

GRUPPO TELECOM ITALIA

Efficienza Energetica

ANFoV - Milano - 4 Giugno 2009

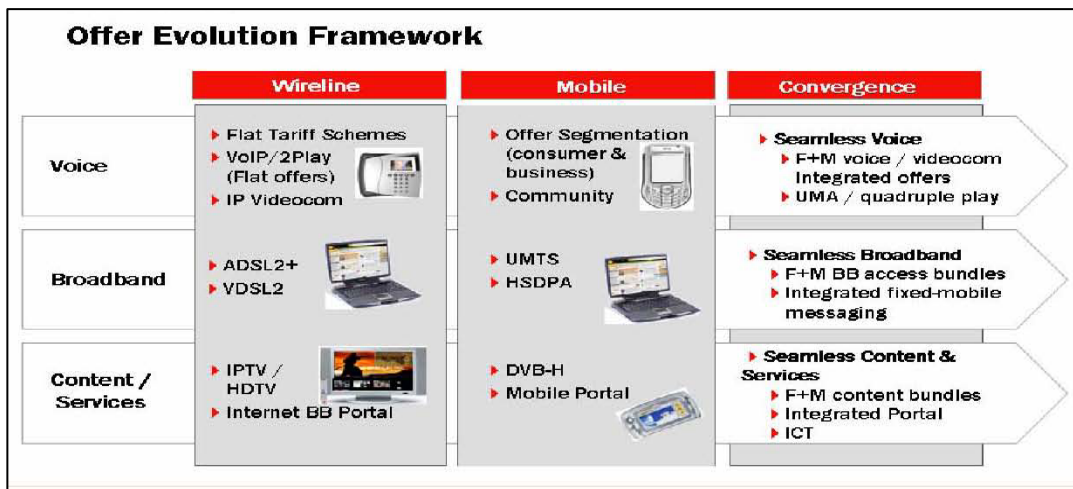
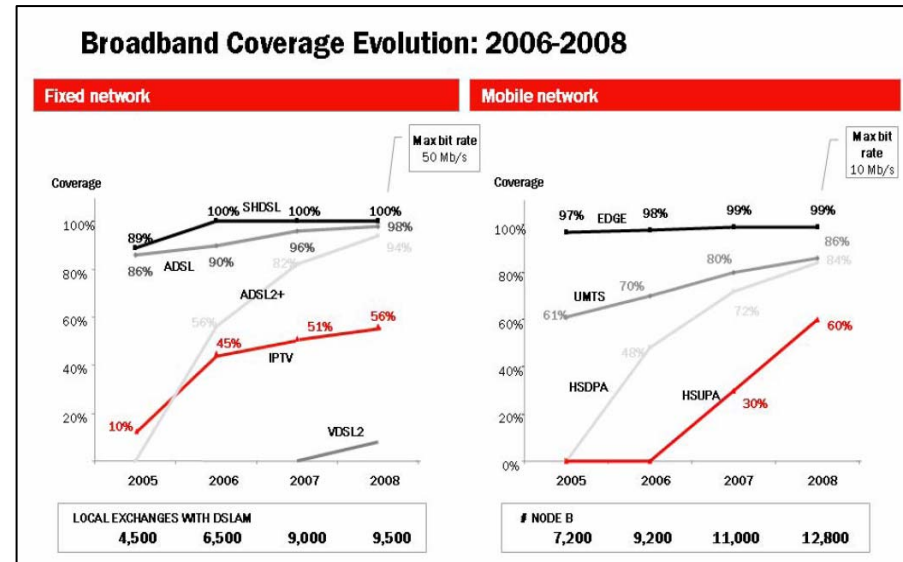
Efficienza energetica: la prospettiva dell'Operatore TLC

| Flavio CUCCHIETTI - Telecom Italia |

TI network infrastructure and offered services

▶ Network, some figures ...

- ▶ ~ 25 Million fixed lines in Italy
- ▶ ~ 26 Million mobiles lines in Italy. (above 45 Millions with abroad activities)
- ▶ ~ 11.000 Central Office (CO) sites
- ▶ 6.500 COs with ADSL (up to 9.500 in 2008)
- ▶ Broadband (ADSL) lines: ~ 8.000.000 in Italy and ~1.500.000 abroad
- ▶ access network average length of 1300-1500m
- ▶ ~ 150.000 outdoor cabinets



▶ Offered Services

- ▶ POTS & VideoTelephony services
- ▶ BB services ("Alice"): ADSL/ADSL2+; VDSL2 (from 2007 on)
- ▶ IP TV (from 3Q 2005, in 21 main Italian cities)
- ▶ Mobile services (MMS, Mobile TV); 3G techn. (UMTS)
- ▶ Internet & VAS Services
- ▶ VoD ("Rosso Alice" portal)



"Houston, We Have a Problem"

