Department
for Culture
Media & Sport

Digital Radio Switchover

Preliminary Analysis of the Impact of a Switchover

December 2013

Contents

Summary

- This paper provides preliminary estimates (monetised where possible) of the main impacts of a digital radio switchover in the UK. It takes into account impacts on consumers and industry as well as a range of wider effects.
- The main benefits to consumers are welfare increases from radio services that provide better listening quality and greater choice. Willingness to pay (WTP) varies between individuals, but the study estimates different groups of the population with average WTP in the range of £35 to £75 over the lifetime of a digital radio.
- Some consumers face a cost from a switch-off of the analogue signal, when they would adopt digital radio against their current preferences. This is particularly the case for those listening in vehicles, where there is currently a low level of digital radio uptake. The rate of turnover of vehicle stock and the proportion of new vehicles with DAB radios fitted at manufacture are key to consumer costs.
- The radio industry (retailers, manufacturers, and broadcasters) will benefit from rollout and switchover, due to higher consumption of digital radio hardware and services. Ceasing dual transmission would result in savings for broadcasters, including through the reduced energy costs of running digital transmitters.
- There are a number of smaller, or currently indeterminate, impacts that occur under a decision to switchover: release of spectrum (benefit); the energy consumption of radio sets (small cost/benefit), marketing awareness (small cost), and radio disposal (negligible cost). The effect of these impacts on the overall assessment is currently judged to be minimal.
- Rollout creates net benefits for consumers of around £100m, but further market growth would be needed before the overall benefits of switchover outweigh the costs. By 2020 switchover is likely to have an overall positive impact, but the maximum economic benefit of over £450m is not likely to be realised until 2025.
- All forecasts have an element of uncertainty. Higher market uptake, greater WTP, or faster price reductions will strengthen the case for an earlier switchover.
- The analysis allows us to draw several conclusions that help to inform digital radio policy:
    - That rollout of further digital radio coverage has a clear positive effect on consumers;
    - That the impact of switchover is more complex and comes with costs to some consumers;
    - The consumer costs of switchover diminish over time as market-led digital radio uptake occurs naturally;

- The economic case is currently unclear on the best point in time to switchover, but the analysis suggests that the economic case for a switchover grows stronger over time; and
- Further information on key assumptions would provide greater assurance around the economic case for a switchover, as could evidence emerging over time.

1 Introduction

The joint Government and industry Digital Radio Action Plan[1], first published in July 2010, sets out the process for providing ministers with the information and assurances necessary to make a decision on whether to proceed with a radio switchover. The Action Plan required an assessment of the impacts of a digital radio switchover to be considered prior to any decision on a digital radio switchover.

When launching the Action Plan, the Government committed itself to a consumer-led approach to radio switchover, with two criteria to be met before a switchover date could be determined: 50% of all radio listening to be digital; and national DAB coverage comparable to FM and local DAB reaching 90% of the population and all major roads.

As these criteria have not yet been met, a final decision on a switchover date is not being immediately addressed by the Government, and so a full cost-benefit analysis is not being presented at this stage. However, this paper sets out the preliminary analysis of the likely impacts of a digital radio switchover.

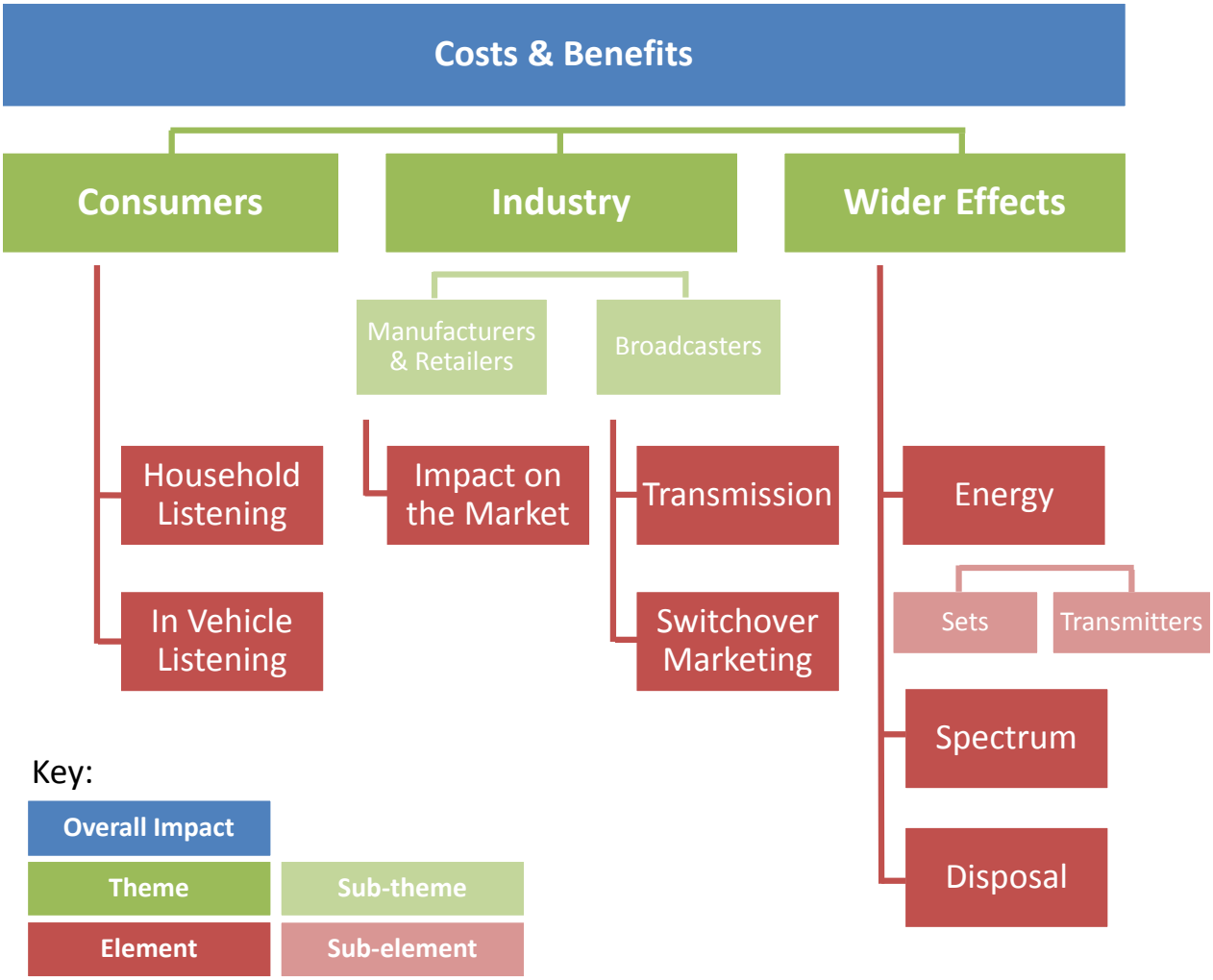
In July 2012 a methodology report[2] was published, detailing an interim methodology proposed by DCMS and seeking views from interested parties. Following the views and evidence submitted, additional research has been undertaken in order to refine and improve that methodology.

