Leveraging AI for Next-Gen Campus Energy Management

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CampusEnergy2020
THE POWER TO CHANGE
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ENGIE

Context: Ohio State Energy Partners

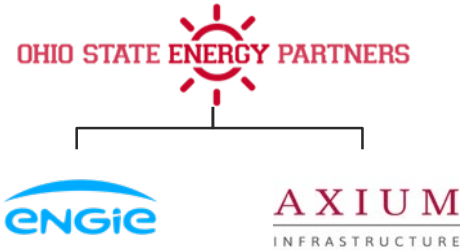
OHIO STATE ENERGY PARTNERS

Goal

Reduce campus energy consumption by **25% within 10 years**.

Partnership Highlights

- Launched **July 2017** with a contract term of **50 years**
- Partnership consists of **ENGIE** (operator, investor) and **Axium** (investor)
- Manage energy for **400+ buildings** and **25 million sq. ft.**
- Operate **1 steam, 3 chilled water plants, 2 HV switchyards, steam, natural gas, electricity, and chilled water distribution networks**
- Build a new combined heat and power **(CHP)** plant to be **online by 2022**



ENERGY OPTIMIZATION SOFTWARE IS CORE ELEMENT OF PLATFORM AT OSU

5 Key Elements of Energy Strategy

1. **Resiliency**
2. **Sustainability**
3. **Flexibility**
4. **Affordability**
5. **Predictability**

Energy as a Service™ Platform

Operational Value

- **Infrastructure Modernization**
- **Energy Efficiency Services and Operations**
- **Commodity Procurement and Risk Mitigation**
- **AI-Enabled Energy Optimization**

Financial Partnership

- **Investment into the University**
- **Academic Partnership**

DIGITAL PROJECT : 'SMART INSTITUTIONS'

Goal

Deliver an **Energy Management solution** to monitor and optimize campus energy consumption, and enhance planning for campus growth.

Key Deliverables

- Build an integration **(Fusion)** platform for connecting to and ingesting university data:
  - Smart Meters, Utility Bills, Building Management Systems, WiFi Occupancy, Weather, ArcGIS
- Implement the **C3.ai Energy Management** platform to manage campus energy.
- Develop advanced analytics **(AI) for energy forecasting** (electricity & natural gas) to enable additional energy conservation measures.
- Enable discovery and execution of **energy conservation measures** and and value-add applications
- Create a **Public UI** for sharing data with the faculty & staff, students, and the community.

