



Emerging digital business models for renewable self-consumers: Enablers for citizen participation in the energy transition? – Perspectives from Germany
Les nouveaux modèles d'affaire numériques pour les auto-consommateurs d'énergie renouvelable favorisent-ils la participation des citoyens à la transition énergétique ? Focus sur l'Allemagne

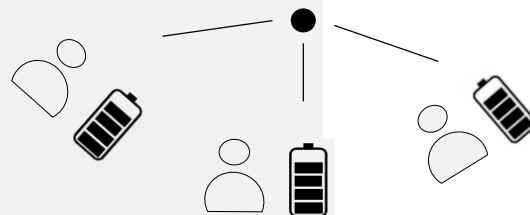
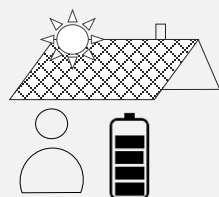
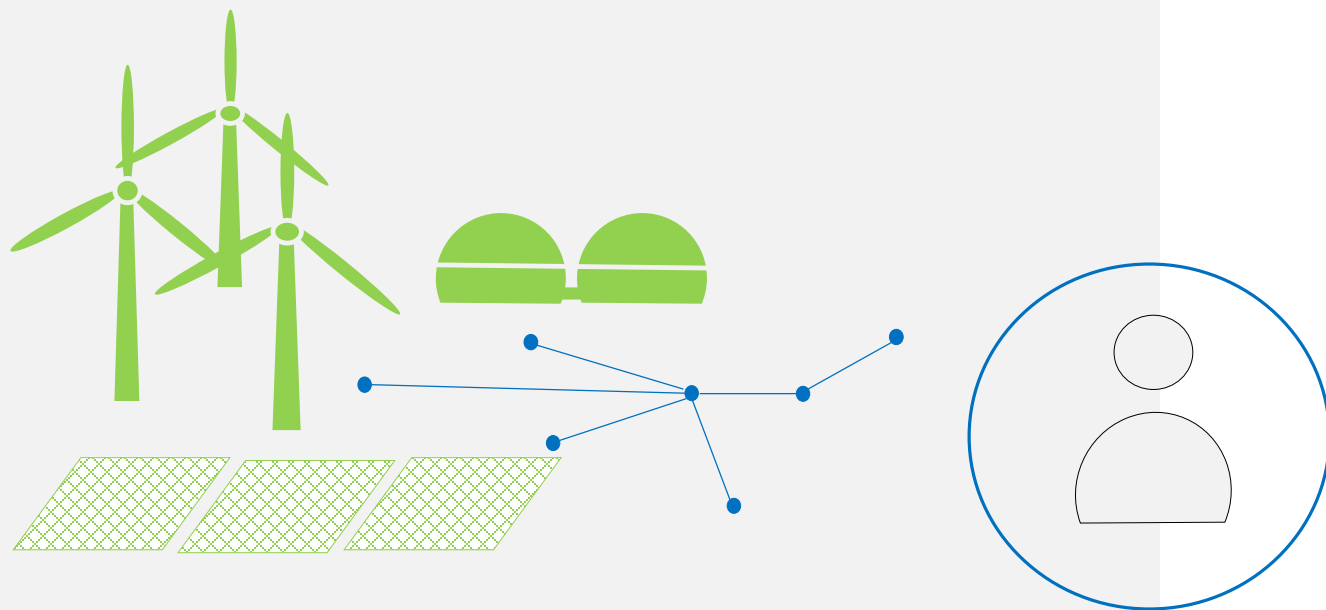
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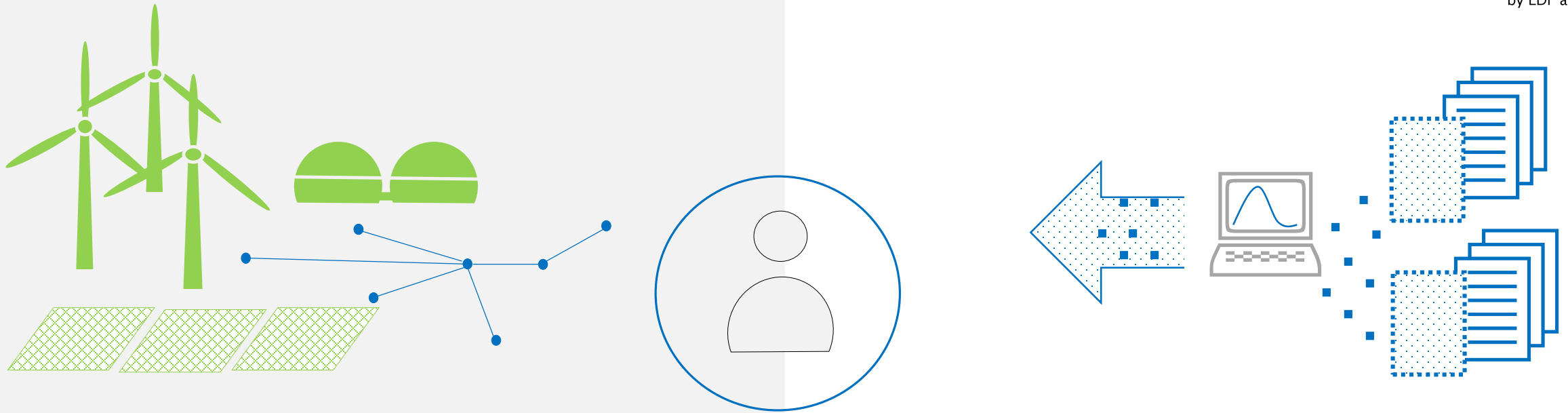
Energy communities for collective self-consumption: frameworks, practices and tools

