World Benchmarking Alliance

Climate and Energy Benchmark in the electricity sector

Methodology Report

August 2023

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Introduction

The recent AR6 Synthesis Report of the Intergovernmental Panel on Climate Change (IPCC) makes a clear statement: 'Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming'. (1)

The electricity sector plays a pivotal role in decarbonising our world. Besides being central to many aspects of daily life, electricity will become even more relevant as it spreads to new end-uses, where electrification is required to deliver decarbonisation objectives. Moreover, in its updated Net Zero by 2050 Emissions Scenario (NZE), the International Energy Agency (IEA) foresees electricity providing more than half of total final energy consumption and two thirds of useful energy by 2050, with nearly 90% coming from renewables (2). In this scenario, the electricity sector reaches net zero emissions by 2040. Similarly, the International Renewable Energy Agency (IRENA) foresees that, in 2050, the share of renewable energy in electricity generation is 91% for achieving their 1.5ºC Scenario (3). In the meanwhile, the electricity sector emitted 13 gigatonnes (Gt) of carbon dioxide (CO2) in 2021, more than one third of global energy-related emissions (2).

In this sense, the rapid expansion of clean electricity is key to reduce CO2 emissions. Different power generation methods produce different levels of greenhouse gas (GHG) emissions along their value chain. Fossil fuel technologies have most of their emissions coming from the combustion of fuel in generation operations, while renewable sources' emissions occur upstream in the supply chain, as evidenced by lifecycle analyses (LCA). For example, The United Nations Economic Commission for Europe (UNECE)'s Lifecycle Assessment of Electricity Generation Options shows that fossil fuel-based technologies have the highest emissions intensity, such as coal power with 751 – 1095 gCO2eq/kWh, while renewable technologies are located in the lower end, such as onshore wind with 7.8 – 16 gCO2eq/kWh (4). Although low compared to absolute global terms, indirect emissions from embodied carbon in renewables' infrastructure is significant at the power sector level, considering the high variability of renewable technologies' performance. A lifecycle approach allows to evaluate the impact of a product or process considering all the stages on their life cycle (from "cradle to grave"). This approach is especially important for electricity decarbonisation, as power demand and supply is foreseen to grow as countries develop, and meeting the net zero targets will require to take a closer look at every part of the electricity value chain.. It is necessary to recognize that renewable technologies are key enablers of the energy transition.

For this benchmark, and given the importance of electricity for global decarbonisation, we have taken a lifecycle approach and considered technology and energy supply chains involved in the sector. As defined by the IEA, technology supply chains refer to the different steps needed to install a technology, with inputs of materials, components and services involved at each stage (5), which involves the extraction of materials, processing, and manufacturing of components, and the assembly, installation, operation and decommissioning of equipment. Energy supply chains comprise the different steps needed to supply a fuel or final energy service to end users, including power generation, transmission, distribution and storage.

Although this benchmark will mainly focus on power generation and retailing companies, technology suppliers (also referred to as "transition enablers") are taken into account to provide a wider perspective of the electricity sector and the important role that they play in deep decarbonisation efforts. As the deployment of renewable energy accelerates, the need to address indirect emissions

coming from its value chain becomes increasingly pressing. Moreover, the inclusion of technology providers enables the assessment of their synergies with electricity generators and retailers on climate performance.

This sector-specific methodology report complements our general methodology for the Climate and Energy Benchmark.

Benchmarking the electricity sector

ACT and Social assessments

The shift towards a renewables-based energy system entails a deep restructuring of global economies, with just transition at the core of this transformation. The Electricity benchmark takes a holistic approach to assess companies integrating social criteria as part of our methodology. As explained in our methodology report, our benchmark comprises an ACT (Assessing low-carbon transition) assessment (60% of the total score), and a social assessment (20% from just transition indicators and 20% from core social indicators).

Scope of the methodology and the benchmark

For this benchmark, we will assess the electricity sector considering two different ACT methodologies based on the scope of companies' activities, the ACT Electricity methodology and the ACT Generic methodology.

