Business model for sustainability: motivations and antecedents[1]. An exploratory case of a global manufacturing company engaged in the energy transition

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Abstract

Purpose of the paper: *The UN Sustainable Goal #13 on Climate Action aims to achieve decarbonization targets. The literature tackles a number of motivations and antecedents for an organization to address this. However, the impact of such a transformation on the organization's business model remains underexplored, and the business case remains undetermined.*

Methodology*: This paper is based on a literature review and interviews. This is an exploratory a single case study. As a result, this paper is a conceptual piece of work with insights from literature and an empirical framework from the selected exploratory case. The empirical framework of this paper is the energy transition, which aims to achieve net-zero greenhouse gas emissions by 2050. This is accomplished through reducing emissions in a variety of energy sectors as well as implementing UN Sustainable Goal #7 for affordable and clean electrical energy.*

Findings*: This paper contributes to understanding the strategic motivation and antecedents within an organization that seeks to achieve sustainable targets and where a main business model is already in place. In addition, this paper contributes to the literature on sustainable business models.*

Research limits: *The research has been limited to one single company. By including larger samples and new cases, it can be expanded for a more thorough and in-depth investigation.*

Practical implications*: Building on business model literature, business model innovation, and business models for sustainability as a foundation, this paper initially addresses the theoretical list of antecedents and motives that lead management to define and implement an energy transition strategy. It then checks this list against a real case by adopting an in-depth investigation approach.*

Originality of the paper*: A multinational manufacturing corporation that recently announced an energy transition investment plan to accelerate global decarbonization is thoroughly investigated. It uncovers the emergence of new antecedents such as (1) digitalization, (2) advancement of specific technologies, and (3) the corporation's own culture. Observations reveal that digitalization is becoming an antecedent for business model sustainability. Hence, this paper contributes to clarifying the position of digitalization in relation to sustainability.*

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1. Introduction

While describing potential future directions for business model theories, Massa, Tucci, and Afuah (2017) emphasize the need for formal business models for sustainability (BMfS) while taking into account a set of dynamics (e.g., key factors). In 2016, Schaltegger, Hansen, and Lüdeke-Freund (2016) contend that the nature of the BMfS can also emerge from organizations capable of creating new value while maintaining a "green" orientation. In this case, the authors also advocate the modeling of such business models, either for individuals or organizations, by incorporating theoretical constructs into the system dynamics.

Most recently, in their essay "A call for action: The impact of business model innovation on business ecosystems, society, and planet," Snihur and Bocken (2022) state that the need for further research on sustainable business models, or BMfS. Such investigations enable a better understanding of the factors that create long-term value for organizations that seek to add social and environmental dimensions to their economic one.

According to Pereira, Niesten, and Pinkse (2022), how enterprises pursue strategic goals and the management motivations to engage with BMfS in the sustainable energy generation domain are still underexplored. Indeed, given that the phenomenon is still evolving and not yet finalized, motivations for organizations to engage in BMfS may alter over time (Pereira *et al.*, 2022). Macroeconomic factors such as an economic crisis, stakeholder commitment, or a firm's pre-crisis competitiveness can all influence an organization's level of investment in sustainable activities (Bettinazzi *et al.*, 2020). In contrast, Bohnsack *et al.* (2021) claim that digitalization can enable new business models for renewable energy installation in order to optimize energy self-consumption and facilitate communication with end-users.

This research initially reviews theoretical foundations and subsequently investigates an exploratory single case in order to debate the antecedents and motives for enterprises shifting their business model to BMfS. A multinational corporation operating in global power management and energy transition is chosen. This organization is currently implementing its energy transition strategy. Senior managers that are addressing UN Sustainable Goal #13 by developing and implementing an energy transition strategy are interviewed and analyzed to reveal their motivations and antecedents for such a strategy.

By doing so, we hope to contribute to the BMfS literature, which in this case focuses on antecedents and motivators. As a result, the purpose of this paper is to investigate the drivers and antecedents of the business model for sustainability within the context of a developing strategic initiative of a global corporation. In particular, the role of digitalization and the emergence of sustainable technology in energy management is debated, as is their position as determinants. The results are based on an

empirical study of a division of a global manufacturing organization based in Switzerland and operating in the European, Middle Eastern, and African regions (EMEA). In this case, the strategy's implementation is still in its early stages, as the energy transition is a current phenomenon.

In this article, we investigate the following research question:

Research question: What are antecedents for BMfS for manufacturing companies that are moving their business model in the empirical framework of energy transition?

