BRIEFING PAPER

Energy Sharing

The European Union (EU) envisions an Energy Union, centred on citizens taking responsibility for the energy transition. To enable citizens to do this, the EU has defined certain rights within the "Clean Energy Package" of the Renewable Energy Directive (RED). A key element is community-produced energy, or Energy Sharing[1]. This short paper summarises the most important information about Energy Sharing and discusses open questions.

1 What are Renewable Energy Communities?

The definition of "Bürgerenergiegesellschaften" (Citizen energy communities) in Germany was revised following the criteria of Renewable Energy Communities (RE communities) in the RED II Art. 2 (16) during the revision of the Renewable Energy Sources Act 2023 (EEG 2023, § 3 Nr. 15)[2]. But German law has not yet defined the legal framework within which RE communities can produce, consume, store, and sell renewable energy economically and using the public grid (cf. RED II, Art. 22). Currently, if communities want to utilise their jointly produced energy via the public grid, grid tariffs and taxes are incurred, which is not economically feasible. RED II stipulates that EU Member States should have implemented legislation for RE communities and the conditions for operating Energy Sharing by June 2021. This has not yet happened in Germany.

Specifically, according to RED II, Art. 2(16), a RE community is a "legal entity which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity". Shareholders or members are "natural persons, SMEs or local authorities, including municipalities [small and medium enterprises]" (ibid.). The RE communities' primary purpose is "to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits" (ibid.).

2 What is Energy Sharing?

The right to Energy Sharing implies sharing, storing, and selling the renewable energy jointly produced within a spatially defined RE community. In Germany, the joint use for renewable energy has so far only been economical with so-called tenant electricity *(Mieter:innenstrom)*. However, the bureaucratic hurdles are high and only a small group of people within the housing community can participate. Energy

[1] An overview is available on the Bündnis Bürgerenergie (BBEn) explanation video (in German), released on 23.11.2022.

[2] For the design of the citizens' energy communities, please refer to a summary presentation by BBEn (in German), last accessed on 23.11.2022.

Sharing in RE communities implies the use of the local grid infrastructure and would thus enable the use of jointly generated energy within a larger radius.

3 How far is the implementation of the right to Energy Sharing in the EU?

Under RED II, from 11 December 2018, all Member States must ensure that the rights of RE communities are implemented in national law by June 2021. However, the directive has still not been implemented in German law. Appropriate legal frameworks for RE communities have been created so far in Portugal, Austria, Greenland, and Italy.[3]

4 Benefits of Energy Sharing

Strengthen municipalities as cooperation partners: RE communities can make municipal land accessible and use it to generate additional revenue for the municipalities. By doing so, municipal decision-makers become advocates for the energy transition and will ensure broad acceptance in the municipality.

Incentivise private investments and strengthen low-threshold participation: Energy Sharing provides incentives for private individuals and small and medium enterprises (SME) to increase their investments in renewable energy systems. There are also opportunities for citizens without their own real estate or land to participate.

Consider electricity, heating, mobility, and energy savings together: Through Energy Sharing, local incentives are developed that push forward the necessary and efficient electrification of heating and transportation sectors.

Raising decentralised flexibility potentials: Energy Sharing can contribute to enhancing the flexibility potential in RE communities, such as generation-based charging of electric vehicles or the flexible use of heat pumps.

5 Challenges of Energy Sharing

5.1 Impacts on the grid and its operators

Currently it is not completely clear how Energy Sharing affects grids, i.e. whether it can cause grids, especially distribution grids, extra burden or of relief to grids if all members of the RE communities draw electricity at the same time. It is also not yet clear which grids and voltage levels would be used depending on the selected geographic structure and which effects this would have.[4]

So far, there is no definition of energy sharing in Germany. The following questions are relevant:

[3] An evaluation of all EU countries on their implementation of the EU directives can be found in dena, 2022, Fig.1.
[4] Detailed explanation and analysis of the grid challenges are available in the following preliminary study (in German): https://www.germanwatch.org/sites/default/files/EERA-2022-Auswirkungen-von-Energy-Sharing_final.pdf

1. *How is Energy Sharing defined: which geographic structure and which voltage levels are considered?*

   EU Member States should determine how Energy Sharing from a RE community can be operated according to their respective national legislation – in Germany, this has not yet happened. Currently RE communities are defined in such a way that "at least 75% of the voting rights belong to natural persons, who reside legally, following the Federal Registration Act, in a specific postal code area that is completely or partially in a 50-kilometre radius from the planned installation" (§ 3 Nr. 15 EEG 2023). This can be used to derive a geographical area in which RE communities can operate energy sharing.

2. *Under which conditions can Energy Sharing burden the grid?*

   Depending on the design and definition of RE communities and energy sharing, there may be additional strain or a relief on the grid. In addition, the technology mix used, the grid area, and the existing grid situation must also be considered (cf. Pechan, 2022). Figure 1, extracted from the preliminary study by Pechan (2022), shows different possibilities in which producers and consumers of RE communities can be connected to the grid.

