

## **NON-ENERGY BENEFITS (NEBs) AS OMITTED PROGRAM EFFECTS:**

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### ***Context, Methods, and Results for Home Performance with Energy Star™***

*Workshop, 1 Washington Circle Hotel, 7/19/07*

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## **TOPICS**

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- Introduction & definitions
- NEBs, rationale, uses
- Measurement approaches
- Values of NEBs for HP with ES™ programs
- Conclusions & implications
- Other issues
  - Economic / development multipliers
  - Attribution to individual measures
  - Effects of demographics

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## **BACKGROUND – WHAT NEBs CAN TELL US**

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- “Net” NEBs
  - Why analyzed? - assumption of zero..., precision
- Three perspectives
  - Agency, societal, participant
- Esoteric? Myriad useful program applications
  - Marketing
  - Benefit-cost
  - Barriers
  - Decision-maker perspectives; understanding decisions

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## **NEBs – NOT SO ESOTERIC TO MANY AUDIENCES...**

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- Three audiences out there that should care...
  - Program / agencies
  - Sales / manufacturers
  - Users / participants

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## ***NEBS CATEGORIES***

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- Limited causes / sources of effects
- Individual categories of benefits for 3 perspectives:
  - Utility
  - Societal
  - Participant

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## ***MEASURING PARTICIPANT BENEFITS***

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- Developed approaches for utility, societal (secondary, program, other data)
- Participant HTM
  - Develop method of open-ended → existence → pos/neg → value options
  - *Revelation* on measurement
- SERA pioneered / developed / adapted / tested / used 9 types of measurement approaches including:
  - WTP / WTA / CV / Bounded variations
  - Comparative approaches
  - Ranking / logit / conjoint
  - Regression, market /direct valuation
  - Other

(Source: Skumatz/SERA)

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## ***ASSESSMENT OF NEB MEASUREMENT & DATA COLLECTION METHODS***

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- Pros and cons of each – applications vary based on:
  - Budget, time, length of survey
  - Detail needed / application / number of categories
- Comparisons of Cost Vs. Performance of:
  - Analytical methods
  - Survey / data collection methods
- Source of comparison data from SERA studies since 1994
  - Compared multiple methods within single studies

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## ***RESULTS FROM HOME PERFORMANCE WITH ENERGY STAR™***

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Summary of results from 2006  
Evaluation of NYSERDA's Program

## APPROACH FOR 2006 HOME PERFORMANCE WORK

- Mail survey approach (180 responses)
- Measurement methods used:
  - LMS (7 values)
    - Multiplicative / from literature; variations in savings perceptions (study)
  - CV / WTP variations
    - Concerns in literature: not rational, implausibly large, missing budget constraints, difficult to provide background, "warm glow" vs. WTP
  - Ranking of packages
    - Hypothetical scenarios, participants don't have to generate options / values; cardinal ranking, short, robust
- Groupings of NEBs / subcategories

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## GROUPING OF NEBS IN SURVEY

NEB Group	Component NEBs
Comfort & equip service	Comfort, noise, light, maint, lifetime, features, construction quality
Home and its value	Appearance of home / equipment, ability to sell/lease home
Health-related	Number & type of illnesses causing lost days from work or school, direct medical costs
Energy educ, bill pay, other	Understanding of energy use in home, bill payment concern, changes in other bills, "do good" for environment, other

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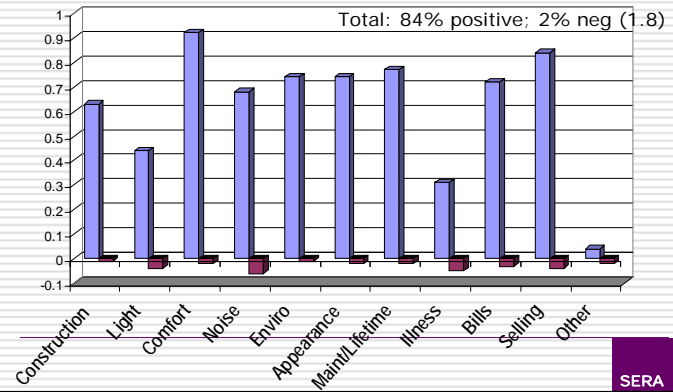
## OTHER TOPICS: AWARENESS, USAGE, SAVINGS / VALUE

- Source: contractor, TV, word of mouth
- Use of A/C and heating equipment
- Changes in energy use – 8 changes; 1 had more energy use (more showers)
- Perceived energy savings: 1/3 much less; 2/5 somewhat less.
- Perceived value of HP with ES retrofits beyond standard:
  - \$4,400 (median \$2,500 one time)

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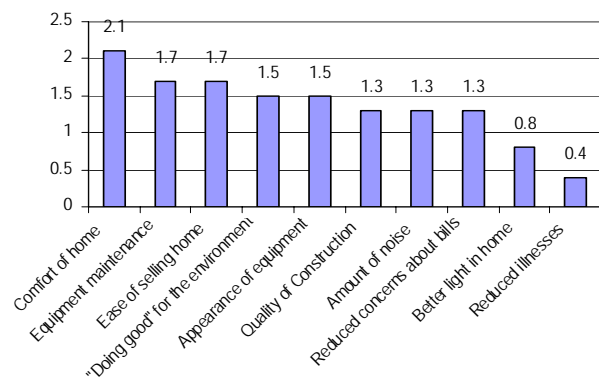
## PERCEIVED INCREASE/DECREASE IN HOME VALUE FROM NEBS

