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European Network of
Transmission System Operators
for Electricity

ACCOUNTING AND FINANCIAL SETTLEMENT OF KF, ACE AND RAMPING PERIOD (FSKAR) IMPLEMENTATION GUIDE

2022-09-21

APPROVED DOCUMENT
VERSION 2.2

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Version 2.2

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18 **NOTE CONCERNING WORDING USED IN THIS DOCUMENT**

19 The force of the following words is modified by the requirement level of the document in which
20 they are used.

21 • SHALL: This word, or the terms "REQUIRED" or "MUST", means that the definition is an
22   absolute requirement of the specification.

23 • SHALL NOT: This phrase, or the phrase "MUST NOT", means that the definition is an
24   absolute prohibition of the specification.

25 • SHOULD: This word, or the adjective "RECOMMENDED", means that there may exist valid
26   reasons in particular circumstances to ignore a particular item, but the full implications must
27   be understood and carefully weighed before choosing a different course.

28 • SHOULD NOT: This phrase, or the phrase "NOT RECOMMENDED", means that there may
29   exist valid reasons in particular circumstances when the particular behaviour is acceptable
30   or even useful, but the full implications should be understood and the case carefully weighed
31   before implementing any behaviour described with this label.

32 • MAY: This word, or the adjective "OPTIONAL", means that an item is truly optional.

33 Revision History

Version	Release	Date	Paragraph	Comments
0	1	2020-09-15		First draft of the accounting & FSKAR Implementation guide.
0	2	2020-10-15		Comments from CIM EG members were considered.
1	0	2020-11-04		Approved by MC.
2	0	2022-01-18		Business description of accounting part was included.
				Metering & Accounting profiles were migrated to CIM ESMP.
				In Financial Settlement Report dependency table, for Settlement prices exchange (CCO Coordination), DSR, DSPR and MSR. Product was changed from Active power (8716867000016) to active energy (8716867000030)
2	1	2022-03-15		Comments from CIM EG were considered: • Accounting point was replaced by exchange point to be aligned with the Harmonised Role Model • Metering and accounting documents (SOMA, SOAM and SOVA) were replaced by the new MeasurementForExchangePoint document. • Typo correction
2	2	2022-09-21		Comments from CIM EG were considered: • Accounting value replaced by accounting data. Metered measurement data replaced by metering data. • Exchange point relevant values removed as the term is considered confusing. It is replaced by metering data. • MeasurementForExchangePoint_MarketDocument renamed to MeteringData_MarketDocument Approved by SOC.

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1 Scope

The objective of this Accounting & FSKAR implementation guide is to make it possible for IT developers to develop an IT application for System Operators and Coordination Centre Operators to exchange cross border metering data as well as accounting and settlement data relative to the RGCE Accounting & Settlement process according to the SAFA annex 3, policy on accounting and settlement.

The implementation guide is one of the building blocks for using UML (Unified Modelling Language) based techniques in defining processes and messages for interchange between actors in the electrical industry in Europe.

This guide provides a standard for enabling a uniform layout for the transmission of data between TSOs to establish and calculate the accounting data and also to issue the financial settlement results within a Synchronous Area. The implementation guide is developed for the harmonisation of the underlying data exchange process. The implementation guide refers to information models based on the European style market profile (ESMP), IEC 62325-351. In particular, the IEC 62325-450 methodology was applied to develop the contextual and assembly models.

2 References

2.1 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- IEC 62325-301:2018, Framework for energy market communications – Part 301: Common information model (CIM) extensions for markets;

- IEC 62325-351:2016, Framework for energy market communications – Part 351: CIM European market model exchange profile;

- IEC 62325-450:2013, Framework for energy market communications – Part 450: Profile and context modelling rules;

- IEC 62325-451-1:2017, Framework for energy market communications – Part 451-1: Acknowledgement business process and contextual model for CIM European market;

- IEC 62325-451-2:2014, Framework for energy market communications - Part 451-2: Scheduling business process and contextual model for CIM European market

2.2 Other references

- The Harmonised Electricity Market Role Model;

- Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing (EB GL).

  o All continental European TSOs' proposal for Common settlement rules for intended exchanges of energy as a result of the frequency containment process and ramping period in accordance with the Article 50(3) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing. (CCFR)

  o All continental European TSOs' proposal for Common settlement rules for all unintended exchanges of energy in accordance with the Article 51(1) of Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing. (CCU)All continental European TSOs' proposal for Common settlement rules for all unintended exchanges of energy

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144   in accordance with the Article 51(1) of Commission Regulation (EU) 2017/2195
145   of 23 November 2017 establishing a guideline on electricity balancing. (CCU)

146   • Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on
147   electricity transmission system operation (SO GL)

148   • Synchronous Area Framework Agreement (SAFA) for Regional Group Continental
149   Europe Annex 3: Policy on Accounting and Settlement

150   • FSKAR Transparency Reporting IG

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3 Terms and definitions

Accounting data (E_{EX}): Accounting data E_{EX} is the exchanged energy between two LFC areas/blocks as reflected in the accounting message exchange. Accounting data is calculated from a formula contractually agreed by both SOs based on the previously validated Metering data.

Aggregated Netted External Schedules (ANES): A schedule representing the netted aggregation of all external TSO schedules and external commercial trade schedules between two scheduling areas or between a scheduling area and a group of other scheduling areas.[1]

Compensation Program Schedule: It is a schedule representing the exchange of electricity of TSOs related to a compensation program.

Coordination Centre Operator (CCO): A party responsible for the coordination of its Coordination Centre Zone in respect of scheduling, load frequency control, time deviation and compensation of unintentional deviation.

Day-Ahead Market Prices (DAMP): Day-Ahead Market Prices for each LFC block or area provided by each corresponding LFC Operator in €.

Exchange point: A domain for establishing energy exchange between two Metering Grid Areas. This is a type of Metering Point. Note that SAFA for RGCE Annex 3 or Bilateral agreements may refer to accounting point for historical reason. These are considered as Exchange Points in the current IG.

External commercial trade schedule: It means a schedule representing the commercial exchange of electricity between market participants in different scheduling areas.[1]

External TSO schedule: It means a schedule representing the exchange of electricity between TSOs in different scheduling areas.[1]

Frequency Containment Process (FCP): Means a process that aims at stabilising the system frequency by compensating imbalances by means of appropriate reserves.[1]

Frequency Containment Process Energy (FCPE or E_{FCP}): The energy resulting from the frequency containment process. It is equal to the product of the notified K-factor with the average frequency deviation for each TSO-TSO settlement period and each LFC area.

$$E_{FCP} = -k * \Delta f * \frac{1}{4}h$$

Frequency deviation (Delta f or Δf): The difference between the actual and the nominal frequency of the synchronous area which can be negative or positive [1].

Intended Energy Exchange (E_{IE}): This means the intended cross-border energy exchanges according to EBGL Art. 50. This includes the ANES, the cross-border exchanges over virtual tie-lines, the cross-border energy exchanged as a result of the frequency containment process and the cross-border energy exchanged as a result of the ramping periods.

K-factor: K-factor represents the assumed reaction of an LFC area/block to a frequency deviation. Defined in the SOGL as a value expressed in megawatts per hertz ('MW/Hz'), which is as close as practical to, or greater than the sum of the auto-control of generation, self-regulation of load and of the contribution of frequency containment reserve relative to the maximum steady-state frequency deviation.[1]

LFC Operator: Responsible for the load frequency control for its LFC Area or LFC Block.

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[1] SO GL Network Code

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195 **Ramping period**: It is a period of time defined by a fixed starting point and a length of time
196 during which the input and/or output of active power will be increased or decreased 1. For CE,
197 the ramping period is set at 10 minutes.

198 **Ramping Period Energy (ERP):** Energy exchanged as a result of ramping between different
199 ANES values (ANESn-1 and ANESn, where n and n-1 refer to adjacent TSO-TSO settlement
200 periods).

201 **Scheduled energy exchanges (E_{SCH}):** It refers to the energy corresponding to the sum of the
202 ANES for each LFC area/block (including the compensation program), , as obtained by the co-
203 ordination centres from the Verification Platform. Compensation program will be put to 0 once
204 issues with Kosovo and Ukraine are finally solved.

205 **TSO**: Transmission System Operator. The role of System Operator (SO) is performed by the
206 TSO.

207 **TSO-TSO Settlement period**: The TSO-TSO-Settlement period is a parameter of the process
208 representing the time resolution on which the accounting data and energy exchanges are
209 determined. According to the currently approved version of the FSKAR methodologies, the
210 TSO-TSO settlement period shall be equal to 15 minutes as stated in CCU and CCFR
211 documents. Art. 6.
212
213 **System Operator Accounting data Matching (SOAM):** Calculated accounting data on
214 interconnection.
215
216 **System Operator Metering Alignment (SOMA):** Metering data on interconnection.
217
218 **System Operator Validated Accounting (SOVA):** Bilaterally validated calculated accounting
219 data on interconnection.
220
221 **Unintended Exchange (UE or E_{UE}):** This means the unintended cross-border exchange of
222 energy according to EBGL Art. 51. It is equal to the difference between the metered exchanges
223 on physical tie-lines and the sum of the ANES, the VTL exchanges, the FCP energy and the RP
224 energy. The unintended exchange is calculated as shown below.
225
$$E_{UE} = E_{EX} - E_{SCH} - E_{VTL} - E_{FCP} - E_{RP}$$

226 **Virtual Tie-Line (VTL)**: The energy exchanged through virtual tie lines can be manual
227 frequency restoration reserves, automatic frequency restoration reserves or imbalance netting.
228 Moreover, there might be other processes that use virtual tie-lines for the exchange of energy.
229 Virtual tie-line exchanges are recorded in the accounting data.

230 **Working Day:** The Working Day is the calendar day except Saturdays, Sundays and 4
231 holidays: Christmas day (25th of December), New Year's Day (1st of January), Easter Monday
232 and Ascension Day.

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233 ## 4   The Accounting and Financial Settlement Business Process

234 ### 4.1   General Introduction to Accounting process related to established accounting
235 data