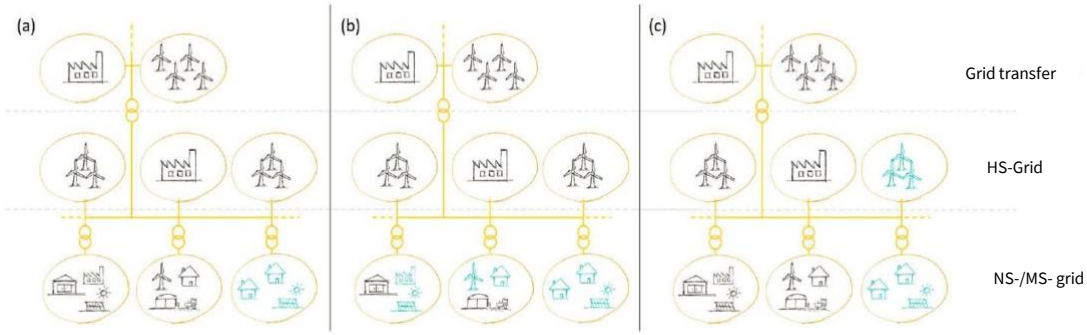

Figure 1: Three possible distribution of generation and consumption of a RE community across different distribution grids and voltage levels (part of the RE community is in green); Source: Pechan, 2022.

Pechan (2022) subsequently summarises different grid situations and the consequences of energy sharing in a table (see Figure 2).

Effects of Energy Sharing on utilisation capacity of the shared grid		Grid situation		
		Grid shortage due to high load	No grid shortage	Grid shortage due to high supply
Possible consequences of energy sharing in the grid area	Load reduction	-	0	(+)*
	Load increase	+	0	-
	Reduced capacity of energy recovery system	0/+	0	-
	Increased capacity of energy recovery system	(-)*	0	+

Figure 2: Overview of possible effects of Energy Sharing on utilisation of the distribution grid (+: strain; -: relief; 0: no effect; *presumably no occurrent case due to energy sharing); Source: Pechan, 2022.

Another important aspect that determines whether energy sharing will burden or relieve the electricity grid is the usage behaviour of members of the RE community. It can be presumed that Energy Sharing will lead to a change in consumption in certain periods of high energy generation. However, if these periods come simultaneously, they can put a strain on the grids.

5.2 Financial incentives for implementing energy sharing

In order to implement Energy Sharing, the right financial incentives must be introduced. For that, the following questions arise:

1. *How can energy sharing be shaped in an attractive manner?*

Currently, two alternatives in particular are being discussed. The first proposes that grid fees and other ancillary electricity costs for the use of the jointly produced energy could be reduced if an effect of relief on the energy grid is assumed. This is applied in Portugal, for example: RE communities can request a lower fee, which then increases or decreases according to the degree of use of the shared grid (cf. ACER, 2021, S. 10).

On the other hand, a possible market premium following the §20 EEG would be conceivable. BBEn (2021) recommends that RE communities should receive this compensation if their renewably generated electricity is fed into the grid. This should be paid regardless of whether the energy is sold on the exchange market or if the community uses it. An additional financial incentive would be necessary to encourage members of the RE community to use the energy when it is generated. This could be solved by paying an additional energy sharing premium, which would be calculated per Kw/h of energy generated and used on a quarter-hourly basis by the members of the RE community.

2. *What is the relation between of the costs and benefits of using energy sharing to society as a whole?*

One critique of energy sharing is that lower grid fees would allow RE communities to escape the solidarity framework of energy supply and grids. People who do not participate on energy sharing should not have to bear the higher costs per kilowatt hour for the provision of the public energy network.

5.3 Possible services for the grid

It remains to be clarified which services energy sharing can contribute in terms of relieving the grid or to countering grid load. For this, the following questions arise:

1. *Could Energy Sharing provide flexibilities – for example through standard service provision, sector coupling, or regional flexibility markets?*
2. *How would the aggregation of RE communities' work and how could the energy they generated be made available for existing markets?*

5.4 Digital Infrastructure

In order for changes in consumption within the RE community to occur in periods with a (a lot of) jointly produced renewable energy, a digital infrastructure must be in place, which would enable the necessary exchange of information. Smart meters would play an important role here, enabling users to view their actual consumption and make incentive-driven adjustments (cf. Dena, 2022, S. 31 ff.).
Currently, due to faltering rollout in Germany, smart meters are only available in private households to a very limited extent, but the number is expected to increase in the upcoming years. For this, the following questions are important:

1. *Which data should smart meters transmit and what are the tasks of the DSOs as possible managers of this data?*
2. *Who would bear the costs of the digital infrastructure? How could this be introduced in a socially just way?*

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