1. The ACT Electricity methodology applies to electric utility companies, i.e. companies in the energy supply chain (70 companies in this benchmark) and is designed to assess three types of company profiles: pure generation, pure retail, and mixed profile companies. Companies involved in transmission and distribution activities only are excluded from the scope of the methodology. This is because there is a limited scope for action on decarbonisation in these activities.

   Notably, grouping companies allows for a more accurate assessment, as the weight of the methodology's indicators varies according to the identified profile. Generators' GHG emissions come primarily from their owned assets (direct emissions), while retailers have their largest emissions from indirect sources (the electricity they purchase to later re-sell).

   The corresponding Nomenclature of Economic Activities (NACE) codes regarding the scope of activities considered in the ACT Electricity methodology are presented below.

Segment	Activity
Generation	Production of electricity (including thermal, nuclear, hydroelectric, gas turbine, diesel and renewable) [35.11]
Transmission	Operation of transmission systems that convey the electricity from the generation facility to the distribution system [35.12]
Distribution	Operation of distribution systems (i.e., consisting of lines, poles, meters, and wiring) that convey electric power received from the generation facility or the transmission system to the final consumer [35.13]
Trading	Sale of electricity to the user - activities of electric power brokers or agents that arrange the sale of electricity via power distribution systems operated by others - operation of electricity and transmission capacity exchanges for electric power [35.14]

   For the purpose of the ACT assessments, companies have been grouped in three different profiles:

- **Pure generation** companies, which generate electricity to sell and do not purchase any additional electricity from other sources
    - >95% of the electricity sold by the company is generated from company-owned assets
- **Pure retail** companies, which purchase electricity to sell and do not generate any electricity from company-owned assets
    - >95% of the electricity sold by the company is purchased from other sources (e.g., other generators, wholesale markets)
- **Mixed profile** companies, which generate electricity to sell as well as purchasing electricity from other sources
    - Some (≤95%) of the electricity sold by the company is generated from company-owned assets, while some (≤95%) is purchased from other sources (e.g., other generators, wholesale markets)

2. The ACT Generic methodology applies to companies that are part of the technology supply chain as manufacturers of electricity generation technologies (11 companies in this benchmark) and are considered enablers of electricity generation, transmission, distribution and retail. ACT Generic allows to assess companies that are outside the scope of other sector-specific ACT methodologies. In this methodology, the weighting of the different modules and indicators is assigned after a company-specific analysis of the most significant emission sources of a company's activities, considering direct and indirect emissions from all the value chain.

The Electricity Benchmark as a roadmap

The Electricity Benchmark can act as a roadmap for companies to show how can they contribute to achieving the SDGs and the Paris Agreement goals. The ACT assessments place a particular emphasis on the following key areas: alignment of a company's targets across the value chain (i.e., scopes 1, 2 and 3); contribution to low-carbon electricity generation, trend in future emissions intensity (i.e. phase out of fossil fuel-based power generation); and decarbonisation of the energy technology supply chain (as upstream emissions of renewable energy technologies still play a significant role for decarbonisation). Companies will also be assessed on their low-carbon capital expenditure (especially concerning electricity generators) and strategies to influence suppliers and clients (mainly for electricity retailers). The ACT methodology's definitions of Sustainable Renewable Electricity, Electricity (Storage) Equipment, Biofuels and Biogas and Hydrogen are aligned with the EU Taxonomy. Further, each company's development of a low-carbon transition plan and scenario analysis, determining the impact of the transition on its strategy or business model, are also important elements of the assessments.

The ACT Electricity and Generic methodologies were developed with input from a multistakeholder Technical Working Group. Public consultation and a thorough technical 'road test' were important steps in the development of the ACT methodologies. ACT sought the views and opinions of a wide range of stakeholders including companies, civil society, academics and other relevant experts. More recently, the ACT Electricity and Generic methodologies (now hosted by WBA) have gone through a revision process, with several indicators updated to reflect more ambitious efforts on our path to net zero, such as the inclusion of 1.5°C-aligned only low-carbon pathways and the alignment of near and long term emissions reduction targets. For the ACT Electricity methodology, the scope of activities was extended to include electricity retail activities besides power generation, with the corresponding update on the performance weighting schemes.

