

Can telecom save the planet?

The predictions are grim: We simply must stop global warming. Or else. The good news is that information and communication technology holds one of the keys to a future low-carbon world. Here is what we can do to keep carbon emissions down.

RECENT YEARS HAVE seen increasing certainty about the causes of global warming, especially greenhouse gases. The most important greenhouse gas created by human activity is carbon dioxide (CO₂). It comes mainly from burning fossil fuels such as coal and oil.

The global average temperature has increased by about 1°C in 100 years, according to a report by the Intergovernmental Panel of Climate Change (IPCC). The IPCC also presents future scenarios to illustrate what might happen at different temperatures. The IPCC scientists agree that there will be large effects on the weather, water supply, sea levels, vegetation, and animal life and disastrous effects if the temperature rises more than 2°C.

Emissions of greenhouse gases have increased 70 percent since 1970. The IPCC's report shows that a stabilization of greenhouse gases at 450 ppm, which is equivalent to a 2°C average increase, is possible if global emissions peak in 2015 and after that decrease significantly. Emissions have increased by 20 percent between 2000 and 2006, the steepest increase ever measured. The IPCC predicts that emissions will increase 25–90 percent until 2030 if nothing is done.

So what needs to happen in terms of CO₂ emissions to stop global warming?

The advantages of effective and early measures outweigh the disadvantages by far. The Stern report for the British govern-

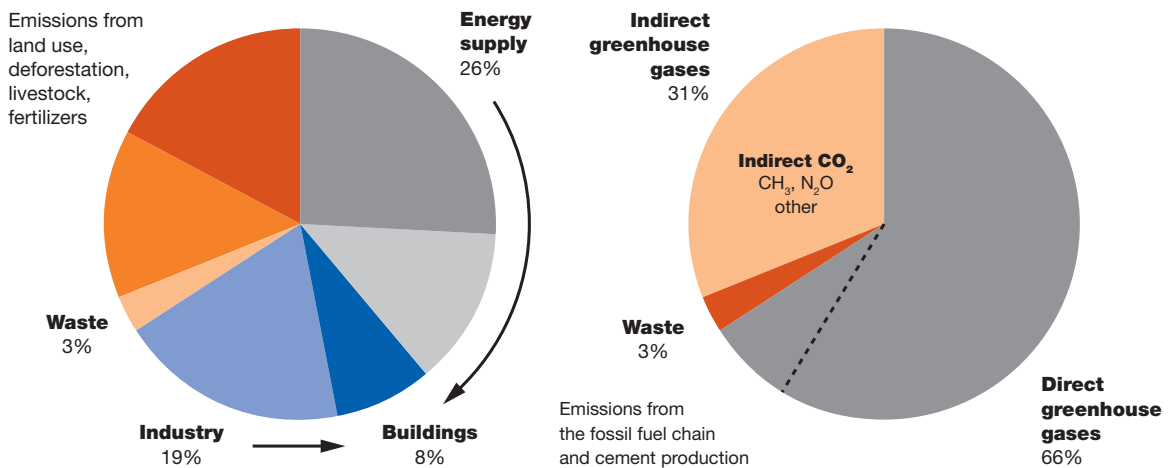
ment concluded that failure to mitigate the effects of climate change could reduce global GDP by 20 percent. Later, Lord Stern admitted that the situation is far worse than the assumptions that formed the basis of his ground-breaking report. "We badly underestimated the degree of damages and the risks of climate change," he said in a speech in London on April 16, 2008. "All of the links in the chain are on average worse than we thought a couple of years ago."

Consumer influence on climate comes from housing, transportation, and food. On average, the global citizen generates approximately 4.7 tons of CO₂ and another 2.8 tons of CO₂-equivalent emissions or effects. To reach the 2°C goal, we need to achieve an average per-citizen rate of about 1 ton of CO₂ equivalents by 2050, assuming 9 billion people on the planet.

Carbon dioxide – where does it all come from?

