International Energy Agency

World Energy Investment 2020

Methodology Annex

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Introduction

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The way investment is measured across the energy spectrum varies, largely because of differences in the availability of data and the nature of expenditures. This document explains in greater detail the methodology used to ensure that the estimates are consistent and comparable across sectors in *World Energy Investment 2020* (*WEI 2020*). In *WEI 2019*, the definition of investment changed from the previous editions of *WEI* where investment was defined as overnight capital expenditure. In *WEI 2020,* investment is again measured as the ongoing capital spending on assets. For some sectors, such as power generation, this investment is spread out evenly from the year in which a new plant or upgrade of an existing one takes a final investment decision (i.e. when a project reaches financial close or begins construction) to the year in which it becomes operational. For other sources, such as upstream oil and gas and liquefied natural gas (LNG) projects, investment reflects the capital spending incurred over time as production from a new source ramps up, or to maintain output from an existing asset.

For energy efficiency, the measurement task is more complex and much of the expenditure is by consumers for whom purchases of more efficient goods are not investments per se. In *WEI 2020*, as in *WEI 2019* and other recent IEA reports, investment in energy efficiency includes incremental spending by companies, governments and individuals to acquire equipment that consumes less energy than that which they would otherwise have bought. Due to the different possible methodologies available, this estimate of energy efficiency investment is not definitive but still included to provide a comparison with the scale of investment in energy supply. Fossil fuel and power sector investments are those that raise or replace energy supply, while energy efficiency investments are counted as those that reduce energy demand.

Investment estimates are derived from International Energy Agency (IEA) data for energy demand, supply and trade, and estimates of unit capacity costs, analysis of which benefits from extensive interaction with industry. By default, investment data are given in year 2019 US dollars, adjusted using country-level gross domestic product (GDP) deflators and 2019 exchange rates. Unless otherwise stated in *WEI 2020*, all time series and historical comparisons are presented in real 2019 US dollar terms, adjusted for inflation.

Overall, this approach to investment represents an approximation of real-world practice and is aligned with the concept of capital expenditure in financial reporting and accounting. In reality, varying time lags and spending patterns characterise the period between the final investment decision and the operation of an energy project. As such, where available, measures of financial performance, financial flows and physical energy changes are also provided to give a more complete picture of the turnover of the energy asset base as well as decisions to commit new capital. While other areas of spending – including operating and maintenance expenditures, research and development, financing costs, mergers and acquisitions or public markets transactions – remain important for energy sector development, and are analysed on a standalone basis, they are not included in the investment calculations of *WEI 2020*.

Measuring investment in energy efficiency

Defining and measuring investment in energy efficiency is far less straightforward than for investment in energy supply. The IEA defines an energy efficiency investment as the incremental spending to acquire equipment that consumes less energy than would otherwise have been used to provide the service, such as lighting, heating or mobility, had the consumer not bought a more efficient option (i.e. the baseline). The additional cost of a more efficient alternative can represent but a small share of the total spending on a particular energy-related good or service. Furthermore, spending is carried out on the balance sheets of many millions of households and firms, often without external financing. As much as possible, a bottom-up analysis using data on sales of efficient goods is used.

In the buildings sector, the incremental investment for new or renovated buildings is the change in cost for services (design, delivery, installation) and products (lighting, appliances, equipment and materials) that achieve increased energy efficiency performance beyond the investment required for the minimum performance legally allowed. Thus, in principle, the full cost of a renovation that is associated with energy

efficiency improvements is included. For building types and products that have legal requirements on the performance of buildings, buildings services or building products, this cost is the incremental spending beyond that needed to achieve the minimum energy performance standards, energy efficiency regulations or building energy codes. For building types and products that do not have energy requirements, this cost is the incremental spending on energy-efficient services and products beyond what would have otherwise been spent, which in some cases is no spending. For the incremental investment in buildings achieved due to a recent improvement in energy efficiency policies, this cost is the incremental spending required to achieve the new energy performance requirements beyond the previous level to which the market had already adapted. Building sector spending for residential and commercial buildings is compiled from published national reports, including those of various government departments, agencies and public institutions. If not counted elsewhere in the buildings sector estimate, energy efficiency obligations, loans and funds established by policy are also considered as incremental spending. The estimate also draws upon industry sources, construction-sector indices and studies of capital cost requirements.

For the industry sector and freight transport sectors, the incremental investment is calculated based on the average technology efficiency in a recent base year. The result is modelled on a regional basis and based on the realised level of energy savings in a sector and energy saving cost curves in the World Energy Model (IEA, 2019f). Added to this is published data on investment in industrial energy management systems that improve system-wide efficiencies in manufacturing and heavy industry.

The baselines that are used to represent the likely alternative investment option, i.e. had the more efficient good not be purchased, are specific to each sector and sub-sector (Table 1.1).

Table 1 Approaches to setting the baselines above which incremental investment in energy efficiency is estimated in different sub-sectors

Sector	Sub-sector	Baseline
Buildings	Building envelope, HVAC (heating, ventilation, and air conditioning) and controls	Minimum energy performance standards for new construction, incorporated into the baseline with a time lag of several years to reflect adoption of the standard into the value chain. For retrofits of existing buildings, all spending is incremental.

