

Rocky Mountain Utility Efficiency Exchange October 2012

SELECT HVAC

Utility Collaboration with Industry & Educators



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What is SELECT HVAC?

- SELECT HVAC was created in response to the clear need for high-quality HVAC performance.
 - *The HVAC system is typically the highest consumer of energy in any structure.*
 - *Estimated savings potential with quality installations ranges from 18% to 36% for air conditioners and heat pumps – and between 11% and 18% for furnaces.**
 - *Department of Energy – Goal of 50% reduction in home energy consumption by 2015.*



ates are not enough...

*www.energystar.gov

How Does It Work?

- Collaboration, collaboration, collaboration.

- *Initially: PVREA & Platte River Power Authority*



- *Ensuring Quality: Utilities & Educators*



- Reputable colleges and universities
 - Conforming to national standards

- *Effective Because: Utilities & Contractors*

- Signed agreements
 - Rebates contingent upon verification

- *Successful Because: Utilities & Educators & Contractors*

- *Keep it simple*

everyone is committed to the success



It's a Win/Win/Win...

– Contractors Win:

- *Improved reputation*
- *Better trained techs*
- *Less time wasted in the field*
- *Utility referrals*
- *Higher rebate returns*
- *Increased*

• Educators Win:

- *Promotes quality education*
- *Broadens curriculum*

• Utilities Win:

- *Improved reputation*
- *Member /Customer confidence*
- *Lowered energy demands*

It CAN Be Done!

- Effectively:
 - *Through use of a proven template*
- Efficiently:
 - *Forms have been designed and vetted*
- Intelligently:
 - *Courses have been developed and evolve with industry standards*
 - Inexpensively:
 - *The investment is low for everyone involved*
 - With a high return
 - *Business and community wins*

It's Getting Noticed...

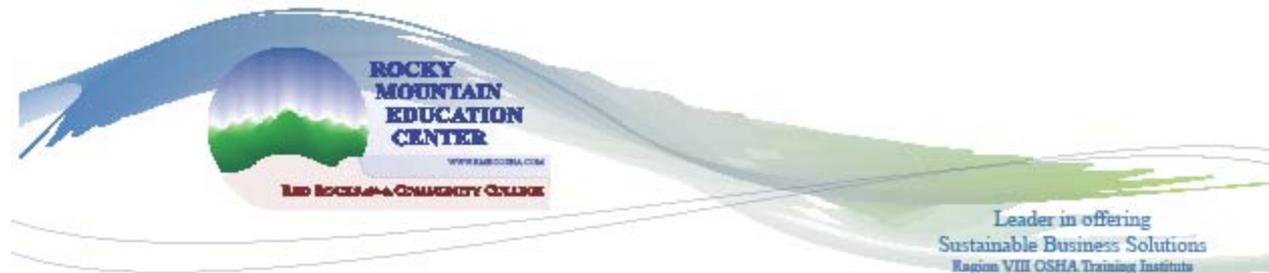
- The EPA has chosen Northern Colorado Energy Star Homes as one of three HQUITO's in the nation for Energy Star Version 3 oversight.
 - *SELECT HVAC is key the process – proper commissioning, proper design, proper sizing, etc.*
- The SELECT HVAC model has succeeded where other efforts have failed.
 - *Simplicity*
 - *Clarity*
 - *Commitment*

I'm happy to answer your questions...

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Advanced Green HVAC Training at Rocky Mountain Education Center/Red Rocks Community College



Residential Building Energy Demographics

Air conditioning in nearly 100 million U.S. homes₁

Except in the temperate climate regions along the West coast, air conditioners (AC) are now standard equipment in most U.S. homes. As recently as 1993, only 68% of all occupied housing units had AC. The latest results from the 2009 Residential Energy Consumption Survey (RECS) show that 87 percent of U.S. households are now equipped with AC. ¹

Primary energy consumption in the residential/multifamily sector totaled 20.99 quadrillion (10^{15}) Btu (quads) in 2009, equal to 54% of consumption in the buildings sector and 22% of total primary energy consumption in the U.S. ¹

1. EIA-Residential Energy Consumption Survey 2009 — Release date: August 19, 2011

There is a significant business opportunity to retrofit homes with new, more efficient air conditioning equipment that would reduce annual cooling costs to households. For example, 20% of the homes built during the 1980s have air conditioning equipment over 20 years old.

Many U.S. homes could also benefit from regular maintenance, as only 42% of those using central air equipment service it annually. ¹

Our Residential lab:

We do comparative analysis and retrofit training, starting with the most basic 60% efficient furnace working our way through 80% and 95% efficient furnaces (modulating gas valves and electronically commutated fan motors). We have several furnace units we use for retrofit training.

