Impact assessment concerning amendments to the Swedish Energy Agency’s regulations and general advice on electricity certificates (STEMFS 2011:4)

Summary

The Swedish Energy Agency proposes amendments to the regulations and general advice (STEMFS 2011:4) on electricity certificates. The regulations contain provisions on the measurement and reporting of measurement values, the conditions for allocation for production increase and conversion, and the producer’s obligation to notify changes. The regulations also contain provisions on information to be included in an application, notification or declaration.

The main amendment concerns Chapter 3, Section 3 on the measurement of electricity generated in an electricity generation plant that feeds electricity into an electricity network not covered by network concessions (non-concession-regulated network). The draft regulations require the electricity generator to measure the fed-in electricity every 15 minutes and report the measurement values to the Swedish Energy Agency. This constitutes a change from the current requirement that the fed-in electricity must be measured every hour. As a result of the draft regulations, the same requirements are being imposed on generation plants whose measurement point is into a non-concession-regulated network and generation plants whose measurement point is into a concession-regulated network.

Those directly affected by the change are network owners and other reporters who measure and report measurement data in non-concession-regulated networks to the Swedish Energy Agency. Electricity producers measuring their electricity production in non-concession-regulated networks for the allocation of electricity certificates are indirectly affected. They are affected by higher costs for the operators that manage the measurement and reporting of measured values, which are then charged to the electricity producer.

The background to the proposal is an amendment to the Ordinance (2011:1480) on electricity certificates to the effect that measurements in non-concession-regulated networks must be carried out every 15 minutes.

In addition to the main proposal on 15-minute measurement, administrative amendments to the regulations (STEMFS 2011:4) are also proposed. The Swedish Energy Agency does not consider that these will have any impact on the stakeholders concerned. The proposed administrative amendments are:

- Amendment of the reference to the Swedish Energy Markets Inspectorate's regulations and general advice on the measurement, calculation and reporting of transmitted electricity (EIFS 2023:1).

- Amendment to Annex A1 and the instructions for A1, to indicate in the application whether electricity production is measured every 15 minutes.

- Update of the instruction to Annex A1 on the current coordinate reference system, which in some cases must be indicated in the application.

- A transitional provision is introduced allowing continued measurement of the amount of electricity measured on an hourly basis until 31 December 2024. However, during this period, 15-minute values must be calculated and reported in accordance with Chapter 3, Section 3.

- Addition of a general recommendation with respect to Chapter 3, Section 3 on how quarter-hourly measurement values can be calculated from hourly measurements until the end of 2024.

The new regulations are proposed to enter into force on 1 April 2024 with transitional measures in place until 31 December 2024.

Contents

1.1 Preparatory work

The new regulations have been drawn up in light of the Government Offices' amendment to Section 9 of the Ordinance (2011:1480) on electricity certificates concerning measurement and reporting. Under the amended Ordinance, the electricity generated in an electricity generation plant that is fed into a non-concession-regulated network must be measured every 15 minutes instead of every hour. The measurement values must be reported to the Swedish Energy Agency in order to be used for issuing electricity certificates.

The amendment to the ordinance was circulated for comment in the period from June to September 2023. No comments were received during the consultation that led the Government Offices to make any changes to the intended proposal. The amendment entered into force on 1 November 2023.

The Swedish Energy Agency may issue more detailed regulations regarding measurement and reporting in accordance with the authorisation in Section 18 (3) of the Ordinance (2011:1480) on electricity certificates. Provisions on reporting electricity fed into the non-concession-regulated network are set out in Chapter 3, Sections 2–3 of the Swedish Energy Agency's regulations and general advice (STEMFS 2011:4) on electricity certificates. The amendment to the Ordinance leads the Swedish Energy Agency to make the corresponding amendment to Chapter 3, Section 3 of the Agency's regulations and general advice (STEMFS 2011:4).

During its work on updating the regulation, the Swedish Energy Agency held consultations with the Ministry of Climate and Enterprise. In the initial phase of the work, the Swedish Energy Agency talked to the companies concerned, and other interested parties, about the change in question.

In connection with the regulatory work, an impact assessment has been drawn up in accordance with the Ordinance (2007:1244) on regulatory impact assessments. It includes the proposed amendments to the Swedish Energy Agency's regulations and general advice (STEMFS 2011:4) on electricity certificates.

1.2 Background

This section provides background information that makes it possible to understand the context in which the amendments to the regulation are proposed.

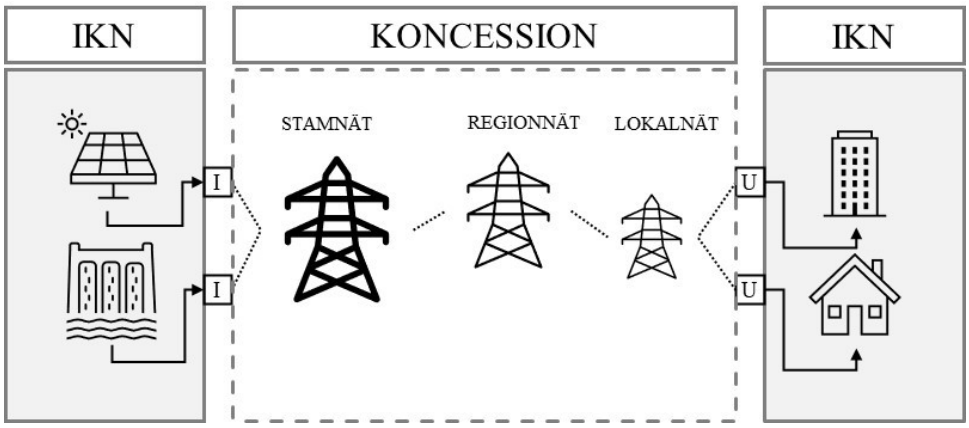
1.2.1 Structure of the electricity network

The Swedish electricity network can be roughly divided into two different types of networks: concession-regulated networks, such as core, regional and local networks, and non-concession-regulated networks. Put simply, large electricity

producers transfer electricity at an entry point to the core network, which is then passed on to regional and local networks. The electricity is then delivered to exit points at end users.

In addition to the electricity fed into the concession-regulated network, an electricity producer, consumer and business may have its own internal networks consisting of one or more power lines. An internal network is used for the transmission of electricity for its own use and is referred to as a non-concession-regulated network. Figure 1 illustrates the difference between non-concession-regulated networks and concession-regulated networks.

Figure 1 Difference between non-concession-regulated networks and concession-regulated networks and the relationship between them



IKN	NON-CONCESSION
KONCESSION	CONCESSION
STAMNÄT	CORE NETWORKS
REGIONNÄT	REGIONAL NETWORKS
LOKALNÄT	LOCAL NETWORKS

** Electricity generators use electricity for their own use in non-concession-regulated networks, feed electricity at an entry point into the core network. The electricity is transported to local networks where end users connect at an exit point to the local network to consume electricity in non-concession-regulated networks (simplified example, there are also entry points to regional and local networks).*

Different network types are subject to different rules. However, as a general rule, a permit, known as a network concession, is required for the construction and use of a high-power line. Only under specified conditions is a permit not required for the construction and use of one or more high current power lines in non-concession-regulated networks. The Ordinance (2007:215) on exemptions from the requirement for a network concession under the Electricity Act (the Non-Concession-Regulated Network Ordinance) sets out the conditions for exemption from applying for a permit.

1.2.2 Electricity market participants

Electricity producers

Electricity producers are responsible for the production of electricity. There are both large companies that use hydro, wind or nuclear power for their production, and also small companies or private individuals that produce solar electricity for their own consumption and supply the surplus to the network.

Network owners

Network owners are the companies that own the electricity network, from transmission (core) network to regional and local networks. A network owner is responsible for the transmission of electricity and has the exclusive right to transfer electricity in its network. The network owner is also responsible for measuring the input to the electricity network (production) and withdrawal from the network (consumption)[1]. These measurement points are located in connection with the concession-regulated network and the measured values are used as the basis for charging costs from both the electricity network company and the electricity supplier.

Network owners are also obliged to report measured values for plants to which electricity certificates are allocated to the Swedish Energy Agency[2], This obligation covers entry points into concession-regulated networks. Network owners may also offer services such as measurement and reporting measured values in non-concession-regulated networks to the Swedish Energy Agency, but this is not an obligation.

Other reporters of measured values

There are also other companies that offer measurement and reporting of measured values within non-concession-regulated networks for plants to which electricity certificates are allocated. Measured values are reported electronically via EDIEL,[3]this is a standard for information exchange developed by the Swedish Transmission System Operator (SVK), in cooperation with transmission system operators in other Nordic countries. In order to report the measured values, the operator must sign an EDIEL contract with SvK and thus be allocated an EDIEL ID. An IT system is also required in order to be able to report via EDIEL.

[1] Ordinance (1999:716) on the measurement, calculation and reporting of transmitted electricity | the Swedish Parliament (Riksdagen.se)
[2] Section 9 (d), Ordinance (1999:716) on the measurement, calculation and reporting of transmitted electricity
[3] Chapter 1, Section 5, the Swedish Energy Markets Inspectorate's regulations and general advice on measurement, calculation and
reporting of transmitted electricity (EIFS 2023:1)

1.2.3 Electricity certificate scheme

The electricity certificate scheme is a market-based support scheme aimed at increasing the production of renewable electricity in a cost-effective way. The system has been in place in Sweden since 2003 and is open to production facilities commissioned between 2003 and 2021. Since 1 January 2012, Sweden and Norway have had a single electricity certificate market.

