ITU Regional Development Forum 2018 (RDF-ARB)

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The positive contribution of ICTs in Climate Change mitigation and adaptation

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Session Topics

- The roles of ICT in tackling Climate Change
- How a range of green ICT technologies can be used to reduce GHG emissions.
- What are the potential GHG savings from the introduction of green ICT technologies?
- Barriers to the introduction of green ICT technologies.
- How ICTs can help in adaptation to Climate Change.

How much does Climate Change cost?

- Do we need this to tackle climate change? The UK Thames Barrier was built in 1982 at a cost of £634 million (around £2 billion today).
- A rise of 2°C could cause losses equivalent to 0.2 to 2 per cent of world gross domestic product.
- In Pakistan the cost of climate change is estimated to be US$6-14bn per year up to 2050.

Source: IPCC 5th Assessment Report: "Climate Change 2014 Synthesis Report Summary for Policymakers"
www.ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf

Local Impacts of Climate Change (Example: Pakistan)

- Excessive flooding from increased river flows (especially in 2010 and 2011).
- Droughts (especially in 2010).
- Rapid glacial melting threatening cases of Glacial Lake Outbursts (GLOFs).
- Threats to coastal areas due to projected sea level rise, and increased cyclonic activity due to higher sea surface temperatures.
- Further decrease in (already scanty) forest cover.
- Increase in incidence of dengue fever.

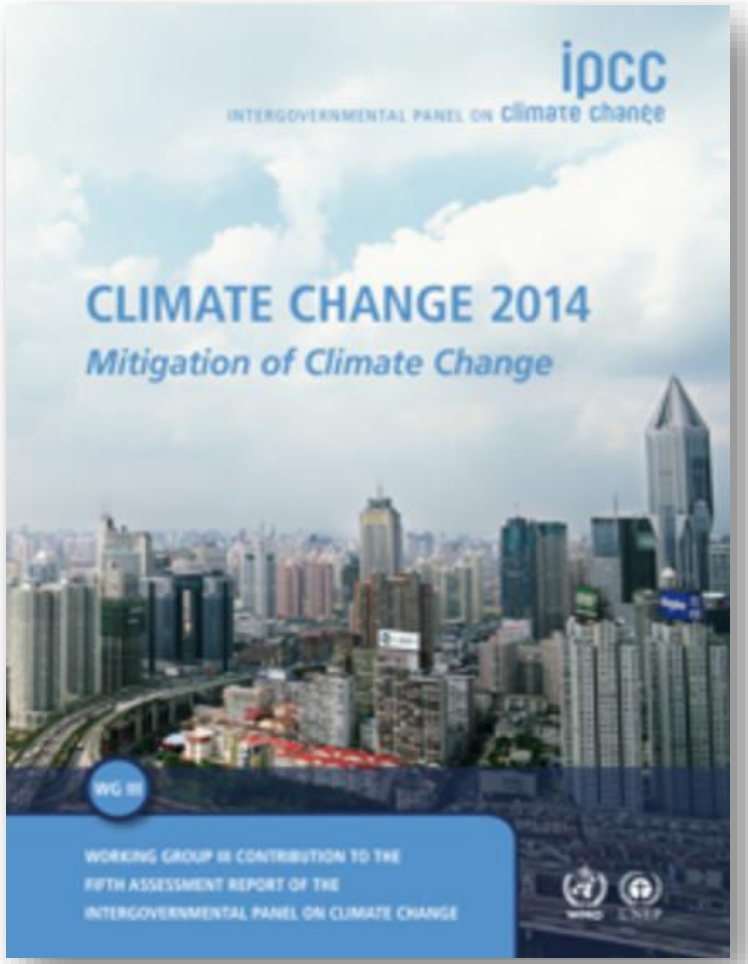
Source: Statement by Mr. Muhammed Javed Malik, Secretary (National Disaster Management), Government of Pakistan, at the High Level Segment of 17th Conference of the Parties to UNFCCC, Durban, South Africa, 8 December 2011.

Roles of ICTs in tackling climate change

- Improving the energy efficiency of the ICTs themselves.
- Climate change monitoring (providing data from satellite, airborne, terrestrial and oceanic sensors).
- Applying ICTs to reducing emissions in other sectors (mitigation), e.g. in the power sector.
- Applying ICTs to improving adaptation to climate change.

The importance of Mitigation

- Without additional efforts to reduce GHG emissions beyond those in place today, emissions growth is expected to persist driven by growth in global population and economic activities.
- Mitigation scenarios reaching about 450 ppm CO_2e in 2100 typically involve overshoot of atmospheric concentrations, as do many scenarios reaching about 500 ppm to about 550 ppm CO_2e in 2100.