Session 4 – June 23, 2020

Opportunities and impacts of digital technologies for energy communities

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1. In which way does digitalisation influence the emergence of self-consumption business models?
2. Do digital business models enable citizens to actively engage in the energy transition?

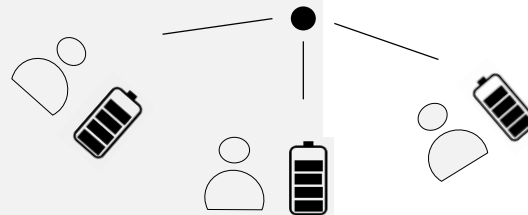
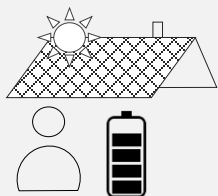


TABLE OF CONTENT

- I. Citizens in the energy transition – role of prosumers?
- II. Role of digitalisation in the energy industry
- III. Methods
- IV. Enablers for citizen's participation?
- V. Discussion
- VI. Outlook

Citizens in the energy transition – role of prosumers?

The European commission envisaged a framework for the energy transition “[...] with citizens at its core, where citizens take ownership of the energy transition, benefit from new technologies to reduce their bills, participate actively in the market, and where vulnerable consumers are protected” (Miguel Arias Cañete – Commissioner for Climate Action and Energy, speech from March, 12 2015 in London).

“**Energy citizenship**” introduced by Devine–Wright 2007 describes the engagement of citizens in the energy transition as active participants that influence innovation, engage politically and occupy with energy technology (Ryghaug et al. 2018).

Within the framework of “energy citizenship”, citizens can take different roles (Ryghaug et al. 2018):



Prosumers are key players:

- 1) Represent (active) participation of citizens which may results in higher **acceptance** of the energy transition (EU Commission 2018).
- 2) Help to overcome challenges of variable renewable (VRE) based energy systems through the provision of short term storage or by reducing loads as demand side management measures (DSM) and thus providing **flexibility** services (Brown et al., 2019; Kubli et al., 2018).

Citizens in the energy transition – role of prosumers?

