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Digital Net Zero – Mapping the challenge

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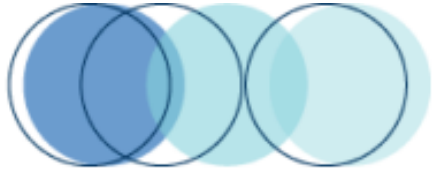
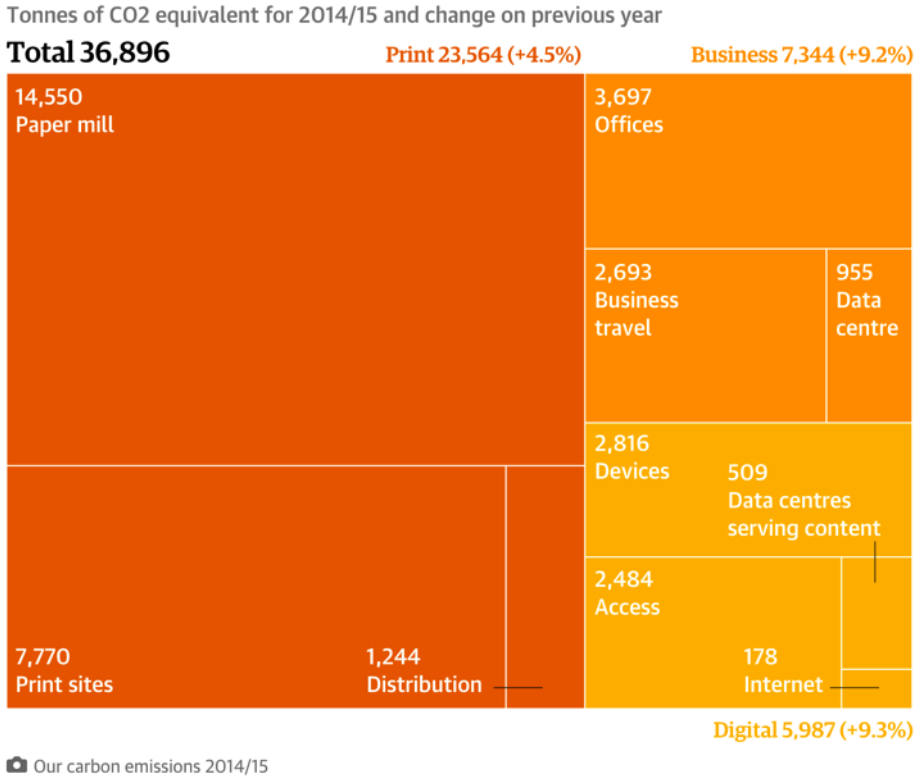
BIG
Bristol Interaction Group

