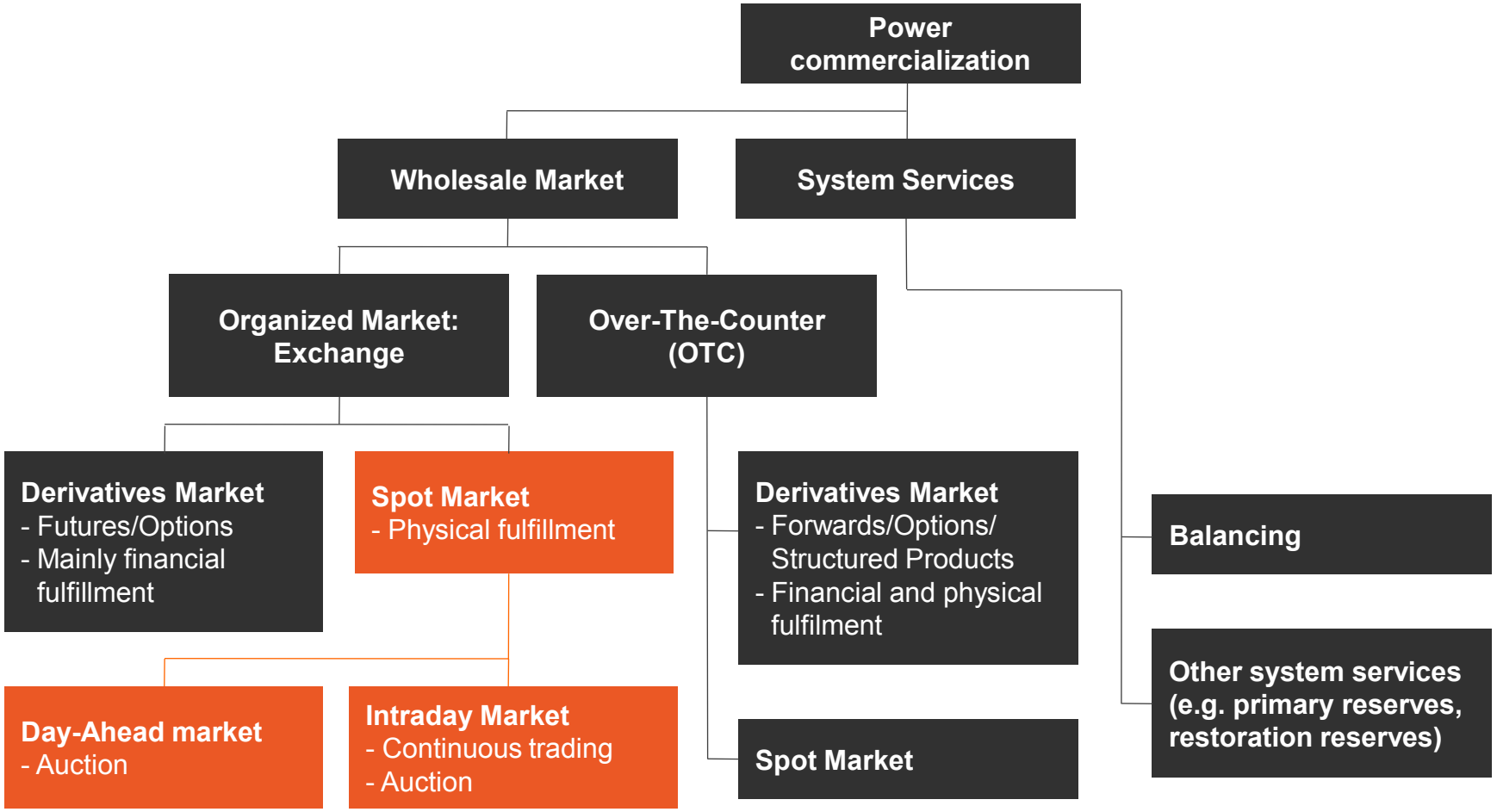
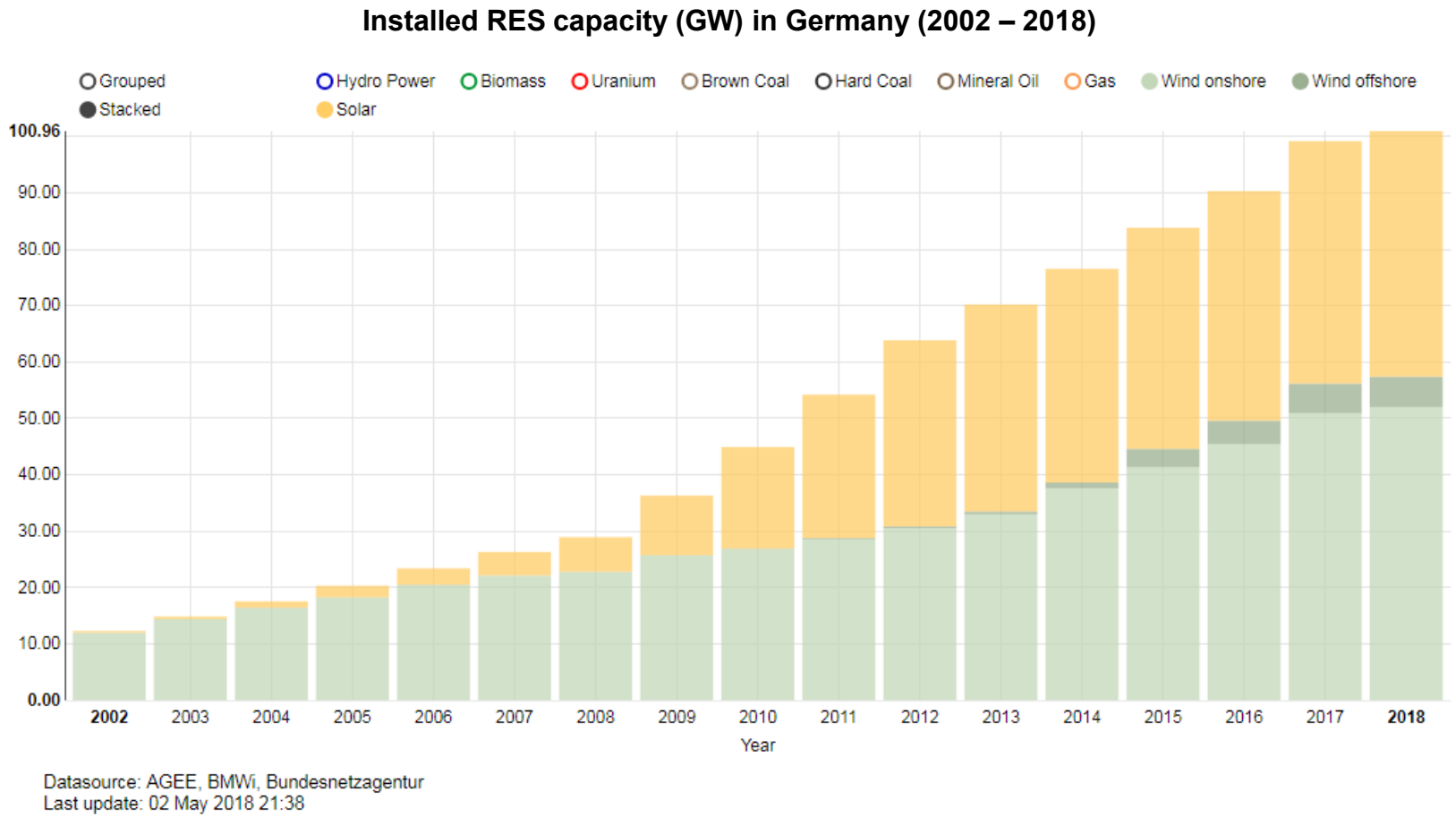
Local Flexibility Markets: Beyond the Status-quo

