Information and communication technologies enable more energy efficient societies

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Change is about us

Company's biggest responsibility is to be profitable - but not just in monetary terms

Triple bottom line

Environmental issues are center stage

Investment community increased interest

Customer expectations

Leaders capitalize the value

Demands of rural **connectivity**

Corporations

Climate change resource scarcity

Increasingly tight laws and regulations

Increasing pressure from NGO´s

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Why does environment matter in ICT sector?

CO_2

- Regulation
- Ethical purchasing behavior
- Corporate responsibility

€

- Energy consumption
- Energy sources
- New business opportunities

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Environment and energy top of consumer mind

59% said “I like to try new technologies that help the environment”

68% said “I like to do business with companies that are environmentally responsible”

72% said “I resent companies that say they care about the environment but don’t mean it”

More than **50%** of consumers are more likely to by from companies with good environmental reputations

18% believe that telecommuting programs are a good environmental initiative

EBrain Market Research National Technology Readiness Survey
Fall 2007
(based on a random sample of 1,025 U.S. adults (18 years or older))

Consumer surveys

3 reasons why energy efficiency matters

Energy efficiency = OPEX efficiency

- In mature markets, up to 10% of network OPEX is used on energy
- In developing markets, it can be from approx. 15% up to even 30% of networks OPEX for energy
- Fossil fuel prices remain volatile with high dependency

Lack of electricity supply

- Networks are expanding into rural and suburban areas – grid availability and/or quality is challenging
- 1.6bn people lack access to grid electricity (“off-grid”)
- An additional 1bn people have unreliable access (“bad-grid”)

Climate change

- Average temperature is increasing annually
- Carbon emissions remain the second largest contributor to green house gas emissions after methane
- Ethical purchasing behavior among consumers becoming mainstream

SMART2020: Enabling the low carbon economy in the information age

A report by The Climate Group on behalf of the Global eSustainability Initiative (GeSI)

- ICT's **own sector footprint currently is two per cent** of global emissions and will almost double by 2020
- This is countered by the sector's unique ability to
  - monitor and maximize energy efficiency both within and outside of its own sector
  - **could cut CO2 emissions by up to five times ICTs own footprint**

Three Ways for Information Communication Technology to Maximize Positive Influence on Other Areas of Society

