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# CARBON PERFORMANCE ASSESSMENT OF ELECTRICITY UTILITIES: A COMMENTARY

Wednesday 7 June 2017

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## EXECUTIVE SUMMARY

The Transition Pathway Initiative (TPI) is a global, asset owner-led initiative, supported by asset owners and managers with over £2 trillion of assets under management. The initiative assesses how companies are preparing for the transition to a low-carbon economy, focusing on two elements:

1. *Management Quality*: the quality of companies' management of their greenhouse gas emissions and of risks and opportunities related to the low-carbon transition.
2. *Carbon Performance*: how companies' carbon performance now and in the future might compare to the international targets and national pledges made as part of the Paris Agreement.

The TPI's first assessment, released in January 2017, was of the management quality of the global top 20 electricity utilities by market capitalisation, as well as the global top 20 oil and gas producers.

This report provides a complementary, in-depth assessment of the carbon performance of the same 20 electricity utilities. The results are also available to browse on the TPI's online toolkit, at <http://www.transitionpathwayinitiative.org>.

We apply and extend the Sectoral Decarbonization Approach, used by the Science Based Targets Initiative among others. This enables us to translate greenhouse gas emissions targets made at the international level into appropriate benchmarks, against which the performance of individual companies can be compared. Using modelling from the International Energy Agency, we derive benchmark global carbon emissions intensity pathways for electricity utilities that are consistent with:

1. A *2 Degrees* scenario, commensurate with the overall aim of the Paris Agreement to limit global warming to below 2°C.
2. A *Paris Pledges* scenario, which is consistent with the global aggregate of emissions reductions actually pledged by countries as part of the Paris Agreement in the form of Nationally Determined Contributions or NDCs.

Based on public disclosures, we are able to estimate the carbon intensity of electricity production for 18 of the global top 20 electricity utilities today. Two companies make insufficient disclosures for us to estimate carbon performance. We estimate utilities' future carbon intensity on the basis of quantitative targets they have set themselves to reduce emissions. A total of 9 utilities have set targets that we can use. All 9 targets extend to 2020, while only 6 targets extend to 2030.

We find that 12 out of the 18 electricity utilities are aligned with the benchmarks today; their carbon intensity is lower. The average carbon intensity of the 18 utilities is also below the benchmarks today. However, there is significant variation. Six companies are more carbon-intensive than the benchmarks today, 5 in North America and one in Asia.

Looking to the future, the trajectories of the 9 utilities with quantitative emissions targets are, on average, aligned with the global Paris Pledges benchmark, but they fall out of alignment with the global 2 Degrees benchmark after 2020 and the gap widens by 2030. So, while a majority of the utilities we consider are aligned today, the evidence suggests that the emissions targets of the global top 20 are, in general, not ambitious enough to keep the sector on a pathway consistent with limiting global warming to 2°C.

Moreover the picture also changes if we replace global with more exacting regional benchmarks, especially in Europe. While the 3 European utilities outperform the global benchmarks at all times, only one of them – Iberdrola – outperforms the European 2 Degrees benchmark and by 2030 even it is out of alignment. By contrast, the proportion of North American utilities better/worse than the benchmarks changes little when we move from the global to the North American level.

Although the TPI's management quality assessment framework rewards companies with quantitative targets for future carbon emissions, we find that there is no discernible association between utilities' management quality and their carbon intensity today, a result that is consistent with previous studies. Our results also show that carbon intensity today is a principal determinant of carbon intensity in the future. This endorses the need for investors to consider these two complementary analyses together.

## 1. INTRODUCTION

### 1.1. Aims of this report

This report discusses the results of the assessment by the Transition Pathway Initiative (TPI) of the carbon performance of the world's 20 largest electricity utilities by market capitalisation.

The results are available to browse on the TPI's online toolkit, at <http://www.transitionpathwayinitiative.org>. This report provides a more detailed analysis of the results, as well as a commentary.

### 1.2. The Transition Pathway Initiative

The TPI is a global, asset owner-led initiative, supported by asset owners and managers with over £2 trillion of assets under management. The initiative assesses how companies are preparing for the transition to a low-carbon economy. The analysis is in two parts:

1. *Management Quality*: TPI evaluates and tracks the quality of companies' management of their greenhouse gas emissions and of risks and opportunities related to the low-carbon transition. Companies are assigned to one of five levels, from level 0 ("Unaware of, or not Acknowledging, Climate Change as a Business Issue") to level 4 ("Strategic Assessment"), based on how they perform against 14 criteria.
2. *Carbon Performance*: TPI also evaluates how companies' recent and future carbon performance might compare to the international targets and national pledges made as part of the Paris Agreement. It is the results of this part of the analysis that we cover in this report.

TPI publishes the results of its analysis through an open online tool hosted by the Grantham Research Institute on Climate Change and the Environment at the London School of Economics (LSE): <http://www.transitionpathwayinitiative.org>.

TPI was launched in January 2017 with management quality assessments of the global top 20 companies by market capitalisation in each of the electricity utilities, and oil and gas, sectors (i.e. a total of 40 companies).<sup>1</sup> This report therefore marks the addition of carbon performance data for the 20 electricity utilities. Further sectors and companies will be added over the course of 2017 and beyond.

The funds supporting TPI have committed to use the results in a number of different ways, including informing their investment decision-making, engagement with companies, and dialogue with fund managers and policy makers.

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<sup>1</sup> <http://www.lse.ac.uk/GranthamInstitute/tpi/early-analysis-tpi-toolkit-shows-companies-are-building-capacity-to-manage-transition-risk/>

## 2. AN OVERVIEW OF CARBON PERFORMANCE METHODOLOGY

The methodology followed in assessing the carbon performance of electricity utilities is described in detail in a separate report, “Carbon Performance Assessment of Electricity Utilities: Note on Methodology”, which is also available on the TPI website. Therefore we will only provide a condensed version here.