Sector	Sub-sector	Baseline
	Appliances and lighting	Minimum energy performance standards, incorporated into the baseline with a time lag of several years
Industry	Energy-intensive industry	Sector average technology efficiency in prior year and no energy management system spending
	Other industry	Sector average technology efficiency in prior year and no energy management system spending
Transport	Light-duty vehicles	Average efficiency of new vehicle sales, per size and power class
	Freight vehicles and other transport	Average intensity of different modes in the prior year

In the light duty vehicles sector, spending is taken to be the additional price of each efficient vehicle sold (defined as those in the top 25% for fuel economy in their size and power class, according to the Worldwide Harmonised Light Vehicles Test Procedure [WLTP]) compared to the average price of vehicles in eight size and eight power classes in each country in that year. Different size and power classes are considered to take into account expressed consumer preferences and to maintain the principle of reduced energy demand for the same level of energy service provided. Electric light duty vehicles – both battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV) are included in this exercise with their electricity consumption converted to litres of gasoline equivalent on a WLTP basis. Underlying data is derived from IHS Markit (2018) and supplemented with public data sources and Marklines (2020), according to the general methodology of the Global Fuel Economy Initiative (GFEI, 2019). This price-based approach differs from cost-based approaches that estimate the total cost of the improving efficiency of the car fleet rather than the incremental consumer spending only. Cost-based approaches are commonly used in modelling exercises and aim to quantify the additional costs associated with improved fuel economy in future years, such as those incurred by manufacturers.

Measuring investment in fuel supply

In line with the other energy sectors, the investment estimates for oil, gas and coal represent capital spending, i.e. the total amount of investment costs incurred in any given year. They are derived from IEA data for demand, supply and trade, plus industry data on investment costs, where available. In the case of upstream oil and gas investment, global spending estimates are based on the announced spending of over 75 leading oil and gas companies. The investment activities of these companies, represent over three-quarters of global oil and gas production, have been surveyed and adjusted to represent the global spending. For the oil refining sector, spending estimates are calculated based on project-level information on new refineries, and upgrading projects in 108 countries. The investment estimates for the midstream sectors such as oil and gas pipelines and shipping transport were made to correspond to the IEA data for demand, supply and trade for oil and gas products. This follows the new methodology of the World Energy Model, used to produce the projections in the IEA's annual World Energy Outlook.

The investment in LNG liquefaction terminals is based on reported or estimated annual spending for nearly 60 projects that reached final investment decision between 2000 and 2019. Analyses rely on a wide range of publicly available sources. IEA estimates have been made where detailed information is not available, such as disaggregated spending by type of activity and capital spending plans by unlisted companies.

The investment for biofuels (including liquid biofuels and biogases) is based on capacity expansion plans for production facilities and assumptions on plant costs. Biofuels investment does not include additional spending on the production and supply of agricultural feedstocks. In this way, the biofuels investment estimate is more comparable to that for downstream fuel supply (e.g. refining and gas processing) activities than to upstream activities.

IEA Upstream Investment Cost Index (UICI)

The IEA Upstream Investment Cost Index or UICI is an indicator that the IEA developed to monitor cost trends in the upstream sector. The index measures the annual change of capital costs for exploration and development experienced by operating companies for the entire upstream sector, averaged across all regions and assets. The index is a composite indicator that reflects prices for cement, steel and other construction materials and equipment, as well as the cost of sector specific labour, drilling rigs and oilfield services. The UICI is calculated by weighting the average capital spending of

two separate exploration and production indices on the basis of disaggregated historical data for the different key components within these two activities. The index captures the yearly evolution of costs related to the acquisition of seismic data, project management, well drilling and completion, and the construction of production facilities, as well as the costs of labour, materials and equipment that are incorporated into charges for drilling, completion, related services and facilities.

IEA Upstream Shale Investment Cost Index (USICI)

The IEA Upstream Shale Investment Cost Index or USICI aims to assess trends in underlying costs incurred directly by operating companies. This index tracks the inflation rate of capital costs associated with the drilling and completion of modern shale wells, as well as the construction of required facilities for production across the US shale industry. USICI is built as the weighted average of representative components for each of these key activities, including drilling, completion and field facilities. IEA USICI is therefore a blended indicator that takes into account time evolution of rig rates, cost of fuel, steel and other raw materials, fracking equipment rates, chemicals as well as changes to costs related to a specialised workforce required for the different services.

Measuring investment in the power sector

The estimates of electricity investment presented in *WEI 2020* correspond to annual capital spending on new power plants and network assets, or the replacement of old assets; i.e., investment outlays are spread evenly from the year that an asset takes a final investment decision (.i.e. it reaches financial close or begins its construction) until the year it becomes operational. Thus, the investment for 2019 reflects spending carried out in assets that will become operational in the future, too. The construction period is estimated from data on reported primary financing transactions, sanctioning dates, and operational dates at a project-level by technology and by region in a given year.

