Non-Energy Benefits (NEBs): The Latest in Results, Applications, and Best Practices for State Cost-Effectiveness Tests

Lisa A. Skumatz, Ph.D., Skumatz Economic Research Associates

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NON-ENERGY BENEFITS (NEBS)

Latest in Results, Applications, & Best Practices for State C/E Tests

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Lisa A. Skumatz, Ph.D., Skumatz Economic Research Associates, Inc. (SERA)
303/494-1178; skumatz@serainc.com
NON-ENERGY BENEFITS

- Program **value** beyond direct goal (savings)
- **20 years** of progress/ where we are
- **Motivation**
  - 0 is the wrong number
  - “Bundled features” / rational / tunnel
- **B/C incomplete** – Biased investments / decisions because all costs, not all benefits
- High value from quantitative studies
  - Evaluation’s purpose – to inform decision-making

Source: Skumatz / SERA research
20 YEARS OF NEBS PROGRESS...

1: Perspectives, Basic Measurement
1994-1998

2. Estimation & B/C & LIPPT
1996-2001+

3: Measurement, Use, & Expansion
2001-present

4: Refocus B/C Apps
2008-present

But there still isn’t agreement on name! - NEB, OPI, NNEB, MB, co-benefits...
Source: SERA, all rights reserved
**NEB DRIVERS, 3 BENEFICIARIES**

<table>
<thead>
<tr>
<th>Utility/Ratepayer</th>
<th>Societal</th>
<th>Participant</th>
</tr>
</thead>
<tbody>
<tr>
<td>oPayments/financial</td>
<td>oEconomic development / job / multipliers</td>
<td>oPayments &amp; coll’n</td>
</tr>
<tr>
<td>oDebt collection efforts / calls</td>
<td>oTax impacts</td>
<td>oEducation</td>
</tr>
<tr>
<td>oEmergencies / insurance</td>
<td>oEnvironmental</td>
<td>oBuilding stock</td>
</tr>
<tr>
<td>oT&amp;D, power quality, reliability</td>
<td>oEmissions</td>
<td>oHealth</td>
</tr>
<tr>
<td>oSubsidy (LI)</td>
<td>oHealth</td>
<td>oEquipment service incl. productivity, comfort, maint, etc.</td>
</tr>
<tr>
<td>oOther</td>
<td>oWater &amp; other resources / utilities</td>
<td>oOther utilities (water, etc.)</td>
</tr>
<tr>
<td></td>
<td>oNational security</td>
<td>oOther (transactions, enviro, psychic, etc.)</td>
</tr>
<tr>
<td></td>
<td>oWildlife/Other</td>
<td></td>
</tr>
</tbody>
</table>

More than 60 categories derive from these drivers. Include subsets as appropriate to application.

Source: (Skumatz/SERA, 2004)
NEBs MEASUREMENT – 4 MAIN MEASUREMENT APPROACHES

- Direct
- Secondary
- Model
- Survey

Story of a ferry... then it’s academic

Strengths & weaknesses; bracket
Survey most appropriate for some
Balancing precision & practical
Avoid bias, achieve many responses
Multiple survey approaches
How accurate is needed?

Source: Skumatz / SERA research
MEASUREMENT ISSUES & BEST PRACTICES

☐ Best measurement practices
   ■ “Net” positive & negative, meaningful, outcomes
   ■ Large sample, discount rates, host of other best practices / research

☐ Measurement accuracy (coming)

☐ Transferability considerations
   ■ Can’t transfer directly (measures, climate, target, lists)
   ■ Some relatively constant or easily measured

Source: Skumatz / SERA research
NEGATIVE NEBS VALUE / PERCEIVED COST OF BARRIERS

Residential Example

<table>
<thead>
<tr>
<th>Negative NEBs</th>
<th>Solar W/H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>-$14 NZ</td>
</tr>
<tr>
<td>Maintenance</td>
<td>-$9 NZ</td>
</tr>
</tbody>
</table>

