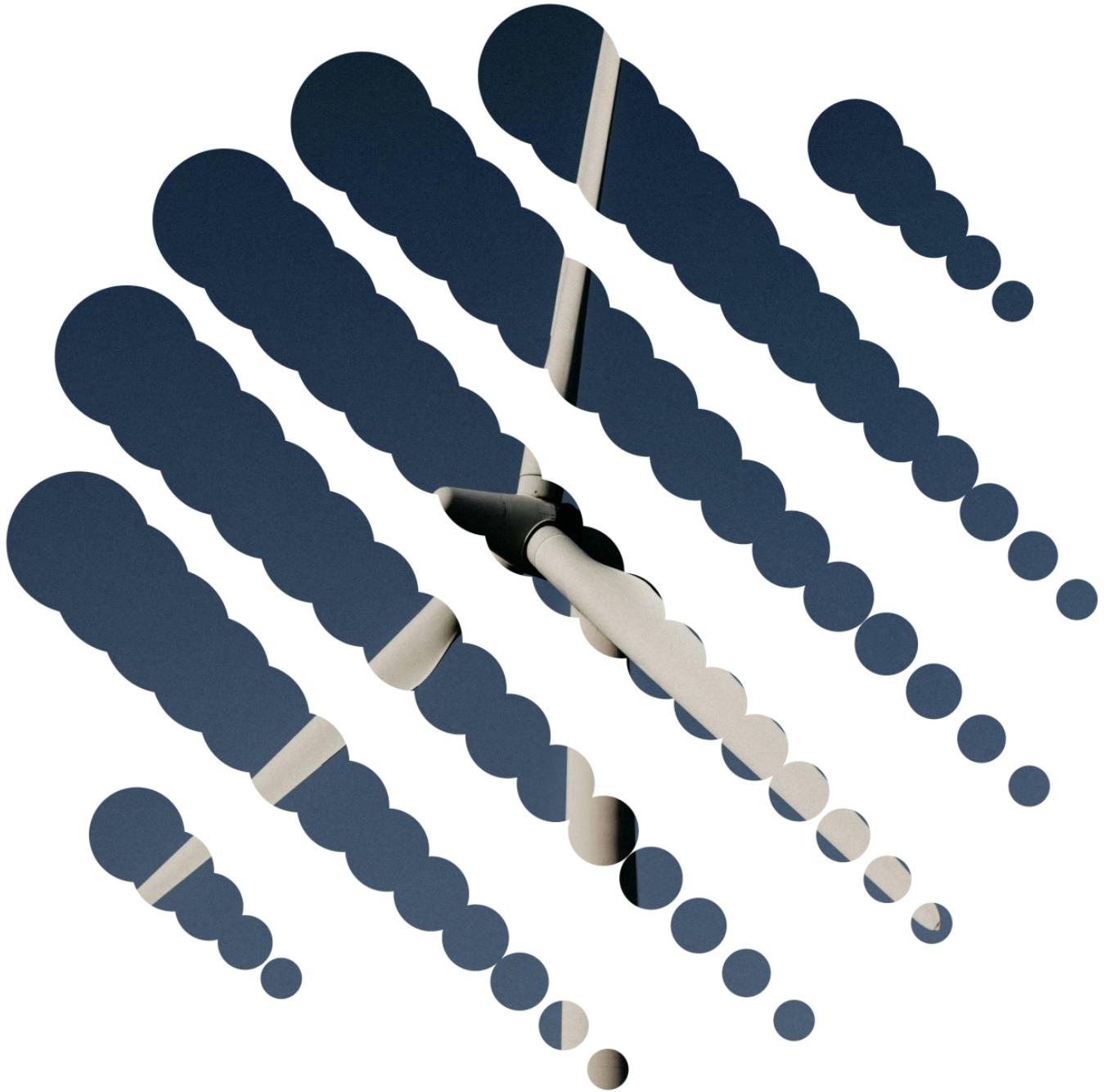


Carbon Performance assessment of electricity utilities: note on methodology

October 2024



Simon Dietz, Cristóbal Budnevich Portales, Ali Amin, Valentin Jahn and Antonina Scheer

About the LSE Transition Pathway Initiative Centre

The Transition Pathway Initiative Centre (TPI Centre) is an independent, authoritative source of research and data on the progress of corporate and sovereign entities in transitioning to a low-carbon economy.

The TPI Centre is part of the Grantham Research Institute on Climate Change and the Environment, which is based at the London School of Economics and Political Science (LSE). It is the academic partner of the Transition Pathway Initiative (TPI), a global initiative led by asset owners and supported by asset managers, aimed at helping investors assess companies' preparedness for the transition to a low-carbon economy and supporting efforts to address climate change. As of October 2024, over 150 investors globally, representing more than US\$80 trillion combined Assets Under Management and Advice, have pledged support for TPI.¹

The TPI Centre provides research and data on publicly listed equities, corporate bond issuers, banks, and sovereign bond issuers. The TPI Centre's company data:

- Assess the quality of companies' governance and management of their carbon emissions and of risks and opportunities related to the low-carbon transition.
- Evaluate whether companies' current and planned future emissions are aligned with international climate targets and national climate pledges, including those made as part of the Paris Agreement.
- Form the basis for the Climate Action 100+ Net Zero Company Benchmark Disclosure Framework assessments.
- Are published alongside the methods online and fully open access at www.transitionpathwayinitiative.org.

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¹ This figure is subject to market price and foreign exchange fluctuations and, as the sum of self-reported data by TPI supporters, may double count some assets.

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1. The TPI Centre's use of the Sectoral Decarbonisation Approach (SDA)

The TPI Centre's Carbon Performance assessments to date have been predominantly based on the Sectoral Decarbonisation Approach (SDA).² The SDA translates greenhouse gas emissions targets made at the international level (e.g. under the 2015 UN Paris Agreement) into appropriate benchmarks, against which the performance of individual companies can be compared.

The SDA recognises that different sectors of the economy (e.g. oil and gas production, electricity generation, and automobile manufacturing) face different challenges arising from the low-carbon transition, including where emissions are concentrated in the value chain and how costly it is to reduce emissions. Other approaches to translating international emissions targets into company benchmarks have applied the same decarbonisation pathway to all sectors, regardless of these differences [1]. Such approaches may result in suboptimal insights, as not all sectors have the same emissions profiles or face the same challenges: some sectors may be capable of faster decarbonisation, while others require more time and resources.