All of our furnace units, 80% efficient and higher, are arranged to simulate single family as well as multifamily installations. These units have split system air conditioning evaporator coils and matching remote mounted condensing units 12 to 18 Seasonal Energy Efficiency Ratio (SEER).

**Our newly upgraded
residential and commercial lab
has more than 3,000 square
feet of training area and
equipment.**



Commercial Building Energy Demographics

- Of the 4.9 million commercial buildings in the U.S., less than 1% is greater than 200,000 square feet. These large buildings consume about 25% of the total energy used. ^{2,3}
- 99% of all buildings are less than 200,000 square feet = 4,851,000 Buildings - 54 billion sq. ft. ^{2,3}
- Buildings less than 200,000 square feet consume 75% of all the energy used in commercial buildings 13.5 quadrillion BTUs of primary energy = \$59.4 billion per year ^{2,3}

2. EIA-(2006) 2003 Commercial Buildings Energy Consumption Survey.

3. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy (2009) *2009 Buildings Energy Data Book*. *State Energy Database System (SEDS) is an energy adjustment used by EIA to relieve discrepancies between data sources. Energy is attributable to the commercial sector, but not directly to specific end-us

Our Commercial lab:

We do comparative analysis and retrofit training, starting with the most basic 8 Energy Efficiency Ratio – (EER) roof top units working our way through 12 EER and 18 EER with:

- digital scroll compressors**
- variable speed drive alternating current fan motors**
- modulating gas valves**
- electronically commutated fan motors**

Several of the roof top units are used for retrofit training.

We also have a computer room air conditioning for retrofit training.



🌍 We can no longer ignore the money savings opportunities that exist in buildings that consumes 75% of all the energy used in buildings.

🌍 This emerging market has ***incentives***; rising energy prices, utility funded conservation programs, building owners that want to be more energy efficient and more sustainability.

To effectively *free the stranded energy and money* that exists in these buildings, the following items need to be addressed:

- 🌍 To serve millions of buildings, we need trained personnel to handle the increased volume of energy efficiency retrofits and upgrades.
- 🌍 Preventive maintenance based on sustainability

Demand is strong in residential and commercial, buildings to tie climate systems into new “smart grid” systems.

The fact is energy efficient (green) HVAC is rapidly becoming the way of doing business

All workers at all levels of the HVAC industry need to keep up with new techniques in this new green economy.

HVAC workers who do not have current certifications or understanding of the new technology and will have difficulty getting the higher incomes associated with these technologies.

**What we do at Rocky Mountain
Education Center/Red Rocks
Community College**

Train technicians to be
**HVAC Energy Efficiency
Systems Specialists.**

Our technicians are distinguished by promoting a holistic systems approach to energy efficient retrofits and upgrades. The retrofits and upgrades recommended by our technicians are based on energy savings and return on investment rather than just doing in-kind repairs.

The HVAC Energy Efficiency Systems Specialist effectively frees the stranded energy and money that exists in buildings today.

Energy

Efficiency *The*

First Step to

Energy

Independence

COURSES

Effective Communications:

Two Days

This is a practical course in technical communication. In addition to preparing basic service job site quotes, students will be expected to manage a technical writing project by successfully producing service tickets that will prevent call backs. The focus will be on professionalism in oral and written communication.

COURSES

Preventive Maintenance for Sustainability:

Two Days

Using a sustainable maintenance plan, materials and special Service Technician Knowledge to prevent or slow the course of excessive wear in Equipment Assets. Preventive maintenance prevents equipment malfunction, by reducing or eliminating excessive wear on equipment and equipment downtime. If you find and fix things before you are forced to do so, your returns are typically 3-4 times greater than your original investment.

COURSES

Refrigeration Transition Retrofit from R-22 to MO99 and 407C: Two Days

The students will test the R-22 system within an existing air conditioning unit. The retrofit will be completed with each replacement refrigerant. The unit will have to be placed into operation and evaluated for performance. The students will record all operational data and information in a service report. This report will include a pressure / temperature comparison, super heat analysis, and operational check for capacity.

COURSES

Review of Commercial HVAC Fundamentals:

Two Days

Review basic HVAC system components, system configurations and applications. Topics to be discussed include the following:

- basic physics of air
- general comfort
- system health as related to satisfying building and system load requirements

In addition, system functions for all air', air/water; including CAV, VAV will be reviewed. Ventilation and building make-up air requirements will also be assessed. Air Conditioning deals with building thermo load assessment, determination of individual space loads and overall system capacity requirements.

