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# NEIs/NEBs: STATE TREATMENT OF NEBS & FINDINGS FROM DATA FROM HUNDREDS OF STUDIES – Assessing Gaps in State Multipliers

40 years in Energy Efficiency Evaluations, Non-Energy Benefits, and  
 Hard-To-Measure Effects

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## TOPICS

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1. Background
2. Measurement
3. State Activity & Use
4. Quantitative Analysis of Current State Adders
5. Summary / Conclusions

Why am I here talking about NEIs / NEBs?

- Pioneer / monetizing NEIs since 1994; 50+ NEI publications
- Work in many states across US and Canada
- Methods, measurements, testimony
- 41 years in energy efficiency evaluation

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# Background / Intro / Benefit Cost Analysis (BCA)

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## NEBs / NEIs, BCA, & USES

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Net NEBs/NEIs = Positive and negative effects beyond energy savings from measures / interventions

- NEIs should be used in BCA- include all costs but not all benefits – biased. Omitted because “HTM” historically.
- NEBs reduce Bias in Benefits / “0” is the wrong number
- Quantification critical / need to monetize to fully use
- Bundle of services / features
- Negatives quantify “barriers”

**MARKETING & ROI –**

“Sell” what’s valuable to customers; link to peers

**B/C TESTS –**

Refined C/E for program & portfolio; reduce bias in investment

**PROGRAM REFINEMENT –**

Positive & Negative NEBs to optimize measures, incentives, and targeting. ID barriers

**POLICY / GOALS**

Quantifies Non-energy goals (e.g. Low income, jobs, Go(L)).

**TRAIN THE CHAIN –**

Align / Educate Actors on NEB priorities



Source: Skumatz / SERA

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## "PERSPECTIVES" / BENEFICIARIES FOR CLARITY DRIVERS FOR SCORES OF NEBS

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### Utility

- Bill-payment
- System & Risk

### Societal

- H&S
- Environmental
- Economics/Jobs
- Infrastructure
- Social

### Participant (Resi, LI, Com'l)

- Bill-payment
- Improved service, O&M
- H&S
- Knowledge / control
- Financial / other bills
- Commercial (productivity, etc.)

~160 NEBs so far in these categories  
Drivers / groups shown on this page, many specific NEBs in each area  
Clarity in causation, meaning, and valuation method

Source: Skumatz / SERA

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## COMMON NEBS ESTIMATED

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Utility	Society	Participant	(Res&ICI)
<ul style="list-style-type: none"> <li>-Carrying cost on arrearsages</li> <li>-Bad debt written off</li> <li>-Shutoffs / Reconnects</li> <li>-Notices; calls, collection costs</li> <li>-Emergency gas service calls (for gas flex connector and other programs)</li> <li>-Insurance savings</li> <li>-Transmission and distribution savings (usually distribution)</li> <li>-Fewer substations, etc.</li> <li>-Power quality / reliability</li> <li>-Reduced subsidy payments (low income)</li> <li>-Other</li> </ul>	<ul style="list-style-type: none"> <li>-Economic development benefits -- direct and indirect multipliers</li> <li>-Tax effects</li> <li>-Emissions / environmental (trading values and/or health / hazard benefits)</li> <li>-Health and safety equipment</li> <li>-Water and waste water treatment or supply plants</li> <li>-Fish / wildlife mitigation</li> <li>-National security</li> <li>-Health care</li> <li>-Other</li> </ul>	<ul style="list-style-type: none"> <li>-Water / wastewater bill savings</li> <li>-Operating costs (non-energy)</li> <li>-Equipment maintenance</li> <li>-Equipment performance (push air better, etc.)</li> <li>-Equipment lifetime</li> <li>-Shutoffs / Reconnects</li> <li>-Property value benefits / selling</li> <li>-Bill-related calls to utility</li> <li>-Comfort</li> <li>-Aesthetics / appearance</li> <li>-Fires / insurance damage (gas)</li> <li>-Lighting / quality of light</li> <li>-Noise</li> <li>-Safety</li> </ul>	<ul style="list-style-type: none"> <li>-Control over bill</li> <li>-Understanding / knowledge</li> <li>-"Care" or "hardship" (low income)</li> <li>-Indoor air quality</li> <li>-Health / lost days at work or school</li> <li>-Fewer moves</li> <li>-Doing good for environment</li> <li>-Savings in other fuels or services (as relevant)</li> <li>-GHG and environmental effects</li> <li>-Negatives</li> </ul>

Source: Skumatz research, Much fuller list in Skumatz, ECEEE 2019.