236 The accounting process is the validation of the metering data (usually located at an
237 interconnecting tie-line of a TSO) and of the resulting accounting data. In order to perform the
238 accounting process in a correct manner, the TSOs of a common border have to prepare a
239 bilateral accounting agreement. Within these documents, TSOs agree on the list of common
240 (physical and virtual) tie-lines to be included in the accounting process and rules of calculation
241 of accounting data based on meterings for each tie-line, including the consideration of line
242 losses. Actual preparation of bilateral agreement is out of scope of this implementation guide.
243
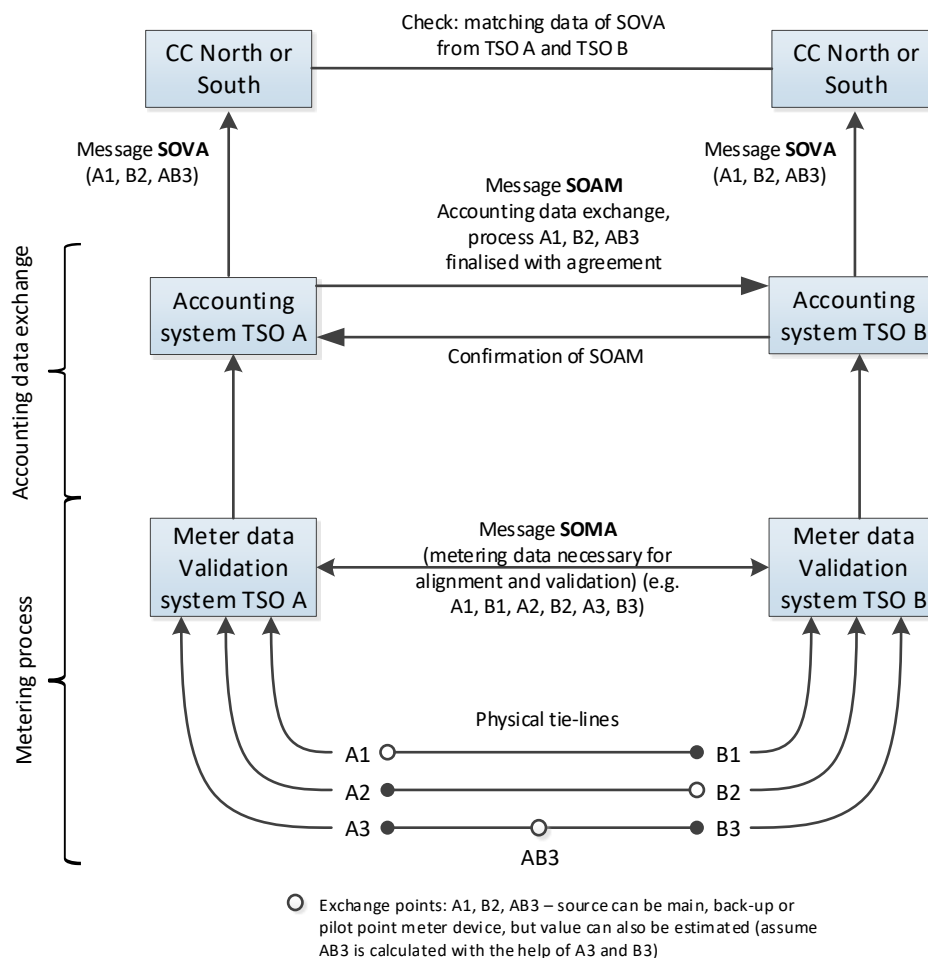
244
245 **Figure 1 - Accounting process related to establishing accounting values description**
246

247 This accounting process begins with collection of metering data for each common tie-line on
248 both sides of the border. Each TSO assembles and sends his metering data document "System
249 Operator Meter Alignment" (SOMA) to his adjacent/neighbouring TSO. Every TSO validates the
250 contents of the SOMA document from the other TSO. Validation includes expected content of
251 the received document, correct syntax and that differences between the meterings of both TSOs
252 are in line with expected thresholds. The TSOs inform each other about the result of validation
253 with confirmation document.
254
255 In case of at least one unsuccessful validation both TSO follow the predefined troubleshooting
256 procedures within bilateral accounting agreement until successful validation is reached. In case
257 of successful validation, the agreed data is assembled and sent to the accounting system of
258 the TSO in order to calculate the accounting data (e.g. consideration of losses on the tie-line
259 between the Meter device position of each TSO and the border).
260

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Based on agreed rules from bilateral accounting agreement and using the validated meter metering data (SOMA), the accounting data is calculated and assembled into a document "System Operator Accounting data Matching" (SOAM). SOAM is sent from TSO A to TSO B. TSO B is requested to validate this data. Validation includes expected content of the received document, correct syntax and that calculations of both TSOs are exactly the same (Integer plus the first three decimals must be the same). Which TSO assumes the sending and validating role is defined for each border in the bilateral agreement. In case of unsuccessful matching, if the 'validating TSO' does not calculate exactly the same values as the 'sending TSO', both TSOs follow the predefined troubleshooting procedures within bilateral accounting agreement until successful matching is reached. After successful matching, both TSOs assemble document "System Operator Validated Accounting" (SOVA) and send it to their related CCO.

The CCOs match the respective SOVA, meaning they should receive from both TSOs the same data in the SOVA files. If the last versions of the two received SOVA do not correspond exactly, involved TSOs are notified about the result with a negative confirmation and are required to send the corrected SOVA. if the values of the SOVA are exactly the same the accounting process is complete.

The daily accounting process should be done in an automatically way. However, in case of mismatch, it should be resolved on the first working day after energy delivery.

If data is not adjusted by the TSO and they match, this data is considered as final. End date for corrections is up to a maximum of four working days after the reception of the DSR. After the end of the Monthly Settlement Process, accounting data cannot be changed anymore.

4.2 General Introduction to FSKAR process

Due to the physical nature of an interconnected network, there are unavoidably deviations between the intended exchange (scheduled exchange + FCP + RP + VTL) and the actual physical flows. Ramps do not include VTL. These deviations are referred to as Unintended Exchange. The EBGL in the Art. 50(3) and 51(1) requires that the settlement of the unintended exchange, the FCP and RP shall be done financially.

The deviations are determined as the difference between the physical exchanges (as determined by metered data, agreed upon by neighbouring TSOs) and the scheduled exchanges (this includes the ANES and the exchanges realized over VTL), per each LFC area or block and for a given settlement period. These deviations capture three different components.

- Frequency containment process energy (FCP energy) results from the activation of FCR across the synchronous area and is an intended component.

- Ramping period energy (RPE) results from the application of ramps to the scheduled exchanges and it is also an intended component. The RP energy is the difference between a step change and a ramped change, where the ramp is linear starting 5 minutes before the change and ending 5 minutes after the change. This energy corresponds to the triangular shape as indicated in the figure below and it is calculated from the differences in the ANES and the ramping time.

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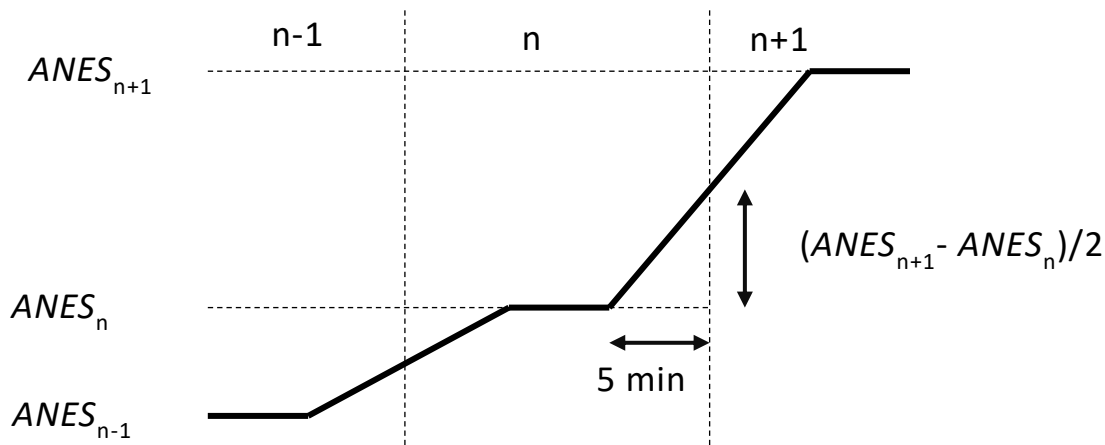
Figure 2 - Visualization of the calculation for the Ramping Period Energy

$$E_{RP} = \frac{(ANES_{n-1} - ANES_n)/2}{2} * \frac{5}{60}h + \frac{(ANES_{n+1} - ANES_n)/2}{2} * \frac{5}{60}h$$

The equation can be simplified as follows for the implementation:

$$E_{RP} = \frac{(ANES_{n-1} - ANES_n) + (ANES_{n+1} - ANES_n) * h}{48}$$

Or

$$E_{RP} = \frac{(E_{SCH,n-1} - E_{SCH,n}) + (E_{SCH,n+1} - E_{SCH,n})}{12}$$

- The third component, corresponding to the residual amount, is the actual unintended exchange.

The aim of the FSKAR process is to perform the accounting and settlement of these three components with a price. The accounting consists of capturing the FCP energy, RP energy and unintended exchange for all LFC blocks and areas. Settlement corresponds to the calculation of a price for each of the three components, and the resulting TSO invoicing. The agreement between RGCE TSOs is to settle FCP energy and unintended exchange at the same price, established based on day-ahead market prices, and the RP energy at a zero price.

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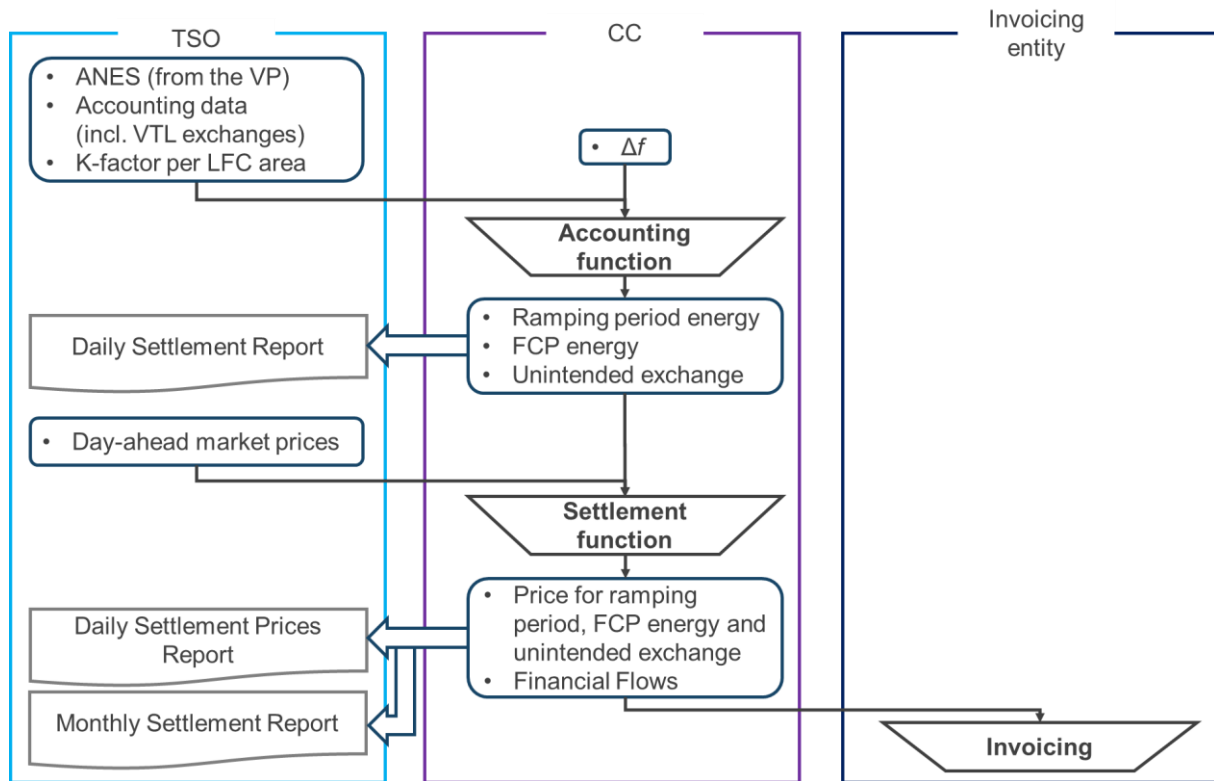
Figure 3 - Data flow and setup of Accounting and Settlement functions of FSKAR

4.2.1   Accounting process: determination of energy exchanges

When the process of establishing accounting metering devices data is complete, the sum of the accounting data from the LFC areas is compared to the sum of the LFC Areas schedules (ANES - Aggregated netted external schedules) for the settlement period in order to determine the exchanged FCP energy, RP energy and UE.

The input parameters are the scheduled energy exchange E_{SCH}, the exchanged energy via virtual tie-lines E_{VTL}, the exchanged energy between the LFC areas/blocks E_{EX} as reflected in the accounting data, the frequency deviation Δf and the K-factor.