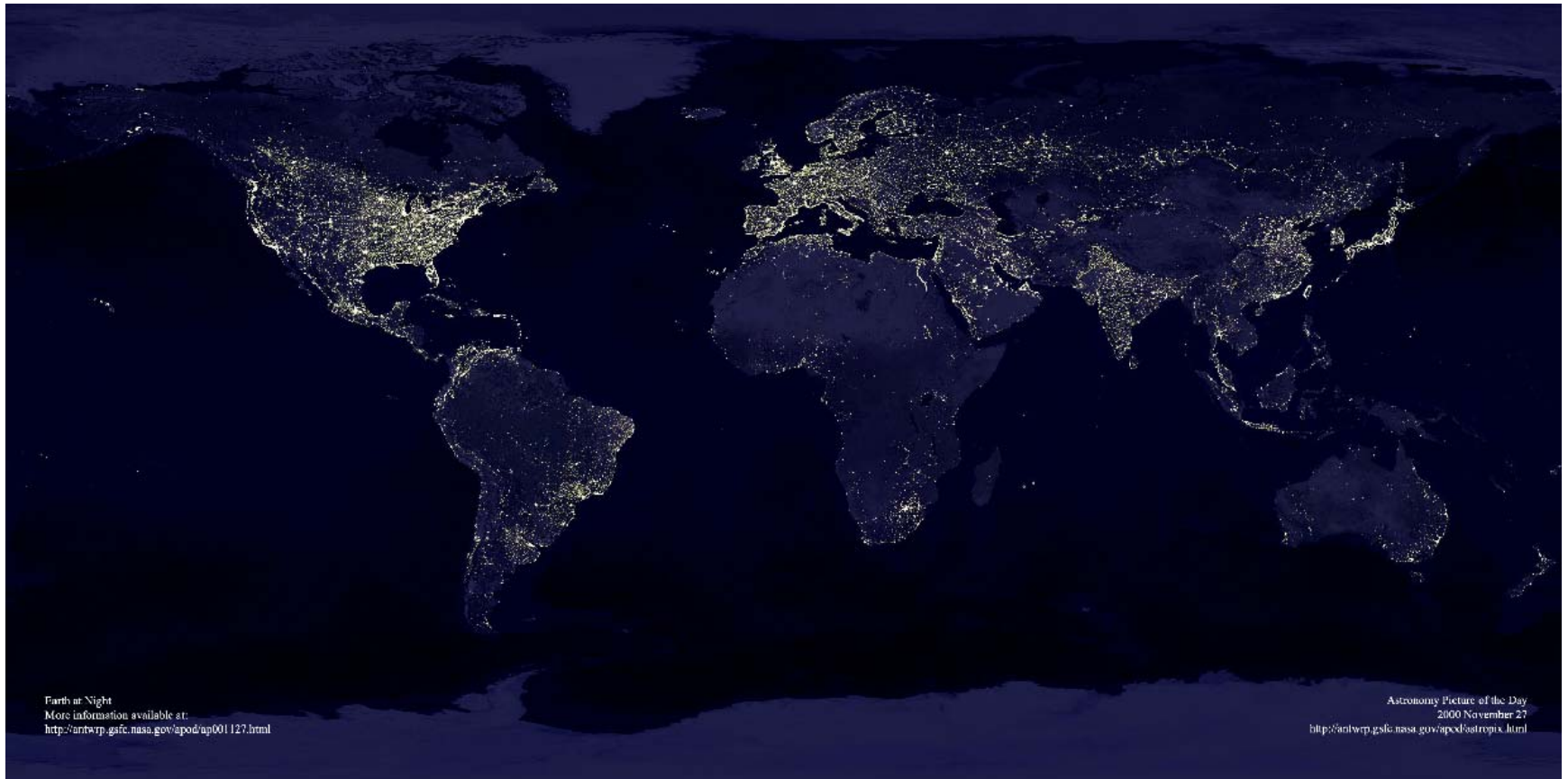
Energy

- ▶ Energy
- ▶ our d
- ▶ Energy
- ▶ Some
- ▶ The c
- ▶ increa



The
expected to show major growth
over the next years

More energy to light the World



**Much more energy is required to sustain the economic growth of China, India ...
.... new strategies wanted**

Efficienza Energetica

The energy share of ICT is increasing

Trend of energy for telecom and computer in Japan

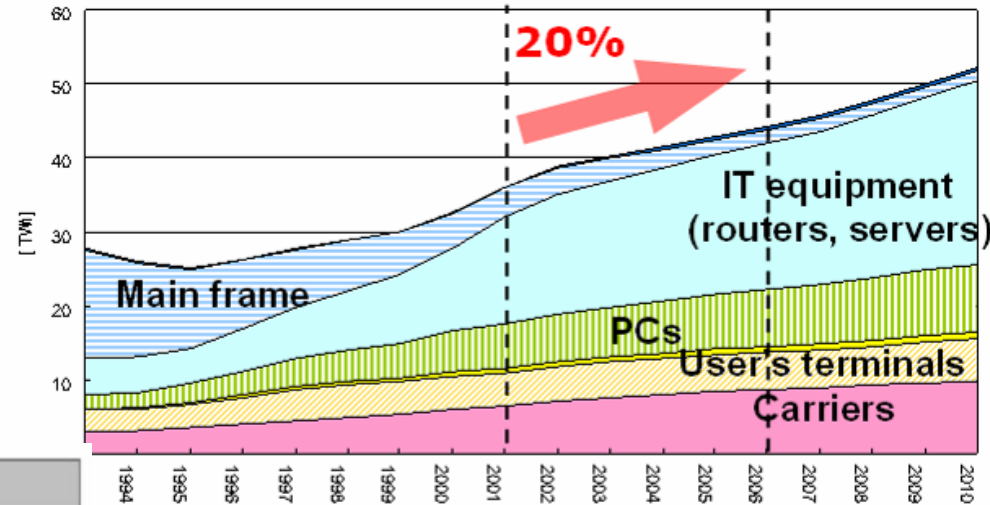
TLC

- ▶ network side ~ 1% (*)
- ▶ user side + HN(**) ~ 1% (*)

Data Centres

- ▶ USA and JP 2,5% (*)
- ▶ EU ~ 1 - 1,5% (*)

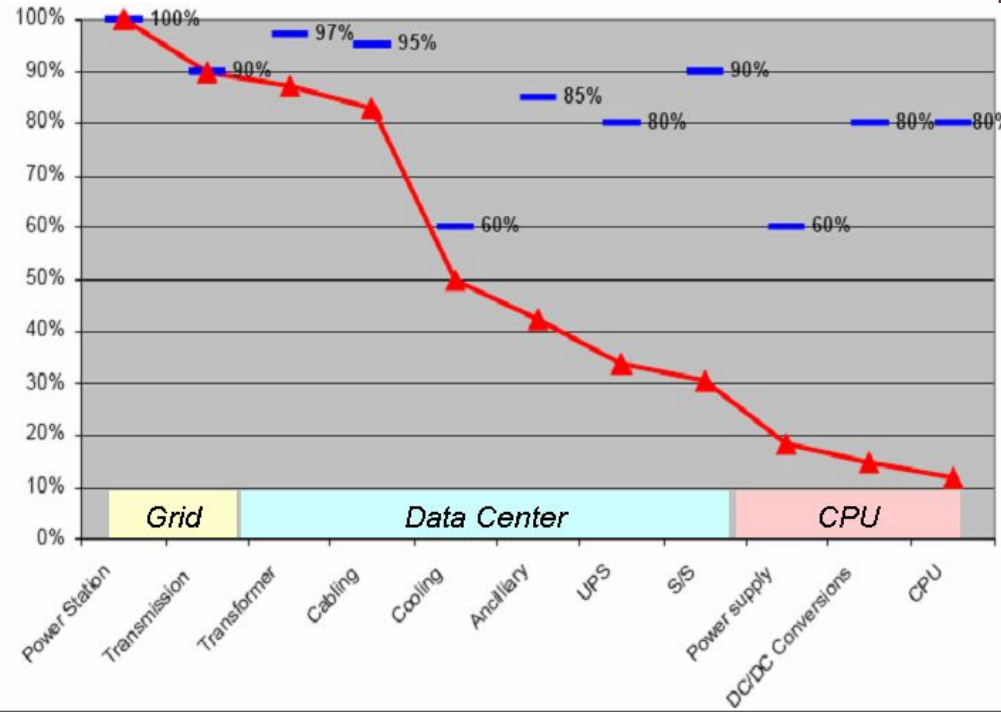
(*) % of the National/Regional Electrical Energy consumption
(**) HN = Home Networking



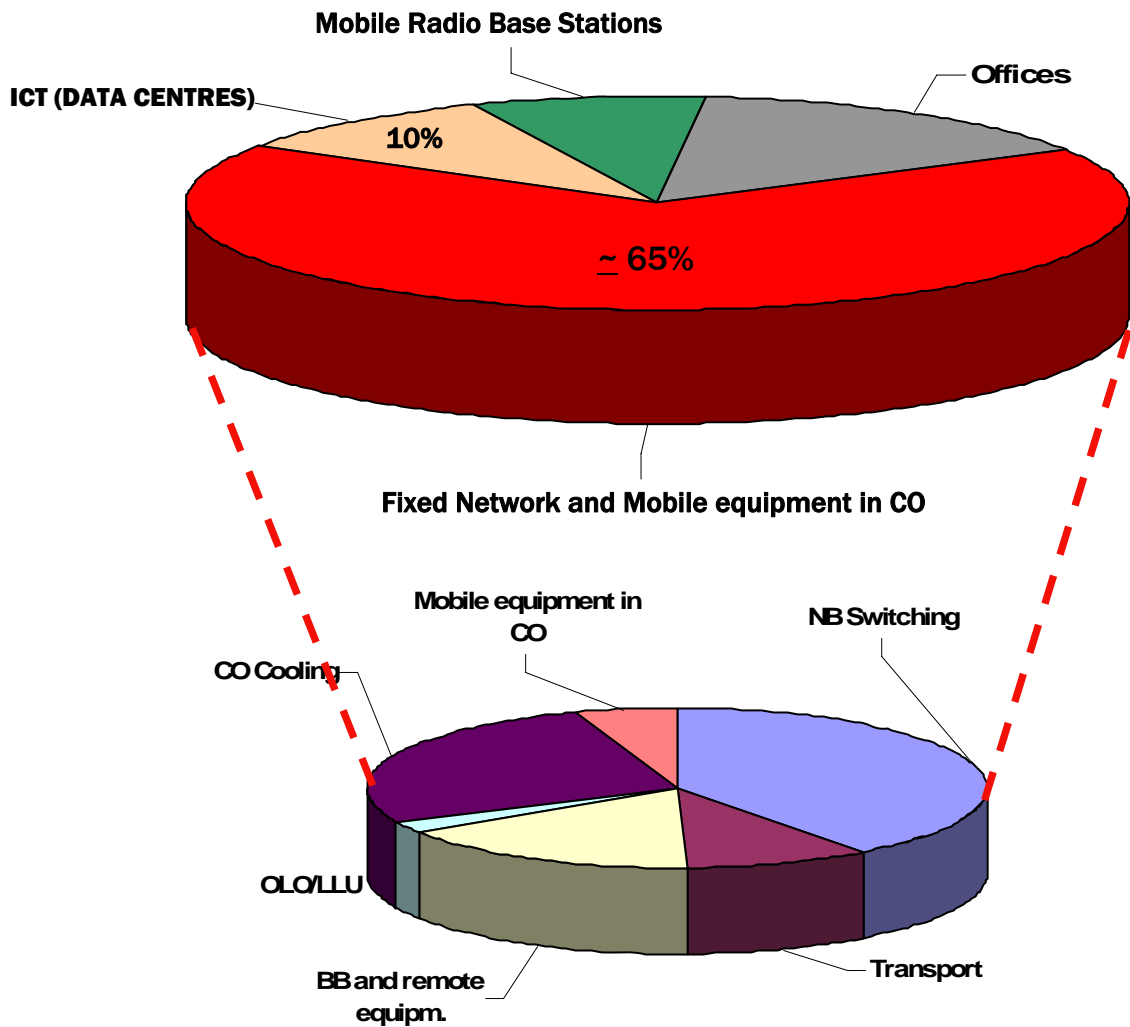
Source: Panel discussion, Intelc 2007, Hiroake Ikebe

Biggest wins in DC acting at the root (server) and on cooling

to improve it is a Need and an Opportunity



Energy consumption distribution in Telecom Italia



Typologies of use

1. **Wireline network:** N° sites: about 10.500 Consumption 2007: 1.444 GWh
2. **Mobile network:** N° sites about 10.150 (excluding collocate); Consumption 2007: 211 GWh
3. **Data Center:** N° sites 8; Consumption 2007: 208 GWh;
4. **Office:** N° sites: 630; Consumption 2007: 371 GWh;

2.231.500 kWh^(*)

