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Business Approaches in the Energy Sector - a Review

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Review paper

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Abstract: *The significance of enhancing business models within the energy sector has markedly increased in recent years due to the growing demand for sustainable energy sources and the requirements created by regulations and imposed on companies in relation to environmental protection. The purpose of this research is to provide suggestions for the development of business models corresponding to the present, which take into account the principles of sustainable development, in a competitive environment characterized by heightened volatility. By analyzing the literature and industry examples, it is argued that business models in the energy sector have to adapt in three main directions: adopting green technologies, rethinking production using digital platforms and tools, but also based on knowledge-based services. In order to generate a comprehensive analysis, the PRISMA methodology was used and the Web of Science database was queried by scanning all the publications on the business models in energy. The basic idea in the case of business models in the field of energy forces companies to a permanent and flexible adaptation of the business to the developments in the economic, social, legal, technological and ecological spheres by promoting energy efficiency solutions and the large-scale use of energy renewable sources, but also in relation to the realities already present regarding high energy prices, uncertain long-term supply and the huge environmental impact of fossil energy consumption.*

JEL Classification:
L21; M10; O13; Q40.

Keywords: *Business Model; Energy, Green Technologies; Digital Platforms; Knowledge-Based Services.*

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Introduction

The business model is intended to represent a better way of running existing businesses. The emergence or proposal of new business models is related to innovation and relates to the company's business strategy. Business models try, on the one hand, to capitalize on the commercial opportunity, and on the other hand, to identify the development possibilities for the company.

If more than 50-60 years ago business models focused a lot on influencing customer behavior, starting with very low price offers that were later supplemented with associated products or services, which had additional costs for the customer, at present, high-level technology (including Artificial Intelligence), outsourcing of various types of services, complex level supply chains, network-type international cooperation structures, the large-scale use of innovation at any level are highly valued etc. Various explanations or definitions for business models have been offered over time. For example, Afuah and Tucci stated the business model as a method of building and using resources to offer customers a better offer than the competition and generate profit in the medium and long term (Afuah & Tucci, 2000). Porter states that the business model is a description of the activity of a company so as to generate profit (Porter, 2001). Another point of view describes the business model as a set of elements that include decisions on payroll, contracts, vertical integration, aspects related to sales and marketing but also the impact of these decisions for the customer and the company (Casadesus et al., 2011). Also, the business model can consider the description of the methods by which a company conducts its daily operations.

Basically, a business model is the way in which a company can gain a competitive advantage and thus increase its profits. The major importance of a business model is given by the effective implementation of the company's objectives and the current management of the company. Through such a model, a set of questions vital to any socio-economic structure can be answered, from what the firm sells and to whom, to where financing money can be obtained and when a promising result can be obtained. In understanding the steps taken by any company to operate as effectively as possible, many companies start from the most well-known business model template: the Business Model Canvas. This model was developed in 2005 by Alexander Osterwalder (Osterwalder et.al, 2005). The model has a complex structure based on 9 components: Key partners, Key activities, Key resources, Value propositions, Customer relationships, Customer segments, Channels, Revenue streams, Cost structure. The proposed structure in the form of a diagram helps the decision-makers in the company to focus on four levels: customers, ways of relating to potential customers, the infrastructure of the company and ways of financing. Currently, the complexity of the situations constrains companies to a pertinent analysis and a constant concern to design the business model that best suits that company.

In the given context, of a tortuous economic evolution, with pluses and minuses, with ups and downs, with the manifestation and overlap of multiple crises, the decision-makers are trying to find mechanisms to adapt and make companies' operations more flexible. Companies try to find viable solutions and identify their own solutions to respond in a competitive manner. A necessary and useful tool in this sense is the design of a business model.

Practically, every field or sector of activity and every company tries to propose a business model that adapts as best as possible to the dynamics of that domain of activity, to the company's objectives, to its internal and external environment and that takes into account all the problems and the challenges it faces.

The main challenge of our time is accelerating the transition to a competitive low-carbon economy. Europe needs to step up its investments in energy efficiency and renewable energy technologies, as well as in the development of clean energy business models, taking advantage of the new possibilities and consumer empowerment brought about by digitalization.

The energy system has reached a critical point. Renewable energy sources are increasingly cost competitive and represent an increasing share of electricity production. Energy intensity ratios, which measure energy consumption relative to economic output, are falling, especially in developed economies. New energy storage solutions are needed, as well as the development of a wider portfolio of cost-effective technologies for obtaining energy from renewable sources. In addition, energy-efficient technologies need to be applied more rapidly in real estate, transportation systems, and manufacturing practices. All these aims can be achieved by promoting new business models that mainly target the energy sector.

The objective of the article is to analyze the evolution of the content of business models in the field of energy and generate some useful ideas for the development of the companies that are operating in the energy field. The structure of the paper is that, after the Introduction part, a Review of the Literature will be carried out, then a methodology for highlighting and analyzing the business models will be proposed, followed by an interpretation of the obtained results, and finally, the formulation of ideas of the type of conclusions regarding the analyzed field.

Literature Review

In the last 20 years, the specialists' concerns on creating, developing and enhancing business models, applicable to a wide range of business, along with the increase of expertise exchange due to internet and the open sources use, have determined a considerable and variate amount of models. The business models were created in order to transform any kind of business in a resilient, more sustainable and profitable business for both entrepreneurs and communities.

According to Saeed Nosratabadi et al. (2019), the concept of the sustainable business model describes the rationale of how an organization creates, delivers, and captures value, in economic, social, cultural, or other contexts, in a sustainable way.

Nowadays, business models aim to help organizations from all fields of activity to achieve both their economic goals as well as social goals and those related to environmental protection.

Same authors (Nosratabadi et al., 2019), have identified and analyzed over 3688 business models, top five domains being Environmental Sciences, Business management and accounting, Social Sciences, Engineering and Energy.

Geissdoerfer et al. (2018) conducted a large study on business models that shows us the evolution of the concept, its intended goal and the gap between its intended design and its implementation, gap that most often leads to the failed implementation of the business model.

A useful approach, including for the energy sector, can be represented by the proposal made by Linz et al. (2020), which analyzes the typology of business models in relation to the level of personalization of the offer and the volume of transactions. There is, for example, the Platform business model approach developed by Amazon, Alibaba, Apple, Google, Microsoft, Facebook or Airbnb, through which these platforms act as intermediaries that connect various categories of groups and allow interactions and transactions that create value. This approach is based on a standard offer but takes into account large volume of integration transactions (Parker et al., 2018; Periyasami & Periyasamy, 2022; Romero et al., 2021; Kim & Min, 2019).

