

Utility Incentives for RTU FDD in California

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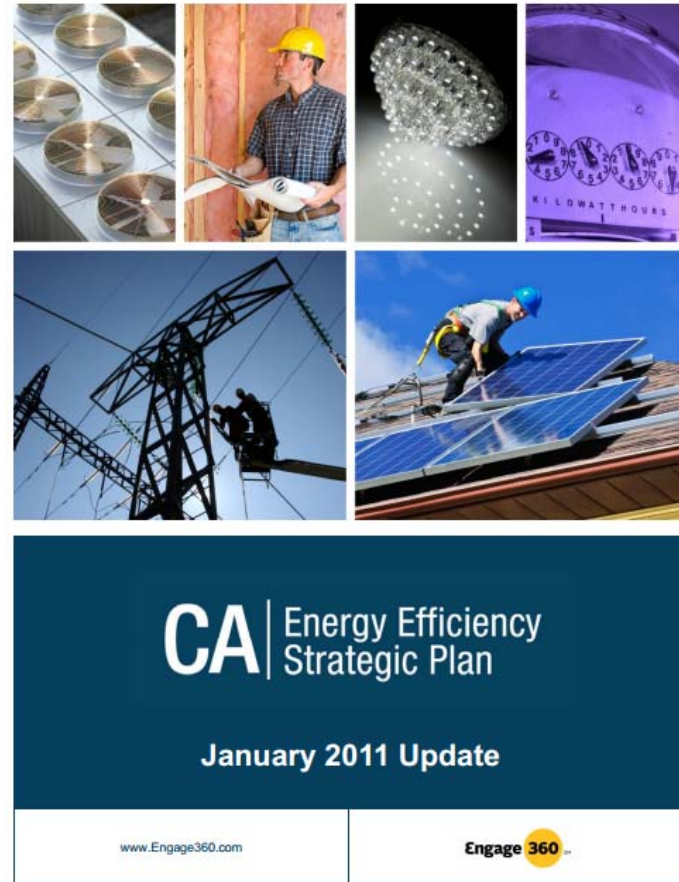
Agenda

- Strategic Direction
- Action Plan
- Industry Involvement
- Business Case
- Research
- Programs
 - Field FDD
 - Onboard FDD
- Challenges
- Next Steps



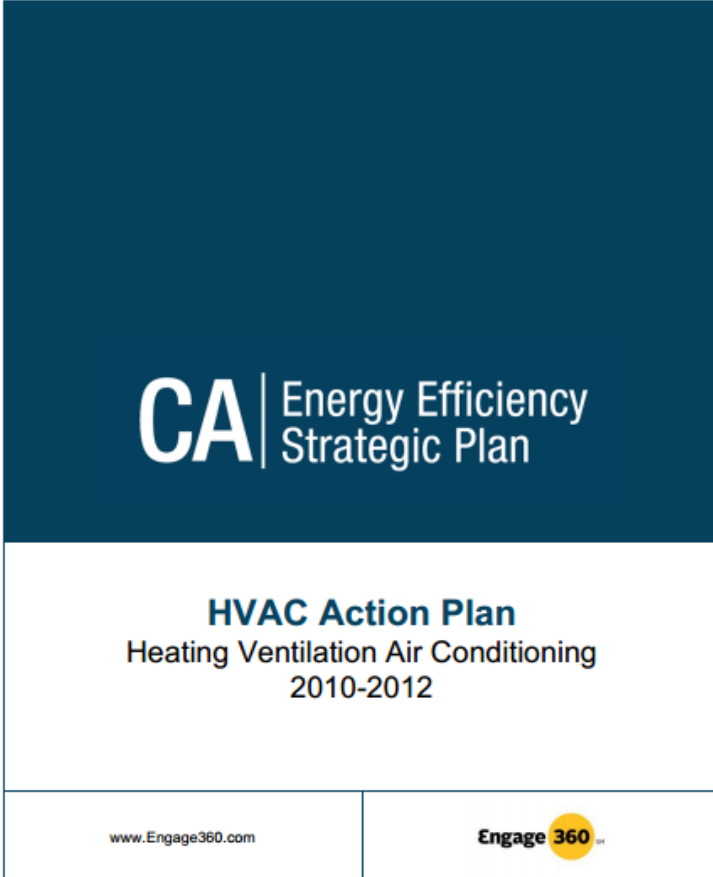
Strategic Direction

1. Prioritize in-field diagnostics
2. Benchmark existing protocols
3. Develop nationwide standards
4. Aggressively promote onboard diagnostics



