"Civic Energy Informer" - Facilitating assistance for actors in civic energy through a modular digital platform

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Abstract: Although civil society is a key driver for the energy transition, civic energy initiatives remain a niche competitor within the energy market. Facilitating the active involvement of citizens and communities, and subsequently the uptake of civic energy initiatives, requires a profound source of available information on the underlying processes, benefits, and possible risks such initiatives encompass. Data collected on practical experience from over 20 diverse civic energy pilots in seven European states over the past five years have highlighted the complexity of information demand the civic energy process entails. Due to this diversity and the distinctiveness of each pilot, this paper reports on the development of the "Civic Energy Informer", a modular digital platform that covers these diverse information demands in order to offer specific advice for various stakeholders. This presents a foundation for promoting the facilitation of civic energy initiatives by providing well-founded insights and tools for potential adopters.

1   Introduction

While it has been frequently established that civil society is a key driver for the energy transition, civic energy initiatives remain a niche competitor within the European energy market [BS18]. Nonetheless, civic energy and its related, synonymously used concepts of 'community energy' or 'local energy' have become a noteworthy aspect of the energy landscape, representing a shift towards a decentralised and democratic renewables-based energy system [VS15, Mc19, Va16]. This shift is epitomised by the European Commission's 'Clean Energy for all Europeans Package' and the subsequent recast of the Renewable Energy Directive and the Electricity Directive [Cl21]. These present an opportunity to further secure the role of civic energy by including definitions of community energy, alongside the entailed rights and the need to address existing barriers for a level playing field within the energy market [Di21a, Di21b]. While the practical application of these directives' national transpositions is debatable [FM21], it could present an opportunity for further enshrining civic energy initiatives in regional energy strategies.

Although the opportunities that civic energy offers to the realisation of a successful inclusive and just energy transition [AB14, Ro00], defining and thus actively facilitating

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civic energy poses a difficult task due to the inherently complex and heterogenous nature of civic energy initiatives [Ba16, DS18]. This complexity is highlighted by the European Economic and Social Committee, who outlines civic energy as "decentralized renewable energy generation owned (at least 50%) or operated by citizens, local authorities, charities, NGOs, farmers, cooperatives, or SMEs, creating a stream of local value that can stay within the region" [Eu15]. To enable the uptake of civic energy in the European energy landscape therefore requires a system that takes into consideration the broad variety of involved stakeholders, business models, energy systems, as well as the benefits such initiatives can deliver to the involved local communities. Facilitating the active involvement of citizens and communities, and subsequently the uptake of civic energy initiatives, thus necessitates a profound source of available information on the underlying processes, benefits, as well as possible risks such initiatives encompass.

On this basis, McGovern et al. [Mc19] investigated the need for a digital transformation that fosters civic energy uptake by offering a guided process management approach that supports not only certain aspects regarding the market roll out of established civic energy initiatives but also offers practice-based advice for every stage of the 'civic energy cycle' (CEC) [MK18]. Making information and communication about civic energy initiatives readily available for a heterogenous group of citizens and governments through digital means could therefore allow for enhanced participation and exchange that can foster acceptance and subsequently accelerate an inclusive and just energy transition [Mc19, SGS18].

Building on this potential for fostering civic energy initiatives through digitalisation on the one hand, and the identified demand for a variety of information and advice that derived from the reported practical experience of numerous distinct civic energy pilot projects on the other hand, this paper reports on the development of a modular digital platform that aims to facilitate assistance for civic energy initiatives. Based on this premise, a digital "Civic Energy Informer" platform is presented that offers initial advice for the diverse stakeholders involved in civic energy and caters to the specific information demands that each phase of the CEC entails. The objective is to create a foundation for promoting the facilitation of civic energy initiatives by providing a substantiated digital information source as an incentive for advancing the active engagement of existing and potential future adopters.

