



Cost of Providing Roaming Wholesale Services

Workshop 2

July 2024

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Introduction

- ▶ **Engagement**: Axon Partners Group Consulting (hereinafter, 'Axon') has been commissioned the study "*Cost of Providing Roaming Wholesale Services – CNECT/2022/OP/0065*" (the 'Project') by the European Commission (hereinafter, 'EC').
- ▶ **Objective of the study**: Estimate the cost of providing wholesale roaming services and wholesale voice call termination by mobile network operators in each EU/EEA country, needed for the Roaming review planned for 2025 as well as for any other further review where termination costs are relevant (i.e., future update of the Euro Rate for mobile termination).
- ▶ **Purpose of this Workshop**: Summarize the main project activities as well as the outcomes/results achieved as part of the execution of the project.

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1. Project's Milestones

2. Presentation of Results

3. Consultation Outcomes

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1. Project's Milestones

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As announced in Workshop 1 (June 2023) the Project aims at achieving 5 key objectives



MAIN PROJECT OBJECTIVE

Update the model to assess the costs of providing wholesale roaming and mobile termination services

Main phases of the Project



Objective 1

Propose changes to improve the cost model



Objective 2

Implement agreed changes and updates in cost model



Objective 3

Validate cost model and outputs with stakeholders



Objective 4

Provide technical assistance on cost model for EC's reporting



Objective 5

Updates of relevant input-data for years 2023-2026

Key tasks involved

- ▶ Propose changes to improve results, methodology and principles behind SMART 2017/0091 cost model
- ▶ Workshop 1 to agree on the proposed changes and scope

- ▶ Implement changes to the cost model
- ▶ Data gathering process with stakeholders to obtain needed inputs
- ▶ Populate and calibrate the cost model

- ▶ Two rounds of public consultations with stakeholders
- ▶ Finalization of cost model
- ▶ Elaboration of project report

- ▶ Provision of assistance to EC in reporting obligations
- ▶ Answering specific questions related to the use of the cost model and its results

- ▶ Prepare the cost model to be updated over the next years¹
- ▶ Data gathering process with stakeholders to obtain needed inputs

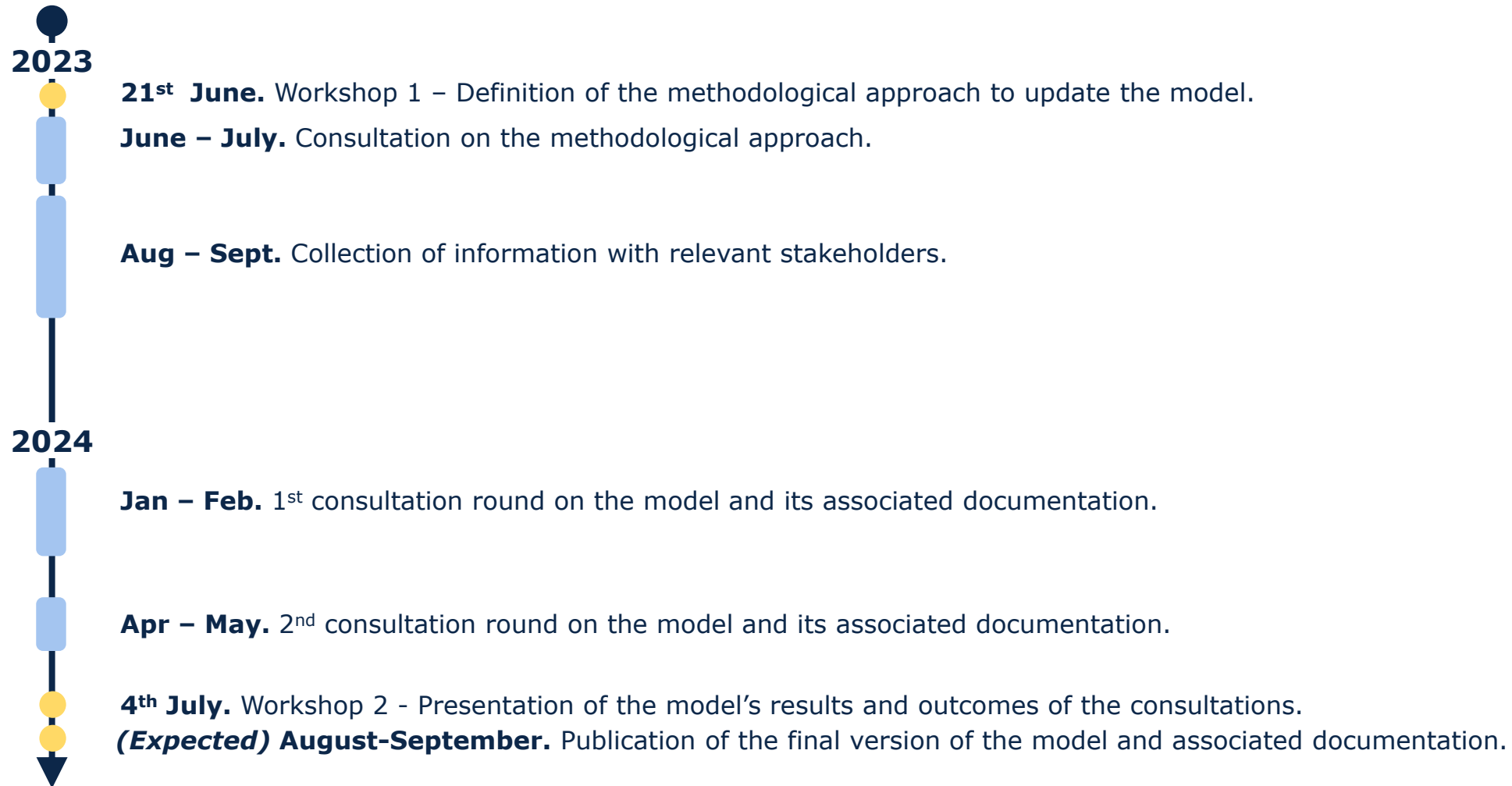
COMPLETED

ON-GOING

PLANNED






¹ Two updates will be executed: in H1 2025 (for inputs of years 2023 and 2024) and H1 2027 (for inputs of years 2025 and 2026).

The target of having the model finalised by July 2024 has been successfully met, as presented a year ago during Workshop 1



Workshop 1 presented the key methodological principles to be adopted in the update of the cost model

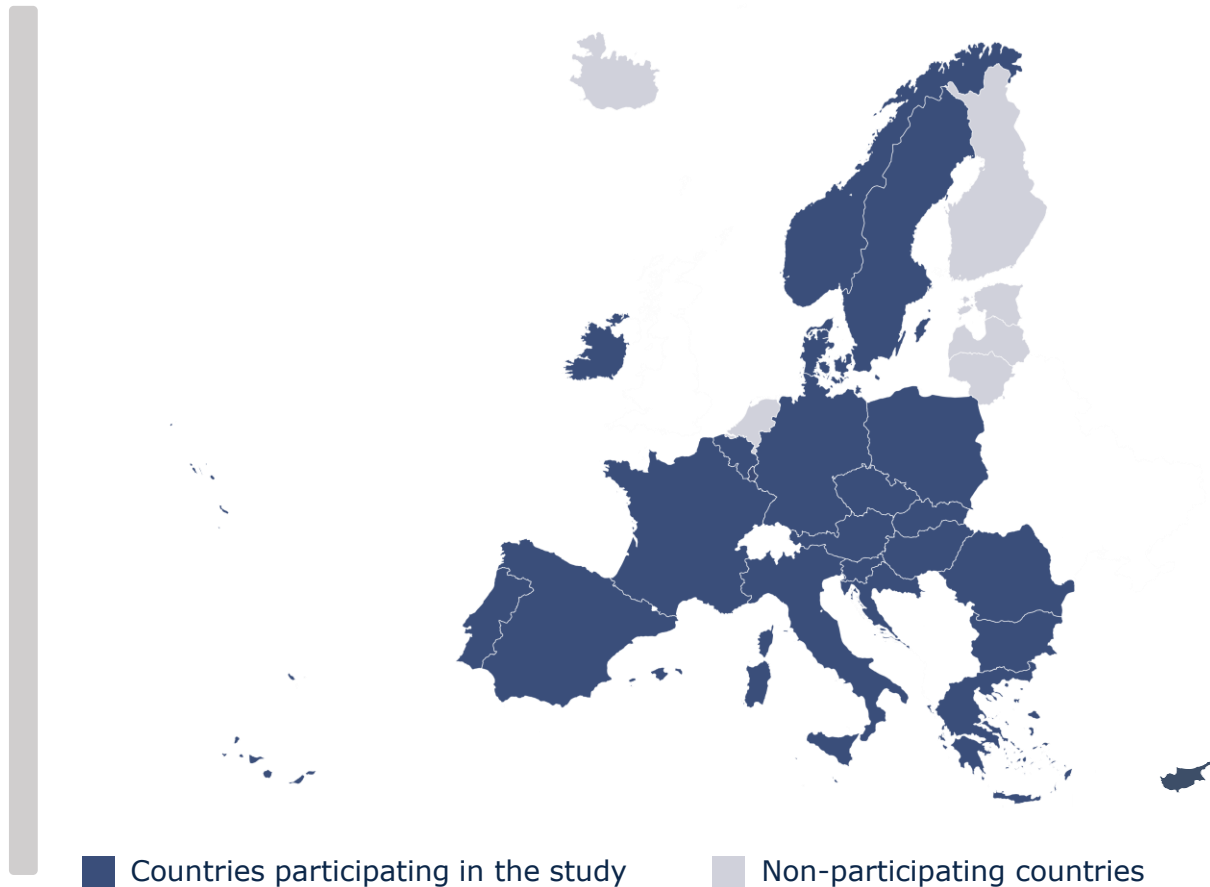
- ▶ The methodological treatment of several key methodological issues was presented by the EC/Axon team in Workshop 1.
- ▶ Stakeholders were given the chance to provide comments during and after the Workshop 1.
- ▶ A thorough presentation was delivered by the EC/Axon’s team providing detailed responses to the questions and comments submitted by the stakeholders.

Main conclusions from Workshop 1	
 Organisation plan and timetable	<ul style="list-style-type: none">▶ The EC/Axon team considered appropriate to extend the time initially reserved for the data collection process and the two consultation phases.
 Consistency with principles of SMART 2017/0091	<ul style="list-style-type: none">▶ The updated model should maintain the methodological principles and overall structure of the existing model from SMART 2017/0091.
 Incorporation of 5G technology	<ul style="list-style-type: none">▶ The 5G technology should be incorporated within the model, together with the new available spectrum bands and (potentially) small-cells.
 Separation of M2M services	<ul style="list-style-type: none">▶ In the case of broadband, M2M services should be separated from the traditional services provided to end-customers.
 New process for the subsequent model’s update	<ul style="list-style-type: none">▶ A simplified update, focusing on the most relevant inputs, should be used for future model’s updates until 2026¹ (Objective 5).

¹ Two updates will be executed: in H1 2025 (for inputs of years 2023 and 2024) and H1 2027 (for inputs of years 2025 and 2026).

A total of 23 EU/EEA countries participated during the data collection process, for which a country-specific version of the model was developed

Participation of the 30 EU/EEA countries



- ▶ 23 of the 30 EU/EEA countries submitted information during the data collection process.
- ▶ A country-specific version of model was developed for each of countries participating in the data collection process.
- ▶ The received information was used to **populate the model** with up-to-date and fully representative data from the EU/EEA operators.