www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf

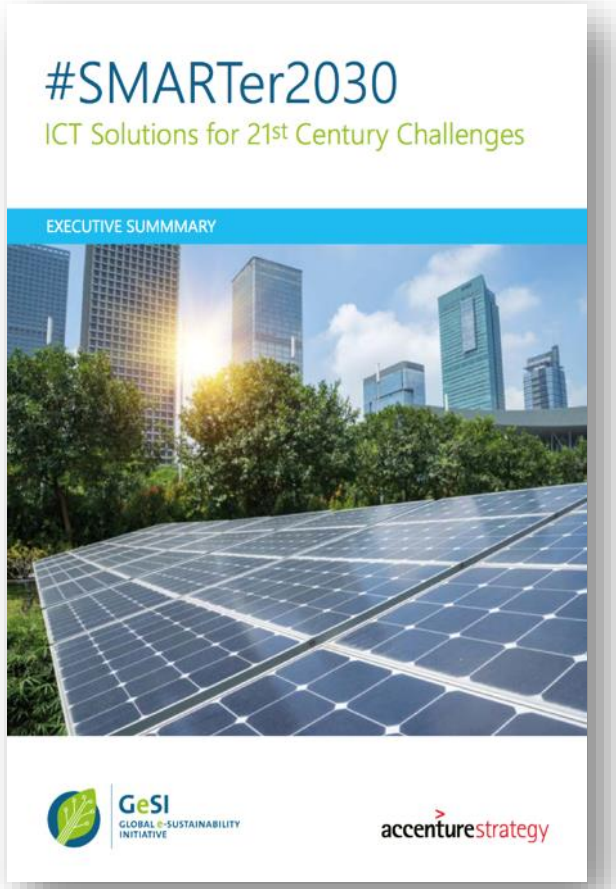
Mitigation: Emission reductions possible in other sectors using ICTs

Categories	Effects
Consumption of materials	By reducing materials consumption (dematerialization), the environmental load related to goods production and disposal as well as waste generation can be reduced.
Power / energy consumption	By enhancing the efficiency of power and energy use to reduce consumption, the environmental load related to power generation, power transmission, etc. can be reduced.
Movement of people	By reducing the movement of people, the environmental load required for transportation can be reduced.
Movement of materials	By reducing the movement of materials, the environmental load required for transportation can be reduced.
Improved efficiency of office space	By using office space efficiently, power consumption for lighting, air conditioning, etc. can be reduced, thus reducing environmental load.
Storage of goods	By reducing storage space of goods, power consumption for lighting, air conditioning, etc. can be reduced, thus reducing environmental load.
Improved work efficiency	By enhancing work efficiency, the environmental load can be reduced.
Waste	By reducing waste emissions, the environmental load required for environmental preservation as well as for waste disposal can be reduced.

Source: ITU-T Recommendation L.1400 “Overview and general principles of methodologies for assessing the environmental impact of ICT” www.itu.int/rec/T-REC-L.1400

