

# Robust Central Air Conditioners & Heat Pumps: Delivering Energy Efficiency in Use

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March 2002



## What Does High Performance Require\*?

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- A *robust* product: “keeps on tickin’.”
- A capable, motivated *installer*.
- A *sales contract* that specifies the right equipment, ductwork renovations, *etc.*

\*We're limiting this talk to existing residences.



## Symptom: Technician Shortages

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- Demand: Rising, up 17% by 2006
- Supply: Training program enrollment down 71% between 1982 and 1996.
- Possible Solutions:
  - NATE: certify for improved prestige and pay.
  - Improve what is specified by sales person.
  - **Make the product less vulnerable to installation shortcomings.**



## Symptom: Problems in the Field

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- High Static Pressures and low air flow: poor ductwork.
- Charge! <1/2 systems within 5% of correct.
- Oversizing - averages 50%
- High Temperature Performance
- Duct leakage - 30%?

*TXV decreases problems greatly.*



## Symptom: High Ancillary Electricity Use

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- Designs vary in *internal* static pressure
- Fan motor performance varies tremendously, PSC v. ECPM

Technology (1/2 HP example):	Multi-speed PSC	Variable speed ECPM
High Speed Efficiency	55% - 67%	74% - 78%
Low Speed Efficiency	34% - 39%	>70%



## Robust AC & HP Performance Features

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- Certified Efficiency (SEER 13).
- Guaranteed high temperature performance ( $EEE_{95} = 11.6$ ).
- For Heat Pumps, heating COP = 7.9; HSPF = 7.9, also.



## Robust AC & HP Design Features

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- Feedback controlled metering device (TXV)
- Effective, high-efficiency, air handlers.
- Limited self-diagnostics, with alarm on thermostat or equivalent.
  - Air filter needs changing
  - Dealer maintenance required.
- Chlorine-free refrigerants



Can I buy one now? **No, but each feature is available, now:**

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- Chlorine-free refrigerants, *e.g.*, “Puron”
- TXVs in some equipment, CA to require.
- “ECPM” air handlers in 5 - 10% now.
- Versions of diagnostics available for technicians as “bananas”
- **Just need market demand to drive integration.**



## Program Elements

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- Develop and Refine Technical Specification
  - Began 2001
  - Manufacturers say it is feasible to build the product, if market will exist.
- Estimate savings/unit and larger effects
- Build Program Consensus.
  - Court Potential Sponsors/Participants
  - Notify Manufacturers of Program Launch



## Possible Time Table

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- Spring, 2002 - Draft Specification Completed for Sponsors.
- Summer, 2002 - Manufacturer Feedback.
- Fall, 2002 - Final Specification, Participant enrollment for CEE or other program.
- January, 2004 - Program Launch, Incentives Available.



## What is the Program's Role?

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- One of three parts for improved residential performance:
  - Better equipment
  - Better installations
  - Installing the right equipment, etc.
- Will Manufacturers Buy In?
  - Will help with product differentiation
  - Will reduce callbacks that sap profitability
  - Will reduce disputes with dealers

