European Network of
Transmission System Operators
for Electricity

COMPLIANCE AUDIT REPORT REDES ENERGETICAS NACIONAIS

3. – 4.5.2012

COMPLIANCE AUDIT CONDUCTED IN LISBON BY THE ENTSO-E RG CE SG COMPLIANCE MONITORING & ENFORCEMENT
AT THE CONTROL CENTRE OF THE ENTSO-E MEMBER REN

DISCLAIMER

The present Compliance Audit Report is based on the information as provided by the audited company. This report is in no way a guarantee that security and reliability on the system of the audited company and/or on the whole synchronously interconnected system of the Regional Group Continental Europe (RGCE) is ensured. This report cannot be considered as a certification of whatever form. Finally, this report does not as such have any impact on the compliance, by the audited company and/or by any other member of ENTSO-E, with the RGCE Operation Handbook and/or any other relevant applicable standard.

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1 EXECUTIVE SUMMARY

1.1 COMPLIANCE MONITORING IN ENTSO-E RGCE

The mission of the ENTSO-E System Operation Committee Regional Group Continental Europe (RGCE) is to improve the reliability and security of the interconnected power system in the Continental Europe through developing and enforcing RGCE Operation Handbook (OH) standards, monitoring the interconnected power system and assessing its future adequacy. The RGCE member TSOs are subject to compliance with all approved OH standards. The Compliance Monitoring Program (CMP) is the RGCE program that monitors and assesses compliance with these standards via:

- the annual process of self-assessment, which is applied to all TSOs, as well as
- the annual process of mandatory on-site compliance audits, which is applied to a certain number of TSOs chosen on a rotating base either directly (in case of doubts that a certain TSO complies with OH Standards) or by random.

SG Compliance Monitoring & Enforcement (CME) is in charge of performing above mentioned two processes. The 2012 is the third year of conducting mandatory compliance audits. SG CME performed four voluntary compliance audits in 2008-2009 and twelve mandatory audits in 2010-2011.

1.2 AUDITED TSO

The RGCE member TSO REN was chosen for a Compliance Audit in 2012. CME conducted the audit on 3 - 4.5.2012 at the control centre of REN in Lisbon, Portugal.

1.3 AUDITED OH STANDARDS

The Compliance Audit encompassed 18 standards of Operation Handbook Policy 5 which are related to Emergency Operations. In 2011 REN made compliance declarations in the self-assessment process for all standards which will be checked against their evidence during the audit:

1.4 RESULTS

The audit team's findings confirmed that REN is fully compliant in case of all the audited standards (17).

A recommendation was made in case of P5-C-S1.2.1.1 even though the audit team confirmed that REN is fully compliant with this standard.

Necessary documentation was prepared and available at the audit location and the representatives of REN clearly demonstrated that they are familiar with the content of every single document. All explanations were focused to the matter and very well presented. Visiting of NCC helped the audit team to better understand organisation and processes in the REN's system.

The audit team expresses its full satisfaction with the REN approach both in the preparation phase and during the on-site audit.

The table 1 describes REN's compliance declaration in self assessment questionnaire 2011 and compliance audit questionnaire 2012 with compliance level suggestion by CME audit team after reviewing the evidence for the audited standards. Upgrades are highlighted with green and downgrades with red colour. Standards which kept their declaration level are not highlighted.

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TABLE 1: COMPLIANCE LEVEL CHANGES FOR THE AUDITED OH STANDARDS

OH Standard	Self assessment questionnaire 2011	Compliance audit questionnaire 2012	On site compliance audit 2011
P5-A-S1	FC	FC	FC
P5-A-S2	FC	FC	FC
P5-A-S3	FC	FC	FC
P5-B-S1	FC	FC	FC
P5-B-S3.1	FC	FC	FC
P5-B-S5.2	FC	FC	FC
P5-B-S6.3	FC	FC	FC
P5-B-S6.4	FC	FC	FC
P5-B-S6.4.1.1	FC	FC	FC
P5-B-S6.4.1.2	FC	FC	FC
P5-B-S6.4.1.3	FC	FC	FC
P5-C-S1.2	FC	FC	FC
P5-C-S1.2.1.1	FC	FC	FC
P5-C-S1.2.1.2	FC	FC	FC
P5-C-S1.2.1.3	FC	FC	FC
P5-C-S2.3	FC	FC	FC
P5-C-S3.6	FC	FC	FC
P5-C-S3.7	Compliance level evaluation is not performed by the audit team (see section 4.18)		

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2 AUDIT REPRESENTATIVES

The Audit Team has the task to prepare and perform the Compliance Audit as well as to develop the corresponding audit report. The audit team composition is given on table 2. The TSO subject to a compliance audit may object any member of the Audit Team on the basis of a conflict of interests or the existence of other circumstances that could interfere with the impartial performance of his or her duties. The audited TSO is obligated to express its concerns with the proposed team member four weeks prior to the team's arrival on-site. The REN didn't make any such objection. The REN staff present during the compliance audit is given on table 3.

