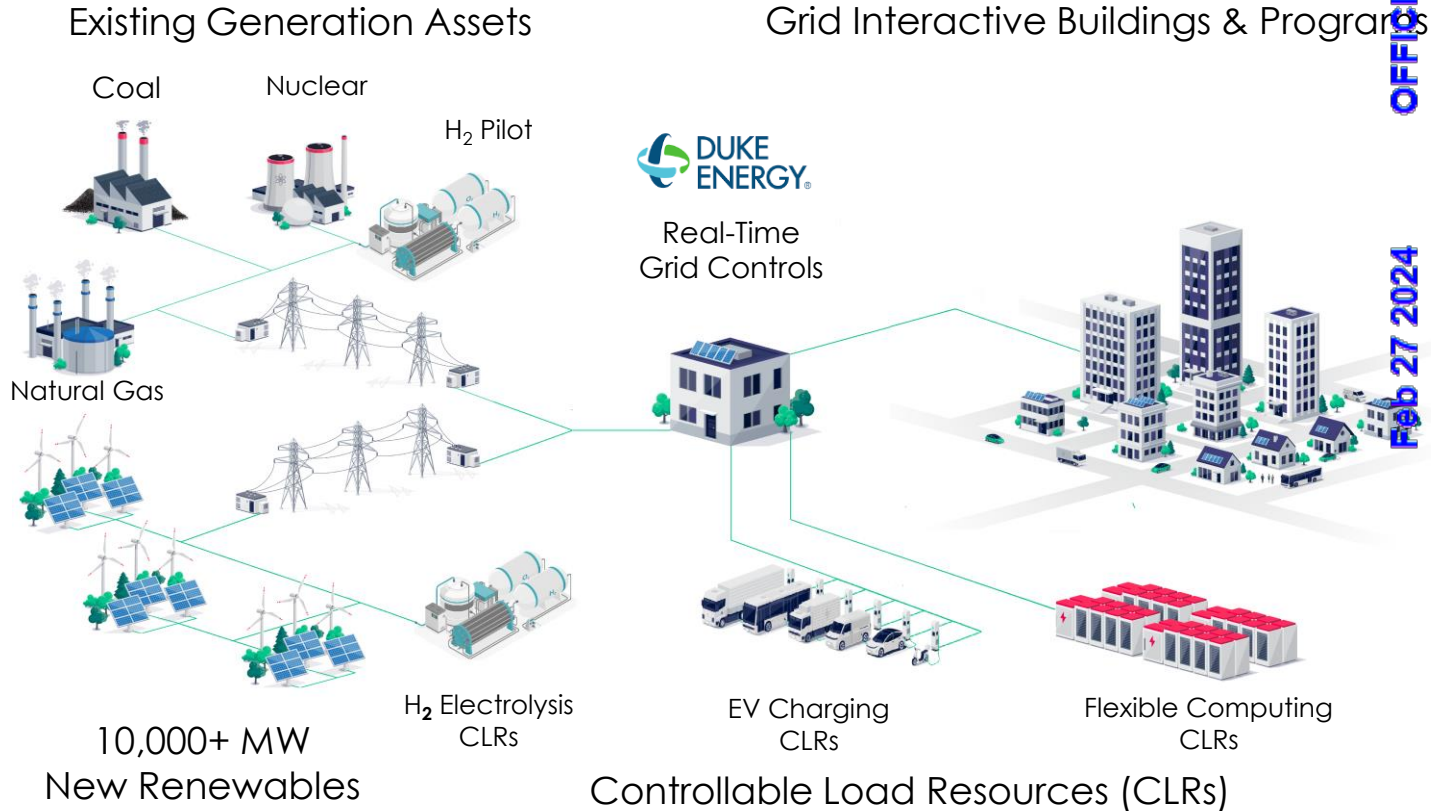


# CLR Achievable Grid Services & Value Streams

## Value Streams

- Real-Time Grid Control
- Renewables Integration
- Avoided Capacity
- Energy Orchestration
- Performance M&V



# Controllable Load Resource (CLR) Overview

Docket No. E-7, Sub 1306  
Presson Exhibit 27

Duke Energy

## Controllable Load Resources Grid Service Attributes

- Flexible & Bi-Directional
- Responsive (<10 seconds)
- Automatable (ADR)
- Reliable
- Modular
- Standardizable

Duke Emerging Technology Office (ETO)