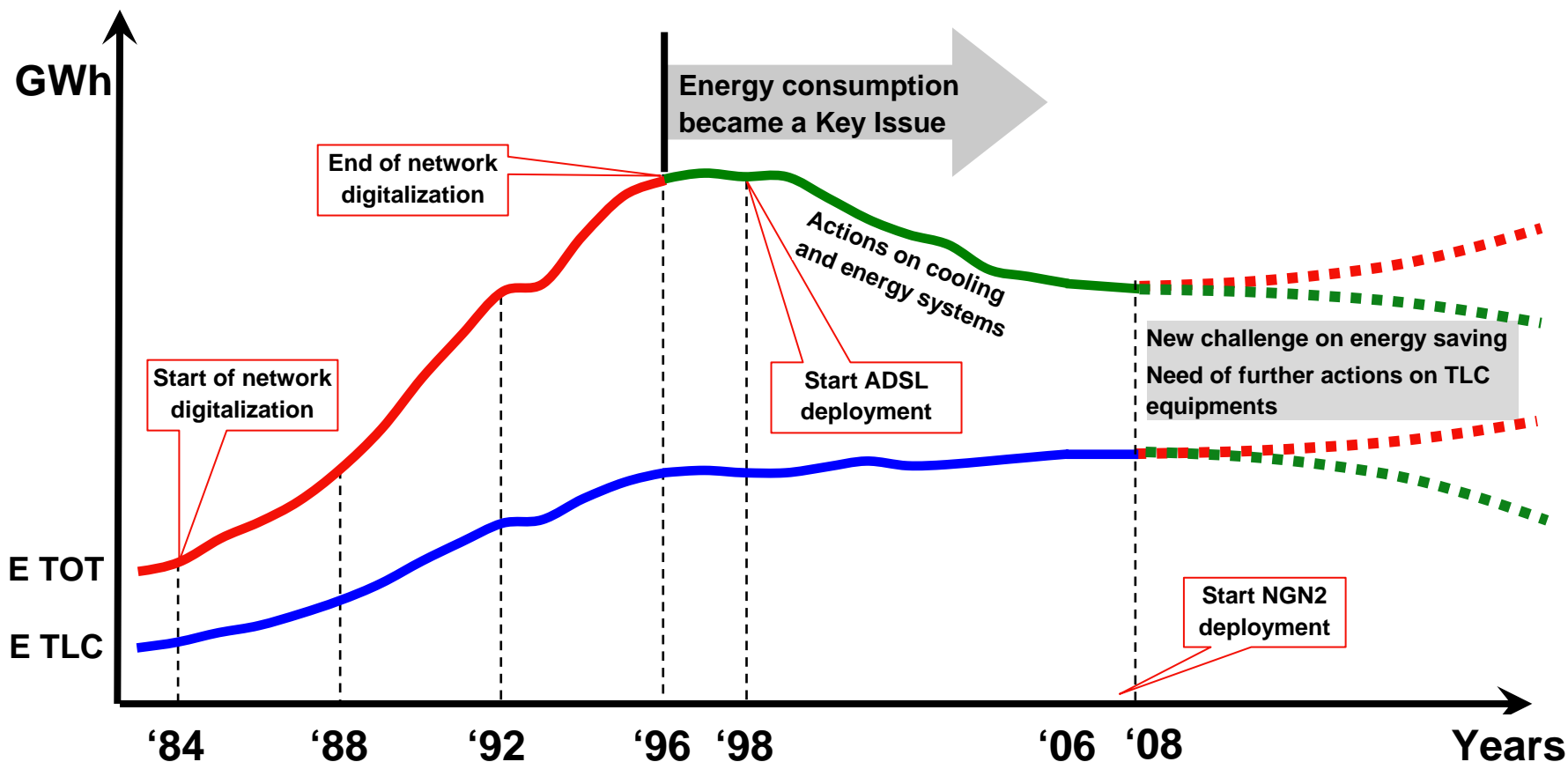
- ▶ 0,7% of the total National energy demand,
- ▶ Second national user

(*) Forecast EoY 2008

Efficienza Energetica

Energy consumption in TI – Wireline network domain

- ▶ '80-'90 □ Digital switching and ISDN = network energy consumption * 4
- ▶ last 10 years □ 20% reduction, but **strong increase of OPEX** due to energy cost
- ▶ FUTURE □ NGN shall take great care on energy consumption



E TOT: total energy consumption from mains (TLC equipment, cooling, auxiliary systems)
E TLC: energy consumption of TLC equipment