GSM Symposium
Luzern, 7th of July 2019

Ways of commercializing power on the European market



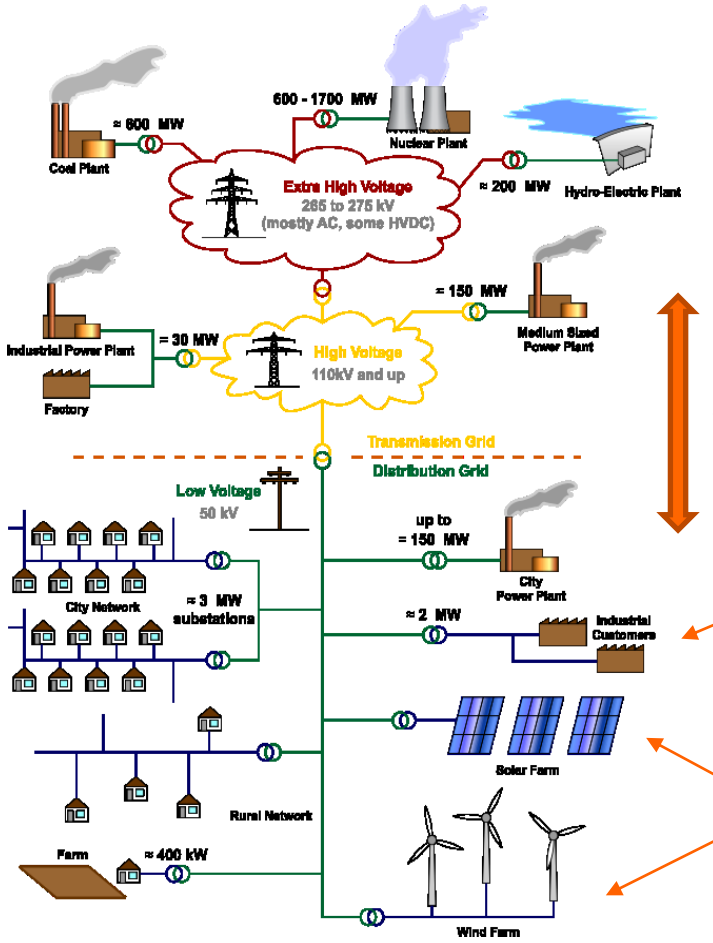
Skyrocketing intermittent RES installed capacity in Germany and other European countries



Decentralization creates a need for vertical coordination

Transmission grid
➔ Management of large-scale flexibility

Distribution grid
➔ Decentralization towards digitalized, active system management and usage of flexibility



Coordination between TSOs

Coordination across voltage levels TSO-DSO

Demand response

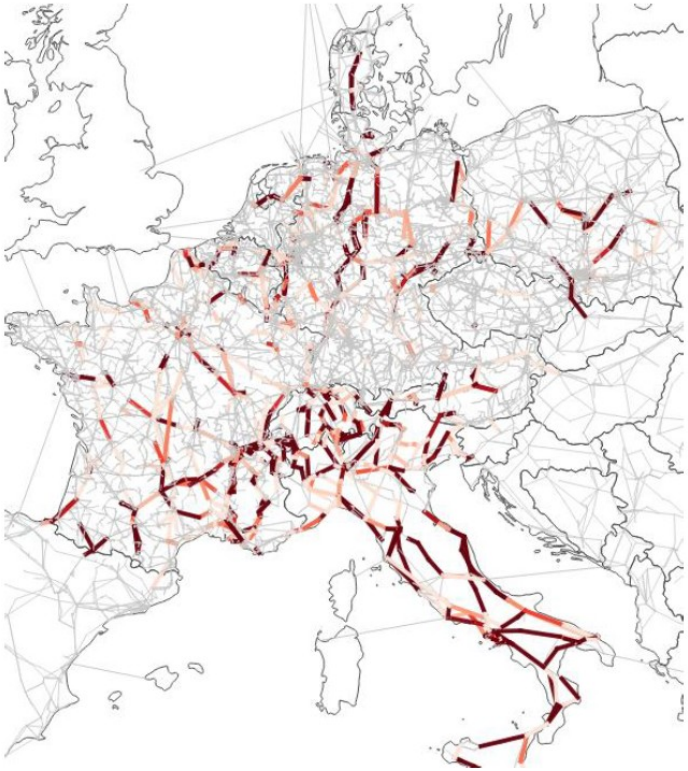
Battery storage, IoT, smart metering…

Intermittent renewables

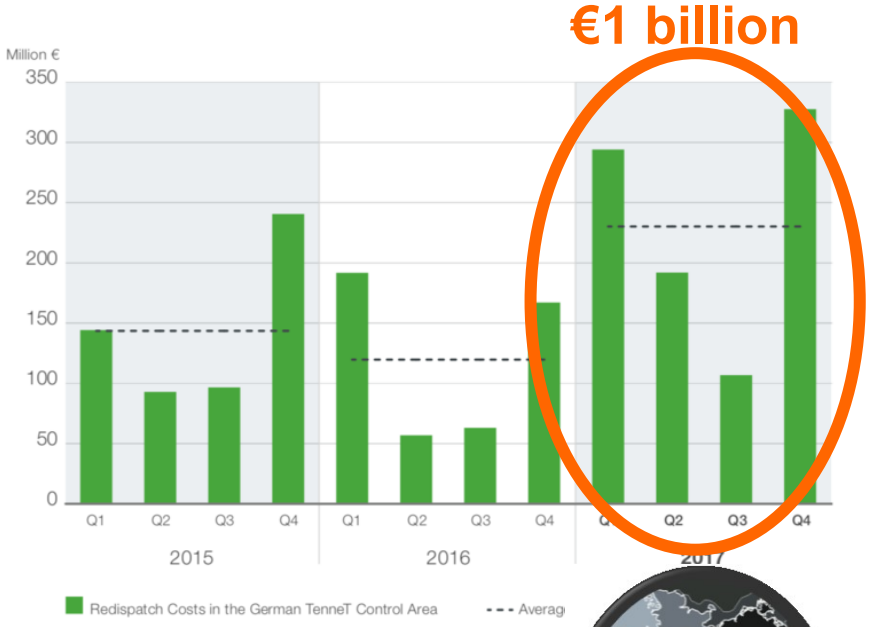
Important questions:
- How to foster the coordination between voltage levels?
- What new role for the DSOs?

