

# Carbon4 Finance response to the SEC's Public Consultation on Climate Change Disclosures

## Introduction

June 14, 2021

Carbon4 Finance welcomes the opportunity to provide feedback on the Securities and Exchange Commission's (SEC's) request for public input on climate-related financial disclosures. As specialists in the low-carbon transition, we applaud SEC's growing interest for climate change-related challenges, and we strongly support the development of sustainability disclosures to equip investors in their investment decisions.

Greenhouse gases emissions linked to human activity will induce a climate change that experts agree will have major consequences on our economy and society. Knowledge of exposure to these risks but also to potential opportunities related to climate change is therefore an issue at stake for investors, for the future of financial performances and its preservation.

It is undeniable that climate change poses a systemic risk to financial investments. Investors need to assess and monitor physical risks and transition risks, and the assessment and measure of these risks are based on company disclosures. Back in 2015, the landmark Paris Climate Agreement identified and encouraged ESG disclosures as a key tool to support the low-carbon transition.

In this context, reliable disclosures of risks, financial impacts, and opportunities related to climate change is crucial as to inform investors for decision-making purposes. Climate change mandatory reporting provides an initial quantitative assessment of each company's climate data and its related challenges, an understanding of their carbon performances related to benchmarks, and whether they are aligned with international objectives in the fight against climate change. A real-world example comes from France, where the implementation of climate change reporting for large companies provided investors with the tools to activate financing towards companies tackling climate change. It is therefore key for investors, regulators and data providers to access differentiating data as to understand a company's awareness of its climate change impact. With future sustainable disclosures from the SEC, investors will own the appropriate tool to become actor in the climate transition.

## About Carbon4 Finance

Created in 2016, Carbon4 Finance (C4F) provides institutional investors with comprehensive and reliable climate data to assess the climate risks and opportunities of their investment portfolios and build environmental investment strategies. Our clients are asset managers, asset owners, banks and index providers willing to report their climate performances or develop climate investment tools and policies based on custom climate data solutions.

Carbon4 Finance offers a complete analysis of climate risks:

- A **bottom-up analysis that goes beyond sectoral analysis**, enabling the identification of the climate-related best performing companies within each sector;
- An **exhaustive analysis of the carbon footprint, identifying both risks and opportunities**, including the calculation of induced emissions and emissions savings (scope 1, 2 and scope 3 emissions upstream and downstream).

Carbon4 Finance climate methodologies build on the 13 years of experience of our consulting entity Carbone 4, in performing life-cycle GHG assessments. These methodologies were designed by consulting engineers, specialized by economic sector. Carbone 4's co-founder Jean-Marc Jancovici developed the Bilan Carbone® (known as Carbon Footprint) method for the ADEME, reference accounting methodology in France which went on to influence international standards. Carbone 4 strongly contributed to the working group for the ISO 14069 and associated guide which specifies rules for GHG emissions accounting. Carbone 4 was also involved in the Finance for Tomorrow working group to support the construction of the 50 ClimActs launched on the One Planet Summit in December 2017. Finally, Carbon4 Finance is represented among the TEG (Technical Expert Group) of the EU that is establishing EU-wide standards on green taxonomy.

In our recent reports on the Oil & Gas<sup>1</sup> and Power<sup>2</sup> sectors, Carbon4 Finance analyzed companies' degree of exposure to transition risk, observed the historical trends of their absolute emissions (Scope 1, 2 and 3), and assessed the strategies activated to align with the global objective of decarbonizing the economy. These results were collected based on CIA (Carbon Impact Analytics)<sup>3</sup> analysis campaigns conducted in 2020 and measured the exposure of companies to transition risk via an overall rating (from A+ to E-) and various sectoral indicators. We believe these results may guide the Commission in assessing the materiality of climate-related disclosures related to the Oil & Gas and Power sectors. Those reports are enclosed to this Public Consultation feedback.

Besides climate data, Carbon4 Finance together with CDC Biodiversité (French actor on biodiversity protection), will launch the Biodiversity Impact Analytics (BIA) Database powered by the GBS®. Combining experiences on climate data and biodiversity footprint methodology, this database will allow investors to assess the impact on biodiversity of their portfolio with a large coverage in terms of assets and markets.

As providers of climate risk data for the financial sector, we welcome the opportunity to provide our input on the selected questions below.

<sup>1</sup> <http://www.carbon4finance.com/lindustrie-petroliere-la-hauteur-des-enjeux-climatiques/>

<sup>2</sup> <http://www.carbon4finance.com/bilan-du-secteur-de-lelectricite/>

<sup>3</sup> [http://www.carbone4.com/wp-content/uploads/2019/09/CarbonImpactAnalytics\\_November18.pdf](http://www.carbone4.com/wp-content/uploads/2019/09/CarbonImpactAnalytics_November18.pdf)

# Public consultation response

## Question 1

How can the Commission best regulate, monitor, review, and guide climate change disclosures in order to provide more consistent, comparable, and reliable information for investors while also providing greater clarity to registrants as to what is expected of them? Where and how should such disclosures be provided? Should any such disclosures be included in annual reports, other periodic filings, or otherwise be furnished?

We strongly support the Commission's willingness to enhance reporting guidelines as to provide more consistent, comparable and reliable information for investors. As we mentioned earlier, investors need to access actionable climate data, as climate change poses a systemic risk to financial investments.

## Question 2

What information related to climate risks can be quantified and measured? How are markets currently using quantified information? Are there specific metrics on which all registrants should report (such as, for example, scopes 1, 2, and 3 greenhouse gas emissions, and greenhouse gas reduction goals)? What quantified and measured information or metrics should be disclosed because it may be material to an investment or voting decision? Should disclosures be tiered or scaled based on the size and/or type of registrant)? If so, how? Should disclosures be phased in over time? If so, how? How are markets evaluating and pricing externalities of contributions to climate change? Do climate change related impacts affect the cost of capital, and if so, how and in what ways? How have registrants or investors analyzed risks and costs associated with climate change? What are registrants doing internally to evaluate or project climate scenarios, and what information from or about such internal evaluations should be disclosed to investors to inform investment and voting decisions? How does the absence or presence of robust carbon markets impact firms' analysis of the risks and costs associated with climate change?

In accordance with Marc Carney's discourse on the "Tragedy of the horizon", three main climate risks categories are identified: transition risks, physical risks and liability risks. In terms of disclosure, we believe both transition and physical risks should be evaluated by the Commission.

**Climate transition risks** are the risks involved with the adjustment process towards a low carbon economy (regulatory development, technological breakthrough, etc.). As to enable an energy transition, it is necessary to shift away from carbon-intensive investments and to mitigate climate change. Beyond the carbon footprint, it is essential to consider the capacity of a company to contribute to the energy and climate transition.

We identify several metrics which registrants should report on as to enable investors embedding transition risks in their investment strategy.

First, reporting should contain **induced emissions**, comprising the Scope 1, Scope 2 and Scope 3 emissions most material to their activities, by business segment. All scopes' consistency should be transparent, and calculation methodology should be subject to comprehensive explanations. Historical data should be reported as to comprehend the registrant's ability to reduce its emissions over time. As activity data is key as to back up the emissions reported by companies, physical data on energy consumption would provide higher granularity and consistency of data.

Focusing on **emissions savings**, it is a climate metric which **we believe the Commission should carefully assess, as it helps investors to steer investments towards solutions for a decarbonized economy**. Today, the climate impact of companies is assessed through a static indicator: the carbon intensity, which measures, at a given moment, a company's carbon emissions. To achieve the 2° C target of the Paris Climate Agreement, it is also necessary to look at the reality of a company's strategic and financial commitment to a low carbon transition. A metric providing the means to quantify this commitment is the "carbon emission savings" indicator, which was developed by Carbon4 Finance, and successfully applied by investors, i.e., our clients, in their sustainable investment strategy.

**Emissions savings** are calculated by adding up the "avoided emissions" (comparing the company to the trajectory of its sector) and the "reduced emissions" of a company (comparing the company with itself over 5 years):

- **avoided emissions** are the emissions that are avoided by the company's products and services; they are calculated by comparing the emissions with a sectorial baseline scenario (i.e. an IEA scenario 2°), or with the substitution by low-carbon solutions. **A company avoids emissions if there is a positive gain between the induced emissions of the company on the one hand, and the baseline sectoral emissions scenario on the other hand.**
- **reduced emissions** are the **volume of emissions lowered through a process efficiency over time**: an emission reduction is a **real decrease** of the company's carbon intensity over 5 years.

**The "emission savings" indicator is key to understand the real impact of a company.** This indicator is a powerful tool as to identify companies that have already entered the climate transition and to measure the companies' action for the low carbon transition, providing figures that are more meaningful and tangible than all the companies statements that claim carbon neutrality.

While induced and emissions savings can be used to report on a company's current performance, it is important to have a forward-looking view of the company. Extra-financial disclosures should contain the detailed **climate change mitigation strategy** of the registrants, with targeted emissions reduction as well as the intermediary actions to achieve the target(s). In accordance with the Paris Climate Agreement, a **strategy towards a 2° aligned economy should be set out**. Governance and oversight of climate change-related challenges should also be disclosed as to ensure management is involved in the monitoring of the climate change forward-looking strategy. We will further tackle this point in the Question 8.

Lastly, as to demonstrate companies' willingness to shift their business towards climate change mitigation, they should disclose their investment and R&D in low-carbon projects. It is indeed by reporting low-carbon investments that companies show investors they are equipped with the necessary resources as to mitigate the climate transition risks. Investors need to ensure that issuers align consistent resources as to tackle climate risks.

The other category of risk which should be addressed in companies' disclosures, are the **physical risks**. It represents the exposure and vulnerability of registrants to physical consequences of climate change (see our CRIS Methodology<sup>4</sup>).

To enable investors to understand and manage company risks and to engage in dialogue with registrants, companies should identify in their reporting acute and chronic climate hazards as well as adaptation strategies to withstand these risks.

Registrants should disclose the geographical area of their activities, and the location of assets in sectors most affected to physical risks. This would provide investors with accurate data as to identify the companies most subject to natural disasters.

### Question 4

What are the advantages and disadvantages of establishing different climate change reporting standards for different industries, such as the financial sector, oil and gas, transportation, etc.? How should any such industry-focused standards be developed and implemented?

The challenges arising from climate change vary by economic sector, both in terms of levers for reducing emissions and in terms of innovations. Roughly 80% of worldwide GHG emissions are generated by some sectors, on which climate disclosure efforts should be prioritized.

Sector	Type of activities
<b>Energy</b>	Electricity and fossil fuel production, Transmission & Distribution
<b>GHG emissions intensive sectors</b>	Heavy industry, Transport industry, Agriculture & Food industry, Forest & Paper, Construction, ICT
<b>Capital goods</b>	Equipment manufacturers for energy, Transport, Real Estate, Industry, etc.
<b>Financial institutions</b>	MDB, Integrated banks, Retail Banks, Insurance
<b>Information and Communication technologies</b>	Data centers, Software, Media, Communication technologies, Consulting services

*Sectors to be prioritized in the energy and climate transition*

We recommend the SEC to concentrate its efforts on assets that have a material impact on the carbon performance of investee companies.

<sup>4</sup> <http://crisforfinance.com/en/cris-finance-climate-risk-impact-screening/>

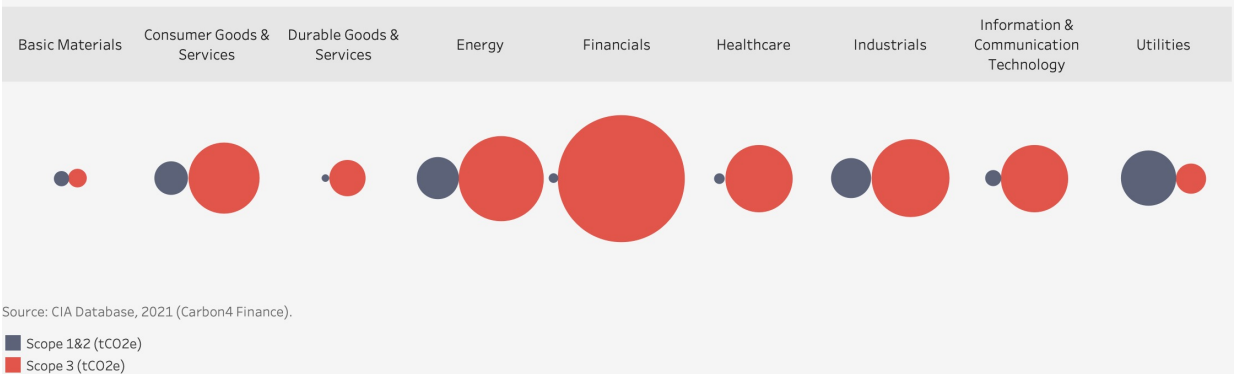
Carbon4 Finance develops sector-specific indicators and calculation modules to factor in the specificities of each sector. This in-depth assessment of the portfolio constituents covers all operating segments and is based on several operational and company-specific data: production volumes (tons of steel, MWh per source, etc.), production or sales locations, energy efficiency of the process, sources of supply, etc. This operational data is collected from various reports made publicly available by the company (annual, CSR and ESG reports). **The disclosure of these consistent, comparable, and reliable data would inform investors on the most material risks to consider for each sector.**

The graph below, retrieved from our database, illustrates the breakdown of induced Scope 1&2 and Scope 3 emissions by sector, for the S&P 500 index. It shows that the Commission should first tackle the industries which have a stronger impact on climate change via their Scope 1&2, and Scope 3 emissions.

### Breakdown of induced Scope 1&2 and Scope 3 emissions by sector

Comparison of induced Scope 1&2 and Scope 3 emissions of S&P500 registrants, aggregated by sector.

The size of the circles is proportional to the amount of emissions (in tonnes of CO2 equivalent).



## Question 8

How, if at all, should registrants disclose their internal governance and oversight of climate-related issues? For example, what are the advantages and disadvantages of requiring disclosure concerning the connection between executive or employee compensation and climate change risks and impacts?

As **governance on climate change** is crucial as to monitor the achievement of related targets, registrants should clearly and transparently define the bodies in charge of tackling climate change starting from the highest-level positions in the management (including the Executive Committee). Companies should define the Board-level oversight and responsibility over carbon performances. Governance on climate change is key for investors as to verify the consistency of reported quantitative data on transition and physical risks. An appropriate governance strengthens a registrant's capability to address this challenge.

Additionally, registrants should disclose if any (financial) incentives linked to the achievement of climate change-related metrics are provided by the management. With that disclosed information, investors would understand if the achievement of the climate change mitigation strategy is more likely to succeed.

As to raise awareness of individuals within issuers' entity, disclosure on whether the company encourage employees to pay attention to climate change or provide trainings on that matter should be provided.

## Question 14

What climate-related information is available with respect to private companies, and how should the Commission's rules address private companies' climate disclosures, such as through exempt offerings, or its oversight of certain investment advisers and funds?

The Commission should address private companies' disclosures by integrating induced emissions (Scopes 1&2 and Scope 3) as a mandatory metric. Without activity and emissions data, it prevents investors from making an initial quantitative screening on carbon performances, major orders of magnitudes and the associated climate risks as to understand their origin (sector, activities, value chain, location, etc.).

Both private and public companies should be actors in the fight against climate change, which should be demonstrated by appropriate climate change disclosures.

# The oil industry: is it up to the climate challenge?

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December 2020

## Foreword.

Using the Carbon Impact Analytics (CIA) methodology, Carbon4 Finance established a ranking of companies within the O&G industry depending on their level of exposure to transition risks.

Based on our data and analysis, we observed historical trends in GHG absolute emissions (Scope 1, 2 & 3) and appreciated the strategies implemented to align – or not – with decarbonation objectives for the world economy.

This briefing note summarizes the results of the CIA (Carbon Impact Analytics) campaign led between June and September 2020 on a sample of a hundred companies of the Oil & Gas (O&G) industry. The CIA methodology aims at measuring stakeholders' exposure to transition risks with a rating scheme (from A+ to E-) and sector-specific KPIs.

# Key messages.

## Scope 3 emissions are the most important, but rarely reported

- **The calculated Scope 3 emissions represent 85% of the total emissions. In other words, if the downstream emissions from a stakeholder's value chain in a sector are not taken into account, then the bulk of its carbon footprint is ignored.**
- Scope 3 emissions are of crucial importance for appreciating transition risk, yet only 1 in 4 companies report them. Not that calculating Scope 3 emissions is easy - collecting the necessary data is indeed long and tedious - but it does show that awareness of the real impact is still too slow among the O&G companies, or that there is a deliberate desire to minimize this impact.
- Moreover, calculation methods vary from one stakeholder to another, making comparison difficult.

