# Microgrids:
## Keeping the power on when it matters

Greta Foster
*DER Product Line Manager*

OMA Energy Conference
September 2022

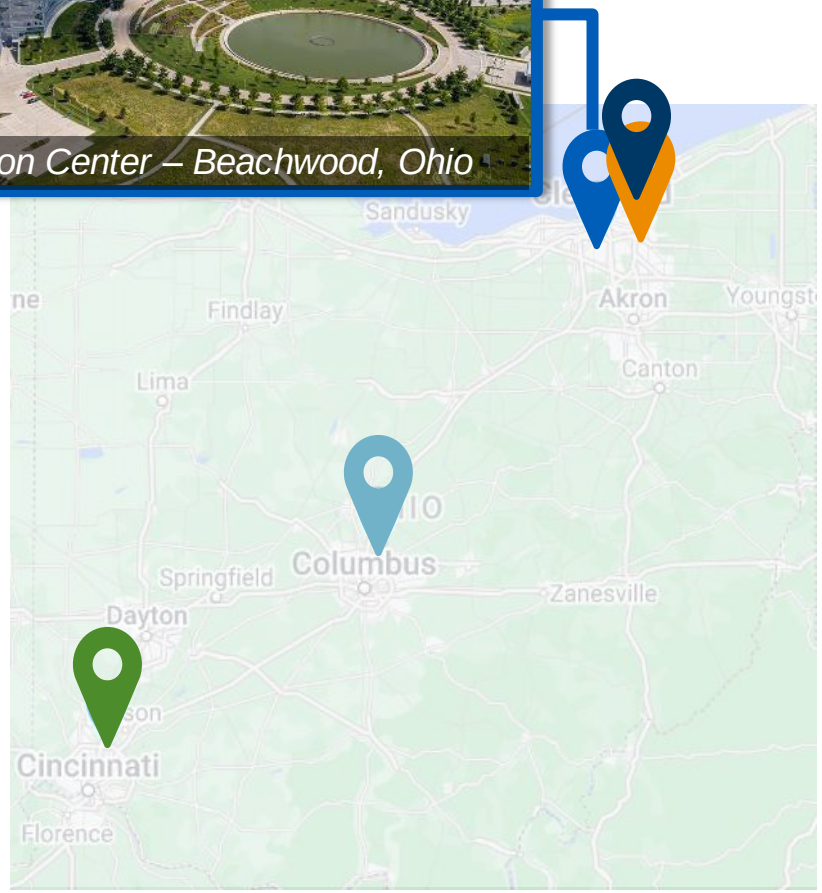
Powering Business Worldwide

# Eaton has deep Ohio roots

## Eaton overview

*An intelligent power management company*

Providing power management technologies that are more reliable, efficient and safe for 110 years


### Electrical Sector

2021 Sales **$12.7B**

- Americas
- EMEA
- APAC
- Crouse-Hinds/BLine

### Industrial Sector

2021 Sales **$6.9B**

- Aerospace
- Vehicle
- eMobility
- Filtration
- Hydraulics
  divested in '22

### Ohio Statewide Footprint


**5**
**Locations**

| Locations |
| --- |
| **Eaton Center - Beachwood** |
| **Aerospace Manufacturing - Euclid** |
| **Electrical Mfg & Sales - Parma** |
| **Service / Sales - Columbus** |
| **Service / Sales - Cincinnati** |

