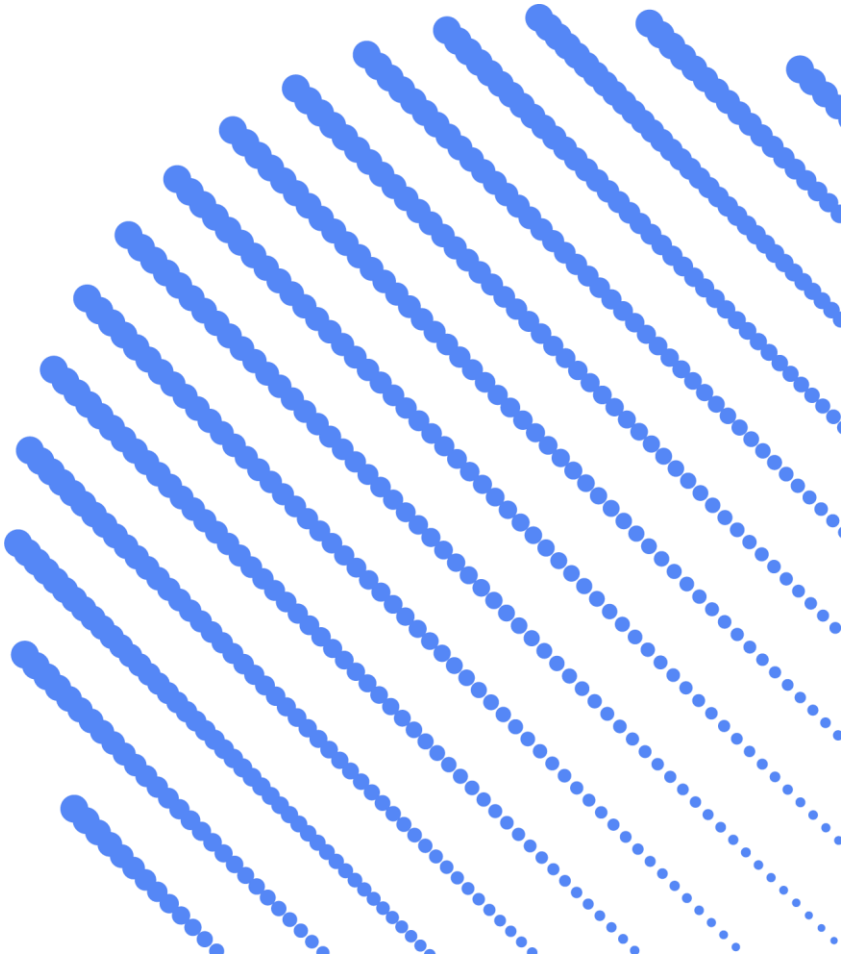
Transition Pathway Initiative

Management Quality and Carbon Performance of Energy Companies: September 2020 Update

Simon Dietz, Alexa Beaucamp, Dan Gardiner, Nikolaus Hastreiter, Valentin Jahn, Michal Nachmany, Jolien Noels, Saskia Straub, Rory Sullivan and Dongmiao Zhang



Research Funding Partners

We would like to thank our Research Funding Partners for their ongoing support of TPI and their enabling the research behind this report and its publication

Transition Pathway Initiative

About TPI and this report

TPI is a global initiative led by Asset Owners and supported by Asset Managers. Established in January 2017, TPI now has over 80 supporters with c. $21 trillion of combined Assets Under Management and Advice.*

Using publicly disclosed data, TPI assesses the progress that companies are making on the transition to a low-carbon economy, supporting efforts to mitigate climate change:

- In line with the recommendations of TCFD;
- Providing data for the Climate Action 100+ initiative.

All TPI data are published via an open-access online tool: www.transitionpathwayinitiative.org.

This slide set presents our latest assessment of the energy sector, including coal mining companies, electricity utilities, and oil and gas producers and distribution companies.

*September 2020



Key messages

This is TPI's 2020 assessment of the energy sector, comprising 163 companies in coal mining, electricity, and oil and gas production and distribution. We have expanded our coverage from 135 companies in 2019 by adding new companies to the database and including oil and gas distribution in this report for the first time.

Energy companies' average Management Quality score is 2.7, which is just 0.1 points better than last year. The sector remains slow in implementing new operational and strategic carbon management practices. Within the sector, coal mining lags far behind electricity, and oil and gas, although the big diversified mining companies with coal businesses stand out as leaders within the coal sector.

We see more progress on setting emissions targets and consequently on Carbon Performance. The share of companies aligned with Below 2°C has increased from 12% to 18%. Clearly there remains a long way to go, however. Electricity utilities continue to lead the way on Carbon Performance. No oil and gas company can yet claim to be aligned with 2°C or Below 2°C, although European oil and gas producers are showing leadership and getting closer.

2020 has been an extraordinary year for the world. Nonetheless we do not see an obvious imprint from Covid19 in our data. We received a high response rate from companies to our request for feedback, we do not see any negative trends in Management Quality or Carbon Performance that are obviously attributable to Covid19, and the share of companies disclosing emissions data in 2020 for FY2019 has actually increased relative to 2019 disclosures of FY2018 emissions.

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2. Sector focus: coal mining
3. Sector focus: electricity utilities (including a special feature on US companies)
4. Sector focus: oil and gas
5. About TPI: further information about the initiative and methodology



1. The state of the energy transition: overview of results



Transition Pathway Initiative

TPI coverage of the energy industry

This latest TPI report updates and expands our assessment of energy companies. We now cover 163 public companies in four energy sectors: coal mining, electricity, oil and gas production, and oil and gas distribution.

We last assessed the energy sector in September 2019, covering 135 companies. For this report, we include 22 new companies in coal, electricity and O&G production. We also include O&G distribution in this report for the first time.

We class 6 of the coal miners as diversified miners. These companies can be assessed on Carbon Performance. We published a Discussion Paper on Carbon Performance assessment in the diversified mining sector in May and will provide updated analysis of the whole diversified mining sector in our report on Industrials/Materials in early 2021. Pure play coal miners are not assessed on Carbon Performance.

Sector	Companies assessed on Management Quality	Companies assessed on Carbon Performance
Coal mining	35	6
Electricity utilities	68	66
O&G production and distribution	61	53
Total	**163***	**125**

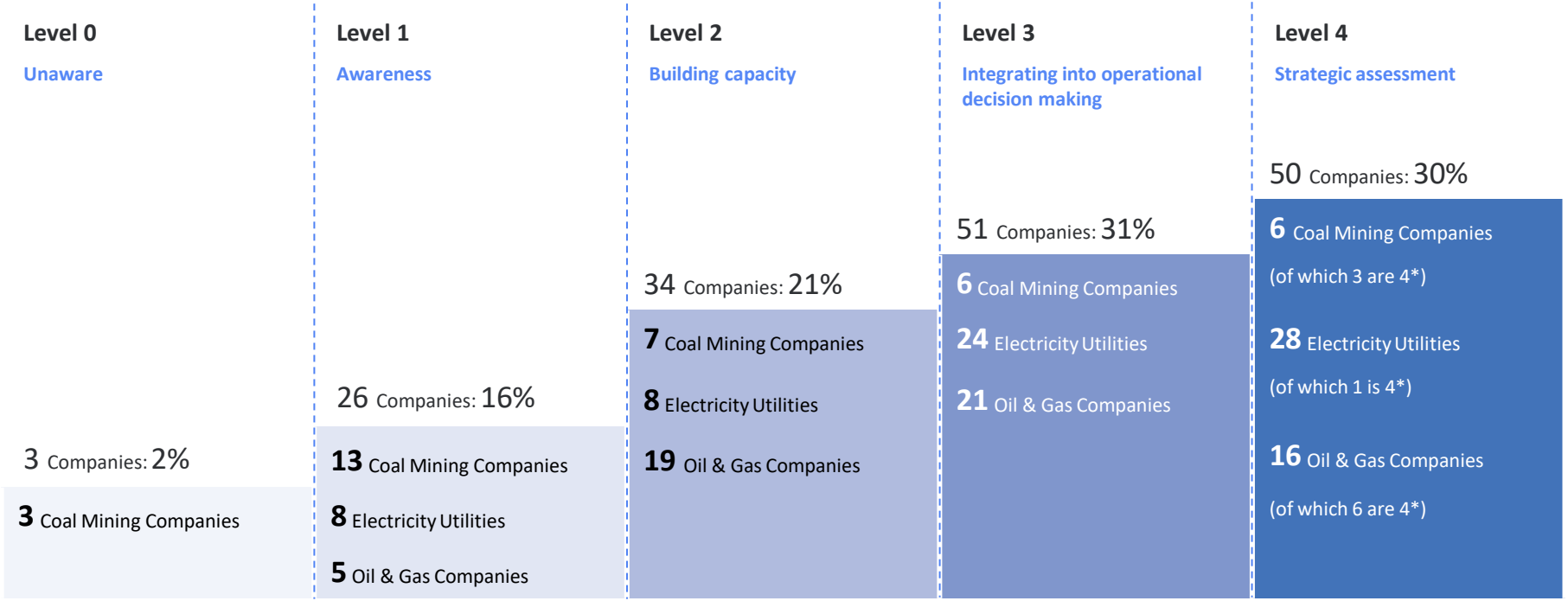
* One company appears in two sectors

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Management Quality level

Companies' Management Quality ratings may not always reflect their most up-to-date disclosures. TPI updates its assessments once a year.

FTSE Russell



One company (JXTG, now ENEOS) is counted twice, since it operates in two different energy sectors

Transition Pathway Initiative

Management Quality level

Energy companies' average Management Quality score is now 2.7, which is a slight improvement of 0.1 points on last year. The sector remains on the cusp of integrating climate change into operational decision making (TPI Level 3). Doing so requires both disclosure of operational GHG emissions and setting emissions targets, so the average company is at the stage of putting these two measures in place.

Further inspection of the data (also see below on trends) shows that the average score of the new companies is 2.2, whereas the average score of the companies that were also assessed last year is 2.8. Thus the addition of new companies slightly masks progress being made, but not by much – energy companies remain slow in implementing new operational and strategic carbon management practices.

Within the sector, electricity utilities' average score is 3, oil and gas companies average 2.8, but coal miners only average 2.0. Coal mining remains one of the worst performing sectors in the TPI database.



Level 4* companies

TPI awards Level 4* to companies that satisfy all Management Quality criteria. Depending on the sector, this amounts to 18 or 19. The difference between a plain vanilla Level 4 company and a Level 4* company is up to six additional indicators satisfied.

Although there are 50 (30% of) energy companies on Level 4, there are only 10 on Level 4*. This underlines that the vast majority of companies still have further carbon management practices to implement, particularly those associated with strategic assessment.

4* companies	Sector
Anglo American	Coal (diversified)
BHP	Coal (diversified)
Vale	Coal (diversified)
Terna	Electricity
BP	O&G production
Eni	O&G production
Equinor	O&G production
Galp Energia	O&G production
Hess	O&G production
Total	O&G production

Transition Pathway Initiative

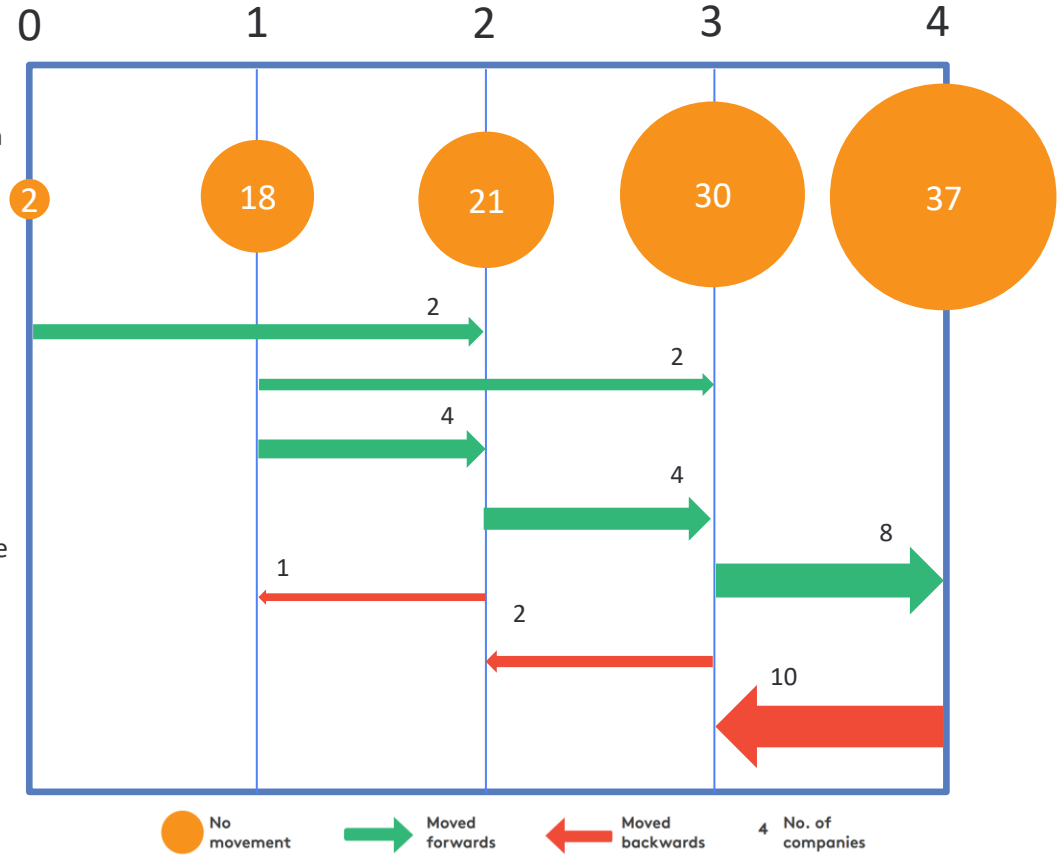
Trends in Management Quality

We have trend data on 141 energy companies, which have now been assessed by TPI at least twice. For some companies, we now have 4 years of Management Quality data, which can be downloaded from our online tool.

