

CANARIE

How ICT and Cyber-Infrastructure can help reduce global warming

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The Climate Change Imperative

- > **One of, if not, the greatest threat to our future society and economy is global warming.**
- > **15-30% cut in greenhouse gas emissions by 2020 will be needed to keep the temperature increase under 2 °C, and a deeper reduction by 60-80% may be needed by 2050.***
- > **Past IPCC assessments have underestimated the pace of change**
 - > Latest data indicates we are at the high end of projections
- > **It will be necessary to go beyond incremental improvements in energy efficiency, current life-styles and business practices. Significantly more drastic measures will need to be undertaken**

*International Panel on Climate Change



ICT and Cyber-infrastructure and CO2 emissions*

- > **It is estimated that the ICT industry alone produces CO2 emissions that is equivalent to the carbon output of the entire aviation industry.**
- > **ICT emissions growth fastest of any sector in society, doubling every 4 years**
- > **One small computer server generates as much carbon dioxide as a SUV with a fuel efficiency of 15 miles per gallon**
- > **Average utilization of servers is less than 6%.**
- > **Typical university produces 200,000 – 500,000 metric tons CO2 per year of which 100,000 – 300,000 tons is from Cyber-infrastructure and ICT**

*An Inefficient Tuth: http://www.globalactionplan.org.uk/event_detail.aspx?eid=2696e0e0-28fe-4121-bd36-3670c02eda49



Public Sector to be carbon neutral by 2010 in BC

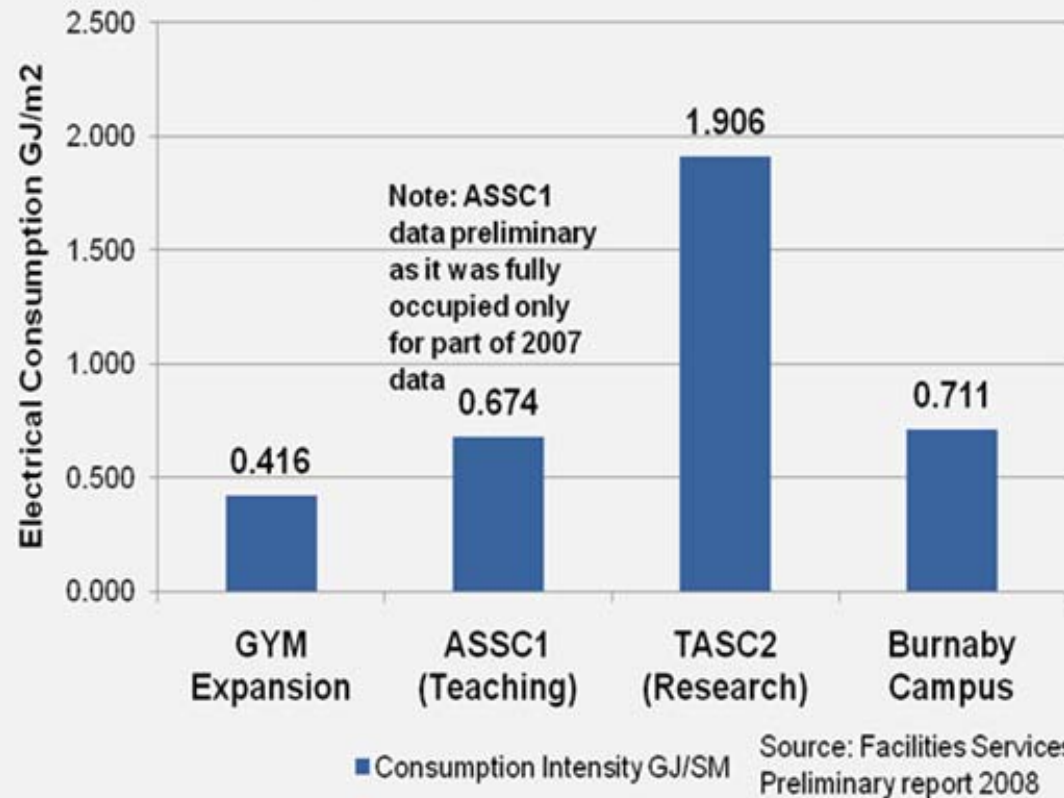
- > **British Columbia was first government to introduce carbon tax in Western Hemisphere**
- > **Provincial Government in province of British Columbia has mandated all public sector institutions to be carbon neutral by 2010**
 - Other provinces exploring to implement the same policy
 - New Zealand has also made the same requirements
- > **Many universities and businesses are adopting voluntary carbon neutrality objectives**
 - Dell, Cisco, Google etc
- > **This will have big impact on university research and optical networks**

