APPENDIX 2

Regulation methods in the fourth regulatory period of 1 January 2016 – 31 December 2019 and the fifth regulatory period of 1 January 2020 – 31 December 2023

Electricity transmission network operations

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1 REGULATORY METHODS – SUMMARY

In this document, the Energy Authority ("the Authority") sets out methods for regulating the reasonableness in pricing of electricity network operations for 2016–2023. These methods apply to transmission system operators (TSOs).

The Authority will confirm the final regulation methods to the TSO as an appendix to the confirmation decision by the end of 2015.

The guidelines have been drawn up by government officials in the Energy Authority. The principles governing the choices presented in this document are derived especially from the following legislation:

- Act on the Supervision of the Electricity and Natural Gas Market (Laki sähkö- ja maakaasumarkkinoiden valvonnasta, 590/2013, "Supervision Act")
- Electricity Market Act (588/2013)
- Government Proposal to Parliament on Legislation on the Electricity and Gas Markets (Hallituksen esitys eduskunnalle sähkö- ja maakaasumarkkinoita koskevaksi lainsäädännöksi, HE 20/2013 vp)
- Commerce Committee's report (talousvaliokunnan mietintö, TaVM 17/2013 vp)
- Other regulations issued under the Electricity Market Act

The Energy Authority has also considered decisions by the Market Court and the Supreme Administrative Court on complaints concerning previous regulation methods.

In the development of the regulation methods, the Authority has also drawn on the practical experience it has gained from regulation.

Moreover, the Authority has used expert reports and statements as background material in the preparation of guidelines and regulation methods. These are listed in the references.

In preparing the guidelines and the regulation methods for regulation decisions, the Authority has consulted TSOs extensively. In 2014 and 2015, the Energy Authority organised more than sixty public hearings with TSOs and stakeholders.

1.1 SUMMARY OF THE REGULATION METHODS

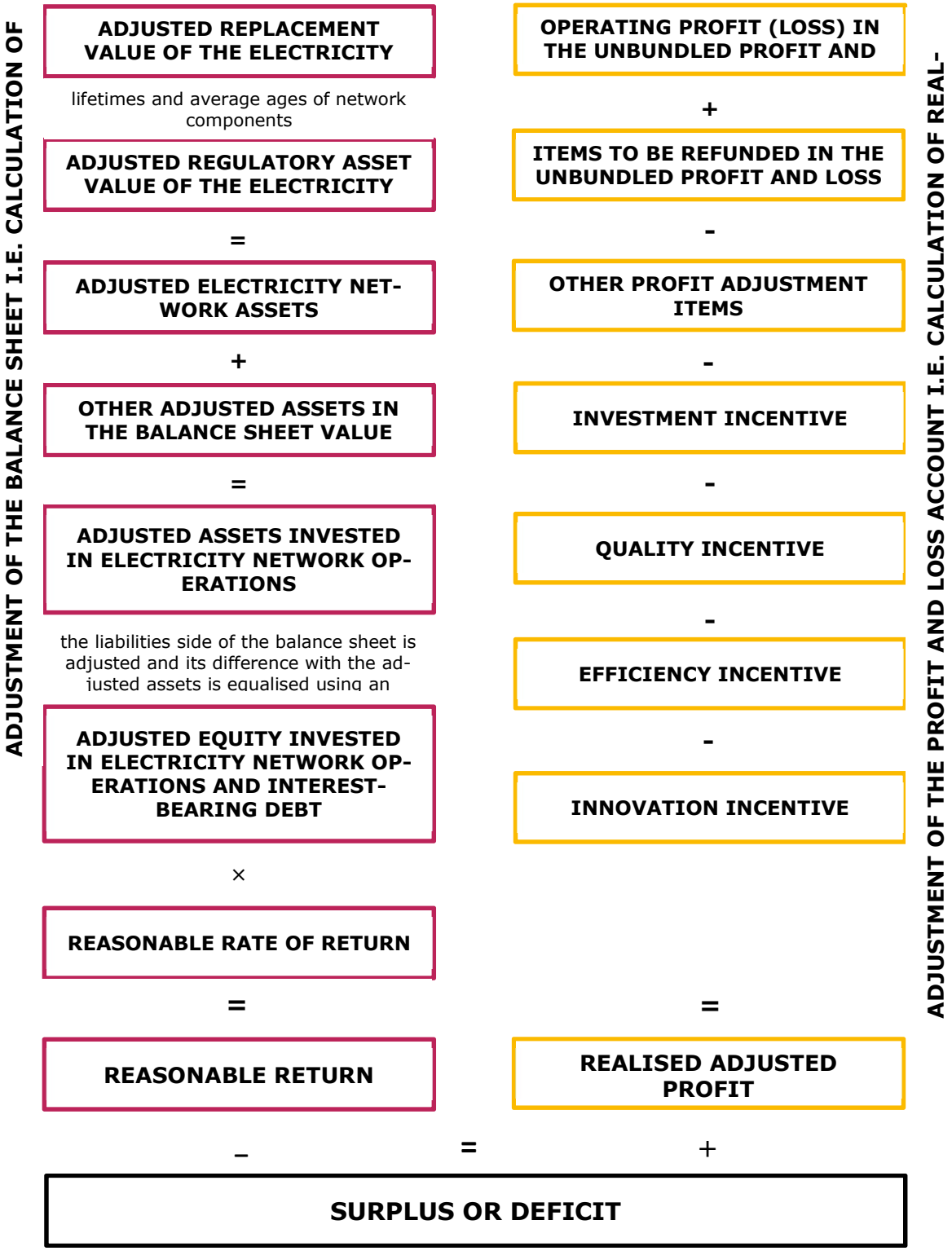

Figure 1. *Regulation methods during the regulatory periods 2016–2019 and 2020–2023*

The regulation methods consist of several different methods, which together form the entity presented in Figure 1. This entity is used to regulate the reasonableness of the pricing of network operations. All individual methods are described in this document.

Methods of calculating the adjustment of the balance sheet, i.e. reasonable return, are presented on the left-hand side of Fig. 1 (2, 3 and 4). Methods of calculating the adjustment of the profit and loss account, i.e. realised adjusted profit, are presented on the right-hand side of the figure (5, 6 and 7).

LEARNING ABOUT THE REGULATION METHODS

A general picture of the regulation methods can first be obtained by reading Chapters 1, 4 and 7. The methods are described in further detail in Chapters 2, 3, 5 and 6.

1.1.1 Adjustment of balance sheet, i.e. calculation of reasonable return

Adjusted assets invested in network operations consist of adjusted electricity network assets in the non-current assets (2.1), other non-current assets (2.2) and current assets (2.3) on the unbundled balance sheet.

The adjusted capital invested in network operations is obtained by adding together adjusted equity (2.4.1), interest-bearing debt (2.4.2) and non-interest-bearing debt (2.4.2). An equalisation item (2.4.1) is also added to this in order to reconcile the different sides of the balance sheet.

Reasonable rate of return (3) is calculated on the basis of the weighted average cost of capital (WACC model).

Reasonable return is calculated by multiplying the adjusted capital invested in network operations (2.4) by the reasonable rate of return (3.4).

1.1.2 Adjustment of profit and loss account, i.e. calculation of realised adjusted profit

The calculation of the realised adjusted profit begins with the operating profit (loss) of the TSO's profit and loss account in the unbundled profit and loss account.

When calculating the realised adjusted profit, the annual change in refundable connection fees according to the unbundled balance sheet, depreciation on goodwill, planned depreciation in the unbundled profit and loss account and write-down of

network assets, and the loss of sales resulting from the sale of a network section entered under other operating expenses are returned (5.1). However, the profit from the sale of a network section entered under other operating income is deducted (5.1) when calculating the realised adjusted profit.

Next, reasonable costs of financial assets (5.3) are deducted as profit adjustment items.

The impacts of incentives are also deducted. Incentives include the investment incentive (6.1), quality incentive (6.2), efficiency incentive (6.3) and innovation incentive (6.4).

The sum total of the calculations is the realised adjusted profit.

1.1.3 Deficit and surplus

The deficit or surplus of the return is obtained by deducting the reasonable return from the realised adjusted profit.

The return is in surplus if the result of the subtraction is positive. The return is in deficit if the result of the subtraction is negative.

1.2 ENTITY FORMED BY REGULATION METHODS

In this document, the Energy Authority describes the entity formed by the regulation methods. Reasonable pricing referred to in electricity market legislation is determined on the basis of this entity in its entirety.

The regulation methods form a carefully considered entity. As the Market Court stated in its decision (MAO:271-344/06), in addition to the fact that it must be possible to independently study and assess individual sections and parameters included in the methods, the confirmation decision represents a carefully considered entity. This must be taken into account when developing the entity and individual methods because the methods and variables interact with one another.

When individual sections are assessed outside the context of the entity formed by the methods, a certain degree of caution should be exercised (precautionary principle). That way, for example, no change will result in an internal conflict, illogicality or considering the same factors several times in the regulation methods. Furthermore, even fairly small deviations in the values selected for the parameters may result in considerable differences in terms of the entity of methods.

It is not possible in practice or even in terms of clarity in the administrative decision to draw up the regulation methods with a degree of accuracy where the treatment of every single factor is exhaustively justified.

If necessary, the Energy Authority will specify the contents of the regulation methods with written instructions. When issuing supplementary instructions, the Authority will apply the methods and principles of the confirmation decision to safeguard equal operating opportunities for TSOs.

OBJECTIVES OF REGULATION

According to electricity market legislation, the main objectives of the special regulation of a natural monopoly are the reasonableness of pricing and high-quality network services. The Energy Authority therefore seeks these with the entity formed by the regulation methods and with the practical steering impacts of the methods on the TSO's business operations.

In addition to the main targets of regulation, other key targets include equality and network development, as well as the sustainability, continuity, development, and efficiency of business operations.

Equality means social income distribution between the owners of the regulated enterprises and the customers. Profit levels must not be too high in relation to, for example, investments which the owners could make in other business operations that carry a similar level of risk.

Sustainability, continuity and development mean that regulation must ensure necessary investment and other network development to safeguard sufficient security of supply. Other appropriate development and vitality of business operations must also be safeguarded in the long term.

Efficiency means that the service the customer requires is provided at the lowest possible cost. The pricing of network operations is not subject to market pressure, in which case the TSO has no incentive to improve the efficiency of its operations. In such a case, without regulation, any cost ineffectiveness could be compensated with higher prices. Therefore, reasonableness of monopoly pricing must be regulated to ensure that the TSO achieves a cost level that is actually achievable.

Consumer rights

According to an objective stated in the Internal Market in Electricity Directive (2009/72/EC 51, introductory part), the interests of consumers are essential. Furthermore, the quality of service must also be an important area of responsibility for the TSO.

As the national regulatory authority, the Energy Authority is charged to ensure that consumer rights are enforced. Consumer rights must be strengthened and safeguarded, and the related openness must be increased.

DEVELOPMENT OF REGULATION

Concerning their key elements, the regulation methods have been established on the basis of decisions issued by the Energy Authority and those issued by the Market Court and the Supreme Administrative Court relating to them.

The Authority's task is to develop the regulation methods. According to the legislative history of the Supervision Act (HE 20/2013 vp, detailed justification of section 10 of the Supervision Act), the Energy Authority must prepare a new confirmation decision in which the methods of the decision have been developed based on experience, as required. The Authority must also ensure that the confirmation decision will be subject to sufficient public debate at the draft stage.

When developing regulation, the Energy Authority must consider the targets and principles of a natural monopoly expressed in electricity market legislation and in case law. The Authority must also consider these in the application of the regulation method.

DISCRETION

The Energy Authority has ex-ante competence in key regulation issues. The objective of legislation (Directive 2003/54/EC 15, introductory part) in adopting ex-ante regulation was to reduce uncertainty and expensive and time-consuming disputes.

Electricity market legislation gives wide discretion to the Authority with regard to its application. This also applies to regulation methods and their development and application. Even if the regulation methods were drafted in great detail, questions of interpretation would still remain, which the Energy Authority as an independent regulation authority would have to resolve within the limits of its discretionary power.

The Supreme Administrative Court has also stated (KHO 2010/86) that legislation gives the Energy Authority a wide margin of discretion in the development of regulation methods.

When developing and applying the regulation methods and in regulation in general, the Authority takes into account the limits of the principles of good administration and fundamental rights in its use of discretion with respect to all parties subject to specific regulation.

EQUALITY AND REASONABLENESS FROM THE TSO'S POINT OF VIEW

The regulated TSOs must be treated equally.

However, the fact that the different elements of the methods give a different end result to different TSOs is no justification for the non-application of the method in question.

On the other hand, special obligations resulting from legislation have been accepted in case law as a ground for different treatment of transmission system operators and distribution system operators in the regulation methods (MAO:268/06).

When examining from the TSO's point of view whether the regulation methods have, in reality, achieved a reasonable end result in accordance with their objectives, certain aspects must be taken into account. Based on the legislative history of the legislation (HE 20/2013 vp, detailed justification of section 24), these include whether the TSO has been able to

- make sufficient investments in the network
- cover its costs
- pay a yield to its owners.

If the TSO has achieved these or it would have been possible, the TSO has met its obligations within the scope of the regulation methods.

1.3 AMENDING THE CONFIRMATION DECISION

During the regulatory period, the Energy Authority may amend the confirmation decision with a new decision in situations prescribed in section 13 of the Supervision Act.

UPDATING THE PARAMETERS OF THE CONFIRMATION DECISION FOR THE FIFTH REGULATORY PERIOD

For the fifth regulatory period, the Authority will update the following parameters of the regulation methods during 2019:

- risk premium of debt relating to the reasonable rate of return (4.2)
- reference level for outage costs (6.2.3)
- efficiency frontier (6.3.3).

These updates are not amendments to the methods. They are updates to the parameters of the regulation methods comparable to the annual update of parameters in the calculation of a reasonable rate of return, for example.

The updating of the parameters for the fifth regulatory period will be made in the same way as their determination for the fourth regulatory period, using the methods described in this document.

With respect to updates, the Authority will not submit a separate decision, but the TSO will be notified of them in a regulation letter.

1.4 REGULATORY DATA

It is the requirement of regulation that the TSO delivers to the Authority the actual copies of the necessary regulatory data in the correct format and on schedule.

