Energy Efficient Homes and Buildings

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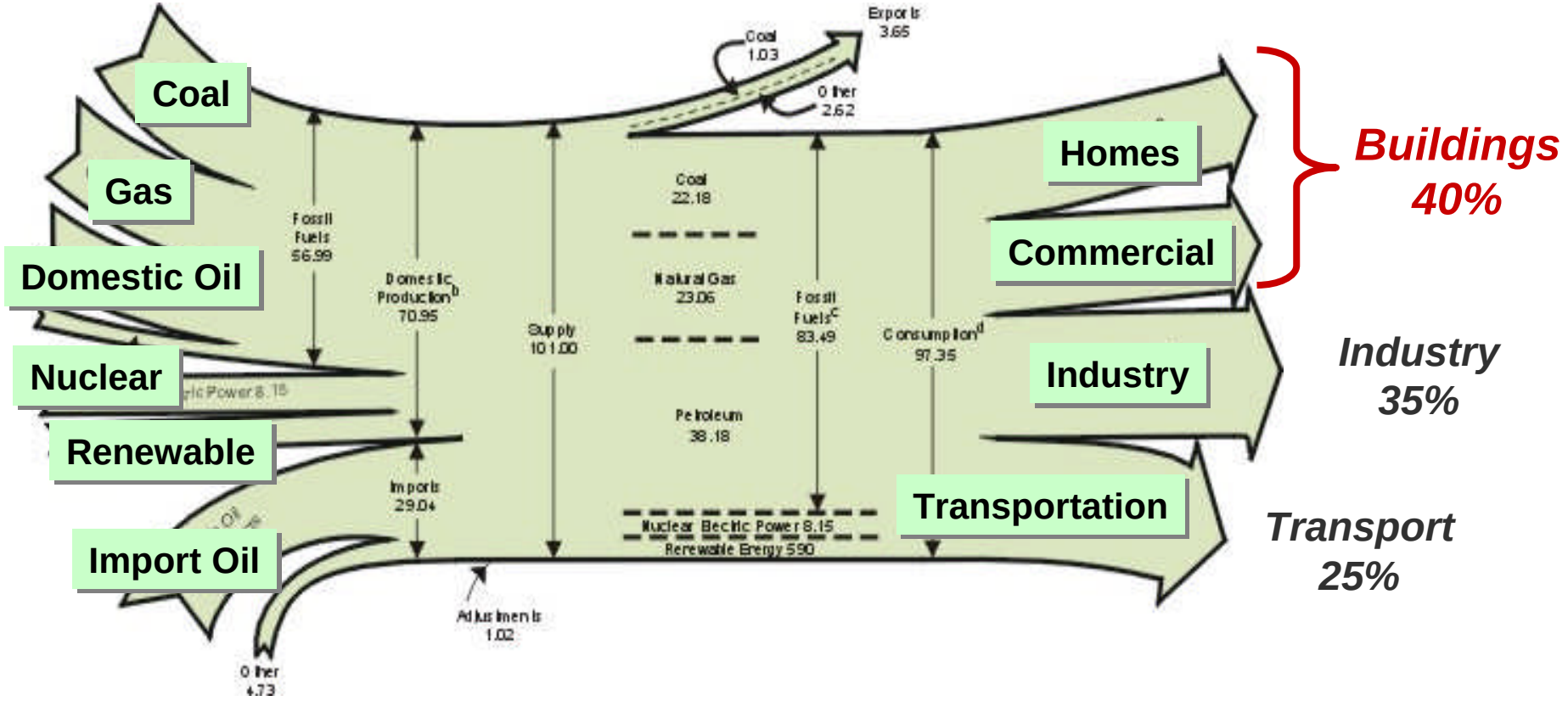
Thanks …

OWENS CORNING

ClimateVISION

Committed to energy productivity!