2   Motivation

Framing civic energy as a continuous improvement process, which captures aspects of civic energy initiatives that go beyond techno-economic processes, as proposed by McGovern and Klenke [MK18], allows to streamline heterogenous, multi-stakeholder initiatives and thus advances the facilitation of civic energy uptake. This continuous improvement process is reflected in the CEC, which categorises key assignments involved in the development of civic energy initiatives into four main phases with manageable

corresponding process stages [MK18]. Additionally, civic energy is characterised by its heterogenous forms of organisational-, legal-, and business models, as well as by its variety of stakeholders involved, the intended community participation and benefits, its possible 'activities' (e.g. energy generation, supply, distribution, and/or consumption, etc.), and not to mention the different forms of energy technologies (e.g. solar, wind, heat networks, or e-mobility, etc.) [CU20, WD08]. Hence, civic energy initiatives can vary strongly between these characteristics and the underlying motivation of engaging in civic energy [AB14, Ra14], e.g. economic incentives, environmental and climate protection, or social cohesion, Consequently, each civic energy initiative in itself faces a myriad of different opportunities and barriers [Wa08, Ko16, Ro08], making the development of a universal support and advice structure challenging - if not impossible.

Due to this variety and complexity of civic energy, using a "toolbox" approach could cover essential information needs of multi-stakeholder partnerships for relevant processes in the CEC [Mc19]. Yet, the available tools predominately accommodate the technical requirements of energy production and delivery – to date, a digital toolbox framework that caters to all phases of the CEC is not readily available. As McGovern et al. [Mc19] established, the question when developing a digital toolbox for civic energy "[…] should focus on 'what' to support for 'whom' rather than 'how' or 'by which means'" (p.686). In order to address the multifaceted dynamic of civic energy initiatives, a modular digital platform is deemed as the most appropriate approach to address the diverse information demands such initiatives entail. This approach allows to align a toolbox framework with the heterogeneity of civic energy stakeholders and the myriad of characteristics named above, which require distinct information to address specific barriers and opportunities. Furthermore, the creation of a modular digital platform addressing the entire CEC would further allow relevant intersection of information for several different factors of civic energy initiatives, e.g. the 'who'/'for whom', and 'what'.

Building on this premise, this paper reports on the data collected in the Interreg North Sea Region Programme 'COBEN' project [In21] on practical experience from over 20 diverse civic energy pilots in seven European states (i.e. the Netherlands, U.K.-Scotland, Denmark, Germany, Belgium, Norway, and Sweden) over the past five years. Existing data from surveys on business models, risk management, procurement guidelines and legal frameworks have highlighted the complexity of information demand that the civic energy process entails. This complexity and the distinctiveness of each civic energy initiative – covering a range of different pilots, e.g. solar cooperatives, district heating networks, e-mobility services, and wind energy landscapes – forms the basis of the modular digital platform presented in this paper. Based on the feedback on the experiences in the pilot projects, the identified information demands were then structured into relevant modules to align with the CEC.

3   Digital Platform - Criteria and Design

As mentioned above a Civic Energy Informer should be built as a toolbox framework where only selected tools will be available. While a perfect and universal Civic Energy Informer would identify and address all digitalisation needs of any possible civic energy initiative, a real-world Civic Energy Informer would have to focus on a variety of specific initiatives and the tools available. Its main task is to collect all needed tools based on this focus as well as to implement the underlying logic and information flow. This way an Informer can guide the user through the CEC and its decision by collecting the data needed for the tools at a specific point, feeding these tools with the data they need, and presenting the results back to the user. These results should be added to the set of collected data (user data), so the Civic Energy Informer can reduce the amount of data to be put in by the user.

