VISNOVA
CLEAN ENERGY FROM RURAL REGIONS

4.5.4
Peer Review Report for Pilot-Investment of the District of Northern Saxony

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Landkreis Nordsachsen

WFG Landkreis Nordsachsen

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Peer Review Report for

Pilot-Investment of the

District of Northern Saxony

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Peer Review Report for pilot investment of the District of Northern Saxony

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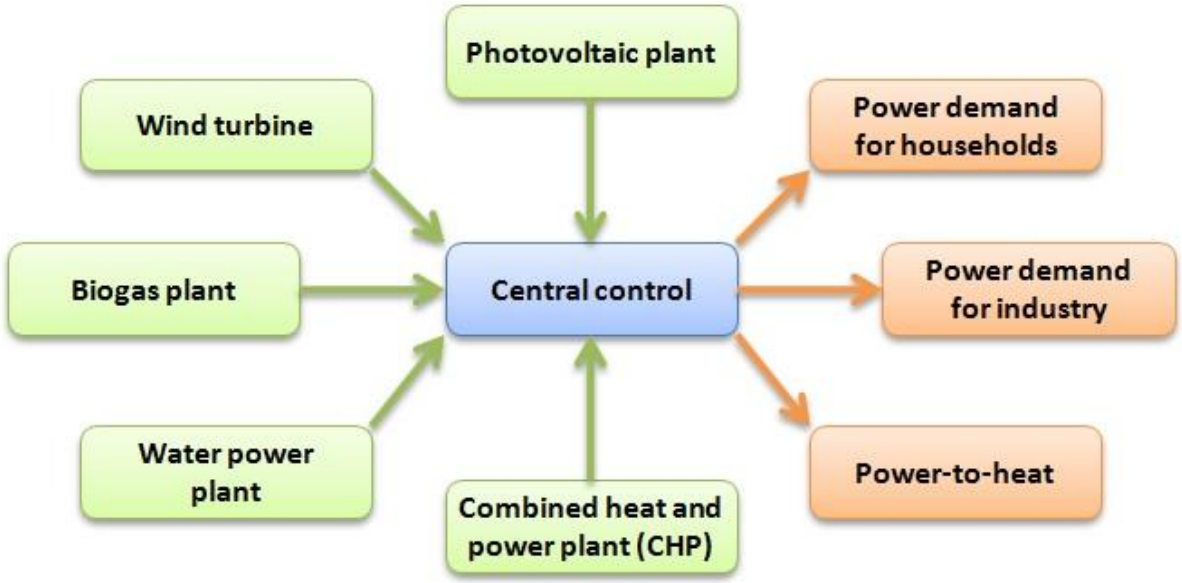
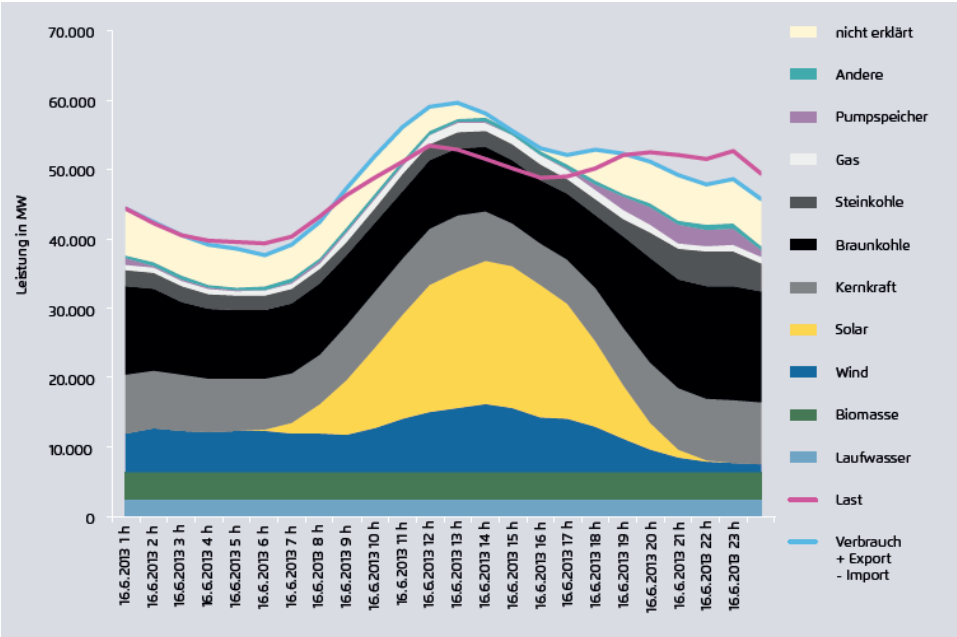
Introduction

A virtual power plant is a cluster of distributed generation installations (such as CHP, wind-turbines, small hydro, photovoltaic plant etc.) which are collectively run by a central control entity. An example for a virtual power plant is shown in the scheme below.



