



Electric Utilities Benchmark Insights Report

November 2021

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Introduction

Our world needs a major decarbonisation and energy transformation to prevent the climate crisis we're facing and meet the Paris Agreement goal of limiting global warming to 1.5°C. Without urgent climate action, we will experience more extreme weather events, rising sea levels and immense negative impacts on ecosystems. These will impact each and every one of us for decades to come, but more so the most vulnerable populations and regions.

196 countries signed up to the Paris Agreement in 2015, in the same year 193 countries committed to the UN Sustainable Development Goals (SDGs). The Intergovernmental Panel on Climate Change 2018 Special Report on limiting warming to 1.5°C showed that global CO₂ emissions need to fall by about 45% from 2010 levels by 2030 and reach net zero by around 2050.

The private sector plays a critical role in driving decarbonisation and must take action now to meet the Paris Agreement goal. The WBA Climate and Energy Benchmark is the most comprehensive accountability mechanism that measures corporate progress against the Paris Agreement and whether companies are contributing to a just transition. Private sector engagement alongside action by governments and civil society is essential for meeting the SDGs and the Paris goal.

As part of the overall WBA Climate and Energy Benchmarks, the Electric Utility Benchmark measures and ranks the world's 50 most influential electric utility generation companies on their low-carbon transition. The Electric Utilities Benchmark 2021 is the first comprehensive assessment of companies in the electric utilities sector using the International Energy Agency's (IEA) Net Zero Emissions by 2050 Scenario which was released in May 2021. In partnership with CDP and ADEME (the French agency for ecological transition), the benchmark assesses 50 keystone electric utility companies' targets and performance against their 1.5°C pathways, to see if they are on track to meet the Paris Agreement goal using the ACT (Assessing low-Carbon Transition) Electric Utility methodology. This is the second iteration of assessments: we assessed the globally influential electric utility companies on their alignment to a low-carbon world in 2020 and now again in 2021.¹

¹ In 2020 we assessed 50 keystone electric utility companies against a pathway built on the IEA B2DS (Beyond 2°C) scenario pathway, and in 2021, 50 companies against the IEA Net Zero Scenario (1.5°C) pathway. We undertook full ACT assessments – of performance, narrative, and trend – in 2020 and 2021.

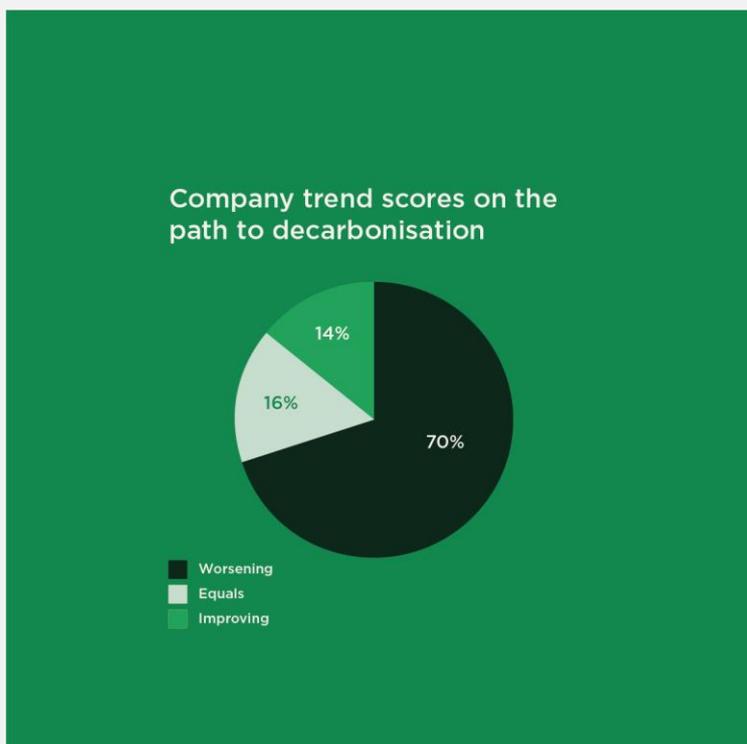
Key findings

This report presents four key findings from the benchmark results, including a comparison against previous findings, as well as a deeper dive into findings across each performance module assessed. The Electric Utilities Benchmark 2021 shows evidence of improvements in the low-carbon performance of some of the companies and one company clearly leading with an ACT rating of 18.5A+. Nonetheless, it is clear that companies on the whole are not yet transitioning sufficiently to align with a 1.5°C world, even in this sector which has the technology available to decarbonise. These companies should look to good practice of their peers in stronger leadership, more investment into a low carbon future and greater transparency to scale the low-carbon ambition and performance gap that exists in the sector.

Key finding 1: State of decarbonisation in the electric utilities sector disappointingly low

The electric utilities sector started decarbonising before all others, which means it has the most advanced and mature technologies for the low-carbon transition and acts as the enabler for other sectors to decarbonize. However, the sector itself is a long way from keeping within the goal of 1.5°C. The WBA’s second benchmark for this sector finds that the low-carbon performance of 70% of the assessed companies is expected to worsen in the near future. Persistent reliance on fossil fuel for electricity generation means that 98% of companies are expected to exceed their carbon budgets by 2035.

Our 2021 assessments of the 50 companies against the increased ambition of the International Energy Agency’s (IEA) Net Zero Emissions by 2050 Scenario shows that even electric utilities are a long way from achieving 1.5°C. Yet this is the sector that started decarbonising before all others, that has the most advanced and mature technologies for the low-carbon transition, and is the enabler for almost all other sectors to decarbonise.



Tracking progress

Over these two years’ results, we can track some changes in the companies’ contributions to achieving the Paris Agreement goals. Overall, the companies’ ACT ratings have increased slightly between the 2020 and 2021 assessments despite using a more ambitious scenario. However, the new scenario has reduced scores for material investment where locked-in and future emissions intensity scores are lower than they would have been under a Beyond 2°C Scenario (B2DS). Together, these two indicators account for 28% of the performance score and so have a significant impact on the ratings. The sector still has a strong fossil fuel dependency, with 44% of companies forecast to exceed their 1.5°C carbon budget by more than 50% and a further 54% to exceed their budget by some

Figure 1: Company trend scores on the path to decarbonisation

amount. The low-carbon performance of 70% of the 50 keystone companies assessed is expected to worsen in the near term.

Companies have made progress on transition planning and targets. Their scores have improved between 2020 and 2021 with improvements in the quality of low-carbon transition plans and climate change scenario testing and an increase in the ambition of targets even against the new, more demanding scenario. See key finding 2 for more details.

