



DR Control Strategies

CEC EPC-16-026

Develop and Pilot Test Flexible Demand Response Control Strategies for Water Pumping Stations and Industrial Refrigeration Plants

An aerial photograph of an industrial district, likely in Los Angeles, showing numerous large, flat-roofed industrial buildings and parking lots. In the background, a range of mountains is visible under a clear sky. A white square with a blue border is overlaid on the right side of the image, containing the 't&d' logo in blue lowercase letters.

t&d



DR Control Strategies
Supporting
California's
Clean Energy
Goals

Demand Response (DR) is helping utilities manage electrical load with participating customers but it's potential has barely been realized. The largest opportunity exists in industrial facilities, where energy storage is often inherent at a large scale.

Led by Electric Power Research Institute (EPRI), Project EPC-16-026 is developing and testing integrated control strategies for fast and flexible DR for two important commercial/industrial end-use sectors:

- Water delivery
- Refrigerated food distribution

Successful development and adoption of these systems will enable faster and more flexible demand response, resulting in grid support, while optimizing on-site operations and saving energy.



DR Control Strategies

Project Goals

1

Identify

DR control strategies for water pumping and refrigeration

2

Advance

industry understanding of system-based strategies

3

Develop

independent market-signaling interface plus integrated version for refrigeration

4

Pilot

Water-pumping FEMS & compatible version for refrigeration

5

Design

Both systems to enable DR management of multiple loads in both sectors



Water Pumping Station

The California Water Service, East LA Station in Montebello, CA is on task to test three key technologies:

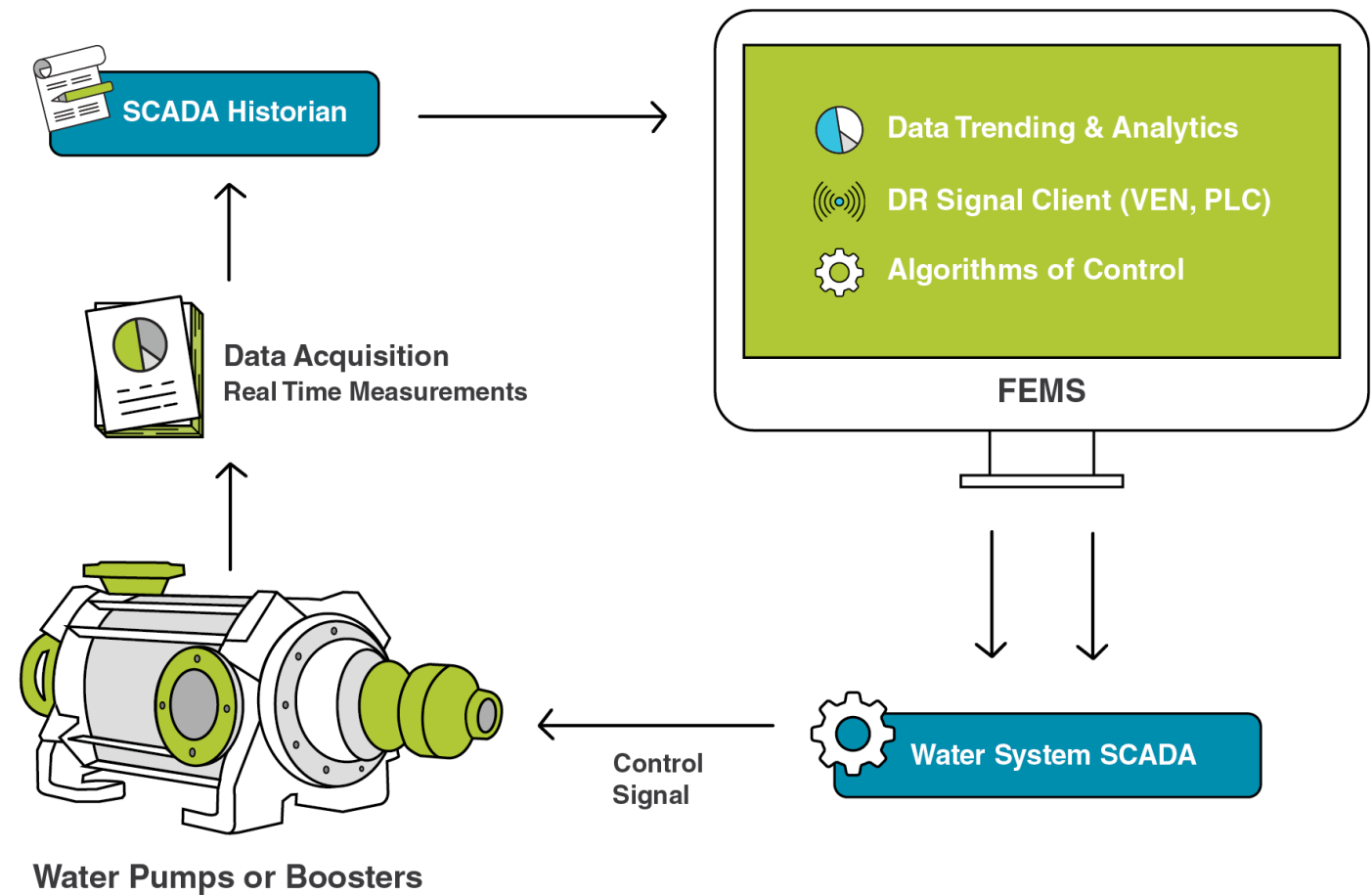
- Variable Speed Pumping with Zonal Storage Tanks
- Cloud-based data exchange with Water Control System Historian
- DR Decision Support Tool for Day-ahead and Day-of Water Operations