Most companies (108) stay on the same level as they occupied last year. This includes 37 companies that had already reached Level 4. More companies (20) have moved up at least one level than have moved down (13).

Eight companies have moved up from Level 3 to 4. A number of these companies have begun to have their operational GHG emissions verified, and/or can now demonstrate support for climate action.

Ten companies have moved down from Level 4 to 3. The single biggest explanatory factor is a failure to continue disclosing involvement in trade associations that are active in climate lobbying.



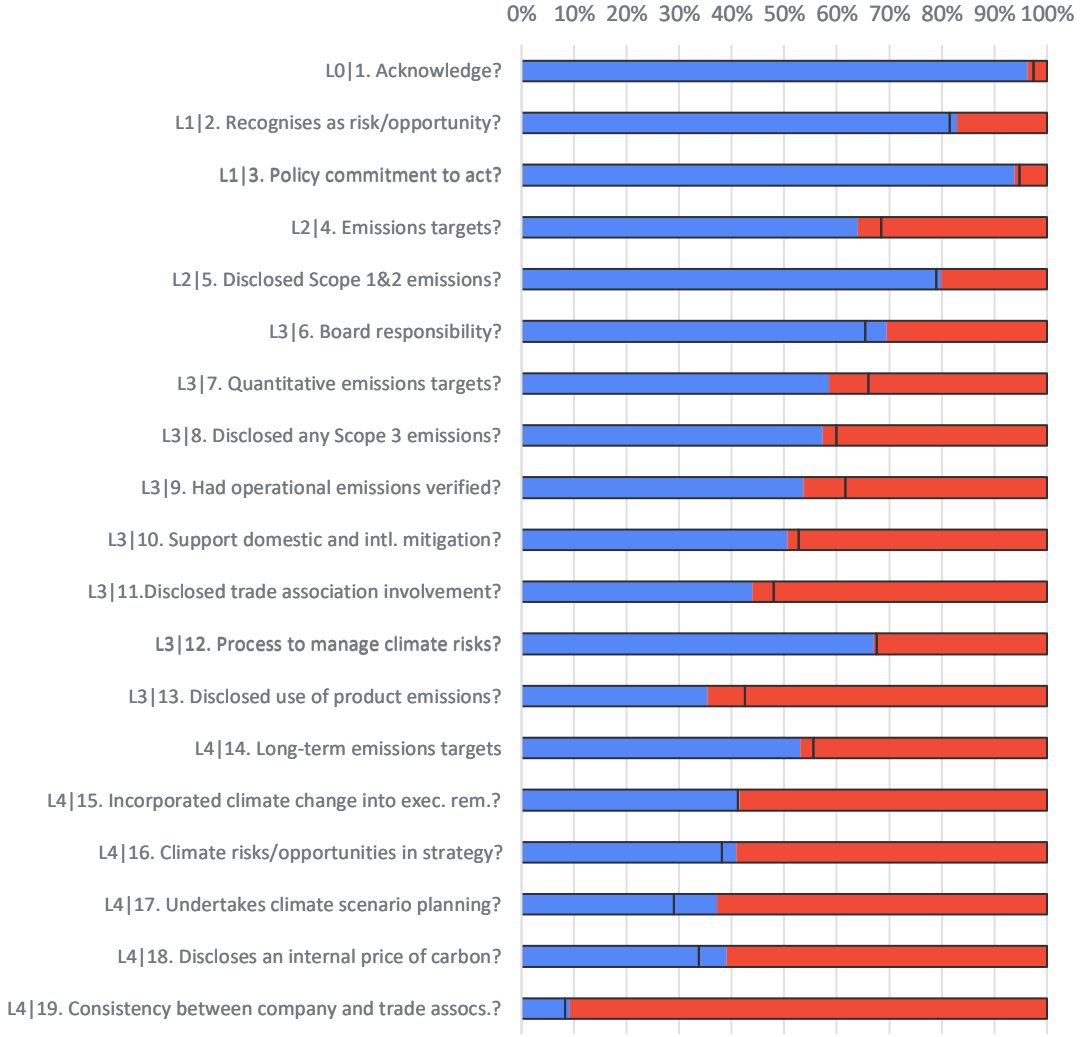
One company operating in two sectors (JXTG, now ENEOS) is counted once

Management Quality: indicator by indicator

Most energy companies implement the basic carbon management practices. 94% now have a policy commitment to act on climate change, for instance. Fewer take the more advanced steps. Only 9% ensure consistency between their climate change policies and the positions taken by trade associations of which they are a member, for instance.

We see this general pattern repeatedly, both within the energy sector and across the wider TPI database.

The energy sector is at or above average on most Management Quality indicators, driven by electricity utilities, but dragged down by coal miners. Limited disclosure of Scope 3 emissions from use of sold products by coal miners and O&G companies (Q13) is of continued concern.

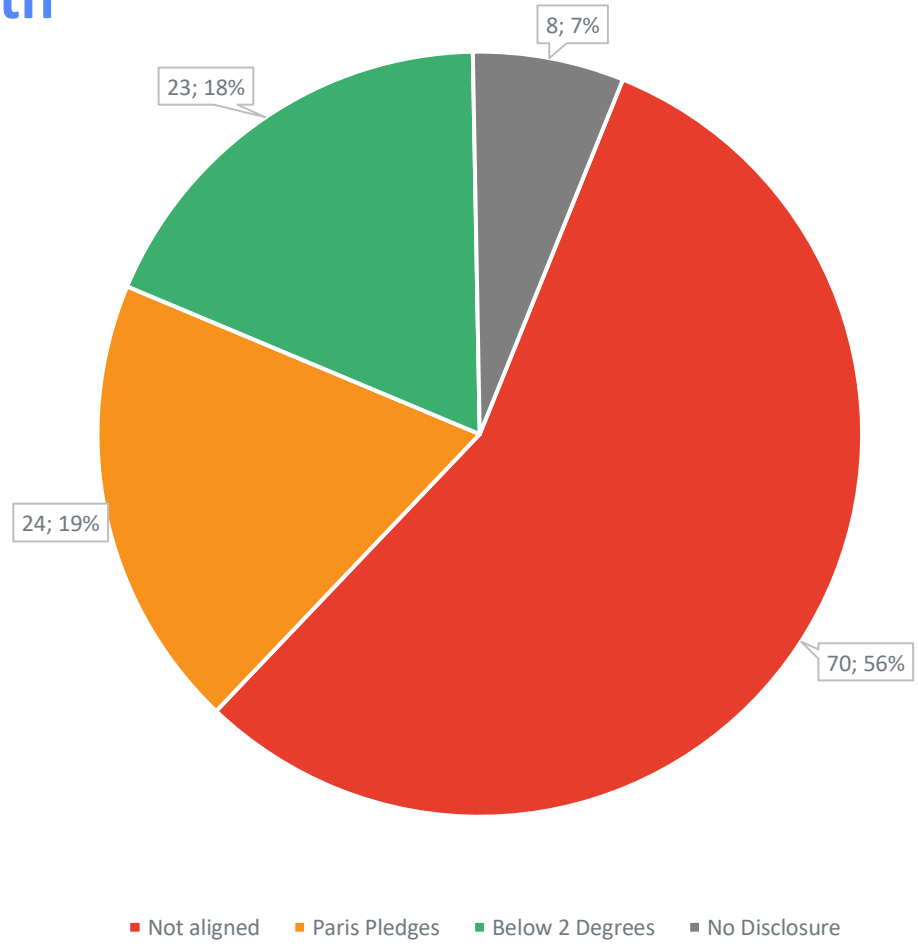


Carbon Performance: alignment with the Paris Agreement benchmarks

This year's Carbon Performance assessment in energy covers 125 companies, including electricity utilities with a significant generation business, O&G producers (not distribution companies), and diversified miners with a coal business (not pure play coal mining companies).

We find that 37% of companies are aligned with at least the Paris Pledges/NDCs in 2050, with 18% aligned with the most ambitious Below 2°C benchmark.

This is an improvement on last year, when only 28% of energy companies were aligned with at least the Paris Pledges/NDCs and only 12% were aligned with Below 2°C. Some of the improvement comes, however, from taking a longer-term perspective by extending our analysis horizon from 2030 to 2050. In doing so, some of the same companies that are not aligned in 2030 become aligned by 2050.

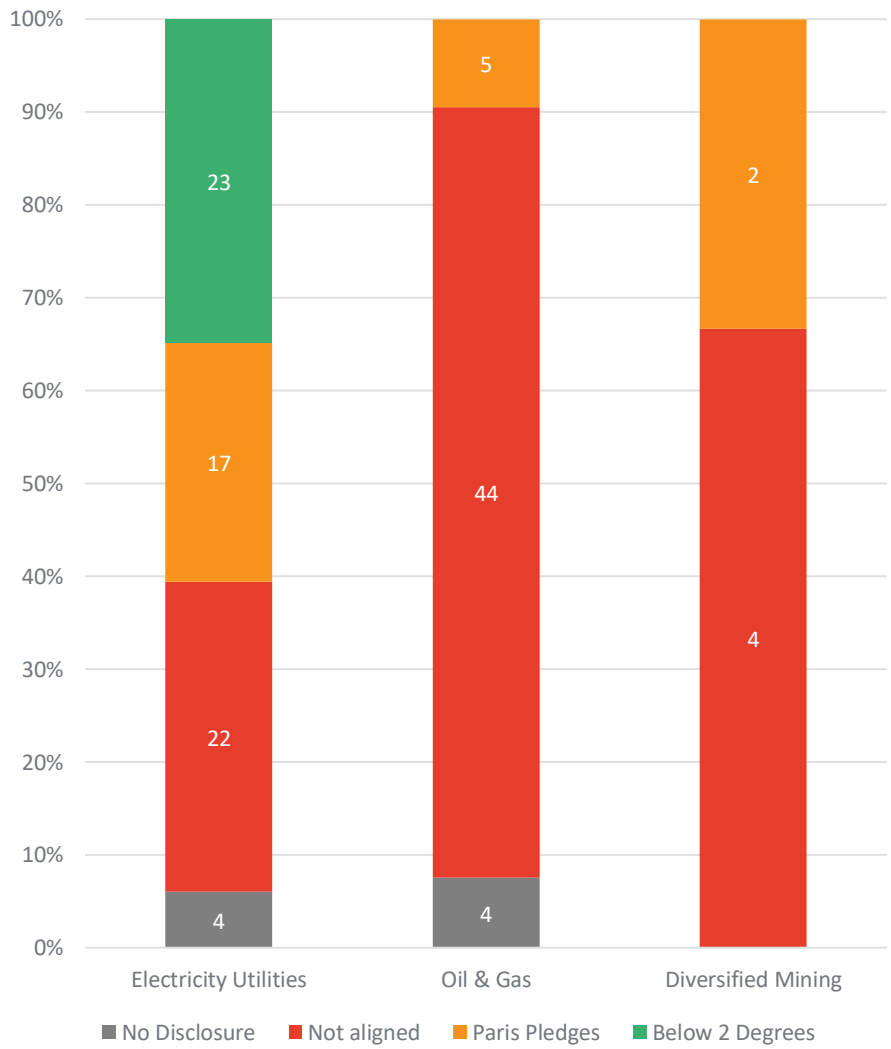


Carbon Performance: sector breakdown

Breaking the Carbon Performance data down by sector, alignment with the Paris climate goals is strongest in the electricity sector, followed by the diversified mining companies with a coal business, with the least alignment in O&G.

