Mid-West Energy Efficiency Alliance

Non-energy benefits for Commercial and Industrial Customers

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7 February 2018

Agenda

Non—Energy Impacts: What are they?

Why do this?

How: Self reports & engineering analysis

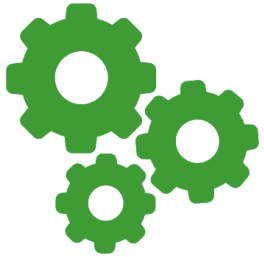
What: Examples of NEIs to end users

Conclusion and Limitations

Non-energy impacts:
What are we talking about

What are Non-Energy Impacts (NEIs)?
NEIs include positive or negative effects attributable to energy efficiency programs apart from energy savings.

Participant Impacts – NEIs that directly benefit a program partner, stakeholder, trade ally, participant, or the participant's household.



Production Increases
- 1-5% reduction in product defects

Worker Productivity
- 80% reduction in visibility complaints
- 5-10% reduction in indoor air temperature complaints

Safety
- 100% reduction in risk of slips and falls
- 100% reduction in risk of catastrophic failure
- 1-5% reduction in safety risks

Environmental
- 5-10% reduction of carbon footprint
- Improvement of public image and sales

O&M Cost Savings
- 100% reduction in maintenance requests
- 30-50% reduction in maintenance costs
- 5-10% reduction in labor costs

How do we know these values are "REAL"?
Separate approaches to estimate NEIs

Stated Valuation
Hard to quantify NEIs

- Retrofit measures:
  - Survey (self-report) based
  - Respondents provide range of expected NEIs for each measure
- Break out NEIs into 13 mutually exclusive categories: O&M or non-O&M NEIs (e.g. increased revenue
- Ask interview respondents to provide values for parameters used to estimate NEBs (hours, wages)
- Developed standard formulas to construct formulas based on interview results
- Used ratio-estimation to calculated NEIs by measure category or end-use

Life-cycle cost /engineering
O&M Cost savings

- Engineering based
  - Used for O&M cost savings only
  - Need other methods for less tangible NEIs such as revenue, productivity, comfort.
- Use engineering formulas to estimate life-cycle cost differences for operational impact of EE technology
- Focuses on Operations and Maintenance costs changes only
- Developed detailed maintenance schedules comparing life-cycle costs of baseline and EE technologies
- Used ratio-estimation to calculated NEIs by measure category or end-use

Non-energy impacts:
Why estimate NEIs?

Improve the Bottom Line for Businesses

Profit = Revenue – Costs

Why estimate NEIs?

Program cost-effectiveness: Massachusetts

- *Regulatory cost-effectiveness testing* – Positive NEIs (NEBs) demonstrate effective use of resources in regulatory filings.

