EECS RULES Subsidiary Document

# AIB-EECS-SD03: EECS REGISTRATION DATABASES

## Hub User Compliance Document (HubCom)

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## STATUS OF THIS DOCUMENT

This document, the Hub User Compliance Document (HubCom), is also known as AIB-EECS-SD03: EECS Registration Databases, which is a subsidiary document to the EECS Principles and Rules of Operation (the EECS Rules) of the Association of Issuing Bodies (AIB) for the European Energy Certificate System.

In the event of conflict between the text of the EECS Rules and the text of this document, the EECS Rules shall always take precedence.

The latest changes to this document were formally approved on 18 November 2026. The effective date of this EECS Rules subsidiary document is 19 November 2026.

Signed by the Secretary General:



Liesbeth Switten 18 November 2026

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## DOCUMENT HISTORY

| Version | Issue date | Reason for issue |
|---|---|---|
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| Draft 0.2 | 14 June 2005 | Prepared for General Meeting |
| Release 1.0 | 22 September 2005 | Release |
| Release 1.1 | 23 September 2005 | Revised to reflect format of other SDs |
| Release 2.0 | 20 January 2006 | Revised to adopt similar format to other SDs |
| Release 3.0 | 22 September 2006 | Revised to support disclosure certificates |
| Release 3.1 | 10 November 2006 | Revised to support the hub. Annex A3 and B5 updated and moved to chapter 5.2. Annex D completely recast, old Annex D moved to Annex E. EAN changed to GS1. |
| Release 4.0 | 1 January 2008 | Revised to align CHP and Disclosure chapters, change the limit on exported GO and clarify the position of AIB Test Manager |
| Release 5.0 | 1 January 2009 | CR0714: SD03 GS1/email encoding. CR0806: FS5 Technology code 95. |
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| Release 5.2 | 1 June 2009 | PRO-CR0901: implementation of Chapter 5 Multi-certificates in SD03. PRO-CR0903: removal of exportenv34.xsd (original RECS) from SD03. |
| Release 5.3 | 29 July 2009 | PRO-CR0902: changes in SD03 according to CR0812 (earmarks) and correction of the reference to PRO-FS06 |
| Release 5.4 | 27 November 2009 | PRO-CR0908: handling of SD03 incompliance issues. PRO-CR0909: “Generation period” and “Issue date”. |
| Release 5.5 | 7 July 2010 | PRO-CR1002: implementation of the new export format exportenv67 |
| Release 5.6 | 12 October 2010 | PRO-CR0909: “Generation period” and “Issue date”. PRO-CR0922: start and end date of production and date of issue. PRO-CR0927: use of a single format for representing a certificate issuer. |
| Release 5.7 | 1 January 2011 | PRO-CR1031: corrections to the new export format exportenv67 |
| Release 5.8 | – | PRO-CR1103: new export format exportenv70 |
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| Release 6.1 | 23 September 2011 | Revised in accordance with the wishes of the Amsterdam General Meeting of 23 September 2011 |
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| Release 6.2 v2 | 2 February 2012 | New AIB logo |
| Release 6.2 v3 | 22 March 2012 | Corrections to indexes and error code in B3.5.2 |
| Release 6.2 v4 | 31 May 2012 | Error correction in the exportenv70 XML schema location (B3.2.1) |
| Release 6.3 | 26 February 2013 | Revised to be a document independent of the EECS Rules, to enable it to be used as part of the Hub Participant Agreement document set |
| Release 6.3.1 | 15 March 2013 | Softening of the "binding" requirement in art. 2.4.1.3 |
| Release 6.4 | 13 March 2014 | ACK changed to AK. Use of heat parameter values referred to the EECS Rules Fact Sheet. "Member and Competent Authority Codes". Fact sheet names updated. Formal link with the document "Specifications Hub Webservice". |
| Release 6.5 | 8 May 2015 | Immutability of data on a certificate. Update of Directive references. Product Type Technology means HEC GO. How to mark the Product Type for combined HEC-RES-E GO. Extra explanation on Product Status NGC/ICS. Mandatory fields for HEC allowed as optional for other GOs. |
| Release 6.6 | 20 July 2015 | Four extra fields on HEC GOs. New XSD v71 and class diagram v71. Maximum number of certificate blocks in a transfer. Recommendation to issue certificates in bundles. The Sender should validate the message against the schema (XSD) before sending. |
| Release 6.7 | 24 September 2015 | Adjustments of Note 3 and Note 4 of B5.2.1 |
| Release 6.8 | 2 October 2015 | "Figure 3 Basic Data Transmission Protocol – format errors rejection by recipient" and the schema v71 validation problems corrected. Text in 2.3.5.4 adjusted. B5.5.3 and B5.5.4 clarified. |
| Release 6.9 | 4 December 2015 | Correction of differences identified between the EECS Rules and SD03. Update of table B5.2 Optional and Mandatory Elements. |
| Release 7.0 | 23 February 2016 | Schema correction for Purpose and note on mandatory message id |
| Release 7.1 | 13 June 2017 | Web service description added. End of mailbox support (AIB-2016-GM04-12). Deadline for the schema v71 implementation (AIB-2017-GM02-19). Validity of schemas v70 and v71 clarified and conversion rules added. Schema v71 changed to allow 0 values for CO2EmissionProduced and AbsoluteCO2EmissionSaved for RES GOs (AIB-2017-GM01-17), error in its Purpose element corrected. Technical Audit added (AIB-2016-GM-03-19). B5 tables unified to specify Unit, Length and Occurrence. Pending status handling added as recommended option, diagrams updated. Smaller adjustments from AIB-2017-GM01-20. Definition of "AIB Hub" added. Schema diagrams for v70 and v71 updated. |
| Release 7.2 | 12 March 2018 | Capacity fields updated to support a maximum of 3 decimal places (EECS-CR1705, AIB-2017-GM05-23) |
| Release 7.3 | 8 June 2018 | Account Holder database related changes and additions. Relationship between Account Holder, Issuing Body, Registry and Domain clarified by a diagram in chapter 1.1. Minimum date for Date Operational, Issuing date and Production period. Immutability of optional fields clarified (B5.2.1). Ref. AIB-2018-GM02-23a-b, AIB-2018-GM02-30. |
| Release 7.4 | 14 June 2019 | Technical audit and member audit integrated in Annex D. CMO replaced by Registry where appropriate. Schema v70 deleted. |
| Release 7.5 | 10 July 2020 | Mailbox registry description deleted (the mailbox facility was supported until 1 July 2019). Statistics schema definition added. Validation of the combination of Energy Source and Type of Installation added. Data Exchange Models clarified (chapter 4 and C4). Glossary updated. Ref. AIB-2020-GM-04-12. Addition of 2.3.1.10 (AIB-2020-GM-04-10). "Energy Medium" replaced by "Energy Carrier" except in XML (AIB-2019-GM-04-24). |

| Version | Issue date | Reason for issue |
|---|---|---|
| Release 8.0 | 25 April 2022 | Schema v80 and end date for schema v71, including transformation rules. Statistics schema: certificatecount datatype introduced to improve schema validation, new statistics types for the Energy Carriers “EnergyGas” and “Hydrogen”. |
| Release 8.1 | 7 June 2022 | Composition Purity: length of the token corrected from four to five. Storage tag: compulsory for all Energy Carriers in v80 with a default value, length changed from 3 to 5. Empty chapter B7.2 removed. Attribute name of the Conversion element corrected from “type” to “tag” in the XML examples. Minor wording changes. |
| Release 8.2 | 8 November 2022 | Recommended maximum number of transactions per minute added (2.3.5 Performance). ProductionPeriod start and end clarified. Calculation method of GHGEmissionsProduced and GHGEmissionsSaved fixed to 9 characters. GHGEmissionProduced datatype changed to Integer. Fact Sheet numbers added to the element descriptions. In v80, AmountPrimaryEnergySaved, OverallPrimaryEnergySavings, GHGEmissionProduced and AbsoluteGHGEmissionSaved made optional also for HEC, GHGEmissionProduced also for fossil and RadioactiveWasteProduced also for nuclear energy sources. Decimals unified, Decimal(10,3) changed to Decimal(11,3), decimal types renamed in the v80 schema. Small corrections of examples, descriptions and XSD related to v80. |
| Release 9.0 | 4 November 2025 | Message schema v81 added. Issues and typos in message schema v80 corrected. Message schema v71 removed. GS1 coding structure option for the Account Number removed. |
| Release 9.1 | 25 March 2026 | AMQP communication protocol specification added. Security requirements, issue resolution process, registry responsibilities and performance expectations clarified, other minor fixes. Cancellation and expiration statistics collection extended with Production Domain Code and Cancellation Categories. |
| Release 9.2 | 19 November 2026 | Message schemas: v81 XML examples and element tables corrected (calculationMethod, fossilAuxiliaryDeducted, CalorificValue unit). certificationBody extended to 255 characters in v81. faceValue made mandatory in v80 and v81. Production period length values (Fact Sheet 25) and expiry of sub-daily certificates clarified. Issuing Bodies may restore the information lost in transformation on the certificates they issued (B3.2.4).<br>Transfers: default limit of 5000 certificate bundles per transfer on both channels. Handling of certificates pending acceptance by the Receiving Account Holder clarified (4.4.4). AMQP channel: use of PENDING, answers to retries and repeated deliveries and the technical answers of a Registry clarified (4.2, 4.3, C2.6, C2.7). Web service channel (SOAP): the AIB Hub authenticates with its client certificate AHUB_WEBSERVICE.<br>Statistics: production date based statistics extended with the cancellation and expiration attributes, short code OtherScheme introduced, monthly delivery by the 20th calendar day, upload channels and JSON format added (B6, B8).<br>Account Holders: extended set of elements and JSON format added (B5, B8).<br>Annex D replaced by the description of the Technical Audit. References to the AIB Hub Connection Guide, AMQP Channel Specification, Technical Audit Guide and IB Admin Manual replaced by the AIB Hub Guide. List of related documents (1.3) and chapter on JSON validation schemas (B8) added.<br>Editorial review of the whole document: cross-references, element definitions (occurrence labels, HEC fields per EECS Rules N6.6.1), transfer state names, terminology, glossary and abbreviations corrected, sub-section 1.2.6 (Message Definition and File Format) added, Data Field Definition Index (B1) updated. Document moved to the AIB document template, figures redrawn. |

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# 1 INTRODUCTION AND PURPOSE

## 1.1 Purpose and Scope

1.1.1.1 This document addresses the technical and operational requirements for a Registration Database ("Registry") according to the European Energy Certificate System (EECS).

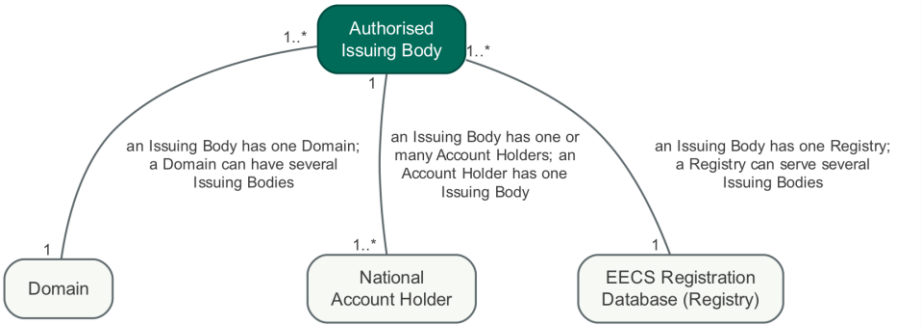



Figure 1.1 – Relationship between Issuing Body, Domain, Account Holder and Registry

1.1.1.2 It specifically addresses

(a) the transfer of information from or to an EECS Registration Database;

(b) file formats and transport protocols;

(c) common identifiers; and

(d) the testing of interfaces.

1.1.1.3 This document deals with electronic interfaces only.

1.1.1.4 This document is subject to the change management procedures set out in the EECS Rules and related subsidiary documents.

1.1.1.5 Unless specifically stated otherwise, the terms applied in this document shall have the meaning assigned to them in the EECS Rules; if a specific term is not defined in the EECS Rules, but has been defined in the Hub Participant Agreement, the term shall have the meaning defined therein.

## 1.2 Approach

### 1.2.1 General

1.2.1.1 The approach to the interface definition process adopted in this document is to partition the specification into stand-alone units that may, if required, be changed without affecting any other unit. A description of the business process follows and provides a contextual background.

### 1.2.2 Principles and rules of operation to be observed by Hub Users

1.2.2.1 Section 2 describes the principles which Hub Users are required to support, and the rules of operation that apply to them, in particular those relating to:

(a) The allocation of responsibilities for handling and transmitting data;

(b) Security;

(c) The obligations and warranties of Hub Users, including those relating to certificates, error handling, contingency and performance; and

(d) The consequences of data transfer.

### 1.2.3 Definition of the content of certificates according to the EECS standard

1.2.3.1 Section 3 defines the information to be held on certificates from a business perspective.

### 1.2.4 Data Exchange Process and Requirements

1.2.4.1 A business process can be represented by a 'transaction', which can be a message (or sequence of messages) that fulfils a business function. For example: 'submit report request' leads to 'report sent' or 'error message - not available'. Each of these messages can be defined as a logical 'flow' meeting a specific requirement, and which can be classified by its business characteristics:

(a) Originating Party;

(b) Receiving Party;

(c) Initiating event (e.g. user request, another flow, timer expires);

(d) Processing requirements;

(e) Data content at the business level;

(f) Mechanism (whether this is Manual, or Electronic Data File Transfer); and

(g) Validation rules.

1.2.4.2 Sections 4 and 5 cover these issues.

### 1.2.5 Identifier Standards

1.2.5.1 The data that is exchanged between EECS Registration Databases includes information relating to Accounts and Production Devices. It is important that these entities are uniquely identified, and that the identification should remain unique even after a series of transactions. The scope of these identifiers must therefore include at least the whole EECS community, irrespective of the particular scheme or schemes that any particular Registration Database supports.

1.2.5.2 These matters are addressed in ANNEX A - EECS Identifiers**.**

### 1.2.6 Message Definition and File Format

1.2.6.1 This defines what the data flow contains in terms of fields, their attributes and how the fields are grouped within the flow. At the same time, the rules for which fields and groups are optional or mandatory and whether and how often groups can be repeated are specified.

1.2.6.2 This logical message definition encompasses all the data visible at the user level and is closely aligned to the database design, since the flows are used to populate the database and/or are derived from their contents. The physical file format defines the data representation and control information. Similarly to the logical definition, a naming convention and layout standards are set out so that the information can be exchanged and validated in a consistent and unambiguous form.

1.2.6.3 These matters are addressed in: ANNEX B - EECS Transfer Interface File Specification.

### 1.2.7 Data Transfer Protocols

1.2.7.1 The data transfer mechanism for electronic data interchange is considered to be separate from the format of the data file. The mechanism provides for secure and reliable exchange of data that is appropriate for the maintenance of a clear audit trail of certificate transfer and the avoidance of double counting.

1.2.7.2 To the extent required by the AIB Hub Participant Agreement, all certificate transfers between two Registries should be transferred via the AIB Hub.

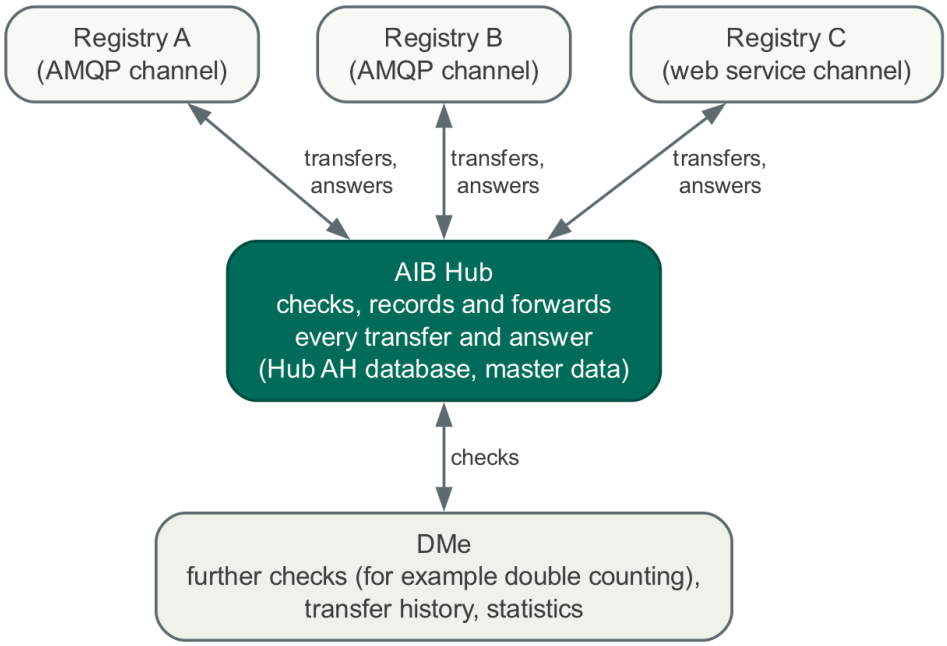



Figure 1.2 – Registries, the AIB Hub and DMe

1.2.7.3 These matters are addressed in: ANNEX C - EECS Transfer and Account Holders Interface Transport Specification.

### 1.2.8 Interface Testing

1.2.8.1 In order to ensure that each EECS Registration Database is able to transfer via the AIB Hub information in a form that complies with the requirements identified above, it is necessary to test each instance of such a database. The specification addresses the basic test process, the tests that are to be performed, the Technical Audit Report and the approval process by the ISU.

1.2.8.2 The tests are addressed in: ANNEX D - EECS Transfer Interface Test Specification for the Hub.

## 1.3 Related documents

1.3.1.1 The following documents complement this document. They are maintained by the AIB, describe the implementation details of the AIB Hub interfaces and are referred to throughout this document:

(a) AIB Hub Guide – the system guide for Registry Operators: the AIB Hub web interface, the connection of a Registry over the AMQP channel and the web service channel (SOAP), the environments and certificates, and the Technical Audit. It replaces the AIB Hub Connection Guide, the AIB Hub AMQP Channel Specification, the AIB Hub Technical Audit Guide and the AIB Hub IB Admin Manual;

(b) AIB Hub REST API Documentation – the REST interface of the AIB Hub for Registries;

(c) Technical Audit Report (template) – the report of a Technical Audit, whose Questionnaire chapter the Registry Operator fills in (Annex D); and

(d) XML Schema Definitions (XSD) and JSON validation schemas – see B7 and B8.

1.3.1.2 The current versions of these documents are available in the section Info › Documents of the AIB Hub web interface and on the ISU SharePoint. The XSD and JSON schema files are additionally published on the AIB website (see B7). In case of conflict between this document and any of the documents listed above, this document prevails.

# 2 PRINCIPLES AND RULES OF OPERATION TO BE OBSERVED BY HUB USERS

## 2.1 Responsibilities in the framework of handling and transmission of data

2.1.1.1 A successful and reliable messaging and transaction system requires:

(a) That each Message is assumed to be transferred from the Registry of the Sender to the Registry of the Recipient through the Hub;

(b) That every failure of delivery must be discovered by the sending Registry in cooperation with the receiving Registry and, where applicable, with the Superuser;

(c) That the relevant Message is clearly identifiable as coming from the intended Sender;

(d) That the relevant Message must be assumed to have been sent and arrived without alteration of any of its data ("integrity");

(e) That the Messages are sent with a high confidence that they will not be understood and/or used by any reasonably equipped third party;

(f) That the Registries keep their master data up to date, including changes to Fact Sheets, and that Registries keep their Account Holders list up to date in the central Account Holder database in the AIB Hub.

The Hub has implemented reasonable solutions to deal with the requirements set out both in this document, and in the documents to which it refers.

The Hub User acknowledges the importance of these principles; it acknowledges that the solutions must be regarded as reasonably sufficient in order to safeguard the operational and regulatory requirements, and that it will respect the requirements in order to safeguard the operation and the credibility of the Hub service.

2.1.1.2 The Hub User acknowledges that it has read and understood the process descriptions, including the expected tasks, roles and responsibilities of the Hub User and the AIB in that respect and the requirements set forth in this document including its Annexes.

2.1.1.3 The Hub User acknowledges that the requirements set forth in this document and every update thereof must be at all times respected in order to safeguard:

(a) the correct and smooth operation of the Hub;

(b) the security of the transactions via the Hub; and

(c) the avoidance of risks, disputes and claims between Hub Users, the AIB and other Participants.

2.1.1.4 Any exports of Certificates via the Hub require that all mandatory data, codes and identifiers that are required to be included in a Certificate, must be provided, in accordance with the mandatory specifications set forth in this document. The Hub Users will have no obligation to provide the data that is mentioned in this document as "optional" in order to be compliant with the system. However, Hub Users shall assess whether the provision of such optional data will be necessary for their business purposes. In any case, all data received shall be maintained (2.2.1.4).

2.1.1.5 The Hub User who sends data via the Hub ("the Sender") is responsible for the accurate creation of Messages, the application of appropriate security measures, the transmission of Messages and the monitoring of responses from the Hub and the Recipient of the data. The Sender will apply the rules agreed between it and the Recipient in relation to the validity, meaning and interpretation of the transferred Transaction Data. The Sender shall validate the message against the XML Schema Definition (XSD) or the JSON validation schema of the message schema version in use (B7, B8) before sending.

2.1.1.6 The Hub User acting as Sender shall only accept a Transfer Request from the duly authorized personnel of an Account Holder with respect to a Certificate held on that Account Holder's Transferables Account on that Hub User's Registry.

2.1.1.7 The operator of the Hub is responsible for the distribution of the data messages and the acknowledgements between the Registries of the Sender and the Recipient. The Hub will validate the formal compliance of the data. However, the AIB Hub will not systematically verify the content of the transferred data. The acknowledgement of a Message will not imply that the content of the transferred data must be deemed correct, valid or even validly existing.

2.1.1.8 The Recipient of transferred data is responsible for the verification, correct handling and processing of received data.

2.1.1.9 Each Hub User must manage the security, availability, capacity and performance of its own systems. Each Hub User is responsible for monitoring its interface to the AIB Hub (web service endpoint or AMQP queues) and for initiating the processing of incoming messages when they are received.

## 2.2 Security

2.2.1.1 A sufficient level of security is a crucial requirement for the operation of the Hub and the operation of a Registry.

2.2.1.2 On the web service channel (SOAP), the messages must be encrypted and may be digitally signed as described in C1.4 WS (SOAP) Protocol Specification.

2.2.1.3 On the AMQP channel, the message must be digitally signed. With mutual Transport Layer Security (mTLS), no additional encryption is needed on the message payload because mTLS ensures both data confidentiality and integrity.

2.2.1.4 All data included in a Certificate must be maintained by a receiving Hub User, where this data includes but is not limited to the ICS, Label, Purpose information and optional fields. Each Domain may at its sole discretion decide which items of certificate information it wishes to display. The data incorporated in a Certificate may not be modified or deleted after it has been transferred outside of the Domain in which it has been issued.

2.2.1.5 The Hub Users and/or Registry Operators are responsible for the configuration and maintenance of firewalls to manage the allowed connections from and to the Hub and to monitor unusual access to their systems, and they shall provide and maintain sufficient protection against harmful software and unwanted access through state of the art protective software and policies.

2.2.1.6 The access to the Hub is restricted to the Hub User and/or Registry Operator, and its personnel that require access in the normal course of the Hub User's or Registry Operator's business. The Hub User will take reasonable security precautions to prevent unauthorized persons from gaining access to the Hub and the data stored in and transmitted through the Hub, the Hub User's Registry and any connected Registry, using authorization policies and password protection.

## 2.3 Hub User's obligations and warranties

### 2.3.1 General

2.3.1.1 The Hub User may not sell, lease, license, furnish, or otherwise provide or permit access to the Hub to any other person or entity. The Hub User will not engage in the operation of any illegal business use or permit anyone else to use the Hub or the data transferred via the Hub, or any part thereof, for any illegal purpose or any purpose not agreed under the Agreement.

2.3.1.2 The Hub User shall ensure that Transactions are only executed upon instructions of Account Holders that are issued by persons that are authorized to give such instructions.

2.3.1.3 The Hub User acknowledges that Messages contain confidential information, and it will ensure that Messages sent by it as Sender or received by it as Recipient will be maintained in confidence and are not disclosed to any unauthorized person, nor used by any unauthorized person other than for the purposes of the intended transaction. Any authorized disclosure to a third party shall be done on the same terms.

2.3.1.4 The Hub User shall not disrupt or try to gain unauthorized access to any account, computer, hardware, or network related to the Hub's services or other user's services.

2.3.1.5 The Hub User shall not (try to) obtain any data from the Hub service or related hardware, except data that is intended to be provided or made available to the Hub User.

2.3.1.6 The Hub User shall not damage, disable, overburden, or impair the Hub service (or the hardware and/or network(s) connected to the service) or interfere with anyone else's ability to access or use the service.

2.3.1.7 The Hub User shall in general not violate any regulations, legal provisions, codes of conduct or guidelines that may be applicable to the transfer of Transaction Data via the Hub, including any specific rules applicable to a particular Certification Scheme or specific category of Certificates.

2.3.1.8 It is the responsibility of a Hub User to verify whether the applications of Registrants for the registration of Production Devices in its Domain are compliant with applicable legal provisions and Domain Protocols and other agreed criteria. The Hub User will notify the AIB of any material breach of regulations or agreements by a Registrant or Participant if it is of the reasonable opinion that such breach could affect the transfer of Certificates out of its Registry into the Registry of another Hub User.

2.3.1.9 In the event of any misappropriation or misuse by the Hub User or anyone who is accessing the Hub or the data contained therein or transmitted through the Hub, AIB shall have the right to obtain injunctive relief for its data and materials and/or the data and materials of other users or other third parties.

2.3.1.10 The Hub User acknowledges that the AIB shall be entitled to disconnect the Hub User's Registry from the Hub, or limit its usage, in case of urgent circumstances or reasonable indications of such circumstances, as established by the Hub Participant Agreement. Urgent problems may require an interruption of the service without timely notification as established by the Emergency Plan.

### 2.3.2 Specific rules in relation to Certificates

2.3.2.1 The Hub User (and/or, where relevant, the Registry Operator), shall hold Certificates only within the framework of the normal operations of Competent Bodies in accordance with the purpose and scope of the Hub Participant Agreement and the applicable legislation, and they shall not hold Certificates for purposes of personal trade or financial gain or any other purpose that is not compatible with the function and role of Competent Bodies. Exceptionally, the Hub User may (i) purchase and own a Certificate for the sole purpose of (a) proving the nature of the Output that it has consumed; or (b) testing the system under the conditions set forth in this document, or (ii) hold a Certificate if the holder of the Certificate has defaulted on an undisputed payment to the Hub User, in which case the Hub User may hold the Certificate in order to take appropriate actions in accordance with national law to minimize its losses.

2.3.2.2 The Hub User and the Registry Operator shall ensure that Certificates are, as far as practicable, protected against claims of the Hub User's or Registry Operator's creditors.

2.3.2.3 The Certificates transferred via the Hub must specify at least the data required by national legislation and the mandatory data required by this document. Subject to that requirement, Certificates transferred by non-AIB Members need not be compliant with the EECS Rules including the subsets thereof unless and insofar referred to in the Hub Participant Agreement.

2.3.2.4 The Hub User shall not present any data rendered in any misleading or incorrect format.

2.3.2.5 The Cancellation and Withdrawal of Certificates will occur in accordance with the applicable legal provisions, the relevant Domain Protocol and agreements between the Competent Bodies and Participants in that respect.

2.3.2.6 The Hub User shall ensure that no Certificate will be cancelled for use in another Domain than the Domain wherein it is held, unless transfer is not possible for technical reasons and an ex-domain cancellation agreement has been agreed between the relevant Hub Users. Furthermore,

the Hub User shall report the statistical information in relation to the ex-domain cancellations to the AIB.

### 2.3.3 Error handling

2.3.3.1 The Hub User shall ensure that any inaccurate information in its Registry, e.g. (but not limited to) inaccuracies due to erroneous information submitted by Registrants or Participants or changes regarding Production Devices, will be corrected as soon as practicable and that all relevant Participants will be informed.

2.3.3.2 In case an error has been introduced into, or with respect to, a Certificate held in an Account Holder's Account in the Hub User's Registry, in the course of its transfer into that Account or afterwards, the Hub User shall correct the error in or with respect to that Certificate and any errors that may have been replicated in Certificates split from it, or withdraw the Certificate. In case such error is noticed after a transfer of the relevant Certificate to or from the Registry of another Competent Body, the Hub User will immediately inform that Competent Body.

2.3.3.3 Where there is evidence that a Message has been corrupted or if any Message is identified or reasonably capable of being identified as incorrect, it shall be re-transmitted by the Sender as soon as practicable with a clear indication that it is a corrected Message.

2.3.3.4 Notwithstanding that the Sender is responsible and liable for the completeness and accuracy of a Message, the Sender shall not be liable for the consequences of an incomplete or incorrect transmission if the error is or should in all circumstances be reasonably obvious to the Recipient. In such event the Recipient must immediately inform the Sender thereof.

2.3.3.5 If the Recipient has a reason to believe that a Message is not intended for it, it shall take reasonable action to inform the Sender. It shall ensure the confidentiality of the information.

### 2.3.4 Contingency

2.3.4.1 The Hub User shall operate reliable and secure systems, which will have adequate capacity. The Hub User shall apply state of the art back-up and recovery procedures (DRP) in order to safeguard the Market Participants and the users of the Hub against the loss of data in the Registry and the loss of Transaction Data and to allow timely recovery.

### 2.3.5 Performance

2.3.5.1 This section sets out performance expectations for the Registries, and Hub Users should optimize their systems to try to achieve these benchmarks. The transfer time of data between the initiation of the transfer by the Sender and the receipt of the data by the Recipient can be expected to take:

(a) Maximum of 30 calendar days for transfers where manual approval is needed. If this criterion is not met, corrective measures shall be taken in order to find out the reason for delay and to improve the performance.

(b) Maximum of 4 hours in case of registries which automatically accept the incoming transfers. This time limit can be influenced by the current traffic on the AIB Hub side and therefore this 4-hour limit shall be counted only from the moment the transfer has been delivered to the Registry (transfer state "Delivered" in the AIB Hub; on the web service channel (SOAP) "Waiting for Confirmation" once the Registry has replied PENDING; on the AMQP channel the time counts from "Delivered", also when the Registry answers PENDING later). If this criterion is not met, corrective measures shall be taken in order to find out the reason for delay and to improve the performance.

(c) In case of an unscheduled Registry outage, the abovementioned performance expectations do not apply and the Registry performance is monitored and evaluated by TSU and SU after the outage is over.

(d) In case of a scheduled Registry outage (e.g. due to maintenance or system release) which is expected to take longer than 4 hours during business hours, it is required that the Registry administrators inform the AIB Support or by creating a request in the AIB Hub Service Desk or by informing ISU representatives and other Registry Operators (ISU and CMO mailing lists). In this case, the abovementioned performance expectations do not apply. Expected behaviour is:

(i) Web service channel (SOAP) – when the Registry outage is short (e.g., less than 1 business day) and the Hub User does not require the Registry to be disconnected from the AIB Hub side for the duration of the outage, transfers are manually resent by TSU after the outage ends. In this case, the recommendation from point (b) above is to be calculated only from the moment after those transfers are resent to the Recipient.

(ii) For both the Web service channel (SOAP) and AMQP channel – when the Registry outage is longer and the Hub User requires the Registry to be disconnected from the AIB Hub side for the duration of the outage, transfers which were rejected by the Hub for this reason must be resent by the Sender after the outage ends.

(iii) AMQP channel – the Registry picks up the transfers from its incoming queue after the outage ends.

2.3.5.2 The total time between the receipt of a Message by a Recipient and the receipt of the acknowledgement of that receipt, sent by the Recipient to the original Sender of the Message, will depend on the service provided by AIB's service provider as well as the performance of the registries that are involved. The applicable guidelines are set forth in the SLA which is part of the Hub Participant Agreement and is added as an Annex to that agreement.

2.3.5.3 The AIB shall be entitled to interrupt the service of the Hub in case of urgent circumstances or reasonable indications of such circumstances, such as irregularities, errors, issues of security, damage control and/or protection of intellectual property rights. Urgent problems may require an interruption of the service without timely notification.

2.3.5.4 To ensure the performance of the AIB Hub, a transfer may not contain more certificate bundles than a cap configured in the AIB Hub. The default limit is 5000 certificate bundles on both channels, the web service channel (SOAP) and the AMQP channel. On the AMQP channel the limit can technically be raised up to 15000 if needed in the future. A certificate bundle starts:

(a) Web service channel (SOAP) – with the tag <r:Certificates> and ends with the tag </r:Certificates>.

(b) AMQP channel, XML – with the tag <r:Certificates> and ends with the tag </r:Certificates>.

(c) AMQP channel, JSON – with "certificates": [ { ...certificateBundle } ]

More details about a certificate bundle can be found in paragraph B3.4.8.

2.3.5.5 To avoid transfers with a high number of records and to ensure the performance of the AIB Hub and Registries, it is highly recommended to issue and exchange certificates which contain the same information in bundles. These bundles can contain more than 1 MWh.

2.3.5.6 On the web service channel (SOAP), to ensure the performance of the AIB Hub and the Receiving Registry, it is highly recommended that a Sending Registry sends a maximum of ten transfers per minute.

2.3.5.7 To ensure the smooth functioning of the services, it is highly recommended to ensure that a Registry has the capacity to handle at least ten transfer requests per minute from the AIB Hub.

### 2.3.6 Miscellany

2.3.6.1 The Hub User and where relevant the Registry Operator must produce and publish regular statistical reports and must accept the use of this data by the AIB for statistical purposes. The

Hub Participant Agreement contains the detailed requirements regarding this information. The AIB shall only disclose the reported data as statistical data. Refer to B6 Statistics Elements Description for details of the required Statistics.

2.3.6.2 The obligations of the Hub User and/or Registry Operator stated herein must be respected by all of the Hub User's and/or Registry Operator's personnel and/or agents or service providers and their personnel. The Hub User or Registry Operator will duly inform its personnel, agents or service providers having access to the Hub of these obligations and will reasonably ensure that its personnel, agents and/or service providers will respect these obligations.

2.3.6.3 The Hub User will operate with properly trained and reliable personnel.

2.3.6.4 Where a Registry Operator operates, or shall operate, the Registry of the Hub User, this operator shall comply with all obligations set forth in this document as obligations of the Hub User.

## 2.4 Consequences of data transfer - Evidence

2.4.1.1 The Hub User accepts the Integrity of all Messages transmitted in accordance with the applicable Messaging Protocol and confirmed by an acknowledgement message, unless such Messages can be proven to have been corrupted as a result of technical failure on the part of hardware, system or transmission line.

2.4.1.2 The Hub User shall keep reliable electronic records of all material communications and transactions between Hub Users and/or Participants regarding the registration of Production Devices and the Issue, Transfer and Cancellation of Certificates. The retention period shall be 10 years as a minimum, but not less than the minimum retention period required by national law applicable to the Hub User.

2.4.1.3 In case of disputes between the Hub User and any other user, or between the Hub User and any Participant, the AIB may act as a trusted third party and upon request, it may prove by means of its relevant logs that certain data has passed or not passed the Hub at a certain point in time, and that an acknowledgement message was sent or not sent with a limitation in time of one year after the alleged transmission. In that case, the Hub User must accept the statement of the AIB as a presumption, which is considered valid evidence unless the Hub User can provide evidence of the contrary, and the Hub User will ensure that its customers will accept the same.

# 3 CERTIFICATE INFORMATION

## 3.1 Introduction

3.1.1.1 This section describes the information to be held on a certificate according to the EECS standard. Technical details of identifiers, field definitions and valid values can be found in: ANNEX A - EECS Identifiers and ANNEX B - EECS Transfer Interface File Specification. The arrangements for transfer and retention of EECS Certificates shall be such that the data associated with an EECS Certificate shall not change in any way once it has been properly issued, except to indicate that it has expired or has been cancelled or withdrawn.

## 3.2 General information

3.2.1.1 Each EECS Certificate shall contain the information as instructed in the EECS Rules.

3.2.1.2 v80 schema - valid until the end of October 2027

(a) Refer to EECS Rules Release 8 v1.11.

(b) Supported Energy Carriers: “Electricity”, “EnergyGas” and “Hydrogen”

(c) Relevant EECS Rules chapters for requirements for certificate information:

(i) EECS Rules C3.5.4 Each EECS Certificate shall contain the following information

(ii) EECS Rules Section PART IV: N ELECTRICITY SCHEME RULES:

(1) N6.5 Information on EECS Certificates

(2) N6.6 Additional Information in Certificates

(iii) EECS Rules Section PART IV: O GAS SCHEME RULES:

(1) O7 Information on EECS Gas Certificates

(2) O8 Additional information on EECS Gas Certificates

3.2.1.3 v81 schema - valid from 11 November 2026 (implementation in the AIB Hub); for the transition period see B3.2

(a) Refer to EECS Rules Release 8 v1.11.

(b) Supported Energy Carriers: “Electricity”, “EnergyGas” and “Hydrogen”

(c) Relevant EECS Rules chapters for requirements for certificate information:

(i) EECS Rules C3.5.4 Each EECS Certificate shall contain the following information

(ii) EECS Rules Section PART IV: N ELECTRICITY SCHEME RULES:

(1) N6.5 Information on EECS Certificates

(2) N6.6 Additional Information in Certificates

(iii) EECS Rules Section PART IV: O GAS SCHEME RULES:

(1) O7 Information on EECS Gas Certificates

(2) O8 Additional information on EECS Gas Certificates

3.2.1.4 Both message schema versions are supported on both communication channels: the web service channel (SOAP) (until its retirement at the end of October 2027) and the AMQP channel. It is up to each Member whether to implement v81 first, the AMQP channel first, or both together; all options are allowed and supported by the AIB Hub. No new Registry may connect over the web service channel (SOAP).

3.2.1.5 Format of the information fields is given in this document in Section B4.6.

# 4 DATA EXCHANGE PROCESSES

## 4.1 Basic Model (web service channel (SOAP))

The following diagram represents the basic data exchange models. The model is based on data flows and authorisation routes.

The process described does not show all scenarios but it is intended to provide a basis for describing business requirements. See more examples in C2 AIB Hub Web Service and AMQP Interface Description.

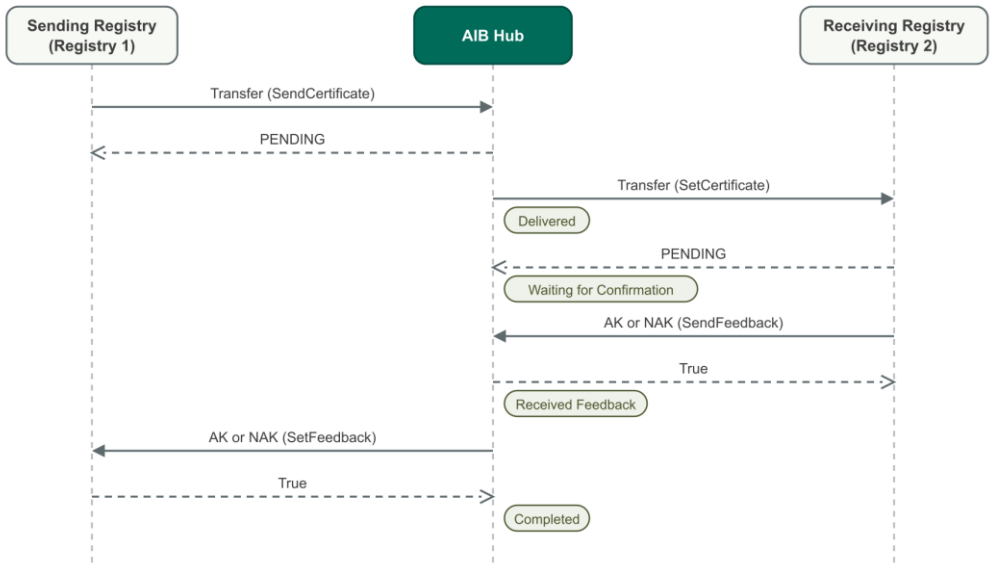



Figure 4.1 – Basic data transmission protocol on the web service channel (SOAP): asynchronous AK or NAK, with the transfer states in the AIB Hub

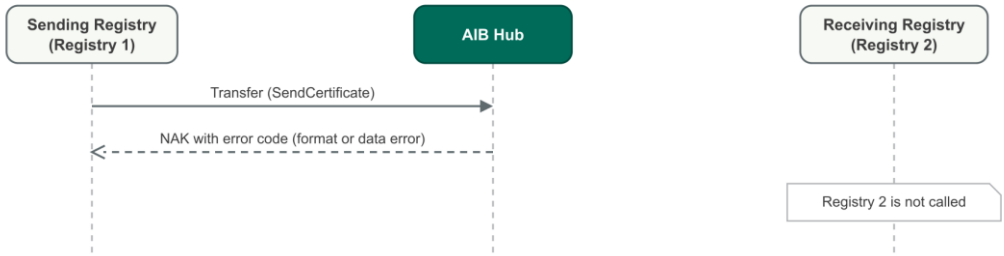



Figure 4.2 – Format or data errors detected by the AIB Hub (web service channel)

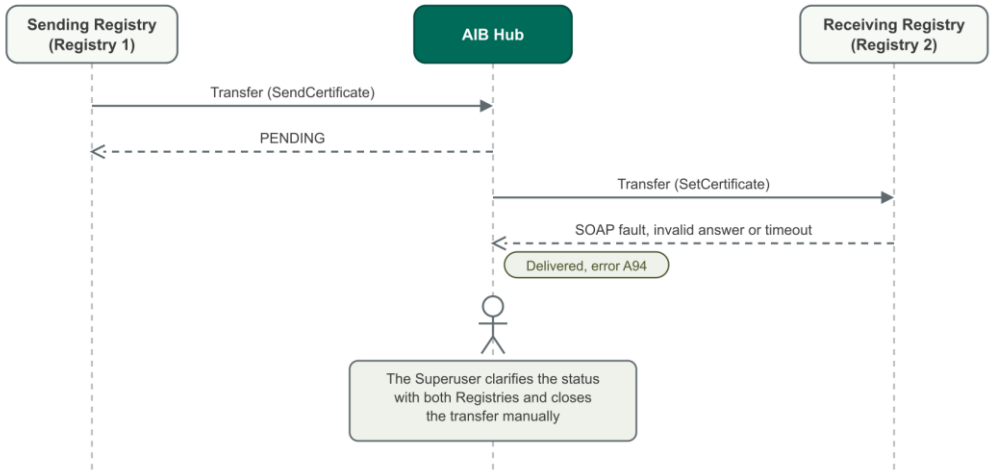



Figure 4.3 – Manual action of the Superuser, for example when the Receiving Registry gives no valid answer to SetCertificate (web service channel)

## 4.2 Basic Model (AMQP channel)

The AMQP channel works on the FIFO principle (first in, first out). When a message is returned to the queue due to an issue with the technical acknowledgement etc., the message is returned to the top of the queue.

