

# Energy Storage Trends in Europe

How Batteries Enable Clean Energy Today

13.01.2021, Dr. Kai-Philipp Kairies

# About The Speaker

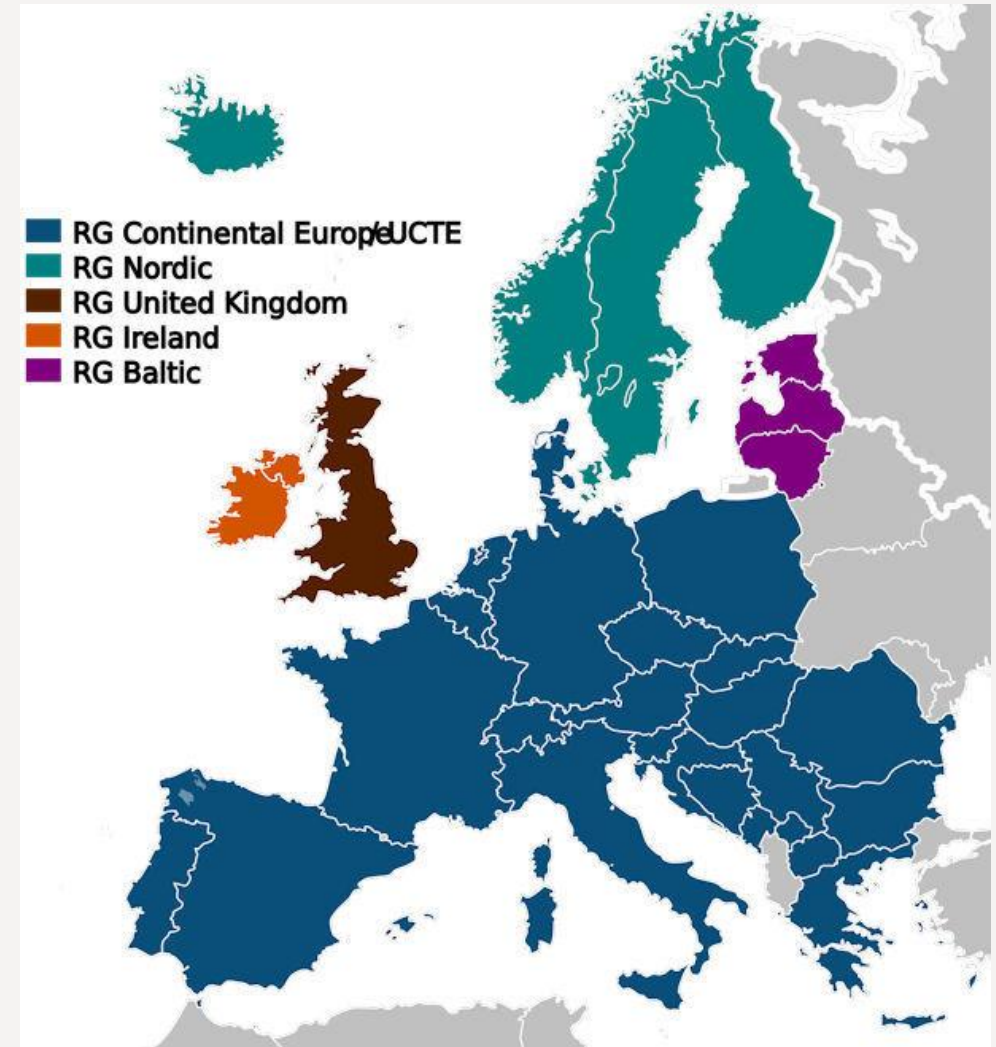


**Dr. Kai-Philipp Kairies**

- 2012 Developed micro grid batteries in Singapore
- 2013 Storage system consultant to German government
- 2016 Head of battery storage research group stationary (Aachen University)
- 2017 Lead analyst storage systems IRENA
- 2018 Scholar at University of California, Los Angeles
- 2020 Founder and CEO of ACCURE Battery Intelligence

# The European Electricity Grid

- Highly interconnected and robust
  - Germany: Less than 15 min blackout per person per year
  - Backup power is not a major reason for storage adoption
- 2030 goal: 65% renewable energy in the electricity sector
  - Predominantly wind power in the north
  - Predominantly solar power in the south