Source: Skumatz Economic Research Associates research
KEY APPLICATIONS OF NEBS

- Sell Value
- Design / Refine
- C/E
- Reflect Goals
- Train Chain

Source: SERA, all rights reserved
NEBS IN COST-EFFECTIVENESS APPLICATIONS
NEBS IN C/E – COMPARE & OPTIMIZE INVESTMENT

- TRC / Societal, Participant, UCT, RIM... NEBs
  - Bias from 0 value for part of net benefits. For true representation of B & C, NEBs elements estimate the missing factors.
  - Addresses bias, better guide measure, pgm, and portfolio investment
  - **Address by:**
    1) include monetized NEBs appropriate to test (e.g. TRC, SCT), or
    2) exclude all costs associated with achieving NEBs or
    3) use UCT
  - B/C early, then “conservative” awaiting evidence

Source: Skumatz / SERA research
NEBS IN C/E – COMPARE & OPTIMIZE INVESTMENT

- **Chicken & Egg** – important uses ↔ trusted uses; money if “serious” application
- won’t incorporate effects until well-measured; no money at measurement unless “serious” appl...
- Much investment, data, expertise, increments in 20 years… Dominoes…

Source: Skumatz / SERA research
NEBS IN B/C – THE ACCURACY QUESTION(?!)

- Simplified B/C Inputs- Lets compare the risks/ranges
  \[ \text{PV}[\text{NTG}*(\text{Sav+NET NEB})*\text{Lifetime}]/\text{PV}(\text{Incr Cost}) \ldots \]

**NTG** – accuracy, measurement, incomplete
RISK/RANGE: Medium, $ high

**Savings**: Impact, repeatedly & expensively measured, little variation, $100K+
RISK/RANGE: LOW (+/- very small), $ HIGH

**EUL**: Lists 20+ years old, Origins (!), technologies, dated, varies / local, values 2x
Risk/Range: HIGH (?-2+, varies; wrong), $ medium-low

**Incr cost**: Limited, age, not local
RISK/RANGE: medium (not a factor of 2...) $ VERY HIGH

**Discount rate**: Not highly complicated, purpose / use; <WACC, risk link, regulatory environment;
RISK/RANGE: medium, $ Very Low

**NEBs**: Lit exists, comparability, transferability, local, inexpensive to add to existing studies, gaps
RISK/RANGE: low-med (+/-...) $ Very low

Source: Skumatz / SERA research
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  - $ Very low

Where to invest – risk / reward??
- Make some periodic, etc...
  - EUL for sure – lasting
  - NEB no brainer
  - NTG periodic sector-wide

Under the rug...! And what we’re being compared to isn’t that magically accurate either. Just because it is in a spreadsheet doesn’t make it TRUE!!

Source: 14
Skumatz / SERA research
NEBS IN C/E – WHERE TO INVEST?

- **Risk / Reward**
  - RANGES compared to COSTS
    - Make some periodic (savings, NTG, cost)
    - EUL problem, NEB no brainer (cheap, high value)
  - NEB gaps – especially measure-based; under way...

Source: Skumatz / SERA research
**KEY QUESTIONS FOR IMPROVING TESTS - BALANCE**

- **Tradeoffs** – How much to improve tests? Depends on costs & benefits of accuracy improvements (in NEB categories)
  1. Which NEBs **most valuable**?
  2. What **value range** arises from reasonable cost measurement (eval budget)
  3. Does inclusion of this RANGE (low vs. high value) **change the B/C conclusion**?

  **If NO**, You’re done And bias addressed sufficiently

  **Source**: SERA, all rights reserved

  **IF YES**, Refine measurement up to value or cost of “wrong” decision

  **‘NEB-It’ Model**
EXAMPLES OF STATE TREATMENT OF NEBS

☐ Adders
  ■ (well-suited to program / measure independent)

☐ Readily Measurable

☐ Hybrid ➔

☐ All NEBs ➔

☐ Program / measure-independent

☐ Domino effect

Source: Skumatz / SERA research
# State Regulatory Treatments of NEBS – Examples & Specifics

<table>
<thead>
<tr>
<th></th>
<th>Maximize DSM opportunities &amp; feedback</th>
<th>Minimize Regulatory Risk</th>
<th>Minimize Evaluation Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Adder</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Readily</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Measurable</strong></td>
<td></td>
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<tr>
<td><strong>Hybrid</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>All NEBs</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: SERA Research
NEB RESULTS: WHAT IS BEING OMITTED?

