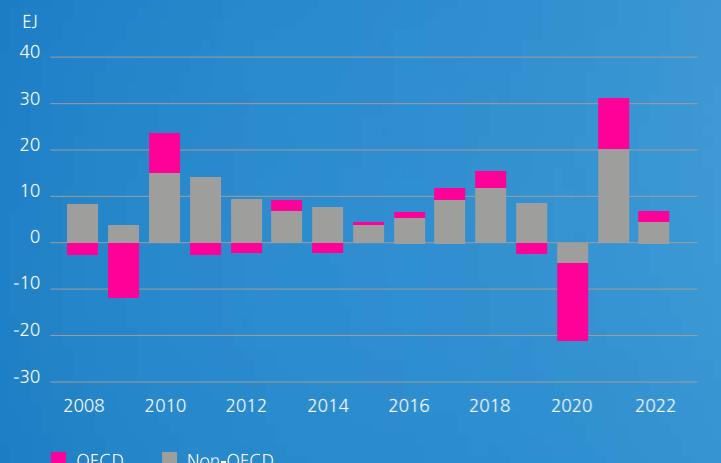
Notes: Annual changes and shares of total are calculated using terawatt-hours figures.

Power and renewables

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Hydroelectricity Generation*

Terawatt-hours	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Growth rate per annum	Share	
												2023	2013-23	2023
Canada	391.8	382.5	382.2	385.4	394.6	385.9	381.8	386.5	382.4	397.7	364.2	-8.4%	-0.7%	8.6%
Mexico	28.0	38.9	30.9	30.0	30.9	32.2	23.6	34.7	35.6	20.4	-42.6%	-3.1%	0.5%	
US	266.5	255.8	246.5	263.8	296.8	289.5	285.5	282.8	249.0	251.3	236.3	-6.0%	-1.2%	5.6%
Total North America	686.3	677.1	659.5	679.2	722.3	707.6	690.8	696.1	666.1	684.6	620.9	-9.3%	-1.0%	14.6%
Argentina	32.8	32.4	32.3	29.8	31.6	32.3	27.5	23.7	19.6	22.8	29.9	31.3%	-0.9%	0.7%
Brazil	391.0	373.4	359.7	380.9	370.9	389.0	397.9	396.4	362.8	427.1	428.7	0.4%	0.9%	10.1%
Chile	19.9	23.0	23.6	19.7	21.3	23.4	21.4	21.7	18.1	20.4	24.0	17.9%	1.9%	0.6%
Colombia	44.4	44.7	44.7	46.8	57.3	56.7	54.4	49.8	60.5	64.3	59.8	-7.0%	3.0%	1.4%
Ecuador	11.0	11.5	13.1	15.8	20.1	20.7	24.6	25.6	24.6	25.3	25.3	2.9%	8.7%	0.6%
Peru	22.3	22.2	23.7	24.1	29.1	30.7	31.5	30.5	31.9	29.7	29.1	-2.3%	2.7%	0.7%
Trinidad & Tobago	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Venezuela	81.5	80.4	74.7	63.0	70.0	65.3	62.8	67.2	67.8	68.5	65.6	-4.3%	-2.1%	1.5%
Central America	21.9	21.6	22.5	22.8	27.1	26.8	21.6	26.9	29.8	31.4	25.4	-19.3%	1.5%	0.6%
Other Caribbean	2.5	1.8	1.4	1.9	2.7	2.4	1.6	1.8	2.0	2.0	1.6	-17.2%	-3.9%	†
Other South America	72.5	68.2	67.4	74.6	70.9	69.9	62.2	54.8	50.8	54.2	60.5	11.7%	-1.8%	1.4%
Total S. & Cent. America	699.8	679.2	663.2	679.3	701.1	717.2	705.5	697.1	669.0	745.1	749.9	0.6%	0.7%	17.7%
Austria	42.0	41.0	37.2	40.0	38.3	37.6	40.8	42.0	38.8	34.0	38.9	14.4%	-0.8%	0.9%
Belgium	0.4	0.3	0.3	0.4	0.3	0.3	0.3	0.3	0.4	0.3	0.4	44.7%	0.3%	†
Bulgaria	4.0	4.6	5.7	3.9	2.8	5.1	2.9	2.8	4.8	3.8	3.1	-17.7%	-2.5%	0.1%
Croatia	8.6	9.0	6.4	6.9	5.3	7.7	5.8	5.7	7.1	5.5	8.2	49.7%	-0.5%	0.2%
Cyprus	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Czech Republic	2.7	1.9	1.8	2.0	1.9	1.6	2.0	2.1	2.4	2.1	2.3	11.9%	-1.5%	0.1%
Denmark	^	^	^	^	^	^	^	^	^	^	^	31.7%	3.9%	†
Estonia	^	^	^	^	^	^	^	^	^	^	^	15.5%	0.2%	†
Finland	12.8	13.4	16.8	15.8	14.8	13.3	12.4	15.9	15.8	13.5	15.2	12.5%	1.7%	0.4%
France	70.8	62.8	54.6	59.9	49.0	63.9	56.0	61.7	58.7	44.3	55.5	25.4%	-2.4%	1.3%
Germany	23.0	19.6	19.0	20.5	20.2	17.7	19.7	18.3	19.7	17.6	19.6	11.4%	-1.6%	0.5%
Greece	6.3	4.5	6.1	5.5	4.0	5.7	4.0	3.3	5.9	3.9	3.9	2.4%	-4.6%	0.1%
Hungary	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	24.7%	0.4%	†
Iceland	12.9	12.9	13.8	13.5	14.1	13.8	13.5	13.2	13.8	14.2	14.2	0.2%	1.0%	0.3%
Ireland	0.6	0.7	0.8	0.7	0.7	0.7	0.9	0.7	0.7	0.7	0.9	33.2%	4.5%	†
Italy	52.8	58.5	45.5	42.4	36.2	48.8	46.4	47.6	45.4	28.4	38.9	37.1%	-3.0%	0.9%
Latvia	2.9	2.0	1.9	2.5	4.4	2.4	2.1	2.6	2.7	2.7	3.8	38.2%	2.7%	†
Lithuania	0.5	0.4	0.3	0.5	0.6	0.4	0.3	0.3	0.4	0.5	0.5	-3.0%	-1.5%	†
Luxembourg	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	40.9%	-2.7%	†
Netherlands	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	36.0%	-5.1%	†
North Macedonia	1.6	1.2	1.9	1.9	1.1	1.8	1.2	1.3	1.3	1.3	1.6	20.6%	0.2%	†
Norway	128.1	135.5	137.3	142.8	142.4	139.0	125.3	140.9	143.3	127.6	136.1	6.6%	0.6%	3.2%
Poland	2.4	2.2	1.8	2.1	2.6	2.0	2.0	2.1	2.3	2.0	2.4	21.8%	-0.2%	0.1%
Portugal	13.7	15.6	8.7	15.7	5.9	12.4	8.8	12.1	11.9	6.5	12.1	84.8%	-1.3%	0.3%
Romania	14.8	18.5	16.6	18.0	14.5	17.7	15.6	15.4	17.4	14.0	18.2	30.5%	2.1%	0.4%
Slovakia	4.8	4.2	3.9	4.4	4.3	3.6	4.4	4.5	4.3	4.7	4.7	29.0%	-0.2%	0.1%
Slovenia	4.6	6.1	3.8	4.5	3.9	4.7	4.5	4.9	4.7	3.1	5.0	57.9%	0.7%	0.1%
Spain	36.8	39.2	28.1	36.4	18.3	34.3	22.5	30.5	29.6	17.6	25.5	44.8%	-3.6%	0.6%
Sweden	61.4	63.8	75.3	62.1	65.1	62.1	65.3	72.3	73.8	69.8	66.0	-5.4%	0.7%	1.6%
Switzerland	38.5	38.0	38.3	34.6	34.1	34.6	37.6	37.5	36.6	29.6	37.0	25.1%	-0.4%	0.9%
Türkiye	59.4	40.6	67.1											

