

Digitalisation and system integration

International perspectives on renewables, trading, VPPs and decentralisation.

Power System Flexibility Campaign & 3DEN Joint Expert Webinar
Strategies for Digitalisation of Electricity Systems (25 February 2021)

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Our Virtual Power Plant

"In 2009, we started with our vision of a Virtual Power Plant. Today, we operate one of the largest Virtual Power Plants in the world."

Jochen Schwill & Hendrik Sämisch
(Founders & CEOs)

Aggregated Power: **9 700 MW**

Aggregated Assets: **10 000**

Providing services to: **8 system operators**



Our clients

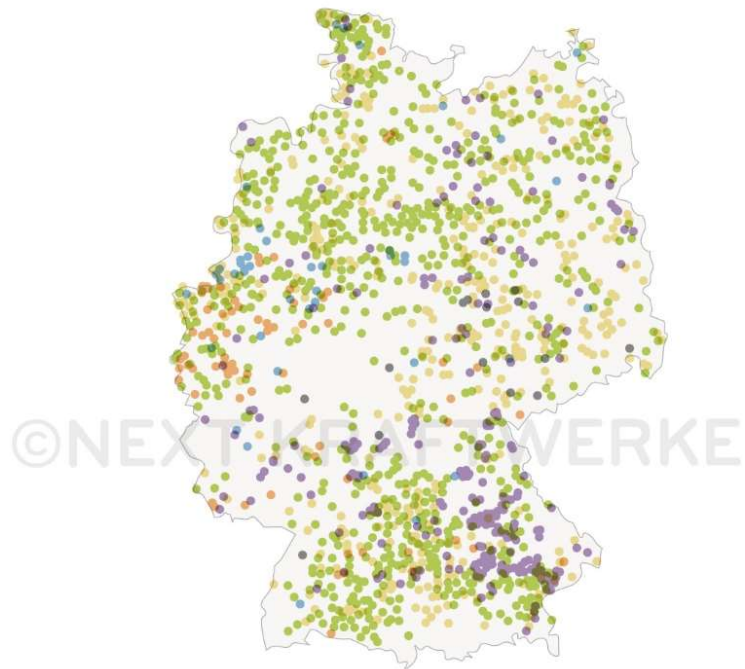
Independent power producers in 8 European countries



