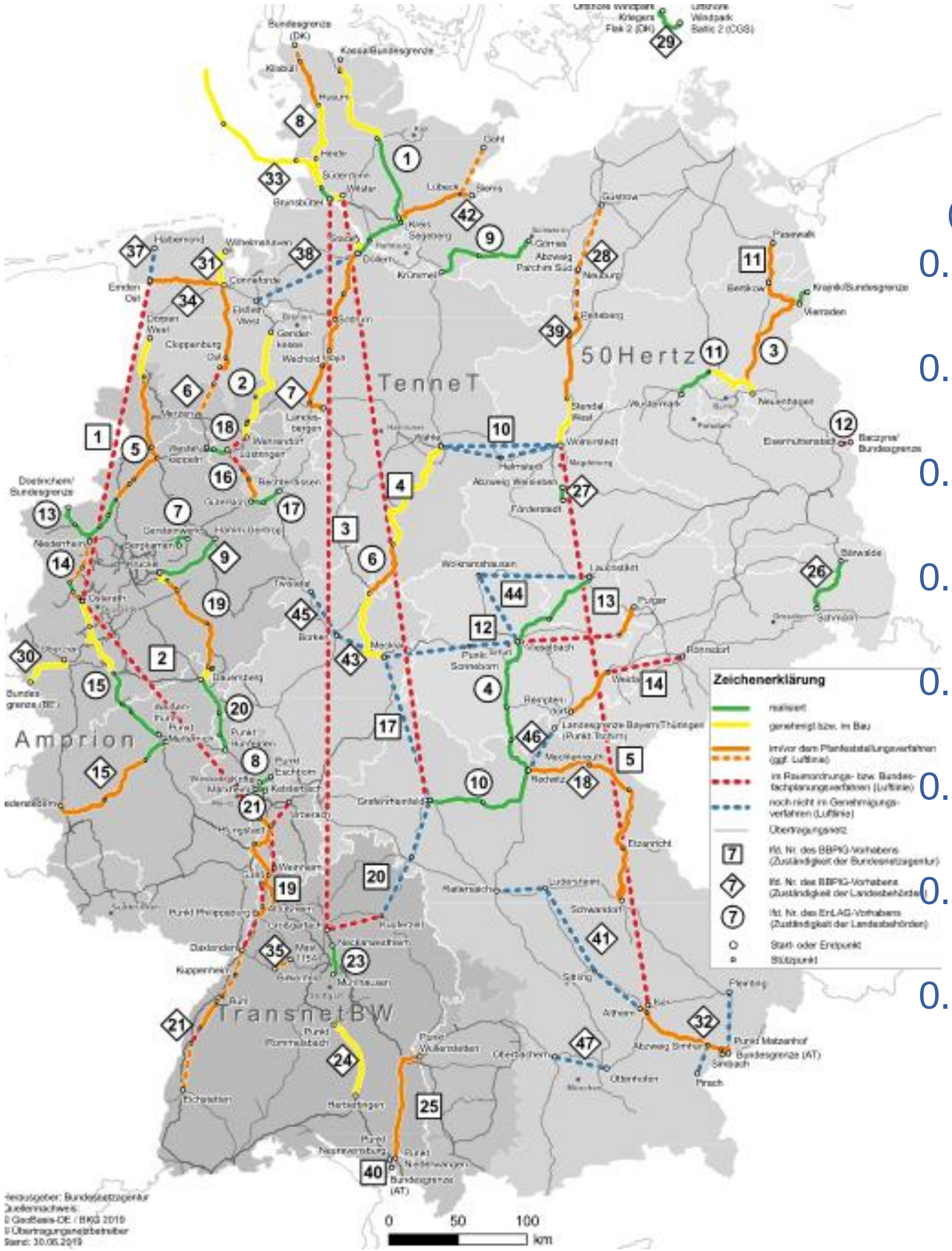
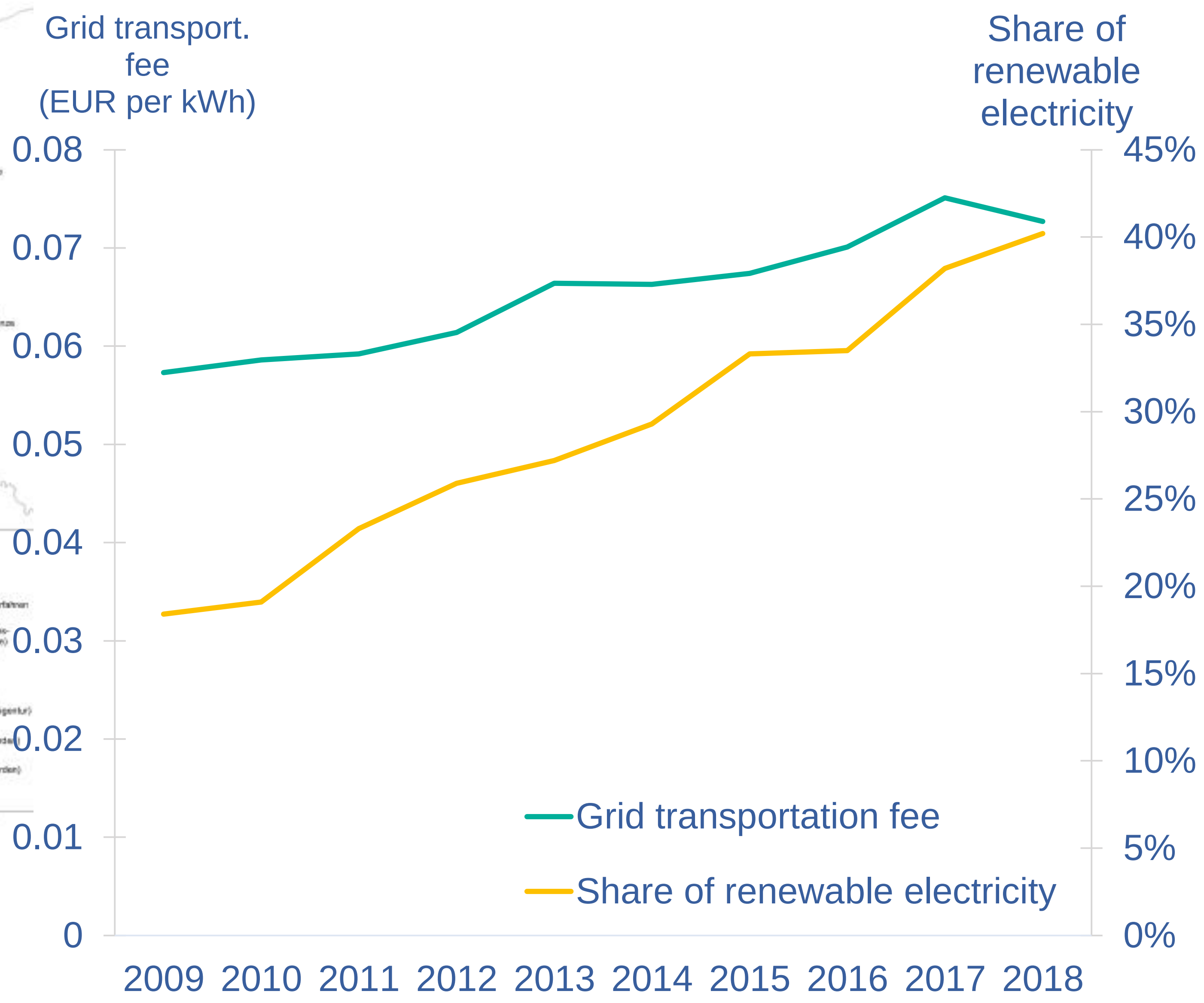
Digital technology to enable the energy transition

