

Intelligent Efficiency / Internet of Things Part of the Clean Energy Solution?



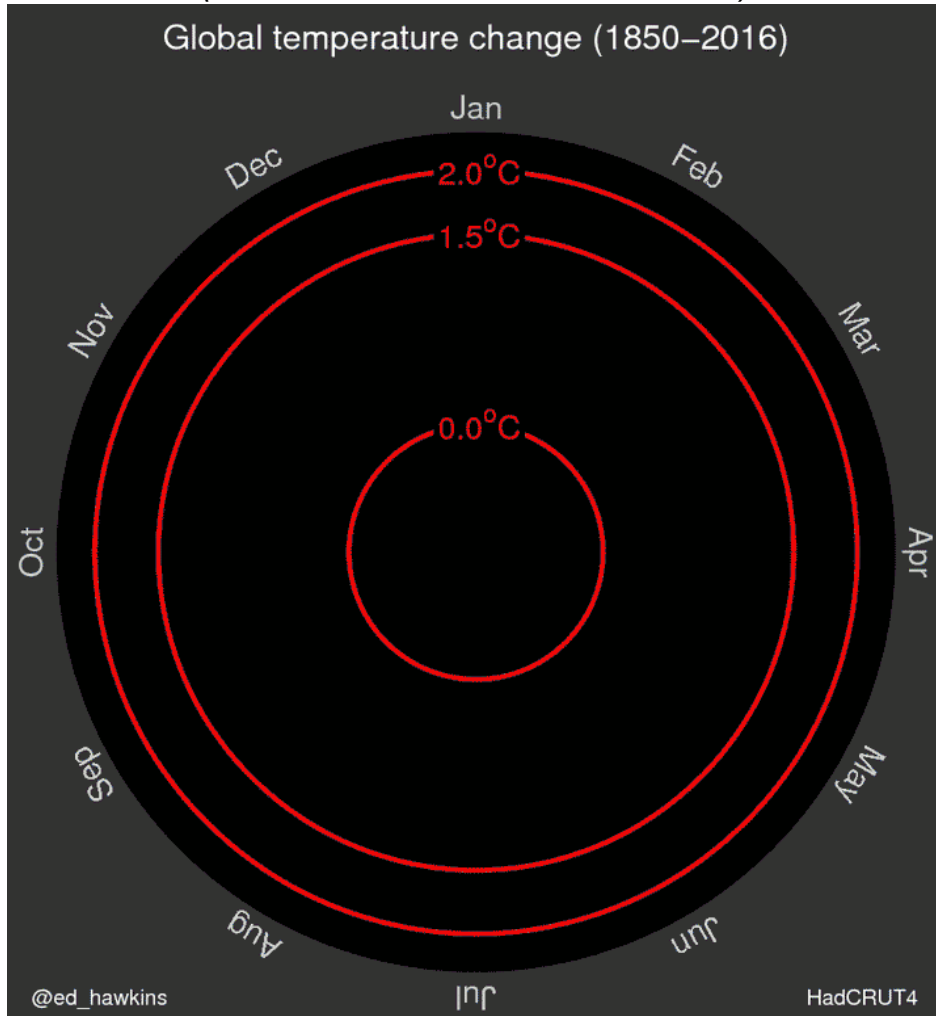
Pierre Delforge

Natural Resources Defense Council

