Portland State UNIVERSITY

Harvesting Benefits From Deep Decarbonization (+ Implementation Considerations)

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Estimated Economy-Wide Supply Curve for GHG Mitigation Policies

Economic growth is likely from low(er) cost policies (vertical axis)

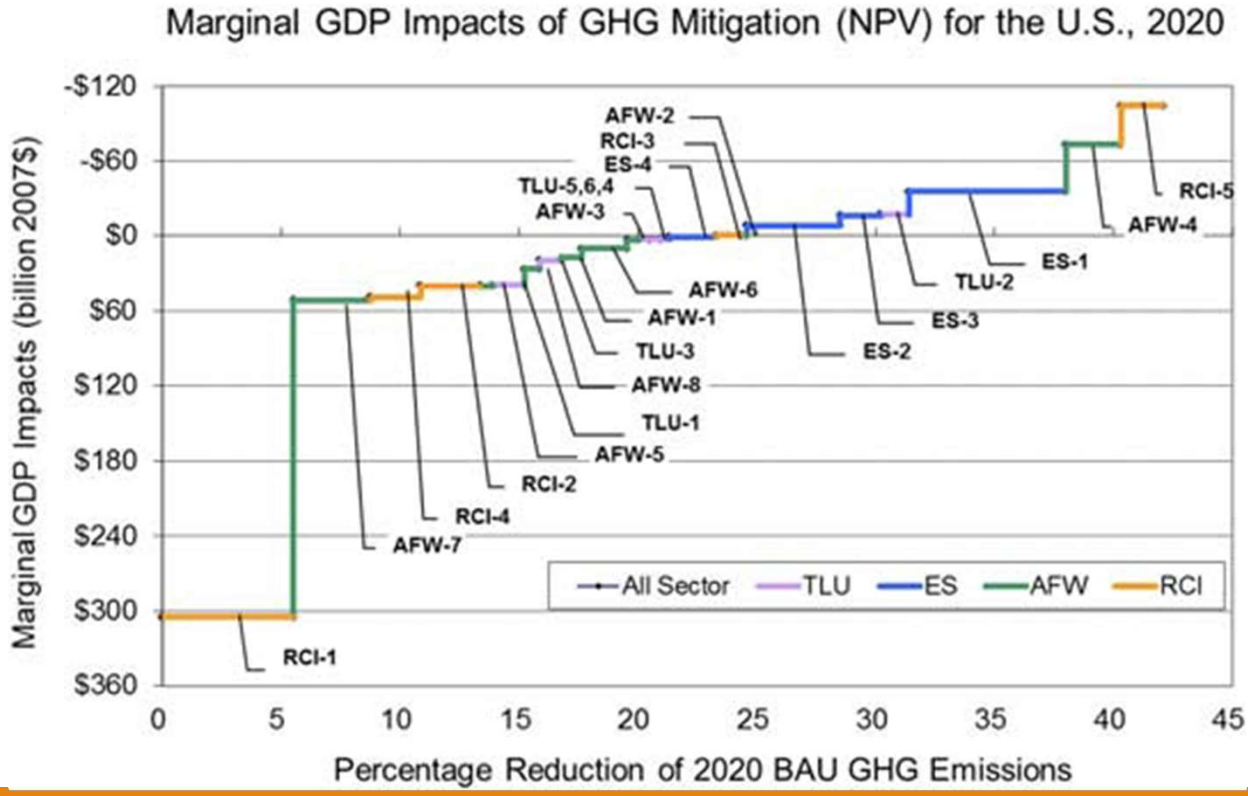
Energy Efficiency (RCI) policies also yield largest GHG savings (horizontal axis)

