E-INVOICING AND ELECTRONIC SETTLEMENT MATCHING

VERSION 1.0

Created by Energy Traders Europe

European Foreword

This document has been prepared by the Energy Traders Europe, Operations Committee, owner of the eSM standard with guidance from OpenPeppol, owner of the e-invoicing standard BIS.3.0.

This document is part of a set of documents owned by Energy Traders Europe, Operations Committee, consisting of the following:

| Document | Description |
| --- | --- |
| E-Invoicing and Settlement Matching Specification (this document) | Document describing:* Supported eSM Document Types
* Process Considerations
* General Approach & High-Level Principles
* Considerations Regarding Document Types
* E-Invoicing Document Creation Triggering Event
* High-Level Process Description
* Mapping of ESM Invoices to Peppol Invoices
* Syntax Mapping Spreadsheet
* Eligibility of eSM Documents for E-Invoicing
* Rounding Issues
* Usage of Signs
* Enrichment
* Code Lists
 |
| eSM to Peppol Syntax Mapping ( Excel file) | Contains all mappings from eSM XML to BIS 3.0 XML |
| Electronic Settlement Matching Standard V4.0 | Describes support of e-invoicing in the eSM context. Provides rounding guidelines.  |
| CpML for ESM Specification V4.0 | Added support for e-invoicing, new fields:* EInvoicing, EInvoicingFormat, SupplierEndpointID, SupplierEndpointID-Scheme, CustomerEndpointID, CustomerEndpointIDScheme, TaxCategory, AccountingCostReference
* Added business rules for cross-validation of values: end date after start date, correct sums in totals
* New type for amounts in currency, only two decimals allowed
 |
| Electronic Settlement Matching XML schemas V4.0 | Updated with new e-invoicing fields. |

For details about the documents, see also “Additional Information”.

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# About this Document

This technical specification describes the process for converting invoices created using the Electronic Settlement Matching (eSM) standard by Energy Traders Europe to the Open Peppol BIS 3.0 format for e-invoicing.

## Revision History

| Version | Date | Changes | Author of changes |
| --- | --- | --- | --- |
| 1.0 | April 2025 | First version, Phase 1 | eSM working group |
|  |  |  |  |
|  |  |  |  |

## Target Audience

This document is for business analysts and IT professionals in commodity trading who want to use the e-invoicing capabilities of the eSM process.

For example, this can be:

* Software engineers and data architects who implement CpML interfaces
* Business analysts who develop process interfaces

The following knowledge is assumed:

* Familiarity with the terms and processes used in the commodity trading industry
* Know-how regarding the structure and functionality of XML schemas
* Some knowledge of the applicable invoicing and settlement processes and market practices

## Additional Information

This section lists web sites or documents with additional information related to the eSM Process.

| Reference document | Description | Source | Version | Publishing Date |
| --- | --- | --- | --- | --- |
| 1.
 | Electronic Settlement Matching (eSM) standard | <https://www.energytraderseurope.org/data-standard-overview/esm-electronic-settlement-matching-1> | 4.0 | April 2025 |
| 1.
 | CpML for eSM specification | <https://www.energytraderseurope.org/data-standard-overview/esm-electronic-settlement-matching-1> | 4.0 | April 2025 |
| 1.
 | Peppol BIS specification | <https://docs.peppol.eu/poacc/billing/3.0/> | 3.0 |  |
|  | Unified Business Language (UBL) | <https://docs.oasis-open.org/ubl/UBL-2.1.html> | 2.1 | November 2013 |
|  | EN 16931-1, European standard on invoicing | [https://ec.europa.eu/digital-building-blocks/sites/display/DIGITAL/Compliance+with+eInvoicing+standard](https://ec.europa.eu/digital-building-blocks/sites/display/DIGITAL/Compliance%2Bwith%2BeInvoicing%2Bstandard) |  |  |
| 1.
 | Peppol: International Code Designators based on ISO 6523  | <https://docs.peppol.eu/poacc/billing/3.0/codelist/ICD/> | 3.0 |  |
| 1.
 | Peppol: Endpoint Address Scheme | <https://docs.peppol.eu/poacc/billing/3.0/codelist/eas/> | 3.0 |  |
| 1.
 | Peppol: Supported units of measurement based on UNECE Rec 20 | <https://docs.peppol.eu/poacc/billing/3.0/codelist/UNECERec20> | 3.0 |  |
| 1.
 | Peppol: Calculation of totals | <https://docs.peppol.eu/poacc/billing/3.0/bis/#_calculation_of_totals> | 3.0 |  |
| 1.
 | Peppol: National validation rules | <https://docs.peppol.eu/poacc/billing/3.0/bis/#national_rules> | 3.0 |  |
| 1.
 | Peppol: Tax exemption reason code | <https://docs.peppol.eu/poacc/billing/3.0/syntax/ubl-invoice/cac-TaxTotal/cac-TaxSubtotal/cac-TaxCategory/cbc-TaxExemptionReasonCode/> | 3.0 |  |
| 1.
 | Peppol: Tax exemption reason | <https://docs.peppol.eu/poacc/billing/3.0/syntax/ubl-invoice/cac-TaxTotal/cac-TaxSubtotal/cac-TaxCategory/cbc-TaxExemptionReason/> | 3.0 |  |

