

ITU-T

Energy Saving Checklist – An Overview of the Approach

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**WORKSHOP - ICTS AND ENVIRONMENTAL CHALLENGES OECD- DANISH MINISTRY
OF SCIENCE, TECHNOLOGY AND INNOVATION, NATIONAL IT AND TELECOM
AGENCY EIGTVEDS PAKHUS COPENHAGEN**



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- **Can it be directly applied to other sectors?**

Energy Saving-Why do we Care?

- **The Fourth IPCC Assessment Report has proposed a reduction of GHG emissions of 25-40 per cent below 1990 levels by the year 2020**
 - **This could be sufficient to keep the average global temperature rise below 2°C**
- **Even this may be insufficient to keep food production at current levels when regional and local climate variations are included**
- **The possibility of runaway global warming is not as distant a threat as we may wish***
 - **Dr. Hansen has said that a global tipping point will be reached by 2016 if levels of greenhouse gases like methane and carbon dioxide are not reduced.**

* <http://www.ens-newswire.com/ens/jun2007/2007-06-01-01.asp>

Climate Change, Peak Oil and Peak Coal

- **The good news for the climate (bad news for petrol-heads)**
 - **Oil cannot be extracted any faster***
 - **If it were down to oil alone, emissions would be capped at present levels and start to decrease**
- **The bad news for climate**
 - **Coal will be used as an alternative wherever possible**
 - **Coal may not peak until around 2032****
 - Dale Allen Pfeiffer-Writer and Graduate in Geology, Earth Science and Mathematics
- **Even worse news**
 - **Coal will not be able to support the kind of energy-intensive economy which we have built on oil and natural gas**..**
 - **..in this last mad burn-off of energy resources, we may very well incur the demise of life on this planet (with runaway warming)****

*<http://www.energybulletin.net/4716.html>

**http://www.fromthewilderness.com/free/ww3/072004_global_climate3.shtml

European Code of Conduct: what is it?

- Code of Conduct:
a voluntary commitment of individual companies, with the aim of reducing energy consumption of products and/or systems through the setting of agreed targets in a defined development timescale.
- Targets could expressed in maximum allowed power consumption for the different operational modes or based on indicators (e.g. W, KWh/m²) or benchmarking.
- Energy consumption levels are complemented by general commitments of power and energy management, switching off components not needed, and reducing energy consumption where possible.

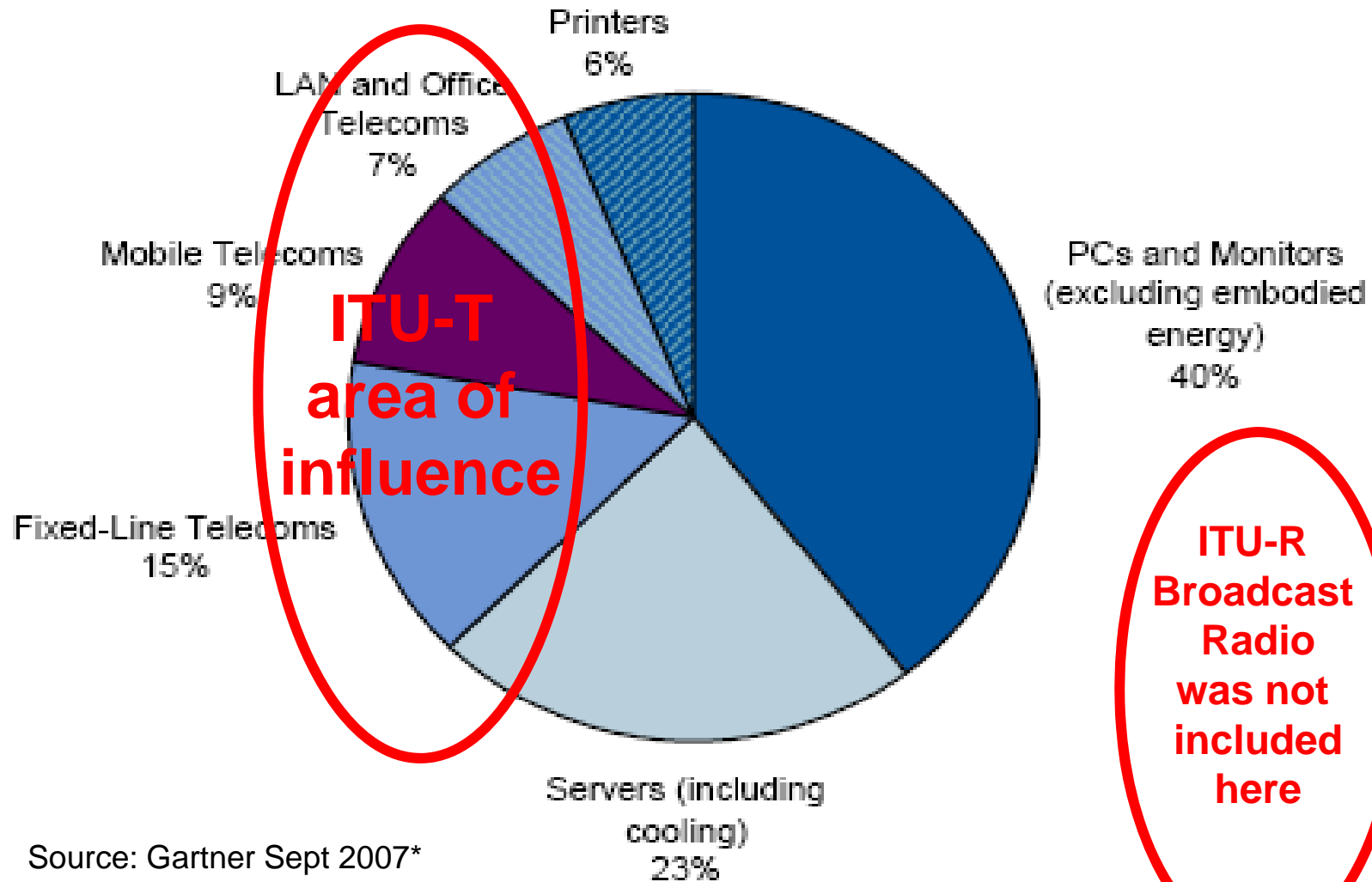
Presented by Paolo Bertoldi at ITU-T Power saving tutorials on 14 February 2008
<http://www.itu.int/ITU-T/studygroups/com15/tutorials/power.html>