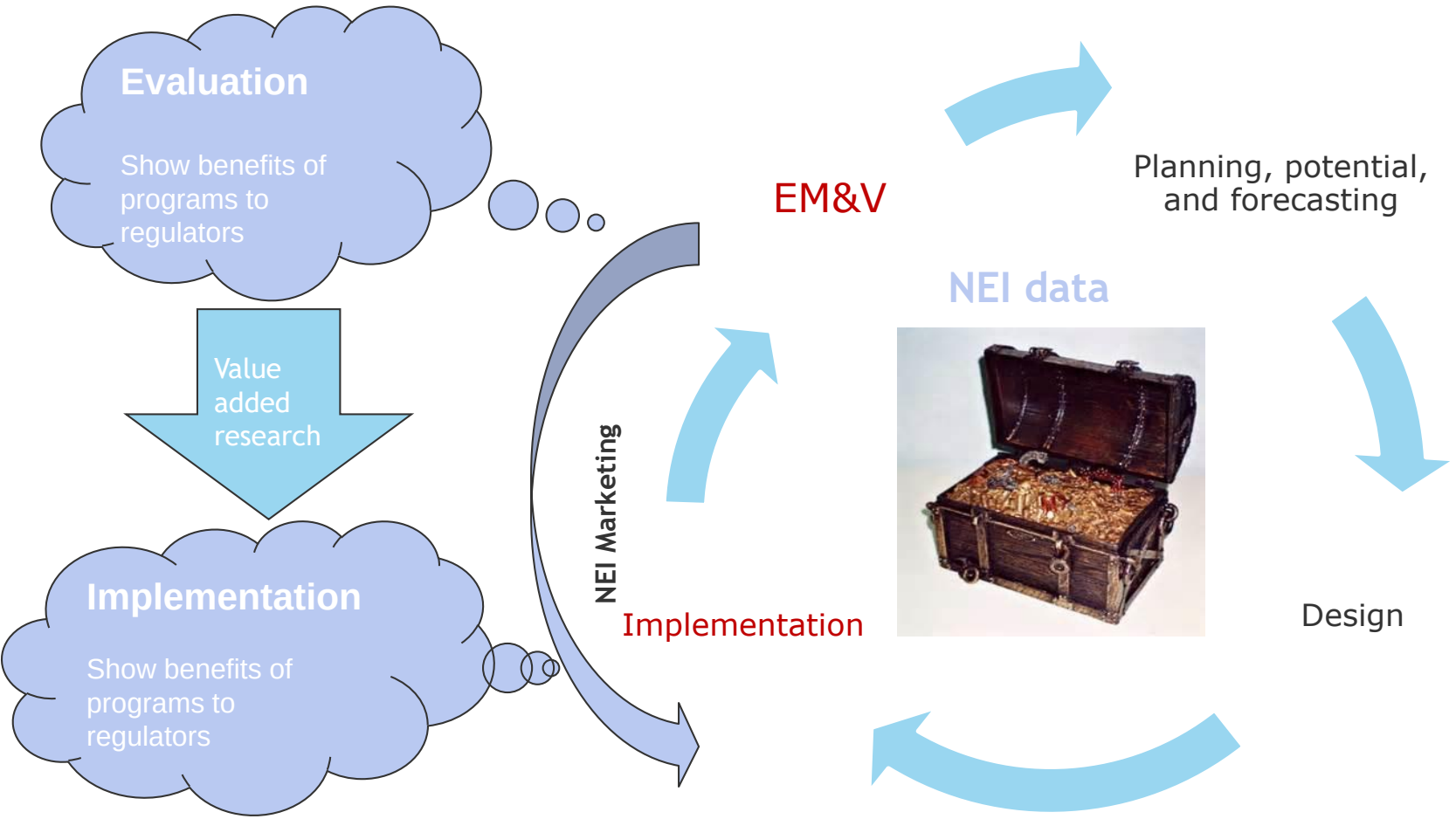
Sales and marketing to end users:

AEP Ohio, Consumers Energy

- *Program marketing /targeting* – Demonstrate full value of programs to customers;

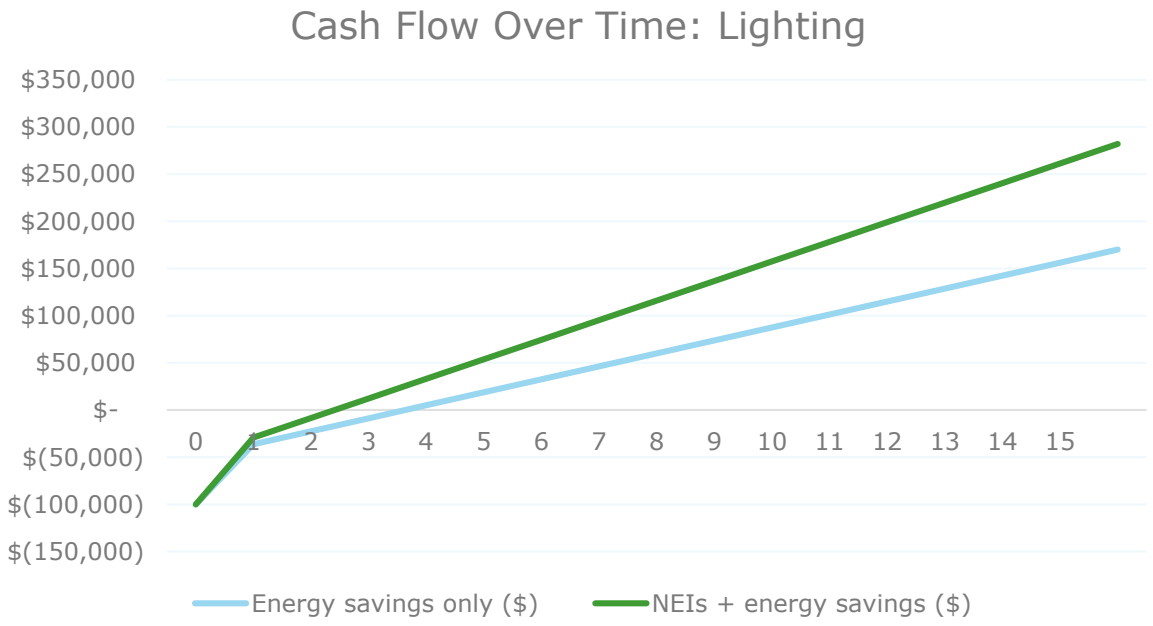
Why estimate NEIs?
Closing the Feedback Loop:

