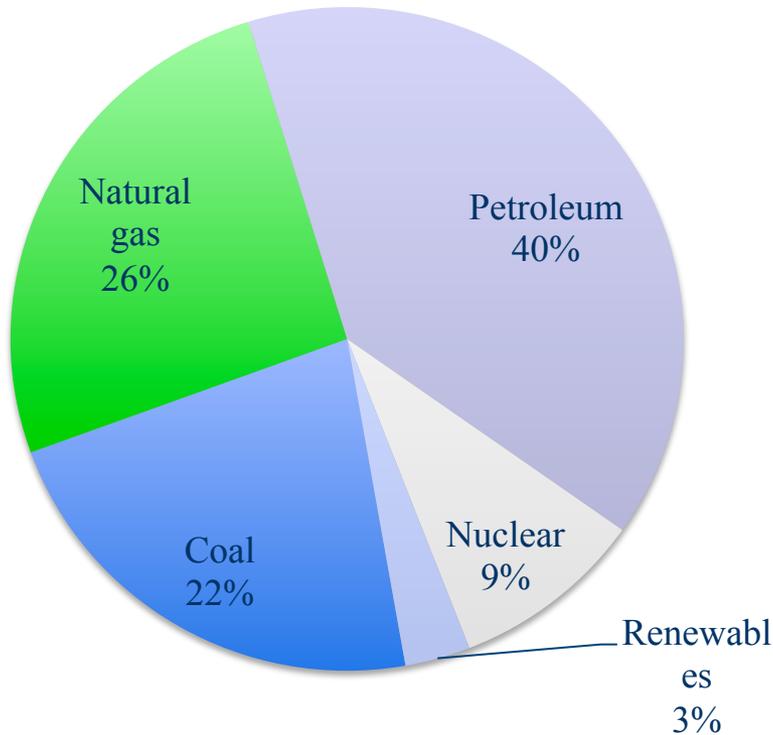


Won't Programmable Thermostats Save the (Energy) Day?

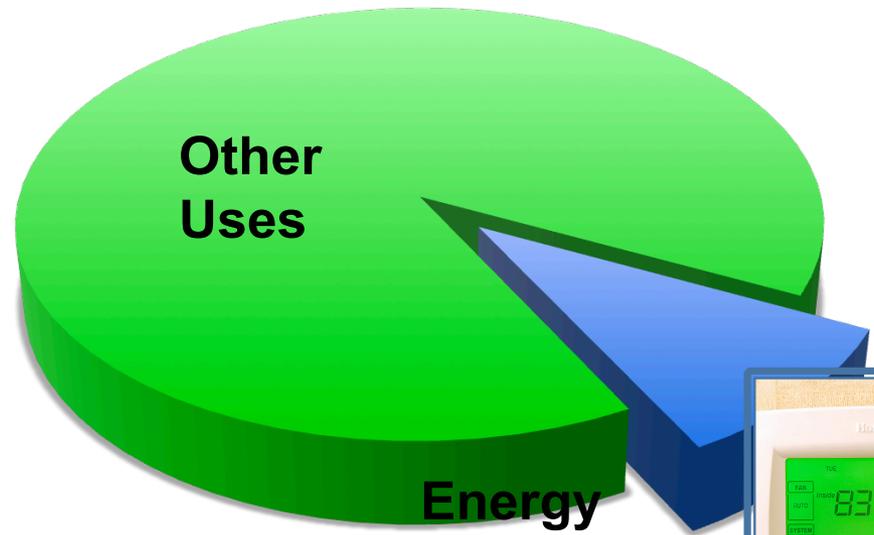
Alan Meier
Lawrence Berkeley Lab
&
UC Davis Energy Efficiency Center

Residential thermostats control the same amount of energy as that generated by nuclear power plants

USA Energy Supply - 2009



National Energy Consumption



Energy controlled by thermostats



Although this thermostat has many tempting buttons to play with,

PLEASE ONLY USE THE UP AND DOWN ARROWS AT THE UPPER RIGHT TO ADJUST THE TEMPERATURE.

When you leave the community room, simply press the cancel button in the lower right corner.

Please do not touch any other part of the thermostat!!



An illustration of the problem

Can we expect sensors and controls to save energy in these situations?