## Absolute emissions are on the rise

- In our sample, 1 in 3 companies saw their absolute emissions increase in 2019 compared to 2014.
- The decreases observed are unlikely to be the result of a desire to decarbonise. These reductions are mainly linked to the search for short-term profitability and financial stability, or to structural changes in the markets in which the players operate (variation in the price of crude oil - brent).
- In fact, the announced reduction targets will require real efforts if we hope to achieve the Paris Agreement targets.
- while companies announce vigorous efforts to decarbonize themselves, monitoring absolute emissions over longer and longer periods of time will certainly help to distinguish real efforts from the strokes of luck.

## The major stakeholders are still very carbon-intensive

- Apart from Eni, which has historically been involved in gas, a high carbon intensity was calculated for all the major oil companies.
- The largest stakeholders are not the least exposed to the transition risk, i.e. they remain highly dependent on oil and are not sufficiently involved in natural gas.



## Low-carbon alternatives favoured in corporate strategies

- Renewable electricity generation, biofuel and petrochemical manufacturing: many stakeholders are moving towards these low-carbon activities to diversify their sources of income.



## Promotion of ambitious but vague reduction targets

- The variety of terms used in company announcements makes comparison difficult and too few companies commit to reducing their absolute emissions.
- Reduction targets for Scope 3 emissions remain too scarce, while those covering Scope 1&2 emissions are being set at a wider scale.
- Although companies announced ambitious targets, the decrease in absolute emissions resulting from their implementation would not allow for this industry to contribute to a downward trajectory in GHG emissions limiting temperature rise to 2°C by 2100, which is one of the objectives of the Paris Agreement.
- Fact of fiction ? considering the sector upward trend in absolute Scope 3 emissions, we remain doubtful of the companies' willingness to reduce GHG emissions linked to the use of their products.

Due to the high environmental stakes surrounding the industry, it has historically been followed by many third parties (NGOs, institutional groups, etc.). Globally, it is generally agreed that in the long term, despite the inclusion of Scope 3 emissions in their transition strategy, the major stakeholders have ambitions that are not in line with the Paris agreements.



### Oil Change International, *Big Oil Reality Check — Assessing Oil And Gas Climate Plans*<sup>1</sup>

- **Key message:** none of the "big oil" commitments reviewed are ambitious enough - not even BP, which has committed to reduce production and halt exploration.



### Transition Pathway Initiative, *Carbon Performance of European Integrated Oil & Gas Companies: Briefing Paper*<sup>2</sup>

- **Key message :** the commitments made under Scope 3 are not ambitious enough for an alignment with the 2°C scenario. Shell and Eni stand out as the most ambitious companies in the sector.

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1. <http://priceofoil.org/2020/09/23/big-oil-reality-check/>  
2. <https://www.transitionpathwayinitiative.org/publications/58.pdf?type=Publication>

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# 1 Our methodology

The CIA methodology makes it possible to model the carbon footprint of each stakeholder's different activities; the overall rating is a result of the weighted total of these different footprints.

For example, for a company involved in oil, power generation, and petrochemicals, each segment is analysed separately, and the overall score for that stakeholder will be the weighted sum of the scores obtained.

**The following section presents the CIA methodology applied to Oil & Gas activities only.**

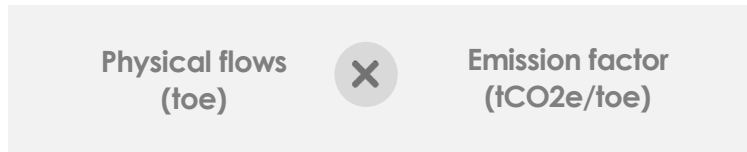


# 1.1 Calculation of induced emissions

## Scope 1&2

For each activity, an emission factor is associated with a physical volume that is either published by the stakeholder (primary data) or estimated by the analyst if the information is not directly available (secondary data). These emission factors are updated annually, during the methodological review of the sector concerned.

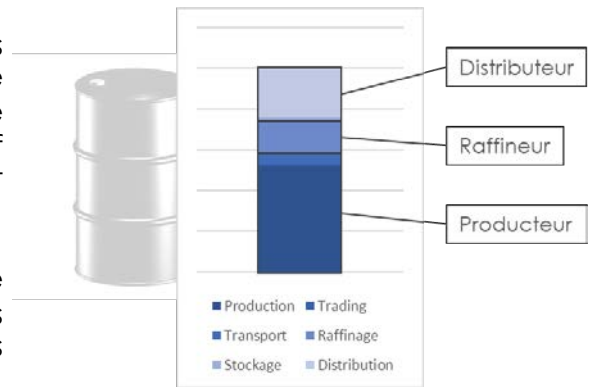
### Induced emissions scope 1 et 2 (tCO2e) :



## Scope 3

Scope 3 emissions calculated for O&G activities correspond only to downstream emissions related to the combustion of the products managed by the stakeholder. Based on a study of added value, a share of the emissions linked to the combustion of the sold product at the end of the chain is then allocated.

The emissions resulting from the combustion of one tonne of oil equivalent extracted from the ground are thus distributed to all the stakeholders who contributed to its delivery to the market, from production to distribution.



For example, for the same volume, an independent producer will have higher Scope 3 emissions than an independent refiner, since extraction is the step that adds the most value. This approach also avoids double counting in the case of an integrated stakeholder.

### Induced emissions scope 3 (tCO2e) :



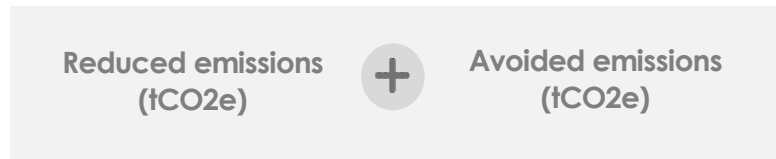
This consideration of the value added by Scope 3 emissions that are calculated by C4F is an important methodological contribution by CIA compared to the very inhomogeneous emissions reported by companies.

# 1.2 Calculation of emission savings

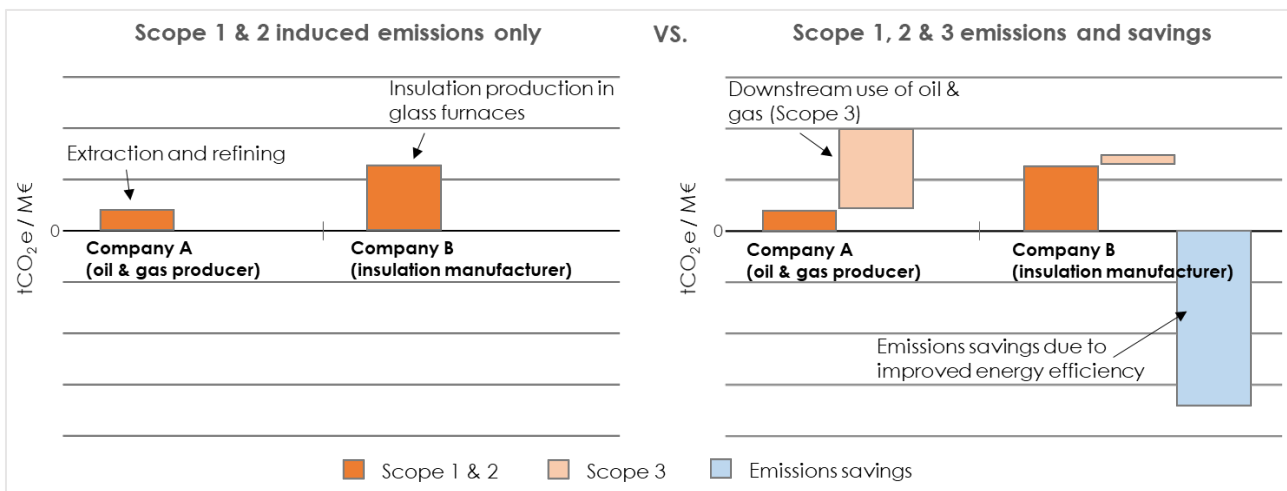
Emission savings measure the speed at which the company is moving to mitigate its transition risk and carbon impact. On the one hand because of its reduction efforts: these are "reduced emissions", where the performance of a stakeholder is tracked over a given period (for example, reduced emissions because of investment in less polluting industrial processes).

On the other hand, because of the positioning of its products and services sold: these are the "avoided emissions", this is where the observed situation is compared to a reference scenario (for example the avoided emissions from the use of biofuel without deforestation compared to petroleum-based fuel).

**Emission savings (tCO<sub>2</sub>e) :**



The graph below illustrates the importance of the saved emissions in the overall assessment of a stakeholder's impact.

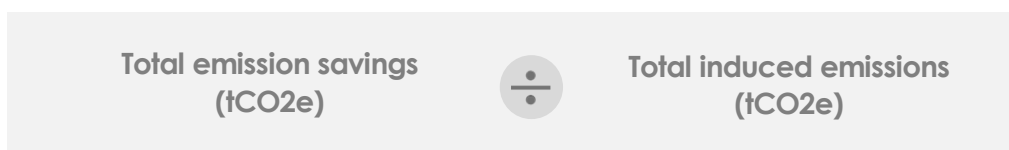


For the O&G sector, reduced emissions are calculated based on the evolution of the carbon intensity of the stakeholder over the last 5 years - between 2014 and 2019 - and only considering the Scope 1&2 emissions. If our calculations show a reduction in this intensity over the last 5 years, this means that the stakeholder has improved its energy efficiency within the scope of its operations and is therefore allocated reduced emissions.

### 1.3 Carbon Impact Ratio (CIR)

In order to be able to compare the efforts of one company to another, C4F has developed the **Carbon Impact Ratio (CIR)** indicator, which expresses emission savings (here only reduced since there are no avoided emissions) as a share of the emissions induced by the company's activities.

**Carbon Impact Ratio :**



For example, a company with a CIR of 1.2 has emission savings 1.2 times higher than its induced emissions. In other words, for every tCO<sub>2</sub>e emitted into the atmosphere, the company saves 1.2 tCO<sub>2</sub>e over the year of analysis.

## 1.4 Calculation of the sector rating

The sector rating for O&G activities corresponds to the weighted sum of 3 indicators ranging from 1 (best possible performance) to 15 (worst possible performance):

- **Absolute past performance – historical view**
- **Relative current performance - a view of the work in progress**
- **Qualitative analysis – a view of its future performance**

### **Absolute past performance**

In order to assess the company's past performance, the change in its absolute emissions (**Scope 1, 2 and 3**) between 2014 and 2019 is calculated using an equivalent method and a comparable scope (i.e. including only the O&G activities presented above). This evolution is then compared with the required reduction in GHG emissions between 2020 and 2025 according to the scenarios published by the IEA, all sectors combined.

As companies in the sector are announcing increasingly ambitious emission reduction targets, our indicator on past performance already allows us to compare its stated ambitions with historical data and, later on, compare the actual decarbonation of the stakeholders with their targets.

### **Relative current performance**

In order to compare the O&G sector stakeholders with each other, the **Corporate Carbon Intensity (CCI)** is calculated, a physical quantity expressed in kgCO<sub>2</sub>e/toe and which only concerns the emissions linked to the combustion of the products managed by the company, i.e. Scope 3 - as opposed to the intensity used to calculate the reduced emissions, which only concerns Scope 1&2 emissions.

### **Qualitative analysis**

The qualitative analysis assesses whether the transition risk has been considered in the strategy implemented by the stakeholder. It is based on 5 criteria:

1. Strategic vision of the stakeholder
2. Transitional investments
3. Emission reduction targets, Scope 1&2
4. Emission reduction targets, Scope 3
5. Governance of energy and climate issues

### **Final score**

The weighted sum of the indicators gives a sector score ranging from 1 to 15.



Although O&G companies are inherently exposed to transition risk, the sector score helps to make a distinction between them, by quantifying awareness, measuring their efforts, and benchmarking their ambitions. In an economy that is moving towards decarbonation and independence away from fossil fuel resources, those that are the least exposed to transition risk will logically be the least affected by systemic change.

# 2

## Carbon4 Finance's results

This briefing note summarizes the results of the CIA (Carbon Impact Analytics) campaign led between June and September 2020 on a sample of a hundred companies of the Oil & Gas (O&G) industry. The CIA methodology aims at measuring stakeholders' exposure to transition risks with a rating scheme (from A+ to E-) and sector-specific KPIs.



## 2.1 Our sample

The Oil & Gas global industry represents around 1,300 companies for a total market capitalisation of 4,933 billion euros<sup>1</sup>, of which 34% is attributable to the Saudi Arabian Oil Company (hereafter Saudi Aramco) alone - one of the few NOCs listed on the stock exchange.

The companies covered by CIA represent around **85%** of this total capitalisation, which includes a sample of **102 stocks** including the 20 largest capitalisations in the sector - except for Novatek.

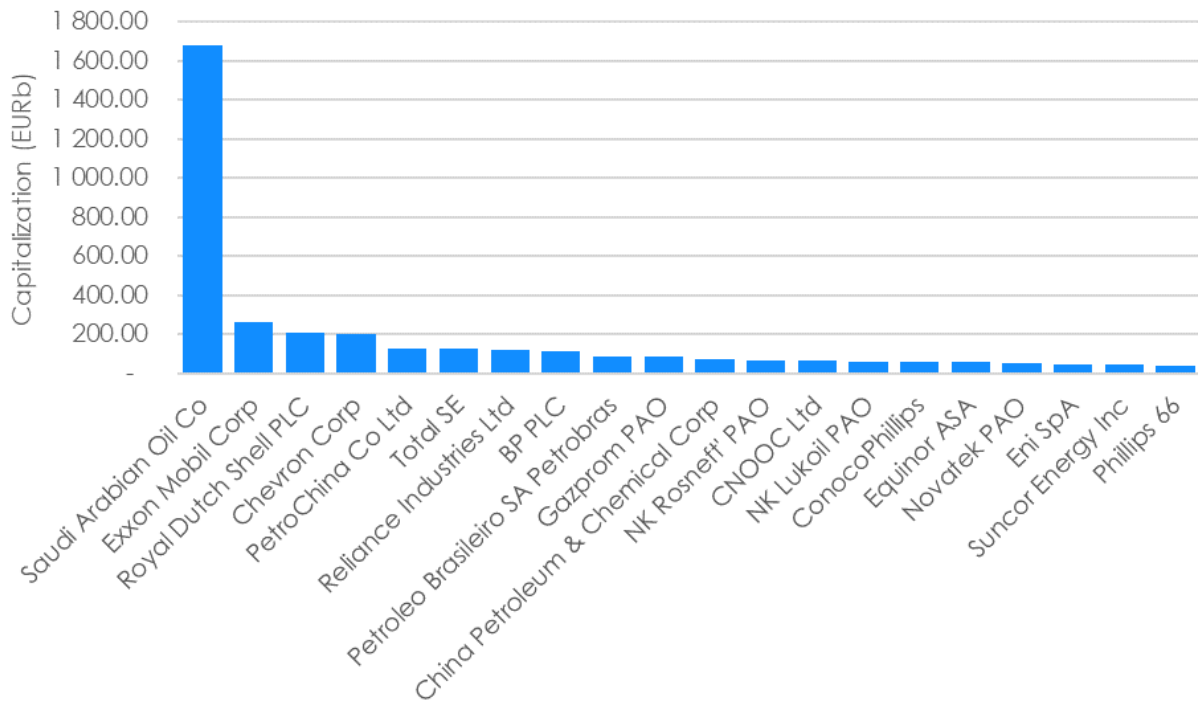


Figure 1 - The 20 largest companies in the global O&G industry, by market capitalisation (in billions of euros)

## 2.2 Ranking of the most emitting companies

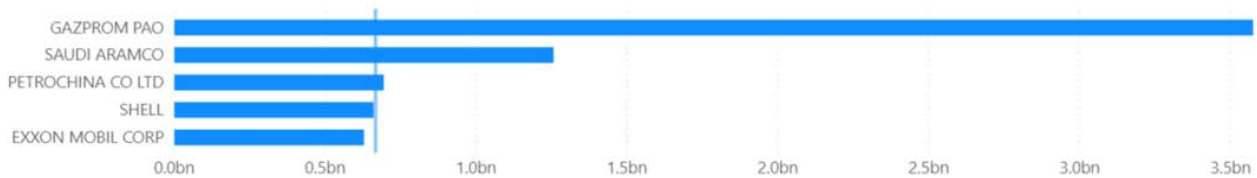


Figure 2 – Top 5 polluters, Scope 3 (milliards de tCO2e)

1. Refinitiv Eikon datas 31/12/2019

In terms of absolute emissions, the stakeholder for whom the largest amount of GHG emissions were calculated for downstream is Gazprom, the Russian gas giant. Indeed, with **3,574 million tCO<sub>2</sub>e**, its Scope 3 emissions account for **nearly 30%** of the sample's Scope 3 emissions. It should be noted that Gazprom is responsible for around 12% of the world's natural gas production (1.40% for oil) and owns numerous gas pipelines in Europe.

