



We make the energy transition work\*.



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[\\*See how](#)



# LOOK AROUND.

Almost everything we experience, touch or do in our everyday lives is made **possible by power.**



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An aerial night view of a city, likely Paris, showing a river (the Seine) winding through the urban landscape. The city is illuminated with warm lights, and the sky is a deep blue with some clouds. The text is overlaid on a dark semi-transparent rectangle in the upper left.

Dedicated to improving lives  
and the environment.

Providing power management technologies  
that are **reliable, efficient and safe.**



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# Get to know our business.

## Electrical Sector

2019 Sales \$13.4 B

- Electrical Products
- Electrical Systems & Services

## Industrial Sector

2019 Sales \$8.0 B

- Aerospace
- Hydraulics
- Filtration
- Vehicle
- eMobility

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**Total sales** \$21.4 Billion USD  
**Net income** \$2.2 Billion USD

- Headquarters: Dublin, Ireland
- Chairman & CEO – Craig Arnold
- Customers in more than 175 countries
- Approximately 92,000 employees
- Key locations in Cleveland, United States; Shanghai, China; Morges, Switzerland; São Paulo, Brazil
- Regional engineering teams to support products and custom solutions



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# We are recognized by others for doing well, **and doing good.**

- *Fortune* magazine has named us regularly as one of the 'World's Most Admired Companies'.
- We are recognized consistently for environmental transparency and performance in the global 'CDP Climate Disclosure Leadership Index'.
- We've been one of *Corporate Responsibility* magazine's '100 Best Corporate Citizens' for 12 years consecutively.
- We've featured repeatedly in the 'FTSE4Good Index Series' which measures the performance of companies that demonstrate strong *Environmental, Social and Governance (ESG)* practices



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# Eaton in Europe, Middle East and Africa

More than **24,000** employees, **70**  
manufacturing sites and **280** field service  
engineers in over **40** countries



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An aerial night view of a city skyline with numerous skyscrapers and lights. Overlaid on the city are glowing green and yellow arcs and lines that connect various points across the city, symbolizing a network or energy transition. The sky is dark with some clouds.

We make the energy transition work\*.

More electricity.  
More alternative energy sources.  
Ever-increasing efficiencies.



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# Energy transition in numbers

## Electrical demand

### BUILDING ELECTRIFICATION:

**50%**

increase in global building energy share by 2050

### DATA AND COMPUTING:

**4X**

increase in share of electricity demand by 2030

## Decentralized supply

### RENEWABLES:

**50%**

of generation by 2035

### STORAGE:

**13X**

installed base growth by 2030

## Infrastructure requirements

### SYSTEM RESILIENCE:

**5% - 12%**

increase in outage minutes

### OPTIMIZATION:

**13B**

connected power devices by 2025

### CYBERSECURITY:

**84%**

of companies have had an IoT breach



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# Electrification is the most efficient way to decarbonize...

...but electrification increases power demand and the risk of grid congestion.



Transport



Buildings



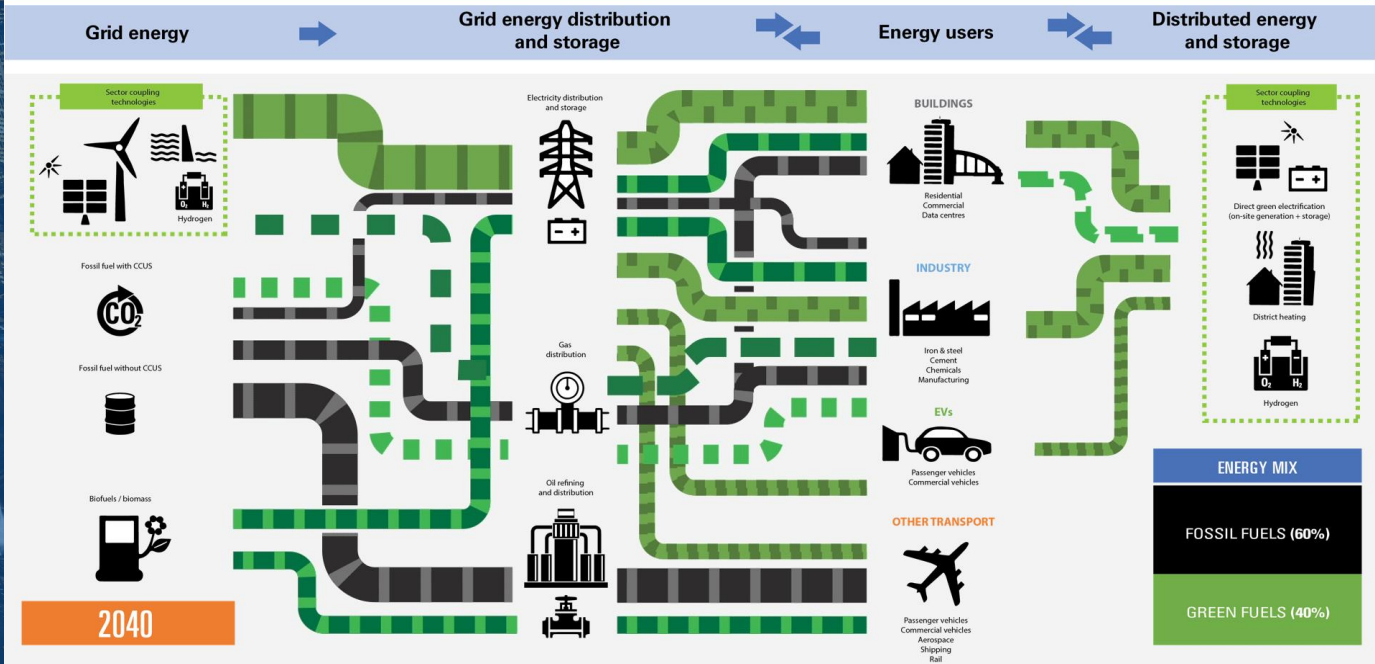
Industry

**Power demand increases  
by 65% over 2018-50\***

*\*2020 BloombergNEF Sector Coupling study,  
sponsored by Eaton and Statkraft*

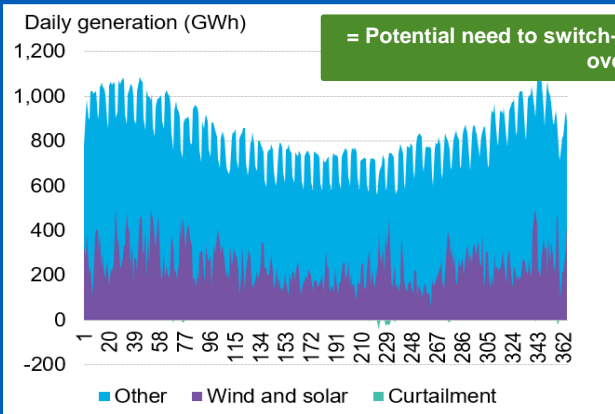
# A decentralized system, based on renewable energy, is fast emerging