Therefore, the SDA takes a sector-by-sector approach, comparing companies within each sector against each other and against sector-specific benchmarks, which establish the performance of an average company that is aligned with international emissions targets.

The SDA can be applied by taking the following steps:

- A global carbon budget is established, which is consistent with international emissions targets, for example keeping global warming below 2°C. To do this rigorously, some input from a climate model is required.
- The global carbon budget is allocated across time and to different regions and industrial sectors. This typically requires an Integrated Assessment Model (IAM), and these models usually allocate emissions reductions by region and by sector according to where it is cheapest to reduce emissions and when. Cost-effectiveness is, however, subject to some constraints, such as political and societal preferences, and the availability of capital. This step is therefore driven primarily by economic and engineering considerations, but with some awareness of political and social factors.
- In order to compare companies of different sizes, sectoral emissions are normalised by a relevant measure of sectoral activity (e.g. physical production or economic activity). This results in a benchmark pathway for emissions intensity in each sector:

$$\text{Emissions intensity} = \frac{\text{Emissions}}{\text{Activity}}$$

- Assumptions about sectoral activity need to be consistent with the emissions modelled and therefore should be taken from the same economy–energy modelling where possible.

² The Sectoral Decarbonisation Approach (SDA) was created by CDP, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF) in 2015. See: <https://sciencebasedtargets.org/resources/files/Sectoral-Decarbonization-Approach-Report.pdf>

- Companies' historical emissions intensity is calculated, and their future emissions intensity is based on emissions targets they have set (this assumes companies meet their targets).³ Together, these establish emissions intensity pathways for companies.
- Companies' emissions intensity pathways are compared with each other and with the relevant sectoral benchmark pathway.

³ Alternatively, companies' future emissions intensity could be calculated based on other data provided by companies on their business strategy and capital expenditure plans.

2. Applying the SDA to the electricity sector

2.1. Deriving the benchmark pathways

The TPI Centre evaluates companies against benchmark pathways, which translate the emission reductions required by the Paris Agreement goals into a measurable trajectory at the sectoral level. For each sector benchmark pathway, the key inputs are:

- A timeline for economy-wide carbon emissions, which is consistent with meeting a particular climate target (e.g. limiting global warming to 1.5°C) by keeping cumulative carbon emissions within the associated carbon budget.
- A breakdown of this economy-wide emissions pathway into emissions from key sectors (the numerator of sectoral emissions intensity).
- Consistent estimates of the timeline of physical production from, or economic activity in, these key sectors (the denominator of sectoral emissions intensity).

For the electricity utilities sector, TPI obtains all of these inputs from the International Energy Agency (IEA), via its World Energy Outlook 2023 and Net Zero Roadmap reports [3][4]. The IEA has established expertise in modelling the cost of achieving international emissions targets. It also provides unprecedented access to the modelling inputs and outputs in a form suitable for applying the SDA.

The IEA's economy-energy model simulates the supply of energy and the path of emissions in different sectors burning fossil fuels, or consuming energy generated by burning fossil fuels, given assumptions about key inputs, such as economic and population growth.

In low-carbon scenarios, the IEA model minimises the cost of adhering to a carbon budget by always allocating emissions reductions to sectors where they can be made most cheaply, subject to some constraints as mentioned above. These scenarios are therefore cost-effective, within some limits of economic, political, social, and technological feasibility.

The IEA's work can be used to derive three benchmark emissions pathways, against which companies are evaluated by TPI:

1. **A National Pledges scenario**, which is consistent with the global aggregate of emissions reductions related to policies introduced or under development as of mid-2023. According to the IEA, this scenario does not take for granted that all government targets will be achieved. Instead, it takes a granular, sector-by-sector look at existing policies and measures. This scenario gives a probability of 50% of holding the global temperature increase to 2.4°C by 2100 [3].
2. **A Below 2°C scenario**, which is consistent with the overall aim of the Paris Agreement to limit warming, albeit at the lower end of the range of ambition. This scenario gives a probability of 50% of holding the global temperature increase to 1.7°C by 2100 [3].
3. **A 1.5°C scenario**, which is consistent with the overall aim of the Paris Agreement to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels" [5]. This scenario gives a probability of 50% of holding the global temperature increase to 1.4°C by 2100 [4].

For each scenario, IEA modelling output provides sector-specific emissions pathways. It also provides associated estimates of production in each sector. Alternatively, assumptions on overall economic growth can be used as a measure of sectoral activity (under the assumption that the sector grows at

the same rate as the overall economy). Emissions are then divided by activity to derive sectoral pathways for emissions intensity.

Figure 2.1 shows the benchmark emissions intensity pathways for the electricity utilities sector. Table 2.1 provides the underlying data on grid intensities, which we use directly from the IEA reports as these figures exclude emissions from heat production.

Figure 2.1. Global emissions intensity benchmarks by warming scenario for the electricity utilities sector

