Smart Enough to Reprogram Itself:
Results from Thermostat Setpoint Optimization Programs

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Setpoint Optimization Programs

- Connected thermostats facilitate behavioral tune-ups!
- One program researched: Tendril’s Orchestrated Energy across 5 utility territories
### Fixed effects model

$$RT_{h,p} = \alpha_p + \beta_{CDH} \cdot CDH_{h,p} + \beta_{ToD} \cdot ToD_h + \beta_{wknd} \cdot Weekend_h + \beta_{actv} \cdot Active_{h,p} + \beta_{actvCDH} \cdot Active_{h,p} \cdot CDH_{h,p}$$
Algorithm Alters Thermostat Schedule

- Average setpoint increased
- Average indoor temperature increased
Runtime Reduction across the Summer

2.47 kWh per home per active day
Runtime savings across all territories

Savings robust across territories

Runtime savings more consistent as minutes than as percentage

**Single Day:** Active Day vs. its Counterfactual

**Unadjusted:** Active Days compared to all usage

**Adjusted:** As above, Learning converted to Active Days
Savings vary by provider

Less Aggressive  More Aggressive

nest
uplight
resideo
Eco Factor

32 kWh  111 kWh  207 kWh  475 kWh
4.6%  9.1%  15.0%  13.5%
≈ 1 TWh Achievable Potential across the United States

- **MARINE**: 40 kWh per HH per summer
- **COLD / VERY COLD**: 79 kWh per HH per summer
- **MIXED-HUMID**: 182 kWh per HH per summer
- **HOT-DRY / MIXED-DRY**: 195 kWh per HH per summer
- **HOT-HUMID**: 398 kWh per HH per summer

* Assuming 9% cooling energy savings per household, and consumption based on RECS 2015 by region
Questions?

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