Notably, the ACT Electricity and Generic methodologies weigh the different modules that make up the performance scores according to each company's business model's impact on climate change. In the ACT Electricity methodology, indicator weights vary depending on companies' scope of activities. Electricity generators have higher emissions arising from their owned assets, and therefore the corresponding module (Module 2 – Material investments) has a higher scoring weight for this type of company. On the other hand, electricity retailers have higher indirect emissions coming from the electricity they purchase, and therefore Module 4 of the methodology (Sold product performance) is the highest weighted for this company profile. Mixed profile companies are assessed with a dynamic weighting depending on their share of emissions. In the case of the ACT Generic methodology, the weighting scheme varies according to the company's GHG profile, and the most significant emission sources are identified previous to the assessment. Module weightings are distributed according to this analysis, with some cross-sectoral modules having fixed weights (such as Module 1 – Targets). Fine tuning the performance weighting schemes allows to reflect the levers that companies can play on, according to their profile and activities. The holistic analysis still allows ACT scores comparison, considering performance, narrative and trend parts

The ACT methodology includes indicators that align with the information disclosed by companies using CDP, GRI and SASB reporting frameworks. It is also aligned with and supports the objectives of the recommendations made by the TCFD. Mappings of alignments on transition plan elements across some frameworks can be found in a CDP paper (p. 5) and a GFANZ paper (p. 61).

Selecting the keystone electricity sector companies

WBA applied systems thinking to identify 70 electric utilities companies and 11 relevant enablers that exert a significant influence on achieving the SDGs and the Paris Agreement goals. Our approach draws from prominent academic research proposing the concept of keystone actors, inspired by the notion of 'keystone species' in ecology. This is due to the fact that the most influential companies in a specific industry function akin to keystone species in ecological communities. Consequently, these companies can wield a disproportionate impact on the structure and system in which they operate.

To identify the 70 electric utilities companies and 11 enabling companies for the benchmark, we used the following five criteria and principles established by WBA for selecting keystone companies:

1. The company holds dominance in global production revenues and/or volumes within the electric utilities sector.
2. The company controls globally relevant segments of production and/or service provision, evaluated through gigawatts of installed capacity and renewable energy generation.
3. The company establishes global connections within (eco)systems through subsidiaries and their supply chains.
4. The company wields influence over global governance processes and institutions.
5. The company maintains a global footprint, especially in developing countries. However, due to the sector's strong dependence on national regulation, this principle was less applicable compared to other sectors.

Note that previous iterations of the Electric Utilities Benchmark (released in 2020 and 2021) considered 50 electric utilities companies. The scope has been expanded with 20 additional electric utilities companies for the main following reasons:

- A better regional distribution and coverage of the developing economies: 11 (out of 20) companies are headquartered in developing economies.
- A higher coverage of the direct emissions linked to the electricity sector (as mentioned above, responsible for more than one third of global energy-related emissions).

The selection includes companies engaged in electricity generation, electricity retail, and mixed activities. The updated ACT Electricity sector methodology focuses on emissions from electricity generation and retail given that generation activities are expected to represent more than 90% of scope 1 and 2 emissions, and they represent a homogeneous activity indicator that can accurately measure a company's low carbon transition. In addition, as demand-side management becomes essential in a net zero scenario, electricity retailing companies have the potential to influence end-users by offering energy saving opportunities, and many of them could provide readily-available supply chains for deploying energy efficiency programmes.

WBA cross-checked companies assessed by the Transition Pathway Initiative and Climate Action 100+ to ensure strong alignment with these initiatives in accordance with our selection principles. Among the 70 electric utilities companies, 57% are assessed by the Transition Pathway Initiative, and 40% are actively involved in Climate Action 100+, while 3 out of the 11 technology provider companies are assessed by these initiatives as well.

Next steps

1. WBA will contact all 81 companies to encourage their engagement in the benchmarking process. In September 2023, the WBA and CDP teams will share the ACT and social transformation assessment data collected from public sources for each company for validation. Companies will be provided with resources and materials to learn more about the ACT and social transformation assessments and the WBA Electric Utilities Benchmark.

