


ITU-CITET Regional Training Workshop on ICT and Climate Change Mitigation and Adaptation in Arab Region
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Session 5: ICT Service Provider Strategies

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Session Objectives

To Discuss:


- How Telecommunications/ICT service provider equipment impacts GHG emissions
- How Telecom Services Providers can improve energy efficiency of IT equipment
- How adopting new technologies and services has an impact on energy consumption





Warm-up Exercise with Flip Chart/Power Point (2 minutes)

Why do you care about the energy efficiency of your telecommunications service?

- Your Answers
- 1)
- 2)
- 3)




To start:
How Telecommunications/ICT service provider equipment impacts GHG emissions




GHG Emissions by Economic Sector

www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary_for_policymakers.pdf



Why should telecommunications and IT service providers be concerned about climate change? #1

- Use of energy
 - Fossil fuels are burned in power stations releasing carbon dioxide (CO₂) into the atmosphere
 - This is the key human driver of climate change
- Reducing energy consumption
 - reduces emissions
 - saves cost



Why should telecommunications and IT service providers be concerned about climate change? #2

- Use of energy
- Mitigation
 - Reducing emissions reduces the CO₂ emitted into the atmosphere
 - Use of alternative energy sources (than fossil fuels) reduces emissions to the atmosphere
 - Solar, wind, tidal etc.

7

Why should telecommunications and IT service providers be concerned about climate change? #3

- Use of energy
- Mitigation
- Adaptation
 - Telecommunication infrastructure
 - is subject to the effects climate change
 - It may need upgrading to allow for more frequent risks
 - can be used to provide a 'sensor layer network' to provide useful information on the effects of CC on its own and for other public services

8

**Next:
Energy Efficiency of ICTs
(and how to Improve it)**

10

Scope

- ICTs' own utilisation of energy
 - and its contribution to climate change
- What ICTs can do to tackle climate change
 - in terms of energy efficiency, mitigation and adaptation
- The role of ICT standards
 - will be covered by Nevine

10

Types of ICTs

ICTs cover a wide range of technologies for gathering, storing, retrieving, processing, analysing and transmitting information in digital form, including:

- Telecommunications Equipment (e.g. switches, routers, mobile base stations)
- IT Equipment (e.g. Cloud Servers)
- Personal devices (e.g. TVs, laptops and iPads)
- Power supplies to telecom infrastructure (e.g. towers)

What impact do these have on GHG emissions?

Source: <http://www.ict.ac.uk/ict/136725.pdf>

11

Energy footprint of ICT

- The energy footprint of ICT is still growing due to wider use of ICTs in a range of economic sectors, even if the energy consumption of individual devices is reducing.
- Large installations of ICT for the implementation of e.g. Smart Grids and e-services will further increase emissions.

According to Gartner in 2007 the global (ICT) industry accounted for approximately 2% of global carbon dioxide (CO₂) emissions energy footprint of ICTs.

12

Important Questions for the ICT sector regarding Energy Efficiency

- How do Telecom and Internet Service Providers and equipment manufacturers assess their carbon footprint and set targets for reduction?
 - if they do!
- How are they improving the energy efficiency of their equipment and services and what more could they do in the future?
- How will next generation networks reduce energy consumption?
- What is the role of the supply chain in improving energy efficiency?

13

Mitigation and Adaptation in Future Networks

- Future Networks are reducing energy consumption through:
 - a decrease in the number of switching centres,
 - a more tolerant climactic range for future equipment,
 - use of more advanced technologies such as G.lite, VDSL2 and PONs.
- Future network providers and manufacturers should commit to reducing power consumption by:
 - maximizing network capacity,
 - improving IP systems, reducing energy requirements of VoIP services and multimedia applications while maintaining the best QoS and QoE for end user,
 - reducing the number of electronic devices required in order to reduce emissions from the manufacture and distribution of devices,
 - reducing the overall consumption of energy in data centres and developing energy efficiency servers,
 - monitoring power consumption in network devices to enable most efficient use.

Source: ITU-T Technology Watch Report 7 "NGNs and Energy Efficiency"

14

Energy Efficiency: What issues should be addressed in coming years?

- Use of higher voltage to power telecom infrastructure more efficiently-avoiding heating losses in the power lines
- Use of renewable energy
- Increasing transmission rates are needed to keep up with Moore's Law
 - The challenge is to do this without increasing the energy required by terminal devices.
 - Transmit only information bits with nothing during idle periods.
 - Make the transmission equipment more energy efficient.
 - Minimise the need for electronic processes running at full transmission rate.

15

Broadband Modems Bit-rate and power consumption over time

Can we increase speed while saving power?

Source: www.itu.int/en/ITU-T/standard/com15/Documents/tutorials/tutorial_2005_10_26_faulkner.pdf

16

Which stakeholders are involved in improving energy efficiency?

