#SMARTer2030

ICT Solutions for 21st Century Challenges

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Executive Summary: ICT Solutions for 21st Century Challenges

ICT has the potential to enable a 20% reduction of global CO_{2e} emissions by 2030, hold emissions at 2015 levels and effectively decouple economic growth from emissions growth.

Since 2008, the Global e-Sustainability Initiative has been researching the role Information and Communications Technology (ICT) can play in cutting global CO_{2e} emissions and promoting a more sustainable society. This is our third report in that effort and it is based on detailed modeling that, for the first time, also quantifies the far-reaching social and economic benefits of ICT.

The findings are profound.

As ICT has become faster, cheaper and more accessible globally, our report highlights its potential to generate powerful environmental, economic and social benefits beyond what we envisioned as recently as two years ago. Our findings show an ICT-enabled world that is cleaner, healthier and more prosperous, with greater opportunities for individuals everywhere.

Our major findings are as follows:
- **ICT can enable a 20% reduction of global CO_{2e} emissions by 2030, holding emissions at 2015 levels.** This means we can potentially avoid the tradeoff between economic prosperity and environmental protection.
- **ICT emissions as a percentage of global emissions will decrease over time.** Our research shows the ICT sector's emissions "footprint" is expected to decrease to 1.97% of global emissions by 2030, compared to 2.3% in 2020, which our previous report predicted. Furthermore, the emissions avoided through the use of ICT are nearly ten times greater than the emissions generated by deploying it.

- **ICT offers significant environmental benefits in addition to reducing carbon emissions.** The most substantial benefits identified by this study include increasing agricultural crop yields by 30%, saving over 300 trillion liters of water and saving 25 billion barrels of oil per year.
- **An assessment of eight economic sectors** – mobility & logistics, manufacturing, food, buildings, energy, work & business, health and learning **– shows that ICT could generate over $11 trillion in economic benefits per year by 2030,** the equivalent of China's expected annual GDP in 2015.
- **ICT will connect 2.5 billion extra people to the "knowledge economy" by 2030**, giving 1.6 billion more people access to healthcare and half a billion more people access to e-learning tools.
- **Worldwide growth of the digital economy continues to accelerate, providing the scale necessary to drive greater connectivity and new, disruptive business models.** And, as opposed to the old production-line economy, individuals are firmly at the center of this process.

In our view, three stakeholder groups hold the key to accelerating the widespread adoption of ICT solutions: policymakers, business leaders and consumers. We have developed recommendations for action for each in the final section of the report.

What follows is a summary of each of these major findings and recommendations for realizing the full potential of ICT.
The full report is available at http://smarter2030.gesi.org.

ICT has the potential to enable a 20% reduction of global CO_{2e} emissions by 2030, holding emissions at 2015 levels.

In 2014, the Intergovernmental Panel on Climate Change (IPCC) published a report presenting the culmination of its research into the causes of climate change and its impact on the global ecosystem. The report found that if greenhouse gas emissions continued at their current rate, the world would significantly miss its target of holding global average temperature increases to less than 2°C.

The IPCC concluded that a "business as usual" scenario would see temperature increases of between 2.6 and 4.8°C by the end of the century – an unhealthy scenario for our planet and quality of life.

The seemingly intractable problem, though, is that the global economy has so far failed to decouple economic growth from emissions growth. The historical trend holds that for every 1% increase in global GDP, CO_{2e} emissions have risen by approximately 0.5%[1] and resource intensity by 0.4%[2]. The world seems caught in a bind, having to choose between economic prosperity and environmental protection.

We have found that by rolling out identified ICT solutions across the global economy, total global emissions of CO_{2e} could be cut by 12Gt by 2030, promoting a path to sustainable growth.

Figure 1 illustrates the contribution to global emissions mitigation of the main sectors we have examined in this report. The total emissions mitigation enabled by ICT alone would be enough to hold emissions at their current level[3].

ICT emissions as a percentage of global emissions will decrease over time.