By virtue of section 30 of the Supervision Act, a TSO is obliged to deliver the information required in regulation to the Energy Authority.

1.4.1 Regulatory data required in regulation

The regulatory data required in the application of the regulation methods is specified in the following documents:

- Decree of the Ministry of Trade and Industry on Unbundling of Electricity Network Operations (Kauppa- ja teollisuusministeriön asetus sähköliiketoimintojen eriyttämisestä, KTMa 79/2005, the "Unbundling Decree")
- Regulation of the Energy Authority on Key Figures of Electricity Network Operations and Their Publication (Energiaviraston sähköverkkotoiminnan tunnusluvuista ja niiden julkaisemisesta antama määräys, EMV 963/002/2011,

"Key Figure Regulation"); the Key Figure Regulation will be updated in 2015 and published in connection with the issuing of the confirmation decisions

- regulation methods (this document).

Key regulatory data includes the unbundled financial statements, network structure, and financial and technical key figures.

UNBUNDLING DECREE

The TSO must provide with the regulatory data the unbundled financial statements (profit and loss accounts and balance sheets) confirmed in accordance with section 10, paragraph 2 of the Unbundling Decree, including additional information and notes.

KEY FIGURE REGULATION

In the regulatory data, the TSO must deliver the information and key figures referred to in the appendices of the Key Figure Regulation.

REGULATORY METHODS

In the network structure data, the TSO must deliver the quantity of network components and the average age data of the electricity network's components that are in its possession and actually used by the TSO. The data must be delivered divided according to Appendix 1 and as values corresponding to the situation on the last day of December each year.

The TSO must also report the quantity data of network components invested in and removed from the electricity network during each year with a corresponding division. If the TSO has purchased or sold sections of the electricity network, the TSO must report the quantity data of network components purchased or sold, including average age data, with a corresponding division. The TSO must also report the quantity data of replacement investments with a corresponding division. The lifetimes of network components must also be supplied, if necessary.

The TSO must also report other breakdowns required in the adjustment of the unbundled balance sheet and profit and loss account of network operations. These are referred to in Chapters 2.1, 2.2, 2.4.2, 5.1, 5.2, 5.3 and 6.4.1. The TSO must be able to verify the validity of the breakdowns in a reliable way.

1.4.2 Delivering the regulatory data

The network structure data must be delivered to the Energy Authority by the end of March each year. Information about the financial statements and the technical key figures must be delivered to the Energy Authority by the end of May.

As a general rule, the TSO must deliver the regulatory data via the Energy Authority's web-based regulatory data system.

If the information is to be delivered by other means, the Authority will issue a separate written notification.

If the TSO neglects to deliver the regulatory data to the Energy Authority, the Authority may impose a penalty payment on it in accordance with section 31 of the Supervision Act.

1.4.3 Validity of the regulatory data

The regulatory data supplied by the TSO must be valid, i.e. genuine and reliable.

When determining and delivering the regulatory data, the TSO must comply with written instructions, definitions and specifications, which are presented in the following:

- Unbundling Decree
- Key Figure Regulation
- Regulatory methods
- Regulatory data system
- Other guidelines issued by the Authority

In unclear cases, the TSO must request the Authority for more detailed instructions.

The validity of regulatory data is mainly based on the Energy Authority's trust in the TSO. The TSO calculates and delivers the data independently. The Authority lacks the resources to systematically verify all data. The TSO's own legal and moral responsibility for the correctness of the regulatory data is therefore emphasised.

The Energy Authority will correct any incorrect regulatory data that does not comply with the regulatory methods, unless the TSO corrects such data.

The TSO must be able to verify the regulatory data it has delivered during regulation visits by the Energy Authority or when otherwise separately requested by the Authority.

1.5 UNBUNDLING OF OPERATIONS

According to paragraph 77 of the Electricity Market Act, a TSO must unbundle electricity network operations from other electricity trade operations, and electricity trade operations from other business operations. The unbundling of operations also applies to legally unbundled TSOs.

In accordance with paragraph 6 of the Unbundling Decree, the TSO must enter the income (5.1) and costs (5.2), as well as asset items (2.1, 2.2 and 2.3) and capital items (2.4), which directly pertain to the electricity network operations, directly to the unbundled financial statements of the electricity network operations.

Operations open to free competition by law cannot be unbundled to electricity network operations. Construction of connection lines is one example of this. Such operations are not subject to the regulation methods, either.

The treatment of matters related to unbundling in the regulation methods is specified in the Energy Authority's recommendation on the imputed unbundling of electricity and natural gas business operations[1].

1.6 NETWORKS PURCHASED AND SOLD DURING THE REGULATORY PERIOD

CALCULATING REPLACEMENT VALUE AND REGULATORY ASSET VALUE

In the adjustment of the value of the buyer's electricity network assets,

- the electricity network to be purchased is added to the replacement value and regulatory asset value of the buyer's electricity network on the basis of the number of network components and average age data
- the lifetime of the network components to be purchased is determined according to the lifetime the buyer has previously selected for each network component.

[1] Energy Authority's recommendation on the imputed unbundling of electricity and natural gas business operations (Energiamarkkinaviraston suositus, Sähkö- ja maakaasuliiketoimintojen laskennallinen eriyttäminen, docket 549/002/2011), 17 June 2011; the recommendation will be updated before the start of the fourth regulatory period

The sold electricity network is deducted from the replacement value and regulatory asset value of the seller's electricity network on the basis of the number of network components and average age data.

1.7 INFLATION

The annual change in monetary value, i.e. the impact of inflation, is taken into account in the calculation of reasonable return and realised adjusted profit in the manner specified below.

INFLATION ADJUSTMENT IN THE CALCULATION OF REASONABLE RETURN

The reasonable rate of return (WACC %) is determined as a nominal value, i.e. the impact of inflation is not removed from it. To avoid taking inflation into account twice in the calculation of reasonable return, the value of unit prices used in the adjustment of electricity network assets is not adjusted during the regulatory period. In terms of other invested adjusted assets, the values according to the unbundled balance sheet for the year in question are used.

The reasonable return is obtained by multiplying the adjusted capital invested in the electricity network operations annually and the interest-bearing debt by the nominal reasonable rate of return (WACC %). The nominal reasonable rate of return used in the calculation of the year in question includes an inflation expectation, and the impact of inflation will therefore be considered once in the calculation of a reasonable return.

INFLATION ADJUSTMENT IN THE CALCULATION OF REALISED ADJUSTED PROFIT

When calculating realised adjusted profit, an inflation adjustment is made to the quality incentive, the efficiency incentive and the investment incentive. The consumer price index is used in the inflation adjustment.

In the quality incentive (6.2), the inflation adjustment is made to the unit prices of outages presented in 2005 monetary value (Table 6). The adjustment is made annually in the calculation of the reference level for outage costs and the realised outage costs.

In the efficiency incentive, the inflation adjustment is made annually in the calculation of the reference level for efficiency costs.

In the investment incentive, the inflation adjustment is made annually in the calculation of straight-line depreciation, which is calculated from the replacement value.

USE OF THE CONSUMER PRICE INDEX IN INFLATION ADJUSTMENT

The change in the total index of the consumer price index (1995 = 100) is used in the inflation adjustment.

The average of the index points of the consumer price index for April–September of the year in question is used as the index for each year. For example, the average of the consumer price index points for April–September 2016 is used for 2016.

The change in the consumer price index is presented in Formula 1.

$$\Delta KHI_t = \frac{KHI_t}{KHI_{t-1}} - 1 \qquad (1)$$

where

ΔKHI_t = Change in the consumer price index for year t

t = Year under review

KHI_t = Average of the index points of the consumer price index (1995 = 100) for April–September during the year t

KHI_{t-1} = Average of the index points of the consumer price index (1995 = 100) for April–September during the year $t-1$

1.8 CALCULATIONS TO BE MADE DURING THE REGULATORY PERIOD

During the regulatory period, the Energy Authority will calculate the following information for the TSO annually using the regulatory data system:

- Adjusted replacement value of electricity network assets
- Adjusted regulatory asset value of electricity network assets
- Adjusted straight-line depreciations of electricity network assets
- Adjusted equity invested in electricity network operations
- Adjusted interest-bearing debt invested in electricity network operations

- Adjusted non-interest-bearing debt invested in electricity network operations
- Adjusted capital invested in electricity network operations
- Reasonable return
- Realised adjusted profit
- Deficit or surplus
- Items of profit-distribution nature

The Authority will report this information to the TSO through the regulatory data system. The Authority will also make it available to the public, such as the TSO's customers and the media.

The Energy Authority will carry out the calculation of the above-mentioned data applying the regulation methods this document describes and the regulatory data provided by the TSO.

Once the TSO has received the annual calculation for information, the TSO must inspect it and report any errors. If necessary, the Authority will provide a new calculation for information.

Even if the TSO does not comment on the annual calculations immediately after receiving them, this does not prevent it from providing a statement at a later date. The last opportunity to comment is with respect to the regulation decision draft. However, due to the predictability and efficiency of regulation, the Authority recommends that comments are forwarded primarily during the regulatory period immediately after the receipt of calculations.

The annual calculations made by the Authority during the regulatory period do not include obligations concerning the TSO, and they are not therefore administrative decisions with a right of appeal. The Energy Authority will confirm the calculations concerning the entire regulatory period after the regulatory period by submitting a regulation decision (1.9), which is appealable (1.10).

1.9 REGULATION DECISION MADE AFTER THE REGULATORY PERIOD

After the end of the regulatory period, the Energy Authority will submit a regulation decision to the TSO by virtue of section 14 of the Supervision Act. With this decision, the Authority confirms the amount in euros by which the TSO's realised adjusted profit falls short of or exceeds the amount of reasonable return over the entire course of the regulatory period.

DEFICIT AND SURPLUS

In the regulation decision, the Authority adds the realised adjusted profits for different years in the regulatory period using the methods confirmed in the confirmation decision and the regulatory data provided by the TSO and deducts from this the sum of reasonable returns for the corresponding years. The sum total is the deficit or surplus for the entire regulatory period.

If the realised adjusted profits accrued over the entire regulatory period fall short of the amount of reasonable returns for the regulatory period, the TSO will accrue a deficit.

If the realised adjusted profits accrued over the entire regulatory period exceed the amount of reasonable returns, the TSO will accrue a surplus.

INTEREST ON SURPLUS

If the realised adjusted profit during the regulatory period exceeded the amount of reasonable return by at least five per cent, interest must be paid on the surplus. The interest rate will be the average of the reasonable cost of equity (3.2) for the years of the regulatory period in question.

The interest on the surplus will be considered in the regulation decision when calculating the deficit or surplus transferred to the next regulatory period. The amount to be reduced by virtue of section 14 of the Supervision Act for which the interest is calculated will be the surplus accrued for the regulatory period that has ended.

DEFICIT OR SURPLUS FOR THE PREVIOUS REGULATORY PERIOD

The regulation decision takes into account the deficit or surplus accrued for the TSO during the regulatory period preceding the regulatory period in question. The Energy Authority has confirmed the deficit or surplus in the regulation decision concerning the previous regulatory period.

CALCULATING DEFICIT OR SURPLUS TRANSFERRING FROM REGULATORY PERIOD

The calculation of deficit or surplus transferring from the regulatory period to the next regulatory period is presented in Table 1.

Table 1. *Calculation of deficit or surplus*

+ Sum of realised adjusted profits for all the years of the regulatory period
- Sum of reasonable returns for all the years of the regulatory period
= Deficit (-) or surplus (+) accrued for the regulatory period
+ Any interest liability on surplus accrued for the regulatory period
= Deficit (-) or surplus (+) accrued for the regulatory period, including interest liability
+ Deficit (-) or surplus (+) in accordance with the regulatory decision accrued for the previous regulatory period*
= DEFICIT (-) OR SURPLUS (+) TRANSFERRING TO THE NEXT REGULATORY PERIOD

* *Deficit accrued from the regulatory period preceding the previous regulatory period will no longer be taken into account even if the deficit or a part thereof has not been equalised during the previous regulatory period*

EQUALISATION OF DEFICIT OR SURPLUS

If, on the basis of the calculation described in Table 1, the TSO has any deficit to be transferred to the next regulatory period, it cannot be equalised until the next regulatory period.

If, on the basis of the calculation described in Table 1, the TSO has any surplus to be transferred to the next regulatory period, it must be equalised during the next regulatory period.

However, on serious grounds, it is possible to apply for extra time for the equalisation of deficits and surpluses from the Energy Authority.

1.10 APPEALING CONFIRMATION AND REGULATION DECISIONS

The confirmation decision issued by the Energy Authority before the start of the regulatory period and the regulatory decision issued by it after the end of the regulatory period are administrative decisions. The TSO may appeal these decisions in accordance with section 36, paragraph 2 of the Supervision Act.

The appeal must be lodged with the Market Court. A decision issued by the Market Court can be appealed to the Supreme Administrative Court. The Authority may

also appeal a decision by the Market Court to the Supreme Administrative Court if the Market Court has by its decision amended a confirmation or regulation decision.

According to section 38 of the Supervision Act, a confirmation and regulation decision must be complied with despite an appeal, unless otherwise stated by the Authority in the decision. Furthermore, the appellate court has the right to issue orders on the implementation of the decision as provided in the Administrative Judicial Procedure Act.

2 ADJUSTED ASSETS AND CAPITAL INVESTED IN NETWORK OPERATIONS

ADJUSTMENT OF ASSETS INVESTED IN NETWORK OPERATIONS

The adjustment of assets invested in network operations is based on the assets side of the TSO's unbundled balance sheet, which is adjusted as presented in chapters 2.1, 2.2 and 2.3.

Adjusting the assets side of an unbundled balance sheet gives the value of adjusted assets invested in network operations as the sum total of the adjusted balance sheet.

The adjusted assets invested in network operations consist of the following items:

- Adjusted electricity network assets in non-current assets (2.1)
- Adjusted other assets in non-current assets (2.2)
- Adjusted assets in current assets (2.3)

ADJUSTMENT OF CAPITAL INVESTED IN NETWORK OPERATIONS

The adjustment of capital invested in network operations is based on the liabilities side of the TSO's unbundled balance sheet, which is adjusted in the ways presented in chapter 2.4.