The following diagram represents the basic data exchange models. The model is based on data flows and authorisation routes.

The process described does not show all scenarios, but it is intended to provide a basis for describing business requirements for sending transfers and technical acknowledgements.

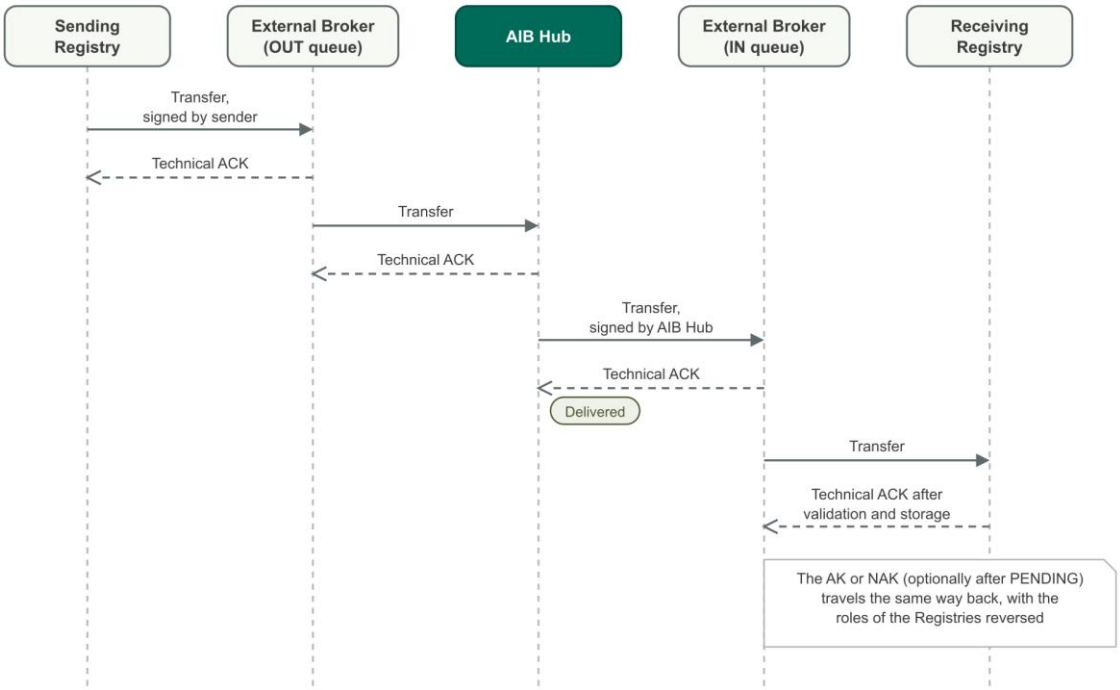



Figure 4.4 – Transfer and acknowledgement on the AMQP channel

The Registry successfully writes the message to the queue and receives a technical ACK from the External Broker.

The AIB Hub successfully picks the message from the External Broker and returns a technical ACK. After the validations and the transfer workflow in the AIB Hub, the message is written to the queue on the External Broker. This is also confirmed by receiving a technical ACK (the transfer state in the AIB Hub is "Delivered").

Figure 4.5 shows what the External Broker does with a message it delivers to the Receiving Registry, depending on the technical answer with which the Receiving Registry settles the message:

**Accepted (technical ACK):** the Receiving Registry has validated the message and stored it safely (C2.7.13). The External Broker deletes its copy of the message. This is the same technical ACK as in Figure 4.4.

**Rejected (REJECT):** the Receiving Registry cannot accept the message at all, for example because it cannot read it, and therefore cannot answer it with a positive or negative acknowledgement. The External Broker moves the message to the dead-letter queue of the Registry, a separate queue that the Registry cannot read and that the AIB Hub monitors, and does not deliver it again. The AIB Hub receives no answer, so the transfer remains in the state "Delivered" until the Superuser has clarified it with the Registries. If the rejected message is an acknowledgement, the transfer is already closed in the AIB Hub and the Sending Registry resolves it as described in 4.3.1.1 (f)(ii). A Registry informs the AIB Hub Service Desk of every message it rejects.

**Released (RELEASE):** the Receiving Registry cannot process the message at the moment, for example because of a temporary technical problem. The External Broker returns the message to the top of the queue and delivers it again. A Registry does not release a message that it will never be able to process, as the External Broker would deliver it again and again and the messages behind it would wait.

**Not settled:** the connection is lost before the Receiving Registry has answered. The External Broker returns the message to the queue and delivers it again. The Receiving Registry may therefore receive a message that it has already processed, and recognises it by its MessageID (C2.7.14).

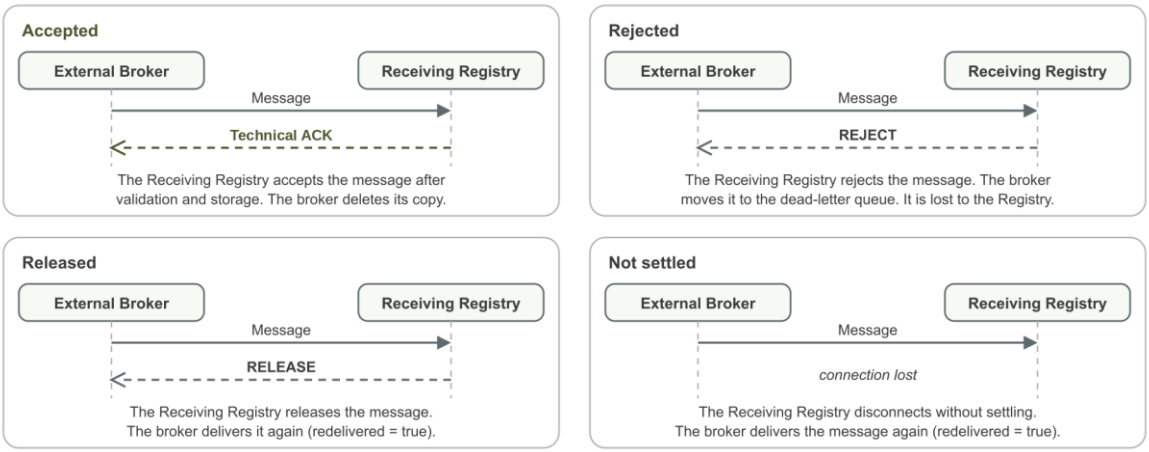



Figure 4.5 – Outcomes of a message delivered by the External Broker

Note: In the AMQP messaging model, both transfer and acknowledgement messages use the same message structure and delivery mechanism. The acknowledgement workflow is identical to the transfer workflow shown in this figure, with the roles of the Sending Registry and Receiving Registry reversed.

The technical answers only settle the delivery of a message between the External Broker and a Registry. They are not the acknowledgement of the transfer (AK or NAK), which the Receiving Registry sends as a separate message to its OUT queue, optionally preceded by PENDING (C2.6.10 and C2.6.11). A Receiving Registry that refuses a transfer therefore answers the delivered message with a technical ACK and then sends a NAK. It stores the certificates on the account of the Receiving Account Holder when it sends the AK (4.4.4.1 (b) and 4.4.4.2), not when it sends the technical ACK. The AK is sent once the External Broker has confirmed it with a technical ACK, and the Receiving Registry does not need to wait until the AIB Hub has processed it.

The AIB Hub reads the messages of each OUT queue in the order in which the Registry has written them (FIFO). A Receiving Registry that transfers the imported certificates onward therefore writes the new transfer to its OUT queue only after the External Broker has confirmed the AK, so that the AIB Hub reads the AK first.

## 4.3 Basic Data Transmission Protocol

The AIB Hub shows the progress of each transfer as a sequence of states (Figure 4.6). The AIB Hub Guide, Annex C, describes each state.

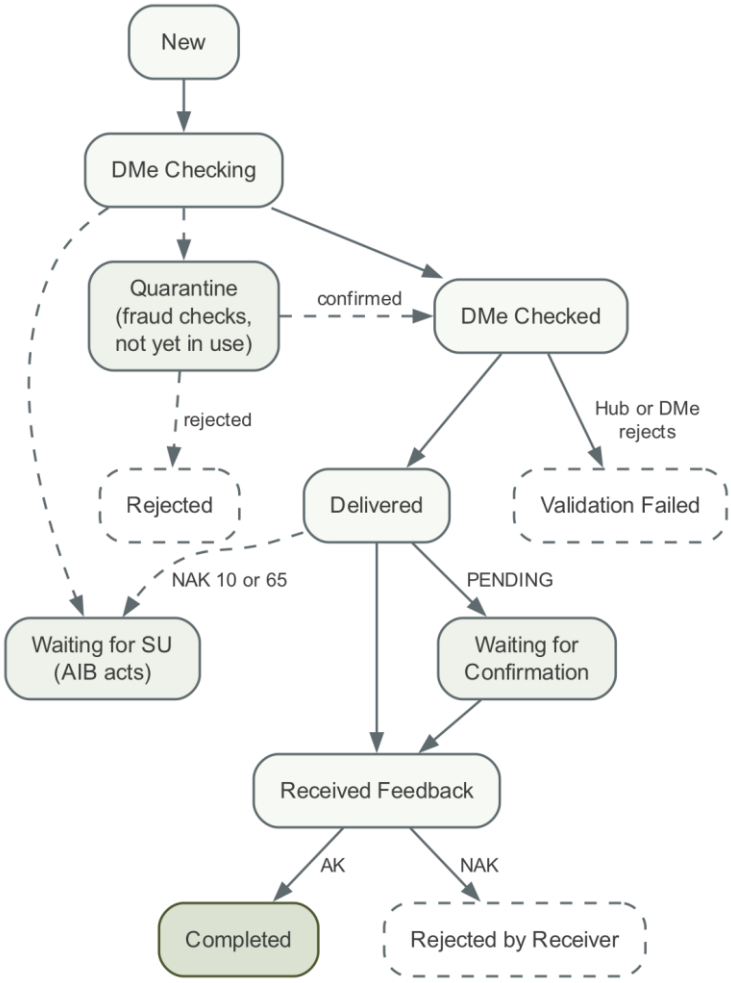



Figure 4.6 – States of a transfer in the AIB Hub

### 4.3.1 Responsibilities of Sender

4.3.1.1 The Sender is responsible for the accurate creation of messages, the application of appropriate security measures, the transmission of messages and the monitoring of responses from the AIB Hub and Recipient(s). The Sender:

(a) Creates a transfer message;

(b) Checks the syntax of the message before sending;

(c) Applies appropriate message security measures;

(d) Sends the message to the Recipient via the AIB Hub;

(e) Checks if an acknowledgement is received within the appropriate timescale;

(f) In case the acknowledgement has not been received within the appropriate timescale, keeps the status of the transfer open and checks the status of the transfer in the AIB Hub:

(i) Web service channel (SOAP)

(1) If the transfer is not found in the AIB Hub:

Agree with the TSU/SU on the possibility of resending the message payload (e.g. EECS GOs) as a new transfer.

Reinitiate the transfer (with a new MessageID).

(2) If the transfer is found in the AIB Hub but the status is unclear (e.g. timeout):

Sender contacts the Recipient and Superuser via the AIB Hub Service Desk or other agreed communication channel.

(3) If the transfer is in a final state (Completed, Rejected by Receiver, Validation Failed or Rejected):

The Sending Registry is responsible for closing the transfer on its side accordingly.

(ii) AMQP channel

(1) If the transfer is not found in the AIB Hub after one hour:

Resend the transfer with the same MessageID as a retry.

(2) If the transfer is closed in the AIB Hub (for example Completed or Rejected by Receiver), but is still open on the Sender's side:

Option 1: Resend the transfer with the same MessageID as a retry to receive the acknowledgement again, if the transfer is still present in the AIB Hub transfer log (the AIB Hub removes a transfer from its transfer log 30 days after its last change of state, and DMe keeps it).

Option 2: Close the transfer manually on the Sender's side in accordance with the status of the transfer in the AIB Hub.

(3) If the transfer is found in the AIB Hub but the status is unclear:

Sender contacts the Recipient and Superuser via the AIB Hub Service Desk or other agreed communication channel.

(g) In case an acknowledgement is received:

(i) positive: logs the message as received and takes appropriate action;

(ii) negative: checks for software or message errors, repairs errors and resends the data as a new message using a new MessageID;

(iii) PENDING: keeps the transfer open until either a positive or a negative answer is received. On the AMQP channel, the AIB Hub sends PENDING in answer to a retry of a transfer that is still in progress (see 4.3.2.1 (g)). Cooperate with Superuser and Recipient if questions arise.

### 4.3.2 Responsibilities of the AIB Hub

4.3.2.1 The AIB Hub is responsible for distribution of messages and acknowledgements between registries. The AIB Hub shall retain a continuous thread of activity for the messages. That is, the Hub recognises that a certificate transfer is in progress so that the returning AK/NAK can be matched with the original transfer. The AIB Hub:

(a) Checks for incoming messages in a manner that ensures a timely response;

(b) Verifies the message for errors in the XML or JSON message, unrecognised values in any of the routing fields, or invalid content in any other field;

(c) In case the message is correct:

(i) sends PENDING to the Sender (only on the web service channel (SOAP); for a retry on the AMQP channel, see 4.3.2.1 (g));

(ii) sends the message to the Recipient;

(d) In case the message is not correct:

(i) sends a negative acknowledgement to the Sender which is either:

(1) negative on the message (e.g. failure on check sum or format); or

(2) negative on the content (e.g. sending or receiving Account Number does not exist or is not valid in the Account Holder database of the AIB Hub).

(e) In case the delivery of the message or answer to a Registry is not clear, a possible double counting situation is found, the same transfer is sent several times, or the Recipient answers with a negative acknowledgement with error code 10 or 65, the AIB Hub keeps the transfer in the state "Waiting for SU" to handle it manually after coordinating with the Registries. A retry on the AMQP channel of a transfer the AIB Hub has already received (the same transfer message resent unchanged with the same MessageID) is not held in the state "Waiting for SU" for that reason; the AIB Hub answers it as described in 4.3.2.1 (g).

(f) Passes on positive or negative acknowledgements from the Recipient to the Sender, except a negative acknowledgement with error code 10 or 65, which it holds as described in (e).

(g) On the AMQP channel, answers a retry of a transfer it has already received, i.e. the same transfer message resent unchanged by the Sender with the same MessageID (see 4.3.1.1 (f)(ii)), without creating a new transfer or changing the state of the original transfer:

(i) if the original transfer is still in progress: sends PENDING to the Sender; the positive or negative acknowledgement of the original transfer follows later as usual;

(ii) if the original transfer is closed with a positive or negative acknowledgement and still present in the AIB Hub transfer log: sends that acknowledgement to the Sender again.

### 4.3.3 Responsibilities of Recipient

4.3.3.1 The Recipient is responsible for the monitoring of all configured data submission ports and the correct handling and processing of data received. The Recipient:

(a) Checks for incoming messages in a manner that ensures a timely response. On the web service channel (SOAP), it is recommended to answer with PENDING after minimum validations and before further processing, to avoid timeouts. On the AMQP channel, the Recipient may answer with PENDING before its positive or negative acknowledgement (see C2.6.11).

(b) Extracts and validates the message source from the message;

(c) Verifies the correctness of message contents within the appropriate timescale;

(d) In case the message is correct:

(i) sends a positive acknowledgement to the Sender via the AIB Hub;

(e) In case the message is not correct:

(i) sends a negative acknowledgement to the Sender via the AIB Hub which is either:

(1) negative on the message (e.g. failure on check sum or format); or

(2) negative on the content (e.g. the Sending or Receiving Account Number does not exist or is not valid in the Account Holder database of the Recipient registry).

(f) On the AMQP channel, does not process a transfer again when it is delivered again with a MessageID that the Recipient has already received. If it has already sent a positive or negative acknowledgement, it sends the same acknowledgement again. Otherwise, it answers the repeated delivery once it has decided, or it sends PENDING first and the acknowledgement later. It does not send PENDING after its acknowledgement, and it does not reject a repeated delivery with error code 10 or 65.

## 4.4 Export and Import of Certificates

### 4.4.1 Introduction

4.4.1.1 Data exchange between EECS Registration Databases takes place based on the following procedures. The interface is designed for operation within an automated environment but may be implemented manually should circumstances dictate. Compliance with this specification does not depend upon a fully automated solution being used.

4.4.1.2 Some actions are not relevant to the operation of this interface and are included only for completeness of process.

### 4.4.2 Responsibilities of Sending Account Holder

4.4.2.1 The Sending Account Holder is responsible for the correct submission of a transfer notification to the Issuing Body operating the Sending Account Holder's account. The Sending Account Holder:

(a) Specifies a transfer order which contains:

(i) the number of certificates;

(ii) which certificates; and

(iii) the Receiving Account Holder of the certificates (by its Account Number).

(b) Is responsible for the correct content of the transfer order.

### 4.4.3 Responsibilities of Exporting Issuing Body

4.4.3.1 The Exporting Issuing Body is responsible for the correct handling of the order and submission of these details to the Importing Issuing Body. The Exporting Issuing Body:

(a) Validates the details submitted by the Sending Account Holder;

(b) Detects which Issuing Body will import the certificates;

(c) Creates a transfer message conforming to the specification in ANNEX B - EECS Transfer Interface File Specification;

(d) Sends the message to the Importing Issuing Body using the secure transport mechanism defined in ANNEX C - EECS Transfer and Account Holders Interface Transport Specification;

(e) Sets the status of the certificates to "exported";

(f) Waits for acknowledgement;

(g) If PENDING is received, keeps the status of the certificates as "exported"; (on both channels; on the AMQP channel the AIB Hub sends PENDING in answer to a retry of a transfer that is still in progress, see 4.3.2.1 (g))

(h) When the message is successfully written to the queue, keeps the status of the certificates as "exported"; (only on the AMQP channel)

(i) If a positive acknowledgement is received, record that the export has been completed;

(j) If a negative acknowledgement is received:

(i) negative on content: contacts the Sending Account Holder and rectifies the issue as appropriate. Resends the data as a new message using a new MessageID as appropriate;

(ii) negative on message: reviews the message generation process and rectifies issues as appropriate. Resends the data as a new message using a new MessageID as appropriate.

### 4.4.4 Responsibilities of the Importing Issuing Body

4.4.4.1 The Importing Issuing Body is responsible for the correct handling of the order, processing of these details and Acknowledgement to the Exporting Issuing Body. The Importing Issuing Body:

(a) On the web service channel (SOAP), it is recommended to answer with PENDING after minimum validations and before further processing, to avoid timeouts. On the AMQP channel, a PENDING before the positive or negative acknowledgement is optional.

(b) In case the message is correct:

(i) sends a positive acknowledgement (using required security measures) to the Exporting Issuing Body (see: ANNEX B - EECS Transfer Interface File Specification); and

(ii) stores certificates on the account of the Receiving Account Holder.

(c) In case the message is not correct:

(i) sends a negative acknowledgement (using required security measures) to the Exporting Issuing Body (see: ANNEX B - EECS Transfer Interface File Specification);

which is either:

(1) negative on the message (e.g. failure on check sum or format); or

(2) negative on the content (e.g. Receiving Account Number does not exist).

4.4.4.2 From the moment the Importing Issuing Body sends the positive acknowledgement, the certificates are held in its registry and are its responsibility. Where the registry requires the Receiving Account Holder to accept incoming transfers (manual approval), the Importing Issuing Body obtains this acceptance before sending the positive acknowledgement, within the 30 calendar days of 2.3.5.1 (a), and otherwise rejects the transfer automatically with a negative acknowledgement.

4.4.4.3 If the Receiving Account Holder has not accepted the transfer by the day before the earliest expiry date of its certificates, the Importing Issuing Body automatically rejects it at the nearest opportunity, but at the latest on the following day, with error code 145 (see Fact Sheet 18 for details), so that the certificates return to the Exporting Issuing Body before they expire. The expiry date is the one determined by the Importing Issuing Body in accordance with the EECS Rules (C6.1.1 (c)) and the applicable Product Rules. Certificates that come back to the Exporting Issuing Body after their expiry date in its registry are expired by the Exporting Issuing Body and reported in its statistics (B6). The Importing Issuing Body should inform the Receiving Account Holder of certificates pending acceptance in good time before their expiry.

## 5 REQUIREMENTS

### 5.1 Functional requirements

5.1.1.1 These requirements identify what the mechanism is to do:

(a) **Transfer**: Each message is assumed to be transported from sender to recipient via the AIB Hub;

(b) **Transparency**: Any failure of delivery must be discovered;

(c) **Attributable**: The message must be clearly identifiable as having come from the intended sender;

(d) **Accurate**: The message must arrive with a high confidence that it has not been altered in transit;

(e) **Private**: The message must arrive with a high confidence that it will not be understood by any reasonably equipped third party;

(f) **Idempotency (AMQP channel)**: A transfer is processed once, however often it is delivered. For each retry or repeated delivery the original acknowledgement must be returned: by the AIB Hub to a Sending Registry (see 4.3.2.1 (g)) and by the Receiving Registry to the AIB Hub (see 4.3.3.1 (f)). If the original transfer is still in progress, PENDING may be returned first and the acknowledgement follows.

5.1.1.2 The business process shows an acknowledgement activity. This is part of the solution to the transparency requirement and should be considered a mandatory solution. The requirements transfer and attributable apply to the acknowledgement.

5.1.1.3 The security related requirements (accurate and private) have been written as functional requirements even though they contain potentially quantitative concepts ('high confidence', and 'reasonably equipped'). This has been done because these concepts are expensive to measure, and the available solutions do not support the kind of variation which would be needed to properly address a quantitative analysis. In effect, solutions will be chosen on the basis of an investigation of risk.

# 6 DEFINITIONS

## 6.1 Glossary

| | |
|---|---|
| AIB Hub | The AIB Communications Hub, as defined in the EECS Rules. |
| AIB Hub Technical Audit | The test procedure by which the AIB verifies that a Registry is able to exchange messages with the AIB Hub in accordance with this document before it is connected to the PROD environment (Annex D). |
| AMQP channel | This facility supports communication with the Hub via the AMQP messaging protocol and enables energy certificates to be transferred asynchronously to a recipient Registry via the AIB Hub broker. The interface supports the exchange of transfer and acknowledgement messages, allowing the Hub to forward transfers and deliver acknowledgement messages detailing the processing result of the transfer. Within the AIB Hub, AMQP is used for internal and external communication. Communication with a Registry is described as communication via the "External Broker". |
| Audit Sandbox | The practice stage of the Technical Audit, in which the Registry Operator may run the test scenarios in any order and as often as needed. It is not evaluated (Annex D). |
| Audit Test | The evaluated stage of the Technical Audit, in which the Registry must pass all required test scenarios in the prescribed sequence within 14 calendar days (Annex D). |
| Certificate Authority (CA) | An organisation that produces Digital Certificates. The CA must be trusted by all parties involved.<br>The CA will sign Digital Certificates using its own private key, and those who use the certificates must have a trusted copy of the CA's own public key. In some cases, this trusted copy will be provided by another CA, creating a hierarchy of trust. This hierarchy normally terminates with a self-signed Digital Certificate. |
| Digital Certificate | A signed copy of someone's public key and associated identification information. The key is normally signed by a Certificate Authority who warrants that the public key does indeed belong to the person identified in the certificate.<br>A self-signed Digital Certificate is one which has been digitally signed by the person identified in the certificate. |
| Digital Signature | A process of encrypting a message or document with a private key so that the recipient can verify that the message was sent by the owner of the private key and that the message has not been changed. The message may be sent in plain text with the digital signature attached as an extra data block. |
| DMe | The AIB Data Management Environment: the data platform of the AIB that validates the transfers processed by the AIB Hub (double counting and other checks) and holds the statistical data reported by Hub Users. |
| EECS Certificate | A unique electronic Certificate specifying and representing the quality and method of production of a specific quantity of Output, which is maintained on an EECS Registration Database and Issued in accordance with the provisions of the EECS Rules. |
| EECS Identifiers | The identifiers of Registries, Certificates, Production Devices and Account Holders and the related codes, defined in Annex A. |
| EECS Product | A Product supported by EECS. |

| | |
|---|---|
| EECS Registration Database (Registry) | A database operated by a Member, or operated by a CMO on behalf of a Member, for the purposes of EECS, comprising:<br>(a) Transferables and Cancellation Accounts and the EECS Certificates in those Accounts;<br>(b) details of Production Devices and information provided to the Member or its CMO in connection with the registration of those Production Devices with that Member or CMO; and<br>(c) details of EECS Certificates which have been transferred out of that EECS Registration Database. |
| EECS Scheme | Arrangements established by a Section of PART IV of the EECS Rules for the acceptance of Products in relation to a type of Output into EECS. |
| External Broker | The AMQP message broker operated by the AIB Hub to which Registries connect; each Registry publishes to and consumes from its own queues. |
| Hub Web Service | This facility supports communication with the Hub via web services and enables energy certificates to be transferred to a recipient, returning a message detailing the success of the transfer. |
| Message schema version | The version of the certificate transfer message format (currently v80 and v81) defined in Annex B, with its XSD (B7) and JSON validation schema (B8). |
| mTLS certificate | This certificate is used to authenticate the Registry when establishing a mutually authenticated TLS connection with the AIB Hub messaging infrastructure. It enables secure identification of the Registry and ensures that only authorised Registries can connect to the AIB Hub broker and exchange transfer and acknowledgement messages. |
| PKI (Public Key Infrastructure) | The set of processes and systems used to manage a set of public keys. The term may apply to a single organisation, to a closed group of organisations, or to an open market. The term does not cover any specific technology or process. |
| PRE-PROD environment | The AIB Hub environment used for Member testing and the Technical Audit (www.aibhubtest.org), also called Pre-Production or TEST environment; see the AIB Hub Guide. |
| PROD environment | The AIB Hub production environment for live transfers between Registries (www.aibhub.org). |
| Public Key Cryptography | A set of encryption algorithms which support the use of two keys, one public and one private. One key, the public key, can be issued widely and used by any sender to encrypt a message. The message can only be decrypted by the matching private key.<br>The process is symmetrical in that the private key can be used to encrypt messages which only the public key can decrypt. This form is used to support a Digital Signature. |
| Receiving Account Holder | The Account Holder to whom the transfer is sent, also referred to as the Transferee. |
| Recipient | The Hub User who receives a transfer via the Hub. |
| Registry configuration | The record in the AIB Hub of one connection between a Registry and the AIB Hub: one code, one communication channel and one message schema version, with the certificate types and Issuing Bodies the Registry may exchange. |

| | |
|---|---|
| Sender | The Hub User who sends the transfer data via the Hub. |
| Sending Account Holder | The Account Holder who initiates the transfer, also referred to as the Transferor. |
| Signing Certificate | This certificate is used by the Registry and the AIB Hub to digitally sign transfer and acknowledgement messages exchanged via the messaging interface. It enables verification of the message origin and ensures message integrity and non-repudiation. Signing certificates are used to generate and verify digital signatures in accordance with the XML Digital Signature (XML-DSig) and JSON Web Signature (JWS) standards. |
| Superuser (SU) | The AIB Hub user role of the AIB Secretariat that administers the AIB Hub, approves configuration changes and resolves transfers requiring manual intervention. |
| Technical Audit Report | The report of a Technical Audit. The Registry Operator fills in its Questionnaire chapter, the AIB Superuser completes the rest from the results recorded in the AIB Hub, and the ISU approves it (Annex D). |
| Technical Support User (TSU) | The AIB Hub user role of the AIB's service provider, which gives first-line support to Registry Operators through the AIB Hub Service Desk (see the AIB Hub Guide for details). |
| Virtual Registry | A test counterparty simulated by the AIB Hub in the PRE-PROD environment, used in the Technical Audit (Annex D) and for test transfers. |
| Web service channel (SOAP) | Communication with the AIB Hub through web service calls in both directions (the Hub Web Service and the web service of the Registry), until its retirement at the end of October 2027. |

## 6.2 Abbreviations

| | |
|---|---|
| AIB | Association of Issuing Bodies |
| AK / NAK | Positive / negative acknowledgement |
| AMQP | Advanced Message Queuing Protocol |
| CA | Certificate Authority |
| CHP | Combined Heat and Power (cogeneration) |
| CMO | Central Monitoring Office |
| DMe | AIB Data Management Environment |
| DRP | Disaster Recovery Plan |
| EECS | European Energy Certificate System |
| EIC | Energy Identification Code (ENTSO-E) |
| FS | EECS Rules Fact Sheet |
| GHG | Greenhouse Gas |
| GIAI | Global Individual Asset Identifier |
| GO | Guarantee of Origin |
| GS1 | Earlier EAN (International Article Numbering Association) and UCC (Uniform Code Council) |
| GSRN | Global Service Relation Number |
| HEC | High-Efficiency Cogeneration |

| | |
|---|---|
| IB | Issuing Body |
| ICS | Independent Criteria Scheme |
| ISU | AIB Information Systems Unit |
| JSON | JavaScript Object Notation |
| JWS | JSON Web Signature |
| KYC | Know Your Customer |
| mTLS | Mutual Transport Layer Security |
| NGC | Non-Governmental Certificate |
| PKI | Public Key Infrastructure |
| RES | Renewable Energy Sources |
| REST | Representational State Transfer (AIB Hub REST API) |
| RFNBO | Renewable Fuel of Non-Biological Origin |
| SLA | Service Level Agreement |
| SOAP | Simple Object Access Protocol |
| SU | Superuser |
| TLS | Transport Layer Security |
| TSU | Technical Support User |
| UTC | Coordinated Universal Time |
| WS | Web Service |
| WSDL | Web Services Description Language |
| XML | Extensible Markup Language |
| XML-DSig | XML Digital Signature |
| XSD | XML Schema Definition |

# ANNEX A - EECS IDENTIFIERS

## A1 Introduction

### A1.1 Purpose

A1.1.1 The scope of this Interface Specification document is the definition of allowed identifiers for key entities used in the transfer of data between EECS Registration Databases.

## A2 Coding Structures

### A2.1 Introduction

A2.1.1 In order to ensure uniqueness of all data identifiers a methodology of coding has been implemented. For Registries, Certificates and Production Devices, the coding structure is based on the GS1 numbering structure.

A2.1.2 EECS Registration Databases must support the set of codes specified here.

### A2.2 Coding of Registries

A2.2.1 Each registry must maintain at least one GS1 prefix to be used in accordance with the GS1 numbering structure. The registry Prefix forms an essential part of the coding for Production Devices and Certificates. A Company Prefix is a numeric identifier of between 6 and 13 digits in length.

A2.2.2 The Company Prefix is used as the registry ID. Where a registry maintains more than one prefix, one prefix may be chosen as the registry ID. The Company Prefix can be obtained from a local GS1 office.

*Example Registry Company Prefixes are:*

*51234567 (8-digit Company Prefix)*

*598765432 (9-digit Company Prefix)*

*5425011229014 (13-digit Company Prefix)*

### A2.3 Coding of Certificates

A2.3.1 Certificates will be coded in accordance with Global Individual Asset Identifier (GIAI) (AI 8004), an element of the GS1 numbering structure. The certificate number is always exactly 30 digits long.

| Format of the Element String | | | | |
|---|---|---|---|---|
| Global Individual Asset Identifier | | | | |
| GS1 Company Prefix for the registry | | assigned by the registry | Individual Asset Reference | |
| $N_1$ ... | $N_i$ | $N_{i+1}$ ... | variable length | $N_{30}$ |

A2.3.2 The above “i” represents the length of the Company Prefix for the registry.

A2.3.3 The GIAI uses the GS1 Company Prefix of the registry assigning the Asset Reference. The structure and numbering of the Individual Asset Reference is determined by the relevant registry. Registries may adopt any numbering methodology appropriate to the coding structure, although it is recommended that sequential Individual Asset Reference numbers be assigned.

A2.3.4 Although the GS1 specification for GIAI allows the Individual Asset Reference to contain all characters contained in Table 1 of the International Standard ISO/IEC 646, for the purposes of Certificate coding only numeric characters are permitted.

*Example GIAI-based Certificate Number:*

***51234567****00000000000000000001234 (8-digit Company Prefix with 22-digit Individual Asset Reference)*

## A2.4 Coding of Production Devices

A2.4.1 Production Devices will be coded in accordance with Global Service Relation Number (GSRN) (AI 8018), an element of the GS1 numbering structure.

| Format of the Element String | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Global Service Relation Number | | | | | | | | | | | | | | | | | | |
| GS1 Company Prefix<br>For the registry | | | | | | | | | | | | | | | | Service Reference | | Check Digit |
| $N_1$ | $N_2$ | $N_3$ | $N_4$ | $N_5$ | $N_6$ | $N_7$ | $N_8$ | $N_9$ | $N_{10}$ | $N_{11}$ | $N_{12}$ | $N_{13}$ | $N_{14}$ | $N_{15}$ | $N_{16}$ | $N_{17}$ | | $N_{18}$ |

A2.4.2 The GSRN uses the GS1 Company Prefix of the registry assigning the Service Reference. The Service Reference is assigned by the registry and relates to an individual Production Device. The structure and content of the Service Reference number is at the discretion of the registry.

A2.4.3 The Check Digit is calculated as shown below. Its verification, which must be carried out in the application software, ensures that the number is correctly composed.

| Check Digit Calculation | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Global Service Relation Number | | | | | | | | | | | | | | | | | | |
| GS1 Company Prefix<br>For the registry | | | | | | | | | | | | | | | | Service Reference | | Check Digit |
| $N_1$ | $N_2$ | $N_3$ | $N_4$ | $N_5$ | $N_6$ | $N_7$ | $N_8$ | $N_9$ | $N_{10}$ | $N_{11}$ | $N_{12}$ | $N_{13}$ | $N_{14}$ | $N_{15}$ | $N_{16}$ | $N_{17}$ | | $N_{18}$ |
| Multiply value of each position by | | | | | | | | | | | | | | | | | | |
| x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | | |
| Accumulated results = 'sum' | | | | | | | | | | | | | | | | | | |
| Check digit = (nearest multiple of 10 ≥ 'sum') – 'sum' | | | | | | | | | | | | | | | | | | |

| Example Check Digit Calculation | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Global Service Relation Number | | | | | | | | | | | | | | | | | |
| | GS1 Company Prefix<br>For the registry | | | | | | | | | | | | | | | Service Reference | | Check Digit |
| Start number | 3 | 7 | 6 | 1 | 0 | 4 | 2 | 5 | 0 | 0 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | |
| | Multiply value of each position by | | | | | | | | | | | | | | | | | |
| | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | x1 | x3 | |
| Interim | 9 | 7 | 18 | 1 | 0 | 4 | 6 | 5 | 0 | 0 | 6 | 1 | 6 | 3 | 12 | 5 | 18 | |
| | Accumulated results = 'sum' | | | | | | | | | | | | | | | | | 101 |
| | Check digit = (nearest multiple of 10 ≥ 'sum') – 'sum' | | | | | | | | | | | | | | | | | 110<br>-101<br>=9 |
| Final number | 3 | 7 | 6 | 1 | 0 | 4 | 2 | 5 | 0 | 0 | 2 | 1 | 2 | 3 | 4 | 5 | 6 | 9 |

*Example GSRN-based Production Device Numbers are:*

**51234567**0000012341 (8-digit Company Prefix with 9-digit Service Reference and single Check Digit)

**598765432**000001237 (9-digit Company Prefix with 8-digit Service Reference and single Check Digit)

## A2.5 Coding of Account Numbers

A2.5.1 Each Account Holder shall be assigned a unique account number by their host IB according to the following structure:

- IB_ID (2 numeric digits)
- X (single 'X' character)
- 6-character alphanumeric ID (0-9 and A-Z only)
- check character (see below)

An example Account Number is 10XRWENETJ.

A check character is a character added to the end of the Account Number that validates the authenticity of the code. A simple algorithm is applied to the other digits or letters of the code which yields the check character.

The last character of each Account Number represents the check character that is calculated from the other characters using the following algorithm.

Calculation of the check character:

(i) The first 9 characters of the code are individualised as follows:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | X | R | W | E | N | E | T |

(ii) Where alphabetic characters are present, they are replaced by a numeric value with the value 10 for the letter « A »; 11 for the letter « B »; 12 for the letter « C », etc. and 35 for the letter «Z», as follows:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 33 | 27 | 32 | 14 | 23 | 14 | 29 |

(iii) Then, the positions are again weighted, beginning with the greatest value to the left and ending with a one at the far right.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 33 | 27 | 32 | 14 | 23 | 14 | 29 |
| *10* | *9* | *8* | *7* | *6* | *5* | *4* | *3* | *2* |

(iv) Each digit is multiplied by its position weight.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 10 | 0 | 264 | 189 | 192 | 70 | 92 | 42 | 58 |

(v) The products are then summed to give a total value: 917

(vi) A modulo 36 (which corresponds to the total number of characters available) is applied to the value 917 with the formula (36 – MOD([value],36)). This produces a numeric value in the range 1 to 36.

In the above example, the result is 19 which, since it is greater than 9, has to be converted to a letter using a similar mechanism as in Step 2. Number 0 is not an allowed output. Where the check character code is 36 this is represented as the character [.

Thus, the code for the above example is: 10XRWENETJ. With an account base of 11XYWZNET the check character would be [ and the full account code would be 11XYWZNET[.

## A2.6 Coding of Issuing Bodies, Competent Authorities, Energy sources, Technologies, Cogeneration GO Codes, Earmarks, Geographical Coordinate codes, EECS Scheme Members and EECS Products, Transfer Error codes

A2.6.1 Permissible valid codes for

A2.6.2 Issuing Bodies and Competent Authorities are found in EECS Rules Fact Sheet 04 “Member and Competent Authority Codes”.

A2.6.3 Types of Energy Sources and Technologies and their emission factors are found in EECS Rules Fact Sheet 05 “Types of Energy Inputs and Technologies”.

A2.6.4 Use of Heat Codes for Cogeneration GOs are found in EECS Rules Fact Sheet 11 “Cogeneration GO Codes”.

A2.6.5 Earmark flags are found in EECS Rules Fact Sheet 03 “Types of Public Support”.

A2.6.6 Coordinate Codes for Production Device Location are found in EECS Rules Fact Sheet 16 “Geographical Coordinates”.

A2.6.7 EECS Schemes and the Members of each EECS Product are found in EECS Rules Fact Sheet 17 “EECS Scheme Members and EECS Products”.

A2.6.8 Transfer Error Codes are found in EECS Rules Fact Sheet 18 “Transfer Error Codes”.

A2.6.9 Dissemination Level codes are found in EECS Rules Fact Sheet 20 “Dissemination level of Output”.

A2.6.10 Use of Gas codes are found in EECS Rules Fact Sheet 21 “Use of Gas Codes”.