Renewable energy Consumption*

* Based on gross generation and not accounting for cross-border electricity supply. 'Input-equivalent' energy is the amount of fuel that would be required by thermal power stations to generate the reported electricity output.

Details on thermal efficiency assumptions are available in the appendices and definitions page and at <https://www.energyinst.org/statistical-review>.
△ Less than 0.005

^a Less than 0.005.
^t Less than 0.05%.

Excludes Estonia, Latvia.

Notes: Annual changes and share of total are calculated using exajoules figures and include data from 1990.

 **Renewable energy** Renewable power generation*

* Based on gross generation and not accounting for cross-border electricity supply. 'Input-equivalent' energy is the amount of fuel that would be required by thermal power stations to generate the reported electricity output.

Details on thermal efficiency assumptions are available in the appendices and definitions page and at <https://www.energyinst.org/statistical-review>. All less than 0.005.

^a Less than 0.005.
^t Less than 0.05%.

Excludes Estonia, Latvia and Lithuania.

Notes: Annual changes and share of total are calculated using exajoules figures and incorporate

Renewable energy Generation by source*

Terawatt-hours	2022				2023				2023 Growth rate			
	Wind	Solar	Other renewables‡	Total	Wind	Solar	Other renewables‡	Total	Wind	Solar	Other renewables‡	Total
Canada												
Mexico												
US												
Total North America												
Argentina												
Brazil												
Chile												
Colombia												
Ecuador												
Peru												
Trinidad & Tobago												
Venezuela												
Central America												
Other Caribbean												
Other South America												
Total S. & Cent. America												
Austria												
Belgium												
Bulgaria												
Croatia												
Cyprus												
Czech Republic												
Denmark												
Estonia												
Finland												
France												
Germany												
Hungary												
Iceland												
Ireland												
Italy												
Latvia												
Lithuania												
Luxembourg												
Netherlands												
North Macedonia												
Norway												
Poland												
Portugal												
Romania												
Slovakia												
Slovenia												
Spain												
Sweden												
Switzerland												
Turkey												
Ukraine												
United Kingdom												
Other Europe												
Total Europe												
Azerbaijan												
Belarus												
Kazakhstan												
Russian Federation												
Turkmenistan												
Uzbekistan												
Other CIS												
Total CIS												
Israel												
Jordan												
Saudi Arabia												
United Arab Emirates												
Other Middle East												
Total Middle East												
Algeria												
Egypt												
Morocco												
South Africa												
Eastern Africa												
Middle Africa												
Western Africa												
Other Northern Africa												
Other Southern Africa												
Total Africa												
Australia												
Bangladesh												
China												
China Hong Kong SAR												
India												
Indonesia												
Japan												
Malaysia												
New Zealand												
Pakistan												
Philippines												
Singapore												
South Korea												
Sri Lanka												
Taiwan												
Thailand												
Viet Nam												
Other Asia Pacific												
Total Asia Pacific												
Total World	141412	180759	229058	301186	396316	492641	595492	728405	873858	1073136	1418969	32.2%
of which: OECD												
Non-OECD												
European Union												

Based on gross generation and not accounting for cross-border electricity supply.

* Includes electricity generated from: geothermal, biomass and other sources of renewable energy (not already itemised).

^ Less than 0.05%.

† Less than 0.05%.

A more extensive time series of renewables by source is available at <https://www.energyinst.org/statistical-review>.

Renewable energy Solar – Installed photovoltaic (PV) power and concentrated solar power (CSP)*

Megawatts	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Growth rate per annum	Share	
												2023	2013-23	2023
Canada	1210	1843	2519	2665	2932	3095	3327	3609	4554	5312	5757	8.4%	16.9%	0.4%
Mexico	109	174	287	633	1126									



