



Sustainability Services

# #SMARTer2030 Business Case for KPN and the Netherlands



High performance. Delivered.

# KPN has set sustainability targets for its own operations and its enabling impact and operates in a Dutch context with concrete climate targets

## KPN's sustainability strategy and the Netherland's context

### KPN's sustainability strategy



“We believe ICT is the key to unlocking a better future for our planet and its people.”



#### KPN's sustainability agenda

- Environmental, climate neutral operations
- Economic, connected anytime anywhere
- Social, smarter living and working

#### Select sustainability targets



- Own operations: 25% absolute energy reduction in 2020 compared to 2010
- Enabling impact: In 2020 KPN services enable customers to save as much energy as consumed by KPN

### The Netherland's sustainability context

#### The Netherland's climate targets

At the global Climate meeting in Paris in December 2015, the Netherlands have publicly committed to reduce Greenhouse Gas emissions:



PARIS2015  
UN CLIMATE CHANGE CONFERENCE  
COP21-CMP11

- -40% by 2030 (compared to 1990)
- -80% to -95% by 2050 (compared to 1990)

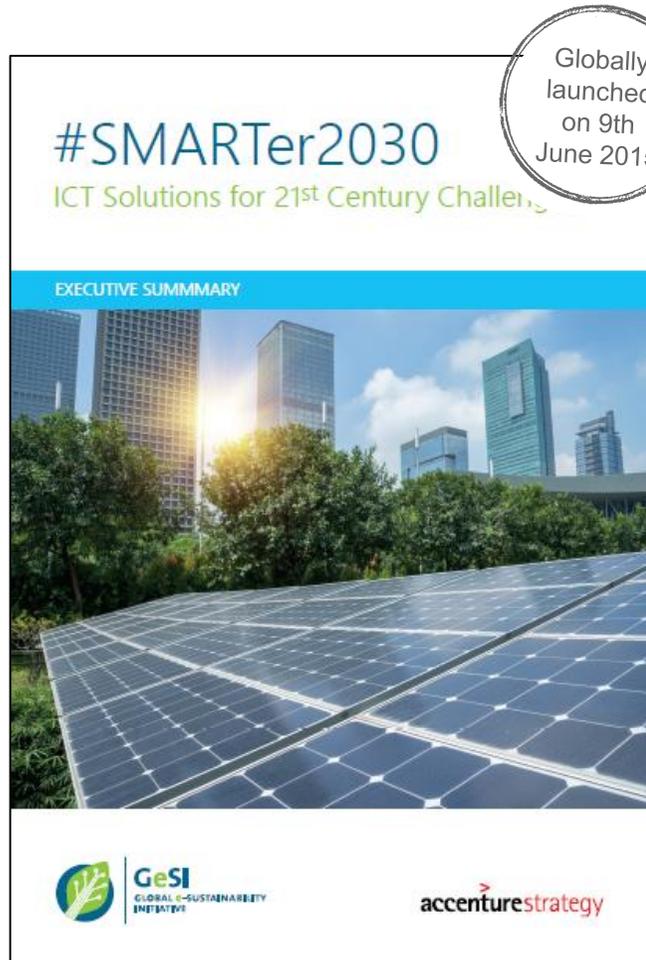
Current emissions (2014) of the Netherlands amount up to ca. 187 Million tons of CO<sub>2</sub>e.

#### Main sustainability issues in the Netherlands

- Climate change mitigation
- Sustainable mobility
- Renewable energy and energy conservation
- Agriculture productivity
- Energy performance of buildings

# The global #SMARTer2030 study shows that ICT can decrease CO<sub>2</sub> emissions, stimulate the economy and deliver benefits to society

## #SMARTer2030 main findings<sup>1</sup>



### Environmental benefits



- ICT has the potential to maintain global CO<sub>2</sub>e emissions at 2015 levels, with business as usual
- At the same time, ICT can reduce the consumption of scarce resources, e.g. -25 bn. barrels of oil

### Economic benefits



- ICT is good for growth and efficiency, enabling over US\$ 11 trillion in business value from sustainability
- \$6.5 trillion in new revenues in 2030 (of this, \$2.0 trillion for the ICT sector)
  - \$4.9 trillion in cost savings

### Social benefits



- ICT could connect 2.5bn previously unconnected people to ICT services by 2030, enabling a total of
- 1.6 billion people connected to e-health
  - 0.5 billion e-learning participants

<sup>1</sup> For additional information on global #SMARTer2030 results, pls refer to appendix 3

Source: GeSI / Accenture Strategy #SMARTer2030 study

# #SMARTer2030 use cases demonstrate the positive role of ICT and create quantitative evidence for the company-specific analysis

## Twelve #SMARTer2030 use cases

### Twelve #SMARTer2030 ICT use cases

#### ✓ Quantified sustainability benefits

 Connected Private Transportation	 Smart Agriculture
 E-Banking	 Smart Building
 E-Commerce	 Smart Energy
 E-Health	 Smart Logistics
 E-Learning	 Smart Manufacturing
 E-Work	 Traffic Control & Optimization

**ICT use case = innovative application of ICT that can deliver substantial sustainability benefit(s) compared to traditional approaches**

### Metrics for company-specific analysis

#SMARTer2030 use-case sustainability benefits demonstrate ICT's positive role and are provided with quantitative metrics.

The company-specific analysis includes:

 Environmental benefits as Greenhouse Gas emissions savings, Fuel, Energy, Barrels of Oil and Water savings, Yield increases

 Economic benefits as ICT revenues, stakeholder revenues and cost savings

 Social benefits as the number of E-Health beneficiaries and E-Learning degrees

<sup>1</sup> Technologies are included in use cases definitions, e.g. Big Data Analytics, Cloud, M2M / Internet of Things, Smartphone-enabled Mobile Access, Social Media, pls refer to appendix 1 for use-case specific technologies and applications

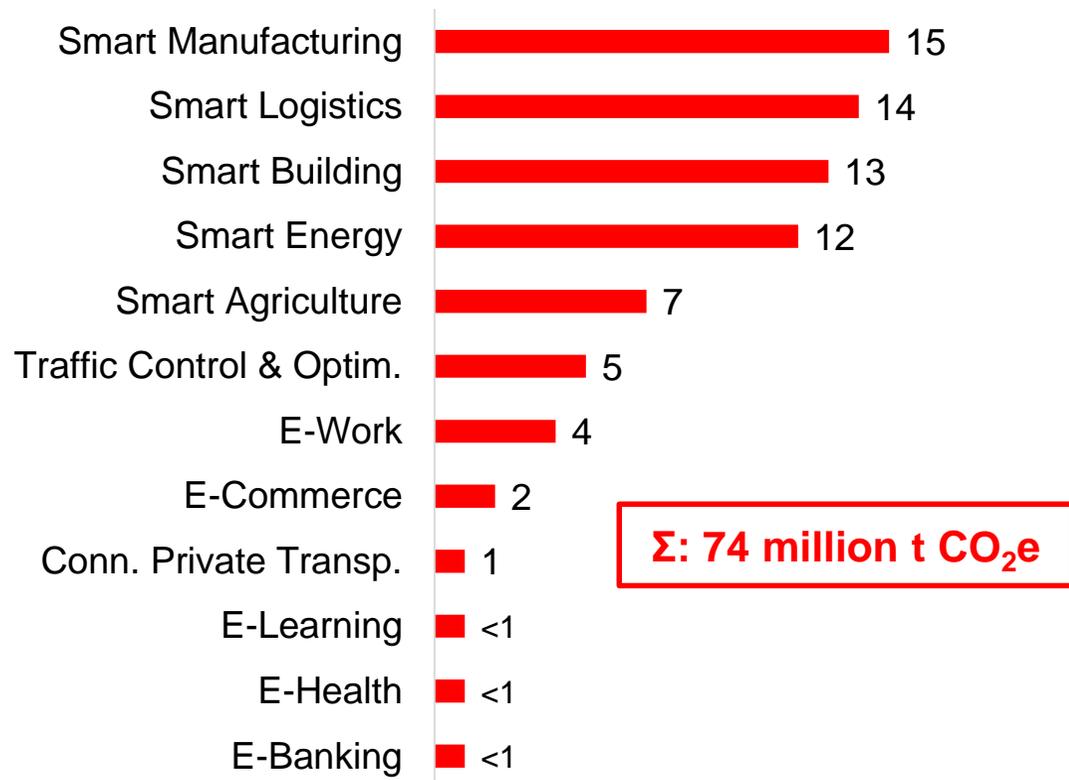
Source: Accenture Strategy; GeSI

# In the Netherlands, ICT can enable a reduction of Greenhouse Gas Emissions of ca. 74 million tons of CO<sub>2</sub>e<sup>1</sup> in 2030



## Greenhouse Gas emissions savings in the Netherlands in 2030

#SMARTer2030 use cases – GHG emissions savings in million t CO<sub>2</sub>e in 2030



ICT solutions with sustainability benefits have a high potential to enable **Greenhouse Gas emissions reduction**, e.g. via the following **levers**:



**Smart Manufacturing:** Processes automation and engine optimization



**Smart Logistics:** Reduction in ground, air, maritime and air freight due to more efficient logistics management



**Smart Building:** Reduction in the energy consumption of households and commercial buildings



**Smart Energy:** Reduction in energy production due to improved demand management, improved renewable energy integration, more efficient distribution grids

1 CO<sub>2</sub>e = Carbon Dioxide Equivalents; combines all emitted greenhouse gas (GHG) emissions into one metric

Sources: GeSI SMARTer2030; Accenture Analysis

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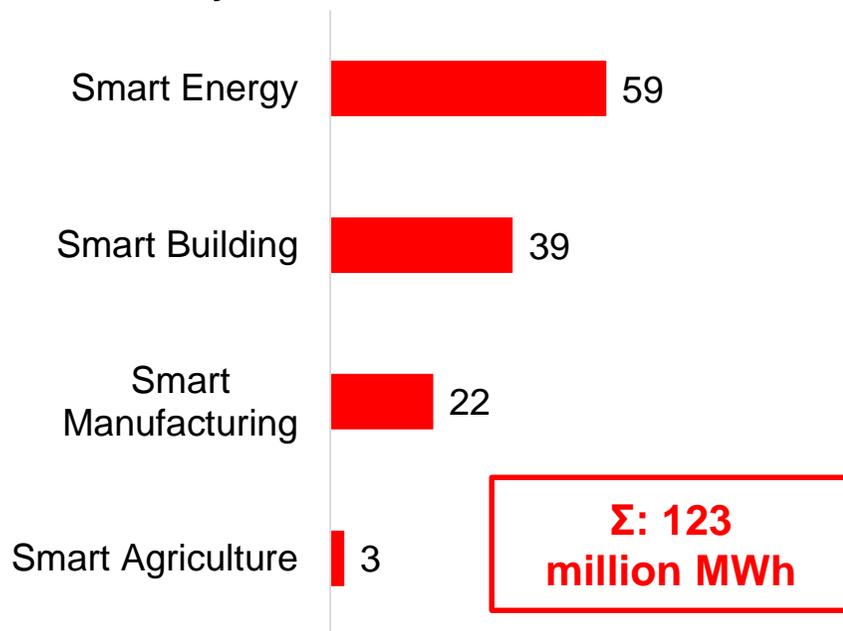
# 123 million MWh of energy and 5.6 billion liters of fuel can be saved in the Netherlands by 2030



