Your response

Question	Your response
Question 1: Do you have comments on the overall approach to the review?	EUTC agrees that Ofcom's approach is a good way of addressing the challenges faced by spectrum regulators over the next decade.
Question 2: Have we captured the major trends that are likely to impact spectrum management over the next ten years?	We believe that Ofcom has captured most of the major trends, although may have underestimated the structural changes that are likely to accompany 5G. Apart from the GSM-R system for railways, 1G, 2G and 3G spearheaded a move away from self-provided radio communications networks towards mobile operator provided services. This was largely because the scale and costs of these networks precluded small scale networks. The main reason for this situation was that these networks required centralised control infrastructure which was extremely expensive and only available from a few vendors. The entry into the market of 4G/LTE products more amenable to medium size networks has seen the rekindling of interest in private networks. This has been especially prominent in markets such as the USA where access to spectrum for private LTE networks has been facilitated. The emergence of 'verticals' in 5G signals the resurgence of both the interest and ability of users other than MNOs to own and operate their own radio telecoms networks. The key for regulators to encourage this new growth is access to spectrum. Ofcom's strategy recognises this principle for small scale and single site networks, but overlooks the need to also make spectrum available at lower frequencies for wide area networks. If one looks at the utility sector in the USA, there are opportunities to obtain spectrum for high data-rate, large wide-area networks in the 600 MHz, 700 MHz, 800 MHz, 900 MHz and 2300 MHz bands. There is no equivalent spectrum for private uses for high power, wide-area, broadband data networks in the UK. Suitable spectrum is only made available to MNOs. In several countries in Europe, notably Ireland, Germany, Denmark, Poland and Austria,

	spectrum is being made available for utilities in the 400 MHz region. EUTC urges Ofcom to examine similar options in the UK to open up opportunities for utilities to operate their own critical operational networks. In parallel, Ofcom needs to use their regulatory powers to ensure that all private networks have the rights to interwork with public MNOs. One of the major concepts of 5G – heterogeneous networking will not be possible unless private networks can interconnect to public network and devices roam seamlessly from one type of network to another. This facilitates the concept where utilities and others build specialised networks for their own critical use (eg underground facilities, factories or large sites such as ports and airports), but use the capacity or wide-area features of public MNOs to avoid wasteful duplication of coverage. The business models going forward into a 5G will not be the simple public or private networks of the past, but a diverse array of shared networks, public-private partnerships and virtual systems growing out of the MVNOs (Mobile Virtual Network Operators) and 5G network slicing models. In most European countries, there is effectively an oligopoly for the provision of wide-area broadband data services supported and promoted by regulators, restricting the option for private users to own and operate independent wide-area radio networks, even where spectrum could be made available. Associated with this issue, an area neglected in Ofcom's identification in future trends is that all attention is focused on spectrum above 500 MHz. Major new wide area data technologies are emerging using spectrum below 500 MHz. In addition to traditional bandwidths of 12.5 kHz or 6.25 kHz, new technologies are exploring bandwidths of 25 kHz, 50 kHz and 100 kHz. The electricity sector has used funding provided by the energy regulator Ofgem to launch a number of innovation projects focused on wideband data applications in VHF and UHF spectrum.

	These projects are part of the digitalisation of the energy sector, the use of Smart Grid technology to deliver the Government's zero carbon agenda and plans to mitigate the effects of climate change. Recognition of these initiatives and provision of suitable spectrum to facilitate this innovation should form part of Ofcom's vision for the next 10 years.
Question 3: Could any of the future technologies we have identified in Annex 6, or any others, have disruptive implications for how spectrum is managed in the future? When might those implications emerge?	EUTC does not believe it has any particular specialist knowledge of the technologies identified in Annex 6. The disruptive elements EUTC believes Ofcom needs to take account of are: • That the world of the 2020s and 2030s is completely dependent on secure and reliable electricity networks for every aspect of life, leisure, business and commerce; and that access to spectrum is vital to enable the electricity industry to develop operational telecoms solutions to deliver this requirement. • That reduction of CO2 and climate change mitigation will overwhelm all other considerations. In this context, the electricity industry finds itself centre-stage.
Question 4: Do you agree that there is likely to be greater demand for local access to spectrum in the future? Do you agree with our proposal to consider further options for localised spectrum access when authorising new access to spectrum?	EUTC agrees that there is likely to be greater demand for local access to spectrum in the future, but Ofcom should not overlook the need for access to wide-area spectrum also. A number of other European countries are recognising this need as indicated in earlier responses, as are the USA and a number of countries in Latin America.
Question 5: Do you agree with the actual and perceived barriers identified for innovation in new wireless technologies, and our proposed ways of tackling those?	The UK has historically been a great innovator in wireless communications, and Ofcom's commitment to and encouragement of new technology is commended. The challenge is that markets are becoming ever more global, and spectrum harmonisation between the UK and other countries is more essential than ever. Ofcom's international role and representation has always been an asset to UK business, and it is hoped that this will continue -or even become enhanced - post-Brexit.