# A clean energy future needs new flexibilities

Security of supply vs. volatile generation







**Power grids**

offer spatial flexibility

# Storage systems

offer temporal flexibility





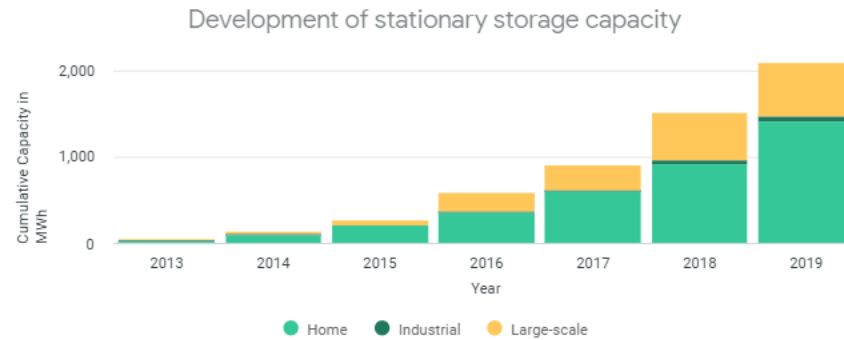


## Market and technology development of battery storage systems in Germany - Status 2020 -

Battery storage systems are a key enabler of clean energy. Since 2013 the market for stationary storage has been growing steadily. By the end of 2019, over 2.1 GWh of battery storage systems were already installed in Germany.

In order to track this rapidly changing market, researcher from JARA Energy collect data on stationary battery storage systems in Germany. The latest results were published in their paper that was updated recently under the title "The development of stationary battery storage systems in Germany - status 2020, Figgene et al., 2020".

The contributing institutions were the Chair of Electrochemical Energy Conversion and Storage Systems (ISEA) of RWTH Aachen University and the FZ Jülich-IEK3 section. ACCURE visualizes the published data in interactive graphics to allow for individual presentation requests, which are welcome be used freely, provided the ACCURE website and the paper are mentioned properly.



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ACCURE design according to Figgene et al.



**>1,400 MWh installed**

**Home storage market**

More than 100,000 systems with a storage capacity of over 1,400 MWh have already been installed in Germany.

Download data



**+ 75% growth**

**Industrial storage market**

The market for industrial storage systems has been growing strongly in recent years. Since 2018 the installed capacity has increased by 75%.

Go to paper



**- 30% costs**

**Large-scale storage market**

Due to the drop in price of lithium ion batteries, the installation costs for large-scale storage systems have been reduced by almost 30% in last three years.

