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Discussion Paper

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ICTs and environmental sustainability

Highlights

- A snapshot on climate change and the role of ICTs
- ICTs as both enabler and driver of sustainable solutions
- The ICT industry and its own footprint
- The policy landscape

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ICTs and environmental sustainability

Discussion paper

I. Introduction

Information and Communication Technologies (ICT or ICTs) continue to transform, around the world how we live, work and play. As a key contributor to growth and employment, ICTs increase efficiency and productivity, creating jobs and supporting business models which recognize the portability[1] of information, workforce mobility and distribution of resources.

The power of ICTs as an economic enabler is particularly true in the context of increased availability of high-speed Internet. The Internet, which is an excellent example of the application of ICTs, has also been a major driver of globalization, multiplying the positive effects of innovation in management and operational processes, and the distribution of wealth and opportunities for employment. Generally speaking, for every dollar invested in broadband IP (Internet protocol) technologies and collaborative tools, another four dollars are generated in return.[2] And, the World Bank has estimated that for every 10% increase in high-speed Internet access, economic growth rises 1.3%.[3]

Together with these economic implications of ICTs, industry can have key roles in addressing such critical societal goals as enabling transition to a low carbon economy by increasing energy efficiency, reducing energy use and managing scarce resources. Climate change is one of the most pressing challenges of our times, linked as it is with real needs for energy, development and economic growth. It is a global long-term problem that requires collaborative solutions, and the engagement of all countries in a cooperative spirit will be crucial to success. Smart ICT applications and the Internet can enable energy efficiency improvements in areas as diverse as building design and maintenance, transport and logistics, electricity generation, distribution and consumption, travel substitution, product dematerialization and enable a myriad of other daily process efficiencies. Equally, ICTs provide information and analytic tools to organizations and individual consumers which empower them to adapt their behaviour in an environmentally responsible manner.

II. A snapshot on climate change and the role of ICTs

Global green-house gas (GHG) emissions from human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004.[4] Most of the observed increase in global average temperatures since the mid-20th century is very likely due to the increase in anthropogenic GHG concentrations.[5] New scientific research, which has occurred since the Inter-governmental Panel on Climate Change's (IPPC) Fourth Report was issued in 2007, indicates that changes in GHG concentrations and sea-levels are occurring faster than expected, and the risks of major regional climate disruptions are greater than were predicted even a few years ago.[6]

ICT use is responsible for approximately 2-3 % of current global carbon dioxide emissions. However,

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1 *In this context, portability is defined as the ability for people to re-use their data across interoperable applications.*

2 *Frost & Sullivan also estimated in 2009 that approximately 500,000 new jobs are created for every $10 billion increase in digital investment.*

3 *See Information and Communications for Development 2009: Extending Reach and Increasing Impact, World Bank Publications 2009, at: http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0, contentMDK:22231728~pagePK: 64257043~pi PK:437376~theSitePK:4607,00.html.*

4 *See Intergovernmental Panel on Climate Change's Fourth Report, UN Inter-governmental Panel on Climate Change 2007, at: http://www.ipcc.ch/#.*

5 *Id.*

6 *Richardson, et al., Synthesis Report - Climate Change Global Risks, Challenges & Decisions, Copenhagen (10-12 March 2009): www.climatecongress.ku.dk.*

the use of ICTs accounts for roughly 40% of recent overall productivity growth among OECD countries. The application of ICTs has real potential to reduce energy consumption in the remaining 97- 98% of carbon emissions. The notion that ICTs are part of the solution – they can have significant impact to enable socio-economic policy agendas, particularly in reduction of carbon footprint – was at the heart of the GeSI (Global e-Sustainability Initiative) Smart 2020 study. This study found that ICTs, when deployed strategically in business processes and to eco-enable everyday activity, have the potential to reduce global carbon dioxide emissions by 15% equal to 7.8 GtCO2e by 2020[7], an amount five times larger than its own carbon footprint.[8]

In the United Kingdom, the Stern Review[9] suggested, as an interim target, that developed countries seek to reduce emissions 20-40% below 1990 levels.[10] Subsequently, the Copenhagen Accord, reached on 18 December 2009, recognized "the scientific view that the increase in global temperature should be below 2 degrees Celsius," in the context of sustainable development, to combat climate change.[11] Based in part upon the analysis undertaken in GeSI, the goals recommended in the Stern Review and issues like those addressed in the Copenhagen Accord, the European Policy Centre (EPC) task force on economic recovery identified three critical elements that must be put into place in order to achieve ambitious climate goals:

- Carbon-accounting infrastructure to make energy use and carbon emissions visible;
- Smart electrical power grid system, to accommodate new demands for renewable energy, energy efficiency and consumer empowerment; and
- High-speed broadband access to the Internet, to enable telework and other efficiencies.[12]