Carbon budget and transitioning fuels

We have used the IEA's Net Zero Emissions by 2050 Scenario (NZE) to assess companies against their 1.5°C pathways in this year's assessment. In 2020 we found a worrying picture of the sector's performance against the B2DS. Performance against the NZE looks even more concerning. The NZE 1.5°C pathway sees electricity demand nearly tripling between 2020 and 2050. By 2030 the share of electricity generation from renewables needs to increase from 29% to 61%. Demand for electricity will only increase and other sectors such as automotive rely on electrification to reduce emissions. Therefore, the choices and commitments electricity generation companies – and policymakers that set the sector's regulation – make now, impact on success of a low-carbon transition in other sectors. **Currently, 66% of generation capacity of the companies assessed is fossil-fuelled and this is only forecast to decline to 49% by 2035 – far short of the 22% needed by the 1.5°C pathway.** ²

70% of the companies assessed in 2020 were projected to exceed their carbon budgets by 2035; in the 2021 assessments the figure is 98%. Only Ørsted is projected to emit within its carbon budget. Overall, the companies assessed will exceed their total carbon budget by 57% up to 2035. Of the companies with the ten largest carbon budget excesses only one – PLN – has a coal phaseout date and that is 2056. In fact, an alarming 92% of the companies have coal in their portfolio and nine companies have over 50% of their capacity from coal. This continued reliance on coal puts the success of the sector's low-carbon transition at risk: by 2030 the NZE requires no unabated coal use in advanced economies and an overall 70% decrease in coal-powered generation. Four of the 50 companies do not use coal and a further 20 have a coal phaseout date, up from 11 in 2020. However, the average phaseout date in advanced economies is 2036, which is too late to align with a 1.5°C pathway.

Although gas is held out as a replacement for coal and a key transition fuel, globally there is little evidence of it increasing its share of capacity relative to coal and clear evidence that coal continues to be the dominant emissions source across the sector. This focus on the need to phase out coal risks the sector committing to natural gas and increasing its risk of stranded assets. Investors are increasingly aware of this risk and the inclusion of natural gas in the EU Taxonomy – which could classify natural gas as contributing to climate change mitigation or otherwise as environmentally sustainable for the purposes of that Regulation – is receiving push back from investors. If the electric utilities sector does not roll out commercially viable carbon capture and storage in the short to medium term the economics of coal and gas will be undermined by renewables, storage and other alternatives to high baseload grids such as demand management.

² This forecast figure assumes capacity is at the same level in 2035 but the IEA forecasts an increase of 97% in electricity demand by 2035. The split of Fossil/low-carbon capacity in 2035 depends on how much of this new capacity is low-carbon.

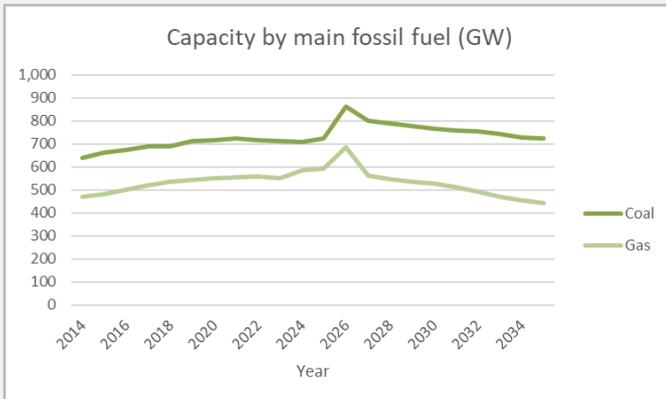


Figure 2: Capacity by main fossil fuel (GW)

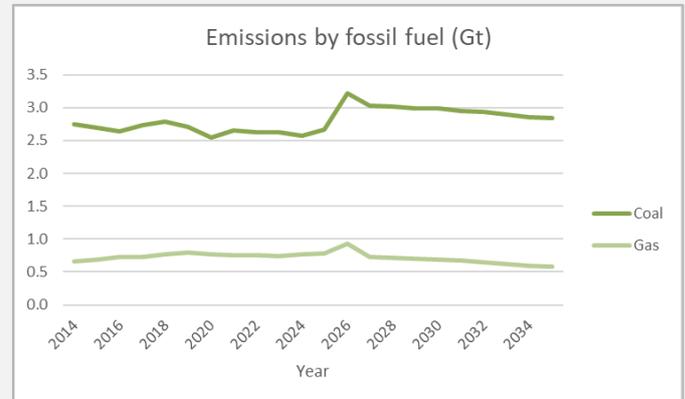


Figure 3: Emissions by fossil fuel (Gt)

Key finding 2: Companies' targeted emissions reduction falls short of the 1.5°C goal

Targets of electric utility companies to reduce emissions are falling short of the 1.5°C goal. While we see that nearly half the companies have improved target ambition and disclosure since the 2020 benchmark, 47 of the 50 companies assessed have not aligned their targets with their 1.5°C pathway. Our assessments also find that the majority of companies' low-carbon plans remain inadequate to bring about a rapid transition to low-carbon electricity generation.

Targets to reduce emissions fall short of the 1.5°C goal

Alignment of company emissions targets with their 1.5°C pathway is a key indicator of long-term commitment to the low-carbon transition. A shocking 47 of the 50 companies assessed do not have emissions reduction targets aligned to their 1.5°C pathway using the IEA NZE scenario. Nineteen of these have not set a scope 1 emissions reduction target, have no targets that extend beyond 2024 or do not provide enough detail to be assessed. This demonstrates an overwhelming lack of ambition and commitment to the Paris Agreement.

Although alignment with the 1.5°C pathway is lacking, 23 companies increased their target ambition either through developing targets for the first time or significantly improving the ambition or disclosure of previous targets. Three companies, Chugoku Electric Power Company, Enel and Origin Energy have not improved their targets since the previous assessment so their scores decreased when assessed against the more ambitious 1.5°C pathway.

Even with increasing target ambitions across the assessed companies, there are only three companies with targets covering 100% of electricity generation activities and fully aligned with a 1.5°C pathway under the IEA NZE scenario: these are Ørsted, EDP and AES Corporation. Ørsted and EDP's targets are both a 98% reduction in scope 1 and 2 emissions by 2025 and 2030, respectively. Whereas, AES Corporation has a target to reduce emissions intensity by 75% by 2030.

The electric utility sector must reach net-zero emissions globally by 2040 and in advanced economies by 2035. However, 24 of the companies have not developed a net-zero target at all and only 16 companies report comprehensive net-zero or carbon neutrality targets that could be assessed. A further eight have a net-zero target that could not be assessed because of an unsubstantiated reliance on offsetting, insufficient detail, or lack of information on coverage and scope. Most assessed net-zero targets scored poorly due to a proportion of the target relying on offsets or their end date extending beyond the net-zero year required by their 1.5°C pathway – 2035 for companies operating in advanced economies and 2040 for those in emerging markets or developing economies.

None of the companies' net-zero targets are completely aligned with their 1.5°C pathway under the IEA NZE scenario. The average time horizon of the net-zero targets assessed is 2047, seven years later than required. This indicates that even those companies pursuing net-zero must increase their ambition, bringing their target time horizon forward. Twelve further companies have made informal commitments to achieve net-zero or carbon neutrality but have not developed formal targets.

