Europe Economics

Financial incentives for electricity and natural gas distribution in the regulatory period from 2025

Final report

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Executive Summary

VREG is in the process of drawing up its tariff methodology for the Flemish electricity and natural gas distribution system operators for the regulatory period beginning in January 2025.

As part of this process, VREG has commissioned Europe Economics to provide advice on financial incentives that can be used to incentivise distribution system operators to provide high-quality and customer-oriented services in an efficient and cost-effective manner. The study comprises the following two phases:

1. Development of a framework for financial incentives
2. Development of five concrete financial incentive mechanisms

Phase 1: Framework for financial incentives

As there are many possible objectives a regulator may wish to incentivise, but not all are suitable for a financial incentive mechanism, the first step in developing our framework was to consider the range of candidate objectives, along with a suite of potential deliverables, for electricity and gas DSOs operating in Flanders. To ensure that only suitable objectives and deliverables are incentivized through a financial incentive, we developed a decision tree that assesses each candidate objective against a series of questions focussing on whether:

- the objective is largely within the DSO's control;
- absolute compliance is required;
- the objective is important to consumers, citizens and/or the environment;
- it is feasible to measure and/or assess deliverables;
- measuring and reporting performance is unduly burdensome;
- there is a risk of creating perverse incentives; and
- historical data are available.

The answers are then used to determine the most suitable mechanism for incentivising each objective (if any). This decision tree also forms the basis for our recommendations regarding the objectives that could be incentivized financially and that are developed in further detail during the second phase of the project.

Our assessment of potential objectives and deliverables, along with other aspects of our study, have been informed by a review of the approaches taken by five other European regulators to setting financial incentives for the quality of service provided by electricity and gas DSOs.

We then considered the different types of mechanisms regulators can use to incentivise the quality of service provided to customers. Our recommendation is that VREG switches from its current relative financial incentive scheme (a zero-sum mechanism based on comparisons of performance by Flemish DSOs), to an incentive scheme based on absolute reference values. This is because following the 2018 merger Fluvius is the operating company for all DSOs active in Flanders, which means that awarding zero-sum financial rewards and penalties across DSOs is unlikely to provide strong incentives for Fluvius to maintain and improve its quality of service.

Finally, the framework also sets out our approach to determining the parameters of financial incentive mechanisms.

Our recommendation for setting reference values for absolute incentives is to use the following two-step process (where possible) using comparable data from Flemish DSOs:

1. Identify frontier level of performance, either based on the upper quartile level of performance among Flemish DSOs in the year in which performance was the best, or else the best level of historical performance for Fluvius as a whole (in cases where DSO-level data are not available).
2. Apply an assumption for expected improvements in performance over time, where historical data show a trend improvement.

Our recommendation for setting unit incentive rates for the first year of the next regulatory period is to take a top-down approach that begins by determining the appropriate amount of revenue of risk for the incentives package as a whole. The total revenue at risk is then distributed between the objectives and deliverables which are incentivized financially, taking into account their relative importance. This is followed by determination of a reasonable range over which performance is expected to vary for each objective (e.g. based on historical variation in performance). For each incentive and deliverable, the unit incentive rate for the first year of the next regulatory period is then derived by dividing the revenue at risk by the corresponding reasonable range. Finally, we recommend that this incentive rate remains fixed in real terms for the duration of the regulatory period through indexation to CPI.

Phase 2: Design of five financial incentives

Our Phase 1 assessment recommends financial incentives based on quantitative measures for the following four objectives:

- Ensuring security of supply
- Providing good connections service
- Enhancing customer satisfaction
- Providing smart metering information

In addition, our framework suggests that a financial incentive could be suitable for the objective "Innovative grid management to facilitate the energy transition" provided that any issues around perverse incentives can be mitigated by careful mechanism design. Given the lack of historical data available for the deliverables associated with this objective, our framework recommends an expert panel assessment for this mechanism.

All of the five objectives discussed above are relevant for both electricity and gas.

For the electricity sector we recommend that the total upside across the five financial incentives is capped at up to 5 per cent of Fluvius' allowed income for endogenous costs in the first year of the price control, and that the total downside is capped at up to 4.5 per cent.

For the gas sector we recommend the total upside across the five financial incentives is capped at up to 2.25 per cent of Fluvius' allowed income for endogenous costs in the first year of the price control, and that the total downside is capped at up to 1.75 per cent.

Our recommendations on allocating the maximum upside and downside between the five financial incentives is set out in the table below. These recommendations have been broadly informed by regulatory precedents, and also take account of our own informed judgement in the light of the Flanders context.

Table 1: Allocation of revenue at risk between incentive mechanisms (%)

Financial incentive mechanism	Electricity		Gas	
	Upside	*Downside*	*Upside*	*Downside*
Ensuring Security of Supply	2.5	2.5	0.25	0.25
Providing a Good Connections Service	0.75	0.75	0.25	0.25
Enhancing Customer Satisfaction	0.75	0.75	0.75	0.75
Providing Smart Metering Information	0.5	0.5	0.5	0.5
Innovative Grid Management to Facilitate the Energy Transition*	0.5	0	0.5	0
Total	**5.0**	**4.5**	**2.25**	**1.75**

*Our recommendation for this mechanism is that it is reward-only.

Ensuring security of supply for Fluvius' customers can be incentivized through two deliverables: interruption frequency which measures the annual average number of interruptions per distribution network user, and interruption duration which measures the annual average duration of interruptions in hours, minutes and seconds. These deliverables are utilised separately in both low voltage and medium voltage networks for electricity DSOs and for low pressure and medium pressure grids for gas DSOs.

Similarly, the objective of providing a good connections service can be incentivized financially through the following two deliverables: connection quotations on time which measures the percentage of quotation applications closed within the applicable deadlines, and connections on time which measures the percentage of connection applications closed within the applicable deadlines (as set out in the technical regulations). These deliverables are utilised for low, high and very high power/pressure connection levels for both electricity and gas DSOs.

Incentivising Fluvius to enhance the satisfaction of customers that interact with their DSO can be done by assessing performance against a composite customer satisfaction score across a range of service areas based on survey information. Although survey results capture the satisfaction of both electricity and gas customers together, separate parameters apply to the two sectors due to differences in the services areas relevant for electricity and gas customers.

The provision of smart metering information can be incentivized through deliverables relating to the quality of the data Fluvius provides on its online portal, Mijn Fluvius. These include measures related to completeness which assess how much consumption data Fluvius successfully collects against the amount of data that Fluvius expects to collect, based on the number of customers with MyFluvius accounts, smart meters and mandates. It also includes measures related to timeliness which assess how quickly Fluvius makes consumption data from smart meters available to view on the portal.

The objective of innovative grid management to facilitate the energy transition can be used to reward Fluvius for innovative projects that meet a set of relevant criteria based on an expert panel assessment. The expert panels (which would be separate for electricity and gas) would be comprised of up to five independent industry experts and a representative from VREG, selected by VREG on the basis of their expertise in the field and their impartiality. We have made recommendations on governance arrangements that are designed to ensure the transparency and independence of the assessment process.

Every two years, starting at the end of 2026, Fluvius can submit innovation projects to the panel for assessment. We recommend that, for each of electricity and gas, no more than five projects can be submitted at each assessment. To be eligible for rewards projects must be innovative, contribute towards the energy transition, demonstrate success, deliver significant benefits and go beyond Fluvius' business-as-usual activities. The panel will assess projects in two stages. Stage 1 assesses the eligibility of projects for rewards, based on the eligibility criteria. Stage 2 will then assign a numerical score of 1-10 to the overall package of eligible projects, based on specified criteria. The average score from the panel will then be used to determine financial rewards for Fluvius.

For each incentive based on a quantitative metric, the detailed parameters (reference values, caps and collars and unit incentive rates[1]) for the relevant deliverables are set out in Appendix 1.

[1] One of the inputs into the calculation of unit incentive rates is the total allowed income for endogenous costs in the first year of the price control. As this is not known for certain at this point, the figures for unit incentive rates in this report are only approximate. Final figures for unit incentive rates will therefore need to be calculated by VREG when it knows the final figure for total allowed income for endogenous costs in the first year of the price control.

1 Introduction

VREG is in the process of drawing up its tariff methodology for the Flemish electricity and natural gas distribution system operators for the regulatory period beginning in January 2025.

As part of this process, VREG has commissioned Europe Economics to provide advice on financial incentives that can be used to incentivise distribution system operators to provide high-quality and customer-oriented services in an efficient and cost-effective manner. The study comprises the following two phases:

1. Development of a framework for financial incentives
2. Development of five concrete financial incentive mechanisms

This report sets out our findings from both phases of the analysis.

1.1 Parameters of incentive schemes

The design of financial incentive schemes requires decisions regarding a number of relevant parameters which are summarised and briefly explained in the table below.

Table 1.1: Summary of parameters for financial incentive schemes

Parameter	Short explanation
Deliverable(s)	Measure(s) used to calculate performance of DSOs under a specific objective
Type of financial incentive	Absolute or relative incentive scheme (or guaranteed standards of performance)
Weight of financial incentive	Percentage of allowed income affected by the incentive scheme
Reference value	The performance level at which company does not earn any financial reward nor receives any financial penalty
Cap/collar	The maximum possible reward/penalty that the company can earn/receive
Unit incentive rate	The financial reward/penalty per unit of performance improvement/deterioration relative to reference value

1.2 Structure of the report

Chapter 2 provides an overview of the current tariff methodology in Flanders including the financial incentive mechanisms applicable for the current regulatory period that runs between 2021 and 2024.

Chapter 3 summarises the key lessons from quality of service incentive mechanisms used by regulators of electricity and gas distribution networks in five jurisdictions (the Netherlands, Germany, France, Ireland and Great Britain).

Chapter 4 sets out our framework for assessing which regulatory objectives should be incentivised by means of a financial incentive mechanism. Drawing on the current regulatory framework and the experience of other regulators, we then present a list of candidate objectives, along with associated deliverables, before applying our assessment framework to these objectives.

Chapter 5 describes different types of mechanisms that regulators can use to incentivise the quality of service provided to customers and sets out our recommendation of switching to an absolute incentive mechanism.

Chapter 6 then presents our proposed framework for assessing performance and determining the financial impact for those objectives and deliverables subject to a financial incentive.

Chapter 7 provides our recommendations for Phase 2 of the study.

Chapter 8 sets out our recommendations regarding the overall financial impact of the five incentive mechanisms developed during the second phase.

Chapter 9 presents our recommendations for the detailed design of the financial incentives based on quantitative metrics. These incentives relate to ensuring the security of supply, providing a good connections service, enhancing customer satisfaction and providing smart metering information.

Chapter 10 presents our recommendations for the detailed design of the "innovative grid management to facilitate the energy transition" incentive which is based on expert panel assessment.

Finally, Appendix 1 sets out the detailed parameters (reference values, caps and collars and unit incentive rates[2]) that we recommend for each year of the next regulatory period for all deliverables that are based on quantitative metrics.

[2] One of the inputs into the calculation of unit incentive rates is the total allowed income for endogenous costs in the first year of the price control. As this is not known for certain at this point, the figures for unit incentive rates in this report are only approximate. Final figures for unit incentive rates will therefore need to be calculated by VREG when it knows the final figure for total allowed income for endogenous costs in the first year of the price control.

PHASE 1: FRAMEWORK FOR FINANCIAL INCENTIVES

Europe Economics

2 Review of Tariff Methodology

In this chapter we present an overview of the current tariff methodology governing the electricity and gas market in Flanders. In particular, we summarise the tariff methodology for the current regulatory period (2021-24) and the existing financial incentives for the electricity and gas DSOs.

As the distribution network operator, Fluvius is subject to a number of legal obligations which include public service obligations.[3] These obligations include uninterrupted supply for household customers, rational energy use, and purchase of support certificates green power. The public service obligations are set out in the Energy Decree.[4] In addition, electricity and gas DSOs operating in Flanders are also subject to the rules set out in the technical rules for the electricity and gas sectors.[5]

2.1 Overview of tariff methodology for the 2021-24 regulatory period

The 2021-2024 tariff methodology places a cap on the revenues that DSOs can earn from distribution network tariffs.[6] The methodology builds on the revenue cap approach used by VREG in the previous 2015-2016 and 2017-2020 regulatory periods. The costs for each DSO are categorised into endogenous, exogenous and other costs:

- Endogenous costs are the reasonable and necessary costs of network activities, and include the cost of investment, operating expenditure and financing costs. Endogenous costs can be influenced by the decisions of DSOs.
- By contrast, exogenous costs cannot be influenced by the DSO and are passed on by the DSO through the distribution network tariffs.
- Other costs, such as fines, are borne by the DSO and may not be passed on via the distribution network tariffs.

To ensure that the quality of service provided by Fluvius is not compromised, VREG also sets financial incentives for service quality. These are summarised below.

2.2 Financial incentives for quality of service

In this section we summarise the existing financial incentives[7] that VREG have in place for the 2021-24 regulatory period. These include a q-factor incentive, a smart meter incentive and a mechanism to incentivise the timely implementation of electricity tariff structure change.

[3] VREG: "Public service obligations" [online]
[4] Vlaanderen (2009) "Decree containing general provisions regarding energy policy ["the Energy Decree"]" [online]
[5] For further details, see: VREG (2021): "Technical regulations for the distribution of electricity in the Flemish region" [online] and VREG (2021): "Technical regulations for the distribution of gas in the Flemish region" [online].
[6] VREG (2022) "Tariff methodology for electricity and natural gas distribution during the regulatory period 2021-2024" [online]
[7] General efficiency incentives are outside the scope of this report and are subject to a separate study commissioned by VREG.

2.2.1 Q-factor

The tariff methodology[8] specifies a quality incentive in the form of a "q-factor" which adjusts DSO's permitted income based on recent performance in relation to power interruptions (for electricity only) and late connections/ reconnections (for both gas and electricity). The incentive scheme is zero-sum across all DSOs, with overall industry revenues unaffected by the q-factor. The merger of Eandis and Infrax in 2018 into a single operating company in Flanders (Fluvius) rendered comparative comparisons between operating companies less meaningful and as a result has significantly dampened the incentive properties of the current relative incentive mechanism.

Calculation of q-factor

The calculation of the q-factor considers the following three elements:

- the total number of quality points achieved;
- the size of the DSO, proxied by the number of active access points (as of 1 January in the assessment year i.e. the year before the start of the next regulatory period); and
- the DSO's allowable income for endogenous costs for the first year of the next regulatory period (prior to any adjustments for quality)

The process begins with VREG determining the total number of quality points for each DSO based on various quality aspects (these are explained in further detail below). These points are then used to allocate the total monetary quality amount (Q) among the DSOs. The quality amount attributed to each DSO is proportional to the number of points earned for quality performance, which means that DSOs with a higher number of points receive a greater share of the quality amount per access point. For the current regulatory period, the percentage of total income for endogenous costs that feeds into the quality incentive is 0.7969 per cent for electricity and 0.0469 per cent for gas.[9]

Caps and floors are used to limit the financial exposure of DSOs under the quality incentive. If there is excess income (overflow) due to the zero-sum mechanism, it is redistributed to other DSOs. Similarly, if there is a shortfall in income (underflow), it is compensated by income transfers from other DSOs. The relevant cap/floor for the current regulatory period is 1.0625 per cent for electricity and 0.0625 per cent for gas.

The final step involves calculating the q-value for each DSO per activity (electricity or gas). This determines the adjusted allowable income for the DSO for the next regulatory period. The q factor represents the percentage difference between the original allowed income and the adjusted income for the next regulatory period.

Determination of quality points for DSOs

Quality points are determined based on reliability indicators (i.e. interruption frequency and duration) and commercial indicators (i.e. compensation paid for late connections and reconnections). Reliability indicators are only taken into account when calculating the quality points for electricity DSOs while commercial indicators are relevant for both electricity and gas DSOs.

Table 2.1 below summarises the quality indicators and their respective contribution to the quality points that can be earned by electricity and gas DSOs.

As medium-voltage interruptions have a greater impact and affect more customers than low voltage (LV) interruptions (which are more local), VREG decided to assign a weighting of 70 per cent to medium voltage (MV) interruptions and weighting of 30 per cent to low-voltage interruptions.

[8] VREG (2020) "Tariff methodology regulatory period 2021-2024: Appendix 9: The quality incentive" [online]

[9] These values were determined using formula 2 (1.125 x 425/600) and formula 3 (0.375 x 25/200) for electricity and gas, respectively in Appendix 9 of the tariff 2021-24 methodology.

Similarly, as the number of interruptions has a greater negative impact on customers than the duration of interruptions, VREG applied a weighting of 55 per cent to interruption frequency and a weighting of 45 per cent to interruption duration for both medium and low voltage.

Table 2.1: Overview of quality points based on quality indicators

	Quality indicator	Points (per indicator category)	Weighting 1 (medium vs low voltage) (%)	Weighting 2 (interruption frequency vs duration) (%)	Weighting total (%)	Points (per quality indicator)
A1	MV – interruption frequency*	400	70	55	38.5	154
A2	MV – interruption duration*			45	31.5	126
A3	LV – interruption frequency*		30	55	16.5	66
A4	LV – interruption duration*			45	13.5	54
D1	Compensation for late connection	25		80	80	20
D2	Compensation for late reconnection			20	20	5
	Total quality points (electricity)	425				425
	Total quality points (gas)	25				25

Note that reliability indicators marked with an asterisk are only taken into account for the calculation of quality points for electricity DSOs.
Source: VREG (2020) "Tariff methodology regulatory period 2021-2024: Appendix 9: The quality incentive" [online]

The average network interruption for each DSO is determined as an arithmetic average of the annual values. The averages are then normalized for all DSOs in relation to the highest average individual interruption frequency or duration of a DSO. This standardization leads to values between 0 and 1 for each DSO. Using the assumption that the impact of the power interruption frequency or duration on customers is best proxied using a logarithmic function, points are distributed based on an inverse exponent, such that DSOs with fewer interruptions get higher points.

In terms of fixed compensation for late connection or reconnection, for each year VREG calculates the ratio of (i) the total fixed fees paid by that distribution system operator in that year for late connections or reconnections and (ii) the total requests for connections or reconnections realized in the same year. VREG uses the arithmetic average value of the separate annual ratios, which are adjusted to account for the indexing of compensation fees, as outlined in the Energy Decree (Article 4.1.11/2). Points are distributed according to a linear scale and DSOs that have not paid any fixed compensation receive the highest score.

2.2.2 Smart meter incentive

In addition to the q-factor incentive, VREG has implemented a digital smart meter incentive in the electricity market to support the energy transition and enhance market functioning.[10] The maximum reward that a DSO can obtain through this incentive is €500,000.

This incentive offers financial rewards or penalties based on:

1. Surveys to assess digital meter information provided by DSOs

VREG conducts a market survey of households and businesses to evaluate how effectively DSOs are promoting smart meters and their benefits to customers.

2. Metrics related to online registration to digital meter web portals

The acceptance and effectiveness of smart meters will depend on how well distribution network users engage with energy monitoring through web portals. The VREG track two key indicators:

[10] VREG (2022) "Tariff methodology regulatory period 2021-2024: Annex 11: Incentives" [online]

- The ratio of users registered on the web portal to the total number of smart meters installed.
- The number of unique monthly visitors on the web portal.

Furthermore, the VREG assesses the effectiveness with which users are informed about the new tariff structure by monitoring:

- The ratio of users with a large-scale consumption meter who set their access capacity using the web portal to the total number of users with active large-scale consumption metering.
- The number of unique monthly visitors on the high consumption user web portal.

2.2.3 Timely implementation of electricity tariff structure change

The objective of this incentive mechanism was to implement changes in the electricity tariff structure by January 1, 2023, in line with planned modifications to the tariff methodology for the electricity distribution network tariffs.[11] The mechanism sought to ensure that the updated tariff structure was applied for electricity consumption and injection, with DSOs charging access holders accordingly. Additionally, by September 1, 2022, the operators needed to make a web portal available for access holders to specify their desired access capacity, and market integration tests concerning the new grid tariffs were to commence to ensure active involvement of stakeholders.

If any of the objectives were not achieved, a penalty was to be imposed on all DSOs, capped at €6m collectively. Additionally, for each new month in which objectives remained unmet, a penalty of up to €1m was to be levied on the group of DSOs.

[11] VREG (2022) "Tariff methodology regulatory period 2021-2024: Annex 11: Incentives" [online]

3 Key Lessons from Other Jurisdictions

In this chapter we summarise our research into the use of quality of service incentive mechanisms by regulators of electricity and gas DSOs in five jurisdictions:

- The Netherlands
- Germany
- France
- Ireland
- Great Britain

For each of these jurisdictions, we summarise the current regulatory framework (including any objectives set by governments relating to the energy transition given their importance over the upcoming regulatory periods) and then describe the existing quality of service incentives for the electricity and gas sectors. Our review covers all mechanisms that seek to incentivise DSO performance in terms of the outputs and outcomes delivered through financial rewards and penalties.[12] We then consider the experience and any lessons learned by the relevant regulator from using these mechanisms.

Finally, we summarise the overall lessons and themes that have emerged from our research into quality of service incentive mechanisms in these five jurisdictions.

3.1 The Netherlands

The Netherlands Authority for Consumers and Markets (ACM) regulates the tariffs that the gas and electricity network companies of the Netherlands can charge customers. The current regulatory periods for both electricity and gas distribution in Netherlands run from 2022-2026. The ACM's final methodology decisions for both sectors were published in September 2021.[13] There are currently seven regional grid operators in the Netherlands, all seven of which operate both electricity and gas networks.[14]

The Dutch government has stated it wants to reduce the Netherlands' greenhouse gas emissions by 49 per cent by 2030, compared to 1990 levels, and a 95 per cent reduction by 2050. These goals were laid down in the Netherlands Climate Act 2019.[15] As a member of the EU, the Netherlands are also subject to the targets laid out in the European Climate Law.[16] The law includes a legal objective to reach climate neutrality by 2050, with an intermediate target of reducing net greenhouse gas emissions by at least 55 per cent by 2030, compared to 1990 levels, in both cases superseding the domestic targets set previously by the Dutch government.

3.1.1 Regulatory framework

ACM uses an incentive-based regulatory framework, with four regulatory objectives:[17]

[12] Therefore, for the avoidance of doubt, our review is not limited to incentives similar in scope to the current q-factor used by VREG.

[13] ACM's 2022-2026 decisions for electricity grid operators and gas grid operators are available here (electricity) and here (gas). The information on ACM's methodology in this case study is taken from these documents.

[14] Gasunie Transport Services "All Dutch Distribution Network Operators" [online]

[15] Government of the Netherlands: "Climate policy" [online]

[16] European Commission: "European Climate Law" [online]

[17] ACM (2017) "Incentive regulation of the gas and electricity networks in the Netherlands" Figure 2 [online]

- to provide network operators with an incentive to operate in an efficient manner;
- to prevent network operators from charging tariffs above the (efficient) cost level;
- to allow network operators an appropriate return on investment; and
- to encourage optimal quality of energy transportation (for electricity DSOs).

For both electricity and gas distribution, ACM's determination is done in three steps:

1. ACM publishes a "method decision" covering a period of between 3 to 5 years. This decision sets out how ACM is going to calculate allowed revenue for the regional grid operators.
2. ACM then publishes its "x-factor" decisions for each grid operator, which set out the initial level of allowed revenue for the period for each operator and the annual evolution in tariffs (the x-factor) to be applied over the regulatory period
3. During the regulatory period, ACM publishes annual tariff decisions. These set out the tariffs for each individual grid operator, based on the x-factor decisions and ACM's tariff codes.

3.1.2 Quality of service incentives for electricity

ACM's method decision for electricity grid operators includes a quality of service incentive, in the form of a "q-factor". The q-factor rewards grid operators that offer customers a reliable service, and penalises operators with an unreliable service. The incentive scheme is zero-sum across the operators, with overall industry revenues unaffected by the q-factor.

ACM considers reliability to be the most important aspect of quality of service for electricity grid operators, and therefore its measurement of quality is centred on measurement of reliability. Reliability is measured with three indicators:

- Interruption frequency – calculated by dividing the total number of customers affected by power interruptions for a regional operator by the total customer base of that grid operator.
- Average interruption duration – calculated by first multiplying the total number of affected customers per interruption by the duration of that interruption, and then summing the total lost minutes across all interruptions, before dividing the total lost minutes by the total number of customers.
- Annual outage duration – the product of the interruption frequency and the average interruption duration.

To calculate the above three metrics for the 2022-2026 regulatory period, ACM used interruptions data over the years 2016-2020.

Alongside these reliability metrics, ACM determines the value that customers place on quality. The determination is based on various studies commissioned by ACM over the last 20 years. The results of a 2012 study into the valuation of quality by customers conducted by Blauw have been used for all regulatory period since 2012. For the 2017-2021 period, Blauw were commissioned to set up new, simpler and continuous valuation functions for both households and SMEs. The new formula expressed the valuation of customer interruptions (in euros) as a function of the logarithm of the interruption frequency and the logarithm of the average interruption duration of a regional grid operator.

ACM combined the quality metrics and the quality valuation to determine quality performance. The estimates for interruption frequency and average interruption duration per grid operator per year were inputted into the valuation function, yielding an approximation of the average welfare loss of a customer in the network operators' area in a given year. After the quality performance was calculated for each operator, the ACM calculated the average quality performance across all operators. This average quality performance served as the yardstick for calculating each operator's q-factor. The additional money that grid managers received/owed in the 2022-2026 regulatory period was the difference between the yardstick quality performance and the quality performance of that individual network operator over the years 2016-2020.

A cap and collar was also set by ACM to ensure that the q-factor did not lead to "very large financial consequences" for grid managers. ACM considered it reasonable that the q-factor should be capped due to quality being measured over a relatively short period of time. The cap and collar are both set equal to 5 per cent of total allowed income for each DSO.

3.1.3 Quality of service incentives for gas

For gas grid operators, there is no quality of service incentive (the q-factor is set to zero). This is because, as of its most recent method decision, ACM has not identified a suitable indicator of service quality for gas, and does not consider a q-factor to be necessary for incentivising quality service in gas distribution. ACM's rationale is that "the safety of gas transport networks is considered so essential that an economic incentive for this is regarded as irresponsible and that the transport security of gas transport networks is generally so high that a q-factor based on this quality indicator is not expected to lead to an effective economic incentive for grid managers."[18]

3.1.4 Experience of using quality of service incentives in the Netherlands

The electricity sector in the Netherlands saw a significant decrease in outage time from 2006 to 2019, with an annual decline of 2.1 per cent across the seven DSOs.[19] This represents a strong increase in the quality of performance from the electricity DSOs over the time period, potentially driven in part by the q-factor, which has existed as an incentive mechanism throughout that period.

Criticism of q-factor methodology

The effectiveness of the q-factor as a regulatory tool has recently been assessed by one of the Dutch DSOs, Stedin. The report[20] published in 2022 found that the q-factor, in its current form, is not in line with the objectives of the energy legislation in the Netherlands, leading to perverse outcomes. Based on analysing different examples of the results that the q-factor methodology produces, the key shortcomings of the q-factor that Stedin claimed to identify were:

- Equal changes in performances can lead to different outcomes for different DSOs, Two grid managers can improve performance by the same amount in a given year, but receive different changes in income for the q-factor
- Improvements in quality (i.e. fewer interruptions) can lead to deterioration in quality performance, and therefore a reduction in income, or vice versa.
- The incentives created by the q-factor do not support a network operator in making investment decisions, due to a lack of predictability in the outcomes of the q-factor calculation;
- The measurability of the q-factor is flawed. The valuation function, Stedin argues, is a valuation of perceived quality, and it was developed as a valuation function for individual customers, not the average interruptions across all customers for a DSO.

Stedin objected to the use of aggregated data in a valuation function that was developed for interruption data from individual customers. It also argued that the choice to combine interruption frequency and duration in the valuation function lead to trade-offs between these indicators that are not robust or plausible. It recommended setting the q-factor to zero, with a second-best option of switching to only using interruption duration as a measure of reliability, rather than combining frequency and duration.

In our view, there are flaws in Stedin's objections. Stedin objects to the fact that equal changes in performances can lead to different outcomes, but this simply reflects the non-linear nature of the valuation

[18] ACM (2021) "Method decision regional gas network operators 2022-2026" p.80
[19] University of Groningen (2020) "Performance of Dutch energy distribution operators [online]
[20] Stedin (2022) "Q-factor – analyse" [online]

function. It is ACM's view that it is harder for a DSO to reduce interruptions from 100 to 50, than to reduce interruptions from 10,000 to 9,950, although both cases involve reducing interruptions by 50. This is not an unreasonable position, as the marginal cost of reducing interruptions is likely to increase as the number of interruptions approaches zero. Moreover, the marginal cost to consumers of experiencing interruptions is likely to reduce as interruptions increase (which is the rationale for ACM's logarithmic valuation function). Stedin also objects to improvements in quality leading to reduced quality performance score, but this is simply a reflection of the relative nature of ACM's scheme. A reduction in interruptions will lead to a reduced quality score if the other DSOs are improving at a faster rate – the relative performance of the DSO will have deteriorated.

Appeals against q-factor methodology

Stedin and three other DSOs[21] formally appealed against the 2022-2026 tariff methodology to the College van Beroep voor het bedrijfsleven (CBb), the Dutch Board of Appeals for Business.[22] One of the grounds for appeal related to the q-factor methodology. Stedin's position was that ACM's q-factor provides counterproductive incentives that encourage network operators to take socially undesirable actions and financially penalise them when they perform socially desirable actions. It cited the arguments set out above, including the example of fewer interruptions leading to worse quality scores for DSOs.

The CBb did not agree with Stedin's position, on any of the issues raised. CBb noted that the possibility that a quality improvement in one year compared to another year does not necessarily lead to a higher quality score for a DSO is inherent in a system in which the average quality performance in the sector is used as a benchmark. Stedin's set of examples simply showcase this method of relative quality measurement. In regard to measurability issues, CBb noted that Stedin's objections on these grounds essentially boil down to the fact that the valuation of the interruption duration and the interruption frequency is based on hypothetical scenarios. CBb agreed with ACM's position on this matter, which is that using hypothetical power interruption scenarios to gather information about the value that the customer assigns to a certain interruption duration or frequency is a reasonable approach. CBb noted that ACM's approach is a generally accepted form of "stated preference research" in cases where "revealed preference" data are not available. In this case, revealed preference data would be data on interruptions registered at the level of individual customers, which is not available to the ACM.

CBb concluded that Stedin's grounds of appeal regarding the q factor fail.

3.2 Germany

Bundesnetzagentur (BNetzA), the regulator for energy markets, sets price controls for the gas and electricity network companies of Germany.[23] BNetzA uses a revenue cap regulatory regime to determine the appropriate level of revenue for network operators in Germany. The current (fourth) regulatory period runs from 2023 to 2027 for electricity distribution and from 2019 to 2023 for gas distribution.

As of January 2023, there were around 880 electricity DSOs and 700 gas DSOs registered with BNetzA. In the electricity market, around 800 of these DSOs operate networks with less than 100,000 connected costumers. Most DSOs are vertically integrated companies operating as municipal utilities. Operating an electricity distribution network also requires approval by the relevant state regulatory authority.[24]

Under the Climate Action Programme 2030 and the new Climate Action Act (Klimaschutzgesetz) the German government has made a binding undertaking to reduce greenhouse gas emissions by 65 per cent by

[21] The other three DSOs did not put forward any specific arguments against the q-factor methodology.
[22] CBb (2023) Pronunciation ECLI:NL:CBB:2023:321 [online]
[23] BNetzA serves as the federal regulator for Electricity, Gas, Telecommunications, Post and Railway.
[24] Federal Ministry of Justice "Energy Services Act" [online]

2030 (compared to 1990 levels).[25] This is in line with the European Climate Law[26], that Germany is subject to as a member of the EU, which sets an intermediate target of reducing net greenhouse gas emissions by at least 55 per cent by 2030.

3.2.1 Regulatory framework

The procedure for determining revenue cap for electricity and gas distribution, and thus the network charges are as follows[27]:

1. A cost check ('cost review') is first carried out for each DSO, which is based on the DSO's annual financial statements for the last full financial year.
2. Benchmarking is then used to compare the costs of individual network operators:
   - Under the standard procedure, the efficiency of DSOs is assessing relative to other operators in order to determine their individual performance.
   - Under the simplified procedure,[28] DSOs receive a flat-rate efficiency value, which is derived by the weighted average of all efficiency levels determined in the national efficiency benchmarking.
3. The individual revenue cap for each DSO is determined based on the cost review and benchmarking results.
4. On the basis of the individual revenue cap, the DSOs determine the network fees for access to their energy supply network in accordance with the statutory provisions and publish them in price sheets.

3.2.2 Quality of service incentives for electricity

Quality regulation, facilitated by the Energy Industry Act (EnWG) and the Incentive Regulation Ordinance (ARegV), is enacted through a quality element known as the Q-element. This entails defining standards for network reliability and performance, and guaranteeing sustained efficiency and dependability of the grid network. DSOs are rewarded or penalised within their revenue cap for the quality of services provided.

Quality of service comprises different categories which are summarised in the table below. The quality incentive mechanism for electricity DSOs focuses on network reliability.

Table 3.1: Summary of quality of service categories

Category	Description
Network reliability	Ability for the DSO to transport energy from one location in the network to another while maintaining quality parameters. Network reliability is 100 per cent if there are zero network interruptions while maintaining product quality.
Product quality	Refers to the technical quality of the electricity or gas supplied. For example, in electricity, it can be voltage stability. In gas, it can be the chemical composition of the gas while maintaining a certain pressure level.
Service quality	Refers to the relationship between the network operator and its customers. For example, this might relate to meeting deadlines or the quality of billing.

Source: BNetzA "Quality regulation and quality element" [online]

The financial incentive scheme works by comparing the actual performance of the DSO in terms of average network interruptions per end user (at low voltage level) and average network interruptions per unit of rated power (at medium voltage level) with reference values. The reference values for medium voltage takes

[25] The Federal Government (DE) – "Intergenerational contract for the climate" [online]
[26] European Commission: "European Climate Law" [online]
[27] BNetzA "Essential elements for incentive regulation"[online]
[28] The simplified procedure applies for DSOs with fewer than 30,000 customers for electricity DSOs and 15,000 customers for gas DSOs.

account of regional differences in load densities across DSOs. The differences between actual performance and the reference values are multiplied by the average number of end consumers in the last three complete calendar years. A monetarisation factor is then applied based on the Value of Lost Load (VoLL) i.e. the cost of electricity interruptions.[29] VoLL is calculated separately for economic sectors and households.

The outcome of these calculations determines whether the DSO receives financial rewards or penalties. If the DSO's performance is better than the reference values, it receives financial rewards. However, if its performance falls short of the reference values, it faces financial penalties.

BNetzA imposes a maximum reward/penalty of 2 to 4 per cent of the revenue ceiling for each individual DSO from the last completed calendar year,[30] with the aim of minimising deviations from the intended zero-sum revenue design.

3.2.3 Quality of service incentives for gas

BNetzA has not set a financial incentive for gas operators due to the lack of reliable data. Compared with the electricity sector, reliability has a relatively smaller impact on costs for gas operators, where the primary cost drivers are safety-related rules and standards. Interruptions in the gas sector are also infrequent occurrences.

3.2.4 Experience of using quality of service incentives in Germany

In the first regulatory period, the quality element for 2012 and 2013 resulted in 143 electricity DSOs receiving a reward and 59 electricity DSOs receiving a penalty. The bonus and penalty amounts for individual operators were around €4m.[31]

The network reliability of the German electricity distribution network operators has improved over time, with the average duration of interruptions decreasing by around 43 per cent between 2006 and 2019.[32] Nonetheless, in 2021, 850 network operators reported 166,733 supply interruptions for 857 networks, a rise of 4,509 interruptions compared with the previous year. Nonetheless, the yearly value of 12.7 minutes per connected end consumer in the low and medium voltage segment remained below the 2011-2020 average of 13.63 minutes.[33]

In addition, the q-factor itself has been reviewed and critiqued by a number of studies and stakeholders:

- In 2020,[34] the BNetzA commissioned a report with the aim of fundamentally reviewing the existing quality of service incentive and developing options for further development. A potential option identified by the report was to differentiate between customer groups to better reflect downtime costs and improve the reliability calculation. However, as this option would require the definition of consumer groups,

[29] The VOLL assesses electricity interruption costs using the "production function method," considering electricity's role in various sectors. VoLL for each sector is determined by analysing societal costs from supply interruptions. The approach involves assuming linear production functions for agriculture, industry, and trade, linking kilowatt-hour value to sectoral value added over total electricity consumption. In the household sector, a linear relationship between leisure value and electricity consumption is assumed. VoLL values for each sector are weighted by electricity consumption, and when multiplied by the average load per end consumer. BNetzA (2020) "Determination of methodology for quality element electricity 2021-2023" [online]

[30] This excludes uncontrollable costs and potential expenses related to higher voltage levels.

[31] BNetzA (2014) "Monitoring report 2013" [online]

[32] BNetzA (2020) "Defining methodology: Quality Element 2021-2023", p.4 [online]

[33] BNetzA (2022) "Monitoring report 2022" [online]

[34] Similar evaluations were previously conducted in 2010 and 2013.

determination of consumption data, and the establishment of individual monetization factors, the report concluded that this could pose additional challenges.[35]

- In their joint response to BNetzA's consultation for the fourth (current) regulatory period, the German Association of Energy and Water Industries (BDEW) and the German Association of Local Utilities (VKU) stated that there is a need for a more comprehensive dataset of the quality elements included in the calculation of the q-factor, including the reference function and structural parameters, to identify empirical relationships and ensure their validity. They emphasized that the empirical analysis should also consider endogenous structural parameters to enhance reliability.[36]

3.3 France

The Commission de Régulation de l'Énergie (CRE) regulates the tariffs that gas and electricity network companies can charge customers in France. The current tariff for public electricity and natural gas distribution grids entered into effect on 1 August 2021[37] and 1 July 2020[38], respectively, for a regulatory period of approximately four years. Incentive regulation under CRE's tariff framework seeks to balance economic efficiency and service quality for distribution system operators, aiming to improve key aspects of service crucial to the functioning of electricity and gas markets.

The law on Energy and Climate adopted in 2019 as part of France's commitment to the 2015 Paris Agreement to address climate change, sets the framework, ambitions and target of France's energy and climate policy.[39] This includes a carbon neutrality target by 2050 which means net zero greenhouse gas emissions from human activities, with residual gross emissions to be absorbed by carbon sinks.[40] As an EU member state, France is also subject to the targets laid out in the European Climate Law.

Electricity and gas market

Public electricity distribution networks are owned by the municipalities which are able to delegate all or part of their responsibilities to associations of municipalities (départements). Enedis (serving 95 per cent of metropolitan France) and some 160 local distribution companies share the responsibility of operating the public distribution networks that supply electricity to end consumers, households and professionals at medium and low voltages (20 kV and 400 kV).[41] CRE regulates the seven electricity DSOs which serve over 100,000 customers.

There are 26 natural gas distribution system operators serving approximately 11 million consumers connected to the natural gas distribution networks. Natural gas DSOs vary considerably in size. GRDF distributes 96 per cent of the natural gas distributed and transports natural gas across most of France.[42]

[35] BNetzA (2020) "Expert opinion on the conception of a quality element" [online]
[36] BNetzA (2023) "20230210_BDEW_VKU_Opinion_Data Collection_Q element" [online]
[37] CRE (2021): Délibération N°2021-13 "Deliberation of the French Energy Regulatory Commission of 21 January 2021 on the tariffs for the use of public distribution electricity grids (TURPE 6 HTA-BT)" [online]
[38] CRE (2020): Délibération N° 2020-010 "Deliberation by the French Energy Regulation Commission of 23 January 2020 deciding on the equalised tariff for the use of GRDF's public natural gas distribution networks" [online]
[39] Ministère de la Transition écologique et de la Cohésion des territoires et Ministère de la Transition énergétique (2020): "Loi énergie-climat" [online]
[40] France Stratégie: "The Value for Climate Action" [online]
[41] CRE (2023): "Electricity networks" [online]
[42] CRE (2023): "Natural gas networks" [online]

3.3.1 Regulatory framework

CRE has considered a range of issues that are relevant for the overall regulatory framework and for financial incentives. The issues considered that are relevant for electricity distribution include:

- The role played by electricity distribution grids in the energy transition: The connection of decentralised renewables production, the development of electric mobility[43] and self-consumption[44] will have implications for Enedis as these are expected to change the flows on electricity distribution grids in future years.
- Ensuring that supply quality remains at a sufficient level while strengthening quality of supply in priority areas such as connection times: While supply quality has improved over the last few years, a key challenge for the upcoming period will be to increase the reliability of outage time measurement by including data supplied by Linky meters (smart meters). The CRE considers that quality of service should be strengthened in priority areas such as connection times where performance has deteriorated in recent times.
- Technological developments create new sources of flexibility: Technological developments (smart metering, storage, digital technology, etc.) create new potential sources of flexibility and the challenge for Enedis will be to mobilise new flexibility sources (storage, load shedding, aggregation of decentralised flexibility, electric mobility) while limiting network reinforcement to what is strictly necessary.
- Enedis must continue to transform and modernise: Enedis must transform, modernise and innovate to continue to be a reference operator among the electricity DSOs.
- Benefits of Linky programme are in line with expectations: Deployment of Linky meters should enable a reduction in non-technical power losses[45] and metering costs and the provision of new services and much more precise data on grid operation.

The issues considered by CRE that are relevant for gas distribution include:

- Maintaining the gas distribution network at a maximum security level: Security of people and property is a primary issue for GRDF, which implements a range of actions to renew and secure its infrastructure.
- Supporting the energy transition: Biomethane injection into the networks will aid gas infrastructure operators in addressing the challenges associated with the energy transition.

3.3.2 Quality of service incentives for electricity

Enedis is subject to a number of financial incentives regarding quality of service and continuity of supply. In addition, all local electricity distribution companies are subject to a penalty mechanism for long outages while those serving over 100,000 clients and EDF SEI are also subject an incentive relating to scheduled appointments missed by the DSO.

Table 3.2 and Table 3.3 below set out the indicators used to incentivise Enedis along with associated targets, penalties/rewards and incentive limits.

[43] Electric mobility refers to all stakeholders and infrastructures necessary for the use of electric vehicles (e.g. cars, buses, trucks and electric scooters) on a daily basis including the charging stations of and the network around them. Source: TotalEnergies [online].

[44] Electrical self-consumption allows consumers and businesses to produce and consume their own electricity by installing solar panels or other renewable generation systems in their home, property, or community. Types of self-consumption include solar self-consumption through using solar panels, micro-wind energy through using wind turbines with power lower than 100 KW and bioenergy from solid raw materials through the combustion of solid biomass. Source: Repsol [online].

[45] Non-technical losses occur due to unidentified, misallocated or inaccurate energy flows. These losses can be thought of as electricity that is consumed but not billed. Source: SP Energy Network [online].

Table 3.2: Summary of financial incentives for Enedis

Incentive (indicator)	Target	Penalty/reward
Scheduled appointments missed by Enedis	All missed appointments are subject to penalty	Penalty identical to amount billed by Enedis in the case of non-execution of a scheduled intervention because of the user or supplier (missed appointment, etc.)
Deadline for transmitting to RTE[46] the half-hourly measurement curves of each balance responsible party[47]	98% per calendar year	Penalty: €2,500 per unit Incentive floor: €150k
Rate of response to complaints within 15 calendar days	Increasing from 93% to 95% over tariff period	Penalty/reward: €80,000 per calendar year per tenth of a point below/ above the reference objective Incentive limits: ± €10m
Rate of multiple complaints filtered[48]	Decreasing from 9.7% to 9% over tariff period	Penalty/ reward: €25,000 per calendar year per tenth of a point below/ above the reference objective Incentive limits: ± €5m
Number of penalties paid for connections not made available at the date agreed on with the user	Penalties applicable for all connections not made available at the date agreed on with the user, upon a claim filed by the user	Penalties vary between €50 and €1,500 depending on type of connection
Rate of compliance with the sending of the connection agreement within the procedure deadline or the deadline requested by the client	Increasing from 91% to 94% over tariff period	Penalties and rewards are calculated based on the volume of connection proposals sent and the type of user Incentive limits: ± €7m
Average timeframe for performing connection operations by connection category	Reference objectives vary by connection categories	Penalties and rewards are calculated based on the volume of withdrawal connections / injection connections Incentive limits in the range of -€5m, +€3.5m
Availability rate of the function "interrogation of data useful for the service order" in the supplier and third-party portal	99% per calendar year	Penalty: €50,000 one tenth of a point if the annual rate is strictly lower than the reference objective Incentive floor: -€1.75m
Accessibility rate of the special supplier telephone line	Increasing from 95% to 96.5% over tariff period	Penalty/reward: €30,000 per calendar year per tenth of a point below/ above the reference objective Incentive limits: ± €1m
Percentage of calls to the special supplier line with a wait time of less than 90 seconds	Increasing from 74% to 80% over tariff period	Penalty/reward: €60,000 per calendar year per tenth of a point below/ above the reference objective Incentive limits: ± €3m

[46] RTE (Réseau de Transport d'Électricité) is the electricity transmission system operator in France.

[47] Balance responsible parties (les responsables d'équilibre) are operators with a contractual commitment with RTE to finance the cost of the differences observed a posteriori between the electricity injected and the electricity consumed (injections < withdrawals) within a balance perimeter. Conversely, in the event of positive deviations (injections > withdrawals), these parties receive financial compensation from RTE. Balance responsible parties can be electricity suppliers (French or foreign), consumers or any third party (bank, broker, etc.). Source: CRE [online].