The concerted operational mode delivers extra benefits such as the ability to deliver peak load electricity or load-aware power generation at short notice. Such a virtual power plant can replace a conventional power plant while providing higher efficiency and more flexibility. Note that more flexibility allows the system to react better to fluctuations. However, a virtual power plant is also a complex system requiring a complicated optimization, control, and secure communication methodology.
The demand for such a virtual power plant increases because of the volatility of renewable energies.
Conventional power plants provide a quit stable output, also during the night and independent from the weather situation. Several power plants are also quite flexible to react on a changing demand, e.g. gas power plants. In the opposite especially two kind of renewable energies are strongly depending on the weather situation, wind power and solar power. During daytime photovoltaic plants feed in more electricity in the grid. Also the wind blows stronger during daytime.
This leads to the situation that, mainly in summertime, there is more electricity in the grid then is needed, so it has to be exported otherwise. Otherwise the worst case would be a breakdown of the grid. This courses problems in other countries.
In the figure below such a situation is illustrated for the 16th of June 2013. The purple line is the demand and the light blue line shows the production of electricity. In the hours around noon you can see the yellow and darker blue areas rise, this is the output of photovoltaic and wind power plants. In these hours the electricity production is much higher then the demand but the aim of a stable electricity grid is that demand and production are quite the same.



With implementing CHP in the virtual power plant it is possible to lower down the feed in. The implementation of Power-to-Heat increases the demand of electricity. With combining these to systems we can serve both sides, the supply of energy and the demand. With lowering down the feed in we save conventional power sources and with increasing the demand we can store mainly electricity from RES in heat.

Few words about technical aspects of pilot project/ investment.

The implementation of Power-to-Heat and CHP in a virtual power plant is done by the Technische Werke Delitzsch GmbH a local energy supplier mainly for the city of Delitzsch.
The units that are implemented are:
CHP 1 with a electrical capacity of 900 kW_{el} and a thermal capacity of 1300 kW_{th}. CHP 2 with a electrical capacity of 999 kW_{el} and a thermal capacity of 1030 $kW_{th.}$ Both CHP are running in an interlock circuit so that the electrical capacity in the virtual power plant is restricted up to 950 kW_{el}. The operation reserve - which is the capacity in the virtual power plant – can be offered from 450 kW_{el} to 950 $kW_{el.}$
The Power-to-Heat unit has an electrical capacity of 1200 Kw_{el}, this mean the demand of electricity for heating.

CHP 1

CHP 2

Power-to-Heat unit

switchboard – the interface to the virtual power plant


thermal storages for the teleheating system

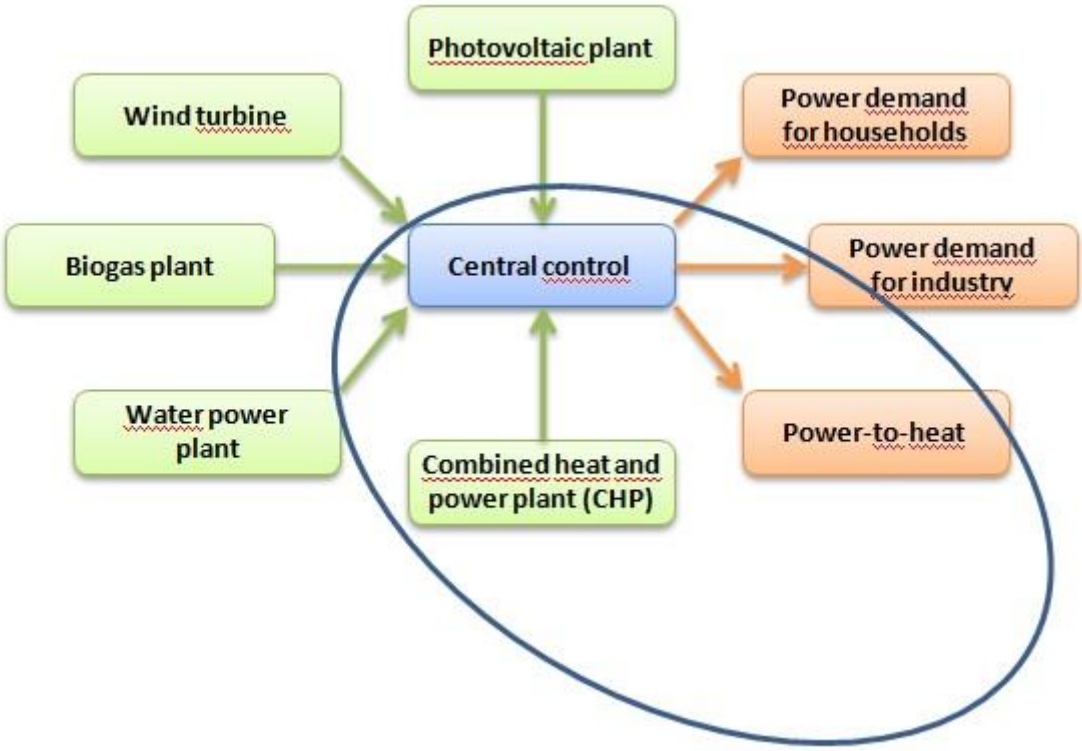
When and why appeared idea of this investment?

