

NON-ENERGY BENEFITS (NEBS):

20 years – Monetizing NEBs/Multiple Benefits in Buildings

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NON-ENERGY BENEFITS

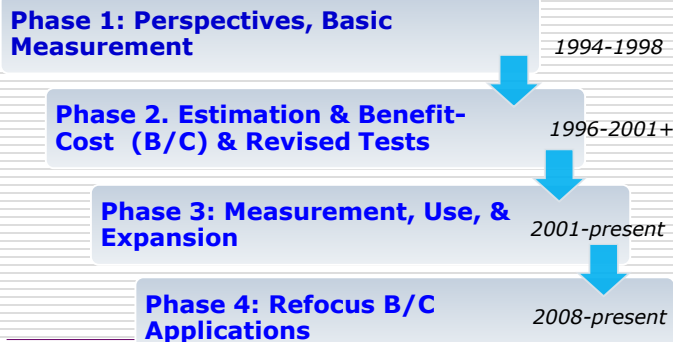


- Program **value** beyond savings
- 20 years** of progress/ where we are
- Motivation**
 - 0 is the wrong number
 - "Bundled features" / rational / tunnel
- B/C incomplete** – Benefit-cost - Biased investments / decisions because all costs, not all benefits
- High value from quantitative studies

Source: Skumatz / SERA research



20 YEARS OF NEBS PROGRESS...

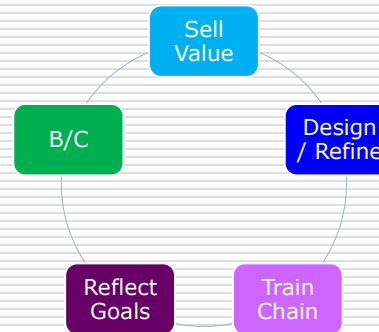


But there still isn't agreement on name! - NEB, OPI, NNEB, MB, co-benefits...

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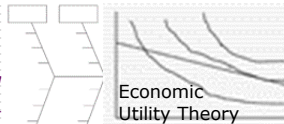
KEY APPLICATIONS OF NEBS



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NEBs, DRIVERS, 3 BENEFICIARIES



Utility/Ratepayer	Societal	Participant
<ul style="list-style-type: none"> o Payments/financial o Debt collection efforts / calls o Emergencies / insurance o T&D, power quality, reliability o Subsidy (Low Income) o Other 	<ul style="list-style-type: none"> o Economic development / job / multipliers o Tax impacts o Environmental o Emissions o Health o Water & other resources / utilities o National security o Wildlife/Other 	<ul style="list-style-type: none"> o Payments & collection o Education o Building stock o Health o Equipment service including productivity, comfort, maintenance, etc. o Other utilities (water, etc.) o Other (transactions, environmental, psychic, etc.)

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

Source: (Skumatz/SERA, 2004)
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Methods & bracket (e.g. 1994 – 2001 health, fire/insurance...)

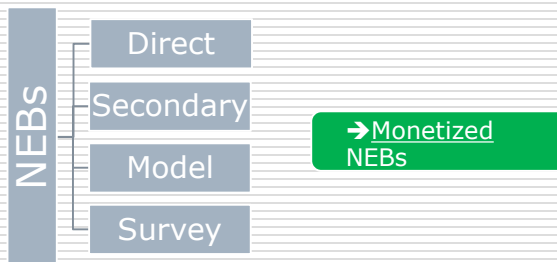


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NEB RESULTS: MEASUREMENT & EXAMPLES FROM 20 YEARS



NEBs MEASUREMENT & DATA – 4 MAIN MEASUREMENT APPROACHES



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

Source: Skumatz / SERA research; may be used with permission of author



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MEASUREMENT ISSUES & BEST PRACTICES

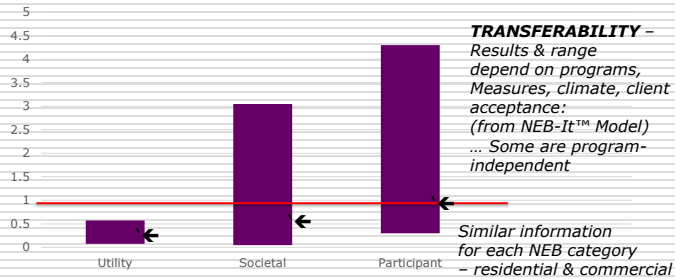
- Best measurement practices
 - “NET” in multiple facets
 - Large sample, non-overlapping, applicable subset
 - Valuation, discount rates, host of other best practices / research
- Measurement accuracy issue
 - Relative to other B/C elements
- Transferability (independent vs. climate, measures, recipients, etc.)?