The common target was 28.4 TWh of new renewable electricity production by 2020. The target was met in spring 2019. Sweden also had a target of an additional 18 TWh by 2030. The overall target under the electricity certificate scheme was therefore 46.4 TWh of new renewable electricity production by 2030 and that target was met in March 2021.

How does the electricity certificate scheme work?

A producer can obtain an electricity certificate from the State for each megawatt-hour (MWh) of renewable electricity produced. The electricity producer can then sell the electricity certificates in an open market where the price is determined between seller and buyer. In this way, the electricity certificates provide additional revenue for renewable electricity production, in addition to normal electricity sales. Plants commissioned before the end of 2021 may still be approved, but will have an allocation period of less than 15 years due to the system ending in 2035. The energy sources eligible for electricity certificates are wind power, certain hydropower, certain biofuels, solar energy, geothermal energy, wave energy and peat in CHP plants.

The quota obligation creates demand for electricity certificates

Purchasers of electricity certificates are operators with quota obligations, which means that they have to buy a certain proportion of electricity certificates in relation to their sales or use of electricity. The quota obligated operators are mainly electricity suppliers but are also electricity users who use the electricity they have produced themselves, electricity users who import or purchase electricity on the Nordic electricity exchange, and electro-intensive industries registered by us at the Swedish Energy Agency. The proportion of electricity certificates that the quota obligated operators must purchase each year is determined by a quota set out in the Ordinance (2011:1480) on electricity certificates. Quota levels are fixed until 2035.

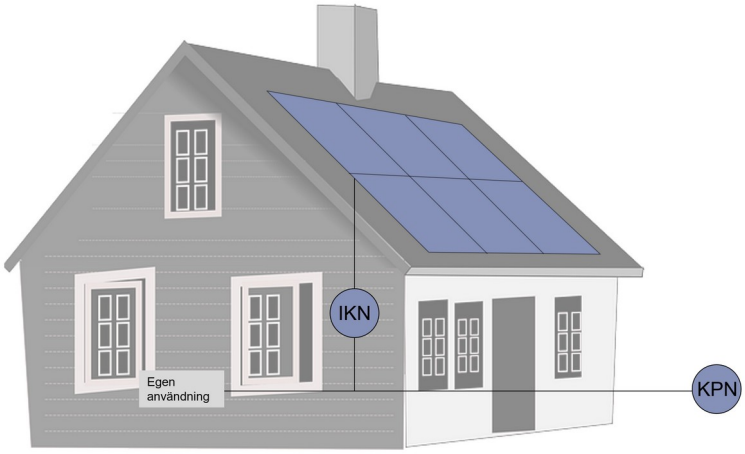
1.2.4 *Selection of a measurement point for the allocation of electricity certificates*

Electricity certificates are issued for the amount of renewable electricity that has been measured and reported to the Swedish Energy Agency. The electricity producer chooses whether to measure the electricity production in a non-

concession-regulated network, or at the connection point to a concession-regulated network.

If the electricity producer selects a measurement point in the non-concession-regulated network, electricity certificates are issued for the total renewable electricity production, including the electricity produced by the producer itself. If the electricity producer instead selects a measurement point in connection with the concession-regulated network, it receives an allocation for the excess of renewable electricity production, that is to say, the electricity fed into the concession-regulated network. Measurement in the non-concession-regulated network thus gives more allocated electricity certificates, which allows for a higher revenue from the sale of the electricity certificates.

Figure 2 Illustration of alternative locations of the measurement point, measurement of total production in non-concession-regulated networks or measurement of excess electricity in connection with concession-regulated networks.



With a measurement point in the non-concession-regulated network, the electricity producer needs to bear the cost for the purchase and installation of an electricity meter and for reporting measured values to the Swedish Energy Agency via EDIEL. Reporting via EDIEL requires an IT system, which implies costs for the reporter. If the electricity producer does not have a system for reporting/receiving via EDIEL, they can appoint an agent for this purpose. There are a number of companies on the market that provide this service. This is different from measurement at the connection point to the concession-regulated network, where the network owner is required to measure and report measured values to the Swedish Energy Agency for plants that are allocated electricity certificates[4]. The network owner may not charge for the electricity meter in concession-regulated networks for production facilities below 43.5 kW[5].

[4] Measurement Ordinance (1999:716), Section 9(1d)
[5] Electricity Act (1997:857), Chapter 4, Section 11

Non-concession-regulated network reporters may be the network owner in the electricity producer's network area or another company offering measurement and reporting services. Reporters in concession-regulated networks are only network owners. Reporting is done electronically in the EDIEL message standard,[6] which is how the exchange of information between operators on the Swedish electricity market takes place.

1.2.5 Rules on measurement, calculation and reporting

The allocation of electricity certificates is based on the measured amounts of renewable electricity produced. Responsibility for rules on the measurement and reporting of electricity is divided between the Swedish Energy Agency and the Swedish Energy Markets Inspectorate, depending on whether the measurement takes place in the non-concession-regulated network or concession-regulated network.

Measurement in a non-concession-regulated network

Measurement and reporting in a non-concession-regulated network are governed by Section 9 of the Ordinance (2011:1480) on electricity certificates and Chapter 3, Sections 2–3 of the Swedish Energy Agency's regulations and general advice (STEMFS 2011:4) on electricity certificates. Under the current provisions, the producer must report measured values for each hour of the day, every 24 hours, and report the measured values to the Swedish Energy Agency no later than the fifth working day after the measurement day.

Measurement in a concession-regulated network

Measurement and reporting in a concession-regulated network are regulated in the Ordinance (1999:716) on the measurement, calculation and reporting of transmitted electricity (the Measurement Ordinance) and the Swedish Energy Markets Inspectorate's regulations and general advice (EIFS 2023:1) on the measurement, calculation and reporting of transmitted electricity[7] (the Measurement Regulations).

Under Section 9 of the Measurement Ordinance, the network owner must[8] report measurement results for every quarter-hour during the day to the Swedish Energy Agency, if the measurement result relates to electricity fed in from a production plant entitled to the allocation of electricity certificates. Provisions on reporting the measured values are set out in Chapter 7, Section 3 of the Measurement

[6] Chapter 3, Section 3 of the Swedish Energy Agency's regulations and general advice (STEMFS 2011:4) on electricity certificates, and Chapter 1, Section 5 of the Swedish Energy Market Inspectorate's regulations (2023:1) and general advice on the measurement, calculation and reporting of transmitted electricity
[7] Laid down in Chapter 3, Section 1 of the Regulations and general advice (STEMFS 2011:4) on electricity certificates.
[8] The Measurement Ordinance uses the term 'network company' instead of 'network owner'.

Regulations. Network owners must report individual metrics at an entry point[9] for a production plant, which is entitled to the allocation of electricity certificates, to the Swedish Energy Agency. The report must be made to the account keeping authority for electricity certificates (the Swedish Energy Agency) no later than the fifth working day after the measurement day.

Provisions for the quarter-hour measurement came into force on 1st November 2023. The amendment to the Measurement Ordinance contains a transitional provision[10] allowing continued hourly measurement for certain measurement systems and equipment[11] [12] until the end of 2024. Hourly values must be converted into quarter-hour values during the transitional period before they are reported to the Swedish Energy Agency (Chapter 5, Section 1 of the Measurement Regulations). Calculation must be done by distributing the energy evenly over time.

1.3 Problem and objective

This impact assessment concerns an update of the Swedish Energy Agency's regulations and general advice (STEMFS 2011:4) on electricity certificates. The relevant proposals in the regulations provide for increased obligations for electricity producers to measure and report measured values in non-concession-regulated networks every 15 minutes instead of every hour (Chapter 3, Section 3). The proposed changes aim to create a consistent regulatory framework for the measurement and reporting of electricity in concession-regulated networks and non-concession-regulated networks for the purposes of the allocation of electricity certificates.

The proposal for an amendment to the Swedish Energy Agency's regulations on electricity certificates has been prompted by new provisions in the Measurement Ordinance and in the Ordinance on electricity certificates on quarter-hourly measurements. The amendment means that the 15-minute measurement requirement will be the same regardless of whether the measurement is carried out at entry points to non-concession-regulated networks or to concession-regulated networks. This means consistent measurement of electricity generation and management of measured values for operators to whom electricity certificates are allocated.

[9] Definition: Electricity generating plant feeding in electricity into (1) a flat-rate calculation area, or (2) a line covered by a network concession for the line. Section 1a of the Regulation (1999:716) on the measurement, calculation and reporting of transmitted electricity
[10] Section 23 of the Ordinance (1999:716) on the measurement, calculation and reporting of transmitted electricity
[11] Category 1 measurement system: electricity meters used for direct measurement (without measuring transformer), SWEDAC's regulations (STAFS 2022:9) on measurement systems for the measurement of transmitted electricity, Chapter 1, Section 2, point 7.
[12] Category 2 measurement system: a system consisting of electricity meters and a current transformer, SWEDAC's regulations (STAFS 2022:9) on measurement systems for the measurement of transmitted electricity, Chapter 1, Section 2, point 8.

