

Connected Device Data Frameworks

**A Collaborative Specification to Solve Energy Efficiency Data Needs
and Bring Connected Devices Into Programs**

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Energy
Solutions

AGENDA

Introductions

Advanced Rooftop Unit Controls (ARC) Overview

Examining the Tech-to-Utilities Pipeline: Existing ARC Study

Accelerating the Tech-to-Utilities Pipeline: Connected Device Data

ARC Data Specification

Using in Programs

Next Steps

Introductions



Advanced Rooftop Unit Controls (ARC) for HVAC Retrofits



- Controls retrofit for existing package rooftop HVAC units (RTUs)
- Multi-speed fan control
- May include: demand controlled ventilation, CO₂ sensors, integrated economizer controls, variable speed compressor control

Almost 50% of commercial buildings use RTUs

It's a challenge to determine the energy savings of RTU controls

DOE-Funded ARC Study

Examining the Technology-to-Utilities Pipeline

- Best-in-class study from PNNL
- 66 RTUs on 8 buildings
- 4 climate zones
- Retail, office, food sales, and healthcare building types

To create a deemed efficiency measure in a Technical Reference Manual (TRM), we need:

- All permutations of 26 building types and 16 climate zones
- Hourly load profiles
- A large data set



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Advanced Rooftop Control (ARC) Retrofit: Field-Test Results

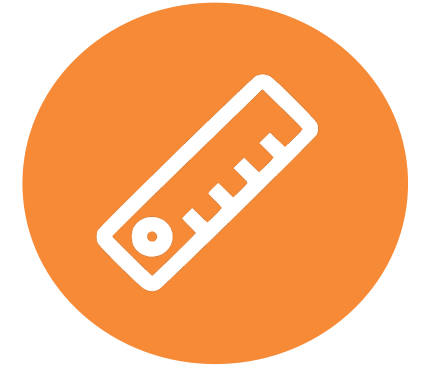
W. Wang
S Katipamula, Principal Investigator
H Ngo
R Underhill
D Taasevigen
R Lutes

July 2013

The Need for Efficiency Measure Data

Due to:

- 1 Increasing utility savings goals
- 2 Diminishing voluntary program savings due to federal and state energy codes



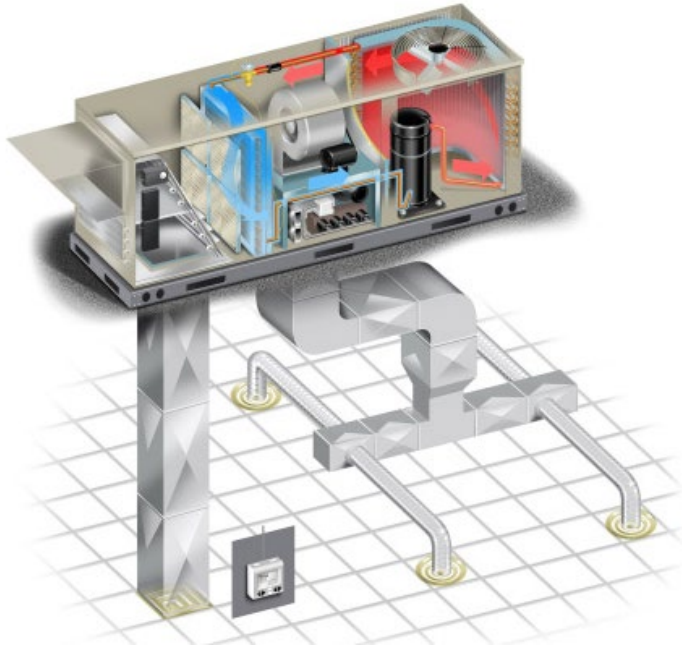
Efficiency programs need:

- Measures that can scale
- Reliable assessments of project level energy impacts for the sales process
- Greater performance certainty in **program evaluation** and **portfolio planning**

Greater measure impact data can streamline programs or allow for deemed savings claims, with with an upfront investment

Unlocking a Better Data Source

Accelerating the Technology-to-Utilities Pipeline



Measure Question

What is the fan speed at every temperature across a year in my location?

What percentage of units have functioning economizers?