Furthermore, this toolbox can be implemented as a "smart" toolbox (a tool selection decider) which narrows down the tools to be displayed to the user based on previous data entered by the user. This can be used to guide the user through the decision processes to be taken down the line when exploring the CEC and help the user focus on the relevant information only by hiding non-relevant tools for the user's civic energy initiative. Figure 1 shows the basic platform design of a Civic Energy Informer.
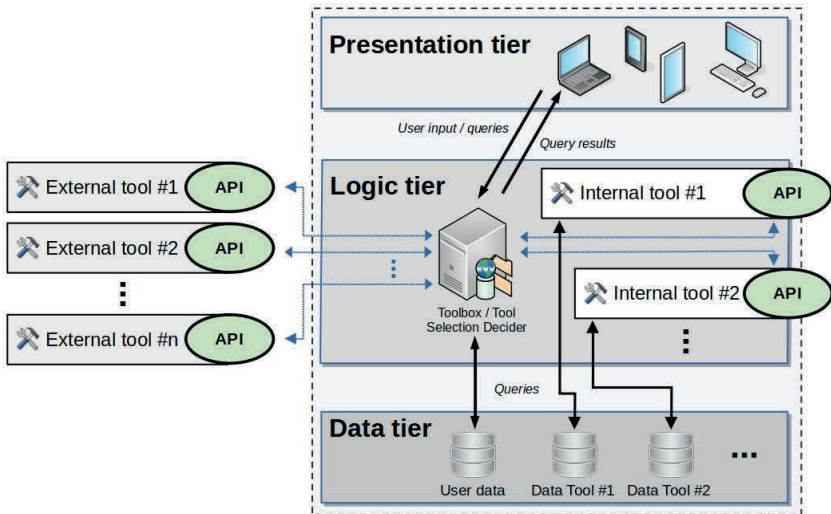

Fig. 1: Civic Energy Informer platform design adapted from the three-tier model by Pehlken, Koch and Kalverkamp, 2019 [PKK19]

The tools might be included into a Civic Energy Informer to build a monolithic and closed piece of software. But in order for the toolbox framework to develop its full potential, a

more open and distributed approach seems more promising. Outsourcing these tools as web services accessible through APIs has many advantages, like providing highly optimised tools for special requirements and conditions of an initiative as well as a larger pool of tools to choose from. In addition, it becomes easier to create your own Informer according to your needs and, above all, enables a uniform representation of the data across the entire presentation layer. Of course, the APIs of the web services need to be well documented, both technically and in terms of the focuses within the CEC. The latter in particular will be important in deciding which tools should be selected for the toolbox and presented to the user. Since the system is based on an open architecture, which prefers and focuses on the use of API calls, an integration of data from Corporate Environmental Management Information Systems into a Civic Energy Informer - and vice versa - can easily be done.

4   The "Civic Energy Informer" Platform

Within the COBEN project a prototype of a Civic Energy Informer is being developed as a proof-of-concept. The data and information collected within the COBEN project form the basis for the data set to be included into the platform and will be accessed via API calls from web services. The platform itself will be implemented as an interactive website and to avoid possible problems with the data protection regulations no user data will be stored outside the user session or on any external server.

To ensure the meeting of relevant information demand, the Civic Energy Informer is structured into relevant tools, or "modules", to match with the CEC. The Civic Energy Informer aligns its derived modules with the four main phases of the CEC – Initiation, Planning, Roll-Out, Reflection and Adoption – as illustrated in Figure 2.

The initial input is asked to determine specific output of relevant Output section "modules". These will be based on three segments of input data:

- Who is using the tool and inquiring information – which also implies the structure of the civic energy initiative;

- What kind of energy source is in the centre of the civic energy initiative;

- Which of the four main 'phases' of the civic energy cycle (CEC) is the initiative in/ would the user like to receive information about.

