Evaluation of National Energy Efficiency Programs in Asia: Lessons Learned from the U.S.

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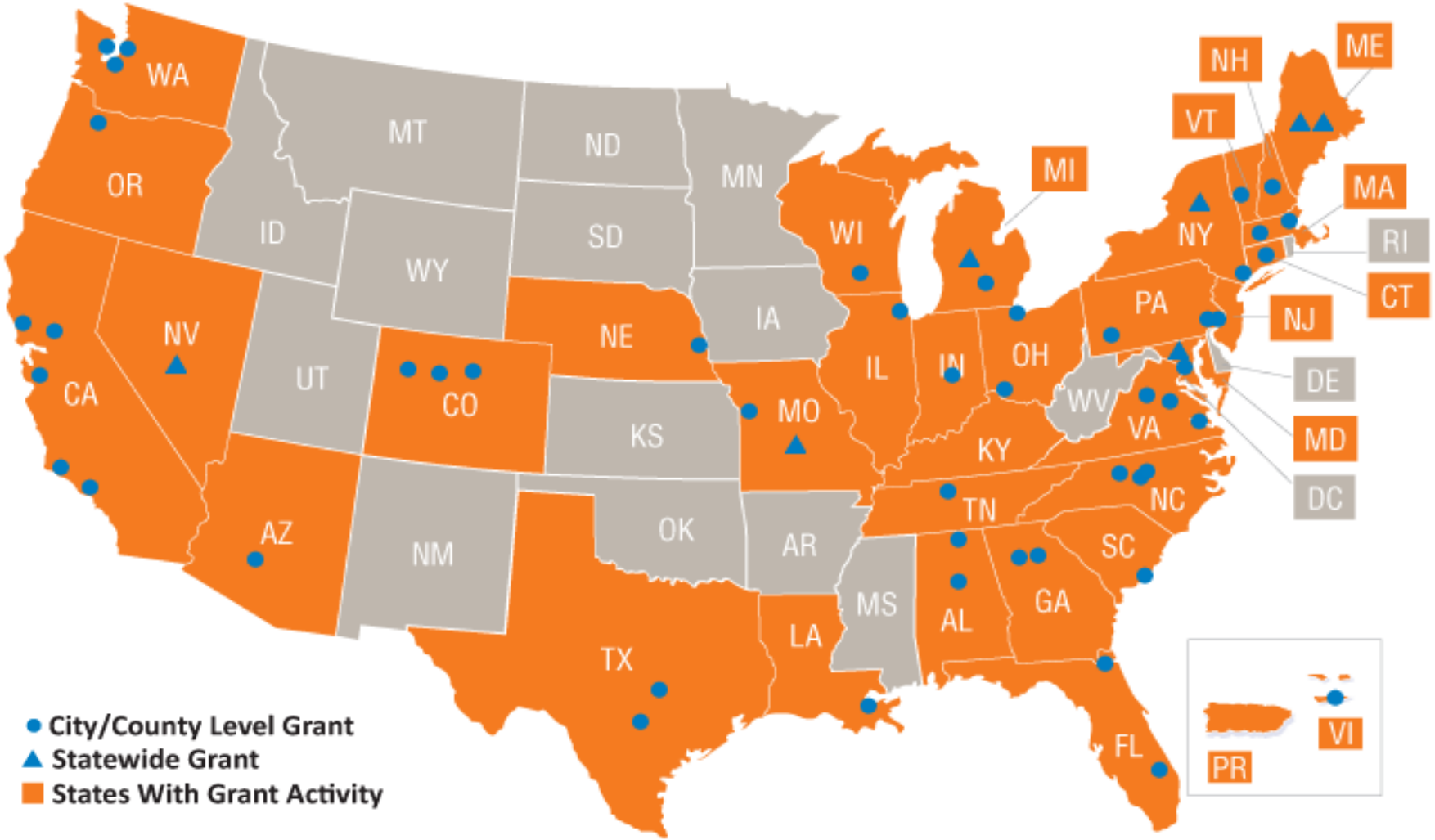
Outline

- Overview of Better Buildings Neighborhood Program (BBNP)
- Selected evaluation methodology & findings
- Lessons learned for Asia
- Digitalization and evaluation

Better Buildings Neighborhood Program (BBNP)

- Four year program (2010-2013)
- Leveraged $508 million in Recovery Act (ARRA) and FY10 funding (41 grantees & 24 subgrantees)
- Spurred nationwide energy efficiency program innovation
  - Demonstrated self-sustaining efficiency retrofit programs
  - Implemented whole building energy upgrade programs in 34 states and one territory
  - Targeted urban, suburban, and rural environments (all building sectors)
  - Encouraged industry partnerships and investment
- Learned what is effective and replicable

BBNP Grant Recipient Locations



Types of BBNP Evaluations and Objectives

TYPES OF BBNP EVALUATIONS	EVALUATION OBJECTIVES
Impact evaluation	• Estimate MMBTU and CO_2e impacts, and economic and job impacts
Process evaluation	• Assess degree to which BBNP met its goals related to program processes and grantee program activity • To identify the most effective approaches – including program design and implementation activities – to completing building energy upgrades that support the development of a robust retrofit industry in the U.S.
Market effects evaluation	• Identify indications of BBNP effect on the local building improvement markets • Understand how and why energy upgrade contractors and distributors changed their business practices in a way that promotes greater adoption of energy efficiency