How sector coupling will decarbonise our energy system (North European example)

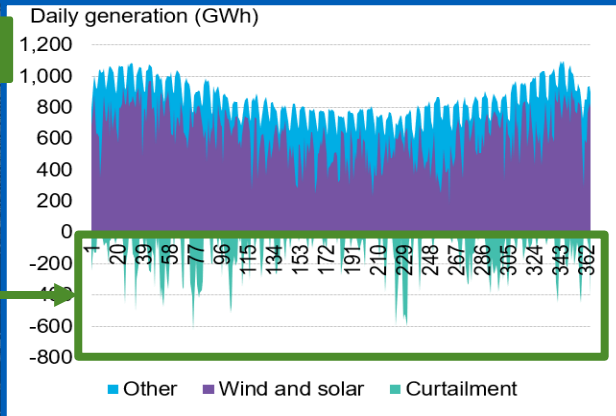


# Flexibility must be the cornerstone of a 'high renewable' energy grid (European archetype)

## UK's daily electricity generation - Today



## UK's daily electricity generation - 2030



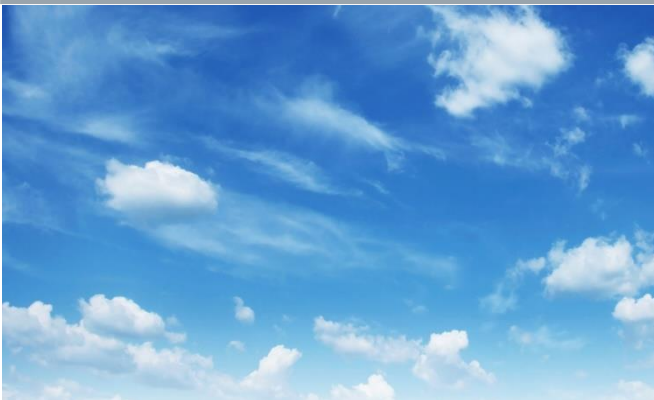
### Main challenges

- We will always have long periods of low solar energy and little/no wind (**seasonal generation gaps**)
- Higher intra-day variability of renewable generation (**ramp-up and ramp-down rates**)
- Growing need to switch off renewables when the supply of energy exceeds demand (**curtailment**)

### The answer is more flexibility

- Batteries can help even out variability of electricity supply and demand on a daily basis (**short duration flexibility**)
- Green hydrogen (produced using cheap renewable electricity instead of curtailment) can help with weekly and monthly seasonal generation gaps and reduce need for fossil fuels during low renewable periods (**long duration flexibility**)