TPI’s carbon performance assessment is based on the Sectoral Decarbonization Approach (SDA),<sup>[1]</sup> which is also being used by the Science-Based Targets Initiative, for example. The SDA translates greenhouse gas emissions targets made at the international level (e.g. under the Paris Agreement) into appropriate benchmarks, against which the performance of individual companies can be compared.

As the name suggests, 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.

Applying the SDA can be broken down into the following steps:

- A global carbon budget is established, which is consistent with international emissions targets, for example keeping global warming below 2°C. This step is science-driven.
- The global carbon budget is allocated across time and to different regions and industrial sectors. This typically requires an integrated economy-energy model, and these models usually allocate emissions reductions by region and by sector according to where it is cheapest to reduce emissions and when (i.e. the allocation is cost-effective). Cost-effectiveness is, however, subject to some constraints, such as political and public 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, economic activity). This results in a benchmark path 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 are therefore taken from the same economy-energy modelling.

- Companies’ recent and current emissions intensity is calculated and their future emissions intensity can be estimated based on emissions targets they have set (i.e. this assumes companies exactly meet their targets).<sup>2</sup> Together these establish emissions intensity paths for companies. The length of these paths will vary depending on how much information companies provide on their recent and current emissions intensity, as well as the time horizon for their emissions targets, if indeed they have set and disclosed any targets.

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<sup>2</sup> Alternatively, future emissions intensity could be calculated based on other data provided by companies on their business strategy and capital expenditure plans.

TPI uses two sectoral benchmark paths, both of which are derived from data from the International Energy Agency (IEA), via its biennial *Energy Technology Perspectives* report:[2]

1. A **2 Degrees 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”. [3]
2. A **Paris Pledges scenario**, which is consistent with the global aggregate of emissions reductions pledged by countries as part of the Paris Agreement in the form of Nationally Determined Contributions or NDCs. Several studies have documented that this aggregate is currently insufficient to put the world on a path to limit warming to 2°C, even if it will constitute a departure from a business-as-usual trend. [4]–[6]

In the electricity utilities sector, the specific measure of emissions intensity that we use is **greenhouse gas emissions per unit of electricity produced**, in units of (metric) tonnes of CO<sub>2</sub> equivalent per megawatt hour. This specifically covers emissions from the electricity generation process. In most cases, these emissions constitute all or nearly all of the company’s scope 1 emissions.

In line with TPI’s philosophy, companies’ emissions intensity paths are derived from public disclosures (including responses to the annual CDP questionnaire, as well as companies’ own reports, e.g. sustainability reports) as far as possible. In particular, only company disclosures are used to estimate recent and current emissions intensity, and company disclosures are also the source of information on targets for future emissions.

But some companies have set targets to reduce the absolute quantity of future emissions, rather than the intensity of their emissions. This raises the particular question of what to assume about those companies’ future activity (i.e. electricity production in this case). The approach taken in the TPI is to assume company activity increases at the same rate as the sector as a whole (i.e. this amounts to an assumption of constant market share), using sectoral growth rates from the IEA in order to be consistent with the benchmark paths.

TPI’s carbon performance assessment has been subject to internal quality assurance, as well as a company review stage, in which all companies were contacted with a draft of TPI’s assessment and invited to check the veracity of the disclosed data being used, as well as being requested to answer specific queries in some cases.

Companies were contacted on 3<sup>rd</sup> April 2017 and given until 28<sup>th</sup> April 2017 to respond. In total, 7 out of 20 companies responded (a 35% response rate), of which 2 made requests to change emissions intensity data points. We reviewed the information provided and amended data points for both companies.

### 3. DATA AVAILABILITY

The electricity utilities assessed by TPI are listed in Table 1, alongside details of the extent of companies' public disclosures on their recent and current emissions intensity, and the extent and type of their future emissions targets.

We can provide some carbon performance data on **18 out of 20** companies. The two companies for which we cannot currently provide any data are Power Assets Holdings and PPL Corporation. Neither of these companies makes sufficient disclosures relating to its recent and current emissions intensity, and neither has set quantitative emissions targets. Power Assets Holdings has not disclosed an estimate of its emissions in the period 2013-15. PPL Corporation has disclosed a recent emissions intensity estimate,<sup>3</sup> but we have judged it to provide insufficient accompanying information about what the estimate includes.

**Nine** utilities have set company-wide, quantitative targets for their future emissions, which we can use to estimate carbon performance. The duration of these targets varies from 2020 to 2050. Three companies (American Electric Power Co., Entergy Corp. and SSE) have targets that only extend to 2020, while the remaining 6 companies have targets that extend to at least 2030. We extrapolate emissions intensity linearly between target years.

The remaining 11 companies have not set company-wide, quantitative targets for their emissions, which we can use to estimate future carbon performance. Of these, ten companies have not disclosed any quantitative targets. Eversource Energy is an exception. It has adopted quantitative emissions targets made by state governments in the US states where it operates, but it does not provide a company-wide emissions target, aggregated by emissions and production across states, that we can use.

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<sup>3</sup> PPL Corporation Sustainability Report 2015: A Bright Future, p47.

