P2 – Policy 2: Scheduling and Accounting [C]

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Chapters

A. Scheduling

B. Online Observation

C. Accounting and settlement of UNINTENTIONAL DEVIATIONS

Introduction

To operate a large power system like the one of UCTE and to create the suitable conditions for commercial electricity trade it is necessary to schedule in advance the power to be exchanged at the interconnection borders between the system operators. During daily operation, the schedules are followed by means of the LOAD-FREQUENCY CONTROL installed in each CONTROL AREA / CONTROL BLOCK. Notwithstanding LOAD-FREQUENCY CONTROL, UNINTENTIONAL DEVIATIONS invariably occur in energy exchanges. For this reason, it is necessary to co-ordinate the SCHEDULE nomination between the system operators, to observe in real-time UNINTENTIONAL DEVIATIONS and to co-ordinate ACCOUNTING and computation of the COMPENSATION PROGRAMS to balance UNINTENTIONAL DEVIATIONS.

Note: All terms that are formatted in CAPITILISED letters can be found in the glossary of terms.

A. Scheduling of Power Exchange

[UCTE Operation Handbook Appendix 1 Chapter A: Scheduling of Power Exchange, 2016]

Introduction

Due to ongoing market liberalisation throughout Europe, the commercial cross border electricity trading of MARKET PARTICIPANTs has increased. The scheduling processes described in this document meet the demands of the relevant Network Codes/Guidelines. This not only supports but even enhances the commercial cross border exchange of electricity as desired by the European Union. Within this scope the ENTSO-E RG CE Operational Handbook Policy 2 Chapter A "Scheduling of Power Exchange" describes in a general approach how to run this process within ENTSO-E RG CE. This document describes the scheduling process only for normal operational conditions – for emergency operation see ENTSO-E RG CE OH Policy 5.

In the "Implementation Guide for the ESS (ETSO Scheduling System) in the ENTSO-E RG CE processes" the receiver of SCHEDULEs is identified as the TSO.

The ENTSO-E RG CE Schedule Reporting Process and the file formats of the exchanged messages referenced in this document are described in ENTSO-E RG CE Schedule Reporting Process Implementation Guide.

The ENTSO-E RG CE Schedule Reporting Process and VERIFICATION PROCESS are applied for both wholesale market and TSO-TSO related exchanges.

TSO-TSO exchanges are initiated by TSOs to maintain secure operation of the grid. The number and types of exchanges has increased and new mechanisms are developed based on the Network Codes/Guidelines. Possible examples are cross-border REDISPATCHING, COUNTERTRADING and cross-border balancing. For TSO-TSO exchanges dedicated standards shall apply and EXTERNAL TSO SCHEDULEs are used.

Definitions

According to Network Code on Capacity Allocation and Congestion Management (NC CACM):

A-D1. Net Position. Means the netted sum of electricity exports and imports for each market time unit for a bidding zone.

A-D2. Scheduled Exchange Calculator. Means the entity or entities with the task of calculating scheduled exchanges.

According to System Operation Guideline (GL SO):

A-D3. Aggregated Netted External Schedule. Means 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.

A-D4. Automatic FRR (aFRR). Means FRR that can be activated by an automatic control device.

A-D5. External Commercial Trade Schedule. Means a SCHEDULE representing the commercial exchange of electricity between MARKET PARTICIPANTs in different SCHEDULING AREAs.

A-D6. External TSO Schedule. Means a SCHEDULE representing the exchange of electricity between TSOs in different SCHEDULING AREAs.

A-D7. Frequency Restoration Reserves (FRR). Means the active power reserves available to restore system frequency to the nominal frequency and, for a synchronous area consisting of more than one LFC AREA, to restore power balance to the scheduled value.

A-D8. Netted Area AC Position. Means the netted aggregation of all AC-external schedules of an area.

A-D9. Schedule. Means a reference set of values representing the generation, consumption or exchange of electricity for a given time period.

A-D10. Scheduling Agent. Means the entity or entities with the task of providing SCHEDULEs from MARKET PARTICIPANTs to TSOs, or where applicable third parties.

A-D11. Scheduling Area. Means an area within which the TSOs' obligations regarding scheduling apply due to operational or organisational needs.

A-D12. Load-frequency Control Area (LFC AREA). Means a part of a synchronous area or an entire synchronous area, physically demarcated by points of measurement at interconnectors to other LFC AREAs, operated by one or more TSOs fulfilling the obligations of load-frequency control.

A-D13. Load-frequency Control Block (LFC BLOCK). Means a part of a synchronous area or an entire synchronous area, physically demarcated by points of measurement at interconnectors to other LFC BLOCKs, consisting of one or more LFC AREAs, operated by one or more TSOs fulfilling the obligations of load-frequency control.

According to Network Code on requirements for grid connection of generators (NC RfG):

A-D14. Synchronous Area. Means an area covered by synchronously interconnected TSOs, such as the synchronous areas of Continental Europe, Great Britain, Ireland-Northern Ireland and Nordic and the power systems of Lithuania, Latvia and Estonia, together referred to as "Baltic" which are part of a wider synchronous area.

According to Regulation (EU) No. 543/2013:

A-D15. Bidding Zone. Means the largest geographical area within which MARKET PARTICIPANTs are able to exchange energy without capacity allocation.

A-D16. Countertrading. Means a Cross Zonal energy exchange initiated by the System Operators between two Bidding Zones to relieve a Physical Congestion.

A-D17. Redispatching. Means a measure activated by one or several System Operators by altering the generation and/or load pattern, in order to change physical flows in the Transmission System and relieve a Physical Congestion.

According to Regulation (EU) No. 1227/2011:

A-D18. Market Participant. Means any person, including TRANSMISSION SYSTEM OPERATORs, who enters into transactions, including the placing of orders to trade, in one or more wholesale energy markets.

According to directive 2009/72/EC:

A-D19. Transmission System Operator (TSO). A natural or legal person responsible for operating, ensuring the maintenance of and, if necessary, developing the transmission system in a given area and, where applicable, its interconnections with other systems, and for ensuring the long–term ability of the system to meet reasonable demands for the transmission of electricity.

According to ENTSO-E The Harmonized Electricity Market Role Model (Version 2015-01)

(within this document the term Control Block refers to the definition of the LFC BLOCK):

A-D20. Coordination Centre Zone. Means the composition of a number of Control Blocks under the responsibility of the same COORDINATION CENTER OPERATOR.

A-D21. Coordination Centre Operator. Entity responsible for:

A-D21.1. The coordination of exchange programs between its related Control Blocks and for the exchanges between its associated COORDINATION CENTER ZONEs.

A-D21.2. Ensuring that its Control Blocks respect their obligations in respect to load frequency control.

A-D21.3. Calculating the time deviation in cooperation with the associated coordination centers.

A-D21.4. Carrying out the settlement and/or compensation between its Control Blocks and against the other COORDINATION CENTER ZONEs.

According ENTSO-E RG CE Implementation Guide Accounting and Settlement:

A-D22. ENTSO-E RG CE Settlement Responsible party. (Played by the Coordination Center Operator, the Control Block Operator or the Control Area Operator) who collects all the Accounting Point data and all relevant scheduling data and establishes the ENTSO-E RGCE Settlement Report for the corresponding ENTSO-E RGCE area and sends it to the ENTSO-E RGCE Publication Framework.

According to this document:

A-D23. Compensation Program Schedule. A schedule representing the exchange of electricity of TSOs related to a compensation program.

A-D24. Load-frequency Control Area Operator. Entity responsible for:

A-D24.1. The aFRRs for its own area.

A-D24.2. The coordination of the correction of time deviations.

A-D25. Load-frequency Control Block Operator. Entity responsible for:

A-D25.1. The aFRR within its own block and ensuring that its LFC AREAs respect their obligations in respect to aFRRs and time deviation.

A-D25.2. The organisation of the settlement and/or compensation between its LFC AREAs.

A-D26. Aggregated Netted External Market Schedule. Means a SCHEDULE representing the netted aggregation of all EXTERNAL COMMERCIAL TRADE SCHEDULEs between two related SCHEDULING AREAs or between a SCHEDULING AREA and VIRTUAL SCHEDULING AREA.

A-D27. Aggregated Netted External TSO Schedule. Means a SCHEDULE representing the netted aggregation of all EXTERNAL TSO SCHEDULEs between two related SCHEDULING AREAs or between a SCHEDULING AREA and a VIRTUAL SCHEDULING AREA.

A-D28. Agreement. Means the comparison and confirmation of corresponding values of EXTERNAL TSO SCHEDULEs dedicated to the same border.

A-D29. Verification. Means the comparison of corresponding values of AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs and AGGREGATED NETTED EXTERNAL TSO SCHEDULEs for all TIME INTERVALs within the SCHEDULEs dedicated to the same border and direction.

A-D30. Virtual Scheduling Area. Means a SCHEDULING AREA without generation or consumption where the sum of all imports is equal to the sum of all exports.

A-D31. Nomination. Means the notification of SCHEDULEs to related TSOs.

A-D32. Matching. MATCHING is the comparison of corresponding values of EXTERNAL COMMERCIAL TRADE SCHEDULEs and of EXTERNAL TSO SCHEDULEs dedicated to the same border. It includes predefined rules which will be applied in case the value and/or the direction are not the same on both sides of the border. Thus, MATCHING results in the same values for a given border, direction and all TIME INTERVALs within the SCHEDULEs.

A-D33. ENTSO-E RG CE Agreement Process (AGREEMENT PROCESS). Is the process where the requesting TSO and the providing one confirm the values of EXTERNAL TSO SCHEDULEs for a given direction and for all TIME INTERVALs in a given time frame.

A-D34. ENTSO-E RG CE Verification Process (VERIFICATION PROCESS). Means the VERIFICATION of AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs and AGGREGATED NETTED EXTERNAL TSO SCHEDULEs. Furthermore, the aggregation of all AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs and AGGREGATED NETTED EXTERNAL TSO SCHEDULEs has to sum up to zero within the SYNCHRONOUS AREA of ENTSO-E RG CE.

A-D35. Scheduling Area Schedule (SAS). Means the data set representing all nominated EXTERNAL COMMERCIAL TRADE SCHEDULEs **(**and where agreed also EXTERNAL TSO SCHEDULEs) for a defined process (Day Ahead, Intra Day, Balancing etc.). The SAS contains exchanges between two related SCHEDULING AREAs.

A-D36. Scheduling Area Exchange Document (SAX). Means the data set representing the energy exchange between scheduling areas matched (if bilateral cross-border scheduling is applied) and/or agreed between two TSOs. The document is the input for the VERIFICATION PROCESS. The file format of the document is described in ENTSO-E RG CE Schedule Reporting Process Implementation Guide. For each of the following schedules a separate document shall be provided:

A-D36.1. The exchange of AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs between two SCHEDULING AREAs. This is the aggregation of all EXTERNAL COMMERCIAL TRADE SCHEDULEs

A-D36.2. The exchange of AGGREGATED NETTED EXTERNAL TSO SCHEDULEs between two SCHEDULING AREAs. This is the aggregation of all EXTERNAL TSO SCHEDULEs.

