

Exploiting the digital dividend – a European approach

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FSR workshop: 'Spectrum Management in Europe'

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Introduction to study for the European Commission

Summary of main recommendations

Economic assessment of the case for the sub-band(s)

The switchover to digital television creates the 'digital dividend'

- The switch-off of analogue terrestrial television (TV) broadcasting in Europe will create a 'digital dividend' of surplus spectrum
 - over eight analogue TV channels can be carried in one digital TV multiplex, which (in theory) could release several hundred MHz of spectrum
- This is an unprecedented opportunity regarding spectrum availability, considering:
 - the superior propagation characteristics of UHF frequencies
 - the amount of spectrum that is potentially available
 - the wide range of potential uses of the spectrum, many of which produce significant social value
 - the potential role this spectrum could play in creating economic growth and new employment opportunities
 - the 'simultaneous' availability across the EU

There are many potential uses for the digital dividend



More digital terrestrial TV (DTT)

For more standard-definition channels and/or for high-definition TV (HDTV)



Mobile TV broadcast networks

Main band proposed for DVB-H use in many Member States



Cellular networks (3G/4G)

Spectrum is suited to covering rural areas at lower cost (fewer base stations)



Broadband wireless access (WiMAX)

Spectrum is suited to covering rural areas at lower cost (fewer base stations)



SAB/SAP (e.g. radio microphones)

A variety of users currently use the band for a wide range of applications



Public protection and disaster relief

Wireless broadband services for emergency services and other bodies

We estimate the economic value of the digital dividend across the EU to be EUR150–700 billion*

The focus of our study for the EC was on the 'European dimension'

- A consortium led by Analysys Mason undertook a study for the European Commission on the merits of a co-ordinated approach
- The study focused on the 'European dimension'
 - Economies of scale are key for many potential uses of the band (e.g. mobile handsets, DTT receivers)
 - Ease of use of services is important when travelling in different Member States (e.g. roaming on mobile phones)
 - High-power use of spectrum creates the need for extensive cross-border co-ordination
 - Decisions made on use by one Member State could influence use of the digital dividend in other Member States, and ultimately affect overall benefits at the EU level

The overall aim was to ascertain what action (if any) should be undertaken **at the EU level** to ensure the benefits of the digital dividend are maximised

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Summary of recommended high-level actions

- **All Member States should be required by 2015 to clear the 790–862MHz sub-band** and impose technical restrictions to prevent high-power cross-border interference
- Member States should be encouraged to award spectrum on a service- and technology-neutral basis
- In the short to medium term, a review should be carried out to decide whether action is warranted to prepare for further clearance of the band, and consider actions to safeguard users of interleaved spectrum
 - limited research should be initiated ahead of this review, including investigating costs and logistics, and reviewing necessary platform upgrades

EU Member State plans for 800MHz band

<i>Plans for the 790–862MHz sub-band</i>	<i>Member States</i>
Making it available for wireless broadband or other services	DE, DK, ES, FI, FR, NL, SE, UK
Considering making it available for wireless broadband or other services	CZ, HU, IE, LU, SK
Undecided on use	AT, BE, BG, CY, EE, EL, IT, LT, LV, PL, PT, RO, SI
Awarding all of the digital dividend to DTT	MT

Summary of sector-specific actions

DTT	<ul style="list-style-type: none">• All sold DTT receivers required to meet technology-neutral minimum interference rejection and compression performance standards (equivalent to MPEG-4)• Guidelines for the adoption of minimum compression performance specifications for DTT transmission• The Commission to be a broker in negotiations between Member States, and with non-EU countries
Wireless broadband	<ul style="list-style-type: none">• Research into the development of frequency-agile technologies should be encouraged
Low-power devices	<ul style="list-style-type: none">• Member States requested to share their plans to relocate dedicated frequency channels for low-power devices
Cognitive technologies	<ul style="list-style-type: none">• Guidelines for the technical and regulatory conditions for the introduction of cognitive technologies to the band