To answer the research question, an in-depth investigative approach is adopted, which is based on an exploratory single case study.

As a result, Part 2 discusses the theoretical context as well as the relationship between BMfS and the energy transition. Part 3 describes the research method employed to address the research question. This section also explains why the exploratory single case of a global manufacturing corporation was chosen. Part 4 presents data collection and analysis, including the interview method, and explicates how the data was processed. Part 5 discusses the results, and the relative details are argued. In the final section, the conclusions and potential future developments are presented.

2. Business model for sustainability - insights from the literature

The conventional idea of the business model is based on the concept of delivering and maintaining customer value, as well as on process optimization (Massa *et al.*, 2017; Zott *et al.*, 2011).

BMfS theories could evolve as a sub-field or as a stand-alone theory from well-established business model and business model innovation theories (Lüdeke-Freund and Dembek, 2017). As a result, academics have begun to investigate the relationship between BMfS and current available theories (Schaltegger *et al.*, 2016). Schaltegger, Hansen, and Lüdeke-Freund (2016) contend that the BMfS exists to share value across multiple stakeholders, which may diverge from the traditional business model assumption (Massa *et al.*, 2017).

In this case, the concept of "sustainability" refers to the incorporation of environmental issues into a company's strategy, operations, and business model in order to maintain an economical footprint while contributing to the environment through sustainable development (Massa *et al.*, 2017). Previously, in 2016, Schaltegger, Lüdeke-Freund, and Hansen (2016) claimed that BMfS could manifest as a coevolution of large and small enterprises toward business model transformation.

The definition of BMfS proposed by Schaltegger *et al.* (2016) and explained by Massa, Tucci, and Afuah (2017) implies that organizations have a responsibility to develop innovative solutions that transform their environmental challenges into market opportunities. By considering the triple bottom line, an organization can generate value for multiple stakeholders while also being a driver of societal progress. Thus, BMfS implies that by having organizations that can deliver economic value or change their value proposition, innovations can mitigate the negative impact on the environment and/or society. This is achieved through

implementing sustainable innovation initiatives (Bocken *et al.*, 2014). Therefore, these innovations can have an impact at the strategic level, such as in the value proposition, supply chain, customer interface, and financial model. They may also be technological, organizational, and/or social innovations (Boons and Lüdeke-Freund, 2013).

In addition, profit-driven business models are a significant impediment to many organizations' progress toward sustainability (Upward and Jones, 2016). BMfS expands the scope of the business model by having the potential to create other types of value, such as social and environmental, and to deliver this to a more extensive stakeholder group (Freudenreich *et al.*, 2019). This trend was also debated by Stubbs and Cocklin (2008), who demonstrated that the BMfS success level is linked to a multitude of shareholders. This expansion of shareholders includes local communities, suppliers, partners, and employees, as well as customers.

As previously discussed, the empirical case of this paper is the energy transition. In particular, Bohnsack, Ciulli, and Kolk (2021, p. 828) stated that the current stage of energy transition is characterized by the coexistence of both new and old business models, with energy transition defined as "the shift from fossil-fuel-based electricity generation to renewables and more sustainable sources." Pereira, Niesten, and Pinkse (2022) further examined how the energy transition drives changes in the business models of utilities operating in the field of sustainable energy generation. As a result, the current energy industry transformation has mobilized the academic community. Multiple studies have been conducted to investigate modifications in the business model toward more sustainable energy innovation and retention. This has focused on different types of activities and organizations, such as utilities (Pereira *et al.*, 2022), European electricity firms (Bohnsack *et al.*, 2021), electric vehicle (EV) manufacturers (Bohnsack and Pinkse, 2017; Bohnsack *et al.*, 2014), urban districts (Gauthier and Gilomen, 2016), solar photovoltaic generation (Vernay *et al.*, 2019), and smart grids (Shomali and Pinkse, 2016).

All of these studies provide an overview of how enterprises are converting their business models to embrace sustainable energy generation and how those models reflect value creation, delivery, and capture (Pereira *et al.*, 2022). Therefore, shifting from a traditional definition of a business model to a new theory that focuses on business models for sustainability (Bocken *et al.*, 2014; Boons and Lüdeke-Freund, 2013; Schaltegger *et al.*, 2016).