TABLE 2. CME AUDIT TEAM FOR REN

Audit Team role	Company or association	Name	Email address
Audit team leader	EMS	Vladimir Ilic	vladimir.ilic@ems.rs
Audit team member	MAVIR	Laszlo Galambos	galambos@mavir.hu
Audit team member	SEPS	Martin Jedinak	jedinak_martin@sepsas.sk
Audit team member	Terna	Silvia Moroni	silvia.moroni@terna.it
Compliance Monitoring Advisor	ENTSO-E Secretariat	Lasse Konttinen	lasse.konttinen@entsoe.eu

TABLE 3. REN AUDIT STAFF

Function in the company	Title	Name
System and Development System Operation Division	Assistant Director	Rui Pestana
Head of System Operations (CAM)	Director	Jose Amarante
Head of Control Centre	Assistant Director	Paulo Marques

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3 AUDIT PLAN

3.1 GENERAL PROCEDURES

The purpose of this chapter is to help and provide guidance to your organization regarding the oncoming Compliance Audit. The audit will cover a chosen set of Operation Handbook (OH) standards equivalent to those monitored within the Compliance Monitoring Program 2011 self-assessment process.

Please submit the completed Audit Worksheet by email to the ENTSO-E Secretariat and send carbon copies to all Audit Team members three weeks before the first audit day. On table 4. you may find the complete schedule of the audit process for your company.

All documentation (evidence) required for the onsite audit of each standard must be available as a hard copy or in electronic format at the audit location. The Control Area Manager and/or other responsible expert personnel must be available during the audit to provide guidance to the Audit Team on where to look in the documentation for compliance to the OH standard and, if requested, to give further explanation on criteria and procedures implemented.

In preparation for the audit, please organise your supporting compliance documentation which is the evidence for your compliance for audited standards. If possible, please try to provide English versions of the documents. Otherwise please translate the main title, index and last update of the document for the Audit Team. Previously mentioned preparations must be completed prior to the start of the audit. The ENTSO-E RGCE SG CME would like to emphasize the importance of preparation for the audit. All documentation will be considered as confidential audit records and treated as such. The Audit Team will prepare a public report of its audit findings.

TABLE 4. SCHEDULE FOR THE COMPLIANCE AUDIT

Submittal of the audit material on behalf of the Audit Team	**7 weeks prior to audit**
Objection or concern about audit team personnel	**4 weeks prior to audit**
Submittal of the completed Audit Worksheet to the Audit Team by REN	**3 weeks prior to audit**
Initial draft of the audit report based on the Audit Worksheet sent to REN by the Audit Team	**2 working days prior to audit**
Opening meeting of the Audit Team and CAM of REN (1) Introduction of the Audit Team members, (2) Description of how the on-site audit will be conducted, (3) Discussion on how confidential information will be handled, (4) Discussion on data access required by the Audit Team, (5) Announcement that the REN will be asked to provide feedback on the audit process and results, (6) Presentation of the TSO and TSO's organization (7) Visit at the control room	**First audit day,** 3.5.2012 09:00 – 09:30
Start of the OH standards' review	**First audit day,** 3.5.2012 09:30 – 17:30
Continuation of the OH standards' review	**Second audit day,**

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	3.5.2012 09:00 – 12:30
Internal Audit Team meeting	**Second audit day,** 4.5.2012 12:30 – 14:00
Closing meeting with CAM of REN (1) Presentation of preliminary audit findings and recommendations to be included on the draft audit report, with a strong emphasis on the evidences for each compliance level or non compliance identified by the Audit Team, (2) Discussion and feedback by the REN with a possibility to object the findings, (3) In case of any non-compliance or lack of evidence of compliance, first draft proposal of the TSO on an adequate mitigation plan, including deadline.	**Second audit day,** 4.5.2012 14:00 – 15:30
Delivery of the draft audit report to REN for review	**2 weeks after the audit**
Remarks by REN	**4 weeks after the audit**
Delivery of the final audit report to REN	**6 weeks after the audit**
Acknowledgement of the final Audit Report by ENTSO-E RGCE Plenary and decision on its possible internal or external publishing	**RGCE Plenary in 2013**

3.2 OBJECTIVES

The objective of Compliance Audits in 2012 is to check chosen set of standards from OH Policy 5. These standards were also monitored in the 2011 regular compliance process via the self-assessment questionnaire. Furthermore, before performing the Compliance Audit, the Audit Team makes recommendations to the audited TSO to prepare the evidence or documentation on compliance with the audited OH standards.

3.3 SCOPE

The scope of a compliance audit encompasses issues which are directly related to the compliance of the audited TSO with the investigated RGCE OH standards and issues which make a general background for the implementation of the OH at the audited TSO.

Directly related issues

Issues directly related to the audited RGCE OH standards:

- Existence of TSO's addenda and/or non-compliance declarations/non-compliance self-reports
- Follow-up of the TSO's mitigation plans to remove the declared non-compliances
- Self-assessment questionnaires of 2011 stored at the ENTSO-E Secretariat related to audited TSO concerning the audited OH standards
- Audit Worksheet (AW) 2012
- Information and explanations which the Audit Team receives on site

General background

The compliance audit also encompasses issues of general nature listed below:

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- General policies of the audited TSO rules and procedures for the control centre(s) related to the audited standards
- Procedures to control the application of the audited OH standards and their follow-up
- Procedures to improve the compliance with the audited OH standards
- TSO's internal report related to the implementation of the audited OH standards
- TSO's internal audits and/or documentation concerning implementation of OH standards
- TSO's internal bodies (forums, panels) for the implementation of the OH standards

3.4 METHODOLOGY

The CME group prepared an audit schedule defining the chronological order of the compliance audit, which the audited TSO accepted without comment. The audit team reviewed the existing material on the audited TSO and its neighbouring TSOs already collected through the self-assessment process in the 2011 self-assessment questionnaires. It also processed (assessed) the answers in the 2012 Audit Worksheet filled in by the audited TSO.