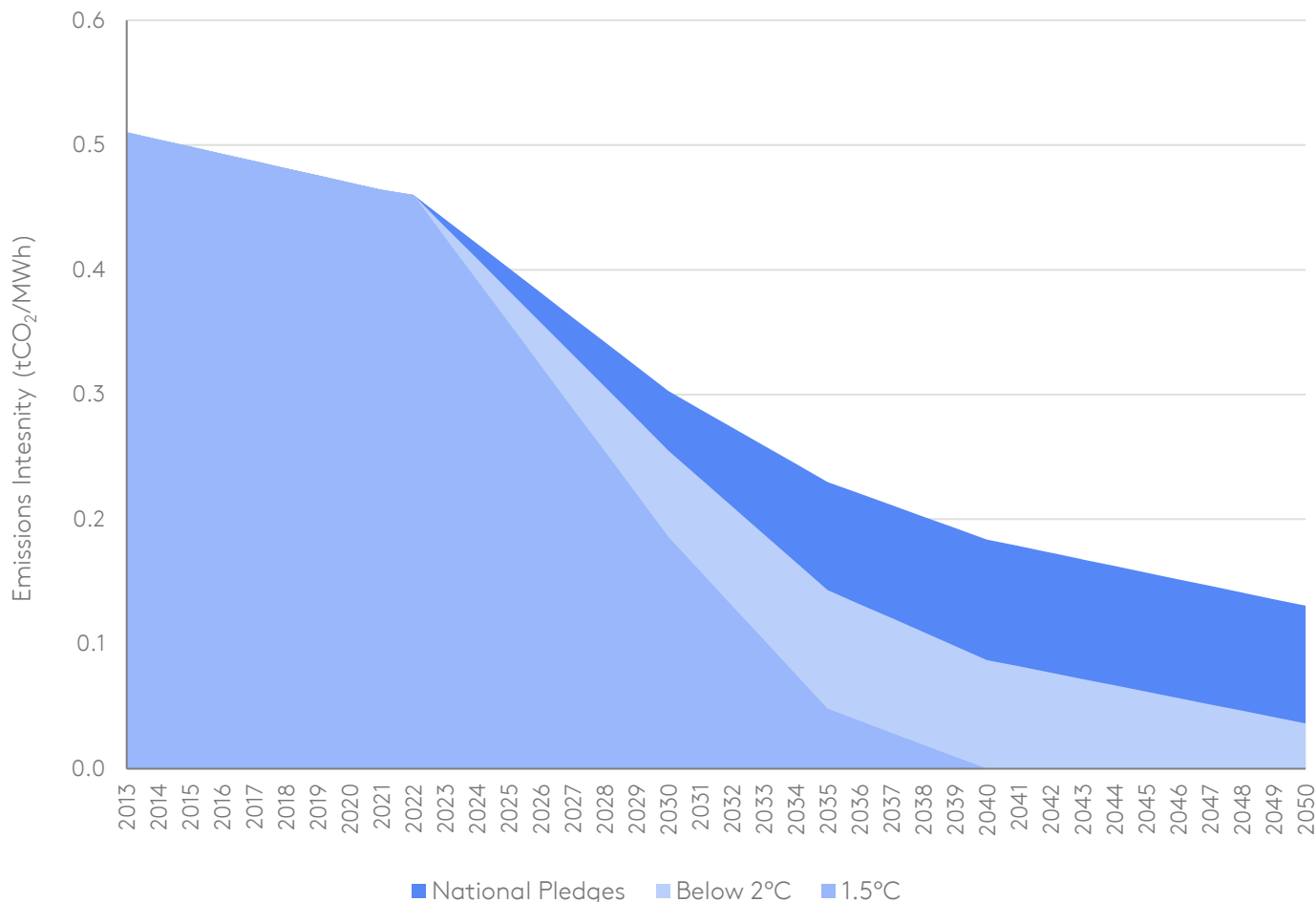


Table 2.1. Projections of grid intensities used to create emissions intensity benchmark pathway by warming scenario (tonne of CO₂ per megawatt hour[tCO₂/MWh])

	2022	2030	2040	2050
Global				
National Pledges	0.460	0.303	0.184	0.131
Below 2°C	0.460	0.255	0.087	0.036
1.5°C	0.460	0.186	0.003 ⁴	-0.004

⁴ For the purposes of our company assessments, we round this figure to net zero emissions from the electricity sector in 2040.

2.2. Deriving regional benchmark pathways

TPI usually assesses companies whose operations span multiple regions, so regional benchmarks are inappropriate. However, electricity is not a globally traded commodity, and utilities tend to operate in individual regions. This means that, for this sector, it is possible to reflect different regions' emissions reduction requirements. Specifically, given regional differences in historical emissions and development stages, the Paris Agreement includes the principle of common but differentiated responsibilities, whereby developed nations are expected to reduce emissions more ambitiously [5]. A 'fair share' approach to carbon budgets would require lower intensities of companies operating in developed regions and would require them to reach net zero sooner. Although the IEA does not explicitly consider historical emissions, pathways based on its regional breakdown of cost-effective generation and emission projections do require faster decarbonisation in developed countries. The TPI Centre therefore provides a complementary Carbon Performance assessment of electricity utilities using regional benchmarks that can be downloaded from our online tool.

Table 2.2. Electricity sector emissions intensity benchmark pathway by warming scenario for the European Union, North America, OECD and non-OECD regions (tCO₂/MWh)

	2010	2021	2022	2030	2035	2040	2045	2050
European Union⁵								
National Pledges	0.365	0.251	0.267	0.082	-	-	-	0.015
Below 2°C	0.365	0.251	0.267	0.066	-	-	0.000	-
1.5°C	0.365	0.251	0.267	0.050	0.000	-	-	-
North America								
National Pledges	0.450	0.312	0.299	0.147	-	-	-	0.036
Below 2°C	0.450	0.312	0.299	0.100	-	-	0.000	-
1.5°C	0.450	0.312	0.299	0.075	0.000	-	-	-
OECD								
National Pledges	0.417	0.304	0.302	0.140	-	-	-	0.043
Below 2°C	0.417	0.304	0.302	0.101	-	-	0.000	-
1.5°C	0.417	0.304	0.302	0.077	0.000	-	-	-
Non-OECD								
National Pledges	0.643	0.568	0.560	0.390	-	-	-	0.173
Below 2°C	0.643	0.568	0.560	0.345	-	-	-	0.053
1.5°C	0.643	0.568	0.560	-	0.077	-	0.000	-