3. Research method and business context

3.1 Research Method

The research data is based on qualitative data and interviews. The data gathered from interviews in the exploratory single case is primary data collected directly from senior management of the organization. Indeed, semi-structured interviews aided in the creation of a map between input and output factors (Gray, 2004), which is connected to the gaps identified

in the literature. Furthermore, the semi-structured questionnaire used during the interviews offers some flexibility to explore a phenomenon from different perspectives. This eventually allows new factors to emerge, i.e., factors not cited in the theoretical list (Gray, 2004).

Indeed, the nature of qualitative research tends to be more exploratory, with open-ended thinking rather than pre-coded questions and responses (Easterby-Smith *et al.*, 2015). One remarkable characteristic of the qualitative approach is that it gathers data from a variety of sources, including observations and interviews (Gray, 2004).

3.2 Case Selection

According to the 2020 International Energy Agency's report on sustainable recovery (IEA, 2020), the energy sector must accelerate the use of renewable electricity sources in order to reduce the environment's carbon footprint. This can occur through the adoption of innovative solutions and technologies that directly improve the energy efficacy of buildings or residential homes, industrial processes, and transportation electrification, such as electric vehicles (EVs) and their charging infrastructure.

In fact, the European Commission's current vision is that buildings have great potential to contribute to the 2030 and 2050 decarbonization objectives. This is because they consume 40% of the energy and generate 36% of greenhouse gas emissions (European Commission, 2021). Most recently, in December 2021, the European Commission amended the directive on building energy performance, reinforcing the message that the goal is to reduce building energy use while making them more energy efficient and less dependent on fossil fuels.

A division of a multinational manufacturing corporation operating in Europe, the Middle East, and Africa (EMEA) that provides solutions for improving building energy efficiency, including energy storage, microgrids, EV charging stations, and associated energy management software, is appropriate in this context. With an annual revenue of over 17 billion dollars, the corporation can provide its clients globally with high-quality products and services in the power management field. This enterprise is well-positioned to observe the transformation toward sustainable solutions and digitalization, as was announced during the annual investor conference in 2021.

During this conference, the global leadership team announced the corporation's energy transition strategy for its electrical sector. This was the result of a global strategy where each region chooses to focus on one or more business segments. Prior to defining a global strategy for energy transition, the corporation was previously involved in other sustainable initiatives. Indeed, over the past decade, the company began with energy storage and focused on residential, commercial, and industrial markets, as well as microgrid segments. They partnered with a major electronic vehicle (EV) manufacturer to provide first and second life lithium batteries and power management. Their product line is centered on EV batteries, both new and used, which can also be used for stationary energy storage applications. Following this, the company chose to invest in an energy management

system to complement its software as a service offering. Most recently, in 2021, the company acquired an EV charging station and software charging point operator manufacturer. This enables the organization to bundle electric vehicle (EV) charging stations with its previous offerings, which provides additional value for their final customers.

Publicly available secondary data about the corporation (including comparisons with peers, industry reports, and business targets) as well as its official communication towards the energy transition were collected. Senior leaders were then invited to participate in the study and provide future updates on the evolution of the strategy's deployment. Traditionally, the division's headquarters are based in Switzerland, where they oversee all business operations in the EMEA region. This includes the design, manufacture, and sales of power quality products, as well as energy storage solutions for their B2B clients. Some software solutions, mainly to facilitate energy management and the user experience, are also provided to final customers.

4. Data and Analysis

4.1 Data collection

Individual interviews conducted via an online communication platform served as the primary method of gathering data. The majority of senior leaders were interviewed. In order to cover all geographical areas and directions such as general management, marketing, strategy, and sales, three individuals were identified. All of those interviewed were part of the corporate-wide team responsible for defining the company's energy transition strategy. Interviews lasted between 45 and 60 minutes and were conducted in November and December 2021. They have been recorded, transcribed, analyzed, and are displayed in Table 1.

The semi-structured interview questionnaire is presented in Appendix A.

Tab. 1: Overview of the interviews conducted

Role of the person	Responsibility	Type, date of contact
General Manager for electrical vehicle charging infrastructures, energy storage and microgrid	Responsible for the whole offering and business in the EMEA region	Web interview, 17 November 2021
Segment leader, Commercial & Industrial Building, EMEA	Leading the commercial and industrial building segment and involved in the energy transition strategy for buildings and electrical vehicle charging infrastructure	Web interview, 24 November 2021
General Manager and Sales leader for Italy	Responsible for the whole sales and market in Italy	Web interview, 23 December 2021

Source: Authors elaboration

As depicted in Table 2, secondary data was sourced from the official corporate website. These included investor conferences, white papers, and landing pages.