What’s being left on the table??
HOW VALUABLE ARE NEBS?
WHAT IS BEING OMITTED?

NEB Value Ranges – As Multiplier times Energy Savings

Source: Skumatz / SERA research
**ARE NEBS HIGH VALUE?**

<table>
<thead>
<tr>
<th>Some program examples</th>
<th>NEB Value / Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weatherization (Wx)</td>
<td></td>
</tr>
<tr>
<td>Energy STAR Products</td>
<td></td>
</tr>
<tr>
<td>A/C program</td>
<td></td>
</tr>
<tr>
<td>Res EMS</td>
<td></td>
</tr>
<tr>
<td>Low Income MF</td>
<td></td>
</tr>
<tr>
<td>Low Income Wx</td>
<td></td>
</tr>
<tr>
<td>Commissioning</td>
<td></td>
</tr>
<tr>
<td>Com’l Lighting</td>
<td></td>
</tr>
<tr>
<td>Portfolio / Total</td>
<td></td>
</tr>
<tr>
<td>Com’l new construction</td>
<td></td>
</tr>
<tr>
<td>Boiler</td>
<td></td>
</tr>
<tr>
<td>Com’l Tech Assistance</td>
<td></td>
</tr>
<tr>
<td>Audit / Incentives</td>
<td></td>
</tr>
</tbody>
</table>

Source: Skumatz / SERA Research
UTILITY NEBS

Example:
Low Income Weatherization

Source: Skumatz Economic Research Associates research
SOCIETAL IMPACTS – ALL PROGRAMS AREN’T ALIKE...

- Economics, Emissions, Hardship

A million dollars spent
On a program isn’t all
Equal – programs & measures matter

(Source: Skumatz /SERA
ECEE 2007, ACEEE 2006)
WHICH PARTICIPANT NEBS ARE HIGH VALUE?

Persistence issues...

Top NEBs similar
Across many programs
(some variation in #s)
New Zealand programs showed “environmental”
among most important also.

Source: (Skumatz/SERA research)
TOP NEBS FOR WX
(Percent of total survey-based participant NEBs)

Regressions to decompose/attribute drivers:
Measures: Insulation, furnace, draft repair
Demographics: Children, elderly, infirm

Source: Skumatz Economic Research Associates research
NEBS – WIDELY RESEARCHED

- 20 years, >100 programs, many states
  - All program types, sectors
  - Programs, measures, portfolios
  - Assembled into model / used for this analysis

- SERA input in deliberations in multiple states
  - Primary / secondary research
  - Recommended values / options,
  - Collaboration / intervention
  - Webinars / workshops / training
  - Other states / status
  - Corrections to existing tests
  - LIPPT / revised and new tests

Source: Skumatz / SERA research
### IMPLICATIONS FOR JUSTIFIABLE NEBs VALUES

<table>
<thead>
<tr>
<th></th>
<th>Utility</th>
<th>Soc</th>
<th>Part</th>
<th>Conserv. Rec’m</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base Percent</td>
<td>X%</td>
<td>X%</td>
<td></td>
<td>X%</td>
<td>Program-invariant</td>
</tr>
<tr>
<td>Low Income</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>Multiple sources</td>
</tr>
<tr>
<td>Weatherization</td>
<td></td>
<td>X%</td>
<td>X%</td>
<td>X%</td>
<td>Substantial Participant impacts</td>
</tr>
<tr>
<td>Measure / Program-specific</td>
<td></td>
<td></td>
<td>%</td>
<td></td>
<td>Varies by measure, sector</td>
</tr>
<tr>
<td>Other Recom’s</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Local Research</td>
</tr>
</tbody>
</table>

Developing values / multiple states & utilities

Source: Skumatz / SERA
THANK YOU!!

Questions?

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