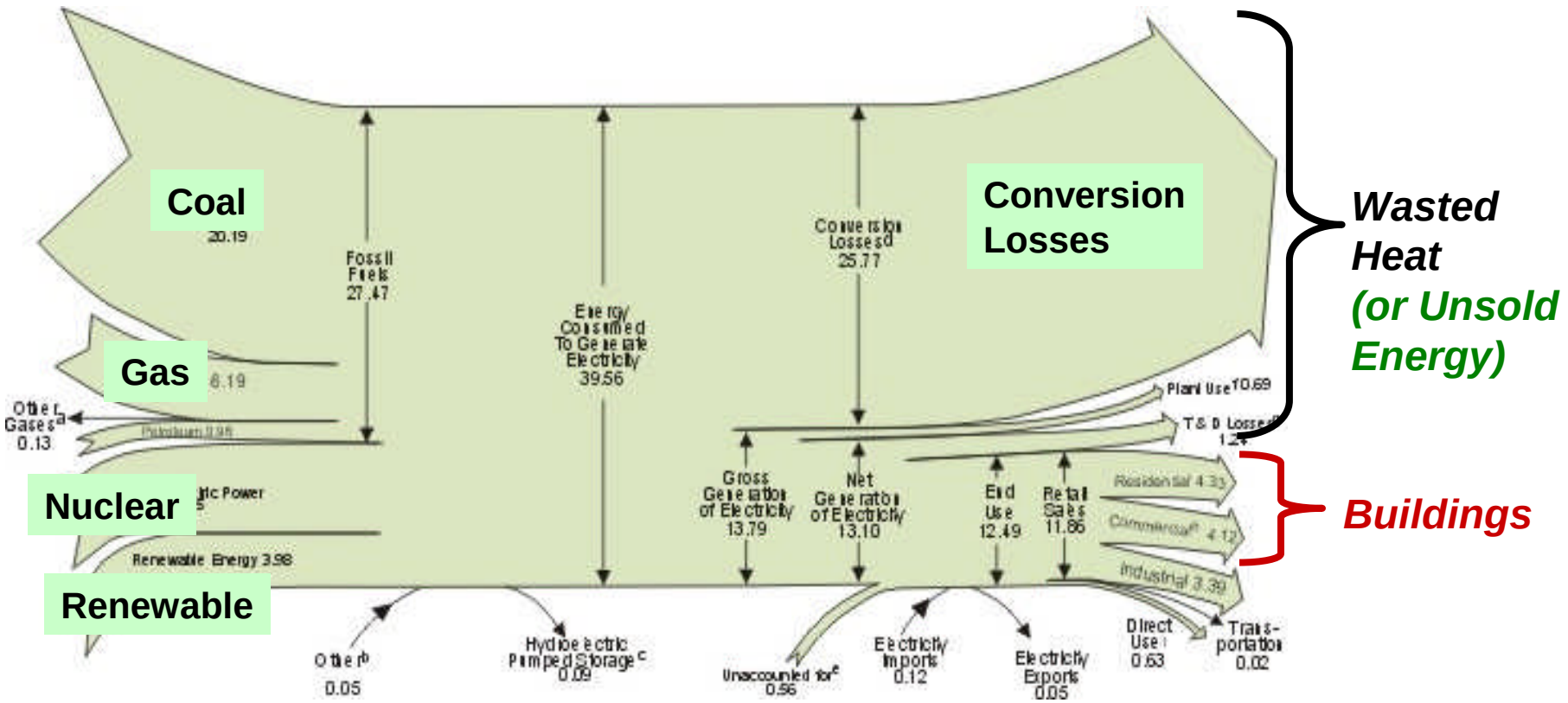
Total US Energy Use ~ $850 Bn
Homes and Buildings largest users