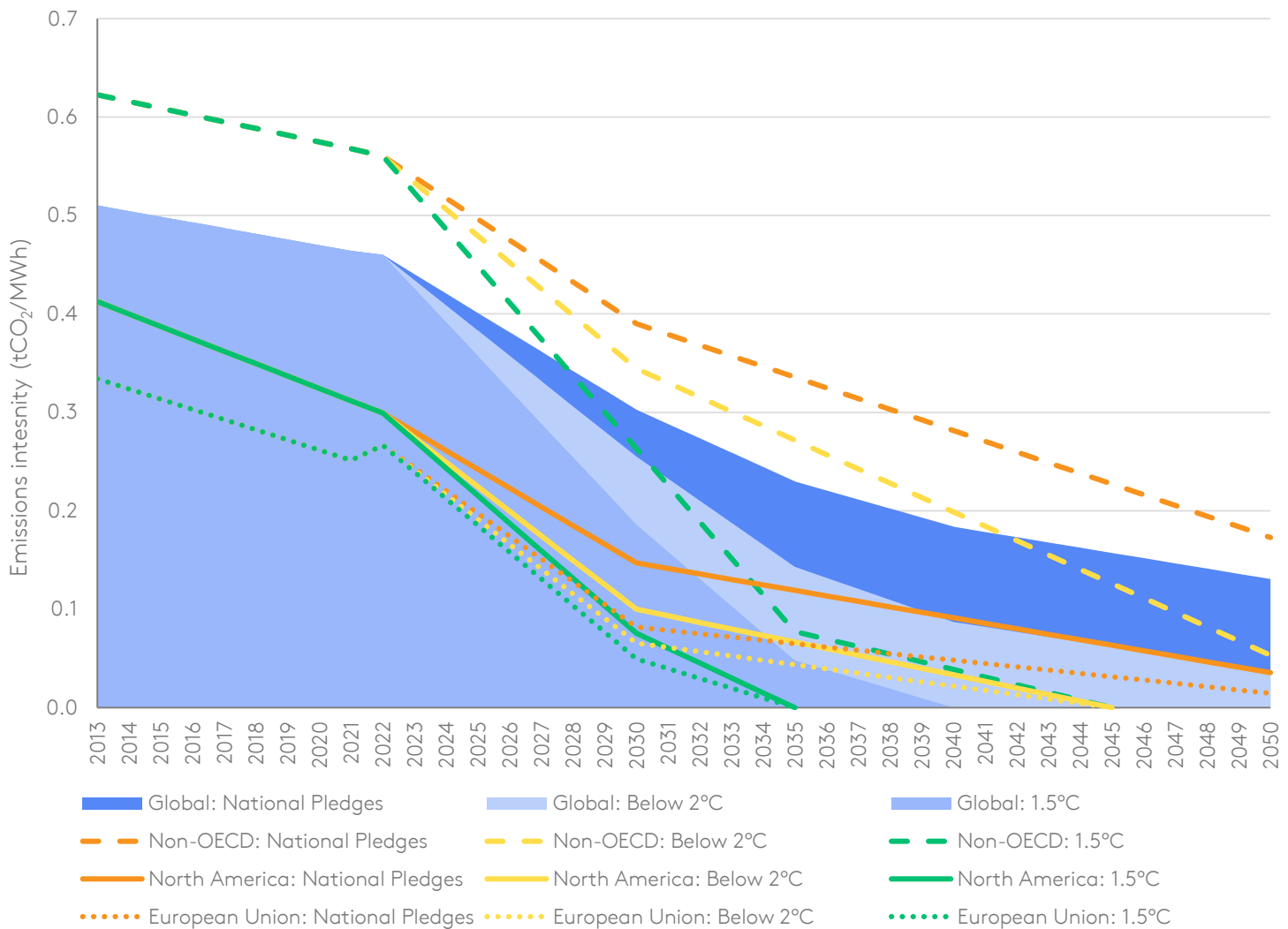
⁵ Note that electricity utilities based in the United Kingdom are compared to the European Union benchmark.

Using regional data from the IEA’s World Energy Outlook (WEO) 2023 and Net Zero Roadmap 2023 reports, and estimates of regional net zero deadlines, we calculate benchmarks for North America, the European Union (EU), OECD, and non-OECD.⁶ To align with 1.5°C, utilities in the European Union, North America and OECD economies must reach net zero by 2035, while those in non-OECD countries must reach net zero by 2045 (five years later than the 2021 Carbon Performance of electricity utilities note on methodology) [4]. To align with Below 2°C, companies in North America, the EU and other developed countries reach net zero emissions intensity in 2045 while those in non-OECD countries are projected to reduce their emissions intensity to nearly 0.05 tCO₂ per MWh of electricity produced by 2050 [6].

Figure 2.2 shows the global and regional benchmark emissions intensity pathways for the electricity utilities sector, whereas Table 2.2 provides the underlying data on the regional grid intensities by warming scenario.

On our online tool, we provide regional alignment scores for utilities for whom at least 90% of revenue is generated in only one of the four regions listed above, based on public corporate disclosure.

Figure 2.2. Global and regional emissions intensity benchmark pathway by warming scenario for the electricity utilities sector



Note: the benchmarks for OECD countries are not shown as they overlap very closely with the benchmark for North America and the European Union; tCO₂/MWh = tonnes of carbon dioxide per megawatt hour.

⁶ To ensure continuity in regional benchmarks, we maintained the same regional breakdown as outlined in our previous methodology note.

3. Carbon Performance assessment of electricity utilities

3.1. Measuring companies' emissions intensities

TPI Centre's Carbon Performance assessments are based on public disclosures by companies. Disclosure that is useful to our assessments tends to come in one of three forms:

1. **Emissions intensity.** Some companies disclose their recent and current emissions intensity and some companies have also set future emissions targets in intensity terms. Provided these are measured in a way that can be compared with the benchmark scenarios and with other companies (e.g. in terms of scope of emissions covered and measure of activity chosen), these disclosures can be used directly. In some cases, adjustments need to be made to obtain estimates of emissions intensity on a consistent basis. The necessary adjustments will generally involve sector-specific issues.
2. **Absolute emissions.** Some companies disclose their emissions on an absolute (i.e. un-normalised) basis. Provided emissions are appropriately measured, and an accompanying disclosure of the company's activity can be found that is also in the appropriate metric, historical emissions intensities can be calculated.
3. **Absolute emission targets.** Some companies set future emissions targets in terms of absolute emissions. This raises the particular question of what to assume about those companies' future activity levels. The approach taken by the TPI Centre is to assume company activity increases at the same rate as the sector as a whole (i.e. assuming a constant market share), using sectoral growth rates from the same model that is used to derive the benchmark pathways, in order to be consistent. While companies' market shares are unlikely to remain constant, there is no obvious alternative assumption that can be made, that treats all companies consistently. Sectoral growth rates from the National Pledges Scenario (based on IEA's Stated Policies Scenario) are used.

The length of companies' emissions intensity pathways will vary depending on how much information companies provide on their historical emissions, as well as the time horizon for their emissions reduction targets.

3.2. Emissions reporting boundaries

Companies disclose emissions using different organisational boundaries. There are two high-level approaches: (i) the equity share approach; and (ii) the control approach, within which control can be defined as financial or operational. Companies are free to choose which organisational boundary to set in their voluntary disclosures, and there is variation across the companies assessed by the TPI Centre.

The TPI Centre accepts emissions reported using any of the above approaches to setting organisational boundaries, as long as:

- The boundary that has been set appears to enable a representative assessment of the company's emissions intensity; and
- The same boundary is used for reporting company emissions and activity, to obtain a consistent estimate of emissions intensity.