Source: Skumatz / SERA research



ARE NEBS HIGH VALUE? RESULTS OF NEBS RESEARCH

NEB Value Ranges – Multiplier times Energy Savings

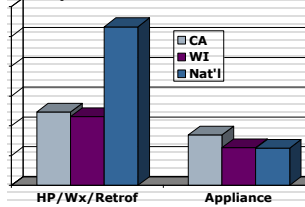


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SOCIETAL AND PARTICIPANT NEBS – VARY BY PROGRAM

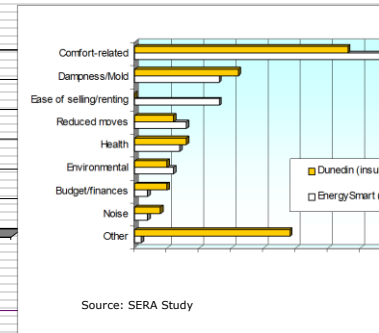
Societal Environmental Jobs / Economic



Audience, scope...

(Source: Skumatz/SERA
ECEEE 2007, ACEEE 2006)-2015

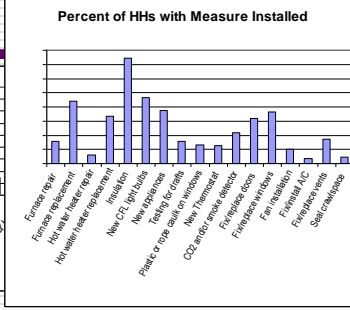
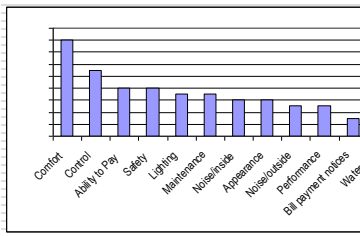
Participant



Source: SERA Study



PARTICIPANT NEBS – ATTRIBUTING



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

(Source: Skumatz/SERA
ECEEE 2007, ACEEE 2006)-2015



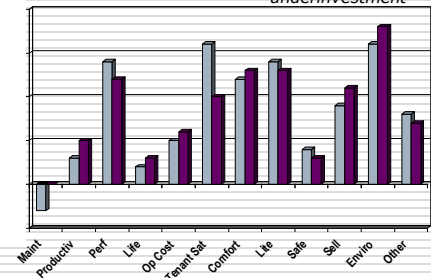
NEGATIVE NEBS VALUE / PERCEIVED COST OF BARRIERS

Residential Example

Negative NEBS	Solar W/H
Appearance	-\$14 NZ
Maintenance	-\$9 NZ

Commercial Example

Audience, disconnect, underinvestment



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A&E Owner



NEBS VALUE / VARIATIONS & CONTEXT

Residential Examples

Residential Program	Relative NEB	Positive NEBs	Negative
Wx	<100%	Comfort, Sale, Green, Years, Other	Few
Wx	<<100%	similar	Few
Wx	>>100%	similar	Few
Wx	>>100%	similar	Few
Wx	>100%	similar	Few
Light	range	Green, Light, Satisf, Life	Quality
Appliances	<100%	Green, Water, Performance, varies	Varies
Windows	<<100%	Noise, comfort, control	
Insulation	<<100%	Comfort, health, control	
Solar WH	<<100%	Green, control	

Real time, Zero & low energy, education, renew, many others

Commercial Examples

Com'l Program Type	Relative NEB Value	Positive NEBs	Negative
New Construction	Range ~100%	Comfort, Light, Tenant Satisf, Ops /Perf, Productivity, Green, Leasing	Maintenance
MF New Construction	Range	Operations/Perf, Green, Lifetimes, Comfort	
Technical Assistance	<100%	Green, Operations, Performane, Lifetime, Comfort, Safety	Maintenance, labor, lighting
Audit	<<100%	Water, Performane, Safety, Light, Productivity	
Commissioning	C/sq ft.	Operational deficiencies, O&M knowledge, Comfort, Productivity	Scheduling
Lighting	Range	Green, Performance, Other Ops, Lifetime, comfort, safety	Maintenance
Boilers	>100%	Control, Footprint, Tenant Satisfaction, Noise	Lifetime