The cost of energy is strongly growing

The average energy cost increased

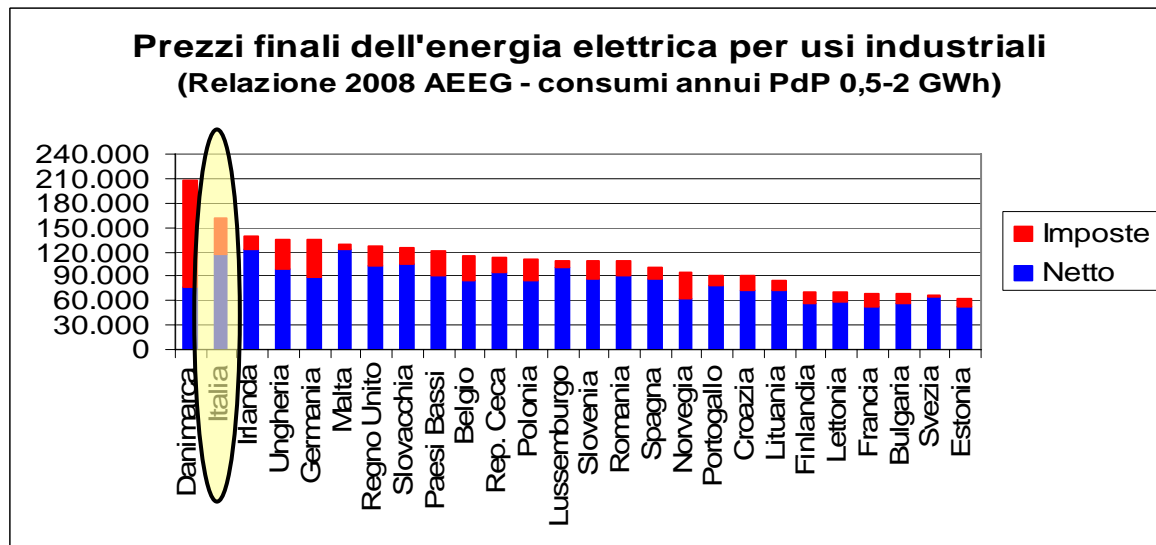
3x

in the last 8 years

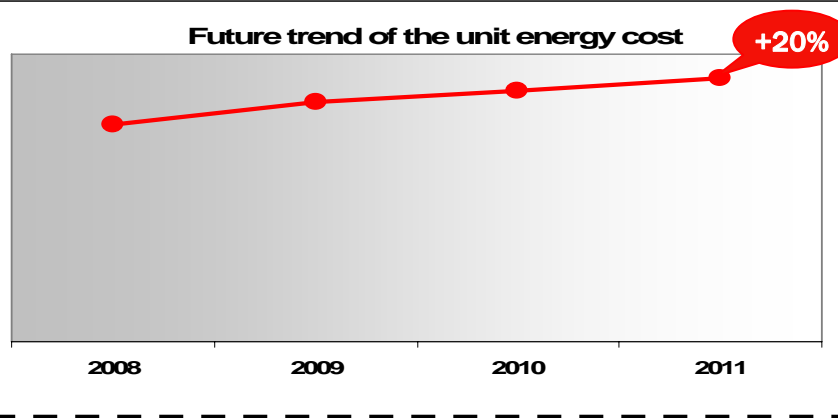
TI ENERGY OPEX 2007

>300 M€

AS-IS



Future trend of the unit energy cost

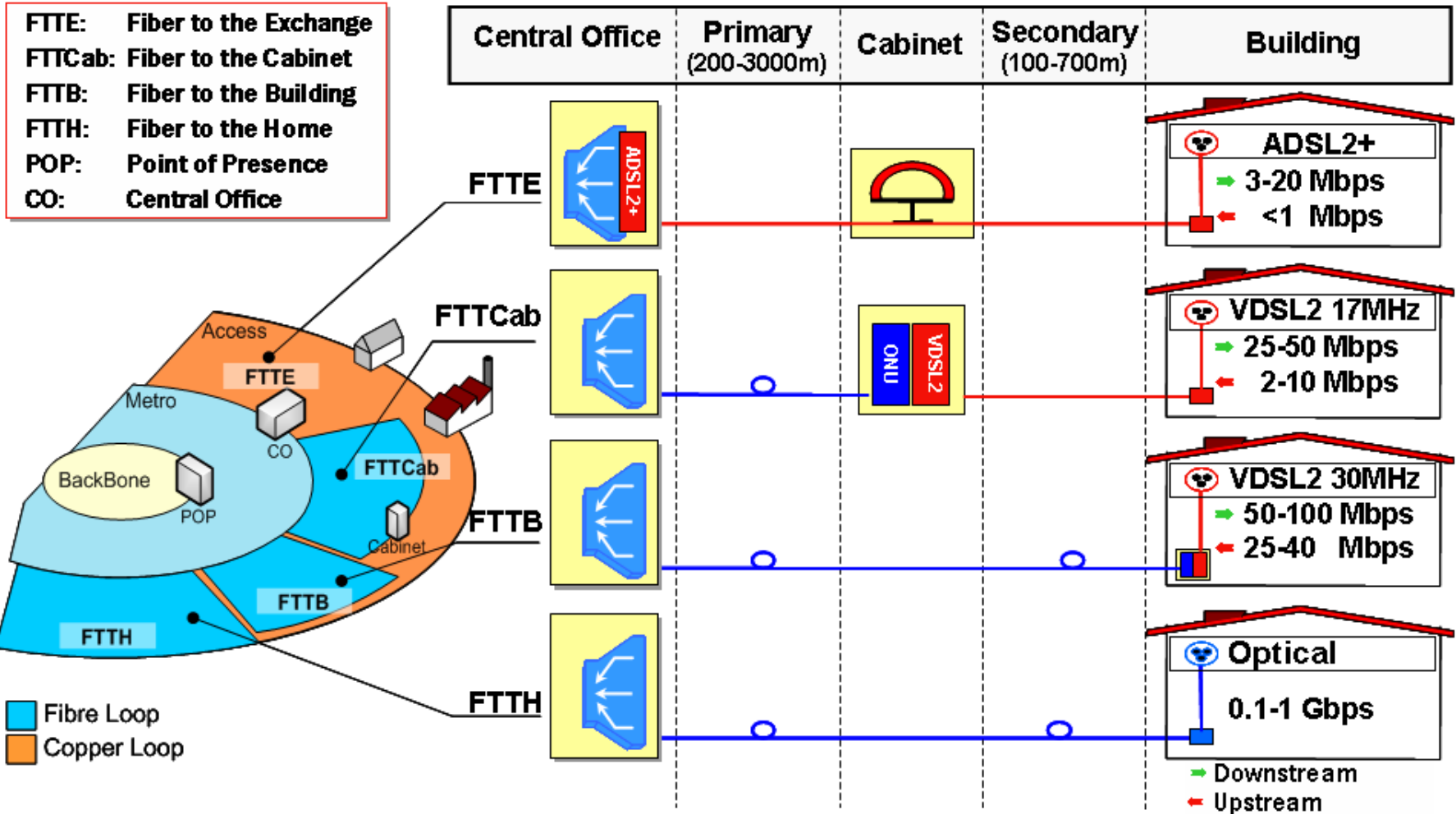


“COULD-BECOME”

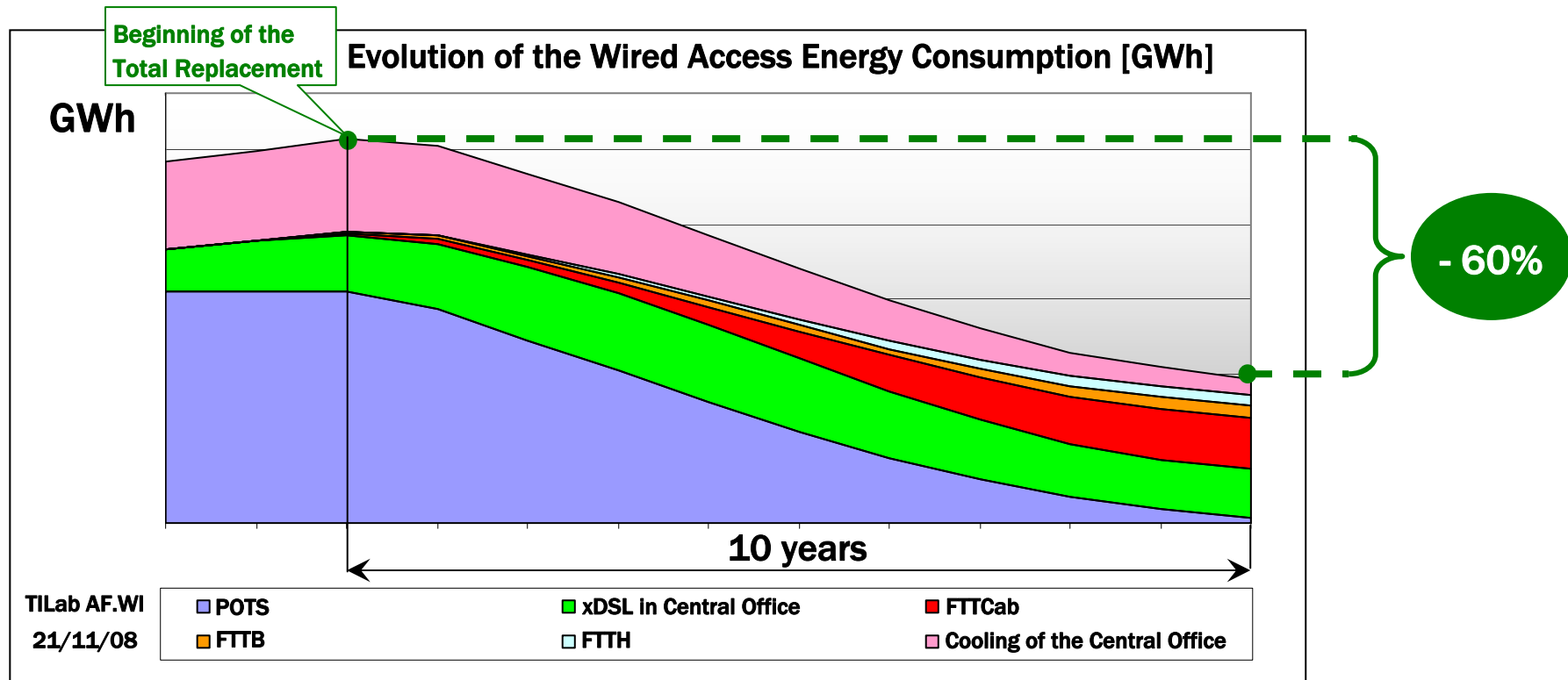


The energy cost trend is also strongly pushing towards
THE NEW network paradigm

The Next Generation Network 2 (R)evolution



The impact of the NGN2 on the energy consumption



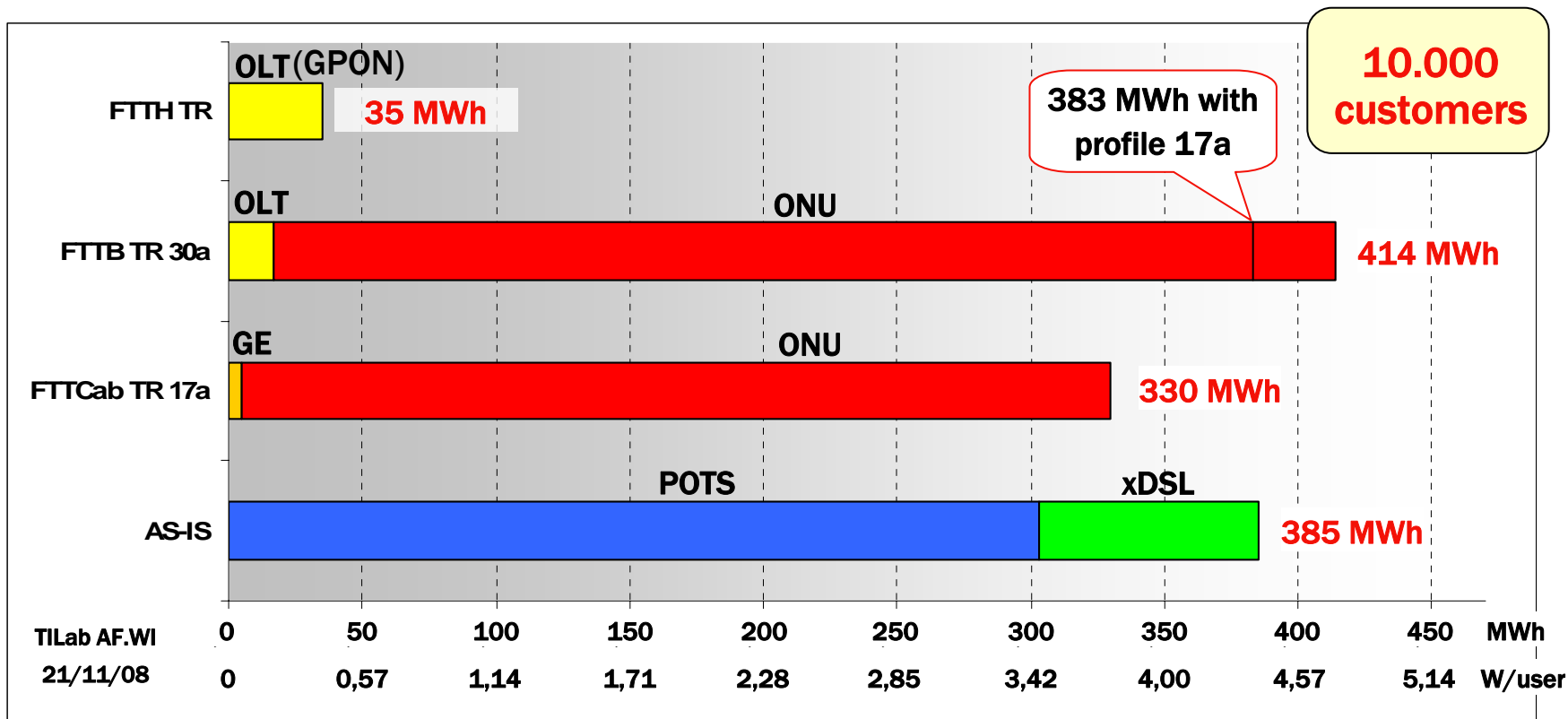
The NGN2 can enable a huge reduction of the energy consumption