No company in the assessment has targets to achieve negative emissions. The IEA's Net Zero Emissions by 2050 Scenario requires the electric utilities sector to be net-negative beyond 2040. It is imperative that even the best performing electric utilities develop more ambitious targets that go beyond just net-zero emissions.

Transition planning remains insufficient

In line with the increased, though insufficient, target ambition, the companies' transition planning has marginally improved since the last assessment from a median score of 43% to 54%. In general, companies continue to lack comprehensive long-term financial strategies and clear reporting on the scope and boundaries of their plans. Most plans remain inadequate to bring about a rapid transition to low-carbon electricity generation, although 44 companies have a low-carbon transition plan or have made transition-planning commitments. Only one company, SSE, has a fully low-carbon aligned transition plan. Five of the six companies with no transition planning are state-owned.



To drive progress, companies must develop future-orientated key performance indicators and targets to measure success against. The top 10 performing transition plans all describe multiple ambitious measures. A majority include emission reduction targets, as well as low-carbon generation or capacity targets and have long-term planning of at least 20 years.

A shocking 19 companies have not provided any financial planning to complement their transition plans. Only eight plans include the major changes to the business expected in the future and the costs associated with them. In a sector with long asset lifetimes, companies should be developing detailed and costed plans that prepare for potential shocks to the business, such as stranded assets, in the long-term. The three most comprehensive plans, belonging to E.ON, Ørsted and SSE, all include long-term financial planning.

Figure 4: Quality of transition planning by companies

Without high-level buy-in from upper management and board level into the company's transition plan, the company risks falling behind on its ambition. Top performing companies provide monetary incentives to reduce the risk of their transition being undermined. A total of 29 companies have monetary incentives for top-level employees, with only 16 incentivising the achievement of quantitative emission reductions. Nine of which the monetary incentive forms at least 10% of their compensation package. EDP, Ørsted and Vattenfall are the only companies to have actively severed links between fossil-fuel growth and executive compensation.

Transition plans should also be informed by company-wide scenario analysis. Ideally, the company should use a range of scenarios, including one that is at least 1.5°C aligned. Thirty-four of the companies with transition plans

have undertaken some form of scenario analysis. An increase of seven since the last assessment. However, the quality of scenario analysis reporting varies. Only eight of the companies consider changing conditions aligned to a 1.5°C scenario. Most companies fail to report results in a meaningful way, with just nine companies expressing results of their analysis in financial terms and only five in terms of potential losses to the company.

Key finding 3: Lack of disclosure on power generation CapEx limits sector's progress on the benchmark

Increasing investment, research and development (R&D) into low-carbon technologies, and scaling new business models is vital to enable the sector's decarbonisation. To be fully aligned with a 1.5°C pathway, companies must be spending over 78% of their generation capital expenditure (CapEx) on low-carbon power generation. The 2021 benchmark forecasts that 40% of the assessed companies that have disclosed data on their power generation CapEx are likely to be spending over this level by 2023. This progress, however, is compromised by the overall lack of CapEx disclosure by many companies and the continued investment and reliance on fossil fuels by large state-owned companies in particular.

Investing in low-carbon technologies and business activities

Electric utility companies need to be making significant investments to shift towards low-carbon business activities and to adapt to the growing demand for electricity.

Data on the share of low-carbon generation CapEx as a proportion of total generation CapEx was collected for the 2020 to 2025 period and used to evaluate company commitments to produce low-carbon electricity and adapt to the changing economic and regulatory environment. (See Annex 1 for a table that shows the different shares for low-carbon generation CapEx over the six-year period 2020 – 2025). Some companies clearly show leadership both in terms of future looking disclosure and high share of CapEx allocated to low-carbon generation. These companies are Eletrobras, Dominion, EDP, Enel, Engie, Ørsted and AES Corporation. Four of these companies are based in Europe, two in the US and Eletrobras in Brazil. To be fully aligned with a 1.5°C pathway, companies must be spending over 78% of their generation CapEx on low-carbon generation. Around 40% of companies that disclosed data are forecast to be spending over this level by 2023. This indicates that some companies have clearly embedded the low-carbon transition into their business model and are investing to make it a reality in the short-term. However, these CapEx commitments are not adopted at a sufficiently large scale. It is expected that more companies invest in low-carbon power generation in the short term or in transmission and distribution projects that will allow a higher penetration of electricity produced from renewable power on the electric grid. It is worth noting that the nine worse performing companies in this area (mainly state-owned) lower the average by 15%. This confirms the worrying trend that large state-owned companies, often with young fossil fuel fleets, continue to invest significant amounts in thermal assets. 20 companies didn't disclose any data at all, even for the year 2020.

Research and development

Research and development (R&D) into technologies with significant potential to mitigate climate change is pivotal for the decarbonisation of the electric utilities sector. To decarbonize at the rate required, electric utilities need to direct significant capital to low-carbon R&D. Areas of research with high mitigation potential include – but are not limited to – carbon capture, use and storage (CCUS) technologies, floating offshore wind, lithium-ion batteries or flexible high-voltage grid technologies. While there is generally a lack of disclosure of this financial information, some companies are paving the way to better disclosure. Iberdrola is the company that invested the most in non-mature technologies, USD 130 million in 2020, in projects involving flexibility tools and platforms for electricity transmission and distribution companies or offshore projects of more than 10 MW on a floating platform.

There are no companies in the sample with no fossil fuel capacity and for 32 companies, coal accounts for more than 10% of capacity. The only way companies with significant fossil assets, especially coal, will be able to continue using fossil fuels is through carbon capture and storage (CCS). These companies need to be investing in CCS but this is not what our assessments show. Of the 22 companies that disclose low-carbon innovation R&D expenditure, 9 do not disclose any data on CCS investment. The remaining 13 report that they are investing but only three - Chugoku, KEPCO and Eletrobras - disclosed financial amounts for CCS. To align with the 1.5°C scenario by 2030, large scale CCS should be developed which is commercially viable and can compete with ever-improving renewables. Nine years to do this is a very short timeframe.

We would expect to see companies who take transition seriously committing to a coal exit date and investing heavily in CCS to capture residual emissions. The only other option for existing fossil fuel plants is conversion to biomass, although without CCS this too is problematic when electric utilities in advanced economies need to be fully decarbonized by 2035. Only 4 companies (EDF, Fortum, RWE and Southern Company) are developing CCUS projects which are not used to only absorb their own emissions (in such instances, companies are not scored on module 9 as the rationale is to incentivize companies to commercialize this activity). For instance, EDF is working on both CO2 recovery for other industrial purposes and the development of Direct Air Capture (DAC). Few companies (including Fortum, Vattenfall and Chugoku) are already using CCUS technologies to reduce their carbon emissions. But for a lot of companies, these technologies remain at the development stages. Companies that take the low-carbon transition seriously should either be committing to a coal exit date or investing heavily in CCS.