# Residential home storage

## The DIY energy transition





## Use-case



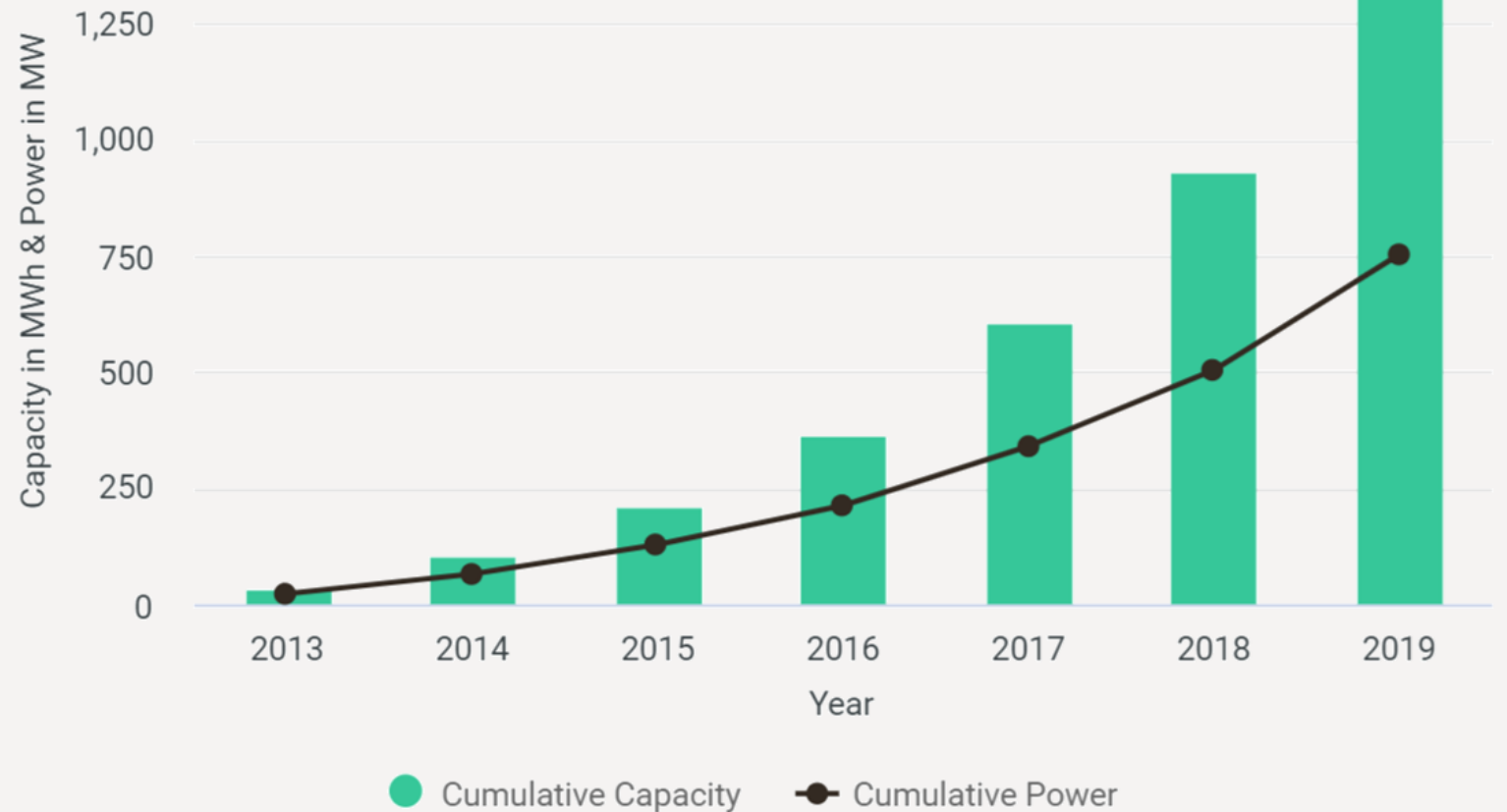
Home storage systems shift solar energy from day to night