May 12, 2016

Spiraling global temperatures

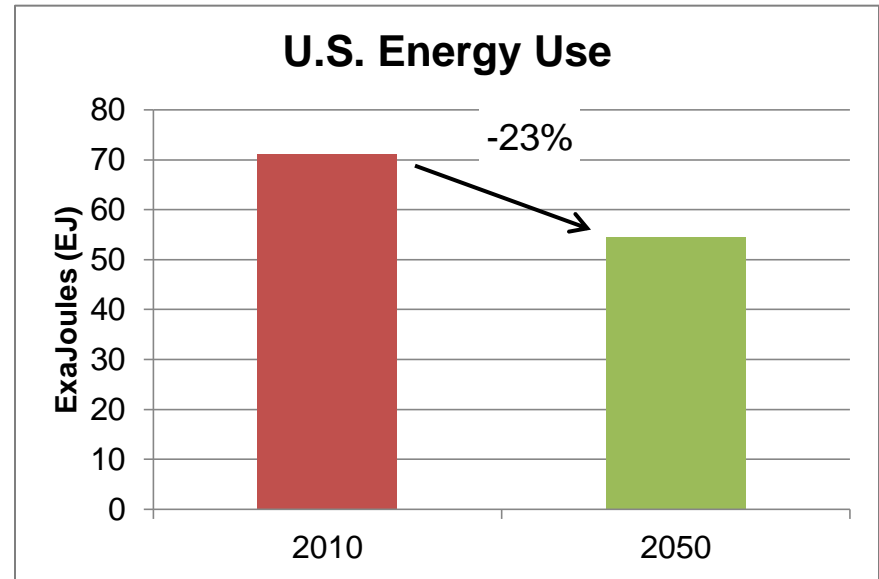
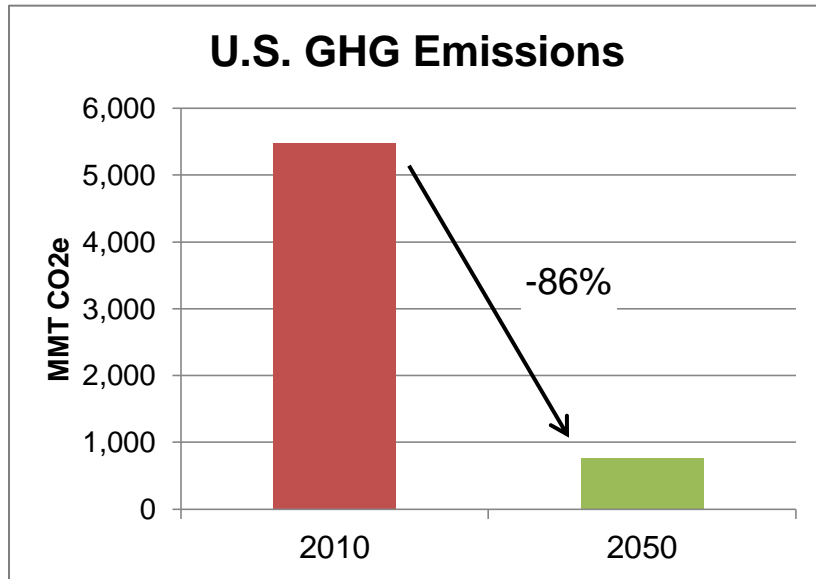
(Use slideshow mode to animate)



Paris Climate Agreement:

- Stay under 2°C
- Strive for 1.5°C

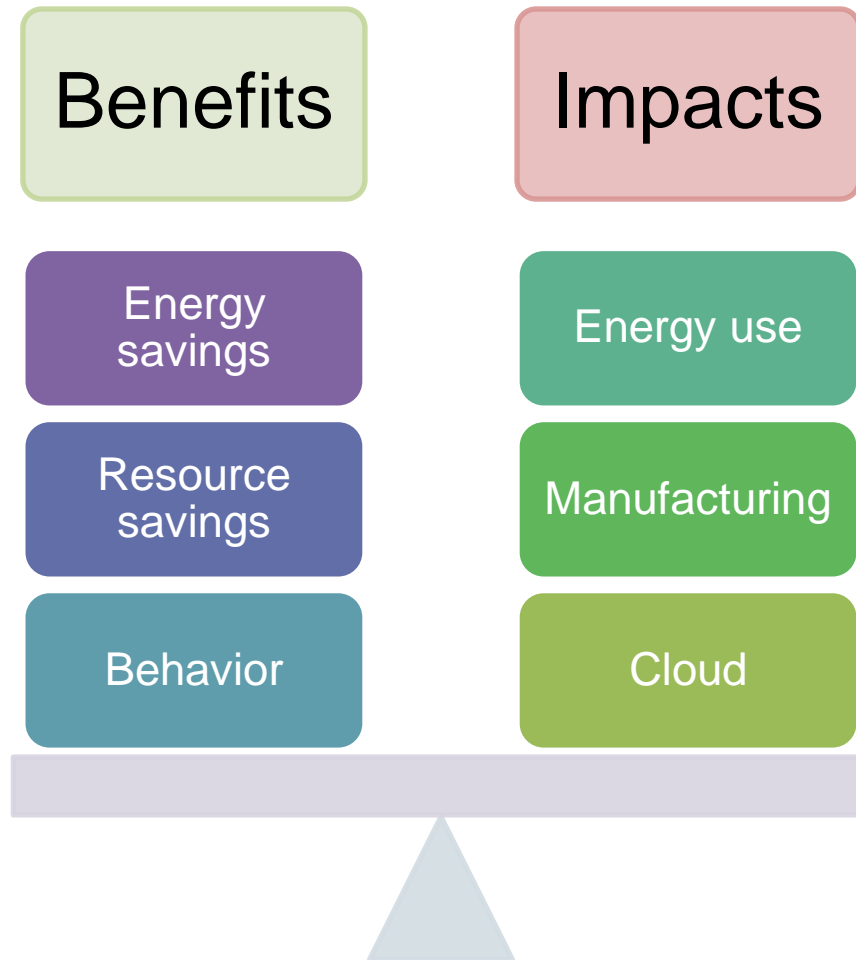
86% reduction in GHG emissions by 2050 (below 2010)



- All sectors: transportation, industry, commercial, residential
- All fuels: coal, oil, gas, electricity...

Source: U.N. Deep Decarbonization Policy Project, Technical Report (2015), Mixed Scenario

How can Intelligent Efficiency be a key piece of the climate solution?