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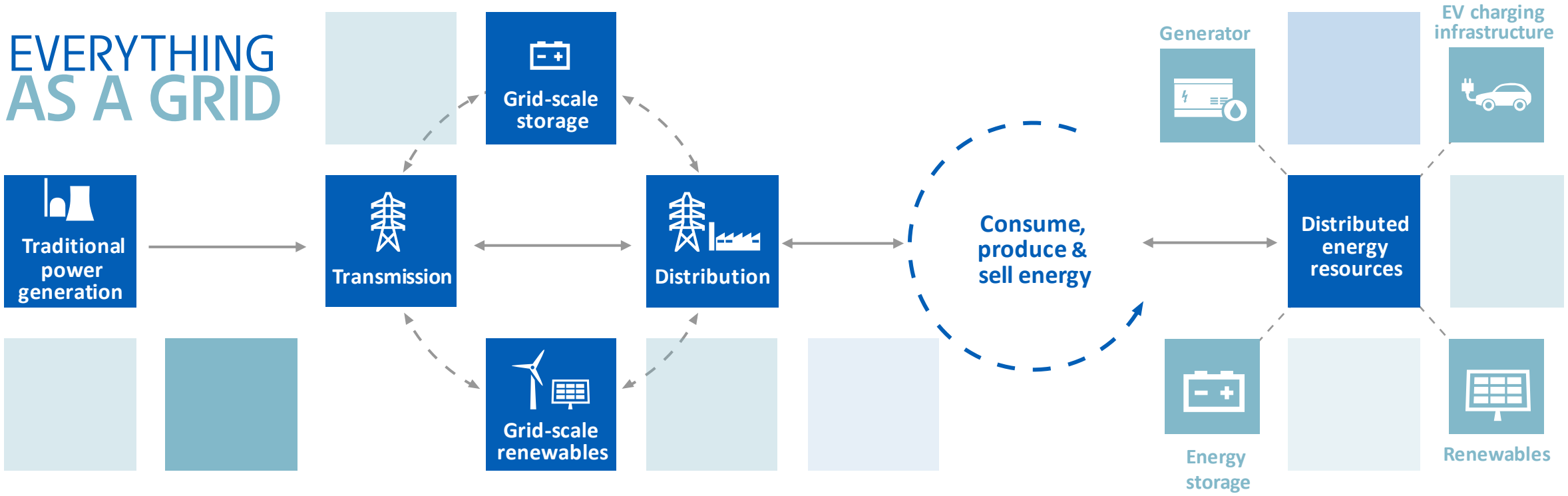
# **Our Past:** Centralized power generation

# **Our Future:** Distributed generation and two-way power flow




✔ Less carbon

✔ More resilience

✔ Lower cost

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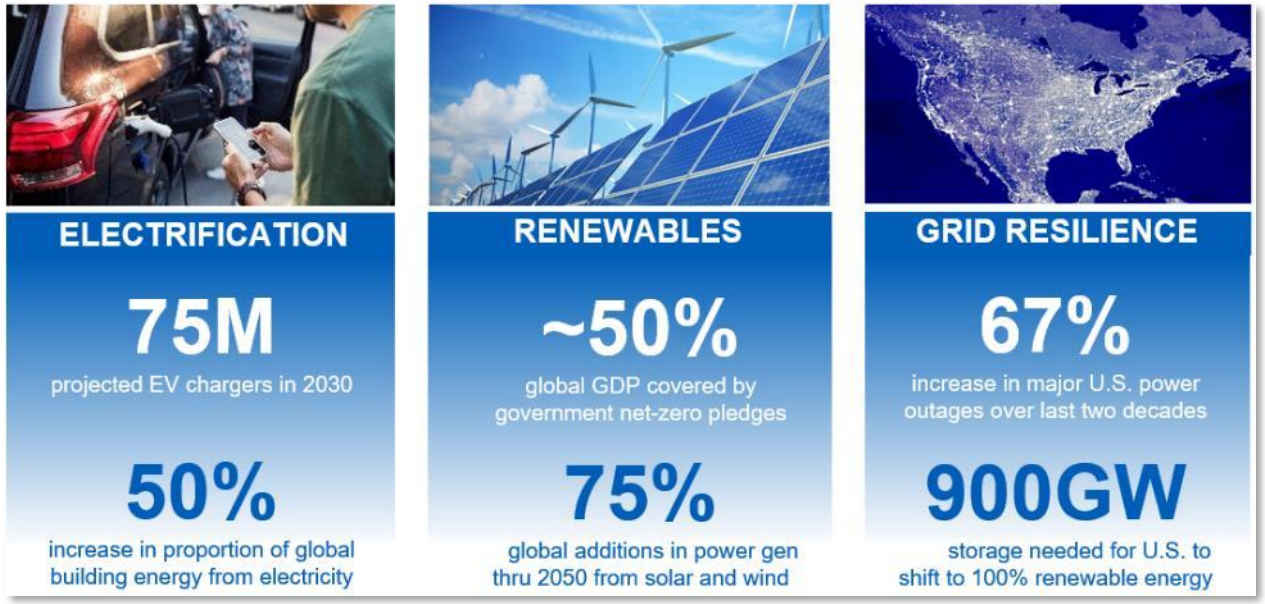
# No better time to stand up a microgrid

## Energy Transition mega-trends are fueling microgrid growth




Sources: EIA, Wood Mackenzie, Climate Central, BloombergNEF

### Access to available financing and incentives
- Federal Stimulus & Investment Tax Credit (ITC)
- Energy as a Service business models