- Less solar energy fed into grid
- Less energy purchased from grid

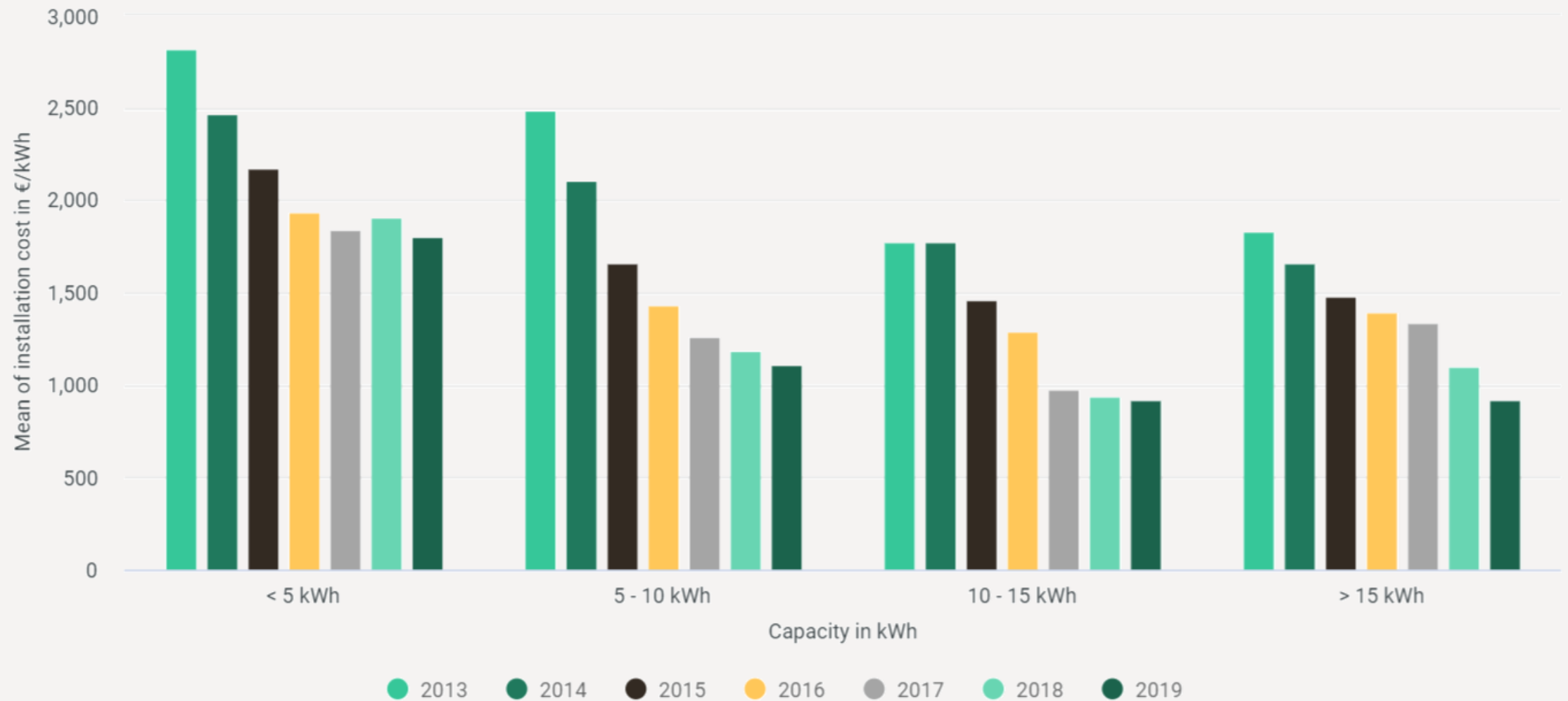
**Save electricity costs!**

# Market Development in Germany

- More than 220,000 systems installed in Germany today
- Over 50% of residential PV installations with battery
- New marketdriver: Retrofitting of old PV systems
- Other booming markets: Italy, UK, Spain