Plan of Action

- Onboard diagnostics
 - Functionality
 - Designated sensor mount locations
- In-field diagnostics
 - Maintenance based on anticipated savings, cost or repairs, frequency of faults
- Quality services
 - Develop QM/QI brand
 - National standards



CA | Energy Efficiency Strategic Plan

HVAC Action Plan
Heating Ventilation Air Conditioning
2010-2012

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Industry Involvement

“An HVAC Advisory Group (working group) should be chartered to involve high-level HVAC industry stakeholders—such as manufacturers, distributors, and contractors—to coordinate industry sponsorship of and participation in HVAC strategies.”



Key Committees:

- FDD (Onboard + In-Field)
- QI (Commercial + Residential)
- QM (Commercial + Residential)

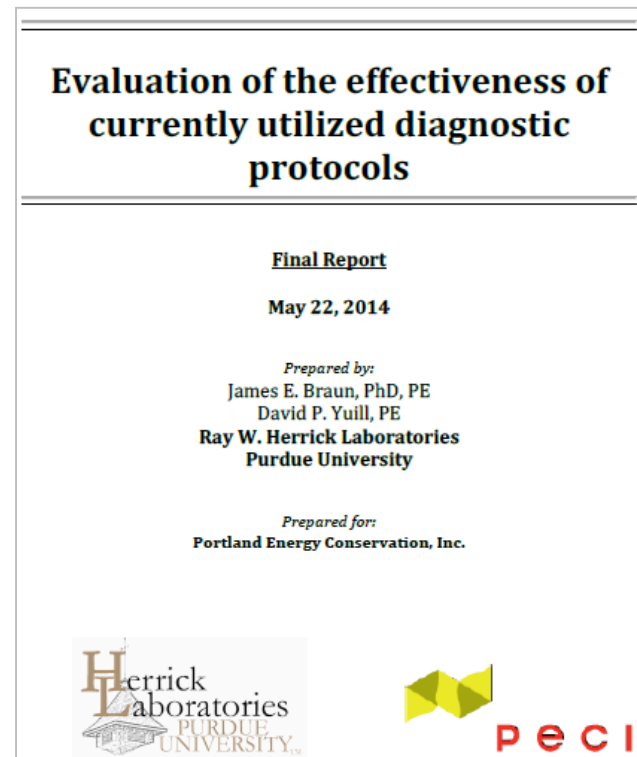
Utility Business Case

- Vested interest in energy efficiency
- Highly motivated to help ratepayers
- Shareholder earnings connected to EE performance
- Focused on HVAC efficiency as key alternative to:
 - Building new power plants
 - Increased grid capacity
 - Keeping ailing power plants operational and safe
- FDD is a vital component
 - Ensures savings are ACHIEVED and MAINTAINED
 - Increases contact with businesses and building owners



