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From carbon dependence to renewables: The European oil majors' strategies to face climate change

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Abstract

International oil companies play a central role in the transition towards a low-carbon economy. These companies have the leadership and influence to advance technological alternatives or sustain the current dependence on fossil fuels. This article aims to analyse the decarbonisation strategies that European oil companies are performing in the wake of climate change. A document analysis was integrated with carbon emission data from 10 European international oil companies and uncovered the four main strategies adopted by companies: sustained carbon dependence, carbon emissions compensation, carbon emissions mitigation and carbon independence. The results indicate that companies have adopted variable levels of action, despite their overlapping discourse on climate mitigation, with only one of the analysed firms performing a transition away from fossil fuels.

KEYWORDS
big oil, climate change strategy, corporate carbon strategy, fossil fuels transition, net-zero emissions, renewable energy, sustainable development

1 | INTRODUCTION

Climate science has produced mounting evidence that human-caused greenhouse gas (GHG) emissions must decline if we want to limit global warming below 1.5°C (Intergovernmental Panel on Climate Change [IPCC], 2021). The Paris Agreement responded to this challenge by legally binding signatory nations to achieve a climate-neutral world by mid-century (UNFCCC, 2015). The European Commission has also agreed on the European Green Deal, seeking to foster a future with a decarbonised economy and net-zero emissions by 2050 (European Commission, 2019). The phase-out of fossil fuels is central to this process: Thus, the 2050 net-zero scenario developed by the International Energy Agency contends that no new oil and gas fields should be approved after 2021 (Bouckaert et al., 2021). In addition, at least 70% of the world's energy supply should come from wind and solar energy by 2050 (Bouckaert et al., 2021).

This setting inevitably entails that international oil companies (IOCs) need to rethink their business models in order to reconcile with a low-carbon future (Lee, 2012; Lu et al., 2019). While there have been few bans on fossil fuel exploration or set emissions reduction targets for IOCs (Bach, 2017; Gaulin & Le Billon, 2020), companies can no longer avoid climate change mitigation (van den Hove et al., 2002). Many European IOCs have adopted a proactive discourse and are positioning themselves as 'energy companies' to dissociate themselves from the oil regime (Lu et al., 2019). However, IOCs' climate actions have mainly focused on marginal improvements to the efficiency of their operations or compensating for GHG emissions (Ihlen, 2009; van den Hove et al., 2002). Previous studies have raised

List of Abbreviations: CCS, carbon capture and storage; CDM, clean development mechanisms; EU ETS, European Union Emissions Trading System; GHG, greenhouse gas; IOCs, international oil companies.

concerns that oil companies' actions are not compatible with the necessary mitigation levels (Ferns et al., 2019; Lu et al., 2019; Mäkitie et al., 2019; Patnaik, 2020; Vieira et al., 2022). Indeed, incremental improvements or eco-innovations are not enough to achieve the net-zero goal. Since limiting global warning requires a phase-out of fossil fuels, the issue is not about how oil companies operate their business, but what they produce. Companies need to face the imperative of transitioning to new markets to survive or else await their own decline.

European IOCs acknowledge that climate change is a global issue that requires action, but there is less clarity about their actual responses—and if transitioning away from fossil fuels is a real goal for these companies. Thus, this article classifies the decarbonisation strategy of 10 European IOCs by integrating a document analysis with carbon emission data. The classification of the decarbonisation strategies was based on the number of IOCs' engagements with renewables and low-carbon technologies, GHG emissions mitigations and perceptions of climate change. The following section contains the theoretical background on corporate responses to climate change and presents the conceptual framework behind the decarbonisation strategies classification. Section 3 details the case study, data collection and analysis methods. Section 4 presents the IOCs' decarbonisation strategies: sustained carbon dependence, carbon emissions compensation, carbon emissions mitigation and carbon independence. As a final step, Section 5 discusses how the analysed companies' adopted strategies relate to previous studies and organisational theories. The paper concludes with final remarks and suggestions for future studies to investigate the factors behind different decarbonisation strategies.

2 | THEORETICAL BACKGROUND

2.1 | Why is it difficult for companies to act on climate change?

In recent decades, the quest for sustainability has framed companies' strategies to improve environmental performance (Haffar & Searcy, 2018). Managers often think of corporate sustainability as the implementation of incremental changes to processes and products, such as the adoption of environmental management system certifications or a new 'green line' of products (Haffar & Searcy, 2018; Orsato, 2009). As Landrum (2018) argues, though, reducing unsustainability is not the same as creating sustainability. This structure of incremental targets fits well with companies' routines, but marginal gains become insufficient in the face of climate neutrality. Climate change mitigation demands significant change: GHG emissions must cease if we want to limit global warming to 1.5°C (IPCC, 2018; Knutti et al., 2016). Companies' whole functioning must be aligned with this goal while still allowing for a competitive advantage (Orsato, 2009).

The magnitude of the challenge is not the only impediment to climate change action. It is also difficult to accept the urgency of acting now on a future-oriented issue marked by uncertainties (Sprengel & Busch, 2010). When a company discharges a toxic effluent into a river, the impact is local and immediate: whether that is changing the water appearance or causing the death of fish. When companies emit GHGs, however, there are no immediate visible effects; indeed, the impacts might be diffused, non-linear and in timescales beyond managers' lifetimes (Kaesehage et al., 2019). Moreover, managers can look around and see a world where 80% of energy production comes from fossil fuels, which makes individual action seems meaningless and reduces the perception of urgency (Kaesehage et al., 2019; Unruh, 2000). This reality shapes not only companies but also institutions and social habits (Seto et al., 2016; Sprengel & Busch, 2010; Unruh, 2000).