Table 1 Publicly disclosed information on company emissions intensity and targets

Company	Country	2013-15 emissions intensity data?	Quantitative emissions targets for 2020-	Type of target (absolute/intensity)
American Electric Power Co.	USA	Yes	2020	Absolute
CLP Holdings	HK	Yes	2020; 2035; 2050	Intensity
Dominion Resources	USA	Yes	No	
DTE Energy	USA	Yes	2020; 2030	Absolute
Edison International	USA	Yes	No	
Enel	ITA	Yes	2020; 2050	Intensity
Entergy Corp.	USA	Yes	2020	Absolute
Eversource Energy	USA	Yes	No	
Exelon Corp.	USA	Yes	No	
FirstEnergy Corp.	USA	2015 only	2045	Absolute
Fortis Inc.	CAN	2014 only	No	
Iberdrola	SP	Yes	2030; 2050	Intensity
NextEra Energy Inc.	USA	Yes	No	
PG & E Corp.	USA	Yes	No	
Power Assets Holdings	HK	No	No	
PPL Corporation	USA	No	No	
Public Service Enterprise Group	USA	2013-14 only	No	
Southern Co.	USA	Yes	No	
SSE	UK	Yes	2020	Intensity
XCEL Energy	USA	Yes	2030	Absolute

## 4. FINDINGS

### 4.1. Overview

Table 2 summarises the electricity utilities' carbon performance data, including emissions intensity along the 2 Degrees and Paris Pledges benchmark pathways. A company whose emissions intensity is below the benchmarks can be said to be aligned with those benchmarks and therefore with the international commitments underpinning them. A company whose emissions intensity is above the benchmarks is not aligned.

Table 2 Company emissions intensity paths and electricity utilities sector benchmarks, 2013-2030

Company	Carbon intensity (metric tonnes of CO <sub>2</sub> e / MWh)					
	2013	2014	2015	2020	2025	2030
American Electric Power Co.	0.807	0.763	0.723	0.818		
CLP Holdings	0.880	0.910	0.880	0.600	0.550	0.500
Dominion Resources	0.362	0.362	0.348			
DTE Energy	0.790	0.780	0.780	0.753	0.647	0.541
Edison International	0.352	0.176	0.195			
Enel	0.392	0.396	0.410	0.349	0.291	0.233
Entergy Corp.	0.260	0.250	0.245	0.268		
Eversource Energy	0.866	0.858	0.948			
Exelon Corp.	0.092	0.084	0.038			
FirstEnergy Corp.			0.530	0.455	0.381	0.306
Fortis Inc.		0.698				
Iberdrola	0.226	0.212	0.225	0.200	0.175	0.150
NextEra Energy Inc.	0.255	0.254	0.250			
PG & E Corp.	0.078	0.083	0.093			
Public Service Enterprise Group	0.276	0.281				
Southern Co.	0.570	0.586	0.545			
SSE	0.570	0.471	0.395	0.300		
XCEL Energy	0.735	0.713	0.707	0.582	0.458	0.334
2 Degrees	0.586	0.572	0.557	0.484	0.387	0.281
Paris Pledges	0.586	0.574	0.561	0.498	0.462	0.420

Focusing first on recent and current emissions intensity, **6 out of 18** companies had an emissions intensity that was higher than the 2 Degrees and Paris Pledges benchmarks, when averaged over the period 2013-15.<sup>4</sup> These companies are therefore not aligned at present. They are: American Electric Power Co., CLP Holdings, DTE Energy, Eversource Energy, Fortis Inc. and XCEL Energy. The remaining **12 (out of 18)** companies had an

<sup>4</sup> That is, taking the unweighted average of each company's emissions intensity between 2013 and 2015.

emissions intensity that was below the benchmarks, when averaged over the period. These companies are presently aligned.

On average, the 18 companies included in our assessment had an emissions intensity of 0.471 tonnes CO<sub>2</sub>e / MWh over the period 2013-15, which is also below both of the benchmarks. Interestingly, the average emissions intensity of the 9 companies *without* future targets was 0.382 tCO<sub>2</sub>e / MWh over the period 2013-15, which is in fact significantly below the average emissions intensity over the same period of the 9 companies that do have future targets, 0.560 tCO<sub>2</sub>e / MWh.

Assuming company targets are precisely met, **4 out of 9** utilities will be more carbon-intensive than either the 2 Degrees or Paris Pledges benchmarks in 2020: American Electric Power Co., CLP Holdings, DTE Energy and XCEL Energy. These same 4 utilities were also more carbon-intensive than the benchmarks in the period 2013-15.

The remaining **5 (out of 9)** utilities will be less carbon-intensive than the benchmarks in 2020. The average emissions intensity of the 9 companies in 2020 will be 0.481 tCO<sub>2</sub>e / MWh, which is also below both of the benchmarks.