[48] Indicators refers to the number of multiple claims for the same connection point and the same type of claim divided by the total number of claims.

Incentive (indicator)	Target	Penalty/reward
Energy adjusted and normalised in Recotemp[49]	Decreasing from 3.97% to 3.67% over tariff period	Penalty/reward: €250,000 per tenth of a point above/ below the reference objective Incentive limits: ± €2.5m
Imbalances in Enedis's balancing perimeter[50]	4% of the power losses volumes observed	If the reference value is exceeded, CRE performs an audit to verify the uncontrollable nature of the causes of the increase in the imbalance volume
Quality of forecast power losses relating to unallocated[51] energy	Decreasing from 1.8% to 1.35% over tariff period	Penalty/bonus: €250,000 per tenth of a point above/ below the reference objective Incentive limits: ± €2.5m
Average outage duration – Low Voltage (B criterion)	From 1 January 2021 to 31 December 2024: 62 minutes	Reward (or penalty for negative values): €6.4 million/minute x difference between reference value and average outage duration of year N in low voltage
Average outage duration – Medium Voltage A (M criterion)	Decreasing from 42.1 minutes to 41.2 minutes over period	Reward (or penalty for negative values): €5.9 million/minute × difference between reference value and average outage duration of year N in medium voltage A
Average outage frequency – Low Voltage (F-BT criterion)	Decreasing from 1.72 outages per year to 1.34 outages per year over period	Reward (or penalty for negative values): €4 million/annual outage x difference between reference value and average outage frequency of year N in low voltage
Average outage frequency – Medium Voltage A (F-HTA criterion)	Decreasing from 1.87 outages per year to 1.43 outages per year over period	Reward (or penalty for negative values): €20 million/annual outage x difference between reference value and average outage frequency of year N in medium voltage A
Penalty mechanism for long outages	Any supply interruptions of a duration higher than 5 hours due to a failure attributable to the public distribution grid managed by the DSO	Between €2 - €3.5 (before tax) per kVA of subscribed power, depending on voltage level and subscribed power

Source: CRE (2021): Délibération N°2021-13, Annex 6 and 7 [online]

Table 3.3 sets out the indicators used to incentivise local electricity distribution companies along with associated targets, penalties/rewards and incentive limits.

[49] In France all withdrawals and injections into the transmission or distribution network must be assigned to a balance responsible party (see above). For each imbalance settlement step and for each responsible party, RTE calculates the difference between injection and withdrawal currently using a gap settlement interval of 30 minutes. To calculate discrepancies for responsible parties and invoice them accurately, RTE needs metering data from DSOs – this process is called the "reconstitution of flows". The first step ("differences" or "imbalances" step) invoices parties prior to the index meter reading of consumers taking place and the second step ("temporal reconciliation" or Recotemp) recalculates balance responsible party imbalances based on metered data. For further information, please see Enedis [online] or RTE [online].

[50] The indicator will be eliminated with the switch to the target system with loop losses where losses are obtained by the balance of injection and withdrawal flows and no longer based on a technical model. Source: CRE (2020): "Consultation publique n°2020-017 du 8 octobre 2020 relative au prochain tarif d'utilisation des réseaux publics de distribution d'électricité" p.38 [online].

[51] As above, the indicator will be eliminated with the switch to the target system with loop losses where losses are obtained by the balance of injection and withdrawal flows and no longer based on a technical model.

Table 3.3: Summary of financial incentive for local electricity distribution companies

Incentive (indicator)	Target	Penalty/reward
Scheduled appointments missed by the DSO*	100% of missed appointments	Penalty amount is identical to that billed by the DSO in the case of non-execution of a scheduled intervention because of the user or supplier (missed appointment, etc.)
Penalty mechanism for long outages	Any supply interruptions of a duration higher than 5 hours due to a failure attributable to the grid managed by the DSO	Between €2 - €3.5 (before tax) per kVA of subscribed power, depending on voltage level and subscribed power

*Note that this incentive only applies to local electricity distribution companies serving over 100,000 clients and for EDF SEI.
Source: CRE (2021): Délibération N°2021-13, Annex 6 and 7 [online]

3.3.3 Quality of service incentives for gas

The tariff methodology does not specify financial incentives for quality of service for gas DSOs other than for GRDF. Table 3.4 below summarises the indicators for GRDF that are subject to financial incentives along with associated targets, penalties/rewards and incentive limits.

Table 3.4: Summary of financial incentives for GRDF

Incentive (indicator)	Target	Penalty/reward
Number of scheduled appointments missed by GRDF	All missed appointments are subject to penalty	Penalty is identical to identical to the amount billed by GRDF in the event of non-execution of a scheduled service call because of the customer or supplier (absence at time of appointment, etc.)
Rate of commissioning performed within the deadline requested	93% per calendar year	Penalty/reward: €20,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €2.6m
Rate of decommissioning completed within the deadline requested	93.5% per calendar year	Penalty/reward: €20,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €2.1m
Rate of connections completed within the agreed deadline	89% per calendar year	Penalty: €25,000 per point if the annual rate is strictly lower than the reference objective Incentive limit: - €725,000 per type of connection
Rate of half-yearly actual meter readings (read or self-read)	97.2% per calendar year	Penalty/reward: €50,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €2.6m
Availability rate of supplier portal	99.5% per calendar year	Penalty/reward: €50,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to than the reference objective Incentive limit: - €1.75m
Rate of responses to supplier complaints within 15 calendar days	96% per month	Penalty/reward: €2,000 per point if the monthly rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €624k
Rate of responses to customer complaints within 30 calendar days	100% per month	Penalty: €25 per claim not processed within 30 calendar days Incentive limit: - €18k

Incentive (indicator)	Target	Penalty/reward
Rate of publication by OMEGA[52] for JJ[53]/JM[54] readings	99.94% per calendar year	Penalty/reward: €25,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €985k
Rate of publication by OMEGA for MM[55] readings	99.93% per calendar year	Penalty/reward: €25,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €982.5k
Rate of publication by OMEGA for 6M[56] readings	99.98% per calendar year	Penalty/reward: €25,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €995k
Rate of metering and estimate point[57] discrepancy in alternative suppliers' contract scope	0.04% per calendar year	Penalty/reward: €25,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €265k
Processing rate of refusals from month M corrected in M+1	99. 8% per calendar year	Penalty/reward: €25,000 per one-tenth of a point if the annual rate is strictly lower than/ higher than or equal to the reference objective Incentive limit: - €950k
Amplitude of distribution variance accounts	Decreasing from 3.6 to 2.4 TWh cumulated over the calendar year over the tariff period	Penalty: €0.5 per MWh above target Reward: €0.25 per MWh below target Incentive limit: - €2.25m
Amplitude of distribution variance accounts by reading frequency and by supplier	4.5 TWh cumulated over the calendar year	Penalty: €0.5 per MWh above target Reward: €0.25 per MWh below target Incentive limit: - €2.25m

Source: CRE (2020): Délibération No 2020-010, Annex 3 [online]

3.3.4 Experience of using quality of service incentives in France

CRE has noted the need for indicators and incentives to evolve regularly in the light of the results achieved by DSOs in the previous period and any new challenges that have emerged since.

Electricity

Since the introduction of service quality regulation in 2009, Enedis has consistently met objectives and improved its service quality performance. CRE highlights Enedis' strong performance in indicators related to electricity balance reliability and the rate of commissioning with timely client visits. Additionally, Enedis has maintained a high level of performance in transmitting half-hourly measurement curves to RTE and ensuring the availability rate of the supplier portal.

In the previous period, Enedis received an overall financial reward of €3.4 million. Enedis's performance was rewarded with a financial reward in each year except 2019, when it received a financial penalty of €146k,

[52] OMEGA is GRDF's information system for management of transmission data and associated client processes, ensuring communication between the DSO and suppliers.
[53] Energy supplied is measured daily and the index containing this measurement is read every day by the DSO.
[54] Energy supplied is measured daily and the index containing this measurement is read monthly by the DSO at the end of the month for all days of the month.
[55] Energy supplied is measured monthly and the index containing this measurement is read monthly by the DSO.
[56] Energy supplied is measured half-yearly and the index containing this measurement is read half-yearly by the DSO.
[57] Metering and estimate point ("point de comptage et d'estimation" or PCE) refers to the point in the distribution network where a quantity of energy is calculated using meters or estimates.

mainly due to poor performance for the indicators relating to responses to complaints within 15 days (penalty of €1.1 million) and the rate of actual meter readings (read and self-read) per half-year period (penalty of €0.7 million). CRE noted that Enedis' performance is not satisfactory in relation to connection times (with average connection times lengthening) and claims processing.

For the current regulatory period, CRE simplified the range of incentive-backed indicators, replacing some with follow-up (non-financial) incentives where the incentive no longer seemed relevant. Other key changes included introducing asymmetrical incentives (penalty only) for two indicators that showed improved quality during the previous period, and strengthening indicators for connection times and claims processing where performance had deteriorated.[58]

Gas

In the previous regulatory period, GRDF achieved a high level of service quality and received financial rewards showing an upward trend. This was due to GRDF (i) demonstrating a high level of performance in distribution variance accounts; (ii_ making progress in meeting service execution deadlines, and (iii) making progress regarding the rate of availability of the supplier portal. However, there was a slight decline in the indicators for the functioning of OMEGA (GRDF's information system), following a period of stable performance at good levels. Opportunities for improvement were identified with regard to enhancing the rate of half-yearly readings based on actual meter readings. GRDF's performance in service quality indicators for its smart meter rollout has also been satisfactory, earning financial rewards in 2017 and 2018.

As in the case of electricity, CRE simplified the range of incentive-backed indicators for the current period by switching to monitoring of indicators with satisfactory and stable performance. In addition, CRE also stopped monitoring indicators for which the level (of performance) had been stable over the last two tariff periods. New incentives were introduced to align with GRDF's role as an operator, such as in relation to the development of biomethane and the "Gas conversion" project. These have been introduced as non-financial incentives but with the possibility of them becoming financial incentives over time.[59]

3.4 Ireland

The Commission for Regulation of Utilities (CRU), the regulator for energy markets, sets price controls for the gas and electricity network companies of Ireland. CRU uses a revenue-cap regulatory regime to determine the appropriate level of revenue required to allow the network operators to operate the networks in Ireland. In both the electricity and gas markets, there is a sole monopoly DSO that operates in each sector (ESB is the electricity DSO and GNI is the gas DSO).

The Irish government has committed to reducing greenhouse gas emissions by 51 per cent by 2030 (relative to a baseline of 2018) and to achieve net zero emissions by 2050.[60] Furthermore, as a member of the EU, Ireland is also subject to the targets laid out in the European Climate Law.

3.4.1 Regulatory framework

CRU published its most recent price control (PR5) for electricity distribution companies in December 2020 which covers the five-year period to 2025. The outputs that the electricity DSO is expected to deliver for PR5 are grouped into three categories:

[58] CRE (2021): Délibération N°2021-13 "Deliberation of the French Energy Regulatory Commission of 21 January 2021 on the tariffs for the use of public distribution electricity grids (TURPE 6 HTA-BT)" [online]

[59] CRE (2020): Délibération N°2020-010 "Deliberation by the French Energy Regulation Commission of 23 January 2020 deciding on the equalised tariff for the use of GRDF's public natural gas distribution networks" [online]

[60] Government of Ireland (2021) "Ireland's ambitious Climate Act signed into law" [online]

- reliability and availability;
- customer satisfaction; and
- transformation of the role of the DSO.[61]

The third category ("transforming the role of the DSO") requires the DSO to transform its business to ensure that it can support and facilitate Ireland's energy sector's transition to a secure low carbon future. The electrification of heat and transport, smart meters, community schemes, the growth of demand response and distributed generation will drive fundamental change for the distribution network.

The most recent price control for gas distribution companies (PC4) was published in August 2017, initially covering the five-year period to September 2022.[62] CRU introduced financial incentives designed to encourage the DSO to operate, maintain and invest in the gas network appropriately and as efficiently as possible. Among the performance and incentives for PC4, there exists a financial incentive that is intended to enhance customer satisfaction and a growth-related incentive to encourage new connections.

3.4.2 Quality of service incentives for electricity

The table below sets out the suite of measures CRU established for PR5 relating to performance incentives for the electricity DSO. A key difference with the previous price review (PR4) is the removal of traditional metering incentives. The incentive was discontinued for PR5 as it is expected that these incentives will become redundant as smart meters replace the existing meter stock.

[61] CRU (2020) "PR5 Regulatory Framework, Incentives and Reporting" [online]

[62] PC4 was published in August 2017, initially covering the five-year period to September 2022. However, due to delays associated with the Russia-Ukraine conflict, the determinations for the next price control (PC5) have not been made published at the time of writing.

Table 3.5: Summary of quality of service incentives for PR5

Outcome category	Output	Measure	Upside (€/m)	Downside (€/m)
Reliability and availability	Unplanned outage duration	Customer minutes lost	50	50
	Unplanned outage frequency	Customer interruption	50	50
	Worst served customers	WSC	6.7	6.7
	Outage information	Balanced scorecard	5	5
Customer satisfaction	Customer satisfaction	Customer satisfaction survey	13.5	13.5
	Care centre satisfaction	Contact centre performance assessment	12.5	37.5
	Stakeholder engagement	Scorecard	5	-
Transformation of the role of the DSO	Connections (ECP-2)	ECP Offers	15	10
	Smart metering	Meter volume, Services delivered	6	20
	Flexibility	Balanced scorecard	15	5
	Visibility	Balanced scorecard	15	5
	Independent role of the DSO	Balanced scorecard	20	10
	Joint DSO/TSO coordination	Balanced scorecard	15	5
Total Incentive Package (€m)			**228.7**	**217.7**
Total as percentage of allowed revenue			**5.1%**	**4.8%**

Note: The upside and downside limits reported in the table apply over the entire regulatory period (and not on an annual basis).
Source: CRU (2020) "PR5 Regulatory Framework, Incentives and Reporting" [online]

The incentive mechanisms are discussed in more detail below.

Unplanned Outages

The objective of this mechanism is to give the DSO a financial incentive to maintain high standards of network reliability. This mechanism comprises two metrics:

1. Customer Minutes Lost (CML): The average number of minutes without supply per customer connected in the year
2. Customer Interruptions (CI): The average number of interruptions per customer connected in the year

The payment or penalty is calculated based on the difference between the target performance (based on historical performance) and actual performance. The DSO's performance is reported to the CRU annually as part of the revenue requirement submission. The reward/penalty for each incentive is set at €500k per point deviation from target, to a maximum of ±€10m per year or ±€50m over PR5.

Worst-served customer (WSC)

The objective of this incentive mechanism is to improve outcomes for those households and businesses who would otherwise have a sustained and materially lower standard of supply reliability. The DSO needs to make use of its allocated funding, €6.7 million, to improve service quality for at least 6,000 worst-served customers. The objective requires a worst served customer to receive a 20 per cent improvement in reliability and for this to be achieved for 70-80 per cent of the 6,000 customers included in the incentive. The incentive rate, upside and downside, is equal to €1,595 per customer, calculated as:

$$\frac{€6.7\text{m}}{(6{,}000 \times 70\%)}$$

The upside and downside for this incentive are both capped at €6.7m, the total value of the fund. For instance, non-delivery against the incentive will result in a penalty of €6.7m (offsetting the value of the funding award, resulting in a net payment of €0m).

Outage information

The objective of this mechanism is to provide customers and network users with accurate and reliable outage information, including on the time for restoration of outages. CRU uses an annual balanced scorecard[63] approach which is based on milestones that were proposed by the DSO.[64] The DSO also needs to report on the accuracy of restoration estimates as this incentive focuses on the accuracy of information as opposed to speed of power restoration. The DSO needs to report on:

- the time between the commencement of the power disruption and the time that the first restoration time estimate was made publicly available.
- restoration of power within 15 minutes of the initial estimated restoration time.
- restoration of power within 1 hour of the initial estimated restoration time.
- restoration of power after 1 hour of the initial estimated restoration time.

The maximum reward/penalty is €1m per year.

Customer Service

The purpose of this mechanism is to incentivise the DSO to maintain appropriately high standards of service. The quality of its customer service / customer satisfaction is measured using a range of metrics relating to the performance of its contact centre (National Customer Contact Centre (NCCC) metrics[65]), and through an overall customer satisfaction survey.[66] The incentive payment or penalty will be calculated based on the difference between actual performance and target performance, which is set based on historical performance.

For the overall customer satisfaction survey, the reward/penalty value per percentage point deviation from target is €738,000.

A more downside-weighted incentive scheme is applied to the NCCC metrics. The reward/penalty per percentage point deviation from the target value in either direction is €833,000. Rewards are available for performance improvements of up to 3 per cent above the target, resulting in a maximum reward of €12.5 million over PR5. On the other hand, penalties apply up to 9 per cent below the target, resulting in a maximum penalty of €12.5 million over PR5.

Stakeholder Engagement

The objective of this incentive mechanism is to incentivise effective stakeholder engagement. The incentive mechanism covers the scope, quality and outcomes/impacts of the DSO's stakeholder engagement activities. It is based on an assessment by an expert panel, Networks' Stakeholder Engagement Evaluation (NSEE) Panel. The panel is made up of stakeholders of CRU, and it was established by the CRU in 2019 through a consultation process. The expert panel assesses the DSO's stakeholder engagement strategy, and the actions and initiatives carried out based on that strategy during the previous calendar year. The maximum incentive payment is €1m per year (upside only).

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[63] CRU (2020) "PR5 Regulatory Framework, Incentives and Reporting" Annex 8 - DSO Customer Service Incentives.

[64] When using the annual balanced scorecard, CRU considers the following assessment criteria: quality of the plan and defined actions (20%); quality of implementation of the plan (40%); and effectiveness of the plan and demonstrable impacts (40%). These weights have been used in the balanced scorecard approach for outage information, stakeholder engagement, flexibility, visibility, independent role of the DSO, and joint TSO/DSO coordination.

[65] The NCCC comprises of the following metrics – speed of telephone response, call abandonment rate, mystery caller survey results, customer call-back survey, first contact/call referral, and time to resolution from first contact.

[66] Conducted by Red-C, an external polling consultancy.

Connections

This objective relates to the timely processing of connections applications from renewables generators under Enduring Connection Policy – Phase 2 (ECP-2).[67] The DSO is subject to a financial incentive on its performance in issuing connection offers within specific timeframes to applicants being processed pursuant to the ECP batches[68] carried out over the PR5 period. The overall reward or penalty will be based on the percentage of offers issued before each milestone, with payments ranging from 100 per cent of the incentive for early offers delivered (30 days before the deadline) to 100 per cent of the penalty for delayed ones (60 days after the deadline). Each batch has a maximum reward of €3 million and a maximum penalty of €2 million, resulting in a cumulative maximum reward of €15m and a maximum penalty of €10m over the PR5 period.

Smart metering

The objective of the smart metering incentive mechanism is to give the DSO an appropriate financial stake to deliver its part of the National Smart Metering Programme (NSMP). The DSO is subject to a financial incentive on the number of smart meters deployed, smart meters functionality delivery[69] and customers' satisfaction in relation to the smart meter deployment process.

Since the DSO is in a good position to meet deployment targets, this category has a lower upside (20 per cent) and a higher downside (50 per cent). Given the challenges of smart meters functionality delivery, more upside-weighted incentives are applied to this category (upside of 50 per cent and downside of 20 per cent). The annual customer satisfaction targets on smart meters replacement process and functionality have equally weighted upside and downside incentives (20 per cent each). The incentive has an annual maximum reward and penalty of €1.2m and €4m, respectively, across all categories.

Flexibility

The objective of the flexibility[70] mechanism is to incentivise the DSO to deliver flexible non-wire alternative solutions to the network's needs. Flexibility reflects the need to achieve quicker and more efficient outcomes by using flexible solutions rather than capex solutions.

The mechanism uses an annual balanced scorecard approach for assessment of performance by the DSO. The balanced scorecard allows more weight to be placed on key milestones that can deliver outcomes for network users, and also incentivises the DSO to put in place the processes required to enable use of flexibility. The key milestones from the scorecard aim to establish robust reporting and transparency arrangements; introduce tenders for flexible non-wire alternative within ESB Network's system development plan; and establish standard products and services to the benefit of all system users. The maximum reward is €3 million per year and the maximum penalty is €1million per year.

Visibility

[67] The Enduring Connection Policy 2.2 (ECP-2) is the second of three batches of connection offers planned under ECP 2 by the Commission for Regulation of Utilities (CRU) to facilitate opportunities for connections by Renewable Energy Sources (RES) to the Irish electricity network.

[68] Batch offers are in three categories: (A) non-batch projects, (B) community-led projects and (C) standard batch projects.

[69] CRU has set out several annual milestones for functionality delivery including, delivery of smart meter data repository by 2021, smart meters enabled to allow remote re-energisation / de-energisation by 2022, deliver Phase 3 functionality including Home Area Network (HAN), and smart meters functionality fully delivered by 2025.

[70] Flexibility refers to the ability to change generation or consumption patterns to support the electricity system.

The objective of the mechanism for low voltage (LV) visibility[71] is to incentivise the DSO to increase the visibility of its network. Increased visibility allows the DSO to actively manage its network to accommodate a greater number of low carbon technologies (LCTs) and avoid expensive capex reinforcements.

The CRU uses an annual balanced scorecard approach for assessment of performance by the DSO. The balanced scorecard allows to place more weight on key milestones that can deliver outcomes for network users, and also incentivises the DSO to put in place processes required to achieve a high level of visibility on the network. The key milestones from the scorecard aim to achieve 50 per cent visibility of its LV network by 2025; gather and validate reference information required to support the visibility of the LV networks; and deliver system interfaces required to enable visibility of its LV network. The maximum incentive payment for the DSO is €3 million per year (reward) and €1million per year (penalty).

Independent Role of the DSO

The objective of this mechanism is to incentivise a timely and robust transformation of the DSO's role and improve the independence of the DSO. The DSO needs to play a central role in the transition to a low carbon system, and the requirements of the European Clean Energy Package mean that it is important for the DSO to act as an innovative neutral market facilitator. For ESB to successfully act as a neutral market facilitator, it must operate with the capability and independence to act flexibly and innovatively without regard to the commercial interests of the ESB generation or supply businesses.

The CRU uses an annual balanced scorecard approach for assessment of the DSO's performance. ESB makes a submission to the CRU setting out the strategy, outputs, delivery against milestones, and effectiveness of the measures implemented so far. The maximum reward is €4 million per year and the maximum penalty is €2 million per year.

Joint DSO/TSO Coordination

The objective of this coordination mechanism is to encourage and reward DSO/TSO coordination and collaboration so that the SOs can help each other in achieving their targets or delivering their plans. The system operators are incentivised to deploy new technology on the grid and in their operations in an effective way, to optimise the existing grid to minimise the need for new infrastructure, to provide system services through new technology, and to address whole system challenges.

The CRU uses an annual balanced scorecard approach to assess the DSO's performance. The DSO provides the CRU with a report on the effectiveness of its approach to "enabling new technology and solutions" and the activities that it has carried out over the previous calendar year. The incentive payment set by the CRU is informed by an independent audit. The audit uses a balanced scorecard framework that has been approved by the CRU. Based on the audit report and other relevant evidence, performance is graded as Average (0 per cent), Above standard (50 per cent) or Significantly Above Standard (100 per cent). The maximum reward is €3m per year and the maximum penalty is €1m per year.

3.4.3 Quality of service incentive for gas

The CRU incentivises the gas DSO with respect to customer service and connections.

Customer service

The incentive mechanism is comprised of three Customer Performance Indicators – call centre response, complaints and customer service. The three measures are weighted equally.

The amount of revenue at stake for each of the three measures is summarised in the table below.

[71] LV visibility refers to the ability to monitor and analyse electricity consumption and distribution at low voltage levels within the network grid.

Table 3.6: Percentage of allowed revenue at stake under quality of service incentives for gas

Measure	Percentage of allowed revenue
Call Centre	0% to +0.125%
Complaints Metric	- 0.125% to 0%
Customer Survey	- 0.125% to + 0.125%

Source: Decision on October 2017 to September 2022 Distribution Revenue for Gas Networks Ireland [online]

New connections

The underlying rationale for the incentive mechanism is that new connections are positive for network utilisation and customer numbers so GNI should be encouraged to seek new growth opportunities. The incentive applies to both domestic housing and Industrial and Commercial (I&C) connection targets, with the two being separated to avoid the DSO focusing only one type of new connection. Within domestic connections, there is a distinction made between housing and apartment blocks.

The CER has decided on a symmetric marginal incentive (reward/penalty) rate for each connection that falls below or exceeds the PC4 business-as-usual (BAU) target. The parameters are shown in the table below:

Table 3.7: Parameters for connection related incentive

Incentive input	Domestic housing	Domestic apartments	I&C connections
PC4 BAU target	62,264	59	3,475
Cap	90,000	76	7,000
Floor	34,529	41	0
Incentive rate	€125	€300	€160
Maximum reward	€3.47m	€0.01m	€0.60m
Maximum penalty	€ -3.47m	€ -0.01m	€0.-60m

Source: Decision on October 2017 to September 2022 Distribution Revenue for Gas Networks Ireland [online]

3.4.4 Experience of using quality of service incentives in Ireland

Most of the quality of service incentives from the previous regulatory period have been retained for the current period, with the exception of traditional metering incentives which have been removed by the CRU. The discontinuation of this incentive for PR5 is in anticipation of smart meters replacing the existing meter stock, rendering the traditional metering incentives unnecessary.[72]

For PR5, the CRU has introduced a new set of quality incentives known as the 'Transformation of the Role of the DSO,' designed to facilitate the transition of Ireland's energy sector towards a secure low-carbon future.

ESB's annual distribution performance report sets out ESB Networks' performance against the incentive arrangements under the PR5 decision.[73] As a result of meeting much of the targets set by CRU, in 2021 ESB still received a financial reward of €11.22m. Nevertheless, ESB fell short of meeting CRU's targets for the unplanned outage incentive and customer satisfaction incentive, resulting in financial penalties.

[72] CRU (2020) "PR5 Regulatory Framework, Incentives and Reporting" [online]
[73] ESB Networks (2022) "Distribution Annual Performance Report 2021" [online]

3.5 Great Britain

Ofgem sets price controls for the gas and electricity network companies of Great Britain using the RIIO model.[74] This case study is focused on the latest periodic determinations, which are:

- RIIO-ED2, the most recent price control for electricity distribution companies, determined in November 2022 and covering the five-year period to March 2028.[75]
- RIIO-GD2, the most recent price control for gas distribution companies, determined in December 2020 and covering the five-year period to March 2026.[76]

There are fourteen electricity distribution network operators (DNOs) in Great Britain, which are owned by six companies. There are eight gas DNOs in Great Britain, which are owned by four companies.

Ofgem made its RIIO-ED2 determination in November 2022, during a period of extraordinary increase and volatility in the price of gas, high consumer energy bills and high general inflation, leading to many households facing a "cost-of-living crisis". Alongside the unprecedented shock to energy prices, the key piece of context for RIIO-ED2 is that the transition to net zero is underway in Britain, driven by the UK Government's legally binding commitment to achieve carbon neutrality by 2050.[77] In its sixth carbon budget, the Climate Change Committee set out an interim target to reduce emissions by at least 68 per cent from 1990 levels.[78]

3.5.1 Regulatory framework

Ofgem's outputs framework is the same for gas and electricity distribution, being made up of three components:

- Licence Obligations (LOs), which set minimum standards that companies must achieve. Ofgem also used statutory instruments known as Guaranteed Standards of Performance (GSoPs) to ensure quality of service is maintained at a minimum level.
- Price Control Deliverables (PCDs), which specify deliverables for the funding allocated and the mechanism to refund consumers in the event that an output is not delivered (or not delivered to a specified standard).
- Output Delivery Incentives (ODIs), which drive service improvement through reputational (ODI-R) and financial (ODI-F) incentives.

The outputs that DNOs are expected to deliver for RIIO-ED2 were grouped into three categories:

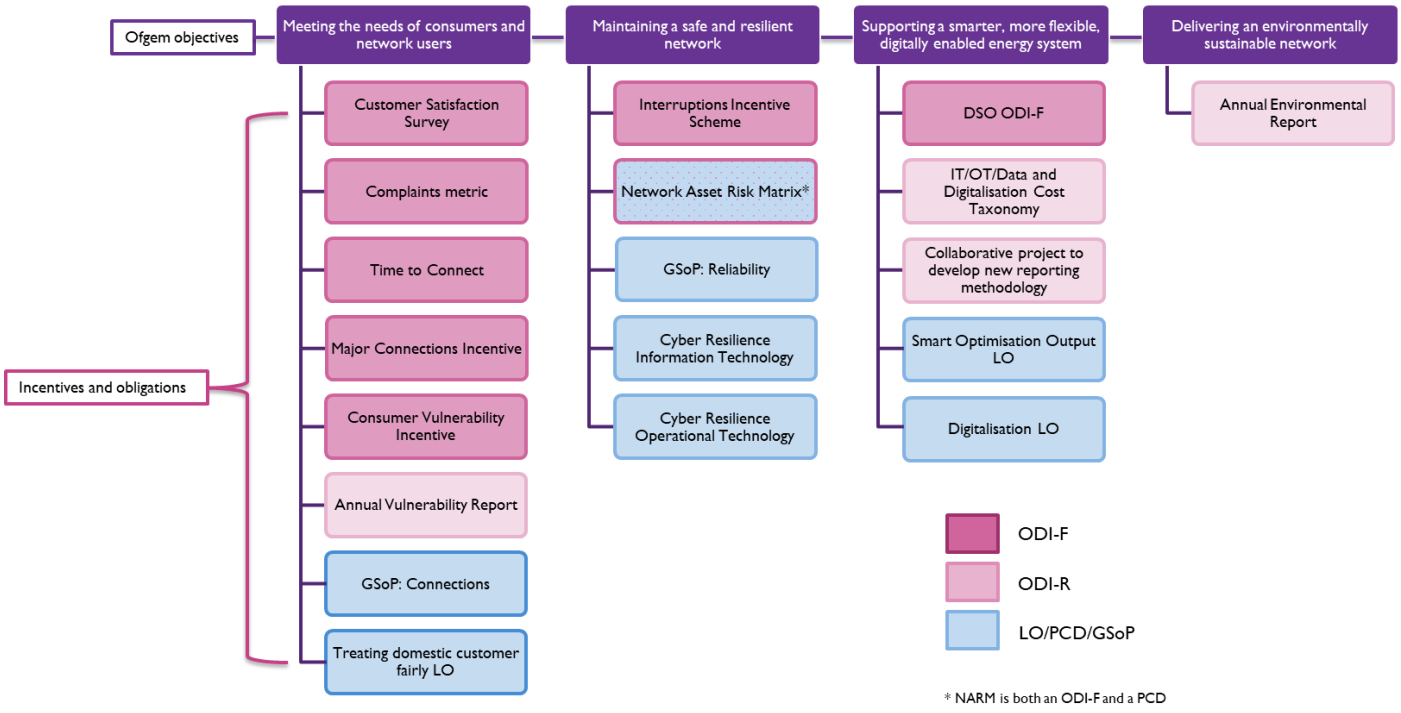
- meeting the needs of consumers and network users;
- maintaining a safe and resilient network; and
- delivering an environmentally sustainable network.

In addition to the three output categories above, Ofgem set out an objective for DNOs to support the transition to a smarter, more flexible and digitally-enabled local energy system.

The figure below shows how Ofgem's incentive mechanisms and obligations relate to the objectives it set out at RIIO-2.

[74] RIIO stands for setting Revenues using Incentives to deliver Innovation and Outputs.
[75] Ofgem (2022) "RIIO-ED2 Final Determinations" [online]
[76] Ofgem (2020) "RIIO-2 Final Determinations for Transmission and Gas Distribution network companies and the Electricity System Operator" [online]
[77] https://www.gov.uk/government/publications/net-zero-strategy
[78] https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf

Figure 3.1: Ofgem's output framework for RIIO-ED2



3.5.2 Financial incentives for electricity

Ofgem set seven common ODI-Fs[79] for RIIO-ED2, summarised in the table below.

[79] Common ODIs are ODIs are applied to all the network companies in a given sector. There are also a number of bespoke ODIs which are specific to particular DNOs.

Table 3.8 Common ODI-Fs in RIIO-ED2

ODI-F name	Purpose	Incentive range (% of RoRE[80])
Customer Satisfaction Survey (CSS)	To incentivise DNOs to improve the quality of customer service and reward exceptional performance	+0.4 / -0.4
Complaints Metric (CM)	To incentivise good performance by DNOs when handling complaints	0 / -0.2
Time to Connect (TTC)	To incentivise DNOs to reduce the time it takes to connect minor connection customers to the network	+0.15 / -0.15
Major Connections*	To incentivise DNOs provide a quality service to major connections customers seeking to connect to the network	0 / -0.35
Vulnerability*	To incentivise the provision of appropriate support services to consumers in vulnerable situations	+0.2 / -0.2
DSO*	To incentivise DNOs to more efficiently develop and use their network, considering flexible and smart alternatives to network reinforcement	+0.4 / -0.2
Interruptions Incentive Scheme (IIS)	To incentivise DNOs to improve network reliability and reduce outages	+1.5 / -2.5

Note: Mechanisms market with an asterisk denote incentive mechanisms newly introduced at RIIO-ED2 while other mechanisms were also in place for RIIO-ED1.
Source: Ofgem (2022) "RIIO-ED2 Final Determinations Overview document" Table 2 (page 22) [online]

Ofgem preferred RoRE to base revenue as the basis for incentive mechanisms because RoRE is a measure that is more directly relevant to investors. Returns to investors ultimately provide the motivation for strong performance under incentive schemes.[81]

Below we provide more detail on each of Ofgem's seven financial incentive mechanism for RIIO-ED2.

DSO incentive

The objective of this new mechanism is to incentivise DNOs to more efficiently develop and use their network, considering flexible alternatives to network reinforcement.

The mechanism is based on an annual ex post review of each DNO's delivery of its DSO activities through three evaluation criteria (with relative weightings shown in brackets):

- Stakeholder survey (40 per cent)
- Performance panel assessment (40 per cent)
- Outturn performance metrics, excluding year 1 (20 per cent)

Ofgem opted to delay implementation of the outturn performance metrics to year 2 of the price control so that it could collect historical data in order to baseline performance and calibrate appropriate targets. The metrics in question are flexibility reinforcement deferral, secondary network visibility, and curtailment efficiency.

The performance panel is made up of a mix of independent experts and industry representatives as appointed by Ofgem. The panel scores the network company out of ten against five weighted criteria, set out in the table below.

[80] RoRE stands for Return on Regulated Equity, which is a measure of the financial return achieved by a licensee's shareholders during a price control period from the firm's actual performance under the price control.
[81] Ofgem (2022) "RIIO-ED2 Draft Determinations – Finance Annex" paragraph 10.178 [online]

Table 3.9: Performance panel assessment criteria weighting

Performance Panel assessment criterion	Weighting (%)
Delivery of DSO benefits	30
Data and information provision	20
Flexibility market development	20
Options assessment and conflict of interest mitigation	20
Distributed energy resources dispatch decision making	10

Source: Ofgem (2022) "RIIO-ED2 Final Determinations Core Methodology Document", Table 7 (page 85) [online]

In year 1, the maximum reward a DNO can gain from the DSO incentive is 0.32 per cent of RoRE, while the maximum penalty is -0.16 per cent. In years 2 to 5, when the outturn performance metrics are included, the reward and penalty limits become 0.4 per cent and -0.2 per cent. Ofgem used an asymmetric cap-and-collar as it considered this was better aligned with the substantial customer benefits that could be unlocked. Ofgem also considered that a relatively stronger upside would mitigate the risk that the DNOs do not stretch themselves in this new area of network management due to loss aversion bias.

Customer Satisfaction Survey (CSS)

The objective of this mechanism, and the complaints mechanism (summarised below) is to encourage DNOs to continue to improve the quality of their customer service by replicating the sorts of measures typically used by consumer-facing businesses in a competitive environment.

The CSS scores for each DNO are based on three weighted surveys (with relative weightings shown in brackets):

- General enquiries survey (20 per cent)
- Connections survey (50 per cent)
- Supply interruptions (30 per cent)

Ofgem used the average of DNO performance from the last four financial years to set a fixed target of 9.01 across the three surveys for the regulatory period. Ofgem decided not to exclude the historical data from COVID-19 affected years, because its analysis suggested that this approach would result in more DNOs earning rewards for maintaining their current service levels. Ofgem considered that its target setting methodology should minimise the number of DNOs that start the price control in reward for maintaining their current service levels. Symmetric deadbands[82] were set at +/- 0.5 standard deviations of the target score.

The maximum financial reward/penalty a DNO could receive from this incentive mechanism is ±0.4 per cent of RoRE.

Complaints metric

The purpose of the Complaints Metric mechanism is to ensure DNOs maintain good performance in their handling of complaints.

DNO scores for the Complaints Metric mechanism are based on four weighted indicators (with relative weightings in brackets):

- complaints unresolved after one day (10 per cent)
- complaints unresolved in 31 days (30 per cent)
- repeat complaints (50 per cent)
- the number of Energy Ombudsman decisions that go against the DNO (as a percentage of total complaints) (10 per cent)

[82] The deadband is a range of outcomes around the target for which no rewards or penalties apply.

Ofgem set a fixed annual target of 2.8 for the regulatory period. DNOs are penalised for scores above that target. This target was based on average performance in the seven years leading up to the final determination. The maximum financial reward/penalty a DNO could receive from this incentive mechanism is +/-0.2 per cent of RoRE.

Time to Connect

The purpose of this mechanism is to incentivise DNOs to reduce the average connection time for customers seeking a minor connection to the distribution network.

Connection time is measured in two ways:

- the "Time to Quote" (TTQ) is the time from the DNO receiving the initial application to issuing a quotation; and
- the "Time to Connect" (TTC) is the time from the customer accepting the quotation to the connection being completed.

Common targets for TTC and TTQ was set for all DNOs, based on average performance over the last four years prior to Ofgem's determination. The financial value of the maximum reward and penalty was set at ±0.15 per cent RoRE.

Major Connections

The purpose of this new mechanism is to ensure that DNOs deliver quality service to customers seeking major connections in market segments where DNOs cannot demonstrate evidence of effective competition.[83] This is a penalty-only metric, as Ofgem considered that permitting rewards could lead to perverse incentives – DNOs that have been successful in demonstrating evidence of effective competition in the most market segments would face the lowest potential penalties, but under a symmetric incentive, also the lowest potential rewards (because the incentive mechanism does not apply to competitive market segments).

The measure is based on the Major Connections Customer Satisfaction Survey. The performance target is based on the average customer satisfaction survey score. For year 1, this was set at 7.41 out of 10, which is based on the UK Customer Satisfaction Index (UKSCI) Utilities score. Ofgem will also perform a robustness check on survey results, to mitigate concerns raised about small survey sample sizes. The survey sample must be of sufficient size to achieve a 5 per cent margin of error and a 95 per cent confidence level.

Ofgem decided that the maximum penalty DNOs would face for this mechanism was -0.35 per cent of RoRE.

Consumer Vulnerability

This new mechanism is intended to ensure that DNOs are held accountable for delivering their vulnerability strategies and the baseline expectations, and to incentivise DNOs to develop ambitious and best practice initiatives. Three priority groups were identified comprising customers:

- most at risk during a loss of supply;
- in, or at risk of, fuel poverty; and
- most at risk of being left behind in the transition towards net zero.

The mechanism is based on a weighted score from five metrics that measure DNO performance in relation to vulnerability (weights for each metric are shown in brackets):

- The proportion of customers registered on a DNO's Priority Service Register (PSR) out of the total eligible customers in its region(s), named PSR Reach (40 per cent).
- The value delivered as a result of DNOs providing fuel poverty support services (20 per cent).

[83] In certain market segments, the regulated DNOs compete with third party providers of major connections, such as Independent Connection Providers (ICPs) and Independent DNOs (IDNOs).

- The value delivered as a result of DNOs supporting customers at risk of being left behind in the energy system transition (20 per cent).
- The customer satisfaction of customers who have received fuel poverty support services (10 per cent).
- The customer satisfaction of customers who have received support to ensure no one is left behind in the energy system transition (10 per cent).

The maximum value of the rewards and penalties for the Consumer Vulnerability incentive was set at ±0.2 per cent of RoRE.

Interruptions Incentive Scheme (IIS)

This mechanism seeks to incentivise the DNOs to improve network reliability beyond the level that is funded *ex ante*, so that consumers are better served in terms of reduced interruption frequency and duration.

There are two key elements of the IIS:

- unplanned interruptions; and
- planned interruptions.

The unplanned interruptions metric is intended to set challenging targets that drive improved reliability across all DNOs for two key reliability measures – Customer Interruptions (CI) and Customer Minutes Lost (CML). Performance targets are based on average DNO performance in the latest four years of historical DNO performance data, with annual improvement factors applied during the control period. The size of the improvement factor varies based on how far a DNO is from the frontier at the beginning of the control period.

The performance target for planned interruptions is based on a rolling three-year average with a two-year lag. This is done so that DNOs cannot allow their performance to deteriorate without facing a penalty but there is sufficient flexibility to reflect changes in work programmes.

The IIS cap was reduced for RIIO-ED2 to 1.5 per cent of RoRE, down from 2.5 per cent in the previous regulatory period, while the collar was maintained at 2.5 per cent. Ofgem considered that reducing the cap from 2.5 per cent would better balance the benefit of additional improvements and the costs associated with delivering them against the potential for DNOs to earn excessive rewards, particularly in the context of the cost-of-living crisis.

3.5.3 Financial incentives for gas

The Customer Satisfaction Survey and Complaints Metric were also used by Ofgem for RIIO-GD2, as was the Unplanned Interruptions component of the Interruptions Incentive Scheme. Ofgem also used an ODI-F to encourage DSOs to reduce leakage from their networks. This ODI-F, named "shrinkage and environmental emissions" meant DSOs could earn rewards or penalties (symmetrically capped and collared at 0.25 per cent of base revenue) based on the difference between baseline and outturn leakage levels, measured in GWh. Baseline leakage levels were set on the basis of average pressure and gas conditioning levels from 2017-18 to 2019-20.

The only other ODI-F applied to gas distribution that does not feature in the ODI-F suite for electricity distribution is the Large Project Delivery (LPD) metric, though Ofgem's core methodology document for RIIO-2 states that it expects this incentive mechanism to be most relevant to electricity transmission, as it only applies to projects over £100m.[84]

[84] Ofgem (2020) "RIIO-2 Final Determinations - Core Document" Paragraph 4.62

3.5.4 Experience of using quality of service incentives in Great Britain

The financial incentive framework Ofgem used for RIIO-ED2 and RIIO-GD2 was informed by its experience in previous regulatory periods (RIIO-ED1 and RIIO-GD1). Overall, DNO performance on quality metrics was strong in the RIIO-1 price control, as the framework successfully drove improved output delivery for customers.[85] However, the incentive mechanisms used targets that were too easy for the DNOs to outperform, leading to the DNOs making high returns.[86]

A significant proportion of the electricity DNOs' high returns came from the IIS. While the scheme successfully drove improvements in reliability following its introduction in 2002 (the number of power cuts had halved by 2020 and length of power cuts fell 60 per cent over the same period), the performance targets for the scheme were too low in RIIO-1, failing to keep pace with performance improvements. By the start of the RIIO-ED1 price control, networks were already exceeding the targets that Ofgem had set.[87]

For gas DNOs, high returns were consistently earned through the National Transmission System (NTS) exit capacity incentive.[88] A report commissioned by Ofgem considered that outperformance of the NTS exit capacity incentive occurred mainly as a result of forecasting errors in setting the incentive targets, as outturn gas demand was lower than anticipated by Ofgem.

Another issue was that the baseline expenditure set at RIIO-1 contributed to improved reliability performance. The totex allowance enabled DNOs to fund programmes or replace assets in order to improve reliability, which then meant DNOs earned additional revenue from the incentive payments under the IIS. Arguably, customers paid twice for the same output, once through the baseline expenditure and once through incentive mechanism payments. This led to the recommendation by CEPA for RIIO-2 that improved reliability expected as a result of the DNOs' proposed investment programme should be captured in the IIS targets, with rewards only payable for improvements above and beyond that level.[89] Citizens Advice recommended that Ofgem set much tougher incentives for network companies for RIIO-2, claiming that if the incentive package had been more robust consumers could have saved £1.1bn.[90]

As noted previously, the IIS reward cap was reduced for RIIO-ED2 to 1.5 per cent of RoRE, down from 2.5 per cent for RIIO-ED1. Additional improvement factors were applied in three tranches, to ensure targets kept pace with performance improvements better than they had for RIIO-1. The annual improvement factors were:

- 0.5 per cent for frontier DNOs
- 2 per cent for DNOs within 20 per cent of the frontier
- 4 per cent for DNOs more than 20 per cent from the frontier

Appeals against Ofgem's final determinations

Two electricity DNOs have appealed against specific elements of Ofgem's final RIIO-ED2 determination, but none of the grounds for appeal relate to the quality incentive mechanisms.[91]

[85] CEPA (2019) "Review of the RIIO framework and RIIO-1 performance" p.21 online
[86] NAO (2020) "Electricity networks" p.32 [online]
[87] NAO (2020) "Electricity networks" p.38 [online]
[88] This incentive mechanism encouraged gas DNOs to minimise the cost of NTS exit capacity booking (i.e. booking the offtake of gas from the transmission network).
[89] CEPA (2019) "Review of the RIIO framework and RIIO-1 performance" p.33 [online]
[90] Citizens Advice (2017) "Energy Consumers' Missing Billions" p.4 [online]
[91] CMA: "Energy Licence Modification Appeal 2023" [online]

Similarly, in 2021 five gas DNOs appealed against specific elements of Ofgem's final RIIO-GD2 determination, but none of the grounds for appeal relate to the quality incentive mechanisms. A number of the grounds for appeal were upheld by the CMA in its final determination.[92]

3.6 Summary of lessons from other jurisdictions

Our review into the use of quality of service incentive mechanisms for electricity and gas DSOs in other jurisdictions identified a number of important lessons to serve as a starting point when developing a financial incentives framework for electricity and gas DSOs operating in Flanders.