2. We strongly encourage companies to participate in the data validation process, for the second or third time if they already did during the first or second Benchmark iterations in 2020 and 2021. We will be on hand to answer any questions companies have about the assessments and the benchmark. Companies may only submit an appeal regarding their assessment result if they have actively participated in the data validation process.

3. The benchmark results will be published during Q4 2023.

4. We intend for our work at WBA to contribute to a multi-stakeholder movement. In tandem with the development of the Electric Utilities Benchmark, we will therefore be engaging with our global Alliance and a broad range of stakeholders to build communities of practice and action to take forward the benchmark findings.

If you have questions about the Climate and Energy Benchmark, please reach out to:

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Appendix I: Companies in the 2023 Electric Utilities Benchmark

N°	Company Name	Country of headquarters
Electric Utilities		
1	**AboitizPower**	Philippines
2	**AES**	United States of America
3	**AGL Energy**	Australia
4	**American Eelectric Power**	United States of America
5	**ČEZ Group**	Czech Republic
6	**China Datang**	China
7	**China Huadian**	China
8	**China Huaneng**	China
9	**China Three Gorges**	China
10	**CHN Energy**	China
11	**Chubu Electric Power**	Japan
12	**Chugoku Electric Power**	Japan
13	**CLP Group**	Hong Kong, China
14	**CMS Energy**	United States of America
15	**Comisión Federal de Electricidad**	Mexico
16	**Constellation Energy**	United States of America
17	**Dominion Energy**	United States of America
18	**Duke Energy**	United States of America
19	**E.ON**	Germany
20	**Egyptian Electricity Holding Company**	Egypt
21	**Électricité de France**	France
22	**Electricity Generating Authority of Thailand**	Thailand

23	**Eletrobras**	Brazil
24	**EnBW Company**	Germany
25	**Enel**	Italy
26	**Energias de Portugal**	Portugal
27	**ENGIE**	France
28	**Eskom**	South Africa
29	**Exelon**	United States of America
30	**Fortum**	Finland
31	**GD Power Development**	China
32	**Iberdrola**	Spain
33	**Inter RAO**	Russian Federation
34	**J Power**	Japan
35	**JSW Energy**	India
36	**Kansai Electric Power**	Japan
37	**K-Electric**	Pakistan
38	**Korea Electric Power Corporation**	Republic of Korea
39	**Kyushu Electric Power**	Japan
40	**Mahagenco**	India
41	**Nextera Energy**	United States of America
42	**NRG Energy**	United States of America
43	**NTPC**	India
44	**Origin Energy**	Australia
45	**Ørsted**	Denmark
46	**Pacific Gas and Electric**	United States of America
47	**Pampa Energia**	Argentina
48	**Perusahaan Listrik Negara**	Indonesia
49	**Polska Grupa Energetyczna**	Poland
50	**Power Assets**	Hong Kong
51	**PPL**	United States of America

52	**Qatar Electricity and Water Company**	Qatar
53	**RWE**	Germany
54	**Saudi Electricity Company**	Saudi Arabia
55	**Southern Company**	United States of America
56	**SSE**	United Kingdom
57	**State Power Investment Corporation**	China
58	**Taipower**	Taiwan, China
59	**Tanzania Electric Supply Company**	Tanzania
60	**Tata Power**	India
61	**Tenaga Nasional**	Malaysia
62	**Tohoku Electric Power**	Japan
63	**Tokyo Electric Power Company**	Japan
64	**Transcorp Power**	Nigeria
65	**Uniper**	Germany
66	**Vattenfall**	Sweden
67	**Vietnam Electricity**	Vietnam
68	**Vistra**	United States of America
69	**WEC Energy Group**	United States of America
70	**Xcel Energy**	United States of America
Technology providers		
71	**ABB**	Switzerland
72	**Canadian Solar**	Canada
73	**Eaton**	Ireland
74	**First Solar**	United States of America
75	**General Electric**	United States of America
76	**Goldwind**	China
77	**Honeywell**	United States of America
78	**Schneider Electric**	France

79	**Siemens Gamesa**	Spain
80	**Trina Solar**	China
81	**Vestas**	Denmark

Appendix II: References

1. **IPCC.** *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Geneva, Switzerland : Intergovernmental Panel on Climate Change, 2023.