The share of electricity utilities aligned with at least the Paris Pledges/NDCs has increased from just under 49% to 61%. The 23 utilities that are aligned with Below 2°C in 2050 all have a net zero or absolute zero emissions target (see our sector focus on electricity below for further comments on this).

Although alignment is weakest in O&G, this sector is witnessing rapid change, with several European companies announcing new long-term emissions targets. Consequently the number of companies aligned with the Paris Pledges/NDCs has risen from 1 to 5. Although no O&G producer is yet aligned with 2°C or Below 2°C, the leading companies are getting closer. See our recent briefing paper on *Carbon Performance of European Integrated Oil and Gas Companies*

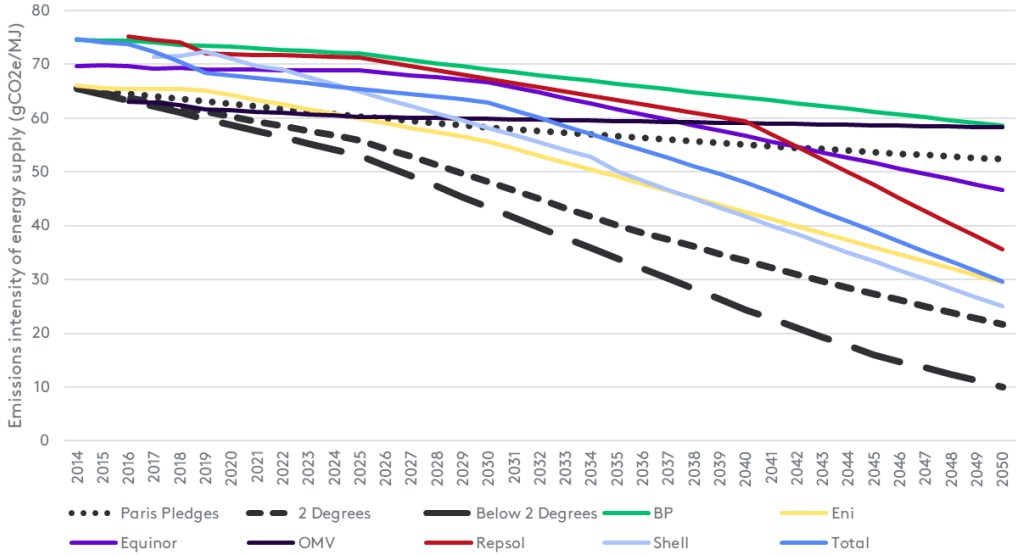


Climate science dictates that the pathway matters, not just the end point

Increases in global temperature depend on cumulative CO_2 emissions. This means the path to net zero matters, not just the end point (i.e. reaching net zero).

Above we looked at whether companies will be aligned by the time 2050 arrives, or are already aligned with 2050 climate goals. But the transition matters and many companies plan to back-load their efforts. If companies are above the benchmarks now, then they need to be below the benchmarks later in order to stay within a Below 2°C or 2°C carbon budget.

Investors need to be aware of this and look at companies' whole transition pathways, which are available on TPI's online tool.



Transition Pathway Initiative

2. Sector focus: coal mining



Transition Pathway Initiative

Management Quality level

Companies' Management Quality ratings may not always reflect their most up-to-date disclosures. TPI updates its assessments once a year.

FTSE Russell

Level 0
Unaware

3 companies: 9%

Adaro Energy
Jardine Matheson Holdings
Shougang Fushan Resources

Level 1
Awareness

13 companies: 37%

Adani Enterprises
ANTAM
Astra International
Bukit Asam
Bumi
China Coal
Coal India
Consol Energy
DMCI Holdings
Inner Mongolia Yitai Coal
New Hope
Nippon Coke & Engineering
Yanzhou Coal Mining

Level 2
Building capacity

7 companies: 20%

China Shenhua Energy
Coronado Global Resources
Jastrzebska Spolka Weglowa
Mitsui & Co (Coal Mining)
Semirara Mining and Power
Washington H. Soul Pattinson
Whitehaven Coal

Level 3
Integrating into operational decision making

6 companies: 17%

African Rainbow Minerals
Banpu
Glencore (Coal Mining)
Eneos (Coal Mining)
South32 (Coal Mining)
Sumitomo Corp

Level 4
Strategic assessment

6 companies: 17%

Anglo American (Coal Mining) ★
BHP (Coal Mining) ★
Vale (Coal Mining) ★

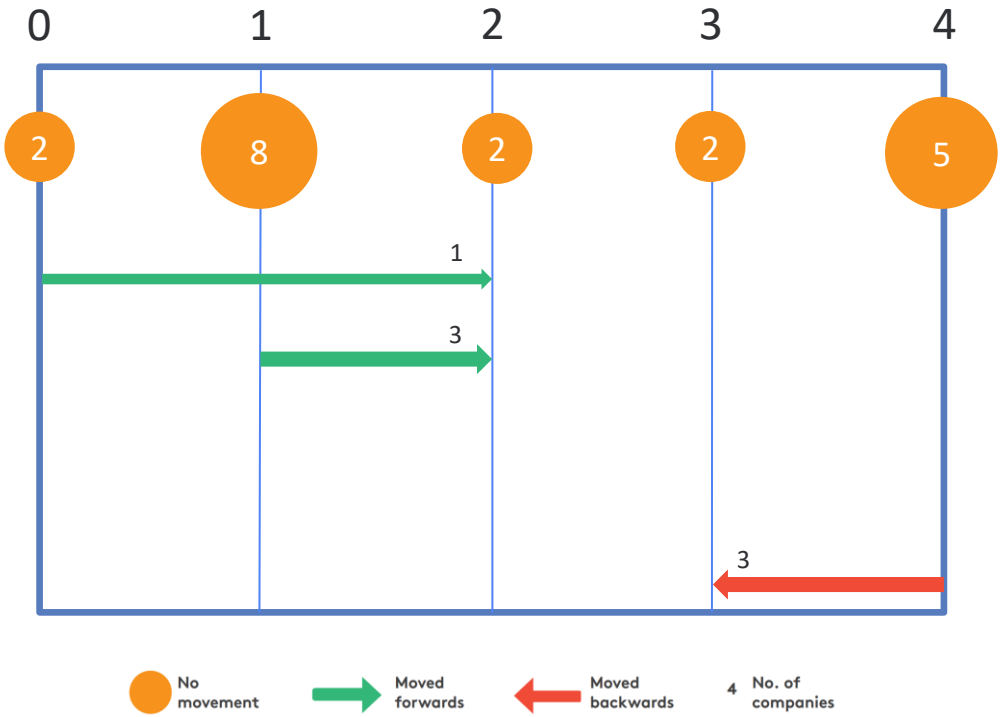
Exxaro Resources
Mitsubishi Corp
Teck Resources

Trends in Management Quality

Coal mining companies average Management Quality score is just 2.0, putting the average company in this sector at the point of “Building capacity” (Level 2). Coal mining remains one of the worst performing of all sectors in the TPI database and has not significantly improved its average score since last year when it stood at 1.9.

We have trend data on 26 out of the 35 companies assessed. Of those 26: 19 companies stay on the same level as last year, including the 5 that had already reached Level 4 last year; 4 companies have moved up at least one level; 3 companies have moved down from Level 4 to Level 3.

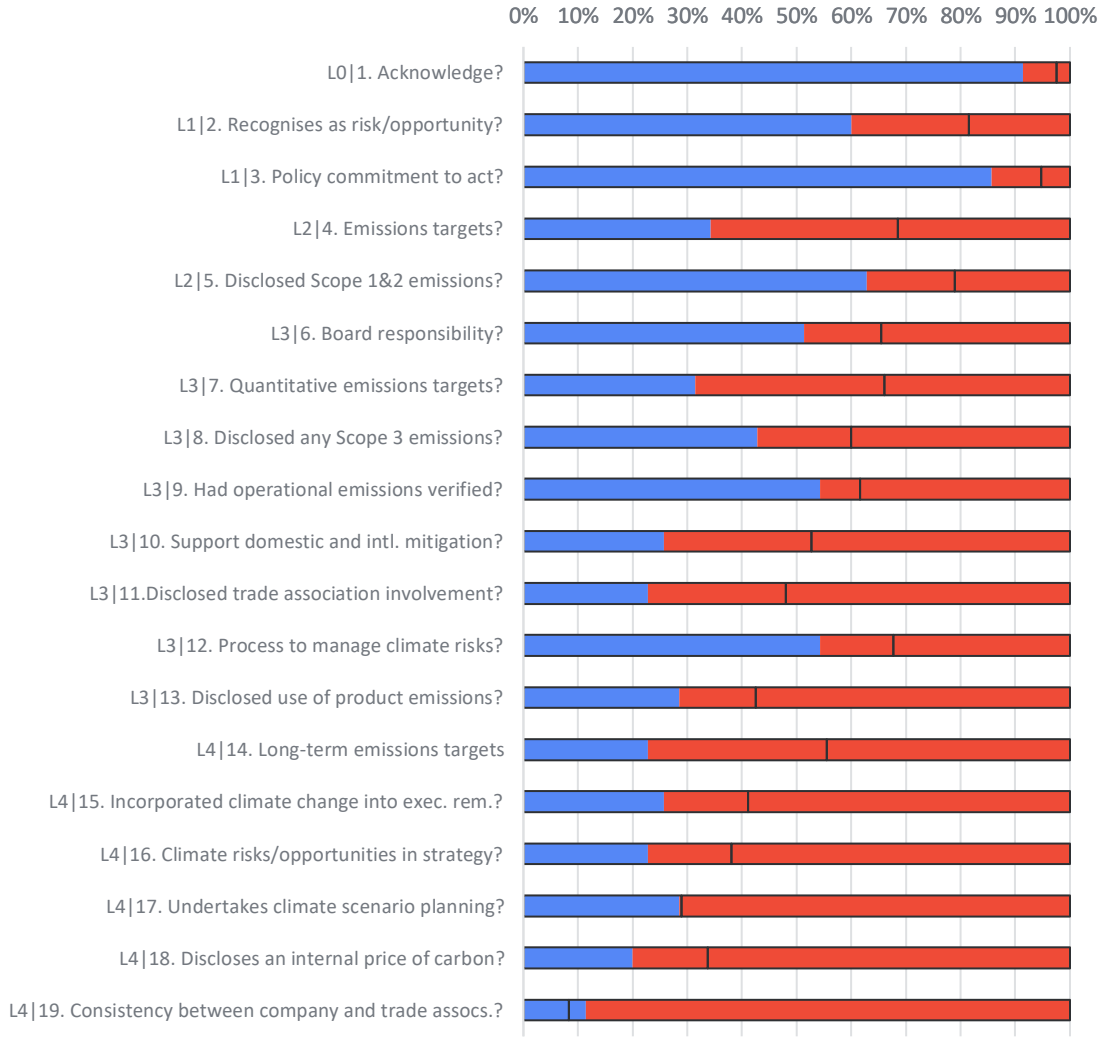
Twelve companies have been added to the coal mining sector this year, some of which have been previously assessed by TPI in other sectors (e.g. Eneos). The average score of these twelve companies is just 1.9, slightly dragging down the sector average.