$350 Bn into Buildings

Source: US DoE EIA

Buildings are main user of electricity



Energy Efficiency leverage

Source: US DoE EIA

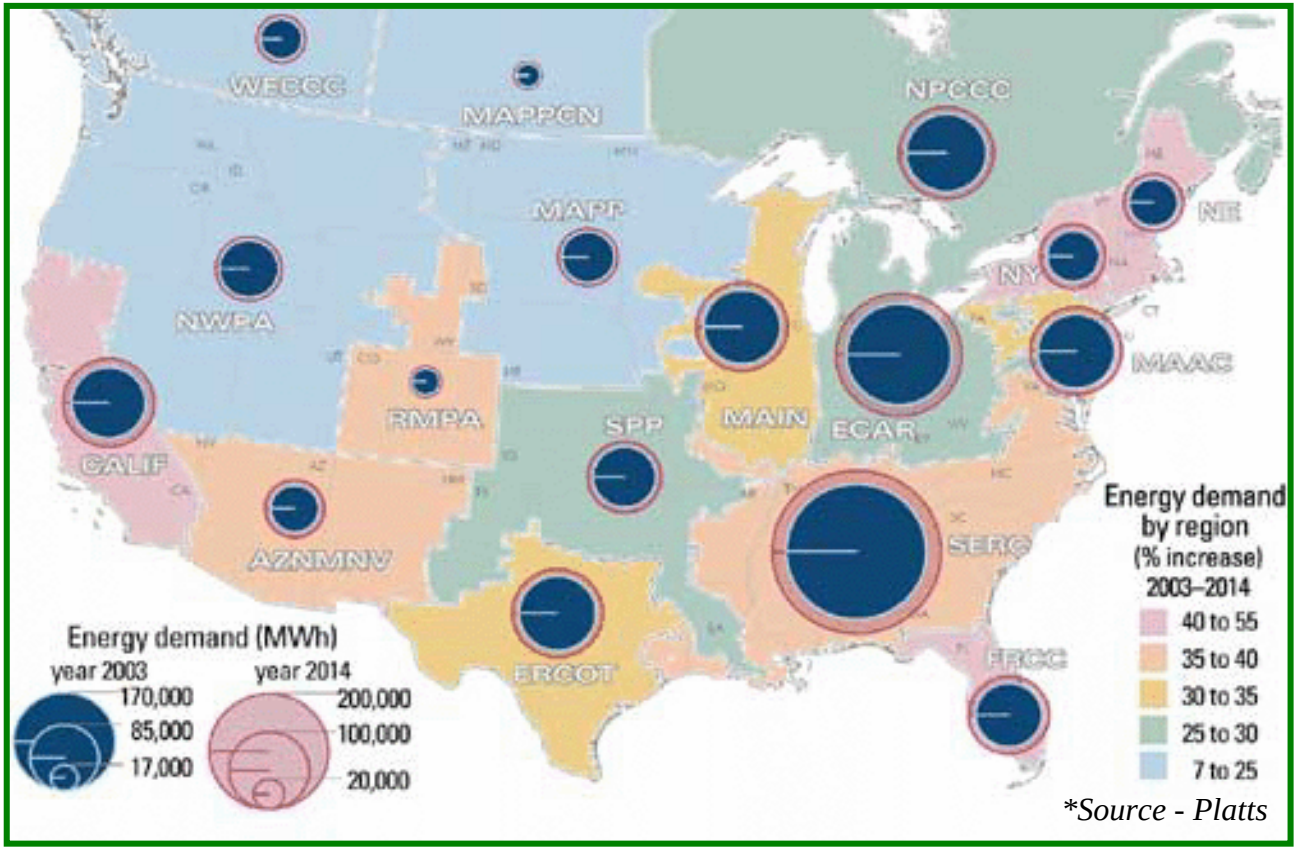
US Homes and Buildings
The major electricity user

- Homes & Buildings use 70% of ***all*** electricity
  - *Electricity demand continues to increase*
  - *Major cause of electricity peak loads*
  - *Major impact on electricity investments*
    - *New generation, transmission and distribution*
  - *Pressure on natural gas use*
    - *Imports dependency*
    - *Increasing costs for all natural gas users*
  - *Major cause of greenhouse gases*
    - *Second only to personal vehicles*
    - *Heat from electricity generation massive potential new energy source with no incremental greenhouse gas creation*

Efficiency creates major benefits

Another way of looking at it…
US Electricity forecasts add 170,000 MW

Regional peak demand (2002–2014)*



Equivalent to 30% Building Efficiency Gain

Energy Efficient Homes
Value potential

- Total $195 Bn of homeowner energy costs
- Major opportunity
  - *100 million existing homes*
  - *1.6 million new homes every year*
- Efficient homes create multiple benefits
  - *Reduce homeowner's operating costs*
  - *Enhanced sale and resale prices*
  - *Reduce dependence on imported energy*
  - *Reduce need for new generating capacity*
  - *Reduce electricity grid investment needs*
  - *Minimise impact of energy price increases*
  - *Positive climate change impact*
  - *Positive community health impacts*

How are we doing capturing them?