Dr Arij van Berkel


TenneT
50Hertz
Amprion
TransnetBW
Zeichenerklärung

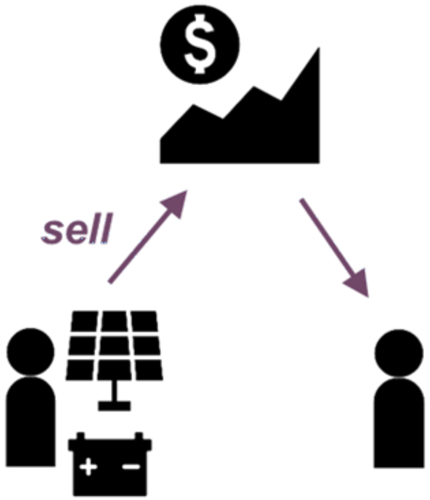

Grid transport. fee (EUR per kWh)
Share of renewable electricity
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
45%
40%
35%
30%
25%
20%
15%
10%
5%
0%
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
Grid transportation fee
Share of renewable electricity

Uncover Invisible Insights	**Upskill Humans**
Predict the Future	**Make Information Accessible**
Optimize	**Automate**

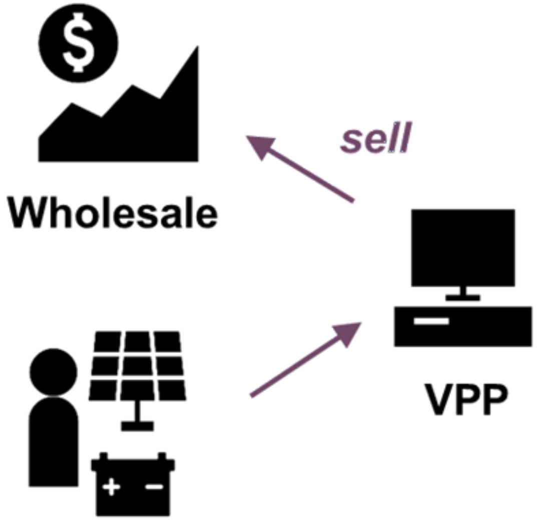
USE CASE EXAMPLES	CORE CAPABILITIES ENABLED BY DIGITAL TRANSFORMATION						IMPORTANCE TO THE ENERGY TRANSITION
	Uncover Invisible Insights	Predict the Future	Optimize	Upskill Humans	Automate	Make Information Accessible	
Planning & Design							
Wind farm layout optimization							Moderate
Renewables production forecasting							**High**
Distribution system simulation and modeling							Moderate
Operations							
Robotic inspection of PV and wind							Moderate
Active network management							**High**
PV tracking optimization							Moderate
PdM for grid infrastructure							Low
Customer Engagement							
Home energy monitoring							Low
P2P energy trading							**High**
Energy preferences in P2P energy trading							Low