Congestions are slowly appearing in Europe

Study on congestion run by the RWTH Aachen University in 2018



Redispatch costs in the TenneT control area, spreading from the North-West to the South-East of Germany, between 2015 and 2017



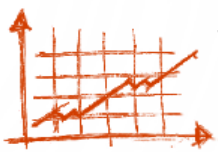
Source: ENTSO-E Transparency platform

Roles on the local flexibility market

Main principle:

➔ Opening of “on-demand” locational order books in the intraday timeframe to solve congestion issues

Certified Flexibility Providers

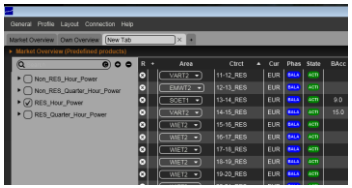


Submit flex offers

Flexibility offer from:

- Power plants
- Storage
- Renewables
- Aggregators
- VPPs

Flexibility Marketplace



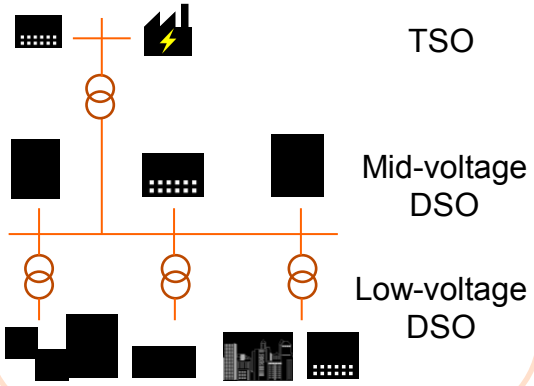
Market platform
Standards
Transparency
Coordination
Neutrality

- Defines market rules and product specifications
- Admits participants on the market
- Operates the markets by matching flexibility offers and demand from SOs continuously
- Monitors the markets

System Operators

Procure flexibility

Flexibility demand from:

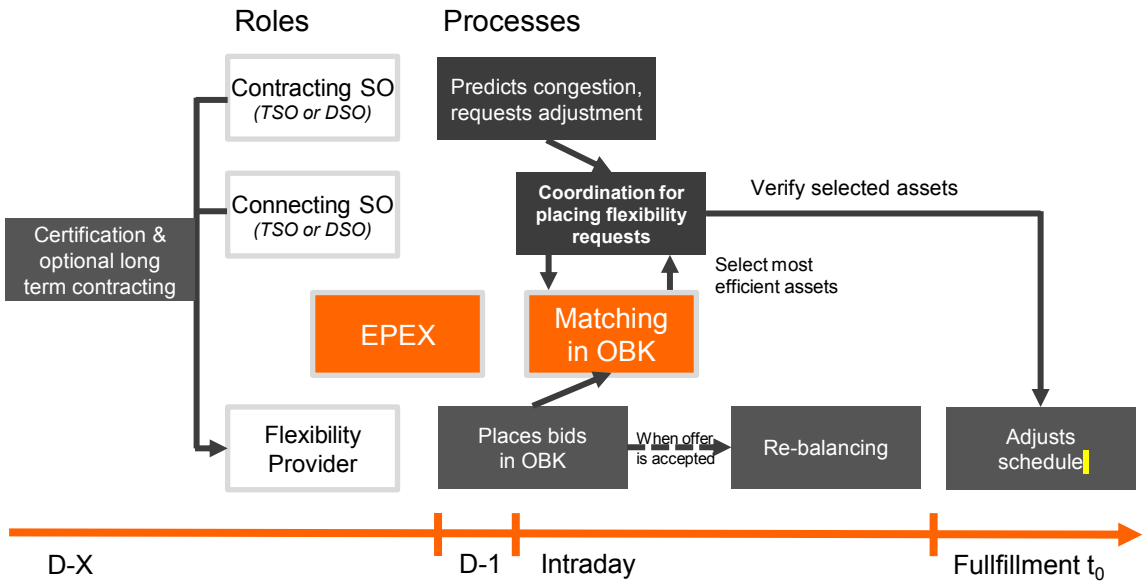


A complementary marketplace to alleviate congestions and value flexibility

The Flexibility Providers can bid the same asset on both the zonal Intraday market and a locational order book (when certified by the relevant SO for this local market area).