A2.6.11 Type of Gas codes, gas composition criteria and the ETS/ESR eligibility tag are found in EECS Rules Fact Sheet 22 “Type of Gas”.

A2.6.12 Storage and Conversion tags are found in EECS Rules Fact Sheet 23 “Storage and Conversion Tracking”.

A2.6.13 Calculation method codes for greenhouse gas emission and radioactive waste information are found in EECS Rules Fact Sheet 24 “Methodology for carbon footprint info on GO”.

A2.6.14 Production period length identifiers are found in EECS Rules Fact Sheet 25 “Production Period Identifiers”.

A2.6.15 Please consult the latest versions of these Fact Sheets for details.

## ANNEX B - EECS TRANSFER INTERFACE FILE SPECIFICATION

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## B2 Introduction

### B2.1 Purpose and Scope

B2.1.1 This annex describes the file structures for:

- transferring certificates between registries
- acknowledging the receipt of such transfers

B2.1.2 This interface specification annex addresses data transfer, including acknowledgement of transfer, between registries, specifically relating to certificates for EECS Electricity and Gas Schemes. The EECS Electricity and Gas Schemes are based on the Renewable Energy Directive (EU) 2023/2413, the Energy Efficiency Directive (EU) 2023/1791 and the Internal Markets Directives (EU) 2019/944 and (EU) 2024/1788.

B2.1.3 The acceptability of certificates in certain markets is not a matter for this document. The data file is designed to allow certificates issued and processed under different rules to be distinguished from each other, even though the underlying data elements may be the same across a number of systems.

B2.1.4 File record specifications are defined for each data record relating to transfers of certificates between registries. Message content and management process are defined.

## B3 Overview of Certificate Transfer File Structure

### B3.1 Introduction

B3.1.1 The transfer data file is designed to handle EECS Certificates for a number of technologies, fuels and sources and Energy Carriers.

### B3.2 Preamble

B3.2.1 The XML preamble describes the encoding and data schema that apply to the file. It takes the following form. The schema referenced in the preamble corresponds to the message schema version used (in the example below the v80 schema “exportenv80.xsd”; for v81 the schema “exportenv81.xsd” is referenced). The message schema version applied by the AIB Hub to a Registry is the one set in its Registry configuration in the AIB Hub; a change of the version requires a Technical Audit (Annex D).

```
<?xml version="1.0" encoding="UTF-8"?>
<r:Env xsi:schemaLocation="http://system.aib-net.org/exportenv80.xsd"
xmlns:r="http://system.aib-net.org" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance">
<r:Env xsi:schemaLocation="http://system.aib-net.org/exportenv81.xsd"
xmlns:r="http://system.aib-net.org" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance">
```

B3.2.2 The hosting of the schema does not form part of this specification.

B3.2.3 The current supported schemas:

(a) v80: ‘exportenv80.xsd’ is described in this standard and addresses the requirements for certificates issued under the EECS Electricity and Gas Scheme. This schema version will be valid until the end of October 2027.

(b) v81: ‘exportenv81.xsd’ is described in this standard and addresses the requirements for certificates issued under the EECS Electricity and Gas Scheme. This schema version should be implemented by AIB Members at the latest by the end of October 2027. It has been available to AIB Members since its implementation in the AIB Hub on 11 November 2026.

B3.2.4 Transformation rules between supported schemas:

(a) During an upgrade from an old to a new message schema, each AIB Member is required to upgrade their EECS Registration Database and all EECS Certificates they hold in their database at the time of the upgrade, by the specified deadline. Throughout this Annex B, for each relevant element and attribute, there are "Transformation Rules" described which must be followed during such schema upgrade. This often requires format or value changes to the EECS Certificates held in the database and is subject to thorough testing in cooperation with the AIB in the form of the Technical Audit (described in Annex D).

(b) During a transition period between two message schema versions, the AIB Hub supports receiving and forwarding both an old and a new schema version. When needed, the AIB Hub translates the transferred EECS Certificates according to the "Transformation Rules" described throughout this Annex B for each relevant element and attribute.

(c) Information lost in the transformation: when the AIB Hub transforms a certificate into an older message schema version (for example from v81 to v80), the elements and attributes that the older version does not contain are lost, and some values are shortened or replaced by values that the older version can express, as set out in the Transformation Rules (for example, the Storage tag "S0200020203" becomes "S0200"). The lost information does not come back when the certificate is later transferred to a Registry using the newer version.

(d) Restoring the lost information on certificates returned to their Issuing Body: when a certificate that lost information in a transformation is transferred back into the registry of the Issuing Body that issued it, this Issuing Body may restore the lost information from its own record of that certificate, so that the certificate again carries the data with which it was issued (EECS Rules A3.1.1). Restoring is optional, and only the information lost in the transformation may be restored. A Registry shall not restore lost information on certificates issued by another Issuing Body, even when it holds that information from an earlier transfer of the same certificates. Such certificates keep their data as received from the AIB Hub. This is checked in the Technical Audit (Annex D, scenario 9).

### B3.3 Header

B3.3.1 The transfer file has a header section. This is designed to identify the file and to assist registries in routing the file to the appropriate process in their system. Messages received by the Hub must contain appropriate information to identify the eventual recipient.

B3.3.2 As an example, this file fragment shows a transfer from the registry using the GS1 code number 7080003400673 to the registry using the GS1 code number 8032551320001. The context is "transfer", indicating a certificate transfer.

```
<r:Header MessageTransmissionTime="2025-05-25T13:59:15Z">
    <r:MessageID>082025052500037</r:MessageID>
    <r:FromRegistry cS="GS1">7080003400673</r:FromRegistry>
    <r:ToRegistry cS="GS1">8032551320001</r:ToRegistry>
    <r:Context>transfer</r:Context>
</r:Header>
```

B3.3.3 The example shows the use of 'cS' attributes on the r:FromRegistry and r:ToRegistry fields to identify different interpretations of the fields. The default is to have no such attribute, in which case the registry GS1 number should be used.

### B3.4 Certificate Transfer File: Body

B3.4.1 The body section of the certificate transfer file contains the data on the certificates to be transferred, and the identities of the old and new holders of the certificates.

B3.4.2 The file structure is designed to handle certificates issued under the EECS Electricity and Gas Scheme.

B3.4.3 It is the responsibility of the sending registry to ensure that the data contained in the file is consistent with the EECS Rules and the Directive the certificate relates to.

B3.4.4 It is the responsibility of the receiving registry to ensure that the data contained in the file is used in accordance with the EECS Rules appropriate to the particular certificate.

B3.4.5 This section shows examples of the body section of EECS certificates.

(a) Example Body created with Schema v80 for Electricity non-HEC

```
<r:Body>
  <r:SendingAccountID>NNXHUB2AHZ</r:SendingAccountID>
  <r:ReceivingAccountID>NNXHUB1AHZ</r:ReceivingAccountID>
  <r:NumberOfCertificates>1</r:NumberOfCertificates>
  <r:Message>Here are your certificates.</r:Message>
  <r:Certificates faceValue="MWh">
<r:StartCertificateNumber>NNNNNNNNNNNNNNNNNNNNNNNNNNNNNN </r:StartCertificateNumber>
<r:EndCertificateNumber>NNNNNNNNNNNNNNNNNNNNNNNNNNNNNN </r:EndCertificateNumber>
    <r:IssuingBody>NN</r:IssuingBody>
    <r:CountryOfIssue>XX</r:CountryOfIssue>
    <r:DateOfIssue>2022-01-12</r:DateOfIssue>
    <r:ProductionPeriod start="2021-01-01T00:00:00+02:00" end="2021-01-
01T23:59:59+02:00"/>
    <r:EnergyCarrier>Electricity</r:EnergyCarrier>
    <r:Conversion tag="XNN"/>
    <r:Storage tag="XNNNN"/>
    <r:Product name="EECS:GO" legalStatus="LC">
        <r:Purpose>Disclosure</r:Purpose>
        <r:CompetentAuthority>XX01</r:CompetentAuthority>
        <r:ProductType type="driver">Source</r:ProductType>
    </r:Product>
    <r:ProductionDeviceID>NNNNNNNNNNNNNNNNN</r:ProductionDeviceID>
    <r:ProductionDeviceName>Production Device A</r:ProductionDeviceName>
    <r:DateOperational>2021-01-12</r:DateOperational>
    <r:Capacity>
        <r:ElectricalCapacity>10000.000</r:ElectricalCapacity>
    </r:Capacity>
    <r:ProductionTechnology>XNNNNNN</r:ProductionTechnology>
    <r:EnergySource>XNNNNNNNN</r:EnergySource>
    <r:SupportFlag>1</r:SupportFlag>
    <r:ProductionSupportDescription>Production
support.</r:ProductionSupportDescription>
    <r:InvestmentSupportDescription>Investment
support.</r:InvestmentSupportDescription>
    <r:ProductionDeviceLocation>
      <r:Coordinates Longitude="LO" Latitude="LA" CoordinateCode="WGS-
84"/></r:ProductionDeviceLocation>
    <r:DisseminationLevel>02</r:DisseminationLevel>
    <r:Label>EcoEnergy</r:Label>
    <r:Label>Another label</r:Label>
    <r:AdditionalInfo>Example RES-GO without Sustainability</r:AdditionalInfo>
  </r:Certificates>
</r:Body>
```

(a) Example Body created with Schema v80 for Electricity HEC

```
<r:Body>
  <r:SendingAccountID>NNXHUB2AHZ</r:SendingAccountID>
  <r:ReceivingAccountID>NNXHUB1AHZ</r:ReceivingAccountID>
  <r:NumberOfCertificates>1</r:NumberOfCertificates>
  <r:Message>Here are your certificates.</r:Message>
  <r:Certificates faceValue="MWh">
<r:StartCertificateNumber>NNNNNNNNNNNNNNNNNNNNNNNNNNNNNN </r:StartCertificateNumber>
<r:EndCertificateNumber>NNNNNNNNNNNNNNNNNNNNNNNNNNNNNN </r:EndCertificateNumber>
    <r:IssuingBody>NN</r:IssuingBody>
    <r:CountryOfIssue>XX</r:CountryOfIssue>
    <r:DateOfIssue>2022-01-12</r:DateOfIssue>
    <r:ProductionPeriod start="2021-01-01T00:00:00+02:00" end="2021-01-
01T23:59:59+02:00"/>
    <r:EnergyCarrier>Electricity</r:EnergyCarrier>
```

```
    <r:Conversion tag="XNN"/>
    <r:Product name="EECS:GO" legalStatus="LC">
        <r:Purpose>Disclosure</r:Purpose>
        <r:CompetentAuthority>XX01</r:CompetentAuthority>
        <r:ProductType type="driver">Source</r:ProductType>
        <r:ProductType type="driver">Technology</r:ProductType>
    </r:Product>
    <r:ProductionDeviceID>NNNNNNNNNNNNNNNNNN</r:ProductionDeviceID>
    <r:ProductionDeviceName>Production Device A</r:ProductionDeviceName>
    <r:DateOperational>2021-01-12</r:DateOperational>
    <r:Capacity>
        <r:ElectricalCapacity>10000.000</r:ElectricalCapacity>
        <r:ThermalCapacity>10000.000</r:ThermalCapacity>
    </r:Capacity>
    <r:ProductionTechnology>XNNNNNN</r:ProductionTechnology>
    <r:EnergySource>XNNNNNNNN</r:EnergySource>
    <r:SupportFlag>1</r:SupportFlag>
    <r:ProductionSupportDescription>Production
support.</r:ProductionSupportDescription>
    <r:InvestmentSupportDescription>Investment
support.</r:InvestmentSupportDescription>
    <r:ProductionDeviceLocation>
      <r:Coordinates Longitude="LO" Latitude="LA" CoordinateCode="WGS-
84"/></r:ProductionDeviceLocation>
    <r:DisseminationLevel>02</r:DisseminationLevel>
    <r:Cogeneration HECCriteriaMet="true">
        <r:UseOfHeat>a</r:UseOfHeat>
        <r:PercentagePrimaryEnergySaved>20.1</r:PercentagePrimaryEnergySaved>
        <r:AmountPrimaryEnergySaved>199.770</r:AmountPrimaryEnergySaved>
        <r:OverallPrimaryEnergySavings>34.1</r:OverallPrimaryEnergySavings>
        <r:UsefulHeat>10.030</r:UsefulHeat>
    </r:Cogeneration>
    <r:ElectricalEfficiency>97.1</r:ElectricalEfficiency>
    <r:ThermalEfficiency>54.1</r:ThermalEfficiency>
    <r:CalorificValue type="lower" unit="MJ/kg">123.123</r:CalorificValue>
    <r:GHGEmissions GHGSavingsCriteriaMet="true">
        <r:GHGEmissionProduced
calculationMethod="XNNNNNNNN">234.123</r:GHGEmissionProduced>
        <r:AbsoluteGHGEmissionSaved
calculationMethod="XNNNNNNNN">123.123</r:AbsoluteGHGEmissionSaved>
    </r:GHGEmissions>
    <r:Sustainability sustainabilityCriteriaMet="true" certificationBody="XX">
        <r:RequirementReference>REDIIart.30</r:RequirementReference>
        <r:Scheme>ISCC</r:Scheme>
        <r:AuditReport>Reference to the report</r:AuditReport>
        <r:SustainabilityAdditionalInfo>More info</r:SustainabilityAdditionalInfo>
    </r:Sustainability>
    <r:Label>EKOENERGY</r:Label>
    <r:Label>Another label</r:Label>
    <r:AdditionalInfo>Example HEC with Sustainability</r:AdditionalInfo>
  </r:Certificates>
</r:Body>
```

(a) Example Body created with schema v80 for EnergyGas

```
<r:Body>
  <r:SendingAccountID>NNXHUB2AHZ</r:SendingAccountID>
  <r:ReceivingAccountID>NNXHUB1AHZ</r:ReceivingAccountID>
  <r:NumberOfCertificates>1</r:NumberOfCertificates>
  <r:Message>Here are your certificates.</r:Message>
  <r:Certificates faceValue="MWh">
<r:StartCertificateNumber>NNNNNNNNNNNNNNNNNNNNNNNNNNNNNN </r:StartCertificateNumber>
<r:EndCertificateNumber>NNNNNNNNNNNNNNNNNNNNNNNNNNNNNN </r:EndCertificateNumber>
    <r:IssuingBody>NN</r:IssuingBody>
    <r:CountryOfIssue>XX</r:CountryOfIssue>
    <r:DateOfIssue>2022-01-12</r:DateOfIssue>
    <r:ProductionPeriod start="2021-01-01T00:00:00+02:00" end="2021-01-
01T23:59:59+02:00"/>
    <r:EnergyCarrier>EnergyGas</r:EnergyCarrier>
    <r:Conversion tag="XNN" preConversionSupportFlag="1"/>
    <r:Storage tag="XNNNN"/>
```

```
    <r:Product name="EECS:GO" legalStatus="LC">
        <r:Purpose>Disclosure</r:Purpose>
        <r:CompetentAuthority>XX01</r:CompetentAuthority>
        <r:ProductType type="driver">Source</r:ProductType>
    </r:Product>
    <r:ProductionDeviceID>NNNNNNNNNNNNNNNNNN</r:ProductionDeviceID>
    <r:ProductionDeviceName>Production Device A</r:ProductionDeviceName>
    <r:DateOperational>2021-01-12</r:DateOperational>
    <r:Capacity>
        <r:GasProductionCapacity>10000.000</r:GasProductionCapacity>
    </r:Capacity>
    <r:ProductionTechnology>XNNNNNN</r:ProductionTechnology>
    <r:EnergySource  advancedBiomassFeedstock="true">XNNNNNNNN</r:EnergySource>
    <r:SourceShares>XNNNNNNN1:10%, XNNNNNNN2:90%</r:SourceShares>
    <r:SupportFlag>1</r:SupportFlag>
    <r:ProductionSupportDescription>Production
support.</r:ProductionSupportDescription>
    <r:InvestmentSupportDescription>Investment
support.</r:InvestmentSupportDescription>
    <r:ProductionDeviceLocation>
      <r:Coordinates Longitude="LO" Latitude="LA" CoordinateCode="WGS-
84"/></r:ProductionDeviceLocation>
    <r:DisseminationLevel>02</r:DisseminationLevel>
    <r:Gas type="XNNNN">
        <r:CompositionPurity>YNNNN</r:CompositionPurity>
        <r:GasCompositionCriteria>ZNNNN</r:GasCompositionCriteria>
        <r:GasUsage>a</r:GasUsage>
    </r:Gas>
    <r:CalorificValue type="higher">123.123</r:CalorificValue>
    <r:GHGEmissions GHGSavingsCriteriaMet="true">
        <r:GHGEmissionProduced calculationMethod="XNNNNNNNN">
234.123</r:GHGEmissionProduced>
        <r:AbsoluteGHGEmissionSaved
calculationMethod="XNNNNNNNN">123.123</r:AbsoluteGHGEmissionSaved>
    </r:GHGEmissions>
    <r:Sustainability sustainabilityCriteriaMet="true" certificationBody="XX">
        <r:RequirementReference>REDIIart.30</r:RequirementReference>
        <r:Scheme>ISCC</r:Scheme>
        <r:AuditReport>Reference to the report</r:AuditReport>
        <r:SustainabilityAdditionalInfo>More info</r:SustainabilityAdditionalInfo>
    </r:Sustainability>
    <r:Label>EKOENERGY</r:Label>
    <r:Label>Another label</r:Label>
    <r:AdditionalInfo>Example GAS with Sustainability</r:AdditionalInfo>
  </r:Certificates>
</r:Body>
```

B3.4.6 This section shows examples of the body section of schema v81 EECS certificates.

(a) Example Body created with Schema v81 for Electricity non-HEC

```
<r:Body>
  <r:SendingAccountID cS="eecs">90X0000006</r:SendingAccountID>
  <r:ReceivingAccountID cS="eecs">99X000000X</r:ReceivingAccountID>
  <r:NumberOfCertificates>100</r:NumberOfCertificates>
  <r:Message>Import Electricity RES GO</r:Message>
  <r:Certificates faceValue="MWh">
    <r:StartCertificateNumber
cS="eecs">20251113142327563689000001001</r:StartCertificateNumber>
    <r:EndCertificateNumber
cS="eecs">20251113142327563689000001100</r:EndCertificateNumber>
    <r:IssuingBody>02</r:IssuingBody>
    <r:CountryOfIssue>DK</r:CountryOfIssue>
    <r:DateOfIssue>2025-11-01</r:DateOfIssue>
    <r:ProductionPeriod start="2025-10-01T00:00:00+02:00" end="2025-10-
31T23:59:59+01:00" length="month"/>
    <r:EnergyCarrier>Electricity</r:EnergyCarrier>
    <r:Conversion tag="C02" preConversionCancellationStatement="CS123456789">
      <r:PreConversionProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-
03-31T23:59:59+02:00" length="month"/>
```

```
      <r:PreConversionProductionDevice ID="506003453000000275" name="Central
Hidroeléctrica" technology="T030200" dateOperational="2021-01-12" capacity="10.999"
label="EKOENERGY" supportFlag="1"/>
      <r:PreConversionPDCoordinates Longitude="115 778 E" Latitude="448 92 N"
CoordinateCode="WGS-84"/>
      <r:PreConversionPDAddress Country="NO" City="Hønefoss" PostCode="NO2342"
StreetName="Hovedgaten" StreetNumber="123"/>
      <r:PreConversionEmissions
calculationMethod="E0100000000">234.000</r:PreConversionEmissions>
      <r:PreConversionRadioactiveWaste
calculationMethod="E0200000000">12.000</r:PreConversionRadioactiveWaste>
    </r:Conversion>
    <r:Storage tag="S0200010101" efficiencyFactor="78.6"
cancellationStatement="CS123456789" cancellationIssuingBody="22">
      <r:StorageSystemCoordinates Longitude="115 778 E" Latitude="448 92 N"
CoordinateCode="WGS-84"/>
      <r:StorageSystemAddress Country="NO" City="Hønefoss" PostCode="NO2342"
StreetName="Hovedgaten" StreetNumber="123"/>
      <r:PreStorageProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-
31T23:59:59+02:00" length="month"/>
    </r:Storage>
    <r:Product name="EECS:GO" legalStatus="LC">
      <r:Purpose>Disclosure</r:Purpose>
      <r:CompetentAuthority>BE20</r:CompetentAuthority>
      <r:ProductType type="driver">Source</r:ProductType>
    </r:Product>
    <r:ProductionDeviceID cS="GS1">897867500000000015</r:ProductionDeviceID>
    <r:ProductionDeviceName>Production Device A</r:ProductionDeviceName>
    <r:DateOperational>2000-01-12</r:DateOperational>
    <r:Capacity>
      <r:ElectricalCapacity>10000.100</r:ElectricalCapacity>
      <r:MechanicalCapacity>0.001</r:MechanicalCapacity>
      <r:ThermalCapacity>0.001</r:ThermalCapacity>
    </r:Capacity>
    <r:Module>
      <r:ModuleCapacity>10.999</r:ModuleCapacity>
      <r:ModuleDateOperational>2022-01-01</r:ModuleDateOperational>
      <r:ModuleDescription>Element 1</r:ModuleDescription>
    </r:Module>
    <r:ProductionTechnology cS="eecs">T070000</r:ProductionTechnology>
    <r:EnergySource cS="eecs">F01040100</r:EnergySource>
    <r:SupportFlag cS="eecs">1</r:SupportFlag>
    <r:ProductionSupportDescription>Production
support.</r:ProductionSupportDescription>
    <r:InvestmentSupportDescription>Investment
support.</r:InvestmentSupportDescription>
    <r:ProductionDeviceLocation>
      <r:Coordinates Longitude="LO" Latitude="LA" CoordinateCode="WGS-84"/>
      <r:Address Country="NO" City="Hønefoss" PostCode="NO2342"
StreetName="Hovedgaten" StreetNumber="123"/>
    </r:ProductionDeviceLocation>
    <r:DisseminationLevel>2a</r:DisseminationLevel>
    <r:Cogeneration HECCriteriaMet="false">
      <r:UseOfHeat>a</r:UseOfHeat>
      <r:PercentagePrimaryEnergySaved>0.1</r:PercentagePrimaryEnergySaved>
      <r:AmountPrimaryEnergySaved>10.123</r:AmountPrimaryEnergySaved>
      <r:OverallPrimaryEnergySavings>17.0</r:OverallPrimaryEnergySavings>
      <r:UsefulHeat>10.030</r:UsefulHeat>
    </r:Cogeneration>
    <r:ElectricalEfficiency>67.0</r:ElectricalEfficiency>
    <r:ThermalEfficiency>67.0</r:ThermalEfficiency>
    <r:CalorificValue type="lower" unit="MJ/kg">11.120</r:CalorificValue>
    <r:GHGEmissions>
      <r:GHGEmissionProduced
calculationMethod="E0100000000">234.000</r:GHGEmissionProduced>
      <r:AbsoluteGHGEmissionSaved
calculationMethod="E0100000000">123.000</r:AbsoluteGHGEmissionSaved>
    </r:GHGEmissions>
    <r:RadioactiveWasteProduced
calculationMethod="E0200000000">4.030</r:RadioactiveWasteProduced>
```

```
    <r:Sustainability sustainabilityCriteriaMet="true"
certificationBody="Certification Body A">
      <r:RequirementReference>REDIIart.29</r:RequirementReference>
      <r:Scheme>ISCC</r:Scheme>
      <r:AuditReport>https://example.ex/report.pdf</r:AuditReport>
      <r:SustainabilityAdditionalInfo>This is a text
example</r:SustainabilityAdditionalInfo>
    </r:Sustainability>
    <r:Label>RBSA</r:Label>
    <r:Label>GREENENERGY</r:Label>
    <r:AdditionalInfo>Example RES-GO (non-HEC) with all v81
elements</r:AdditionalInfo>
    <r:BiddingZone zone90percentageRES="true"
zoneLowEmission="true">10Y1001A1001A46L</r:BiddingZone>
    <r:RedispatchingCriteriaMet>true</r:RedispatchingCriteriaMet>
    <r:PowerPurchaseAgreement startDate="2025-01-01" endDate="2029-12-31"
buyerID="12ABc"/>
  </r:Certificates>
</r:Body>
```

(b) Example Body created with Schema v81 for Electricity HEC

```
<r:Body>
  <r:SendingAccountID cS="eecs">90X0000006</r:SendingAccountID>
  <r:ReceivingAccountID cS="eecs">99X000000X</r:ReceivingAccountID>
  <r:NumberOfCertificates>100</r:NumberOfCertificates>
  <r:Message>Import Electricity RES HEC GO</r:Message>
  <r:Certificates faceValue="MWh">
    <r:StartCertificateNumber
cS="eecs">20251113142642177569000000001001</r:StartCertificateNumber>
    <r:EndCertificateNumber
cS="eecs">20251113142642177569000000001100</r:EndCertificateNumber>
    <r:IssuingBody>02</r:IssuingBody>
    <r:CountryOfIssue>DK</r:CountryOfIssue>
    <r:DateOfIssue>2025-11-01</r:DateOfIssue>
    <r:ProductionPeriod start="2025-10-01T00:00:00+02:00" end="2025-10-
31T23:59:59+01:00" length="month"/>
    <r:EnergyCarrier>Electricity</r:EnergyCarrier>
    <r:Conversion tag="C02" preConversionCancellationStatement="CS123456789">
      <r:PreConversionProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-
03-31T23:59:59+02:00" length="month"/>
      <r:PreConversionProductionDevice ID="506003453000000275" name="Central
Hidroeléctrica" technology="T030200" dateOperational="2021-01-12" capacity="10.999"
label="EKOENERGY" supportFlag="1"/>
      <r:PreConversionPDCoordinates Longitude="115 778 E" Latitude="448 92 N"
CoordinateCode="WGS-84"/>
      <r:PreConversionPDAddress Country="NO" City="Hønefoss" PostCode="NO2342"
StreetName="Hovedgaten" StreetNumber="123"/>
      <r:PreConversionEmissions
calculationMethod="E0100000000">234.000</r:PreConversionEmissions>
      <r:PreConversionRadioactiveWaste
calculationMethod="E0200000000">12.000</r:PreConversionRadioactiveWaste>
    </r:Conversion>
    <r:Storage tag="S0200010101" efficiencyFactor="78.6"
cancellationStatement="CS123456789" cancellationIssuingBody="22">
      <r:StorageSystemCoordinates Longitude="115 778 E" Latitude="448 92 N"
CoordinateCode="WGS-84"/>
      <r:StorageSystemAddress Country="NO" City="Hønefoss" PostCode="NO2342"
StreetName="Hovedgaten" StreetNumber="123"/>
      <r:PreStorageProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-
31T23:59:59+02:00" length="month"/>
    </r:Storage>
    <r:Product name="EECS:GO" legalStatus="LC">
      <r:Purpose>Disclosure</r:Purpose>
      <r:CompetentAuthority>BE20</r:CompetentAuthority>
      <r:ProductType type="driver">Source</r:ProductType>
      <r:ProductType type="driver">Technology</r:ProductType>
    </r:Product>
    <r:ProductionDeviceID cS="GS1">897867500000902005</r:ProductionDeviceID>
    <r:ProductionDeviceName>Production Device B</r:ProductionDeviceName>
    <r:DateOperational>2000-01-12</r:DateOperational>
```

```
    <r:Capacity>
      <r:ElectricalCapacity>1000.123</r:ElectricalCapacity>
      <r:MechanicalCapacity>2000.123</r:MechanicalCapacity>
      <r:ThermalCapacity>3000.123</r:ThermalCapacity>
    </r:Capacity>
    <r:Module>
      <r:ModuleCapacity>10.999</r:ModuleCapacity>
      <r:ModuleDateOperational>2022-01-01</r:ModuleDateOperational>
      <r:ModuleDescription>Element 1</r:ModuleDescription>
    </r:Module>
    <r:ProductionTechnology cS="eecs">T070000</r:ProductionTechnology>
    <r:EnergySource cS="eecs">F01040100</r:EnergySource>
    <r:SupportFlag cS="eecs">1</r:SupportFlag>
    <r:ProductionSupportDescription>Production
support.</r:ProductionSupportDescription>
    <r:InvestmentSupportDescription>Investment
support.</r:InvestmentSupportDescription>
    <r:ProductionDeviceLocation>
      <r:Coordinates Longitude="LO" Latitude="LA" CoordinateCode="WGS-84"/>
      <r:Address Country="DK" City="Aarhus" PostCode="8000" StreetName="Hovedgaden"
StreetNumber="12"/>
    </r:ProductionDeviceLocation>
    <r:DisseminationLevel>2a</r:DisseminationLevel>
    <r:Cogeneration HECCriteriaMet="true">
      <r:UseOfHeat>a</r:UseOfHeat>
      <r:PercentagePrimaryEnergySaved>10.1</r:PercentagePrimaryEnergySaved>
      <r:AmountPrimaryEnergySaved>1000.123</r:AmountPrimaryEnergySaved>
      <r:OverallPrimaryEnergySavings>20.2</r:OverallPrimaryEnergySavings>
      <r:UsefulHeat>2000.123</r:UsefulHeat>
    </r:Cogeneration>
    <r:ElectricalEfficiency>30.3</r:ElectricalEfficiency>
    <r:ThermalEfficiency>40.4</r:ThermalEfficiency>
    <r:CalorificValue type="lower" unit="MJ/kg">11.120</r:CalorificValue>
    <r:GHGEmissions>
      <r:GHGEmissionProduced calculationMethod="E0100000000" unit="Kg
CO2eq/MWh">0.100</r:GHGEmissionProduced>
      <r:AbsoluteGHGEmissionSaved calculationMethod="E0100000000"
unit="Kg/MWh">0.000</r:AbsoluteGHGEmissionSaved>
    </r:GHGEmissions>
    <r:RadioactiveWasteProduced
calculationMethod="E0200000000">4.030</r:RadioactiveWasteProduced>
    <r:Sustainability sustainabilityCriteriaMet="true"
certificationBody="Certification Body A">
      <r:RequirementReference>REDIIart.29</r:RequirementReference>
      <r:Scheme>ISCC</r:Scheme>
      <r:AuditReport>https://example.ex/report.pdf</r:AuditReport>
      <r:SustainabilityAdditionalInfo>This is a text
example</r:SustainabilityAdditionalInfo>
    </r:Sustainability>
    <r:Label>RBSA</r:Label>
    <r:Label>GREENENERGY</r:Label>
    <r:AdditionalInfo>Example HEC GO with all v81 elements</r:AdditionalInfo>
    <r:BiddingZone zone90percentageRES="true"
zoneLowEmission="true">10Y1001A1001A46L</r:BiddingZone>
    <r:RedispatchingCriteriaMet>true</r:RedispatchingCriteriaMet>
    <r:PowerPurchaseAgreement startDate="2025-01-01" endDate="2029-12-31"
buyerID="12ABc"/>
  </r:Certificates>
</r:Body>
```

(c) Example Body created with schema v81 for EnergyGas

```
<r:Body>
  <r:SendingAccountID cS="eecs">90X0000006</r:SendingAccountID>
  <r:ReceivingAccountID cS="eecs">99X000000X</r:ReceivingAccountID>
  <r:NumberOfCertificates>100</r:NumberOfCertificates>
  <r:Message>Import EnergyGas GO</r:Message>
  <r:Certificates faceValue="MWh">
    <r:StartCertificateNumber
cS="eecs">20251113142947564689000001001</r:StartCertificateNumber>
```

```
    <r:EndCertificateNumber
cS="eecs">20251113142947564689000001100</r:EndCertificateNumber>
    <r:IssuingBody>02</r:IssuingBody>
    <r:CountryOfIssue>DK</r:CountryOfIssue>
    <r:DateOfIssue>2025-11-01</r:DateOfIssue>
    <r:ProductionPeriod start="2025-10-01T00:00:00+02:00" end="2025-10-
31T23:59:59+01:00" length="month"/>
    <r:EnergyCarrier>EnergyGas</r:EnergyCarrier>
    <r:Conversion tag="C02" preConversionCancellationStatement="CS123456789">
      <r:PreConversionProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-
03-31T23:59:59+02:00" length="month"/>
      <r:PreConversionProductionDevice ID="506003453000000275" name="Central
Hidroeléctrica" technology="T030200" dateOperational="2021-01-12" capacity="10.999"
label="EKOENERGY" supportFlag="1"/>
      <r:PreConversionPDCoordinates Longitude="115 778 E" Latitude="448 92 N"
CoordinateCode="WGS-84"/>
      <r:PreConversionPDAddress Country="NO" City="Hønefoss" PostCode="NO2342"
StreetName="Hovedgaten" StreetNumber="123"/>
      <r:PreConversionEmissions
calculationMethod="E0100000000">234.000</r:PreConversionEmissions>
      <r:PreConversionRadioactiveWaste
calculationMethod="E0200000000">12.000</r:PreConversionRadioactiveWaste>
    </r:Conversion>
    <r:Storage tag="S0200010101" efficiencyFactor="78.6"
cancellationStatement="CS123456789" cancellationIssuingBody="22">
      <r:StorageSystemCoordinates Longitude="115 778 E" Latitude="448 92 N"
CoordinateCode="WGS-84"/>
      <r:StorageSystemAddress Country="NO" City="Hønefoss" PostCode="NO2342"
StreetName="Hovedgaten" StreetNumber="123"/>
      <r:PreStorageProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-
31T23:59:59+02:00" length="month"/>
    </r:Storage>
    <r:Product name="EECS:GO" legalStatus="LC">
      <r:Purpose>Disclosure</r:Purpose>
      <r:CompetentAuthority>BE20</r:CompetentAuthority>
      <r:ProductType type="driver">Source</r:ProductType>
    </r:Product>
    <r:ProductionDeviceID cS="GS1">897867500000905006</r:ProductionDeviceID>
    <r:ProductionDeviceName>Production Device C</r:ProductionDeviceName>
    <r:DateOperational>2000-01-12</r:DateOperational>
    <r:Capacity>
      <r:MechanicalCapacity>100.100</r:MechanicalCapacity>
      <r:ThermalCapacity>200.234</r:ThermalCapacity>
      <r:GasProductionCapacity>300.345</r:GasProductionCapacity>
    </r:Capacity>
    <r:Module>
      <r:ModuleCapacity>400.123</r:ModuleCapacity>
      <r:ModuleDateOperational>2022-01-01</r:ModuleDateOperational>
      <r:ModuleDescription>Gas upgrading plant</r:ModuleDescription>
    </r:Module>
    <r:ProductionTechnology cS="eecs">G000000</r:ProductionTechnology>
    <r:EnergySource cS="eecs"
advancedBiomassFeedstock="true">F01010101</r:EnergySource>
    <r:SourceShares>XNNNNNNN1:10%, XNNNNNNN2:90%</r:SourceShares>
    <r:SupportFlag cS="eecs">1</r:SupportFlag>
    <r:ProductionSupportDescription>Production
support.</r:ProductionSupportDescription>
    <r:InvestmentSupportDescription>Investment
support.</r:InvestmentSupportDescription>
    <r:ProductionDeviceLocation>
      <r:Coordinates Longitude="LO" Latitude="LA" CoordinateCode="WGS-84"/>
      <r:Address Country="DK" City="Aarhus" PostCode="8000" StreetName="Hovedgaden"
StreetNumber="12"/>
    </r:ProductionDeviceLocation>
    <r:DisseminationLevel>3b</r:DisseminationLevel>
    <r:Gas type="Y0000" fossilAuxiliaryDeducted="true">
      <r:CompositionPurity>99.80</r:CompositionPurity>
      <r:GasCompositionCriteria>C0100</r:GasCompositionCriteria>
      <r:GasUsage>c</r:GasUsage>
      <r:GasCriterion>Low-Carbon Gas</r:GasCriterion>
```

```
      <r:ETSESREligibility>A0100</r:ETSESREligibility>
    </r:Gas>
    <r:CalorificValue type="higher" unit="MJ/kg"/>
    <r:GHGEmissions GHGSavingsCriteriaMet="true">
      <r:GHGEmissionProduced calculationMethod="E0100000000" unit="Kg
CO2eq/MWh">20.123</r:GHGEmissionProduced>
      <r:AbsoluteGHGEmissionSaved calculationMethod="E0100000000"
unit="Kg/MWh">30.234</r:AbsoluteGHGEmissionSaved>
    </r:GHGEmissions>
    <r:RadioactiveWasteProduced
calculationMethod="E0200000000">0.123</r:RadioactiveWasteProduced>
    <r:Sustainability sustainabilityCriteriaMet="true"
certificationBody="Certification Body A">
      <r:RequirementReference>REDIIart.30</r:RequirementReference>
      <r:Scheme>ISCC</r:Scheme>
      <r:AuditReport>https://example.ex/report.pdf</r:AuditReport>
      <r:SustainabilityAdditionalInfo>This is a text
example</r:SustainabilityAdditionalInfo>
    </r:Sustainability>
    <r:Label>EKOENERGY</r:Label>
    <r:AdditionalInfo>Example EnergyGas GO with all v81 elements</r:AdditionalInfo>
  </r:Certificates>
</r:Body>
```

B3.4.7 The original Account Holder and the new Account Holder of the certificates are identified in elements 'r:SendingAccountID' and 'r:ReceivingAccountID' respectively.

B3.4.8 The actual certificates are described in the 'r:Certificates' block (bundle). This refers to a contiguous set of certificates with serial numbers between StartCertificateNumber and EndCertificateNumber inclusive. If the transfer involves non-contiguous sets of certificates, then further 'r:Certificates' blocks can be included as required.

B3.4.9 When handling the abovementioned certificate bundles, each EECS Registration Database must follow a no-stitching policy, meaning each certificate bundle may be further divided into smaller separate bundles, but shall never be grouped back into a larger bundle.

B3.4.10 A single transfer file can only have one body element. This implies that:

(a) All the certificates are to be transferred from the same original holder;

(b) All the certificates are to be transferred to the same new holder.

B3.4.11 A single transfer file can only contain certificates of one Energy Carrier.

## B4 Certificate Transfer Message Definition

### B4.1 Introduction

B4.1.1 Data fields defined in the message schema are described in further detail in this section. Examples of application are presented in Section B3.

B4.1.2 Where appropriate, details of field structure have been included.