Investment estimates reflect IEA analysis on annual capacity additions and unit investment costs, derived in part from surveys with industry, IEA (2019), S&P Global Platts (2020), BNEF (2020a), IRENA (2020) and other organisations. The methodology represents an approximation of real-world practice. In reality, capital outlays on new plants also spread over the years preceding installation and capital expenditures are often incurred during the life of a plant, and capital expenditures are often incurred during the life of a plant, even if this spending does not result in a change to capacity.

Nuclear power presents particular challenges given the long lead times and spending patterns associated with plant development. For new nuclear power plants, spending also corresponds to the even allocation from the year in which the unit takes final investment decision, to the year in which the unit is connected to the grid. *WEI 2020* includes estimates for upgrades to existing nuclear plants to extend lifetime operation. Investment in existing plants is estimated by reviewing plants reaching a 40-year lifetime in a given year and assessing their reported operational plans going forward.

Investment in electricity networks includes transmission and distribution, and includes spending on digital equipment for the smart monitoring and operation of the grid (e.g. smart meters, automation and EV fast charging stations). The data corresponds to the capital spending methodology and reflects three key drivers: investment in new infrastructure to accommodate new demand (increased connections and consumption), investment to replace ageing infrastructure and the investment required to integrate renewables in the power system.

Past investments in transmission and distribution assets, where possible, are based in publicly available data from utilities, regulators and other domestic entities. Networks investment to accommodate new demand is calculated based on the commissioning of new transmission and distribution lines and on the analysis of data provided by the NRG Expert Transmission and Distribution Database (NRG, 2020). The applied unit investment costs are based on past capital expenditures and data from industry surveys. Investment in asset replacement assumes an average lifetime of 40 years for assets already in operation. Unit replacement costs are derived from costs of new infrastructure. Investment costs of transmission and distribution networks required for renewables integration are derived from renewable integration costs based on literature reviews. The analysis of investments in the digitalisation of the electricity grid is based on analysis of NRG (2020), BNEF (2018). EV charging stations investment is based on combining estimates of public and private charger installations with prevailing cost information, based on IEA (2020a).

Additionally, investment in grid-scale battery storage and behind-the-meter storage is based on the capacity deployment reflected in the Energy Storage Association (2020), the Clean Horizon Project Database (Clean Horizon, 2020), BNEF (2020a), the analysis of data from the China Energy Storage Alliance Global Energy Storage Market Analysis (CNESA, 2020), and data provided by governments. Investment in pumped-hydro storage, the largest component of global storage investment, is included in the hydropower data of *WEI 2020*. Behind-the-meter storage is derived from BNEF (2020a) and data provided by governments.

Finally, data on investment decisions, where available, are also shown to give a more complete picture of the turnover of the capital stock. *WEI 2020* has undertaken an analysis of final investment decisions for power generation, based on awarded equipment contracts from data provided by McCoy Power Reports (2019) (including coal power, gas power and hydropower) and reported (nuclear) construction starts based on data from the International Atomic Energy Agency, Power Reactor Information Systems (PRIS) (2020), Global Energy Monitor (2020) and Clean Energy Pipeline (2020). These data may not capture smaller projects below 5 MW (below 10 MW for hydropower). However, *WEI 2020* has made estimates for investments and final investment decisions (treated as the same) in small-scale generator sets, based on Global Data (2018).

Energy financing and funding trends

WEI 2020 features analysis on trends related to financial flows, financial performance, ownership and the sources of funding and finance – the structure of financing arrangements used to finance assets and their geographic location – for different energy sectors, as well as analysis of these issues from the perspective of companies, banks and investors. The relationship between capital expenditures and financial flows is not always well understood, so this analysis should be seen as a complement to the core investment data, rather than a direct quantitative input. We have included the analytical approach for some of these elements below.