## Energy saved in the Netherlands by 2030



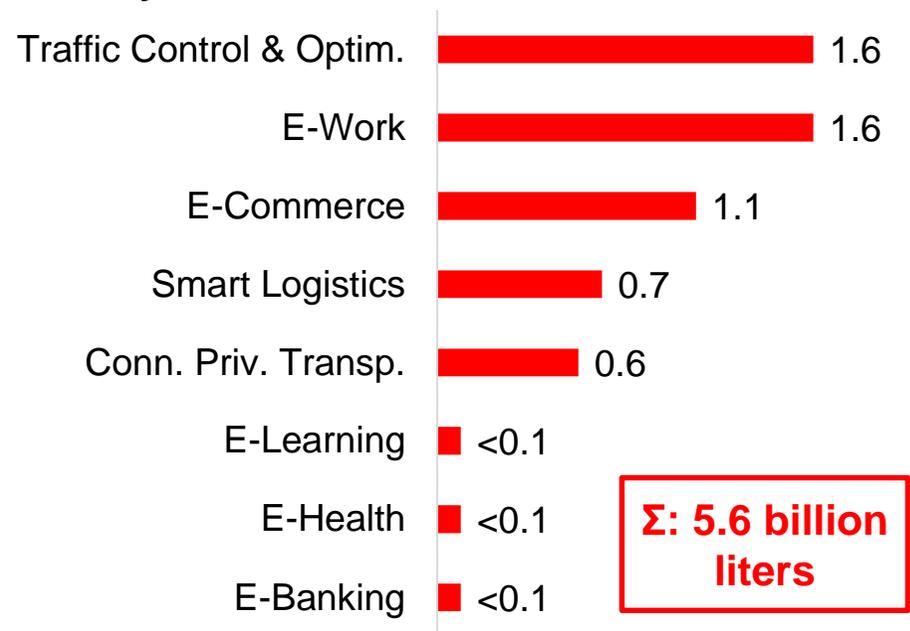
#SMARTer2030 use cases – energy savings in million MWh by 2030



## Fuel saved in the Netherlands by 2030



#SMARTer2030 use cases – fuel savings in billion liters by 2030



Most important lever for energy savings is reduced energy production, due to more efficient grids and a smarter energy supply/demand management

Most important levers for fuel saved are reduced private and business transportation, more efficient routes, more efficient vehicles

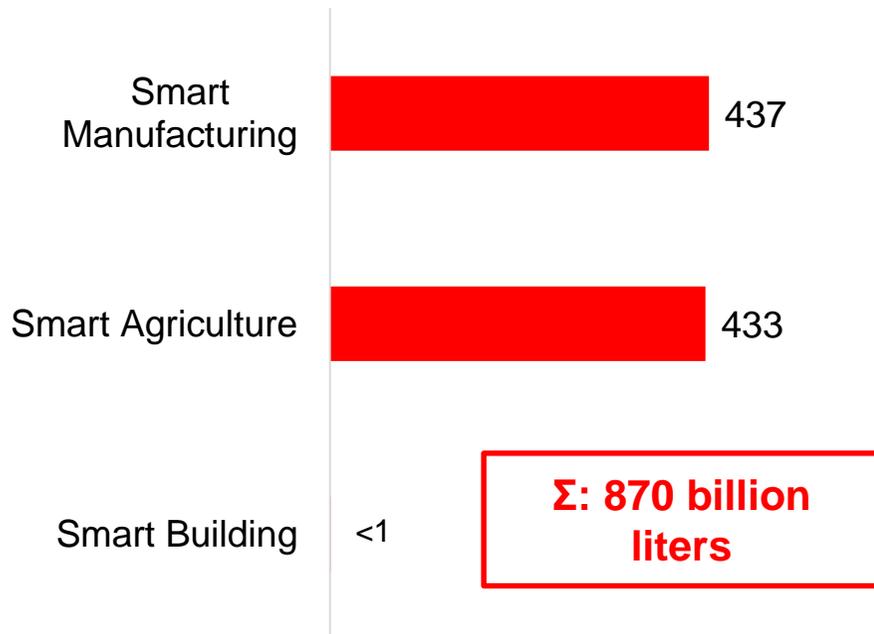
# Ca. 870 billion liters of water can be saved in 2030 and agricultural yield can increase by ca. 1 ton/hectare



## Water savings in the Netherlands in 2030



SMARTer2030 use cases – water savings in billion liters in 2030



## Yield increase in the Netherlands in 2030



Ca. 1 ton/hectare in additional agricultural yield via Smart Agriculture solutions in 2030, leading to, e.g.,

- Better management of soil conditions
- Improved knowledge of the requirements to help maximize production
- Better control of pests and diseases

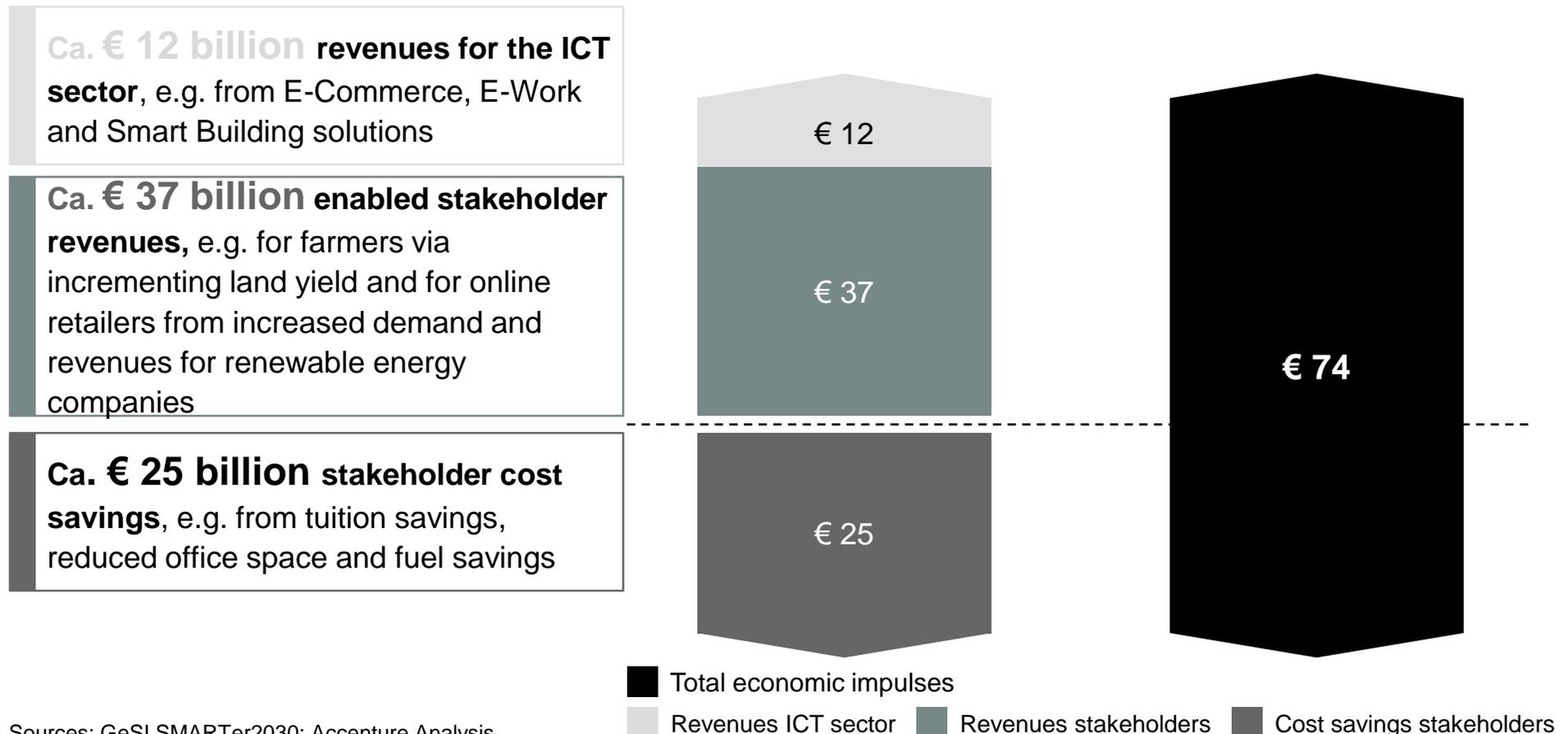
**Water savings and yield increase are enabled by increased efficiencies as a result of the applied ICT solutions in 2030**

# In the Netherlands, ICT solutions with sustainability benefits can deliver a total of € 74 billion of economic benefits in 2030



## Overview economic benefits in the Netherlands in 2030

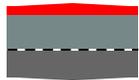
Economic benefits enabled by ICT solutions with sustainability benefits – in € billion, in 2030



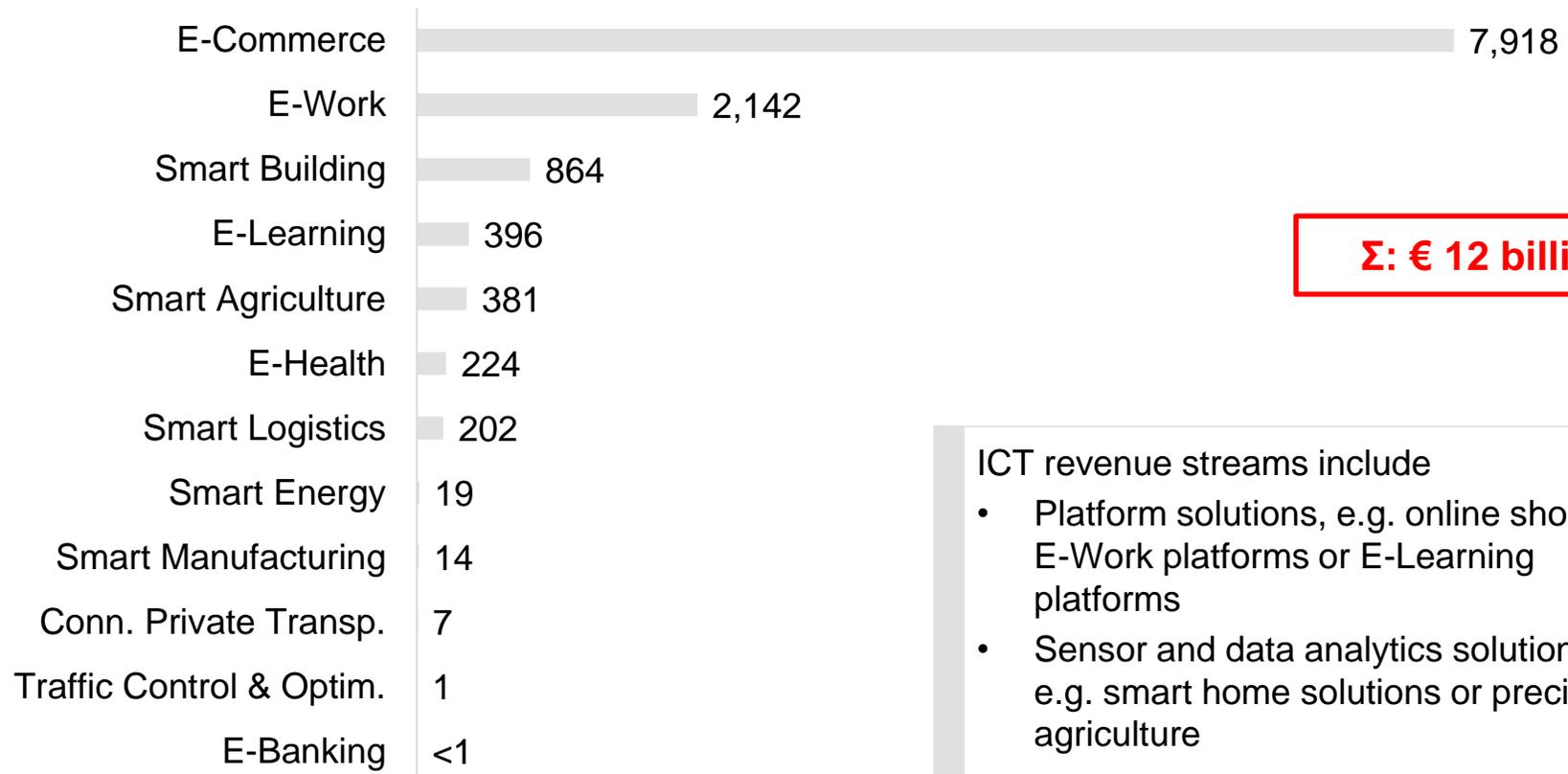
# The ICT sector could generate € 12 billion in revenues providing services that deliver sustainability benefits