# EU 2050 targets and trends



## GHG reduction targets

**100%** reduction in greenhouse gas emissions compared to 1990 levels



## Renewables deployment

**80%** of electricity to come from renewable energy sources by 2050



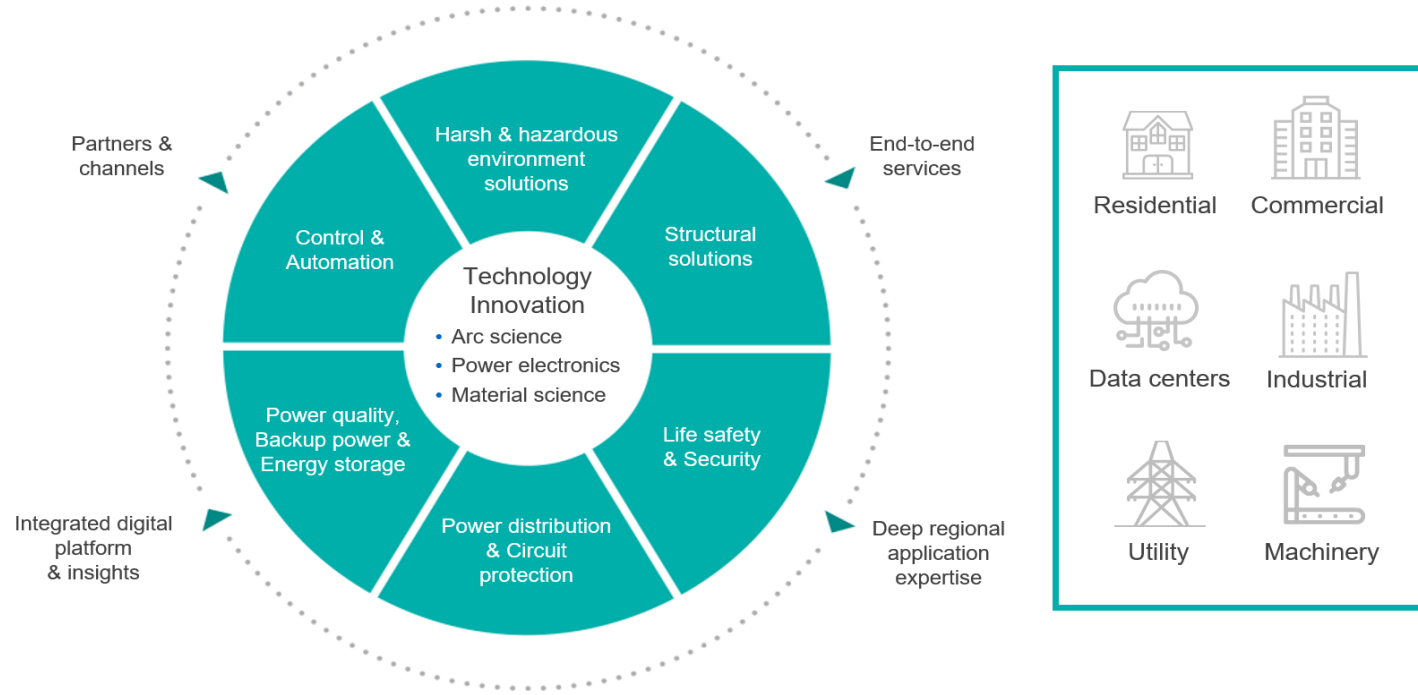
## Electric vehicles

**35M** passenger vehicles to be in use by 2030



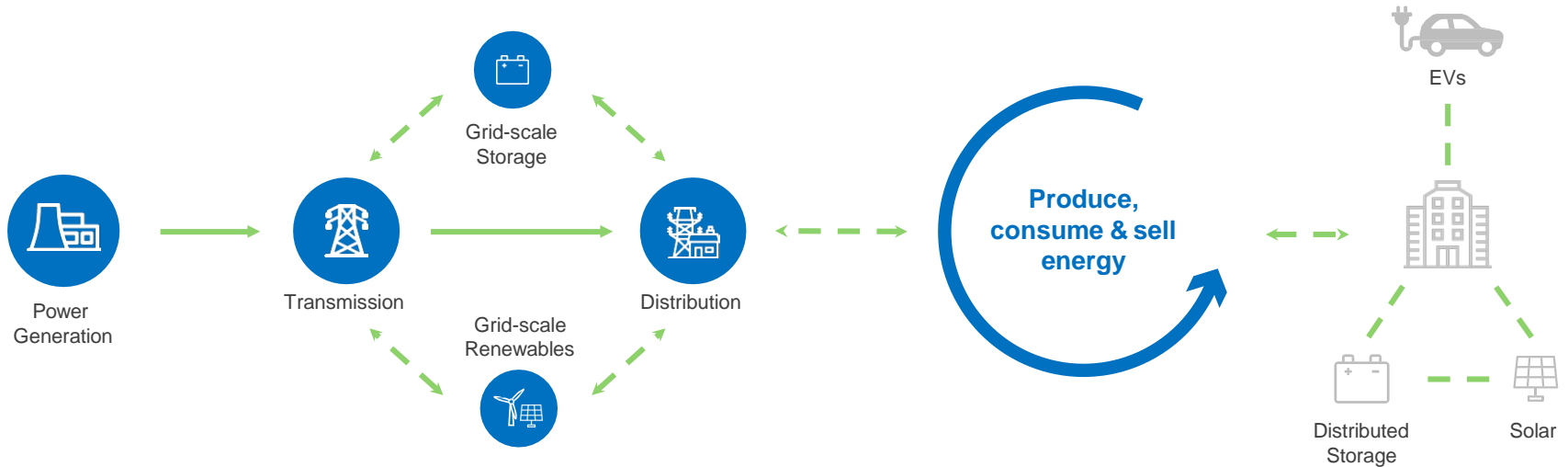
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# We help you capitalize on the energy transition



# We make it possible to run 'Everything as a Grid'

EVERYTHING  
AS A GRID



Storage and Specialized Infrastructure



Traditional Power Infrastructure



Optimization Software Service

**EATON**

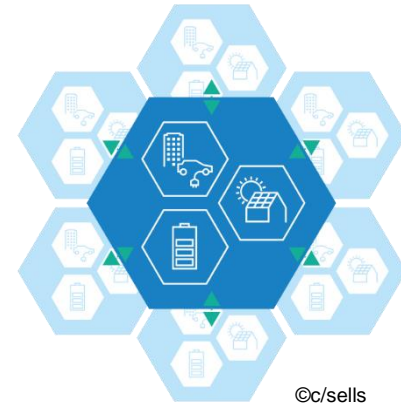
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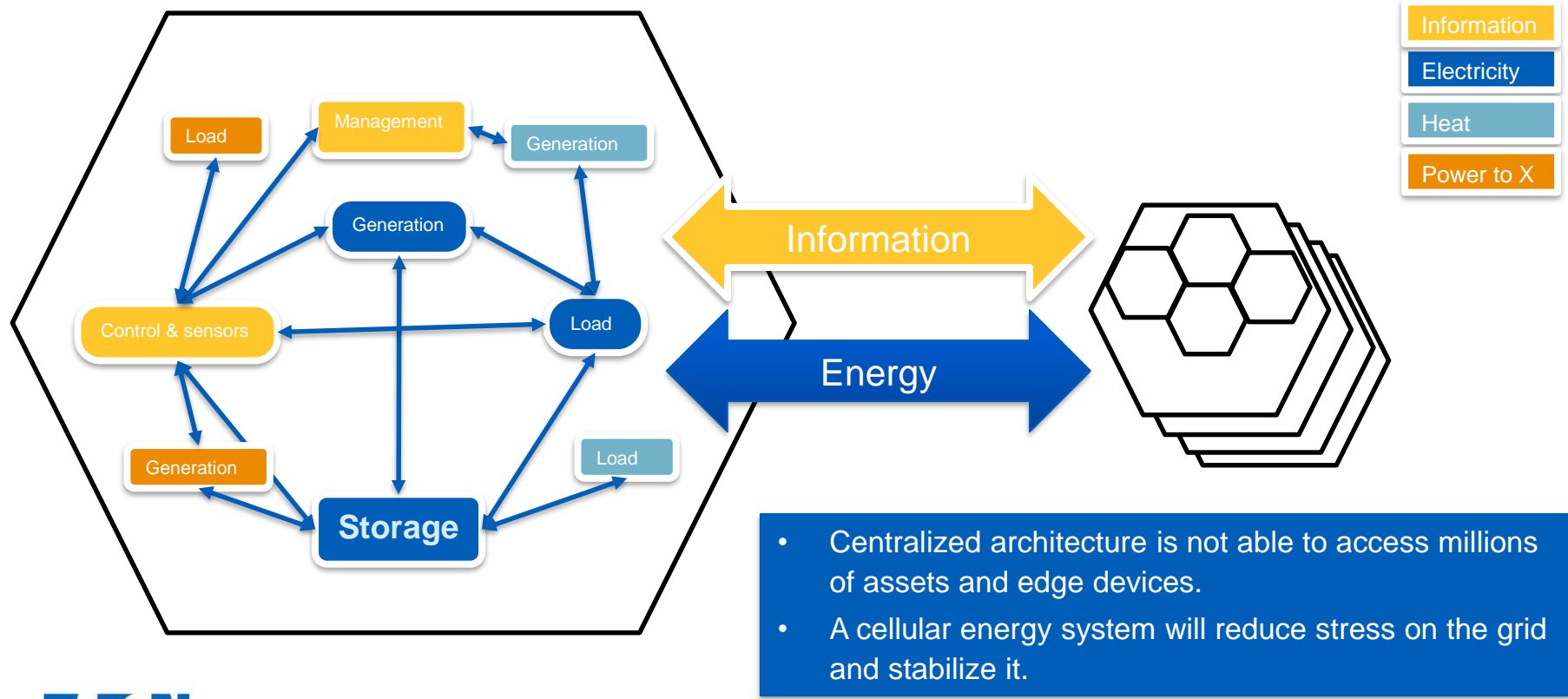
# A cellular energy system is the goal