Adjusting the liabilities side of an unbundled balance sheet gives the value of adjusted capital invested in network operations as the sum total of the adjusted balance sheet.

The adjusted capital invested in network operations consists of the following items:

- Adjusted equity (2.4.1)
- Adjusted interest-bearing debt (2.4.2)
- Adjusted non-interest-bearing debt (2.4.2)
- Equalisation item (2.4.1)

2.1 ADJUSTMENT OF ELECTRICITY NETWORK ASSETS IN NON-CURRENT ASSETS

Although comprised of several different components, the electricity network forms the largest individual part of the TSO's assets, i.e. the non-current assets on the unbundled balance sheet.

According to the Electricity Market Act, the term "electricity network" refers to an interconnected entity intended for the transmission or distribution of electricity, consisting of the following:

- Power lines
- Substations
- Other electric devices, electric equipment, systems and software serving the use of the electricity network and the production of electricity network services

The value of electricity network assets is adjusted in the regulation methods to correspond with their actual net value. The adjustment is conducted so that the value according to the unbundled balance sheet is not used in the calculation of a reasonable return. Instead, the adjusted replacement value of the electricity network (2.1.2) calculated from the adjusted regulatory asset value of the electricity network (2.1.1) is used.

UNIT PRICES

Unit prices are used in the calculation of the adjusted replacement value of the electricity network assets.

Average network component-specific unit prices are used in the calculation of the replacement value. The network components and unit prices are presented in Appendix 1.

The unit prices are not index-adjusted for different years during the regulatory period, because inflation has been taken into account in the reasonable rate of return. Unit prices according to Appendix 1 will be used during the fourth regulatory period from 2016 to 2019 and the fifth regulatory period from 2020 to 2023. The unit prices will not be updated with a separate unit price survey for the fifth regulatory period. This is to improve continuity and predictability between regulatory periods.

Where a component pertaining to the electricity network assets is not included in the network components listed in Appendix 1, the component can be considered at its balance sheet value as presented in Chapter 2.2. Such components include data

systems and land areas for substations, for example. In order for them to be considered, the TSO shall provide a sufficient account of the components and their balance sheet values according to the unbundled financial statements in connection with submitting the regulatory data.

LIFETIMES

Lifetimes are used in the calculation of the adjusted regulatory asset value of the electricity network assets and the adjusted straight-line depreciations.

The lifetimes for various network components are presented in Appendix 1. If no lifetime has been specified for a network component in the appendix, its regulated asset value will remain constant during the regulatory period.

The lifetimes are based on the lifetime data provided by the TSO. The lifetimes must correspond to the actual average technical and financial lifetimes, i.e. the times the network components are actually used before they are replaced. The selected lifetimes take the TSO's maintenance and investment strategy into account.

AVERAGE AGE DATA

Average age data is used in the calculation of the adjusted regulatory asset value of the electricity network assets.

The TSO must report the actual age data for every component in the electricity network at the end of each regulatory year. Based on this age data, the TSO must calculate average age data for all network components in use and report it in the regulatory data system.

The term "actual age data" refers to the lifetime of a component, i.e. its age calculated from the first moment of use or year of manufacture. When calculating the average age in terms of every component, the age is always limited to the lifetime selected by the TSO for the network component. This means that a component that is older than the lifetime is regarded as only as old as the lifetime selected by the TSO. When a new component is being reported in the regulatory data for the first time, its age should mainly be the actual age of the component, i.e. the age calculated from the moment it was taken into use. If this is not known, the age of 0.5 years must be used.

When the TSO cannot establish a component's actual age, the age used in the calculation of the average age of the network component must be 90% of the life-time selected by the TSO in the fourth regulatory period and 100% in the fifth regulatory period.

COMPONENTS NOT INCLUDED IN NETWORK OPERATIONS

Components and assets that are not part of network operations are not included in the adjusted assets invested in network operations. These include land areas that are not used in actual network operations, for example. No reasonable return is obtained on these items, as they are not part of network operations.

Components are not part of network operations when they are not

- in the TSO’s possession but used by the TSO with an arrangement under the law of property, where the possession of the network is not transferred from the owner of the network (“participation” in another’s fixed assets)
- subject to the TSO’s development obligation
- the TSO’s network operations complying with the network licence
- necessary for the operation of the network.

Furthermore, components pertaining to free competition are not included in the adjusted assets invested in network operations. These include, for example, components the customer orders to be built meeting the characteristics of a connection line.

A network section serving several production plants that was built after 1 September 2013 is not included in the adjusted assets invested in network operations, either, unless the network section also simultaneously serves electricity consumption other than that directly related to production.

Exception concerning transmission system

A network section serving a production plant may be included in the adjusted electricity network assets of a transmission system if it is

- funded by the TSO
- owned by and in the possession of the TSO
- originally designed and dimensioned also to serve the TSO's other customer consumption in the region in the near future
- technically and economically the most sensible network solution.

When delivering the regulatory data, the TSO must provide an account of the transmission system components which it has included in the adjusted electricity network assets, and the reasons why it has done so. The Authority will assess the account and decide on the handling of these components on this basis.

COMPONENTS NOT PART OF ELECTRICITY NETWORK ASSETS

Components that are not part of network operations cannot be part of the electricity network assets either. In addition, components are not part of the adjusted electricity network assets when they are not

- connected to the network
- in actual use, for example, stored equipment and materials
- entailed acquisition costs to the TSO.

AID RECEIVED FOR THE CONSTRUCTION OF THE NETWORK

The TSO may receive aids or other compensation for investing in the network from the Finnish Government or the European Union, for example. Correspondingly, a TSO from another EU or EEA state may participate in an investment made in Finland based on EU regulation 347/2013.

Components funded with aids or compensation received for building the network are not included in the adjusted regulatory asset value of the electricity network assets, i.e. no reasonable return is obtained on them.

However, components funded with aids or compensation are taken into account in the adjusted replacement value of the electricity network assets when they are

used to calculate adjusted straight-line depreciations of the electricity network assets in the investment incentive (6.1.1).

The TSO must provide an account of the amount of aids and other compensation it has received in connection with delivering the network structure data. The account must describe the components for the construction of which they have been used and how they are handled in the TSO's financial statements. The Energy Authority will provide further instructions on reporting the aids as required.

Components funded by congestion income

Components funded by congestion income are treated in the same way as components funded by aids or compensation received for building the network.

PARTICIPATION IN FOREIGN INVESTMENTS

Based on EU regulation 347/2013, TSOs may be obligated to participate in transmission system investments in another EU or EEA state if these investments produce benefits in Finland.

The TSO's obligation to participate in investments in another EU or EEA state may be based on the following legally valid official decisions:

- Energy Authority's decision on the distribution of incentives (article 12, paragraph 4 of regulation 347/2013)
- Decision of Agency for the Cooperation of Energy Regulators (ACER) on distribution of costs (article 12, paragraph 6)

When delivering the regulatory data, the TSO must also provide an account of the costs arising from investments made in another EU or EEA state and the components the investments helped to build.

Components owned by TSO

If a component in which an investment was made in another EU or EEA state is funded by the TSO and under its ownership and control, the procedure described below applies.

If the TSO has activated the costs on the unbundled balance sheet

- and it has a network component listed in the table in Appendix 1, it will be considered accordingly in the adjusted replacement value of the electricity network assets (2.1.1), the regulatory asset value (2.1.2) and straight-line depreciation (6.1.1),
- but it does not have a network component listed in Appendix 1, it will be considered at its value recognised on the balance sheet in accordance with sections 2.2 and 6.1.2.

If the TSO has recognised the component as a cost in the unbundled profit and loss account

- and it has a network component listed in the table in Appendix 1, it will be considered accordingly in the adjusted replacement value of the electricity network assets, the regulatory asset value and straight-line depreciation. Costs arising from the component will be returned in the calculation of realised adjusted profit (5.1),
- but it does not have a network component in Appendix 1, it will not be included in the adjusted replacement value of the electricity network assets, the regulatory asset value or the straight-line depreciation. No separate adjustment will be made on the component in the calculation of realised adjusted profit, either. A component recognised wholly in expenses has already been taken into account in the operating profit (loss) in the profit and loss account.

Components not owned by TSO

If a component in which an investment was made in another EU or EEA state is not under the ownership and control of the TSO, the procedure described below applies.

If the TSO has activated the costs on the unbundled balance sheet, it will be considered at its value recognised on the unbundled balance sheet in accordance with sections 2.2 and 6.1.2.

If the TSO has recognised the component as a cost in the unbundled profit and loss account, no separate adjustment will be made in the calculation of the realised adjusted profit. A component recognised wholly in expenses has already been taken into account in the operating profit (loss) in the profit and loss account.

Investments made in another EU or EEA state other than those in accordance with regulation 347/2013

For investments made in another EU or EEA state other than those in accordance with EU regulation 347/2013, the TSO must provide the Energy Authority with an account of the project. In the account, the investment must essentially be treated in the same way as investments in accordance with the regulation. However, the account must, in particular, address the benefits of investing in Finland.

The Authority will assess the account and decide on its basis whether the components invested in will be considered in regulation methods and if so, to what extent. Insofar as the components are considered in regulation methods, the procedure is the same as that applied to investments in accordance with the regulation as described above.

2.1.1 Adjusted replacement value

The adjusted replacement value of the electricity network assets is calculated for all the years of the regulatory period as a value corresponding to the situation on the last day of December of each year.

In the fourth and fifth regulatory periods, the adjusted replacement value of a network component is calculated by multiplying the unit price according to Appendix 1 by the number of network components reported by the TSO in the regulatory data. The adjusted replacement value of the entire adjusted electricity network assets is obtained by adding the network component specific adjusted replacement values.

The calculation of adjusted replacement value per network component is presented in Formula 2.

$$JHA_i = unit\ price_i \times quantity_i \qquad (2)$$

The adjusted replacement value of all electricity network assets is calculated as a total of adjusted replacement values of the network components in accordance with Formula 3.

$$JHA = \sum_{i=1}^{n} \left(JHA_i \right) \qquad (3)$$

in Formulae 2 and 3

JHA_i = Total adjusted replacement value of all components of network component i

$unit\ price_i$ = Unit price of network component i in accordance with Appendix 1

$quantity_i$ = Number of all components in network component i

JHA = Adjusted replacement value of the all electricity network assets

2.1.2 Adjusted regulatory asset value

The adjusted regulatory asset value of the electricity network assets is calculated for all the years of the regulatory period as a value corresponding to the situation on the last day of December of each year.

The adjusted regulatory asset value of the network component is calculated from its adjusted replacement value on the basis of the lifetime of the network component selected by the TSO and the average age of the network component announced by the TSO in the regulatory data. The adjusted regulatory asset value of all adjusted electricity network assets is obtained by adding the adjusted regulatory asset values of all network components.

The calculation of adjusted regulatory asset value per network component is presented in Formula 4.

$$NKA_i = \left(1 - \frac{average\ age_i}{lifetime_i}\right) \times JHA_i \qquad (4)$$

The adjusted regulatory asset value of all electricity network assets is calculated as a sum of adjusted regulatory asset values of the network components in accordance with Formula 5.

$$NKA = \sum_{i=1}^{n} \left(NKA_i\right) \qquad (5)$$

in Formulae 4 and 5

NKA_i = Adjusted regulatory asset value of all components in network

component i

$lifetime_i$ = Lifetime of network component i

$average\ age_i$ = Average age of all components in network component i

NKA = Adjusted regulatory asset value of all electricity network assets

2.2 ADJUSTMENT OF OTHER ASSETS IN NON-CURRENT ASSETS

In connection with the adjustment of assets invested in network operations, non-current assets other than electricity network assets on the unbundled balance sheet are in principle taken into account at their balance sheet value. These kinds of assets include, e.g. acquisitions in progress. However, in respect of these, goodwill and investments are adjusted by eliminating them.

OTHER ASSETS RECORDED IN ELECTRICITY NETWORK ASSETS

The TSO must notify in the notes to the financial statements any items recorded in electricity network assets that are not taken into account in the calculation of adjusted replacement value or regulatory asset value. These items are taken into account in adjusted assets invested in network operations according to their value on the unbundled balance sheet. Their permitted reasonable depreciation level is the planned depreciation based on the profit and loss account. Such items include, for example, stored equipment and materials.

ELECTRICITY NETWORK COMPONENTS RECORDED IN OTHER THAN ELECTRICITY NETWORK ASSETS

However, if electricity network components are recorded under items other than the electricity network assets in non-current assets, the balance sheet value of the components is eliminated from these items. Elimination is conducted with respect to components referred to in the list of network components in Appendix 1 that are in actual use in the electricity network. These components are taken into account in adjusted assets invested in network operations in their adjusted regulatory asset value in accordance with Chapter 2.1.2.

GOODWILL

Goodwill on the unbundled balance sheet is eliminated in connection with the adjustment of assets invested in network operations.

Legislative history (HE 20/2013 vp) takes a stand on acquisitions and other arrangements where the sum paid for electricity network assets is higher than its actual net value.

Regulation methods must therefore be based on the actual net value of the TSO's electricity network assets and not, for example, on the commercial market value determined on the basis of mergers and acquisitions, which may include valuation or acquisition items not pertaining to electricity network operations.

Electricity network assets in accordance with the unbundled balance sheet are adjusted to the adjusted regulatory asset value as described in Chapter 2.1. This describes the actual net value of the electricity network assets in the regulation methods.

Based on this, the Energy Authority will deem that the goodwill of the unbundled balance sheet arising in connection with an acquisition describes an intangible asset that cannot be allocated to other assets.

Merger assets

The share of goodwill of the merger assets created in the merger is treated in the same manner as goodwill.

INVESTMENTS

When adjusting assets invested in network operations, investments in non-current assets according to the unbundled balance sheet are eliminated.

Investments in non-current assets include, for example, investments that seek profits other than those directly connected to network operations or the expansion of business operations. These investments cannot be regarded as necessary in terms of network operations. It therefore cannot be justified to include them in any part in adjusted assets invested in network operations.

2.3 ADJUSTMENT OF ASSETS IN CURRENT ASSETS

FINANCIAL ASSETS

When calculating adjusted assets invested in network operations, financial assets recorded on the unbundled balance sheet are eliminated.