Another approach, opposite to the one above, operates with a limited number of transactions (administered directly between the service provider and its client) and with a single value, associated with a maximum personalization value (Wikström et al., 2010; Shafer et al., 2005; Kujala et al., 2010; Artto & Dietrich, 2004). This type of approach, called the Project business model, defines Accenture. This way of doing business brings into question the ability of supplier companies to offer a customized solution to a company that needs to achieve increased performance. The solution involves the development of a project in which a specialized consultancy in a given field appears.

A targeted component of the economic system, targeted by almost all sustainable business models, is the consumer itself, consumer which has to be educated in changing its behavior and attitude toward a more environmental friendly position (Marques et al., 2020).

Nowadays, more than ever, due to climate change, and economic crises enhanced by wars that beak out again in historical conflictual areas, the energy domain became the focus of specialists from different fields of research.

Business models in the energy industry has grown significantly in recent years based on the requests to use sustainable energy sources and the requirements created by regulations and imposed on companies in relation to environmental protection.

Aslani and Mohagar (2013) underline how difficult it is to use classic business models in the energy sector due to its specific nature from entrepreneurial, technological and political point of view as well as due to the market uncertainties.

The classic business model approach in the energy sector refers to the linear value chain, in which the improvement of the margin of the companies in the energy sector can be done due to the decrease in energy production costs or through the so-called economies of scale (Giehl et al., 2020; Gitelman & Kozhevnikov, 2023).

Another noteworthy illustration of a thriving business model is exemplified by the Swiss energy company EGL. Their approach revolves around a grid-based model that seamlessly integrates energy trading, asset management, and gas supply (Gitelman & Kozhevnikov, 2023). Thus, using its own production capacities, EGL provides fuel for the efficient generation of electricity, closely related to its transactions. Supplying gas to its own plants and external consumers, in parallel with its role as European competence center in market analysis, distinguishes EGL through the close links between gas supply, power generation and energy transactions. The company's key competence is reflected in the expansion of the portfolio and the entry into various European markets thanks to the experience in trade and marketing.

On the other hand, virtual power plant (VPP) operators employ an innovative business model that enhances energy exchanges among diverse participants, optimizing energy sources for cost, reliability, and customer satisfaction. They also manage demand and control power usage for consumers, addressing system imbalances through wholesale markets or direct agreements with power grid operators (Giehl et al., 2020; Roozbehani et al., 2022).

Another approach explains that blockchain technology and smart contracts are based on the peer-to-peer (P2P) trading model. P2P trading involves secure digital platforms that facilitate the exchange of energy between networked parties (Soto et al, 2021; Filipova, 2018).

There are approaches in different domains, including energy sector, that are much more focused on their services sales than on their main products (Wedekind, 2020). This approach tries to attract much more clients for the companies and, in the same time tries to keep existing customers loyal. This will bring increased revenues and a better position for the company within the market.

The shift in energy, coupled with digitalization and decentralization, is giving rise to fresh business models emphasizing sustainability, personalized service, and adaptability (Brzóska et al, 2022; Cleary and Palmer, 2019).

Methodology

Since the paper tries to identify some business approaches in the energy sector in the light of using principles of sustainable development and a competitive environment the PRISMA methodology will be used. Before anything to be done, the Web of Science database was used in order to scan different publications on the business models in energy, as main paper topic. It

was used Boolean operators for the following words combination: TS = (Business Models* AND Energy*). In the figure from above are described the steps related to the PRISMA approach (Figure 1).

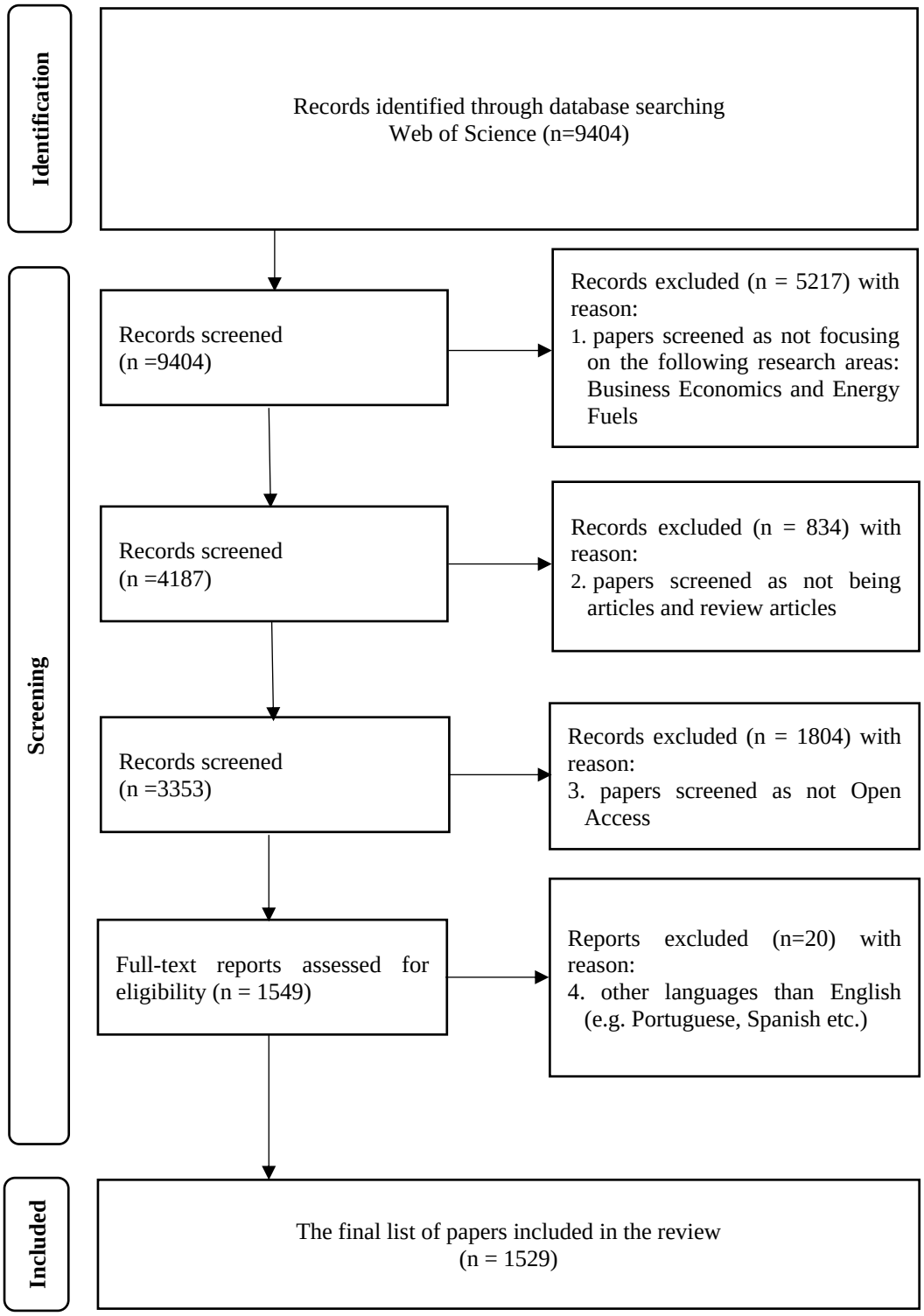

Fig. 1. PRISMA flowchart of literature review process based on the combined search of two critical concepts: Business Models and Energy

Source: Made by authors based on PRISMA approach.

