



# IOT-Driven Microgrids - Unlocking value from Data



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31 October 2019

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# The megatrends making way for the new energy landscape

## Digitization

Number of connected devices increases data streams



**▲ 400%**

connected devices reaching 40bn by 2025

## Decarbonization

Use of renewables grows and energy prices drop



**▼ 60%**

average cost of wind power has dropped since 2009

## Decentralization

Flexible energy generation changes the traditional grid



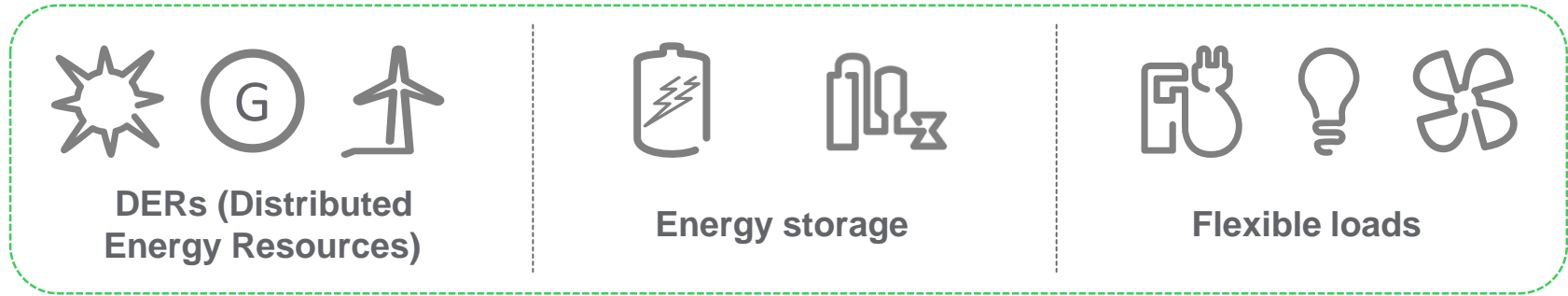
**165.5 GW**

global distributed generation market in 2023, 87.3 in 2014

# Smart Microgrids: a huge IOT opportunity

## Microgrid

An **integrated energy system** consisting of a group of **interconnected loads** and **Distributed Energy Resources** within clearly **defined electrical boundaries**, that act as a single **controllable entity** with respect to the grid



### IOT-Enabled

Connectivity  
Smart devices and sensors  
Democratization of technology



### Data Streams

IT/OT Convergence  
Increased understanding  
Real-time decisions



### Business Analytics

Mathematical algorithms  
Optimization and forecast  
Extract value

# Finland's largest microgrid for new Lidl distribution center

## The Challenges



### Energy costs

- ✓ Deliver high level of Energy Efficiency
- ✓ Participate in DR through self-produced energy
- ✓ Optimize energy usage **lowering costs**



### Sustainability

- ✓ Build an environmentally friendly DC, in accordance with **BREEAM** requirements
- ✓ Powered with **renewable energy**
- ✓ Minimize CO<sub>2</sub> emissions



### Reliability

- ✓ Future-proof logistics center
- ✓ **Secure** cyber-communication
- ✓ Quickly react to Finland's **peak loads**

## The Result



**Carbon neutral** building



**BREEAM Excellent** rating



**100% Renewable Energy** with a 1600-panel solar power plant



First building in Finland that stores and distributes **heat from cooling**

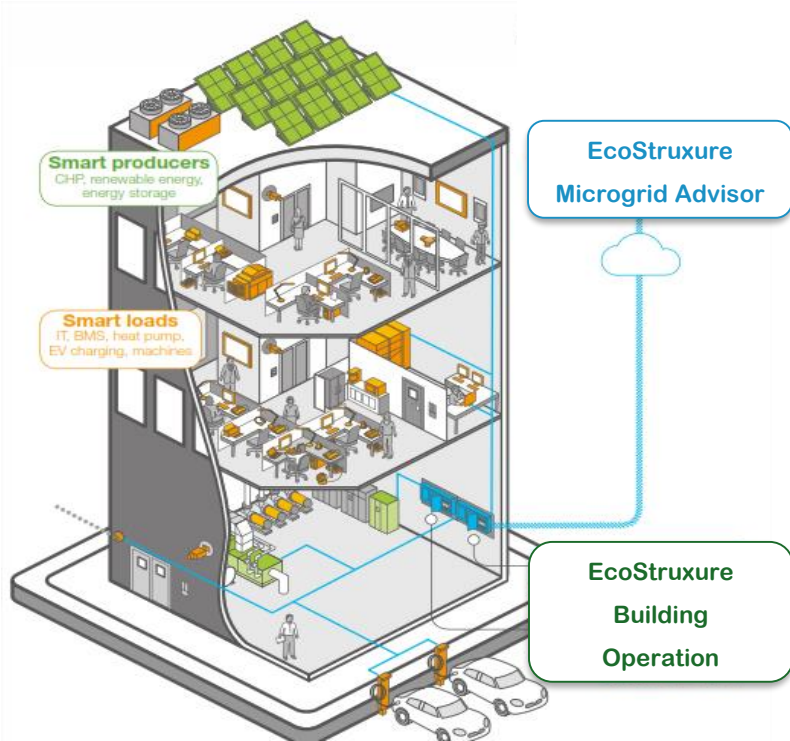


Up to **70%** energy costs **savings**



A new efficiency **benchmark** for Lidl

# A cloud-based solution for a seamless performance



**Cloud-based** platform that leverages powerful **analytics** to control and **optimize** energy resources for a sustainable and cost-effective **performance**



Customer constraints



Weather forecast



Energy tariff rates



Demand response requests

Real-time data and predictive machine learning algorithms, to decide when to **Consume, Produce, Store or Sell Energy**

**Open** building management platform that integrates multiple systems for centralized, **real-time control**

**Analytic services** to further improve energy efficiency

ISO-27001 Information **security** certification

# IOT data and ML enable more efficient and smarter grids

## IOT-Data streams



From descriptive to **prescriptive**, using algorithms to forecast and optimize  
Large amounts of data enable buildings to do things they never could have done before

## IT/OT Ecosystem



Build open and scalable models, starting from a Proof of Concept and **extracting real value**  
Think about how IT architectures and technologies integrate into the building and the grid

## New Business Models



**SaaS platform (Servitization)**: easy-to-use and innovative tools with predictive algorithms  
Better understanding of what impacts costs and performance, to make **smarter decisions**

## Prosumers



**Two-way power flow**: Local resources (DERs) supplying power to main grid  
Sharing resources (bi-directional district heating) in a **collaborative** economy



## More Efficient, Resilient and Sustainable

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