Financial assets to be eliminated include the following items in the assets side of the unbundled balance sheet:

- Short- and long-term receivables
- Marketable securities
- Cash and bank receivables and comparable items

In accordance with the decision of the Supreme Administrative Court (KHO:2010:86), trade receivables are not eliminated.

Even in terms of financing theory, the management of financial assets does not constitute actual network operations. Its inclusion in any part in adjusted assets invested in network operations cannot therefore be justified.

The costs resulting from financial assets necessary to safeguard network operations are taken into account in the calculation of realised adjusted profit in accordance with Chapter 5.3.

INVENTORIES

When calculating adjusted assets invested in network operations, the book value according to the unbundled balance sheet is used as the value of inventories.

2.4 ADJUSTMENT OF CAPITAL INVESTED IN NETWORK OPERATIONS

The liabilities side of the adjusted balance sheet is determined by dividing adjusted capital invested in network operations into the following:

- Adjusted equity
- Adjusted interest-bearing debt
- Adjusted non-interest-bearing debt

2.4.1 Adjustment of equity

In the adjusted balance sheet, equity is regarded as the TSO’s equity in accordance with the unbundled balance sheet.

In the adjusted balance sheet, voluntary provisions and the depreciation of assets other than electricity network assets, minus deferred tax liability, are also regarded as equity.

Group contributions are also taken into account in the adjustment of equity.

Furthermore, an equalisation item is added to equity in the adjusted balance sheet.

GROUP CONTRIBUTION

The TSO is in an equal position regardless of whether it operates under a group structure.

Granted group contribution

In the adjustment of capital invested in network operations, the amount of group contribution minus the implied amount of tax is returned to equity.

This is done regardless of whether a decision has been made on the closing date to grant the group contribution and whether it has yet been paid.

A granted group contribution is an item of a profit distribution nature, and on the unbundled balance sheet of a TSO operating without a group structure it will be entered under "Profit for the financial period".

Received group contribution

In the adjustment of capital invested in network operations, the amount of group contribution minus the implied amount of tax is deducted from equity. Received group contribution is also an item of a profit distribution nature, and it increases the profit for the financial period.

Receivables are eliminated in the calculation of reasonable return as presented in Chapter 2.3 of this document. The amount of group contributions received is taken into account in the elimination.

EQUALISATION ITEM

The equalisation item describes the difference in value between the adjusted assets invested in network operations and the assets side of the balance sheet.

The balancing item is used to balance assets and liabilities on the adjusted balance sheet. It is recorded under equity in the liabilities side of the adjusted balance sheet.

The value of the equalisation item is calculated as the difference between the assets and liabilities sides of the adjusted balance sheet.

The equalisation item may also be negative if the value of adjusted assets invested in network operations is lower than the assets side of the unbundled balance sheet.

2.4.2 Adjustment of debt

In the adjustment of capital invested in network operations, debt is divided into interest-bearing and non-interest-bearing debt.

ADJUSTED INTEREST-BEARING DEBT

Interest-bearing debt on the unbundled balance sheet is taken into account as such in adjusted interest-bearing debt. However, the equity share in the interest-bearing group contribution debt is eliminated.

Items in interest-bearing debt include, among others, bank, pension and other loans in the non-current liabilities in the unbundled balance sheet, as well as instalments of the above-mentioned loans in the current liabilities of the unbundled balance sheet.

In the adjustment of capital invested in network operations, any capital loans and other interest-bearing loans granted by the owners of the TSO are treated as interest-bearing debt.

ADJUSTED NON-INTEREST-BEARING DEBT

Non-interest-bearing debt on the unbundled balance sheet is taken into account as such in adjusted non-interest-bearing debt. These items include accounts payable, accruals and other short-term debt, for example. However, the equity share in the non-interest-bearing group contribution debt is eliminated. Congestion income carried forward in accrued liability is also eliminated.

Mandatory provisions entered on the unbundled balance sheet are treated in full as non-interest-bearing debt. In the depreciation difference of assets other than electricity network assets, the share of deferred tax liability is regarded as non-interest-bearing debt.

<u>CONNECTION FEES</u>

Components funded by connection fees are included in adjusted assets invested in network operations.

The TSO is in an equal position regardless of whether it uses refundable or non-refundable connection fees.

Refundable connection fees

Although refunds are rarely made, even a formal refunding condition gives the connection fee the character of a debt. As a distinction from other long-term debts, connection fees involve no interest liabilities, i.e. they are a non-interest-bearing debt by nature. Refundable connection fees cannot be entered under equity in the unbundled balance sheet by virtue of a statement by the Accounting Board.[2]

The net change in connection fees is returned in the calculation of realised adjusted profit in accordance with Chapter 5.1.

The TSO must separately itemise the annual amount of refundable connection fees entered in the balance sheets of the owner or its other companies as notes to the unbundled financial statements.

Non-refundable connection fees

Non-refundable connection fees are income from network operations in accordance with Chapter 5.1.

[2] Statement of the Accounting Standards Board on the recognition of electricity connection fees (1650/2001)

3 REASONABLE RATE OF RETURN

3.1 MODEL FOR WEIGHTED AVERAGE COST OF CAPITAL

The method used when determining a reasonable rate of return approved for adjusted capital invested in network operations is the Weighted Average Cost of Capital, or the WACC model.

The WACC model expresses the average costs of capital used by the enterprise, in which the weightings are the relative values of equity and debt.

The Energy Authority has commissioned a statement[3] from Ernst & Young Oy (EY) for the definition of parameters in the WACC model. This statement is used as the key basis for selecting the levels of parameters in the WACC model, presented below.

3.2 REASONABLE COST OF EQUITY

When determining a reasonable rate of return, the reasonable cost of equity is calculated using the CAP model (Capital Asset Pricing Model).

The CAP model describes the dependency between the returns requirement of an investment involving a risk and the risk.

In the model, the reasonable cost of capital is formed by adding a risk premium to risk-free interest. This is obtained by multiplying the market risk premium by the beta coefficient. A premium for lack of liquidity is also added to the risk-free interest.

The calculation of the model is presented in Formula 6.

$$C_E = R_r + \beta_{equity} \times (R_m - R_r) + LP \qquad (6)$$

where

C_E = Reasonable cost of equity

R_r = Risk-free rate

β_{equity} = Equity beta coefficient

[3] Ernst & Young Oy, Determining a reasonable rate of return on capital invested in electricity and natural gas network operations, 10 October 2014

R_m = Average market returns

$R_m - R_r$ = Market risk premium

LP = Premium for lack of liquidity

3.2.1 Risk-free rate of equity

When determining a reasonable rate of return, the interest of ten-year Finnish government bonds is used as the risk-free rate of interest, which acts as a basis for a reasonable cost of equity.

The risk-free rate describes the returns requirement of an investment that is as risk-free as possible. In general, government bonds with a high credit rating are regarded as such investments.

As the investment horizon for equity must be several years, the selection of maturity is important. It is therefore justifiable to use the returns on a long-term bond when defining risk-free interest.

The value of the risk-free rate is calculated annually in two different ways: R_{r1} and R_{r2}. Of these two differently calculated values, that giving a higher value for the risk-free rate is applied the following year.

In alternative R_{r1} , the value of the risk-free rate is updated each year, using the average of the realised daily value of the ten-year Finnish government bonds for the period April–September in the previous year. For example, the value for 2016 is determined on the basis of the average of the realised daily values in the period April–September 2015.

In alternative R_{r2} , the value of the risk-free rate is updated each year, using the average of the realised daily value of the ten-year Finnish government bonds in the ten previous years. For example, the value for 2016 is determined on the basis of the average of the realised daily values in the period October–September 2015.

Realised daily values are published by the Bank of Finland.[4]

[4] The Finnish benchmark government bond yields issued by the Bank of Finland are calculated as averages of the bid rates quoted by primary dealers on the Reuters system daily at 1:00 pm. If the calculation method changes, the daily values issued by the Bank of Finland, calculated using the updated method, will be applied.

The value of the above-described risk-free interest rate is also used as the risk-free rate, which acts as the basis of a reasonable cost of debt (3.3.1).

3.2.2 Beta coefficient

The value of equity beta is 0.720 when determining the reasonable rate of return.

The beta coefficient describes the risk element of the enterprise under review in relation to the average risk element in all investments.

The beta coefficient depends on the cost structure, debt ratio and growth of the enterprise. In practice, this results in a convergence of the betas of enterprises operating in the same industry.

The regulation methods are based on the fact that the beta coefficient is a sector-specific variable. It describes the risk level of investments made in enterprises in the electricity network sector when compared to all investments in the stock market.

The asset beta describes the risk of business operations without the risk arising from indebtedness. In the regulation methods, the asset beta has been calculated with the Hamada formula, in which the impact of the tax rate is also eliminated.

In addition to a report ordered from EY, the level of the beta coefficient in regulatory methods for electricity network operations has been assessed in a report submitted to the Authority.[5] The higher of the values presented in these two reports, 0.4, is used as the value of the debt-free beta coefficient.

To determine the reasonable equity cost, the asset beta is adjusted into equity beta. The calculation of this adjustment, which considers the debt ratio and the rate of corporate tax, is presented in Formula 7.

$$\beta_{velallinen} = \beta_{velaton} \times \left(1 + (1 - yvk) \times \frac{D}{E}\right) \quad (7)$$

where

β_{equity} = Equity beta coefficient

β_{asset} = Asset beta coefficient

[5] PCA Corporate Finance, WACC-mallin parametrien analysointi uutta regulaatiomallia varten (Analysing parameters of the WACC model for the new regulatory model), 18 September 2014

yvk = Rate of corporate tax

D/E = Capital structure (interest bearing debt / equity)

3.2.3 Market risk premium

The value of market risk premium is 5% when determining the reasonable rate of return.

The market risk premium describes the difference between the risk-free interest rate and the return on equity investment, i.e. the degree to which the shares have yielded a return exceeding the risk-free rate.

When determining the cost of equity, there is an interaction between the risk-free interest rate and the market risk premium. The selection of the risk-free interest rate therefore has an impact on the amount of risk premium.

The value of the market risk premium applied in previous regulatory periods has been based on, for example, studies and statements commissioned by the Authority. The Market Court has also approved the used value in its decision (MAO:635-688/10). According to a study commissioned by the European Commission, this level is justified when the risk-free interest rate has been determined by applying the return on ten-year Finnish government bonds.

3.2.4 Premium for lack of liquidity

The value of the premium for lack of liquidity is 0.6% when determining the reasonable rate of return.

The premium for lack of liquidity describes any illiquidity of an investment.

Factors reducing the value of ownership of a company that is unlisted or has a lack of liquidity for another reason may include higher transaction costs and a longer sale period than the ownership of a listed company.

Efforts have been made to use different methods for modelling the premium for lack of liquidity when determining the value of an enterprise. However, it has not been possible to select a single generally accepted method for the calculation. Practical application of the premium is therefore extremely discretionary.

A moderate level of premium for lack of liquidity is justified based on the licence requirements of network operations and the significant acquisitions conducted in the sector even in the last few years.

When assessing the level of the premium for lack of liquidity, the fact that the enterprises in the sector are mainly majority-owned must also be considered. This means that the owners have control in the enterprises and can, therefore, have a direct impact on the business operations of the enterprises.

In addition to the Market Court's decision (MAO:271–344/2006), the value of the premium for lack of liquidity has been discussed in several statements[3, 6, 7, 8, 9]. The value of the premium can be determined as an average of the values presented in these statements.

3.2.5 Capital structure

A fixed capital structure, where the weighting of interest-bearing debt is 50% and that of equity is 50%, is used in the determination of a reasonable rate of return.

The capital structure describes the weightings of the cost of equity and the cost of debt in the WACC model.

The capital structure also influences the determination of the beta coefficient. To bring the beta coefficients of various shares into a commensurable form, the impact of the capital structure of the enterprise must be eliminated.

According to financing theory, the enterprise's optimal capital structure must be used in the calculation of the weighted average cost of capital. A study commissioned by the European Commission[3] has derived the TSO's capital structure in terms of its business operations on the basis of listed reference enterprises that are as similar as possible. The assumption is that these enterprises have optimised their capital structure to maximise the enterprise's value.

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6 Martikainen Teppo, Lausunto Sähkömarkkinakeskukselle jakeluverkkotoimintaan sitoutuneen pääoman kohtuullisesta tuottoasteesta (Statement to the Energy Authority on the reasonable rate of return for capital employed in distribution network operations), 4 November 1998

7 PricewaterhouseCoopers, Lausunto koskien sähkön jakeluverkkotoiminnan pääoman keskikustannusta (Statement on the average cost of capital in electricity distribution network operations), 7 April 2004

8 Deloitte & Touche Oy, Energiamarkkinavirasto – Sähköverkkotoiminnan WACC-mallin ja sen parametrien arviointi (Energy Market Authority – Evaluation of the WACC model and its parameters in electricity network operations), 6 August 2010

9 Kallunki, Juha-Pekka, Lausunto Energiamarkkinaviraston käyttämästä sähköverkkotoiminnan valvontamallista (Statement on the regulatory model used by the Energy Market Authority in electricity network operations), 29 April 2011

3.3 REASONABLE COST OF DEBT

When determining a reasonable rate of return, the reasonable cost of debt is calculated by adding the risk premium of debt to the risk-free rate.

The calculation of the model describing reasonable cost of debt is presented in Formula 8.

$$C_D = R_r + DP \quad (8)$$

where

C_D = Reasonable cost of debt

R_r = Risk-free rate

DP = Risk premium of debt

3.3.1 Risk-free rate of debt

When determining the reasonable rate of return, the value of a risk-free rate, which is the basis for reasonable cost of debt, is calculated as with equity (3.2.1).

3.3.2 Risk premium of debt

In the fourth regulatory period (2016–2019), the value of the risk premium of debt is 1.4% when determining the reasonable rate of return.

The risk premium of debt describes the cost of the funding of debt in addition to risk-free rate.

A study conducted by the European Commission[3] has assessed the level of risk premium of debt in different ways. Based on these methods, a range of the value of risk premium of debt for Finnish TSOs has been estimated. The value of premium can be determined as the average of this range.

The value of the risk premium of debt for the fifth regulatory period (2020–2023) will be updated by the end of 2019.

