Virtual Power Plants: Technical and Commercial Management of Decentralized Assets

Dr. Nicolas Sommer

CoNDyNet Industry Workshop: From Research to Application
22./23. October 2016
WHAT IS A DIGITAL UTILITY?

- Independent Grid Operators
- Independent Power Producers
- Energy Markets
- Power Consumers

- A VPP operates and markets power plants, without owning them!
- It’s a platform where independent producers & consumers are connected to grid operators & markets through M2M communication
Technical requirements

Interfacing power plants is not a matter of simple plug & play

Individual control interface at each station

- High variation of control interfaces used
- No standardized interface for connecting a power plant

Role of the Next-Box

- Standardized interface between power plant & control system
- Follows IT security regulations of the transmission code
- Defined protocol for connection errors, etc ...

Integrating Decentralized Stations

Standardized interface to the Virtual Power Plant

Control system

- Collector of all the information transmitted via machine-to-machine communication by the Next Boxes and the electricity system.
- Through the central control system, the units are controlled, started up and shut down.
Services – Market Premium Modell

Photovoltaics forecast - Know the current feed-in of your portfolio

Abweichung Einspeisung PV

MW

Beispiel 1

0
50
100
150
04:00 06:00 08:00 10:00 12:00 14:00 16:00 18:00 20:00 22:00

Zeit

Beispiel 2

0
50
100
150
200
250
300

©NEXT KRAFTWERKE

Prognose PV Intraday
Prognose PV Live
Einspeisung PV
Balancing services – Flexibility by VPPs

How does it work?
Proactive Flexibility - Day-Ahead

Peak load operation

Peak load operation of a biogas unit – example
Proactive Flexibility - Intraday

Peak load operation

Power production led by price signals

Tapping flexibility potentials by running an asset according to price signals pushed forward in intervals as short as 15 minutes

Very flexible plants: Production adjustment on the basis of intraday-prices
Stabilizing the grid
Control of decentralized assets in a Virtual Power Plant

Reactive Flexibility
Stabilizing the grid and keeping the grid frequency at 50 Hertz.

Services
Optimal trade with remote-controlled units within the Market Premium Model.

Proactive Flexibility
(Short term) trading of power to use the units flexibility profitable.
<table>
<thead>
<tr>
<th>THE GOAL</th>
<th>Making 100% renewable energy possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>THE PATH</td>
<td>Digital, flexible, sustainable</td>
</tr>
<tr>
<td>THE STATUS</td>
<td>One of the largest Digital Utilities in Europe</td>
</tr>
<tr>
<td>THE TEAM</td>
<td>About 110 employees with a broad academic background</td>
</tr>
<tr>
<td>CONTACT</td>
<td>Dr. Nicolas Sommer</td>
</tr>
<tr>
<td></td>
<td>Portfolio, Schedule and Balancing Group Manager</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:sommer@next-kraftwerke.de">sommer@next-kraftwerke.de</a></td>
</tr>
<tr>
<td></td>
<td>@next_kraftwerke</td>
</tr>
</tbody>
</table>