Residential examples: Resource savings from smart appliances



Smart thermostat

- Heating/cooling energy



Light bulbs

- Electricity



Refrigerator

- Food



Irrigation

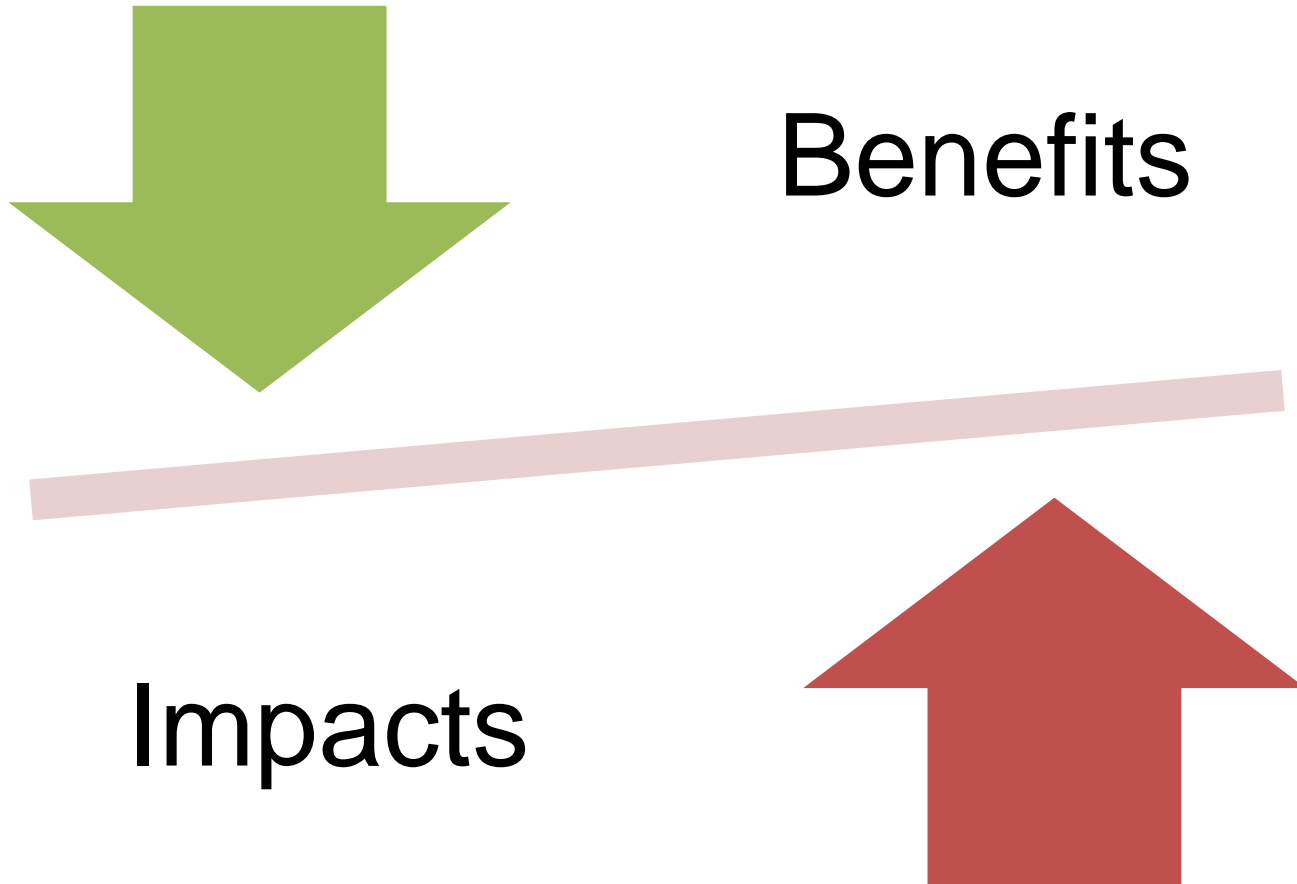
