

Successful Energy Communities Attract Innovation and Private Investors

BY SABINE LÖBBE, FEREIDOOON SIOSHANSI, AND DAVID ROBINSON

Abstract

Energy communities should be customer-centered, market-driven and welfare-enhancing¹. Individual consumers with proper incentives are becoming prosumers and prosumagers. The next obvious step will be to aggregate thousands or millions of such participants into physical or virtual energy communities. Private companies will help to scale and develop easy-to-handle solutions. The role of aggregation to optimize community resources and to integrate with markets are among the main topics covered in Energy Communities, a review of which by Chirara Candelise was recently published in Energiea.

Worldwide, energy communities are emerging as part of the solution for a more sustainable, low-carbon, decentralized, resilient and semi-independent energy systems. Consumers question their traditional role as passive “load” while regulation and policy are beginning to reflect the new role of active citizens. In Germany, for example, customers have already installed around 3.3 million distributed generation systems, mostly rooftop solar systems. While the growth of distributed energy resources introduces complexity to the system, it also introduces new resources that can contribute to managing the same complexity. Energy communities are one means to address these challenges. They serve to integrate the consumer as an active part of the future energy system. This transfers responsibilities to the end consumer or to communities of consumers and those representing these stakeholders in the value chain.

While the basic technology to do what is needed already exists, putting the pieces together and making them work at scale remains a challenge. However, as the political and regulatory support for energy communities grows, technology advances, and customers become more aware of and interested in local, ecologically sound alternatives as well as self-generation and consumption, the case for developing energy communities becomes more compelling. In this context, the role of private actors is crucial.

Energy communities: a means to serve citizens and market development

The key finding of the book on energy communities² is that they

- Should be customer-centered to attract energy customers (i.e. citizens) to participate actively in the energy community;
- Should be market-driven and integrated into the existing or the evolving future market design of the surrounding system; and

- Should be welfare-enhancing, a key issue, with some debate on who benefits from the enhancements; – members of the energy community or the society at large.

The next obvious but challenging step will be to aggregate thousands or millions of such participants into physical or virtual energy communities. They may act both as a competitive alternative to, as well as a means of complementing, the central electricity system comprised of large generation stations, storage facilities and high voltage networks.

Multiple roles of private actors in energy communities

Energy communities share energy on a yearly, monthly, hourly or minute-by-minute basis as well as services like renewables generation, storage, optimization, supply, charging and trading. They invest in renewables, storage and other distributed resources (e.g. EV charging networks) In most cases, they share beliefs and values to engage the community members in the energy transition as well as in addressing social issues like equity, poverty relief, environmental gains and job creation.

In practice, energy communities rely on contributions from companies like start ups and incumbents, cooperatives, energy suppliers as well as providers of production assets, IT providers for data management, metering service providers; these are essential to making energy communities a success. In their chapter³ Jake Barnes and Paula Hansen challenge the idea of single actors as the sole proprietors of energy community business models and articulate the role of actors and expertise in explaining what such business models achieve. The authors explore three business model archetypes of energy communities, with different governance models to integrate a defined set of cooperation partners and service providers.

In another chapter⁴ Christian Chudoba and Tereza Borges examine advantages and challenges of energy communities using energy-as-a-service digital platforms to enable energy community models. They underline how platform-based approaches can help to manage energy communities and remove barriers to innovation.

Digital energy platforms are becoming a foundation for new consumer-centric business models that offer simple solutions to complex problems. We are all familiar with the rise of digital platforms, including

Sabine Löbbe is at Reutlingen University, Germany and can be reached at Sabine.Loebbe@Reutlingen-University.de. **Fereidoon Sioshansi** is at Menlo Energy Economics, USA. **David Robinson** is at The Oxford Institute for Energy Studies, UK.

fully integrated platforms like Google and Amazon, as well as sector-focused platforms like Airbnb and Uber. Airbnb's platform is an illustration of how a platform can create value by connecting buyers and sellers (in this case travelers with hosts around the world), disrupting the traditional tourism business. A key feature of platform models is their very low marginal costs of operation once the digital platform has been built.