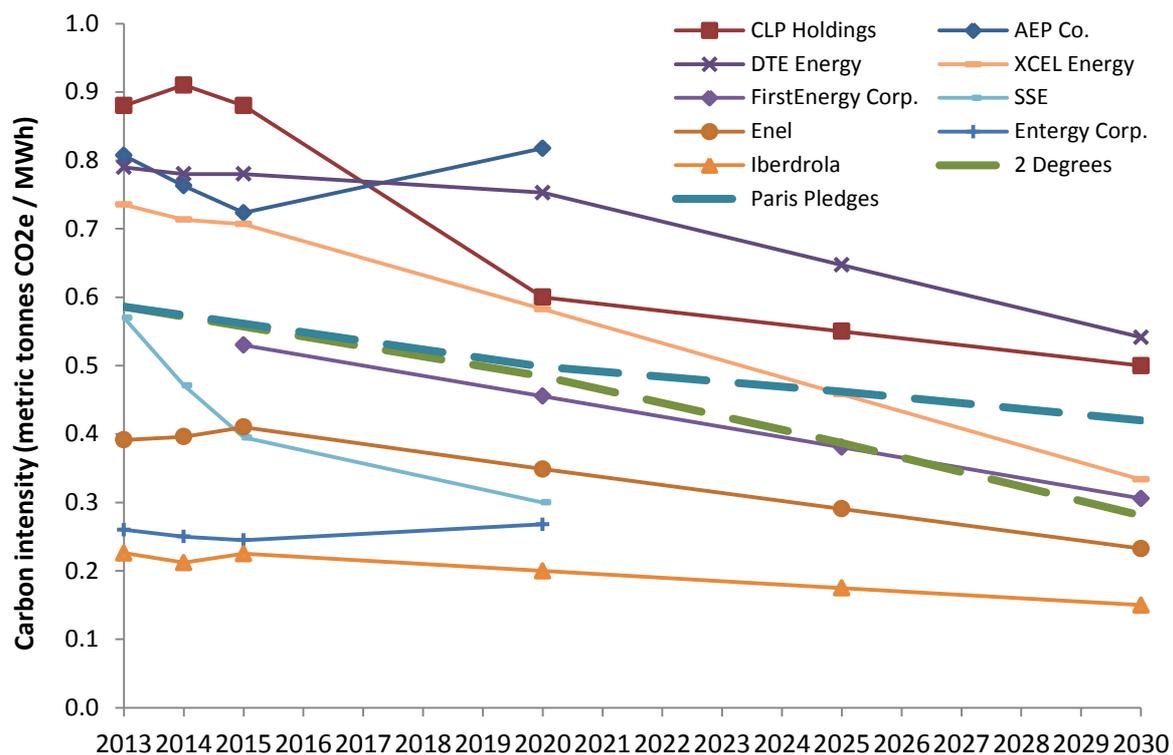
By 2030, the set of utilities with useable quantitative emissions targets falls to 6. Assuming company targets are precisely met, **4 of these 6** companies will be more carbon-intensive than the 2 Degrees benchmark: CLP Holdings, DTE Energy, FirstEnergy Corp. and XCEL Energy. Furthermore, **2** of these companies, CLP Holdings and DTE Energy, will be more carbon-intensive than the Paris Pledges benchmark.

Only 2 out of the 6 companies with quantitative emissions targets will be less carbon-intensive than the 2 Degrees benchmark in 2030: Enel and Iberdrola. The average emissions intensity for the 6 companies in 2030 will be 0.344 tCO<sub>2</sub>e / MWh. This is below the Paris Pledges benchmark, but for the first time the company average is above the 2 Degrees benchmark.

#### 4.2. Convergence towards the benchmarks?

Figure 1 plots emissions intensity paths for the 9 companies with quantitative targets for their future emissions, which TPI could use to estimate carbon performance. The chart uses data from Table 2. The chart allows us to see more clearly whether companies' emissions intensity is becoming increasingly or decreasingly aligned with the benchmarks.

Figure 1 Emissions intensity paths for companies with targets



Focusing to begin with on the 4 companies whose emissions intensity is above the benchmarks between 2013 and 2015:

- CLP Holdings starts with the highest emissions intensity of all the 18 utilities included in our analysis, but it also makes the biggest reductions in absolute terms: by 2020 its emissions intensity is cut by 0.29 tCO<sub>2</sub>e / MWh from the 2013-15 average (a 33% cut), while by 2030 it is cut by a total of 0.39 tCO<sub>2</sub>e / MWh from the 2013-15 average (a 44% cut). Looking over the whole period, CLP Holdings reduces the gap between its emissions intensity and the Paris Pledges benchmark. However, between 2020 and 2030 it actually falls further behind the 2 Degrees benchmark, indicating a tougher target would be required to continue progressing towards alignment with this benchmark.
- The emissions intensity of American Electric Power Co. fell between 2013 and 2015, but the emissions target it currently has in place implies that its emissions intensity will actually increase between 2015 and 2020, to 0.818 tCO<sub>2</sub>e / MWh. Consequently the gap between the company's performance and the benchmarks increases.
- DTE Energy's targets imply its emissions intensity falls by 0.24 tCO<sub>2</sub>e / MWh between 2013-15 and 2030 (a 31% cut). While this is sufficient to close the gap with the Paris Pledges benchmark, it actually results in the company falling further behind the 2 Degrees benchmark.
- XCEL Energy also reduces its emissions intensity significantly. It cuts its emissions intensity by 0.385 tCO<sub>2</sub>e / MWh or 54% between 2013-15 and 2030, which is the biggest relative cut and the second biggest absolute cut. Doing so is sufficient to bring the company under the Paris Pledges benchmark, but not yet under the 2 Degrees benchmark.

Of the 5 companies who, between 2013 and 2015, were less carbon-intensive than both of the benchmarks, 4 remain under the benchmarks for the duration of their targets. The exception is FirstEnergy Corp., which remains under the Paris Pledges benchmark, but does not reduce its emissions intensity fast enough to stay under the 2 Degrees benchmark.

Overall, Figure 1 shows that the utilities with targets see their emissions intensities fall and gradually converge between now and 2030. This is backed up by the statistics: not only does average emissions intensity fall, so does the standard deviation, from 0.27 tCO<sub>2</sub>e / MWh for the period 2013-15 to 0.22 tCO<sub>2</sub>e / MWh in 2020 and 0.15 tCO<sub>2</sub>e / MWh in 2030.