Drivers of prosumption in Germany

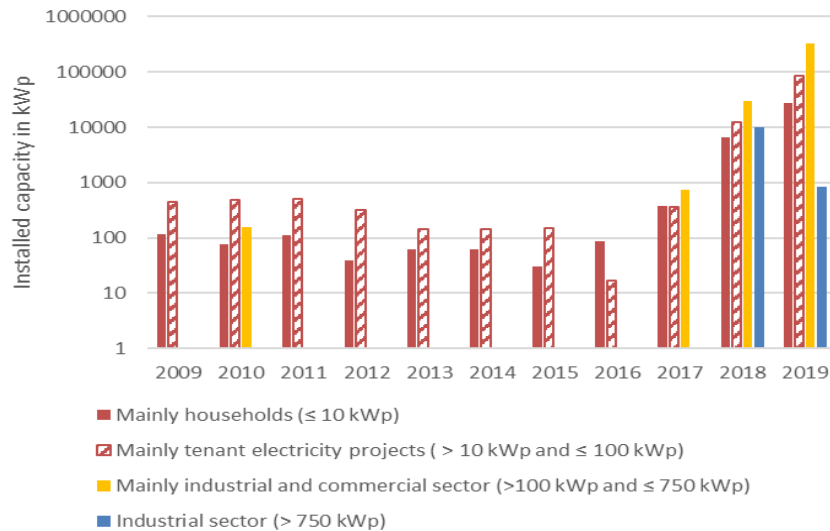


Figure 1 Development of PV rooftop installations based on Bundesnetzagentur 2020

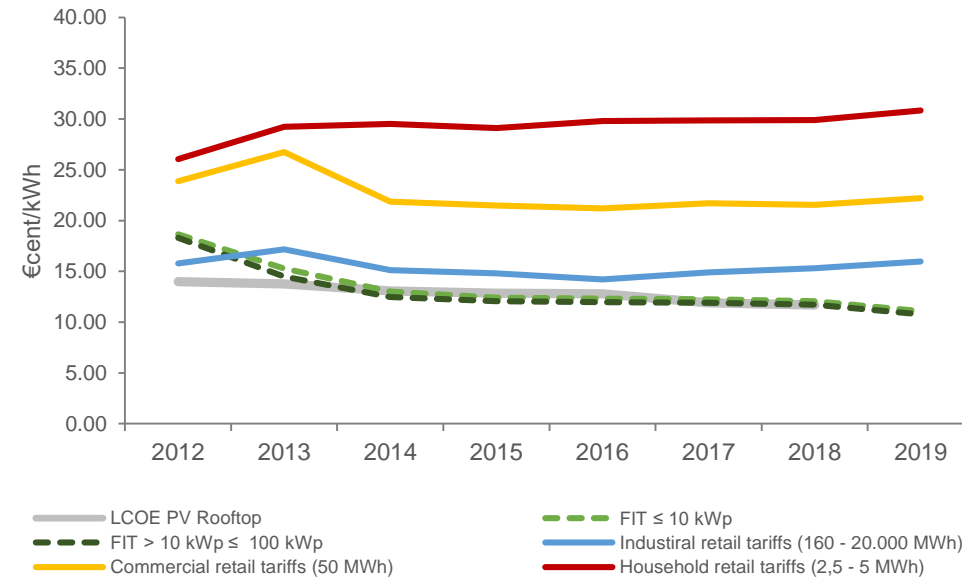


Figure 2 Development of electricity prices, FITs and LCOE for PV Rooftop plants based on Fraunhofer ISE 2018, BDEW 2020; Bundesnetzagentur 2019

Drivers:

- Electricity cost savings or potentially new revenue streams (decreasing FITs and LCOE, with increasing electricity prices)
- Environmental consciousness
- Reaching higher degrees of self-sufficiency
- Interest in new technologies
- Doing something “good” for the community (Kotilainen et al., 2016, van Summeren et al. 2020)

Role of digitalisation in the energy industry

- **Digitisation:** Creation of digital versions of analog files and information
- **Digitalisation:** changes in processes and data use through new tools and applications
- **Digital transformation** which is characterised as the fundamental change of society, technology use, institutions and economy (Rachinger et., 2019)



Digitalisation is necessary to:

- Link distributed energy resources (DER)
- Activate and unlock flexibility
- Enable people to become active participants
- Allow precise demand side management (DSM) options
- Flexible tariffs

→ Makes the energy transition “smart”: smart meters, smart home, smart grids, smart cities...

→ Helps the emergence of new business models

Multiple method approach: systematic literature review, surveys or semi-structured interviews considered

1) Systematic literature and market review of business models for prosumers

2) Clustering of digital business models for self-consumption new, modernised, requirement for battery, onsite production... etc.

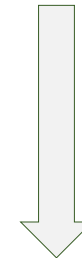
3) Criteria based analysis of business models with regard to participation