A high level of stakeholder engagement has been observed during the two consultation processes

Outcomes of the 1 st consultation	Outcomes of the 2 nd consultation
<div>19 countries participated of this process</div> <div>51 different stakeholders provided feedback</div> <div>593 responses were received from stakeholders</div> <div>79% of the responses were issued by operators</div>	<div>20 countries participated of this process</div> <div>45 different stakeholders provided feedback</div> <div>185 responses were received from stakeholders</div> <div>79% of the responses were issued by operators</div>

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We provide results for up to 4 sets of scenarios that illustrate the range of services' unit costs produced by the model

Scenario	Alternatives	Adopted alternatives for the illustration of results
Annualisation criteria	<ul style="list-style-type: none"> Economic depreciation based on ARPU Economic depreciation based on demand 	<ul style="list-style-type: none"> Economic depreciation based on demand
Roaming increment	<ul style="list-style-type: none"> Specific roaming increment Joint roaming and domestic increment 	<ul style="list-style-type: none"> Specific roaming increment
Specific cost allocation	<ul style="list-style-type: none"> Allocation based on GB Allocation based on drivers 	<ul style="list-style-type: none"> Allocation based on drivers
Threshold to identify seasonal patterns	<ul style="list-style-type: none"> 10% 30% 50% 	<ul style="list-style-type: none"> 50%
Demand	<ul style="list-style-type: none"> Base-case Conservative Aggressive 	<ul style="list-style-type: none"> Base-Case Conservative
Common costs allocation (only applicable to data services)	<ul style="list-style-type: none"> Common costs allocated based on traffic Common costs allocated based on customers 	<ul style="list-style-type: none"> Common costs allocated based on traffic Common costs allocated based on customers

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2.2 M2M Data Roaming

2.3 Voice Roaming

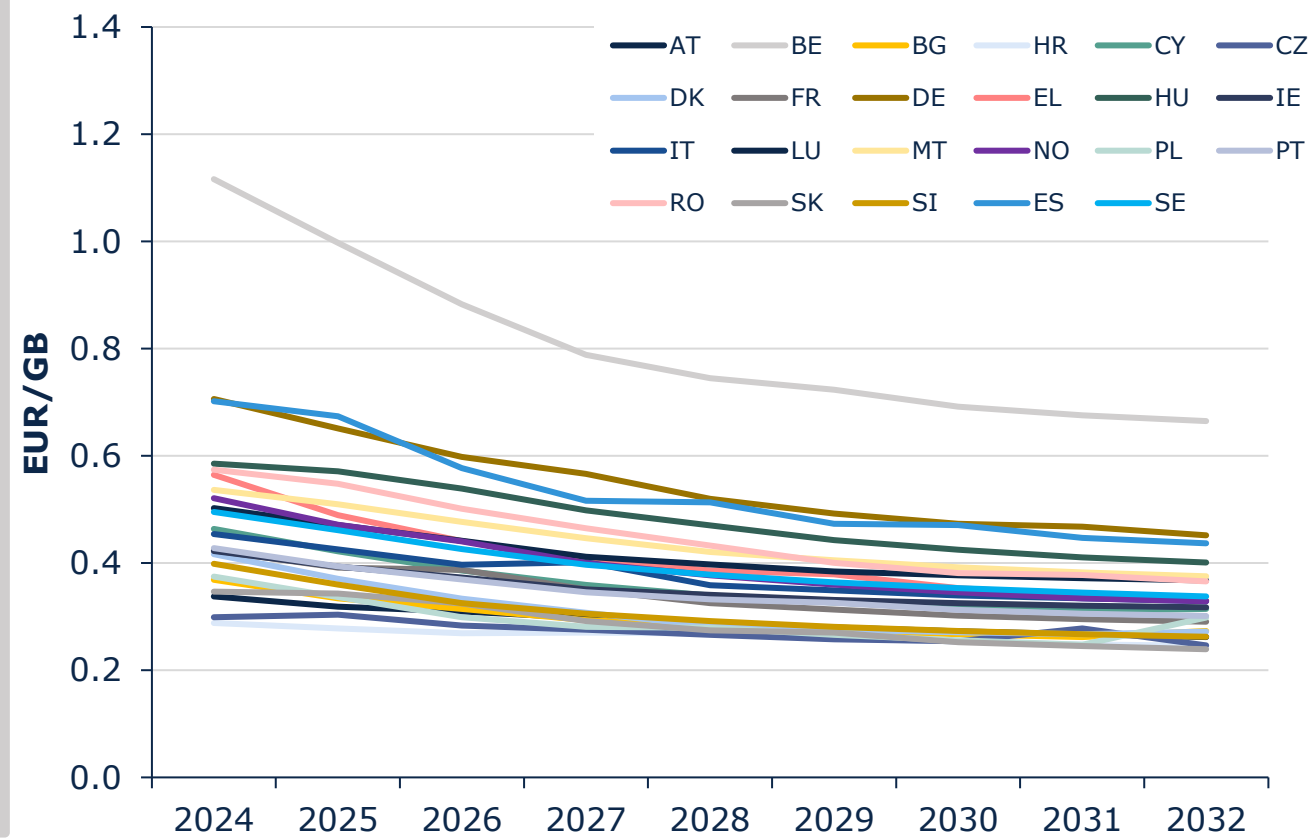
2.4 Voice Termination

3. Consultation Outcomes

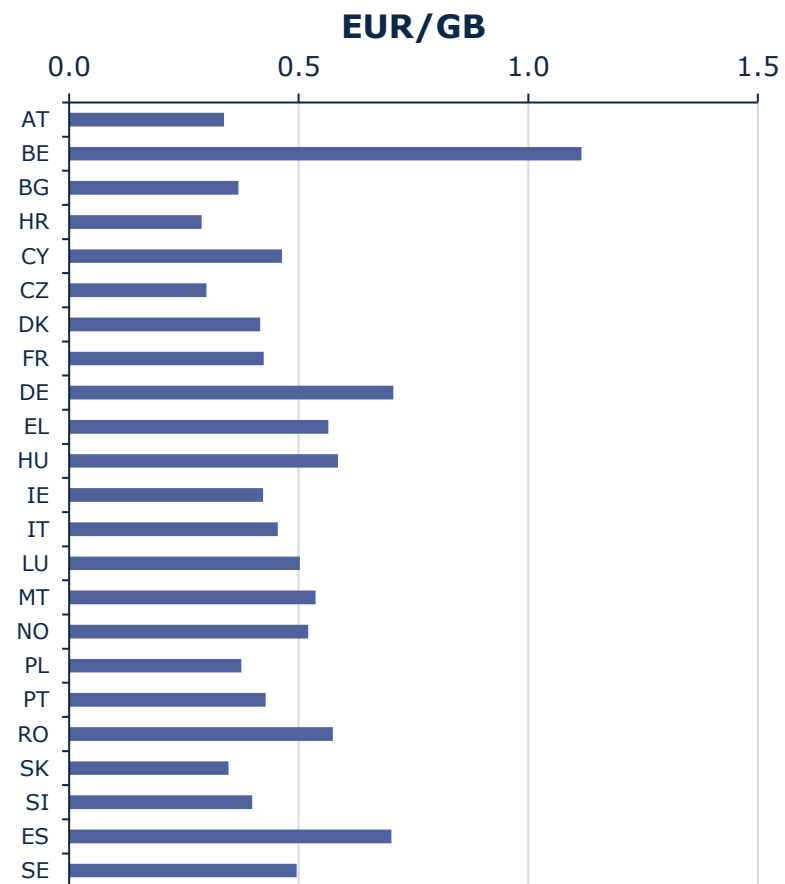
Traditional Data Roaming unit costs show a declining pattern towards the range of 0.25–0.45 EUR/GB, with the exception of Belgium at 0.65 EUR/GB