It is followed by major NOCs such as Saudi Aramco, Petrochina (listed as part of the CNPC, China's largest oil group) or Petrobras, but also the big oil companies such as Royal Dutch Shell, Exxon, BP, Chevron, Total and Eni.

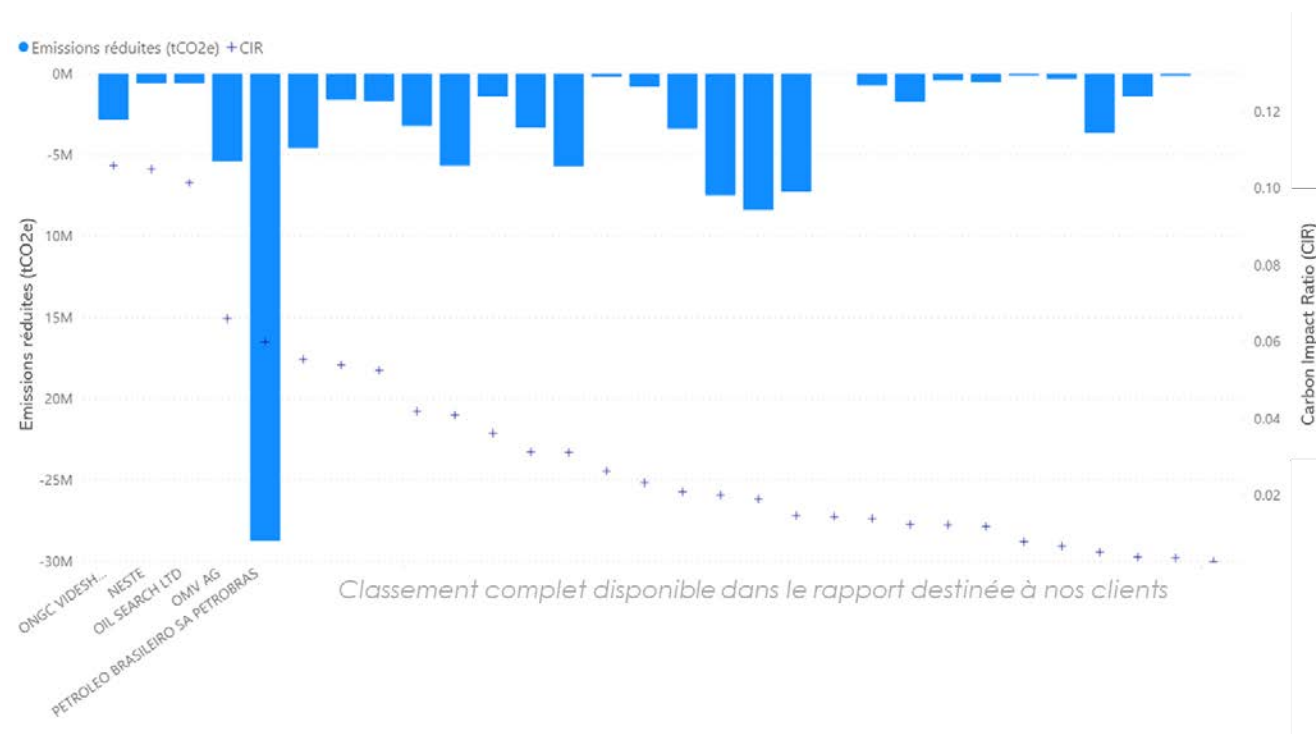
These 15 companies account for **more than 80%** of the total Scope 3 emissions in the sample.

## 2.3 Companies that have begun their transition : Avoided emissions and the CIR

### Focus on Petrobras

Based on our calculations using data published by the stakeholder, **Petrobras** is the company that has achieved the greatest reduction in its operational emissions over the last 5 years, with a 34% reduction in its carbon intensity between 2014 and 2019.

Nevertheless, by taking into account Petrobras' induced emissions, we obtain a [CIR](#) of 0.06, i.e. the reduced emissions compared to 2014 levels represent only 6% of the induced emissions for the year 2019.



## Focus on ONGC Videsh

With a CIR of 0.11, ONGC Videsh is the stakeholder which has the best ratio between what it emits and what it has reduced. While its production volume increased by a factor of 1.77 between 2014 and 2019, its emissions reported in Scope 1 and 2 fell by 36.40%, owing in particular to a significant reduction in the flaring of associated petroleum gases (APG) within its production activities.

Rather than burning them - which emits CO<sub>2</sub> into the atmosphere - ONGC recovers them and transforms them into value-added products, such as liquefied petroleum gas (LPG) or condensates. These products will still be subject to end-of-pipe combustion, but these emissions fall under ONGC's downstream Scope 3.

**The Indian company has therefore moved its operational emissions (Scope 1&2) to its indirect emissions (downstream Scope 3), resulting in significant reduced emissions.**

## 2.4 A look at past emissions

### A) Increase in absolute emissions

The vast majority of the 40 companies with the largest volumes in 2019 increased their absolute emissions compared to 2014.



**Figure 3 – Change in absolute emissions (%), 2019 vs. 2014**

Due to readability, the companies that have more than doubled their emissions are not included in this graph.

Among the non-standard increases, the North American midstream stakeholder, **Marathon Petroleum Corp.** came out on top with +230%. This can be explained by the fact that the company has generally increased its managed volumes (up to x2 in its transport and energy supply activities), but it also started a new natural gas processing activity in 2015, following the acquisition of MarkWest.

## Focus on Repsol

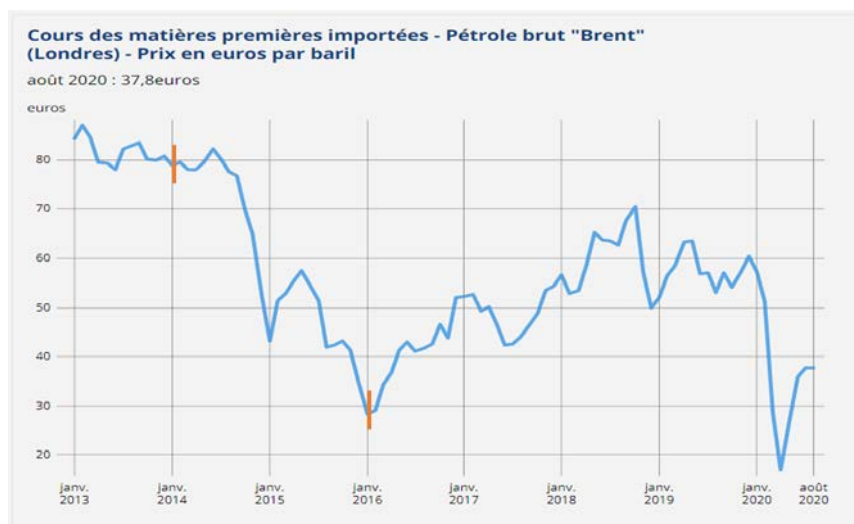
Among the major stakeholders, Repsol increased its absolute emissions by +47.85%, which is explained by the acquisition at the end of 2014 of Talisman, a Canadian oil company. This acquisition resulted in an increase in production volumes (x2), refining activity (x1.11) and retail sales (x1.15). Note that within its production mix, the share of gas increased slightly from 62% to 64%.

It should be recalled that in 2019, Repsol committed to reducing the energy intensity of its products (Scope 1, 2 and 3) by 40% by 2040 (compared with 2010). While the stated ambition is commendable, it must be realised that in order to hope to achieve the objectives of the Paris agreement and limit global warming to 2°C by 2100 compared with pre-industrial levels, absolute accounts for as much as intensity – if not more. Here, however, Repsol's historical trend does not suggest that it is prepared to reduce its absolute emissions.

And it is not the only one: **to a greater or lesser degree, all the majors have seen their absolute emissions increase between 2014 and 2019**, and this upward trend should be put into perspective with the reduction ambitions announced between 2019 and 2020.

## B) For the companies who have reduced their emissions, is it a real desire of mitigating their climate impact?

**There is no way of linking these reductions to a company's real desire of mitigating its climate impact in the long term.** These reductions are mainly linked to economic conditions (search for short-term profitability and financial stability) or structural market changes. An overview of the price of crude oil<sup>1</sup> can also help to understand the variations observed.



## Focus on ConocoPhillips

In the case of ConocoPhillips, a major North American producer, the company experienced financial difficulties as early as 2015<sup>2</sup> due to the fall in crude oil prices; which led it to sell several assets to repay its debt and distribute dividends to its shareholders. Among these divested assets there were: oil sands projects which were sold to Canadian operators in 2017<sup>3</sup>, as well as its interests in exploration blocks off the coast of Senegal<sup>4</sup>.

These disposals have had an impact on production volumes: the share of bitumen has decreased, as has the share of gas. This decrease is reflected in the Scope 3 emissions: the drop in production volumes leads to a reduction in the combustion emissions for which the stakeholder is responsible.

1. Source : INSEE statistics

2. <https://www.nytimes.com/2015/01/30/business/2-oil-giants-post-losses-reflecting-price-plunge.html>

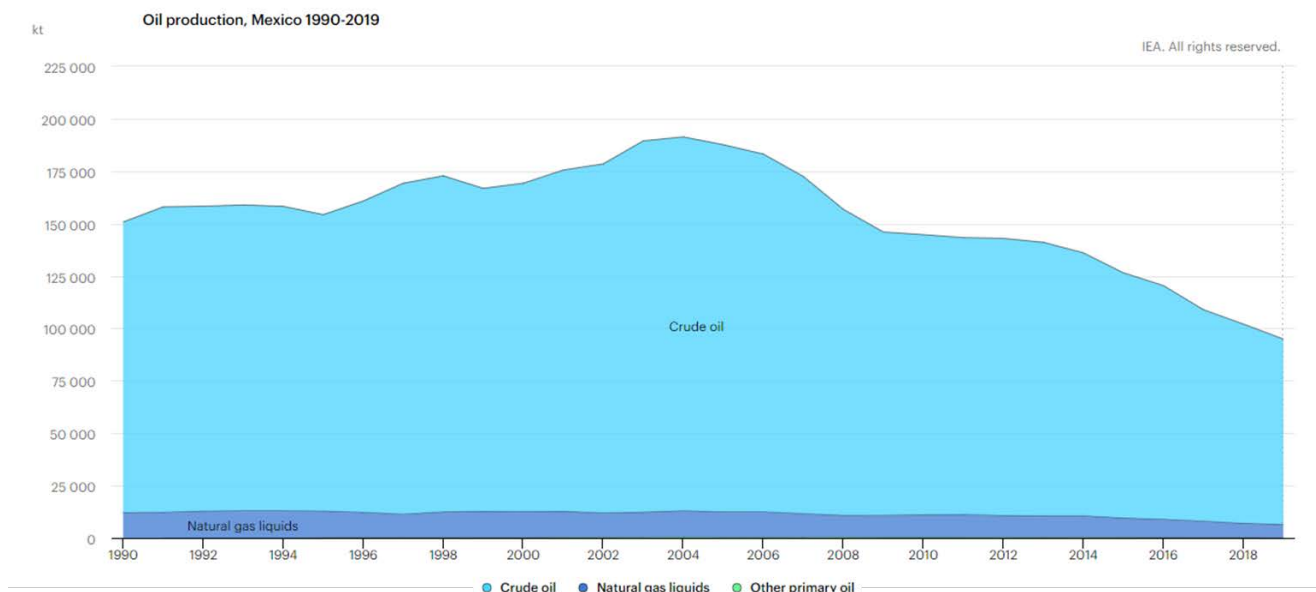
3. <https://www.ft.com/content/38e9a030-14d8-11e7-b0c1-37e417ee6c76>

4. <https://www.financialafrik.com/2016/11/01/conocophillips-acheve-la-vente-de-blocs-dexploration-au-large-du-senegal/>

## Focus on PEMEX

In the case of PEMEX, the drop in its emissions can be explained by the end of its monopoly on the energy market in Mexico<sup>1</sup>. In 2015, already weakened by the downward trend in production volumes since 2005, PEMEX faced the collapse of the price of crude oil, and was bailed out by the Mexican state - the sole shareholder - which at the same time liberalised the market over which it had previously held a monopoly.

The arrival of competition - coupled with the decrease in production volumes of existing assets - logically impacted production activities (-30%) while the volumes of crude oil exported by PEMEX remained unchanged between 2014 and 2019. The domestic refining activity faced an even greater decline (50%), while the imports of refined products from Mexico reached record highs in 2018<sup>2</sup>.



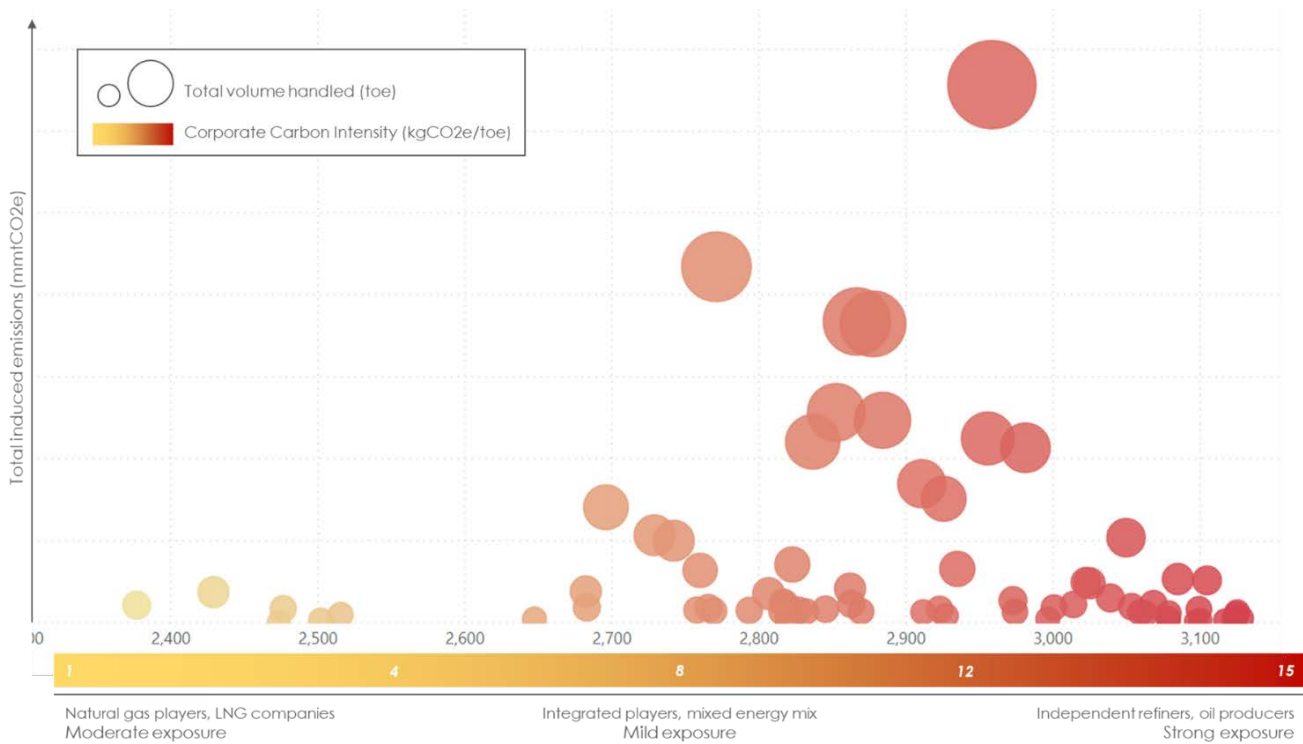
If we add in operational problems that impacted the utilization rate of several refineries in the group<sup>3</sup>, we can better understand the importance of the observed reduction.

