

HVAC Technical Innovations

Integrating Solar With Residential Heating and Cooling

AESP Technology Symposium
September 18th, 2008

Bill Cunningham - Lennox Industries
Cooling Product Manager



Lennox Innovation Never Felt So Good

- Lennox – Leader in HVAC innovation
- Recognized as a partner in energy efficiency
- Trusted partner in the utility industry



Agenda

» HVAC and the Electric Utility



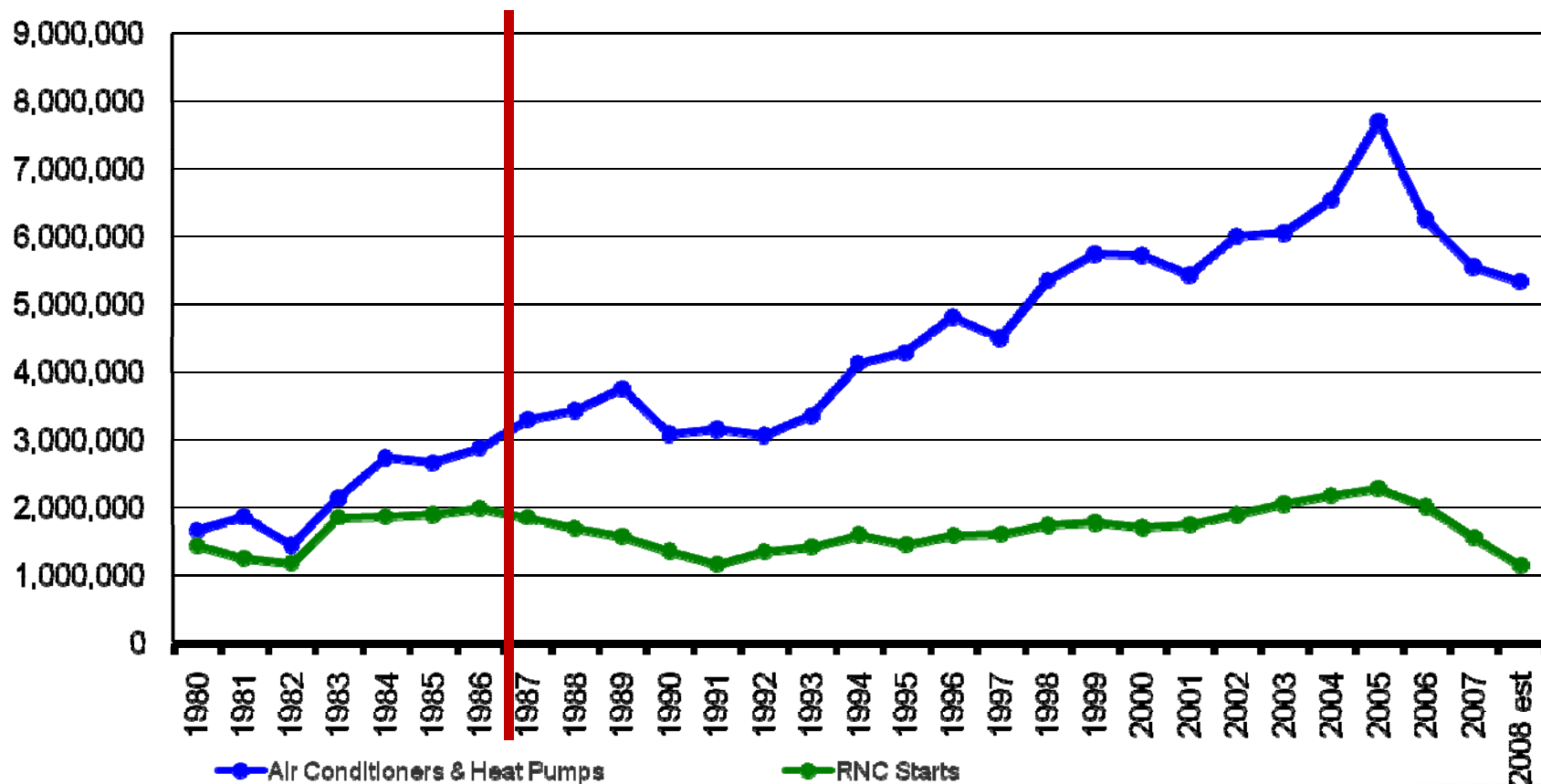
» Solar as a Renewable Resource

» Innovative Solution



HVAC and the Electric Utility

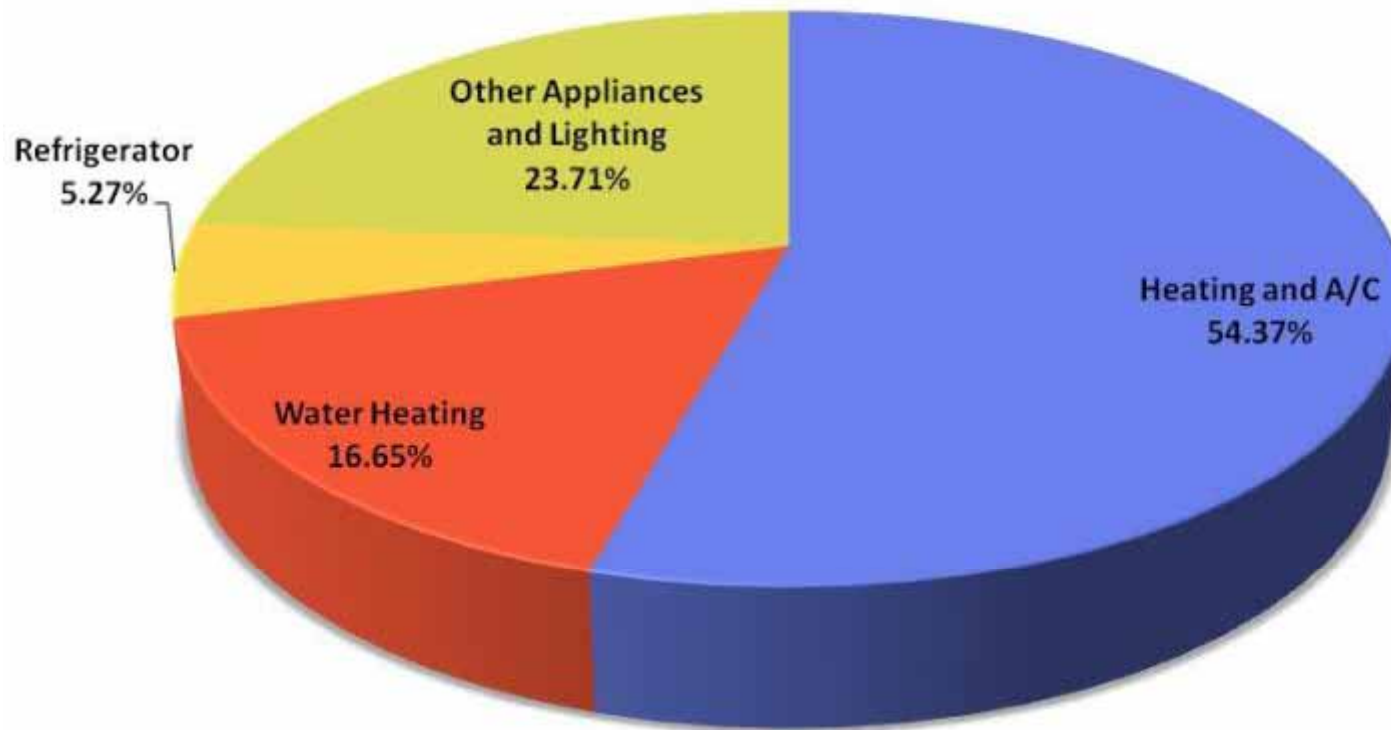
HVAC continues to grow among non New Construction customers