Currently, limiting the assessment to one particular type of organisational boundary would severely restrict the breadth of companies that can be assessed.

When companies report historical emissions or emissions intensities using both equity share and control approaches, a reporting boundary is chosen based on which method provides the longest available time series of disclosures or is the most consistent with disclosure on activity and any targets.

3.3. Data sources and validation

All TPI Centre's data are based on companies' own disclosures. The sources for the Carbon Performance assessment include responses to the annual CDP questionnaire and companies' own reports, e.g. sustainability reports.

Given that our Carbon Performance assessment is both comparative and quantitative, it is essential to understand exactly what the data in company disclosures refer to. Company reporting varies not only in terms of what is reported but also in terms of the level of detail and explanation provided. The following cases can be distinguished:

- Companies that provide data in a suitable form and with enough detail for analysts to be confident that appropriate measures can be calculated or used.
- Companies that provide enough detail in their disclosures, but not in a form that is suitable for the assessment (e.g. they do not report the measure of company activity needed). These companies cannot be included in the assessment.
- Companies that do not provide enough detail on the data disclosed (e.g. the company reports an emissions intensity estimate but does not explain precisely what it refers to). These companies are also excluded from the assessment.
- Companies that do not disclose their greenhouse gas emissions or activity.

Once a preliminary Carbon Performance assessment has been made, it is subject to the following procedure to provide quality assurance:

- **Internal review:** the preliminary assessment is reviewed by an analyst who was not involved in the original assessment.
- **Company review:** the reviewed assessment is sent to the company, which has the opportunity to review it and confirm the accuracy of the disclosures used. This review includes all companies, including those who provide unsuitable or insufficiently detailed disclosures.
- **Final assessment:** feedback from the company is reviewed and incorporated if it is considered appropriate. Only information in the public domain can be accepted as a basis for any change.

3.4. Responding to companies

Giving companies the opportunity to review their Carbon Performance assessments is an integral part of the TPI Centre's quality assurance process. Each company receives its draft assessment and the data that underpins the assessment, offering them the opportunity to review and comment on the data and assessment. We also allow companies to contact us at any point to discuss their assessment.

If a company seeks to challenge its result or representation, our process is as follows:

- The TPI Centre reviews the information provided by the company. At this point, additional information may be requested.
- If it is concluded that the company's challenge has merit, the assessment is updated.
- If it is concluded that there are insufficient grounds to change the assessment, the original assessment is published.
- If the company requests an explanation regarding its feedback after the publication of its assessment, the TPI Centre explains the decisions taken.
- If a company requests an update of its assessment based on data publicly disclosed after the research cut-off date communicated to the company, the new disclosure is noted. For corrections, we take this into consideration immediately, whereas general assessment updates will be incorporated in the next assessment cycle.

If a company chooses to further contest the assessment and reverts to legal means to do so, the company's assessment is withheld from the TPI Centre website and the company is identified as having challenged its assessment.

3.5. Presentation of assessment on the TPI Centre website

The results of the Carbon Performance assessments are posted on the TPI Centre's online tool (www.transitionpathwayinitiative.org/tpi/sectors). On each company page, its emissions intensity pathway is plotted on the same chart as the benchmark pathways for the relevant sector. Different companies can also be compared on the toolkit main page, with the user free to choose which companies to include in the comparison.

4. Specific considerations for the assessment of electricity utilities

4.1. Measure of emissions intensity

In applying the SDA to the electricity utilities sector, a key consideration is that the vast majority of lifecycle emissions stem from companies' electricity generation, i.e. burning oil and gas to generate electricity. Therefore, the scope of a company assessment should include emissions from electricity generation.

Hence, in the electricity utilities sector, the specific measure of emissions intensity is:

- Greenhouse gas emissions per unit of electricity produced, in units of (metric) tonnes of CO₂ equivalent per megawatt hour.

This specifically covers emissions from the electricity generation process. It is sometimes referred to as 'absolute emissions' from electricity production (e.g. in the CDP questionnaire). In most cases, these emissions constitute all or nearly all of the company's Scope 1 emissions, but some companies have significant Scope 1 emissions from other sources, and these must be subtracted, or else a stand-alone figure for emissions from electricity generation must be provided.

There are three main reasons for the choice of measure. First, it is consistent with the data provided by the IEA for the benchmark pathways, which comprise direct CO₂ emissions from electricity generation,⁷ as well as the amount of electricity generated. Second, almost all power-sector emissions are from the generation process. Third, data are relatively widely available for the companies in the TPI sample.

Some companies are engaged in the generation of electricity and heat in combined heat and power (CHP) facilities. Because TPI focuses strictly on the emissions intensity of electricity generation, it is sometimes necessary for TPI to adjust such companies' disclosures. Where a company does not readily separate its disclosed emissions between electricity and heat, where possible TPI adjusts the company's emissions intensity by subtracting emissions due to the production of heat (or an estimate thereof) from the numerator, and the amount of heat produced from the denominator, so that the adjusted intensity reflects only the company's electricity generation activities.

4.2. Coverage of targets

There are differences in the scope of companies' emissions targets. Some companies have set specific targets for emissions from electricity production, while others have set targets for total Scope 1 emissions, or Scope 1 and 2 emissions.

Where a target covers a scope broader than just emissions from electricity production, further research is needed. In cases where emissions other than from electricity generation are negligible, and it is reasonable to assume that they will remain so, the percentage reduction in emissions (e.g. a 20% cut) can be directly applied to base year emissions from electricity production.

Companies often express targets relative to emissions in a base year (e.g. 2010), but they do not always report absolute emissions from electricity production in the base year, rather they sometimes report

⁷ IEA only provides an estimate of CO₂ emissions and does not include other greenhouse gases. However, these are typically a very small share of companies' emissions from electricity production (0-3%), so we allow a comparison of company emissions intensity, in terms of all greenhouse gases, with benchmark emissions intensity, in terms of CO₂ only.

base-year emissions in a different scope (e.g. total Scope 1 emissions in 2010). If a company does not report absolute emissions from electricity generation in the base year, these are estimated where necessary using the ratio of absolute emissions to emissions in the company's chosen scope since 2013 (cumulatively).⁸

Most companies report historical absolute emissions of all greenhouse gases (i.e. CO₂ equivalent or CO₂e), but some have set future targets that relate to CO₂ only. This inconsistency is disregarded due to the very small share of non-CO₂ greenhouse gases in companies' absolute emissions from electricity production, as explained above and in footnote 7.