COURSES

Air Flow & EC Fan Retrofit:

Four Days

Air Flow deals with fans, fan performance characteristics as well as design and layout of air delivery systems. This course also deals in detail with fan classification and selection. Topics to be discussed include:

- fan types and construction
- fan 'laws' series/parallel operation
- systems curves and charts
-

This course deals in detail with testing strategies and procedural requirements of air system evaluation. Topics to be discussed include testing fans and air outlet/intake volume measurement. Students will do a fan retrofit by converting to an electronically commutated fan system.



Utility incentives are important, and *real*.

- Unlike merchandise rebates, the utilities really want the participation.
- Use ratepayer funds to incentivize efficiency upgrades.
 - ✓ Energy savings reduces fuel consumed.
 - ✓ Essentially an investment in demand, which has the same effect as an investment in supply.
 - ✓ Enhances customer experience and perception.
- Types:
 - “Custom” – Requires analysis and pre-approval before the purchase. The pre-approval shows the precise rebate for that installation.
 - “Prescriptive” – Customer can purchase equipment, then apply for rebate. The \$ amounts are published.

Suppliers who can guide customers through achieving the rebates have a competitive advantage!



Xcel Energy business efficiency rebates include:

- ✓ Upgraded Motors
- ✓ Variable Frequency Drives
- ✓ **ECMs (prescriptive in refrigeration, otherwise custom)**
- ✓ Voltage controllers/constant speed motor controllers
- ✓ Compressors & system components
- ✓ Lighting
- ✓ High Efficiency Cooling
- ✓ Energy Management Systems
- ✓ System Recommissioning
- ✓ And more

More information is at xcelenergy.com or the Business Solutions Center at 1-800-481-4700.



Xcel Energy and ECMs

- Recognized energy saving potential.
- ECMs in HVAC Applications: Still custom. After enough have gone through custom process, we hope to make the rebates prescriptive (pending filings and regulatory approval).
- Actively requesting applications for custom rebates!

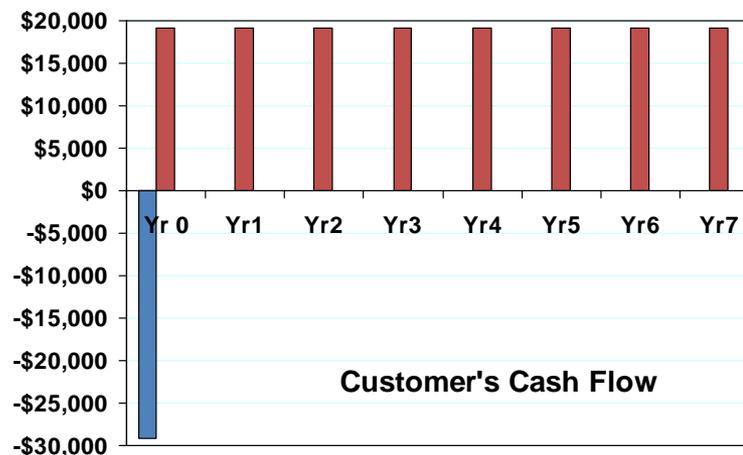
ECMs for evaporative fans in refrigeration systems are already prescriptive.

✓ \$40 or \$70 per *fractional hp* ECM

✓ Deemed savings of 413 to 896 kWh / yr, per *fractional hp* ECM

Example: 320 *fractional HP* ECMs in a chain of 59 gas stations...

Equipment Cost:	\$36,800
Installation Cost:	\$14,725
Xcel Energy Rebate:	<u><u>-\$22,400</u></u>
Net ECM Cost:	\$29,125
Energy Savings:	205,400 kWh/Yr.
Energy Savings \$:	\$19,105 / Yr.
Simple Payback:	18 Months



COURSES

Air Conditioning Retrofit Project to Increase Capacity:

Four Days /

The students assemble a refrigeration system within an existing air conditioning unit. The retrofit will be a refrigerant plate and frame desuperheater system. The reduction in the discharge pressure due to operation of a desuperheater will compensate for the reduction in air density at altitudes above 5,000 feet (this equivalent to adding 15% more condenser capacity). Included in this retrofit will be all required refrigeration piping and accessories. The unit will have to be electrically wired and placed into operation. The students will record all operational data and information in a project report. This report will include a pressure enthalpy diagram, piping & electrical schematics and a complete sequence of operation.

Ed Hegwood, LEED AP O+M

Instructor

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(RMEC)**

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