The Role of ICT in Driving a Sustainable Future

GeSI SMARTer 2020

FORO

InTECligencia

PARA UN MUNDO MEJOR

TIC+ECO

GeSI
GLOBAL e-SUSTAINABILITY INITIATIVE

Dr. Luis Neves
Group Climate Change and Sustainability Officer Deutsche Telekom
Chairman, Global e-Sustainability Initiative

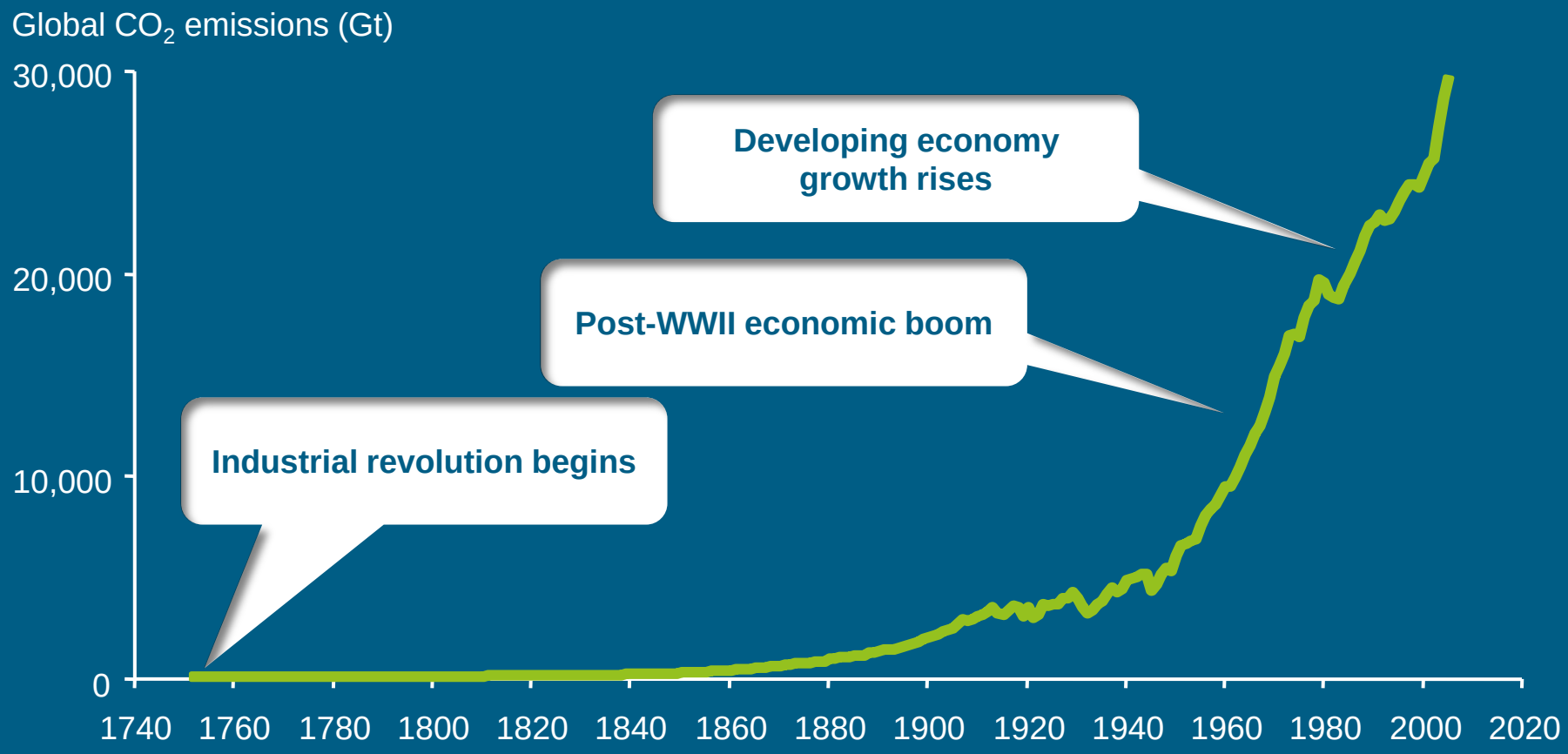
TIC+ECO

GeSI members and partners

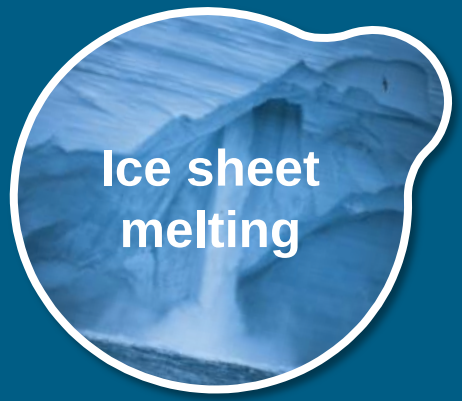
GeSI vision

A sustainable world through responsible, ICT-enabled transformation.

Human activity combined with limited emissions abatement has pushed CO_2 emissions to nearly 32,000 Mt in 2009



GHG emissions lead to dramatic and widespread temperature changes – there are also other destabilizing effects



We have re-evaluated ICT's potential to enable a low-carbon economy in 2020

SMARTer 2020 follows up the SMART 2020 study, which first evaluated ICT's potential to enable a low-carbon economy in 2020