A cell is the *infrastructure for bringing together different forms of energy and levelling the load.*

- ✓ Balancing load and generation on the lowest level
- ✓ Grid is built from bottom to top and a cell from a lower level can be clustered with other cells
- ✓ No central control room, but cell managers in every cell
- ✓ In the US as 'autonomous energy grid' and in Europe as 'cellular energy system'



# Cellular energy system – detailed view





# Buildings as a Grid

Buildings are becoming **energy hubs**. You need to be prepared for the future - integrate EV chargers or leverage renewable energy produced on site while managing the energy flows and planning power capacity.

## We enable our customers to:

- Get a future-proof electrical infrastructure
- Reduce carbon footprint
- Safely and securely adapt to fast changing standards and regulations



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# The challenges you face

## Regulation



Comply with regulation with the **minimum investment**

## Maximize earnings



Solve the power management challenge without exploding **CAPEX**

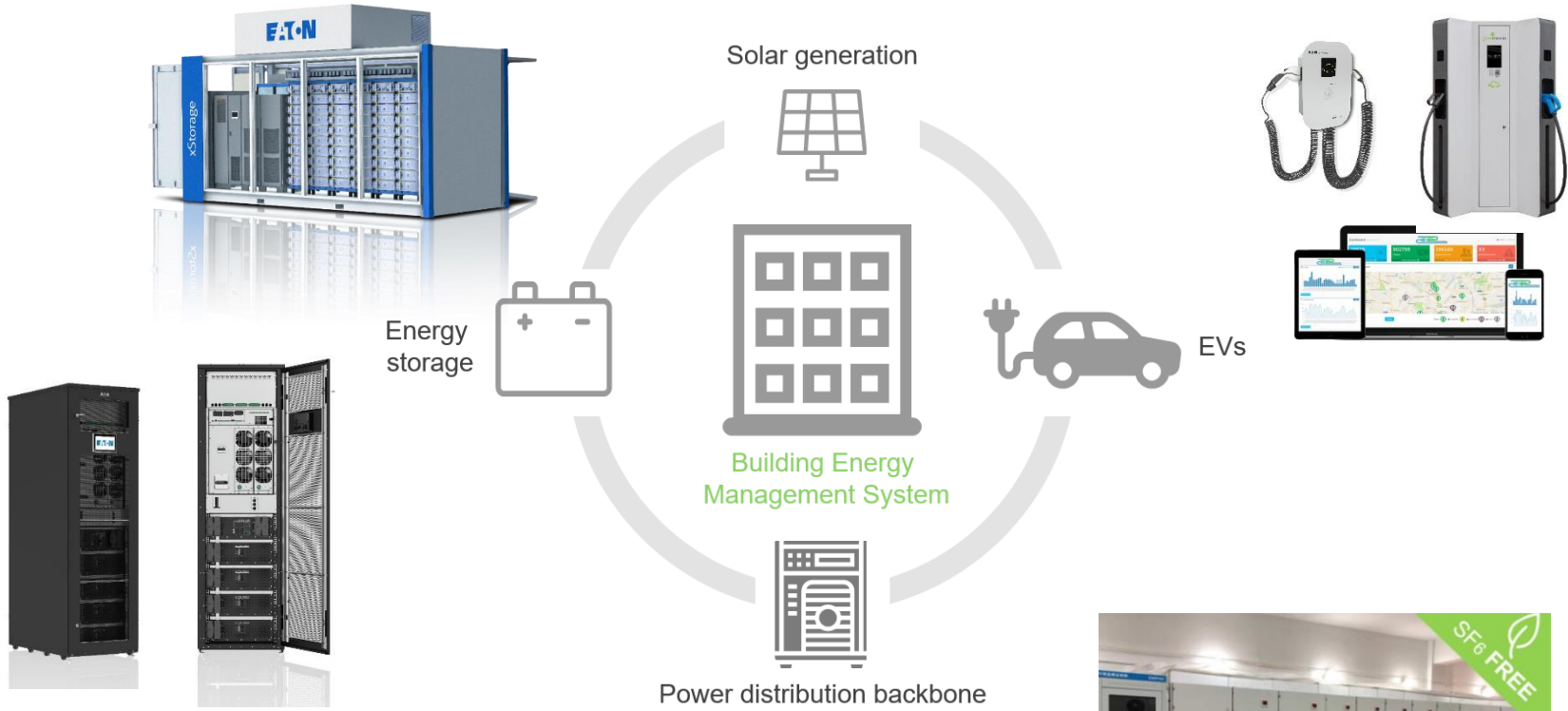
Minimize the energy bill & **OPEX**  
Provide additional **revenue**

## Sustainability



Lower the **carbon footprint** of business activity

# A winning strategy: integrate storage and EV charging with an SF6-free switchgear backbone



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# Integrate EV chargers with energy storage

