Report summary

The ICT sector has transformed the way we live, work, learn and play. From mobile phones and micro-computer chips to the internet, ICT has consistently delivered innovative products and services that are now an integral part of everyday life. ICT has systematically increased productivity and supported economic growth across both developed and developing countries. But what impact do pervasive information and communication technologies have on global warming? Is it a sector that will hinder or help our fight against dangerous climate change?

To answer these questions, this report has quantified the direct emissions from ICT products and services based on expected growth in the sector. It also looked at where ICT could enable significant reductions of emissions in other sectors of the economy and has quantified these in terms of CO_2e emission savings and cost savings.

Aside from emissions associated with deforestation, the largest contribution to man-made GHG emissions comes from power generation and fuel used for transportation. It is therefore not surprising that the biggest role ICTs could play is in helping to improve energy efficiency in power transmission and distribution (T&D), in buildings and factories that demand power and in the use of transportation to deliver goods.

In total, ICTs could deliver approximately 7.8 $GtCO_2$e of emissions savings in 2020. This represents 15% of emissions in 2020 based on a BAU estimation. It represents a significant proportion of the reductions below 1990 levels that scientists and economists recommend by 2020 to avoid dangerous climate change[1] In economic terms, the ICT-enabled energy efficiency translates into approximately €600 billion ($946.5 billion[2]) of cost savings.[3] It is an opportunity that cannot be overlooked.

Our analysis identifies some of the biggest and most accessible opportunities for ICT to achieve these savings.

- **Smart motor systems:** A review of manufacturing in China has identified that without optimisation, 10% of China's emissions (2% of global emissions) in 2020 will come from China's motor systems alone and to improve industrial efficiency even by 10% would deliver up to 200 million tonnes (Mt) CO_2e savings. Applied globally, optimised motors and industrial automation would reduce 0.97 $GtCO_2$e in 2020, worth €68 billion ($107.2 billion).[4]

- **Smart logistics:** Through a host of efficiencies in transport and storage, smart logistics in Europe could deliver fuel, electricity and heating savings of 225 $MtCO_2$e. The global emissions savings from smart logistics in 2020 would reach 1.52 $GtCO_2$e, with energy savings worth €280 billion ($441.7 billion).

- **Smart buildings:** A closer look at buildings in North America indicates that better building design, management and automation could save 15% of North America's buildings emissions. Globally, smart buildings technologies would enable 1.68 $GtCO_2$e of emissions savings, worth €216 billion ($340.8 billion).

- **Smart grids:** Reducing T&D losses in India's power sector by 30% is possible through better monitoring and management of electricity grids, first with smart meters and then by integrating more advanced ICTs into the so-called energy internet. Smart grid technologies were the largest opportunity found in the study and could globally reduce 2.03 $GtCO_2$e , worth €79 billion ($124.6 billion).

[1] The Stern Review suggested that developed countries reduce emissions 20-40% below the 1990 levels would be a necessary interim target based on IPCC and Hadley Centre analysis. Source: Stern, N (2008), *Key Elements of a Global Deal on Climate Change*, London School of Economics and Political Science, http://www.lse.ac.uk/collections/climateNetwork/publications/KeyElementsOfAGlobalDeal_30Apr08.pdf

[2] All currency conversions to US$ based on exchange rate €1=$ 1.57757, obtained at http://xe.com on 9th June 2008.

[3] Exact figures: €553 billion ($872.3 billion) in energy and fuel saved and an additional €91 billion ($143.5 billion) in carbon saved, assuming a cost of carbon of €20/tonne, for a total of €644 billion ($1,015 billion) savings.

[4] All value figures here include a cost for carbon of €20/tonne. See Appendix 3 for detailed assumptions.

While the sector plans to significantly step up the energy efficiency of its products and services, ICT's largest influence will be by enabling energy efficiencies in other sectors, an opportunity that could deliver carbon savings five times larger than the total emissions from the entire ICT sector in 2020.