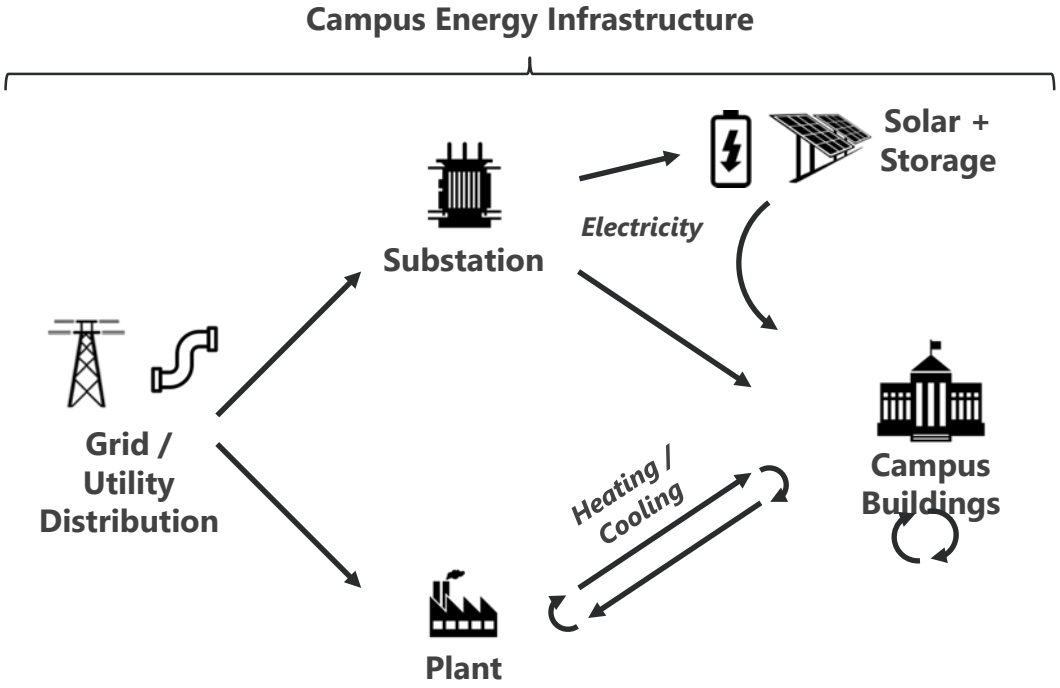
OHIO STATE ENERGY PARTNERS

ENGIE

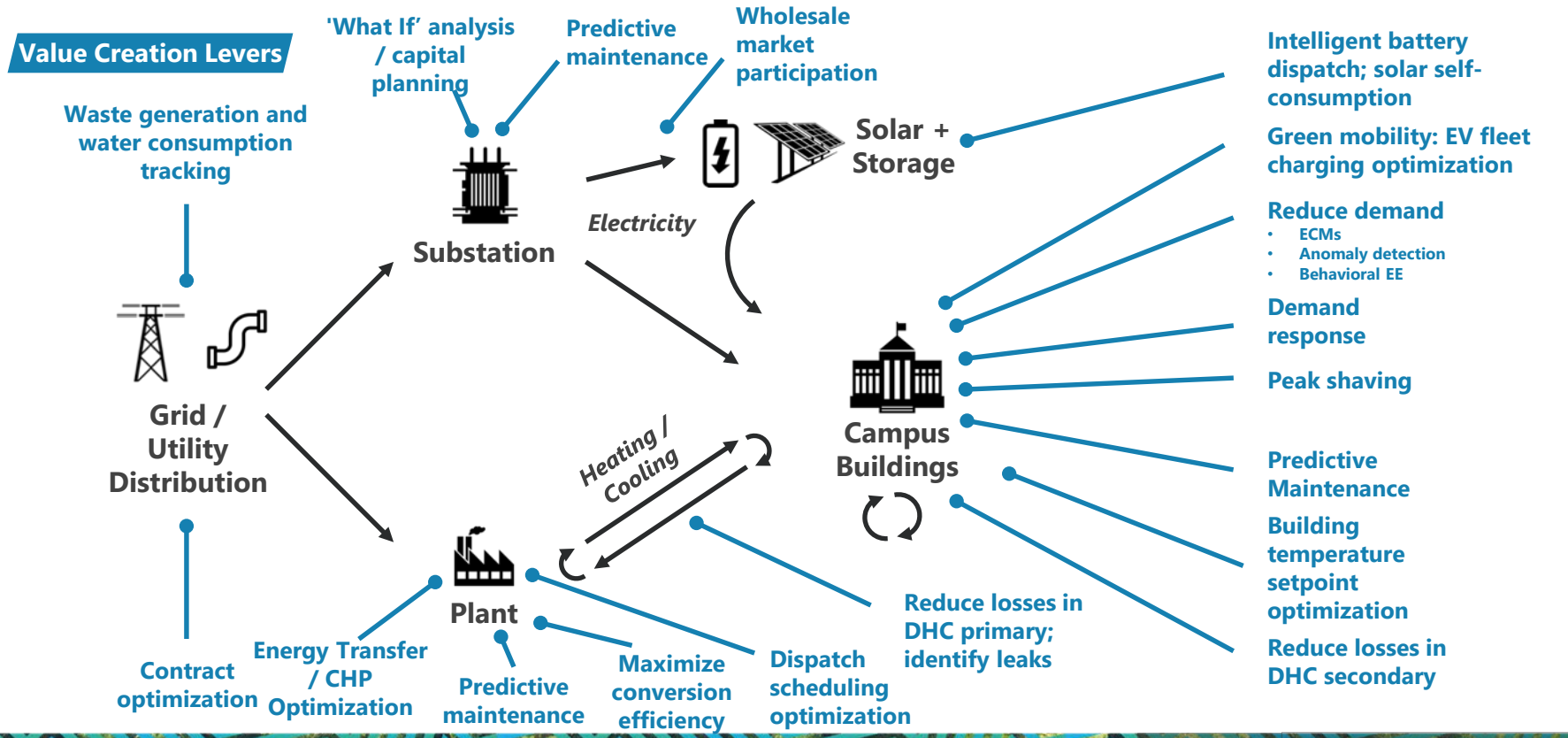
C3.ai


AI for Campus Energy Management

AI SOFTWARE CREATES VALUE AT MULTIPLE POINTS ON CAMPUS



AI SOFTWARE CAN CREATE VALUE AT MULTIPLE POINTS ON CAMPUS