When setting objectives and deliverables, in addition to considerations around the reliability and security of the service provided, regulators have often reflected emerging priorities and issues around energy transition, the implication this may have for the role of DSOs and the digitalisation of markets. For example, for the current regulatory period the CRU introduced an objective around the transformation of the DSO role, designed to facilitate the transition of Ireland's energy sector towards a secure low-carbon future. Further, both the CRU and Ofgem introduced financial incentive mechanisms linked to the objective of smarter/ more innovative grid management by DSOs.

In terms of the types of mechanisms used, other regulators have relied on either a relative incentive mechanism or a suite of absolute incentive mechanisms to provide financial incentives for operators relating to their quality of service. The ACM and BNetzA both rely on a relative incentive mechanism in the form of a q-factor (quality factor) that is zero-sum across the operators, with the overall industry revenues unaffected by the q-factor. In both cases the q-factor only applies to electricity DSOs as the regulators have not defined a quality of service incentive for the gas sector. While these mechanisms are similar to the existing zero-sum financial incentive in Flanders, there exist some important differences between the Flemish and Dutch/ German markets. First, both the Netherlands and Germany have multiple competing DSOs active in the electricity and gas markets. In addition, the overall weight attached to the quality incentive is also greater in the Netherlands (about 5 per cent of overall revenue).

At the same time, CRE, the CRU and Ofgem have developed a suite of absolute incentive mechanisms for operators. In particular, both CRE and the CRU have implemented incentive packages for a single large DSO serving most or all of the electricity and gas markets in France and Ireland (respectively). In the case of Ofgem, there are a number of companies which manage electricity and gas DSOs in Great Britain. In all three cases, DSOs are subject to a range of financial incentives rather than a single quality factor. Previous regulatory experience also highlights one of the key challenges associated with designing absolute incentive schemes. In particular, Ofgem's experience at RIIO-1 illustrates how targets that were too easy for DSOs to outperform could lead to DSOs making high returns at the expense of customers.

The design and calibration of financial incentives (including setting the reference values and unit incentive rates) is often informed by historical data regarding DSOs' performance in previous regulatory periods. Where historical data is used, regulators have taken a variety of approaches to determine reference values including setting reference values at average historical performance, above average historical performance and below average historical performance, following careful consideration of the relevant context for each performance area and deliverable when making these determinations. Similarly, any assumptions made regarding improvements in performance over time vary by incentive mechanism, again on the basis of an informed view by regulators supported by information on historical performance.

In the absence of historical data (e.g. for newly introduced incentives), other methods such as expert panel assessment are used to develop the financial incentive. For example, the DSO incentive introduced by Ofgem

[92] CMA: "Energy licence modification appeals 2021" [online]

at RIIO-ED2 puts a 40 per cent weight on performance panel assessment and the stakeholder engagement incentive set by CRU is also subject to assessment by an expert panel.

While there are important lessons to learn from other jurisdictions, there is no single regulator whose experience precisely mirrors the challenges faced by VREG. The use of absolute incentive mechanisms in other jurisdictions in cases where there is a single operator serving most or all of the market suggests that moving away from the current zero-sum incentive in favour of absolute incentive mechanisms could be appropriate for Flanders. At the same time, the suite of financial incentives developed should also take account of emerging issues and priorities over the next regulatory period, including the energy transition and the digitalisation of markets.

4 Objectives and Deliverables

In this section we set out our framework for assessing which regulatory objectives should be incentivised by means of a financial incentive mechanism. We then present our list of candidate objectives, along with the associated deliverables, before applying our assessment framework to these objectives.

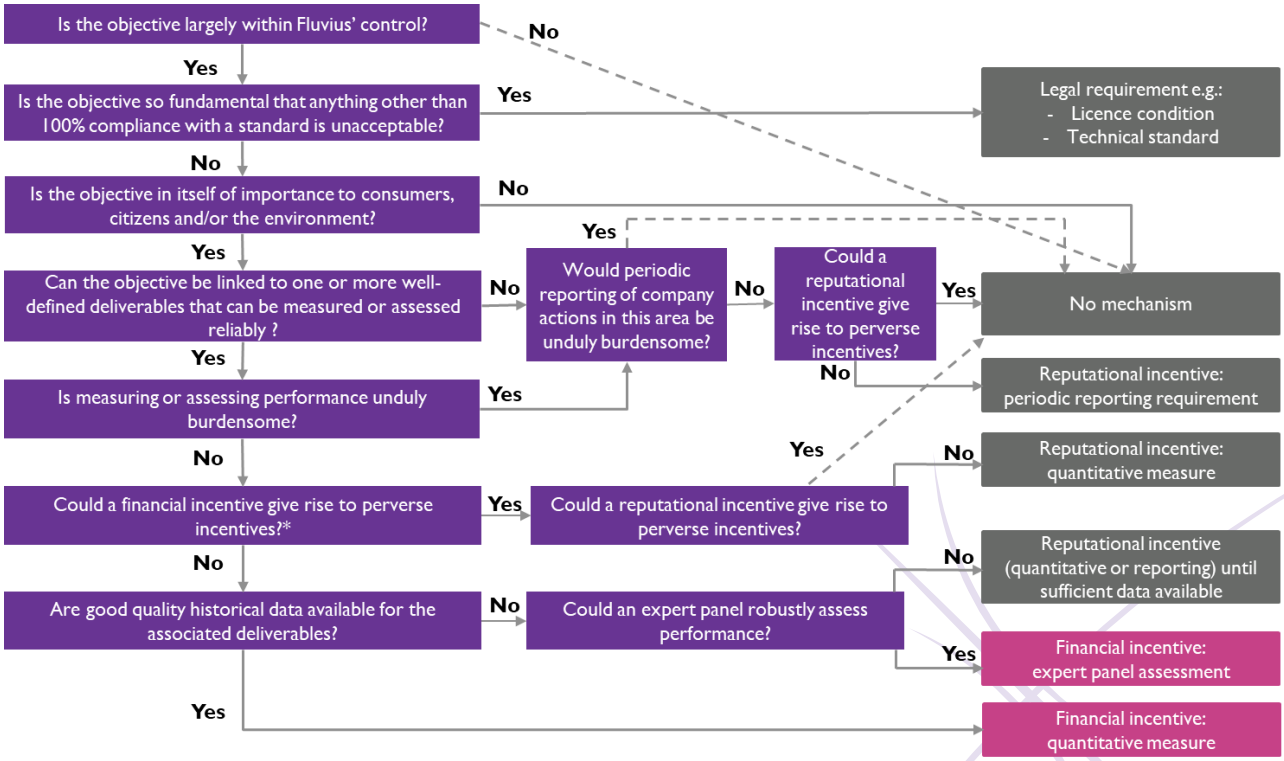
4.1 Framework for assessing objectives and deliverables

Our framework first assesses objectives and deliverables based on a series of questions to determine the most suitable mechanism (if any) for incentivising that objective before considering the potential interaction between quality of service incentives, as well as any interaction with other incentives.

4.1.1 Decision tree for determining mechanism for relevant objectives and deliverables

We have developed a decision tree that assesses the suitability of a financial incentive mechanism for an individual regulatory objective. The decision tree assesses each candidate objective against a series of Yes/No questions, and uses the answer to those questions to determine the most suitable mechanism (if any) for incentivising that objective. The questions are designed to systematically filter out objectives that are not suitable for a financial incentive mechanism. Figure 4.1 presents the decision tree, with the questions in purple boxes and the different possible outcomes listed in the boxes on the right-hand side of the diagram.

Figure 4.1: Framework for assessing whether objectives should be incentivised financially



*Note that perverse incentives may be mitigated by incentives from other objectives or deliverables in the overall package.
Source: Europe Economics analysis.

The rationale for each of the questions in the decision tree is provided below. In the main text, we set out the rationale for the seven questions on the left-hand side of the diagram, going from top to bottom, while the rationale for the four questions in the middle of the diagram is explained in boxes after the question which leads to that "branch" of the decision tree.

Is the objective largely within Fluvius' control?

The first criterion ensures that we only recommend an incentive mechanism of any type for objectives largely within Fluvius' control. If an objective is clearly outside Fluvius' control, then it would not be appropriate for Fluvius to be held accountable for performance in relation to the objective and deliverables or for it to receive financial penalties or rewards for outcomes that were not a direct result of its actions.

Is the objective so fundamental that anything other than 100% compliance with a standard is unacceptable?

The second criterion filters out objectives where a financial incentive mechanism would be inappropriate because it is not a strong enough incentive, given the importance of complete compliance. For example, providing a financial incentive for a DSO to ensure its network is safe means a DSO could choose to operate an unsafe network if it were willing to incur the associated financial penalty. In our view, this would not be an appropriate mechanism. Instead, as shown in the framework diagram, we consider that a legal requirement, such as a licence condition, is the appropriate approach for ensuring that such objectives are achieved.

For many potential objectives, absolute compliance is not required or even necessarily optimal once costs are taken into account (i.e. the answer to the first criterion in our framework is "No"). Instead, regulators aim to incentivise DSOs to achieve good levels of performance.

Is the objective in itself of importance to consumers, citizens and/or the environment?

This criterion is included to ensure that only objectives of importance to consumers, citizens and/or the environment are progressed. If an objective is not important to at least one of these parties, then there is no reason for a regulator to devote time and resources to developing and implementing a financial incentive mechanism for it.

Can the objective be linked to one or more well-defined deliverables that can be measured or assessed reliably?

This criterion is included because if an objective cannot be linked to deliverables that can be reliably measured or assessed, it will not be possible to develop a financial incentive mechanism for that objective. The wording of the criterion includes the phrase "measured or assessed" so that our framework recognises the possibility of a financial incentive mechanism for objectives that can be linked to quantitative metrics and for objectives that can be linked to qualitative assessment (e.g. by an expert panel). Our analysis of other jurisdictions found that there is precedent for both forms of financial incentive mechanism.

Is measuring or assessing performance unduly burdensome?

This criterion is an assessment of proportionality. It may be feasible to define deliverables for an objective that can be measured or assessed, but if the costs involved in doing so (which will ultimately be borne by consumers/taxpayers) are high and the benefits of incentivising the objective are comparatively small, then the net benefit to consumers/citizens/the environment of developing and implementing the financial mechanism may be negative.

Would periodic reporting of company actions in this area be unduly burdensome?

This question can be reached in two alternative ways:

- Firstly, if it is deemed that an objective cannot be linked to well-defined deliverables that can be reliably measured or assessed.

- Secondly, if it is deemed that measuring or assessing deliverables would be unduly burdensome.

In these cases, an alternative way to incentivise the DSO would be to require it to produce periodic reports setting out its actions in relation to a particular objective, in order to provide reputational incentives.

The rationale for this question is the same as for the equivalent question relating to measuring/assessing deliverables. While a periodic reporting requirement can generate reputational incentives, the benefits of this would need to be weighed against the burden for DSOs of producing the reports.

If the answer to this question is "Yes", then the recommendation of our framework is for no incentive mechanism.

If the answer is "No", then the objective moves to the question ***"Could a reputational incentive give rise to perverse incentives?"*** (explained below). If the answer to this question is yes, then the recommendation from our framework is for no incentive mechanism. An answer of "No" leads to our framework recommending a reputational incentive based on periodic reporting.

Could a financial incentive give rise to perverse incentives?

There is a risk that a regulator providing a DSO with a financial incentive to achieve a particular objective could inadvertently create a perverse incentive for that DSO to behave in a way that negatively impacts consumers, citizens and/or the environment. For example, a financial incentive for a DSO to reduce in-house greenhouse gas emissions may lead to the DSO not undertaking certain activities that it would otherwise have carried out in an effort to reduce its in-house emissions. If those foregone activities would have helped the Flanders economy to achieve the energy transition, the overall impact of the financial incentive might be negative for the environment, as the DSO's own emission reductions are likely to be far smaller than the emissions reductions that would be achieved by the energy transition. This would be a perverse outcome.

Our framework recommends not using financial incentive mechanisms for objectives where doing so has a significant risk of creating perverse incentives. We note that perverse financial incentives may be mitigated by incentives from other objectives/deliverables in the overall package.

Could a reputational incentive give rise to perverse incentives?

If a financial incentive for a candidate objective could create perverse incentives, an alternative option is to have a reputational incentive based on the same deliverables that would have fed into the rejected financial incentive mechanism. For example, a league table of DSO in-house emissions could be published (normalised by some scaling measure). It is therefore necessary to assess whether or not a reputational incentive mechanism could also give rise to perverse incentives, for the same reasons as discussed previously. In general, reputational incentives are weaker than financial incentives and, as a result, are less likely to generate perverse incentives.

If the answer to this question is "No", then the recommendation from our framework is that VREG should implement a reputational incentive mechanism based on the same deliverables that would have been used for a financial incentive mechanism. If the answer to this question is "Yes", then the recommendation from our framework is that there should be no incentive mechanism.

Are good quality historical data available for the associated deliverables?

Good quality historical data is needed to objectively determine parameters such as reference values for a financial incentive mechanism based on quantitative measures. If such data are available, then we reach the end of the decision tree, with a recommendation that the objective in question is incentivised financially, using

a quantitative measure. If not, the objective moves to a branch question about the feasibility of an expert panel assessment, discussed in the box below.

Could an expert panel robustly assess performance?

If historical data are not available for an objective that otherwise passes all of the criteria in our framework, it does not necessarily mean that a financial incentive is not feasible. Expert panels have been used in financial incentive mechanisms by energy regulators in other jurisdictions. The benefit of including this possibility is that it does not restrict the framework to only recommending financial incentives for objectives that are linked to activities that the DSO is already doing (which are the only activities for which historical data will be available).

If the answer to the question is "Yes", our framework recommends a financial incentive mechanism based on expert panel assessment. If the answer to this question is "No", then a financial incentive mechanism is not recommended. Instead, the framework recommends a temporary reputational incentive while data are gathered that can be used to develop a financial incentive mechanism in the future.

4.1.2 Interaction between quality of service incentive schemes

In addition to assessing the suitability of a financial incentive mechanism for individual objectives and deliverables through the framework set out above, it is also important to consider any potential interaction between quality of service incentive schemes as well as the resulting 'package' of incentives in aggregate.

The objective of these checks is to minimise any risk of double counting leading to double rewards/penalties or additional, unduly burdensome reporting obligations for DSOs (e.g. where similar aspects of service provision are covered under two separate incentive mechanisms). For example, unsatisfactory performance against the objective of providing good connections could also lead to lower levels of customer satisfaction among connections customers, creating a potential overlap between the two objectives. If a financial incentive mechanism applies to both of these objectives, without careful design there would be a danger that the DSO receives rewards or penalties twice for the same performance.

4.1.3 Interaction with other incentives and cost of capital

In addition to the interaction between the quality of service incentives discussed above, it is also important to consider the interaction of financial incentives with other incentives that apply to DSOs as well as with the cost of capital.

Advance mechanism

First, we consider interaction with the advance mechanism, described in paragraph 5.5.4.4 of the 2021-2024 tariff methodology.[93] The advance mechanism allows VREG, following a request from a DSO, to make an interim adjustment (by adding an advancement of revenues) to a DSO's future endogenous income which will be reversed in subsequent regulatory periods. VREG can also request adjustments to a DSO's endogenous allowed revenue at its own initiative.

The scope for interaction between the advance mechanism and financial incentive mechanisms is limited. The interim revenue adjustments of the advance mechanism may only take place if a number of stringent criteria are met. One of these criteria is that if positive adjustments are requested, the DSO needs to demonstrate that these are necessary as a result of changes in legislation and regulations, or an emergency situation. In

[93] VREG (2022) "Tariff methodology for electricity and natural gas distribution during the regulatory period 2021-2024" [online]

our view, it is unlikely for this criterion to be fulfilled as a result of the application of financial incentive mechanisms. Firstly, the incentive mechanisms would not pass the criterion of being a within-period "change in legislation and regulations", as they would not be determined within-period. Secondly, it is unlikely that the financial incentive mechanisms would contribute to passing the criterion of there being an "emergency situation" as the mechanisms would be designed with limits on the financial penalties that DSOs can incur, limiting DSOs' financial exposure. Therefore, we consider it unlikely that the financial incentive mechanisms would have any impact on whether the criteria for an advance mechanism are met at any point during the regulatory period.

Cost of capital

In terms of the interaction between financial incentives and cost of capital assessment, under the WACC-CAPM framework (the standard approach to estimating the cost of capital) risks are classified into two groups – systematic and specific risks. Systematic risks are risks that are correlated with the overall economy and are hence non-diversifiable. The greater a company's exposure to systematic risks, the higher its cost of capital. Specific risks are those risks that only apply to a particular asset class and can be diversified away by investors, and which therefore do not affect the cost of capital.

In general, much of the performance of the DSOs under their incentive schemes is likely to be driven by company-specific factors, and would therefore not increase exposure to systematic risk and would not affect the cost of capital.

4.2 Candidate objectives and deliverables

There are many possible **objectives** a regulator may wish to incentivise, but not all are suitable for a financial incentive mechanism. Based on our research into other jurisdictions and our review of the existing regulatory framework, we developed the following long list of potential objectives for a financial incentive mechanism:

- Enhancing customer satisfaction
- Protecting vulnerable customers
- Ensuring security of supply
- Reducing in-house environmental impact
- Innovative grid management to facilitate the energy transition
- Promoting whole systems thinking
- Providing good connections service
- Providing smart metering information
- Improving data management
- Ensuring safety
- Maintaining cyber security
- Ensuring efficient exogenous costs
- Ensuring cost efficiency

While each incentive mechanism would relate to a single objective, an objective might have more than one associated **deliverable** to cover different relevant dimensions of performance in that area. For example, the objective of ensuring security of supply might have both the number and the duration of interruptions as deliverables. At the same time, there are advantages in not proliferating too large a number of deliverables, as this would make the regime more complex, increase the scope for Fluvius to take advantage of information asymmetry (as VREG would not be able to apply as much regulatory scrutiny to each deliverable), and reduce the extent to which the incentive regime focused management effort on the key variables of most importance to customers.

The box below summarises our high-level recommendation for how objectives and the associated deliverables should be defined. We will provide further detail on the definition of objectives and deliverables that are being used for financial incentive mechanisms during Phase 2 of the project.

When defining the relevant objectives and the associated deliverables, it is important to ensure that any definitions used provide little scope for subjective interpretation by stakeholders e.g. by specifying the scope of the objective and/or deliverable through listing the relevant aspects of service provision that fall within and/or outside of its scope. For example, Appendix 9 of the 2021-24 tariff methodology[94] defines power cuts/interruptions as "a sudden complete loss of voltage (0 per cent of the agreed voltage)" and specifies four groups[95] of power interruptions (with further definitions provided for each group) that are excluded from the scope of the current q-factor.

Similarly, it is also important to set out the precise way in which each deliverable will be measured e.g. by specifying the relevant unit of measurement and/or method of calculation to avoid scope for data manipulation. By way of illustration, incentives related to customer experience and satisfaction should be based on a specified customer satisfaction survey instrument that cannot be changed by the DSO without VREG approval, otherwise there is a risk that DSOs may re-design elements of the survey to elicit more favourable responses from customers.

Where objectives and/or deliverables are already defined and measured under the existing framework or by an independent third party (e.g. the Flemish government provides a definition of "vulnerable customers"), we recommend using these existing definition and measures as a starting point. This would ensure that any future definitions and measures are consistent with those previously used by operators (giving rise to a longer time series of comparable data for monitoring and incentivising performance in relation to that objective and/or deliverable). At the same time, we recognise that there may be cases where improvements need to be made to existing definitions, especially if shortcomings have been identified by stakeholders.

4.2.1 Description of candidate objectives and deliverables

Below we provide a description of each candidate objective along with potential deliverables for both electricity and gas DSOs that could be linked to the candidate objective. The set of deliverables presented in this section may not all be relevant for Flemish DSOs. In the case of those objectives which are selected for a financial incentive mechanism, the appropriateness and feasibility of specific deliverables for those objectives is considered in later sections of the report (and will be considered in further detail during Phase 2 of the project). The set of candidate objectives and deliverables below are illustrated with examples from other jurisdictions as relevant. (Full details of these examples can be found in Section 3.)

Enhancing customer satisfaction

The objective of enhancing customer satisfaction can either refer to:

- enhancing the satisfaction of all customers (whether or not they have been in contact with the company); or
- enhancing the satisfaction of those customers that have recently interacted with company (e.g. through a query or complaint).

[94] VREG (2020) "Tariff methodology regulatory period 2021-2024: Appendix 9: The quality incentive", section 3.1.1 [online]

[95] These four groups are: (i) momentary power cuts; (ii) planned power outages; (iii) power interruptions resulting from a fault, incident or interruption on an interconnected network that is not managed by the reporting distribution system operator; and (iv) certain exceptional power interruptions (with external attestation).

The downside of the first approach is that it will overlap with other objectives, since customers that have experienced (say) outages or a poor connections service are more likely to be dissatisfied. This creates a risk that the package of financial incentives may double count good or bad performance.

The second approach focuses more specifically on the DSOs providing good customer service. It covers the quality of the DSOs' complaints management processes and responses to general enquiries. If the satisfaction of customers who have requested a connection is included, care would be needed to ensure that it complements any separate incentives that exist in relation to the quality of connections service rather than leading to double-counting.

Possible deliverables for both electricity and gas DSOs include customer satisfaction surveys (e.g. general enquiries survey, complaints survey, etc.) and complaints metrics (e.g. complaints received by the DSOs or the Ombudsman, or the speed with which complaints are processed and resolved). In the case of complaints data, we note that perverse incentive may arise if operators' own complaints data are used for the financial incentive mechanism e.g. operators may seek to classify complaints as enquiries or other types of customers contacts to give a lower figure for complaints, or procedures for making complaints may be made less visible to customers.

By way of illustration, the CRU uses a customer service incentive for the DSO to maintain appropriately high standards of service. The quality of its customer service/satisfaction is measured through both a customer satisfaction survey and using a range of metrics relating to the performance of its contact centre.

Protecting vulnerable customers

This objective relates to DSOs providing additional support to customers in vulnerable situations, above and beyond the service provided to non-vulnerable customers, which is elsewhere covered by the "Enhancing customer satisfaction" objective. By "vulnerable", the objective refers to customers in adverse financial circumstances or customers that would be at the highest risk during a supply interruption, which may include elderly customers living alone or customers that need to use medical equipment that requires a power supply.

Possible deliverables for both electricity and gas DSOs include customer satisfaction scores derived from a survey of vulnerable customers (if such customers can be identified).

By way of example, Ofgem put in place a consumer vulnerability incentive that is aimed at holding DNOs to account for delivering their vulnerability strategies focussing on three priority groups of vulnerable customers. Ofgem defines vulnerable customers as customers in fuel poverty, customers at risk of being left behind by the energy transition, and customers most at-risk during loss of supply.

Ensuring security of supply

This objective relates to reducing the frequency and duration of interruptions to supply.

Possible deliverables for both electricity and gas DSOs include interruptions frequency and interruptions duration (e.g. using the existing definitions set out in Appendix 9 of the 2021-24 tariff methodology).

Regulators often use financial incentive mechanisms to incentivise network reliability. For example, both the ACM and BNetzA use a q-factor mechanism which provides financial incentives for DSOs to minimise interruptions on the electricity network grid.

Reducing in-house environmental impact

This objective relates to DSOs reducing the net direct impact of their in-house activities on the environment.

Possible deliverables for both electricity and gas DSOs include in-house carbon emissions (e.g. tons of carbon emitted, % reduction from baseline), waste/recycling measures and water usage.

Innovative grid management to facilitate the energy transition

This objective largely relates to electricity DSOs. It involves DSOs improving the flexibility and resilience of the grid by facilitating appropriate innovative solutions to grid management, including flexibility and storage technologies. This innovation must link to the energy transition, ensuring networks can manage flows on the network as electrification increases, and enabling increased distributed generation of renewable energy by providing fast connections.

Gas DSOs may also be able to innovate to facilitate the energy transition (by accommodating injections of bio-methane into the grid).[96]

Possible deliverables for electricity include an expert assessment of innovation projects in this area that have been implemented by the DSO, rewarding DSOs for innovation that provides value to customers. Quantitative deliverables for this objective are hard to define, because by definition this objective relates to DSOs undertaking new activities.

Regulators including Ofgem and the CRU use financial incentives to drive DSOs to more efficiently develop and use their network, considering flexible alternatives to network reinforcement. As an illustration, the CRU introduced a range of new incentives to transform the role of the DSO and to facilitate the transition of Ireland's energy sector to a secure low carbon future.

Promoting whole systems thinking

This objective is based on reviews of the Council of European Regulators' (CEER) regulatory literature and relates to increasing collaboration between DSOs and their local stakeholders to maximise the societal net benefit for the entire system, making sure DSOs consider the consequences of their actions on other actors in the value chain. It includes appropriate collaboration between the TSO and DSOs to ensure that the actions that are taken in each part of the system are optimal for the system as a whole.

Possible deliverables for both electricity and gas DSOs might include bespoke deliverables when there is a clear opportunity for collaboration with local stakeholders or with other network companies.

Providing good connections service

This objective relates to the speed and quality of the connections service that DSOs offer customers, both large and small. It involves offering customers a range of connection products (firm and flexible) which meet their needs and providing fast connections.

Possible deliverables for both electricity and gas DSOs include the compensation paid to customers for late connections/reconnections, a connections satisfaction survey, the range of connection products offered and time to quote and time to connect/reconnect to the grid, though time to quote and time to connect measures require data to be available on the time it has taken DSOs to provide customers with connection quotes and to activate connections. Other potential deliverables for electricity include the length of time for processing new PV applications and time taken for new PV or renewable energy to be taken into service.[97]

Regulators in other countries, such as CRE, the CRU and Ofgem, all use financial incentives to incentivise DSOs to reduce the average connection time for customers seeking a connection to the distribution network and to improve the quality of connection services.

Providing smart metering information

This objective relates to the energy consumption information provided to customers with digital smart meters through online portals. It involves enabling customers to access data on their consumption at different time periods, which may lead them to alter their consumption patterns.

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[96] Gas DSOs may also need to begin the process of decommissioning the gas network, although this may lie outside the remit of VREG's regulation.

[97] Our recommendation for these final two deliverables is for a reputational incentive as the date by which these connections can be taken into service could vary considerably depending on the specific connection request.

Possible deliverables for both electricity and gas DSOs could include smart meter website/portal participation and related surveys.

The CRU relies on a smart metering incentive mechanism to give the DSO an appropriate financial stake in delivering its part in the National Smart Metering Programme. The DSO is assessed on smart meters deployed, smart meters functionality delivery and customers' satisfaction around the smart meter deployment process.

Improving data management

This objective relates to DSOs improving the timeliness, accuracy and consistency of their data management, including ensuring that customers' private data is managed securely and appropriately.

Possible deliverables for both electricity and gas DSOs include timeliness of data reporting, consistency of data collection methodology across DSOs and across time, accuracy of reported data, and GDPR breaches.

Ensuring safety

This objective relates to DSOs ensuring the network is safe.

Possible deliverables include the number of workplace injury incidents or customer safety incidents.

Maintaining cyber security

This objective relates to DSOs ensuring the network is resilient to cyber-attacks.

Possible deliverables include the number of cyber security breaches and the time taken to resolve cyber security incidents.

Ensuring efficient exogenous costs

This objective relates to DSO's ability to influence (to some extent) certain exogenous costs. For example, even though the fees charged by TSOs are categorised as exogenous, DSOs may save costs by monitoring and adjusting the load on the connection points with the transmission network.

Possible deliverables therefore include transmission network costs (provided these are classified as exogenous by VREG). Other exogenous costs such as taxes and compulsory purchases of green certificates are less likely to be suitable as deliverables since DSOs are unlikely to be able to influence these costs.

Ensuring cost efficiency

This objective relates to encouraging DSOs to invest and operate cost-efficiently. VREG has commissioned a separate study to determine the general efficiency incentive (focussing on endogenous costs) to be applied for the next regulatory period.

4.2.2 Comparison of objectives and incentive mechanisms across other jurisdictions

The tables below indicate for each candidate objective whether regulators in other jurisdictions incentivise the objective through a financial incentive mechanism. As the q-factor used in the Netherlands (by ACM) and Germany (by the BNetzA) solely seek to incentivise the "ensuring security of supply" objective (for electricity), the tables focus on the incentive mechanism in the other three jurisdictions reviewed (France, Ireland and Great Britain).

As the table below shows, the financial incentive mechanisms used by other regulators mostly focus on the "enhancing customer satisfaction", "ensuring security of supply", "innovative grid management to facilitate the energy transition" and "providing good connections service" objectives.

Table 4.1 Use of financial incentive mechanisms in selected other jurisdictions, by objective (electricity)

Objectives	France (CRE)	Ireland (CRU)	Great Britain (Ofgem)
Enhancing customer satisfaction	Complaints response rate, Appointments missed	Customer satisfaction, contact centre satisfaction and stakeholder engagement	Customer Satisfaction Survey, Complaints Metric
Protecting vulnerable customers	N/A	N/A	Vulnerability
Ensuring security of supply	Outage duration and frequency, long outages mechanism	Unplanned outage duration and frequency, worst served customers and outage information	Interruptions Incentive Scheme
Reducing in-house environmental impact	N/A	N/A	N/A
Innovative grid management to facilitate the energy transition	N/A	Flexibility, Visibility, Independent Role of the DSO	DSO incentive
Promoting whole systems thinking	N/A	Joint DSO/TSO Coordination	N/A
Providing good connections service	Late connections, Connections agreement procedure, Average connections timeframe	Connections incentive	Time to Connect, Major Connections
Providing smart metering information	N/A	Smart metering incentive	N/A
Improving data management	N/A	N/A	N/A
Ensuring safety	N/A	N/A	N/A
Maintaining cyber security	N/A	N/A	N/A
Ensuring efficient exogenous costs	N/A	N/A	N/A
Ensuring cost efficiency	N/A	N/A	N/A

Note: Given the differences in the objectives set by regulators, we have exercised a degree of judgement in mapping the suite of incentive mechanisms used by other regulators onto our candidate objectives.
Source: Europe Economics.

The financial incentive mechanisms used by other regulators for the gas sector mostly focus on the "enhancing customer satisfaction", "reducing in-house environmental impact", "providing good connections service" and "providing smart metering information" objectives.

Table 4.2 Use of financial incentive mechanisms in selected other jurisdictions, by objective (gas)

Objective	France (CRE)	Ireland (CRU)	Great Britain (Ofgem)
Enhancing customer satisfaction	Appointments missed, complaints response rate	Call centre, complaints metric and customer survey	Customer Satisfaction Survey, Complaints Metric
Protecting vulnerable customers	N/A	N/A	N/A
Ensuring security of supply	N/A	N/A	Unplanned Interruptions
Reducing in-house environmental impact	N/A	N/A	Shrinkage and environmental emissions
Innovative grid management to facilitate the energy transition	N/A	N/A	N/A
Promoting whole systems thinking	N/A	N/A	N/A
Providing good connections service	Connections completed	Growth incentive	N/A
Providing smart metering information	Availability rate of supplier portal	N/A	N/A
Improving data management	Various measures	N/A	N/A
Ensuring safety	N/A	N/A	N/A
Maintaining cyber security	N/A	N/A	N/A
Ensuring efficient exogenous costs	N/A	N/A	N/A
Ensuring cost efficiency	N/A	N/A	N/A

Note: Given the differences in the objectives set by regulators, we have exercised a degree of judgement in mapping the suite of incentive mechanisms used by other regulators onto our candidate objectives.
Source: Europe Economics.

4.3 Outcome from applying framework to candidate objectives

This section provides our recommendations regarding the suitability of financial incentives for each candidate objective based on using the decision tree above, followed by our conclusions regarding the interaction of quality of service incentives with other incentives.

4.3.1 Recommendations regarding financial incentives

The table below summarises our recommendations regarding the objectives which may be incentivized through a financial incentive.

Table 4.3: Summary of recommendations regarding financial incentives

Objective	Deliverables	Rationale for recommending a financial incentive
Ensuring security of supply	Interruption metrics (interruption frequency and duration)	A financial incentive mechanism based on one or more quantitative measures is suitable for these objectives.
Providing good connections service	Compensation for late connections/ reconnections and (for electricity) survey	
Enhancing customer satisfaction	Customer survey	
Providing smart metering information	Smart meter metrics	
Innovative grid management to facilitate the energy transition	Expert panel assessment	A financial incentive mechanism based on expert panel assessment is suitable as a mechanism given the lack of good quality historical data and provided that any issues around perverse incentives are mitigated by careful mechanism design.

Source: Europe Economics analysis.

As shown in Table 4.3 above, the result of applying our decision tree is that financial incentives are recommended for the following four objectives:

- Enhancing customer satisfaction
- Ensuring security of supply
- Providing good connections service
- Providing smart metering information

All four objectives pass the first seven questions of the framework and therefore are recommended for a financial incentive mechanism based on one or more quantitative measures. The deliverables relevant for Flemish DSOs are summarised in the second column of the table.

The recommendation of our framework regarding the "Innovative grid management to facilitate the energy transition" objective is less definitive. While this objective passes the first five questions of the decision tree, it may give rise to perverse incentives as innovative solutions may not always lead to optimal or least-cost outcomes. Assuming that any issues around perverse incentives could be mitigated by careful design of the mechanism, the lack of good quality historical data (due to the nature of innovative activities that DSOs will be undertaking) suggests a financial incentive based on expert panel assessment as a suitable mechanism for this objective.

In our view, all of the objectives discussed in this section are relevant for both electricity and gas.

4.3.2 Recommendations for other objectives

Table 4.4 below summarises the outcome of applying our framework to the list of candidate objectives where a financial incentive is not recommended, with the final column providing our rationale for recommending a mechanism other than a financial incentive (if any).

Table 4.4: Summary of recommendations regarding non-financial incentives

Objective	Mechanism recommended for next regulatory period (if any)	Rationale for recommending another mechanism for next regulatory period (if any)
Protecting vulnerable customers	Reputational incentive based on periodic reporting	Objective cannot currently be linked to well-defined deliverables due to a lack of suitable database of vulnerable customers
Promoting whole systems thinking	Reputational incentive based on periodic reporting	Currently it is challenging to link this objective to well-defined deliverables, but examples from other European countries suggest financial incentives may be used in the future
Reducing in-house environmental impact	Reputational incentive based on quantitative measure	Financial incentive would potentially give rise to perverse incentives
Improving data management	Reputational incentive: quantitative measure or periodic reporting until sufficient data available	Deliverables can be hard to define and there is currently a lack of historical data.
Ensuring safety	Legal requirement	Less than 100% compliance unacceptable
Maintaining cyber security	Legal requirement	Less than 100% compliance unacceptable
Ensuring efficient exogenous costs	No mechanism	Exogenous costs largely outside Fluvius' control
Ensuring cost efficiency	Mechanism covered by separate study	Cost efficiency incentive covered by separate study

Source: Europe Economics analysis.

We recommend a reputational incentive mechanism based on periodic reporting for the objective of "Protecting vulnerable customers". We were not able to identify any well-defined deliverables that can be linked to this objective, in part because the definition of a "vulnerable customer" (usually referred to as a "protected customer") in Flanders is broader than customers that are vulnerable in an energy-specific context.[98] Moreover, the protection of such customers is not solely the responsibility of Fluvius. In other jurisdictions, there are specific registers for energy-vulnerable customers (e.g. the Priority Service register in Great Britain, which helps Ofgem develop vulnerable customer metrics for DSOs). While we do not recommend a financial incentive, it may be feasible for DSOs to provide periodic reports setting out any actions they have taken to ensure protected customers are well served.

We also recommend a reputational incentive mechanism based on periodic reporting for the objective of "Promoting whole systems thinking". It is challenging to identify clearly defined deliverables that can be linked to this objective and would be feasible in the Flanders context.

Two examples of possible deliverables from Italy are discussed in a recent report by CEER.[99] The first deliverable involves Italian electricity DSOs receiving payments directly from the Italian TSO when the DSOs take efforts to mitigate supply issues that originate on the transmission grid. This would be difficult for VREG to replicate, as it would require a change to the incentive regulations of the TSO, which is beyond VREG's regulatory scope. The second deliverable is a reward paid to DSOs for providing real-time data to the TSO on the state of MV networks. Such a deliverable is potentially feasible in Flanders from a regulatory framework perspective, but would require establishing the necessary data transfer infrastructure before the incentive mechanism could be developed. It is possible that this deliverable could be used for a financial incentive mechanism in a future regulatory period. It is also possible that bespoke deliverables could be defined for individual DSOs where a clear opportunity is identified for that DSO increase collaboration with other parts

[98] It is based on household's eligibility for social tariffs and other social benefits.
[99] CEER (2018): "Incentives Schemes for Regulating Distribution System Operators, including for innovation" [online].

of the value chain, but a sector-wide financial incentive mechanism would need to be based on a deliverable that can be linked to the activities of all the DSOs. Not all DSOs will have equal scope for additional collaboration with other parties.

For the objective of "Reducing in-house environmental impact", we recommend a reputational incentive based on quantitative measures of DSOs environmental impacts. This objective is not suitable for a financial incentive mechanism because of the risk of creating perverse incentives, as DSOs might forego undertaking activities that could benefit the energy transition in order to obtain financial rewards for lower in-house emissions, potentially resulting in a negative net impact on the environment.

For the objective of "Improving data management", we recommend a reputational incentive until sufficient data becomes available to develop a financial mechanism. For this objective, a potential deliverable relates to data management problems,[100] such as Fluvius being slow to process meter data leading to delays in billing for customers. The mutual exchange of market data (including, for example, meter readings and billing data) and market processes (e.g. supplier switches) is controlled by the Central Market System[101] (CMS), As one of the joint organisers of the CMS, Fluvius can be held partially accountable for data management issues that occur due to inefficiency or other problems within the CMS. However, relevant deliverables for data management can be hard to define as the outcome of interest (e.g. punctuality of customer billing) is also impacted by third parties such as energy suppliers. Moreover, deliverables that can be well-defined (e.g. headpoint blockages) currently lack sufficient historical data, making this objective unsuitable for a financial incentive mechanism at the moment. Provided that a suitable deliverable (or deliverables) sufficiently within Fluvius' control can be defined in the future and that historical data for such deliverables are available,[102] a financial incentive mechanism may be suitable in future price reviews.

We recommend a legal requirement for the objectives of "Ensuring safety" and "Maintaining cyber security". In both cases, anything less than absolute compliance with the objective would be unacceptable. As a result, a financial incentive mechanism would be inappropriate, as it would mean DSOs could choose to trade-off better/worse performance against the objectives with financial rewards/penalties.

No incentive mechanism is recommended for the objective of "Ensuring efficient exogenous costs". This is because, while Fluvius can exert some degree of control over these costs (e.g. in the case of transmission fees), to a large extent these costs lie outside its control. Where controllable costs within exogenous costs can be clearly identified, these could in theory be included in the endogenous costs, the efficiency of which is incentivised separately.

As the objective of "Ensuring cost efficiency" is already incentivised through the overall design of the price control and is subject to a separate study commissioned by VREG, no additional financial incentive mechanism is recommended under this contract to ensure that DSOs do not receive double rewards or penalties based on the evolution of endogenous costs.

4.3.3 Recommendations regarding interaction with other mechanisms and cost of capital

As discussed in section 4.1.3 above, in our view the advance mechanism is unlikely to have an impact on the financial incentives that apply to DSOs to ensure that quality of the services provided.

In terms of the interaction between financial incentives and the cost of capital assessment, as explained in section 4.1.3 above, only systematic risks affect the cost of capital. In general, DSOs' performance under the

[100] This is also referred to as HP (head point) blockages.

[101] The company Atrias, established in 2011 through a joint initiative of the four largest Belgian DSOs (Fluvius, ORES, Sibelga and RESA)[101], is responsible for creating and operating a common data exchange platform for data exchange between all parties in the Belgian energy market. The Atrias platform (Central Market System or CMS) went live in November 2021. Fluvius is a 50 per cent shareholder in Atrias. For further details. see "About Atrias" [online].

[102] Current data appears limited to one year of information on head point blockages.

financial incentive schemes recommended above is likely to be driven by company-specific factors relating to management performance, which do not affect operators' exposure to systematic risk and therefore would not lead to changes in the cost of capital.

As none of the DSOs operating in Flanders is listed on the stock exchange, the beta (which measures exposure to systematic risk) for Fluvius is estimated using a set of comparator companies consisting of network operators active in the energy sectors in other jurisdictions. To the extent that quality of service incentives would expose Fluvius to any element of systematic risk, the same thing would apply to these comparators given that they are subject to similar quality of service incentive mechanisms.[103] As a result, these kinds of systematic risks will already be captured in the estimated beta and hence in the estimated cost of capital.

Any further investigation of these issues is a matter for the contractor advising VREG on the cost of capital.

[103] By way of illustration, possibly systematic risks that both Fluvius and comparator companies might be exposed to as a result of quality of service incentives might include the following:

- Under the "ensuring security of supply" objective, the risk of interruptions might be increased by climate change (to the extent that extreme weather events are within the scope of the relevant deliverables linked to this objective). As climate change would in general be expected to affect returns negatively across the economy as well, this would potentially be an example of systematic risk.
- Similarly, under the "enhancing customer satisfaction" objective, it can be argued that increases in wholesale energy prices may lead to a decrease in customer satisfaction due to customers' general lack of satisfaction in energy companies amidst rising energy bills. As energy price shocks also affect returns negatively across the economy, this would again be a potential systematic risk.

5 Types of Incentive Mechanism

In this section we discuss the different types of mechanisms that regulators can use to incentivise the quality of service provided to customers.

We first discuss two different types of deliverables that can be used as the basis for an incentive mechanism: quantitative metrics and qualitative assessment.

We then discuss three different types of incentive mechanism, namely:

- Relative incentive mechanism
- Absolute incentive mechanism
- Guaranteed standards of performance

We set out the pros and cons of each type of deliverable and mechanism, followed by our view on the type of incentive mechanism that would be suitable for VREG's tariff methodology to incentivise the quality of service provided by Fluvius.

5.1 Types of deliverables for incentive mechanisms

5.1.1 Quantitative metrics

One type of deliverable that can be used as the basis for an incentive mechanism is a quantitative metric. A quantitative metric is a numerical measure used to assess, evaluate, or quantify a specific aspect of performance.

A key benefit of using quantitative metrics is that they offer a clear and unambiguous means of defining success, leaving little room for interpretation or subjectivity. Once defined, quantitative metrics also have the benefit of generally being easy to measure and assess, simplifying the regulator's performance assessment process. They also enable continuous tracking of the performance of regulated companies.

One drawback of using quantitative metrics is that they can lead to an overly narrow focus on one aspect of performance within a wider objective. This can lead to other areas of performance being neglected. In a similar vein, once defined, quantitative metrics may encourage regulated companies to attempt to manipulate or "game" the system in order to achieve financial rewards, again leading to sub-optimal outcomes in areas of performance not measured. In addition, quantitative metrics often lack context and nuance. This can be a drawback for performance objectives that are complex, where the use of quantitative metrics can lead to an oversimplification of performance evaluation.

5.1.2 Qualitative assessment

Another type of deliverable that can be used as the basis for an incentive mechanism is a qualitative assessment. This encompasses all non-numerical evaluations used to assess a specific aspect of performance. A typical example of a qualitive assessment in a regulatory context is assessment by an expert panel.

Qualitative assessments allow performance to be assessed in greater depth compared to quantitative metrics, allowing for the consideration of context and nuance, such as considering qualitative factors that may impact performance. They are particularly useful for incentivising objectives where the complexity of the objective makes it hard to define quantitative metrics, or where any quantitative metrics would provide too narrow of an assessment of performance. For example, an expert panel can balance short-term and long-term goals in

their assessment of performance, promoting a broader focus on performance from regulated companies beyond immediate numerical results.

The key drawback of qualitative assessments is that they rely on subjective judgements, making them vulnerable to bias, inconsistency and differing interpretations. Qualitative metrics may also lack precision, which can make it challenging to compare and rank performance of regulated companies. In addition, assessing qualitative measures can be resource-intensive and time-consuming, often requiring extensive documentation and evaluation efforts.

5.1.3 Recommendation on suitability of different types of deliverables

In conclusion, the appropriate type of deliverable to use for an incentive mechanism depends to a large extent on the nature of the objective that the regulator is trying to achieve. For relatively straightforward objectives, such as ensuring security of supply, quantitative deliverables provide a transparent, simple and objective method of assessing and tracking DSO performance. For objectives with a greater degree of complexity and nuance, such as innovative grid management to enable the energy transition, qualitative assessment provides a richer and less restrictive approach to evaluating DSO performance.

5.2 Relative incentive mechanism

Financial incentive schemes based on relative quality of service normally involve financial rewards and penalties which depend on how each firm's quality of service compares with that of other firms in the sector during the regulatory period. (In theory, it might also be possible to have a relative quality of service incentive which involved comparisons with other similar sectors, or with the same sector in other jurisdictions.) VREG's current quality of service incentive scheme is a relative incentive mechanism.

5.2.1 Relevant regulatory context

Schemes based on relative levels of service quality are particularly relevant in sectors where there are several regulated firms in operation (or if there are other sectors with similar properties, in which case quality of service in one sector could be used as a benchmark for another sector).

