

# World Energy Investment 2020

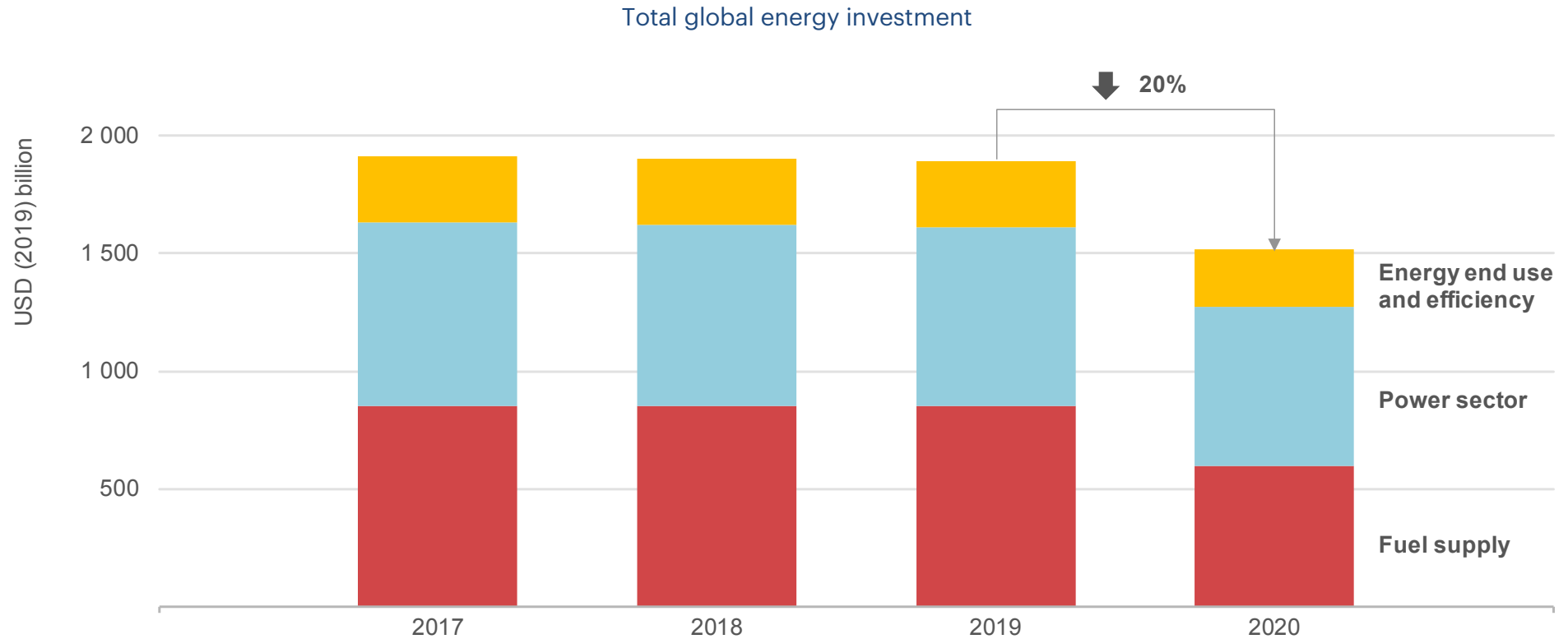


---

# Overview and key findings

---

## Energy investment is set to fall by one-fifth in 2020 due to the Covid-19 pandemic

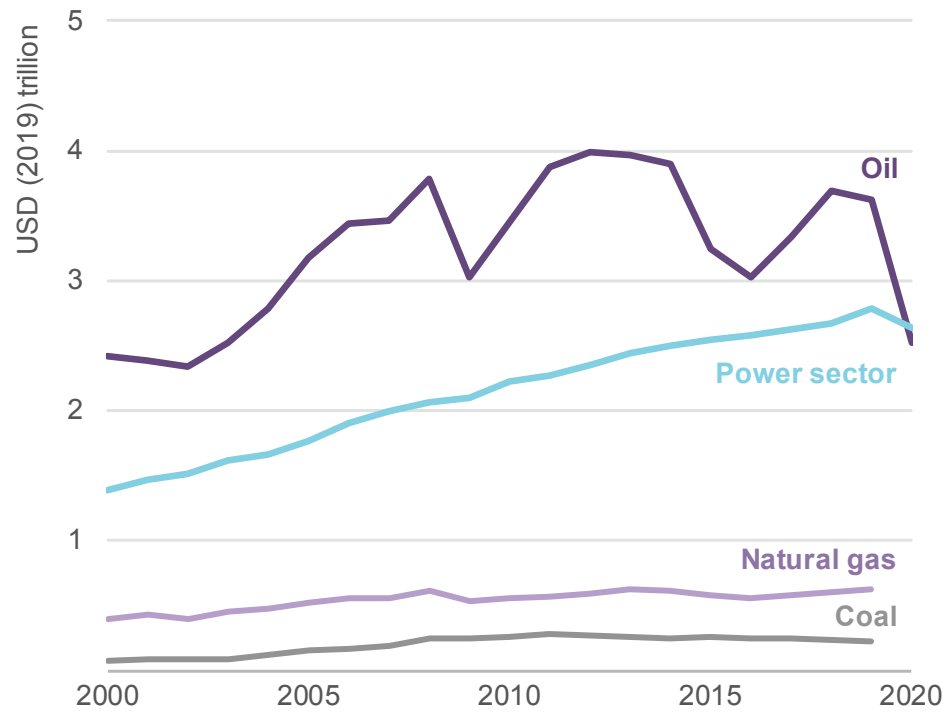


IEA 2020. All rights reserved.

