



How to push oil and gas companies to realise climate change mitigation

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DOI 10.32015/JIBM.2024.16.1.9

Mednarodno inovativno poslovanje
=
Journal of Innovative Business and
Management

ISSN 1855-6175

Abstract: Purpose of the article - The article aims to provide guidance to governments, companies and civil society for real-world sustainable market transformations.

Research methodology - Sustainable market transformations (SMTs) are key to creating long-term sustainable development. Literature on sustainable market transformations focuses on how markets can move from unsustainable to more sustainable. We apply the Sustainable Market Transformation Framework (SMTF) to the Oil & Gas sector in Europe (2017-2022). To analyse whether and in which way a sustainable market transition is unfolding, we use Lessig's Modalities theory (1998). Lessig identifies four regulators— Market, Law, Architecture and Norm —that influence behaviour of individuals and organisations.

Keywords: sustainable market transformation framework (SMTF), Lessig's modalities theory, oil & gas sector

JEL classification: Q01, Q56

Kako spodbuditi naftna in plinska podjetja k uresničevanju omilitve podnebnih sprememb

Povzetek: Namen članka - Članek si prizadeva zagotoviti smernice za vlade, podjetja in civilno družbo glede resničnih trajnostnih preobrazb trga.

Metodologija raziskave - Trajnostne preobrazbe trga (SMTs) so ključnega pomena za ustvarjanje dolgoročnega trajnostnega razvoja. Literatura o trajnostnih preobrazbah trga se osredotoča na to, kako se lahko trgi premaknejo od "netrajnostnih" k bolj "trajnostnim". Uporabljamo okvir za trajnostno preobrazbo trga (SMTF) na naftnem in plinskem sektorju v Evropi (2017-2022). Da bi analizirali na kakšen način poteka trajnostna preobrazba trga, uporabljamo teorijo modalitet Lessiga (1998). Lessig identificira štiri regulatorje - TRG, ZAKON, ARHITEKTURO IN NORME - ki vplivajo na vedenje posameznikov in organizacij.

Ključne besede: okvir za trajnostno preobrazbo trga (SMTF), teorija modalitet Lessiga, naftni in plinski sektor

1 INTRODUCTION

Sustainable Development

In 1962 Rachel Carlson wrote one of the first internationally known and ground-breaking books related to sustainability and the interaction between humans and our environment. *Silent Spring* challenged destructive corporate practices concerning among others the increased use of fertilizers. It aimed to make us re-evaluate our way of life and our relationship to the natural world. Many decades later, we keep coming back to the same questions of how to achieve environmental justice and how to stop the continuous increase of the earth's temperature. As stated by David Biello, the upcoming century will be of key importance and the choices we make now "will help set the course of the entire planet for at least tens of thousands of years. If people, plants, and animals don't like the climate of 2100, 2500, or perhaps even 25000, they will have us to blame" (2016, p. 5).

The Paris Agreement found its origin in 1992 when the United Nations Framework Convention on Climate Change was initiated. The Paris Agreement was adopted in 2015 at the annual gathering of the Parties to the Convention. Its goal is to stabilize greenhouse gas (GHG) emissions in the atmosphere "at a level that would prevent dangerous anthropogenic interference with the climate system" (Horowitz, 2016). By 2024, 196 States have joined the Paris Agreement.

A related approach towards reducing GHG emissions is a 'Green Deal'. A Green Deal can generally be described as "a strategy for Mobilization of whole community and enterprises to create clean and green economy through implementation of pro-environmental solutions in various sectors, which take into account the three aspirations of sustainable development-- the well-being of people, the environment and economic sustainability" (Smol, 2022). The most ambitious Green Deal was released by the European Union in 2019 and aims to achieve 100% GHG emission reductions by 2050 (Hainsch et al., 2022).

The Oil & Gas sector and its impact on sustainable development

Degradation of the Earth's ecosystems, the heating of the atmosphere and other related environmental damaging developments cannot be tied to one country, one sector or one company. However, the main trigger for the climate change crisis is the Oil and Gas sector. The Oil & Gas sector produces products and fuels that are widely integrated in all parts of society. They are used in expected and potentially unexpected industries, such as transport, plastic production, but also fertilizers, clothing, insecticides and even toothpaste. The total emissions emitted by extracting, refining, and burning oil and gas during transport and other production processes represent more than 50% of global GHG emissions (Xu and Chen, 2016). This makes the sector by far the most significant contributor to the burning of fossil fuels and hence the main trigger for rising global temperature.