## ICT revenue potential in the Netherlands in 2030



#SMARTer2030 use cases – ICT revenues in € million in 2030



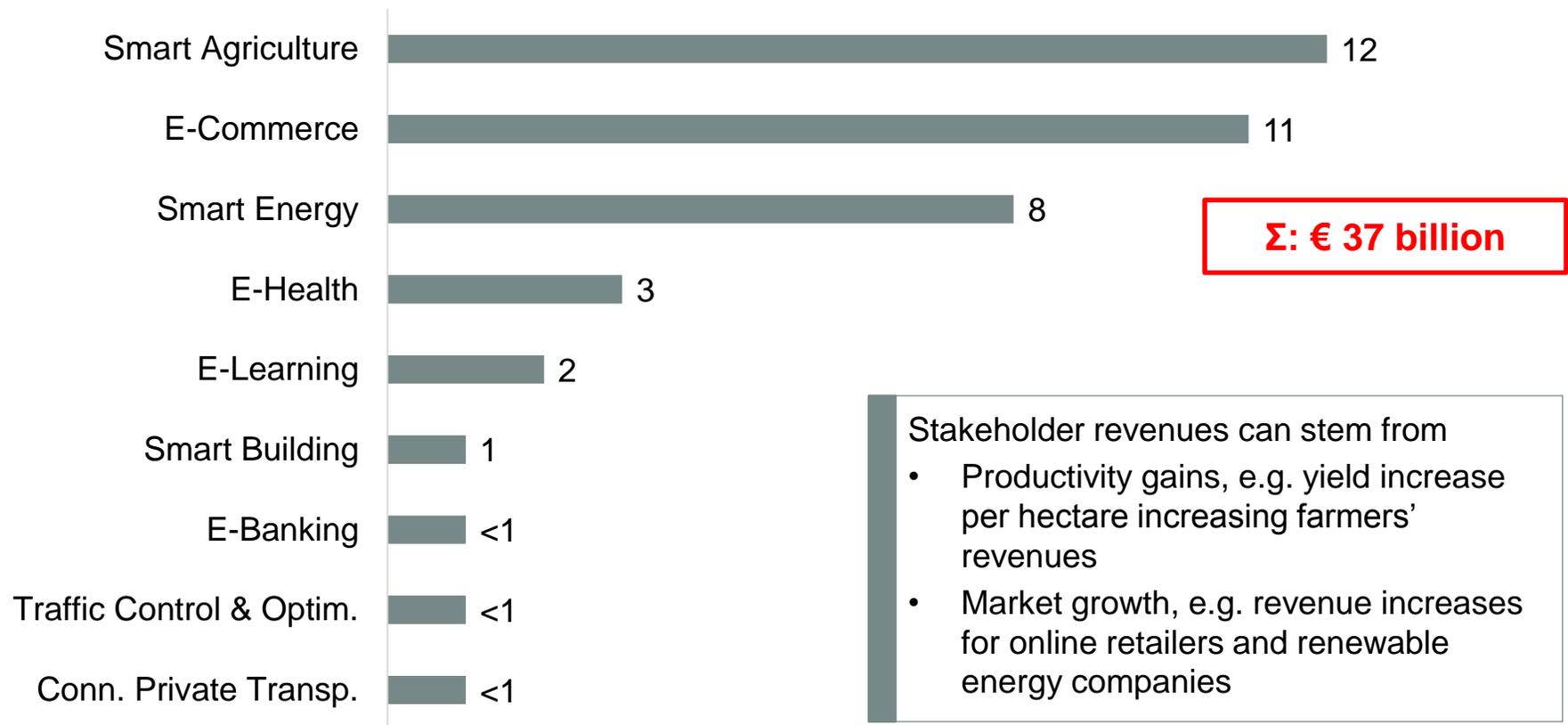
# Stakeholder revenues enabled by the application of ICT solutions with sustainability benefits can amount up to € 37 billion



## Stakeholder revenue potential in the Netherlands in 2030



#SMARTer2030 use cases – stakeholder revenues in € billion in 2030



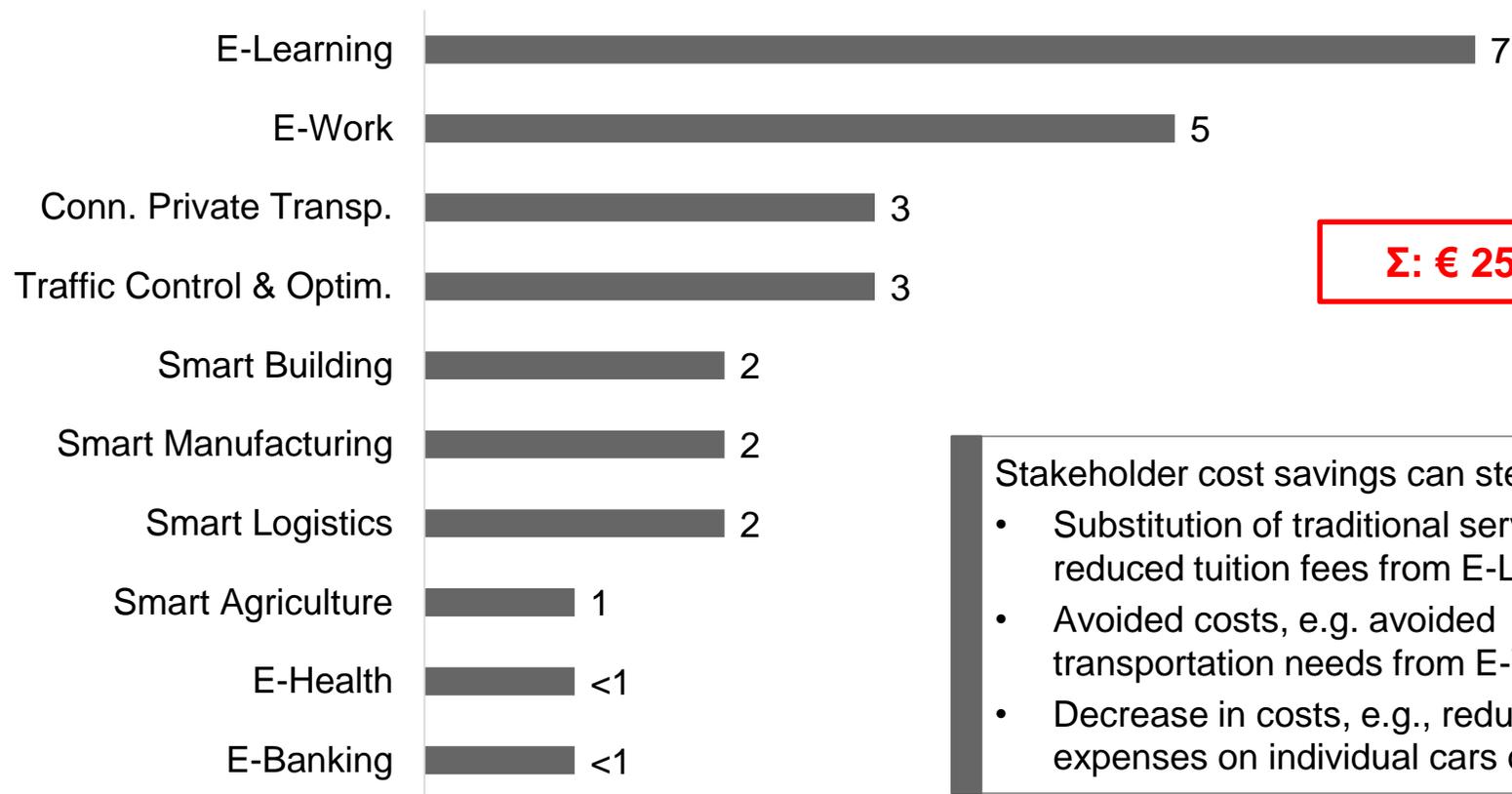
# The grand total of stakeholder cost savings can be € 25 billion in 2030



## Stakeholder cost savings potential in the Netherlands in 2030



#SMARTer2030 use cases – stakeholder cost savings in € billion in 2030



Stakeholder cost savings can stem from

- Substitution of traditional services, e.g. reduced tuition fees from E-Learning
- Avoided costs, e.g. avoided transportation needs from E-Work
- Decrease in costs, e.g., reduce the expenses on individual cars owned

**Over 3.8 million people could benefit from E-Health and over 1.6 million additional E-Learning degrees could be enabled in the Netherlands**



## **Social benefits of ICT in 2030 in the Netherlands: E-Health and E-Learning**

**Improved access to more affordable healthcare:**

**Improved access to and more affordable Learning opportunities:**

**>3.8 million** E-Health beneficiaries in the Netherlands in 2030 

Enabled by “The doctor in your pocket“, comprising:

- Remote access from any connected smart device
- More affordable healthcare services
- More effective treatment through personalized medicine
- Empowered and informed decision-making

**>1.6 million** E-Learning degrees in the Netherlands in 2030 

Enabled by the transition of knowledge delivery from “static classroom” to “anytime anywhere”, comprising:

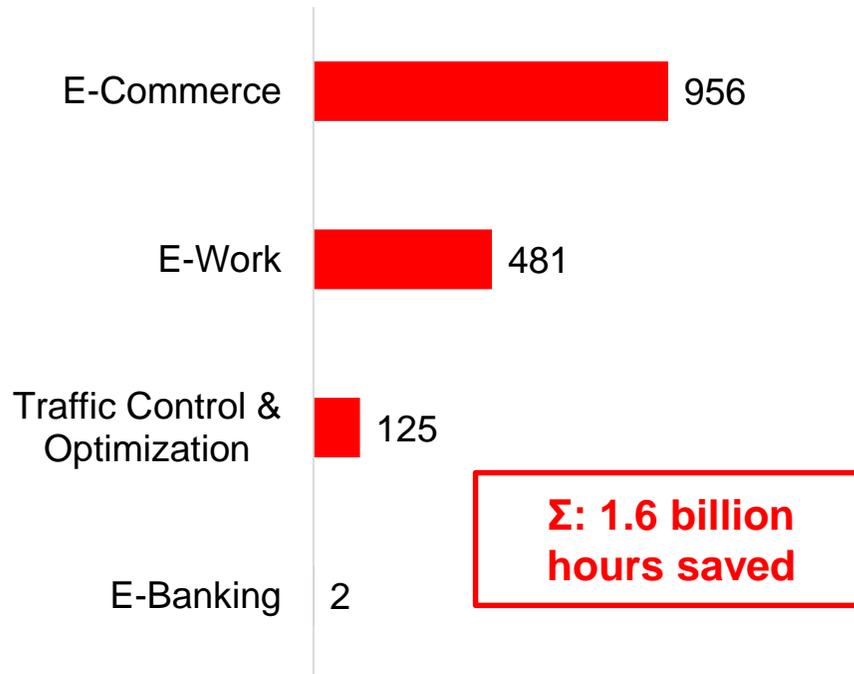
- Remote access from any connected smart device
- More affordable tuition fees
- More available learning offers
- Lifelong learning process controlled from your smart device

# In the Netherlands, ICT could enable time savings of ca. 1.6 billion hours in 2030



## Time savings in the Netherlands in 2030

#SMARTer2030 use cases – time savings in million hours in 2030



ICT solutions with sustainability benefits have a high potential to enable **time savings**, e.g. via the following **levers**:



**E-Commerce:** People will be able to buy online, avoiding the trip to the store and saving time on the road



**E-Work:** People will be able to work wherever they are, avoiding the trip to the office and saving time



**Traffic Control & Optimization:** Efficiency in transport will reduce traffic jams, reducing the time spent on the road



**E-Banking:** People will be able to be attended to wherever they are, whatever they need, avoiding the trip to the bank and saving time

# Smart Manufacturing technologies in 2030 can enable various quantifiable economic and environmental benefits in the NED



## Deep-dive on Smart Manufacturing use case

### Technology vision 2030



- Augmented reality devices
- Cyber-physical systems (CPS)
- Data analytics & cloud computing
- Drones & Robotics
- Embedded system production technology
- Global network
- Industrial Internet of Things (IoT) and Machine-to-Machine (M2M)
- 3-D printing



### Enabled benefits (qualitative)

Virtual Manufacturing	Customer Centric Production
Circular Supply Chain	Smart Services

### #SMARTer2030 quantitative evidence for benefits

Category	Metric	In NED in 2030
<b>Economic</b> 	ICT revenues	€ 14 million
	Stakeholder cost savings	€ 2 billion
<b>Environmental</b> 	GHG saved	15 million t of CO <sub>2</sub> e
	Barrels of oil saved	14 million barrels
	Energy saved	22 million MWh
	Water saved	437 billion liters

# Smart Logistics technologies in 2030 can enable various quantifiable economic and environmental benefits in the Netherlands

## Deep-dive on Smart Logistics use case

### Technology vision 2030

- Augmented reality and wearable technologies 
- Commercial Unmanned Aerial Vehicles (UAV)
- Connected commercial vehicles, load units, products and machines
- Digital warehouses
- Fleet management and optimized routes
- Operational agility systems

### Enabled benefits (qualitative)

Fall in transport as a result of a reduction in road freight due to route optimization, maximization of vehicle capacity, logistic sharing and eco drive

Fall in transport as a result of a reduction of air, maritime and train freight due to maximization of vehicle capacity and logistic sharing

### #SMARTer2030 quantitative evidence for benefits

Category	Metric	In NED in 2030
<b>Economic</b> 	ICT revenues	€ 202 million
	Stakeholder cost savings	€ 1.8 billion
<b>Environmental</b> 	GHG saved	14 million t of CO <sub>2</sub> e
	Barrels of oil saved	6 million barrels
	Fuel saved	712 million liters

# Smart Building technologies in 2030 can enable various quantifiable economic and environmental benefits in the Netherlands

## Deep-dive on Smart Building use case

### Technology vision 2030



- Monitoring, detection and diagnosis technologies, e.g.
  - Data analytics and cloud computing
  - Internet of Things
- Alarm management and automation
- Energy management technologies, e.g. smart metering and steering apps
- Information and communication platforms

### Enabled benefits (qualitative)

Energy & resource efficiency	Improved process efficiency
Reduction in energy consumption	Enhanced living & working



### #SMARTer2030 quantitative evidence for benefits

Category	Metric	In NED in 2030
<b>Economic</b> 	ICT revenues	€ 960 million
	Stakeholder cost savings	€ 2.8 billion
	Stakeholder revenues	€ 965 million
<b>Environmental</b> 	GHG saved	13 million t of CO <sub>2</sub> e
	Barrels of oil saved	24 million barrels
	Energy saved	39 million MWh
	Water saved	542 million liters

# Smart Energy technologies in 2030 can enable various quantifiable economic and environmental benefits in the Netherlands



## Deep-dive on Smart Energy use case

### Technology vision 2030



- Advanced analytics
- Convergence of Information Technology and of Operations Technology
- Demand response technologies (B2B, B2C)
- Distribution management system
- Energy storage technology
- Internet of Things (IoT) and Machine-to-Machine (M2M) technology
- Sensor technologies

### Enabled benefits (qualitative)

Improved load management + enablement of renewables

Grid efficiency

Resilient energy infrastructure

### #SMARTer2030 quantitative evidence for benefits

Category	Metric	In NED in 2030
 <b>Economic</b>	ICT revenues	€ 19 million
	Stakeholder revenues	€ 7.9 billion
 <b>Environmental</b>	GHG saved	12 million t of CO <sub>2</sub> e
	Barrels of oil saved	36 million barrels
	Energy saved	59 million MWh

# Appendix 1: Explanation of #SMARTer2030 use cases

# Overview #SMARTer2030 use cases (1/6)

## Use case definition

#SMARTer2030 use case	Main technologies and applications considered in 2030 vision of use case
<b>Connected Private Transport</b>  	<ul style="list-style-type: none"> <li>• Board computer system</li> <li>• Car/route sharing</li> <li>• Connected private and public vehicles</li> <li>• GPS/GEO location based services</li> <li>• Intermodal transport</li> <li>• Remote diagnosis for maintenance</li> <li>• RFID (radio frequency identification)/NFC (near-field communication) technologies</li> <li>• Smartphone enabled car-sharing or car-pool platforms</li> <li>• Social Media technology &amp; apps</li> </ul>
<b>E-Banking</b>  	<ul style="list-style-type: none"> <li>• Digital assistants/consults</li> <li>• Digital currencies (e.g. BITCoin)</li> <li>• Faster and 24/7 access</li> <li>• Financial market insight and investment platforms</li> <li>• Online banking apps</li> <li>• Videoconferencing</li> </ul>

## Overview of #SMARTer2030 results for use case

Expected use case benefits (qualitative, ordered per estimated relevance)	Main #SMARTer 2030 calculated benefits metrics and results
<ul style="list-style-type: none"> <li>• Reduced emissions, pollution, noise, resource consumption, traffic jams, accidents</li> <li>• Reduced car ownership, transportation and infrastructure costs</li> <li>• Freed up space in cities</li> <li>• Increased mobility regardless of age, mental or physical capabilities</li> </ul>	<ul style="list-style-type: none"> <li>• ICT revenues (\$): 2 bn</li> <li>• Stakeholder revenues (\$): 550 m</li> <li>• Stakeholder cost savings (\$): 610 bn</li> <li>• Carbon emissions saved (GtCO2 eq) globally: 0.766</li> <li>• Fuel saved (L) globally: 220 bn</li> <li>• Time saved (h): 42.3 bn</li> </ul>
<ul style="list-style-type: none"> <li>• Reduced use of resources (wood, water, energy)</li> <li>• Reduced infrastructure needs (branch offices)</li> <li>• Reduced amount of coin production and cash transports</li> <li>• Immediate access to banking services regardless of location</li> </ul>	<ul style="list-style-type: none"> <li>• ICT revenues (\$): 77 m</li> <li>• Stakeholder revenues (\$): 15.3 bn</li> <li>• Stakeholder cost savings (\$): 2 bn</li> <li>• Carbon emissions saved (GtCO2 eq) globally: 0.003</li> <li>• Fuel saved (L) globally: 1.3 bn</li> <li>• Time saved (h): 915 m</li> </ul>

# Overview #SMARTer2030 use cases (2/6)

## Use case definition

#SMARTer2030 use case      Main technologies and applications considered in 2030 vision of use case

### E-Commerce



- Advanced data analytics
- Apps for retail mobile shopping
- Delivery on demand
- Integrated multichannel infrastructures/mobile shopping
- Location based services
- Retail 3D printing
- Videoconferencing/augmented reality

### E-Health



- Augmented reality (e.g. medical training)
- Data generation and big data analytics
- Data storage in electronic form
- DNA sequencing
- Remote access
- Remote diagnostics (capture and communicate health data)
- Videoconferencing (between service seekers and providers)
- Wearable health-monitoring watches or mobile phones

## Overview of #SMARTer2030 results for use case

Expected use case benefits (qualitative, ordered per estimated relevance)

Main #SMARTer 2030 calculated benefits metrics and results

- Reduced private transportation
- Reduced transportation of goods to stores, but more to homes
- Reduced infrastructure needs (stores)
- Customer-centricity
- Product & service comparison
- Immediate access to goods regardless of location

- ICT revenues (\$): 580 bn
- Stakeholder revenues (\$): 1,144.7 bn
- Carbon emissions saved (GtCO2 eq) globally: 0.3
- Fuel saved (L) globally: 165.5 bn
- Time saved (h): 105 bn

- Improved access to and quality of public health services
- Informed and empowered patients
- Efficient monitoring and distribution of information
- Personalized medicine
- Value-based reimbursement, e.g. incentives for preventative behavior

- ICT revenues (\$): 63 bn
- Stakeholder revenues (\$): 208.8 bn
- Stakeholder cost savings (\$): 63 bn
- Carbon emissions saved (GtCO2 eq) globally: 0.2
- Fuel saved (L) globally: 1.7 bn
- E-Health beneficiaries (#): 1.6 bn