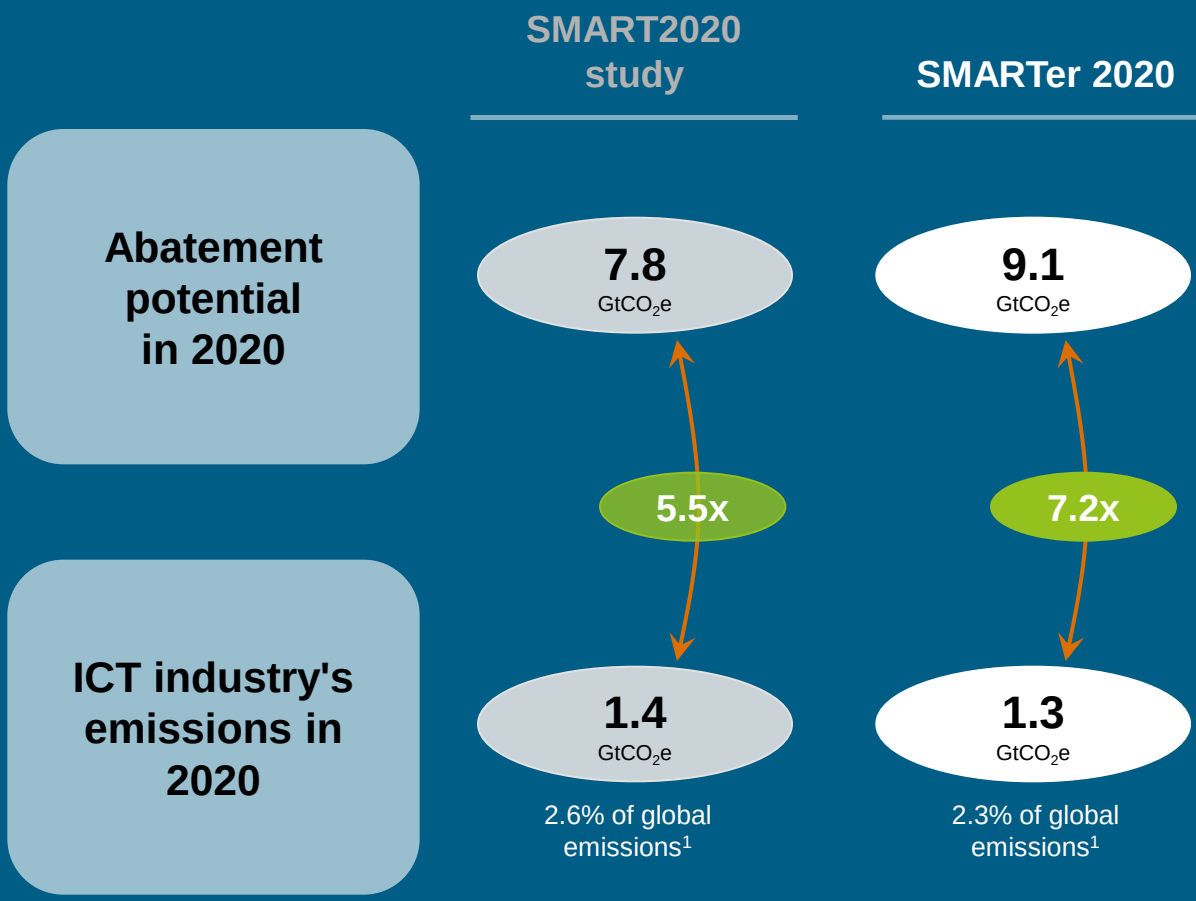
In 2008

SMART2020

Today

SMARTer 2020

The abatement potential of ICT is seven times the size of the ICT sector's own carbon footprint



Key changes

Increase in potential due to:

- Availability of new abatement solutions
- Updates to previous estimations due to recent trends and technological innovations
- Increase in total global GHG emissions

Lower estimate due to:

- Emergence of smart devices which have lower footprint than PCs
- More precise estimates of wireless networks emissions available
- Global economic slowdown also a factor

1. On a base of 55 Gt CO_2e GHG emissions (IEA)

The potential for information technology to reduce global carbon emissions has been under-estimated until now

9.1 $GtCO_2e$

Total abatement potential of ICT-enabled solutions in 2020

16.5%

% of global GHG emissions in 2020

Emissions savings could yield USD1.9 trillion in gross energy and fuel savings, and 29.5 million jobs would be created

GHG emission reductions

9.1 Gt
(16.5% of total)

As estimated in the report

↓

Number of barrels of oil with equivalent emissions[1]

21.6B barrels

Barrel of oil emits 0.43 metric tons of CO_2[1]

↓

At today's crude oil price, value of the oil that would be saved[2]

$1.9T

$87.99 per barrel of crude oil as of Nov 6, 2012[2]

↓

Equivalent number of jobs if the money was used in other sectors[3]

29.5M jobs

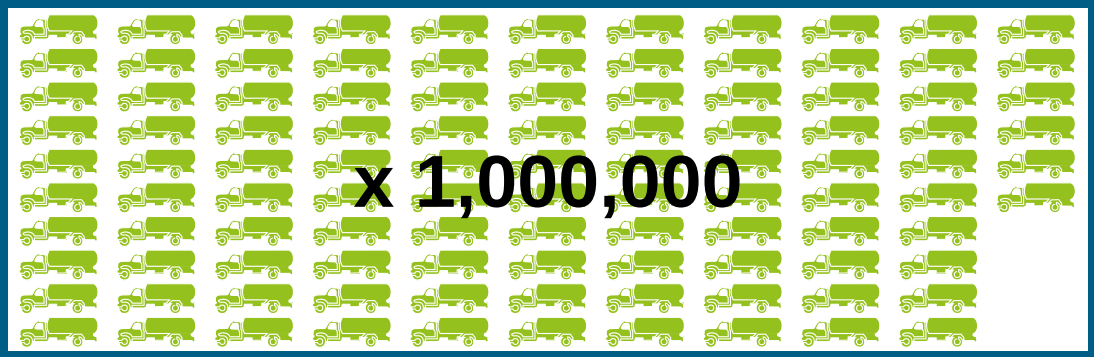
Using the same ratio of economic value to jobs created as in SMART2020 report

Though estimates, these calculation give a sense of the magnitude of the economic benefits

1. Source: EPA http://www.epa.gov/greenpower/pubs/calcmeth.htm#oil 2. Source: Bloomberg http://www.bloomberg.com/energy/)

9.1 gigatons of GHG emissions amounts to USD1.9 trillion in gross energy and fuel savings

Savings of 21.6 billion barrels of oil[1]



Equivalent to GDP of the Russian economy[2]

1. Number of barrels of oil with equivalent emissions assuming Barrel of oil emits 0.43 metric tons of CO_2 2. At today's crude oil price, value of the oil that would be saved ($87.99 per barrel of crude oil as of Nov 6, 2012)

The new research study identifies GHG abatement potential from ICT-enabled solutions ranging across six sectors