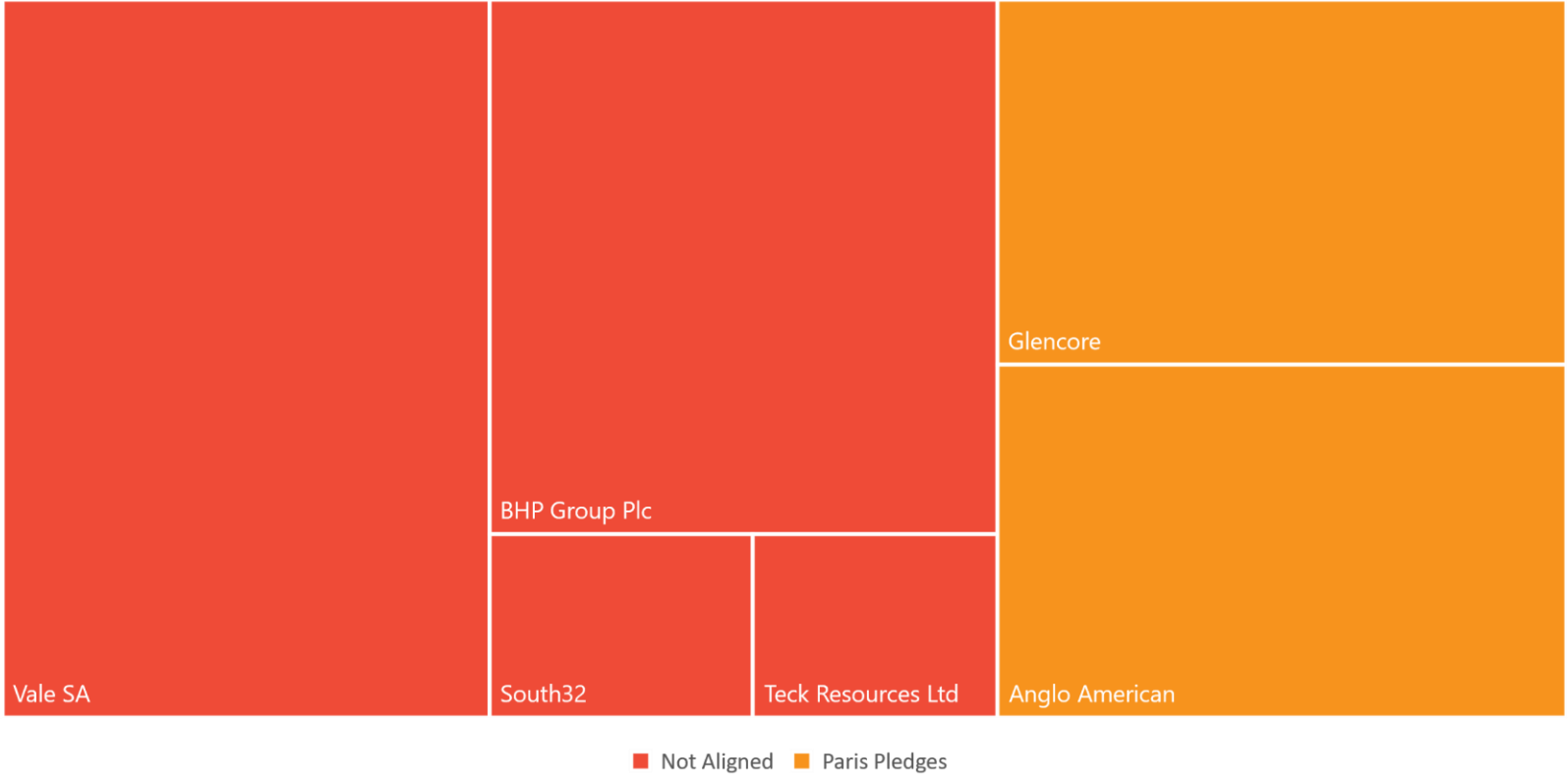
Management Quality: indicator by indicator

As one of the worst performing TPI sectors, unsurprisingly coal mining companies fare worse than average on almost all of the Management Quality indicators.

There is one exception: does the company ensure consistency between its climate change policy and the positions taken by trade associations of which it is a member? (Q19) As a whole, very few TPI companies satisfy this indicator, but 11% of coal miners do. This is attributable to a small number of diversified mining companies. In general, the diversified mining companies with coal businesses perform much better on Management Quality than the pure play coal miners.



Alignment of diversified miners with a coal business, scaled by market cap.



3. Sector focus: electricity utilities



Transition Pathway Initiative

Management Quality level

Companies' Management Quality ratings may not always reflect their most up-to-date disclosures. TPI updates its assessments once a year.

FTSE Russell

Level 0
Unaware

0 Companies: 0%

Level 1
Awareness

8 Companies: 12%

Black Hills Corp
China Resources Power
CK Infrastructure
Kyushu Elec Power
PGE
Power Assets
Portland General Electric
Tenaga Nasional

Level 2
Building capacity

8 Companies: 12%

CenterPoint Energy
Edison International
Evergy
Fortis
Hawaiian Electric
NextEra Energy
NTPC
Vistra Energy

Level 3
Integrating into operational decision making

24 Companies: 35%

Algonquin Power & Utilities Co
Alliant Energy
Ameren
CEZ
Chubu Electric Power
Chugoku
Con Edison
DTE Energy
Duke Energy
Eversource Energy
Firstenergy
Hydro One
Idacorp Inc
Kansai Elec Power
KEPCO
Origin Energy
PG&E
PPL
RWE
Sempra Energy
Southern Company
Tohoku Elec Power
WEC Energy Group
XCEL Energy

Level 4
Strategic assessment

28 Companies: 41%

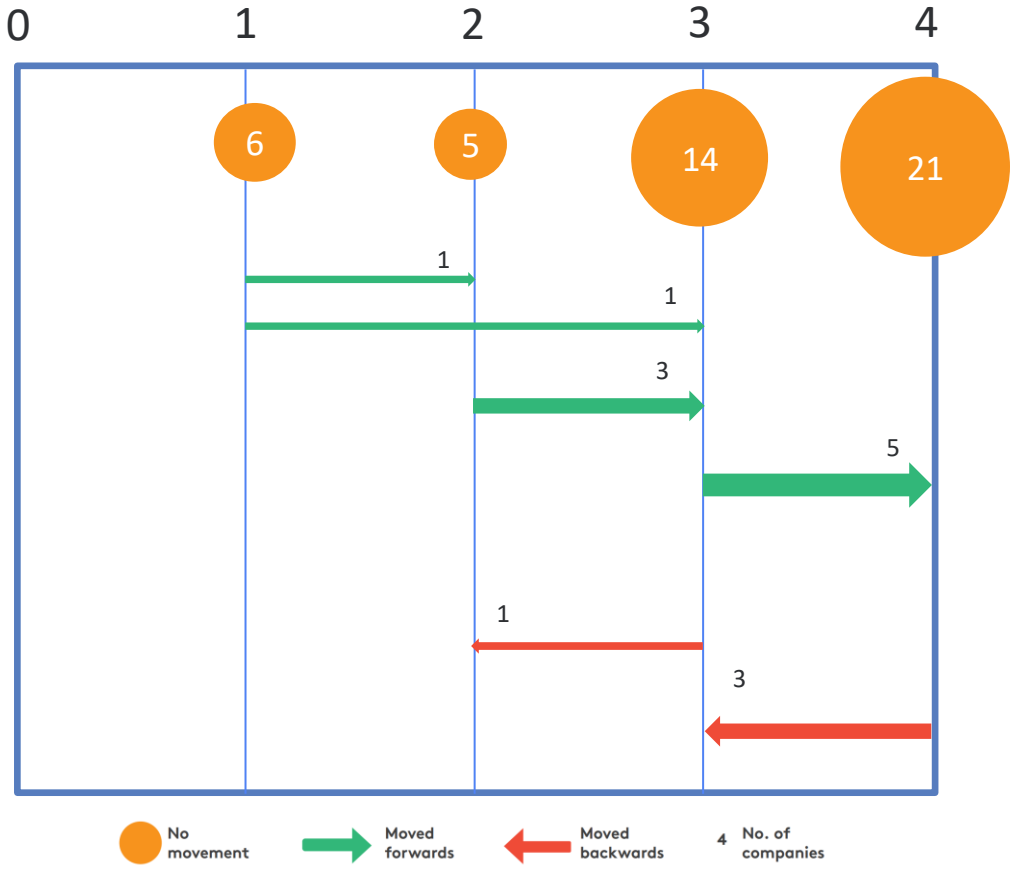
Terna

AES
AGL Energy
American Electric Power
CLP
CMS Energy
Dominion Energy
E.ON
EDF
EDP
Electric Power Development
Emera Inc
Endesa
Enel
Engie
Entergy
Exelon
Fortum
Iberdrola
National Grid
NRG Energy
Orsted
Pinnacle West Capital
Public Service Enterprise Group
Red Electrica
SSE
TEPCO
Uniper

Trends in Management Quality

Electricity utilities' average Management Quality score is 3, corresponding to Level 3, "integrating climate change into operational decision making". The electricity sector is consistently the top or joint-top performing TPI sector on Management Quality.

Of the 60 electricity utilities for which we have trend data, 46 remain at the same level as their last assessment, including 21 utilities that had already reached Level 4. A total of 10 companies have moved up at least one level and 4 have moved down at least one level.

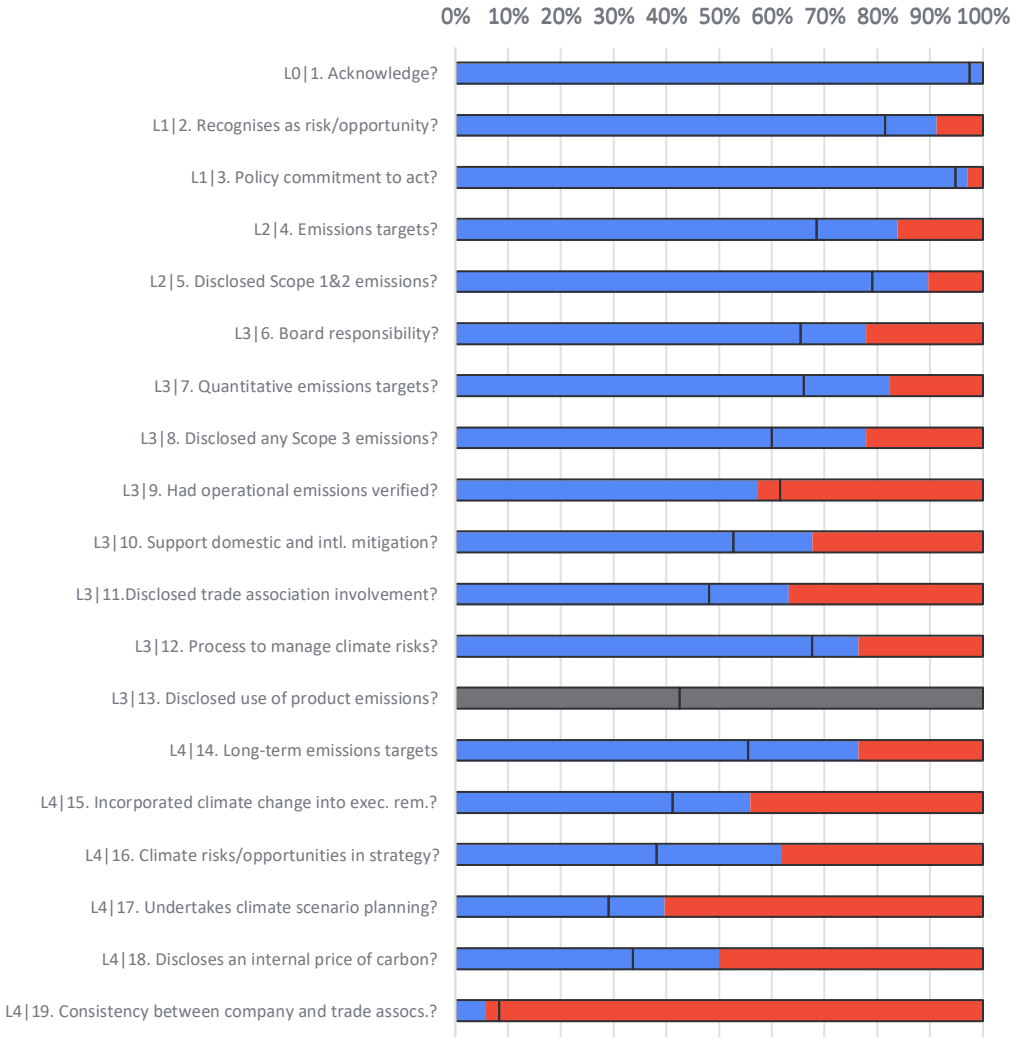


Management Quality: indicator by indicator

Electricity utilities perform above average on most individual Management Quality indicators. All companies in this sector acknowledge climate change as as a significant issue for the business (Q1) and nearly all of them have a policy commitment to act on climate change (Q3).

Performance is particularly strong relative to other sectors on emissions reduction targets (i.e. Q4, which tests for the existence of a target, even qualitative, Q7, which tests for quantitative targets, and Q14, which tests for quantitative, long-term targets, defined as at least 5 years in duration).

The electricity sector is heavily regulated with regards to its emissions in some regions (e.g. the EU) and this likely explains some of the results we see.