New business models

The low-carbon transition is creating many new opportunities for electric utility companies such as the development of energy solutions for customers, power produced from green hydrogen or infrastructure for electric vehicles. By developing these at a significant scale companies can energise the sector for decarbonization. As shown in the table below, numbers of all new business models are increasing with the exception of 'carbon capture and use operator'. This is still small scale because the assessment only considered it a valid business activity if it generates a revenue stream rather than simply reducing companies' own emissions. The biggest increase is in 'energy as a service provider' and is explained by the growing number of companies investing in demand management through smart grids, smart meters and other technologies to help customers reduce energy consumption. This trend reveals companies have understood how crucial it is to make the electric grid more flexible and better manage the supply and demand load. Large scale low-carbon generation also increased to cover almost all companies assessed. Only two generating companies assessed are not developing this business which is essential for any company to transition. Eskom and Inter RAO's plants are wholly fossil-based and there is little evidence of new low-carbon generation at present. The focus should now be on setting clear and forward-looking targets to scale up the expansion of renewable capacity.

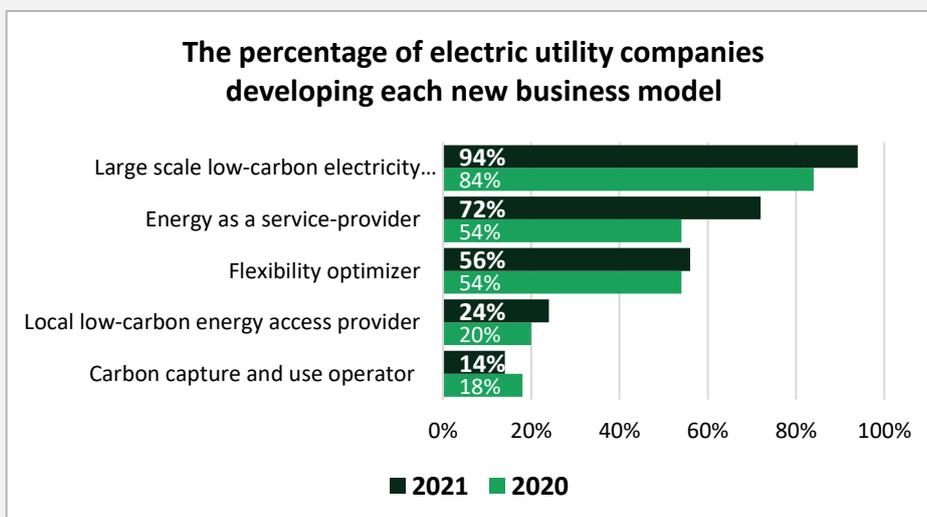


Figure 5: The percentage of electric utility companies developing each new business model

Key finding 4: Electric utilities are making efforts for a just transition, but have room for improvement

The global transition to a well-functioning low-carbon economy can only be successful if it is socially just – that is, if the people at the heart of the current carbon-intensive systems are identified and engaged as agents of change. A socially just transformation means rapidly phasing out fossil fuels, while creating new industries, new skills and new jobs through investment, and respecting human and labour rights at the same time. The 50 keystone electric utilities assessed in the benchmark were also evaluated in WBA’s 2021 pilot Just Transition Assessment. The results show electric utility companies are on average more advanced than the oil and gas and automotive companies in working towards a just transition. However, there is still a wide disparity between the efforts of the different companies and considerable room for improvement.

WBA’s [assessments of 180 companies on the just transition indicators](#) provides us, for the first time, with clear insight into how companies are managing the universal challenge of eliminating carbon emissions in a way that leaves no one behind. Our assessments have revealed a systemic lack of disclosure on how companies identify, prepare for and mitigate the social impacts of their low-carbon transition strategies. Our findings uncover a current absence of a holistic approach to decarbonisation planning, where emissions reduction is considered hand in hand with respect for human and labour rights to ensure a just and equitable low-carbon transition. We did however identify some good practice examples, which are highlighted in our Just Transition Assessment report for other companies to follow.

Our results show that the electric utility companies can further improve on the just aspect of their decarbonisation journey, but are on average more advanced than the oil and gas and automotive companies, and show more good just transition practices; although the average (mean) score is still just 3.9 out of 16. The highest scoring electric utility company – SSE – received 14 out of 16 points on the just transition indicators, with the three companies next in line – EDF, Enel and ENGIE – receiving 12 out of 16. We did identify some companies with good practice and show in case studies of SSE and Enel several areas of just transition practice that others can follow.

People most at risk being left out of decision that affect their future

Guidance on just transition planning highlights that companies must engage in social dialogue and consult with relevant stakeholders (such as workers, their unions or representatives, governments, impacted communities and civil society organisations) to share knowledge and negotiate a strategic direction that ensures a ‘just’ low-carbon transition.

Electric utilities perform best on their public commitment to engage in social dialogue with appropriate parties for bipartite or tripartite negotiations, with 20 companies meeting this. This is a similar proportion to oil and gas and automotive manufacturers. However, only 8 electric utility companies actually demonstrate social dialogue and meaningful engagement with stakeholders (at a minimum including workers, unions or equivalent worker bodies, and affected stakeholders) on all aspects of a just transition. This suggests that while a significant number of companies are committed to social dialogue, they need to act on this and actually have the dialogue and engagement for a just and equitable decarbonisation transition.

Despite the relatively good scores on social dialogue and stakeholder engagement, electric utility companies scored poorly on the expectation to develop and implement just transition planning through ongoing social dialogue. Only one company, SSE, receives the full 4 points available for the just transition planning indicator. Companies must increase the quality of their just transition planning to ensure that their low-carbon transitions respect human and workers’ rights and can look to SSE as a good example.

Green and decent jobs and skills for the low-carbon economy

Job creation is where most evidence of companies contributing to the just transition is found, both among companies in the electric utilities sector and across all 180 assessed companies. Twenty-four companies have a public commitment to create and provide or support access to green and decent jobs as part of the low-carbon transition. The lower performing companies still need to do more on committing to create and provide or support access to green and decent jobs as part of the low-carbon transition.

Companies are also expected to enable job creation, retention and redeployment through appropriate skills development and training. Three companies – EDF, ENGIE and Iberdrola – score the full 2 points available for indicator 4 and 16 receive 1.5. However only the three companies scoring the full 2 points disclose a process for identifying skills gaps for workers and affected stakeholders in the context of the low-carbon transition, which involves engaging with unions (or equivalent worker bodies) and communities. These results suggest that the industry is aware of the issues, their role and what must be done, but they are not yet engaging with the depth and specific steps they need to take to contribute to a just transition, such as identifying skill gaps.