This paper builds on the framework of the methodology paper, considering the costs and benefits for consumers, industry and wider impacts. Consumers are analysed through their two main modes of listening, which together account for approximately 85% of listening: at home (65%) and in vehicle (20%)[3]. In terms of industry, those manufacturing and selling sets, and broadcasting radio, are assessed. The wider impacts covered include environmental effects, such as energy and disposal costs, and the spectrum released. The impacts considered are summarised in Figure 1.

A number of switchover scenarios are considered, with switchovers from 2015 to 2030. Given the lifetime of radio transmitters, which the appraisal period should cover, the impacts are assessed up to 2050. In all scenarios, it is assumed that a switchover date would be announced two years in advance, the minimum period set out in legislation, and that the rollout of digital transmitters would be built out to match FM. These scenarios are compared with the baseline case in which digital radio would have little further investment in transmitters and continue with its current coverage, and analogue transmission would continue.

[1] https://www.gov.uk/government/publications/digital-radio-action-plan
[2] DCMS – Cost-Benefit Analysis of Radio Switchover: Methodology Report (2012)
[3] Rajar – 2007Q2 to 2013Q1

Figure 1: Impacts assessed in the analysis



2 Consumers

Introduction

For consumers, the impacts on those listening to the radio at home (65%) and in vehicles (20%), which together make up 85% of radio listening, are assessed and presented below. There is insufficient data on the remaining 15%, classified as at work or elsewhere, to make an assessment.

2.1 Household listening

Context

Households have been steadily taking up digital radio, with the proportion of total household listening via a digital platform (by DAB radio, online or on DTV) rising from around a quarter in early 2008 to just under half by early 2013. The majority of this listening, approximately 70%, is via a DAB radio.

Estimating consumer benefits

For the consumer listening to digital radio, the benefits of digital radio need to be weighed against the costs of purchasing digital sets, and the loss of analogue services.

The benefits of digital services over analogue are now well-evidenced, with several studies, including London Economics/YouGov research[4], the Go Digital[5] trial, and Ofcom's annual assessments of the digital radio market[6], providing evidence. All these studies identify consumer preference for similar aspects of digital radio: sound quality and clarity, greater choice of stations, more functions (such as pause and rewind, and information scrolls) and greater ease of use. In assessing the case for a digital radio switchover, it is important to be able to place a monetary value on these estimates.

Approach to valuing benefits

The London Economic/YouGov research quantified consumers' willingness to pay (WTP) for digital radio, at an average of £41.82 per respondent. However, as identified in the assessment from Europe Economics[7], the content of these responses posed interpretive challenges[8].

[4] London Economics in association with YouGov – Digital radio switchover: Consumer research to inform the cost benefit analysis (2011)
[5] Ipsos Mori - Go Digital Trial: Measuring the impact of radio switchover on consumers (2013)
[6] Ofcom – The Communications Market: Digital Radio Report (2013)
[7] Europe Economics – Independent Review: Government Cost Benefit Analysis of Digital Radio Switchover (2011)
[8] With regards to whether the respondent answered with reference to: all sets or one set; the individual or the household; in home sets, in vehicle sets or both; and a one-off or annual impact.