ENTSO-E System Frequency Group determines yearly K-factors for all TSOs in the synchronous area, which are used by the CCs. TSOs participating in the FCR cooperation additionally update these K-factors on a daily basis with 4h-resolution, and these TSOs therefore are required to additionally send the updated K-factors to the CCs

For a given quarter hour, the energy exchange is calculated as follows:

$$E_{EX} = E_{IE} + E_{UE}$$

$$E_{IE} = E_{VTL} + E_{SCH} + E_{FCP} + E_{RP}$$

$$E_{FCP} = -K * \Delta f * \frac{1}{4}h$$

$$E_{UE} = E_{EX} - E_{SCH} - E_{VTL} - E_{FCP} - E_{RP}$$

$$E_{RP} = \frac{(ANES_{n-1} - ANES_n) + (ANES_{n+1} - ANES_n)*h}{48} \text{Or}$$

$$E_{RP} = \frac{(E_{SCH,n-1} - E_{SCH,n}) + (E_{SCH,n+1} - E_{SCH,n})}{12}$$

The parameters in the calculations refer to the cross-border energy exchange that is intended (E_{IE}) and unintended Energy (E_{UE}).

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356   E_{IE} is the sum of virtual tie lines (E_{VTL}), schedules (E_{SCH}), FCP (E_{FCP}) and ramping period
357   processes (E_{RP}).
358

359   Unintended exchange E_{UE} is equal to the remaining energy exchanges, which are not included
360   or due to the verified ANES, the virtual tie-line exchanges, the delivery of FCR (FCP energy) or
361   the realization of ramps in the control programs (RP energy).
362

363   The unintentional deviation E_{UD} is broken down into three different components (E_{RP}, E_{FCP}
364   and E_{UE}) in the new FSKAR process and is thus not used by itself anymore.
365

366   The outputs of the accounting function are E_{FCP}, E_{RP} and E_{UE}.

367   E_{RP} is the difference between a step change and a ramped change, where the ramp is linear
368   starting 5 minutes before the change and 5 minutes after the change.

369

370   **4.2.2   Settlement process: determination of Prices**

371

372   The input parameters to calculate the settlement price for each settlement period (15 min.) are
373   the day-ahead market prices (DAMP), E_{UE} and E_{FCP} for each LFC area/block and Δf.
374   The DAMP are send every day to the CC by the LFC Operator
375

376   Frequency – independent component is calculated as follows:
377

$$Price_{ref}(t) = \frac{\sum_m DAMP_m(t) * (|E_{UE} + E_{FCP}|)_m(t)}{\sum_m(|E_{UE} + E_{FCP}|)_m(t)}$$

378

379
380
381   Frequency – dependent component calculated as follows:

$$Price_{UE,FCP}(t)$$
$$= \begin{cases} Price_{ref}(t) - 2\,€/mHz * (-100\,mHz + 20\,mHz) & \Delta f(t) < -100\,mHz \\ Price_{ref}(t) - 2\,€/mHz * (\Delta f(t) + 20\,mHz) & -100\,mHz \leq \Delta f(t) < -20\,mHz \\ Price_{ref}(t) & -20\,mHz \leq \Delta f(t) \leq 20\,mHz \\ Price_{ref}(t) - 2\,€/mHz * (\Delta f(t) - 20\,mHz) & 20\,mHz < \Delta f(t) \leq 100\,mHz \\ Price_{ref}(t) - 2\,€/mHz * (100\,mHz - 20\,mHz) & \Delta f(t) > 100\,mHz \end{cases}$$

382
383
384   The outputs consist of cash flows for each LFC area for each settlement period. Sum of cash
385   flows must be zero over each settlement period.
386

387   **4.2.3   Invoicing (Out of scope)**

388   The detailed process for the invoicing is out of scope of this IG.

389   The CCs provide the TSOs with settlement reports according to the results of the settlement.
390   The invoicing entity is provided with the resulting settlement values once per month.
391

392   **4.2.4   Transparency reporting (Out of scope)**

393   The Transparency Platform (TP) receives settlement report according to the results of the
394   settlement process. As the invoicing process, this is out of scope of this IG and is defined in
395   the FSKAR Transparency IG referenced in the beginning of the document.
396

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397 **4.3 Use cases**

398 **4.3.1 Metering and accounting**
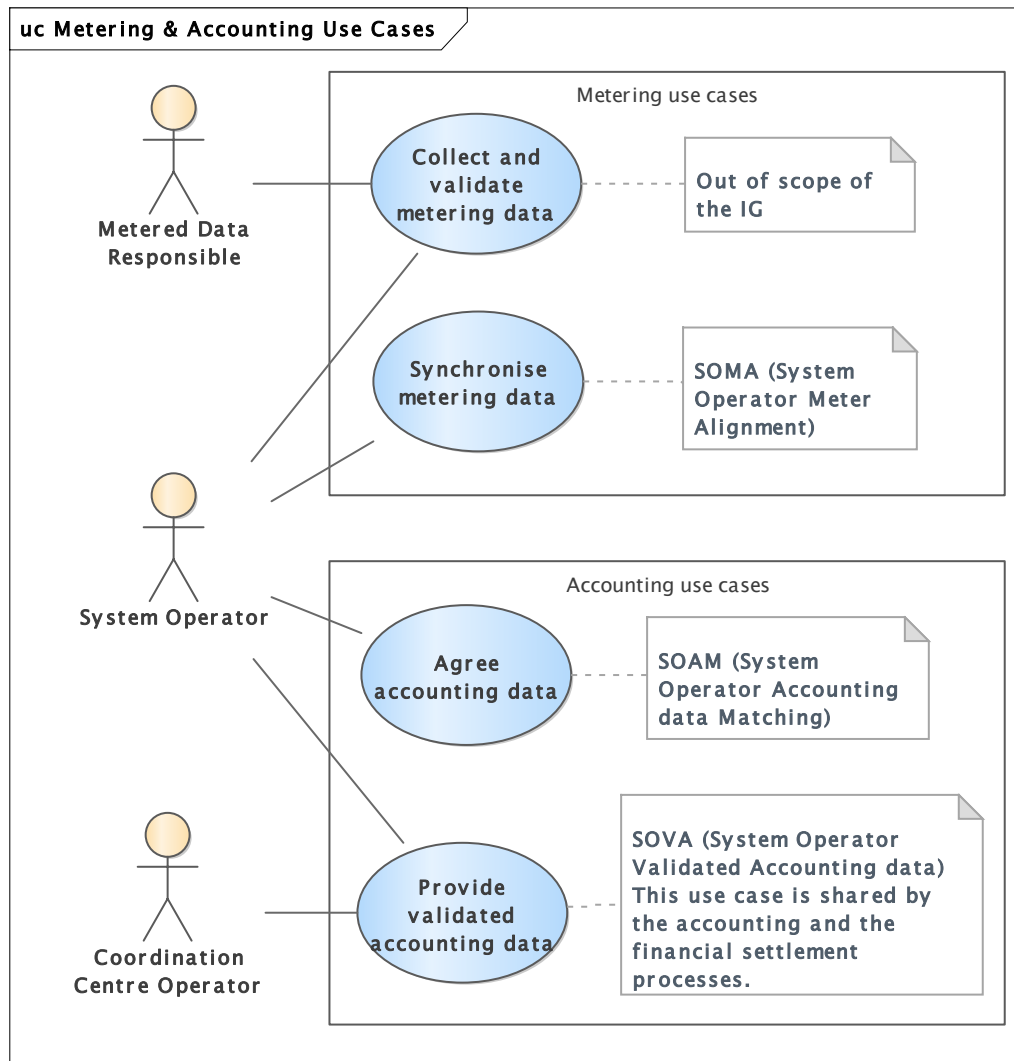
399
400 **Figure 4 - Metering and accounting use case diagram**

401

402 Table 1 gives a list of roles involved in the Metering and Accounting business process.
403
404 **Table 1 - Role labels and descriptions**

Role Label	Role Description
Metered Data Responsible (MDR)	MDR is responsible for the history of metering data for a Metering Point.
System Operator (SO)	SOs are in charge of synchronizing the metering data together with their neighbouring SOs. After an optional internal validation, they build the accounting data and share it with their neighbouring SOs for agreement. Finally, once that the accounting data is agreed, each SO submit it towards its corresponding CCO.
Coordination Centre Operator (CCO)	CCO gets the validated accounting data from SOs which is used as an input for the financial settlement process.

405

406 Table 2 gives a list of use cases for the Metering and Accounting business process.
407

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Table 2 – Metering and Accounting use cases

Use case label	Roles involved	Action descriptions and assertions
Collect and validate metering data	MDR, SO	SO gets the metered data from the MDR which ensures that the meterings are correct. This use case is out of scope of this IG.
Synchronise metering data	SO	SOs on each side of a border exchange their meterings in order to ensure that they have the same consistent set of data with which they can establish the accounting data at the exchange point. The set of data has to be defined between the SOs.
Agree accounting data	SO	This use case defines the exchange between SOs that take into consideration the agreed metering data (a single meter or a calculated value) and ends with the agreement of the values that shall be used as accounting data at the exchange point.
Provide validated accounting data	SO, CCO	The agreed results, which represent the validated data, are sent by each SO to its corresponding CCO. Note: This use case is shared by the accounting and financial settlement processes.

409

410   **4.3.2   Financial settlement use cases**

411
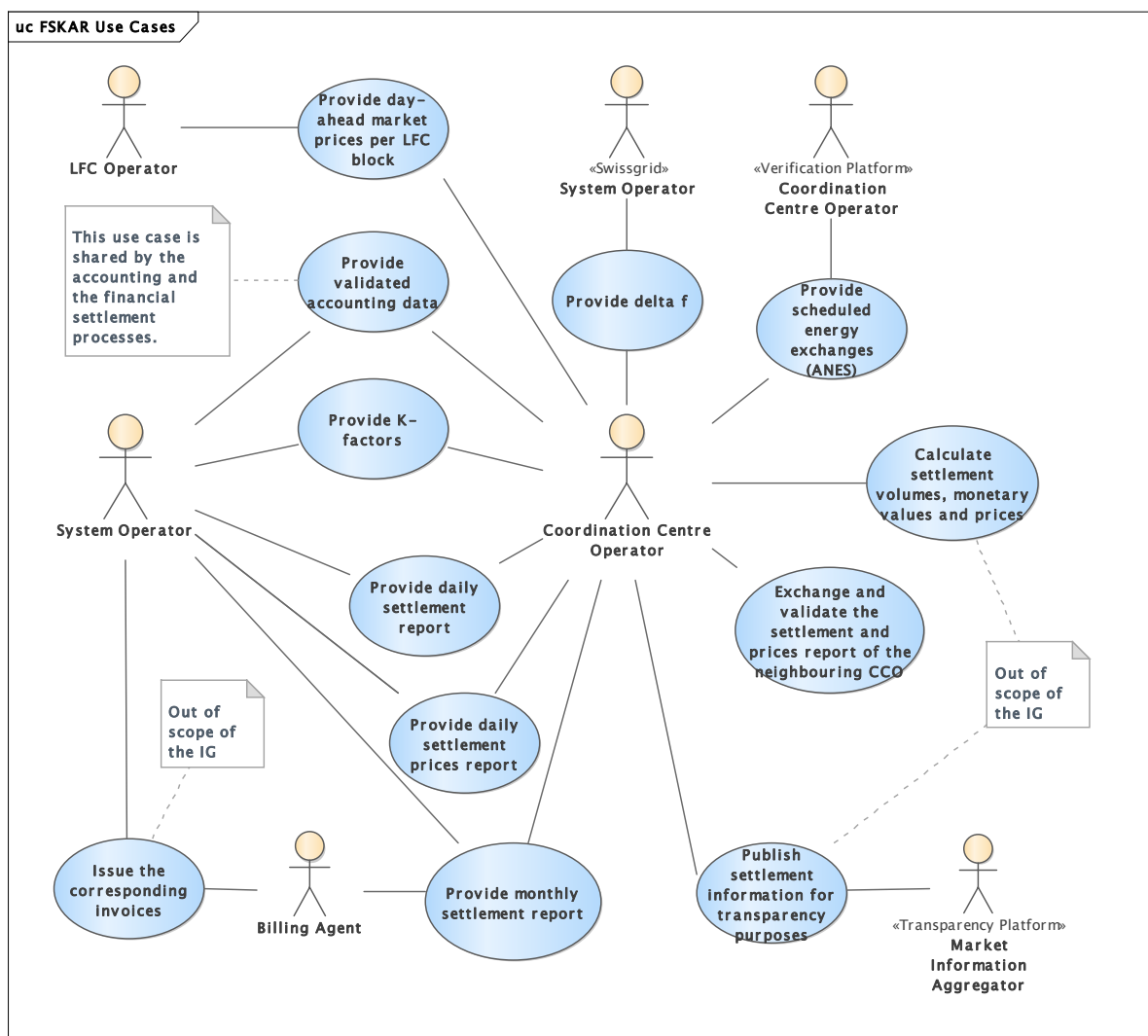
412

413   **Figure 5 – Financial settlement use case diagram**

414

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415   Table 1 gives a list of roles involved in the FSKAR business process.
416
417   **Table 3 - Role labels and descriptions**