**However, while companies announce vigorous efforts to decarbonize themselves, monitoring absolute emissions over longer and longer periods of time will certainly help to distinguish real efforts from the strokes of luck - good or bad.**

## 2.5 Energy mix : Gas versus Oil

The Corporate Carbon Intensity (CCI) allows for a comparison of the exposure to transition risk between the different stakeholders and the identification of certain trends.

- <https://www.oblis.be/fr/news/2017/05/04/valeur-semaine-petroleos-mexicanos-540472-et-https://www.wsj.com/articles/mexicos-pemex-steps-up-refinery-investment-plans-1449613321>
- <https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MTPNTUSMX2&f=A>
- <https://www.reuters.com/article/us-mexico-oil/mexicos-lopez-obrador-pledges-more-than-11-billion-for-refineries-idUSKB1KY2C1>



**Figure 4 – Average intensity of products managed by Oil & Gas companies**

In this graph - from which Gazprom has been excluded for readability reasons - several things can be observed:

- The stakeholders that generate the most emissions (y-axis) tend to have a more carbon-intensive energy mix (x-axis and bubble colour), which is logical since Scope 3 emissions are included in the induced emissions.
- Irrespective of emissions, stakeholders who manage a large amount of hydrocarbons (bubble size) also tend to have a more carbon-intensive product mix. In other words, they are currently more dependent on oil than on gas.

Companies with the CCI the weaker (on the left of the spectrum) are independent producers who have chosen to focus mainly on natural gas, including US stakeholders involved only in shale gas and who, in fact, produce small quantities. There are also companies specialising in the production and exportation of Liquefied Natural Gas, such as Australia's **Woodside Petroleum**. The last profile with a low CCI is the pure midstream stakeholder **Targa Resources Inc.**, which specialises in the processing of natural gas at the well outlet.

Conversely, companies with a high CCI (on the right of the spectrum) are refiners of petroleum products, as well as purely downstream stakeholders specialised in distribution to consumers via service stations. Given the nature of the products sold, these companies are more heavily exposed to the transition risk.

The position of the stakeholders who manage the largest volumes is of importance here, even without a look on past performance: the inertia specific to large structures is highlighted, since it is not necessarily the largest companies that are currently best prepared for the transition (intended or forced) to a low-carbon economy.

Among the majors, only **Eni** stands out thanks to its more balanced mix of natural gas and oil. The others are currently more invested in oil than gas.

## 2.6 Estimating future performance – The Top 5

Taking into account all of the qualitative criteria described above, the following 5 stakeholders obtain the best qualitative score.



Neste, a Finnish integrated stakeholder known for its involvement in biofuels, obtained the best qualitative score for 2019, on a par with Eni, an Italian integrated stakeholder. Several stakeholders are behind him, whose ambitious announcements suggest that the climate challenge is better integrated into the short and medium-term strategy.






### A - Strategies of the top 5

**The strategy adopted by these stakeholders is to generate an increasing share of their turnover through activities that are less dependent on fossil resources, to ensure the sustainability of their economic activity in a context of diminishing resources. We can observe significant investments, but also disposals of carbon assets.**

Some are favouring "low-carbon" energies - which include renewable energies and natural gas - by acquiring numerous stakes in existing companies (**Total, Repsol**), while others are moving towards biofuels by adapting existing infrastructures (**Eni**) or building new ones (**Neste**).

An increase in petrochemical activity is also envisaged in the strategy of many stakeholders (**Equinor**): although they generate significant operational emissions during their manufacture, petrochemical products are not intended to be directly burned - although a lot of plastic and textile waste ends up in incinerators. Moreover, chemicals represent a higher value-added activity.

**To sum up, we are witnessing a strategic shift, to varying degrees, and the emphasis is on renewable energies and other low-carbon activities.** The table below summarises the strategies of the best stakeholders and allows comparison.


Stakeholder	Strategy	Time Scale	Investments	Goals
	<ul style="list-style-type: none"> <li>Continuous increase in bio-fuel production capacity (already 25.5% of turnover in 2019) up to 4.5 Mmt in 2022</li> <li>Monitoring the avoided emissions due to the use of its biofuels compared to conventional fuels</li> </ul>	2022 - 2030	40.49%	-4%, 2017-2025 <b>Gross</b> Scope 1 & 2 Absolute (tCO <sub>2</sub> e)
	<ul style="list-style-type: none"> <li>Reduction in production volumes (not quantified), increasing share of gas</li> <li>Diversification towards bio-fuels (conversion of existing refineries) and hydrogen</li> <li>Increasing investment in renewable production capacity</li> <li>CCUS and reforestation projects to offset induced emissions</li> </ul>	2030	3.24%	-80%, 2018-2050 <b>Net</b> Scope 1, 2 & 3 Absolute (tCO <sub>2</sub> e)
	<ul style="list-style-type: none"> <li>Diversification of activities towards natural gas and the sale of electricity to the detriment of oil (currently, electricity accounts for ~2% of turnover, target of 15% in 2025)</li> <li>Increase in renewable capacity by 2.5 by 2025 (7.5 GW)</li> <li>Investments in hydrogen for transport</li> </ul>	2020 - 2025	7.12%	-15.40%, 2010-2020 <b>Gross</b> Scope 1 & 2 Absolute (tCO <sub>2</sub> e)
	<ul style="list-style-type: none"> <li>Focus on renewable electricity generation - with a stated objective of 25 GW of capacity by 2025 - and the use of natural gas in favour of oil.</li> <li>Financing of research on the CCUS (10% of the R&amp;D budget)</li> <li>Investments towards biogas for transport</li> </ul>	2025 - 2030	11.09%	-15%, 2019-2030 <b>Net</b> Scope 1, 2 & 3 Intensity (gCO <sub>2</sub> e/MJ)
	<ul style="list-style-type: none"> <li>Diversification of activities towards renewable electricity and low carbon (petrochemicals), but increase in the share of oil in production (from 35% in 2019 to 50% in 2030)</li> <li>10-fold increase in renewable capacity by 2025 (~5GW)</li> </ul>	2025 - 2030	3.52%	-20%, 2005-2030 <b>Gross</b> Scope 1 & 2 Absolute (tCO <sub>2</sub> e)

Summary table of 5 most ambitious companies' strategies

## BP's ambition

Even though BP does not appear in the top 5 qualitative performances - due to less transition investments, its involvement in source rock hydrocarbons and a more fragile governance on climate issues - the ambition displayed still deserves special attention.

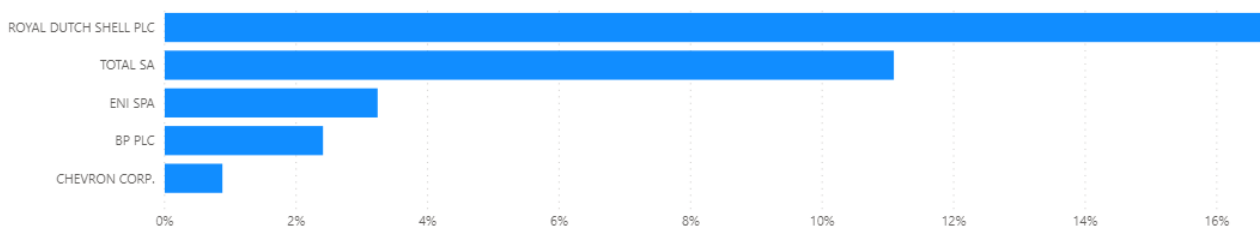
In terms of its strategic ambition, **BP remains the only stakeholder to have explicitly quantified a reduction in its production volumes**, although this objective does not concern all of the company's volumes - notably its 20% stake in Rosneft, another Russian giant which represents 44% of its oil production and 14% of its natural gas<sup>1</sup>.

Acteur	Stratégie	Horizon	Investissements	Ambitions
	<ul style="list-style-type: none"> <li>Sortie progressive des énergies fossiles (-40% en volumes de production d'ici 2030 – hors Rosneft – et arrêt de l'exploration dans les nouveaux pays) pour plus d'activités bas-carbone (renouvelables, biocarburants, hydrogène)</li> <li>Multiplication des investissements vers le bas-carbone par 10 d'ici 2030.</li> </ul>	2025 - 2030	2.41%	-6%, 2015-2025 Gross Scope 1 & 2 Absolute (1CO2e)

These ambitious announcements can be attributed to two factors: on the one hand, the arrival of Bernard Looney at the head of the company in 2020, and on the other hand, the spectacular fall in the price of crude oil following the global economic downturn due to the SarS-Cov 2 pandemic – which necessarily leads to less investments in exploration & production, hence a decrease in production in the medium run.

These outlooks, coupled with the decline of production volumes from existing assets, lead us to think that BP's announcements do not only results from its willingness to limit its GHG emissions, but also from geological and economic conditions.

BP also plans to drastically increase its investments in its low-carbon activities, although the stakeholder has a long way to go. Among the big names, BP is ranked just ahead of Chevron for the share of CAPEX directed towards low-carbon projects.



1. <http://priceofoil.org/2020/09/23/big-oil-companies-still-failing-on-climate/>

## B- Analysis of reduction targets

	Increase in absolute emissions (5y)	Reduction targets (incl. Scope 3)
	+13%	-80%, 2018-2050 Net Scope 1, 2 & 3 Absolute (tCO <sub>2</sub> e)
	+14%	-50%, 2019-2050 Net Scope 1, 2 & 3 Intensity (gCO <sub>2</sub> e/MJ)
	+31%	-60%, 2019-2050 Net Scope 1, 2 & 3 Intensity (gCO <sub>2</sub> e/MJ)
	+12%	-50%, 2019-2050 Net Scope 1, 2 & 3 Intensity (gCO <sub>2</sub> e/MJ)
	+30%	-
	+48%	-40%, 2010-2040 Net Scope 1, 2 & 3 Intensity (gCO <sub>2</sub> e/MJ)
	+9%	-50%, 2019-2050 Net Scope 1, 2 & 3 Intensity (gCO <sub>2</sub> e/MJ)
	+13%	-

### 1) Scope 3 commitments

With the exception of US-based ExxonMobil and Chevron, the other "big oil" companies have all announced reduction targets aimed at achieving carbon neutrality by 2050 with a set of intermediate steps, although these targets are still surrounded by a great deal of vagueness.

Indeed, the reduction targets relate to net Scope 1, 2 & 3 emissions, i.e. taking into account the offsetting efforts undertaken by the company. So, when an O&G company announces an objective for neutrality by 2050, it actually commits to offsetting its induced emissions through the purchase of "carbon credits", funds that will be used to finance reforestation/afforestation projects and other agricultural techniques<sup>1</sup>.

However, **offsetting does nothing to protect against the risks of transition** - be it failed assets, the risk of market loss or the risk of increased costs.

They are also envisaging increasing the use of **CCUS**, a technology that allows carbon dioxide to be captured from the air or at the factory outlet, stored in underground tanks and then reused in an on-demand industrial process (metallurgy, food industry, etc.). Nevertheless, the cost of this technology remains extremely high and the carbon footprint of such a process is still poorly known.

Another limitation: **only Eni has so far committed itself to reducing its absolute emissions (incl. Scope 3)**. The other targets are expressed in terms of carbon intensity of products sold (gCO<sub>2</sub>e/MJ), which does not commit to an effective reduction in absolute emissions. However, it is these emissions that must decrease to remain in line with the objectives of the Paris agreements.

**Given its importance for the O&G sector, it is to be applauded that Scope 3 is gradually being considered in these targets. On the other hand, considering the past emissions and uncertainty surrounding these announcements, there is no way of telling whether the future emissions will be in line with the climate scenarios.**

1. For more information on this subject, please refer to the "Net Zero" initiative launched by Carbone 4.

## 2) Scope 1&2 commitments

While **only 9%** of the companies in our sample have announced a reduction target covering their Scope 3, around 40% are already committed to Scopes 1&2. The positions to be tackled as a priority vary: reducing flaring and gas leaks remains a priority for many stakeholders (Scope 1), while others are turning to electricity produced from renewable sources to power their production sites (Scope 2), or are trying to reduce their energy consumption (Scope 1&2).

However, the time scales differ. While the big stakeholders consider a horizon of 2030 with 2019 as the reference year, the smaller stakeholders are committing to shorter reduction targets, or are still following a previously announced target.

### Zoom

#### A comparison between Eni and BP

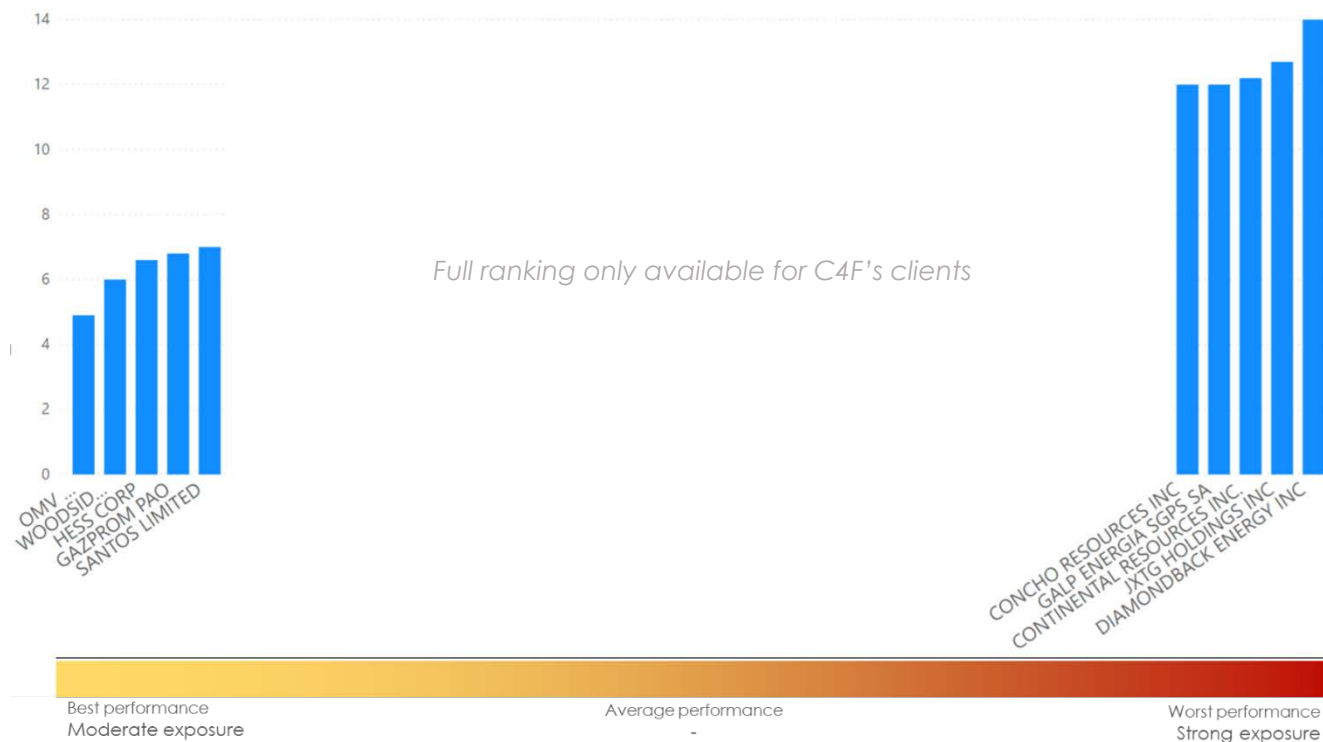
Although these two stakeholders have announced similar reduction and neutrality targets in terms of content, the difference in ratings is based on other criteria, notably investment and governance.

The share of Eni's low-carbon investments is 0.83% higher than that of BP over the same period (3.24% for Eni, 2.41% for BP). At the same time, BP has implemented an absolute reduction target on its Scope 1&2 emissions up to 2025. Eni's targets are less ambitious in comparison.

Finally, while both companies include climate performance in their variable remuneration for employees and have set up internal structures dedicated to climate issues; BP does not seem to offer specific training on climate issues to its employees, something that is highlighted in Eni's documents and which earned it a better score for the governance criterion.

## 2.7 Segment notes

The sector score is a synthesis of the three indicators described above, and therefore makes it possible to classify companies by taking into account their history, their current positioning and their future ambitions. Below are the **40 largest market capitalisations in the sector**, classified by sector score.