Transitional measures are introduced at regulation level so that electricity producers can continue to measure hourly electricity production until the end of 2024, but report it in the 15 minute format by dividing hourly values by four. A general recommendation with respect to Chapter 3, Section 3 of the regulations describes how the 15-minute values can be calculated from 60-minute measurement values. This means that the method for calculating measurement values is also consistent for non-concession-regulated networks and concession-regulated networks. The Swedish Energy Agency considers that the proposed regulations do not go beyond the requirements laid down in the above-mentioned ordinances and regulations.

In conjunction with this change, a review of the regulations for electricity certificates has been carried out. Some administrative changes to the regulations are also proposed as a result. The editorial changes made in connection with the new measurement requirements clarify the obligations with which electricity producers who are already allocated electricity certificates need to comply.

1.4 The zero option

The zero option means that the Swedish Energy Agency does not use the right to prescribe the measurement of input electricity from electricity production in non-concession-regulated networks, as set out in Section 18 (3) of the Ordinance (2011:1480) on electricity certificates. The result would be that the 15-minute measurement rule in the non-concession-regulated networks would be governed solely by the Ordinance. The provision in Chapter 3, Section 3 of the Swedish Energy Agency's regulations (STEMFS 2011:4) on the measurement of electricity production in non-concession-regulated networks for the allocation of electricity certificates would continue to lay down requirements for hourly measurement.

The 15-minute measurement requirement would still apply to electricity producers because the provision is at a superior legal level compared to the regulation. In addition, different rules would create confusion for electricity producers over which rules were applicable to the measurement and reporting of electricity production in non-concession-regulated networks.

The Swedish Energy Agency considers that the zero option would have disadvantages for electricity producers to whom electricity certificates are allocated. The draft amendments to the regulations are therefore considered to make life easier for electricity producers when measuring and reporting electricity production for which electricity certificates are issued.

1.5 Alternative solutions

Four amendments are proposed in the draft regulation. In essence, the amendment consists of an enhanced requirement for the measurement of electricity production for which electricity certificates are issued. The other amendments are of an administrative nature and are not considered to have any appreciable impact on the electricity producers affected by the regulation. Alternative solutions to the Swedish Energy Agency's proposal are set out below.

1.5.1 15-minute measurement of electricity production in non-concession-regulated networks

Provisions on the measurement of electricity generation plants in non-concession-regulated networks are laid down in the Ordinance on electricity certificates. From 1 November 2023, non-concession-regulated networks must be measured every 15 minutes in contrast to every hour previously. The reason for this amendment is that the measurement and reporting of *all* electricity fed in, i.e. into concession-regulated networks and non-concession-regulated networks, which qualify for electricity certificates or guarantees of origin, should be done in a uniform manner.

Provisions on the measurement in the non-concession-regulated networks are set out in Chapter 3, Section 3 of the Regulations and general advice (STEMFS 2011:4) on electricity certificates. The current provision requires electricity producers to whom electricity certificates are allocated to measure the electricity fed in into the network every hour.

The amendment of the provision in the Ordinance obliges the Swedish Energy Agency to make the same amendment to its regulations. Differences in rules at ordinance and regulation level would create confusion for electricity generators who would have to comply with the 15-minute measurement requirement at ordinance level. The Swedish Energy Agency considers that there is therefore no alternative solution but to impose the same requirements as in the ordinance in its regulations.

1.5.2 Administrative amendments and clarifications

This section analyses possible alternative solutions for all draft administrative changes.

Updated reference to the Swedish Energy Markets Inspectorate's regulations

Measured values reported to the Swedish Energy Agency from measurement points in concession-regulated networks must be subject to rules in accordance with the Swedish Energy Markets Inspectorate's regulations and general advice on the measurement, calculation and reporting of transmitted electricity (EIFS

2023:1). The regulation was adopted on 17 January 2023 and entered into force on 1 November 2023 and is an update of the previous regulation EIFS 2016:2.

Chapter 3, Section 1 of the Swedish Energy Agency’s regulations (STEMFS 2011:4) on electricity certificates contains a reference to the Swedish Energy Markets Inspectorate's previous regulations. The draft amendment to the Swedish Energy Agency's regulations means that the reference is changed to the Swedish Energy Markets Inspectorate's new regulation number.

The impact of the transition to the quarter-hourly measurement on electricity generation plants that feed in electricity into concession-regulated networks has been investigated and analysed by Swedish Energy Markets Inspectorate. The amendment to the Swedish Energy Agency's regulations does not have any additional consequences for electricity producers, other than those described by the Swedish Energy Markets Inspectorate in its impact assessment.

The Swedish Energy Agency sees no alternative solution other than to propose that the reference to the Swedish Energy Markets Inspectorate's regulations be updated. If the reference were to be left unchanged, the provisions on the measurement in concession-regulated networks laid down in Chapter 3, Section 1 of the Swedish Energy Agency’s regulations would refer to provisions which have been repealed and to provisions for the 15-minute measurement in concession-regulated networks that would still apply, but that the Swedish Energy Agency’s regulation would require measurement per hour.

On this basis, the Swedish Energy Agency does not see any alternative solution for regulating measuring of the feed-in into a concession-regulated network, other than amending the reference to Swedish Energy Markets Inspectorate's new regulations EIFS 2023:1.

Update to current coordinate reference system

Electricity generationplants are located both onshore and offshore, such as wind farms. When applying for an allocation of electricity certificates, the application must include information on the cadastral identification of the property where the plant is located (A1 form, STEMFS 2011:4). The requirement is clarified in the instructions to the A1 form. For installations on very large properties, such as wind farms, the cadastral identification and the coordinates of the measurement point are indicated. For offshore installations, the coordinates of the measurement point are given. The instructions state that the coordinates must be indicated in the Swedish National Grid (RT90) with an accuracy of five digits.

RT90 was used until 2006 to produce the public maps of Sweden.[13] The official reference system used in Sweden today is SWEREF 99.[14] The national map projection for SWEREF 99 is called SWEREF 99 TM and is used for applications at national level. The map projection uses a two-dimensional Cartesian coordinate system with an N coordinate (Northing) and an E coordinate (Easting).

Coordinates in SWEREF 99 may also be given as latitude and longitude. Another reference system for specifying latitude and longitude, which is frequently used in simple GPS devices, for example mobile phones, is WGS 84. These reference systems, WGS 84 and SWEREF 99, currently diverge (2021) from each other by 70–80 cm and that difference is increasing by a few centimetres per year. In our application, where the aim is to be able to locate the plant during, for example, inspection, SWEREF 99 and WGS 84 can be regarded as the same thing.[15]

After consultation with the Swedish Mapping, Cadastral and Land Registration Authority, it is proposed that coordinates can be given in SWEREF 99 TM (N and E) or as latitude and longitude according to SWEREF 99/WGS 84.

The change that the Swedish Energy Agency is making will simplify matters for electricity producers applying for the allocation of electricity certificates. The electricity producer can already provide site coordinates in the application process, but must use the RT90 format. An update to the reference system currently in force will simplify application, because the change means that the electricity producer does not have to convert coordinates to RT90.

An alternative solution to the proposal is not to update the regulation with the current reference system. This would mean that electricity producers applying for the allocation of electricity certificates would have to convert the coordinates to RT90. Because coordinates are currently used in other formats, the Swedish Energy Agency considers that it is better to update the instructions in order to make it easier for electricity producers.

The Swedish Energy Agency does not foresee any impact on electricity producers applying for electricity certificates.

Administrative changes to the application form and instructions to the application

The electricity certificate application form proposes a change to replace the hourly measurement data with an indication that electricity production is

[13] RT 90 – SWEREF 99 | the Swedish Mapping, Cadastral and Land Registration Authority (landmateriet.se)
[14] SWEREF 99 | the Swedish Mapping, Cadastral and Land Registration Authority (lanmateriet.se)
[15] SWEREF 99 | the Swedish Mapping, Cadastral and Land Registration Authority (lanmateriet.se)

measured on a quarter-hourly basis. The form contains a question “Is the installation’s electricity production measured per quarter-hour?”. The change is a consequence of the change in Chapter 3, Section 3, according to which electricity in non-concession-regulated networks must be measured every quarter-hour.

However, the transitional provision allows measuring every hour until the end of 2024. For a period of time, both hourly and quarter-hourly measurements will be allowed. It is therefore proposed to clarify the instructions to the form that, until the end of 2024, "Yes" can also be given as an answer for the hourly measurement. The change allows the electricity producer to indicate at the time of application whether the production at the plant is measured on an hourly or quarter-hourly basis.

The Swedish Energy Agency does not see that there is an alternative solution to the question in the questionnaire of whether the electricity production is measured per quarter-hour The indication of the measurement time period is an important element in the assessment and verification of the application for the allocation of electricity certificates. Not implementing the amendment would create ambiguities when applying for electricity certificates, because only the hourly measurement option would be required.

The Swedish Energy Agency considers that the proposed amendments will have no impact on electricity producers applying for electricity certificates.