With nearly 70 percent of industry with revenues of US$1 billion or more planning to increase spending on energy efficiency and climate change within the next 12 months, far-reaching opportunities exist for the ICT sector to be a key element in the drive to lower emissions.[13]

III. ICTs as both enabler and driver of sustainable solutions

■ Facilities management and smart grids

Some of these opportunities relate to ICT use in more efficient facilities management. For instance, sensor-based broadband applications can foster effective responses to environmental change as well as improving efficiency of current building and grounds systems. The potential total emissions avoidance from the implementation of smart building solutions, for example, are estimated to be as

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[7] *Various units of measure are used throughout this document, and a conscious decision was made to depict units of measure applied in the original work or effort, rather than attempt to harmonize among disparate measures for purposes of this paper and perhaps misrepresent the findings.*

[8] *Global e-Sustainability Initiative, Smart 2020 Report 2008, at: www.smart2020.org/_assets/files/02_Smart2020Report.pdf [hereinafter "Smart 2020 Report"], p. 20. For example, GeSI estimated that smart buildings that consume less energy could abate up to 360 million metric tons of CO_2 and save $20-$40 billion.*

[9] *The Stern Review on the Economics of Climate Change (http://www.occ.gov.uk/activities/stern.htm), the most comprehensive review ever carried out on the economics of climate change, was published on October 30 2006 and was lead by Lord Stern, the then Head of the U.K. Government Economic Service and former World Bank Chief Economist. See also Stern, N (2008), Key Elements of a Global Deal on Climate Change, LSE, www.lse.ac.uk/collections/climateNetwork/_publications/KeyElementsOfAGlobalDeal_30Apr08.pdf.*

[10] *See id., at 10-11.*

[11] *The Copenhagen Accord, a document that delegates to the 15th session of the Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change agreed to "take note of", can be viewed at: http://unfccc.int/files/meetings/cop_15/application/pdf/cop15_cph/auv.pdf.*

[12] *Economic Recovery to a Greener Economy: Mobilising ICT-based Innovations, EPC Policy Brief (July 2009), at: http://www.epc.eu/documents/uploads/373530745_Economic%20recovery%20to%20a%20greener%20economy.pdf*

[13] *See Zabarenko, Deborah, Majority of Firms will Spend More on Climate Change, Reuters (25 May 2010).*

high as 1.68Gt C02e by 2020.[14] Related studies have identified that advanced technologies in the facilities space, such as Building Energy Management Systems (BEMS), could lead to energy savings of between 5%-40%.[15] The cost savings attributable to smart metered buildings has also been estimated at $40-$50 billion per year.[16] Further, a smart electrical grid – an ICT-enabled energy management system, which overlays a communications control network on the electrical grid – could potentially reduce CO2 emissions in the U.S. by up to 480 MMT of CO2 and save $15-$35 billion in energy and fuel costs.[17]

Examples

Deutsche Telekom and T-Systems, in cooperation with ABB, have launched a project to establish platforms for the management of energy distributions networks and smart homes. Digital meters send the consumption data via radio communication or DSL, software processes the information and makes it available to the customer on a personalized Internet portal – and the information can be updated every 15 minutes if desired. Integration of the smart meter marks the first step for Friedrichshafen's (the first test city in the project) toward implementation of a full smart grid solution. The objective is to incrementally equip power supply systems with communication solutions in order to better attune supply and demand.

In the U.S., Verizon Wireless is working with Consert, IBM and the Fayetteville Public Works Commission in North Carolina to launch a smart grid pilot project with more than 200 commercial and residential participants.[18] Users can set daily use profiles, check and adjust energy consumption from an Internet connection, select a monthly target bill amount and authorize public works to cycle their appliances off for brief periods during peak energy times. Results to-date indicate that the typical consumer can save, on average, 15% or more of their normal energy use solely through monitoring.

Also helping U.S. consumers to understand the economics of their consumption patterns, AT&T is working with SmartSynch to deploy a cost-effective point-to-point solution in which energy meters communicate directly with a utility's central system over a wireless network. Through use of a SIM card installed in every smart meter, much like a mobile phone, the AT&T service enables intelligent energy decisions through meter reading at set intervals, remote service connect/disconnect capabilities and real-time notification of outages.

Telefónica is also working actively on the contribution of ICTs for the development of smart buildings services, having recently launched "inmotics", an innovative service which consists of the remote control of energy systems and electricity consumption from devices and building lighting. This solution provides all the needed tools to intelligently control all the consumption elements within an office network, allowing energy consumption within buildings to be automatically controlled and reduced by an estimated 27%, with related reduction in CO2 emissions, according to the experiences of several banking and services companies engaged in the pilot.

