The Role of ICT in Reducing Carbon Emissions in the UK

BT

Contents

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Executive Summary

Background

The UK Government has set ambitious targets to cut the UK's annual carbon emissions by 50 per cent by 2030 and 80 per cent by 2050, as part of the global initiative to tackle climate change.

To date, the carbon abatement measures in the UK Carbon strategy have not yet taken the full potential of ICT into account.

Key Findings

The ICT sector in the UK could not only help meet emission reduction targets, but also deliver significant economic benefits in terms of new revenue generation and cost savings.

The research looked at what ICT could enable in 2030 and found:

- **A 24% reduction in UK carbon emissions annually**, equivalent to taking 26m passenger cars off the road[2, 3]

- This saving **will be 12 times the carbon footprint of the ICT sector itself**

- **An additional £122 billion in sustainable economic benefits annually,** comprising £58.5 billion in additional ICT and stakeholder revenues and £63.5 billion in cost saving opportunities[4]

- **Socio-economic benefits for the entire economy** – e-Learning opportunities will generate an additional income of £13 billion while e-Health will generate over £1.3 billion in space savings, and enhanced health services will be available to 19.9 million people across the country[5]

Recommendations

The findings show the ICT sector should not be overlooked when considering the decarbonisation of the UK's economy and that it can also deliver broader environmental and socio-economic benefits.

BT recognises its role in this journey and embraces the opportunity to leverage its network, products and services to help the Government tackle and achieve its carbon targets and drive positive change.

This study aims to raise awareness of the possibilities of deploying smart technologies, how their deployment may be supported and case study examples from within BT of how environmental, economic and social benefits are already being realised.

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[1] Updated Energy and Emissions Projections 2015, Department of Energy and Climate Change available here: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/477698/Updated_energy_and_emissions_projections_2015.pdf

[2] Accenture Strategy worked with the Global e-Sustainability Initiative (GeSI) to develop the SMARTer2030 report. GeSI is a leading source of impartial information, and collaborates with its members from major ICT companies and organisations, to provide resources and best practices for achieving integrated social and environmental sustainability through ICT. Over 30 major ICT companies, including BT, are members. The report is available here: http://smarter2030.gesi.org/

[3] 2030 carbon projections based on CCC analysis and carbon reductions calculated using: http://www3.epa.gov/otaq/climate/documents/420f14040a.pdf

[4] GeSI SMARTer2030 report

[5] GeSI SMARTer2030 report

UK Climate Change Act

The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty which was negotiated at the United Nations Conference on Environment and Development (UNCED) in 1992. This treaty has the objective to 'stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system'[6]. Parties of the UNFCCC have agreed that emissions should be reduced so as to limit the global increase in temperature to a maximum of 2°C above pre-industrial levels.

The UK, as part of the UNFCCC, has taken a global leadership role in the urgent collective action to tackle climate change. As the first country to introduce legally-binding targets[7], through the 2008 Climate Change Act, the UK has been at the forefront of global action and has set itself a clear framework to develop an emissions reduction strategy that is both viable and credible.

Through the Climate Change Act, the UK committed to reducing its annual carbon emissions by at least 80 per cent in 2050 from 1990 levels. The Act also requires Her Majesty's Government (HMG) to set legally binding 'carbon budgets' which define the maximum greenhouse gas (GHG) emissions over each five year period between 2008 and 2050.

The Committee on Climate Change (CCC) was established to develop these carbon budgets and analyses. The CCC sits outside Governmental and Parliamentary cycles, which helps it to take a non-political, longer term view and enables it to to advise the Government on emissions targets and report to Parliament on progress made.

The first four carbon budgets, covering the period from 2008 to 2027, were written into law. The UK is currently in the Second Carbon Budget period (2013-2017) and is on track to meet the Second and the Third Carbon Budgets. This progress is described below in Table 1[8].

Alongside the carbon budgets, the CCC defines a 'cost effective pathway' which outlines the most commercially and technologically feasible pathway to meet the budget.

Meeting the Fourth Carbon Budget

The UK government is currently deciding policies to meet the Fourth Carbon Budget. Based on current calculations by the UK Government, there is a gap to meet the Fourth Carbon Budget of 187 Mt CO_2e[9].

Table 1. UK Carbon Budgets and Progress

Budget	Carbon Budget Level	% Reduction Below 1990	Estimated / Actual Progress*[10]
First Carbon Budget (2008-12)	3,018 Mt CO_2e	23%	- 36 Mt CO_2e (actual)
Second Carbon Budget (2013-17)	2,783 Mt CO_2e	29%	- 60 Mt CO_2e (estimated projection)
Third Carbon Budget (2018-22)	2,544 Mt CO_2e	35% by 2020	- 51 Mt CO_2e (estimated projection)
Fourth Carbon Budget (2023-27)	1,950 Mt CO_2e	50% by 2025	187 Mt CO_2e (estimated projection)
Fifth Carbon Budget (2028-2032)	1,765 Mt CO_2e	57% by 2030	(Not yet determined)

* = negative figure denotes Carbon Budget was achieved / projected

This gap has been identified and calculated by the CCC and Department for Energy and Climate Change (DECC) and is based on predicted baseline emissions[11] and predicted reductions through policy measures.

[6]http://unfccc.int/essential_background/convention/items/6036.php

[7]Committee on Climate Change available here: https://www.theccc.org.uk/tackling-climate-change/the-legal-landscape/global-action-on-climate-change/

[8]Committee on Climate Change available here: https://www.theccc.org.uk/tackling-climate-change/reducing-carbon-emissions/carbon-budgets-and-targets/

[9]Updated Energy and Emissions Projections 2015, Department of Energy and Climate Change

[10]Updated Energy and Emissions Projections 2015, Department of Energy and Climate Change

[11]Based on the most recent DECC analysis, 2015

Figure 1: UK Carbon Emissions and Projections (2012–2027)
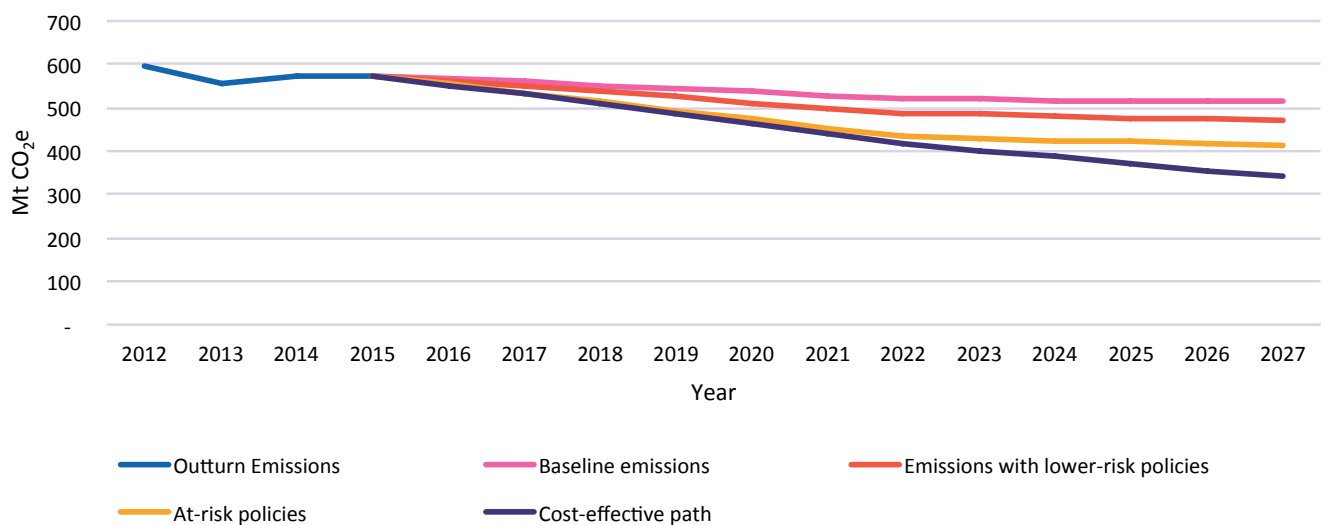
The UK's projected carbon reduction pathway is shown in Figure 1. The graph shows the trajectory for UK baseline emissions[7] up to 2027 (pink), the estimated reduction pathway taking into account the impact of lower-risk (orange) and at-risk policies (yellow) over time. The cost-effective pathway is shown in purple.