The methodology includes audit criteria and expectations based on best practices. The adopted criteria are objective, measurable (if possible), complete and relevant to the objectives. At defining the audit methodology, the auditors identify the potential sources of audit evidence and estimate the amount and type of evidence needed.

The audit team uses an Audit Worksheet (see chapter 4) for reviewing the audited OH standards. The purpose of the AW is to ensure consistency and fairness. By using the AW the Audit Team documented the material reviewed and the observations made. One of the main reasons for an on-site visit is to review the existing documentation and to interview the staff. Thus, the auditors obtain "objective evidence" which support the self-assessed declarations of the audited TSO. The audit team determine whether the evidence presented by the TSO is sufficient. They do this by assessing the relevance, validity and reliability of the information and documentation presented.

It is the responsibility of the audited TSO to provide evidence of compliance with all audited OH standards. In most cases the evidence is in written form like documents, plans, programs or records. In some cases the evidence is a review of computerized records or additional supporting material provided at interviews with the staff of the audited TSO.

3.5 EVALUATION PRINCIPLES

Preparatory phase – activities in charge of Audited TSO

- Inspection of the exact wording of each audited OH standard and of additional questions formulated by the CME
- The TSO must fill in the audit questionnaire and submit to the audit team before the audit
- Identification of documents and other material the TSO has to present to the auditors in order to demonstrate its compliance level with each OH standard

Preparatory phase – activities in charge of CME Audit team

- Identification of compliance level declaration inconsistency with neighbouring TSOs (Self-assessment questionnaire 2011 cross-border check regarding compliance level declarations)
- Analysis of the explanations and comments which the audited TSO made in the self-assessment 2011 and audit questionnaires 2012 in written form in order to evaluate the quality of explanations and comments.
- Identification of the missing explanations in the self-assessment 2011 and audit questionnaire 2012
- Analysis of the improvements achieved during the implementation of mitigation and improvement plans declared in the MLA Addendum/Addenda, in the self-assessment

questionnaire 2011 and in the Audit Worksheet 2012 in case of non compliance and sufficient compliance

Audit phase

- Request to the audited TSO to give additional explanations, especially related to standards which were not or not fully addressed by documents and other material mentioned in the self-assessment questionnaire 2011 and audit questionnaire 2012.
    - The goal is to improve the quality of the explanations
- Request to the audited TSO to present that evidence and, if necessary, additional evidence, in printed or electronic form
    - The goal is to improve the quality of the presented evidence
    - The presented material must be relevant to the audited OH standard at all,
- Request to the audited TSO to remark the titles of all presented documents, their relevant chapters and even relevant passages
- Request to the audited TSO to provide further written explanations related to the presented material

3.6 CONFIDENTIALITY

By signing this report the audit team members assure that they will maintain the confidentiality of information obtained during the compliance audit and drafting of the audit report. Moreover, they express their readiness to sign a supplementary confidentiality agreement, if the audited TSO assert such a claim.

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4 AUDIT WORK SHEET

4.1 P5-A-S1 APPRECIATION OF TSO SYSTEM STATES

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-A-S1
Appreciation of TSO system states.The system state is determined by the constrained TSO according to its N-1 security assessment, based on potential influence on neighbouring systems taking into account the efficiency of remedial actions.
Compliance Level: FC
Explanation for the full compliance declaration: Our procedures define the criteria for different states of operation on the system. **Additional Questions** Do you have tools/procedures to assess system state of your own system in real time? yes

AUDIT QUESTIONNAIRE 2012

P5-A-S1 APPRECIATION OF TSO SYSTEM STATES. The system state is determined by the constrained TSO according to its N-1 security assessment, based on potential influence on neighbouring systems taking into account the efficiency of remedial actions.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

Our procedures (approved by regulator) describe the different system states predictable.

Additionally we signed an agreement with our neighbour (REE) which defined the reasons for the different states.

Do you have a mitigation plan to the standard? Yes ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

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Not applicable.

Do you have tools/procedures to assess system state of your own system in real time?

Yes ☒ No ☐

List of evidences, comments:

System operator procedures ***(approved by regulator)***

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1.4 CRITERIA FOR SAFETY AND OPERATING SYSTEM

1.4.1 STATES OPERATING SYSTEM

Are defined four possible functional states of the electrical system:

1.4.1.1 NORMAL STATE

Situation in which all the control variables that characterize the state of the system are within the margins of normal operation set out in paragraph 1.4.4.1 and meet the safety criteria meet the contingencies specified in paragraph 1.4.4.2.

1.4.1.2 STATE OF ALERT

Situation in which all the control variables that characterize the state of the system are within the margins of normal operation set out in Section 1.4.4.1, but do not meet the safety criteria meet the contingencies specified in paragraph 1.4.4.2.