European Code of Conduct: what is it?

- There are 4 Codes of Conduct in operation:
 - Digital TV Service Systems (set-top boxes);
 - External Power Supplies;
 - UPS;
 - Broadband Equipment;
- And one under development
 - Data centers

Presented by Paolo Bertoldi at ITU-T Power saving tutorials on 14 February 2008
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Estimated Distribution of Global Carbon Dioxide Emissions from ICT

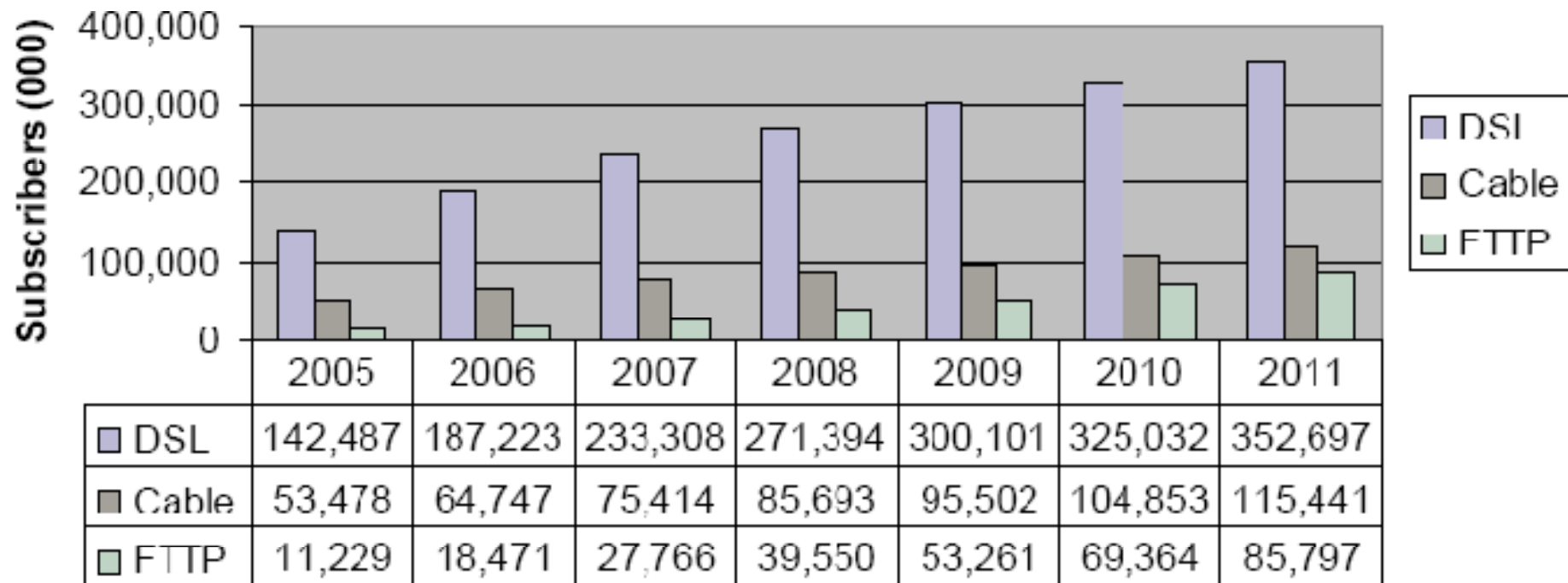


Source: Gartner Sept 2007*

* Rakesh Kumar and Lars Mieritz, "Conceptualising 'Green IT' and Datacentre Powering and Cooling Issues", Gartner Research paper ID number G00150322, 7 Sept 2007.

Broadband Subscriber Forecast

Global broadband subscribers forecast



Source: Lynn Hutcheson - Ovum

Year

www.Ovum.com

DSL and FTTP are within scope of SG15

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What is an Energy Saving Checklist?

- **A recently introduced concept in ITU-T**
 - **Similar to those you use for your houses, but applied at the design stage to broadband technologies**
- **A set of questions relating to energy saving in technology***
 - **It focuses on the technology detail to offer “tips and tricks” which will stimulate energy efficient thinking throughout the design, standardisation and purchase processes**
- **In our example in SG15 (broadband transmission) it is a tool for assessment of existing and new ITU-T Recommendations in the light of climate change****
 - **Intended to ensure that new Recommendations lead to an economic and more energy efficient solution**
 - **A step towards achieving GHG sustainability in the ICT industry**