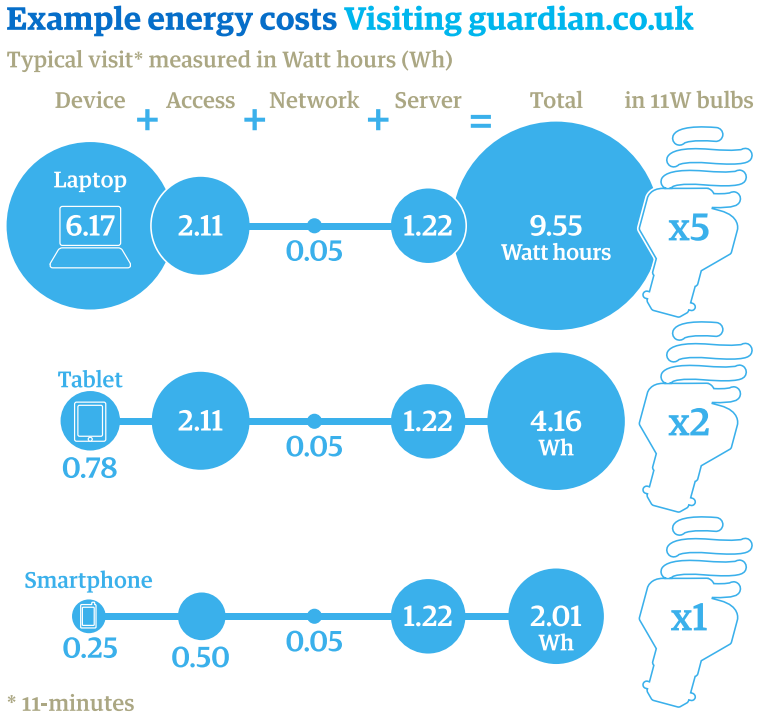
SYMPACT



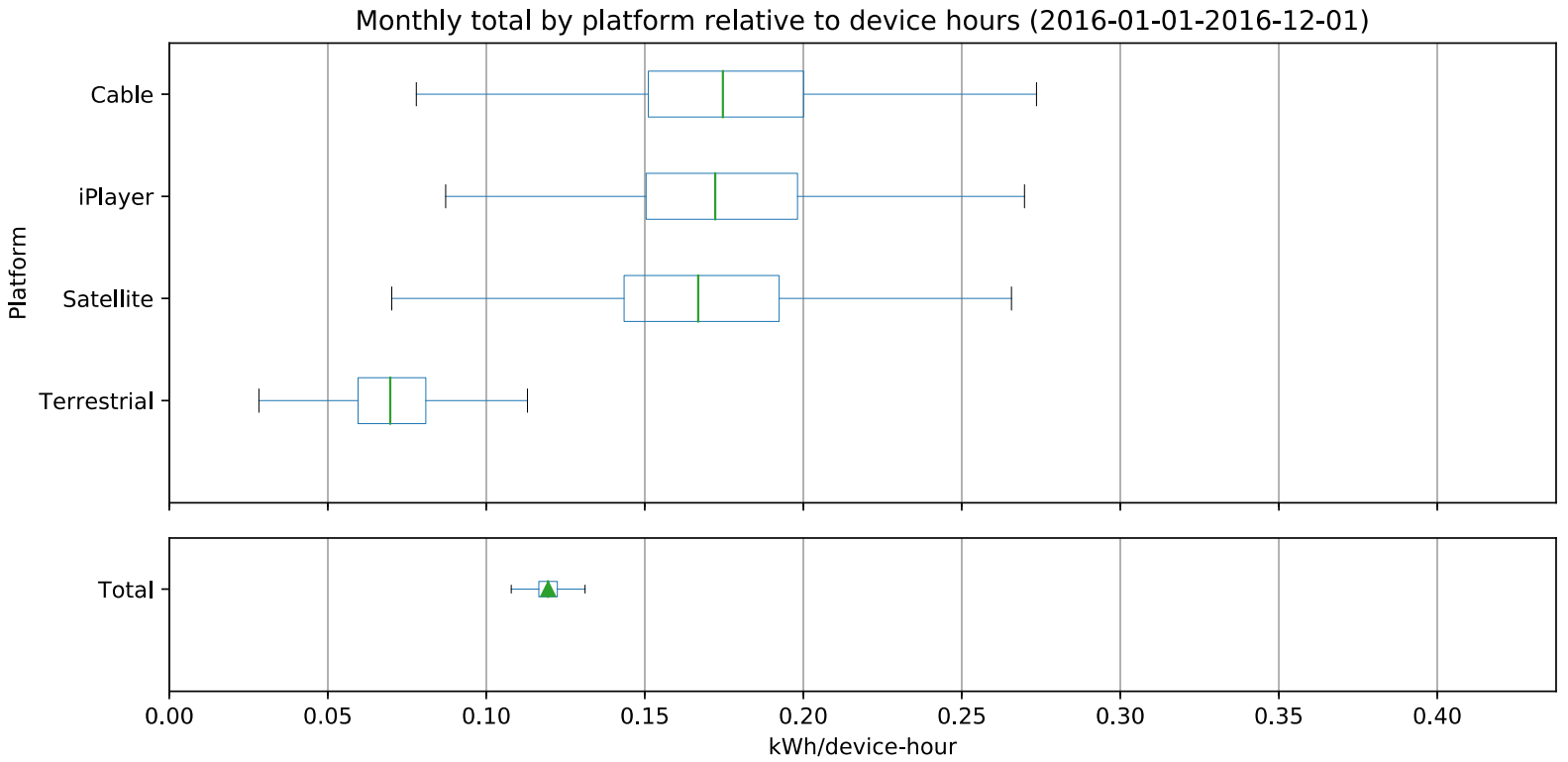
- Modelling environment for the end-to-end assessment of digital services.
- Highly detailed, with Monte-Carlo modelling of uncertainty.
- Allows the modelling of a diversity of behaviours within the user population.
- Rich dataset – integrated with online sources (eg EnergyStar).
- Integrated with analytics systems to incorporate actual user behaviours.
- Visual dashboards. Can be used in real-time.
- ‘What if’ analysis, including long-term future scenarios based on changes in tech and behaviour.

Footprinting The Guardian





BBC Electricity use per device-hour



DIMPACT

Insight to action on digital carbon impacts

BBC

BT

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carnstone partners ltd

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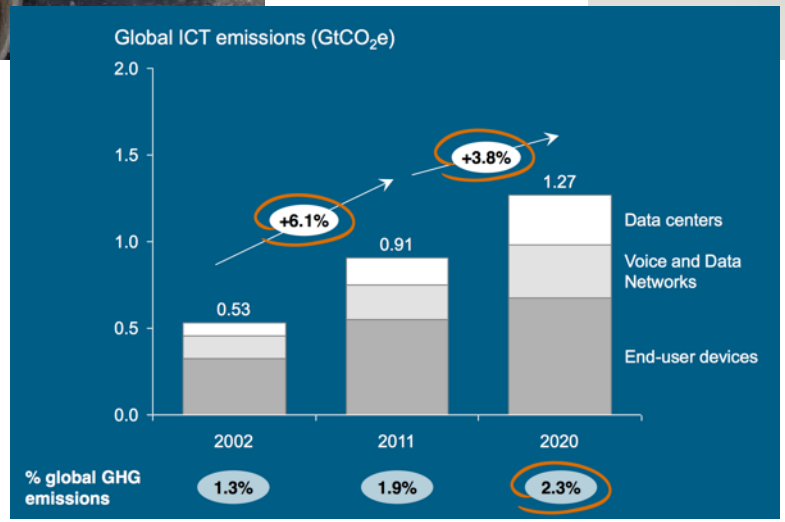
quiet science web applications