The lower limit of the range is formed by the average of the index consisting of returns on ten-year bonds of European utility companies with Bloomberg credit rating A (*utility companies, Bloomberg fair market yield curve*) for the period from

June 2009 to May 2019, minus the average monthly quotations of the 10-year German government bond for the period from June 2009 to May 2019.

The upper limit of the range is formed by the average of the index consisting of returns on ten-year bonds of European utility companies with Bloomberg credit rating BBB (*utility companies, Bloomberg fair market yield curve*) for the period from June 2009 to May 2019, minus the average monthly quotations of the 10-year German government bond for the period from June 2009 to May 2019.

"Monthly quotation" refers to the quotation on the last trading day of the month.

The value of the risk premium consists of the average of the above-mentioned range, and it is applied as such during the fifth regulatory period.

The above-mentioned indices must include several enterprises at the time the risk premium is updated. Otherwise, the value of the risk premium of the debt applied by the Authority in the fifth regulatory period will be 1.4%.

3.4 CALCULATING REASONABLE RATE OF RETURN

The weighted average costs of adjusted capital invested in network operations is used as the reasonable rate of return (WACC %) in the regulation methods.

The total capital cost is calculated with the average weighted costs of equity and interest-bearing debt. The returns requirement of non-interest-bearing debt is zero, which is why it is not necessary to include it in the calculation of a reasonable rate of return.

A reasonable pre-tax rate of return[10] is used in the regulation methods.

Corporate tax is thus considered in the calculation of the reasonable return and it is not deducted in the calculation of realised adjusted profit. Application of the reasonable pre-tax rate of return clarifies the regulation methods and places the TSOs in an equal position regardless of their company status or group structure.

The reasonable rate of return is first calculated post-tax as presented in Formula 9.

$$\mathrm{WACC}_{post-tax} = C_E \times \frac{E}{E+D} + C_D \times (1 - yvk) \times \frac{D}{E+D} \qquad (9)$$

where

$WACC_{post\text{-}tax}$ = Reasonable rate of return after corporate tax

C_E = Reasonable cost of equity

C_D = Reasonable cost of interest-bearing debt

E = Adjusted equity invested in network operations

D = Adjusted interest-bearing debt invested in network operations

yvk = Current rate of corporate tax

After this, the above-mentioned post-tax reasonable rate of return is adjusted with the current rate of corporate tax. This will give the pre-tax reasonable rate of return, the calculation of which is presented in Formula 10.

$$\text{WACC}_{pre-tax} = \frac{WACC_{post-tax}}{(1 - yvk)} \quad (10)$$

where

$WACC_{pre\text{-}tax}$ = Reasonable rate of return before corporate tax

A fixed capital structure where the weighting of interest-bearing debt is 50% and that of equity is 50% is applied to the TSO. This way, the calculation of the pre-tax reasonable rate of return before corporate tax is carried out in accordance with Formula 11.

$$\text{WACC}_{pre-tax} = \frac{C_E \times 0{,}50}{(1 - yvk)} + C_D \times 0{,}50 \quad (11)$$

4 REASONABLE RETURN

The TSO's reasonable return is calculated by multiplying the adjusted capital invested in network operations (2.4) by the reasonable rate of return (3.4).

Therefore, the TSO receives a reasonable return on

- adjusted equity invested in network operations
- interest-bearing debt invested in network operations.

No reasonable return is obtained on non-interest-bearing debt invested in network operations as its returns requirement is zero.

The calculation of the pre-tax reasonable return before corporate tax is presented in Formula 12.

$$R_{k,\,pre\text{-}tax} = WACC_{pre\text{-}tax} \times (E + D) \qquad (12)$$

where

$R_{k,\,pre\text{-}tax}$ = Reasonable return before corporate tax, EUR

$WACC_{pre\text{-}tax}$ = Reasonable rate of return, per cent

E = Adjusted equity invested in network operations, EUR

D = Adjusted interest-bearing debt invested in network operations, EUR

$E + D$ = Adjusted capital invested in network operations, EUR

4.1 ADJUSTED ASSETS AND CAPITAL INVESTED IN NETWORK OPERATIONS

ADJUSTED ASSETS INVESTED IN NETWORK OPERATIONS

Adjusted assets invested in network operations consist of adjusted electricity network assets on the unbundled balance sheet (2.1), other non-current assets (2.2) and current assets (2.3).

Electricity network assets in non-current assets of the unbundled balance sheet, which constitute the most important asset item of electricity network operations, are replaced by adjusted electricity network assets (2.1). They consist of the adjusted regulatory asset value of the electricity network (2.1.2), which is calculated

from the adjusted replacement value of the electricity network with the network component-specific lifetimes and average ages (2.1.1). The adjusted replacement value is calculated on the basis of the quantity and unit prices of network components (Appendix 1).

Other assets invested in electricity network operations are adjusted next (2.2 and 2.3).

The principle of adjusting the assets side of the balance sheet when calculating the TSO's adjusted assets invested in network operations is presented in Table 2 in the form of a balance sheet calculation.

Table 2. *Principle of adjusting the assets side of the balance sheet*

ASSETS	
UNBUNDLED BALANCE SHEET	**ADJUSTED BALANCE SHEET**
Non-current assets	**Adjusted non-current assets**
Electricity network	Regulatory asset value of the electricity network
Goodwill	
Investments	
Other non-current assets	Other non-current assets at the balance sheet value
Current assets	**Adjusted current assets**
Inventories	Inventories at the balance sheet value
Trade receivables	Trade receivables at the balance sheet value
Financial assets	
TOTAL ASSETS	**ADJUSTED BALANCE SHEET TOTAL**

ADJUSTED CAPITAL INVESTED IN NETWORK OPERATIONS

The adjusted capital invested in network operations is obtained by adding the adjusted equity (2.4.1), adjusted interest-bearing debt (2.4.2) and adjusted non-interest-bearing debt (2.4.2). An equalisation item (2.4.1) is also added to this in order to reconcile the different sides of the balance sheet.

The principle of adjusting the liabilities side of the balance sheet of network operations, to be made when calculating the TSO's adjusted capital invested in network operations, is presented in Table 3 in the form of a balance sheet calculation.

Table 3. *Principle of adjusting the liabilities side of the balance sheet*

LIABILITIES

UNBUNDLED BALANCE SHEET	**ADJUSTED BALANCE SHEET**
Equity	**Adjusted equity**
Equity	Equity at the balance sheet value
	Group contributions granted, minus deferred tax liability
	Depreciation difference of assets other than electricity network assets, minus deferred tax liability, and voluntary provisions
	- Group contributions received, minus deferred tax liability
	Equalisation item of adjusted balance sheet
Accumulated appropriations	
Depreciation difference and provisions	
Obligatory provisions	
Obligatory provisions	
Debt	**Adjusted debt**
Interest-bearing	**Interest-bearing**
Interest-bearing debt	Interest-bearing debt at the balance sheet value
Capital loans	Capital loans at the balance sheet value
	- Share of equity in interest-bearing group contribution that is granted but not paid
Non-interest-bearing	**Non-interest-bearing**
Non-interest-bearing debt	Non-interest-bearing debt at the balance sheet value
	- Share of equity in non-interest-bearing group contribution that is granted but not paid
	Obligatory provisions at the balance sheet value
	Share of deferred tax liability of the depreciation difference of assets other than those in the electricity network
TOTAL LIABILITIES	**ADJUSTED BALANCE SHEET TOTAL**

4.2 REASONABLE RATE OF RETURN

The reasonable rate of return is calculated on the basis of the weighted average cost of capital (WACC model).

When the definition of a reasonable rate of return in accordance with Formula 11 is entered in Formula 12, the calculation of the reasonable rate of return after corporate tax on adjusted capital invested in network operations (pre-tax) will comply with Formula 13.

$$R_{k,pre-tax} = \left(\frac{C_E \times 0{,}50}{(1 - yvk)} + C_D \times 0{,}50 \right) \times (E + D) \tag{13}$$

The reasonable cost of adjusted equity invested in network operations in Formula 13 is calculated in accordance with Formula 14.

$$C_E = R_r + \beta_{velaton} \times \left(1 + (1 - yvk) \times \frac{50}{50} \right) \times (R_m - R_r) + LP \tag{14}$$

The reasonable cost of adjusted interest-bearing debt invested in network operations in Formula 13 is calculated in accordance with Formula 15.

$$C_D = R_r + DP \tag{15}$$

in Formulae 13, 14 and 15

$R_{k,\ pre\text{-}tax}$	=	Reasonable return before corporate tax
C_E	=	Reasonable cost of equity
C_D	=	Reasonable cost of interest-bearing debt
yvk	=	Corporate tax rate
E	=	Adjusted equity invested in network operations
D	=	Adjusted interest-bearing debt invested in network operations
R_r	=	Risk-free rate
β_{asset}	=	Asset beta coefficient
$R_m - R_r$	=	Market risk premium
LP	=	Premium for lack of liquidity
DP	=	Risk premium of debt

The parameters of reasonable rate of return applied in the fourth regulatory period are presented in Table 4.

Table 4. *Parameters of reasonable rate of return in the fourth regulatory period*

PARAMETER	VALUE APPLIED
RISK-FREE RATE	The higher value of the following two values, calculated annually: R_{r1} = Average daily values of the interest of 10-year Finnish government bonds for April–September of the previous year R_{r2} = Average daily values of the interest of 10-year Finnish government bonds for the previous ten years
ASSET BETA	0.4
EQUITY BETA	0.720
MARKET RISK PREMIUM	5.0%
PREMIUM FOR LACK OF LIQUIDITY	0.6%
CAPITAL STRUCTURE (gearing/equity)	50%/50%
RISK PREMIUM OF DEBT	1.4%
RATE OF CORPORATE TAX	20.0%

UPDATING PARAMETERS OF REASONABLE RATE OF RETURN

The Energy Authority updates the value of the risk-free rate of interest annually.

The Authority updates the rate of corporate tax to correspond with the current value annually as required.

For the fifth regulatory period, the Authority will update the risk premium of debt for

the reasonable rate of return.

The values of the following parameters relating to the reasonable rate of return will remain unchanged throughout the years of the fourth and fifth regulatory periods:

- Market risk premium
- Premium for lack of liquidity
- Asset beta
- Equity beta
- Capital structure

5 INCOME AND COSTS OF NETWORK OPERATIONS

The basis for calculating realised adjusted profit is the operating profit (loss) in accordance with the unbundled profit and loss account of the network operations, which is adjusted with the profit adjustment items described in this chapter. The impact of incentives will then be deducted in the calculation of realised adjusted profit (6).

5.1 INCOME FROM NETWORK OPERATIONS

Income entered before the operating profit (loss) in the unbundled profit and loss account is used as income from network operations in the calculation of realised adjusted profits.

Income from network operations includes the following:

- Income from network service fees
- Income from cross-border transmission fees
- Income from international transmission fees
- Congestion income
- Income from system services
- Income from balancing services
- Non-refundable connection fees
- Income from other services related to network operations

The following adjustment items are returned in the calculation of realised adjusted profit:

- Annual net change in refundable connection fees
- Planned depreciation and reduction in value of electricity network assets in non-current assets
- Planned amortisation of goodwill
- Sales loss resulting from the sale of a network section

The profit from the sale of a network section entered under other operating income is deducted when calculating the realised adjusted profit.

CONNECTION FEES

In the calculation of the realised adjusted profit, the annual net change in refundable connection fees entered in the unbundled balance sheet is returned.

The annual net change in connection fees is obtained by deducting the amount of connection fees in the unbundled balance sheet of the previous accounting period from the amount of connection fees in the unbundled balance sheet in the accounting period.

Non-refundable connection fees are treated as income from network operations.

The manner in which connection fees are treated in the balance sheet adjustment is described in Chapter 2.4.2.

Connection fees are not deferred

The Authority has considered an alternative method of treating connection fees to defer their high accruals. This matter has also been dealt with in TSO public hearings and in a previously commissioned study, as well as in a court of law, based on complaints by TSOs (MAO:13/10 and MAO:427–501/12).

No alternative method of treating connection fees has been presented that would safeguard equal treatment of TSOs.

Connection fees are not therefore deferred, but treated as income from network operations for the accounting period during which they have been entered in the unbundled financial statements.

DEPRECIATION OF ELECTRICITY NETWORK ASSETS IN NON-CURRENT ASSETS

In the unbundled profit and loss account, planned depreciations of electricity network assets are returned in the calculation of realised adjusted profit.

Amortisation of electricity network assets recorded in non-current assets in the unbundled financial statements are also added to planned depreciations to be returned.

PLANNED AMORTISATION OF GOODWILL

Planned amortisation of goodwill on the unbundled profit and loss account is returned in the calculation of realised adjusted profit.

SALES PROFIT AND LOSS RESULTING FROM THE SALE OF A NETWORK SECTION

If the profit from the sale of a network section is entered under other operating income in the unbundled profit and loss account, the amount of sales profit is deducted when calculating the realised adjusted profit.

However, if a sales loss has been recorded under other operating expenses in the unbundled profit and loss account, the sales loss is returned in the calculation of realised adjusted profit.

CONGESTION INCOME

The TSO must use the congestion income it has received for the purposes listed in Article 16, section 6 of EC Regulation No 714/2009:

a) Guaranteeing actual availability of allocated capacity

   For example, countertrading costs to maintain the transmission capacity from Finland to the other EU member states.

b) Maintaining or increasing interconnection capacities through network investments, in particular in new interconnectors

   For example, investments in cross-border lines between Finland and the other EU member states as well as investments within Finland if these investments can increase or promote the cross-border capacity with the other EU member states.

When delivering regulatory data, the TSO must provide an account of the congestion income received and the purposes for which the income was used.

Congestion income used during the accounting year during which it was entered as income

If the TSO uses the congestion income received for any of the purposes listed in the EU Regulation during the same accounting year, the procedure described below must be used.

The congestion income and the corresponding costs recognised in expenses have already been taken into account in the operating profit (loss) in the unbundled profit and loss account. Therefore, no separate adjustment is to be made in the calculation of realised adjusted profit.

If the costs corresponding to the congestion income were activated on the unbundled balance sheet, the congestion income must be eliminated in the calculation of the year's realised adjusted profit.

Congestion income not used during the accounting year during which it was entered as income

If the TSO is not able to use the congestion income for the purposes listed in the EU Regulation during the year, the TSO must use the procedure described below.