5.2.2 Pros and cons of relative incentive mechanism

Relative incentive mechanisms can be effective in identifying poor performers and encouraging these firms to adopt best practice. They also have the advantage of being simple to apply, relative to incentive schemes based on absolute quality, because the regulator does not need to decide on the appropriate absolute quality standard. They also prevent companies being able to use information asymmetry to influence the regulator into setting targets at a level which turns out to be too easy to outperform. Relative mechanisms can also be seen as imitating a competitive market better than absolute schemes, since in competitive markets quality will often be one of the dimensions on which firms compete with each other.

A principal drawback of using relative mechanisms rather than absolute mechanisms is that it does not provide consumers with certainty with regard to the level of quality that must be attained. Additionally, it relies on the existence of suitable comparators, either in the same domestic sector or internationally, on which to base the reference value. Another possible disadvantage is that there may be less of an incentive for regulated firms to outperform the relative reference value that must be achieved. This is because outperformance could lead to an upward adjustment in the reference value in the future (depending on when and how the reference value is reviewed).

5.3 Absolute incentive mechanism

Incentive schemes based on absolute quality of service normally involve the regulator introducing fixed quality targets and rewarding the supplier if the targets are achieved and penalising the supplier if they are not.

5.3.1 Relevant regulatory context

While absolute incentive mechanisms can be used in any context, they are particularly relevant when a single operator serves all or most of the market. They are also relevant when it is difficult to make fair comparisons of performance across firms in a sector due to exogenous factors which mean that the feasible level of performance differs across firms. For example, there may be significant differences in the cost of achieving the same level of quality of service for a firm serving a rural area compared with the cost faced by a firm serving an urban area. In such circumstances, the use of relative incentive schemes becomes challenging and may not be possible at all.

5.3.2 Pros and cons of absolute incentive mechanism

The main advantage of absolute incentive mechanisms is that they provide a fixed target for regulated firms to achieve which does not vary with over- or under-performance by other firms. This provides certainty to consumers with regard to the level of quality that must be attained. Moreover, absolute incentive mechanisms do not rely on the availability of suitable comparators to define quality targets.

A key disadvantage of absolute incentive mechanisms is that the regulator needs to fix absolute reference values at the price review in the context of information asymmetry, as the company (or companies) will know more than the regulator about what level of future performance is achievable. This creates a risk that the company (or companies) will be able to influence the regulator to set targets that are too easy to outperform, allowing them to subsequently earn high financial rewards under the incentive scheme at the expense of customers.

5.4 Guaranteed standards of performance

Guaranteed standards of performance (GSoP) set out minimum levels of service that must be met by each regulated firm. GSoP are often accompanied by a process for customer compensation if the regulated firm fails to deliver the required level of service. The guaranteed standards tend to cover key service areas in which a reasonable minimum level of performance can be defined.

5.4.1 Relevant regulatory context

GSoP are relevant when there is a risk of customers suffering a particularly poor standard of service which is mitigated by defining a minimum level of performance for companies to deliver. Protection to customers is often provided through specified payments to affected individuals.

5.4.2 Pros and cons of GSoP

The key advantage of GSoP is that they ensure that customers receive a minimum level of service and that they are compensated if the company fails to deliver this minimum performance standard. At the same time as protecting customers, these standards also provide firms with a financial incentive to provide customers with an appropriate quality of service.

A disadvantage of GSoP is that they do not provide an incentive for companies to go beyond the minimum level of service that has been specified.

Another disadvantage is that it may be challenging to determine an appropriate level of compensation. The level of compensation (with respect to a certain aspect of service) must be sufficiently high to act as a deterrent for poor service. The compensation should also reflect the value that the customer places on the service, and the inconvenience that would be caused by a failure of the company to provide this service. However, the value placed on quality may vary significantly between different groups of customers.

Difficulties can also arise with regard to treatment of poor quality of service arising from force majeure events (e.g. a major storm, flooding, terrorist attack). If these are included such that the firm still has to pay compensation, then the company could potentially be exposed to very large financial risks outside the control of management. On the other hand, if they are excluded then the firm has less financial incentive to respond effectively when such force majeure events occur.

5.5 Conclusions on suitability of different mechanisms for Fluvius

Our recommendation is that VREG switches from a relative quality incentive scheme to one based on absolute reference values.

While there is regulatory precedence from Netherlands and Germany for using relative mechanisms, the 2018 merger of Eandis and Infrax into Fluvius has a significant impact on the suitability of relative incentive mechanisms in the Flanders context, making the precedence from Netherlands and Germany less relevant. Fluvius is the operating company for all DSOs in Flanders, which means that using comparisons between DSOs to determine reference values for quality of service is less likely to imitate a competitive market, which is normally one of the main advantages of using a relative incentive scheme. While relative schemes may still be able to identify the poorest performing DSOs, setting benchmark reference values is less meaningful without competition between the DSOs. It risks baking-in underperformance at the sector level, because without competitive pressure even the best-performing DSOs could be performing at a level that is below what the industry could achieve.

GSoP are valid alternatives to a relative incentive mechanism for aspects of service where minimum levels of service can be defined, but they do not provide any financial incentive for DSOs to improve performance beyond that minimum standard. The objectives we have identified as suitable for financial incentives are aspects of service where incentivising ongoing quality improvement is desirable, and a GSoP is not the most suitable mechanism for this purpose. For example, VREG already has a GSoP in place for late (re)connections set out in the Energy Decree, but we would recommend VREG sets additional financial incentives beyond those imposed by the existing GSoP, which has a low financial weight and relies on customers making the effort to apply for compensation. Regulatory precedents from France, Ireland and Britain also suggest that GSoPs on their own are not sufficient to incentivise companies to improve performance over time – all three regulators for these countries also use a number of absolute incentive mechanisms to achieve their respective objectives.

Overall, we consider absolute incentive schemes to be the most appropriate type of mechanism for VREG to implement. The current structure of the Flanders electricity and gas distribution sectors means that DSO performance comparisons are not a suitable basis for setting targets. To the extent possible, absolute reference values should be set on the basis of objective evidence, to avoid Fluvius benefiting from reference levels that turn out to be too easy to outperform and to enable VREG to set stretching targets in areas where it considers that current performance levels are not sufficient. This approach also provides certainty to consumers with regard to the level of quality that DSOs must achieve.

6 Assessing Performance and Determining Financial Impact

The development of (absolute) incentive mechanisms involves considering a number of dimensions. In this section we discuss how the following parameters can be determined:[104]

- reference values;
- unit incentive rates; and
- caps and collars (which determine the weighting placed on each incentive)

We then discuss any additional features of incentive schemes (e.g. asymmetric incentive rates) before briefly summarising the monitoring and reporting requirements underpinning the assessment of performance. Finally, we provide a summary of our proposed framework for assessing performance and determining financial impact for the objectives and deliverables with financial incentives.

6.1 Setting reference values

Absolute incentive schemes require VREG to set absolute reference levels as part of the price review. This is a critical parameter in the incentive scheme as it sets the target for performance: if DSOs do not achieve this level of performance, they incur financial penalties, whereas if they achieve a level of performance above the reference value, they receive financial rewards.[105] Therefore, the reference value denotes the performance level at which a DSO does not earn any financial reward nor any financial penalty.

In principle, a benchmarking exercise could be used to determine the reference values to be achieved. Given our recommendation of switching to an incentive mechanism based on absolute reference values, this would mean performing an *ex ante* performance benchmarking exercise to determine the appropriate level at which to set those targets. In this context, we consider that the most appropriate approach to benchmarking is to compare performance measures that have been normalised for the size of the DSO across Flemish DSOs. The sections below summarise the key steps for such a benchmarking exercise.

Selection of comparators and assessment of data quality

A key aspect of the exercise is determining the relevant set of comparators to be used. Where data is disaggregated by DSOs, our recommendation is to use Flemish DSOs as comparators given that data from other operators (e.g. those operating in other parts of Belgium or in neighbouring countries) will not comparable e.g. due to differences in reporting metrics. Where data at the DSO level is not available, we recommend focusing on historical performance by Fluvius as a whole, as comparisons with other operators are unlikely to be robust due to similar comparability issues.

Once relevant data has been obtained from all comparators, the quality and completeness of the data should be carefully assessed. This might include checking that the units of measurement used are consistent, and

[104] Some incentive mechanisms could include other features e.g. deadbands, asymmetric incentive rates. These aspects would be considered if relevant as part of the detailed development of five concrete incentive mechanisms during Phase 2 of the project.

[105] Incentive schemes can be reward-only (or penalty-only) where there is only scope for DSOs to earn rewards (or penalties) for performance above (below) the reference value.

identifying any extreme or outlier observations. Gaps in the data (e.g. missing values or "0" entries) should also be investigated.

Once the relevant dataset has been obtained, we recommend that, where possible, absolute reference values are set using the following two-step process:[106]

1. Identify frontier level of performance, either based on the upper quartile level of performance among Flemish DSOs in the year in which performance was the best, or else the best level of historical performance for Fluvius as a whole (in cases where DSO-level data are not available).
2. Apply an assumption for expected improvements in performance over time, where historical data show a trend improvement.

Step 1: Identify frontier level of performance

Step 1 ensures that DSOs that are performing poorly, relative to the rest of the sector, are required to catch up with better performing DSOs. Alternatively, it requires Fluvius to return performance to best previous level where its performance has deteriorated over time. Therefore, this step sets the baseline level of performance that DSOs or Fluvius need to achieve before any financial rewards can be earned.

There is a degree of judgement in determining exactly how much catch-up should be required in Step 1, with a number of different approaches possible.

To determine the relevant catch-up assumption using DSO-level data, in theory, VREG could use the single best performing DSO as the baseline to which the other DSOs are required to catch-up. However, it might be unrealistic to expect all of the DSOs to be able to achieve the same level of performance as the best performer. There might be objective reasons for some DSOs to be better or worse than others in their performance in relation to some objective, related to uncontrollable factors such as geographical variation. Therefore, a more pragmatic approach to determining the level of catch-up is to set a reference value towards the top of the range of DSO performance, but not the absolute top. Potential options include using the upper quartile,[107] the upper decile or the upper quintile. The optimal choice of reference value can vary by objective, depending on how the regulator views the overall level of performance of the sector. For example, if the regulator thinks the sector is generally underperforming for a given objective, it may prefer to select a more stringent reference value e.g. the upper decile. Conversely, when setting absolute targets for the first time (e.g. following a switch from a relative incentive scheme), regulators may wish to take a more cautious approach to ensure that any targets set are achievable by operators. This could be done by setting a reference value using the upper quartile rather than the level of the best performer or the upper decile. This strikes a balance between requiring stretching performance without making unrealistic catch-up assumptions.

The degree of judgement required is perhaps less when data is only available for Fluvius as a whole to determine the appropriate level of catch-up as the highest level of historical performance represents a level of performance that has already been achieved by the same operating company in the past.

Step 2: Assumption for expected improvements in performance over time

Step 2 of our recommended process ensures that the reference values over the regulatory period take account of any trend improvement in performance over time, ensuring that DSOs are continuously stretched to improve performance throughout the course of the regulatory period. In the absence of this, reference values which may appear to be stretching at the time the price control is set may turn out to be too easy for the DSOs to outperform by the end of the price control period, leading to high financial rewards for DSOs at the expense of customers.

[106] Taking account of the historical cost trend and rate of improvement over time also help ensure that the reference values are attainable given DSO's revenue allowance.

[107] This involves ranking the DSOs in order from best to worst, and selecting the DSO that is a quarter of the way down the list as the baseline.

Provided that sufficient historical data is available, the applicable improvement assumption can be calculated from historical trends. A simple option would be to calculate a linear trend of improvement by taking the average performance of the whole sector for a particular deliverable over a historical reference period. The trend in annual improvement can then be applied to the reference value for the first year of the regulatory period (2025) to calculate the reference values for 2026, 2027 and 2028.

In some cases, it may be possible to cross-check reference values against regulatory precedents in other countries (if similar measures were used). While such values can be useful as a sense check e.g. in terms of the order of magnitude of parameters, these are unlikely to provide robust evidence regarding references values due to differences in the regulatory framework and environment. Expert views may also be used to sense check the parameters.

6.2 Setting unit incentive rates

Unit incentive rates determine the financial reward or penalty for the DSOs for a given level of under- or over-performance relative to the reference value. A higher unit incentive means a stronger financial incentive, as firms are penalised more harshly, or rewarded more strongly, for their under- or over-performance. Therefore, the unit incentive rate is likely to be a crucial driver of how much effort Fluvius puts into improving performance in relation to any given measure.

In this section, we set out two potential approaches to setting unit incentives rates:

- The first uses estimates of customers' Willingness to Pay (WTP) to derive incentive rates; and
- The second determines incentive rates through top-down decisions about the amount of revenue at risk (i.e. the scale of financial rewards and penalties compared to allowed revenue).

6.2.1 Willingness to Pay approach

A WTP approach to setting unit incentive rates involves deriving estimates of the value that customers place on performance improvements for a given deliverable, and then aligning the unit incentive with this value. In this situation, if DSOs make performance improvements up to the point where the marginal cost[108] of additional improvements is equal to the financial reward received for those additional improvements (i.e. the unit incentive rate), then the socially optimal level of performance[109] ought to have been reached. This is typically a desirable outcome, and therefore the WTP approach to setting unit incentive rates is appealing from a theoretical basis.

However, there may be some situations where it is desirable to set an incentive rate below the customer WTP. For example, this would apply if some of the cost of investments to improve performance will be funded through expenditure allowances. In this case, the unit incentive rate should be lower than the customer WTP, as otherwise Fluvius would have an incentive to make decisions on the basis of how the full customer WTP compares with only part of the cost (i.e. the residual additional cost that it would bear) – which might lead to over-investment in improving performance. It might also be appropriate to set the unit incentive rate below WTP if customer WTP is significantly higher than the cost of making improvements. In such a situation, using the full WTP would lead to customers paying more than necessary for the performance improvement.

The key drawback with using a WTP approach is that it is often very difficult to implement in practice, because of the difficulty involved in estimating WTP. Estimating WTP usually involves undertaking consumer surveys, with complex survey design needed to ensure that survey responses are a true reflection of the value

[108] In this context, marginal cost refers to the additional cost incurred improving performance by one unit.
[109] The socially optimal level of performance refers to the level of performance that maximizes overall societal welfare or benefit.

customers place on improvements. As stated in our proposal, we would only be able to implement a WTP approach if there are relevant existing WTP estimates available in published literature, or if Fluvius is able to supply relevant WTP estimates. The likelihood is that there will be various deliverables for which no estimates of customer WTP are available.

6.2.2 Revenue at risk approach

Under this approach, a unit incentive rate for a given deliverable is calculated by deciding what percentage of revenue should be determined by performance in relation to that deliverable and identifying a reasonable range over which performance may be expected to vary. By dividing the revenue at risk by the reasonable range, one obtains a unit incentive rate which aligns the expected deviations in performance from the reference value with the amount of financial exposure deemed suitable for that deliverable.

This approach can be extended to the quality-of-service incentive package as a whole by first determining what percentage of total revenue (or other measures such as the return on regulated equity) should be at risk across all incentive mechanisms. This would likely be based on financial resilience considerations, ensuring that the financial viability of a DSO, or Fluvius as a whole, would not be threatened by poor performance under the incentive package. Once the total revenue at risk for the incentive package has been established, the revenue at risk for each individual objective and associated deliverables can be decided on the basis of the relative importance of each one to customers, factoring in qualitative views from stakeholders and/or regulatory precedent.

While it can be argued that this approach is less theoretically rigorous than a WTP approach, and is unlikely to precisely align unit incentive rates with the value that customers place on service improvements, it is far more practical to implement and provides assurance that the overall incentive package will not jeopardise the financial resilience of DSOs. Hence, for objectives and deliverables for which there is not currently sufficient WTP evidence available to use a WTP approach, our recommendation is to use a revenue at risk approach.

As in the case of setting reference values, it may be possible to cross-check incentive rates against regulatory precedents in other countries. While such values can be useful as a sense check e.g. in terms of the order of magnitude of parameters, these are unlikely to provide robust evidence regarding incentives rates due to differences in the regulatory framework and environment. Expert views may also be used to sense check the parameters.

6.3 Setting caps and collars (or weights)

"Caps" are the maximum level of rewards that can be earned by a DSO for a deliverable, while "collars" are the maximum levels of penalties, limiting the financial risk to which DSOs are exposed. Caps and collars are intrinsic to the revenue at risk approach to setting unit incentive rates, but are also relevant to a WTP approach. Under either approach the caps and collars, in conjunction with the unit incentive rate, determine the financial weight attached to an incentive. In addition to caps and collars for each individual incentive mechanism, it would also be possible to implement an aggregate cap and collar on the total financial reward or penalty that Fluvius can earn across all quality of service incentive schemes.

There is a strong case for having caps and collars for a financial incentive mechanism. If an incentive mechanism is implemented without a cap or collar, DSOs would potentially have unlimited risk exposure under that incentive. This would create a risk of DSOs going bankrupt due to financial penalties under the incentive mechanism if there are large negative shocks that impact performance. It would also create the possibility of DSOs earning excessive rewards if *ex post* it turns out that absolute targets have been set too low and were too easy to outperform (e.g. due to Fluvius benefitting from information asymmetry when targets are set).

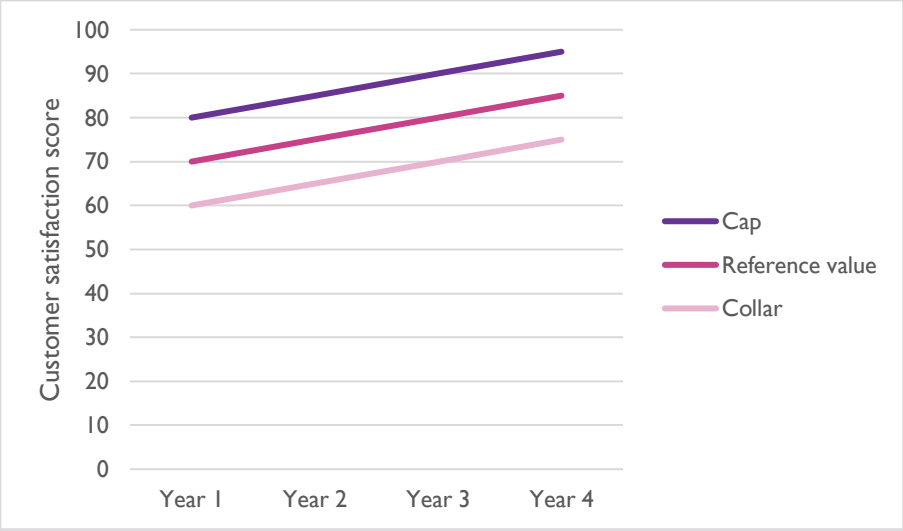
While caps and collars are necessary features of an incentive mechanism, it is important they are not set at a level that unduly curtails the incentive properties of the mechanism. There is a risk that DSOs will not put effort into making further performance improvements if they have hit the cap, or will not put effort into preventing further performance deterioration if they have hit the collar. A balance is required between the provision of incentives and the need to maintain financial resilience.

Illustrative example of reference values, caps and collars

The use of caps and collars, along with reference values are illustrated in the chart below, using a hypothetical deliverable that measures customer satisfaction with the services provided on a scale between 0 and 100 with higher scores representing greater customer satisfaction.

The reference values for a four-year regulatory period are shown in pink, starting at a score of 70 in the first year which increases to a score of 85 in the final year. These represent the level of performance at which DSOs would not earn any financial rewards nor would receive any financial penalties. The purple and light pink lines show the applicable caps and collars, respectively, set at 5 scores from the reference value set for each year. Caps/ collars represent the level of performance at which DSOs would earn the maximum reward/ penalty possible under the incentive mechanism. For example, in this hypothetical example any DSO achieving a score of 80 (or above) in the first year would receive the maximum reward applicable under the incentive.

Figure 6.1: Hypothetical example of reference values, caps and collars



Source: Europe Economics.

6.4 Additional features of incentive schemes

In addition to the dimensions discussed above, financial incentives may in theory also have additional features such as asymmetric incentive rates, non-linear rewards and penalties, or deadbands.

This section describes these additional features, noting that any decisions regarding these additional features will need to be supported by robust evidence. Therefore, our recommendation is not to incorporate these additional features as part of the detailed design of incentives, unless specific evidence is available to support the use of these features.

Asymmetric rewards and penalties which could take a number of different forms including:

- Applying different unit incentive rates for performance improvements relative to performance deterioration. However, this would need to be justified by clear evidence that consumers valued performance improvements at a different rate to performance deteriorations, otherwise the company will a sudden unjustified change in the strength of the incentive it faces when performance passes the reference level.
- Setting the cap (maximum reward) at a different level from the collar (maximum penalty) including the possibility of reward-only or penalty-only schemes. For example, the "innovative grid management to support the energy transition" incentive is based around an expert panel assessment of how innovative a firm has been, and would be suited for a reward-only incentive scheme as this would encourage DSOs to innovate without facing the potentially "unfair" possibility of a penalty when the subjective viewpoint of the panel cannot be known in advance. By contrast, where the performance of DSOs in relation to a measure is already close to the maximum possible, then a penalty-only scheme or a scheme with a higher collar than cap may be more appropriate to ensure that firms have an incentive to maintain performance at that high level rather than letting it deteriorate.

Non-linearity of rewards and penalties. When WTP data is available to inform unit incentive rates, there may be cases in which customer WTP for further performance improvements falls as performance improves. In such cases, this could be reflected within the design of quality incentive schemes by using a higher unit incentive rate for initial units of improvement, and a lower unit incentive rate for further performance improvements beyond a threshold value. However, this relies on WTP evidence being available which distinguishes between WTP at different levels of performance.

Deadbands. This would involve a range being specified around the reference value in which no financial rewards or penalties apply, with financial rewards or penalties only kicking in when performance moves outside this deadband. However, in general deadbands are best avoided as they do not provide the firm with incentives to improve performance when performance lies within the deadband. In order to justify a deadband, there would need to be clear evidence that customers only place a value of performance improvements or deteriorations when performance moves outside the deadband.

Extra conditions for certain rewards. There may be cases in which it might be appropriate to offer additional rewards for exceptional performance, but only if one or more further conditions are also met. This would give incentives for companies to go the extra mile in improving performance, with customers only paying for the additional reward if they are genuinely getting exceptional service. For example, the "innovative grid management to support the energy transition" incentive requires a series of criteria to be met for the company to gain rewards for innovation under the incentive scheme.

6.5 Monitoring performance

Assessment of performance by the regulator requires reliable, high quality data from regulated companies. VREG has to have the confidence that it will be provided with the required information in a timely manner, and that information will be accurate and sufficient to allow it to apply the incentive framework as intended. At the same time, the reporting and monitoring requirements should be practical and should not give rise to a disproportionate burden for regulated companies, as reflected by the "not unduly burdensome" criterion of our framework.

As Fluvius already collects and reports a range of measures, current reporting and monitoring arrangements could be taken as a starting point and reviewed to ensure that accurate and relevant data is provided to VREG to enable it to assess DSO performance for the purpose of the proposed financial incentive mechanisms. This includes appropriate assurances around data quality.

We will provide further detail on the monitoring and reporting requirements for the five concrete financial incentives developed as part of Phase 2 of the study.

6.6 Conclusions on framework for assessing performance and determining financial impact

Our recommendation is to set reference values for absolute incentives using the following two-step process (where possible) using comparable data from Flemish DSOs:

1. Identify frontier performance, either based on the upper quartile level of performance among Flemish DSOs in the year in which performance was the best, or else the best level of historical performance for Fluvius as a whole (in cases where DSO-level data are not available).
2. Apply an assumption for expected improvements in performance over time, where historical data show a trend improvement.

Both steps involve a degree of regulatory judgement: in the first step, on how much catch-up should be required from those DSOs that are performing less well than their peers, and in the second step, on how much improvement in performance DSOs should be expected to achieve over time.

Unit incentive rates could be derived using either a WTP estimates or a top-down revenue at risk approach, with the former generally regarded as more theoretically rigorous. Nonetheless, in the absence of WTP estimates from the existing literature or from Fluvius, the revenue at risk approach represents a suitable practical alternative.

The revenue at risk approach can be used to derive both the relevant unit incentive rates as well as caps and collars through the following steps:

- A judgement is first made on an acceptable level for the total revenue at risk across all incentives, bearing in mind financial resilience considerations.
- The total revenue at risk is then distributed between the objectives and deliverables which are incentivized financially, taking into account the relative importance of each objective and deliverable.
- For each deliverable, a reasonable range over which performance is expected to vary is determined, potentially based on historical variation in performance among DSOs.
- The revenue at risk for each deliverable can be divided by the corresponding reasonable range to derive the unit incentive rate for that deliverable.
- The cap and collar for each deliverable is then set in line with the decision on the revenue at risk for that deliverable.

Our recommendation is to set the unit incentive rate for the first year of the next regulatory period using the approach outline above and that this incentive rate remains fixed in real terms for the duration of the regulatory period through indexation to CPI.

7 Recommendations for Phase 2

Our Phase 1 assessment recommends financial incentives based on quantitative measures for the following four objectives for Phase 2:

- Enhancing customer satisfaction
- Ensuring security of supply
- Providing a good connections service
- Providing smart metering information

In addition, our framework suggests that a financial incentive could be suitable for the objective "Innovative grid management to facilitate the energy transition" provided that any issues around perverse incentives can be mitigated by careful mechanism design. Our framework recommends an expert panel assessment for this mechanism.

We also recommend VREG switches from a relative quality incentive scheme to quality of service incentives based on absolute reference values. This is because following the 2018 merger Fluvius is the asset manager for all DSOs active in Flanders, which means that using comparisons between DSOs to determine quality targets and awarding zero-sum financial rewards and penalties across DSOs is unlikely to provide strong incentives for Fluvius to maintain and improve its quality of service.

Our recommended approach for setting reference values for absolute incentives is to use the following two-step process (where possible) using comparable data from Flemish DSOs:

1. Identify frontier level of performance, either based on the upper quartile level of performance among Flemish DSOs in the year in which performance was the best, or else the best level of historical performance for Fluvius as a whole (in cases where DSO-level data are not available).
2. Apply an assumption for expected improvements in performance over time, where historical data show a trend improvement.

We recommend that unit incentive rates are derived using a top-down revenue at risk approach. This begins by determining the total revenue at risk for the incentives package (as a percentage share of total allowed revenue for endogenous costs), and the revenue at risk for each incentive mechanism. The unit incentive rates for a given incentive mechanism are then derived on the basis of the revenue at risk for that mechanism and the caps and collars set around the reference value.

PHASE 2: DESIGN OF FIVE FINANCIAL INCENTIVES

Europe Economics

8 Financial Impact of Five Incentive Schemes

This chapter sets out our recommendation for the total revenue at risk across the five financial incentive schemes, and the allocation of that revenue at risk across the five incentive schemes.

8.1 Total revenue at risk

We distinguish between the total financial "upside" for the incentives package, which is the maximum reward Fluvius can earn, and the total financial "downside", which is the maximum penalty Fluvius can incur. The total upside and total downside are different due to one of the incentives, the innovation incentive, being reward-only. Together, the total upside and total downside constitute the revenue at risk under the incentive schemes.

In terms of the timing of adjusting allowed income, we recommend using an in-period adjustment, with a two-year lag between Fluvius' performance and its receipt of penalties/rewards due to data availability (e.g. 2025 performance data would become available too late for an adjustment to 2026 allowed income).

8.1.1 Total upside

Based on a review of regulatory precedents, we recommend that for electricity the total upside across the five financial incentives is capped at up to 5 per cent of Fluvius' allowed income for total endogenous costs[110] in the first year of the price control.[111] For some of our recommended deliverables, the maximum reward Fluvius can earn is curtailed by the performance cap hitting the upper bound of possible performance. This results in the maximum reward being slightly lower than 5 per cent in practice, at approximately 4.4 per cent.

Based on a review of regulatory precedents, we recommend that for natural gas the upside across the four financial incentives is capped at up to 2.25 per cent of Fluvius' allowed income for total endogenous costs in the first year of the price control. For some of our recommended deliverables, the maximum reward Fluvius can earn is curtailed by the performance cap hitting the upper bound of possible performance. This results in the maximum reward being lower than 2.25 per cent in practice, at approximately 1.77 per cent.

8.1.2 Total downside

Based on a review of regulatory precedents, we recommend that for electricity the total downside across the five financial incentives is capped at up to 4.5 per cent of Fluvius' allowed income for total endogenous costs in the first year of the price control.

[110] We set financial incentives on the basis of the allowed income for total endogenous costs as exogenous costs are simply passed through by DSOs.

[111] In order to maintain the same strength of incentive for Fluvius, we recommend that the unit incentive rates should be indexed to CPI (and thus remain unchanged in real terms) rather than fixing the percentage of revenue at risk for each year of the regulatory period. This has the effect that in practice the percentage of revenue at risk may be slightly different in subsequent years as the allowed revenue may change at a different rate through the period depending on outturn endogenous costs and the application of the trend and frontier shift assumptions.

Based on a review of regulatory precedents, we recommend that for natural gas the downside across the four financial incentives is capped at up to 1.75 per cent of Fluvius' allowed income for total endogenous costs in the first year of the price control.

8.1.3 Rationale for our recommendations

As set out in Chapter 6 above, we apply a "top down" approach to setting incentive rates. Therefore, our recommendation for the total revenue at risk (combining both upside and downside) is a key aspect of our recommended incentives package. It determines the overall weight of the incentives package and, in conjunction with the caps and collars, determines unit incentive rates for each measure.[112]

The total revenue at risk needs to be set at a level that provides adequate incentive for Fluvius to improve its quality of service without impacting on Fluvius' financeability. This is because it is important that the incentive package should not impact upon Fluvius' ability to raise finance on competitive terms.

We consider that our recommended financial weights are consistent with Fluvius continuing to be financeable.[113] Firstly, other regulators have implemented financial incentives which have put a similar (or higher) percentage of revenue at risk under absolute quality incentives, without considering that this posed a problem in terms of the financeability of the regulated firms. Secondly, to explore the issue further we asked VREG to run a scenario through its financial model in which Fluvius performs at the collar of all of our recommended financial incentive schemes. The results of this analysis showed that in such a scenario Fluvius would still be able to maintain an investment grade credit rating.

Our recommendation for the total upside and downside has been broadly informed by regulatory precedents in the five jurisdictions reviewed in Phase 1. The regulatory precedents are summarised in Table 8.1 below.

Table 8.1 Total revenue at risk for quality of service incentives for comparators (% of allowed revenue for endogenous costs)

		Netherlands (ACM)	Germany (BNetzA)	Ireland (CRU)	Great Britain (Ofgem)
Electricity	Upside	5	4	5.1	6.6
	Downside	5	4	4.8	10
Gas	Upside	N/A*	N/A*	2.25	0.75
	Downside	N/A*	N/A*	2.25	1.75

*ACM and BNetzA do not use quality of service incentives for gas DSOs.

Note: CRE are not included as the final determination published by CRE does not specify a cap or collar for many of its quality of service incentives.

Applying any lessons from other jurisdictions also requires careful consideration of the Flemish energy market (where a single operating company serves the entire energy market) and regulatory context (e.g. our earlier recommendation to switch to absolute incentive mechanisms and the potential for the incentive package to include up to five absolute incentive mechanisms for the next regulatory period). In the light of these considerations, our conclusion is that approximately up to five per cent[114] of total revenue is an appropriate upside to give the overall incentives package for electricity. This weighting is similar to three of the four precedents, and while Ofgem uses a higher upside we note that Ofgem uses more than five incentive mechanisms and has had many of those mechanisms in place for multiple regulatory periods. We consider that a slightly lower downside of up to 4.5 per cent of allowed revenue is also justified by the regulatory

[112] We calculate the unit incentive rates such that they are equal for the upside and downside for any deliverable, even if the maximum upside reward is different to the maximum downside penalty for that incentive due to the cap/collar hitting the upper/lower bound of possible performance.

[113] In a regulatory context, financeability analysis considers whether a price control will allow a regulated firm to maintain an investment grade credit rating.

[114] In practice, the maximum upside is close to 4.4 per cent due to a number of electricity deliverables having a smaller upside range due to the cap being curtailed by the upper bound of performance.

precedents, noting that CRU has a lower downside than upside for electricity. Ofgem has a notably high downside of 10 per cent, but as already stated it uses more than five incentive mechanisms and has had many of those mechanisms in place for multiple regulatory periods. In addition, there is a clear rationale for one of our recommended incentives, Innovative Grid Management to Facilitate the Energy Transition, to be reward-only (we set out this rationale later on in the chapter).

For gas, the evidence from regulatory precedence is more limited, but suggests that a lower financial weight than electricity is appropriate for both upside and downside. In addition, the expectation in Flanders is that the energy transition will involve an increase in electrification and a reduction in the demand for natural gas, suggesting that stronger incentives should be applied to Fluvius' electricity network activities than its gas network activities. In the light of these considerations, our conclusion is that up to 2.25 per cent[115] of total revenue is an appropriate weight to give the upside of the incentives package for gas, and up to 1.75 per cent[116] is an appropriate downside (again lower due to the innovation incentive being reward only). These recommendations are in line with regulatory precedent from Ireland and the UK.

8.2 Allocation of revenue at risk between incentives

Our recommended allocation of the maximum upside and downside between the five incentive mechanisms for gas and electricity is set out in the table below.

Table 8.2: Allocation of revenue at risk between incentive mechanisms (%)

Financial incentive mechanism	Electricity		Gas	
	Upside	***Downside***	***Upside***	***Downside***
Ensuring Security of Supply	2.5	2.5	0.25	0.25
Providing a Good Connections Service	0.75	0.75	0.25	0.25
Enhancing Customer Satisfaction	0.75	0.75	0.75	0.75
Providing Smart Metering Information	0.5	0.5	0.5	0.5
Innovative Grid Management to Facilitate the Energy Transition*	0.5	0	0.5	0
Total	**5.0**	**4.5**	**2.25**	**1.75**

*Our recommendation for this mechanism is that it is reward-only.

Again, our recommendations have been broadly informed by regulatory precedents, along with our own informed judgement in the light of the Flanders context. When reviewing the regulatory precedents, we again considered the nature of the incentive (relative versus absolute), the overall incentive package used and the length of time the incentive mechanisms have been in place. When considering the revenue at risk for individual incentive schemes, we also assessed how closely the incentive mechanisms and associated objectives of other regulators map onto the objectives agreed with VREG. The rationale for our recommendations is set out below.

As mentioned in Section 8.1.1, in practice the total upside is slightly smaller than the figures reported in Table 1 for both electricity and gas. This is because for some of the deliverables, when we apply our framework from Phase 1 the cap on the deliverable is limited by the upper bound of possible performance – for example, any deliverable on interruption frequency has an upper performance bound of zero interruptions, because it is impossible to achieve less than zero interruptions. This means the upside range (the range above the reference value) is smaller than the downside range. We have kept the unit incentive rate the same for the upside and downside ranges, as there is no evidence that the consumer benefit of a unit change in

[115] In practice, the maximum upside is close to 1.77 per cent due to a number of gas deliverables having a smaller upside range due to the cap being curtailed by the upper bound of performance.

[116] In practice, the maximum downside is close to 1.74 per cent due to some gas deliverables having a smaller downside range due to the collar being curtailed by the lower bound of performance.

performance differs depending on whether performance is above or below the reference value. This has the consequence of making the financial upside slightly smaller than the financial downside.

Electricity

- Ensuring security of supply (2.5 per cent upside/downside) – in line with our recommendation, regulators using absolute incentive schemes (Ofgem and CRU) place around 50 per cent of the total weight of their incentive packages on this incentive mechanism, and interruptions also represent an important area of service provision for customers. Our recommendation is further supported by the fact that interruption frequency and duration are both well-established measures of supply security in Flanders and form part the q-factor mechanisms currently applied by VREG. Finally, in comparison with the incentive relating to connections (discussed below), a relatively higher weight for interruptions is also appropriate as the connections data used to determine the parameters for the financial incentive relates only to demand connections, meaning that issues around generation connections and the energy transition are not relevant to the weighting of these incentives.[117]
- Providing a good connections service (0.75 per cent upside/downside) – As set out in section 9.2.2 below, performance has deteriorated significantly over recent years, implying that Fluvius needs to put special effort into improving performance in this area. Therefore, we place slightly more relative weight on this incentive than that implied by regulatory precedents.
- Enhancing customer satisfaction (0.75 per cent upside/downside) – Our recommendation closely aligns with the relative weight applied by other regulators (CRU and Ofgem) using measures that are, at least in part, informed by customer satisfaction surveys.
- Providing smart metering information (0.5 per cent upside/downside) – Our recommendation broadly aligns with the relative weight applied by CRU for its mechanism related to smart metering information (the most relevant regulatory precedent for this objective).
- Innovative grid management to facilitate the energy transition (0.5 per cent upside only) – Our recommendation of a reward-only mechanism differs from the use of a penalty-and-reward mechanism by other regulators. This is because we do not consider it appropriate to penalise Fluvius for choosing not to use innovative solutions for grid management (given that, for example, these may not always represent cost efficient or otherwise optimal outcomes). As in the absence of historical data the incentive is based on expert panel assessment only, we also consider it appropriate to apply a lower weight than that would be implied by regulatory precedents.

Gas

The conclusions that can be drawn from regulatory precedents are more limited for the gas sector as regulators tend to use fewer quality of service metrics for gas DSOs.

For "ensuring security of supply", three considerations have led to our recommendation of a low relative weight of 0.25 per cent. Firstly, regulatory precedents place a lower relative weight on gas interruptions than electricity interruptions. Secondly, as the energy transition progresses in Flanders and electrification increases, it is likely to be more important that Fluvius makes efforts to reduce interruptions in the electricity grid than in the gas grid, so the relative financial incentives should be higher for the electricity interruptions incentive mechanism. Finally, the historical data indicates that interruptions are already very low in gas, with DSOs having zero interruptions in some years. Given there is little room for performance to improve further, a lower relative financial weight is appropriate.

[117] As explained further in the next chapters, this is because generation connections are not included in the historical data and the time required to provide a generation connection (or a quote for a generation connection) is likely to be bespoke.

For "providing a good connections service", we recommend a weight of 0.25 per cent, lower than the 0.75 per cent recommended for electricity. The main rationale for the lower weight on connections for gas is that from 2025, new buildings (residential and non-residential) in Flanders will not be permitted to have a gas connection, but will still require an electricity connection.[118] As a result, the number of new gas connections is likely to fall relative to the number of new electricity connections in the regulatory period. The lower level of activity related to gas connections is justification for a reduction in the weight given to the connections incentive.

Our recommendation of 0.75 per cent for the "enhancing customer satisfaction" incentive aligns with our recommendations for electricity. It is also in line with the limited regulatory precedents for gas, where the most financial weight is placed on the regulators' incentives for gas connections and gas customer satisfaction.

In line with our recommendation for electricity DSOs, we recommend a 0.5 per cent weight for each of the "providing smart metering information" and "innovative grid management to facilitate the energy transition" incentives.

[118] It will still be possible for customers to request a gas connection for an existing building.

9 Design of Financial Incentives based on Quantitative Measures

This chapter sets out the detailed design of the four financial incentives based on quantitative metrics. For each incentive we provide a definition of the relevant deliverable(s), followed by presenting the parameters of the incentive scheme based on our framework developed in Phase 1.

With the exception of the "ensuring security of supply" incentive, the data used in this chapter to determine the relevant parameters for the incentives and associated deliverables have been provided directly by Fluvius. This means that the data have not been subject to the same review process and checks as those outlined in section 2 of Appendix 9 of the 2021-24 tariff methodology.[119] If financial incentives based on the quantitative metrics and data reported in this chapter are implemented for the next regulatory period, we strongly recommend that equivalent checks are carried out to provide assurance regarding the completeness, robustness and quality of this data.

In the case of the "ensuring security of supply" incentive, the data used to determine the parameters for the electricity sector are is the same as that used by VREG to calculate the rewards and penalties applicable under the current q-factor incentive, which has been checked for quality based on the process outlined in Appendix 9 of the 2021-24 tariff methodology. For the gas sector data provided by VREG, once again we strongly recommend that equivalent checks to those prescribed in Appendix 9 of the 2021-24 tariff methodology are carried out to provide assurance regarding the completeness, robustness and quality of the data.

9.1 Ensuring security of supply

This incentive mechanism relates to ensuring security of supply for Fluvius' customers.

9.1.1 Definition of deliverables

This objective pertains to minimising the frequency and duration of supply interruptions. The incentive mechanism is designed to ensure that Fluvius has a financial interest in maintaining consistently high standards of supply reliability.

We consider that it is important that the definition of interruptions remains unchanged, to allow historical data to be used to set robust performance targets for the next regulatory period.

For electricity, in line with the current tariff methodology,[120] we recommend that the deliverables for power interruptions include all interruptions except the following interruptions in the electricity network:

- Momentary power cuts, defined as failures with an interruption duration less than or equal to 3 minutes;
- Planned power outages on the power grid infrastructure that are communicated in advance to the respective distribution grid users;

[119] VREG (2020): "Tariff methodology regulatory period 2021-2024: Appendix 9: The quality incentive", section 2 [online].

[120] For further details of relevant power interruptions, please see section 3.1.1. of VREG (2020) "Tariff methodology regulatory period 2021-2024: Appendix 9: The quality incentive" [online].

- Power interruptions resulting from a fault, incident or interruption on an interconnected network that is not managed by the reporting distribution system operator; and
- Certain exceptional power interruptions, including natural disasters, war, terrorist attack, fire and safeguarding the electrical system against sudden or anticipated integrity-threatening events.

For the gas network, we recommend that the deliverables for interruptions include all unplanned disruptions, aligning with the category of 'Interruptions due to unplanned works' as outlined in the annual quality reports for gas. Unplanned works refer to actions taken by Fluvius in response to incidents reported by consumers. This category includes interruptions following sudden gas odours, gas outages, installation damage, or malfunctions in measuring equipment reported by consumers.

The incentive mechanism comprises the following two deliverables:

- Interruption frequency which measures the annual average number of interruptions per distribution network user; and
- Interruption duration which measures the annual average duration of interruptions in hours, minutes and seconds.

These deliverables are utilised separately in both low voltage and medium voltage networks for electricity DSOs and for low pressure and medium pressure grids for gas DSOs.

The table below sets out the overall revenue at risk for each deliverable. The relative weights between deliverables reflect the weighting used by VREG in the current q-factor methodology when allocating the quality points.[121]

Table 9.1: Percentage of allowed revenue at risk for each deliverable (%)

	Electricity	Gas
	Percentage of allowed revenue at risk	
Medium voltage/pressure – interruption frequency	0.96	0.10
Medium voltage/pressure – interruption duration	0.79	0.08
Low voltage/pressure – interruption frequency	0.41	0.04
Low voltage/pressure – interruption duration	0.34	0.03
Total	**2.5**	**0.25**

Source: Europe Economics.

9.1.2 Parameters of incentive scheme

Interruptions data

Historical data relating to the two deliverables described above was provided by VREG for the period between 2017 and 2022 for electricity and gas. The datasets report annual interruption frequency and duration for each DSO separately, and cover interruptions on the low and medium voltage networks for electricity and low and medium pressure grids for gas.

For electricity, our assessment was based on the same data that VREG used to calculate the q-factor for the current and previous regulatory period. Our understanding is that the frequency and duration measures have been normalised to account for differences in DSO sizes and therefore are comparable across operators and over time. Additionally, we also understand that the dataset has been adjusted to accommodate changes in DSO boundaries following the merger of the two previous operating companies in 2018.

[121] For further information on the weights currently used by VREG, please see Chapter 2 above. CRU (Ireland) and Ofgem (UK) apply equal weight (50:50) to both the frequency and duration of interruptions. This is similar to VREG's current q-factor weight of 55:45. Neither CRU nor Ofgem make a further distinction between low and medium voltage/pressure interruptions.

In the case of the gas sector, historical data was obtained from VREG's annual quality of service reports. As these reports do not record interruption frequency per consumer, this was obtained by dividing the total number of interruptions for each DSOs by the total number of customers served by the respective DSO for each year of the dataset. The final dataset also accounts for changes in DSO boundaries in 2019, 2020 and 2021,[122] following the steps employed by VREG to account for these changes in the case of the deliverables for electricity DSOs.

Results

Based on our framework set out in Chapter 6 and the historical data described above, we calculated the reference value for the first year of the next regulatory period (i.e. 2025) based on the industry upper quartile level of performance for the historical year with the best performance. For deliverables where performance has been improving through time (based on the period for which we have data available), we also applied a trend improvement based on the trend in upper quartile performance to calculate proposed reference values for the remaining years of next regulatory period. This is important to ensure that the reference values do not become too easy for Fluvius to outperform by the end of the regulatory period. Reflecting the variation observed in DSO performance, we set caps and collars at one standard deviation from the reference values for both electricity and gas.[123] Where relevant, we also applied an upper bound of zero for reference values and caps.

Electricity

For electricity interruptions, our recommended reference values for interruption frequency for 2025 are 0.2114 and 0.0370 average annual interruptions per network user for medium and low voltage interruptions, respectively. For medium voltage interruptions, historical data show a trend improvement in performance over the years, and hence we recommend an additional annual improvement of around 1.6 per cent. For low voltage interruptions, there is no evidence of a trend improvement in performance from the historical data, and thus we do not recommend a further improvement factor for this deliverable.

The unit incentive rate for these deliverables in 2025 would be approximately €0.69m per unit change in interruption frequency for medium voltage and €1.58m per unit change in interruption frequency for low voltage, based on the most recent data available on Fluvius' endogenous costs. For subsequent years, we recommend the unit rates to be fixed in real terms through indexation to CPI.