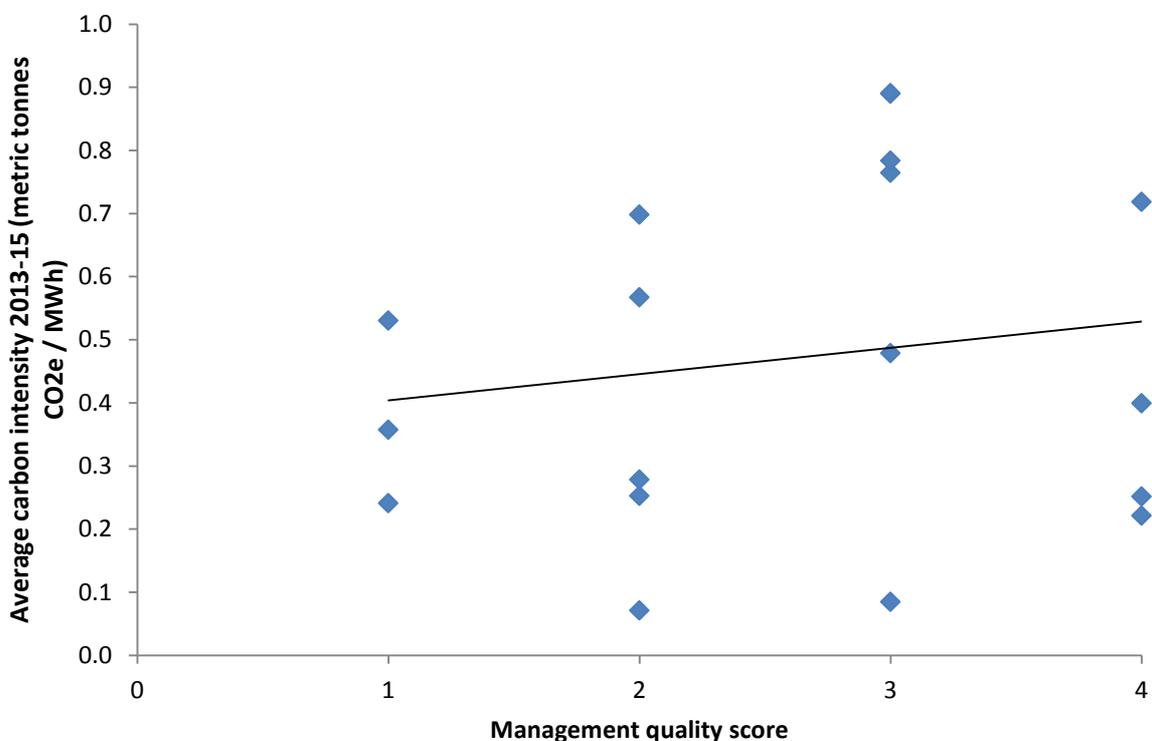
On the other hand, alignment with the 2 Degrees benchmark requires that electricity utilities accelerate the pace of their decarbonisation after 2020 and there is evidence that the emissions targets of several utilities are not ambitious enough to keep the pace with 2 Degrees. In addition, 14 out of 20 companies do not have targets stretching beyond 2020, of course.

#### 4.3. The association between management quality and carbon performance

TPI released its assessment of the management quality of these 20 electricity utilities in January and it is insightful to look at whether there is a correlation between companies' management quality score (from 0-4) and their emissions intensity.

Figure 2 plots companies' management quality score against their average emissions intensity over the period 2013-15. It is clear that there is essentially no association between management quality and companies' recent/current carbon performance.

Figure 2 Association between management quality and average emissions intensity 2013-15 (black line is least squares fit)



TPI's management quality assessment framework requires companies to have set quantitative emissions targets in order to progress to level 3 ("Integrated into Operational

Decision-Making”), and those targets must extend more than 5 years into the future in order to progress to level 4 (“Strategic Assessment”). This means that the 9 companies, whose future carbon performance we can estimate, score well on management quality by construction.<sup>5</sup>

Nonetheless, insofar as Figure 1 suggests recent/current emissions intensity is an important determinant of future emissions intensity, the finding of no association between companies’ management quality scores and their emissions intensity may also carry over to future emissions intensity for a larger set of companies.

#### 4.4. The influence of regional differences on the results

Table 1 shows that 15 of the global top 20 electricity utilities are based in North America (14 in the United States and one in Canada), while 3 are based in Europe and 2 are based in Hong Kong.

All 3 of the European utilities are aligned with the benchmarks today and will remain so for the duration of their emissions targets. SSE, which has a target that expires in 2020, will need to cut its emissions intensity further by at least 0.019 tCO<sub>2</sub>e / MWh between 2020 and 2030 to remain aligned with the 2 Degrees benchmark.

Of the 14 North American utilities with data included in the carbon performance assessment, 8 were aligned with the benchmarks over the period 2013-15, while 6 were not. In 2020, 2 out of 5 North American utilities with emissions targets will be aligned with the benchmarks: Entergy Corp. and FirstEnergy Corp. In 2030, 2 out of 3 North American utilities with targets will be aligned with the Paris Pledges benchmark: FirstEnergy Corp. and XCEL Energy. However, neither utility achieves a carbon intensity low enough to beat the 2 Degrees benchmark in 2030.

Of the two utilities based in Hong Kong, CLP Holdings is above the benchmarks throughout the period, though catching up with the Paris Pledges benchmark as mentioned above, while Power Assets Holdings does not make sufficient disclosures to be included in the assessment.

Therefore there is some evidence to suggest that the location of a utility affects its likelihood of being aligned with the (global) benchmarks; specifically European utilities are more likely to be aligned. The average emissions intensity of the 3 European utilities was 0.366 tCO<sub>2</sub>e / MWh between 2013 and 2015, while the average emissions intensity of the 14 North American utilities was 0.464 tCO<sub>2</sub>e / MWh over the same period. In 2020, the average emissions intensity of the 3 European utilities will be 0.283 tCO<sub>2</sub>e / MWh, compared with 0.575 tCO<sub>2</sub>e / MWh for the 5 North American utilities with targets.