Looking at emission sources, it is evident that the Information and Communication Technology (ICT) sector is a key player in achieving a low-carbon world.

Four business sectors — building, travel, transport, and food (where meat production is most important) — are responsible for about three-quarters of global energy consumption and CO₂-equivalent (CO₂e) emissions. The IPCC gives us this overview of point sources, emissions, and growth in emissions:





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So, what is the share of CO₂e for the ICT sector? Recent studies (Ericsson Research, Gartner, GeSI/McKinsey) have estimated that the ICT sector's global warming share is 2 percent, measured as direct CO₂ emissions.

Mobile telecom's share is 0.2 percent (but 2.0 percent of global GDP) and fixed telecom's share, including broadband, is 0.3 percent. PCs and the internet (especially data centers) are the most significant contributors to global warming in the ICT sector. ICT's contribution to CO₂e emissions is about 1.5 percent. Its share of CO₂e is lower than the share of direct CO₂ because agriculture and forestry, which make up about one-third of CO₂e emissions, are included in the CO₂e total.

Some studies claim that ICT and aviation emit the same amount of CO₂. This is misleading, as the ICT figure accounts for the whole life cycle, including manufacturing, whereas the aviation figure is old and rounded down, with only jet engine CO₂ emissions included. If we look at operation and fuel production, use new figures, and include CO₂e emissions and effects, we see that aviation is responsible for about 5 percent of global CO₂e while ICT is responsible for only about 1 percent.

It could get worse

The ICT sector comprises mobile and fixed telecom (including broadband), and PCs and data centers (including computer networks). In this report ICT does not include Entertainment & Media (E&M), defined as TVs with peripherals, printers, copiers, the paper industry, and a whole range of consumer electronics. The E&M sector has about 1.5 times greater CO₂ emissions than the ICT sector.

The future roadmaps for ICT hardware look promising. The laptop, LCD monitor, and better power management trends have done wonders for the energy consumption of PCs. New network hardware for telecom has far better energy efficiency (per line, per subscriber) than the average installed equipment. A new mobile phone, on average, consumes only about 0.35W through its charger even if plugged in all the time. The radio network supporting it, on average, consumes only 2W per subscriber.

Let's get back to the first question: Can telecom save the planet? Not by itself, but ICT is one of the keys to a future low-carbon world.

point

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One of the most extensive research reports regarding ICT and sustainability is the European Commission's report [EC/JRC_04], which highlights dematerialization of goods, a shift from products to services, and more efficient (intelligent) operation of buildings, production facilities, and transports. This study is one of a few that also looks into third-order structural changes, so-called "rebound" effects, or the full interactions with the overall economy and society.

Study results show that total greenhouse gas emissions in the EU could increase by 32 percent (worst-case assumptions) or decrease by 29 percent (best-case assumptions), compared to the base year 2000. The ICT impact on greenhouse gas emissions in 2020 could be from +2 percent to -16 percent.

None of the studies we reviewed look at ICT on a global scale. Their estimates are modest and only include a part of all ICT services and applications that could reduce society's overall carbon footprint. But by putting together the studies and including a bolder scenario for medium-term reductions, we outlined the following reduction/substitution potential in percentage (%) for short (and medium) terms:

- Flexi-working — 2% (4%), large potential
Reduces the need for buildings and commuting.
- Virtual presence — 1% (2%), medium potential (only including business travel)
Mainly connected to business travel by air, which can be replaced by virtual presence. But "ordinary" teleconferences should not be forgotten, along with the potential to reduce hotel space and other travel by air.
- Electronic commerce — 2% (4%), large potential

Reduces the need for buildings (malls, stores, warehouses) and shopping travel, and can also decrease product transportation and unnecessary production. When the products are in digital format (software, music, books, papers, films), conventional physical production and distribution can also be avoided.