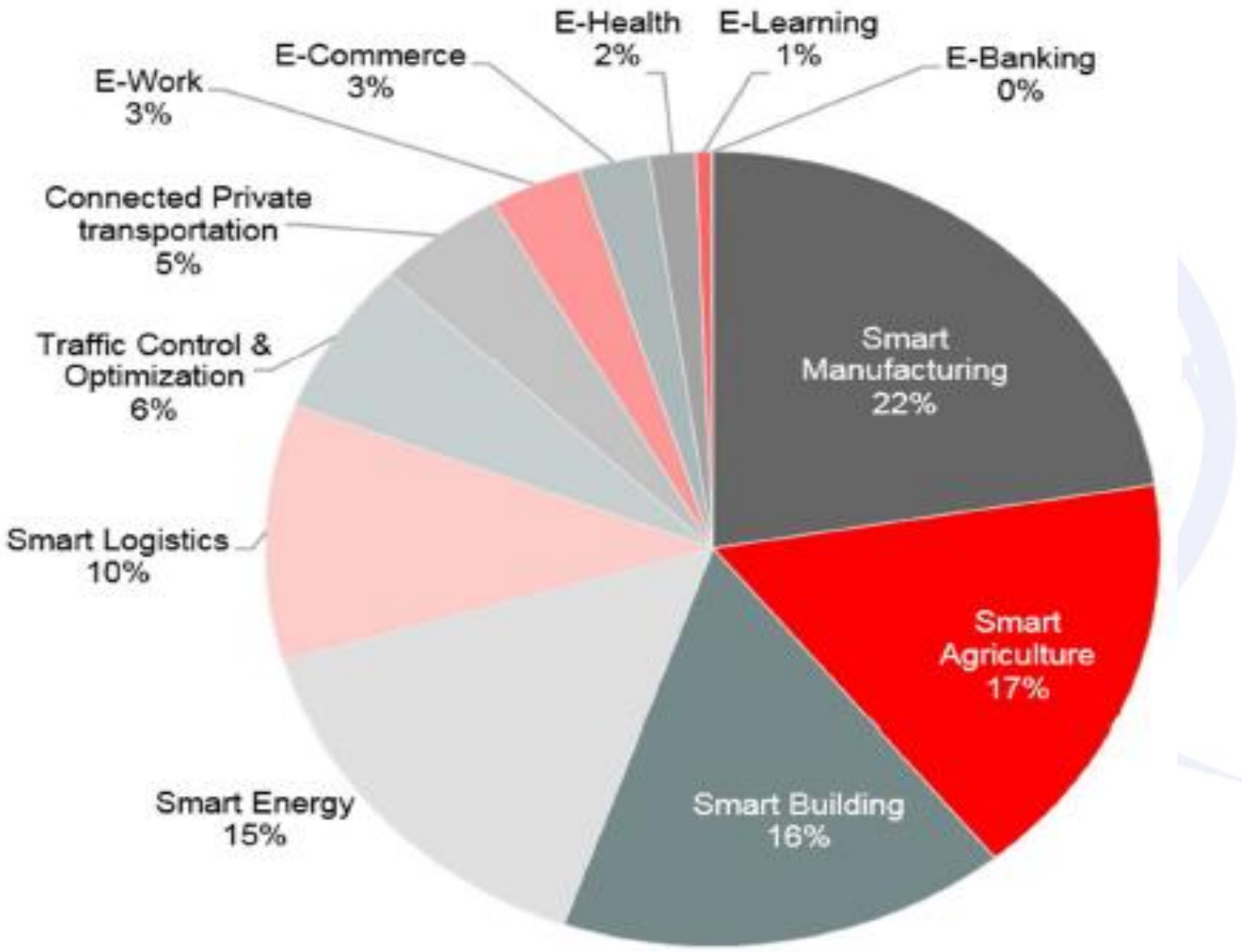
GeSI SMARTer 2030 claims…

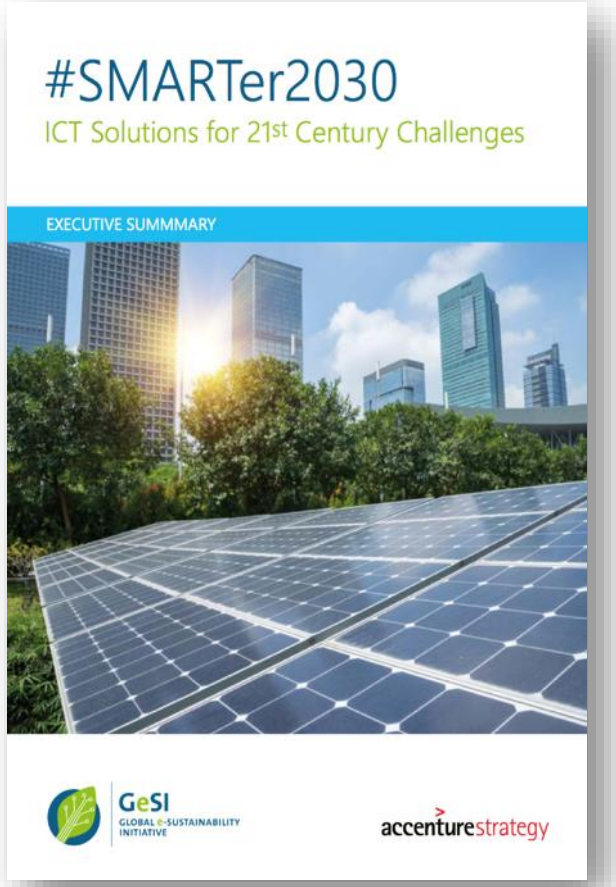
- ICT can enable a 20% reduction of global CO_2e emissions by 2030, holding emissions at 2015 levels.
- ICT emissions as a percentage of global emissions will decrease to 1.97% of global emissions by 2030, compared to 2.3% in 2020.
- ICT could generate over $11 trillion in economic benefits per year by 2030.



Source: GeSI: SMARTer2030 ICT Solutions for 21st Century Challenges, 2015.

ICT CO_2e abatement potential (2030)





Source: GeSI: SMARTer2030 ICT Solutions for 21st Century Challenges, 2015 (page 18).

Korea's Green ICT Strategy

- Smart grids
- Telepresence
- E-commerce
- E-civil service
- E-logistics
- Real-time navigation
- E-government
- Smart motors
- Home energy management systems
- Digital contents
- Smart work
- E-learning
- Bus information systems
- E-health care

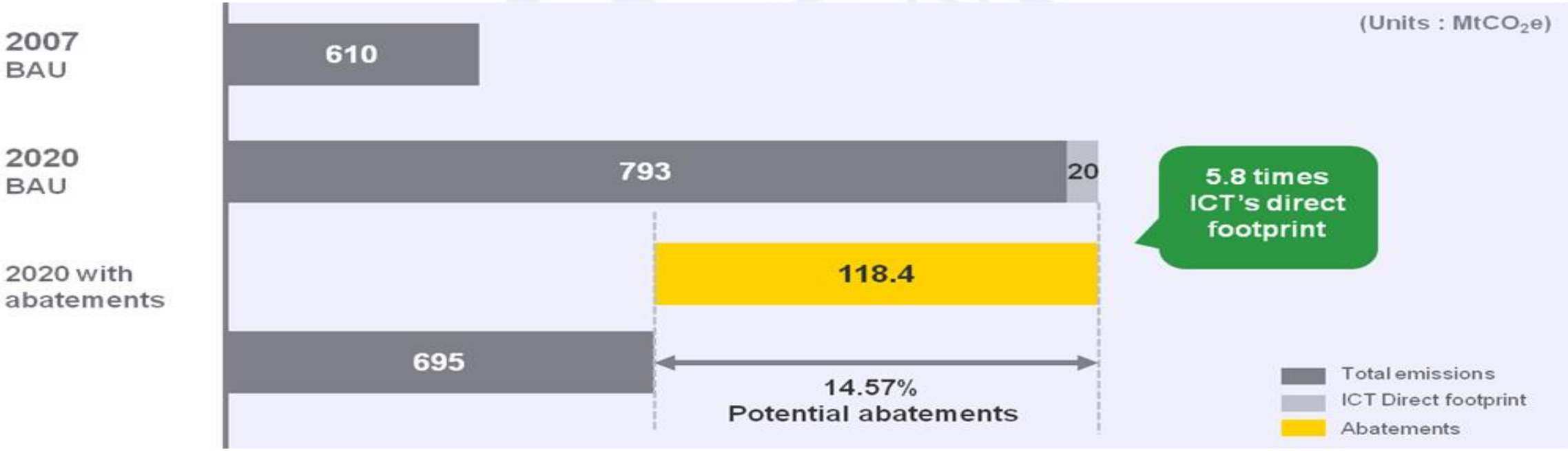
ITU Report: "The case of Korea - The quantification of GHG reduction effects achieved by ICTs", 2013 – www.itu.int/pub/T-TUT-ICT-2013-08