1.4.1.3 STATE OF EMERGENCY

Situation in which one or more control variables of the system have values outside the range of normal operation.

Included in this state those cases in which is recorded an interruption in power supply of a local nature.

1.4.1.4 STATE OF RESTORATION

Situation characterized by loss of electricity supply in the electrical system (regional blackout) or the entire electrical system (national blackout), and the main objective is the replacement of the orderly, safe and fast service.

“

Procedure for exchange of information on the status of electrical systems ***(signed between REN and REE)***

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The definition of status:

“

System Status: The status of the system may, according to a 'policy' 5 of the ENTSOE be classified into four levels, related to the risk of the network regulating the frequency and urgency of actions relating to propagation risk. The possible states are:

- Normal - no risk to the interconnected system. There is a balance between generation and consumption, and system services required are being provided, with frequency, tension and movement within the margins of safety pre-defined, with a sufficient reserve to withstand contingencies that are pre-defined. The safety criterion n-1 is satisfied, taking into account the possible effects of mitigating measures.

- Alert - There is a risk to the safety of the neighboring system under contingency. The base state (N) of the system is stable, in particular its control variables (frequency, voltage and transits), but had at least one contingency situation or a possible deterioration of the system, for which, if any, mitigation measures available will not sufficient. The system operator is uncertain whether the system will return to normal state, the set times, in the event of such deterioration.

With respect to computer systems alertness should be decreed where the SCADA system, main and back-up and / or application that performs the calculations security are unavailable.

- Emergency - The electrical system is severely disrupted. There is a serious risk to the safety of the neighboring system. The principles of safety are not met, with at least one of the control variables (frequency, voltage and transits) outside the set limits. The overall security of the system is in danger. The defense plans are in force (load shedding, reduction of tension in the distributor, activation of interruptibility, request support to trader neighbor, etc…). There is no guarantee of the effectiveness of mitigation measures to limit the problem to the neighboring system or any system ENTSO-E EC RG. From this state, once stabilized, can be started the process of restoring parts of the system.

- Blackout - or state characterized by the almost total absence of voltage on the electrical system with consequences abroad and triggering the replenishment plans of operators. The blackout can be partial (if the system is affected) or totally (the whole system collapsed).

“

Message type between control rooms defined:

“

6.1 - Imbalance between generation and consumption

• Frequency deviation

Frequency deviation higher than 200 mHz.

Frequency deviation exceeding 1 Hz

• Reserve generation

Reserve Margin primary / secondary / tertiary below the minimum required.

Loss of more than 3000 MW.

Imbalanced system without margin.

• Load Shedding load

Manual Load Shedding.

Automatic Load Shedding.

6.2 - Network

• Tensions

Areas in out of voltage range - risk of voltage collapse in n-1.

Areas in out of voltage range – worsening evolution expected.

• Flows

Relevant to n-1 violation.

Flows beyond security limits - worsening evolution expected.

6.3 - Exceptional Events

• Grid split

Partial islanding within a control area.

Large (cross-border) splitting.

• Critical events

Outside the limits of certain types of contingencies - worsening evolution expected.

6.4 – IT Disturbance

Security analysis unavailable

SCADA (primary and backup) unavailable.

6.5 - Other

• Blackout

• Restoration in progress

• Back to normal state.

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AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team:

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FC

Explanation for the suggested compliance level:
Audit Team visited the control room and checked SCADA and N-1 security calculations which confirmed REN explanation and evidence given in Audit Questionnaire 2012. REN and REE have implemented a traffic light system since previous onsite audit in 2009 which was one of the recommendations from REN Audit Team 2009.

The "***Procedure for exchange of information on the status of electrical systems***" contains the message types for traffic light system. The system states are described in "***System operator procedures***" which is approved by Portuguese regulator.

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4.2 P5-A-S2 INFORMATION BETWEEN CONTROL ROOMS BY THE CONSTRAINED TSO

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-A-S2
Information between control rooms by the constrained TSO.The constrained TSO has to inform at least all direct neighbouring TSOs about the state of its own system.
Compliance Level: FC
REE yes
Explanation for the full compliance declaration: we inform our neighbour TSO by mail, fax or phone. **Additional Questions** Do you have procedures with direct neighbours for information on system states? yes

AUDIT QUESTIONNAIRE 2012

P5-A-S2 INFORMATION BETWEEN CONTROL ROOMS BY THE CONSTRAINED TSO. The constrained TSO has to inform at least all direct neighbouring TSOs about the state of its own system.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

We have signed an agreement with our neighbour (REE) which defined the need for mutual communication of system status.

Do you have a mitigation plan to the standard? Yes ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you have procedures with direct neighbours for information on system states?

Neighbour	Yes	No
REE	☒	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

List of evidences, comments:

***Procedure for exchange of information on the status of electrical systems* (signed between REN and REE)**

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6. SYSTEM STATE COMMUNICATION

A sign with the state which is each of the systems is changed in real time between control rooms, for this purpose will be use the ICCP protocol supported in the 'Electronic Highway'.