A-D36.3. The exchange of COMPENSATION PROGRAM SCHEDULEs.

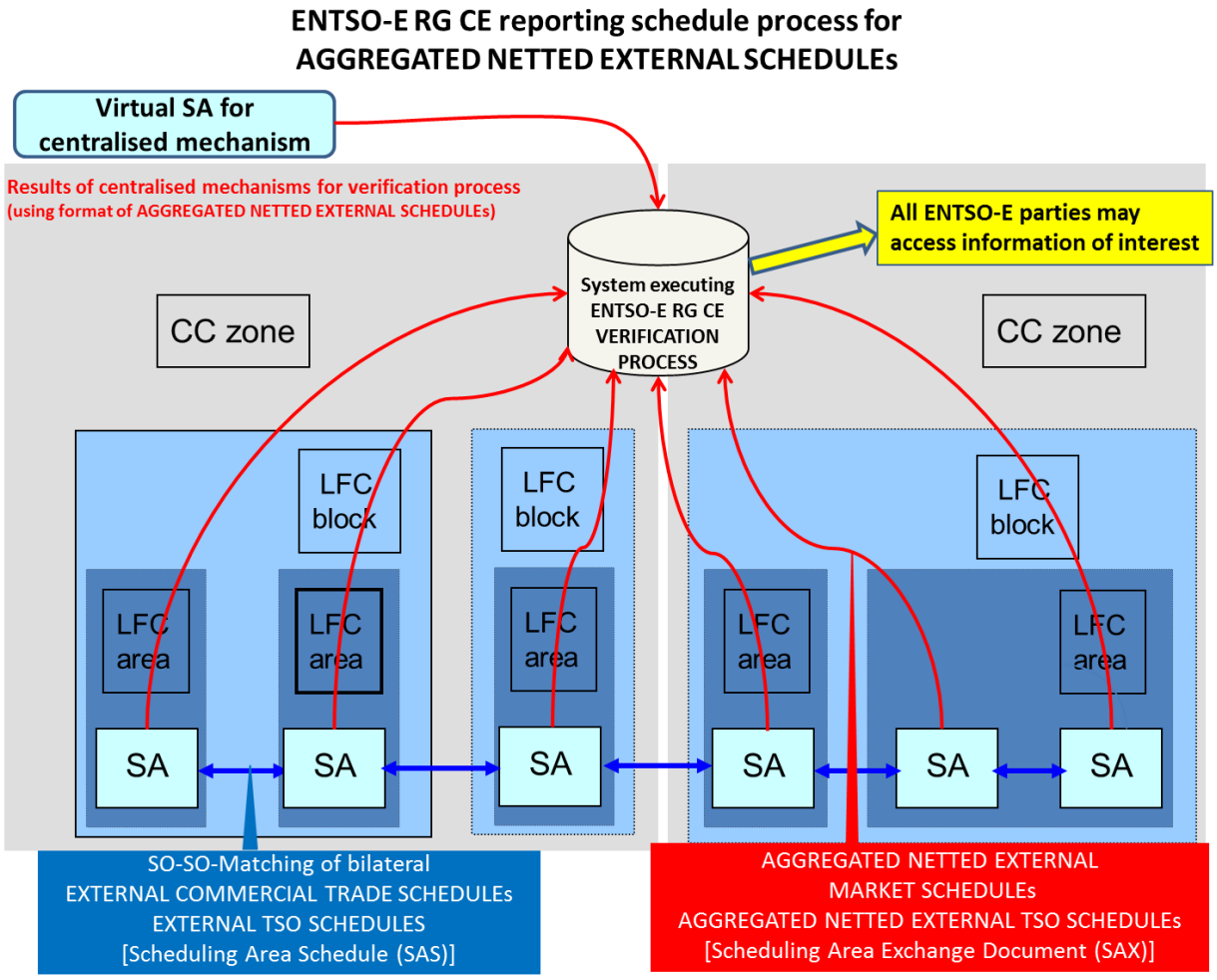

Figure 1: Information exchange of the ENTSO-E RG CE VERIFICATION PROCESS

A-D37. Gate-Closure Time (GCT). GCT is a deadline for the nomination of EXTERNAL COMMERCIAL TRADE SCHEDULEs.

A-D38. Cut-Off Time (COT). COT is a deadline, after GCT:

A-D38.1. For corrections of nominated, but mismatching EXTERNAL COMMERCIAL

TRADE SCHEDULEs. If the mismatch cannot be solved until COT, agreed rules between TSOs shall be applied to ensure successful MATCHING. In some cases, COT can be equal to GCT.

A-D38.2. For nomination of AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs for the VERIFICATION PROCESS.

A-D39. Time Interval. TIME INTERVAL is the shortest possible time period for the delivery of energy represented by a single value. The resolution of the TIME INTERVAL has to be agreed among the involved parties.

A-D40. Definition of D, D-1, D-2, D+1.

D: is the delivery day.

The day “D” is based on Central European Time (CET) respectively Central European Summer Time (CEST).

D-2: two Days Ahead (before) “D”.

D-1: the Day Ahead (before) “D”.

D+1: the Day After “D”.

Standards for Wholesale markets

A-S1. **Bilateral cross-border scheduling**. The EXTERNAL COMMERCIAL TRADE SCHEDULEs between two related SCHEDULING AREAs must be bilaterally matched before the delivery. MATCHING according to the "Implementation Guide for the ESS (ETSO Scheduling System) in the UCTE processes" (SO-SO Matching) should be applied. After the successful MATCHING the VERIFICATION PROCESS shall be performed.

A-S2. **Scheduling in net position**. For centralised mechanisms (e.g. Market Coupling which produces NET POSITIONs as output) using an implicit capacity allocation mechanism scheduling in NET POSTIONs should be used and the VERIFICATION PROCESS is applied. AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs are used for scheduling in NET POSITION between the VIRTUAL SCHEDULING AREA of the centralised mechanism and each of the related SCHEDULING AREAs. In case of using SCHEDULING IN NET POSITIONs, for these SCHEDULEs MATCHING is not applied. SCHEDULEs from the centralised mechanisms (e.g. SCHEDULED EXCHANGE CALCULATOR) are required in order to apply the VERIFICATION PROCESS. These SCHEDULEs are required as a reference to the SCHEDULEs (originating from MARKET PARTICIPANTs) reported by the TSOs.

A-S3. **Use of Virtual Scheduling Areas**. Each SCHEDULING AREA participating in a centralised mechanism (e.g. Market Coupling, Compensation of UNINTENTIONAL DEVIATION) has a virtual border with the VIRTUAL SCHEDULING AREA. This VIRTUAL SCHEDULING AREA comprises all AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs used for scheduling in NET POSITION.

A-S4. **Sum of Netted Area AC Positions**. The sum of the NETTED AREA AC POSITIONs of all LFC AREAs for each time unit of a SYNCHRONOUS AREA must be at any time equal to zero. The COORDINATION CENTER OPERATORs ensure this by performing the VERIFICATION PROCESS.

A-S5. **Treatment of DC-links**. A DC-link crossing the border of the ENTSO-E RG CE SYNCHRONOUS AREA between two related SCHEDULING AREAs or a DC-link within the ENTSO-E RG CE SYNCHRONOUS AREA between two related SCHEDULING AREAs is considered in the ENTSO-E RG CE scheduling process like an AC interconnection, even if it is treated in the SCHEDULING AREA as a generation or consumption unit. AGGREGATED NETTED EXTERNAL SCHEDULEs concerning DC links shall be reported separately from AGGREGATED NETTED EXTERNAL SCHEDULEs concerning AC links.

A-S6. **General rules for bilateral cross-border scheduling. The** following minimum set of rules need to be agreed:

A-S6.1. Standards for identification.

A-S6.2. Resolution for TIME INTERVAL, content and precision of the exchanged SAS.

A-S6.3. MATCHING and solution for mismatches.

A-S6.4. Troubleshooting in case of problems with data exchange.

A-S6.5. Timing for processes (e.g. exchange of SASs, MATCHING,

Day Ahead and Intra Day process, GCT, COT).

A-S6.6. Responsibilities (e.g. MATCHING).

A-S7. **The following general rules for scheduling between TSOs and LFC AREA OPERATOR, LFC BLOCK OPERATOR or COORDINATION CENTER OPERATOR apply:**

A-S7.1. Standards for identification.

A-S7.2. Resolution for TIME INTERVAL, content and precision of the exchanged SAX.

A-S7.3. VERIFICATION PROCESS.

A-S7.4. Troubleshooting in case of problems with data exchange.

A-S7.5. Agreed timing for processes.

A-S8. **Framework for an international Coding Scheme**. For the electronic exchange of documents referring to the ENTSO-E RG CE scheduling process a common identification of the involved ENTSO-E RG CE entities (SCHEDULING AREAs, LFC AREAs, LFC BLOCKs and COORDINATION CENTER ZONEs) on all levels in accordance with EIC (Energy Identification Code) must be used. This implies that each body within the ENTSO-E RG CE organisation must be identified as a party (EIC-X-code). Depending on the role being played different role type codes (e.g. TSO, LFC AREA OPERATOR, LFC BLOCK OPERATOR and COORDINATION CENTER OPERATOR) are applied. Areas are identified by EIC-Y-code. The registration or change of an EIC code must be coordinated together with the responsible ENTSO-E bodies. For this, every party is responsible for informing all other involved parties. The valid list of codes is published at the ENTSO-E website.

A-S9. **Electronic Data Exchange**. For ELECTRONIC DATA EXCHANGE for scheduling between SCHEDULING AREAs, LFC AREAs, LFC BLOCKs and COORDINATION CENTER ZONEs ENTSO-E communication facilities supporting the scheduling process shall be used. The communication facilities must fulfil the specified availability and performance to respect the standards defined in this document. It is in the responsibility of all ENTSO-E RG CE TSOs to operate their IT processes, including the communication, in an acceptable performance.

A-S10. **Electronic Data Exchange Format**. The ELECTRONIC DATA EXCHANGE FORMAT for MATCHING has to be agreed between the related TSOs.
The ELECTRONIC DATA EXCHANGE FORMAT for VERIFICATION PROCESS is described in ENTSO-E RG CE Schedule Reporting Process Implementation Guide.

A-S11. **Identification of Market Participants and Scheduling Agents in the nomination of Schedules**. For the identification of MARKET PARTICIPANTs and SCHEDULING AGENTS either EIC or GS1 (former EAN) must be applied.