Supporting and using influence to advance a just transition

Electric utility companies operate in a highly regulated industry but are subject to different national and regional policy and regulatory regimes. Lobbying and political engagement at the regional level is therefore very important for the industry. The scores across indicator 5 on social protection and social impact management are worryingly low but Iberdrola shows good practice. Companies are also expected to advocate for policies and regulations that support a just transition and avoid undermining policies that are just transition-friendly. Both individually and through trade and employers' organisations, companies should advocate for governments to ensure strong just transition targets and policies and to invest in the development and dissemination of green technology and know-how, to help boost reskilling and green job creation. No company receives the full 2 points available for this indicator (6), and just one company – Enel - receives 1.5 points. Thirty-seven companies (74%) score 0 for indicator 6 overall.

Module level summaries

Module 1: Targets

Module 1, targets, assesses:

- The alignment of a company's scope 1 and 2 generation emissions reductions targets with its 1.5°C pathway, (indicator 1.1 – weighted 12% of the performance assessment) and, to get a complete view of the company's commitment to and credibility on emissions reductions over time, this module also assesses
- The time horizon of targets (indicator 1.2 – weighted 4% of the performance assessment)
- Whether companies are on track to achieve their targets (indicator 1.3 – weighted 4% of the performance assessment)

Without an ambitious target, it is unlikely that the company is committed to a transition, and therefore this indicator has a high impact on the likelihood of a successful transition. The module therefore accounts for 20% of the total ACT Electric Utilities performance assessment score. The median score for this module in the 2021 Benchmark is 10%.

The criteria to achieve a fully aligned target has become more demanding this assessment than previous benchmarks – this year they are aligned with the Paris Agreement temperature goal of limiting warming to 1.5°C. The assessment uses the International Energy Agency's Net Zero by 2050 scenario requirements, whereby, advanced economies must decarbonise their electric utility sectors by 2035, and the rest of the world by 2040.³

Only three companies have set targets that are fully aligned with a 1.5°C pathway and which cover 100% of electricity generation activity: Ørsted, EDP and AES Corporation. Ørsted and EDP target a 98% reduction in scope 1 and 2 emissions by 2025 and 2030, respectively. A total of 16 companies report comprehensive scope 1 and 2 net-zero targets that could be assessed under the assessment methodology. However, none of these net-zero targets are aligned with the IEA's Net Zero Emissions by 2050 Scenario (NZE) to achieve 1.5°C pathway alignment because the end years were either beyond the net-zero dates established by the IEA or they rely on unsubstantiated carbon offsets and could therefore not be assessed.

Ørsted's net-zero by 2040 target is the most ambitious and comprehensive in the assessment. It is the only electric utility company to have a net-zero target certified by the Science Based Targets initiative (SBTi) under its new Net-Zero Standard. However, no company has set a target to become carbon negative in the future, despite the NZE requirement for the sector to achieve net-negative emissions. Nineteen companies have not set any targets or have no targets that reach beyond 2024.

The long-expected time horizon of generation assets means that electric utilities 'commit to or lock in' a large amount of carbon emissions into the future, which requires targets that have time horizons that are aligned with this reality. However, most companies lack targets that cover a long enough time horizon to include the majority of a company's asset lifetimes, with only 14 companies' targets covering 75% of fossil fuel asset lifetimes. Moreover, aside from communicating long-term commitments, short-term action needs to be incentivised through regular intermediate targets at intervals of no more than five years. But no companies with long-term

³ The criteria to have fully aligned targets has become more demanding. The 2021 assessments use the IEA's NZE 1.5°C scenario requirements, whereby advanced economies must decarbonise their electric utility sectors by 2035, and the rest of the world by 2040. Companies with net-zero targets beyond these dates have their commitment gaps assessed at either 2035 or 2040, depending on whether they operate in advanced economies or emerging markets and developing economies. This means that a company with a net-zero by 2050 target will not score 100% and will score worse than a company with a net-zero target at an earlier date.

targets beyond 10 years have set intermediate targets that satisfy these requirements. As of 2020, a total of 26 companies report to be on track to meet their targets.

Module 2: Material investment

Electric utilities is an asset-intensive sector and so at 35%, module 2 - material investment - is the highest weighted module in the ACT performance assessment. It assesses:

- The company's past five years' emissions intensity trend (indicator 2.1 – weighted 7% of the performance assessment)
- The company's emissions lock-in to 2035 (indicator 2.2 – weighted 14% of the performance assessment) and
- The company's next five years' emissions intensity trend (indicator 2.3 – weighted 14% of the performance assessment)

Companies that perform poorly on this module are generally those with significant coal and gas capacity and no short to medium term plans to reduce it. Ørsted scores full marks for this module due to its plans to reduce scope 1 and 2 emissions by 98% by 2025.

Six of the top 10 companies overall are also in the top 10 for material investment. This correlation is unsurprising due to the 35% weighting. It is not the whole picture though as module 1, targets, accounts for another 20% and the trend and holistic 'narrative' assessments are also key to the overall picture of a company's preparedness for the low-carbon economy.

All three indicators in this module have a future-looking element and so there is significant impact in using the more ambitious 1.5°C Net Zero Emissions (NZE) scenario aligned with that Paris Agreement temperature goal, rather than the well below 2°C (B2DS) scenario used in the 2020 Benchmark. Overall the mean average score has gone down from 13% to 11% and the median from 12% to 9%. The company performance on the locked-in emissions indicator worsened between the 2020 and the 2021 sector assessments. However, the recent and future, five-year emissions intensity trends are about the same.

The IEA NZE requires decarbonisation of the electric utilities sector by 2035 in advanced economies and 2040 globally. Advanced economies should have no unabated coal after 2030. Traditional fossil-fuelled baseload power will be increasingly uncompetitive in a market driven by renewables with their very low marginal costs. The IEA NZE scenario requires a tripling of renewables this decade. Currently large hydro and nuclear dominate with 41% and 34% of renewables respectively. Onshore wind is 17%, offshore 2% and solar 5%. Is the electric utilities sector able and willing to achieve this massive increase in the space of eight years?

The past emissions intensity indicator compares the rate of change over the previous five years with the rate required by the 1.5°C pathway over the coming five years.

Despite the more demanding emissions reduction requirements of the 1.5°C scenario, average scores on this indicator have increased by 5% compared to the 2020 Benchmark. Nearly all companies in advanced economies have shown emissions intensity reductions in the past five years. For many of these companies this is due to the moderately straightforward transition from coal to gas and the improving economics of wind and solar. Many economies are reaching the tipping point where renewable capacity is cheaper than fossil fuels and the policy environment is supportive of renewables. However, for some companies the impact of Covid-19 reduced emissions intensity in 2020, which led to better scores for these companies.

Only 14 (in 2020 it was 13) of the 50 companies reduced their emissions intensities between 2015 and 2020 at the rate required for their company decarbonisation pathway under the 1.5°C scenario. 10 companies (in 2020 it was 11) were not aligned at all on this indicator, having higher emissions intensities in 2020 than in 2015.

