

# Financing DERs – Challenges and Opportunities



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# Learning Objectives

- What is a DER?
  - Why do it?
  - Challenges
  - Costs
  - \$ Possibilities
  - Confidence - Metrics
  - Movement in the Market
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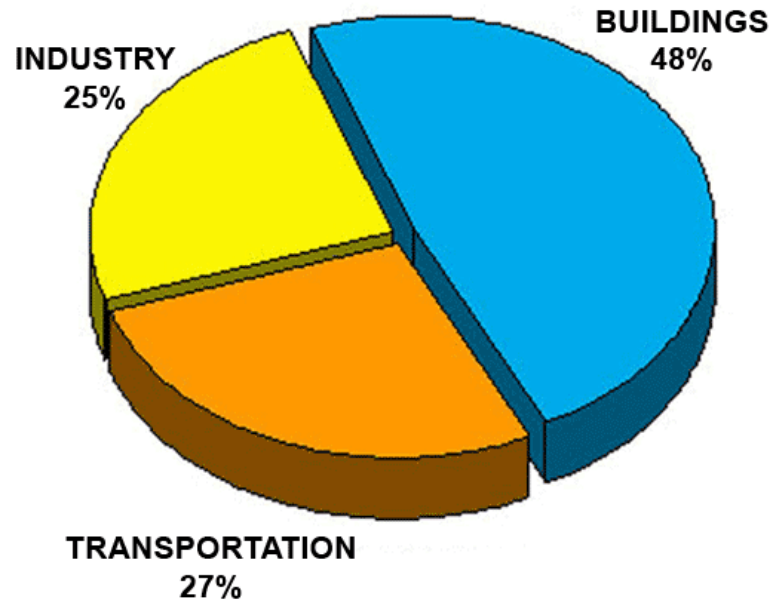
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# How Deep is a Deep Energy Retrofit?

- ACI, Affordable Comfort Inc., Thousand Home Challenge – 70-90% overall energy savings
  - DOE Building America Program, Building Science Corp, Deep Energy Retrofit of a Sears Roebuck House, Case Study – 54% total
  - GreenBuildingAdvisor.com – 50-90% total
  - Architecture 2030 – 50% total savings by 2010
  - Absolute Value -Heating usage targets @ 10 kBtu/sf
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# Why Target 50-90% Savings?

- National carbon reduction targets of 80% by 2050



**US ENERGY CONSUMPTION**

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# Why Target 50-90% Savings? (contd)

- Energy Independence
  - Cost Effectiveness
  - Invasiveness of retrofits
  - Passive Survivability
  - Economic and jobs stimulus
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# DER Growth Challenges and Financial Obstacles

1. Large upfront capital costs
  2. Lack of broad rollout of low interest green mortgages and loans of significant size
    - Fannie Mae secondary market 5% EEMs
  3. Limited bank lending (currently)
  4. Super optimal investment status
  5. Appraise-ability - Market does not value energy efficiency, yet
  6. Confidence in Metrics - lack of universally accepted energy and capital needs assessment standards (test-in/out and measures estimation)
  7. Education for all stakeholders
  8. Occupant Behavior
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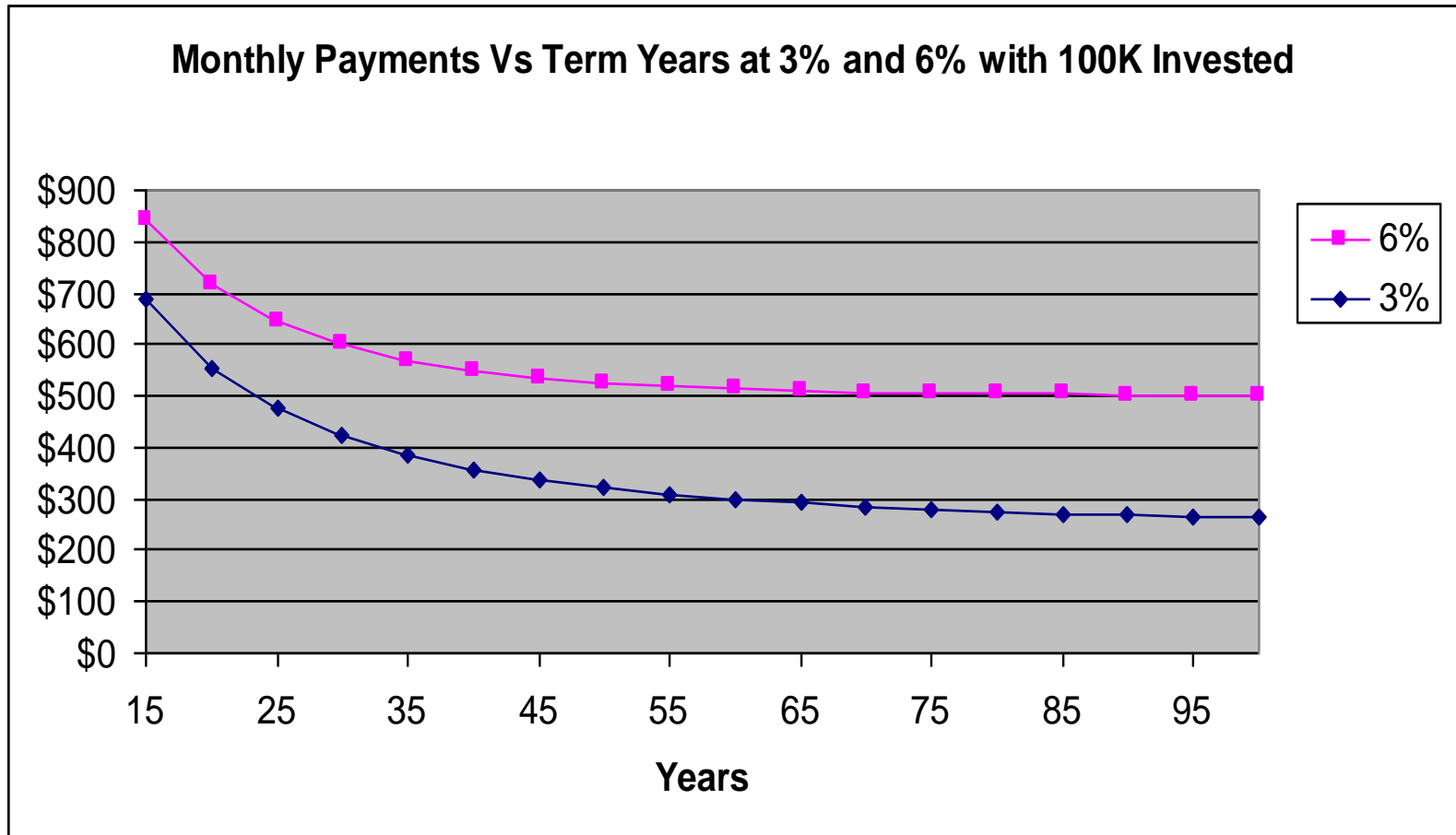
# Costs of DERs – Single Family Homes