There is no consensus in the literature on why companies decide to take climate change action and adopt specific strategies. Some authors base their explanations on the Resource-Based View theory. In this view, internal resources (e.g., technical and financial capabilities, organisation structure and culture) are crucial factors that facilitate a company's ability to innovate and take risks (Elijido-Ten & Clarkson, 2019; Hart, 1995; Orsato, 2009). For others, successful responses to climate change are dependent on managers' personal values and how they frame the issue in time and space, more so than their actual scientific knowledge or business reasoning (Kaesehage et al., 2019). Thus, managers' understanding of how their business success stems from their capacity to contribute to societal well-being is crucial to prompting adequate responses (Kaesehage et al., 2019). As a contrasting view, Porter's positioning school (Mintzberg, 1990) argues that companies' responses to climate change are far more influenced by the need to adapt to external social, political or market pressures than they are by internal motivations (Orsato, 2009).

Businesses that aim to persevere amidst a changing climate are expected to pursue carbon independence. However, true independence requires disruptive approaches that go beyond short-term reductions in carbon emissions and compel a reorientation of the entire business. Of course, this level of strategic capacity might not be achievable for all (Orsato, 2009): Many companies use problem-solving techniques based on simplification and linearity that are unhelpful for dealing with systemic problems like climate change (Haney, 2017). Managers can quickly lose focus on what climate change means to their business and choose to adopt partial solutions that only respond to more immediate calls. Indeed, it is easier to focus on incremental targets established by climate policy than rethink the whole business to fit within planetary boundaries (Rockström et al., 2009). The environmental strategy literature already distinguishes among businesses that adopt reactive approaches (e.g., reducing pollution only to comply with regulations) versus proactive approaches (Haney, 2017). However, what prompts proactivity towards climate action is still a topic of debate.

2.2 | Conceptual framework: Decarbonisation strategies in response to climate change

There are many pathways for companies to reduce GHG emissions and lessen their impact on climate change. By analysing previous

literature on this topic (Table 1), we have adopted four types of decarbonisation strategies that follow from Weinhofer and Hoffmann's (2008) classification, while adding one more typology: what we call *sustained carbon dependence*. The four strategies overlap with previous authors' typologies; their main distinctions lie in their different degrees of impact on the natural environment and capacity to mitigate climate change.

The choice of *sustained carbon dependence* is the first strategy explored in the literature; it resembles the strategies of 'cautious planners' and 'emergent planners' by Kolk and Pinkse (2005), 'minimalist' (Sprengel & Busch, 2010), 'denial' (Geels, 2014) and 'introverted laggard' (Damert & Baumgartner, 2018). Whereas scepticism over a changing climate was common in the early years of international climate negotiation, today's companies are unlikely to express this opinion. Although companies accept climate change as a real phenomenon, they continue to aggravate it by maintaining technologies or products that produce GHG emissions. Those companies do not consider climate change a real threat to their business and decide to postpone the search for solutions or use political lobbying to undercut legislation aimed at curbing carbon emissions (Escobar & Vredenburg, 2011; Geels, 2014; Levy & Kolk, 2002; Sprengel & Busch, 2010). These businesses may also adopt marketing strategies that give a false impression of their actions on the issue (Geels, 2014; Levy & Kolk, 2002; Sprengel & Busch, 2010). In short, these firms are detrimental to the natural environment—their resistance to change delays the phase-out of fossil fuels and aggravates the climate crisis.

TABLE 1 Decarbonisation strategies presented by previous authors

Author	Year	Decarbonisation strategies typologies
Hoffman	2005	• Operational improvement. • Anticipating and influencing climate change regulations. • Accessing new sources of capital. • Improving risk management. • Elevating corporate reputation. • Identifying new market opportunities. • Enhancing human resource management.
Kolk and Pinkse	2005	• Cautious planners: Preparing for actions with not much activity. • Emergent planners: Have set targets but not yet implemented measures. • Internal explorers: Have adopted minor incremental improvements (low-hanging fruit). • Vertical explorers: Strongly focus on measures within the supply chain. • Horizontal explorers: Explore low-carbon opportunities in markets outside of their current business scope. • Emissions traders: Companies that engage in emission markets and emissions offset projects.
Weinhofer and Hoffmann	2010	• CO_2 compensation: Companies that engage in emissions trading or carbon offsetting projects. • CO_2 reduction: Companies that increase the efficiency of their production processes or design low-carbon products. • Carbon independence: Companies that develop carbon free production processes or products.
Sprengel and Busch	2011	• Minimalist: Produce an incremental reduction of carbon emissions and inform stakeholders. • Regulation shapers: Engage in carbon mitigation to secure a position in political debates on future regulations. • Pressure managers: Seek new markets and environments with lower pressure to reduce carbon emissions. • Emission avoiders: Reduce emissions and seek to reduce the production and sale of carbon-intensive products and activities.
Lee	2012	• Wait-and-see observer: Companies with few climate mitigation measures. • Cautious reducer: Moderate level of carbon mitigation with activities in the initial stages. • Product enhancer: Focus on the development of less carbon-intensive products. • All-round enhancer: Companies that engage broadly with reducing their carbon emissions and marginally with new markets and business development. • Emergent explorer: Companies focused on entering new low-carbon markets and investing in disruptive technology, giving little emphasis to reducing their current emissions. • All-round explorer: Companies that are committed to entering low-carbon markets and developing new business opportunities, but also focus on reducing the carbon intensity of their current business.
Geels	2014	• Denial: The external pressures are not perceived or misinterpreted. • Local search: Small adjustments in routines and incremental innovation. • Distant search and strategic reorientation: Exploration of new technologies and development of new capabilities. • Strategic recreation: Change in beliefs, mission, identity, technology and strategy.
Damert and Baumgartner	2018	• All-round enhancer: Companies with a high implementation level of climate management activities. • Legitimating reducer: Companies that mainly focus on reducing their emissions and legitimising their business operation. • Emergent innovator: Their priority is to innovate in order to reduce carbon emissions. • Introverted laggard: Companies that have not yet implemented measures to reduce or compensate for their emissions.