The Direct Environmental Impacts of ICT



(From SMARTer2020 report – GeSI 2013)

Net Zero – The Challenge

- Decarbonise energy supply.
- Use less energy – particularly at times of peak demand.
- Reduce Upgrade Cycles.
- Decarbonise mining and manufacturing.
  - PFCs
  - China
- ‘Circular Economy’ and clean up disposal.

ICT Energy Use – The Big Picture

- Malmodin et. al. estimated usage in 2020.
- Used a combination of official statistics, sales and market size data, and device power use data.

- ICT accounted for 859 TWh of electricity use – about 4% of the world's total usage.
- Of this, data centres account for 230 TWh.
- Networking (including Enterprise): 282 TWh – Mobile, Edge and Access dominates
- User Devices (not TVs): 353 TWh

Total emissions (including manufacture): 690 Mt CO_2e – roughly 2.3% global emissions.

Malmodin, J., Moberg, Å., Lundén, D., Finnveden, G. and Lövehagen, N. (2010), Greenhouse Gas Emissions and Operational Electricity Use in the ICT and Entertainment & Media Sectors. Journal of Industrial Ecology, 14: 770–790.

- Updated figures for 2020 provided in https://arxiv.org/pdf/2102.02622.pdf

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5G networks ‘can be up to 90% greener than 4G systems’

Nokia and Telefónica note as data traffic exponentially rises, 5G networks will need to be equipped with a number of sustainable hardware and software features to keep related emissions as low as possible

Jonny Bairstow

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Thursday 3 December 2020

Image: Shutterstock

5G networks can be up to 90% more energy efficient per traffic unit than existing 4G systems, suggests a new study from Nokia and Telefónica.

Efficiency is not enough…..

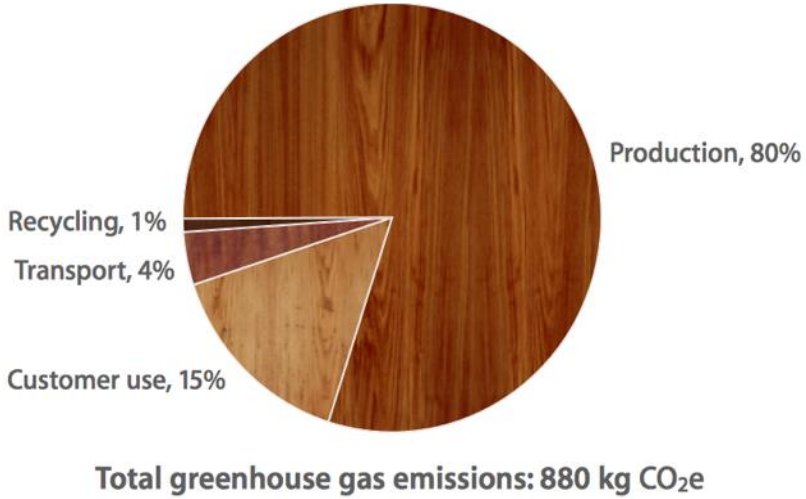
- Finds ways to make use of more bandwidth.
- Encourages the spread of infrastructure (within homes and cities) to allow service access. Ambient, Ubiquitous….
- Encourages the upgrading of devices.
- Encourages multiple devices? (Alternate affordances)
- Promotes a move from collective to personal experiences

Use vs Embodied Emissions

- Historically, electricity use dominated embodied emissions
- For user devices, no longer true:
  - Efficiency improvements (and grid decarbonization)
  - Low power standby

  So Device Ownership Patterns important
- For infrastructure….?

15” Macbook Pro with Retina Display



Assessing a new technology/deployment….

- Absolute usage, not efficiency:
  - How will the energy use change per person/connection/service?
  - How will the power demand at peak times change?
- Infrastructural change:
  - What new infrastructure will be needed? What can be retired?
  - Can several be integrated? (cf STBs)
- Induced Demand:
  - How might it change User Device ownership patterns?

One technology, meshed….?

- In the home, networking uses more energy than compute devices.
- Always on, and used far below capacity.
- Overlapping (Neighbours, Mobile)
- Is a better solution possible? (Energy plus Embodied)

Reducing upgrade cycles…..?

- ‘Thin Client’ phone screen
- Mobile Connection
- Cloud and Edge Computing to provide functionality

Digital Living within Planetary Boundaries ?

Thank You!



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