The locked-in emissions indicator compares projections of companies' cumulative absolute (total) emissions from 2021 to 2035 to the cumulative budgets allocated by their 1.5°C company pathways. These company pathways all

converge to the expectation for the sector in 2050. The pathways start from each company's current (2020) emissions and are weighted by the regional split of the companies' generating assets. Electricity consumption is forecast to more than double between 2020 and 2050. If we assume that most new generation going forward is renewables or lower carbon, then intensity will decrease. But lock-in shows us just how much companies will emit from existing and planned fossil fuel sources.

The impact of the more ambitious scenario is most marked for this indicator. The median score is 4%. Removing the influence of the change in scenario the median score would have been 55%.

Only one company, Ørsted, emits within its carbon budget from 2020 until 2035. 27 companies exceed their carbon budgets by less than 50% and 22 exceed by over 50%. Overall, the companies assessed exceed their total carbon budget by 57% up to 2035. The top 10 companies with the largest excess account for two-thirds of the excess emissions – although most of these also have the largest overall generation capacity. Five of these 10 companies are headquartered in mainland China, four elsewhere in Asia and one in Saudi Arabia. Only one of these companies, PLN, has a coal phaseout date and that is 2056. The companies most exposed to stranded assets due to the young age of their electricity infrastructure are all based in emerging economies. The average decommissioning year for coal assets is 2045 in ASEAN, India and China but 2033 in the EU, 2032 in Japan and 2031 in the US.

The near-term future emissions intensity trend indicator compares the emissions intensity predicted for 2025 (based on the company's current and expected future assets) to the 2025 intensity on the company's 1.5°C pathway. This 'action gap' is then compared to what the maximum 'action gap' would be if the company were to continue with no change in its emissions intensity. The closer the predicted emissions intensity for 2025 is to the 1.5°C pathway value for 2025, the better aligned to the required pathway the company is.

This indicator is the equally highest weighted because of its importance in predicting future performance. The median score is 23%. This means that the middle-ranking company is only a quarter of the way to achieving the reductions needed to achieve 1.5°C. Removing the influence of the change in scenario the score would have been 33%.

Just two of the companies in the sample are forecast to achieve their company benchmark emissions intensity in 2025. This lack of progression towards the future emissions intensities necessary for the sector to keep global warming to 1.5°C is alarming when we consider that electric utilities is one of the easier sectors to decarbonise and is also the first sector to decarbonise at scale.

Module 3: Intangible investment

Module 3, intangible investment, assesses investments in low-carbon innovation and technologies that mitigate climate change relative to overall company capital expenditure (CapEx). It comprises just one indicator, 3.1, and is weighted at 10%, accounting for 2 out of the overall performance assessment score of 20.

Low-carbon innovation is defined as activities in connection with research, introduction and improvement of products and technologies that contribute to achieving the goal of net-zero emissions. Deployment of new renewable capacity is not included.

A company's investments in low-carbon innovation give insight into its commitment to alternative technologies that may support new, low-carbon business models.

Investment in low-carbon innovation is not as necessary for some technologies as it is for others. Technologies that have a technology readiness level (TRL) of less than nine are considered to be non-mature. Spending on non-mature technologies is rated twice as useful as spending on mature technologies because more investment is needed to develop, scale-up and commercialise emerging technologies.

In 2020, only 22 companies out of 50 disclosed investments in low-carbon innovation. Of these 22 companies, only 9 (ČEZ Group, Duke Energy, EDP, EnBW, Iberdrola, KEPCO, PG&E, Southern Company and TEPCO) provided enough detail to determine whether investments were made into non-mature technologies.

Of the companies that reported investments in low-carbon innovation in 2020, the average expenditure is USD 102 million and the median is USD 34 million. This is due to large investments made by a few companies, such as EDF (USD 781 million), Ørsted (296 million) and Iberdrola (USD 261 million). On average less than 2% of total CapEx has been spent on low-carbon innovation by these 22 companies. The expectation for electric utility companies to be investing at least 5% of overall CapEx in low-carbon innovation.

Only 12 companies report investment in low-carbon innovation that is more than 1% of CapEx. Fortum spent 5% of its CapEx on low-carbon innovation. The only company which spent more than 5% of its CapEx was Ørsted, but it did not disclose the nature of the research, so it was not possible to determine whether its spending was in non-mature technologies where most investment is needed.

The average investment in non-mature technologies was USD 36 million but this figure is distorted by one company, Iberdrola, which invested about USD 130 million in non-mature technologies. Of the companies which made their investments in non-mature technologies publicly available, the mean average spend was 0.8% relative to overall CapEx.

The main areas of research were low-carbon generation, digitalisation and smart grids, electromobility, battery storage, hydrogen, nuclear research and carbon capture and storage (CCS). Considering the importance of CCS to the electric utility sector and to many companies' transition plans, it is worth noting that 21 companies mentioned research into this technology. This is a significant improvement since the last assessment when only four companies reported investments in CCS research. However, only four companies (EDF, Fortum, RWE and Southern Company) are developing CCS projects which are used to absorb more than just their own emissions. For example, EDF is working on both CO₂ recovery for other industrial purposes and the development of Direct Air Capture (DAC). Fortum is working on CO₂ capture for different industrial actors and RWE is using a scrubbing method to capture CO₂ for recycling purposes.

Some companies, including Fortum, Vattenfall and Chugoku, are already using CCS technologies to reduce their carbon emissions. But for a lot of companies, these technologies remain at the development stage. For example, KEPCO is working on performance optimization of dry regenerable CO₂ sorbent, and CO₂ utilization but hasn't developed it at scale. This is all the more worrying as 27 companies assessed are electric utility companies with the majority of their assets in advanced economies and are thus expected to reach net-zero emissions by 2035, while the other 23 companies assessed are expected to reach net-zero in 2040 as most of their assets are located in emerging economies. A lot of the companies will likely have residual emissions or hard to abate emissions and need to rely on CCS technologies to remove more CO₂ from the atmosphere than they are releasing.

Twenty-nine companies assessed scored 0% for this module. These companies are present in all regions. Notably, all six Chinese companies assessed scored 0% for this module, disclosing neither their CapEx, nor investments in low-carbon innovation.

Module 5: Management

This module, consisting of six indicators, assesses a company's climate governance and its strategic approach to the low-carbon transition, with:

- Indicator 5.1, level of oversight (e.g. at board level) of climate change issues – weighted 1% of the performance assessment
- Indicator 5.2, climate expertise – weighted 1% of the performance assessment
- Indicator 5.3, low-carbon transition plan – weighted 8% of the performance assessment
- Indicator 5.4, incentives for climate change management – weighted 1% of the performance assessment
- Indicator 5.5, incentives for fossil fuel power – weighted 1% of the performance assessment

- Indicator 5.6, climate-related scenario analysis or stress testing – weighted 8% of the performance assessment

Module 5 accounts for 20% of the ACT Performance Assessment. ACT assessments are primarily future oriented, so the forward-looking indicators - low-carbon transition plan and scenario planning - are given a heavier weighting. The other indicators - oversight, expertise, management incentives and fossil fuel incentives - have a lower weighting in the overall performance rating, but do provide important contextual information on the company's credibility and commitment to achieving the Paris goals.