Relevant ARC Data Fields

- Fan speed
- Outside air temperature
- Annual weather by ZIP code

- Outside air temperature
- Economizer damper position
- Economizer fault status

ARC Data Specification

Framework for standardized data collection across ARC technologies

Consistent data enables analysis at the utility and program levels

Data Specification Fields:

Site Data:

- Building type
- ZIP code

Equipment Data:

- Cooling capacity
- Model number

Time-Series Data:

- Energy use
- Fan speed
- Outside air temperature

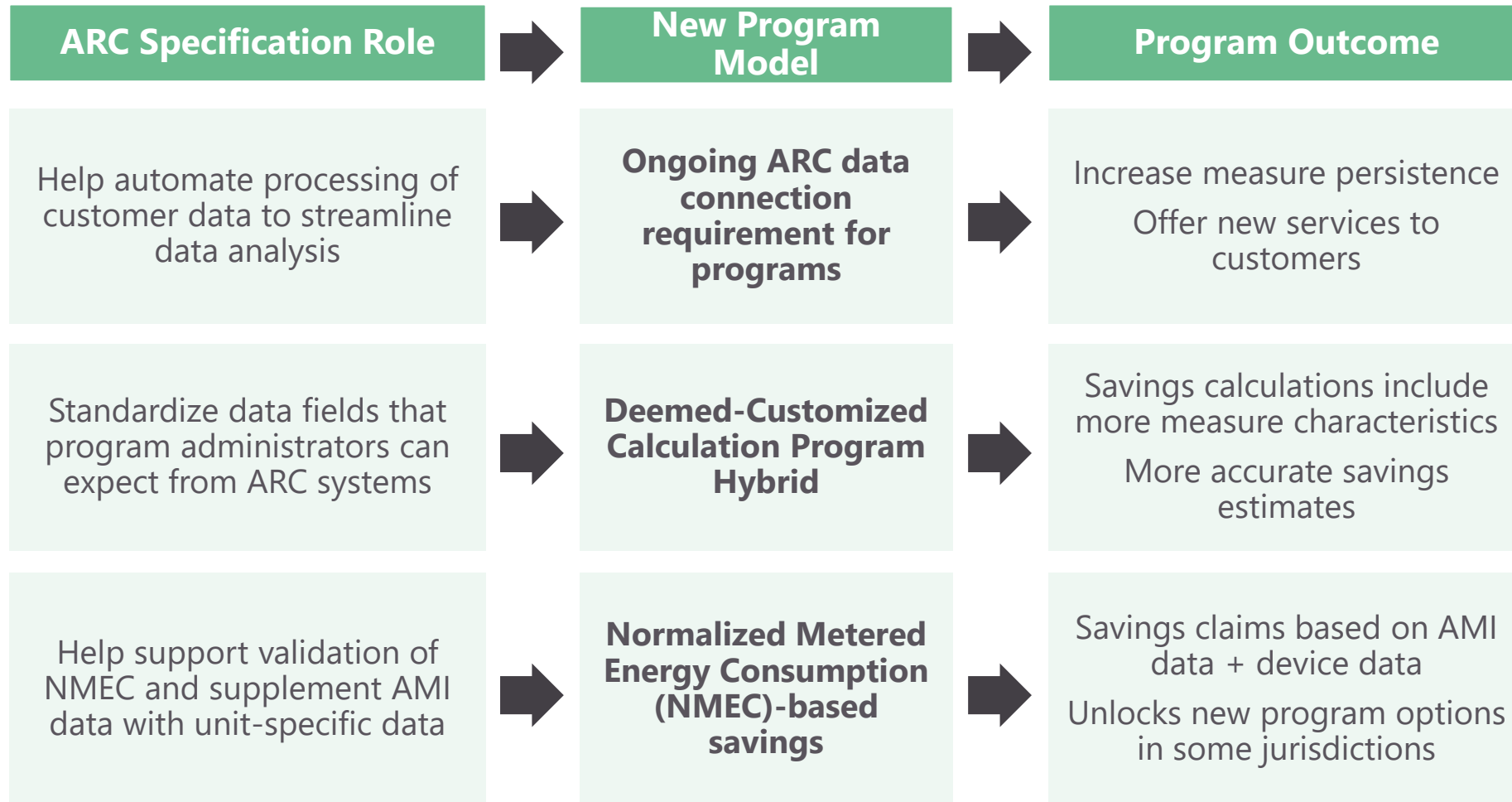
Primary Fields Needed for Energy Programs:

- Fan speed
- Equipment capacity
- Energy consumption and power draw
- Outdoor air temperature
- Temperature setpoints
- Supply air temperature
- Time in mode (heating/cooling/ventilation)
- Energy savings mode status

Data Specification Outcomes

- Use of Data Spec in Efficiency Incentive Programs
- Quantified Impacts across permutations of building type, unit size, climate zone, etc.
- Accelerated Development of Deemed ARC Measures
- Continuous, Real-Time Feedback on Efficiency Program Savings
- Improvements to Building Energy Modeling
- Data Specs for Other Connected Devices

The Future of Connected Data Programs



Next Steps

- 1 **Identify utility and implementer partners** for pilot of ARC data specification in incentive program
- 2 Support use of specification for **creating large ARC performance datasets**
- 3 **Promote use of ARC performance datasets** to characterize efficiency impacts
- 4 Consider data specification approach for **additional connected device types**

Thank You

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