

Marketing of Small-scale Assets in Germany – Current and Future Challenges and Opportunities

Kirstin Ganz¹, Mirjam Helena Eerma, Michael Hinterstocker

FfE, Am Blütenanger 71, 80995 Munich, +49 89 158121-49, k ganz@ffe.de, www.ffe.de

Abstract:

With the German Energiewende both the need for flexibility rises and the number of small-scale electric assets such as heat pumps and electric vehicles increases. In this paper, we investigate, how existing players for flexibility marketing see challenges and opportunities for the flexibility marketing of small-scale assets.

For this purpose, semi-structured interviews with different players in flexibility marketing are conducted. First, current players in flexibility marketing in Germany are identified in a literature review. Then, relevant categories for the questionnaire are defined, an interview questionnaire is created, and the interviews are performed. The interview results are then analyzed about the challenges and opportunities for the flexibility marketing of small-scale assets.

For the interviews, we acquired interviewees from seven companies. Regarding today's marketing situation, there is almost no marketing of small-scale assets. Among the interview partners, there is a wide variety of marketed technologies and markets, with some markets being more suitable than others, depending on the technology. The main challenges for flexibility marketing of small-scale assets are high technical and organizational costs with low margins leading to low revenue potential and a lack of acceptance (especially for electric vehicles). Possible price incentives are often greatly reduced by little beneficial regulatory conditions such as levies and lead to low margins. Regarding the opportunities and the future potential for flexibility marketing of small-scale assets, a slightly higher potential for spot markets than the balancing services can be identified, mainly due to the lower regulatory requirements.

In summary, all interview partners are addressing the issue of marketing small-scale assets clearly showing the importance of the topic. Until now, however, the challenges hamper the marketing of small-scale assets.

Keywords: small-scale flexible assets, flexibility marketing, unIT-e², IEWT2023

1 Introduction

Currently, there is a transformation of our energy system towards small-scale electric assets such as heat pumps and electric vehicles (EVs). These assets stress, on the one hand, the power system with high electrical demand. On the other hand, when used flexibly, they can relieve the stress on the power system and facilitate the integration of renewable energies [1]. Research is ongoing on how profitable business cases for flexumers [2] can be created to

¹ Jungautor

boost this transformation towards flexible usage. Several research projects deal with the possible marketing of flexible small-scale assets, especially EVs such as BDL [3] or unIT-e². In unIT-e², the focus lies on the integration and marketing of EVs under consideration of limited distribution grid capacities.

So far, however, the commercialization of flexible small-scale assets in Germany has not progressed very far, although research has discovered their potential benefits. This leads to the research question of how existing players for flexibility marketing in the different electricity markets see challenges and opportunities for the flexibility marketing of small-scale assets today and in the future.

There is various literature regarding the challenges and opportunities of flexibility marketing of small-scale assets. However, most of the current literature (e.g., [4], [5]) summarize older literature results without new input from flexibility marketing players or evaluate different European market designs regarding flexibility marketing with defined criteria from literature (e.g., [6]). Older literature often realized expert interviews but are not up to date with the current regulatory framework and not focused on Germany (e.g., [7]). In this paper, we aim to get an updated impression regarding the practice-oriented challenges and opportunities of current players in Germany through expert interviews. The current status quo on marketing flexible small-scale assets is also surveyed.

2 Methodology

The methodology of this paper is based on the “flexibility marketing process framework” which was first created in [8]. There, a general framework was created consisting of the physical assets (e.g., EVs), the aggregator or flexibility marketer (e.g., NextKraftwerke), the market itself (e.g., the spot market EPEX SPOT), the clearing house (e.g., ECC) and the grid operator. Depending on the market, the technologies, or customers the players might differ slightly. All these players which are part of the process are relevant players for flexibility marketing and shall be considered in the analyses of current challenges and opportunities.

The methodology of the paper is structured as followed (see Figure 1): first, current players in Germany who are part of the flexibility marketing process (based on the “flexibility marketing process framework”) are identified by a literature review leading to a definition of relevant interview partners. To get a holistic view, interview partners from different phases of the general framework were selected. Then, the relevant categories of the questionnaire are defined, and the questionnaire is created. Finally, the results of the interviews are compared and challenged with the literature review from the beginning.

