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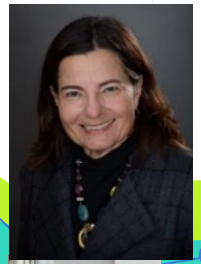
SERA



THERMOSTATS: SURVEY RESULTS REVEAL IMPLICATIONS FOR BEHAVIOR, SATURATION, TURNOVER, AND POTENTIAL

Poster for BECC 2021, 9/15/21

SERA 2021; cite if used

ESTIMATING T-STAT TURNOVER & IMPLICATIONS FOR ENERGY SAVINGS & MERCURY RECOVERY

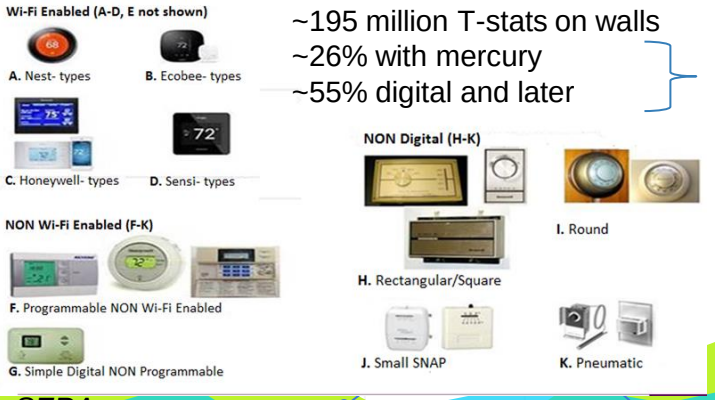
SERA

1. Number by age & type on US walls Meta data from SERA statistical surveys in 5 states.

2. EUL estimate for traditional t-stat models: 20-35 years by type ➔ calculate natural market cohort turnover/yr

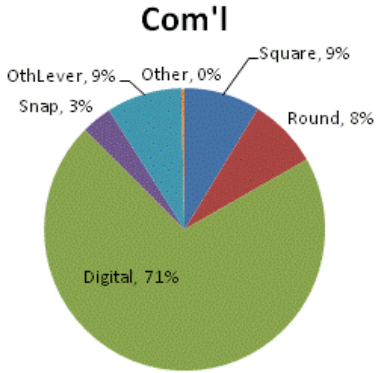
3. Estimated Energy Savings & 4. Mercury Recovery Potential

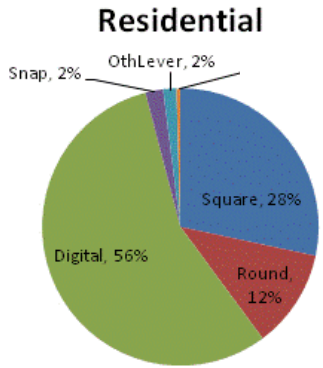
1. **Weighted results from 5 SERA-conducted state surveys of thermostats (residential & commercial)**
   Asked number, type (photos), age of current t-stat, age& type removed, use, satisfaction, etc.
   Assigned types with mercury. Estimated: Number of T-stats by type and number with mercury