*Ref. TSAG LS 30

**<http://www.itu.int/md/T05-SG15-080211-TD-GEN-0288/en>

What are the Benefits of Energy Saving in Telecommunications?

- Reduces the cost of energy
 - for operators or end-users.
- Reduces the carbon footprint
 - where electricity is sourced from fossil fuel
- Reduces the size and cost of backup battery/generator
 - to support lifeline services during power outage
- Low power makes new technology solutions feasible
 - such as line-powered remote nodes (e.g. fibre/xDSL)
- Mitigates GHG emissions in other sectors
 - e.g. travel

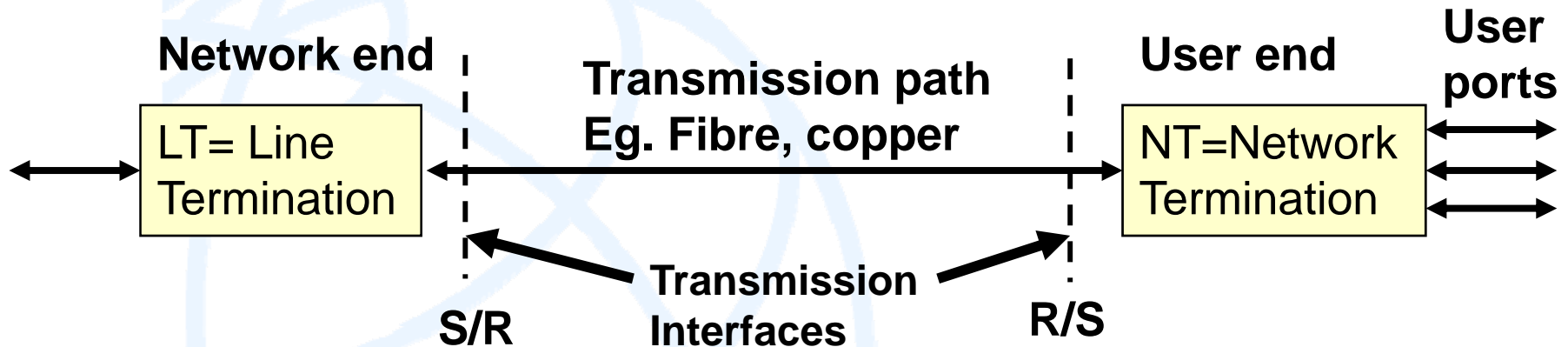
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Example Technologies which ITU-T is targeting for Energy Saving

- **Broadband Access Technologies**
 - **DSL (digital subscriber loop)**
 - **FTTH (Fibre to the home)**
- **Serve mass populations over the ‘final drop’**
 - **Hence have potential for large energy savings when considered worldwide**
 - **Consume typically 7-10 Watts per transmission pair**
 - **But are currently ‘always-on’ technologies - this is being addressed in ITU-T**

Broadband Access, Scope and limitations of ITU-T “Recommendations”



- **Focus is on transmission interfaces**
 - **Describing “the signals passing through”**
 - **But the “black boxes” at the ends consume most of the energy**
- **Liaison is needed with other bodies about devices**
 - **International standards bodies such as International Electrotechnical Commission (IEC)**
 - **Regional policymakers such as European Commission “Code of Conduct for Broadband Equipment”(EU/CoC)**

What is the power consumption of SG15 Broadband Access Technologies?