# Overview #SMARTer2030 use cases (3/6)

## Use case definition

#SMARTer2030 use case	Main technologies and applications considered in 2030 vision of use case
<b>E-Learning</b> 	<ul style="list-style-type: none"> <li>• Advanced data analytics</li> <li>• E-Learning apps</li> <li>• Gamification, virtualization, access to computing</li> <li>• Massive Open Online Courses (MOOC)</li> <li>• Online community platforms</li> <li>• Smart systems portfolio (Personalized and competency-based platforms that track what, how, and when you learn)</li> <li>• Videoconferencing</li> </ul>
<b>E-Work</b> 	<ul style="list-style-type: none"> <li>• Augmented reality</li> <li>• Cloud-based platforms (e.g. “platform as a service”)</li> <li>• Connections and smart devices</li> <li>• Telecommuting/collaboration tools</li> <li>• Telework (“mobile workspace”)</li> <li>• Videoconferencing</li> <li>• Virtual business meetings</li> <li>• Voice over IP</li> </ul>

## Overview of #SMARTer2030 results for use case

Expected use case benefits (qualitative, ordered per estimated relevance)	Main #SMARTer 2030 calculated benefits metrics and results
<ul style="list-style-type: none"> <li>• Improved access and quality will raise earning potential and quality of life</li> <li>• Lifelong, personalized, affordable, engaging learning</li> <li>• Self-directed learning anytime, anywhere</li> </ul>	<ul style="list-style-type: none"> <li>• ICT revenues (\$): 75 bn</li> <li>• Stakeholder revenues (\$): 412.9 bn</li> <li>• Stakeholder cost savings (\$): 1,211 bn</li> <li>• Carbon emissions saved (GtCO2 eq) globally: 0.07</li> <li>• Fuel saved (L) globally: 5.0 bn</li> <li>• E-learning degrees (#): 450 m</li> </ul>
<ul style="list-style-type: none"> <li>• Reduced emissions, pollution, noise, resource consumption, traffic jams, and accidents through virtual commuting</li> <li>• Better work-life balance</li> <li>• Reduced amount of work-related accidents, stress-related diseases</li> </ul>	<ul style="list-style-type: none"> <li>• ICT revenues (\$): 536 bn</li> <li>• Stakeholder cost savings (\$): 680 bn</li> <li>• Carbon emissions saved (GtCO2 eq) globally: 0.4</li> <li>• Fuel saved (L) globally: 165 bn</li> <li>• Time saved (h): 105.0 bn</li> </ul>

# Overview #SMARTer2030 use cases (4/6)

## Use case definition

#SMARTer2030 use case      Main technologies and applications considered in 2030 vision of use case

### Smart Agriculture



- Automation and optimization of farm management technologies
- Online platforms and apps
- Precision agriculture, comprising e.g.
  - M2M / IoT, sensors and satellites
  - Advanced data analytics
  - Processing of genomic sequencing of livestock, seeds and plants
- Traceability and tracking systems, incl. Smart logistics (RFID1, GPS)

### Smart Building



- Alarm management & automation
  - Data analytics tools
- Energy management technologies
  - Smart metering & sensors
- Information & communication platforms
- Monitoring, detection and diagnosis technologies
  - Data analytics & cloud computing
  - Sensor technologies

## Overview of #SMARTer2030 results for use case

Expected use case benefits (qualitative, ordered per estimated relevance)

Main #SMARTer 2030 calculated benefits metrics and results

- Reduced hunger & famine
- Improved food distribution, productivity
- Resilience towards climate change, pests
- Reduced emissions, pollution, land degradation, water consumption
- Increased biodiversity

- ICT revenues (\$): 53 bn
- Stakeholder revenues (\$): 1,762 bn
- Stakeholder cost savings (\$): 404 bn
- Carbon emissions saved (GtCO2 eq) globally: 2,018
- Energy saved (MWh): 1 bn
- Water saved (L) globally: 251 tr
- Yield increase (kg/ha growth) globally: 897

- Large gains in energy & resource efficiency
- Enhanced living & working
- Proactive fire, gas, structural failure detection increases safety
- Higher real estate valuation
- Lower maintenance, operational costs

- ICT revenues (\$): 200 bn
- Stakeholder revenues (\$): 184.9 bn
- Stakeholder cost savings (\$): 361 bn
- Carbon emissions saved (GtCO2 eq) globally: 0.79
- Energy saved (MWh): 5 bn
- Water saved (L) globally: 261 bn

# Overview #SMARTer2030 use cases (5/6)

## Use case definition

#SMARTer2030 use case      Main technologies and applications considered in 2030 vision of use case

### Smart Energy



- Advanced analytics
- Convergence of Information Technology and of Operations Technology
- Demand response technologies (B2B, B2C)
- Distribution management system
- Energy storage technology
- Internet of Things (IoT) and Machine-to-Machine (M2M) technology
- Sensor technologies

### Smart Logistics



- Augmented reality and wearable technologies
- Commercial Unmanned Aerial Vehicles (UAV)
- Connected commercial vehicles, load units, products and machines
- Digital warehouses
- Fleet management and optimized routes
- Operational agility systems

## Overview of #SMARTer2030 results for use case

Expected use case benefits (qualitative, ordered per estimated relevance)

Main #SMARTer 2030 calculated benefits metrics and results

- Decarbonization through broad deployment of renewables
- Energy and cost savings
- Energy security
- Energy independence
- Diversification to reduce risk of system failure (blackout)
- Universal access to energy
- Social cohesion through shared energy systems
- Consumers become producers

- ICT revenues (\$): 2 bn
- Stakeholder revenues (\$): 811.3 bn
- Carbon emissions saved (GtCO<sub>2</sub>eq) globally: 3.4
- Energy saved (MWh): 6.3 bn

- Reduced emissions, pollution, noise, resource consumption, traffic jams, accidents
- New revenue streams for logistics providers
- Operational efficiency gains (distance driven, capacity utilization, reduced risks)

- ICT revenues (\$): 60 bn
- Stakeholder cost savings (\$): 462 bn
- Carbon emissions saved (GtCO<sub>2</sub> eq) globally: 1.3 bn
- Energy saved (MWh): 1.1bn
- Fuel saved (L) globally: 266.7 bn

# Overview #SMARTer2030 use cases (6/6)

## Use case definition

#SMARTer2030 use case      Main technologies and applications considered in 2030 vision of use case

### Smart Manufacturing



- Augmented reality devices
- Cyber-physical systems (CPS)
- Data analytics & cloud computing
- Drones & Robotics
- Embedded system production technology
- Global network
- Industrial Internet of Things (IoT) and Machine-to-Machine (M2M)
- 3-D printing

### Traffic Control & Optimization (TCO)



- Automated driving
- Autonomous vehicles
- “Car to x communication“
- Connected smart sensors
- Driverless cars
- Driving support technologies
- GPS/GEO location-based applications
- Information Technologies
- Intelligent infrastructure
- Real-time information gathering and data analytics
- Traffic management platform

## Overview of #SMARTer2030 results for use case

Expected use case benefits (qualitative, ordered per estimated relevance)

Main #SMARTer 2030 calculated benefits metrics and results

- Rapid manufacturing of new products
- Remote monitoring, early issue identification
- Higher productivity, quality, flexibility, resource efficiency
- Worker safety
- Mass customization

- ICT revenues (\$): 3 bn
- Stakeholder cost savings (\$): 420 bn
- Carbon emissions saved (GtCO2 eq) globally: 2.7 bn
- Energy saved (MWh): 4.2 bn
- Water saved (L): 81.2 tr

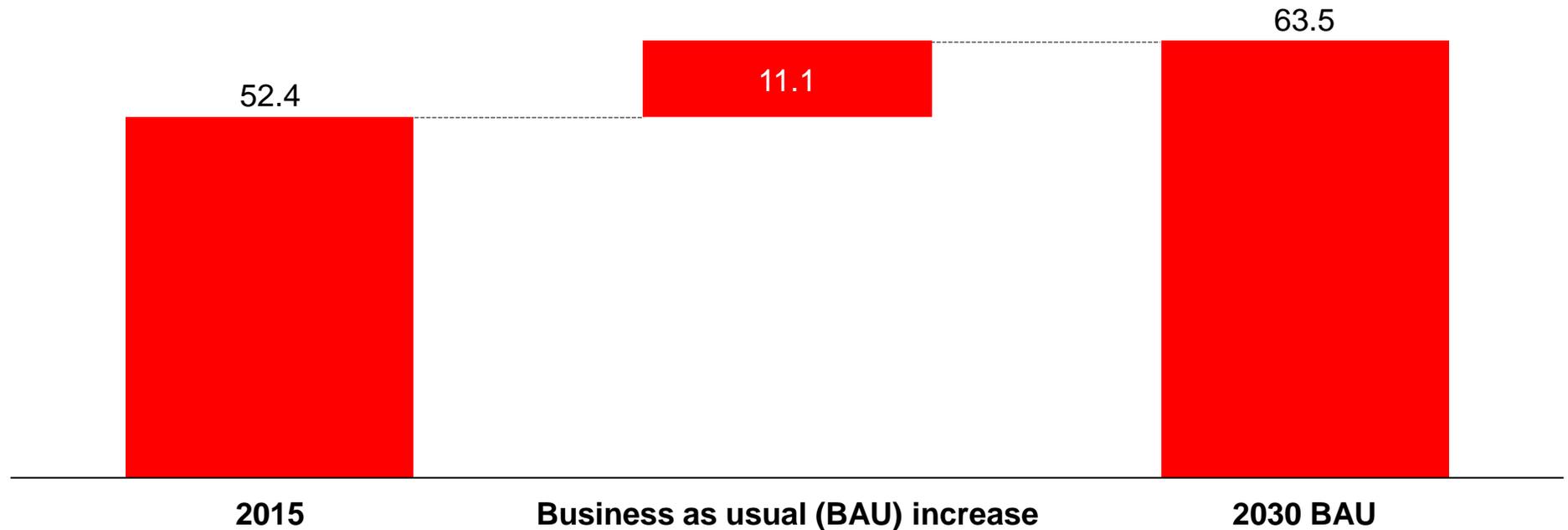
- Reduced emissions, costs, pollution, noise, resource consumption, traffic jams, accidents
- Higher productivity, efficiency
- Improved health & safety, mobility

- ICT revenues (\$): 95 m
- Stakeholder revenues (\$): 0.7 bn
- Stakeholder cost savings (\$): 377.7 bn
- Carbon emissions saved (GtCO2 eq) globally: 0.8 bn
- Fuel saved (L): 236.1 bn

# Appendix 2: Additional information on global #SMARTer2030 results

# The world is not on track: Under business as usual CO<sub>2e</sub> emissions will continue to grow

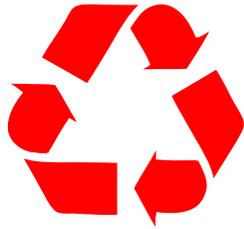
## CO<sub>2e</sub> emissions forecast (Gt CO<sub>2e</sub>)



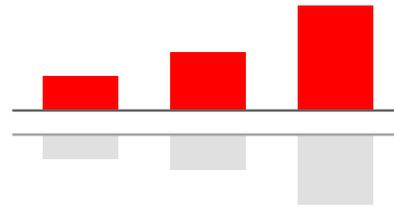
**Historically each 1% of growth in GDP equated to a 0.5% increase in CO<sub>2e</sub> emissions**

