Commercial HVAC Efficiency Regulations and Refrigerants Are Changing: Are You Ready?
Polling Question

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1. _______________
Today’s Presenters

David Hules

• Director of Commercial Marketing, Air Conditioning Business
• 9 years With Emerson
• Responsible for understanding industry trends across the commercial air conditioning market segments and translating these into marketing activities and new products

Karim Amrane, Ph.D.

• Senior Vice President, Regulatory and International Policy at Air-Conditioning, Heating, and Refrigeration Institute
• 25 Years Experience In HVACR Industry
• Manages industry’s cooperative research program
• Responsible for the development and implementation of AHRI’s regulatory and international policy
Agenda

1. Commercial Heating and Air Conditioning Trends
2. Current State of Commercial HVAC Industry
3. Efficiency Regulations and Activities
4. Future Refrigerants Landscape → What it means for you
5. Summary and Key Takeaways
Polling Question

What percentage of your job is spent helping your clients understand or make HVAC decisions?

1. 0-30%
2. 30-60%
3. 60-100%
Megatrends Driving Commercial Air Conditioning

**Trend**
- Building Automation / Connectivity
- Energy Efficiency and Sustainability
- Comfort and Air Quality

**Industry Response**
- Modulation Technologies
- Advanced Diagnostics
- Sensing and Facility Monitoring
- Low-GWP Refrigerants
- Efficiency Retrofits
Industry Trends Driving Towards Solutions to Deliver the Most Efficient Buildings

- Enable Green Buildings (LEED, Net Zero)
- Whole Building Efficiency Targets
- Ventilation & Air Quality
- Commissioning and Monitoring for Buildings
- Coordination of Building Subsystems
The Road to Zero: DOE’s Next Generation Heating & Cooling R&D Strategy

- Action to phase-down HFCs can avoid up to 0.5°C of warming by 2100
- HVACR uses 50% of all energy in U.S. commercial & residential buildings

Source: U.S. Department of Energy
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43% of Respondents Said that Frequent Changes to HVAC Codes and Standards is a Challenge

Q: What are critical challenges or issues affecting the future of HVAC systems? (n=233)
Q: What are critical challenges or issues affecting the future of building automation systems? (n=233)

Source: Consulting Specifying Engineer 2015 HVAC and Building Automation Systems Study
Energy Efficiency and Interoperability Changes are Impacting Engineers

Q: What are the biggest changes in HVAC systems that you’ve observed during the past 12 to 18 months? (n=230)
Q: What are the biggest changes in building automation systems that you’ve observed during the past 12 to 18 months (n=227)

Source: Consulting Specifying Engineer 2015 HVAC and Building Automation Systems Study
Polling Question

What Region Of The Country Are Your Primary Operations?

1. North Central
2. South East
3. North East
4. South Central
5. South West
6. North West
Status of State Energy Code Adoption for Commercial Buildings (As of April 2016)

Source: https://www.energycodes.gov/status-state-energy-code-adoption
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Pooling Question

How aware are you of government regulations to reduce/mitigate energy consumption & adopt more environmentally responsible refrigerants in the United States?

1. Fully Aware
2. Somewhat Aware
3. Not Aware
Consulting Specifying Engineer Survey Feedback / Inputs

Learnings:

• 86% of CSEs agree that "tracking and understanding government, utility and/or trade association HVAC regulations" is important to their business.
  • However only 20% of CSE's are both aware of the DOE regulations AND understand how the regulations impact their business.

• 22 % of CSEs report that they have interactions with customers in which HVAC regulations are discussed.

• 55% of CSEs say in general, their clients are NOT aware of HVAC energy efficiency standards and that they need to educate them on these standards.

To find more on HVAC regulations visit: AC & Heating Connect™
DOE Efficiency Standards for Commercial AC Packaged / Split Systems

On 1/1/2018 The DOE Will Adopt The 90.1-2013 IEER Levels Nationally

Note: ASHRAE 90.1 also has an EER component not shown here
## CEE Commercial Unitary Specification - Demanding Efficiency Levels Driven By Utility Advocates

<table>
<thead>
<tr>
<th>Size Category</th>
<th>System Type</th>
<th>Old Specifications</th>
<th>Current Specifications</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>CEE Tier 0</td>
<td>CEE Tier 1</td>
</tr>
<tr>
<td>&lt;65,000 Btu/h</td>
<td>All Split</td>
<td>NA</td>
<td>14.0 SEER</td>
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<tr>
<td></td>
<td>All Single Package</td>
<td>NA</td>
<td>14.0 SEER</td>
</tr>
<tr>
<td>≥65,000 Btu/h and &lt;135,000 Btu/h</td>
<td>Single Packaged and Split</td>
<td>11.7 EER</td>
<td>11.7 EER</td>
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<tr>
<td></td>
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<td>11.8 IEER</td>
<td>13.0 IEER</td>
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<tr>
<td>≥135,000 Btu/h and &lt;240,000 Btu/h</td>
<td>Single Packaged and Split</td>
<td>11.7 EER</td>
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<tr>
<td></td>
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<td>11.8 IEER</td>
<td>12.5 IEER</td>
</tr>
<tr>
<td>≥240,000 Btu/h and &lt;760,000 Btu/h</td>
<td>Single Packaged and Split</td>
<td>10.5 EER</td>
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<td>10.6 IEER</td>
<td>11.3 IEER</td>
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<tr>
<td>&gt;760,000 Btu/h</td>
<td>Single Packaged and Split</td>
<td>9.9 EER</td>
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<td></td>
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<td>10.0 IEER</td>
<td>11.1 IEER</td>
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</table>