Role Label	Role Description
Billing Agent	A Billing Agent is the role that acts as an intermediate between SOs for invoicing purposes.
Coordination Centre Operator (CCO)	The CCO coordinates the data received from the SOs of its Coordination Centre Zone and performs business check with the other(s) CCO. It then calculates the physical and financial settlement for each SOs of its Coordination Centre Zone and send the corresponding reports. It is the one responsible for the publication of data to the MIA and the SOs of its Coordination Centre Zone. Note: in the FSKAR process, the Verification Platform sending the ANES is considered as part of the CCO role
Market Information Aggregator (MIA)	The MIA receives and publishes all submitted information by the CCO. Note: in the FSKAR process, the MIA role is played by Transparency Platform.
System Operator (SO)	Within the FSKAR process, the SOs must provide the accounting data in form of SOVA files to the CCO. Additionally, SOs participating in the FCR cooperation must submit the updated K-factors to the CCOs. The SOs will then receive settlement information from the CCO that they will have to validate (MSR), and potential associated invoice they will have to settle. Note: The SO "Swissgrid" has also the responsibility of sharing the delta f value with the CCOs.
LFC Operator	LFC Operator is in charge of providing the Day-Ahead Market Prices per LFC block/area.

418

419   Table 2 gives a list of use cases for the FSKAR business process.
420
421   **Table 4 - FSKAR use cases**

Use case label	Roles involved	Action descriptions and assertions
Provide validated accounting data	SO, CCO	The SOs send to their CCO the SOVA. The SOVA corresponds to relevant interconnections accounting data established and validated by both SOs. Note: This use case is shared by the accounting and financial settlement processes.
Provide K-factors	SO, CCO	Each SO sends their K-factors to their CCO. Yearly for most SOs: determined centrally by ENTSO-E SG SF. 4h-resolution for SOs in FCR cooperation.
Provide Day-ahead market prices (DAMP) per LFC block/area	LFC Operator, CCO	All LFC operators send their DAMP per LFC block/area to their CCO. DAMP is submitted per default on LFC block level, but for LFC blocks with multiple LFC areas, DAMP can be submitted per LFC area, if agreed with the CCO.

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Use case label	Roles involved	Action descriptions and assertions
Provide delta f (Δf)	SO, CCO	SO (Swissgrid) sends the delta f to the CCO.
Provide scheduled energy exchanges (ANES)	CCO	The Verification Platform (Controlled by CCO) provides the scheduled exchanges to the CCOs. The ANES describe agreed energy flow on interconnections.
Calculate settlement volumes, monetary values and prices	CCO	Based on the SOs input, the CCO calculates the settlement volumes and its monetary values for each LFC area, as well as the prices for following exchanges: Frequency Containment Process Energy Ramping Energy Unintended Exchanges
Provide Daily Settlement Report (DSR)	CCO, SO	The CCO calculates the settlement volumes for each SO and provides to the SO the relevant information: settlements volumes, K-factor, accounting values, ANES and delta f.
Exchange and validate the settlement and prices report of the neighbouring CCO	CCO	Prior to the settlement prices determination, the CCOs exchange the settlement volumes and DAMP of the SOs of their Coordination Centre Zone. Following determination of the settlement prices, the CCOs confirmed between themselves that they calculated the same data.
Provide Daily Settlement Prices Report (DSPR)	CCO, SO	Once all SO have sent their DAMP to the CCO and the DSR has been sent, the CCO calculates and sends the daily settlement prices and monetary values, as well as the SO settlement volumes. It also sends back the SO DAMP prices of that SO that were used for the calculation.
Provide Monthly Settlement Report (MSR)	CCO, SO, Billing agent, MIA	After the deadline for problem reporting has expired for all days of the month and all problems have been closed, the CCO establishes the MSR (volumes, monetary values and prices) which are send to the SOs. The SOs are asked to validate the MSRs within 4 working days. Once all SO have validated the MSRs for the month, the CCO sends the MSRs to the Billing Agent (validated settlement volumes, prices and monetary values). In case of issues with submission deadlines, this should be handled directly with the CCO.
Publish settlement information for transparency purposes	CCO, MIA	CCO sends monthly validated settlement data (volumes, monetary values and prices of frequency containment process energy, ramping energy and unintended exchanges) to MIA for transparency purposes, ensuring SOs have access to all settlement data.
Issue the corresponding invoices	Billing Agent, SO	Billing Agent acts as a financial intermediary for billing.

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423

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424   **4.4   Activity diagrams**

425   **4.4.1   Metering and Accounting activity diagram**

act Metering and Accounting activity diagram

Metered Data Responsible	System Operator	«Neighbouring» System Operator	Coordination Centre Operator

Begin Metering & Accounting process

Provide validated metering data (Out of scope)

Exchange validated metering data

Exchange validated metering data

Are all the differences between related mesaurements below the tolerance?

No

Yes

Calculate accounting data

Calculation of accounting data must be done by both neighboring SOs.

Send a negative confirmation

Only the designated SO provides the accounting data to its neighboring SO.

Provide accounting data

Is there any difference between the accounting data?

Yes

No

Send positive confirmation

Provide validated accounting data

Review validated accounting data

If any error after the end of the process, this should be solved in a bilateral way by 2 neighbouring SOs

Is the review successful?

No

Yes

End of the metering and accounting process

426

427   **Figure 6 - Metering and accounting activity diagram**

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428
429
430 Each SO has the responsibility to properly collect the metering data of the tie-lines being part
431 of its LFC area, and make sure the data is properly validated. This is out of scope of this
432 document.
433
434 Once SO has the complete set of validated metering data of a border, it can get in touch with
435 the corresponding neighbouring SO in order to ensure that the validated metering data that will
436 be used for the calculation of the Accounting data is coherent.
437
438 Please note that:
439   - Accounting data at the exchange point may refer to numerous distinct metering data
440   (Master device and optionally Backup device).
441   - Exchange Point refers to (virtual) tie-line.
442
443 As a reminder, tie-lines and virtual tie-lines are identified by EIC-T codes, whereas Exchange
444 Points are identified by EIC-Z codes. EIC-W codes for resource object identification or virtual
445 resource object identification were used for historical reasons to identify tie-lines. They should
446 be replaced by EIC-T codes in future.
447
448 Each SO sends their respective metering data to the neighbouring SO. Resolution of meterings
449 is expected to be 15 minutes or 5 minutes depending on the SOs bilateral agreements. After
450 examination of the information a confirmation is sent to the neighbouring System Operator. The
451 confirmation is positive when all the differences between all related meterings are below the
452 tolerance. However, in the case where there is a disagreement (differences between related
453 meterings above the tolerance) or that there are missing values at both ends of the tie-line, a
454 negative confirmation is sent. In this case the SOs have to investigate the problem and once it
455 is resolved resend again the corrected data.
456
457 Please note that:
458 Note 1: Each direction must be treated independently
459 And
460 Note 2: Two Tolerances may have to be validated: The absolute and the relative (a percentage).
461 If one of the tolerance is validated then the TSO considers that differences are acceptable
462 This is the rule unless the bilateral agreements state something different.
463
464 After that, each SO calculate the accounting data. Accounting data is calculated from a formula
465 contractually agreed by both SOs based on the previously validated metering data. Hence,
466 there should not be any differences between both SOs calculation.
467
468 It is important to note that accounting data is sent by only one designated SO to its counterparty
469 in order to check that both SO have made the same calculation. If the receiving SO agrees with
470 the accounting data, then a positive confirmation is sent. However, if the receiving SO does not
471 agree with the accounting data, then a negative confirmation is sent. When a negative
472 confirmation is sent, both SOs have to recalculate the accounting data and the designated SO
473 should send the accounting data again to its neighbouring SO. Once any outstanding problems
474 are resolved, the exchange point data is resent by the original designated SO.
475
476 Finally each SO sends its validated accounting data (SOVA) to each corresponding CCO. Then
477 CCO evaluate both SOVA messages and check that there are no differences in received data.
478 If there are no differences, a positive confirmation is sent to both SOs and the process finishes.
479 If there are differences between the two SOVA files, then CCO sends a negative confirmation
480 to both of them. In that case, the two neighbouring SOs have to bilaterally talk in order to solve
481 the mismatch and may recalculate the accounting data again.
482
483 Once border SOVAs are agreed, then FSKAR process can start. If any change happens after
484 the end of the accounting process, this should be solved in by the two neighbouring SOs and
485 the CCOs.