- **Power consumption of a modem pair per line (approximate without user ports)**
 - **ADSL 3 W (1.5W NT plus 1.5W LT)***
 - **VDSL 6.75 W (4W NT plus 2.75WLT*)**
 - **PON 3 W (2W NT including a 1/32 share of OLT@1W)**
- **User Ports typically add up to a further 5 W and include**
 - **Router/Firewall, 4 Ethernet, Wifi, and VOIP ports**
 - **Not standardised in ITU-T**
- **Currently these are ‘always-on’ technologies**

*http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative_broadband%20communication.htm

What are the broadband energy consumption trends?

- Broadband market likely to double in next 5 years
- Marketing and competition is driven by headline speed figures such as “Download speed is up to 24Mbits”
- The challenge is to reduce the energy consumption by more than half - every 5 years
 - to reduce the worldwide BB energy consumption
 - In the face of ‘the need for speed’

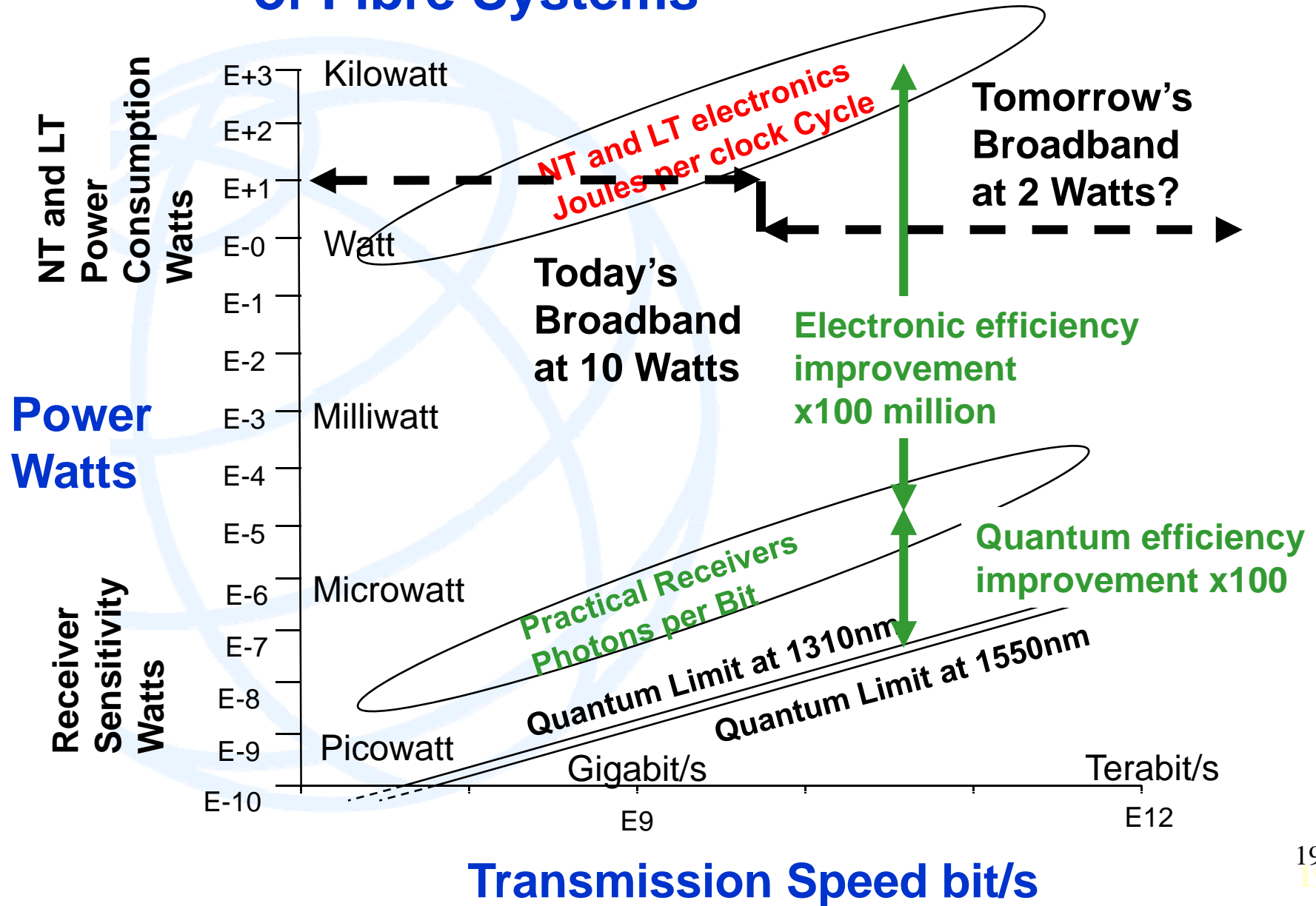
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How effective is it likely to be?