Additionally, where the state of the systems is different from normal affected the system operator must communicate to the other additional information, including identifying the cause of the change of state and in the case of alert and the time expected to return to normal state. The notice referred to will be far from the phone, fax or email listed on the attached list and should be used whenever possible, the following message type:

6.1 - Imbalance between generation and consumption

• Frequency deviation

Frequency deviation higher than 200 mHz.

Frequency deviation exceeding 1 Hz

• Reserve generation

Reserve Margin primary / secondary / tertiary below the minimum required.

Loss of more than 3000 MW.

Imbalanced system without margin.

• Load Shedding load

Manual Load Shedding.

Automatic Load Shedding.

6.2 - Network

• Tensions

Areas in out of voltage range - risk of voltage collapse in n-1.

Areas in out of voltage range – worsening evolution expected.

• Flows

Relevant to n-1 violation.

Flows beyond security limits - worsening evolution expected.

6.3 - Exceptional Events

• Grid split

Partial islanding within a control area.

Large (cross-border) splitting.

• Critical events

Outside the limits of certain types of contingencies - worsening evolution expected.

6.4 – IT Disturbance

Security analysis unavailable

SCADA (primary and backup) unavailable.

6.5 - Other

• Blackout

• Restoration in progress

• Back to normal state.

“

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** “***Procedure for exchange of information on the status of electrical systems***” describes the protocols for communication with constrained TSO. REN and REE have implemented a bilateral traffic light system. After manual switching of traffic lights further information is communicated via telephone between REN and REE. REN is also ready to implement ENTSO-E Awareness System as soon as the system will be available.

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4.3 P5-A-S3 INTER-TSO CONTACT LISTS FOR SYSTEM OPERATION

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-A-S3
Inter-TSO Contact lists for system operation. Inter-TSO agreements shall include a list of functional positions directly involved in the system operation to be contacted at any time with phone numbers, fax numbers and e-mail addresses that shall be provided by all TSOs and regularly updated. This list includes desks of control rooms and the relevant staff. All critical information about real-time operation shall be sent to these TSO counterparts.
Compliance Level: FC
REE
Explanation for the full compliance declaration: Our Inter-TSO agreements include the contacts of functional people **Additional Questions** Does your control room have contact lists for immediate communication with neighbouring TSOs? **REE** yes

AUDIT QUESTIONNAIRE 2012

P5-A-S3 INTER-TSO CONTACT LISTS FOR SYSTEM OPERATION. Inter-TSO agreements shall include a list of functional positions directly involved in the system operation to be contacted at any time with phone numbers, fax numbers and e-mail addresses that shall be provided by all TSOs and regularly updated. This list includes desks of control rooms and the relevant staff. All critical information about real-time operation shall be sent to these TSO counterparts.

Compliance level FC ☒ SC ☐ NC ☐

Concise explanation and list of evidences for declared compliance level:

We have signed the follows agreements with REE:

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1 - Scheduling and Accounting;

2 - Supporting Procedure for restoration of the Portuguese and Spanish Systems after general incidents;

3 - Emergency energy assistance;

4 - Agreement for the calculation of the NTC;

5 - Outages Scheduling with influence in the Portugal-Spain interconnection;

6 - System Information exchanges between REN and REE for Operational Processes;

7 - Exchange of the status of electrical systems;

8 - Coordinated actions in case of frequency deviation, sync loss or significant interruption in the supply;

9 - Real time operation of the interconnection lines between Portugal and Spain.

(additionally we have established an “implementation guide for exchange of information between TSO” and within the MIBEL we have the same procedure for “congestion management”)

In all these procedures there is a list of contacts and the reference to the established process for updating.

Do you have a mitigation plan to the standard? Yes ☐ No ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Does your control room have contact lists for immediate communication with neighbouring TSOs?

Neighbour	Yes	No
REE	☒	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

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List of evidences, comments:

For example :

Real time operation of the interconnection lines between Portugal and Spain (annex 4 and 5)

Operación tiempo real lineas interconex

Exchange of the status of electrical systems (annex 3 and 4)

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Do you regularly (e.g. once per year) update your contact list and send it to the neighbouring TSO?

Neighbour	Yes	No
REE	☒	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

List of evidences, comments:

For example:

Real time operation of the interconnection lines between Portugal and Spain

Operación tiempo real lineas interconex

“

1.3 Annexes Modifications

The Annexes of this procedure will keep updated continuously without the need to issue a new version. For this to happen, the TSO to identify the need for a change will send a corresponding proposal to the other, for approval. This process will take place by email between officials of the CECOEL, CD and COR listed in Annex 2.

“

Exchange of the status of electrical systems (annex 3 and 4)

estado_dos sistemas_v3_ca.doc

“

4 - Annexes Modifications

The Annexes of this procedure will keep updated continuously without the need to issue a new version. For this to happen, the TSO to identify the need for a change will send a corresponding proposal to the other, for approval. This process will take place by email between officials of the CECOEL and CD contained in Annex 2.

“

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** The grid operators at the control room provided up to date contact lists: “***Real time operation of the interconnection lines between Portugal and Spain***”, Annex 1.3. Audit Team reviewed the listed documents in Audit Questionnaire 2012.