P2P Energy Trading

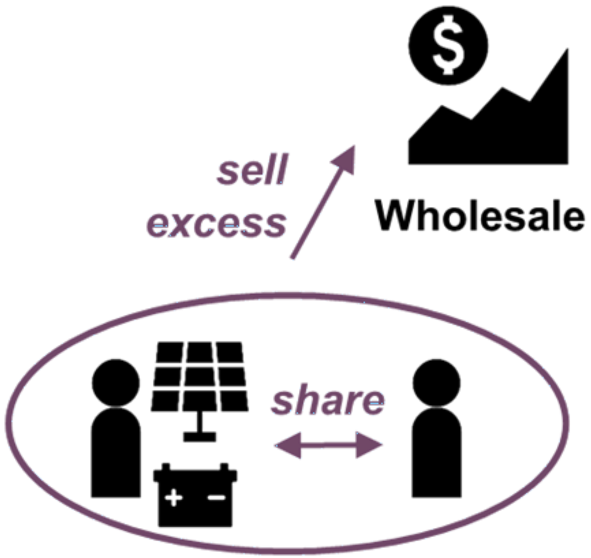
DER Market



Virtual Power Plant

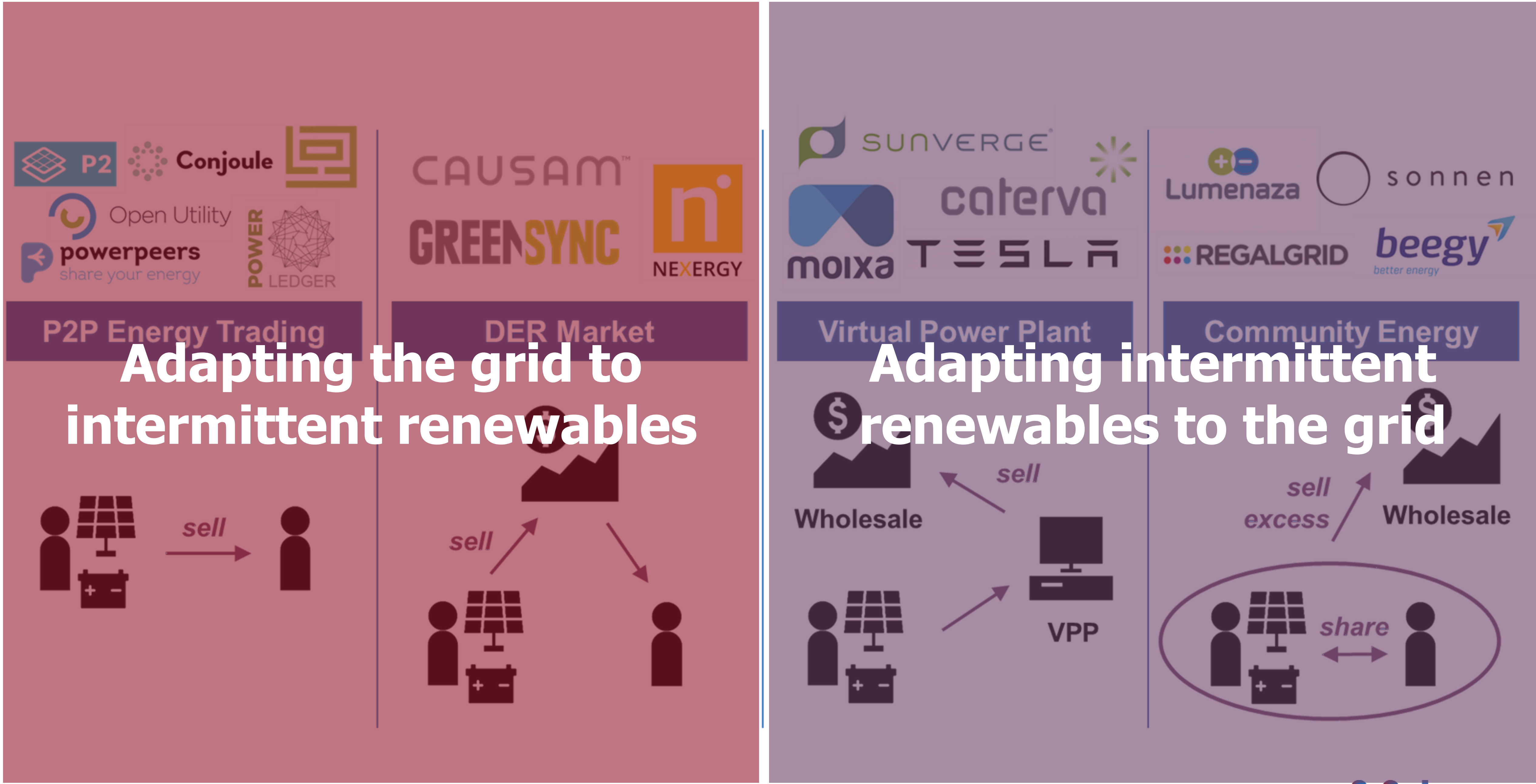


Community Energy



Source: Lux Research, *Selling from Behind the Meter: Making Sense of Community and Peer-to-Peer Markets for Distributed Energy Trading*, August 2017

Icons from Noun Project Noun Project (Creative Stall, Rockicon, Icon Island)