## Conventions

### Use of Modal Verbs

For compliance with this specification, implementers need to be able to distinguish between mandatory requirements, recommendations and permissions, as well as possibilities and capabilities. This is supported by the following rules for using modal verbs.

The key words “must”, “must not”, “required”, “should”, “should not”, “recommended”, “may” and “optional” in this document are to be interpreted as follows:

| Key word | Description |
| --- | --- |
| Must | Indicates an absolute requirement. Requirements must be followed strictly to conform to the standard. Deviations are not allowed.Alternative expression: shall, required, is mandatory |
| Must not | Indicates an absolute prohibition. This phrase means that the provision must not be used in any implementation of the standard.Alternative expression: must be omitted |
| Should | Indicates a recommendation. Among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others. There may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.Alternative expression: recommended |
| May | Indicates a permission. This word means that an item is truly optional within the limits of CpML. One data supplier may choose to include the item because a particular transaction requires it or because the data supplier feels that it enhances the document while another data supplier may omit the same item.Alternative expression: optional |
| Should not | This phrase means that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.Alternative expression: “not recommended” |

### Typographical Conventions

This documentation uses the following typographical conventions:

* ‘DocumentID’: Single quotation marks are used to indicate field names in XML schemas.
* “True”: Double quotation marks are used to indicate field values in XML schemas.
* ESMDocument/ProcessInformation: Slashes indicate paths or nested nodes within XML schemas.
* LineItemsIncluded: Field names and values as well as attributes are consistently written with camel case spelling, as in the XML schemas. There are no spaces between words and each new word starts with an uppercase letter.

# Scope and Purpose of this Specification

Electronic invoicing is a significant step towards the wider use and knowledge of electronic business. An e-invoice is a reliable, secure and paperless method to digitally handle and process invoices for any kind of product or service.

This technical specification defines the mapping between eSM invoices and the semantic model of an invoice defined in Peppol, which services as a technical representation of EN 16931-1. This specification describes a syntax mapping and provides additional information and business rules that need to be followed to create valid Peppol invoices from the esM process. The first phase of analysis has focused on data mapping, subsequent phases will consider process flows and orchestration and will detail the architecture model.

At the time of the initial publication of this document, there is a gradual rollout of e‑invoicing across jurisdictions, some with known, some with unknown timelines.

Given that the buyer and/or seller may belong to different jurisdictions with different timelines or different requirements for e-invoicing adoption or the buyer and/or seller may not fall under any e-invoicing regime, there is a need for a robust and scalable data mapping, a flexible architecture and a separation of the default eSM process and e‑invoicing. This separation enables eSM users to adopt e-invoicing if and whenever they wish. For the purpose of this specification, two types of process users are defined:

* **eSM default user**: Uses the full matching functionality of eSM, but has no requirement for e-invoicing.
* **e-invoicing user**: Uses the full matching functionality of eSM and additionally has e‑invoicing requirements as defined in this document.

Each company to agree internally and follow own tax jurisdiction requirements:

* The eSM invoice document is the fiscal invoice for eSM users.
* The e-invoicing invoice document is the fiscal invoice for e-invoicing users.

## Legal Requirements

The European Parliament and Council voted the Directive 2014/55/EU on electronic invoicing in public procurement on 16 April 2014. This Directive calls for the definition of a common European standard on electronic invoicing (EN 16931) at the semantic level, and additional standardisation deliverables which will enhance interoperability at the syntax level.