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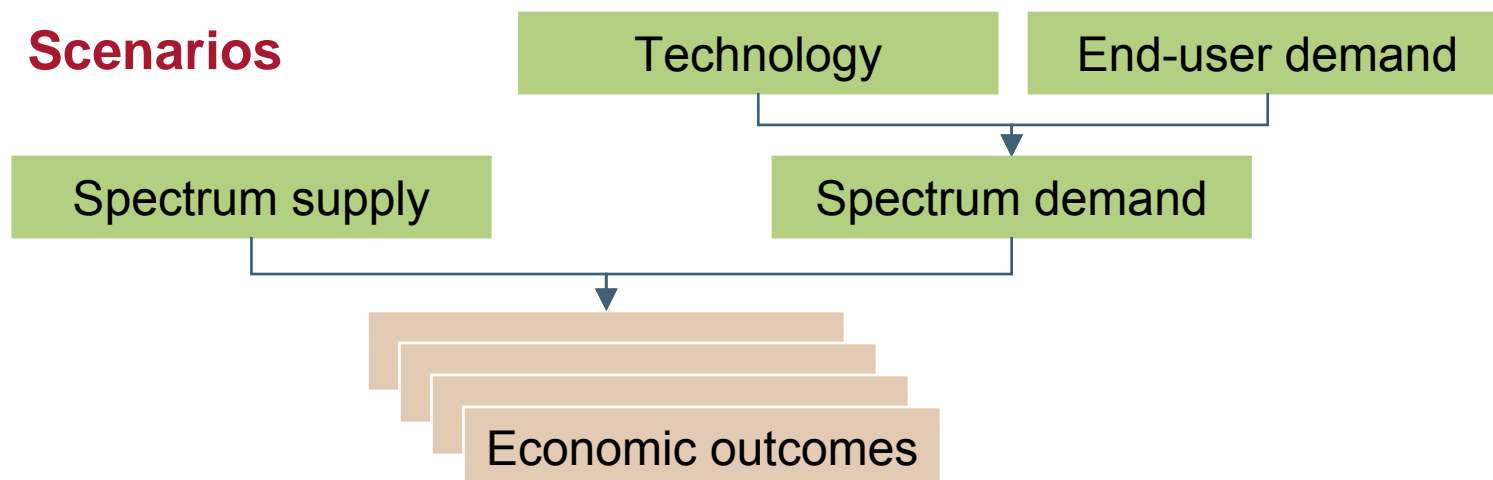
Introduction to study for the European Commission

