standardization and innovation

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American National Standards Institute

Impact of Regulatory Standards on Innovations in the HVACR Industry

Presented by

Henry Hwong

Director, Product Sections

Air Conditioning & Refrigeration Institute

Introduction to ARI

- National trade association formed in 1953 and headquartered in Arlington, Virginia
- Represents more than 90% of North American produced air conditioning and commercial refrigeration equipment manufacturers
- Over 200 members in 26 product sections

Impact of Regulatory Standards on Innovations in the HVACR Industry

- Agenda
  - What is Innovation?
  - Regulatory Environment in the HVACR Industry
  - Case Study One
    - Seasonal Energy Efficiency Ratio
  - Case Study Two
    - State Efficiency Standards
  - Conclusions

What is Innovation?

What is Innovation?

What is Innovation?

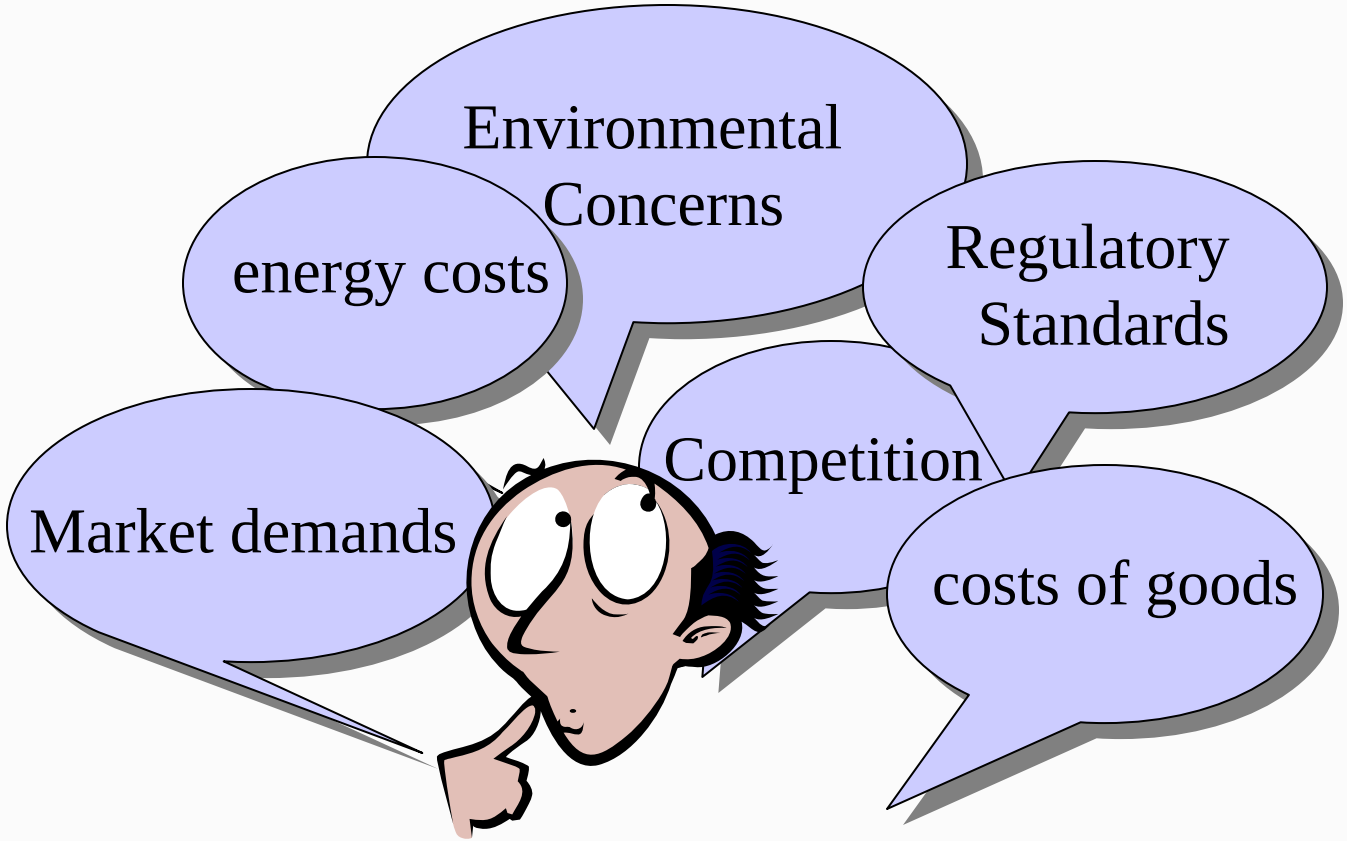
- CNN's list of top 10 innovations since 1980

1. The Internet
2. Cell phone
3. Personal computers
4. Fiber optics
5. E-mail
6. Commercialized GPS
7. Portable computers
8. Memory storage discs
9. Consumer level digital camera
10. Radio frequency ID tags

Standardization or Innovation; Which comes first?