Use rigorous evaluation techniques to monetize NEIs for program implementation



- Positive NEIs: Demonstrate full value of programs to customers
  - Decrease costs, increased revenue
  - Fewer hours labor, increased sales, increased safety
- Negative NEIs: Reveal barriers to implementing
  - *CHP – Increase in preventative maintenance, repairs due to new equipment*
  - *Boilers – Efficient technologies require higher maintenance costs, which vary by unit size*

Why estimate NEIs?
Sales & evaluation



Project level cost-effectiveness: Massachusetts

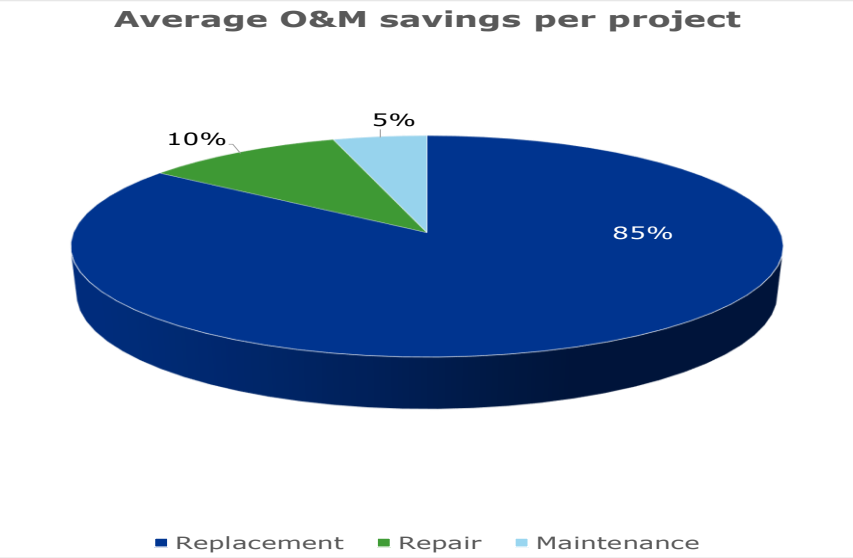
- NEIs decrease the payback period of project

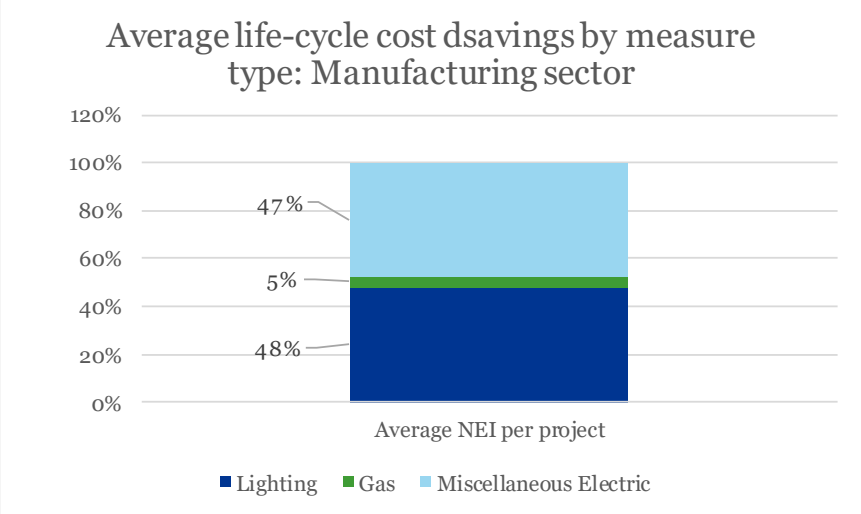
Results for Lighting	
Payback Period (with NEI):	2.41 years
Payback Period (without NEI):	3.64 years
Years to positive ROI:	1.32 years
Energy Savings/year:	13,750 $/year
NEI/year	7,000 $/year

Program level cost-effectiveness: Massachusetts

- 2018 Impact on Benefit-cost of portfolio of programs
- NEIs was about $408 million roughly 17% of total portfolio benefits, for the residential, low income, and C&I sectors.
  - $263 million for PAs installing electric measures
  - $145 million for PAs installing gas measures)

Manufacturing:
Non-energy impacts





O&M Cost savings

- Average O&M NEI roughly 50% of average project cost (or $43k)

Revenue / production (Example)

- New compressor improved equipment output by 5 to 8 percent. 58,500 more pallets per year produced = Average benefit roughly $15,000 year in revenue
- Auto manufacturer: “The change from steam boilers to direct-fired heaters increases our ability to better maintain the desired process temperature which resulting in more high quality products.”