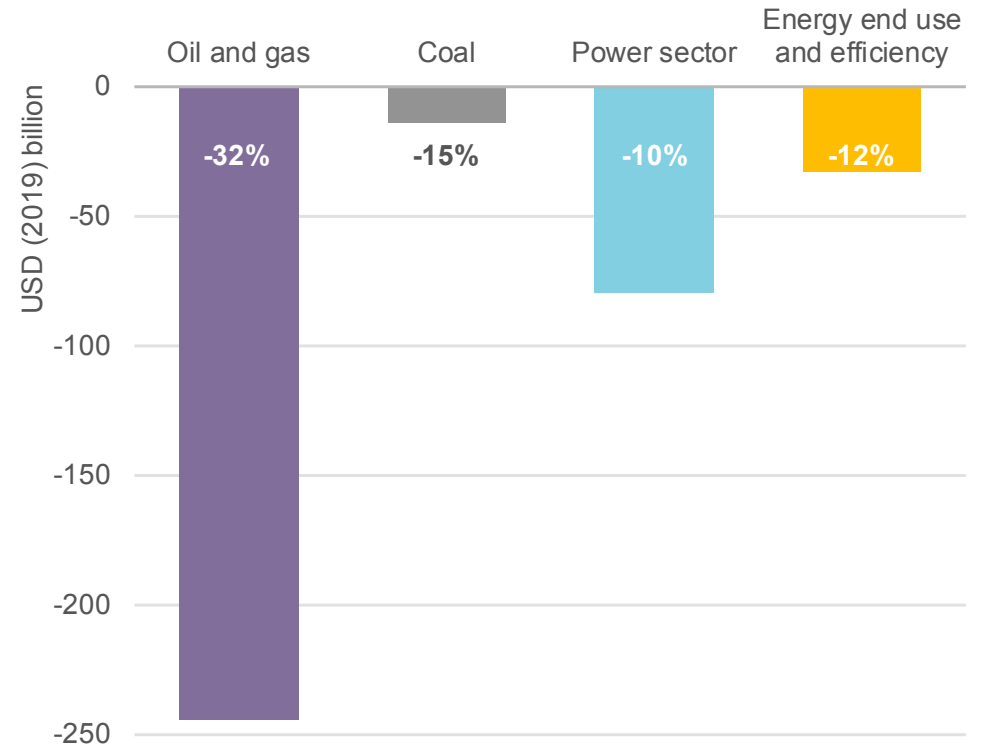
Notes: Investment is measured as the ongoing capital spending in energy supply capacity and, in the case of energy efficiency, the incremental spending on more efficient equipment and goods. The scope and methodology for tracking energy investments is available [here](#). “Fuel supply” includes all investments associated with the production, transformation and provision of solid, liquid and gaseous fuels to consumers; these consist mainly of investments in oil, gas and coal supply, but include also biofuels and other low-carbon fuels. “Power sector” includes the capital spending on all power generation technologies, as well as ongoing investments in grids and storage. “Energy end use and efficiency” includes the investment in efficiency improvements across all end-use sectors, as well as end-use applications for renewable heat.

## Investment activity has been disrupted by lockdowns but also by a sharp fall in revenues, especially for oil

Global end-use spending on energy



Change in estimated 2020 investment versus 2019, by sector



IEA 2020. All rights reserved.

## Pre-crisis expectations of modest growth have turned into the largest fall in global energy investment on record

The speed and scale of the fall in energy investment activity in the first half of 2020 is without precedent. Many companies reined in spending; project workers have been confined to their homes; planned investments have been delayed, deferred or shelved; and supply chains interrupted.

At the start of the year, our tracking of company announcements and investment-related policies suggested that worldwide capital expenditures on energy might edge higher by 2% in 2020. This would have been the highest uptick in global energy investment since 2014. The spread of the Covid-19 pandemic has upended these expectations, and 2020 is now set to see the largest decline in energy investment on record, a reduction of one-fifth – or almost USD 400 billion – in capital spending compared with 2019.

Almost all investment activity has faced some disruption due to lockdowns, whether because of restrictions on the movement of people or goods, or because the supply of machinery or equipment was interrupted. But the larger effects on investment spending in 2020, especially in oil, stem from declines in revenues due to lower energy demand and prices, as well as more uncertain expectations for these factors in the years ahead.

Oil (50%) and electricity (a further 38%) were the two largest components of worldwide consumer spending on energy in 2019. However, we estimate that spending on oil will plummet by more than USD 1 trillion in 2020, while power sector revenues drop by USD 180 billion (with demand and price effects accompanied in many countries by a rise in non-payment). Among other implications, this would mean an historic switch in 2020 as electricity becomes the largest single element of consumer spending on energy.