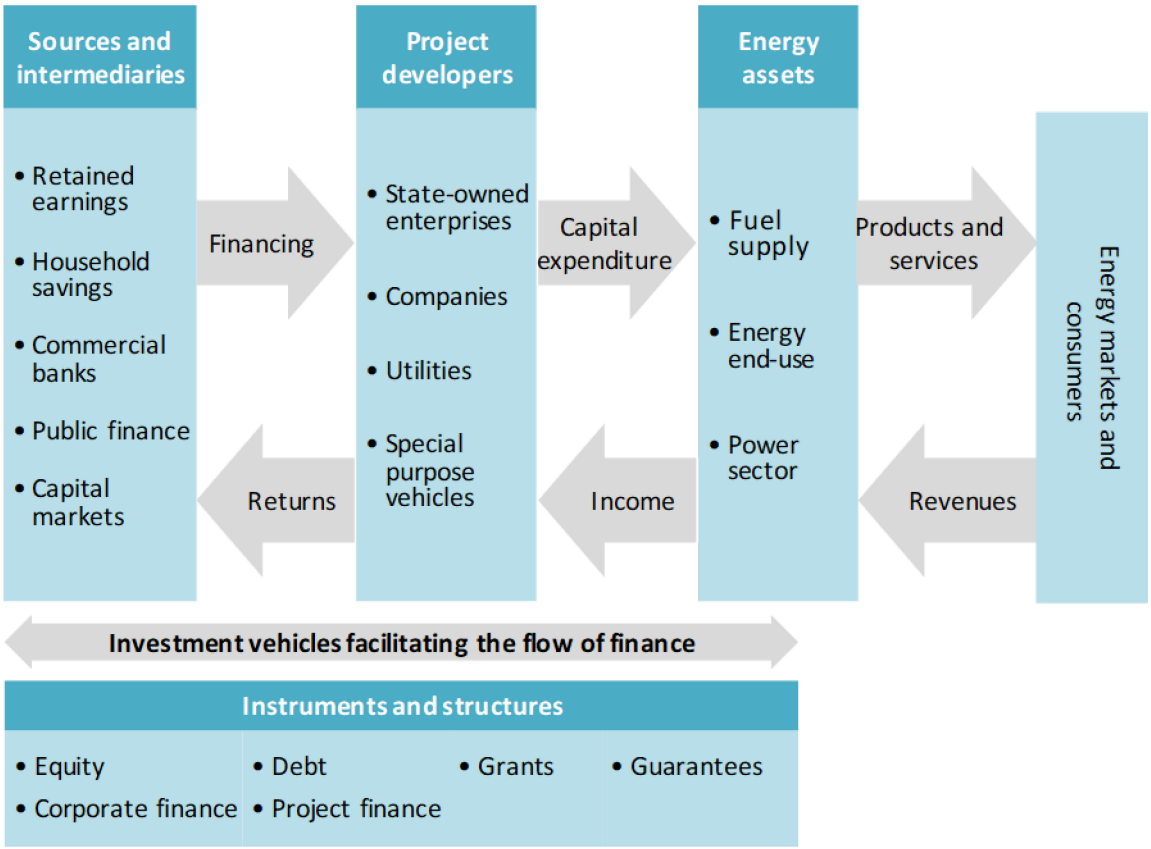
Measuring sources of finance for investments

WEI 2020 broadly categorises the sources of finance for new energy assets into balance-sheet and project financing, which are carried out by a variety of intermediaries and support capital expenditures carried out by project developers (Figure 1). When mapping sources of finance to investments, the focus is on primary financing, but the *WEI* also analyses select trends in secondary financing (refinancing, mergers and acquisitions). To estimate project-financed investment on a spending basis, reported primary financing data, financial close date as proxy of the sanctioned date as well as actual or estimated operational date at project-level are combined in a given year. Balance sheet financing is estimated as the residual of the total investment less the contribution from project finance. Given the difficulties in synthesising complex data, which are not always complete or transparent, the results should be seen as providing a broad indication of trends.

In some cases, we also analyse whether finance is coming from public or private sources – for balance sheet finance the analysis categorises the type of company

carrying out spending on its balance sheet as a state-owned enterprise or private sector actor; for project finance, categorisations are made of the debt providers and equity sponsors. The main data sources are IJGlobal (2020), Clean Energy Pipeline (2020), transaction announcements and the World Bank Public Participation in Infrastructure Database database (2020).

Figure 1 Financial flows in energy investment



Capital markets

In the *WEI 2020*, there is new analysis on the role of capital markets and institutional investors. With over USD 100 trillion under management, institutional investors – including asset managers, infrastructure funds, insurance companies, pension funds, private equity and sovereign wealth funds – are a large potential source of finance for the energy sector. Past editions of WEI have noted that 90% of energy investments are financed on a primary basis from the balance sheets of companies and consumers, with a smaller role for project finance (mostly loans from banks). But such mechanisms also depend on having a robust interconnected system of secondary financial sources and intermediaries and diverse investment vehicles to facilitate flows. Although a

number of well-capitalised industry players (e.g. some integrated oil and gas, utility and state-owned companies) are able to make investments from retained earnings alone, there are economic benefits to tapping into wider pools of finance, at a lower cost of capital, and especially in an era of lower interest rates. Moreover, banks often face limits on their lending, particularly with regulatory constraints emerging in recent years, such as Basel III.

The objective here is not to provide a full accounting, but to track investor and capital market trends in three main channels (1) shareholding in the top energy companies; (2) acquisitions and refinancing of energy projects; (3) financial flows to pooled investment vehicles (securitisation and yieldcos) for clean energy. These trends are assessed primarily using data from Thomson Reuters Eikon (2020), IJ Global (2020), Bloomberg (2020), supplemented by other sources of financial transaction data and studies on financial performance.

This analysis is followed by a focus on sustainable finance, which assesses from a broader standpoint the recent dramatic rise of sustainable financial flows, and related regulatory developments, and how this trend relates to energy investment. Among listed investments, sustainable debt securities – including labelled green bonds, green and sustainable loans, and sustainability-linked debt – may provide investors the clearest route to capital allocation for clean energy and other green activities.They may also be particularly suited for small-scale renewables and efficiency investments, which are difficult for investors to fund directly. These advantages stem from labelling and certification (under frameworks such as Green Bond Principles, and more specific evaluations, e.g. Climate Bonds Standard). Still, frameworks are not always harmonised across markets, and as labelled securities grow beyond green bonds, their impact and uses become more complex to evaluate. These trends are assessed using data from BNEF (2020b), Thomson Reuters (2020), Environmental Finance (2020), with benchmarking against other sources, including Climate Bonds Initiative and issuer reporting.