Supplementary analysis[9] was commissioned to understand the different contexts in which respondents framed their answers to these questions. This analysis allowed DCMS to go some way to address the Europe Economics concerns on the London Economic/YouGov research, and resulted in an average WTP of £74 per household per set over the lifetime of a digital radio for all consumers. Furthermore, DCMS has segmented this result into WTP for those that already had digital radio and those that only had analogue, giving WTP values of £83 and £65 respectively.

However, from the trends in market data and uptake, the market price at which those more resistant to taking up digital radio would do so can be ascertained. This can be used as a proxy for their minimum willingness to pay, as we know that consumers will only purchase a digital radio if their WTP is at least equal to the price they pay. This is much lower than the other WTP estimates.

Using WTP to assess the impact of switchover

Consequently, this preliminary analysis is based on a conservative average WTP of £50, implying that the average consumer would be prepared to pay up to £50 for digital radio services, and that receiving those services for a lower price would result in a consumer surplus for that consumer.

Whilst the consumption of digital radio may represent a benefit to the average consumer, there are likely to be differences in individual consumption decisions that need to be considered. The purchase cost of the radio and different consumer preferences will be distributed around the average values seen in the market and through WTP studies.

Recognising that consumers will differ both in their willingness to embrace the new technology, and in the rate at which their existing analogue sets will need replacement, we simplify the distribution of preferences in three broad groups and ascribe a different willingness to pay to each, as set out in Table 1. So although the analysis has an overall average WTP of £50, the analysis reaches this estimate by considering the distribution of WTP of the different groups.

Table 1: Consumer groups modelled, with varying willingness to pay

Consumer Group	Description	Typical WTP
1. Adopters	Value digital much more than analogue. Have high WTP so will be early adopters.	~£75
2. Followers	In the middle, recognise benefits of digital, but will not pay too high a price for it.	~£50
3. Replacers	Value digital only marginally more than analogue, so will wait until prices fall before switching, getting utility out of their analogue sets in the meantime.	~£35

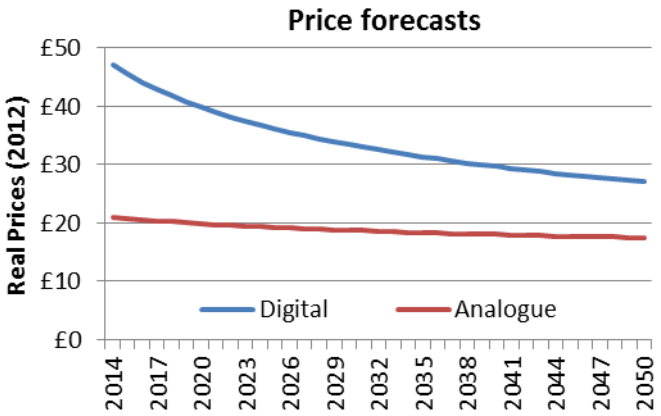
[9] London Economics – Consumer research for Cost-Benefit Analysis of Digital Radio Switch over. A supplementary report to DCMS (2012)

Costs for households

Although some consumers may choose to listen online or by DTV, it is expected that the majority of consumers that have not already converted will replace their existing analogue sets with DAB radios and incur a cost in doing so.

From GfK[10] market data from 2004 to 2011, the average cost of digital radios[11] has been projected[12]. Figure 2 shows the projected average prices for digital radios compared with analogue. The average price of a DAB radios falls steadily from approximately £50 to under £30, whilst the average price of analogue radios, would remain fairly constant at around £20.

Figure 2 Price forecasts for digital and analogue radio based



However, it should be noted that these are the average costs. There are premium products above the average price, as well as cheaper models; there are already DAB radios available for under £20.

Net benefits

The net benefits to consumers are derived from the average WTP and the average cost of digital radio purchase. However, the number of conversions also needs to be modelled. Uptake in digital radio is projected based on the current trends in listening and reach from Rajar[13] until all those within transmitter coverage have digital radio. The change in reach each year is scaled up the by 1.7 sets per household (from Ofcom analysis[14] of the average number of sets used per household) and the number of households (from DCLG projections[15]) to approximate the increase in sales.

Nature and timing of the policy decision

The nature and timing of policy decisions will also have an impact on the net benefits. For each of the three consumer groups identified, we can isolate the effects of both:

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[10] GFK – www.gfk.com
[11] To estimate the costs, only those products where the radio is the main function are included, such as portable radios, radio recorders and clock radios, rather than audio home systems that include CD players or other similar devices.
[12] We project this data forward utilising a power law line of best fit. The power law provides a very good fit with the historic digital radio price data, and also fits with the expectation that prices would initially fall sharply, before technological advances have a more marginal impact in the long run and the price decline slows.
[13] Radio Joint Audience Research - http://www.rajar.co.uk/
[14] Ofcom – The Communications Market: Digital Radio Report (2013)
[15] DCLG – https://www.gov.uk/government/publications/household-projections-2008-to-2033-in-england

- The impact of additional coverage from further rollout of digital transmitters, which provides a benefit for consumers as it increases their choice, enabling consumers within the areas of new coverage to take up digital radio if they choose to. This is most likely to benefit the adopters and followers within the coverage areas.
- The impact of the switch-off of analogue signals, which will have either a negative impact on consumers who divert expenditure onto purchasing a new digital set or will lose the benefits of analogue radio, or a negligible impact on those who have already done so. This is most likely to impact the replacers and some followers as those adopters and followers that have already converted will be unaffected.