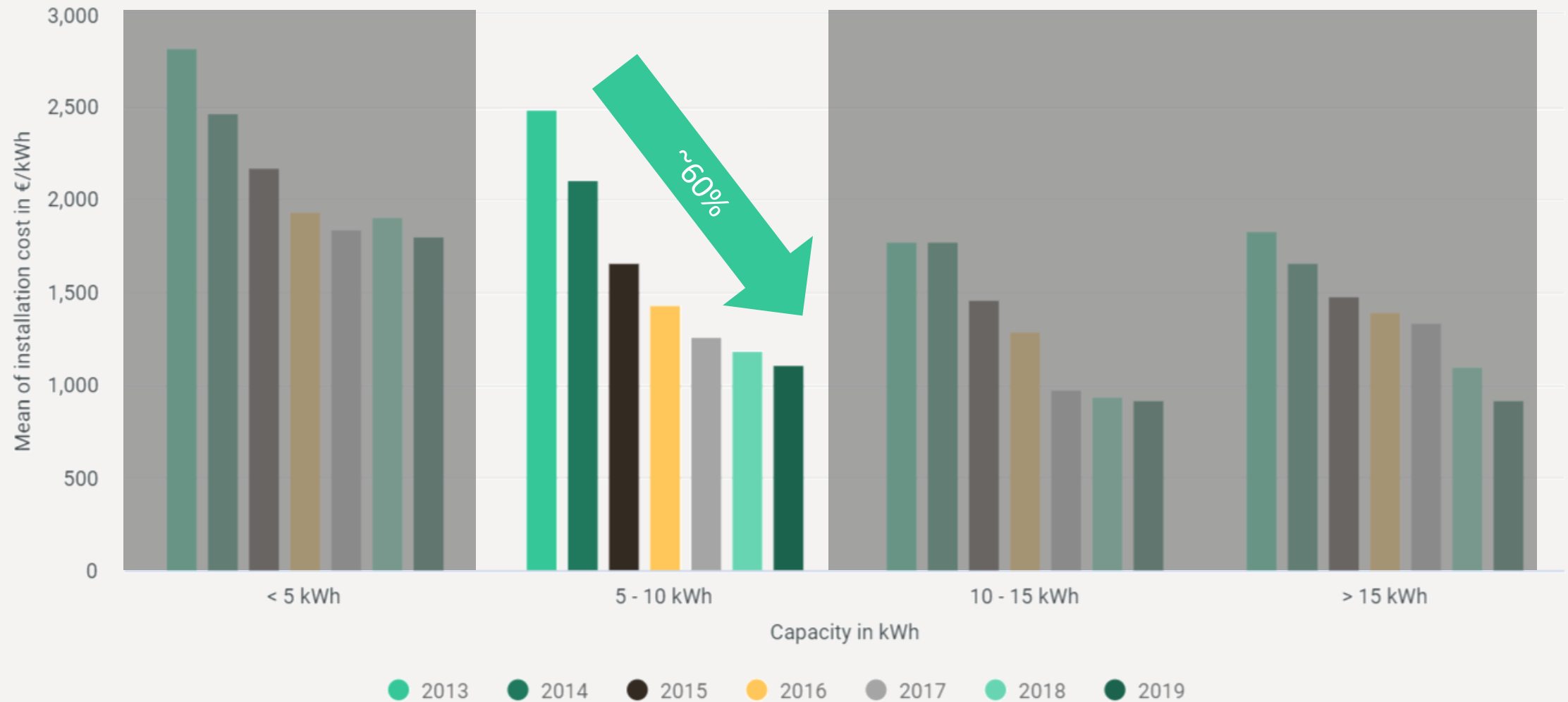


# Retail Prices (incl. VAT)

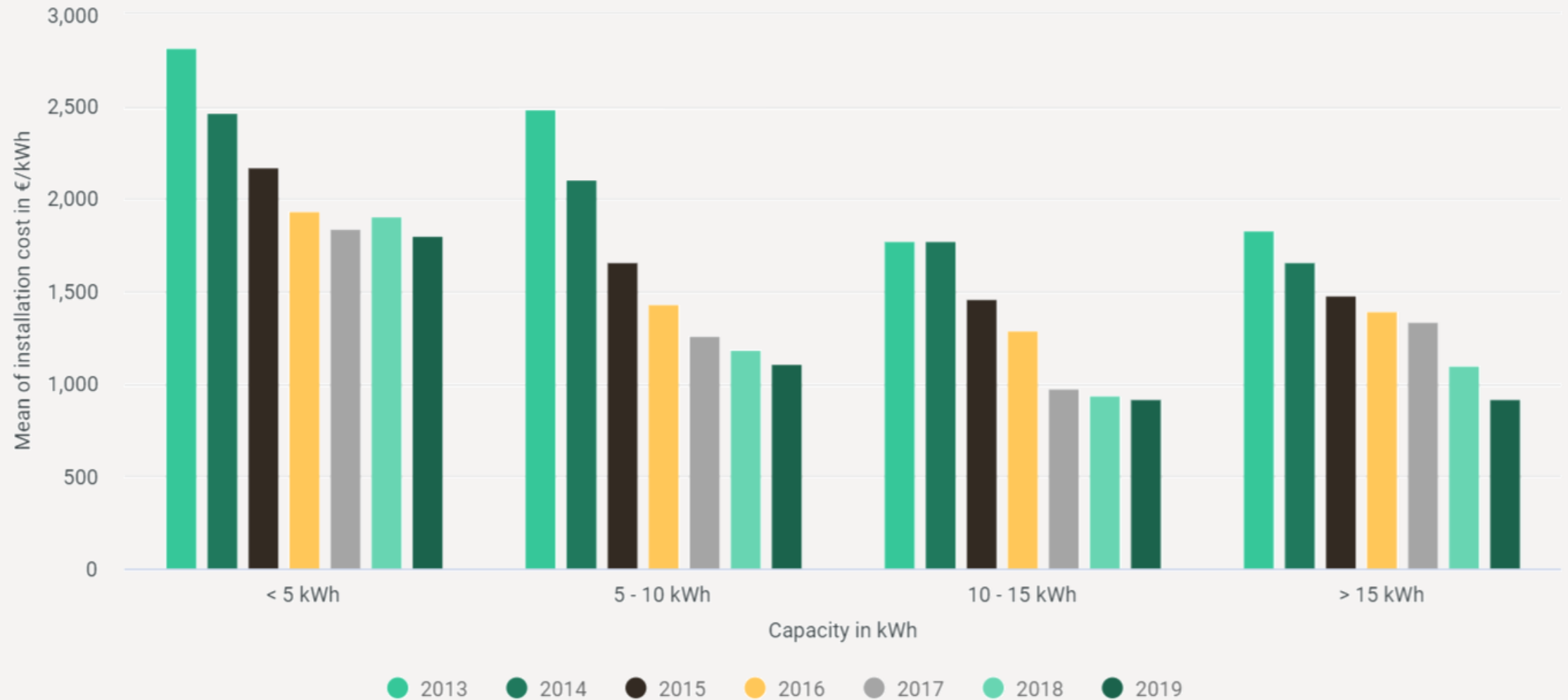




# Retail Prices (incl. VAT)



# Retail Prices (incl. VAT)



# De-Risking Battery Storage

New technologies come with new challenges

- Safety
- Accelerated Ageing
- Sudden outage
- BMS errors

Predictive battery monitoring can prevent critical battery failures.