In our 2008 report, SMART2020, we estimated that the ICT sector's emissions would reach 1.43Gt CO_{2e} by 2020, which would represent 2.7% of global emissions. Five years later, our SMARTer2020 report revised that forecast down to 1.27Gt, representing 2.3% of global emissions. The revised estimates were based on actual energy efficiencies realized between 2008 and 2012 as well as on updated data.
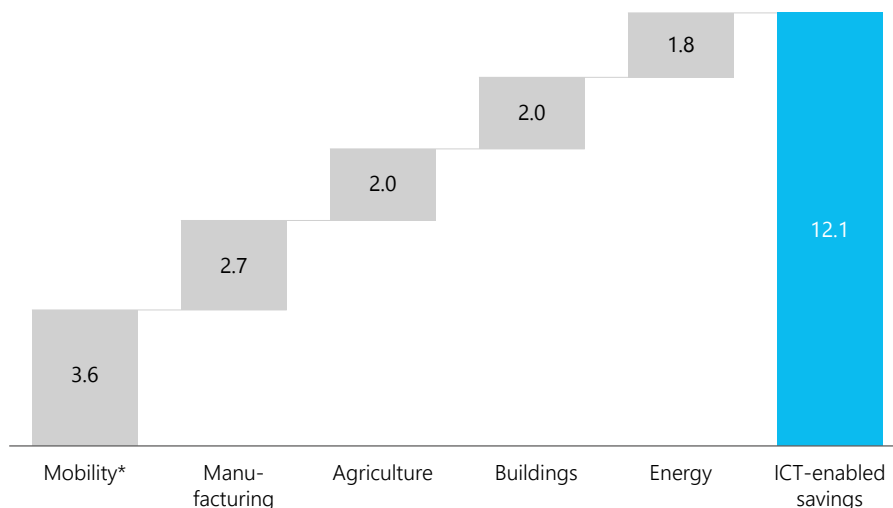
In this study, we predict a further decrease, with ICT's own footprint expected to reach 1.25Gt CO_{2e} in 2030, or 1.97% of global emissions.

Furthermore, our modeling shows that the 12Gt CO_{2e} avoided through the use of ICT solutions is nearly 10 times higher than ICT's expected footprint in 2030 (see Figure 2).

Our research shows that the decrease in the ICT sector's footprint is due to a range of investments companies in the sector have been making to reduce their emissions and to the expected improvements in the efficiency of ICT devices.

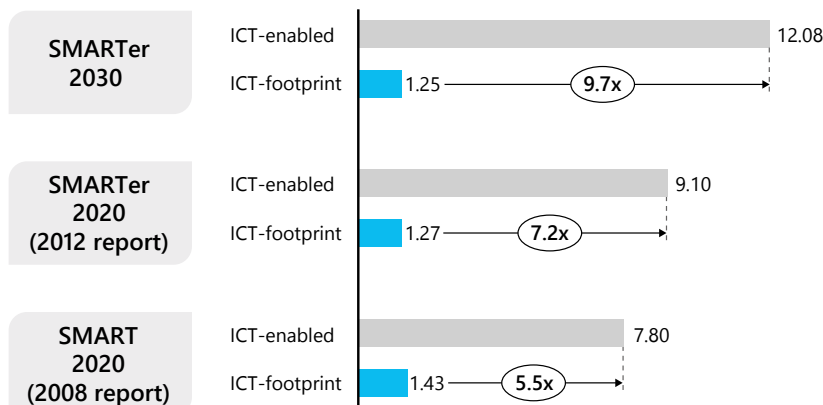**ICT offers significant environmental benefits in addition to reducing carbon emissions.**

Figure: 1: CO$_{2e}$ abatement potential by sector (2030)

* Mobility solutions consider ICT-enabled improvements to private and commercial mobility and additionally consider the reduced need to travel from various sectors, including health, learning, commerce, etc.

Source: WRI, IPCC, World Bank, GeSI, Accenture analysis & CO$_2$ models

Figure 2: ICT benefits factor in 2020 and 2030 (Gt CO$_{2e}$)

Source: WRI, IPCC, GeSI, SMARTer2020, Accenture analysis & CO$_2$ models

ICT also offers other significant additional environmental benefits like spurring higher agricultural yields and reducing the consumption of scarce resources. By 2030, the most substantial additional environmental benefits identified by this study include:

- Increasing agricultural crop yields by 30%, or close to 900kg per hectare per year;
- Saving over 300 trillion liters of water per year, mostly from smarter agricultural practices; and
- Saving 25 billion barrels of oil per year.

An assessment of eight economic sectors – mobility & logistics, manufacturing, food, buildings, energy, work & business, health and learning – shows that ICT could generate over $11 trillion in economic benefits per year by 2030.

