

# Smart Grids – Innovative approaches for future electricity distribution

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R&D-Projekt Manager „Grids for future electricity supply“

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**VORWEG GEHEN**

# Smart Energy Projects of RWE Deutschland AG

<b>Current Projekts</b>	<b>Projekt Manager</b>	<b>Contract Period</b>
<b>Future Smart Grids (BMW-i-promoted project)</b>	<b>Torsten Hammerschmidt</b>	<b>01.07.2009 - 31.12.2011</b>
E-DeMa (BMW-i-promoted project)	Prof. Dr. Michael Laskowski	01.01.2009 - 31.12.2012
Grid4EU (status of application)	Thomas Wiedemann	01.01.2011 - 31.12.2014
Grid4Vehicle (EU-promoted project)	Thomas Theisen	01.01.2010 - 30.06.2011
Virtual Power Plant	Dr. Jörg Heinen	
Harmonics in the electrical infrastructure	Dr. Thomas Wiesner	01.06.2010 - 30.06.2012
Smart Meter Mülheim	Andreas Wolff	01.07.2008 - 31.12.2011
Open Meter (passive cooperation, EU-promoted project)	Olaf Neumann	01.01.2009 - 30.06.2011
E-Mobility (BMW-i-promoted project)	Dr. Ingo Diefenbach, Dr. Armin Gaul, Thomas Theisen	01.02.2009 – 31.12.2011
TIE-IN (status of application)	Dr. Armin Gaul	

# Customer Applications Relating Energy Supply

## Smart Energy World



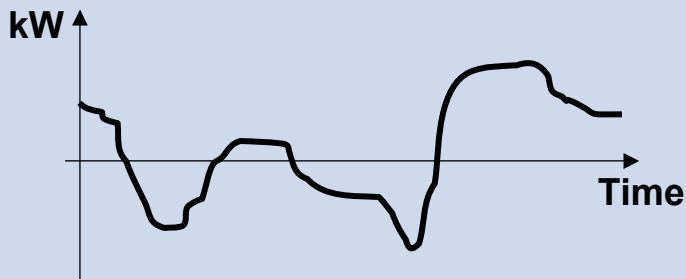
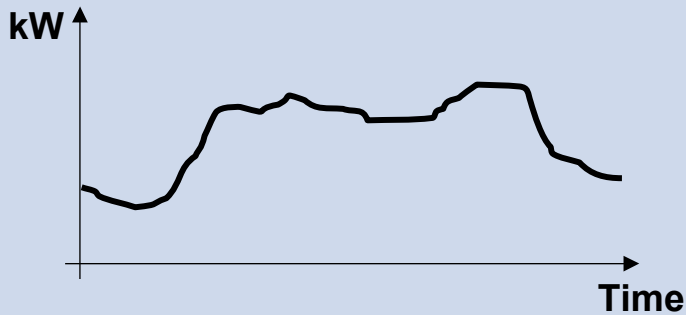
## Smart Energy World