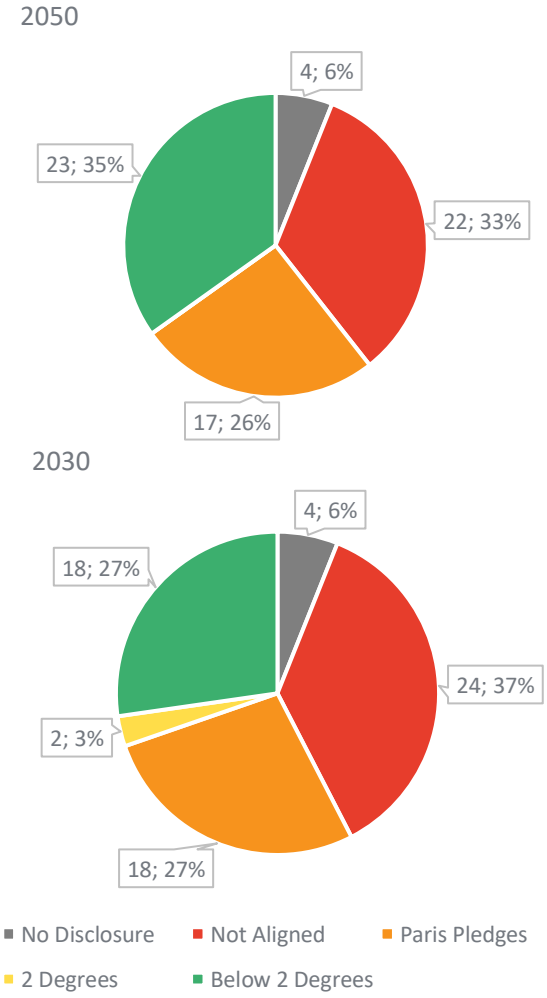
Carbon Performance: alignment with the Paris Agreement benchmarks

We see comparatively strong and improving Carbon Performance in the electricity sector. 57% of companies assessed are aligned with at least the Paris Pledges/NDCs in 2030 and that share rises to 61% in 2050, as some utilities with mid-century net/absolute zero emissions targets come into alignment. In comparison, 49% of companies were judged to be aligned with at least the Paris Pledges/NDCs in 2030 when we assessed them last year. The shares of companies without suitable disclosure or who are yet to align with any of the benchmarks have also decreased marginally.

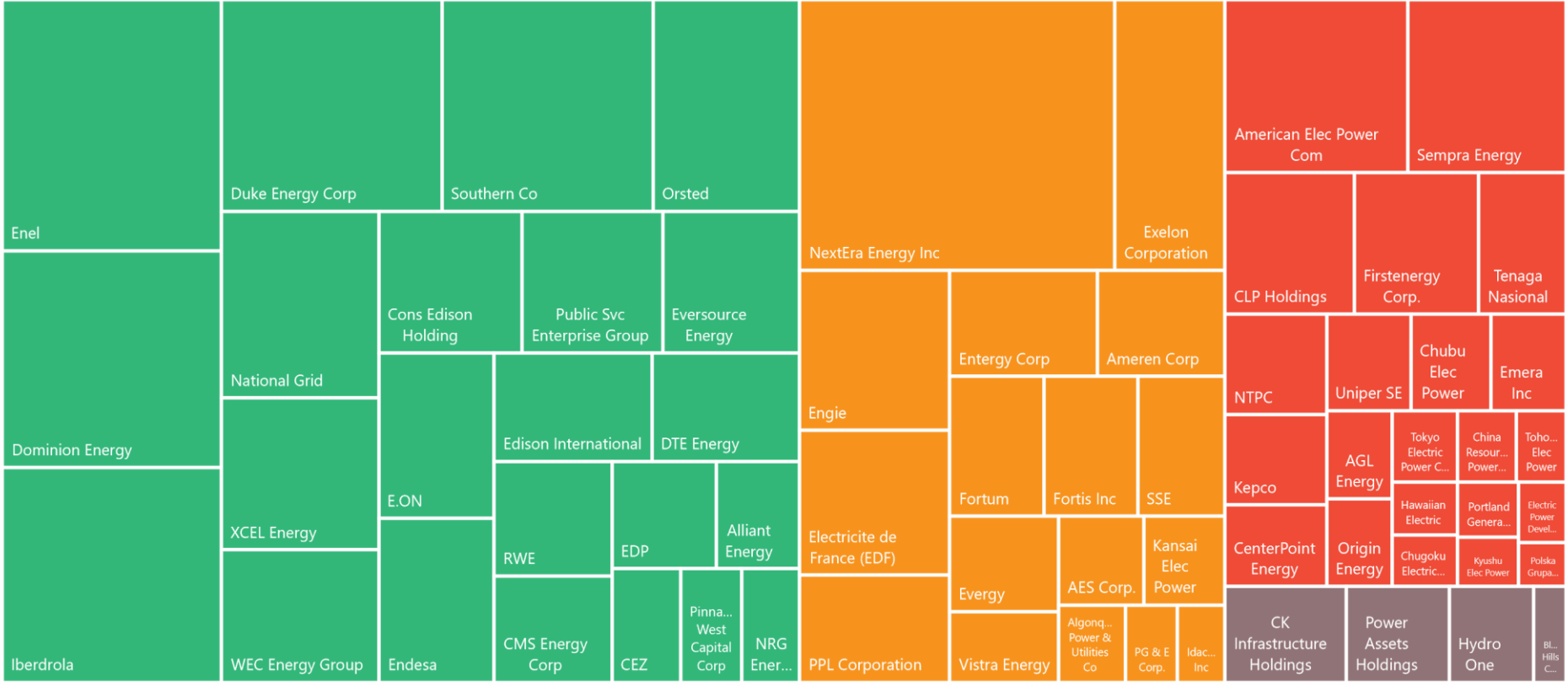
Two methodological issues are important to note when interpreting these results:

1. By 2050, there is no difference between what it takes to be aligned with 2°C and with Below 2°C in the electricity sector, which explains why we don't see any utilities in the former category;

2. By 2050, IEA benchmark scenario emissions from electricity in fact go *negative*. Strictly speaking, absolute/net zero targets are not enough in the electricity sector and instead utilities would need to target negative emissions. However, for now TPI considers absolute/net zero in 2050 as aligned with Below 2°C.



Alignment of electricity utilities, scaled by market cap.



Special feature on US electric utilities

The US elections in November 2020 are a key decision point on climate action, with the Democratic and Republican parties offering very different visions of the United States' energy future and its contribution to the Paris climate goals. In the run up, we have singled out US electric utilities for analysis.



Management Quality of US electric utilities

FTSE Russell

US electric utilities average Management Quality score is 3, which is the same as the sector's worldwide average. There are fewer Level 1 companies, but about the same proportion on Levels 3 and 4. There are no Level 4* utilities in the US.



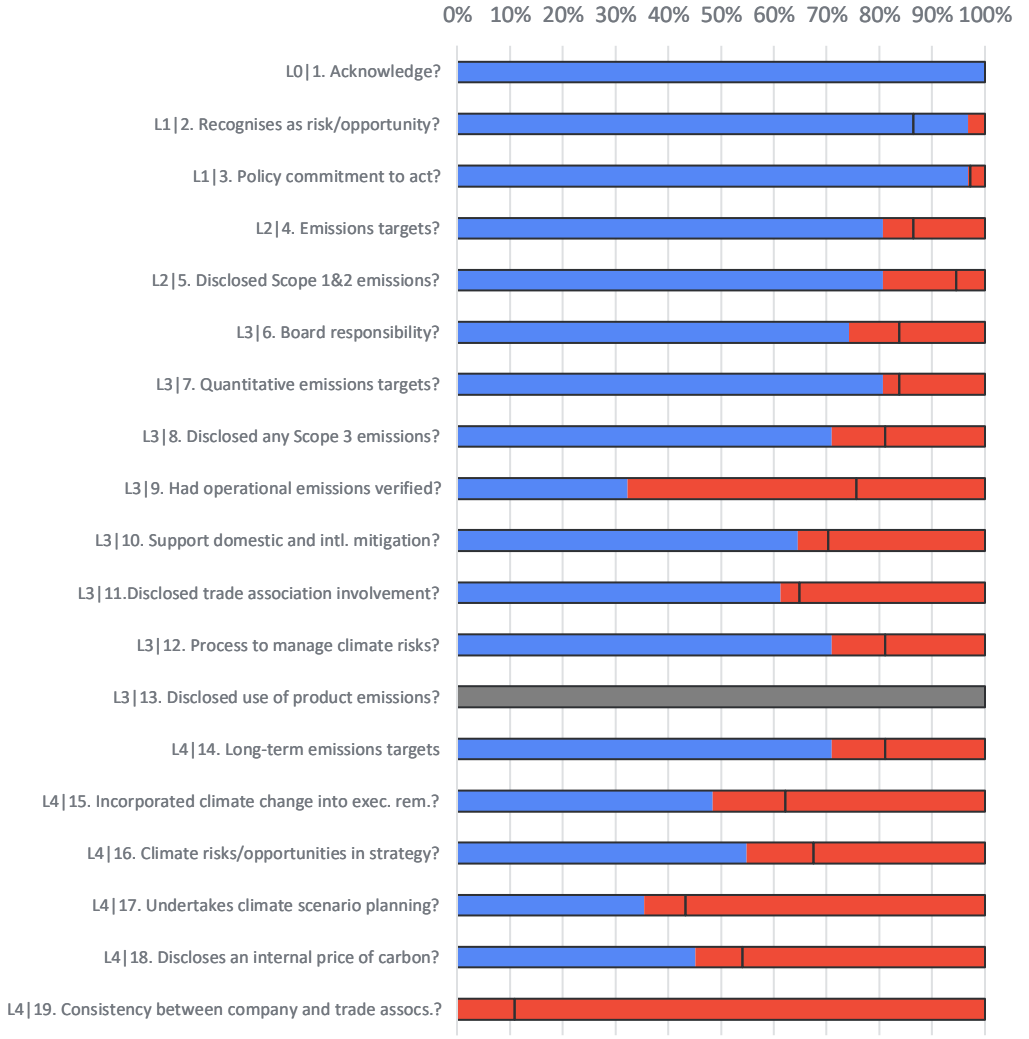
Companies' Management Quality ratings may not always reflect their most up-to-date disclosures. TPI updates its assessments once a year.

US electric utilities: Management Quality indicator by indicator

Here we disaggregate the Management Quality data for US electric utilities by indicator and we compare the results with the average for all electric utilities in the TPI database (the black vertical marks on each bar). Outside the US, TPI covers 37 utilities, most of which are in Europe and Asia (in roughly equal proportions).

Overall, US electric utilities underperform relative to the sector average on most individual indicators, but they are at or above average on Q1-Q3, which explains why their average Management Quality score matches the global sector's.

They underperform most notably on verifying operational emissions (Q9), although emissions are typically reported to the US Environmental Protection Agency (EPA). In addition, no US utility can currently demonstrate it ensures consistency between its climate change policy and the positions taken by trade associations of which it is a member (Q19).

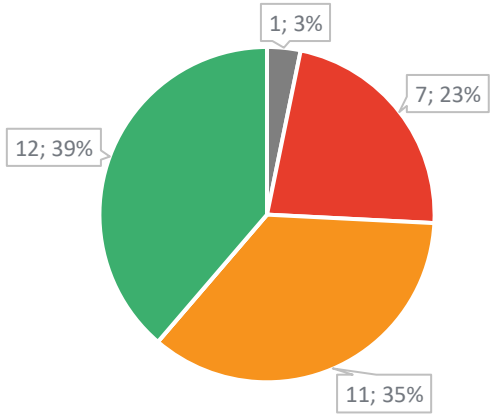


Carbon Performance of US electric utilities

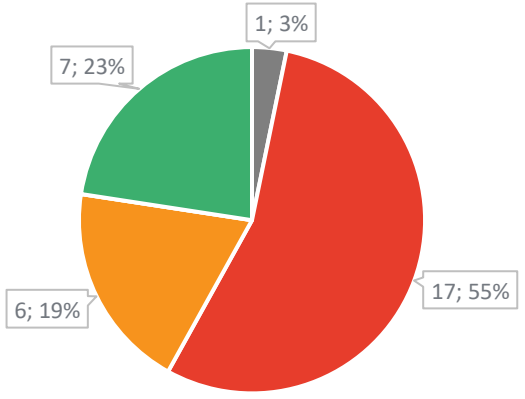
On Carbon Performance, we test the alignment of US utilities against US-specific benchmarks, which we obtain from the IEA's regional projections in its *Energy Technology Perspectives* report.

Our analysis reveals that many US utilities are targeting alignment with the country's erstwhile Paris Agreement pledge/NDC and its extrapolation by IEA to 2050. In other words, most US utilities are aligned with moderate decarbonisation. However, only 40% are aligned with Below 2°C in 2050.