The three lowest ranking companies in this module, Comisión Federal de Electricidad (CFE), Egyptian Electricity Holding Company (EEHC) and Electricity Generating Authority of Thailand, have no form of climate governance in place and score 0 for this module. These companies are fully state-owned and no evidence was found indicating oversight of climate change, incentives for the management of climate-related issues, or evidence that the companies had severed links between fossil-power generation and executive compensation.

Companies with strong transition plans and scenario analysis are the top-performing companies in the module, given the transition plan and scenario analysis indicators combined weight of 80% of the module. Forty-four companies have a low-carbon transition plan, with E.ON, Ørsted and SSE demonstrating the most comprehensive plans. Of the six companies lacking transition plans, five are state-owned. SSE is the only company found to be fully low-carbon aligned. It clearly describes its measures of success in terms of emission reductions and growth of renewable capacity, as well as providing detailed long-term views of how the company will look in a low-carbon future. Overall, the companies' transition planning has improved in the past year, with the median average increasing from 43% in the last assessment to 54%. However, companies continue to include low levels of financial detail in their planning, with 19 companies not including any quantified financial information.

Most companies, 34, are supporting their transition planning with scenario analysis. Of these, 25 undertake scenario analysis to 2050 or beyond. AGL, Iberdrola, Ørsted, SSE and AES Corporation are the best-performing companies and have all undertaken comprehensive scenario analysis using 1.5°C scenarios and timescales of at least 20 years. Similarly, to companies' transition plans, there is a significant lack of financial context included in most companies scenario analysis. Only eight of the companies express the results of their analysis in financial terms, with only five expressed as in terms of potential losses to the company.

Significant expertise in climate change and the low-carbon transition was found in four companies (Enel, PG&E, Southern Company and Vattenfall) – the majority of which (three) are publicly listed companies, and all with headquarters in advanced economies. In total 17 companies showed some level of expertise – 14 of which are in advanced economies, and nine with headquarters in Europe & Central Asia. Three of the top 10 performing companies in this module had significant climate expertise, Vattenfall, CLP Holdings and SSE. Nearly all companies demonstrating some climate expertise came were in the top half of the sample.

Thirty-five companies provide incentives for the management of climate change issues, with 80% of these incentives taking the form of a monetary reward. Analysis of scores for climate management incentives and overall module score shows a correlation between the two. However, only EDP has severed links between fossil-fuel growth and executive compensation.

Module 8: Policy engagement

The electric utilities sector is heavily regulated due to its structural importance to economies and society. Regulation affecting the sector is usually developed in a consultative fashion due to the need for technical inputs. This gives opportunities for regulatory capture and significant influence over regulations, potentially in ways which are negative for the climate. Since the industry is a major source of emissions, effective and timely regulation is necessary to ensure that scientific limits are observed in order to mitigate climate change and that there is a "level playing field" for businesses in this sector to approach the transition to a low-carbon economy.

This module assesses:

- Both company governance around relationships with trade associations: does it have a policy, who has oversight and responsibility and what actions will it take if the trade association position differs from that of the company) (indicators 8.1 and 8.2, weighted 1% and 2% of the performance assessment respectively)
- The company's actual support for or obstruction of climate policies (indicator 8.3 – weighted 2% of the performance assessment).

Since the last assessment there has been an increase in the number of companies with a policy to govern action if supported trade associations adopt climate negative positions. Nonetheless, 66% of companies do not have a policy in place. Just 17 companies have policies in place, only 12 of which are public, with 10 of these companies having a policy in place which covers the entire company and its group memberships. The remaining two companies' policies do not include a full list of trade association memberships, or fully cover secondary memberships. Only seven of these companies (AGL Energy, Dominion Energy, EDF, Enel, Exelon, Origin Energy and Vistra) scored 75% or more in indicator 8.1; all of which are publicly listed companies, based in advanced economies.

Thirty-five companies are involved with trade associations beyond simple membership, ranging from being founding members to being board members, and active participants in working groups and task forces. However, some companies use their influence to support climate policies; for example, EDP is a founding member of the Transport Decarbonisation Alliance and CLP Holdings engages with the World Business Council for Sustainable Development.

Eighteen companies hold negative climate positions indirectly through their trade association memberships. Eight of these companies are headquartered in the United States of America, and six are in China. Five of the companies based in the United States are members of the US Chambers of Commerce who in March 2021 issued a policy statement in advance of President Biden's nationally determined contributions (NDCs) announcement, strongly advocating for a continued role for fossil fuels in the energy mix, including coal.

All China based companies are members of the China Electricity Council (CEC), each company holding CEC Vice President membership. CEC lobbied to increase limits for coal-fired capacity by 300 GW by 2030. CEC justify this by claiming to prioritise energy security over energy transition.

Climate policies are publicly supported by 86% of companies assessed, with seven companies expressing their support for at least five policies. Climate positive policies were directly or indirectly opposed by 13 companies, these companies averaged a lower overall performance score in comparison to the overall sample, and all but one of these companies are based in advanced economies. For example, Fortum has opposed carbon taxes in general in preference of a market solution, and in August 2021 it was reported that InterRAO was lobbying for the legislation that would allow it to avoid paying carbon tax. Two companies, Uniper (part of Fortum) and RWE who both acknowledge the reality of climate change, are both suing the government of the Netherlands under the Investor-State dispute settlement (ISDS) system. Both are suing the Netherlands for compensation in relation to its 2030 coal phase-out regulation, due to impacts on their businesses.

Module 9: Business model

Keystone electric utilities should be developing new business models that enable them to decarbonise and remain profitable in a low-carbon world. Through one indicator, 9.1 (weighted 10% of the performance assessment), this module assesses the maturity of the new low-carbon business models the 50 companies are developing, examining profitability, business size, growth and deployment schedules. It is weighted 10% of the performance assessment.

Company actions are categorised based on Accenture's Low Carbon, High Stakes report, which identifies five business models – namely: Large scale low-carbon electricity generator, Local low-carbon energy access provider, Energy as a service-provider, Flexibility optimizer and Carbon capture and use operator – through which companies can significantly reduce greenhouse gas emissions and capitalise on billions in saved costs and new

revenue. Points are awarded based on a company's most mature business model in order not to penalise those companies developing multiple new business models, some of which might be at very early stages of development. The scoring has been adapted for the 2021 assessment to emphasise large scale, low-carbon electricity generation as this is the main business model electric utility companies should develop to achieve net-zero emissions. As a result, companies were scored on low-carbon capital spend as a share of total capital expenditure (CapEx) over the period 2020 to 2025. Low-carbon CapEx figures are a good proxy of the scale at which companies are developing low-carbon business models. On average, the companies assessed scored 4.6% in 2021 compared to 6.1% in 2020. The gap is due to the increased ambition of the IEA NZE scenario used and requirements for CapEx disclosure, as well as the scoring changes.