A-S12. **Time Interval**. The following resolutions for the TIME INTERVALs are allowed: t_i = ¼h, ½h or 1h.

A-S13. **Availability**. The scheduling process must be available every day from 00:00 to 24:00 CET respectively CEST.

A-S14. **Data exchange and MATCHING of SAS between related SCHEDULING AREAs (Day Ahead, Intra Day, Modifications)**.

A-S14.1. The TSOs must assemble and exchange a SAS. This transmission must also take place in the case of any modifications.

A-S14.2. The TSOs have to match the SAS documents. After MATCHING and by consideration of local market rules the TSOs must inform the related SCHEDULING AGENTs about the result of MATCHING.

A-S15. Data exchange and VERIFICATION of SAX between SCHEDULING AREAs and the entity performing the VERIFICATION PROCESS (Day Ahead, Intra Day, Modifications):

A-S15.1. The TSO must assemble and transmit a SAX to the entity performing the VERIFICATION PROCESS. This transmission must also take place in the case of any modifications.

A-S15.2. The entity performing the VERIFICATION PROCESS has to verify the SAX documents. As part of VERIFICATION PROCESS a status report will be sent to the respective TSOs.

A-S16. **Day Ahead scheduling process.** Due to different local market rules for the Day Ahead process a set of rules must be agreed between related TSOs in order to perform bilateral cross-border scheduling or scheduling in NET POSITION. This is to ensure a successful MATCHING (if bilateral cross-border scheduling is applied) and data transmission in time towards other ENTSO-E RG CE bodies and the VERIFICATION PROCESS.

A-S17. **Timing for Day Ahead scheduling (D-1 for D).**

A-S17.1. If bilateral cross-border scheduling is applied, then the transmission of SASs to related TSO has to be completed latest 15 minutes after GCT.

A-S17.2. If bilateral cross-border scheduling is applied, then the MATCHING at SCHEDULING AREA level has to be completed not later than 15 minutes after the COT.

A-S17.3. The deadlines set forth in timetable 1 shall be applied.

Latest Process-Time [hh:mm] d-1	**Deadline**
15:30	**COT for Scheduling Area Level**
15:55	**Transmission of SAXs**
16:00	**Start of VERIFICATION PROCESS on CC-level**
16:20	**End of VERIFICATION PROCESS on CC-level**

Timetable 1: Day Ahead deadlines for Scheduling Process

A-S18. Intra Day scheduling process. The Intraday process may only start once the Day Ahead process

is completed. Due to different local market rules for the Intra Day process a set of rules must be agreed between related TSOs in order to perform bilateral cross-border scheduling or scheduling in NET POSITION. This is to ensure a successful MATCHING (if bilateral cross-border scheduling is applied) and data transmission in time towards other ENTSO-E RG CE bodies and the VERIFICATION PROCESS.

A-S19. Timing for Intra Day scheduling.

A-S19.1. If bilateral cross-border scheduling is applied, then the MATCHING at SCHEDULING AREA level has to be completed by the TSOs latest 10 minutes before the delivery.

A-S19.2. In order to ensure the successful execution of the VERIFICATION PROCESS the deadlines outlined in the timetable 2 have to be respected. GCTs are subject to the local market rules that may consider additional timing restrictions. However, the numbers indicated in timetable 2 represent the latest time the process step has to be completed.

Latest Time [minutes] before executing SCHEDULE	Deadline
15	**GCT and COT for NOMINATIONs**
9	**Transmission of SAXs**
7	**VERIFICATION PROCESS on CC-level**
5	**COT VERIFICATION PROCESS on CC-level**
0	**Delivery**

Timetable 2: Intra Day Deadlines for Scheduling Process

A-S20. TSO driven Modification of External Commercial Trade Schedules. In exception to the normal market processes, modifications can be applied due to agreed security rules.

A-S21. Final schedules for the accounting of UNINTENTIONAL DEVIATION. After day “D” the responsible COORDINATION CENTER OPERATORs have to transmit the final SCHEDULEs to the ENTSO-E RG CE SETTLEMENT RESPONSIBLE PARTY.

A-S22. **Troubleshooting**.

A-S22.1. The ENTSO-E RG CE bodies involved in the scheduling process having trouble with the transmission of data to their related counterparties should either accept the counter schedule values (SAS and/or SAX) or agree upon the values on the phone with their counterparties.

A-S22.2. If bilateral cross-border scheduling is applied and a successful MATCHING

between the related TSOs cannot be achieved until the COT then they shall apply the minimum values.

A-S23. Verification Process

A-S23.1. VERIFICATION PROCESS compares corresponding values of AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs dedicated to the same border without applying corrective measures.

A-S23.2. A positive verification result must have the same values for a given direction and for all TIME INTERVALs in a given time frame.

A-S23.3. In case of a negative verification result the related TSOs have the obligation to solve it.

A-S23.4. The aggregation of all AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs has to sum up to zero within the SYNCHRONOUS AREA of ENTSO-E RG CE.

A-S23.5. COORDINATION CENTER OPERATORs of ENTSO-E RG CE are responsible to perform the VERIFICATION PROCESS.

A-S23.6. If scheduling in NET POSITION is applied, then the SCHEDULED EXCHANGE CALCULATOR of the centralised process (e.g. Market Coupling) shall provide the exchanges between each SCHEDULING AREA and the VIRTUAL SCHEDULING AREA to the entity executing the VERIFICATION PROCESS. This shall be in form of AGGREGATED NETTED EXTERNAL MARKET SCHEDULEs as a reference to the SCHEDULEs (originating from MARKET PARTICIPANTs) reported by the TSOs.

A-S24. **Reporting of SAX.** The TSO is responsible for the transmission of SAXs to the entity executing the VERIFICATION PROCESS.

A-S24.1. Latest 30 min after completing the Day Ahead (D-1) MATCHING and before processing Intra Day Schedules the TSOs shall transmit the SAX for the Day Ahead process to the entity executing the VERIFICATION PROCESS. COORDINATION CENTRE OPERATORs must check if the values of the SAX of all SCHEDULING AREAs sum up to zero.

A-S24.2. Immediately after completing each Intra Day matching the TSO shall transmit the SAX for Intra Day process to the entity executing the VERIFICATION PROCESS. COORDINATION CENTER OPERATORs must check if the values of the SAX of all related SCHEDULING AREAs sum up to zero.

A-S24.3. SCHEDULEs for Day Ahead and Intra Day shall be made available by COORDINATION CENTER OPERATORs for further processing in e.g. Day Ahead Congestion Forecast (DACF).

Standards for TSO-TSO exchanges

A-S25. **Bilateral cross-border scheduling.** The EXTERNAL TSO SCHEDULEs between two related SCHEDULING AREAs must be bilaterally agreed using the AGREEMENT PROCESS or matched before the delivery. If MATCHING is applied, then it should respect the "Implementation Guide for the ESS (ETSO Scheduling System) in the UCTE processes". After the successful AGREEMENT or MATCHING the VERIFICATION PROCESS shall be performed**.**

A-S26. **Scheduling in net position**. For centralised mechanisms (e.g. multilateral REDISPATCHING, TSO-TSO centralised balancing) utilising available capacity scheduling in NET POSTIONs should be used and the VERIFICATION PROCESS is applied. AGGREGATED NETTED EXTERNAL TSO SCHEDULEs are used for scheduling in NET POSITION between the VIRTUAL SCHEDULING AREA of the centralised mechanism and each of the related SCHEDULING AREAs. In case of using SCHEDULING IN NET POSITIONs, for these SCHEDULEs MATCHING is not applied. SCHEDULEs from the centralised mechanism are required in order to apply the VERIFICATION PROCESS. These SCHEDULEs are required as a reference to the SCHEDULEs reported by the TSOs.

A-S27. **Use of Virtual Scheduling Areas.** Each SCHEDULING AREA participating in a centralised mechanisms (e.g. multilateral REDISPATCHING, TSO-TSO centralised balancing, Compensation of UNINTENTIONAL DEVIATION) has a virtual border with the VIRTUAL SCHEDULING AREA. This VIRTUAL SCHEDULING AREA comprises all AGGREGATED NETTED EXTERNAL TSO SCHEDULEs used for scheduling in NET POSITION.

A-S28. Sum of Netted Area AC Positions. The sum of the NETTED AREA AC POSITIONs of all LFC AREAs for each time unit of a SYNCHRONOUS AREA must be at any time equal to zero. The COORDINATION CENTER OPERATORs ensure this by performing the VERIFICATION PROCESS.

A-S29. Treatment of DC-links. A DC-link crossing the border of the ENTSO-E RG CE SYNCHRONOUS AREA between two related SCHEDULING AREAs or a DC-link within the ENTSO-E RG CE SYNCHRONOUS AREA between two related SCHEDULING AREAs is considered in the ENTSO-E RG CE scheduling process like an AC interconnection, even if it is treated in the SCHEDULING AREA as a generation or consumption unit. AGGREGATED NETTED EXTERNAL SCHEDULEs concerning DC links shall be reported separately from AGGREGATED NETTED EXTERNAL SCHEDULEs concerning AC links.

A-S30. **General rules for bilateral cross-border scheduling. The** following minimum set of rules need to be agreed:

A-S30.1. Standards for identification.

A-S30.2. Resolution for TIME INTERVAL.

A-S30.3. If applicable, MATCHING and solution for mismatches.

A-S30.4. Troubleshooting in case of problems with data exchange.

A-S30.5. Timing for processes (e.g. Day Ahead and Intra Day process, GCT, COT).

A-S30.6. Responsibilities

A-S31. **The following general rules for scheduling between TSOs and LFC AREA OPERATOR, LFC BLOCK OPERATOR or COORDINATION CENTER OPERATOR apply:**

A-S31.1. Standards for identification.

A-S31.2. Resolution for TIME INTERVAL, content and precision of the exchanged SAX.

A-S31.3. VERIFICATION PROCESS.

A-S31.4. Troubleshooting in case of problems with data exchange.

A-S31.5. Agreed timing for processes.

A-S32. Framework for an international Coding Scheme. For the electronic exchange of documents referring to the ENTSO-E RG CE scheduling process a common identification of the involved ENTSO-E RG CE entities (SCHEDULING AREAs, LFC AREAs, LFC BLOCKs and COORDINATION CENTER ZONEs) on all levels in accordance with EIC (Energy Identification Code) must be used. This implies that each body within the ENTSO-E RG CE organisation must be identified as a party (EIC-X-code). Depending on the role being played different role type codes (e.g. TSO, LFC AREA OPERATOR, LFC BLOCK OPERATOR and COORDINATION CENTER OPERATOR) are applied. Areas are identified by EIC-Y-code. The registration or change of an EIC code must be coordinated together with the responsible ENTSO-E bodies. For this, every party is responsible for informing all other involved parties. The valid list of codes is published at the ENTSO-E website.