Each of these effects is affected by timing:

- Accelerating rollout brings benefits to more consumers sooner, increasing the immediate benefit to the adopters and followers and benefiting replacers in the long run.
- Delaying switchover reduces the number of consumers on whom a cost is imposed, mainly replacers, although initially followers would be affected too.

It follows, therefore, that there will be a date of switchover after which the benefits of rollout will outweigh the costs of switch-off. However, adopters and followers are more likely to benefit, whilst, at least some, replacers will face a cost.

Evidence gaps

There is inherent uncertainty in trying to estimate consumers' WTP. The segmented market WTP approach used gives a good understanding of the preferences of those who have, or shortly will, convert. There is however greater uncertainty around those more resistant to switchover. Consumer preferences will also be revealed, to some degree, over time.

2.2 In vehicle listening

Context

Whilst there has been a steady progression of digital radios into households, the progress in vehicles has been much slower with less than 10% of the vehicle stock currently digital. This is reflected in the listening figures.

Vehicles becoming digital

There are two aspects to radio listening in vehicles becomes digital. Firstly there is the proportion of new vehicles that have digital radios fitted at manufacture and how these feed into the overall vehicle stock. Secondly there are the vehicles that are not sold with digital radios fitted, but are converted afterwards.

The proportion of new vehicles with digital radios incorporated is growing, but natural rates of vehicle turnover mean it will take some time for these to replace the large stock of older vehicles with analogue radios. There are currently very few conversions of vehicles with analogue radios to digital.

Three groups are considered; those who:

- Have a vehicle with a digital radio originally fitted when new;
- 'Willingly' convert their vehicle from analogue to digital; and
- Are 'forced' to convert at the point of switchover, or lose radio from their vehicles.

Vehicle stock

DfT statistics[16] provide figures on the vintage profile of the current vehicle stock (cars and goods vehicles – lorries and vans). DfT have also provided us with total stock, sales and scrappage projections consistent with vehicle travel demand forecasts from their National Transport Model. From these we can project the vintage of the vehicle stock each year.

Using data from CAP/SMMT[17] on the proportion of vehicles with DAB fitted and assumptions on how this will change in the future we can project the proportion of the vehicle stock that was originally installed with DAB each year. This is assumed to grow in switchover scenarios, whilst remaining constant in the baseline.

Combining this with the vintage modelling and the number of conversions (both willing, and, in the scenario, forced) gives a projection of the vehicle stock in each year that is digital.

Cost and Benefits

In terms of measuring the costs and benefits, there is limited data for vehicles. GfK[18] measure the price and quantity of conversions, which we project forward. The additional cost from fitting DAB radios, rather than analogue radios, in vehicles at the point of manufacture is inferred from household sets.

The benefits to consumers in vehicles are also largely inferred from households. The average household WTP of £50 is adjusted for the different proportion of listening in vehicles to give an inferred average WTP of £15. This is the assumed average benefit to consumers with DAB radios fitted at manufacture and from 'forced' conversions. However, this is the average of a distribution of different consumer benefits; for instance, although there are currently few vehicle conversions, the average price paid is around £100, so some consumers have a WTP at least equal to this - which is accounted for in the benefit from willing conversions.

Evidence Gaps

There are significant evidence gaps on the costs and benefits of listening digitally in vehicles, with inferences from households providing the best evidence currently available. The evidence base would be strengthened if there was specific research into the benefits to vehicle owners and their listening habits, as well as more detailed information on the costs of installing at manufacture and how the price of conversions falls over time.

[16] DfT – Vehicle Licensing Statistics (http://www.dft.gov.uk/statistics/series/vehicle-licensing/)
[17] Ofcom – The Communications Market: Digital Radio Report (2013)
[18] GfK – www.gfk.com

3 Industry

The impact on the industry is assessed in terms of retailers and manufacturers of radio sets and radio broadcasters.

Retailers and Manufacturers

Since 2008 approximately 2 million digital radios have been sold in the UK each year, whilst the quantity of analogue radios sold has been declining over the last few years to 3.7 million in the year to quarter two 2013[19]. The UK radio sets market is worth several hundred million pounds.

There is also a significant global market for digital radios with over 20 countries with a regular digital service based on DAB, DAB+ or DMB[20] and a growing number of countries announcing intentions to migrate to digital services.

Both the manufacture of sets[21] and chips[22] are competitive, with many manufacturers. However UK firms form a significant proportion of the design and manufacturing market and are therefore well placed to gain from the potential growth in demand for digital radio.

3.1 Impact on the Market

Digital radio policy decisions will influence business opportunities. Firstly, the rollout of further transmitters will increase sales, as those within the additional coverage areas take up digital radio. Secondly, the switch-off of analogue will increase demand, bringing some demand forward and generating further demand that would not otherwise have existed. However, bringing sales forward will to some extent displace future sales. There would also be negative impacts on the analogue market which would be likely to reduce dramatically, though this is already in decline.

The retail boost anticipated from further uptake of digital radio is expected to have a net positive impact on investment and employment, particularly in the run up to switchover, which would bring an economic benefit to the UK.

The impacts on retail sales will be passed through to manufacturers and the associated supply chain. As the UK has significant strength in the manufacture of digital radios we would expect the UK to have more to gain from a boost in digital sales than it would lose from an acceleration in the decline of analogue sales.