1.6 Description of the proposal

This section presents the Swedish Energy Agency’s proposal to amend the regulations and general advice (STEMFS 2011:4) on electricity certificates. The amendments aim to create a coherent regulatory framework for the measurement of transmitted electricity for electricity plants in non-concession networks and concession-regulated networks. Through the amendment of time resolution for measured values in the regulations, the reporting of measured values by electricity producers eligible for electricity certificates will be done in a uniform manner. The main amendment to the regulations is a new provision on the 15-minute measurement in non-concession-regulated networks. In addition, some minor administrative changes are proposed which are deemed to make it easier for electricity producers to apply for electricity certificates.

1.6.1 Proposed amendments to the regulations

The Swedish Energy Agency proposes amendments to its regulations and general advice (STEMFS 2011:4) on electricity certificates as set out below.

Chapter 3, Section 3. Amendment in connection with the measurement and reporting for installations in non-concession-regulated networks.

The proposal requires that measured values reported to the Swedish Energy Agency must have a time resolution of 15 minutes, instead of 60 minutes, for measurement points in non-concession-regulated networks. The amendment will have an impact on electricity producers, network owners and other reporters of measurement data, who in some cases need to replace electricity meters in order to comply with the new requirements. The amendment also gives rise to a review of administrative procedures for the reporting of measured values, updating software in electricity meters in some cases and expanding storage capacity for measured values. Previously, the Swedish Transmission System Operator was the accounts keeping authority. The old wording that measurement values must be reported to the Swedish Transmission System Operator is updated to the Swedish Energy Agency.

The paragraph also introduces a general recommendation describing how quarter-hourly values must be calculated from hourly measurements during the transition period.

The provision comes into force from 1st January 2024 with a related transitional provision until the end of 2024.

Table 1 Proposal for a new wording in the regulations (STEMFS 2011:4)

Current provision	New wording
Chapter 3. Measurement and reporting of electricity produced. Reporting of measurement values Section 3. Measurement values for each **hour** of the day must be reported on a 24-hour basis to **the Swedish Transmission System Operator** no later than the fifth working day after the measurement day. The figures must be checked, and if necessary corrected, before reporting. If they are corrected, it must be indicated who has corrected them, how they have been corrected and what has been changed. 'Working day' means a day that is not a Sunday, another public holiday, Saturday, Midsummer's Eve, Christmas Eve or New Year's Eve. The Public Holidays Act (1989:253) **lays down** provisions concerning the days considered public holidays. Reports must be sent electronically using the EDIEL messaging standard.	**Chapter 3. Measurement and reporting of electricity produced. Reporting of measurement values Section 3** Measurement values for each **quarter-hour** of the day must be reported on a 24-hour basis to **the Swedish Energy Agency** no later than the fifth working day following the measurement day. The figures must be checked, and if necessary corrected, before reporting. If they are corrected, it must be indicated who has corrected them, how they have been corrected and what has been changed. 'Working day' means a day that is not a Sunday, another public holiday, Saturday, Midsummer's Eve, Christmas Eve or New Year's Eve. The Public Holidays Act (1989:253) **lays down** provisions concerning the days considered public holidays. Reports must be sent electronically using the EDIEL messaging standard. **General advice with respect to Chapter 3, Section 3** Measurement may, until the end of 2024, refer to the amount of electricity transferred in each hour, if the measuring equipment cannot record the transmitted electricity in each quarter-hour. Reporting must also be made on a quarter-hourly basis during this period. Quarter-hourly measurements based on measured hourly measurements should be calculated by distributing energy evenly over time. If it is not appropriate to distribute energy evenly over time, energy may be distributed according to

	industry applicable methodology.

Section 3, Section 1. Amendment of the reference to the Swedish Energy Markets Inspectorate's regulations on the measurement and reporting for installations in concession-regulated networks.

Measured values reported to the Swedish Energy Agency from measurement points in concession-regulated networks must be subject to rules in accordance with the Swedish Energy Markets Inspectorate's regulations and general advice on the measurement, calculation and reporting of transmitted electricity (EiFS 2023:1). Chapter 3, Section 1 of the Swedish Energy Agency's regulations contains a reference to the Swedish Energy Markets Inspectorate's previous regulations, which needs to be updated with a new regulation number. The reference is changed from EIFS 2011:3 to EIFS 2023:1.

The impact of the amendment to the Swedish Energy Markets Inspectorate's regulations[16] has been investigated and analysed by the Swedish Energy Markets Inspectorate.[17] The amendment involves a transition to the 15-minute measurement in concession-regulated networks and enters into force on 1 November 2023. The amendment made by the Swedish Energy Agency is assessed *not* to have any additional impact on electricity producers than indicated in the Swedish Energy Markets Inspectorate's impact assessment.

Table 2 Proposal for a new wording in the regulations (STEMFS 2011:4)

Current provision	New wording
Chapter 3. Measurement and reporting of electricity produced. Reporting of measurement values **Section 1.** Provisions on the measurement and reporting of electricity fed into a concession-regulated network are contained in the Swedish Energy Market Inspectorate's regulations and general advice on the measurement, calculation and reporting of transmitted electricity (**EIFS 2011:3**). Electricity from other installations approved for the allocation of electricity certificates must be measured and reported in accordance	**Chapter 3. Measurement and reporting of electricity produced. Reporting of measurement values** **Section 1.** Provisions on the measurement and reporting of electricity fed into a concession-regulated network are contained in the Swedish Energy Market Inspectorate's regulations and general advice on the measurement, calculation and reporting of transmitted electricity (**EIFS 2023:1**). Electricity from other installations approved for the allocation of electricity certificates must be measured and reported in accordance

[16] https://ei.se/om-oss/publikationer/publikationer/foreskrifter-el/2023/foreskrift-eifs-20231
[17] Swedish Energy Markets Inspectorate's ref. no: 2022: 100432.

with Sections 2 and 3.	with Sections 2 and 3.

Annex A1. Amendment concerning information to be provided when applying for an electricity certificate and instructions for the application

Annex A1 contains the application form for the allocation of an electricity certificate and instructions for the application. The information to be included in the application is set out there. The Swedish Energy Agency proposes two amendments which are set out below. The Agency considers that the draft amendments will *not* have any consequences for electricity producers applying for the allocation of electricity certificates. The information to be provided when applying is already a requirement at present and will not require more time for someone applying for electricity certificates.

3a application form, Indication on whether the installation's production is measured per quarter-hour

In the application for an electricity certificate, the requirement to notify whether the electricity generation plant is measured on an hourly basis is supplemented to also include measurement on a quarter-hourly basis. The information applies to measurement points in both concession-regulated and non-concession-regulated networks. The amendment is assessed *not* to have any consequences for electricity producers applying for the allocation of electricity certificates.

Table 3 Proposal for a new wording in the regulations (STEMFS 2011:4)

Current provision	New wording
3a. Indication on the measurement of the output for the allocation of certificates Is the output of the installation measured per **hour**? ☐ Yes ☐ No	**3a. Indication on the measurement of the output for the allocation of certificates** Is the output of the installation measured per **quarter-hour**? ☐ Yes ☐ No

Instruction for application form, A1 3a. Indication if the output of the installation is measured per quarter-hour

The instruction for the 3a form is also changed from hour to quarter-hour. The form also clarifies that during the transitional period until the end of 2024, ‘Yes’ may also be indicated when the output of the installation is measured on an hourly basis (see the transitional provision below) in the event that the measuring equipment is unable to record the transmitted electricity per quarter-hour.

Table 4 Proposal for a new wording in the regulations (STEMFS 2011:4)

Current provision	New wording
Instruction for A1, 3a. Indication on the measurement of the output for the allocation of certificates **Is the output of the installation measured per hour?** Tick 'Yes' or 'No' depending on whether the installation's electricity production is measured per **hour** or not. Information on whether the installation's electricity production is measured per **hour** may be obtained from your network owner if the installation is in a concession-regulated network. In other cases, the installation owner is responsible for measuring the installation's electricity production per **hour**.	**Instruction for A1, 3a. Indication on the measurement of the output for the allocation of certificates** **Is the output of the installation measured per quarter-hour?** Tick 'Yes' or 'No' depending on whether the installation's electricity production is measured per **quarter-hour** or not. **Until the end of 2024, 'Yes' may also be indicated when measurement is carried out on an hourly basis in the event that the measurement equipment cannot record transmitted electricity per quarter-hour.** Information on whether the installation's electricity production is measured per **quarter-hour** may be obtained from your network owner if the installation is in a concession-regulated network. In other cases, the installation owner is responsible for measuring the installation's electricity production per **quarter-hour**.

Instruction for A1 application form, 3. Basic information, update to the current coordinate reference system

For offshore electricity generation plants, such as offshore wind, there is a requirement to provide details of coordinates in the application for an electricity certificate, instead of the cadastral designation. For properties larger than 1 square kilometre, there is also a requirement to provide the coordinates of the measurement point of the installation, in addition to the cadastral designation. The coordinates must be indicated in the RT90 format, as specified. RT90 was used until 2006 to produce the public maps of Sweden.

The official reference system used in Sweden today is SWEREF 99.[18] The national map projection for SWEREF 99 is called SWEREF 99 TM and is used for applications at national level. The map projection uses a two-dimensional Cartesian coordinate system with an N coordinate (Northing) and an E coordinate (Easting).