Evolution of costs*

Scenarios: Base-Case & Common costs allocated based on traffic

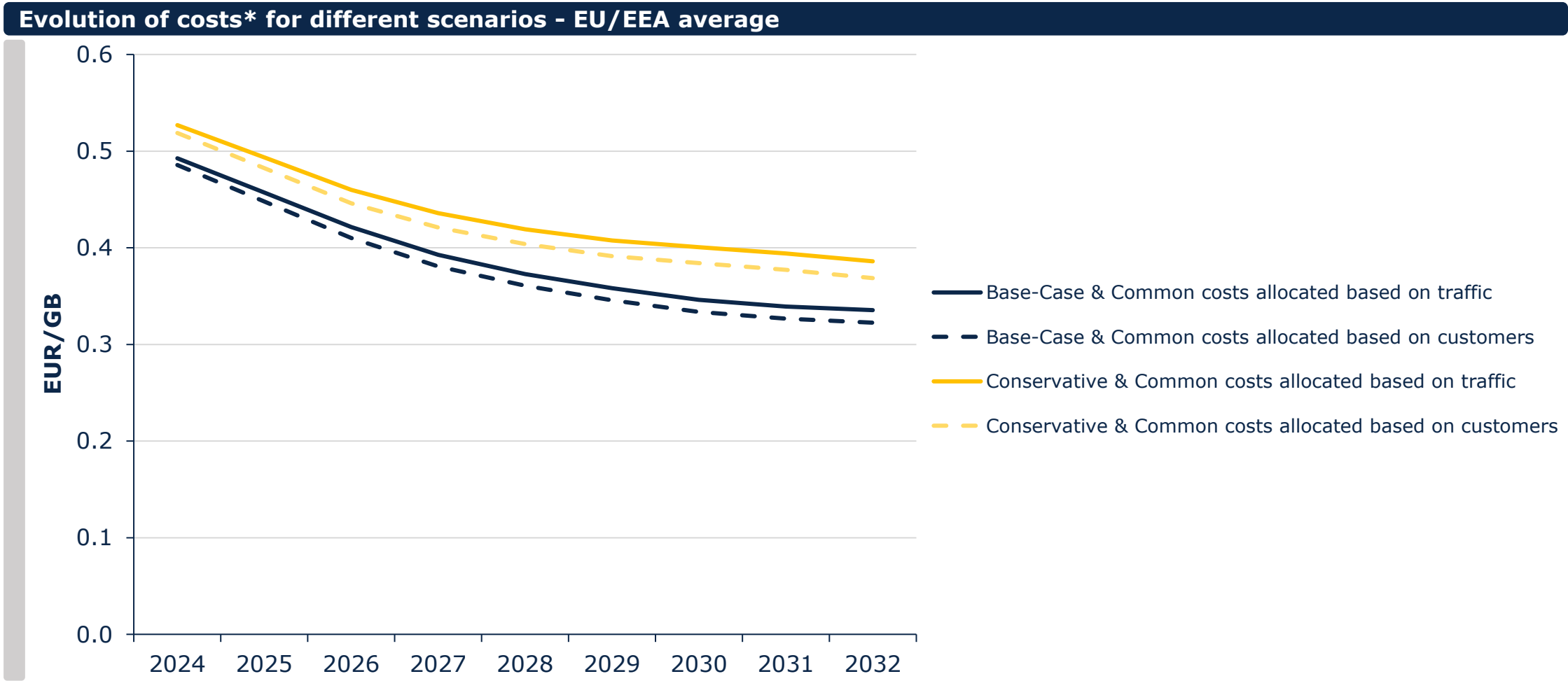


Cost comparison in 2024*



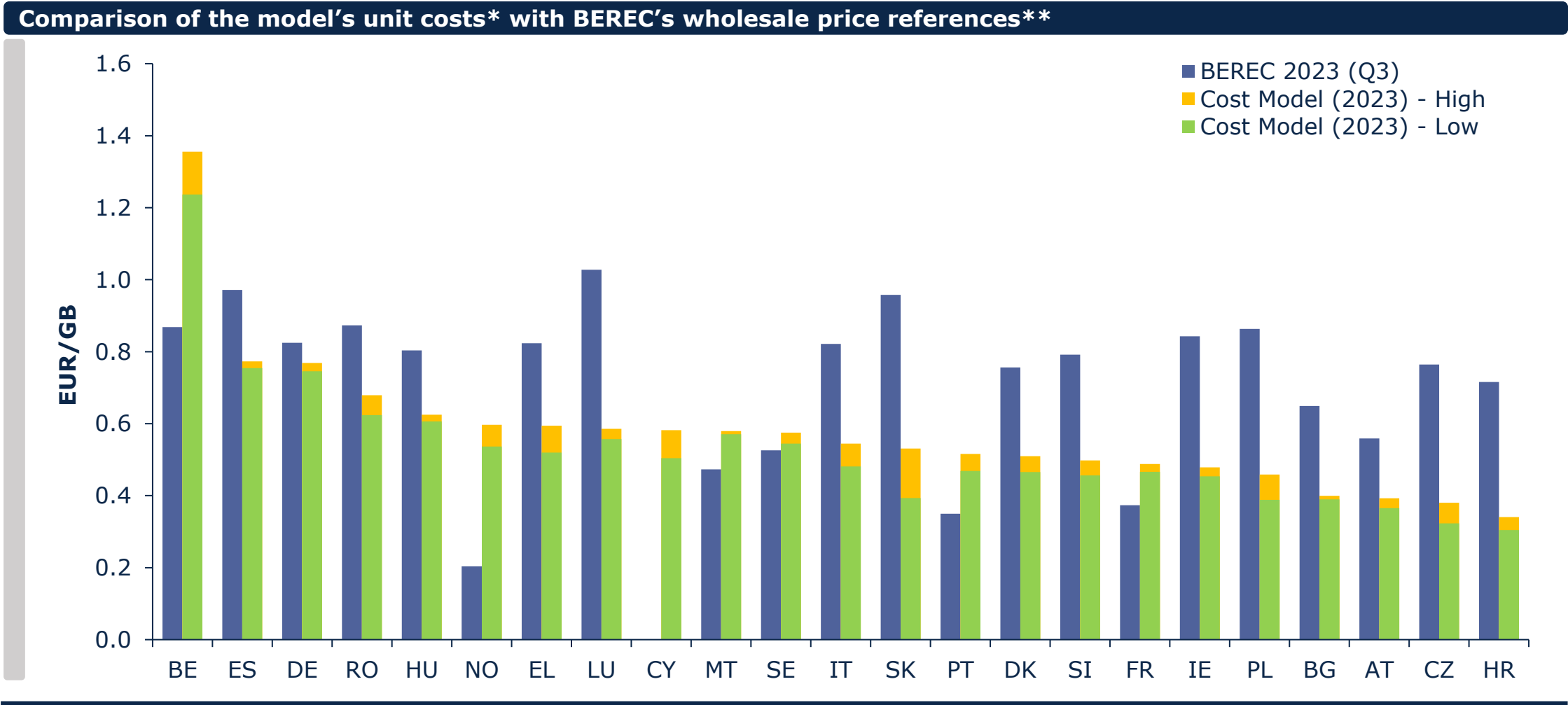
* These cost references include 0.095 EUR/GB of transit costs, as per the figure estimated by the EC.

Using the Conservative Demand scenario, unit costs are, on average, +10/15% higher than the Base-Case Demand scenario



* These cost references include 0.095 EUR/GB of transit costs, as per the figure estimated by the EC.

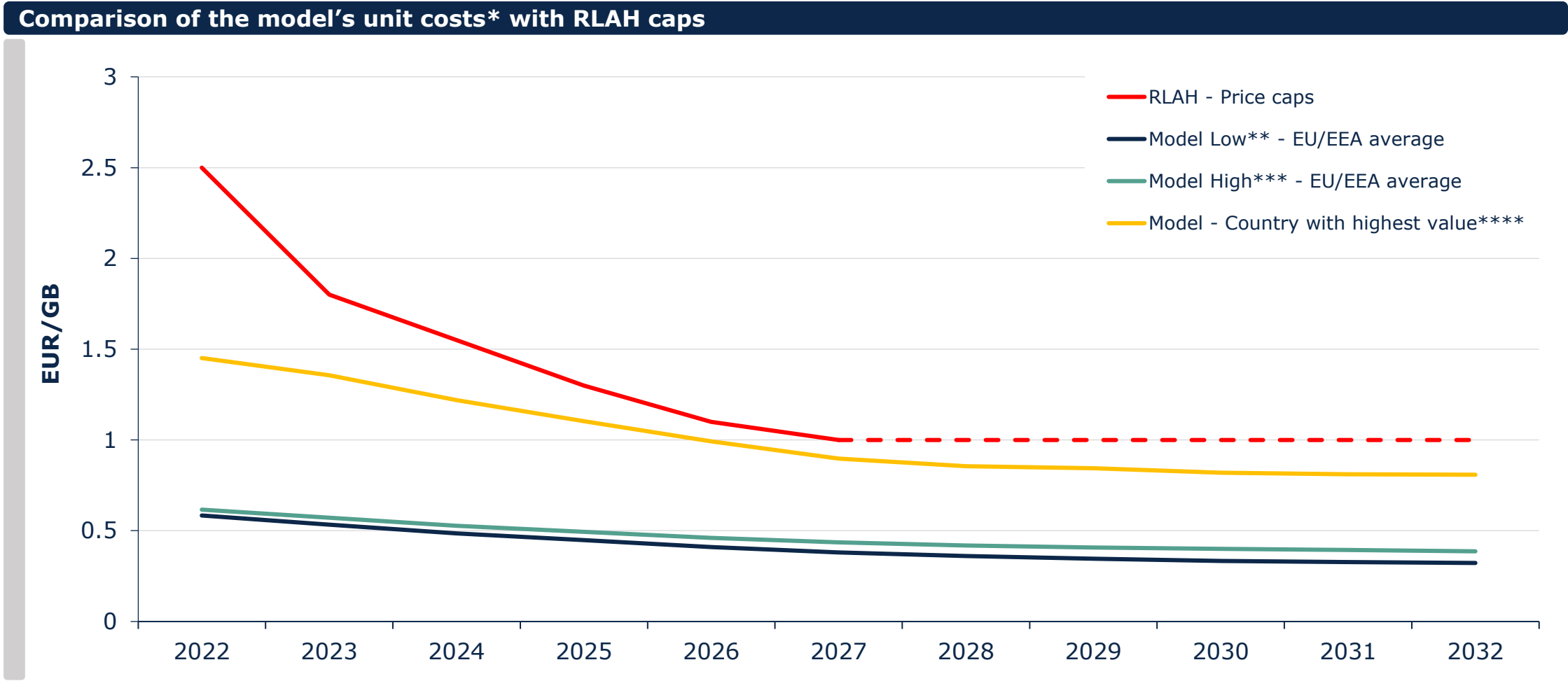
The model's Data Roaming results are in similar levels than wholesale market prices in Q3 2023, although differences are found in country-by-country comparison



* These cost references include 0.095 EUR/GB of transit costs, as per the figure estimated by the EC.

** Source: [30th BEREC International Roaming Benchmark Data and Monitoring Report](#)

Data Roaming results are below the price caps in place, as set by the EC



* These cost references include 0.095 EUR/GB of transit costs, as per the figure estimated by the EC.
** Combination of scenarios producing the lowest unit cost results: Base-Case & Common costs allocated based on customers.
*** Combination of scenarios producing the highest unit cost results: Conservative & Common costs allocated based on traffic.
**** For every year, the unit cost relates to the country with the highest cost of the sample, considering any of the 4 combinations of scenarios (Base-Case/Conservative & Common costs allocated based on traffic/customers)

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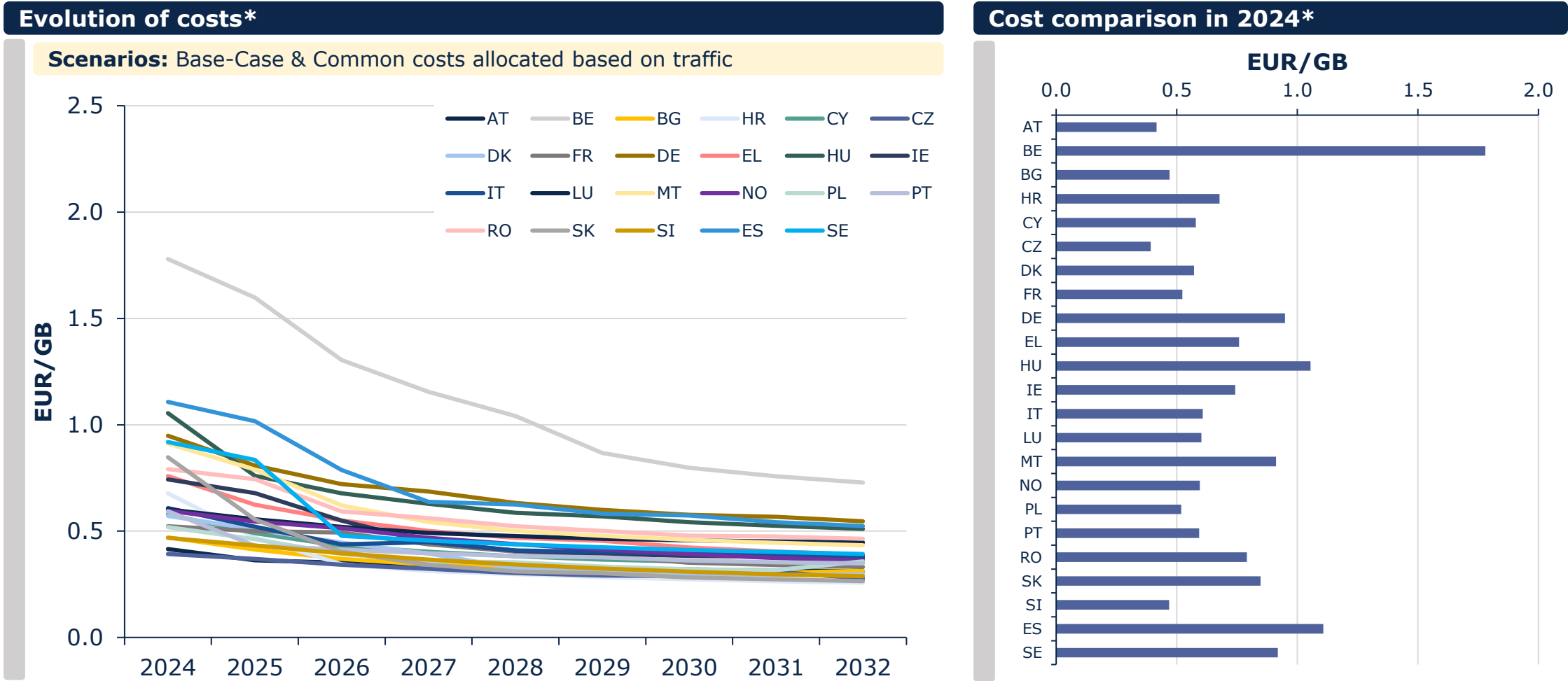
2.2 M2M Data Roaming