- Dematerialization — 0–5% (10%), very large potential
Instead of owning products, from large investments like summer houses, boats, and cars, all the way down to printers and books, the service is rented when needed, or provided in other ways such as subscriptions. ICT is seen as a key enabler in any service-based business.
- Services — 2%–4%, mixed potential
Services such as health, education, government, and banking combined have large potential, but individually have small potential, at least in the short term. Mobile-health and mobile-learning could be really large but need more investigation. The list can be made even longer.
- Intelligent systems (telematics) — 5% (10%), large potential
These are not structural changes but rather improvements in efficiency of systems such as transport, facility management, and production processes. These ICT services or applications are already happening and their use can be accelerated. In the short term, efficiency gains have improvement potential equal to dematerialization.

To summarize, all the structural changes and efficiency gains

that ICT can make happen have a reduction potential of 7 percent up to 35 percent.

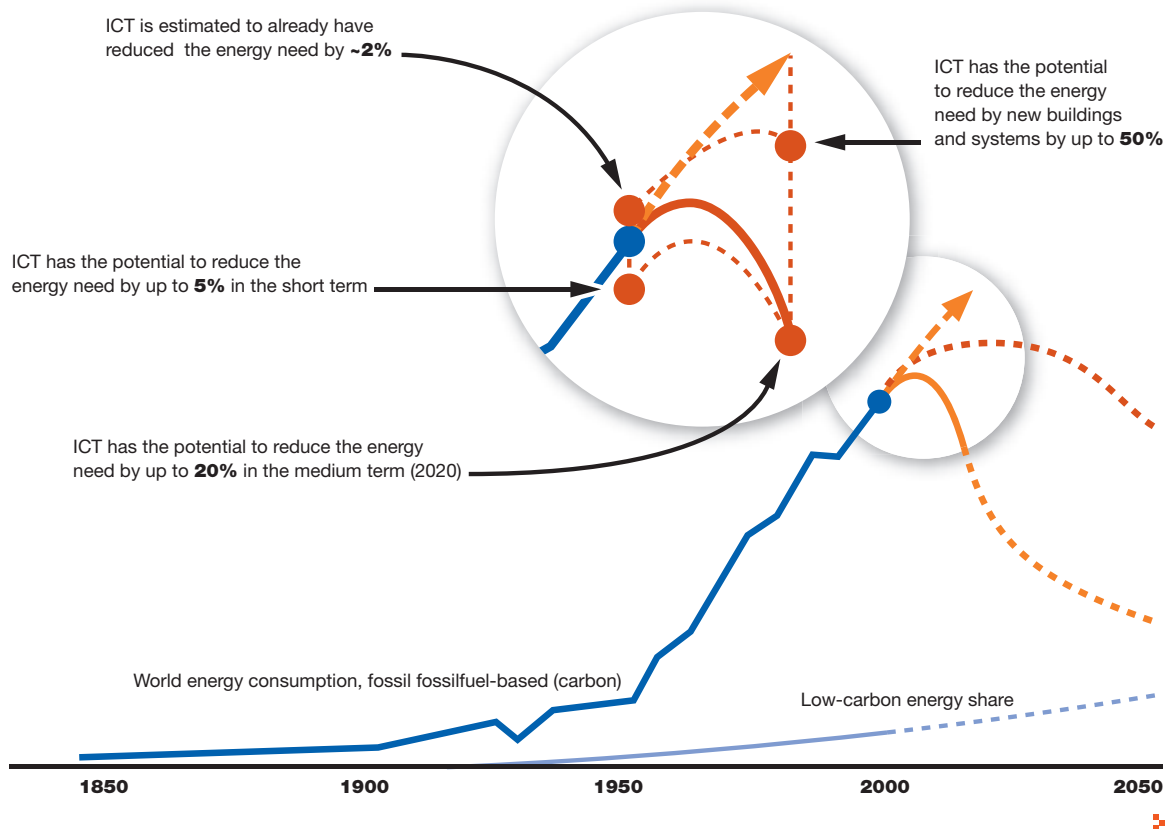
Looking at the graph below, we believe that 5–20 percent is a reasonable reduction potential for ICT in the short to medium term.