A-S33. Electronic Data Exchange. For ELECTRONIC DATA EXCHANGE for scheduling between SCHEDULING AREAs, LFC AREAs, LFC BLOCKs and COORDINATION CENTER ZONEs ENTSO-E communication facilities supporting the scheduling process shall be used. The communication facilities must fulfil the specified availability and performance to respect the standards defined in this document. It is in the responsibility of all ENTSO-E RG CE TSOs to operate their IT processes, including the communication, in an acceptable performance.

A-S34. Electronic Data Exchange Format. The ELECTRONIC DATA EXCHANGE FORMAT for MATCHING has to be agreed between the related TSOs.
The ELECTRONIC DATA EXCHANGE FORMAT for VERIFICATION PROCESS is described in ENTSO-E RG CE Schedule Reporting Process Implementation Guide.

A-S35. Identification of Market Participants and Scheduling Agents in the nomination of Schedules. For the identification of MARKET PARTICIPANTs and SCHEDULING AGENTs either EIC or GS1 (former EAN) must be applied.

A-S36. **Time Interval**. The following resolutions for the TIME INTERVALs are allowed: t_i = 1min, ¼h, ½h or 1h.

A-S37. Availability. The scheduling process must be available every day from 00:00 to 24:00 CET respectively CEST.

A-S38. **Data exchange and MATCHING of SAS between related SCHEDULING AREAs (Day Ahead, Intra Day, Modifications)**. If bilateral cross-border scheduling with MATCHING is applied, then:

A-S38.1. The TSOs must assemble and exchange a SAS. This transmission must also

take place in the case of any modifications.

A-S38.2. The TSOs have to match the SAS documents. After MATCHING and by consideration of local market rules the TSOs must inform the related SCHEDULING AGENTs about the result of MATCHING.

A-S39. Data exchange and VERIFICATION of SAX between SCHEDULING AREA and entity performing the VERFICATION PROCESS (Day Ahead, Intra Day, Modifications):

A-S39.1. The TSO must assemble and transmit a SAX to the entity performing the VERIFICATION PROCESS. This transmission must also take place in the case of any modifications.

A-S39.2. The entity performing the VERIFICATION PROCESS has to verify the SAX documents. As part of VERIFICATION PROCESS a status report will be sent to respective TSOs.

A-S40. Final schedules for the accounting of UNINTENTIONAL DEVIATION. After day "D" the responsible COORDINATION CENTER OPERATORs have to transmit the final SCHEDULEs to the ENTSO-E RG CE SETTLEMENT RESPONSIBLE PARTY.

A-S41. **Troubleshooting**.

A-S41.1. The ENTSO-E RG CE bodies involved in the scheduling process having trouble with the transmission of data to their related counterparties should either accept the counter schedule values (SAS and/or SAX) or agree upon the values on the phone with their counterparties.

A-S41.2. If bilateral cross-border scheduling is applied and a successful MATCHING between the related TSOs cannot be achieved they shall apply the minimum values.

A-S42. **Verification Process**

A-S42.1. VERIFICATION PROCESS compares corresponding values of AGGREGATED NETTED EXTERNAL TSO SCHEDULEs dedicated to the same border without applying corrective measures.

A-S42.2. A positive verification result must have the same values for a given direction and for all TIME INTERVALs in a given time frame.

A-S42.3. In case of a negative verification result the related TSOs have the obligation to solve it.

A-S42.4. The aggregation of all AGGREGATED NETTED EXTERNAL TSO SCHEDULEs has to sum up to zero within the SYNCHRONOUS AREA of ENTSO-E RG CE.

A-S42.5. COORDINATION CENTER OPERATORs of ENTSO-E RG CE are responsible to perform the VERIFICATION PROCESS.

A-S42.6. If scheduling in NET POSITION is applied then the centralised mechanism shall provide the exchanges between each SCHEDULING AREA and the VIRTUAL SCHEDULING AREA to the entity executing the VERIFICATION PROCESS. This shall be in form of AGGREGATED NETTED EXTERNAL TSO SCHEDULEs as a reference to

the SCHEDULEs reported by the TSOs.

A-S43. **Reporting of SAX.** The TSO is responsible for the transmission of SAXs to the entity executing the VERIFICATION PROCESS.

A-S43.1. After completing each AGREEMENT or MATCHING the TSO shall transmit the SAX to the entity executing the VERIFICATION PROCESS. COORDINATION CENTER OPERATORs must check if the values of the SAX of all related SCHEDULING AREAs sum up to zero.

A-S43.2. SCHEDULEs shall be made available by COORDINATION CENTER OPERATORs for further processing in e.g. Day Ahead Congestion Forecast (DACF).

B. Online Observation

Introduction

The task of online observation is performed during the system operation phase. In order to prevent systematic faults in the context of LOAD-FREQUENCY-CONTROL (see Policy 1) it is essential to check the UCTE-wide consistency of the input variables for online operation used by the single parties involved. This comprises the control deviation used as an input value for LOAD-FREQUENCY-CONTROL as well as the real-time observation of border- crossing exchange power flows and EXCHANGE PROGRAMS among all CONTROL AREAS / CONTROL BLOCKS of UCTE (see Appendix, Figure 2 “Hierarchical Levels of UCTE Co-ordination”).

Definitions

B-D1. Control Program. The CONTROL PROGRAM is the matched set of all EXCHANGE PROGRAMS related to a defined area (e.g. CONTROL AREA, CONTROL BLOCK) and the program for the compensation of UNINTENTIONAL DEVIATION.

B-D2. Power Deviation. In this context the meaning is “Power Control Error” see ⏭P1

Standards

B-S1. Accuracy, Transmission of measurements and Power Deviations. (see ⏩P1)

B-S2. Control Programs. The sum of Control Programs of each UCTE level (e.g. CONTROL AREA level, CONTROL BLOCK level) of a synchronous area must be equal to zero at any time.

B-S3. Power deviation.

B-S3.1. The sum of Power Deviations of all CONTROL AREAS of a CONTROL BLOCK must be equal to the Power Deviation of the CONTROL BLOCK concerned (taking account of the measurement's range of accuracy).

B-S3.2. The sum of Power Deviations of all CONTROL BLOCKS in the area of a CO-ORDINATION CENTRE must be equal to the Power Deviation calculated with respect to the external border of the CO-ORDINATION CENTRE concerned (taking account of the measurement's range of accuracy).

B-S3.3. The sum of Power Deviations of all CONTROL BLOCKS of a synchronous area must be equal to zero at any time. (See also glossary)

B-S4. Physical Exchange.

B-S4.1. The sum of physical exchanges of all CONTROL AREAS of a CONTROL BLOCK must be equal to the physical exchange of the CONTROL BLOCK concerned (taking account of the measurement's range of accuracy)

B-S4.2. The sum of physical exchanges of all CONTROL BLOCKS in the area of a CO-ORDINATION CENTRE must be equal to the physical exchange with respect to the external border of the CO-ORDINATION CENTRE concerned (taking account of the measurement's range of accuracy).

B-S4.3. The sum of the measurements of the physical exchange of all CONTROL BLOCKS of a synchronous area is equal to zero at any time (taking account of the measurement's range of accuracy).

B-S5. Perturbation of measurement equipment.

B-S5.1. The operator of the relevant CONTROL AREA has to inform the neighboring CONTROL AREA OPERATOR and the corresponding operator of the CONTROL BLOCK on any perturbation in the measurement equipment with regard to the physical exchange crossing the border with the neighboring CONTROL AREA.

B-S5.2. The operator of the relevant CONTROL BLOCK has to inform the neighboring CONTROL BLOCK OPERATOR and the corresponding CO-ORDINATION CENTRE about any perturbation in the measurement

equipment with regard to the physical exchange crossing the border with the neighboring CONTROL BLOCK.

B-S6. Measures in case of discrepancies.

B-S6.1. Detection of abnormal operation. The observation of UNINTENTIONAL DEVIATIONS by the CONTROL BLOCK (see Glossary: "Observation of Unintentional Deviations") allows to identify and to correct as soon as possible abnormal operating and accounting situations (e.g.: abnormal values of TIE-LINE tele-measurements (TMs), misunderstanding in setting the exchange program of a CONTROL AREA, etc.). The CONTROL BLOCK OPERATOR has to contact the responsible UCTE body as soon as possible in order to make corrective measures and to step back to normal operation.

B-S6.2. Transmitted and calculated Power Deviation differs

B-S6.2.1. If the transmitted Power Deviation of a CONTROL AREA differs from the Power Deviation calculated by the CONTROL BLOCK, the operator of the relevant CONTROL BLOCK has to contact immediately the corresponding operators of the CONTROL AREAS in order to solve the problem.

B-S6.2.2. If the transmitted Power Deviation of a CONTROL BLOCK differs from the Power Deviation calculated by the CO-ORDINATION CENTRE, the operator of the relevant CO-ORDINATION CENTRE has to contact immediately the corresponding operator of the relevant CONTROL BLOCK in order to solve the problem.

B-S6.3. Power Deviations do not sum up

B-S6.3.1. In case that the sum of the Power Deviations of the CONTROL AREAS in a CONTROL BLOCK is not equal to the Power Deviation of the CONTROL BLOCK, the operator of the relevant CONTROL BLOCK shall immediately contact the corresponding operators of the CONTROL AREAS in order to solve the problem.

B-S6.3.2. In case that the sum of the Power Deviations of the CONTROL BLOCKS in the area of a CO-ORDINATION CENTRE is not equal to the Power Deviation calculated with respect to the external border of the CO- ORDINATION CENTRE concerned, the CO-ORDINATION CENTRE shall immediately contact the corresponding operators of the CONTROL BLOCKS in order to solve the problem.

B-S6.4. Control Programs do not sum up

B-S6.4.1. In case that the sum of the control programs of the CONTROL AREAS in a CONTROL BLOCK is not equal to CONTROL PROGRAM of the CONTROL BLOCK, the operator of the relevant CONTROL BLOCK shall immediately inform the corresponding operators of the CONTROL AREAS.

B-S6.4.2. In case that the sum of the control programs of all CONTROL BLOCKS in the synchronous area is not equal to zero, the responsible CO-ORDINATION CENTRE shall immediately inform the corresponding operators of the CONTROL BLOCKS.

Guidelines

B-G1. Acquisition of TIE-LINE METERING. The CONTROL BLOCK OPERATORS shall acquire the METERING data of the TIE-LINEs to adjacent CONTROL BLOCKS to record the energy in the time-frame used for power exchanges.

B-G2. Exchange of metered data. The CO-ORDINATION CENTRE shall be provided with data of total hourly Scheduled exchanges for each CONTROL BLOCK and real-time active power Telemeasurements of each TIE-LINE crossing the border of the CO-ORDINATION CENTRE area.