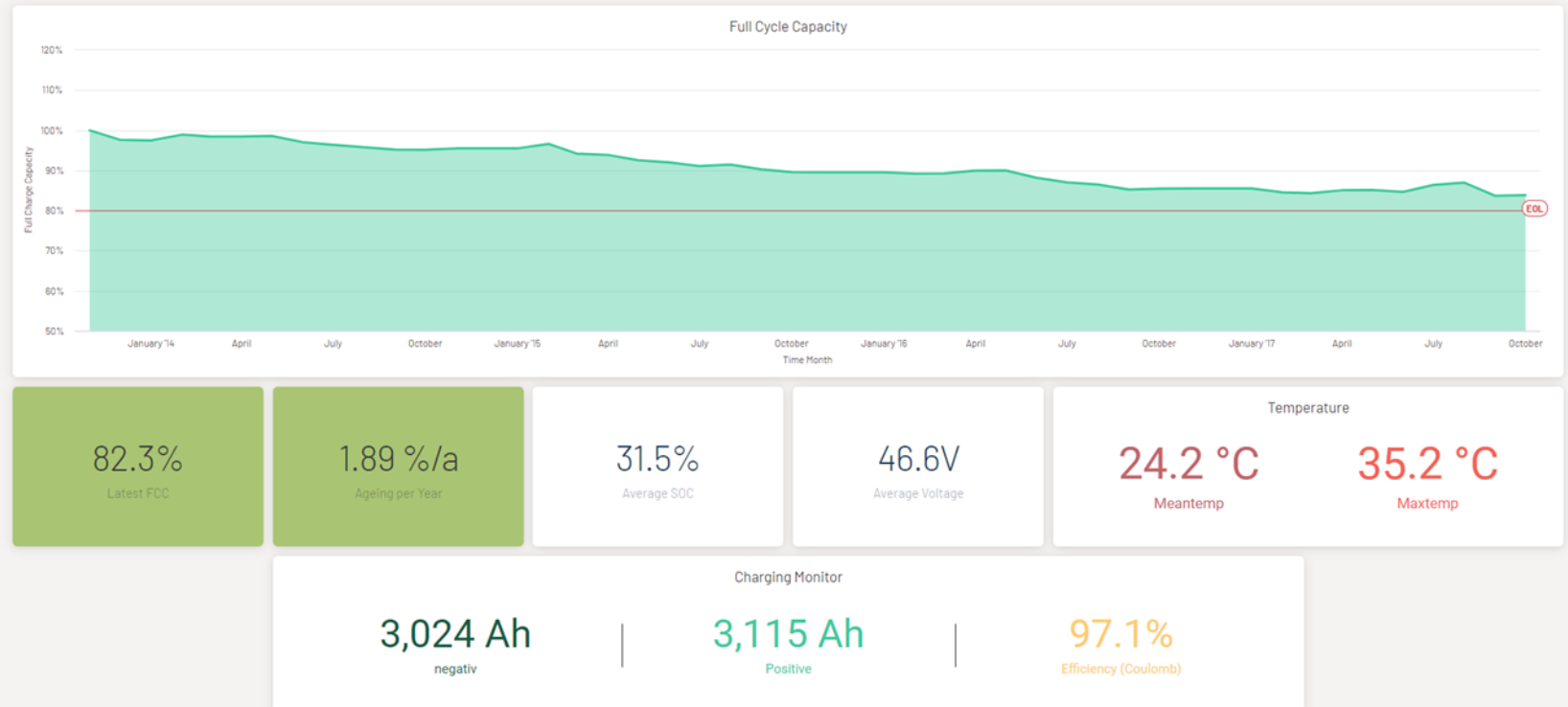
# De-Risking Battery Storage

New technologies come with new challenges

- Safety
- Accelerated Ageing
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- BMS errors

Predictive battery monitoring can prevent critical battery failures.