### Evolving regulatory environment
- FERC Order 841 – energy storage
- FERC Order 2222 – wholesale markets

### Improving microgrid/DER economics
- Rising electricity prices & tariffs
- DER monetization with grid services

### Expanding global commitments to ESG goals
- Government climate change actions/proposals
- Ambitious net zero pledges by corporations

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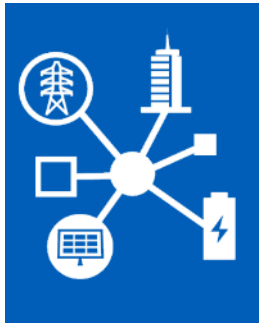
# Microgrids are a local grid within the grid delivering power reliability and resilience to the site



## Distributed Energy Resources (DER) System

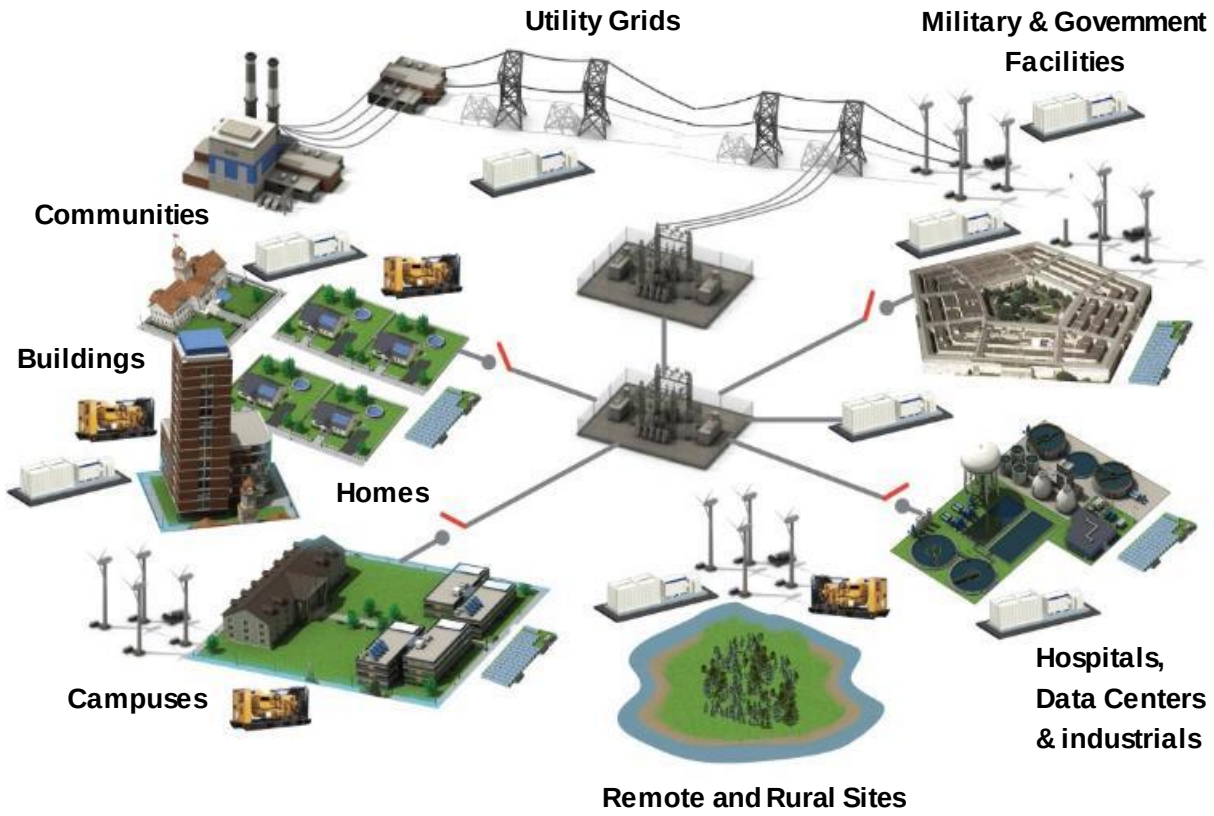
A defined boundary of interconnected electrical loads and decentralized generating assets controlled as an integrated system and operating in parallel with the grid

A **Microgrid** is a DER system than can operate autonomously or "islanded" from the grid for maximum system resiliency