An assessment done by the world benchmarking alliance of the UN Sustainable Development Goals (SDGs) shows that the energy transition and decarbonization (SDG 13 climate action) has both positive and negative spillover effects into several other SDGs such as SDG 1 (no poverty), SDG 3 (good health and wellbeing), SDG 7 (affordable and clean energy), SDG 9 (industry, innovation and infrastructure), SDG 12 (responsible consumption and production), and SDG 17 (partnerships for the goals)(UN General Assembly, 2015).

Since 2015, the Paris Agreement has been widely referred to in Annual Reports and Sustainability Reports. Oil & Gas companies picked up on the trend. References to the Paris-targets linked to their own increased focus on reducing GHG emissions became common practice. However, actual achievements have disappointed many global and national actors. For this reason, Friends of the Earth-Netherlands sued Shell in a landmark case, alongside six other NGOs including the National Association for the Preservation of the Waddenzee and thousands of citizens (District Court of The Hague, the Netherlands; 2020). Even though Shell tried to convince the court of its recent progression towards sustainability goals and targets, the verdict focuses on the fact that the Shell's targets and disclaimers stated in the annual reports, are bound to external factors such as societies' progression in emission reduction: "in step with society and its customers" (District Court of The Hague, *Klimaatzaak Urgenda*, analysed and translated by Dentons, hereafter the 'Shell Verdict'). As stated in the notes of the case, externalized targets are not in line with the court's expectations. Therefore, the court ruled that by 2030, Shell must have reduced its GHG emissions by 45% compared to 2019 levels, including its own emissions and those of its suppliers and customers (tier 1-3). This case was the first of its kind to accomplish legal corporate obligations related to the goals set by the Paris

Agreement and the European Green Deal. In light of this case researching transformation in the Oil and Gas sector becomes all the more relevant.

Sustainable Market Transformation Framework

A variety of concepts has entered the scientific community to describe fundamental shifts in society. Over time, the term “transformation” is gradually becoming more institutionalized and has been further developed and examined over time (Feola, 2015; Rotmans et al., 2007; Pesch, 2014; Köhler et al., 2019). Research on sustainable market transformations focuses on how markets that are embedded in complex socio-economic and socio-technical systems can move from unsustainable to more sustainable (Loorbach et al., 2017). This is what has been introduced by Nijhof et al. (2022) as Sustainable Market Transformation (SMT). The SMT-theory explains that transformations develop through different phases, where each phase is part of a changing social system. The indicators which are considered indicative of each phase are set out in the Sustainable Markets Transformation Framework (SMTF). In Phase 1, which is called “Inception”, there is an increase of societal discussions, civil society interventions and overall pressure from various actors that raises awareness about sustainability matters (Argyrou et al., 2022). First signs of change show itself in co-creations, innovative projects and exploring new business opportunities. Phase 2 is called “Competitive Advantage”. Here, several of the innovations and opportunities are proved to have a strong business case. First movers utilize these advantages and trigger the development of sustainability standards and a new sustainability focused paradigm (Kivimaa et al., 2020). In this phase, root causes of unsustainable behaviour are not yet tackled or solved. In Phase 3 (“Synergy”), actors realize that only focusing on competitive advantage is not creating the change needed to achieve the full benefits of sustainable actions and initiatives. Via collaboration actors try to align their work to develop overarching frameworks and targets, such as the SDGs (Simons & Nijhof, 2021). There is an increased focus on legislation to eradicate and penalize laggards. This creates the conditions for Phase 4 to kick in, “Institutionalisation”. In this phase legal structures are maturing further, and the majority of market actors is contributing to making structural changes. The sustainability problem now operates in a level playing field or is solved entirely. A new sustainable market has been established. If new sustainability issues arise, the transformation starts a new cycle of phases (Nijhof et al., 2022).