Renewable energy Wind – Installed wind turbine capacity*

Megawatts													Growth rate per annum			Share
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013–23	2023		
Canada	7801	9694	11214	11973	12250	12816	13220	13735	14259	15265	16989	11.3%	8.1%	1.7%		
Mexico	2122	2569	3271	4051	4180	6541	6995	7155	7318	7318	^	13.2%	0.7%			
US	60198	64430	72767	81502	87831	94666	103836	118664	133019	141674	148020	4.5%	9.4%	14.6%		
Total North America	70121	76693	87252	97526	104261	111662	123597	139394	154433	164257	172327	4.9%	9.4%	16.9%		
Argentina	163	188	188	228	751	1609	2624	3292	3310	3706	12.0%	36.7%	0.4%			
Brazil	2202	4888	7633	10129	12304	14843	15438	17198	21161	24163	29135	20.6%	29.5%	2.9%		
Chile	295	732	907	1034	1305	1524	1620	2340	3137	4510	17.8%	31.4%	0.4%			
Costa Rica	148	196	278	319	378	408	411	394	390	408	4.5%	10.7%	^			
Uruguay	59	481	857	1211	1513	1516	1516	1516	1516	1516	^	38.3%	0.1%			
Other S. & Cent. America	675	962	1346	1569	1635	1864	2080	2147	2275	2519	2742	8.9%	15.1%	0.3%		
Total S. & Cent. America	3542	7448	11209	14451	17363	20903	22675	26220	31772	35729	42018	17.6%	28.1%	4.1%		
Austria	1675	2110	2489	2730	2887	3133	3224	3226	3408	3579	3977	11.1%	9.0%	0.4%		
Belgium	1769	1933	2181	2334	2779	3305	3864	4673	4948	5303	5504	3.8%	12.0%	0.5%		
Bulgaria	683	699	699	698	703	704	702	702	702	702	702	0.3%	0.1%			
Denmark	4819	4886	5077	5245	5489	6123	6111	6259	7004	7084	7482	5.6%	4.5%	0.7%		
Finland	447	627	1005	1565	2044	2041	2284	2586	3257	5677	6957	22.5%	31.6%	0.7%		
France	8160	9201	10298	11567	13499	14900	16427	17535	18551	20811	22196	6.7%	10.5%	2.2%		
Germany	33477	38614	44580	49435	55580	58721	60742	62201	63711	66163	69459	5.0%	7.6%	6.8%		
Greece	1809	1978	2091	2370	2624	2877	3589	4119	4649	4702	5220	11.0%	11.2%	0.5%		
Ireland	1923	2283	2451	2802	3319	3674	4126	4307	4339	4536	4807	6.0%	9.6%	0.5%		
Italy	8542	8683	9137	9384	9737	10230	10679	10871	11254	11821	12308	4.1%	3.7%	1.2%		
Netherlands	2713	2865	3391	4257	4202	4393	4484	6648	7674	8755	10749	22.8%	14.8%	1.1%		
Norway	818	859	867	883	1207	1710	2914	4030	5049	5062	5065	0.1%	20.0%	0.5%		
Poland	3429	3836	4886	5747	5759	5766	5838	6298	6967	8150	9307	14.2%	10.5%	0.9%		
Portugal	4610	4857	4937	5124	5124	5172	5223	5223	5427	5538	5617	1.4%	2.0%	0.6%		
Romania	2773	3244	3130	3025	3030	3032	3038	3013	3015	3087	2.4%	1.1%	0.3%			
Spain	22958	22925	22943	22990	23124	23405	25590	26819	27908	30114	31028	3.0%	3.1%	3.1%		
Sweden	4194	5088	5819	6435	6611	7300	8681	9976	12116	14279	16252	13.8%	14.5%	1.6%		
Türkiye	2760	3630	4503	5751	6516	7005	7591	8832	10607	11396	11697	2.6%	15.5%	1.1%		
Ukraine	362	514	514	526	553	621	1258	1402	1761	1761	1761	—	17.1%	0.2%		
United Kingdom	11282	13074	14305	16126	19585	21606	23887	24458	25748	28762	30215	5.1%	10.4%	3.0%		
Other Europe	1724	1913	2193	2442	2700	3007	3358	3560	3936	4365	5318	21.8%	11.9%	0.5%		
Total Europe	120927	133819	147496	161436	177068	188721	203610	216638	232034	251575	268708	6.8%	8.3%	26.4%		
Russian Federation	10	10	11	11	52	102	945	1955	2218	2518	13.5%	73.8%	0.2%			
Other CIS	12	14	33	81	103	162	182	181	188	192	2.4%	31.6%	^			
Total CIS	22	24	44	92	114	214	284	1127	2136	2406	2710	12.6%	61.6%	0.3%		
Iran	108	149	153	191	259	282	305	308	310	342	365	6.7%	13.0%	^		
Jordan	1	1	118	184	198	295	384	529	632	614	614	—	83.7%	0.1%		
Other Middle East	13	14	14	34	37	47	97	97	97	608	892	46.6%	53.2%	0.1%		
Total Middle East	122	165	286	409	494	623	786	934	1040	1564	1871	19.6%	31.4%	0.2%		
Egypt	555	555	755	755	1130	1132	1380	1640	1643	1890	15.1%	13.0%	0.2%			
Morocco	495	797	797	902	1022	1225	1435	1471	1558	1858	19.3%	14.1%	0.2%			
South Africa	257	569	1079	1473	2094	2094	2516	2495	3163	3442	8.8%	29.6%	0.3%			
Tunisia	200	233	240	240	245	245	245	245	245	245	—	2.1%	^			
Other Africa	235	245	449	461	467	777	832	938	1058	1136	1219	7.2%	17.9%	0.1%		
Total Africa	1742	2399	3320	3831	4578	5471	5528	6514	6909	7745	8654	11.7%	17.4%	0.9%		
Australia	3221	3797	4181	4324	5407	6409	7881	10207	10555	11327	7.3%	13.4%	1.1%			
China	76731	96819	131048	148517	164374	184665	2									

 Renewable energy Biofuels production*

 Renewable energy Biofuels consumption*

Biofuels production by fuel type

Biofuels production by fuel type

Source: Includes data from EO Lights; US Energy Information Administration (March 2019).

* Includes biogasoline (such as ethanol) and biodiesel. Volumes have been adjusted for energy content.

† Less than 0.05%.

Notes: Annual changes and shares of total are calculated using thousand barrels a day oil equivalent figures.

Source: Includes data from EO Lights; US Energy Information Administration (March 2021)

* Includes biogasoline (such as ethanol) and biodiesel. Volumes have been adjusted for energy content.

^ Less than 0.5.

† Less than 0.05%.