Source: AHRI, HRAI, NAHB, CMHC

HVAC and the Electric Utility

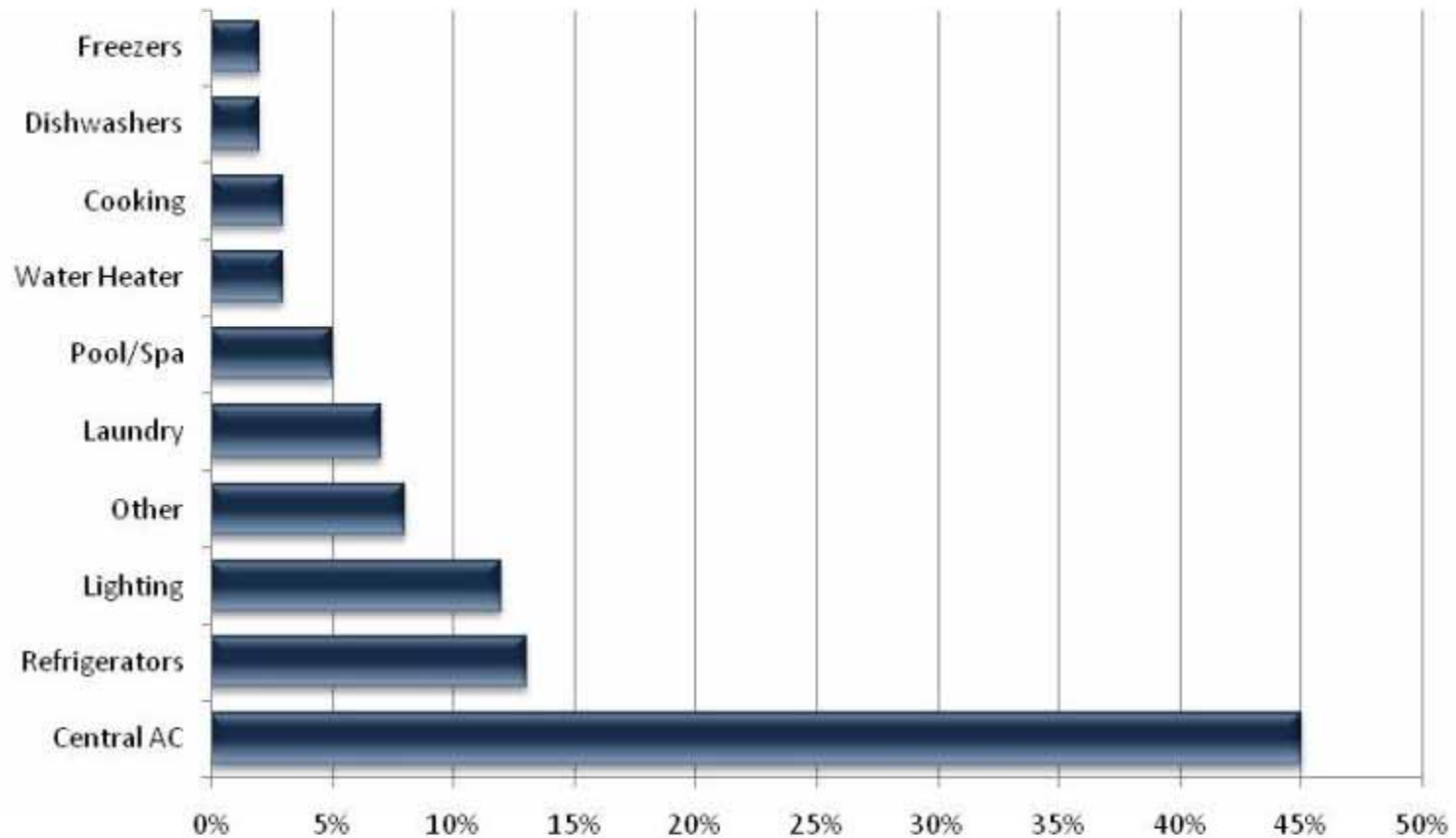
Residential Energy Consumption



Source: EIA 2001 Res. Energy Consumption Survey

HVAC and the Electric Utility

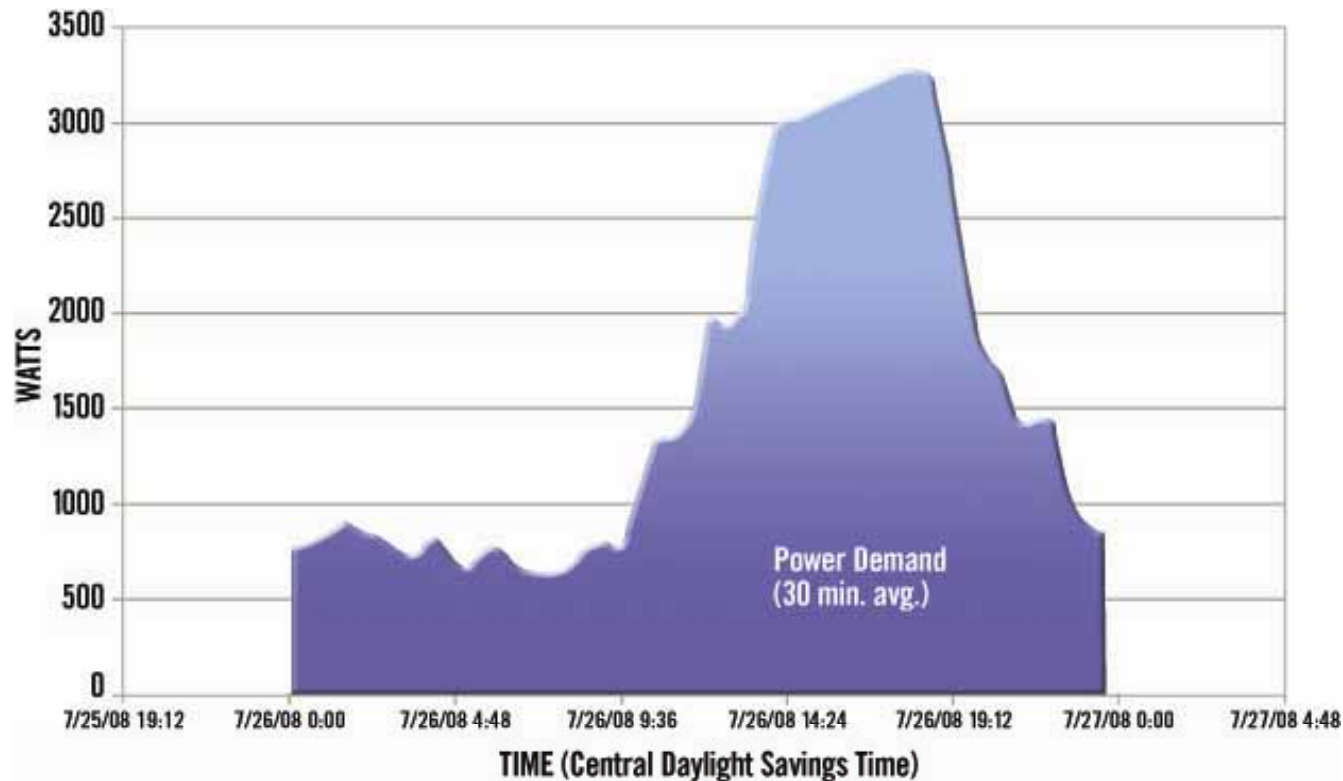
Residential Peak Load Contribution



Source: Proctor Engineering Report – End User Breakdown of Residential Peak Load



HVAC and the Electric Utility



- ❗ Consumers' seek comfort at the worst time for electric utilities
- ❗ Peak load matches peak demand
- ❗ Potential "Snap Back" at peak demand

HVAC and the Electric Utility

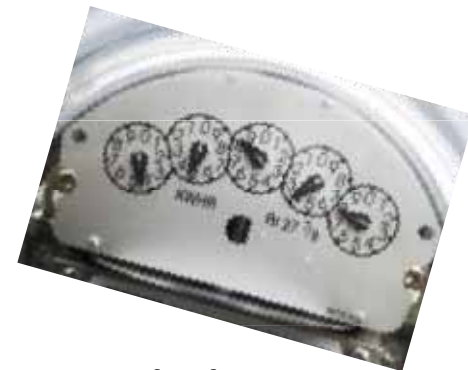


🌱 Programmable Thermostats

- › Are consumers properly trained?
- › Still opportunity for peak load
- › Ultimately requires behavioral changes

🌱 Demand Response Programs

- › Reduces consumer comfort
- › Provides great control of peak load
- › Electric company owned/supported devices



🌱 Energy Efficiency Minimums

- › Government support
- › Widely used in many markets
- › Sometimes requires rebate programs