Assumptions:

NGN2 coverage of 64% of the customers, with the following target mix: FTTH 50%, FTTCab 40%, FTTB 10%
Steady introduction of the ADSL2+/VDSL2 technology in the C.O. not covered by the NGN2

Efficienza Energetica

The energy consumption of different FTTx architectures Case study



FTTH is by far the most energy saving architecture from an Operator's point of view

The energy consumption of VDSL2 equipment (1/2)

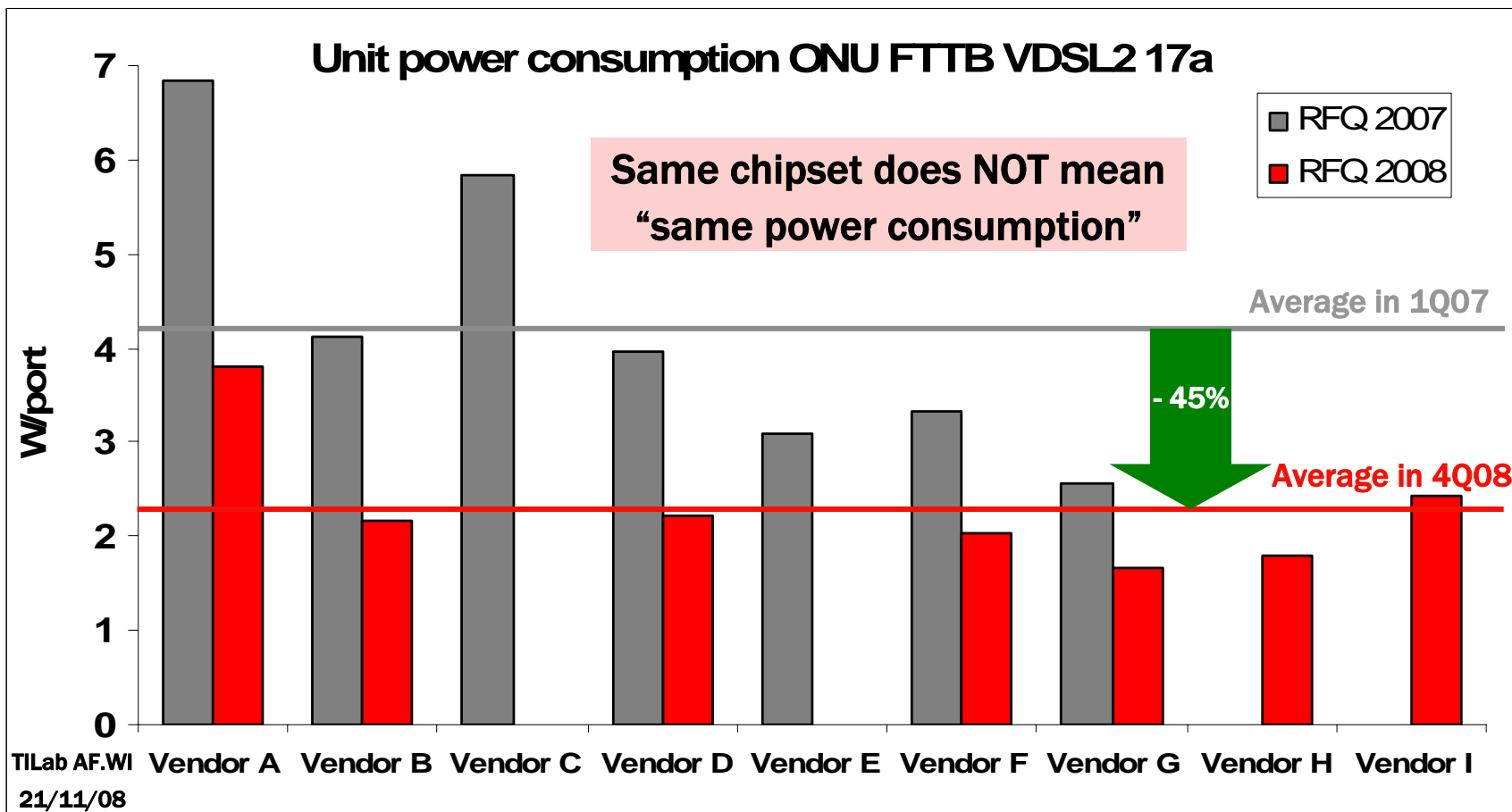
- ▶ A **100% FTTH coverage is not economically feasible**, due to the high infrastructural CAPEX (for fibre deployment)
- ▶ **Need for actions** towards standard and vendors in order to push the availability of **more energy efficiency VDSL2 equipment**
- ▶ We are participating (and leading) **several strategic initiatives**



TCO methodology



The energy consumption of VDSL2 equipment (2/2)

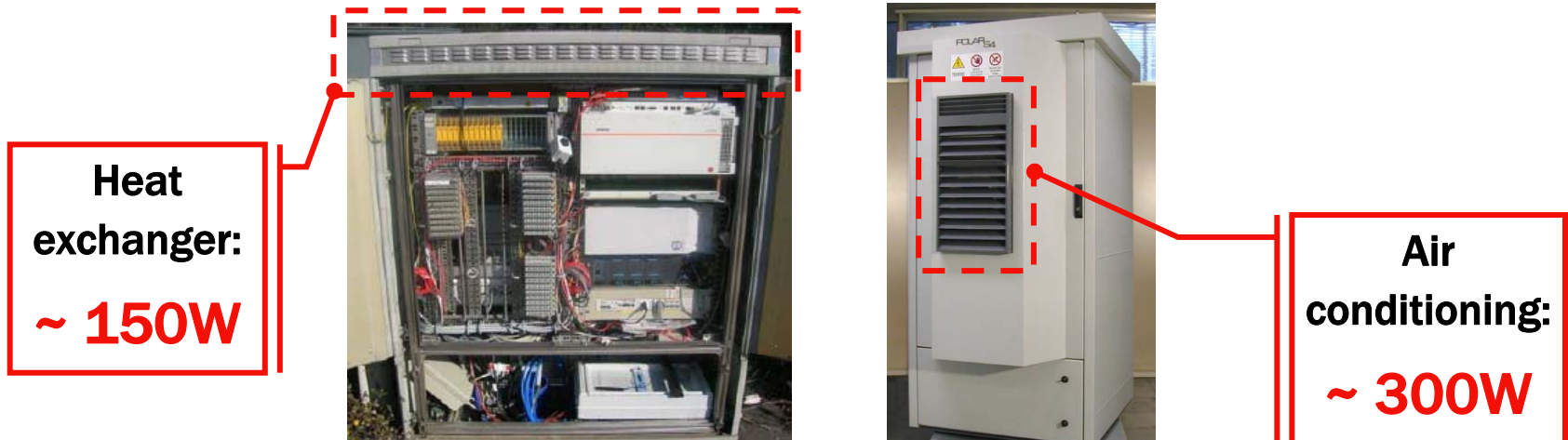


Valuable results have already been reached...