Financial and economic participation

E-participation

Social participation

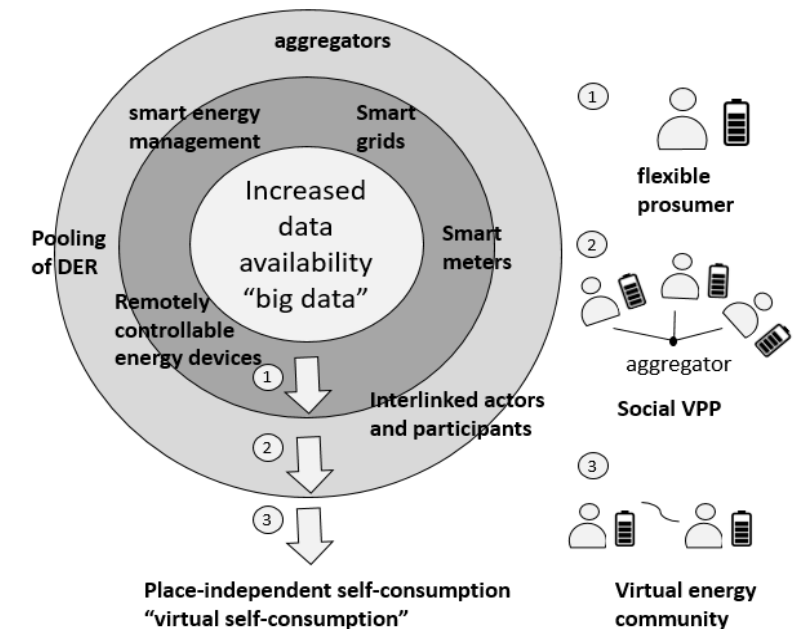
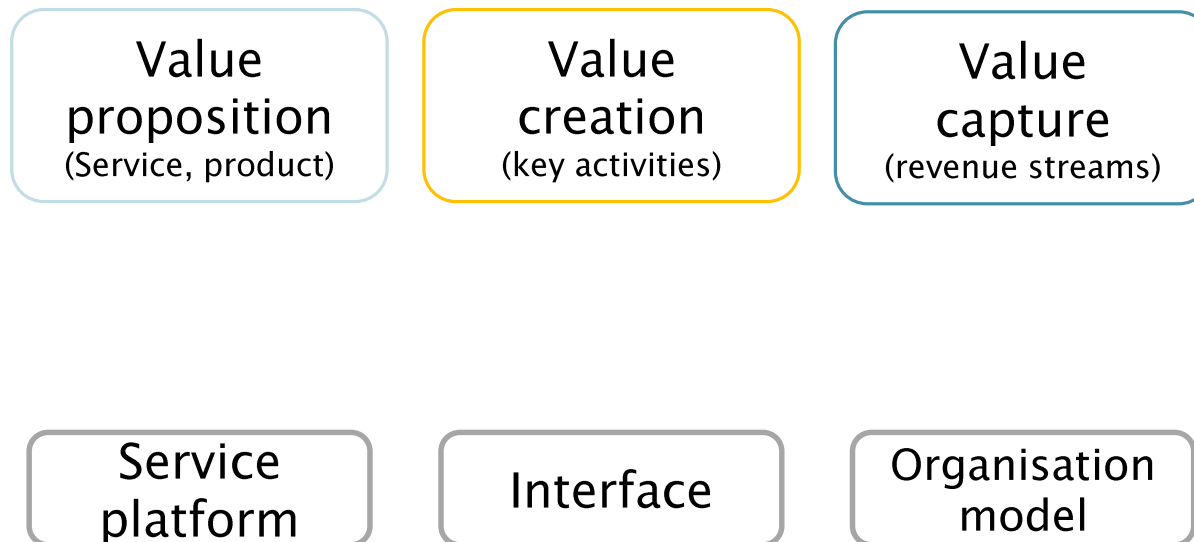
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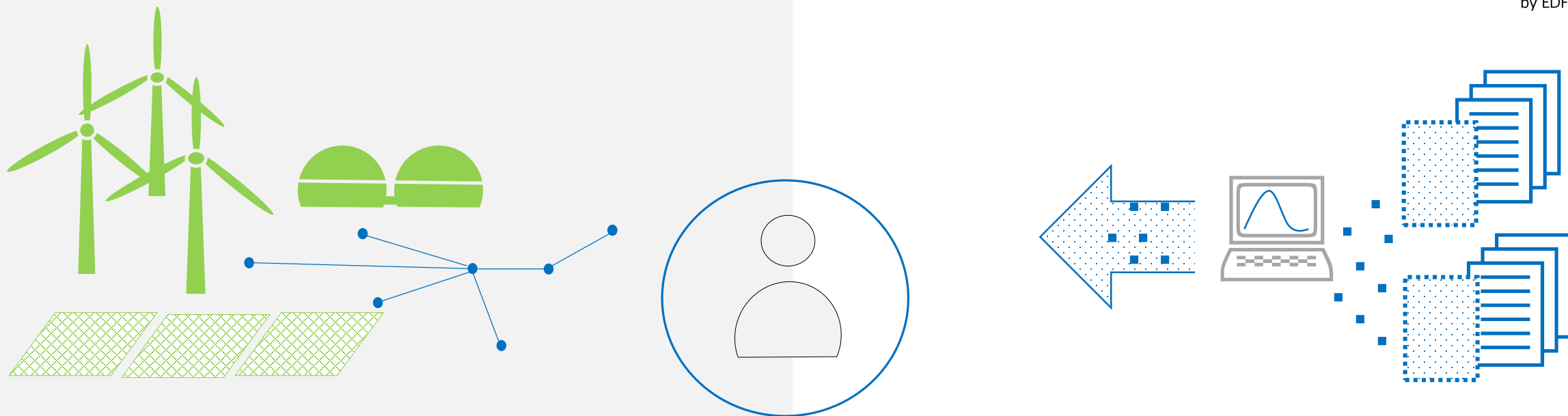
4) Surveys or semi-structured interviews with prosumers considered

Emerging business models for self-consumption

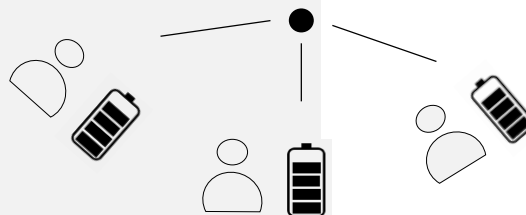
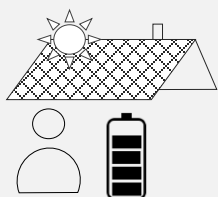
- **Business model:** “[...] the logic of how the firm operates and creates value for its stakeholders.” Dellermann 2017
- **Digital business model:** Based on Veit et al., 2014, Remane et al., 2017 explain “A business model can be categorized as digital if digital technologies trigger fundamental changes in these value dimensions”