Companies might also adopt the strategy of *carbon emissions compensation*—or as Kolk and Pinkse (2005) call them, 'emission traders'. In this case, companies seek solutions like carbon capture and storage (CCS), natural sequestration of carbon, clean development mechanisms or the acquisition of carbon credits (Sprengel & Busch, 2010; Weinhofer & Hoffmann, 2008). This strategy opens the possibility of outsourcing compensation activities to another party (Kolk & Pinkse, 2005). By outsourcing, companies avoid changes in their assets or technologies but become dependent on the innovations produced by others. Compensation strategies are risky when considering the impact on the natural environment: They have a limited capacity that would never sustain the world's current fossil fuel usage (Mackey et al., 2013). Therefore, sequestration technologies are more suitable for removing the enormous amounts of carbon that have already been released than justifying continuous emission (Mackey et al., 2013).

The third strategy is *carbon emissions mitigation*, which companies have widely adopted and resembles the strategies that other authors describe as 'operation improvement' (Hoffman, 2005), 'internal explorer' (Kolk & Pinkse, 2005), 'local search' (Geels, 2014) and 'legitimating reducer' (Damert & Baumgartner, 2018). It is different from emissions compensation insofar as companies still implement adjustments or incremental innovations to reduce the carbon intensity of their production processes or products (Geels, 2014; Hoffman, 2005; Sprengel & Busch, 2010; Weinhofer & Hoffmann, 2008). Examples of incremental change are transitioning to less carbon-intensive fuels, modifying products to reduce emissions or changing production processes to increase energy efficiency (Escobar & Vredenburg, 2011; Sprengel & Busch, 2010). Such adjustments may have collateral economic benefits if they reduce resource consumption (Sprengel & Busch, 2010). Of course, many companies that adopt this strategy are more concerned with their economic gains and image than their impact on the natural environment (Kaesehage et al., 2019). Relatedly, emissions reductions can alleviate the pressure on the natural environment, but they are not a definitive solution; indeed, such improvements often fall short of a net-zero target (Haffar & Searcy, 2018). Adopting strategies that deliver results that are inconsistent with the available science and the remaining carbon budget will likely fail to produce the necessary mitigation (Rockström et al., 2009).

Carbon independence is the ultimate strategy that companies can adopt; other authors have called this the 'all-round explorer' (Lee, 2012), 'emission avoiders' (Sprengel & Busch, 2010), 'horizontal explorer' (Kolk & Pinkse, 2005), 'new markets' (Hoffman, 2005), 'strategic recreation' (Geels, 2014) and 'all-round enhancer' (Damert & Baumgartner, 2018). Carbon independence is a proactive strategy whereby companies go beyond legislative requirements and set trends (Elijido-Ten & Clarkson, 2019). With this approach, the company abandons fossil fuels by recreating its core business or remodelling its production process, eliminating GHG emissions while still meeting consumers' demands (Geels, 2014; Haney, 2017; Orsato, 2009; Sprengel & Busch, 2010; Weinhofer & Hoffmann, 2008). The viability of this strategy varies by the sector; some industries will undoubtedly have an easier time adopting circular practices and renewable energy sources. Oil companies need to go further than others since their main product is the very cause of climate change and bound to become obsolete. Thus, the only way to ensure their longevity is to realign their core business needs with the prospect of a net-zero world (Orsato, 2009). Notably, firms that have pursued independence have usually achieved superior performance that will reward them in the future (Elijido-Ten & Clarkson, 2019; Kaesehage et al., 2019; Orsato, 2009). Nevertheless, carbon independence will likely provide a first-mover advantage for a limited period of time. The ISO 14001 certification, for example, used to be a differentiator in terms of environmental practices in the early '00s, but it has since become a minimum requirement for operating in many industries (Orsato, 2009). Carbon neutrality will likely follow the same path.

3 | METHOD

This study's objective was to analyse the decarbonisation strategies that European oil companies are performing in the wake of climate change. To this end, we assessed the residual markers of companies' mitigation efforts. The conceptual framework presented in the previous section hints at what kinds of practical actions companies can take to reduce their emissions. Therefore, we used companies' Scope 1 annual GHG emissions as one data source that could reveal mitigation efforts. Since the oil companies' product is the very cause of climate change, we also sought evidence that they are investing in renewables and low-carbon technologies in their annual reports.

3.1 | Sample choice

We selected the sample with a criterion-based approach (Patton, 2015). First, we considered IOCs located in Europe because of their reputation for proactive climate action and recent development of net-zero emissions strategies (Ferns et al., 2019; Lu et al., 2019). Next, we looked for all European private companies listed in the S&P Global Platts 2005 ranking of the world's largest 250 energy companies that work downstream and upstream (Table 2). We selected the 2005 ranking because of relevant climate policy developments: the ratification of the Kyoto Protocol and the European Union Emissions Trading System (EU ETS). In particular, the ratification of the Kyoto Protocol recognised the issue of global warming and cemented the need to reduce GHG emissions that are primarily produced by fossil fuel usage. Additionally, the European Union launched the first Emissions Trading System to prompt emission reductions from manufacturing sectors, including oil. We consider these to be solid incentives for kick-starting IOCs' climate actions. Table 2 contains the selected companies, their country of origin, revenue and number of employees, all retrieved from the Orbis database (Bureau van Dijk, 2021).

3.2 | Data collection

We used a mix of qualitative and quantitative data for each IOC from 2005 until 2019 to capture companies' decarbonisation strategies.