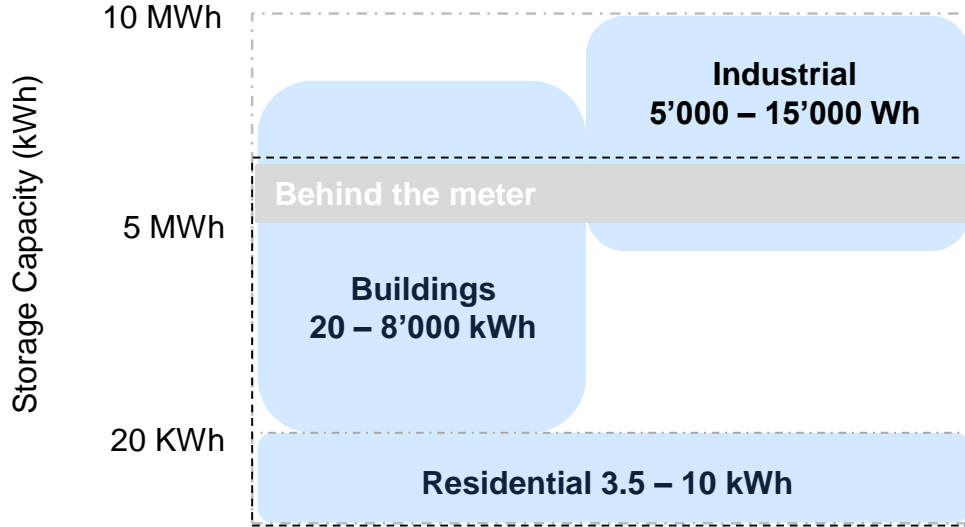
Mix & Match:



- Take control of energy supply, cut bills and move towards a more sustainable future
- Get uninterrupted, high-quality power for EV Chargers even off-grid
- Harness the full potential of renewable sources
- Gain reliability and independence and avoid potential dips in the grid supply

Energy storage enables you to defer grid investment, store renewable energy and release it when needed to charge EVs.

# Modular, scalable energy storage solutions



Johan Cruijff Arena  
with xStorage Buildings  
**3 MW** storage, Netherlands

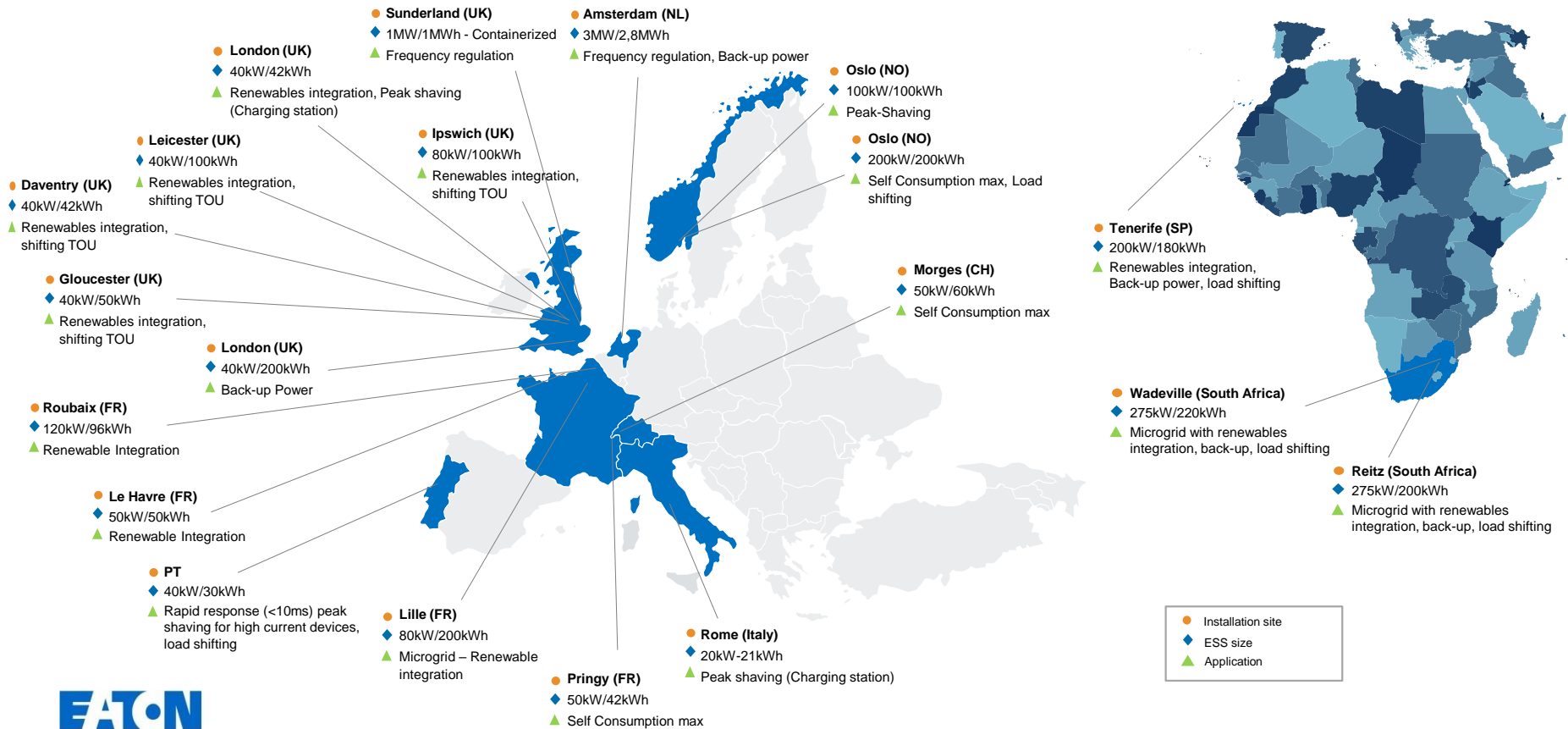


**40kW** scalable xStorage  
Buildings system at the Catholic  
university of Lille, France



**Home** energy storage unit  
xStorage Home available to  
utilities and homeowners

# Examples of live Buildings as a Grid systems across Europe and Africa



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# Catholic University of Lille: towards a zero carbon campus

Supporting Catholic  
University of Lille's goal  
to achieve

0 CARBON  
FOOTPRINT  
BY 2035



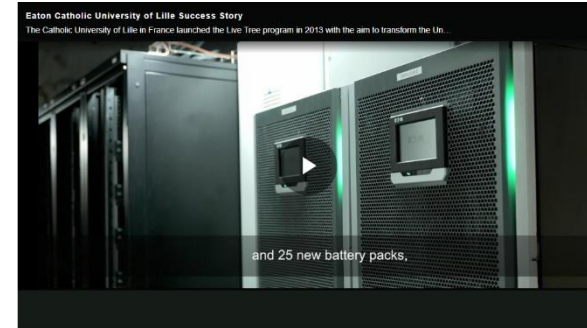
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# Delivering a zero-carbon campus in France

The Catholic University of Lille is committed to achieving a zero carbon campus by 2035. The Eaton 'xStorage Buildings' system is essential to the transition project which is known as 'Live Tree'.