Our recommended reference values for electricity interruption duration for 2025 are 00:31:41 hours:minutes:seconds and 02:40:13 hours:minutes:seconds for medium and low voltage interruptions, respectively. As there is no evidence of a trend improvement in performance from the historical data, we do not recommend a further improvement factor to determine the reference values for electricity interruption duration for the subsequent years of the regulatory period.

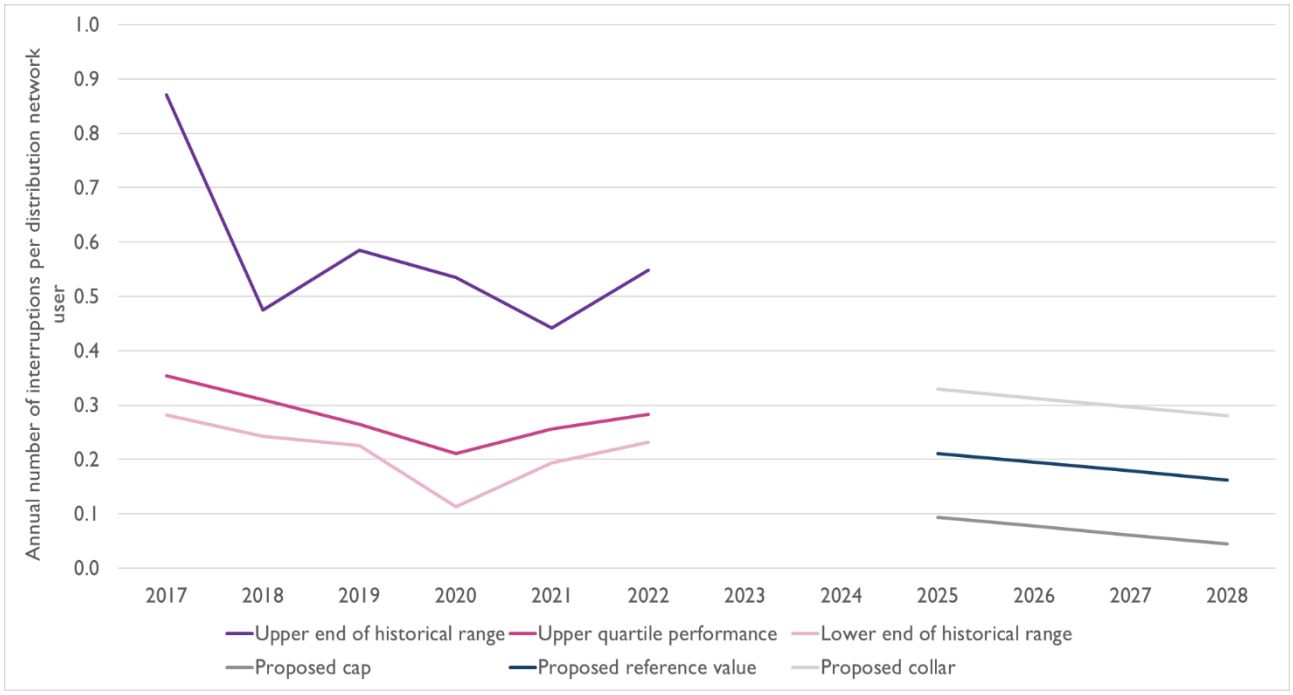
The unit incentive rate for these deliverables in 2025 would be approximately €0.81m per minute change in interruption duration for medium voltage and €0.07m per minute change in interruption duration for low voltage, based on the most recent data available on Fluvius' endogenous costs. For subsequent years, we recommend the unit rates to be fixed in real terms through indexation to CPI.

Historical performance and the parameters for of the incentive scheme for the electricity sector are summarised in the charts below. Our detailed recommendations for the reference values, caps and collars for each year of the next regulatory period are set out in Appendix 1.

[122] In particular: (i) on 1 April 2019, IMEA, IVEG and 13 municipalities from IVEKA merged into Fluvius Antwerpen; (ii) on 1 January 2020 four municipalities left Iveka and joined Fluvius Antwerpen; and (iii) on 1 January 2021, one municipality from Gaselwest joined Imewo.

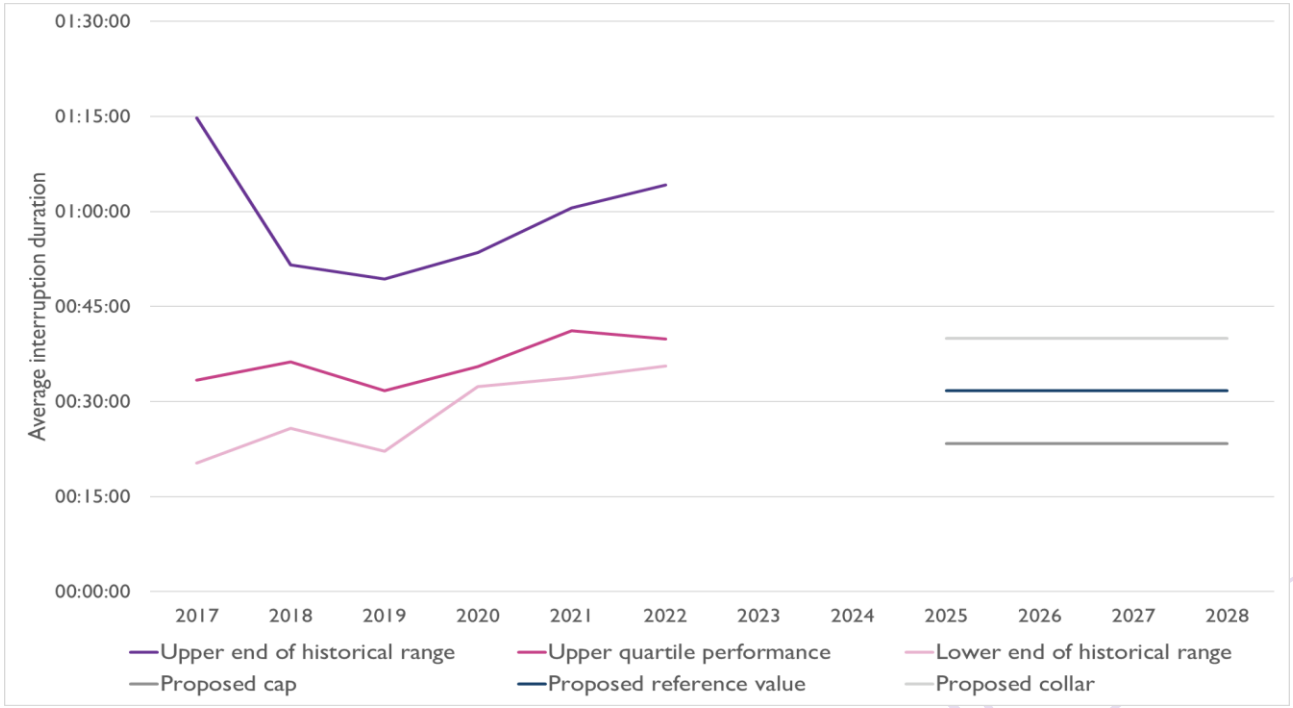
[123] To reflect the cross-sectional nature of the data, we use the standard deviation across DSOs for the historical year with the best performance (based on the industry upper quartile level of performance) to set caps and collars.

Figure 9.1: Recommended parameters for medium voltage interruption frequency



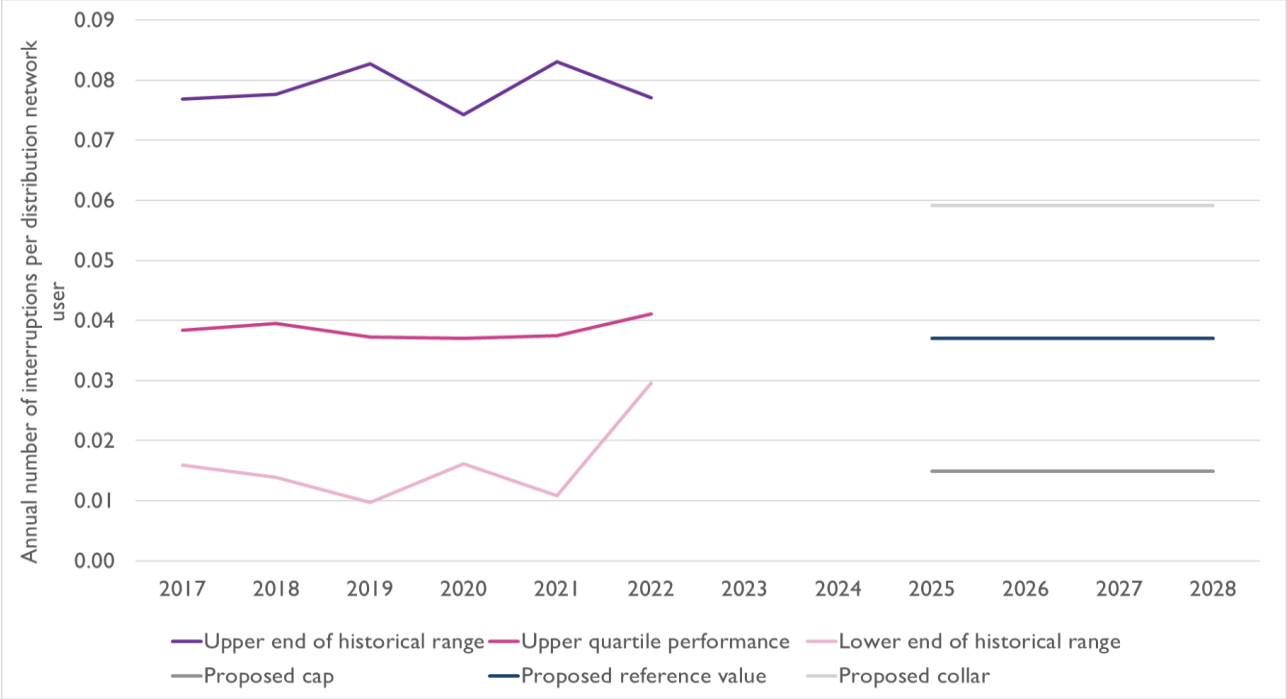
Source: Europe Economics analysis.

Figure 9.2: Recommended parameters for medium voltage interruption duration



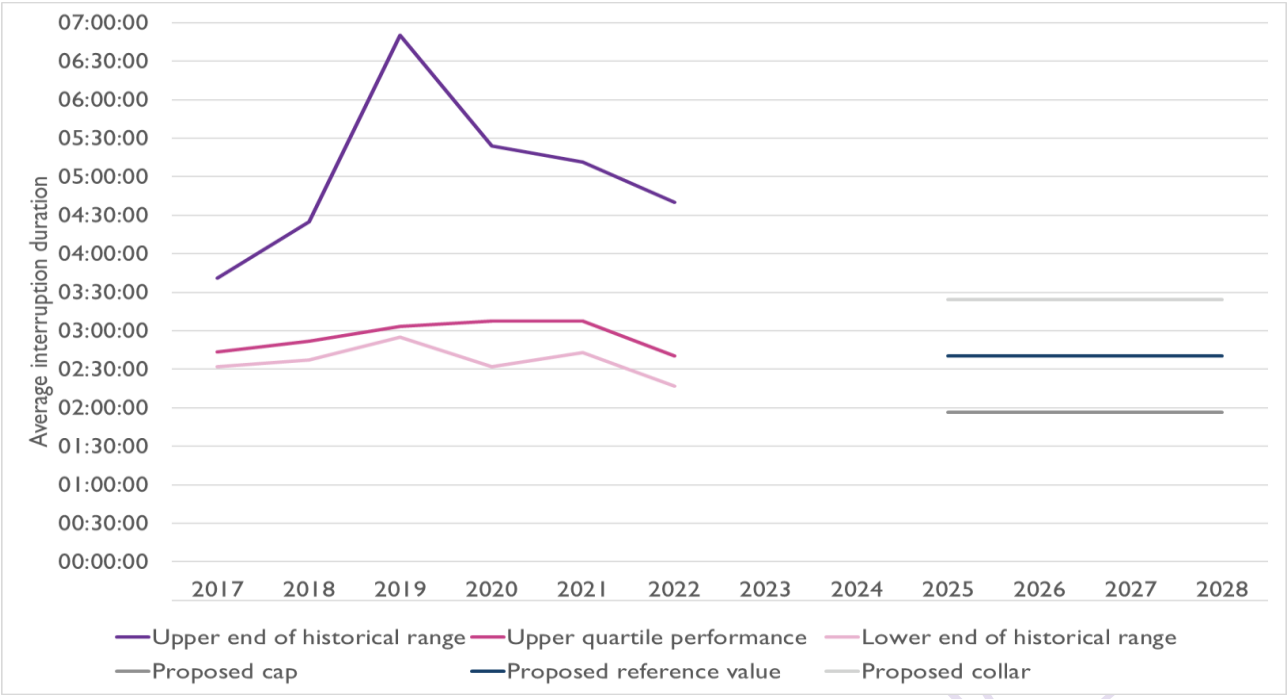
Source: Europe Economics analysis.

Figure 9.3: Recommended parameters for low voltage interruption frequency



Source: Europe Economics analysis.

Figure 9.4: Recommended parameters for low voltage interruption duration



Source: Europe Economics analysis.

Gas

For gas interruptions, our recommended reference values for interruption frequency for 2025 are 0.000 and 0.6797 average annual interruptions per 1,000 network users for medium and low pressure grids, respectively. As our recommended reference value for medium pressure interruption frequency for the first year of the next regulatory period is already at the lower bound of the possible performance range, we

recommend setting the same reference value (i.e. 0.000) for subsequent years of the regulatory period. For low pressure interruption frequency, historical data suggests a trend improvement in performance over the years, and in the light of this we recommend an additional annual improvement of around 10.6 per cent.

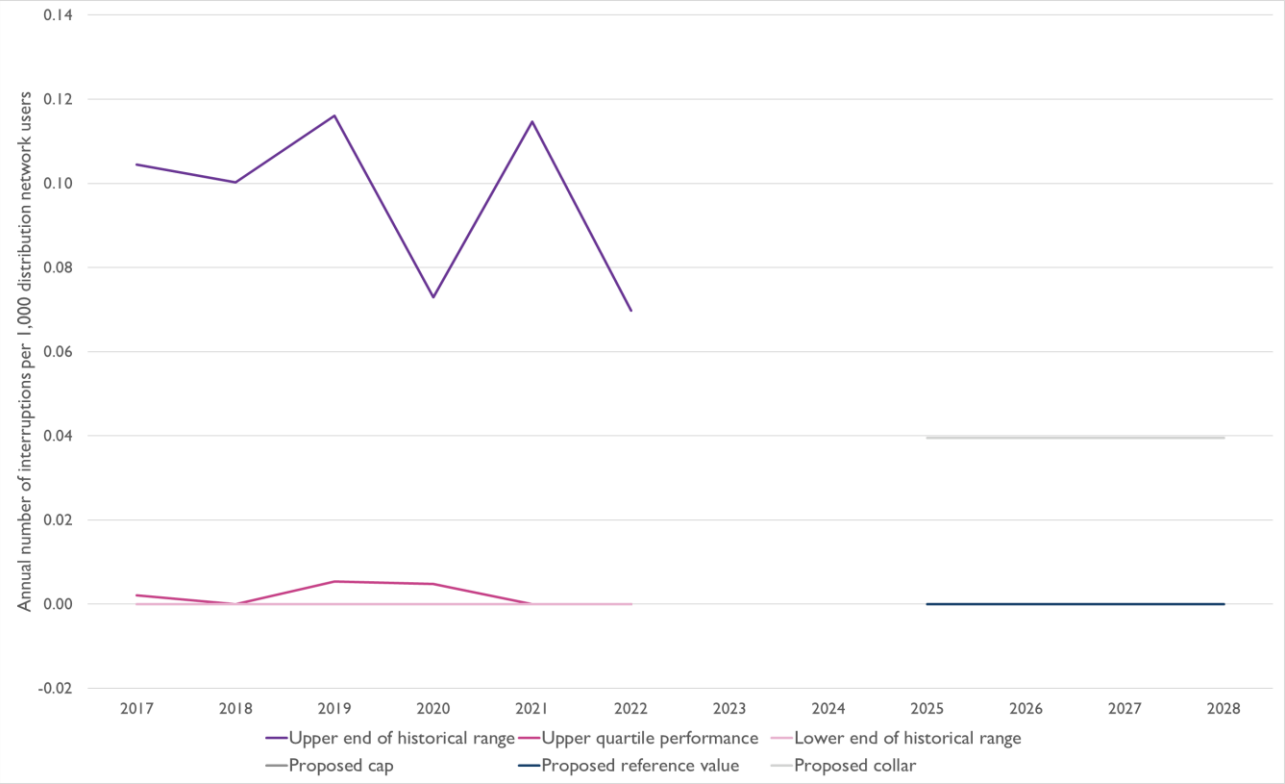
The unit incentive rate for these deliverables in 2025 would be approximately €0.099m per unit change in interruption frequency for medium pressure and €0.005m per unit change in interruption frequency for low pressure, based on the most recent data available on Fluvius' endogenous costs. For subsequent years, we recommend the unit rates to be fixed in real terms through indexation to CPI.

Our recommended reference values for interruption duration for 2025 are 00:00:00 hours:minutes:seconds and 01:33:00 hours:minutes:seconds for medium and low pressure interruptions, respectively. As above, given that our recommended reference value for medium pressure interruption duration for the first year of the next regulatory period is already at the lower bound of the possible performance range, we recommend setting the same reference value (i.e. 00:00:00) for subsequent years of the regulatory period. For low pressure interruption duration, we do not recommend using a further improvement factor to determine the reference values for electricity interruption duration for the subsequent years of the regulatory period, as historical data provides no evidence of a trend improvement in performance over time.

The unit incentive rate for these deliverables in 2025 would be approximately €0.005m per minute change in interruption duration for medium pressure and €0.006m per minute change in interruption duration for low pressure, based on the most recent data available on Fluvius' endogenous costs. For subsequent years, we recommend the unit rates to be fixed in real terms through indexation to CPI.

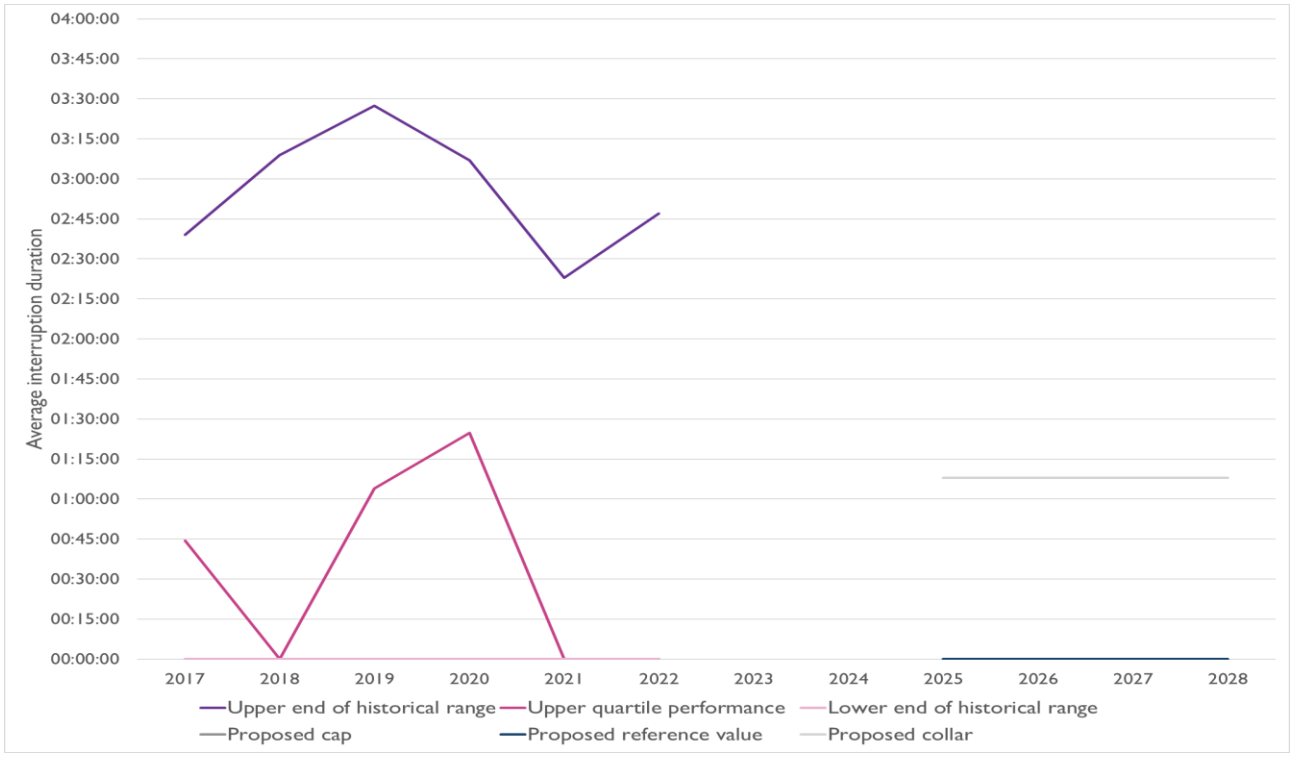
Historical performance and the parameters of the incentive scheme for the gas sector are summarised in the charts below. Our detailed recommendations for the reference values, caps and collars for each year of the next regulatory period are set out in Appendix 1.

Figure 9.5: Recommended parameters for medium pressure interruption frequency



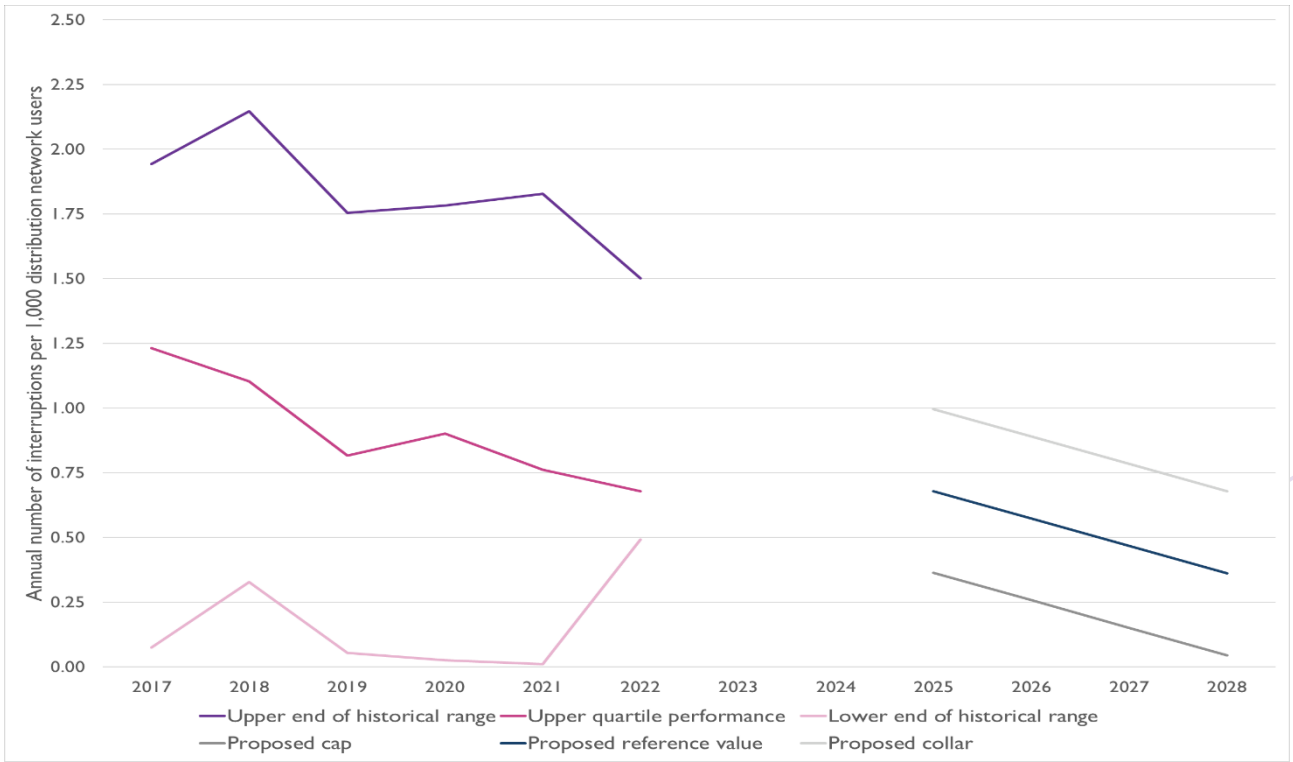
Source: Europe Economics analysis.

Figure 9.6: Recommended parameters for medium pressure interruption duration



Source: Europe Economics analysis.

Figure 9.7: Recommended parameters for low pressure interruption frequency



Source: Europe Economics analysis.

Figure 9.8: Recommended parameters for low pressure interruption duration

Source: Europe Economics analysis.

9.2 Providing a good connections service

This objective relates to the timeliness of the connections service that DSOs offer to their customers.

9.2.1 Definition of deliverables

The incentive mechanism is designed to ensure that Fluvius has a financial interest in providing timely connections to its customers.

The incentive mechanism is based on the following two deliverables:

- Connection quotations on time which measures the percentage of quotation applications closed within the applicable deadlines.
- Connections on time which measures the percentage of connection applications closed within the applicable deadlines.

The applicable deadlines for Fluvius to provide quotations and connections for customers are set out in the technical regulations.[124] Different types of connections have different deadlines, varying between 10 and 30 working days for electricity connection quotations and between 15 working days and 18 weeks for electricity connections.[125] We note, however, that for electricity connections the applicant can request to extend the

[124] For further details, see: VREG (2023): "Technical regulations for the distribution of electricity in the Flemish region" [online] and VREG (2023): "Technical regulations for the distribution of gas in the Flemish region" [online].

[125] Should a new category of connections be introduced within the regulatory period (e.g. connections with capacity limitation contracts), we recommend that for such new categories VREG should collect data on the percentage of quotations and connections provided on time under a reputational incentive with a view to using this data as a basis for setting a financial incentive at the next regulatory review. In the event that there are significant changes to the connections types included in the technical regulation during the regulatory period, VREG may wish to include a reopener that will allow for these changes to be taken into account.

deadline of 18 weeks set out in the technical regulations. Despite the lack of a hard deadline, Fluvius provided us with data on both the number of quotations and connection applications completed on time. This implies that Fluvius has (internally) adopted an approach to determine whether the quotations and/ or connections have been completed in a timely fashion. Going forward, we recommend that VREG requires Fluvius to clearly set out the approach that it has used to define and measure these deliverables ("connection quotations on time" and "connections on time") and that Fluvius is required to maintain the same approach across time, such that the outturn data used to calculate financial rewards and penalties is calculated on the same basis as the historical data that we have used to determine reference values and other parameters of the incentive.

The technical regulations also allow for these deadlines to be extended either by mutual consent between the customer and DSO (in the case of quotations) and in the case of exceptional circumstances (in the case of connections up to 5 MVA).[126] We recommend that Fluvius reports to VREG the number of the cases where the deadline prescribed in the technical regulations has been extended by mutual consent and due to exceptional circumstances under a reputational incentive (while including data relating to whether the extended deadline has been met in the calculation of the relevant deliverable(s), if Fluvius included such cases in the historical data that it provided to us).[127] In addition, we also recommend that Fluvius develops a clear and well-documented policy on dealing with cases involving deadline extensions by mutual consent or due to exceptional circumstances which is reviewed and approved by VREG.

The applicable deadlines set out in the technical regulations may also change during the next regulatory period. To mitigate the impact of any future changes in these deadlines, we recommend that VREG requires Fluvius to provide data on the average time to quote and average time to connection[128] for each category of connections going forward as a reputational incentive. If feasible, we also recommend that Fluvius provides these data for historical years.

If the deadlines are changed in any significant way, we consider that our existing incentive scheme parameters would no longer be applicable. For example, if the deadlines are made longer, then Fluvius' *measured* performance under our incentive scheme will improve and it will earn more rewards / fewer penalties even though its underlying *actual* performance is unchanged. The opposite would be true if the deadlines were made shorter. Hence, VREG would need to reopen this incentive scheme and either:

- move to a reputational incentive for this deliverable until the next price review; or
- if it deems sufficient historical data are available for the alternative metrics of average time to connect/quote, set parameters for a replacement incentive scheme based on this data as part of the reopener. As these metrics are independent of the deadlines set out in law, they would be robust to any further changes that might be made to the deadlines thereafter.

The data provided by Fluvius that we have used for this incentive include demand connections but exclude generation connections.[129] Connecting generation to the grid requires a preliminary study before a quotation is provided to customers, meaning that the time required to provide quotations as well as the time required for generation connections will vary between applications. Given these bespoke time requirements, we have excluded generation connections from the scope of the "providing a good connections service" incentive.

[126] For further detail, see art. 2.2.39 §3 of VREG (2023): "Technical regulations for the distribution of electricity in the Flemish region" [online].

[127] Should VREG see a sharp, unjustified increase in the number of cases involving extensions to the applicable deadlines by mutual consent or due to exceptional circumstances, then we would recommend that VREG takes action and excludes these connection applications from the scope of the calculations to determine Fluvius' performance under the relevant deliverable(s). These would prevent Fluvius from gaining financial benefit from unjustified increases in the use of these provisions.

[128] For example, Ofgem uses the "Time to Quote" (TTQ) and "Time to Connect" (TTC) metrics to measure connection time.

[129] We note, however, that demand customers with microgeneration (e.g. PV) on their premises (which may sometimes spill electricity onto the grid) are included in the data reported.

Nonetheless, cognisant of the increasing importance of generation connections in light of the energy transition, we recommend that Fluvius starts reporting data on generation connections to VREG under a reputational incentive which could form the basis of a financial incentive at the next regulatory review.

Under the Energy Decree, DSOs are required to pay compensation to customers that apply for it when the deadlines for providing connections and reconnections set out in the technical regulators are missed. This gives rise to a potential further deliverable for this incentive based on the compensation paid to customers for late connections and reconnections. However, for customers to be awarded any compensation for such delays, they have to initiate the compensation process themselves which then needs to be reviewed and approved by Fluvius. Consequently, any data on the amount of compensation paid by DSOs in relation to late connection and reconnections will only include the number of successful claims (along with the amount of compensation paid to customers) but will exclude those customers who were affected by late connections and reconnections but chose not to apply for compensation. It will thus provide only a partial picture of DSO performance in terms of the timeliness of the connections services delivered. Customers' engagement with the compensation process for late connections and reconnections may also be affected by the anticipated compensation for the delays experienced, and the daily rates specified in the Decree are relatively modest.[130]

In the light of these issues associated with the data on financial compensation paid out to customers, our recommendation is for the incentive to focus on the two deliverables relating to "connection quotations on time" and "connection on time" outlined above.

The data concerning "connection quotations on time" encompasses all quotation applications, including cases where Fluvius could not provide a quote for the customer. Recognising the potential perverse incentive for Fluvius to decline quotations that could otherwise have been provided but outside the applicable timescales, to improve its performance in terms of the "connection quotations on time" deliverables, we recommend that Fluvius reports the number of quotations refused (i.e. where it was unable to provide a quotation following an application) as well as the reason for the refusal under a reputational incentive.

9.2.2 Parameters of incentive scheme

Connections data

Historical data relating to the two deliverables described above was provided by Fluvius for the period from 2018 to mid-2023 The datasets report the number of applications closed within the applicable deadline and the total number of applications on a monthly basis, covering both electricity and gas. The data reflects performance by Fluvius as a whole and is not disaggregated by DSO.

Data for connection quotations on time are provided separately for (i) low power/pressure; (ii) high power/pressure; and (iii) very high power/pressure connection levels. By contrast, data for connections completed on time are provided for (i) low power/pressure connections; and (ii) high power/pressure and very high power/pressure connections combined.[131]

[130] For example, Article 4.1.11/3 specifies a daily compensation allowance of 25 euros for late simple connections rising to a 100 euros per day for late simple connections with a study. For further details, please see Vlaanderen (2009) "Decree containing general provisions regarding energy policy" [online]

[131] In the electricity sector, Fluvius connects installations under 25 kVA to the low-voltage grid. For connections between 25 kVA and less than 250 kVA, Fluvius, following technical-economic criteria, may connect to the low-voltage grid, a transformation substation, or the medium-voltage grid. Connections equal to or exceeding 250 kVA but less than 15 MVA are directed to the medium- or high-voltage grid. Connections between 15 MVA and less than 25 MVA undergo an initial technical-economic analysis, with Fluvius deciding whether to refer them to the local electricity transportation network operator. Source: VREG (2023): "Technical regulations for the distribution of electricity in the Flemish region", p.31.

Using these datasets, we calculate an average score for each deliverable (i.e. connection quotations on time and connections on time) for the following connection levels:

- Low power/pressure connections; and
- High power/pressure and very high power/pressure connections.[132]

The table below sets out the overall revenue at risk for each deliverable. We apply a weighting of 70 per cent weight to connections and a 30 per cent weight to quotations for both the electricity and gas sectors, reflecting the relative importance of these to customers.[133] In addition, the weights between low power/pressure, high power/pressure and very high power/pressure connections have been determined based on the total number of applications[134] received by Fluvius for each connection level, separately for electricity and gas.

Table 9.2: Percentage of allowed revenue at risk for each deliverable (%)

	Electricity	Gas
	Percentage of allowed revenue at risk	
Connection quotations on time – low power/pressure	0.20	0.074
Connection quotations on time – high and very high power/pressure	0.02	0.002
Connections on time – low power/pressure	0.47	0.172
Connections on time – high and very high power/pressure	0.05	0.004
Total	**0.75**	**0.25**

Source: Europe Economics.

Results

We have applied the framework we developed in Phase 1 to determine the parameters for this incentive mechanism.

Our recommendation is to set caps and collars three standard deviations above and below the reference value, using the standard deviation of the connections measures over time. This approach takes account of the volatility of the score achieved by Fluvius over time (as measured by the standard deviation) as well as the need to strike a balance between having sufficiently strong unit incentive rates and not unnecessarily restricting the performance range over which Fluvius receives a lower penalty or higher reward for improvements in performance. As we do not have DSO-level data to measure a standard deviation on a cross-sectional basis, we use the standard deviation through time of the performance of Fluvius as a whole. Taking three standard deviations ensures that Fluvius historical performance generally falls within the range between the cap and collar.

Electricity

For connection quotations provided within the applicable deadline, our recommended reference value for 2025 are 88.57 per cent and 90.96 per cent for high and very high power, and low power networks, respectively. As there is no evidence of a trend improvement in performance from the historical data, we do not recommend a further improvement factor to determine the reference values for the subsequent years of the regulatory period.

The unit incentive rate for these deliverables in 2025 would be approximately €0.01m per percentage point change in high and very high power connection quotations completed and €0.14m per percentage point

[132] The weights used to calculate the weighted average for the relevant deliverables have been determined based on the total number of applications received by Fluvius for high and very high power/pressure connections, separately for the electricity and gas sectors.

[133] Based on Europe Economics judgement, broadly reflecting the deadlines set out in the technical regulations for providing quotations and connections.

[134] This includes the applications where Fluvius subsequently provided a quotation or a connection within the applicable deadlines as well as those where it did not.

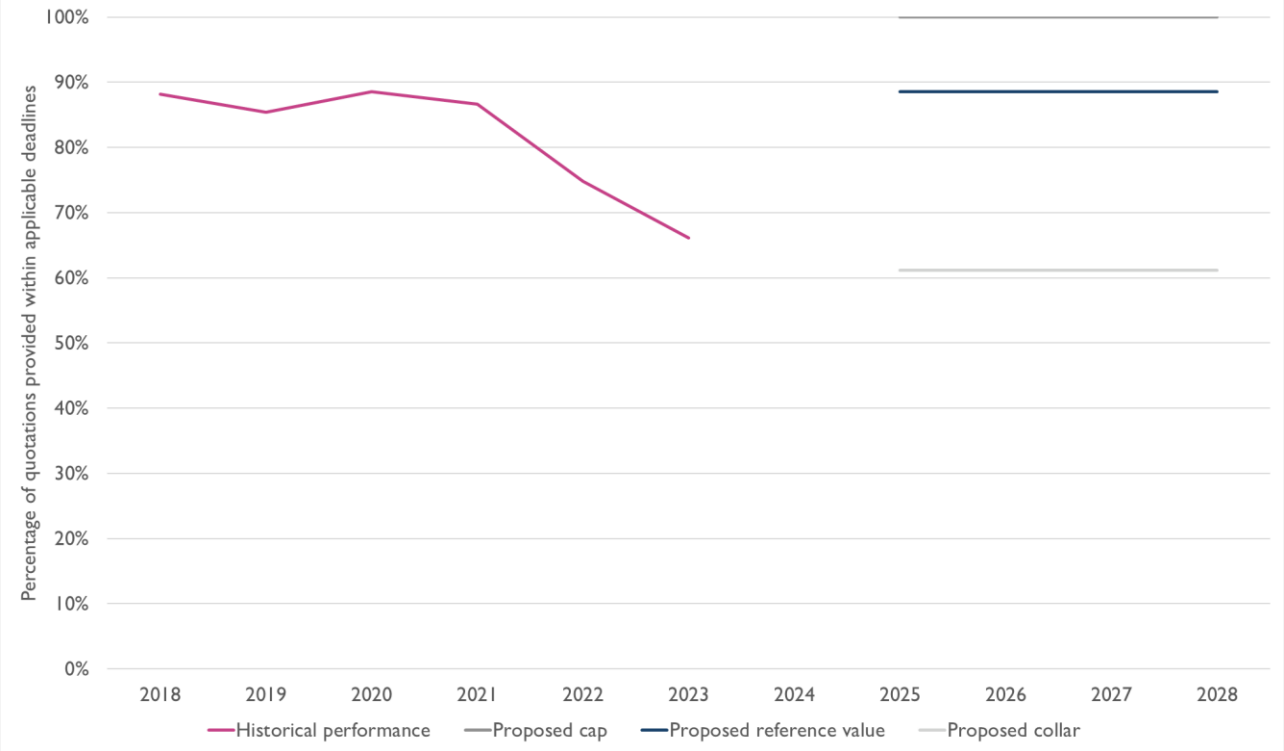
change in low power connection quotations completed within the application deadline, based on the most recent data available on Fluvius' endogenous costs. For subsequent years, we recommend that the unit rates are fixed in real terms through indexation to CPI.

For connections provided within the applicable deadline, our recommended reference values for 2025 are 92.58 per cent for high and very high power connections and 86.16 per cent for low power connections. For low power connections, historical data suggests a trend improvement in performance over the years, and hence we recommend an additional annual improvement of around 3.6 percentage points. For high and very high-power connections, there is no evidence of a trend improvement in performance from the historical data, and thus we do not recommend a further improvement factor for this deliverable.

The unit incentive rate for these deliverables in 2025 would be approximately €0.02m per percentage point change in high and very high power connections completed and €0.14m per percentage point change in low power connections completed within the application deadline, based on the most recent data available on Fluvius' endogenous costs. For subsequent years, we recommend that the unit rates are fixed in real terms through indexation to CPI.

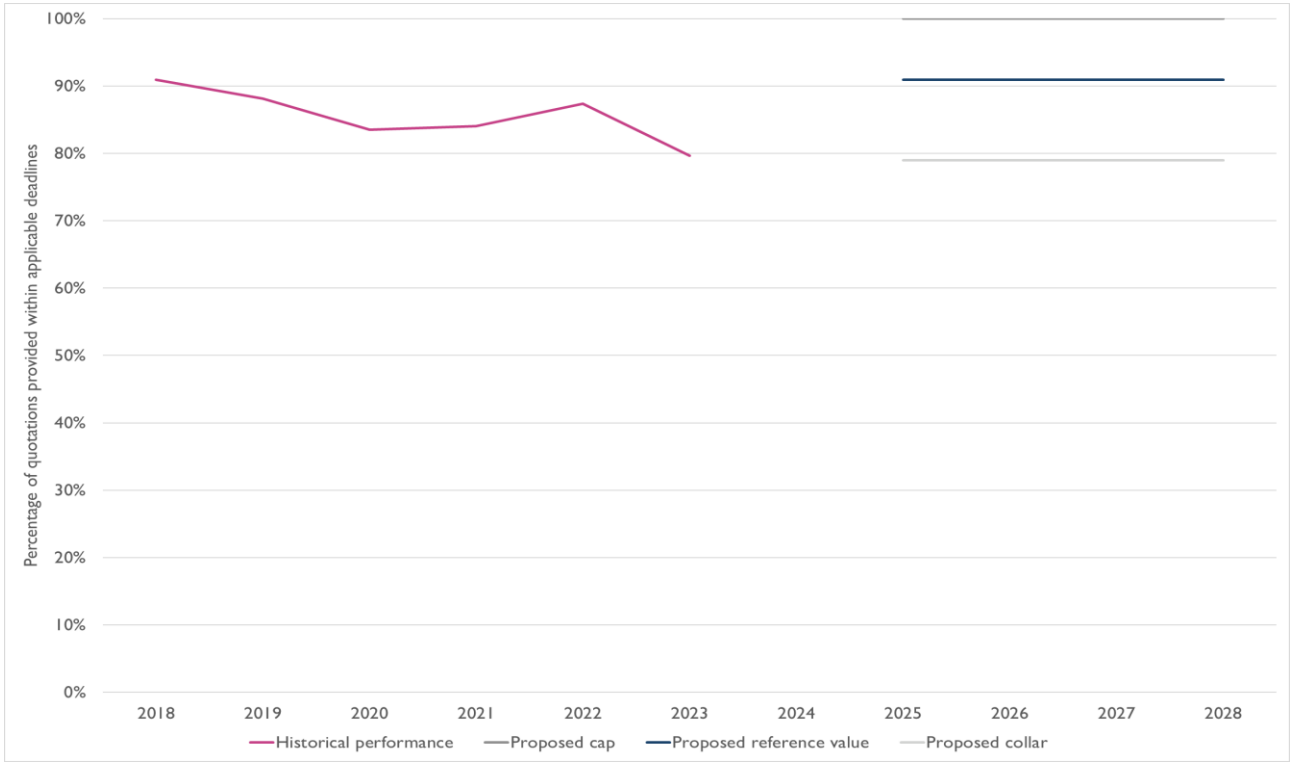
Historical performance and our recommended parameters for this incentive scheme for the electricity sector are summarised in the chart below. Our numerical recommendations for the reference values, caps and collars for each year of the next regulatory period are set out in Appendix 1.

Figure 9.9: Recommended parameters for connection quotations on time – high power and very high power connections in the electricity sector



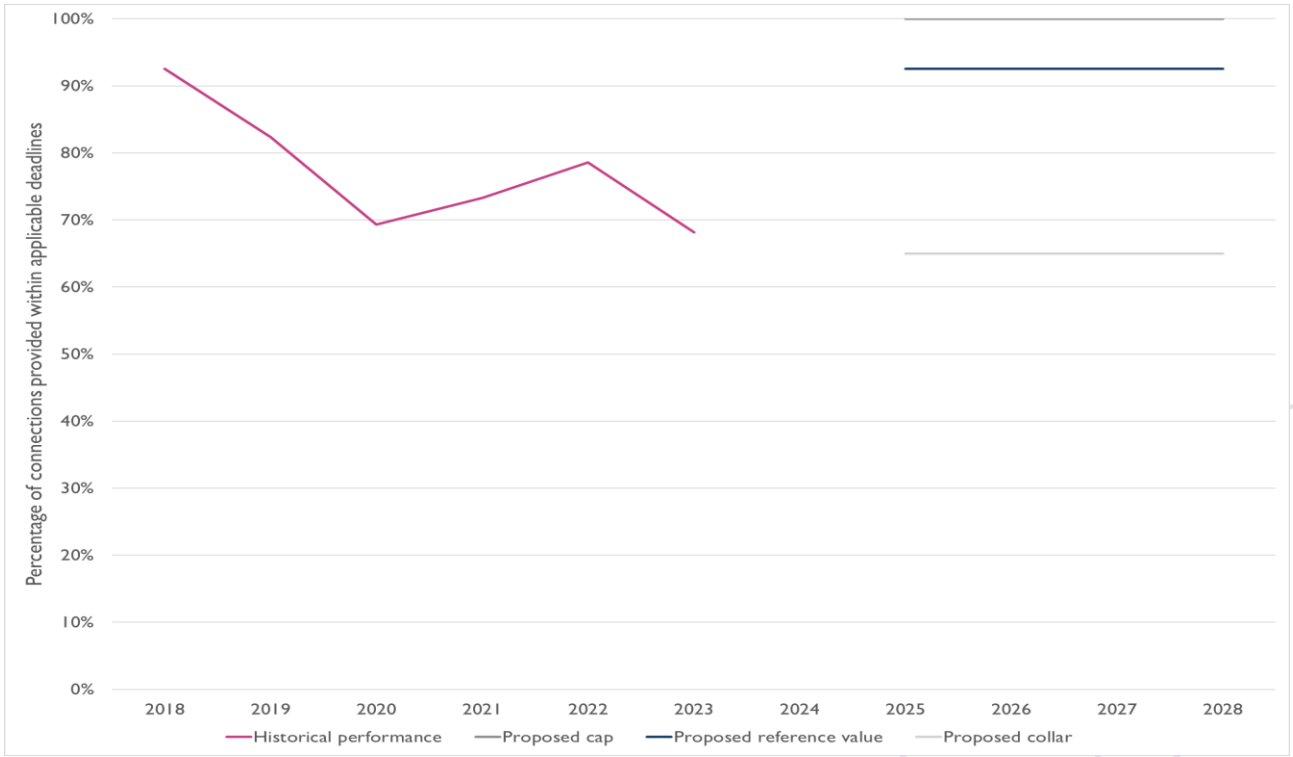
Source: Europe Economics analysis.