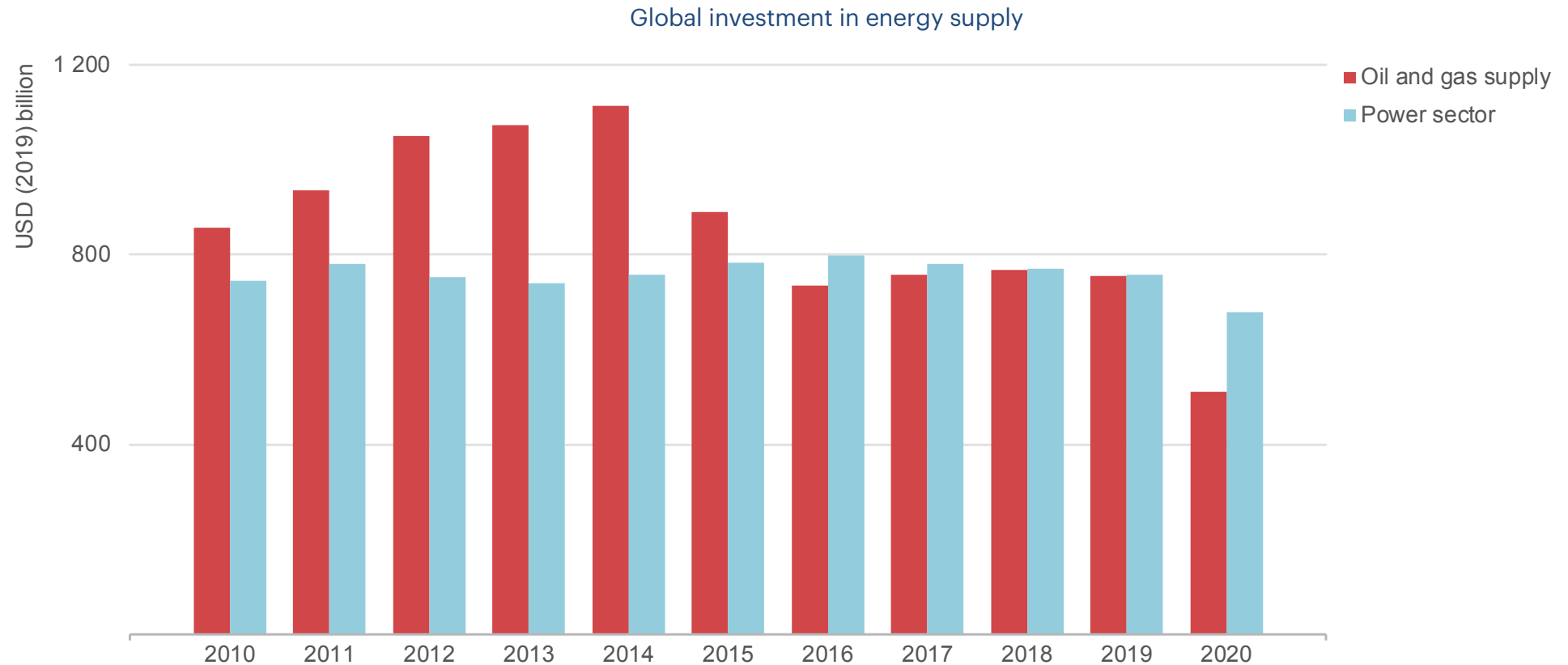
Not all of these declines are felt directly by the energy industry. Energy-related government revenues – especially in the main oil and gas exporting countries – have been profoundly affected, with knock-on effects on the budgets available to state-owned energy enterprises.

The revisions to planned spending have been particularly brutal in the oil and gas sector, where we estimate a year-on-year fall in investment in 2020 of around one-third. This has already triggered an increase in borrowing as well as the likelihood that restrained spending will continue well into 2021.

The power sector has been less exposed to price volatility, and announced cuts by companies are much lower, but we estimate a fall of 10% in capital spending. In addition, sharp reductions to auto sales and construction and industrial activity are set to stall progress in improving energy efficiency.

Overall, China remains the largest market for investment and a major determinant of global trends; the estimated 12% decline in energy spending in 2020 is muted by the relatively early restart of industrial activity following strong lockdown measures in the first quarter. The United States sees a larger fall in investment of over 25% because of its greater exposure to oil and gas (around half of all US energy investment is in fossil fuel supply). Europe's estimated decline is around 17%, with investments in electricity grids, wind and efficiency holding up better than distributed solar PV and oil and gas, which see steep falls. Developing countries, especially those with significant hydrocarbon industries, see the most dramatic effects of the crisis, as falling revenues pass through more directly to lower funds for investment.

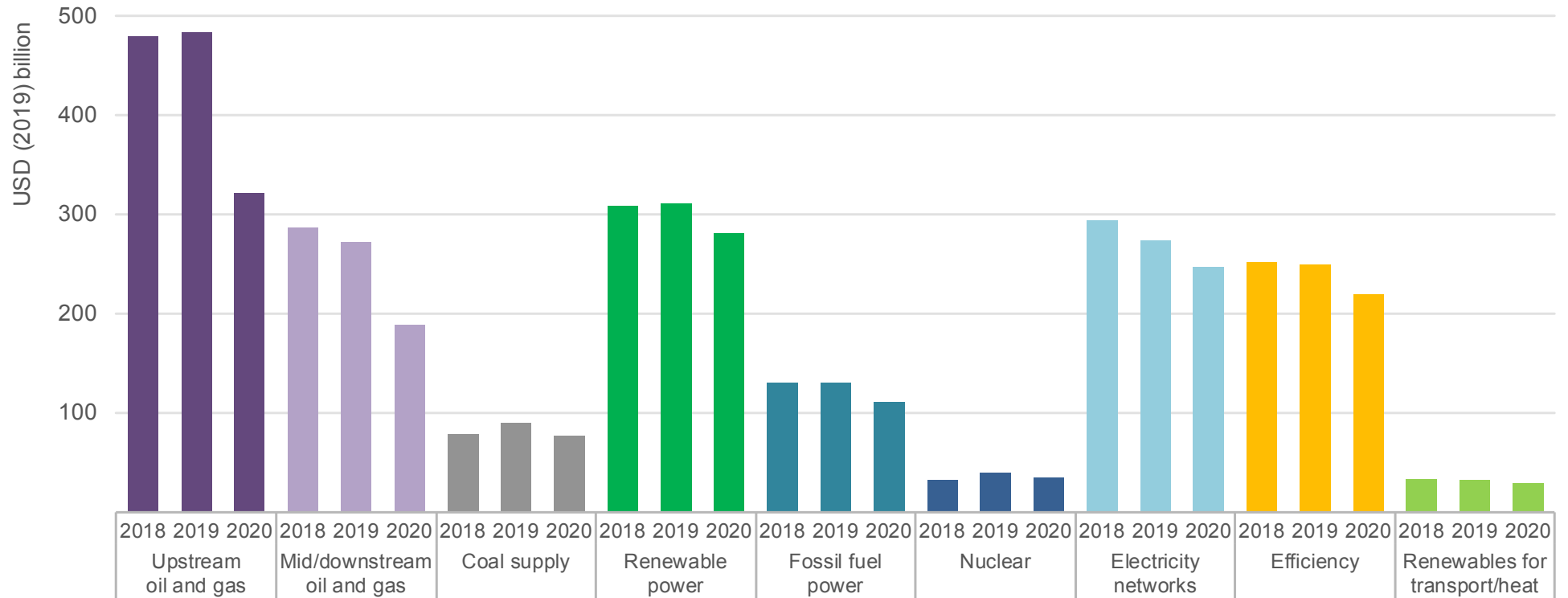
## Over the last ten years, power sector spending has been relatively stable compared with the rollercoaster ride for oil and gas



IEA 2020. All rights reserved.