END-STATE | LEVERAGE AI TO DRIVE ENERGY OPTIMIZATION

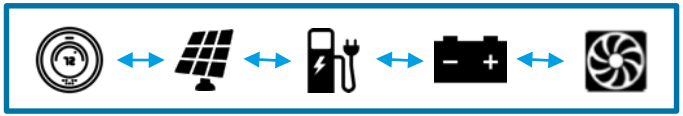
Monitor real-time building data, market pricing, and on-site demand

'Smart Institutions'

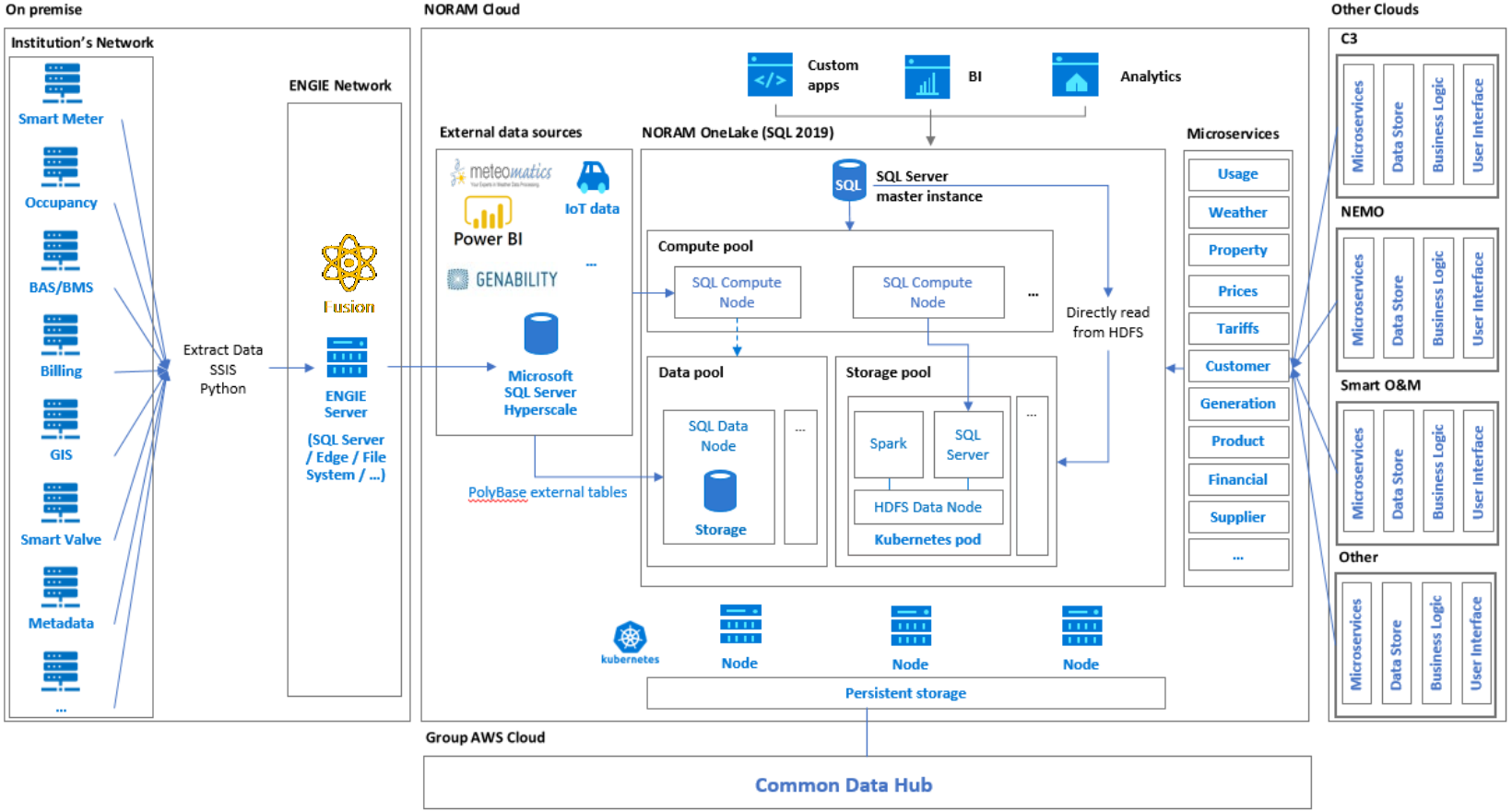
Monitor changes, verify benefits, engage staff / students, and design new programs