2.3 Voice Roaming

2.4 Voice Termination

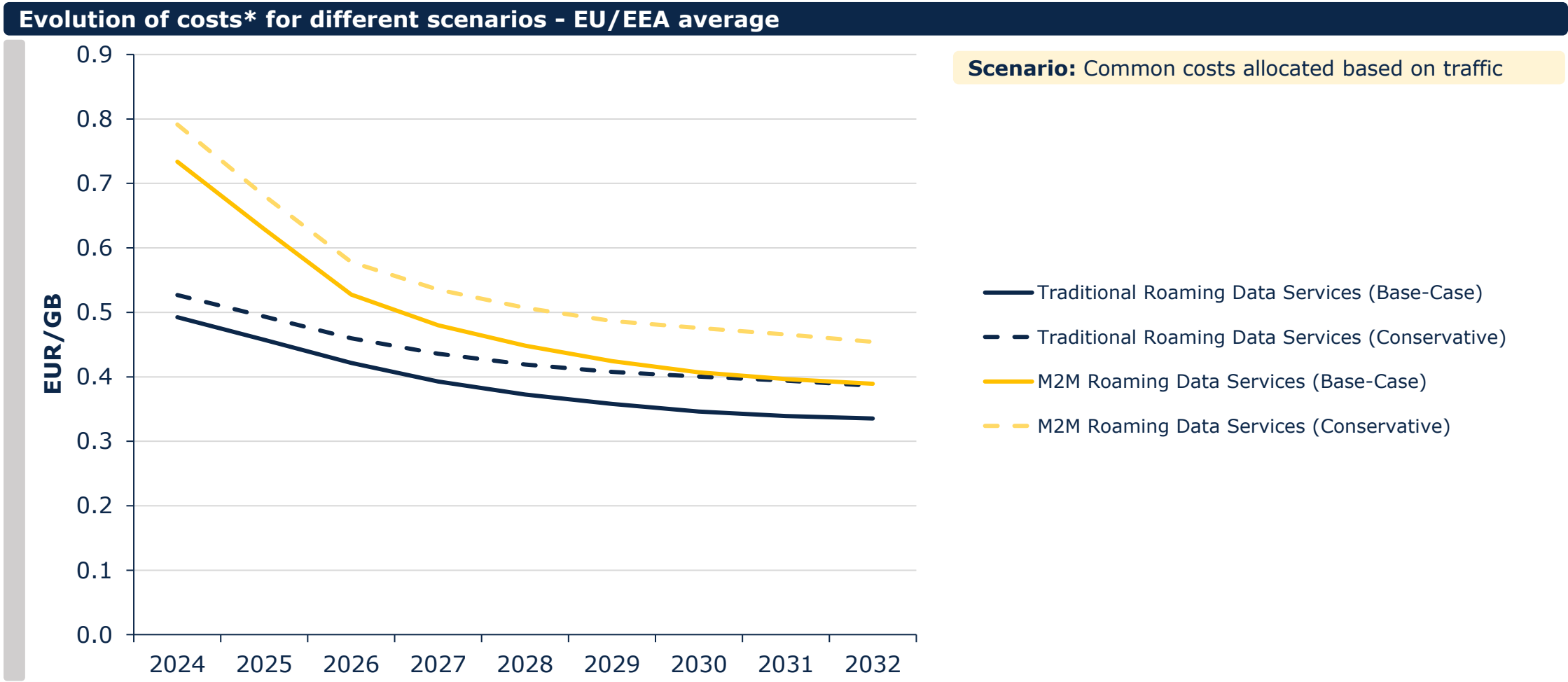
3. Consultation Outcomes

In the case of M2M Roaming, a similar situation to that of Traditional Roaming is observed, with Belgium presenting the highest unit cost result



* These cost references include 0.095 EUR/GB of transit costs, as per the figure estimated by the EC.

M2M Data services present higher cost levels than Traditional ones due to their greater use of 2G & 3G networks (being these solutions less cost-efficient)

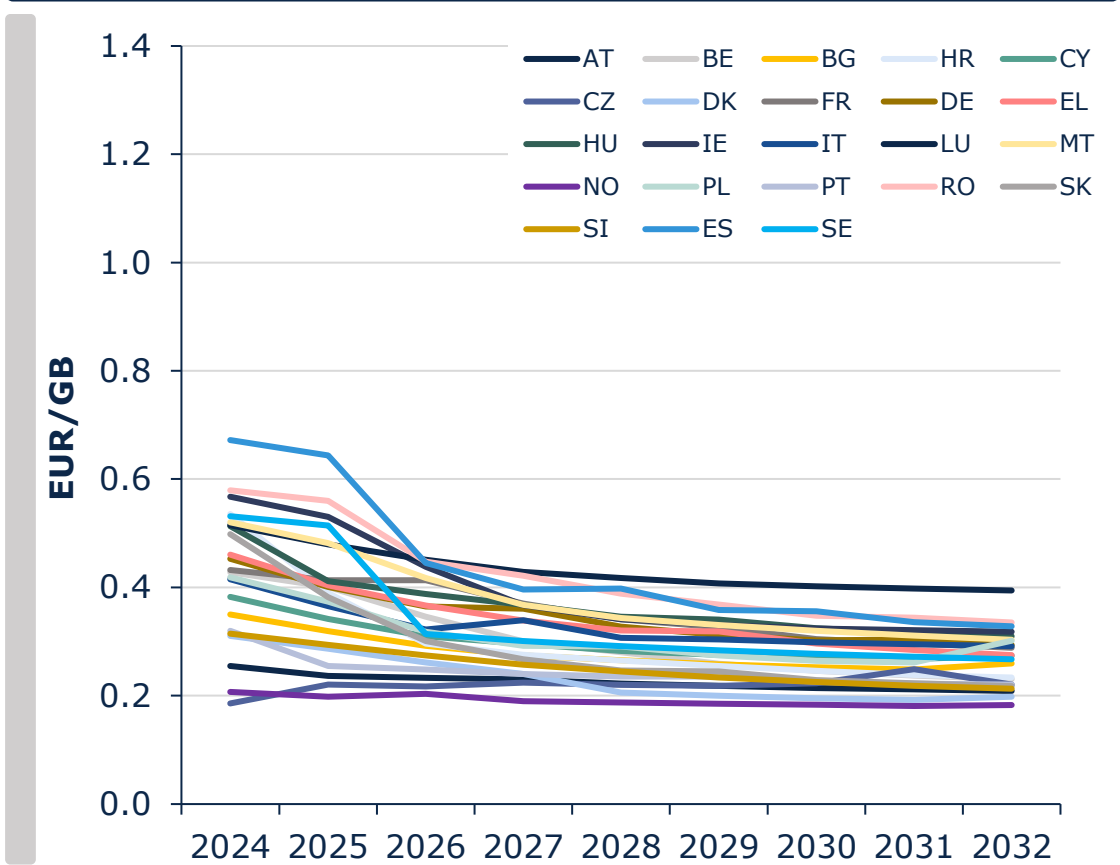


* These cost references include 0.095 EUR/GB of transit costs, as per the figure estimated by the EC.

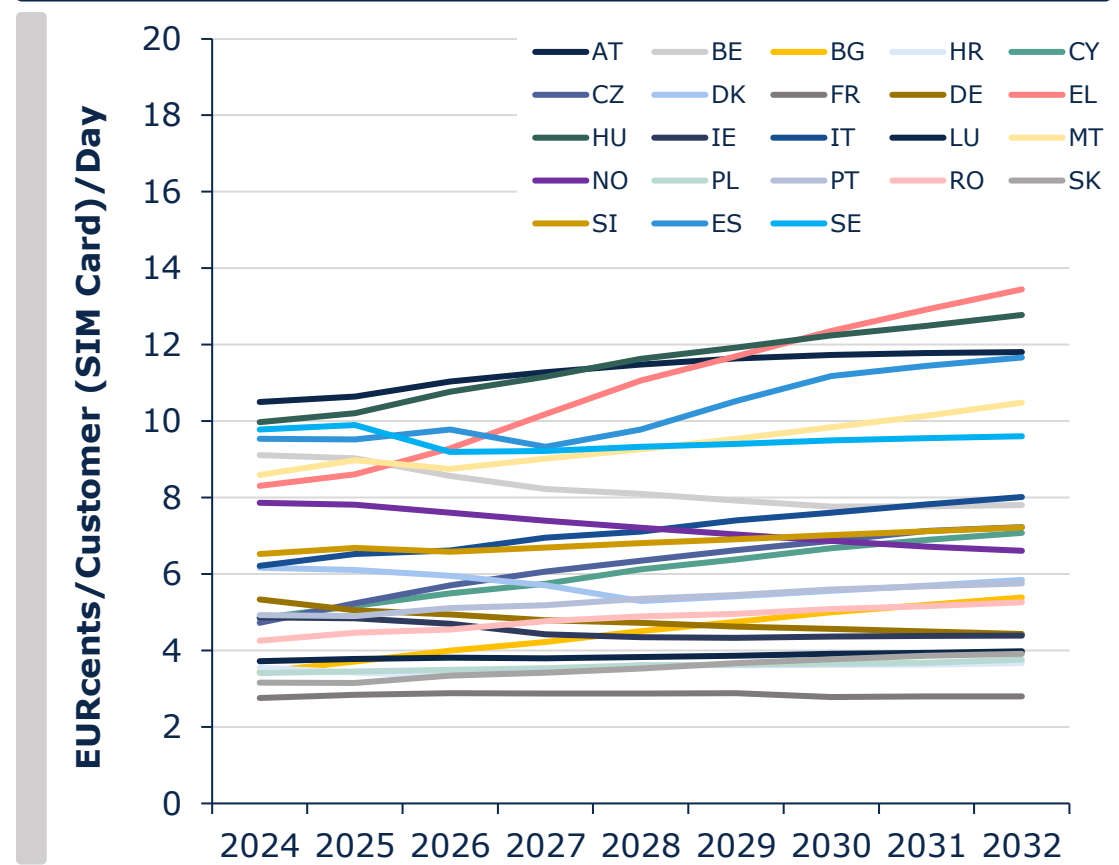
The model can also produce unit costs with a dual component: one for traffic and another based on a per-customer basis

Scenarios: Base-Case & Common costs allocated based on customers

Evolution of costs - Traffic component*



Evolution of costs - Customers component



* These cost references include 0.095 EUR/GB of transit costs, as per the figure estimated by the EC.

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2.1 Traditional Data Roaming