[1] Period from 1975 to 2010 considered. Accenture analysis based on data from WRI and World Bank GDP data, http://data.worldbank.org/
[2] Period from 1975 to 2010 considered. Accenture analysis based on data from SERI and Dittrich, M. (2014). Global Material Flow Database. 2014 version and World Bank GDP data, http://data.worldbank.org/
[3] The 12.1 Gt CO_{2e} reduction in 2030 enabled by ICT includes 1.8 Gt CO2e abatement from integration of renewable energy production into the grid. In its business as usual emissions forecast IPCC expects emissions to rise by 11.1 Gt by 2030. This rise already considers the CO_{2e} abatement from renewable energy. Therefore, the additional ICT-enabled CO_{2e} reduction against the IPCC emissions forecast for 2030 is 10.3 Gt CO_{2e} (based on a total of 12.1 Gt CO_{2e} minus 1.8 Gt CO2e from renewable.)

ICT is transforming all aspects of the economy, but our research has found that the following eight sectors will deliver the most significant ICT-enabled sustainability benefits to the global economy, generating over $11 trillion in sustainable benefits, slightly greater than China's expected annual GDP for 2015[4].

ENERGY

ICT CAN ENABLE THE INTEGRATION OF RENEWABLES ONTO THE GRID, IMPROVE EFFICIENCY AND HEIGHTEN TRANSPARENCY.

Smart grids, analytics solutions and advanced energy management systems can abate 1.8Gt CO_{2e} and generate $0.8 trillion in new revenue opportunities.

FOOD

ICT CAN HELP RAISE PRODUCTIVITY AND REDUCE FOOD WASTE.

Smart agriculture will boost yields by 30%, avoid 20% of food waste and could deliver economic benefits worth $1.9 trillion. At the same time, smart agriculture could reduce water needs by 250 trillion liters and abate 2.0Gt CO_{2e}.

HEALTH

ICT WILL PUT "A DOCTOR IN YOUR POCKET," ALLOWING USERS TO MANAGE THEIR OWN HEALTH VIA THEIR SMART DEVICE.

ICT could deliver e-health services to 1.6 billion people across the developing and developed world.

LEARNING

ICT CAN MAKE EDUCATION ACCESSIBLE, ENGAGING, FLEXIBLE AND AFFORDABLE

We expect to see 450 million e-learning participants in 2030, helping to raise incomes by 11% on average per e-degree.

BUILDINGS

ICT WILL INCREASE COMFORT AND REDUCE ENERGY AND WATER BILLS.

Smart building solutions could cut 2.0Gt CO_{2e} from the housing sector, reducing energy costs by $0.4 trillion and creating revenue opportunities of $0.4 trillion.

MOBILITY & LOGISTICS

ICT CAN HELP EVERYONE REACH THEIR DESTINATIONS FASTER, CHEAPER AND SAFER.

Real-time traffic information, smart logistics, intelligent lighting and other ICT enabled solutions could abate 3.6Gt CO_{2e}, including abatement from avoided travel.

WORK & BUSINESS

ICT-ENABLED TELECOMMUTING AND VIRTUAL CONFERENCING CAN SAVE EMPLOYEES TIME AND MONEY

Additional revenues from e-commerce could total $1.8 trillion and e-work could add $0.5 trillion while freeing up 100 hours per e-worker annually.

MANUFACTURING

ICT WILL PLACE THE CUSTOMER AT THE CENTER OF A USER FOCUSED SERVICE, CUTTING RESOURCE INPUTS AT THE SAME TIME

Smart manufacturing, including virtual manufacturing, customer centric production, circular supply chains and smart services could abate 2.7Gt CO_{2e}.

Furthermore, we estimate that $6.5 trillion of additional revenues will flow from ICT-enabled services in 2030 (see Figure 3): nearly half a trillion dollars from the 2.5 billion people newly connected to the digital economy, plus $1.6 trillion from other ICT-services. ICT-enabled services from other sectors will contribute an additional $4.5 trillion of revenues from increased agricultural yields, expanded e-commerce offerings, smart energy solutions and more.

ICT could also cut total economic costs across the sectors by $4.9 trillion: $1.2 trillion from reduced electricity expenditure, $1.1 trillion from reduced fuel expenditure and $2.6 trillion from various other opportunities including savings on tuition, real estate and water.