The TSO must enter the rest of the received congestion income into a separate internal follow-up account until the income can be used for a purpose listed in the EU Regulation.

The unused congestion income is eliminated in the calculation of the current year's realised adjusted profit if the income is included in the TSO's profit (loss) in the unbundled profit and loss account.

If the TSO uses the congestion income included in the internal follow-up account for a purpose listed in the EU Regulation during subsequent years, a corresponding share must be returned in the calculation of the realised adjusted profit.

Congestion income not used for the purposes listed in Article 16(6)(a/b) of EC Regulation No 714/2009

If it is determined at a later date that congestion income entered in the internal follow-up account cannot be used in the manner laid down in points a or b of Article 16(6), the TSO must apply for permission from the Energy Authority to use the congestion income as income from network operations.

If the Authority approves the application, the congestion income will be returned to the calculation of the realised adjusted profits for the year in which the decision is made as income from network operations.

5.2 COSTS OF NETWORK OPERATIONS

In the calculation of realised adjusted profit, costs entered in the unbundled profit and loss account are used as costs of network operations. These are adjusted with the profit adjustment items described in this chapter.

According to section 3, paragraph 6 of the Electricity Market Act, electricity network operations refers to placing the electricity network at the disposal of those needing

electricity transmission and similar network services in return for consideration. Electricity network operations include the following:

- Design, construction, maintenance and operation of the electricity network
- Connecting customers' electrical devices to the network
- Metering of electricity
- Other measures required in the transmission of electricity necessary for electricity transmission and other network services

Costs related to these functions constitute costs of network operations.

Costs of network operations also include the following:

- Costs of cross-border transmission
- Costs of international transmission
- Countertrading costs
- Costs of system services
- Costs of balancing services
- Compensation paid by the TSO to its customers for outages

In accounting, these costs must be allocated to business operations in accordance with the matching principle.

EQUAL TREATMENT OF INVESTMENTS AND EXPENSES IN ACCOUNTING

The TSO is in an equal position regardless of whether it capitalises its costs pertaining to investment or records them as expenses.

The cost of components will not be taken into account twice in the regulation methods.

If the component investment is recorded as expenses in operational costs, this component will not be accepted in the adjusted replacement value and regulatory asset value. No separate adjustment will be made on the component in the calculation of realised adjusted profit, either. A component recognised wholly in expenses has already been taken into account in the operating profit (loss) in the profit and loss account.

Demolition and general costs recorded as expenses are taken into account in the calculation of realised adjusted profit in the same way as other expenses.

The demolition costs of replacement investments, which have been capitalised on the unbundled balance sheet, are taken into account in adjusted assets invested in network operations at their value according to the unbundled balance sheet as described in Chapter 2.2.

The TSO must provide a breakdown of capitalised costs arising from investments as a separate cost item in the notes to the unbundled financial statements.

COSTS NOT PART OF NETWORK OPERATIONS

In the calculation of actual adjusted profit, only costs for which the TSO receives compensation are accepted as costs of network operations.

Uncompensated costs are treated as items of profit distribution nature and they are returned in the calculation of realised adjusted profit. These uncompensated costs include the following, for example:

- Tariff difference compensations
- Resource and resource provision compensations
- Component investment compensations

If the TSO wishes these costs to be accepted as costs of network operations, the TSO must provide an account of the matter in connection with the delivery of regulatory data. The actual compensation received against the TSO's costs must be verified in the account. The Authority will assess the account and on its basis decide on the handling of these costs.

COMPENSATION PAID TO CUSTOMERS FOR OUTAGES

Any compensations paid by the TSO to its customers for outages are considered costs of network operations. Standard compensations treated as sales adjustments are also costs of network operations.

The TSO must present compensation paid to customers for outages as a separate cost item in the notes to the unbundled financial statements.

DEPRECIATION OF OTHER ASSETS IN NON-CURRENT ASSETS

Planned depreciation based on the unbundled income statement is used as the depreciation on fixed assets other than electricity network assets in the calculation of realised adjusted profit. These items have already been taken into account in the

operating profit (loss) on the unbundled income statement. Therefore, no separate adjustment is made in the calculation of the realised adjusted profit.

However, if network components are recorded in items other than the electricity network assets in the non-current assets on the unbundled profit and loss account, depreciation on these components will be eliminated from depreciation on other commodities in non-current assets, because the network components are taken into account in the adjusted straight-line depreciation of electricity network assets according to Chapter 6.1.1.

CONTROLLABLE AND NON-CONTROLLABLE OPERATIONAL COSTS

Costs arising from electricity network operations incurred by the TSO, entered through profit and loss, are divided in the calculation of actual adjusted profit into controllable and non-controllable operational costs. Controllable operational costs are subject to an efficiency target in accordance with the efficiency incentive (6.3).

The definition of controllable operational costs (KOPEX) is presented in Table 5.

Table 5. *Controllable operational costs*

KOPEX	=	Materials, supplies and goods
	+	Increase or decrease in inventories
	+	Personnel expenses
	+	Cost of leasing
	+	Other external services
	+	Internal expenses
	+	Other operating expenses
	+	Compensation paid to customers for outages (if not included in other expenses)
	+	Components recorded as expenses (if not included in other items above)
	–	Loss energy acquisition costs
	–	Production for own use
	–	Costs from maintenance of reserve capacity
	–	Costs entered as income corresponding to congestion income
	–	Costs of balancing services
	–	Development and maintenance fees for the European market in accordance with EU regulation
	–	Costs on development and maintenance of day-ahead and intraday markets in accordance with EU regulation

If necessary, the TSO must provide the Energy Authority with an account of the efficiency and impact of maintenance fees for the European market. The Authority will assess the account and on its basis decide on the handling of these costs.

Costs from network operations other than those presented in Table 5 are uncontrollable operating costs.

5.3 FINANCING COSTS OF NETWORK OPERATIONS

Reasonable costs of financial assets are taken into account as financing costs when calculating the realised adjusted profit.

REASONABLE COSTS OF FINANCIAL ASSETS

Network operations require certain financial assets. They are needed to make regular payments, because the payment transactions of the TSO occur at somewhat different times from cash payments. They are also needed to make provisions for unexpected expenses.

Reasonable costs arising from financial assets necessary to safeguard network operations are therefore taken into account in the calculation of realised adjusted profit. This is conducted using a calculation method based on which the costs of the financial assets are not unreasonably low or insufficient from the TSO's perspective by virtue of a decision by the Supreme Administrative Court (KHO:2010:86).

The following are taken into account in the financial assets recorded in the unbundled balance sheet:

- Short- and long-term receivables, with the exception of trade receivables
- Marketable securities
- Cash and bank receivables and comparable items

When calculating the realised adjusted profit, the amount taken into account with respect to financial assets corresponds to a maximum of 10% of the turnover from network operations.

The reasonable costs of financial assets can be calculated by multiplying the maximum amount of financial assets by the reasonable cost of debt used in the calculation of a reasonable rate of return (3.3).

This gives the reasonable costs of financial assets required for safeguarding network operations, and these are deducted when calculating the realised adjusted profit.

6 INCENTIVES

6.1 INVESTMENT INCENTIVE

The purpose of the investment incentive is to encourage the TSO to make its investments cost-effectively on average and enable replacement investments.

The investment incentive consists of the incentive impact of unit prices and the straight-line depreciation calculated from the adjusted replacement value.

The incentive impact of unit prices directs the TSO to invest more effectively than on average and to find more cost-effective methods of implementation than before. The incentive impact arises from the difference between investments calculated with unit prices and the cost of realised investments. When investing cost-effectively on average, the TSO will obtain a higher value for its investments than the actual investments (adjusted replacement value).

With the regulatory asset value, the incentive impact of the straight-line depreciation calculated from the TSO's adjusted replacement value directs the TSO to maintain its network in accordance with the lifetimes it has selected in actual use as part of the network assets and enables the making of sufficient replacement investments.

The incentive impact arises from the fact that the methods allow the TSO an annual depreciation level based on average adjusted straight-line depreciation on the basis of the lifetimes selected by the TSO. Imputed straight-line depreciations are always allowed in full as far as the component is in actual use. The imputed straight-line depreciation will therefore be calculated for the component even after the end of the lifetime if the component is still in actual use.

When the lifetime has been correctly selected, the straight-line depreciation of the investment incentive enables and covers on average all necessary replacement investments, including early replacement investments. In other words, the investment incentive enables full depreciation of the replacement value of network components. Straight-line depreciation is permitted for components that have exceeded their lifetime in the same relation as the depreciated cost of the components that have correspondingly been demolished before reaching the end of their lifetimes.

6.1.1 Adjusted straight-line depreciations

The adjusted straight-line depreciations on the electricity network assets are calculated per network component from the adjusted replacement value of the electricity

network assets (2.1.1). Adjusted straight-line depreciations are calculated for all years of the regulatory period in the situation on the last day of December in the year in question. As the unit prices will not be updated for the fifth regulatory period and inflation is not taken into account in the unit prices, the change in inflation is taken into account with the consumer price index in the calculation of straight-line depreciation.

The calculation of adjusted straight-line depreciation of network component i for the year k is presented in Formula 16.

$$JHATP_{i,k} = \frac{JHA_i}{lifetime_i} \times \left(\frac{KHI_k}{KHI_{2016}} \right) \quad (16)$$

Adjusted straight-line depreciations for the entire electricity network are calculated in accordance with Formula 17.

$$JHATP_k = \sum_{i=1}^{n} \left(\frac{JHA_i}{lifetime_i} \right) \times \left(\frac{KHI_k}{KHI_{2016}} \right) \quad (17)$$

in Formulae 16 and 17

$JHATP_{i,k}$ = Adjusted straight-line depreciation of network component I in the year k

$JHATP_k$ = Adjusted straight-line depreciations of all electricity network assets in the year k

JHA_i = Adjusted replacement value of network component i

$lifetime_i$ = Technical and economical lifetime of network component i

KHI_k = Consumer price index in the year k

KHI_{2016} = Consumer price index in 2016

AID RECEIVED FOR THE CONSTRUCTION OF THE NETWORK

The TSO may receive aids or other compensation for investing in the network from the Finnish Government or the European Union, for example. Components funded by aids or compensations are taken into account in the adjusted replacement value

of the electricity network assets when calculating adjusted straight-line depreciations of the electricity network assets in the investment incentive.

6.1.2 Investment incentive in the calculation of realised adjusted profit

The impact of the investment incentive is deducted when calculating realised adjusted profit. The impact of the investment incentive on the realised adjusted profit is calculated annually in accordance with the formula (17).

6.2 QUALITY INCENTIVE

The purpose of the quality incentive is to encourage the TSO to develop the quality of electricity transmission.

The TSO is encouraged to achieve at least the level of security of supply required by the Electricity Market Act. The Authority aims to guide the TSO also to voluntarily develop the quality of electricity transmission to a level higher than the minimum level required by law.

CALCULATION METHOD

The method in compliance with the TSO's outage cost calculation described in this chapter is used in the quality incentive. The method is based on the calculation of the disadvantage caused by an outage at an access point of the electricity system.

The TSO must perform the annual calculation required for the quality incentive using the method described in this chapter.

When delivering the regulatory data each year, the TSO must submit to the Energy Authority the value of actual outage costs during the previous year. The TSO must also deliver access point specific outage data and any other data required for the calculation in electronic format for the Energy Authority to verify the calculation of the disadvantages caused by outages.

6.2.1 Outage costs

The outage costs or the disadvantage caused by outages are calculated based on the number of outages, their duration and dates and times, the power affected by the outage and unit prices.

OUTAGES

The following outages caused by the transmission system are considered:

- Number of access point specific unexpected outages, their duration and the impacted power
- Number of access point specific outages caused by high-speed automatic reclosing and the impacted power
- Number of access point specific outages caused by time-delayed automatic reclosing, their duration and the impacted power

UNIT PRICES OF OUTAGES

The seven consumption types listed in Table 6 have been specified for the TSO's customers. Each of the access points in the TSO's network has been classified as one of these types.

The unit prices of outages used are the values presented in Table 6, which are based on a report commissioned by the Authority and Fingrid Oyj from Tampere University of Technology and Lappeenranta University of Technology[11].

According to the report, the outage prices have been adjusted for the quality incentive to ensure that the disadvantage caused by outages describes the disadvantage experienced by customers as well as possible. The outage unit prices were adjusted in further studies commissioned by Fingrid Oyj from Pöyry Forest Consulting Oy[12,13].

The unit prices for unexpected outages of less than one second determined in the study by Tampere University of Technology and Lappeenranta University of Technology were updated in Table 6 to the same extent the unit prices for unexpected outages of more than one second were updated. The reports did not determine unit prices for outages of less than one second in the minerals industry, which is why the same unit price is used for all outages in the minerals industry in the case of power coefficient A.

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11 Tampere University of Technology, Lappeenranta University of Technology/Mäkinen Antti, Järventausta Pertti, Verho Pekka, Repo Sami, Honkapuro Samuli, Partanen Jarmo, Sähkönsiirtoverkon häiriökeskeytysten aiheuttaman haitan arvioinnissa käytettävien parametrien päivittäminen (Updating parameters used to assess disadvantages caused by transmission outages), April 2009

12 Pöyry Forest Consulting Oy, Keskeytyksestä aiheutuneen haitan arviointi kemiallisessa metsäteollisuudessa (Assessing disadvantages caused by outages in the chemical wood processing industry), public report, 26 October 2009

13 Pöyry Forest Consulting Oy, Keskeytyksestä aiheutuneen haitan arviointi metalli- ja kemianteollisuudessa (Assessing disadvantages caused by outages in the metal and chemical industries), public report, 20 November 2009

The unit prices in the table are at 2010 monetary values. The unit prices for the outage cost reference level and the calculation of the actual outage costs are revised to each year's monetary value, using the consumer price index as specified in Chapter 1.8.