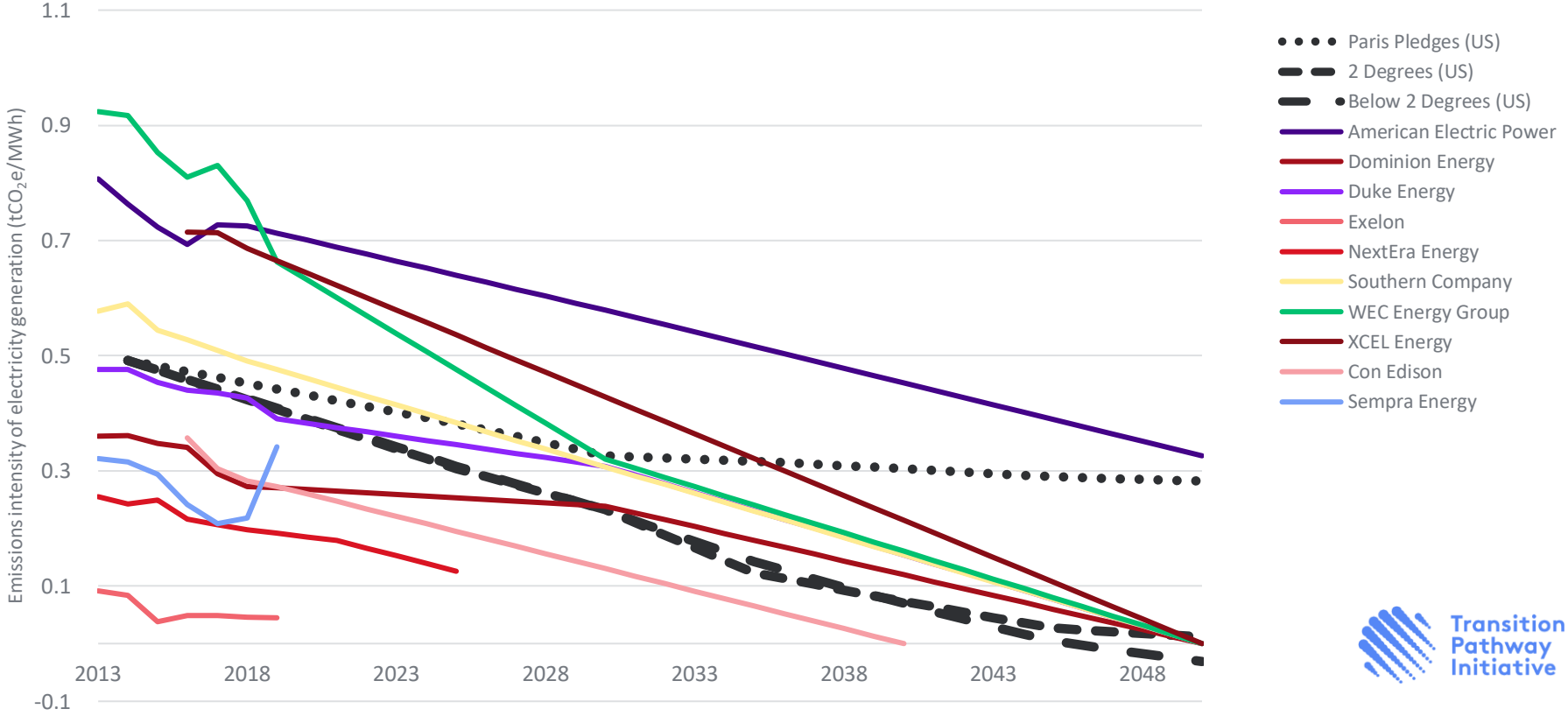
2050



2030



10 largest US electricity utilities by market cap against US benchmarks



Transition Pathway Initiative

4. Sector focus: oil & gas



Transition Pathway Initiative

Management Quality level

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FTSE Russell

Level 0
Unaware

0 companies: 0%

Level 1
Awareness

5 companies: 8%

Formosa Petrochemical
Oil & Natural Gas
Petrochina
Reliance Industries
TATNEFT

Level 2
Building capacity

19 companies: 31%

Cabot Oil & Gas
Cheniere Energy
CNOOC
Concho Resources
Diamondback Energy
Enbridge
EOG Resources
HollyFrontier
Lukoil
Marathon Oil
Marathon Petroleum
Noble Energy
Oil Search
Ovintiv
Phillips 66
Pioneer Natural Resource
Saudi Aramco
Targa Resources
Valero Energy

Level 3
Integrating into operational decision making

21 companies: 34%

Apache
Canadian Natural Resources
Cenovus Energy
Chevron
China Petroleum & Chemical
Devon Energy
Ecopetrol
Exxon Mobil
Gazprom
Imperial Oil
Eneos (Oil & Gas)
Kinder Morgan
Neste
NovaTek
PTT
Rosneft Oil
Santos
SK Innovation
Suncor Energy
TC Energy
Woodside Petroleum

Level 4
Strategic assessment

16 companies: 26%

BP ★
Eni ★
Equinor ★
Galp Energia ★
Hess ★
Total ★

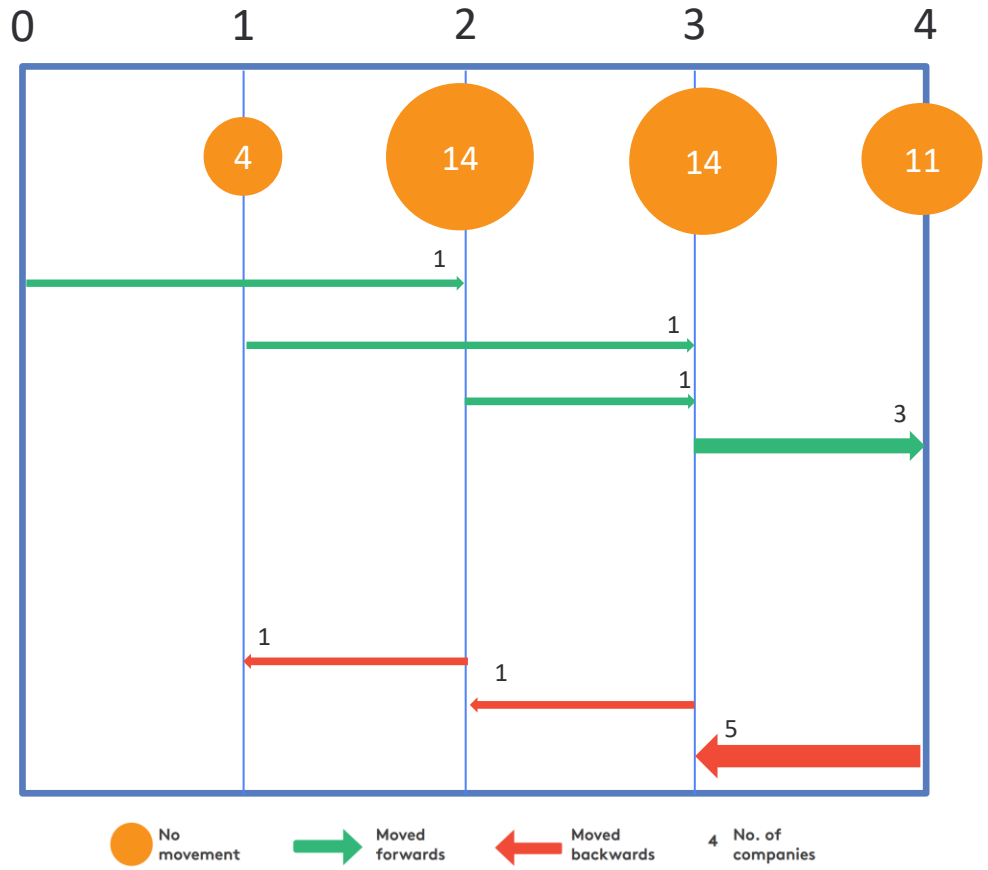
Centrica
ConocoPhillips
INPEX CORPORATION
Naturgy Energy
Occidental Petroleum
OMV
Petrobras
Repsol
Royal Dutch Shell
Sasol (Oil & Gas)

Trends in Management Quality combined

Oil and gas companies' average Management Quality score is 2.8, up from 2.7 in 2019 and 2.4 in 2018. Thus we are witnessing slow but steady progress in the sector.

The 7 O&G distribution companies included in this report average 2.9. Centrica and Naturgy Energy are on Level 4, Kinder Morgan and TC Energy are on Level 3, and Enbridge, Cheniere and Targa Resources are on Level 2.

We have trend data on 56 companies, of which 43 stay on the same level as their last assessment, 6 companies have moved up at least one level and 7 companies have moved down at least one level.

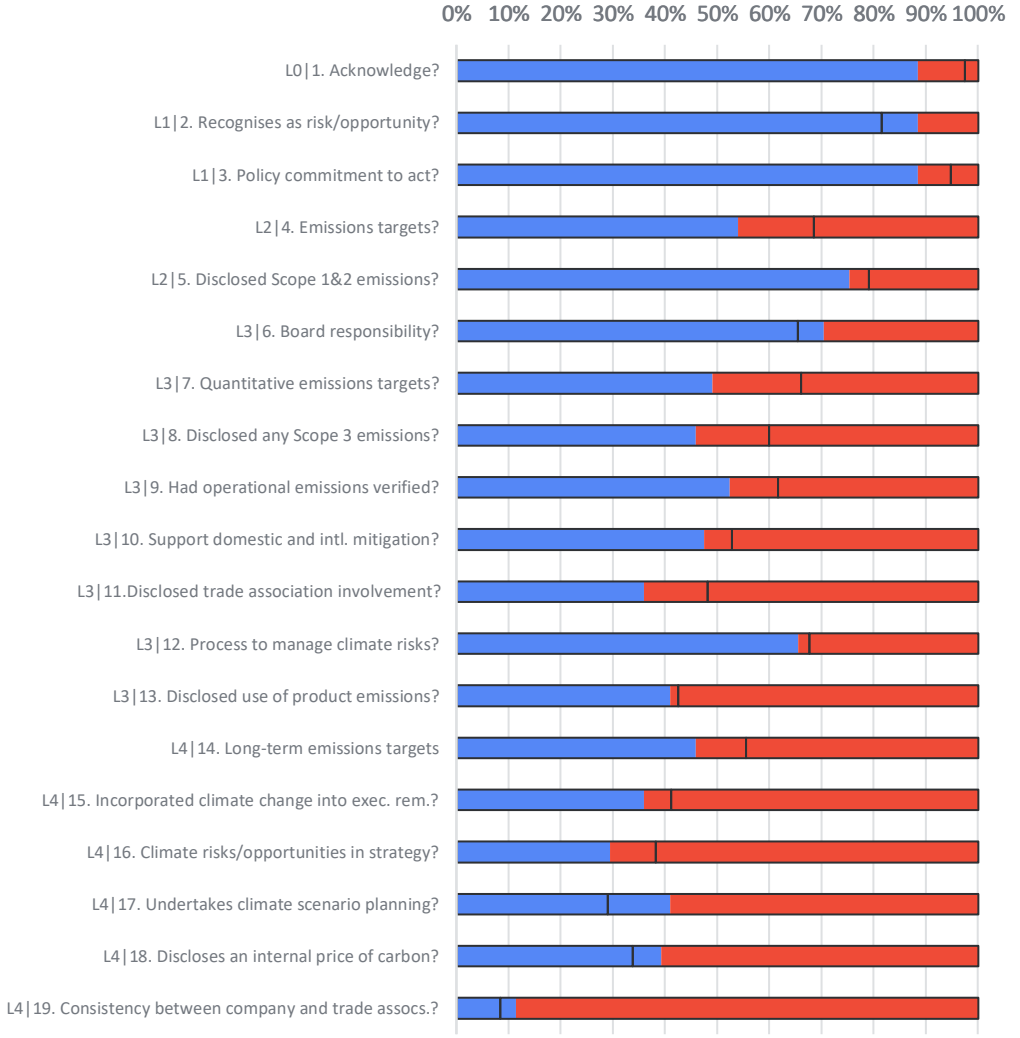


Management Quality: indicator by indicator

The O&G sector is close to the TPI all-company average on Management Quality and accordingly O&G companies perform better than average on some indicators and worse than average on others.

Relatively strong performance on a cluster of indicators may reflect a growing recognition in the sector of the significant risks (and opportunities) presented by the low-carbon transition: Q2, explicitly recognising climate change as a relevant risk and/or opportunity for the business; Q6, nominating a board member or board committee with explicit responsibility for climate change; Q17, undertaking climate scenario planning.

Disclosing emissions (Q5, Q8 and Q13), verification of those emissions (Q9) and emissions reduction targets (Q4, Q7 and Q14) remain weak points.