### Flexible Computing Load (ETO NC)

#### Installed & Operating

- 7 x Whatsminer M33S++ Servers
- ~48 kW Total / 90% Flexible Capacity
- 1,694 TH/s
  - Cx & Testing (Oct '23)
- VPN Data Access (Nov '23)
- DCFE Control Integration (Complete)



North Carolina

### Duke-Owned EV Chargers (DCFNC NC)

#### Installed & Operating

- 16 x BTC POWER DC Fast Chargers
- Duke-Owned Asset
- Establish Real-Time Data Feed (Nov '23)
  - AMI Meter
  - DCFNC Cabinet
  - On-Site Power Meter
  - Transformer / Substation Meter
- Benchmarking Grid Services (Nov '23)
- CLR Control Coordination (Complete)



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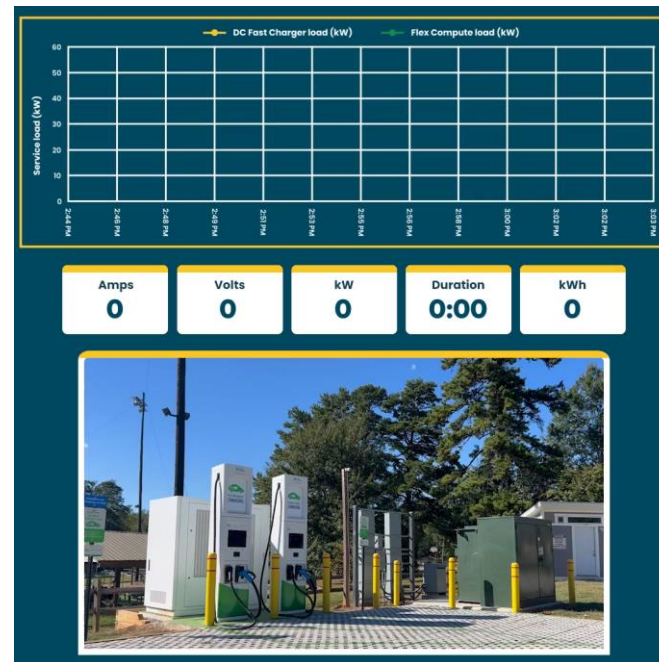
# CLR Pilot Study – Phase I Dashboard