The chapter by Chudoba and Borges explains how digital platforms, such as those provided by Lumenaza, enable consumers to join and participate effectively in energy communities, optimize the resources within the community and integrate into the wider system. First, these platforms enable energy communities to operationalize all the tasks of an energy service provider, including management of the processes for signing up new members, billing not only energy services but also insurance, bonus schemes, and the sharing of electricity, storage, EV charging and other community services. Second, energy communities become increasingly complex as they grow and adopt new distributed energy resources (e.g., solar panels, EV batteries, stationary batteries, heat pumps and other storage and demand-management tools), frequently behind individual consumer meters. Digital platforms optimize the use of these resources within the community, for instance by shifting demand (through remote control or incentives) to periods when community solar is operating and by storing electricity for use when the solar resources are not available. Digital platforms enable innovation, for instance the adoption of new algorithms to manage the smart charging of EVs when community renewables are available. Third, to minimize the wider costs of the electricity system and benefit all consumers, energy communities should be integrated into the wider system. Platform providers can automate that integration. Indeed, these platforms enable the community to act as an aggregator that sells energy and flexibility services in local and wider markets.

The theme of system integration and cost sharing is addressed further in the chapter by Del Pizzo et al, which discusses the integration of energy communities from the perspective of an Italian Distribution System Operator (DSO), E-Distribuzione. The authors, from Enel Foundation, argue that a DSO in Italy can provide several services and act as market facilitators to the community and to its members. It is important to recognize that under EU legislation, citizens have the right to be a member of an energy community (for instance to share jointly produced solar energy), while retaining the right to buy electricity and services from competing retailers and aggregators; and indeed, to sell their energy and services outside the community with the support of a retail or aggregator. Among other services, the DSO provides an advanced metering structure (Open Meter) that enables consumers to receive near

real-time data with high granularity and facilitate the energy settlement of each member and of the whole energy community. It also enables energy competing retailers and aggregators to provide "tailor-made" commercial offers to consumers within the community, for instance rewarding a consumer's flexibility to support system balancing needs by shifting demand to adapt it to the daily production of renewable resources.

Conclusion

The growing availability of distributed energy resources constitutes a decarbonized citizen-centered alternative to, and complement for, the central electricity system. To date, energy communities are a relatively small part of the overall system. An obvious next step is to aggregate thousands or millions of citizens into physical or virtual energy communities to exploit economies of scale and scope based on digitalized, AI-based, innovative solutions. This will require private actors collaborating with citizens and developing solutions in a competitive environment. Allowing and supporting this competition within a well-defined regulatory framework for our future energy systems is one of the most challenging issues facing regulators around the world.

However, many energy communities have been designed with a view to isolating energy communities from the existing energy system. This is partly due to the view that the existing system and the companies that operate in it do not adequately reflect the growing concern for environmental and social objectives. There is a risk that this will lead to a balkanization of electricity systems, raising the costs of the energy transition. This view is expressed in the Chapter by Robinson and del Guayo who argue for a regulatory approach that aligns the interest of energy communities with those of the wider energy system.

Footnotes

¹ Löbbe, Sabine; Sioshansi, Fereidoon; Robinson, David (2022): *Energy Communities: Customer-Centered, Market-Driven, Welfare-Enhancing?*, Elsevier, Academic Press, ISBN: 978-0-323-91135-1

² Löbbe, Sabine; Sioshansi, Fereidoon; Robinson, David (2022): *Energy Communities: Customer-Centered, Market-Driven, Welfare-Enhancing?*, Elsevier, Academic Press, ISBN: 978-0-323-91135-1

³ Barnes, Jake; Hansen, Paula: *Governing energy communities: The role of actors and expertise in business model innovation*, in: Löbbe, Sabine; Sioshansi, Fereidoon; Robinson, David (2022): *Energy Communities: Customer-Centered, Market-Driven, Welfare-Enhancing?*, Elsevier, Academic Press

⁴ Chudoba, Christian; Borges, Tereza: *Platform-based energy communities in Germany and their benefits and challenges*, in: Löbbe, Sabine; Sioshansi, Fereidoon; Robinson, David (2022): *Energy Communities: Customer-Centered, Market-Driven, Welfare-Enhancing?*, Elsevier, Academic Press,