Predict load profiles, optimize supply, and determine best real-time operation

Automatically control systems, send alerts, and dispatch available power (e.g., storage)



SMART INSTITUTIONS ARCHITECTURE – DATA SHARING



OSU INTEGRATES DATA FROM MULTIPLE SOURCE SYSTEMS

Electric & Gas Bills

Smart Meter Data

Building Automation and Building Management Systems

ICS, Plant, and Chiller and Boiler Data

Occupancy Data from WiFi Access Points

ENGIE Fusion Data Platform

- **1,100** Smart Meters
- **7,000** Tags @ 10 Min Intervals
- **370** Million Readings Per Year

- Buildings Monitored:
  - **12** Academic @ 2.2M sq. ft.
  - **2** Med Center @ 700k sq. ft.
  - **9** Student Life @ 1.2M sq. ft.
- **550,000+** Tags @ 15 Min Intervals
- **25+ Billion** Readings Per Year

- **25,000** Access Points
- **220 million** Recordings Per Year @ 1-Hour Intervals

OSU USES AI FOR MULTIPLE USE CASES

THE OHIO STATE UNIVERSITY

AI Features in Smart Institutions

- Energy Consumption Forecasting
- Steam And Chilled Water Production Forecasting
- Energy Consumption Anomaly Detection
- Data Quality Alerting and Cleansing

In Development

- Chiller/Boiler Operations Optimization
- Peak Demand Prediction And Forward Alerting
- Predictive Maintenance And Asset Anomaly Detection
- CHP Optimization