Research and Development

The approach taken is a bottom-up tracking exercise based on publicly reported data. While it is acknowledged that definitions can vary, especially between the public and private sectors in terms of how capitalised assets are included, the reported numbers and their allocations between technology areas are generally taken at face value. Interpolations, estimations and extrapolations are used sparingly. The main breakdowns and sources of data are presented in Table 1.2.

Table 2 Sources for the compilation of energy R&D spending 2012-2019

Funding Type	Region/Country	Source
Public	IEA member governments	Data submitted annually to IEA, broken down by technology area and published in the IEA Energy Technology RD&D database. See IEA (2020b, 2011)
	China	Statistics Yearbook on Science and Technology Activities of Industrial Enterprises; China Statistical Yearbook on Science and Technology; data submission to the Mission Innovation (MI) Secretariat, shared with permission.
	India	Research budgets of energy-related ministries
	Brazil	"IEA estimates based on "Energy Big Push" project analysis as of 2019
	Indonesia	MEMR Strategic plans
	Russia	Survey data and news coverage
	South Africa	Budget reports of the Department of Energy and SANEDI
Private	Corporate	Reported R&D spending in annual company disclosures, allocated per energy sub-sector according to share of revenue from that activity unless otherwise stated by the company
	Early stage venture capital	Series A, series B and seed funding by technology area from the Cleantech Group i3 database, reclassified to align with IEA energy technology categories and sectors of investors.

Corporate financial reports of over 2 500 companies active in energy sector industry classifications are included in the sample. These classifications include: fossil fuel extraction, transport, conversion and services; electricity generation, including production, equipment manufacture and services; electricity, gas and district heating utilities; electricity and gas networks and smart grids; electric mobility; LEDs; insulation; electricity storage; non-electricity renewable energy, including production and equipment manufacture. R&D budgets of companies that are active in multiple sub-sectors are allocated on the basis of interviews with major companies or split in line with the share of revenue in these sectors (including non-energy sectors). For

automotive companies, a share of R&D that is relevant to improving fuel efficiency, alternative fuels and alternative drivetrains is allocated based on interviews and reports. These attempts to capture only energy-relevant R&D budgets are particularly important in the case of companies whose primary sectoral classification is not well-aligned with the full extent of their market and innovation activities.

One notable caveat is that this methodology makes it challenging to capture corporate research into efficient buildings, appliances and industry. Such R&D is undertaken within the R&D activities of these other sectors for which energy efficiency cannot be separated from their other research activities. However, we know that energy research in other sectors is substantial (IEA, 2017). Furthermore, non-listed companies comprise a non-trivial component of total energy R&D spending and these are not captured by our methodology.

Low-carbon energy technology spending is separated wherever possible to include all technologies (for the public sector and venture capital) and all industry sub-sectors (for the corporate sector) related to: renewables; nuclear; CCUS; smart grids; electric mobility; LEDs; electricity storage, insulation.

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Abbreviations, units and acronyms

ABS	asset-backed securities
B30	diesel containing 30% biodiesel
BEV	battery-electric vehicles
boe	barrel of oil equivalent
Bt	billion tonnes
C&S	Central & South America
CAD	Canadian dollar
cal	calorie
CCUS	carbon capture, utilisation and storage
CO2	carbon dioxide
CTO	coal-to-olefin
DAC	Direct Air Capture
E15	ethanol blend 15 (gasoline containing 15% ethanol)
E20	ethanol blend 20 (gasoline containing 20% ethanol)
EBITDA	earnings before interest, depreciation and amoritization
EOR	enhanced oil recovery
EPC	energy performance certificate
EPC	engineering, procurement and construction
ESCO	energy service company
EUR	euro
EV	electric vehicle
FID	final investment decision
FYP	Five-Year Plan
g	gram
GBP	British pound sterling
GDP	gross domestic product
HVO	hydrotreated vegetable oil
ICT	Information and communication technology
IRR	internal rate of return
IT	information technology
JPY	Japanese Yen
kb/d	thousand barrels of oil per day
kg	kilogram
km	kilometre
ktoe	thousand tonnes of oil equivalent
kV	kilovolt
kWh	kilowatt hour
LCFS	Low Carbon Fuel Standard
LCOE	levelised cost of electricity
LLC	limited liability company
LNG	liquified natural gas
LPG	liquified petroleum gas
MBS	mortgage-backed security
MBtu	million British thermal units
mb/d	million barrels of oil per day
MDB	multilateral development banks
MENA	Middle East and North Africa
MI	Mission Innovation
Mt	million tonnes
MTO	methanol-to-olefin
Mtoe	million tonnes of oil equivalent
Mtpa	million tonnes of coal equivalent per year