~195 million T-stats on walls
~26% with mercury
~55% digital and later

Varies by state





Shares in one example state

Source: SERA survey

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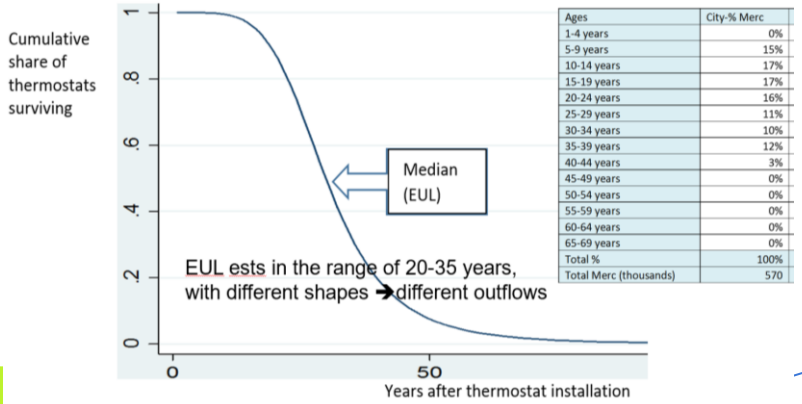
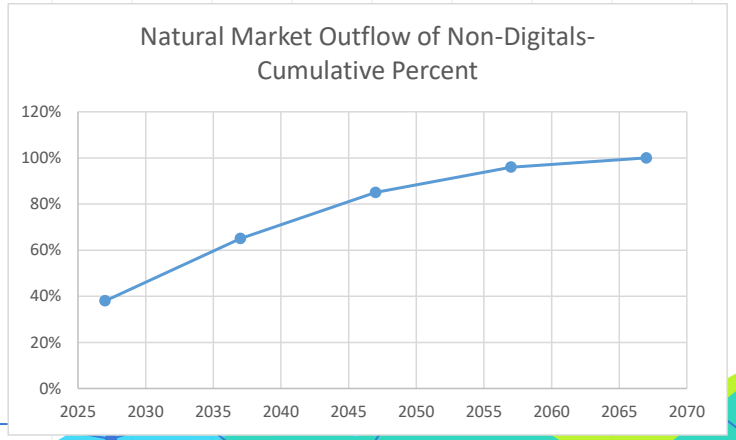
2. Lifetimes + Age Distrib ➔Outflow



Ages	City-% Merc
1-4 years	0%
5-9 years	15%
10-14 years	17%
15-19 years	17%
20-24 years	16%
25-29 years	11%
30-34 years	10%
35-39 years	12%
40-44 years	3%
45-49 years	0%
50-54 years	0%
55-59 years	0%
60-64 years	0%
65-69 years	0%
Total %	100%
Total Merc (thousands)	570

Shares in one example state

2. Long lifetimes for old tech means relatively slow natural turnover for 10 year periods



Source: SERA survey & analysis

ESTIMATING T-STAT TURNOVER & IMPLICATIONS FOR ENERGY SAVINGS & MERCURY RECOVERY

1. Number by age & type on US walls. Meta data from SERA statistical surveys in 5 states.

2. EUL estimates for traditional models: 20-35 years by type ➔ calculate natural market cohort turnover/yr

3. Estimate Energy Savings & Mercury Recovery Potential

3. Estimate 88 million non-digital, traditional T-stats on walls, "ready for upgrade"
Natural market replacement means ½ would be replaced in the next 15 years.
To increase this replacement rate, utility programs likely needed.

Outflows have impacts on the rate mercury models are removed.
More than half the non-digitals on walls contain mercury (~51 million)
How much mercury is in the t-stats? 200 metric tons

Utilities should assure recycling of these measures, and aid programs if they increase replacement rate.