- Using the **Eaton xStorage Buildings system** the university can store energy from 1,300 m<sup>2</sup> of photovoltaic (PV) panels to use whenever they choose. This gives them a great deal of flexibility compared with traditional PV systems which provide energy for immediate use only.
- The energy from the **Eaton xStorage Buildings system** powers **three electric vehicle charging stations** that offer six charging points which can supply up to 132 kW.



*“We chose Eaton for this project because they meet our needs in terms of scalability for the battery pack and allowed us to easily integrate our system into our existing architecture.”*

**Grégory Vangreveninge**, Technical Manager - Yncréa Hauts-de-France



# H2020 Invade: the European smart grid and storage research project



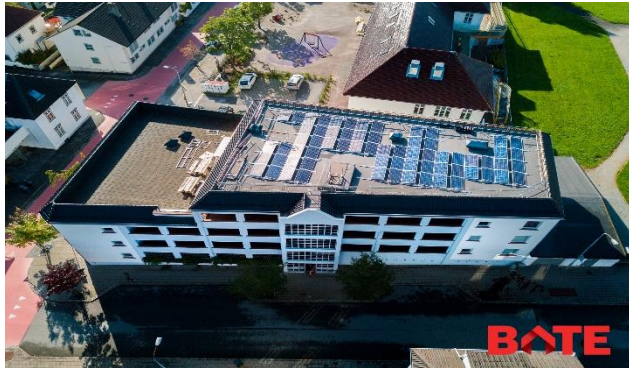
Enabling a housing  
association to

MAXIMIZE SELF  
CONSUMPTION OF  
RENEWABLES



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# Deploying xStorage Home to increase solar power use on a Norwegian housing scheme



- Lyse - a Norwegian industrial group focused on energy and fibre-based broadband - invested in Eaton xStorage Home systems as part of 'INVADE' which is one of Europe's biggest smart grid and storage research projects.
- We worked with Lyse and a housing association called Solvang to develop residential energy storage systems, connected to PV panels and EV chargers, that would optimize energy consumption. The systems have reduced energy bills and maximized consumption of locally-produced solar energy by using three Eaton xStorage Home systems, eight EV chargers and roof-mounted solar panels.

*"We will develop new digital solutions that ensure better use of the energy grid, an easier transition toward renewable energy, and the stabilisation of peaks using energy storage."*

*Trond Torbjørnsen, Senior Business Developer at Lyse.*



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# Using small-scale renewables to reduce pressure on the grid



Working with a UK energy supplier and its rural customers to enable

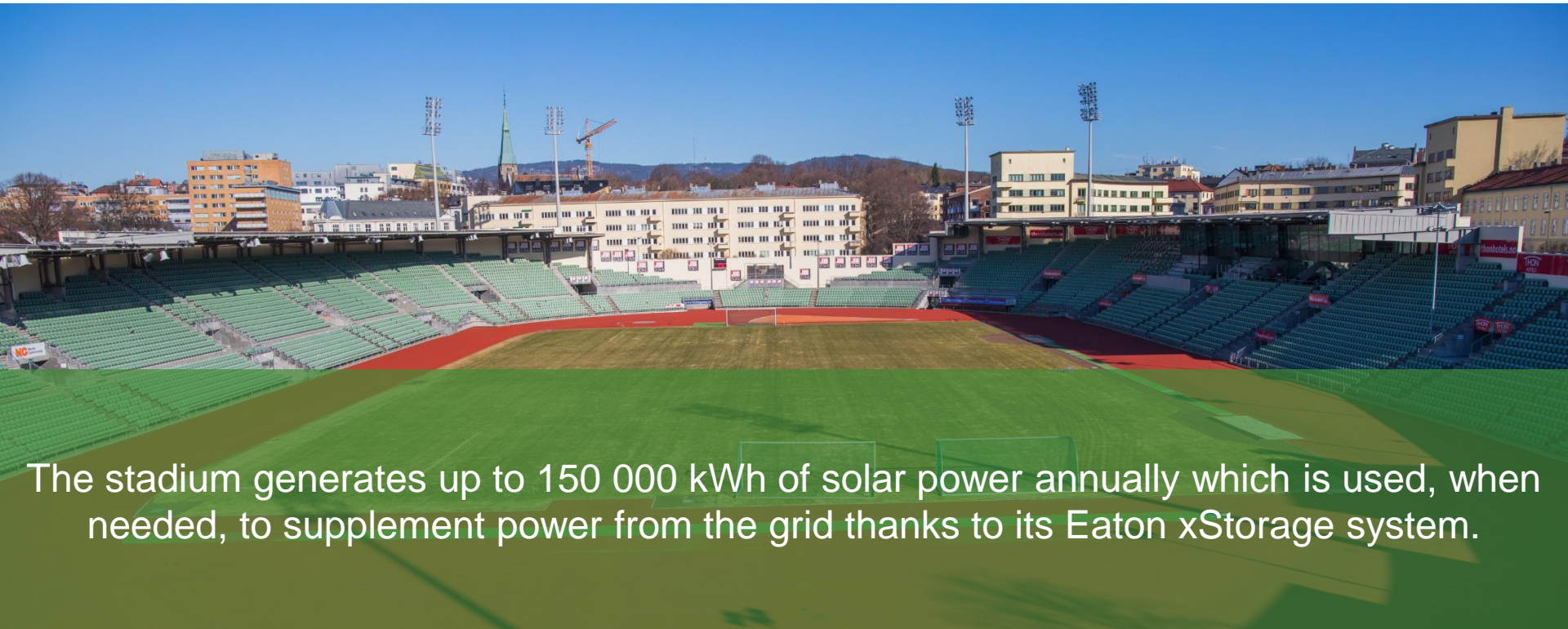
FLEXIBILITY AT THE NETWORK EDGE

# xStorage makes self-generated power a flexible resource, easing pressure on the grid



- Drax, the UK's largest renewable power generator, wants to smooth out grid volatility by helping its retail customers to meet peaks in demand. Self-generated renewable energy from technologies such as solar panels and wind turbines can help, but only if end-users can store the energy they produce.
- In Leicestershire, Yennards Farm is one of several test sites in a Drax-led project to optimize the use of small-scale renewables. Instead of exporting energy to the grid from on-site solar panels, the farm retains the power in an Eaton xStorage system and draws on it when needed.
- Renewable energy, produced and consumed at source, reduces demand on the grid at peak times, cuts the cost of the farm's electricity, and helps the UK towards meeting its carbon reduction targets.