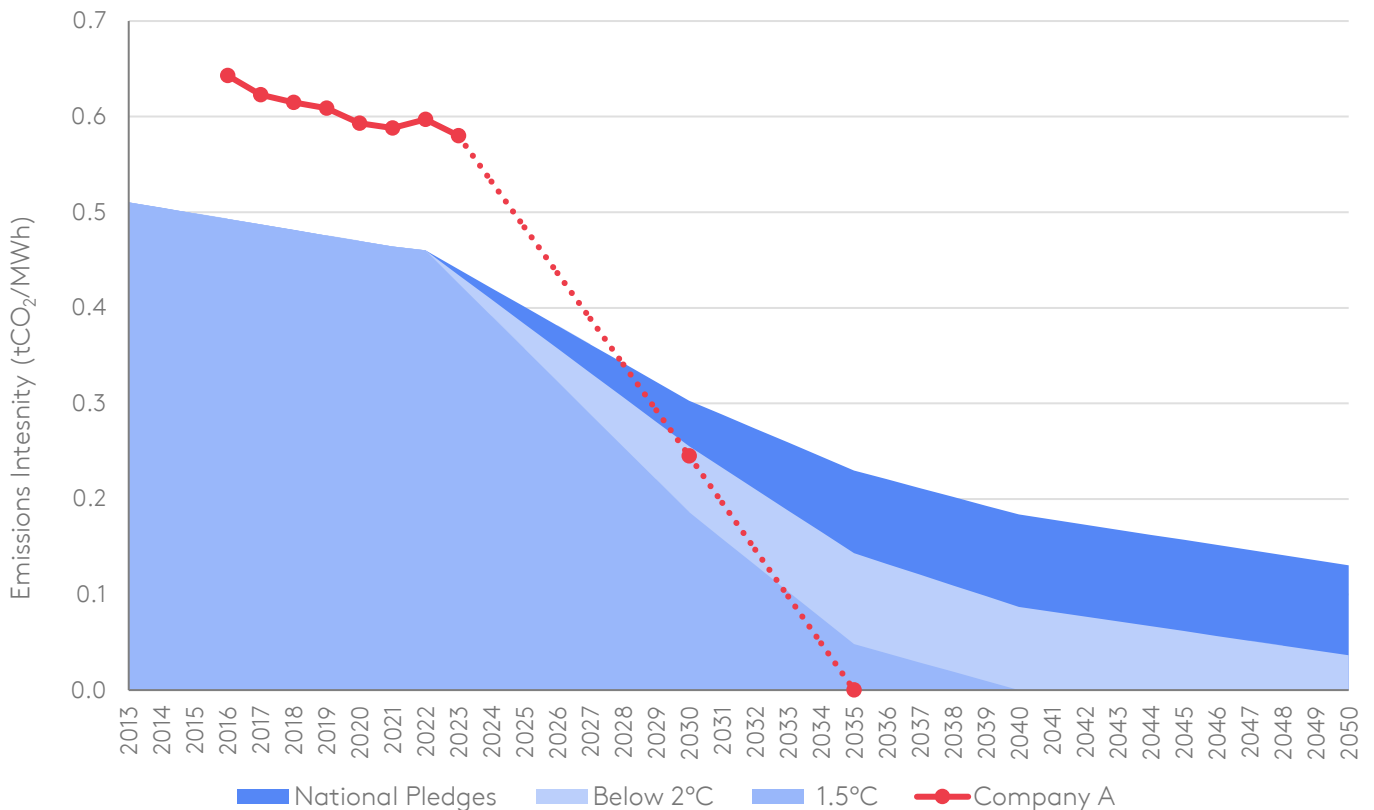
4.3. Worked examples⁹

Company A: a simple case

Company A reports its emissions intensities in the required metric, i.e. greenhouse gas emissions from electricity generation, per unit of electricity produced. For example, in 2023 it was 0.58 tCO₂e/MWh. The company also discloses emissions intensity values for the years 2016–2022. These figures are used directly without adjustment (See Figure 4.1).

Company A has also set a target to reduce the emissions intensity of its generation portfolio to 0.245 tCO₂e /MWh by 2030, and to 0.00 tCO₂e /MWh by 2035. After verifying that the target emissions intensities are expressed in a manner consistent with the historical emissions intensity disclosures, the target figures are used without adjustment.

Figure 4.1. Company A's emissions intensity pathway compared with global electricity utilities sector benchmarks



⁸ Due to the occasional practice of companies re-basing their emissions, this adjustment is preferred to using disclosures of base-year absolute emissions from past years' reporting. For example, it is often the case that a company's stated base-year (2020) emissions in their 2023 CDP response differ from the company's stated 2020 emissions in their 2021 CDP response.

⁹ In the following examples various numbers are rounded for ease of presentation.