... but the potential for improvement is still high

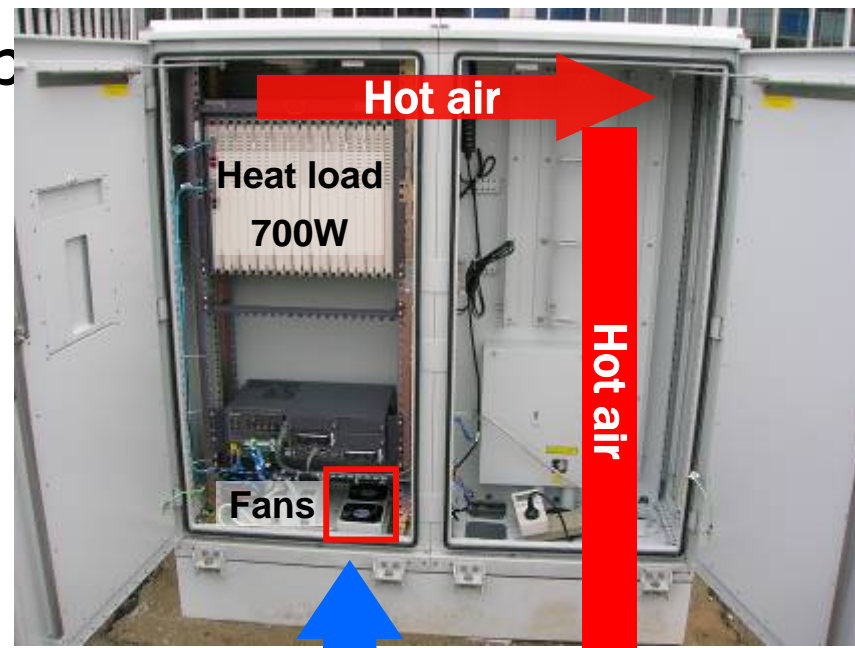
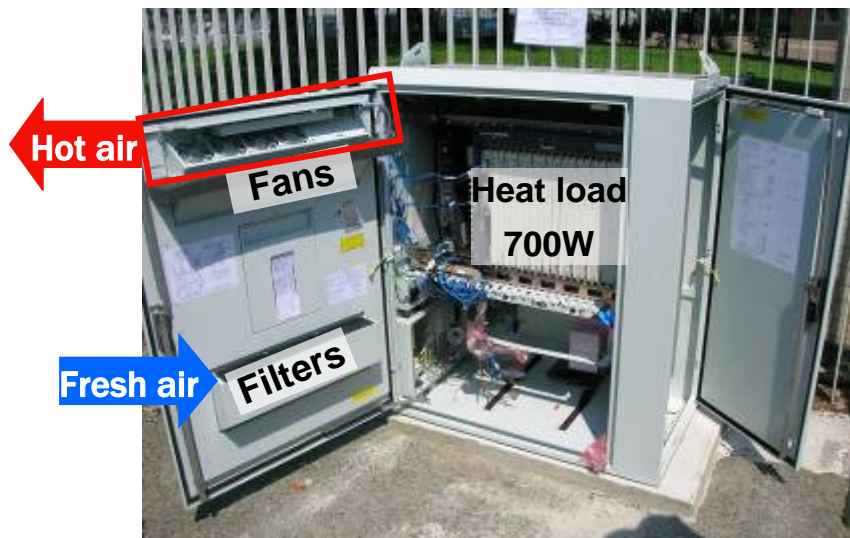
The issue of cooling FTTCab

- ▶ The power consumption of an **FTTCab Total Replacement** system amounts to **several hundreds Watts** in a **limited space...**
- ▶ ... and this implies serious issues for **heath dissipation, noise, feasibility at all**
- ▶ **Current cooling** systems are quite **inefficient**

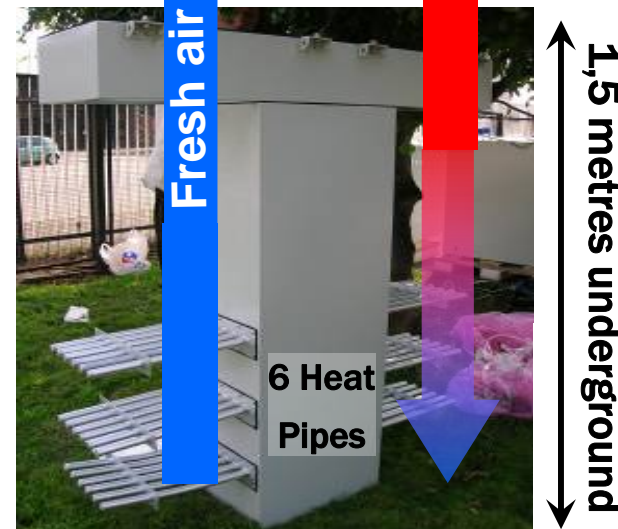


TILab is analysing **innovative** cooling methods to enable **higher energy efficiency**

TILab trials on cooling FTTCab



- ▶ Both the **free cooling** and the **underground cooling** solutions are giving a **positive feedback**
- ▶ These solutions can bring significant **savings** that, in the NGN2 deployment, could mean **tens of M€**
- ▶ The future **power savings** in the VDSL2 **equipment** will **enable a wider adoption** of these solutions

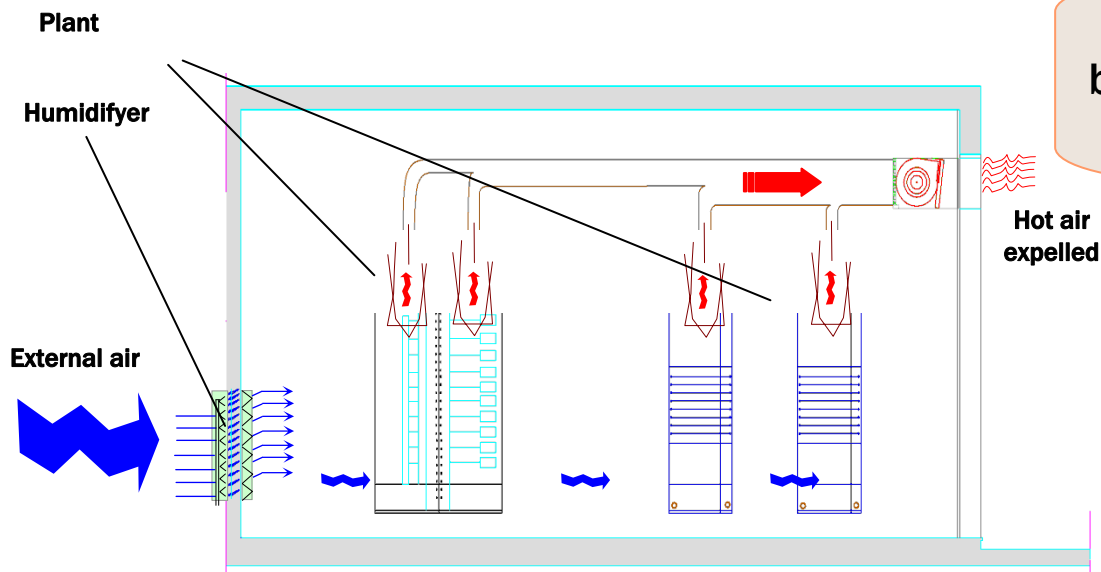


Efficiency initiatives for the CO

Ø Plant Innovations: Extracting full freecooling

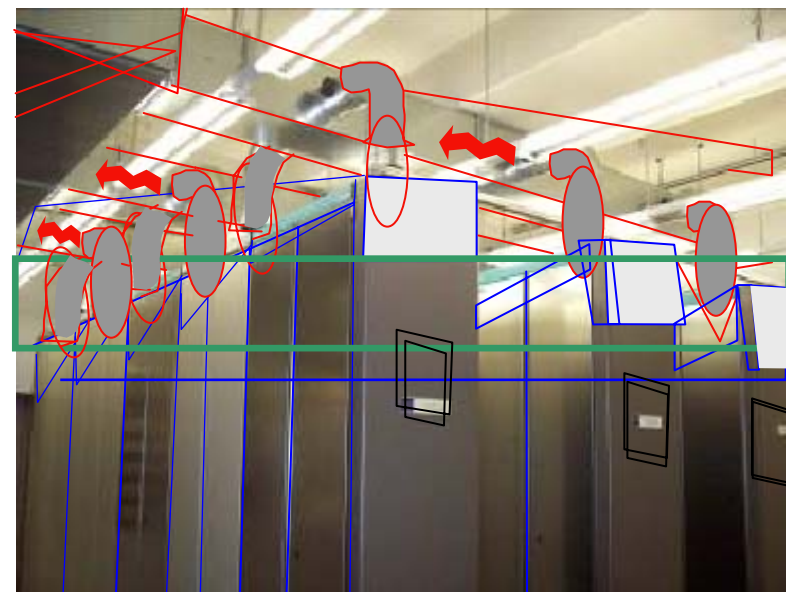
- Ø The realization of a cooling system without air conditioning plant

C.O. equipment (and their rack) must be designed to enable fresh air cooling
→ try to avoid too high densities



Already widely used in Swisscom, BT ...