The "Sustainable City" concept developed by France Telecom-Orange is a multi-network solution (radio, GPRS, Internet) that provides a wide array of information for municipal management, including environmental surveillance, management of street lighting, waste containers, municipal watering systems and traffic. The concept began as an experiment in 2007 in the city of Cagnes-sur-Mer, in the South of France. Based on "machine-to-machine" (M2M) operating techniques, "the sustainable city" enables the city of Cagnes-sur-Mer to automatically control its environment parameters in real time via a network of sensors, for temperature (seawater, air), sound disturbances, wind speed, UV

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[14] *See Green Technology: Driving Economic and Environmental Benefits from ICT, a World Econ. Forum Report (Jan. 2009) [hereinafter "Green Technology"], at: http://www.weforum.org/pdf/ip/ittc/Green%20Technology%20Report.pdf, at 11.*

[15] *See id. at 11, citing Oxford University, "Six Cases of Corporate Strategic Responses to Environmental Regulation."*

[16] *See id.*

[17] *See Green Technology, supra note 14, at 8.*

[18] *Verizon 09/10 Corporate Responsibility Report, p. 56, at: http://responsibility.verizon.com/images/vz_uploads/verizon_cr_report_2009-2010.pdf.*

index and hydrometers.

In the U.K., BT is joining forces with Arqiva and Detica to offer a dedicated and secure long range radio communications solution for the U.K. government's proposed smart metering initiative. Due to cover 28 million homes and small business properties by 2020, this multi-billion pound initiative is designed to reduce energy costs and lower Great Britain's carbon dioxide emissions by 2.6 million tonnes per year once the rollout is complete.[19]

The full potential of intelligent ICT solutions such as smart grids, buildings and homes may not immediately be realized unless consumer behaviour is also changed, and this will require and enabling policy environment. Consumer and user education will be a critically important complement to any policies and programs on ICTs and the environment. Denmark's Action Plan for Green IT, for instance, highlights children and young people as the largest group of private ICT consumers, and it envisions increasing environmental awareness by using favored communications platforms – gaming and social networking sites – for messaging.[20] Similarly, Japan's Green IT Initiative aims to increase societal awareness of environmental issues through measurement and visualization of the net impact of ICTs on the environment.[21]

The Connected Urban Development (CUD) partnership, including Cisco and the Clinton Global Initiative, is also seeking to actualize technology-driven goals through education – demonstrating emissions reduction through ICT-enabled improvements in the efficiency of urban infrastructure. The emphasis of CUD is on partnerships with global cities to promote innovative practices for reducing carbon emissions while fostering economic growth. The founding CUD cities are: San Francisco, Amsterdam and Seoul, with Birmingham, Hamburg, Lisbon and Madrid having joined the program in 2008.[22]

- Transportation infrastructure

In this era of heightened concern regarding climate change, how we organize traffic and travel has become a critical concern, particularly for urban environments. If there is less traffic, there is less CO2. It is estimated that the amount of fuel wasted by congestion in U.S. urban areas alone has increased 480%, from 500 million gallons to 2.9 billion gallons from 1982 to 2005.[23] ICT-based services and solutions can help to optimize traffic flows and, where possible, avoid them completely. For instance, improvements in supply chain logistics can minimize travel among distribution networks. Telematics solutions can optimize loading and route management for goods transport vehicles, taking more traffic off the road and lowering logistics company costs. Optimal route management – through smart mapping and other tools enabled by ICTs – can work to impact the average time that a car driver spends today in traffic jams, which equates to a full three days and nights per year or, if measured for all, approximately 14 billion liters in unnecessarily used fuel.

Another example of opportunities for improved efficiency is fleet management telematics, which can track and monitor vehicle idle time, with a tremendous potential to reduce fuel costs and CO2 emissions. For instance, France Telecom-Orange M2M fleet management solution enables users to improve their vehicle preventive maintenance by reducing covered distances and monitoring engine performance. The benefit is two-fold: greater productivity and decreased CO2 emissions, particularly when remote monitoring and metering solutions are extended to management of public infrastructure. For example, the remote gas consumption metering system developed by Orange Business Services for Primagaz resulted in a 48-metric ton reduction in CO2 in 2009.

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[19] *BT has also launched an additional service in this area. Entitled Carbon Impact Assessment, the solution assists customers to understand and reduce the carbon footprint arising from their own use of ICT services.*

[20] *See OECD, Towards Green ICT Strategies: Assessing Policies and Programmes on ICT and the Environment (2009), at 20.*

[21] *See Green Technology, supra note 14, at 21.*

[22] *For more information, see: www.connectedurbandevelopment.org.*

[23] *See Green Technology, supra note 14, at 13, citing Technology CEO Council, "A Smarter Shade of Green."*

Similarly, through the deployment of Oracle Corporation's Transportation Management Software, Kraft Foods was able to reduce costs in its large-scale food production distribution operation in the United States which includes 500 shipping points, 6000 destinations and 2500 trucks on the road each day. The transportation management application enabled a reduction in wasteful, energy consuming and costly empty truck movements. In the first year, 500,000 miles of "empty miles" were eliminated also enabling a reduction in greenhouse gas emissions by an average of 3.3 pounds per mile.

