CANARIE

How ICT and Internet can help reduce global warming

Bill St. Arnaud

CANARIE Inc – www.canarie.ca

Bill.st.arnaud@canarie.ca

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 ℃, and a dee per 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

CANARIE

NETWORKS > COLLABORATION > RESULTS > RÉSEAUX > COLLABORATION > RÉSULTATS
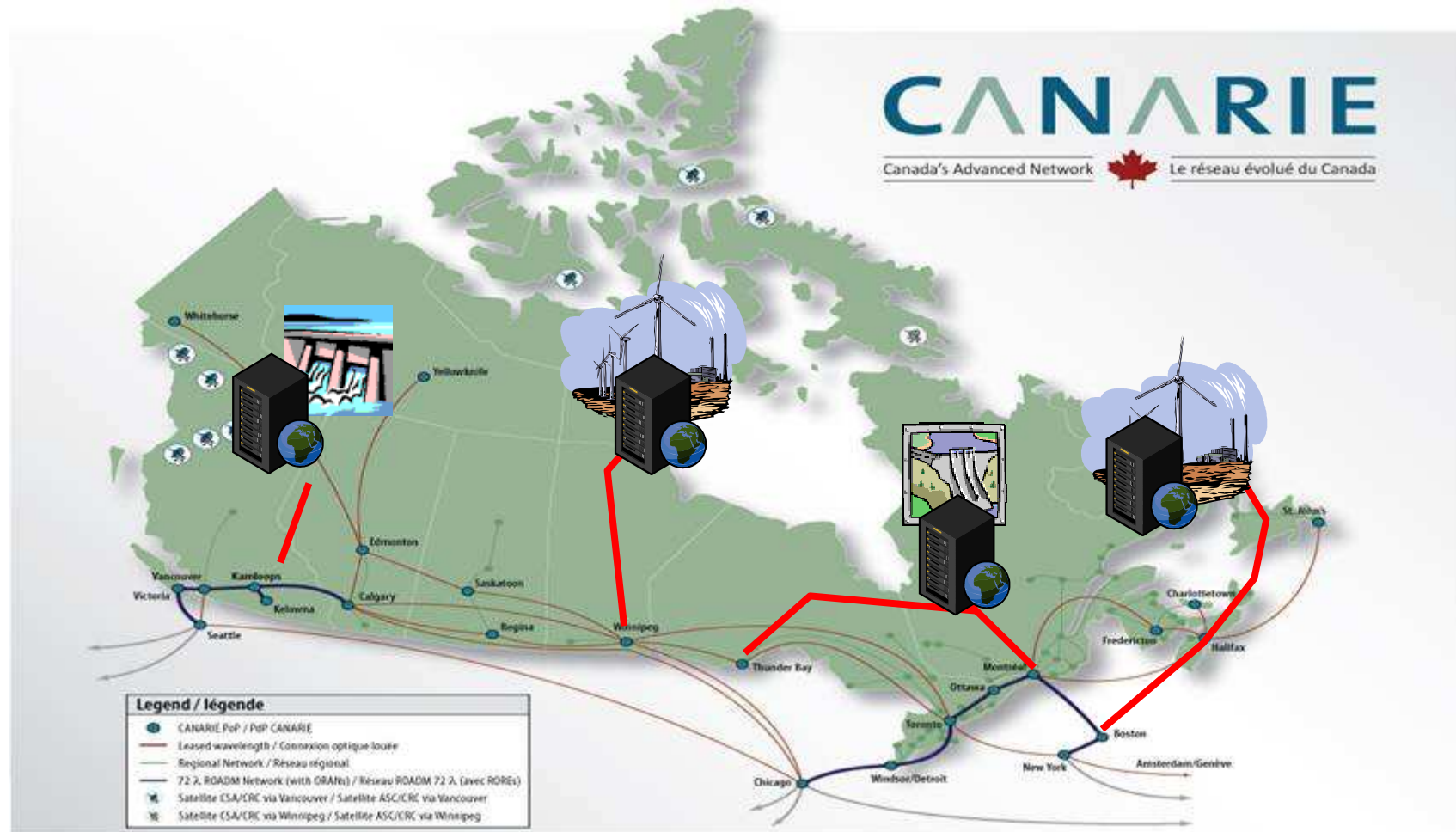
The Falsehood of Energy Efficiency

> **Lots of confusion between energy efficiency and consumption versus CO2 emissions**

> **The only thing that counts is CO2 emissions**

> **Most current approaches to reduce carbon footprint are focused on increased energy efficiency of equipment and processes**