Replacement

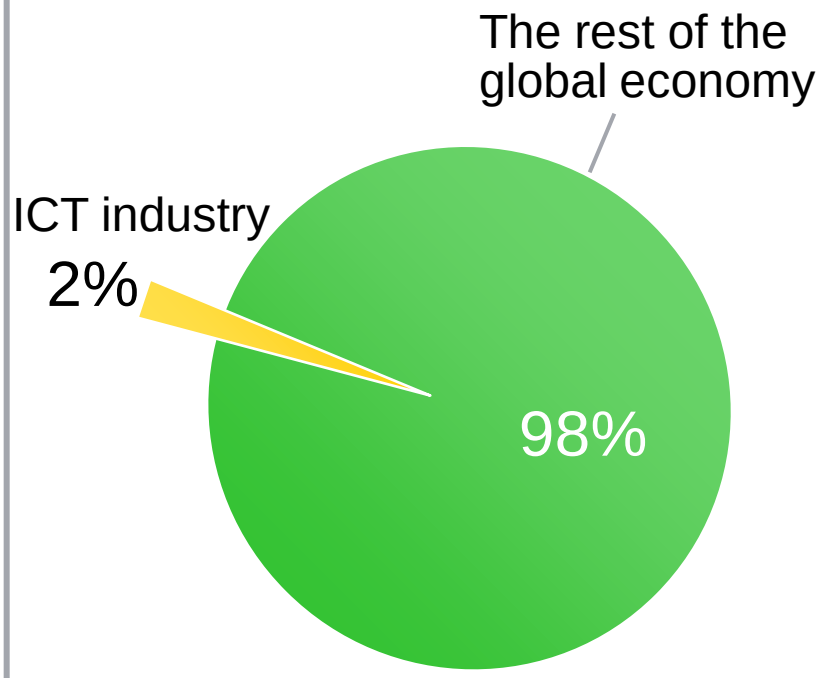
Optimization

Transformation

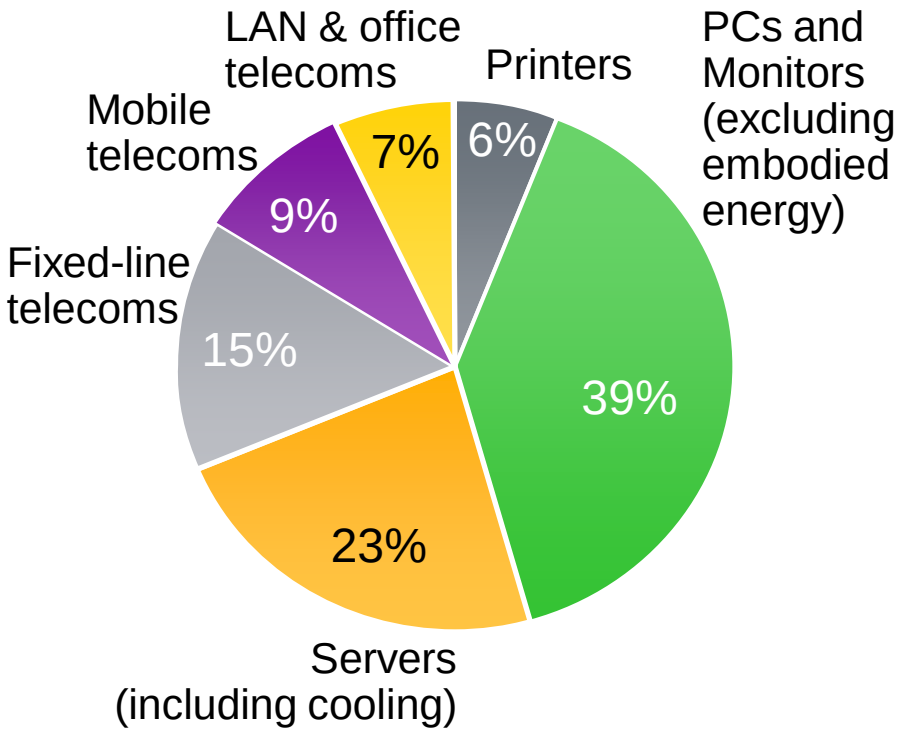
ICT-enabled energy efficiency translates into some € 600 billion cost savings*

*) Source: SMART 2020 report by The Climate Group on behalf of the Global eSustainability Initiative (GeSI)

ICT accounts for 2% of worldwide emissions



Total carbon emissions

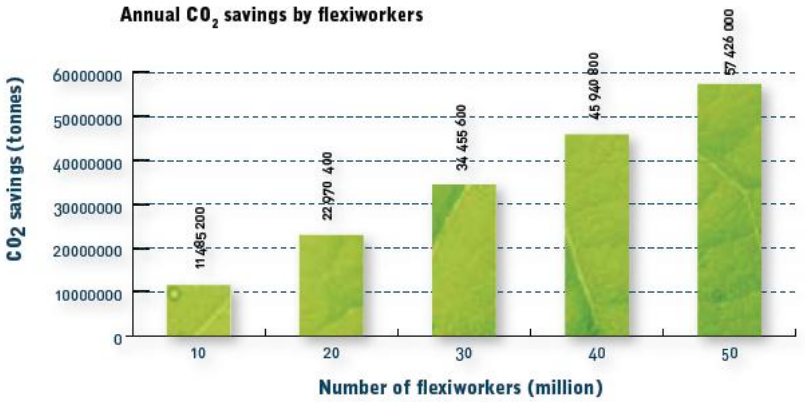


ICT carbon emissions breakdown

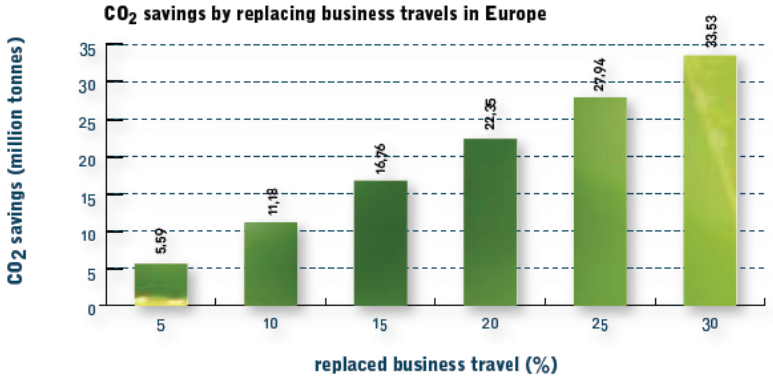
Source: Gartner – IT Vendors, Service Providers and Users Can Lighten IT's Environmental Footprint, December 2007