- Does standardization drive innovation or visa versa?

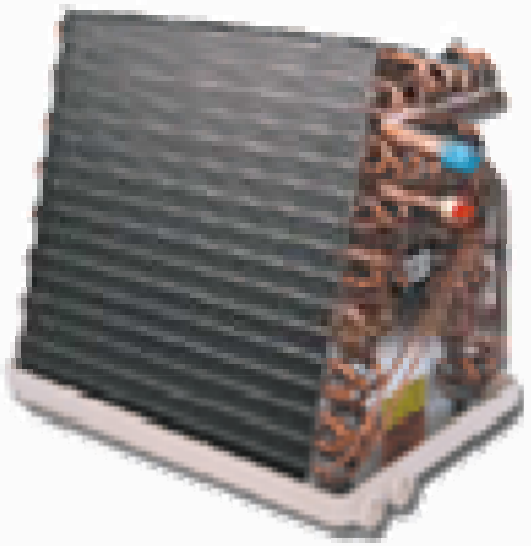
Innovation Priorities; Which comes first?



Regulatory Environment in the HVACR Industry

- Long history of federal, state, voluntary, and mandatory energy efficiency standards in the U.S.
- Majority of US HVACR products are covered under one of the following energy efficiency standards:
  - National Appliance Energy Conservation Act (NAECA)
  - Energy Policy Act of 1992 (EPACT)
  - ASHRAE 90.1
  - State Regulations

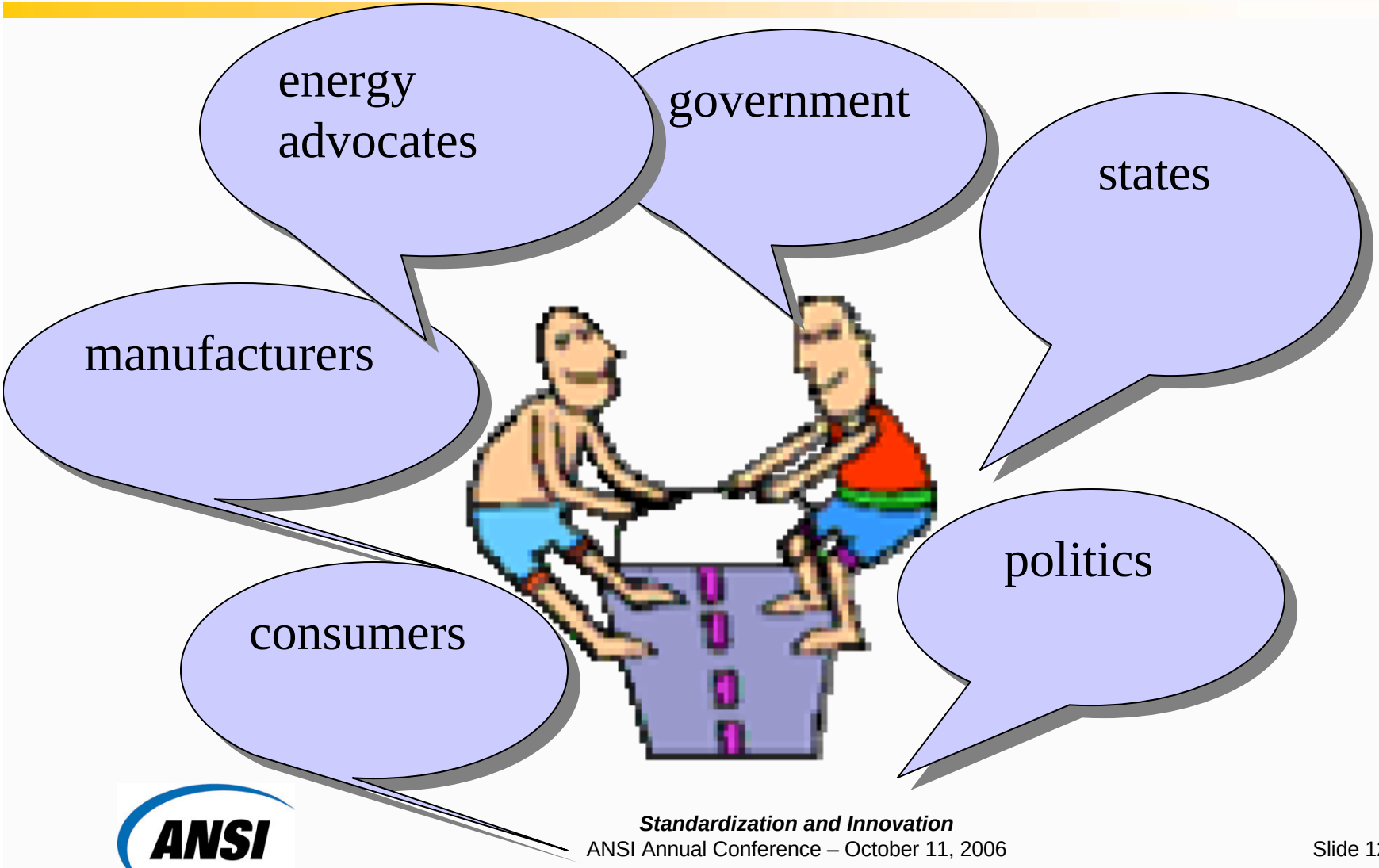
Case Study One: National Appliance Energy Conservation Act (NAECA)



