

NFDI4Energy Conference

1. NFDI4Energy Conference

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Drivers and Challenges of Open Data from an Energy Industry Perspective

A Design Science Study

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Abstract: Open data plays a crucial role in the information society, offering numerous advantages. Nevertheless, it poses significant challenges, particularly within the energy sector. This paper explores the drivers and challenges of open data through a literature review. Additionally, we outline our methodology using design science to further elucidate these insights in collaboration with stakeholders from the energy industry, actively working towards practical solutions.

Keywords: open data, energy industry, design science

1 Introduction

On February 23, 2022, the European Commission granted approval for the Data Act, a regulatory framework establishing rules for the utilization of data generated by Internet of Things devices, Industrial Internet of Things, and Connected Cars [1]. The primary focus of the act revolves around ensuring the fairness of data, emphasizing its findability, accessibility, interoperability, and reusability [2]. Consequently, the implications of the Data Act extend to the energy industry, introducing a need for guidelines on the disclosure of critical data.

As a result, the energy sector faces specific challenges in harnessing open data. This research endeavors to address the fundamental question: "What are the drivers and challenges of open data from the perspective of the energy industry?" Our approach involves an initial literature review, followed by validation and refinement of findings through a design thinking workshop and surveys within the affected energy industry. The purpose of this abstract is to present a comprehensive overview of both the drivers and challenges associated with open data in the energy sector. Additionally, we aspire to engage in a discussion of our findings with the audience at the NFDI4Energy conference.

2 Research Background

2.1 Drivers for Open Data in Research

In academia various main drivers in the field of open data in the energy industry are discussed, including:

- Improvement of collaboration [3]–[12] - This leads to improved exchange of knowledge and increased cooperation. Furthermore, open access to data creates the basis for more intensive and efficient collaboration between different research institutions, industry and political decision-makers. This aspect underlines the importance of open data as a catalyst for interdisciplinary and cross-sector research cooperation.
- Creation of greater transparency, accountability and accessibility [4], [5], [7]–[11] - Open data makes it possible to make research results and processes comprehensible and verifiable for a wider audience. This not only contributes to the credibility of research, but also promotes public trust in scientific findings.
- Supporting innovation [4], [8], [10], [11], [13] - Through the availability of open data, innovative ideas that arise across disciplines and sectors can be developed and validated more effectively. Open data acts as a bridge that enables knowledge from different areas to be brought together and new solutions to complex challenges to be generated.

This findings show that open data is not just a tool, but a key driver of innovation, transparency and collaboration in energy research.

2.2 Challenges for Open Data in Research

Further, several challenges in the context of open data in the energy sector are discussed in literature, which play a crucial role in the implementation and use of open data in this sector, including:

- Ethical and security concerns [3], [4], [6]–[9], [11] - The publication of data containing personal or sensitive information such as user behavior in the energy sector requires careful consideration and handling. Safeguarding privacy and data security is therefore of great importance here.
- Ensuring data quality [3]–[5], [7], [9], [11] - There is a risk that data providers may provide incomplete, inaccurate, inconsistent or outdated data, which can compromise research quality and efficiency. It is therefore important to implement appropriate processes to check and maintain data quality.
- Legal restrictions [4], [5], [7], [8], [11] - Data providers may be subject to various legal regulations that limit the amount and type of data they are allowed to release. This can make availability and access to important data more difficult.
- Technical challenges [4], [5], [8], [11], [13] - Data providers may use formats and standards that do not match user requirements, making it difficult to access and process the data. It is crucial that the data provided is machine-readable, well-structured and easily accessible.
- Coordination of different interests [3]–[5], [7], [11] - Different stakeholders such as politicians, scientists, energy suppliers and consumers have different perspectives and goals, which can make it difficult to agree on common guidelines and approaches.

These challenges clearly show that the use of open data in the energy sector poses not only technological, but also ethical, legal and social challenges.

3 Methodology

To substantiate the broader drivers and challenges of open data in the energy industry and provide concrete requirements for open energy data platforms, we conducted a design thinking workshop in which seven industry partners from the fields of energy suppliers and producers, grid operators, municipal utilities and software suppliers as well as six energy researcher took part.

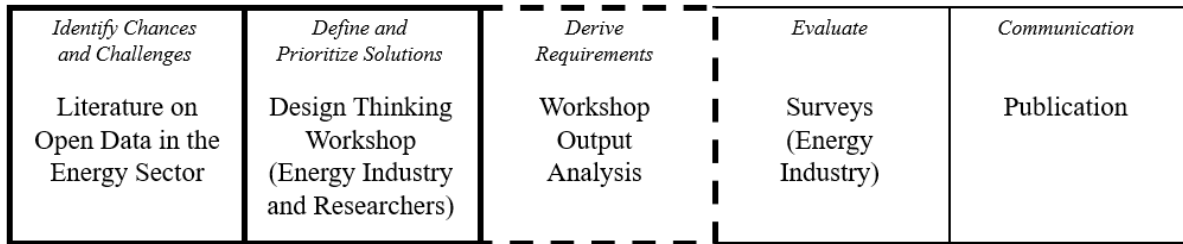


Figure 1. Work in progress within the overall Design Science approach.

The Design Thinking workshop aimed for three goals:

1. collect drivers and challenges of open data for the energy industry
2. ideate on concrete open data platform requirements
3. prioritize the resulting requirements

For the collection of drivers and challenges, we conducted a fishbowl discussion method to facilitate an open and interactive exchange [14], with the industry partners in the inner circle as discussing participants and the energy researchers in the outer circle as questioning participants. The ideation was achieved through a Conversation Cafe methodology [15]. The participants are divided into two groups. One group focuses on developing features related to the previously mentioned drivers of open data, while the other group develops solutions to the identified challenges. In the last part of the workshop, all participants are asked to prioritize which of the resulting features and solutions are most important to them.

4 Preliminary Results

Based on the results of the workshop, the drivers have been clustered in the following overarching themes: (1) simulation and modelling, (2) accessibility, (3) cooperation, and (4) incentives for data exchange. The challenges are clustered into two overarching themes: (1) data request, which includes quality of data and usability of data, and (2) data provision, which contains legal issues and incentives to provide data. A distinct segregation of drivers and challenges proves challenging. Moreover, we plan to corroborate our comprehensive findings through a survey encompassing a wider network within the energy industry.

Author contributions

Conceptualization: C.Sp.; Data curation: C.Sp., S.H.; Funding acquisition: C.W.; Investigation: C.Sp., S.H.; Methodology: C.Sp.; Project administration: C.Sp., Z.P.; Supervi-

sion: C.W.; Validation: C.Sp.; Visualization: C.Sp.; Writing – original draft: S.H.; Writing – review & editing: C.Sp., Z.P., F.S., C.Se., M.N.

Competing interests

The authors declare that they have no competing interests.

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