[4] $11.4 trillion in stakeholder benefits expected. IMF, 2015 forecasts $11.3 trillion of GDP in current USD prices (Status as of May 2015), https://www.imf.org/

ICT will connect 2.5 billion additional people to the "knowledge economy" by 2030.
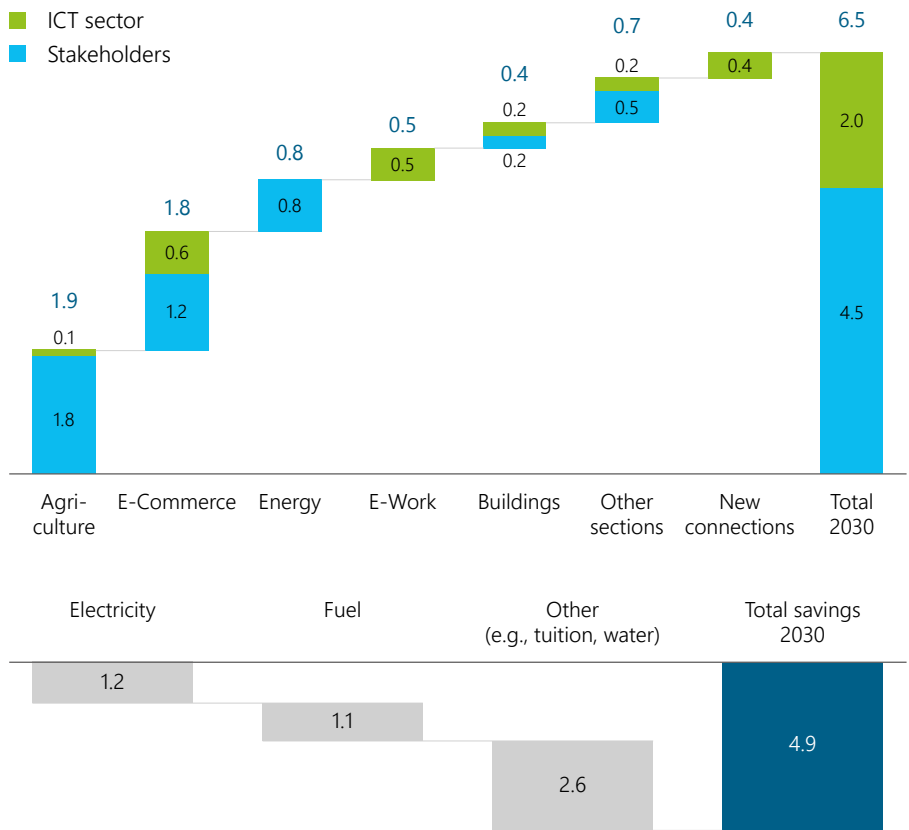
The ICT-enabled economy of 2030 will not only be cleaner and more prosperous, but will support a better quality of life. We believe ICT has the power to transform lives and to put the individual at the heart of the new knowledge economy.

Our modeling finds that an additional 2.5 billion people will be connected to ICT by 2030. Global ICT access could bring e-healthcare solutions to 1.6 billion people across the world and help half-a-billion people gain access to quality, affordable education through e-learning. We believe e-learning solutions alone have the potential to raise incomes by 11% on average per e-degree, creating more than $0.5 trillion in additional annual income by 2030.

Overall, the benefits ICT can deliver at a personal level are threefold: reduced costs, higher incomes and greater convenience. These benefits are particularly meaningful to disadvantaged or remote communities where ICT could help pensioners with limited mobility to access healthcare at home via e-health solutions, or provide a smallholder farmer in rural Kenya with access to global crop, weather and market data, boosting his or her income, raising yield and cutting resource-use and associated emissions.

Similarly, our research shows that e-working solutions can boost the productivity of tele-workers in all parts of the world, giving them back an average of 100 hours a year to spend with their friends and family (250 billion hours across the global economy in total).

Figure3: ICT-enabled revenue and cost saving opportunities (2030)

Source: WRI, IPCC, Gartner, FAO, GeSi, Accenture analysis & CO_2 models

Worldwide growth of the digital economy continues to accelerate, providing the scale necessary to drive greater connectivity and new, disruptive business models.