This result is consistent with the finding that the European power sector – or at the very least the Western European power sector – is less carbon-intensive than its North American counterpart. Due to a combination of economic, political and technological factors, including the availability of fossil fuels and actual and likely emissions reduction commitments by governments, this gap is expected to remain in 2030.[2], [7]

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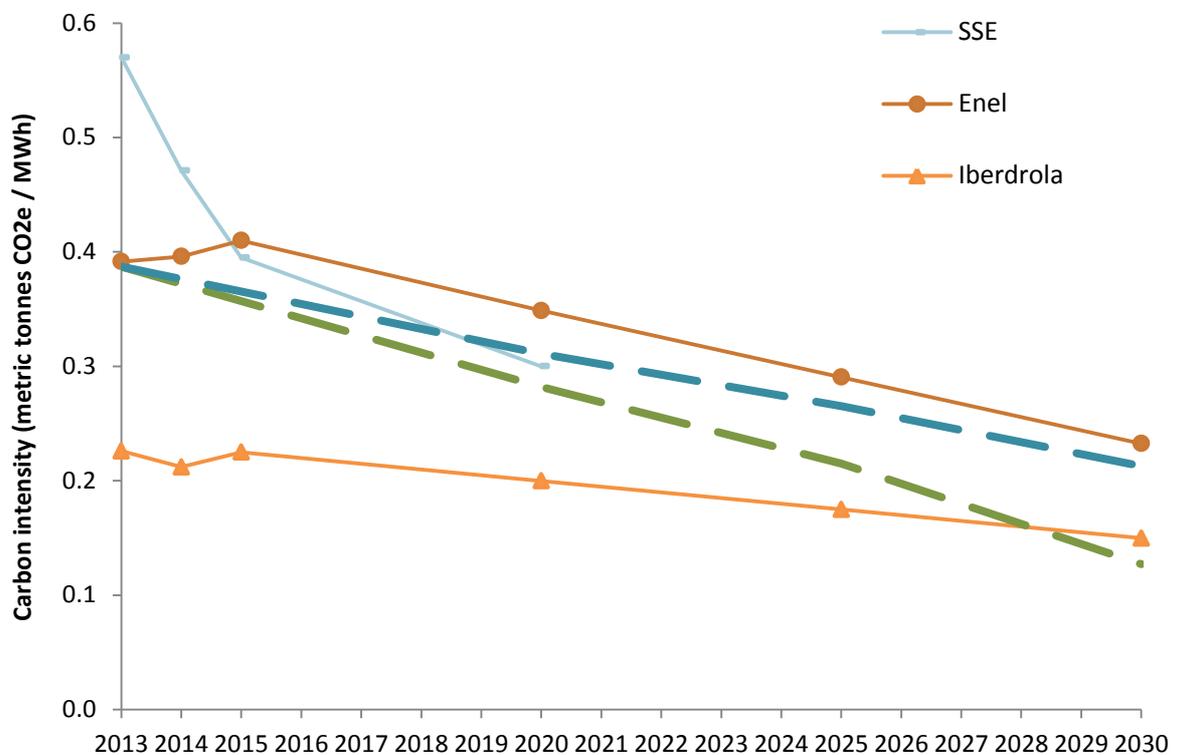
<sup>5</sup> The management quality assessment framework requires, however, that these targets cover both the scope 1 and 2 emissions of companies, whereas the carbon performance assessment is limited to scope 1 emissions arising from electricity production. In practice only one company, Firstenergy Corp., is below level 3 on management quality, while at the same time featuring in our assessment of future carbon performance. Firstenergy Corp. is on level 1.

It is therefore worth analysing whether the utilities we look at are in alignment with region-specific versions of the 2 Degrees and Paris Pledges benchmarks. We can also use data from the IEA *Energy Technology Perspectives* report to do this, because these include regional breakdowns of direct CO<sub>2</sub> emissions from power, as well as gross electricity generation.

The regional 2 Degrees benchmarks result from IEA modelling a cost-effective allocation of emissions cuts between regions to stay within the corresponding global carbon budget (with some constraints on cost-effectiveness in the short term). The regional Paris Pledges benchmarks reflect IEA’s assessment of national emissions reduction commitments and measures in place at the time of preparing the 2016 *Energy Technology Perspectives* report.

Figure 3 plots the 3 European utilities’ emissions intensity paths against European benchmarks, while Figure 4 does the same for the 5 North American utilities that have set emissions reduction targets we can use.

Figure 3 Emissions intensity paths for European utilities versus European benchmarks

