The energy and carbon footprint of the ICT and E&M sector in Sweden 1990-2015 and beyond

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Abstract

“Decoupling” has stricken the ICT and E&M sector in Sweden! Despite exponentially increasing data volumes and usage, CO2 emissions and energy consumption decreases (2010 – 2015)!

The trend of decreasing energy and carbon footprints is estimated to continue until 2020. Further on its not yet possible to estimate.

Sweden is among the leading ICT countries globally. It can be expected that development will follow a similar path in other ICT mature countries. The last statement can be seen as verified in a new global ICT & E&M study (not yet published).
"When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the stage of science."

(William Thomson, Lord Kelvin, 1824-1927)

In short: What get's measured gets done
Scope

ICT sector

User equipment
- Older phones
- Fixed cordless phones
- Mobile phones, smartphones and tablets
- Routers, modems
- CPE (customer premises equipment)
- Desktop and laptop PCs
- IPTV (TV + STB)

Access networks

Operator activities
- Including the operator’s data centers
- Control and core nodes
- Offices and stores travel and vehicles
- Global Internet

Data transmission and IP core network

Enterprise networks and data centers

ICT service providers

User equipment
- Business PCs and office equipment

E&M sector

TVs, TV peripherals, TV networks
Other consumer electronics
Paper media
ICT services and E&M content production
A typical Swede possess in average...

1 PC (most PCs are laptops used in homes)

1.5 mobile phone (mainly smartphones)

0.5 Tablet

0.7 TVs

...and have the highest data traffic in the world
Swedish key data and trends

- **Telephone lines**
  - 2010: 5M
  - 2015: ...of which is VoIP

- **Fixed broadband**
  - 2010: ...of which is fiber
  - 2015: 5M

- **Mobile phone sales**
  - 2010: 5M
  - 2015: ...of which is Smartphones

- **PC sales**
  - 2010: 5M
  - 2015: 5M

- **TV sales**
  - 2010: ...
**Swedish key data and trends**

Facebook data center

Data traffic

ICT sector use - energy consumption

- Primary energy footprint (GWh)
- Data centers
- User equipment
- Other operators
- Other energy
- Network electricity
- Telia, measured

Graphs showing data trends and comparisons over time.
Use behavior and trends

› Usage “moves” to smaller and more energy efficient devices/platforms
  – from desktop PCs to laptop PCs
  – from TVs and PCs to tablets and smartphones
› The PSTN or “POTS (Plain Old Telephony System)”
  – Are being decommissioned but more energy can be saved
› Amount of ICT and E&M scrap is now decreasing
  (Sweden has the highest recycling rate of electronics)
Life cycle impact, based on LCA

Devices/platforms energy consumption and embodied footprints are improving constantly – Kaizen!
Results: Total carbon footprint - Sweden
Results: Total carbon footprint - Sweden

Scenario with global electricity mix instead of Swedish mix

Data traffic

E&M sector

ICT sector

Data traffic
The new research scope – the globe!
The global perspective: A new global ICT and E&M study
(Not yet published)
Global ICT sector trends:
Electricity consumption vs data traffic
(Not yet published)
“Decoupling” has stricken the ICT and E&M sector in Sweden! We see an exponentially increasing data volume and usage, still a CO2 emission and energy consumption decreases (2010 – 2015)!

The trend of decreasing energy and carbon footprints is estimated to continue until 2020. Further on its not possible to estimate. The added footprints from IoT is estimated to be rather small in the near by future.

Sweden is among the leading ICT countries globally. It can be expected that development will follow a similar path in other ICT mature countries. The last statement can be seen as verified with the new global ICT & E&M study (not yet published).
Thank you!

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