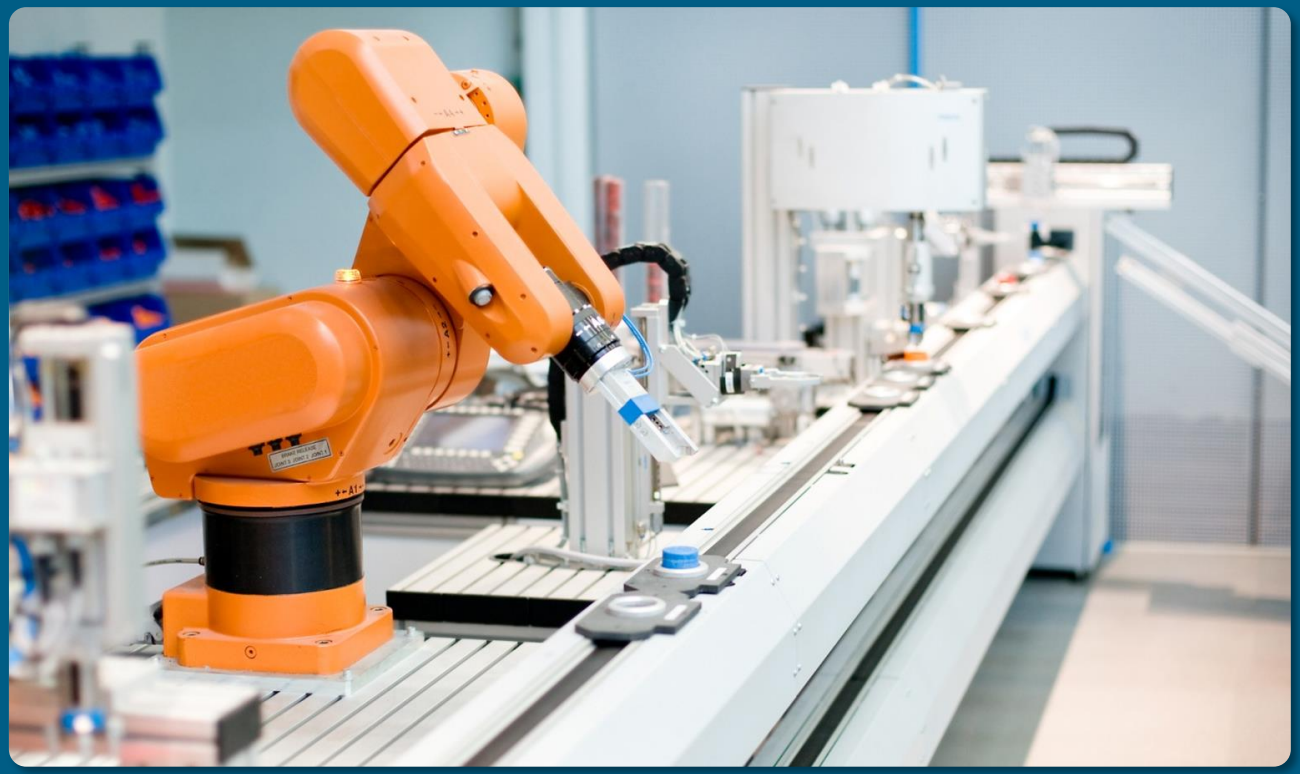
- Agriculture & Land-Use
- Buildings
- Manufacturing
- Power
- Service & Consumer
- Transportation

Example 1: Smart farming

The new research study identifies GHG abatement potential from ICT-enabled solutions ranging across six sectors

- Agriculture & Land-Use
- Buildings
- **Manufacturing**
- Power
- Service & Consumer
- Transportation

Example 2: Automation of industrial processes



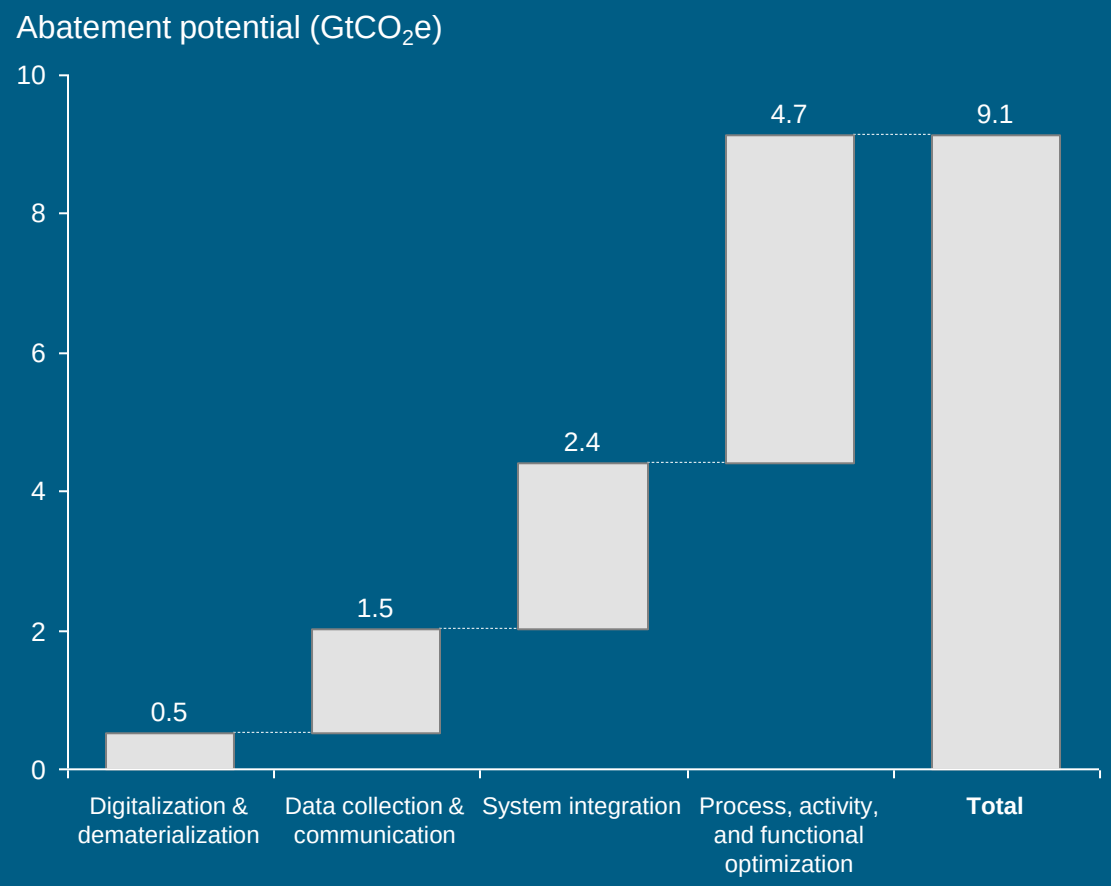
The new research study identifies GHG abatement potential from ICT-enabled solutions ranging across six sectors

- Agriculture & Land-Use
- Buildings
- Manufacturing
- **Power**
- Service & Consumer
- Transportation

Example 3: Integration of renewables

Emission reductions come from virtualization initiatives such as cloud computing, but also through efficiency gains

Abatement potential by change lever



1.Of global GHG emissions in 2020
Source: BCG analysis

Major drivers

Digital. & dematerial.

- Establishment of technologies that **substitute** or **eliminate** the need for a carbon-intensive product
- Not many new technological innovations in change lever

Data coll. & Comm.