Research

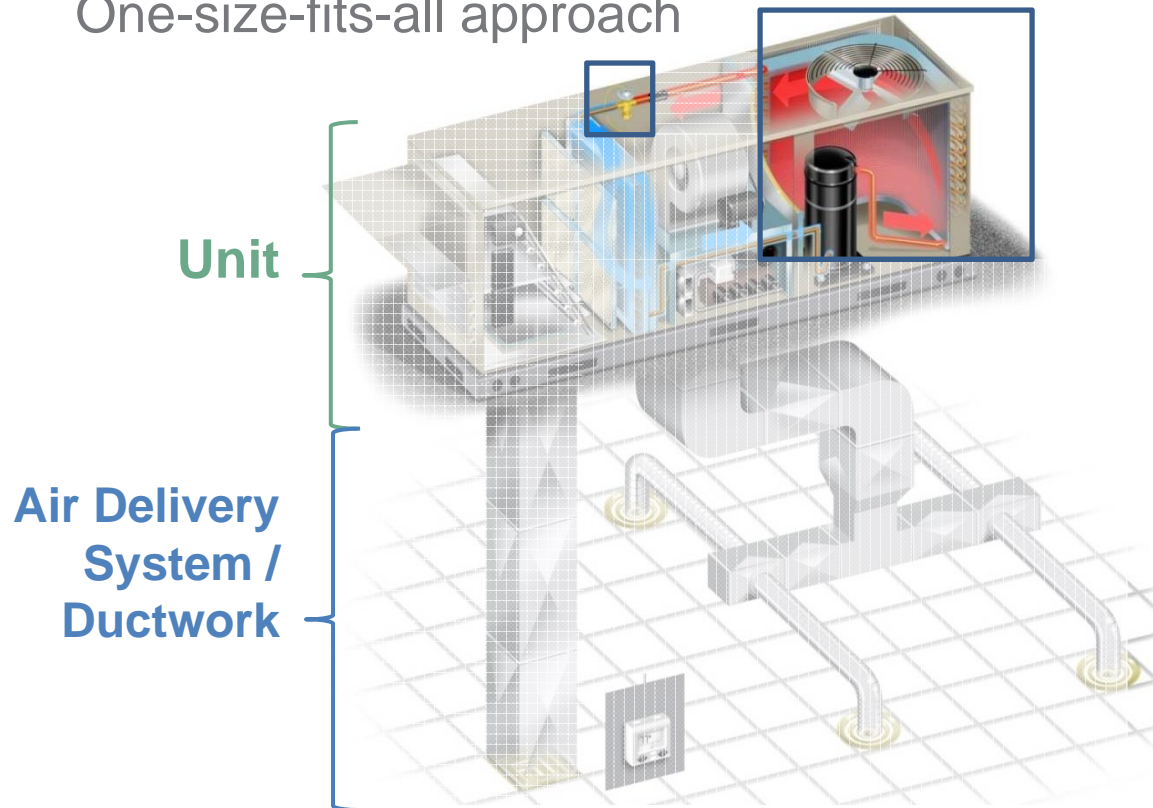
- Purdue/SCE/PECI FDD Evaluations
 - Strategic plan goal: benchmark protocols
- CA Emerging Tech Projects:
 - Onboard FDD retrofit residential
 - Effects of faults on residential split system
 - FDD software
 - Residential QM + FDD
 - Pattern recognition FDD
 - FDD for RTUs



[http://www.etcc-ca.com/advanced-project-reports-search: Title Contains "Fault"](http://www.etcc-ca.com/advanced-project-reports-search: Title Contains)