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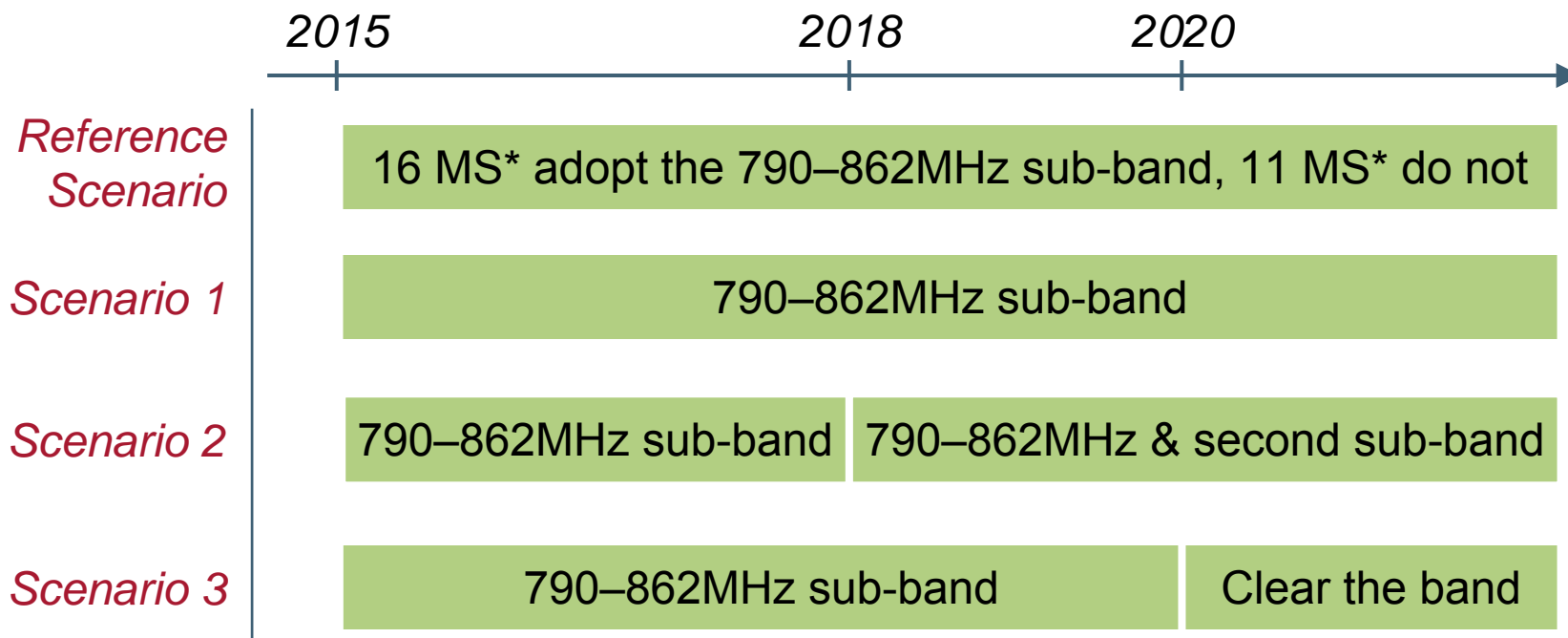
Approach to economic assessment

- Rather than starting with possible actions and analysing their effects, we analysed how economic outcomes might vary under different combinations of scenarios for spectrum supply and demand



- We then considered what EU-level action could be taken to promote the scenarios that emerged as the most beneficial

Spectrum supply scenarios



We included some radical spectrum supply scenarios in our analysis (e.g. clearance of DTT from the entire 470–862MHz band), in order to test them against potentially extreme demand scenarios (e.g. emergence of a new, currently unknown, high-value use)

Spectrum demand scenarios

Wireless broadband (WBB)