1. Architecture 2030, 4.5 Million Jobs Stimulus Plan –
    - ❑ (NREL new home \$ stats extrapolation) \$51,250 for 75% total energy savings
  2. Easthampton, MA Home, 1,300 sf –
    - ❑ \$77,000 (\$117,000 total) for 70% total energy savings
  3. Sears Roebuck House, BSC Case Study, 3,600sf –
    - ❑ \$75,000 (\$300,000 total) for 54% total energy savings
  4. Marlboro, VT Home -
    - ❑ \$107,000 (\$245,000 total) for 66% total energy savings (81% heat)
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# Easthampton, MA Example – 1,300 sf single family home

	Measure	\$ Cost	\$ Cost/sf
Basement	Insulate	\$6,000	\$6.50
Walls	Cellulose + Foam Board - R29	\$13,000	\$8.00
	New Siding	\$28,000	\$17.00
Windows	Fiberglass Triple Layer R5.5	\$13,000	
Roof	Rebuilt + Insulated R60	\$30,000	\$35.00
	New metal	\$12,000	\$14.00
Solar	Hot water – heat and DHW	\$15,000	\$14.00
	<b>Total</b>	<b>\$117,000</b>	
	Total Efficiency Cost	<b>\$77,000</b>	
	Total “Anyways” Cost	<b>\$40,000</b>	

# Possible \$ Solutions - Ideal Investment Term Length



# Possible \$ Solutions - Super Optimized?

- Argument: cost optimization is achieved at 35-45% for energy efficiency investments
- Counter-point: ECEE paper on distortions in calculating cost optimization

<b>Distortions that often make investments look</b>	
<b>Better</b>	<b>Worse</b>
<b>Static calculations</b>	<b>Payback method with too short lifetimes</b>
<b>Exponential energy price increase</b>	<b>High interest rates</b>
	<b>Zero residual values</b>
	<b>Anyways investments</b>

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# Possible \$ Solutions – The Power of Interest Rates

## **100K Low Interest Rate Example**

1. 250 K existing mortgage at 6% for 30 yr, Monthly payment of \$1,499 and monthly utility bill of
  2. DER Invest \$100K
  3. Refinance 350 K at 3% for 30 year = Monthly payment of \$1,475
  4. Plus Average monthly energy savings of \$100 to \$400 reduces new monthly payment well below previous
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# Possible \$ Solutions – Municipal Financing and Incentives

- PACE
  - Architecture 2030 – 4.5 Million Jobs Stimulus Plan (proposed) interest rate buy-down
  - Home Star Program (proposed) –
    - \$4,000 for 20% savings and \$1,500 for each 5% after that, cap at 50% project costs
    - 50% savings = \$13,000, 75% = \$20,500
  - State Revolving Loan Funds – 16 states
  - Utility DER Pilot Projects
  - Tax Rebates
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# Possible \$ Solutions – phasing, calculations, and monetization of other benefits

- Phased Retrofits
  - Savings calculation methodology
    - Simple Payback, ROI, NPV, Savings/Cost ratio
    - Appreciation via rising energy costs
  - Secondary benefits
    - More usable space (bsmts, attic)
    - Durability/risk mitigation
    - Health & comfort
    - Passive survivability, etc...
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# Possible Solutions- Confidence in the Market

- Uniform standards for assessments and comparisons
    - HERS – residential
    - Enterprise Community Partners, Inc. and CAS FAS Financial Services - Retrofit Audit Protocol - Residential Multifamily
    - Commercial and Industrial – Investment grade energy modeling software (DOE2.2, eQuest, Trace, HAP, EnergyPlus)
  - Risk Issue – Durability and Moisture Issues
    - Should be part of existing and design case assessments
  - Costs Database
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# Movement in the Market and Govt. for Financial Products Support

- White House Report- Recovery Through Retrofit
  - Enterprise Community Partners, Inc. and CAS FAS Financial Services - Retrofit Audit Protocol for Multifamily buildings
  - ANSI approved underwriting protocols developed for commercial green building market
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# Thanks for your time! Questions?

This concludes The American Institute of Architects Continuing Education Systems Program

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- Western Mass Green Consortium
  - 2<sup>nd</sup> Wednesdays, 4pm, Northampton Brewery
  - Workshop Series - Project Retrofit