- Water



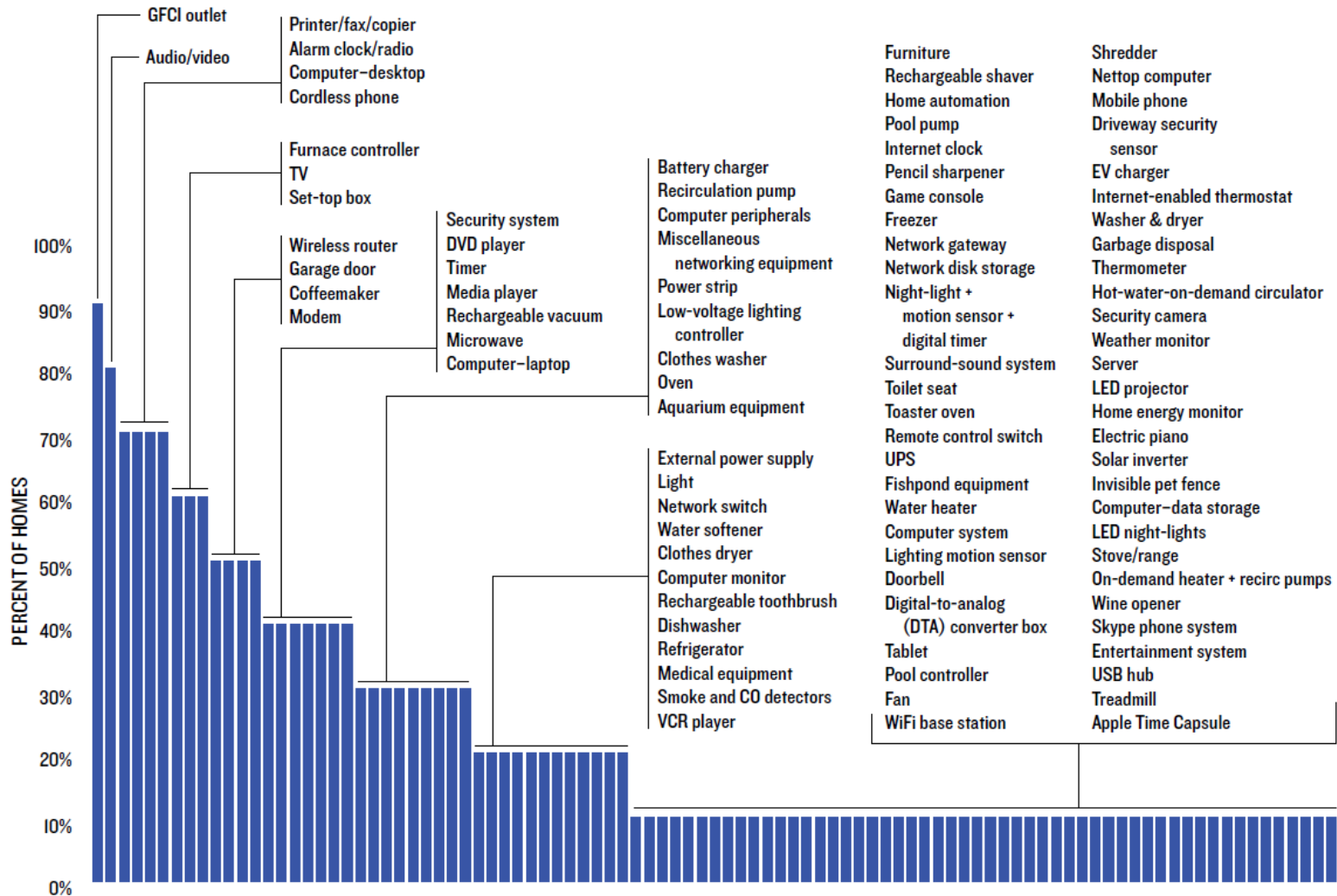
Internet

- Dematerialization

Net benefits

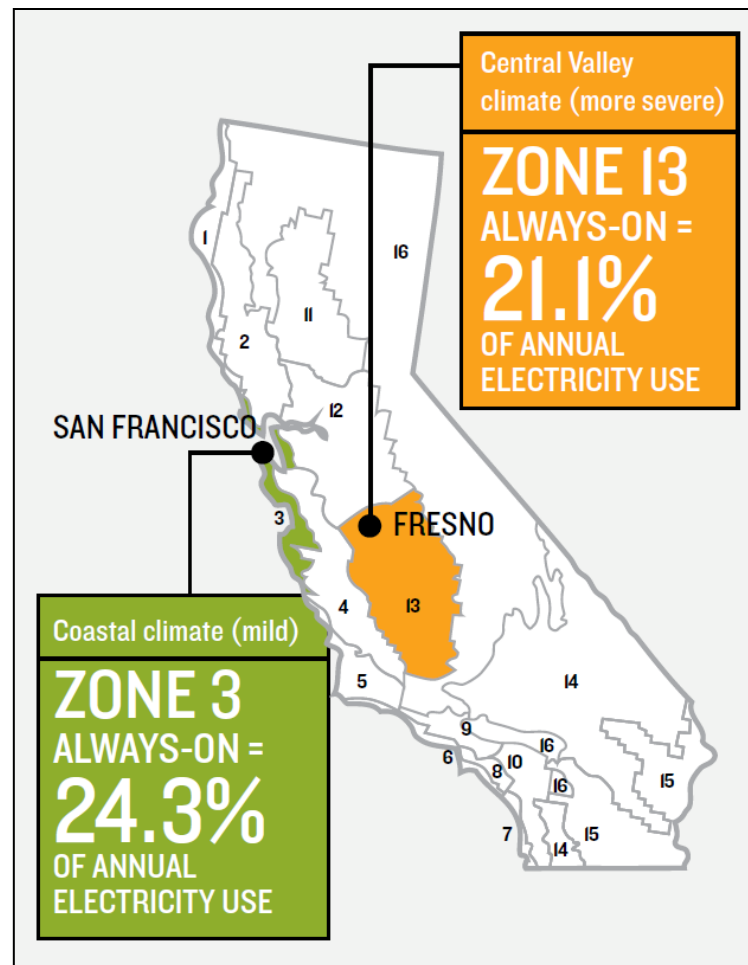


More devices, more of them “smart”