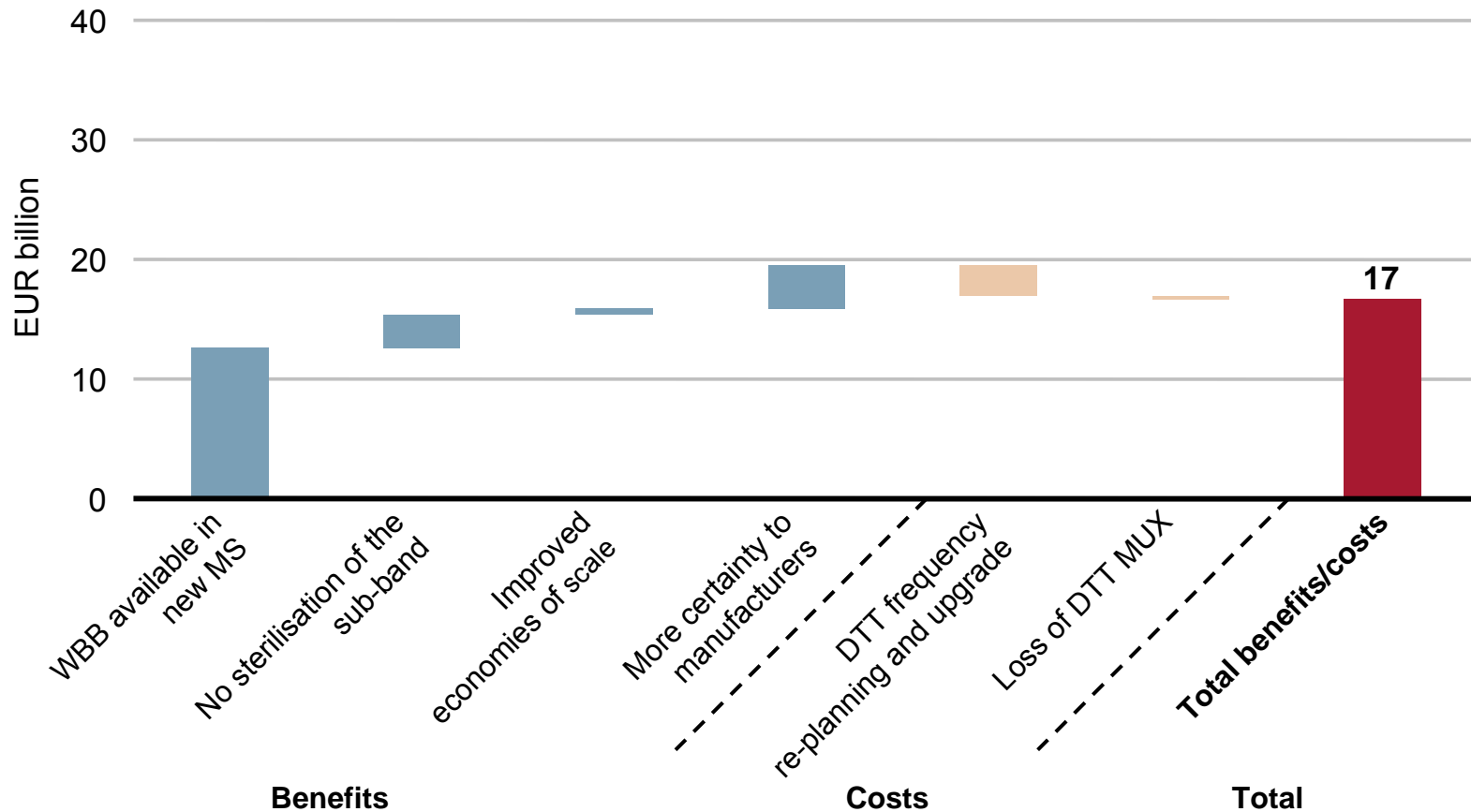
		Low	High	High with new use
DTT	Low	Scenario A	Scenario B	Scenario C
	High	Scenario D	Scenario E	Scenario F

We calculated the economic impact of each supply scenario (Scenarios 1–3) under each demand scenario (Scenarios A–F)