TABLE 2 Major European IOCs included in the analysis

Rank S&P 2005	Company	Country	Revenue USD (2020)	*N* employees
2	Total SA	France	120B	105,476 (2020)
4	BP	UK	181B	63,545 (2020)
5	Royal Dutch shell	UK	181B	87,000 (2020)
6	Eni SpA	Italy	55.1B	31,495 (2020)
19	Repsol	Spain	42B	23,793 (2020)
51	MOL group	Hungary	13.07B	25,000 (2019)
62	OMV	Austria	22.3B	25,291 (2020)
127	PKN Orlen	Poland	21.8B	32,792 (2020)
142	ERG SpA	Italy	1.22B	768 (2020)
211	Hellenic Petroleum SA	Greece	7.16B	3544 (2020)

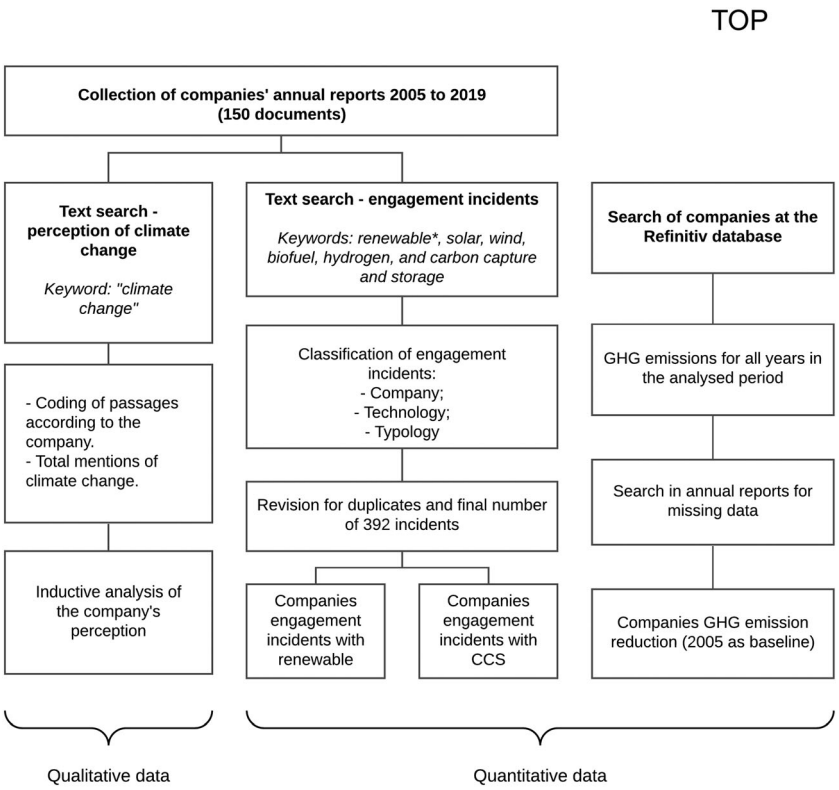

FIGURE 1 Steps of the data collection

We collected the yearly data on companies' Scope 1 GHG emissions from the Refinitiv database (Refinitiv, 2021) for the analysed period. We supplemented any missing data with information from annual reports. The data on GHG emissions allowed us to calculate the total emissions that companies mitigated between 2005 (the baseline year) and 2019.

We used annual financial reports to capture data on IOCs' investments in renewables, alternative fuels and low-carbon technologies. Annual reports are reliable sources of information on organisational development and strategic plans (Hartmann et al., 2020). Since the reports did not often contain structured data on companies' financial expenditure on renewables and low-carbon technologies, we manually searched for firms' engagement incidents with those technologies to quantify their level of investment. In total, we analysed 150 annual reports with the software NVivo 11. Using the software's text search function, we applied the keywords renewable*, solar, wind, biofuels, hydrogen and CCS to identify engagement incidents. We selected those keywords because they represent the main technological options that oil companies could invest in during that period (IEA, 2020).

We then analysed the text excerpts that mentioned those technologies to see if an engagement incident was present. Valid engagement incidents encompassed R&D projects, reconversions, acquisitions, expansions, joint ventures, partnerships and the construction of facilities. Identified engagement incidents were coded in their respective technology node. We did not log an incident when the reports only made generic mentions about adopting or intending to develop a particular technology. The nodes were later revised to

exclude multiple mentions of one incident, resulting in 392 unique incidents during the analysed period. Appendix S1 features a complete list of the engagement incidents, which are categorised by year, company and technology.

As a final step, we collected relevant annual reports excerpts to elaborate on the companies' perceptions of climate change. We identified such segments using the term 'climate change' in the NVivo text search function. Those were then coded to match the corresponding company for later analysis. Our intent in capturing this data was to add nuance to the strategies that underpinned companies' emissions mitigations and engagement incidents with low-carbon technologies. Figure 1 details the steps of the data collection process.

3.3 | Data analysis

The data analysis was guided by the classification of four decarbonisation strategies, as presented in Section 2.2. We used three critical parameters to determine the company's decarbonisation strategy: total GHG emissions reduction, engagement incidents with renewables and investments in CCS. Those three parameters are adequate for delineating strategies because they comprise the whole range of mitigation actions that companies can perform, while also being a quantifiable element that can facilitate comparisons between companies.

We adopted thresholds for each parameter to distinguish the different strategies. The thresholds for GHG emissions reduction were based on the European Climate Policy targets and the definition of deep decarbonisation offered by Bataille et al. (2018). We expected that carbon-dependent companies would not perform emissions reductions. Meanwhile, carbon emissions compensation companies would perform reductions below the EU 2020 target of a 21% reduction in emissions (with 2005 as the baseline year); in other words, they would solely seek to comply with the current regulation. Carbon emissions mitigation companies, by contrast, would reduce emissions above the EU 2020 target once such a practice became part of their strategy. Lastly, carbon-independent companies would perform deep decarbonisation and present reductions greater than 80%.