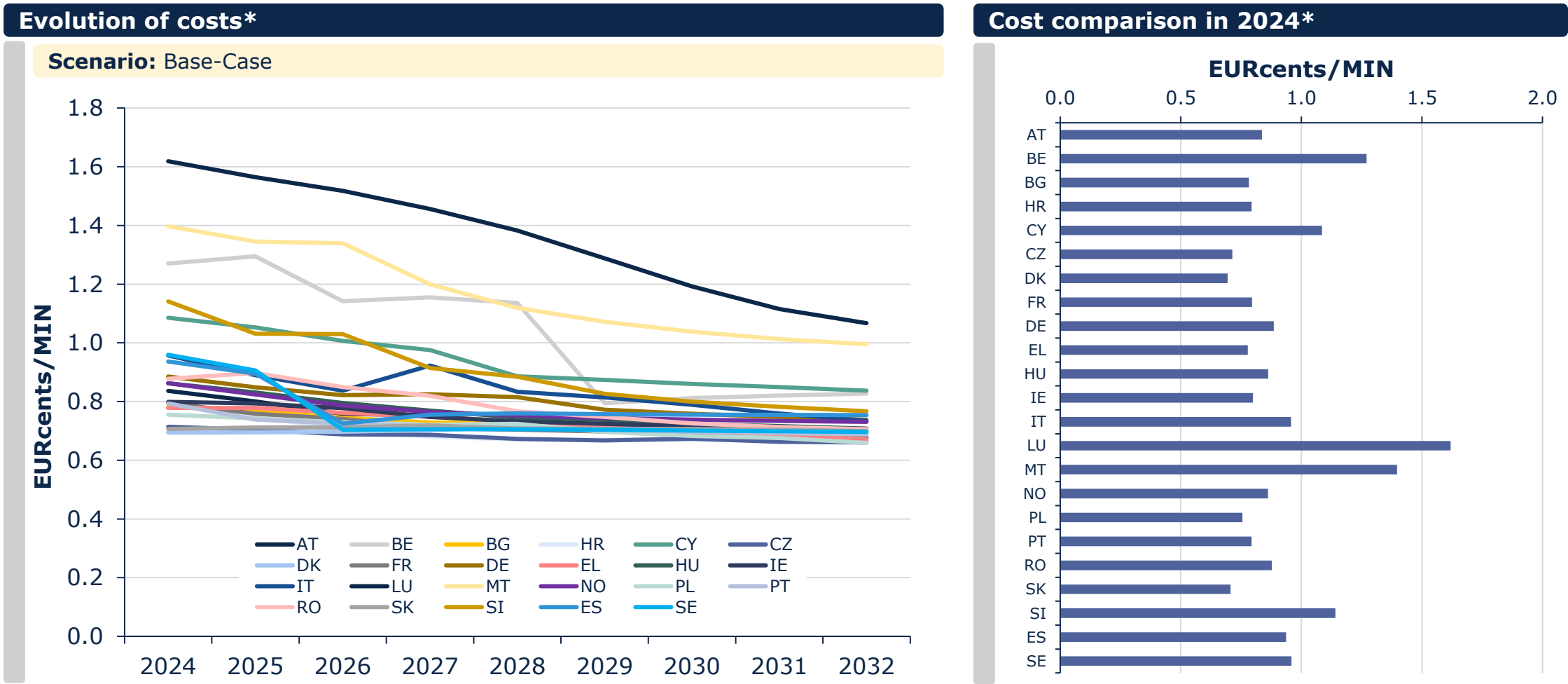
2.2 M2M Data Roaming

2.3 Voice Roaming

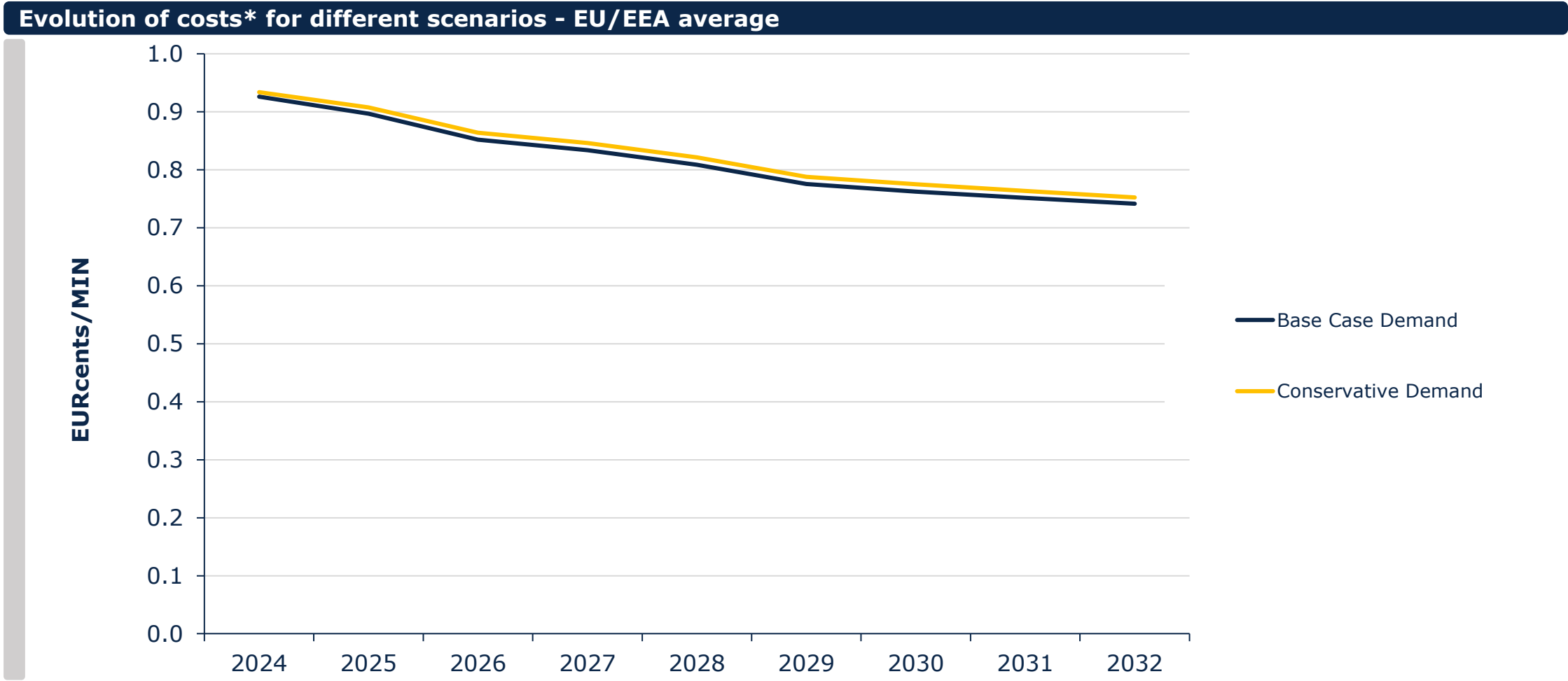
2.4 Voice Termination

3. Consultation Outcomes

Voice roaming unit costs show that small countries (Luxemburg, Malta, Slovenia and Cyprus) generally present higher results due their lower economies of scale

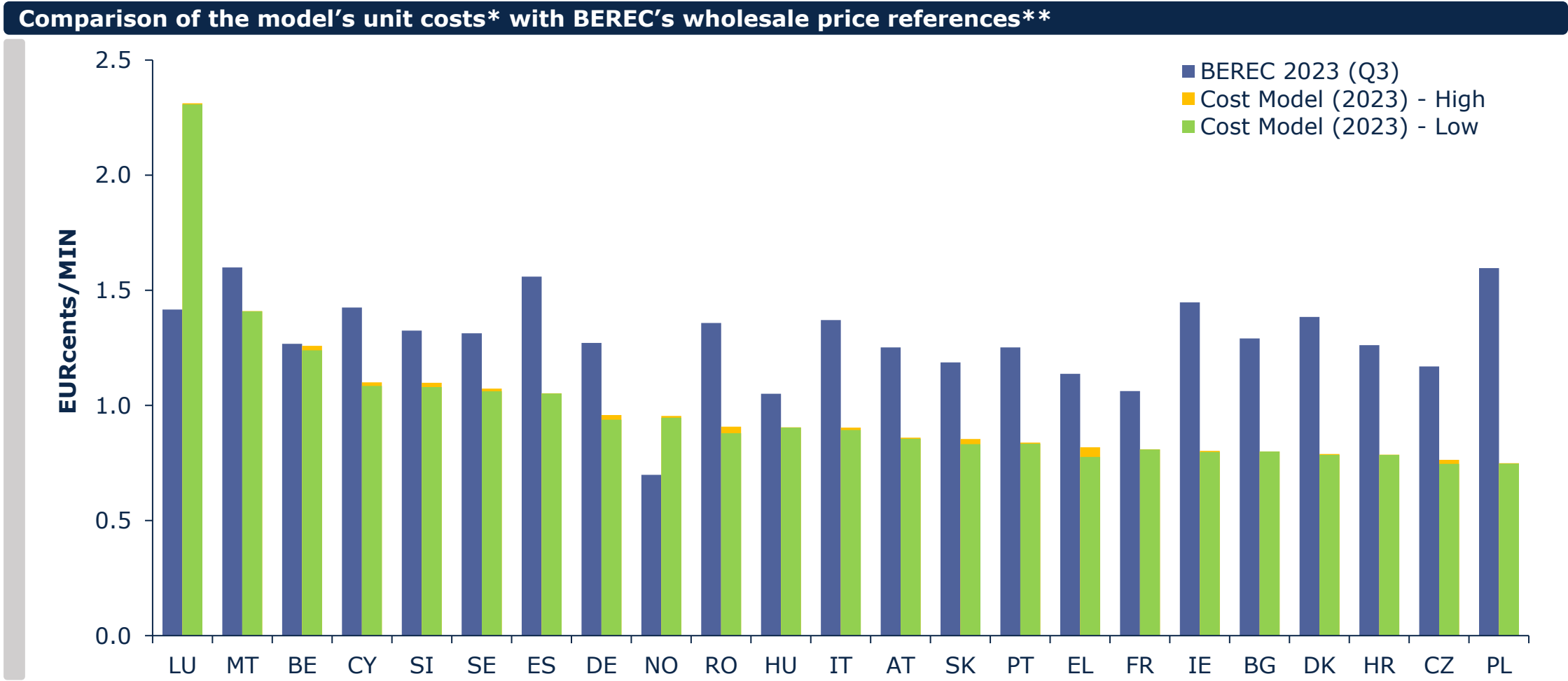


In the case of voice services, no significant variations are observed in the results of the Base-Case vs Conservative Demand scenarios



* These cost references include 0.4 EURCents/min of transit costs, as per the figure estimated by the EC, and 0.2 EURCents/min of termination costs, as per the COMMISSION DELEGATED REGULATION (EU) 2021/654 of 18 December 2020.

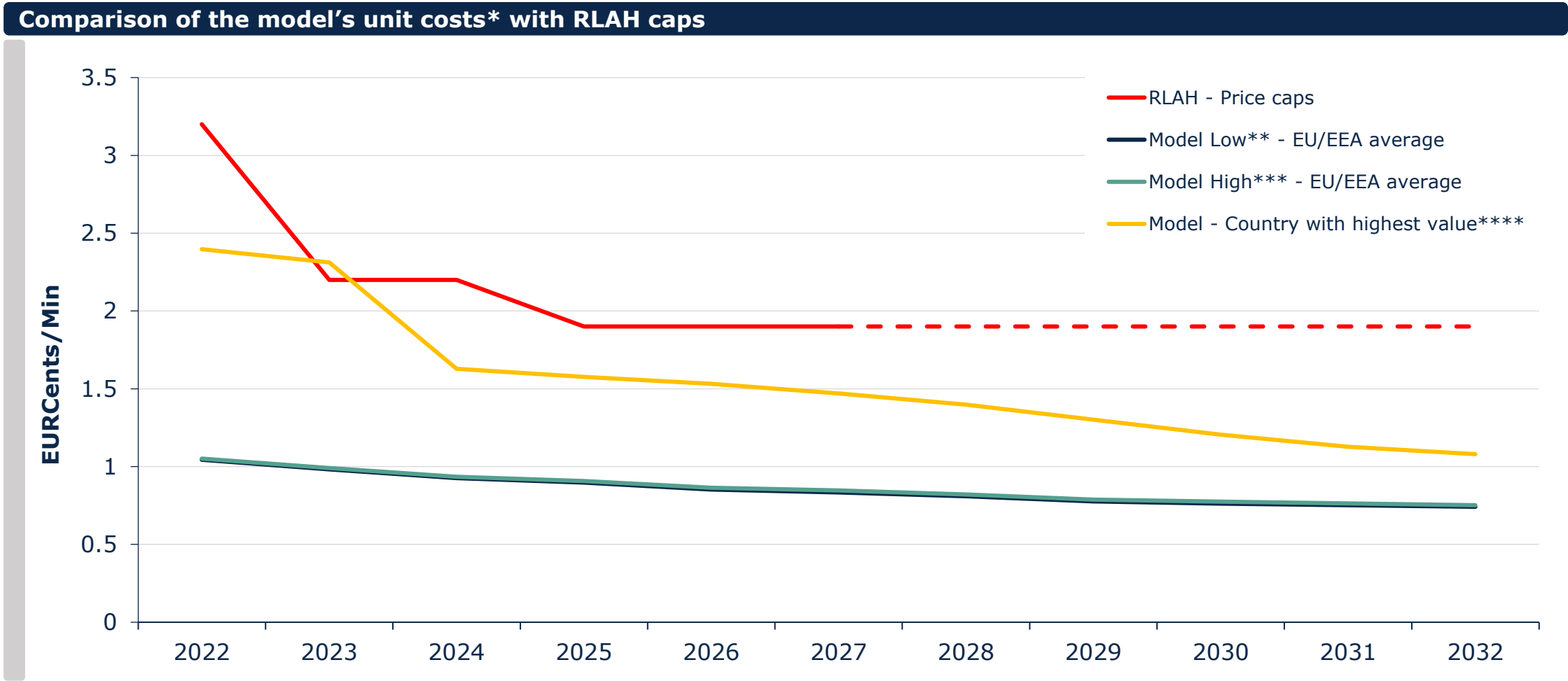
The model's Voice Roaming results are also in similar levels than wholesale market prices in Q3 2023



* These cost references include 0.4 EURCents/min of transit costs, as per the figure estimated by the EC, and 0.2 EURCents/min of termination costs, as per the COMMISSION DELEGATED REGULATION (EU) 2021/654 of 18 December 2020.

** Source: [30th BEREC International Roaming Benchmark Data and Monitoring Report](#)

Voice Roaming results estimated for next years are also below the price caps in place



* These cost references include 0.4 EURCents/min of transit costs, as per the figure estimated by the EC, and 0.2 EURCents/min of termination costs, as per the COMMISSION DELEGATED REGULATION (EU) 2021/654 of 18 December 2020.

** Scenario producing the lowest unit cost results: Base-Case.

*** Scenario producing the highest unit cost results: Conservative.

**** For every year, the unit cost relates to the country with the highest cost of the sample, considering any of the 2 scenarios (Base-Case & Conservative).