C. Accounting and Settlement of UNINTENTIONAL DEVIATIONS

Introduction

The task of accounting of UNINTENTIONAL DEVIATIONS is performed "after the fact", e.g. at the next working day following the system operation. It comprises the validation of meter measurement data, followed by the derivation and matching of accounting data, before the settlement of the account of UNINTENTIONAL DEVIATIONS of each CONTROL AREA / CONTROL BLOCK / CO-ORDINATION CENTRE with reference to a recording period is carried out. The compensation of UNINTENTIONAL DEVIATIONS is performed by using a program of compensation "in kind" within the compensation period - as an import / export of the corresponding amount of energy per tariff period, that was accumulated in the recording period. The compensation of UNINTENTIONAL DEVIATION is a duty towards the community of the UCTE TSO and is in the responsibility of the UCTE body responsible for LOAD-FREQUENCY-CONTROL. The COMPENSATION PROGRAMS of all CONTROL BLOCKS respectively all CONTROL AREAS within UCTE must sum up to zero. All times mentioned in this document are related to CET respectively CEST (see also Appendix, Figure 2 “Hierarchical Levels of UCTE Co-ordination”).

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Definitions

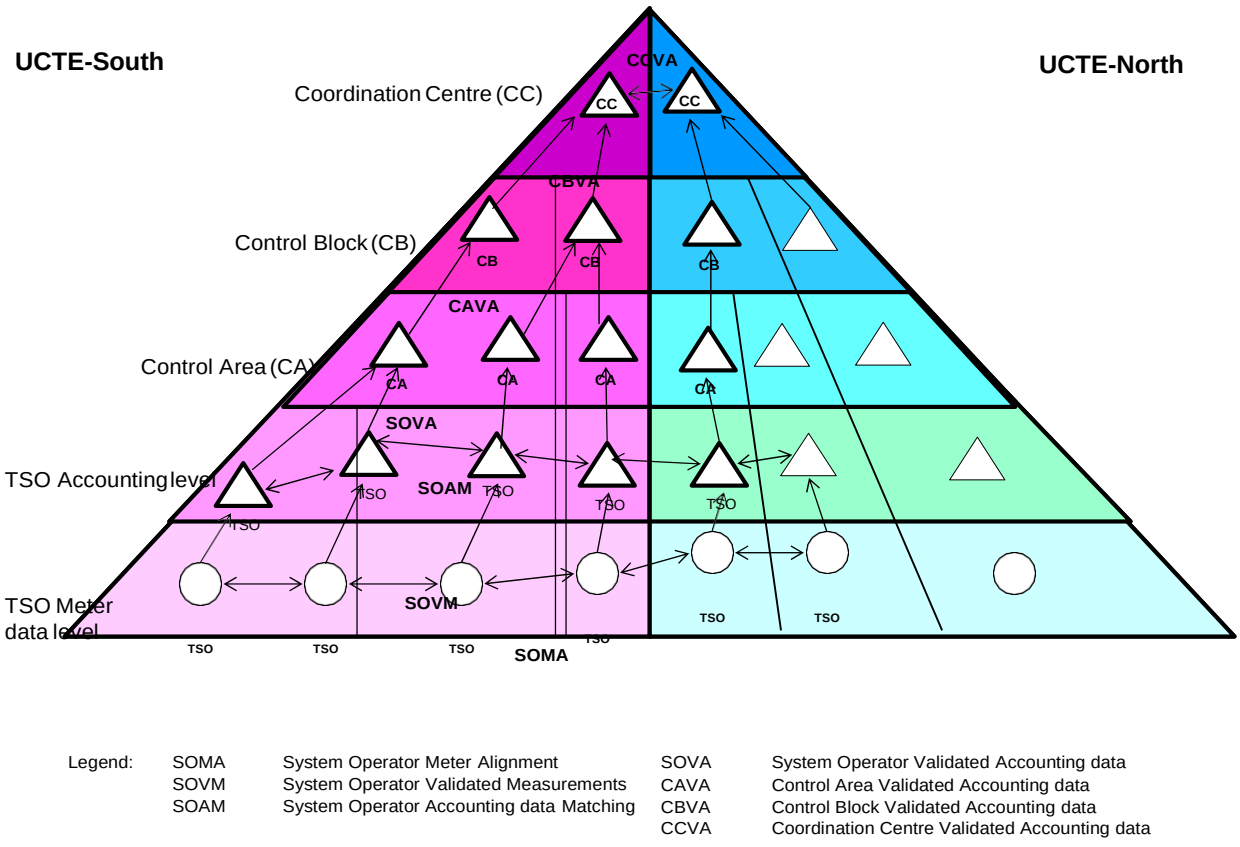
C-D1. Accounting Process. The Accounting Process is the validation of the metered data (usually located at an interconnecting TIE-LINE of a TSO) and of the resulting accounting data.

The daily accounting process is usually performed on the first working day after energy delivery. It starts with the initial exchange of metered data between neighboring TSO, continues with the establishment of the accounting data, and the transmission of the resulting data up to the top of the UCTE pyramid and finishes with the exchange of the accounting data between the Co-ordination Centers top of the UCTE pyramid.

The weekly accounting process is identical to the daily process with the exception that it ends at the deadline for the weekly accounting process.

The purpose of the daily accounting is to provide a validated set of accounting data to the UCTE bodies in order to calculate every day the actual state of the account of unintentional deviation.

The UCTE accounting and process is based on the UCTE pyramid.



Legend:

SOMA	System Operator Meter Alignment	SOVA	System Operator Validated Accounting data
SOVM	System Operator Validated Measurements	CAVA	Control Area Validated Accounting data
SOAM	System Operator Accounting data Matching	CBVA	Control Block Validated Accounting data
		CCVA	Coordination Centre Validated Accounting data

Figure 1: Accounting Process flow: From the bottom to top of the UCTE Pyramid

C-D2. Settlement Process:

A distinction must be drawn between daily and weekly settlement.

The daily settlement starts after the daily accounting process. It is the calculation of the UNINTENTIONAL DEVIATION and the update of the state of the account per UCTE body. It is finalized by the transmission of the settlement report on all levels of the UCTE pyramid.

The weekly settlement process is identical to the daily one. It covers the correction of daily settlement (if any) and the calculation of the program for compensation of unintentional deviations on the state of the final account at the end of the recording period. The settlement process goes from the top of the UCTE pyramid to its bottom.

The basis for the settlement process are the market schedules and the physical energy flow on the lowest level of UCTE pyramid, the TSO level.

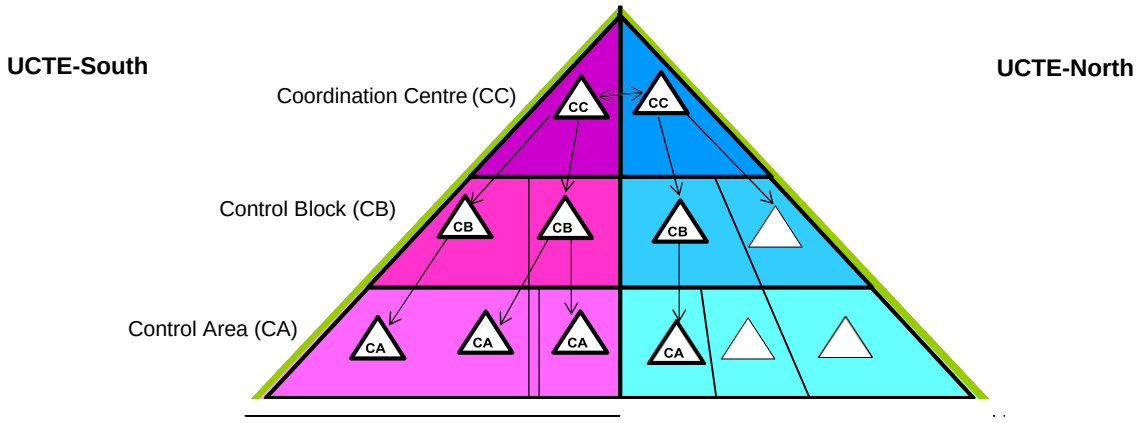


Figure 2: Settlement Process flow: From top to bottom of UCTE Pyramid

C-D3. UNINTENTIONAL DEVIATION (UD). The UNINTENTIONAL DEVIATION is calculated ex – post as the sum of the TIE-LINE flows (ET) minus the sum of VIRTUAL TIE-LINE flows (EVT) minus the sum of all market party Schedules (ES) - excluding schedules for the compensation of UNINTENTIONAL DEVIATION - of an defined area during a given CET respectively CEST time period (see ⏭P2-C-S5.1.2)

C-D4. Physical Energy Exchanges (ET and EVT).

C-D4.1. TIE-LINE Flows ET. The sum of the TIE-LINE flows on a border between two TSO / CONTROL AREAS / CONTROL BLOCKS / CO-ORDINATION CENTRES.

C-D4.2. VIRTUAL TIE-LINE Flows EVT. VIRTUAL TIE-LINES are used to consider generators physically located in another CONTROL AREA in real time without schedule. The sum of the VIRTUAL TIE-LINE flows (EVT)

between two TSO / CONTROL AREAS / CONTROL BLOCKS / CO-ORDINATION CENTRES is included in ET and must be considered as below:

The physical energy exchange (ET) between CA1 and CA2 is measured by M1+ M2 and includes the physical flow of the generator measured by M3. To isolate the schedule based flow between the CA the measurement M3 has to be subtracted for LFC and for accounting:

ET – EVT = M1+ M2 – M3

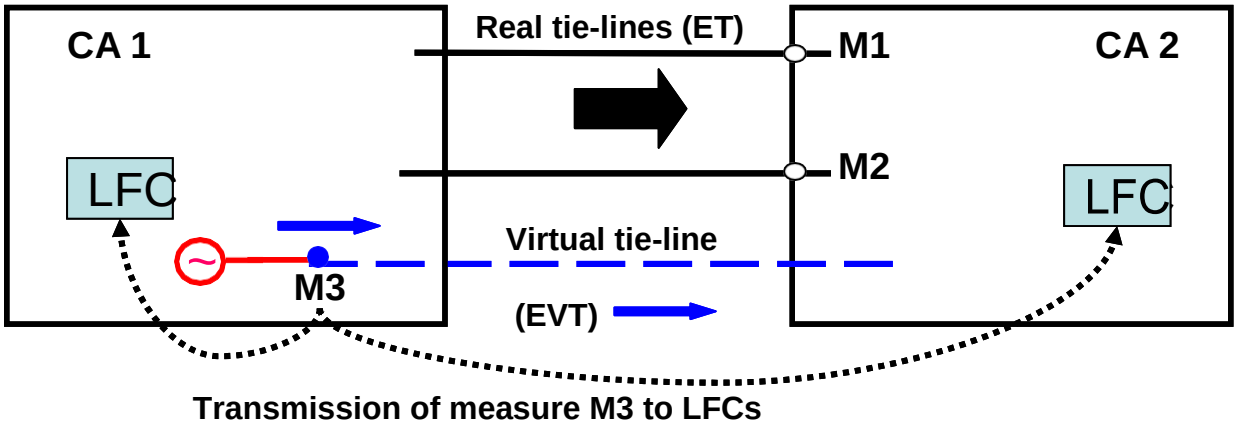


Figure 3: The consideration of VIRTUAL TIE-LINE

C-D5. Meter Measurement Data. The physical energy exchange is registered per TIE- LINE, by meter devices installed at substations, which are located at the end of the TIE-LINE. There is at least one main meter device and up to “n” back up meter devices per TIE-LINE.