[18] SWEREF 99 | the Swedish Mapping, Cadastral and Land Registration Authority (lanmateriet.se)

Coordinates in SWEREF 99 may also be given as latitude and longitude. Another reference system for specifying latitude and longitude, which is frequently used in simple GPS devices, for example mobile phones, is WGS 84. These reference systems, WGS 84 and SWEREF 99, currently diverge (2021) from each other by 70–80 cm and that difference is increasing by a few centimetres per year. In our application, where the aim is to be able to locate the plant during, for example, inspection, SWEREF 99 and WGS 84 can be regarded as the same thing.[19]

After consultation with the Swedish Mapping, Cadastral and Land Registration Authority, it is proposed that coordinates can be given in SWEREF 99 TM (N and E) or as latitude and longitude according to SWEREF 99/WGS 84.

The change that the Swedish Energy Agency is making will simplify matters for electricity producers applying for the allocation of electricity certificates. The electricity producer can already provide site coordinates in the application process, but must use the RT90 format. An update to the reference system currently in force will simplify application, because the change means that the electricity producer does not have to convert coordinates to RT90.

Table 5 Proposal for a new wording in the regulations (STEMFS 2011:4)

Current provision	New wording
Instruction for A1, 3. Basic information Cadastral designation Here you should enter the cadastral designation of the property where the installation is located. If the property is very large (> 1 square kilometre), indicate not only the cadastral designation, but also the **X and Y coordinates** of the measurement point of the installation. If the measurement point of the installation is located at sea, indicate the **X and Y coordinates** of the measurement point. **The coordinates must be given with an accuracy of five digits. The coordinates must be given in the National network (RT90).**	**Instruction for A1, 3. Basic data. Cadastral designation**Here you should enter the cadastral designation of the property where the installation is located. If the property is very large (> 1 square kilometre), indicate not only the cadastral designation, but also the **coordinates** of the measurement point of the installation. If the measurement point of the installation is located at sea, indicate the **coordinates** of the measuring point. **Coordinates may be specified in SWEREF 99 TM or as latitude and longitude in SWEREF 99/WGS 84.**

[19] SWEREF 99 | the Swedish Mapping, Cadastral and Land Registration Authority (lanmateriet.se)

Transitional provision until the end of 2024

The regulation introduces a transitional provision that provides the option to continue measurement the amount of electricity transmitted every hour until the end of 2024, if the measurement equipment cannot to record the electricity transmitted every quarter-hour. If measurement is carried out every hour, calculated values for each quarter-hour must be reported to the Swedish Energy Agency. The provision states that quarter-hourly measurements from measured hourly measurements can be calculated by distributing the energy evenly over time and, if this is not appropriate, the energy may be distributed in accordance with the industry's methodology.

The transitional provision gives those who need to replace electricity meters more time to adapt to the new requirements for quarter-hour measurement. The amendment is expected to make it easier for electricity producers, network owners and reporters of measurement values to adapt to the new rules.

Table 6 Proposal for a transitional provision in the regulations (STEMFS 2011:4)

Current provision	New wording
	Transitional provision 1. The previous wording of Chapter 3, Section 3 applies until the end of 2024 if the measuring equipment cannot record the electricity transferred during each quarter-hour. However, during this period, 15-minute values must be calculated and reported in accordance with the new Chapter 3, Section 3.

1.7 Legal requirements

1.7.1 Agency's powers to issue regulations

The Swedish Energy Agency's regulations and general advice (STEMFS 2011:4) on electricity certificates are based on the authorisation set out in Section 18 (3) of the Ordinance (2011:1480) on electricity certificates.

1.7.2 Compliance with EU rules

EU regulations are directly applicable and do not need to be transposed into Swedish law. Member States must ensure that regulations are correctly applied.

The Swedish Energy Agency cannot impose obligations that breach EU law or fail to regulate provisions at national level that would be contrary to EU law.

The Swedish Energy Agency considers that the proposed amendment is in line with the obligations arising from Sweden's membership of the European Union and the existing provisions in EU directives and regulations.

Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing stipulates that the imbalance settlement period must be 15 minutes. This is transposed into Swedish law by means of the Electricity Act (1997:857), the Ordinance (1999:716) on the measurement, calculation and reporting of transmitted electricity (the Measurement Ordinance) and the Energy Market Inspectorate’s regulations (2023:1) on the measurement, calculation and reporting of transmitted electricity (the Measurement Regulations). These rules apply only to measurement points into a concession-regulated network.

The Measurement Ordinance and the Measurement Regulations also lay down requirements for 15-minute measurement and reporting to the Swedish Energy Agency for plants approved for the allocation of electricity certificates. These requirements also apply only to plants with a measurement point in concession-regulated networks.

However, there are no EU rules regulating the details of measurement and reporting of measured values for plants in non-concession networks. This is regulated only by the Ordinance and the Regulation on electricity certificates for installations for which electricity certificates are allocated.

1.8 Economic impact

The proposed amendments to the regulations have consequences for electricity producers to whom electricity certificates are allocated and whose obligations are regulated in the Swedish Energy Agency’s regulations and general advice (STEMFS 2011:4) on electricity certificates. The economic consequences described in this section concern those changes that the Swedish Energy Agency considers will have an impact on electricity producers under Section 1.6.1. Of the proposed amendments to the regulations, only the amendment to Chapter 3, Section 3 for quarter-hourly measurement is considered to have an economic impact on electricity producers.

An important prerequisite for understanding the economic impact is how measurement in non-concession-regulated networks works in practice (Section 1.2.4). The electricity producer is obliged to measure and report measured values to the Swedish Energy Agency. In order to comply with the obligation, electricity

producers use service providers, such as network owners or other reporting providers, who take responsibility for measurement and reporting. This means that the direct cost of 15-minute measurement falls on network owners and other reporters that may need to change electricity meters, configure electricity meters and store measured values, etc. The direct costs are then charged over time to the electricity producer, who is thus also financially affected by the proposal. Although the electricity producer is the entity required to measure and report, the electricity producer is indirectly affected financially.

The financial impact presented is based on the direct costs incurred by network owners and other reporters of measured values. The economic impact on electricity producers is presented at the end of section 1.8.1.

1.8.1 Impact on reporters and electricity producers

The proposed changes will entail direct costs for network owners and other reporters that measure electricity production at a point of entry into a non-concession-regulated network on behalf of electricity producers. The economic consequences arise from the need to adapt existing measurement systems to manage 15-minute measurement. The adaptation means that some electricity meters will need to be replaced or configured, there will be changes in administrative procedures and expanded storage space.

The Swedish Energy Agency's assessment is that requirements for 15-minute measurement will have financial implications for network owners of between SEK 1,520 and 1,950 per electricity meter and for other reporters of between SEK 360-1,470 per electricity meter. For electricity producers using network owners as reporters, the economic impact is SEK 150 to SEK 200 per year over 10 years. For those who use other reporters, the cost is SEK 30 to SEK 150 per year for 10 years.

A detailed review of the economic impact arising from the draft regulation on 15-minute measurement is presented below.

Affected parties

Those affected by the draft amendments are electricity producers with plants, in which electricity is measured in non-concession-regulated networks, and reporters that measure and report measured values on behalf of these electricity producers to the Swedish Energy Agency. The reporting service providers mainly consist of network owners who both measure and report measurement values within concession-regulated and non-concession-regulated networks. Reporters also consist of other companies that offer services in measurement and reporting of measurement values in non-concession-regulated networks.

Electricity producers

In total, there are approximately 1,404 electricity producers with one or more electricity generation plants with measurement in non-concession-regulated networks. They are organised in various legal forms, the majority are limited liability companies, followed by private individuals. Solar panel installations account for 64 per cent of plants with measurement in non-concession-regulated networks, followed by wind, bioenergy and hydropower. See breakdown below in Table 7.

Table 7 Overview of electricity producers and types of energy, number

Type of owner	Solar	Wind	CHP	Hydropower	Total
Housing cooperative, economic association	189	5		3	197
Limited liability company	655	52	47	25	779
Partnership, limited partnership	31	1	1	1	34
Non-profit association, foundation	47	2	1	1	51
Private individual	265	19	6	4	294
State, municipality, county council	44	1	4		49
Grand total	**1,231**	**80**	**59**	**34**	**1,404**

In terms of number, mainly private individuals and limited liability companies will be affected by the 15-minute measurement requirement. The cost to them will be indirect because these operators use a reporter to report measured values to the Swedish Energy Agency.

Network owners

There are 61 network owners who currently deal with measurement and reporting for plants to which electricity certificates are allocated in non-concession-regulated networks. Network owners are mainly medium and large companies, as well as a few small companies[20], economic associations and one federation. In total, the network owners deal with measurement and reporting for 420 plants. Most of them, 54 network owners, measure and report for ten or fewer electricity generation plants. The total standard annual output of these 420 plants is approximately 2.9 TWh. The number of network owners, broken down by the number of plants managed by each company is shown in Table 8.

[20] Based on turnover in accordance with Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (2003/361/EC).

Table 8 Number of network owners by responsibility for measurement of the output at the number of plants [21]

Number of plants	Number
10 or less	54
11–100	5
101 or more	1

Other reporters

There are 10 other reporters that measure and report measured values for plants for which electricity certificates are allocated in non-concession-regulated networks. These are made up of three large enterprises, one medium-sized enterprise, two small enterprises, three micro-enterprises[22] and one economic association. In total, these reporting service providers handle 2,434 plants in non-concession-regulated networks with a total standard annual output of approximately 13.3 TWh. Four of these companies handle fewer than 100 installations and one handles more than 1,000 installations. The breakdown is shown in Table 9.