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486   **4.4.2   Financial settlement activity diagram**

Figure 7 – Financial settlement activity diagram

487
488

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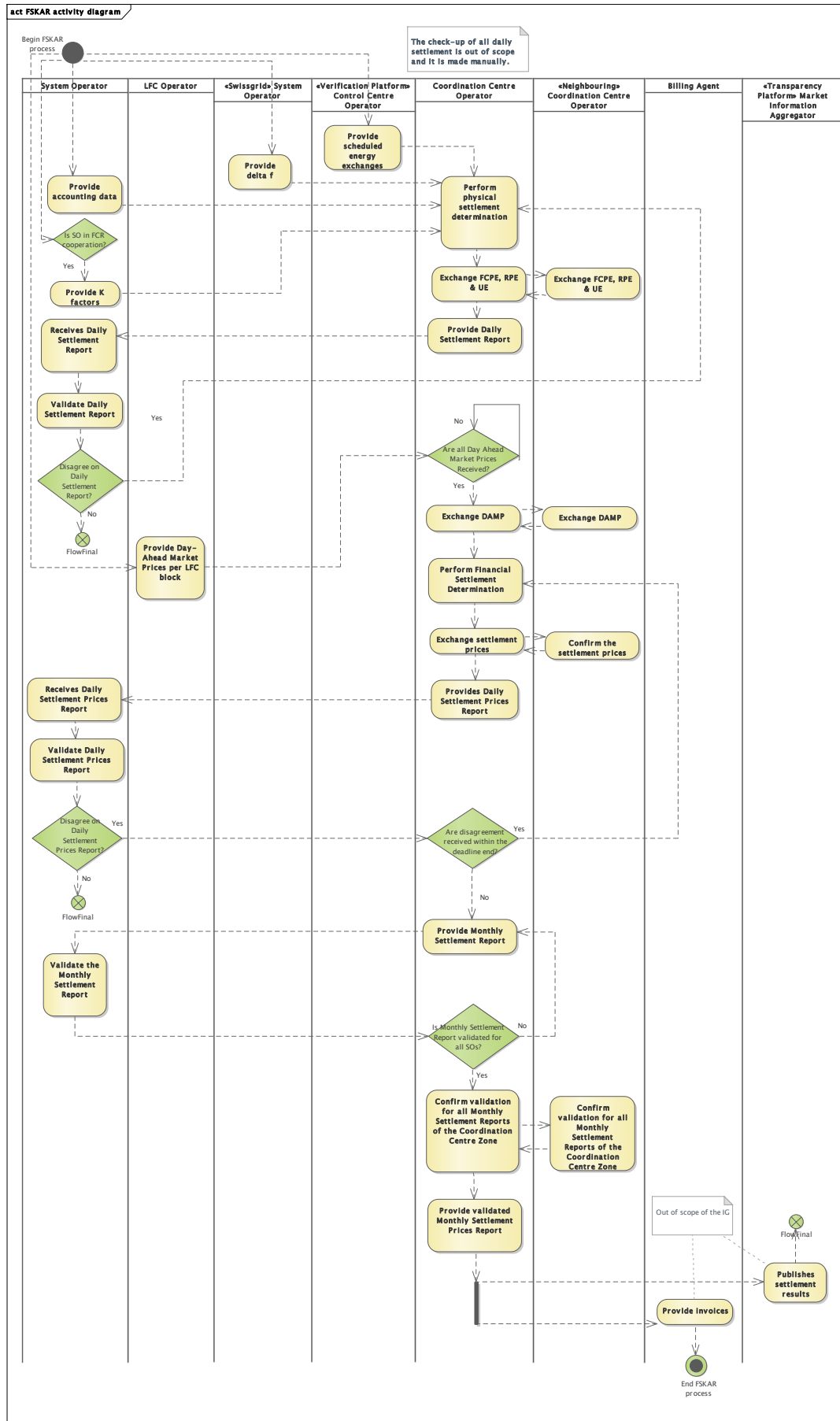
489   As soon as data are available for a given day (At latest on the first working day following the
490   date of given day, see chapter 4.5), SOs are supposed to send to their respective CCO the
491   following relevant information:
492   -   The bilaterally agreed accounting data on interconnector (SOVA), which details all
493   physical Tie -Line, plus the Virtual Tie Line. SOVA shall be provided at 14:00 CET D+1.
494   In case that SOVA is not provided on time, CCO should liaise directly by email or phone
495   with the corresponding SO to solve the issue. Each SO must have a contact person
496   which should be contacted in case of issues.
497   -   The K-factor. ENTSO-E Steering Group System Frequency (SG SF) determines yearly
498   K-factors for all SOs in the synchronous area, which are used by the CCs. This
499   exchange is not detailed in the IG.
500   SOs participating in the FCR cooperation additionally update these K-factors on a daily
501   basis with 4h-resolution, and these SOs therefore are required to additionally send the
502   updated K-factors to the CCs. This is the exchange detailed in the IG
503
504   The CCOs also need the delta f, which will be send by the Swiss SO **Swissgrid** for the whole
505   Synchronous area
506
507   Finally, the CCOs will extract from the Verification Platform the scheduled energy exchanges.
508
509   Once all the information have been gathered, CCOs can calculate the settlement volumes:
510   -   Frequency Containment Process Energy,
511   -   Ramping Energy
512   -   Unintended Exchanges
513
514   The CCO then exchange between themselves the result of their calculation and send back to
515   each SO the DSR. The DSR contains for the concerned SO its settlement volumes, K-factor,
516   ANES and SOVA, as well as the delta f or the Synchronous area. DSR shall be provided at D+2
517   at the latest. Reason is that CCO needs the first quarter of next day to calculate the ramps of
518   the next day. This is received on a daily process.
519
520   The SO checks that the data used by the CCO were correct, and also redo the calculation. In
521   case of disagreement, within 4 working days, the SO can reach out the CCO accounting office.
522   If necessary, CCO (re)sends an updated daily settlement report to the SO(s).
523
524   In parallel of the daily settlement process, LFC operators are supposed to send the DAMP of
525   each LFC block/area to the CCO. As the DAMP are originally per Bidding zone and not LFC
526   block/area, calculation may be done by the SOs part of the same LFC block in order to have a
527   common DAMP. For more detail, please refer to the business description in the reference.
528
529   Once all DAMP prices have been sent, all the CCOs calculated the settlement prices, namely;
530   -   Frequency Containment Process Energy prices,
531   -   Ramping Energy prices,
532   -   Unintended Exchanges prices
533
534   In order to do so, the CCO have to exchange between themselves the DAMP of their respective
535   LFC blocks. After the calculation, one CCO will send its result to the other(s), which have to
536   confirm the result.
537
538   When all CCOs agree and the four (4) working days deadline for DSR disagreement is over,
539   the CCO sends the DSPR to the SOs. The DSPR contains:
540   -   the settlements volumes and the associated monetary values of the SO,
541   -   the settlements prices, which are the same for the whole Synchronous area
542   -   the own SO DAMP price that was used for the calculation.
543
544   The SO has four (4) workings days to perform business check on the data received. In case of
545   disagreement, the SO can reach out the helpdesk of its CCO. If necessary, updated DSR, or
546   DSPR will be sent to the SO(s).
547
548

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549 Once, for all days of the month, all mismatches have been cleared and the deadlines are over,
550 the CCOs send the MSR to all SOs. The MSR contains the settlement volumes and monetary
551 values of the SO, as well as the settlement prices of the Synchronous area, for the whole month
552
553 The SOs have four (4) workings day to confirm whether or not they accept the results within
554 MSR.
555 To confirm, the Confirmation Document will be used with the header and a reason code
556 indicating whether the monthly settlement report was accepted or rejected. In case of rejection
557 the SO has to explain the reason of disagreement directly with the accounting office of the CCO.
558
559 When all the SOs have confirmed the MSR, CCO confirms the validation for all MSRs of its
560 Coordination Centre Zone (via email), that the reports have been confirmed.
561
562 Once this is completed, one designated CCO sends to the billing agent and the MIA the
563 validated MSR of all SOs. This report contains the settlements volumes and monetary values
564 of all SO, as well as the settlement prices of the Synchronous area.

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565   **4.5   Timetable for the daily accounting and settlement process**

566   The SAFA (Synchronous Area Framework Agreement for Regional Group Continental Europe)
567   Annex 3: Policy on Accounting and Settlement shows in section C-10-2 the timing for the
568   accounting and settlement process. Below, the table and graph below is taken from the SAFA.
569   Please note that the SAFA version is leading in case of differences.

570   Working days for the accounting and settlement process are defined in SAFA Annex 3, C-1-7:

571   *The Working Day is the calendar day except Saturdays, Sundays and 4 holidays: Christmas*
572   *day (25th of December), New Year's day (1st of January), Easter Monday and Ascension Day.*

573   All times in SAFA are related to CET (Central European Time) and CEST (Central European
574   Summer Time).

575

Note: the following timing (if not expressed
different) is valid for the next workday

Timing of daily data delivery exchange	data only for one day		Data for more than one Day (e.g. after weekend, holidays etc.)	
Action	Gate closure	Cut Off time (Agreement deadline)	Gate closure	Cut Off time (Agreement deadline)
Metering data delivery (SOMA) to neighbouring TSO	10:00 AM	1:00 PM	10:00 AM	1:00 PM
Delivery of ANES from VP to Co-ordination Centre		12:00 PM		
Accounting data delivery (SOAM) to neighbouring TSO	1:30 PM	2:00 PM	1:30 PM	4:00 PM
Delivery of agreed Accounting data (SOVA) by TSO to LFC Area. Note: if disagreement: available data have to be sent		2:00 PM		4:00 PM
Delivery of agreed Accounting data (SOVA) to LFC Block		2:00 PM		4:00 PM
Delivery of agreed Accounting data (SOVA) to Co-ordination Centre		2:00 PM		4:00 PM
Accounting data delivery to neighbouring Coordination Centre		3:15 PM		5:15 PM
Delivery of K-factors to Co-ordination Centre		2:00 PM		2:00 PM
Delivery of DAMP to Co-ordination Centre		2:00 PM		2:00 PM

576   **Figure 8 Timetable for daily accounting and settlement process (source: SAFA Annex**
577   **3, C-10-2)**

578

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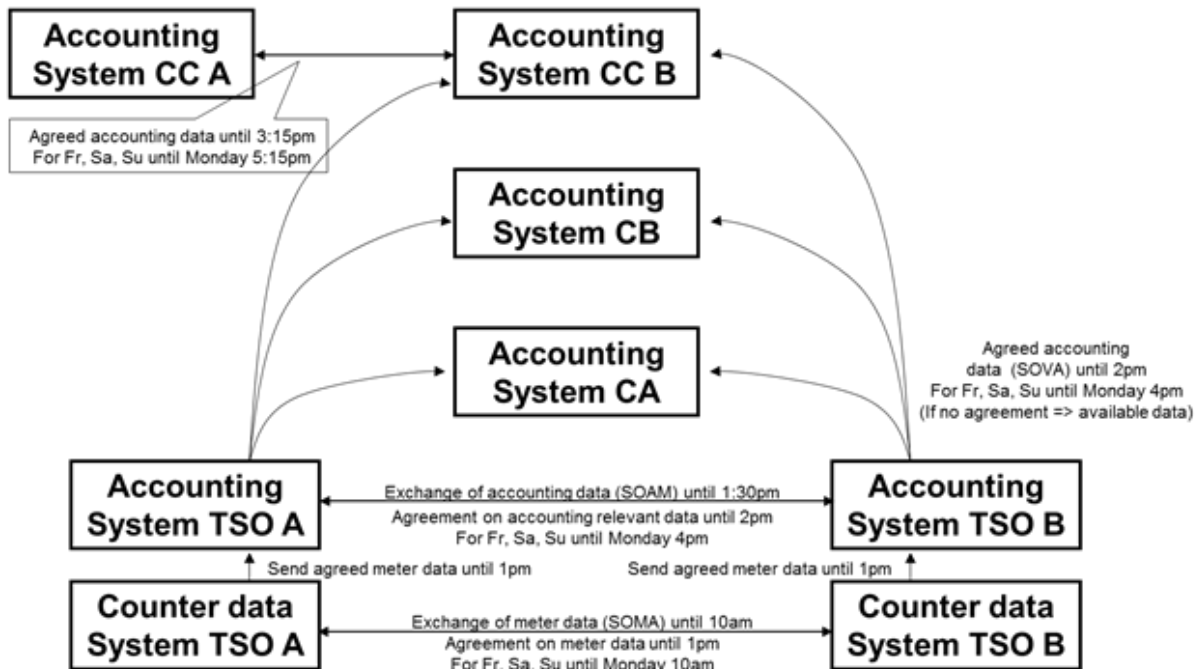
Figure 9 Timing of daily accounting data exchange (Source: SAFA Annex3, C-10-2)