Scenario D: high demand for DTT, low for WBB

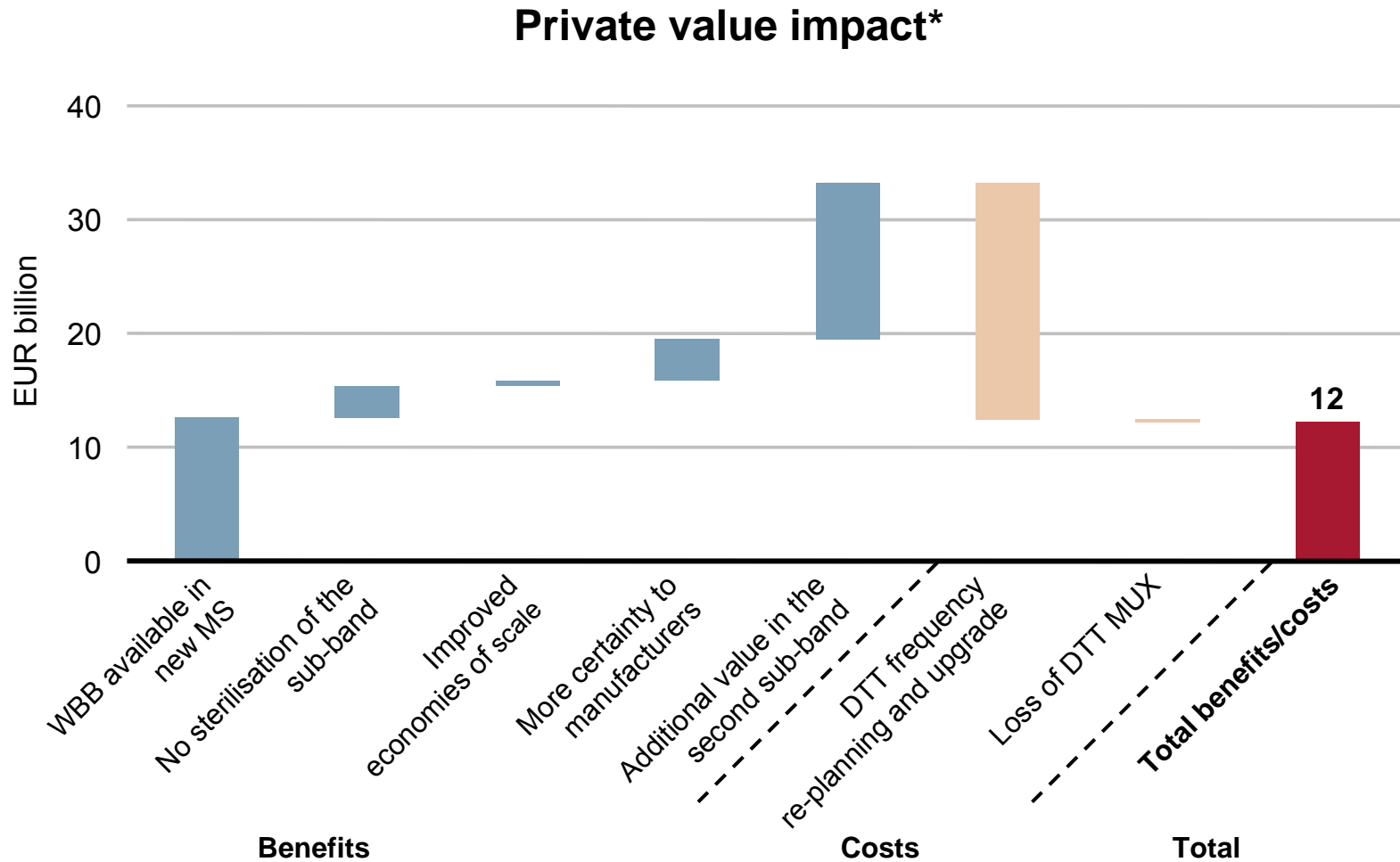
Scenario 1: adoption of the first sub-band only