47 companies assessed received points for this module, though only eight companies received a maximum score of 100%. Of these eight companies, five are headquartered in Europe (ČEZ, EDF, Engie, Enel, Ørsted), two in the United States (NextEra Energy and Dominion) and one in Brazil (Eletrobras). Seven of them score the maximum score on the large scale low-carbon generator business model. Only ČEZ scores 100% for alternatives to the dominant model for its expansion of smart grids and decentralisation for developing digital distribution grid. The geographic distribution of companies scoring above 80% is centred around Europe and North America (11 out of 12 companies are headquartered in these regions, the twelfth company is Eletrobras) contrary to the last assessment where top companies were predominantly in Europe. While this might be driven by regulations, it indicates the low-carbon transition is happening at a larger scale and companies have improved transparency on forward-looking plans. However, these elements are still lacking in the East Asia and Pacific region.

The most mature business model pursued is developing 'large-scale low-carbon electricity generation' where electric utilities shift their portfolio to wind, solar, hydro, nuclear and increasingly to green hydrogen. Examples of significant expansion abound. China's giant State Power Investment Corporation is targeting an expansion of its low-carbon capacity to 132 GW by 2025 and 202 GW by 2035 against 91 GW in 2020 and EDP is targeting 50 GW renewable capacity by 2050, up from 18 GW in 2020. However, it remains to be seen if companies' expansion will meet the expectations needed in a 1.5°C scenario. The NZE scenario used in these assessments requires the electric utilities sector to reach 61% renewables share in 2030 and 88% in 2050. In 2020, 29% of the companies' capacity came from renewable sources which means the global renewable capacity of the companies assessed must double within the next nine years.

The second most mature business model was the development of smart grids and smart meters as well as the expansion of Electric Vehicle (EV) infrastructure. Unlike the traditional electric utility business model, which sees electricity sold as a commodity, energy-as-a-service focuses on selling services and products that help customers increase energy efficiency and implement smart electricity management. Electrical grids, such as the ones used in the US or Europe, are generally 'one-way' systems which means that supply is managed to match demand. Smart grids and meters enable a switch towards a 'two-way' system where the demand side is also managed so that it matches supply. This is essential to manage fluctuations in electricity demand due to variable or intermittent renewable power sources and increase their penetration. Increasingly, companies are placing this business model at the heart of their development strategy. For instance, Taiwan Power is targeting smart management and smart service coverage of 82% in Taiwan by 2030. Others such as EDF's Solutions Énergétiques or CEZ's ESCO have set up dedicated energy services business units and are planning increasing shares of revenues from this business. Iberdrola is aiming at a 47% share of earnings from its development of smart grids.

23 companies are developing EVs or EV infrastructure. This business model assists in the rollout of smart grids at scale because the growing number of EVs can act as backup battery capacity for when demand peaks. For instance, EnBW has launched EnBW mobility+ which provides access to over 150,000 charging points across Europe sourced 100% from renewable energy. Xcel Energy is planning to power 1.5 million EVs by 2030 and will invest USD 2 billion in the ownership of chargers and related infrastructure.

Annex 1

The table below displays the different shares for low-carbon generation CapEx over the six-year period. 33 of the companies assessed disclosed at least one year of data.

	2020	2021	2022	2023	2024	2025
	Share of low-carbon generation CapEx in 2020	Share of low-carbon generation CapEx in 2021	Share of low-carbon generation CapEx in 2022	Share of low-carbon generation CapEx in 2023	Share of low-carbon generation CapEx in 2024	Share of low-carbon generation CapEx in 2025
American Electric Power Company, Inc.	66.3%	66.3%	66.3%	66.3%	66.3%	66.3%
Centrais Eletricas Brasileiras S/A (ELETROBRAS)	No data found	96.8%	96.8%	96.8%	96.8%	96.8%
CEZ	3.8%	6.6%	5.6%	10.4%	7.5%	1.5%
China Datang Corp	38.0%	No data found				
China Huadian Corporation	43.0%	44.4%	45.8%	47.2%	48.6%	50.0%
China Huaneng Group	37.0%	39.6%	42.2%	44.8%	47.4%	50.0%
China Three Gorges Corp	98.0%	No data found				
CHN Energy	26.0%	No data found				
CLP Holdings Limited	6.0%	No data found				
Dominion Energy	85.6%	86.0%	86.0%	86.0%	86.0%	86.0%
Duke Energy Corporation	10.6%	80.7%	84.8%	85.2%	No data found	No data found
EDF	95.6%	96.0%	No data found	No data found	No data found	No data found
EDP - Energias de Portugal S.A.	74.0%	99.3%	99.3%	99.3%	99.3%	99.3%
EnBW Energie Baden-Württemberg AG	82.8%	72.3%	72.3%	72.3%	No data found	No data found
ENEL SpA	86.2%	86.0%	85.1%	87.3%	93.9%	93.9%
ENGIE	94.8%	80.0%	80.0%	80.0%	No data found	No data found
Exelon Corporation	53.7%	No data found				

Fortum	No data found	100.0%	55.0%	55.0%	55.0%	55.0%
Iberdrola SA	63.6%	51.0%	51.0%	51.0%	51.0%	51.0%
Korea Electric Power Corp	No data found	61.3%	58.0%	47.9%	No data found	No data found
NextEra Energy, Inc.	82.4%	82.4%	82.4%	No data found	No data found	No data found
Ørsted	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Perusahaan Listrik Negara (PLN)	15.5%	No data found				
PG&E Corporation	No data found	95.2%	No data found	No data found	No data found	No data found
RWE AG	88.4%	96.8%	96.8%	No data found	No data found	No data found
Saudi Electricity	0.04%	No data found				
SSE	57.8%	51.5%	51.5%	51.5%	51.5%	No data found
State Power Investment Corporation (SPIC)	50.0%	52.0%	54.0%	56.0%	58.0%	60.0%
The AES Corporation	85.0%	89.8%	89.8%	89.8%	89.8%	89.8%
The Southern Company	No data found	12.5%	12.5%	12.5%	12.5%	12.5%
The Tokyo Electric Power Company Holdings, Inc (TEPCO)	100.0%	No data found				
Vattenfall Group	98.1%	78.1%	78.1%	No data found	No data found	No data found
Vistra Energy Corp	87.0%	96.3%	No data found	No data found	No data found	No data found
Xcel Energy Inc.	63.6%	32.9%	17.6%	11.9%	16.0%	0%
Average	61.8%	71.3%	65.7%	62.6%	61.2%	60.8%

Figure 6: Shares of low-carbon generation CapEx over the six year period

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