# ICT can decrease global carbon emissions, stimulate economic growth and deliver benefits to society

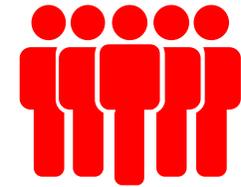
## SMARTer2030 main findings



- ICT has the potential to maintain global CO<sub>2e</sub> emissions at 2015 levels
- At the same time, ICT can reduce the consumption of scarce resources



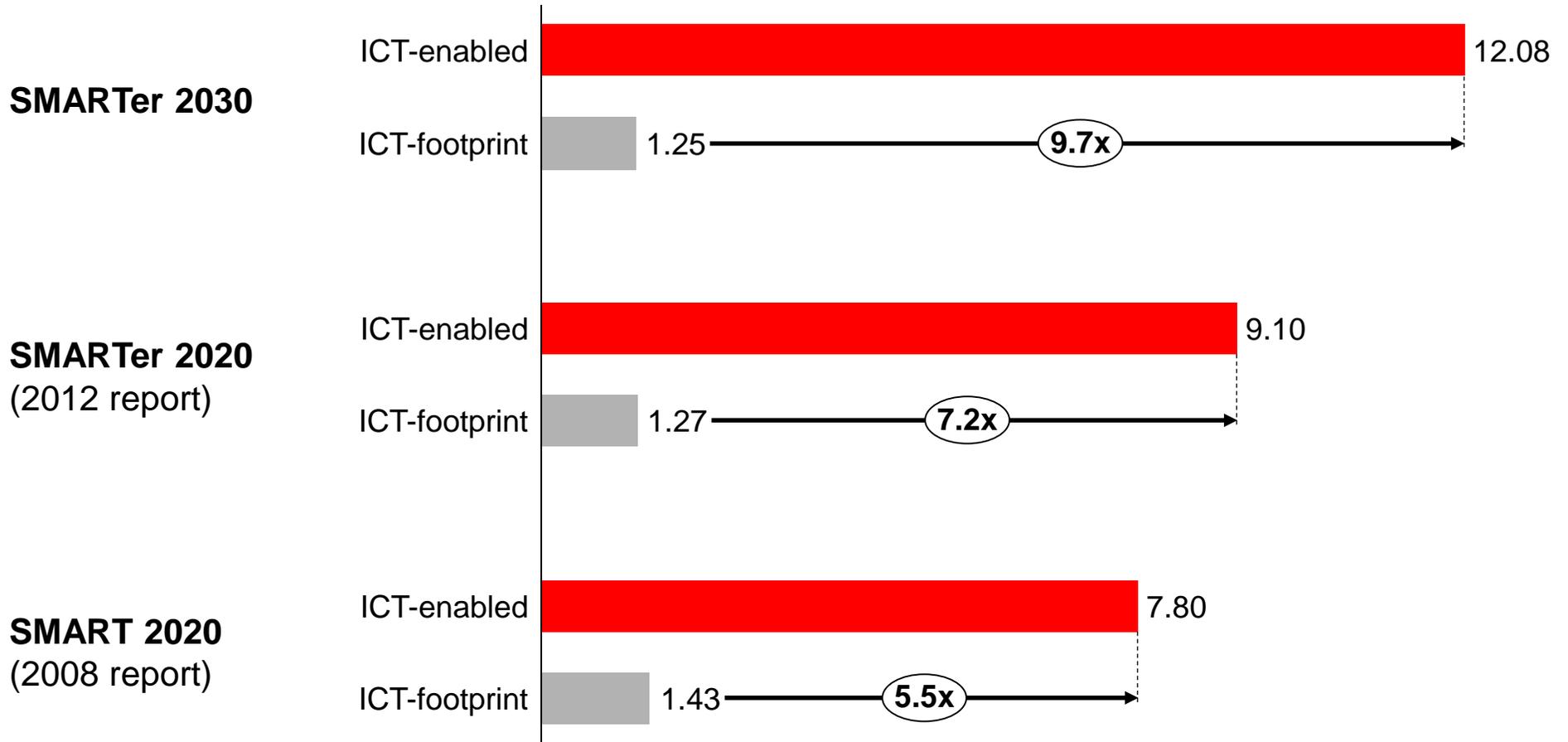
- ICT is good for growth
  - Over 6 trillion USD in new revenues in 2030
  - Close to 5 trillion USD in cost savings in 2030, including 2.3 trillion USD from energy efficiency



- ICT could connect 2.5 billion previously unconnected people to ICT services by 2030, enabling a total of
  - 1.6 billion people connected to e-health
  - 0.5 billion e-learning participants

# ICT could realize a benefit 9.7 times higher than its own emissions in 2030, while its footprint is expected to fall

## ICT benefits factor in 2030 and 2030 (Gt CO<sub>2e</sub>)



# ICT enables improved customer centricity and new business models building on increased digital density

## Context 2015 – Main changes compared to SMARTer2020 in 2012



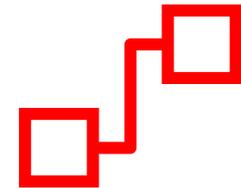
### Improved user centricity

ICT is now genuinely putting people at the center, allowing for more compelling service offerings that “deliver it all”: better experience, reduced cost, improved sustainability



### New business models

The business case for ICT-enabled business is now stronger than ever. Digital disruptors have grown into multibillion dollar businesses, far beyond what seemed possible 2012

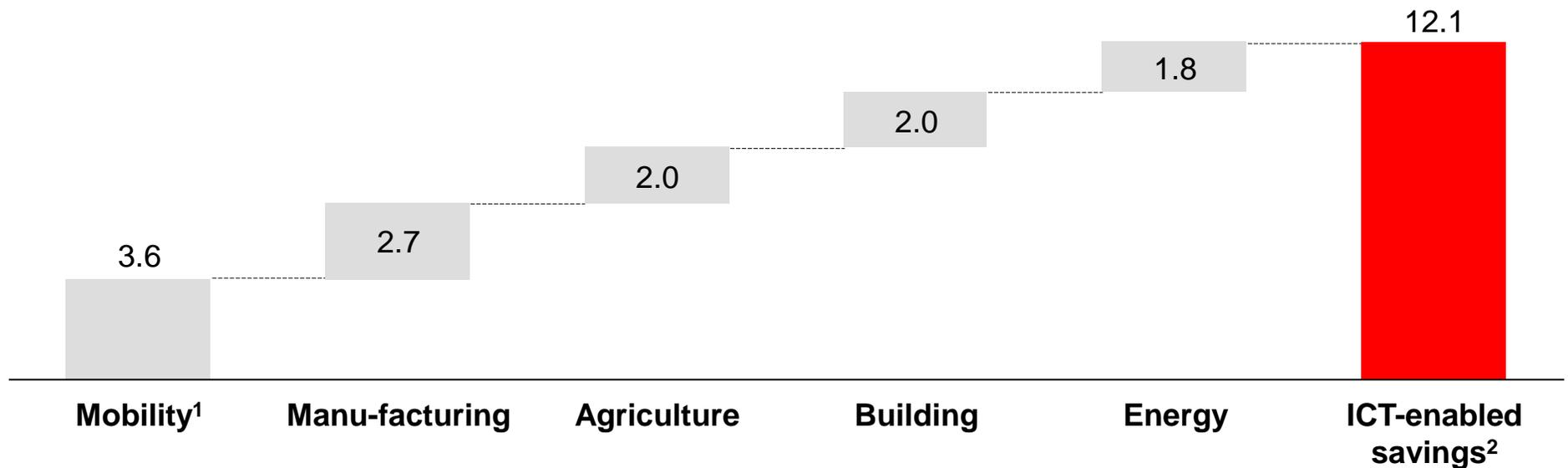


### Increased digital density

Internet access and smartphone ownership are at much higher levels and the number of connected devices is expected to grow to 100 billion by 2030

# Smart solutions to mobility, manufacturing, agriculture, building and energy deliver ICT's potential of 12Gt CO<sub>2e</sub>

## CO<sub>2e</sub> abatement potential by sector (Gt CO<sub>2e</sub>)



## ICT has the potential to maintain global CO<sub>2e</sub> emissions at 2015 levels, decoupling economic growth from emissions growth

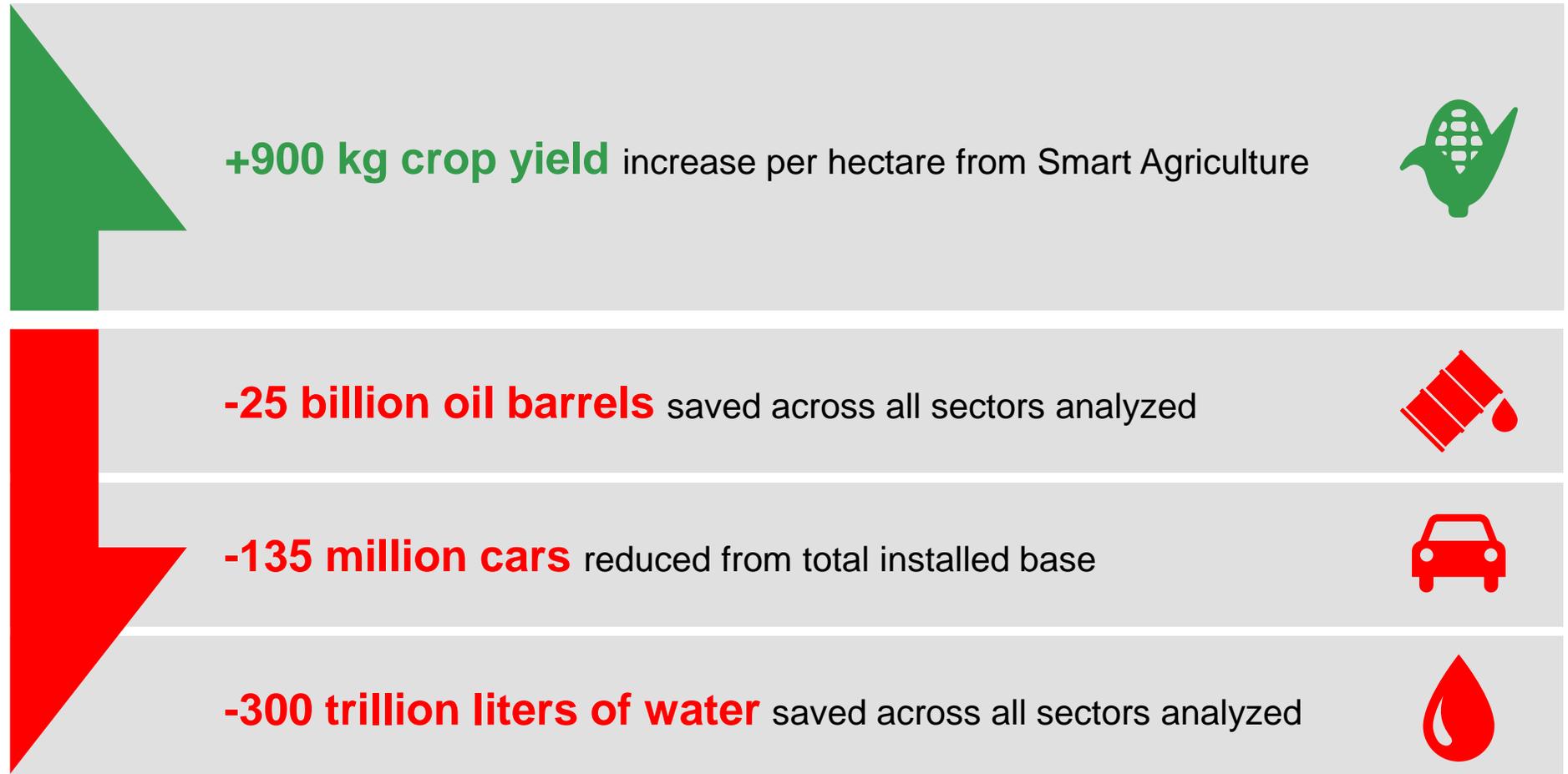
<sup>1</sup> Smart mobility solutions consider improved driving efficiency but also the reduced need to travel from various sectors, including health, learning, commerce, etc.

