ERICSSON

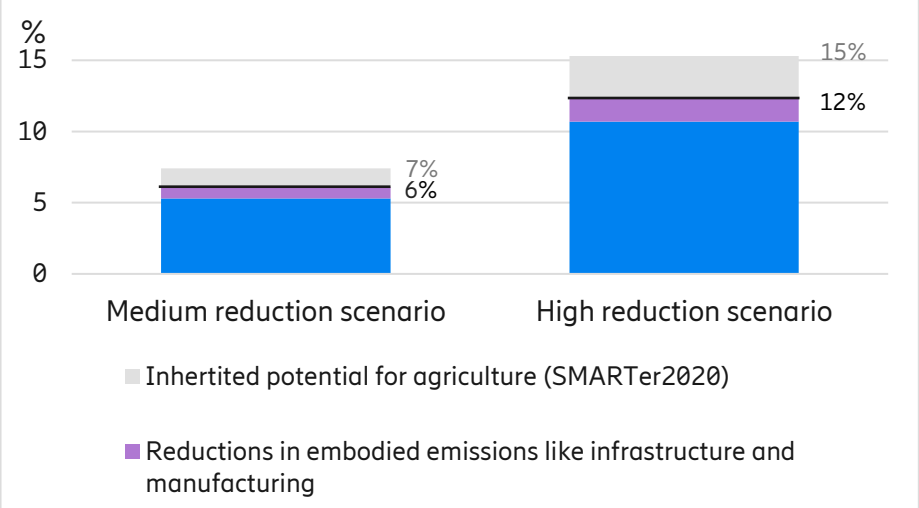
Research Brief

ICT's potential to reduce greenhouse gas emissions in 2030

Information and Communication Technology (ICT) solutions have a calculated potential to reduce the global greenhouse gas emissions by up to 15%. From existing ICT solutions in different sectors like energy, building and transport, the potential was derived for two different global scenarios. This resulted in reduction potentials of 6% and 12% respectively and an additional potential of 1-3% if the agriculture sector was added based on another study.

ICT's potential derived for two scenarios

In this study, existing ICT solutions shown to reduce greenhouse gas (GHG) emissions were identified in the categories: energy, buildings, transport, travel, work, and services. As no quantifications of ICT's potential was found in the agriculture and land use sector, this was treated separately.



Two global reduction scenarios were formed for the year 2030. A medium reduction scenario was based on the median of the potentials derived from different locally existing ICT solutions and a moderate usage. A high reduction scenario corresponded to the highest credible potential and a more aggressive application. Reductions due to reduced use of infrastructure and less manufacturing activities were included in the two scenarios.

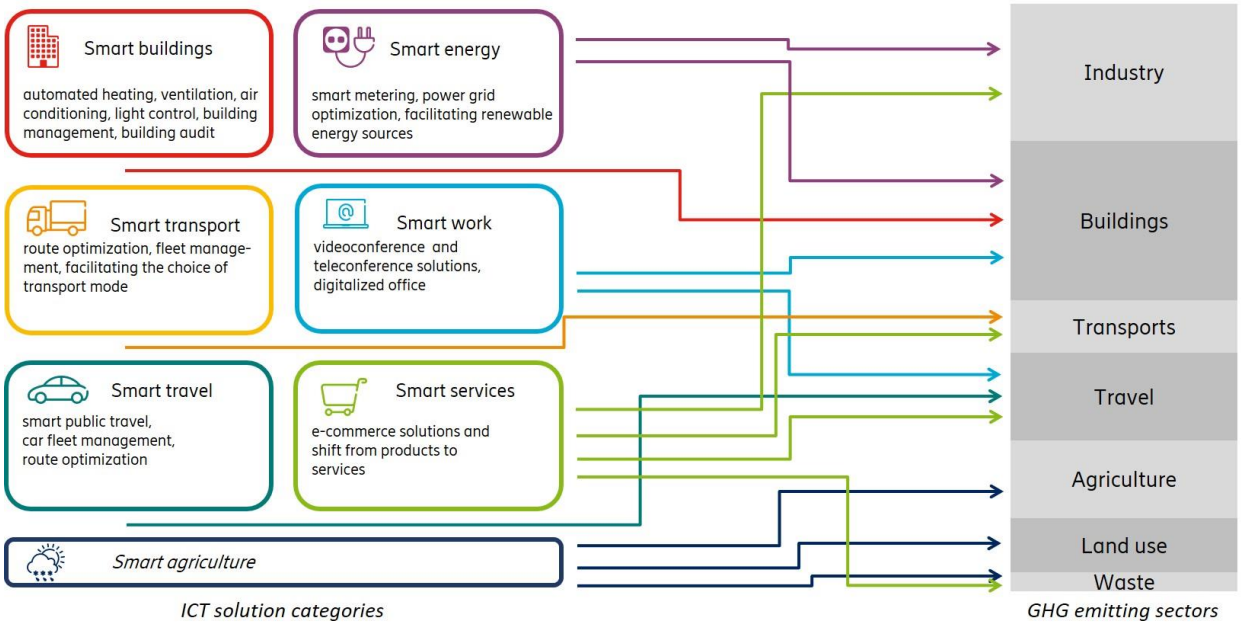
For the assessed categories, GHG emission reduction potentials for 2030 were estimated to be 6-12 % for the medium and high reduction scenarios, respectively.