- Trends in **increased data complexity** require real time analysis and communication
- **Social media** and networking are also a major driver

System integration

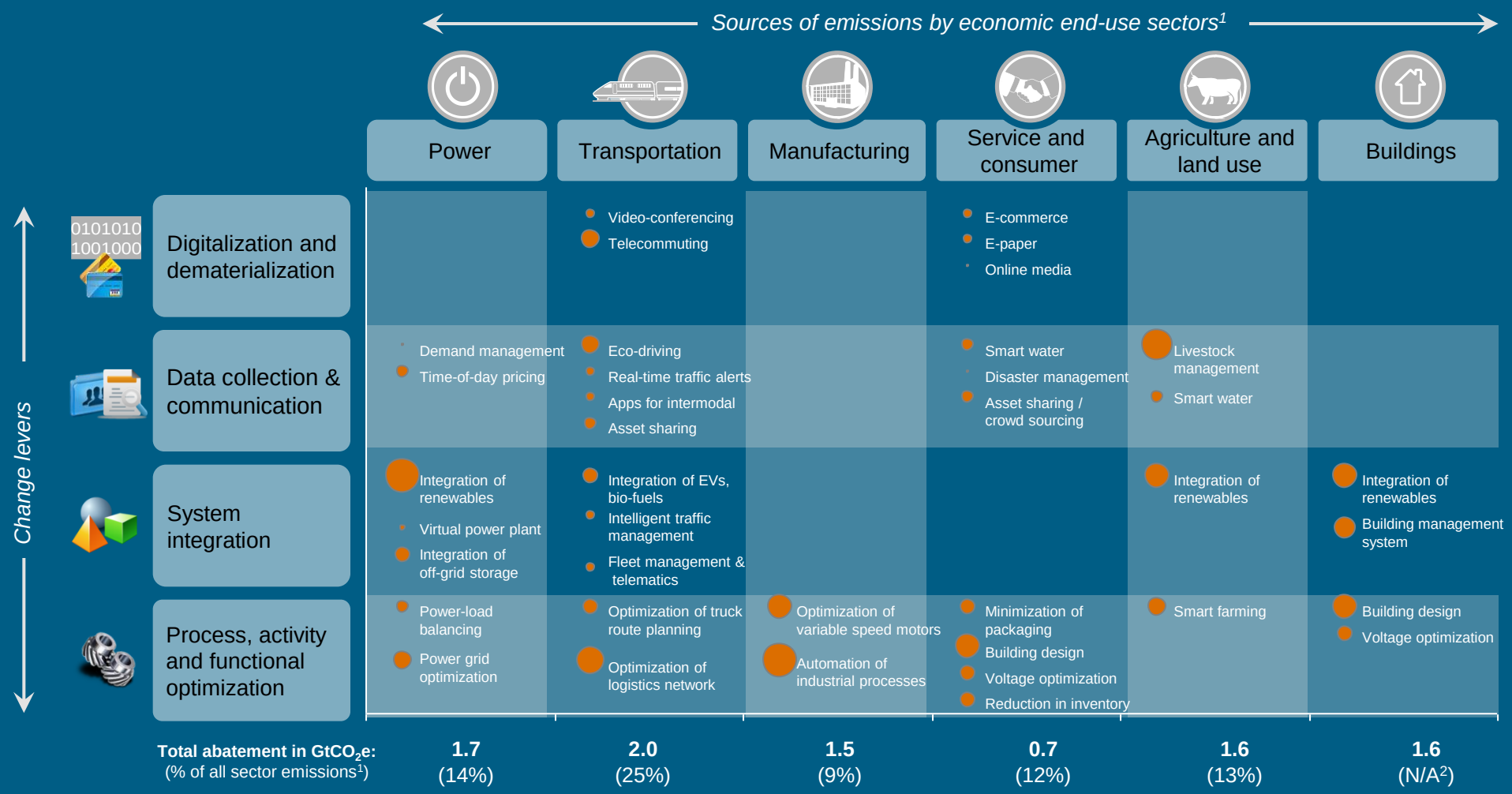
- Driven by solutions that **manage** the use of resources (e.g. building management system) and **integrate** less-carbon intensive processes (e.g. renewables)

Optimization

- Result of **intelligent** simulation, automation, redesign, or control
- Improved **processing power** driving growth of change lever

35 ICT-enabled abatement solutions identified in the study

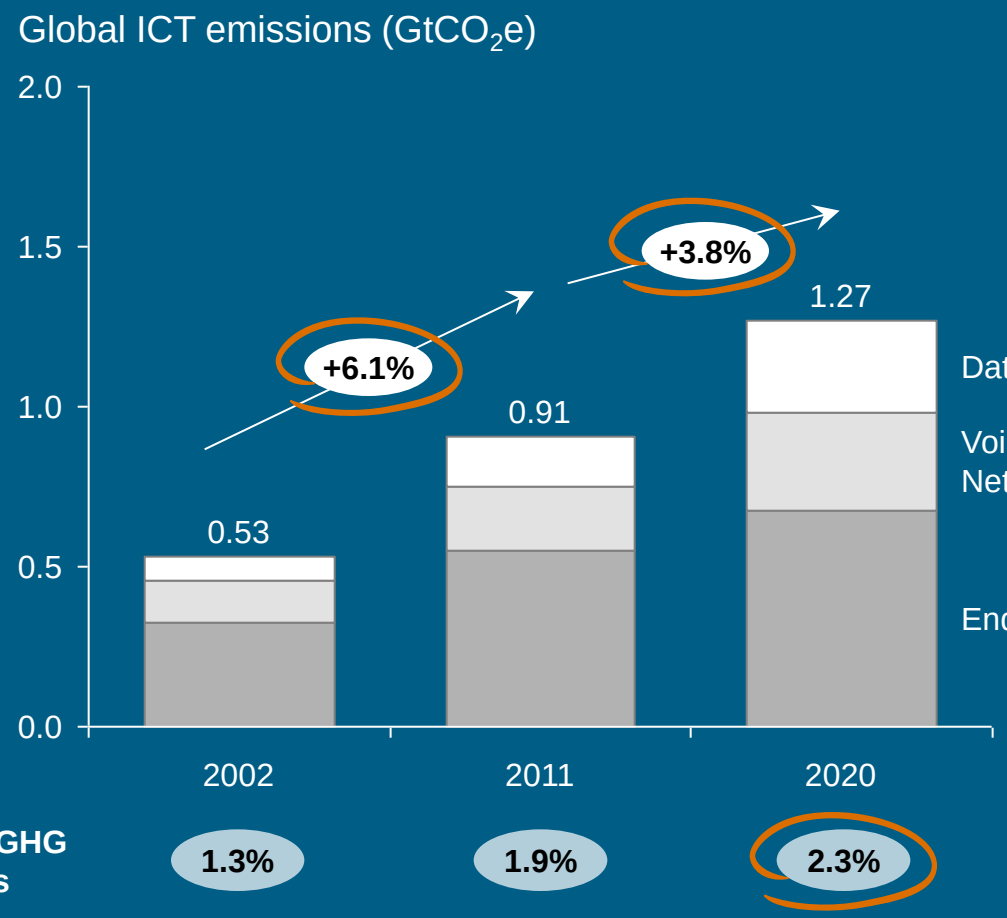
Abatement potential modeled individually for each sub-lever