<sup>2</sup> 12 Gt CO<sub>2e</sub> reduction in 2030 enabled by ICT include 2 Gt CO<sub>2e</sub> abatement from integration of renewable energy production into the grid. In its business as usual emissions forecast for 2030 the Intergovernmental Panel on Climate Change (IPCC) already considers the CO<sub>2e</sub> abatement potential from renewable energy. Therefore, the additional ICT-enabled CO<sub>2e</sub> reduction against the IPCC emissions forecast for 2030 is 10 Gt CO<sub>2e</sub>

Source: WRI, IPCC, World Bank, GeSI, Accenture analysis & CO<sub>2</sub> models

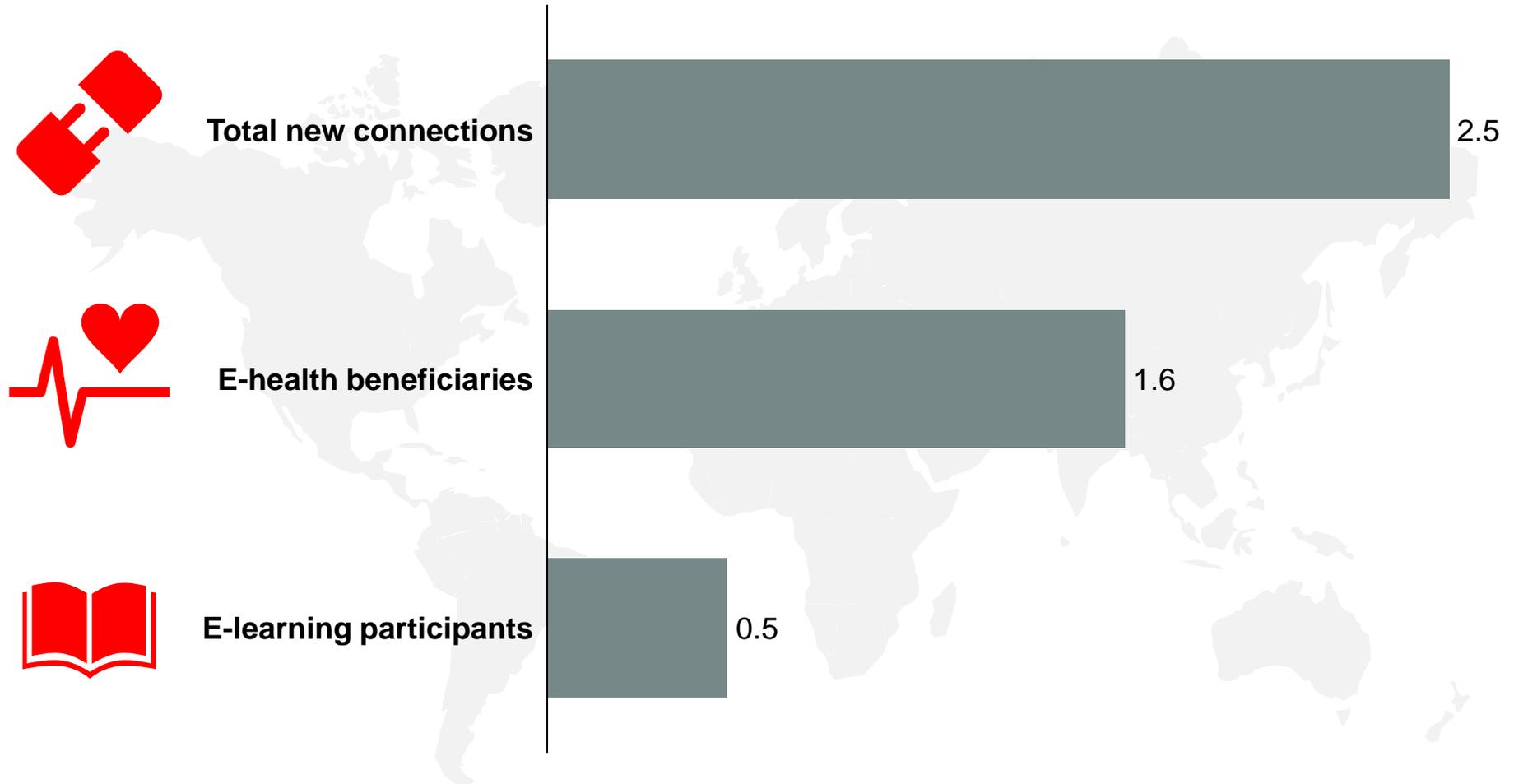
# ICT offers further environmental benefits, from better yields to reduced consumption of scarce resources

## ICT-enabled environmental benefits across sectors beyond CO<sub>2e</sub>



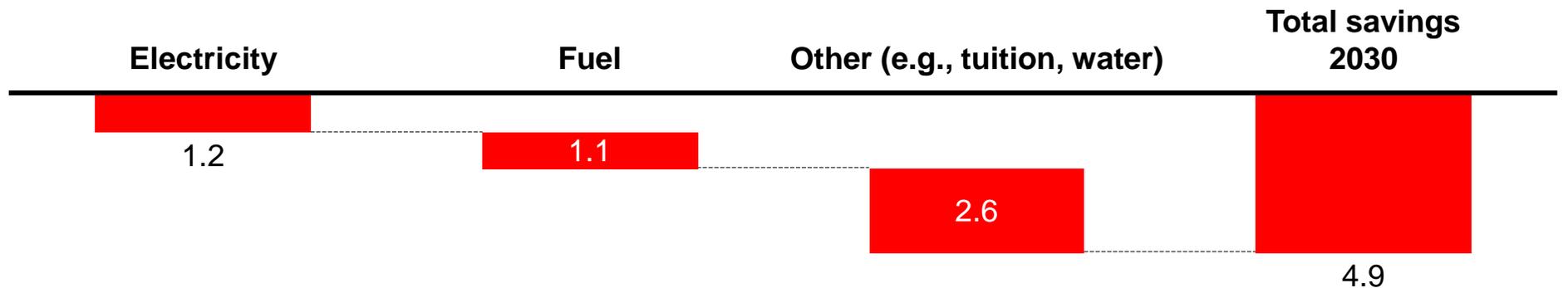
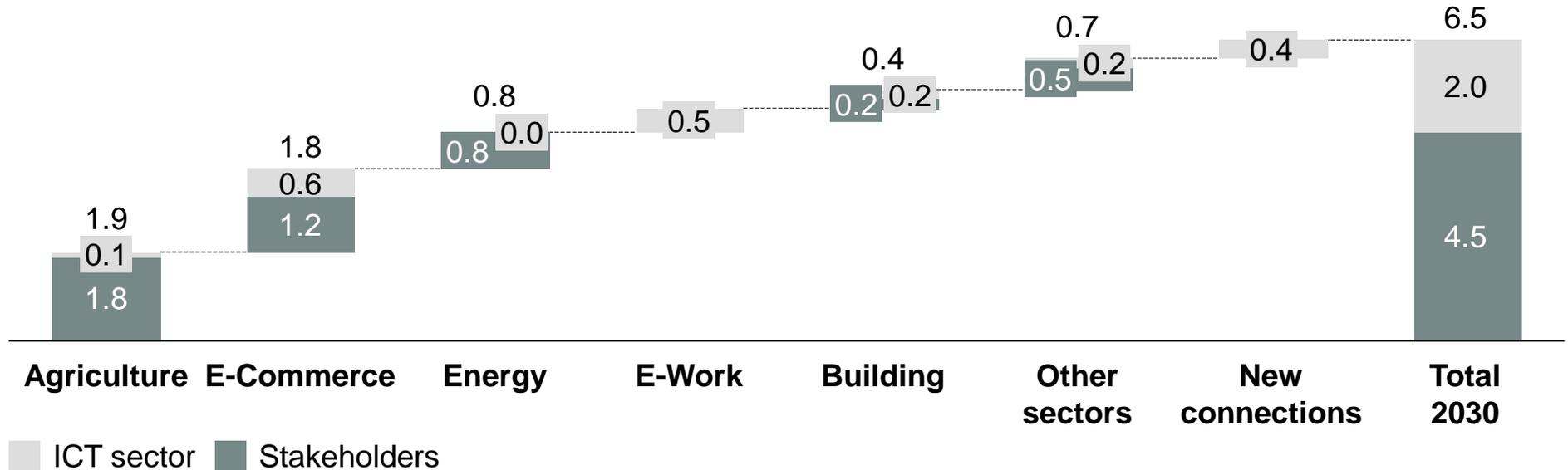
# ICT will connect 2.5 billion more people to ICT thereby making a broad range of benefits available

## New ICT connections 2015-2030 (billion connections)



# ICT is good for growth and could deliver over \$6 trillion in revenues and close to \$5 trillion USD in cost savings

## ICT-enabled revenues and cost savings p.a. (2030, USD trillion)



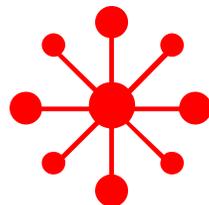
# To fully realize ICT's potential stakeholder action is required with policy action as a key priority

## Prioritized policy action areas



### National CO2 targets

Set national CO2 targets and recognize ICT solutions as an effective and necessary tool to decrease carbon emissions while enabling continued economic growth and sustainable living



### Investment incentives in infrastructure deployment

Create investment incentives in infrastructure deployment to connect the unconnected and enable broad segments of the population access to ICT solutions