Since our last report, SMARTer2020 published in 2012, several major developments have converged to create a genuine prospect for the digital economy to take-off:

User Centricity:
One of the major differences between the new, digital, economy and the old is the role and power of the customer as an individual. No longer at the end of an impersonal production line, users are now at the center of the process, able to direct and co-create services according to their specific needs, for example via personalized medicine and diagnostics for health conditions, or the customization of a new garment. We illustrate what this means in practice for each of the eight sectors later in the report.

Number of Connected Devices:
In 2015, "digital connectivity" has fundamentally changed. Internet access and smart phone ownership are at much higher levels and the number of connected devices is expected to grow to 100 billion by 2030[5].

New Business Models:
The business case for ICT-enabled business models is now stronger than ever. That wasn't as clear at the time of our last report. Digital disruptors like Uber and AirBnB have grown into multi-billion dollar businesses and 61% of c-suite executives interviewed by Accenture emphasized the revenue opportunities presented by digital investments[6].

5 International Energy Agency, More Data Less Energy, 2014
6 Accenture, CEO Briefing 2015, From Productivity to Outcomes, 2015

Finally, as the technology-fluent millennial generation grows more affluent and demands more flexibility from the goods and services its members buy, opportunities abound for organizations to respond in ever more innovative ways.

Recommendations

This new research demonstrates that ICT has the potential to create a more hopeful and prosperous future, putting the citizen at the heart of a sustainable, digital economy.

In our view, three stakeholder groups hold the key to accelerating the widespread adoption of ICT solutions: policymakers, business leaders and consumers. We have developed recommendations for action for each in the final section of the report.

Policymakers

- Set and enforce global and national emissions targets and recognize ICT solutions as a core tool to securing continued economic growth under these constraints.
- Incentivize investments in infrastructure geared to connecting the unconnected and enable more people, across all income segments, to gain access to ICT.
- Establish a fair, balanced and consistent regulatory approach to ICT that promotes innovation and investment, protects intellectual property rights and ensures consumer privacy and security.

Business Leaders

- Drive investments in ICT uptake and cooperate with others in your sector.
- Explore ICT-enabled revenue and cost-saving opportunities and set bold sustainability targets to harness opportunities and prepare for tighter emissions regulation.

Consumers

- Get ready to "think digital" and be willing to try innovative ways of going about work and life.
- Use ICT to tailor services to your specific needs, whether that be in education, healthcare, mobility or commerce.
- Use your buying power to encourage the businesses and public services that are rolling out sustainable ICT-enabled services to do more.

The full report is available at http://smarter2030.gesi.org

Please note: As with any research program looking to produce a viable forecast for a 15-year horizon, our modeling is open to uncertainties and contingencies. We have tried to make our assumptions and the technical and policy requirements on which they rest as clear as possible (please see the appendix for further information) but we are fully aware that our scenarios remain only one of a broad range of possible trajectories.

About GeSI

The Global e-Sustainability Initiative (GeSI) is a strategic partnership of Information and Communication Technology (ICT) companies and organizations committed to creating and promoting technologies and practices to foster economic, environmental and social sustainability. Formed in 2001, GeSI's vision is a sustainable world through responsible, ICT-enabled transformation. GeSI fosters global and open cooperation, informs the public of its members' activities to improve their sustainability performance, and promotes innovative technologies for sustainable development. GeSI's membership includes over 30 of the world's leading ICT companies; the organization also collaborates with a range of international stakeholders committed to ICT sustainability objectives. These partnerships include the United Nations Environment Program (UNEP), the United Nations Framework Convention on Climate Change (UNFCCC), the International Telecommunications Union (ITU), and the World Business Council for Sustainable Development (WBCSD). Such collaborations help shape GeSI's global vision on evolution of the ICT sector, and how it can best meet the challenges of sustainable development. For more information, see www.gesi.org.

About Accenture

Accenture plc. is a global management consulting, technology services and outsourcing company, with more than 323,000 people serving clients in more than 120 countries. Combining unparalleled experience, comprehensive capabilities across all industries and business functions, and extensive research on the world's most successful companies, Accenture collaborates with clients to help them become high-performance businesses and governments. The company generated net revenues of US$30.0 billion for the fiscal year ended August 31, 2014. Its home page is www.accenture.com.

About Accenture Strategy

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