The entire process started from a total of 9404 records and was narrowed through a successive removing process records based on the following criteria:

- papers focusing on the following research areas: Business Economics and Energy Fuels;
- papers declared as articles and review articles;
- papers declared as Open Access articles;
- papers written in English language.

After completing the entire set of stages the total eligible records number is 1529. Some other info useful for the analysis are:

- Study period 1975-2024;
- Citing articles 27717 (without self-citations);
- Times cited 31720 (without self-citations);
- The total number of contributors (as first author or corresponding author) 200.

Results

To fulfill the review were used in a combined manner the facilities generated by the Web of Science platform and the VOSviewer program.

A first finding of the research is that the topic studied was treated by the experts in the field especially in the last 5 years (Figure 2). This happened due to major changes, transformations and crises in the energy sector that have taken place globally in the last 4-5 years.

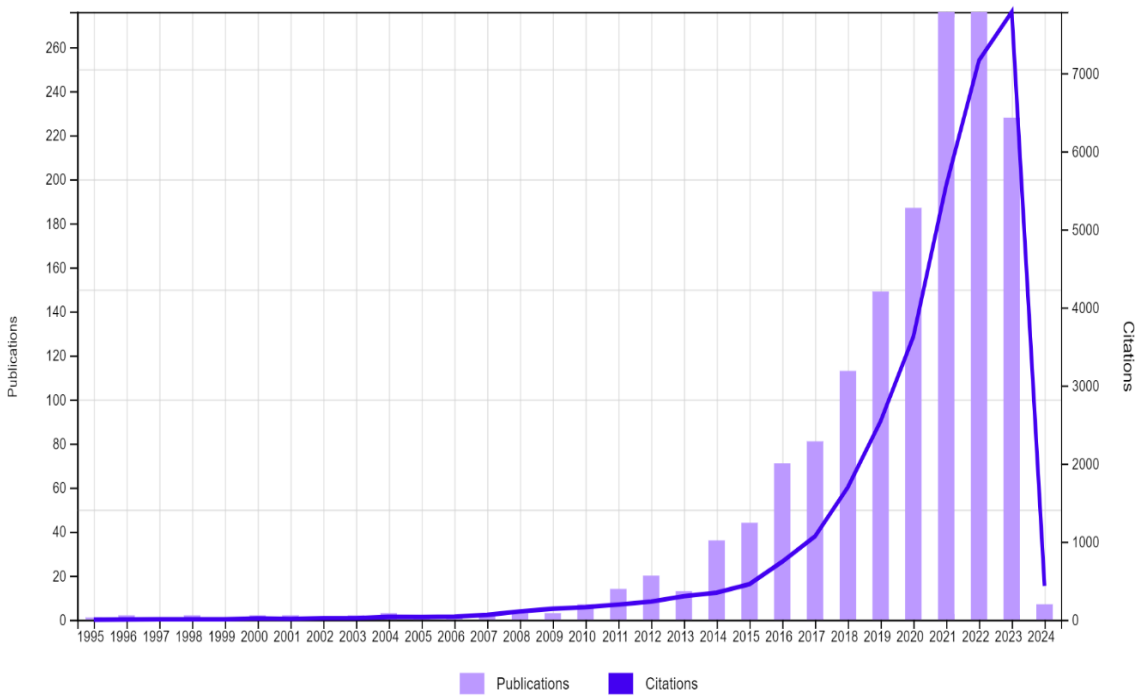

Fig. 2. Times Cited and Publications over time (1975-2024)

Source: Made by authors based on the facilities of Web of Science database platform

As it can be observed the most prolific years in terms of scientific production are 2021 and 2022. In 2021 276 articles were published and the total number of citations was 5564. In 2022 also 276 articles were published but the total number of citations was 7163. Another useful information refers to the most cited papers (Table 1). This info type will be processed later in this section, when VOSviewer program will be used in order to find the most used keywords in

the articles and the most important authors in terms of publications and cited papers.

Table 1. Top 10 most cited papers

Authors	Title	Year	Journal	Citations WoS (Citations All Databases)
El-Kassar, AN, Singh, SK (El-Kassar & Singh, 2019)	Green innovation and organizational performance: The influence of big data and the moderating role of management commitment and HR practices	2019	Technological Forecasting And Social Change	489 (583)
Jiménez-Rodríguez, R., Sánchez, M. (Jiménez-Rodríguez & Sanchez, 2005)	Oil price shocks and real GDP growth: empirical evidence for some OECD countries	2005	Applied Economics	414(482)
Koirala, BP, Koliou, E., Friege, J., Hakvoort, RA, Herder, PM (Koirala et al., 2016)	Energetic communities for community energy: A review of key issues and trends shaping integrated community energy systems	2016	Renewable &Sustainable Energy Systems	405(765)
Sovacool, BK, Burke, M., Baker, L., Kotikalapudi, CK, Wlokas, H. (Sovacool et al., 2017)	New frontiers and conceptual frameworks for energy justice	2017	Energy Policy	330 (633)
Davis, SJ, Haltiwanger, J. (Davis & Haltiwanger, 2001)	Sectoral job creation and destruction responses to oil price changes	2001	Journal of Monetary Economics	312 (982)
Harmsen, GJ (Harmsen, 2007)	Reactive distillation: The front-runner of industrial process intensification - A full review of commercial applications, research, scale-up, design and operation	2007	Chemical Engineering nd Processing: Process Intensification	273(429)
Despeisse, M., Baumers, M., Brown, P., Charnley, F., Ford, S.J., Garmulewicz, A., Knowles, S.. Minshall, T.H.W., Mortara, L., Reed-Tsochas, F.P., Rowley, J. (Despeisse et al., 2017)	Unlocking value for a circular economy through 3D printing: A research agenda	2017	Technological Forecasting And Social Change	266 (500)
Rotemberg, JJ, Woodford, M (Rotemberg &Woodford, 1996)	Imperfect competition and the effects of energy price increases on economic activity	1996	Journal of Money Credit and Banking	263(1024)
Martinot, E., Chaurey, A., Lew, D., Moreira, JR, Wamukonya, N (Martinot et al., 2002)	Renewable energy markets in developing countries	2002	Annual Review of Energy and the Environment	256 (664)
Zhou, Y., Wu, JZ., Long, C. (Zhou et al.2018)	Evaluation of peer-to-peer energy sharing mechanisms based on a multiagent simulation framework	2018	Applied Energy	242(405)

Source: Made by authors based on the Web of Science database.