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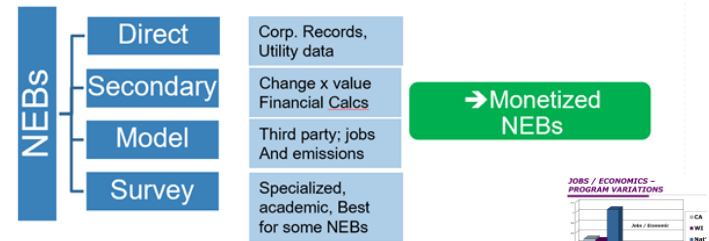
## Developing Credible Measurement / Valuation & Transferability

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## 4 MAIN NEB QUANTIFICATION APPROACHES

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Source: Skumatz / SERA

Source: SERA Research

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## METHODS FOR SURVEY-BASED PARTICIPANT NEBS

- Relative vs. WTP; LMS best performance
  - Statistics, Academics, Practical
- Stratification - Causal
- Dollars and Percentages
- Best practices-triple net



## NEB MEASUREMENT BEST PRACTICES & ISSUES

### Best Measurement Practices

- Triple Net:
  - Net positive & negative
  - Net NTG
  - Net appropriate eqpt baseline
- Measure-based
- Consistent units

### Transferability Categories

- All NEBs categorized / affects transferability:
  - Pgm / measure independent
  - Climate depend.
  - Geog depend.
  - Partic. Mix depend.
  - Pgm / measure dependent

### B/C Test affects NEBs Included

- Appropriate NEBs for each "Test" perspective itemized
- Choose NEBs from Test and Policy Goals

### Issues

- Measure-attribution / sampling
- Baseline
- Commercial
- Utility infrastructure
- HTR/equity, health

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## State Activity & Use of NEBs in Benefit Cost Tests

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Source: Skumatz / SERA

## USING THE LITERATURE FOR THESE STATE-LEVEL ANALYSES- "NEB-It"

### Used SERA's "NEB-It" Database

- >1,800 NEB studies reviewed
- ~800 priority studies; ~600+ entered (most comprehensive available)
- >38,000 NEBs and Inputs data
- Sortable
- Sources & scores & reliability metrics
- Automatic updates (CPI, state, measure)
- Comparisons, Statistics, Patterns, Gaps

### Used "NEB-It" Model with Adjustment Features

- Inputs-measures, mix, location, sector
- Client data - %, rates, horizon, etc.
- Primary & Secondary Calculations
- Select In/Out NEBs (>100)
- NEBs by category & measure & both
- Value & multiplier & ratios