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4.4 P5-B-S1 INTER-TSO CO-ORDINATION

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-B-S1
Inter-TSO co-ordination.For emergency issues TSOs have to agree in writing on bilateral/multilateral procedures with all their neighbours.
Compliance Level: FC
REE
Explanation for the full compliance declaration: Mutual Agreement REE - REN: 'Congestion managment'; 'Supporting exchanges in emergency situations'; 'Supporting for restoration of portuguese and Spanish Systems after general incidents'. **Additional Questions** Do you have written agreements concluded with all adjacent TSOs which take into consideration emergency procedures? **REE** yes

AUDIT QUESTIONNAIRE 2012

P5-B-S1 INTER-TSO CO-ORDINATION. For emergency issues TSOs have to agree in writing on bilateral/multilateral procedures with all their neighbours.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

REN and REE have signed the follow agreements:

- Supporting Procedure for restoration of the Portuguese and Spanish Systems after general incidents
- Emergency energy assistance
- Agreement for the calculation of the NTC

- Outages Scheduling with influence in the Portugal-Spain interconnection

Within the MIBEL we have the same procedure for “congestion management”.

Do you have a mitigation plan to the standard? Yes ☐ No ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Which emergency issues do you consider in your bilateral/multilateral procedures? (e.g. changes of network topology, cross-border re-dispatching, counter-trading, transaction curtailment, emergency energy assistance…)

Change of network topology, counter-trading, and emergency assistance.

List of evidences, comments:

Outages Scheduling with influence in the Portugal-Spain interconnection

OUTAGES SCHEDULING WITH II

“

4.4 Coordinated safeguard plans

In some cases, when a TSO uncovers a safety violation in its studies, for example, in the case of N-1, while implementing the preventive or corrective measures to eliminate the violation, these measures may require the undertaking of manoeuvres or the adoption of certain operating conditions by the neighbouring TSO.

In such cases, a request will be sent by e-mail to the other TSO to seek its approval for the implementation of the safeguard plan. If the TSO agrees, the safeguard plan will be considered to be a coordinated safeguard plan and will be understood to be accepted by both systems.

Coordinated safeguard plans are discussed as soon as a violation of the security criteria in any part of a study is detected. Its validity is subsequently confirmed during weekly scheduling.

“

Agreement for the calculation of the NTC

Calculo_Cap_Com_Interlig_PT_v1_2011.dc

“

4 - Calculation method

(…)

In studies to determine NTC, each operator will monitor the situation in standard and post-contingency as elements of its transmission system as it considers appropriate in the neighboring country to the security of your system and will use criteria safety that apply to your system.

(…)

Each system operator can take the appropriate topology measures to increase the capacity of interconnection, with the concurrence of the other operator.

(…)

“

Some examples:

Topology measures to increase the capacity of interconnection →


Esquema_Bemposta_2002_caso1.one


Esquema_Bemposta_2002_caso1.pdf


Esquema_Bemposta_2002_caso2.one


Esquema_Bemposta_2002_caso2.pdf

In scenarios of export we consider the power plant of Bemposta and one unit of Picote on tie-line (LBTAAV)

Remedial actions →


LPGFR_teledisparo CLL.one


LPGFR_teledisparo CLL.pdf

The outage of a Portuguese line (LPGFR) led to the implementation of a special scheme in Spanish grid as preventive remedial action.

Supporting Procedure for restoration of the Portuguese and Spanish Systems after general incidents


PRS_APOIO_PORTUGAL_ESPANHA_portu

“

SCOPE

This procedure applies in cases of restoration of service after a loss of electrical consumption. This document refers to the possible support that a system not affected can provide to the other system in case of an incident. The provision of support required will depend on the technical possibilities at the time of your request. Neither system will endanger the safety of your electrical system to help the neighbouring system. In any case, can be provided to support much greater than the contemplated herein.

The support system that benefits should then restore the power supplied. Search will be able to refund that are satisfactory to parties, a joint way, independent of current contracts.

This procedure will apply to 8 tie lines 400 and 220 kV between Spain and Portugal.

“

Emergency energy assistance

Acordo REE-REN Intercamb Apoio PTvs “

“

SCOPE

This procedure applies to all actions associated, in a direct or indirect enforcement of the EEA between the electrical systems of Portugal and Spain, for security reasons in one of two electrical systems, as well as all actions to ensure security in the exchange system that provides support and reserve power needed to supply the exchange of support requested.

“

Congestion management

MPGestãoConjuntaInterligaçãoPTESP_Jun

“

9.1 Level of energy exchange resulting from the daily market (PDBF) higher than the NTC between Portugal and Spain

(…)

9.2 Congestion identified in real time

(…)

10. COUNTER-TRADING IMPLEMENTATION
10.1. Counter-Trading

In the situations described in paragraphs 9.1 and 9.2 will apply the mechanism to solve congestion in the interconnection between Portugal and Spain after the PDBF defined by "Counter-trading" in paragraph 3 of this bilateral procedure.

For this purpose Portuguese and Spanish System Operators establish a new energy exchange program between both systems, overlapping on existing exchange programs other with the appropriate magnitude and direction, so that the net exchange programs between the two electrical systems respects the new value of the NTC, ensuring in this way the resolution of the congestion identified in real time.

After the counter-trading each system will manage by the mechanisms of balance according to your needs, taking into account the new situation.