High Level Overview of Methods Used

SUITE OF STUDIES	METHOD
Savings and Economic Impacts (Volume 2)	• M&V of a sample of grantees and projects • Billing regression analysis • Realization rates and NTG analysis • Extrapolate the sample findings to overall BBNP population • IMPLAN economic modeling against a base case scenario
Drivers of Success in BBNP- Statistical Process Evaluation (Volume 3)	• Survey sampling • Cluster analysis to cluster grantee/sub-grantee into groups with similar performance on success indicators • Multivariate regression
Process Evaluation of the BBNP (Volume 4)	• Survey sampling • Qualitative descriptions and analysis • Bivariate analysis
Market Effects (Volume 5)	• Survey sampling • Descriptive statistics • Estimated order of magnitude energy savings associated with the early market effects • Secondary data analysis of changes in contractor association memberships and certifications
Spotlight on Key Program Strategies (Volume 6)	• Interviews • Qualitative descriptions and analysis

Key Results

GOALS	RESULTS
Create new jobs and save existing ones	Estimated 10,191 net direct and indirect jobs
Spur economic activity and invest in long-term growth	Program spending of $445.2 million generated more than: • $1.3 billion in net economic activity • $129.4 million in net federal, state, and local tax revenues Estimated net benefit-cost ratio: 3.0
Achieve 15% to 30% estimated energy savings from residential energy efficiency upgrades	Verified single family residential savings: 15.1% Grantees reported 22% estimated energy savings in single family residential upgrades
Reduce the cost of energy efficiency program delivery by 20% or more	Delivery cost for program savings (program-wide $/MMBtu) fell each year of the 3-year program by 30% or more Third-year program delivery cost was 58% lower than first-year cost

Lessons Learned for Asia #1

1. Experienced evaluation team
2. Sufficient time and resources (funding) to do good evaluation
   a. Engaging evaluators and for evaluating program impacts
   b. Critical buy-in/commitment from government (utilities, too)
3. Helpful client at outset to establish data tracking/ reporting requirements
   a. Grantees are accountable for reporting accurately and consistently
4. Helpful and responsive client management team
5. Use of multiple evaluation methods across project and for specific topics
6. Comprehensive evaluation theory of change (logic model)

Lessons Learned for Asia #2

7. Emphasize quality assurance & good management practices
    a. Peer review team
    b. Knowledgeable and experienced client and project management team
8. If possible, request *preliminary* evaluation reports – helped for refining *final* reports
9. Focus on how results will be used:
    a. Have evaluation team communicate results and recommendations/lessons learned to internal stakeholders
    b. Have internal stakeholders promote findings to broad audience of stakeholders

Digitalization and Evaluation

Information and communication technologies (ICT)

a. Smart meters
b. Smart thermostats and devices
c. Non-intrusive load metering (NILM) devices

Sub-metering and disaggregated, real-time energy use data =>

M&V 2.0

M&V 2.0 (Automated M&V) - 1

Analytical tools and services that provide automated, ongoing analysis of energy consumption (billing) data across every project in a program and uses large comparison groups of non-participants as control

1. Savings data from smart (AMI) meters can:
   a. Provide rapid feedback from pilots or emerging technologies to programs – useful for program delivery as well as evaluation
   b. Update deemed savings with local data and analysis (Best use?)
   c. Assess persistence with continuous measurement
2. Perform more accurate and timely EM&V at a lower cost (compared to traditional onsite inspection) => overall cost of EM&V can be reduced or higher quality EM&V can be done within a given budget

M&V 2.0 (Automated M&V) - 2

Limitations

1. Cannot assess free ridership or spillover (net savings)
2. Not appropriate for certain program types (e.g., custom projects)
3. Changes in baseline conditions
4. Not designed for market effect studies
5. Not designed for process evaluations
6. Evaluation is not just about analyzing large data sets
    a. It is about analyzing data AND arriving at conclusions and recommendations for improving overall program performance or areas for program improvement

M&V 2.0 (Automated M&V) - 3

Bottom Line:

1. M&V 2.0 tools enhance and support evaluation but not replace it
2. M&V 2.0 is an “infant” – lots of opportunities and new applications and discoveries may occur in the coming years

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Final Evaluation Reports

- Volume 1 - Evaluation of the BBNP (Final Synthesis Report)
- Volume 2 - Savings and Economic Impacts of the BBNP
- Volume 3 - Drivers of Success in the BBNP- Statistical Process Evaluation
- Volume 4 - Process Evaluation of the BBNP
- Volume 5 - Market Effects of the BBNP
- Volume 6 - Spotlight on Key Program Strategies from the BBNP

Available at: https://energy.gov/eere/better-buildings-neighborhood-program/accomplishments#reports

Time for Questions