GJ	gigajoule	Mtpa	million tonnes of natural gas equivalent per year
GW	gigawatt	MW	megawatt
GW	gigawatt	MW_e	megawatt of electrical energy
GW_e	gigawatt of electrical energy	MWh	megawatt hour
GWh	gigawatt hour	MW_{th}	megawatt of thermal energy
GW_{th}	gigawatt of thermal energy	NOC	National Oil Company
OECD	Organisation for Economic Co-operation and Development	SPV	special purpose vehicle
OFSE	oil field service and equipment	STEPS	The IEA Stated Policies Scenario
OPEC	OPEC is an intergovernmental organization of 13 oil-exporting developing nations	SUV	sport utility vehicle
OPEC+	OPEC, plus ten other cooperating countries	toe	tonne of oil equivalent
PACE	property-assessed clean energy	TTF	title transfer facility
PDH	propane de-hydrogenation	TWh	terawatt hour
PHEV	plug-in hybrid electric vehicle	UHV	ultra-high voltage
PLN	Perusahaan Listrik Negara	UICI	IEA upstream Investment Cost Index
PPA	power purchase agreement	USD	United States Dollar
PV	(Solar) photovoltaic	USICI	IEA upstream Shale Investment Cost Index
R&D	research & development	VC	venture capital
RD&D	research, development & demonstration	WACC	weighted average cost of capital
RFS2	Renewable Fuel Standard 2	WEI	IEA World Energy Investment
ROIC	return on invested capital	WEO	IEA World Energy Outlook
SDS	The IEA Sustainable Development Scenario	WLTP	Worldwide Harmonised Light Vehicles Test Procedure
SHC-TCP	Solar Heating and Cooling Technology Collaboration Program	WTI	West Texas Intermediate
SOE	state-owned entity	YTD	year to date

Glossary

Advanced biofuels: Sustainable fuels produced from non-food crop feedstocks, which are capable of delivering significant lifecycle greenhouse gas emissions savings compared with fossil fuel alternatives, and which do not directly compete with food and feed crops for agricultural land or cause adverse sustainability impacts. This definition differs from the one used for "advanced biofuels" in the US legislation, which is based on a minimum 50% lifecycle greenhouse gas reduction and which, therefore, includes sugar cane ethanol.

Advanced economies: OECD regional grouping and Bulgaria, Croatia, Cyprus, Malta and Romania.

Asset-backed security An asset-backed security (ABS) is an investment security that is backed by a pool of assets, e.g. loans (home, auto, student), leases, credit card debt, royalties, or other financial asset receivables.

Balance sheet finance: Involves the explicit financing of assets on a company's balance sheet using retained earnings from business activities, including those with regulated revenues, as well as corporate debt and equity issuance in capital markets. To some extent, it measures the degree to which a company self-finances its assets, though balance sheets also serve as intermediaries for raising capital from external sources.

Borrowing costs: Borrowing cost are the costs incurred by a company resulting from the borrowing of funds e.g. interest.

Buildings: The buildings sector includes energy used in residential, commercial and institutional buildings, and non-specified other. Building energy use includes space heating and cooling, water heating, lighting, appliances and cooking equipment.

Capital costs: Costs to develop and construct a fixed asset such as a power plant and grid infrastructure or execute a project, excluding financing costs. For power generation assets, capital costs include refurbishment and decommissioning costs.

Capital structure Capital structure is the particular combination of debt and equity used by a company to finance its overall operations and growth.

Coal: Includes both primary coal (including lignite, coking and steam coal) and derived fuels (including patent fuel, brown-coal briquettes, coke-oven coke, gas coke, gas-works gas, coke-oven gas, blast-furnace gas and oxygen steel furnace gas). Peat is also included.

Co-generation: The combined production of heat and power

Community choice aggregators (CCAs): Municipal-level entities that procure bulk power.

Corporate venture capital	Equity investments in start-ups that are developing a new technology or service by companies whose primary business is not venture capital nor other equity investments. In addition to playing the traditional role of a venture capital investor, corporate venture capital investors often provide support to the start-ups via access to their customer base, R&D laboratories and other corporate resources. Corporate venture capital is used by companies as part of their energy innovation strategies to enter new technology areas or learn about technologies more quickly than developing them in-house.
Current ratio:	Current assets divided by current liabilities
Debt:	Bonds or loans taken out by a company to finance its growth and operations.
Developing economies:	All other countries not included in the "advanced economies" regional grouping.
Dispatchable low-carbon power:	Dispatchable low-carbon power refers to technologies whose power output is derived from low-carbon sources and can be readily controlled - increased to maximum rated capacity or decreased to zero - in order to match supply with demand.
Dispatchable power generation:	Refers to technologies whose power output can be readily controlled – increased to maximum rated capacity or decreased to zero – in order to match supply with demand.
District heating:	An insulated network that delivers hot water or steam from co-generation (the combined production of heat and power) or heat-only sources via pipelines to space heating or hot water users in buildings.
Dividend coverage ratio:	The ratio of a company's dividend payout relative to its net income.
Dividend pay-out ratio:	The proportion of a company's net income that is paid out to shareholders in dividends.
Early-stage venture capital	Generally the first three venture capital fundraising rounds involving external investors in a start-up, referred to as seed, series A and series B. These investments accept a significant share of of technology risk and are a major source of risk capital that support innovation in many clean energy technologies. The values generally increase from up to USD 2 million for a seed round, to USD 10 million or more for a series B round, but can be smaller or much larger.
EBITDA:	Earnings before interest, tax, depreciation and amortization (EBITDA) is a measure of a company's operating performance. EBITDA allows for comparison between companies without needing to take differentiate financial, accounting and tax considerations.
Electrolyser:	Refers to water electrolysers designed for the production of hydrogen via electrolysis using electricity and water inputs.

