
t&d

CEC EPC Project 16 - 026

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

Project Overview

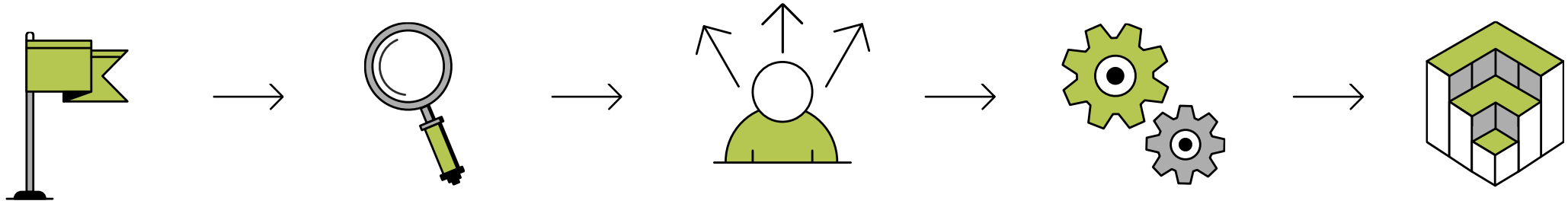
EPC Project 16-026 is developing and testing integrated control strategies for fast and flexible DR for two important commercial/industrial end-use sectors:

- Water delivery
- Refrigerated food distribution

Successful development and adoption of these systems will enable faster and more flexible demand response, resulting in optimized on-site operations and energy bill savings.

DR Control Strategies Logic Model

Updated: March 2020



PROJECT GOALS
Goals of this EPIC research and development project

KEY FINDINGS
Successes and challenges identifies through research and development.

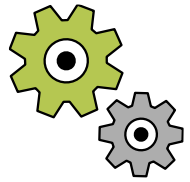
OPPORTUNITIES
Activities or circumstances that could fill in the gaps and leverage points to enable forward movement.

EXPECTED OUTCOMES
Most likely near term and longer-term outcomes identified by the TA&D project team.

NEXT STEPS
Knowing what we know now, these are the suggested next steps.

RESEARCH QUESTION 1

Can a **Flexible Energy Management System** (FEMS) be developed that allows for demand response control of energy used **water pumping utilities**?

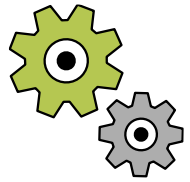


SUCCESS TO DATE

1. Taxonomy for flexible water pumping has been developed.
2. DR strategies and operational constraints for pilot testing have been identified.
3. DR decision support tool for Day-ahead and Day-of Water Operations has been designed.
4. Security policy and approved Cloud-based data exchange with SCADA Historian has been identified.

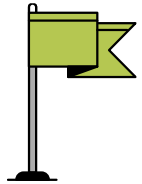
RESEARCH QUESTION 2

Can electricity usage control schemes be integrated into existing supervisory energy management control systems for **industrial refrigeration** that meet food safety standards and allow for demand response?



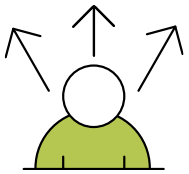
SUCCESS TO DATE

1. Data communication between the refrigerated warehouse controls system at the site and a remote server in the cloud has been established.

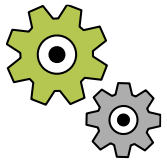


PROJECT GOALS

KEY FINDINGS



OPPORTUNITIES



EXPECTED OUTCOMES

NEXT STEPS

FEMS FOR WATER PUMPING

Determine if a Flexible Energy Management System (FEMS) can be developed for water utilities that allows for demand response control of energy used for pumping water.

SUCCESSES
- Taxonomy developed.
- DR strategies identified.
- Decision support tool designed.
- SCADA Historian policy approved.

CHALLENGES
- May need to change sites due to number of pumps shut off at current test site.

MISSING PIECES
- Understand operator tolerance for engaging response from water pumps.
- Prove that a cloud-base data exchange will interface with SCADA Historian and the FEMS System.

LEVERAGE POINTS
- Demand Response of water related energy has been a key focus for CA utilities for more than a decade.

NEAR-TERM OUTCOMES
- Cloud-base data exchange will interface with SCADA Historian and the FEMS System
- Additional water utilities engage in testing

LONGER-TERM OUTCOMES
- Successfully deployed across multiple water utilities
- Achieves 20% adjustment goal.
- Adopted by other utilities for deployment across CA.

NEXT STEPS
1. Develop Cloud server/ interface to enable Cloud-based data exchange interface with SCADA Historian and FEMS System.
2. Develop and test FEMS database and software.
3. Demonstrate DR strategies for flexible water pumping.

ACTIVITY/ OWNER
- EPRI
- SCE

DR CONTROLS INTEGRATION FOR INDUSTRIAL REFRIGERATION

Determine if electricity usage control schemes can be integrated into existing systems while still meeting food safety standards for refrigeration.

SUCCESSES
- Data communication established.

CHALLENGES
- Security standards involving food safety have added complexity to integrating electricity usage control schemes.

MISSING PIECES
- Confirmation that an OpenADR2.0B signal communication from a VTN to a VEN in the cloud can meet food safety standards.

LEVERAGE POINTS
- DR potential across industrial refrigeration is high and of great interest to SCE and other utilities.

NEAR-TERM OUTCOMES
- OpenADR2.0B signal meets food safety standards.
- Additional refrigeration plants participate in testing.

LONGER-TERM OUTCOMES
- Successfully deployed across multiple refrigeration plants.
- Achieves 20% adjustment goal.
- Adopted by other utilities for deployment across CA.

NEXT STEPS
1. Address privacy concerns to help expedite metered data sharing.
2. Set up OpenADR2.0B signal
3. Test refrigeration system controls strategies for DR
4. Analyze operational data and assess control schemes.

ACTIVITY/ OWNER
- EPRI
- SCE

Opportunities resulting from EPC 16-026

WATER PUMPING

- Understand operator tolerance for engaging a response from water pumps.
- Prove that a cloud-base data exchange will interface with SCADA Historian and the FEMS System.
- Leverage high utility interest in DR of water related energy to engage more water utilities.

INDUSTRIAL REFRIGERATION

- Confirm that an OpenADR2.0B signal communication from a VTN to a VEN in the cloud can meet food safety standards.
- Understand operator tolerance for integrating DR and address concerns regarding food safety standards.
- Leverage high utility interest in DR potential for industrial refrigeration to engage more refrigeration plants.

Next Steps

WATER PUMPING

- Develop Cloud server/ interface to enable Cloud-based data exchange interface with SCADA Historian and FEMS System.
- Develop and test FEMS database and software.
- Demonstrate DR strategies for flexible water pumping.

INDUSTRIAL REFRIGERATION

- Address privacy concerns to help expedite metered data sharing.
- Set up OpenADR2.0B signal.
- Test refrigeration system controls strategies for DR.
- Analyze operational data and assess control schemes.

Thank you for coming

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