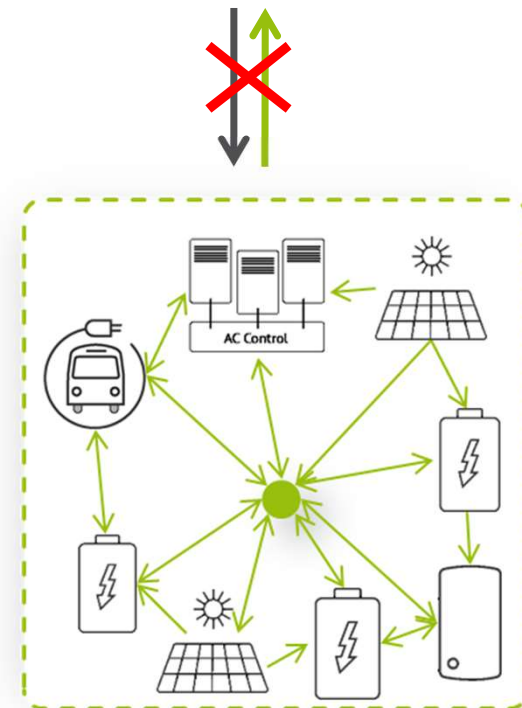
Virtual Power Plant vs. Microgrid

Different goals and legacy systems ask for different setups

Virtual Power Plant

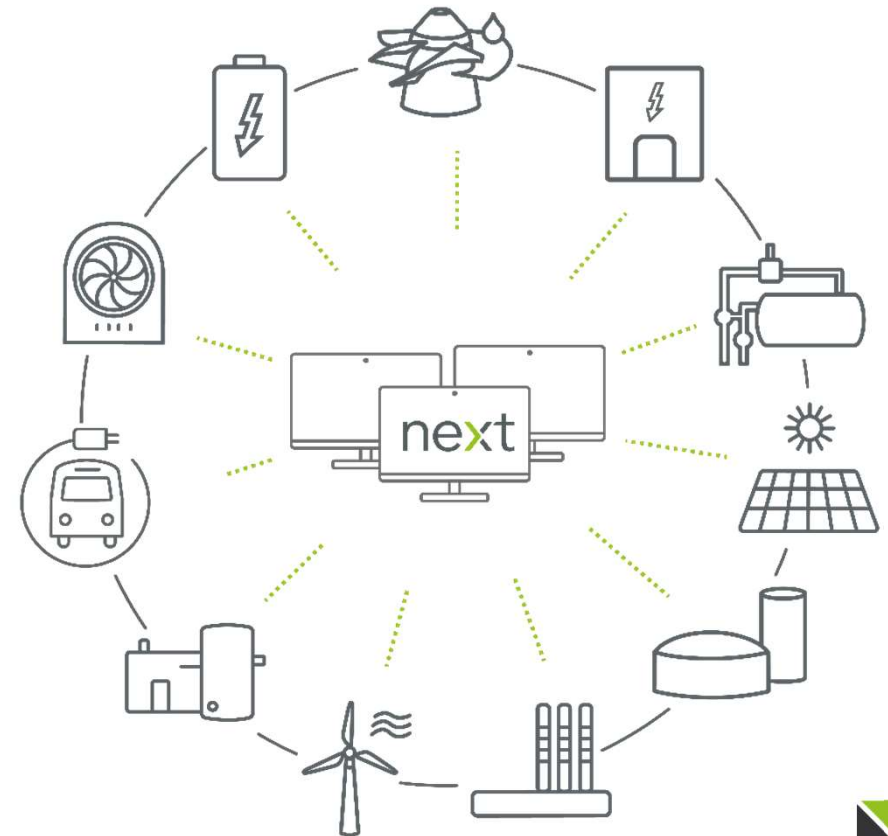
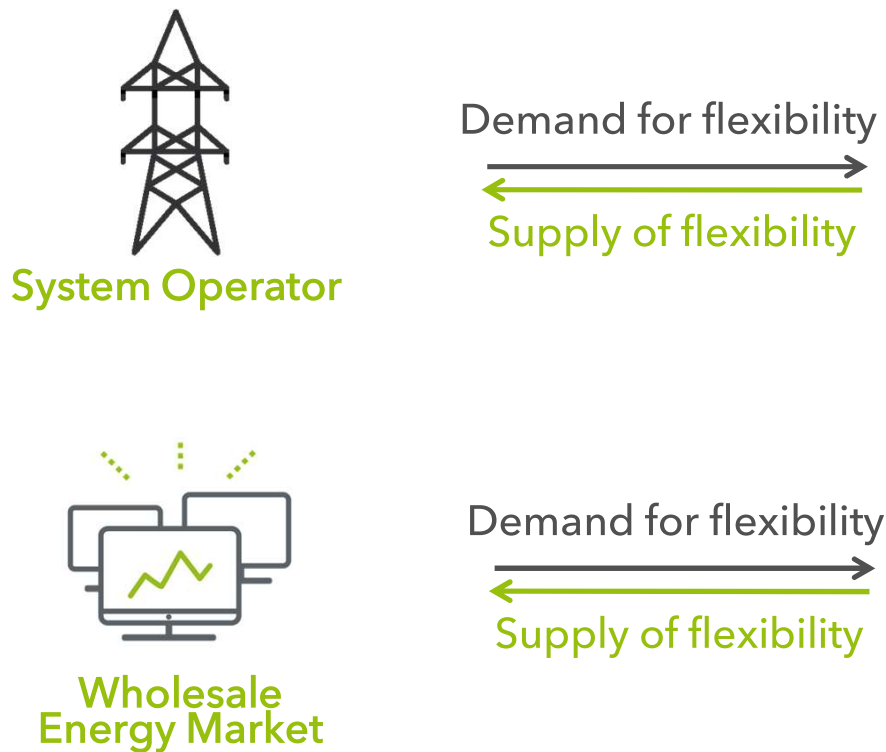


Microgrid



VPPs unlock flexibility of VRE and DER

How can we monetise this flexibility?



When is flexibility really valued?