- 3 critical events since 2020
- Alerts prevented damage



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# C&I Storage

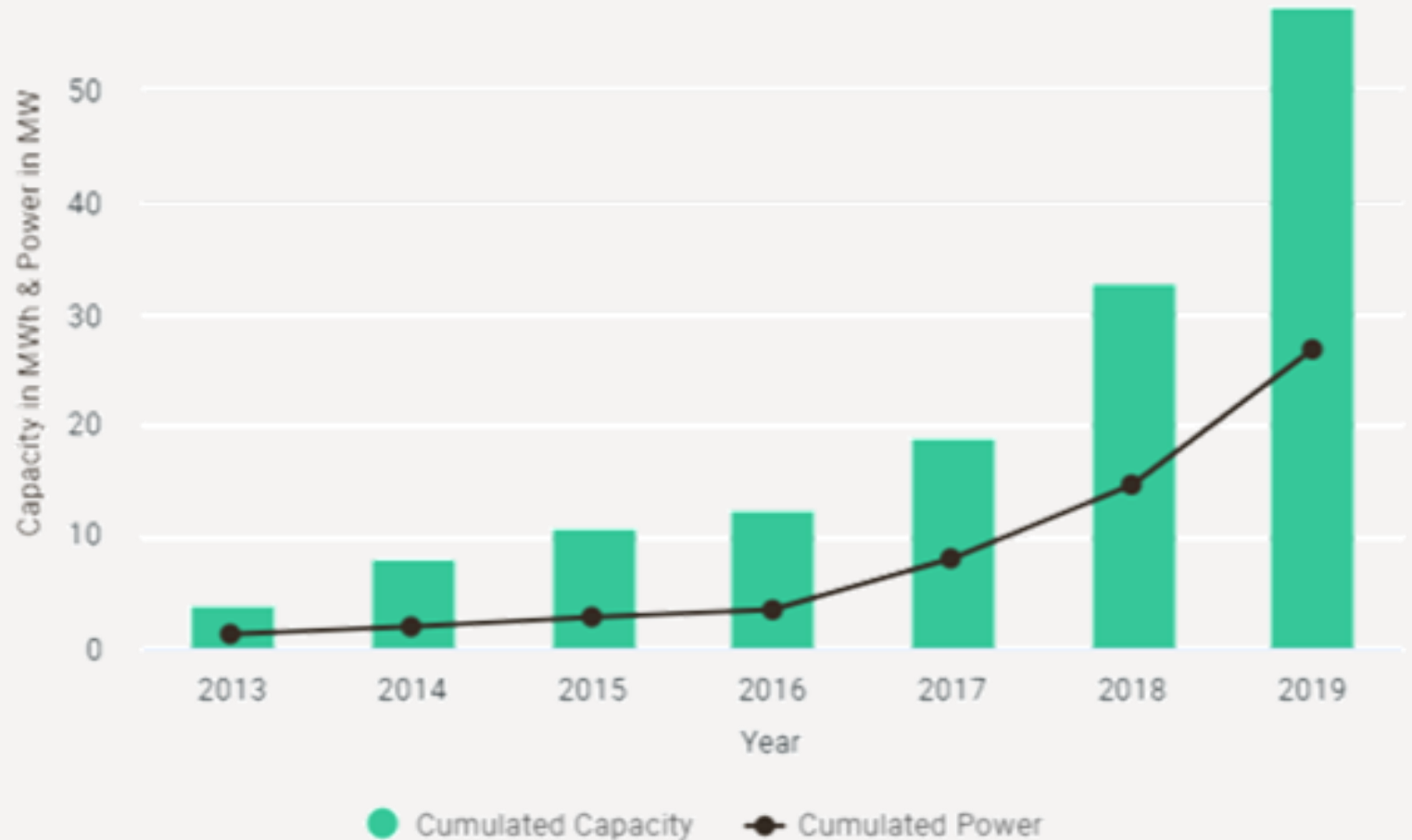
The energy all-rounder





# Market Development in Germany

- More than 800 systems installed in Germany today
- Typical use-cases
  - Peak shaving
  - Solar + storage
- Profitability highly depends on load profile and location



# Grid services

## Utility-scale disruption



# Market Development in Germany

- Grid services are highly individual and highly regulated
  - Frequency response
  - Ramping
  - Black start capability
  - Peak shaving
- 450 MWh of “virtual transmission” to be built in Germany over the next 2 years

