

Consumer electronics and energy demand

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I. The totality of devices matters

- Households tend to own more devices: more of old (e.g. TVs) plus new (e.g. tablets).

- 2013 in U.S.:

31 devices/household

167 TWH

12% of residential electricity consumption

- 2010 in U.S.

25 devices/household

193 TWH

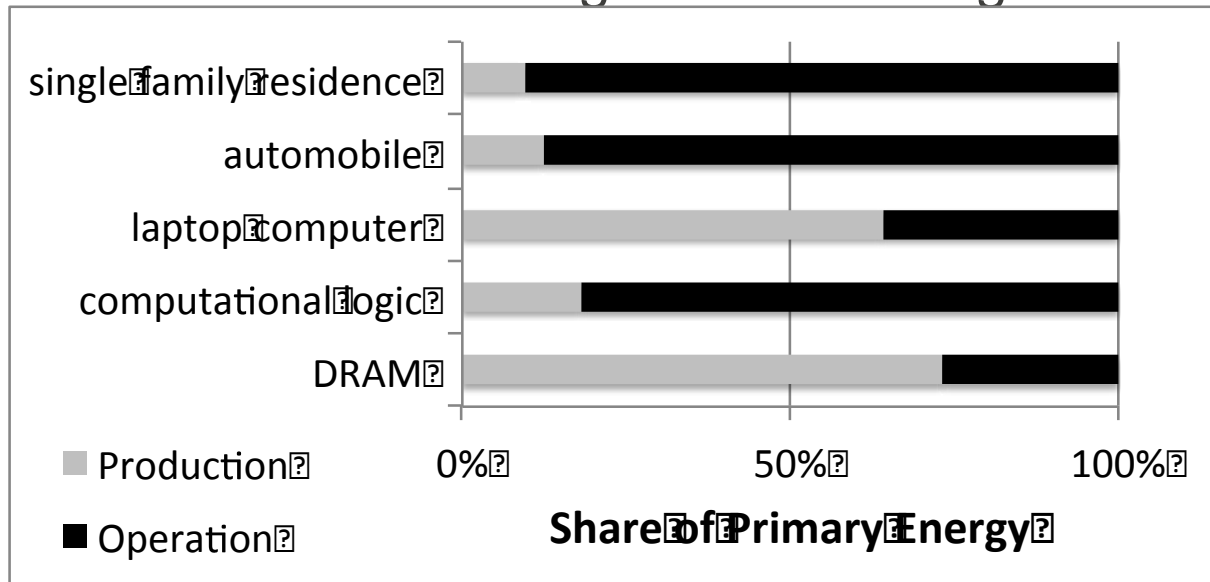
13% of residential electricity consumption

- Direct energy use: efficiency improvements > increased ownership

Source: Roth et al,
Energy Consumption
of CE in U.S. Homes
(2013, 2010)

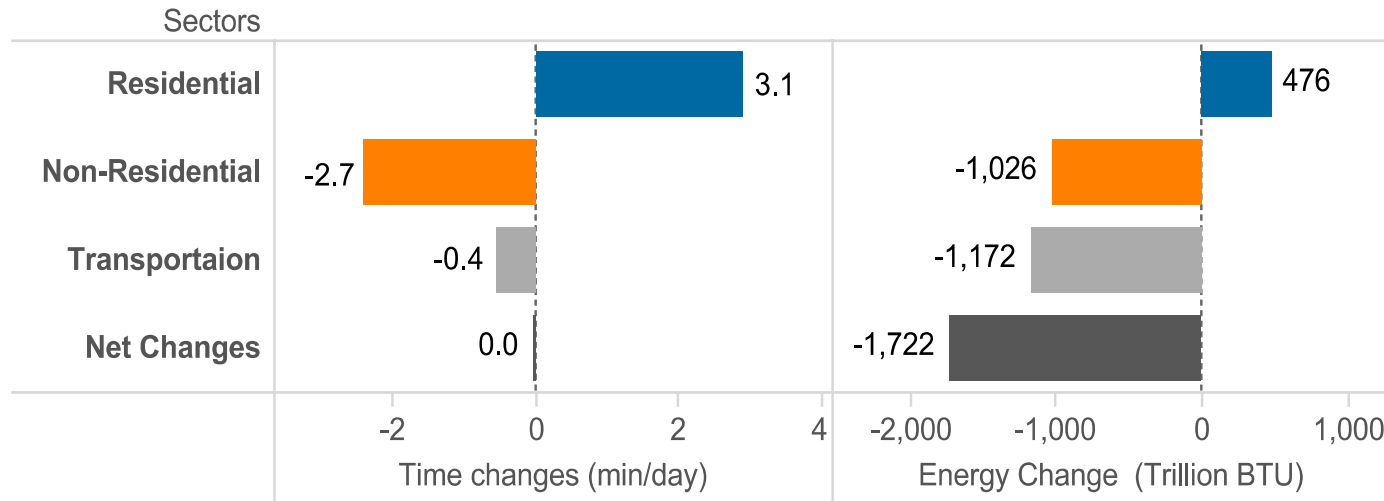
II. The life cycle matters

- For many devices with a plug, operation dominates over production in life cycle energy.
- But production phase can be significant for consumer electronics because:
 - energy overhead of purification and high spec materials/parts
 - Short lifespans
- Annual CO₂ overhead of laptop ~ 80kg, refrigerator ~ 400 kg.



Source: Williams,
Environmental
Effects of ICTs,
Nature (2011)

III. Lifestyle trends matter



Source: Sekar, Williams & Chen, Decomposing the effects of time-use shifts on energy consumption, under review (2017)

▼ “Digital” lifestyle seems to entail:

- More time spent at home
- Less time driving and outside doing shopping/entertainment

▼ Lifestyle change reduces energy use, ~2% in U.S. from 2003-2012:

- Driving is most energy intensive activity
- Less retail and offices per capita

IV. Trends and drivers

▼ Energy impact per “device” (net energy ↓ -probably)”

- / Increased efficiency: energy ↓
- / Functionality (e.g. bigger screens): energy ↑
- / Miniaturization: smaller physical profile, energy ↓,
more purification: energy ↑

▼ Totality of devices (net energy ↓ or ↑)

- / Divergence- new applications and devices (IOT): energy ↑
- / Convergence: natural saturation, consolidation for convenience: energy ↓

▼ Lifestyle (net energy ↓?)

- / Using electronics for less driving/car sharing. Big ↓
- / Less shops/offices: energy ↓ if true
- / Other indirect factors

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