Potential GHG emission reductions arising from the introduction of 14 ICT services

ICT services	Year 2011	Year 2020
	GHG abatement (Units: million tCO_2e)	GHG abatement (Units: million tCO_2e)
1. Smart grid	1.98	68.70
2. Telepresence	0.86	11.03
3. E-commerce	1.09	7.93
4. E-civil service	0.47	6.11
5. E-logistics	1.34	4.79
6. Real-time navigation	0.59	3.57
7. E-government	0.15	3.48
8. Home energy management system	0.76	2.96
9. Smart motor (Industrial)	1.61	2.89
10. Digital contents	0.52	2.05
11. Smart work	0.17	1.89
12. E-learning	0.69	1.61
13. Bus information system	0.25	1.40
14. E-health care	0.02	0.04
Total	**10.3**	**118.4**

www.itu.int/pub/T-TUT-ICT-2013-08

Potential GHG emission reductions compared to Business as Usual (BAU)



www.itu.int/pub/T-TUT-ICT-2013-08

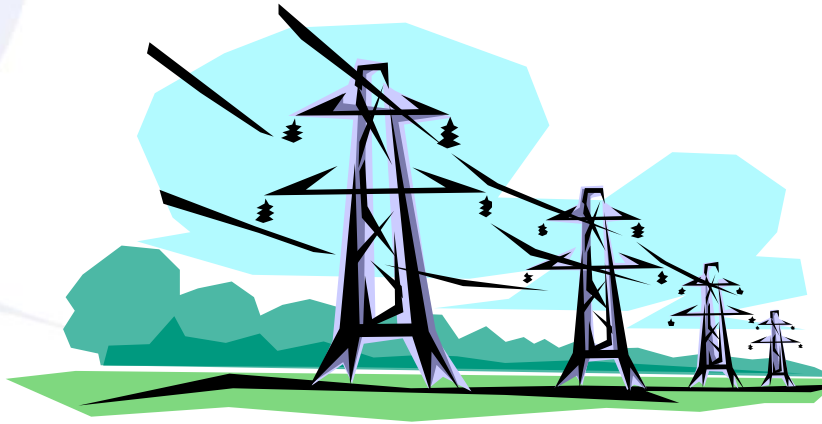
Potential GHG emission reductions from the introduction of ICT services in Pakistan

Smart Meters	3.87 $MtCO_2e$
Smart Grids	4.36 $MtCO_2e$
RTN	0.86 $MtCO_2e$
e-logistics	0.36 $MtCO_2e$
Telepresence	0.01 $MtCO_2e$
Bus Information Systems	5.46 $MtCO_2e$
e-government	0.59 $MtCO_2e$
e-commerce	5.15 $MtCO_2e$
Home Energy Management Systems	0.41 $MtCO_2e$
Total	21.05 $MtCO_2e$

Potential GHG emissions reductions compared to Business as Usual (BAU) in Pakistan