The CCC suggests that the identified gap to meeting the Fourth Carbon Budget of 187 Mt CO_2e is mainly a result of supporting policies which will expire or lose funding during the 2020s. The CCC has therefore recommended increased clarity over longer term horizons and greater investments into infrastructure and technology measures – these points form the basis of their recommendations to Parliament.

However, current recommendations and UK policies do not fully take into account, or explicitly point to, the enabling role of ICT and how the sector can enable significant emissions reductions. The UK Carbon Strategy does point to the inclusion of increased renewable energy on the grid and grid flexibility, however does not include ICT's full potential. Carbon budgets and the guidance towards achieving the cost-effective pathway, are written 12 years in advance, so it is to be expected that the potential of ICT was relatively unknown when the first four carbon budgets were written into law.

Given the potential of ICT to play a greater enabling role, in addition to the current policies and interventions, there is an opportunity to help the UK to fill the identified gap and achieve its targets for 2030 and beyond.

ICT's Carbon Reduction Potential

The Global eSustainability Initative's (GeSI) most recent report, SMARTer2030[12], analysed 12 ICT use cases and supporting case studies to quantify the potential of ICT to reduce global carbon emissions as well as deliver significant economic benefits. The key findings were as follows:

- ICT has the potential to enable a 20% reduction in global CO_2 emissions by 2030, holding emissions at 2015 levels and therefore effectively decoupling economic growth from emissions growth. Together, the use cases could enable over 12 Gt CO_2e in reductions in 2030 globally – 22 times the current level of UK carbon emissions[13]

- Emissions avoided worldwide through the use of ICT are nearly ten times greater than the emissions generated by deploying it by 2030. ICT emissions as a per centage of global emissions will decrease over time, with

research showing that the ICT sector's emissions 'footprint' is expected to decrease to 1.97% of global emissions by 2030, compared to 2.3% in 2020

- ICT could generate over £7.2 trillion in economic benefits per year by 2030, based on an assessment of eight key economic sectors

Figure 2 describes each use case and the ways in which each can reduce emissions, while Figure 3 (page 7) shows the total breakdown, by use case, of carbon abatement. The growing potential of ICT is being driven by greater adoption rates of smartphones and internet-enabled devices, as well as greater access to broadband around the world.

In addition to carbon abatement, these use cases offer potential revenue uplifts for the global ICT sector of £1 trillion GBP in 2030[14]. Beyond the ICT sector, external stakeholders could benefit from cost savings and additional revenues totalling £6.2 trillion. These new revenue streams will be generated from connecting the unconnected across the world, and through delivering new services and products such as wearables and increased use of sensor technology. Cost savings (nearly £3.3 trillion in 2030), could be generated from reduced electricity expenditure, reduced fuel costs and other resource efficiencies (water, paper etc.).

[12]GeSI SMARTer2030 report
[13]Updated Energy and Emissions Projections 2014, Department of Energy and Climate Change
[14]GeSI SMARTer2030 report

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Smart Manufacturing	• Smart Manufacturing is the intensified application of advanced intelligence systems which includes use of ICT to increase knowledge around inefficiencies, and enabling rapid manufacturing of new products, dynamic responses to product demand and real time optimisation of manufacturing production and supply chain networks • Carbon reduction through improved process automation and engine optimisation
Smart Agriculture	• Smart Agriculture stands for the efficient farming and agriculture methods (excluding marine agriculture) that involve the use of ICT such as GPS and intelligent sensors • Carbon reduction enabled through energy efficiency measures, a reduction in fertilizers used, improved manure management and efficient enteric fermentation and rice cultivation
Smart Buildings	• Smart Buildings is the combination of specific building software and remote controls that lead to intelligent homes and workplaces. Its main pillars are: energy management for households through automatic detection and energy storage, improved buildings efficiencies and the combination of sensors and Machine-to-Machine communication (the Internet of Things) • Carbon reduction through decreased energy consumption in households and commercial buildings
Smart Energy	• Smart Energy is connecting energy supply to current demand using more efficient networks and encompasses three areas: dynamic demand management (supply and demand), improvement of grid services and decarbonisation from the integration of renewable energies to a smart grid • Carbon reduction through decrease in energy production due to decreased demand, increase in renewable energy, and improved grid efficiencies
Smart Logistics	• Smart Logistics are the improvements leveraged from ICT that result in an optimisation of distribution activities, reduction in distance travelled etc. • Carbon reduced through decrease in air, train, maritime and road freight through maximisation of vehicle capacity and logistics sharing
Traffic Control and Optimisation	• Traffic Control and Optimisation seeks to manage traffic and parking in cities in a smarter, efficient and more fluent way, through intelligent sensors and connected cars • Carbon is reduced through increased use of efficient routes (reduced distance driven), increased efficiency of personal vehicles, and increased use of public transport
Connected Private Transportation	• Connected Private Transportation refers to connecting vehicles to help stimulate car sharing and route sharing, reducing the usage of cars overall • Carbon is reduced through route sharing, car sharing (decrease in travel) and associated reduction in car production
E-Work	• E-Work is the use of cloud platforms, connections and communicating devices to facilitate daily office work between people based at different locations • Carbon is reduced through lower levels of commuting (less personal transport) and decrease in business trips by car and airplane
E-Commerce	• E-Commerce is the improvement of current platforms and connections that make possible online commerce / trading of products or services using internet networks between retailers and consumers • Carbon is reduced through increased online shopping, requiring fewer trips to shops and lower fuel consumption
E-Health	• E-Health is the provision of health resources and care using ICT means and encompasses three areas: delivery of information for professionals and consumers, improving public health services (eg: education and training of health works) and enabling patients to manage their own health • Carbon is reduced through a fall in patient transport used, as well as decreased space used in hospitals and clinics
E-Learning	• E-Learning is the deployment of computerised devices in educational and learning environments, promoting valuable interactive lessons. Its main pillars are: building partnerships with quality training providers and offering wider educational horizons by offering new accessible learning content • Carbon is reduced through reduction in transport required in secondary and higher education and company travel for training purposes
E-Banking	• E-Banking refers to providing banking products and services through electronic delivery channels, such as internet or mobile banking • Carbon is reduced through few consumer trips required to the bank and reduction in employees employed by banks