Table 6. *Unit prices of the disadvantage caused by outages*

	Unexpected outage of more than 1 sec		**Unexpected outage of less than 1 sec (PJK)**
Customer's consumption type	**Value of coefficient A** EUR/kW	**Value of coefficient B** EUR/kWh	**Value of coefficient A** EUR/kW
1 Minerals industry	0.44	0.27	0.44
2 Paper industry	2.60	0.23	2.2
3 Chemicals industry	2.40	2.00	1.3
4 Metal industry	2.02	0.98	1.8
5 Traffic	0.10	0.90	0.0
6 Distribution networks,	1.90	16.10	1.5
7 Distribution networks,	1.90	16.10	1.5

6.2.2 Reference level for outage costs in the fourth regulatory period

The determination of the reference level for the quality incentive was examined in a study commissioned by the Energy Authority from Gaia Consulting Oy[14] as well

[14] Gaia Consulting Oy/Karttunen Ville, Vanhanen Juha, Partanen Jarmo, Matschoss Kaisa, Bröckl Marika, Haakana Juha, Hagström Markku, Lassila Jukka, Pesola Aki and Vehviläinen Iivo, Selvitys laatukannustimen toimivuudesta ja kehitystarpeista vuosille 2016–2023 (Report on performance and development needs of the quality incentive in 2016–2023), 27 October 2014

as in the report commissioned by the Authority from Tampere University of Technology and Lappeenranta University of Technology[15]. In the latter, the issue was examined especially from the perspective of the risk of a major supply interruption.

The TSO's average realised regulatory outage costs for the two previous regulatory periods, i.e. eight years, are used as the reference level for regulatory outage costs. In the fourth regulatory period, the average realised regulatory outage costs for 2008–2015 are used as the reference level.

When the reference level is calculated, the impacts of major supply interruptions are not removed even if the impact of the quality incentive in the calculation of realised adjusted profits has also been made reasonable in the previous regulatory periods. Major supply interruptions are considered in the reference level as this compensates the costs to the TSO arising from them.

The reference level is adjusted by the annual energy transmitted to the customers in order to make the reference level for regulatory outage costs comparable with the realised regulatory outage costs with respect to the transmitted energy.

The calculation of transmission system outage costs' reference level in the fourth regulatory period is presented in Formula 18.

$$KAH_{ref,k} = \frac{\sum_{t=2008}^{2015}\left[KAH_{t,k}^{KV} \times \left(\frac{W_k}{W_t}\right)\right]}{8} \quad (18)$$

The calculation of actual transmission system outage costs is presented in Formula 19.

$$KAH_{t,k}^{KV} = \sum_{i=1}^{n}\left[(A_i + B_i \times T_i) \times P_i \times K_{i,va} \times K_{i,vp}\right] \times \left(\frac{KHI_k}{KHI_{2010}}\right) \quad (19)$$

in Formulae 18 and 19

$KAH_{ref,k}$ = Outage cost reference level for the year k, EUR

[15] Tampere University of Technology, Lappeenranta University of Technology/Verho Pekka, Strandén Janne, Nurmi Veli-Pekka, Mäkinen Antti, Järventausta Pertti, Hagqvist Olli, Partanen Jarmo, Lassila Jukka, Kaipia Tero, Honkapuro Samuli, Nykyisen valvontamallin arviointi – suurhäiriöriski (Assessment of the current regulatory model – risk of major supply interruptions), 24 November 2010

$KAH^{KV}_{t,k}$ = Actual transmission system outage costs in the year t with the monetary value in the year k, EUR

W_k = Volume of energy transmitted in the year k, kWh

W_t = Volume of energy transmitted in the year t, kWh

k = Year 2016, 2017, 2018 or 2019

t = Year 2008, 2009, 2010, 2011, 2012, 2013, 2014 or 2015

n = Number of unexpected outages in the year t, pcs

A_i = Power coefficient for an outage of less than 1 sec or more than 1 sec i, depending on the type of consumption

B_i = Energy coefficient i for the unexpected outage, depending on the type of consumption

T_i = Duration of unexpected outage i, hours

P_i = Effective power of the access point at the start of unexpected outage i, kW

$K_{i,va}$ = Seasonal coefficient for the starting time of unexpected outage i

$K_{i,vp}$ = Time of day coefficient for the starting time of unexpected outage i

KHI_k = Consumer price index in the year k

KHI_{2010} = Consumer price index in 2010

The values of the parameters, the power coefficient depending on the type of consumption and the energy coefficient (A and B) in Formula 19 were determined in the report commissioned by the Authority and Fingrid Oyj[8]. Only the power-based coefficient A is used for unexpected outages of less than one second.

6.2.3 Reference level for outage costs in the fifth regulatory period

The reference level for the fifth regulatory period will be the sum total of the mean values for the actual outage costs in 2012–2019.

The calculation of transmission system outage costs' reference level in the fifth regulatory period is presented in Formula 20.

$$KAH_{ref,k} = \frac{\sum_{t=2012}^{2019}\left[KAH_{t,k}^{KV} \times \left(\frac{W_k}{W_t}\right)\right]}{8} \quad (20)$$

where, unlike in Formulae 18 and 19,

k = Year 2020, 2021, 2022 or 2023

t = Year 2012, 2013, 2014, 2015, 2016, 2017, 2018 or 2019

6.2.4 Actual outage costs during the fourth and fifth regulatory period

The disruption caused to the TSO's customers from the outages is calculated annually.

The actual transmission system outage costs during the fourth and fifth regulatory period $KAH^{KV}{}_t$ are calculated in accordance with Formula 19. The difference from Formula 19 is

$t = k$ = Year under review, i.e. 2016, 2017, 2018, 2019, 2020, 2021, 2022 or 2023

6.2.5 Quality incentive in the calculation of realised adjusted profit

The impact of the quality incentive is deducted when calculating the realised adjusted profit.

The impact of the quality incentive is calculated by deducting realised outage costs from the outage cost reference level.

The maximum impact of the quality incentive in the calculation of the realised adjusted profit is set to be reasonable. The largest deviations in the annual number of outages and their duration are considered by setting upper and lower limits for the quality incentive. This means a difference between the reference level for outage costs and the realised outage costs higher than the set limit value will have no impact on the calculation of the realised adjusted profit.

The impact of the quality incentive taken into account in the calculation of the realised adjusted profit may not be higher than 3% of the TSO's reasonable return for the year in question. This applies to the quality bonus received from improved quality and the quality sanction resulting from deteriorated quality.

Furthermore, the quality incentive must be symmetrical if the TSO's highest possible quality bonus is less than 3% of the year's reasonable return. The possible quality sanction may therefore be at a maximum the same order of magnitude as the highest possible quality bonus.

6.3 EFFICIENCY INCENTIVE

The purpose of the efficiency incentive is to encourage the TSO to act in a cost-effective manner.

The operations of a TSO are cost-effective when the input, or costs, used in its operations are as low as possible in relation to the output of operations.

ON THE CALCULATION OF THE EFFICIENCY INCENTIVE

The calculation of the TSO's efficiency incentive consists of six different factors:

- General efficiency target (6.3.1)
- Company-specific efficiency target (6.3.2)
- Reference level for company-specific efficiency costs (6.3.3)
- Company-specific realised efficiency costs (6.3.4)
- Efficiency incentive in the calculation of realised adjusted profit (6.3.5)

6.3.1 General efficiency target

The purpose of the general efficiency target is to encourage TSOs, including those found efficient by the efficiency measurement, to improve the efficiency of their operations in accordance with general productivity development.

In the regulation of monopoly operations, it is natural to set a general efficiency target for enterprises.

DEVELOPMENT OF PRODUCTIVITY IN THE NETWORK INDUSTRY

A study[16] commissioned by the Energy Authority assessed the level of the general efficiency target by examining productivity development in various network activities.

The productivity figures vary depending on the network operations and the period under examination. The study recommends defining the general efficiency target based on long-term productivity development.

On this basis, the study recommends the same annual general efficiency target with a value of two per cent for all network activities.

NEW TASKS AND METHODS OF OPERATION

As a result of changes in legislation, the TSO has been assigned with new tasks, and will probably be assigned more in the future. Furthermore, old tasks are to be conducted with new kinds of operating methods.

It is difficult to take into account the extra costs resulting from the new tasks and methods and, on the other hand, the cost savings they reliably bring in the calculation of realised adjusted profit.

The Authority believes that the clearest and most appropriate way to take these costs and benefits into account in the calculation of the realised adjusted profit is to revise the level of the general efficiency target.

LEVEL TO BE APPLIED

The value of the general efficiency target used in the fourth and fifth regulatory period is 0% instead of the two per cent determined based on long-term productivity development.

This compensates the impacts of the extra costs to the TSO resulting from new tasks and methods of operation in the calculation of the realised adjusted profit.

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[16] Sigma-Hat Economics Oy / Kuosmanen, T., Saastamoinen, A., Keshvari, A., Johnson, A., & Parmeter, C., Yleinen tehostamistavoite sähkön ja maakaasun siirto- ja jakeluverkkotoiminnan valvontamalleissa sekä tehostamiskannustimen arviointi: Ehdotus Energiaviraston soveltamien menetelmien kehittämiseksi neljännellä valvontajaksolla 2016 – 2019 (General efficiency goal in regulatory models for electricity and natural gas transmission and distribution network operations and assessment of the efficiency incentive: Proposal for the development of the Energy Authority's methodology during the fourth regulatory period 2016–2019), 21 October 2014

6.3.2 Company-specific efficiency target

The purpose of the company-specific efficiency target is to encourage TSOs found inefficient in the efficiency measurement to achieve a level of efficient operations.

EFFICIENCY POTENTIAL

The efficiency target is based on the identified efficiency potential of a TSO.

The efficiency potential can be identified, for example, by comparing the TSO's realised costs and production to those of all TSOs.

As there is only one transmission system operator in Finland, the reference group used in the evaluation of the efficiency potential consists of other European TSOs. According to a study on the efficiency of European TSOs[17], transmission system operations in Finland have been cost-effective.

METHOD USED

According to the European study, the TSO has been efficient. Furthermore, the general efficiency target in the fourth and fifth regulatory period is 0%.

Therefore, the measuring of the TSO's efficiency only consists of comparing the TSO's cost level with its own cost level in previous years.

The calculation of efficiency potential is based on the TSO's realised controllable operational costs (KOPEX). These are compared to the reference level calculated based on realised costs in previous years, i.e. reasonable controllable operating costs (SKOPEX).

6.3.3 Reference level for efficiency costs

The reference level for efficiency costs is the reasonable controllable operating costs (SKOPEX). The reference level is calculated annually, taking the impact of inflation and the network volume into account.

During the first year of a regulatory period, the reference level for efficiency costs is defined based on the TSO's average realised controllable operating costs during the previous regulatory period, i.e. the previous four years.

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[17] Frontier Economics, Consentenc, Sumicsid, E3GRID2012 – European TSO Benchmarking Study: A Report for European Regulators, 2013

During the subsequent years of a regulatory period, reasonable controllable operating costs from the previous year are used as the reference level for efficiency costs.

REFERENCE LEVEL FOR OUTAGE COSTS DURING THE FOURTH REGULATORY PERIOD

The calculation of the reference level in 2016 is presented in Formula 21.

$$SKOPEX_{2016} = \frac{1}{4} \sum_{t=201}^{2015} ((1 + \Delta KHI_{2016}) \times (1 + \Delta K_{2016}) \times KOPEX_t) \quad (21)$$

where

$SKOPEX_{2016}$ = Efficiency cost reference level or reasonable controllable operating costs for 2016

ΔK_{2016} = Network volume change from the year *t* to 2016

ΔKHI_{2016} = Change of the consumer price index from the year *t* to 2016

$KOPEX_{t,}$ = Realised controllable operating costs in the year *t*

The calculation of the reference level for the subsequent years of the regulatory period, 2017–2019, is presented in Formula 22.

$$SKOPEX_t = (1 + \Delta KHI_t) \times (1 + \Delta K_t) \times SKOPEX_{t-1} \quad (22)$$

where

$SKOPEX_t$ = Efficiency cost reference level or reasonable controllable operating costs for the year *t*

$SKOPEX_{t-1}$ = Efficiency cost reference level or reasonable controllable operating costs for the year *t-1*

ΔK_t = Change of network volume from the year *t-1* to the year *t*

ΔKHI_t = Change of the consumer price index from the year *t-1* to the year *t*

t = Year 2017, 2018 or 2019

REFERENCE LEVEL FOR OUTAGE COSTS DURING THE FIFTH REGULATORY PERIOD

The calculation of the reference level in 2020 is presented in Formula 23.

$$SKOPEX_{2020} = \frac{1}{4} \sum_{t=201}^{2019} ((1 + \Delta KHI_{2020}) \times (1 + \Delta K_{2020}) \times KOPEX_t) \qquad (23)$$

where

$SKOPEX_{2020}$ = Efficiency cost reference level or reasonable controllable operating costs for 2020

ΔK_{2020} = Network volume change from the year *t* to 2020

ΔKHI_{2020} = Change of the consumer price index from the year *t* to 2020

$KOPEX_t$ = Realised controllable operating costs in the year *t*

The calculation of the reference level for the subsequent years of the regulatory period, 2021–2023, is presented in Formula 24.

$$SKOPEX_t = (1 + \Delta KHI_t) \times (1 + \Delta K_t) \times SKOPEX_{t-1} \qquad (24)$$

where

$SKOPEX_t$ = Efficiency cost reference level or reasonable controllable operating costs for the year *t*

$SKOPEX_{t-1}$ = Efficiency cost reference level or reasonable controllable operating costs for the year *t-1*

ΔK_t = Change of network volume from the year *t-1* to the year *t*

ΔKHI_t = Change of the consumer price index from the year *t-1* to the year *t*

t = Year 2021, 2022 or 2023

NETWORK VOLUME ADJUSTMENT

Changes in the scope of operations of the TSO are considered in accordance with a model developed by the Authority in cooperation with Fingrid Oyj.