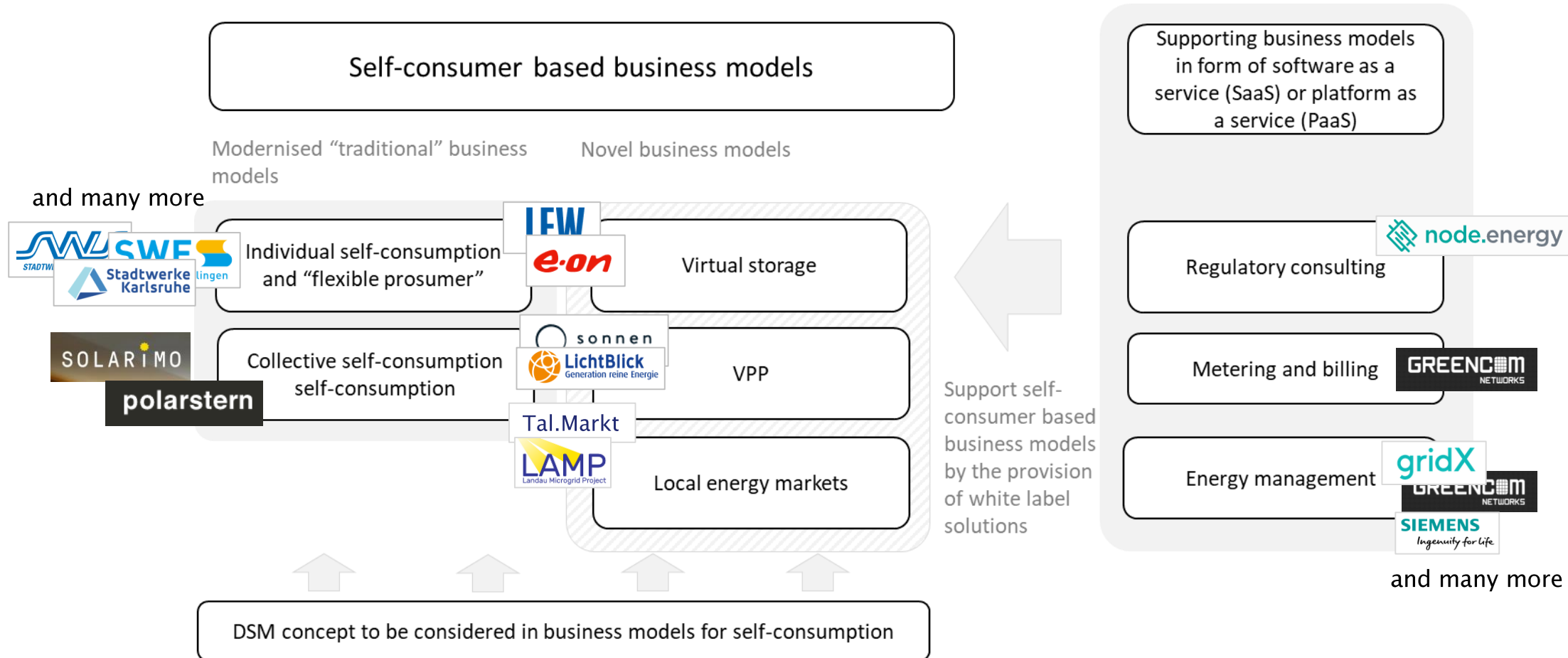
Remane et al. 2017



1. In which way does digitalisation influence the emergence of self-consumption business models?
 1. Digitalisation modernizes traditional business models.
 2. Adds other components like platforms to the business model concepts (Remane et al. 2019).
 3. Helps the emergence of new business models for self-consumption by introducing new opportunities through bi-directional communicating, remote control, interlinking, aggregating, pooling and developing numerous software appliances.