Most important are the policymakers:

- National , regional and local governments

Regulators-implement policy

- Telecoms/ICT regulators, e.g. Ofcom for UK.
- Energy regulators, e.g. Ofgem for UK.

Service Providers-have licenses and obligations set by the regulators

- Telecoms Service Providers, e.g. BT.
- IT Service Providers, e.g. Apple, Microsoft, Google.

Users:

- Need to question the energy consumption of each item of equipment purchased.

17

How policy makers and regulators can encourage energy efficiency

Policy Makers and regulators can play an important role in reducing energy consumption and GHG emissions by (examples):

- Incorporating energy efficiency as a regulatory strategy.
- Setting energy efficiency targets, e.g. UK Climate Change Act 2008.
- Putting in place a policy for infrastructure sharing in both fixed and mobile networks.
- Permitting different site sharing tariffs to be levied when renewable or battery power is provided.
- Moving from a passive to an active mobile base station site sharing policy.
- Looking at how the move to a 5G mobile network architecture will impact on the provision of renewable energy to BTS sites.
- Adopting and promoting Green ICT standards.

18

Examples of Sustainability Reports

- BT Group Better Future Report - www.btplc.com/Betterfuture/
- Orange CSR Report - www.orange.com/en/responsibility
- Telecom Italia Sustainability Report – www.telecomitalia.com/it/en/sustainability/sustainability-report.html
- Verizon Sustainability Policy - www.verizon.com/about/responsibility/sustainability
- Vodafone India Sustainability Report - www.vodafone.com/content/dam/sustainability/2014/pdf/annual_sustainabilityreport_2013.pdf

19

Example: BT's energy use in UK

Year	Energy Use (GWh)
2011	2,756
2012	2,675
2013	2,600
2014	2,515
2015	2,402

www.btplc.com/Sharesandperformance/Annualreportandreview/index.cfm

20

Infrastructure Sharing

- Should a TSP be using active or passive sharing for BTS sites?

(Passive) Mast Sharing and (Active) Mast and Antenna Sharing

21

Using renewable energy sources

- In developing countries, around 30% [1] of GHG emissions from a mobile TSP comes from use of diesel (or other fossil fuel powered) generators
 - where there is no connection to the electricity grid or
 - where it is unreliable and may supply electricity for only 8 hours per day.
- To overcome this, Renewable Energy Technology (RET) can be used to power mobile BTS at local level. Options include:
 - Solar PV
 - Wind
 - Biomass
 - Fuel Cell & Hybrid combinations
- Typical power consumption ranges from 1-3kW depending on whether air conditioning is required but 50% of this power can be saved by switching off base station functions depending on traffic conditions, for example at night time and weekends when traffic loads are lower.
- Estimated that more than 84,000 RET platforms will be in use by 2020.

[1] www.gsma.com

22

Solar PV and wind turbine powering mobile BTS in Qatar

23

Recommendations to Service Providers

- Identify all items of equipment (including home equipment) and its energy consumption and collect data
- Set benchmarks and targets for reductions.
- Work with suppliers to reduce energy consumption of network equipment.
- Share infrastructure with other service providers to reduce costs as well as energy consumption.
- Use as much renewable energy as possible to reduce GHG emissions.
- Help to develop global standards including methodologies to assess the impact of ICTs on climate change.

24

Interim Summary

- There are a number of ways to make ICTs more energy efficient and these should be employed as appropriate.
 - using the relevant standards.
- TSPs should assess the energy consumption of their networks and home equipment and set benchmarks and targets for reductions.
- Policymakers and regulators should ensure that sufficient incentives are in place to drive energy efficiency in TSP networks.

Next
Where do Telecommunications Service Providers (TSPs) fit in the value chain?

Example of an ICT supply chain

How you can influence emissions

Users may choose between TSP1 and TSP2 according to their carbon footprint. Information about this can be seen in their sustainability report; if they publish one

How TSPs can influence emissions

TSPs may choose between Suppliers according to their carbon footprint. Information about this can be seen in their sustainability report; if they publish one.

Green competition?

- TSPs are competing on a basis of service types and quality, price, and **green credentials**
- Both users and TSPs may wish to look for greener suppliers
- This applies all the way down the value chain to raw materials

Next
How to estimate what the power consumption of a telecommunications device should be?