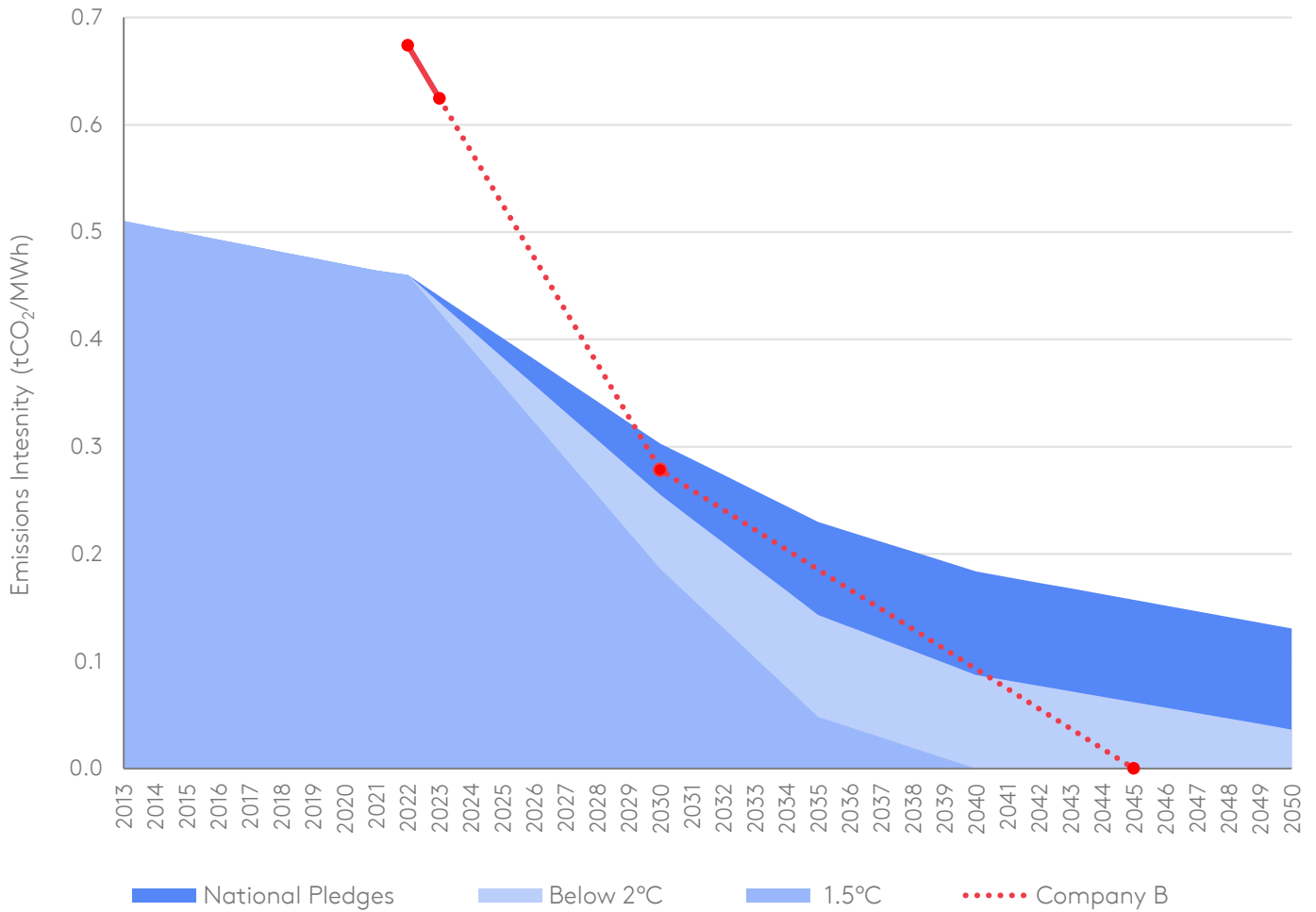
Company B with an absolute emissions reduction target

Company B reports its greenhouse gas emissions from electricity generation per unit of electricity produced. For example, in 2022 and 2023 the intensities were 0.67 and 0.62 tCO₂e/MWh, respectively. After verification, these figures are used directly without adjustment.

Company B also has a target to reduce its Scope 1 emissions by 50% of the 2020 level by 2030, and to reach net zero by 2045 at the latest. The TPI Centre understands this target to cover all of the company's Scope 1 emissions from electricity production. In order to translate this information into an estimate of emissions intensity between 2023 and 2045, the following steps are taken:

- “2045 at the latest” is not further defined; however, it is necessary for the TPI Centre to assume a specific date to plot the pathway. We assume that “2045 at the latest” can be approximated by the year 2045 and the expected emissions intensity will be 0.00 tCO₂e/MWh.
- The 2020 emissions from electricity generation are 27.15 million tonnes (Mt) of CO₂e. The company's target is understood to cover all such emissions. Hence, the estimated absolute emissions from electricity generation in 2030 are therefore: $27.15 \times (1 - 50\%) = 13.6 \text{ MtCO}_2\text{e}$.
- As the company does not provide an intensity target, its electricity production between 2023 and 2030 is assumed to grow at the same rate as regional electricity production according to the IEA scenarios. In the IEA STEPS scenario, electricity production in Central and South America (where the company generates more than 90% of its revenue) grows cumulatively by 18.5% between 2023 and 2030. The company's electricity production in 2023 was 41,152,724 MWh, and its 2030 production can be estimated at: $41,152,724 \times (1 + 18.5\%) = 48,786,022 \text{ MWh}$.
- Dividing the company's estimated 2030 emissions by the estimate of electricity production in 2030 gives an estimated emissions intensity of $13,600,000 / 48,786,022 = 0.278 \text{ tCO}_2\text{e/MWh}$ for 2030.

Figure 4.2. Company B’s emissions-intensity pathway compared to global electricity utilities sector benchmarks



Company B’s pathway against its regional benchmarks

Based on publicly available data on revenue and electricity generation by geography, Company B only operates in Central and South America. This data allows the TPI Centre to compare the company’s pathway against the regional benchmarks presented in Section 2.2. As Company B only operates in non-OECD countries in Central and South America, it is assessed against the non-OECD regional benchmarks.

While the company’s pathway remains unchanged, the non-OECD emissions intensity benchmarks are less stringent over time, in line with the principle of common but differentiated responsibilities among regions and based on the IEA’s regional power sector modelling. Comparing Company B’s pathway against the non-OECD benchmarks (see Figure 4.3), the alignment scores change for the three assessed timeframes as summarised in Table 4.1. Specifically, when using regional benchmarks instead of global benchmarks, the short-term score improves from Not Aligned to National Pledges, the medium-term score improves from National Pledges to Below 2°C, and most notably, the long-term score improves from Below 2°C to 1.5°C. This feature provides additional nuances to TPI tool users in assessing company’s Carbon Performance.

Figure 4.3. Company B’s emissions-intensity pathway compared to regional electricity utilities sector benchmarks