Also, as leading countries in the scientific production for the topic related to the business models in energy are England, USA, China, Germany, Spain and Italy (Figure 3).

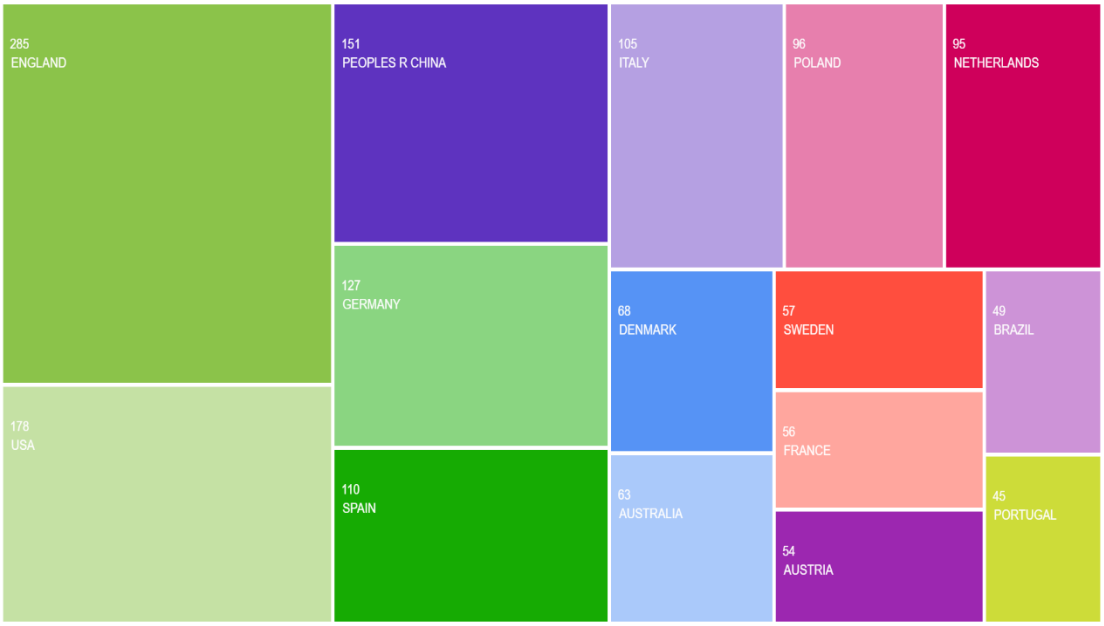

Fig. 3. TreeMap Chart by Countries

Source: Made by authors based on the facilities of Web of Science database platform.

This finding it is demonstrated by the permanent concerns of research and studies in these countries but also by the investments of companies in the field of energy in order to adapt better in relation to economic changes, market transformations and consumer demands.

Another confirmation of the diagram above is given by the representation in Figure 4 in which it can be seen that the representative entities in carrying out studies and applied research for the analyzed subject come mostly from England and the USA, but there are also other similar structures from the Netherlands, Switzerland and Denmark. All these universities have specialized departments that carry out major studies and comprehensive analyzes in the field of business in the energy sector.

Fig. 4. TreeMap Chart by Affiliations

Source: Made by authors based on the facilities of Web of Science database platform.

The analysis must be conducted in relation to a research question. Therefore, by using the VOSviewer software, it was intended to obtain answers to the following question: "What was the state of research and evolution in the field of business models in the energy field?".

Some journals are offering a special attention to the subject of business models in energy. Processing the data showed that three publication titles are covering more than 35% of published articles out of a total of 333 journals (Table 2).

Table 2. Top three publication titles

Publication titles	Record Count	% of total publications
Energies	367	23,662
Energy Policy	103	6,641
Applied Energy	96	6,190

Source: Made by authors.

Moreover, four publishers host around 78% of the total number of publications in this topic (Table 3).

Table 3. Top four publishers

Publishers	Record Count	% of total publications
Elsevier	672	43,327
MDPI	383	24,694
Springer Nature	77	4,965
Wiley	76	4,900

Source: Made by authors.

A first step in the Bibliometric analysis through VOSviewer software refers to use the Co-authorship option as Type of analysis, and organizations as unit of analysis. By imposing the minimum number of documents of an organization to be 5 and the minimum number of citations of an organization to be 15 we discovered from a total number of organizations that 34 meet the thresholds (Figure 5).

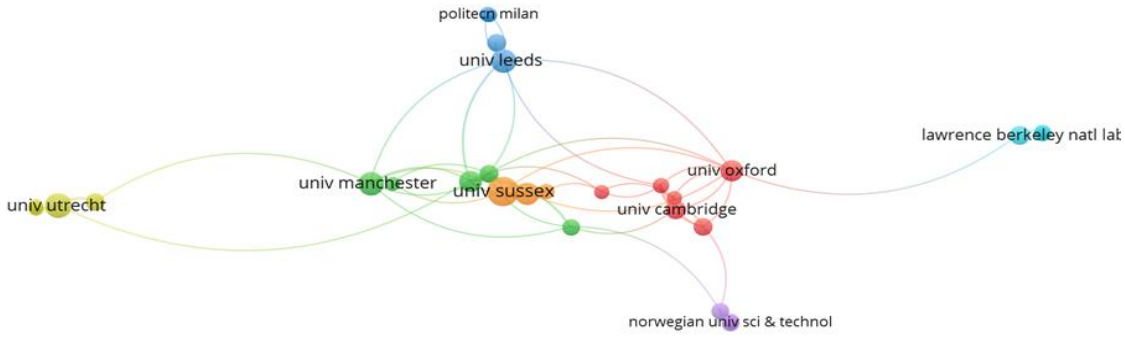

Fig. 5. VOSviewer diagram represents Network visualization for a link co-authorship – organizations

Source: Made by authors through VOSviewer software.