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2.1 Traditional Data Roaming

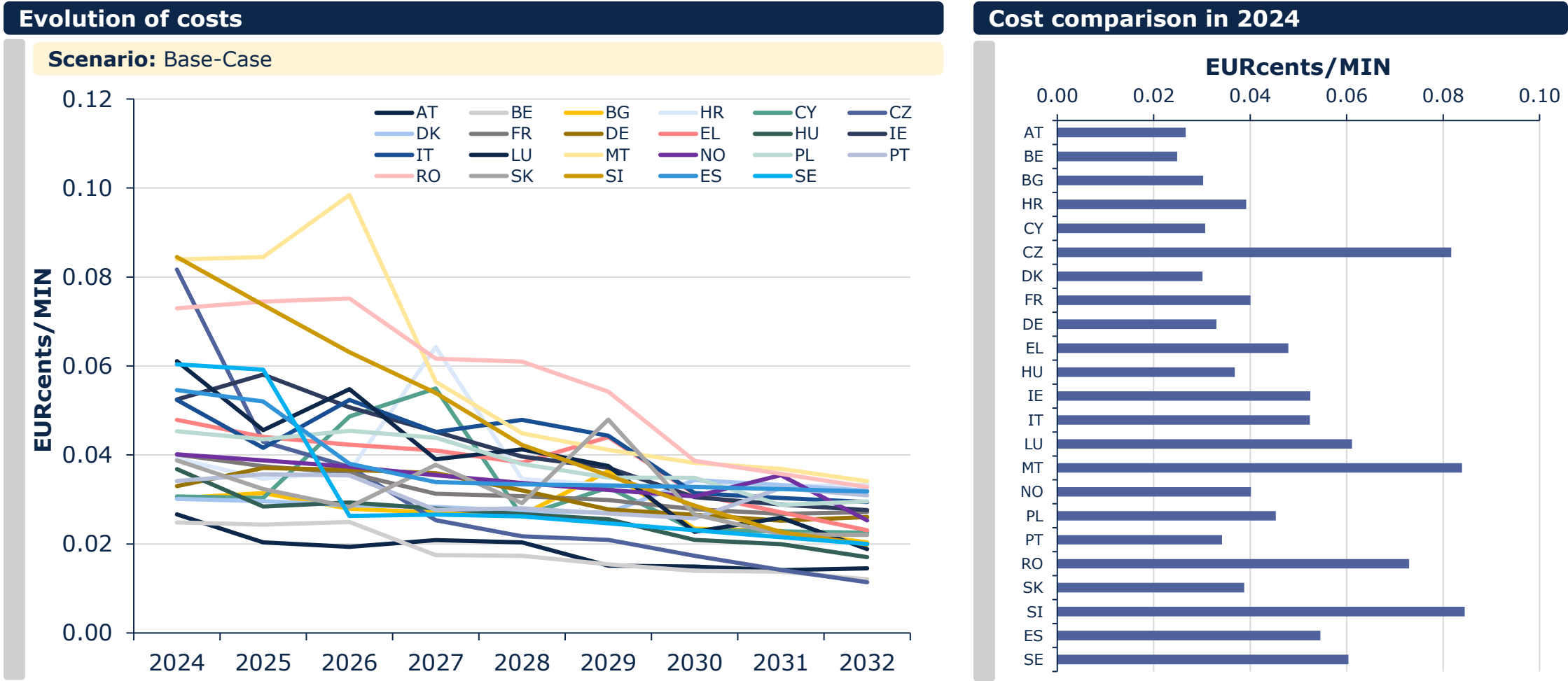
2.2 M2M Data Roaming

2.3 Voice Roaming

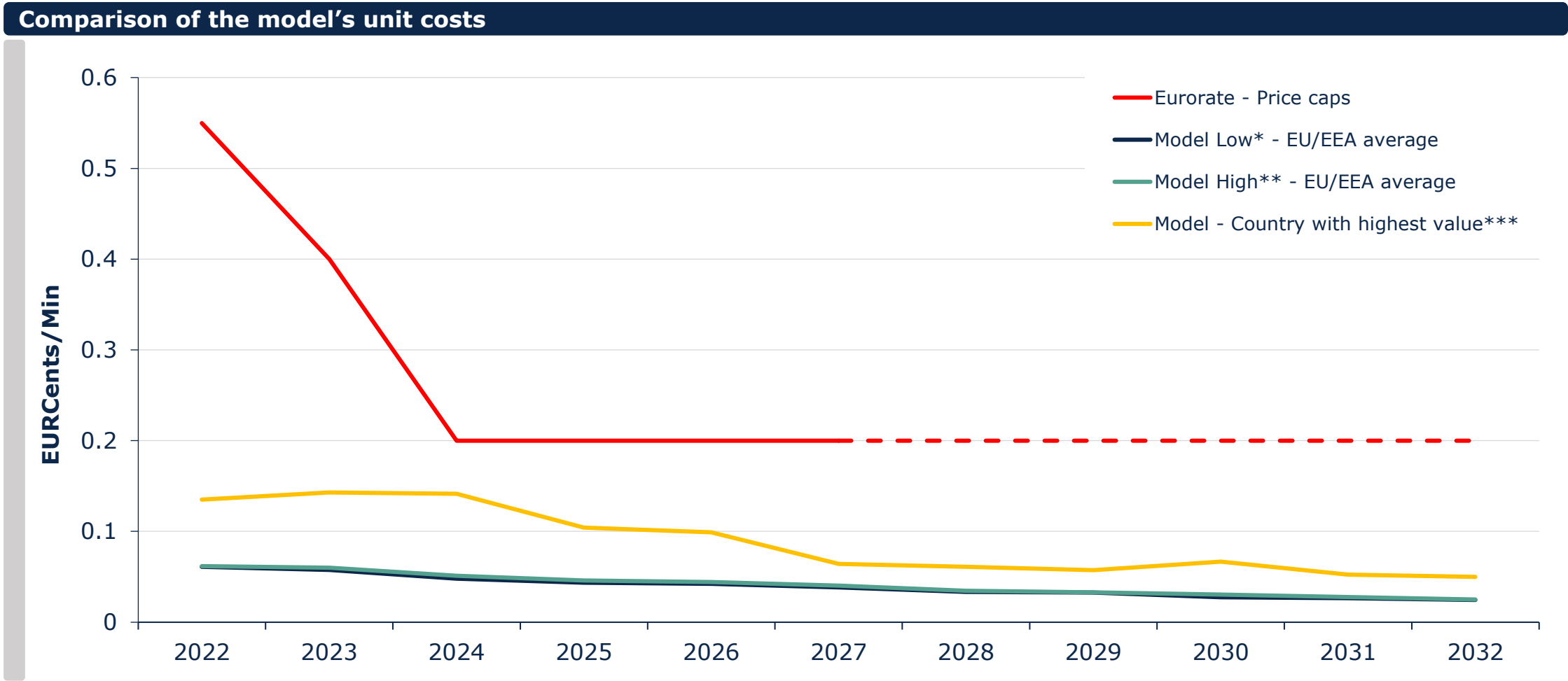
2.4 Voice Termination

3. Consultation Outcomes

Voice termination unit costs range between around 0.01 and 0.10 EURcents/min for the EU/EEA countries beyond 2024



Voice Termination results show that a sufficient gap exists with the Eurorate foreseen in the upcoming years for the MTR



* Scenario producing the lowest unit cost results: Base-Case.
** Scenario producing the highest unit cost results: Conservative.
*** For every year, the unit cost relates to the country with the highest cost of the sample, considering any of the 2 scenarios (Base-Case & Conservative).

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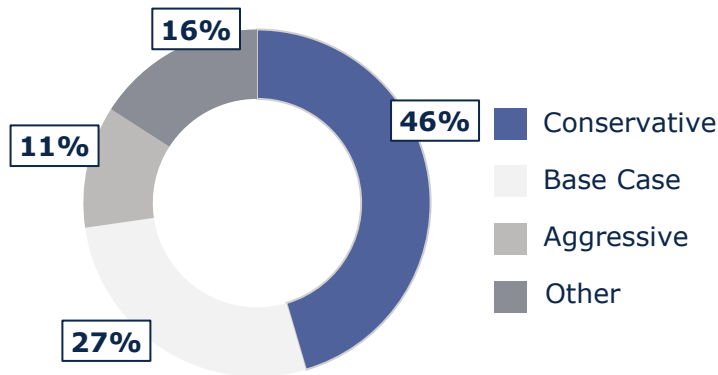
3. Consultation Outcomes

3.1 Assessment of feedback in 1st consultation

3.2 Assessment of feedback in 2nd consultation

Stakeholders expressed their position and feedback regarding the consulted methodological aspects and implementations

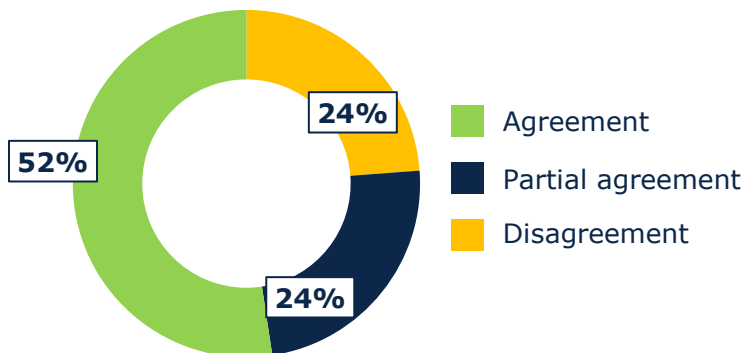
Preferred Demand Scenario



Main comments received:

- ▶ **Conservative** is preferred as data volume growth is expected to decline
- ▶ **Base Case** is preferred as it relies on historical trends
- ▶ **Aggressive** is preferred as the 5G roll-out will lead to higher data volumes

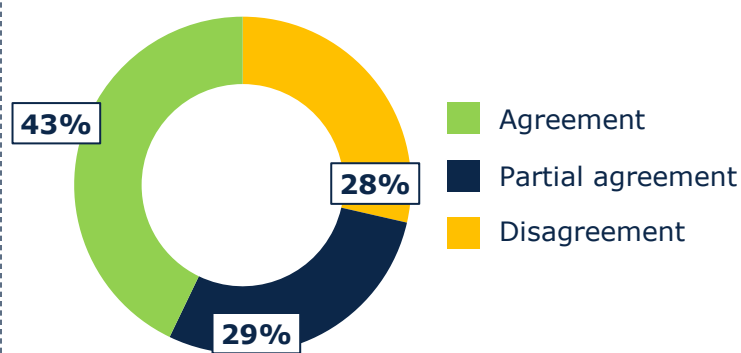
Implementation of 5G¹



Main comments received:

- ▶ The model often assumes a decrease in access sites when traffic is shifted towards 5G
- ▶ 5G costs/investment should not be overestimated/underestimated

