



# Commercial HVAC Workshop on Advancing Commercial Unitary Rooftop Unit Efficiency:

Defining a National Approach that Supports  
Next Generation HVAC Programs

Afroz K. Khan  
Senior Program Manager  
September 29, 2009  
New Orleans, LA



# Objectives of “Advancing Commercial Unitary Rooftop Unit Efficiency” Workshop

- ▶ To learn about the drivers and issues impacting our respective industries;
- ▶ To further define and identify limitations of the national ARTU concept with CEE members, OEMs, and major component suppliers;
- ▶ Define roles and responsibilities that will create the conditions for CEE members to develop next generation rooftop efficiency programs.

# Introductions

Please share:

- ▶ Your name, position and organization
- ▶ How long you have been in your present position
- ▶ Is this your first CEE Industry Partners Meeting?

# Ground Rules

- ▶ 100% Participation – Please stay off of email
- ▶ Off topic issues & questions will be recorded in a parking lot for future discussion
- ▶ All ideas are valid and valued
- ▶ Meeting closure outlines next steps and actions

This meeting will be held according to  
**CEE Guidelines for Program Meetings**

# Overview of CEE

- ▶ Created in 1991 by administrators of ratepayer funded EE programs and nonprofits as their organization to:
  - Leverage efficiency resources (U.S. and Canada) to address structural market barrier and capture greater total savings
  - Share “best” practices
  - Identify common needs to enhance savings impacts
- ▶ 117 members from states and provinces with ratepayer funded efficiency programs
- ▶ \$3 million organizational budget (staff of 26) supporting a member base with annual program budgets exceeding \$3.7B

# Membership is limited - for credibility

- ▶ **Efficiency Program Administrators**—utilities and non-utilities with ratepayer funded programs
- ▶ **Public Stakeholders**—such as DOE national labs, state and provincial energy offices, government energy research agencies, regional and national efficiency organizations

**NO** Organizations with private interests, e.g., manufacturers, consultants, program contractors

# Today's Agenda

## Part I: Understanding the Landscape (1:15-2:15pm)

- Efficiency Program Design and Challenges
  - Afroz Khan, CEE and Josef Schmuztler, Puget Sound Energy
- HVAC Industry Trends and Drivers
  - Richard Lord, Carrier

## Part II: Exploring Next Generation RTUs (2:30-4pm)

- Background on ARTU
  - Afroz Khan, CEE
- AHRI Feedback on ARTU features
  - Karim Amrane, AHRI