Motors, Air compressor, HVAC, Daylighting, rebate, PV, renew, others

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→ Direct Implications for B/C

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NEBS – WIDELY RESEARCHED



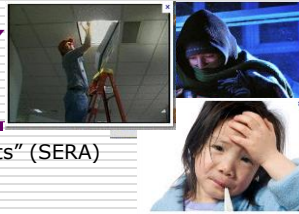
- >20 years, >100 programs & portfolios, many states in model
 - Methods, gaps, priorities, applications
- NEB-It Model to assemble results, quickly analyze
- Transferability of results – depends
 - Measures
 - Climate
 - Targets
 - Inclusions
- Policy - Deliberations in multiple states

'NEB-It' Model

Source: Skumatz / SERA research
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NEBS PRIORITY RESEARCH



- Greatest progress – beyond “lists” (SERA)
 - Utility
 - Societal
 - Participant
- Needs more work / gaps (SERA)
 - Utility
 - Society
 - Participant
 - Overall

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NEBS IN POLICY CONTEXT: BENEFIT-COST / COST-EFFECTIVENESS APPLICATIONS

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NEBS IN TESTS – REDUCE BIAS

- Benefit Cost / Cost-Effectiveness Tests -TRC / Societal, Participant, UCT, RIM... NEBs
 - Tests already include all costs (easily tracked); use NEBs to provide truer representation of Benefits to address bias... NOT ABOUT "BELIEVING" IN NEBS...
 - Better guide measure, program, portfolio investment
 - Address by:
 - 1) include monetized NEBs or
 - 2) exclude all costs associated with achieving NEBs
 - 3) or use UCT (utility cost test)
 - B/C early, then "conservative" awaiting evidence

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NEBS IN COST-EFFECTIVENESS TESTS

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- Updated definitions for all BC tests to incorporate appropriate NEBs & refined tests, starting in 2000

Test	Benefits	Costs	States Using Traditionally	Improved treatment with NEBs
Utility Cost (or Program Administrator Test) (UCT or PAC)	<ul style="list-style-type: none"> • Avoided supply costs for transmission, distribution, and generation (TD&G) • Avoided gas and water supply costs 	<ul style="list-style-type: none"> • Program administration • Participant incentives • Increased supply cost 	CA, CT, HI, IA, IL, IN, MI, MN, MO, NY, OH, RI, TX, VA, WA, WI, WY	Use cost only paid by the utility

- **Chicken & Egg** – NOT about "believing" in NEBs. Important uses ← → trusted values; money if "serious" application; evidence
 - Much investment, data, expertise, increments in 20 years... Dominoes...



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POLICY: US STATES WITH NEBS IN COST-EFFECTIVENESS TESTS

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- A number of states include some subset of NEBs – multiple options

	DSM	RISK	COST
Adder			
Readily Measurable	↓	↑	↑
Hybrid			
All NEBs			

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HOW ACCURATELY TO MEASURE NEBS? TRADEOFFS

- **Tradeoffs** – How much to improve tests? How accurately to estimate NEBs? Look at costs & benefits of NEB improvements
 1. What **value range (low to high)** arises from reasonable cost measurement of important / biggest NEBs (evaluation budget)
 2. Does inclusion of LOW vs. HIGH end of the RANGE **change the decision or B/C conclusion?**

IF **NO**,
You're done & bias addressed sufficiently

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

'NEB-It'
Model

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TAKEAWAYS

- 20 years of literature & methods research
- Measured / measurable / high value
 - Methods / best practices / skills
 - Relative to...
 - Patterns / transferability
 - Attribution to measures
 - Most questions already answered...
- Monetizing vs. case studies...
- Multiple applications; audience issues
- Important to reducing bias in decision-making
- Dominos, choices in approach

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THANK YOU!!

Questions?



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