Separation of M2M services¹

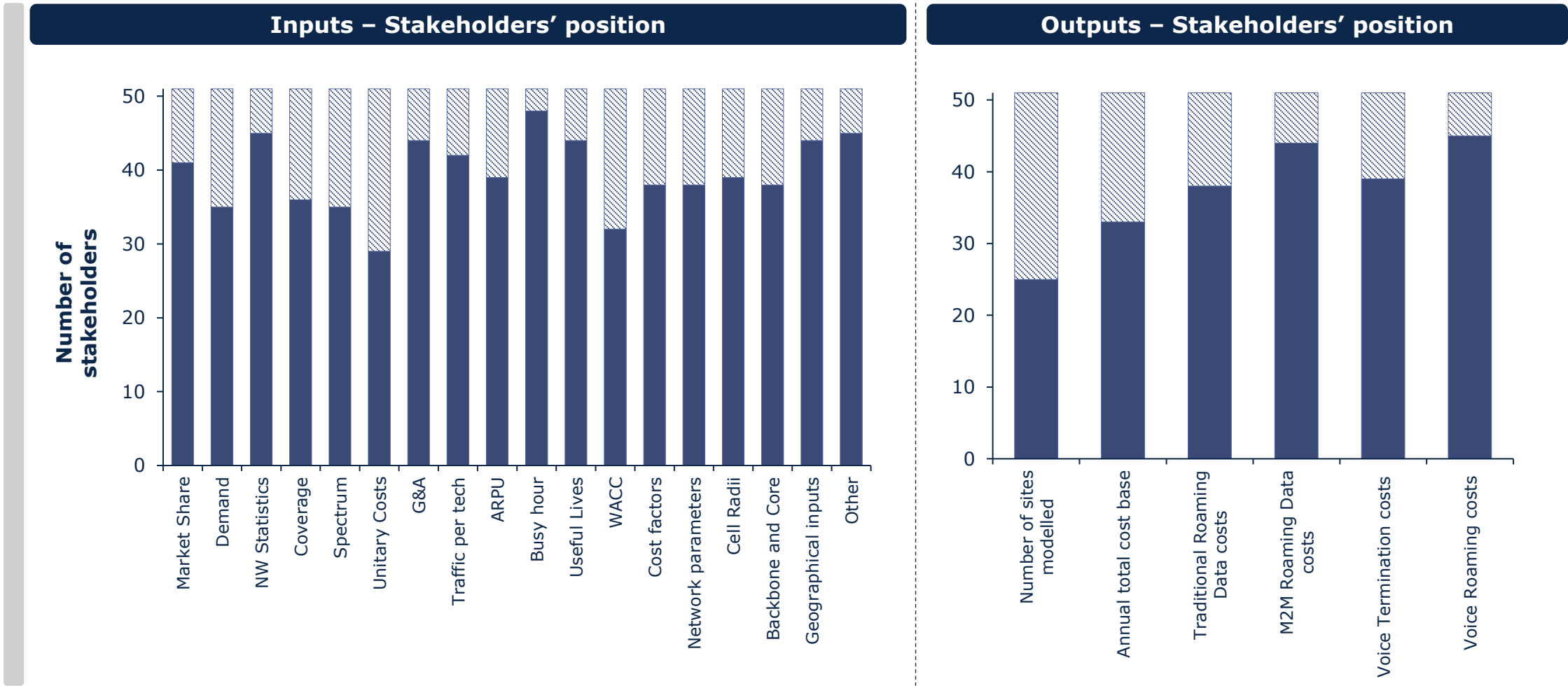


Main comments received:

- ▶ Costs should not only be allocated on a traffic-basis but also on a customer-basis
- ▶ The definition of M2M services should be standardized by the EC
- ▶ Operators face difficulties to distinguish M2M traffic

¹ Percentages displayed are calculated after removing duplicate comments (copy & paste) from operators belonging to the same telecom groups.

Stakeholders also provided their feedback about inputs and outputs of the updated model



Participant stakeholders in agreement (agreement is assumed when no feedback was provided for the consulted input/output)

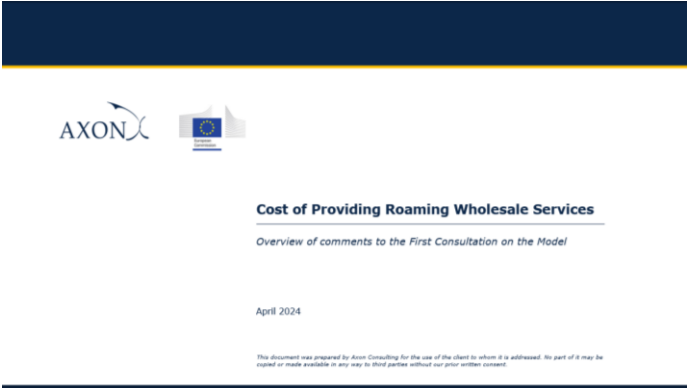
The EC/Axon team addressed the relevant feedback received by stakeholders when designing the model submitted to the 2nd consultation phase

- ▶ The EC/Axon team analysed one by one the comments received during the 1st consultation round.
- ▶ When considered appropriate and justified, updates/modifications were introduced in the model of each country to address the received feedback.
- ▶ As part of the 2nd consultation round, stakeholders received:
 - An updated version of the model with introduced updates/modifications.
 - A thorough presentation providing detailed responses to the questions and comments submitted by the stakeholders in the 1st consultation round.

Illustrative excerpt of the list of changes introduced in the model

Worksheet	Description of the change
UPDATE OF INPUT PARAMETERS	
1E INP SPECTRUM	The following spectrum bands have been updated: 700MHz, 1800 MHz, 2600-TDD MHz, 26 GHz (TDD).
1F INP UNITARY COSTS	A review of costs for spectrum licences has been performed taking into account the new data/indications received.
1G INP COUNTRY ECO PAR	Inflation rates have been updated
2E INP BUSY HOUR	The "Percentage of traffic in the busiest hour of the day" has been updated for the "Subscribers" category.
2G INP RESOURCES LIFE	The useful life has been included for the 26 GHz band.
3A MAP SERV2DRIV	The usage factor of on-net voice services has been updated for the Driver "2G/3G Busy Hour Call Attempts in the MSC-Ss"
3B MAP ROUTING FACTORS	The "Blocking probability" and "Idle traffic" has been adjusted for backbone and core network related elements.
INCORPORATION OF THE NEW SCENARIO FOR M2M SERVICES: "Common costs allocated based on customers"	
COVER	A new scenario "Common costs allocation" has been created with two options: i) Common costs allocated based on traffic and ii) Common costs allocated based on customers
1I INP TECHNOLOGY DIS	The table "Disaggregation per Type of Data Service" has been adjusted to incorporate the following items: - % Customers (SIM Cards), separating between "Traditional data services provided to end-customers" and "M2M / IoT data services". - Roamer days, corresponding to the number of days spent by roamers in the country during the year.
9B OUT SERV LRIC UNIT COST	An additional step "Support calculations to perform the allocation of common costs based on customers (instead of on traffic)" has been introduced, allowing the allocation of common costs based on customers when the option "Common costs allocated based on customers" is selected in the COVER worksheet.
9G OUT RESULTS - NW	Results for M2M Domestic and Roaming services (located at the end of the worksheet) have been disaggregated in two different components (to be added together to make up the total cost of the service): - First component: a cost per consumption measured in "EUR/GB" (available in table 9.A for M2M Domestic Data, and 10.A for M2M Roaming Data) - Second component: a cost per customer measured in "EURcents / Customer (SIM Card) / Day" (available in table 9.B for M2M Domestic Data, and 10.B for M2M Roaming Data, located on the right) Important note: Only when the option "Common costs allocated based on customers" has been selected in the COVER worksheet, the model will present results for the second component (in tables 9.B and 10.B). On the contrary, when the option "Common costs allocated based on traffic" has been selected, all costs are assumed to be recovered by means of the first component.
10C OUT RESULTS - POLICY	Same as previous change

Presentation treating the feedback received in 1st consultation



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3.1 Assessment of feedback in 1st consultation

3.2 Assessment of feedback in 2nd consultation

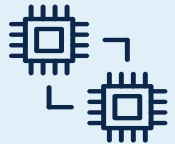
Stakeholders were requested to provide their feedback on 5 topics



**Q1. Allocation of
common costs**



**Q2. Incorporation of
5G**



**Q3. Separation of
M2M services**



Q4. Outputs



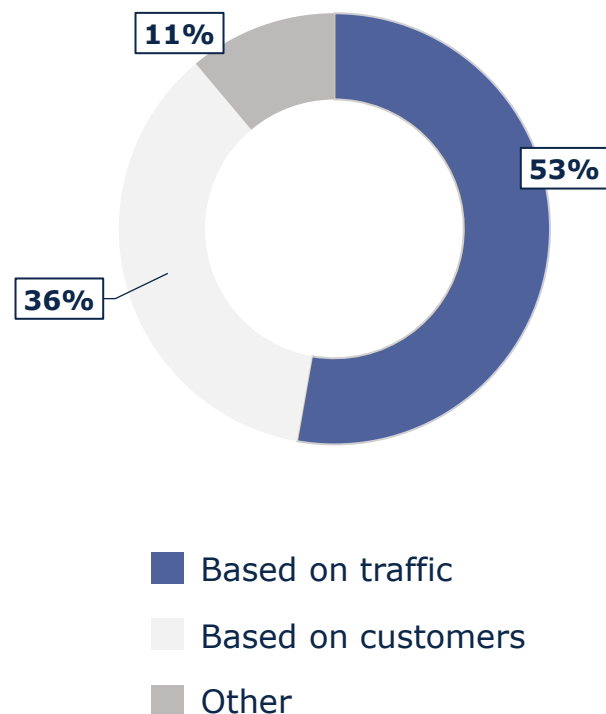
Q5. Transit charges



Q1. Allocation of common costs

Stakeholders have favoured the allocation of common costs based on traffic

Preferred cost-allocation scenario



Summary of main feedback received

Based on customers

- ▶ Common costs of data services present a fixed nature that shows a small dependence on traffic.
- ▶ More appropriate particularly for cases where M2M services generate low amounts of traffic (when compared with traditional services).

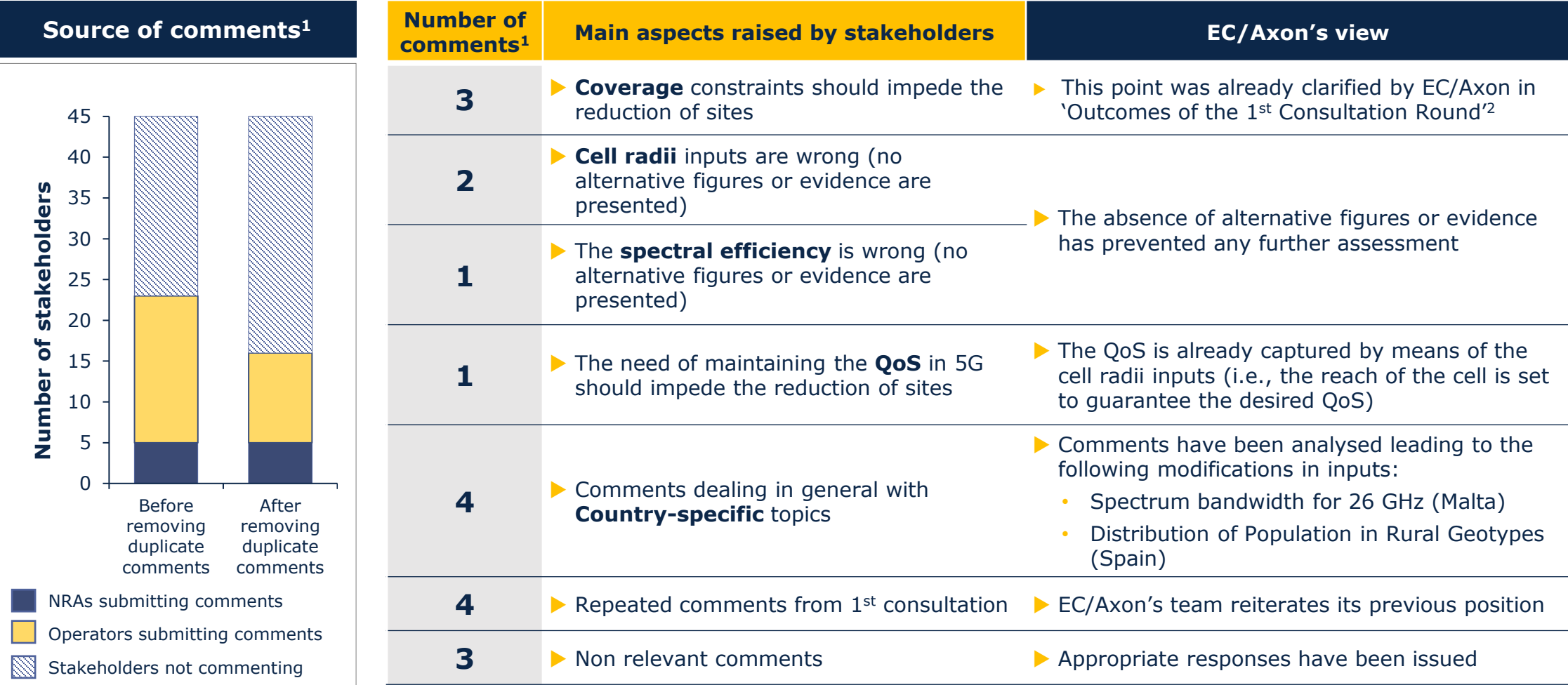
Based on traffic

- ▶ This option is simpler, more transparent and universal reading.
- ▶ M2M-services generally produce lower traffic volumes than traditional data services. Therefore, any allocation based on customers would under-estimate the costs of traditional data services.
- ▶ An approximation based on the volume of data responds better to the current availability of data.
- ▶ This option avoids distortions of competition between MNOs and (IoT) MVNOs.