Private value impact*

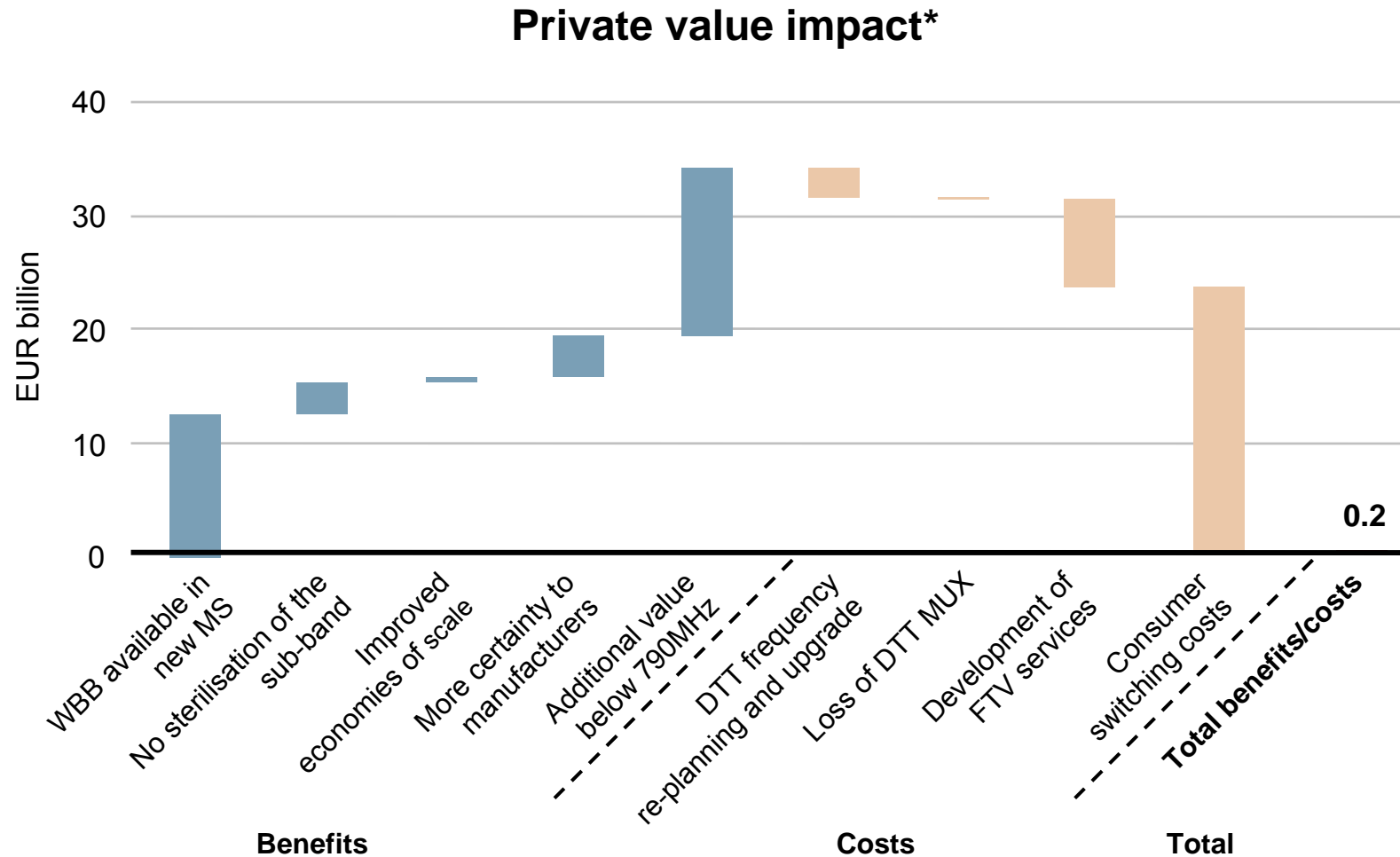


Scenario D: high demand for DTT, low for WBB

Scenario 2: adoption of the second sub-band



Scenario D: high demand for DTT, low for WBB Scenario 3: clearance of the band



Summary of results for all scenarios

	Scenario 1 <i>(adoption of the first sub-band only)</i>	Scenario 2 <i>(adoption of the second sub-band)</i>	Scenario 3 <i>(clearance of the band)</i>
Scenario A <i>(DTT low, WBB low)</i>	EUR17 billion	EUR13 billion	EUR1 billion
Scenario B <i>(DTT low, WBB high)</i>	EUR44 billion	EUR61 billion	EUR51 billion
Scenario C <i>(DTT low, WBB high & new use)</i>	EUR44 billion	EUR75 billion	EUR95 billion
Scenario D <i>(DTT high, WBB low)</i>	EUR17 billion	EUR12 billion	EUR0.2 billion
Scenario E <i>(DTT high, WBB high)</i>	EUR44 billion	EUR60 billion	EUR50 billion
Scenario F <i>(DTT high, WBB high & new use)</i>	EUR44 billion	EUR74 billion	EUR95 billion