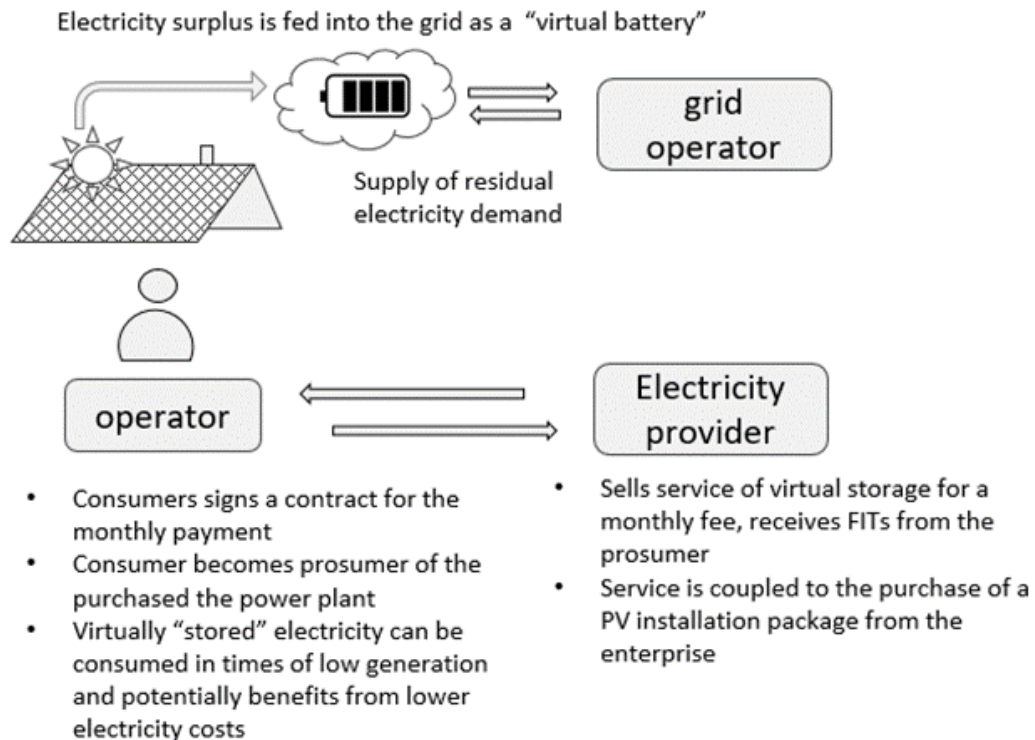


Emerging business models for self-consumption



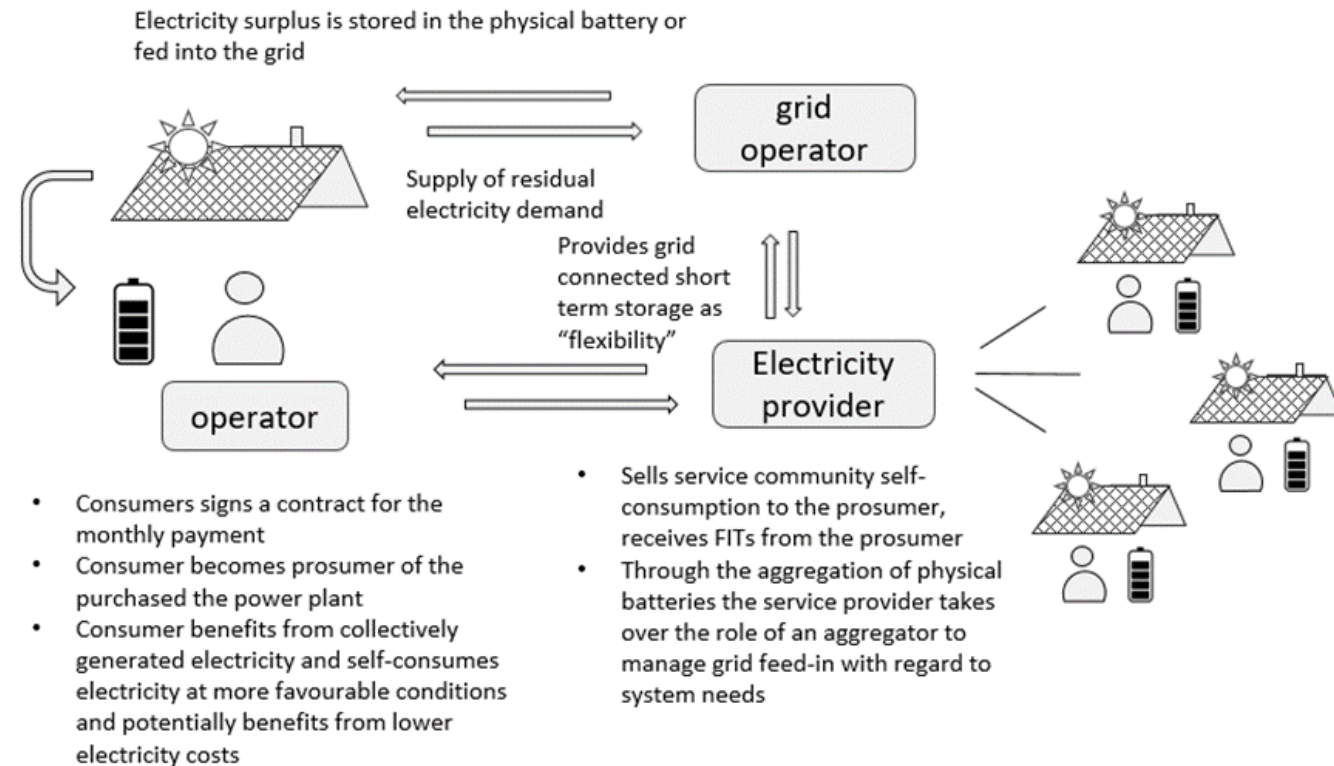
Role of participation

Case 1 “Virtual storage”