Figure 9.10: Recommended parameters for connection quotations on time – low power connections in the electricity sector



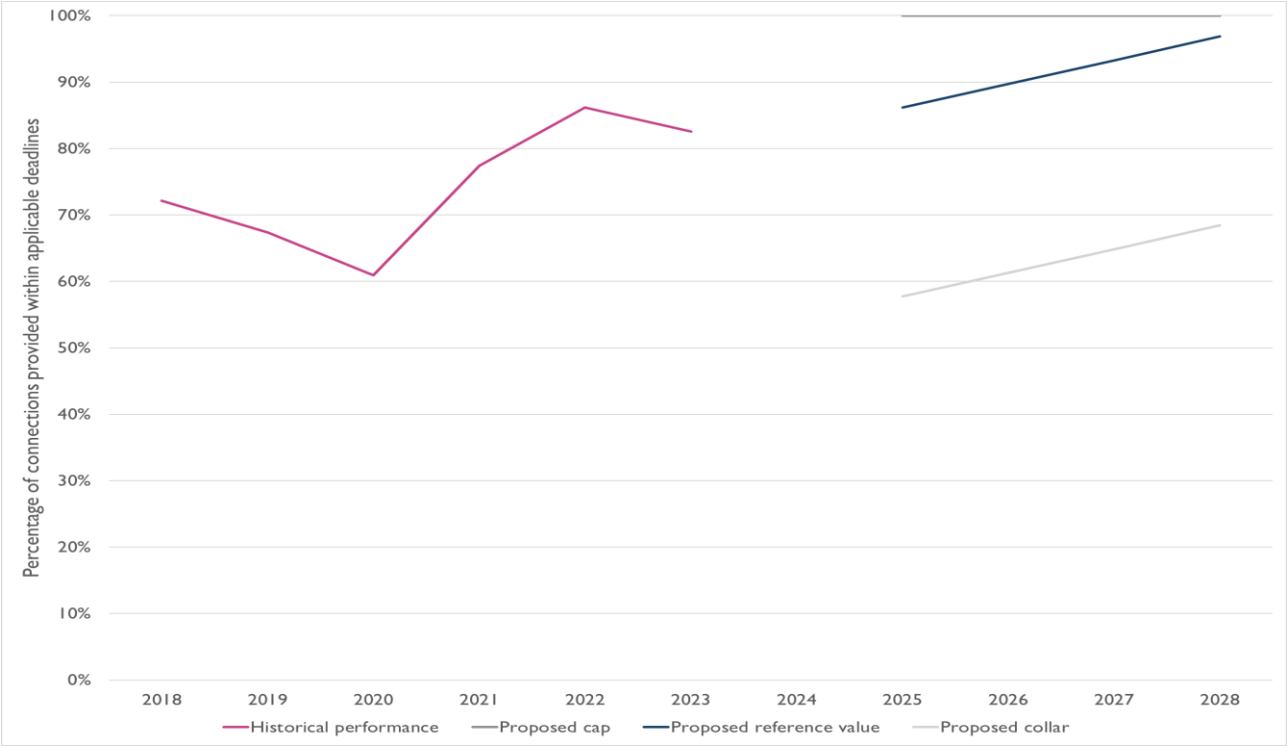
Source: Europe Economics analysis.

Figure 9.11: Recommended parameters for connections on time – high power and very high power connections in the electricity sector



Source: Europe Economics analysis.

Figure 9.12: Recommended parameters for connections on time – low power connections in the electricity sector



Source: Europe Economics analysis.

Gas

For connection quotations provided within the applicable deadlines, our recommended reference values for 2025 are 91.41 per cent for high and very high pressure connections and 90.52 per cent for low pressure connections. As there is no evidence of a trend improvement in performance from the historical data, we do not recommend a further improvement factor to determine the reference values for the subsequent years of the regulatory period.

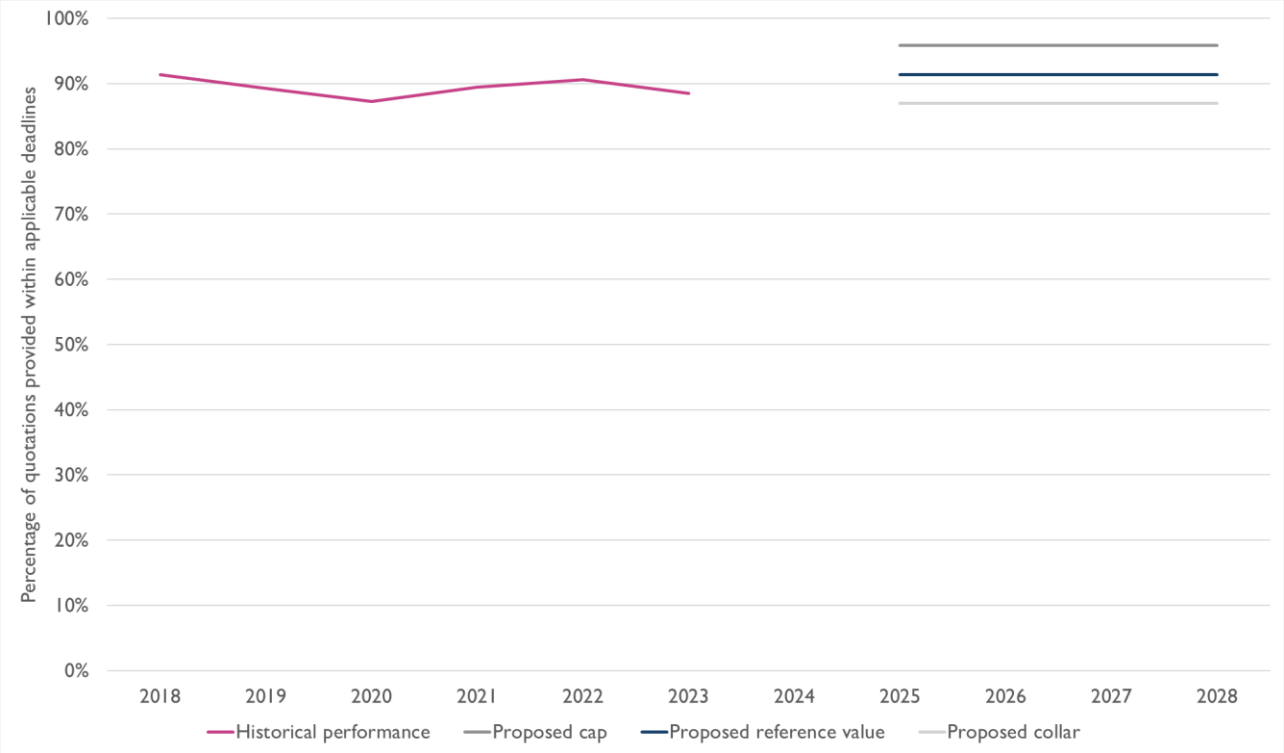
The unit incentive rate for these deliverables in 2025 would be approximately €0.001m per percentage point change in high and very high pressure connection quotations completed within the application deadline and €0.026m per percentage point change in low pressure connection quotations completed within the application deadline, based on the most recent data available on Fluvius' endogenous costs. For subsequent years, we recommend that the unit rates are fixed in real terms through indexation to CPI.

For connections provided within the applicable deadlines, our recommended reference values for 2025 are 93.16 per cent for high and very high pressure and 85.99 per cent, for low pressure networks. For low pressure connections, historical data suggests a trend improvement in performance over the years, and hence we recommend an additional annual improvement of around 4.1 percentage points. For high and very high-pressure connections, there is no evidence of a trend improvement in performance from the historical data, and thus we do not recommend a further improvement factor for this deliverable.

The unit incentive rate for these deliverables in 2025 would be approximately €0.001m per percentage point change in high and very high pressure connections completed within the application deadline and €0.021m per percentage point change in low pressure connections completed within the application deadline, based on the most recent data available on Fluvius' endogenous costs. For subsequent years, we recommend that the unit rates are fixed in real terms through indexation to CPI.

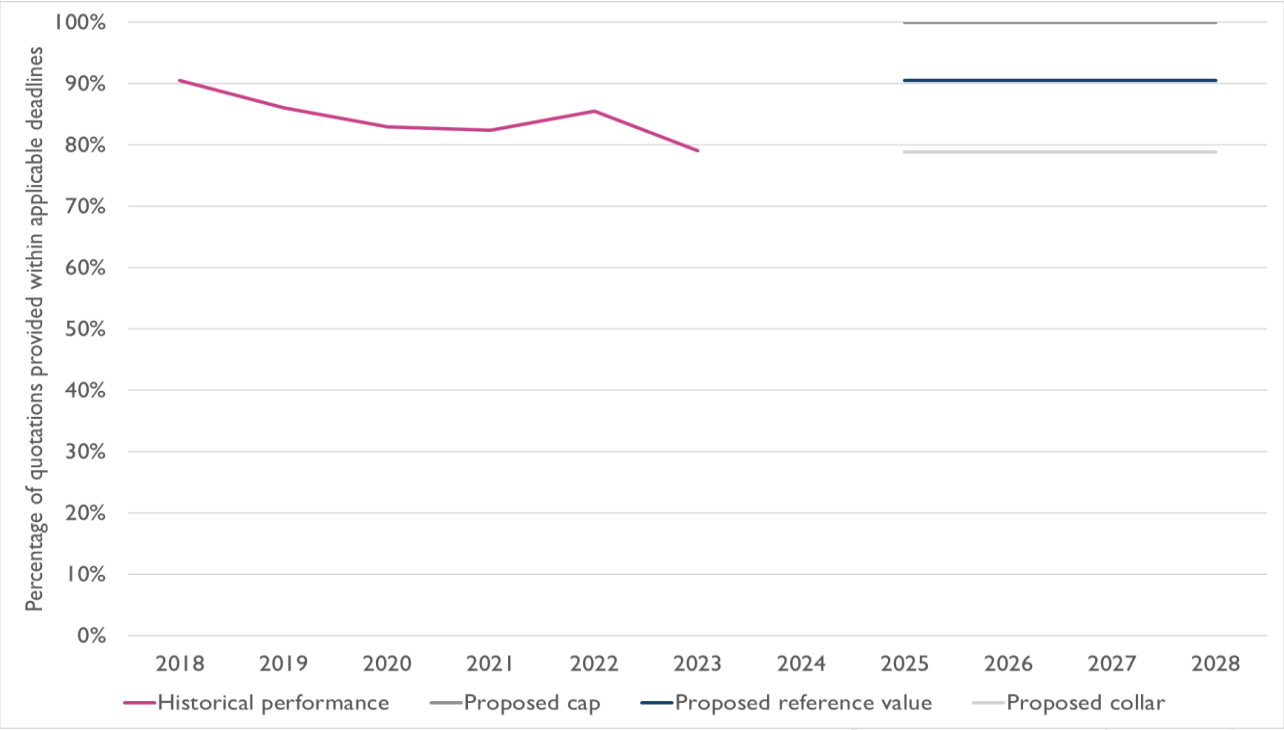
Historical performance and our recommended parameters for this incentive scheme for the gas sector are summarised in the chart below. Our numerical recommendations for the reference values, caps and collars for each year of the next regulatory period are set out in Appendix 1.

Figure 9.13: Recommended parameters for connection quotations on time – high pressure and very high pressure connections in the gas sector



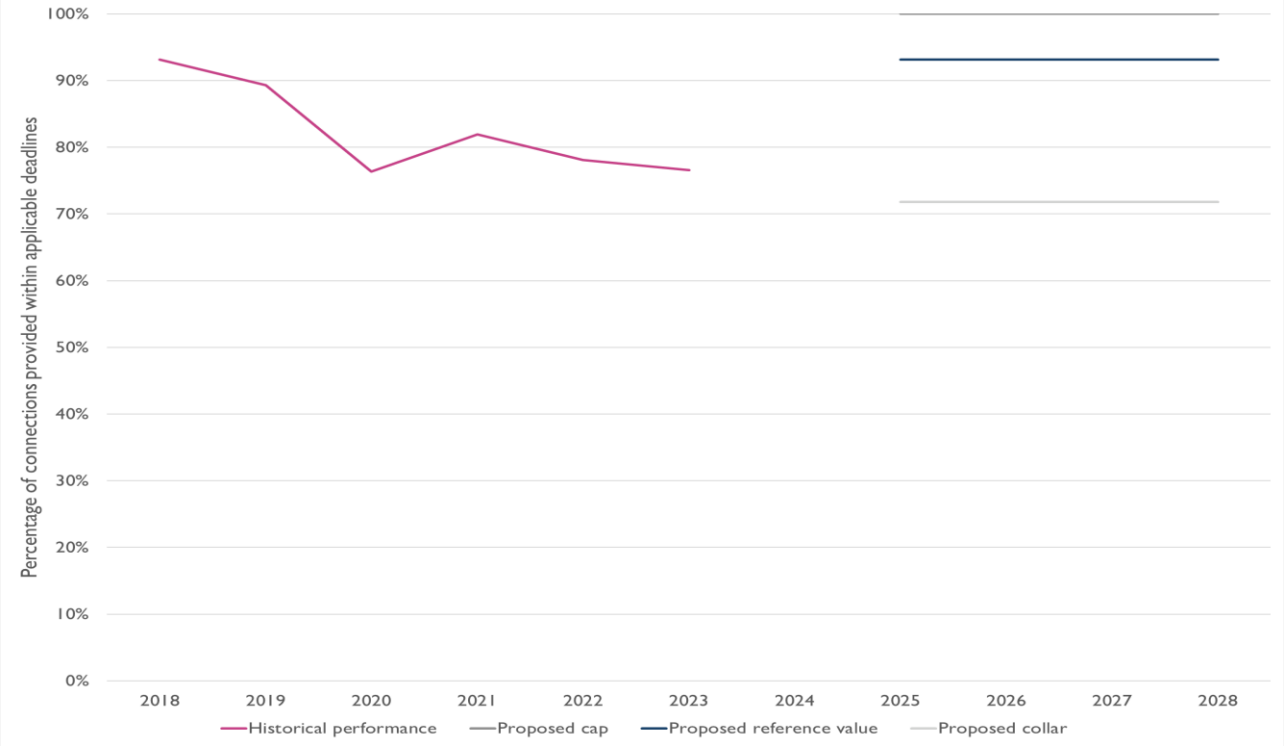
Source: Europe Economics analysis.

Figure 9.14: Recommended parameters for connection quotations on time – low pressure connections in the gas sector



Source: Europe Economics analysis.

Figure 9.15: Recommended parameters for connections on time – high pressure and very high pressure in the gas sector



Source: Europe Economics analysis.

Figure 9.16: Recommended parameters for connections on time – low pressure connections in the gas sector

Source: Europe Economics analysis.

9.3 Enhancing customer satisfaction

This incentive mechanism relates to enhancing the satisfaction of customers that interact with Fluvius.

9.3.1 Definition of deliverable

Approaches to measuring customer satisfaction

Different approaches can be used to measuring customer satisfaction. One potential approach relates to how well a company handles customer complaints, where company performance can be assessed through the percentage of complaints resolved within a specified time period. Such measures have been used by other regulators to incentivise DSO performance (e.g. by Ofgem in Great Britain and the CRU in Ireland). These measures are simple, transparent and can be used to track company performance over time. However, the definition of a "resolved complaint" is open to interpretation. Using this measure for a financial incentive mechanism can generate perverse incentives for a regulated company to set a low bar when it records complaints as "resolved" – though this could be addressed through regulatory guidance (as done by Ofgem). Currently, the historical data required to develop a measure based on complaints management is not available for Fluvius.

A different complaints-based approach to measuring customer satisfaction is simply the number of complaints received, but we consider this a very poor metric. It creates a strong perverse incentive for companies to hide their complaint procedures and to record calls as queries rather than complaints wherever possible, in order to score better on the metric without actually improving the service customers receive. None of the regulatory precedents we have reviewed involve using simply the number of complaints as the basis for a financial incentive. We strongly advise against this measure being used to set a financial incentive for Fluvius.

An alternative to complaints-based measures are measures based on customer satisfaction. Data from a customer satisfaction survey can be used to measure the satisfaction of customers that have interacted with Fluvius, for example through a Net Promoter Score or a Customer Satisfaction Score.

To determine a company's Net Promoter Score (NPS), customers are grouped into three categories based how likely they are to recommend the company to a friend or colleague using a score between 0 and 10. The NPS for a company is calculated as the difference between "Promoters" and "Detractors" where respondents with scores of 9 or 10 are categorised as "Promoters" and those with scores of 6 or below are categorised as "Detractors".[135] Given the standardised approach to calculating a NPS, an argument in favour of using this measure is the comparability of performance across different sectors and countries. Nonetheless, while the concept of a NPS is useful for businesses wishing to track customer loyalty, we are not aware of any precedent for using NPS for a regulated company which does not need to compete for customers. More fundamentally, the NPS does not distinguish between a customer giving a score of 0 and a customer giving a score of 6 despite the customer scoring 0 having a much more negative view of the company's performance than the customer scoring a 6.

The results from the survey could also be used to develop a Customer Satisfaction Score (CSAT) which provides a direct measure of customer satisfaction with Fluvius' performance, as done by Ofgem and CRU. To ensure the comparability of results between different years of the survey, there should be no material changes to the wording of the relevant question used to determine the customer satisfaction score.

In the light of the drawbacks associated with using the number of complaints or the NPS, and the current lack of historical data on complaints management, our recommendation for this incentive is to focus on a measure of customer satisfaction.

VREG may wish to collect data on complaints management under a reputational incentive to facilitate the development of potential further financial incentives relating to customer satisfaction at the next price review. This could involve collecting data on the number of repeat complaints and data on the time taken to resolve complaints (for example, Ofgem's complaints incentive includes metrics for complaints solved after one day and complaints resolved after 31 days). In addition, VREG may also wish to monitor the number of complaints received by Fluvius, although for the reasons set out above we do not recommend using the number of complaints as the basis for a financial incentive mechanism.

Composite customer satisfaction score

In particular, the deliverable used for this incentive mechanism is a measure of customer satisfaction derived using data from a survey of customers that have recently interacted with Fluvius.

We understand that Fluvius commissions an independent market research firm to survey its customers shortly after they interact with Fluvius. If this incentive were implemented, we recommend that VREG requires Fluvius to carry on commissioning the survey each year, maintaining the same structure to the survey and the same wording to the question used for calculating the customer satisfaction. Any changes to the survey would need to be documented and should require approval from VREG, as would any changes to the way in which the customer satisfaction variables are measured.

The survey is divided into seven different areas of service, namely:

- Premium applications
- Malfunctions
- Connections
- Studies and construction
- Metering
- Local production (only relevant for electricity distribution)

[135] Scores of 7 or 8 are categorised as "Passives".

- Prepaid intake (also called "budget meters" in previous waves of the survey)

We use responses to the following survey question to calculate our measure of customer satisfaction:

"All things considered, how satisfied are you overall with the entire [insert service area] process at Fluvius?"

Customers respond to the question using the following five-point scale:

- Not satisfied
- Not really satisfied
- Satisfied
- Very satisfied
- Extremely satisfied

We understand from Fluvius that since 2019 there have been some minor changes to the survey which did not affect the wording of the question above. In 2022, an eighth service area was added to the survey which surveys budget meter customers four months after installation of the budget meter (rather than immediately after installation, as is the case for "prepaid intake"). To ensure comparability of results across the years examined, we have excluded this additional service area from our measure of customer satisfaction.

Using the survey results, we calculate a composite customer satisfaction score by converting the survey responses to numerical scores between one and five, as set out in the table below.

Table 9.3: Conversion of survey responses to customer satisfaction score

Response	Score on 1-5 scale
Not satisfied	1
Not really satisfied	2
Satisfied	3
Very satisfied	4
Extremely satisfied	5

We calculate the satisfaction score for each service area and then take a weighted average of the scores across service areas to arrive at our composite satisfaction score for each year. The weighted average is based on the total number of customers contacted for a response for each survey area, as this reflects the number of customers that received service from Fluvius for each area.[136]

Using the scale above, Table 9.4 below summarises the satisfaction score calculated for each service area for each year in our dataset for the electricity sector, as well as the weights used to calculate the composite score.

[136] The weights are rounded to the nearest five per cent and are based on the number of respondents contacted in the first four waves of the survey in 2022, as this is the data made available to us at the time of writing. We recommend that Fluvius provides a more complete dataset to calculate weights more robustly (i.e. data covering the number of respondents contacted from 2019-2022).

Table 9.4: Customer satisfaction score for each service area for the electricity sector (2019-2023) and weights used to calculate the composite satisfaction score

Process/ Year	Weight	2019	2020	2021	2022	2023*
Premium application	10%	3.4	3.9	3.5	3.3	3.4
Malfunctions	5%	3.8	3.9	3.8	3.4	3.3
Connections	15%	3.7	3.6	3.4	3.5	3.7
Studies and construction	5%	3.4	3.3	3.3	2.9	3.1
Metering	50%	3.9	4.1	3.8	3.7	3.7
Local production	10%	3.3	2.9	2.8	2.7	2.9
Prepaid intake / budget meter	5%	3.2	3.3	3.1	2.7	2.8

Note: 2023 figures are based on the partial data covering part of the year made available to us at the time of writing.
Source: Europe Economics analysis.

In the case of gas, the calculation of the composite satisfaction score excludes responses for the "local production" service area. Table 9.5below summarises the satisfaction score calculated for each service area for each year in our dataset for the gas sector, as well as the weights used to calculate the composite score.

Table 9.5: Customer satisfaction score for each service area for the gas sector (2019-2023) and weights used to calculate the composite satisfaction score

Process/ Year	Weight	2019	2020	2021	2022	2023*
Premium application	15%	3.4	3.9	3.5	3.3	3.4
Malfunctions	5%	3.8	3.9	3.8	3.4	3.3
Connections	15%	3.7	3.6	3.4	3.5	3.7
Studies and construction	5%	3.4	3.3	3.3	2.9	3.1
Metering	55%	3.9	4.1	3.8	3.7	3.7
Prepaid intake / budget meter	5%	3.2	3.3	3.1	2.7	2.8

Note: 2023 figures are based on the partial data covering part of the year made available to us at the time of writing.
Source: Europe Economics analysis.

We note that in future Fluvius should record responses separately for gas and electricity customers, to allow separate scores to be calculated for each sector, allowing for more precise measurement of customer satisfaction for each sector.

9.3.2 Parameters of incentive scheme

Customer satisfaction data

Fluvius has provided historical data from its customer satisfaction survey covering the period 2017-23, though the 2023 results are only partial at the time of writing. Survey data are not collected separately for DSOs, and therefore our measure relates to Fluvius as a whole. The survey captures the views of both electricity and gas customers, with the exception of "local production" which only covers electricity.

The use of survey data gives rise to two important considerations:

- the size of the sample; and
- the representativeness of the sample.

We discuss each of these points in turn.

As the table below illustrates, the number of respondents (i.e. the size of the survey sample) varies significantly over time. However, the size of the sample is sufficiently large in each of the years to allow for the calculation and comparison of the composite satisfaction score over time.

Table 9.6: Sample size for customer satisfaction survey

	2019	2020	2021	2022	2023*
No. of respondents	13,642	8,934	10,172	21,872	16,969

Note: 2023 responses only cover part of the year.

In terms of sample representativeness, we analysed the demographics of the sample using the breakdown of respondents by gender and age provided by Fluvius.[137] As noted previously, the survey is sent to all customers[138] who had a recent contact with Fluvius, with a response rate of approximately six per cent. The gender ratio of the sample has remained stable over time (with the percentage of male respondents varying between 66 per cent and 68 per cent) and the age profile of the sample showed little variation across the years examined (in 2019 and 2020 slightly over 50 per cent of respondents were 55 years' old or older, and by 2023 this figure was close to 60 per cent). The little variation observed in the demographic characteristics of the sample allows for meaningful comparison of the scores achieved by Fluvius across time, though it will be important to monitor if these demographics continue to remain stable during the regulatory period. We cannot ascertain how representative the survey sample is of the corresponding population, as there is no data on the gender or age profile of people who have recently interacted with Fluvius (i.e. the "population" of interest).

Results

We have applied the framework we developed in Phase 1 to determine the parameters for this incentive mechanism.

For electricity, our recommended reference value for the composite satisfaction score for 2025 is 3.8 out of 5, corresponding to the weighted average customer satisfaction score achieved by Fluvius in its best performance year over the historical period examined (2020 in this case).

As there is no evidence of a trend improvement in performance from the historical data, we do not recommend a further improvement factor for determining the reference value for the subsequent years of the regulatory period.

Our recommendation is to set caps and collars three standard deviations above and below the reference value, using the standard deviation of the weighted average Fluvius has achieved through time. This results in the cap being set at 4.2 out of 5, and the collar being set at 3.4 out of 5. In determining these caps and collars, we have considered the volatility of the customer satisfaction scores achieved by Fluvius over time (as measured by the standard deviation) as well as the need to strike a balance between having sufficiently strong unit incentive rates and not unnecessarily restricting the improvement over time in its satisfaction scores for which Fluvius can still receive financial rewards. As we do not have DSO-level data to measure a standard deviation on a cross-sectional basis, we use the standard deviation through time of Fluvius' performance as a whole. Taking three standard deviations ensures that Fluvius historical performance generally falls within the range between the cap and collar.

Applying our top-down approach set out in Chapter 6 above, the unit incentive rate for this incentive in 2025 would be approximately €1.50m per 0.1 change in the satisfaction score, based on the most recent data

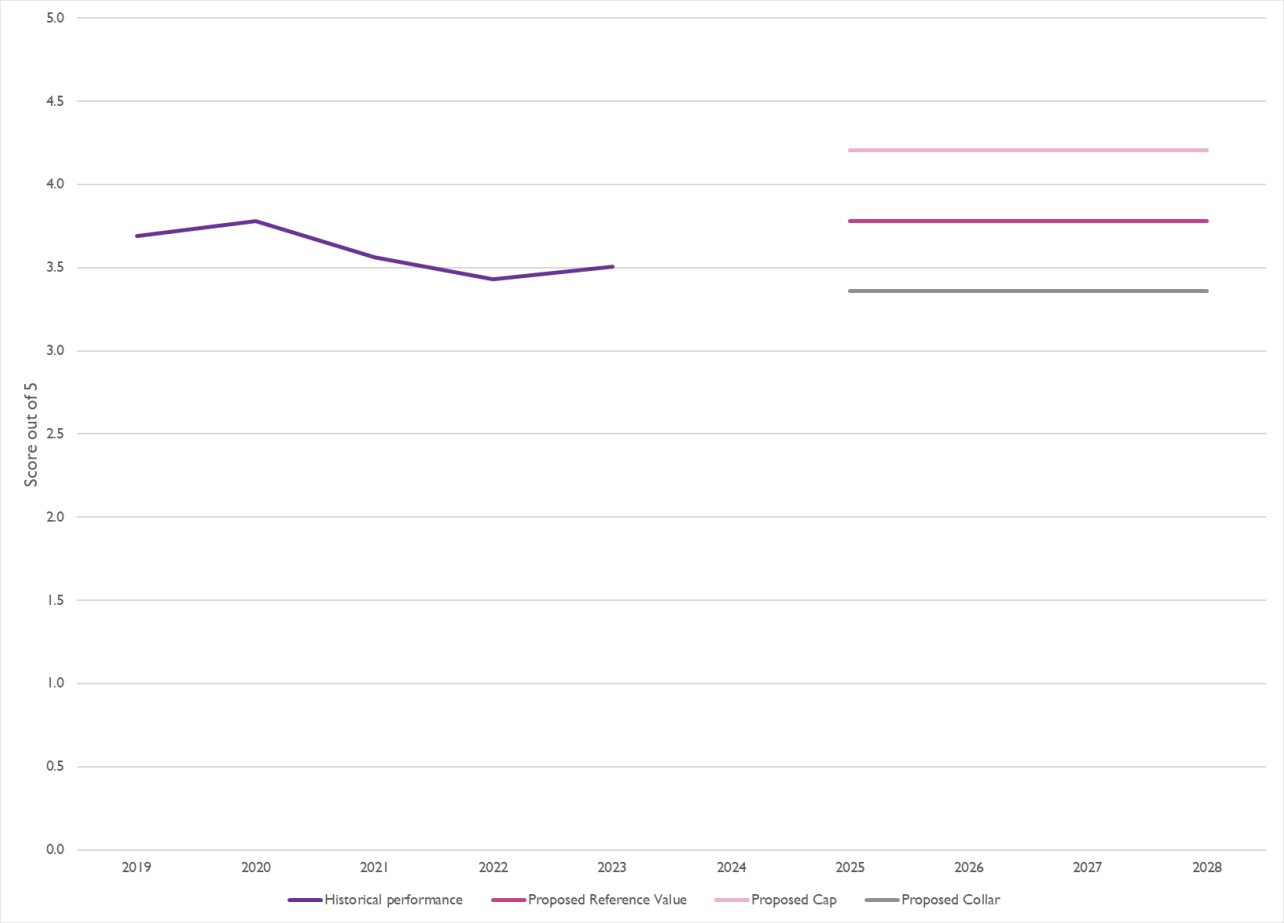
[137] Our analysis covered the full years for which data is available, i.e. from 2019 to 2022.

[138] These include responses from both household and business customers where the process is identical for both customer segments (e.g. solar panel registration) but only includes responses from households where the process is different (e.g. high voltage connections are not taken into account because the connection process is not completely identical to low voltage connections).

available on Fluvius' endogenous costs. We recommend that this incentive rate is fixed in real terms for the duration of the regulatory period through indexation to CPI.

Historical performance and the parameters for the electricity customer satisfaction incentive mechanism are summarised in the chart below.

Figure 9.17: Recommended parameters for customer satisfaction incentive (electricity)



Source: Europe Economics analysis.

In the case of gas, applying our Phase 1 framework gives a recommended reference value for the composite satisfaction score of 3.9 (out of 5) for 2025, corresponding to the weighted average customer satisfaction score achieved by Fluvius in its best performance year over the historical period examined (2020 in this case). As noted above, the responses for the "local production" service area of the survey are excluded from calculating the reference value for gas.

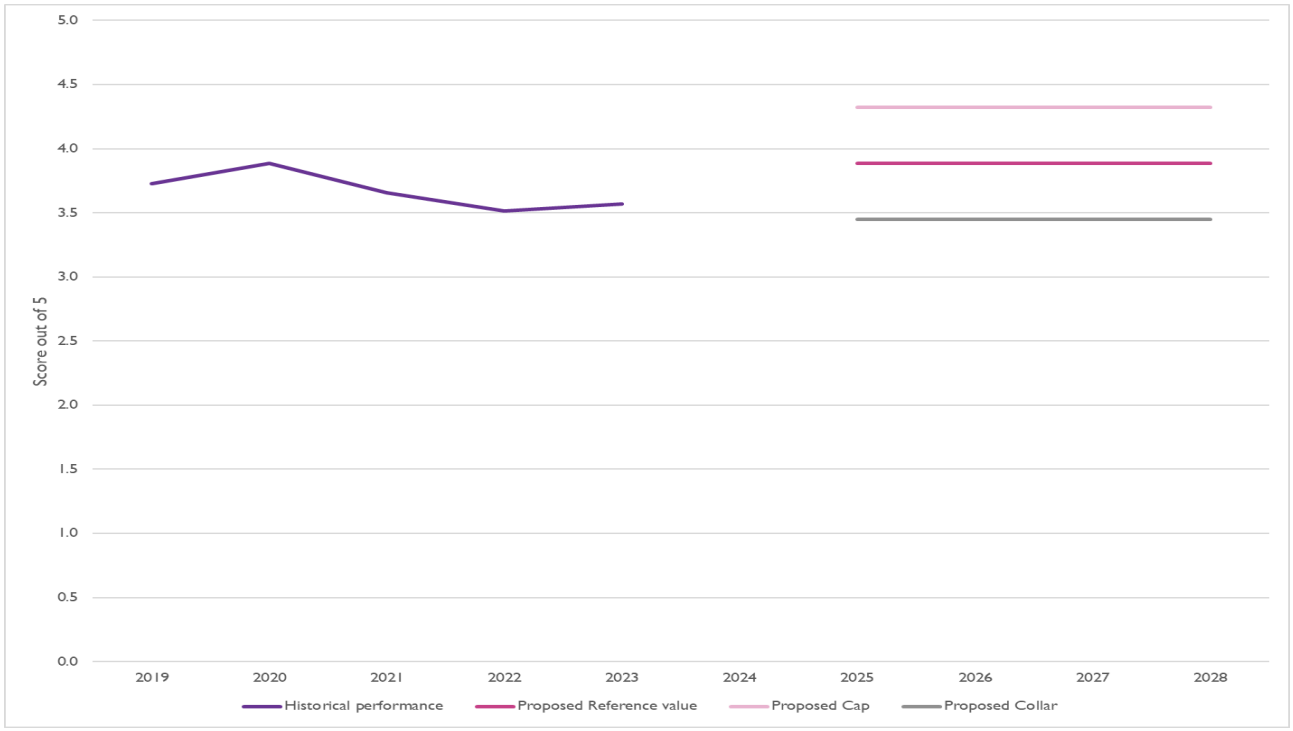
As with electricity, there is no evidence of a trend improvement in performance from the historical data, and therefore we do not recommend a further improvement factor for determining the reference value for the subsequent years of the regulatory period.

As in the case of electricity, our recommendation is again to set caps and collars three standard deviations above and below the reference value (i.e. at 3.4 and 4.3).

The unit incentive rate for gas is approximately €0.70m per 0.1 change in the satisfaction score. We recommend this incentive rate is fixed in real terms for the duration of the regulatory period through indexation to CPI.

Historical performance and the parameters for the gas customer satisfaction incentive mechanism are shown in the chart below.

Figure 9.18: Recommended parameters for customer satisfaction incentive (gas)



Source: Europe Economics analysis.

9.4 Providing smart metering information

This incentive mechanism relates to the provision of energy consumption information relating to Fluvius customers with smart meters.

9.4.1 Definition of deliverables

The deliverables for this objective focus on Fluvius' provision of smart metering data. The key avenues through which Fluvius can provide smart metering information to its customers are the "Mijn Fluvius" online portal and third-party platforms that receive smart metering information from Fluvius. The portal allows customers with smart meters to access historical data on their electricity and gas consumption (including the pattern of consumption through time), which may lead them to alter their energy consumption behaviour in a way that benefits the grid. Portal users can view daily consumption data for gas and electricity, and can choose to access more granular consumption data if they put in place a mandate to give permission for this data to be revealed – granular data is available quarter-hourly for electricity and hourly for gas. Mandates can also be put in place to give permission for consumption data to be shared by Fluvius to third parties, such as energy suppliers with their own usage-tracking platforms that add in price data, enabling customers to view their historical consumption in monetary terms.

With this in mind, we see two dimensions through which the provision of smart metering information to Flemish energy consumers can improve over time:

- An increase in the quantity of smart metering data provided (e.g. through an increase in the number of customers with active Mijn Fluvius portal accounts, or an increase in the number of mandates customers put in place to access energy consumption data through Mijn Fluvius or through third parties).
- An increase in the quality of smart metering data provided (e.g. improving the timeliness and completeness of the consumption data updates that Fluvius undertakes).

Deliverables related to the quantity of smart metering data provided

We have considered three potential deliverables that could incentivise Fluvius to try to increase the overall quantity of smart metering data that it provides to customers. While all three deliverables have some merit, we do not think any are suitable as deliverables for our financial incentive. One reason for this is that they all relate to outcomes that are not sufficiently within Fluvius' control. There are also practicality issues for all three that would make it very difficult to determine robust parameters for a financial incentive scheme.

The first potential deliverable is the number of customers with active accounts for Fluvius' online energy data portal ("Mijn Fluvius"). An active account is defined as an account where a customer signs up to the portal, and then accesses the portal on at least one other occasion after signing-up. One advantage of this deliverable is that the number of customers with active accounts will, in part, reflect how well Fluvius has informed customers about the portal and how easy it has made it for customers to sign up to and use the portal.

A second potential deliverable, closely related to the first, is the ratio of the number of portal accounts to the number of smart meters, which is the deliverable for the incentive that already exists in VREG's regulatory framework. This deliverable has the advantage of controlling for the roll-out of smart meters in Flanders (which will be correlated with the number of portal accounts).

A third potential deliverable is the number of mandates that portal users put in place. Mandates are where network users with smart meters give permission for their smart meter consumption data to be revealed. This can be a mandate for electricity/gas consumption to be made data be available to view on the Fluvius portal, or it can give permission for third parties to access consumption data from Fluvius (including the VREG for its V-test service, which allows customers to compare energy contracts, or energy suppliers for their own apps which allow consumers to see their consumption in monetary terms). Mandates can either relate to daily data or (for electricity / gas respectively) quarter-hourly / hourly data. Mandates can also be given for other portal users to access a network user's consumption data. The benefit of this deliverable over the previous two is that it is more reflective of the total quantity of smart metering information being provided, as individual portal users can put in place multiple mandates with each mandate increasing the amount of information being provided, and ultimately increasing the potential changes in consumers' consumption behaviour.

While we see merit in each of these three deliverables, there are drawbacks to all three that mean we do not consider any should be used for a smart metering incentive. The primary drawback for all three deliverables is exogeneity – the deliverables focus on outcomes that are primarily outside Fluvius' control. Fluvius can only have so much influence on how many customers choose to be active portal users – some customers may simply be uninterested in reviewing their consumption data, regardless of any efforts Fluvius may make to improve the online portal or to persuade customers to sign-up. Similarly, the number of mandates will be influenced by the activities of third parties – such as the amount of effort energy suppliers put into persuading customers to use their energy-tracking platforms – as well as the extent to which customers are interested in viewing more granular consumption data (e.g. due to movements in the market price of energy).

In addition to the issue of exogeneity, there are also practical difficulties relating to the setting of reference values for all three potential deliverables. For the number of active portal users, outturn performance will be heavily influenced by the smart meter roll-out itself (as more smart meters means more potential portal users). Determining meaningful reference targets for the number of active portal accounts requires a forecast of the progression of the roll-out, which adds too much uncertainty to the deliverable's parameters.

There is also a high degree of uncertainty associated with setting reference values for the ratio of active accounts to smart meters. There is likely to be a section of the Flemish population that cannot be persuaded to sign up to the online portal regardless of how hard Fluvius tries to encourage customers to sign up. This means that there will be a natural limit to the ratio of accounts to smart meters that can be achieved. Setting

reference values above the natural limit would lead to Fluvius incurring financial penalties regardless of how hard it tries to increase sign-ups. The historical data currently available are insufficient to determine what the natural limit could be, as the data cover the initial period in which those customers which are most interested in viewing consumption data are signing up. Taking a cautious approach, such as setting a reference value at the current ratio of active accounts to smart meters, risks making it too easy for Fluvius to earn rewards.

Setting reference values for the number of mandates that customers put in place is also difficult in practice. Firstly, we understand from Fluvius that GDPR legislation means that mandates only apply for three years before needing to be renewed. The historical data we have on mandates goes back to 2020, meaning that most of our historical data is not impacted by renewed mandates. However, the outturn figures for the number of mandates in the next regulatory period will be a mixture of customers putting in place new mandates and customers renewing existing mandates, and it will be difficult to determine appropriate reference values without comparable historical data. In addition, we understand that by the start of the next regulatory period, new legislation means that all existing active portal users will be signed up for the most granular consumption data (quarter-hourly for electricity and hourly for gas), and new portal users will automatically be signed up too. This means the number of mandates will automatically increase without Fluvius making any additional effort. Finally, we understand that the historical data is impacted by one-off events such as the MIG6 go-live in November 2021, during which it was not possible to apply for new mandates, the introduction of new apps from energy suppliers in 2022, and the impact of the high-profile energy price crisis in 2022. These one-off events mean the historical data on the number of mandates may not reflect the scope for future mandates.

Deliverables related to the quality of smart metering data provided

We have investigated a number of potential deliverables relating to the quality of the data Fluvius provides on its portal. Fluvius has provided monthly historical data on a number of performance measures that covers the year 2022. Having reviewed the historical data, we have developed eight deliverables each for the electricity and gas sectors. These deliverables can be divided into two categories; completeness and timeliness.

The completeness deliverables assess how much consumption data Fluvius successfully collects against the amount of data that Fluvius expects to collect, based on the number of customers with smart meters and mandates. The amount of data that is "expected" to be collected depends on the type of smart meter in question (electricity or gas) and which mandates a customer has signed (daily values or more granular). For example, a customer with a smart electricity meter and a mandate for quarter-hourly data would expect 96 consumption values to be collected every day from their meter, becoming available to review on the portal the next day. The more complete the data that Fluvius collects and then provides to its customers, the more information customers will have on their actual consumption, better informing future consumption decisions.

If consumption data cannot be read from a smart meter (e.g. due to a loss of connection between the smart meter and Fluvius), there are two possible outcomes for that customer when they come to view their consumption on the portal. The first possibility is that the customer will be able to view estimated consumption values for the time period where the connection with the smart meter was lost. The estimated consumption values are based on interpolation between the latest actual consumption value read before the smart meter went offline, and the first value read when the meter comes back online. If estimation is not possible, then consumption values will instead be missing when a customer attempts to view them on the portal. While estimated values are not as useful as actual consumption data, they are preferable to missing values, because they give a customer some idea of how much energy they consumed during that period.

The timeliness deliverables assess how quickly Fluvius makes consumption data read from smart meters available to view on the portal. The quicker that data is provided to customers, the quicker they can use it to inform future consumption decisions. Current technological capabilities in Flanders mean that, in an ideal world, Flemish customers are able to view their actual consumption data the day after the consumption takes place ("Day + 1"). Delays in reading meters or processing data read from meters can lead to data only becoming available on the portal at Day + 2, Day + 3 or later. While the objective should always be Day + 1, in situations where this is not achieved it is important that Fluvius makes efforts to minimise the delay – Day + 2 is preferable to Day + 3 or later.

Fluvius has provided historical monthly data for a total of twenty-four different measures relating to data completeness and timeliness on the Mijn Fluvius portal, covering the year 2022. There are eight measures relating to completeness for each of electricity and gas, and four related to timeliness for each.[139] Our deliverables consolidate the completeness measures such that there are four completeness deliverables each for electricity and gas.

Completeness deliverables

The completeness deliverables are:

- The average number of days per year that users[140] have some or all of their **quarter-hourly/hourly** consumption values **estimated** (quarter-hourly for electricity, hourly for gas)
- The average number of days per year that users have some or all of their **quarter-hourly/hourly** consumption values **missing** (quarter-hourly for electricity, hourly for gas)
- The average number of days per year that users have some or all of their **daily** consumption values **estimated**
- The average number of days per year that users have some or all of their **daily** consumption values **missing**[141]

Fluvius' data distinguishes between days where data was partly estimated (or missing) and days where data was fully estimated (or missing). However, the data on partly estimated/missing values do not include how many of the days' values were missing, which could range from 1 to 95 in the case of quarter-hourly electricity data. Without this information we cannot know how much weight to place on the partly estimated/missing days. Therefore, we have combined the measures of partly and fully estimated (or missing) values into a single deliverable that measures the days where at least some of the expected consumption values were estimated (or missing). To illustrate, if the number of fully estimated days for quarter-hourly electricity data in 2022 was 100, and the number of partly estimated days in 2022 for quarter-hourly electricity data was 50, there would be 150 days in total where data was partly or fully estimated, and this is the value we use in our deliverable.

The average number of days per user is calculated using data on the number of portal users that have put in place a mandate for the relevant data.

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[139] In practice, there are seven completeness measures for electricity and five for gas. For electricity, one of the eight completeness measures could not be measured for 2022 – "completely missing quarter-hourly volumes" – but will become available in next year's report. For gas, the equivalent measure – "completely missing hourly volumes" – was similarly missing. In addition, both "partly estimated" and "partly missing" daily volumes for gas are not applicable measures – there is only one daily volume that can be recorded for gas, so it can only be completely missing/estimated, or it can be successfully read. The same is not true for electricity, as there are four potential daily volumes to be recorded.

[140] Number of combinations of MyFluvius users with quarter-hour volumes of electricity and meters for which a mandate is available. Source: Fluvius – Data Management Quality Reporting to VREG, 2022.

[141] We note that Fluvius shares the same data with third parties (with an appropriate mandate in place) which means that these parties will receive a similar quality of service in terms of the completeness and timeliness of the data provided as MyFluvius users.

Fluvius provided us with historical monthly data for 2022. Therefore, for each of our eight completeness deliverables, we have a total of twelve values for the average number of days that relevant portal users have estimated/missing data, covering each month of 2022.

Timeliness deliverables

The timeliness deliverables are:

- The percentage of meter readings fully available on the portal at Day + 1.
- The percentage of meter readings fully available on the portal at Day + 2.
- The percentage of meter readings fully available on the portal at Day + 3.
- The percentage of meter readings available on the portal later than Day + 3.

These deliverables are all calculated separately for electricity and gas. For each deliverable, the percentage we have calculated uses the total number of days of consumption that were expected to be made available on the portal in that time frame as the denominator. For the Day + 1 measure, this is simply the total of all the expected consumption values, as all data is initially expected to be available at Day + 1. For Day + 2, the expected total is all of the consumption values that failed to become available on Day + 1, and for Day + 3 the expected total is all of the days that failed to become available on Day + 1 or Day + 2. To illustrate, if 100 values were expected on Day +1, but only 90 became available, the score for Day + 1 would be 90 per cent. If a further 6 values became available on Day + 2, then Day 2 would score 60 per cent, as 6 out of a possible 10 values became available.