## Common system elements

- **Controllable loads**
  Machinery, equipment, EVs, computing, lighting, HVAC, etc.
- **Distributed Energy Resources**
  Solar, energy storage, generators, combined heat & power (CHP)
- **Intelligent Controls**
  Hardware (DER controllers) and software (control algorithms)

**DER systems can be** | **Community • Campus • Building • Home**

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# Achieving a more resilient energy infrastructure with microgrids is a balance of your business goals

**Microgrid Value Propositions**


**Sustainability:** minimize carbon emissions

- Generate more power from renewable sources
- Build renewable EV infrastructure
- Sell clean power back to the grid

**Resilience:** support for critical operations

- Bolster operations to ensure business continuity
- Operate off-grid in "island" mode
- Protect people, assets and data

**Efficiency**: reduce energy costs

- Optimize energy consumption
- Avoid peak demand charges
- Energy as a Service financing (OpEx vs. CapEx investment)

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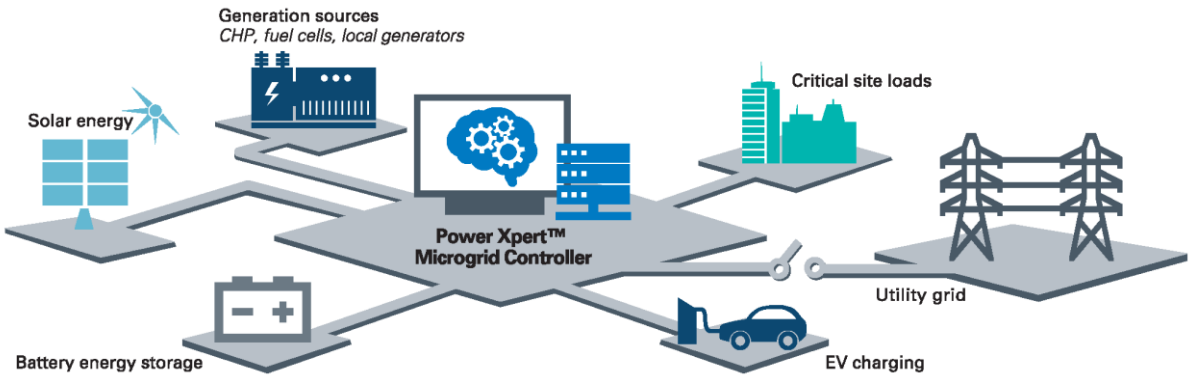
# Eaton has a broad range of capabilities to support microgrid design and deployment from end-to-end




**Microgrids require an intelligent controller as the "brains" of the system optimizing performance**

## Microgrid capabilities

### Microgrid solutions

- Power Xpert Microgrid Controller
- Pow-R-Line Xpert Microgrid Switchboard
- Energy as a Service (EaaS) financing through partners

### Feasibility studies

- Site-specific microgrid system studies
- DER sizing and techno-economic analysis
- Microgrid simulation for system configuration and testing

### Field Services

- Site electrical upgrades
- Electrical installation
- Operations and maintenance

### Turnkey electrical solutions

- Microgrid system design and DER integration
- Engineering, procurement & contracting (EPC)
- Project management
- Start up and commissioning

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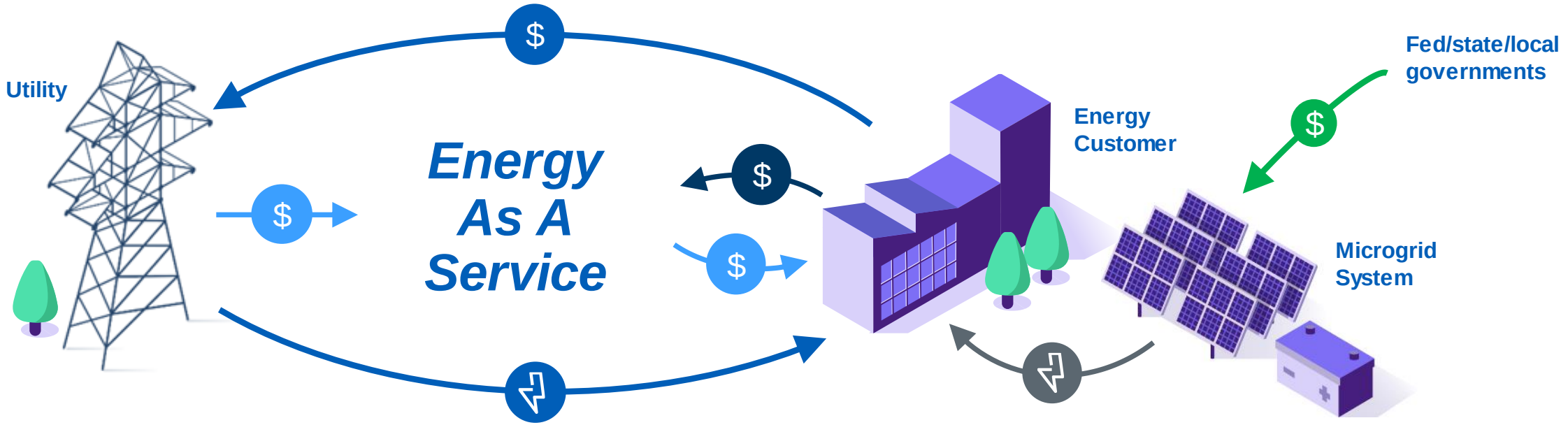
# Energy as a Service Financing allows you to install a microgrid without the up-front capital