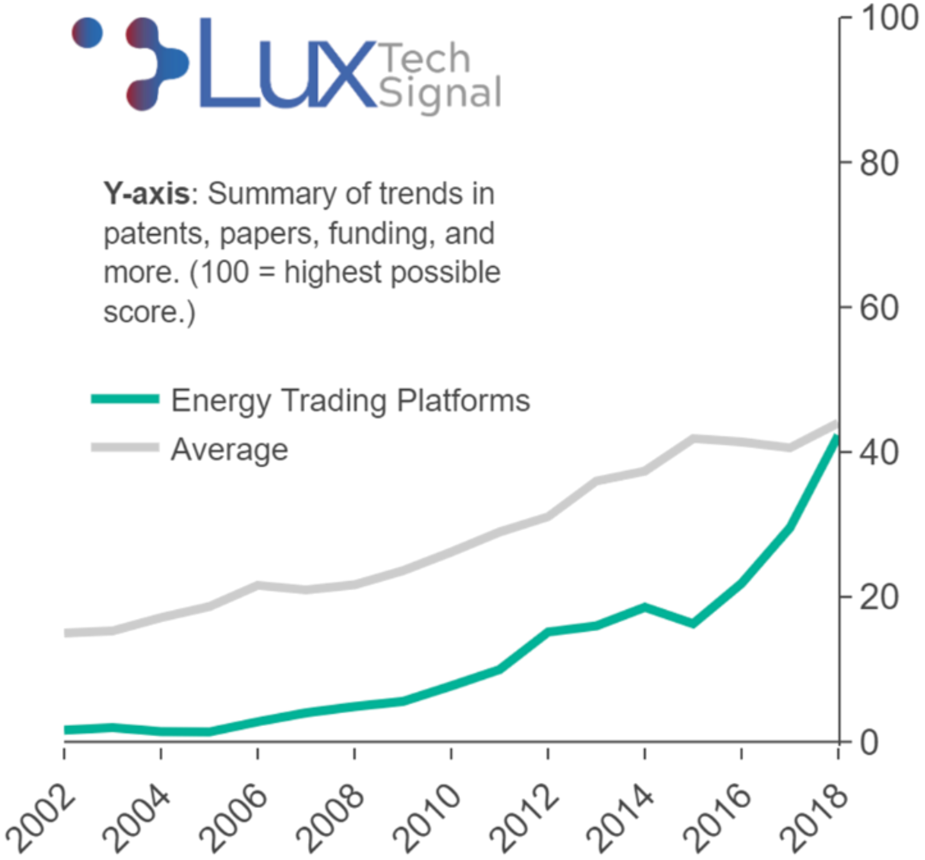


Adapting the grid to intermittent renewables

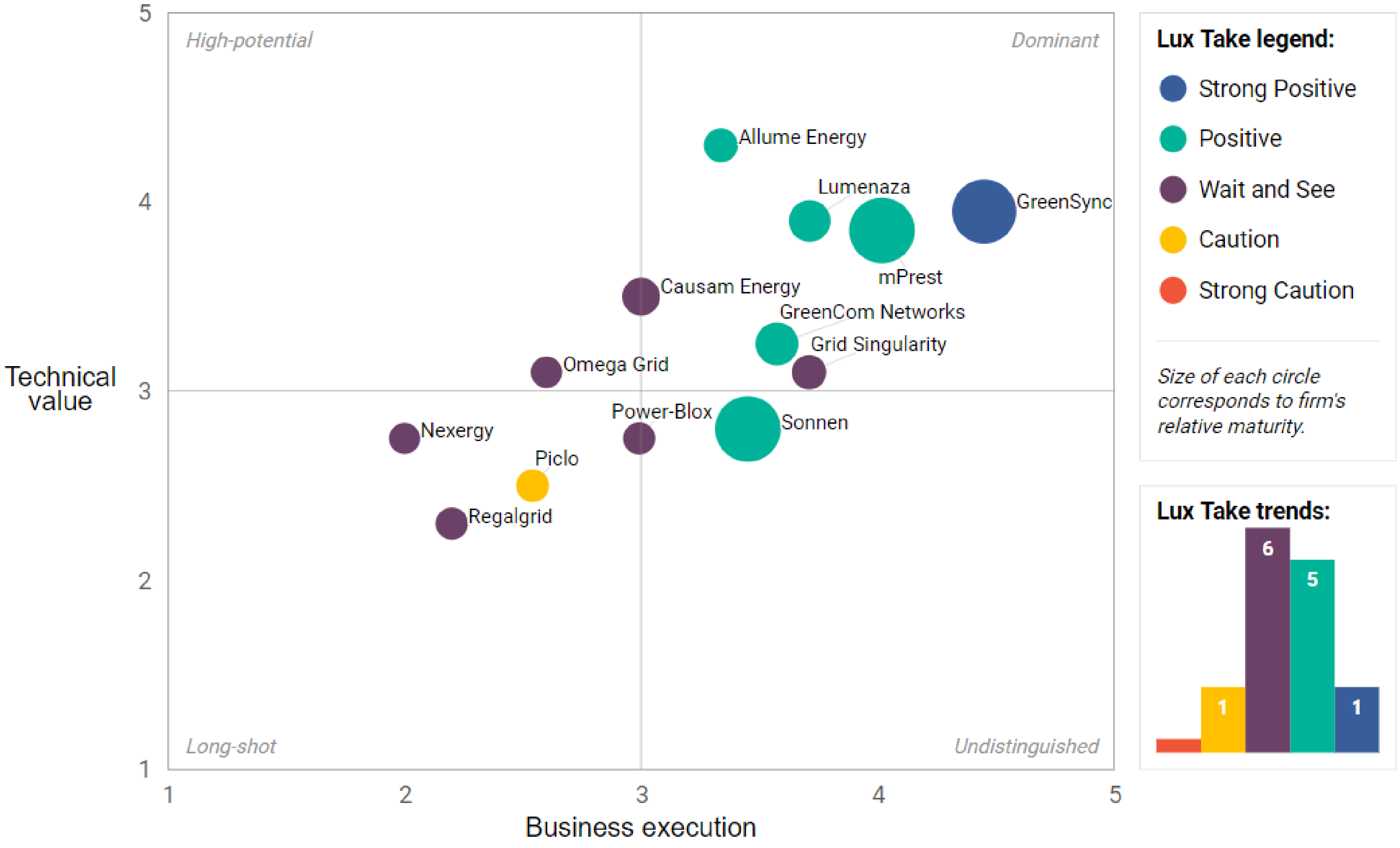
Adapting intermittent renewables to the grid