Huge range of energy performance
Homes and Buildings…

- Commercial/Institutional Buildings
  - *Average US building uses up to 500 $kWh_e/m^2/yr$*
  - *New US buildings ~ 200 to 500 kWh_e/m^2*
  - *New EU buildings ~ 150 to 250 kWh_e/m^2*
  - *Emerging low-energy codes ~ 45 to 90 kWh_e/m^2*
- Homes
  - *New US home uses 200 to 300 kWh_e/m^2*
  - *New EU low-energy construction ~ 80 to110 $kWh_e/m^2/yr$*
  - *Emerging low-energy codes ~ 45 and 70 $kWh_e/m^2/yr$*

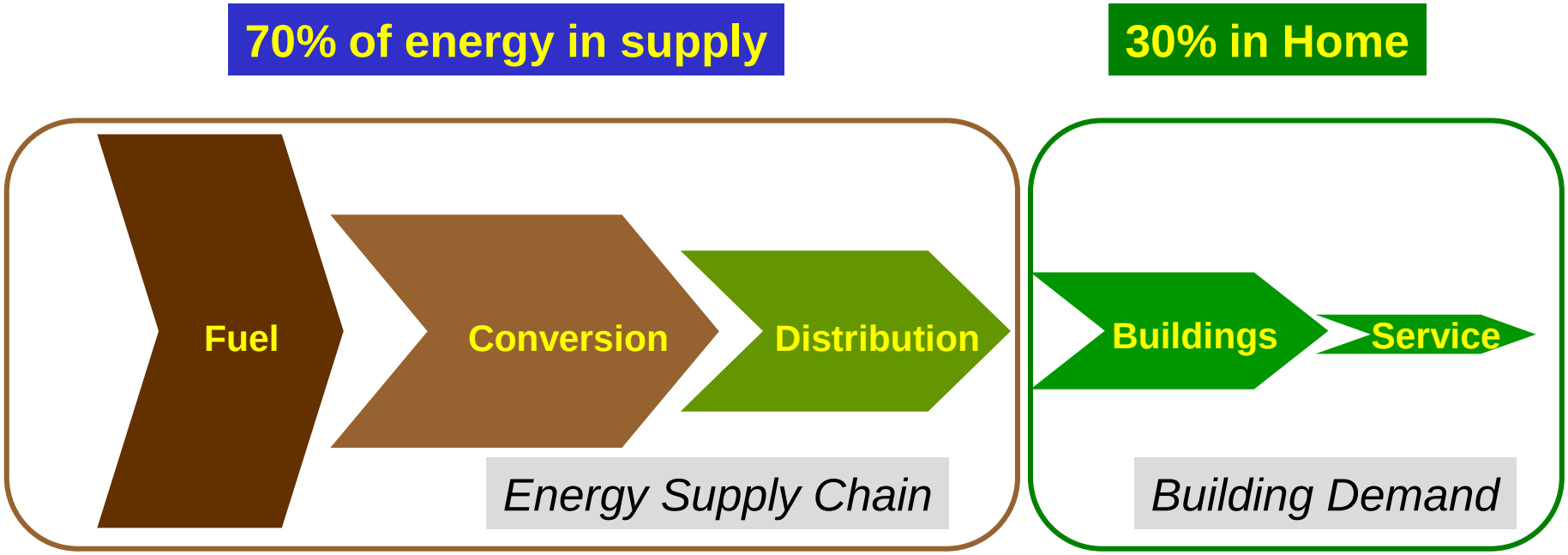
Saving potential is there

Energy Efficient Construction Tools
Major progress in last decade

- Green building approaches more widely known
- Building designs that work with climate not fight it
  - *Orientation, natural conditioning, daylighting…*
- Super-efficient building shells
  - *Insulation, glazing,*
  - *Wall structures – wood, masonry, steel, composites…*
- Advanced home management systems
  - *Adaptive, zoned, predictive, weather forecast optimized…*
- Appliances
  - *Optimization, insulation, stand-by, demand managed…*
- Lighting
  - *Enhanced CFL's, LED's…*
- Implementation ***easily*** halves energy demand

But painfully slow to proliferate…

Energy use in the supply chain
Not only in the home



Do rigid market structures hinder gains?

Efficient energy supply technologies
Cost-effective developments in last decade

- On-site co-generation of heat and power
  - *Doubles useful energy from fuel*
  - *Micro-turbines, engines, turbines…*
  - *Heat-driven cooling…*
- Cost effective renewable generation/co-generation
  - *Wind turbines*
  - *Bio-mass – wood, vegetation…*
  - *Bio-gas, bio-diesel…*
  - *Active and passive solar*
- Easier technical interconnection with grid
- Integration with efficient homes increases community efficiency and supply reliability
- Potential to halve greenhouse gas emissions

But painfully slow to proliferate…

One Example
Covell Village, Davis, California

- "European" village concept of a "total" community
- Range of homes from up-scale SFH to entry level affordable to encourage social blend
- Village centre – retail, educational and communal facilities
- Water management and wildlife habitat
- Designed for maximum social interactions and minimum car use