# Part I – Understanding the Landscape

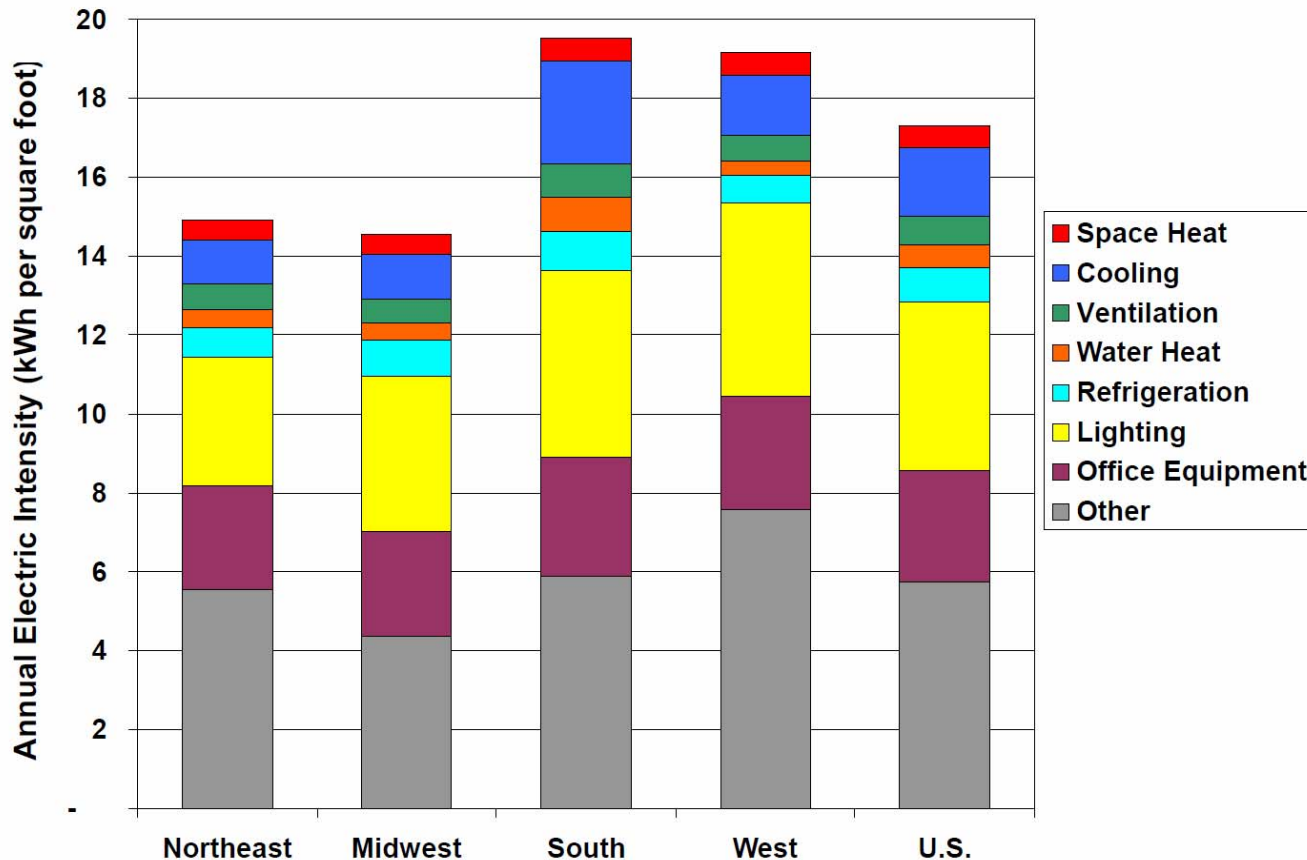
# Program Perspectives

**Afroz Khan, CEE**

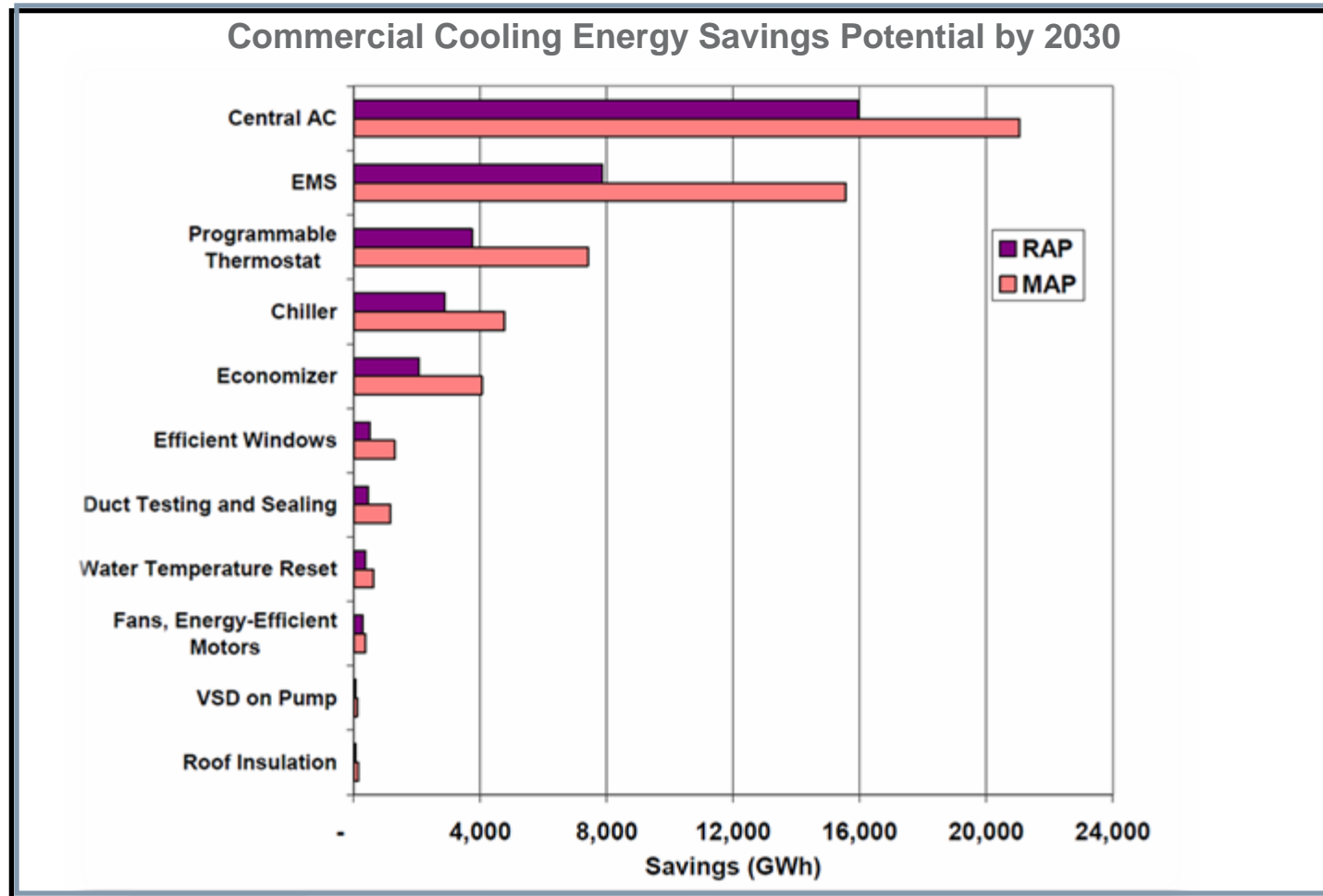
Josef Schmuztler, Puget Sound Energy

# The Opportunity for Commercial HVAC

## 2008 US Commercial Intensity by Region



# Why Do We Care?



Source: 2008 EPRI Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S  
(RAP – Realistic Achievable Potential; MAP - Maximum Achievable Potential)