RCI- Demand Side Management Policies for Residential, Comm, Ind

ES- Energy Supply

AFW- Ag, Forestry, Waste

TLU- Transport and Land Use



Source: Nelson, et al (2015) p. 23

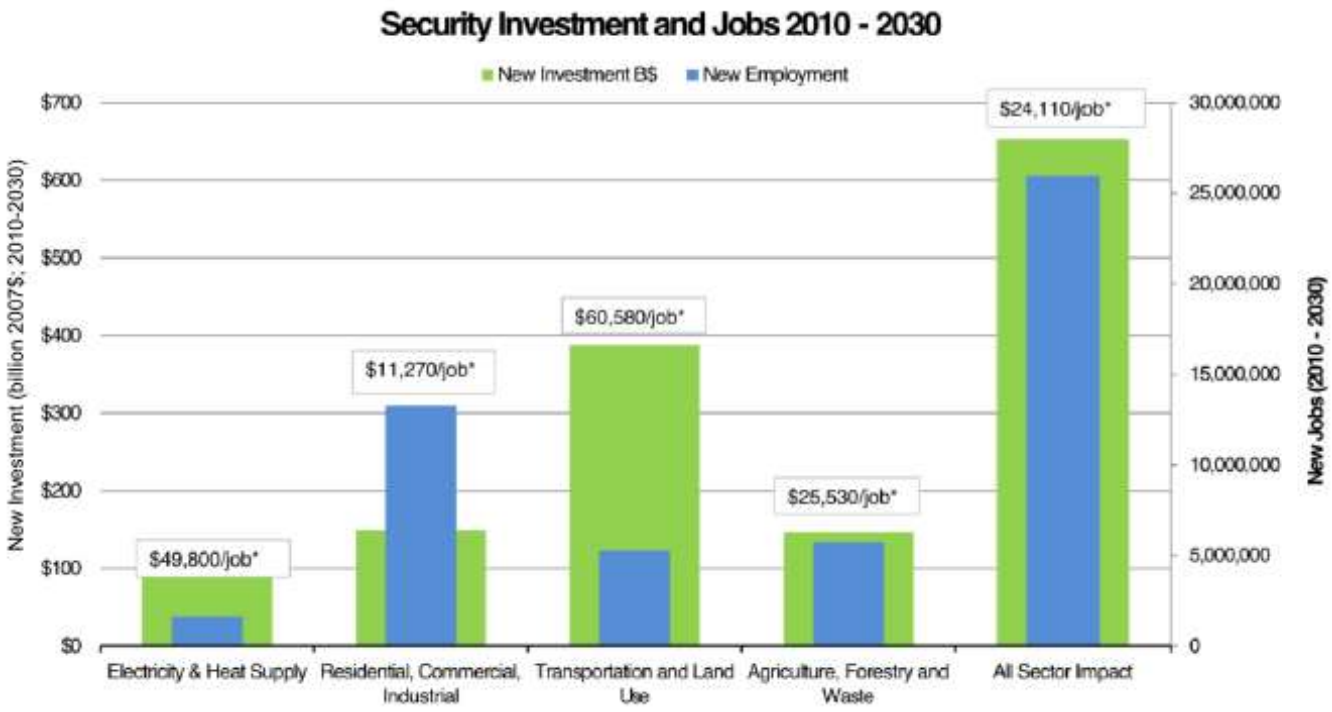
Job Equity from Energy Efficiency Policies

Energy efficiency policies (RCI) have

- the lowest initial capital investment per job
- highest job growth potential (blue)

Broad-Based Growth: Sectors with largest job growth in SoCal AB32 simulations were:

- Retail, Restaurant and Accommodation, Health Services, Real Estate, Financial Services, Equipment Manufacturing (Wei and Rose, 2014, p. 110-111)



Source: Delaquil, et al (2015) p. 23

Weatherization as an Equity Strategy for Low-Income Households

Key equity indicator is Energy Burden: The percent of income spent on utility bills

- Inland California renters' annual energy burden are about 34% higher than homeowners all else being equal
- Less attic insulation and lower AC efficiency consistently predict higher energy burden
- Non-energy benefits of low-income weatherization programs are large:
  - Lower occupant mortality and morbidity (including hospitalizations) from lower thermal stress, lower absenteeism, increased food security, reduced predatory borrowing (Tonn, et al, 2014)
    - Present value of $14k per unit weatherized (p. xvii-xviii)
- Reduced utility arrears
  - Reduced evictions and subsequent homelessness

Harvest Energy Efficiency Co-Benefits by Geo-targeting Demand Response

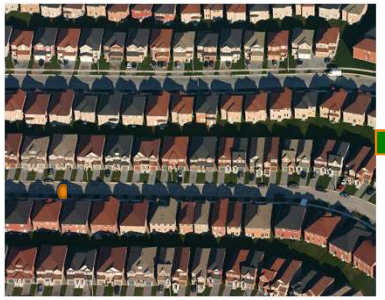
Avoid future electric distribution investment

Predictive models of program participation based on customer attributes: energy usage, home vintage, home value, etc.

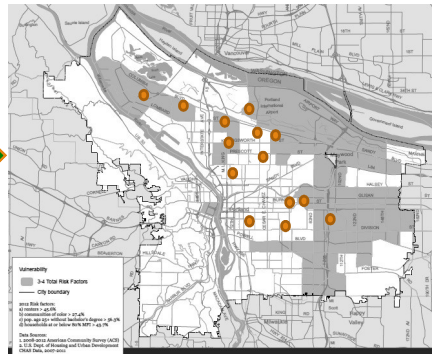
Micro-grids: incentivize electricity storage and distributed generation as possible (resilience)

1. Develop statistical models from 3k ETO/Utility program data

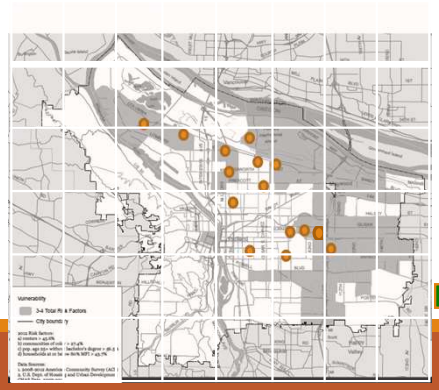
2. Apply to all 288k Multnomah County residential accounts



