



LOW-INCOME NON-ENERGY IMPACTS OF EE

Massachusetts Energy Efficiency Advisory Council

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LOW-INCOME NON-ENERGY IMPACTS OF EE

- Describe NEIs
- List NEIs
- Health NEIs
- Health NEIs in Mass.
- Program impacts

Non-Energy Impacts?

- F/K/A Non-Energy Benefits (NEBs)
- “Non-electric benefits shall account for those benefits that are specific to Program **Participants** and shall be comprised of the following: (i) **Resource benefits**, which account for the avoided costs of natural gas, oil, propane, wood, kerosene, water, and other resources for which consumption is reduced as a result of the implementation of an Energy Efficiency Program. Resource benefits shall be calculated as the product of: (A) the reduction in consumption of the identified resource and (B) the avoided cost factor for each resource. (ii) **Non-resource benefits**, which include, but are **not limited to**: (A) reduced costs for **operation and maintenance** associated with efficient equipment or practices; (B) the value of **longer equipment replacement cycles** and/or **productivity improvements** associated with efficient equipment; (C) **reduced environmental and safety costs**, such as those for changes in a waste stream or disposal of lamp ballasts or ozone-depleting chemicals; and (D) all benefits associated with providing energy efficiency services to **Low-Income Customers.**”

DPU 11-120-A, Phase II, Energy Efficiency Guidelines (2013), sec. 3.4.4.1(b), gas at sec. 3.4.4.2(b).

Non-Energy Impacts (TRM Apdx C)

- Annual (discounted as avoided costs) or one-time, some by consumption unit
- Residential include:
 - Comfort, Noise reduction
 - Home durability, equipment maintenance
 - Property value
 - Light quality
- Low-income include above plus:
 - Safety

Non-Energy Impacts, cont'd

- C & I include:
 - Labor costs
 - Material handling & movement
 - Administrative costs
 - O & M
 - Product spoilage
 - Rent & sales revenue
 - Waste disposal
- Almost all NEIs based on studies by NMR Group (res., 2011) and DMV KEMA and Tetra Tech (C&I, 2012)

Needed:

- A better estimate of health benefits from energy efficiency.

There has been much work identifying health benefits in the US, but without monetizing them.

Overview of WAP Evaluation Products (Three Cubed)

Energy Savings and Cost Effectiveness

- Single-Family
- Mobile Homes
- Large Multifamily (NYC & national)
- Under -and Over-Performers Study
- Sustainable Energy Resources for Consumers Grant
- Others
 - Territories
 - Refrigerators
 - AC Pilot

Co-Benefits

Health & Household Related

- Washington State Asthma Study
- Emissions Reductions
- Indoor Air Quality Study
- Macro-Economic Impacts
- Social Network Assessment

Process Assessments

- National Occupant Survey
 - Energy Behavior
 - Health Condition
 - Home Condition
 - Budget Issues
- 15 Case Studies of Local Weatherization Agencies
- Weatherization Innovation Pilot Program Evaluation
- Others
 - Program Characterization
 - Field Process Study
 - Deferral Study
 - Surveys of Wx Staff, Trainees, Training Centers

WAP Health & Household NEI Study

(Source: Three Cubed)

- Explored health & household NEIs of 'traditional' weatherization (i.e., installation energy conservation measures (ECMs) and non-ECMs)
- Conducted nationally representative pre- and post-weatherization (Wx) Occupant Survey (n= > 600), plus a comparison group (n= > 800)
- Monetized subset of benefits using combination of survey results, measures installed, medical databases, and other valuable secondary sources
- Grouped in tiers based on strength of data and methodology (1=strongest)

WAP Monetized Non-Energy Impacts

Included in this Supplemental Study

Reduced Asthma

Reduced Thermal Stress - Cold

Reduced Thermal Stress - Hot

Fewer Missed Days of Work

Reduced CO Poisoning

Increased Home Productivity


Reduced Home⁸ Fires

Tailoring the National WAP Study to MA (Three Cubed)