	However, the UK must recognise that problems such as interference due to the mis-alignment of spectrum in the 450-470 MHz band with the European Band Plan will only become worse in the future as spectrum is used more intensively. UHF band re-alignment will have to be addressed at some point, otherwise the deployment of high power, wide area LTE systems in these bands in continental Europe will swamp GB systems making the band almost unusable. The way in which to achieve this re-alignment in a cost-effective manner has eluded the UK administration for many years. However, it is noted that the emergency services have largely vacated this band, and with neighbouring administrations in Ireland and Denmark identifying 410-430 MHz for critical utility operations, they may be opportunities for the UK to incentivise re-alignment of 450-470 MHz spectrum in collaboration with utility users. Finally, EUTC must remind the UK Regulator that any changes to this band in the UK will have major repercussions on the Republic of Ireland. Any changes must be co-ordinated and accomplished in collaboration with the Irish Government.
Question 6: Do you agree with Ofcom's proposals to improve our outreach and reporting activities, and spectrum information tools? • **Are there additional ways that Ofcom could better engage with existing and future users and providers of wireless communications?** • **Please explain any specific areas where you believe more or better provision of information could provide value to stakeholders**	EUTC believes that Ofcom is already a leading regulator in terms of publishing data and engaging with industry and users.
Question 7: Do you agree that it is important to make more spectrum available for innovation before its long-term use is certain? Do you have any comments about our proposed approach to doing this?	EUTC agrees with Ofcom's analysis. In terms of utilities, we would refer to our comments above about innovation in VHF and UHF spectrum below 500 MHz and recommend that Ofcom explores the opening up of this spectrum for use by wide-area, wide bandwidth systems.

Question 8: Do you agree that it is important to encourage spectrum users to be 'good neighbours' to ensure more efficient use of the spectrum? Do you agree with our proposals to: **a) increase realism in coexistence analysis at a national and international level?** **b) encourage spectrum users to be more resilient to interference?** **c) ensure an efficient balance between the level of interference protection given to one service and the flexibility for others to transmit?** **Do you have any comments on which of these will be the most important?**	EUTC agrees in principle with Ofcom's objectives. However, as utilities we must draw attention to long life and reliability required of assets in the utilities sector. Utility assets may have a design life of up to 100 years, with telecoms assets routinely expected to last at least 10 years. In this context, the cost of the telecoms assets is not the dominant cost, but the difficulty of replacement of telecoms modules in systems which must operate 24/7/365. In addition, there are physical constraints on access to telecoms systems due to safety obligations when working in close proximity to high voltage systems or in flammable atmospheres. In terms of co-existence at international level, the previous comments on the misalignment of the 450-470 MHz spectrum with the European Band Plan and difficulties this causes for UK users, and the implications of change for the Irish Republic are relevant.
Question 9: Are there any other issues or potential future challenges that should be considered as part of this strategy?	EUTC is not convinced that regulators and policy makers have fully grasped the realities of the extension of the reach of telecoms into the machine-to-machine world. Enhanced mobile broadband (eMBB), fixed wireless access (fwa) and similar aspects of 5G are people centric – delivering and receiving data from people. In the M2M world, currently a few control engineers in a centralised control room receive data from a few thousand inputs and operate a few hundred controls in response to the inputs. In the digitalised grid of the future, the same few engineers will oversee hundreds of thousands or millions of inputs and controls, but automation systems will actually operate the network in real time – millisecond by millisecond. This will only be possible through ultra-reliable low latency communications (URLLC), but the reliability, ubiquity and response required of these systems to avoid catastrophic failures has not yet been fully grasped by regulators in EUTC's opinion. The security implications of operating these networks and their vulnerability to attack from actors ranging from lone mavericks, organised crime to nation states must also not be underestimated. Utilities will require

	collaboration with and assistance from all the various government agencies concerned to counter these threats.
Question 10: Do you agree that continued use of our existing spectrum management tools (as set out in sections 4-7) will be relevant and important for promoting our objectives in the future, in light of future trends?	EUTC has no views on Ofcom's spectrum management tools.
Question 11: Is there anything else we should be considering doing, or doing differently, to promote our objectives?	EUTC welcome's Ofcom's willingness to explain and expose its thinking to the wider community, both nationally and internationally.