UK ICT Carbon Reductions
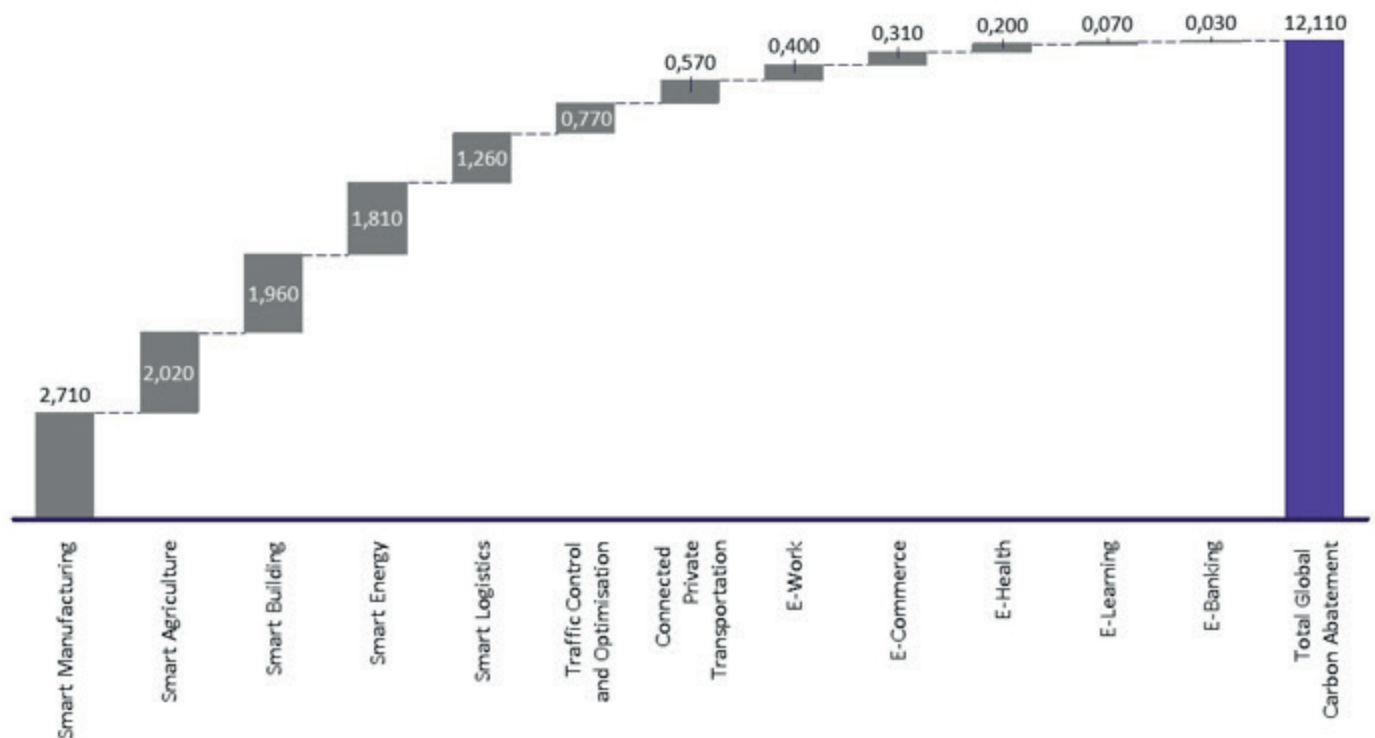
These ICT-enabled carbon abatement and social and economic benefits are also applicable to the UK. These benefits and the opportunity that ICT provides to the UK are particularly relevant as the application of ICT to this challenge provides a clear incentive to embrace ICT to get closer to the 2030 emissions reduction target.

To date, HMG and CCC's recommendations have not explicitly called out the potential for ICT to enable carbon reductions in the UK, with the exception of the integration with renewables and increased grid flexibility under the 'Secure, Low Carbon Electricity' UK Carbon Strategy sector (described in further detail below). This means that all ICT-enabled carbon abatement measures from the SMARTer2030 report, except for the Smart Energy use case, are additive and not duplicative of the current policies and recommendations within DECC's or CCC's recommendations.

Using the data from the SMARTer2030 report, it is estimated that ICT-enabled carbon abatement could help to shrink the UK's identified gap of 187 Mt CO$_2$e by 121.7 Mt CO$_2$e, a reduction equivalent of 65 per cent, helping the UK to meet the Fourth Carbon Budget. This 122 Mt CO$_2$e reduction is equivalent to reducing the UK's current carbon emissions by 24 per cent in[15] 2030, or taking 26m cars off the road[16]. Therefore in 2030, the emissions avoided through the use of ICT will be 12 times greater than the emissions generated by deploying it[17].

The total potential carbon abatement enabled through ICT has been mapped to HMG's Carbon Strategy below in Figure 4. The strategy focuses on six sectors and is derived directly from the CCC's carbon budgets and recommendations. SMARTer2030 uses cases have been mapped to each sector in terms of focus (see Table 2)[18]. It should be noted that the Smart Energy use case closely maps to the 'Secure, Low-Carbon Electricity' UK carbon sector and has therefore not been counted as additional carbon abatement potential. Carbon abatement through increased grid-connected renewables and grid efficiencies are already accounted for within projected UK carbon reductions. The use cases within each Carbon Strategy sector are defined in terms of their description, applicability and carbon abatement levers further below. It is important to note that ICT can enable further reductions in nearly all UK Carbon Strategy sectors, as it acts as an underlying enabler for each which helps demonstrate its potential for deep cross-sector ICT-enabled carbon reductions.
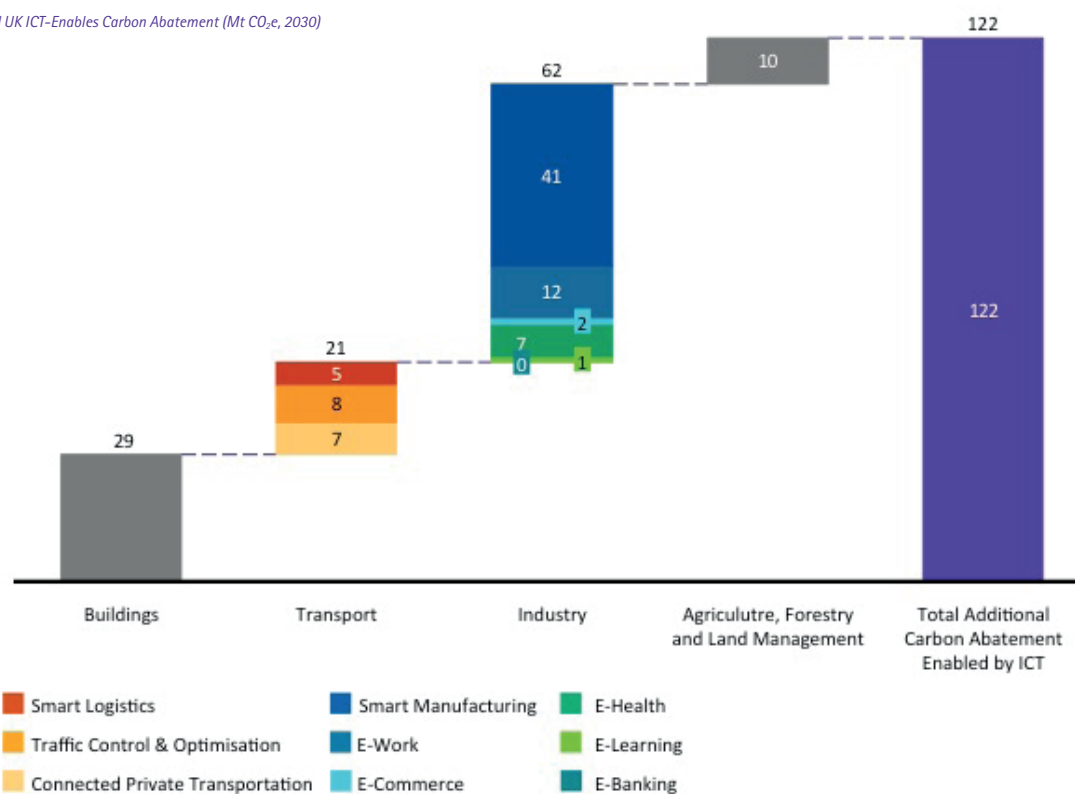
The Smart Energy use case within SMARTer2030 has not been included within total additional carbon abatement enabled through ICT for the UK due to the overlapping nature with existing measures and policies used within the CCC carbon budgets and recommendations