References [1],[2]

Case 2 prosumer based VPPs



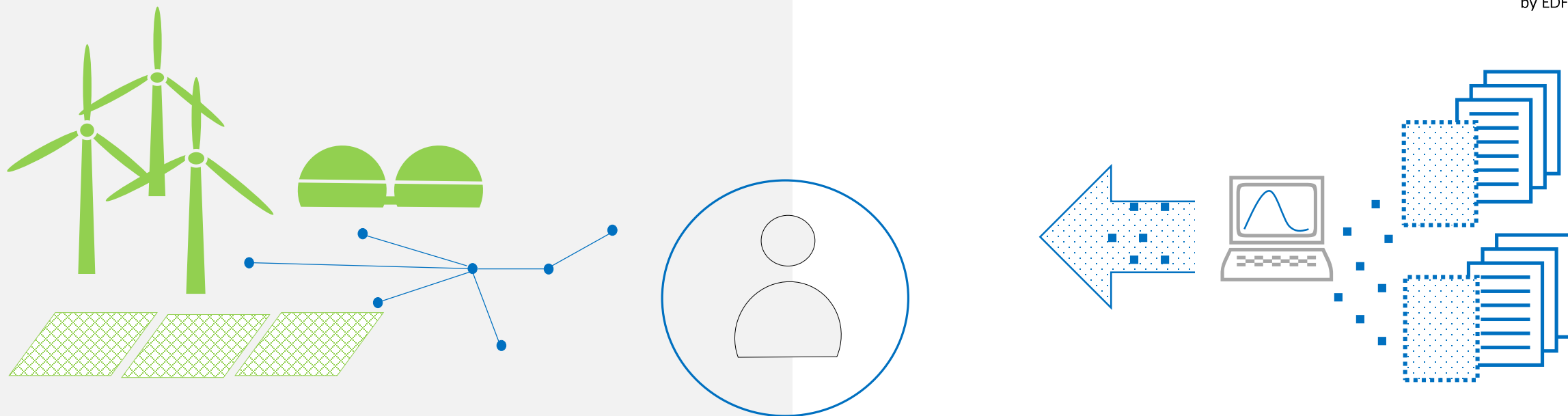
References [3],[6]

Role of participation

- Lowitzsch, 2019 see in particular the need in economic participation of citizens to allow for high citizens engagement which “includes the ownership structure of renewable assets or software.”
- We therefore chose three criteria to test the two cases with regard to their **ownership, operation** and in which way an **aggregator** is needed.

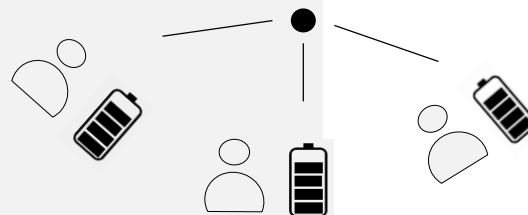
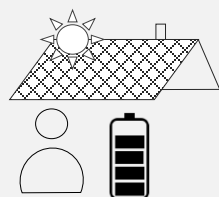
Definition aggregation: “[...] a function performed by a natural or legal person who combines multiple customer loads or generated electricity for sale, purchase or auction in any electricity market” article 2 (18) (Directive (EU) 2019/944 of the European Parliament and of the Council of 11 December 2018 on the Promotion of the Use of Energy from Renewable Sources., 2019).

	ownership	operation	aggregation	Reference
case 1) virtual storage	The prosumer owns the PV plant. In case of a leasing concept the owner remains the electricity provider. Since the concept of "virtual storage" is not coupled to a physical battery, there is no ownership question for the storage concept.	Prosumer owns the PV plant. In case of a leasing concept the owner remains the electricity provider. “Virtual storage” as novel billing concept does not need the specification of an operator.	Role of aggregation is not needed, since storage is "virtual".	[1],[2]
case 2) VPP	The prosumer owns the PV plant. In case of a leasing concept the owner remains the electricity provider. The same is true for the ownership structure of the physical battery.	Prosumer stays operator of the PV plant. In case of a leasing concept the operator remains the electricity provider. The prosumers agrees to provide a defined volume of storage capacity to the service provider.	Aggregator is typically the same legal entity as the electricity provider. Independent aggregators like proposed by the EU directive 2019/944 are currently not part of prosumer based business models.	[3],[4],[6]