Tab. 2: Overview about secondary data

Date	Topic	Type of data
March 2021	2021 Annual Investor Conference - Electrical sector	Investor annual conference
January 2022	Understand how EV charging works in commercial buildings	White paper
2021	Energy Transition	Landing page

Source: Authors elaboration

4.2 Data analysis

Yin's (2018) pattern-matching approach was used to code the data. We discovered a main theme, such as antecedents and motivators for BMfS, and a relative pattern (Yin, 2018, pp. 165-200). This is presented in Table 3. The inductive strategy that we adopted begins with observations and interviews, then progresses to formulate empirical generalizations. Finally, how this exploratory case can contribute to existing BMfS theory is identified (Gray, 2004, p. 126).

As a result, in order to categorize the factors, provide context within the observed phenomenon, and link them to future outcomes, traditional axial coding was used for the data analysis (Gray, 2004). Indeed, axial coding lends itself to an additional interpretation of the phenomenon as a causal interaction between various parameters (Gray, 2004). As a result, the primary objective was to use the questionnaire to stimulate the classical features of business model theories that emerged from the literature review and to connect them to other aspects (Easterby-Smith *et al.*, 2015). These aspects include current claims in the literature regarding BMfS, stakeholders, and performance factors.

Table 3 displays the evidence of the collected data and the first level of coding employed. Consequently, the main contribution of this paper is to clarify the position of digitalization in relation to BMfS, revealing it as an antecedent. The second contribution of this paper is the confirmation of four business patterns, or BMfS archetypes, that emerge from the literature.

Tab. 3: Quotation table with evidence from primary

Theme	Data supporting the theme	Type of source	Pattern
Antecedents and Motivators for BMfS	"The effect on digitalization on the energy transition inside the company will be positive but it will be a transformation. Indeed, energy transition can be seen as 3D: decarbonization, decentralization and digitalization. Digitalization will help to get more data and more data means more analysis and more analysis means more services. Ideally, it will be possible to have more control, optimalization against user or customer preferences"	Primary	Definitions Position of digitalization
Antecedents and Motivators for BMfS	"Digitalization and digital transformation is needed for future products and if we need think around buildings where there are EV charging station, HVAC, PV and other assets in order to maximize the self-consumption you need those assets to communicate each other or you need to change a bit the behavior how to consume energy."	Primary	Facilitate self-sufficiency
Antecedents and Motivators for BMfS	"So, there is an implicit motivation to grow the sales of existing products and thanks to this transition the company decided to change its strategy to go more in the direction of sustainable approach. Indeed, we believe that it is possible to apply in their own buildings the solutions that are developing to reduce the CO2 footprint, energy consumption, etc.."	Primary	Move toward sustainability and renewable products Re position the business to have an environmental positive impact
Antecedents and Motivators for BMfS	"…the grid will need flexibility in the different sector where energy is consumed such buildings, industry, residential, EV charging infrastructure. Each of this sector can contribute to energy transition and they are also touched by the energy transition."	Primary	Efficiency

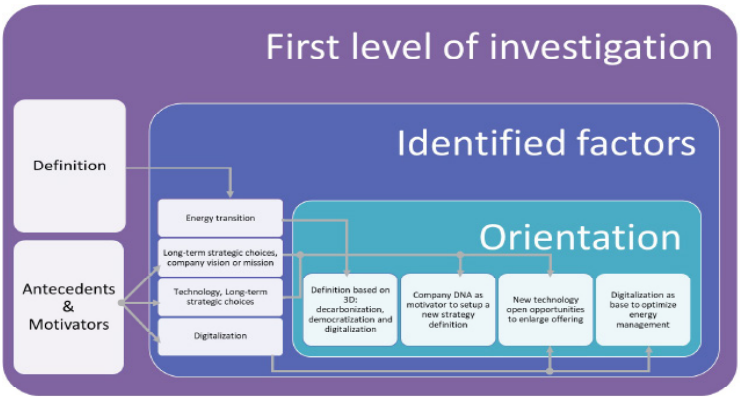
Source: Authors elaboration

5. Discussion

The exploratory single case study's energy transition initiative is the result of past activities toward sustainability that the corporation was already pursuing prior to the 2021 announcement. This initiative is built on three fundamental pillars: decarbonization, democratization, and grid digitalization. Decarbonization is linked with the notion that carbon neutrality is required by 2050, and it is aligned with the UN's Sustainable Goal #13 on Climate Action. Democratization and digitalization relate to the products and services that the corporation would like to provide in order to mitigate its carbon footprint. Generally, three major factors emerge as antecedents and motivators during the interviews.

