

Virtual Power Plant of Municipalities in the County of Ebersberg

Entry for the Innovation in Politics Award –

Detailed project description

Project idea and political backing

The county of Ebersberg has set itself the ambitious target of becoming free from fossil fuel and finite sources of energy by the year 2030 through energy efficiency and energy saving measures and through the production of energy from renewable sources.

Energy is to be generated in the county of Ebersberg, distributed through local grid infrastructures and run by municipal utility companies. In this way, the energy transition will also create local value added in the county. To implement these goals the municipalities are working intensively together to establish a power supply company for the county that will allow them to produce and distribute energy from the region for the region. The municipalities decided in favour of a Virtual Power Plant as a first building block for Ebersberg's Regional Utility, because this project appeared to be realisable in the near term and could also be implemented at a reasonable cost. The Virtual Power Plant is to help municipalities engage in a common energy policy at local level, enable smooth continuation of the energy transition process by stabilising the network load with only moderate network expansion, and also generate revenue for the energy transition.

The municipalities have jointly commissioned their energy cooperative *Regenerative Energie Ebersberg* (REGE) with the implementation of the Virtual Power Plant.

As a key player in Ebersberg county regional policy, Robert Niedergesäß, county district commissioner and chairman of REGE eG supervisory board, has always given the project his utmost support; he has weighed the pros and cons and proactively encouraged cooperation between the participating communities. In addition to the two members of the board of REGE eG, Mr. Niedergesäß therefore has a pivotal role to play in the successful implementation of the Virtual Power Plant. The importance of the project for the successful implementation of the energy transition in the county shall be explained in detail below.

Scope of cooperation and role played by the municipalities

Operator of the Virtual Power Plant is the community and citizen owned energy cooperative *Regenerative Energie Ebersberg eG* (REGE), founded by the municipalities and energy cooperatives of the county of Ebersberg for implementing the county's energy transition targets. The general assembly and supervisory board of REGE is composed predominantly of mayors of the county of Ebersberg who are aware of the energy transition objectives and needs of their municipalities, and who commission REGE with the implementation of corresponding projects. The acceptance and

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support of the projects by the citizens is ensured through the minority participation of the citizen-owned energy cooperatives in the county. The honorary board is in charge of operations at REGE. This board is made up of the county climate protection manager and one board member of a county energy cooperative. The Virtual Power Plant also receives support from a utility service provider (Stadtwerke München / Munich municipal Utility Corporation) that helps the municipalities access the energy exchange and balancing energy auctions, this being an expensive and complex process. It also provides the municipalities with energy expertise. If the honorary board members of the REGE are under time pressure the Energy Agency of the county is integrated to take over urgent tasks and as contact partner for those involved in the Virtual Power Plant project. The Virtual Power Plant is therefore based on a broad alliance of citizen initiatives, energy transition players and municipalities.



District commissioner Robert Niedergesäß with REGE board members and the first plant operators of the Virtual Power Plant at the signing of the contract

The energy suppliers of the Virtual Power Plant, currently 6 biogas plant operators as well as one wind turbine plant, and, in the medium term, the operators of many different renewable energy units throughout the county, grant the municipalities the right to adjust their power generation to the demand on the grid, and for which they receive remuneration. This payment is higher than the classic feed-in tariff and also helps the plant operators prepare for “the time after the EEG” (Germany’s Renewable Energy Sources Act), when it will no longer be possible to claim for subsidies in 20 years’ time.

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Outcome of the cooperation

In view of the barely profitable feed-in tariffs of the EEG 2014, the Virtual Power Plant, on the one hand, offers incentives for new plant operators based on enhanced revenue potential. On the other hand, it will also ensure that those units that drop out of the EEG feed-in tariff can continue to operate economically. The profitable remuneration for renewable energy provided by the Virtual Power Plant is in the medium term also to be made possible via direct delivery of electricity to customers in the county. In this way, the municipalities directly support renewable energy production in the county through their Virtual Power Plant.

A significant benefit of the Virtual Power Plant is indirect promotion of the energy transition: Photovoltaic plants only feed in power when the sun is shining, whereas the county's biogas plants run at full power all through the year. In Ebersberg, almost 30 % of the power is therefore not being produced when the consumers require the electricity. This increasing unbalance between production and consumption as the energy transition moves forward, necessitated increased grid intervention events through the region's grid operator. In order to avoid limit violations caused by fluctuation in the in-feed, the grid operator had to undertake extensive operational and network measures, the costs of which were then charged to the grid customer. To keep consumer costs down the municipalities therefore searched for a solution that would allow low-cost integration of additional renewable power generating units in the county grid.