1. Based on 2008 data – EDGAR; 2. EDGAR data does not split building out as a separate sector

ICT emissions growth expected to slow down from 6% to ~4%

ICT emissions 2.3% of global emissions by 2020

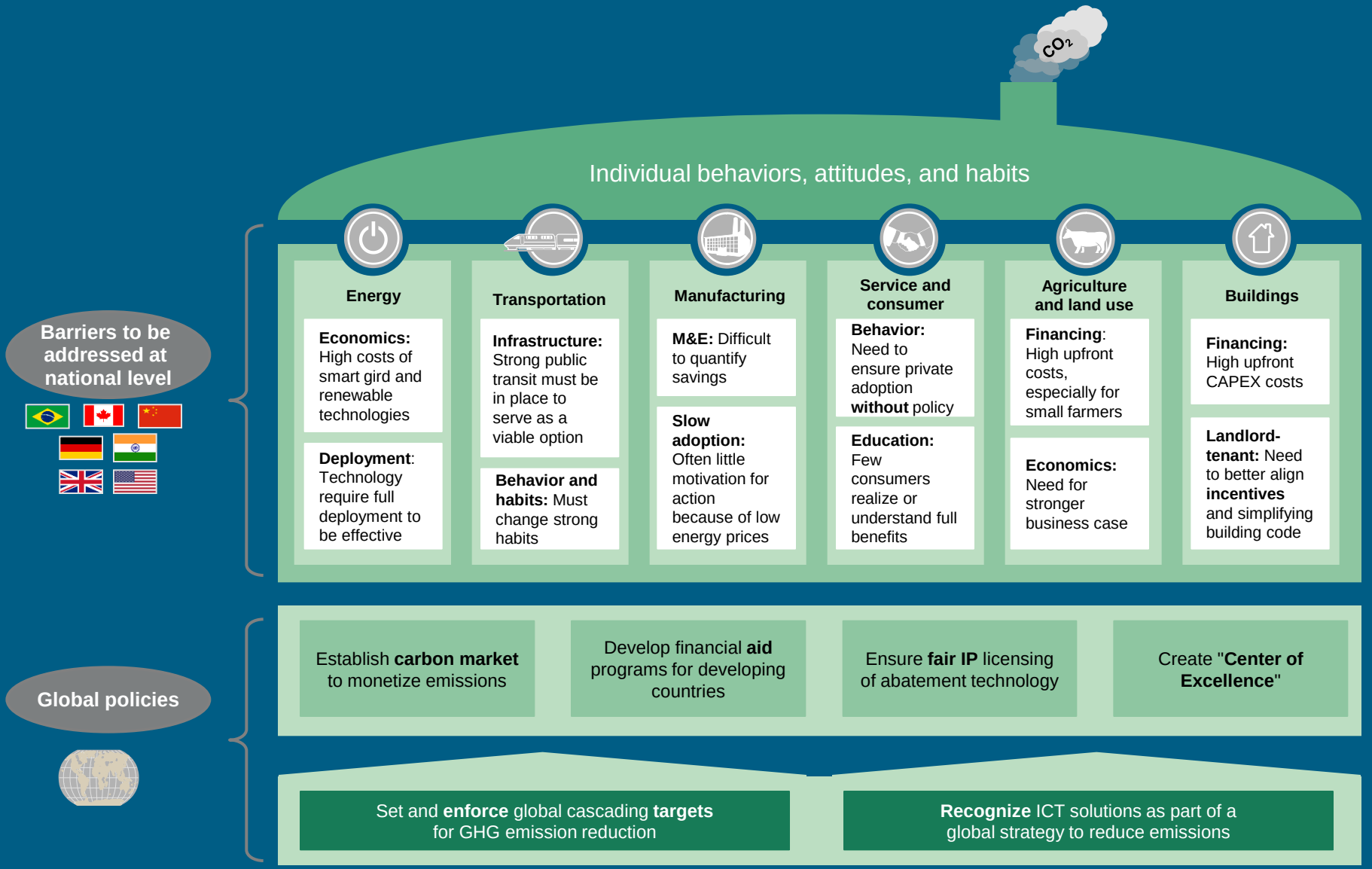


	CAGR 2002-2011	CAGR 2011-2020
Data centers	8.6%	7.1%
Voice and Data Networks	4.7%	4.6%
End-user devices	6.1%	2.3%

1. Data for 2010 2. Previous study used an incorrect number for the wireless network emissions (50 vs. 24kWh/yr) and therefore ended up with higher total emissions

Source: Gartner; Forrester ; U.S. Census Bureau; IEA; Greentouch; CEET; CDP; Ovum; GSMA; CERN; Cisco; CEET; SMART 2020: Enabling the low carbon economy in the information age; academic publications; industry experts; academic experts; manufacturer websites; GeSI Smart2020 Refresh team members; BCG analysis

Policies at the national level have the most significant potential to drive sub-lever adoption



Country deep-dives provide context to demonstrate how national and local policies can yield higher abatement


Brazil


Canada


China


Germany


India


U.K.


U.S.

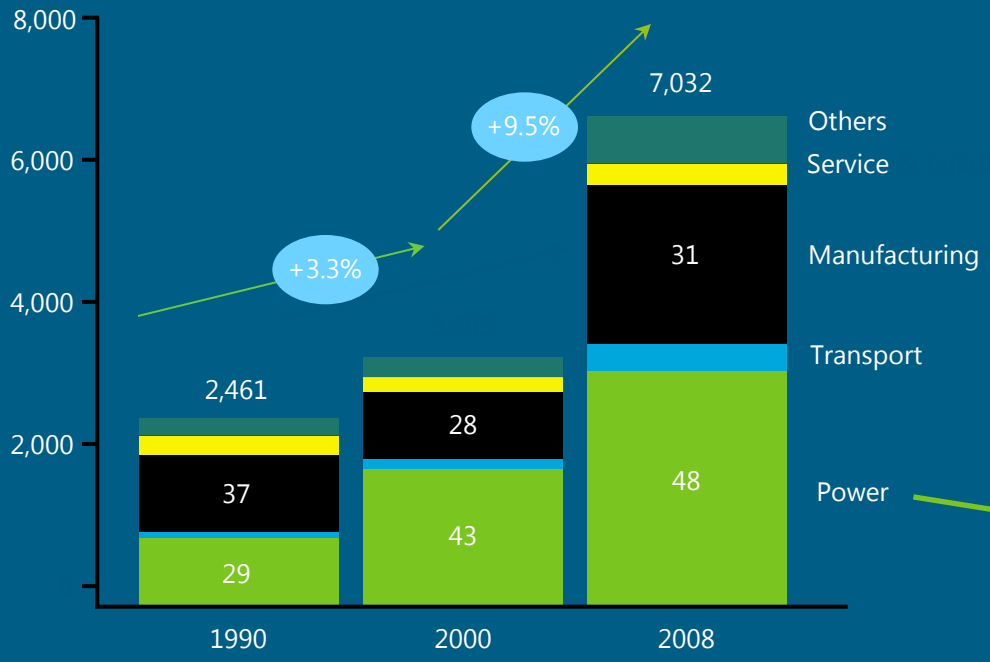
All countries have unique circumstances that impact their ability to abate GHGs