Electricity Generation*

Terawatt-hours	Growth rate per annum										Share			
	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2023	2013–23	2023
Canada														
Mexico														
US														
Total North America														
Argentina														
Brazil														
Chile														
Colombia														
Ecuador														
Peru														
Trinidad & Tobago														
Venezuela														
Central America														
Other Caribbean														
Other South America														
Total S. & Cent. America														
Austria														
Belgium														
Bulgaria														
Croatia														
Cyprus														
Czech Republic														
Denmark														
Estonia														
Finland														
France														
Germany														
Greece														
Hungary														
Iceland														
Ireland														
Italy														
Latvia														
Lithuania														
Luxembourg														
Netherlands														
North Macedonia														
Norway														
Poland														
Portugal														
Romania														
Slovakia														
Slovenia														
Spain														
Sweden														
Switzerland														
Türkiye														
Ukraine														
United Kingdom														
Other Europe														
Total Europe														
Azerbaijan														
Belarus														
Kazakhstan														
Russian Federation														
Turkmenistan														
Uzbekistan														
Total CIS														
Iran														
Iraq														
Israel														
Kuwait														
Oman														
Qatar														
Saudi Arabia														
United Arab Emirates														
Other Middle East														
Total Middle East														
Algeria														
Egypt														
Morocco														
South Africa														
Eastern Africa														
Middle Africa														
Western Africa														
Other Northern Africa														
Other Southern Africa														
Total Africa														
Australia														
Bangladesh														
China														
China Hong Kong SAR														
India														
Indonesia														
Japan														
Malaysia														
New Zealand														
Pakistan														
Philippines														
Singapore														
South Korea														
Sri Lanka														
Taiwan														
Thailand														
Vietnam														
Other Asia Pacific														
Total Asia Pacific														
Total World														
of which:	OECD													
Non-OECD														
European Union [#]														

* Based on gross output.
† Less than 0.05%.
Excludes Croatia and Slovenia prior to 1990.

Electricity Generation by fuel*

Terawatt-hours	2022								2023				
Oil	Natural gas	Coal	Nuclear energy	Hydro-electricity	Renewables	Other‡	Total	Oil	Natural Gas				

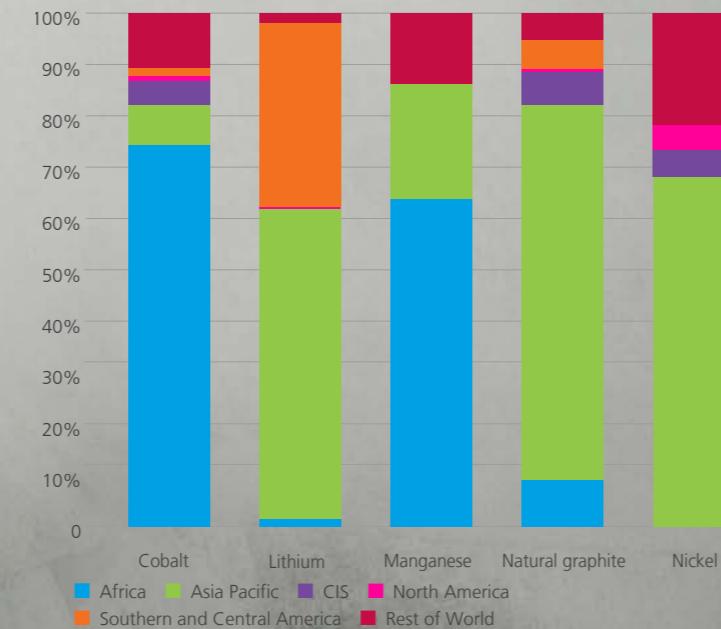
Key minerals

Whilst production of copper has grown at an average rate of just under 2% over the past ten years (it dropped by 1.6% in 2023), production of other minerals critical to the global energy system, particularly for battery technologies, continues to grow at around 4% per annum. The Asia Pacific region produced nearly 70% of the metals and materials critical to the manufacture of Li-ion batteries. Within this, China was both the world's leading producer of refined cobalt and the world's leading consumer of it, with nearly 87% of consumption used by the lithium-ion battery industry. As well as producing nearly 20% of the world's lithium production, China also produced around 77% of its graphite supply.

Portugal holds the largest lithium reserve in Europe (around 60,000 metric tons). Whilst historically it has primarily focused on ceramics for glassware production, it is increasingly looking to enter the lithium market.

Although prices for metals and materials have fallen across the board from their 2022 highs, lithium carbonate prices sat at around 400% higher than their 2019 pre-COVID levels and copper some 140% above its.

In 2023, the Asia Pacific region produced nearly 70% of the metals and materials* critical to the manufacture of Li-ion batteries



Global production and prices of key metals and minerals now sit above their 2019 pre-COVID levels

Key minerals Production and reserves

Cobalt production and reserves

Mine production

Thousand tonnes	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Reserves						
												2023	2013-23	2023	Share	R/P ratio		
Australia	6.4	6.2	6.0	5.5	5.8	4.9	5.7	5.6	5.3	5.8	4.6	-20.6%	-3.2%	2.3%	1700	16.0%	370	
Canada	4.0	3.9	4.3	4.2	3.7	3.5	3.3	4.5	4.4	3.1	2.1	-31.4%	-6.3%	1.1%	230	2.2%	110	
China	2.6	2.8	2.6	2.3	2.5	2.0	2.5	2.2	2.2	2.2	1.8	1.8	0.0%	-3.9%	0.9%	140	1.3%	80
DR Congo	76.6	76.5	84.4	69.0	90.3	109.4	78.0	86.6	93.1	115.4	139.8	21.2%	6.2%	71.0%	6000	56.4%	43	
Cuba	4.0	3.7	4.0	3.9	3.9	3.5	3.8	3.8	4.0	3.8	3.2	3.6	-14.6%	-2.1%	1.6%	500	4.7%	154
Madagascar	2.4	3.4	4.0	3.8	3.1	2.9	2.9	0.8	2.0	3.3	3.6	9.1%	4.1%	1.8%	100	0.9%	28	
Morocco	2.0	2.2	2.3	2.7	2.5	1.8	2.4	2.4	1.8	1.7	1.7	1.8	0.0%	-1.7%	0.9%	13	0.1%	8
New Caledonia	3.2	4.0	3.6	3.2	2.8	2.1	1.7	2.2	1.5	1.8	1.8	0.0%	-5.7%	0.9%	56	0.5%	32	
Papua New Guinea	1.0	2.1	2.5	2.2	3.3	3.3	2.9	2.9	3.0	3.0	2.9	-3.0%	11.1%	1.5%	49	0.5%	17	
Philippines	2.8	4.6	4.3	4.0	4.6	4.8	5.1	4.9	4.3	4.7	4.5	-3.8%	4.8%	2.3%	260	2.4%	58	
Russian Federation	6.3	6.3	6.2	5.5	5.9	6.1	6.3	9.7	8.0	9.2	8.8	-4.3%	3.4%	4.5%	250	2.3%	28	
South Africa	3.0	3.0	2.9	2.3	2.3	2.3	2.1	1.8	1.2	1.0	1.0	0.0%	-10.4%	0.5%	37	0.3%	37	
Zambia	5.9	4.6	3.0	5.0	2.6	1.6	0.4	0.3	0.2	0.3	0.3	0.0%	-27.1%	0.1%	270	2.5%	1071	
Rest of World	11.4	7.5	7.1	4.8	4.0	2.8	3.0	3.7	6.5	13.7	20.9	52.8%	6.3%	10.6%	1037	9.7%	50	
Total World	131.6	130.7	137.2	118.4	137.3	150.9	120.0	131.5	137.5	168.3	196.9	17.0%	4.1%	100.0%	10642	100.0%	54	

Sources: includes data from US Geological Survey, British Geological Survey ©UKRI and World Mining Data. ^ less than 0.05%. Rest of World is the sum of only recorded reserves.