Maximizing Positive Influence of IT: Business Travel Reduction in Europe

Flexi-work vs. commuting:
11,5 - 57,5 Mt savings



Business travel vs. video conferencing:
5,6 - 33,5 Mt savings



Source: WWF

Telepresence at NSN and Its Positive Impact on CO2 Emissions

We analyzed the usage patterns of our 31 telepresence studios

We come to the result that Halo-usage at NSN reduced flying by 6 million passenger-km per year which corresponds to circa 10 000 tCO2 annually

Favoring Virtual Work over Travel – NSN example

WebEx – Virtual Meeting Tool

Voice Conference

Videoconferencing

VoIP Client

Home office connection

Facts about Greenhouse Gas Emissions

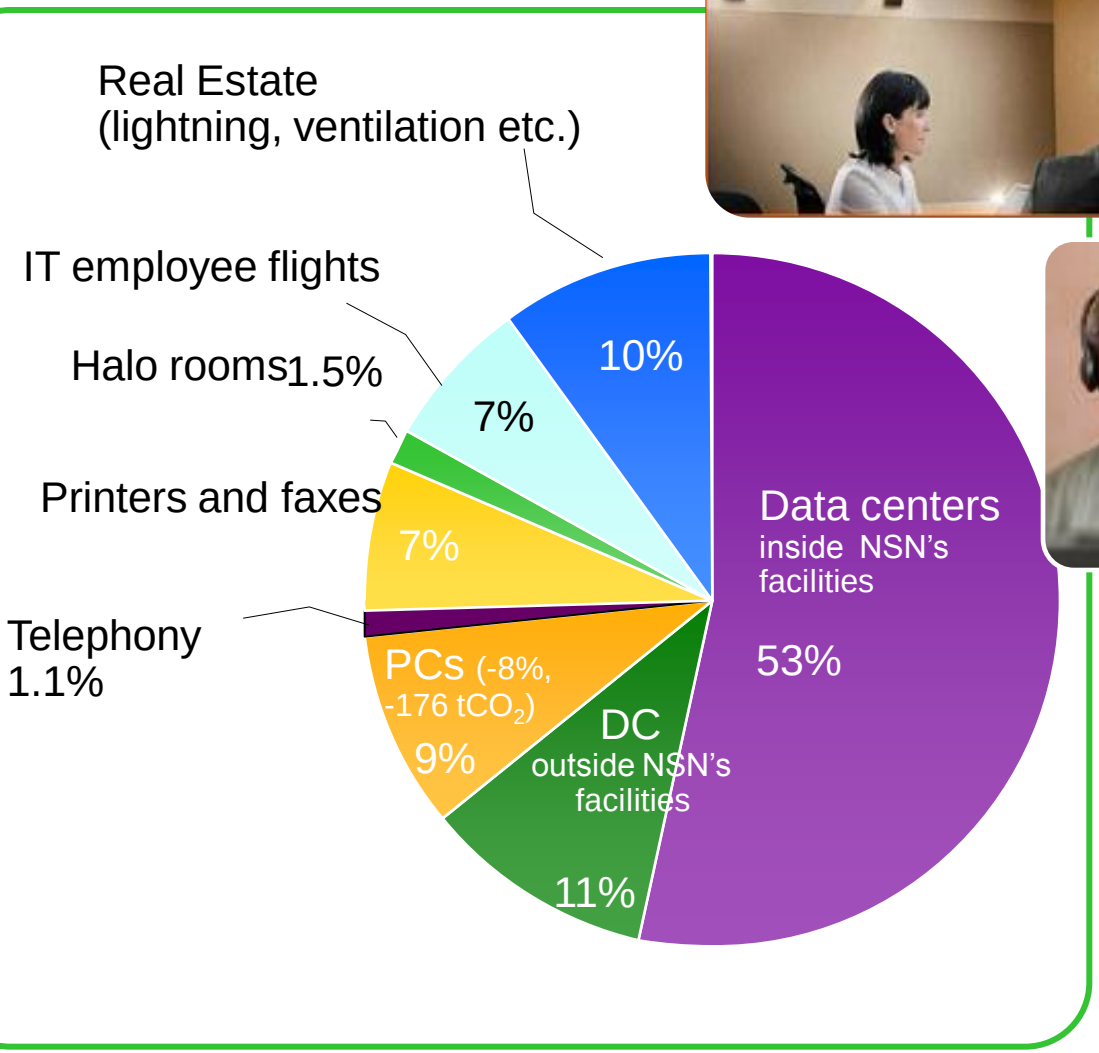
- Worldwide emissions: 40 billion tons CO_2e *)
- ICT sector's worldwide emissions: circa 800 Mio tons CO_2
- NSN's own operations' footprint: circa 1 million tons CO_2
- NSN IT's footprint 23 219 tons CO_2