COMPREHENSIVE

FAST

TRANSPARENT

FLEXIBLE RESULTS & SCENARIOS

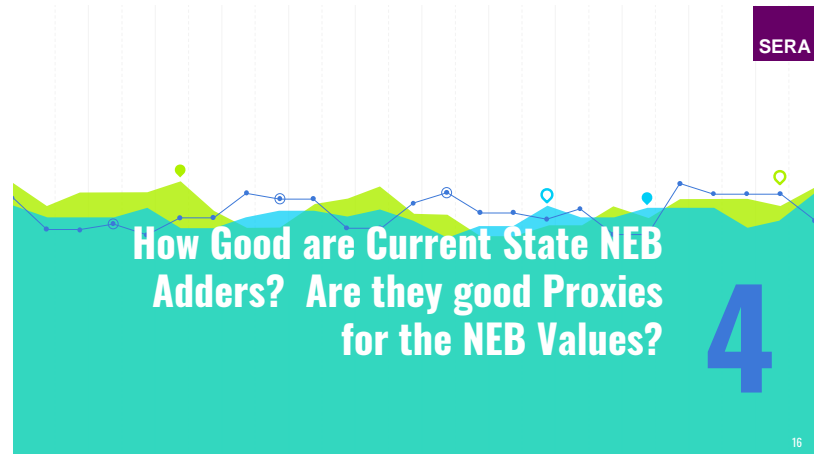
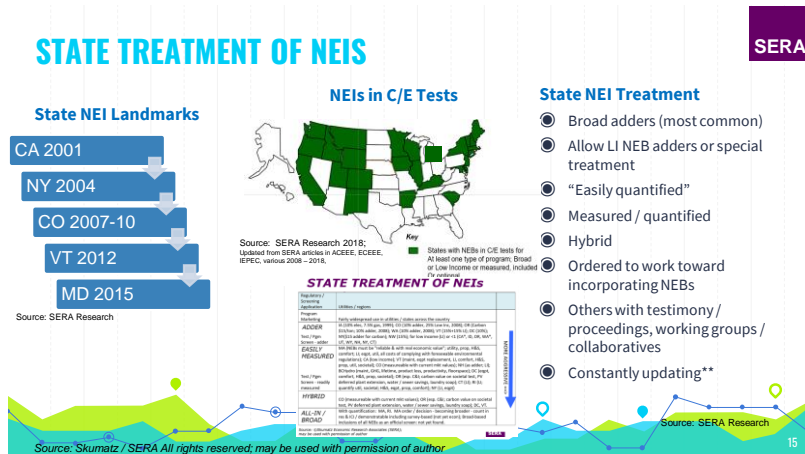
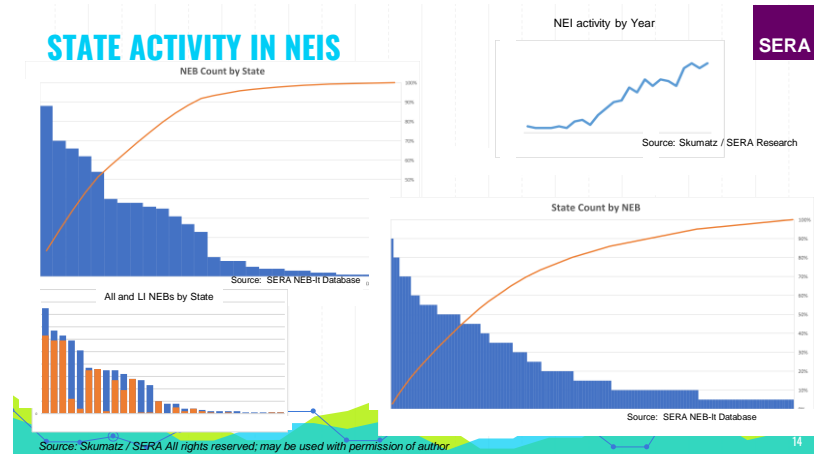
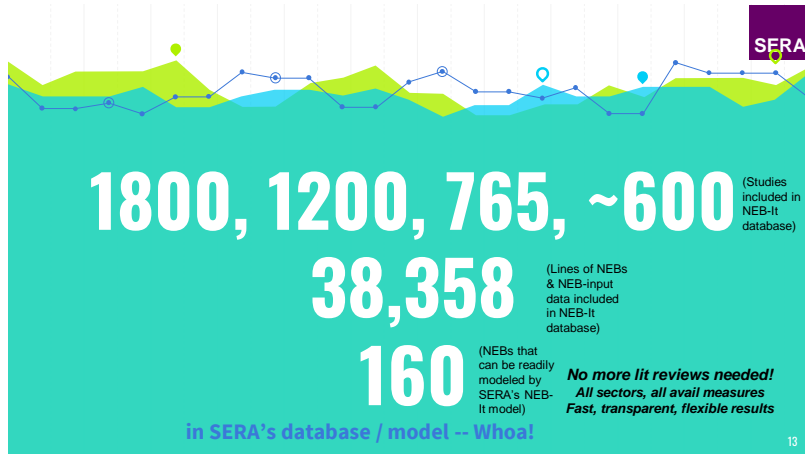
SERA NEB-It

Sectors Initiative Measures Region

All Existing Lit & Inputs

NEB & Measure Results

Source: Skumatz / SERA



## USING "NEB-IT" DATA TO EXAMINE STATE "ADDERS"

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- NEBs are considered HTM
- % Adders are common - typical range
  - Often "negotiated"
  - Some in place for a decade+

- Question:** Are typical Adder values reasonable "stand-ins" for the value of NEBs in BC Tests?
  - Estimated using NEB-It Database
  - Accounted for reliability factor for NEB estimate in stacking order
  - Relevant perspective for the BC Test + Policy goals to select NEBs to include