1. Eaton's financing partner funds the microgrid system, and the customer pays the Financier a fixed PPA rate ($/kWh) for all energy generated
2. Microgrid system offsets customer's total energy consumption and peak demand, reducing total utility bill
3. Customer buys remainder of electricity from the grid, often at a higher rate than the PPA rate ($/kWh) for energy from the microgrid
4. Eaton can help system owners unlock additional value from the DER assets by monetizing their flexibility (e.g, demand response payments or grid services)
5. Available incentives, such as the federal investment tax credit (ITC), generally flow to the legal owner of the microgrid system (Financing partner) helping to offset the microgrid investment and lowering the PPA rate to the customer

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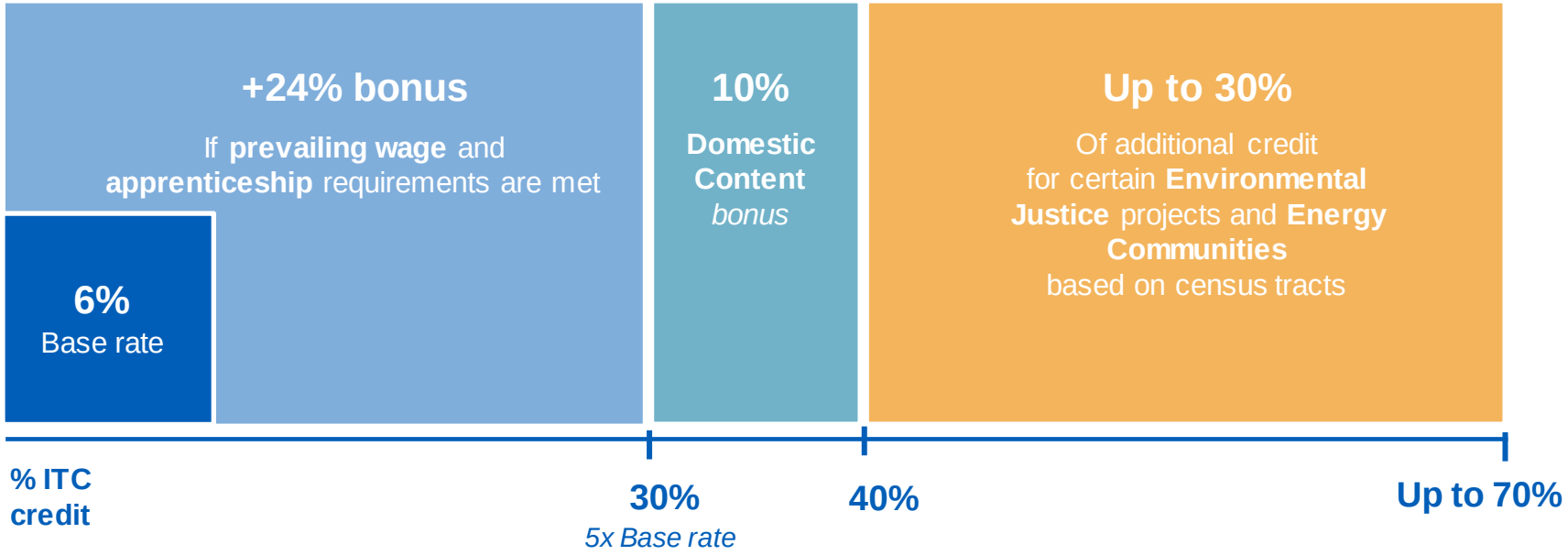
# Inflation Reduction Act of 2022:
## Investment Tax Credit (ITC) as it relates to microgrids