Table 2: UK Carbon Strategy Sectors Mapped to SMARTer2030 Use Cases

UK Carbon Strategy Sectors	SMARTer2030 Use Cases
Buildings	Smart Buildings
Transport	Smart Logistics Traffic Control & Optimisation Connected Private Transportation
Industry	Manufacturing E-Work E-Commerce E-Health E-Learning E-Banking
Secure, Low-Carbon Electricity	Smart Energy
Agriculture, Forestry, & Land Management	Smart Agriculture
Water & Resource Efficiency	N/A

This reduction is significantly higher than the ICT sector's emissions as a percentage of total emissions. The UK ICT sector is responsible for approximately 2.5 per cent of emissions, which is set to decrease over time to 2.3 per cent in 2020 and further down to 1.97 per cent in 2030[19]. This is at the same time when ICT can enable a reduction of 65 per cent of the UK's projected gap to meet the Fourth Carbon Budget. Additionally, ICT can enable £122bn in sustainable economic benefits in the UK in 2030[20]. This figure is equivalent to the total size of the UK ICT sector in 2013[21], clearly demonstrating the size of the potential benefits applicable to the UK economy.

[19]GeSI SMARTer2030

[20]Accenture Strategy analysis

[21]Department of Energy and Climate Change: http://www.businessgreen.com/bg/news/2401210/uk-green-economy-hit-gbp122bn-in-2013

Superfast Cornwall and Carbon Reductions

Superfast Cornwall was funded by the EU, BT and Cornwall Council and is supported by Broadband Delivery UK, an arm of the UK Department of Culture, Media and Sport. The project delivered fibre broadband to 95 per cent of homes and businesses in Cornwall and the Scilly Isles.

To demonstrate how broadband can help enable carbon reductions at a consumer level, the total potential carbon savings through specific use cases have been studied at a Cornwall level. Five use cases were considered in

Cornwall: telecommuting reducing travel for both business and consumers, e-commerce, and cloud services in place of servers at customer premises. Based on these use cases, total carbon savings are estimated at 581,146 tonnes over the nine year period from 2011 to 2020. This equates to an estimated annual saving per subscriber of around one tonne of CO_2 each year. In addition, superfast broadband connections have helped boost the economy by more than £186 million, created thousands of jobs and saved public money. However Cornwall is not alone. Throughout the UK, BT has been crucial to putting the UK ahead in broadband provision. According to Ofcom's December 2014 EU scorecard, the UK continues to lead the top five EU economies on virtually all the key measures across coverage, take-up, use and competition.

Among the latest developments, BT has started trials of ultrafast G.fast broadband, which is already delivering download speeds up to 330 megabits per second (Mbps). This new technology will be rolled out to 10 million UK homes and businesses by the end of 2020 and the majority of premises within a decade. This provision of ultrafast broadband will help continue to cut carbon reduction through the use cases discussed within this report.

Additional Benefits of ICT

As discussed, the benefits of ICT extend beyond carbon abatement. ICT could offer significant economic benefits to both the UK's ICT sector as well as other external stakeholders.

Overall in 2030, ICT could enable an additional £122 billion in sustainable economic benefits annually, comprising of £58.5 billion in additional ICT and stakeholder revenues and £63.5 billion in cost saving opportunities[22]. For the UK, it is estimated that £22 billion of these

revenues will be generated by the ICT sector alone. This opportunity is broken down by UK Carbon Strategy sector in Figure 5, below.

Figure 5: Total UK ICT Enabled Revenues (2030)
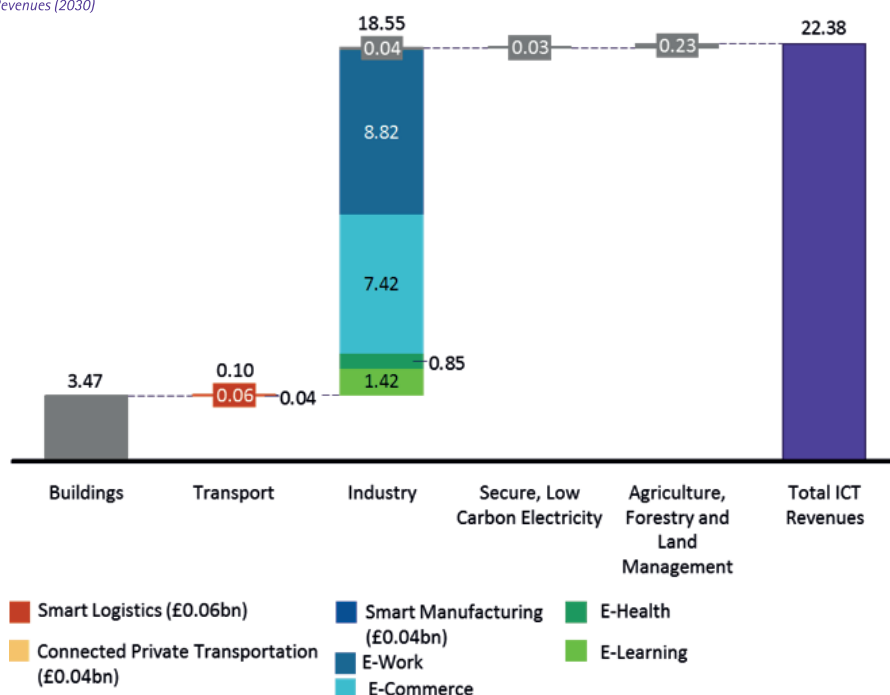
However, it is not just the ICT sector which will benefit from additional revenues and socio-economic benefits. An additional £36 billion in revenues could be realised in the pursuit of ICT-enabled, cross-industry products and services, for example, new learning centre revenues, higher crop yields and remote health services[23].