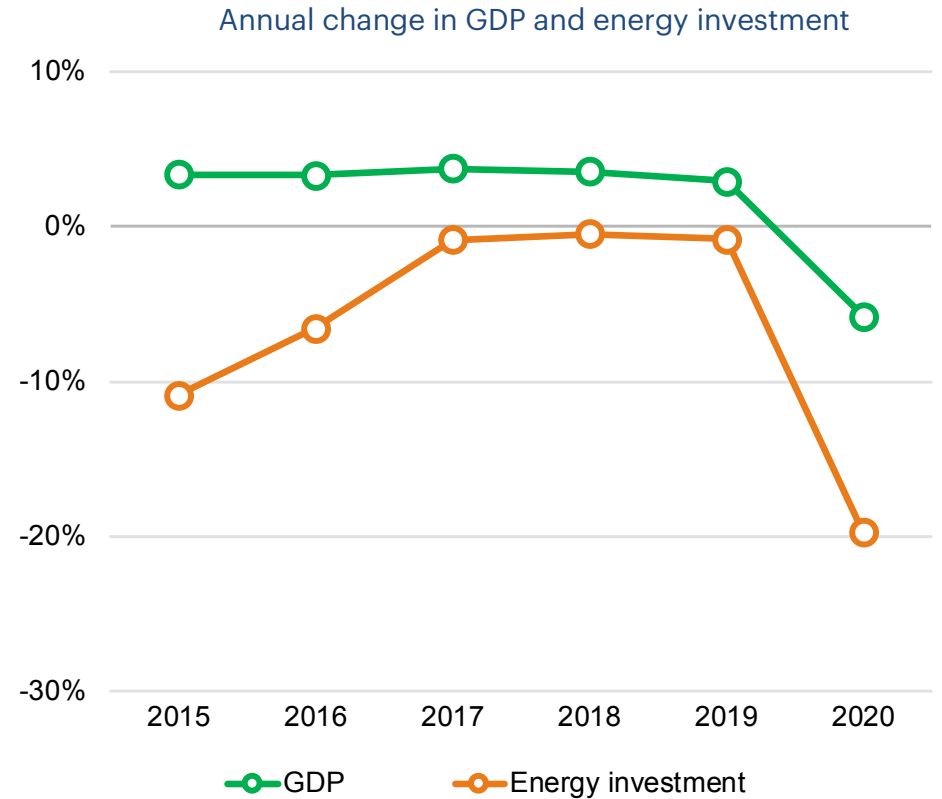
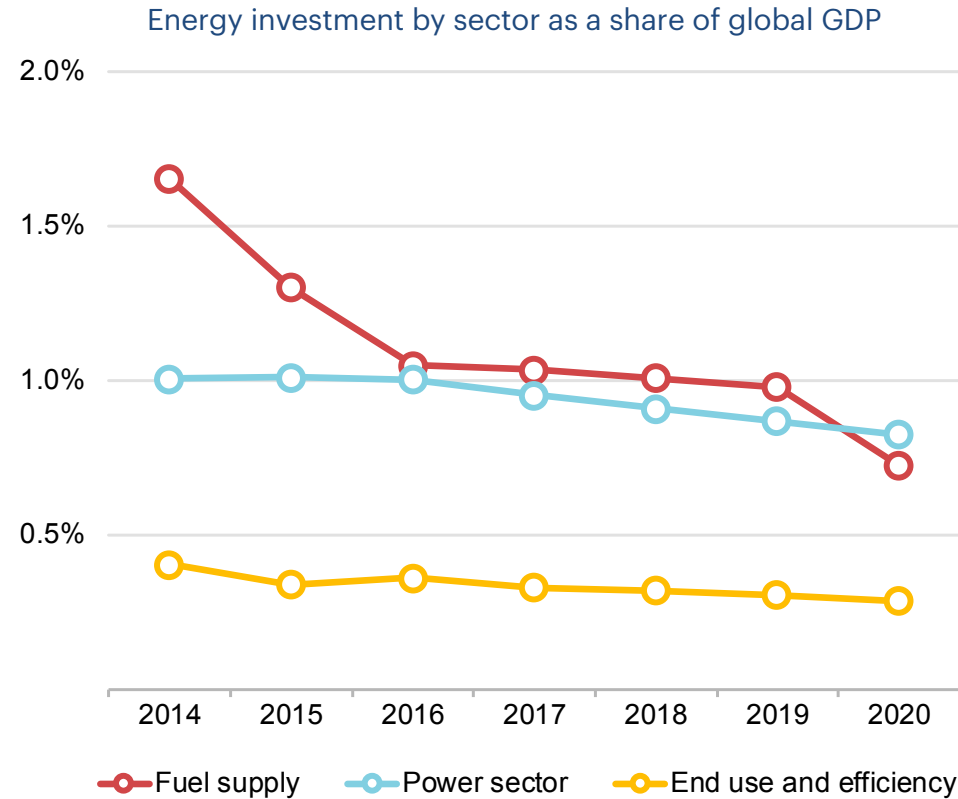
## Fuel supply investments have been hit hardest in 2020 while utility-scale renewable power has been more resilient, but this crisis has touched every part of the energy sector

Energy investment by sector



IEA 2020. All rights reserved.

## Energy should be in the front line of the world's push for sustainable development, but the investment data reveal a harsher reality



IEA 2020. All rights reserved.



## The crisis has underscored existing vulnerabilities and created new uncertainties

Investment in fuel supply has fluctuated markedly over the last decade, with typical cyclical elements common to all commodities overlaid with growing structural pressures to reduce emissions and switch to cleaner technologies. By contrast, investment in the electricity sector has been more stable, buoyed by its central place in economic development and energy transition strategies, and by growth in electricity demand that has consistently outpaced overall energy demand. For the fifth year in a row, investment in power is set to exceed that in oil and gas supply.