In the U.S., traffic congestion creates a US$78 billion annual drain on the U.S. economy in the form of 4.2 billion lost hours.[24] It is estimated that efficiencies in ground transportation, many of which would rely on ICT to be actualized could reduce travel time and congestion, shaving off up to 440 MMT of CO2 emissions and saving $65-$115 billion.[25] As products and services become 'digital', online delivery can also reduce environmental impacts across all sectors of the economy. Online-enabled fulfillment of off-line commerce has demonstrated benefits, as a doubling in e-commerce over a 10-period could enable a total reduction in greenhouse gases emissions of 206.3 million tons (187 million metric tons) per decade.[26]

France and Germany have already advanced campaigns advocating the use of public transport to reduce congestion and green-house emissions – campaigns made more appealing thanks to the application of ICT solutions. Both countries are presently among the most advanced in Europe in the deployment of contactless applications such as public transport ticketing services via mobile phones (also called "near field communication," or NFC). The French association of transport authorities, in cooperation with mobile operators and transport companies, launched a commercial pilot applying mobile NFC in Nice in May 2010. The Paris region and several other French cities have also announced their intentions to deploy NFC solutions dubbed "Touch & Travel" – which are also currently piloted among Frankfurt, Cologne, Düsseldorf, Hannover and Berlin.

- Travel substitution and global collaboration

Travel substitution (virtual meetings and flexible work arrangements facilitated by IP networks) could reduce CO2 by up to 130 MMT and save $20-$40 billion.[27] For instance, Cisco's use of its own Telepresence solution, as of mid-2009, resulted in an avoidance of 120,815 in-person meetings, with a travel cost savings of $483 million, productivity savings (in employee time re-tasked from travel) of $181 million, and a GHG reduction of 260,960 metric tons (equivalent to taking 45,149 cars off the road.[28]

To date, Telefónica has installed 17 Telepresence rooms in its offices worldwide, generating a collaborative space for time optimisation and the reduction of the international travel costs and CO2 emissions associated with travel to meetings. Early indications were that the use of Telepresence rooms across the group has a potential to reduce CO2 emissions by 7500 tons per year, considering an average of 200 to 300 business trips avoided per month.[29] In the "Telepresence Revolution," a

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[24] *See id.*

[25] *See US Addendum to the GeSI Smart 2020 Report [hereinafter "US Addendum to Gesi Report"], at 8, available at http://www.gesi.org/ReportsPublications/tabid/60/Default.aspx.*

[26] *See id. In 2006, European B2C e-commerce sales of goods and services (including online travel, event tickets, and digital downloads) totaled US$182 billion. With a projected annual growth rate of 34% through 2010, the market is projected to triple, reaching US$578 billion by 2010. Both in the U.S. and Europe, the vast majority of sales is in the B2B (business to business) segment, which accounts for around 87% of the total online sales in Europe and about US$2.2 trillion of turnover in the U.S. Id.*

[27] *See id., at 42.*

[28] *For more information on Telepresence, see: www.informationweek.com/news/government/state-local/showArticle.hjtml?article ID=224200650. Verizon presently operates 29 high-definition videoconferencing sites, including 12 internationally, using Cisco's Telepresence product on its own global network. See Verizon 09/10 Corporate Responsibility Report, p. 53, at: http://responsibility.verizon.com/images/vz_uploads/verizon_cr_report_2009-2010.pdf.*

[29] *For additional information, see: http://www.global.telefonica-data.com/es/catalogo/telepresencia/calculo telepresencia.html.*

study by the Carbon Disclosure Project and supported by AT&T, it found that a company with $1 billion or more in annual revenue using four Telepresence rooms could achieve a financial return on investment in as little as 15 months. The study also found the use of Telepresence could: 1) save nearly 900 business trips in the first year of use; and 2) reduce emissions by 2,271 metric tons over five years – the greenhouse gas equivalent of removing 434 passenger vehicles from the road for one year.

Additional efficiencies – whether through Telepresence, conferencing or other similar innovations – can be enabled by global collaboration, creating personnel synergies, while reducing travel cost and impact. For example, consider a global health IT company, based in Australia, which plans to use private IP and other unified telecommunications solutions (such as IP telephony, 'follow me' solutions, IP-enabled audio and video conferencing) to integrate disparate work teams. Facilitating collaboration among applications developers in Bangalore, Chennai, and the UK for instance, as Verizon has found, can enable 25% efficiencies in the overall IT budget through global teamwork. A growing number of examples are producing similarly compelling results:

- A 2008 report by the University of Bradford and Sustain IT entitled "Conferencing at BT" showed that use of tele-conferencing solutions by BT has eliminated 717,494 face-to-face meetings. Each conference, on average, avoided travel of 267 miles across all modes of transport, with a minimum savings of 55kgs of CO2 per call (and a net annual savings of at least 53,552 tonnes of CO2 in one year alone).
- A study by Deutsche Telekom also showed that a videoconference over a distance of 100 kilometers uses less than 5% of the primary energy that would be consumed if the participants were to travel by car.[30]
- France Telecom-Orange has deployed other teleworking solutions to limit employee travel, enable mobile access to the workplace, and operationalize Internet-based collaborative work tools.
- Employing related solutions deep into operations, Telecom Italia's info412 call centers now have almost a quarter of its workforce e-working. Telecom Italia has found that home-based staff spends 15% less time on calls and take 3.3% more calls per hour than colleagues based in the call center.[31]
- By 2010, similar efforts by AT&T support approximately ten thousand remote workers, and based on a customer survey, estimates are that these solutions avoided 142 million commuter miles in 2009, resulting in a net reduction of 61,637 metric tonnes of CO2e.

For many businesses, the manner in which they conduct their operations can be optimized and improved by looking at the underlying business processes and ensuring they are streamlined, interoperable and most effective. Most business processes have an ICT component, and by understanding how processes are supported by applications and infrastructure, ICTs can help drive more efficient and greener processes. Invariably, each initiative will need an element of investment and should provide payback in operational efficiency, productivity improvements, revenue enhancements or cost reductions along with the underlying measurement of a reduced CO2 footprint.

eHealth and mobile health efficiencies can have similar impacts on traditional processes, by giving patients the option of meeting a physician virtually instead of having to travel to the health care center. In studying an eHealth system it deployed in Zagreb, Croatia, Ericsson found that the use of e-referrals and prescriptions had the potential to reduce CO_2e emissions by up to 15,000 tonnes per year through reductions in patient travel and paper consumption.

Similar efficiencies can also be utilized to consolidate or replace physical devices, increasing value and lowering energy use. Large power-hungry computer systems can be replaced by leaner computers known as thin clients, using only about ¼ of conventional PC power. Storage space and computing power are simply sourced from a main data center, in exactly the quantities that the

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[30] *See Green Technology, supra note 14, at 11, citing Lehman Brothers, "The Business of Climate Change."*

[31] *See id.*

company needs at that moment. In addition, the latest security solutions can be facilitated 'in the cloud'. Fault management, monitoring, security assessment, threat detection and prevention can occur through solutions deployed to act as communications network traffic moves between public and private networks – stopping denial of service and other cyber-security attacks at the backbone. ICTs are also being used actively to track consumption mitigation through implementation of these technical efficiencies. For instance, to-date, more than 1.2 million servers have been virtualized globally, which is equal to saving 8.4 billion kilowatt-hours of electricity a year.[32]

- Dematerialization or transformation of business processes

Relatively simple actions can have a significant impact on the environment and energy efficiency. "Dematerialization," or the presentation of information in a digital rather than physical form, can facilitate communications between suppliers and customers and reduce green house gas emissions and solid waste disposal problems. For instance, studies in the U.S. projected a savings of 16 million trees (2 million tons of wood), reduction in GHGs by 3.9 billion pounds, elimination of 1.6 billion pounds of solid waste and a decrease in 13 billion gallons of toxic waste water, if every American household would switch to on-line billing and payment.

Progress Energy is a Fortune 250 electric utility company serving approximately 3 million customers in the southern U.S. It seeks to reduce billing costs and enhance customer service. Working with Oracle, it has introduced a new electronic billing and payment platform for its customers. Not only did the solution result in an annual savings in payment processing, paper and printing costs, but it saves 365 tons of paper, 730 tons of trees, 6 million gallons of water and prevents emissions of 1.85 million pounds of GHG.

Ericsson has made a similar study of possible efficiencies in the digital delivery of taped media. A single media campaign using traditional methods produces approximately 410kg of CO_2e emissions, whereas the Ericsson Spots4media digital delivery solution produces approximately 40kg of CO_2e emissions, including tapes and physical distribution. The actual addition due to the ICT service is less than 2kg of CO_2e per media campaign – a 91% net reduction of CO_2e emissions per media campaign.

IV. The ICT industry and its own footprint

The rising energy demands of some ICT infrastructures need to be addressed to lower the environmental impact of a rapidly widening range of ICTs and applications products. Although ICTs are presently responsible for approximately 2% of carbon emissions,[33] some estimate that emissions from the ICT sector will rise in the coming years from approximately 0.5 GtCO2e today (the equivalent of .5 billion metric tonnes of CO2) to 1.4 Gt CO2e by 2020.[34]

Nothing in the ICT sector functions without energy. However, not every computer or every device is the same. Innovative technology can actually work far more efficiently with the same or improved performance, and ICC members are working actively to reduce energy consumption / CO2 emissions in the ICT sector:

- Green Data Centers – Deutsche Telekom is the first to test a biogas-powered fuel cell for use in data centers, supplying computers and cooling systems with fully climate-neutral energy.
- Renewable Energy – ICT companies are banking on renewable energies and are testing new ways of powering their networks. For example, in Germany, Deutsche Telekom's power requirements are covered 100 percent by renewable energies. And in Africa, France Telecom-Orange has already installed over 750 solar base stations, to not only enable the connection of remote areas but also reduce CO^2 emissions.