2. **IEA.** *World Energy Outlook 2022.* Paris : International Energy Agency, 2022.

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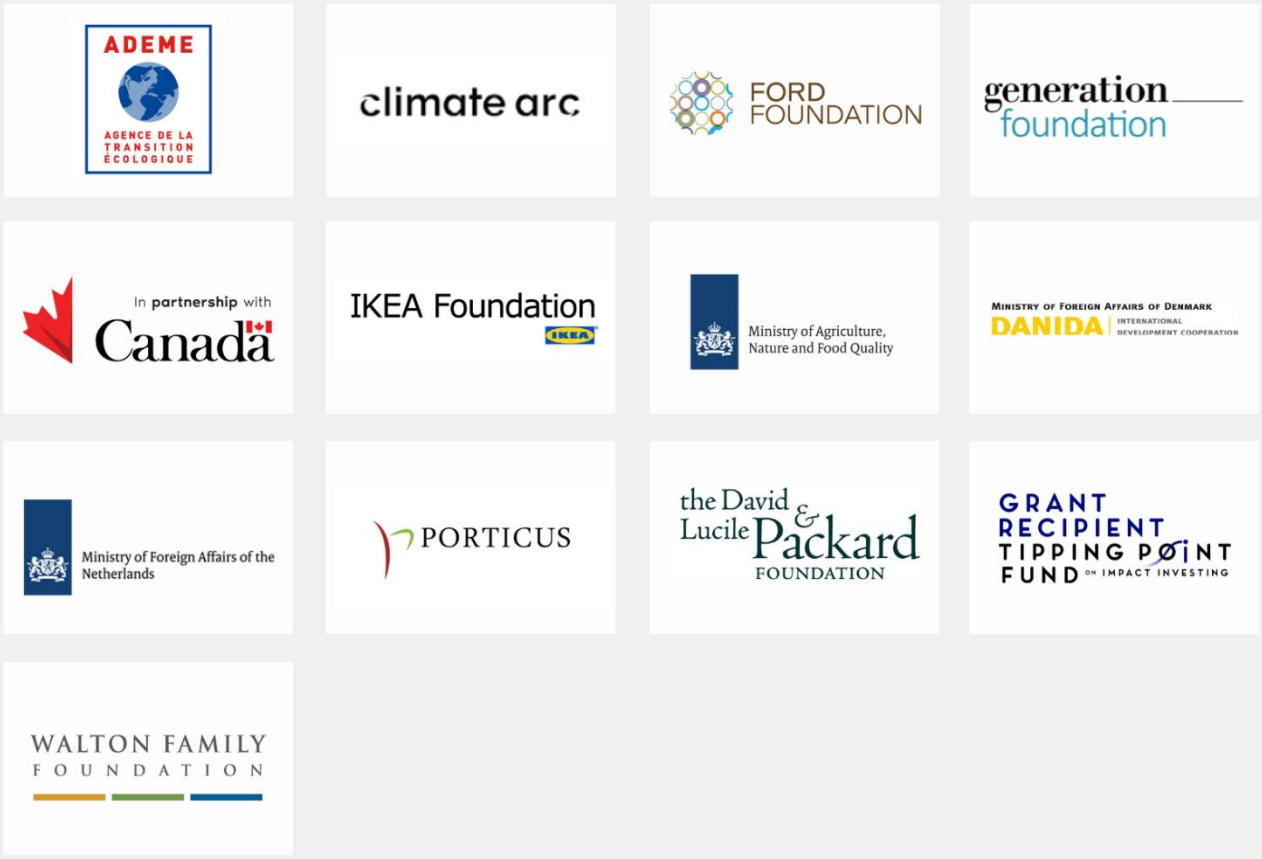

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