Docket No. E-7, Sub 1306  
Presson Exhibit 27

Duke Energy & NCREPS

## CLR Grid Controls Flex Compute & EV Chargers

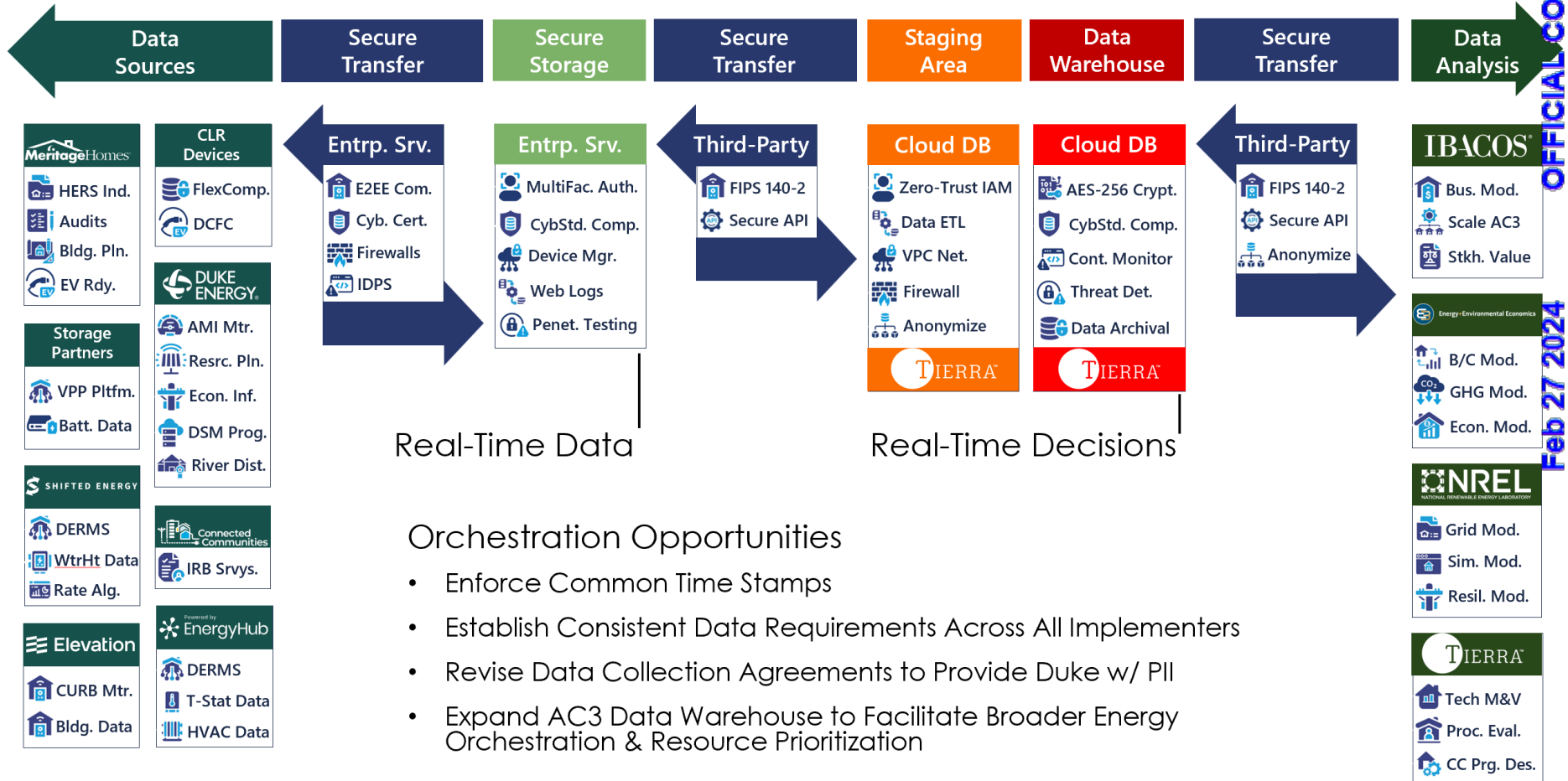
- Real-Time CLR Load-Fill Control (Dec '23)
- Energy Orchestration Coordination (Ongoing)
- Real-Time CLR Control Dashboard (Ongoing)



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# Energy Orchestration Secure Data Framework



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# Current Control Strategies & Data Framework

## Energy Control Center

Control Standard

 ECC Platform

## Power Share

Control Standard

 Telephone Calls

 Fax Messages

 E-Mail Requests

## Power Manager

Control Standard

 MercuryDERMS

## Rate Optimizer

Control Standard

 Grid Maestro

## Open Source

Control Standard

 OpenADR

 OCPP

## Control Attributes

- Unique and Device-Specific Controls
- Cross-Communication and Coordination Challenges
- One-Way Communication (Verification Challenges)

# Current Control Strategies & Data Framework

## Energy Control Center

 **DUKE ENERGY.**  
 Grid Controllers

## Power Share

 **DUKE ENERGY.**  
 Program Staff

## Power Manager

 **DUKE ENERGY.**  
 Program / Agg. Staff

## Rate Optimizer

 **DUKE ENERGY.** DOE Pilot  
 Optimization Algorithm




## Open Source

 **DUKE ENERGY.** ETO Pilot  
 ETO Staff

## Control Standard

 ECC Platform

## Control Standard

 Telephone Calls  
 Fax Messages  
 E-Mail Requests

## Control Standard

 MercuryDERMS

## Control Standard

 Grid Maestro

## Control Standard

 OpenADR  
 OCPP

## Intermediary (Option)

 Emergency Switch

## Controlled Devices

 Thermostats



## Intermediary Device

 CTA-2045 Port


## Intermediary Device

 CTA-2045 Port




## Controlled Devices

 Generation Assets  
 Substations

## Intermediary

 PowerShare Customers




## Controlled Devices

 Steel Plant Loads  
 Data Center Loads  
 Process Loads

## Controlled Devices

 Water Heater Controls

## Controlled Devices

 Res. Thermostats  
 Res. Wtr.Htr. Controls  
 EV Chargers

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# CLR & Energy Orchestration

Duke Energy

## Standardized & Centralized Communication & Controls

- Common Time Stamps
- Updated Data Accessibility Requirements for Partners
- Cross-Device & Control Platform Compatibility
- Active Insights with Real-Time Performance Data (Coordination, Prioritization, etc.)
- Integrated Performance / Control Dashboard