At the same time, ICT could also help to drive £63.5 billion in cost savings for external stakeholders, comprising £10.9 billion from reduced electricity expenditure, £6.6 billion from reduced fuel expenditure and another £46 billion 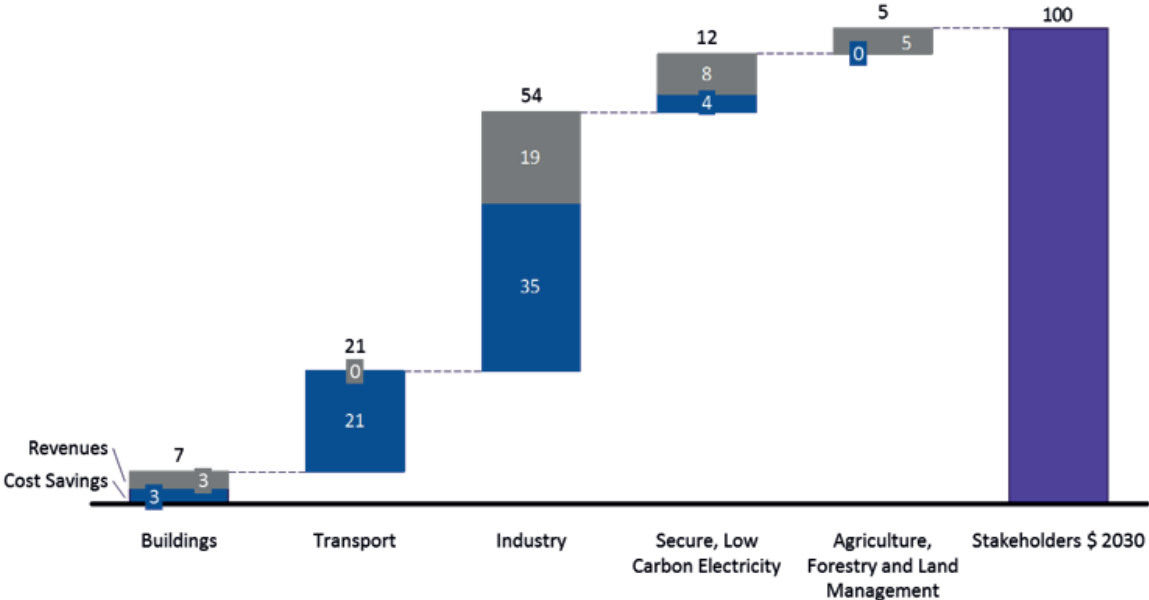from other savings including tuition, water, paper, and food waste. The breakdown of revenues generated and costs saved within the UK across these five sectors is shown below in Figure 6.

Figure 6: Breakdown of UK ICT-Enabled Revenue and Sost Savings

ICT could also enable socio-economic benefits, for example, improving incomes of UK workers through Smart Agriculture and E-Learning. In the UK alone, E-Learning opportunities can increase incomes by approximately 10 per cent, generating an additional income of £13 billion across the UK in 2030[24]. ICT can also enable significant social benefits within the UK. Four of the use cases from SMARTer2030 (E-Working, E-Commerce, Traffic Control and Optimisation and E-Banking) can together help save 4 billion hours of time. This time is saved through fewer hours spent commuting, more efficient route management and a decreased need to travel to stores thanks to online services. E-Working, defined as the ability to work from home and for work to be conducted across various locations, can be enabled through cloud based applications and services. These services are currently offered within the UK and are becoming increasingly popular. The benefits are extensive and outlined in Case Study 2 below.

[23]Accenture Strategy analysis
[24]Accenture Strategy analysis

E-Working Applications for a Management Consultancy

In line with other consulting firms, there has been an on-going pressure to reduce costs, meet client demands and optimise the performance of staff. A Management Consulting firm employing 350 staff across 12 sites in 9 countries is using cloud based collaboration tools and flexible working practices to meet these increasing demands.

The collaboration tools introduced include audio and video conferencing to help collaborate with colleagues and clients and subsequently reduce travel requirements across the firm. The use of these tools has increased effectiveness of staff by encouraging collective / multi-site brainstorming of ideas and timely team discussions. Externally, it has enabled more effective communication with clients, increasing productivity while reducing travel costs and the company's overall carbon footprint.

Flexible working practices were also introduced to support less rigid working hours / patterns, home working, employment of part time workers and flexible arrangements for those returning from maternity leave. Initially these working practices allowed the firm to reduce staff costs and retain key personnel. Since the economic upturn, the practices have allowed the firm's consultants to go to client's offices exactly when they're needed. Home working specifically has improved work/life balance as staff consultants spend less time travelling and more on effective work. As a consequence, the firm has reduced both travel costs and its carbon footprint.

BT's Commitment

As a leading provider of communications services and infrastructure in the UK, BT is well-positioned to galvanise the role of ICT in the country's decarbonisation roadmap. To demonstrate its commitments towards decarbonisation, BT launched a vision to help society live within the constraints of our planet's resources through its products and people. This vision sits alongside a 2020 ambition for BT to help their customers reduce carbon emissions by at least three times the end-to-end carbon impact of BT's business, referred to as BT's 3:1 ambition. This vision helps demonstrates BT's leadership position within the UK ICT sector, whilst BT's 2020 3:1 ambition underlines the longevity of BT's intended commitment to the UK's decarbonisation pathway.

BT's network is central to the UK's communications network. As of May 2015, BT was halfway to achieving its 2020 ambition, having reached a 1.5:1 ratio. Accordingly, BT has the opportunity to play a leading role on behalf of the ICT sector to help the UK move towards its 2030 carbon targets. An estimated 104.5 Mt CO_2e of UK ICT-enabled carbon abatement opportunity will be underpinned by BT's network, either through its core copper network, or superfast broadband (for households and SMEs)[25]. This equates to approximately 67 per cent of the 'carbon on the table'.

The total potential carbon abatement that could be enabled by BT is shown below in Figure 7, mapped to the UK's Carbon Strategy and associated SMARTer2030 use cases. Details into how these figures were calculated can be found in the Methodology and Assumptions section.
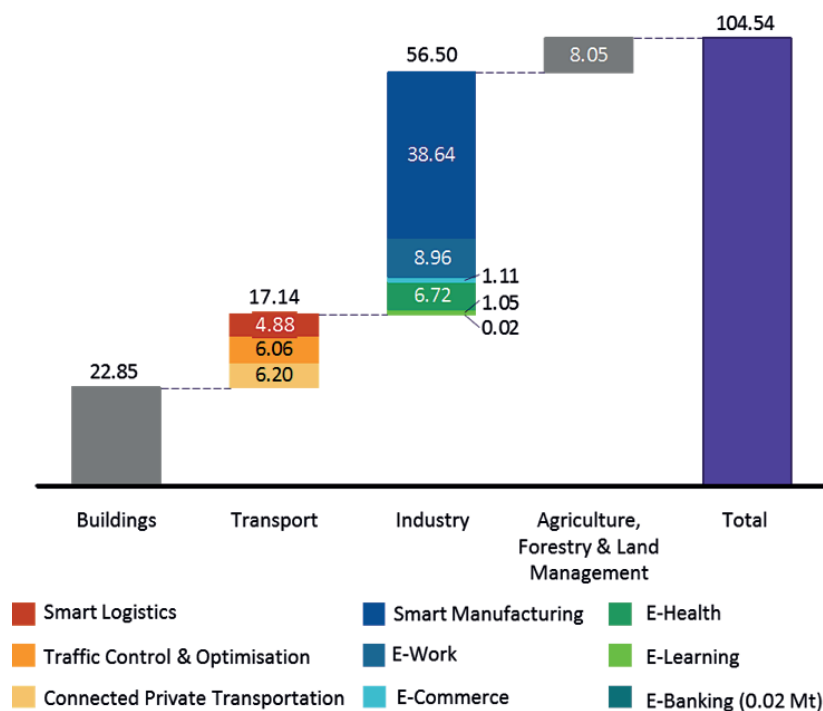
However, there is no need to wait until 2030 to see the potential of ICT in reducing carbon emissions – BT's network is already enabling ICT to reduce emissions throughout the UK. For example, working with the Open University and Milton Keynes Council, BT has delivered a Smart Parking pilot project. The pilot provides real time information on parking availability via roadside displays and smartphone apps. Smart Parking can help to reduce traffic congestion by 50 per cent because less driving time is required to look for a parking space and subsequent reduction in fuel use and vehicle emissions. More detail on the pilot programme can be found in Case Study 3.