- **What follows is an illustration of what might be possible in the FTTH application**
- **The Checklist needs to exploit technology opportunities to achieve energy savings...**

Relationship between Power and Speed of Fibre Systems



What are the targets which the checklist attempts to achieve?

- We need to avoid doubling current emissions over the next 5 years
- This means both Fibre-to-the-Premises and DSL technologies
 - 8 Watts (per NT/LT pair) to less than 4 Watts
 - With more efficient electronics, a standby mode and lower power signals
- Other parts of the ICT sector need to do their bit to contain emissions at 2% of the total 16TW world energy consumption

How long will it take to implement?

- **New generations of equipment take 5 years to mature through development and standards (Recommendations)**
 - **Compliant with checklist**
- **We renew equipment every 6-13 years (via depreciation and obsolescence)**
 - **Change-out to lower energy equipment will take at least 13 years to complete**
- **This is an 18 year cycle**
 - **Climate change and its reversal appears to be much more urgent**
 - **All the time we muse on the problem, GHGs are accumulating**
- **To make more rapid improvements we need more direct action**
 - **Suppliers to use higher levels of integration (better chip design) to reduce power consumption**
 - **Consumers switching off devices when they are not being used -when out of office, when asleep at night**

How does Telecommunications mitigate energy consumption in other sectors-two examples?

- **Reduces the need for travel**
 - **Slows the rate of growth of travel (especially for businesses)**
 - **Not so good for pleasure (holidays)**
- **Reduces the need for printed paper**
 - **Especially in businesses where printers and photocopiers are no longer needed**

Some figures from industry

- **In 2006 NTT's ubiquitous broadband services achieved a CO2 reduction of 4.14 million tons, across the customer sectors**
- **This is larger than CO2 emissions of the entire NTT Group at 3.78 million tons**
- **Giving a net reduction of 0.36 million tons**

http://www.itu.int/dms_pub/itu-t/oth/06/0F/T060F0060080019PDFE.pdf (slide number 14)

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Example Questions- 1. General

- Does this ‘new technology’ foresee the development of devices that will require the consumption of fossil fuel power?
 - YES / NO
- Will the implementation of this ‘new technology’ change the fossil fuel power requirements?
 - YES / NO
- If **YES**, please assign an approximate score to the significance of this technology for climate change
 - based on the following assumptions concerning power consumption and market potential (see next Figure)

Categorisation of power consumption and market potential

	Power consumption per technology				
Market-Million devices in 10 years	Below 0.1 Watt	Up to 1 Watt	Up to 10 Watts	Up to 100 Watts	1 kWatt Plus
0-1M	A	A	B	B	C
1-10M	A	B	B	C	C
10-100M	B	B	C	C	D
100M-1B	B	C	C	D	D
1B+	C	C	D	D	E

Some possible examples from other sectors

- **New generation car**

- 'Electric car' replaces a typical family 'gas guzzler' of 100KW
- Uses an electric motor of 6KW (G-Wiz)
- Could be recharged at night using nuclear power (with no GHG emissions)

- **New generation plane?**

- Is an electric plane also feasible!!
This is just a demonstration model...
- Could this be scaled up to solve the massive problem of aviation?

Summary

- **The checklist has been introduced in relation to the ICT sector**
 - **A General Technical Document with useful metrics and tools**
 - **The challenge is to reduce broadband emissions by more than 50% every 5 years**
 - **Unfortunately new technologies take 5 years to mature**
 - **The first step will have to be achieved using better integration of existing technology or better consumer discipline such as switching the power off when it is not in use**
- **Mitigation is possible in other sectors**
 - **NTT claim a better than 1:1 result**
- **Can other sectors use the checklist model?**
 - **Yes we think so (e.g. houses, cars, planes)**

Thank You

For additional information, see
www.itu.int/ITU-T/climatechange

and

<http://www.itu.int/ITU-T/studygroups/com15/index.asp>