# xStorage kicks in to reduce peak demand at Bislett Stadium, Norway



The stadium generates up to 150 000 kWh of solar power annually which is used, when needed, to supplement power from the grid thanks to its Eaton xStorage system.

# xStorage retains solar-generated back-up power to mitigate the stadium's peak demand



- One of Norway's best-known sports arenas, Bislett Stadium generates up to 150 000 kWh annually from 1100 m2 of solar energy production capacity. The output feeds an Eaton xStorage Buildings system that includes a 100-kW power conversion system and three racks of 30 Eaton battery packs made up of second-life Nissan LEAF vehicle battery modules.
- At peak demand, the system reduces energy consumption from the grid by accessing back-up renewable solar energy stored in the battery packs. The system that is currently installed can store up to 109 kWh but it can be upscaled easily to match increasing needs in the future.

# Using a UPS to balance the grid

## MICROSOFT TESTING FACILITY

Microsoft and Eaton, working in partnership at the Microsoft Innovation Center, Virginia, have developed a new approach to help grid operators access UPS as a valuable power source



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# Microsoft and Eaton show how energy storage can turn a data center into a profit center



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- Large-scale data centers are equipped with rarely-used battery banks to provide back-up in the event of a power outage. To make use of this valuable resource, we worked with Microsoft to harness the storage capabilities of lithium-ion battery-powered uninterruptible power supply (UPS) to serve as a distributed energy resource (DER) for grid operators. Our controller allows the UPS to track frequency regulation signals and respond quickly by charging or discharging the battery to balance the grid.
- Transforming a UPS into a regularly-used value-generating asset creates opportunities that include providing peak shaving to help avoid or reduce demand charges, shifting energy consumption for time-of-use rate optimization, and providing frequency regulation to help grid operators meet explosive growth demands.



# How energy storage solutions underpin grid availability and reliability in Africa



Microgrids are widely regarded as the most effective route to addressing energy poverty in Africa. Our energy storage systems make the most of microgrid technology.



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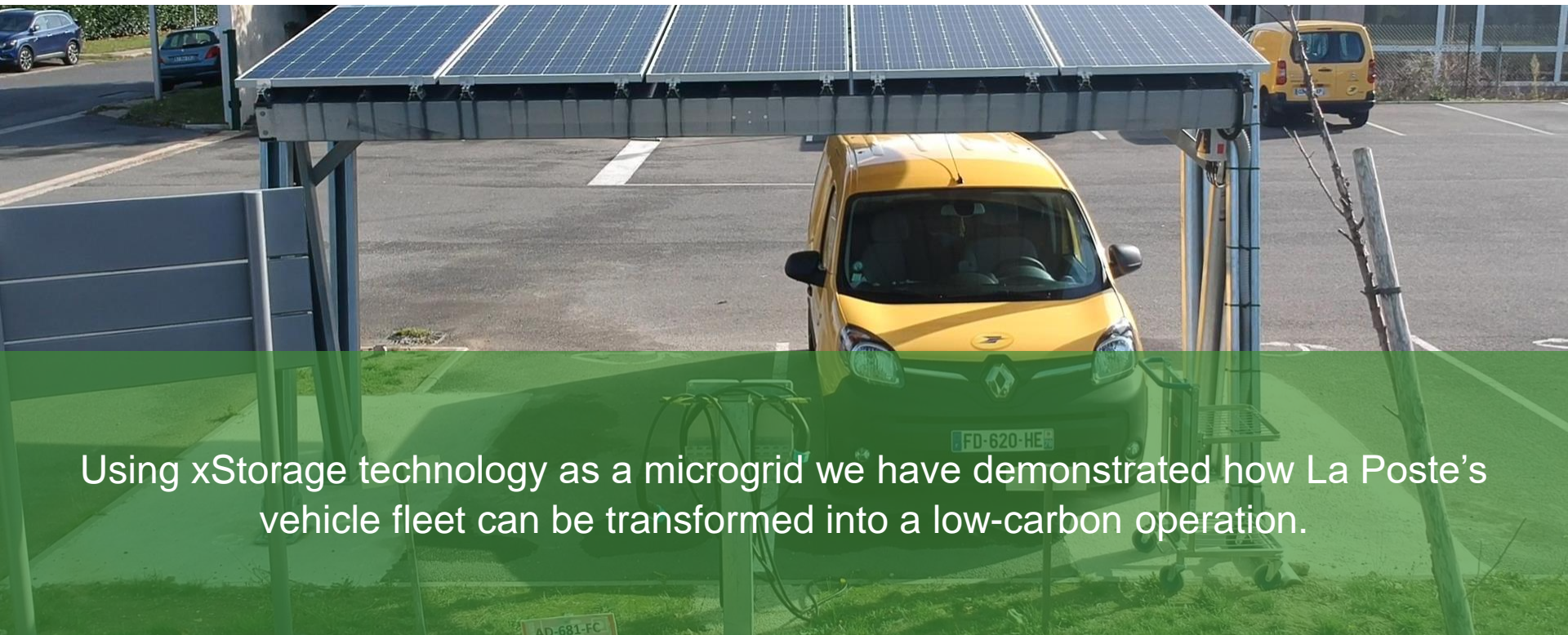
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# At Wadeville, we deployed xStorage for the first time in Africa



- We used second-life batteries in a system to support a microgrid that can provide enough energy for 230 community homes.
- Introducing energy self-sufficiency in this way relieves pressure on the grid and the power infrastructure that serves Wadeville, leading to greater overall grid stability and reducing power supply costs by up to 40 per cent.
- Microgrid technology is increasingly seen as a way of addressing energy poverty in Africa. Improving grid reliability supports business continuity, minimizes business losses and boosts economic growth.