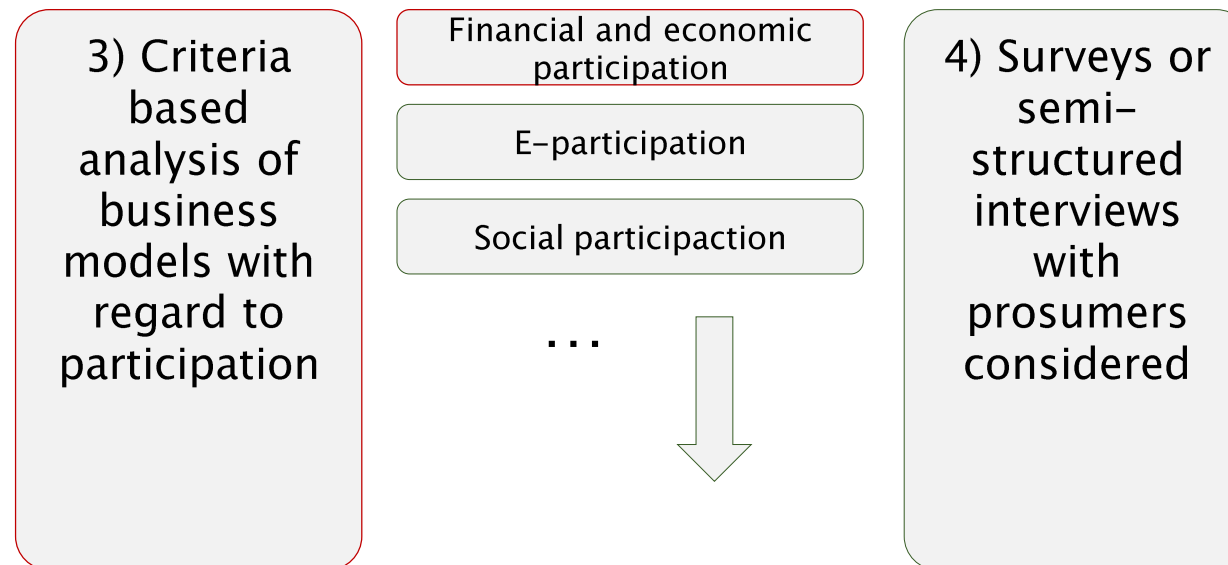
1. Do digital business models enable citizens to actively engage in the energy transition (through economic participation)?

Based on the two case studies with regard to the selected criteria, ownership, operation and aggregation they do seem to influence the opportunities for participation on an economic level. Potentially services that include flexibility provision could be more profitable due to double revenue streams.



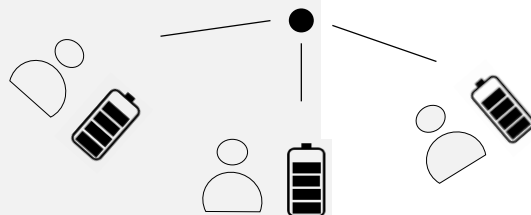
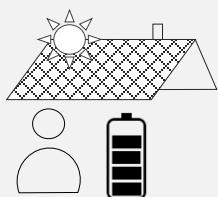
- Digital business models for renewable self-consumers are becoming more complex in terms of involved actors (Vermesan et al., 2011) – in this way digital business model **may help to increase participation** of prosumers.
- Block chain applications allow for increased transparency (Mengelkamp et al., 2018). With regard to energy citizenship, digital business models for self-consumption may increase the awareness of citizens taking a key role in the energy system and through the right incentive setting may encourage citizen activation – in this way **contribute to the rise of energy citizenship** (Ryghaug et al., 2018).
- The regulatory framework of the EU does only partly consider the emergence digital business models having more components on the virtual level. A self-consumer is “[...] a final customer operating within its **premises located within confined boundaries** or where allowed by Member States, on other premises, who generates renewable electricity for its own consumption [...]”. Current regulations do not allow for “virtual self-consumption” independent from space and definitions of new roles like the aggregator concept are still missing (EEG 2017).
- The business model is however only likely to sustain if it helps to activate the full potential of the prosumer by **creating not only value to the prosumer but also to the whole electricity system** (Brown et al., 2019).
- Current discussions in Germany about the amendment of the EEG incentivises prosumers to fully feed in electricity instead of self-consume electricity (Hannappel et al., 2020).

- Financial and economic participation has been selected as one of the most important areas for citizens participation in the energy transition Lowitzsch, 2019. However, identified business models should be also tested towards other areas of participation (social, political, industrial/workplace, civic and e-participation) to be able to receive a comprehensive overview (Holstenkamp & Radtke, 2018).
- Revision of the methodology, surveys for customers could be considered – challenge of anonymised data.





Thank you!



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