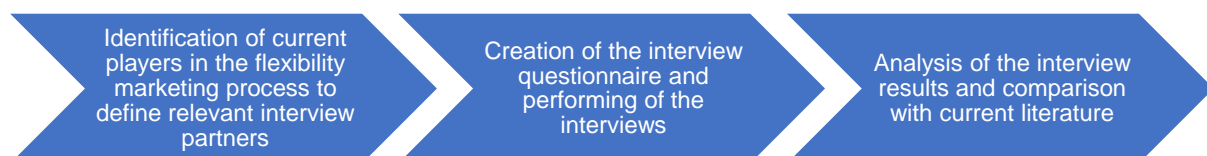


Figure 1: Methodology

3 Results

3.1 Market Analysis of Relevant Players in Germany

In the first step, a market analysis of Germany for current relevant players in flexibility marketing is performed. The focus lies on the players marketing the flexible assets. This can be an integrated or independent aggregator [4]. An integrated aggregator is simultaneously a supplier and an aggregator whereas an independent aggregator has only the role of a flexibility marketer often seen as a new market participant. In the following, both roles are called flexibility marketers.

In Germany, there are approximately 18 flexibility marketers (see Table 1, Sources: [9], [10] and flexibility marketer websites based on the master thesis of Mirjam Eerma [11]). The share of independent and integrated aggregators is similar. Regarding technologies and markets, most flexibility marketers have a diverse portfolio and operate in more than one market. Exceptions are for example The Mobility House, (only marketing battery storages of EVs but on different markets) or sonnen (marketing PV batteries on the FCR market).

Relevant players for flexibility marketing are, however, not only the flexibility marketers but also other players from the “flexibility marketing process framework”. These include transmission grid operators such as TenneT, TransNet BW, 50 Hertz, and Amprion which are responsible for balancing services and, therefore, also relevant players with a different perspective [12].

Table 1: Flexibility Marketers in Germany

Flexibility Marketer	Generation	Load	Storage	Type of Aggregator
Next Kraftwerke	X	X	X	Independent
Entelios	X	X	X	Independent
EWE	X	X	X	Integrated
The Mobility House	-	-	X	Niche
SWM	X	X	X	Integrated
BayWa r.e.	X	X	-	Integrated
Energy2market	X	X	X	Independent
e.on	X	X	X	Integrated
BalancePower	X	X	-	Independent
MVV	X	-	-	Integrated
Getec Energie GmbH	X	X	X	Integrated
Tiko energy	X	X	X	Independent
Open energi	-	-	X	Independent

Mark-E	X	-	-	Integrated
Sonnen	-	-	X	Niche
Lichtblick	X	X	X	Independent
Axpo Deutschland GmbH	X	X	X	Integrated
Alpiq Deutschland GmbH	X	X	X	Integrated

3.2 Definition of Interview Partners and Creation of Interview Guide

From several interview requests, seven interviews could be realized: five flexibility marketers, one TSO, and one software provider for virtual power plants (VPPs). Unfortunately, the number of realized interviews is smaller than anticipated. However, this is a common problem which can be found also in older papers such as in [7] with only eight interviews. To get a holistic view, the interview partners are also heterogenous which complicates the analyses. Still, relevant information can be extracted from these interviews, especially as a discussion with the literature follows.

For the interview partners the prerequisite was to be part of an organization of the “flexibility marketing process framework” with at least two years of working experience. Detailed information about the interview partners can be found in Table 2.

Table 2: Overview of interview partners

Type of company	Role of the interviewees	Years in the company
Aggregator & Flexibility Marketer	Head of Business Development; Project Manager in the field of electromobility	8 & 2 years
Aggregator & Flexibility Marketer	Head of Optimization and Planning	7 years
Energy supplier & Flexibility Marketer	Senior Project Manager in Business Innovation	5 years
TSO	Managing Director of a management consulting company in the energy industry – Representative for the TSO	>2 years
Aggregator & Flexibility Marketer	Head of Flexibility Trading	4 years

Energy supplier & Flexibility Marketer	Project Manager	>2 years
Software provider for VPPs	Head of Corporate Development	16 years

For the interviews, an interview guide/questionnaire was created. The interview guide is divided into three levels: main category, main questions, and sub-questions. Depending on the interview (type of interview partner, knowledge, and conversation process), not all sub-questions were asked, but all main categories and main questions were considered.