The Oil & Gas sector in the sustainable market transition

Research focusing specifically on the transformation process of Oil & Gas companies is important for two reasons. Firstly, as outlined earlier, this sector is contributing most to the increase in global temperature. The climate crisis has several adverse spill-over effects on other SDGs outside the ones related purely to energy, with the Oil & Gas sector as main trigger. Secondly, it is observed by several scholars that when a sector’s sustainability transformation is in its early stages, relatively small players or new companies entering a sector (‘Emerging Davids’) are more likely to be proactive to push the transition forward than established corporates (Hockerts & Wüstenhagen, 2010). However, these larger players have a superior market power, more financial resources and a broader international reach and hence have a larger potential to contribute significantly to a SMT (“Greening Goliaths”) even when their sustainability ambitions are lower. Moreover, while Greening Goliaths tend to lag behind the Emerging Davids with agility and innovation capacity, they are capable of making a bigger impact via their strengths in process innovation (Hockerts & Wüstenhagen, 2010). When we look at the large players in the Oil & Gas sector over a period of six years, do we see progression in their actions towards a sustainability transformation? Is the sustainable market transformation in Oil and Gas companies a successful transition or a house of cards? Due to the evident importance of Oil & Gas companies on the earlier mentioned broad range of sustainability matters, this article aims to dive deeper into the sustainability transition of the Oil & Gas industry.

The remainder of this article is built up as follows. In section two, we dive deeper into the research method, which is based on a case study approach. In section three, we present our findings. In the final section, we explain the relevance of our findings in relation to the overall sustainable market transition in the Oil & Gas sector and highlight elements that can be relevant for the broader global sustainability transition.

2 METHODOLOGY

Sustainable Market Transformation Framework (SMTF) and Lessig's four regulators

As the theoretical basis for this study, we selected the SMTF. We applied the therein pre-defined indicators in our analysis of the way how several Oil & Gas companies move through the SMTF phases. Our units of analysis regard five Oil & Gas companies operating in Europe of which we have collected and analysed publicly disclosed data that reflect their ambitions, transition plans and activities over the period 2017-2022, hence starting soon after signing of the Paris Agreement.

To systematically analyse what motivates these Oil & Gas companies to move towards the next SMTF phase, an additional theoretical framework is employed. That is the 'Modalities Theory' developed by Lawrence Lessig (1998). Lessig (1998) identifies four regulators that influence behaviour of individual persons and organizations: Law, Market, Norm, and Architecture. The 'Law' regulator encompasses rules, regulations, contracts, and supervision. In the Oil & Gas sector, this involves legislation (national legislation, European legislation, and international treaties) on reducing GHG-emissions and may include incentives like subsidies or taxes. The 'Market' regulator entails the economic relations between parties, wherein sustainability is incentivized by competition, prices, and supply & demand dynamics. Companies may adopt sustainability for a competitive advantage or to meet market demands. The 'Norm' regulator involves community-enforced behavioural constraints, influencing the culture of individuals in the Oil & Gas sector regarding sustainability, encompassing ethics, social interactions, and sector agreements. Finally, the 'Architecture' regulator refers to existing features that restrict or enable behaviour, including algorithms, programs, innovation spaces, physical constraints, and the overall business environment. These four regulators will be used for the analysis of the data which we collected concerning the Oil & Gas sector, as further described in the data collection section.

Data collection and analysis

From the Shell Verdict onwards (see Introduction), the relevance of annual reports and sustainability reports appears to be evident in analysing sustainable development aimed for by Oil & Gas companies. Hence, these types of public documentation have been used as the starting point for developing the research protocol of this study. In the collected documents, we searched by means of key words, complemented with 'intelligent searches', e.g., by checking for subjects related to transformation via the table of content of such public reports. The key terms included references to 1) Law, 2) Market, 3) Norm and 4) Architecture. The data have been collected and analysed through the five steps depicted in the Research Protocol (table 1). In line therewith, reflections are provided concerning the state of sustainability transition, as well as further guidance for the Oil & Gas sector, in Chapter 3 and 4.