# CEE High Efficiency Commercial Air-Conditioning (HECAC) Initiative

- ▶ Launched in 1993 with specifications identifying SEER/EER/IPLV for Unitary AC and HP equipment.
- ▶ Goal is to encourage the proper installation and widespread use of high-efficiency air conditioners and heat pumps in commercial buildings.

# Current Commercial HVAC Initiative Work Efforts

## ▼ Current Unitary AC/HP Specification

- New industry performance metrics (IEER)
- Plan to revise specification in January 2010

## ▼ Rooftop Unit Concept

- Advanced Feature-set to address e-savings, persistence and maintenance

## ▼ Quality Installation, ANSI QI Standard

- Comments to ACCA, larger commercial HVAC systems
- Committee to discuss program integration

## ▼ New Systems; Technologies

- Variable Refrigerant Flow technology
- Chiller Systems

# Program Challenges

- ▶ Peak load is increasing faster than average load for electric utilities (narrower peaks)
- ▶ Rise in material costs have impacted utility cost-effectiveness tests
- ▶ Varying legislative issues dictating program retooling and design
- ▶ Lack of system metrics for meeting growing needs and challenges

# Program Trends

- ▶ Broadening prescriptive measures to include economizers, DCV and VSDs
- ▶ Incorporating whole building approaches that make use of retro-commissioning
- ▶ Training emphasis in programs to create appropriate “efficiency experts” for effective delivery

# Program Perspectives

Afroz Khan, CEE

**Josef Schmuztler, Puget Sound Energy**

# Industry Perspective

Richard Lord – United Technologies

# Part II – Defining the Next Generation of Roof Top Units

# Advanced Rooftop Unit (ARTU) Background

- ▶ In 2003, a CEC PIER project identified several problems in the field for roof-top units less than four years.
- ▶ A set of “features” that would define an Advanced Rooftop Unit was developed through a subsequent CEC PIER project report released in 2008.
- ▶ The committee has been exploring the potential for a national specification using the feature-set as a starting point.

# Why focus on Advanced Roof-Top Units?

- ▶ Metrics currently in place to raise the bar for efficient RTUs are no longer cost-effective for efficiency programs
- ▶ Several programs are working independently to incorporate an ARTU concept through individual measures such as DCVs, economizers and VSDs.

Can we work together to define a national approach?

# ARTU Scorecard Concept

- ▶ In the absence of a performance metric for advanced roof-top units, concept is being explored by committee
- ▶ Value the input from industry and other stakeholders to test the concept
- ▶ Members are still struggling with how to incorporate this into their programs
- ▶ As a first step, exploring the technical merits of the feature-set

# Feature-set Aspects

- ▶ 36 Features, 11 Categories
  - (1) Economizers
  - (2) Fans and (3) Fan Control
  - (4) Adv. Monitoring and (5) Adv. Diagnostics
  - (6) Unit Efficiency
  - (7) Sensors
  - (8) Refrigeration Control
  - (9) Refrigeration Cycle
  - (10) Thermostats
  - (11) Installation and Checkout Capability

# Feature-set Feasibility

- ▶ Commercial HVAC committee reviewed feature-set and modified.
- ▶ Letter sent to industry in late May to review the revised feature-set and identify:
  - any publicly available field test data on the energy savings potential of one or more features in combination
  - additional features that may not be included but which could save energy or enable persistence of savings
  - the number of products currently available in the market that contain the set of features currently included.

# Next Steps for Committee

- ▶ To vet the feature-set with industry and discuss at next Industry Partners meeting
  - Determine the merits of addressing ARTUs and methods for doing this
  - Define appropriate roles and responsibilities
- ▶ Explore program approaches and identify the appropriate deliverable for implementation

# Industry Presentation on Feedback

## - Karim Amrane, AHRI

# Group Discussion Questions

- ▶ Can we work together to define an ARTU?
  - What are the challenges in tackling this definition?
  - Does a feature-set score card concept make sense?
  - Who should be involved in working on this? How can we enable that process?

If time....

- ▶ What other technologies or issues should CEE be focusing on?
  - Chiller Systems
  - Variable Refrigerant Flow