Designed as a Community

Covell Village
CEC supported study – Report end 2004

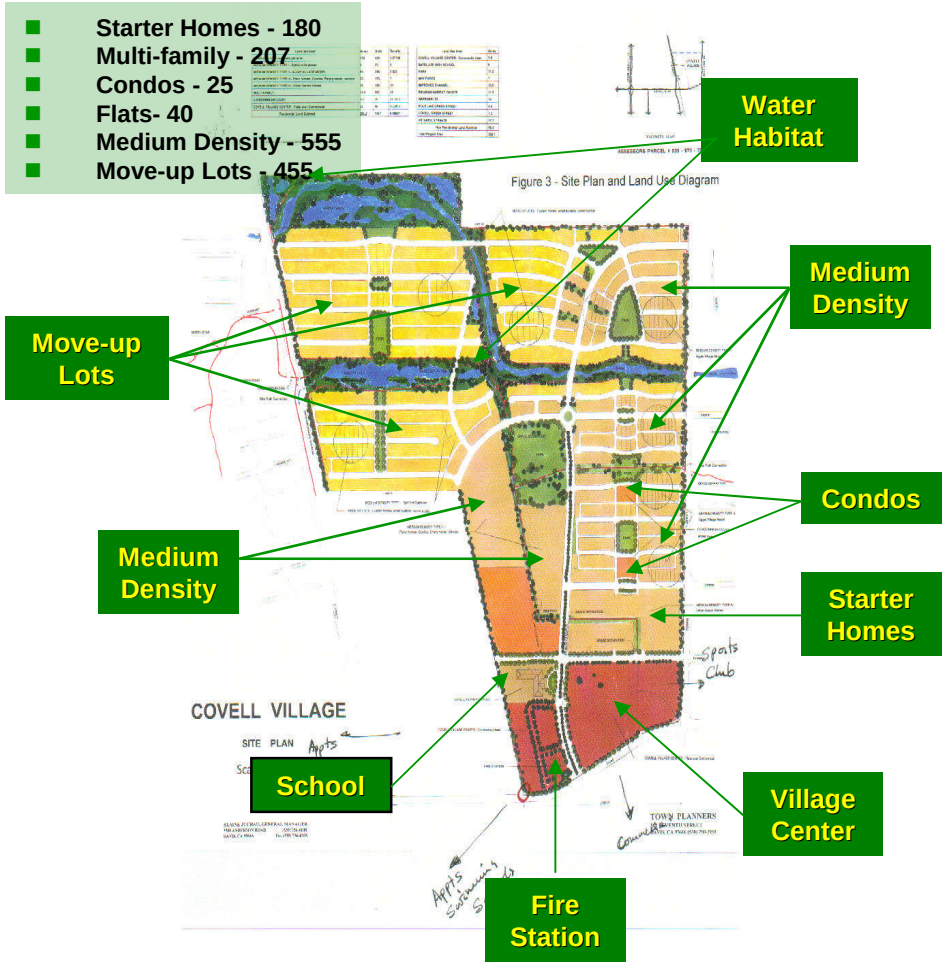
Candidate for a competitive, breakthrough energy solution?

Proposed Development

- 383 acres
- 1457 mixed style homes
- Community Centre

Breakthrough Goals

- CEC Study launched May 2004
- Energy uses ½ US average
- Carbon-dioxide 1/3rd norm
- Cost equal or less than conventional construction
- Distributed cogeneration
- Integrated district energy system with RoA of > 8%
- Premium home pricing



Combine supply and demand efficiencies

Some thoughts for today's discussions…

- Homes are more efficient than in the past, but nowhere near breakthrough levels
- How much of the perceived increased construction costs results from learning curve effects or "deterrent pricing"?
- Would some form of energy performance certification accelerate the market for efficient homes – EU, Australia have good models?
- How can government use their market influence to shorten the learning curves – HUD, DoD, States…?
- How can government and industry encourage the proliferation of new efficiency and supply technologies?
- What is needed to create energy solutions combining efficient construction and energy supply – market structure, technology?
- Is it about efficient homes, or efficient communities?
- Can we be more creative to monetize the lifetime value of energy efficient homes for owners, utilities and builders?
- What market failures are slowing down energy efficient homes?
- ***Can we do this with joint action, or do we need government mandates?***

Thank You