A high score indicates high exposure to transition risk, while a low score indicates moderate exposure to transition risk.

### A look at the best stakeholder OMV AG

The Austrian integrated stakeholder OMV AG obtained the best sector rating in this analysis campaign. Thanks in particular to a product mix composed of half gas (52%), as well as a reduction in its absolute emissions over the last 5 years (Scope 1, 2 & 3), due to a decrease in its refining and distribution activities despite a constant increase in its production volumes.

Indeed, over the last 5 years, OMV has divested several oil assets to move towards offshore gas, including a strengthening of its shareholdings in assets in Tunisia<sup>1</sup> and Russia<sup>2</sup>. The stakeholder has also divested certain assets in refining<sup>3</sup>.

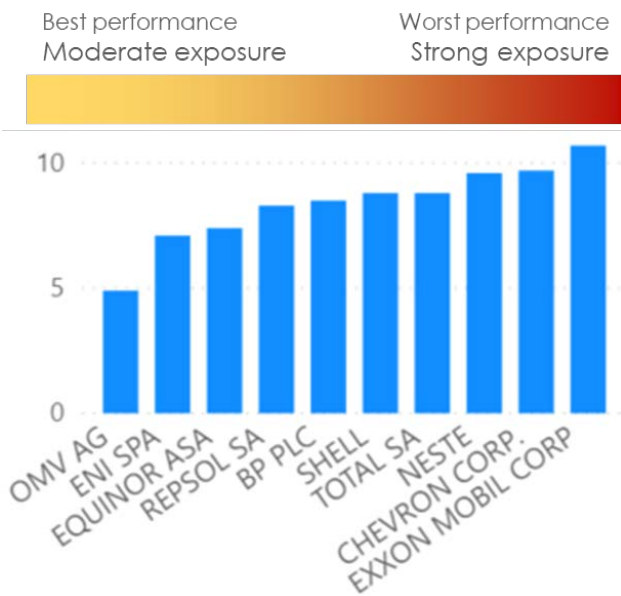
From a strategic point of view, OMV AG plans to increase the share of low-carbon products to 60% of its portfolio by 2025 (52% in 2019), while reducing the energy intensity of its products by 6% by 2025 (compared to 2010), all Scopes combined. The company is also committed to achieving carbon neutrality by 2050, although this notion does not correspond to an absolute physical reality.

1. <https://www.ogj.com/general-interest/companies/article/17272366/omv-to-invest-500-million-in-nawara-gas-field>

2. <https://www.neweurope.eu/article/austrias-omv-enters-russias-yuzhno-russkoye-gas-field/>

3. <https://www.ogj.com/refining-processing/refining/operations/article/17271965/omv-completes-sale-of-bayernoil-interest>

In line with its strategy, OMV has directed 6% of its CAPEX towards transition projects.



Among the big names in the sector, there is a rather striking difference between European and American companies, as the absence of an ambitious strategy at **Exxon** and **Chevron** has a strong impact on their sector rating.

The qualitative rating is the differentiating factor for most of the stakeholders, as the differences observed in the carbon intensity of their products and the evolution of their absolute emissions remain small.

While **Neste** has a certain lead in biofuels, the refining of petroleum products remains its main activity, which therefore presents an extremely high carbon intensity. It is not involved in natural gas, an activity that could contribute to reducing its carbon intensity.

On the other hand, its biofuel production activity is well considered by the CIA method in a dedicated module, and the score obtained via this module puts Neste ahead of all the other major companies.

**Eni** comes out ahead of the other major companies thanks to its past positioning in the field of natural gas and objectives more ambitious than its peers – although not necessarily compatible with a 2°C trajectory. The profiles of **Total**, **Shell** and **BP** are remarkably similar; due to the diverse strategies that they are about to implement, it will be possible to compare the effectiveness of a given strategic choice by monitoring all these companies using the CIA method.

# Glossary

Abbreviation	Meaning
<b>2DS</b>	"2 Degrees Scenario", in which the temperature increase is limited to 2°C by 2100 compared to pre-industrial levels
<b>B</b>	Billion
<b>B2DS</b>	"Beyond 2 Degrees Scenario", in which the temperature increase is limited to 1.6°C by 2100 compared to pre-industrial levels
<b>CIA</b>	Carbon Impact Analytics, analysis methodology used by Carbon4 Finance
<b>EF</b>	Emission factors
<b>IEA</b>	International Energy Agency
<b>K</b>	Thousand
<b>LNG</b>	Liquefied natural gas
<b>LPGs</b>	Liquid petroleum gases
<b>M</b>	Million
<b>NOCs</b>	National Oil Companies
<b>NPS</b>	New Policies Scenario
<b>O&amp;G</b>	Oil & Gas business sector
<b>RTS</b>	"Reference Technologies Scenario", considered as the business-as-usual scenario
<b>SDS</b>	Sustainable Development Scenario
<b>tCO2e</b>	Tonne of CO2 equivalent which measures GHG emissions considering the Global Warming Potential (GWP) of each one
<b>Toe</b>	Tonne of oil equivalent



Launched in 2016 and based in Paris, **Carbon4 Finance** brings to the financial sector the expertise of the consulting firm Carbone 4, which since 2007 has provided services in carbon accounting, scenario analysis and advice in all economic sectors.

Carbon4 Finance offers a complete set of climate data solutions covering both physical risk (CRIS Methodology: Climate Risk Impact Screening) and transition risk (CIA Methodology: Carbon Impact Analytics). These proprietary methodologies allow financial organisations to measure the carbon footprint of their portfolio, assess the alignment with a 2°C-compatible scenario and measure the level of risks that arise from events related to climate change.

Carbon4 Finance applies a rigorous "bottom-up" research-based approach, which means that each asset is analysed individually and in a discriminating manner.

For more information, please visit [www.carbon4finance.com](http://www.carbon4finance.com)

# A REVIEW OF THE ELECTRICITY SECTOR

**Christophe Laugé**  
*Carbon Analyst*

April 2021

# EXECUTIVE SUMMARY.

This report summarises the results of an analysis of around 100 companies in the electricity sector. The analyses were carried out using the Carbon Impact Analytics (CIA) method. The CIA methodology aims to measure the companies' exposure to transition risk, with an overall score based on sectoral indicators and ranging from A+ to E-.

Thanks to the data collected and calculated during this campaign, we established the companies' ranking in the electricity sector according to their degree of exposure. We also looked at their ability to minimise this exposure, and assessed the strategies put in place to see whether they are aligned with the decarbonisation objectives of the global economy.

## Key messages

### A wide range of profiles

- Among the smallest market capitalisation companies, there are two radically opposed worlds: those still relying mostly on fossil fuels and those moving away from them by favouring low-carbon production sources (many renewable energy pure-players);
- Among the companies with the largest market capitalisation, we find that a majority has a decarbonised profile without being low-carbon energy pure-players.

### A great heterogeneity of the decarbonisation between the different players

- Some companies have had a sudden realisation in recent years and are now committed solely to low-carbon energy, such as Ørsted and Vattenfall;
- Nevertheless, this realisation is not unanimous and some players in electricity generation continue being heavily exposed to fossil fuels, mainly in America and Asia.

### Decarbonisation efforts must continue

- In order to achieve the objectives of a 2°C scenario, direct emissions linked to electricity production must be divided by 4 between 2019 and 2040;
- Not only will it be necessary to continue investing in low-carbon electricity generation, but also in electricity transmission and distribution infrastructures and energy storage systems.

This exercise will be repeated annually, the continuity of the CIA methodology will allow for year-on-year comparisons of the results and thus inform future discussions on the effectiveness of the private sector in mitigating their environmental impact.

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# 1 Foreword

Electricity is an industrial and service sector whose purpose is to supply electric energy to an end-user. This process includes several stages: generation (power plants), transmission (high voltage network, which sometimes manages storage systems) and distribution (low voltage network, which sometimes includes storage systems as well) and supply (marketing operations).

Electricity is not freely available in nature, so it must be "produced". Electricity is generated in power plants, which transform so-called primary energy (which is found in nature) into electrical energy. This transformation is achieved by using electric generators driven either by a thermal machine powered by fossil fuels (coal, natural gas or oil), organic fuels (biomass or waste) or nuclear fission; or even directly by mechanical hydroelectric or wind energy. Other sources of electrical energy are also used, such as solar energy (photoelectric effect or thermal concentration) or geothermal energy.

Global electricity production has been increasing steadily since the post-war period (global production was 600 TWh in 1945!).

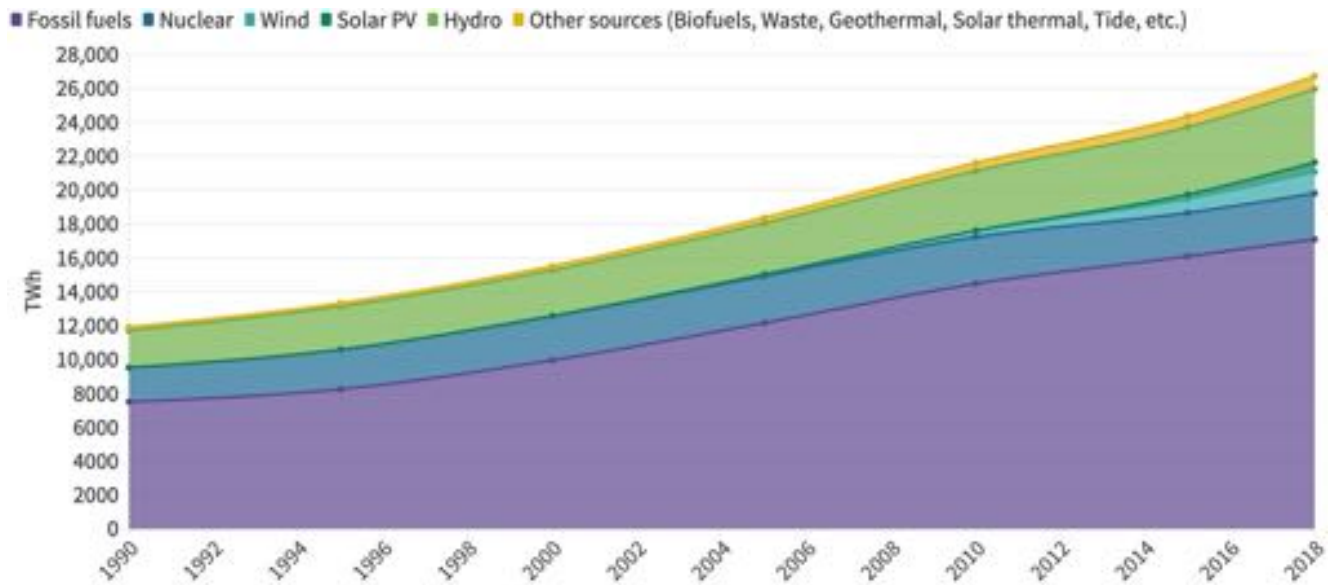


Figure 1 - Global electricity production between 1990 and 2018<sup>1</sup>

In 2018, fossil fuels (coal, natural gas and oil) accounted for almost 2/3 of the world's electricity generation (coal makes just under 40% of electricity generation and gas just under 25%, with oil - heavy fuel oil - making up about 5%).

Between 1990 and 2018, global electricity generation increased by an average of 2.93% per year. This increase was faster for renewables, which was 3.75% per year. The global electricity mix was composed of about 18.5% renewables (including 18.4% hydro) in 1990 compared to 23% (including 16.2% hydro) in 2018 (excluding geothermal, solar thermal, and biomass).

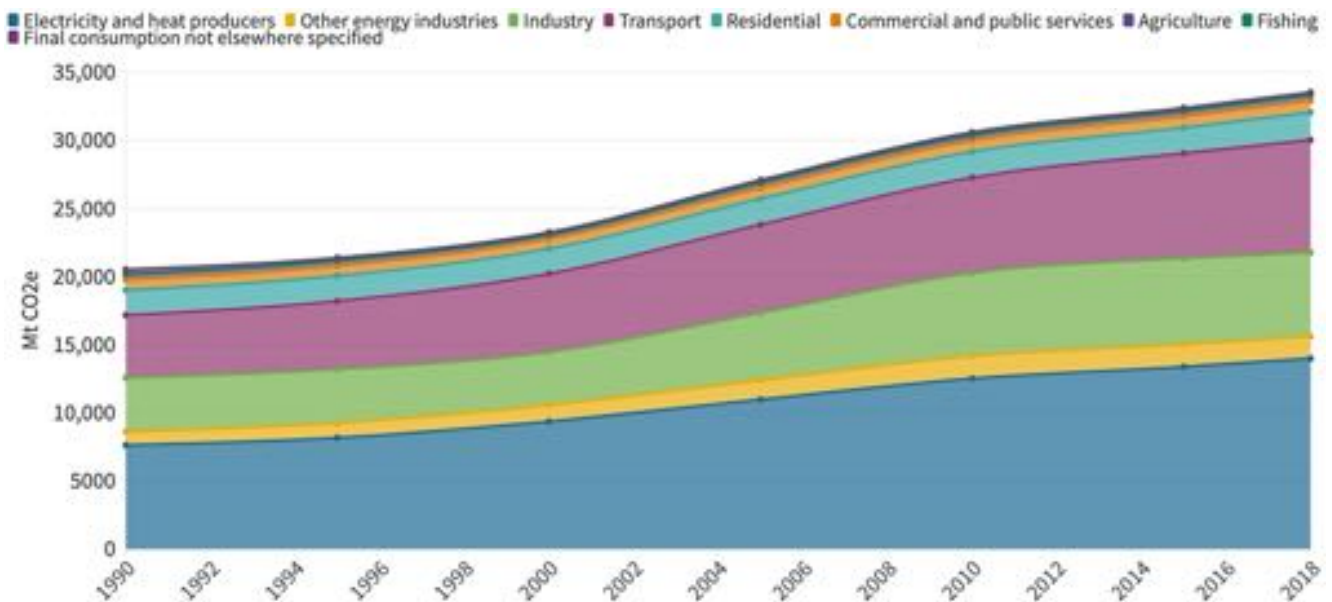


Figure 2 - Global GHG emissions by industry between 1990 and 2018

1. IEA (2020), Electricity Information: Overview, IEA, Paris <https://www.iea.org/reports/electricity-information-overview>

In terms of greenhouse gas (GHG) emissions, electricity generation was responsible for 7.622 Mt CO<sub>2</sub>e in 1990 compared to 13.978 Mt CO<sub>2</sub>e in 2018, accounting for 37.15% of overall GHG emissions in 1990 and 41.71% in 2018.

On a geographical basis, there is a large difference (more than a factor of 10) in the carbon intensity of electricity generation (gCO<sub>2</sub>e/kWh) between countries; in France it was approximately 40 gCO<sub>2</sub>e/kWh in 2019 compared to approximately 720 gCO<sub>2</sub>e/kWh in India<sup>2</sup>. These differences arise from the wide variety of existing ways of generating electricity, from very low-carbon sources such as renewable energy and nuclear power, to the most carbon-intensive resources (coal and heavy fuel oil), as well as intermediate resources such as natural gas.

The electrification of the energy system seems to be progressing and low-carbon energies are increasing their share in the electricity mix. In order to achieve the objectives of a 2°C scenario, this decarbonisation must continue at a rate of -9.5% per year between 2019 and 2040 in terms of direct emissions.

Nevertheless, the integration of low-carbon production often requires modifications to the electricity network, particularly when the new sources are intermittent or do not have rotating machines (cf. RTE IEA report<sup>3</sup>); generating in turn additional costs, related to the line capacities, additional equipment (storage and frequency control), connection and reinforcement costs: the size of the power lines and transformers, as well as the supply of the reactive energy for the voltage control.

The integration of intermittent low-carbon production (this question does not arise with hydroelectricity or nuclear power) raises other issues<sup>4</sup> for the network: maintaining the reliability and quality of the electricity supply while managing increasingly intermittent flows. Indeed, it is necessary to always adjust the electricity production and consumption at all times, and intermittent renewable energy is a non-controllable source. The network system operator thus plays a role of market facilitator, in particular to bring out new levers such as more flexibility<sup>5</sup> to optimise the electricity system. Historically, the development of renewable energy has been carried out alongside the maintenance or development of controllable sources with a comparable installed power<sup>6</sup>. The more the network is supplied with intermittent energy, the greater the modification required of the network and its management; however, the limit to which it could reach is the subject of intense debate.