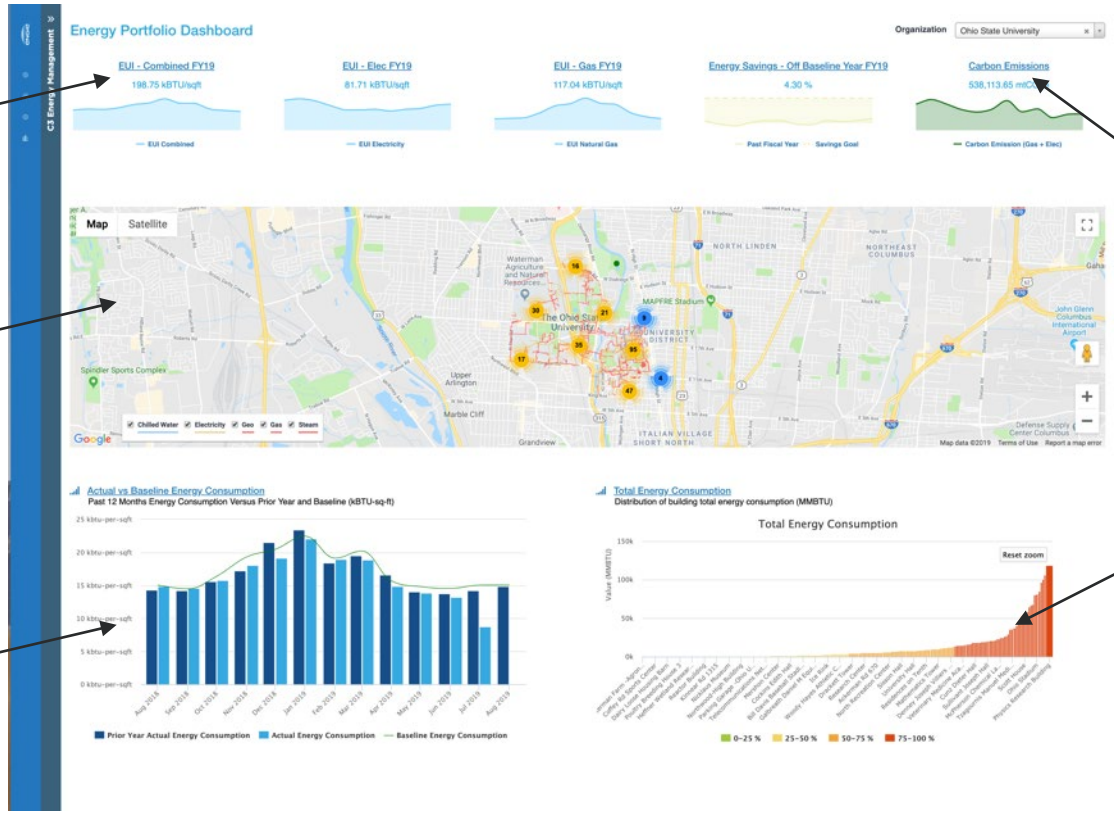

Demonstration

CAMPUS PORTFOLIO DASHBOARD

Automated analysis and tracking of critical KPIs

Geospatial search with all campus energy networks

Tracking of topline trends

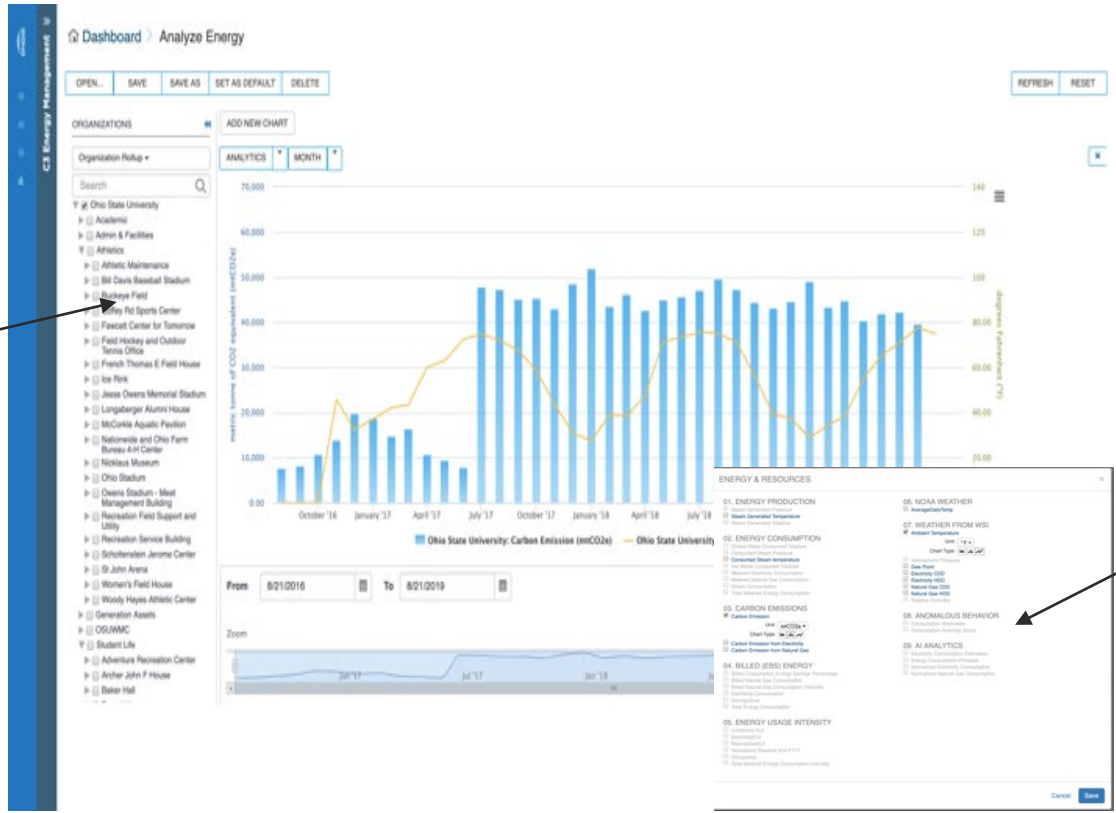