Quantifying the Usability of Programmable Thermostats

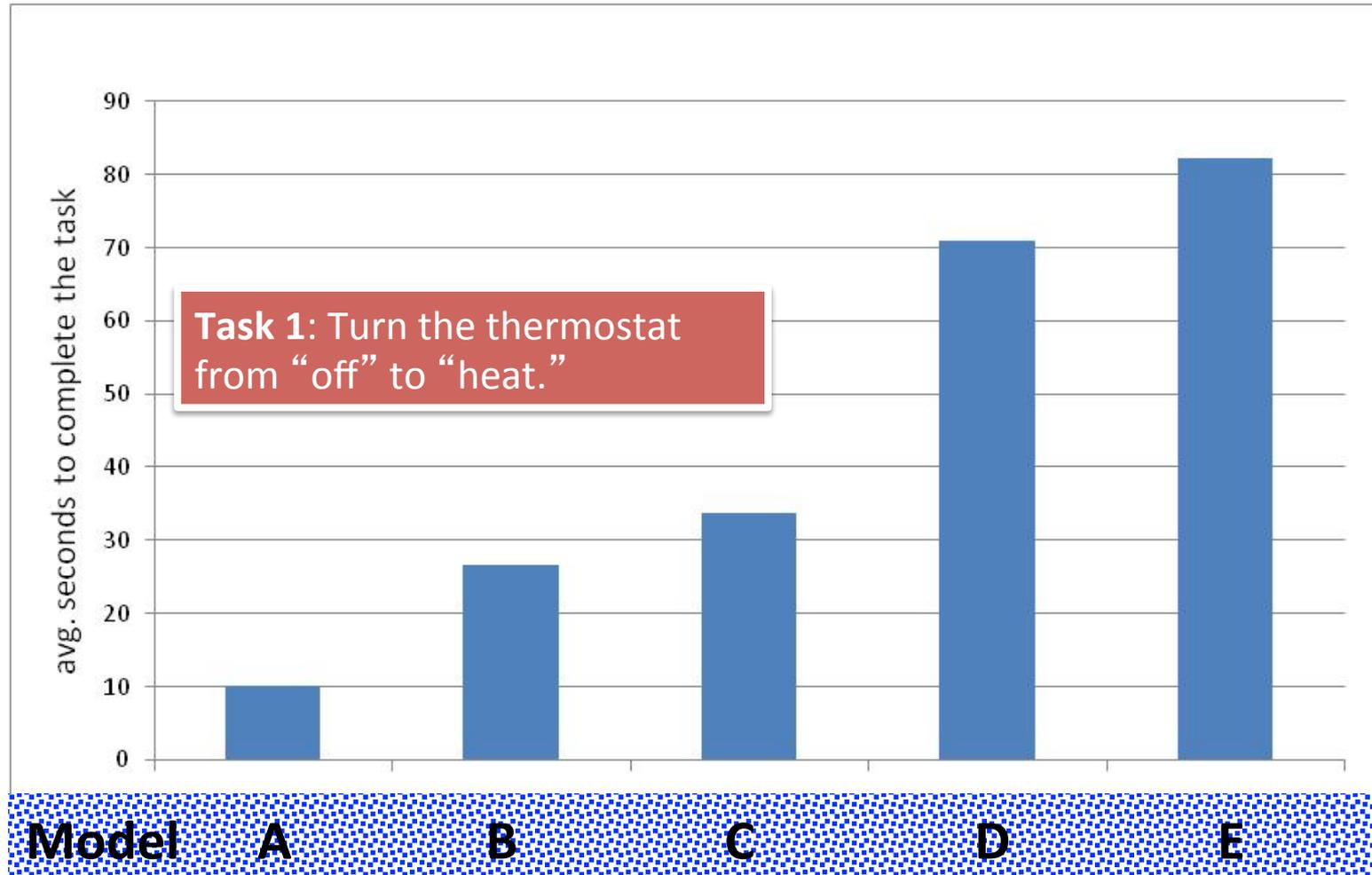
1. Define tasks needed to successfully operate the device
2. Observe people doing tasks
3. Convert observations into a metric

Here's [the video](#)