The first main category deals with the current situation of flexibility marketers, and the second main category with the flexibility marketing of small-scale assets. The focus lies on the second part, as the first part is meant to be background information to better evaluate the answers for the second part. In this part, the current challenges for the flexibility marketing of small-scale assets as well as the potential markets as future potential for the flexibility marketing of small-scale assets are discussed.

The interview guide was primarily created for flexibility marketers as they are the largest group within the interview partners resulting in slightly different questions for the TSO and the software provider for VPPs.

3.3 Interview Results

The following interview results summarize the results stated in [11]. It is a summary of the interview results and does not necessarily reflect the opinion of each individual interview partner. The interview results are presented in two parts as the interview guide: the current situation followed by the marketing of small-scale assets.

3.3.1 Current Situation

Regarding today's marketing situation, there is almost no flexibility marketing of small-scale assets. Among the interview partners, there is a wide variety of marketed technologies (assets from 100 kW up to several MW in their portfolio) as well as markets, with some markets being more suitable than others, depending on the technology. The three main use cases are:

- 1) direct marketing of renewable energies on the spot markets² (89.2 GW in Germany in 01/2023 [13])
- 2) marketing of industrial load in balancing services (in 2020, between 0.02 GW and 0.14 GW prequalified power, depending on the market [14])
- 3) marketing of large-scale battery storages on the FCR market (Especially marketing of batteries on the FCR market has increased in Germany [15])

² Direct marketing of renewable energies on the spot markets is not flexibility marketing in the strict sense but was one of the main use cases of the marketers interviewed.

In addition to the above-mentioned technologies, also biogas plants, power-to-heat plants, combined heat and power (CHP) plants, gas turbines, and pumped-storage plants are part of the portfolio of the interview partners. The decision criterion for the selection of markets is the profitability expectation, as long as the technical suitability is given. The technical suitability includes limited availability but also possible maximum utilization, which could make the spot markets unsuitable. In the case of industrial load, reduced grid charges (due to intensive grid usage or atypical grid usage) have to be considered in the profitability calculations. Currently, there is little optimization between different markets, resulting almost always in the same use case for each flexible asset. Even in the case of an asset outage at the spot markets, no internal substitution of assets happens instead the balancing occurs via the market itself - if it is before Gate-Closure-Time as it is probably cheaper - or be billed as balancing energy (in the case of most experts).

3.3.2 Flexibility Marketing of flexible small-scale assets

Of the interviewed flexibility marketers only two flexibility marketers include small-scale assets to some extent (small-scale batteries on the FCR market and aggregated EV batteries as large-scale stationary storage). However, pilot projects are common among the interview partners as it is seen as a possible new business field.

Flexibility marketing of small-scale assets, in general, could take place in all markets – according to the interview partners –, however, the suitability may differ depending on the technology. In general, more forecasts on the spot market than on the balancing services are made, however, no homogenous trend can be generally identified. Major disadvantages for the balancing services are high prequalification requirements and a rather small market volume. To address the disadvantage of costly and time-consuming prequalification requirements, it is being discussed whether it should be possible to perform standardized type prequalification for small-scale assets in the future. System security, however, should be always considered. It was also discussed with one interview partner how behind-the-meter use cases might reduce the potential number of small-scale assets for flexibility marketing on spot markets and in balancing services.

Focusing on the different small-scale technologies, for EVs, no homogenous picture exists (similar to the general statement). For small-scale batteries, however, balancing services are mentioned mainly.

Challenges for flexibility marketing of small-scale assets can be divided into four groups: technical, economic, regulatory, and social challenges (see Figure 2). This classification of challenges is analogous to [7].

Regarding technical challenges, there is a high degree of digitalization and automatization necessary for marketing small-scale assets which are challenging in general and even more with the delay in the smart meter rollout. Furthermore, the technical requirements for other use cases with small-scale assets such as PV self-consumption optimization are much lower, with increases the competition with these use cases.

Regarding the economic challenges, we see on the one hand a lack of price signals from the markets and on the other hand, generally high costs (organizational costs such as for administration of the system, technical costs such as hardware and software, IT connection, and costs for sales, communication with the customers, and service), which are then scaled

with the numbers of assets. Business models with other technologies are therefore economically more interesting because it requires less effort in marketing alternative technologies than a large pool of small-scale assets. To make marketing of small-scale assets economically viable, either the costs have to be reduced by for example reducing the regulatory requirements for IT connection, etc. or the value of flexibility would have to increase.