HVAC and the Electric Utility

Renewable Energy Programs

- › Geo Thermal
- › Wind
- › Solar



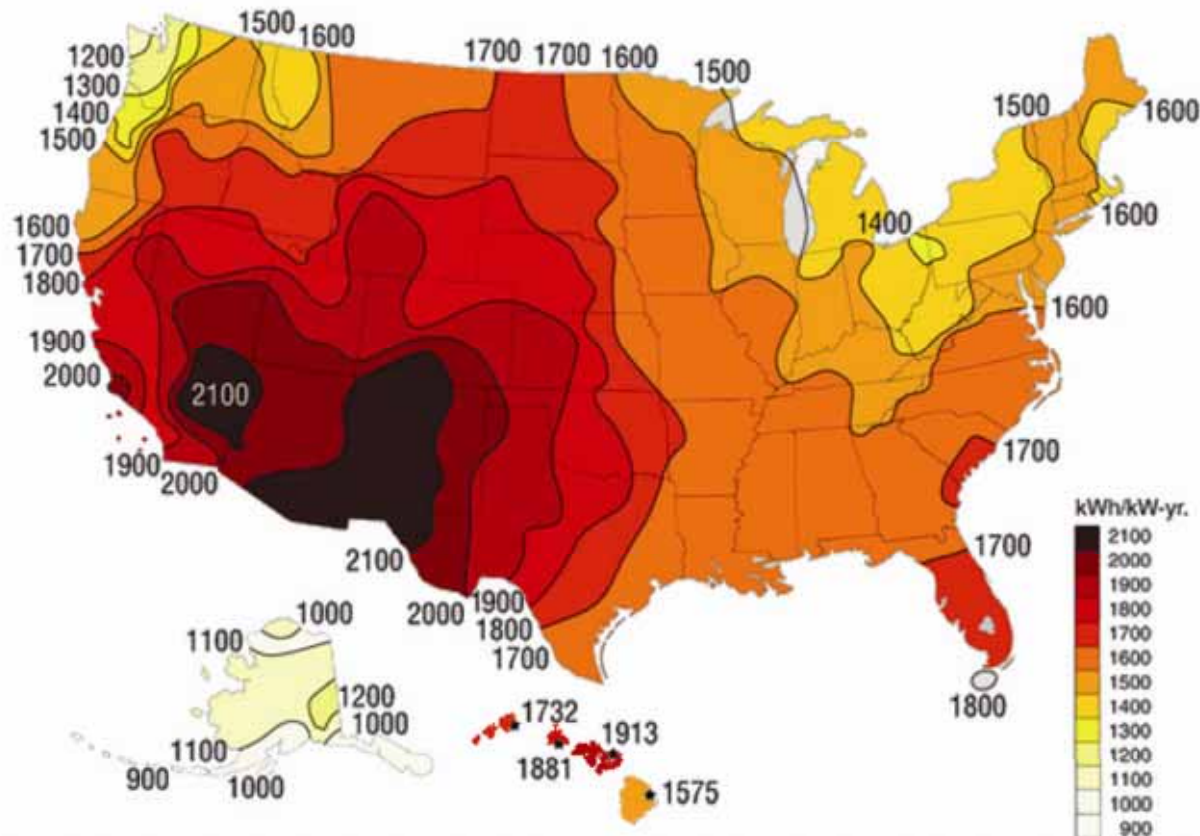
Solar as a Renewable Resource

- ✓ Solar is low maintenance
- ✓ Solar is easier to implement in dense populations



Solar as a Renewable Resource

- ✓ Solar energy is widely available in the U.S.