Energy efficiency investment:	The incremental spending on new energy-efficient equipment or the full cost of refurbishments that reduce energy use. The intention is to capture spending that leads to reduced energy consumption. Under conventional accounting, part of this is categorised as consumption rather than investment.
Energy Research and development (R&D):	Research and development related to improving the performance or reducing the costs of the production, storage, transportation, distribution and use of all forms of energy.
Equity:	Common stock, preferred stock, or retained earnings that a company uses to finance its growth and operations.
Free cash flow:	The cash flow available to the company's investors (e.g. shareholders and bondholders) after all operation expenses are paid and investments are made. It is calculated by subtracting capital expenditure from operating cash flow.
Green bank:	A green bank is a public, quasi-public or non-profit entity established specifically to facilitate private investment into domestic low-carbon, climate-resilient infrastructure.
Green bond:	A green bond is a type of fixed-income instrument that was created to fund projects that have positive environmental and/or climate benefits
Green mortgage-backed securities (MBS):	A mortgage or loan with the intended purpose to improve existing properties to achieve increased energy efficiency or decreased water usage.
Growth equity	A type of private equity investment, usually a minority investment, in relatively mature companies that are looking for capital to expand or restructure operations, enter new markets or finance a significant acquisition without a change of control of the business. While it involves less technology risk than early-stage venture capital, it is one of the ways in which energy technology start-ups scale up innovative technologies. It is a strategy of corporate venture capital investing to develop new technologies.
Hydropower:	The energy content of the electricity produced in hydropower plants, assuming 100% efficiency. It excludes output from pumped storage and marine (tide and wave) plants.
Internal rate of return (IRR):	The discount rate that makes the present value of investment cost (cash outflow) equal to that of benefits (cash inflow), whereby making the net present value of the project equal to 0.

Investment:	In WEI 2020, all investment data and projections reflect actual spending across the life cycle of a project, i.e. the capital spent is assigned to the year when it is incurred. Investments for oil, gas and coal include production, transformation and transportation; those for the power sector include refurbishments, uprates, new builds and replacements for all fuels and technologies for on-grid, mini-grid and off-grid generation, as well as investment in transmission and distribution, and battery storage. Investment data are presented in real terms in year 2019 US dollars unless otherwise stated. Note that the definition was effective beginning in 2019. Previously, the investment data reflected "overnight investment", i.e. the capital spent is generally assigned to the year production (or trade) is started, rather than the year when it is incurred.
Lead times:	The amount of time from the start of a project to its commissioning. In WEI 2019, lead times refer to the time between the final investment decision and the start-up for oil and gas projects and construction time for power generation assets.
Leverage:	Leverage, or gearing, is the relative amount of debt a company uses to raise capital needed to fund its activities.
Light-duty vehicles:	A light-duty vehicle is a road vehicle with at least four wheels and with a kerb weight below 3.5 tonnes. This broadly covers the UN categories of M1 and N1.
Liquidity:	The availability of liquid (cash) assets.
Lockdown:	A state of isolation or restricted access instituted as a security measure.
Long-term debt:	Long-term debt, also called non-current liabilities, are a company's financial obligations will mature after a year.
Low-carbon power:	Low-carbon power comes from methods that produce substantially less carbon (or carbon equivalent) emissions than fossil fuel generations. Low carbon power generation sources include wind power, solar power, hydropower and nuclear power.
Market capitalisation:	Market capitalisation represents to the total value of a company as determined by the stock's present share trading value multiplied by the total number of shares.
Mission Innovation (MI):	A global initiative of over 20 countries to accelerate clean energy innovation. Initiative members aim to double their government and/or state-directed clean energy RD&D investment over five years from 2015 to 2020, among other goals. See the MI website for details.
Mixed feed crackers:	Crackers designed to alter their feedstock mix depending on market conditions.
Mortgage-backed security:	A mortgage-backed security is a sub-type of an asset-backed security that is comprised of a bundle of home loans.

Net debt:	The total debt of a company less its available cash. Net debt compares how much debt a company could pay-off utilizing its liquid assets.
Net-zero emissions:	Net-zero emissions refers to achieving carbon neutrality through the course of a sector's entire value and use-chain.
Nominal (terms):	Nominal (value or terms) is a financial and economic term that indicates the statistic in question is measured in actual prices that exist at the time. nominal value of any economic statistic means the statistic is measured in terms of actual prices that exist at the time.
Offshore wind:	Refers to electricity produced by wind turbines that are installed in open water, usually in the ocean.
Option-adjusted spread:	An option-adjusted spread is the the calculated spread between a computed index of all bonds in a given rating category and its risk-free counterpart.
Paris Agreement:	An agreement with the United Nations Framework Convention on Climate Change ratified by almost 190 countries to tackle climate change. It aims to strengthen the global response to keep a global temperature rise this century well below 2 °C above pre-industrial levels. All Parties to the Agreement are required to put forward their best efforts through Nationally Determined Contributions and to strengthen the efforts in the years ahead.
Payback period:	Refers to the period of time required to recover the amount invested in a project from its benefits (cash inflows).
Pooled vehicle:	A pooled (investment) vehicle is a fund created from capital aggregated from many individual investors that are used to secure full payment for investment.
Power generation:	Refers to fuel use in electricity plants, heat plants and combined heat and power (CHP) plants. Both main activity producer plants and small plants that produce fuel for their own use (auto-producers) are included.
Power purchase agreement (PPA):	A power purchase agreement is a legal contract between an electricity generator (provider) and a power purchaser (user).
Project finance:	Involves external lenders – including commercial banks, development banks and infrastructure funds – sharing risks with the sponsor of the project. It can also involve fundraising from the debt capital markets with asset-backed project bonds. They often involve non-recourse or limited-recourse loans where lenders provide funding on a project's future cash flow and have no or limited recourse to liability of the project parent companies.
Property-assessed clean energy (PACE):	A type of financial instrument with the intended use to upgrade energy-efficiency or instal renewable energy sources for commercial, industrial, and private residential properties.