CI major cause of GHG emissions

TASC2 Research Building



Comparison Intensity in Electrical Consumption





Why ICT and Internet is critical to reducing CO2

- > **Direct emissions of Internet and ICT are important at 2-3% of world emissions but, in order of impact, the most significant contribution we can make is through leveraged, or indirect, emissions reductions.**
- > **According to SMART 2020 these represent as much as a 15% reduction opportunity in global emissions.**
- > **(And SMART 2020 is one of the most conservative reports on the topic. Others identify even higher potential for savings).**



Optical networks and virtualization are key

- > **Optical networks (as opposed to electronic routed networks) have much smaller carbon footprint**
- > **Significant reduced CO2 impacts are possible through use of cyber-infrastructure tools like virtualization, clouds, SOA, grids, Web 2.0, etc.**
- > **New “zero carbon” computer and network architectures needed to connect remote computers, databases and instruments will be essential**
- > **New zero carbon applications and “gCommerce”**



“Zero Carbon” Data Centers

- > **Purchasing green power locally is expensive with significant transmission line losses**
 - Demand for green power within cities expected to grow dramatically
- > **Data center facilities **DON'T NEED TO BE LOCATED IN CITIES****
 - Cooling also a major problem in cities
- > **Most renewable energy sites are very remote and impractical to connect to electrical grid.**
 - But can be easily reached by an optical network
 - May also meet some of government's objectives of extending broadband to rural/remote areas
- > **Many examples already**
 - Green House Data, Cheyenne WY
 - AISO wind powered data farm
 - Iceland and Lithuania National strategies



Calculating 14064 for your network or ICT business

	14062 life cycle	operation 5 years coal
> Optical Switch	4 tons	20 tons
> Router	16 tons	500 tons
> Optical Amplifiers	2 tons	40 tons
> Computer server	12 tons	40 tons
> Ethernet switch	8 tons	20 tons
> PC	20 tons	5 tons
> Travel to install and repair	-	100 tons
> Virtualized network can save 50% of your carbon emissions!		



Do your 14064 NOW!!

- > **You can not earn credits after you implement network equipment or architectures to reduce CO2**
- > **Next year carbon is \$100 per ton in Europe**
- > **Many RFPs from government and industry are demanding ISO 14062 and ISO 14064 data and compliance**

Green IT MoU

- > **Initial Signatories: UCSD, UBC, PROMPT**
- > **To share best practices in reducing GHG emissions and baseline emission data for cyber-infrastructure and networks as per ISO 14064,**
- > **To explore carbon reduction strategies by new network and distributed computing architectures such as PROMPT G-NGI, OptiPuter and CineGrid.**
- > **To work with R&E network to explore relocation of resources to renewable energy sites, virtualization, etc.**
- >
- > **To explore the potential for a “virtual” carbon trading systems**
- > **To explore the creation of a multi-sector pilot of a generalized ICT carbon trading system including stakeholders from government, industry, and universities.**
- > **To collaborate with each other and with government agencies and departments and other organizations**



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NETWORKS > COLLABORATION > RESULTS > RÉSEAUX > COLLABORATION > RÉSULTATS



American College & University President's Climate Commitment

“Signatories agree to...

- Create institutional structures
- Select & implement tangible actions to reduce greenhouse gases
- Complete a comprehensive greenhouse gas inventory
- Develop a climate-neutral action plan
- Make information publicly available”