Lithium production and reserves

Mine production

Thousand tonnes of Lithium content	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Reserves					
												2023	2013-23	2023	Share	R/P ratio	
Argentina	2.5	3.2	3.6	5.8	5.7	6.4	6.3	5.9	6.0	6.4	9.6	50.5%	14.4%	4.8%	3600	13.8%	375
Australia	10.1	12.4	11.9	14.0	21.3	57.0	45.0	39.7	55.3	74.7	86.0	15.1%	23.9%	43.4%	6200	23.8%	72
Brazil	0.4	0.2	0.1	0.2	0.3	1.0	2.2	1.4	1.7	2.6	4.9	86.3%	28.5%	2.5%	390	1.5%	80
Chile	10.5	10.8	9.8	13.6	14.2	17.0	19.2	21.6	28.2	48.8	56.5	15.8%	18.3%	28.5%	9300	35.7%	165
Portugal	0.3	0.3	0.3	0.4	0.8	1.2	0.9	0.3	0.9	0.4	0.4	0.0%	2.4%	0.2%	60	0.2%	158
US	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.6	0.6	0.0%	-3.4%	0.3%	1100	4.2%	1789
Zimbabwe	1.0	0.9	0.9	1.0	0.8	1.6	1.2	0.4	0.7	1.0	3.4	230.1%	13.0%	1.7%	310	1.2%	91
Rest of World	—	—	—	—	0.1	3.0	0.4	0.1	0.1	0.7	3.6	447.1%	—	1.8%	2068	7.9%	576
Total World	30.4	31.0	29.5	38.2	50.9	95.1	86.9	83.7	107.9	157.8	198.0	25.5%	20.6%	100.0%	26028	100.0%	131

Sources: includes data from US Geological Survey, British Geological Survey ©UKRI and World Mining Data. ^ less than 0.05%. Rest of World is the sum of only recorded reserves.

Natural Graphite production and reserves

Mine production

Thousand tonnes	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Reserves		
												2023	2013-23	2023
Brazil ¹	91.9	87.0	7											

Key minerals Production and reserves

Platinum group metals production and reserves*

Mine production

Thousand tonnes	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Reserves		
												Growth rate per annum	at end of	Share
Canada	23.5	28.5	28.6	33.6	26.5	26.5	27.8	27.0	21.0	21.5	21.5	0.0%	-0.9%	5.6%
Russia	105.5	106.0	103.0	102.4	107.0	106.0	122.0	116.0	107.0	107.0	115.0	7.5%	0.9%	30.1%
South Africa	206.0	152.4	222.0	209.3	229.8	178.0	213.7	185.5	226.3	197.1	191.0	-3.1%	-0.8%	50.1%
United States	16.3	16.1	16.2	17.0	17.6	18.1	18.5	18.8	17.7	13.1	12.7	-3.1%	-2.5%	3.3%
Zimbabwe	22.0	22.6	22.6	26.9	26.0	26.0	24.9	27.9	27.1	31.3	34.0	8.6%	4.4%	8.9%
Rest of World	12.7	14.8	12.3	11.5	17.3	17.1	6.2	7.0	6.8	7.3	7.3	0.3%	-5.4%	1.9%
Total World	386.0	340.4	404.7	400.7	424.2	371.7	413.0	382.2	405.9	377.3	381.5	1.1%	-0.1%	100.0%
												71630	100.0%	188

Sources: includes data from US Geological Survey and Kearney Energy Transition Institute.

* Platinum and Palladium. ^ less than 0.05. Rest of World is the sum of only recorded reserves.

Manganese production and reserves

Mine production

Thousand tonnes	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Reserves		
												Growth rate per annum	at end of	Share
Australia	3.0	3.1	2.5	2.2	2.8	3.5	3.2	3.3	3.0	3.0	3.0	-1.3%	0.1%	15.1%
China	3.0	3.0	3.0	2.3	1.7	1.2	1.3	1.0	1.0	0.7	0.7	-0.4%	-13.1%	3.7%
Gabon	2.0	1.9	2.0	1.6	2.2	2.3	2.5	4.3	4.6	4.7	4.6	-1.5%	8.9%	23.2%
Ghana	0.5	0.4	0.4	0.6	0.8	1.4	1.6	0.9	0.9	0.8	0.8	-0.5%	4.7%	4.2%
India	0.9	0.9	0.9	0.7	0.7	1.0	0.8	0.5	0.5	0.7	0.7	-0.1%	-2.4%	3.6%
South Africa	4.3	5.2	5.9	5.3	5.4	5.8	5.8	7.2	7.2	7.3	7.2	-1.4%	5.3%	36.3%
Rest of World	4.0	4.1	3.7	3.8	4.6	3.9	4.2	2.9	2.5	2.7	2.7	-0.1%	-3.6%	13.8%
Total World	17.7	18.6	18.4	16.6	18.2	19.0	19.3	20.0	20.0	20.1	19.8	-1.1%	1.2%	100.0%
												96		

Sources: includes data from US Geological Survey and Kearney Energy Transition Institute. ^ less than 0.05. Rest of World is the sum of only recorded reserves.