Milton Keynes' Smart Parking
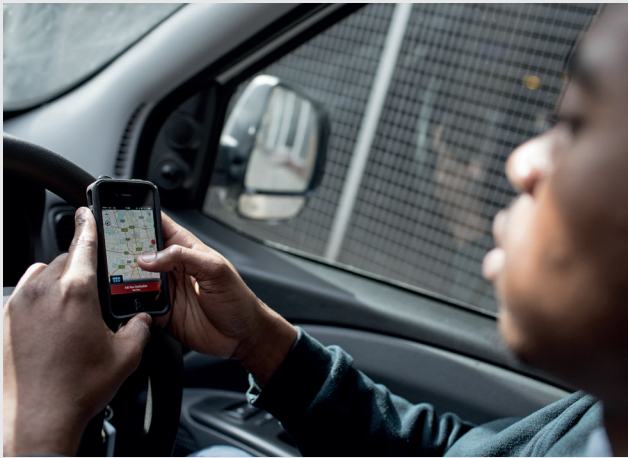
Together with partners BT and the Open University, Milton Keynes Council decided to accelerate its development into a smart city by initiating a pilot project aimed at citywide parking space optimization. Hosted by BT, the established

Milton Keynes Data Hub collects and analyses parking sensor data sent to receivers on lampposts via innovative wireless technologies. As one of the fastest growing cities in the UK, Milton Keynes is now able to expand within local infrastructure constraints by identifying free parking spaces and sending information to roadside displays and smartphone apps to guide vehicles towards them.

In addition to real-time information on parking availability, the sensors also provide data on average parking duration, allowing the city to adjust parking restrictions and better meet customer needs. At any point in time there are about 7,000 free parking spaces available, but without smart parking guiding people to them, at least 12,000 more spaces will be needed by 2020. Fully deploying this ICT-enabled smart parking solution could provide capital savings of least £105m to this city alone. In addition to economic benefits, the solution also contributes to 50 per cent less traffic congestion and reduced fuel use and vehicle emissions.

Beyond carbon abatement, BT's network is also delivering economic and societal benefits for the UK. For example, Surrey Police are using BT's cloud services to provide around the clock proactive service monitoring, which has cut operational costs while maintaining core protective services (see Case Study 4). Humber NHS has been able to cut costs, save time and improve patient care using mobile solutions (see Case Study 5). These case studies give a glimpse into the societal benefits already being enabled by BT's infrastructure.

Enhancing safety and efficiency while saving money

Surrey Police has delivered substantial savings in the running of their ICT services. However, due to diminishing returns Surrey Police was challenged to deliver more efficiency savings whilst the demands for new technology continued to drive end-user demand ever higher. The ICT challenge was to deliver current hosting services more cheaply without compromising security. A 'platform as a service' developed by BT allowed Surrey Police to create a new, secure and virtual platform in BT's cloud. This highly secure cloud-based solution encompasses around the clock proactive service monitoring and protective monitoring, which allowed the police force to enhance their operational efficiency while generating cost savings.

Humber NHS Foundation goes mobile

A mobile solution for Humber NHS Foundation Trust, contracted from BT, transforms patient care and the working lives of clinicians, while at the same time saving the Trust money. The mobile solution uses an innovative software from Belfast company, TotalMobile, to give healthcare professionals on the move access to real-time information where and when they need it.

The mobile healthcare technology enables staff at the Trust to provide a range of mental health, community, learning disability and addiction services. Via the mobile solution, the staff are able to access patient records, view schedules and appointments and update notes while on their rounds, using a mobile device of their choice, such as a tablet or smartphone. The new mobile solution ensures that clinicians have the most up to date information at their fingertips whether in the office, on the go or at a patient's home. It streamlines the Trust's existing processes, reducing the need to return to base, saving time, paper and money and allowing more time to be spent on patient care.

The way forward...

It is clear that there is a significant opportunity for the UK ICT sector to help move the UK closer to achieving its carbon targets. ICT can help to cut the projected gap in 2030 by over 65 per cent which would put the UK in a strong position to achieve its long-term targets. Furthermore, the ICT sector can generate sustainable benefits beyond carbon reductions. The sector could enable an additional £122 billion in sustainable economic benefits in 2030, comprised of £58.5 billion in additional ICT and stakeholder revenues and £63.5 billion in cost saving opportunities.

The benefits of ICT are significant. However, whether all these benefits will be realised depends on the collective action of key stakeholder groups. Government, business leaders and consumers hold the collective key to unlocking the potential of ICT to deliver these benefits. This section briefly touches on what each of these groups can do to move forward to deliver results.

...for Government

Policy makers and influencers can play a large role in helping support the ICT sector to reach its potential to enable further carbon reductions in the UK.

Policy makers can recognise the increasingly large role the ICT sector can play in helping to reduce national carbon emissions. This recognition and inclusion in policies and plans will help enable the decarbonisation potential of ICT. Specifically, this recognition could be generated within the Fifth Carbon Budget and associated recommendations to Parliament.

During this year's Conference of Parties (COP21), the global community set out and committed to a strong global climate deal which limits temperature rises to 2°C, and aims for 1.5°C. By agreeing these international targets, Governments have set the framework for large scale transformation. ICT has the potential to be a critical part of these frameworks which can help enable greater global carbon reductions.

Finally, the Government can continue to raise awareness of ICT-enabled carbon reduction initiatives and their potential benefits from both a national and personal perspective. DECC is already engaging the public through tweetathons, such as #BackClimateAction[26]. These events are an example of how ICT can be used to help raise awareness.

...for Business Leaders

It is key that business leaders embrace the transition to a low carbon economy. National and international policies and targets will affect core business models and changing climate scenarios will continue to increase potential operational risks. Therefore, it is critical that business leaders understand this changing environment, while understanding the role of ICT in this transition. By developing quantified business cases, such as this report, to engage decision makers and secure investment, business risk can be minimised while opportunities to generate new revenues and cost savings can be leveraged.

