ICT and climate change: making the connection

A background paper by *ICTandclimatechange.com* on the scope for using ICT to reduce the impact of greenhouse gas emissions and fight climate change.

Overview

The EU has set out its 2020 objectives for combating climate change, with goals which include:

- 20% reduction in EU greenhouse gas emissions, compared with 1990 levels, or 30% if other developed nations agree to take similar action
- renewables to rise to 20% of all energy consumed, with flexibility in how each country contributes to the overall EU target
- 20% increase in energy efficiency
- biofuels: 10% of all fuel used in transport
- energy policy for EU aimed at capping change at 2°C

These are bold targets. Meeting them will require a major effort across all economic sectors. So what is so special about ICT?

The scale of the challenge and the role of technology

The UN's Intergovernmental Panel on Climate Change (IPCC) which published its latest report in Bangkok in May 2007 said that most of the technology needed to stop climate change already exists, but that governments must act quickly to force through changes across all sectors of society.

In similar vein, the Stern Report published by the UK Treasury in late 2006, points out that carbon emissions have already increased global temperatures by more than 0.5°C and that with no action to cut greenhouse gases, we will warm the planet another 2-3°C within 50 years. This will transform the physical geography of the planet and the way we live, with floods, disease, storms and water shortages becoming more frequent.

Moreover, the effects of climate change could cost the world between 5% and 20% of GDP, prompting the worst recession since the 1920s. Action to reduce greenhouse gas emissions and the worst of global warming would cost 1% of GDP. With no action, each tonne of carbon dioxide we emit will cause at least $85 (£45) of damage. Stern proposes that levels of CO2 in the atmosphere should be limited to the equivalent of 450-550ppm, and that to achieve this, policy should include carbon pricing,

international agreements and new technology. There is little explicit mention of the role to be played by ICT in bringing about these changes.

ICT is different

When it comes to climate change, ICT is not just another economic sector. ICT has an important role to play in reducing greenhouse gas emissions (GHGs) throughout the economy, and can be a strategic ally in the fight against climate change.

Hitherto, the ICT sector has been viewed more in its role as a contributor to GHGs: for example, analysts estimate that ICT constitutes between 2 and 4% of global energy use. But there is a growing perception that ICT can become part of the solution, rather than being part of the problem.

Policy makers have previously viewed ICT in its role as an agent of, and enabler for, economic growth. But the potential role of ICT in helping to reduce GHGs is currently poorly understood. There needs to be a major strategic re-orientation in thinking about the ICT sector, developing the information needed to better understand the many ways in which ICT can help to reduce climate change.

ICT is part of the solution

Like most sectors of the economy, the ICT sector will be subject to the effects of climate change; and like most sectors of the economy, ICT is a contributor to climate change. But unlike most sectors of the economy, ICT can play a positive role in reducing the amount of GHGs throughout the economy.

GeSI, the Global e-Sustainability Initiative, which represents some of the major ICT players, has commented,

"Today, almost every commercial activity will involve ICT somewhere in its implementation... the sustainability footprint of ICT through its use by customers...is complex and hugely wide-ranging. ICT not only drives consumption patterns, but also offers exciting opportunities to dematerialise certain goods."

This aspect of ICT has, so far, received scant attention. Most of the focus on innovation and new technology has been concerned with de-carbonising energy production and road transport. But in making business more efficient, ICTs are already reducing the energy and materials needed for each unit of output and increasing overall productivity. In addition, the Internet stands to revolutionize the relation between economic growth and the environment. So ICT products, services and applications have massive potential to reduce climate change in other industrial and domestic sectors, not only in areas like building design and operation, or in transport - through a reduction in their carbon emissions, but

throughout the economy by fostering de-carbonisation and dematerialisation.

ETNO, the trade association of European Telecoms Network Operators has summed this up as follows, *"We need to be thinking about climate change not only as a threat, but also as an opportunity."* This could be described as a long-overdue recognition of the need for ICT players to step up to the challenges of climate change, not just in terms of reducing their own environmental footprints, but also in embracing the many product and service opportunities that ICT will produce, as the need to reduce GHGs across the economy becomes more pressing.