As it can be easily detected, the most prolific organizations are based in England: University of Sussex, Imperial College of London, University of Leeds, University of Manchester, Oxford University, and Cambridge University.

Then, another coupling items refer to Co-authorship vs. Countries (as unit of analysis). Again, by setting a minimum number of documents for a country as 5 and a minimum number of citations of a country to be 50, from a total of 68 countries only 36 meet the thresholds that are divided in 6 clusters (Figure 6).

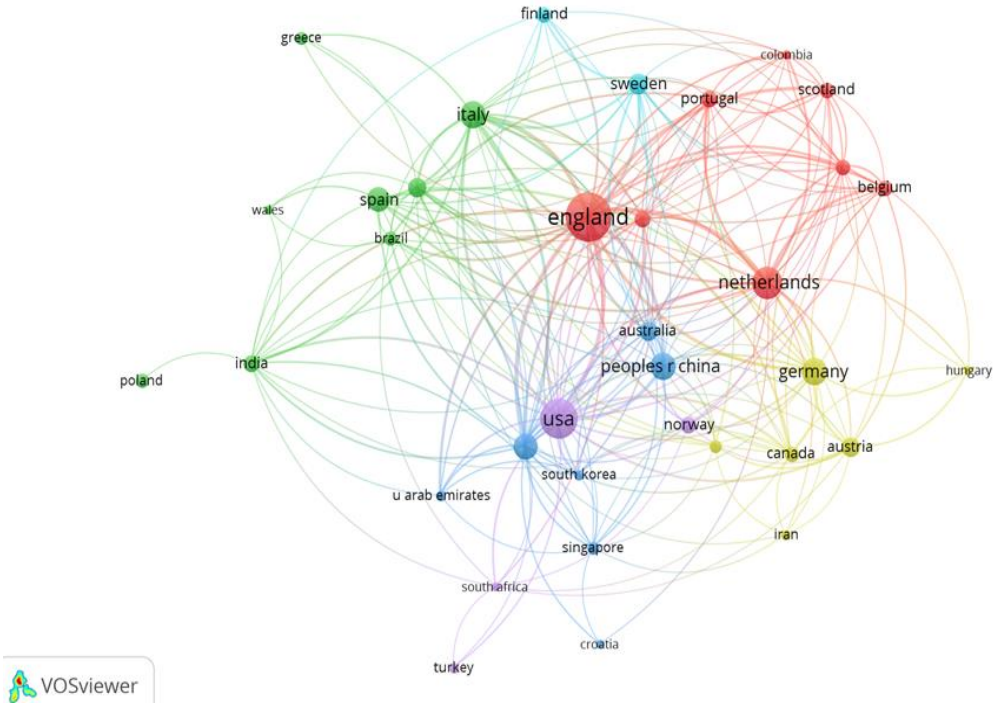

Fig. 6. VOSviewer diagram represents Network visualization for the couple: co-authorship – countries

Source: Made by authors through VOSviewer software.

As can be observed, the most important countries are England, USA, Denmark, Netherlands, Italy, China, Germany and Spain.

In the following diagram a new type of analysis was setup, as Co-occurrence and All keywords, as unit of analysis. In order to generate a relevant diagram a minimum number of occurrences of a keyword as 25 was imposed. Therefore, from a total of 2857 keywords, 23 meet the threshold (Figure 7).

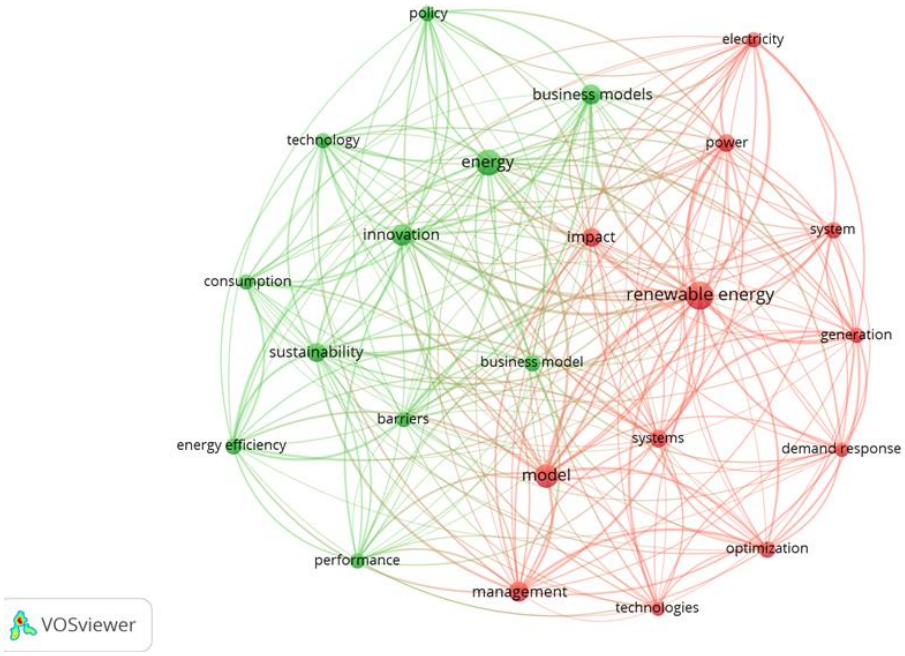

Fig. 7. VOSviewer diagram represents Network visualization for the couple: Co-occurrence – all keywords

Source: Made by authors through VOSviewer software.

Concretely, to draw the diagram from Figure 7 the keywords with the greatest total link strength are selected, because for each of the 23 keywords, the total strength is based on the co-occurrence links with other keywords. As it can be detected, there are two clusters, the red one containing 12 items, of which the most important keywords are renewable energy, model, management and power, and the green cluster with 11 items, of which the most important keywords are innovation, energy, business model and sustainability. Furthermore, it can be draw through the VOSviewer a diagram that shows how the keywords appeared over time that represented the interest and concerns of researchers at that time (Figure 8).