### B4.2 Optional and Mandatory Elements of EECS:GO Certificate v80

B4.2.1 The table below gives an overview of the mandatory and optional fields in v80 for EECS:GO certificates per Energy Carrier. Electricity certificates are differentiated into non-High-Efficiency Cogeneration (non-HEC) certificates and High-Efficiency Cogeneration (HEC) certificates.

| Element | | PRODUCT: EECS:GO (Disclosure) Energy Carrier: | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v80 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| Header | Attribute: MessageTransmissionTime | M | M | M | M |

| Element | | PRODUCT: EECS:GO (Disclosure) Energy Carrier: | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v80 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| Header | MessageID | M | M | M | M |
| Header | FromRegistry | M | M | M | M |
| Header | ToRegistry | M | M | M | M |
| Header | Context | M | M | M | M |
| Body | SendingAccountID | M | M | M | M |
| Body | ReceivingAccountID | M | M | M | M |
| Body | NumberOfCertificates | M | M | M | M |
| Body | Message | O | O | O | O |
| | | | | | |
| Certificates | Attribute: faceValue | M | M | M | M |
| Certificates | StartCertificateNumber | M | M | M | M |
| Certificates | EndCertificateNumber | M | M | M | M |
| Certificates | IssuingBody | M | M | M | M |
| Certificates | CountryOfIssue | M | M | M | M |
| Certificates | DateOfIssue | M | M | M | M |
| Production Period | Attributes: start end | M | M | M | M |
| Certificates | EnergyCarrier | M | M | M | M |
| Certificates | Conversion | M | M | M | M |
| Conversion | Attribute: tag | M | M | M | M |
| Conversion | Attribute: preConversionSupportFlag | N | N | O | O |
| Certificates | Storage[3)] | X[3)] | X[3)] | X[3)] | X[3)] |
| Storage | Attribute: tag | X | X | X | X |
| Certificates | Product | M | M | M | M |
| Product | Attribute: name | M | M | M | M |
| Product | Attribute: legalStatus | M | M | M | M |
| Product | Purpose | M | M | M | M |
| Product | CompetentAuthority | M | M | M | M |
| Product | ProductType | M | M | M | M |

| Element | | PRODUCT: EECS:GO (Disclosure) Energy Carrier: | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v80 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| ProductType | Attribute: type | M | M | M | M |
| Certificates | ProductionDeviceID | M | M | M | M |
| Certificates | ProductionDeviceName | O | O | O | O |
| Certificates | DateOperational | M | M | M | M |
| Capacity | ElectricalCapacity | M | M | N | N |
| Capacity | MechanicalCapacity | O | O | O | O |
| Capacity | ThermalCapacity | O | M | O | O |
| Capacity | GasProductionCapacity | N | N | M | M |
| Module | ModuleCapacity | O | O | O | O |
| Module | ModuleDateOperational | O | O | O | O |
| Module | ModuleDescription | O | O | O | O |
| Certificates | ProductionTechnology | M | M | M | M |
| Certificates | EnergySource | M | M | M | M |
| EnergySource | Attribute: advancedBiomassFeedstock | N | N | O | O |
| Certificates | SourceShares | N | N | O | O |
| Certificates | SupportFlag | M | M | M | M |
| Certificates | ProductionSupportDescription | O | O | O | O |
| Certificates | InvestmentSupportDescription | O | O | O | O |
| ProductionDevice Location | Coordinates[1)] | X[1)] | X[1)] | X[1)] | X[1)] |
| ProductionDevice Location | Address[1)] | X[1)] | X[1)] | X[1)] | X[1)] |
| Certificates | DisseminationLevel | M | M | M | M |
| Certificates | Cogeneration | O | M | N | N |
| Cogeneration | Attribute: HECCriteriaMet | O | M | N | N |
| Cogeneration | UseOfHeat | O | M | N | N |
| Cogeneration | PercentagePrimaryEnergySaved | O | M | N | N |
| Cogeneration | AmountPrimaryEnergySaved | O | O | N | N |
| Cogeneration | OverallPrimaryEnergySavings | O | O | N | N |
| Cogeneration | UsefulHeat | O | M | N | N |

| Element | | PRODUCT: EECS:GO (Disclosure) Energy Carrier: | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v80 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| Certificates | ElectricalEfficiency | O | M | N | N |
| Certificates | ThermalEfficiency | O | M | N | N |
| Certificates | Gas | N | N | M | M |
| Gas | Attribute: type | N | N | M | M |
| Gas | CompositionPurity | N | N | O | O |
| Gas | GasCompositionCriteria | N | N | O | O |
| Gas | GasUsage | N | N | O | O |
| Certificates | CalorificValue | N | M | Only attribute mandatory, value not | Only attribute mandatory, value not |
| CalorificValue | Attribute: type | N | M | M | M |
| CalorificValue | Attribute: unit | N | M | O | O |
| Certificates | GHGEmissions | O | O | O | O |
| GHGEmissions | Attribute: GHGSavingsCriteriaMet | N | N | O | O |
| GHGEmissions | GHGEmissionProduced | O | O | O | O |
| GHGEmissionProduced | Attribute: unit | O | O | O | O |
| GHGEmissionProduced | Attribute: calculationMethod | X | X | X | X |
| GHGEmissions | AbsoluteGHGEmissionSaved | O | O | O | O |
| AbsoluteGHGEmissionSaved | Attribute: unit | O | O | O | O |
| AbsoluteGHGEmissionSaved | Attribute: calculationMethod | X | X | X | X |
| Certificates | RadioactiveWasteProduced | O | O | O | O |
| RadioactiveWasteProduced | Attribute: calculationMethod | O | O | O | O |
| Certificates | Sustainability | O | O | O | O |
| Sustainability | Attribute: sustainabilityCriteriaMet | O | O | O | O |
| Sustainability | Attribute: certificationBody | O | O | O | O |
| Sustainability | RequirementReference | O | O | O | O |
| Sustainability | Scheme | O | O | O | O |
| Sustainability | AuditReport | O | O | O | O |

| Element | | PRODUCT: EECS:GO (Disclosure) Energy Carrier: | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v80 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| Sustainability | SustainabilityAdditionalInfo | O | O | O | O |
| Certificates | Label | O | O | O | O |
| Certificates | AdditionalInfo | O | O | O | O |

M Mandatory element (Note, if an attribute is set to Mandatory, it is Mandatory only if the Element itself is set to Mandatory)

O Optional element [2)]

N Not applicable (cannot be given to the type of certificate)

X Conditionally mandatory element, see notes. If X is used for an attribute, the attribute is mandatory if the Element itself is given.

Notes:

1) Each certificate must contain at least the ProductionDeviceCoordinates or the ProductionDeviceAddress and may contain both.
2) Optional means that it is optional to give it on issuing, but after a certificate has been issued, it is compulsory to keep the information in imports and exports. There are exceptions to this rule where data loss is allowed for specific data fields in case it is done as part of transformation between v80 and v81 and according to the rules introduced for each element in the B4.6 Data Field Definitions – Certificate Transfer File Certificates. (ref EECS Rules A3 IMMUTABILITY)
3) Storage element is mandatory if the Storage Tag to be related to the Certificate does not correspond to the default value "S0100" in EECS Rules Fact Sheet 23 "Storage and Conversion Tracking".

## B4.3 Optional and Mandatory Elements of EECS:GO Certificate v81

B4.3.1 The table below gives an overview of the mandatory and optional fields in v81 for EECS:GO certificates per Energy Carrier. Electricity certificates are differentiated into non-High-Efficiency Cogeneration (non-HEC) certificates and High-Efficiency Cogeneration (HEC) certificates.

Yellow highlighted are attributes and elements which were changed between v80 and v81 and require attention during v81 implementation.

| Element | | Energy Carrier | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v81 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| Header | Attribute: MessageTransmissionTime | M | M | M | M |
| Header | MessageID | M | M | M | M |
| Header | FromRegistry | M | M | M | M |
| Header | ToRegistry | M | M | M | M |
| Header | Context | M | M | M | M |
| Body | SendingAccountID | M | M | M | M |
| Body | ReceivingAccountID | M | M | M | M |
| Body | NumberOfCertificates | M | M | M | M |

| Element | | Energy Carrier | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v81 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| Body | Message | O | O | O | O |
| Certificates | Attribute: faceValue | M | M | M | M |
| Certificates | StartCertificateNumber | M | M | M | M |
| Certificates | EndCertificateNumber | M | M | M | M |
| Certificates | IssuingBody | M | M | M | M |
| Certificates | CountryOfIssue | M | M | M | M |
| Certificates | DateOfIssue | M | M | M | M |
| Certificates | ProductionPeriod (Attributes: start, end, length) | M | M | M | M |
| Certificates | EnergyCarrier | M | M | M | M |
| Certificates | Conversion | M | M | M | M |
| Conversion | Attribute: tag | M | M | M | M |
| Conversion | Attribute: preConversionCancellationStatement | O | O | O | O |
| Conversion | PreConversionProductionPeriod (Attributes: start, end, length) | O | O | O | O |
| Conversion | PreConversionProductionDevice (Attributes: ID, name, technology, dateOperational, capacity, label, supportFlag) | O | O | O | O |
| Conversion | PreConversionPDCoordinates (Attributes: Longitude, Latitude, CoordinateCode) | O | O | O | O |
| Conversion | PreConversionPDAddress (Attributes: Country, City, PostCode, StreetName, StreetNumber) | O | O | O | O |
| Conversion | PreConversionEmissions | O | O | O | O |
| PreConversionEmissions | Attribute: calculationMethod | X | X | X | X |
| Conversion | PreConversionRadioactiveWaste | O | O | O | O |
| PreConversionRadioactiveWaste | Attribute: calculationMethod | O | O | O | O |
| Certificates | Storage | M | M | M | M |
| Storage | Attribute: tag | M | M | M | M |
| Storage | Attribute: efficiencyFactor | O | O | O | O |
| Storage | Attribute: cancellationStatement | O | O | O | O |

| Element | | Energy Carrier | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v81 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| Storage | Attribute: cancellationIssuingBody | O | O | O | O |
| Storage | StorageSystemCoordinates (Attributes: Longitude, Latitude, CoordinateCode) | O | O | O | O |
| Storage | StorageSystemAddress (Attributes: Country, City, PostCode, StreetName, StreetNumber) | O | O | O | O |
| Storage | PreStorageProductionPeriod (Attributes: start, end, length) | O | O | O | O |
| Certificates | Product | M | M | M | M |
| Product | Attribute: name | M | M | M | M |
| Product | Attribute: legalStatus | M | M | M | M |
| Product | Purpose | M | M | M | M |
| Product | CompetentAuthority | M | M | M | M |
| Product | ProductType | M | M | M | M |
| ProductType | Attribute: type | M | M | M | M |
| Certificates | ProductionDeviceID | M | M | M | M |
| Certificates | ProductionDeviceName | O | O | O | O |
| Certificates | DateOperational | M | M | M | M |
| Capacity | ElectricalCapacity | M | M | N | N |
| Capacity | MechanicalCapacity | O | O | O | O |
| Capacity | ThermalCapacity | O | M | O | O |
| Capacity | GasProductionCapacity | N | N | M | M |
| Module | ModuleCapacity | O | O | O | O |
| Module | ModuleDateOperational | O | O | O | O |
| Module | ModuleDescription | O | O | O | O |
| Certificates | ProductionTechnology | M | M | M | M |
| Certificates | EnergySource | M | M | M | M |
| EnergySource | Attribute: advancedBiomassFeedstock | N | N | O | O |
| Certificates | SourceShares | N | N | O | O |
| Certificates | SupportFlag | M | M | M | M |

| Element | | Energy Carrier | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v81 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| Certificates | ProductionSupportDescription | O | O | O | O |
| Certificates | InvestmentSupportDescription | O | O | O | O |
| ProductionDevice Location | Coordinates (Attributes: Longitude, Latitude, CoordinateCode) [1] | X[1] | X[1] | X[1] | X[1] |
| ProductionDevice Location | Address (Attributes: Country, City, PostCode, StreetName, StreetNumber) [1] | X[1] | X[1] | X[1] | X[1] |
| Certificates | DisseminationLevel | M | M | M | M |
| Certificates | Cogeneration | O | M | N | N |
| Cogeneration | Attribute: HECCriteriaMet | O | M | N | N |
| Cogeneration | UseOfHeat | O | M | N | N |
| Cogeneration | PercentagePrimaryEnergySaved | O | M | N | N |
| Cogeneration | AmountPrimaryEnergySaved | O | O | N | N |
| Cogeneration | OverallPrimaryEnergySavings | O | O | N | N |
| Cogeneration | UsefulHeat | O | M | N | N |
| Certificates | ElectricalEfficiency | O | M | N | N |
| Certificates | ThermalEfficiency | O | M | N | N |
| Certificates | Gas | N | N | M | M |
| Gas | Attribute: type | N | N | M | M |
| Gas | Attribute: fossilAuxiliaryDeducted | N | N | M | M |
| Gas | CompositionPurity | N | N | O | O |
| Gas | GasCompositionCriteria | N | N | O | O |
| Gas | GasUsage | N | N | O | O |
| Gas | GasCriterion | N | N | O | O |
| Gas | ETSESREligibility | N | N | O | O |
| Certificates | CalorificValue | O | M | Only attribute mandatory, value not | Only attribute mandatory, value not |
| CalorificValue | Attribute: type | O | M | M | M |
| CalorificValue | Attribute: unit | O | M | O | O |
| Certificates | GHGEmissions | O | O | O | O |

| Element | | Energy Carrier | | | |
|---|---|---|---|---|---|
| Hierarchy | Name in v81 | Electricity (non-HEC) | Electricity (HEC) | Energy Gas | Hydrogen |
| GHGEmissions | Attribute: GHGSavingsCriteriaMet | N | N | O | O |
| GHGEmissions | GHGEmissionProduced | O | O | O | O |
| GHGEmission Produced | Attribute: unit | O | O | O | O |
| GHGEmission Produced | Attribute: calculationMethod | X | X | X | X |
| GHGEmissions | AbsoluteGHGEmissionSaved | O | O | O | O |
| AbsoluteGHG EmissionSaved | Attribute: unit | O | O | O | O |
| AbsoluteGHG EmissionSaved | Attribute: calculationMethod | X | X | X | X |
| Certificates | RadioactiveWasteProduced | O | O | O | O |
| RadioactiveWaste Produced | Attribute: calculationMethod | O | O | O | O |
| Certificates | Sustainability | O | O | O | O |
| Sustainability | Attribute: sustainabilityCriteriaMet | O | O | O | O |
| Sustainability | Attribute: certificationBody | O | O | O | O |
| Sustainability | RequirementReference | O | O | O | O |
| Sustainability | Scheme | O | O | O | O |
| Sustainability | AuditReport | O | O | O | O |
| Sustainability | SustainabilityAdditionalInfo | O | O | O | O |
| Certificates | Label | O | O | O | O |
| Certificates | AdditionalInfo | O | O | O | O |
| Certificates | BiddingZone (Attributes: zone90percentageRES, zoneLowEmission) | O | O | N | N |
| Certificates | RedispatchingCriteriaMet | O | O | N | N |
| Certificates | PowerPurchaseAgreement (Attributes: startDate, endDate, buyerID) | O | O | N | N |

M Mandatory element (Note, if an attribute is set to Mandatory, it is Mandatory only if the Element itself is set to Mandatory)

O Optional element [2)]

N Not applicable (cannot be given to the type of certificate)

X Conditionally mandatory element, see notes. If X is used for an attribute, the attribute is mandatory if the Element itself is given.

Notes:

1) Each certificate must contain at least the ProductionDeviceCoordinates or the ProductionDeviceAddress (except optional StreetName and StreetNumber) and may contain both.
2) Optional means that it is optional to give it on issuing, but after a certificate has been issued, it is compulsory to keep the information in imports and exports. There are exceptions to this rule where data loss is allowed for specific data fields in case it is done as part of transformation between v80 and v81 and according to the rules introduced for each element in the B4.6 Data Field Definitions – Certificate Transfer File Certificates. (ref EECS Rules A3 IMMUTABILITY). The Issuing Body may restore such lost information on the certificates it issued itself (B3.2.4 (d)).

## B4.4 Data Field Definitions – Certificate Transfer File Header

### B4.4.1 Message Transmission Time

Timestamp for message file. The recipient may validate the format of this field but may not reject the message if the date is beyond some arbitrary limit in the past. It is the responsibility of the Sender to monitor the total turnaround time of the transaction to ensure that an acknowledgement (AK or NAK) is received within the time limits of 2.3.5.1.

| Attribute | MessageTransmissionTime |
|---|---|
| Type | DateTime |
| Length | Not applicable |
| Format | The date and time in UTC (Z) time zone. Use of local time zones (e.g. +01:00) is not permitted for this element. |
| Occurrence | Required |
| Structure | YYYY-MM-DDTHH:MM:SSZ |
| Unit | DateTime |
| Example | 2022-01-15T12:24:00Z |

### B4.4.2 Message ID

Unique identifier (MessageID) of the transfer message.

| Element Name | MessageID |
|---|---|
| Type | Token (15 digits, leading zeros included) |
| Length | 15 digits |
| Format | 15 digits fixed length number |
| Occurrence | 1 (per Header element of transfer message)<br>NOTE: Unique identification number for a transfer |
| Structure | IB code (2 digits) & YYYYMMDD & sequential number (5 digits) |
| Unit | Not applicable |
| Example | 042026101800001 |

### B4.4.3 From Registry

Identifier for Sending Registry.

This field may be validated for agreement with the XML specification. The recipient may not reject the message based on the content.

| Element Name | FromRegistry |
|---|---|
| Type | Token[1] |
| Length | 6-13 |
| Format | GS1 GLN number |
| Occurrence | 1 (per Header element) |
| Structure | See section A2.2 |
| Example | 6420616413223 |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | GS1 |

### B4.4.4 To Registry

Identifier for Receiving Registry.

This field may be validated for agreement with the XML specification. The recipient may not reject the message based on the content.

| Element Name | ToRegistry |
|---|---|
| Type | Token |
| Length | 6-13 |
| Format | GS1 GLN number |
| Occurrence | 1 (per Header element) |
| Structure | See section A2.2 |
| Example | 6420616413223 |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | GS1 |

### B4.4.5 Context

Processing context to assist file routing.

| Element Name | Context |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | No default value. Currently only one value is allowed. |
| Occurrence | 1 (per Header element) |
| Business rules | Allowed values:<br>• transfer |

[1] Token: A string with no leading or trailing white space, no tabs, no linefeeds, and not more than one consecutive space.

## B4.5 Data Field Definitions – Certificate Transfer File Body

### B4.5.1 Original Holder

Account Number of the sender of the certificates.

| Element Name | SendingAccountID |
|---|---|
| Type | Token |
| Length | 10 (9 characters and 1 check character, see A2.5) |
| Format | Combination of characters and digits. See section A2.5 for details. |
| Occurrence | 1 (per Body element) |
| Structure | See section A2.5 |
| Unit | Not applicable |
| Example | `<r:SendingAccountID cS="eecs">10XRWENETJ</r:SendingAccountID>` |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | eecs |

### B4.5.2 New Holder

Account Number of the receiver of the certificates.

| Element Name | ReceivingAccountID |
|---|---|
| Type | Token |
| Length | 10 (9 characters and 1 check character, see A2.5) |
| Format | Combination of characters and digits. See section A2.5 for details. |
| Occurrence | 1 (per Body element) |
| Structure | See section A2.5 |
| Unit | Not applicable |
| Example | `<r:ReceivingAccountID cS="eecs">10XRWENETJ</r:ReceivingAccountID>` |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | eecs |

### B4.5.3 Number of Certificates

Number of certificates transferred in the message.

| Element Name | NumberOfCertificates |
|---|---|
| Type | Positive Integer |
| Length | 1-11 |
| Format | Number |
| Occurrence | 1 (per Body element) |
| Structure | N...[N] |
| Unit | Not applicable |
| Example | 682 |

| Element Name | NumberOfCertificates |
|---|---|
| Business rules | The value must be equal to the sum of the certificates of all bundles in the transfer, i.e. the sum of (EndCertificateNumber – StartCertificateNumber + 1) over all Certificates elements; otherwise the AIB Hub rejects the transfer with error code 64 (Fact Sheet 18). |

#### B4.5.4 Message

Free text Message which can be used to communicate information from sender to receiver.

| Element Name | Message |
|---|---|
| Type | String |
| Length | 1-1024 |
| Format | Free text |
| Occurrence | 0 or 1 (per Body element) |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | "Transfer in accordance with order nr … dated …" |

#### B4.5.5 Certificates

Each transfer may have one or more "Certificates" elements.

See information about the maximum number of "Certificates" elements in 2.3.5.4.

| Element Name | Certificates |
|---|---|
| Type | Element with an attribute and sub elements |
| Occurrence | 1 to 5000 (default limit on both channels, see 2.3.5.4)<br>On the AMQP channel the upper limit can technically be raised up to 15000 if needed in the future. At the request of a Registry Operator, the AIB can set a lower limit for its Registry in the registry configuration (Max Amount of Bundles). The AIB Hub then rejects transfers to that Registry that contain more certificate bundles (error code 119). A lower limit than other Registries use can therefore block transfers. |
| **Attribute** | **faceValue** |
| Description | Face Value in accordance with the Section of PART IV of the EECS Rules establishing the EECS Scheme in respect of the relevant Output. |
| Length | 1-8 |
| Default value | None (the attribute must always be given) |
| Occurrence | Mandatory |
| Structure | Currently the AIB Hub supports only the value MWh. |
| Example | `<r:Certificates faceValue="MWh">...</r:Certificates>` |

### B4.6 Data Field Definitions – Certificate Transfer File Certificates

#### B4.6.1 Start Certificate Number

The number of the first certificate in the block of certificates to be transferred.

| Element Name | StartCertificateNumber |
|---|---|
| Type | Non-negative Integer |
| Length | 30 |
| Format | 30-digit fixed length number |
| Occurrence | 1 (per Certificates element) |

| Element Name | StartCertificateNumber |
|---|---|
| Structure | See section A2.3.1<br>*N*-digit Company Prefix with *N*-digit Individual Asset Reference, total 30 digits |
| Example | `<r:StartCertificateNumber cS="eecs">`<br>`871686799993800000000001267377 </r:StartCertificateNumber>` |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | eecs |

### B4.6.2 End Certificate Number

The number of the last certificate in the block of certificates to be transferred.

| Element Name | EndCertificateNumber |
|---|---|
| Type | Non-negative Integer |
| Length | 30 |
| Format | 30-digit fixed length number |
| Occurrence | 1 (per Certificates element) |
| Structure | See also section A2.3.1<br>*N*-digit Company Prefix with *N*-digit Individual Asset Reference, total 30 digits |
| Example | `<r:EndCertificateNumber cS="eecs">`<br>`871686799993800000000001267377 </r:EndCertificateNumber>` |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | eecs |

### B4.6.3 Issuing Body

The ID of the Issuing Body which issued the certificate.

| Element Name | IssuingBody |
|---|---|
| Type | Token |
| Length | 2 |
| Format | NN |
| Occurrence | 1 (per Certificates element) |
| Structure | 2-character numeric, leading zero if required.<br>See EECS Rules Fact Sheet 04 “Member and Competent Authority Codes” for possible values |
| Example | 07 |

### B4.6.4 Country of Issue

The country in which the certificate was issued.

| Element Name | CountryOfIssue |
|---|---|
| Type | Token |
| Length | 2 |
| Format | XX |

| Element Name | CountryOfIssue |
|---|---|
| Occurrence | 1 (per Certificates element) |
| Structure | 2 characters to mark the country of issuance according to the ISO 3166-1 alpha-2 code list. |
| Example | FI |

### B4.6.5 Certificate Issue Date

The date on which the certificate was issued.

| Element Name | DateOfIssue |
|---|---|
| Type | Date |
| Length | Not applicable |
| Format | Date is according to the local time zone in the domain of issuance, not UTC.<br>Minimum value 2004-03-17. |
| Occurrence | 1 (per Certificates element) |
| Structure | YYYY-MM-DD |
| Example | 2025-05-31 |

### B4.6.6 Production Period

Start, end and interval length of actual generation of the Output represented by the certificate. The period is defined by two mandatory attributes in v80 (start, end) and three in v81 (start, end, length).

| Element Name | ProductionPeriod |
|---|---|
| Type | An element having 2 (v80) or 3 (v81) attributes |
| Occurrence | 1 (per Certificates element) |
| Example v80 | `<r:ProductionPeriod start="2022-01-01T00:00:00+01:00" end="2022-01-31T23:59:59+01:00"/>` |
| Example v81 | `<r:ProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-31T23:59:59+02:00" length="month"/>` |
| Structure | Both the start and the end attributes are inclusive, meaning the production period of the certified energy spans from the start to the end date/time of the interval, including the first and the last second. |
| Business rules | Expiry of certificates with a sub-daily production period (length “hour”, “30min” or “15min”): daily accuracy is sufficient. All certificates whose validity, determined in accordance with the EECS Rules (section C6.1.1 (c)) and the applicable Product Rules, ends during a given calendar day may be expired together on that day, irrespective of the time of day at which their production period ended.<br>The end of the period must not be before its start (start ≤ end); otherwise the AIB Hub rejects the transfer with error code 44 (Fact Sheet 18). |
| **Attribute** | **start** |
| Type | DateTime |
| Format | Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences.<br>For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer.<br>Minimum value 2004-03-17T00:00:00+00:00. |
| Occurrence | Required |
| Structure | YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM |
| **Attribute** | **end** |
| Type | DateTime |

| Element Name | ProductionPeriod |
|---|---|
| Format | Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences.<br>For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer.<br>Minimum value 2004-03-17T00:00:00+00:00. |
| Occurrence | Required |
| Structure | YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM |
| **Attribute v81** | **length** |
| Type | Token |
| Length | 1-20 |
| Format | New attribute for schema v81. Mandatory. Allowed values are described in Fact Sheet 25 “Production Period Identifiers”. |
| Occurrence | Required |
| Structure | One of the following five values only, spelled exactly as shown (lower case); no other value is currently accepted by the AIB Hub. The values correspond one-to-one to the production period interval lengths of Fact Sheet 25. To pass the Hub validation the following criteria must be met:<br>• “month”<br>  ○ Attributes Production Period start and end must fall within the same calendar month. Any production period that starts and ends within one calendar month, for example a single week, qualifies as “month”.<br>• “day”<br>  ○ Attributes Production Period start and end must fall within the same calendar day, or maximum within two consecutive calendar days. Duration must be exactly 24 hours in any case, with the only exceptions being summer/wintertime changes.<br>• “hour”<br>  ○ Attribute Production Period start must be TXX:00:00 time and end must be TXX:59:59 time. Duration must be exactly 1 hour.<br>• “30min”<br>  ○ Attributes Production Period start and end times must be one of the following combinations:<br>  ○ TXX:00:00 – TXX:29:59<br>  ○ TXX:30:00 – TXX:59:59<br>  ○ Duration must be exactly 30 minutes.<br>• “15min”<br>  ○ Attributes Production Period start and end times must be one of the following combinations:<br>  ○ TXX:00:00 – TXX:14:59<br>  ○ TXX:15:00 – TXX:29:59<br>  ○ TXX:30:00 – TXX:44:59<br>  ○ TXX:45:00 – TXX:59:59<br>  ○ Duration must be exactly 15 minutes.<br><br>In accordance with Fact Sheet 25, (sub-)hourly production periods start at the full hour or at 15, 30 or 45 minutes past the full hour, as reflected in the combinations above.<br>A production period that meets none of the criteria above, in particular a period spanning more than one calendar month (for example a week from 28 February to 6 March, or a calendar quarter), cannot be assigned any value. Such a period is not |

| Element Name | ProductionPeriod |
|---|---|
| | accepted in schema v81, and a v80 certificate with such a period cannot be transformed to v81 by the AIB Hub – see the transformation rules below.<br>See Fact Sheet 25 “Production Period Identifiers” for details. |
| **Transformation rules** | |
| from v80 to v81 | Hub will transform all incoming v80 GOs to v81 GOs by adding the appropriate value to the “length” attribute based on the abovementioned criteria.<br>Member registries upgrading their database from v80 to v81 shall assign the “length” attribute value based on the abovementioned criteria.<br>In case of v80 GOs issued with production period spanning over multiple calendar months, and only to enable transformation of such GOs to v81 format, it is recommended to change the production period “start” to the beginning of the calendar month of the production period “end”, to enable assigning the “length” attribute value = month. |
| from v81 to v80 | The “length” attribute will be lost. |

### B4.6.7 Energy Carrier

Energy Carrier for which the EECS Certificates have been issued.

| Element Name | EnergyCarrier |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | Text field |
| Occurrence | 1 (per Certificates element) |
| Example | `<r:EnergyCarrier>Electricity</r:EnergyCarrier>` |
| Business Rules | Allowed values:<br>• Electricity<br>• EnergyGas<br>• Hydrogen<br>One transfer can only contain Certificates of the same Energy Carrier. |

### B4.6.8 Conversion Information

Group of elements to provide information whether the Certificate was issued as a consequence of EECS Certificate Conversion, and additional related non-mandatory data as per EECS Rules section C3.6.2.

| Element Name | Conversion |
|---|---|
| Type | Element with two attributes and 6 child elements |
| Occurrence | 1 (per Certificates element) |
| **Attribute** | **tag** |
| Type | Token |
| Length | 3 |
| Occurrence | Mandatory |
| Description | An indication whether or not the Certificate was issued following EECS Certificate Conversion (EECS Rules section C3.6). |
| Structure | One of the Conversion Tags from Fact Sheet 23 “Storage and Conversion Tracking” |
| **Attribute v81** | **preConversionCancellationStatement** |
| Type | Token |
| Length | 1-150 |

| Element Name | Conversion |
|---|---|
| Format | Text field |
| Occurrence | 0 or 1 (per Conversion element) |
| Structure | ID of the cancellation statement used for proving the attributes of the energy fed as Input into the converting Production Device (EECS Rules C7.2.1 (e)(iv)). |
| Example v80 | `<r:Conversion tag="C02" preConversionSupportFlag="1"/>` |
| Example v81 | `<r:Conversion tag="C02" preConversionCancellationStatement="CS123456789">`<br>`<r:PreConversionProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-31T23:59:59+02:00" length="month"/>`<br>`<r:PreConversionProductionDevice ID="506003453000000275" name="Central Hidroeléctrica" technology="T030200" dateOperational="2021-01-12" capacity="10.999" label="EKOENERGY" supportFlag="1"/>`<br>`<r:PreConversionPDCoordinates Longitude="115 778 E" Latitude="448 92 N" CoordinateCode="WGS-84"/>`<br>`<r:PreConversionPDAddress PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/>`<br>`<r:PreConversionEmissions calculationMethod="E0100000000">234.000</r:PreConversionEmissions>`<br>`<r:PreConversionRadioactiveWaste calculationMethod="E0200000000">12.000</r:PreConversionRadioactiveWaste>`<br>`</r:Conversion>` |
| **Transformation rules** | |
| from v80 to v81 | The old preConversionSupportFlag attribute will be removed (was never used in practice yet, so no information will be lost). A v81 message must not contain the preConversionSupportFlag attribute.<br>No other (new) optional attributes or child elements will be added. |
| from v81 to v80 | All new optional attributes and child elements will be lost. |

a) Pre-conversion Production Period

An optional child element to specify the production period of the pre-conversion energy.

| Element Name v81 | PreConversionProductionPeriod |
|---|---|
| Type | Element with 3 attributes |
| Occurrence | 0 or 1 (per Conversion element) |
| **Attribute** | **start** |
| Type | DateTime |
| Format | Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences.<br>For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer.<br>Minimum value 2004-03-17T00:00:00+00:00. |
| Occurrence | Required |
| Structure | YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM |
| **Attribute** | **end** |
| Type | DateTime |
| Format | Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences. |

| Element Name v81 | PreConversionProductionPeriod |
|---|---|
| | For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer.<br>Minimum value 2004-03-17T00:00:00+00:00. |
| Occurrence | Required |
| Structure | YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM |
| **Attribute** | **length** |
| Type | Token |
| Length | 1-20 |
| Format | Required. Allowed values are described in Fact Sheet 25 “Production Period Identifiers”. |
| Occurrence | Required |
| Structure | One of the allowed values. The following criteria must be met:<br>• “month”<br>  ○ Attributes start and end must fall within the same calendar month.<br>• “day”<br>  ○ Attributes start and end must fall within the same calendar day, or maximum within two consecutive calendar days. Duration must be exactly 24 hours in any case, with the only exceptions being summer/wintertime time zone offset changes.<br>• “hour”<br>  ○ Attribute start must be TXX:00:00 time and end must be TXX:59:59 time. Duration must be exactly 1 hour.<br>• “30min”<br>  ○ Attributes start and end times must be one of the following combinations:<br>  ○ TXX:00:00 – TXX:29:59<br>  ○ TXX:30:00 – TXX:59:59<br>  ○ Duration must be exactly 30 minutes.<br>• “15min”<br>  ○ Attributes start and end times must be one of the following combinations:<br>  ○ TXX:00:00 – TXX:14:59<br>  ○ TXX:15:00 – TXX:29:59<br>  ○ TXX:30:00 – TXX:44:59<br>  ○ TXX:45:00 – TXX:59:59<br>  ○ Duration must be exactly 15 minutes.<br><br>See Fact Sheet 25 “Production Period Identifiers” for details. |

b) Pre-conversion Production Device

An optional child element to specify the identity of the pre-conversion production device.

| Element Name v81 | PreConversionProductionDevice |
|---|---|
| Type | Element with 7 attributes |
| Occurrence | 0 or 1 (per Conversion element) |
| **Attribute** | **ID** |
| Type | Long |

| Element Name v81 | PreConversionProductionDevice |
|---|---|
| Length | 18 |
| Format | 18 digits |
| Occurrence | Optional |
| Structure | See section A2.4 |
| **Attribute** | **name** |
| Type | Token |
| Length | 1-255 |
| Format | Text field |
| Occurrence | Optional |
| Structure | Free text |
| **Attribute** | **technology** |
| Type | Token |
| Length | 1-20 |
| Format | TNNNNNN, GNNNNNN or QNNNNNN |
| Occurrence | Optional |
| Structure | One of the Technology codes from EECS Rules Fact Sheet 05 “Types of Energy Inputs and Technologies”. |
| **Attribute** | **dateOperational** |
| Type | Date |
| Format | YYYY-MM-DD |
| Occurrence | Optional |
| Structure | Date according to the local time zone, not UTC. |
| **Attribute** | **capacity** |
| Type | Decimal(11,3) |
| Occurrence | Optional |
| Structure | Always 3 decimals<br>Maximum value 99999999.999<br>Minimum value 0.001 |
| Unit | kW |
| **Attribute** | **label** |
| Type | Token |
| Length | 1-20 |
| Occurrence | Optional |
| Structure | See EECS Rules Fact Sheet 17 “EECS Scheme Members and EECS Products” for possible values |
| **Attribute** | **supportFlag** |
| Type | Token |
| Length | 1-2 |
| Occurrence | Optional |
| Structure | One of the codes listed in EECS Rules Fact Sheet 03 “Types of Public Support”. |

c) Pre-conversion Production Device Coordinates

An optional child element to use in case the pre-conversion production device location is specified with geographical coordinates. The element has no value associated with it. The coordinates and the code are defined by three mandatory attributes.

| Element Name v81 | PreConversionPDCoordinates |
|---|---|
| Type | Element with 3 attributes |
| Occurrence | 0 or 1 (per Conversion element) |
| **Attribute** | **Longitude** |
| Type | Token |
| Length | 1-20 |
| Format | Depends on Coordinate Code |
| Occurrence | Required |
| **Attribute** | **Latitude** |
| Type | Token |
| Length | 1-20 |
| Format | Depends on Coordinate Code |
| Occurrence | Required |
| **Attribute** | **CoordinateCode** |
| Type | Token |
| Length | 1-20 |
| Format | Coordinate code in accordance with the EECS Rules Fact Sheet 16 “Geographical Coordinates”. |
| Occurrence | Required |

d) Pre-conversion Production Device Address

An optional child element to use in case the pre-conversion production device location is specified as an address. The element has no value associated with it. The address is defined by three mandatory and two optional attributes.

| Element Name v81 | PreConversionPDAddress |
|---|---|
| Type | Element with 5 attributes |
| Occurrence | 0 or 1 (per Conversion element) |
| **Attribute** | **Country** |
| Type | Token |
| Length | 2 |
| Format | 2 characters to mark the country of the location according to the ISO 3166-1 alpha-2 code list. |
| Occurrence | Required |
| **Attribute** | **City** |
| Type | Token |
| Length | 1-150 |
| Format | Text field |
| Occurrence | Required |
| **Attribute** | **PostCode** |
| Type | Token |
| Length | 1-10 |
| Format | Text field |

| Element Name v81 | PreConversionPDAddress |
|---|---|
| Occurrence | Required |
| **Attribute** | **StreetName** |
| Type | Token |
| Length | 1-150 |
| Format | Text field |
| Structure | Optional, no default value |
| **Attribute** | **StreetNumber** |
| Type | Token |
| Length | 1-10 |
| Format | Text field |
| Structure | Optional, no default value |

e) Pre-conversion Emissions

A quantification of the carbon footprint related to the pre-conversion energy, taking into account the energy efficiency of such conversion, together with a reference to the methodology used.

| Element Name v81 | PreConversionEmissions |
|---|---|
| Type | Decimal(11,3)<br>Always 3 decimals<br>Minimum value 0.000<br>Maximum value 99999999.999 |
| Occurrence | 0 or 1 (per Conversion element). |
| Unit | g/MWh |
| **Attribute** | **calculationMethod** |
| Type | Token |
| Occurrence | Required (mandatory whenever the PreConversionEmissions element is given) |
| Length | 11 |
| Format | ENNNNNNNNNN, where every N is a natural number between 0 and 9, in accordance with the Code structure from Fact Sheet 24 “Methodology for carbon footprint info on GO” |

f) Pre-conversion Radioactive Waste

A quantification of the radioactive waste related to the energy pre-conversion, taking into account the energy efficiency of such conversion, together with a reference to the methodology used.

| Element Name v81 | PreConversionRadioactiveWaste |
|---|---|
| Type | Decimal(11,3)<br>Always 3 decimals<br>Minimum value 0.000<br>Maximum value 99999999.999 |
| Occurrence | 0 or 1 (per Conversion element). |
| Unit | g/MWh |
| **Attribute** | **calculationMethod** |
| Type | Token |
| Occurrence | Optional |

| Element Name v81 | PreConversionRadioactiveWaste |
|---|---|
| Length | 11 |
| Format | Code (ENNNNNNNNNN) from Fact Sheet 24 “Methodology for carbon footprint info on GO” |

### B4.6.1 Storage

Group of elements to provide information whether the Certificate was issued following release from a Storage System in accordance with the provisions of EECS Rules section C3.2.4, and related additional specifications.

| Element Name | Storage |
|---|---|
| Type | Element with attributes and child elements |
| Occurrence | 1 (per Certificates element) |
| Structure v81 | Storage attributes define whether or not the certificate was issued for energy released from storage and provide some additional specifications (efficiency factor and related cancellation details).<br>Additionally, Storage has child elements to provide more details – location of the storage system and original production period of the represented energy. |
| **Attribute** | **tag** |
| Type | Token |
| Length v80 | 5 |
| Length v81 | 11 |
| Default v80 | S0100 |
| Occurrence | Mandatory |
| Description | An indication whether the Certificate was issued following release from a Storage System in accordance with the provisions of EECS Rules section C3.2.4 |
| Structure | One of the values for Storage Tags from Fact Sheet 23 “Storage and Conversion Tracking” |
| **Attribute v81** | **efficiencyFactor** |
| Type | Decimal(4,1)<br>Always 1 decimal<br>Maximum value 100.0<br>Minimum value 0.1 |
| Occurrence | 0 or 1 (per Storage element) |
| Unit | % |
| Structure | The efficiency factor expresses the remaining energy after deducting storage losses, as a percentage of the original energy that was charged into the Storage System |
| **Attribute v81** | **cancellationStatement** |
| Type | Token |
| Length | 1-150 |
| Format | Text field |
| Occurrence | 0 or 1 (per Storage element) |
| Structure | ID of the cancellation statement used for proving the attributes of the energy charged into the storage system. |
| **Attribute v81** | **cancellationIssuingBody** |
| Type | Token |
| Length | 2 |
| Format | NN |

| Element Name | Storage |
|---|---|
| Occurrence | 0 or 1 (per Storage element) |
| Structure | Code of the Issuing Body who executed and registered the cancellation of the certificates that prove the attributes of the energy charged into the Storage System.<br>2-character numeric, leading zero if required.<br>See Fact Sheet 04 “Member and Competent Authority Codes” for possible values. |
| Example v80 | `<r:Storage tag="S0100"/>` |
| Example v81 | `<r:Storage tag="S0200010101" efficiencyFactor="78.6" cancellationStatement="CS123456789" cancellationIssuingBody="22">`<br>`<r:StorageSystemCoordinates Longitude="115 778 E" Latitude="448 92 N" CoordinateCode="WGS-84"/>`<br>`<r:StorageSystemAddress PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/>`<br>`<r:PreStorageProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-31T23:59:59+02:00" length="month"/>`<br>`</r:Storage>` |
| **Transformation rules** | |
| from v80 to v81 | In case the value of Storage tag attribute was missing, the value “S0100000000” will be added.<br>In other cases, the old value of the Storage tag attribute will be extended with additional “000000” at the end of the code to mark the “Unspecified” category.<br>No other (new) optional attributes or child elements will be added. |
| from v81 to v80 | The last 6 digits of the Storage tag attribute will be lost, e.g. “S0200020203” to “S0200”.<br>All other (new) optional attributes and child elements will be lost. |

a) Storage System Coordinates

An optional child element to use in case the storage system location is specified with geographical coordinates. The element has no value associated with it. The coordinates and the code are defined by three mandatory attributes.

| Element Name v81 | StorageSystemCoordinates |
|---|---|
| Type | Element with 3 attributes |
| Occurrence | 0 or 1 (per Storage element) |
| Example | `<r:StorageSystemCoordinates Longitude="115 778 E" Latitude="448 92 N" CoordinateCode="WGS-84"/>` |
| **Attribute** | **Longitude** |
| Type | Token |
| Length | 1-20 |
| Format | Depends on Coordinate Code |
| Occurrence | Required |
| **Attribute** | **Latitude** |
| Type | Token |
| Length | 1-20 |
| Format | Depends on Coordinate Code |
| Occurrence | Required |
| **Attribute** | **CoordinateCode** |

| Element Name v81 | StorageSystemCoordinates |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | Coordinate code in accordance with the EECS Rules Fact Sheet 16 “Geographical Coordinates”. |
| Occurrence | Required |

b) Storage System Address

An optional child element to use in case the storage system location is specified as an address. The element has no value associated with it. The address is defined by three mandatory and two optional attributes.

| Element Name v81 | StorageSystemAddress |
|---|---|
| Type | Element with 5 attributes |
| Occurrence | 0 or 1 (per Storage element) |
| Example | `<r:StorageSystemAddress PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/>` |
| **Attribute** | **Country** |
| Type | Token |
| Length | 2 |
| Format | 2 characters to mark the country of the location according to the ISO 3166-1 alpha-2 code list. |
| Occurrence | Required |
| **Attribute** | **City** |
| Type | Token |
| Length | 1-150 |
| Format | Text field |
| Occurrence | Required |
| **Attribute** | **PostCode** |
| Type | Token |
| Length | 1-10 |
| Format | Text field |
| Occurrence | Required |
| **Attribute** | **StreetName** |
| Type | Token |
| Length | 1-150 |
| Format | Text field |
| Structure | Optional, no default value |
| **Attribute** | **StreetNumber** |
| Type | Token |
| Length | 1-10 |
| Format | Text field |
| Structure | Optional, no default value |

c) Pre-storage Production Period

An optional child element to specify the original production period of the represented energy before it was stored.