Those differences drive which end-use sectors and which sub-levers deserve most attention

Policies at the national level are the most effective drivers of change in all countries

Opportunities in China

China's CO_2e emissions (1990-2008)



Power sector opportunities (390Mt CO_2e)

1%	Demand management (4 $MtCO_2e$)
2%	Power load balancing (9 $MtCO_2e$)
20%	Time of day pricing (79 $MtCO_2e$)
37%	Power grid optimisation (143 $MtCO_2e$)
39%	Integration of renewables (153 $MtCO_2e$)

Manufacturing sector opportunities (512Mt CO_2e)

32% Automation of industrial processes (165 $MtCO_2e$)

68% Optimisation of variable speed motor systems (347 $MtCO_2e$)

Challenges and Solutions

Challenges

Power

- Technology gap
- State control discourages innovation & competition
- Dependence on coal
- Focus on securing supply rather than shifting demand
- Low awareness about green power
- Limited incentives for change

Manufacturing

- Technology gap
- Inefficient production
- Not a government priority
- Lack of government support
- No data standards
- Limited ability benchmark
- Rise of unemployment from automation

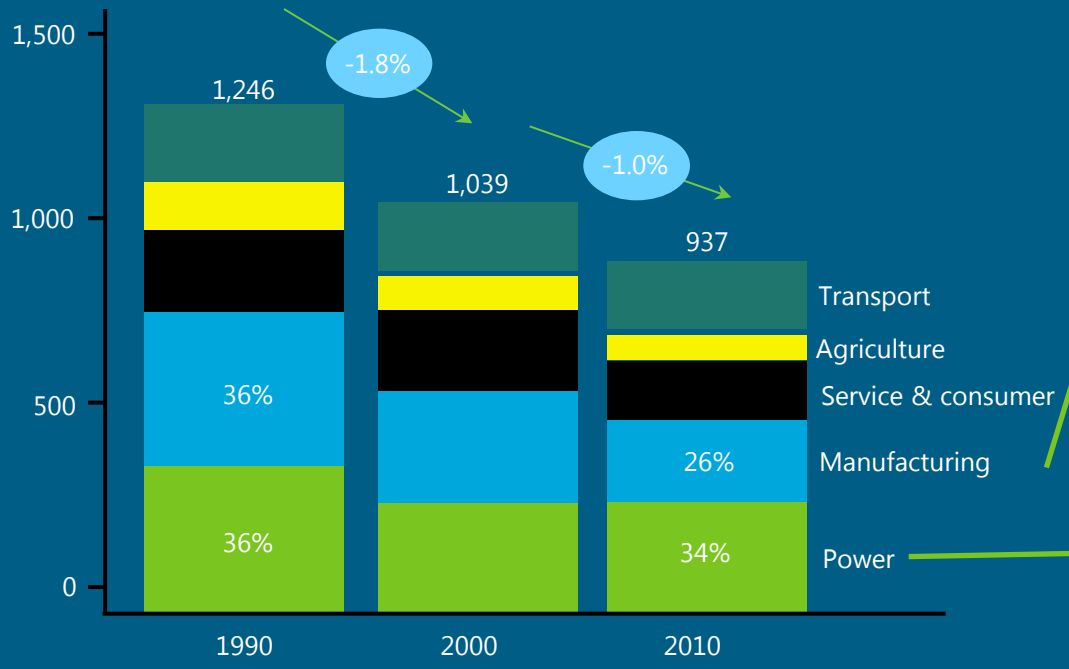
Solutions

- Promote technology innovation
  - R&D funding
  - Strengthen IP protection
- Deregulate power sector to encourage market pricing, competition & innovation
- Increase demand side management
- Enhance public education and create incentives for consumers to change
- Adopt different pricing mechanism

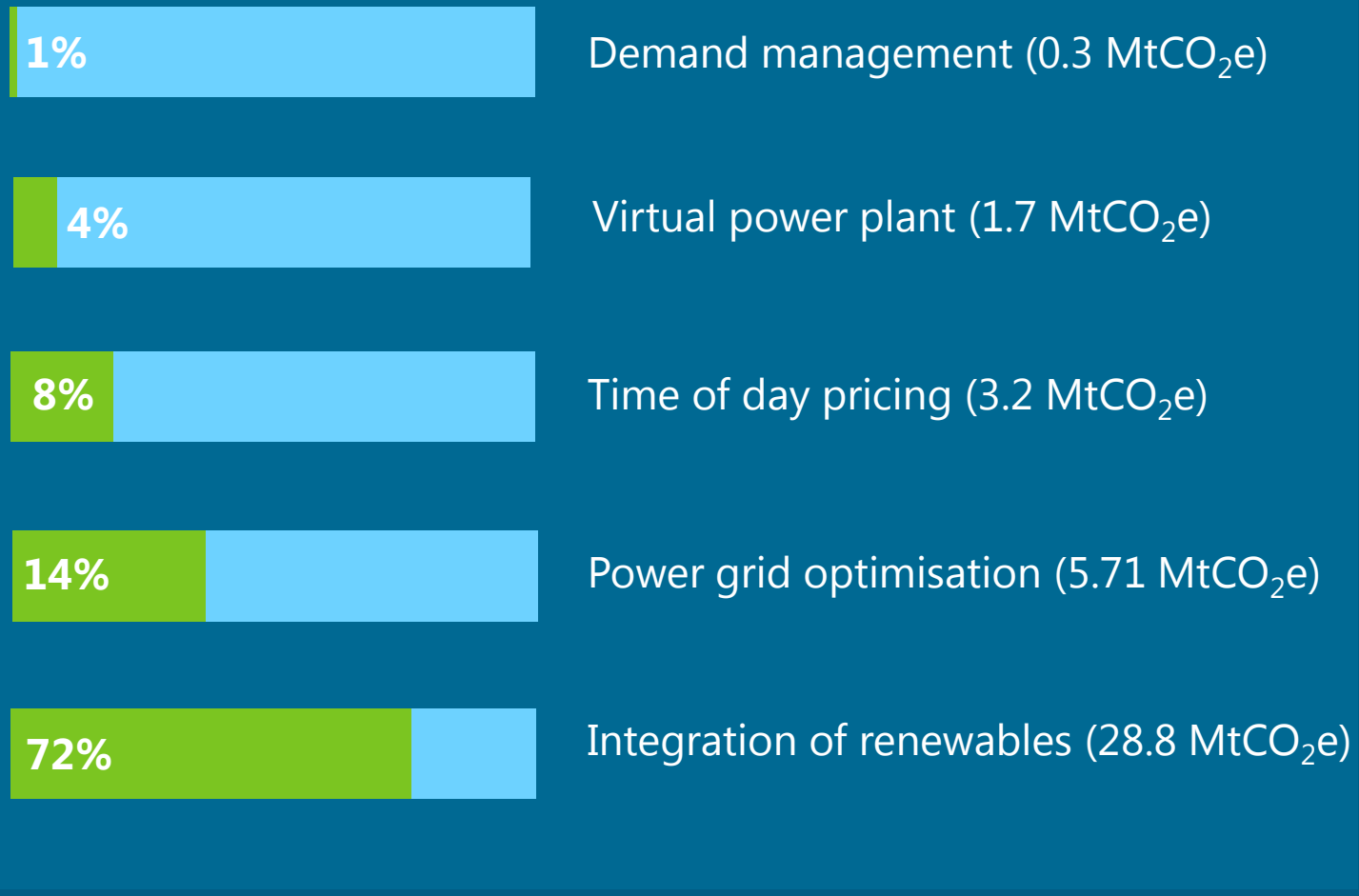
- Promote technology innovation:
  - R&D funding
  - Attract foreign investment & JV's
- Create national efficiency standards & KPIs
- Offer local support for energy efficiency
- Establish data and measurement standards
  - Use best practice
  - Enforce compliance
- Provide further training opportunities