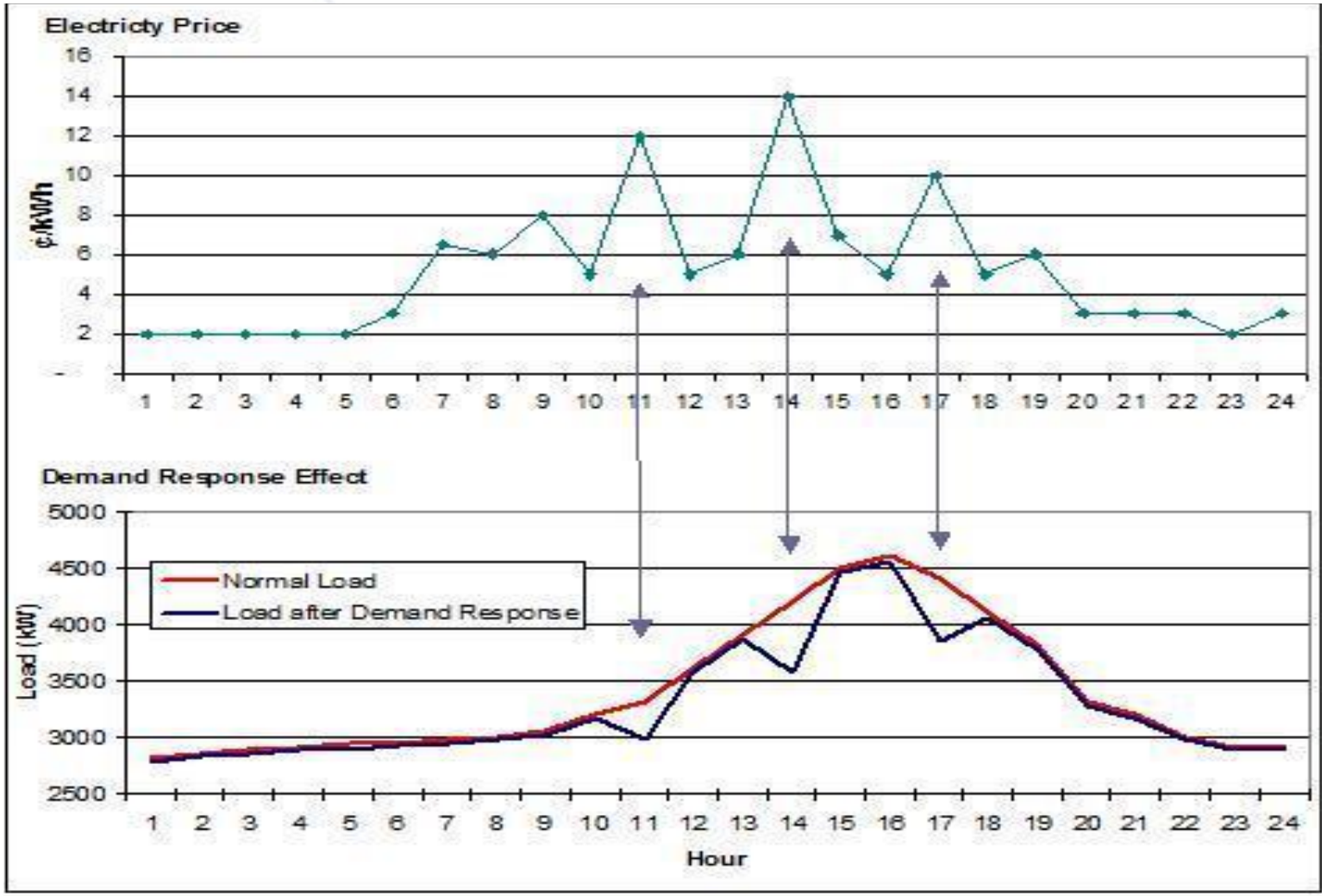
Smart Energy

- A ‘smart grid’ is a set of software and hardware tools that enable generators to route power more efficiently, reducing the need for excess capacity and allowing two-way, real time information exchange with their customers for real time demand side management (DSM).
- Demand control (electricity) by load shifting via smart meters and appliances
  - Reduces peak demand saving hot standby power stations
  - E.g. temporary turn off, for refrigerator, dishwasher etc. (future electric vehicle charging)
  - Requires communication to meters and appliances



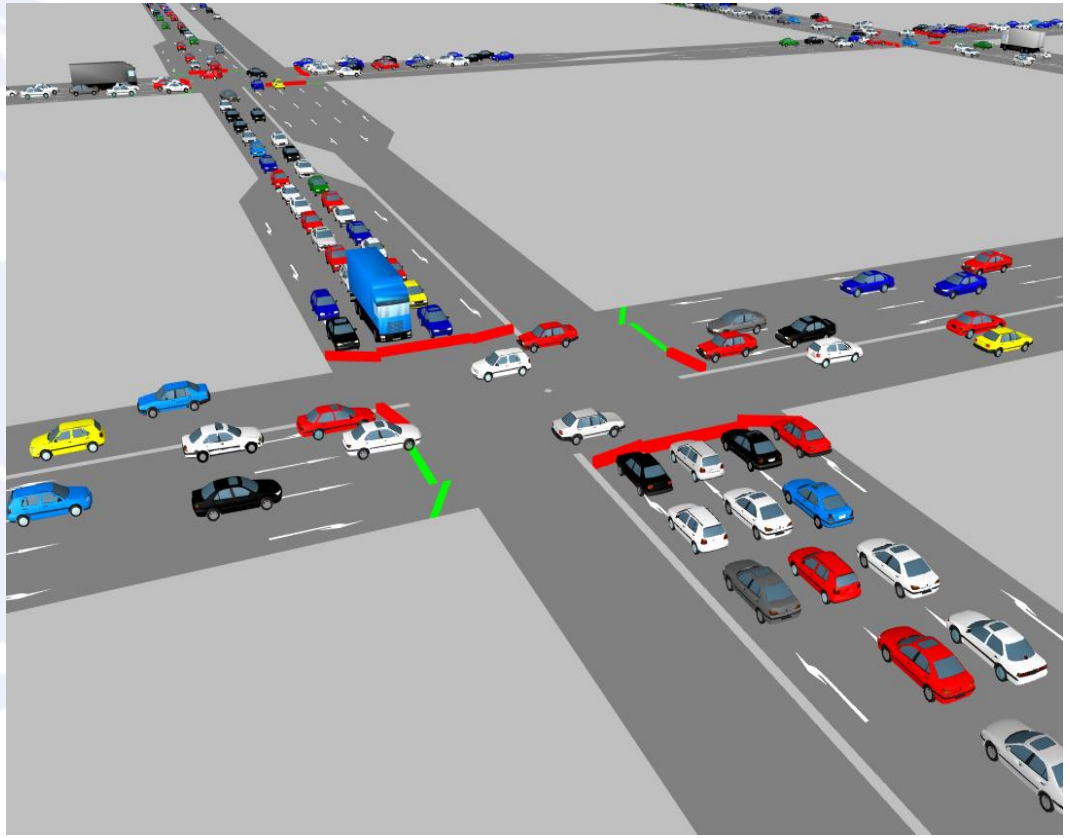
Smart Grid Vision and Roadmap for India: http://indiasmartgrid.org/en/resource-center/Reports/Smart%20Grid%20Vision%20and%20Roadmap%20for%20India.pdf