Table 1. Research Protocol

Step	Description
1.	The five largest Oil & Gas companies that are publicly listed on a European Stock Exchange were selected for the case studies (Shell, BP, ENI, Gazprom, Total).
2.	Annual reports and sustainability reports concerning the five case study companies over a period of six years were collected online.
3.	For each of the thirty points of analysis (five case studies times six years), a separate factsheet was completed, containing: (a) information such as name and contact details of the company; (b) the documents used for the point of measurement; (c) a description of the activities; (d) indications that were used to search the documents; and finally (e) all sentences and notes that were assessed as relevant to analyze and determine the solution directions apparent in the SMTF Phase, via clustering them based on the four key regulators according to Lessig: 1) Law, 2) Market, 3) Norm and 4) Architecture. We included all the information in one Excel data file.
4.	Next, using a triangulation process, the researchers individually reviewed the clusters to assess which regulators of corporate behavior (Law, Market, Norm, Architecture) are most effective to move corporate actions and solutions in high-risk sectors towards the next phase of a SMT.
5.	We debated our choices in multiple consequent meetings to eliminate any bias, and finally agreed on our reflections of which regulators are most effective.

3 FINDINGS

Reflections about the companies' ambitions and actions communicated in the 2017 annual report

In the analysis conducted concerning the annual report of 2017, it is evident that the focus across the annual reports of all five companies aligns with the characteristics of SMTF Phase 1. BP's acknowledgment of the 2015 Paris Agreement and its commitment to fostering a transition towards a low-carbon future falls in the category of the regulator Law. BP's ambitions can be classified as Phase 1-ambition. This phase is characterized by an absence of established sustainability norms, as found in recurrent deferring of blame in the reports of several companies. For instance, Shell's statement regarding the complexities of issues in the Niger Delta "We simply cannot blame one party for all the woes in the Niger Delta" and BP's statement: "The world should prioritize" instead of focusing on what they can achieve sustainably themselves.

Furthermore, the suboptimal performance in emissions reduction, exemplified by ENI's noted increase in GHG emissions, further reinforces the prevalence of Phase 1. In terms of the regulator Architecture, companies are also in Phase 1 with pilots being gradually initiated.

Although glimpses of ambitions and activities that could be qualified as Phase 2 ambitions and activities are visible in certain sections of the reports, particularly towards the later pages, these aspects appear to be less central and are possibly less influenced by CEO involvement. Gazprom's emphasis on competition highlights that companies are starting to see the fruits of positioning themselves in the market as sustainable. Gazprom: "The Paris climate accord that took effect on November 4, 2016, opens up new prospects for gas consumption" (...) and can hence "improve low-carbon development of EU countries".

Moreover, indications of collaboration between industry players are emerging, with both Shell and BP expressing intentions to collaborate. Shell's CEO emphasizes the necessity of business-civil society collaboration "It will need collaboration between business and civil society", while BP's CEO underscores the power of collective action. Such collaborative aspirations signal a potential shift towards Phase 3, where collaboration becomes a defining characteristic.

Reflections 2018

In parallel to their 2017 positions, Gazprom, Total, and ENI continued to operate within Phase 1. Total, notably passive in their approach, articulated a strategy of cautious anticipation, as evidenced by their expressed willingness to await the maturation of policies and innovations before committing fully to sustainability targets. This is captured in their statement: "In the longer term, beyond 2030, our ambition is to pursue these efforts, or possibly to accelerate as new technologies become available and public policies are put in place and reach a reduction of 25 to 35% by 2040." Meanwhile, Gazprom remained heavily fixated on financial performance, as underscored in their sustainability report: "In 2018, we achieved record-high levels of revenue, EBITDA, and net income (...)." Notably absent from Gazprom's strategic vision is any mention of sustainability, as indicated by their stated objective: "The strategic goal for PJSC Gazprom is to become the leader among the global energy companies through diversification of the sales markets, ensuring reliable supplies, performance improvement, use of scientific and research capabilities."