| Element Name v81 | PreStorageProductionPeriod |
|---|---|
| Type | Element with 3 attributes |
| Occurrence | 0 or 1 (per Storage element) |
| Example | `<r:PreStorageProductionPeriod start="2025-03-01T00:00:00+01:00" end="2025-03-31T23:59:59+02:00" length="month"/>` |
| **Attribute** | **start** |
| Type | DateTime |
| Format | Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences.<br>For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer.<br>Minimum value 2004-03-17T00:00:00+00:00. |
| Occurrence | Required |
| Structure | YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM |
| **Attribute** | **end** |
| Type | DateTime |
| Format | Required. Datetime according to the local time zone of the domain of issuance, including the offset from the UTC zone and summer/winter time differences.<br>For example, in Belgium the offset from UTC zone is +01:00 in winter and +02:00 in summer.<br>Minimum value 2004-03-17T00:00:00+00:00. |
| Occurrence | Required |
| Structure | YYYY-MM-DDTHH:MM:SSO where O is the local time zone offset from UTC zone and has format of +/-HH:MM |
| **Attribute** | **length** |
| Type | Token |
| Length | 1-20 |
| Format | Required. Allowed values are described in Fact Sheet 25 “Production Period Identifiers”. |
| Occurrence | Required |
| Structure | One of the allowed values. The following criteria must be met:<br>• “month”<br>  ○ Attributes start and end must fall within the same calendar month.<br>• “day”<br>  ○ Attributes start and end must fall within the same calendar day, or maximum within two consecutive calendar days. Duration must be exactly 24 hours in any case, with the only exceptions being summer/wintertime time zone offset changes.<br>• “hour”<br>  ○ Attribute start must be TXX:00:00 time and end must be TXX:59:59 time. Duration must be exactly 1 hour.<br>• “30min”<br>  ○ Attributes start and end times must be one of the following combinations:<br>  ○ TXX:00:00 – TXX:29:59<br>  ○ TXX:30:00 – TXX:59:59<br>  ○ Duration must be exactly 30 minutes. |

| Element Name v81 | PreStorageProductionPeriod |
|---|---|
| | • "15min"<br>○ Attributes start and end times must be one of the following combinations:<br>○ TXX:00:00 – TXX:14:59<br>○ TXX:15:00 – TXX:29:59<br>○ TXX:30:00 – TXX:44:59<br>○ TXX:45:00 – TXX:59:59<br>○ Duration must be exactly 15 minutes.<br><br>See Fact Sheet 25 "Production Period Identifiers" for details. |

### B4.6.2 Product

Element to group Product related information.

| Element Name | Product |
|---|---|
| Type | Element with attributes and child elements |
| Length | 1-20 chars |
| Format | Text field. Values according to the Fact Sheet 17 "EECS Scheme Members and EECS Products". |
| Occurrence | 1 or more (per Certificates element) |
| Structure | Product with attributes defining the name of the Product, and its legal status. Product has child elements to further describe the Product. Each child element is described separately later in the document:<br>• Purpose<br>• CompetentAuthority (required when the legalStatus-attribute is "LC")<br>• ProductType<br>Note: A Certificate may represent several Products and this logic can keep together the information related to a specific Product. |
| **Attribute** | **name** |
| Type | Token |
| Length | 1-20 |
| Occurrence | Mandatory |
| Format | "EECS:GO" or "ICS:EECS Disclosure" or other Product name defined in FS17: EECS Scheme Members and EECS Products |
| **Attribute** | **legalStatus** |
| Type | Token |
| Length | 1-20 |
| Occurrence | Mandatory |
| Format | One of below:<br>• "LC", meaning Legal Certificate<br>• "NGC", meaning Non-Governmental Certificate |
| Example | GO:<br>`<r:Product name="EECS:GO" legalStatus="LC">`<br>`<r:Purpose>Disclosure</r:Purpose>`<br>`<r:CompetentAuthority>CA01 </r:CompetentAuthority>`<br>`<r:ProductType type="driver">Source</r:ProductType>`<br>`<r:ProductType type="driver">Technology</r:ProductType>`<br>`</r:Product>` |

| Element Name | Product |
|---|---|
| | ICS being non-governmental certificate:<br><r:Product name="ICS:XXX" legalStatus="NGC"><br><r:Purpose>Disclosure</r:Purpose><br><r:ProductType type ="XX">AAA</r:ProductType><br><r:ProductType type ="XX">BBB</r:ProductType><br><r:ProductType type ="YY">CCC</r:ProductType><br></r:Product> |

(a) Purpose

The Purpose for which the certificates have been issued.

| Element Name | Purpose |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | Text field. |
| Occurrence | 1 or more (per Product element) |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | <r:Purpose>Disclosure</r:Purpose><br><r:Purpose>Support</r:Purpose> |
| Business Rules | The Purpose or Purposes for which the Certificate has been issued. Purpose(s) must be within the Purposes defined for the Product for which the certificate is being issued.<br>One or more of below:<br>• Disclosure<br>• Support<br>• Target |

(b) Competent Authority ID

The ID of the Competent Authority responsible for the EECS Product of the certificates being transferred.

| Element Name | CompetentAuthority |
|---|---|
| Type | Token |
| Length | 4 |
| Format | XXNN |
| Occurrence | 0 or more (per Product element).<br>If the legalStatus attribute is “LC”, then at least one Competent Authority is mandatory. |
| Structure | Country code + 2-digit<br>See EECS Rules Fact Sheet 04 “Member and Competent Authority Codes” for possible values. |
| Example | <r:CompetentAuthority>NO01</r:CompetentAuthority><br><r:CompetentAuthority>NO02</r:CompetentAuthority> |

(c) Product Type

Element for describing Product.

| Element Name | ProductType |
|---|---|
| Type | Token |

| Element Name | ProductType |
|---|---|
| Length | 1-20 |
| Format | Element with attribute |
| Occurrence | 1 or more (per Product element) |
| **Attribute** | **type** |
| Type | String |
| Length | 1-20 |
| Occurrence | Mandatory |
| Format | One of below:<br>• driver<br>• targetType<br>• targetScheme |
| Example | `<r:ProductType type="driver">Source</r:ProductType>`<br>`<r:ProductType type="driver">Technology</r:ProductType>` |
| Business Rules | When type-attribute is:<br>• "driver": where the Certificate is a Guarantee of Origin, or Support Certificate, whether it is issued driven by the energy source for the Output to which it relates and/or the technology type used in producing such Output. Possible values:<br>  ○ Source and/or<br>  ○ Technology<br>• "targetType": where the Certificate is a Target Certificate, the type of Target it relates to<br>• "targetScheme":<br>where the Certificate is a Target Certificate, a reference to the relevant target accounting scheme |

### B4.6.3 Production Device ID

The ID of the Production Device of the issued certificates.

| Element Name | ProductionDeviceID |
|---|---|
| Type | Long |
| Length | 18 |
| Format | 18 digits |
| Occurrence | 1 (per Certificates element) |
| Structure | See section A2.4 |
| Unit | Not applicable |
| Example | 506003453000000275 |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive.<br>See chapter A2.4 Coding of Production Devices for details. |
| Default | GS1 |

### B4.6.4 Production Device Name

Name of the originating Production Device.

| Element Name | ProductionDeviceName |
|---|---|
| Type | Token |
| Length | 1-255 |
| Format | Text field |
| Occurrence | 0 or 1 (per Certificates element) |
| Structure | Free text |
| Unit | Not applicable |
| Example | `<r:ProductionDeviceName>Central Hidroeléctrica de Nunes</r:ProductionDeviceName>` |

### B4.6.5 Date Operational

The date on which the Production Device became operational in accordance with national legislation.

| Element Name | DateOperational |
|---|---|
| Type | Date |
| Length | Not applicable |
| Format | Date is according to the local time zone, not UTC.<br>Minimum value 1800-01-01. |
| Occurrence | 1 (per Certificates element) |
| Structure | YYYY-MM-DD |
| Unit | Date |
| Example | `<r:DateOperational>2003-05-21</r:DateOperational>` |

### B4.6.6 Capacity

Each Certificate requires at least one Capacity child element.

| Element Name | Capacity |
|---|---|
| Type | Element with child elements |
| Occurrence | 1 (per Certificates element) |
| Structure | `<r:Capacity>`<br>`<r:ElectricalCapacity>10.999</r:ElectricalCapacity>`<br>`<r:ThermalCapacity>20.999</r:ThermalCapacity>`<br>`</r:Capacity>` |

#### (a) Electrical Capacity

Production Device Electrical Capacity in kW.

| Element Name | ElectricalCapacity |
|---|---|
| Type | Decimal(11,3) |
| Occurrence | 0 or 1 (per Capacity element)<br>Only applicable and mandatory for Energy Carrier “Electricity”. |
| Structure | Always 3 decimals<br>Maximum value 99999999.999<br>Minimum value 0.001 |
| Unit | kW |
| Example | `<r:ElectricalCapacity>78.050</r:ElectricalCapacity>` |

#### (b) Mechanical Capacity

Production Device Mechanical Capacity in kW.

| Element Name | MechanicalCapacity |
|---|---|
| Type | Decimal(11,3) |
| Occurrence | 0 or 1 (per Capacity element) |
| Structure | Always 3 decimals<br>Maximum value 99999999.999<br>Minimum value 0.001 |
| Unit | kW |
| Example | `<r:MechanicalCapacity>10.785</r:MechanicalCapacity>` |

(c) Thermal Capacity

Production Device Thermal Capacity in kW.

| Element Name | ThermalCapacity |
|---|---|
| Type | Decimal(11,3) |
| Occurrence | 0 or 1 (per Capacity element)<br>Mandatory for High-Efficiency Cogeneration Certificates (when the HECCriteriaMet attribute has the value “true”)<br>Only applicable for Energy Carrier “Electricity” |
| Structure | Always 3 decimals<br>Maximum value 99999999.999<br>Minimum value 0.001 |
| Unit | kW |
| Example | `<r:ThermalCapacity>185.200</r:ThermalCapacity>` |

(d) Gas Production Capacity

Production Device Gas Production Capacity in kW.

| Element Name | GasProductionCapacity |
|---|---|
| Type | Decimal(11,3) |
| Occurrence | 0 or 1 (per Capacity element)<br>Only applicable and mandatory for Energy Carriers “EnergyGas” and “Hydrogen”. |
| Structure | Always 3 decimals<br>Maximum value 99999999.999<br>Minimum value 0.001 |
| Unit | kW |
| Example | `<r:GasProductionCapacity>78.050</r:GasProductionCapacity>` |

### B4.6.7 Module

Module description and date-operational, in case the Production Device consists of separate modules. For example:

1) where there is a plant which upgrades the gas quality, the date on which the plant(s) that produced the raw gas became operational and its/their capacity.

2) where the Production Device has added new capacity later: the capacity and date operational of the new module.

| Element Name | Module |
|---|---|
| Type | Element with child elements |
| Occurrence | 0 or 1 (per Certificates element) |

| Element Name | Module |
|---|---|
| Structure | <r:Module><br><r:ModuleCapacity>10.999</r:ModuleCapacity><br><r:ModuleDateOperational>2022-01-01<br></r:ModuleDateOperational><br><r:ModuleDescription>Element1<br></r:ModuleDescription><br></r:Module> |

(a) Module Capacity

| Element Name | ModuleCapacity |
|---|---|
| Type | Decimal(11,3) |
| Occurrence | 1 (per Module element) |
| Structure | Always 3 decimals.<br>Maximum value 99999999.999<br>Minimum value 0.001<br>Type of capacity is the same as the overall capacity element. |
| Unit | kW |
| Example | 185.200 |

(b) Module Date Operational

The date on which the relevant production module became operational in accordance with national legislation.

| Element Name | ModuleDateOperational |
|---|---|
| Type | Date |
| Length | Not applicable |
| Format | Minimum value 1800-01-01 |
| Occurrence | 0 or 1 (per Module element) |
| Structure | YYYY-MM-DD |
| Unit | Date |
| Example | 2002-10-15 |

(c) Module Description

Description of Module. Free text description.

| Element Name | ModuleDescription |
|---|---|
| Type | String |
| Length | 1-255 |
| Format | Free text |
| Occurrence | 0 or 1 (per Module element) |
| Example | “PD123 extension from 2002” |

### B4.6.8 Production Technology

Technology of the Originating Production Device.

| Element Name | ProductionTechnology |
|---|---|
| Type | Token |
| Length | 1-20 |

| Element Name | ProductionTechnology |
|---|---|
| Format | According to the allowed values from EECS Rules Fact Sheet 05 “Types of Energy Inputs and Technologies”.<br>Starting with a letter (T, G or Q, depending on the Energy Carrier), followed by 6 digits:<br>TNNNNNN, GNNNNNN or QNNNNNN |
| Occurrence | 1 (per Certificates element) |
| Structure | One of the Technology codes from EECS Rules Fact Sheet 05 “Types of Energy Inputs and Technologies”.<br>Combination of Production Technology and Energy Source for a Certificate must be a valid combination defined in the Fact Sheet 05. |
| Example | T030200 |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | eecs |

### B4.6.9 Energy Source and Advanced Biomass Feedstock

Energy Source from which the Output was produced.

| Element Name | EnergySource |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | According to the allowed values from EECS Rules Fact Sheet 05 “Types of Energy Inputs and Technologies”.<br>Starting with a letter F, followed by 8 digits:<br>FNNNNNNNN |
| Occurrence | 1 (per Certificates element) |
| Structure | One of the Fuel (energy source) codes from EECS Rules Fact Sheet 05 “Types of Energy Inputs and Technologies”.<br>Combination of Production Technology and Energy Source for a Certificate must be a valid combination defined in the Fact Sheet 05. |
| Example | F01050203 |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | eecs |
| **Attribute** | **advancedBiomassFeedstock** |
| Type | Boolean |
| Description | Where the Energy Source is of biological origin, this attribute indicates whether this Energy Source originates from an Advanced Biomass Feedstock, according to the feedstocks listed in Annex IX of the Renewable Energy Directive. |
| Format | true or false |
| Occurrence | Optional.<br>Only applicable for Energy Carriers “EnergyGas” and “Hydrogen”. |

### B4.6.10 Source Shares

If Output is produced from a mixture of Inputs, consisting of other than only the Input from the Energy source: in addition to the recorded EnergySource for which the corresponding Certificate was Issued, information on those Inputs, EnergySource, and their share in total energy Input. This share shall be determined in accordance with the Energy Input Factor.

| Element Name | SourceShares |
|---|---|
| Type | String |
| Length | 1-255 |
| Format | Free text |
| Occurrence | 0 or 1 (per Certificates element)<br>Only applicable for Energy Carriers “EnergyGas” and “Hydrogen”. |
| Example | “F01010101: 10%, F01010201: 90%” |

### B4.6.11 Support Flag

Support Flag denoting whether the relevant Production Device and/or its Output have benefited or will benefit from Support.

| Element Name | SupportFlag |
|---|---|
| Type | Token |
| Length | 1-2 |
| Format | Depends on setting of cS attribute |
| Occurrence | 1 (per Certificates element) |
| Structure | The allowed codes are listed in EECS Rules Fact Sheet 03 “Types of Public Support”. |
| Example | 1 |
| **Attribute** | **cS** |
| Type | String |
| Format | Currently only the default value is allowed.<br>Not case sensitive. |
| Default | eecs |

### B4.6.12 Production Support Description

Description of Production Support Scheme. Free text description based on values in EECS Rules Fact Sheet 03 “Types of Public Support”.

| Element Name | ProductionSupportDescription |
|---|---|
| Type | String |
| Length | 1-1024 |
| Format | Free text |
| Occurrence | 0 or 1 (per Certificates element) |
| Example | “GSC-Be” |

### B4.6.13 Investment Support Description

Description of Investment Support Scheme.

| Element Name | InvestmentSupportDescription |
|---|---|
| Type | String |
| Length | 1-1024 |
| Format | Free text |

| Element Name | InvestmentSupportDescription |
|---|---|
| Occurrence | 0 or 1 (per Certificates element) |
| Example | "FZOEU" |

B4.6.14 Production Device Location

ProductionDeviceLocation element is required for a Certificates element, and it should contain element(s) Coordinates and/or Address which are described below. In case of small aggregated production devices (in accordance with EECS Rules section C3.5.8), Fact Sheet 16 explains what the mentioned address or geo-location code refers to.

| Element Name | ProductionDeviceLocation |
|---|---|
| Type | Element with child elements |
| Occurrence | 1 (per Certificates element) |
| Structure | `<r:ProductionDeviceLocation>`<br>`<r:Coordinates Longitude="115 778 E" Latitude="448 92 N" CoordinateCode="WGS-84"/>`<br>`<r:Address PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/>`<br>`</r:ProductionDeviceLocation>` |

(a) Coordinates

Location of the Production Device described with geographical coordinates. This element has no data associated with it. The coordinates and the code are defined by three mandatory attributes.

| Element Name | Coordinates |
|---|---|
| Type | Element with 3 attributes |
| Occurrence | 0 or 1 (per ProductionDeviceLocation element)<br>Note: either Coordinates and/or Address is required |
| Example | `<r:Coordinates Longitude="115 778 E" Latitude="448 92 N" CoordinateCode="WGS-84"/>` |
| **Attribute** | **Longitude** |
| Type | Token |
| Length | 1-20 |
| Format | Depends on Coordinate Code |
| Occurrence | Required |
| **Attribute** | **Latitude** |
| Type | Token |
| Length | 1-20 |
| Format | Depends on Coordinate Code |
| Occurrence | Required |
| **Attribute** | **CoordinateCode** |
| Type | Token |
| Length | 1-20 |
| Format | Coordinate code in accordance with the EECS Rules Fact Sheet 16 "Geographical Coordinates". |
| Occurrence | Required |

(b) Production Device Address

Location of the Production Device described with 3 mandatory attributes (country, city, and postal code) and 2 optional attributes (street name and number). This element has no data associated with it. The address is defined by the attributes.

| Element Name | Address |
|---|---|
| Type | Element with 5 attributes |
| Occurrence | 0 or 1 (per ProductionDeviceLocation element)<br>Note: either Coordinates and/or Address is required |
| Example | `<r:Address PostCode="NO2342" Country="NO" City="Hønefoss" StreetName="Hovedgaten" StreetNumber="123"/>` |
| **Attribute** | **Country** |
| Type | Token |
| Length | 2 |
| Format | 2 characters to mark the country of the location according to the ISO 3166-1 alpha-2 code list. |
| Occurrence | Required |
| Example | FI |
| **Attribute** | **City** |
| Type | Token |
| Length | 1-150 |
| Format | Text field |
| Occurrence | Required |
| **Attribute** | **PostCode** |
| Type | Token |
| Length | 1-10 |
| Format | Text field |
| Occurrence | Required |
| **Attribute v81** | **StreetName** |
| Type | Token |
| Length | 1-150 |
| Format | Text field |
| Structure | Optional, no default value |
| **Attribute v81** | **StreetNumber** |
| Type | Token |
| Length | 1-10 |
| Format | Text field |
| Structure | Optional, no default value |
| **Transformation rules** | |
| from v80 to v81 | StreetName and StreetNumber are not added as the attributes are only optional. |
| from v81 to v80 | Information will be lost. |

### B4.6.15 Dissemination level

The dissemination level of the Output for which an EECS Certificate is issued, in accordance with EECS Rules section C3.5.4 (t).

| Element Name | DisseminationLevel |
|---|---|
| Type | Token |
| Length | 1-2 |
| Occurrence | 1 (per Certificates element). |
| Structure | Refer to EECS Rules Fact Sheet 20 “Dissemination level of Output”. Note that the DisseminationLevel code must match the Energy Carrier according to the Fact Sheet 20. |
| Unit | Not applicable. |
| Example | `<r:DisseminationLevel>2a</r:DisseminationLevel>` |
| **Transformation rules** | |
| from v80 to v81 | No transformation for codes 1, 5, 6 and 7.<br>For codes 2, 3 and 4 a letter will be added to the code based on the Energy Carrier on the Certificate:<br>• a (Electricity)<br>• b (EnergyGas)<br>• c (Hydrogen)<br>Code 4d is not used in these transformation rules as the information is not given in v80 details.<br>For code 8 there will be no mandatory transformation as the value will be supported in both schemas to facilitate Hub transfers of previously issued certificates. But code 8 cannot be used for newly issued certificates in registries that already implemented v81. |
| from v81 to v80 | In case of the new codes (including a letter), the value will be reduced to only the number.<br>In other cases, no transformation needed. |

### B4.6.16 Cogeneration

Element containing fields specific to thermal and electrical energy cogeneration (also called CHP – combined heat and power)

| Element Name | Cogeneration |
|---|---|
| Type | Element with an attribute and child elements |
| Occurrence | 0 or 1 (per Certificates element); mandatory for High-Efficiency Cogeneration certificates<br>Only applicable for Energy Carrier “Electricity” |
| Business rules | For Certificates where the HECCriteriaMet-attribute is “true” and ProductType is “Technology”: whether the energy unit has met the primary energy savings criteria of the Energy Efficiency Directive (EU) 2023/1791, Annex III.<br>Where these primary energy savings criteria for High-Efficiency Cogeneration (HEC) are met, this Certificate can be considered to be a High-Efficiency Cogeneration Certificate, and the related mandatory attributes are to be included in the Certificate. |
| **Attribute** | **HECCriteriaMet** |
| Type | Boolean |
| Occurrence | Required |
| Structure | Allowed values:<br>• true<br>• false |
| Business rules | **true:** For Certificates where the ProductType is Technology: whether the energy unit has met the primary energy savings criteria of the Energy Efficiency Directive |

| Element Name | Cogeneration |
|---|---|
| | (EU) 2023/1791, Annex III. The following fields are mandatory (EECS Rules N6.6.1 (a)):<br>• UseOfHeat<br>• PercentagePrimaryEnergySaved<br>• UsefulHeat<br>• ElectricalEfficiency<br>• ThermalEfficiency<br>• CalorificValue<br>• ThermalCapacity<br>• ProductType (type "driver") = Technology<br><br>**false:** the above criteria not met. |
| Example | `<r:Cogeneration HECCriteriaMet="true">…`<br>`</r:Cogeneration>` |

(a) Use of Heat

Use of heat being one of the values identified in Fact Sheet 11 "Cogeneration GO Codes" under "Uses of Heat"

| Element Name | UseOfHeat |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | Text field |
| Occurrence | 0 or 1 (per Cogeneration element).<br>Mandatory when HECCriteriaMet has value "true"<br>Only applicable for Energy Carrier "Electricity" |
| Default | - |
| Structure | One of the values identified in the EECS Rules Fact Sheet 11 "Cogeneration GO Codes" under "Uses of Heat" |
| Example | a |

(b) Percentage Primary Energy Saved

The primary energy saved expressed as a percentage according to Annex III of the Energy Efficiency Directive (EU) 2023/1791

| Element Name | PercentagePrimaryEnergySaved |
|---|---|
| Type | Decimal(4,1)<br>Always 1 decimal<br>Maximum value 100.0<br>Minimum value 0.1 |
| Occurrence | 0 or 1 (per Cogeneration element).<br>Mandatory when HECCriteriaMet has value "true"<br>Only applicable for Energy Carrier "Electricity" |
| Unit | % |
| Example | 98.0 |

(c) Amount Primary Energy Saved

The actual amount of primary energy saved expressed in megajoules per MWh

| Element Name | AmountPrimaryEnergySaved |
|---|---|
| Type | Decimal(11,3)<br>Always 3 decimals<br>Maximum value 99999999.999<br>Minimum value 0.001 |
| Occurrence | 0 or 1 (per Cogeneration element).<br>Optional, also for High-Efficiency Cogeneration certificates (EECS Rules N6.6.1 (b))<br>Only applicable for Energy Carrier "Electricity" |
| Unit | MJ/MWh |
| Example | 10.200 |

(d) Overall Primary Energy Savings

The overall primary energy savings expressed as a percentage based on the total energy input and output flows of a Cogeneration unit

| Element Name | OverallPrimaryEnergySavings |
|---|---|
| Type | Decimal(4,1)<br>Always 1 decimal<br>Maximum value 100.0<br>Minimum value 0.1 |
| Occurrence | 0 or 1 (per Cogeneration element). Optional, also for High-Efficiency Cogeneration certificates (EECS Rules N6.6.1 (b))<br>Only applicable for Energy Carrier "Electricity" |
| Unit | % |
| Example | 17.0 |

(e) Useful Cogeneration Heat

Useful Heat production from Cogeneration correlating to 1 MWh of High-Efficiency Cogeneration electricity production.

| Element Name | UsefulHeat |
|---|---|
| Type | Decimal (11,3)<br>Always 3 decimals<br>Maximum value 99999999.999<br>Minimum value 0.001 |
| Occurrence | 0 or 1 (per Cogeneration element).<br>Mandatory when HECCriteriaMet has value "true"<br>Only applicable for Energy Carrier "Electricity" |
| Unit | GJ/MWh |
| Example | 10.030 |

### B4.6.17 Electrical Efficiency

The electrical efficiency of a production device expressed as a percentage.

| Element Name | ElectricalEfficiency |
|---|---|
| Type | Decimal(4,1)<br>Always 1 decimal<br>Maximum value 100.0<br>Minimum value 0.1 |

| Element Name | ElectricalEfficiency |
|---|---|
| Occurrence | 0 or 1 (per Certificates element).<br>Mandatory when HECCriteriaMet has value “true”.<br>Only applicable for Energy Carrier “Electricity” |
| Unit | % |
| Example | 67.0 |

### B4.6.18 Thermal Efficiency

The thermal efficiency of a production device expressed as a percentage.

| Element Name | ThermalEfficiency |
|---|---|
| Type | Decimal(4,1)<br>Always 1 decimal<br>Maximum value 100.0<br>Minimum value 0.1 |
| Occurrence | 0 or 1 (per Certificates element).<br>Mandatory when HECCriteriaMet has value “true”.<br>Only applicable for Energy Carrier “Electricity” |
| Unit | % |
| Example | 67.0 |

### B4.6.19 Gas

This element and its child elements are applicable and required only for Energy Carriers “EnergyGas” and “Hydrogen”. For other Energy Carriers they are not applicable.

| Element Name | Gas |
|---|---|
| Type | Element with two attributes and 5 child elements |
| Occurrence | 0 or 1 (per Certificates element)<br>Only applicable and **required** for certificates where Energy Carrier is “EnergyGas” or “Hydrogen” |
| **Attribute** | **type** |
| Type | Token |
| Length | 5 |
| Occurrence | Required |
| Description | Type of Gas, referring to the chemical composition of the produced gas. |
| Format | Code from Fact Sheet 22 “Type of Gas” |
| **Attribute v81** | **fossilAuxiliaryDeducted** |
| Type | Token |
| Length | 1-20 |
| Occurrence | Mandatory |
| Structure | Allowed values:<br>• true<br>• false<br>• unspecified |
| Business rules | EECS Rules section O7.1.3 (c)<br>Whether or not auxiliary energy from non-renewable sources has been deducted from the net Output in the energy eligible for GO issuing. |

| Element Name | Gas |
|---|---|
| | The attribute values true or false are mandatory for newly issued EECS Certificates in v81 message schema. It can be set to "unspecified" only during transformation from v80 to v81. |
| Example v81 | <r:Gas type="Y0101" fossilAuxiliaryDeducted="true"><br><r:CompositionPurity>99.50 </r:CompositionPurity><br><r:GasCompositionCriteria>C0100 </r:GasCompositionCriteria><br><r:GasUsage>c</r:GasUsage><br><r:GasCriterion>Low-Carbon Gas </r:GasCriterion><br><r:ETSESREligibility>A0100 </r:ETSESREligibility><br></r:Gas> |
| **Transformation rules** | |
| from v80 to v81 | The new attribute (fossilAuxiliaryDeducted) can be set to "unspecified" during transformation from v80. It is mandatory to use values true or false for newly issued v81 EECS Certificates. |
| from v81 to v80 | The new attribute (fossilAuxiliaryDeducted) and child elements (GasCriterion and ETSESREligibility) will be lost. |

(a) Composition Purity

An indication of the purity of the composition of the Gas that constitutes the Output for which the EECS Certificate is issued.

| Element Name | CompositionPurity |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | According to the Fact Sheet 22 "Type of Gas".<br>RNNNN (code for a range) or NN.NN (specific percentage value with exactly 2 decimals). |
| Occurrence | 0 or 1 (per Gas element) |
| Business Rules | It can be given optionally for Energy Carriers "EnergyGas" and "Hydrogen". For other Energy Carriers it is not applicable. |

(b) Gas Composition Criteria Reference

As per EECS Rules O8.1.1 (k): where the Output complies with specific criteria relating to the physical composition of the produced gas, a reference to the relevant criteria, as set out in EECS Rules Fact Sheet 22 "Type of Gas".

| Element Name | GasCompositionCriteria |
|---|---|
| Type | Token |
| Length | 2-5 |
| Format | From Fact Sheet 22 "Type of Gas" |
| Occurrence | 0 or 1 (per Gas element) |
| Business Rules | It can be given optionally for Energy Carriers "EnergyGas" and "Hydrogen". For other Energy Carriers it is not applicable. |
| Example | CNNNN |

(c) Gas Usage

As per EECS Rules O8.1.1 (f): end-use of the Gas, as set out in Fact Sheet 21 "Use of Gas Codes"

| Element Name | GasUsage |
|---|---|
| Type | Token |
| Length | 1-5 |

| Element Name | GasUsage |
|---|---|
| Occurrence | 0 or 1 (per Gas element) |
| Structure | Code from EECS Rules Fact Sheet 21 “Use of Gas Codes”. |
| Example | `<r:GasUsage>a</r:GasUsage>` |
| Business Rules | It can be given optionally for Energy Carriers “EnergyGas” and “Hydrogen”. For other Energy Carriers it is not applicable. |

(d) Gas Criterion

As per EECS Rules O8.1.1 (m): Whether the Output to which the EECS Certificate relates, complies with criteria, where the possible contents of this data field are identified in Fact Sheet 22 “Type of Gas”.

| Element Name v81 | GasCriterion |
|---|---|
| Type | String |
| Length | 1-1024 |
| Occurrence | 0 or 1 (per Gas element) |
| Structure | As per instructions in the EECS Rules Fact Sheet 22 “Type of Gas”. |

(e) ETS/ESR Eligibility

As per EECS Rules O8.1.1 (n): An indication whether the reduction of greenhouse gas emissions, associated with the production of the Output to which the EECS Gas Certificates relates, qualifies for accounting under an Emission Trading System or an Effort Sharing Regulation, and the reference to the framework of qualification.

| Element Name v81 | ETSESREligibility |
|---|---|
| Type | Token |
| Length | 2-5 |
| Format | From Fact Sheet 22 “Type of Gas” |
| Occurrence | 0 or 1 (per Gas element) |
| Example | ANNNN |

### B4.6.20 Calorific Value

For electricity certificates (Energy Carrier being “Electricity”), the Calorific Value relates to the Input fed into the Production Device. For gaseous certificates, with Energy Carrier “EnergyGas” or “Hydrogen”, the Calorific Value relates to the Output for which EECS Certificates are issued.

| Element Name | CalorificValue |
|---|---|
| Type | Decimal (11,3)<br>Always 3 decimals<br>Maximum value 99999999.999<br>Minimum value 0.001 |
| Occurrence | 0 or 1 (per Certificates element).<br>Mandatory for High-Efficiency Cogeneration electricity certificates (HECCriteriaMet=“true”): the attribute “type” must be “lower” and a numeric value for the element must be filled in.<br>Optional for non-HEC electricity certificates in v81. Not applicable in v80.<br>For Energy Carriers “EnergyGas” and “Hydrogen” the “type”- attribute is mandatory, but the element value is optional to fill in. |
| Example | For High-Efficiency Cogeneration certificates:<br>`<r:CalorificValue type="lower" unit="MJ/kg">11.120</r:CalorificValue>` |

| Element Name | CalorificValue |
|---|---|
| | For EnergyGas certificates when there is no specific value given, only type:<br><r:CalorificValue type="lower"/> |
| **Attribute** | **type** |
| Type | String |
| Occurrence | Required |
| Format | One of:<br>• lower<br>• higher<br>Note: when the certificate is a High-Efficiency Cogeneration certificate (ProductType contains "Technology" and HECCriteriaMet= "true"), then the attribute type should be "lower". |
| **Attribute** | **unit** |
| Type | Token |
| Length | 1-20 |
| Format | One of below:<br>• MJ/kg<br>• MJ/$m^3$<br>• MJ/l<br>• Unspecified (only for Transformation use)<br>or other unit approved from time to time. |
| Occurrence | Mandatory for High-Efficiency Cogeneration certificates. Optional for all other certificates; when the attribute is omitted, the default value applies. |
| Default | • MJ/kg |

### B4.6.21 GHG emissions

Greenhouse gas emissions intensity of the output.

| Element Name | GHGEmissions |
|---|---|
| Type | Element with an attribute and child elements |
| Occurrence | 0 or 1 (per Certificates element) |
| **Attribute** | **GHGSavingsCriteriaMet** |
| Type | Boolean |
| Occurrence | Optional |
| Format | true or false, in relation with article 29 of the Renewable Energy Directive |
| Example | <r:GHGEmissions GHGSavingsCriteriaMet="true"><br><r:GHGEmissionProduced calculationMethod="E0100000000">234.000</r:GHGEmissionProduced><r:AbsoluteGHGEmissionSaved calculationMethod="E0100000000">123.000</r:AbsoluteGHGEmissionSaved></r:GHGEmissions><br><br>Example when the minimum information given:<br><r:GHGEmissions><r:GHGEmissionProduced calculationMethod="E0100000000">234.000</r:GHGEmissionProduced></r:GHGEmissions> |

(a) GHG Emission Produced

The GHG emissions produced

| Element Name | GHGEmissionProduced |
|---|---|
| Type | Decimal(11,3)<br>Always 3 decimals<br>Minimum value -99999999.999<br>Maximum value 99999999.999 |
| Occurrence | 0 or 1 (per GHGEmissions element) |
| **Attribute** | **calculationMethod** |
| Type | Token |
| Length | 11 |
| Occurrence | Required |
| Format | ENNNNNNNNNN, where every N is a natural number between 0 and 9, in accordance with the Fact Sheet 24 "Methodology for carbon footprint info on GO" |
| **Attribute** | **unit** |
| Type | Token |
| Length | 1-20 |
| Format | Kg CO2eq/MWh or other unit approved from time to time. |
| Default | Kg CO2eq/MWh |

(b) Absolute GHG emissions saved

Absolute GHG emissions saved in kilograms per MWh compared with the best available and economically justifiable technology for separate production of heat and electricity using the same fuels; and which was on the market in the year of construction of the CHP unit, as defined in Annex III of the Energy Efficiency Directive (EU) 2023/1791

| Element Name | AbsoluteGHGEmissionSaved |
|---|---|
| Type | Decimal(11,3)<br>Always 3 decimals<br>Minimum value 0.000<br>Maximum value 99999999.999 |
| Occurrence | 0 or 1 (per GHGEmissions element). |
| **Attribute** | **calculationMethod** |
| Type | Token |
| Length | 11 |
| Occurrence | Required |
| Format | ENNNNNNNNNN, where every N is a natural number between 0 and 9, in accordance with the Code structure from Fact Sheet 24 "Methodology for carbon footprint info on GO" |
| **Attribute** | **unit** |
| Type | Token |
| Length | 1-20 |
| Format | Kg/MWh or other unit approved from time to time. |
| Default | Kg/MWh |

B4.6.22 Radioactive waste produced

Where the source type relates to nuclear energy, a quantification of the radioactive waste produced per MWh of Output to which that EECS Certificate relates, and it may provide a reference to the methodology used for this quantification.

| Element Name | RadioactiveWasteProduced |
|---|---|
| Type | Decimal(11,3)<br>Always 3 decimals<br>Minimum value 0.000<br>Maximum value 99999999.999 |
| Occurrence | 0 or 1 (per Certificates element). |
| Unit | g/MWh |
| **Attribute** | **calculationMethod** |
| Type | Token |
| Occurrence | Optional |
| Length | 11 |
| Format | Code (ENNNNNNNNNN) from Fact Sheet 24 “Methodology for carbon footprint info on GO” |
| Example | `<r:RadioactiveWasteProduced calculationMethod="E0200000000">4.030 </r:RadioactiveWasteProduced>` |

### B4.6.23 Sustainability

Element with child elements to describe additional optional sustainability information.

| Element Name | Sustainability |
|---|---|
| Type | Element with attributes and child elements |
| Occurrence | 0 or 1 (per Certificates element)<br>Note, in the future there might be several Sustainability elements allowed. |
| **Attribute** | **sustainabilityCriteriaMet** |
| Type | Boolean |
| Occurrence | Optional |
| **Attribute** | **certificationBody** |
| Type | String |
| Length v80 | 1-20 |
| Length v81 | 1-255 |
| Format | Free text |
| Occurrence | Optional |
| Example | `<r:Sustainability sustainabilityCriteriaMet="true" certificationBody="XX">`<br>`<r:RequirementReference>REDIIart.29 </r:RequirementReference>`<br>`<r:Scheme>ISCC</r:Scheme>`<br>`<r:AuditReport>https://example.ex/report.pdf </r:AuditReport>`<br>`<r:SustainabilityAdditionalInfo>This is a text example</r:SustainabilityAdditionalInfo>`<br>`</r:Sustainability>` |
| **Transformation rules** | |
| from v80 to v81 | The value of the certificationBody attribute stays the same. |

| Element Name | Sustainability |
|---|---|
| from v81 to v80 | Only the first 20 characters of the certificationBody attribute are kept. The rest of the value is dropped. |

(a) Sustainability Requirement Reference

A reference to the relevant legislative or other source that sets sustainability requirements

| Element Name | RequirementReference |
|---|---|
| Type | String |
| Length | 1-20 |
| Format | Free text |
| Occurrence | 0 or 1 (per Sustainability element) |

(b) Sustainability Scheme

A reference to the relevant sustainability certification scheme(s).

| Element Name | Scheme |
|---|---|
| Type | String |
| Length | 1-20 |
| Format | Free text |
| Occurrence | 0 or 1 (per Sustainability element) |
| Example | `<r:Scheme>ISCC</r:Scheme>` |

(c) Sustainability Audit Report

Reference to the relevant reports, certificates or other documents produced by the abovementioned certification body under the abovementioned sustainability certification scheme.

| Element Name | AuditReport |
|---|---|
| Type | String |
| Length | 1-255 |
| Format | Free text |
| Occurrence | 0 or 1 (per Sustainability element) |

(d) Sustainability Additional Information

Additional information on sustainability in free text.

| Element Name | SustainabilityAdditionalInfo |
|---|---|
| Type | String |
| Length | 1-255 |
| Format | Free text |
| Occurrence | 0 or 1 (per Sustainability element) |
| Structure | Not applicable |
| Unit | Not applicable |

### B4.6.24 Label

The Label is an Attribute on a Certificate reflecting that the Output and/or Production Device and/or Input to which the Certificate relates conforms to a specific set of qualities defined in a Label Scheme, following an agreement between the Authorised Issuing Body and the corresponding Label.

| Element Name | Label |
|---|---|
| Type | Token |
| Length | 1-20 chars |
| Occurrence | 0 or more (per Certificates element) |
| Structure | See EECS Rules Fact Sheet 17 “EECS Scheme Members and EECS Products” for possible values |
| Example | `<r:Label>Naturemade</r:Label> <r:Label>GREENENERGY</r:Label>` |

### B4.6.25 Additional Information

Additional information on certificates as free text.

| Element Name | AdditionalInfo |
|---|---|
| Type | String |
| Length | 1-255 |
| Format | Free text |
| Occurrence | 0 or 1 (per Certificates element) |
| Example | Free text |

### B4.6.26 Bidding Zone

As per EECS Rules N6.6.6 (a-c): An identification of the Bidding Zone in which the network is located to which the Output was injected; whether the Bidding Zone in which the Output was injected equalled or exceeded 90% average renewable energy production during the preceding calendar year; whether the Bidding Zone in which the Output was injected had an emission intensity less than 18 gCO2eq/MJ during the preceding calendar year.

| Element Name v81 | BiddingZone |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | EECS Rules N6.6.6 (a)<br>An identification of the Bidding Zone in which the network is located to which the Output was injected.<br>ENTSO-E Bidding Zone Area EIC code or the display name of the Bidding Zone. The list of approved codes, instructions and a map can be found at:<br>https://www.entsoe.eu/data/energy-identification-codes-eic/ |
| Occurrence | 0 or 1 (per Certificates element) |
| Example | `<r:BiddingZone zone90percentageRES="true" zoneLowEmission="true">10Y1001A1001A46L</r:BiddingZone>` |
| **Attribute v81** | **zone90percentageRES** |
| Type | Boolean |
| Occurrence | Optional |
| Description | EECS Rules N6.6.6 (b)<br>Whether the Bidding Zone in which the Output was injected equalled or exceeded 90% average renewable energy production during the preceding calendar year. |
| Format | true or false |
| **Attribute v81** | **zoneLowEmission** |
| Type | Boolean |
| Occurrence | Optional |
| Description | EECS Rules N6.6.6 (c) |

| Element Name v81 | BiddingZone |
|---|---|
| | Whether the Bidding Zone in which the Output was injected had an emission intensity less than 18 gCO2eq/MJ during the preceding calendar year. |
| Format | true or false |

### B4.6.27 Redispatching Criteria

As per EECS Rules N6.6.6 (d): Whether the Downwards Redispatching criteria (RFNBO DA Art. 4.3) were met during the imbalance settlement period.

| Element Name v81 | RedispatchingCriteriaMet |
|---|---|
| Type | Boolean |
| Format | EECS Rules N6.6.6 (d)<br>Whether the Downwards Redispatching criteria (RFNBO DA Art. 4.3) were met during the imbalance settlement period. |
| Occurrence | 0 or 1 (per Certificates element) |
| Example | `<r:RedispatchingCriteriaMet>true</r:RedispatchingCriteriaMet>` |

### B4.6.28 Power Purchase Agreement

As per EECS Rules N6.6.6 (e): Whether the Output to which the EECS Certificate relates is subject to a Power Purchase Agreement, including identification of the start and end date of such a contract, and including an identification of the buyer.

| Element Name v81 | PowerPurchaseAgreement |
|---|---|
| Format | EECS Rules N6.6.6 (e)<br>Whether the Output to which the EECS Certificate relates is subject to a Power Purchase Agreement, including identification of the start and end date of such a contract (preferably formatted in UTC time zone), and including an identification of the buyer (e.g., the company registration number). |
| Occurrence | 0 or 1 (per Certificates element) |
| Example | `<r:PowerPurchaseAgreement startDate="2025-01-01" endDate="2029-12-31" buyerID="12ABc"/>` |
| **Attribute v81** | **startDate** |
| Type | Date |
| Occurrence | Required |
| Structure | YYYY-MM-DD |
| **Attribute v81** | **endDate** |
| Type | Date |
| Occurrence | Required |
| Structure | YYYY-MM-DD |
| **Attribute v81** | **buyerID** |
| Type | Token |
| Length | 1-150 |
| Occurrence | Required |
| Format | Text field. Usually the company registration number, but in some cases the company name or VAT number is used. |

## B5 Account Holders

A parent element for keeping all the individual Account Holder elements. Each Account Holder file may have one or more “AccountHolder” elements which are described in B5.1.1 Account Holder. The elements B5.1.2 to B5.1.11 form the basic set of Account Holder data (Account Holders Schema v80, accounts_v80.xsd). The extended set (v81, accounts_v81.xsd) adds the optional elements B5.1.12 to B5.1.18. The AIB Hub keeps them and returns them in the v81 format (in the AIB Hub web interface: Data Contain “Extended”), which contains only the elements filled in for each Account Holder. An optional element left out of an uploaded file keeps its current value in the AIB Hub.