Test	Benefits	Costs	States Using Traditionally	Improved treatment with NEBs
Utility Cost for Program Administration Test (UCT or PAC)	<ul style="list-style-type: none"> <li>Avoided supply costs for transmission, distribution and generation (TD&amp;G)</li> <li>Avoided gas and water supply costs</li> </ul>	<ul style="list-style-type: none"> <li>Program administration</li> <li>Participant incentives</li> <li>Increased supply cost</li> </ul>	CA, CT, HI, IL, IN, MI, MN, MO, NY, OR, RI, TX, VA, WA, WI	Site cost only paid by the utility
Reliability Impact Measure (RIM) for No Load & Test, or non-participants test	<ul style="list-style-type: none"> <li>Same as above plus increased revenue</li> </ul>	<ul style="list-style-type: none"> <li>Same as above plus decreased revenue</li> </ul>	AK, CO, HI, GA, HI, IL, IN, MI, MN, NC, ND, NY, SC, VA, WI	Participant NEBs
Participant cost	<ul style="list-style-type: none"> <li>Utility bill reductions</li> <li>Participant incentives</li> </ul>	<ul style="list-style-type: none"> <li>Participant direct costs</li> </ul>	AK, CA, HI, IL, IN, MI, MN, NY, WI	Participant NEBs

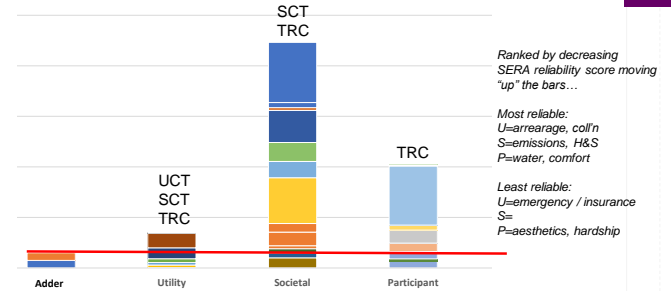
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## Adder vs Estimated NEBs (%) - Residential Low Income

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During presentation, additional examples provided for % terms: Low income, all residential  
\$ terms: Low income, non-low income, all residential, commercial

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## IMPLICATIONS OF ADDER RESULTS FOR STATES

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### Cost Test / Perspective

- Conclusion the same - ultra conservative adders compared to defensible NEB estimates

### States Slow to Adopt / Adapt

- "Dominoes", but reluctance
- Continued advances available in values; not widely adopted

### Barriers to Adding NEBs

- Cost concerns → Append to existing EM&V surveys; web surveys; use existing models & data and transfer/adjust/tailor; inexpensive
- Transferability/not local → Many NEBs use local data in calculations and others can be adapted; don't use lit review averages!
- Program Budgets → Reduce bias / better ranking; don't need to pass beyond budget
- Change, Process → Some stakeholders prefer status quo' dominoes from other states adopting
- Risk/"soft" values → Potentially more reliable than other items in the B/C Equation

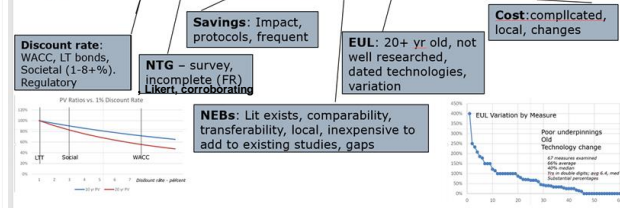
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## NEB ACCURACY / RISK BARRIER- RELATIVE RELIABILITY IN BENEFIT COST TESTS

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$$B/C = [PV[NTG * (Sav + NET NEI) * Lifetime] / PV(Cost) ...]$$



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# Summary & Conclusions 5

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## NEBS ARE MEASURABLE & VALUED

- Defensible measurement methods, and 20+ years of studies available – not new
- States adopted different approaches in State Tests: adder, easily measured, hybrid, all-in. Adder most common.
- Select NEBS to add based on policy goals & test perspective
- Analysis shows current state adds VERY conservative
- Options for addressing barriers available
  - Cost
  - Not local
  - Budgets
  - Change process
  - Risk/"Soft" #s
  - STATE DOMINOS help
- Used SERA's NEB-It database / model / tools to calculate. Comprehensive, saves time, flexible, transparent. *(no more NEB lit reviews needed!)*

Source: Skumatz / SERA

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# THANKS!

## Questions?

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*Valuing Hard-to-Measure (HTM) & NEB Effects For Decision-Making for 40 years...*

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