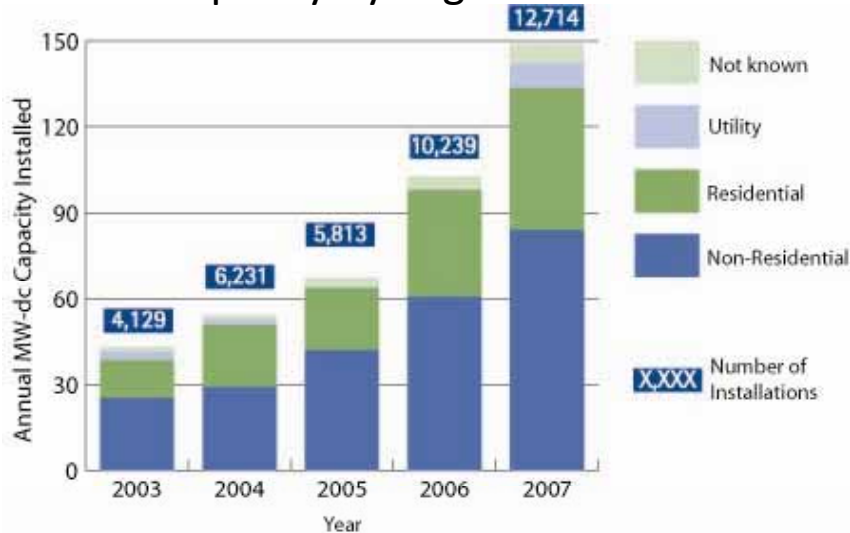


Source: SEIA

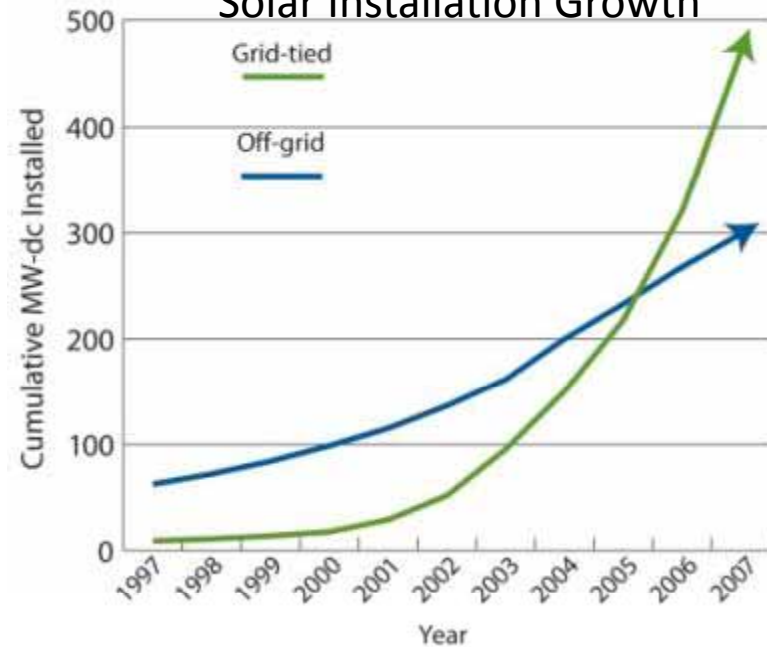
Solar as a Renewable Resource

✓ Solar energy use is growing!