Microprocessors, in vehicles, buildings, machines (manufacturing), and so forth, are not included in ICT, as this group is seen as a part of the vehicle and building categories. Many of the incremental improvements in vehicles and buildings result from microprocessor-controlled systems. These components may be enhanced and used in future ICT systems.

Buildings should have top priority as they are the largest emission source today: 30–50 percent. New buildings should be super-insulated and be prepared for smart climate/ventilation/lighting ICT systems. This means a higher cost up front but lower cost in the long run.

Smarter energy production

The electricity grid is another important system that can be fundamentally changed by ICT. A “smart” grid can control and schedule load to level out consumption spikes, or turn on load when production is most favorable. It’s also good for renewable electricity from wind, wave, and solar power, because of their dependence on forces that can’t be turned on like a power plant. As well, a smart grid can enable small-



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scale production and decentralize the grid.

Electricity is unfortunately to a large extent produced from coal, but in the near future it is estimated that new developments can achieve a 50 percent reduction in associated energy need and CO₂ emissions.

We can look at the past 30 years and see that incremental improvements in aviation, cars, trucks, ships, buildings, and other areas have not led to improvements in energy and CO₂ emissions overall. We have just made more and larger cars and houses, traveled longer, and transported more goods longer and farther. Simply continuing incremental improvements will not lead to decreases in energy and CO₂ emissions.

Total consumption of energy has stayed on the same level, despite ongoing developments, because of rebound effects. This trend can be talked about in positive terms, as there has been economic growth without a growth in energy consumption. ICT and E&M are important parts of this decoupling of economic growth with energy and materials. However, the rebound effect can also be attributed to the global economy.

What consumers can do

For you as a consumer, there are many opportunities to use your mobile phone to adopt a more sustainable lifestyle.

Starting with travel habits, you can ask your employer to make virtual meetings the default type of meeting. For this you'll need a proper teleconferencing system and maybe a tool for sharing your Power-Point presentations or documents. If you don't need to turn up at meetings, you can work from home and reduce the need for travel and also for a permanent workspace in the office.

For meetings that are difficult to perform over the phone, consider a video conference. When you do need to travel to the office, the travel planner in your mobile phone could help your efficiency by providing the exact route, and also calculate CO₂ emissions for different trips. Onboard a train or bus, you can use your phone to pay the ticket, which allows the payment mechanism to be dematerialized and performed with the lowest possible level of emission.

If you prefer to go by car, the phone can locate the nearest

vehicle in your carpool. The mobile phone is also the key to unlock the car.

Next, deal with your consumption habits. Instead of going by car to shop each day, subscribe to a service that delivers part or all of your weekly provisions to your home. There are also some companies from which you can rent carpets, handbags, children's clothes, and other products.

When you are in a store, your phone can be linked to a product's source by taking a photo of the barcode. You'll get back a picture of the producer's farm, information about pro-



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duction methods and CO₂ emissions, and so forth. In this way you steer your consumption only to goods that correlate with your personal values.

Your mobile phone can be used as a remote control for your home. You can turn off the whole house or specific lights and also control appliances remotely. The utility company has a service that allows you to monitor energy and water consumption. In the future, all electronic devices at home will have sensors that communicate with a central database, which can send out information on energy consumption as well as alerts and warnings.

You ultimately may have a phone-based solution that constantly checks your health and sends information to your doctor if something is wrong. This means that you won't need to travel to the hospital for checkups and reporting.

What enterprises can do

For you as an enterprise, you must address climate change as both a business risk and a business opportunity. Loss and supply shortages may become more common from natural disasters. Consumer demand will rapidly change, and for some industries regulation and taxes will force it to change.

McKinsey's 2008 survey shows that CEOs all over the world foresee that environmental issues, including climate change, will carry much greater importance. According to 46 percent of the CEOs surveyed, the environment is one of the top three issues that will have the greatest impact on their company in the coming five years. This figure varies from 59 percent in Asia Pacific, to 53 percent in Europe, to 47 percent in developing markets, to 36 percent in North America.