584 **4.6   Document exchange processes**

585 **4.6.1   Metering and accounting sequence diagram**

586 Next figure shows the metering and accounting sequence diagram of the document exchange
587 processes.
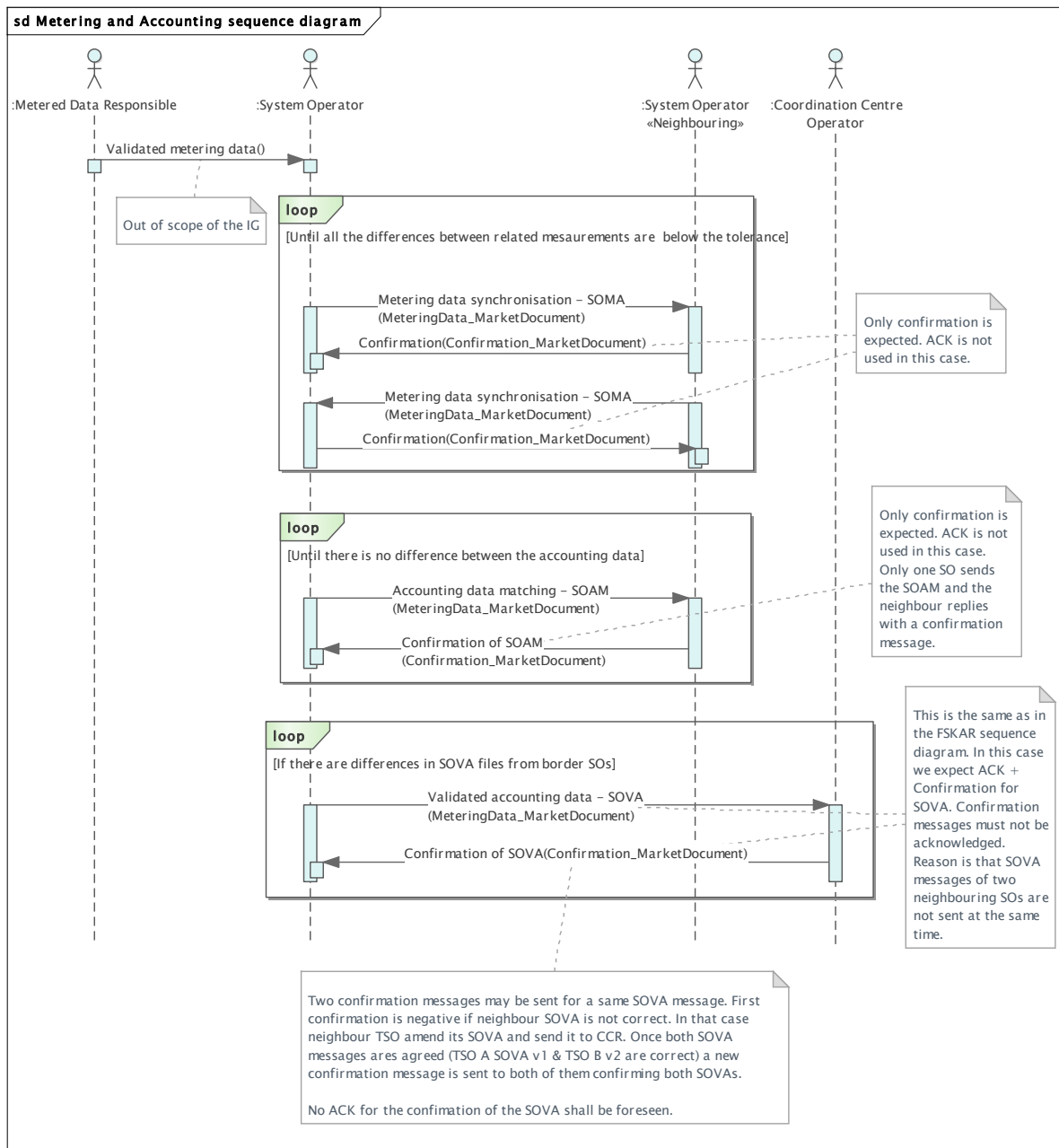
589 **Figure 10 - Metering and accounting sequence diagram**

590

591 The use cases are supported by the following document exchanges:

592 **4.6.1.1   Acknowledgement – Acknowledgement_MarketDocument**

593 Only SOVA message must be acknowledged with an acknowledgment document, IEC 62325-
594 451-1, in a syntactic and semantic way by the corresponding CCO. For SOMA and SOAM, the
595 acknowledgement is not needed because the confirmation implicitly means the
596 acknowledgement.

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597 **4.6.1.2   System Operator Metering Alignment (SOMA) –**
598 **MeteringData_MarketDocument**

599 The SO sends to its neighbouring SO a document containing all the System Operator
600 MeteringAlignment (SOMA) information for a given domain (a border).

601 This document must contain all the time series for all the tie-lines (physical and virtual)
602 defined in the bilateral agreement.

603 This document shall always contain time series information for a tie-line that shall be
604 considered as the metering data.

605 Each SO must confirm the neighbouring SOMA with a confirmation message. A positive
606 confirmation will be sent in case that the metering are below a threshold. A negative
607 confirmation will be sent in case that differences are above a threshold. The following cases
608 where a negative confirmation (Check chapter 4.11) may be sent are:

609 • There is a metering datawith a quality of "not available" (note: Metering data with a
610 quality of "not available" shall not cause a negative confirmation);

611 • The metering data is incoherent (e.g. the threshold is exceeded). (note: Both System
612 Operators must have agreed coherence tests bilaterally for each tie-line);

613 • There is no metering data available for a tie-line (i.e. there is no meter information
614 available on both sides of the tie-line), or all the metering data is incoherent for the tie-
615 line, then the System Operators have to resolve the problem through manual
616 intervention.

617 Any disagreements with the metering data once resolved require that the documents
618 incriminated are retransmitted (i.e. a new version of the document). The metering data that had
619 initially a quality of "not available" shall all have a quality of "adjusted" or "estimated" in the final
620 version (i.e. no Exchange Point Relevant quantities with a quality of "not available" shall exist
621 in the final version).

622 **4.6.1.3   System Operator Accounting data Matching (SOAM) –**
623 **MeteringData_MarketDocument**

624 When the metering data has been agreed (i.e. both System Operators have provided a positive
625 confirmation), the accounting data is calculated and a System Operator Accounting data
626 Matching (SOAM) document is prepared.

627 The process described below is carried out on a daily basis for normal operation. In case of
628 unexpected issues the process can be repeated within 4 working days. Once SOMA process is
629 finished, then SOAM could be delivered as soon as possible.

630 One SO is designated (hereafter called Designated SO) through mutual agreement to
631 systematically transmit the document containing the accounting data to the neighbouring
632 System Operator. The document in question shall contain the information for all the tie-lines
633 relevant to their border.

634 If the neighbouring SO agrees to the accounting data a positive confirmation is transmitted.

635 If there is a disagreement, a negative confirmation is transmitted and the problem is resolved
636 offline. Note, this should not normally happen since the System Operators have agreed on the
637 set of data to be used for the computation and to the algorithm to be used. Designated SO must
638 not acknowledge the confirmation message sent by the neighbouring SO.

639 When the problem has been resolved a new version of the document containing the Exchange
640 Point data is resent by the designated System Operator that made the initial transmission.

641 **4.6.1.4   System Operator Validated Accounting data (SOVA) –**
642 **MeteringData_MarketDocument**

643 Finally each SO sends its validated accounting data (SOVA) to its corresponding CCO. Please
644 notice that two neighbouring SOs may send their own SOVA messages at different times. Both
645 SOs must receive at first acknowledgement when they submit their SOVAs to CCO. Then CCO
646 evaluates both SOVA messages and checks that there are no differences. If there are no

647   differences, a positive confirmation is sent to both SOs and the process finishes. SOs do not
648   have to acknowledge the confirmation sent by CCO.
649   If there are differences between the two SOVA messages, then CCO sends a negative
650   confirmation to both of them. In that case, the two neighbouring SOs have to talk bilaterally in
651   order to solve the mismatch and may recalculate the accounting data again. Once that the
652   mismatch is solved, one or both SOs have to send a new SOVA to the CCO. Then CCO checks
653   again the SOVA and if there are no differences anymore, CCO will send a positive confirmation.
654   Positive confirmation for v2 (SO-A) and positive confirmation for v1 (SO-B).

655   Please notice that SOVA confirmation is done per border SOs. It means that once that a
656   comparison on a border is ready, CCO sends the confirmation to both bordering SOs.

4.6.1.5   Confirmation – Confirmation_MarketDocument

658   Current usage of standards shows that ACK is to be used just to acknowledge that a message
659   is both syntactically and semantically correct. There is no intention in ACK to confirm or do
660   business checks. The purpose of the confirmation document is, as it names says, to confirm in
661   a business way a received market document. For SOMA and SOAM, confirmation message will
662   be used to confirm all checks (syntactical, semantic and business).

663   For SOVA message, ACK plus confirmation messages are expected.

664

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665 **4.6.2 Financial settlement sequence diagram**

666 Next figure shows the financial settlement sequence diagram of the document exchange
667 processes.

668
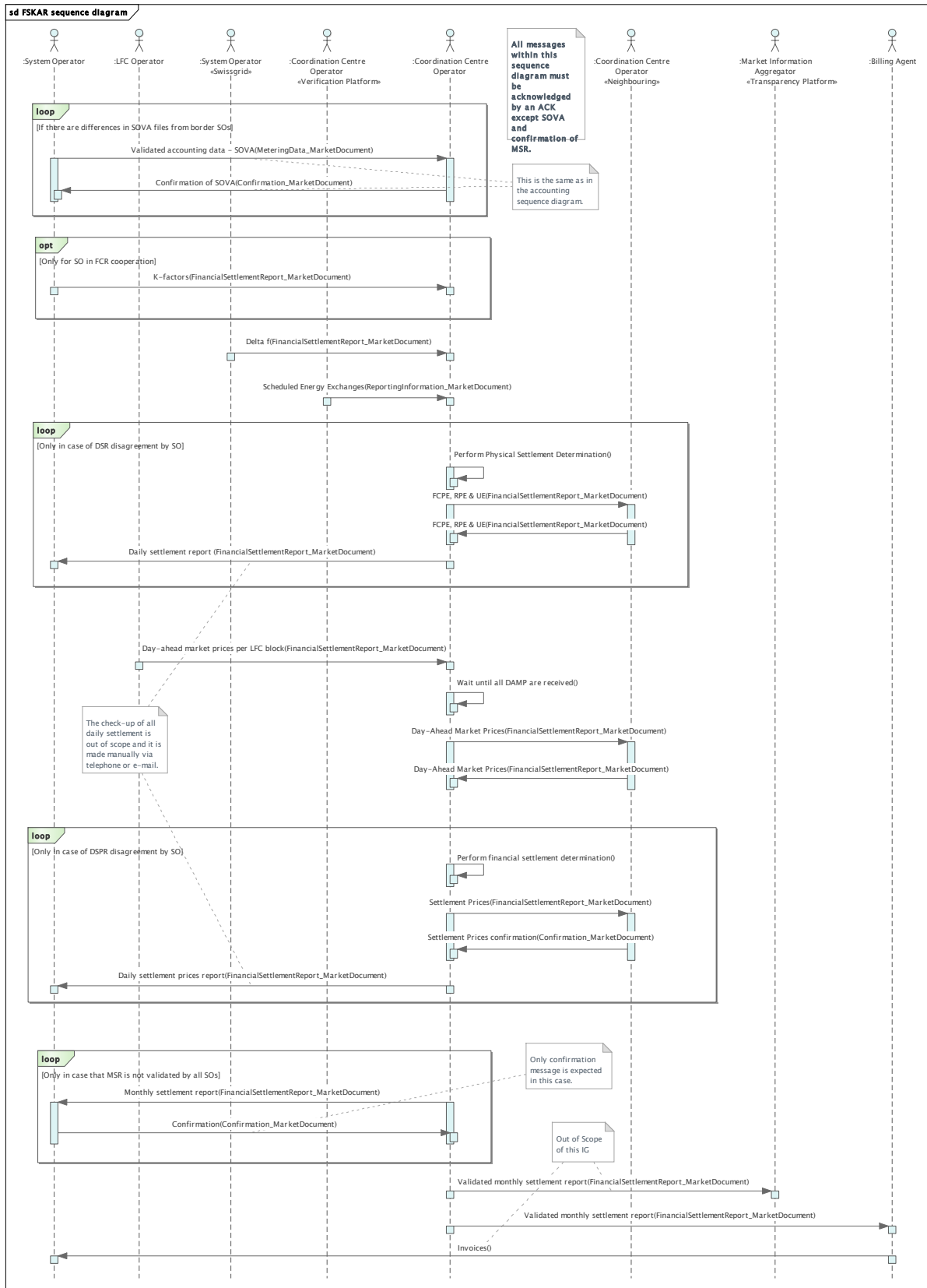
Figure 11 – Financial settlement sequence diagram

669

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670 The use cases are supported by the following document exchanges:

4.6.2.1   Acknowledgement – Acknowledgement_MarketDocument

672 All received documents except confirmation messages and the own acknowledgements, must
673 be acknowledged with an acknowledgment document, IEC 62325-451-1, in a syntactic and
674 semantic way by the different parties.