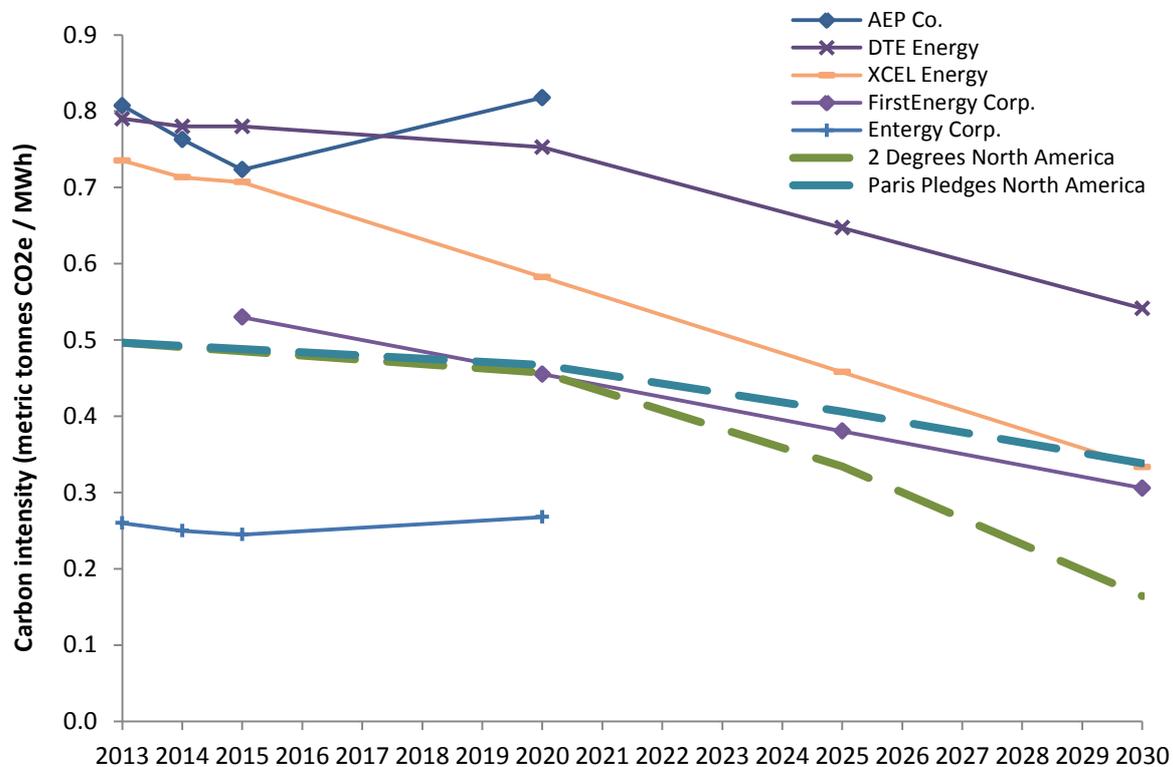


The European benchmarks are significantly tougher than the global equivalents. In 2020, the European 2 Degrees benchmark emissions intensity is 0.282 tCO<sub>2</sub>e / MWh, compared with the global 2 Degrees benchmark of 0.484 tCO<sub>2</sub>e / MWh (i.e. 42% lower), while in 2030 the European 2 Degrees benchmark is 0.127 tCO<sub>2</sub>e / MWh, compared with the global 2 Degrees benchmark of 0.281 tCO<sub>2</sub>e / MWh (55% lower). The European Paris Pledges benchmark is 0.311 tCO<sub>2</sub>e / MWh in 2020 and 0.213 tCO<sub>2</sub>e / MWh in 2030, compared with the global Paris Pledges benchmarks of 0.498 tCO<sub>2</sub>e / MWh in 2020 and 0.420 tCO<sub>2</sub>e / MWh in 2030. Thus the European Paris Pledges benchmarks are even below the global 2 Degrees benchmarks.

Tightening the benchmarks for European utilities results in Enel being above both of the benchmarks throughout our period of analysis, while SSE begins above the benchmarks,

but reduces its carbon intensity below the Paris Pledges benchmark by 2020. Iberdrola is below the benchmarks until 2030 approaches, but by 2030 its carbon intensity is above the 2 Degrees benchmark.

Figure 4 Emissions intensity paths for North American utilities with targets, versus North American benchmarks



The North American benchmarks are more similar to the global benchmarks, particularly in 2020, when the North American 2 Degrees benchmark emissions intensity is 0.457 tCO<sub>2</sub>e / MWh, while the North American Paris Pledges benchmark is 0.468 tCO<sub>2</sub>e / MWh. But by 2030 a gap does open up between the North American benchmarks and their global counterparts, such that the North American Paris Pledges benchmark is 0.339 tCO<sub>2</sub>e / MWh, while the North American 2 Degrees benchmark is 0.165 tCO<sub>2</sub>e / MWh.

Tightening the benchmarks for North American utilities makes less of a difference, but results in 2 utilities moving out of alignment: FirstEnergy Corp. moves from (slightly) below to (slightly) above the benchmarks in 2015, and is now only below the Paris Pledges benchmark in 2025, rather than being below both of the global benchmarks in 2025; XCEL Energy moves from below the Paris Pledges benchmark in 2025 to above it, but is on a fairly steep path of emissions reductions that sees it just better the Paris Pledges benchmark by 2030.

CLP Holdings' emissions intensity may be compared with Chinese benchmarks, using the same method. The 2013 emissions intensity of the Chinese benchmarks is 0.812 tCO<sub>2</sub>e / MWh, so CLP Holdings starts above the benchmarks. By 2020, however, CLP Holdings' emissions intensity (0.600 tCO<sub>2</sub>e / MWh) falls below the benchmarks, which are now 0.631 tCO<sub>2</sub>e / MWh for 2 Degrees and 0.642 tCO<sub>2</sub>e / MWh for Paris Pledges. In 2030, the 2 Degrees benchmark emissions intensity for China is 0.394 tCO<sub>2</sub>e / MWh, while the corresponding Paris Pledges benchmark emissions intensity is 0.540 tCO<sub>2</sub>e / MWh; CLP

Holdings' target emissions intensity of 0.500 tCO<sub>2</sub>e / MWh in 2030 is thus aligned with the Paris Pledges benchmark, but not with the 2 Degrees benchmark.