Account Holder files are uploaded or downloaded through the AIB Hub web interface, the AMQP channel, the AIB Hub REST API or the web service channel (SOAP). The files are in XML (B7) or JSON format (B8), on the web service channel (SOAP, C2.3) in XML only. A file uploaded in the AIB Hub web interface must contain all active Account Holders of all Registries of the Issuing Body. Account Holders missing from it are set inactive on the day of the upload.

| Element Name | AccountHolders |
|---|---|
| Type | Element to hold one or more Account Holder elements |
| Length | No restrictions |
| Format | Hold one or more Account Holder child elements |
| Occurrence | 1 (per Account holder file) |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | <AccountHolders><br><AccountHolder><br><IssuingBodyCode>43</IssuingBodyCode><br><AccountNumber>43X0EXMP1B</AccountNumber><br><CompanyName>Company 1</CompanyName><br><Country>BE</Country><br><PostCode>01234</PostCode><br><City>ExampleCity1</City><br><ValidFrom>2018-01-01</ValidFrom><br><ValidTo>2099-12-31</ValidTo><br><VATNumber>BE0000000000001</VATNumber><br><ModifiedOn>2018-02-23</ModifiedOn><br><AccountHolderId>1234567890</AccountHolderId><br><AccountType>10</AccountType><br><ReverseVAT>false</ReverseVAT><br><BankGuarantee>true</BankGuarantee><br><BankGuaranteeNumber>23094873</BankGuaranteeNumber><br><KycCode>11</KycCode><br><Suspended>false</Suspended><br></AccountHolder><br><AccountHolder><br><IssuingBodyCode>43</IssuingBodyCode><br><AccountNumber>43X0EXMP29</AccountNumber><br><CompanyName>Company 2</CompanyName><br><Country>CZ</Country><br><ValidFrom>2016-01-01</ValidFrom><br><ValidTo>2099-12-31</ValidTo><br></AccountHolder><br></AccountHolders> |

### B5.1.1 Account Holder

Element for keeping individual Account Holder information

| Element Name | AccountHolder |
|---|---|
| Type | Element to hold information of one Account holder |
| Length | Not applicable |
| Format | Not applicable |
| Occurrence | minimum 1<br>maximum not defined, but at the moment 10 000 should be supported. |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | With all the fields filled in:<br><AccountHolder><br><IssuingBodyCode>43</IssuingBodyCode><br><AccountNumber>43X0EXMP1B</AccountNumber><br><CompanyName>Company 1</CompanyName><br><Country>BE</Country><br><PostCode>01234</PostCode><br><City>ExampleCity1</City><br><ValidFrom>2018-01-01</ValidFrom><br><ValidTo>2099-12-31</ValidTo><br><VATNumber>BE0000000000001</VATNumber><br><ModifiedOn>2018-02-23</ModifiedOn><br><AccountHolderId>1234567890</AccountHolderId><br><AccountType>10</AccountType><br><ReverseVAT>false</ReverseVAT><br><BankGuarantee>true</BankGuarantee><br><BankGuaranteeNumber>23094873</BankGuaranteeNumber><br><KycCode>11</KycCode><br><Suspended>false</Suspended><br></AccountHolder><br><br>With only compulsory fields filled in:<br><AccountHolder><br><IssuingBodyCode>43</IssuingBodyCode><br><AccountNumber>43X0EXMP29</AccountNumber><br><CompanyName>Company 2</CompanyName><br><Country>CZ</Country><br><ValidFrom>2016-01-01</ValidFrom><br><ValidTo>2099-12-31</ValidTo><br></AccountHolder> |

### B5.1.2 Issuing Body Code

Code of the Issuing Body to whom the Account holder belongs.

| Element Name | IssuingBodyCode |
|---|---|
| Type | Token |
| Length | 2 |
| Format | NN |
| Occurrence | 1 (per **AccountHolder** element) |
| Structure | 2-character numeric, leading zero if required.<br>See EECS Rules Fact Sheet 04 “Member and Competent Authority Codes” for possible values |
| Unit | Not applicable |
| Example | 43 |

### B5.1.3 Account Number

Account Number of the Account Holder.

| Element Name | AccountNumber |
|---|---|
| Type | Token |
| Length | See section A2.5 (9 characters + 1 check character) |
| Format | Depends on the type, see section A2.5 |
| Occurrence | 1 (per **AccountHolder** element)<br>AccountNumber should be unique within the IssuingBody. |
| Structure | See section A2.5 |
| Unit | Not applicable |
| Example | 43X0EXMP1B |

### B5.1.4 Company Name

Name of the Account Holder.

| Element Name | CompanyName |
|---|---|
| Type | Token |
| Length | 1-100 |
| Format | Text field |
| Occurrence | 1 (per AccountHolder element) |
| Structure | Free text |
| Unit | Not applicable |
| Example | Example Company 1 |

### B5.1.5 Country

The country of the Account Holder (this might be different from the country of the Issuing Body).

| Element Name | Country |
|---|---|
| Type | String |
| Length | 2 |
| Format | XX |
| Occurrence | 1 (per AccountHolder element) |
| Structure | 2-character code according to the ISO 3166-1 country code list |
| Unit | Not applicable |
| Example | BE |

### B5.1.6 Post Code

Post Code of the Account Holder

| Element Name | PostCode |
|---|---|
| Type | String |
| Length | 0-10 |
| Format | Text |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | 0-10 characters |
| Unit | Not applicable |
| Example | 01234 |

### B5.1.7 City

City of the Account Holder

| Element Name | City |
|---|---|
| Type | String |
| Length | 0-150 |
| Format | Not applicable |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | Example City 1 |

### B5.1.8 Valid From

The date from which the Account Holder became valid and from which certificates can be transferred to the Account Holder:

| Element Name | ValidFrom |
|---|---|
| Type | Date |
| Length | Not applicable |
| Format | Date is according to local time, not UTC |
| Occurrence | 1 (per AccountHolder element) |
| Structure | YYYY-MM-DD |
| Unit | Not applicable |
| Example | 2018-01-01 |

### B5.1.9 Valid To

The date to which the Account Holder is valid. If the date is in the past, the account holder is seen as deactivated and it is not possible to transfer certificates to it anymore:

| Element Name | ValidTo |
|---|---|
| Type | Date |
| Length | Not applicable |
| Format | Date is according to local time, not UTC |
| Occurrence | 1 (per AccountHolder element) |
| Structure | YYYY-MM-DD |
| Unit | Not applicable |
| Example | 2099-12-31 |

### B5.1.10 VAT Number

VAT number of the Account Holder

| Element Name | VATNumber |
|---|---|
| Type | String |
| Length | 0-15 |
| Format | Not applicable |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | 0-15 characters |
| Unit | Not applicable |

| Element Name | VATNumber |
|---|---|
| Example | BE0000000000001 |

### B5.1.11 Modified On

The date when the Account Holder was modified in the registry:

| Element Name | ModifiedOn |
|---|---|
| Type | Date |
| Length | Not applicable |
| Format | Date is according to local time, not UTC |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | YYYY-MM-DD |
| Unit | Not applicable |
| Example | 2018-02-23 |

### B5.1.12 Account Holder Identifier

An additional identifier of the Account Holder kept by the Issuing Body. It is not the Account Number of A2.5, which is given in AccountNumber. But in case AccountHolderId is being used by the Issuing Body, all AccountNumbers of the same Account Holder (e.g. its sub-accounts) should carry the same AccountHolderId.

| Element Name | AccountHolderId |
|---|---|
| Type | Token |
| Length | 10 |
| Format | Text |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | Free text |
| Unit | Not applicable |
| Example | 1234567890 |

### B5.1.13 Account Type

Type of the account of the Account Holder, as a code from the master data table Account Type of the AIB Hub.

| Element Name | AccountType |
|---|---|
| Type | Token |
| Length | 2 |
| Format | Code |
| Occurrence | 0-n (per AccountHolder element) |
| Structure | Code from the master data table Account Type of the AIB Hub |
| Unit | Not applicable |
| Example | 10 |

### B5.1.14 Reverse VAT

Whether the reverse-charge VAT mechanism applies to the Account Holder.

| Element Name | ReverseVAT |
|---|---|
| Type | Boolean |
| Length | Not applicable |
| Format | true or false |

| Element Name | ReverseVAT |
|---|---|
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | false |

### B5.1.15 Bank Guarantee

Whether the Account Holder has provided a bank guarantee.

| Element Name | BankGuarantee |
|---|---|
| Type | Boolean |
| Length | Not applicable |
| Format | true or false |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | true |

### B5.1.16 Bank Guarantee Number

Reference number of the bank guarantee of the Account Holder.

| Element Name | BankGuaranteeNumber |
|---|---|
| Type | String |
| Length | 1-20 |
| Format | Text |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | Free text |
| Unit | Not applicable |
| Example | 23094873 |

### B5.1.17 KYC Code

Result of the Know Your Customer (KYC) check of the Account Holder done by the Issuing Body, as a code from the master data table KYC of the AIB Hub.

| Element Name | KycCode |
|---|---|
| Type | Token |
| Length | 2 |
| Format | Code |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | Code from the master data table KYC of the AIB Hub |
| Unit | Not applicable |
| Example | 11 |

### B5.1.18 Suspended

Whether the Account Holder is suspended. The AIB Hub rejects transfers that involve a suspended Account Holder (error code 120, Fact Sheet 18).

| Element Name | Suspended |
|---|---|
| Type | Boolean |
| Length | Not applicable |
| Format | true or false |
| Occurrence | 0-1 (per AccountHolder element) |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | false |

## B6 Statistics Elements Description

This section describes all the elements of the Statistics file. The XML representation is shown; the JSON representation uses the same elements and attributes, with names in lowerCamelCase notation (see B8).

### B6.1 General

B6.1.1 The Hub User should deliver the following statistics to the AIB Hub monthly, by the 20th calendar day. The Hub User must deliver statistics for the completed previous month and possible corrections and updates for the previously reported months up to 24 months backwards. Those statistics can be delivered in one file with several monthly periods in it, or in several files (e.g. divided into monthly files).

B6.1.2 Statistics contain values collected based on Production Period and Transaction Date:

B6.1.3 PRODUCTION PERIOD BASED STATISTICS (Production date):

Relates to when the energy associated with the GO was produced. The reporting Domain should identify, for every reported month, the certificates having Production Period To date belonging to the specific month and report all the actions done to those certificates within the Domain (regardless of the time when the action was done). These statistics give an indication of how many active certificates (active certificates = Issue – Cancel – Expiry – possible Withdrawals) there are in the market from that specific period. After a year the volume should be close to zero at the AIB level (not at the single Domain level due to imports and exports):

1. Issue: The quantity of GOs issued by the reporting Domain (for energy production within the reporting Domain only)
2. Cancel: The quantity of GOs cancelled by the reporting Domain, including GOs cancelled to other Domains (regardless of where the GOs were issued), per Consumption Year and Cancellation Category and including information on the Production Domain (in case the cancelled GOs were issued in a different Domain than the reporting Domain) and on the Consumption Domain (so-called ex-domain cancellations) – the same breakdown as in the transaction date based statistics
3. Expire: The quantity of GOs expired by the reporting Domain (regardless of where the GOs were issued), including information on the Production Domain (in case the expired GOs were issued in a different Domain than the reporting Domain)

B6.1.4 TRANSACTION DATE BASED STATISTICS:

Relates to when the GO itself was issued, transferred, cancelled or expired (action based). The reporting Domain should identify, for each reported calendar month, the quantity of GOs issued, transferred, imported, expired, withdrawn or cancelled:

1. Issue: The quantity of GOs that has been issued by the reporting Domain in the specific calendar month
2. Transfer: The quantity of GOs transferred between Account Holders on the reporting Domain in the specific calendar month

3. Export: The quantity of GOs transferred from reporting Domain to accounts in another Domain in the specific calendar month
4. Import: The quantity of GOs transferred from accounts in another Domain to the reporting Domain in the specific calendar month
5. Expire: The quantity of GOs expired in the reporting Domain in the specific calendar month and including information on the Production Domain (in case the expired GOs were issued in a different Domain than the reporting Domain)
6. Withdraw: The quantity of GOs withdrawn in the reporting Domain in the specific calendar month. Reporting this item is optional. Consider taking this amount into account when reporting other values. E.g. if there was a withdrawal due to wrongly issued certificates, then quantity reported on issued GOs should be reduced.
7. Cancel:
    a. The quantity of GOs cancelled to certify consumption in the reporting Domain per Consumption Year, Cancellation Category and including information on the Production Domain (in case the cancelled GOs were issued in a different Domain than the reporting Domain). These cancellations do not include the so-called ex-domain cancellations.
    b. The quantity of GOs cancelled to certify consumption out of the reporting Domain per Consumption Year, Cancellation Category, including information on the Production Domain (in case the cancelled GOs were issued in a different Domain than the reporting Domain) and Consumption Domain (so-called ex-domain cancellations).

B6.1.5 Statistics files follow the Statistics Schema (statistics_v80.xsd / statistics_v81.xsd) listed in B7 XML Schema Definitions (XSD).

B6.1.6 Statistics files are uploaded to the AIB Hub through the AIB Hub web interface, the AMQP channel or the AIB Hub REST API, in XML (B7) or JSON format (B8). The web service channel (SOAP) does not carry statistics.

B6.1.7 Statistics files without the breakdown of cancellations and expirations by the attributes ProductionDomainCode, ConsumptionDomainCode, ConsumptionYear and CancellationCategory remain accepted until the end of October 2027. Cancel and Expire elements without these attributes are interpreted with the defaults defined in B6.5.3, B6.5.4, B6.6.6 and B6.6.8.

B6.1.8 Example of Statistics file

```
<?xml version="1.0" encoding="UTF-8"?>
<Statistics MessageTransmissionTime="2020-02-11T16:00:00Z" Type="EECS-
Electricity">
      <DomainCode>DK</DomainCode>
      <IssuingBodyCode>02</IssuingBodyCode>
      <Period YearMonth="2018-03">
         <Item TypeOfInstallation="T050000" EnergySource="F01000000">
            <ProductionDate>
               <Issue>1</Issue>
               <Cancel>2</Cancel>
               <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">1</Cancel>
               <Cancel ProductionDomainCode="BEW"
CancellationCategory="Storage">1</Cancel>
               <Expire>0</Expire>
               <Expire ProductionDomainCode="DE">1</Expire>
            </ProductionDate>
            <TransactionDate>
               <Issue>10</Issue>
               <Transfer>20</Transfer>
               <Export>30</Export>
               <Import>40</Import>
               <Expire>50</Expire>
```

```
                <Expire ProductionDomainCode="DE">2</Expire>
                <Withdraw>0</Withdraw>
                <Cancel>50</Cancel>
                <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
                <Cancel CancellationCategory="Storage">4</Cancel>
                <Cancel ProductionDomainCode="BEW" ConsumptionDomainCode="PL"
ConsumptionYear="2022" CancellationCategory="Conversion">5</Cancel>
            </TransactionDate>
         </Item>
      </Period>
</Statistics>
```

## B6.2 Header

B6.2.1 The Statistics file contains the below header lines to identify the Domain and the Issuing Body to which the Statistics belong (the Registry is identified by the Registry selected in the user interface or, for submissions via the AMQP channel or the REST API, by the identity of the submitting Registry).

```
<?xml version="1.0" encoding="UTF-8"?>
<Statistics MessageTransmissionTime="2020-02-11T16:00:00Z" Type="EECS-
Electricity">
      <DomainCode>DK</DomainCode>
      <IssuingBodyCode>02</IssuingBodyCode>
```

B6.2.2 Message Transmission Time - attribute

B6.2.3 Timestamp for when the statistics were retrieved from the original database. Shows from which moment the data was taken from the registry (this might differ from the moment the data is inserted into the AIB Hub and might help to identify possible problems).

| Attribute | MessageTransmissionTime |
|---|---|
| Type | DateTime |
| Length | Not applicable |
| Format | UTC (Z). Use of local time zones (e.g. +01:00) is not permitted |
| Occurrence | Required |
| Structure | YYYY-MM-DDTHH:MM:SSZ |
| Unit | DateTime |
| Example | 2019-10-15T12:24:00Z |

B6.2.4 Type - attribute

B6.2.5 Type of statistics contained in the report

| Attribute | Type |
|---|---|
| Type | xs:token |
| Length | 1-20 |
| Format | Possible values:<br>• EECS-Electricity<br>• National-Electricity<br>• EECS-EnergyGas<br>• National-EnergyGas<br>• EECS-Hydrogen<br>• National-Hydrogen<br>NOTE: later there might be more types to come. See related master data in the AIB Hub |
| Occurrence | Required |
| Structure | Not applicable |

| Attribute | Type |
|---|---|
| Unit | Not applicable |
| Example | EECS-Electricity |

B6.2.6 Domain Code - element

B6.2.7 Represents the Domain for which the statistics are reported:

| Element Name | DomainCode |
|---|---|
| Type | xs:token |
| Length | 2-3 |
| Format | 2 to 3 upper-case letters |
| Occurrence | 1 (per statistics file) |
| Structure | Refer to Domain Code in FS04<br>Domain code in Master data of AIB Hub |
| Unit | Not applicable |
| Example | BEF, FI |

B6.2.8 Issuing Body Code - element

B6.2.9 Represents the Issuing Body for which the statistics are reported:

| Element Name | IssuingBodyCode |
|---|---|
| Type | xs:token |
| Length | 2 |
| Format | 2 digits |
| Occurrence | 1 (per statistics file) |
| Structure | 2-character numeric, leading zero if required. See EECS Rules Fact Sheet 04 “Member and Competent Authority Codes” for possible values |
| Unit | Not applicable |
| Example | 29 |

## B6.3 Period -element

B6.3.1 General Description

B6.3.2 Each Statistics file may have one or more “Period” elements. Maximum number of period elements in one file is 24 and Period should not be older than 24 months.

B6.3.3 One period holds statistics of a specific one-month period.

B6.3.4 Each Period may contain one or more “Item” elements, which are described later.

B6.3.5 Year Month -attribute

B6.3.6 Period has an attribute “YearMonth”, the month to which the given statistics belong.

| Attribute | YearMonth |
|---|---|
| Type | xs:gYearMonth |
| Length | 7 |
| Format | YYYY-MM |
| Occurrence | Required once per Period element.<br>Must be unique within the Statistics XML.<br>Maximum occurrence of Period element per Statistics XML is 24. |
| Structure | Minimum value: the running month minus 24 months. |

| Attribute | YearMonth |
|---|---|
| | Maximum value: the running month.<br>Should be unique within the Statistics XML. |
| Unit | Not applicable |
| Example | 2019-01 |

B6.3.7 Example of a Period with two Items:

```
<Period YearMonth="2018-03">
      <Item TypeOfInstallation="T050000" EnergySource="F01000000">
          <ProductionDate>
              <Issue>0</Issue>
              <Cancel>0</Cancel>
              <Expire>0</Expire>
          </ProductionDate>
          <TransactionDate>
              <Issue>0</Issue>
              <Transfer>0</Transfer>
              <Export>40000</Export>
              <Import>20000</Import>
              <Expire>0</Expire>
              <Withdraw>0</Withdraw>
          </TransactionDate>
      </Item>
      <Item TypeOfInstallation="T050000" EnergySource="F01010101">
          <ProductionDate>
              <Issue>19519</Issue>
              <Cancel>0</Cancel>
              <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
              <Expire>0</Expire>
          </ProductionDate>
          <TransactionDate>
              <Issue>18551</Issue>
              <Transfer>0</Transfer>
              <Export>0</Export>
              <Import>0</Import>
              <Expire>0</Expire>
              <Withdraw>0</Withdraw>
              <Cancel>50</Cancel>
              <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
          </TransactionDate>
      </Item>
</Period>
```

## B6.4 Item -element

B6.4.1 General Description

One Item holds statistics of a specific one-month period and of a specific Type of Installation and Energy Source combination.

Each “Period” element may have one or more “Item” elements. Maximum number of Item elements in one period is the number of unique TypeOfInstallation and EnergySource combinations. At least one Item is required per each Period.

Combination of TypeOfInstallation and EnergySource within a “Period” must be unique.

Examples of Items:

```
<Item TypeOfInstallation="T050000" EnergySource="F01000000">
          <ProductionDate>
              <Issue>0</Issue>
              <Cancel>0</Cancel>
              <Expire>0</Expire>
          </ProductionDate>
          <TransactionDate>
```

```
            <Issue>0</Issue>
            <Transfer>0</Transfer>
            <Export>40000</Export>
            <Import>20000</Import>
            <Expire>0</Expire>
            <Withdraw>0</Withdraw>
        </TransactionDate>
    </Item>
    <Item TypeOfInstallation="T050000" EnergySource="F01010101">
        <ProductionDate>
            <Issue>19519</Issue>
            <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
        </ProductionDate>
        <TransactionDate>
            <Export>40</Export>
            <Import>50</Import>
            <Expire>0</Expire>
            <Withdraw>0</Withdraw>
            <Cancel>50</Cancel>
            <Cancel ConsumptionDomainCode="HU"
ConsumptionYear="2018">50</Cancel>
        </TransactionDate>
    </Item>
```

### B6.4.2 Type of Installation -attribute

Type of Installation to which the given statistics belong. It is recommended to report the statistics at the level of detail used in the certificates.

| Attribute | TypeOfInstallation |
|---|---|
| Type | Token |
| Length | 7 |
| Format | TNNNNNN where the T could be also another letter and N represent a number from 0-9. |
| Occurrence | Required (once per Item element) |
| Structure | One of the Technology codes from EECS Rules Fact Sheet 05 “Types of Energy Inputs and Technologies”<br>Combination of “Type of Installation” and “Energy Source” must be unique for a Period<br>Combination of “Type of Installation” and “Energy Source” must be a valid combination in EECS Rules Fact Sheet 05 |
| Unit | Not applicable |
| Example | T030200 |

### B6.4.3 Energy Source -attribute

Energy Source to which the given statistics belong. It is recommended to report the statistics at the level of detail used in the certificates.

| Attribute | EnergySource |
|---|---|
| Type | Token |
| Length | 9 |
| Format | FNNNNNNNN, where N represent a number from 0-9 |
| Occurrence | Required (once per Item element) |
| Structure | One of the Energy Source codes from EECS Rules Fact Sheet 05 “Types of Energy Inputs and Technologies”<br>Combination of “Type of Installation” and “Energy Source” must be unique for a Period |

| Attribute | EnergySource |
|---|---|
| | Combination of “Type of Installation” and “Energy Source” must be a valid combination in EECS Rules Fact Sheet 05 |
| Unit | Not applicable |
| Example | F01040100 |

## B6.5 ProductionDate -element

### B6.5.1 General Description

Each “Item” element contains a “ProductionDate” element and/or a “TransactionDate” element (at least one of the two).

ProductionDate element contains statistics collected based on the Certificate Production Period End.

ProductionDate element must contain at least one of the following elements: Issue, Cancel or Expire. There may be more than one Cancel element and more than one Expire element in a ProductionDate element, distinguished by their attributes (see B6.5.3 and B6.5.4).

Example of a ProductionDate -element:

```
      <ProductionDate>
      <Issue>0</Issue>
      <Cancel>0</Cancel>
      <Cancel ConsumptionDomainCode="HU" ConsumptionYear="2018">50</Cancel>
    <Cancel CancellationCategory="Storage">4</Cancel>
    <Cancel ProductionDomainCode="BEW" ConsumptionDomainCode="PL"
ConsumptionYear="2022" CancellationCategory="Conversion">5</Cancel>
      <Expire>0</Expire>
      <Expire ProductionDomainCode="DE">2</Expire>
      </ProductionDate>
```

### B6.5.2 Production Date > Issue -element

Quantity of all the Certificates issued in the reporting Domain where the Certificate Production Period (Production Period End) belongs to the given Period, and where Energy Source and Type of Installation is as given in the attributes of the Item.

| Element Name | Issue |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |
| Occurrence | Not required<br>Maximum one per ProductionDate -element.<br>If not given, the value in the AIB Hub is kept. |
| Structure | - |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | 1000000 |

### B6.5.3 Production Date > Cancel -element

Quantity of all the certificates Cancelled in the reporting Domain (including cancelled to external domain) and where the Certificate Production Period (Production Period End) belongs to the given Period, and where Energy Source and Type of Installation is as given in the attributes of the Item. There might be more than one Cancel element in a ProductionDate element if they all have a unique combination of ConsumptionDomainCode, ConsumptionYear, ProductionDomainCode and CancellationCategory.

| Element Name | Cancel |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |
| Occurrence | Not required<br>There might be more than one Cancel element in a ProductionDate element if they all have a unique combination of ConsumptionDomainCode, ConsumptionYear, ProductionDomainCode and CancellationCategory.<br>If not given, the value in the AIB Hub is kept. |
| Structure | See the definition of the attributes below |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | <Cancel>50</Cancel><br>`<Cancel ConsumptionDomainCode="HU" ConsumptionYear="2018">50</Cancel>`<br>`<Cancel ProductionDomainCode="BEW" CancellationCategory="Storage">4</Cancel>` |

| **Attribute** | **ConsumptionDomainCode** |
|---|---|
| Type | Token |
| Length | 2-3 |
| Format | Domain Code (Fact Sheet 04) or ISO 3166-1 alpha-2 country code |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume is being cancelled to the reporting domain. |
| Structure | Domain Code according to Fact Sheet 04; if cancelled outside the AIB Members, the ISO 3166-1 alpha-2 country code.<br>Note that the Domain Code might differ from the Country Code, e.g. in case of multiple Belgian domains, and is not explicitly part of the messages where only the Issuing Body Code is present.<br>Master data table in AIB Hub is used to validate this. |
| Unit | Not applicable |
| Example | BEW, FI, MA |

| **Attribute** | **ConsumptionYear** |
|---|---|
| Type | Token |
| Length | 4 |
| Format | YYYY |
| Occurrence | Not required.<br>Registries are recommended to report the consumption year explicitly in the production date based statistics. If not reported, it is expected that all the reported volume is being cancelled for consumption taking place in the year of the reported period, i.e. the year of the production period. |
| Structure | YYYY |
| Unit | Not applicable |
| Example | 2018 |

| Element Name | Cancel |
|---|---|
| **Attribute** | **ProductionDomainCode** |
| Type | Token |
| Length | 2-3 |
| Format | FS04 Domain Code |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume was issued in the reporting domain. |
| Structure | Fact Sheet 04 - Domain Code.<br>Note that the Domain Code might differ from the Country Code, e.g. in case of multiple Belgian domains, and is not explicitly part of the messages where only the Issuing Body Code is present.<br>Master data table in AIB Hub is used to validate this. |
| Unit | Not applicable |
| Example | BEW, FI, DE |

| **Attribute** | **CancellationCategory** |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | Possible values (according to EECS Rules section C7.2.1 (e)):<br>• Support<br>• Disclosure<br>• Target<br>• Conversion<br>• Storage<br>• OtherScheme (issuance under another Certification Scheme)<br>• Other<br>NOTE: There might be more possible values added later through the AIB Hub master data. |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume was cancelled for Disclosure purpose. |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | Storage |

### B6.5.4 Production Date > Expire -element

Quantity of all the Certificates expired in the reporting Domain and where the Certificate Production Period (Production Period End) belongs to the given Period and Energy Source and Type of Installation is as given in the attributes of the Item. There might be more than one Expire element in a ProductionDate element if they all have a unique ProductionDomainCode.

| Element Name | Expire |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |

| Element Name | Expire |
|---|---|
| Occurrence | Not required<br>There might be more than one Expire element in a ProductionDate element if they all have a unique ProductionDomainCode.<br>If not given, the value in the AIB Hub is kept. |
| Structure | See the definition of the attribute below |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | <Expire>0</Expire><br><Expire ProductionDomainCode="DE">2</Expire> |

| Attribute | ProductionDomainCode |
|---|---|
| Type | Token |
| Length | 2-3 |
| Format | Fact Sheet 04 - Domain Code |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume was issued in the reporting domain. |
| Structure | Fact Sheet 04 - Domain Code.<br>Master data table in AIB Hub is used to validate this. |
| Unit | Not applicable |
| Example | BEW, FI, DE |

## B6.6 Transaction Date -element

### B6.6.1 General description

Where an “Item” element contains both, the “ProductionDate” element is followed by the “TransactionDate” element.

TransactionDate element contains statistics collected based on the Transaction Date, and it must contain at least one of the following elements: Issue, Transfer, Export, Import, Expire, Withdraw or Cancel.

Example of a TransactionDate element:

```
      <TransactionDate>
      <Issue>0</Issue>
      <Transfer>0</Transfer>
      <Export>40000</Export>
      <Import>20000</Import>
      <Expire>0</Expire>
      <Expire ProductionDomainCode="DE">2</Expire>
      <Withdraw>0</Withdraw>
      <Cancel>50</Cancel>
      <Cancel ConsumptionDomainCode="HU" ConsumptionYear="2018">50</Cancel>
      <Cancel CancellationCategory="Storage">4</Cancel>
      <Cancel ProductionDomainCode="BEW" ConsumptionDomainCode="HU"
ConsumptionYear="2022" CancellationCategory="Conversion">5</Cancel>
      </TransactionDate>
```

### B6.6.2 Transaction Date > Issue -element

Issuing statistics for the related Period collected based on the Issuing transaction date

| Element Name | Issue |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |

| Element Name | Issue |
|---|---|
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |
| Occurrence | Not required<br>Maximum one per TransactionDate -element.<br>If not given, the value in the AIB Hub is kept. |
| Structure | - |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | 1000000 |

### B6.6.3 Transaction Date > Transfer -element

Transfer statistics for the related Period collected based on the Transfer transaction date

| Element Name | Transfer |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |
| Occurrence | Not required<br>Maximum one per TransactionDate -element.<br>If not given, the value in the AIB Hub is kept. |
| Structure | - |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | 1000000 |

### B6.6.4 Transaction Date > Export -element

Export statistics for the related Period collected based on the Export transaction date

| Element Name | Export |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |
| Occurrence | Not required<br>Maximum one per TransactionDate -element.<br>If not given, the value in the AIB Hub is kept. |
| Structure | - |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | 1000000 |

### B6.6.5 Transaction Date > Import -element

Import statistics for the related Period collected based on the Import transaction date

| Element Name | Import |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |

| Element Name | Import |
|---|---|
| Occurrence | Not required<br>Maximum one per TransactionDate -element.<br>If not given, the value in the AIB Hub is kept. |
| Structure | - |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | 1000000 |

### B6.6.6 Transaction Date > Expire -element

Expire statistics for the related Period collected based on the Expire transaction date

| Element Name | Expire |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |
| Occurrence | Not required<br>There might be more than one Expire element in a TransactionDate element if they all have a unique ProductionDomainCode.<br>If not given, the value in the AIB Hub is kept. |
| Structure | See below the definition of the attributes |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | `<Expire>0</Expire>`<br>`<Expire ProductionDomainCode="DE">2</Expire>` |

| **Attribute** | **ProductionDomainCode** |
|---|---|
| Type | Token |
| Length | 2-3 |
| Format | Fact Sheet 04 - Domain Code |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume was issued in the reporting domain. |
| Structure | Fact Sheet 04 - Domain Code.<br>Master data table in AIB Hub is used to validate this. |
| Unit | Not applicable |
| Example | BEW, FI, DE |

### B6.6.7 Transaction Date > Withdraw -element

Withdraw statistics for the related Period collected based on the Withdraw transaction date.

| Element Name | Withdraw |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |
| Occurrence | Not required<br>Maximum one per TransactionDate -element.<br>If not given, the value in the AIB Hub is kept. |

| Element Name | Withdraw |
|---|---|
| Structure | - |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | 1000000 |

### B6.6.8 Transaction Date > Cancel -element

Cancel statistics for the related Period collected based on the Cancel transaction date. There might be more than one Cancel element in a TransactionDate element if they all have a unique combination of ConsumptionDomainCode, ProductionDomainCode, CancellationCategory and ConsumptionYear.

| Element Name | Cancel |
|---|---|
| Type | xs:nonNegativeInteger |
| Length | 1-10 |
| Format | Minimum value: 0<br>Maximum value: 1000000000 (billion) |
| Occurrence | Not required<br>There might be more than one Cancel element in a TransactionDate element if they all have a unique combination of ConsumptionDomainCode, ConsumptionYear, ProductionDomainCode and CancellationCategory.<br>If not given, the value in the AIB Hub is kept. |
| Structure | See below the definition of the attributes |
| Unit | Certificates (1 MWh is the size of one certificate) |
| Example | `<Cancel>50</Cancel>`<br>`<Cancel ConsumptionDomainCode="HU" ConsumptionYear="2018">50</Cancel>` |

| Attribute | ConsumptionDomainCode |
|---|---|
| Type | Token |
| Length | 2-3 |
| Format | Domain Code (Fact Sheet 04) or ISO 3166-1 alpha-2 country code |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume is being cancelled to the reporting domain. |
| Structure | Domain Code according to Fact Sheet 04; if cancelled outside the AIB Members, the ISO 3166-1 alpha-2 country code.<br>Note that the Domain Code might differ from the Country Code, e.g. in case of multiple Belgian domains, and is not explicitly part of the messages where only the Issuing Body Code is present.<br>Master data table in AIB Hub is used to validate this. |
| Unit | Not applicable |
| Example | BEW, FI, MA |

| Attribute | ConsumptionYear |
|---|---|
| Type | Token |
| Length | 4 |

| Element Name | Cancel |
|---|---|
| Format | YYYY |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume is being cancelled to the year of the reported period. |
| Structure | YYYY |
| Unit | Not applicable |
| Example | 2018 |

| **Attribute** | **ProductionDomainCode** |
|---|---|
| Type | Token |
| Length | 2-3 |
| Format | FS04 Domain Code |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume was issued in the reporting domain. |
| Structure | Fact Sheet 04 - Domain Code.<br>Note that the Domain Code might differ from the Country Code, e.g. in case of multiple Belgian domains, and is not explicitly part of the messages where only the Issuing Body Code is present.<br>Master data table in AIB Hub is used to validate this. |
| Unit | Not applicable |
| Example | BEW, FI, DE |

| **Attribute** | **CancellationCategory** |
|---|---|
| Type | Token |
| Length | 1-20 |
| Format | Possible values (according to EECS Rules section C7.2.1 (e)):<br>• Support<br>• Disclosure<br>• Target<br>• Conversion<br>• Storage<br>• OtherScheme<br>• Other<br>NOTE: There might be more possible values added later through the AIB Hub master data. |
| Occurrence | Not required.<br>If not given, it is expected that all the reported volume was cancelled for Disclosure purpose. |
| Structure | Not applicable |
| Unit | Not applicable |
| Example | Storage |

## B7 XML Schema Definitions (XSD)

The XML Schema Definitions (XSD) are the formal, machine-readable definition of the XML messages exchanged through the AIB Hub – certificate transfers, acknowledgements, statistics and account holders – for each supported message schema version. An XSD defines the elements and attributes of a message, their order and hierarchy, their data types, lengths and allowed values, and whether they are mandatory or optional, in accordance with the specifications of this Annex B; the message schema version applicable to a Registry is the one set in its Registry configuration in the AIB Hub and is reflected by the schema referenced in the message preamble (B3.2).

The AIB Hub validates every incoming XML message against the XSD of the message schema version configured for the sending Registry and rejects messages that do not conform. Registries shall validate their outgoing messages against the same XSD before sending (2.1.1.5) and may use it to validate the messages forwarded to them by the AIB Hub. The XSD files are maintained by the AIB; in case of a discrepancy between this document and an XSD, this document prevails and the XSD is corrected.

Statistics files and Account Holder files are not tied to the message schema version of the Registry configuration. Their v81 schemas also accept files in the v80 format, so the AIB Hub validates every Statistics file and every Account Holder file against the v81 schema.

The complete schema definitions are available as separate XSD files in the section Info › Documents of the AIB Hub web interface and on the following AIB website:

https://www.aib-net.org/eecs/message-schemas

The following list of XSD files is currently maintained and supported by the AIB Hub, following specifications described in previous chapters:

- Message Schema for EECS Certificates Transfers
  - v80 (exportenv80.xsd)
  - v81 (exportenv81.xsd)
- Acknowledgments Schema
  - v80 (answers_v80.xsd)
  - v81 (answers_v81.xsd)
- Statistics Schema
  - v80 (statistics_v80.xsd)
  - v81 (statistics_v81.xsd)
- Account Holders Schema
  - v80 (accounts_v80.xsd)
  - v81 (accounts_v81.xsd)

## B8 JSON Validation Schemas

For messages exchanged in JSON format – via the AMQP channel (Annex C) and the AIB Hub REST API – the AIB publishes JSON validation schemas (JSON Schema) alongside the XML Schema Definitions listed in B7. A JSON validation schema is the structural equivalent of the corresponding XSD: it defines the same elements and attributes as JSON properties (in lowerCamelCase notation, with the hierarchy of the certificate data flattened), with the same data types, lengths, allowed values and mandatory or optional occurrence. The message schema version is carried in the “messageSchema” property of the JSON message.

The JSON validation schemas serve the following purposes:

- the AIB Hub validates every incoming JSON message against the JSON validation schema of the message schema version configured for the sending Registry (declared in the “messageSchema” property) and rejects non-conforming messages;
- Registries validate their outgoing JSON messages against the schema before sending, and may use it to validate the incoming messages forwarded by the AIB Hub;
- the schemas document the JSON message structure for the implementation of Registry interfaces.

JSON validation schemas are maintained for the same message types and message schema versions as the XSD files listed in B7 (transfers, acknowledgements, statistics and account holders), as far as the JSON format is supported for the respective message type.