[19] Ofcom – The Communications Market: Digital Radio Report (2013)
[20] World DMB – http://www.worlddab.org/country-information
[21] World DMB – http://www.worlddab.org/products/digital-radio-receivers
[22] World DMB – http://www.worlddab.org/products/chip-manufacturers

These impacts have not been included in the analysis because of a lack of information about retailers and manufacturers production costs, meaning that a complete assessment cannot be made.

Broadcasters

The gross value added of radio broadcasting in 2012 was approximately £600m[23] arising predominantly from BBC Radio and Commercial Radio.

3.2 Transmission

Rollout

Switchover will require the rollout of further digital transmitters. However if there was no switchover, then the analogue network will require significant investment in the medium-term to maintain current coverage. Modelling from Arqiva shows that, whilst the overall costs of analogue transmission are lower than digital, a switchover is cheaper than maintaining the current dual transmissions.

Table 2 summarises the three transmitter networks that need to be considered - BBC National, Commercial National and Local (both BBC and Commercial) - in the three tranches of rollout defined by the Memorandum of Understanding (MOU)[24] and the commitments to match FM coverage.

- Baseline – rollout that has already occurred or is currently being implemented
- Immediate rollout – the rollout of transmitters that occurs from 2014-2016 in switchover scenarios
- Switchover rollout – the final stages of rollout envisaged in the run up to a switchover.

Table 2: Transmitter network coverage at various tranches of rollout[25,26,27]

Tranche		BBC National	Commercial National	Local (BBC & Commercial)
	Equivalent Analogue (Robust signal)	94.9%	90.9%	92.6%
1.	Baseline	97.3% Phase 4	89.5%	75.4% Phase 1
2.	Immediate rollout	-	91.0% D1 expansion	90% Phase 2
3.	Switchover rollout (to match FM variable coverage)	99.1%	-	96% Phase 3

[23] ONS – Annual Business Survey – Provisional Results (2012)
[24] DCMS – Memorandum of Understanding on Local DAB Funding for Radio Switchover
[25] BBC – BBC National DAB Network Coverage & Indicative Expansion Plans (2012)
[26] Ofcom – DAB coverage planning, Report to Government (2012)
[27] Ofcom – The Communications Market: Digital Radio Report (2013)

The assumptions for rollout of local transmitters to meet 90% and then match FM coverage are based on the MOU as agreed in July 2012.

Further opportunities

Digital radio would also provide greater opportunity than analogue for broadcasters to grow, innovate and engage better with audiences and the potential to grow new revenue streams. Although we do not explicitly model this we note it as a potential opportunity from rollout.

Additionally, a second national commercial multiplex would allow commercial radio to increase the number of national stations giving consumers further choice of service However as this is a separate policy decision it is not included in the analysis.

3.3 Switchover marketing

A switchover is also likely to require a significant marketing campaign. Digital Radio UK (DRUK) has estimated the cost of this marketing at approximately £30million for a national switchover, rising to £50million for a regional switchover, with different parts of the country switching over at different times[28]. In addition to these marketing costs there will also be a cost in value in kind to broadcasters from foregone airtime for switchover marketing, which DRUK have provided estimates of as well.

[28] DRUK – Switchover Communications Plan (2013)

4 Wider Impacts

The wider impacts assessed are energy consumption (of both transmitters and sets), the benefit from releasing spectrum for other uses and the disposal costs of analogue sets.

4.1 Energy

The energy costs of sets and transmitters are considered separately. However, for both, the modelling is carried out in line with DECC guidance[29], taking the figures from their toolkit, to quantify not only the energy cost, but also the environmental impact from changes to greenhouse gas emissions and air quality.

Transmitters

Overall, digital transmitters consume less energy than analogue transmitters. This is because, digital transmitters require less power to produce a signal to cover the same area and can also carry more services. Therefore digital transmitters require much less energy per service carried, so energy makes up a smaller proportion of the cost[30].

From the Arqiva modelling of transmitter costs we have the average proportions of analogue and digital costs that energy account for, as well as the assumed cost per unit of energy, which are used convert the energy costs into energy (kWh). From the energy figures the costs are recalculated using the DECC energy cost estimates, as they have more detailed forecasts of energy prices, and the DECC greenhouse gas and air quality costs are also incorporated.

Sets

The latest Intertek research[31], commissioned by DCMS, tested the energy consumption of radios when on and on stand-by. It showed that, in many cases, DAB radios consume similar amounts of electricity to analogue radios. The main exception was hi-fis, where digital radios generally consumed more energy. This was the third phase of testing undertaken by Intertek, over several years, as summarised in the Technology and Equipment Group paper[32].

Intertek also provided a model of future radio consumption. There are European Commission regulations on stand-by energy consumption that are due to be introduced from 2015. These will drive stand-by power consumptions down. However, as digital radios still receive information, such as to update programme guides, when on stand-by, it

[29] DECC – https://www.gov.uk/government/policies/using-evidence-and-analysis-to-inform-energy-and-climate-change-policies/supporting-pages/policy-appraisal
[30] Harris Broadcast – http://www.itu.int/ITU-D/asp/CMS/Events/2013/DR-Technologies/S5_Jens_Stockman.pdf
[31] Intertek – Research Study of Energy Consumption of Digital Radios, Phase 3 (2013)
[32] DCMS – Future Energy Consumption of Digital Radio Receivers (2013)

is likely that analogue stand-by power consumptions will fall below digital[33]. Using these energy figures, and additional information from Intertek research from Defra's Market Transformation Programme (MTP)[34] on the energy consumption of listening online (via a computer) and on digital TV (DTV), and projecting them forward, we estimate the energy consumption of different means of listening to radio.