The solution to congestion between Portugal and Spain after the publication of PDBF enables the effective implementation of all energy programs established, without any reductions or cancellation because of the new congestion between Portugal and Spain, except in case of Force Majeure, as described in Section 10.3 of this bilateral procedure.

10.2. Criteria for implementation counter-trading

The criteria for applying the mechanism described in paragraph 10.1 will be applicable as follows:

Coordinated manner by the operators of the Portuguese and Spanish.
Criteria of non-discrimination and maximum transparency.
Only when congestion cannot be solved by other methods, such as the adoption of topological measures of common agreement.
The minimum essential time to solve the congestion.

“

Some examples:

- Counter-trading in 16/Jun/2009 with +55 MWh (Pt→Es), due to delay at the end of the tie-line outage LFRCLL.
- Counter-trading in 07/Feb/2009 with +240 MWh (Pt→ ES), due to lack of reserve in Spain.
- Counter-trading in 02/Feb/2009 with +214 MWh (33+181 Pt→ ES), due to lack of reserve in Spain

Do you have written agreements concluded with all adjacent TSOs which take into consideration emergency procedures?

Neighbour	Yes	No
REE	☒	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

List of evidences, comments:

REN and REE have signed the follow agreements:

- Supporting Procedure for restoration of the Portuguese and Spanish Systems after general incidents
- Emergency energy assistance
- Agreement for the calculation of the NTC
- Outages Scheduling with influence in the Portugal-Spain interconnection

Within the MIBEL we have the same procedure for “congestion management”.

See the procedures in the previous answer.

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** Audit Team reviewed "***Outages Scheduling with influence in the Portugal-Spain interconnection***", "***Agreement for the calculation of the NTC***", "***Emergency energy assistance***" and "***Supporting Procedure for restoration of the Portuguese and Spanish Systems after general incidents***" which confirmed REN's explanation. REN regularly updates the above mentioned documents which are tracked in the document history. Audit Team also checked some examples of communication regarding grid topology change between REN and REE in 2011. The examples were explained in detail with help of SCADA displays to Audit Team.

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4.5 P5-B-S3.1 BACK-UP OF CONTROL ROOM FUNCTIONS

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-B-S3.1
Back-up of control room functions.The control room functions shall be backed up to face any damage to the main installations. This shall be activated within less than three hours and tested for operation at least once a year.
Compliance Level: FC
Explanation for the full compliance declaration: The switching room (Oporto) is back-up of our control room (Lisbon) and vice-versa. **Additional Questions** Do you have a back-up of control room functions in separate locations? yes

AUDIT QUESTIONNAIRE 2012

P5-B-S3.1 BACK-UP OF CONTROL ROOM FUNCTIONS. The control room functions shall be backed up to face any damage to the main installations. This shall be activated within less than three hours and tested for operation at least once a year.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

The switching room (Oporto) is back-up of our control room (Lisbon) and vice-versa.

Do you have a mitigation plan to the standard? Yes ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you have a back-up of control room functions in separate locations?

Yes ☒ No ☐

List of evidences, comments:

Real Time Telecontrol Computer System Redundancy

How often do you test such ability?

Our system is permanently redundant; all main functions have 2 servers one in Oporto (Switching Center) and other in Lisbon (Dispatch Center). If one server has a problem the analogous server, in other control room, take care of service than this ability is permanently test.

If we have one serious problem in one control room the other can take of service of the first one.

List of evidences, comments:

See the answers above.

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** REN has a back up control room in Oporto switching centre and their DTS education centre may also work as backup control room. All two backup control centres are constantly online.

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4.6 P5-B-S5.2 TIE LINES OPENING POLICY

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-B-S5.2

Tie lines opening policy. Disconnection from the synchronous system will be considered the ultimate remedial action and will only be undertaken after coordination with the neighbouring TSOs ensuring that this action will not endanger the remaining synchronous area.o Keeping the interconnection in operation as long as possible is of utmost importance, but shall be consistent with the operating constraints. Therefore any manual emergency opening of tie lines shall be announced in advance, predefined and duly prepared in a coordinated way with the neighbouring TSO.o Opening of a tie line has to be assessed and agreed upon in advance in a transparent way

Compliance Level: FC

REE

Explanation for the full compliance declaration:

This is our pratice, in accordance with our policies.

Additional Questions

Is your tie line opening policy (automatic or manual) coordinated with all concerned neighbouring TSOs?

REE

yes

AUDIT QUESTIONNAIRE 2012

P5-B-S5.2 TIE LINES OPENING POLICY. Disconnection from the synchronous system will be considered the ultimate remedial action and will only be undertaken after coordination with the neighbouring TSOs ensuring that this action will not endanger the remaining synchronous area.

o Keeping the interconnection in operation as long as possible is of utmost importance, but shall be consistent with the operating constraints. Therefore any manual emergency opening of tie lines shall be announced in advance, predefined and duly prepared in a coordinated way with the neighbouring TSO.

o Opening of a tie line has to be assessed and agreed upon in advance in a transparent way; automatic opening may be performed when given events occur and if certain thresholds are exceeded (e.g. overload damage of the equipment).

o Urgent opening can be carried out in case of physical danger to human beings or installations without prior information to neighbouring TSOs involved.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

We foresee this actuation in the procedure “Real time operation of the interconnection lines between Portugal and Spain” sign between REE and REN.