The European e-invoicing standard EN 16931 provides a semantic data model of the core elements of an electronic invoice. The semantic model includes only the essential information elements that an electronic invoice needs to ensure legal (including fiscal) compliance and to enable interoperability for cross-border, cross sector and for domestic trade.

eSM had been defined and released in 2019 for use as an automated alternative to the paper-based settlement process within the energy/commodity trading sector, in compliance with regional tax and accounting rules such as EU regulations as well as local tax and accounting rules such as country- or state-specific regulations. The mapping defined in this document between eSM and Peppol demonstrates the compliance of eSM to the semantic model provided by EN 16931.

## Supported eSM Document Types

Both the eSM process and Peppol supported processing of different document types. For the purposes of e-invoicing in eSM, the following rules apply:

The conversion to the Peppol format supports matched invoices and timed out invoices, see also “Eligibility of eSM Documents for E-Invoicing”. Both strict and non-strict matching is supported. For a successful conversion to PEPPOL, eSM documents must have at least one line item. For e-invoicing users, at least one line item is therefore mandatory.

Credit notes are out of scope in Phase 1. In eSM, there is no separate document structure for credit notes because full cancellation and invoice re-generation is adopted.

Self-billing invoices are out of scope during the current phase. It is intended to include self-billing invoices at a later stage.

Any other eSM-specific documents that are related to matching are out of scope and will not be converted, including shadow invoices (synthetic documents from the perspective of the buyer) and netting statements. This may be reviewed in subsequent phases

# Process Considerations

## General Approach

In a phased approach, Energy Traders Europe is working together with OpenPeppol to provide a flexible and scalable data model solution that makes the eSM standard compliant with Peppol BIS 3.0

In Phase 1, a data analysis has been carried out, comparing eSM V3.6 and the Peppol Business Interoperability Specification (BIS) 3.0, which is Open Peppol’s current e-invoicing specification based on EN 16931. During this analysis, a high degree of similarity was identified, alongside a reduced number of differences. This analysis yielded the following results:

**Differences in cardinality:**In some cases, fields exist in both eSM and Peppol, but with different cardinality, that is, Peppol defines a field as mandatory that is optional in eSM. For eSM default users, these fields will remain optional to avoid breaking backwards compatibility. For e-invoicing users, these fields will follow the Peppol cardinality. For details, see the CpML for eSM specification in reference document [2].

**Different document types:**eSM and Peppol have different document types. For example, a credit note is a separate document in Peppol but not in eSM. For the first phase, only eSM documents of type invoice (“INV”) will be in scope for e-invoicing. For details, see “Supported eSM Document Types”.

**Missing information:** In some cases, information that is mandatory in Peppol is not available in eSM documents or is not provided in a supported data type. For example, Peppol has endpoint IDs for supplier and customer that must follow a supported scheme.

* 1. For most fields, this information is derived from existing data as described in the eSM2Peppol syntax mapping, see “Syntax Mapping Spreadsheet”.
	2. Other fields can be generated by service providers, see “Enrichment”.
	3. Where the values cannot be derived or generated, new fields are introduced to the eSM schemas, see “Consolidated eSM Documents”. To avoid breaking compatibility, these fields are optional for eSM default users. For e-invoicing users, the e-invoicing fields follow the Peppol cardinality.

**Different data types:** In some cases, fields are available in both eSM and Peppol, but the sets of allowed values or supported schemes are not fully compliant. For example, only a subset of the units of measure supported by eSM are also supported in Peppol. For details, see “Code Lists”.

**Rounding differences:** Peppol only allows two decimal places for amounts in any currency, whereas eSM does not limit the number of decimal places. To ensure compatibility, eSM will also use two decimals only and implement rounding rules. For details, see “Rounding Issues”.

Peppol does not have any limits for number of decimal places for volumes or unit prices. To ensure compatibility, the number of decimal places for volumes and prices was adapted in eSM.

## High-Level Principles

The analysis for mapping eSM to Peppol is based on the following principles:

1. The existing matching functionality in eSM must be preserved. Mapping to Peppol must not add any limiting constraints.

The adoption process must allow a gradual uptake of e-invoicing for companies in different jurisdictions.

Where possible, breaking compatibility for eSM default users must be avoided.

Where possible, the service provides should use existing master data to derive, enrich and populate the Peppol fields based on rules defined in the syntax mapping, in order to minimise changes to members’ internal systems. Usage of master data does not imply any data synchronisation between different service providers.

Where possible, existing eSM field names must be reserved. A syntax mapping links eSM fields to their counterparts in Peppol.