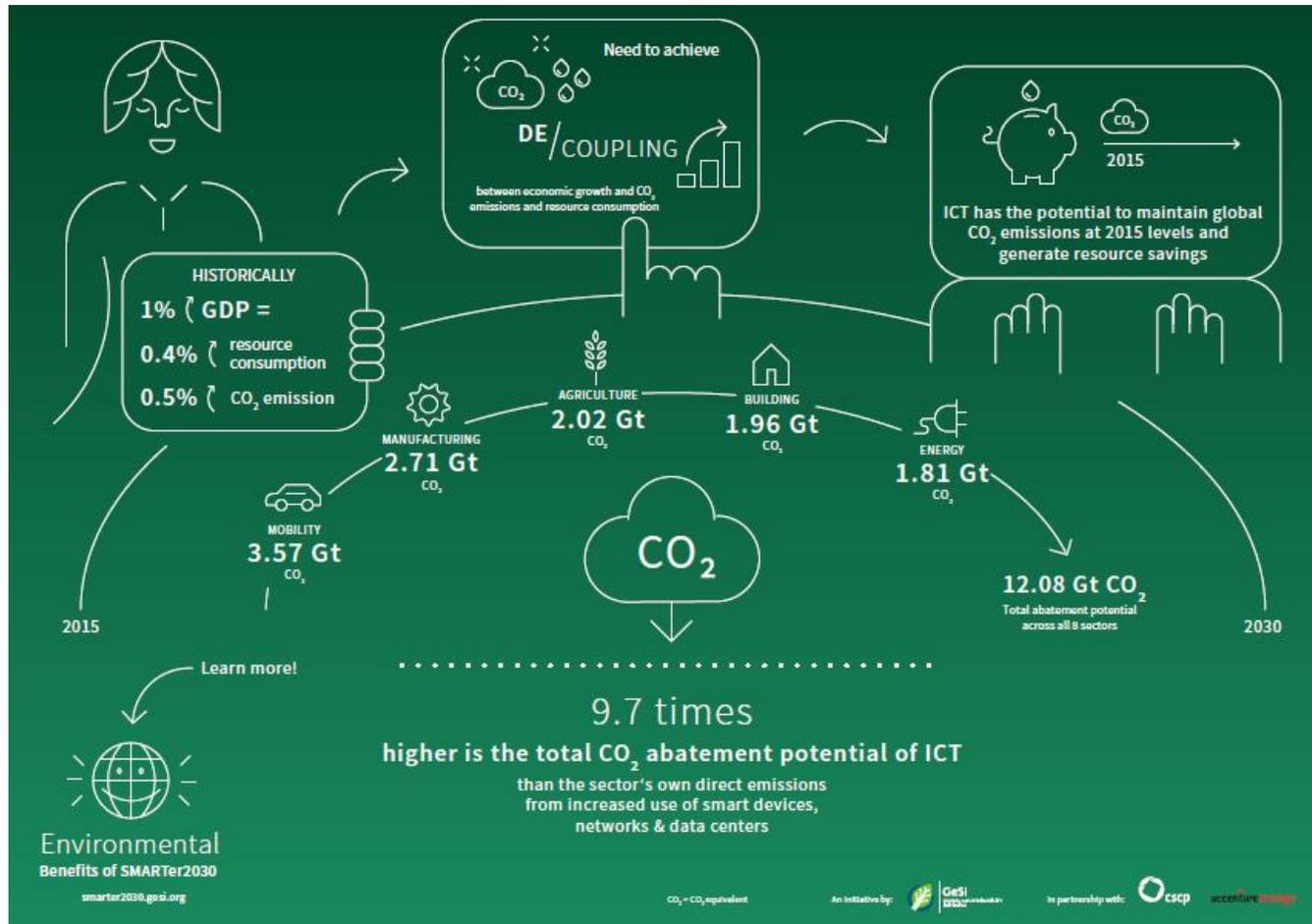


### Fair, balanced & consistent regulatory approach

Establish a fair, balanced and consistent regulatory approach to ICT solutions that promotes innovation and investment, protects intellectual property rights and ensures consumer privacy and security

# Infographics provide illustrative evidence of the #SMARTer2030 results, e.g. on CO<sub>2</sub> emissions savings

## Overview results CO<sub>2</sub>e savings from ICT solutions with sustainability benefits

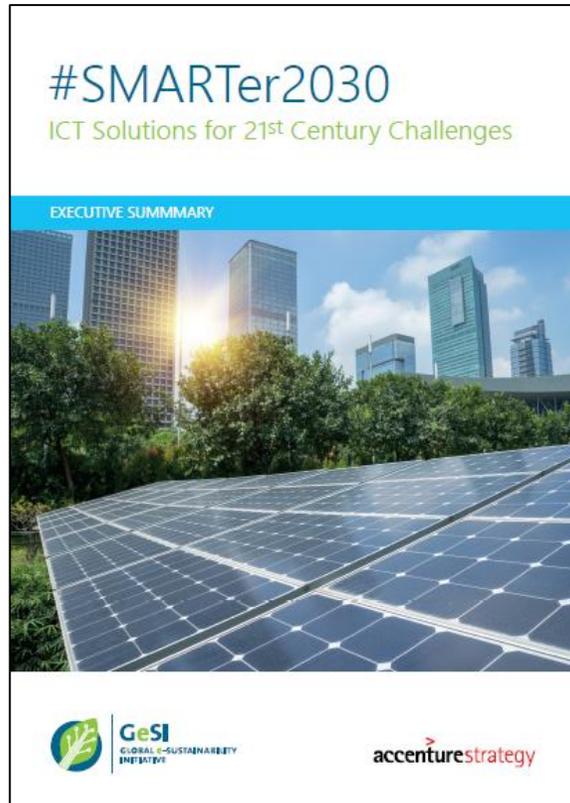


Source: [http://smarter2030.gesi.org/downloads/Environmental\\_Infographic.pdf](http://smarter2030.gesi.org/downloads/Environmental_Infographic.pdf)

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# More information on #SMARTer2030 results can be found in different formats

## Links to more information on #SMARTer2030



### Link to #SMARTer2030 full report:

[GeSI # SMARTer2030 full report](#)

### Link to #SMARTer2030 executive summary:

[GeSI #SMARTer2030 executive summary](#)

### Link to #SMARTer2030 business playbook (10 pages results with key messages to business leaders):

[GeSI #SMARTer2030 business playbook](#)

### Link to #SMARTer2030 video:

[SMARTer2030: Creating a More Sustainable Future with ICT Solutions](#)

# Appendix 3: Extrapolation metrics to calculate use case benefits for other than the nine SMARTer2030 focus countries

# High-level overview of how the results for The Netherlands are obtained from the results calculated for the nine focus countries

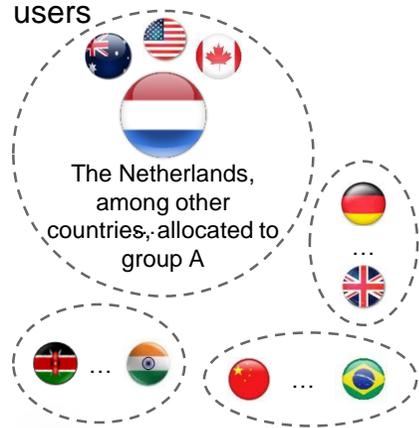
## STEP 1

Calculated results for all **use cases** for **nine focus countries**:

-  USA
-  Canada
-  Australia
-  UK
-  Germany
-  China
-  Brazil
-  India
-  Kenya

## STEP 2

**Grouping** of worldwide countries with the ones assessed, according to macroeconomic similarities, e.g. GDP/capita and internet users



## STEP 3

**Selection of use case specific extrapolation metrics from World Data Bank<sup>1</sup>**

- a) Two or more metrics<sup>1</sup> are selected for each use case to enhance extrapolation accuracy (results not depending on a single extrapolation)
- b) Assessment of share of the nine countries per metric and all other countries according to each select metric (per group)

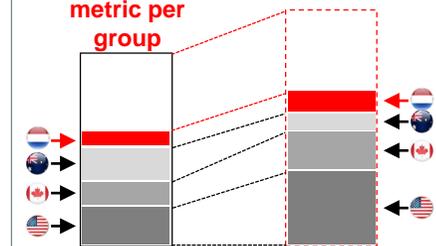
## STEP 4

**Extrapolation calculation** based on the weight of the country with the other countries in the group

### Illustrative

**STEP 4a)**  
Extrapolation result per metric per group

**STEP 4b)**  
Result of all metrics combined per use case<sup>1</sup>



## Illustrative example for one World Bank Data metric: GHG emissions for Smart Energy with “Energy Use” metric

### STEP 1 & 2

### Illustrative

Use case results for nine focus countries (CO<sub>2</sub>)

USA: 0,5 Gt CO<sub>2</sub>  
Canada: 0,25 Gt CO<sub>2</sub>  
Australia: 0,2 Gt CO<sub>2</sub>  
The Netherlands grouped to these three countries (Group A)

### STEP 3a)

### Illustrative

Country result in the World Data Bank Metric for Energy Use (in kt of oil equivalent)

Group A: 100 kt  
USA: 30 kt  
Canada: 12 kt  
Australia: 10 kt  
The Netherlands: 7 kt

### STEP 3b)

### Illustrative

Country weight over the World Data Bank Metric (%)

Group A: 100%  
USA: 30%  
Canada: 12%  
Australia: 10%  
The Netherlands: 7%

### STEP 4a)

### Illustrative

Group A total result and The Netherlands result for the Use Case Metric

USA + CAN + AUS = 0,95 Gt CO<sub>2</sub>  
→ 52% of group A  
Group A = 0,95 / 52% = 1,83 Gt CO<sub>2</sub>  
The Netherlands = 7% x 1,83 = 0,13 Gt CO<sub>2</sub>

### STEP 4b)

Combines results of all metrics per use case and country

<sup>1</sup> Pls refer to following slide for list of used World Bank Data Bank extrapolation metrics per use case

# Extrapolation metrics to calculate use case benefits for other than the nine SMARTer2030 focus countries

## Specific extrapolation metrics per use case

Extrapolation of the results of each use case, calculated for nine focus countries, are made using tailor-made metrics from World Development Indicators Database:

 <b>Connected Private Transportation</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• GDP</li> <li>• Road sector gasoline and diesel consumption</li> </ul>	 <b>Smart Agriculture</b> <ul style="list-style-type: none"> <li>• Arable Land</li> <li>• Cereal Yield</li> <li>• CO<sub>2</sub> intensity</li> <li>• Fertilizer consumption</li> <li>• GDP from agriculture</li> </ul>
 <b>E-Banking</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Credit provided by FS</li> <li>• GDP</li> <li>• Gross capital formation</li> <li>• Stocks traded</li> </ul>	 <b>Smart Building</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Urban population</li> </ul>
 <b>E-Commerce</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Exports from GDP</li> <li>• Imports from GDP</li> <li>• Population</li> </ul>	 <b>Smart Energy</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Energy Production</li> <li>• Energy Use</li> <li>• GDP</li> </ul>
 <b>E-Health</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Healthcare expenditure</li> <li>• Improved sanitation facilities</li> </ul>	 <b>Smart Logistics</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Exports from GDP</li> <li>• Imports from GDP</li> <li>• Merchandise trade</li> </ul>
 <b>E-Learning</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Expenditure on education</li> <li>• Primary education pupils</li> </ul>	 <b>Smart Manufacturing</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Industry Value Added from GDP</li> </ul>
 <b>E-Work</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• Employment to population/Labor force</li> </ul>	 <b>Traffic Control &amp; Optimization</b> <ul style="list-style-type: none"> <li>• CO<sub>2</sub> intensity</li> <li>• GDP</li> <li>• Urban population</li> </ul>

# Each sector impact is based on a bottom-up analysis of the main drivers per sector for nine focus countries

## CO<sub>2</sub>e emissions abatement potential per sector – Agriculture (Gt CO<sub>2</sub>e)