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[32] *See Green Technology, supra note 14, at 19, citing Technology CEO Council, "A Smarter Shade of Green."*

[33] *Gartner, Green IT: The New Industry Shockwave, presentation at: Symposium/ITXPO conference, April 2007.*

[34] *Smart 2020 Report, supra note 8, at 10.*

- Renewable Energy Self-Generation – In its headquarters (District C), Telefónica has the largest rooftop solar energy production installation in Europe and one of the largest in the world. The installation has more than 16,600 photovoltaic solar panels that are installed on the canopy that covers the entire office complex. Electricity generated each year reaches 3.6 GWh/year, which will prevent the emission of more than 1,600 tons of CO2 into the atmosphere.[35]
- Remote Energy Management Software – installed by Verizon on 150,000 PCs in 2009, saving enough energy to power 88,000 homes annually. A similar solution installed by AT&T, to power down computers at night, is expected to save 135 million kilowatt hours per year.
- Vehicle Fleet Idling – A reduction program implemented by Verizon saved 1.7 million gallons of fuel, equal to eliminating more than 33 million pounds of CO2 annually.
- Vehicle Fleet Conversion – Verizon announced in June 2010 that it is adding 501 Ford E-250 cargo vans up-fitted with clean-burning compressed natural gas engines to its fleet. This follows its earlier announced purchase of 576 Chevrolet Silverado hybrid trucks, expected to deliver up to a 40% improvement in city cycle fuel economy.
- Vehicle Dispatch Reduction – In 2009, AT&T avoided approximately 1,250,000 dispatches through various efficiency efforts – saving 10,041 tons of CO2 emissions (assuming an average of 9.3 miles per trip), the equivalent of taking 1,920 cars off the road for a year.
- Change from air to surface transport – Ericsson has made a strategic shift from air to surface freight, with 60% of its products transported in 2009 by surface, up from 43% in 2008.
- Carbon Reduction Commitments – BT has reduced its global carbon emissions by 54% based on a 1997 baseline with an aggressive climate change stabalization intensity commitment to achieve 80% by 2020. To this end the company has a target of providing 25% of its needs through wind turbines on or adjacent to its own premises by 2016.

The sector continues to mitigate its own environmental impact through better life-cycle audits of its products and production processes, with increased emphasis on R&D and innovation to improve product design.

V. The policy landscape

Several governments have recommended ambitious policy goals, both to enable ICTs to address issues related to climate change and to encourage the sector to remediate its own carbon footprint. For instance in 2008, The EU Heads of State and government set a series of demanding cross-industry climate and energy targets to be met by 2020. These are:

- A reduction in EU greenhouse gas emissions of at least 20% below 1990 levels
- 20% of EU energy consumption to come from renewable resources
- A 20% reduction in primary energy use compared with projected levels, to be achieved by improving energy efficiency. [36]

In view of the ICT industry's capacity to address not only its own 2% of the global carbon footprint, but also to enable reductions in the remaining 98%, the EU has recommended that the ICT sector fulfill its EU 2020 goals by 2015.[37] To enhance the cost-effective improvement of energy end-use efficiency among Member States, the EU issued a new Directive in April 2006.[38] Its purpose is to not only remove market barriers and imperfections that impede the efficient end-use of energy, but also, to

[35] *More information please visit: http://www.telefonica.com/ext/rc08/atlasrc/cspages/site/casestudypopup-en-07079.html*

[36] *See the EU Climate and Energy Package, at: http://ec.europa.eu/environment/climat/climate_action.htm.*

[37] *European Parliament Report on a New Digital Agenda for Europe: 2015 (25 March 2010), A7-006/2010, 59.*

[38] *See generally Directive 2006/32/EC, of the European Parliament and of the Council, of 5 April 2006, on Energy End-use Efficiency and Energy Services, repealing Council Directive 93/76/EEC.*

create the conditions for development and promotion of energy efficiency improvement measures.

The ICT sector is working in Europe with the European Commission to develop common standards to measure carbon footprint, to overcome regulatory hurdles to the marketing of low carbon ICT technologies and also to develop and agree in an industry-wide methodology for the carbon footprinting of ICT products and services. This work is being developed within the ICT for Energy Efficiency Forum (ICT4EE), launched in February 2010. Sectoral institutions such as DigitalEurope, GeSI[39], JBCE and TechAmerica-Europe are actively participating in the Forum, whose objectives are three:

- To demonstrate the commitment of the ICT sector to work in partnership to deliver energy efficient ICT solutions in other sectors of the economy and demonstrate leadership in managing the energy efficiency of its own processes through delivery of its 3 year roadmap.
- To help ensure a coordinated approach from the ICT sector to policy recommendations on ICT4EE, climate and energy policies.
- To support the development of informed and coordinated policy-making on the ICT4EE agenda in the European Commission, European Parliament and within Member States.