- an example of best practice from the European Union

31

VDSL Example from-EU Codes of Conduct
Energy Consumption of Broadband Communication Equipment V5

Table 16: Broadband ports – DSL-full-load-state (with service traffic on the lines as specified in Table 7)

Power targets for DSL-full-load-state	Tier 2013-2014 (1.1.2013-31.12.2014) (W)	Tier 2015-2016 (1.1.2015-31.12.2016) (W)
VDSL2 (profile 8b) transmission power 19,8 dBm	1,6	1,4
VDSL2 (profile 12a and 17a) transmission power 14,5 dBm	1,5	1,3
VDSL2 (profile 30a) transmission power 14,5 dBm	1,7	1,5

• More on this in Session 7...

http://net_jrc.ec.europa.eu/energyefficiency/ict-codes-conduct/energy-consumption-broadband-communication-equipment

32

ITU's Recommendation

- To reflect the first and second order effects, ITU has developed the ITU-T L.1410 **Methodology for environmental life cycle assessments of information and communication technology goods, networks and services**
- The standard is divided into two parts:
 - Part I (clauses 5-10) – ICT life cycle assessment: framework and guidance. This part deals with the LCA methodology applied to ICT goods, networks and services.
 - Part II (clauses 11-14) – Comparative analysis between an ICT product system and a reference product system (baseline scenario): framework and guidance. This part deals with comparative analysis based on LCA results of the ICT goods, networks and services product system and the reference product system. environmental assessments through a life cycle assessment (LCA)

Source: ITU-T(2014, pp vi-Viii) <https://www.itu.int/rec/T-REC-L.1410-201412-1/en>

33

When to replace a product? #1

• Is there ever a positive energy benefit?
 • the lines may not cross over the lifetime of the product

Source: ITU-T Focus Group on ICT and Climate Change teleconference 8 Oct 2008

34

Interim Summary

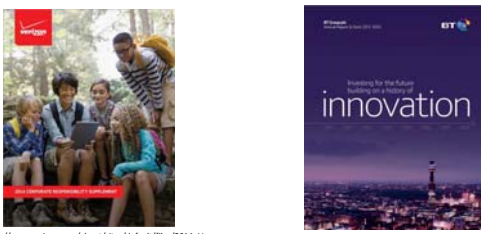
- When choosing between one equipment supplier green credentials are becoming increasingly important. Examples include:
 - Power consumption of the device
 - Sources of raw materials
 - Opportunities for recycling at end of life
- The European Codes of Conduct give examples of best practices (benchmark values) are for energy consumption of telecommunications devices (both wire-line and wireless)

35

Next:
How adopting new technologies and services has reduced energy consumption

36

Sustainability report examples #1



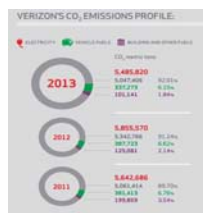
http://www.verizon.com/about/sites/default/files/2014_Verizon_Corporate_Social_Responsibility_Report.pdf

http://www.btplc.com/Sharesandperformance/Annualreportandreview/pdf/2015_BT_Annual_Report.pdf

37

Sustainability report example 2


• Note that Verizon's carbon footprint is decreased in 2013 (even though the 'pie' looks bigger)



http://www.verizon.com/about/sites/default/files/2014_Verizon_Corporate_Social_Responsibility_Report.pdf

38

BT Sustainability example



Global GHG emissions data*
 Year ended 31 March
 CO₂e Ktonnes

Year	Total gross emissions	Scope 1: combustion of fuel and operation of facilities	Scope 2: electricity purchased for own use	Scope 3: other indirect emissions
1997	1,723	137	3,097	1,549
2012	414	157	516	191
2013	421	190	194	137
2014	337	151	62	182
2015	421	178	65	142

BT claims a reduction in emissions (ktCO₂e) of 1.4% in year 2015.


• Note The purple metric is emissions per unit revenue normalised to 1997

39

Next:
IT service providers also have sustainability targets

40

Apple's 3 Sustainability Priorities




"Focus and simplify is one of our mantras. So, after deep reflection, data analysis, and conversations with stakeholders, we set three priorities where we believe Apple can make the most impact:

- Reduce our impact on climate change by using renewable energy sources and driving energy efficiency in our products and facilities.
- Conserve precious resources so we all can thrive.
- Pioneer the use of safer materials in our products and processes".

41

Apple: Lowering carbon emissions by focusing on aluminum



"We sell millions and millions of phones. So making even small adjustments to the production of iPhone can have a big impact. We discovered that changing how we make the aluminum enclosure could lower our carbon footprint.

We prioritized aluminum that was smelted using hydroelectricity rather than fossil fuels. And we reengineered our manufacturing process to reincorporate the scrap aluminum.

As a result, we cut the carbon footprint associated with the aluminum enclosure of iPhone 6s in half compared with the previous generation. And we're looking for new ways to use more carbon-efficient aluminum across all of our products".

42

The carbon footprint of the iPhone 6s aluminum enclosure was half that of the previous generation




43

**Next:
ICT service providers also help reduce emissions in other sectors**

25 YEARS

Example: Deutsche Telecom – Connected Car

- DT developed a Connected Car Solutions Suite for OEMs that can enable people to drive their cars more efficiently and sustainably.