There are no available referential parameters for evaluating whether companies are significantly engaging with renewables compared to fossil fuels. Thus, we used the average value among the studied companies as the threshold for classifying the engagement incidents with renewables as lower or higher (note that incidents with renewables comprised biofuels, hydrogen, solar and wind). By contrasting companies' results with the average, we could establish whether they performed the bare minimum or actively engaged with renewables.

The final parameter considered was investments in CCS. Investments in such technology are compatible with all decarbonisation strategies, but companies focusing on carbon emissions compensation are the most likely to perform them. However, we opted to exclude the purchase of carbon credits from the analysis. Our choice was justified by the difficulty of obtaining the precise quantity of carbon credits that companies have purchased. A simple 'yes or no' response would not further explain the company strategy while serving a similar role as the 'investments in CCS' parameter. Figure 2 presents the different decarbonisation strategies and their thresholds, which allowed us to classify each IOC's level of climate action.

As a final step, we complemented the company's performance classification with its perception of climate change. The annual report passages where companies referred to climate change were coded with an inductive approach—that is, we adjusted the categories to the internal logic of the data (Silver & Lewins, 2014). The final perception categories were *a risk to the business*, *an opportunity to the business*, *need to mitigate* and *need to adapt*. In this way, we were able to compare the perceptions towards climate change among companies following the same decarbonisation strategy. The analysis also allowed us to identify the main proposed actions for mitigating climate change.

4 | RESULTS

All four decarbonisation strategies were present in the sample of analysed companies. Figure 3 presents the classification of the companies. Eni was the only company in between two strategies (carbon compensation and mitigation). The following sections will analyse how companies adopting the same strategy perceive climate change and climate action, their engagement incidents with renewables and carbon capture technologies and their obtained emissions mitigation results.

Figure 4 presents an overview of the quantity and kinds of engagement incidents with renewables and low-carbon technologies. The first column contains the total engagement incidents for each

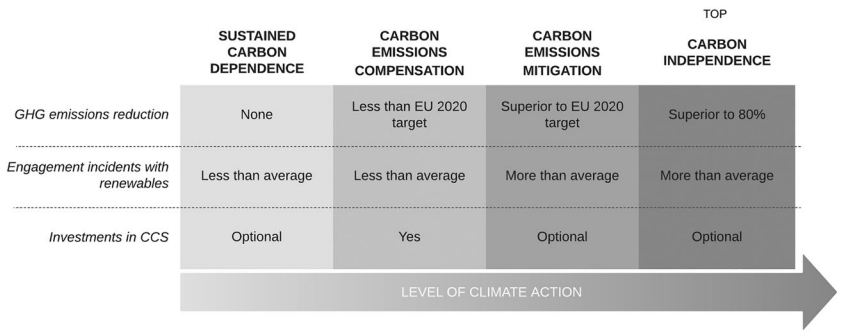

FIGURE 2 Operationalisation of the decarbonisation strategies classification

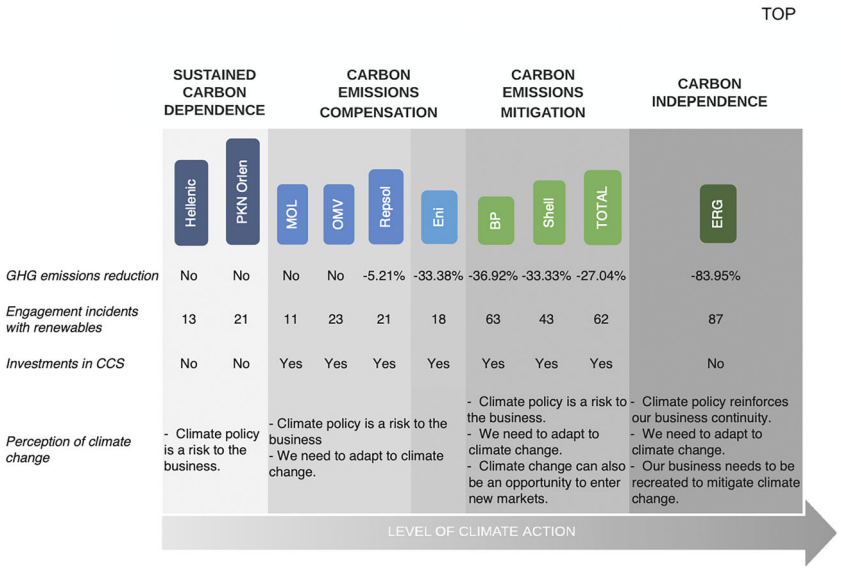

FIGURE 3 Decarbonisation strategies of analysed companies

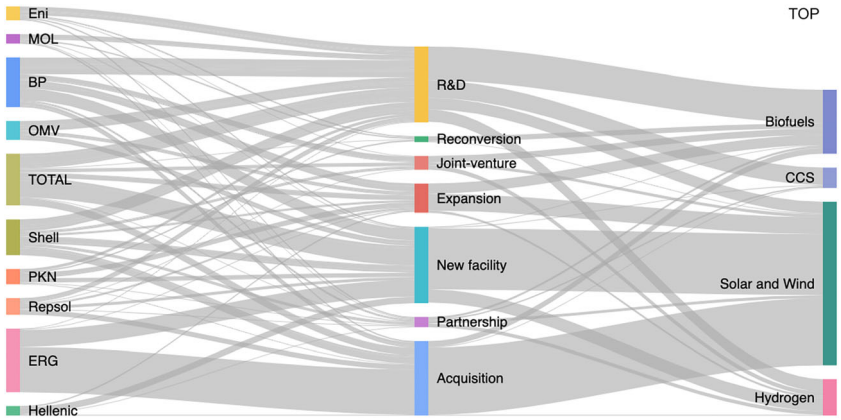

FIGURE 4 Engagement incident with renewables from analysed companies

company; the second represents the means (investment typology) through which the company engages with the technology, and the third combines the investments of all companies according to the type of technology. Carbon-dependant and carbon compensation companies made the fewest investments in renewables. Looking at the companies in these two groups, Hellenic and Repsol have predominantly invested in renewable energy, while MOL, OMV and PKN Orlen have opted for alternative fuels (biofuels and hydrogen). Carbon emissions mitigation companies (BP, Shell and Total) have performed considerably more investments in all four analysed technologies. They have also invested in R&D, mostly related to biofuels, CCS and hydrogen. The carbon-independent company ERG has focused on solar and wind energy, with its investments directed towards the acquisition and building of new facilities.