The cuts in fuel supply investment in 2020 apply to all types of resources and company, but a few elements stand out. Some of the most dramatic cuts in the oil and gas sector – in many cases above 50% – have been among highly leveraged shale players in the United States, for whom the outlook is now bleak (although it is too soon to write off shale as a whole). Funds available to some indebted and poorly performing national oil companies (NOCs) have also dried up, as governments scramble to make up for acute shortfalls in revenue.

Further downstream, a surge in investment in recent years in refining, petrochemicals and liquefied natural gas (LNG) has left each of these sectors now facing a major overhang of capacity, putting intense pressure on margins and pushing back many investment plans and timelines. Natural declines in upstream fields offer a hedge against overinvestment, but there is no such protection further down the value chain against demand coming in below expectations.

In the power sector, the ability of many companies to invest in new capacity has also been weakened by this crisis. This is particularly true of state-owned enterprises (SOEs) in emerging economies, many of which were already under financial stress, as well as equipment suppliers. Larger renewables-focused utilities in advanced economies

appear on firmer footing, but also face some revenue risks from shifting market demand and price trends.

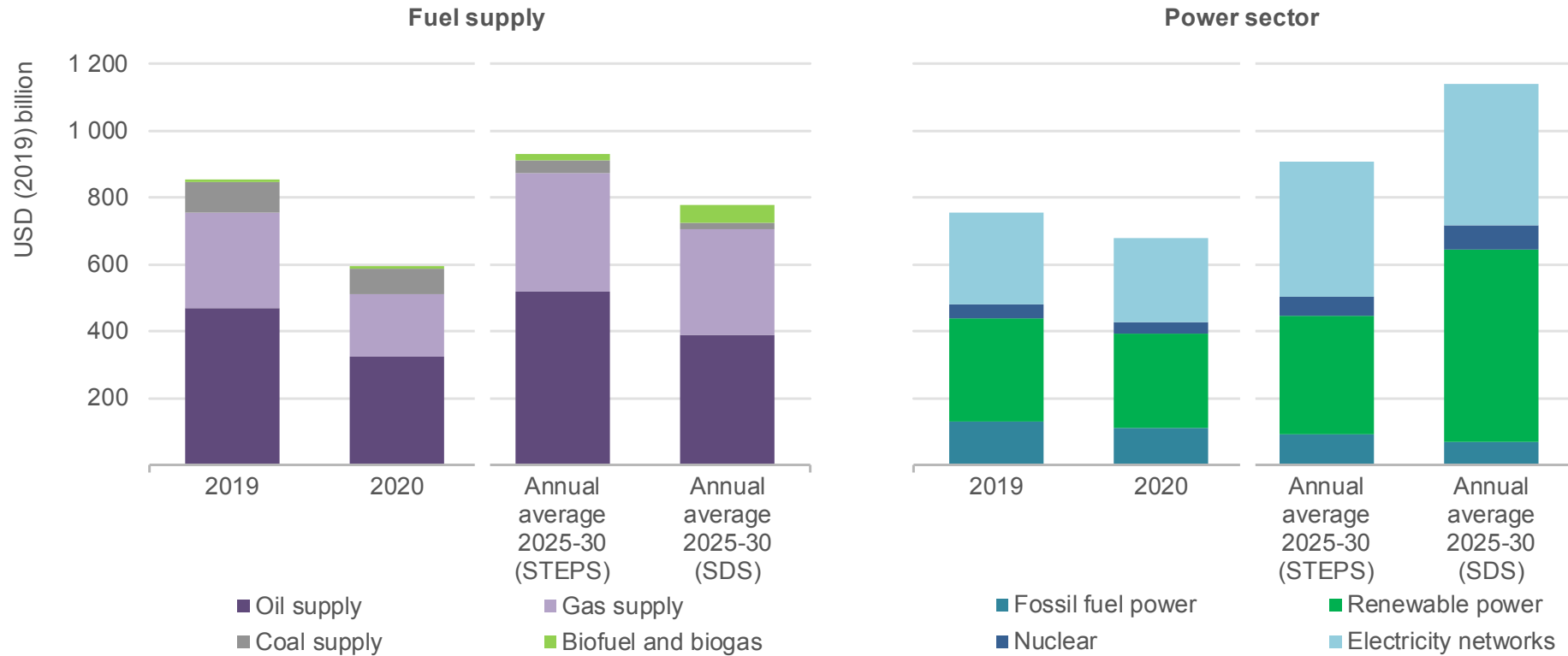
Overall, ongoing investment in renewable power projects is expected to fall by around 10% for the year, less than the decline in fossil fuel power. Capacity additions are set to be lower than 2019 as project completions get pushed back into 2021. Final investment decisions (FIDs) for new utility-scale wind and solar projects slowed in the first quarter of 2020, back to 2017 levels. Distributed solar investments have been more dramatically hit by lower consumer spending and lockdowns.

The crisis is prompting a further 9% decline in estimated global spending on electricity networks, which had already fallen by 7% in 2019. Alongside a slump in approvals for new large-scale dispatchable low-carbon power (the lowest level for hydropower and nuclear this decade), stagnant spending on natural gas plants, and a levelling off of battery storage investment in 2019, these trends are clearly misaligned with the needs of sustainable and resilient power systems.

There are also some worrying signs in the data for the energy sector as a whole. In recent years the share of energy investment in GDP has declined and is set to fall to under 2% in 2020 – down from around 3% in 2014. Economy-wide investment also declined as a share of GDP over this period, but the declines in energy have been particularly steep. In part, this reflects a retreat from the boom years of oil and gas spending in the earlier part of this decade. However, the trend is visible too in the power sector and elsewhere, reflecting the lack of progress in boosting key clean energy technologies at the pace required by rising global needs and the imperative to address climate change.