The same principle could be applied also for Mobile Radio Base Stations



▶ Code of Conducts



EU Codes of Conduct



▶ **Problem!** In EU: ICT (BroadBand, Data Center, External Power Supply, UPS and Digital TV) could **grow up to 250TWh by 2015** (*the same amount used today by the whole Spain*)

▶ **A solution!** EU developed 5 Codes of Conduct on these areas
http://re.jrc.ec.europa.eu/energyefficiency/html/standby_initiative.htm

▶ The goal is to set ambitious targets and best practices, involving vendors and Operators towards an anticipated development and an earlier availability of efficient equipment

▶ CoCs are (currently) based on voluntary subscription

Failing these goals would further empower mandatory actions (e.g. EuP)

First → easy (and simpler) wins

- ✓ External power Supply- from mobile chargers on (in EU >> 1 billion) improving efficiency and lowering standby losses
- ✓ UPS – Minimizing losses on medium/big UPS

Now ▯ BIG (and more complex) wins

- ✓ BroadBand – Network and User equipment (with HN) – Saving energy for Households and Network Operators (TLC, Cable, Wireless ...)
 - ✓ Data Centre – Setting challenging targets and guide the DC Operators (particularly the smaller ones)
- (IN PROGRESS) Digital TV (Set Top Box) – Reducing the standby consumption (and more)**

- Broadband equipment will contribute to the electricity consumption in European Community depending on the penetration level, the specifications of the equipment and the requirements of the service provider, a total European consumption of up to 50 TWh per year can be estimated for the year 2015.
- With the general principles and actions resulting from the implementation of this Code of Conduct the (maximum) electricity consumption could be limited to 25 TWh per year, this is equivalent to 5,5 Millions tons of oil equivalent (TOE) and to total saving of about € 7,5 Billions per year.

**New BB and DC CoC
issued Nov. 2008**

**The BB CoC is already the reference
for Industries and Operators**

**It paves the way for much greater
EE at the Client and the Operator**

- Continuing demand for IT services
- Rising DC electricity consumption projected:
 - Western Europe: 56 TWh in 2007, rising to 104 TWh in 2020
- Expected to contribute substantially to the UK and European Union (EU) commercial sector
- Maximise energy efficiency of data centres to ensure the carbon emissions and energy consumption are mitigated

Efficienza Energetica**Beyond CoCs**

- ▶ CoCs draw the base line, but the operators expect (much) better equipment
 - ▶ TCO is used in tender evaluation and it gives strong advantage to the least energy hungry equipment (*in equipment such as ADSL2+, the energy OPEX equals the initial CAPEX in just 5 years*)
- ▶ CoCs aim at the efficiency from the single equipment point of view

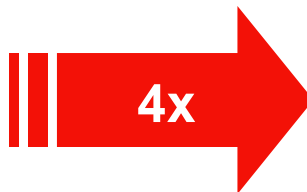
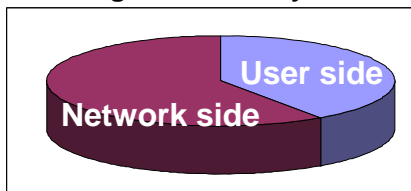
**We need to do more!**

- ▶ We need to enable the enormous efficiency potentials of standby trough all the service chain
 - ▶ New specifications should define how, ports with no activity, should enter a low power state without disrupting the higher layers (e.g. how to a VoIP terminal can go to standby without losing its IP address, authentication ...) → need to act at ITU-T, IEEE, ETSI, BBF, HGI ... level
- ▶ We need to enable the use of DSL low power modes
- ▶ CPE must activate automatically the low power mode for each sub function when it's not in use
- ▶ Radio Base Stations must switch off their second channel when traffic is low

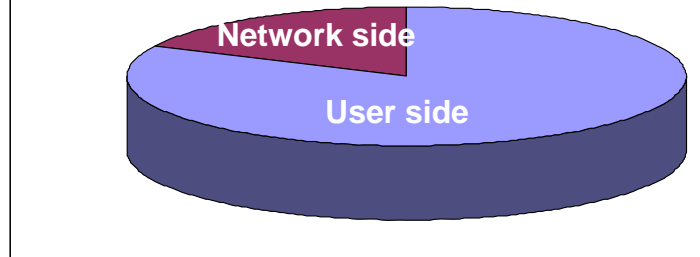
Efficienza Energetica**User side power consumption**

- ▶ Lots of BroadBand related appliances/gadgets already populate our homes...
...and many more will come
- ▶ Their consumption is already comparable to that of the Telecom Network part

W/average user - Today



W/average user - Long term



Customers have to be made aware on the energy behavior of the systems they are buying as it can have serious effects on their energy bill

Wanna save money soon? Go standard!

- ▶ No real competition among Operators on EE!
- ▶ Vendors need to guarantee longer life to their products
- ▶ Products are global!
- ▶ Costly to develop, especially for every single market!

Working together on **Standardization** is a **win-win** ...

... but there is the need for

- ▶ **Coordinated action** among Operators, Vendors and Standardization Bodies
- ▶ Strong commitment of Regulators/Governments



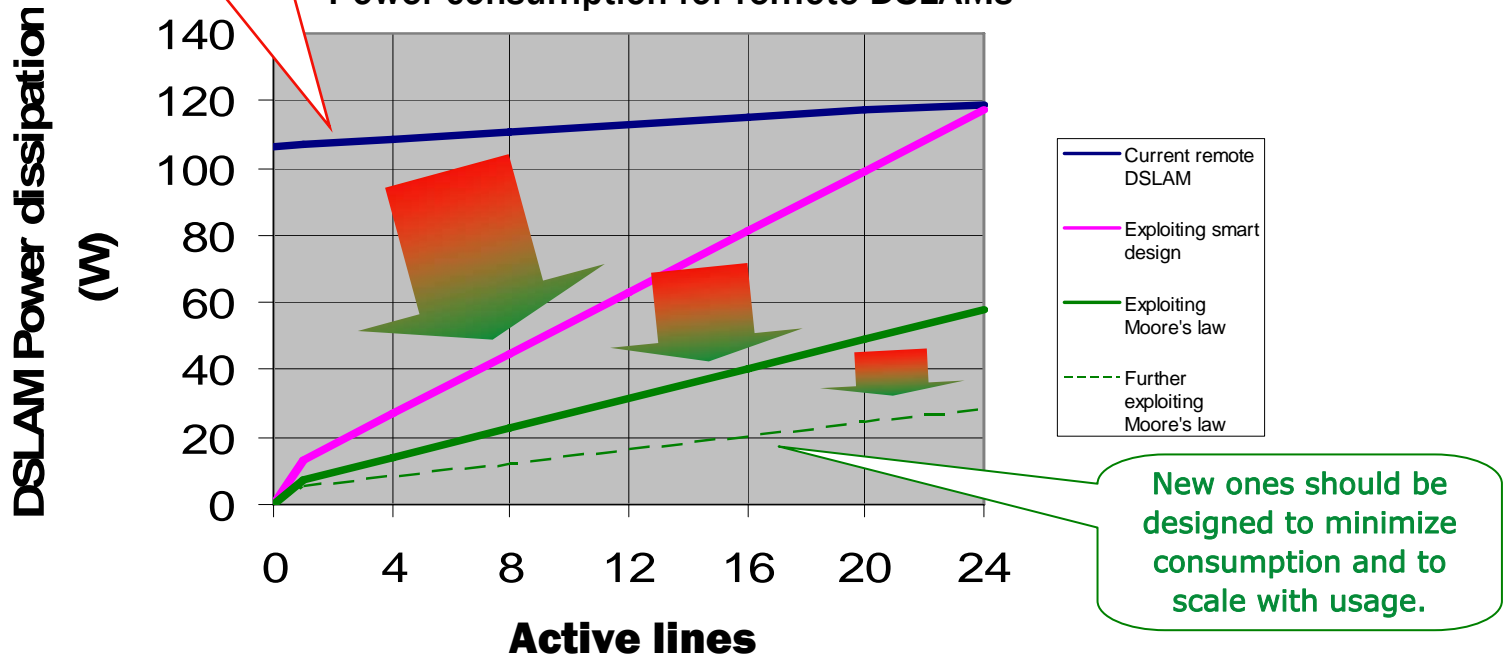
Efficienza Energetica

Energy Efficient design can deliver great advantages

- The Five Golden Rules for Power Consumption Scalability**
- Power consumption should scale linearly with number of connected users
 - Power consumption should scale linearly with traffic flow
 - Power consumption should scale linearly with information flow
 - Power consumption should scale linearly with number of management events
 - Power consumption should scale linearly with number of control events