However, the landscape shifted noticeably in 2018, with BP and Shell having initiatives in Phase 2. In this phase, a competitive edge emerges as companies recognize the tangible impact of sustainability on market demand. This competitive spirit can be observed in Shell's year report: "We were the first international oil and gas company to set an ambition using a measure which includes our customers' emissions (...)." Moreover, BP, Total and Shell demonstrated a heightened focus on influencing pricing dynamics, with all three companies actively lobbying for carbon pricing, believing it to be a pivotal driver for emission reduction and energy transition. These statements are motivated by the regulator Market. Furthermore, there was more movement towards Phase 2 motivated by the regulator Law, as both BP and Shell vocally expressed to fully support the Paris Agreement, indicating a deeper commitment to legislative cooperation and compliance.

Reflections 2019

From the communication published in 2019, it is evident that the majority of initiatives undertaken

by the five companies transitioned into Phase 2, with exceptions observed in the case of Gazprom. Companies persisted in highlighting their competitive edge in sustainability, aiming to establish superiority over industry peers (regulator Market). For instance, Total underscored its achievement of having significantly reduced methane emissions, positioning itself as leader in environmental stewardship.

A trend emerged wherein BP and Shell exhibited increased engagement with Phase 3 initiatives. Notably, a leadership change within BP catalysed a cultural shift, driving an increase of Phase 3 initiatives. BP's CEO described both the moral and business imperative of increased sustainability when he stated that: "I think it is important to say that BP wants to change. Not only is it the right thing to do, it is a tremendous business opportunity for us". These types of statements can be attributed to the regulator Norms. In addition, Shell not only expresses intent but also undertakes tangible actions toward collaboration, exemplified by their founding membership of the Alliance to End Plastic Waste, emphasizing their commitment to addressing pressing environmental challenges.

Reflections 2020

Moving on to 2020, we consider Eni and Gazprom still in Phase 2. Gazprom is still very focused on competing on sustainability, apparent from the following quote: "Gazprom is a leader of the "Responsibility and Transparency" and "Sustainable Development Vector" indices of the Russian Union of Industrialists and Entrepreneurs".

BP and Shell seem to have moved forward to Phase 3, with sustainability now fully integrated in their communication. For example, as BP states: "Collaborating can help us achieve our sustainability goals. It can involve (...) partnerships with cities and corporates to help them meet their decarbonization goals, shared initiatives to raise standards and set new sustainability benchmarks, and more (...)". Promoting sustainability goals is motivated by the regulator Norms.

Total also transitioned towards having initiatives in Phase 3, which follows from its participation in initiatives such as the Northern Lights project in Norway, a collaborative effort with Equinor and Shell aimed at decarbonizing industries reliant on fossil energy (regulator Norms). However, intriguingly, Total's stance occasionally reflected elements of Phase 1, adopting a somewhat passive approach and deflecting blame. This is exemplified by statements regarding their lack of control over indirect emissions, emphasizing the demand-driven nature of energy supply: "We do not have control over these indirect emissions. In energy, as with any commodity, demand typically drives supply, not the reverse." Also, these types of statements are motivated by the regulator Norms.

Notably, all five companies significantly invested in pilots, technologies, and infrastructure, with architectural barriers no longer brought up as hindrances (regulator Architecture). Gazprom enhanced technological capabilities to reduce water consumption and GHG emissions. Similarly, ENI has increased investments in sustainable research and development, while BP has increased its sustainability investments by \$250 million compared to the previous year.

Reflections 2021

In 2021 Shell communicates about initiatives that related to Phase 3: "We are also working with our customers and across sectors to help them find their own pathways to achieve net-zero emissions. This will help grow demand for new low-carbon products (...)". BP continues to navigate Phase 3 with a sustained focus on sustainability and collaborative efforts, although with a noticeable emphasis in this year's report on enhancing shareholder value and meeting market demands.

Total's norm has shifted towards greater collaboration "Reduce the indirect emissions related to its products (Scope 3), together with society - i.e., its customers, its suppliers, its partners and public authorities - by helping to transform its customers' energy demand." This type of behaviour of Shell, BP and Total is motivated by the regulator Norm. Changes are also motivated by the regulator Market is a shift, exemplified by initiatives aimed at reducing demand for non-sustainable options. For example, Total is reducing its sales of petroleum products to align with production by 2030, or around 1.4 Mb/d.