45


Deutsche Telecom: Connected Car

- Your 'Connected Car' combines a range of smart driving solutions including
 - Eco-drive, a coaching system for optimizing driver behaviour;
 - Car2x, a real-time guiding system to anticipate the traffic environment;
 - E-Call, an automatic emergency contact system;
 - Live Traffic, a real-time information system on traffic jams and alternative routes.
- Connected Car solutions can reduce annual CO₂ emissions by 15.9% per car, save €237 per year from reduced fuel consumption and 23 hours per year through reduced time in traffic.
- 16% of all domestic traffic-related CO₂ emissions could be avoided, equal to 2% of all domestic CO₂ emissions.
- Reduced congestion and traffic jams through ICT-enabled safer and smarter driving would reduce asthma-related sickness days and as well as road accidents.

46

Example: BT – Smart Parking


- BT and Milton Keynes Council initiated a pilot to optimize parking spaces across the city.
- Milton Keynes Data Hub collects and analyzes parking sensor data sent to receivers on lampposts via innovative wireless technologies.
- Free parking spaces can be identified and information sent to roadside displays and smartphone apps to guide vehicles towards them.
- Sensors also provide data on average parking duration, allowing the city to adjust parking restrictions and better meet customer needs.
- There are usually about 7000 free parking spaces available, but without smart parking guiding people to them, at least 12,000 more spaces would be needed by 2020.
- Fully deployed, this ICT-enabled smart parking solution could provide capital savings of least £105 million to this city alone.
- The solution also contributes to 50% less traffic congestion and reduced fuel use and vehicle emissions.



47

Example: Verizon Networkfleet

- Verizon's GPS-driven Networkfleet solution is deployed across 2,500 Arkansas State Highway and Transportation Department (AHTD) vehicles.
- By reducing unnecessary idle time and miles driven, AHTD saved nearly \$500,000 in bulk fuel expenses in first year.
- Reduced maintenance costs and other operational efficiencies added to the total savings.
- Better tracking abilities enable the department to operate more proactively, allowing dispatchers to direct dump trucks, snowplows, and other vehicles to emergency situations faster.



48



Barriers to introduction of green technologies from a TSP perspective



- How much would it cost upfront to put these e-services in place?
 - how to pay for the large (and growing) use of data centres.
- How much revenue could be expected and over what period?
 - what would the RoI be?
- How to stimulate uptake to create a critical mass of usage (network effect)?
- What regulatory incentives / barriers are in place for the deployment of green ICT services?

49



Conclusion



- Telecommunications and IT service providers are concerned about energy efficiency and climate change because:
 - It affects their bottom line from the perspectives of costs and competitive position
 - It demonstrates a responsible attitude to sustainability both for the company's future and society
- TSPs have a role to play in both mitigation and adaptation to climate change from the perspective of an ICT service provider and from the perspective of its customers in other sectors.
- Sustainability reports provide a way of communicating the track-record of companies wishing to play its part in ensuring a sustainable future.

50



Further Reading #1



- Verizon '2014 Corporate Responsibility Supplement'
 - http://www.verizon.com/about/sites/default/files/2014_Verizon_Corporate_Social_Responsibility_Report.pdf
- BT "Delivering Environmental Benefits"
 - <http://www.btplc.com/PurposefulBusiness/BetterFutureReport/Downloads/Deliveringenvironmentalbenefitssummary.pdf>
- BT 'Annual Report and form 2015' pages 50 and 57
 - http://www.btplc.com/Sharesandperformance/Annualreportandreview/pdf/2015_BT_Annual_Report.pdf

51



Further Reading #2



- Philipson, G. (2010), 'Carbon and Computers in Australia: The Energy Consumption and Carbon Footprint of ICT Usage in Australia', Australian Computer Society (ACS). Available from <http://www.acs.org.au/index.cfm?action=show&conID=carbonandcomputers>
- ITU-T(2014) Series L: Methodology for environmental life cycle assessments of ICT goods networks and services, Rec.ITU-T L.1410 (12/2014) Available from <https://www.itu.int/rec/T-REC-L.1410-201412-I/en>
- Sala, S. (2010) "The Role of Information and Communication Technologies for Community-Based Adaptation to Climate Change", Food and Agriculture Organization of the United Nations. Available from <http://www.fao.org/docstore/mediapaper/2.pdf>
- Gholami, R, Watson, R, Hassan, H, Molla, A, Bjorn-Andersen, N. (2016) Information Systems Solutions for Environmental Sustainability: How Can We Do More. *Journal of the Association for Information Systems*, Vol. 17, August, pp. 308-323.

52