After submission, reconciliation checks are performed at header level to ensure that the matched eSM invoice document mirrors the submitted e-invoicing document. This validation ensures that the conversion to Peppol was performed successfully, especially relevant when eSM and Peppol service providers are different implementors involved in the end-to-end process. Only key attributes are to be reconciled. The reconciliation is fully automated with no human intervention.

The solution must be flexible and scalable to allow:

* 1. Member companies decide how they integrate eSM matching and e-invoicing within their own internal processes: eSM matching can be performed closely integrated, in parallel or sequential to the e-invoicing process.
	2. Member companies may gradually uptake e-invoicing and can switch from one model to another at a later date.

## Consolidated eSM Documents

To allow for a single, consolidated view of the XML document and its processing status across eSM and Peppol processes, it was decided to use a single document type for matching as well as e-invoicing, and collate both use cases in the existing process messages (box results).

The resulting Peppol e-invoice is a separate document that is not an eSM document type.

The eSM process messages will be extended with the read/receipt, Peppol e-invoicing document, Peppol read/receipt status, reconciliation proof eSM document and Peppol e-invoicing document. The details to be finalised in subsequent phases.

The following e-invoicing specific fields were added to the ESMDocument specification:

Table 1: New e-invoicing fields in eSM

| Section and field | Description |
| --- | --- |
| ProcessInformation/EnableEInvoicing  | If this field is present, then an eSM invoice is to be processed for e-invoicing. |
| ProcessInformation/EInvoicingDetails | Group of fields that provide additional information for e-invoicing. |
| .. EInvoicingFormat | Default value is “PEPPOL”. Additional values will be added if and when more e-invoicing formats are supported. |
| .. SupplierEndpointID | Supplier’s electronic address to which the application level response to the invoice may be delivered in Peppol. |
| .. SupplierEndpointIDScheme | The type of identification scheme of the supplier’s electronic address. |
| .. CustomerEndpointID | Customer’s electronic address to which the application level response to the invoice may be delivered in Peppol. |
| .. CustomerEndpointIDScheme | The type of identification scheme of the customer’s electronic address. |
| InvoiceData/TypeOfInvoice | Functional type of the invoice. The default value is “380” (Commercial invoice). |
| InvoiceData/VATDetails/TaxCategory | Tax category code. |
| InvoiceData/PaymentMeansCode | Information on how the payment is settled.  |
| LineItem/AccountingCostReference | An optional textual value that specifies where to book the relevant data into the buyer’s financial accounts.  |

## E-Invoicing Document Creation Triggering Event

During the analysis, it was considered whether to trigger the creation of the e-invoice before, after or within the eSM matching process.

The preferred approach was to generate the e-invoice after the matching process, because it is believed that this has a minimal impact on existing eSM matching functionality for eSM default users.

For e-invoicing users, e-invoices in the Peppol format should be generated automatically, with no human intervention. The triggering event is when the eSM invoice and the eSM shadow invoice have been successfully matched or matched with tolerance.

For eSM default users, this e-invoicing creation process will not be triggered.

### eSM Matches with TimeOut Error Code

For rejected eSM invoices, the Rejection Document contains a ‘ReasonCode’ field with an error code. By default, all rejected eSM invoices are excluded from e-invoicing.

As an exception, the e-invoice process may be manually triggered if the eSM error code is “TimeOut”, which means that the document timed out on the sender side. In the future, it may be considered to automate this process, details will be clarified in subsequent phases.

**Note:** For more information on error codes in eSM, see Appendix A.1 in the eSM standard (reference document [1]).

# High-Level Process Description

Figure 1: High-level context diagram section describes the e-invoicing data flow within eSM, as defined in scope of Phase 1.