Table 9 Number of other reporters by responsibility for the number of plants[23]

Number of plants	Number of network owners
100 or less	4
101-500	5
501 or more	1

Calculation of financial impact

The transition to the 15-minute measurement will entail direct costs for network owners and other reporters that measure and report measured values to the Swedish Energy Agency on behalf of electricity producers. They will need to make adjustments to their existing measurement systems that may include:

- replacement of electricity meters that cannot record measurement values per quarter-hour;
- configuration of electricity meters that have the functionality to record measurement values per quarter-hour but currently measure per hour;

[21] Information from the Swedish Energy Agency's register of reporting companies for plants approved for the allocation of electricity certificates with a measurement point in non-concession-regulated networks (1 June 2023).
[22] Based on turnover in accordance with Commission Recommendation of 6 May 2003 concerning the definition of micro, small and medium-sized enterprises (2003/361/EC).
[23] Information from the Swedish Energy Agency's register of reporting companies for plants approved for the allocation of electricity certificates with a measurement point in non-concession-regulated networks (1 June 2023).

- modification of administrative procedures for managing measuring and reporting of 15-minute measured values; and

- addressing the requirement for extended storage space for measured values.

The calculations made in this section are based on economic assumptions, the sources of which are presented in the section.

Cost of new meter with installation

According to the information provided by the Swedish Energy Agency, there are currently approximately 2,800 electricity meters that measure the input of electricity into the non-concession-regulated network.[24] The Swedish Energy Agency asked five network owners how many of their electricity meters can currently meet the 15-minute measurement. These five network owners account for about 10 % of the total of 420 electricity meters in non-concession-regulated networks for which network owners report. They estimated that the proportion that can meet the 15-minute measurement is about 49 % of their meters and the remainder need to be replaced. This estimate has been used as a general distribution in the cost calculation for all 61 network owners.

The Swedish Energy Agency also asked four other reporters about the proportion of electricity meters that manage 15-minute measurement. These four reporters account for 85 % of the total of 2,434 electricity meters in the non-concession-regulated network that are managed by other reporters. They estimated the proportion that can manage 15-minute measurement at about 94 % of their electricity meters and that the remaining ones need to be replaced. This estimate has been used as a general distribution in the cost estimate for all other reporters.

Overall, the majority of all electricity meters used in non-concession-regulated networks can manage 15-minute measurement and it is estimated that 13 % will need to be replaced. The majority of all electricity meters are held by other reporters. The breakdown of the operators and the share of electricity meters is presented in Table 10.

Table 10 Estimated share of electricity meters that need to be replaced and can measure per quarter-hour

Number and proportion	Electricity network owners	Other reporters	Total
Total number of meters	420	2,434	2,854

[24] Information from the Swedish Energy Agency's register of reporting companies for plants approved for the allocation of electricity certificates with a measurement point in non-concession-regulated networks (1 June 2023).

Percentage that needs to be replaced	51 %	6 %	13 %
Percentage that can measure per quarter-hour	49 %	94 %	87 %
Number of new meters	214	146	360
Number that can measure per quarter-hour	206	2,288	2,494

The cost estimates from the Swedish Energy Agency for new meters totals SEK 1,000 for small plants[25] and SEK 1,500 for large plants[26]. The difference between plants is the fuse size, which requires different types of electricity meters. The Swedish Energy Agency does not have precise information on the electricity producers' fuse size. Instead, an average of SEK 1,250 per meter is used in the calculation.

The total cost of new meters is estimated at approximately SEK 268,000 for network owners and approximately SEK 183,000 for other reporters, Table 11.

Table 11 Calculation of costs for the purchase of new electricity meters

Number and proportion	Electricity network owners	Other reporters	Total
Number of new meters	214	146	360
Total cost	SEK 267,750	SEK 182,550	450,300

The new meters need to be installed and put into operation, which requires a physical person to enter the plant. Replacing electricity meters requires staff with skills in the field. The Swedish Energy Agency assumes that the person who carries out the task works in some role as an electrician at a network owner or other reporter. Since electricity producers purchase the service from reporters, it is assumed that there is competence within measurement and reporting services in the companies offering these services.

Based on salary statistics from Statistics Sweden, an average salary has been calculated for the professional groups of civil engineers in electrical engineering, industrial electricians, and installation and service electricians. The average salary for installers and operators of the new electricity meters is estimated at approximately SEK 59,000 including employer contributions and holiday pay.

[25] Fuse size <63 A
[26] Fuse size > 80 A

This gives an average hourly cost of SEK 368 (Table 12) for the professional group.

Table 12 Calculation of salary and hourly cost

Profession	Civil engineering professions in electrical engineering	Industrial electricians	Installation and service electricians	Average
Salary	SEK 51,800	SEK 36,800	SEK 34,700	SEK 41,100
Social security contributions	31.42%	31.42 %	31.42 %	31.42 %
Holiday allowance	12 %	12 %	12 %	12 %
Total labour cost	SEK 74,292	SEK 52,779	SEK 49,767	SEK 58,946
Hourly cost (160h)	SEK 464	SEK 330	SEK 311	SEK 368

Installing an electricity meter entails the time taken for electricians to travel to the plant and the time to install the electricity meter. Precise information on the time spent travelling to each plant is missing for the Swedish Energy Agency. Therefore, it is assumed for network owners that their facilities will be located within the network owner’s network area. For other reporters, some installations may be located in the vicinity of the reporter's registered office or further afield. For network owners, it is assumed that the plants are located within a 50 km radius of the company's registered office and that transport takes place by car, driven at an average speed of 70 km/h. This gives a distance travelled of 100 km and a total journey time of 1 hour and 26 minutes to the plant and back[27].

For the other reporters, it is assumed that the average distance from the company's registered office is slightly longer, at around 70 km. The increased distance takes into account the plants that are more distant. Given the same conditions as for network owners, this gives a route of 140 km and a total journey time of 2 hours to the plant and back.

The transport cost is calculated as the cost per 10 km based on the Swedish Tax Agency's flat rate for work journeys by own car or company car of SEK 25 per 10 km.[28]

The installation of an electricity meter may, in some cases, be simple and only take a short time and in other, more complex cases, take longer. There are no

[27] Mathematical formula: Time = Distance travelled/Speed
[28] https://skatteverket.se/privat/etjansterochblanketter/svarpavanligafragor/avdrag/privattjansteresafaq/jagreserendelitjanstenvilkareglergallerfordekostnadsersattningarsomjagfaravminarbetsgivare.5.10010ec103545f243e80001472.html

precise figures, but the Swedish Energy Agency estimates that the average time for installation is approximately 2 hours per electricity meter. Time includes locating the meter, unpacking the new meter, installing, commissioning and then packing up the equipment.

The total cost of installing new meters is approximately SEK 590,000. The cost estimate is shown in Table 13.

Table 13 Total installation cost of new meters

Operator	Number of electricity meters	Distance (km/10)	Travel time (hours)	Installation (hours)	Total cost
Electricity network owners	214	10	1.4	2	SEK 324,223
Other reporters	146	14	2	2	SEK 266,324
Total	360				SEK 590,548

The total cost of purchasing and installing new electricity meters is estimated at approximately SEK 1 million. This means a cost of approximately SEK 2,800 per electricity meter for network owners and SEK 3,100 per electricity meter for other reporters. The higher cost for other reporters is due to the fact that the average distance travelled to each plant is longer. This is because other reporters are not constrained to operating in a defined network area. The cost of purchase and installation is summarised in Table 14.

Table 14 Total cost of purchase and installation of new electricity meters

Costs	Electricity network owners	Other reporters	Total
New meters	SEK 267,750	SEK 182,550	SEK 450,300
Installation and commissioning	SEK 324,223	SEK 266,324	SEK 590,548
Total	**SEK 591,973**	**SEK 448,874**	**SEK 1,040,848**
Average/operator	SEK 9,866	SEK 44,887	SEK 14,869
Average/electricity meter	SEK 2,764	SEK 3,074	SEK 2,889

In some cases, a proportion of the meters deemed to need replacement may only need a software update. In these cases, the total cost is reduced because new electricity meters do not need to be purchased. Instead, more time is required to configure the new software. The Swedish Energy Agency has not calculated this because the estimate would be too speculative.

Cost of configuration of existing measurement system

Electricity meters that currently have the functionality of recording measured values every 15 minutes, but measure per hour at present, need to be reconfigured. Table 11 shows the number of electricity meters that are currently estimated to be able to manage 15-minute measurement. For network owners, the number is 206 electricity meters and for other reporters it is 2,288. Most modern electricity meters can be configured remotely. However, there will be cases where remote configuration does not work and a site visit will be required. The exact outcome will depend on each individual electricity meter. The need to carry out site visits to the plant is a decision taken by the reporter on a case by case basis. In order to provide a cost estimate for the configuration, the Swedish Energy Agency uses a calculation based on a range in which, on the one hand, all electricity meters can be configured remotely and, on the other hand, all electricity meters need to be configured on site.