Real (terms):	Real (value or terms) is a financial and economic term that indicates the statistic in questionhas been adjusted to take into account the effect of inflation.
Renewable power:	Power derived from bioenergy, geothermal, hydropower, solar photovoltaic (PV), concentrating solar power (CSP), wind and marine (tide and wave) energy for electricity and heat generation.
Return on Invested Capital (ROIC):	A profitability ratio expressed as operating income adjusted for taxes divided by invested capital. The ratio measures the ability of a company's core business investments to generate profits. For the ROIC/WACC analysis in WEI 2019, invested capital is calculated by subtracting cash and cash equivalent, other long-term assets than property/plant/equipment, good will and intangibles, and current liabilities from total assets.
Revenue:	Revenue is the income a business derives, usually from the sale of goods and services to customers.
Securitisation:	Creating tradeable securities
Short-term debt:	Short-term debt, also called current liabilities, are a company's financial obligations that are due to be paid within a year.
Stated Policies Scenario (STEPS):	An IEA scenario that reflects the impact of existing policy frameworks and today's announced policy intentions. The aim is to hold up a mirror to the plans of today's policy makers and illustrate their consequences for energy use, emissions and energy security. The aim of the Stated Policies Scenario is to provide a detailed sense of the direction in which existing policy frameworks and today's policy ambitions would take the energy sector out to 2040. Previously known as the New Policies Scenario, it has been renamed in WEO 2019 to underline that it considers only specific policy initiatives that have already been announced.
Sustainable Development Scenario (SDS):	An IEA scenario that outlines a major transformation of the global energy system, showing how the world can change course to deliver on the three main energy-related SDGs simultaneously. SDS shows how the energy sector can achieve the objectives of the UN Sustainable Development Goals (SDGs) most closely related to energy, namely, those goals related to energy access, air pollution emissions and climate change (SDGs 3, 6, 7, and 13). It is aligned with the Paris Agreement's goal holding the increase in the global average temperature to well below 2 °C.
Tight oil:	Oil produced from shales or other very low permeability formations, using hydraulic fracturing. This is also sometimes referred to as light tight oil. Tight oil includes tight crude oil and condensate production except for the United States, which includes tight crude oil only (US tight condensate volumes are included in natural gas liquids).
Transition bond:	A transition bond is a type of fixed-income instrument that is to be used to fund projects to improve environmental performance for fossil-fuel or high-carbon emission projects.

Transport:	Fuels and electricity used in the transport of goods or persons within the national territory irrespective of the economic sector within which the activity occurs. This includes fuel and electricity delivered to vehicles using public roads or for use in rail vehicles; fuel delivered to vessels for domestic navigation; fuel delivered to aircraft for domestic aviation; and energy consumed in the delivery of fuels through pipelines.
U-shaped (economic recovery)	A U-shaped recovery is a type of economic recession and recovery that resembles a U shape when charted using key economic measures, e.g. GDP vs time. A U-shaped recovery is similar to a V-shaped recovery except that the economy takes more time to rebound.
V-shaped (economic recovery)	A V-shaped recovery is a type of economic recession and recovery that resembles a V shape when charted using key economic measures, e.g. GDP vs time. A V-shaped recovery represents a relatively quick time to recession bottom and recovery period.
Weighted-average cost of capital (WACC):	The weighted average cost of capital is expressed in nominal terms and measures the company's required return on equity and the after-tax cost of debt issuance, weighted according to its capital structure.
White certificate:	A tradable asset which proves that a certain percentage of energy savings has been achieved relative to an established baseline. In most applications, white certificates are combined with energy company obligation schemes that are designed to achieve a certain target of energy savings, thereby creating a market for energy efficiency.
Yield company:	Listed equity vehicles holding multiple operational renewable energy projects.

INTERNATIONAL ENERGY AGENCY

The IEA examines the full spectrum of energy issues including oil, gas and coal supply and demand, renewable energy technologies, electricity markets, energy efficiency, access to energy, demand side management and much more. Through its work, the IEA advocates policies that will enhance the reliability, affordability and sustainability of energy in its 30 member countries, 8 association countries and beyond.

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Typeset in France by IEA - May 2020
Cover design: IEA
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