The Local Flexibility Market (LFM) is complementary to the zonal Intraday and the balancing markets.

New Local Flexibility Markets (congestion management)



Existing markets (Intraday and balancing)

Balancing market

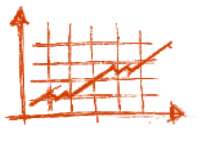
Continuous IDM

The first local trade in Germany

TradeID	RemoteTradeID	Exe Time	State	Product	Ctrct	TmZ	Qty	Prc	Cur	P/O	Phase	BOrdrID	BMbr Id	BMbr Name	BTrdr Id	BTrdr Name	Buy Area	BO/C	E
2		04.02.2019 15:25:34	ACTI	Non_RES_Hour_Pow	17-18_NRES	CET	2.0	-45.50	EUR	O	BALA	6	VWKEX	VW Kraftwerk G	TRD002	JENS MEYERH	SOE_T1		P
3		04.02.2019 15:25:41	ACTI	Non_RES_Hour_Pow	18-19_NRES	CET	2.0	-45.50	EUR	O	BALA	7	VWKEX	VW Kraftwerk G	TRD002	JENS MEYERH	SOE_T1		P

First trade on enera happened on 04/02/2019 at 15h25 with a contract for delivery on the same day at 17h00-18h00 in the market area SOET1 (Sögel)

Certified Flexibility Providers



Submit flex offers

Audi

- Disposes of a **Power-to-Gas asset** whose flexibility is marketed
- Sees the flexibility demand at an acceptable price from a system operator in the area where their plant is located
- Submits a matching flexibility offer order via the same interface

Flexibility Marketplace

epexspot

Market platform
Standards
Transparency
Coordination
Neutrality

Procure flexibility

System Operators

EWE NETZ

- **Forecasts a congestion** in a few hours due to high feed-in and therefore needs downwards flexibility to alleviate it
- Sends a flexibility demand order for 2 MW downward flexibility at – 45.50 €/MWh in the market are SOET1 for delivery from 17h00 to 18h00

2 MW have been traded at **-45.50€/MWh**. The orders are matched in the trading system and the transaction is executed. Audi now has the obligation to deliver the flexibility according to the contract specifications. These specifications are part of characteristics of the traded product and have been pre-determined. Based on this trade, Audi will increase their consumption at a given time and at the chosen location. The resulting BRP imbalance has to be closed on the intraday. This localized physical impact allows EWE NETZ to alleviate a congestion before it occurs in a safe and competitive way.

Enera 1.0

which members are participating ?

- **Already admitted**
  - EWE Netz (SO)
  - EWE Trading (CFP)
  - Volkswagen (CFP)
  - Statkraft (CFP)
  - Baywa Re (CFP)
  - Tennet (SO)
  - Quadra Energy (CFP)
  - Alpiq (CFP)

- **Admission process on going**
  - Avacon (SO)

- + Other 2 other asset owners in the membership process

Next steps: enera target model

- The areas of improvement can be organized in three categories, that will be studied by the Design WG:

1. Direct enhancements to the trading platform

The direct enhancements to the trading platform or associated systems correspond to changes or adaptations of the enera 1.0 Flex Trading Platform that do not require extensive conceptual design work.

This can include:

- New products (blocks…)
- Product cross-matching
- Adaptations of the order books based on the feedback on enera 1.0
- Clearing mechanism or automated payment
- Trading results publication
- …

2. Coordination between System Operators

The coordination between System Operators is key to the efficiency of the flexibility activations and usage.

To implement it properly, an extensive design work will be needed to define the relevant processes, information and tools to be developed.

Such a design work should be done in close collaboration with the different system operators with the organization of workshops.

3. Grid constraints integration

Grid constraints and parameters that have so far been identified are twofold:
- Capacities in line / transformers
- Sensitivities

These have different impacts and effects on the efficiency of the FTP and the coordination between System Operators.

These effects need to be studied and analyzed deeply in order to design the right systems to take them into account in the FTP and the Coordination mechanisms.