Case Study One: National Appliance Energy Conservation Act (NAECA)

- NAECA is standard that established a national minimum efficiency of 10 SEER (Seasonal Energy Efficiency Ratio)
- SEER is the recognized energy efficiency descriptor for residential air conditioners and heat pumps
- NAECA also mandated the US Department of Energy (DOE) to increase federal minimum efficiency through rulemaking
- Highly publicized debate amongst all stakeholders between 12 and 13 SEER

Case Study One: National Appliance Energy Conservation Act (NAECA)



Case Study One: National Appliance Energy Conservation Act (NAECA)

- The 12/13 SEER debate (Manufacturers' perspective)
  - Standard needs to be "technologically feasible and economically justifiable"
  - Reduced choices
  - Long payback for majority of the country
  - 75% of consumers will not benefit

Case Study One: National Appliance Energy Conservation Act (NAECA)

- Effective Jan 23, 2006 -- New minimum energy efficiency standards
  - 13 SEER → 30% increase over current levels
- Impacts on innovation
  - Millions of dollars spent on retooling
  - Countless hours spent on redesigning production line, design to mass produce what was a premium line
  - Design equipment to fit in existing footprint
  - Significant compliance efforts
  - Consumed all available resources to comply with new standard

Case Study Two:
State Efficiency Standards

- NAECA and EPACT established federal minimum efficiency levels and regulations for most residential and commercial air conditioning and refrigeration equipment
- Key element of federal regulations is the concept of "preemption"
- Non-federally covered products are not preempted
- Preemption is key to avoid a patchwork of state standards
- States have historically regulated non-covered products
- Preemption are increasingly being challenged by states

Case Study Two: State Efficiency Standards

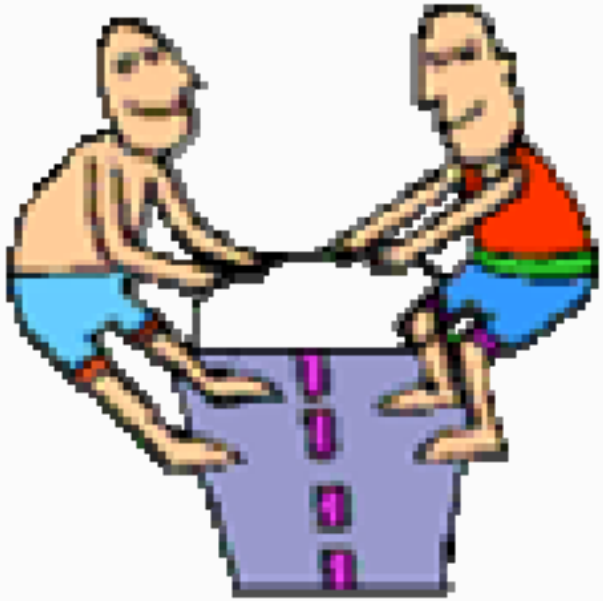
- California
  - Sixth largest economy in the world
  - Sixteen climate zones
  - Uses over 270,000 gigawatt-hours of electricity/year
  - Regulatory authorities are delegated to the California Energy Commission (CEC)
  - Title 24 covers buildings
  - Title 20 covers appliances

Case Study Two: State Efficiency Standards

- Peak Demand
  - Concerns are in peak demand, not necessarily energy efficiency
  - Peak demand growing at 2.4 percent per year
  - Equivalent to 3 new 500-megawatt power plants
  - Results in rolling blackouts
  - Energy Efficiency Ratio (EER) is a better descriptor of peak energy usage than SEER

Case Study Two:
State Efficiency Standards

EER



SEER

Case Study Two:
State Efficiency Standards

- Legal battle ensued between California and manufacturers
- US Supreme Court's eventual denial to hear the case gave states permission to request data not requested in the federal regulations
- Opened the door for states to promulgate its own regulations

Case Study Two:
State Efficiency Standards

- Impact on Innovation
  - Optimization for SEER or EER?
  - Design-by-state
  - Design-by-climate
  - Limitations of components
  - Diluted resources

Conclusions

- Standards and Regulations dictate much of HVACR product development and innovations
- Some have foster innovations in the past while others have stymied innovation
- Similar circumstances two decades ago with environmental concerns
- Standards and regulations will drive innovation for years to come