C-D6. Accounting Point.

C-D6.1. The accounting point is the agreed energy delivery point between two TSOs. The accounting value may be equal to a physical metered data or calculated by using meters on both sides. The algorithm for this calculation and the applied rounding rules are agreed between adjacent TSOs. There must be only a single accounting point per TIE-LINE.

C-D6.2. In case of a VIRTUAL TIE-LINE the accounting point is normally located at the generator. In some special cases power flows of the TSOs are based on values which are agreed between the involved TSOs and considered as an accounting value.

C-D7. Accounting Data. Accounting Data is the result of an agreement between two TSOs on relevant accounting data and is derived from validated metered data.

This can be a one to one copy of the meter measurement data (located at the

Accounting Point) or a calculation using a given bilaterally agreed formula and one or more meter measurement data. (e.g. In order to consider line losses). Accounting data is considered as a value per TIE-LINE.

C-D8. Tariff Period. The Tariff period is the time interval (e.g. season, holiday, working day, etc.) fixed by UCTE agreement during which UNINTENTIONAL DEVIATIONS are attributed the same value for offsetting by compensation in kind (see ⏭P2-C- S5.2). The accumulation of UNINTENTIONAL DEVIATIONS within the recording period is performed separately for each tariff period.

The tariff periods consist of NT, HT, HHT, HHT1 and HHT2 and distinguish summer and winter period. For the definition of the tariff periods the related calendar day must be taken into account (see ⏭P2-C-S1.3 and Figure 5). A tariff period consists up to several hours of a day.

C-D9. Working day. The Working Day is the calendar day except Saturday, Sunday and 4 holidays: Christmas 25th December, New Year, Easter Monday and Ascension.

C-D10. Recording period. Recording Period is the time period for which accounting data and schedules are recorded for the UCTE settlement process.

Normally the recording period starts on Monday 00:00 and ends on Sunday 24:00 based on CET respectively CEST.

C-D11. Compensation Period. Compensation Period is the time period, related to the recording period, during which the CONTROL AREA is applying the program for Compensation of UNINTENTIONAL DEVIATION. Generally the compensation period starts on Thursday 00:00 CET respectively CEST and ends on Wednesday 24:00 CET respectively CEST.

Standards

C-S1. General Process Overview.

C-S1.1. Workflow for the accounting- and settlement process.

The accounting data goes from the bottom to the top (TSO >CA>CB>CC)

The UNINTENTIONAL DEVIATION as well as the related COMPENSATION PROGRAMS are calculated and are sent from top to bottom (CC>CB>CA)

CO-ORDINATION CENTRE (CC), CONTROL BLOCK (CB) and CONTROL AREA (CA) are responsible to split down the account of UNINTENTIONAL DEVIATION which finally results in COMPENSATION PROGRAMS for CONTROL BLOCK and CONTROL AREA. Each level has to ensure that there is no difference (or rounding difference) induced by the splitting. Rounding differences have to be taken by the UCTE body responsible for the corresponding UCTE pyramid level. (see ⏩P2-C-D1. & P2-C-D2. and see ⏩A2 Figure11)

A small amount of energy which cannot be compensated, e.g. due to rounding, remains on the account of UNINTENTIONAL DEVIATIONS.

C-S1.2. Recording Period, Compensation Period

The accounting process is based on the recording period m. The compensation of UNINTENTIONAL DEVIATIONS is performed “in kind“ within the compensation period m – as an import / export of the corresponding amount of energy per tariff period, that was accumulated in the recording period. Figure 4 gives an overview to this procedure.

The standard recording period is defined to comprise 7 days (one week), from Monday, 0:00 to Sunday 24:00 whereas the standard compensation period is defined to comprise 7 days (one week), from Thursday, 0:00 to Wednesday 24:00 of the week following the recording period.

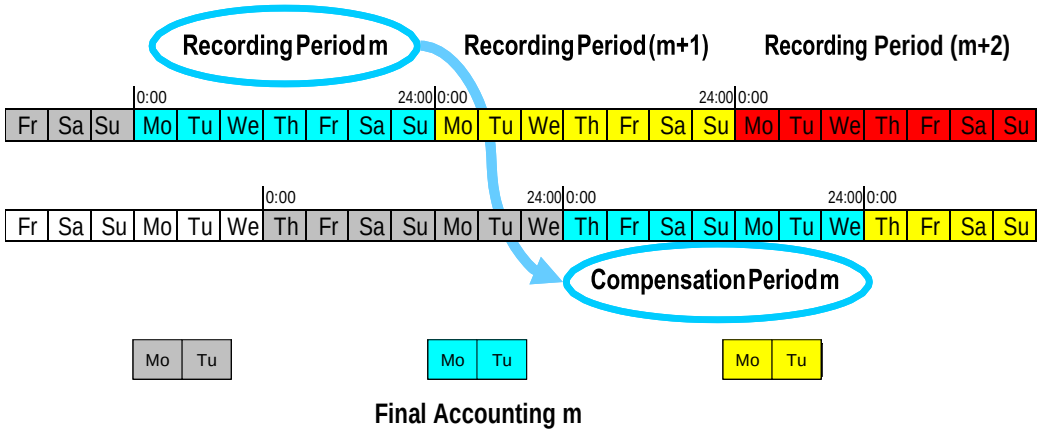
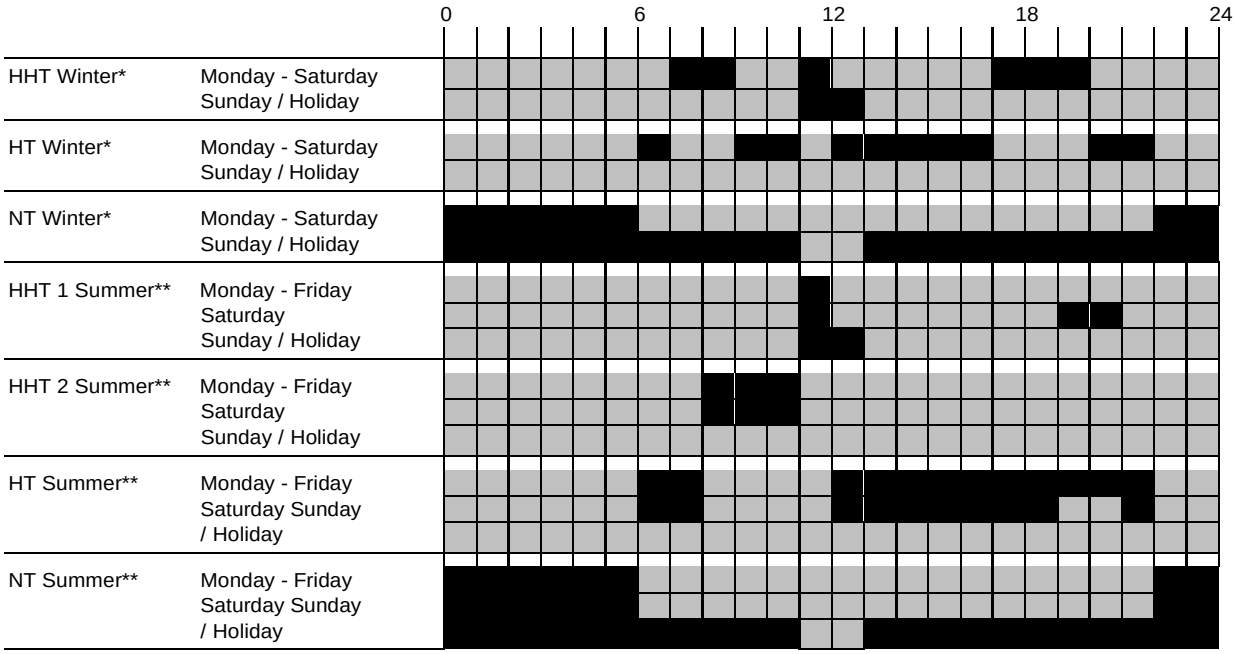


Figure 4: Recording Period, Compensation Period

C-S1.3. Tariff Period. The valid tariff periods of UCTE are indicated below



The black bars present the tariff hours in consideration of the season, the day and the tariff.
NT: Low tariff, HT: High tariff, HHT: Peak tariffs
* Winter: 01.10. – 31.03.
** Summer: 01.04. – 30.09.
Holidays: 25.12. , 01.01. , Ascension and Easter Monday depending on calendar

Figure 5: UCTE Tariff Periods

C-S1.4. Consideration of time shift CET - CEST

C-S1.4.1. For the day having a duration period of 23h, it is agreed upon that the period 02:00 to 03:00 is cancelled. Thus, the tariff on this day will be applied using the tariffs for the period 00:00 to 02:00 and 03:00 to 24:00 as listed in the table.

C-S1.4.2. For the day having a duration period of 25h, it is agreed upon that the period 02:00 to 03:00 will be considered having a two hours duration for the calculation. Thus, the tariff on this day will be applied using the tariffs for the period 00:00 to 03:00, additional 02:00 to 03:00 and 03:00 to 24:00 as shown in figure 5.

C-S1.5. Changes of standard recording and compensation

In case of bank holidays or the change of tariff seasons exceptions to the standard recording and compensation periods may occur. The CO-ORDINATION CENTRES agree on exceptions to the definition of the recording period / compensation period. Starting with the CO-ORDINATION CENTRES, each UCTE level informs the level below 4 weeks before the start of the recording period. The following rules have to be taken into account:

A recording period must last at minimum 4 days

A compensation period must last at minimum 4 days

The compensation period has to start always with a delay of at least three days after the end of the corresponding recording period.

C-S1.6. Further local exceptions

In case of unavailability of an accounting office, e.g. national bank holidays or system maintenance, the office in question must inform the upper UCTE level at least 4 weeks before.

C-S2. General rules

C-S2.1. Accounting and Settlement Period

The daily accounting and settlement is done for the day "D" (see ⏭P2-A-D11) on the next working day. (see ⏭P2-C-D9.)

The weekly accounting and settlement is done for the recording period.