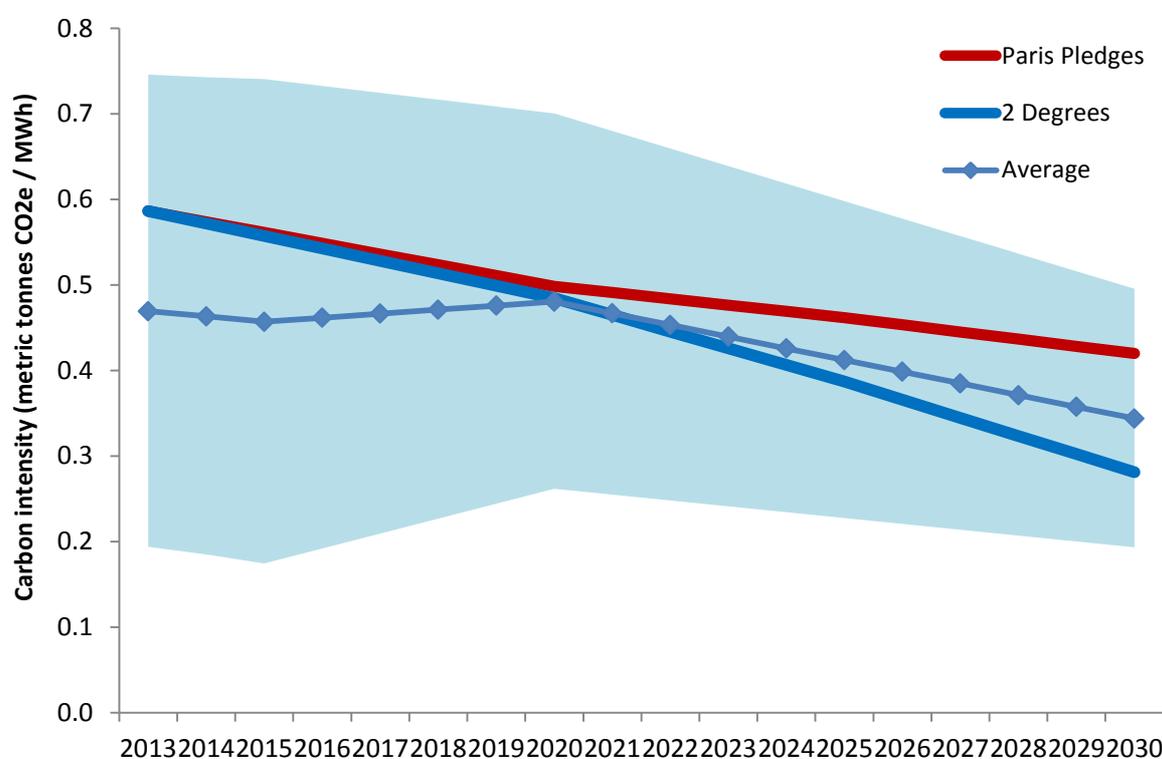
## 5. SUMMARY AND LIMITATIONS OF THE ASSESSMENT

### 5.1. Summary of the results

On average, the 18 electricity utilities we consider are in alignment today: their average carbon intensity is below the global 2 Degrees and Paris Pledges benchmarks. But there is significant variation and one third of companies are more carbon-intensive than the benchmarks today. Five of these companies are in North America; one is in Asia.

Looking to the future, the trajectories of the 9 utilities with quantitative emissions targets that we can use are, on average, aligned with the global Paris Pledges benchmark, but they fall out of alignment with the global 2 Degrees benchmark after 2020 and the gap widens by 2030 (Figure 5). Four utilities out of 9, 3 in North America and one in Asia, are not aligned with either benchmark in 2020, while in 2030 the corresponding ratio is 2 out of 6.

Figure 5 Average emissions intensity of companies, including range +/-1 standard deviation (note that number of companies changes through time)



On average, the 3 European utilities are in alignment with the tougher European Paris Pledges benchmark, but they are not aligned with the European 2 Degrees benchmark from 2020 onwards. The proportion of North American utilities better/worse than the benchmarks changes little when we move from the global to the North American level.

Although the TPI's management quality assessment framework rewards companies with quantitative targets for future carbon emissions, we find that there is no discernible association between utilities' management quality and their emissions intensity today, while our results also show that emissions intensity today is a principal determinant of emissions intensity in the future.

This endorses the need for investors to consider these two complementary analyses together. Our results are in line with a previous study of 433 companies, which showed

there was little or no association between various measures of corporate carbon management practices and year-on-year improvements in emissions intensity.[8] There is arguably even less reason to expect there to be an association between management quality and the level of emissions intensity in a given year or set of years.

## 5.2. Limitations of the assessment

TPI's carbon performance assessment is subject to a number of limitations. Perhaps the most obvious of these is that, like any forward-looking exercise, the accuracy of the conclusions is limited by the accuracy of the projections.

TPI's projections could turn out to be inaccurate for two broad reasons. The first is that the benchmarks turn out to be inaccurate, because reality turns out differently to what the IEA's energy model predicts. IEA updates its modelling every two years with the aim of improving the accuracy of its projections and TPI plans to update its benchmark paths accordingly. The second is that the company emissions intensity paths turn out to be inaccurate. An obvious source of inaccuracy in this regard is that company targets are exceeded or overshoot. Again, TPI will update its company emissions intensity projections as company targets are added and revised. Another reason why company paths could turn out to be inaccurate is that estimating the future emissions intensity of companies usually involves a number of specific assumptions. That is, in most cases companies' emissions targets are by themselves insufficient to specify their future emissions intensity of electricity generation. For example, 5 out of the 9 electricity utilities with emissions targets have set targets to reduce the absolute quantity of emissions and therefore TPI has had to make an assumption about these companies' future electricity production (based on the IEA data).

Another limitation of the assessment is that, since TPI uses companies' self-reported emissions and activity data to derive the emissions intensity paths, companies' paths are only as accurate as the underlying disclosures.

As a result of these caveats, it is clear that the closer a company is to a benchmark, the less confident we can be in conclusions regarding whether it is aligned or not. It is beyond the scope of this study to formally quantify the degree of confidence in the benchmarks.

In the electricity utilities sector, the measure of carbon performance is greenhouse gas emissions per unit of electricity produced. While this covers almost all power-sector emissions on aggregate, is consistent with the IEA benchmarks and can be calculated for most companies, it is a narrow measure of carbon performance for some companies. This particularly concerns companies that, as well as generating electricity to sell, are significantly engaged in transmitting and distributing electricity generated by other companies, or are significantly engaged in other activities such as gas distribution (thus straddling multiple sectors of the economy).

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