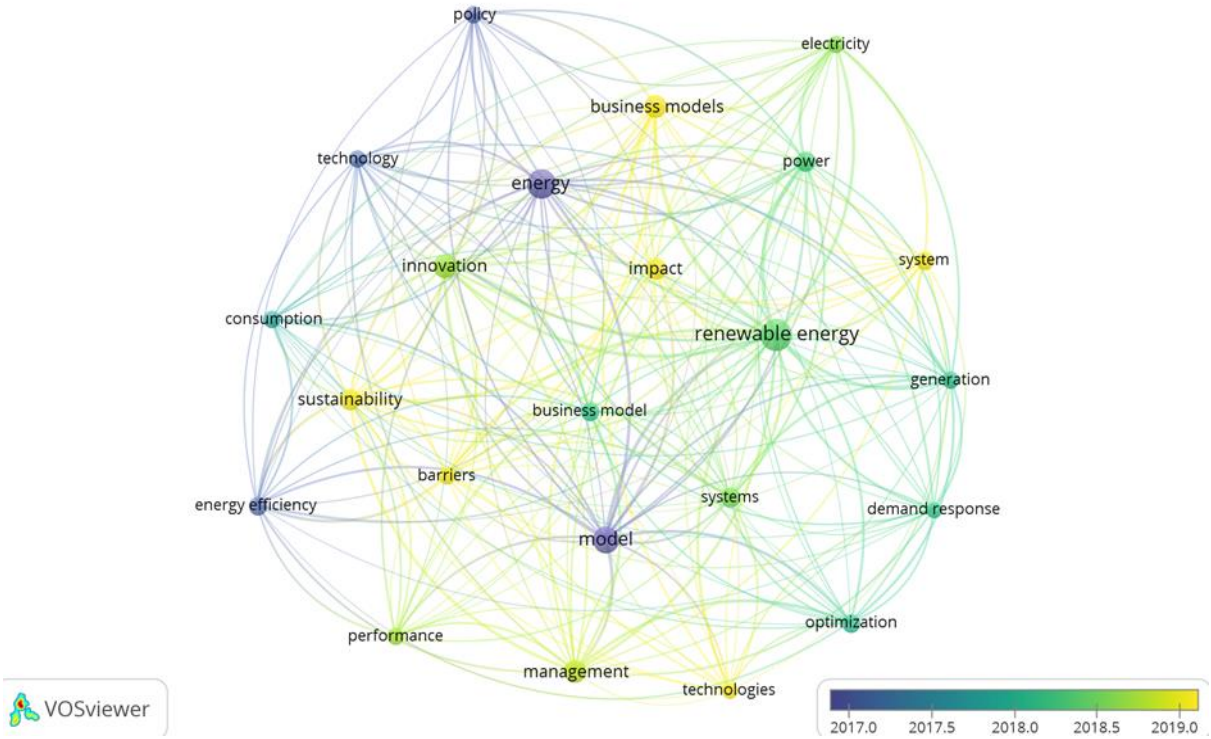

Fig. 8. VOSviewer diagram represents Overlay visualization for the couple: Co-occurrence – all keywords

Source: Made by authors through VOSviewer software.

If during the year 2017 the researches mentioned keywords such as: policy, technology, energy efficiency and model, in 2018 the studies and particular analysis included key terms as consumption, power, systems, generation, optimization, demand, response, business model, renewable energy, electricity and innovation, while for 2019 the most important keywords used were performance, management, sustainability, system, technologies, barriers, impact and business models.

In the same time, in the Bibliometric analysis the couple formed by Citation (as type of analysis) and Documents (as unit of analysis) can be used. By imposing a minimum number of citations of a document as 50, from a total of 500 documents, 168 meet the threshold. The diagram from Figure 9 describe this case, were seven clusters are generated, the red one containing 6 items (the largest number of components). In each cluster, the documents with the most citations can be identified, as follows: in the baby blue cluster is Koirala (2016), in the red cluster is about Richter (2013) and Hossain (2020), in the green cluster it is about Bolton (2016) and Luedeke –Freund (2020), in the magenta cluster is Bale (2015) and Hall (2016), in the orange cluster it is about Tronchin (2018) while in the light green cluster is Zhou (2018).

Another useful informative element can be produced by coupling Citations and the sources that host the cited works (journals and magazines). In this sense, imposing a minimum number of documents of a source as 5 and a minimum number of citations of a source as 10, from a total of

135 identified sources, 17 meet the thresholds. The diagram generated through VOSviewer software contains 6 clusters (Figure 10).

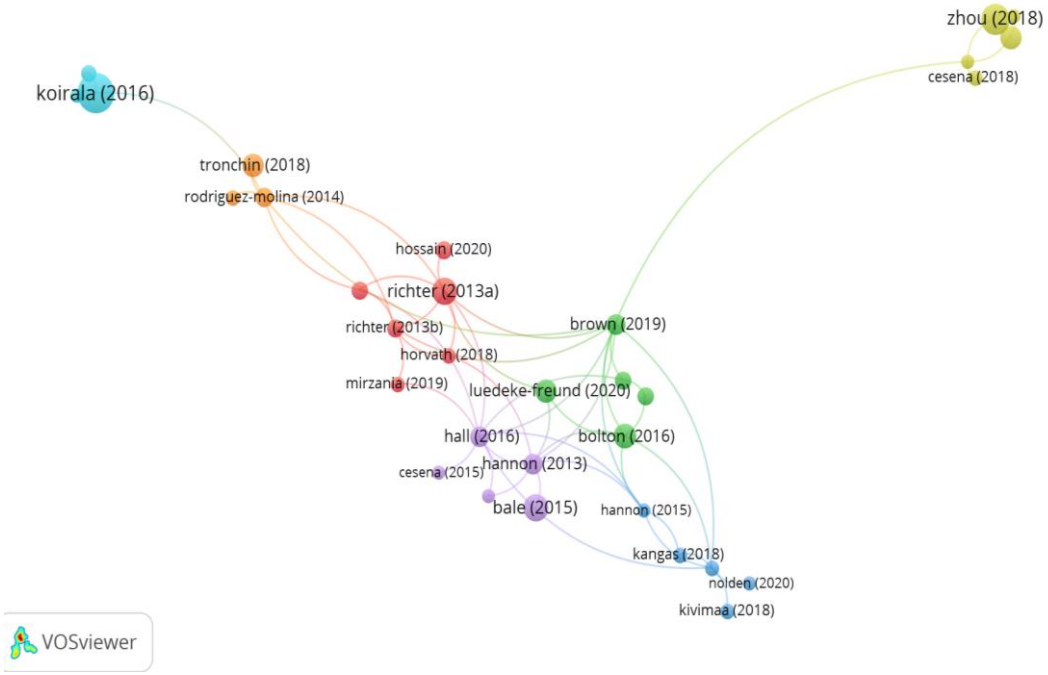

Fig. 9. VOSviewer diagram represents Network visualization for the couple: Citation – Documents

Source: Made by authors through VOSviewer software.

As it can be observed from the Figure 10 the most important sources that published documents (articles) with the most citations are: Energy Policy (part of the magenta cluster), Energies, Applied Energy and Renewable & Sustainable Energy (items from light green cluster).