Listening via digital TV and online consumes much more energy than listening on a DAB radio, which in turn consume marginally more energy than listening on an analogue radio.

By combining this with the reach and listening modelling we can project how much of each method is used to listen to radio and build up a picture of the likely impact on energy consumption. Again, we use the DECC modelling to quantify the energy costs, greenhouse gas emission costs and air quality costs.

This modelling contains a number of assumptions with large ranges, including the proportion of sets left on standby, the amount of listening that is shared, and the energy costs.

4.2 Spectrum

Ofcom estimates that ceasing transmission of national services on analogue could free around 14 MHz of spectrum, with up to 20MHz being released in total if local radio switches too. This spectrum allows transmission over long distance but its capacity for data transmission is limited.

However, even within these limits there are real uses of this Spectrum that would be of value, such as community radio, and PMSE (Programme Making and Special Events). With rapid technological developments occurring, Ofcom is also of the view that it could be used for remote machine-to-machine communication, remote monitoring and white space devices. It is possible that these, and other new valuable uses, could realise significant value in the future.

Ideally we would measure the impact of releasing spectrum on its actual use, but as this is uncertain, the most appropriate approximation of the value of the released spectrum is its value to existing users. Some indication of this is provided by the prices paid for radio licences. This suggests a range from £2.0 million to £3.8 million per year, depending on the amount of spectrum released, and the range of radio fees over the last few years.

4.3 Disposal

Although analogue sets will still receive some local and community radio stations post switchover, most DAB sets will be able to receive these too. This will therefore make a large proportion of analogue sets redundant and therefore likely to be disposed of. However, sets which have combined functions (eg. a CD player as well as radio) are less likely to be disposed of as the other functions are not affected.

London economics/YouGov research investigated the various ways of disposing of sets, from binning, to returning to store, and retaining and reusing, and surveyed consumers to

[33] Intertek – 101092233MKS002 Energy Consumption of digital radios upgrade, modelling brief note – key inputs, 101092233MKS003 Energy Consumption of digital radios upgrade, modelling brief note – key outputs (2013)

[34] Market Transformation Programme – BNCE TV06: 2010 TV test data and analysis (2010)

find out how they anticipated disposing of them. The research also calculated the cost of each method of disposal.

A weighted average of these costs gives an average cost per radio disposed of 27p and also suggests the proportion of radios that may be retained, in both the baseline and scenario. From this, and by using the additional sales as a proxy for the number of sets disposed of, we can model the disposal cost of a switchover.

5 Results of Analysis

The analysis of the costs and benefits undertaken calculates the net present value. This measures the overall economic, social and environmental impact of a switchover, with a positive NPV signalling a net benefit and a negative NPV a net cost. The results are discounted to 2014 present values, in accordance with Green Book guidance[35], and presented in 2012 real prices terms using GDP deflators[36].

Modelling this far into the future will always carry uncertainty. We have minimised this by drawing on the best available data and current evidence, but we have also utilised Monte Carlo analysis to quantify the likelihood of possible outcomes. By applying distributions to modelling inputs and repeating simulations many times it is possible to build up a distribution of probable outcomes. This means that our results reflect, as far as possible, the uncertainties in our assumptions by giving a range of likely outcomes. We have presented these results as fan charts.

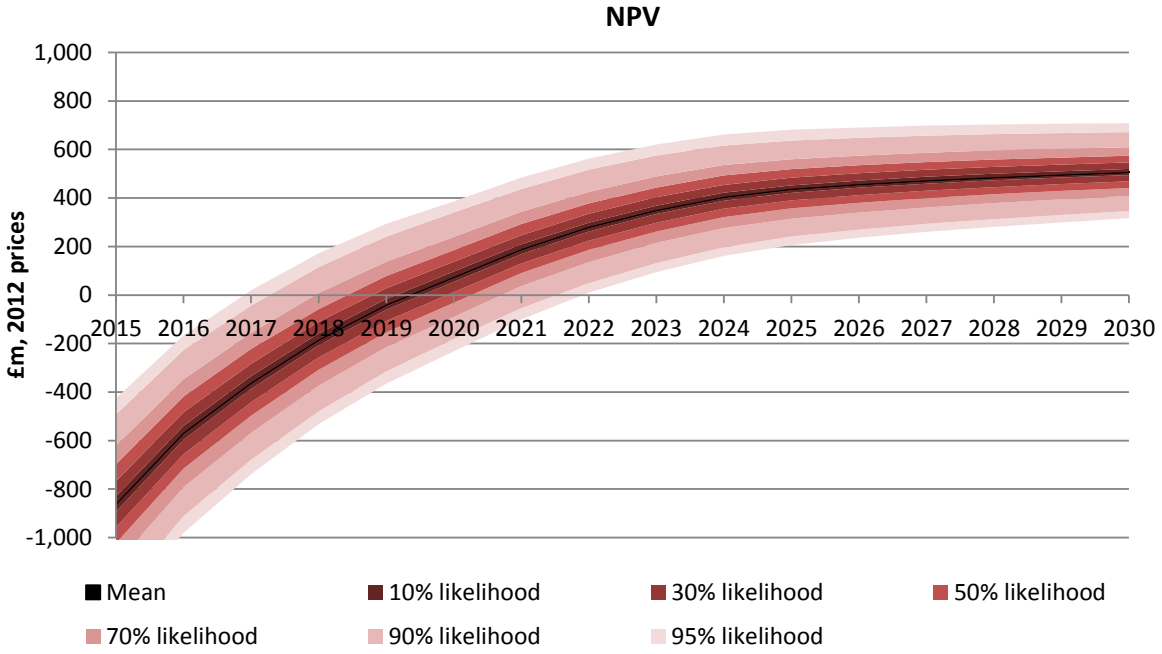
However, there are some risks and uncertainties that are less tangible and so harder to quantify. Some of these are related to the inputs, such as having to infer figures for in vehicle listening from household data, whilst others are wider uncertainties such as larger changes in listening preferences or a potential for a new use for the spectrum released. These cannot easily be quantified in the Monte Carlo analysis.