For Statistics files and Account Holder files, the JSON format is supported with the v81 JSON validation schemas, whatever the message schema version of the Registry configuration (B5, B6.1.6, B7). A JSON file contains the property “messageSchema” with the value “v81” and either the object “statistics” or the array “accountHolders”. The properties carry the element and attribute names of the XSD in lowerCamelCase notation (e.g. “consumptionDomainCode”, “vatNumber”), and repeatable elements are arrays. A Cancel or Expire element is an object holding the quantity in “value” and its attributes as further properties. Dates are given as YYYY-MM-DD and the MessageTransmissionTime in UTC. A JSON Account Holder file has the format of the JSON download of Account Holders in the AIB Hub web interface. The uniqueness rules of B5 and B6, which a JSON validation schema cannot express, are checked by the AIB Hub.

The XML Schema Definitions and the JSON validation schemas are the technical expression of the specifications in this Annex B. In case of a discrepancy between this document and a schema, this document prevails; discrepancies shall be reported to the AIB and are corrected in the schemas.

The JSON validation schemas are available as separate JSON files in the section Info › Documents of the AIB Hub web interface and on the following AIB website:

https://www.aib-net.org/eecs/message-schemas

# ANNEX C - EECS TRANSFER AND ACCOUNT HOLDERS INTERFACE TRANSPORT SPECIFICATION

## C1 Introduction

### C1.1 Purpose

C1.1.1 This annex details the message transport aspects of the Interface Specification for communication between EECS Registration Databases.

C1.1.2 The scope of this Interface Specification annex is the definition of all interfaces between EECS Registration Databases using the AIB Hub. Interfaces between individual database operators and other national or participant systems unique to a specific domain are not part of this annex and are therefore not included.

### C1.2 Approach

C1.2.1 This annex takes the requirements outlined in the main document, AIB-EECS-SD03, and specifies the protocols for transferring messages and a method of providing public/private security keys.

### C1.3 Message transport protocols

C1.3.1 Web service connection between Registries and the AIB Hub

The AIB Hub web service is exposed by the AIB Hub to receive messages and acknowledgements from the Registry via an HTTPS connection. The AIB Hub expects the Registry Operator to expose its registry web service to the AIB Hub to receive those messages and acknowledgements. The web services are described in C2.

C1.3.2 AMQP connection between Registries and the AIB Hub

The AIB Hub messaging interface uses the AMQP 1.0 protocol and a RabbitMQ message broker to exchange messages and acknowledgements with the Registry. The AIB Hub is responsible for provisioning and exposing the broker infrastructure, including the creation and management of the required queues or topics. The Registry Operator connects to the External Broker to publish and consume messages accordingly. The messaging interfaces are described in C2.

### C1.4 WS (SOAP) Protocol Specification

C1.4.1 **Signed**: messages can be digitally signed by the Sender. This option is switched on with “Signing (Only for WS)” in the registry configuration. The AIB Hub validates the digital signature on receipt and digitally signs the message before it is sent to the recipient. The recipient validates the digital signature from the Hub on receipt. The signature is based on X.509 certificates, as used by the TLS (Transport Layer Security) protocol.

C1.4.2 Use of a signature addresses the **attributable** and **accurate** requirements. X.509 is supported by Microsoft and the OpenSSL project and is available on suitably up to date versions of Windows and Unix. This form of the signature therefore supports the **immediate**, **delivery**, and **cost** requirements.

C1.4.3 **Encrypted**: all messages are encrypted after signature. The encrypted message conforms to the S/MIME message structure.

C1.4.4 Encryption addresses the **private** requirement. S/MIME is supported by Microsoft and the OpenSSL project and is available on suitably up to date versions of Windows and Unix. This form of encryption therefore supports the **immediate**, **delivery**, and **cost** requirements.

C1.4.5 **Acknowledgement**: on receipt of a message the recipient is required to validate the signature and confirm that the message conforms to the expected structure and that the data content is of the correct type and falls within expected ranges. The recipient must generate an AK message if the message is acceptable and a NAK message otherwise. This acknowledgement is then signed and returned to the return address via the Hub given on the incoming message. The original Sender should look for a valid acknowledgement. If there is no response within the defined **AK-time**, or if a

NAK is received, the original Sender should attempt to resolve the problem by direct contact with the original recipient and thereafter the Hub.

C1.4.6 The use of an acknowledgement response in this way addresses the **transparency** requirement. The need to validate the original message before transmitting the acknowledgement introduces a process within the receiving registry which is outside the scope of this annex. It is therefore not possible to say what impact the acknowledgement activity will have on the **AK-time** requirement. It is left to each individual registry operator to devise appropriate procedures to address this.

### C1.5 AMQP Protocol Specification

C1.5.1 Signed: Use of message-level digital signatures addresses the attributable and accurate requirements. Signatures are mandatory for all messages exchanged through the AMQP channel and are verified by the Hub and registries on receipt. Detached XML-DSig or JWS signatures are used depending on payload format, based on widely supported industry standards available across modern platforms. This approach supports the immediate, delivery, and cost requirements.

C1.5.2 Encrypted transport: all AMQP communication is performed over mutually authenticated TLS connections (mTLS). Encryption is applied at the transport layer using TLS version 1.2 or higher, ensuring confidentiality and integrity of messages exchanged between registries and the Hub.

C1.5.3 Transport-layer encryption addresses the private requirement. TLS and PKI-based authentication are widely supported across operating systems and client libraries and therefore support the immediate, delivery, and cost requirements.

C1.5.4 Acknowledgement: message delivery and business acknowledgement are handled through asynchronous feedback dataflows. Upon receipt, the recipient validates the signature, message structure, and payload content. The recipient generates a feedback message indicating acceptance or rejection, signs it, and submits it via the messaging channel. The Hub forwards acknowledgements to the originating registry. The sender monitors acknowledgement responses and resolves missing or negative responses through retry procedures or operational escalation.

C1.5.5 The use of asynchronous acknowledgement messaging addresses the transparency requirement. Validation and processing steps within registries occur outside the scope of this annex, and processing duration may vary depending on registry implementation. Retry handling, at-least-once delivery, and idempotent processing ensure reliable exchange despite timing variability.

### C1.6 Management of certificates

C1.6.1 **mTLS certificate protocol:** Each Registry generates its own private key and Certificate Signing Request (CSR) for the mTLS client certificate. The AIB Hub issues the mTLS certificate based on the submitted CSR. The Registry retains sole control of its private key and uses the issued certificate to authenticate to the AIB Hub messaging broker.

C1.6.2 **Signing certificate protocol:** Each Registry must obtain a signing certificate issued by a trusted public Certificate Authority supported by the AIB Hub. The Registry must upload its public signing certificate to the AIB Hub to enable signature verification of messages exchanged via the AMQP messaging interface.

C1.6.3 Each Registry is responsible for securely generating, storing, and protecting its private keys and certificates. Private keys must not be shared and must remain under the exclusive control of the Registry.

C1.6.4 Each Registry Operator is responsible for managing its messaging client, maintaining valid certificates, and ensuring continuous ability to connect to the AIB Hub messaging infrastructure and process incoming and outgoing messages.

C1.6.5 It is the responsibility of individual Registries to manage certificate lifecycle operations, including certificate renewal, replacement, and revocation, and to ensure that valid certificates are configured for secure communication with the AIB Hub.

## C2 AIB Hub Web Service and AMQP Interface Description

### C2.1 Where an EECS Registration Database is connected to the AIB Hub through the AIB Hub web service, then it must use the definitions set out in this annex.

C2.1.1 General requirements for the web services:

C2.1.2 The AIB Hub will communicate with the Registry's Web Service via the specified URL defined in the Registry configuration (in the AIB Hub web interface). The URIs http://system.aibhub.net/ and http://system.aib-net.org are namespace identifiers, not web addresses, and must be used exactly as given.

C2.1.3 An HTTPS connection is required to exchange certificates through the AIB Hub by web service.

C2.1.4 The Registry must authenticate to the AIB Hub Web Service with its client certificate (REGISTRY_AUTH). The AIB Hub authenticates to the Registry Web Service with its client certificate (AHUB_WEBSERVICE). The Registry uses the public key of this certificate to verify that a call comes from the AIB Hub. The certificates of the web service channel (SOAP) are described in the AIB Hub Guide, chapter 5 (see section 1.3).

C2.1.5 The transfer XML encryption is described later in this document.

C2.1.6 It is recommended that the registry restricts the access to its Web Service to the outgoing IP address of the AIB Hub given in the AIB Hub Guide, Annex B.

C2.1.7 The Registry Web Service should support the SOAP 1.1 standard and conform to the WSDL description given in this document. The namespaces for the SOAP messages are described later in this Annex C.

C2.1.8 The timeout for the Web Service connections to the AIB Hub is 2 minutes and the same timeout is recommended for the Registry as well. The timeout setting can be revisited from time to time by the AIB. To avoid manual work for Registry Operators and the AIB Hub Superuser it is recommended to take all the possible actions to avoid timeout in the communications.

C2.1.9 If a timeout nevertheless happens, it is highly recommended to check manually the actual status of the transfer in the AIB Hub and in the counterparty Registry.

C2.1.10 The maximum size of the input and output requests is determined by the maximum limit of the certificate bundles per transfer (ref: 2.3.5.4). NOTE: encryption of a file increases the size of a request considerably compared to the plain transfer XML size.

C2.1.11 The necessary precautions when exposing the Web Service are to be taken by the AIB for the Hub and by the Registry Operators connected to it.

C2.1.12 The registry Web Service should handle receiving several simultaneous requests from the AIB Hub.

C2.1.13 Below are basic flows of communication between Registries and the AIB Hub.

C2.1.14 Deliver a transfer XML from Registry1 to Registry2. It consists of four separate Web Service requests as shown below and in Figure 4.1 (each of them has a 2-minute timeout at the Hub end).

- Registry1 initiates a transfer to AIB Hub using **SendCertificate** request of AIB Hub Web Service.
    - AIB Hub validates the request and replies to Registry1 with **SendCertificateResponse** (PENDING) to notify the request was received and to close the connection to Registry1.
- AIB Hub forwards the transfer to Registry2 using **SetCertificate** request of Registry2 Web Service.
    - Registry2 takes the request for processing and replies to Hub with **SetCertificateResponse** (PENDING) to notify the request was received and to

close the connection to AIB Hub. Meanwhile Registry2 will further process the request.

- Registry2 gives the final answer to AIB Hub using **SendFeedback** request (AK/NAK) of AIB Hub Web Service.
    - AIB Hub replies to Registry2 with **SendFeedbackResponse**=True to notify the request was received and to close the connection to Registry2.
- AIB Hub forwards the answer to Registry1 using **SetFeedback** request (AK/NAK) of Registry1 Web Service.
    - Registry1 replies to AIB Hub with **SetFeedbackResponse**=True to notify the request was received and to close the connection to AIB Hub.

C2.1.15 Deliver a transfer from Registry1 to Registry2 in case the AIB Hub finds the transfer message or its content invalid (see Figure 4.2).

- Registry1 initiates a transfer to AIB Hub using **SendCertificate** request of AIB Hub Web Service.
    - Hub replies to Registry1 with **SendCertificateResponse** with NAK answer to close the connection to Registry1. There will be no connection to Registry2 at all.

(a) Special handling of NAK 65 and NAK 10 error codes. When AIB Hub receives NAK 65 (double counting) or NAK 10 (MessageID already used for another transfer) from Registry2, it does not forward it to Registry1. Both might be related to a certificate double counting situation. The AIB Hub keeps the transfer in the state "Waiting for SU". After investigation of the reason behind the error, the Superuser closes the transfer from the AIB Hub user interface, normally with NAK 89.

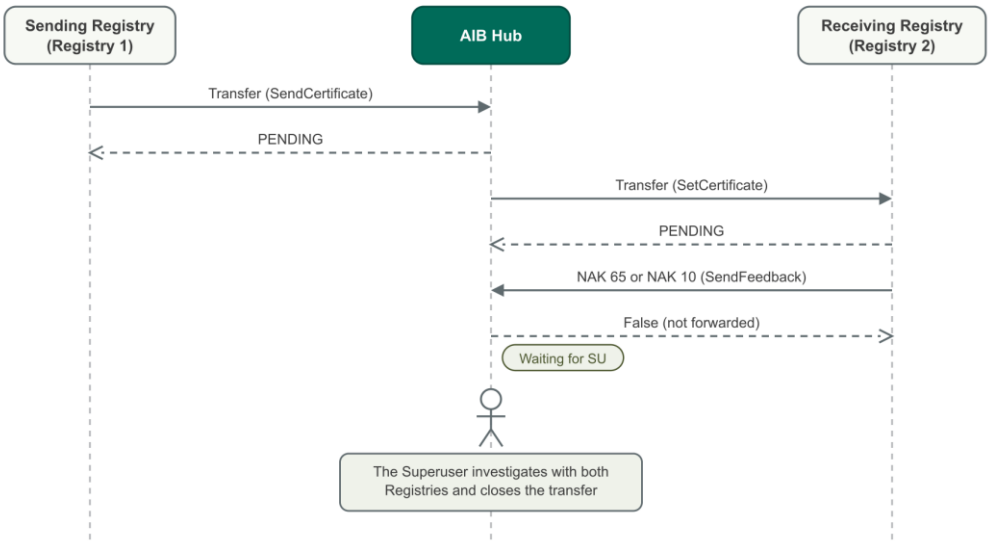



Figure C.1 – NAK 65 or NAK 10 from the Receiving Registry (web service channel)

- Registry1 initiates a transfer to AIB Hub using **SendCertificate** request of AIB Hub Web Service.

- AIB Hub validates the request and replies to Registry1 with **SendCertificateResponse** (PENDING) to notify the request was received and to close the connection to Registry1.
- NOTE: if it is the AIB Hub that finds a double counting situation or that the same transfer was already sent, the Hub does not forward the message to Registry2 at all, but keeps the transfer open to wait for Superuser action.

- AIB Hub forwards the transfer to Registry2 using **SetCertificate** request of Registry2 Web Service.
  - Registry2 takes the request for processing and replies to Hub with **SetCertificateResponse** (PENDING) to notify the request was received and to close the connection to AIB Hub. Meanwhile Registry2 will further process the request.
- Registry2 gives the final answer to AIB Hub using **SendFeedback** request (NAK 65 or NAK 10) of AIB Hub Web Service.
- AIB Hub replies to Registry2 with **SendFeedbackResponse**=False to close the connection to Registry2 and to signal that the NAK is not forwarded. The AIB Hub forwards neither NAK 65 nor NAK 10 to Registry1. For closing the transfer in the AIB Hub (and possibly in Registry1), Superuser manual action is needed.

(b) Some other cases when the transfer is not completed in the AIB Hub and needs special manual attention from Superuser to close the transfer in the AIB Hub and possibly in the Registries:

(i) In case Registry1 gives a False response or another invalid response to the SetFeedback call, the transfer is closed as Completed with error code A94. It is the responsibility of the Sending Registry to monitor such errors and confirm the transfer is closed as completed on their side.

(ii) In case Registry2 gives a SOAP fault or another invalid response to the SetCertificate call, the Superuser can resend the transfer after confirmation from the Receiving Registry.

(c) In case Superuser action is needed to close a transaction manually, communication between the Superuser, Registry1 and Registry2 is needed to find out the correct status of the transfer and to decide on the correct action. There are three possibilities:

(i) Superuser can close the transfer in AIB Hub by sending NAK to Registry1 from the User interface of AIB Hub.

(ii) Superuser can close the transfer in AIB Hub by sending AK to Registry1 from the User interface of AIB Hub.

(iii) Superuser can close the transfer in AIB Hub without sending any answer to Registry1, in case the transfer is already completed in the Registry1 and with correct status.

**C2.2 Where an EECS Registration Database is connected to the AIB Hub through the AIB Hub AMQP channel, it must use the definitions set out in this section.**

C2.2.1 General requirements for the AMQP channel:

C2.2.2 The Registry shall connect to the AIB Hub External Broker using the broker endpoints defined for the relevant environment (PRE-PROD or PROD) and configured in the Registry system.

C2.2.3 A secure AMQP connection over TLS (amqps, port 5671) is required for all certificate exchanges through the AIB Hub AMQP channel.

C2.2.4 The Registry must authenticate to the AIB Hub broker using mutual TLS (mTLS) with a client certificate issued by an approved AIB Hub Certification Authority. The certificate trust chain must be installed and hostname verification enabled on the client side.

C2.2.5 Digital signatures at message level are mandatory. All messages exchanged via the AMQP channel must be digitally signed using the Registry's signing certificate. The signature must be provided as a detached signature in the AMQP application-properties. Signature validation rules are described later in this document.

C2.2.6 The Registry must ensure that access to the AMQP broker is restricted to authorised systems only. Appropriate firewall rules and network security controls shall be implemented on the Registry side.

C2.2.7 The Registry must use an AMQP 1.0 compliant client implementation supporting TLS, flow control, explicit settlement, and durable messaging as defined in this document.

C2.2.8 The Registry must implement heartbeat and session timeout handling according to broker configuration (recommended heartbeat 30–60 seconds). Automatic reconnect with exponential backoff and link re-establishment is required to ensure resilient connectivity.

C2.2.9 In case of connectivity interruption or missing acknowledgement within the expected timeframe, the Registry should verify the transfer status in the AIB Hub and apply the defined retry procedures.

C2.2.10 The maximum message size is defined by the broker configuration (default limit 128 MB). Registries must ensure that payload size, including signature, remains within this limit. Message size considerations must include potential growth due to encoding and signature metadata.

C2.2.11 Necessary security measures for broker connectivity, certificate lifecycle management, and message validation must be implemented by both the AIB Hub and the connected Registries.

C2.2.12 The Registry AMQP client must support concurrent message processing and handle redelivery scenarios in accordance with the at-least-once delivery model defined in this document.

C2.2.13 Examples of the basic flows of communication between Registries and the AIB Hub are given in section 4.2.

### C2.3 Web Services exposed by the AIB Hub to Registries

C2.3.1 This interface describes the Web Service input interface of the AIB Hub. Registries will use this interface for communicating with the AIB Hub. The interface is responsible for receiving the transfer messages and acknowledgements (AK/NAK) from Registries. The AIB Hub will forward the request to another registry using the output interface described in C2.4.1. The web service request can contain one of the following contents:

(d) One transfer message with certificates from the Sender Registry web service (**SendCertificate)**

(e) Acknowledgement (AK/NAK) message from the Receiving Registry web service (**SendFeedback)**

**C2.3.2** **SendCertificate**: Request for sending a transfer

C2.3.3 When the **SendCertificate** of the AIB Hub Web Service is invoked by a Sending Registry, the AIB Hub will validate the request and its content against the set of rules and master data and log the details of the transfer into the AIB Hub database and possibly convert the message to another XML Schema where relevant.

C2.3.4 If all the validations are passed in the AIB Hub, then the AIB Hub will respond with **SendCertificateResponse** with **ReturnCode** PENDING (ref. C2.3.8) to close the Web Service call for the time being and forward the transfer to Receiving Registry by using the **SetCertificate** method of the Receiving Registry (ref. C2.4.2).

C2.3.5 If the validation fails in the AIB Hub, then the AIB Hub will respond with **SendCertificateResponse** with **ReturnCode** NAK (ref. C2.3.8) to close the Web Service call to Sending Registry and no connection to Receiving Registry will be established.

C2.3.6 **SendCertificate** elements are described below:

(i) **sCertificateMime** (xs:string, mandatory):

- A string containing the transfer XML (the XML format is described in Annex B).
- UTF-8 encoding must be used.
- There are three possibilities how the **sCertificateMime** parameter can be filled:

  1. XML message in an encrypted and signed form (NOTE: If the Registry Operator has switched on "Signing (Only for WS)" in the registry configuration in the AIB Hub, the mime message should be signed.)
  2. XML message in an encrypted form without signature.
  3. Plain XML message.

  Encryption and signature is done primarily in a native way by web service technologies (client PKI certificate and HTTPS protocol). Encryption and signature of the **sCertificateMime (**XML message) itself is only an optional feature. AIB Hub identifies these options on the fly during the web service request processing. The certificates used for encryption and decryption are described in the AIB Hub Guide, chapter 5 (see section 1.3).

C2.3.7 XML example of **SendCertificate**:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SendCertificate xmlns="http://system.aibhub.net/">
<sCertificateMime>Content-Disposition: attachment; filename=smime.p7m Content-Transfer-
Encoding: base64 Content-Type: application/x-pkcs7-mime; name=smime.p7m
MIJOJgYJKoZIhvcNAQc....
</sCertificateMime>
<bTest>true</bTest>
</SendCertificate>
</soap:Body>
</soap:Envelope>
```

C2.3.8 SendCertificateResponse: output for SendCertificate request

C2.3.9 When Sending Registry is using the SendCertificate method of the AIB Hub, the AIB Hub is expected to respond to the Sending Registry with a **SendCertificateResponse** as an output within timeout limit given in C2.1.

C2.3.10 If a valid **SendCertificateResponse** is not given as output for a **SendCertificate** request (timeout, invalid answer), it is recommended that the Registry Operator keeps the transfer open in their registry to avoid possible double counting and check with Superuser and the Receiving Registry the status of the transfer. Similarly, the AIB Hub keeps the transfer in the state "Delivered" (with error code A94) if the Receiving Registry does not reply to the SetCertificate call.

C2.3.11 The valid SendCertificateResponse contains SendCertificateResult, which is of type ReturnMessage.

C2.3.12 **ReturnMessage** elements are described below:

(ii) **ReturnCode (xs:string, mandatory):** defines if the transfer was accepted or not by the receiver. The possible values for ReturnCode are:

1 "NAK": the transfer validation failed either in AIB Hub or in the Receiving Registry (Negative acknowledgement)

2 "AK": the transfer validation was successful in the AIB Hub and the transfer was delivered and accepted by the Receiving Registry (Positive acknowledgement)

3 "PENDING": on the web service channel (SOAP), the transfer validation was successful in the AIB Hub, and the transfer has been taken for further processing.

The AK or NAK will be returned later. On the AMQP channel, the AIB Hub sends PENDING in answer to a retry of a transfer that is still in progress (see C2.7.11). A Receiving Registry on the AMQP channel may send PENDING before its AK or NAK (see C2.6.11).

(iii) **Id (xs:string, mandatory):** The unique id of the message to which the answer belongs. (ref. B4.4.2) NOTE: Id can contain leading zero and hence it is defined as a string.

(iv) **ErrorCode (xs:int, mandatory)**: The valid value for **ErrorCode** depends on the value of **ReturnCode**:

1 In case **ReturnCode** = "NAK": ErrorCode > 0 and is one of the error codes given in the Fact Sheet 18.

2 In case **ReturnCode** = "AK": ErrorCode = 0

3 In case **ReturnCode** = "PENDING": ErrorCode = 0

(v) **ErrorMessage** (xs:string, optional): Error message given (recommended value is the description from Fact Sheet 18).

(vi) **DestinationVersion** (string, optional): The field will be filled with the XML version of the transfer, which has been used by the AIB Hub to send the transfer to the Receiving Registry.

(vii) **AdditionalInfo** (string, optional): Contains additional information about the error that occurred or, in the answer of the AIB Hub to a retry on the AMQP channel, states that the transfer has been retried (see C2.7.11).

(viii) **SignatureMime** (string, optional): If the mime message signature is enabled for the registry configuration, this property will contain a signed mime body with the ReturnCode + Id, signed with the client certificate. For example, if the ReturnCode is a "NAK" and the Id is 992017010100001, then the text in the mime body is "NAK992017010100001", which is signed with the client certificate.

C2.3.13 XML example of SendCertificateResponse:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SendCertificateResponse xmlns="http://system.aibhub.net/">
<SendCertificateResult>
<ReturnCode>NAK</ReturnCode>
<Id>992017010100001</Id>
<ErrorCode>1</ErrorCode>
<ErrorMessage>Not correct signed</ErrorMessage>
<AdditionalInfo>The registry configuration for your authentication is in productive
mode, but the file you have sent was sent in test mode!</AdditionalInfo>
</SendCertificateResult>
</SendCertificateResponse>
</soap:Body>
</soap:Envelope>
```

C2.3.14 **SendFeedback**: Request for sending an AK or a NAK answer to a transfer asynchronously

C2.3.15 **SendFeedback** method allows the Receiving Registry to send a NAK or an AK answer to a received transfer if PENDING was given as the reply in the SetCertificateResponse **(C2.4.7)**.

C2.3.16 When the AIB Hub receives a SendFeedback request, the request is validated and the AIB Hub gives a **SendFeedbackResponse** as an output (C2.3.19). If the validations were passed, the request is forwarded to the Sending Registry using **SetFeedback** (ref. C2.4.10). If the validations were not passed, then the transfer is kept in the state "Waiting for Confirmation" (with error code A94) and the answer is not forwarded to the Sending Registry.

C2.3.17 **SendFeedback** method contains **FeedbackMessage** (mandatory). FeedbackMessage element then contains **ReturnMessage** similar to that described in C2.3.12 with the following differences:

(ix) As a ReturnCode only “AK” and “NAK” are allowed on the web service channel (SOAP), where PENDING is given in the SetCertificateResponse (C2.4.7). On the AMQP channel the Receiving Registry may also send “PENDING” before its AK or NAK (see C2.6.11).

(x) The decision whether the **SignatureMime** is filled in is up to the Registry Operator. If it is given, the AIB Hub validates it.

C2.3.18 XML example of **SendFeedback**:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
   <SendFeedback xmlns="http://system.aibhub.net/">
      <FeedbackMessage>
         <ReturnCode>NAK</ReturnCode>
         <Id>9920170101000001</Id>
         <ErrorCode>5</ErrorCode>
         <ErrorMessage>File was not encrypted</ErrorMessage>
         <DestinationVersion />
         <AdditionalInfo />
      </FeedbackMessage>
   </SendFeedback>
</soap:Body>
</soap:Envelope>
```

C2.3.19 SendFeedbackResponse: Output for SendFeedback request

C2.3.20 When the Receiving Registry is using the **SendFeedback** method of the AIB Hub, the AIB Hub is expected to respond to the Receiving Registry with **SendFeedbackResponse** as an output within timeout limit given in C2.1.

C2.3.21 The elements required for that message are described below:

(xi) **SendFeedbackResponse** (mandatory, Boolean) being either True or False:

1 True: the AIB Hub has accepted the answer. It sets the transfer to the state “Received Feedback”, forwards the answer to the Sending Registry (C2.4.10) and accepts no further answers to the transfer.

2 False: the answer was not accepted for forwarding (for example NAK 65 or NAK 10, see C2.1.15 (a)); the AIB Hub keeps the transfer in the state “Waiting for SU” and the Superuser completes the transfer manually from the user interface. If no SendFeedbackResponse is received in time, the Receiving Registry should check the status of the transfer in the AIB Hub.

C2.3.22 XML example of SendFeedbackResponse

```
<?xml version="1.0" encoding="utf-8"?> <soap:Envelope
xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
   <SendFeedbackResponse xmlns="http://system.aibhub.net/">
      <SendFeedbackResult>false</SendFeedbackResult>
   </SendFeedbackResponse>
</soap:Body>
</soap:Envelope>
```

C2.3.23 **SendAccountHolders**: Request for sending Account Holders to AIB Hub

C2.3.24 It is recommended to call the method at most once a day and to send the uploads of the Account Holders of the Registry before midnight UTC to coordinate with the downloads of the other Registries.

C2.3.25 When **SendAccountHolders** of AIB Hub Web Service is invoked by a Registry, the AIB Hub will validate the request and its content against the set of rules and master data and log the details of the request into the AIB Hub database and if the validation was ok, update the Account Holders sent in the request.

C2.3.26 AIB Hub will answer to this call using **SendAccountHoldersResponse,** which is described in C2.3.29.

C2.3.27 **SendAccountHolders** elements are described below:

(xii) **AccountHoldersMime** (xs:string, mandatory):

- A string containing the Account Holders XML (the XML schema is described in Annex B)
- When sending Account Holders, all the active Account Holders of the Registry should be included into the XML (the ones not included will be set inactive in the AIB Hub with ValidTo -date as the date of sending the file).
- Account Holders are transferred in MIME format (similar to certificate transfers) and encrypted with the public key of the REGISTRY_WEB certificate.
- UTF-8 encoding must be used.
- There are three possibilities how the **AccountHoldersMime** parameter can be filled:

1. XML message in an encrypted and signed form (NOTE: If the Registry Operator has switched on "Signing (Only for WS)" in the registry configuration in the AIB Hub, the **AccountHoldersMime** must be signed with Registry PKI certificate REGISTRY_AUTH)
2. XML message in an encrypted form without signature.
3. Plain XML message.

Encryption and signature is done primarily in a native way by web service technologies (client PKI certificate and HTTPS protocol). Encryption and signature of the **AccountHoldersMime (**XML message) itself is only an optional feature. AIB Hub identifies these options on the fly during the web service request processing. The certificates used for encryption and decryption are described in the AIB Hub Guide, chapter 5 (see section 1.3).

C2.3.28 XML example of SendAccountHolders:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SendAccountHolders xmlns="http://system.aibhub.net/">
   <AccountHoldersMime>
      Content-Type: application/x-pkcs7-mime; name="smime.p7m"; smime-type="enveloped-
data"
      Content-Disposition: attachment; filename="smime.p7m"
      Content-Transfer-Encoding: base64
MIILtgYJKoZIhvcNAQcDoIILpzCCC6MCAQAxggKuMIICqgIBADCBkTCBhTELMAkGA1UEBhMCQkUx
GzAZBgNVBAgTEkJSVVhFTExFUy1DQVBJVEFMRTESMBAGA1UEBxMJQnJ1eGVsbGVzMSwwKgYDVQQKEyNBU1NPQ0lB
VElPTiBPRiBJU1NVSU5HIEJPRElFUyBBSVNCTDEXMBUGA1UEAxMOd3d3LmFpYmh1
      ...
   </AccountHoldersMime>
</SendAccountHolders>
</soap:Body>
</soap:Envelope>
```

(xiii) Example of “plain-text” decrypted form of previous WS call – the first example has all fields of the basic set filled (B5.1.2 to B5.1.11), and the second only the compulsory ones:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SendAccountHolders xmlns="http://system.aibhub.net/">
   <AccountHoldersMime>
     <?xml version="1.0" encoding="UTF-8"?>
      <AccountHolders>
        <AccountHolder>
              <IssuingBodyCode>43</IssuingBodyCode>
              <AccountNumber>43X0EXMP1B</AccountNumber>
              <CompanyName>Company 1</CompanyName>
              <Country>BE</Country>
              <PostCode>01234</PostCode>
              <City>ExampleCity1</City>
              <ValidFrom>2018-01-01</ValidFrom>
              <ValidTo>2099-12-31</ValidTo>
              <VATNumber>BE0000000000001</VATNumber>
              <ModifiedOn>2018-02-23</ModifiedOn>
        </AccountHolder>
        <AccountHolder>
              <IssuingBodyCode>43</IssuingBodyCode>
              <AccountNumber>43X0EXMP29</AccountNumber>
              <CompanyName>Company 2</CompanyName>
              <Country>CZ</Country>
              <ValidFrom>2016-01-01</ValidFrom>
              <ValidTo>2099-12-31</ValidTo>
        </AccountHolder>
      </AccountHolders>
   </AccountHoldersMime>
</SendAccountHolders>
</soap:Body>
</soap:Envelope>
```

C2.3.29 SendAccountHoldersResponse: output for SendAccountHolders request

C2.3.30 When a Registry is using the **SendAccountHolders** method of the AIB Hub, the AIB Hub is expected to respond to the Sending Registry with **SendAccountHoldersResponse** as an output within timeout limit given in C2.1.

C2.3.31 If valid **SendAccountHoldersResponse** is not given as an output for **SendAccountHolders** request (timeout, invalid answer), it is recommended that the Registry Operator checks in the AIB Hub user interface whether the file was processed correctly before resending the request.

C2.3.32 The valid SendAccountHoldersResponse contains SendAccountHoldersResult, which is of type SendAccountHoldersReturnMessage.

C2.3.33 SendAccountHoldersReturnMessage elements are described below:

(xiv) **Result (xs:boolean, minOccurs="1", maxOccurs="1" ):** defines if the request was accepted or not:

1 "TRUE": The request validation was successful in the AIB Hub and the Account Holders were updated in the Account Holder database

2 "FALSE": The request validation was not successful; the errors are described in the **ErrorMessage**.

(xv) **ErrorMessage (xs:string, minOccurs="1", maxOccurs="1"):** If there were errors in the sent file, the AIB Hub gives the errors in this field; if all was OK, this field is empty.

C2.3.34 XML example of SendAccountHoldersReturnMessage:

(xvi) **Result** = True:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SendAccountHoldersResponse xmlns="http://system.aibhub.net/">
    <SendAccountHoldersResult>
        <Result>true</Result>
        <ErrorMessage></ErrorMessage>
    </SendAccountHoldersResult>
</SendAccountHoldersResponse>
</soap:Body>
</soap:Envelope>
```

(xvii) **Result** = False:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SendAccountHoldersResponse xmlns="http://system.aibhub.net/">
    <SendAccountHoldersResult>
        <Result>false</Result>
        <ErrorMessage>Error on line 4: 02 - Non-existing Country Code</ErrorMessage>
    </SendAccountHoldersResult>
</SendAccountHoldersResponse>
</soap:Body>
</soap:Envelope>
```

C2.3.35 **GetAccountHolders**: Request for receiving Account Holders XML from AIB Hub

C2.3.36 It is recommended to call the method at most once a day and to download the Account Holders after midnight UTC to coordinate with uploads of other Registries.

C2.3.37 When **GetAccountHolders** of the AIB Hub Web Service is invoked by a Registry, the AIB Hub will validate the request and its content against the set of rules and master data and log the details of the request into the AIB Hub database. If the validation was ok, it will send back the Account Holders list matching the given filters. NOTE: both active and inactive Account Holders will be returned as there is no filter for the validity period of the Account Holders.

C2.3.38 AIB Hub will answer to this call using **GetAccountHoldersResponse,** which is described in C2.3.42.

C2.3.39 **GetAccountHolders** elements are described below:

(xviii) **IssuingBodyCode** (type="xs:string", minOccurs="1", maxOccurs="1"):

- Max length: 2 chars (Refer: Fact Sheet 04 (Member code))
- Default value: Null – No special filter against Issuing Body is done. Account Holders of all the Issuing Bodies will be returned. NOTE: That includes also the Account Holders of your own Registry.
- If value is given, only the Account holders of the given Issuing Body are returned.

(xix) **AccountNumber** (type="xs:string", minOccurs="1", maxOccurs="1")

- Default value: Null – No special filter against Account Number is done. All Account Holders will be returned.
- If value given, the records where the Account Number matches the given Account Number will be returned.
- Max length: 10 characters (see A2.5)

(xx) **DateFrom** (type="xs:dateTime", minOccurs="1", maxOccurs="1")

- Format: "YYYY-MM-DDThh:mm:ss"
- Default value: Null – No special filter against Account Holder modified date is done. All Account Holders are returned.
- If value given, only the records, where Account Holder was modified after the given datetime, will be returned (including Account Holders which were inactivated after the given timestamp).

C2.3.40 Some examples of how to filter the results:

(xxi) Get all Account Holders in the Account Holder database: IssuingBodyCode is null or empty, AccountNumber is null or empty and DateFrom is null or empty.

(xxii) Get all Account Holders assigned to the given IssuingBodyCode: IssuingBodyCode is the given IssuingBodyCode, AccountNumber is null or empty and DateFrom is null or empty.

(xxiii) Get the Account Holder based on the given AccountNumber: IssuingBodyCode is null or empty, AccountNumber is the given AccountNumber and DateFrom is null or empty.

(xxiv) Get all Account Holders which were changed since specified DateTime: IssuingBodyCode is null or empty, AccountNumber is null or empty, DateFrom is the DateTime in the format "YYYY-MM-DDThh:mm:ss". That will return all Account Holders which were changed since the given timestamp. NOTE: that will include also the inactivated Account Holders if those were changed after the given timestamp.

C2.3.41 XML example of GetAccountHolders:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<GetAccountHolders xmlns="http://system.aibhub.net/">
    <IssuingBodyCode>43</IssuingBodyCode>
    <AccountNumber></AccountNumber>
    <DateFrom>2016-01-01T21:30:00</DateFrom>
</GetAccountHolders>
</soap:Body>
</soap:Envelope>
```

C2.3.42 GetAccountHoldersResponse: output for GetAccountHolders request

C2.3.43 When a Registry is using the **GetAccountHolders** method of AIB Hub, AIB Hub is expected to respond to the Sending Registry with **GetAccountHoldersResponse** as an output within timeout limit given in C2.1.

C2.3.44 If a valid **GetAccountHoldersResponse** is not given as an output for **GetAccountHolders** request (but instead e.g. timeout, invalid answer), the Registry can try to repeat the request, but it is recommended not to do it more than three times. If even the third time did not give results, check the situation in AIB Hub user interface and contact the AIB Hub Service Desk.

C2.3.45 The valid GetAccountHoldersResponse contains GetAccountHoldersResult, which is of type GetAccountHoldersReturnMessage.

C2.3.46 GetAccountHoldersReturnMessage elements are described below:

(xxv) **AccountHoldersMime** (xs:string, minOccurs="1", maxOccurs="1"):

- AIB Hub will return the Account Holders in MIME format (similar to certificate transfers) and encrypted with the public key of the REGISTRY_WEB certificate.

C2.3.47 XML example of GetAccountHoldersResponse:

(xxvi) **Mime**

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<GetAccountHoldersResponse xmlns="http://system.aibhub.net/">
    <GetAccountHoldersResult>
        <AccountHoldersMime>
          Content-Type: application/x-pkcs7-mime; name="smime.p7m"; smime-
type="enveloped-data"
          Content-Disposition: attachment; filename="smime.p7m"
          Content-Transfer-Encoding: base64
MIILtgYJKoZIhvcNAQcDoIILpzCCC6MCAQAxggKuMIICqgIBADCBkTCBhTELMAkGA1UEBhMCQkUx
GzAZBgNVBAgTEkJSVVhFTExFUy1DQVBJVEFMRTESMBAGA1UEBxMJQnJ1eGVsbGVzMSwwKgYDEyNBU1NPQ0lBVElP
TiBPRiBJU1NVSU5HIEJPRElFUyBBSVNCTDEXMBUGA1UEAxMOd3d3LmFpYmh1
          ...
          ...
        </AccountHoldersMime>
     </GetAccountHoldersResult>
</GetAccountHoldersResponse>
</soap:Body>
</soap:Envelope>
```

(xxvii) Example of “plain-text” decrypted form of previous WS call:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<GetAccountHoldersResponse xmlns="http://system.aibhub.net/">
    <GetAccountHoldersResult>
        <AccountHoldersMime>
          <AccountHolders>
       <AccountHolder>
                    <IssuingBodyCode>43</IssuingBodyCode>
                    <AccountNumber>43X0EXMP1B</AccountNumber>
                    <CompanyName>Company 1</CompanyName>
                    <Country>BE</Country>
                    <PostCode>01234</PostCode>
                    <City>ExampleCity1</City>
                    <ValidFrom>2018-01-01</ValidFrom>
                    <ValidTo>2099-12-31</ValidTo>
                    <VATNumber>BE0000000000001</VATNumber>
                    <ModifiedOn>2018-02-23</ModifiedOn>
       </AccountHolder>
```

```
            <AccountHolder>
                  <IssuingBodyCode>43</IssuingBodyCode>
                  <AccountNumber>43X0EXMP29</AccountNumber>
                  <CompanyName>Company 2</CompanyName>
                  <Country>CZ</Country>
                  <PostCode>12345</PostCode>
                  <City>ExampleCity2</City>
                  <ValidFrom>2016-01-01</ValidFrom>
                  <ValidTo>2099-12-31</ValidTo>
                  <VATNumber>BE0000000000002</VATNumber>
                  <ModifiedOn>2018-02-23</ModifiedOn>
      </AccountHolder>
         </AccountHolders>
       </AccountHoldersMime>
    </GetAccountHoldersResult>
</GetAccountHoldersResponse>
</soap:Body>
</soap:Envelope>
```

## C2.4 Web Services exposed by Registries to the AIB Hub

C2.4.1 This interface describes the Web Service output interface of AIB Hub which should be implemented in the Registry and which the AIB Hub uses for the communication with the Registry. This interface is responsible for forwarding the message to the web service of the Receiving Registry and for returning the acknowledgement (AK/NAK/PENDING) messages to the AIB Hub.

**C2.4.2** **SetCertificate**: Request for receiving a transfer from the AIB Hub into the Receiving Registry.

C2.4.3 AIB Hub calls **SetCertificate** method for forwarding the transfer from Sending Registry to the Receiving Registry after the Sending Registry has invoked the **SendCertificate** of the AIB Hub Web Service and after AIB Hub has validated the request.