Opportunities in Germany

Germany's CO_2e emissions (1990-2010)



Power sector opportunities (40Mt CO_2e)



Manufacturing sector opportunities (33Mt CO_2e)

Automation of industrial processes (6 $MtCO_2e$)

Optimisation of variable speed motor systems (27 $MtCO_2e$)

Challenges and solutions

Challenges

- Ineffective emissions targets (industrial emissions budget is too high)
- Economics is still not favourable in some niche areas e.g. old paper mills
- Slow adoption due to long change/upgrade cycles in some industries

Solutions

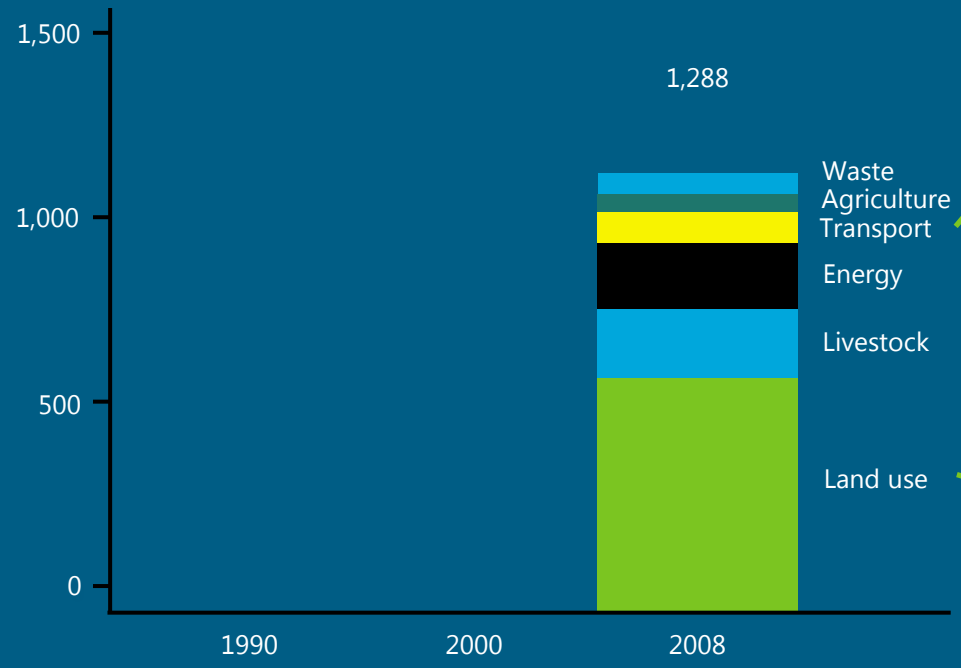
- Create higher emissions budgets, targets, or both
- Improve energy efficiency standards across all industries
- Provide incentives such as tax credits, investment credits or subsidies to improve economics for industries that are lagging behind