Smart Energy: Demand Response



Smart Transport: Traffic Control and Optimization

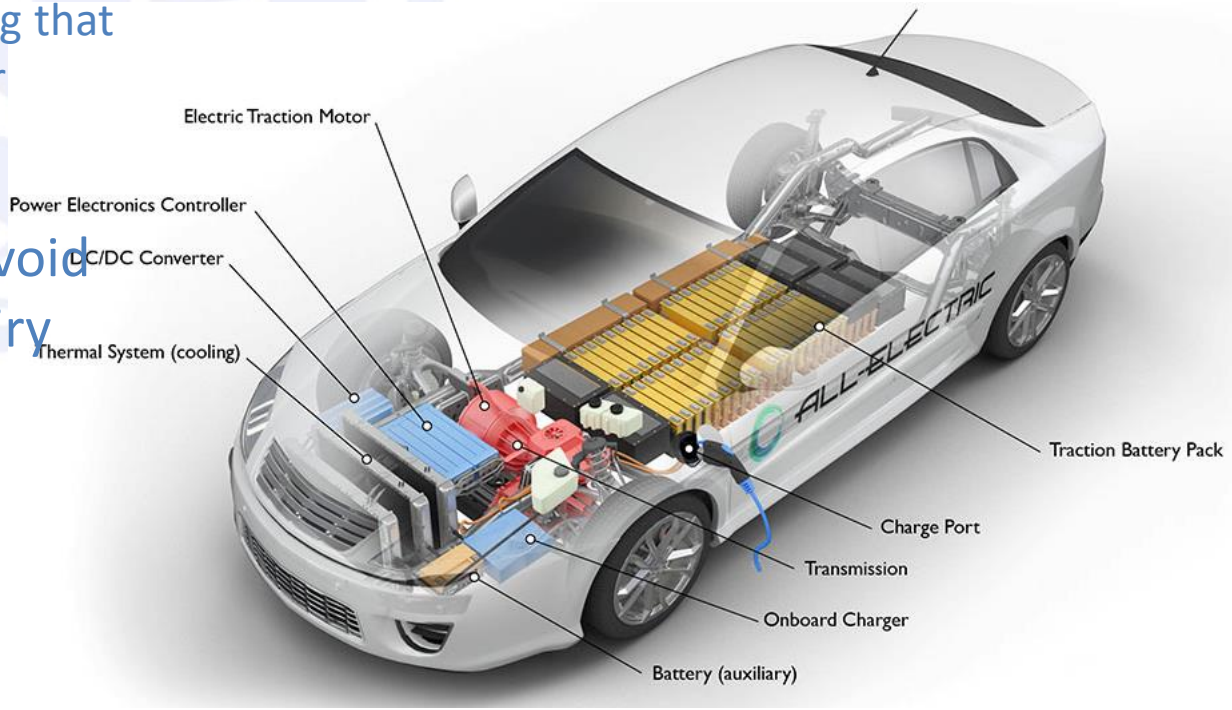
- Traffic Control & Optimization is facilitated through connected smart sensors, location-based applications and intelligent infrastructure, all working together to make traffic, driving and parking more efficient.



Source: GeSI (2015, p 47)

Smart Transport: Electric Vehicles

- EVs save >50% of GHG emissions over vehicle lifetime.
- EVs are currently expensive compared to petrol and diesel fuelled vehicles but are becoming available in quantity - policy makers could stimulate the market.
- India launched a National Mission on EV Mobility with target of 6 million EVs (two wheelers and four-wheelers) by 2020.
- Market for manufacture and sale of EVs should be promoted in developing countries by:
  - Piloting an EV charging infrastructure, initially in major cities.
  - Promoting awareness of the benefits of EVs, including that lifetime costs of an EV are much lower than for other options.
  - Subsidising the sale of EVs to promote the market.
- Quality of EV batteries must be monitored to avoid increase in eWaste arising from premature expiry during use of these vehicles.
- Electric vehicles (EVs) could also have a role as providers of energy storage for the smart grid.