Nickel production and reserves

Mine production

Thousand tonnes	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	Reserves		
												Growth rate per annum	at end of	Share
Australia	234.0	245.0	234.0	204.0	190.0	170.0	180.0	160.0	151.0	155.0	160.0	3.2%	-3.7%	4.2%
Canada	223.0	235.0	240.0	236.0	210.0	176.0	180.0	130.0	134.0	143.0	180.0	25.9%	-2.1%	4.7%
Indonesia	440.0	177.0	170.0	199.0	400.0	606.0	800.0	1000.0	1040.0	1580.0	1800.0	13.9%	15.1%	47.3%
New Caledonia	164.0	178.0	190.0	207.0	210.0	216.0	220.0	190.0	186.0	200.0	230.0	15.0%	3.4%	6.0%
Philippines	446.0	523.0	530.0	347.0	230.0	345.0	420.0	370.0	387.0	345.0	400.0	15.9%	-1.1%	10.5%
Russia	275.0	239.0	240.0	222.0	180.0	272.0	270.0	250.0	205.0	222.0	200.0	9.9%	-3.1%	5.3%
Rest of World	885.6	900.2	974.2	671.0	686.6	871.8	873.8	892.5	924.2	910.3	836.9	-8.1%	-0.6%	22.0%
Total World	2667.6	2497.2	2578.2	2086.0	2106.6	2656.8	2943.8	2992.5	3027.2	3555.3	3806.9	7.1%	3.6%	100.0%
												38		

Sources: includes data from US Geological Survey and Kearney Energy Transition Institute. ^ less than 0.05. Rest of World is the sum of only recorded reserves.

Key minerals Prices

Minerals, materials, and battery prices

Year	Thousand US dollars per tonne						USD/kWh			
	Cobalt*	Lithium carbonate†	Nickel Sulphate^	Pet Needle Coke#	Natural Graphite<	Copper>	Lithium Iron Phosphate Cells-	Lithium Nickel Manganese Cobalt Oxide Cells##		
2000	33.42	4.47					1.81			
2001	23.26	1.49					1.58			
2002	15.23	1.59					1.56			
2003	23.37	1.55					1.78			
2004	52.76	1.72					2.86			
2005	35.19	1.46					3.68			
2006	37.96	2.32					6.73			
2007	67.35	3.53					7.13			
2008	86.00	4.44					6.96			
2009	39.38	5.94								

Methodology

Oil trade movements

The tables exclude the intra-area movements of oil (for example, crude oil and products moving between countries within Europe). They do not include biofuels. Bunkers fuel is not included as exports. Crude imports and exports include condensates. Saudi Arabian exports from 1980 are also available in the oil trade movements table in the Excel workbook. The split of crude oil and products are detailed. Data in the tables are in million tonnes and thousand barrels per day.

Natural gas

Natural gas reserves

Total proved reserves of natural gas are generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and operating conditions.

The data series for proved natural gas reserves in this year's Review does not necessarily meet the definitions, guidelines and practices used for determining proved reserves at company level, for instance as published by the US Securities and Exchange Commission nor does it necessarily represent the EI's view of proved reserves by country. Rather, the data series has been compiled using a combination of primary official sources and third-party data.

Although every effort is made to come up with a consistent series for reserves based on a common definition, different countries use different methodologies and the data have varying levels of reliability.

R/P ratios represent the length of time that those remaining reserves would last if production were to continue at the previous year's rate. They are calculated by dividing remaining reserves at the end of the year by the production in that year.

As far as possible, the data represents standard cubic metres (measured at 15°C and 1013 mbar) and have been standardised using a gross calorific value (GCV) of 40 MJ/m³.

There is a time series of natural gas reserves, which can be found in the Excel workbook. Data are measured in billion cubic metres.

Please note that these reserves tables have not been updated this year.

Natural gas production

Gas production comprises marketed production and excludes gas flared or recycled gas. Includes natural gas produced for gas-to-liquids transformation.

As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar); as they are derived directly from tonnes of oil equivalent using an average conversion factor and have been standardised using a gross calorific value (GCV) of 40 MJ/m³, they do not necessarily equate with gas volumes expressed in specific national terms.

Natural gas production is provided in three different units of measurement to accommodate regional customary usage. World natural gas production PDF tables are in both billion cubic metres, and exajoules. Data in the Excel workbook are also in billion cubic feet per day (bcf/d).

Natural gas consumption

Natural gas consumption excludes natural gas converted to liquid fuels but includes derivatives

of coal as well as natural gas consumed in gas-to-liquids transformation.

As far as possible, the data above represents standard cubic metres (measured at 15°C and 1013 mbar); as they are derived directly from tonnes of oil equivalent using an average conversion factor and have been standardised using a gross calorific value (GCV) of 40 MJ/m³ they do not necessarily equate with gas volumes expressed in specific national terms. The difference between these world consumption figures and the world production statistics is due to variations in stocks at storage facilities and liquefaction plants, together with unavoidable disparities in the definition, measurement or conversion of gas supply and demand data.

Consumption data in the PDF data table is in billion cubic meters (bcm) and exajoules, data in billion cubic feet per day (bcf/d) can be found in the Excel workbook.

Natural gas prices

Annual prices are given for benchmark natural gas hubs together with contracted pipeline and LNG imports. The benchmark hub prices incorporate US (Henry Hub), Canada (Alberta), Netherlands TTF index and the UK (NBP). Contract prices are represented by LNG imports into Japan, the Japan Korea Marker (JKM) and Average German Import Prices.

The prices for LNG and European border are calculated as CIF prices, where CIF = cost + insurance + freight (average freight prices) in US dollars per million British thermal units (Btu).

Natural gas trade movements

Trade flows are on a contractual basis and may not correspond to physical gas flows in all cases. The data illustrates the flow of pipeline natural gas and LNG between sources of production and the regions of consumption. LNG trade. As far as possible, the data represents standard cubic metres (measured at 15°C and 1013 mbar) and has been standardised using a gross calorific value (GCV) of 40 MJ/m³.

Coal

Coal reserves

Total proved reserves of coal are generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known deposits under existing economic and operating conditions.

Total proved coal reserves are shown for anthracite and bituminous (including brown coal) and sub-bituminous and lignite.

Reserves-to-production (R/P) ratios represent the length of time that those remaining reserves would last if production were to continue at the previous year's rate. They are calculated by dividing remaining reserves at the end of the year by the production in that year. The R/P ratios are calculated excluding other solid fuels in reserves and production.

R/P ratios are available by country and feature in the table of coal reserves. R/P ratios for the region and the world are depicted in the chart above and the Energy charting tool. Coal reserve data is in million tonnes.

Please note that these reserves tables have not been updated this year.

