

TORINO, 12 - 16 NOVEMBRE 2018

CONTRADDIZIONI E SFIDE CONTRADICTIONS AND CHALLENGES



Quale evoluzione per le reti di telecomunicazioni: numeri e sostenibilità

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SCIENCE AND THE FUT

Moving bits instead of atoms

ICT has a positive role in reducing energy (resource) consumption

- e-activities instead of traditional ones
- intelligent transport systems
- consumption monitoring and management
 - control and improvement of energy distribution

Estimated energy saving through ICT, in % per sector and in total

- Manufacturing: 25-30% (total 7-8%)
- Transport: 26% (total 8%)
- Buildings: 5-15% (total 2-6%)

Source: Ad-hoc Advisory Group "ICT for Energy Efficiency" of the European Commission DG INFSO, 2008.







... but what about ICT as a consumer?

ICT sector is also a great consumer!



"ICT alone is responsible of a percentage which vary from 2% to 10% of the world power consumption."



"Electricity demand of ICT is almost 11% of the overall final electricity consumption in Germany."



"ICT sector produces some 2 to 3% of total emissions of greenhouse gases."



ICT sectors: which is responsible?



All sectors of ICT are involved

*Source: "*Optimizing energy consumption for data centers," H.Rong, H. Zhang, S. Xiao, C. Li, C. Hu, Elsevier Renewable and Sustainable Energy Review, 58(2016), 674-61.



Access networks

- It is estimated that
 - there are 7 millions of sites (several BSs each) worldwide
 - their power supply can reach 80% of operational costs for mobile operators







Data centers

- In US alone, 90 billion kWh a year, more than 30 giant plants (500+ MW)
- 3% of total electricity
- Doubles every 4 years

Source: R. Danilak, "Why Energy Is A Big And Rapidly Growing Problem For Data Centerss", Forbes, 15/12/17





Is ICT sustainability an issue?

According to recent estimates, ICT industry

- generates about 3% of emissions today
- might generate up to 14% emissions by 2040

Source: Lotfi Belkhir, Ahmed Elmeligi, "Assessing ICT global emissions footprint: Trends to 2040 & recommendations", Elsevier Journal of Cleaner Production 177 (2018) 448-463 ICT Global Carbon Footprint wrt Total WW footprint





The expected growth of electricity demand (and emissions) is due to the data tsunami



The expected growth of electricity demand (and emissions) is due to the data tsunami







Source: Cisco VNI, 2017



The expected growth of electricity demand (and emissions) is due to the data tsunami

Internet traffic triples in just 5 years!



Source: Cisco VNI, 2017



The data tsunami is due to a number of reasons

more people connected also in developing areas





The data tsunami is due to a number of reasons

popularity high-rate multimedia applications

Video CAGR: 31%



Source: Cisco VNI, 2017



Source: Cisco VNI, 2017



Data tsunami: connected devices

The data tsunami is due to a number of reasons

- traffic generated by several connected machines
- robots and digitalized systems producing huge amounts of data



Huge numbers!

Source: Statista, www.statista.com



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- Sustainability calls for new energy generation principles: need to use renewable energy sources
- Need for a joint design of ICT system and their power supply •









- Sustainability calls for new energy generation principles: need t renewable energy sources
- Need for a joint design of ICT system and their power supply







- Strategic for emergency situation → Power grid not available
- Strategic for emerging countries → Power grid unreliable





What to do?

- Strategic for emerging countries
- There already are more than 1 million base stations that operate off-grid or under bad grid conditions
- Most of them powered by diesel generators

Source: "Green Power Design Approach and Feasibility Analysis," Green power for Mobile Technical White Paper, Aug. 2014.





What to do?



- Policy making and regulation for inducing/incentivating to
 - adopt of sustainable technologies and practices
 - reduce device turnover and manage device end-of-life
 - reduce consumption and waste through infrastructure sharing
 - reduce unneeded information delivery (e.g., advertizement)
 - promote awareness and consumer attitude change







- Move to a more energy-aware attitude, several possible actions
 - choose less demanding services (not necessary worse)
 - monitor consumption and reduce unneeded consumption
 - contribute to data collection
 - take conscious choices as a consumer
 - users in the loop



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Grazie per l'attenzione / Thank you

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