ASSESSMENT OF ENERGY EFFICIENCY GAINS FROM ARRA-FUNDED INVESTMENTS IN THE NATION’S PUBLIC HOUSING

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American Recovery and Reinvestment Act (ARRA) enacted to provide stimulus to US economy
- Intended to generate jobs and incomes at a time of deep economic recession
- As part of ARRA, HUD was allocated several $ billion to invest in energy and water efficiency within the nation’s public housing
  - $3 billion allocated by formula
  - $250 million under a competitive green retrofit grant program for multifamily housing
    - Public Housing Authorities (PHAs) were required to submit grant applications to achieve additional funds under this program
- Congress required HUD to report back on results of the efficiency investments
- A team of firms headed by LMI was employed by HUD to compile these results*

*The team consisted of LMI, Summit Consulting, Dominion Due Diligence Group, Compass Group and Clean Energy Consulting.
• HUD administers a variety of programs affecting the nation’s public and subsidized housing stock
  • It supplies resources to local Public Housing Authorities to aid low income residents, and monitors the use of these resources
• There are approximately 3000 Public Housing Authorities within the US
  • These range in size from very small (under 250 housing units) to very large (over 6600 units)
  • They are located in cities and counties throughout the country
• HUD asserts that the nation’s public and subsidized housing stock is undercapitalized by about $25 billion
• ARRA provided HUD several billions in addition to its normal annual budgets
• Build a model of expected energy savings from Energy Conservation Measures (ECMs)

• Test and refine the model with HUD utility consumption data

• Estimate aggregate energy and water savings from HUD’s use of ARRA monies

• Estimate aggregate environmental effects resulting from energy savings

• Report the results to HUD for purposes of informing Congress as to what was accomplished from ARRA monies
DATA SOURCES

• HUD Recovery Act Management and Performance System (RAMPS)
  • Quarterly reporting system showing Energy (and water) Conservation Measures undertaken by each PHA
  • 37 different ECMs identified
  • Data set complete through 2011
• Survey by the LMI team of all 201 competitive grant recipients
  • Achieved an 84% response rate
• Utility consumption data
  • Obtained several years annual consumption data for many PHAs
  • Obtained 1 year before and after data for all competitive grant recipients
• 20 site visits to individual PHAs by the LMI team
AGGREGATE RESULTS

- Energy savings – 315,000,000 kWh/year
  - Sufficient to power about 29,000 US homes for 1 year

- Water savings – 1,172,000 ccf/year
  - Sufficient to supply about 7000 US families for 1 year

- CO2 reduction – 384,600,000 lb/year
  - Equivalent to taking 37,400 cars off the road

- SOx reduction - 1,431,000 lb/year

- NOx reduction - 481,000 lb/year
• On average, competitive grant recipients achieved energy savings of 20.33% from deployment of their awards

• Among the 20 site visits made by the LMI team, energy savings ranged from 2% to 49%
  • Annual unit expense reductions ranged from $22 to $818
  • At one PHA, energy consumption and expense actually increased, due to installation of air conditioning where it had not previously existed

• Payback times could be calculated for seven PHAs
  • These ranged from 2.4 to 13.8 years
    • Three were 5 years or less
    • Three were between 5 and 10 years
    • One was over 10 years
ISSUES CONFRONTED IN EXECUTING THE STUDY

• Incomplete or inaccurate data
  • “Cleaned” data where possible – e.g., converted to proper units, discarded where an extreme outlier
• Difficult to calculate rates of return on investment
  • E.g., because monies spent on upgraded assets such as energy efficient refrigerators also provide food cooling services
    • Data showing incremental cost of more energy efficient vs. less efficient equipment not generally available
• Formula grantees were not informed that rate of return on ARRA investment was an important criterion
  • These grantees tended to use monies for multiple purposes related to energy but not necessarily intended to achieve high returns on investment
    • For example, increase resident comfort, upgrade buildings and building unit equipment
    • Few formula grantees retained data useful for estimating rates of return on investment
• Few energy audits done by either formula or competitive grantees
HUD was able to deploy ARRA monies quickly
  • Notice of Funding Availability issued within a few months of enactment of ARRA
  • Retrofits began shortly thereafter and some were finished later that calendar year
The ARRA monies spent by HUD achieved largescale aggregate energy and water savings, with consequent environmental improvements
HUD’s competitive grant program achieved significantly higher energy savings per dollar spent than the formula program
  • Program structure matters!
In future, HUD grant recipients, whether by formula or competitive selection, should be apprised what criteria are important in choosing among investment options and what data should be retained to measure performance
Independent energy audits procured by the building owner are useful and should be encouraged