The network volume is calculated based on the total length of the overhead line network, the number of substation fields and corresponding coefficients. The calculation of the network volume is presented in Formula 25.

$$VV = X \times VJ + Y \times KE \quad (25)$$

where

VV = Scope of the entire network or network volume

VJ = Total length of the overhead line network in the distribution network, km

KE = Number of substation fields in the transmission system, pcs

X = Cost coefficient for the distribution network overhead line network

Y = Cost coefficient for the transmission system substation fields

Calculation of cost coefficients

The calculation of the distribution network overhead line network cost coefficient in the fourth regulatory period is presented in Formula 26.

$$X_t = \frac{VJc_{ka,2010-2014}}{VJ_t} \quad (26)$$

The calculation of the transmission system substation field cost coefficient in the fourth regulatory period is presented in Formula 27.

$$Y_t = \frac{KEc_{ka,2010-2014}}{KE_t} \quad (27)$$

where

$VJc_{ka,2010-2014}$ = Average costs of the maintenance of the distribution network overhead line network in 2010–2014

VJ_t = Total length of the overhead line network at the end of the year t , km

X_t = Cost coefficient for the overhead line network in the year t

$KEc_{ka,2010\text{-}2014}$ = Average costs of the maintenance of the transmission system substation fields in 2010–2014

KE_t = Number of substation fields at the end of the year t , pcs

Y_t = Cost coefficient for the substation fields in the year t

The calculation of the distribution network overhead line network cost coefficient in the fifth regulatory period is presented in Formula 28.

$$X_t = \frac{VJc_{ka,2014-2018}}{VJ_t} \tag{28}$$

The calculation of the transmission system substation field cost coefficient in the fifth regulatory period is presented in Formula 29.

$$Y_t = \frac{KEc_{ka,2014-2018}}{KE_t} \tag{29}$$

where

$VJc_{ka,2014\text{-}2018}$ = Average costs of the maintenance of the distribution network overhead line network in 2010–2018

VJ_t = Total length of the overhead line network at the end of the year t , km

X_t = Cost coefficient for the overhead line network in the year t

$KEc_{ka,2014\text{-}2018}$ = Average costs of the maintenance of the transmission system substation fields in 2010–2018

KE_t = Number of substation fields at the end of the year t , pcs

Y_t = Cost coefficient for the substation fields in the year t

Calculation of network volume change

The calculation of the change of the network volume in 2016 is presented in Formula 30.

$$\Delta K_{2016} = \frac{VV_{2016}}{VV_t} - 1 \qquad (30)$$

where

ΔK_{2016} = Network volume change in 2016

VV_{2016} = Network volume at the end of 2016

VV_t = Network volume at the end of the year *t*

The calculation of the change of the network volume in 2020 is presented in Formula 31.

$$\Delta K_{2020} = \frac{VV_{2020}}{VV_t} - 1 \qquad (31)$$

where

ΔK_{2020} = Network volume change in 2020

VV_{2020} = Network volume at the end of 2020

VV_t = Network volume at the end of the year *t*

The calculation of the network volume change for the other years of the fifth regulatory period, 2017–2019 and 2021–2023, is presented in Formula 32.

$$\Delta K_t = \frac{VV_t}{VV_{t-1}} - 1 \qquad (32)$$

where

ΔK_t = Network volume change

VV_t = Network volume at the end of the year *t*

VV_{t-1} = Network volume at the end of the year *t* - *1*

t = Year 2017, 2018, 2019, 2021, 2022 or 2023

6.3.4 Realised efficiency costs

Controllable operational costs are used as the realised efficiency costs. The realised efficiency costs are calculated annually.

Cost items according to the unbundled profit and loss account for each year are used as the controllable operational costs. The items included in the controllable operational costs are presented in Table 5 of Chapter 5.2.

6.3.5 Efficiency incentive in the calculation of realised adjusted profit

The impact of the efficiency incentive is deducted when calculating the realised adjusted profit.

The impact of the efficiency incentive is calculated by deducting the realised efficiency costs from the reference level for efficiency costs in the same year.

The maximum impact of the efficiency incentive in the calculation of realised adjusted profit is made reasonable. The greatest deviations in the annual controllable operational costs are considered by setting upper and lower limit values for the efficiency incentive. This means that a difference between the reference level for regulatory outage costs and the realised imputed regulatory outage costs higher than the set limit value will have no impact on the calculation of the realised adjusted profit.

The impact of the efficiency incentive taken into account in the calculation of the realised adjusted profit may not be higher than 20% of the TSO's reasonable return for the year in question. This applies to the efficiency bonus received from the calculation of costs and the efficiency sanction resulting from increased costs.

6.4 INNOVATION INCENTIVE

The purpose of the innovation incentive is to encourage the TSO to develop and use innovative technical and operational solutions in its network operations.

In a study[18] commissioned by the Authority from Gaia Consulting Oy, the functioning of the innovation incentive was assessed and proposals for its development were made.

6.4.1 Research and development costs

In network operations, the key objectives of research and development activities are the development and introduction of smart networks and other new technologies and methods of operation. As a result, the TSO may incur research and development costs before the new technologies are in full use and utilisable.

The Authority encourages the TSO to make active efforts in research and development by deducting reasonable research and development costs in the calculation of realised adjusted profit.

Acceptable research and development costs must be directly related to the creation of new knowledge, technology, products or methods of operation in network operations for the sector. They may also be related to such a project's planning.

The results of projects the costs of which have been accepted in the innovation incentive must be public and may be utilised by other TSOs in their network operations, for example. Publishing confidential information concerning customers is not necessary, however. Results protected by industrial property rights need not be published, either. The results to be published must be delivered to the Energy Authority, which will publish them on its website.

Acceptable research and development costs must be recorded in the unbundled profit and loss account as expenses. Activated research and development costs are not accepted for inclusion in the calculation of the innovation incentive.

The TSO must itemise non-capitalised research and development costs as their own cost items as notes to the unbundled financial statements.

6.4.2 Innovation incentive in calculation of realised adjusted profit

The impact of the innovation incentive is deducted when calculating realised adjusted profit.

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[18] Gaia Consulting Oy/Vehviläinen Iivo, Ryynänen Erkka, Hjelt Mari, Descombes Laura, Vanhanen Juha, Energiaviraston valvontamenetelmissä sovellettavan innovaatiokannustimen arviointi (Evaluation of the innovation incentive applied in the Energy Authority's regulatory methods), 18 September 2014

The impact of the innovation incentive is calculated so that a share corresponding to a maximum of 1% of the TSO's total turnover from network operations in the unbundled profit and loss accounts in the regulatory period are treated as reasonable research and development costs.

The amount of acceptable research and development costs in a single year may therefore exceed or fall below the share corresponding to one per cent of the turnover from network operations in the year in question.

6.5 INCENTIVES IN GENERAL

According to section 10, subsection 2, point 4 of the Act on the Regulation of the Electricity and Natural Gas Market (laki sähkö- ja maakaasumarkkinoiden valvonnasta, 590/2013), a decision on the ratification of the methods to be used in pricing may determine incentive goals for the promotion of network operations, the integration of the market, network security and related research operations and development of the network, the determination method of such incentives and the methods to be used when applying the goals in pricing.

The above-mentioned goals are considered in many ways in the incentives ratified by the Authority. The ratified incentives include elements that consider, for example, the goal on the integration of the market, although no separate incentive on this issue has been named.

Such elements include, among others, the setting of the general efficiency goal as zero to compensate for the costs of new tasks and operating methods and processing maintenance fees for the European market as non-controllable operational costs in compliance with EU regulation.

The Supreme Administrative Court has also stated in a decision[19] that the incentives included in the ratified methods may be deemed to also include elements promoting the integration of the market in terms of network development, investments, the quality of transmission, the promotion of operations and innovations.

[19] Decision of the Supreme Administrative Court, docket 278/2/13, 29 June 2015

7 REALISED ADJUSTED PROFIT

The calculation of realised adjusted profit is started from the operating profit (loss) of the unbundled profit and loss account.

When calculating the realised adjusted profit, the annual change in refundable connection fees according to the unbundled balance sheet, as well as planned depreciation of electricity network assets and amortisation, amortisation of goodwill, and the loss of sales resulting from the sale of a network section entered under other operating expenses, are returned first (5.1). However, the profit from the sale of a network section entered under other operating income is deducted (5.1) when calculating the realised adjusted profit.

Next, reasonable costs of financial assets (5.3) are deducted as profit adjustment items.

The impact of the incentives is also deducted in the calculation of the realised adjusted profit. Incentives include the investment incentive (6.1), quality incentive (6.2), efficiency incentive (6.3) and innovation incentive (6.4).

The impact of the investment incentive is calculated by deducting the adjusted straight-line depreciations on the electricity network assets.

The impact of the quality incentive is calculated by deducting the realised outage costs from the outage cost reference level.

The impact of the efficiency incentive is calculated by deducting the realised efficiency costs from the efficiency cost reference level.

The impact of the innovation incentive is calculated from the TSO’s reasonable research and development costs.

The sum total of the calculations is the realised adjusted profit.

The above-mentioned calculations are presented in Table 8.

Table 8. *Calculation of realised adjusted profit*

OPERATING PROFIT (LOSS) OF THE UNBUNDLED PROFIT AND LOSS ACCOUNT OF NETWORK OPERATIONS
+ Refundable items in the unbundled profit and loss account
+ Net change in refundable connection fees
+ Planned amortisation of goodwill
+ Loss of sales of the network section recorded in other expenses
- Profit on sales of the network section recorded in other income
+ Planned depreciations and value reductions from network assets
- Profit adjustment items
+ Reasonable costs of financial assets
- Investment incentive
+ Adjusted straight-line depreciations of the electricity network assets
- Quality incentive
+ Reference level for outage costs
- Realised outage costs
- Efficiency incentive
+ Reference level for efficiency costs
- Realised efficiency costs
- Innovation incentive
+ Reasonable costs of research and development activities
= REALISED ADJUSTED PROFIT

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APPENDIX 1. NETWORK COMPONENTS, UNIT PRICES AND LIFETIME REPLACEMENT INTERVALS

The Energy Authority has determined the unit prices and lifetime replacement intervals in the appendix considering the report delivered by the TSO. The appendix's unit prices have been updated to better describe the situation at the beginning of the fourth regulatory period by using the average of the consumer price index in April–June 2015. The unit prices in the appendix will be used in the fourth and fifth regulatory period.

The unit prices are based on the TSO's realised average costs.

The unit prices have been rounded off to the nearest hundred euros.

The colour codes of the table are as follows:

- Red background: network type, i.e. the principal breakdown of network component groups
- Yellow background: network component group
- Grey background: definition
- White background: network component and its unit, unit price and lifetime replacement interval

OVERHEAD LINE NETWORK IN THE DISTRIBUTION NETWORK

400 kV PYLONS

Network component	Unit	Unit price, EUR	Lifetime, years
Free-standing steel pylons	pcs		
Guyed steel pylons	pcs		
Guyed aluminium pylons	pcs		
Field pylons	pcs		

220 kV PYLONS

Network component	Unit	Unit price, EUR	Lifetime, years
Free-standing steel pylons	pcs		
Guyed steel pylons	pcs		
Guyed wooden pylons	pcs		

110 kV PYLONS

Network component	Unit	Unit price, EUR	Lifetime, years
Free-standing steel pylons	pcs		
Guyed steel pylons	pcs		
Guyed aluminium pylons	pcs		
Guyed wooden pylons	pcs		
Field pylons	pcs		

400, 220 AND 110 kV WIRES

Network component	Unit	Unit price, EUR	Lifetime, years
ACSR 450–650 mm^2	km		
ACSR 300–459 mm^2	km		
ACSR 150–299 mm^2	km		
ACSR 67–149 mm^2	km		
AACSR	km		
Steel wire	km		

Aluminium alloy wire, AAAC	**km**		
Aluminium wire	**km**		
Optical overhead earth wires	**km**		

400, 220 AND 110 kV POWER LINE ROUTES

Network component	Unit	Unit price, EUR	Lifetime, years
Power line route	**ha**		

TRANSMISSION SYSTEM SUBSTATIONS

SUBSTATIONS

Network component	Unit	Unit price, EUR	Lifetime, years
400 kV duplex field	**pcs**		
400 kV field	**pcs**		
220 kV field	**pcs**		
110 kV field	**pcs**		
20/10 kV field	**pcs**		
220/110 kV disconnector station	**pcs**		

SUBSTATION EQUIPMENT

Network component	Unit	Unit price, EUR	Lifetime, years
400 kV switch	**pcs**		
220 kV switch	**pcs**		
110 kV switch	**pcs**		
20/10 kV switch	**pcs**		
400 kV disconnector	**pcs**		
220 kV disconnector	**pcs**		
110 kV disconnector	**pcs**		
20/10 kV disconnector	**pcs**		
400 kV instrument transformer	**pcs**		
220 kV instrument transformer	**pcs**		

110 kV instrument transformer	**pcs**		
20/10 kV instrument transformer	**pcs**		
20/10 kV reactor, oil insulated	**pcs**		
20/10 kV reactor, air insulated	**pcs**		
110 kV condenser	**pcs**		

SF_6 SUBSTATIONS			
Network component	**Unit**	**Unit price, EUR**	**Lifetime, years**
400 kV SF_6 switchgear	**pcs**		
110 kV SF_6 switchgear	**pcs**		

TRANSFORMERS			
Network component	**Unit**	**Unit price, EUR**	**Lifetime, years**
400/220 kV transformer or 400/120 kV transformer	**pcs**		
220/120 kV transformer	**pcs**		
220/21 kV transformer	**pcs**		
110/10 kV transformer	**pcs**		
20/0.4 kV and 10/0.4 kV transformer	**pcs**		

SUBSTATION BUILDINGS			
Network component	**Unit**	**Unit price, EUR**	**Lifetime, years**
Substation building	**m^2**		

TRANSMISSION SYSTEM DC SYSTEM

400 kV PYLONS

Network component	Unit	Unit price, EUR	Lifetime, years
Wooden pylons for electrode wires, Fenno-	pcs		

400 kV DC GROUND CABLES

Network component	Unit	Unit price, EUR	Lifetime, years
DC wire, Fenno-Skan 1	km		
DC wire, Fenno-Skan 2	km		
DC wire, Estlink 1	km		
DC wire, Estlink 2	km		

400 kV DC SUBSTATIONS

Network component	Unit	Unit price, EUR	Lifetime, years
DC substation, Fenno-Skan 1	pcs		
DC substation, Fenno-Skan 2	pcs		
Estlink 1	pcs		
Estlink 2	pcs		

OTHER TRANSMISSION SYSTEM NETWORK COMPONENTS

SERIES COMPENSATION

Network component	Unit	Unit price, EUR	Lifetime, years
400 kV series compensation stations	pcs		
400 kV SVC stations	pcs		

RESERVE POWER

Network component	Unit	Unit price, EUR	Lifetime, years
Fast disruption reserve	MW		