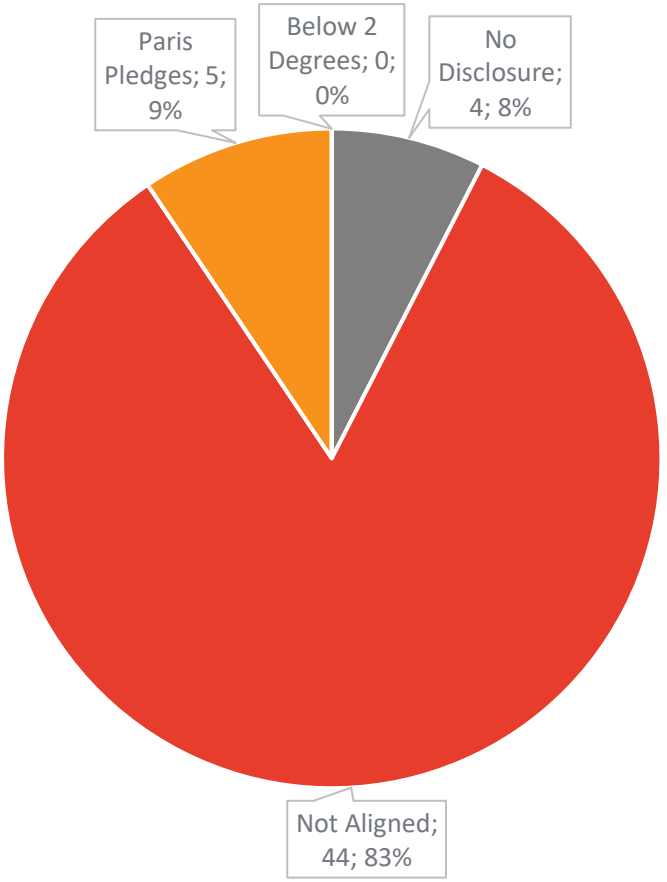
Carbon Performance: alignment with the Paris Agreement benchmarks

We assess Carbon Performance for 53 O&G producers using our methodology that is based on the emissions intensity of energy supply. This methodology is not applicable to O&G distribution companies.

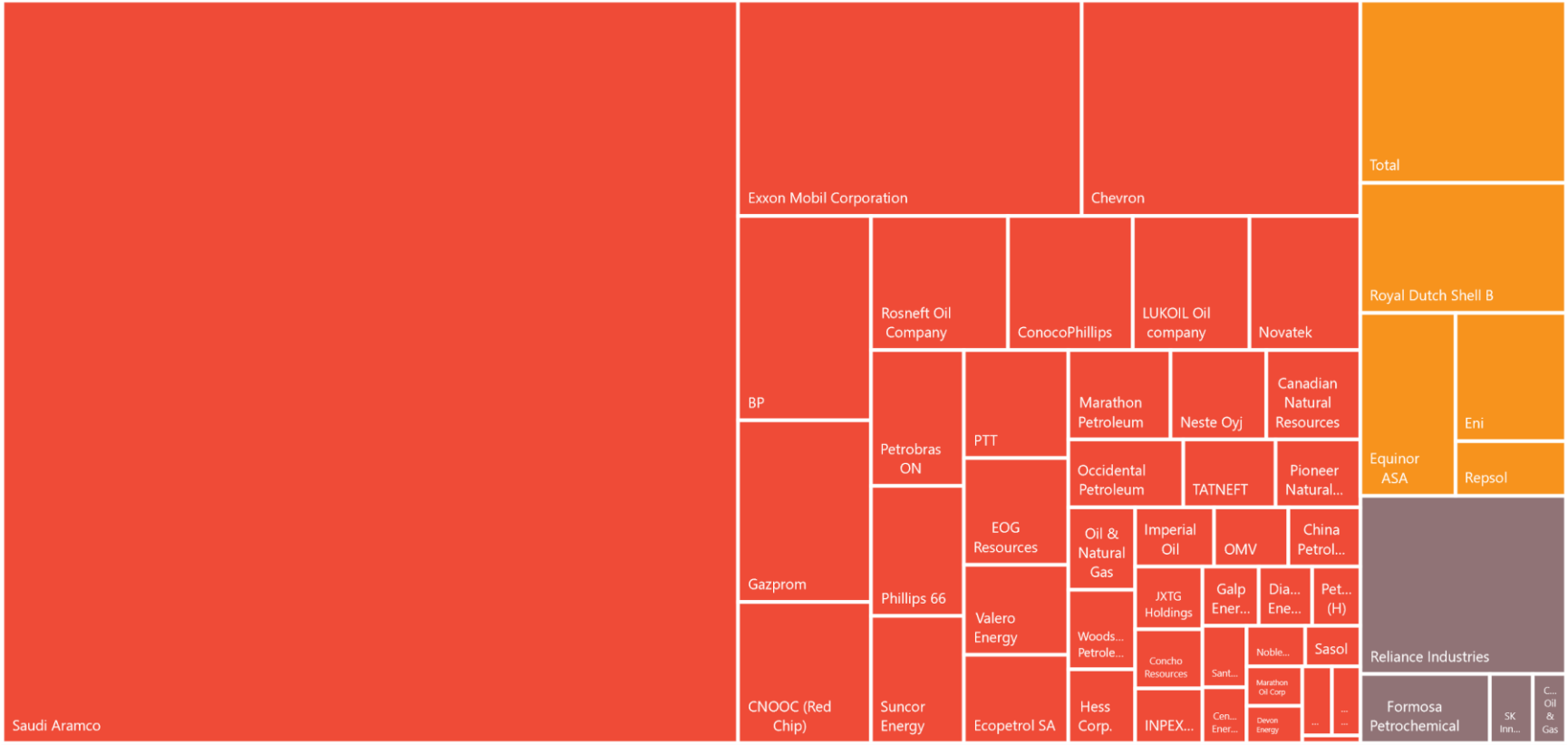
As we explained in last year's report, aligning with the Paris Agreement goals is a major challenge for the O&G sector and requires companies to address not only their operational emissions (e.g. from methane flaring and refining), but also their downstream, Scope 3 emissions from use of sold products.

Consequently the share of companies aligned with the benchmarks is very low overall. Five companies are aligned with the Paris Pledges/NDCs, up from just 1 last year. However, a broad sweep of the sector hides some of the progress being made by the leaders. In the last 6-12 months, a number of European companies have announced new, long-term emissions reduction commitments, some of which bring the companies in question close to aligning with 2°C. This was discussed in our recent briefing paper on *Carbon Performance of European Integrated Oil and Gas Companies* (May 2020). Here we include new data.

Non-disclosure in O&G has decreased by 50% since last year.



Alignment of O&G producers, scaled by market cap.



5. About TPI: further information about the initiative and methodology

Transition Pathway Initiative

TPI strategic relationships

The Grantham Research Institute on Climate Change and the Environment, a research centre at the London School of Economics and Political Science (LSE), is TPI's *academic partner*. It has developed the assessment framework, provides company assessments, and hosts the online tool.

FTSE Russell is TPI's *data partner*. FTSE Russell is a leading global provider of benchmarking, analytics solutions and indices.

The Principles for Responsible Investment (PRI) manages and provides supporter coordination to TPI. PRI is an international network of investors implementing the six Principles for Responsible Investment.



Transition Pathway Initiative

TPI Governance

TPI Co-Chairs

THE CHURCH OF ENGLAND PENSIONS BOARD

Environment Agency Pension Fund

TPI Steering Committee

AP FJÄRDE AP-FONDEN

AP7

BRUNEL Pension Partnership

CCLA for the Church of England

The Church Commissioners for England

THE CHURCH OF ENGLAND PENSIONS BOARD

Environment Agency Pension Fund

LGPS Central Limited

LPP Local Pensions Partnership

NORGES BANK INVESTMENT MANAGEMENT

USS

Wespath BENEFITS | INVESTMENTS

Transition Pathway Initiative

Our Supporters



Transition Pathway Initiative

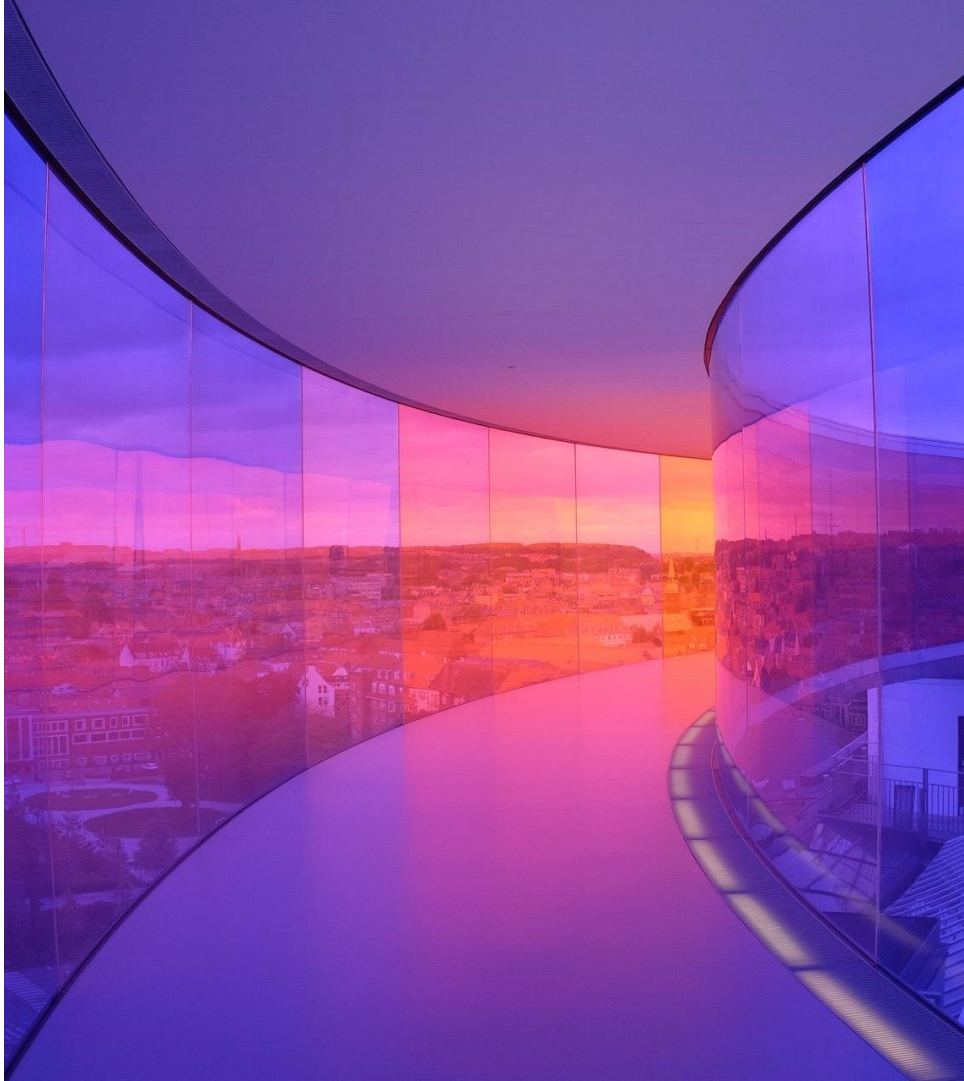
TPI design principles

Disclosure-based: Company assessments are based only on publicly available information

Accessible and easy to use*:* Outputs are designed to be useful to Asset Owners and Asset Managers, especially with limited resources to assess climate change

Not seeking to add unnecessarily to the reporting burden*:* Aligned with existing initiatives and disclosure frameworks, such as CDP and TCFD

Corporate level*:* Pitched at a high level of aggregation



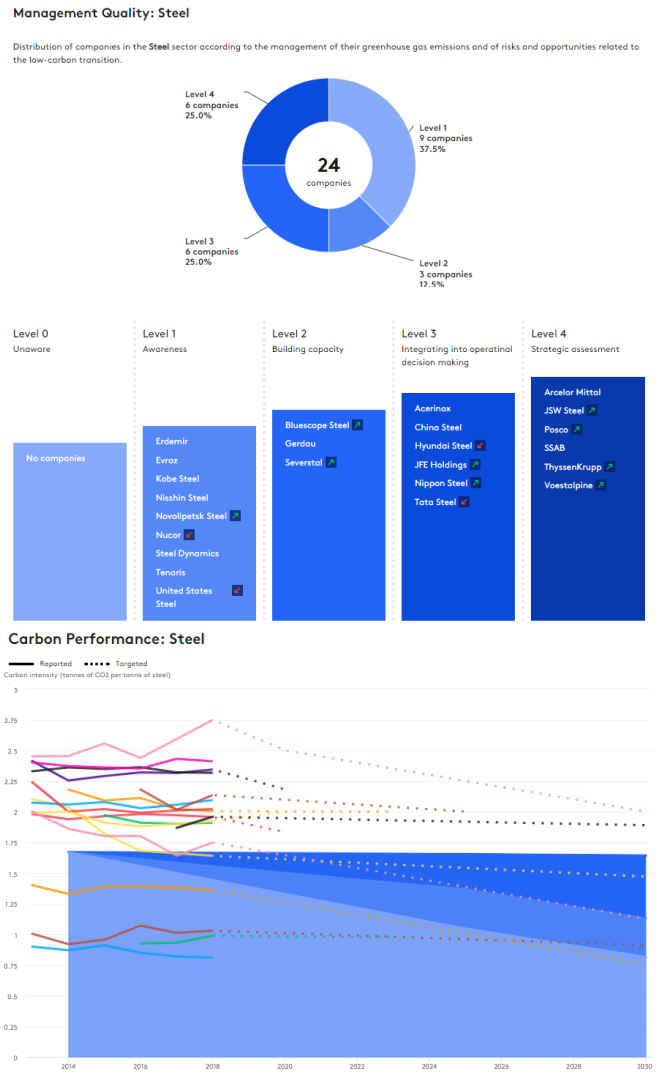
Overview of the TPI Tool

TPI's company assessments are divided into 2 parts:

1. *Management Quality* covers companies' management/governance of greenhouse gas emissions and the risks and opportunities arising from the low-carbon transition;

2. *Carbon Performance* assessment involves quantitative benchmarking of companies' emissions pathways against the international targets and national pledges made as part of the 2015 UN Paris Agreement, for example limiting global warming to below 2°C.