Regarding regulatory challenges, the main obstacle is the high level of market entry challenges for balancing services. This includes, among others, the costly and time-consuming prequalification requirements with no type-prequalification and the high requirements for the provision of balancing power such as the 4h products and high effort for communication and accounting. In general, there is no beneficial regulatory framework for the flexibility marketing of small-scale assets as there are still missing definitions and high regulatory costs/ levies.

Regarding social challenges, there is a lack of customer trust and acceptance. Customers fear a loss of comfort, e.g., that their EV is not charged when needed. Due to these fears, high sales and service costs are necessary to address them. In general, the existing business cases are very complex which means high effort for the sales department in communicating the business case. This barrier could be addressed by new tariffs/business models for the customer such as standardized package offers, i.e., a contract with an electricity provider in combination with an EV when the technology is purchased.

To summarize, the main challenges for the flexibility marketing of small-scale assets are high technical and organizational costs with low margins leading to low revenue potential and a lack of acceptance (especially for EVs).



Figure 2: Challenges for the flexibility marketing of small-scale assets

4 Discussion

As the number of interviews were quite small, it is necessary to discuss the results compared to results found in the literature. In the following, the interview results regarding the challenges of flexibility marketing of small-scale assets are discussed and compared with older literature. The comparison is based on Barbero et al [5], Poplavskaya and Vries [9], and Lampropoulos [7].

In general, the interview results reflect the results from the literature so no huge gap can be identified even though there are some challenges in the literature that weren't mentioned in the interviews (either due to outdated or not relevant for these particular interview partners).

Regarding regulatory challenges, in the literature also unbeneficial regulatory frameworks and undefined roles and responsibilities are mentioned. Moreover, the high entry barriers for balancing services and the generally complex mechanism for small-scale flexibility marketing are stated similarly in the interviews. Especially for FCR, the symmetry of the bids is mentioned as a challenge in the literature. This wasn't mentioned by the interview partners, most likely because the focus wasn't directly on the FCR market. Concerning economic challenges, also high costs for marketing and acquisition, contract management, customer retention, and support – which are scaled with the numbers of assets and customers – are discussed. On the other hand, in the literature, competition between independent aggregators and traditional stakeholders in the energy sector was mentioned, resulting in a wave of purchases (e.g., shell bought sonnen in 2019). This topic wasn't discussed in detail in the interviews. About social challenges, in both the literature and the interviews, social trust and acceptance are mentioned. Regarding technical challenges, the delayed smart meter rollout is also mentioned in the literature, as well as the general digitalization and automatization.

5 Conclusion

Despite a high interest in flexibility marketing of small-scale assets, there is almost no marketing to date, and several challenges could be determined.

To start with, current players in the flexibility marketing process in Germany were identified to define relevant interview partners. For the interviews, an interview guide - tapping the topics of the current marketing situation and the flexibility marketing of small-scale assets - was created and adjusted for the different interview partners. The results were challenged with similar literature.

The main challenges for flexibility marketing of small-scale assets are large technical and organizational costs with low revenues leading to low profit potential and a lack of acceptance (especially for EVs). Possible price incentives are often greatly reduced by little favorable regulatory conditions such as levies and lead to low margins.

In summary, all interview partners are addressing the issue of marketing small-scale assets. This clearly shows the importance of the topic, however, until now the challenges hamper the marketing of small-scale assets.

It should be noted that only a small number of interviews could be realized. To address this issue the results were discussed in comparison to existing literature. In general, the interview results reflect the results from the literature.

As further work in unIT-e², simulations of marketing EV in a linear optimization tool are planned. Taking into account the interview results, for the analysis not only the potential revenues but also several costs are considered to avoid unrealistic high potential. Furthermore, the results show that spot markets are slightly more interesting for small-scale assets, however, when focusing on EVs spot markets and balancing services both were identified as interesting. Therefore, in unIT-e² not only the spot markets are considered but also balancing services, mainly FCR. Lastly, revenues are also compared to behind-the meter use cases (such as PV self-consumption optimization).