The positioning of the factors and their relationships to one another are shown in Figure 1. This map serves as a visual representation of the current state of the organization under analysis. The research's primary findings have a specific current orientation that originates from the managerial understanding of the subject.

Fig. 1: Illustration of the relationship between factors and their orientation



Source: Authors elaboration

5.1 Digitalization becomes an antecedent BMfS

Organizations can now interact directly with end-users thanks to digitalization, and they can discover new ways to deliver value through energy efficiency optimization (Bohnsack *et al.*, 2021) or by recommending changes to user behavior (Vernay *et al.*, 2020).

To date, the relationship between digitalization and BMfS remains unclear. Some studies demonstrate that digitalization has a generic positive impact on sustainability, while other research tends to reject this claim and emphasize digitalization's negative consequences on sustainability (Bohnsack *et al.*, 2022). For instance, the high computational capability of digitalization can promote an increase in energy consumption (Itten *et al.* 2020).

Most recently, Pereira, Niesten, and Pinkse (2022) discovered that digitalization enables smart energy management. Indeed, they demonstrate that as utilities modernize their networks by including digital solutions, communication, and software services, they may focus on more digitalized and decarbonized energy generation (Pereira *et al.*, 2022). This will enable organizations to reconfigure their existing business model toward sustainability.

In addition, as debated by Vernay *et al.* (2020), the recent application of digital technology in the energy sector offers an innovative development for both enterprises that operate in this sector and for the industry as a whole.

The originality of this paper is demonstrated by the inclusion of digitalization as a motivator for BMfS. In fact, unlike utilities, which prioritize digitalization to reinforce an energy system's centralization (Pereira *et al.*, 2022), digitalization is seen as a way to trigger energy decentralization.

Digitalization enables the connection of multiple resources, such as EV charging stations, solar PV inverters, battery storage, and HVAC systems, to maximize the use of energy derived from solar generation. It

also facilitates energy management decisions that can alter the dynamic between how users consume or produce energy.

This paper demonstrates that the deployment of prior digital solutions serves as enablers for new BMfS, including photovoltaics (PVs), energy storage, data analytics, cybersecurity, and electric vehicle (EV) charging infrastructure. This is in contrast to Shomali and Pinkse (2016), who consider that the energy firm's ability to innovate business models while utilizing digital solutions such as smart meters is restricted.

Digitalization is therefore considered an antecedent, as without it, a full energy transition will be difficult to achieve. Indeed, part of the organization's definition of energy transition includes digitalization. Whereas, according to the second interviewee, "digitalization has become one fundamental pillar of energy transition strategy of the company, which is based on three components: decarbonization, democratization, and digitalization."

5.2 New technology open opportunities to embrace energy transition

Bohnsack, Ciulli, and Kolk (2021) recently demonstrated that new technologies such as storage or demand response have improved the reliability of renewable energy installations in order to provide energy over a certain timeframe. Digital technologies have augmented this antecedent by enabling direct communication with customers to share electricity consumption, incentivize electricity-saving behavior, or optimize energy self-consumption (Bohnsack *et al.*, 2021). To date, technology has emerged as a crucial enabler for the transition to new business models. Indeed, the volatility and intermittent nature of renewable energy will have an impact on grid stability. Consequently, the grid will need greater flexibility to manage various problems and loads, including demand response at both grid and site levels (Pereira *et al.*, 2022). In addition, the interviews reveal that the expansion of new technologies such as energy storage and electric vehicles could present both an opportunity and a challenge for sustainable energy management. On the one hand, emerging technologies could add capacity by making additional resources available to assist the grid when needed. On the other hand, grid operators such as utilities and distribution system operators will need to strike a balance between the supply and demand of energy (Helms *et al.*, 2016). In fact, some sectors affected by the energy transition will alter their traditional modes of operation. For example, this is the case for future buildings that will have to produce energy and support the grid whenever it is needed. The same rule could apply to electric vehicles or any other battery that could eventually provide additional capacity to assist the grid when other resources are unavailable.