Configuration of electricity meters remotely requires the reporter to be able to connect to the electricity meter over the Internet and to make the necessary settings. The work steps are presumed to consist of connecting to the electricity meter via a computer, changing the settings to 15-minute measurement and testing that configuration is successful. This is estimated to take about 30 minutes per electricity meter. The Swedish Energy Agency assumes that it is the same professional group of electricians at a network owner or other reporter that does the work. The hourly rate is therefore assumed to be the same as for the installation of a new meter, at SEK 368 (Table 12 Calculation of salary and hourly cost).

The estimated total cost for configuring all electricity meters remotely is approximately SEK 460,000 million. Most of the costs are borne by other reporters who handle the majority of electricity meters in non-concession-regulated networks. Cost breakdown is shown in Table 15.

Table 15 Cost for configuring electricity meters at a distance

Operator	Number of electricity meters	Time of configuration (hours)	Total cost
Electricity network owners	206	0.5	SEK 37,909

Other reporters	2,288	0.5	SEK 421,454
Total	2,494		SEK 459,363

Where an electricity meter needs to be configured on site, the time required will be longer. In addition to the actual configuration, technicians also need to travel to the location of the electricity meter. The route and duration of the journey are assumed to be the same as in the calculation for the installation of a new meter (Table 13). However, configuration is assumed to take less time to complete than the installation of a new meter. The work steps are assumed to consist of locating the meter, connecting to the meter, changing the settings to 15-minute measurement and testing that configuration is successful. The time required is estimated at 45 minutes, which is slightly longer than remote configuration. This is because site visits are necessary to ensure that the electricity meter works properly, which is assumed to require more work.

The total cost, if all electricity meters need to be configured on site, is estimated at approximately SEK 3.3 million. The majority of the costs are borne by other reporters who have many electricity meters. The summary of the calculation is shown in Table 16.

Table 16 Calculation of cost for configuration on site

Operator	Number of electricity meters	Distance (km/10)	Travel time (hours)	Time of configuration (hours)	Total cost
Electricity network owners	206	10	1	0.75	SEK 216,735
Other reporters	2,288	14	2	0.75	SEK 3,118,782
Total	2,494				SEK 3,335,517

The total cost for configuring existing electricity meters is estimated to be between SEK 0.5 and 3.3 million. This corresponds to SEK 184-1,362 per electricity meter. Table 17 summarises the costs of remote and on-site configuration and cost breakdown by operator and electricity meter.

Table 17 Summary of costs for remote and on-site configuration

Costs	Electricity network owners	Other reporters	Total
Configuration remote	SEK 37,909	SEK 421,454	SEK 459,363
Configuration on site	SEK 216,735	SEK 3,118,782	SEK 3,335,517
Distance			
Average/operator	SEK 632	SEK 42,145	SEK 6,562

Average/electricity meter	SEK 184	SEK 184	SEK 184
On site			
Average/operator	SEK 3,612	SEK 311,878	SEK 47,650
Average/electricity meter	SEK 1,053	SEK 1,363	SEK 1,338

The Swedish Energy Agency received information from a reporter during the course of the work that in some cases there is a need to change power transformers in connection with configuration. The Swedish Energy Agency does not have information on the number of new power transformers that need to be replaced, which is determined on a case-by-case basis. However, in each case, it will be necessary to determine whether power transformers need to be changed at the same time as the configuration takes place. The Authority assumes that any additional costs caused by this would fall within the cost range for configuration.

Cost of changes to administrative procedures for reporting

Measuring every 15 minutes means a change in the reporting of data to the Swedish Energy Agency. The reporting is automatic from electricity meters according to information[29] received by the Swedish Energy Agency from two reporters. The Swedish Energy Agency assumes that each reporter has a manual or standard operating procedure (SOP) stating how measurement and reporting are managed for electricity meters in non-concession-regulated networks. These procedures must be updated to take account of the 15-minute measurement requirement, which will require a certain amount of work.

It is estimated that it will take 30 minutes to update the manuals and procedures that describe measurement and reporting. The time taken includes identifying the elements that need to be updated, updating the text and informing those concerned. The implementation is assumed to be carried out by the same professional group of electricians who are competent to install and configure electricity meters at an hourly cost of SEK 368.

The total cost of the update is estimated at approximately SEK 12,900, with the main part of the cost falling on network owners, who are greater in number than the other reporters. The calculation of administrative costs is summarised in Table 17.

Table 18 Summary of administrative costs

Operator	Number	Change admin. (hours)	Total cost

[29] Swedish Energy Agency's reference number: 2023–009543

Electricity network owners	60	0.50	SEK 11,052
Other reporters	10	0.50	SEK 1,842
Total	70		SEK 12,894

Cost of expanded storage space

The Swedish Energy Markets Inspectorate's report *Functional requirements for future electricity meters*[30] gives an assessment that the increased amount of data to be handled by the reporters may entail higher costs for communications, servers and databases that may need to be expanded or improved. The Swedish Energy Agency assumes that today all reporters already have their own solution for storing measurement data by means of their own server, cloud storage or similar. The exact cost for each reporter depends entirely on the number of electricity meters checked and the storage solution used.

In total, 2,854 electricity meters are affected by the proposal for 15-minute measurement in non-concession-regulated networks. In order to simplify the calculation, it is assumed that each electricity meter measures 1,000 kWh per hour corresponding to 4 characters. Each character is assumed to correspond to one byte in the storage space.[31] When moving to the 15-minute measurement, the number of characters per hour will increase from 4 to 12. Instead of storing 1,000 kWh, the electricity meter will instead store four 15-minute values of 250 kWh corresponding to 1,000 kWh per hour. On the basis of this simplified calculation, the 15-minute measurement will require three times more storage space than that for the hourly measurement. Each meter will require storage space of approximately 0.1 MB compared to 0.035 MB when measuring per hour. The calculation is summarised in Table 19.

Table 19 Calculation of storage requirements

Measurement period	Characters / hour	Characters / 24 hours	Characters / month	Characters / year	Storage / year in MB
Every hour	4	96	2,880	34,560	0.035
Every quarter-hour	12	288	8,640	103,680	0.104

Despite the requirement for storage space tripling, the amount of information that needs to be stored is relatively small. In total, all electricity meters in non-concession-regulated networks require an additional storage space of 197 MB. In

[30] EI R2015:09. Functional requirements for future electricity meters.
[31] https://sv.wikipedia.org/wiki/Alfanumerisk, Each alphanumeric character corresponds to one byte of information

addition to this, storage space is also required to back-up the corresponding amount of data.[32] This gives a total storage requirement of approximately 394 MB for all electricity meters in non-concession-regulated networks. For network owners, the storage requirement corresponds to 58 MB and for the other reporters 336 MB. Summary is shown in Table 20.

Table 20 Summary of storage needs including back-up

Number and proportion	Network owners	Other reporters	Total
Total number of meters	420	2,434	2,854
Storage (MB) 60-minute	15	85	100
Storage (MB) 15-minute	44	253	297
Storage requirement (MB)	**29**	**168**	**197**
Back-up storage	29	168	197
Total storage requirement (MB)	**58**	**336**	**394**

To estimate the costs for each reporter, it is assumed that all reporters use a cloud service for storing measurement values. A comparison of different cloud service providers (Table 21) gives an average cost of SEK 1,639 per year for a storage space of 3 terabytes.[33]

Table 21 Summary of costs for cloud computing services[34]

Cloud service provider	Space, TB	Annual cost	Cost / TB	Cost / GB	Cost / MB
Dropbox	3	SEK 2,362	SEK 787	SEK 0.8	SEK 0.0008
Google	2	SEK 999	SEK 500	SEK 0.5	SEK 0.0005
Pcloud	2	SEK 1,187	SEK 593	SEK 0.6	SEK 0.0006
IceDrive	5	SEK 2,009	SEK 402	SEK 0.4	SEK 0.0004
Average	3	SEK 1,639	SEK 570	SEK 0.6	SEK 0.0006

The storage requirement for the measured values at 15-minute intervals is very small in relation to the standard storage space offered by cloud service providers. The total storage requirement of 394 MB for all non-concession-regulated network meters is equivalent to 0.0004 TB.

It was previously assumed that all reporters already have some form of storage. It is used to store measured values, documents and images, etc. In order to give a

[32] To enable information to be restored, if the original is lost or damaged.
[33] 2-5 terabytes storage space is usually offered by default.
[34] Data retrieved on 5 October 2023

true and fair view of the economic impact of the 15-minute measurement, the cost of storage per meter is calculated. This implies that the cost for each meter will be an increased cost for storage in the storage solution currently used by the reporter calculated on the basis of costs per MB in Table 21. The storage cost for introducing the 15-minute measurement is estimated at SEK 0.0001 per electricity meter. The calculation is shown in Table 22.

Table 22 Calculation of storage costs for measured values

Parameters	Network owners	Other reporters	Total
Number of meters	420	2,434	2,854
Storage cost/MB	SEK 0.0006	SEK 0.0006	SEK 0.0006
Annual storage requirement MB / electricity meter	0.14	0.14	0.14
Total storage cost	**SEK 0.03**	**SEK 0.19**	**SEK 0.22**
Cost per electricity meter	SEK 0.0001	SEK 0.0001	SEK 0.0001

Summary financial impact

The total financial impact on network owners and other reporters of the 15-minute measurement in non-concession-regulated networks is estimated at approximately SEK 1.5 to 4.4 million. For network owners, the total cost is approximately SEK 641,000-820,000, which is lower than for other reporters by approximately SEK 0.8-3.5 million. The difference in the cost picture is due to the number of electricity meters controlled by the two groups of operators. The total economic impact of the 15-minute measurement is summarised in Table 23.