In theory, electricity storage and the adaptation of the consumption to production provide an answer to these complexities. Several storage technologies are currently in use: Pumped-Storage Hydroelectricity (PSH) and batteries.

Hydro-pumped storage (the most common storage technology: 99% of the 170 GW of storage available in the world, for a global production capacity of around 7,500 GW) is a technique used in hydroelectric power stations which have the characteristic of being reversible. This technique consists of pumping water from a lower basin - or a river - to an upper basin when there is a surplus of electricity on the grid, and then using it to produce electricity when demand is higher (turbining). However, this technology is limited by geographical constraints.

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2. IEA (2020), CO<sub>2</sub> Emissions from Fuel Combustion: Overview, IEA, Paris <https://www.iea.org/reports/co2-emissions-from-fuel-combustion-overview>

3. IEA (2021), Conditions and requirements for the technical feasibility of a power system with a high share of renewables in France towards 2050, IEA, Paris <https://www.iea.org/reports/conditions-and-requirements-for-the-technical-feasibility-of-a-power-system-with-a-high-share-of-renewables-in-france-towards-2050>

4. [https://assets.rte-france.com/prod/public/2021-01/RTE-AIE\\_synthese%20ENR%20horizon%202050\\_FR.pdf](https://assets.rte-france.com/prod/public/2021-01/RTE-AIE_synthese%20ENR%20horizon%202050_FR.pdf)

5. The flexibility of the sources of the distribution network are numerous and can cover all kinds of technologies, in particular those linked to storage (electric vehicles, hot water tanks, hydrogen storage, etc.). They can also be proposed by consumers or producers, for example a group of individuals who reduce or postpone their consumption in anticipation of a cold peak (voluntary consumption reduction) or a power plant which reduces or increases its production to relieve congestion on the network.

6. This is at least the case in Spain and Germany, with the exception of small, highly interconnected countries (e.g. Denmark) where it is the neighbours who provide the power.

Battery storage has the advantage of offering more versatility than PSHs (few geographical constraints; and it has the possibility of adapting in size and power). However, this technology which enables the supply of large amounts of power on a short time scale, does not yet check all the boxes for a storage system that will be capable of operating from one month to the next, or from one year to the next (see again the RTE IEA report).

## The Power sector campaign

### Points of attention

- The scope of the analysis is limited to the indices monitored by C4F.
- The results presented are limited to the core business (the segment with the largest share of revenues) of a company.

Examples:

Enel is a vertically integrated company (breakdown of its revenues: 62% electricity generation, 20% T&D electricity, 11% electricity supply and 7% gas) and its main activity is electricity generation, so in the case of Enel the study below will only focus on electricity generation.

Engie (breakdown of its revenues: 46% in electricity generation, 10% in electricity supply and 44% in gas), its main activity is also electricity generation, so the study will only present the results of that specific activity.

Edison International (breakdown of its revenues: 14% in electricity generation, 72% in electricity T&D, 14% in electricity supply), its main activity is electricity T&D, so the study will only focus on electricity T&D.

- It is therefore a sectoral study, which does not aim to compare the companies with each other, but rather compares the homogeneous sectors of these companies.



# 2 Methodological overview

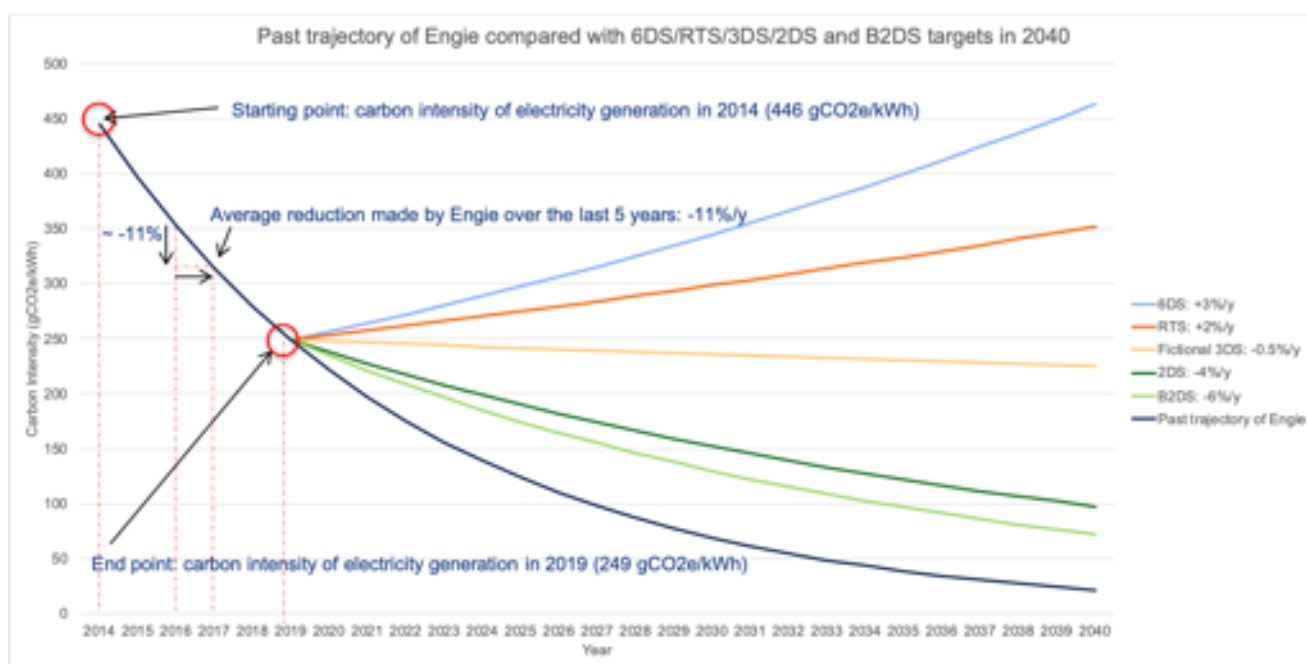
A sector score is composed of **3 sub-scores**:

- **A past performance score**, which captures the company's GHG emissions reduction momentum over the last 5 years;
- **A current performance score**, which compares the company's current performance with the sector as a whole (this score is relative to the sector as a whole and it is adjusted after the sectoral campaign, enabling the comparison on a similar basis);
- **A future performance score**, which measures the extent to which the transition risk is considered in the company's strategy, based on 5 criteria:
  - The measures taken by the actor and its positioning on the market;
  - Transitional investments;
  - Scope 1&2 emissions reduction targets;
  - Scope 3 emissions reduction targets;
  - Governance of energy and climate issues (the existence of internal structures dedicated to energy and climate issues, the presence of training for employees on energy and climate topics and the implementation of incentives for members of the organisation to reduce their carbon footprint).

## 2.1 The case of electricity generation

In the case of electricity generation:

- The past performance score is measured by the reduction rate of the electricity generation's carbon intensity ( $\text{gCO}_2\text{e/kWh}$ ) over the last 5 years and is compared with what is required in the ETP scenarios (B2DS, 2DS, RTS) between the year of analysis and 2040. This reduction rate is then expressed in temperature (below is an explanation with an example and a graph to better understand the attribution of this score). The past performance score makes up 20% of the electricity generation's sector score.



In this graph the reduction of the carbon intensity of Engie's electricity generation activities has been plotted over the last 5 years, from 446  $\text{gCO}_2\text{e/kWh}$  in 2014 to 249  $\text{gCO}_2\text{e/kWh}$  in 2019 (dark blue portion of the curve), which corresponds to an average reduction of 11% per year. In order to obtain the past performance score, this annual reduction rate is compared with the various reduction rates that Engie would need to achieve in order to meet the carbon intensity targets set by the different 6DS/RTS/etc. scenarios set for 2040. In Engie's case, the reduction achieved so far is higher than that of its specific B2DS scenario.

- The current performance score is measured by the carbon intensity of the electricity generation ( $\text{gCO}_2\text{e/kWh}$ ) during the year of analysis (note: it is relative to the sector, see above). It makes up 40% of the electricity generation's sector score.
- The future performance score represents the company's willingness to reduce emissions, divest from fossil fuel power plants, develop more low-carbon power generation units (all sources with EFs below 100  $\text{gCO}_2\text{e/kWh}$  across Scope 1&2&3 are considered as low-carbon) and set targets for reducing the carbon intensity of electricity generation ( $\text{gCO}_2\text{e/kWh}$ ). It makes up 40% of electricity generation's sector score.

## 2.2 The case of electricity transmission and distribution

In the case of electricity transmission and distribution:

- For the past performance score, we focus on reduced emissions. If a company has managed to improve its efficiency over the last 5 years, then it will result in reduced emissions. In the case of an electricity transmission and distribution company, the carbon efficiency is measured by the company's ability to reduce its grid losses. These reduced emissions are used to calculate the CIR (Carbon Impact Ratio) associated with the T&D activity, which is the ratio of the reduced emissions over the induced emissions. The CIR value will then be used to determine the past performance score. The higher the CIR, the better the past performance score (the largest gain was achieved by Consolidated Edison, with a CIR of 0.35, see the paragraph below for more details). The past performance rating represents 30% of the electricity T&D's sector rating.
- The current performance score is measured in terms of grid losses of the electricity network (reminder: the current performance rating is relative to the whole sector, see above). It represents 40% of the electricity T&D's sector rating.
- The future performance score is measured by the company's willingness to contribute to controlling energy demand (through the development of technologies that allow peak shaving or the installation of smart meters) and to define its reduction targets for the network losses and sulphur hexafluoride (SF<sub>6</sub>) leaks - in Europe the losses are around 6 kg SF<sub>6</sub>/TWh for a distribution network and 60 kg SF<sub>6</sub>/TWh for a transmission network. The future performance rating represents 30% of the electricity transmission and distribution's sector score.

# 3 Results

## 3.1 Our sample

### The electric power sector as a whole

There are 626 companies in the electric power industry, **of which 84** are covered by C4F. These 84 companies represent **78% of the total market capitalisation** of this industry. The 20 largest capitalisations in the sector are covered – except for PG&E (due to its financial instability, as it is a company in bankruptcy).



Figure 3 - The 20 largest companies in the electricity sector, by market capitalisation (as of 31/12/2019 in millions or euros)

## 3.2 Ranking of the companies with the highest greenhouse gas emissions

### The electric power sector as a whole

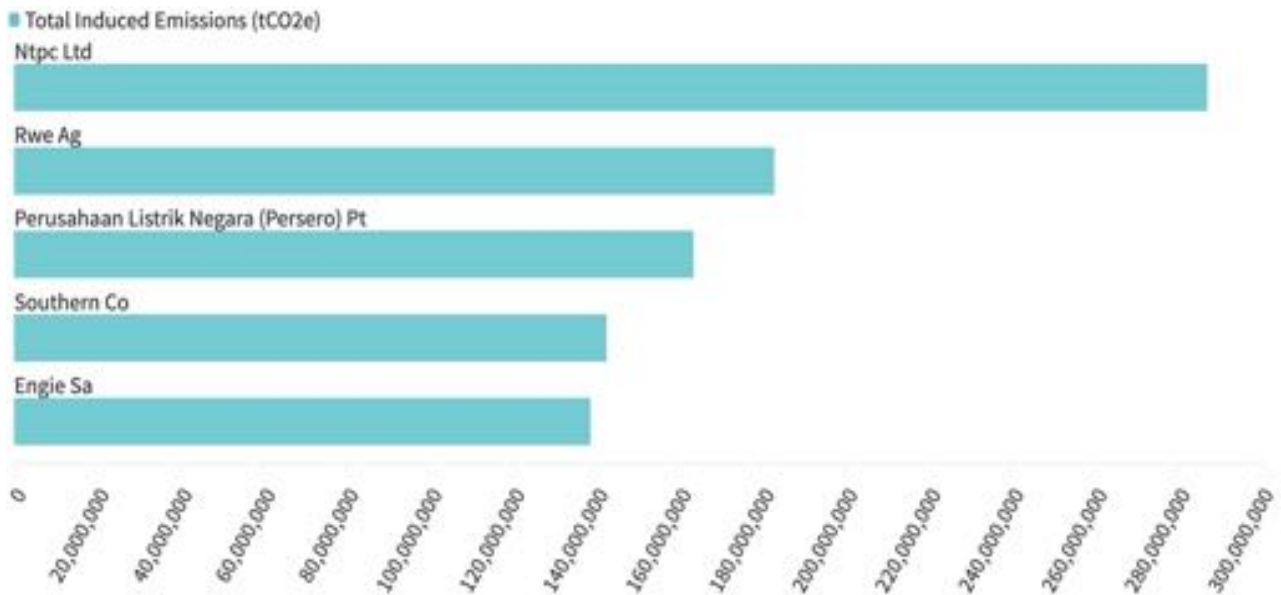


Figure 4 - The 5 most emitting companies in the Power sector, Scope 1&2&3 (tCO<sub>2</sub>e)

In terms of induced emissions, National Thermal Power Corporation Limited (NTPC Ltd), one of India's leading electricity and gas generation and distribution companies, is the largest emitter (of all Scope 1&2&3 emissions). At 287 million tCO<sub>2</sub>e, its emissions account for nearly 9% of the global electricity sector's total emissions (Scope 1&2&3), with a total electricity production of over 245 TWh in 2019.

Of the total Scope 1&2&3 emissions in the sample, the 37 highest emitters alone account for more than 80% of the emissions.

### 3.3 A focus on electricity generation

#### A- Companies committed to decarbonisation: reducing the carbon intensity of their electricity production

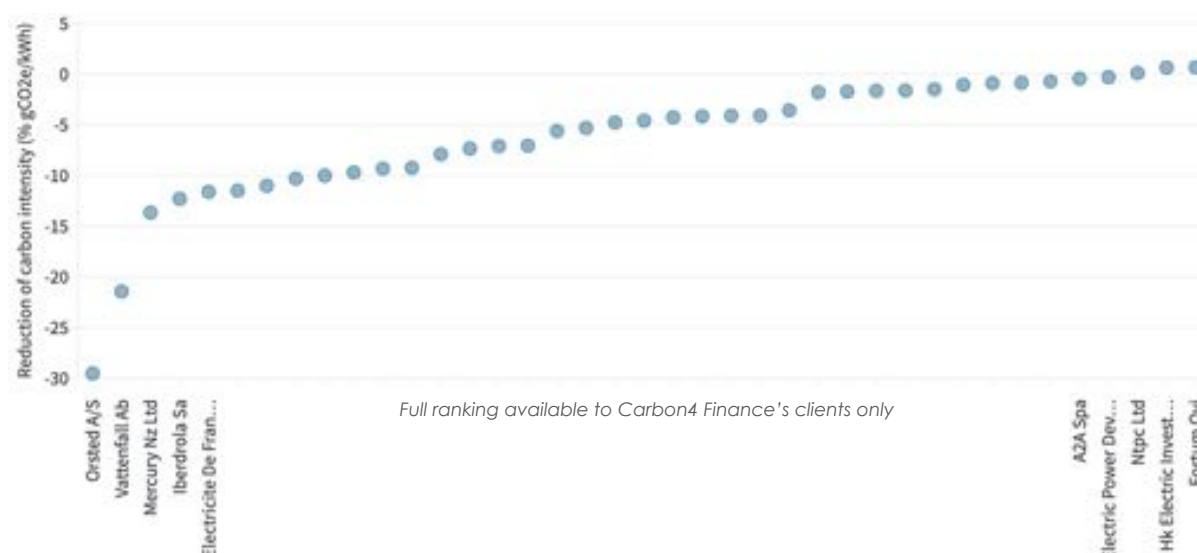


Figure 5 - The carbon intensity reduction (% gCO<sub>2</sub>e/kWh) of the electricity generation over the last 5 years

#### The Ørsted and Vattenfall cases

According to company data, **Ørsted** has achieved the largest reduction in the carbon intensity of its electricity generation over the last 5 years, from 374 gCO<sub>2</sub>e/kWh in 2014 to 65 gCO<sub>2</sub>e/kWh in 2019, equivalent to **an annual reduction of almost 30%**. Indeed, Ørsted (formerly Dong Energy) was mainly a coal operator until 2008 when it revamped its strategy and began to invest heavily in renewables, particularly in offshore wind farms, converting their coal plants to biomass. Ørsted also divested from its oil and gas business in 2017, production formerly used within the group for electricity generation.