We have a total of twelve monthly historical percentages for each of our timeliness deliverables, covering each month of 2022.

Weighting the revenue at risk for our deliverables

As set out in Chapter 8, the smart metering incentive has an upside and downside of ±0.5 per cent of total allowed revenue for endogenous costs for both electricity and gas. We have placed equal weight on the completeness and timeliness deliverables, as there is no regulatory precedent for placing more weight on either of them and we consider both aspects of performance to be of equal importance in the provision of smart metering information.

Within the completeness deliverables, we have divided the revenue at risk between the deliverables relating to daily values and the deliverables relating to quarter-hourly/hourly values based on the number of portal users that have mandates for each.[142] The split for electricity is 58 per cent daily and 43 per cent quarter-hourly, while for gas the split is 57 per cent daily and 43 per cent hourly.

The division between deliverables for estimated data and deliverables for missing data is based on the number of portal users impacted by each, so the strength of the incentive is aligned with the historical scale of the problem. However, we have doubled the weight placed on missing deliverables, because we consider missing values to be of greater detriment to customers than estimated values.

The revenue at risk for the timeliness variables is divided between the deliverables based on the total number of days of consumption that were expected to be made available in each time frame (i.e. the denominators of our percentage). This leads to the vast majority of the weight being placed on the Day + 1 deliverable, which we consider appropriate as this should be Fluvius' primary objective for data timeliness.

The table below provides an overview of how much weight we place on each of our eight smart metering information deliverables for electricity and gas, and therefore how much of the total revenue at risk for this incentive (0.5 per cent) is placed on each deliverable.

[142] As at 31 December 2022.

Table 9.7: Weight placed on each smart metering information deliverable (%)

	Electricity	Gas
Completeness deliverables		
Quarter-hourly/hourly estimated	6.6	14.1
Quarter-hourly/hourly missing	14.4	7.3
Daily estimated	23.9	24.3
Daily missing	5.1	4.3
Total	**50**	**50**
Timeliness deliverables		
Fully available Day + 1	44.8	43.7
Fully available Day + 2	2.4	3.2
Fully available Day + 3	1.6	1.7
Fully available Later than Day +3	1.3	1.4
Total	**50**	**50**

Source: Europe Economics calculations

9.4.2 Parameters for incentive

We have applied our framework from Phase 1 to determine our recommended parameters for each deliverable. The reference values are based on taking the upper quartile monthly performance from the historical data, and multiplying this by twelve to get an annual reference value. With only one year of historical data available, we have not applied a trend improvement to the reference values over the regulatory period – in any case, the monthly values do not provide any evidence of a trend improvement over time during the course of 2022. Therefore, the reference values are fixed for each deliverable throughout the period.

VREG will need to take care when assessing outturn performance against these reference values. Fluvius' 2022 data included annual figures for all of its measures. The average number of annual days Fluvius reports is calculated by taking the total number of days over the year for a particular measure, and dividing by the number of portal users for that measure in December 2022. However, the number of portal users rose consistently each month throughout 2022, which in our view should have been factored in to the calculation. Fluvius' outturn performance should therefore be calculated by taking a weighted average of monthly performance, where each month is weighted by the number of portal users for that deliverable, and multiplying by twelve.

Our recommended caps and collars for all of the deliverables are based on taking the standard deviation of the monthly historical performance and then multiplying by twelve to get an indication of how volatile annual performance for these deliverables might be (bearing in mind we only have one year of historical data). This results in wide performance ranges for the deliverables, which we consider appropriate given the relatively small amount of historical data available. Where relevant, we also applied a lower bound of zero for collars.

Electricity results

The table below provides our recommended reference values for the electricity deliverables, and the associated unit incentive rates for 2025. In each case, with one exception, we recommend the reference value remains the same throughout each year of the regulatory period. The exception is the timeliness measure relating to the percentage of meter readings available on the portal later than Day + 3, where historical data show a trend improvement in performance, and hence we recommend an additional annual improvement of around 0.11 per cent. The incentive rates should remain fixed in real terms by adjusting them for annual CPI inflation in each year after 2025.

Table 9.8: Reference value and unit incentive rates for electricity completeness deliverables

Deliverable	Recommended reference value *(Days per user per year)*	Unit incentive rate in 2025 *(€m per 0.1 change)*
Quarter-hourly/hourly estimated	1.56	0.009
Quarter-hourly/hourly missing	0.99	0.013
Daily estimated	1.32	0.055
Daily missing	0.05	0.078

Table 9.9: Reference value and unit incentive rates for electricity timeliness deliverables

Deliverable	Recommended reference value *(Percentage of data available)*	Unit incentive rate in 2025 *(€m per percentage point change)*
Fully available Day + 1	98.03	0.426
Fully available Day + 2	43.95	0.005
Fully available Day + 3	36.13	0.003
Fully available Later than Day +3	63.06	0.002

Gas results

The table below provides our recommended reference values for the gas deliverables, and the associated unit incentive rates for 2025. In each case, with one exception, we recommend the reference value remains the same throughout each year of the regulatory period. The exception is the timeliness measure relating to the percentage of meter readings available on the portal later than Day + 3, where historical data show a trend improvement in performance, and hence we recommend an additional annual improvement of around 0.07 per cent. The incentive rates should remain fixed in real terms by adjusting them for annual CPI inflation in each year after 2025.

Table 9.10: Reference value and unit incentive rates for gas completeness deliverables

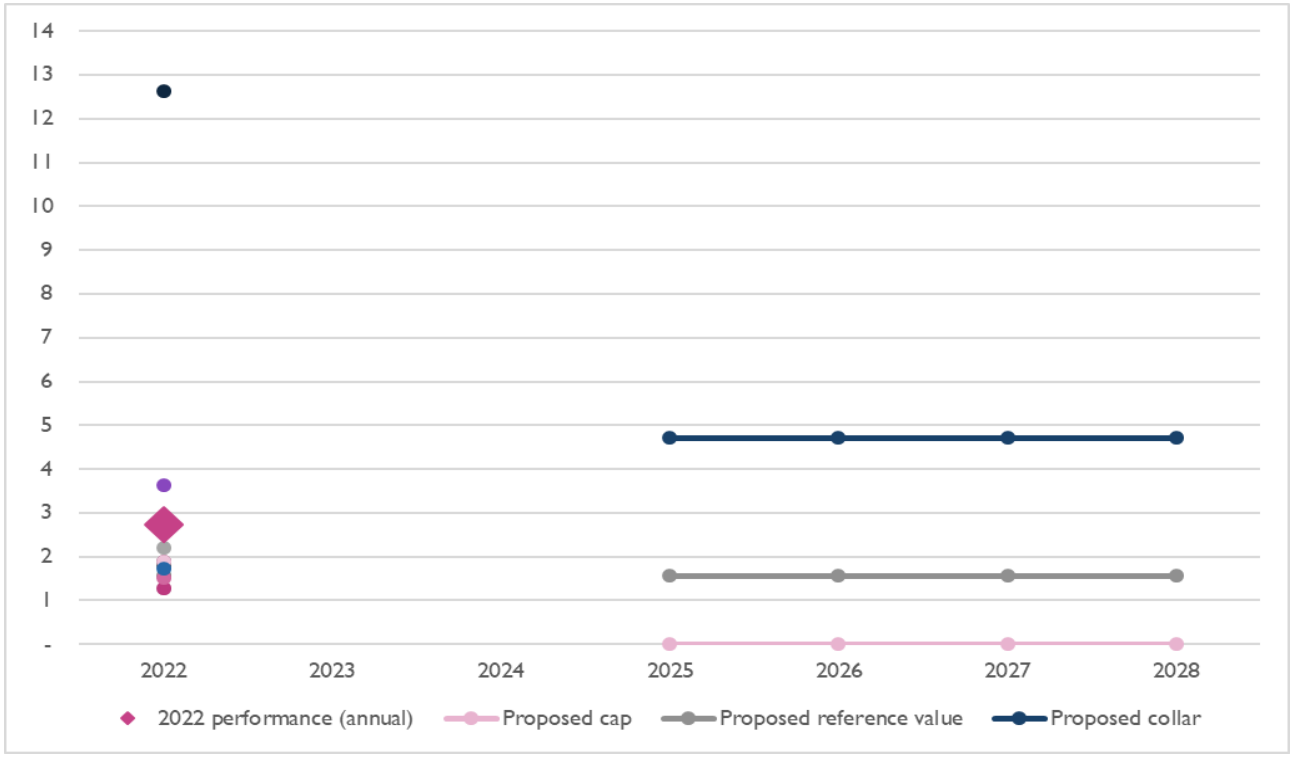
Deliverable	Recommended reference value *(Days per user per year)*	Unit incentive rate in 2025 *(€m per 0.1 change)*
Quarter-hourly/hourly estimated	4.95	0.004
Quarter-hourly/hourly missing	0.10	0.003
Daily estimated	3.09	0.049
Daily missing	0.06	0.030

Table 9.11: Reference value and unit incentive rates for gas timeliness deliverables

Deliverable	Recommended reference value *(Percentage of data available)*	Unit incentive rate in 2025 *(€m per percentage point change)*
Fully available Day + 1	97.01	0.132
Fully available Day + 2	56.94	0.002
Fully available Day + 3	19.33	0.002
Fully available Later than Day +3	26.99	0.001

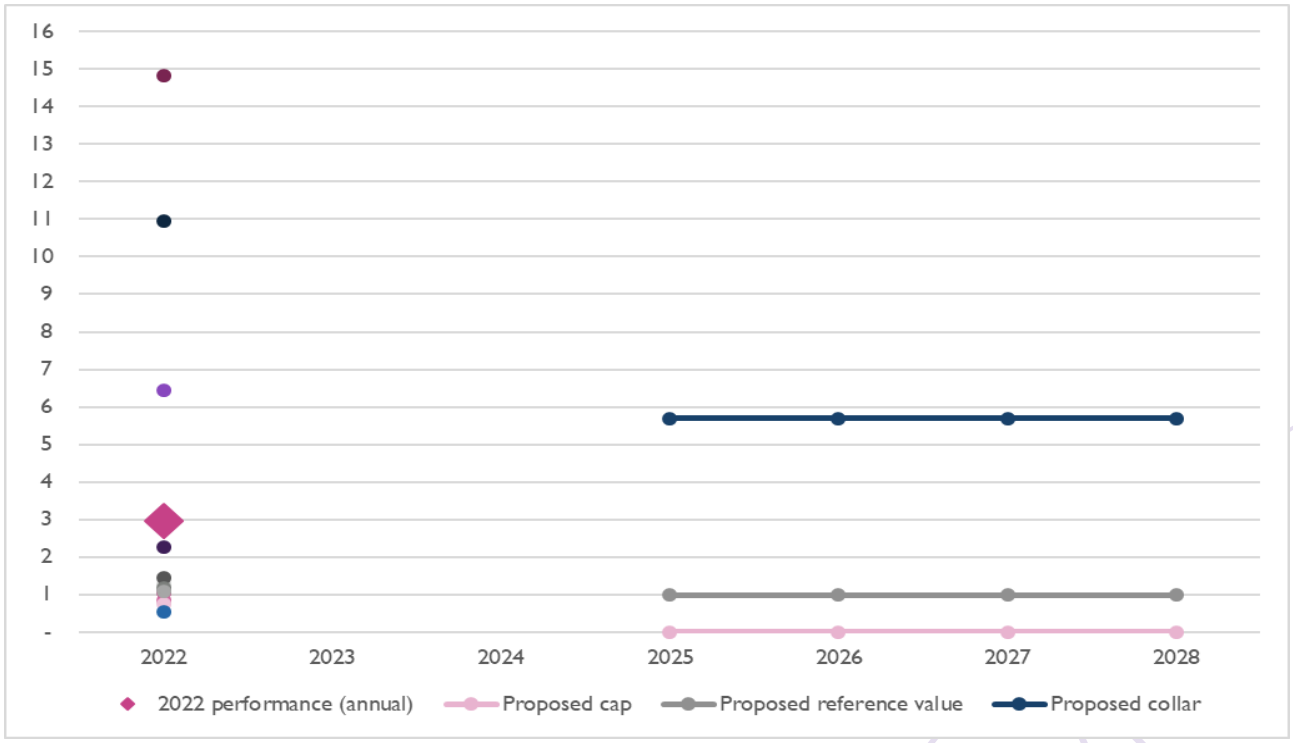
Below we provide charts for each deliverable, presenting reference values, cap, collars, and the historical performance of Fluvius in 2022.

Figure 9.19: Recommended parameters for average number of days for which quarter-hourly data were partly or fully estimated per user per year (electricity)



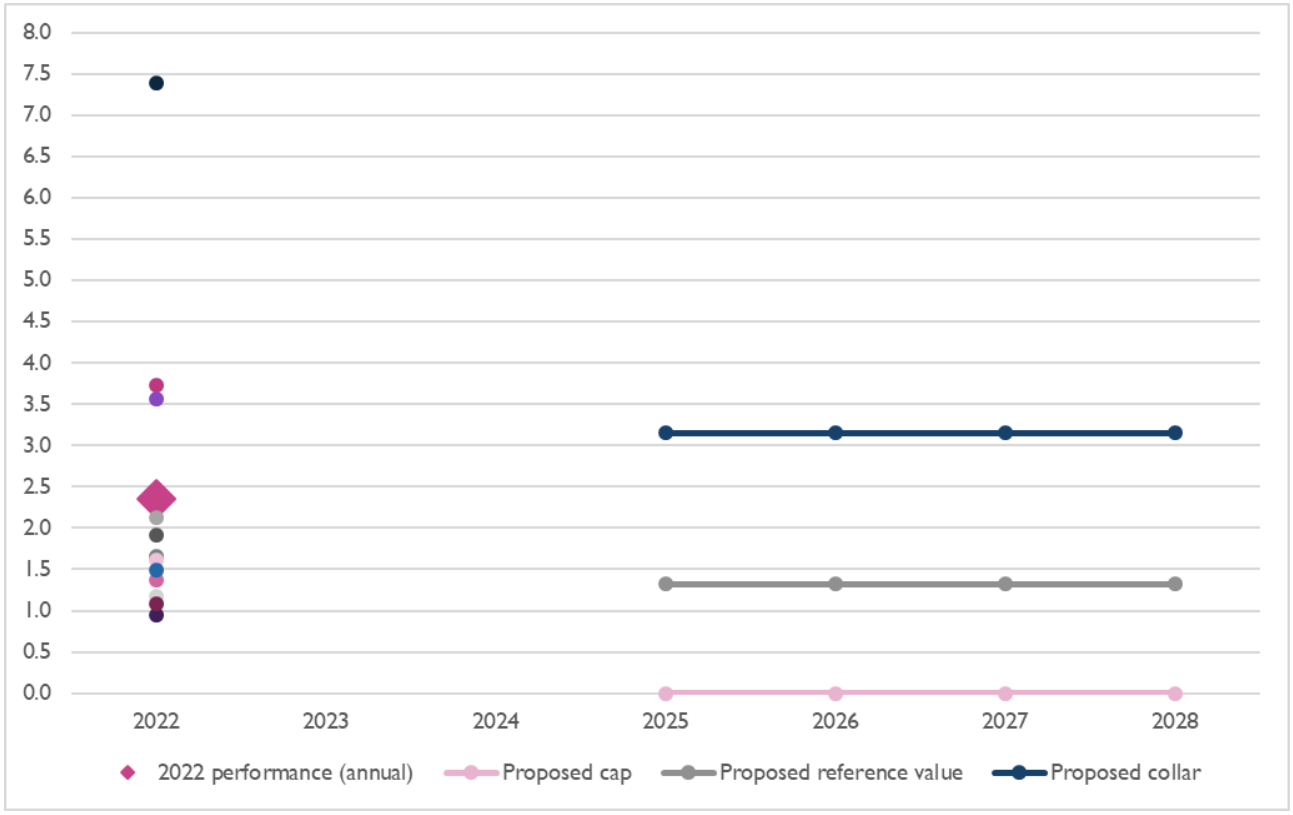
Note: 2022 dots represent performance in each month of 2022 multiplied by 12 to give an equivalent annual figure.
Source: Europe Economics analysis.

Figure 9.20: Recommended parameters for average number of days for which quarter-hourly data were partly or fully missing per user per year (electricity)



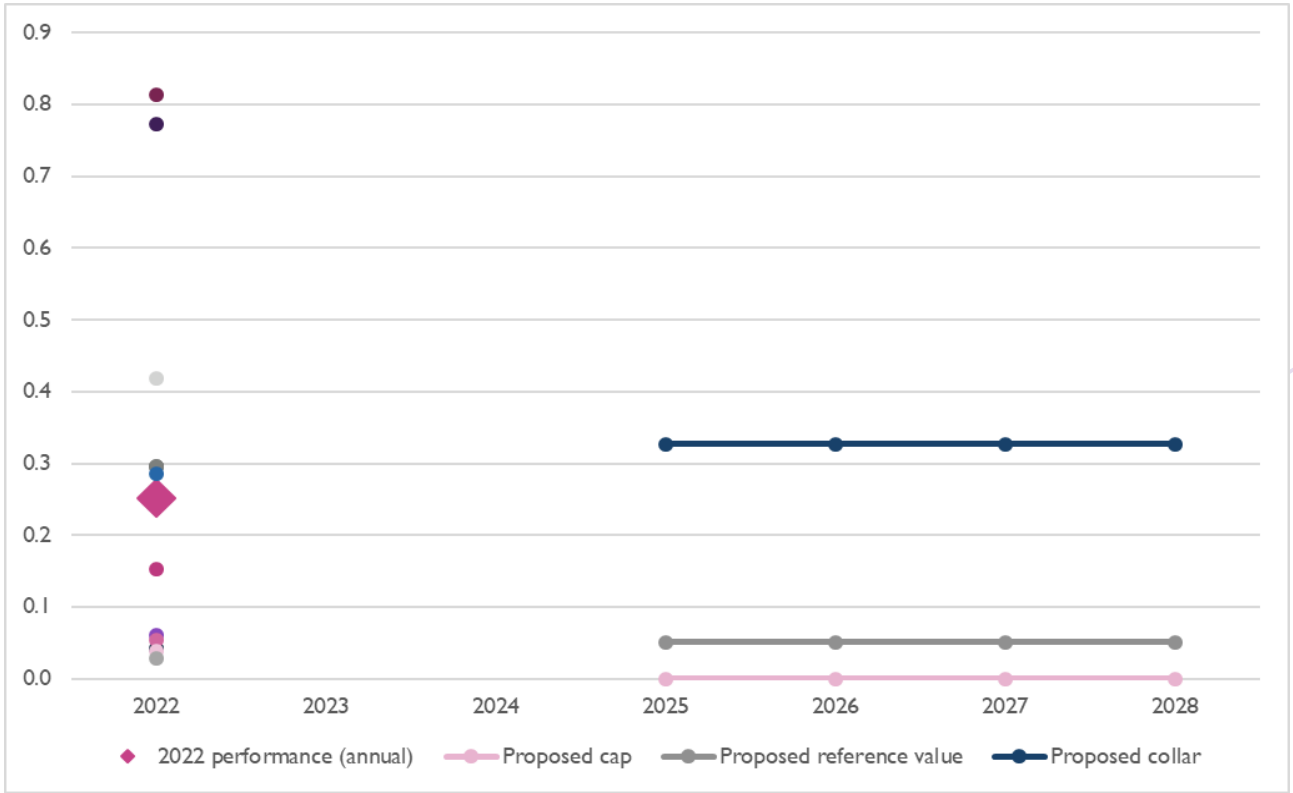
Note: 2022 dots represent performance in each month of 2022 multiplied by 12 to give an equivalent annual figure.
Source: Europe Economics analysis.

Figure 9.21: Recommended parameters for average number of days for which daily data were partly or fully estimated per user per year (electricity)



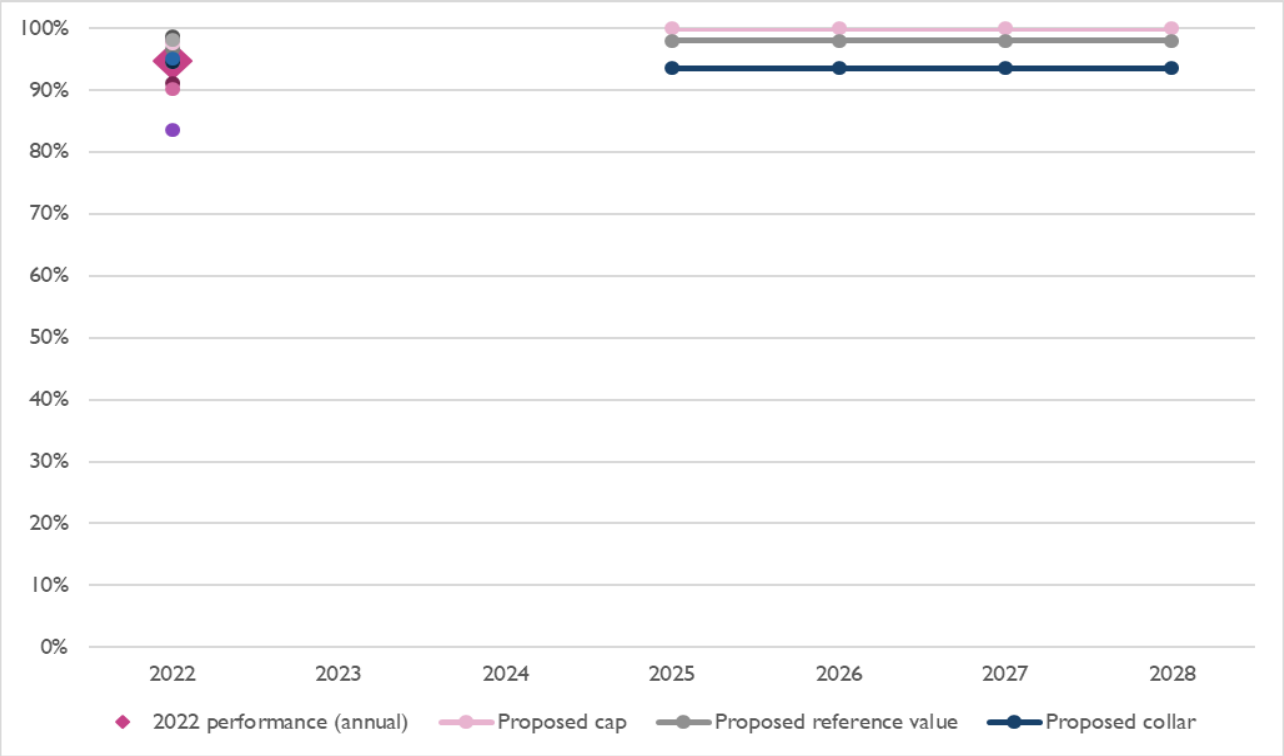
Note: 2022 dots represent performance in each month of 2022 multiplied by 12 to give an equivalent annual figure.
Source: Europe Economics analysis.

Figure 9.22: Recommended parameters for average number of days for which daily data were partly or fully missing per user per year (electricity)



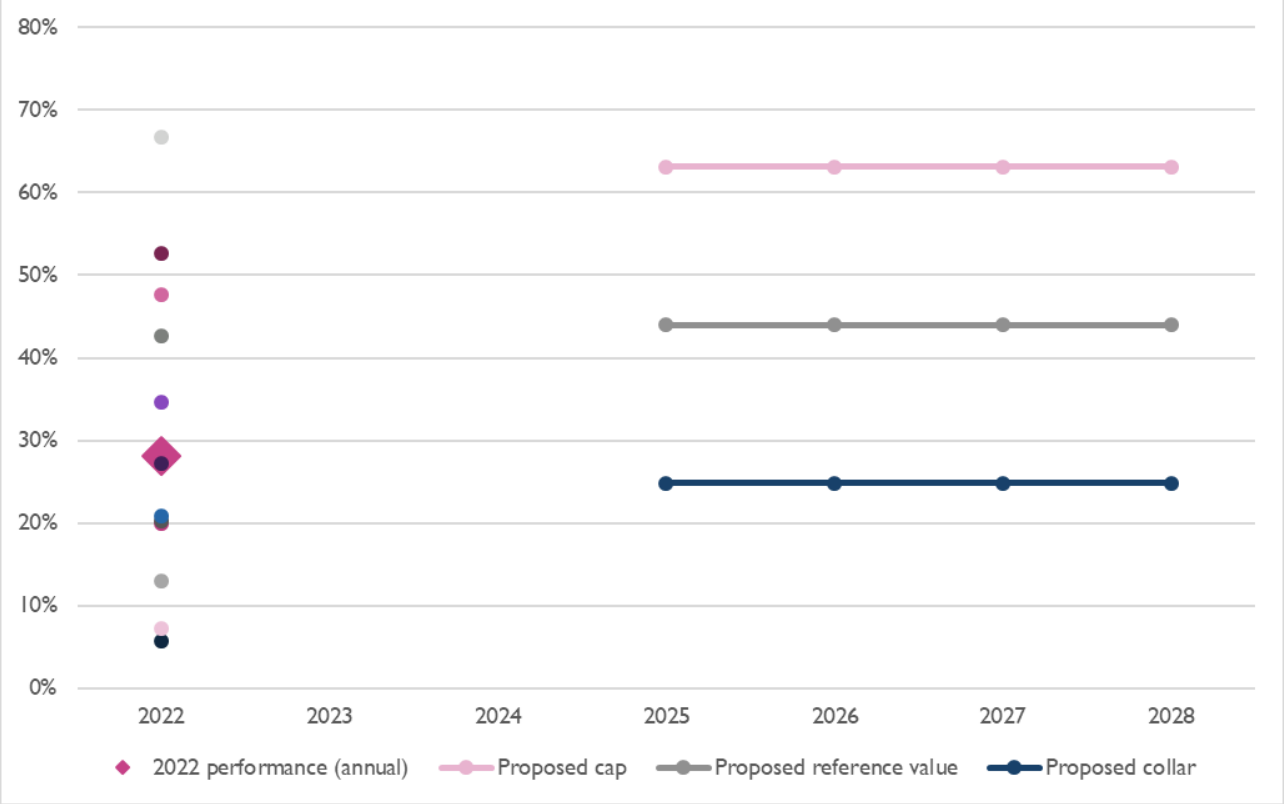
Note: 2022 dots represent performance in each month of 2022 multiplied by 12 to give an equivalent annual figure.
Source: Europe Economics analysis.

Figure 9.23: Recommended parameters for percentage of values available at Day + 1 (electricity)



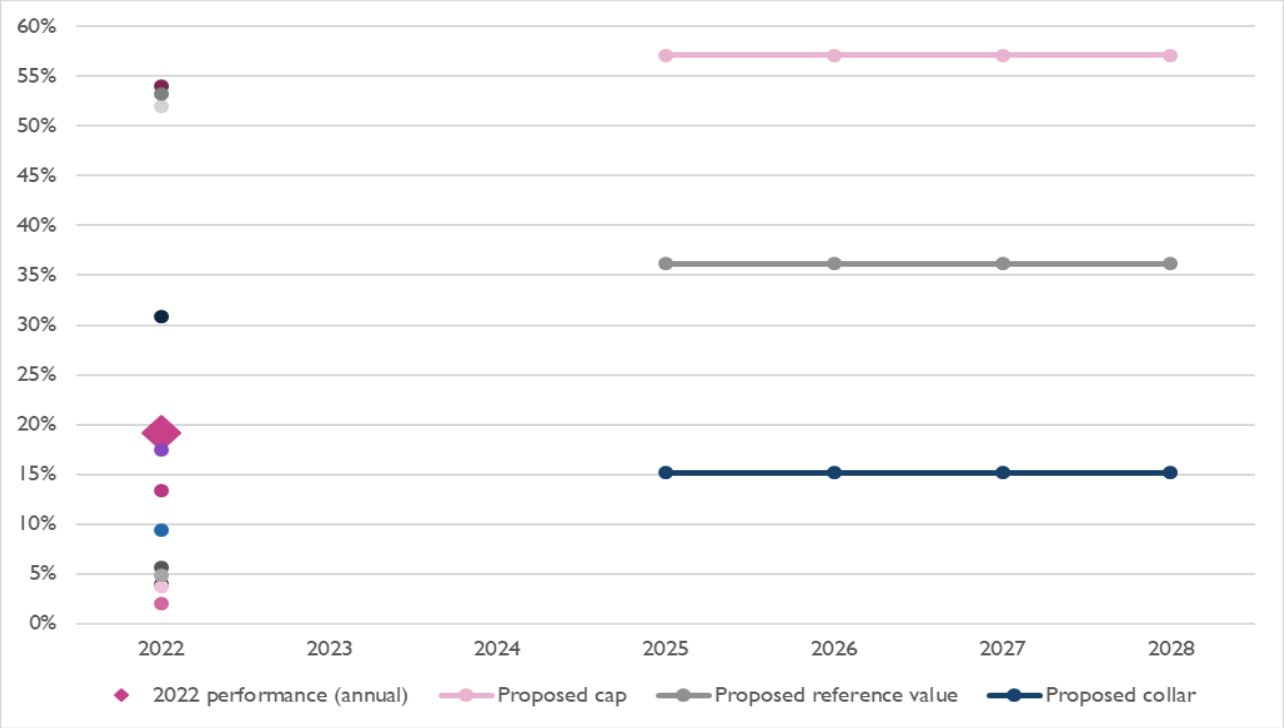
Note: 2022 dots represent performance in each month of 2022.
Source: Europe Economics analysis.

Figure 9.24: Recommended parameters for percentage of values available at Day + 2 (electricity)



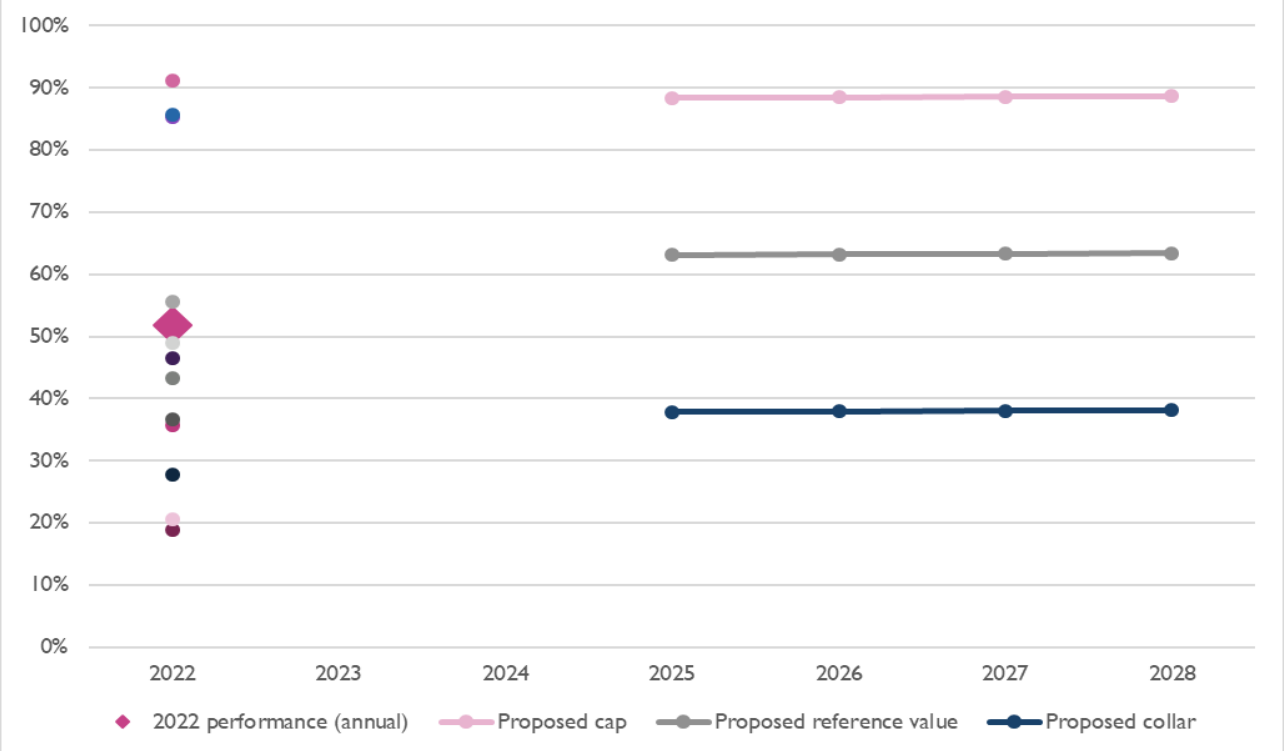
Note: 2022 dots represent performance in each month of 2022.
Source: Europe Economics analysis.

Figure 9.25: Recommended parameters for percentage of values available at Day + 3 (electricity)



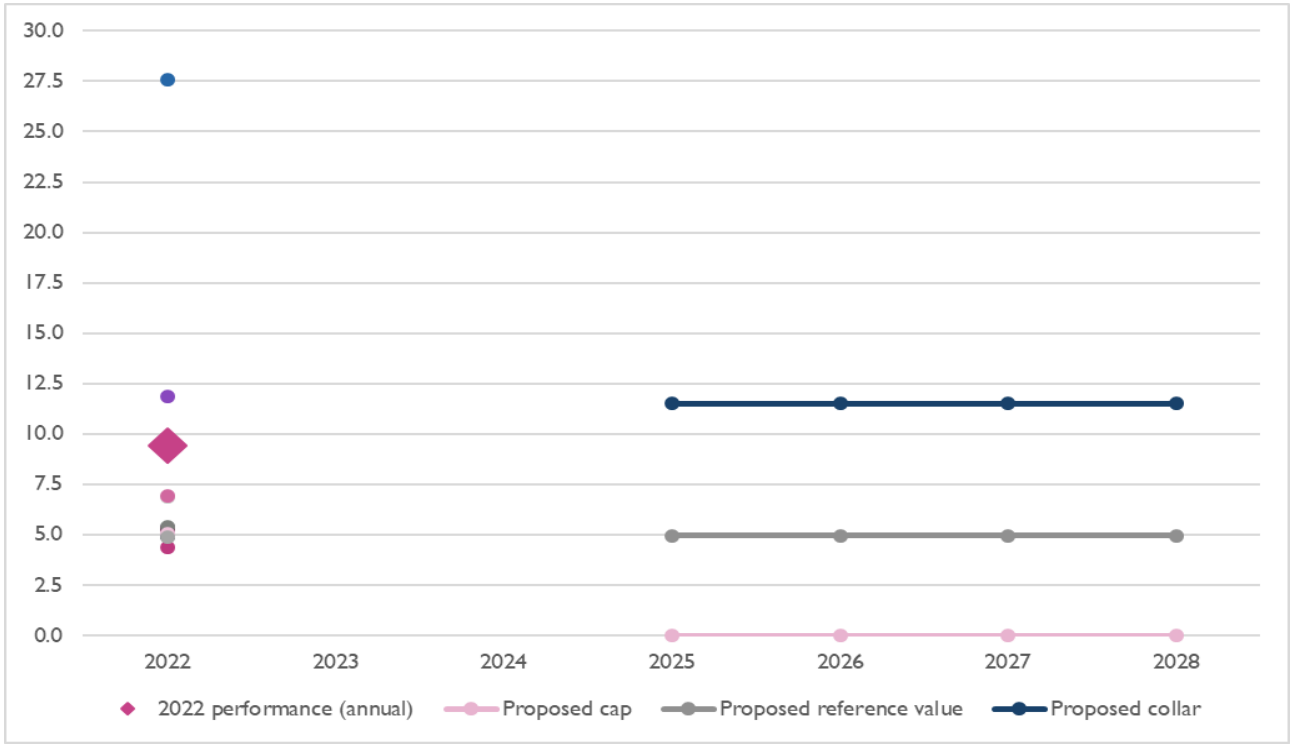
Note: 2022 dots represent performance in each month of 2022.
Source: Europe Economics analysis.

Figure 9.26: Recommended parameters for percentage of values available later than Day + 3 (electricity)



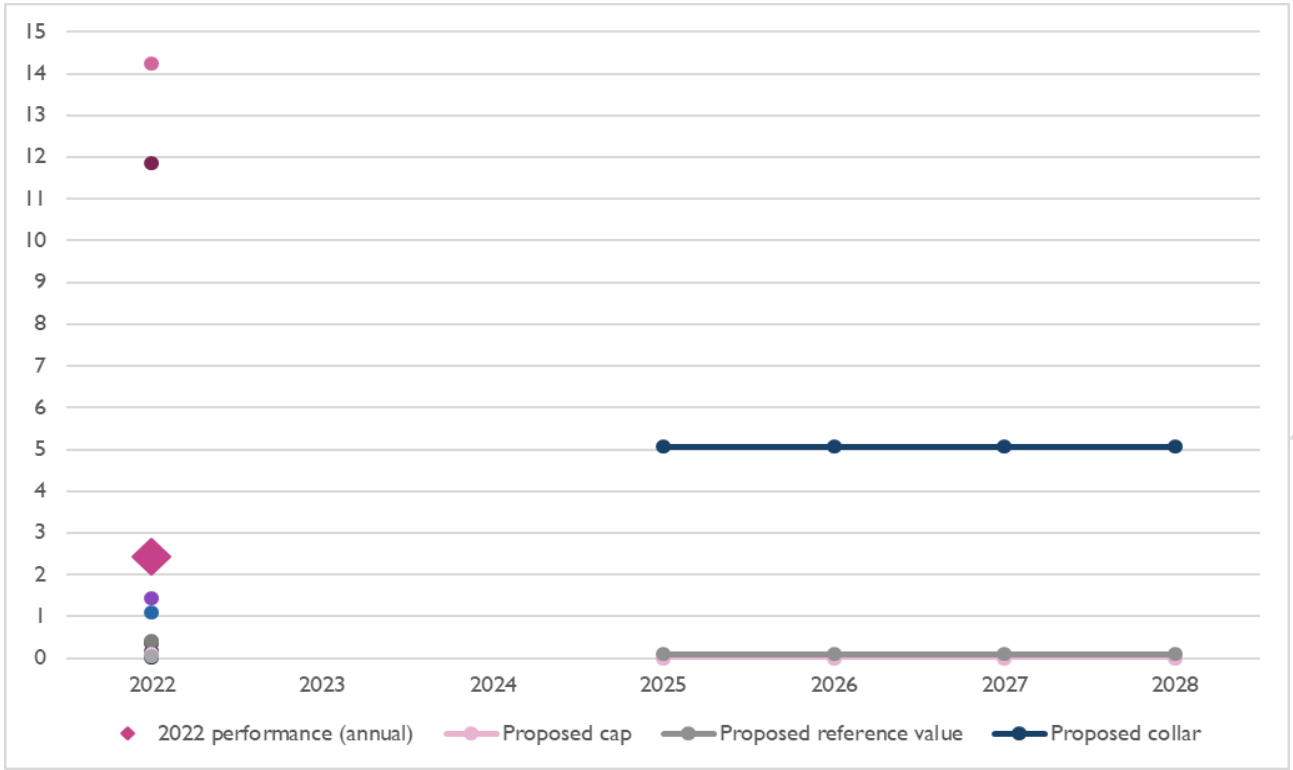
Note: 2022 dots represent performance in each month of 2022.
Source: Europe Economics analysis.

Figure 9.27: Recommended parameters for average number of days for which hourly data were partly or fully estimated per user per year (gas)



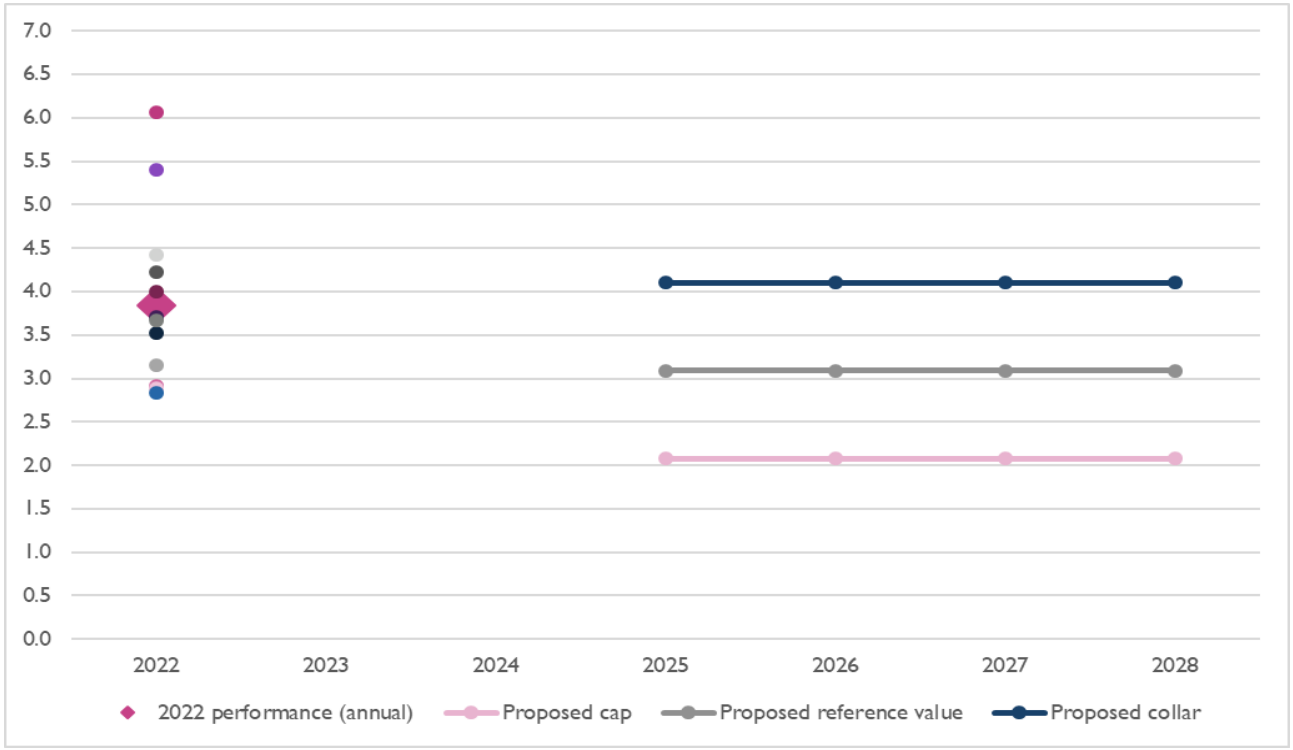
Note: 2022 dots represent performance in each month of 2022 multiplied by 12 to give an equivalent annual figure.
Source: Europe Economics analysis.