ENI, while remaining in Phase 2, demonstrates an openness to collaborative ventures through alliances for sustainable development with diverse stakeholders including individuals, public entities, international organizations, civil society groups, and research institutions. Despite this, we consider ENI still in Phase 2 as they are passive in their approach where they allow for the adoption of various solutions at different speeds depending on the specifics of the multiple contexts and internal

constraints. ENI's statements also refer to the regulator Architecture. The company claims that it depends on existing technologies: "This path, based mainly on existing technologies, will allow ENI to totally reduce its carbon footprint, both in terms of net emissions and net carbon intensity". Our units of analysis regard five Oil & Gas companies operating in Europe of which we have collected and analysed publicly disclosed data that reflect their activities and transition plans over the period 2016-2022, hence starting with the book year after the 2015 Paris Agreement.

In conclusion, while there are signs of heightened competitiveness and assertiveness in industry actions and communications, the overall trajectory indicates a positive momentum towards Phase 3 initiatives across the board. While this might be so for the mentioned companies, we could not yet analyse Gazprom's annual statements regarding 2021 as they could not be retrieved.

Reflections 2022

In the companies' statements published in 2022, the regulator 'Norm' has an even greater significance, particularly evident in the commendable shifts witnessed within Total and Gazprom. Gazprom, for instance, has embarked on a positive trajectory by prioritizing sustainability within its operational framework. Notably, a noteworthy milestone was reached as over 8,000 Gazprom Group employees successfully completed environmental training programs (regulator Norms). Moreover, Gazprom's commitment to environmental protection was evidenced by a substantial investment of 89.1 billion in 2022. This yielded tangible results, including a 14% reduction in air pollutant emissions compared to the previous year. Despite these strides, we consider Gazprom in Phase 2 of its sustainability journey, indicating ongoing efforts towards further enhancement.

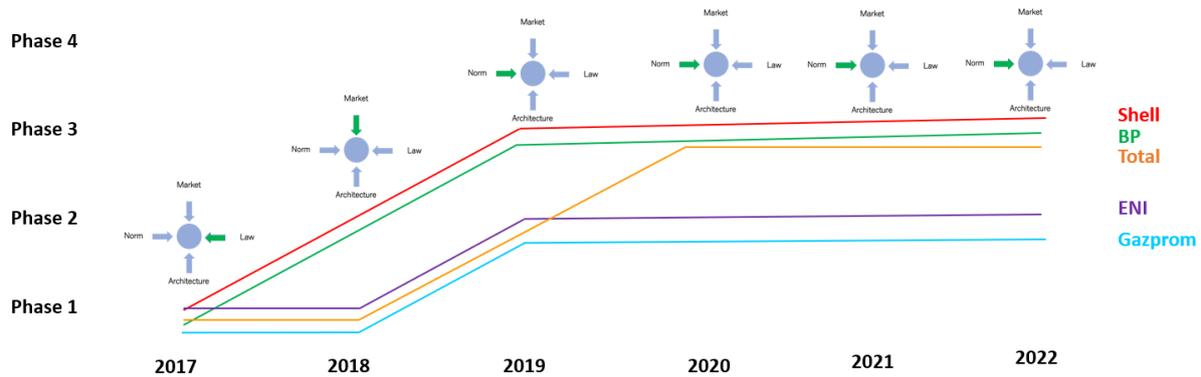
Similarly, Total's transition to TotalEnergies marked a pivotal shift towards a more sustainable norm, exemplified by the publication of a sustainability report. TotalEnergies has now expressed to include sustainability in the core of their strategy (regulator Norm).

Meanwhile, Shell and BP continue to be in Phase 3, showcasing a full integration of sustainability in their norms (regulator Norm). Both companies have become more actively engaged in political and regulatory dialogues, while also making notable advancements in their sustainability performance metrics. Shell, for instance, has taken proactive measures to empower customers in making sustainable choices, thus amplifying its impact beyond operational boundaries. In addition, BP has introduced a tool to assist employees in navigating complex decisions, aiming to accelerate the energy transition (regulator Market).