In the beginning was an initiative from the Duben Heath region to start a project dealing with RES. Also requests from the city of Delitzsch, which is very active in the European Energy Award strengthened the plan to realise a project dealing with RES at the district level. In process of elaborating it became clear that it is not useful to implement another solar panel or other RES. It would be much more useful to work with existing RES facilities to stabilise the volatile output of RES. So the idea of a virtual power plant was born. This process of finding dates back at least to the beginning of the 21st century. It lasts until

there was the possibility to take part in the VIS NOVA project.

What was ways which aimed to starting implementation of this investment?

In January 2013 the feasibility study for a virtual power plant in the District of Northern Saxony was finished. It was examined if it is possible to establish a virtual power plant in the District. Several indicators were considered, for example the energy demand in the cities, the renewable energies facilities, the capacity of the grid and of course the conditions of the energy market. The feasibility study was conducted by Prof. Dr. Bruckner from the Institute for Infrastructure and Resource Management of the University of Leipzig. The conclusion was that it is possible to establish a virtual power plant by using existing renewable energies facilities in the region. The Centre or hub of such a virtual power plant should be located in the city of Delitzsch because the city has the highest energy demand in the region and there is a local energy supplier with its own local grid.
After the study was finished we were in talks with all four local energy suppliers in the district and checked with them together the market restrictions for dealing energy at the European Energy Exchange in Leipzig. The result was that it is not possible to contract enough renewable energy facilities within the VIS NOVA duration for fulfilling the minimum quantity of energy to deal at the European Energy Exchange.
So the aim was changed from establishing a virtual power plant into take part in an existing virtual power plant.
In the talks it also became clear, that the easiest and most efficient way to take part in a virtual power plant is to integrate CHP and power to heat capacity. The following scheme shows the intended structure.



When the decision was made to undertake the pilot investment?

The decision is the result of talks with energy suppliers during the year 2013 and a tender which was decided by the RSC at 22th November 2013. The contract was signed at 07th January 2014.

How long lasted realization of investment?

The investment started with signing the contract at 07th January 2014 and lasted till the implementation of the power-to-heat unit in the virtual power plant at the end of October. The exact date is not possible to define, because there are several checks to confirm its function. So it was working for several days at the and of October in a trial. So all in all the investment lasted about ten moths. The timeframe is shown below.

Call for tenders:	11th October 2013
Deadline for submission of quotations:	15th November 2013
Decision of RSC:	22th November 2013
Informing the bidders:	22th November 2013
Signing of Contract:	07th January 2014
Integrating CHP in Virtual Power Plant:	end of January 2014
Integrating Power to heat in Virtual Power Plant:	end of October 2014

What are the problems occurred during the investment implementation?

The only so to say “problem” was that to implementation could only be done outside the heating period.

II part – Information from the VIS NOVA project partners:

What partners think about the technical aspects of the pilot investment?

It is good that there is a regional power supplier. The possibility of the participation in a virtual power station is a great thing.
For the future version of power to heat, hopefully better memory possibilities for electricity exist soon. Using electricity for heating should represent only a stopgap. (Tulln)

Can you transfer this pilot investment; take into account the realities, to your region?

No, because we have only a supraregional power supplier. That is a private company, where no outsiders have an insight what they do. (Tulln)

If not, what are the barriers?

If yes, can you transfer the full dimension of the investment, or restricted in some way?