What modules to include in which stage is derived from the shared practical experiences of the COBEN pilots. For instance, based on the user input data, modules (i.e. coloured hexagons) for the enquired phase (e.g. Roll-out) the Civic Energy Informer will present relevant modules that aim to support the implementation of civic energy initiatives, such as risk management strategies, advice about tendering processes, and the delivery of community benefits.
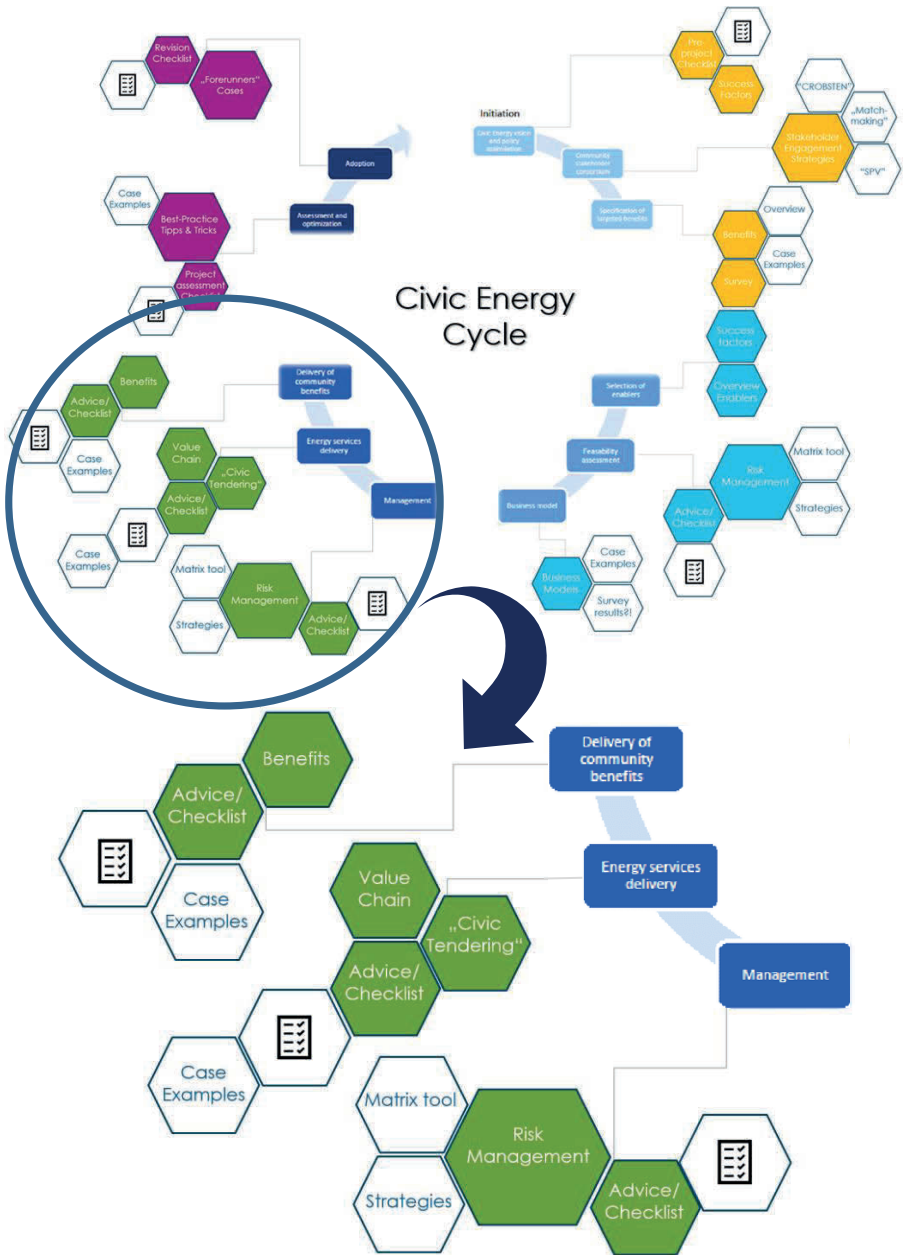
Fig. 2: Civic Energy Informer modules aligned with civic energy cycle adopted from McGovern and Klenke, 2018 [14]