### Smart Grids



# Energy Supply-Task 2030 gives Requirements to Efficient Distribution Grids (Smart Grids)

## Exercise: Customer Requirements



Supply Connection Point

## Solution: Distribution Grid



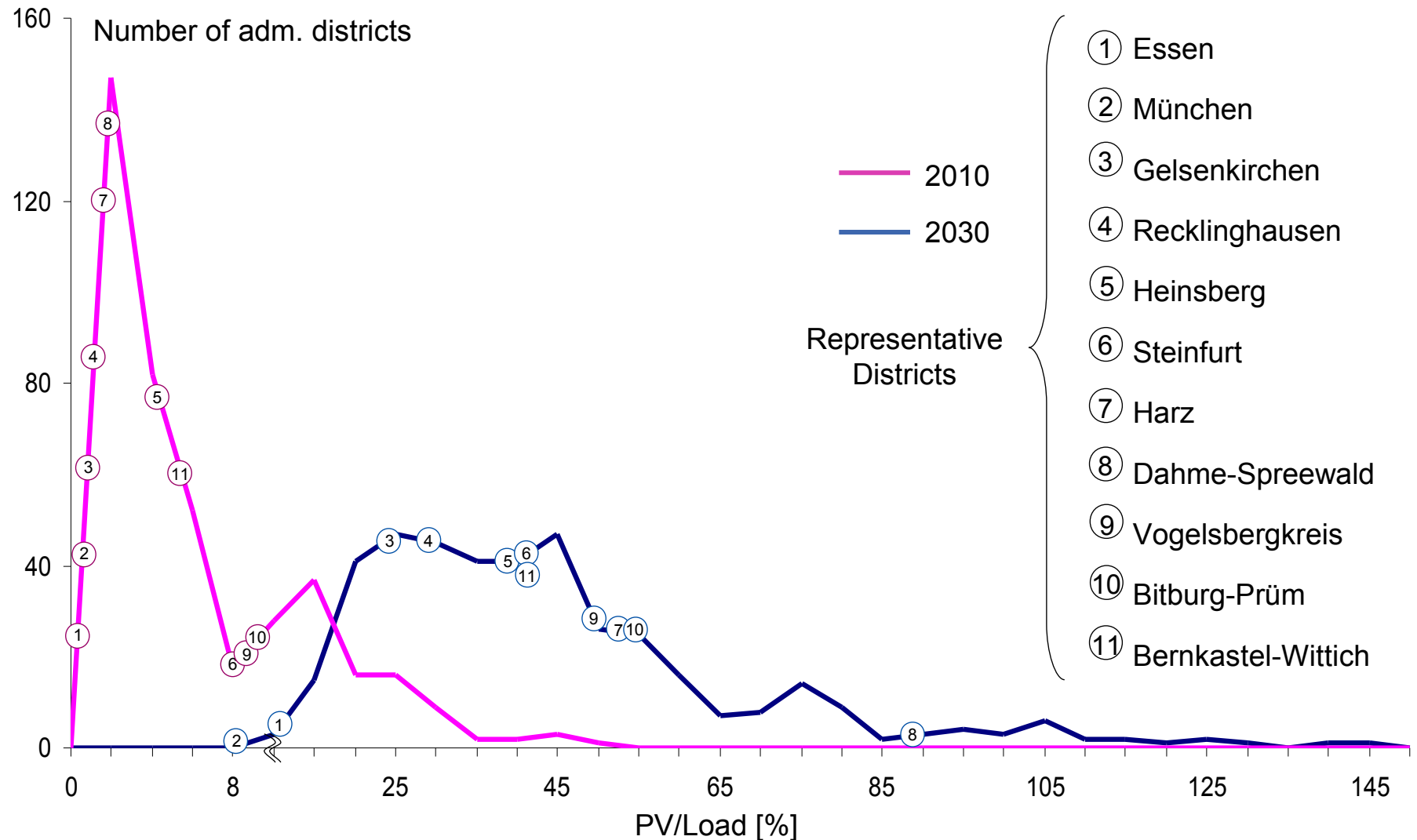
Power Plant



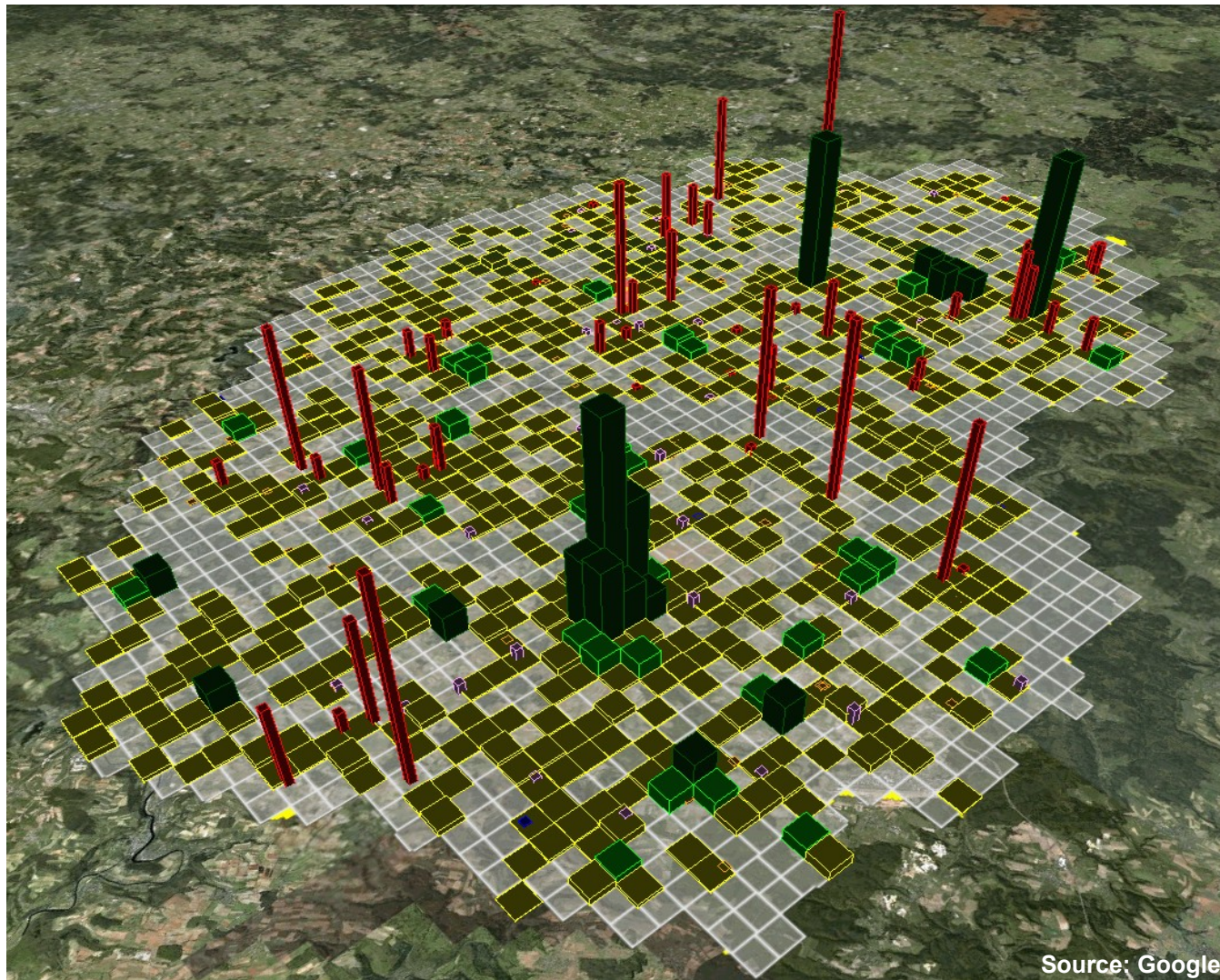