Figure 3 shows how the overall net present value (NPV) varies depending on the year of the switchover. It shows that a switchover in 2015 is likely to have a significant net economic cost, with a central (mean) NPV around -£850m. The NPV increases each year a switchover is deferred, initially rising quickly. By a 2020 switchover the NPV is more likely to be positive than negative, and by a 2022 switchover the modelling suggest the NPV is expected to be positive. The rise in the NPV for switchovers after 2025 is much smaller with the central NPV plateauing at over £450m.

[35] HMT – https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

[36] HMT – https://www.gov.uk/government/publications/gdp-deflators-at-market-prices-and-money-gdp-march-2013

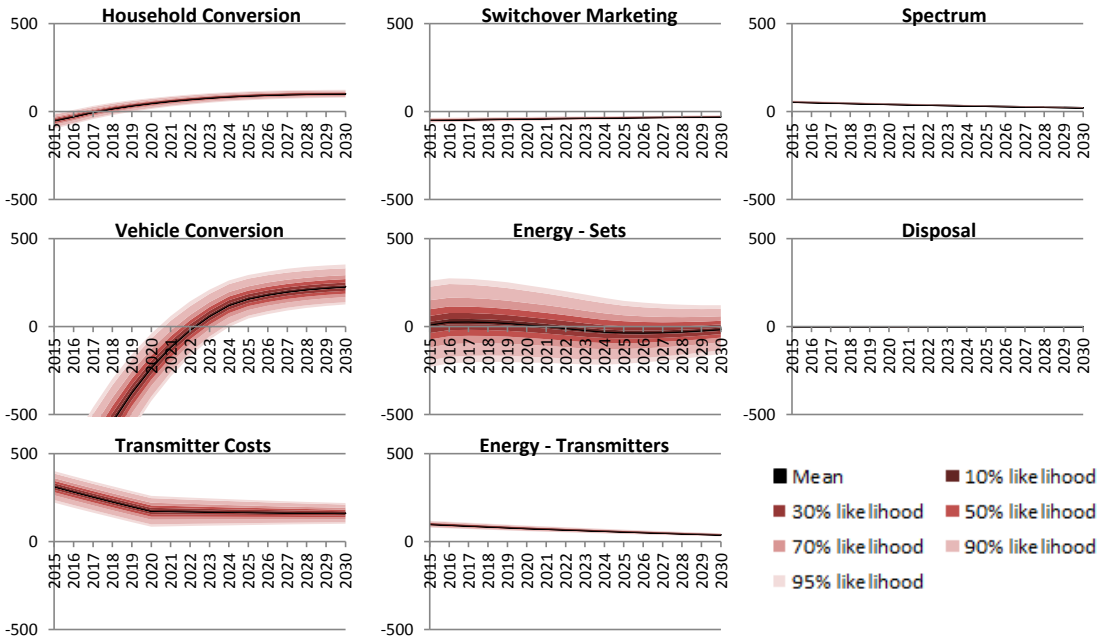
Figure 3: Total net present value of a digital radio switchover by switchover year



There is a sizable range throughout the estimate, though the later the switchover, the smaller the range. A 2015 switchover has a range of ±£450m, whilst a 2030 switchover having a range of ±£200m. This is because the majority of the uncertainty comes from the jump in take up caused by the switchover, and the subsequent period after switchover. A later switchover means the spike is smaller and discounted more, and there are fewer post switchover years in the appraisal period.

To fully understand the model we need to break down the NPV into the present value (PV) estimates for each element, as shown in Figure 4.