Funding

The described work is conducted within the project unIT-e² by Forschungsgesellschaft für Energiewirtschaft mbH and funded by Federal Ministry for Economic Affairs and Climate Action (Bundesministerium für Wirtschaft und Klimaschutz, BMWK) (funding code: 01MV21UN01).

Literature

- [1] Köppl, Simon et al.: C/sells: Großflächiges Schaufenster im Solarbogen Süddeutschlands - Abschlussbericht der FfE. München: FfE, 2020.
- [2] Westphal, Egon Leo et al.: Flexumer als Gestalter der digitalen Energiezukunft – Eine Begriffseinordnung. In: Energiewirtschaftliche Tagesfragen 7/8. Berlin: Bayernwerk AG, FfE, 2019.
- [3] Kern, Timo et al.: Integrating Bidirectionally Chargeable Electric Vehicles into the Electricity Markets. In: Energies 2020, 13(21), 5812; Basel: FfE, 2020.
- [4] Kerscher, Selina: The key role of aggregators in the energy transition under the latest European regulatory framework. In: International Journal of Electrical Power and Energy Systems 2022, 134, 1–16. Stuttgart: University of Applied Sciences Stuttgart, 2022. DOI: 10.1016/j.ijepes.2021.107361.
- [5] Barbero, Mattia: Critical evaluation of European balancing markets to enable the participation of Demand Aggregators. In: Applied Energy 264, 1 - 13. Barcelona: Catalonia Institute for Energy Research (IREC), Universitat Politècnica de Catalunya – BarcelonaTech (UPC), 2020. DOI: 10.1016/j.apenergy.2020.114707.
- [6] Ganz, Kirstin et al.: Comparison of European electricity market designs. In: 6th European GRID SERVICE MARKET Symposium, Luzern., 2022
- [7] Lampropoulos, Ioannis: A system perspective to the deployment of flexibility through aggregator companies in the Netherlands. In: Energy Policy 2018, 118, 534-551. Utrecht: Utrecht University, Copernicus Institute of Sustainable Development, Energy and Resources Group, 2018. DOI: 10.1016/j.enpol.2018.03.073.
- [8] Ganz, Kirstin et al.: How can new business models be technically realized to provide flexibility in the future German energy system? In: 12. Internationale Energiewirtschaftstagung an der TU Wien; Wien: TU Wien, 2021.
- [9] Poplavskaya, Ksenia: Aggregators today and tomorrow: from intermediaries to local orchestrators?. In: Behind and Beyond the Meter; Amsterdam: Fereidoon Sioshansi (Ed.), Academic Press, Elsevier, 2020. ISBN: 9780128199510.
- [10] Xia-Bauer, Chun: Business Models of Virtual Power Plants (VPPs) in Germany. Beijing, China: Sino-German Energy Partnership commissioned by the German Federal Ministry for Economic Affairs and Energy (BMWi), 2021.
- [11] Eerma, Mirjam: Marketing strategies of aggregators in the energy system. Masterarbeit. Herausgegeben durch Technische Universität Berlin: Berlin, 2022.

- [12] Regelleistung.net - Internetplattform zur Vergabe von Regelleistung. In: <https://www.regelleistung.net/ext/>.; Berlin, Pulheim, Bayreuth, Stuttgart: 50 Hertz, Amprion, TenneT, Transnet BW, 2023.
- [13] Netztransparenz.de - Informationen zur Direktvermarktung. In: [https://www.netztransparenz.de/EEG/Monatliche-Direktvermarktung](https://www.netztransparenz.de/EEG/Monatliche-Direktvermarktung;).; Berlin, Pulheim, Bayreuth, Stuttgart: 50 Hertz, Amprion, TenneT, Transnet BW, 2023.
- [14] Regelleistung.net - Präqualifizierte Leistung in Deutschland. In: https://www.regelleistung.net/ext/download/pq_capacity.; Berlin, Pulheim, Bayreuth, Stuttgart: 50Hertz; Amprion; TenneT; TransnetBW, 2023.
- [15] Kern, Timo: Primärregelleistungspreise im neuen Marktdesign – In welche Richtung werden sich die PRL-Preise zukünftig bewegen? In: <https://www.ffe.de/veroeffentlichungen/primaerregelleistungspreise-im-neuen-marktdesign-in-welche-richtung-werden-sich-die-prl-preise-zukuenftig-bewegen/>., München: FfE, 2021.