# Solar-powered vehicles deliver mail to homes in France every day thanks to xStorage Home



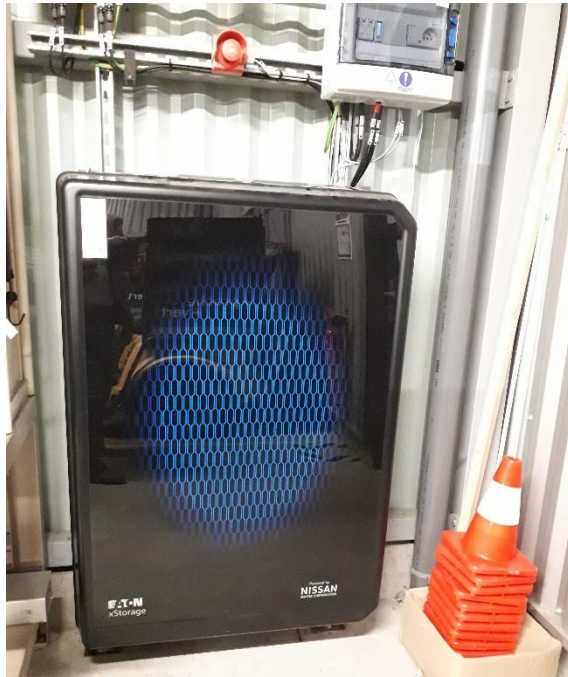
Using xStorage technology as a microgrid we have demonstrated how La Poste's vehicle fleet can be transformed into a low-carbon operation.



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# Generated during the day, power from a PV canopy is stored to charge vehicles at night



- Our demonstration project involves using an xStorage Home system, based on second-life Nissan LEAF batteries, to store the power generated by a photovoltaic shade structure on the car park of La Poste's site at Magny les Hameaux. Generated during the day while the postal vehicles are making deliveries, the power is used at night when they are parked up.
- If the entire fleet of La Poste's 7,000 electric cars were to benefit from a solution of this kind, it would represent 5,593,000 kWh of photovoltaic electricity produced annually for 16,954,000 solar km travelled. This would save 112.98 tons of CO2 compared to vehicles powered by electricity from the French electricity grid.

# Creating a circular economy for electric vehicle batteries at the Johan Cruijff ArenA in Amsterdam



Combining Eaton power conversion units with the equivalent of 148 Nissan LEAF batteries means that energy produced by 4,200 solar panels on the arena's roof can be stored and used optimally



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# Used vehicle batteries play a key role in energy supply and demand at Johan Cruijff ArenA



- The energy storage system we developed for the Johan Cruijff ArenA is the largest in Europe to be based on a mix of new and second-life vehicle batteries. The system provides back-up power, reduces diesel generator use, and supports the grid by flattening demand peaks during the music concerts that are held there.
- With a total capacity of three megawatts, the storage system plays an important role in balancing energy supply and demand at the arena, including optimizing the power generated by 4,200 solar panels on the roof.

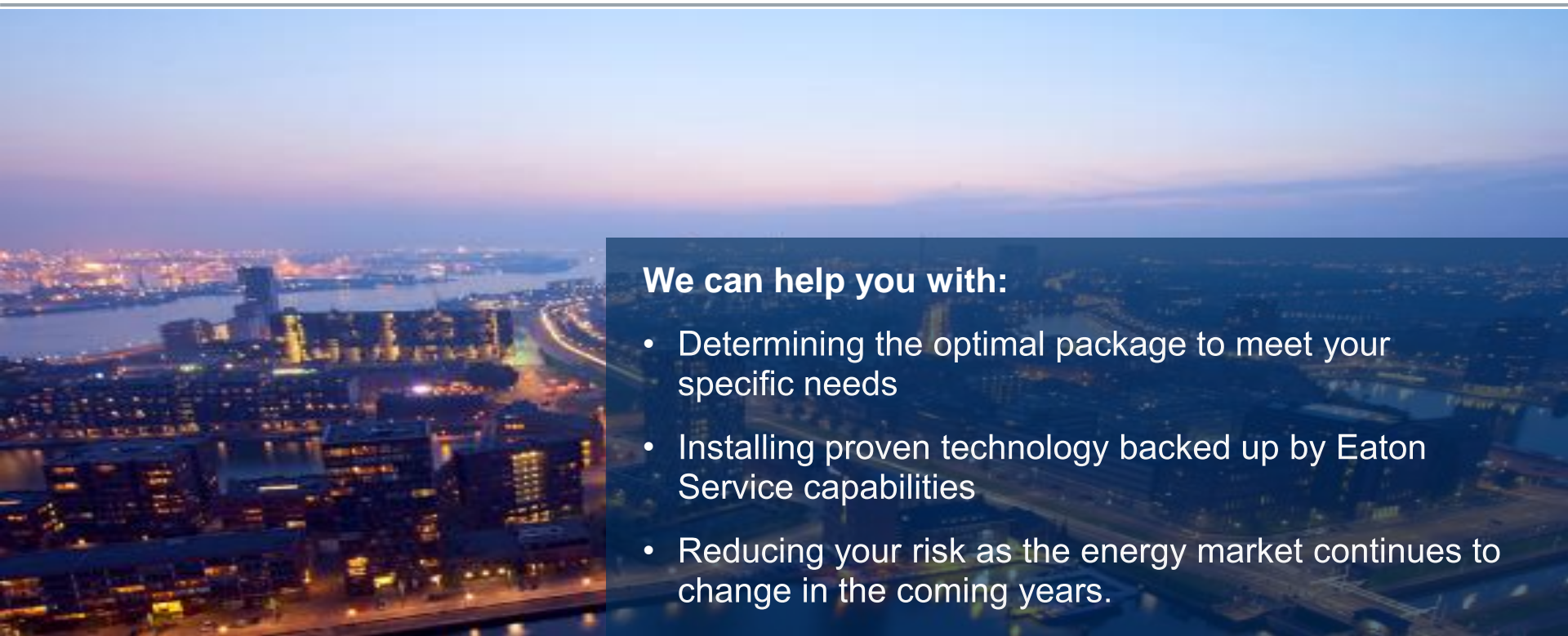
# Complete solution design support

- **Project management and design engineering** to make sure our solution fits your infrastructure needs
- A **complete portfolio of products** to integrate energy storage solution into your power distribution architecture
- **Support for financial study** and financing if needed



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# Taking the next step



## We can help you with:

- Determining the optimal package to meet your specific needs
- Installing proven technology backed up by Eaton Service capabilities
- Reducing your risk as the energy market continues to change in the coming years.



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