*) Observe $CO_2 \neq CO_2e$

Some greenhouse gasses and % of global CO_2e

- CO_2 = 1 CO_2e (60%)
- Methane CH_4 = 21 CO_2e (20%)
- Nitrous oxide N_2O = 310 CO_2e (6%)

NSN IT's environmental footprint is 23 246 tCO_2



Calculation based on Green House Gas protocol and ISO standard 14064-1:2006 and verified by Gaia Consulting Ltd

In a few years carbon can have a price in ICT sector and companies should get ready for it

- Policies are emerging that will penalize companies for CO2 emissions
- These penalties could easily range of between $10 and $50 per ton of CO2 emitted (Source: Gartner)
- In practical terms, carbon costs can shadow energy costs

One of the first things that the companies should do is to decide the objectives and key performance indicators - example from NSN Information Technology unit

Strategic objectives	Strategic KPI
• Reduce environmental footprint (by IT)	• Carbon emission footprint (tCO2) from IT operations and impact of IT products on NSN business footprint

Operative objectives	Operative KPI
• Improve IT Energy Efficiency	• Data Center infrastructure Efficiency
• Reduce NSN employee business traveling	• Flown miles, usage of virtual meeting solutions in NSN
• Effective IT waste management	• Recycling process roll-out in countries
• IT Supplier Corporate responsibility index	• % of suppliers with agreed Green IT requirements

Second step is to start the practical actions to improve the environmental footprint

Säteri Data Center in Espoo, Finland is the biggest in NSN's premises
Space: ~1000 m^2
4 server rooms with circa 1 000 servers

Example actions

- Increasing internal target temperature (from 22º C to 26º C) to reduce cooling
- A thermal mapping to identify any local hot spots in order to further reduce the need for cooling by changing the rack composition
- Building measurement capability for continuous energy consumption

PC energy efficiency – what you can do

- …activate standby mode when away from computer for more than 15 min → Control Panel… Power Options
- Using blank screen instead of a screen saver saves circa 2 % in electricity
- Having monitor off saves circa 36%
- Having whole PC in standby saves circa 96%!

Mobile phones consume small amounts but their large number makes them a relevant target for energy effiency measures

Did you know that…?

- Two thirds of the energy consumed by mobile phone during its usage is wasted when the phone is fully charged and unplugged but the charger is left connected to the mains.
- You may think that the consumption from your charger is irrelevant (less than 1 Watt) but remember that there are 4 billion chargers out there worldwide.
- What you do may be a drop in the ocean but the ocean is made out of drops.

Nokia Siemens Networks Village Connection brings affordable voice and internet connectivity for rural areas

- Typical maximum spend on communication services no more than USD 5 per month
- GSM access point hosted by the local entrepreneur with the antenna on the roof of the building
- Each Access Point handles 250 subscribers within a village
- A local village host operates the GSM Access Point and Internet Kiosk typically out of his home, shop or school
- The village host also conducts service marketing, subscriber management and customer care, tasks done more cost efficiently locally.

Ethiopia Telecommunications Corporation (ETC) network powered by renewable energy solutions

Challenges
- Expand into rural areas, no or bad grid
- Use of renewables (wind or solar)
- Total cost of ownership (TCO)

Solution
- 300 sites – 50% in rural areas with no grid
- Bad-Grid Site Solution
- Complete turnkey solution + consulting, planning & project management

Benefits
- Payback in 2 – 4 years
- Low TCO
- Minimal maintenance costs
- Mature technology - Relatively easy and inexpensive to install
- Long lifetime

"The project's key challenges were electrical power and road access.

There are places in Ethiopia where neither road access nor commercial electric power exists."

Ato Amare Amsalu, CEO of ETC

Renewable energy – goals for mobile industry

An estimated 75,000 off-grid network sites will be built each year in developing countries through 2012 (GSMA Development Fund).