Previous California Utility Programs

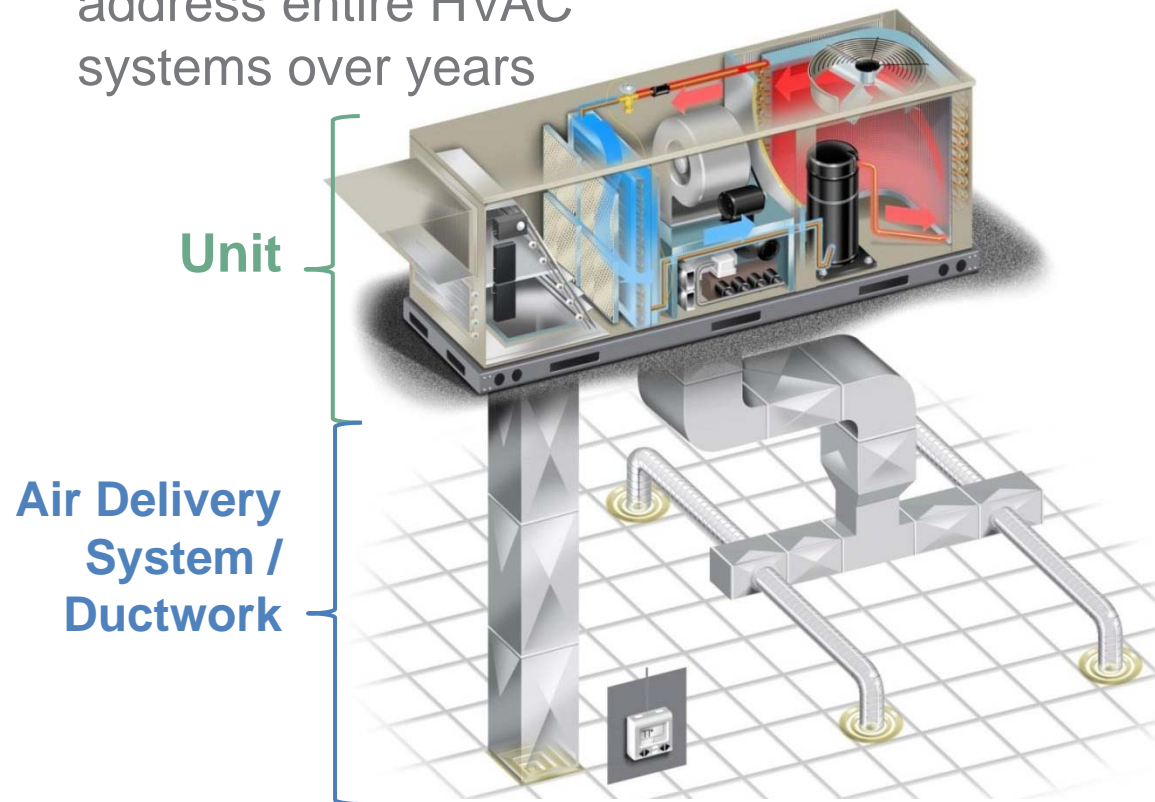
Few tune-up measures
One-size-fits-all approach



- Condenser Coil Cleaning**
- Refrigerant Charge Adjustment**
- Refrigeration Control Panel Testing & Calibration
- Cooling Coil Cleaning
- Condenser Fan/Motor Checked & Lubricated
- Return Air Fan/Motor & Supply Fan/Motor Checked And Lubricated
- Filter Replaced With Proper Media
- Electrical Connections Checked
- Burner Section Combustion & Draft Tests
- Fresh Air, Return, & Exhaust Air Dampers Checked For Obstruction & Lubrication
- Refrigerant & Refrigeration Compressor Adjustments

HVAC Optimization Programs

Holistic approaches address entire HVAC systems over years



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Holistic, Systemic, Long-term

For buildings' HVAC systems, we offer the following solutions:

Quality Maintenance

Optimize performance & maintain high performance with multi-year contract

Quality Renovation

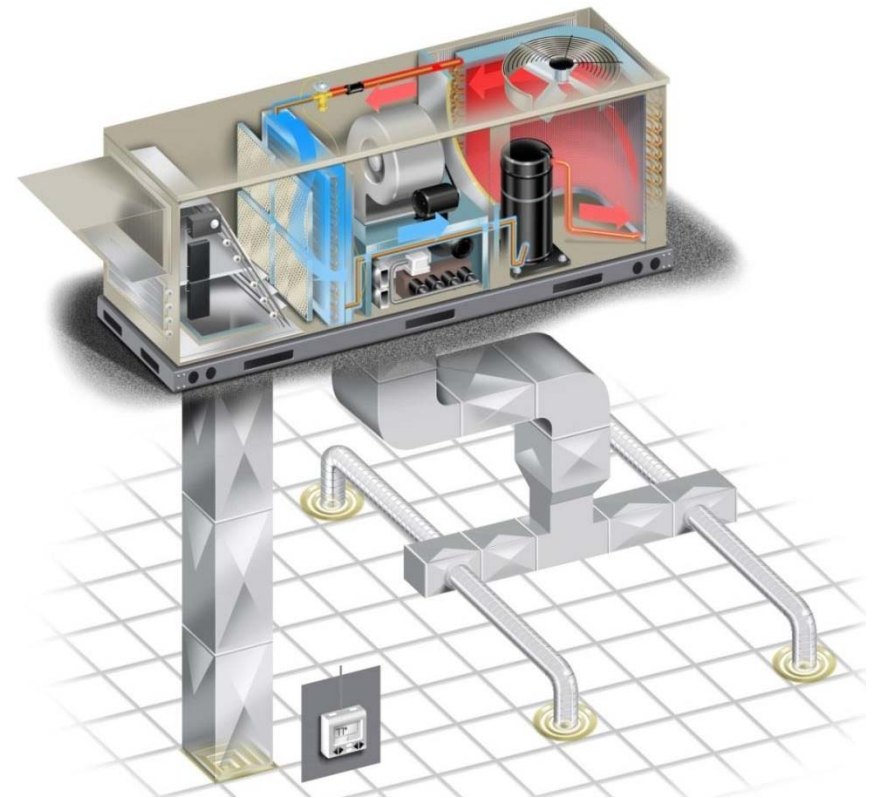
Optimize unit and ductwork performance

Early Retirement

Replace aging units with high-efficiency

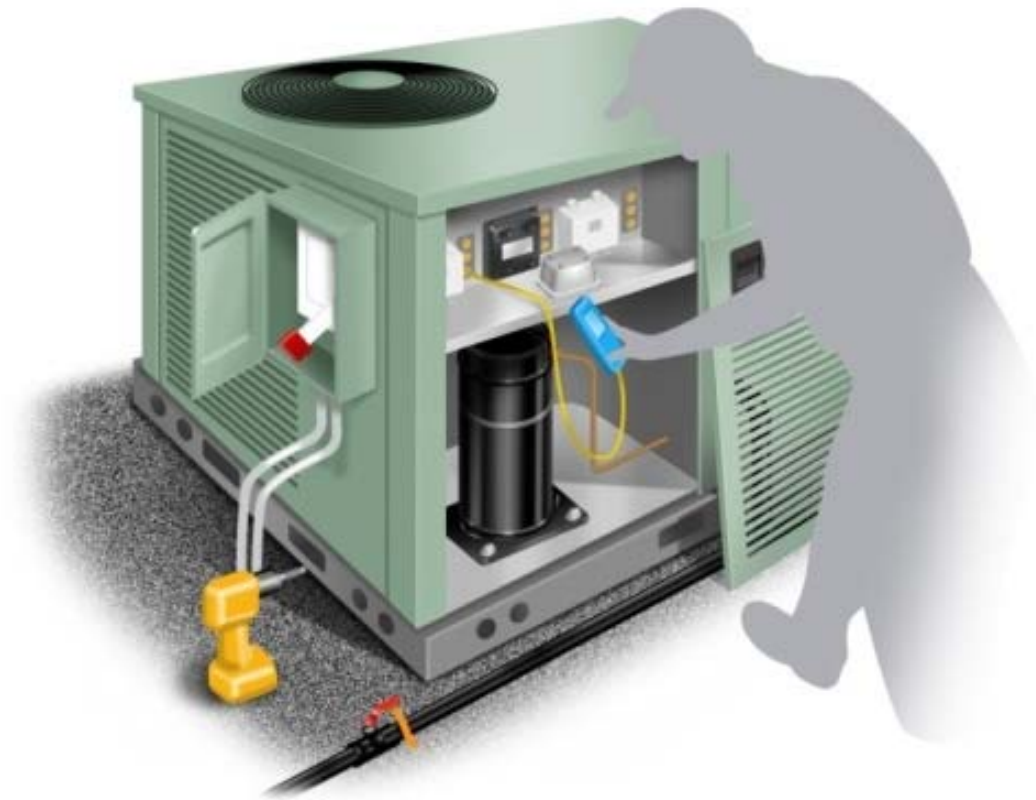
Quality Installation

Install high-efficiency units and optimize unit and ductwork performance



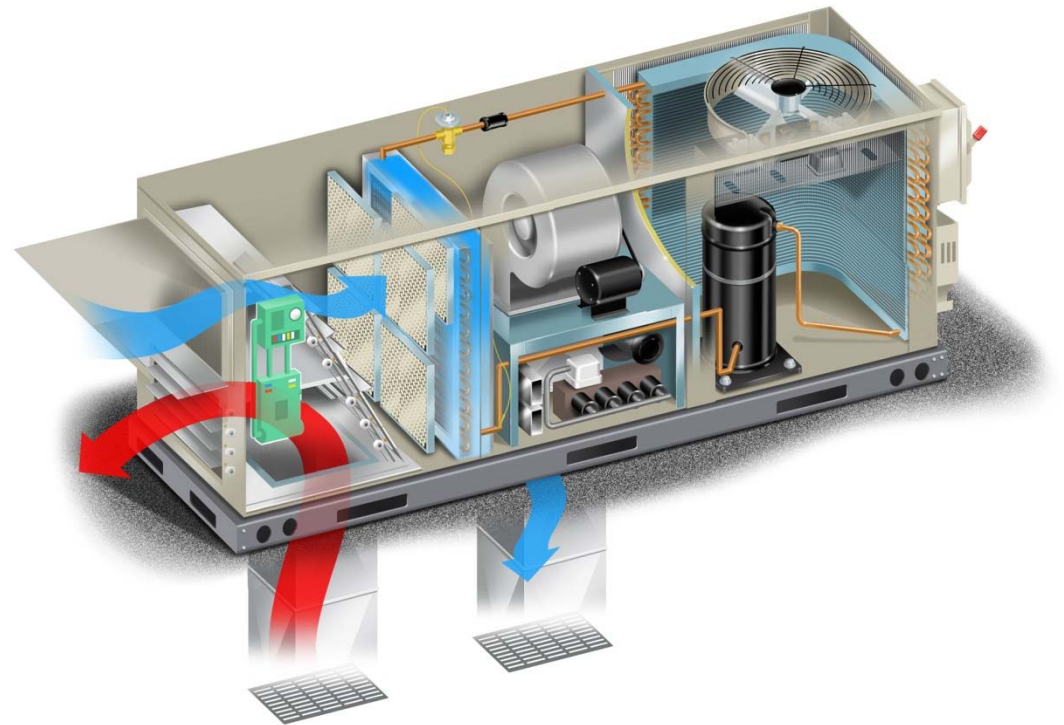
Field FDD

- Quality Maintenance (QM)
 - FDD options with data upload to standard data collection system
- Quality Renovation (QR)
 - Performance-based system diagnostics and renovation



Embedded FDD

- QM and QR
 - Advanced Digital Economizer Retrofits with FDD
- Early Retirement
 - Title 24 Economizer FDD
 - Refrigerant charge indicator option for residential units



Challenges

- Regulatory Challenges
 - Added benefits of FDD not recognized by established savings claim mechanisms
 - An economizer is an economizer
 - A tune-up is a tune-up
 - Maintenance plan is viewed as a tune-up
 - Code and EM&V use Title 24 “FDD protocols” with questionable benefits
 - Proprietary FDD is difficult to leverage with public funding



Challenges

- Technical Challenges
 - FDD performance may not be as effective as it could be (see Purdue Evaluations)
 - Needs to be effective on wide variety of system types, efficiencies, and configurations
 - Needs to be flexible enough to apply in wide range of field operating conditions
 - Measurement uncertainty due to instrumentation and technique is a challenge



Next Steps

Regulatory

- Performance-based savings & M&V could capture true benefits
- Must determine immediate & ongoing value of FDD over current standard practice and traditional program approaches
- Improve application of FDD in codes and EM&V
- Proven, open source algorithms needed

Technical

- “Algorithm Tuning”
 - Identify highest value opportunities, ignore marginal opportunities
- “Universal” widely applicable solutions needed
- Quantify and mitigate impact of measurement uncertainty on FDD performance

Thank You

Additional Information:

www.hvacoptimization.com

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