4.1 | Sustained carbon dependence

PKN Orlen and Hellenic Petroleum are the two companies that adopted a carbon-dependence strategy. Their annual reports mention actions like increasing energy efficiency and reducing GHG emissions, but the companies have not produced emissions reductions. The companies' investments in renewable technologies were also marginal and mainly motivated by regulation compliance. Hellenic has engaged with renewable energy as a way of mitigating its GHG emissions—mostly by constructing new photovoltaic facilities. PKN has instead engaged with biofuels by reconverting two facilities in bio-refineries and conducting an R&D project on advanced biofuels. Their decision was likely prompted by an increased demand for biofuels, stemming from new European regulations that demanded a share of renewable fuels mixed with fossil fuels. The company has not yet included concerns about climate change as a motivation to invest in biofuels; the main driver was the market. The two companies were also not involved with CCS projects.

The firms' annual reports featured limited mentions of climate change and, even in those instances, did not treat it as a crucial issue. The companies did not state the need to adapt to a future higher incidence of climate change-induced extreme weather events. Instead, they presented climate policy as a risk to their business, responsible for hampering their operations and reducing their competitiveness.

4.2 | Carbon emissions compensation

The companies in this category are OMV, MOL group, Repsol and Eni. Eni has achieved emissions reductions consistent with carbon mitigation companies, but made marginal investments in renewables, placing the company in between the carbon emissions compensation and mitigation strategies. Since the company still perceives climate change like other carbon compensation companies, we have included it in this section. Repsol is the other company in this group that achieved a reduction in GHG emissions (−5.21%). All the companies' engagement incidents with renewables resemble those of carbon-dependent companies. Following the same logic of PKN, these firms have invested in biofuels through facility reconversion and R&D in order to supply the demand created by fuel quality directives. OMV, Eni and Repsol have also developed and acquired solar and wind projects to diversify their portfolio and prepare for a future where fossil fuels will not play a central role. Unlike carbon-dependent companies, this group already recognises that fossil fuels will not dominate the fuel mix in the future.

The number of mentions of climate change in their annual reports is higher than carbon-dependent companies, especially after 2015. Repsol has acknowledged that its business needs to adapt to climate change. However, Repsol, OMV and Eni more frequently cited climate change regulations in terms of their business implications. An excerpt from Eni's (2019) annual report reveals how, despite targets for emissions mitigation and engagement with renewables, the company still treats climate policy as a risk to its business:

> Eni's business depends on the global demand for oil and natural gas. If existing or future laws, regulations, treaties, or international agreements related to GHG and climate change, including incentives to conserve energy or use alternative energy sources, technological breakthrough in the field of renewable energies or mass-adoption of electric vehicles trigger a structural decline in the worldwide demand for oil and natural gas, our results of operations and business prospects may be significantly and adversely affected. (Eni, 2019, p. 93)

Eni, OMV and Repsol proposed similar actions to mitigate emissions: They counted on increased operational efficiency, carbon compensation and natural gas as a main low-carbon alternative. These three firms also reaffirmed their interest in achieving net-zero emissions by 2050. Meanwhile, MOL recently adopted a different approach that perceives climate change as an opportunity to recreate its business and pursue leadership. The company developed a strategy in 2017 to face the reduced demand for fossil fuels based on the provision of services rather than the final product; however, the company has yet to enact any significant changes to itself. Most of the company's engagement incidents were related to the reconversion and construction of facilities for biofuel production, as well as R&D on the same technology.

The firms in this group also took the additional step of engaging with CCS. The investments in carbon capture technologies or CDM projects were mainly motivated by regulatory compliance, and more specifically, the EU ETS. Eni stated that all oil projects have their internal rates of return contrasted with the possible costs of carbon credits (Eni, 2019). In its 2019 annual report, the company mentioned that the financial output produced by its projects was sufficient for buying carbon credits and still turning a profit (Eni, 2019). Carbon capture and CDM projects can potentially allow companies to reach partial mitigation targets without extensively modifying their operations. However, companies' engagement incidents with carbon capture so far consist of R&D and pilot projects, which suggests that the technology is still immature.

4.3 | Carbon emissions mitigation

The companies that presented a carbon mitigation strategy were Shell, Total and BP—also the three biggest firms analysed in our sample. They perceived climate change in a dual manner: sometimes as a risk and other times as an opportunity. One of the risks mentioned was climate policy and the associated regulations, which can result in additional costs and create uncertainty for business continuity. Shell also included lawsuits seeking to hold fossil fuel companies accountable for climate change costs as a possible financial risk (Shell, 2018). Although no court has yet ruled that oil companies are responsible for climate change, Shell lost a 2021 case in the Dutch court that demands more aggressive emissions reduction targets from the company (Baazil et al., 2021). Apart from pressures derived from climate policy, IOCs in this category also recognised that a growing societal awareness of climate change can impair the future demand for fossil fuels or reduce investments. The three companies also comprehend that more recurrent extreme weather events can impact their business; thus, they have started to develop adaptation plans for their operations and supply chains. These companies clearly understand that climate change is a major global issue that they need to address. Apart from the risks that climate change poses, these firms also treated climate change mitigation as a strategic growth opportunity that they planned to exploit by entering the electricity provider's market.