C-S2.2. Time Frame

The time frame for Accounting of UNINTENTIONAL DEVIATIONS has to correspond with the time frame of the EXCHANGE PROGRAM (1h, ½ h, ¼ h); this time frame applies to the frames for ET, EVT, UD and the program for the Compensation of UNINTENTIONAL DEVIATIONS. The time frame must be the same on a common border between two areas.

C-S2.3. Rounding rules

Generally the data exchanged is in MWh. If all CONTROL AREAS in a CONTROL BLOCK agree, a mathematical rounding in kWh can be performed.

The program for compensation of UNINTENTIONAL DEVIATION of a CONTROL BLOCK must be in full MW only. By default the program for the Compensation of UNINTENTIONAL DEVIATIONS for a CONTROL AREA should be in MW but if all CONTROL AREAS in a CONTROL BLOCK agree, the program for the Compensation of UNINTENTIONAL DEVIATIONS may be in kW.

The remaining amount of energy in kWh stays on the account of UNINTENTIONAL DEVIATIONS.

C-S2.4. Electronic Data Exchange

Electronic data exchange for accounting and settlement is required using e-mail via EH. If the e-mail via EH is disturbed, an electronic back-up must be agreed such as e-mail via internet or ftp-dial in via ISDN-line. If electronic communication is generally disturbed, fax or phone must be used as last back-up.

C-S2.5. AVAILABILITY.

Accounting offices have to be available on working days from 08:00 to 11:30 and 13:30 to 16:00 CET respectively CEST.

C-S2.6. Trouble shooting

If the weekly process of accounting and settlement cannot be performed like described the affected UCTE body must inform immediately the related UCTE level above which then informs the related CO-ORDINATION CENTRE latest until Tuesday 13:00. The CO-ORDINATION CENTRES then inform until latest Tuesday 14:00 all UCTE CONTROL BLOCKS which inform the related CONTROL AREAS immediately. Both CO-ORDINATION CENTRES will agree on a solution and inform the related CONTROL BLOCKS latest until Tuesday 16:00. Then the CONTROL BLOCKS inform their related CONTROL AREAS immediately.

C-S2.7. Consideration of DC-links

DC-links are not considered in the UCTE Accounting and Settlement Process because they are not considered in the LFC.

C-S2.8. Modification of the accounting process and related data

All involved TSO must provide the complete and correct information about all issues affecting the accounting process e.g. new or changes of tie lines (including DC-links), changes of resolution and time frames etc.

In case of changes the requesting TSO must inform the affected TSO, CA, CB and CC at least 30 days in advance by means of the registration form (see ⏭A2 chapter C Figure 12)

C-S3. Bilateral agreement for the accounting / settlement process

In order to perform the accounting and settlement process in a correct manner the partners of a common border have to fix a bilateral accounting agreement including the following items:

C-S3.1. List of TIE-LINEs, meter measurement and accounting data

TSO have to agree upon the list of TIE-LINEs to be included in the UCTE accounting process. This list also has to provide information about meter measurement and accounting data. It must provide:

- Names of both involved TSOs
- Name of tie-line
- Name and related TSO of substations tie-line is connecting

- List of meter measurement data to be used to derive the accounting value
- List of meter measurement data to be exchanged
- ID for each meter measurement data to be exchanged
- ID of accounting point
- If line losses to be considered, agreement on formula to calculate accounting data

This agreed list must be transmitted towards the related CO-ORDINATION Centers for UCTE publication. The data from the accounting point must be used by all UCTE bodies involved as unique representation of the physical energy exchange concerning the TIE-LINE.

C-S3.2. Data format

The TSOs have to agree on the exchange format for metering, accounting and settlement. For the naming of the documents to be exchanged, independent from the format, see P2-C-Figure 1.

C-S3.3. Trouble shooting

In order to be prepared in case of problems, TSOs have to agree on the rules how to deal in case of trouble shooting (missing meter measurement data, inconsistent data, unavailable data, ...)

In this case TSOs have to agree on a substitute value for every time unit in question. (see ⏭P2-C-G1)

C-S3.4. Resolution.

TSOs have to agree on the resolution for the validation of the energy exchange on their common border. The resolution for the exchange of meter measurement and accounting data is the integer value of MWh or if bilaterally agreed, MWh with 3 decimal digits for the time frame ti = 1h and the MWh value with 3 decimal digits for the time frame ti = ½ h or ¼ h.

C-S3.5. Consideration of line losses

TSOs have to agree on the way to consider line losses. This can be done by agreement using “calculated” accounting points taking into account the line losses or by a dedicated process independent from the UCTE accounting process.

C-S4. Accounting Process

C-S4.1. Principles of accounting.

The physical energy exchange ET_{kt} is calculated on the basis of accounting data. The following equation has to be applied for the physical energy exchange for each border between two Areas “k”, and “l” and the time period “t”:

$$ET_{klt} = -ET_{lkt}$$

C-S4.2. Workflow of accounting process

The daily accounting process starts with the initial exchange of metered data between neighboring TSO, continues with the establishment of the accounting data, and the transmission of the resulting data up to the top of the UCTE pyramid and finishes with the exchange of the accounting data between the Co-ordination Centers top of the UCTE pyramid.

The weekly accounting process is identical to the daily process with the exception that it ends at the deadline for the weekly accounting process.

(see ⏭P2-C-D1.)

C-S4.2.1. Timing of the daily accounting process.

The daily accounting process is performed on the first working day after energy delivery. This also regards the case of national holidays and days off. This implies that the daily accounting process cannot always be completely finalized on all UCTE levels. (see ⏭A2 Timetable 1a, Figure 5)

C-S4.2.2. Timing of the weekly accounting process.

The weekly accounting process is performed according the timetable 2a on Mondays and Tuesdays. In case of national holidays the recording period is adjusted in order to fulfil these requirements. The Co-ordination Centers organize one year in advance the weekly accounting calendar. Therefore every UCTE body has to provide a list of Mondays and Tuesdays which are national holidays and / or days off. (see ⏭A2 Timetables 2a, and Figure 6, for changes of standard recording and compensation periods see ⏭P2-C- S1.5)

C-S4.3. Data Exchange between TSOs in the UCTE Accounting Process

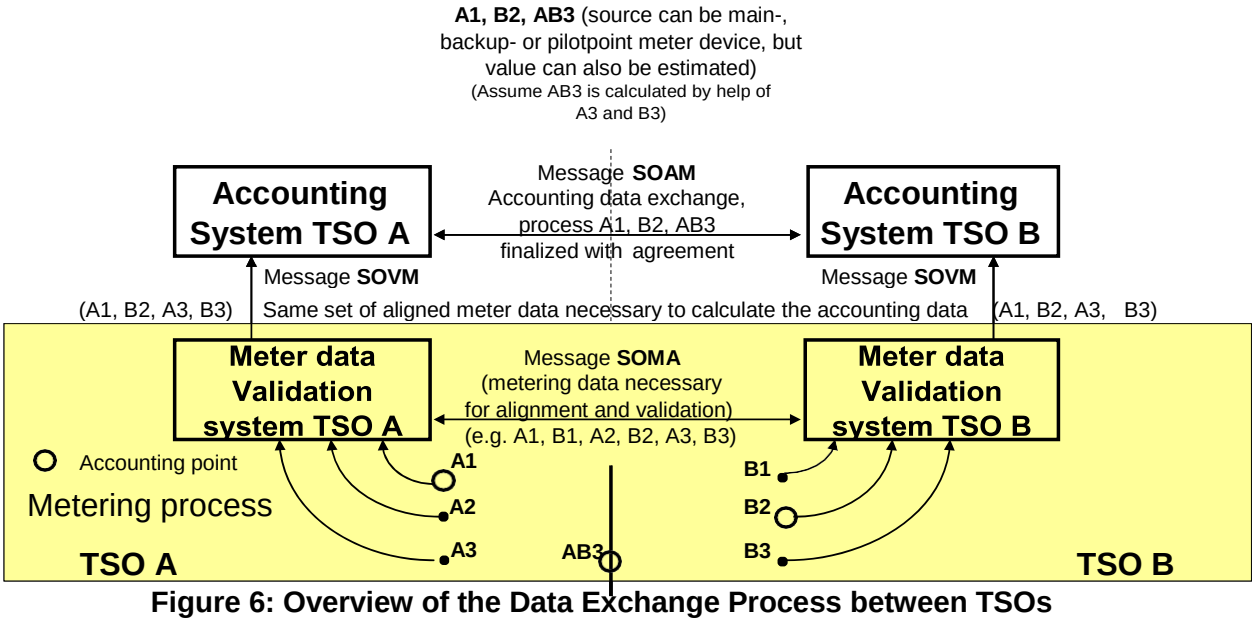


Figure 6: Overview of the Data Exchange Process between TSOs

C-S4.3.1. Principles of meter measurement data exchange

Each TSO assembles and sends his meter measurement data document "System Operator Meter Alignment" (SOMA) to his associated TSO (see ⏭P2-C-S3.1 and P2-C-Figure 1 and P2-C-Figure 6). Every TSO validates the contents of the SOMA document. The TSO inform each other about the result of validation.

In case of successful validation the meter measurement data document "System Operator Validated Measurements" (SOVM) is assembled and sent to the accounting data system of the TSO in order to calculate the accounting data (e.g. consideration of losses).

C-S4.3.2. Principles of accounting data exchange between TSO

The calculated accounting data is assembled into a document "System Operator Accounting data Matching" (SOAM) and must be exchanged between involved TSO. Both TSO match the accounting data and send it after successful matching to the related CONTROL AREA. If accounting data is based on substitute meter measurement data the two involved TSO have time to adjust the data during the final weekly accounting process. If data is not adjusted by the TSO and they match, this data is considered as final on the dedicated UCTE pyramid level. If data do not match, the accounting mismatch rules (see ⏭P2-C-G1) will be applied by the dedicated UCTE pyramid level (see ⏭A2 Timetables 1a, 2a, and Figures 5 and 7; see P2-C- Figure 1 and P2-C-Figure 6).

C-S4.4. METERING Requirements

C-S4.4.1. Voltage and current transformer:

Voltage and current transformers have to be operated at each METERING point which data is used as source for the determination of an accounting point. Voltage and current transformers at the accounting points must have an accuracy class rating of 0.2. Current transformers must have 2 cores for measurement purposes.

C-S4.4.2. Electricity METERING:

On the basis of the current and voltage values measured by the transformers, the electricity meters determine the active energy flow in both directions related to a given time frame. The electricity meters at the accounting points must have an accuracy class rating of 0.2.

C-S4.4.3. Redundancy:

METERING points must be equipped with main and check meters at each TIE-LINE. Main and check meter must be connected each to a separate core of the current transformer.