Opportunities in Brazil

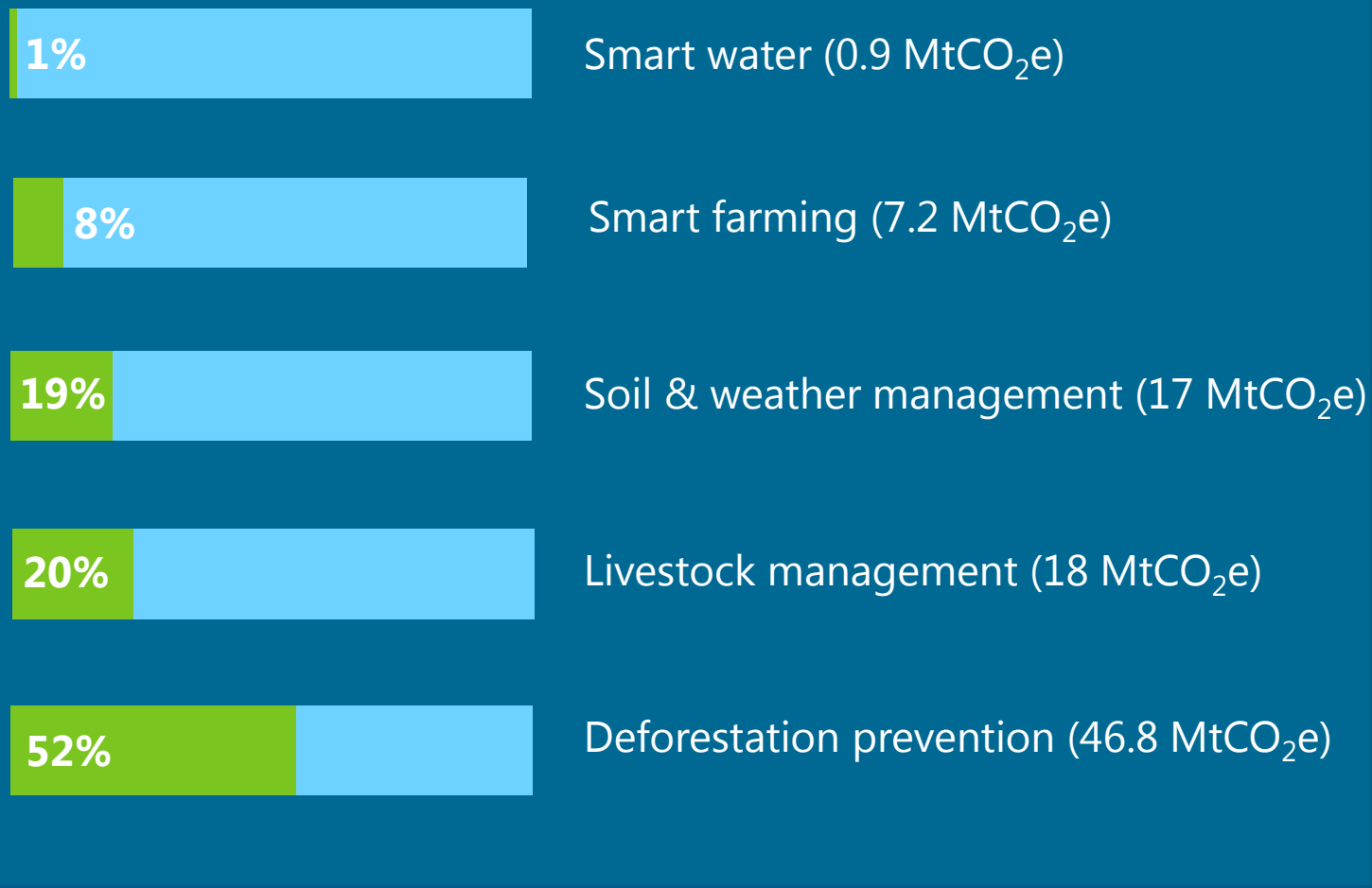
-1.8%

-1.0%

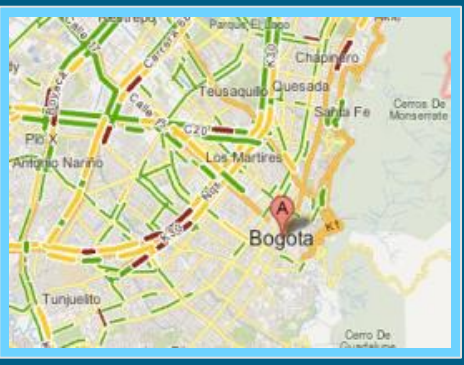
Brazil's CO_2e emissions (1990-2008)

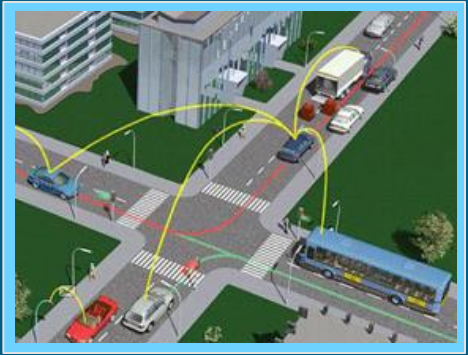


Agriculture & land use opportunities (90Mt CO_2e)



Transportation sector opportunities (38 Mt CO_2e)





38 Mt CO_2e

Challenges and solutions

Challenges

Agriculture & land use

- Economics:
  - maintaining land quality more expensive than using new land
  - other investments yield higher IRR
- Financing:
  - Equipment too expensive
  - Loan contracts hard to enforce
- Education – lack of understanding of benefits of smart farming
- Infrastructure – data networks don't exist in remote farming areas

Transportation

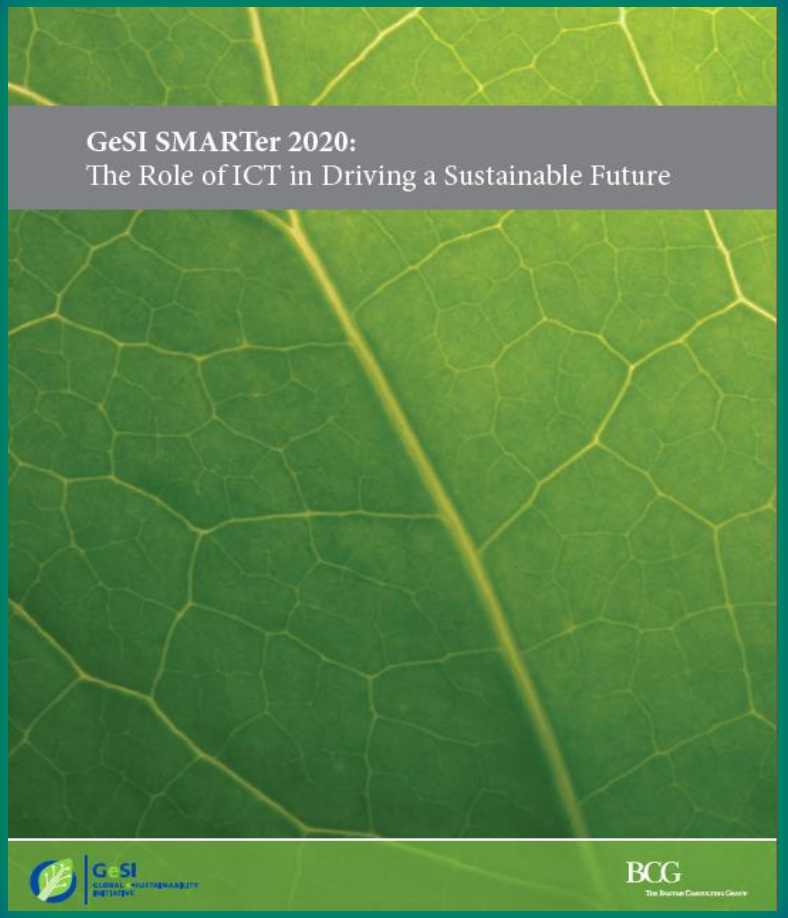
- Split incentives – employers bear cost of telecommuting & worry about deterioration of work culture
- Financing – high upfront costs for investment infrastructure
- Economics – ROI unclear
- Infrastructure – holes in network coverage
- Coordination with state – multitude of fractured institutions with different systems

Solutions

- Price land fairly and prosecution of encroachment onto public land
- Develop carbon markets to yield higher IRR for GHG saving investments
- Government support for agricultural ICT equipment through low interest loans
- ICT educational initiative to explain technology
- Promote construction of high-speed data networks in remote areas through loosening of regulations and increasing availability of cheaper spectrum

- Provide financial rewards for telecommuting
- Assist local governments with investing in infrastructure
- Provide financing for logistics systems
- Allow for tax write offs
- Promote high speed network development
- Mandate transit information system standardisation

Next steps for SMARter2020



Please visit www.gesi.org/SMARTer2020 for the full text version of SMARTer 2020

Thank you - Muchas Gracias

Luis Neves
Chairman
Global e-Sustainability Initiative (GeSI)
c/o Scotland House
Rond Point Schuman 6
1040 Brussels
Belgium
Email: luis.neves@gesi.org
www.gesi.org