Solar Capacity by Segment

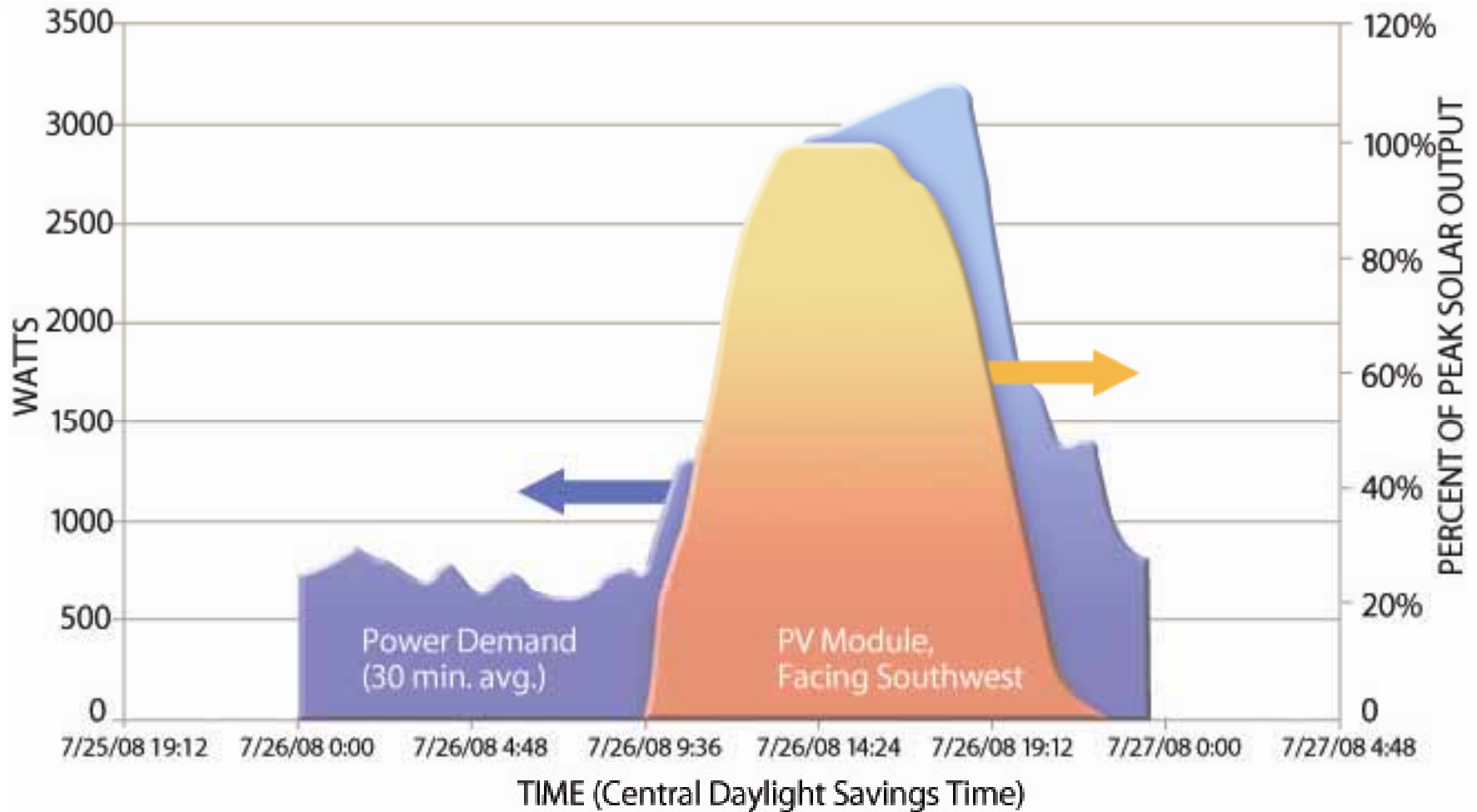


Solar Installation Growth



Source: Larry Sherwood, IREC

Lennox' Innovative Solution



Lennox' Innovative Solution

Introducing for the first time – **SUNSOURCE™**

- Industry first renewable energy integration
- Innovative approach to peak demand reduction
- Increased energy efficiency
- And... We are just getting started!

SUNSOURCE™

LENNOX
Innovation never felt so good.™

Lennox' Innovative Solution

- ✓ Seamless integration of solar
- ✓ Installer friendly
- ✓ Multiple applications



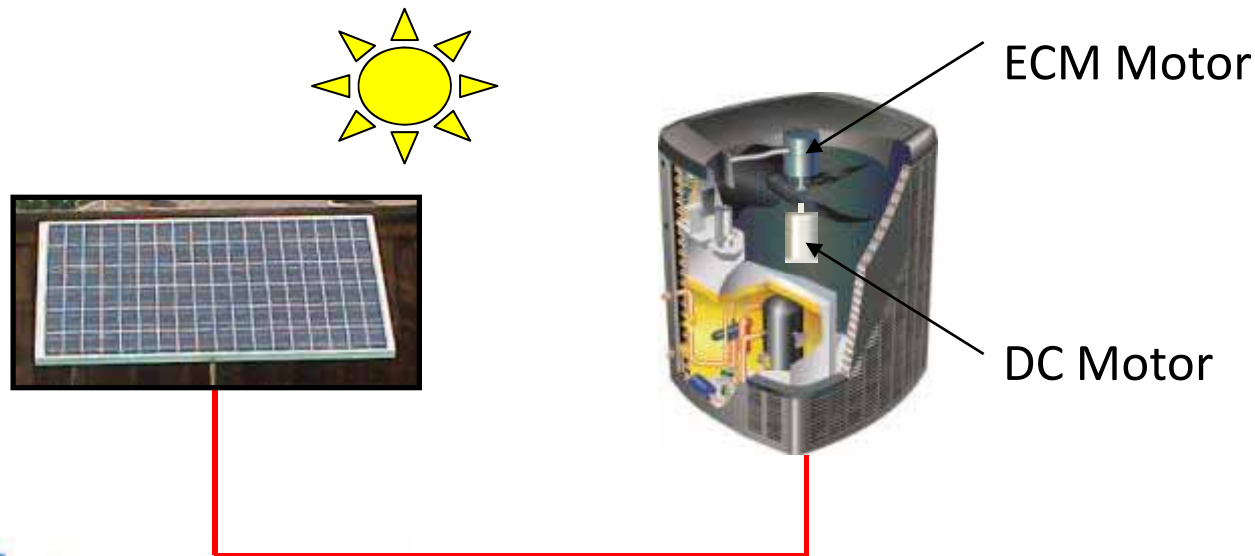
SUNSOURCE™

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Lennox' Innovative Solution

How it Works...