Despite the best efforts of ETNO, and some other ICT players to galvanize the debate, there is little empirical evidence to demonstrate the impact of ICT on reducing GHGs. What is needed is a process to develop an understanding of how ICT can help in the battle to reduce GHGs, positioning the sector as an enabler of societal re-structuring that can decouple energy consumption from economic growth. This will enable us to provide compelling evidence that, when it comes to a carbon cost benefit analysis, ICT can provide a positive outcome for all of society.

ICT and economic growth

Below is a table representing 12 companies from high emitting sectors contrasted with 12 companies from the ICT sector, data from public sources including the Carbon Disclosure Project (www.cdproject.net)

High emitters: include: 4 Airlines, 3 Cement, 3 Steel and 2 Auto manufacturers.
ICT: include 4 Hardware, 1 Software, 1 Broadcaster and 6 Network operators.

High emitters	**Sales $bn**	**Earnings $bn**	**M/cap $bn**	**CO2 tonnes**	**P/e ratio**
Air France	28.5	1.59	11.49	**15.5**	**7.7**
British Airways	16.5	1.2	11.14	**16.1**	**9.3**
Japan Airlines	19.9	0.52	5.93	**16.97**	**11.4**
Singapore Airlines	13.34	1.66	13.37	**13.1**	**8**
Lafarge	22.5	1.82	26.28	**89.2**	**14.4**
Holcim	19.82	1.73	24.81	**74.51**	**14.3**
Cemex	17.59	2.23	25.54	**50.47**	**11.4**
Arcelor	54.08	3.99	41.28	**74.7**	**10.3**
Nippon Steel	33.45	2.93	45.9	**61**	**15.7**
Posco	26.76	4.24	32.45	**62.8**	**7.6**
General Motors	206.71	4.09	16.5	**12.3**	**4**

Ford	160.12	4.79	14.29	**8.4**	**3**
Total	**619.27**	**30.79**	**268.98**	**495.05**	**Average 9.7**

ICT

	Sales $bn	**Earnings $bn**	**M/cap $bn**	**CO2 tonnes**	
Cisco	31.9	10.34	157	**0.5**	**15.2**
Intel	35.38	12.49	110	**4**	**8.8**
HP	94.08	10.16	106.82	**1.54**	**10.5**
IBM	91.42	18.95	140.39	**2.67**	**7.4**
Microsoft	46	17.94	267.62	**0.46**	**14.9**
Sky	8.03	1.06	19.1	**0.03**	**18**
Vodafone	56.99	22.83	142.77	**1.3**	**6.2**
BT	37.86	2.9	48.15	**0.74**	**16.6**
Bell Canada	15.06	1.7	20.66	**0.28**	**12.1**
NTT	91.99	4.26	70.41	**3.19**	**16.5**
NTT (mobile)	40.81	5.22	77.8	**0.86**	**14.9**
Swisscom	7.98	1.31	18.63	**0.02**	**14.2**
Total	**557.5**	**109.16**	**1179.35**	**15.59**	**Average 17.9**

Key observations from the above table include:

1. The High emitters generate larger revenue.
2. BUT High emitters generate only 28% of the earnings of ICT
3. The High emitters have only 23% of the ICT market capitalization
4. BUT High emitters produce 32 times more CO2
5. Per tonne of CO2 High emitters earn $62, ICT earns $6,992
6. ICT produces 112 times more profit per tonne of CO2 than High emitters.

It follows that the ICT economy can grow far more safely than for example air, autos or construction. Most importantly, ICT companies can increase their revenues by helping to build a low carbon economy.

Modelling ICT and energy efficiency

The relationship between ICTs and GHGs is highly complex and poorly understood., but there are clearly sectors where ICT could potentially have a high impact on GHG emissions. The Stern Review cites sector emissions of GHGs in 2000, mostly CO2, as follows: energy emissions: 65%; non-energy emissions: 35%.

The energy emissions which comprise 65% of total GHGs and which are apparently most susceptible to the influence of ICT are: power 24%, industry 14%, transport 14%, buildings 8%, and other energy-related 5%.

A large amount of detailed work would be needed in order to develop a full model. Evidence would need to be collated on effects of individual ICT measures, for instance telecoms resulting in less physical travel. So far, there is little comprehensive evidence on these measures, and what exists is patchy and variable.

Next steps

ICTandclimatechange.com has started developing the model. Please get in touch if you would like to discuss this with us.