Figure 1: High-level context diagram

| # | Step | Description |
| --- | --- | --- |
| 1 | Match eSM documents | Create the matched eSM invoice (or use timed-out invoice) as per the eSM standard. For eSM default users, there are no additional steps. |
| 2a | Enrichment | For e-invoicing users, enrich the eSM document for e-invoicing, as defined in this specification. |
| 2b | Enrichment based on national validation rules | *Out of scope in Phase 1, to be reconsidered for subsequent phases.*For e-invoicing users, perform additional enrichment steps specific to any national jurisdiction requirements for e-invoicing. For information on national validation rules in Peppol, see reference document [10].  |
| 3 | Generate e-invoice | Generate e-invoice as defined in this specification. |
| 4 | Peppol acceptance processing | *Out of scope in Phase 1, to be reconsidered for subsequent phases.*Processing the Peppol submission result.Results to be consolidated in a single view in step (5) consolidation with eSM results.Service providers to use [https://docs.peppol.eu/poacc/upgrade-3/profiles/63-invoiceresponse](https://docs.peppol.eu/poacc/upgrade-3/profiles/63-invoiceresponse/) |
| 5 | Header-level reconciliation & consolidation of processing results | *Reconciliation is out-of-scope in Phase 1, to be reconsidered for subsequent phases.*Reconcile header-level information in the generated e-invoice with the original eSM invoice. In case the eSM service provider and the e-invoicing service provider are different implementors, the reconciliation provides a single view of the processing result and allows to verify that a successful e-invoice generation. Result is a consolidated view (single box result) containing:* E-Invoice
* Reconciliation proof of eSM invoice vs. e-invoice
* Results from Peppol admission with any error codes as provided by step 5
 |
| 6 | Transfer e-invoice to parties and/or national tax authorities | *Out of scope in Phase 1, to be reconsidered for subsequent phases.*Assumed that the Peppol network and related documentation covers these aspects. |

## Roles for Service Providers in the Process

To allow flexibility and scalability, the process steps can be carried out by different service providers (SPs). There are two types of service provider roles that are being referred to:

* eSM Service Providers: Carry out eSM matching and all related eSM processing.
* E-Invoicing Service Providers: Registered on the Peppol network and can process e‑invoicing documents.

The same service provider can carry out one or both roles.

All steps in scope of Phase 1 are assumed to be carried out by eSM service providers.

Steps in scope of subsequent phases are subject to further detailed analysis and are to allow a combination of eSM and/or E-Invoicing Service Providers.

E-Invoicing users can select an e-invoicing service provider without having to become OpenPeppol members themselves.

## Use Case Coverage

The data mapping described in Phase 1 covers the use cases UC1 to UC4.

In subsequent phases, further analysis will consider use cases UC5 to UC8.

Table 2: Supported use cases in eSM to Peppol

| Use Case  | Seller  | Buyer |
| --- | --- | --- |
| UC1 | eSM | eSM |
| UC2 | eSM | e-invoicing |
| UC3 | e-invoicing | eSM |
| UC4 | e-invoicing (Peppol BIS3) | e-invoicing (Peppol BIS3) |
| UC5 | non-eSM  | e-invoicing |
| UC6 | e-invoicing | non-eSM  |
| UC7 | other e-invoicing (non-Peppol BIS3) | e-invoicing (Peppol BIS3) |
| UC8 | e-invoicing (Peppol BIS3) | other e-invoicing (non-Peppol BIS3) |

# Mapping of eSM Invoices to Peppol Invoices

The mapping between an eSM invoice and a Peppol invoice is described using this document as well as the accompanying Excel spreadsheet with the syntax mapping.

## Syntax Mapping Spreadsheet

The attached spreadsheet provides the detailed syntax mappings between the fields in eSM invoices and Peppol documents:

* [eSM2Peppol\_syntax\_mapping\_1.0xlsx](eSM2Peppol_syntax_mapping_1.0.xlsx)

The Excel spreadsheet contains the following information:

* Tab “Invoice Mapping”: Syntax mapping between fields in Peppol invoices in UBL syntax and the corresponding fields in an eSM invoice.
* Tab “Version History”: Overview of changes across versions.

The syntax mapping lists all mandatory and optional fields that are available in Peppol. A mapping to eSM invoices is provided for fields that are mandatory in Peppol BIS 3.0 and some additional fields that are available in eSM invoices or can be generated from other sources. For each field, a mapping rule describes how the Peppol field is to be filled. If additional actions to a 1:1 mapping are required, this is clearly indicated.

eSM as well as Peppol contain fields that require values in a specific format or specific values from a list of allowed values. In some cases, the equivalent fields are based on the same standards, in other cases the values have to be transformed in order to match the target format. The corresponding mappings are described in “Code Lists”.

In addition, some values have to be generated or filled based on standardized values. Whenever this is the case, this is clearly indicated in the syntax mapping. For details, see “Enrichment”.