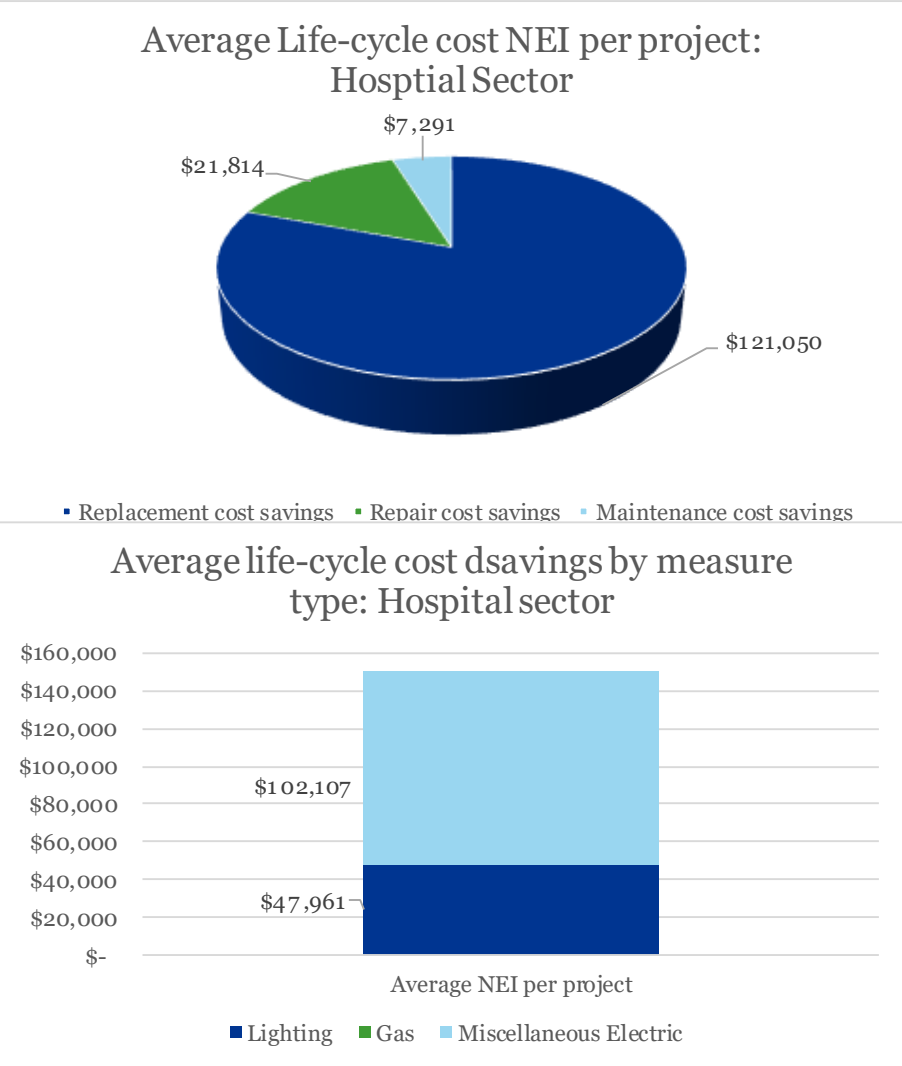
Downtime

VFDs - Eliminated end-of-line pressure shortages staff work continuously

Safety

- Compressed air – Noise – Annual hearing test required by OSHA.
- Lighting - better light, less strain on the eyes, better footing

Healthcare:
Non-energy impacts



O&M Cost savings

- Example (HVAC):
  - External: Fewer service calls from temp/humidity issues.
  - HVAC: Internal service calls decreased roughly $25,000/year

Downtime / revenue increase

- Operating room - VFD / New chiller online - 1 hour downtime / month = $100,000 happened 12 times per year = $1,200,000 improvement in revenue per year.

Safety

- Prior system getting so many complaints and out of compliance.
- Operating rooms - surgeons more productive, able to control temp and humidity better. improvement in performance.

Conclusions

Growth Target	Improvements possible through NEI data
Maintain Customer Sat above 9.0	• Show potential customers more benefits • Provide best practices for tracking progress against customer goals
Diversify the measure portfolio	• Target existing low participation, high NEI measures • Explore non-jurisdictional NEIs for potential new measures
Increase customer base	• Develop targeted segment guides for small and mid-size customers

Contact

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