- ✓ Solar power assists condenser / heat pump motor
- ✓ Smaller units achieve “Turbo” benefit
- ✓ No need for grid tie-in

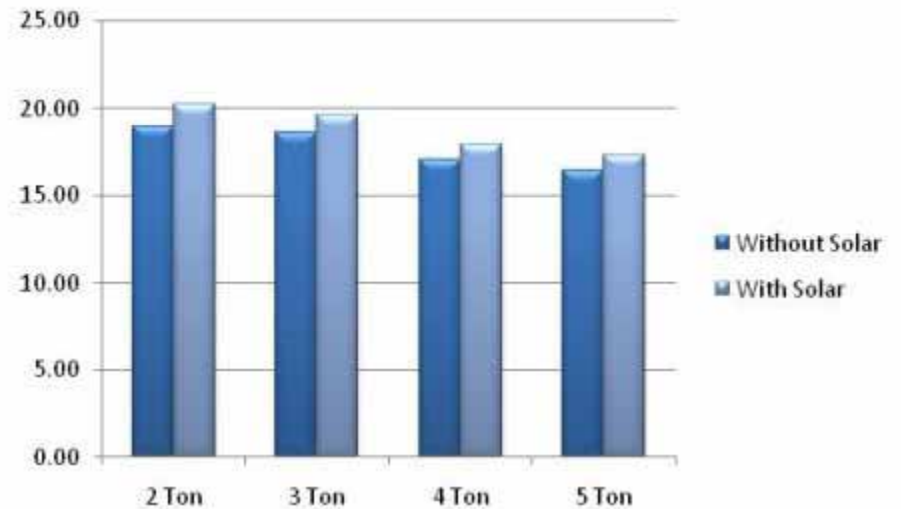
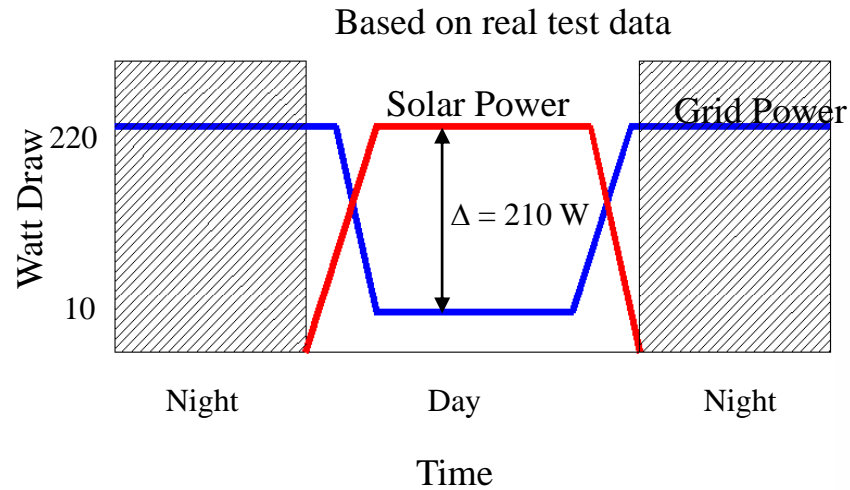


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Lennox' Innovative Solution

🌍 What's the effect?



Increase in SEER of 0.8 – 1.5

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Lennox' Innovative Solution

🌐 What's the effect?

- › 10% of single family homes in California
- › Impact during hottest part of the day!

Peak Demand Reduction of 144 MW

**Same as removing over 116,000 homes
from the grid!**

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Lennox' Innovative Solution

How does this compare to current technologies?



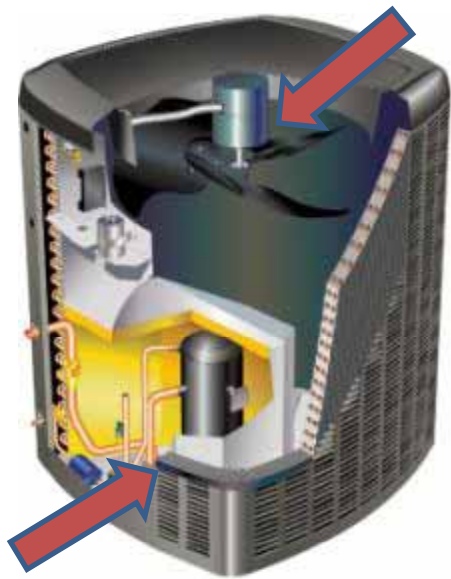
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Lennox' Innovative Solution

Looking into the future...

- Integration with indoor blower
- Integration with compressor



Full integration
Heating and Cooling modes



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Lennox' Innovative Solution

With the support of Utilities... Everyone Wins

- ✓ Peak demand reduction
- ✓ Increased efficiency
- ✓ Environmentally responsible use of renewable energy
- ✓ Improved home comfort

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HVAC Technical Innovations



Thank You



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