By working with other business leaders in the ICT sector, through organisations like GeSI, BT has been able to explore how ICT-enabled solutions can open up new revenue and growth opportunities. By looking further afield and to other sectors, BT is engaging with other business leaders and stakeholders to enable these benefits to be realised.

BT has made all methodologies in its 3:1 ambition and other carbon reduction measures publically available. This has helped ensure that information can be shared across multiple sectors and business leaders can follow this lead.

...for Consumers

Consumer choice will be a main driver of ICT adoption and will also help to drive further investment in services and infrastructure within the UK. To drive the economic, social and environmental benefits and opportunities offered by ICT, consumers have to take an active role.

Consumers can use their individual and collective buying power to encourage companies to innovate and come up with new solutions to tackle climate change. By using their respective buying power, adoption levels will grow and ICT's benefits will increasingly be realised. By reaping the benefits outlined in this report, the empowered consumer can promote the brands, platforms and services which provide the best benefits and/or value and push towards the development of an increasingly competitive, innovative and digital economy.

By thinking digital, consumers can embrace ICT in their daily lives, for example in the innovative approaches to education, healthcare, transport and work that have been laid out within this report. As consumers increasingly realise the benefits of digital, including cheaper, faster, better and more personalised services, they will be able to drive and encourage greater adoption and integrate these services into their lives. Consumers that adopt innovative ICT services early can start accelerating this transition by co-creating products and services themselves, continuing to push business leaders to innovate and transform their thinking.

[26]https://www.gov.uk/government/news/backclimateaction-tweetathon

Post Script

This report and analysis was written based on the Fourth Carbon Budget figures and recommendations, before the Fifth Carbon was released on 26 November 2015.

This report acknowledges the updates in the Fifth Carbon Budget and BT is excited about the inclusion of behaviour change in the UK Carbon Strategy and reduction measures. Behaviour change can be enabled by ICT, which could help the UK reduce carbon emissions using the measures described within this report. Further analysis into how ICT is integrated into the Fifth Carbon Budget will change some of the nature of this analysis.

However, the level of carbon reductions possible in the UK and the great potential for socio-economic benefits through ICT will remain the same.

Finally, given the dependencies between the Fifth Carbon Budget and Government policies and funding, this report and the potential of ICT to help enable further carbon reductions in nearly all of the UK's Carbon Strategy sectors remains critical. ICT can help enable further reductions in nearly all sectors and these additional reductions will be critical as funding remains volatile.

Methodology and Assumptions

All data used within the report was sourced from either publically available data on BT's physical infrastructure or directly from the GeSI SMARTer2030 report, produced in association with Accenture Strategy. The main methodologies for each section are outlined below.

Global extrapolated figures from the SMARTer2030 report were used for the ICT enabled global carbon abatement enabled figures, as well as revenues and cost savings. For UK specific data, this was taken directly from the SMARTer2030 model, as the UK was an individual country which was analysed in greater detail in the report.

All SMARTer2030 use cases, with the exception of Smart Energy, were applied to the UK context as additional carbon abatement potential. To determine which use cases would enable additional carbon abatement, additive to the policies and measures outlined by the CCC in the Carbon Strategy and Carbon Budgets, a gap analysis was completed. This analysis cross-referenced the abatement measures already in place in the UK and the SMARTer2030 use cases to determine which could be applied to increase carbon abatement.

Total UK carbon abatement for each use case was determined using the figures from the SMATer2030 report. This total carbon abatement was split between Business to Consumer (B2C) enabled abatement and Business to Business (B2B) enabled abatement to help to determine the split for total BT-enabled abatement. Each of the proportions for B2C and B2B are listed below in Table 3. These were generated by looking at the impact area and impact lever within each use case and specifying B2B or B2C relationship.

To determine BT market share of carbon abatement figures, market share was split between BT B2B and B2C market shares due to the different types of physical infrastructure required to serve each end user group and in response with how BT is structured as a company. The generation of total market share for B2B and B2C levers is outlined below in Figure 9. Based on market share of each, these per centages (B2B = 95 per cent, B2C = 69 per cent) were applied to the respective B2C / B2B carbon abatement potentials listed above in Table 3 (see Figure 10).

All detailed carbon abatement figures, adoption rates and UK specific data points have been taken directly from the SMARTer2030 report and the associated models. Refer directly to this report and its assumptions / methodology for any clarifications required.

Finally, throughout the report, figures in USD were translated into GBP using the exchange rate from 16 November 2015 of 1 USD = 0.66 GBP. These figures were extracted from the SMARTer2030 report and put into a UK context for this paper.

Table 3: B2B/B2C Carbon abatement proportions

Use Case	B2B Carbon Abatement	B2C Carbon Abatement	Justification
Smart Manufacturing	100%	0%	Carbon reduction enabled through process automation and engine optimisation. All emissions have been associated with B2B emissions as they are associated with improved technology and automation enabled by ICT
Smart Agriculture	33%	67%	Carbon abatement split between B2C and B2B emissions. B2B reductions attributed to reduction in food waste and fall in energy use required through smart agriculture (through increased efficiencies). Resource efficiencies enabled through improved access and provision of information to the farmer have been attributed to B2C reductions
Smart Building	42%	58%	Carbon abatement attributed to reduction in emissions from households and commercial buildings. All commercial building reductions have been attributed to B2B, and household reductions to B2C emissions
Smart Energy	100%	0%	Total carbon abatement associated with increase in renewable energy share, decrease in energy production and decrease in energy loss (through grid efficiencies). All carbon abatement attributed to ICT technical capabilities, such as smart metering or increased renewable infrastructure, and are therefore associated with B2B carbon abatement
Smart Logistics	100%	0%	Emissions reductions associated with reduction in freight usage through ICT enabled capacities such as vehicle maximisation and logistics sharing. Emission reductions entirely attributed to B2B emissions
Traffic Control and Optimisation	20%	80%	Emission reductions driven by efficient routes, efficient cars and increased use of public transport. Efficient routes and public transport associated with B2C emissions reductions due to increased information provision, and efficient cars associated with B2B emissions reduction
Connected Private Transportation	62%	38%	Emission reductions associated with route sharing, car sharing and fall in car production required. Emission reductions from route sharing and car sharing are attributed to B2C emissions through increased information access / provision, but reduction in cars produced are attributed to B2B emissions
E-Work	34%	66%	Emission reductions are associated with fall in commuting, as well as a reduction in business trips by car and airplane. Emission reductions associated with commuting associated to B2C emissions, and reductions in business trips by car and plane attributed to B2B emissions
E-Commerce	0%	100%	Emission reductions due to reduction in consumer travel to shops through online shopping. All of these emission reductions are attributed to consumer enabled reduction through B2C infrastructure
E-Health	99%	1%	Total carbon abatement of e-health use case generated from fall in transport used (by patients) and decreased requirement for infrastructure. Fall in transport associated with B2C choice to not attend hospital / doctors, and receive treatment / advice by other means and reduction in infrastructure associated with B2B emission reductions
E-Learning	43%	57%	Total carbon abatement attributed to reduction in transport required for education (higher and secondary) and company training. B2C abatement associated with reduction in student travel (secondary and higher education) whereas B2B emissions attributed to reduction in company training travel requirements (road and air)
E-Banking	50%	50%	Reductions are split between a reduction in number of consumer trips to the bank required due to improved ICT infrastructure, and also the associated reduction in employees at the bank required. Reduction in bank trip emissions are attributed to B2C through provision of new services, and reduction in employees associated with B2B emission reductions