Percent pos or neg



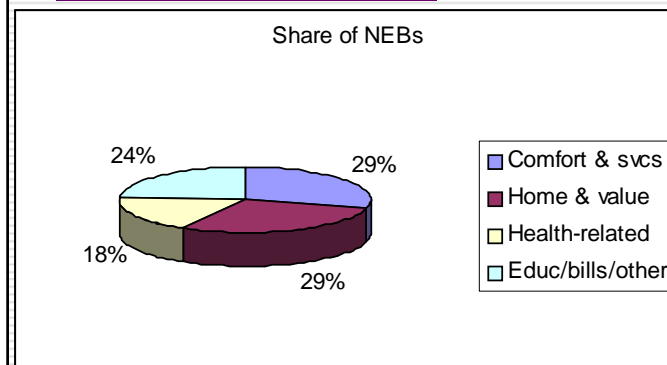
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## RELATIVE NEB SCORES



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## SHARE OF NEBS BY CATEGORY (Total NEBs 120% of savings)



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## LEADING NEBS WITHIN GROUPS

- Comfort:
  - Comfort, lifetime, noise / maintenance / features, construction
- Home / value:
  - Ability to sell, home appearance
- Health:
  - Lost work days, other costs
- Education, etc.
  - Understanding, bill payment concern, enviro

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## WOULD SAME NEB CHANGES HAVE RESULTED WITHOUT PROGRAM?

Category	Yes	Worse without ES
Comfort/ service	16%	51%
Home / value	18%	47%
Health	23%	20%
Education/ bill / other	11%	50%

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## IMPACTS OF NEBS ON EQUIPMENT SELECTION

- Likelihood of selecting same efficiency without program:
  - 15% definitely not; 28% <25% likely
  - 5% would; 11% likely
- Effect of knowing about NEBs on likelihood of selecting same eqpt for retrofit
  - Would have increased likelihood: 42%

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## NEB VALUATIONS RESULTS: ~\$4-5K

- Value ranges - \$4,200
- LMS - 120% of energy savings
  - Savings estimated at \$797/year=\$956/yr; 5-10 year timeframe, 10% discount → \$3,600-\$5,900 (average \$4,700)
- Ranking method:
  - 1) \$5,000 value
  - 2) Ranked preferences about 1.4 times energy savings → \$4,200-\$6,800 (\$5,500)

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## NEB VALUE RESULTS / COMPARISONS

Value and Estimation Method	Multiple of Energy Savings	"Lifetime" value	Value relative to estimated Retrofit value
<b>Retrofit &amp; Energy Savings Values</b>			
Perceived value of house retrofit	1.12 (112%)	\$4,425*	100% (definition)
Energy bill savings	1.0 (100%, by definition)	\$3,020-\$4,894 (\$3,957)	89%
<b>Value of Total NEBs</b>			
Total NEBs: from Reported value	1.04 (104%)	\$4,125*	93%
Total NEBs: from LMS	1.2 (120%)*	\$3,623-\$5,870 (\$4,746)	107%
Total NEBs: from Ranking method 1	1.26 (126%)	\$5,000*	113%
Total NEBs: from Preferences	1.4 (140%)*	\$4,032	91%
<b>Summary Methods</b>			
NEB Range	1.04-1.26 (1.22)	\$3,957-\$5,000 (\$4,476)	91%-113% (101%)
Adjusted for 62% Free Ridership	0.76 (76%)	\$2,775	63%

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## ADJUSTED PAYBACKS

- Gross payback: 5.6 yrs → 2.5
- Net payback excl. FR: 9.0 yrs → 4.0
- B/C incl all partic NEBs: 0.9 → 1.9
- B/C adj for FR: 0.55 → 1.2

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## ***RESULTS AND IMPLICATIONS***

- NEBs/ values
- Barriers
- Disconnects
- Marketing / selling points
- Benefit/cost and Payback

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## ***BARRIERS & SELLING POINTS***

	Most Frequent Responses (Percent noting response)
Barriers – Negative NEBs	None
NEB Selling Points emphasized by contractor	Lower energy bill payment concerns (predictability, etc.) (70%) Improved comfort (68%) Improved equipment lifetimes, maintenance (59%) Ability to sell home in future (43%) Construction quality (38%)
NEB selling points that were most important to homeowner making decision	Lower energy bill payment concerns (predictability, etc.) (74%) Improved comfort (66%) Improved equipment lifetimes, maintenance (57%) Ability to sell home in future (49%) Doing good for environment (43%)

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## ***RESULTS FROM HOME PERFORMANCE WITH ENERGY STAR™***

Provided results from 2004  
Evaluation of NYSERDA's Program

## ***COMPARISON OF 2004/2006 RESULTS***

- Overall value
- Leading NEBs
- Barriers
- Measurement methods
- Other

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## ***IMPLICATIONS***

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- Marketing –
  - Sell features users want to buy/variations...
  - Target audience refinements
- B/C – ROI strong for stakeholders – double ROI beyond energy savings
  - Beneficiaries issue for program agency...
  - However, NEBs improve participation, C/E, lower recruitment costs, rebate needs
- Barriers
  - Negative effects give clues for program interventions, remediation; and \$ investment needed

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## ***IMPLICATIONS***

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- Decision-making
  - NEBs affect decision, value from participation; rational decision-making
- Program design / information
  - Update program B/C, allay fears, confirm benefits, address barriers
  - Targeting, program design implications

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## ***SUMMARY***

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- NEBs measurable, have value / recognized by homeowners, attributable to activity / program
  - Differences in perceptions by actor
- Strong ROI, marketable benefits
- Program design information
- Do-able, affordable

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## ***THREE ADDITIONAL TOPICS/ ISSUES – OUTSIDE THIS PROJECT***

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- Volatile NEBs – Economics
  - Implications of variations by:
    - Geography
    - Program type
- Can most valuable measures in multi-measure programs (Like HP) be identified?
  - Disaggregations...
- Demographic influences / variations

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## ***THANK YOU! QUESTIONS?***

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