Figure 9.28: Recommended parameters for average number of days for which hourly data were partly or fully missing per user per year (gas)



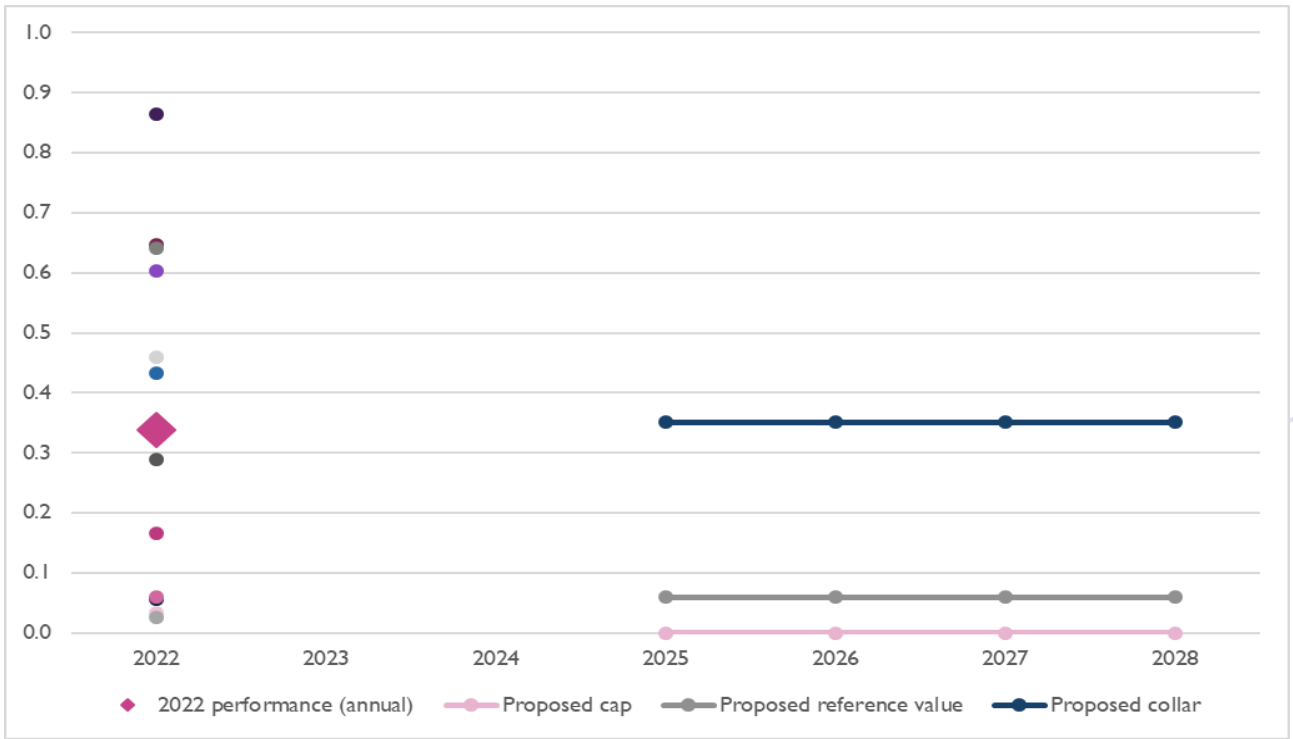
Note: 2022 dots represent performance in each month of 2022 multiplied by 12 to give an equivalent annual figure.
Source: Europe Economics analysis

Figure 9.29: Recommended parameters for average number of days for which daily data were partly or fully estimated per user per year (gas)



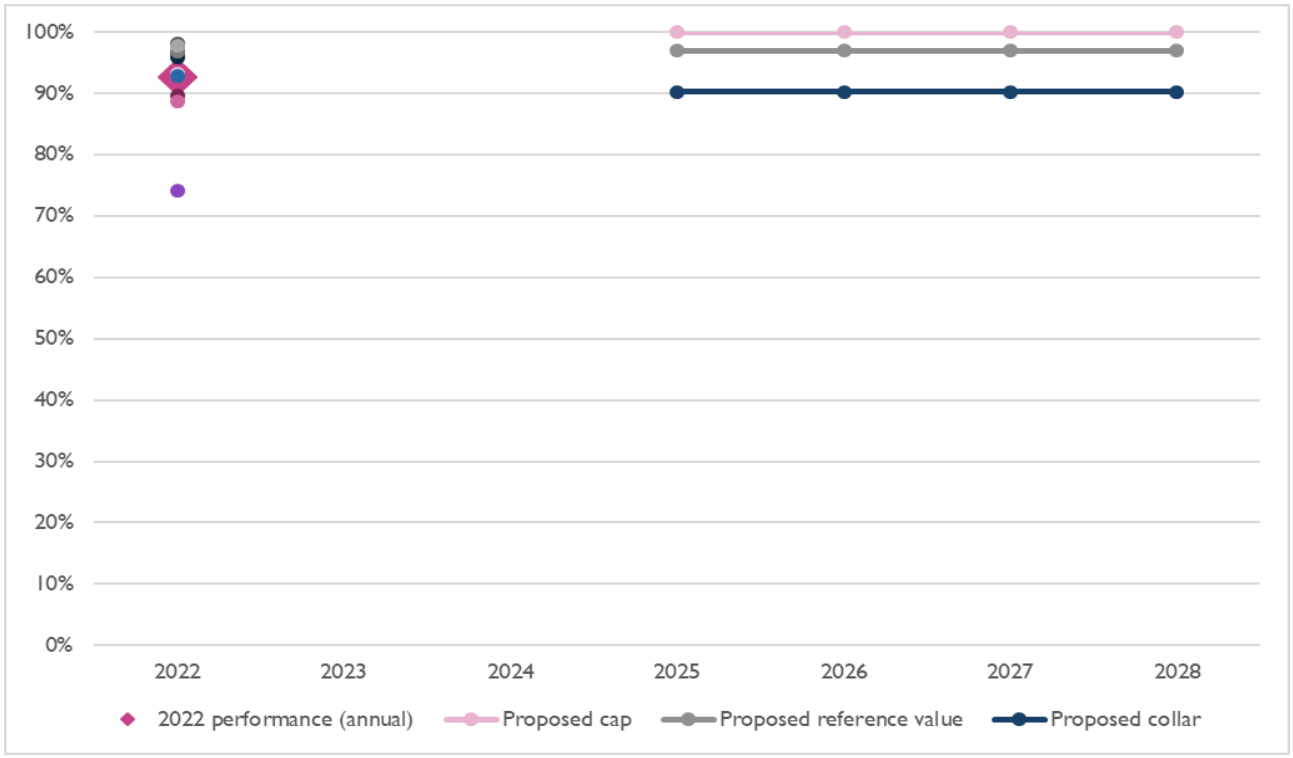
Note: 2022 dots represent performance in each month of 2022 multiplied by 12 to give an equivalent annual figure.
Source: Europe Economics analysis

Figure 9.30: Recommended parameters for average number of days for which daily data were partly or fully missing per user per year (gas)



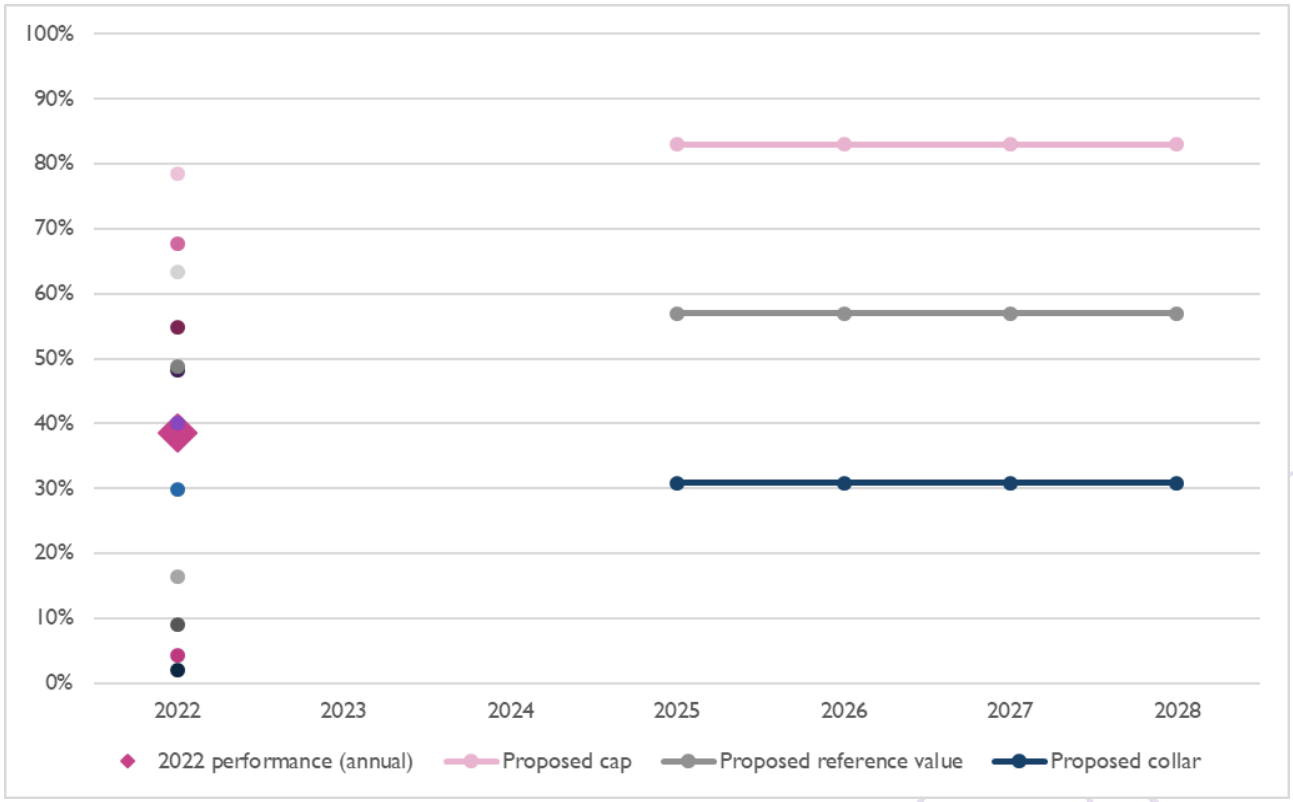
Note: 2022 dots represent performance in each month of 2022 multiplied by 12 to give an equivalent annual figure.
Source: Europe Economics analysis

Figure 9.31: Recommended parameters for percentage of values available at Day + 1 (gas)



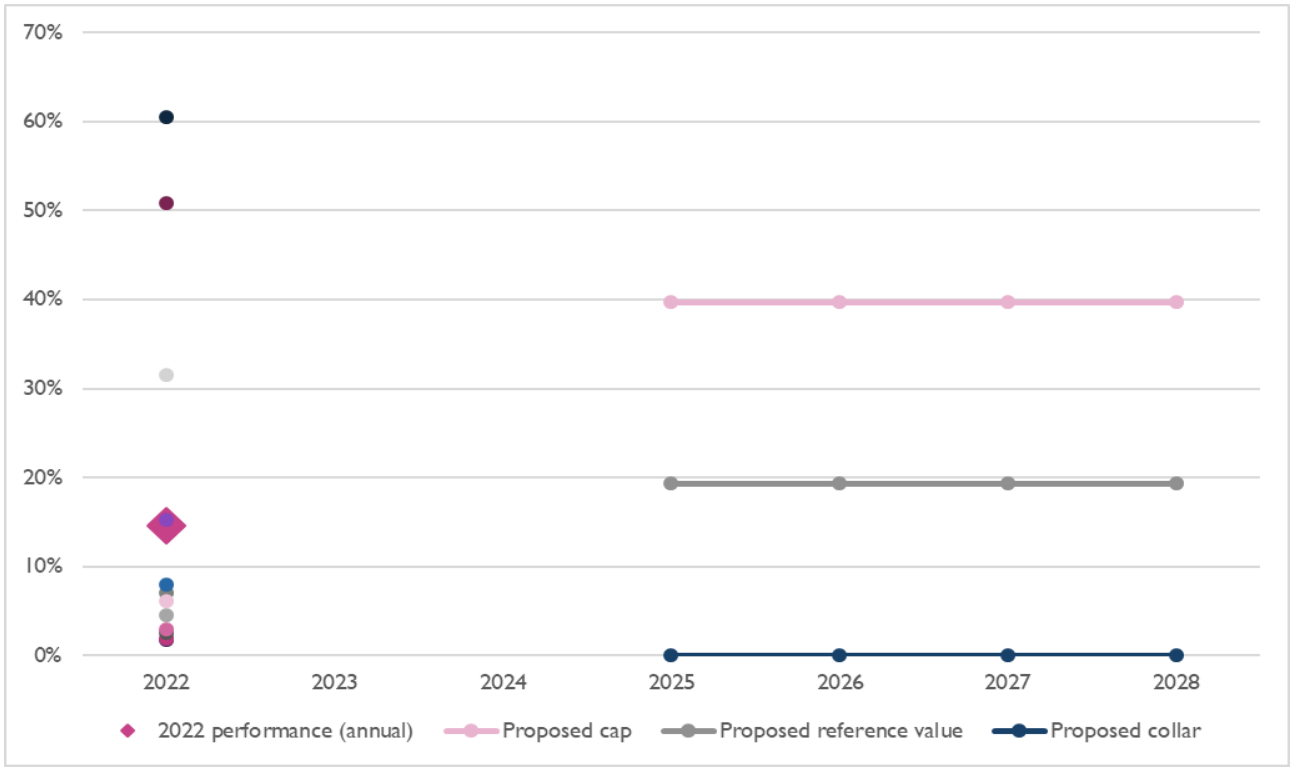
Note: 2022 dots represent performance in each month of 2022.
Source: Europe Economics analysis

Figure 9.32: Recommended parameters for percentage of values available at Day + 2 (gas)



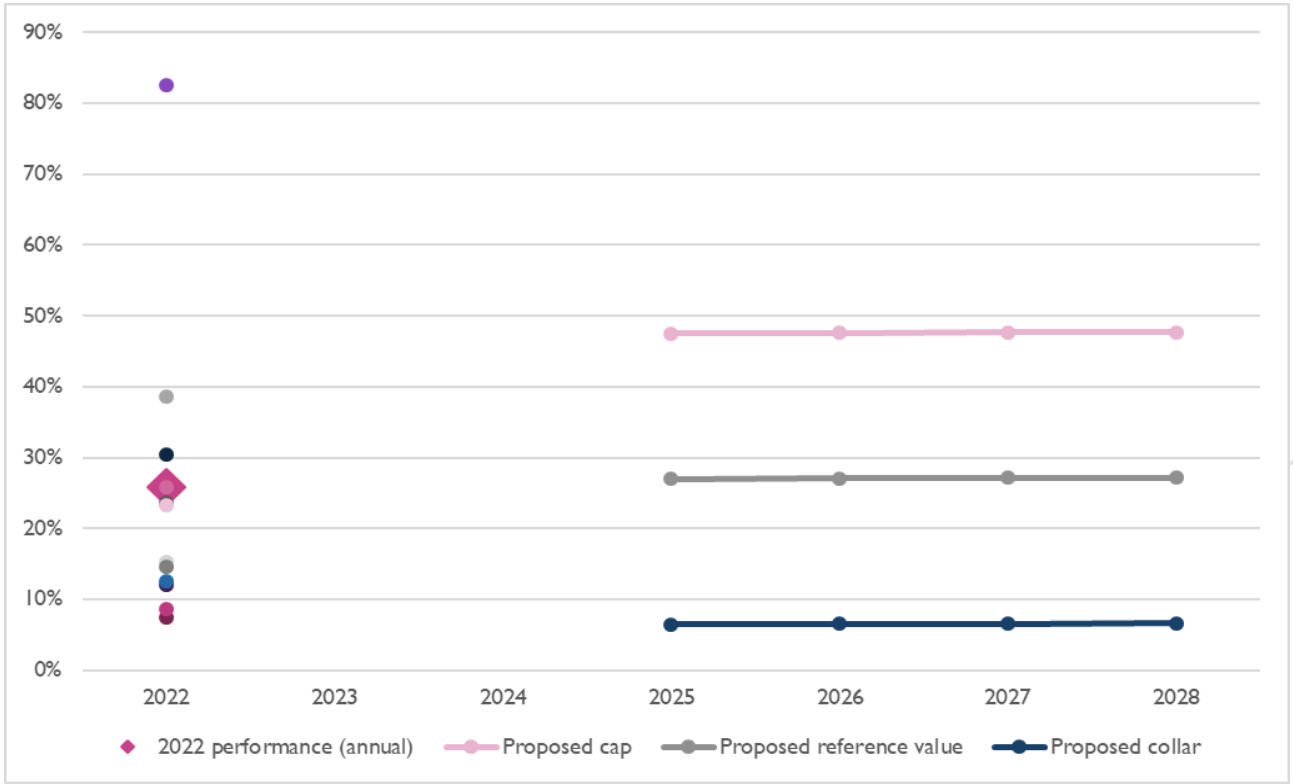
Note: 2022 dots represent performance in each month of 2022.
Source: Europe Economics analysis

Figure 9.33: Recommended parameters for percentage of values available at Day + 3 (gas)



Note: 2022 dots represent performance in each month of 2022.
Source: Europe Economics analysis

Figure 9.34: Recommended parameters for percentage of values available at later than Day + 3 (gas)



Note: 2022 dots represent performance in each month of 2022.
Source: Europe Economics analysis

10 Innovative Grid Management to Facilitate the Energy Transition

This incentive relates to innovative grid management approaches Fluvius could take to facilitate the energy transition.

10.1 Overview

The objective of this incentive is to encourage DSOs to improve grid management by adopting innovative solutions. Any innovative solutions must also facilitate the energy transition, which includes ensuring that networks can manage flows on the network as electrification increases, and enable increased distributed generation of renewable energy by providing fast connections.

As a result, this incentive will be of greater importance to electricity DSOs. Nonetheless, gas DSOs may also contribute to facilitating the energy transition, for example by finding more energy-efficient ways of transporting gas through the network.

Given the nature of this incentive, which encourages DSOs to undertake innovation projects for their regulated activities, it is challenging to define quantitative deliverables for this mechanism. Therefore, based on our framework set out in Chapter 6 above, this incentive is based on expert panel assessment.

Unlike the other four objectives for which we have developed incentive mechanisms in this study, we recommend that for this objective VREG utilises a reward-only incentive. This is because there is inherently an element of judgment involved in the expert panel's scoring, and it seems inappropriate to penalise Fluvius when they cannot be sure ex ante how the expert panel will score their innovation projects.

This incentive mechanism is not intended to be a funding mechanism for innovation. Innovation activities should continue to funded out of the allowed revenue for endogenous costs, as in the past. Hence, the financial rewards Fluvius might earn under this incentive mechanism will not be based on enabling Fluvius to recoup the costs of its innovation projects. Instead, the rewards Fluvius can potentially earn through this incentive are intended at provide an additional financial reward for successful innovation. This should strengthen the incentive on Fluvius to consider ways in which it can innovate in order to facilitate the energy transition in Flanders.

The detailed design of such an incentive involves considering a number of dimensions which includes:

- The scope of the financial incentive, which involves setting out the projects that are eligible for any financial rewards under the incentive;
- The submission process for DSOs to follow when submitting projects to be considered under this incentive;
- The governance arrangements around the expert panel involved in assessing the submissions, including its composition and decision-making rules;
- The assessment of the projects submitted by DSOs including the process and criteria used to score these projects; and
- Determining the relevant financial rewards for DSOs' performance based on the scores obtained.

Each of these dimensions are explored in detail below.

10.2 Detailed description of financial incentive

10.2.1 Scope of incentive

In defining the scope of this incentive mechanism, it is important, in our view, that the regulator does not prescribe the innovation projects that Fluvius undertakes – it should be left to Fluvius to determine the form(s) of innovation that are optimal for achieving the energy transition in Flanders. On the other hand, Fluvius should not automatically receive rewards for any and all grid-related innovation projects it chooses to undertake, as this would incentivize Fluvius to innovate unnecessarily. Therefore, it is important to specify certain criteria that innovation projects undertaken by Fluvius must meet to qualify for financial rewards under this mechanism.

We recommend that for an innovation project to qualify for financial rewards, it must:

- Clearly contribute to the energy transition – for example, by facilitating the connection and operation of renewable electricity generation, or by accommodating increased electrification at lower cost;
- Deliver significant benefits and represent value for money for electricity and/or gas consumers. This criterion is essential because it mitigates the perverse incentive that Fluvius might have to undertake sub-optimal innovation projects simply so that it can access financial rewards.
- Relate to Fluvius' core regulated activities as a distribution network company;
- Be innovative in nature, which could mean either innovative in the Flanders context (i.e. adoption of innovative solutions developed in other jurisdictions) or innovative on a global scale, with greater reward given for the latter;
- Have demonstrated success, perhaps by having passed a feasibility stage (i.e. the innovation has been proven as a concept, even if it has not yet been rolled out[143]);
- Be additional to Fluvius' business-as-usual activities, where business-as-usual includes any innovation activities that are already required by existing legislation and/or regulations; and
- Be within current Flemish legislation, which in some cases might mean that they are permitted within regulation-free zones.

Our recommended criteria for assessing projects are closely aligned with the criteria proposed by CREG in October 2023 for an incentive mechanism for innovation for the Belgian TSO Elia.[144]

Crucially, we recommend that projects should meet all of the criteria above to qualify for financial rewards. For example, projects that are innovative and have passed a feasibility stage but are not related to the energy transition should not qualify for rewards. The assessment of these criteria is discussed further in Section 10.2.4.

We further recommend that the scope of this incentive mechanism is not restricted to innovation projects Fluvius undertakes on its own. In other words, projects undertaken in collaboration with third parties should qualify for rewards. The extent of Fluvius' contribution to a collaborative innovation project would be assessed by the expert panel and factored into the amount of reward Fluvius receives, assuming the project is deemed eligible for rewards. By allowing collaborative projects, this incentive mechanism might also help

[143] Projects rolled out by Fluvius before the introduction of this financial incentive mechanism would not be eligible for rewards. Specifically, we recommend that only innovation projects that begin after VREG first formally announces its proposal to introduce an innovation incentive (i.e. at stakeholder consultation) would be eligible for rewards. Provided that projects started after this point, we do not think that they should cease to be eligible for a financial reward once they are rolled out, as this could give Fluvius a perverse incentive to delay roll-out in order to gain the financial reward first.

[144] CREG (2023) "Draft decision on the NV's innovation plan Elia Transmission Belgium for the regulatory period 2024-2027 under the incentive promoting innovation referred to in Article 26, §§ 2 and 3 of the tariff methodologies" [online]

to achieve the objective of promoting whole systems thinking, if it encourages Fluvius to collaborate with third parties within the energy system, such as the TSO. We did not recommend the whole systems objective for a financial incentive (due to difficulty in defining deliverables we recommended a reputational incentive) and therefore the possibility that it is encouraged under this incentive mechanism does not cause concerns around double counting. Allowing collaborative projects might also encourage Fluvius to seek to make use of third party sources of funding for innovation projects.

Another consideration for the scope of this objective is whether projects need to relate to innovation that can be rolled out under current Flemish legislation, or whether projects which explore approaches that would require legislative change to roll out should also be eligible for rewards. The Flemish government can establish "regulation free" or "low regulation" zones , which are otherwise not covered in Flemish legislation. Fluvius could perhaps choose to use such zones to experiment with innovative technologies not currently covered in wider regulations. To the extent that Fluvius successfully delivers benefits to the inhabitants of the regulation free zone, a reward from the panel may be justified. In all other cases, the expert panel giving Fluvius significant financial rewards for innovation that it currently could not legally implement would be inappropriate as the innovation would not be able to deliver significant benefits to consumers if wider regulations were not changed. In other words, our recommended approach would mean that an innovation project could be eligible for rewards only if the innovative solution it has developed is covered under the prevailing regulations or if it was successfully demonstrated in a regulation free zone.

10.2.2 Submission process

The process for this incentive mechanism involves Fluvius submitting innovation projects to the expert panel for assessment. We recommend that the entirety of the assessment process we set out below for this incentive (both submission of projects and the Stage 1 and Stage 2 assessments combined) should take no longer than one year.

We recommend that project submissions and assessments should occur every two years, with the first chance to submit projects being after two years of the next regulatory period (i.e. the end of 2026). This would mean there are two submission windows in the regulatory period; halfway through the period and at the end of the period. This approach allows more time for projects to be showing results, and limits the administrative burden of the incentive mechanism, compared with annual assessments.

For each project it wishes to submit, Fluvius will submit a written report to VREG setting out:

- the innovation that has been tested or implemented;
- the success that has been demonstrated by the project;
- the potential benefits and costs of rolling out the implementation across its business; and
- for projects involving innovation that has not yet been fully implemented (e.g. a successful pilot test), its forward-looking delivery plan for rolling out the innovation going forward.

All estimates and assumptions regarding delivery, costs and benefits should be grounded in robust evidence or otherwise supported by expert views and assessment.

The document may be accompanied by a presentation when deemed appropriate by the expert panel, and there would be an opportunity for the expert panel to submit follow-up questions to Fluvius to address any queries regarding the written submissions.

We recommend a limit is set on the number of projects that Fluvius can submit for assessment to avoid excessively burdening the expert panel and to encourage high-quality submissions. We recommend that for each assessment period (i.e. every two years) Fluvius may submit a maximum of 5 projects each for the electricity and gas sectors.

We also recommend that VREG states in its decision document that it is "minded to" retain this incentive mechanism in subsequent regulatory periods. This will reduce the extent to which Fluvius is incentivised to focus on shorter-term innovation projects due to the risk of longer-term projects not being rewarded because the incentive mechanism no longer exists by the time the project is ready to submit.

10.2.3 Governance arrangements for expert panel

Basing financial rewards on a qualitative assessment by an expert panel means that the governance arrangements for that expert panel need to considered carefully. We have the following recommendations in this regard:

- There are separate panels for gas and electricity.
- Each panel is composed of up to five independent sector experts and one VREG representative.
  - For the avoidance of doubt, the panel is not intended to represent stakeholders. Instead, it is to be composed of independent experts (e.g. academics, consultants).
  - The same VREG representative can sit on both panels, but the independent experts may be different given that the technical expertise required to assess innovations in each sector may vary.
- The members of each panel are appointed by VREG, following a process of consultation with Fluvius and other interested stakeholders.
  - Panel members must all be genuine experts in the field. Panel members require sufficient energy expertise to be able to assess the technical aspects of Fluvius' submissions and accurately judge the level of innovation displayed and the extent of the likely benefits to consumers.
  - The panel should include a range of skill sets (e.g. engineering, economics) to enable different aspects of Fluvius' projects to be assessed (e.g. the technical innovation, the potential costs and benefits).
  - The independence of panel members is critical. Recruiting panel members from parties with a financial interest in the Flemish energy sector would be inappropriate. To widen the pool of independent experts, VREG could consider recruiting panel members internationally.
  - Each panel member must be required to sign a conflict of interest agreement, to ensure that they are independent of any stakeholder that has a financial interest in the outcome.
  - The stakeholder consultation process that VREG undertakes when determining panel members should include all relevant stakeholders, including consumer advocacy groups.
- Each panel is chaired by one of the five independent experts, with the position rotated every two years.
  - If the panel cannot reach a consensus on the eligibility of a project for rewards, the Chair would have the casting vote
  - The Chair will moderate discussion between members when assessing the submissions
- Panel members (with the possible exception of the VREG representative) are rotated, with rotation of one member occurring after the first 2 years of the panel's existence, and two more members after the next two years. From thence onwards, panel members would be rotated on the basis that no person can serve on the panel for more than six consecutive years. By rotating panel members at different points, this policy would ensure that there is always some continuity to the panel.
- Fluvius must agree to a strict non-canvassing policy
- The panel's assessment decisions must be articulated through a published report to ensure transparency.
- The assessment decisions of the panel cannot be overruled by VREG
- VREG should provide secretarial support to panel members.

Our governance recommendations are designed to maximise the expertise, independence and transparency of the expert panel assessment.

10.2.4 Assessment of projects

We recommend the assessment of projects occurs in two stages. The first stage would determine if projects meet the minimum criteria to be eligible for rewards. The second stage would then calculate a numerical score for the overall set of eligible projects, which would be used to determine an overall financial reward for Fluvius.

Stage 1

In the Stage 1 assessment, each panel member would review Fluvius' submission and determine if they consider it a project that is eligible for financial rewards, based on the scope of the incentive mechanism set out in Section 10.2.1. Panel members are permitted to submit clarifying questions to Fluvius and have the option to seek advice from industry representatives where it can provide additional insight into a project's eligibility.

The panel would then convene to discuss and vote on whether each project meets the eligibility criteria. The outcome of the vote would be based on a simple majority, and in the event of a tie the Panel Chair would have the casting vote. If the outcome of the vote is that the project fails to meet the eligibility criteria, the project would be rejected from being considered for financial rewards, and would not be assessed in Stage 2. The panel would set out its reasoning for rejecting the project in its published report, indicating which criterion or criteria the project was deemed to fail to meet.

Stage 2

Projects that pass the Stage 1 assessment would move on to the Stage 2 assessment. In Stage 2, each panel member would assess the overall package of projects that were successful in Stage 1, using the following evaluation criteria:

- The innovativeness of the projects. Projects that are innovative at an international level would receive higher scores than projects that replicate innovation from other countries, though the latter may still deserve to be rewarded.
- The scale of the potential net benefits of the innovation, including the extent to which it facilitates the energy transition. The reward for the package of projects cannot be greater than the net benefits to consumers and the environment.
- The degree of success evidenced by the project. A project that has already been successfully rolled out across the business would receive a higher score than a project which had simply completed a successful pilot study.
- The quality of the plan for rolling out the innovation across Fluvius' network business going forward (in cases where the innovation has not already been rolled out across the business).

We do not prescribe how much weight panel members assign to each criterion, as we consider that the panel will need flexibility to assess how much weight should be placed on each criterion in the light of the characteristics of the innovation projects that Fluvius has put forward. For example, a transformative innovation that has the potential to dramatically reduce the costs of the energy transition may quality for a high score, even if so far it has only been demonstrated through a successful pilot study.

We also do not recommend that panel members score projects individually and then calculate an average across projects, because this would not capture the overall strength of Fluvius' performance. Taking an average across projects would mean that a group of two projects that both scored a nine would be assessed more favourably than a group of six projects that all scored an eight, when the latter package might be worthy of higher rewards than the former given the total potential benefits of the group of projects.

Instead, we recommend each panel member scores the overall package of projects that pass Stage 1 on a numerical scale of 1-10, on the basis of their overall view of how well the package of projects meet the above

criteria. The scorecard below sets out how the scores of 1 and 10 should be defined, with panel members reaching a judgment on where the overall package of projects sits.

Figure 10.1: Scorecard for Phase 2 assessment of overall package of innovation projects

Score out of 10	Explanation for score for overall package of projects
9-10	• The package demonstrates transformative innovation, even by international standards. • The innovations within the package have a clear, well-evidenced and very large positive impact on the progress of the green transition in Flanders. • The innovations within the package have clear, well-evidenced and very large net benefits to network users and the environment. • The projects within the package are well developed, with success clearly demonstrated, implementation under way (or complete) and a detailed and convincing plan for how any further roll-out across Flanders will be carried out.
7-8	• The package demonstrates transformative innovation for the energy sector in Flanders. • The innovations within the package have a clear, well-evidenced and very large positive impact on the progress of the green transition in Flanders. • The innovations within the package have clear, well-evidenced and very large net benefits to network users and the environment. • The projects within the package are well developed, with success clearly demonstrated, implementation under way (or complete) and a detailed and convincing plan for how any further roll-out across Flanders will be carried out.
5-6	• The package demonstrates a strong level of innovation for the energy sector in Flanders. • The innovations within the package have a clear and well-evidenced significant positive impact on the progress of the green transition in Flanders. • The innovations within the package have clear and well-evidenced significant net benefits to network users and the environment. • The projects within the package are reasonably well developed, with success clearly demonstrated and implementation either under way or with a detailed and convincing plan for how implementation will be carried out.
3-4	• The package demonstrates a moderate degree of innovation for the energy sector in Flanders. • The innovations within the package are shown to have a moderately positive impact on the progress of the green transition in Flanders. • The innovations within the package are shown to bring moderate net benefits to network users and the environment. • Success of the projects are well demonstrated on a small scale, with some evidence of a convincing plan for further implementation across Flanders.
1-2	• The package demonstrates only a small amount of innovation for the energy sector in Flanders. • The innovations within the package are shown to have only a small positive impact on the progress of the green transition in Flanders. • The innovations within the package are shown to bring only small net benefits to network users and the environment. • Success of the projects are well demonstrated on a small scale, with little evidence of a convincing plan for further implementation across Flanders.

Source: Europe Economics

As in Stage 1, panel members would be able to send clarifying questions to Fluvius and seek advice from industry representative to inform their scoring. Panel members would meet to discuss their scores and would have the opportunity to revise their scores taking account of the panel discussion.

The average score out of 10 across the panel members would then be calculated, and this would form the basis for the financial rewards.

10.2.5 Determining the financial rewards

As discussed in Section 10.1, this incentive mechanism is a reward-only mechanism. No financial penalties will be incurred by Fluvius under this mechanism.

In section 8.2 above, we recommended that for both electricity and gas the total revenue at risk for this incentive is 0.5 per cent of the total allowed revenue for endogenous costs for each sector. This means that the maximum reward Fluvius can earn in each sector is equal to 0.5 per cent of total allowed revenue for endogenous costs for the previous two years (as the assessment only happens every two years).

The financial rewards are directly based on the scores decided in the Stage 2 assessment. Therefore, a score of ten in Stage 2 would mean that Fluvius earns the maximum reward. A score of one in Stage 2 would mean a reward of one tenth of the maximum reward. The amount of reward would progress linearly between one and ten (e.g. a score of five in Stage 2 would mean a reward of half the maximum).

10.3 Summary of mechanism

The incentive mechanism for Innovative Grid Management to Facilitate the Energy Transition would use expert panels to assess Fluvius' performance against the objective for electricity and gas separately. The expert panels would be comprised of up to five independent industry experts and a representative from VREG, with panel membership determined by VREG following a stakeholder consultation process. Panel members would be selected on the basis of their expertise in the field and their impartiality. We have set out our recommendations for robust governance arrangements to be put in place to ensure the transparency and independence of the assessment process.

Every two years, starting at the end of 2026, Fluvius can submit innovation projects to the panel for assessment. We recommend that no more than five projects can be submitted for each assessment period for each sector, electricity and gas. To be eligible for rewards projects must be innovative, contribute towards the energy transition, demonstrate success, deliver significant benefits and go beyond Fluvius' business-as-usual activities. We recommend projects undertaken in collaboration with third parties are included in the scope of this mechanism, as are projects that would require legislative change to implement (providing the benefits of the innovation are large enough to justify such legislative change).

The panel will assess projects in two stages. Stage 1 assesses the eligibility of projects for rewards, based on the eligibility criteria. Stage 2 will then assign a numerical score of 1-10 to the overall package of eligible projects, based on criteria set out above. The average score from the panel will then be used to determine financial rewards for Fluvius.

Appendix

Europe Economics

Appendix 1: Summary of Recommended Parameters for Incentives based on Quantitative Metrics

In this appendix we set out the detailed parameters (reference values, caps and collars and unit incentive rates[145]) that we recommend for each year of the next regulatory period for all deliverables that are based on quantitative metrics, namely:

- Ensuring security of supply;
- Providing a good connections service;
- Enhancing customer satisfaction; and
- Providing smart metering information.

Ensuring security of supply (electricity)

Table A1.1: Recommended parameters for medium voltage interruption frequency (per network user)

	2025	2026	2027	2028
Cap	0.0936	0.0773	0.0610	0.0447
Reference value	0.2114	0.1951	0.1788	0.1625
Collar	0.3293	0.3130	0.2966	0.2803

Source: Europe Economics analysis.

Table A1.2: Recommended parameters for medium voltage interruption duration (hours:minutes:seconds)

	2025	2026	2027	2028
Cap	00:23:24	00:23:24	00:23:24	00:23:24
Reference value	00:31:41	00:31:41	00:31:41	00:31:41
Collar	00:39:58	00:39:58	00:39:58	00:39:58

Source: Europe Economics analysis.

[145] One of the inputs into the calculation of unit incentive rates is the total allowed income for endogenous costs in the first year of the price control. As this is not known for certain at this point, the figures for unit incentive rates in this report are only approximate. Final figures for unit incentive rates will therefore need to be calculated by VREG when it knows the final figure for total allowed income for endogenous costs in the first year of the price control.

Table A1.3: Recommended parameters for low voltage interruption frequency (per network user)

	2025	2026	2027	2028
Cap	0.0149	0.0149	0.0149	0.0149
Reference value	0.0370	0.0370	0.0370	0.0370
Collar	0.0591	0.0591	0.0591	0.0591

Source: Europe Economics analysis.

Table A1.4: Recommended parameters for low voltage interruption duration (hours:minutes:seconds)

	2025	2026	2027	2028
Cap	01:56:23	01:56:23	01:56:23	01:56:23
Reference value	02:40:13	02:40:13	02:40:13	02:40:13
Collar	03:24:04	03:24:04	03:24:04	03:24:04

Source: Europe Economics analysis.

Table A1.5: Incentive rates for electricity interruptions

	Units	Incentive rate (€m)
Medium voltage - interruption frequency	Per 0.01 interruption	0.69
Medium voltage - interruption duration	Per minute interruption	0.81
Low voltage - interruption frequency	Per 0.01 interruption	1.58
Low voltage - interruption duration	Per minute interruption	0.07

Source: Europe Economics analysis.

Ensuring security of supply (gas)

Table A1.6: Recommended parameters for medium pressure interruption frequency (per 1,000 network users)

	2025	2026	2027	2028
Cap	0.000	0.000	0.000	0.000
Reference value	0.000	0.000	0.000	0.000
Collar	0.0394	0.0394	0.0394	0.0394

Source: Europe Economics analysis.

Table A1.7: Recommended parameters for medium pressure interruption duration (hours:minutes:seconds)

	2025	2026	2027	2028
Cap	00:00:00	00:00:00	00:00:00	00:00:00
Reference value	00:00:00	00:00:00	00:00:00	00:00:00
Collar	01:07:58	01:07:58	01:07:58	01:07:58

Source: Europe Economics analysis.

Table A1.8: Recommended parameters for low pressure interruption frequency (per 1,000 network users)

	2025	2026	2027	2028
Cap	0.3632	0.2574	0.1515	0.0457
Reference value	0.6797	0.5739	0.4681	0.3622
Collar	0.9963	0.8905	0.7846	0.6788

Source: Europe Economics analysis.

Table A1.9: Recommended parameters for low pressure interruption duration (hours:minutes:seconds)

	2025	2026	2027	2028
Cap	01:08:27	01:08:27	01:08:27	01:08:27
Reference value	01:33:00	01:33:00	01:33:00	01:33:00
Collar	01:57:33	01:57:33	01:57:33	01:57:33

Source: Europe Economics analysis.

Table A1.10: Incentive rates for gas interruptions

	Unit	Incentive rate (€m)
Medium pressure - interruption frequency	Per 0.01 interruption	0.099
Medium pressure - interruption duration	Per minute interruption	0.005
Low pressure - interruption frequency	Per 0.01 interruption	0.005
Low pressure - interruption duration	Per minute interruption	0.006

Source: Europe Economics analysis.

Providing a good connections service (electricity)

Table A1.11: Recommended parameters for low power connection quotations (% of quotations made within applicable deadlines)

	2025	2026	2027	2028
Cap	100.00%	100.00%	100.00%	100.00%
Reference value	90.96%	90.96%	90.96%	90.96%
Collar	78.97%	78.97%	78.97%	78.97%

Source: Europe Economics analysis.

Table A1.12: Recommended parameters for high and very high power connection quotations (% of quotations made within applicable deadlines)

	2025	2026	2027	2028
Cap	100.00%	100.00%	100.00%	100.00%
Reference value	88.57%	88.57%	88.57%	88.57%
Collar	61.15%	61.15%	61.15%	61.15%

Source: Europe Economics analysis.

Table A1.13: Recommended parameters for low power connections (% of connections made within applicable deadlines)

	2025	2026	2027	2028
Cap	100.00%	100.00%	100.00%	100.00%
Reference value	86.16%	89.73%	93.30%	96.87%
Collar	57.72%	61.28%	64.85%	68.42%

Source: Europe Economics analysis.

Table A1.14: Recommended parameters for high and very high power connections (% of connections made within applicable deadlines)

	2025	2026	2027	2028
Cap	100.00%	100.00%	100.00%	100.00%
Reference value	92.58%	92.58%	92.58%	92.58%
Collar	64.99%	64.99%	64.99%	64.99%

Source: Europe Economics analysis.

Table A1.15: Incentive rates for electricity connections (€m per percentage point change)

	Incentive rate
Connection quotations on time - low power	0.14
Connection quotations on time - high and very high power	0.01
Connections on time - low power	0.14
Connections on time - high and very high power	0.02

Source: Europe Economics analysis.

Providing a good connections service (gas)

Table A1.16: Recommended parameters for low power connection quotations (% of quotations made within applicable deadlines)

	2025	2026	2027	2028
Cap	100.00%	100.00%	100.00%	100.00%
Reference value	90.52%	90.52%	90.52%	90.52%
Collar	78.84%	78.84%	78.84%	78.84%

Source: Europe Economics analysis.

Table A1.17: Recommended parameters for high and very high power connection quotations (% of quotations made within applicable deadlines)

	2025	2026	2027	2028
Cap	95.87%	95.87%	95.87%	95.87%
Reference value	91.41%	91.41%	91.41%	91.41%
Collar	86.96%	86.96%	86.96%	86.96%

Source: Europe Economics analysis.

Table A1.18: Recommended parameters for low power connections (% of connections made within applicable deadlines)

	2025	2026	2027	2028
Cap	100.00%	100.00%	100.00%	100.00%
Reference value	85.99%	90.04%	94.10%	98.15%
Collar	52.22%	56.27%	60.32%	64.38%

Source: Europe Economics analysis.

Table A1.19: Recommended parameters for high and very high power connections (% of connections made within applicable deadlines)

	2025	2026	2027	2028
Cap	100.00%	100.00%	100.00%	100.00%
Reference value	93.16%	93.16%	93.16%	93.16%
Collar	71.81%	71.81%	71.81%	71.81%

Source: Europe Economics analysis.

Table A1.20: Incentive rates for gas connections (€m per percentage point change)

	Incentive rate
Connection quotations on time - low power	0.026
Connection quotations on time - high and very high power	0.001
Connections on time - low power	0.021
Connections on time - high and very high power	0.001

Source: Europe Economics analysis.

Enhancing customer satisfaction

Table A1.21: Recommended parameters for customer satisfaction for electricity (composite satisfaction score out of 5)

	2025	2026	2027	2028
Cap	4.2	4.2	4.2	4.2
Reference value	3.8	3.8	3.8	3.8
Collar	3.4	3.4	3.4	3.4

Source: Europe Economics analysis.

Table A1.22: Recommended parameters for customer satisfaction for gas (composite satisfaction score out of 5)

	2025	2026	2027	2028
Cap	4.3	4.3	4.3	4.3
Reference value	3.9	3.9	3.9	3.9
Collar	3.4	3.4	3.4	3.4

Source: Europe Economics analysis.

Table A1.23: Incentive rates for customer satisfaction (€m/ 0.1 change in score)

	Incentive rate
Customer satisfaction - electricity	1.50
Customer satisfaction - gas	0.78

Source: Europe Economics analysis.

Providing smart metering information (electricity)

Completeness

Table A1.24: Recommended parameters for average number of days for which quarter-hourly data were partly or fully estimated per user per year

	2025	2026	2027	2028
Cap	0.0000	0.0000	0.0000	0.0000
Reference value	1.5556	1.5556	1.5556	1.5556
Collar	4.7059	4.7059	4.7059	4.7059

Source: Europe Economics analysis.

Table A1.25: Recommended parameters for average number of days for which quarter-hourly data were partly or fully missing per user per year

	2025	2026	2027	2028
Cap	0.0000	0.0000	0.0000	0.0000
Reference value	0.9878	0.9878	0.9878	0.9878
Collar	5.6957	5.6957	5.6957	5.6957

Source: Europe Economics analysis.

Table A1.26: Recommended parameters for average number of days for which daily data were partly or fully estimated per user per year

	2025	2026	2027	2028
Cap	0.0000	0.0000	0.0000	0.0000
Reference value	1.3227	1.3227	1.3227	1.3227
Collar	3.1490	3.1490	3.1490	3.1490

Source: Europe Economics analysis.

Table A1.27: Recommended parameters for average number of days for which daily data were partly or fully missing per user per year

	2025	2026	2027	2028
Cap	0.0000	0.0000	0.0000	0.0000
Reference value	0.0508	0.0508	0.0508	0.0508
Collar	0.3270	0.3270	0.3270	0.3270

Source: Europe Economics analysis.

Timeliness

Table A1.28: Recommended parameters for percentage of values available at Day + 1 (%)

	2025	2026	2027	2028
Cap	100.00	100.00	100.00	100.00
Reference value	98.03	98.03	98.03	98.03
Collar	93.57	93.57	93.57	93.57

Source: Europe Economics analysis.

Table A1.29: Recommended parameters for percentage of values available at Day + 2 (%)

	2025	2026	2027	2028
Cap	63.11	63.11	63.11	63.11
Reference value	43.95	43.95	43.95	43.95
Collar	24.79	24.79	24.79	24.79

Source: Europe Economics analysis.

Table A1.30: Recommended parameters for percentage of values available at Day + 3 (%)

	2025	2026	2027	2028
Cap	57.11	57.11	57.11	57.11
Reference value	36.13	36.13	36.13	36.13
Collar	15.16	15.16	15.16	15.16

Source: Europe Economics analysis.

Table A1.31: Recommended parameters for percentage of values available later than Day + 3 (%)

	2025	2026	2027	2028
Cap	88.32	88.43	88.54	88.65
Reference value	63.06	63.17	63.28	63.39
Collar	37.80	37.91	38.01	38.12

Source: Europe Economics analysis.

Providing smart metering information (gas)

Completeness

Table A1.32: Recommended parameters for average number of days for which quarter-hourly data were partly or fully estimated per user per year

	2025	2026	2027	2028
Cap	0.0000	0.0000	0.0000	0.0000
Reference value	4.9505	4.9505	4.9505	4.9505
Collar	11.5019	11.5019	11.5019	11.5019

Source: Europe Economics analysis.

Table A1.33: Recommended parameters for average number of days for which quarter-hourly data were partly or fully missing per user per year

	2025	2026	2027	2028
Cap	0.0000	0.0000	0.0000	0.0000
Reference value	0.1006	0.1006	0.1006	0.1006
Collar	5.0612	5.0612	5.0612	5.0612

Source: Europe Economics analysis.

Table A1.34: Recommended parameters for average number of days for which daily data were partly or fully estimated per user per year

	2025	2026	2027	2028
Cap	2.0787	2.0787	2.0787	2.0787
Reference value	3.0895	3.0895	3.0895	3.0895
Collar	4.1003	4.1003	4.1003	4.1003

Source: Europe Economics analysis.

Table A1.35: Recommended parameters for average number of days for which daily data were partly or fully missing per user per year

	2025	2026	2027	2028
Cap	0.0000	0.0000	0.0000	0.0000
Reference value	0.0597	0.0597	0.0597	0.0597
Collar	0.3507	0.3507	0.3507	0.3507

Source: Europe Economics analysis.

Timeliness

Table A1.36: Recommended parameters for percentage of values available at Day + 1 (%)

	2025	2026	2027	2028
Cap	100.00	100.00	100.00	100.00
Reference value	97.01	97.01	97.01	97.01
Collar	90.31	90.31	90.31	90.31

Source: Europe Economics analysis.

Table A1.37: Recommended parameters for percentage of values available at Day + 2 (%)

	2025	2026	2027	2028
Cap	83.01	83.01	83.01	83.01
Reference value	56.94	56.94	56.94	56.94
Collar	30.88	30.88	30.88	30.88

Source: Europe Economics analysis.

Table A1.38: Recommended parameters for percentage of values available at Day + 3 (%)

	2025	2026	2027	2028
Cap	39.70	39.70	39.70	39.70
Reference value	19.33	19.33	19.33	19.33
Collar	0.00	0.00	0.00	0.00

Source: Europe Economics analysis.

Table A1.39: Recommended parameters for percentage of values available later than Day + 3 (%)

	2025	2026	2027	2028
Cap	47.52	47.58	47.65	47.72
Reference value	26.99	27.06	27.12	27.19
Collar	6.46	6.53	6.59	6.66

Source: Europe Economics analysis.