Today's equipment consume power independently from their usage

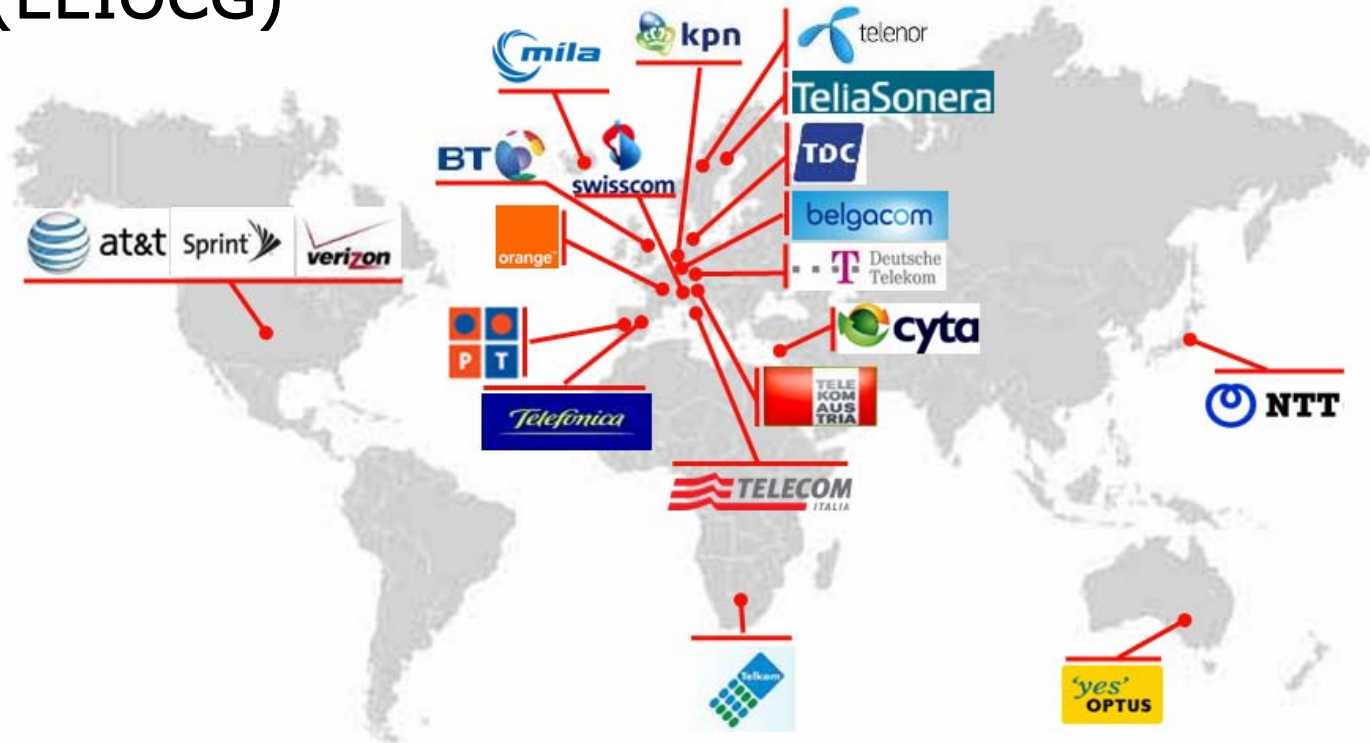
Power consumption for remote DSLAMs



New ones should be designed to minimize consumption and to scale with usage.

The same applies in: Data Centres (servers), home (Access Gateway, STB ...), corporate (Ethernet), mobile (RBS) ...

The Energy Efficiency Inter-Operator Collaboration Group (EEIOCG)



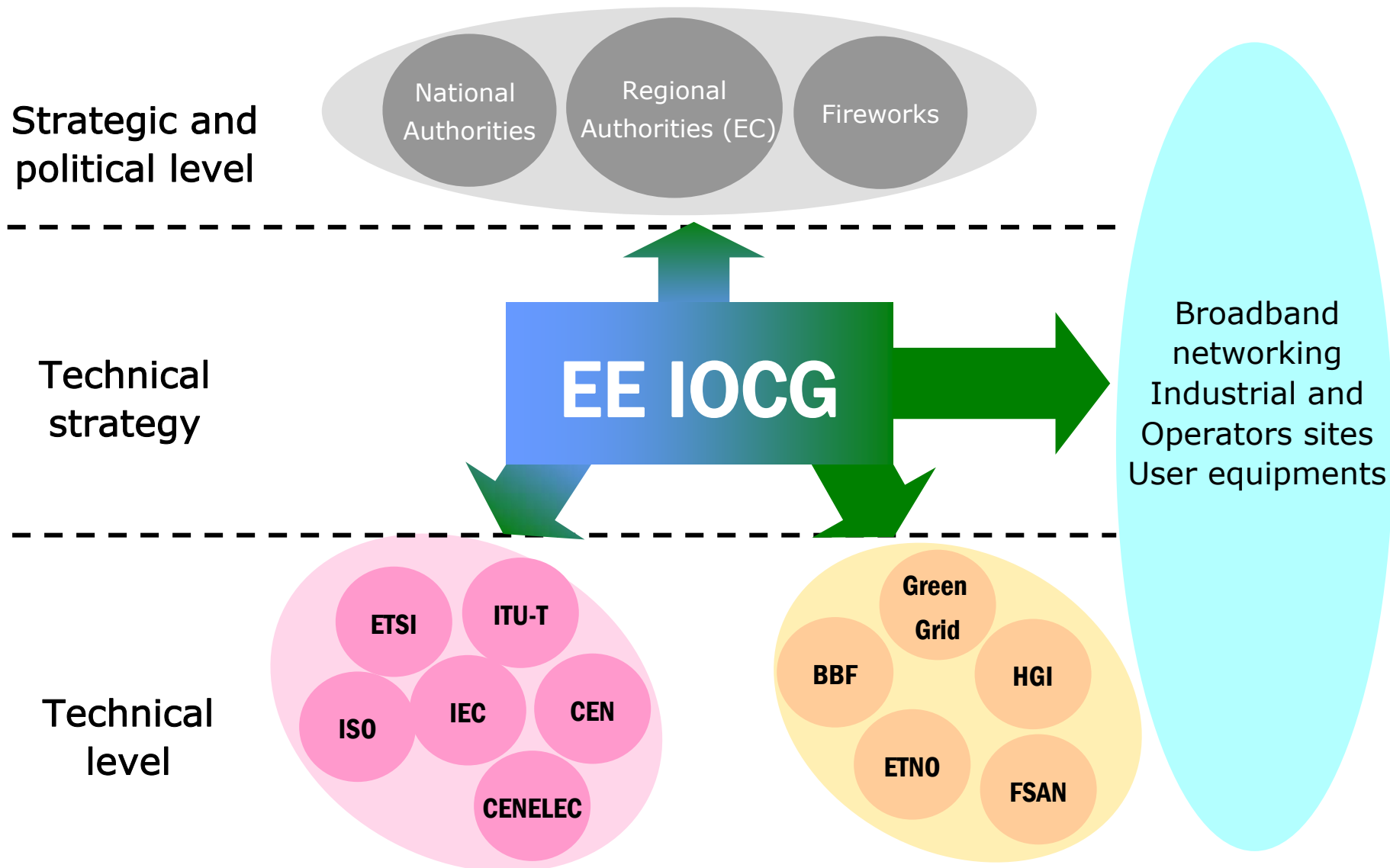
► Defines high level strategic actions and coordinated guidance towards

► Standardization

► Equipment suppliers (both network and user side)

in order to speed up the availability of Energy Efficient equipment and networks, helping vendors towards investments optimization

The EEIOC Group: Positioning



Action Points – Main subjects ... more to come

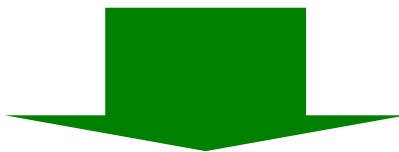
Subarea	Main subjects
xDSL	<ul style="list-style-type: none"> - Reduce energy consumption in full power state according to CoC BB - introduce power saving methods when little or no traffic
Environmental Conditions	<ul style="list-style-type: none"> - Extend temperature ranges for DC rooms to enable more efficient cooling
IT Equipment Efficiency	<ul style="list-style-type: none"> - Extend temperature ranges of ICT equipment towards Class 3.1 of ETSI Standard EN 300 019-1-3 - Define common target values in RFQs and KPIs for efficient IT equipment
Switches and routers	<ul style="list-style-type: none"> - Energy optimized IP and LAN
DSL NT/ONT	<ul style="list-style-type: none"> - Define common target values in RFQs for DSL NT/ONT - Define power saving mechanisms when little or no traffic
STB and End User Equipment	<ul style="list-style-type: none"> - Define common target values in RFQs for STB - Define power saving mechanisms / architectures - Unified external power supply for CPEs (NT, AG, HG ...) Standardize: voltage (12V?), DC plug, EMC requirements ...
Mobile phones	<ul style="list-style-type: none"> - Prepare common requirements on energy efficiency and eco-design of mobile terminals - Unified charger for mobile phones (mini USB interface?)
Cooling @ CO/IDC	<ul style="list-style-type: none"> - Extend fresh air cooling and define KPIs (COP) for efficient cooling

Efficienza Energetica

Conclusions

- ▶ ICT is among the solutions for a greener World
but it's also a problem as it needs much energy
- ▶ Without action, the consumption could grow a lot
- ▶ Governments and Regional authorities are requesting
ICT to optimize its energy footprint
- ▶ This comes trough (global) Standardization

Even the biggest Operator isn't big enough to drive the market alone



Working together on Energy Efficiency is strategic for our
Companies and benefits the whole Community

THANK YOU