Smart Logistics

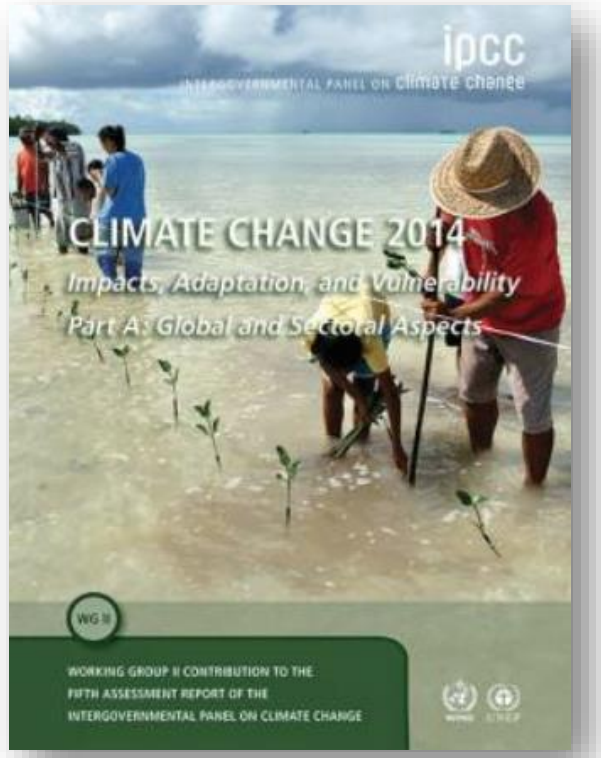
- Avoid unnecessary journeys by using
  - GPS for locating and directing delivery vehicles.
  - ‘always turn right rule’ (Verizon).
  - Mobile phone (or PDA) to inform of ‘next call’.
  - Mobile phone to ‘ring ahead’.
- Smart logistics in Europe could deliver fuel, electricity and heating savings of 225 MtCO2e.
- Global emissions savings from smart logistics in 2020 would reach 1.52 GtCO2e, with energy savings worth US$441.7 billion.
- Smart traffic control
  - Lights send out status signals to warn drivers they will need to stop.
- Smart parking
  - Vehicles directed to an empty space.
  - No touring around to find a space.

Barriers to introduction of Green ICT technologies

- Technical barriers – e.g. lack of a fast broadband infrastructure, lack of an e-payments gateway.
- Commercial barriers – e.g. lack of effective competition.
- Regulatory barriers – e.g. regulatory environment is encouraging the status quo.

The Need for Climate Change Adaptation

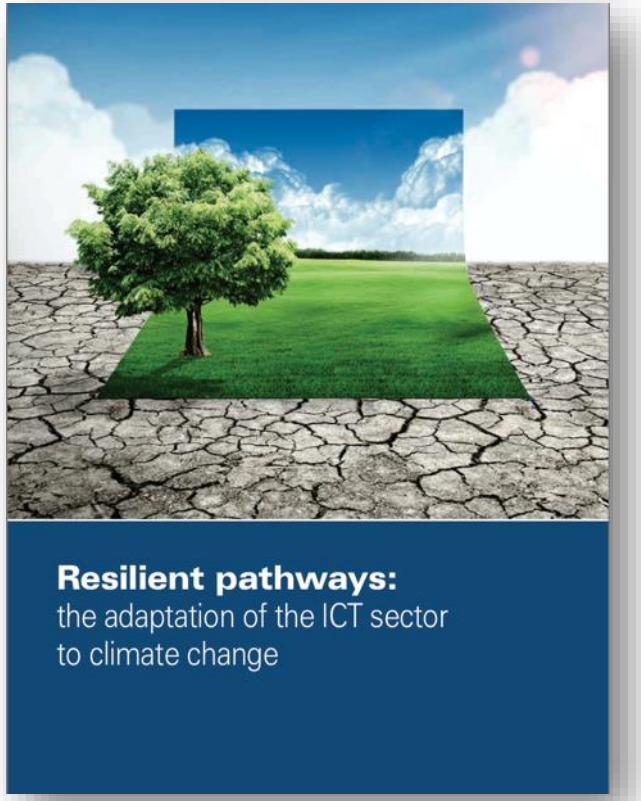
- Changes in temperature, precipitation, wind-speeds, lightning patterns, humidity, snow and ice, among others.
- Both acute (extreme) weather events and chronic (longer term) changes in climate.
- 1.8°C to 4°C rise in temperature by 2100 if no action is taken.
- >10% increase in wind speeds and poleward shift in storm tracks.
- 10% increase in lightning activity for every 1°C increase in temperature.



ICT Sector Responses

- Ensure that ICT infrastructure can cope with more extreme ranges of temperature, rainfall, wind speed, etc.
- Increase resilience by adding diverse routing.
- Carry out Risk Assessments:
  - Use a Climate Adaptation Risk Assessment Checklist.
  - Agree a "Climate Change Adaptation Plan".
- Share 'know-how':
  - Best Practices (e.g. for increased resilience).
  - Risk assessment checklists and remedial actions.

www.itu.int/en/ITU-T/climatechange/Documents/Publications/Resilient_Pathways-E.PDF