Natural gas consumption

Natural gas consumption excludes natural gas converted to liquid fuels but includes derivatives

category are bituminous and anthracite (hard coal). The sub-bituminous coal includes lignite and brown coal. Other commercial solid fuels are also included. The data includes coal produced for coal-to-liquids and coal-to-gas transformations.

In the coal production PDF table, the units are in exajoules. The data can also be downloaded from the Excel workbook in million tonnes.

Coal consumption

Coal consumption includes data for solid fuels only. Included in the hard coal category are bituminous and anthracite. The sub-bituminous coal includes lignite and brown coal. Other commercial solid fuels are also included. The figures exclude coal converted to liquid or gaseous fuels, but includes coal consumed in transformation processes.

Differences between world consumption figures and the world production statistics are accounted for by stock changes, and unavoidable disparities in the definition, measurement or conversion of coal supply and demand data.

Coal prices

Annual prices quoted include the Northwest Europe marker price, Japan steam spot CIF price, China Qinhuangdao spot price and the US Central Appalachian coal spot price index. Coal prices except for the US Central Appalachian price are calculated as CIF prices, where CIF = cost + insurance + freight (average freight prices). The US Central Appalachian price is FOB = free on board. All prices are quoted in US dollars per tonne.

IHS Northwest Europe prices for 1996-2000 are the average of the monthly marker, 2001-2017 the average of weekly prices. IHS Japan prices basis = 6,000 kilocalories per kilogram NAR CIF. Chinese prices are the average monthly price for 2000-2005, weekly prices 2006-2017, 5,500 kilocalories per kilogram NAR, including cost and freight (CFR).

Coal trade movements

Commercial solid fuels only, i.e. bituminous coal and anthracite (hard coal), and lignite and brown (sub-bituminous) coal, and other commercial solid fuels. Intra-area movements (for example, between countries in Europe, Other CIS, Other Africa, Other Asia Pacific) are excluded.

Nuclear energy

The data are based on gross generation and not accounting for cross-border electricity supply. 'Input-equivalent' energy is the amount of fuel that would be required by thermal power stations to generate the reported electricity output. Details on thermal efficiency assumptions are available online.

Data for the units are in exajoules in the PDF. The data are available in the Excel workbook in terawatt-hours (TWh).

Hydroelectricity

The data are based on gross generation and not accounting for cross-border electricity supply. 'Input-equivalent' energy is the amount of fuel that would be required by thermal power stations to generate the reported electricity output.

Details on thermal efficiency assumptions are available online.

Coal production

Coal production includes data for commercial solid fuels only. Included in the hard coal

Methodology

The Statistical Review provides a globally consistent data time series. Here we outline the definitions, conversion factors and calculations we use to produce the report.

Primary energy

Traditionally, in the Statistical Review of World Energy, the primary energy of non-fossil based electricity (nuclear, hydro, wind, solar, geothermal, biomass in power and other renewables sources) has been calculated on an 'input-equivalent' basis – i.e. based on the equivalent amount of fossil fuel input required to generate that amount of electricity in a standard thermal power plant. For example, if nuclear power output for a country was 100 TWh, and the efficiency of a standard thermal power plant was 38%, the input equivalent primary energy would be $100/0.38 = 263$ TWh or about 0.95 EJ.

For many years, the efficiency of this standard power plant has been assumed to be 38%. However, in reality, the world average efficiency of fossil fuel-based power changes over time and has risen from around 36% in 2000 to over 40% today. Moreover, given the much higher efficiency of the most modern power plant (e.g. the thermal efficiency of a modern gas turbine plant is above 55%), the global average is expected to increase in the future.

Therefore, to better assess primary energy trends, we use a time-dependent thermal equivalence model. The conversion factor used each year to calculate the 'input-equivalent' consumption for a given level of generation is based on a simplified representation of measured average efficiency levels:

1965-2000: assumed constant efficiency of 36%

2000-2017: a linear increase from 36% to 40% based on observed data

2018 onwards: the annual rate of efficiency improvement is based on the simplified assumption that efficiency will increase linearly to 45% by 2050.

The table below quantifies these assumptions (rounded to 1 decimal place):

Thermal equivalent efficiency factors used to convert non-fossil electricity to primary energy

Year(s)	Efficiency factor	Year(s)	Efficiency factor
2001	36.2%	2012	38.8%
2002	36.5%	2013	39.1%
2003	36.7%	2014	39.3%
2004	36.9%	2015	39.5%
2005	37.2%	2016	39.8%
2006	37.4%	2017	40.0%
2007	37.6%	2018	40.2%
2008	37.9%	2019	40.4%
2009	38.1%	2020	40.5%
2010	38.4%	2021	40.6%
2011	38.6%	2022	40.7%

*1965-2000 = 36.0%

In this year's Statistical Review, we use the updated thermal equivalent efficiency factor to convert electricity generation from biomass to primary energy equivalent. Prior to 2022, the same factor was used for biomass as for all non-fossil electricity. From 2022 onwards, we assume a constant efficiency of 32% for biomass power to better reflect the actual efficiency of biomass power plants.

Primary energy consumption is reported in net terms. The gross calorific value to net calorific value adjustment is fuel-specific.

Fuels used as inputs for conversion technologies

(gas-to-liquids, coal-to-liquids and coal-to-gas) are counted as production for the source fuel and the outputs are counted as consumption for the converted fuel.

Oil

Oil reserves

Total proved reserves of oil are generally taken to be those quantities that geological and engineering information indicates with reasonable certainty can be recovered in the future from known reservoirs under existing economic and geological conditions.

The data series for proved oil reserves in this year's review does not necessarily meet the definitions, guidelines and practices used for determining proved reserves at company level, for instance as published by the US Securities and Exchange Commission nor does it necessarily represent the EI's view of proved reserves by country. Rather, the data series has been compiled using a combination of primary official sources and third-party data.

Oil reserves include field condensate and natural gas liquids as well as crude oil. This inclusive approach helps to develop consistency with the oil production numbers published in the Review, which also include these categories of oil. The reserves and R/P ratio for Canada includes Canadian oil sands and the reserves and R/P ratio for Venezuela includes the Orinoco Belt. Liquid hydrocarbon fuels from non-hydrocarbon sources, such as ethanol from corn or sugar or synthetic oil derived from natural gas (so-called GTL or gas-to-liquids), are not included in either the reserves or production series.