On an operational level this means the information offered within the Civic Energy Informer platform is developed by active stakeholders through systematic reflection on which modules are suitable in each phase and their corresponding process stages. Hence, future operational adopters can derive information and tools, e.g. either for their own civic energy developments or for consulting purposes etc., from proven practice experiences of various operational actors, such as public authorities and businesses, which were actively involved in the COBEN project. In practice this means that, e.g. a municipality can receive information about the risks that might occur with developing a district heating network and can then access tools to support their risk management and other relevant issues that other municipalities have already identified and tackled. However, the Civic Energy Informer is not solely aimed for local authorities, but can also support citizens by offering information on, e.g. what to consider when planning on developing a cooperative solar park, or advice already active cooperatives in different civic energy process management challenges. Besides public authorities, citizens, and cooperatives, the role of the business and industry sectors is also represented in the platform, as these are a key actors in civic energy initiatives, e.g. as heat energy source for district heating networks. Hence, the Civic Energy Informer is covering most central stakeholders that are or could potentially be involved in the promotion of renewable, decentralised civic energy solutions.

5   Discussion and Conclusion

The Civic Energy Informer platform derives from the shared experiences of diverse pilot projects over an extended period of time, identifying common as well as case specific prospects and barriers throughout each phase and process stage of the CEC. In this, the platform that is presented in this paper is unique and fills in existing knowledge gaps as well as the practical demand for collective information, as McGovern et al. [Mc19] identified. By providing well-founded, experience-based insight and practical tools to cover the information demands that different actors and future adopters might encounter throughout the civic energy process, this Civic Energy Informer platform presents a foundation for promoting the facilitation of civic energy initiatives. The modular approach described above can thus offer an achievable way of delivering relevant advice and support tools to new and existing civic energy initiatives, while not neglecting the large variety of information demands and heterogeneity of the actors involved within a civic energy process.

However, since the high variety of possible information requests this platform might be facing due to the input variables, it will not be able to cater to every need the user might request. Since the scope of pilot project whose practical experience informed the development of the Civic Energy Informer was limited to the European North Sea Region and within this encompassed a diverse, yet not complete, set of civic energy pilots. Thus, one might argue that the platform cannot present appropriate advice for pilots that are effectively deviating from this scope. Furthermore, one could question the effectiveness of such information platform - that only encompasses a relatively general information

demand at the current stage - to significantly contribute power shift within the European energy structures [DS18]. Nonetheless, considering this Civic Energy Informer as an expandable knowledge base, additional information on the growing scope of civic energy pilots could be integrated and thus, progressively improve the quantity as well as quality of available information for future adopters. Hence, the Civic Energy Informer in itself could be regarded as a continuous improvement process similar to the CEC it is based on [MK18].

Another aspect to note is the omission of considering the policy factors in the platform. Policies are necessary enablers for civic energy initiatives and can – if present – enhance the capacity and facilitate the uptake of civic energy [BS18]. However, the fact that the legislative landscape in which civic energy initiatives are situated is frequently changing presents a problem for a tool such as the outlined Civic Energy Informer. Addressing the individual legislative support structures and/or barriers would be useful, yet problematic to integrate as those might vary in different EU member states as well as on the different regional and local levels [Wa08]. A possible solution could be an EU-wide implementation of legislative support structures that enable the facilitation of civic energy initiatives. While this might have been the intention with the recast of the Renewable Energy Directive and the Electricity Directive, the national transpositions of these directives differ notably between the member states and thus a fundamental, pan-European enabling structure is still needed. Additionally, if the policy context is to be considered in this digital platform, it would require the availability of long-term resources to keep the needed policy data up-to-date.

Nonetheless, the Civic Energy Informer modular platform tackles the existing knowledge demand and offers initial advice and guidance throughout the entire CEC, rather than just addressing specific isolated aspects of the civic energy process, as it has been frequently the case [Mc19]. Thus, the presented Civic Energy Informer offers a source of incentive for fostering civic energy through advancing the active engagement of interested stakeholders by providing a complex yet practical information platform that addresses the innate heterogeneity of civic energy.

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