## Eligibility of eSM Documents for E-Invoicing

eSM documents with the following properties are eligible for e-invoicing:

* Document root is ‘ESMDocument’.
* ‘ProcessInformation/SenderRole’ is set to “OfficialDocumentIssuer”.
* ‘ProcessInformation/EInvoicing’ is present and ‘ProcessInformation/EInvoicingDetails’ is filled.
* ‘InvoiceData’ is present.
* ‘InvoiceData/Selfbilling’ is set to “False”.
* ‘LineItems’ is present and has at least one line item.
* Document has reached a successful end state in eSM processing (Matched or Matched with tolerance) or, as an exception, have been rejected with error code “TimeOut”, see also “E-Invoicing Document Creation Triggering Event”.

## Rounding Issues

All amount-based fields are reported with 2 decimals in eSM as well as Peppol. Quantities, percentages and unit prices can be reported with more decimals.

The Peppol standard includes validation rules that perform a cross-validation of values that are calculated from other values. To ensure that these cross-validations work, similar business rules have been added in eSM. For more information on the rules in the eSM process, see “Overall Usage of Rounding Principles” in the eSM standard (reference document [1]) and check the business rules in the CpML for eSM specification (reference document [2]).

The validation rules for calculated values in Peppol are described in [9]. A tolerance of 1 Cent applies for these calculations.

## Usage of Signs

Line item prices can be negative in eSM. Peppol only allows positive values for prices. For quantities, Peppol allows negative and positive values. Service providers need to ensure that line item prices can be reported in a valid manner, awaiting solution proposals.

Possible workaround:

If a line item has a negative price in eSM, then the following product would be negative:

* ‘Price’ \* ‘SettlementVolume’ = ‘TotalAmount’: -30.00 € \* 1,000.00 kWH = -30,000.00 €

Because Peppol does not allow the negative price, the same total would still be reported if this is mapped to Peppol as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| Field in eSM | Value in eSM | Field in Peppol | Value in Peppol |
| ∑(LineItem/LineItem­Details/Price[1-2]) | -30.00 | InvoiceLine/Price/PriceAmount | 30.00 |
| LineItem/Settlement­Volume | 1,000.00 | InvoiceLine/InvoicedQuantity | -1,000.00 |
| LineItem/NetAmount/­TotalAmount | -30,000.00 | /InvoiceLine/Line­Extension­Amount | -30,000.00 |

Additional (optional) fields could be filled in Peppol to indicate that the values have been switched, for example:

* Variant A:
	+ InvoiceLine/Item/AdditionalItemProperty[1]/Name = OriginalPrice
	+ InvoiceLine/Item/AdditionalItemProperty[1]/Value = -30.00
	+ InvoiceLine/Item/AdditionalItemProperty[2]/Name = OriginalSettlementVolume
	+ InvoiceLine/Item/AdditionalItemProperty[2]/Value = 1,000.00
* Variant B:
	+ InvoiceLine/Item/Description = “Original price = -30.00, original settlement volume = 1,000.00”

***Important:*** *This issue is under investigation by service providers. The above statement does not represent an agreed solution. Issue only occurs for invoices with multiple line items where one or more line items have a negative price. Related to issue 13 in the issue log.*

## Enrichment

 In some cases, service providers must generate values or use existing master data to populate fields, as indicated in the syntax mapping, see “Syntax Mapping Spreadsheet”.

**Important:** Master data is not shared or synchronized between service providers.

The following fields are affected:

Table 3: Enriched fields during eSM to Peppol conversion

| Location in Peppol | Method | Description |
| --- | --- | --- |
| /cac:TaxTotal/cac:TaxSubtotal/cac:Tax­Category/­cbc:TaxExemptionReasonCode AND/cac:TaxTotal/cac:TaxSubtotal/cac:Tax­Category/cbc:Tax­ExemptionReason | Derive | A tax exemption reason is required for some tax category codes. It is assumed that service providers can generate these values as required. If ‘TaxCategoryCode’ in eSM has a different value than “S", these fields may have to be filled. For details about the requirements, see the business rules in reference documents [11] and [12]. |
| /cac:InvoiceLine/cbc:InvoicedQuantity with @unitCode | Map & convert | Units of measurement need to be mapped to Peppol counterparts, see “Units of Measurement”. |

## Code Lists

Fields with the following data types require values that conform to a specific format. In some cases, there is a straight 1:1 mapping, in others transformations are required.

### Currency Codes

Both eSM and Peppol list currencies using ISO 4217 3 alpha codes. A direct 1:1 mapping is possible.