We have provided a detailed explanatory note on reserves clarifying current definitions and

Appendices Approximate conversion factors

Crude oil*

From	To				
	tonnes (metric)	kilotres	barrels	US gallons	tonnes per year
Multiply by					
Tonnes (metric)	1	1.165	7.33	307.86	–
Kilotres	0.8581	1	6.2898	264.17	–
Barrels	0.1364	0.159	1	42	–
US gallons	0.00325	0.0038	0.0238	1	–
Barrels/day	–	–	–	–	49.8

*Based on worldwide average gravity.

Oil products

From	To convert					
	barrels to tonnes	tonnes to barrels	kilotres to tonnes	tonnes to kilotres	tonnes to gigajoules	tonnes to barrels oil equivalent
Multiply by						
Ethane	0.059	16.850	0.373	2.679	49.400	8.073
Liquefied petroleum gas (LPG)	0.086	11.600	0.541	1.849	46.150	7.542
Gasoline	0.120	8.350	0.793	1.328	44.750	7.313
Kerosene	0.127	7.880	0.798	1.253	43.920	7.177
Gas oil/diesel	0.134	7.460	0.843	1.186	43.380	

Definitions

Regional definitions

Country groupings are made purely for statistical purposes and are not intended to imply any judgment about political or economic standings.

North America

US (excluding US territories), Canada, Mexico.

Caribbean

Atlantic islands between the US Gulf Coast and South America, including Puerto Rico, US Virgin Islands and Bermuda.

Central America

Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, Panama.

South and Central America

Caribbean (including Puerto Rico and US Virgin Islands), Bermuda, Central and South America.

Europe

European members of the OECD plus Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Cyprus, Georgia, Gibraltar, Latvia, Lithuania, Malta, Montenegro, North Macedonia, Romania, Serbia and Ukraine.

Commonwealth of Independent States (CIS)

Armenia, Azerbaijan, Belarus, Kazakhstan, Kyrgyzstan, Moldova, Russian Federation, Tajikistan, Turkmenistan, Uzbekistan.

Middle East

Arabian Peninsula, Iran, Iraq, Israel, Jordan, Lebanon, Syria.

Northern Africa

Territories on the north coast of Africa from Egypt to Western Sahara.

Eastern Africa

Territories on the east coast of Africa from Sudan to Mozambique. Also Madagascar, Malawi, Uganda, Zambia, Zimbabwe.

Middle Africa

Angola, Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Republic of Congo, Equatorial Guinea, Gabon, Sao Tome & Principe.

Western Africa

Territories on the west coast of Africa from Mauritania to Nigeria, including Burkina Faso, Cape Verde, Mali and Niger.



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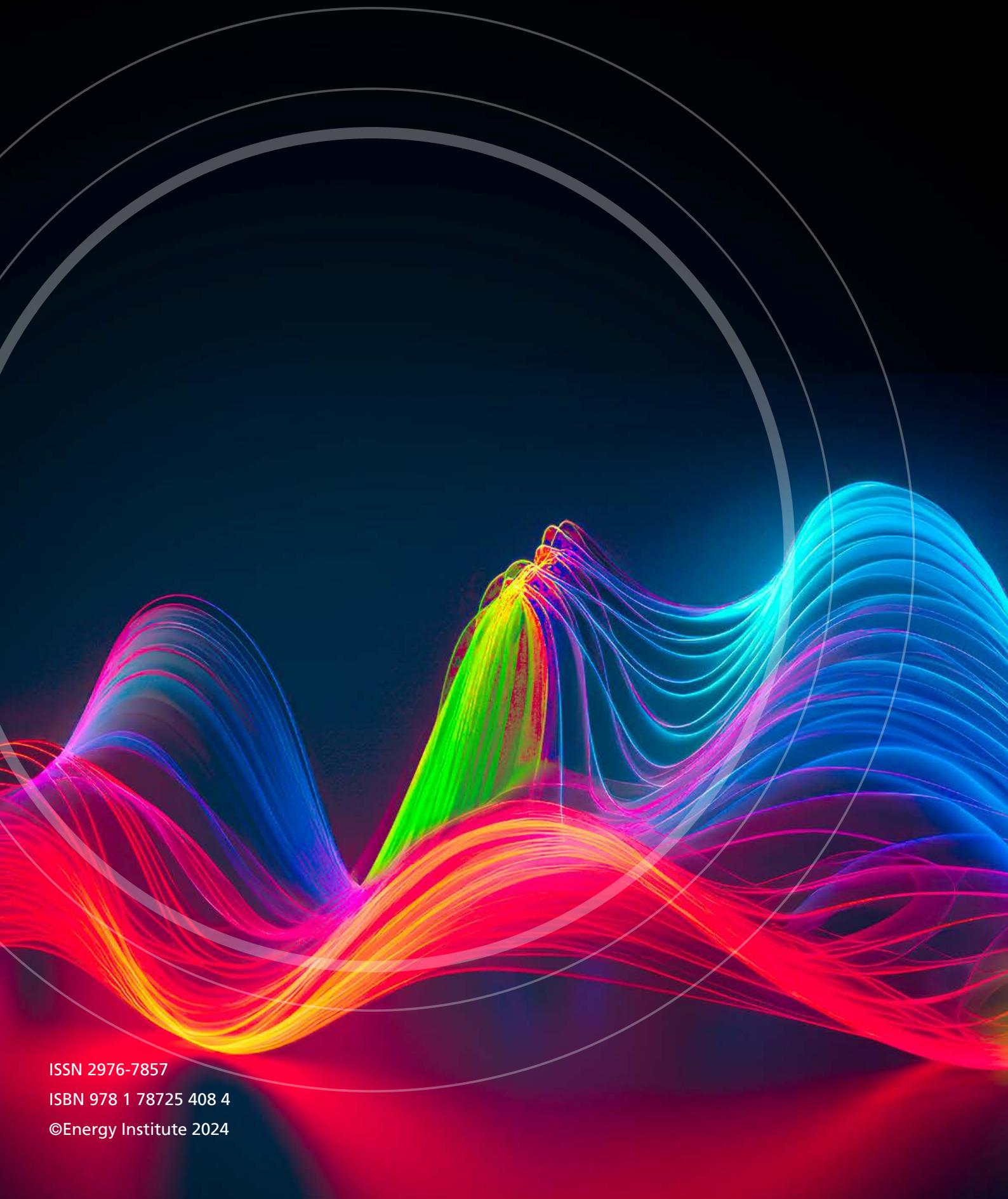
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