These are not easy wins. There are policy, market and behavioural hurdles that need to be overcome to deliver the savings possible. For example, Chinese factory managers find it difficult to stop producing long enough to implement more efficient industrial processes because they risk losing revenue and competitiveness.

Logistics efficiency is hampered by fragmentation in the market, which makes it difficult to coordinate across the sector to achieve economies of scale. Even with the latest technologies implemented, buildings are only efficient if managed properly. In India, there is no coordinated national roadmap for smart grid implementation and more needs to be done to build the cross-functional and cross-sectoral capabilities needed to design and implement innovative business and operating models and deliver new technology solutions.

In addition to the savings possible by supporting other sectors to become more energy efficient, there are also potential energy savings from dematerialisation or substitution – replacing high carbon physical products and activities (such as books and meetings) with virtual low carbon equivalents (e-commerce/e-government and advanced videoconferencing). Our study indicates that using technology to dematerialise the way we work and operate across public and private sectors could deliver a reduction of 500 $MtCO_2e$ in 2020 – the equivalent of the total ICT footprint in 2002, or just under the emissions of the UK in 2007. However, these solutions would need to be more widely implemented than they are today to realise their full abatement potential.

This is the opportunity the ICT sector has in the fight against climate change. But it does come at a cost. Emissions from the sector are estimated to rise significantly over the coming years – from 0.5 $GtCO_2e$ today to 1.4 $GtCO_2e$ in 2020 under BAU growth.[5] This growth assumes that the sector will continue to make the impressive advances in energy efficiency that it has done previously. However, meeting the sheer scale of demand for products and necessary supporting services in emerging markets such as China and India and continuing to deliver the services to increase productivity growth in the developed world will effectively outweigh the adoption of the current wave of efficiency benefits per product or service. There is also the possibility that the speed of introduction and the impact of new ICT technology or the mass adoption of social networking could cut carbon emissions in ways currently impossible to predict.

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Getting SMART

The scale of emissions reductions that could be enabled by the smart integration of ICT into new ways of operating, living, working, learning and travelling makes the sector a key player in the fight against climate change, despite its own growing carbon footprint. No other sector can

[5] The scope of this analysis includes whole life emissions from PCs and peripherals, data centres, telecoms networks and devices.

supply technology capabilities so integral to energy efficiency across such a range of other sectors or industries.

But with this potential comes responsibility. Emissions reductions in other sectors will not simply present themselves; the ICT sector must demonstrate leadership on climate change and governments must provide the optimum regulatory context. This report outlines the key actions needed.

These actions can be summarised as the SMART transformation. The challenge of climate change presents an opportunity for ICT to first standardise (S) how energy consumption and emissions information can be traced across different processes beyond the ICT sector's own products and services. It can monitor (M) energy consumption and emissions across the economy in real time, providing the data needed to optimise for energy efficiency. Network tools can be developed that allow accountability (A) for energy consumption and emissions alongside other key business priorities. This information can be used to rethink (R) how we should live, learn, play and work in a low carbon economy, initially by optimising efficiency, but also by providing viable low cost alternatives to high carbon activities. Although isolated efficiency gains do have an impact, ultimately it will be a platform – or a set of technologies and architectures – working coherently together, that will have the greatest impact. It is through this enabling platform that transformation (T) of the economy will occur, when standardisation, monitoring, accounting, optimisation and the business models that drive low carbon alternatives can be developed and diffused at scale across all sectors of the economy.

The ICT sector can't act in isolation if it is to seize its opportunity to tackle climate change. It will need the help of governments and other industries. Smart implementation of ICTs will require policy support including standards implementation, secure communication of information within and between sectors and financing for research and pilot projects.

This report demonstrates the potential role the ICT sector could play in mitigating climate change. It is now up to policy makers, industry leaders and the sector itself to make sure this potential is realised. The stakes couldn't be higher.