## Even before 2020, investment trends were poorly aligned with the world’s projected needs

Global energy supply investment by sector in 2019 and 2020 compared with annual average investment needs 2025-30

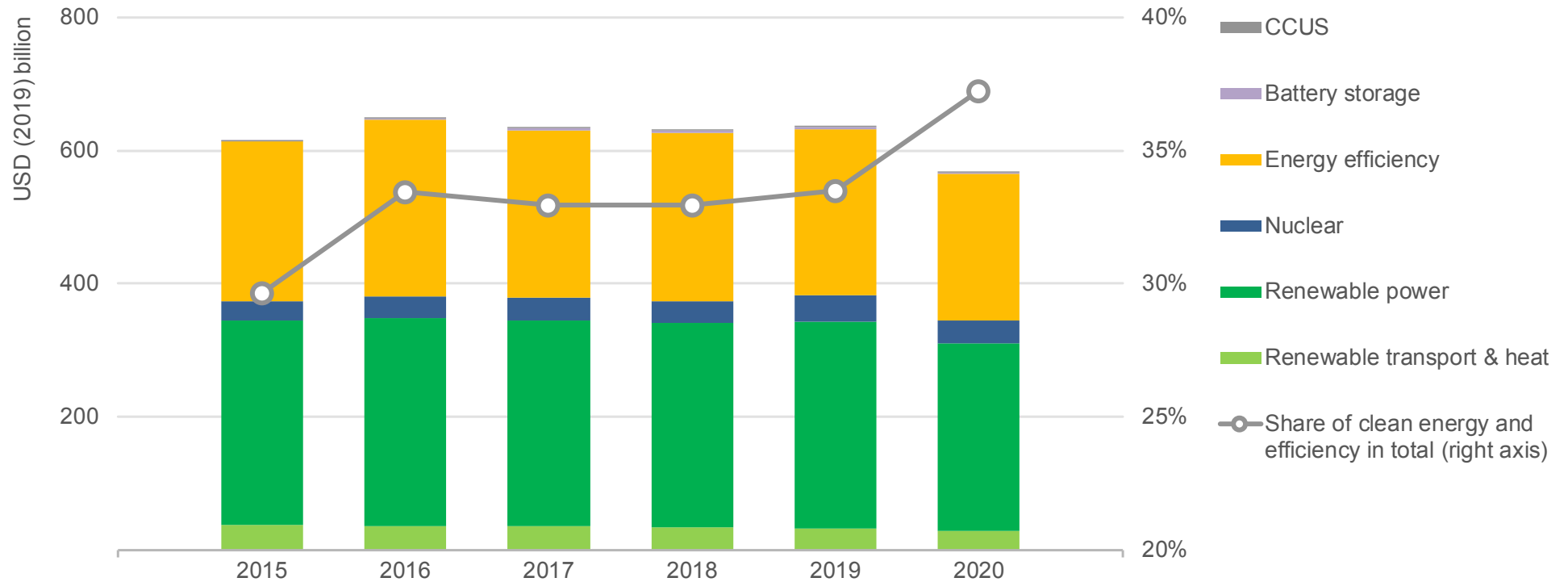


IEA 2020. All rights reserved.

Notes: STEPS = Stated Policies Scenario; SDS = Sustainable Development Scenario. Electricity networks include also battery storage investment. Projected investment levels are from the *World Energy Outlook 2019*; the point of comparison is the period from 2025-30 in order to provide an indicative post-recovery benchmark for spending levels.

## Clean energy investment has been relatively resilient in the downturn, but a flat trend of spending since 2015 is far from enough to bring a lasting reduction in emissions

Global investment in clean energy and efficiency and share in total investment



IEA 2020. All rights reserved.

Note: CCUS = Carbon capture, utilisation and storage.

## The implications of the current investment slump depend on the speed and sustainability of the world's economic recovery

The Covid-19 pandemic has brought with it a major fall in demand, with high uncertainty over how long it will last. Under these circumstances, with overcapacity in many markets, a cut in new investment becomes a natural and even a necessary market response.

However, the slump in investment may not turn out to be proportional to the demand shock, and the lead times associated with energy investment projects mean that the impact of today's cutbacks on energy supply (or demand, in the case of efficiency) will be felt only after a few years, when the world may be well into a post-recovery phase. As such, there is a risk that today's cutbacks lead to future market imbalances, prompting new energy price cycles or volatility.

In addition, even before the crisis, the flow of energy investments was misaligned in many ways with the world's future needs. Market and policy signals were not leading to a large-scale reallocation of capital to support clean energy transitions. There was a large shortfall in investment, notably in the power sector, in many developing economies where access to modern energy is not assured. Although today's crisis in some ways represents an opportunity to change course, it also has the potential to exacerbate these mismatches and take the world further away from achieving its sustainable development goals.

The implications in practice will depend on a few key variables. The duration of the disruptions to economic activity and the shape of the recovery are major uncertainties. So too are the policy response to the crisis and, crucially, the extent to which energy investment and sustainability concerns are baked into recovery measures. Among

consumers, it remains to be seen whether the crisis has fundamentally reset views on mobility, tourism, or working and shopping from home.