4.6.2.2   Validated accounting data (SOVA) – MeteringData_MarketDocument

676 The accounting data includes the validated meterings for each physical tie-line and should also
677 reflect the exchanges per virtual tie-lines defined in the bilateral agreement.

4.6.2.3   Delta f – FinancialSettlementReport_MarketDocument

679 The frequency deviation is one of the inputs for the financial settlement process and represents
680 the simple average value of the frequency deviations in the Synchronous area per TSO-TSO
681 settlement period. Swissgrid (SO) is the only party in charge of providing the delta f to the
682 CCOs.

4.6.2.4   Scheduled Energy Exchanges – ReportingInformation_MarketDocument.

684 Refers to the energy corresponding to the sum of the ANES for each LFC area/block, as
685 obtained from the Verification Platform by the CCOs.

4.6.2.5   K-factors – FinancialSettlementReport_MarketDocument

687 It represents the assumed reaction of an LFC area/block to a frequency deviation. There are
688 SOs which have a yearly K-factor, while the SOs cooperating in the FCR cooperation have a
689 time resolution of K-factors equal to 4 hours. The current working assumption is:

690 • Yearly K-factors are configured manually once a year when the Steering Group
691   System Frequency (SG SF) defines them for the SA CE. (Out of scope of the IG)

692 • SOs in the FCR cooperation send the K-factors for each 4h-period to the CCs. These
693   are then updated for those SOs.

4.6.2.6   FCPE, RPE and UE exchange – FinancialSettlementReport_MarketDocument

695 Once the physical settlement determination is performed, CCOs must exchange the settlement
696 volumes: FCP energy, RP energy and Unintended exchange for each LFC area/block. This data
697 exchange allows CCOs to be aligned.

4.6.2.7   Daily settlement report (DSR) – FinancialSettlementReport_MarketDocument

699 The DSR includes ANES, K factor, delta f, and settlement volumes (FCPE, RPE and UE)
700 previously calculated during the physical settlement determination phase. DSRs also contains
701 metered flows for each tie-line.

702 In case that SO agrees with the DSR no more actions are required from SO side.

703 In case of disagreement, the SO must coordinate with the CCO to solve the issue. The
704 resolution of all disagreements on DSR is out of scope and it is made manually via telephone
705 or email within 4 working days. In case of DSR disagreement, the physical settlement
706 determination must be run again and consequently CCOs should exchange FCPE, RPE and UE
707 again and provide a new DSR to the SO.

708

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709 **4.6.2.8   Day-Ahead Market Prices (DAMP) –**
710 **   FinancialSettlementReport_MarketDocument**

711 The price determination is also known as the financial settlement function and is carried out by
712 the CCOs. The main inputs for the financial settlement are the volumes calculated during the
713 physical settlement determination and the DAMP. DAMP for each LFC block/area is provided
714 by each corresponding LFC operator in €, with two decimal places. DAMP is submitted per
715 default on LFC block level, but for LFC blocks for multiple LFC areas, DAMP can be submitted
716 per LFC area, if agreed with the CCO.

717 CCOs must exchange the received DAMP from their associated LFC Operators. This way all
718 CCOs have all the prices from all the LFC blocks within the Synchronous area.

719

720 **4.6.2.9   Settlement prices exchange – FinancialSettlementReport_MarketDocument;**
721 **   Confirmation_MarketDocument**

722 Once the financial settlement determination process has finished, CCO exchanges with the
723 neighbouring CCO the settlement prices for FCPE, RPE and UE. The neighbouring CCO checks
724 if the received prices are in line with the ones calculated on its side. Neighbouring CCO answers
725 confirming if the prices are fine or there are discrepancies using Confirmation document.

726

727 **4.6.2.10   Daily settlement prices report (DSPR) –**
728 **   FinancialSettlementReport_MarketDocument**

729 Once the settlement prices have been confirmed and 4 days deadline for adaption of DSR is
730 over, CCO delivers the DSPR to their associated SOs. This report includes daily settlement
731 prices (FCPE, RPE and UE) to the SO, as well as the settlement volumes (FCPE, RPE and UE)
732 and monetary values.

733 This report also contains the SO DAMP prices of the respective SO that were used for the
734 calculation.

735 In case that SO agrees with the DSPR no more actions are required from SO side.

736 In case of disagreement, the SO must coordinate with the CCO. The resolution of all
737 disagreements on DSPR is out of scope and it is made manually via telephone or email within
738 4 working days. In case of DSPR disagreement, the financial settlement determination must be
739 run again and consequently CCOs should exchange settlement prices again and provide a new
740 DSPR or DSR to the SO.

741

742 **4.6.2.11   Monthly settlement report (MSR) –**
743 **   FinancialSettlementReport_MarketDocument, Confirmation_MarketDocument**

744 After the deadline for problem reporting has expired for all days of the month and all problems
745 have been closed, the CCO establishes the monthly settlement results (volumes, monetary
746 values and prices) which are sent to the SOs for validation in form of MSR. SO confirms if the
747 MSR is fine or there are discrepancies using Confirmation document within 4 working days.

748 Once the MSR has been validates for all SOs, then it can be submitted to Market Information
749 Aggregator (TP) for publication (out of scope) and to the Billing Agent to issue the
750 corresponding invoices.

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752 **4.7 Document overview**

753 The document exchange processes of Accounting & FSKAR described in the previous chapter
754 require sending and receiving various ESMP documents. The information to be exchanged is:

755 • Acknowledgement_MarketDocument v8.1 based on IEC 62325-451-1:2017 Ed2;

756 • Confirmation_MarketDocument v5.3 based on IEC 62325-451-2:201

757 • FinancialSettlementReport_MarketDocument v1.0;

758 • MeteringData_MarketDocument v1.0;

759 • ReportingInformation_MarketDocument v2.1;

760

761 **4.8 MeteringData_MarketDocument**

762 Following table shows a description of the different attributes in MeteringData_MarketDocument
763 v1.0 to be used in this business process

764 **4.8.1 MeteringData_MarketDocument Dependency Table**

765 **Table 5 - MeteringData_MarketDocument Dependency Table**

MeteringData_MarketDocument				
Class	**Attribute**	**SOMA**	**SOAM**	**SOVA**
Metering Data_ Market Document	mRID	Used		
	revisionNumber	Used		
	type	A45: Measurement Value Document	A46: SOAM - System Operator Accounting data Matching	A47: SOVA - System Operator Validated Accounting Point data
	process .processType	A20: SOMA process	A22: RGCE accounting process	A22: RGCE accounting process
	createdDateTime	Used		
	sender_ MarketParticipant. mRID	Used EIC code of the sender Coding Scheme: A01		
	sender_ MarketParticipant. marketRole.type	A04: System Operator		

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MeteringData_MarketDocument				
Class	**Attribute**	**SOMA**	**SOAM**	**SOVA**
	receiver_ MarketParticipant. mRID	Used EIC code of the receiver Coding Scheme: A01		
	receiver_ MarketParticipant. marketRole.type	A04: System Operator		A16: Coordination Centre Operator
	period.timeInterval	Used		
	domain.mRID	EIC code of the Continental Europe Synchronous area. Coding Scheme: A01		
Series	mRID	Used		
	businessType	A64: Metered measurement data	A66: Energy flow. (For tie-lines) A67: Power plant energy Schedule. (For virtual tie-lines)	
	product	8716867000030: Active energy		
	curveType	A01: Sequential Fixed Block A03: Variable Fixed Block		
	marketEvaluation Point.mRID	EIC-Z code of the exchange point or EIC-T2 code of the tie line. Coding Scheme: A01	EIC-Z code of the Exchange Point Coding Scheme: A01	
	measurement_ Unit.name	MWH: Megawatt hours		
	in_Domain.mRID	Used EIC code of the importer LFC block/area Coding Scheme: A01		
	out_Domain.mRID	Used EIC code of the exporter LFC block/area Coding Scheme: A01		
	flowDirection.direction	Not used		

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2 For historical reasons, EIC-W codes were used. These codes should be replaced by EIC-T codes in the future.

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MeteringData_MarketDocument				
Class	**Attribute**	**SOMA**	**SOAM**	**SOVA**
	registration_ DateAndOrTime. dateTime	Not used		
	objectAggregation	Not used	A16: Exchange point	
	originalTransaction_ Series.mRID	Not used		
Series_ Period	timeInterval	Used		
	resolution	PT15M or PT5M (Depending on SO agreement)	PT15M	
Point	position	Used		
	quantity	Used in all the cases except when quality code is A02 (Not available)	Used	
	quality	Optional. If quality is not provided, then the value can be considered as final. A01 = Adjusted A02 = Not available (no quantity available) A03 = Estimated A05 = Incomplete	Not used	

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767 **Note**: Accounting data match when the quantity values are the same.
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769 **4.9   FinancialSettlementReport_MarketDocument**

770 Following table shows a description of the different attributes in
771 FinancialSettlementReport_MarketDocument v1.0 to be used in this business process

772 **4.9.1   FinancialSettlementReport_MarketDocument Dependency Table**

773 **Table 6 - FinancialSettlementReport_MarketDocument Dependency Table 1/2**

FinancialSettlementReport_MarketDocument						
Class	**Attribute**	**Delta f**	**K-factors**	**DAMP (Between LFC operator and CCO)**	**DAMP (CCO Coordination)**	**FCPE, RPE & UE (CCO Coordination)**
Financial Settlement Report_ Market Document	mRID	Used				
	revisionNumber	Used				
	type	B43: Settlement coordination document	B42: K-factor document	A44: Price document	B43: Settlement coordination document	
	process.process Type	A57: FSKAR settlement				
	sender_MarketP articipant.mRID	Used				
	sender_MarketP articipant.market Role.type	A04: System Operator	A04: System Operator	A48: LFC Operator	A16: Coordination Centre Operator	
	receiver_Market Participant.mRID	Used				
	receiver_Market Participant.mark etRole.type	A16: Coordination Centre Operator				
	createdDateTim e	Used				
	period.timeInterv al	Used. Daily Period				
	domain.mRID	EIC code of the Continental Europe Synchronous area. Coding Scheme: A01		EIC code of the LFC block or area. Coding Scheme: A01		EIC code of the Continent al Europe Synchron ous area. Coding Scheme: A01
	docstatus	Not used				
Timeseries	mRID	Used				