Similarly, **Vattenfall** has achieved a very significant reduction in the carbon intensity of its electricity generation over the past 5 years, from 421 gCO<sub>2</sub>e/kWh in 2014 to 126 gCO<sub>2</sub>e/kWh in 2019, the equivalent to **an annual reduction of 21%**. This reduction is mainly due to the sale of its fossil fuel and coal activities in 2016 (which were partly used internally by the group, such as Ørsted with its oil and gas activities). Today the low carbon intensity of Vattenfall's electricity production is largely attributable to nuclear power generation (more than 40% of its total production), but the company remains significantly exposed to fossil fuels (24% of total production, of which 16% is gas and 8% coal).

## B- The reduction by region

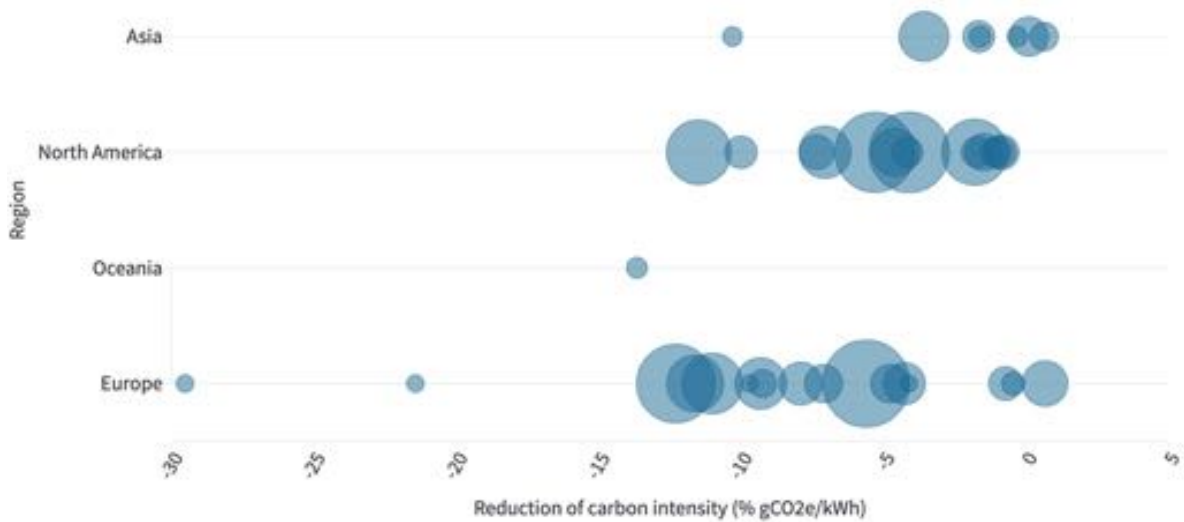


Figure 6 - The carbon intensity reduction of electricity generation (% gCO<sub>2</sub>e/kWh) by region

In this graph we have plotted the annual reduction of the electricity generation companies' carbon intensity by region. Overall, North American and European companies have embarked on a GHG mitigation strategy. Among the large market capitalisation (larger bubble size), the reduction is slightly greater for the European companies than for the American ones. In Asia, the reduction remains insignificant.

## C- The current energy mix

The carbon intensity of the electricity generation (gCO<sub>2</sub>e/kWh) allows us to compare the exposure to transition risk between the different players.

Below is a graph representing the carbon intensity of electricity generation (gCO<sub>2</sub>e/kWh) on the x-axis, the production volumes (MWh) on the y-axis and the size of the bubbles is proportional to the market capitalisation. The colours are correlated with the current performance rating of the electricity generation.

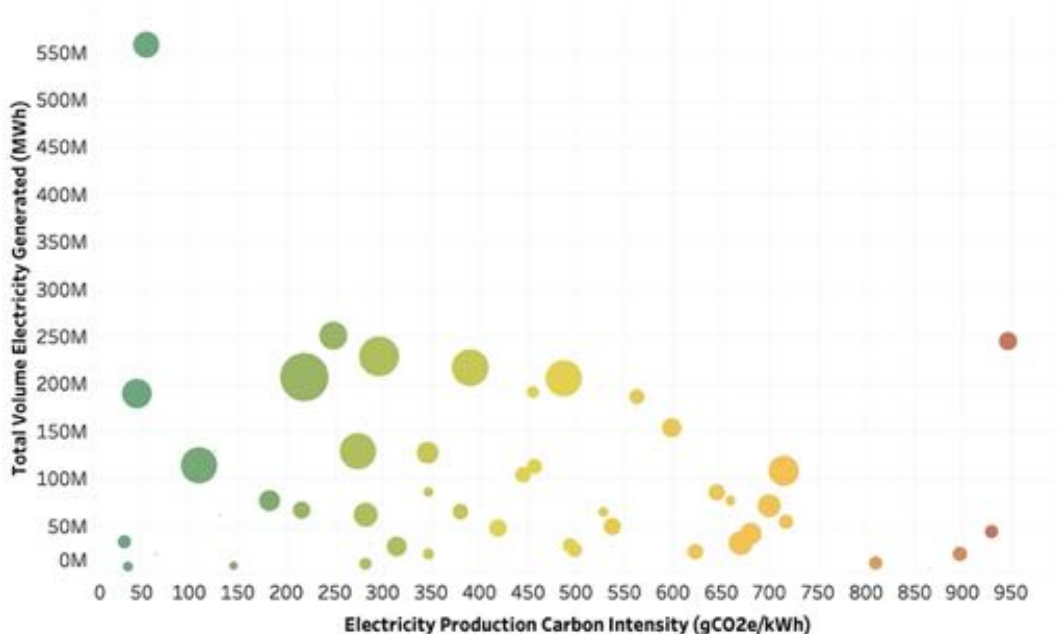


Figure 7 - The carbon intensity of the companies' electricity generation (gCO<sub>2</sub>e/kWh)

Our observations from the graph:

- Among the smallest market capitalisation, there are two radically different profiles, which fall either side of 400 gCO<sub>2</sub>e/kWh. Two schools of thought stand out: those still relying heavily on fossil fuels, and those shifting away from them relatively quickly (with many pure players in renewable energy);
- Among the companies with the largest market capitalisation, we find a wide variety of profiles, the majority being decarbonised companies (we note that EDF is in a peculiar position, as it has a low stock market value given its high production and low emissions per kWh);
- Overall, the profiles are diverse, particularly among the smaller market capitalisation, some of which are still very dependent on fossil fuels.

## D- Energy mix by region

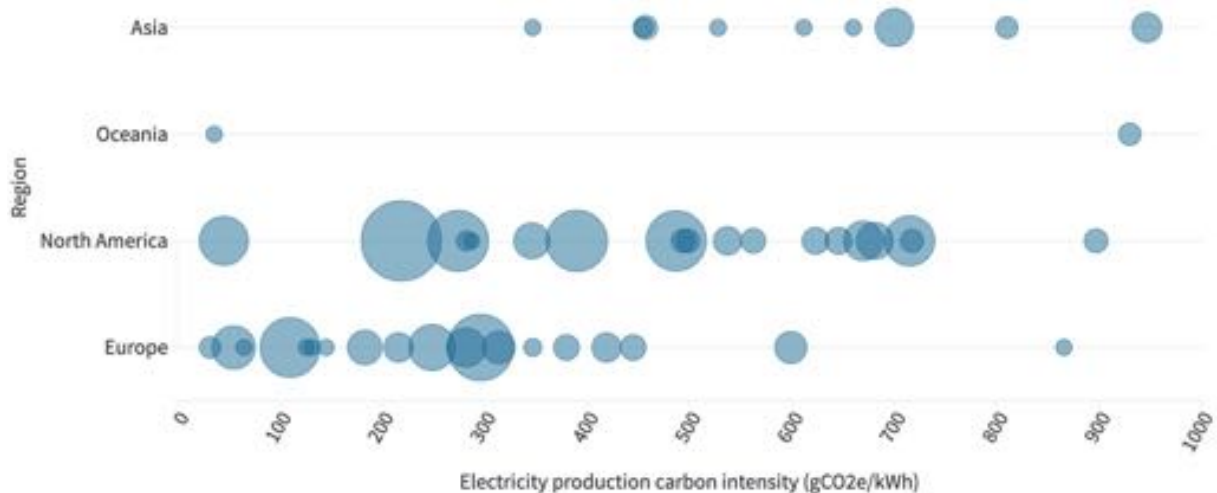


Figure 8 - The carbon intensities of the electricity generation (gCO<sub>2</sub>e/kWh) by region

In this graph we see that European power producers have a much lower carbon intensity than their American and Asian counterparts, both among large and small market capitalisations (bubble size).

Does this mean that European electricity generation companies have better anticipated the energy transition? The first decarbonised energy source in Europe remains nuclear, followed by hydropower. Neither of these was implemented for climate mitigation purposes, but rather because of the scarcity of coal on the ground, forcing them to turn to gas, nuclear power, and hydroelectricity. It is therefore mainly due to historical reasons which explain this relatively good performance.

## E- Which plans are the electricity generating companies coming up with?

Taking all the qualitative criteria together, the following 5 actors have the highest qualitative score.

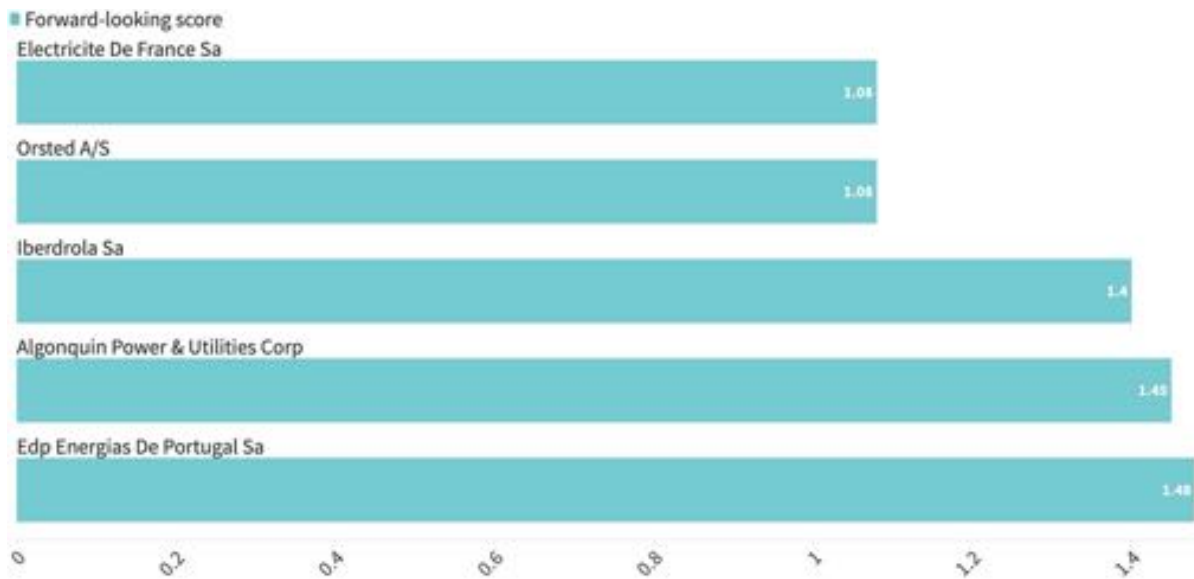







Figure 9 - The top 5 qualitative scores for the electricity generation sector

As a general observation, companies receiving a good qualitative score are those whose decarbonisation is already well underway, therefore further seeking to strengthen their position as drivers of this transition.

These companies are seeking to generate an increasingly larger share of their revenues from low-carbon energy. More concretely, they are investing heavily in low-carbon energy (mainly wind and solar), but also divesting from their fossil fuel assets (mainly thermal power plants). Below is a comparative table of the strategies put in place by the best performing players.

Company	Strategy	Horizon	Low-carbon investments	Targets
 EDF	<ul style="list-style-type: none"> <li>- Disposing all its coal plants by 2026</li> <li>- Extending the life of its nuclear power plants</li> <li>- Increasing its solar capacity (1 GW/year until 2028)</li> <li>- 10 GW of additional storage capacity by 2035</li> </ul>	2023 - 2035	97% (monetary)	Maintaining the level of its carbon intensity at 55 gCO <sub>2</sub> e/kWh
 Orsted	<ul style="list-style-type: none"> <li>- Expanding its share of electricity generated from low-carbon sources (mainly offshore wind), reaching 99% in capacity by 2025</li> </ul>	2023 - 2032	95% (monetary)	Carbon intensity (gCO <sub>2</sub> e/kWh): - 98% 2006 - 2025
 IBERDROLA	<ul style="list-style-type: none"> <li>- Investment programme of B EUR 32 between 2019 and 2022 integrating renewables into its network</li> <li>- Expanding its wind and solar farms</li> </ul>	2022 - 2030	95% (capacity)	Carbon intensity (gCO <sub>2</sub> e/kWh): -50% 2007 - 2030
 ALGONQUIN Power & Utilities Corp.	<ul style="list-style-type: none"> <li>- Closing coal-fired generation plants (eg. Asbury Power Plant)</li> <li>- Reaching 75% of electricity generated from renewables by 2023</li> <li>- Add 2,000 MW of renewables between 2019-2023</li> </ul>	2023	100% (capacity)	Carbon intensity (gCO <sub>2</sub> e/kWh): -32% 2017 - 2023
 edp	<ul style="list-style-type: none"> <li>- Expanding its wind and solar farms</li> <li>- Disposing of coal-fired power plants</li> </ul>	2025 - 2030	93% (monetary)	Carbon intensity (gCO <sub>2</sub> e/kWh): - 90% 2005 - 2030

These announcements certainly seem achievable for those companies whose energy transition has been underway for some years (or even forever). Affordability is not an impediment anymore for the other players which have not yet make it to the top 5, since the cost of renewables has dropped considerably over the last decade<sup>7</sup>.

7. [https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA\\_Power\\_Generation\\_Costs\\_2019.pdf](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2020/Jun/IRENA_Power_Generation_Costs_2019.pdf)

## F- Sector score

The sector score ranks companies according to their past performance, current positioning and future ambitions. Below are the rankings for the electricity producers.

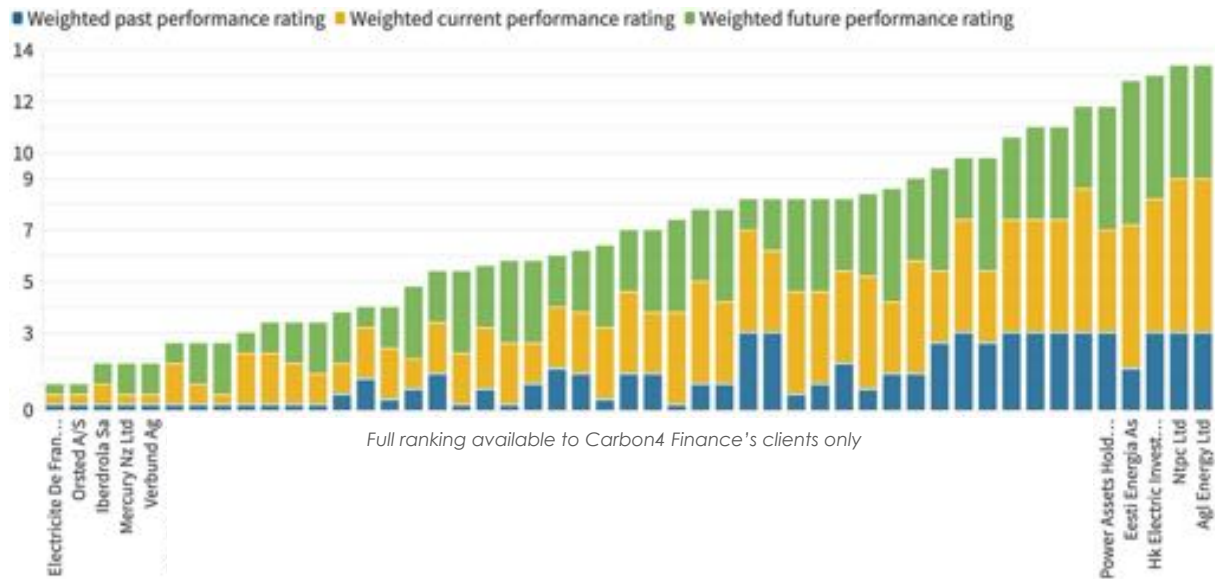




Figure 10 - The ranking of electricity generation companies

A high score (close to 15) indicates that the company is heavily reliant on coal and that it has little or no commitment to decarbonisation; while a low score (close to 1) indicates a low exposure to transition risk.