To this end, carbon mitigation companies highlighted the same actions mentioned by carbon compensation firms: increasing energy efficiency, adopting carbon compensation technologies or mechanisms, developing low-carbon products and evaluating alternative energies. Companies in this group promoted natural gas as the main low-carbon alternative, largely because it does not require significant modifications to their operations. Granted, the reliance on natural gas is problematic because its phase-out will be required to achieve net-zero emissions by 2050 (Bouckaert et al., 2021). The belief in natural gas as a viable solution to climate change exposes their lack of interest in developing solutions beyond fossil fuels.

Compared to their carbon compensation peers, these companies have achieved emissions reductions beyond regulatory compliance (on average, 32%) and more extensively engaged with renewables.

However, they have also signalled their disinterest in a carbon-independence strategy. Their investments in renewables are mainly a diversification strategy, with hydrocarbons still lingering in their portfolios. Their annual reports state that 'oil and gas will remain central to our business for many years' (Shell, 2017, p. 6) and that 'the world will continue to need supplies of hydrocarbons' (BP, 2017, p. 7). This belief in the world's dependence on fossil fuels might be proven wrong: After all, renewables presented a higher growth in 2020 while oil, natural gas and coal presented significant declines (BP, 2021b). BP admitted in 2021 that it underestimated the growth of wind and solar power in its energy outlook reports over the five precedent years (BP, 2021a). These inaccurate estimates are likely biased towards a future where the oil industry persists and undermines renewables' development. It is also possible that these firms are diversifying in an attempt to delay the renewable market's development. For instance, oil companies in the renewables market might seek to influence the pace of the energy transition to increase their chances of survival (van Mossel et al., 2018). In addition, the presence of such powerful companies can limit the entrance of players focused solely on expanding renewables as fast as possible.

Carbon mitigation companies also emphasise the need for carbon capture technologies to mitigate emissions. Indeed, their reports often signal support for establishing trading systems and carbon pricing. Their investments in R&D on carbon capture and pilot projects might justify their interest in carbon pricing. Because carbon capture technologies (a technology that oil companies are leaders in) depend on high carbon prices, these companies may hope to use carbon pricing to maintain business as usual while keeping regulations limited to partial reduction targets. Of course, such mechanisms also diffuse the environmental cost of fossil fuels to all consumers, even if many never had the choice to avoid their use, instead of placing the cost on industries that are profiting from these fuels.

4.4 | Carbon independence

ERG was the only company among those analysed that performed a carbon-independence strategy. Instead of investing in low-carbon technologies such as hydrogen, biofuels or CCS, the company strategically transitioned to the renewables market. In 2007, ERG decided to leave the oil industry and invest solely in renewables. The company has performed the transition mostly by acquiring wind farms in Europe and photovoltaic plants in Italy. This transition unravelled gradually over 10 years; in 2017, it sold its last assets in the oil industry and definitively exited that market. The company is also in the process of selling its natural gas assets. Being one of the first players to exit fossil fuels, the company can avoid economic loss and perform the transition at its own pace. ERG made its first investments in wind farms in 2008 and gradually entered the hydraulic and solar businesses. The company was the first wind farm operator in Italy and has since become one of the leading suppliers of renewable energy in Europe (Plantera, 2021). The business' radical change stemmed from the will to act in advance of the anticipated long-term energy scenarios (ERG, 2017). Carbon compensation and mitigation companies also recognise that a low-carbon energy future is coming; however, they continue to bet on solutions like natural gas and have never committed to a full transition away from fossil fuels. Granted, ERG is the smallest company in our sample, which may have allowed some flexibility in exiting the oil market. However, this explanatory factor should be treated with care: After all, the second-smallest company in our sample (i.e., Hellenic Petroleum) presented a carbon-dependence strategy.

ERG's annual reports often highlighted the company's efforts to combat climate change by producing renewable energy. Being a carbon-independent company, ERG has adopted metrics that display the emissions it has avoided through its operations instead of establishing targets for emissions reduction. Nonetheless, the company reduced its emissions by 84% in the period analysed. Unlike all the other analysed companies, ERG sees no risk in regulations targeted at fighting climate change. Legislation seeking to curb GHG emissions and tackle climate change now represents a positive external impact for the firm, reinforcing their strategic decision to leave oil and gas. The company is also well positioned to profit from all the government incentives for increasing renewable energy generation. ERG is developing plans to adapt to more frequent extreme weather events, which are the primary risk that the company associates with climate change.

5 | DISCUSSION

The analysed cases underscore that oil companies are pursuing different decarbonisation strategies in order to address climate change. The companies communicated similar goals and intended actions but had not applied them with the same levels of success. Most companies are aware that the hegemony of fossil fuels will end soon, leaving their business susceptible to increasing governmental and societal pressure. However, ERG was the only company that transitioned away from fossil fuels and adopted a carbon-independence strategy. Notably, considering the strategies present in the literature, we found no instances of 'vertical explorers' (Kolk & Pinkse, 2005), which focus on their supply chains to find solutions, or 'pressure managers' (Sprengel & Busch, 2010), which seek new markets with less pressure to reduce carbon emissions.