C-S4.4.4. Transformer cables:

Due to the accuracy of the whole METERING, voltage transformer cables must be designed in such a way that a voltage drop is reduced to 0.1% or less of the nominal voltage.

C-S4.4.5. Telecounter:

The task of a Telecounter is the acquisition of metered values from the electricity meters at the METERING point and the teletransmission of this data to the central accounting office of every partner concerned (remote meter reading). The counters at a METERING point must be doubled.

C-S4.5. AVAILABILITY and Timing for Meter Measurement Data Exchange Process:

Must follow the deadlines outlined in timetable 1a and 2a in chapter C in the Appendix.

C-S4.6. AVAILABILITY and Timing of Accounting Data Exchange Process

Must follow the deadlines outlined in timetable 1a and 2a in chapter C in the Appendix.

C-S4.7. Troubleshooting procedure

C-S4.7.1. The bilaterally agreed rules for trouble shooting have to be applied (see ⏭P2-C-G1).

C-S4.7.2. The TSO are obliged to send their available accounting data

even if values do not match at deadline.

C-S5. Settlement process

The daily settlement process starts after the finalization of the daily accounting process according to ⏭A2 chapter C Timetables 1b and Figure 5. The resulting UNINTENTIONAL DEVIATION and the update of the state of the account per UCTE body must be finalized and transmitted by means of the settlement report (see⏭A2 chapter C Figures 1 and 2) to all levels of the UCTE pyramid.

The weekly settlement process starts after the finalization of the weekly accounting process according to ⏭A2 chapter C Timetables 2b and Figure 7. The resulting UNINTENTIONAL DEVIATION and the update of the state of the account per UCTE body must be finalized and transmitted by means of the settlement report (see⏭A2 chapter C Figures 3 and 4) to all levels of the UCTE pyramid. The weekly settlement process includes the calculation and distribution (see⏭A2 chapter C Figure 3) of the program for compensation of unintentional deviations. The program for compensation of unintentional deviations is based on the final account at the end of the associated recording period.

(see ⏭P2-C-D2.)

C-S5.1. UNINTENTIONAL DEVIATIONS

C-S5.1.1. Principles about UNINTENTIONAL DEVIATION:

- The calculation is based on agreed schedule- and accounting data (original or substituted)
- The final schedules are available at the accounting responsible of CA, CB and CC.
- The accounting data are available at the accounting responsible of CA, CB and CC.
- The upper level of the UCTE pyramid is splitting down the account of UNINTENTIONAL DEVIATION to the UCTE body on the next lower level of the UCTE pyramid (CC to CB, CB to CA).

C-S5.1.2. Calculation of UNINTENTIONAL DEVIATIONS

The UNINTENTIONAL DEVIATIONS UD_{kt} of an area (CA, CB, CC) “k” and time unit “t” are calculated ex - post as difference between physical and programmed energy exchange:

$$UD_{kt} = (ET_{kt} - EVT_{kt}) - ES_{kt}$$

ES_{kt} = sum of all market party schedules

(note: the compensation program for unintentional deviations is not a market party schedule and hence not included in ES_{kt}!)

ET_{kt}= physical energy exchange on the basis of accounting data.

EVT_{kt} = sum of the VIRTUAL TIE-LINE flows between two areas

In the UCTE the sum of the UNINTENTIONAL DEVIATIONS of all CONTROL AREAS / CONTROL BLOCKS / CO-ORDINATION CENTRES must be equal to zero:

$$0 = \sum_{k} UD_{kt}$$

The UNINTENTIONAL DEVIATION is summed up per UCTE tariff.

The UNINTENTIONAL DEVIATIONS of each area k (CA, CB, CC) are accumulated to an account $\boldsymbol{ACC}_{kt}(T,D)$ on the day D - under consideration of a pre-defined set of tariff periods T:

$$ACC_{kt}(T\,,\,D) = ACC_{kt}(T\,,\,D-1) + UD_{kt}(T\,,\,D)$$

C-S5.2. Program for compensation of UNINTENTIONAL DEVIATION (COMPENSATION PROGRAM)

C-S5.2.1. Principles:

- The compensation of the UNINTENTIONAL DEVIATION within the UCTE Settlement Process is currently achieved by an energy EXCHANGE PROGRAM (non-monetary) called COMPENSATION PROGRAM.
- The Program for compensation of UNINTENTIONAL DEVIATION is a duty of a TSO towards the community of UCTE TSOs. For nomination and validation see ⏭P2-A-D12.2.
- For each time interval all COMPENSATION PROGRAMS for all CONTROL BLOCKS must sum up to zero.
- The sum of all COMPENSATION PROGRAMS of the CONTROL AREAS within a CONTROL BLOCK must be equal to the COMPENSATION PROGRAM of the CONTROL BLOCK.
- The sum of all COMPENSATION PROGRAMS of the CONTROL BLOCKS within a CO-ORDINATION CENTRE area must be equal to the COMPENSATION PROGRAM of the related CO-ORDINATION CENTRE.

C-S5.2.2. Calculation of the COMPENSATION PROGRAM

The UNINTENTIONAL DEVIATION account per tariff period of each area is divided by the number of tariff hours of the compensation period. The result is mathematical rounded to full MW and the rest remains on the account.

With reference to the recording period m the COMPENSATION PROGRAM $\boldsymbol{CP_{km}(T)}$ is calculated for each area "k" and tariff period "T" during final weekly settlement:

$$CP_{km}(T) = round\left[-\frac{ACC_{km}(T)}{Count(T)} \right]$$

In this equation Count (T) represents the number of hours referring to the tariff period T in the compensation period m.

If due to rounding this rule is not fulfilled, the UCTE body responsible for calculation of UD has to take the remaining amount on its account.

For detailed description of the calculation of the program for compensation of UNINTENTIONAL DEVIATIONS please see ⏭A2, Figure: 10

Example of the splitting down of the program for compensation of UNINTENTIONAL DEVIATIONS from the top to the lowest level of the UCTE Pyramid please see ⏭A2, chapter C Figure: 11 and ⏭P2-C-S5.1.1

C-S5.2.3. Distribution of COMPENSATION PROGRAMS

The COMPENSATION PROGRAMS are distributed from the top of the UCTE pyramid to the bottom (CC>CB>CA). The distribution of the COMPENSATION PROGRAM to the next lower UCTE level is managed by the accounting responsible UCTE body by means of a ESS based schedule.

C-S5.2.4. Timing of Distribution of COMPENSATION PROGRAMS

The distribution of the COMPENSATION PROGRAMS has to take place at the same time as the distribution of the weekly settlement reports. (see ⏭A2, Timetable: 2b and Figure 9)

C-S5.2.5. Nomination of COMPENSATION PROGRAM

The nomination of the COMPENSATION PROGRAM is based on the distributed program (see ⏭P2-C-S5.2.3) and the final report. The nomination is done

daily (D-1) at the same time as fixed for UCTE scheduling and in accordance to the nomination process (see ⏭P2-A-D12.2 and ⏭P2-A-D5 and A-D6).

C-S5.3. Settlement reports

At the end of the settlement process the settlement report is generated which mainly should give a quick overview about the UNINTENTIONAL DEVIATION and the actual state of the individual account. There is a daily and a final (weekly) settlement report.

The Settlement reports show data for the affected period of the relevant UCTE Pyramid level in the UCTE agreed resolution (currently the UCTE tariff).

C-S5.3.1. Contents and status of settlement report

The daily and final settlement reports consists out of two parts.

- A settlement summary part which intention is to give a quick settlement overview (mandatory part of report).
- Followed by a detailed part on the further pages, which shows the settlement details. (optional part of report)

The report is generated daily respectively weekly. The weekly settlement report is considered as final.

The mandatory summary part of the report contains the following information:

- Date when report has been released and the period concerned
- Account of UNINTENTIONAL DEVIATION at recording start
- Total amount of schedules
- Total amount of flows
- UNINTENTIONAL DEVIATION based on previously shown total of Schedules and flows
- Account of UNINTENTIONAL DEVIATION at recording end

(see ⏭A2, Figure: 1) daily

(see ⏭A2, Figure: 3) weekly

The detailed part of the settlement report is optional. However if the lower UCTE pyramid level requests it, the upper level has to provide it. This optional detailed part of the report contains the following information for the same UCTE level (for CONTROL BLOCKS on CONTROL BLOCK level, for CONTROL AREA on CONTROL AREA level):

- Date when report has been released and the period concerned

List of all relevant Schedules:

- All exchanged Schedules
- Total amount of Schedules

List of all accounting data:

- All accounting values per TIE-LINE
- Total amount of flows

(see ⏭A2, Figure: 2) daily
(see ⏭A2, Figure: 4) weekly

C-S5.3.2. Timing of settlement report

(see ⏭A2, Timetable:1b and Figure 6) daily
(see ⏭A2, Timetable:2b and Figure 7) weekly

C-S5.4. Publication in Vulcanus. After ending up with the UCTE Accounting and Settlement Process the agreed accounting data has to be published on the Vulcanus website.

Guidelines

C-G1. Trouble Shooting for the Accounting process.

C-G1.1. In case of unavailability of meter measurement data or available data but not agreed on time, the following procedure is recommended in the following sequence:

C-G1.1.1. If available, use the check meter values from the accounting point substation.

C-G1.1.2. If available, use the main meter values from the adjacent substation.

C-G1.1.3. If available, use the check meter values from the adjacent substation.

C-G1.1.4. If available, use the integrated measurement values from the on-line observation (see subsection on-line observation).

C-G1.1.5. Otherwise, the partners involved agree on the methodology to determine substitutes.

In any case, more flexible procedure for troubleshooting can be agreed in a bilateral way among the affected TSOs, insuring the normal operation of the accounting process.

C-G1.2. In case two UCTE bodies are sending mismatching accounting data to the next higher UCTE level as part of the daily accounting process the next higher UCTE level should immediately prepare a substitution of values in the following sequence:

C-G1.2.1. If both TSO are sending accounting values having “small” mismatch (up to 10% mismatches of average value 2[(A1-B1)/(A1+B1)]), the next upper level (CA or CB or CC) should use the average of both values as substitute value.

Where A1 = Accounting data send for line 1 by TSO A and

Where B1 = Accounting data send for line 1 by TSO B.

C-G1.2.2. If both TSO are sending accounting values having „large“ mismatches or do not sent accounting values at all and telemeasurements of the TIE-LINEs are available for the next upper level, this level (CA or CB or CC) should use telemeasurements as substitute value.

C-G1.2.3. If both TSO are sending accounting values having „large“ mismatches or do not sent accounting values at all and telemeasurements are NOT available, the next upper level (CA or CB or CC) should set accounting value to ZERO as substitute value.

C-G1.3. Status of unintentional deviation account.

All substituted values can be changed until the end of the deadline of the weekly settlement process (see ⏭P2-C-S4.2).