First International IEEE Workshop on

Sustainable Internet and Internet for Sustainability

Panel Session

Internet sustainability or Internet for sustainability: what really matters?

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Panelists

Franco Davoli (Univ. Genoa, Italy)
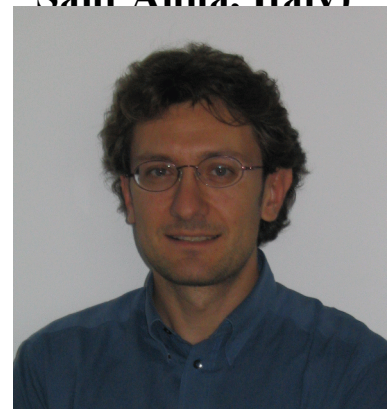
Karin Anna Hummel (Univ. Vienna, Austria)

Brunilde Sansò (Ecole Polytechnique de Montreal, Canada)

Luca Valcarenghi (Scuola Superiore Sant'Anna, Italy)

The Challenge

Need for carbon footprint reduction

EC energy policy for 2020

> reduce greenhouse gases by 20%
> reduce energy consumption by 20%
> increase by 20% the share of renewable energies in energy consumption

Energy Consumption Sources

The transport sector in EU is responsible for about 30% of total primary energy consumption (aviation is ~ 12% of the transport energy consumption). Trends: electric and hybrid vehicles

Energy use in residential and commercial buildings corresponds to about 40% of EU total final energy consumption and CO_2 emissions -- more than 50% is from electrical energy. Trends: ICT controlled smart buildings.

Industrial manufacturing is responsible of about 1/3 of the carbon dioxide (CO_2) emissions

Electricity Consumption & ICT

The finiteness of fossil carbon energy sources and the need to reduce CO_2 emissions are pushing forward the electrification of our society

Today corresponds to 20% of the final energy consumption but it predicted to significantly increase
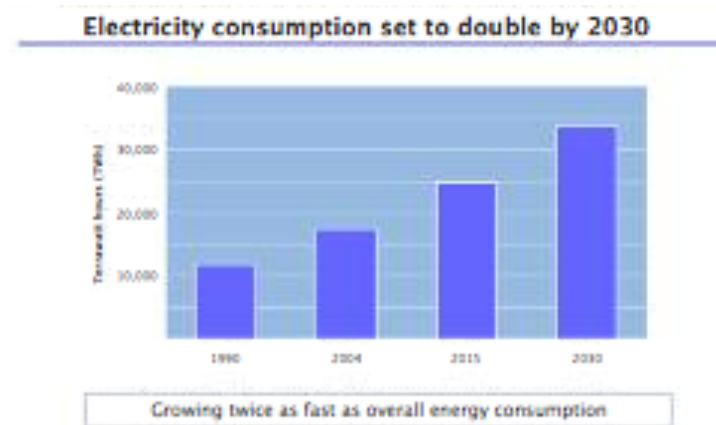

Figure 1: Electricity consumption forecast[1] (Source: International Energy Agency, IEA)

Efficient electricity consumption is a key issue; ICT/Internet technologies converge to enable smart energy efficient systems

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Internet Sustainability

In Western Europe the demand for IT services was about 60 TWh of electricity consumption (with another 20 TWh in the residential sector), which corresponds to about 7% of the total EU energy consumption. It is expected to rise to 104 TWh per year by 2020

IT services driven by Internet. According to some studies, the use of the Internet is growing at 10% per year worldwide. This growth is supported by the increase of applications and uses of the net.