Red indicates the private value associated with the optimal supply scenario

Conclusions from the economic analysis

- The Reference Scenario is inferior to the alternative supply scenarios, irrespective of the demand scenario
- The spectrum supply scenario that maximises private value varies by wireless broadband demand scenario
- There is a clear economic case for action to create a 790–862MHz sub-band suitable for medium- or low-power services (e.g. WBB)
- There is potentially an economic case for *future* action to facilitate further clearance of the 470–862MHz band
 - ▶ *additional* value is estimated at up to EUR30 billion from a second sub-band at 694–790MHz, and up to EUR51 billion from total clearance, given sufficient demand for WBB or other future uses
 - ▶ however, these results are limited to a private value assessment, and exclude public and social value impacts of DTT and WBB
 - ▶ any decision to clear DTT from the band would ultimately be a political decision in each Member State

Additional information can be found on the study website

www.analysismason.com/EC_digital_dividend_study

The screenshot shows the website's navigation menu with 'Research' selected. The main content area is titled 'Exploiting the digital dividend – a European approach' and includes an 'Introduction to the study' section with bullet points about spectrum availability and potential uses. A sidebar on the left lists various services, and a 'Contact' section is visible on the right.

Published documents include:

- slide pack introducing the study
- presentations from and summary of stakeholders hearings held on 6 March 2009
- presentations from and summaries of Member States workshops held on 15 April and 26 June 2009
- Final report (including annexes)

Overview of Analysys Mason's work on spectrum issues

Analysys Mason provides a range of spectrum-related services

Category	Examples of recent projects
Digital dividend	<ul style="list-style-type: none"> • Study for the European Commission to assess options for European co-ordination of approaches to the digital dividend • Studies for the UK, French and Dutch regulators/governments on alternative uses of digital dividend spectrum
2.6GHz spectrum awards	<ul style="list-style-type: none"> • Ongoing support to the Danish regulator (NITA) with the design and implementation of the award process • Valuation and bidding strategy support to a bidder in the 2.3/2.6GHz auction in Hong Kong and a major Western European operator • Studies for the UK regulator (Ofcom) on award options for the 2.6GHz and 2010–2025MHz bands
GSM re-farming	<ul style="list-style-type: none"> • Support to a Western European operator with valuation of 900MHz spectrum and response to a government consultation on re-farming • Study for Ofcom and two other Western European regulators to assess options for liberalising the 900MHz and 1800MHz bands • Assisted a private equity client to establish the value of 900MHz spectrum to a European mobile operator
Spectrum trading	<ul style="list-style-type: none"> • Ongoing study on the implementation of spectrum trading in an Asian country • Study on the issues associated with the introduction of a secondary market in spectrum across Europe for the EC • Valuation of 800MHz spectrum holdings in the USA (for the seller) and 3.5GHz spectrum in the UK (for a potential buyer)
Spectrum pricing	<ul style="list-style-type: none"> • Study for Ofcom on the opportunity cost and recommended administered incentive pricing (AIP) levels for PMSE • Study for Ofcom on the opportunity costs for business radio spectrum in VHF Band I
Future spectrum demand	<ul style="list-style-type: none"> • Forecast demand for mobile spectrum on behalf of a major cellular industry organisation • Assessment of future spectrum demand below 15GHz on behalf of the UK government
New technology economic assessments	<ul style="list-style-type: none"> • Economic cost/benefit analysis of potential introduction of UWB technologies for the UK regulator (Ofcom) • Study for a major cellular industry organisation on demand and future prospects for LTE
Other spectrum awards, inc. spectrum valuation	<ul style="list-style-type: none"> • Support to regulators in Europe, Asia and Middle East with awards of 220MHz, 400MHz, 900MHz, 1800MHz and 2.1GHz spectrum • Support to applicants (e.g. mobile operators) in Europe, Asia, Middle East and North America with acquisition of 900MHz, 1700MHz, 1800MHz, 2.1GHz and 3.5GHz spectrum in beauty contests, auctions and hybrid award processes

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