As of 01 January 2016 such a solution has been in place: the Virtual Power Plant. Using a wireless infrastructure specifically designed for this purpose, with 'Critical Infrastructure conformity', there are currently seven production units distributed across the county that are interlinked to form a fast-response power plant.

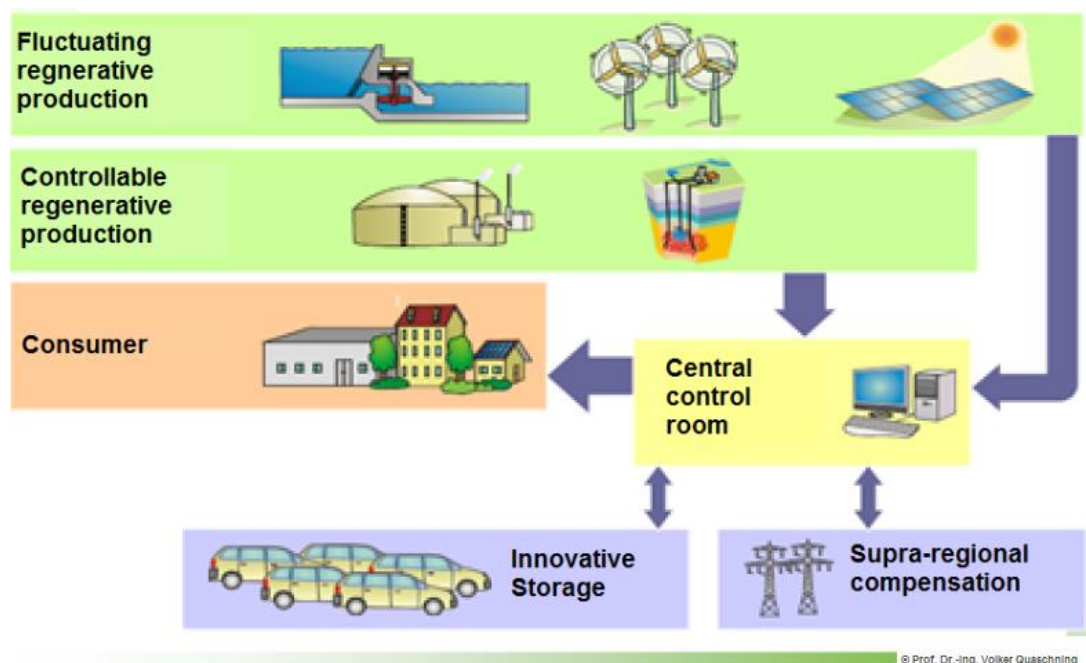


Diagram of a Virtual Power Plant

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The produced amount of electricity can, in this way, be adjusted to the real-time demand. Whenever the demand for power is particularly low and the supply in the grid particularly high, the biogas plants are ramped down. The indicator is the electricity price on the market. When the relationship between supply and demand is reversed and the market price recovers, the power plant feeds renewable energy back into the grid. With its Virtual Power Plant the county of Ebersberg therefore already shows us today what the energy transition will look like in the future.

The grid-stabilising potential of this forward-looking project does, however, not stop here: in future, the Virtual Power Plant is also to offer balancing energy (enhanced response of the power plant) that is directly requested by grid operators. Our aim is also to step up the current capacity of the power plant of approx. 2 MW through more biogas units, and in the future also using all other renewable sources of energy in the county. In addition, the communications infrastructure can be used for smarter grid control. If controllable network transformers are also incorporated in the wireless network, the available capacity of the grid can be fully utilised through switching operations and smart control of the grid load. This additional advantage, as well as the general development of energy know-how is particularly relevant in the light of the municipalities applying for grid concessions in the county.

Based on the cooperation of 19 municipalities, generation units all over the county can be connected to the Virtual Power Plant, enabling a stabilisation throughout the entire grid. In addition to this, economies of scale contribute to the efficiency of the plant. This would not be possible without inter-municipal cooperation. The cooperation of several local communities can therefore prevent the need for massive and expensive grid expansion, enable the integration of other regenerative sources of energy in the grid and, in this way, play a crucial role in the Ebersberg energy transition 2030.