The main factor that differentiated ERG from the other analysed companies is its smaller size, but this seems insufficient to explain its pursuit of a carbon-independence strategy. Being a smaller company, it may have perceive itself as having limited capacity to shape its external environment (e.g., due to lack of influence and power) and thus responded to external pressures more promptly (Patnaik, 2020; Pfeffer & Salancik, 2003). Larger companies, such as the ones classified as carbon mitigation, tend to be capable of influencing regulations and political activity, limiting consumers' options beyond fossil fuels or convincing investors that there are no suitable alternatives to fossil fuels. This power affords them the ability to delay a full reorientation (Patnaik, 2020). Alternatively, ERG's smaller asset base may have made it easier to shift the focus from fossil fuels to renewable energy,

but this would not account for why the second-smallest company in our sample (Hellenic Petroleum) adopted a carbon-dependence strategy. This assumption about size also runs counter to the findings of previous studies (Damert & Baumgartner, 2018; Lee, 2012; Weinhofer & Hoffmann, 2008). For instance, Lee (2012) analysed 241 Korean companies and identified that larger companies adopted more proactive strategies while smaller ones pursued a 'wait-and-see' approach. Likewise, Damert and Baumgartner (2018) analysed a global sample of 116 automotive companies and corroborated that larger companies are the ones that usually adopt carbon-independence strategies.

The companies' particular local context may be another possible explanatory factor for the different decarbonisation strategies. We focused solely on European companies in order to attenuate contextual differences, since all companies would be subject to the same European policies (Weinhofer & Hoffmann, 2008). However, there are naturally socio-political differences within European countries. For instance, Eni and ERG—two Italian firms in our sample—pursued different strategies: the former making marginal investments in renewables and the latter completely exiting the fossil fuels industry. Meanwhile, BP and Shell—two British companies—hewed to the same strategy of carbon mitigation.

It is also worth considering a company's internal resources when trying to understand its ease of diversifying (Barney, 1991). All the studied IOCs were able to diversify into renewables or biofuels, so it is unlikely that technological constraints or a lack of knowledge transferability halted their complete transition towards a new market. Rather, their investments and repositioning moves (e.g., from oil to energy companies) seem like symbolic actions intended to secure a position in political debates on future regulations (Sprengel & Busch, 2010). This is evident in carbon compensation and carbon mitigation companies continuing to promote natural gas as an alternative low-carbon fuel. These firms' emphasis on a solution that aligns with their current activities reveals a resistance to strategic recreation (Geels, 2014).

In sum, our study aimed to unravel the different decarbonisation strategies adopted by European IOCs. Consequently, the collected data do not allow us to provide conclusive evidence on why such strategies were adopted. Nevertheless, there is an apparent need to adopt a wider array of explanatory factors. Previous studies have mainly tried to explain different decarbonisation strategies by focusing on external pressures or variables such as company size and location (Daddi et al., 2018; Damert & Baumgartner, 2018; Geels, 2014; Sprengel & Busch, 2010; Weinhofer & Hoffmann, 2008). However, aspects related to the personal values and motivations of managers and executives could also be crucial elements (Kaesehage et al., 2019). For instance, Lee (2012) found that only companies pursuing a strategy akin to carbon independence sought to increase managers and employees' awareness of and commitment to a climate change response. Among our sample, the capacity of ERG's managers and directors to correctly interpret the meaning of the climate crisis to their business may have prompted the choice to become carbon independent (Pfeffer & Salancik, 2003). Thus, scholars need to pursue a more thorough consideration of internal elements—related to both individuals and organisational culture—in order to complement the understanding of what motivates the adoption of different corporate strategies.

6 | FINAL REMARKS

The case study developed in this article allowed us to elaborate on the decarbonisation strategies adopted by European IOCs in the wake of climate change. The article's first contribution is the classification of decarbonisation strategies and their parameters. This classification might assist in evaluating the level of progress in other industries, apart from oil and gas. The centrality of this sector to the fight against climate change made it a natural choice for the conceptual framework, but it would be valuable for future studies to consider other industries. Other industries could have a more proactive relationship with climate change action than oil companies, which might then shape the predominant strategies.

Our second contribution is the classification of 10 analysed companies according to the different decarbonisation strategies. We found that companies classified as carbon dependence, compensation or mitigation adopted a similar discourse and proposed a similar slate of actions (i.e., increased energy efficiency, investments in renewables and the promotion of natural gas as a low-carbon fuel). What varied among these companies was their performance level: Not all of them were mitigating emissions in amounts consistent with current regulations or investing in renewables with the same intensity. ERG was the only company that has chosen a carbon-independence strategy by transitioning to renewable energies and abandoning fossil fuels. In any case, annual reports provide evidence of how companies tend to adopt a sustainability discourse that contradicts their performance. Moreover, most companies' promotion of natural gas as a carbon reduction strategy signals their continued carbon dependence.

Our study also features some inherent limitations that could be overcome by future research. Since the case study only analysed 10 European IOCs, we cannot generalise the results. Future studies could expand the analysis to IOCs from other locations and use other methodologies (e.g., surveys and econometric analysis with larger samples) to enable generalisation. Further, the parameters that we used to classify decarbonisation strategies can be tailored to the particularities of different industries. For instance, the purchase of carbon credits might be a more common practice in other sectors than CCS investments; likewise, other industries might invest in different carbon-free technologies. Finally, although we analysed data over 16 years, we did not incorporate temporality. Future studies might develop a maturity model that integrates the time dimension into our proposed classification.

It would also be valuable to perform an in-depth case study that analyses the factors that underpin companies' different decarbonisation strategies. We have discussed many different factors that might have shaped the companies' responses; however, more evidence is needed to understand why companies exposed to a similar external environment have different perceptions about the urgency of climate change and its meaning for their business. To this end, future research

could leverage the organisational and transition theories that we highlighted and elaborate on a handful of factors that we identified. The first is the kind of internal resources that firms possess, which might make investing in specific low-carbon alternatives more appealing than others. The second is a different comprehension of what climate change means to a firm's business, which may reflect how companies collect external information and assign weight to different factors. A third aspect deals with companies' perceived influence over socio-political and economic actors. Finally, the individual motivations of CEOs and managers could play a role in adopting a carbon-independence strategy.

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CONFLICT OF INTEREST

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