Q2. Incorporation of 5G

Although additional comments regarding the 5G implementation have been received, we notice that the feedback is considerably scattered



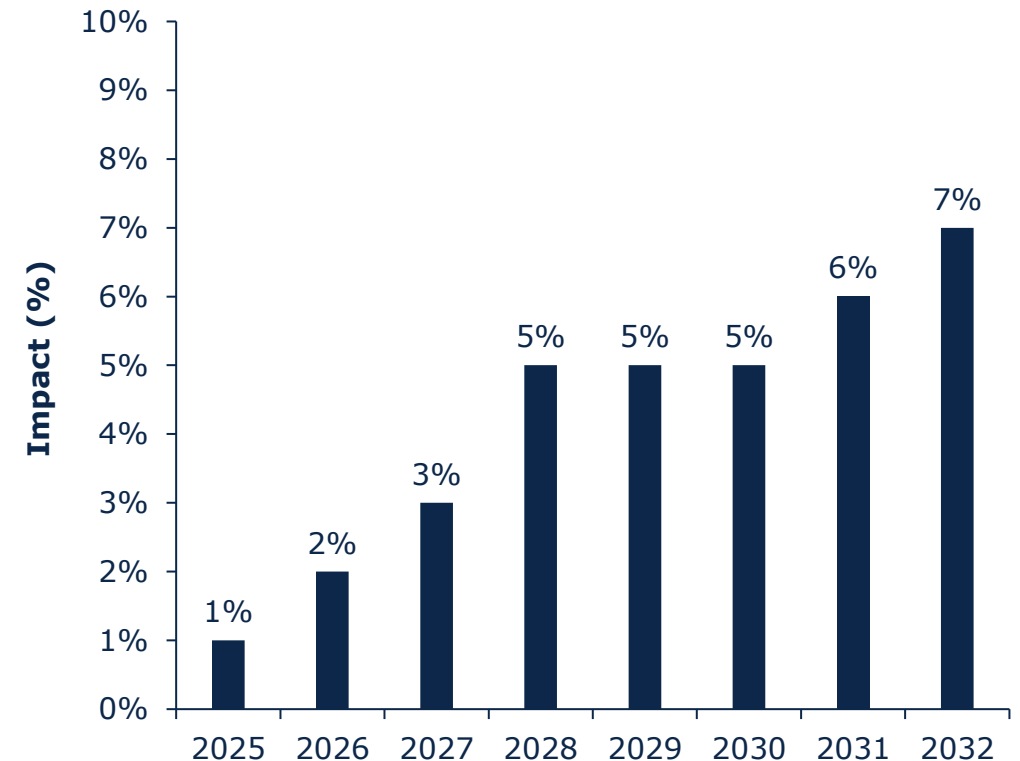


Q2. Incorporation of 5G

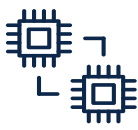
We have introduced a condition in the model's algorithm used for calculating sites, in order to prevent any (potential) decrease in the number of sites over time

- ▶ As presented in the 1st consultation round, the model for certain EU/EEA countries showed a decrease in the number of estimated access sites over the years. This was justified by the expected (conservative) demand growth for the coming years and the performance improvements of the 5G technology.
- ▶ After analyzing the comments received in the 2nd consultation round, the EC/Axon team notices that the feedback (see previous slide) does not actually challenge the model's inputs or calculations.
- ▶ However, considering the concerns among several project stakeholders regarding the reduction in sites estimated by the model, the EC/Axon team has decided to adopt a conservative approach to this aspect.
- ▶ Specifically, the EC/Axon team has introduced a condition in the model's algorithm used for calculating sites, in order to prevent any (potential) decrease in the number of sites over time¹. This ensures that the modeled operator does not need to dismantle a node to (potentially) reinstall it a few years later.

Impact in unit cost of data services – EU/EEA average

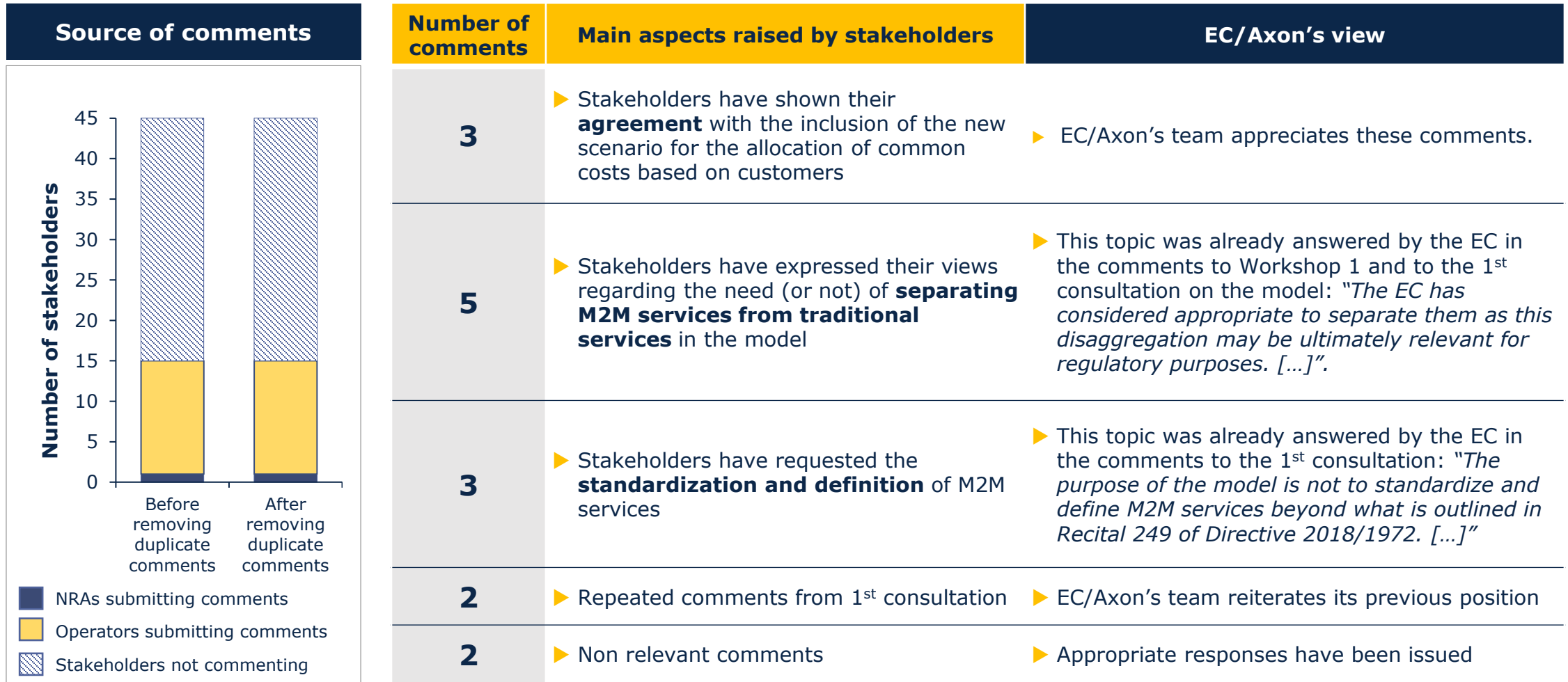


¹ The algorithm assumes that the number of sites for year "n" is the maximum of: i) number of sites estimated in year "n" and ii) number of sites for year "n-1".



Q3. Separation of M2M services

The limited feedback received regarding the M2M implementation is generally outside the scope of the consultation, which focuses on the model and the produced results





Q4. Outputs

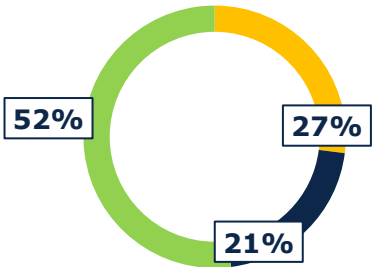
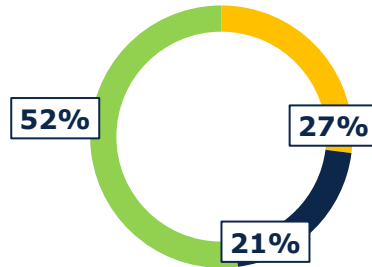
The feedback received on the model’s outcomes does not challenge the validity of the produced results

Source of comments	Number of comments	Main aspects raised by stakeholders	EC/Axon’s view
<p>Before removing duplicate comments</p> <p>22% 28% 50%</p>	5	▶ Comments related to the setting of regulatory wholesale rates	▶ This topic was already treated in the comments to the 1 st consultation: <i>"The utilization of the cost model for the setting of wholesale rates will be accomplished in a subsequent legislative process, to be carried out by the EC in conjunction with the European Parliament and the Council, [...]."</i>
<p>After removing duplicate comments</p> <p>24% 30% 46%</p>	4	▶ The model underestimates/overestimates costs (no evidence has been presented)	▶ The absence of evidence has prevented any further assessment. The proper recovery of costs in each country was guaranteed through the 'Reconciliation assessment' described in the Methodological Approach document.
	2	▶ Questioning the highest result produced by the model for Belgium	▶ This result is mostly related to the specific market dynamics in this country. Due to confidentiality reasons, we are unable to disclose further details about these dynamics.
	11	▶ Country-specific inputs comments regarding adopted	▶ Comments have been analysed in detail. Only the update of the years for the 2G/3G phase-out of France has been considered opportune.
	5	▶ Repeated comments from 1 st consultation	▶ EC/Axon’s team reiterates its previous position
	8	▶ Non relevant comments	▶ Appropriate responses have been issued



Q5. Transit charges

A reasonable level of acceptance is observed for transit charges proposed by the EC in the 2nd consultation round

Expressed Position	Number of comments	Main aspects raised by stakeholders	EC/Axon's view
<p>Before removing duplicate comments</p>  <p>After removing duplicate comments</p>  <p>Legend: Agreement Partial agreement Disagreement</p>	9	<ul style="list-style-type: none">▶ Transit charges should be higher▶ There are operators with higher transit charges	<ul style="list-style-type: none">▶ Transit charges are calculated based on an average that includes outliers. Additionally, the Commission will endeavor to monitor the movement of transit charges and update them in the future if necessary.
	2	<ul style="list-style-type: none">▶ Transit charges should be lower	
	2	<ul style="list-style-type: none">▶ It should be assumed that transit charges will decrease over the years (instead of assuming constant transit charges)	<ul style="list-style-type: none">▶ The EC/Axon team acknowledges this comment and will take it into consideration. To this respect, the EC/Axon team will also keep in mind the revision of transit charges when updating the model in the future.
	1	<ul style="list-style-type: none">▶ Repeated comments from 1st consultation	<ul style="list-style-type: none">▶ EC/Axon's team reiterates its previous position
	4	<ul style="list-style-type: none">▶ Non relevant comments	<ul style="list-style-type: none">▶ Appropriate responses have been issued

Summary of changes introduced in the model after the 2nd consultation phase

- ▶ We have introduced a **condition in the model's algorithm** used for calculating sites, in order **to prevent** any (potential) **decrease** in the number **of sites over time**.
- ▶ The following **inputs** have been updated:
 - Spectrum bandwidth for 26 GHz (Malta)
 - Distribution of Population in Rural Geotypes (Spain)
 - Years for the 2G/3G phase-out (France)
- ▶ Additionally, the EC/Axon team will keep in mind the **revision of transit charges** when updating the model in the future.

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