Check Flood Risk Zones

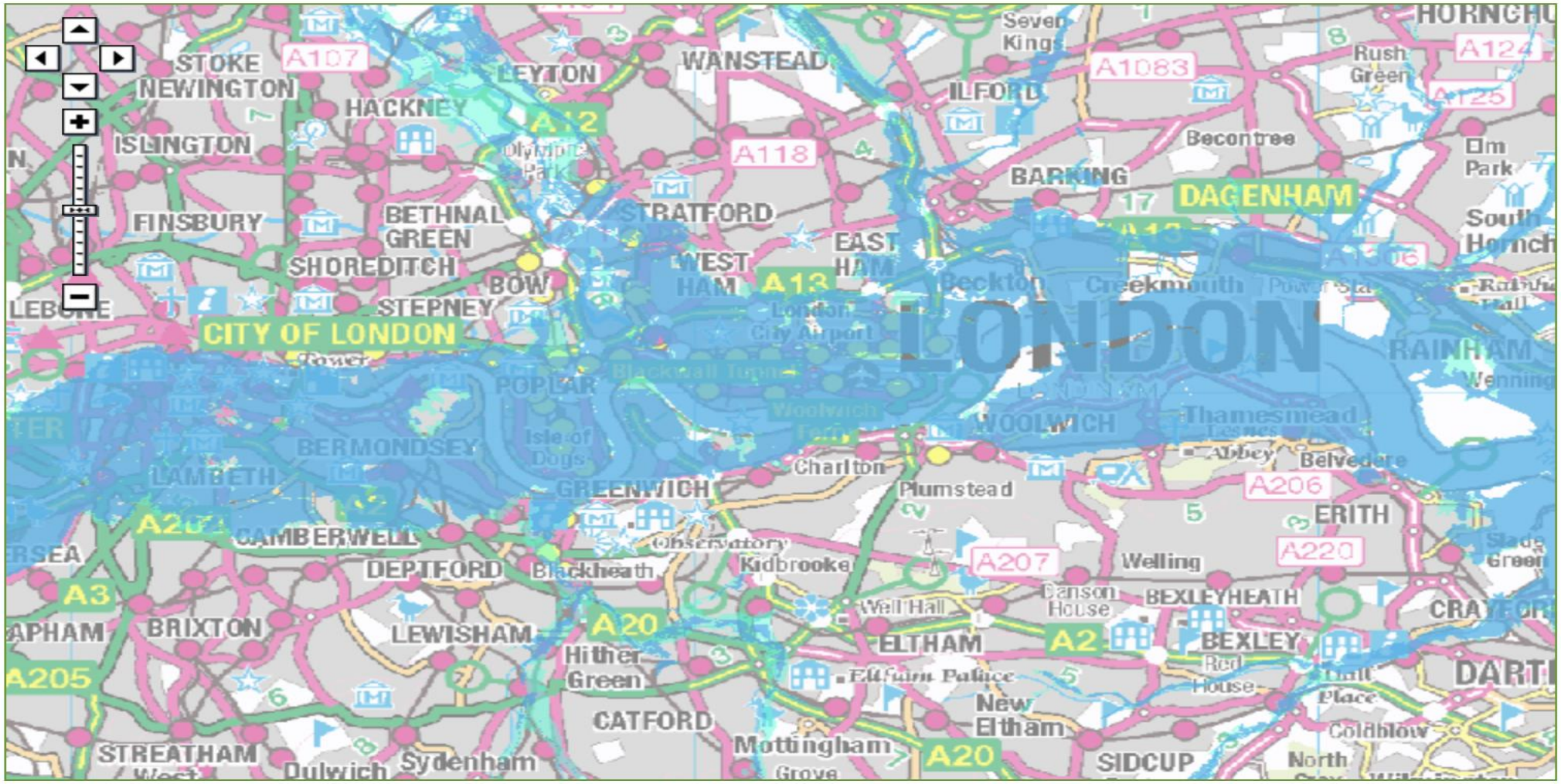
Map legend

Click on the map to see what Flood Zone (National Planning Policy Guidance definitions) the proposed development is in.

- Flood Map for Planning (Rivers and Sea)
  - Flood Zone 3
  - Flood Zone 2
  - Flood defences (Not all may be shown*)
  - Areas benefiting from flood defences (Not all may be shown*)
  - Main rivers

X: 541,396;Y: 179,993 at scale 1:125,000

Other maps ▸ Data search ▸ Text only version ▸



www.environment-agency.gov.uk/floodrisk

Suggested Actions - *Assess Risks*

- Carry out periodic climate risk assessments on existing networks:
  - *Evaluate risks and cost of remedial action*
  - *Carry out remedial work if costs can be justified*

Suggested Actions - *Share Best Practices*

Example from Telefónica Perú:

Preventive action to protect network sites.

- Blocking doors of network sites with sandbags on both sides of door (inside and outside room),
- Total cost of this preventive action was extremely low in comparison with potential damage to equipment and loss of service due to network failure.

References for further reading (Mitigation)

- IPCC Climate Change 2014 Mitigation of Climate Change, Summary for Policymakerswww.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_summary-for-policymakers.pdf
- SMARTer2030 “ICT Solutions for 21st Century Challenges”, GeSI, 2015 – www.gesi.org/portfolio/project/82
- ITU Report: “The case of Korea - The quantification of GHG reduction effects achieved by ICTs”, 2013www.itu.int/pub/T-TUT-ICT-2013-08.
- ITU Report: “Enabling Energy Efficiency through ICTs: The case of Pakistan”.
- ITU-T SG 5 Environment and Climate Change www.itu.int/en/ITU-T/climatechange/Pages/default.aspx
- “Zero-carbon Homes: A Road Map”, Joanna Williams, ISBN-13: 978-1849712491

References for further reading (Adaptation)

- IPCC Special Report: “Managing the risks of extreme events and disasters to advance climate change adaptation” - www.ipcc-wg2.gov/SREX/images/uploads/SREX-All_FINAL.pdf
- ITU Report: “Resilient Pathways: The Adaptation of the ICT Sector to Climate Change” - www.itu.int/en/ITU-T/climatechange/Documents/Publications/Resilient_Pathways-E.PDF
- ITU-T Recommendation L.1500 “Framework for information and communication technologies (ICTs) and adaptation to the effects of climate change Adaptation”.
- ITU-T Recommendation L.1502 “Adapting information and communication technology infrastructure to the effects of climate change”.