Power Plant/  
Storage

BMW-promoted Project  
Grids for Future Electricity Supply




# Renewable Generation in Germany until 2030







# Inhomogeneity of Energy Supply-Task drives Grid-Costs



## Load per area:

-  Urban area
-  Rural area with supply
-  Rural area without supply

## Generation per area:

-  Wind power
-  Photovoltaiks
-  Hydro power
-  Biomass energy

# Innovative Grid Concepts are Analysed by Simulations

**1 Use of Information- and Communication Technology (ICT)**

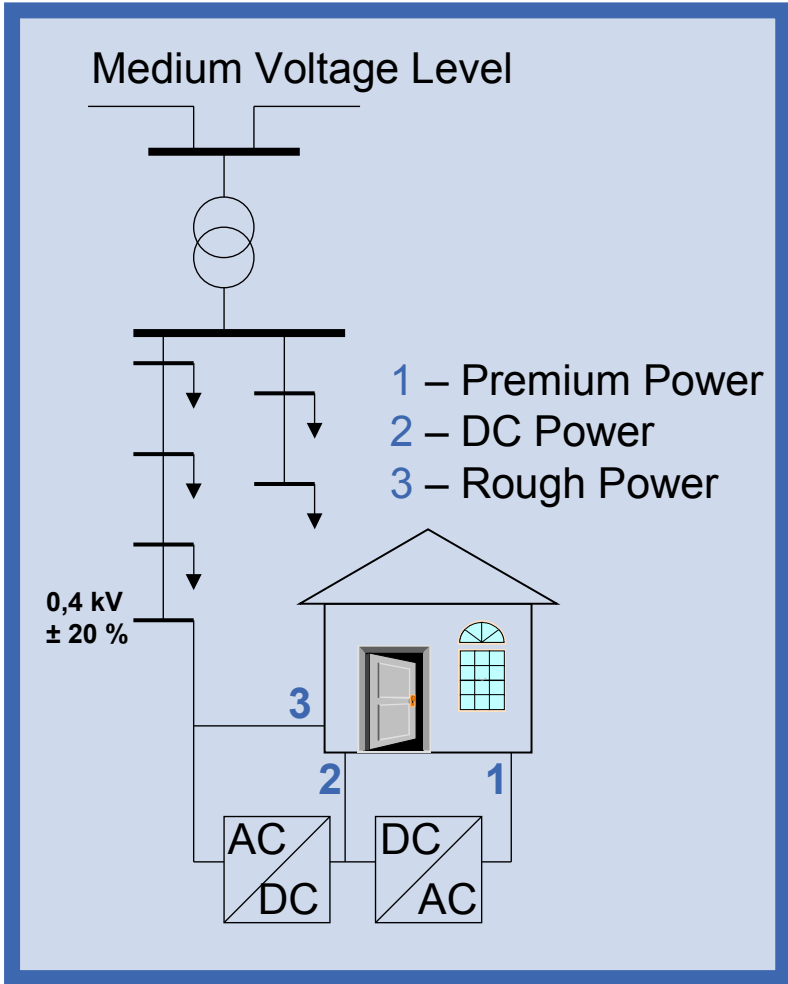
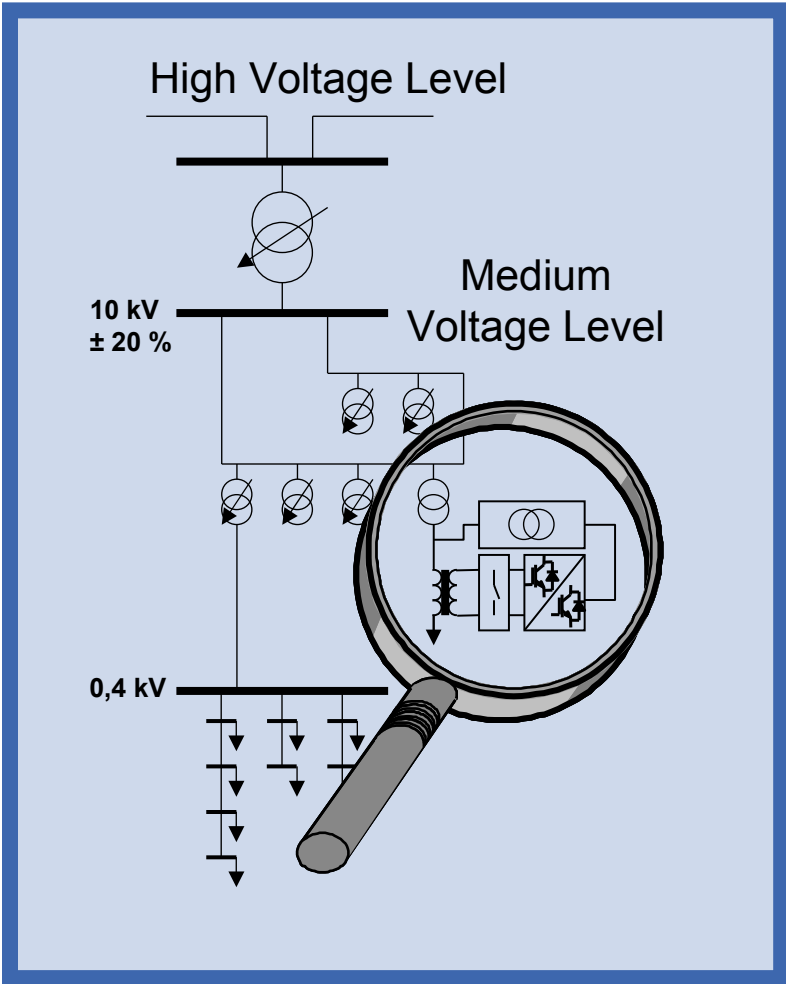
**2 Disposition of Storage Devices**