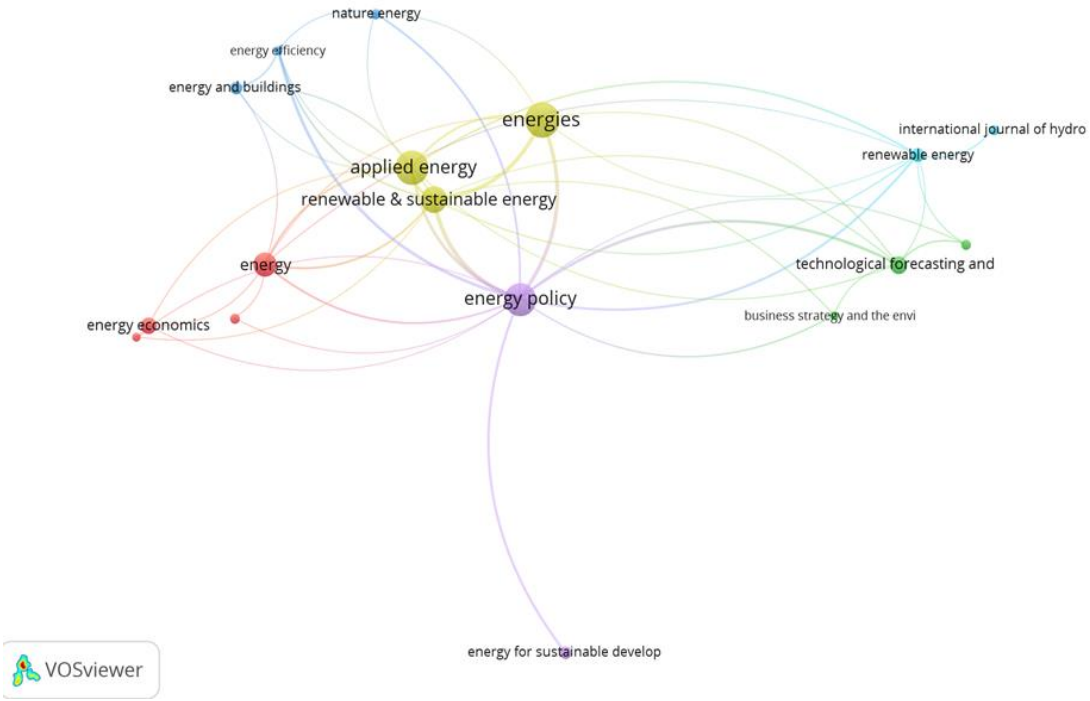

Fig. 10. VOSviewer diagram represents Network visualization for the couple: Citation – Sources

Source: Made by authors through VOSviewer software.

Another kind of useful information is to underline and to interpret the couple Citation and Authors. This will highlight the most prolific authors in terms of written and quoted articles. By setting a minimum number of documents for an author as 3 and a minimum number of citations of an author as 10, from a total of 1810 authors, 23 meet the thresholds (Figure 11).

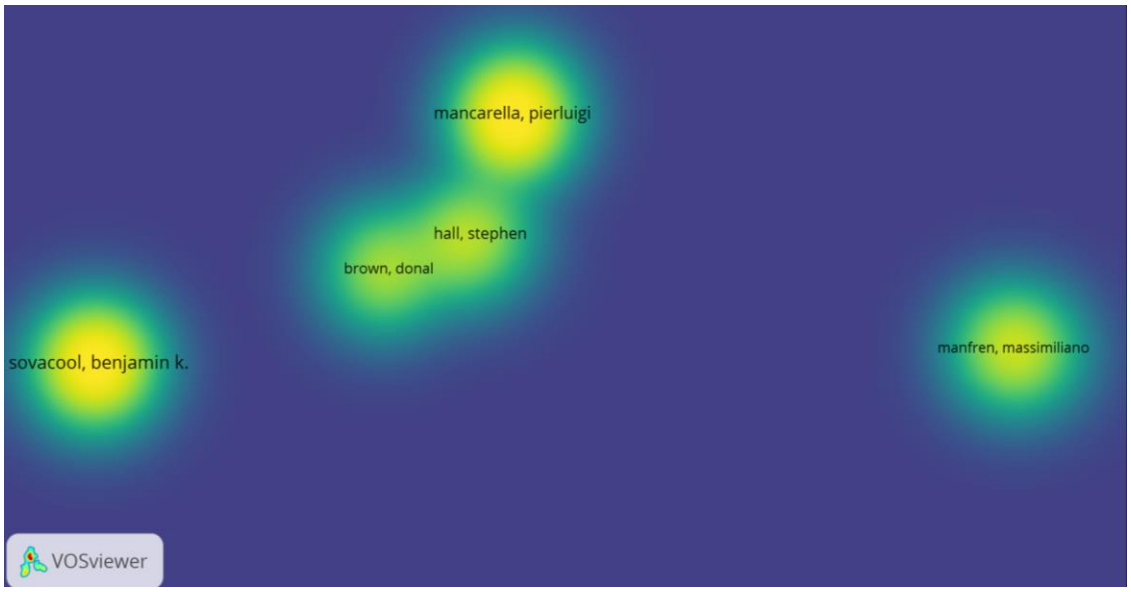

Fig. 11. VOSviewer diagram represents Density visualization for the couple: Citation – Authors
Source: Made by authors through VOSviewer software.

Thus, the most important authors are: Sovacool Benjamin K. (11 documents and 799 citations), Mancarella Pierluigi (7 documents and 318 citations) and Hall Stephen (5 documents and 301 citations).

Last but not least, it is useful to see how often two authors are cited together by various other articles. So, co-citation coupling refers to how often two authors are cited together by other documents. In simpler terms, when both authors appear in the reference list of a third document, they are considered co-cited. Therefore, by imposing a minimum number of citation of an author as 20, from a total of 20388 authors, 46 meet the threshold. The diagram revealed five clusters, with the most important one as the red cluster (Figure 12).