C2.4.4 When **SetCertificate** of the Receiving Registry Web Service is invoked by the AIB Hub, it is expected that the Receiving Registry will process the request and perform required validations and give **SetCertificateResponse** as an output to AIB Hub following description in C2.4.7.

C2.4.5 Elements for **SetCertificate** are identical to the ones for **SendCertificate** (ref. C2.3.6) except for the following differences:

(xxviii) There are two possibilities how the parameter **sCertificateMime** is filled:

1 If “Signing (Only for WS)” is switched on in the registry configuration of the Receiving Registry, the parameter **sCertificateMime** is encrypted and signed.

2 If “Signing (Only for WS)” is switched off in the registry configuration of the Receiving Registry, the parameter **sCertificateMime** is only encrypted.

C2.4.6 XML example of **SetCertificate**:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SetCertificate xmlns="http://system.aibhub.net/">
<sCertificateMime>Content-Disposition: attachment; filename=smime.p7m
Content-Transfer-Encoding: base64
Content-Type: application/x-pkcs7-mime;
name=smime.p7m MIIGfgYJKoZI...
</sCertificateMime>
<bTest>true</bTest>
</SetCertificate>
</soap:Body>
</soap:Envelope>
```

C2.4.7 SetCertificateResponse: output for SetCertificate request

(f) **SetCertificate** method expects **SetCertificateResponse** as an output to the request; the reply should be given before the timeout given in C2.1. If the **SetCertificateResponse** is not given

on time or is invalid, the AIB Hub keeps the transfer in the state “Delivered” with error code A94.

C2.4.8 The valid **SetCertificateResponse** contains **SetCertificateResult,** which is of type **ReturnMessage** described in C2.3.12.

(i) It is recommended that the Registry always answers with ReturnCode PENDING when receiving this request to avoid a timeout.

C2.4.9 XML example of SetCertificateResponse:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SetCertificateResponse xmlns="http://system.aibhub.net/">
<SetCertificateResult>
<ReturnCode>NAK</ReturnCode>
<Id>123456789012345</Id>
<ErrorCode>5</ErrorCode>
<ErrorMessage>File was not encrypted</ErrorMessage>
<DestinationVersion>v80</DestinationVersion>
<AdditionalInfo>This is just a test</AdditionalInfo>
<SignatureMime />
</SetCertificateResult>
</SetCertificateResponse>
</soap:Body>
</soap:Envelope>
```

C2.4.10 **SetFeedback**: request for sending an AK or a NAK answer to a transfer

C2.4.11 AIB Hub will use this method for delivering an answer to a Sending Registry.

C2.4.12 When the Sending Registry receives a SetFeedback request from the AIB Hub, a SetFeedbackResponse is to be given as an output (ref. C2.4.15). If the **True** response is not given before timeout, the transfer remains in the state “Received Feedback” with error code A94 in the AIB Hub (see C2.1.15 (b)).

C2.4.13 The content of **SetFeedback** is identical to the **SendFeedback**: C2.3.17.

C2.4.14 XML example of **SetFeedback**:

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SetFeedback xmlns="http://system.aibhub.net/">
<FeedbackMessage>
<ReturnCode>NAK</ReturnCode>
<Id>082010070905512</Id>
<ErrorCode>22</ErrorCode>
<ErrorMessage>To cS, receiving registry, @1 is unknown CMO</ErrorMessage>
<DestinationVersion />
<AdditionalInfo />
</FeedbackMessage>
</SetFeedback>
</soap:Body>
</soap:Envelope>
```

C2.4.15 SetFeedbackResponse: output for SetFeedback request

C2.4.16 When the AIB Hub is using the **SetFeedback** method of a Sending Registry, the Sending Registry is expected to respond to AIB Hub with **SetFeedbackResponse** as an output within timeout limit given in C2.1.

C2.4.17 The parameters required for that message are described below:

(ii) **SetFeedbackResponse** (mandatory, Boolean) being either False or True:

1 **True**: the delivery of the answer was successful. If AIB Hub receives this answer, the AIB Hub sets the transfer to the state "Completed" (after an AK) or "Rejected by Receiver" (after a NAK) and accepts no further answer to the transfer.

2 **False**: the delivery of the answer was not successful; if the AIB Hub receives this answer, the transfer is closed as Completed with error code A94 in the AIB Hub (see C2.1.15 (b)) and it is the responsibility of the Sending Registry to resolve the situation.

C2.4.18 XML example of SetFeedbackResponse

```
<?xml version="1.0" encoding="utf-8"?>
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema">
<soap:Body>
<SetFeedbackResponse xmlns="http://system.aibhub.net/">
<SetFeedbackResult>true</SetFeedbackResult>
</SetFeedbackResponse>
</soap:Body>
</soap:Envelope>
```

## C2.5 WSDL (Web Services Description Language) of the Web Service

C2.5.1 WSDL Definition of AIB Hub Web Service including Account Holder database methods (the WSDL is available in the section Info › Documents of the AIB Hub web interface; the endpoint URLs of the AIB Hub environments are given in the AIB Hub Guide, Annex B "Environment reference", see section 1.3):

```
<?xml version='1.0' encoding='UTF-8'?>
<wsdl:definitions xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/" xmlns:tns="http://system.aibhub.net/"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:ns1="http://schemas.xmlsoap.org/soap/http" name="ServiceSoapService"
targetNamespace="http://system.aibhub.net/">
  <wsdl:types>
    <xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:tns="http://system.aibhub.net/" elementFormDefault="qualified"
targetNamespace="http://system.aibhub.net/" version="1.0">
      <xs:element name="GetAccountHolders">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="IssuingBodyCode" type="xs:string"/>
            <xs:element name="AccountNumber" type="xs:string"/>
            <xs:element name="DateFrom" type="xs:dateTime"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="GetAccountHoldersResponse">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="GetAccountHoldersResult"
type="tns:GetAccountHoldersReturnMessage"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="SendAccountHolders">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="AccountHoldersMime" type="xs:string"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="SendAccountHoldersResponse">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="SendAccountHoldersResult"
type="tns:SendAccountHoldersReturnMessage"/>
```

```
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="SendCertificate">
        <xs:complexType>
          <xs:sequence>
            <xs:element minOccurs="0" name="sCertificateMime" type="xs:string"/>
            <xs:element name="bTest" type="xs:boolean"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="SendCertificateResponse">
        <xs:complexType>
          <xs:sequence>
            <xs:element minOccurs="0" name="SendCertificateResult"
type="tns:ReturnMessage"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="SendFeedback">
        <xs:complexType>
          <xs:sequence>
            <xs:element minOccurs="0" name="FeedbackMessage" type="tns:ReturnMessage"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="SendFeedbackResponse">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="SendFeedbackResult" type="xs:boolean"/>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:complexType name="ReturnMessage">
        <xs:sequence>
          <xs:element minOccurs="0" name="ReturnCode" type="xs:string"/>
          <xs:element minOccurs="0" name="Id" type="xs:string"/>
          <xs:element name="ErrorCode" type="xs:int"/>
          <xs:element minOccurs="0" name="ErrorMessage" type="xs:string"/>
          <xs:element minOccurs="0" name="DestinationVersion" type="xs:string"/>
          <xs:element minOccurs="0" name="AdditionalInfo" type="xs:string"/>
          <xs:element minOccurs="0" name="SignatureMime" type="xs:string"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="GetAccountHoldersReturnMessage">
        <xs:sequence>
          <xs:element name="AccountHoldersMime" type="xs:string"/>
        </xs:sequence>
      </xs:complexType>
      <xs:complexType name="SendAccountHoldersReturnMessage">
        <xs:sequence>
          <xs:element name="Result" type="xs:boolean"/>
          <xs:element name="ErrorMessage" type="xs:string"/>
        </xs:sequence>
      </xs:complexType>
    </xs:schema>
  </wsdl:types>
  <wsdl:message name="SendAccountHoldersResponse">
    <wsdl:part element="tns:SendAccountHoldersResponse" name="parameters"></wsdl:part>
  </wsdl:message>
  <wsdl:message name="GetAccountHoldersResponse">
    <wsdl:part element="tns:GetAccountHoldersResponse" name="parameters"></wsdl:part>
  </wsdl:message>
  <wsdl:message name="GetAccountHolders">
    <wsdl:part element="tns:GetAccountHolders" name="parameters"></wsdl:part>
  </wsdl:message>
  <wsdl:message name="SendCertificateResponse">
    <wsdl:part element="tns:SendCertificateResponse" name="parameters"></wsdl:part>
  </wsdl:message>
  <wsdl:message name="SendAccountHolders">
```

```
    <wsdl:part element="tns:SendAccountHolders" name="parameters"></wsdl:part>
  </wsdl:message>
  <wsdl:message name="SendFeedbackResponse">
    <wsdl:part element="tns:SendFeedbackResponse" name="parameters"></wsdl:part>
  </wsdl:message>
  <wsdl:message name="SendFeedback">
    <wsdl:part element="tns:SendFeedback" name="parameters"></wsdl:part>
  </wsdl:message>
  <wsdl:message name="SendCertificate">
    <wsdl:part element="tns:SendCertificate" name="parameters"></wsdl:part>
  </wsdl:message>
  <wsdl:portType name="ServiceSoap">
    <wsdl:operation name="SendFeedback">
      <wsdl:input message="tns:SendFeedback" name="SendFeedback"></wsdl:input>
      <wsdl:output message="tns:SendFeedbackResponse"
name="SendFeedbackResponse"></wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="GetAccountHolders">
      <wsdl:input message="tns:GetAccountHolders" name="GetAccountHolders"></wsdl:input>
      <wsdl:output message="tns:GetAccountHoldersResponse"
name="GetAccountHoldersResponse"></wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="SendCertificate">
      <wsdl:input message="tns:SendCertificate" name="SendCertificate"></wsdl:input>
      <wsdl:output message="tns:SendCertificateResponse"
name="SendCertificateResponse"></wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="SendAccountHolders">
      <wsdl:input message="tns:SendAccountHolders"
name="SendAccountHolders"></wsdl:input>
      <wsdl:output message="tns:SendAccountHoldersResponse"
name="SendAccountHoldersResponse"></wsdl:output>
    </wsdl:operation>
  </wsdl:portType>
  <wsdl:binding name="ServiceSoapServiceSoapBinding" type="tns:ServiceSoap">
    <soap:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
    <wsdl:operation name="SendFeedback">
      <soap:operation soapAction="http://system.aibhub.net/SendFeedback"
style="document"/>
      <wsdl:input name="SendFeedback">
        <soap:body use="literal"/>
      </wsdl:input>
      <wsdl:output name="SendFeedbackResponse">
        <soap:body use="literal"/>
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="GetAccountHolders">
      <soap:operation soapAction="http://system.aibhub.net/GetAccountHolders"
style="document"/>
      <wsdl:input name="GetAccountHolders">
        <soap:body use="literal"/>
      </wsdl:input>
      <wsdl:output name="GetAccountHoldersResponse">
        <soap:body use="literal"/>
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="SendCertificate">
      <soap:operation soapAction="http://system.aibhub.net/SendCertificate"
style="document"/>
      <wsdl:input name="SendCertificate">
        <soap:body use="literal"/>
      </wsdl:input>
      <wsdl:output name="SendCertificateResponse">
        <soap:body use="literal"/>
      </wsdl:output>
    </wsdl:operation>
    <wsdl:operation name="SendAccountHolders">
      <soap:operation soapAction="http://system.aibhub.net/SendAccountHolders"
style="document"/>
      <wsdl:input name="SendAccountHolders">
```

```
        <soap:body use="literal"/>
      </wsdl:input>
      <wsdl:output name="SendAccountHoldersResponse">
        <soap:body use="literal"/>
      </wsdl:output>
    </wsdl:operation>
  </wsdl:binding>
  <wsdl:service name="ServiceSoapService">
    <wsdl:port binding="tns:ServiceSoapServiceSoapBinding" name="ServiceSoapPort">
      <soap:address location="https://mtls.aibhub.org/usy-aibhub-
wsendpointg01/00201001500000000000000000000100/ws"/>
    </wsdl:port>
  </wsdl:service>
</wsdl:definitions>
```

### C2.5.2 Example of a Registry WSDL

```
<WL5G3N0:definitions xmlns:WL5G3N0="http://schemas.xmlsoap.org/wsdl/"
xmlns:WL5G3N1="http://system.aibhub.net/"
xmlns:WL5G3N2="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:WL5G3N3="http://schemas.xmlsoap.org/wsdl/soap12/"
targetNamespace="http://system.aibhub.net/">
  <WL5G3N0:types>
    <s:schema xmlns:http="http://schemas.xmlsoap.org/wsdl/http/"
xmlns:mime="http://schemas.xmlsoap.org/wsdl/mime/"
xmlns:s="http://www.w3.org/2001/XMLSchema"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:soap12="http://schemas.xmlsoap.org/wsdl/soap12/"
xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
xmlns:tm="http://microsoft.com/wsdl/mime/textMatching/"
xmlns:tns="http://system.aibhub.net/" xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
elementFormDefault="qualified" targetNamespace="http://system.aibhub.net/">
      <s:element name="SetCertificate">
        <s:complexType>
          <s:sequence>
            <s:element maxOccurs="1" minOccurs="0" name="sCertificateMime"
type="s:string"/>
            <s:element maxOccurs="1" minOccurs="1" name="bTest" type="s:boolean"/>
          </s:sequence>
        </s:complexType>
      </s:element>
      <s:element name="SetCertificateResponse">
        <s:complexType>
          <s:sequence>
            <s:element maxOccurs="1" minOccurs="0" name="SetCertificateResult"
type="tns:ReturnMessage"/>
          </s:sequence>
        </s:complexType>
      </s:element>
      <s:complexType name="ReturnMessage">
        <s:sequence>
          <s:element maxOccurs="1" minOccurs="0" name="ReturnCode" type="s:string"/>
          <s:element maxOccurs="1" minOccurs="0" name="Id" type="s:string"/>
          <s:element maxOccurs="1" minOccurs="1" name="ErrorCode" type="s:int"/>
          <s:element maxOccurs="1" minOccurs="0" name="ErrorMessage" type="s:string"/>
          <s:element maxOccurs="1" minOccurs="0" name="DestinationVersion"
type="s:string"/>
          <s:element maxOccurs="1" minOccurs="0" name="AdditionalInfo" type="s:string"/>
          <s:element maxOccurs="1" minOccurs="0" name="SignatureMime" type="s:string"/>
        </s:sequence>
      </s:complexType>
      <s:element name="SetFeedback">
        <s:complexType>
          <s:sequence>
            <s:element maxOccurs="1" minOccurs="0" name="FeedbackMessage"
type="tns:ReturnMessage"/>
          </s:sequence>
        </s:complexType>
      </s:element>
      <s:element name="SetFeedbackResponse">
        <s:complexType>
```

```
          <s:sequence>
            <s:element maxOccurs="1" minOccurs="1" name="SetFeedbackResult"
type="s:boolean"/>
          </s:sequence>
        </s:complexType>
      </s:element>
    </s:schema>
  </WL5G3N0:types>
  <WL5G3N0:message name="SetCertificateSoapIn">
    <WL5G3N0:part element="WL5G3N1:SetCertificate" name="parameters"/>
  </WL5G3N0:message>
  <WL5G3N0:message name="SetCertificateSoapOut">
    <WL5G3N0:part element="WL5G3N1:SetCertificateResponse" name="parameters"/>
  </WL5G3N0:message>
  <WL5G3N0:message name="SetFeedbackSoapIn">
    <WL5G3N0:part element="WL5G3N1:SetFeedback" name="parameters"/>
  </WL5G3N0:message>
  <WL5G3N0:message name="SetFeedbackSoapOut">
    <WL5G3N0:part element="WL5G3N1:SetFeedbackResponse" name="parameters"/>
  </WL5G3N0:message>
  <WL5G3N0:portType name="RegistryServiceSoap">
    <WL5G3N0:operation name="SetCertificate">
      <WL5G3N0:input message="WL5G3N1:SetCertificateSoapIn"/>
      <WL5G3N0:output message="WL5G3N1:SetCertificateSoapOut"/>
    </WL5G3N0:operation>
    <WL5G3N0:operation name="SetFeedback">
      <WL5G3N0:input message="WL5G3N1:SetFeedbackSoapIn"/>
      <WL5G3N0:output message="WL5G3N1:SetFeedbackSoapOut"/>
    </WL5G3N0:operation>
  </WL5G3N0:portType>
  <WL5G3N0:binding name="RegistryServiceSoap" type="WL5G3N1:RegistryServiceSoap">
    <WL5G3N2:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
    <WL5G3N0:operation name="SetCertificate">
      <WL5G3N2:operation soapAction="http://system.aibhub.net/SetCertificate"
style="document"/>
      <WL5G3N0:input>
        <WL5G3N2:body use="literal"/>
      </WL5G3N0:input>
      <WL5G3N0:output>
        <WL5G3N2:body use="literal"/>
      </WL5G3N0:output>
    </WL5G3N0:operation>
    <WL5G3N0:operation name="SetFeedback">
      <WL5G3N2:operation soapAction="http://system.aibhub.net/SetFeedback"
style="document"/>
      <WL5G3N0:input>
        <WL5G3N2:body use="literal"/>
      </WL5G3N0:input>
      <WL5G3N0:output>
        <WL5G3N2:body use="literal"/>
      </WL5G3N0:output>
    </WL5G3N0:operation>
  </WL5G3N0:binding>
  <WL5G3N0:binding name="RegistryServiceSoap12" type="WL5G3N1:RegistryServiceSoap">
    <WL5G3N3:binding style="document" transport="http://schemas.xmlsoap.org/soap/http"/>
    <WL5G3N0:operation name="SetCertificate">
      <WL5G3N3:operation soapAction="http://system.aibhub.net/SetCertificate"
style="document"/>
      <WL5G3N0:input>
        <WL5G3N3:body use="literal"/>
      </WL5G3N0:input>
      <WL5G3N0:output>
        <WL5G3N3:body use="literal"/>
      </WL5G3N0:output>
    </WL5G3N0:operation>
    <WL5G3N0:operation name="SetFeedback">
      <WL5G3N3:operation soapAction="http://system.aibhub.net/SetFeedback"
style="document"/>
      <WL5G3N0:input>
        <WL5G3N3:body use="literal"/>
```

```
      </WL5G3N0:input>
      <WL5G3N0:output>
        <WL5G3N3:body use="literal"/>
      </WL5G3N0:output>
    </WL5G3N0:operation>
  </WL5G3N0:binding>
  <WL5G3N0:service name="RegistryService">
    <WL5G3N0:port binding="WL5G3N1:RegistryServiceSoap" name="RegistryServiceSoap">
      <WL5G3N2:address location="https://ac-
esb02.acce.alfa.local:9043/ECS/InternationalCertificatesTrade/receiveCertificate"/>
    </WL5G3N0:port>
  </WL5G3N0:service>
</WL5G3N0:definitions>
```

### C2.6 Messaging interface exposed by the AIB Hub to Registries (AMQP)

C2.6.1 This interface describes the AMQP messaging input interface of the AIB Hub. Registries use this interface for communicating with the AIB Hub. The interface is responsible for receiving transfer messages and acknowledgements (AK or NAK, optionally preceded by PENDING) from Registries and forwarding them to the relevant recipient Registry. Registries also use this interface to send Statistics files (B6.1.6) and Account Holder files (B5) to the AIB Hub and to request Account Holder files from it, as described in the AIB Hub Guide.

C2.6.2 The interface is implemented using the AMQP 1.0 protocol over a secure message broker infrastructure provided by the AIB Hub. Registries connect to the broker using mutually authenticated TLS connections and publish messages to queues assigned to their Registry identity.

C2.6.3 The messaging interface supports the following message types for transfers:

(a) Transfer message containing certificates from the Sending Registry (sendCertificate)

(b) Acknowledgement message (AK or NAK, optionally preceded by PENDING) from the Receiving Registry (sendFeedback)

C2.6.4 sendCertificate: message for sending a transfer

When a Sending Registry submits a transfer message using the AMQP interface, the AIB Hub validates the message structure, digital signature, and content against the defined rules and master data. The AIB Hub logs the transfer details in its database and forwards the transfer message to the Receiving Registry using the corresponding messaging interface.

Example of sendCertificate AMQP message:

The sendCertificate message is transmitted as an AMQP 1.0 message with application-properties containing the digital signature and the message body containing the transfer payload.

Example AMQP message structure:

message-id: "992026020500016"
content-type: "application/xml"
content-encoding: "utf-8"

AMQP Application-properties:
Signature:
"MIICljANBgkqhkiG9w0BAQEFAAOCAg8AMIICCgKCAgEAuExampleSignatureBase64Value..."

AMQP Body (XML payload example):

```
<r:Header MessageTransmissionTime="2026-02-05T11:41:02Z">
       <r:MessageID>992026020500016</r:MessageID>
        <r:FromRegistry>9900000000002</r:FromRegistry>
       <r:ToRegistry>3613581</r:ToRegistry>
        <r:Context>transfer</r:Context>
    </r:Header>
    <r:Body>
        <r:SendingAccountID cS="eecs">99X000000X</r:SendingAccountID>…..
```

C2.6.5 If validation fails in the AIB Hub, the transfer message is rejected and is not forwarded to the Receiving Registry. The AIB Hub sets the transfer to the state “Validation Failed” and sends a negative acknowledgement with the error code to the Sending Registry, except in the cases held in the state “Waiting for SU” (4.3.2.1 (e)).

C2.6.6 The transfer message payload must conform to the XML or JSON schema defined in Annex B and must be encoded using UTF-8.

C2.6.7 Each transfer message must contain a unique identifier (MessageID) that allows the AIB Hub and Registries to identify and track the transfer. The same transfer message may be resent unchanged with the same MessageID as a retry (see 4.3.1.1 (f)(ii)); the AIB Hub answers a retry of a transfer it has already received as described in C2.7.11.

C2.6.8 All messages must be digitally signed by the Sending Registry using its signing certificate. The AIB Hub validates the digital signature upon receipt. Messages with missing or invalid signatures are rejected.

C2.6.9 After successful validation, the AIB Hub forwards the transfer message to the Receiving Registry. The forwarded message is digitally signed by the AIB Hub.

C2.6.10 sendFeedback: message for sending an acknowledgement

The Receiving Registry must submit an acknowledgement message using the messaging interface to indicate the processing result of the transfer.

C2.6.11 The acknowledgement message contains a ReturnCode with one of the following values:

(a) "AK" ErrorCode = 0: the transfer was successfully validated and accepted by the Receiving Registry

(b) "NAK" ErrorCode > 0 and is one of the error codes given in the Fact Sheet 18: the transfer validation or processing failed in the Receiving Registry

(c) "PENDING" ErrorCode = 0: an optional interim answer of the Receiving Registry. It means that the transfer has been received and its processing is not finished, for example while it waits for manual approval. The AK or NAK must follow. The AIB Hub sets no time limit between the two, but the performance expectations of 2.3.5.1 apply. Until the AK or NAK arrives, the AIB Hub keeps the transfer in the state “Waiting for Confirmation”. PENDING must not be sent after the AK or NAK.

C2.6.12 The acknowledgement message must include the unique MessageID of the original transfer message and must be digitally signed by the Registry that sends it, i.e. the Receiving Registry of the transfer.

C2.6.13 When the AIB Hub receives a valid acknowledgement message, it validates the message and forwards it to the Sending Registry.

C2.6.14 Message delivery is asynchronous. The Sending Registry must monitor acknowledgements and apply retry or operational procedures if acknowledgements are not received within the expected timeframe.

C2.6.15 The messaging interface uses an at-least-once delivery model. Registries must ensure that their systems support idempotent processing and are capable of handling duplicate messages.

C2.6.16 Secure communication between the Registry and the AIB Hub must use mutual TLS authentication. Access to messaging resources is restricted to authorised Registries.

C2.6.17 The AIB Hub provides dedicated messaging queues for each Registry. Registries must publish outgoing messages and consume incoming messages using these queues.

C2.6.18 The AIB Hub maintains the transfer lifecycle and status. Registries must ensure proper handling of transfer messages and acknowledgements in accordance with this specification.

## C2.7 Messaging interface exposed by Registries to the AIB Hub (AMQP)

C2.7.1 This interface describes the AMQP messaging output interface of the AIB Hub. The AIB Hub submits transfer messages and acknowledgement messages to the Registry via the AMQP external message broker infrastructure. Registries must connect to the broker using mutually authenticated TLS and consume messages from the queues assigned to their Registry identity. The AIB Hub also uses this interface to return its answers to the Statistics files and Account Holder files sent by the Registry and to deliver the Account Holder files requested by it, as described in the AIB Hub Guide.

C2.7.2 The messaging interface supports the following message types for transfers:

(a) Transfer message containing certificates forwarded by the AIB Hub (setCertificate)

(b) Acknowledgement message (AK or NAK) forwarded by the AIB Hub, or an acknowledgement (PENDING, AK or NAK) sent by the AIB Hub itself in answer to a retry (setFeedback)

C2.7.3 setCertificate: message for receiving a transfer

When the AIB Hub forwards a transfer message to a Receiving Registry, the Registry must receive the message from its assigned messaging queue and validate the message structure, digital signature, and payload content.

C2.7.4 The Registry must validate the digital signature applied by the AIB Hub. Messages with missing or invalid signatures must be rejected and handled according to Registry operational procedures.

C2.7.5 The Registry must validate that the message conforms to the expected XML or JSON schema defined in Annex B and that the content is valid and consistent with the Registry's business rules.

C2.7.6 After successful validation and processing of the transfer message, the Receiving Registry must submit an acknowledgement message using the sendFeedback messaging interface as described in C2.6.10. Before that, once it has received the transfer, it may send PENDING (see C2.6.11).

C2.7.7 If the transfer message cannot be processed successfully, the Receiving Registry must submit a negative acknowledgement (NAK) message indicating the error condition.

C2.7.8 setFeedback: message for receiving an acknowledgement

When the AIB Hub forwards an acknowledgement message to the Sending Registry, the Registry must receive the acknowledgement message from its assigned messaging queue and validate the digital signature and message content.

C2.7.9 The acknowledgement message contains the MessageID and ReturnCode, allowing the Sending Registry to correlate the acknowledgement with the original transfer.

C2.7.10 The Sending Registry must update the transfer status in its system based on the received acknowledgement message.

C2.7.11 When the AIB Hub receives a retry of a transfer it has already received (the same transfer message resent unchanged by the Sending Registry with the same MessageID, see C2.6.7), it answers the retry itself and does not create a new transfer. If the original transfer is still in progress, the AIB Hub sends PENDING (ErrorCode = 0); the AK or NAK of the original transfer follows later as usual. If the original transfer is closed with an AK or NAK and still present in the AIB Hub transfer log (30 days after its last change of state, see 4.3.1.1 (f)(ii)), the AIB Hub sends that AK or NAK again (the same ReturnCode, ErrorCode and ErrorMessage). In its answers to the retry, the AIB Hub states in AdditionalInfo that the transfer has been retried (currently "Payload has been retried."); the later AK or NAK of the original transfer carries no such text. On receiving PENDING, the Sending Registry must keep the transfer open until it receives the AK or NAK; answers to a retry never reopen a transfer that is already closed in the Sending Registry.

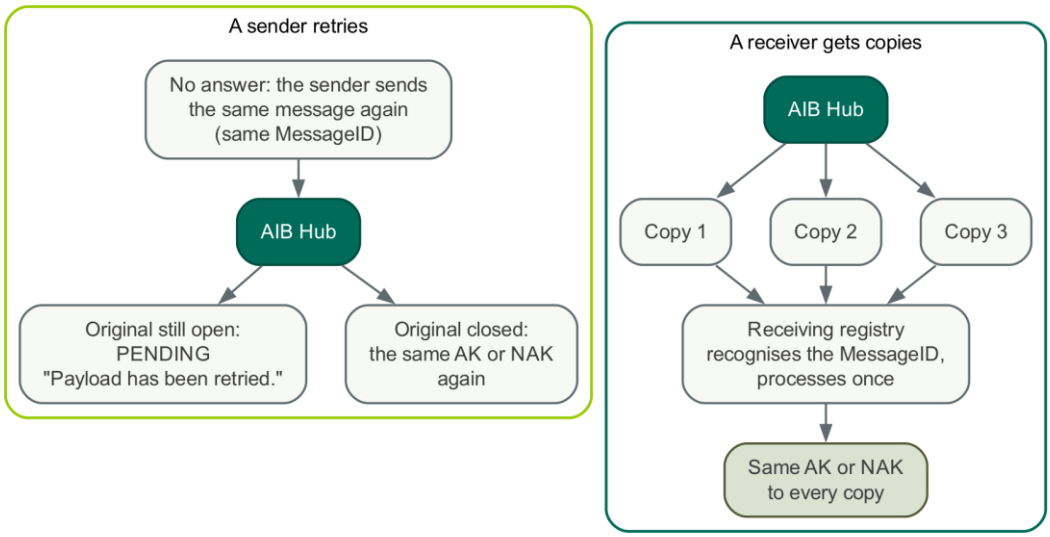



Figure C.2 – A retry by the Sending Registry and repeated deliveries to the Receiving Registry (AMQP channel)

C2.7.12 The Registry messaging client must support asynchronous message reception and must be capable of receiving multiple messages concurrently; however, until the double counting validation can be processed in parallel, it is recommended to process messages sequentially.

C2.7.13 The Registry must acknowledge receipt of AMQP messages at the messaging protocol level (technical ACK) only after validation and processing to ensure reliable delivery. Processing means that the transfer is validated and safely stored. The positive or negative acknowledgement may follow later, for example after manual approval.

C2.7.14 The messaging interface uses an at-least-once delivery model. Registries must ensure idempotent processing and must be capable of handling duplicate message delivery without adverse effects. A Receiving Registry recognises a repeated delivery by the MessageID in the payload, not by the AMQP message properties, and answers it as set out in 4.3.3.1 (f).

C2.7.15 The Registry must ensure secure operation of its messaging client, including protection of private keys, certificate lifecycle management, and secure storage of credentials.

C2.7.16 Communication between the AIB Hub and the Registry must use mutual TLS authentication. Registries must ensure that only authorised systems are permitted to connect to the messaging infrastructure.

C2.7.17 Registries must ensure continuous availability of their messaging client to receive incoming transfer and acknowledgement messages in a timely manner.

C2.7.18 The Registry is responsible for monitoring incoming messaging queues and ensuring that transfer messages and acknowledgements are processed according to the requirements defined in this specification.

# ANNEX D - EECS TRANSFER INTERFACE TEST SPECIFICATION FOR THE HUB

## D1 Introduction

### D1.1 Purpose

D1.1.1 This annex describes the Technical Audit: the test procedure by which the AIB verifies that an EECS Registration Database (Registry) is able to exchange EECS Certificates via the AIB Hub in compliance with this document, before the Registry is connected to the production environment of the AIB Hub and before a change to its configuration or its interfaces takes effect.

D1.1.2 The Technical Audit is performed with the Technical Audit tool of the AIB Hub. The step-by-step description of the tool and of the individual test scenarios is given in the AIB Hub Guide, chapter 6 “Pass the Technical Audit” (see section 1.3).

### D1.2 Approach

D1.2.1 The Technical Audit exercises the interfaces defined in Annexes B and C between the audited Registry and a Virtual Registry operated by the AIB Hub. It tests the ability of the Registry to send and receive correctly formatted messages, to validate incoming messages and to respond with the correct acknowledgement or rejection reason. It does not test the business functionality of the Registry beyond the interface, nor interfaces between the Registry and national or participant systems.

D1.2.2 Communications between Registries are, for the purposes of the Technical Audit, assumed to be mediated by the AIB Hub.

### D1.3 When a Technical Audit is required

D1.3.1 A Registry Operator must pass a Technical Audit:

(a) before a newly constituted or replaced Registry is connected to the production environment of the AIB Hub;

(b) before the Registry starts issuing, exporting or importing a new certificate type (a new combination in the “Allowed Transaction Type” configuration of the Registry in the AIB Hub);

(c) before the Registry changes its communication channel (from the web service channel (SOAP) to the AMQP channel) or its message schema version (for example v80 to v81); the transfer configuration of the Registry for the new channel or schema version becomes active only after the Technical Audit has been approved;

(d) after a change to the Registry that may affect its compliance with this document; depending on the extent of the change the AIB may require a full or a reduced audit; and

(e) when required by the AIB in the context of the AIB Member Audit or of the review procedures of the EECS Rules (AIB-EECS-SD07).

D1.3.2 The AIB decides, on request of the Registry Operator, on the scope of a reduced audit.

## D2 Technical Audit Process

### D2.1 Overview

D2.1.1 The Technical Audit consists of the following steps:

(a) the Audit Sandbox;

(b) the Audit Test;

(c) the Technical Audit Report, whose Questionnaire chapter the Registry Operator fills in; and

(d) the review by the AIB and the approval by the ISU.

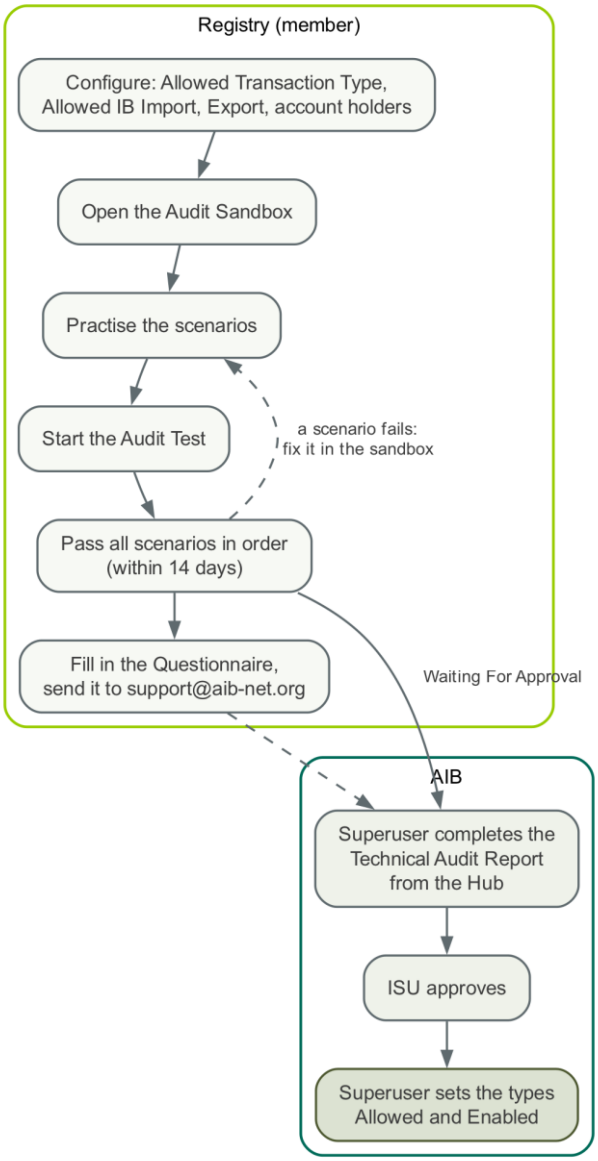



Figure D.1 – The Technical Audit from configuration to approval

D2.1.2 The Technical Audit is performed in the PRE-PROD environment of the AIB Hub (see the AIB Hub Guide). The Technical Audit tool is not available in the production environment. There is no requirement for on-site witnessing of the Technical Audit by the AIB.

### D2.2 Audit Questionnaire

D2.2.1 The Registry Operator fills in the Questionnaire chapter of the Technical Audit Report. The template is available in the section Info › Documents of the AIB Hub web interface and on the AIB website (aib-net.org/portal/information/technical-audits). The Questionnaire collects information on the Registry system, its operation and security. The Registry Operator sends the completed Questionnaire to the AIB Support.

### D2.3 Audit Sandbox

D2.3.1 The Registry Operator selects in the Registry configuration the certificate types and transaction types (issuing, export, import) for which the Registry is to be audited (“Allowed Transaction Type”), chooses for each requested certificate type the Account Holder that receives the audit transfers,

and opens the Audit Sandbox. The Registry configuration relevant to the audit is locked while an audit is running.

D2.3.2 In the Audit Sandbox the Registry Operator may run the test scenarios in any order and as often as needed; the results are not evaluated by the AIB. It is strongly recommended to complete every scenario in the Audit Sandbox before starting the Audit Test.

### D2.4 Audit Test

D2.4.1 The Audit Test is started from the Audit Sandbox. The Registry must pass all scenarios required by its configuration, in the prescribed sequence, within 14 calendar days of the start of the Audit Test. A failed scenario ends the Audit Test, and so does aborting it. If the 14 days run out, the AIB Hub sets the Audit Test to Failed. The Registry Operator corrects the problem, repeats the scenario in the Audit Sandbox and starts a new Audit Test. Every failed Audit Test must be explained to the AIB.

D2.4.2 When all scenarios have passed, the AIB Hub sets the Audit Test to the state Waiting For Approval. The AIB Hub records the results of all scenarios.

### D2.5 Review and Approval

D2.5.1 The AIB Superuser reviews the results recorded in the AIB Hub and the Questionnaire, completes the Technical Audit Report and prepares it for approval by the ISU. Where a scenario result requires explanation (for example a positive acknowledgement where a rejection was expected), the Registry Operator provides it on request. After the approval, the AIB Superuser sets the audited certificate types to Allowed and Enabled in the registry configuration.

D2.5.2 Any concern arising from a failed Technical Audit may be escalated, in the first instance to the AIB Secretariat, and, if that does not result in a resolution, to the Information Systems Unit (ISU).

## D3 Test Environment and Prerequisites

D3.1.1 Before starting the Technical Audit the Registry Operator must ensure that:

(a) the Registry is connected to the PRE-PROD environment of the AIB Hub through the communication channel to be audited (the web service channel (SOAP) or the AMQP channel), with valid certificates (see Annex C and the AIB Hub Guide);

(b) the country, Domain, Issuing Body, Registry configuration, Account Holders and users required for the audit exist and are valid in the AIB Hub;

(c) the Registry uses the same software, procedures and validations as in production operation, or a test instance configured identically; the test data need only be syntactically correct and need not represent real business data;

(d) for scenarios initiated by the Virtual Registry, the Registry is able to receive certificates of every certificate type selected in its configuration; the AIB maintains the corresponding certificate templates per message schema version in the AIB Hub; and

(e) live data cannot be affected: while a Registry configuration is in audit, the Registry exchanges transfers only with the Virtual Registry, and transfers it sends to other Registries are rejected (error code 123). Transfers sent to the Virtual Registries of the audit while no Technical Audit is active are rejected (error code 124).

## D4 Test Scenarios

D4.1.1 The test scenarios, numbered 1 to 9 in the Technical Audit tool of the AIB Hub, cover the following abilities of the Registry. Only the scenarios and cases relevant to the audited configuration are required:

(a) import of certificates (scenario 1): receiving and accepting transfers of every certificate type selected for import;

(b) export and issuing of certificates (scenario 2): sending, for every certificate type selected for issuing or export, transfers that pass the validations of the AIB Hub and reach the completed status;

(c) rejection of incorrect messages (scenario 3) with the correct error code according to Fact Sheet 18 “Transfer Error Codes”, for example an invalid or unknown Account Holder, an invalid technology code, expired certificates, an unsupported certificate type or Issuing Body and, where the Registry allows it, the rejection of an incoming transfer by the Issuing Body or the Account Holder;

(d) handling of several concurrent transfers in both directions (scenarios 4 and 5), including the correct use of positive and negative acknowledgements;

(e) immutability (scenario 6): certificates received and re-exported by the Registry retain all their data unchanged, also in a transfer with as many certificate bundles as the Max Amount of Bundles of the registry configuration (2.3.5.4);

(f) double counting (scenario 7): rejection of certificates that are already held in the Registry (error code 65);

(g) for the AMQP channel (scenario 8): idempotent processing of repeated deliveries of the same transfer (4.3.3.1 (f) and Annex C). The AIB Hub delivers the same transfer four times, as separate messages with the same MessageID. The Registry recognises the copies by the MessageID, processes the transfer once and answers every delivery with a positive acknowledgement, so that the AIB Hub receives four positive acknowledgements. A PENDING may precede them. No delivery is answered with NAK 10 or NAK 65; and

(h) for Registries using message schema v81 (scenario 9): correct handling of certificates transformed between v80 and v81 by the AIB Hub, including the immutability of the certificate data (see B3.2), and, for a Registry that restores information lost in the transformation (B3.2.4 (d)), that it restores only that information and only on the certificates it issued itself.

D4.1.2 The detailed description of each scenario, its cases and the expected responses is given in the AIB Hub Guide, chapter 6.

## D5 Problem Reporting

D5.1.1 The Registry Operator logs all failures observed during the Technical Audit, tracks their resolution in its systems and processes and ensures that they are fixed before the Audit Test is repeated.

D5.1.2 The AIB Hub records all messages exchanged during the Technical Audit and their results. The Technical Audit Report is the record of the Technical Audit.