GHG KPI analysis and tracking

Portfolio benchmarking to identify best and worst performers

DETAILED CAMPUS AND ASSET ANALYZER

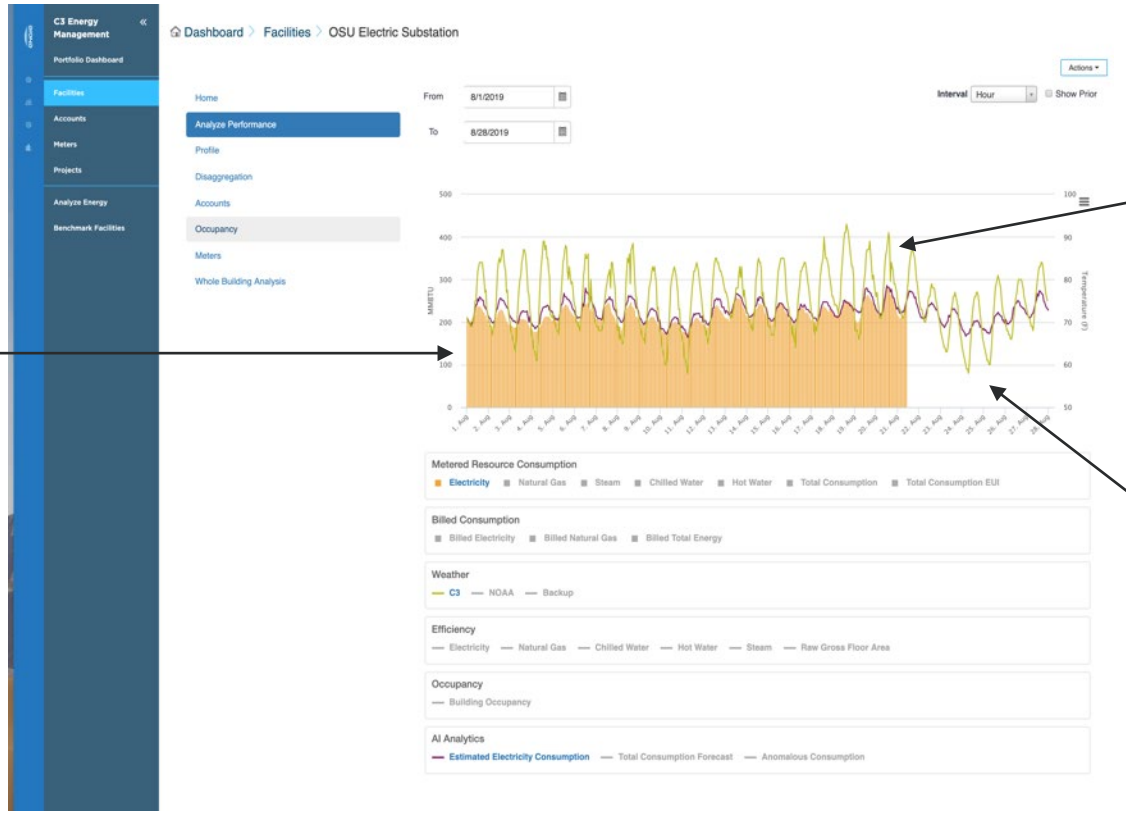
Explore full university hierarchy and select any node or aggregation for analysis