Potential of up to 15% with agriculture included

A category for agriculture and land use was created but quantifications of ICT´s potential were hard to find. As ICT solutions are expected to bring emission reductions also in this sector, the potential for agriculture used in the publicly available SMARTer2020 report was applied. This resulted in total reduction potentials of 7 and 15% for the two respective scenarios.

Quantifying GHG in 2030

For the medium and high reduction scenarios the total potential GHG reduction was estimated to be about 4 Gt and 8 Gt CO_2-equivalents, respectively (or about 5 and 10 Gt including agriculture). To get a percentage figure, these values were compared to the overall 2030 global GHG emissions, estimated to be 63.5 Gt CO_2-equivalents. The overall estimate was set as the average of six different future scenarios defined by the United Nation´s Intergovernmental Panel on Climate Change (IPCC). The baseline GHG emissions per sector were composed by combining the overall emission with an estimated industry sector distribution.



Many ICT solutions categorized and mapped

To calculate the ICT potential of each category and then the overall potential was a stepwise procedure. Identified ICT solutions were first gathered into solution categories. A data collection challenge was that ICT solutions often are introduced in combination with other optimizations and improvements. Often, in such cases the potential of the ICT solutions as such could not be obtained.

The ICT solution categories were then mapped onto the global GHG emissions on industry sector level based on data from the World Resource Institute (WRI) for buildings, transport and travel, agriculture, land use, waste, and industry.

A main assumption was that the relative share of GHG emissions for different parts of the sectors (such as residential buildings and commercial buildings for Buildings) remains the same in 2030. It was also assumed that the relation between emissions related to usage and embodied emissions remains the same.

Reduction potential per ICT solution category

The potential reductions to reduce the global GHG emissions by 2030 per ICT solution category were estimated to be about 0,6-4% each. These numbers were derived by dividing the reduction in each category with the corresponding global GHG emissions per sector for 2030. The smart grid category was shown to have the largest reduction potential. Note that the percentage reduction per sector cannot simply be added together to form the overall potential, as solutions from different categories could be addressing the same emissions.

ICT solution category	Medium reduction scenario	High reduction scenario
Smart grid	1.6%	3.9%
Smart buildings	0.9%	1.4%
Smart transport	0.6%	0.6%
Smart travel	0.9%	0.9%
Smart work	0.9%	0.9%
Smart services	1.6%	1.6%

Future is hard to estimate

As all similar estimates, these results come with much uncertainty in all steps even though they are based on existing ICT solutions and their actual, experienced reductions in GHG emissions. The estimate relies on a limited amount of ICT solutions applied locally, which are extrapolated to a global level. On top of that there are uncertainties related to future development.

The reduction potentials for ICT are applied on forecasted 2030 emissions which are higher than the emissions in 2015. As the world is focusing on reductions of the global GHG emissions, other activities than ICT may very well have led to further reductions making the baseline estimate for 2030 too high.

Reference to full paper:
Malmodin, Jens & Bergmark, Pernilla. (2015). Exploring the effect of ICT solutions on GHG emissions in 2030. 10.2991/ict4s-env-15.2015.5.