Table 23 Summary of costs due to the 15-minute measurement

Costs	Electricity network owners	Other reporters	Total
Purchase of new electricity meters	SEK 267,750	SEK 182,550	SEK 450,300
Installation / commissioning	SEK 324,223	SEK 266,324	SEK 590,548
Configuration - remote (Min)	SEK 37,909	SEK 421,454	SEK 459,363
Configuration - on site (Max)	SEK 216,735	SEK 3,118,782	SEK 3,335,517
Admin. procedures	SEK 11,052	SEK 1,842	SEK 12,894
Storage space	SEK 0.03	SEK 0.19	SEK 0.22
Total Min	**SEK 640,935**	**SEK 872,171**	**SEK 1,513,105**
Total Max	**SEK 819,760**	**SEK 3,569,499**	**SEK 4,389,259**

The estimated breakdown of costs per operator is estimated at approximately SEK 10,600-13,600 for network owners and approximately SEK 87,000-350,000 for other reporters. The breakdown per electricity meter is calculated at SEK 1,500-2,000 for network owners and SEK 360-1,500 for other reporters. The difference in cost per meter is due to the fact that network owners have a higher proportion of electricity meters that need to be replaced. The breakdown is summarised in Table 24 below.

Table 24 Minimum and maximum costs per operator and electricity meter

	Costs	Network owners	Other reporters
Operator	Min Average	SEK 10,682	SEK 87,217
	Max Average	SEK 13,663	SEK 356,950
Electricity meters	Min Average	SEK 1,526	SEK 358
	Max Average	SEK 1,952	SEK 1,467

The real total cost for each operator is individual and depends entirely on the number of electricity meters they have, whether the electricity meters can be configured remotely, the actual time required to replace the electricity meters and the requirement for increased storage space for measured values.

Impact on electricity producers

All direct costs incurred by the reporter according to Table 23 will ultimately be passed on to the electricity producers. The way the cost is passed on to the electricity producer is individual for each reporter. The Swedish Energy Agency assumes that the cost is spread over 10 years, which would correspond to the depreciation period for electricity meters in the Swedish Energy Markets Inspectorate's revenue regulation of network owners.[35]

The annual cost for electricity producers that have network owners as reporters is estimated at approximately SEK 153–196 and for electricity producers whose measurement is performed by other reporters at SEK 36–146. The cost is summarised in Table 25 below.

Table 25 The electricity producers' annual cost increase over 10 years

Costs	Network owners	Other reporters
Min / electricity meter	SEK 153	SEK 36
Max / electricity meter	SEK 196	SEK 146

[35] SFS2018-1520 p.6, https://svenskforfattningssamling.se/sites/default/files/sfs/2018-08/SFS2018-1520.pdf

1.8.2 Impact on competitive conditions

The 15-minute measurement requirement for electricity generation plants in non-concession-regulated networks means that the same rules are introduced as for plants in concession-regulated networks. This is not considered to affect the competitive conditions.

All electricity production is measured at the connection point to concession-regulated networks, which is the same for all electricity producers. In addition, the electricity producer may opt for measurement in a non-concession-regulated network for the allocation of electricity certificates. Measurement is then performed at two points, in the non-concession-regulated network and the concession-regulated network, but only measured values from the non-concession-regulated network are reported to the Swedish Energy Agency and form the basis for the allocation. The reason why producers choose a measurement point in a non-concession-regulated network is that this results in the allocation of more electricity certificates, see Chapter 1.2.4. It may affect the conditions of competition in that one electricity producer obtains more electricity certificates than another. However, the proposed 15-minute measurement amendment has no impact on the allocation of electricity certificates and no impact on competitive conditions.

1.8.3 Other impact on companies

The proposed regulations do not impose any requirements on operators other than electricity producers, reporters and network owners. Manufacturers of meters are indirectly affected by the new regulations, because some meters need to be replaced to manage 15-minute measurement. These meters are already dominant on the electricity market as a result of the amendment to the Measurement Ordinance (1999:716) and the Swedish Energy Markets Inspectorate's regulations and general advice on the measurement, calculation and reporting of transmitted electricity (EIFS 2023:1). The non-compliant meters will be replaced by the end of 2024 and the manufacturers are deemed to be able to meet the increased demand, since meter replacements are likely to take place over this time.

1.8.4 Special consideration of small businesses

No specific consideration has been given to small businesses. In order to achieve uniform management of measurement and reporting of measured values, the rules need to be equal for all.

The companies affected by the amendment are small network companies and other reporters which are presented in Table 8 and Table 9, as well as electricity producers presented in Table 25.

Small enterprises in the group of other reporters report measured values for the majority of non-concession-regulated network plants. For the most part, these are solar panel installations that are held by private individuals and housing associations. According to the consultation initially carried out by the Swedish Energy Agency as part of the investigation, the majority of these electricity meters can handle the 15-minute measurement. This change means for the reporter only that existing electricity meters need to be configured to handle the 15-minute measurement. This means that the cost per plant for smaller electricity producers is estimated at SEK 358–1,467 according to Table 24.

1.8.5 Impact on the public sector

The implementation of the amendments also entails costs for the public sector as presented here.

Impact on the Swedish Energy Agency

The proposed amendments concerning the 15-minute measurement in non-concession-regulated networks mean that all reporting to CESAR takes place at the 15-minute resolution. The fact that all measured values have a 15-minute resolution simplifies the handling of measurement data for the Swedish Energy Agency and reduces the need for information to operators compared to if different requirements are imposed for measurement and reporting depending on the location of the measurement point.

The transition to the 15-minute measurement in non-concession-regulated networks requires an upgrade of the CESAR accounting system. It is not just this amendment that gives rise to the need for upgrading. From 1 November, all measured values reported to CESAR will be 15-minute values both in non-concession-regulated networks, affected by this amendment, and in concession-regulated networks. The latter have the 15-minute measurement and reporting requirements under the Measurement Ordinance and Measurement Regulations. The total cost includes the configuration and development of software and the storage of data, and amounts to approximately SEK 700,000. The amendment also entails an increase in the labour cost for regular maintenance at 42 hours per year. The day-to-day maintenance of CESAR is managed by the supplier, Grexel, and the contractual hourly rate is SEK 1,090,[36] this results in a total cost of approximately SEK 45,800 per year.

[36] Contract ref. no. 2022-5024 with 20 % project management and 80 % software developers employed. When converting from Euro to SEK, the rate of SEK 11.5/Euro has been used.

Impact on other public sector organisations

There are 45 public sector organisations (state, municipality, county councils), mainly municipalities, which are owners of electricity generation plants for which electricity certificates are allocated. In total, there are 203 installations, consisting of 195 solar panel installations, 7 biofuel plants and one wind farm. It is expected that the reporter will pass on the cost of meter conversion and any replacement to the electricity producer. As a result, the 45 public sector organisations that are electricity producers will be affected in terms of costs according to Table 25.

Otherwise, the amendment has no impact on public organisations.

1.8.6 Impact on electricity customers

The proposed amendments to the regulations do not have a direct impact on electricity customers on the Swedish electricity market. The regulation concerns electricity producers to whom electricity certificates are allocated by application to the Swedish Energy Agency.

The indirect impact on electricity customers is deemed to be insignificant. Expanding renewable electricity within the electricity certification scheme is financed by electricity consumers paying an electricity certificate fee on their electricity bills. The price of electricity certificates set in an open market is largely dependent on supply and demand. Therefore, an increase in the cost for electricity generation plants does not affect the price of electricity certificates.

The price of electricity consumed by electricity customers is initially set on the Nordic electricity exchange, Nord Pool, by bids from electricity producers. Increased costs may lead to an increase in the price bid, which may ultimately be paid by electricity customers. These cost increases are distributed across all electricity customers. The impact on electricity customers' costs is considered marginal.

1.9 Environmental impact

The Swedish Energy Agency considers that the proposal does not have any significant environmental impact. The impact is in the premature replacement of a proportion of the meters, leading to an increase in material waste. Our assessment is that the impact is only marginal because only old meters may need to be replaced.

1.10 Social impact

The Swedish Energy Agency's assessment is that human health, living conditions, labour market and housing conditions are not affected by the proposed rules.

1.11 Entry into force and information initiatives

The draft regulation specifies the rules introduced in the ordinance. The regulation should therefore enter into force as close as possible to the entry into force of the amendment to the ordinance on 1 November 2023.

The consultation on the amendment to the ordinance was also published on the Swedish Energy Agency's website. All subscribers to the news on electricity certificates and guarantees of origin will receive this information by email.

1.12 Consultation

The proposed amendment to the regulation will be sent out to the industry and the relevant authorities for consultation in January 2024. The consultation will give stakeholders the opportunity to comment on the planned amendments.

1.13 Follow-up

Some time after the entry into force of the regulations, the Swedish Energy Agency will investigate, through supervision, whether electricity producers are complying with the rules laid down in the regulations.

1.14 Contact persons

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