Feedback from UserGroup

High degree of interaction/dependency

Appendix

The enera project

The challenge

- **The increasing share of installed renewable capacity is creating new challenges for system operators to manage the grid efficiently and economically**

The enera Project

- **The German ministry of Economic Affairs and Energy is funding the enera project to explore new smart market mechanism to allow for more renewable energies in the future part of the SINTEG funding programme.**
- **The 3 pillars of the project are: Network, Market and Data**

The partners

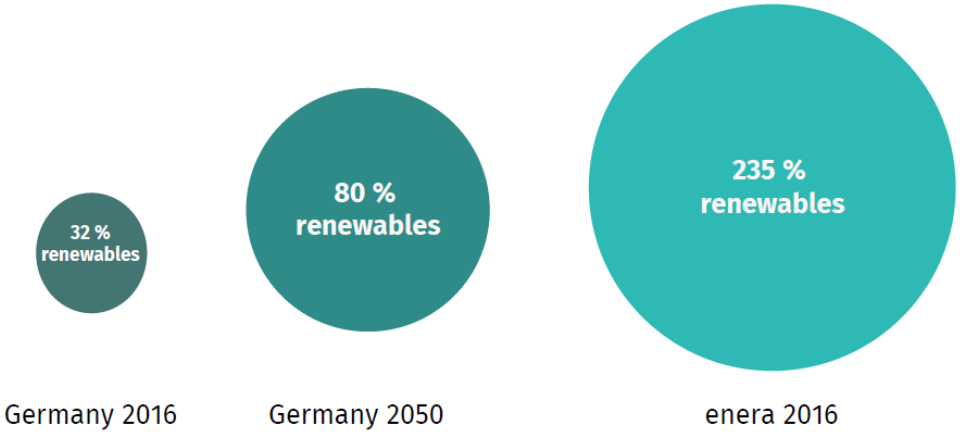
Pilot project involving EPEX SPOT as Marketplace for flexibility

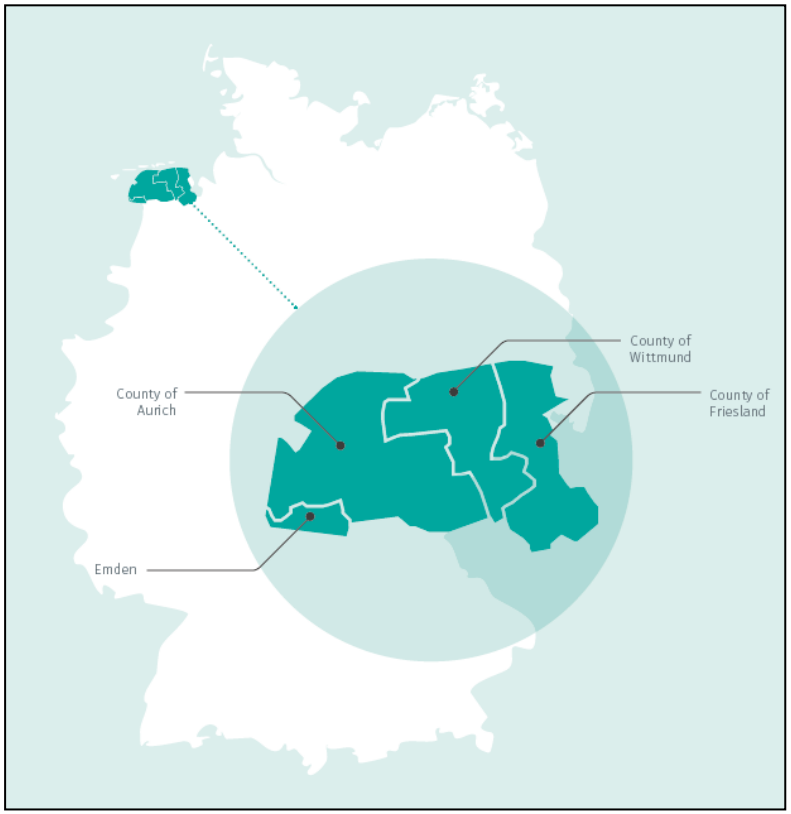
➔ **Real case application of Local Flexibility Market concept**