Market designs encouraging flexibility

Snapshot of market designs for January 2021

Condition	Germany		Austria		Poland		Italy	
Electricity market is liberalised	✓		✓		✓		✓	
Many buyers and sellers shape the price in a free, transparent market	✓		✓		✓		✓	
High or relatively high penetration of renewables*	~40%		~57%		~15%		~40%	
Wholesale electricity price changes every hour or 15 minutes	✓	DA - 1 hour ID - 15 minutes	✓	DA - 1 hour ID - 15 minutes	✓	DA - 1 hour ID - 1 hour	✓	DA - 1 hour ID - 15 minutes
Renewables are a subject to variable remuneration	✓	Feed-in-Premium or out of subsidy	✓	Feed-in-Premium or out of subsidy	✓	Feed-in-Premium, rarely Feed-in-Tariff	✓	Feed-in-Premium, rarely Feed-in-Tariff
Renewables are responsible for their own imbalance	✓		✓		✓		✓	
Liquid Intra-Day Market	✓		✓		✓		✓	
Energy-Only-Market	✓		✓		✗		✗	
Existence of negative prices	✓	‘6-hour-rule’	✓		✗		✓	Rare occurrence
Decentralised generation or DR allowed to deliver ancillary services	✓	3 product categories	✓	3 product categories	Limited participation, from 1 MW behind certain node		Pilot projects	

*Source: Our World in Data based on BP Statistical Review of World Energy & Ember (2021)



How does a VPP deliver flexibility and provide quantified value?



Technology can only support business cases



Renewables live monitoring & forecasting

Improve your trading through forecasting based on live data



Asset Dispatch & Control

Control decentral assets through schedules based on wholesale market prices



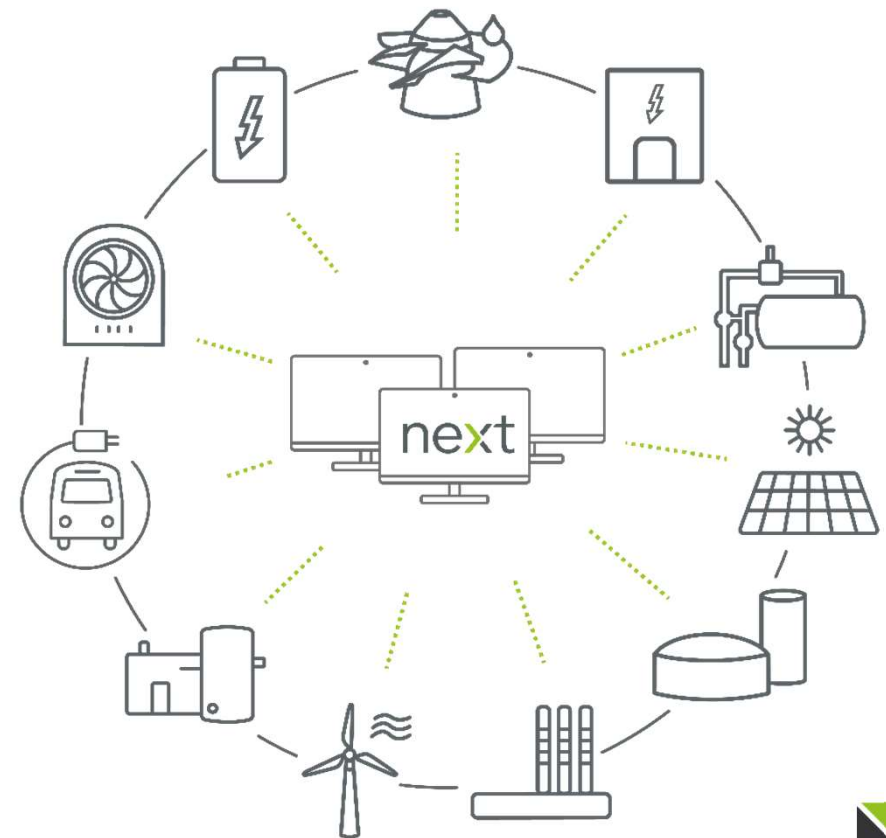
Demand Response

Triggering demand-side flexibility for grid support & additional revenue



Balancing Services

Provide ancillary services to grid operators



Thank you for your attention!



Contact

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