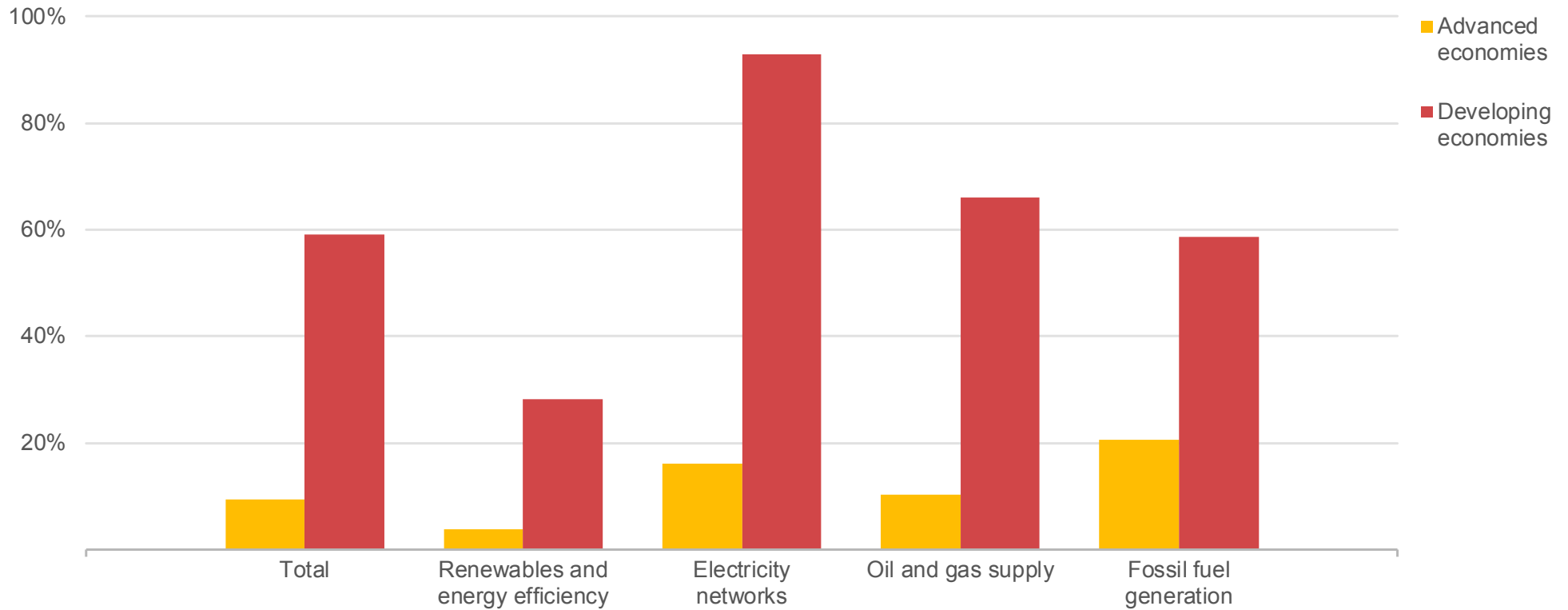
There are questions too about the shape of the post-crisis energy industry and its financial strength, strategic orientation and appetite for risk. And finally, there are the economic factors that drive investment trends, in particular whether oil prices remain low, and how quickly costs for some key clean energy technologies continue to come down.

A key indicator will be the capital going into clean energy technologies. This has been stable in recent years at around USD 600 billion per year, although unit cost reductions have meant that this is associated with a steady increase in actual deployment for some technologies such as solar photovoltaic (PV), wind and electric vehicles (EVs). Even though this "clean" spending is set to dip in 2020, its share in total energy investment is set to rise. However, these investment levels remain far short of what would be required to put the world on a more sustainable pathway. In the IEA SDS, for example, spending on renewable power would need to double by the late 2020s.

If, by contrast, the world were to return to anything like its pre-crisis pathway (as might be expected in the absence of a notable policy shift) then a different set of risks come into view. In oil markets, for example, if investment stays at 2020 levels then this would reduce the previously-expected level of supply in 2025 by almost 9 million barrels a day, creating a clear risk of tighter markets if demand starts to move back towards its pre-crisis trajectory.

## The respective roles of state versus private investors vary widely in different countries ...

The share of state-owned energy investments by sector



IEA 2020. All rights reserved.

Note: Data are for 2019.

## ... and those economies most in need of investment have a narrower range of financing options

Today's crisis will inevitably leave governments and large parts of the corporate sector with larger burdens of debt. Governments are providing direct and indirect support to keep households and companies afloat, but most energy companies are set to emerge from this crisis with significantly weaker balance sheets. The natural response to these stresses is for companies to consolidate, sell assets where they can, and reassess investment and employment plans. Some of these effects could endure well beyond 2020.

How this plays out in practice will vary widely in different parts of the world, depending on the types of companies investing in energy, the fiscal space available to governments, and the broader financial and institutional environment. One of the starkest variations across different geographies is the respective roles of state versus private actors; detailed analysis in this year's report reveals that SOEs account for well over half of energy investment in developing economies, but less than 10% in advanced economies.

SOEs, in the shape of NOCs, have strong roles in global oil and gas supply investment and an even higher share of output, as their assets tend to have lower development and production costs. They also dominate the picture in many developing economies for investment in thermal generation and in electricity networks. By contrast, with the notable exception of hydropower, private actors take the lead everywhere in renewables (although many renewable projects rely on incentives set by governments and sales to state-owned utilities).

Pathways out of today's crisis depend heavily on the financial sustainability and strategic choices of these SOEs and their host governments. There is a risk that some state actors fall back on familiar levers for economic development, pushing up coal use and emissions.

Liquidity constraints could well become a lasting risk for investment, especially in long-term or capital-intensive projects.