IT energy efficiency is quite low, for example the efficiency of conventional radio base stations is around 1.2% (to transmit 120W it is necessary to waste 10 kW).
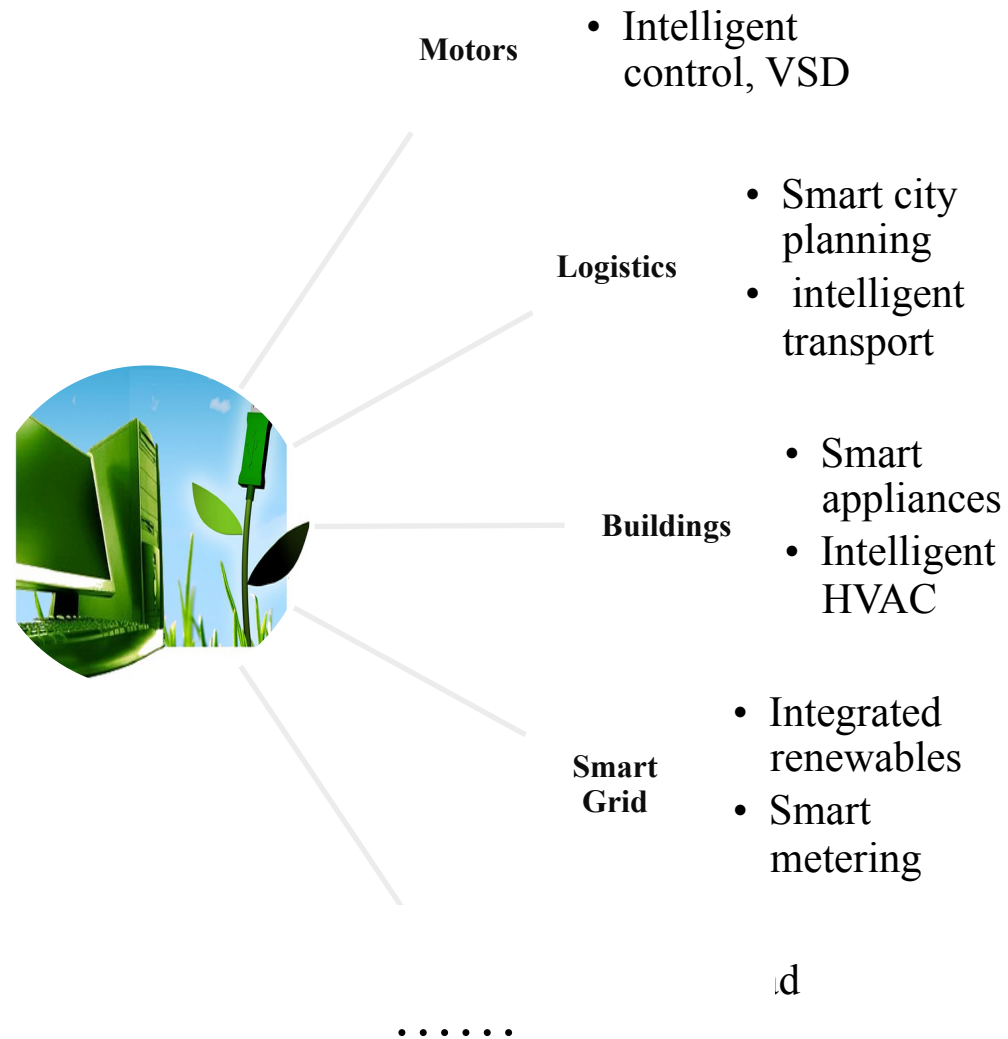
The peak load of US data centers (8GW) corresponds about 16 baseload power plants.

This situation is no longer acceptable and new solutions must be provided to sustain the growth of ICT due to the tremendous social benefits of their evolution.

Internet technologies can produce [major] energy saving in other sectors

Laitner et al. (*) estimate that in recent years, for each kilowatt of energy used by ICT equipment, approximately 10 kilowatts were saved economy wide through productivity gains and efficiency improvements

(*) J.A. Laitner, K. Ehrhardt-Martinez. Information and Communication Technologies: The Power of Productivity. Environmental Quality Management, 2009, Part I: 18(2):47–66,Part II: 18(3) :19–35.

Motors
- Intelligent control, VSD

Logistics
- Smart city planning
- intelligent transport

Buildings
- Smart appliances
- Intelligent HVAC

Smart Grid
- Integrated renewables
- Smart metering

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Internet sustainability or Internet for sustainability ?

- Information
- Monitoring
- Control
- Optimization
- Innovation
- Transformation

Application	Electricity consumption [% of EU consumption]	Electrical energy saving potential	Energy saving potential [% of EU consumption]	Enabling power electronics technologies
Motor control • industrial applications • appliances, HVAC, lifts • traction drives	~50%	30–40% (feasible in ~50% applications)	5–6%	IGBTs, SiC devices, Power modules
Lighting	21%	>70%	>14%	High-efficiency intelligent ballasts; Power semiconductors
ICT Data centres and servers	2%	50%	1%	DC distribution networks ICT and power electronics integration
ICT Radio base stations	1%	30%	0.3%	Efficient power amplifiers Low standby consumption technologies
ICT Standby consumption	4%	80–90%	3.6%	Power semiconductors Intelligent control

Table 2: Power electronics applications and electrical energy-saving potential

Final Question

Do we need specialized workshops like Sustalnet to discuss the ongoing research on ICT energy efficiency, or there are already too many workshops/conferences in the area?

If yes, which should be the right size of the event:

- a workshop co-located with a major event?

- a standalone workshop ?

2012?