Overall reflections

In the hierarchy of industry dynamics, the sequence of movement aligns as follows, which is summarized in figure 1: Shell and BP lead the forefront, followed by TotalEnergies, ENI, and Gazprom. While the regulator Law has actioned the sector towards Phase 1, it is the interplay between the Norm and Market that dictates the pace. Since 2019, a shift occurred, underscoring the primacy of the regulator Norm as the principal driver of industry behaviour. The role of Architecture proves to be more of a passive factor, as it was only used as an excuse in the beginning but did not hinder or influence the companies in later phases. It is the nuanced interplay between the regulator Norm and Market that ultimately shapes the speed and direction of the companies within the sector.

Figure 1. Summary of research findings. Green arrow represents primacy of regulator Market, Law, Architecture or Norm (clockwise) through the subsequent years of analysis.



4 CONCLUSION

Relevance of our findings in relation to the sustainable market transition in the Oil & Gas sector

The study aimed to analyse if and how European Oil & Gas companies are transforming their sector to realize GHG reduction to support the 2015 Paris Agreement goals. Changes in a sector can be triggered due to several reasons and at different levels, for example new normative measures, innovations, or a changing discourse of what is right or wrong (Argyrou et al., 2022). Transformations develop through different phases, where each phase is part of a changing social system (SMTF). We applied the Simons & Nijhof SMTF.

To gather more rich knowledge into the behaviour of Oil & Gas companies, we developed a case study approach (see Table 1). Based on information published in the period 2017-2022, we collected relevant information about the ambitions, transition plans and activities of five Oil and Gas companies operating in Europe. We compared the collected information with the indicators of the four SMTF phases, analysed their ambitions, transitions plans and activities and plotted each of the five companies per year in one of the SMTF phases.

To gain insights in and to better understand the motivation of the selected companies to change their behaviour, we used Lessig's Modalities theory (1998). We identified which of the four regulators – Law, Market, Norm, and Architecture – influenced the companies' behaviour. This method contributed to our qualitative analysis on the question if and how European Oil & Gas companies are transforming their sector to support achieving the 2015 Paris Agreement goals. As demonstrated in figure 1, the regulator Law motivated the companies to move towards Phase 1, the regulators Norm and Market - and their interplay - influence the pace of the transformation of the market. The role of Architecture proves to be more of a passive factor: although the companies used arguments in this field as an excuse for not transitioning, we did not see those arguments in later years. We conclude that as of 2019, the regulator Norm appears to be the most effective driver to push Oil & Gas companies towards the next SMTF phase and the pace wherein this happens.

Relevance of our findings for the overall global sustainability transition

We selected the Oil & Gas sector as this sector is by far the most significant contributor to the burning of fossil fuels and hence the main trigger for rising global temperature. The findings show that the sector is still far away from institutionalizing sustainability in daily operations. We noticed a stagnation in the transformation in 2020-2022. Referring to Lessig's Modalities theory, we recommend that strong influence be exerted by governments, other companies, civil society organizations to influence the cultural norms in the sector. The regulator Law can assist therein as Law can directly and indirectly drive the other three regulators, i.e. Norms, Market and Architecture. This might contribute to moving the sector towards the final phase in the SMTF. These findings can provide guidance to governments, companies, and civil society for real-world sustainable market

transformations. Our study also deepened the conceptual understanding of the SMT theory by developing a research protocol that can be used by other researchers to examine other (high-risk) sectors and markets and/or the same sector over time.

Research limitations and suggestions for future research

Our findings indicated that several of the selected companies mentioned the need for a carbon tax in their annual reports. One of the indicators of the SMTF Phase 3 is the following: “(...) sustainability leaders begin to pressure governments to pass legislation and impose regulations. Sometimes companies want more regulation. They want a level playing field for the new game” (Changing the Game, pp. 69). However, we have not found any information on any lobbying activities by the companies against regulations. We could not assess if what is happening behind the scenes aligns with what is written in annual reports. This limits our findings.

To gain deeper insights into the motivation of the Oil & Gas companies to move towards the next SMTF phase, we recommend future research. Such research could involve conducting a stakeholder analysis per case: which stakeholders have been key to moving the sector to the next level. However, such a study would be labour intensive and commercially sensitive for participating companies. Other topics for further research concern the questions: How could more collaboration between Oil & Gas companies look like? How can we act on opportunities together? How can European law push companies to move faster, even though they are operating in a global market?

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