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FinancialSettlementReport_MarketDocument						
Class	Attribute	Delta f	K-factors	DAMP (Between LFC operator and CCO)	DAMP (CCO Coordination)	FCPE, RPE & UE (CCO Coordination)
	businessType	C38: Frequency Deviation	C25: K-factor	C39: Day-Ahead Market Price		C34: Frequency Containment Process Energy C36: Ramping Period Energy A21: Unintended Energy
	product	8716867000030: Active energy				
	curveType	A01: Sequential Fixed Block A03: Variable Fixed Block				
	measurement _Unit.name	MTZ: Millihertz	E08: Megawatt per Hertz	MWH: megawatt hours		MWH: megawatt hours
	currency _Unit.name	Not used	Not used	EUR: EURO		Not used
	in_Domain	Not used	EIC code of the LFC area/block. Coding Scheme: A01 **Note**: Same EIC code in in & out domain	EIC code of the LFC block/area. Coding Scheme: A01 **Note**: Same EIC code in in & out domain		EIC code of the importer LFC area/ block or Continental Europe Synchronous area. Coding Scheme: A01

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FinancialSettlementReport_MarketDocument						
Class	**Attribute**	**Delta f**	**K-factors**	**DAMP (Between LFC operator and CCO)**	**DAMP (CCO Coordination)**	**FCPE, RPE & UE (CCO Coordination)**
	out_Domain	Not used	EIC code of the LFC area/block. Coding Scheme: A01 **Note**: Same EIC code in in & out domain	EIC code of the LFC block/area Coding Scheme: A01 **Note**: Same EIC code in in & out domain		EIC code of the exporter LFC area/block or Continental Europe Synchronous area. Coding Scheme: A01
	connectingLine_ RegisteredResource	Not used				
Series_Period	timeInterval	Used				
	resolution	PT15M	PT1H	PT15M		
Point	position	Used				
	quantity	Used		Used (Note: DAMP must have a precision of two decimals as max)		Used (Volume quantity)
	monetaryValue_ Quantity.quantity	Not used				

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Table 7 - FinancialSettlementReport_MarketDocument Dependency Table 2/2

FinancialSettlementReport_MarketDocument					
Class	**Attribute**	**Settlement prices exchange (CCO Coordination)**	**Daily Settlement Report (DSR)**	**Daily Settlement Prices Report (DSPR)**	**Monthly Settlement Report (MSR)**
Financial Settlement Report_ Market Document	mRID	Used			
	revisionNumber	Used			
	type	B43: Settlement coordination document	B38: Settlement document	B44: Financial settlement document	
	process. processType	A57: FSKAR settlement			
	sender.mRID	Used			
	sender.roleType	A16: CoordinationCentre Operator			
	receiver.mRID	Used			
	receiver.roleType	A16: Coordination Centre Operator	A04: System Operator		A04: System Operator A10: Billing Agent
	createdDateTime	Used			
	period.timeInterval	Used. Daily Period			Used. Monthly Period
	domain.mRID	EIC code of the Continental Europe Synchronous area. Coding Scheme: A01			
	docstatus	Not used	A13: Withdrawn Only used in case a document has been submitted by mistake		
Timeseries	mRID	Used			

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businessType	C35: FCPE price C37: RPE price C33: UE price	B63: Aggregated netted external schedule (ANES) C34: Frequency Containment Process Energy C36: Ramping Period Energy A21: Unintended Energy C25: K-factor C38: Frequency deviation A66: Energy Flow (Metered Tie-Line flows for each Tie-Line A67: Powerplant energy schedule (Intended energy exchange for each Virtual Tie-Line A44: Compensation Program (Temporary)	C34: Frequency Containment Process Energy C36: Ramping Period Energy A21: Unintended Energy C35: FCPE price C37: RPE price C33: UE price C39: Day-Ahead Market Price	C34: Frequency Containment Process Energy C36: Ramping Period Energy A21: Unintended Energy C35: FCPE price C37: RPE price C33: UE price
product	8716867000030: Active energy			
curveType	A01: Sequential Fixed Block A03: Variable Fixed Block			

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FinancialSettlementReport_MarketDocument					
Class	**Attribute**	**Settlement prices exchange (CCO Coordination)**	**Daily Settlement Report (DSR)**	**Daily Settlement Prices Report (DSPR)**	**Monthly Settlement Report (MSR)**
	measurement _Unit.name	MWH: megawatt hours	MTZ: Millihertz (Only for Frequency Deviation) E08: Megawatt per Hertz (Only for K-factor) MWH: megawatt hours (For all except Frequency Deviation and K-factor)	MWH: megawatt hours	
	currency _Unit.name	EUR: EURO	Not used	EUR: EURO	

FinancialSettlementReport_MarketDocument					
Class	**Attribute**	**Settlement prices exchange (CCO Coordination)**	**Daily Settlement Report (DSR)**	**Daily Settlement Prices Report (DSPR)**	**Monthly Settlement Report (MSR)**
	in_Domain	EIC code of the importer LFC area/block Coding Scheme: A01	EIC code of the importer LFC area/block or Continental Europe Synchronous area. Coding Scheme: A01	For FCPE price, RPE price and UE price : Not used (Synchronous area code already in header) For DAMP: EIC code of the LFC block/area. (Same in both in-and out domain attributes) For the rest EIC code of the importer LFC area/block or Continental Europe Synchronous area. Coding Scheme: A01	For FCPE price, RPE price and UE price: Not used (Synchronous area code already in header) For the rest: EIC code of the importer LFC area/block or Continental Europe Synchronous area. Coding Scheme: A01

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FinancialSettlementReport_MarketDocument					
Class	Attribute	Settlement prices exchange (CCO Coordination)	Daily Settlement Report (DSR)	Daily Settlement Prices Report (DSPR)	Monthly Settlement Report (MSR)
	out_Domain	EIC code of the exporter LFC area/block Coding Scheme: A01	For FCPE price, RPE price and UE price: Not used (Synchronous area code already in header) For the rest: EIC code of the exporter LFC area/block or Continental Europe Synchronous area. Coding Scheme: A01	For FCPE price, RPE price and UE price: Not used (Synchronous area code already in header) For DAMP: EIC code of the LFC block/area. (Same in both in-and out domain attributes) For the rest: EIC code of the exporter LFC area/block or Continental Europe Synchronous area. Coding Scheme: A01	For FCPE price, RPE price and UE price: Not used (Synchronous area code already in header) For the rest: EIC code of the exporter LFC area/block or Continental Europe Synchronous area. Coding Scheme: A01
	connectingLine_ RegisteredResource	Not used	EIC code of the tie-line. Coding Scheme: A01 Note: Used only with businessType codes A66 and A67	Not used	

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FinancialSettlementReport_MarketDocument					
Class	**Attribute**	**Settlement prices exchange (CCO Coordination)**	**Daily Settlement Report (DSR)**	**Daily Settlement Prices Report (DSPR)**	**Monthly Settlement Report (MSR)**
Series_Period	timeInterval	Used			
	resolution	PT15M	PT1H (Only for K-factors) PT15M (For the rest)	PT15M	
Point	position	Used			
	quantity	Used	Used Volume quantity for FCPE, RPE and UE businessType codes	Used Volume or price depending on the chosen businessType code.	Used Volume or price depending on the chosen businessType code
	monetaryValue_ Quantity.quantity	Not used		Used only with businessType codes C34, C36 and A21 Monetary value	Used only with businessType codes C34, C36 and A21 Monetary value

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779 **Note**: Volumes and monetary values of energy are always netted. If for a given 15-minute time
780 interval and In and Out domain couple there are non-zero values, then only a zero can be
781 provided for the opposite In and Out domain couple and the same 15-minute time interval.

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4.10 ReportingInformation_MarketDocument

Following table shows a description of the different attributes in
ReportingInformation_MarketDocument v2.1 to be used in this business process

4.10.1 ReportingInformation_MarketDocument Dependendency Table

Table 8 - ReportingInformation_MarketDocument Dependency Table

ReportingInformation_MarketDocument		
Class	**Attribute**	**Values**
Reporting Information_ Market Document	mRID	Used
	revisionNumber	Used
	type	B26: Aggregated netted external schedule document
	process.processType	A57: FSKAR settlement
	sender.mRID	EIC code of Verification Platform 10V000000000009D
	sender.roleType	A32 = Market information aggregator
	receiver.mRID	EIC code of Coordination Centre Operator
	receiver.roleType	A16**:** Coordination Centre Operator
	createdDateTime	Used
	time_Period.timeInterval	Used. Daily Period
	domain.mRID	EIC code of the Coordination Centre Zone. Coding Scheme: A01
	dataset_marketDocument .mRID	Not used
	dataset_marketDocument. revisionNumber	Not used
	docstatus	Not used
	referenced_DateAndOrTime. date	Not used
	referenced_DateAndOrTime. time	Not used
Timeseries	mRID	Used
	businessType	B63: Aggregated netted external schedule (ANES)
	product	8716867000016: Active power
	in_Domain	EIC code of the importer LFC area/block. Coding Scheme: A01
	out_Domain	EIC code of the exporter LFC area/block. Coding Scheme: A01
	connectingLine_ RegisteredResource	Not used
	measurement_Unit.name	MAW: megawatt

ReportingInformation_MarketDocument		
Class	**Attribute**	**Values**
	curveType	A01: Sequential Fixed Block A03: Variable Fixed Block
	marketObjectStatus.status	Not used
Series_Period	timeInterval	Used
	resolution	PT15M
Point	position	Used
	quantity	Used
	posFR_Quantity.quantity	Not used
	negFR_Quantity.quantity	Not used

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4.11 Confirmation_MarketDocument

Following table shows a description of the different attributes in Confirmation_MarketDocument v5.3 to be used in this business process.

Table 8 - Confirmation_MarketDocument Dependency Table

Confirmation_MarketDocument					
Class	**Attribute**	**SOMA**	**SOAM**	**SOVA**	**MSR**
Confirmation_MarketDocument	mRID	Used			
	type	A18: Confirmation Report			
	createdDateTime	Used			
	sender_MarketParticipant.mRID	EIC code of SO		EIC code of CCO	EIC code of SO
	sender_MarketParticipant.marketRole.type	A04: System Operator		A16: Coordination Centre Operator	A04: System Operator
	receiver_MarketParticipant.mRID	EIC code of SO			EIC code of CCO
	receiver_MarketParticipant.marketRole.type	A04: System Operator			A16: Coordination Centre Operator
	schedule_Period.timeInterval	Daily period			Monthly period
	confirmed_MarketDocument.mRID	Used			
	confirmed_MarketDocument.revisionNumber	Used			
	related_MarketDocument.mRID	Not used			
	related_MarketDocument.revisionNumber	Not used			
	domain.mRID	EIC code of the Continental Europe Synchronous area. Coding Scheme: A01			
	subject_MarketParticipant.mRID	Not used			
	subject_MarketParticipant.marketRole.type	Not used			
	process.processType	Not used			

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Confirmation_MarketDocument					
Class	Attribute	SOMA	SOAM	SOVA	MSR
Reason (Linked to Confirmation _MarketDocument)	code	A01 if the SO/CCO confirm the data A02 if the SO/CCO disagrees and wants to trigger the contestation procedure. A03: Message contains errors at the time series level B08: Data not yet available			A01 if the SO confirms the data A02 if the SO disagrees and wants to trigger the contestation procedure.
	text	Optional (Textual explanation corresponding to the reason code).			
Confirmed_TimeSeries	Not used				
Imposed_TimeSeries	Not used				

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5   Communication channel

798   For all details in respect to the communication channel used for the message exchanges defined
799   in this Implementation Guide please refer to 'SAFA for RGCE – Annex 03 – Policy on Accounting
800   and Settlement'.
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