NRDC study: Always-On = 23 percent of CA residential electricity use

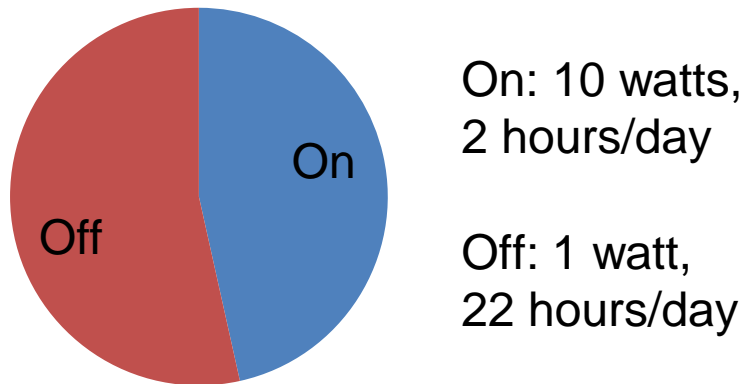
- ❑ IOT devices always-on
- ❑ Always-on load represents 23 percent of residential electricity use in CA



Design IOT for low energy



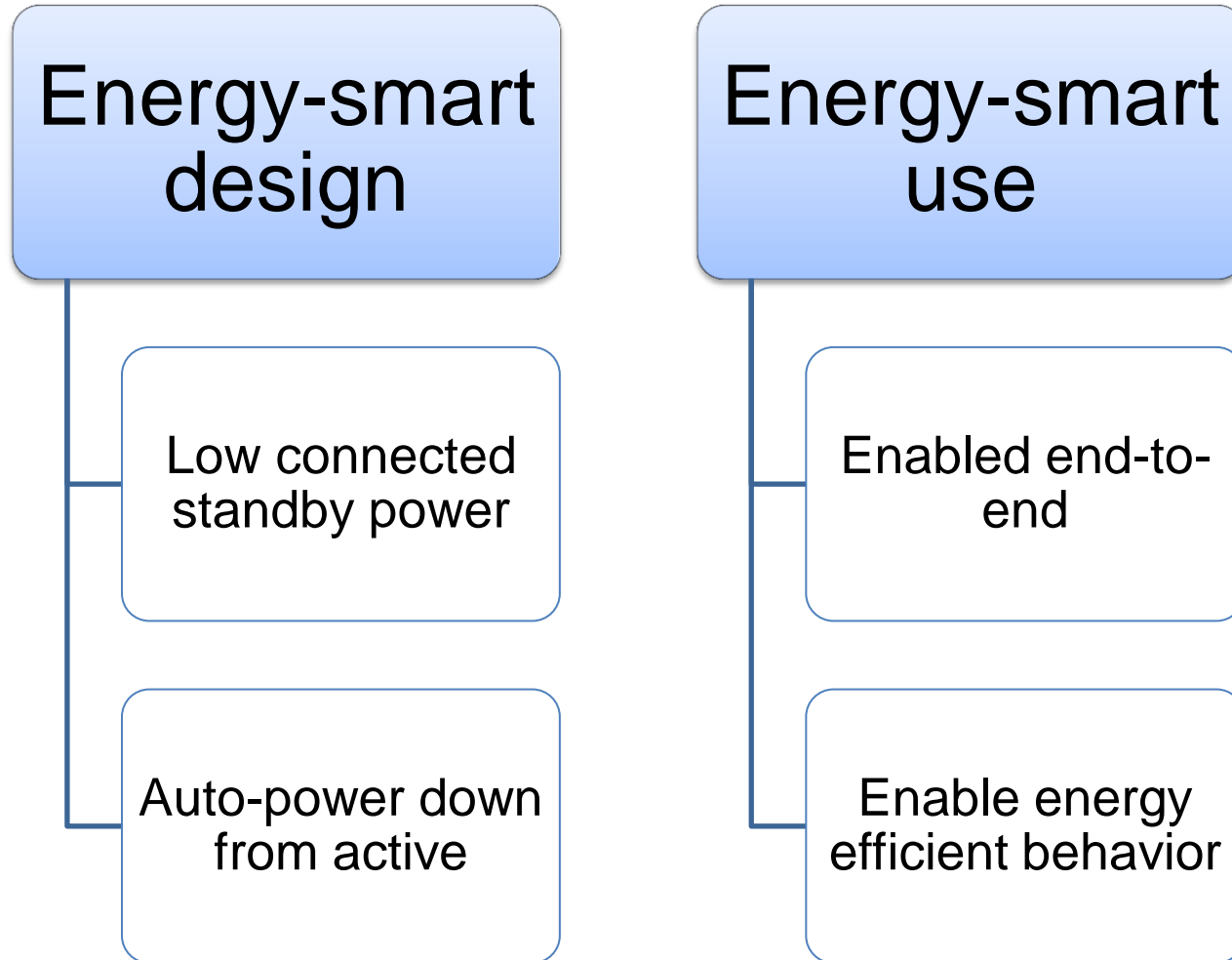
Energy use of hypothetical smart LED bulb