- 1) Evaluated a subset of the NEIs monetized from the national WAP – Those with **household benefits**.
- 2) Except for asthma, apply the WAP results from households surveyed in the **Cold Climate Region** (MA, NY, CT, PA, OH, IN, IL, IA, and ME)
 - Larger, more robust sample size was used for asthma NEI given asthma prevalence does not vary significantly by climate region
 - Not all results are statistically significant – therefore, other lines of evidence (e.g., literature review, NMR study) used to substantiate application of derived NEIs for MA
- 3) Adjust national **medical, wage, and other costs to MA** and year 2014, apply LI population statistical data for MA
- 4) Recategorize **avoided death benefit as a household benefit** instead of a social benefit [as

now in Mass : only applies to Thermal Stress, CO, Fire]
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Key Measure	2011 NMR Analysis	2016 Three ³ Analysis							
		NEI Category	Health and Safety	Asthma (\$9.99)	Thermal Stress (\$463.21; cold + \$145.93; hot)	Missed Work Days (\$149.45)	CO (\$36.98)	Work at Home (\$33.98)	Fire* (\$93.84)
Low Income Energy Affordability Network 									
Weatherization; Electric or Gas	\$10.46	\$5.50	\$335.43 (\$182.35 + \$153.08)	\$82.30	\$36.98	\$18.71	\$19.64	\$464.18	
Air sealing	\$5.69	\$2.99	\$182.35 (\$138.66 + \$43.69)	\$44.74	NA	\$10.17	\$2.24	\$243.91	
Insulation	\$4.77	\$2.51	\$153.08 (\$116.41 + \$36.67)	\$37.56	NA	\$8.54	\$17.40	\$220.27	
CO and smoke detectors	Not analyzed	NA	NA	NA	\$36.98	NA	NA	\$36.98	
Heating System Retrofit/Replacement, Electric or Gas	\$50.32 \$5.27 (health) + \$6.38 (CO) + \$38.67 (fire)	\$2.77	\$168.92 (\$128.45 + \$36.67)	\$41.44	NA	\$9.42	\$18.87	\$242.73	

Comparison of Low-Income Health and Safety NEIs, by Key Measure – Preliminary, NMR/3 Cubed consensus (\$/installed measure, per year)

Ralph Prahl:

- Due to **stronger methodology**, new study probably captures some health effects that 2011 MA study was unable to capture
- 2011 study depended on **participants' ability to recognize and report health effects**, but new study does not
- New study able to incorporate estimates of lives saved – One key result is greatly **increased estimates of health benefits from reduced hypothermia and hyperthermia**

SUMMARY

- Wx \$10.46 > \$464.18 OR 44X
- HS \$50.32 > \$242.73 OR 4.8x
 - MANY MORE ASHPs COST-EFFECTIVE
- These values, while rigorously reviewed by PAs and evaluation consultants, are preliminary. They remain subject to finalization pursuant to the EM&V Framework.

POSSIBLE IMPLICATIONS: MEASURES

- PROGRAM MUCH MORE COST-EFFECTIVE
 - BROADER RANGE OF AIR SOURCE HEAT PUMP SITES
 - * EXPANDED LEAN LEADERSHIP
 - MORE PRE-WEATHERIZATION REPAIRS?
 - OTHER MEASURES, WITH CAUTION

POSSIBLE IMPLICATIONS: OPERATIONS

- May require expansion of contractor infrastructure for specific measures. (Not a program design change.)
- Since the population served is low-income households, by definition without financial liquidity, reserve for repair of long-lived measures may be required -- accounted for in cost-effectiveness calculations, of course.

POSSIBLE IMPLICATIONS: FUNDING

- Ralph Prahl's policy question: Given the outsized role of health effects in program benefits, should we be seeking additional funding from health sector?
- Governance issues?
- More health-related measures, such as bi-level lighting to help prevent trips and falls?

BOTTOM LINE

- With same budget, a much broader scope of measures is possible.

For more information

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