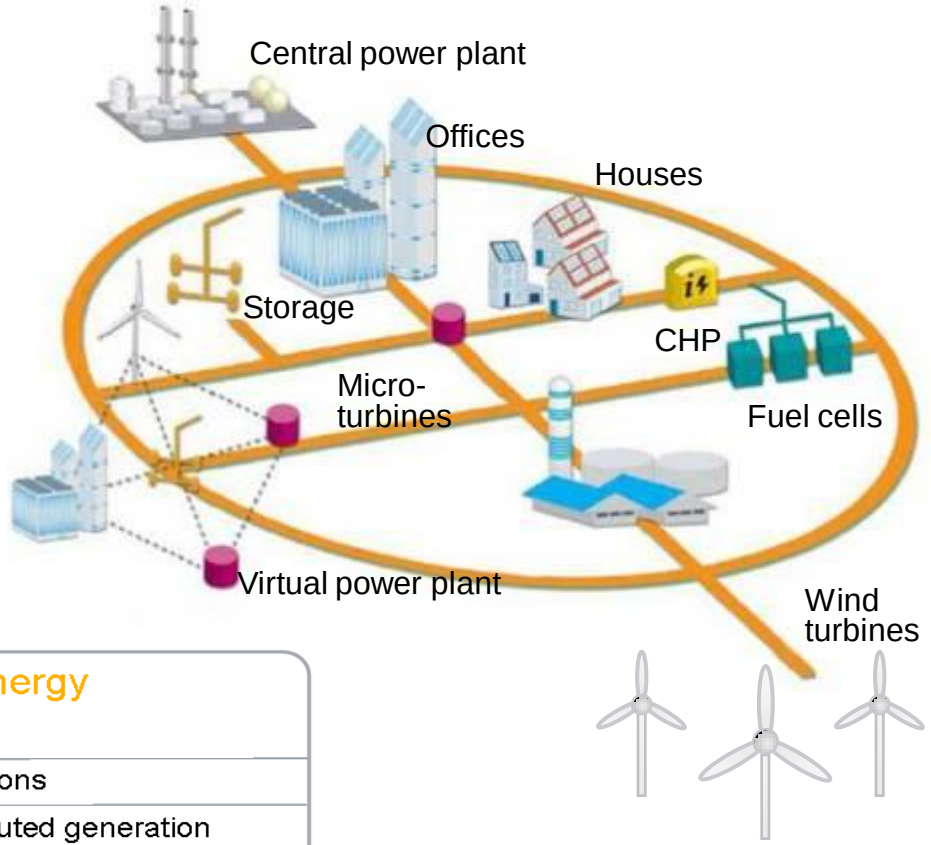
The GSMA predicts that by 2012, up to 50% of new off-grid base stations in developing world could be powered by renewable energy.

Nokia Siemens Networks commitment

- Renewable energy will be our first choice for remote base stations by 2011

Smart Grids – a new opportunity

- Smart grids = intelligence in the grid + intelligence in the energy consumption
- People will reduce energy use based on information on current consumption enabled by ICT solutions



20th Century Grid		21st Century eEnergy
Electromechanical, analog	➡	Digital
One-way communications-**if any**	➡	Two-way communications
Built for centralized generation	➡	Accommodates distributed generation
Radial topology	➡	Network topology
Few sensors	➡	Monitors and sensors throughout
Manual restoration	➡	Semi-automated restoration - self-healing
Prone to failures and blackouts	➡	Adaptive protection and islanding
Check equipment manually	➡	Monitor equipment remotely
Emergency decisions by phone	➡	Decision support systems
Limited control over power flows	➡	Pervasive control systems
Centralized billing	➡	Trading by software agents
Consumer demand uncontrolled	➡	Optimal use of energy by intelligent agents

Governments as change agents for smart grids

China

34% of investments allocated to eco-efficiency related measures. Explosive urbanization. Smart grids, smart cities, smart metering,…

U.S.A. 17% of investments to eco-efficiency related measures.
$8.2 billion in smart grid investments: $3.4 billion by the Department of Energy, matched by more than $4.7 billion in private investment. The largest single energy grid modernization investment in U.S. history.

EU Member States need to invest at least 400-450 b€ in transmission and distribution infrastructures in the next 30 years. Shared design for integrating new generation technologies. ICT for control and monitoring. Smart meter installations by 2013.