### Scheme Identifiers

Several fields in Peppol have a @schemeID attribute, which governs the requirements for the value that is input in the field. For example, these schemes are relevant to identify the parties in a transaction. For this purpose, eSM allows EICs, LEIs, or ACER codes, or a combination of VAT ID plus EIC, depending on context. However, the attribute is optional on the fields that are relevant for eSM, therefore currently no issue is assumed.

For a list of supported schemes, see reference document [6].

### Endpoint IDs: Electronic Address Scheme (EAS)

Endpoint IDs are used to identify the parties’ electronic addresses to which the application level response to the invoice may be delivered. Endpoint IDs must conform to a supported format, for example, DUNS, EAN, or LEI. For a list of supported formats, see reference document [7].

eSM provides the endpoint IDs in separate fields that support the same address schemes as Peppol. For details, see “Consolidated eSM Documents”.

### VAT Numbers

In general, VAT IDs from eSM can be mapped 1:1 to their counterparts in Peppol. However, some countries required specific formats for reporting VAT numbers. Some conversion might be necessary in such cases, see also “National Validation Rules”.

### Units of Measurement

Both eSM and Peppol have a list of valid units of measurement (UoMs). The list in Peppol (see reference document [8]) is based on the following UNECE recommendations:

* [Rec 20 – Codes for Units of Measure Used in International Trade](https://unece.org/sites/default/files/2023-10/rec20_Rev17e-2021.xlsx)
* [Rec 21 – Codes for Passengers, Types of Cargo, Packages and Packaging Materials (with Complementary Codes for Package Names](https://unece.org/sites/default/files/2023-10/rec21_Rev12e_Annex-V-VI_2021.xls)

In eSM, the units of measurement are defined by the list of allowed values in ‘ESMUnitOfMeasureType’. Currently, not all eSM values are present in the UNECE recommendations. Requesting additions is a lengthy process and only a subset of the eSM values is therefore supported in Phase 1.

Process users and service providers will map units of measurement from eSM invoices to Peppol as best as possible, see the following tables.

**Note:** Missing UoMs will be temporarily suspended in eSM while they are requested to be added to the UNECE code lists for later adoption in Peppol. Once the missing units are adopted in PEPPOL, they will be re-enabled in eSM and available to be used for e-invoicing.

Possible Workarounds: In some cases, a mapping can be achieved by converting the corresponding amount to a unit of the same type, but with a different scale. Example: eSM has “GJPerDay” (gigajoule per day), but Peppol only has “P21” (kilojoule per day). Therefore, the corresponding amounts must be converted to kilojoule per day when generating the Peppol invoice.

In case of certificates, it might be necessary to select the unit of measurement of the underlying technology, rather than the certificate type.

The eSM units of measurement listed in Table 4 have a direct counterpart in Peppol. If the column “UoM” contains multiple entries, any of the listed values can be used.

Table 4: Units of measure with direct mapping

| UoM in eSM | Description | UoM in Peppol | Description |
| --- | --- | --- | --- |
| Bag | any bag  | XBG | Bag |
| BBL | Barrel | BLL / J57 / BLD | barrel (US) / barrel (UK petroleum) / dry barrel (US) |
| BSH | Bushel | BUA / BUI | bushel (US) / bushel (UK) |
| BTU | British thermal unit | BTU | British thermal unit (international table)  |
| Celsius | degree Celsius | CEL | degree Celsius |
| Day | Day | DAY | day |
| Fahrenheit | degree Fahrenheit | FAH | degree Fahrenheit  |
| G | Gram | GRM | gram |
| GAL | Gallon | GLI / GLL | gallon (UK) / gallon (US) |
| GJ | gigajoule | GV | gigajoule |
| GW | gigawatt | A90 | gigawatt |
| GWh | gigawatt hour | GWH | gigawatt hour |
| hL | hectoliter | HLT | hectolitre |
| In | Inch | INH | inch |
| Ingot | Ingot | XIN | Ingot |
| KG | kilogram | KGM | kilogram |
| kL | kiloliter | K6 | kilolitre |
| KM3 | cubic kilometer | H20 | cuic kilometre |
| KW | kilowatt  | KWT | kilowatt |
| KWh | kilowatt hour | KWH | kilowatt hour |
| L | Liter | LTR | litre |
| LB | Pound | LBR | pound |
| M3 | cubic meter | MTQ | cubic metre |
| M3PerDay | cubic metres per day | G52 | Standard cubic metre per day |
| MCM | million cubic meter | HMQ | million cubic metre |
| MJ | megajoule | 3B | megajoule |
| MT | metric ton | TNE | tonne (metric ton) |
| MW | megawatt | MAW | megawatt |
| MWh | megawatt hour | MWH | megawatt hour (1000 kw.h) |
| NM3 | normal cubic meter | NM3 | Normalised cubic metre |
| Ozt | troy ounce | APZ | troy ounce or apothecary ounce |
| SM3 | standard cubic meter | SM3 | Standard cubic metre |
| St | stone | STI  | stone (UK) |
| T | ton | TNE / LTN / STN | tonne (metric ton) / ton (UK) or long ton (US) / ton (US) or short ton (UK/US) |
| Therm | Therm | N72 / N71 | therm (US) / therm (EC) |