Large list of energy, sustainability, weather, and AI-based analytics

DETAILED BUILDING ANALYSIS AND FORECASTING

View and analyze AI-based forecasts using energy, weather, and occupancy



Understand energy drivers such as weather and occupancy

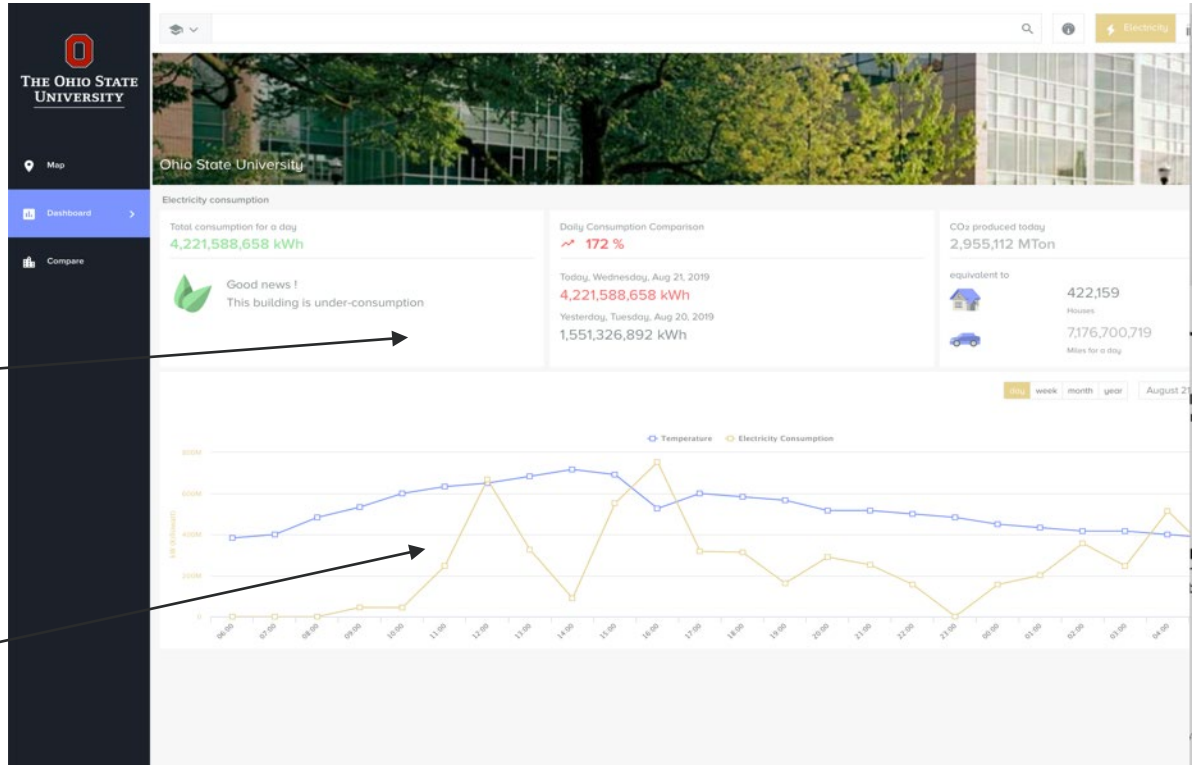
Take preventative action such as demand response based on energy forecasts

END-STATE: LEVERAGE AI TO DRIVE ENERGY OPTIMIZATION

Public site for Smart Institutions for University students and faculty

Overall trends to encourage competition and real-time behavior change

Basic data analysis capabilities



https://preprod.osu.bigdata.digital.engie.com/dashboard/electricity


Next Steps

ROADMAP FOR SMART INSTITUTIONS

Sustainability & Distributed Energy

EV Fleet Optimization

Determine when and where to charge vehicles in EV fleets

Solar & Storage Optimization

Optimal dispatch of solar and storage resources for demand response and charge management

Carbon Tracking & Reporting

Portfolio and building-level carbon tracking; self-service sustainability reports

DHC & CHP

Distribution Network Optimization

Determine optimal setpoints to maximize DHC efficiency throughout the network

CHP Optimization

Optimize CHP setpoints and operating schedule to improve generation and heating efficiency

Predictive Maintenance on DHC

Predict failure of DHC assets including chillers and boilers to decrease costs, improve uptime