Figure 4: Present value of each element by switchover year



The following bullets summarise each impact in turn:

- **Household listening** – the benefit from greater coverage from the rollout of further transmitters results in a central PV of around £100m whatever year a switchover occurs. The effect of the switch-off of analogue radio, and consumers switching to digital earlier than they would otherwise have chosen to, has a greater cost than the coverage benefits in early switchovers, but falls over time to be much smaller than the coverage benefits. This results in a negative central PV for a 2015 switchover of -£50m. This rises to become positive by 2018, £50m by 2020 and £100m by 2030. The range decreases the later the switchover as a large proportion of the uncertainty is caused from the spike in sales from a switchover. The earlier the switchover the larger the spike and the less it is discounted. A 2015 switchover has a range of ±£40m, whilst a 2030 switchover has a range of ±£20m.
- **In vehicle listening** – as the majority of the vehicle stock is not digital, and take up of digital conversions is low, an early switchover leads to a large cost; a 2015 switchover has a central PV in excess of -£1bn. This drives the model, making the overall PV negative too. This cost reduces the longer a switchover is delayed, allowing for vehicles with digital radios to become the majority of the vehicle stock as new vehicles feed down the chain and older vehicles without digital are scrapped. The central PV for vehicle conversion becomes positive for switchovers after 2023, rising to over £200m for a 2030 switchover. There is a large degree of uncertainty around the take up of digital radio in vehicles and the costs and benefits, although this does fall for later switchovers. A 2015 switchover has a range of ±£360m whilst a 2030 switchover drops to ±£115m.
- **Transmission** – the saving in transmission costs has a central PV just over £300m in a 2015 switchover, but this quickly falls to around £170m by a 2020 switchover. In switchovers in 2020 and beyond the initial costs of extending the digital transmitter network, are outweighed by the savings from dual transmission post switchover, resulting in a central PV around £165m. In switchovers before 2020 the analogue network is (partly) decommissioned whilst digital is being rolled out so the PV is greater. The uncertainty around the transmitter costs falls from ±£90m in a 2015 switchover to ±£60m for a 2030 switchover.
- **Switchover Marketing** – will have a small cost in all scenarios, with a central PV of around -£40m ±£10m. The central PV is slightly higher in earlier switchovers, as is the range.
- **Energy: Sets** – early switchovers have a small positive central PV, rising to £30m by 2017 before falling. Switchovers after 2022 have a negative central PV, with a 2026 switchover falling to -£35m, before rising again to -£15m by 2030. Digital radios consume more power than analogue, which drives the negative PVs in later switchovers. In early switchovers, by more consumers switching to digital radios earlier, the amount of digital radio listened to by DTV and online, which consume more energy, reduces. This offsets the greater energy consumption of digital radios to analogue radios, hence the slightly positive PVs. However, these estimates have a large range, ±£250m for a 2015 switchover, though this does fall to ±£140m by a switchover 2030. This is due to several uncertainties that feed into this estimate, such as, energy costs; overall hours of listening, and the split by different means; and the amount of time sets are on stand-by.

- **Energy: Transmitters** – given analogue transmitters greater energy use, the earlier a switchover the greater the PV. The PV is positive for a switchover in any year, with a 2015 switchover to having a central PV around £100m. This falls to a PV of £40m for a 2030 switchover. The uncertainty is around ±£15m, though is slightly greater from early switchovers and lower for later switchovers.
- **Spectrum** – the benefits from spectrum being released are relatively small, but accumulate over a number of years, so the PV is higher the earlier the switchover. A 2015 switchover gives a £55m PV, whilst a 2030 switchover has a £20m PV. The range is around ±£5m for all scenarios.
- **Disposal** – the disposal costs per set are very small, so although there is always a negative PV it is effectively negligible.

6 Conclusions

This preliminary analysis suggests that a switchover in the next few years would be more likely to have a net negative impact than a positive one. However, the NPV grows each year a switchover is deferred with switchovers after 2020 more likely to have a positive impact than a negative one, switchovers after 2022 unlikely to be negative, and an NPV plateauing at over £450m from switchovers after 2025. There is therefore significant uncertainty around the optimal timing for a switchover at present. The different impacts have also been analysed separately to show how the different groups are affected by the timing.

The model is driven by consumers listening in vehicles, as less than 10% of the vehicle stock is currently digital. It will take some time for newer vehicles with digital radios to replace older vehicles without, which will reduce the number of conversions, which are more costly, needed at switchover. Consumers listening at home will benefit by a NPV around £100m from the rollout of additional transmitters. However they will face a greater cost than this from the switch-off of analogue radio in early switchovers, but this reduces as the price of digital radios falls and more households choose to take up digital radio, leading to a net benefit to household consumers from switchovers in 2018 or later.

The reduction in transmitter cost from ceasing dual broadcasting, as well as the reduction in energy costs from digital transmitters over analogue, has a net benefit, with an NPV in excess of £200m. There will also be a benefit from the analogue spectrum released, though how it will be used is currently unknown.

The energy consumption of sets fluctuates, with a small positive impact in early switchovers and a negative impact in later switchovers, whilst the marketing costs have a small negative impact and the disposal costs of redundant analogue sets are negligible.

The uncertainty in this paper highlights the need for the impacts of a switchover to be reassessed if and when a switchover decision is reconsidered. To some degree the costs and benefits will be revealed over time, although further research may be required to fill evidence gaps. Given the importance of in vehicle listening on the modelling, this could be an area for further investigation, as could a greater understanding of the different consumer groups and how they will be impacted. Furthermore, we note that this analysis looks at the aggregate effect across the United Kingdom and does not delve into demographic groups, which may also require further research to fully understand the impacts of a digital radio switchover.

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