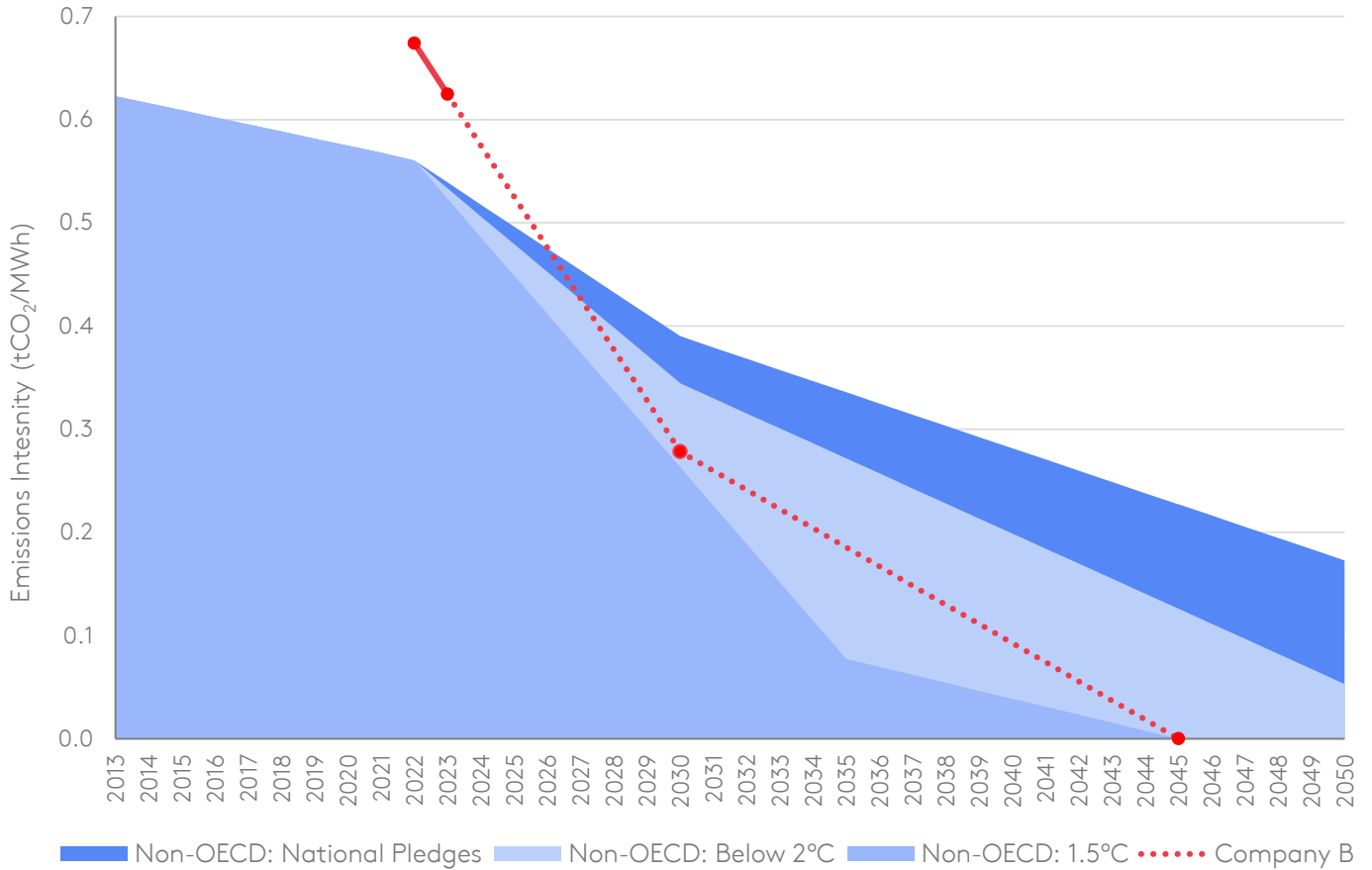


Table 4.1. Company B’s global and regional alignment scores comparison for the short, medium and long term.

	Global benchmarks	Regional benchmarks (non-OECD)
Short term (2027)	Not Aligned	National Pledges
Medium term (2035)	National Pledges	Below 2°C
Long term (2040)	Below 2°C	1.5°C

Note: Long-term alignment for non-OECD is measured in 2045 instead of 2040.

5. Discussion

This note has described the methodology followed by the TPI Centre in carrying out the Carbon Performance assessment of electricity utilities companies.

The Carbon Performance assessment is designed to be robust yet easy to understand and use. There are inevitably many nuances surrounding each company's individual performance, how it relates to the benchmarks, and why. Investors may wish to dig deeper into companies' assessments in their engagements with them to better understand these.

5.1. General issues

The Carbon Performance assessment of electricity utilities companies follows the Sectoral Decarbonisation Approach (SDA), which involves comparing companies' emissions intensity with sector-specific benchmark emissions intensities that are consistent with international targets (i.e. limiting global warming to 1.5°C, Below 2°C and a National Pledges scenario).

TPI mainly uses the modelling of the IEA to calculate the benchmark pathways. While such economy-energy models offer a number of advantages, they are also subject to limitations. In particular, model projections often turn out to be wrong, which means that comparisons between companies and the benchmark pathways may also be inaccurate. However, there is no way to escape the need to make projections of the future in forward-looking exercises like this. Models tend to be regularly updated with the aim of improving their accuracy, and the TPI Centre updates its benchmark pathways accordingly.

We use self-reported emissions and activity data to derive emissions intensity pathways. Therefore, companies' pathways are only as accurate as the underlying disclosures.

Estimating the historical and especially the future emissions intensity of companies involves making a number of assumptions. Therefore, it is important to bear in mind that the emissions pathway drawn for each company is an estimate made by the TPI Centre, based on information disclosed by companies, rather than the companies' own estimates or targets. In other cases, the information disclosed by companies alone is sufficient to completely characterise the emissions intensity pathway.

5.2. Issues specific to electricity utilities

In the electricity utilities sector, the measure of Carbon Performance is absolute greenhouse gas emissions from electricity generation, per unit of electricity produced. While this covers almost all power-sector emissions, is consistent with the IEA benchmarks and can be calculated for most companies, it is a narrow measure of Carbon Performance for some companies in the sample. This particularly concerns companies that, as well as generating electricity, are significantly engaged in distributing or retailing electricity generated by other companies or are significantly engaged in other activities such as gas distribution/retail (thus straddling multiple sectors of the economy). These companies may have, respectively, a larger share of Scope 2 emissions in total Scope 1 and 2 emissions, and a larger share of Scope 1 emissions coming from activities other than electricity generation. Note that TPI may include in a Carbon Performance assessment the electricity sold by a utility that was not generated by that utility in particular cases where including sold electricity represents a more accurate picture of the utility's emissions pathway.

The TPI Centre has developed a regionalised approach to evaluate the Carbon Performance of electricity utilities. Recognising the higher baseline emissions intensity of electricity generation grids in non-OECD countries compared to Europe and North America, our benchmarks incorporate the principle of 'common but differentiated responsibilities'. This principle requires companies operating mostly in developed regions to achieve net-zero emissions intensities relatively earlier than those operating primarily in emerging markets.

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