> **This approach is doomed to failure because of Khazzoom-Brookes postulate (aka Jevons paradox)**
> – Greater energy efficiency reduces overall cost and therefore promotes increased usage

> **We need a "zero carbon" strategy because increased usage will not change emission equation**
> – Anything times zero is zero

"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 WO
>> –AISO wind powered data farm
>> –Iceland and Lithuania National strategies

"Zero Carbon" facilities connected by optical networks

ISO 14064/2/3

> **ISO 14064 is the accounting process required to validate whether a project actually reduces CO2**

> **ISO 14062/3 sets the measurement process for "life cycle" CO2 emissions for a product or service**

> **You need to implement ISO 14064 process to demonstrate actual CO2 reductions**

  – Vendors need to provide 14062/3 data for products and services

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	300 tons
> Ethernet switch	8 tons	200 tons
> PC	20 tons	5 tons
> Travel to install and repair	-	100 tons
> Total 14064	68 tons	1165 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**

Next Generation Internet to reduce Global Warming

> **PROMPT: New $50m research consortium made up of Bell Canada, Nortel, Ericsson, McGill, UoT**

  – International participation including GENI, CAL-IT2, Scripps, etc

> **Any future internet network, project, program or application must have as its primary objective of a zero carbon footprint**

> **Zero carbon condition applies to**

  – Remote instrumentation and laboratories

  – all optical, wireless and last mile networks

  – all routers, switches, and web servers

  – all applications, computers instrumentation

  – and all customer devices such as PCs, mobile phones, PDAs etc

CANARIE NETWORKS > COLLABORATION > RESULTS > RÉSEAUX > COLLABORATION > RÉSULTATS

Novel licensing approach

> **Instead of complicated licensing agreements and royalties payment for IP will be made through carbon offsets**

> **PROMPT plans to set up a number of testbeds to develop CO2 reduction protocols, verification and audit systems to measure networks and ICT ability to reduce CO2**
  - Specific target will be remote instrumentation and laboratories

> **PROMPT will work with various carbon offset brokerage firms to aggregate and sell carbon offsets**

> **Many companies like Cisco, Google, IBM, etc will purchase carbon offsets if you use their technology top reduce Co2**

Why Broadband is critical to reducing global warming

> 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).

SMART 2020

> Internet and ICT could reduce emissions by 15 per cent and save global industry $US 800 billion in annual energy costs by 2020.

> Could cut CO2 greater than the current annual emissions of either the US or China.

> One of the biggest contribution to reducing CO2 emissions by Internet and ICT is through "virtualization" or "de-materialization" of existing physical products and services.

> http://www.theclimategroup.org/news_and_events/news_and_comment/smart2020pressrelease

Solutions to reduce global warming

> **Carbon taxes**
  - Politically difficult to sell

> **Cap and trade**
  - Useful for big emitters like power companies
  - Addresses only supply side of CO_2

> **Carbon offsets**
  - Immature market with no standards
  - But addresses demand side of CO_2 by businesses and consumers

> **Carbon Neutrality imposed by law**
  - Growing in popularity especially as protests over gas tax escalates

> **But there may be an additional approach….**

CANARIE

Carbon Rewards rather carbon taxes

> **Although carbon taxes are revenue neutral, they payee rarely sees any direct benefit**
> – No incentive other than higher cost to reduce footprint

> **Rather than penalize consumers and businesses for carbon emissions, can we reward them for reducing their carbon emissions?**

> **Carbon rewards can be "virtual" products delivered over broadband networks such movies, books, education, health services etc**

> **Carbon reward can also be free ICT services (with low carbon footprint) such as Internet, cellphone, fiber to the home, etc**

Carbon Reward Examples

> **Free download music, video for a premium on electricity/gas**

> **Fire mobile cellphone service in return for a premium on gasoline purchase or toll road fees**

> **Free advanced tele-presence systems in exchange for carbon fees assessed on air travel**

> **Free mobile cell phone using femto cell and Wifi on public transportation**

Carbon Reward Strategy for last mile infrastructure

> **Provide free high speed Internet and fiber to the home with resale of electrical and gas power (ESCOs)**

> **Customer pays a premium on their gas and electric bill**

> **Customers encouraged to save money through reduced energy consumption and reduced carbon output**

> **Customer NOT penalized if they reduce energy consumption**
  - May end up paying substantially less then they do now for gas + electricity + broadband + telephone + cable

> **Network operator gets guaranteed revenue based on energy consumption rather than fickle triple play**

Thank you

> **More information**

> **http://green-broadband.blogspot.com**

>