3. Identify high probability accounts

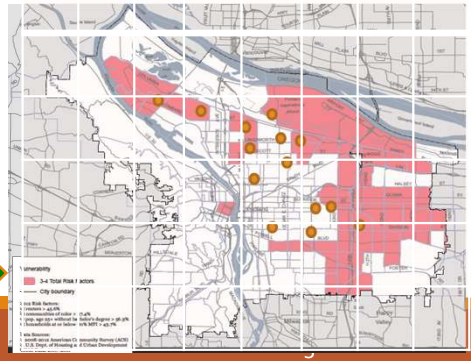


4. Overlay electric circuits



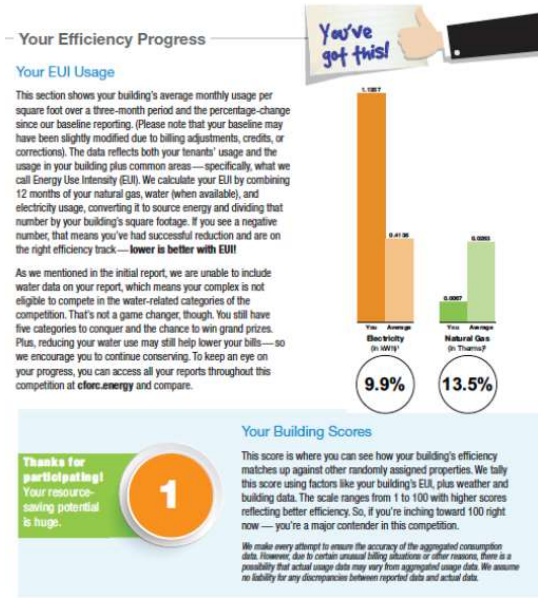
5. Target high probability households in:

a) Constrained circuits
b) Vulnerable areas

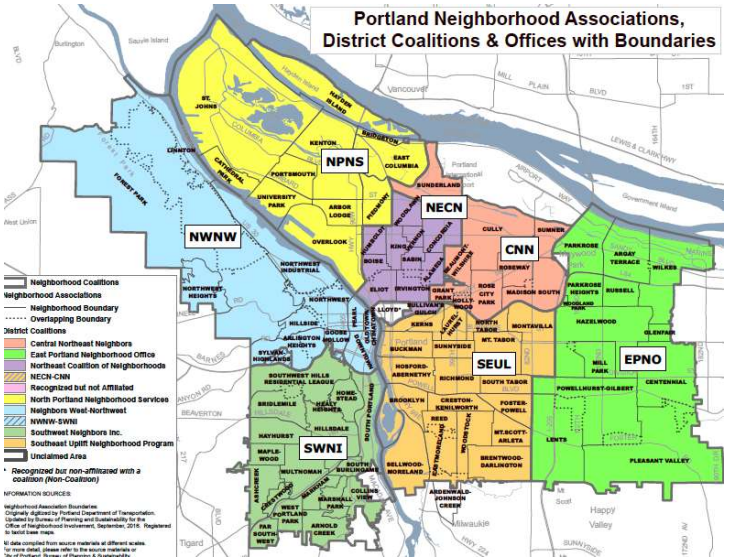


Behavioral Interventions will be Required to Reach GHG and Equity Targets

- **Low salience of energy amongst all customer groups = Energy Efficiency Gap**
- **Low-income segment is "Hard-to-Reach"**
- **Competitions and peer comparisons can engage multifamily and low income stakeholders**



Communities for Conservation behavioral apartment competition funded by CA PUC: 2,000 apartments' energy and water usage benchmarked and competing for prizes.



Suggestion: Leverage Portland's famous social capital for marketing and outreach: A Conservation Competition between Neighborhood Associations

Source: Res-Intel.com

Program Implications: Equity Strategies Require (More) Capital from Multiple Sources

- Grid / demand response benefits need to be capitalized
  - Resilience strategies integrated into programs
- Low income bill assistance (payments) need to be capitalized (principal) for weatherization
  - $ and GHGs out the window, climate targets will be unattainable
  - Leverage OR state low income funding
- Reduced homelessness: community development block grant funding
- Low interest loans / on-bill finance (Mpower, Savings within Reach)
- Property assessed clean energy funding
- OR health plan / Insurance funding (?): lower mortality and morbidity for low-income residents
  - Improved worker productivity and attendance warrants business tax support (?)

Overarching Implementation Considerations

1. **Design:** Randomize participation to enable causal claims about effects
2. **Test:** Test policy interventions (treatment vs control)
3. **Learn:** Evaluate outcomes (and processes) based on key indicators
4. **Adapt:** Optimize intervention based on findings
5. **Scale up:** Additional interventions, jurisdictions, participants
6. **Replicate:** Diffusion of policy innovations to U.S., World

Be courageous: Early (cheap) failures + learning = long term success

Collaborate: Policy "experiments" reduce the drag of adversarial institutions/history

Create: Research and implementation roadmap based on key evaluative criteria

See Haynes et al, 2012 for summary

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Questions and Comments

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Resources

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