### TOP 3




Rank	Company	Comments	Past performance rating	Current performance rating	Future performance rating	Sectoral rating
#1	 EDF	EDF reaches the top of the ranking because: - It has significantly reduced the carbon intensity (gCO <sub>2</sub> e/kWh) of its electricity production (-12% on average per year over the last 5 years) - The current carbon intensity of its electricity production has a value of 55 gCO <sub>2</sub> e/kWh (in 2019) - EDF also stands out for a strategy that addresses the challenge of adaptation and mitigation (objective of extending the life of its nuclear power plants and increasing the share of low-carbon energies in the mix, notably by being the leader in solar energy in France by 2035 and by continuing its investments in nuclear power)	1	1	1	1
#2	 Orsted	Orsted reaches the second place in the ranking because: - Historically the company was exclusively a producer of fossil energy (coal/oil) but over the last 3 years the company has opted for a completely different strategy by investing significantly in renewable energies (especially offshore wind power) and by selling its thermal power assets, this allowed the company to reduce its carbon intensity by almost 30% over the last five years - The current carbon intensity of its electricity production decreased to 65 gCO <sub>2</sub> e/kWh (in 2019) - Orsted intends to continue the development of offshore wind projects and to convert its thermal power plants from coal to biomass	1	1	1	1
#3	 IBERDROLA	Iberdrola reaches the third place in the ranking because: - It has also been able reduce the carbon intensity of its electricity production around 50% over the last 5 years - Though almost 20% of the electricity produced by the company still relies on gas (and is responsible for over 50% of the company's GHG emissions), which leads to a carbon intensity of around 150 gCO <sub>2</sub> e/kWh	1	2	2	1.8

## A focus on Mercury Energy: is there a limitation to the methodology?

Mercury Energy, a New Zealand company, was formed from the break-up of Mighty River Power into three state-owned electricity generation companies (Mercury Energy, Genesis Energy and Meridian Energy) in 1998. Mercury Energy took over the ownership and operation of the eight hydroelectric plants on the Waikato River and inherited two oil-fired plants (ready for decommissioning), while Genesis Energy took over the ownership of all the other thermal plants. Mercury Energy has since acquired one geothermal plant and commissioned another. With its renewable generation units (hydro and geothermal), the company has reached fifth place in the ranking.

This demerger took place more than 20 years ago, so the past performance rating of Mercury Energy has not been impacted. If this split had been less than 5 years ago, how would Mercury's past performance rating have been calculated? Should the company's energy mix before the split be considered? If so, should it still be granted the best past performance rating, given that it would have significantly 'reduced' the carbon intensity of its electricity generation? A very similar and more recent case is the separation of RWE from its subsidiary Innogy.

## TOP 3 TAIL END

Rank	Company	Comments	Past performance rating	Current performance rating	Future performance rating	Sectoral rating
Third to last	 港燈 HK Electric	Third to last in the ranking is HK Electric Investments, a company highly exposed to coal (70% of total electricity production) leading to a carbon intensity of around 810 gCO <sub>2</sub> e/kWh. The company is aware of its climate impact, but invests in gas-fired power plants and not in low-carbon energy sources (<100 gCO <sub>2</sub> e/kWh).	15	13	12	13
Second to last	 एनटीपीसी NTPC	Second to last is NTPC Ltd, one of the main producer and distributor of electricity and gas in India, a company that is also highly exposed to coal (about 93% of total electricity production), which leads to a carbon intensity of about 950 gCO <sub>2</sub> e/kWh. Nevertheless, the company is aware of the energy-climate issues and is beginning to integrate a decarbonation strategy.	15	15	11	13.4
Last	 AGL	At the very bottom of the ranking is AGL Energy, an Australian company with a high exposure to coal (more than 60% of total electricity production) which leads to a carbon intensity of around 930 gCO <sub>2</sub> e/kWh. Also due to a lack of transparency, it is difficult to assess the strategy for adapting to climate risks, or for reducing its carbon footprint.	15	15	11	13.4

## 3.4 A focus on electricity transmission and distribution

### A- Companies which successfully reduced their emissions



Figure 11 - T&D CIR of companies

The CIR (Carbon Impact Ratio) represents the ratio between the reduced emissions and the induced emissions. It measures the capacity of a player to reduce its GHG emissions compared to the emissions generated by its activity, allowing to position the company against its peers.

#### Focus on Consolidated Edison

Since 1996 Consolidated Edison has managed to reduce its SF6 leakage by 97% (sulfur hexafluoride SF6 is a gas with 22,000 times the warming potential of carbon dioxide). In order to do this, the company has resorted to major research programmes and a team dedicated to replacing the faulty equipment (with a continuous monitoring the emissions from all the equipment). Consolidated Edison is looking for alternatives to SF6, including the development of electrical equipment (circuit breakers/switches) with no requirements for SF6.

#### Limitations of the methodology

A large proportion of the companies involved in electricity transmission and distribution have not reduced their emissions over the last 5 years. It may be difficult for this sector to reduce its emissions further as some players have already very low network losses.

## B- Current performance

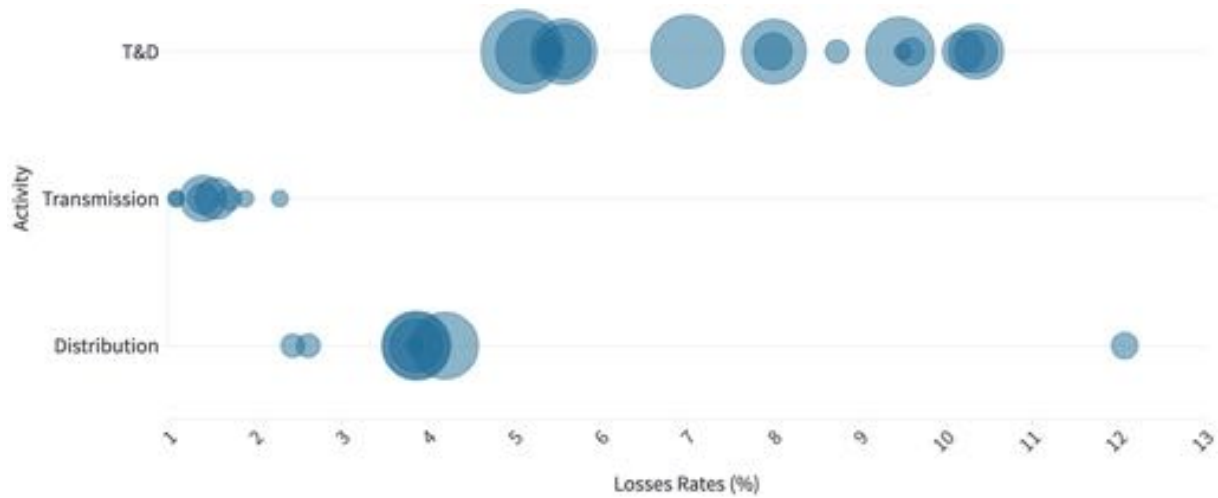


Figure 12 – Grid losses by network type

Companies with a larger market capitalisation (proportional to the bubble size) have networks whose performance is in the middle range when it is a player that is only involved in transmission or distribution. However, if the company is involved in both transmission and distribution then the performance is much more heterogeneous.

## C- Future performance

Taking the qualitative criteria into consideration, the following 5 players receive the highest qualitative score.

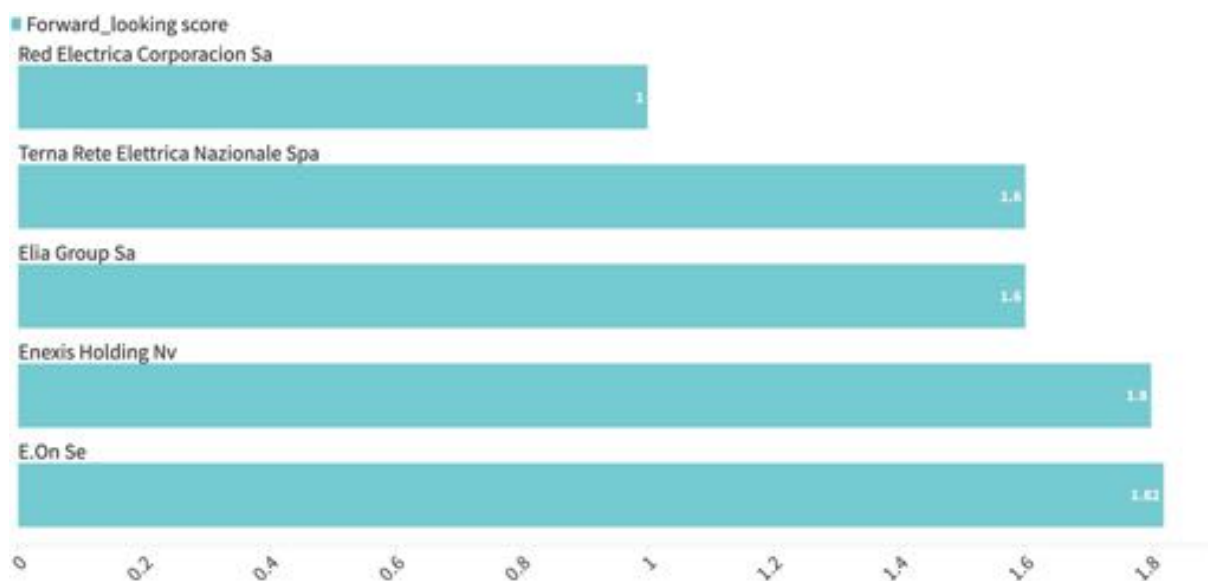







Figure 13 - The top 5 qualitative scores for the electricity transmission and distribution sector

Let's take a closer look at the top players' different strategies.

Company	Strategy	Horizon	Targets
 <b>RED ELÉCTRICA DE ESPAÑA</b>	<ul style="list-style-type: none"> <li>- Red will benefit from the will of the Spanish state to integrate low carbon – renewable in the present case – sources in the grid</li> <li>- Red intends to expand its network in order to facilitate interconnection of electrical grids</li> <li>- Red is promoting electric mobility</li> </ul>	2018 - 2022	<i>SF6 leakage rates: below 4kg/TWh transported</i> <i>Reduce by 40% Scope 1&amp;2 emissions per MWh transported by 2030 compared to 2015 figures</i>
 <b>Terna</b>	<ul style="list-style-type: none"> <li>- Terna will benefit from the will of the Italian government to integrate more renewable sources into the grid (35% of the electricity transported by Terna was already from renewable sources in 2019)</li> <li>- Terna also plans to boost smart solutions</li> </ul>	2020 - 2024	Keep grid losses rates below 2%
 <b>elia</b>	<ul style="list-style-type: none"> <li>- Elia will benefit from the will of the Belgium government to increase the share of renewables into its grid and to support electricity storage and hydrogen storage projects</li> <li>- Elia aspires to run an SF6-free grid</li> </ul>	Not specified	<i>SF6 leakage rates: below 0.25% (kg leaked/kg used)</i>
 <b>ENEXIS</b>	<ul style="list-style-type: none"> <li>- Enexis will benefit from the Dutch government to increase the share of renewables into its grid (mainly wind and solar farms)</li> <li>- Enexis aims to reduce its GHG emissions by 95% by 2050 compared to 2018 levels</li> <li>- Enexis is also extending the use of smart meters</li> </ul>	2030 - 2050	<i>Reduce grid losses (no quantified target)</i> <i>Use of internal CO2 prices</i>
 <b>e.on</b>	<ul style="list-style-type: none"> <li>- E.ON will benefit from the German government to integrate more renewables into its grid while preparing for Germany's phase out of coal by 2022</li> </ul>	2030	Keep grid losses rates below 4%

The main challenges for the electricity transmission and distribution sector include integrating low-carbon energy into the networks, developing energy demand management technologies and keeping network losses and SF6 leakage to adequate levels.

## D- Sector score




Below is the ranking of the electricity transmission and distribution companies covering their past performance, current positioning and future ambitions:






Figure 14 – Ranking of electricity transmission and distribution companies

A low score (close to 1) reflects low loss rates as well as an effort to reduce network loss rates, a willingness to expand the transmission and distribution network and to integrate renewable sources of energy.

## TOP 3

Rank	Company	Comments	Past performance rating	Current performance rating	Future performance rating	Sectoral rating
1		Red reaches the top of the ranking because: - It has slightly reduced its leakage rate of SF6 - Its network losses are very low (around 1.5%) - It will also benefit from the will of the Spanish state to integrate low carbon sources into its grid	9	3	1	4,2
2		Terna reaches the second place in the ranking because: - It has slightly reduced its grid losses rates and SF6 leakages - Its network losses are very low (around 1.4%) - It will benefit from the will of the Italian government to integrate more renewable sources into its grid	9	3	3	4,8
3		Elia reaches the third place in the ranking because: - Its grid losses are very low (less than 1.5%) - Elia will benefit from the will of the Belgium government to increase the share of renewables into its grid - Elia aspires to run a SF6-free grid	10	3	3	5,1

## TOP 3 TAIL END

Rank	Company	Comments	Past performance rating	Current performance rating	Future performance rating	Sectoral rating
Third to last		Third to last in the ranking is Chugoku, a Japanese company that does not show awareness of its impact on climate change, it will not connect its grid to low carbon generation sources to replace fossil sources.	10	13	11	11,5
Second to last		Second to last is Perusahaan (PLN), one of the main producers and distributors of electricity in Indonesia, with grid losses that are rather high (9.5%). PLN shows little interest in connecting its grid to low carbon generation sources and it does not seek to reduce its grid losses nor its SF6 leakages.	10	13	12	11,8
Last		At the very bottom of the ranking is Hydro One, a Canadian company, with grid losses that are rather high (10.3%). Hydro One will not connect its grid to low carbon generation sources and it is willing to reduce its SF6 leakages but has not set any quantified targets.	10	14	15	13,1

# CONCLUSION.

The decarbonisation of the electric power industry has irrevocably begun; a large number of players are committed to the production of low-carbon electricity and some are even pure-players in renewable energy (i.e. producing the entirety of their electricity from renewable sources: biomass, wind, geothermal, hydroelectricity, concentrated solar power or solar PV).

However, this trend is not homogeneous as some companies remain heavily exposed to fossil fuels with no concrete plan to switch to low-carbon energy.

Finally, it appears that the largest players have decarbonised profiles but are not pure players in low-carbon energy.



# Glossaire

Abbreviation	Meaning
<b>gCO<sub>2</sub>e</b>	Grams of carbon dioxide equivalent
<b>GW</b>	Gigawatt
<b>kWh</b>	Kilowatt-hour
<b>Mt</b>	Megatonne
<b>MW</b>	Megawatt
<b>MWh</b>	Megawatt-hour
<b>tCO<sub>2</sub>e</b>	Tonne of carbone dioxide equivalent
<b>TWh</b>	Terawatt-hour
<b>2DS</b>	Scenario 2DS – Pathway to limit global warming to 2°C by 2060
<b>IEA</b>	International Energy Agency
<b>B2DS</b>	Scenario "beyond 2DS" - Pathway to limit global warming to 2°C by 2060
<b>REV</b>	Revenues
<b>ETP</b>	Energy Technology Perspectives
<b>GHG</b>	Greenhouse gas
<b>RTS</b>	« Reference Technologies Scenario », considered as the usiness-as-usual scenario
<b>SF<sub>6</sub></b>	Sulfur hexafluoride



Created in 2016 and based in Paris, Carbon4 Finance brings the Carbone 4 consultancy expertise to the financial sector, which since 2007 has been providing carbon accounting, scenario analysis and consultancy services in all economic sectors.

Carbon4 Finance offers a comprehensive set of climate data solutions covering both physical risk (the CRIS methodology: Climate Risk Impact Screening) and transition risk (the CIA methodology: Carbon Impact Analytics). These proven methodologies allow financial organisations to measure the carbon footprint of their portfolio, assess their alignment with a 2°C compatible scenario and measure the level of risk arising from climate change events.

Carbon4 Finance applies a rigorous bottom-up, research-based approach, which means that each asset is analysed individually and in a rigorous manner. For more information, please visit [www.carbon4finance.com](http://www.carbon4finance.com)