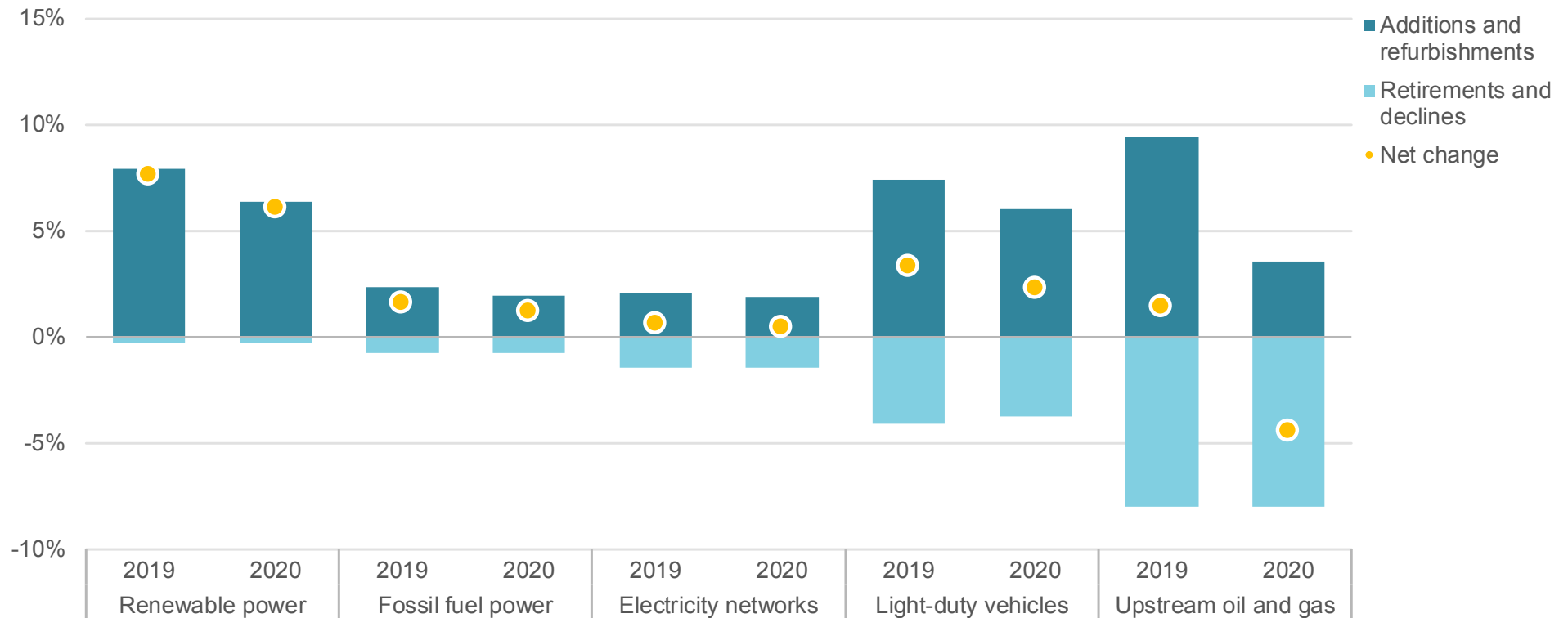
A focus on value and quick delivery, as well as environmental gains, could provide an opening for some cleaner technologies, especially in power where solar PV and wind are not only among the cheapest options for new generation, but also have relatively short investment cycles. These investments also make good sense for financial investors: new joint analysis with Imperial College London shows that renewable power companies in advanced economies have delivered higher equity returns over the past decade than those in fossil fuel supply, and weathered the storm in 2020 better as well.

However, this does not yet make 2020 a tipping point for attracting more investment to clean energy transitions. Renewables generally do not yet offer all the characteristics that investors are looking for in terms of market capitalisation, dividends or overall liquidity. Opportunities for newer sources of low-cost clean energy finance to enter the mix, e.g. from institutional investors, are still concentrated in Europe and North America. Although investments in coal power are down in many parts of the world, global approvals of new plants in the first quarter of 2020 (mainly in China) were at twice the rate seen in 2019, and there is a long pipeline of projects under construction.

The pace of change in the power sector puts it in the vanguard of energy transitions, but it does not represent the entire energy system - the share of electricity in final energy consumption is only around 20%. Alongside a rising role for low-carbon electricity, investment in a much wider range of energy technologies, including energy efficiency and low-carbon fuels for industrial heat and long-distance transport, will be crucial to reduce emissions across the energy system as a whole.

## The crisis is hastening the retirement of some older plants and facilities, but also dampening consumer spending on new and more efficient technologies

Changes to the energy-related capital stock in 2019 and 2020 as a share of total stock in the preceding year



IEA 2020. All rights reserved.

## Covid-19 is a huge shock to the energy system, but the response also presents an opportunity to steer the energy sector onto a more resilient, secure and sustainable path

Every year, a certain portion of the existing energy-related capital stock is retired or requires replacement. This applies to a wide range of energy-using equipment and infrastructure, including appliances, vehicles, buildings, large industrial machinery and power plants. It is also the case for existing oil and gas fields, which decline over time.

The speed of this turnover is a major determinant of investment flows, and it varies by sector. A large share of investment in upstream oil and gas, for example, goes just to combat declines and keep output stable, meaning that the upstream is capable of adjusting more quickly to fluctuations in demand than other parts of the hydrocarbons supply chain such as refineries or LNG plants.

Elsewhere, this rate of renewal serves as an indicator for how quickly newer, more efficient or cleaner technologies can increase their market share, e.g. high-efficiency air conditioners, or EVs or more fuel-efficient cars. There is no guarantee, however, that new purchases always follow this pattern, as demonstrated by the popularity of less-efficient sport utility vehicles (SUVs) in recent years, which has more than offset the emissions reductions from higher sales of EVs.

The current crisis, and the policy response to it, will influence the rate of change in the energy-related capital stock. The economic slowdown is putting enormous pressure on some of the more exposed parts of the global economy. A surfeit of productive capacity in some areas, at a time of suppressed demand, is accelerating the closure or idling of low-efficiency parts of the capital stock. Within the energy

sector this is already visible among refineries and in lower utilisation of some coal-fired power plants.

However, the crisis could slow the pace of change in other areas. A reluctance to commit capital to new projects could leave cash-constrained governments, companies and households using existing assets for longer, delaying the speed with which newer technologies are introduced into the system. Low oil prices and a reluctance to pay higher upfront costs could even usher in a new cycle of cheaper, less-efficient vehicles and appliances. This raises the spectre of an energy system characterised by systematic underinvestment in new technologies and overreliance instead on its existing capital stock, with all that this implies for emissions.

Policy makers have the opportunity to design their responses to the crisis with these elements in mind, combining economic recovery with energy and climate goals. They can kick-start consumer spending, for example by providing incentives to replace old, poorly performing products with new, more efficient models. Much-needed investment in electricity networks and storage can ensure that tomorrow's power systems remain resilient and reliable even as they are transformed by the rise of clean energy technologies. The way that policy makers respond to the crisis today will determine the energy security and sustainability hazards that the world will face tomorrow.