How Can We Get More Deep Energy Retrofits in the US?

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Brennan Less
LBNL, Residential Building Systems
“So many more deep residential energy retrofits are occurring than we ever hoped. Savings are high, budgets are low...We are on-track!”
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- No One Ever, PhD
• Every single country on the globe is struggling with this issue
• The problems are not technical (mostly)
• We’ve been doing this for >40 years
"Future DERs will need to look different than they have in (many) past demonstration projects... We are not going to be wrapping every existing home in the US with 4” of exterior insulation, air sealing them to 0.6 ACH$_{50}$, and custom engineering the HVAC."

-Brennan Less (that’s me)
Bottlenecks and Burdens

• High project costs
• Extended project timelines
• Disruption and inconvenience
• Complexity – too many players
• Inadequate workforce
• Information burden
• Risk of new technologies and practices (procurement, contractor, inspection, etc.)
• Financing (incentives split from homeowners and financing)
• Market valuation in real estate
• Inconsistent outcomes
• Lack of incentives commensurate with costs
Cost Burden

Many cold climate projects have reported > $100,000

At best, a DER costs as much as a kitchen remodel...

But then you don’t have a new kitchen
Time Burden

~2 Months

- Homeowner selects auditor
- Comprehensive home energy assessment conducted by certified auditor
- Homeowner works with BPI accredited contractor to choose the best upgrades based on needs and budget
- Test out is completed by contractor
- Work is completed by a BPI certified contractor
- Documentation submitted to home performance program

~8 Months

- Application is completed for DER program (by homeowner and contractor), and submitted
- Customer agreement finalized
- Pre-construction site verification visit
- Work begins
- During-construction site verification #1
- Site verification #1
- Site verification #2
- Site verification #3
- Completion of project
- Post construction site verification

Figure 11. Home performance and deep energy retrofit program timelines. Source: EPA 2011, Neuhauser 2012.
Time Burden, Continued

Frugal Happy DIY DER timeline
“People say nothing’s impossible, but I do nothing everyday.”

-Winnie the Pooh
Recommended by Barack Obama!

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How to Do Nothing
Resisting the Attention Economy

-Jenny Odell

This book will change how you see the world.
-Malcolm Harris, author of Kids These Days
Options and Ideas Moving Forward
Options and Ideas Moving Forward

• Need to comprehensively address the actual barriers to widespread implementation of DERs
  – Make them easier, faster, more convenient, less disruptive, flexible, etc.
  – One Stop Shop program designs
  – Trigger Point program strategies
    • Time of Sale, Renovation or Energy Rate change
  – Over-time retrofits, with planning and implementation support
  – Standardized packages and approaches, NOT optimized
    • Marginal value of contractor familiarity, reliability and serviceability will outpace any marginal cost-performance benefit
    • Need to find sweet spot between Standardized and Individualized
DOE RBI Funding of DER Cost-Stacks and Research Prioritization

• Modeled on successful SunShot program by DOE
  – 75% reduction in installed PV costs

• DER work will inform targeted DER research strategy in upcoming years

Source: Goodrich et al. (2012)
DOE RBI Funding of DER Cost-Stacks and Research Prioritization

• Tasks
  – Literature review of US and international DER programs, market assessments
  – Develop reproducible cost-stack methodology to guide future research funding
  – Create baseline cost-stacks for present-day Deep Retrofits in the US
  – Survey of DER contractors and associated professionals to identify research opportunities

• May include time burdens along with costs
DOE RBI Funding of DER Cost-Stacks and Research Prioritization

• To help support DER R&D at the Federal level
• Please provide your valuable input:

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Options and Ideas Moving Forward, Contd

• Different types of DERs with more Consumer Benefits
  – Minimum disruption retrofit
  – Low risk retrofit
  – Smart home retrofit
  – Resilient retrofits (power outage resilience, etc.)
  – Contractor-friendly retrofit - designed around familiarity, durability, longevity
    • Current Code retrofit
  – Grid responsive retrofits
  – Water, carbon ...

• Role of PV, electrification, car charging, thermal/battery storage
  – How can we still get most (but not all) of the thermal comfort, IAQ/health, durability and other co-benefits?
European Panelized Approaches

• Energiesprong – Panelized retrofits
• Complete reskinning – best for uniformly shaped buildings
  – Integrate walls, windows, HVAC
  – Questions remain about moisture considerations
• Integrate financing, planning, contracting, etc. Simplify for owners/occupants. Make it one decision. ONE STOP SHOP.
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- Panelized retrofit activity in US
  - RMI REALIZE initiative
  - NYSERDA RetrofitNY, 10-years, $30 million
  - California, $7.2 million to operationalize a market facilitation platform to deliver Energiesprong-type projects.
THANK YOU

• Let us know if you want to contribute to current DOE Cost-Stack Assessment and Contractor Survey

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• Residential Building Systems Group
• Indoor Environment Group