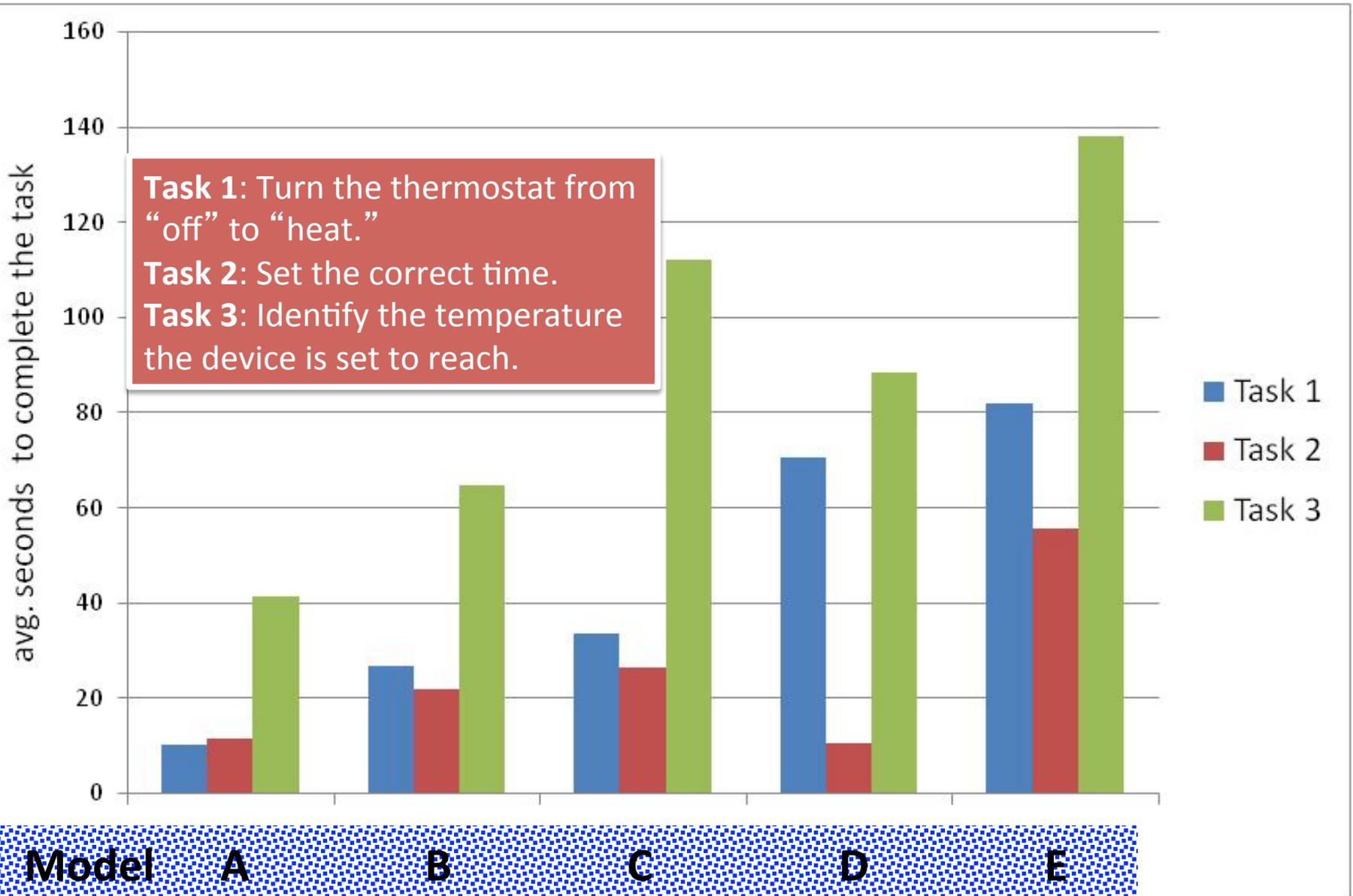


Average Time to Complete a Task by Model

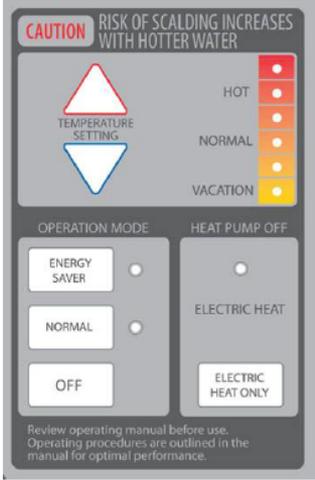
(a simple metric)



Time to Complete Tasks by Model



Other Lousy Interfaces Controlling Energy-Using Products

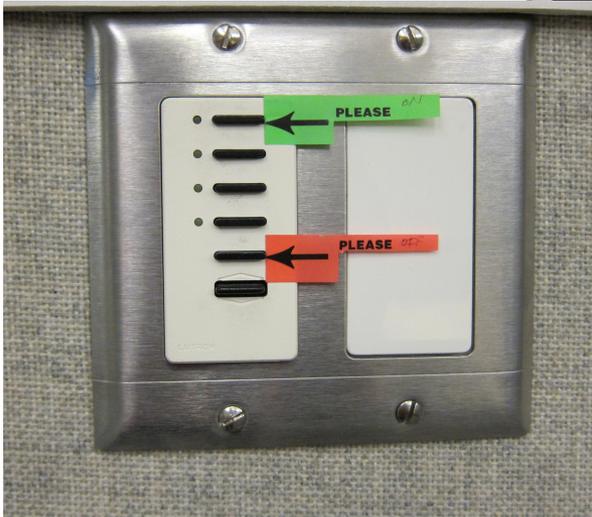


A. O. Smith

GE

Rheem

Commercial Lighting



Heat pump water heaters



Home entertainment

Final Thoughts

Huge changes in thermostat industry since we started making these measurements

- Better interfaces
- 4 million+ Internet-connected thermostats (Nest, Ecobee, Weatherbug, Telkonet, etc.)
- Less reliance on human interactions
- New kinds of user frustrations (strange algorithms, dodgy wifi)

Thermostats are at the cutting edge of sensors, controls, applications of big data, IoT, user interactions ... and energy savings