The follow-up to the Smart2020 Report, released by GeSI on 1 September 2010, is an important contribution to this area. The study, Evaluating the Carbon Reduction Impacts of ICT, is an assessment methodology, providing guidance and illustrative case studies to industry and other stakeholders on measuring the transformative CO_2e reduction potential of ICT.

The Federal Communications Commission (FCC) in the U.S. intends to begin a proceeding to improve the energy efficiency and environmental impact of the communications industry, including a government leadership role in improving the energy efficiency of its data centers.[40] This effort in the U.S. is expected to build upon the Department of Energy's 2008 Data Center Efficiency Program, which aimed at increasing the energy efficiency of 1,500 "mid-tier and enterprise class data centers by 25% and 200 "enterprise-class data centers" by 50% by 2010.

However, some more recent policy-setting in this space has recognized that the ICT sector is "already about three times more energy-efficient than the economy as a whole."[41] As emphasized at the Internet Governance Forum (IGF) in Hyderabad in 2008, "the impact of ICT on the environment needs to be looked at holistically, including its broader transformation in the economy and the impact on the ecosystem as a whole."[42] The relative growth in ICT-related energy must be weighed against the efficiencies it can enable against all businesses. For instance, the recently announced National Broadband Plan of the U.S. FCC provided some of this perspective in the context of its own developing policy:

> "Imagine a connected America where millions are on a smart grid, cutting greenhouse gases from power plants by as much as 12 percent – the equivalent of taking 55 million cars off the road."

In the U.S., the FCC has proposed collaboration and study with the Department of Energy, to understand the communications, security and privacy-related requirements of electric utilities, to

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[39] *As a follow-up to the GeSI Smart2020, GeSI is presently working with the Boston Consulting Group (BCG) to develop a framework to measure the energy efficiency value of ICT systems. The BCG report is to be released in early fall 2010.*

[40] *Federal Communications Commission, Connecting America: the National Broadband Plan (March 2010), at 287-288, available at: http://download.broadband.gov/plan/national-broadband-plan.pdf.*

[41] *Economic Recovery to a Greener Economy: Mobilising ICT-based Innovations, EPC Policy Brief (July 2009), at: http://www.epc.eu/documents/uploads/373530745_Economic%20recovery%20to%20a%20greener%20economy.pdf*

[42] *See Comments of Joseph Alhadeff, Oracle, in Workshop 52: ICTs and an Environmentally Sustainable Internet, at: intgovforum.org/cms/2008-igf-hyderabad/event-reports/72-workshops/349-icts-and-an-environmentally-sustainable-internet-another-challenge-of-connecting-the-next-billion-internet-users-worshop-52.*

inform federal Smart Grid policy.[43] And further, the International Telecommunication Union (ITU) has established a studaygroup on ICTs, the environment and climate change that is working with GeSI, governments, the ICT industry[44] and other institutions to promote and foster policy development in this space.[45]

Thoughtfully ambitious policies will be required – policies which recognize the potential of ICTs to address key societal goals with an appropriate investment friendly environment and the continued flexibility to innovate. Noble, while misguided regulations (e.g., flat energy consumption taxes) could stifle innovation and have the opposite effect vis-à-vis energy reduction goals.[46] Further, while technology development and deployment is integral to achieving many global future energy objectives, the ICC is concerned that investment in research has declined for the last few decades.[47] This trend must be reversed, as innovative technologies will be critical to improvements. In some areas, where lack of interoperability may frustrate efficient and effective ICT deployment, there may be a need for greater harmonization and standardization. Policy makers and regulators need to closely work together with ICT companies to develop the right framework conditions for the innovation and implementation of developing ICT solutions.

Policymakers also have an important role to play when it comes to educating consumers (as many energy saving innovations tend not to be visible) and participating in the international standard-setting process. For instance, having a global carbon accounting standard which is recognizable, quantifiable, documented and accountable would help the adoption of innovative technologies that can be immediately translated into economic benefit, regardless of where a company is operating.

Policymakers should also be encouraged to look at the role of ICTs in the sustainability debate from a broader perspective. As discussed above, the introduction of ICTs has led to unprecedented cost reduction, coupled with vast increases in productivity and efficiency. The positive contribution of ICT solutions has the potential to broadly impact the way our economy is structured.

VI. Conclusion

New and stronger action on climate change is needed. The ICT sector will need the engagement of all stakeholders to help in the reduction of CO2 and energy consumption. Governments and public authorities will have a particularly key role to play as investors in modernizing their own services and as pioneers and solution oriented supporters for innovative developments which require wide coordination and incentives in selected cases.