**3 Local Voltage Control to exploit Grid Transportation Capacity**

**4 Hierarchical Supply Layers in Medium Voltage Level**

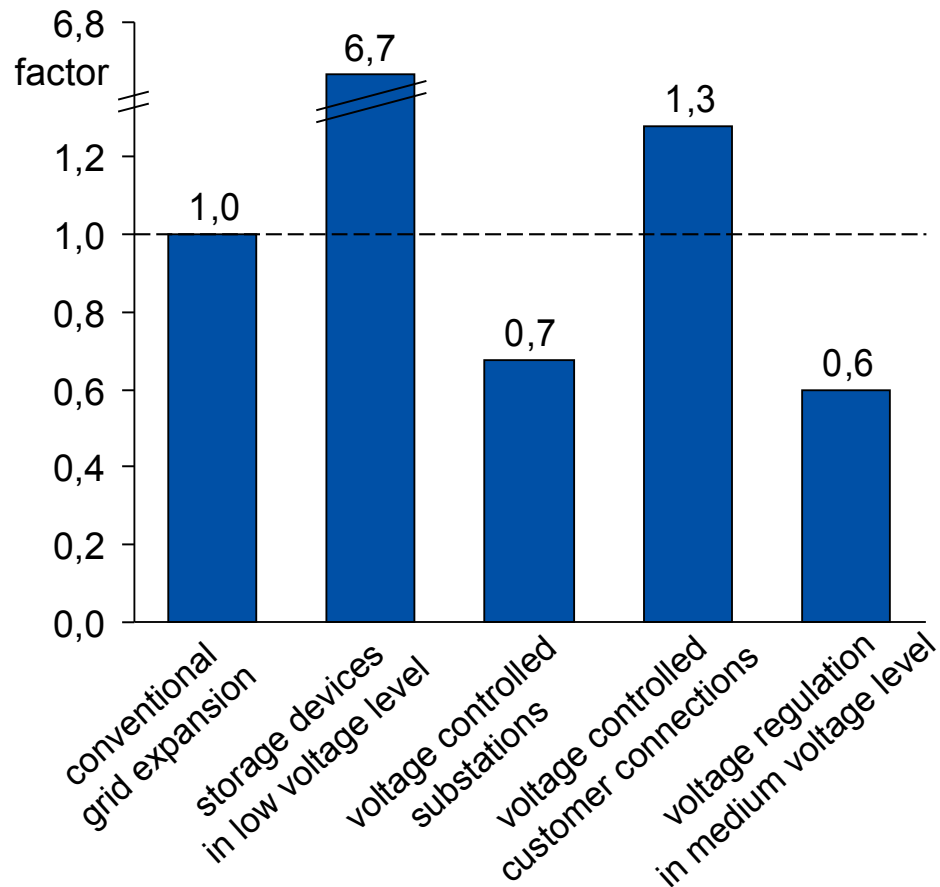


# Examples of Innovative Local-Voltage-Control



# Innovative Grid Concepts provide economic distribution solutions dependent on the area structure

annuity  $\Delta$ -costs  
2010->2030



# Conclusions

- > Economy of Innovative Grid Concepts depends on Energy Supply-Task;  
Rural Grids are more affected by Future Developments than Urban Ones
- > Disparity in places of decentralized Generation and Load drives Grid Costs
- > Cost Degression of Power Electronics broaden usecases but  
Mass Operation needs Cost-Efficient and Rugged Equipment
- > Benchmark of Innovative Concepts is the Conventional Grid