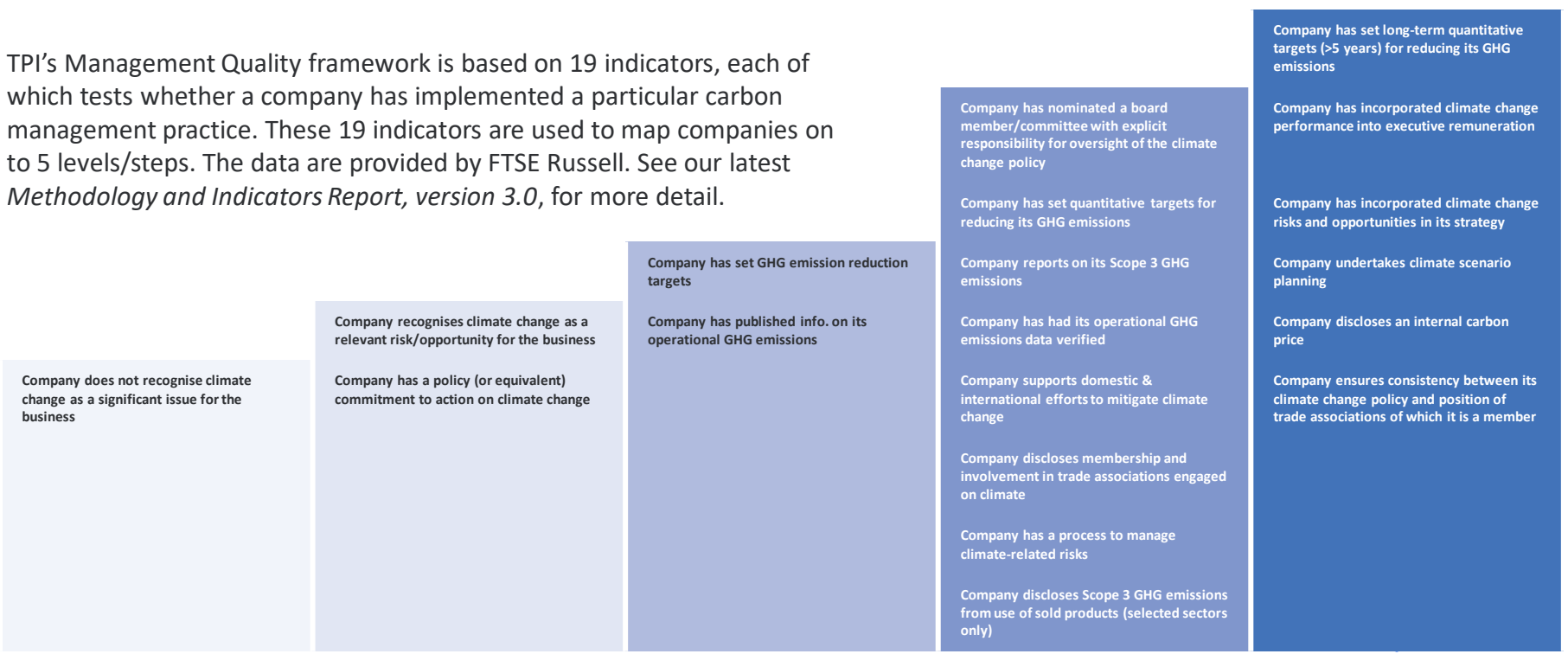
Both of these assessments are based on company disclosures.



Management Quality

FTSE Russell

TPI's Management Quality framework is based on 19 indicators, each of which tests whether a company has implemented a particular carbon management practice. These 19 indicators are used to map companies on to 5 levels/steps. The data are provided by FTSE Russell. See our latest *Methodology and Indicators Report, version 3.0*, for more detail.



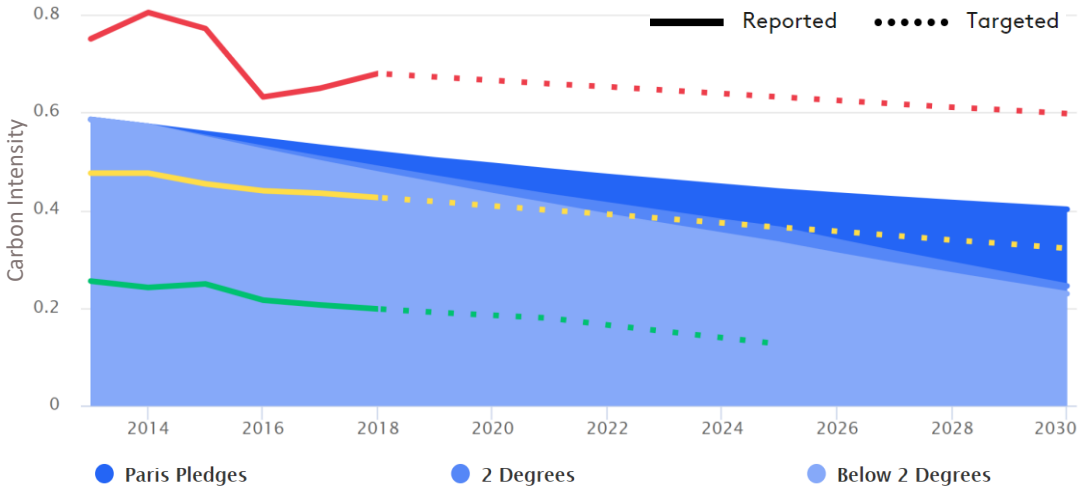
Carbon Performance

TPI's Carbon Performance assessment tests the alignment of company targets with the UN Paris Agreement goals.*

We use 3 benchmark scenarios for each sector, which in the energy sector are:

1. *Paris Pledges*, consistent with emissions reductions pledged by countries as part of the Paris Agreement (i.e. NDCs; note these are insufficient to limit global warming to 2°C or below);
2. *2 Degrees,* consistent with the overall aim of the Paris Agreement, albeit at the low end of the range of ambition;
3. *Below 2 Degrees*, consistent with a more ambitious interpretation of the Paris Agreement's overall aim.

Benchmarking is sector-specific and based on emissions intensity (e.g. tonnes of CO_2 per MWh electricity generated). See TPI website for further details.



Company A is not aligned with any of the benchmarks

Company B is eventually aligned with the Paris Pledges, but neither 2C/ nor Below 2C

Company C is aligned with all Paris benchmarks, including Below 2C

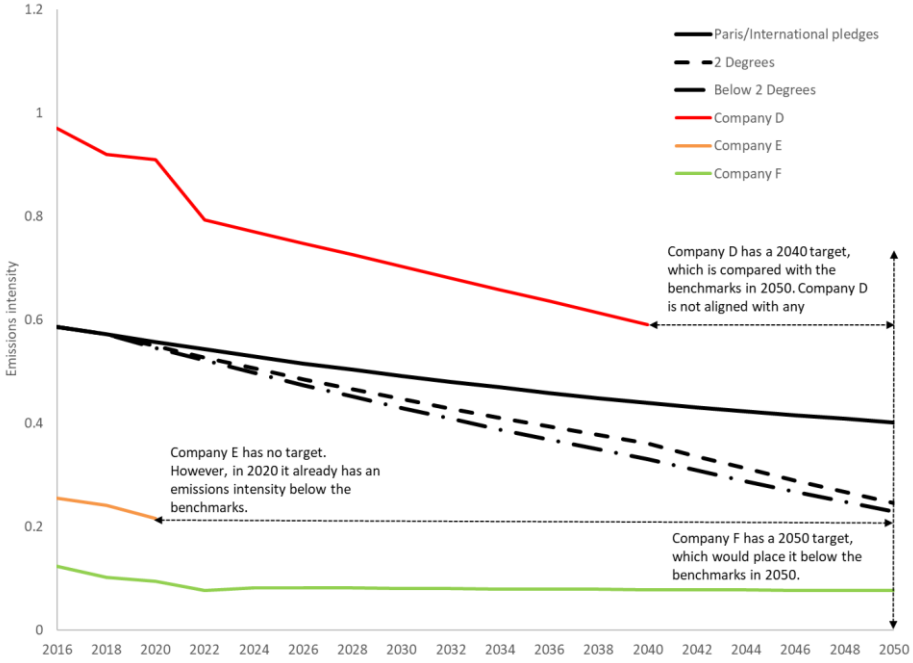
*We use the Sectoral Decarbonization approach (SDA), which was created by CDP, WWF & WRI in 2015 & is also used by the Science Based Targets Initiative.

Reducing TPI's Carbon Performance data to a single indicator of alignment with the Paris Agreement

Our Carbon Performance data cover multiple years. How can they be used to answer the simple question: is a company aligned with the Paris goals?

To do this, we compare a company's emissions intensity in the last year for which we have data with the benchmarks at the end of the horizon. For energy companies, we look out to 2050, so for example:

- Company with a 2050 target – the company's projected 2050 emissions intensity is compared with the benchmark emissions intensities in 2050;
- Company with no target – the company's historical emissions intensity is compared with the benchmark emissions intensities in 2050 (i.e. a comparison of where the company is now with where it would need to be in 2050).



Transition Pathway Initiative

Reflections on the benchmarks

TPI's Below 2°C benchmark is based on the IEA's B2DS scenario from its *Energy Technology Perspectives* report. For this TPI report, we use the 2017 edition of ETP. The 2020 edition has just been published and the data will be released soon, enabling us to incorporate the new scenarios in future reports. Preliminary analysis indicates, however, that there is little difference between the ETP editions' energy sector emissions intensities, so our conclusions are not expected to change.

A question we are often asked is how our Below 2°C benchmark relates to the goal of limiting warming to 1.5°C. This is a complicated issue, because defining a 1.5°C scenario is affected by a number of variables, including:

- The probability of keeping temperatures below 1.5°C (e.g. 50%, 66%). No 1.5°C scenario can guarantee keeping temperatures below that level, due to climate system uncertainties. Some scenarios also allow temporary overshoot of 1.5°C, others not.
- Temperatures depend on cumulative CO_2 emissions, resulting in a 'carbon budget' for 1.5°C. But this carbon budget does not just depend on emissions before 2050, it depends on emissions after 2050 and higher emissions earlier could be offset by negative emissions later.

According to IEA, the B2DS scenario underpinning our Below 2°C benchmark has cumulative CO_2 emissions of 750GtCO_2 between 2015 and 2100. According to IPCC, the 1.5°C carbon budget from 2015 to 2100 is 443GtCO_2 (66% chance) or 503GtCO_2 (50% chance), a range that is well below the IEA scenario. However, recently IEA has argued that if there are large negative emissions after 2050, the IEA's most ambitious scenarios could be 1.5°C compatible. In particular, IEA has argued that there is potential for more than 250GtCO_2 negative emissions after 2050. This would bring B2DS cumulative emission down to c. 500GtCO_2. Overall, it is possible our Below 2°C is compatible with 1.5°C, but it is not a conservative scenario, and it would presumably lead to temporary overshoot of 1.5°C.

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