Source: Lux Research, *Selling from Behind the Meter: Making Sense of Community and Peer-to-Peer Markets for Distributed Energy Trading*, August 2017

Icons from Noun Project Noun Project (Creative Stall, Rockicon, Icon Island)



Lux Tech Signal
Y-axis: Summary of trends in patents, papers, funding, and more. (100 = highest possible score.)
Energy Trading Platforms
Average
100
80
60
40
20
0
2002
2004
2006
2008
2010
2012
2014
2016
2018



Technical value
Business execution
High-potential
Dominant
Long-shot
Undistinguished
Allume Energy
Lumenaza
GreenSync
mPrest
Causam Energy
GreenCom Networks
Grid Singularity
Omega Grid
Power-Blox
Sonnen
Nexergy
Piclo
Regalgrid
Lux Take legend:
Strong Positive
Positive
Wait and See
Caution
Strong Caution
Size of each circle corresponds to firm's relative maturity.
Lux Take trends:
6
5
1
1

Jessica Hernandez
Future Grid More...
March 20, 2019 | Edit

Average importance

Vattenfall acquires energy trading software developer Senfal

Vattenfall acquired a 100% stake in Senfal, a developer of energy trading software powered by artificial intelligence aiming to service industr optimizing the flexibility participation. With the st interested in tools to hel developers that can leve benefit grid operators as

For the original news arti

Acquisition

Jessica Hernandez
Future Grid More...
February 13, 2019 | Edit

Equinor acquires energy trading company

Equinor finalized the acquisition of Danish power and gas trading company Danske Commodities Equinor will leverage DC's footprint, which spans 37 European countries, and the company's expe optimization of energy flows to manage Equinor's renewable assets. Similarly to other oil and ga interest will continue to expand outside the oil and gas space as it prepares itself to become mor solutions provider with a larger renewables portfolio, which will include not only wind power asse

Max Halik
Future Grid More...
September 6, 2018 | Edit

Average importance

Power Ledger begins first Asian trial of peer-to-peer energy marketplace

Power Ledger recently announced that it set up a peer-to-peer (P2P) energy trading marketplace in Bangkok, allowing electricity from solar modules rated for 635 kW to be traded within a group of businesses and apartments. In order to enable this pilot – one of the first of its kind in Asia – the startup partnered with Bangkok's municipal utility. As is common with energy trading schemes, bringing the right stakeholders onboard is crucial for success. Power Ledger claims 31 other projects lined up, but with a total capacity of only 2 MW, and expansion into other regions of SE Asia will be slow. Clients should take this announcement cautiously; it might be an indicator of P2P potential in Asia, but the market is still at early stages.

For the original news article, click here .

Project

Further reading from Lux Research: Power Ledger, Metropolitan Electricity Authority

Max Halik
Energy Storage More...
December 10, 2018 | Edit

Very important

LO3 Energy announces partnership with eMotorWerks/E allow energy trading for EVs and microgrids

eMotorWerks and LO3 recently announced a partnership to integrate the latter's Exergy platform JuiceNet EV charging platform. An initial project will allow owners of electric vehicles to purchas microgrids; Exergy will manage the price signals and peer-to-peer matching, while JuiceNet will c systems involved. This is a predictable move from eMotorWerks as part of the Enel X brand, whic management services to Enel's customers. At larger scale, this could mean reduced electricity c customers charging their vehicles and better payments for microgrid operators compared to fee situation for customer engagement and savings. For the original news article, click here .

Partnership

Further reading from Lux Research: Enel, eM

Jessica Hernandez
Future Grid More...
November 23, 2018 | Edit

Very important

Tepco Frontier Partners invests in peer-to-peer energy trading and online electricity marketplace platform developer Electrify

Tepco's strategic investment comes right after the alpha test of Electrify's energy trading platform, called Synergy. Electrify is targeting Singapore initially, but it plans to expand to other countries afterward, including Japan; a collaboration opportunity with Tepco will put Electrify's plan on the right track. Today, Electrify is taking advantage of Singapore's new open energy market to help citizens navigate the available energy retail options; after the launch of Synergy (planned for early 2019), consumers will also be able to purchase electricity from peers (electricity prosumers). Other Asian countries following the energy liberalization trend are likely to look at Singapore to shape their own future open energy markets.

For the original news article, click here .

Investment Strategy

Further reading from Lux Research: Electrify, Tepco Frontier Partners

Lux Research

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