Quantities with the units of measurement listed in Table 5 can be converted to a different base unit.

**Important:** All UoMs in the following table where no suitable conversion is available, will be suspended for the time being.

Table 5: Units of measure to be converted

| UoM in eSM | Description | UoM in Peppol | Description | Conversion factor |
| --- | --- | --- | --- | --- |
| 100MJ | 100 megajoule | 3B | megajoule | Quantity/100 |
| 100MJPerDay  | 100 megajoule per day | P21 | kilojoule per day | Quantity/100000 |
| cwt  | hundredweight | LBR | pound | Convert to pounds, adjust quantities accordingly.  |
| DTH  | Deka therm (10 therms of natural gas) | N72 / N71 | therm (US) / therm (EC) | Quantity/10  |
| GJPerDay | gigajoule per day | P21 | kilojoule per day | Quantity/1000000 |
| MCMPerDay | million cubic meter per day | G52 | Standard cubic metre per day | Quantity/1000000 |
| MJPerDay | megajoule per day | P21 | kilojoule per day | Quantity/1000 |
| MMBTU | million british thermal units | BTU | British thermal unit (international table)  | Quantity/1000000 |
| MMJ | million megajoule | 3B | megajoule | Quantity/1000000 |
| MMJPerDay | million megajoule per day | P21 | kilojoule per day | Quantity/1000000000 |

For Phase 1, the units of measurement listed in Table 6 will be suspended in eSM because they have no counterpart in Peppol.

Table 6: Units of measure to be suspended

| Unit of measurement | Comment |
| --- | --- |
| AAU  |  |
| BCF |  |
| BF |  |
| BTUPerDay |  |
| CBU |  |
| CER | Used by at least one eSM user. Use substitute, e.g. UoM of underlying technology? Is there a substitute?  |
| EUA | Used by at least one eSM user. Use substitute, e.g. UoM of underlying technology? Is there a substitute?  |
| EUAA |  |
| Fee |  |
| GwhPerDay |  |
| KwhPerDay |  |
| LEC |  |
| MMBTUPerDay | Used by at least one member. Use substitute?  |
| MwhPerDay |  |
| OBU |  |
| ROC |  |
| SBU |  |
| ThermPerDay |  |
| UKA  | Used by at least one member. Use substitute, e.g. UoM of underlying technology?  |
| Vega |  |
| WBU |  |

## National Validation Rules

National rules in Peppol rules apply based on the country of the seller and do not affect invoices issued in other countries. The rules are described in reference document [10].

Might require transformations on existing values in eSM, for example, regarding VAT IDs.

***Important:*** *National validation rules are not in scope of Phase 1. Needs more investigation at later stage,* in accordance with the gradual rollout of e-invoicing across jurisdictions*.*

1. Glossary of Terms

| **Term** | **Abbreviation/Acronym** | **Description** |
| --- | --- | --- |
| Business Interoperability Specification | BIS | Set of specifications for implementing a Peppol business process |
| Business term | BT | The semantic information model in part 1 of the European standard on e-Invoicing defines business terms and assigns an identifier to each of them. That identifier can be used to trace how the business term is bound to the relevant syntax.  |
| Electronic Settlement Matching | eSM | Standard developed by Energy Traders Europe  |
| eXtensible Markup Language | XML | Extensible Markup Language (XML) is a markup language and file format for storing, transmitting, and reconstructing data. It defines a set of rules for encoding documents in a format that is both human-readable and machine-readable.  |
| Service provider | SP |  |
| Unified Business Language | UBL | Universal Business Language (UBL), ISO/IEC 19845, is an open library of standard electronic business documents and information models for supply chain, procurement, and transportation such as purchase orders, invoices, transport logistics and waybills. |
| Value-added tax | VAT |  |