Hypothetical power draws and duty cycle, for illustration purposes only

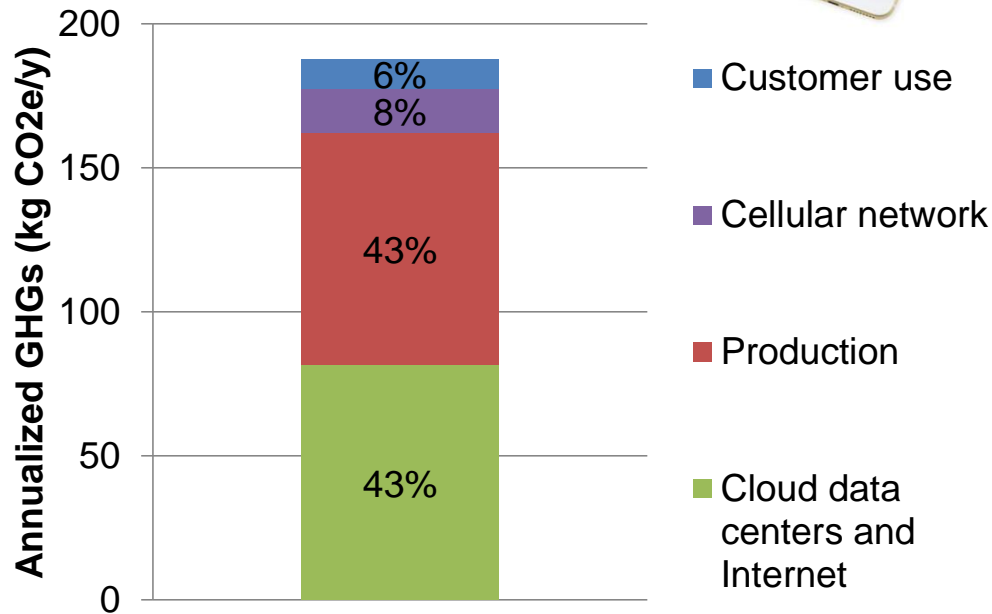
- IOT devices can use more energy Off than On
- Two key low-energy design opportunities:
 1. Low-power connected standby
 2. Minimize active time

Energy-smart design AND use



Under the hood of IOT

Lifecycle GHGs of Smart Phone *



(*) Hypothetical example for illustration purposes, varies depending on use. Sources: Goldstein D., Delforge P., ACEEE 2015, Apple (production, use), Koomey J. (network use), Google (cloud).

- IOT impacts beyond use phase
- Manufacturing supply chain:
 - Raw material
 - Production
 - Transportation
- “Data supply chain”:
 - Cloud data centers
 - Internet and cellular network

IT enabling effect: benefits and impacts

	Benefits	Impacts
Industrial efficiency	Real-time process optimization	Enhanced fossil fuel extraction and use
ecommerce	Dematerialized stores	Increased gadget sales and natural resources use
Driverless cars	Electric taxis	Sprawl incentive

- Public policy ultimately determines whether technology is used for net positive or net negative impacts

Summary

- ❑ IOT / Intelligent Efficiency critical for transition to low-carbon society
- ❑ But much remains to be done for IE's environmental promise to be realized
- ❑ IOT devices need to be designed and used to consume the least energy possible
- ❑ Public policy needs to guide the enabling effect to uses that benefit society