# Backup

# Customer Applications Relating Energy Supply

## E-Mobility

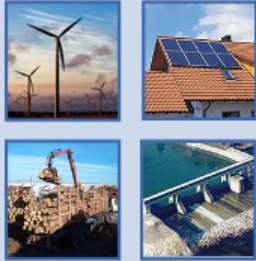


## E-Energy



Future Market Place  
Smart Customer

## Virtual Power Plant



## Energy Aware Clock



Quelle: www.ti.se



## Smart Home



## Power Aware Cord



Quelle: www.ti.se

## Smart Metering



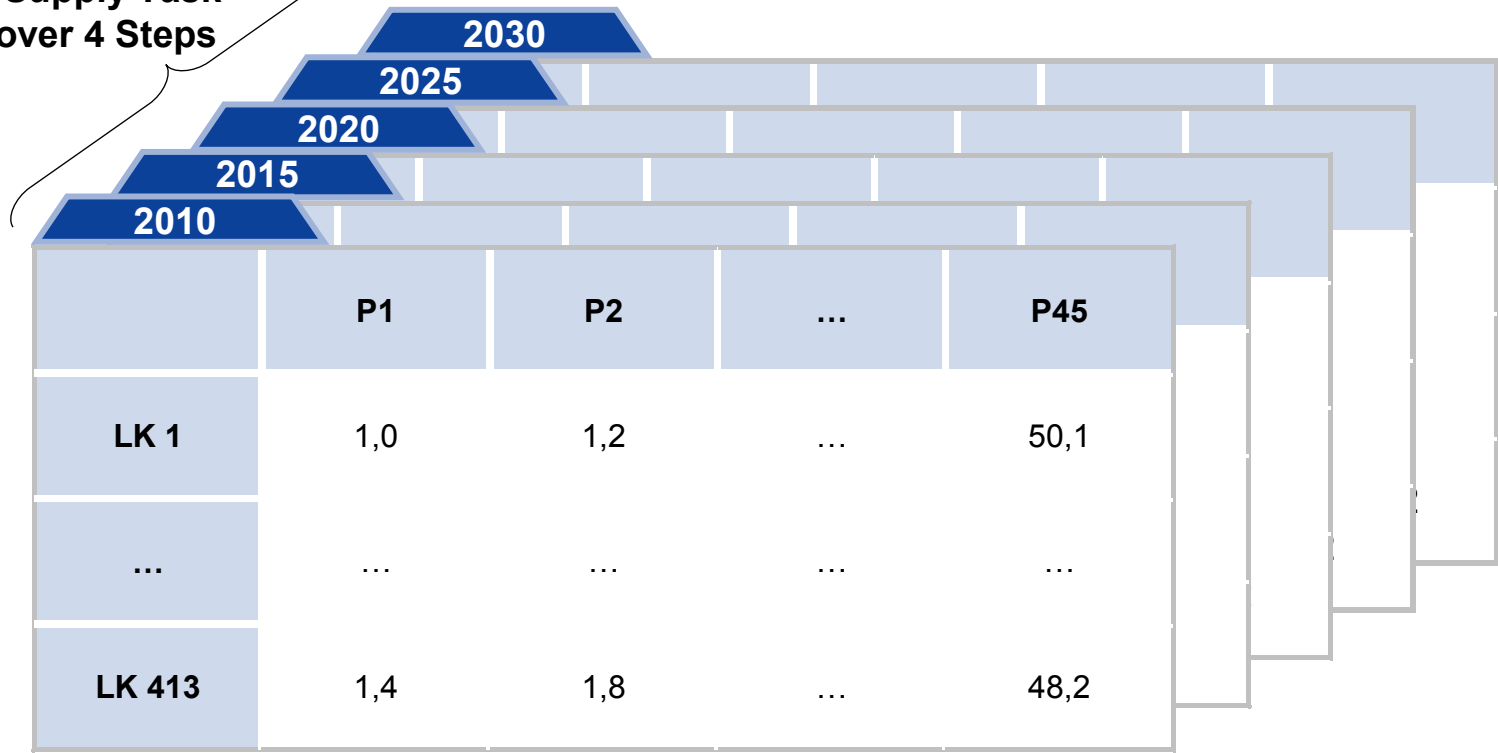
# Smart Energy World

## Smart Grids



# Description of Energy-Supply Task for 413 Administrative Districts in Germany

Current Energy-Supply Task and Prognosis over 4 Steps



413 Administrative Districts in Germany

Energy-Supply Task is defined by 45 parameter which can be sorted into 7 subgroups