Meanwhile, Helms, Loock, and Bohnsack (2016) contend that energy sector enterprises are developing new business models to address the need for time-based flexibility. As was evidenced from the interviews, this factor will become increasingly significant with the advent of electric vehicles. Their high demand for energy and power may generate congestion points that grid operators will need to manage. This implies, as the segment leader stated, that "in the future, the flow of the energy will be more and

more complex, impacting the whole traditional way to distribute energy that is moving from centralized to decentralized approach." Still, there are a few unresolved issues, particularly in the regulations, such as vehicle-to-grid, where the energy transfer from EV batteries to the grid is not fully standardized. These may add greater complexity to the development and prioritization processes.

From an empirical context, this paper validates four of the business patterns identified by Bocken *et al.* (2014). As shown in Table 3, the collected primary data supports the business patterns that this corporation under study is repositioning its strategy toward more sustainable products and solutions. This assists end-users in maximizing their energy self-sufficiency when this energy is generated from renewable sources. Finally, digitalization promotes the energy-efficient harmonization of multiple assets.

5.3 Company DNA plays a key role on motivation toward a new strategy definition

Bock *et al.* (2012) demonstrated that an organization's culture and strategic flexibility can influence the innovation of the business model phase. In addition, they contend that culture is a critical driver of business model innovation. Furthermore, innovation is a tool for transforming and reviewing the business model (Demil and Lecocq, 2010) and is key to an enterprise's performance (Zott *et al.*, 2011). It may also be a "permanent revolution," as the ongoing decisions of each firm have ramifications on the business model (Casadesus-Masanell and Ricart, 2010, pp. 198-200). As a result, according to Demil and Lecocq (2010), managers must constantly evaluate their portfolio of competencies and resources to modify the organization or business model elements in order to best optimize the corporation's potential. This suggests that every firm makes decisions with functional repercussions, regardless of the existence of a feasible long-term strategic plan or a satisfactory business model (Casadesus-Masanell and Ricart, 2010). In this specific exploratory single case study, the corporate DNA has been the fundamental driver in defining the energy transition strategy. Behind the implicit motivation to increase financial performance, we discovered that the current transition in the energy sector is creating a demand for sustainable approaches to satisfy multiple stakeholders. This includes investors, customers, shareholders, employees, and markets where the corporation operates.

5.4 Further implications for organizations and management

There are several unresolved questions regarding the impact of BMfS on energy-transitioning enterprises. When considering management cognition and the initial and boundary conditions, the future positioning of the factors remains unexplored.

Future analysis might consider other sets of factors as well as moderators and outcomes to examine how the corporation adjusts its business model toward sustainable energy management and how this may challenge the

traditional view of the business model by delivering benefits to multiple stakeholders. Future research might examine the evolution and dynamics of the new business models, as well as the adaptation of managerial skills and knowledge. These topics pertain to the exploration of how and to what extent the new organizational structure and activity reconfiguration will impact the performance of BMfS.

6. Conclusion

This paper investigates the early motivations and antecedents for a global power management corporation engaging in sustainable operations to address the energy transition. Digitalization is becoming a central component of its energy transition strategy because it can enable additional value for customers and alter the customer relationship dynamic (Parida *et al.*, 2019; Boons and Lüdeke-Freund, 2013). This relationship is fundamental to the success of the organization's energy transition strategy. In fact, the definition of digitalization as an antecedent for BMfS is the most significant primary theoretical contribution.

Other factors, such as the firm's DNA and technology, have also been identified as primary drivers of business model innovation. However, the lack of clarity in certain policies or standards, such as the vehicle-to-grid regulations, governs the energy flow from electric vehicles to the grid. This can complicate a company's priorities, investment plans, and business model developments. This is the second contribution of this paper, as it validates existing patterns for BMfS from an empirical case.

Finally, this research contributes to the literature on new business models associated with the sustainable energy transition by analyzing a specific case involving a division of a multinational corporation. Managers and academics who are interested in the potential of innovative business models in these settings can use them to become knowledgeable about how other organizations and industries practice.

In conclusion, the growing number of corporate sustainability initiatives that focus on sustainable energy management add to and enhance the literature on business models for sustainability and contingent theories.

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Appendix A - Interview questionnaire

Initial questions

1.1 Could you introduce yourself? Roles, background, etc.…
1.2 How do you define energy transition within your company?

Antecedents and Motivators

2.1 What is the division motivations to engage in the energy transition?
2.2 Could you list main drives (external or internal) for adopting an energy transition initiative?
- Internal/Long term strategic choice.
- Internal/Digital transformation of the company.
- External/Technology.

2.3 Do digitalization and/or digital transformation of your division help to the energy transition initiative? Please describe.

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