- Passed and signed in August 2022 - implementation underway
- Reinstates and extends the traditional commercial **investment tax credit (ITC)** for 2-years and creates a general zero-emissions **Clean Electricity Credit** in 2025
- In addition to **solar**, it expands ITC eligibility to include **microgrid controllers, energy storage** and more
- ITC includes base-rate with bonus if eligibility requirements are met - pending further Federal guidance

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# Case Study:
## Microgrid at Eaton's circuit breaker factory in Arecibo, Puerto Rico

### Solution:

Eaton and Enel X partnered to develop and finance a **microgrid at the manufacturing site** by leveraging our respective intelligent power management capabilities

Energy as a Service (EaaS) financing provided by Enel X through a 20-yr PPA

CAT 5

Microgrid designed to withstand damaging hurricanes

Watch a video overview: Eaton.com/MicrogridProjects


### Result:

The microgrid contributes to local sustainability and resiliency efforts while generating cost savings and additional revenue streams with DER monetization

Integrates **5MW solar + 1.1MWh battery energy storage** into the power infrastructure

Transforms Eaton's operations to become more **sustainable and resilient…**

…all while **reducing energy costs by >10%**

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# Case Study:
## Public utility water tower pumping station in Columbus


**Project scope:**
Turnkey project to design and build a microgrid system for the city's water tower that can operate both grid-connected and in "island" mode

open transitions ▪ renewable firming ▪ peak shaving ▪ islanding ▪ motor starting

Microgrid consists of 104 KW Solar PV, 440 KW BESS, and microgrid controller integrated directly into the switchboard

**Benefits:**

- **RESILIENCE** – Keep the water pumping in a grid outage
- **SUSTAINABILITY** – Green alternative to a generator
- **EFFICIENCY** – Energy cost savings per kWh



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# Questions to consider when determining if a microgrid is the right solution for your site

## Site Requirements

1. **Geography:**
   Where is the site located? Who is your utility provider?

2. **Solar suitability:**
   How much rooftop or land area is available at the site for solar?

3. **Longevity:**
   Do you own or lease the site? Do you plan to remain on the site for at least 10 years?

## Power Needs

4. **Site load profile:**
   What is peak and average load of the site?

5. **Energy spend:**
   How much does the site spend on power per month? All in $/kWh cost including peak demand charges

6. **Resiliency:**
   How often does the site lose power and for how long? Try to quantify the cost of an outage.

## Corporate Goals

7. **Corporate objectives:**
   What are your stated objectives around sustainability, resilience or energy savings?

8. **Sourcing strategy:**
   How comfortable are you sourcing the design and ongoing operation of the microgrid?

## Financing Needs

9. **Energy as a Service:**
   Are you more interested in a packaged microgrid solution as an operating expense or a capex direct investment?

10. **Creditworthiness**:
    What is your credit rating?

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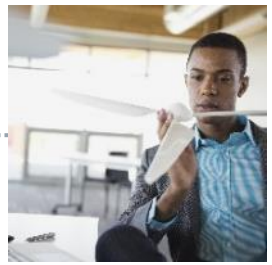
# EVERYTHING AS A GRID

> Every time you hear **sustainability, climate change, or resiliency**, you are hearing about **growth opportunities** for our company today and for the foreseeable future.

***Chairman and CEO Craig Arnold***
*Q2 2022 earnings call | August 2, 2022*



**Eaton.com/Microgrid**

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# Eaton has a full breadth of microgrid capabilities

## Make us your easy button

**Feasibility studies**

Step 1: Evaluate the economic and resilience impact of your microgrid project

**Design, build & construct**

Leading turnkey services and power systems engineering capability for technical microgrid project development

**Hardware deployment**

Expansive electrical portfolio and robust supply chain to procure solar PV and battery energy storage

**Microgrid software**

Intelligent microgrid controls paired with economic optimization software to deliver energy savings

**Market services**

Unlock additional value from your DER assets by enrolling in flexibility programs such as demand response

**Operations & maintenance**

Ongoing system maintenance from Eaton's highly trained team of dedicated field services personnel

**Energy as a Service**

Eaton offers customers the ability to fund projects as an operational expense by seamlessly structuring deals with trusted finance partners

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