Operations

Occupancy & Traffic Flow Analytics

Tracking traffic & carbon flow via wifi signals

Building Setpoint Optimization

Generate daily schedules of building temperature setpoints to reduce peak load

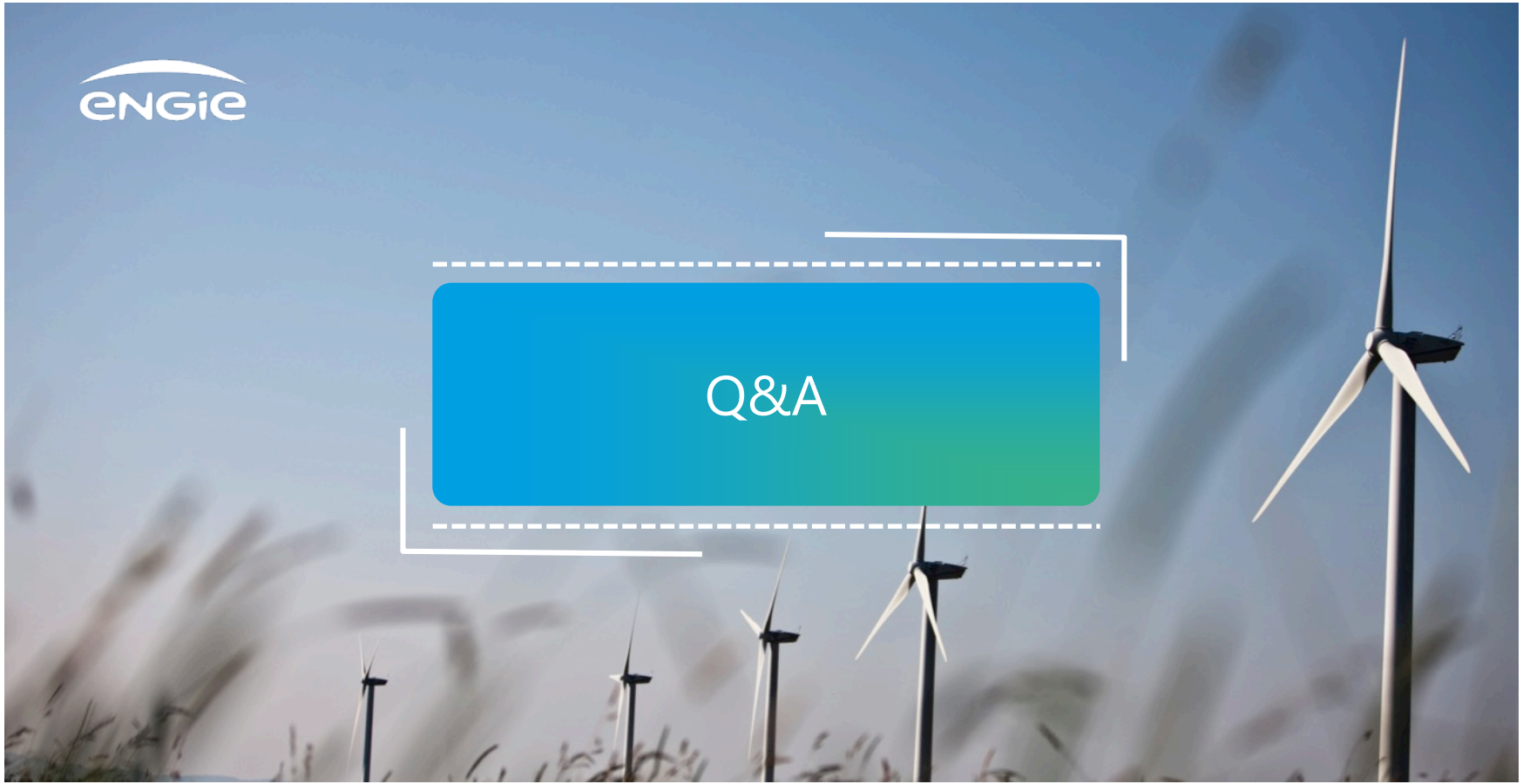
Identifying Server Loads

Facilitate IT centralization priorities by identifying individual servers located across campus

Building Asset Predictive Maintenance

Predict failure of building assets (e.g., chillers)

Release 2.0+ features to be continuously refined with customer and partner input


Q&A

Thank you!

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DESIGNING AND DELIVERING DIGITAL SOLUTIONS
THAT TRANSFORM THE ENERGY WORLD

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