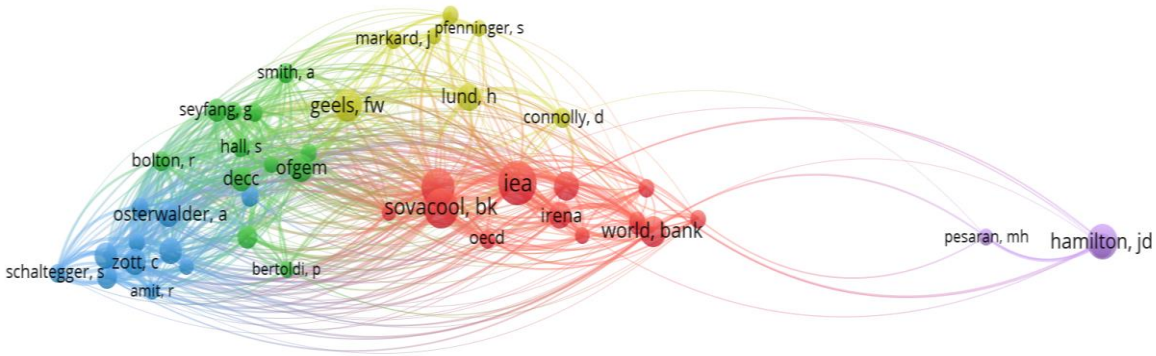

Fig. 12. VOSviewer diagram represents Network visualization for the couple: Co-citation – Cited authors
Source: Made by authors through VOSviewer software.

Conclusions

In a world where current concerns are related to the need for decarbonization and digitization, there is, rightly, a constant concern to build and use the business model that includes such elements. The companies in the energy sector are evolving in the sense of developing a direct contact with the end customers, including using certain software programs, dedicated automations and personalized digital platforms. A critical problem at global level refers to the way in which energy flows can be optimized in various categories of buildings (residences, commercial and industrial spaces, offices, etc.). Using intelligent components, predictive maintenance and a remote monitoring of these building structures. Such a solution must be integrated into the business model of the entities dealing with these issues.

There is more and more talk of an imminent danger to humanity related to the possibility of blackouts on a planetary scale. Companies operating in the field of energy production and distribution are already thinking of viable solutions to avoid such situations. Thus, they are thinking of a transition from the classic energy transport and distribution networks to the creation of intelligent networks that, by integrating control devices and automatic distribution systems (using advanced technology sensors), will significantly increase the reliability of the electrical networks. There is also a change of phrase among energy operators in the idea of high-efficiency cogeneration energy production that means more care for the environment and increased efficiency. Another target pursued by profile companies is storage systems, which capture excess energy and release it when needed. This solution can increase the private consumption of solar energy by homes and companies, reduce consumption peaks and provide functional reserves to compensate for short-term fluctuations in the network.

The research and evolution of business models in the energy sector have been a focal point of this study, driven by the need for adaptation to economic changes, market transformations, and consumer demands. Notably, entities primarily from England and the USA, with additional representation from the Netherlands, Switzerland, and Denmark, have spearheaded studies and applied research in this area, as depicted in Figure 4.

Using the VOSviewer software to address the research question, "What was the state of research and evolution in the field of business models in the energy field?" it was found that certain journals have shown significant attention to this subject. Three publication titles account for over 35% of the published articles among 333 journals, while four publishers host approximately 78% of the total publications.

Bibliometric analysis through VOSviewer software revealed significant insights. Initially, focusing on educational and research entities, it was found that 34 organizations, predominantly based in England, were prolific in producing research on energy business models. Subsequently, analyzing countries revealed that England, the USA, Denmark, Netherlands, Italy, China, Germany, and Spain were the most prominent contributors to research in this field.

Further analysis delved into keyword co-occurrences, identifying clusters of terms such as renewable energy, model, management, power, innovation, and sustainability. The evolving interests of researchers were tracked through the appearance of keywords over time, reflecting shifts in focus from policy and technology to performance, sustainability, and impact.

Significant concerns have been highlighted across various scholarly articles, disseminated research outcomes, cited literature, and identified keywords. Notably, these concerns revolve around the exploration and utilization of green technologies, the development and application of digital platforms for energy system management and energy supply, as well as the growing importance and contribution of knowledge-based services for firms operating within the energy sector.

Examining citation patterns and document sources revealed significant publications and their hosting sources. For instance, "Energy Policy" emerged as a key source for highly cited documents. The analysis also highlighted prolific authors, including Sovacool Benjamin K., Mancarella Pierluigi, and Hall Stephen, who have made substantial contributions to the literature on energy business models.

Co-citation coupling, which measures how often two authors are cited together by other documents, unveiled clusters of influential authors, with the most prominent cluster identified as the red cluster.

In summary, the research on business models in the energy sector reflects a concerted effort by academia and industry to understand and adapt to the dynamic landscape of energy markets. Through bibliometric analysis, key contributors, influential publications, and evolving research trends have been identified, shedding light on the state of research and evolution in this critical field. This comprehensive examination underscores the interdisciplinary nature of energy business models and the global collaboration driving advancements in the sector.

At the same time, if the topic of the decarbonization process is being discussed more and more often, it is necessary to highlight what energy companies must do in order to be able to implement solutions in the sense of decarbonization and to mention what such an objective entails: electricity consumption green from renewable sources (solar, wind, biogas, hydroelectric, green hydrogen, etc.), reducing consumption through energy efficiency solutions (infrastructure and mobility), reducing energy waste, transforming processes to make them ecological, etc.

Synthesizing the ideas contained in the main findings, some useful ideas can be extracted for those interested in this field:

- Transitioning towards green technologies is imperative for the energy sector to address environmental concerns and meet sustainability goals. This involves shifting from traditional fossil fuels to renewable energy sources such as solar, wind and hydroelectric power. Embracing green technologies not only reduces carbon emissions but also opens up new opportunities for innovation and investment. Additionally, it enhances energy security by diversifying the sources of energy production, thus reducing reliance on finite resources;
- The integration of digital platforms and tools revolutionizes how energy is produced, distributed, and consumed. Digitalization enables real-time monitoring and optimization of energy systems, leading to improved efficiency and reliability. Advanced analytics, IoT sensors, and AI algorithms empower energy companies to optimize operations, predict maintenance needs, and respond swiftly to changes in demand. Moreover, digital platforms facilitate the integration of distributed energy resources such as rooftop solar panels and battery storage systems, enabling a more decentralized and resilient energy grid;
- Knowledge-based services involve leveraging expertise and data-driven insights to deliver value-added solutions to customers. In the energy sector, this can encompass services such as energy management consulting, predictive maintenance, and energy efficiency audits. By offering knowledge-based services, energy companies can help customers optimize their energy usage, reduce costs, and minimize environmental impact. Furthermore, these services foster long-term relationships with customers, driving loyalty and recurring revenue streams.

Overall, adapting business models in these three directions—adopting green technologies, leveraging digital platforms, and offering knowledge-based services—is essential for energy companies to thrive in a rapidly evolving landscape characterized by increasing environmental awareness, technological advancements, and changing customer preferences. Embracing these transformations not only enables energy companies to remain competitive but also contributes to a more sustainable and resilient energy ecosystem.

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