We therefore believe that putting the same energy and focus in taking carbon out of business processes will deliver competitive advantages, while simultaneously supporting the sustainability agenda. Examples of how this could be accomplished include:

- Modeling of costs and associated carbon emissions generated from activities
- Identify and message on dependencies that drive cost and carbon emissions

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[43] *See id., at 272.*

[44] *Some companies have partnered with civil society organizations to advance forward-thinking policy recommendations of their own. For instance, Ericsson, together with the World Wildlife Fund (WWF), has developed a Five Step Plan with recommendations for policy makers for transitioning to a low carbon economy. For more information, see: www.ericsson.com/res/thecompany/docs/corporate-responsibility/cr08_doc/wwf_ericsson_5step_plan.pdf.*

[45] *For more information on this effort, see: http://www.itu.int/themes/climate/.*

[46] *See Comments of Joseph Alhadeff, supra note 42.*

[47] *See ICC Commission on Environment and Energy, Energy Today and Options for Tomorrow (15 May 2009), Doc. No. 213/59, at 9, citing OECD/IEA, Energy Technology Perspectives 2008 in Support of the G8 Plan of Action, Scenarios and Strategies to 2050 (Paris 2008).*

- Prioritize and cost-justify "green" investments by demonstrating impact and potential short, medium and long term cost savings
- Ensure alignment of sustainability objectives with strategic goals

Companies and governments will face an unlimited number of environmental sustainability choices – all great ideas enabled by technical innovations. Innovative ICT solutions can help organizations map out their priorities, informing decisions as to funding, staffing and resource allocation to improve sustainability and profitability, further driving growth and innovation. In all of these efforts, modern high speed broadband networks will be the crucial enabler for almost all industries and essential for leading the way to a low carbon society. Without a modern telecommunication infrastructure of high speed networks, society cannot reap the whole potential of possible CO2 emission reduction that Green ICT solutions can provide.

The ICC recognized the 15th session of the Conference of the Parties (COP) meeting in Copenhagen – of the United Nations Framework Convention on Climate Change (UNFCCC) – as an important moment.[48] The political agreement reached at COP15 is but one key indicator of international commitment to finding durable solutions to climate change. As a global multi-sectoral business organization, ICC stands ready with its members to further engage with policy makers to facilitate and implement a transition to a future low-carbon economy. And as a key enabler for productivity, growth and jobs, ICTs will also be a key factor for achieving the carbon emission reduction goals critical to that effort.

[48] *See Business View on the UNFCCC post-2012 Framework to Address Climate Change, Policy Statement of the ICC Commission on Environment and Energy (Doc. 213/76) (18 November 2009), at: http://www.iccwbo.org/uploaded Files/ICC/policy/environment/COP15/Business_views_post-2012_framework.pdf.*

The International Chamber of Commerce (ICC)

ICC is the world business organization, a representative body that speaks with authority on behalf of enterprises from all sectors in every part of the world.

The fundamental mission of ICC is to promote trade and investment across frontiers and help business corporations meet the challenges and opportunities of globalization. Its conviction that trade is a powerful force for peace and prosperity dates from the organization's origins early in the last century. The small group of far-sighted business leaders who founded ICC called themselves "the merchants of peace".

ICC has three main activities: rules-setting, dispute resolution and policy. Because its member companies and associations are themselves engaged in international business, ICC has unrivalled authority in making rules that govern the conduct of business across borders. Although these rules are voluntary, they are observed in countless thousands of transactions every day and have become part of the fabric of international trade.

ICC also provides essential services, foremost among them the ICC International Court of Arbitration, the world's leading arbitral institution. Another service is the World Chambers Federation, ICC's worldwide network of chambers of commerce, fostering interaction and exchange of chamber best practice.

Business leaders and experts drawn from the ICC membership establish the business stance on broad issues of trade and investment policy as well as on vital technical and sectoral subjects. These include financial services, information technologies, telecommunications, marketing ethics, the environment, transportation, competition law and intellectual property, among others.

ICC enjoys a close working relationship with the United Nations and other intergovernmental organizations, including the World Trade Organization, the G20 and the G8.

ICC was founded in 1919. Today it groups hundreds of thousands of member companies and associations from over 120 countries. National committees work with their members to address the concerns of business in their countries and convey to their governments the business views formulated by ICC.

ICC Commission on E-Business, IT and Telecoms (EBITT)

Business leaders and experts drawn from the ICC membership establish the key business positions, policies and practices on e-business, information technologies and telecommunications through the EBITT Commission.

With members who are users and providers of information technology and electronic services from both developed and developing countries, ICC provides the ideal platform to develop global voluntary rules and best practices for these areas. Dedicated to the expansion of cross-border trade, ICC champions liberalization of telecoms and development of infrastructures that support global online trade.

ICC has also led and coordinated the input of business around the world to the World Summit on the Information Society, Geneva 2003, Tunis 2005, and continues this effort in the activities established in the Tunis Agenda through its initiative, Business Action to Support the Information Society (BASIS http://www.iccwbo.org/basis).

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