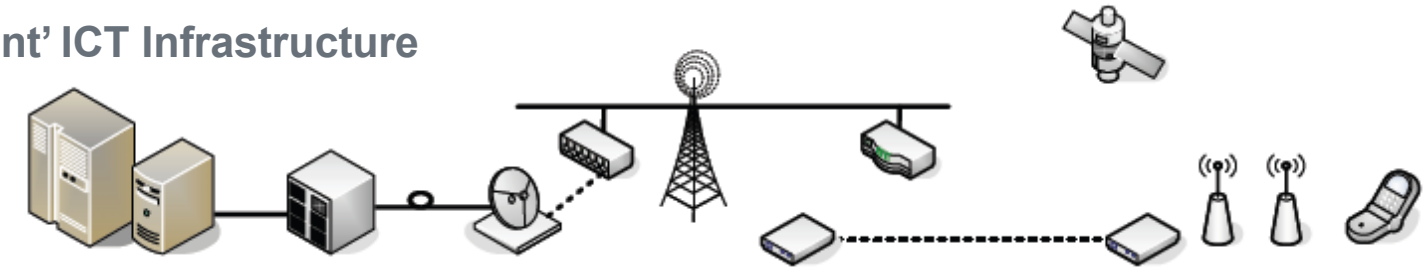
India. Need for smart grids is paramount – India is the home of one of the weakest electric grids in the world. Target is 'Power to all by 2012'. Energy demand will more than double by 2030.

Changes in energy markets open up a growth opportunity for ICT

today

Electrical 'blind' Infrastructure

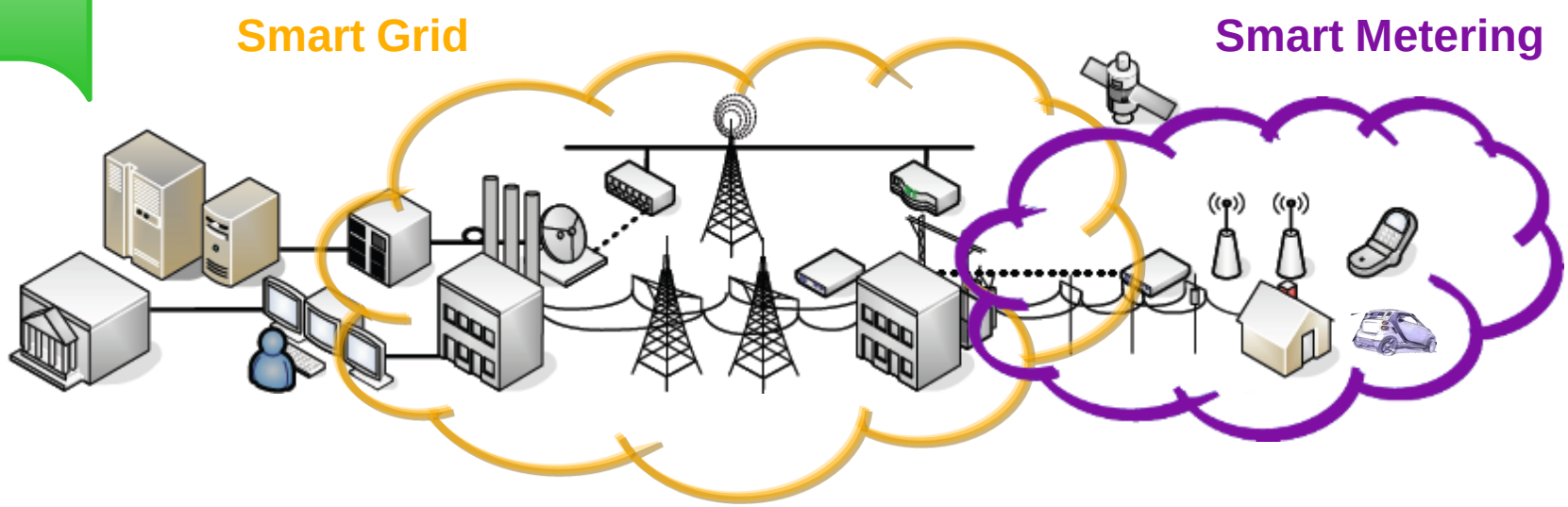
'Intelligent' ICT Infrastructure



Source: Electric Power Research Institute (EPRI)

ICT infrastructure will make electricity grids interactive for both power generation and power consumption

tomorrow



Source: Electric Power Research Institute (EPRI)

‘It takes a new way of thinking
to solve the problems that we created by the old way of thinking.’

- Albert Einstein

Thank you