Exemplary role, reproducibility, PR work

The Virtual Power Plant in the county of Ebersberg is one of the first of its kind to be operated by an alliance of several municipalities. Based on this cooperation it is possible to stabilise the county's entire power grid. The Virtual Power Plant can also be promoted as a first building block of the new Regional Utility with a very positive feedback. It also stands out against virtual power plants of other private operators based on the priority statutory objective of the REGE of supporting the energy transition through its function and its proceeds. This is underscored by the fact that relatively small production units with an installed capacity as low as 100 kW are connected, although this is less economically efficient than just interlinking very large plants.

Thanks to the support of a service provider this complex project can be run on an honorary basis. The concept thus offers great potential for others to follow suit in the form of municipal joint ventures and energy cooperatives that also want to use the trust placed in them and their regional foothold to build up a virtual power plant of their own. The contract terms negotiated with the service provider and the energy producers can easily be provided. Also the acquired know-how for winning over production plants for the project and for the communications infrastructure required for connecting these units can be communicated.

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With the new perspective of network load stabilisation the project awards renewable sources of energy an altogether positive image – not due to, but with the help of the renewable energy plants. In specific combination with a regional eco-electricity product from the Virtual Power Plant a large multiplier effect can unfold, giving a fresh boost to the energy transition on local level and promoting climate protection.



Logo of the aspired electricity product from the region for the region

Parallel to the further development and enlargement of the Virtual Power Plant, a corresponding electricity product is currently being designed. This symbiosis of regional power generation and regional consumption is set to be presented to power consumers in the county of Ebersberg under the name “EBERstrom” at the beginning of 2018. The respective PR work and advertising of the project is already under way. Details are again being prepared with the support of a utility service provider and the Virtual Power Plant will be available as a power supplier for energy customers.

Results and achievements

The key objectives of the Virtual Power Plant are to get municipalities involved in a joint energy commitment, to push forward the energy transition with moderate grid expansion through network stabilisation and to generate revenue for the energy transition.

With the Stadtwerke München (Munich municipal Utility Corporation) as partner in the Virtual Power Plant, it has been possible since the start of the project to acquire comprehensive knowledge about the electricity market in Germany, the interplay and jobs of different market players, the risk-return profile of different energy activities and about the respective regulatory framework conditions. The cooperation project reveals ‘the rules of the game’ in the energy industry to the municipalities, enabling them to assess energy-related facts and circumstances more easily and making them more independent from the dominating market players. The Virtual Power Plant also creates the bases for establishing a Regional Utility with which the municipalities aim to bring services of general interest back into public hands in the medium term.

As the Virtual Power Plant generates proceeds by providing power when the demand is high and by ramping down supply units when there is too much power in the grid, the network stabilising effect of the project is inherent in the system. Fluctuations in the renewable energy feed-in by the renewable energy units can be balanced, and the need for network expansion is significantly reduced. The Virtual Power Plant is thus able to drive the energy transition in the county of Ebersberg while maintaining moderate grid charges. The specific quantification and correct assignment of network stabilising measures is complicated and can only be carried out by the respective grid operator.

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Due to the long-term orientation of the project it is possible to create revenue for the energy transition on a regular basis. This is reflected on the one hand in the tariff paid to unit operators connected to the power plant, who, achieve up to 5% additional revenue compared to the EEG feed-in tariff. This secures the economic operation of existing renewable energy plants. At the same time, this more attractive tariff also motivates new plant operators and promotes the development of more production capacities. On the other hand, the Virtual Power Plant indirectly drives the energy transition. The remaining revenues of REGE also go towards energy transition projects, as set out in the articles of association. In the medium term the Virtual Power Plant will enable cross-subsidisation of several decentralised production plants. The severe drop in EEG feed-in tariffs over recent years can thus be compensated to make an investment in renewable sources of energy attractive again.

Financing

The start-up financing for the Virtual Power Plant came from the shareholdings of the municipalities and citizen-owned energy cooperatives in REGE. This enabled investments in the communications infrastructure. The development and implementation of the project was accomplished on the basis of honorary work, this also applying to operations carried out at municipal level. The services provided by the utility service provider are financed through the proceeds of the virtual power plant – as is also the feed-in tariff for the plant operators. The revenue is also used to pay off the communications infrastructure and for the implementation of more energy transition projects. Amortisation of the wireless network is set to be accomplished in 15 years' time. Transferability of the project to municipalities that require a shorter depreciation period is possible. Here there is an option to refrain from setting up an own wireless network and to use the existing mobile phone network, this will reduce the total investment considerably. We will gladly provide pro and con arguments for reaching a decision. External funding has not been used so far.