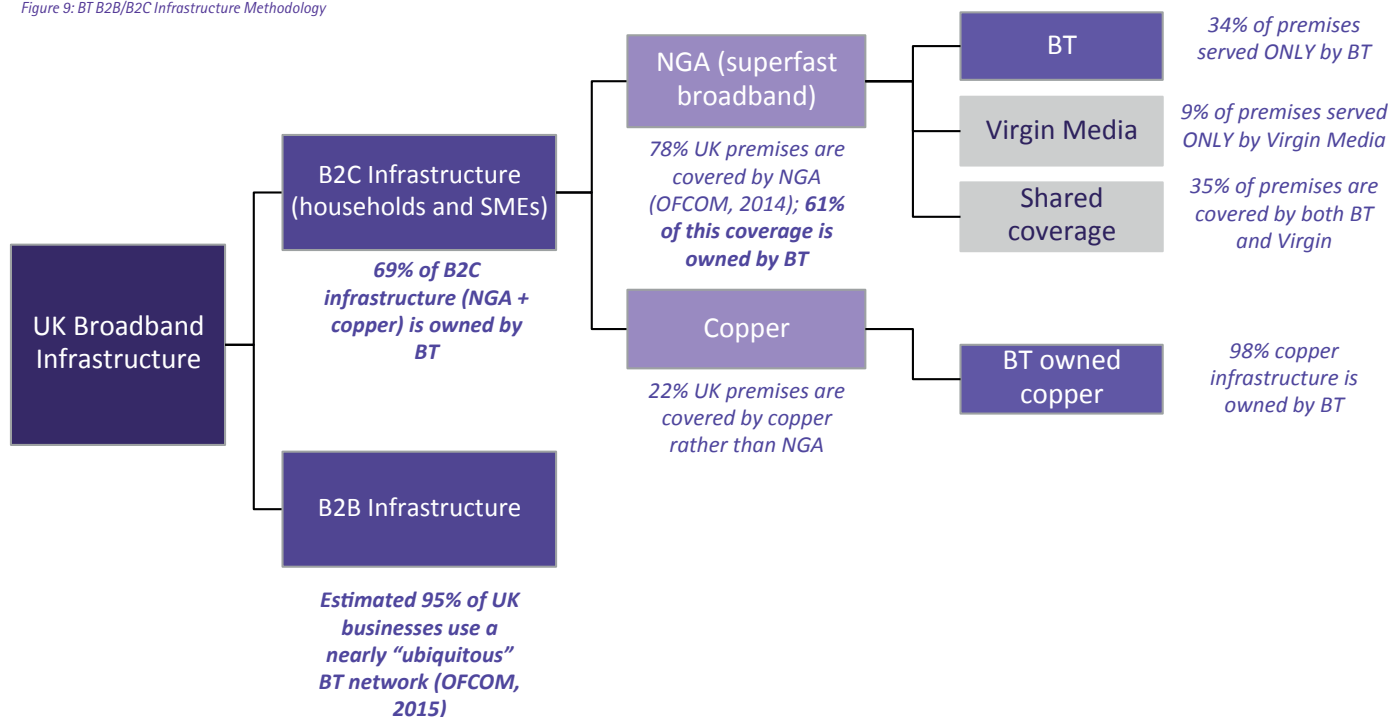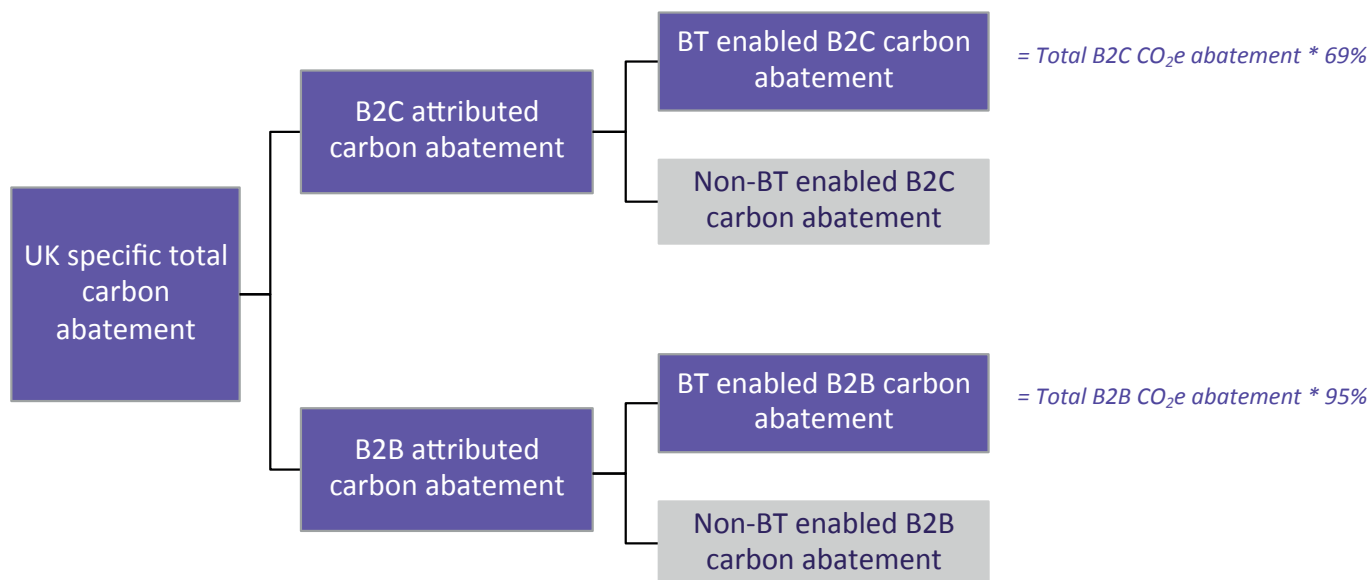*Figure 9: BT B2B/B2C Infrastructure Methodology*

UK Broadband Infrastructure

B2C Infrastructure (households and SMEs)

69% of B2C infrastructure (NGA + copper) is owned by BT

NGA (superfast broadband)

78% UK premises are covered by NGA (OFCOM, 2014); 61% of this coverage is owned by BT

Copper

22% UK premises are covered by copper rather than NGA

BT

34% of premises served ONLY by BT

Virgin Media

9% of premises served ONLY by Virgin Media

Shared coverage

35% of premises are covered by both BT and Virgin

BT owned copper

98% copper infrastructure is owned by BT

B2B Infrastructure

Estimated 95% of UK businesses use a nearly "ubiquitous" BT network (OFCOM, 2015)

Figure 10: BT-Enabled Carbon Abatement Methodology

UK specific total carbon abatement

B2C attributed carbon abatement

BT enabled B2C carbon abatement

*= Total B2C CO_2e abatement * 69%*

Non-BT enabled B2C carbon abatement

B2B attributed carbon abatement

BT enabled B2B carbon abatement

*= Total B2B CO_2e abatement * 95%*

Non-BT enabled B2B carbon abatement

Disclaimer

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