Industrial Refrigeration

Lineage Logistics is the 2nd largest industrial refrigeration company. Key characteristics of the Mira Loma refrigerated warehouse are:

- 677,000 sq. ft. of temperature controlled refrigerated space
- Space temperatures range from freezer (below 0° F) to cooler (0 to 32° F), dry storage (above 32° F), and dock areas (40° F)
- Traditional central ammonia refrigeration plant
- ~2.6MW power demand

DR Control Strategies FEMS Design for Water Pumping





DR Control Strategies Water Pumping - Status



PROJECT STATUS

Taxonomy for flexible water pumping has been developed. Additional activities completed to date include:

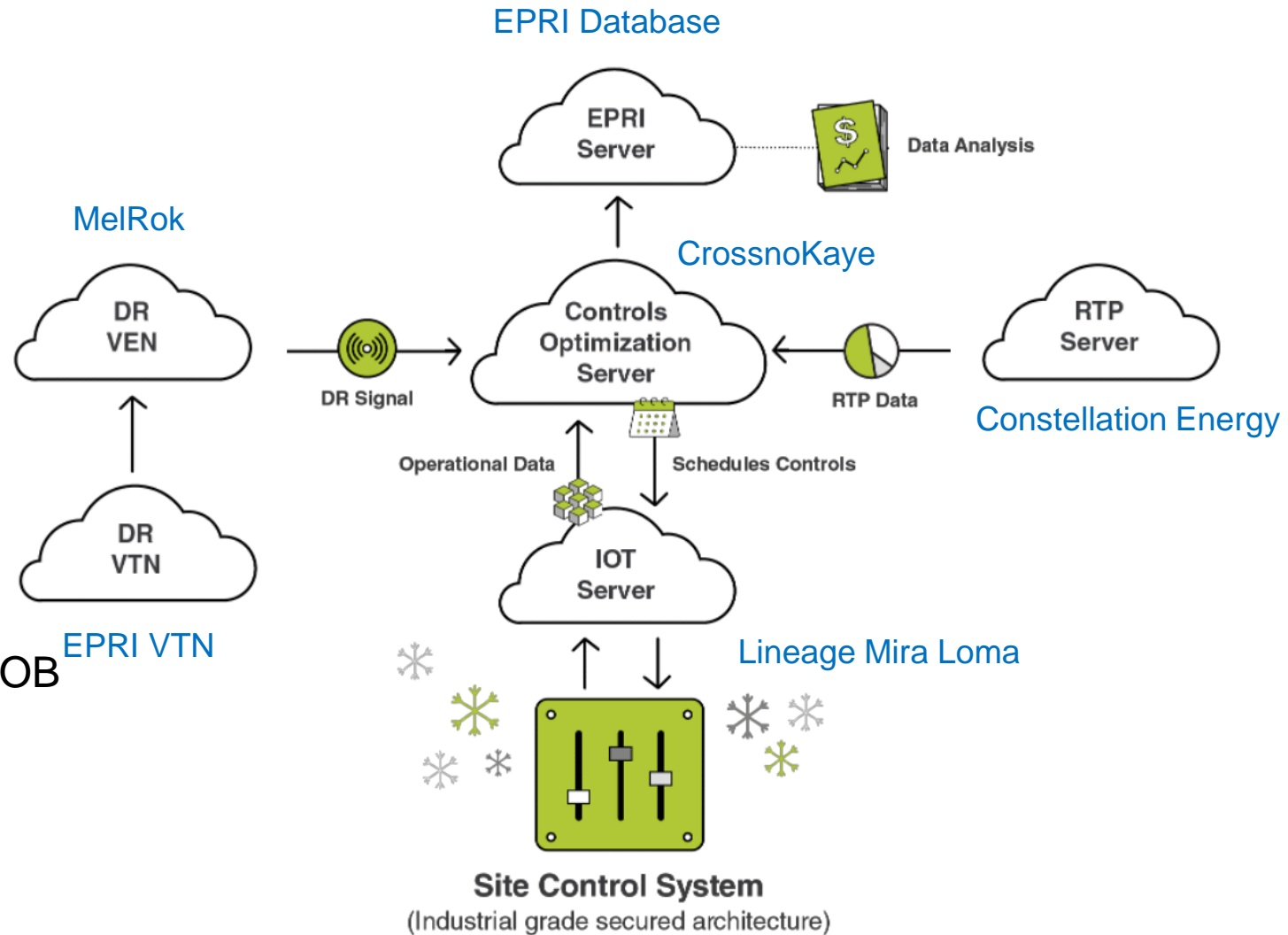
- Identified DR strategies and operational constraints for pilot testing
- Designed DR decision support tool for Day-ahead and Day-of Water Operations, which has been vetted by Water Operations personnel
- Completed plant operator interviews and collected initial data
- Installed sub-metering and implemented SCADA connection
- Identified security policy and approved Cloud-based data exchange with SCADA Historian

NEXT STEPS

- Implement Cloud server and interface to enable Cloud-base data exchange interface with SCADA Historian and FEMS System.
- Develop and test the FEMS database and software.
- Demonstrate DR strategies for flexible water pumping within water operational constraints.
- Understand operator tolerance for engaging response from water pumps.

DR Control Strategies FEMS for Industrial Refrigeration

Make 2-way OpenADR 2.0B ^{EPRI VTN}





DR Control Strategies Industrial Refrigeration - Status



PROJECT STATUS

The Mira Loma refrigerated warehouse utilizes an existing cloud-based supervisory controls system to reduce energy costs, while meeting food safety standards. Data communication between the refrigerated warehouse controls system at the site and a remote server in the cloud is operational.

NEXT STEPS

- Help expedite retrieval of site's metered energy data.
- Set up OpenADR2.0B signal communication from the EPRI VTN to a VEN in the cloud and to the remote server in the cloud.
- Conceptualize, test and demonstrate refrigeration system controls strategies for DR.
- Monitor, collect and analyze operational data, and assess control schemes for flexible DR to support the grid.
- Provide recommendation on potential DR control strategies for industrial refrigeration plants in California.



Thank you for coming

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