enera region: A significant wind production

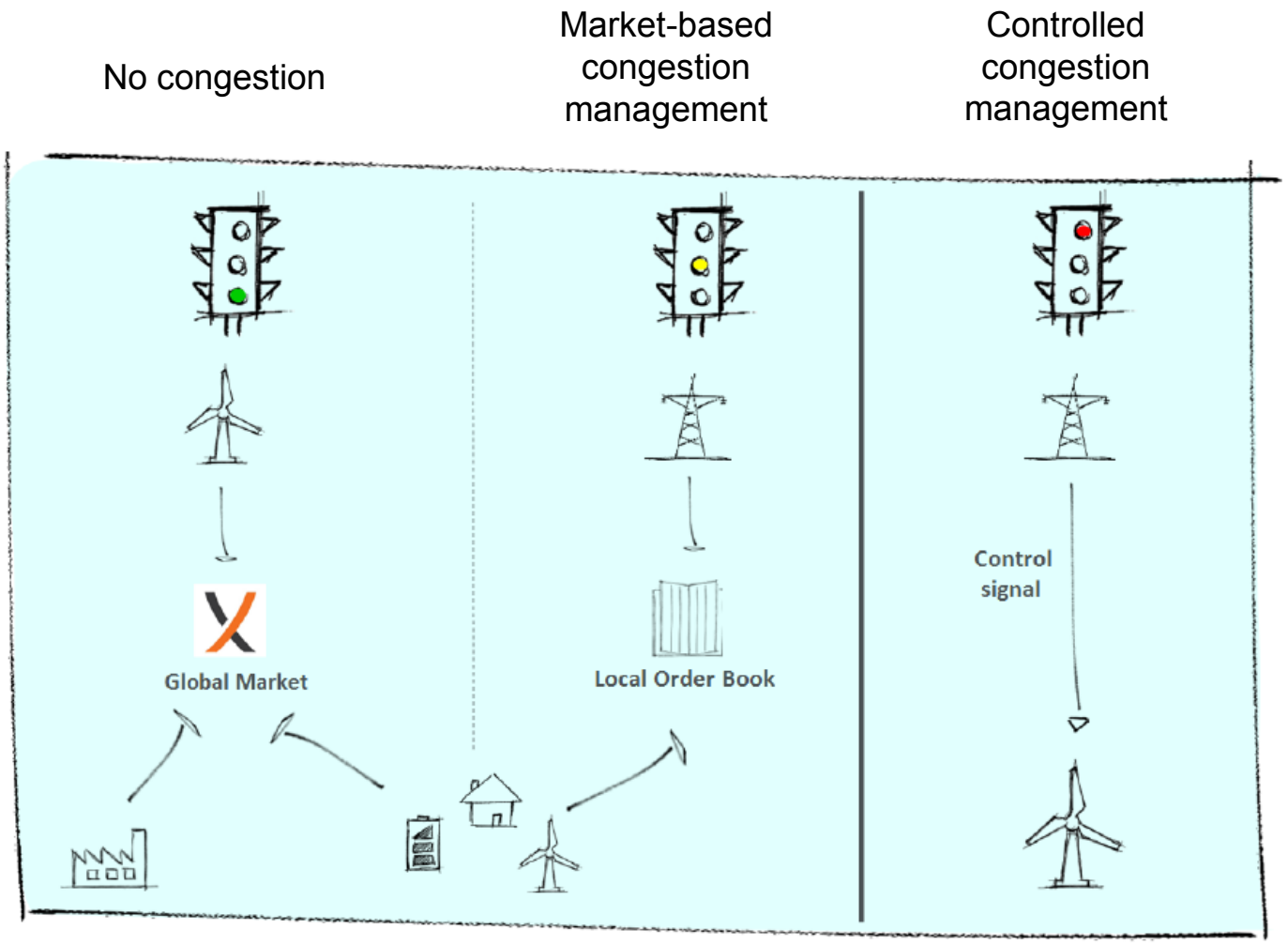
The Region

- **Counties of Aurich, Friesland & Wittmund**
- **390.000 inhabitants**
- **200.000 households**