**Note:** Electric Resistance Values Shown, Subtract 0.2 EER/IEER For All Other Equipment

**Note:** Effective January 2016
# Technology Solutions to Optimize System Part Load Efficiency – IEER

<table>
<thead>
<tr>
<th>Technology Levers</th>
<th>Higher IEER</th>
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<tbody>
<tr>
<td>Multi-Speed Blower Fans</td>
<td><img src="image1.png" alt="Image" /></td>
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<tr>
<td>Multi-Speed Condenser Fans</td>
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<td>Compression</td>
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<tr>
<td>Larger Coil Heat Exchangers</td>
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<tr>
<td>Controls</td>
<td><img src="image5.png" alt="Image" /></td>
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**DOE Efficiency Standards for Residential AC & HP Packaged / Split Systems Effective January 1, 2023**

<table>
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<tr>
<th>Product Class</th>
<th>National</th>
<th>Southeast*</th>
<th>Southwest**</th>
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<tr>
<td></td>
<td>SEER</td>
<td>HSPF</td>
<td>SEER</td>
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<tr>
<td>Split System Air Conditioners with a Certified Cooling Capacity &lt;45,000 Btu/h</td>
<td>14</td>
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<td>15</td>
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<tr>
<td>Split System Air Conditioners with a Certified Cooling Capacity &gt;45,000 Btu/h</td>
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<td>14.5</td>
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<td>Split System Heat Pumps</td>
<td>15</td>
<td>8.8</td>
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<tr>
<td>Single-Package Air Conditioners and Heat Pumps</td>
<td>14</td>
<td>8.0</td>
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</tbody>
</table>

- *Southeast includes: The states of Alabama, Arkansas, Delaware, Florida, Georgia, Hawaii, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, the District of Columbia, and the U.S. territories.
- **Southwest includes the states of Arizona, California, Nevada and New Mexico.
- ***The 10.2 EER amended energy conservation standard applies to split system air conditioners with a seasonal energy efficiency ratio greater than or equal to 16.
- Note: The energy conservation standards for small-duct high velocity and space-constrained remain unchanged from current levels.
How Could Regulations Impact You?

• **Higher Part Load Efficiency (IEER) Systems**
  - Potentially higher first cost
  - Lower operating cost

• **Potential Increase in System Footprint**
  - Larger heat exchanger surface area

• **Reduction in System Refrigerant Circuits**

• **More Applications with Modulated Scroll Compressors**
  - Mechanical Modulation and Variable Speed Technology

• **VFDs on Evaporator Blower Motors – Staged Speeds**
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Current Low GWP Candidates for Air Conditioning & Heat Pump Applications

Common Questions:
- What Is A Low-GWP Refrigerant?
- Why Is The Industry Moving In This Direction?
- What Does This Mean For Me?
Key Activities Impacting Low GWP Refrigerant Regulations and Timing for HVAC

- Global HFC Phasedown Framework Underway – Montreal Protocol Amendment

- EPA Proposed Ruling For Status Change (Delist) In Chillers
  - R134a, R410A and R407C

- Key Safety Standards Under Revision For A2L Fluids
  - US: UL1995 & ASHRAE15
  - International: ISO-5149, IEC 60335, EN-378

- AHRI A2L “Real World” Flammability Study Underway

- Equipment Manufacturers Launching New Systems With A2L
  - Region And Application Dependent
Our Understanding of Regulation Timing for Low GWP Refrigerants in AC Applications

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<tbody>
<tr>
<td>IEC/UL/ASHRAE Stds. Update for A2L’s</td>
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<td>A2L Into Bldg Codes</td>
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<td>DOE Commercial RTU’s IEER Std</td>
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<td>1/1/23</td>
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<td>EPA Proposed Delist (Chillers)</td>
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RTU’S

Component Re-designs

OEM A2L Designs

RTU Launches

Chillers

Component Re-designs

OEM A2L Designs

OEM Chiller Launches
## Flammable LGWP Refrigerants Emerging in HVAC Applications in the Next 5 Years

<table>
<thead>
<tr>
<th>Application</th>
<th>China</th>
<th>Japan</th>
<th>Rest of Asia</th>
<th>Europe</th>
<th>US/NA</th>
<th>Middle East &amp; Africa</th>
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<tbody>
<tr>
<td>Residential Air To Air Split AC/HP</td>
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<td>Residential Air To Water Heating</td>
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<td>Lt Commercial PAC</td>
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<td>Scroll Chillers</td>
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<td>Large Chillers</td>
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<td>PTACs / Window Units</td>
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</table>

**Note:**
- A3 Active Programs
- A2L Active Programs
- A3 / A2L Beyond 2021
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Thank You For Attending!

To Learn More On “Getting Comfortable With Designer Air”, Please Visit Our Webpage At emersonclimate.com/designerair

Stay Tuned For More Emails Containing Information And Timing On Our Next Webinar!