A first step in addressing the issue is to secure commitment from top management to do so. Then review the issue with key people outside and inside the company. Present the high-level risk and opportunity landscape to top management, including the following key questions: How does our company relate to the climate change issue? Have we taken a position? Do we have enough knowledge? How well is the issue integrated into our business processes? Do we have single-source suppliers in

The front-runners

Here are some examples from companies that have started the journey:

- **TeliaSonera** of Sweden has, since 2001, reduced its emissions 70 percent by decreasing travel 30 percent, increasing teleservices 15–20 percent per year, decreasing office space 50 percent, reducing energy consumption more than 30 percent, and changing to green energy sources from 2007. At the same time, the company decreased its travel expenditures by approximately EUR 13 million per year. The reduced travel time has saved time for employees.
- **Sun Microsystems** of the US has around 35,000 employees globally. But it has workspace only for around 50 percent of them. The company promotes flexible work time, and its measures show an efficiency gain per employee of around three hours per week. The cost savings have been significant for Sun Microsystems thanks to their green approach.
- **Interface, Inc.** of the US is in the industry of modular carpeting, manufacturing and marketing of broadloom carpet, panel fabrics, and upholstery fabrics. Fourteen years ago founder Ray Anderson read Paul Hawken's book, *The Ecology of Commerce*. Now Interface has advanced almost halfway toward its vision of Mission Zero; Interface's promise to eliminate its negative impact on the environment by the year 2020, through redesigning processes and products, pioneering new technologies, and reducing or eliminating waste and harmful emissions while increasing the use of renewable materials and sources of energy.
- **Toyota** of Japan is probably the best-known automaker to focus on sustainability. The company's investment in new environmental technologies and its efforts to continuously improve energy conservation and recycling measures move it closer to its vision of zero emissions. Toyota has established the Toyota Guiding Principles, which form the cornerstone of management's philosophy. Toyota has used a "360 degree" model in its implementation, meaning that all functions and deliverables support the zero-emission vision.



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areas that might be hit by weather disasters? How is our energy supply secured both in operation and for our products in use?

Next, get an in-depth understanding of your company's environmental impact today. Is it in supply, production, operation, transport, or in the use of your products? Collect data with a "cradle to cradle" approach. Consider the consequences if your company does not change. How will regulation and taxes develop? How will customer demand change, and how will customer reaction change?


Reduce, reuse and recycle

Once you have identified the areas of largest potential impact, determine what can be done. Are there any quick wins that also include efficiency gains and cost reduction or areas that help exceed legal requirements? Are there any changing business models, such as renting materials instead of owning them?

For some industries the business logistics will change; for some industries the energy prices might change the value chain (example: truck to boat) or force a focus on energy efficiency. Put pressure on your suppliers, on your transporters; provide incentives to your customers and employees to act in a climate-smart way. Can you reduce the material in use, reuse some of it, and recycle? Innovation is required in the areas of business opportunities, products, material use, processes, and business models.

Finally, some general recommendations:

- Understand whether it is enough to fine-tune existing ways of working or to do things differently. The chief information officer will be an important player in reducing a company's CO₂ footprint, in terms of energy consumption, using IT enablers to reduce travel and transport, and implementing new IT systems that support dematerialization and reduction of travel. Assuring that these enablers are easy to use is vital — otherwise not much will happen.

- Be certain that you understand your industry's future cost drivers. Will energy supply be one?
- Ensure that the change within your company goes hand in hand with the perception buildup of your company's green approach. Your employees' awareness and engagement throughout the company is vital.
- Do your homework and "walk the talk" in order to be trustworthy in the market. So-called "greenwashing" will create a boomerang effect sooner or later.
- Seize all opportunities to be cost effective, find new business opportunities, reduce your company's greenhouse emissions, and attract employees and investors. Ensure that you reduce your economic dependence on climate change drivers. The good news is that ICT holds the key to a future low-carbon world. Go green! 

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