Shares in one example state

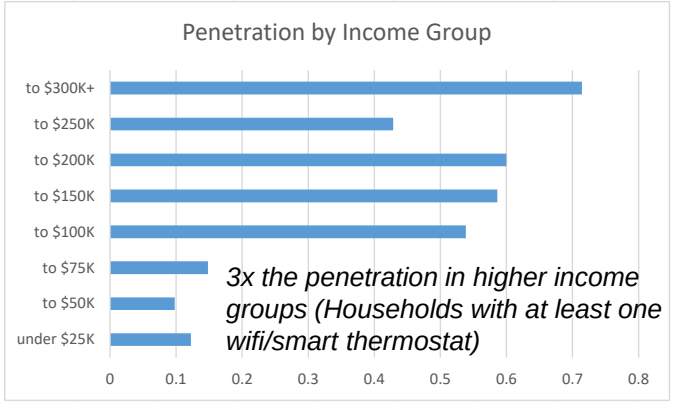
Source: SERA survey

WIFI & SMART T-STATS

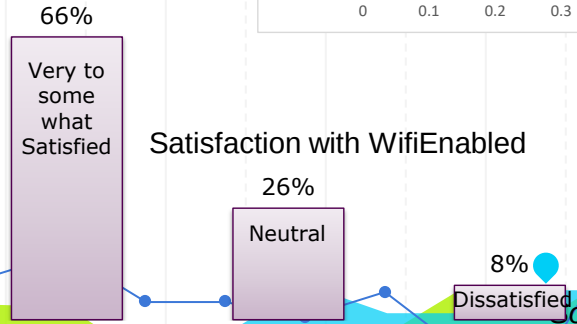
- Share grew 7x over the first 5-6 years.
- More than 1/3 purchased because of utility or manufacturer rebate.
- 1/3-1/2 would not have bought the thermostat without the rebate.
- Favorite features: can use remotely, easy, set and forget
- Least favorite features: App is not perfect, doesn't integrate well with other appliances, Kids can set / reset it
- Why they don't have one: expensive, needs internet
- Percent not using programmability: 35-45%

Reasons for installing wifi-enabled

27%	19%	48%	6%
• Upgraded HVAC • Req'd for other installations	• Old one Broke • Didn't work well	• Easier to use • More control	• Energy Program • Rebate



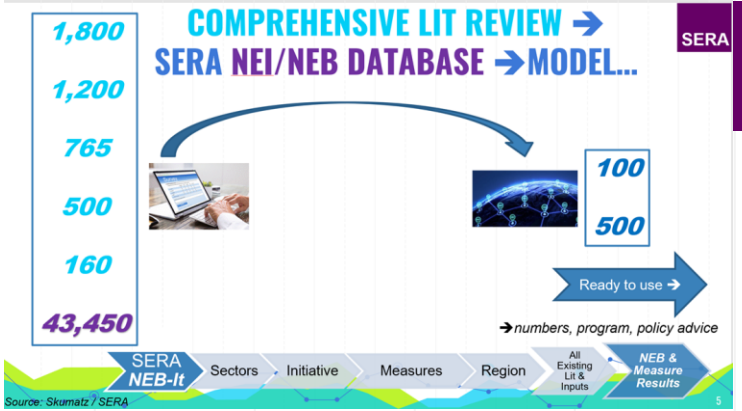
3x the penetration in higher income groups (Households with at least one wifi/smart thermostat)

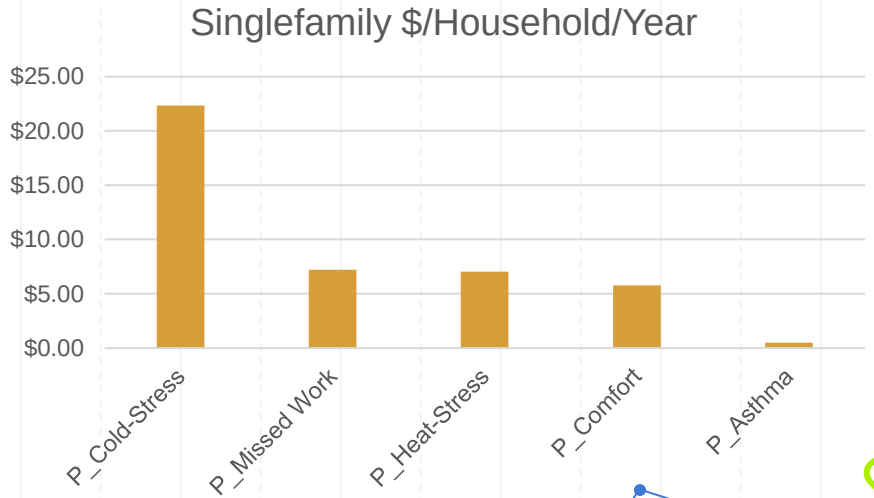


Source: SERA survey

NON-ENERGY IMPACTS (NEIs) FOR T-STATS

- Used large-scale SERA NEIs database / literature review to identify t-stat NEIs. 43,000 lines of data from 500+ studies
- T-stat NEB studies emphasize health impacts and comfort ➔
- Substantial annual value from NEBs.
- New work with much broader list of NEBs underway.





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THANKS!

Questions?

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