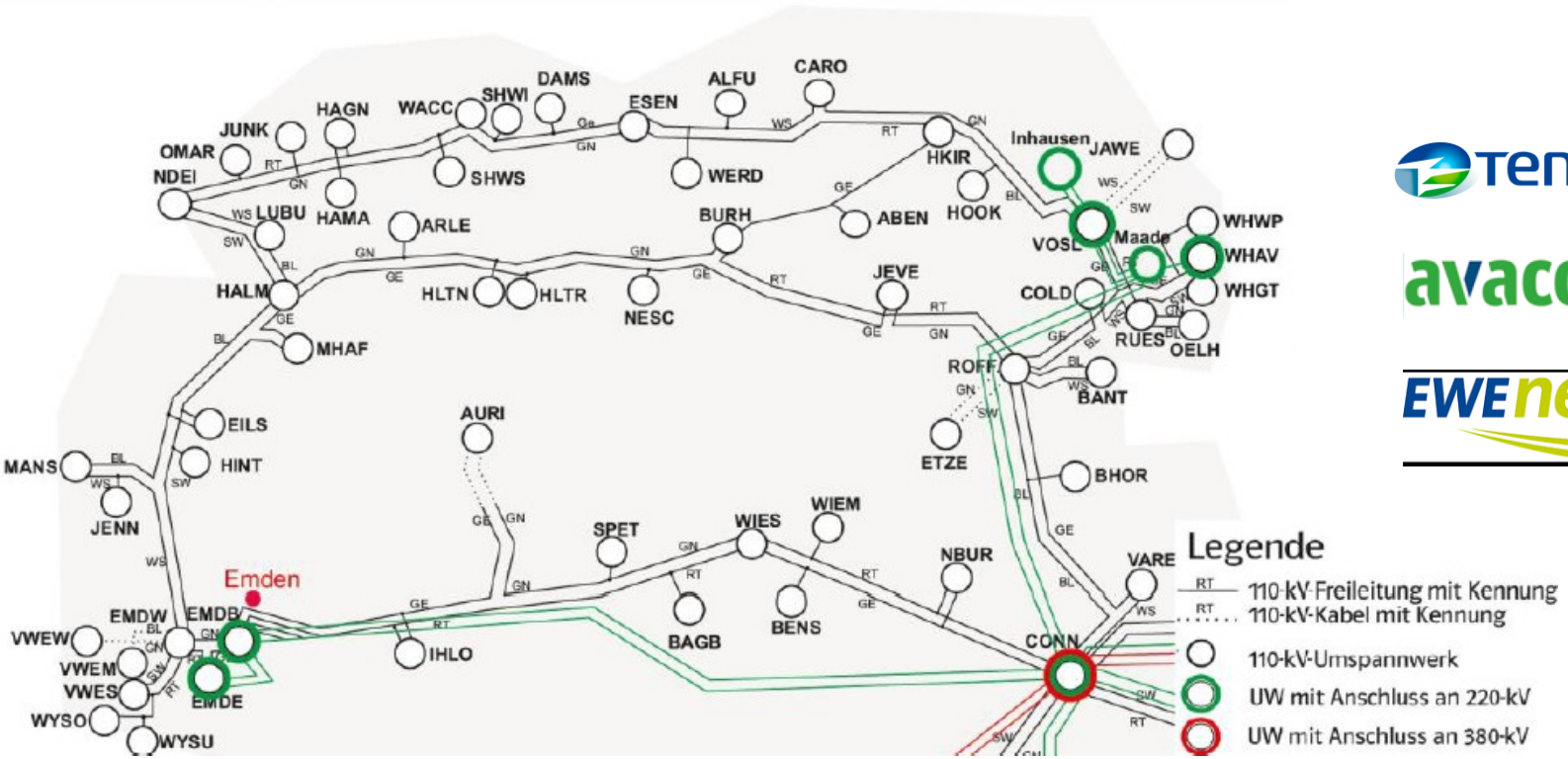


The process



Source: enera

Physical grid bottlenecks appear in the region on three SO grids



Enera 1.0

which contracts and products ?

Attribute	Description
Trading procedure	Continuous trading
Trading period	24/7
Tradable products	<table><tr><th>Product Name</th><th>Delivery Period</th><th>Comment</th></tr><tr><td>RES_Hour_Power</td><td>One hour</td><td>Flexibility from Renewable Energy Source</td></tr><tr><td>RES_Quarter_ Hour_Power</td><td>15 minutes</td><td>Flexibility from Renewable Energy Source</td></tr><tr><td>Non_RES_Hour_Power</td><td>One Hour</td><td>Flexibility not from a Renewable Energy Source</td></tr><tr><td>Non_RES_Quarter_ Hour_Power</td><td>15 minutes</td><td>Flexibility not from a Renewable Energy Source</td></tr></table>
Gate opening	Trading will open on the day before delivery at 15:00
Gate closing	5 minutes before delivery start
Minimum price increment	0.1 €/MWh
Minimum price	RES products: - 9999.9 €/MWh Non_RES products: -50 €/MWh
Maximum price	RES products: + 9999.9 €/MWh Non_RES products: + 9999.9 €/MWh
Minimum volume increment	0.1 MW
Trading phase	During trading the market will be in Balancing Trading phase. During this phase regular orders can only match with balancing orders.
Available order types	Limit orders & iceberg orders Balancing orders.
Available execution conditions	None, IOC (Immediate-or-cancel), FOK (Fill-or-kill)
Available validity restrictions	Good for session, Good till date