Do you have a mitigation plan to the standard? Yes ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Is your tie line opening policy (automatic or manual) coordinated with all concerned neighbouring TSOs?

Neighbour	Yes	No
REE	☒	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐
	☐	☐

List of evidences, comments:

Real time operation of the interconnection lines between Portugal and Spain

Operación tiempo real lineas interconex

“

5. Procedure for reporting the need to put an interconnection between Portugal and Spain out of service

If it is necessary to put out of service one interconnection line Portugal and Spain so urgent (a period from 5 minutes to a few hours from the time of communication) will take

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out the following procedure.

The Control Centre responsible for (and operation) program of work in question should then trigger the process of consignation (to work without voltage) line in accordance with paragraph 2.1.

Exceptionally, in case of physical danger to human beings and property, the tie lines could be put out of service without prior notice. Immediately after the withdrawal of service, the Control Center that has performed the manoeuvre will notify the other of cause and trigger, if any, the process of consignation (for works without voltage) line in accordance with paragraph 2.1.

"

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** "***Real time operation of the interconnection lines between Portugal and Spain***" is in line with the standard as described in Audit Questionnaire 2012. REN and REE have formalised their good practices in a written document as recommended by REN Audit Team 2009.

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4.7 P5-B-S6.3 MANAGEMENT OF ENTSO-E RG CE OVER-FREQUENCY

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-B-S6.3

Management of ENTSO-E RG CE over-frequency.In case the system frequency is still higher than a dedicated threshold (50.2 Hz), TSOs shall take additional manual (or automatic if available) actions to decrease the frequency (i) through starting pumped-storage power plants or (ii) decreasing the level of generation of active power by activating extra primary reserve if available (next steps under the leadership of the frequency leader - refer to §C).

Compliance Level: FC

Explanation for the full compliance declaration:

If the system frequency is higher than 50,2 Hz we firstly reduced the ace to zero by manual actions (reduced generation or put in service pumped-storage according merit order), after that we follow the guidelines of frequency leader.

Additional Questions

Do you have procedures to limit the output power of power plants?	no
Do you have procedures to start pumps in case of over-frequency?	no

AUDIT QUESTIONNAIRE 2012

P5-B-S6.3 MANAGEMENT OF ENTSO-E RG CE OVER-FREQUENCY. In case the system frequency is still higher than a dedicated threshold (50.2 Hz), TSOs shall take additional manual (or automatic if available) actions to decrease the frequency (i) through starting pumped-storage power plants or (ii) decreasing the level of generation of active power by activating extra primary reserve if available (next steps under the leadership of the frequency leader - refer to §C).

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

Our procedures (approved by regulator) describe which the frequency of our system wants to be inside a range defines by Entsoe.

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“

1.4.4.1.1 FREQUENCY

The frequency assigned to the system is 50 Hz or, alternatively, the value given by UCTE in order to correct the time synchronously.

Finding the interconnected national electricity system with the European system, the frequency variation margins shall be in accordance with the references established to maintain the frequency throughout the interconnected European system.

In case of operating an isolated network part of the domestic electrical off from the rest of the European system, the margins can be displayed temporarily exceeded.

“

Do you have a mitigation plan to the standard? Yes ☐ No ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you have procedures to limit the output power of power plants?

Yes ☐ No ☒

List of evidences, comments:

If the frequency still higher than 50,2 Hz the ACE will be different of zero for one ΔP ~ 0 MW, than our dispatcher will act to bring the ACE to zero (unless we receive instruction in other way from the frequency leader).

To bring the ACE to zero we select the generators according the merit order resulting from reserve offers made by producing agents.

Do you have procedures to start pumps in case of over-frequency?

Yes ☐ No ☒

List of evidences, comments:

If the frequency still higher than 50,2 Hz the ACE will be different of zero for one ΔP ~ 0 MW, than our dispatcher will act to bring the ACE to zero (unless we receive instruction in other way from the frequency leader).

To bring the ACE to zero we select the generators according the merit order resulting from reserve offers made by producing agents.

AUDIT PHASE

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COMPLIANCE AUDIT 2012

Compliance Level suggestion by the audit team:
FC

Explanation for the suggested compliance level:
"***System operator procedures***" defines REN procedures during over frequency situation. REN has market oriented approach to reduce generation or increase load based on utilities' bidding merit order in a dedicated IT-platform.

REN classifies frequency over 50.2 Hz as an emergency state and has authority to redispatch generation and load based on TSO need to lower frequency under 50.2 Hz. REN has authority according to Portuguese Grid Code and "***System operator procedures***" to manage all generators and pumped storages in their grid if system situation demands it.

Audit Team and REN staff discussed on REN answers to Audit Questionnaire 2012 additional questions. They concluded that REN should have answered yes to both additional questions. The improper answers were due to ambiguousness of the two questions.

4.8 P5-B-S6.4 MANAGEMENT OF ENTSO-E RG CE UNDER-FREQUENCY

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-B-S6.4

Management of ENTSO-E RG CE under-frequency.In case the system frequency is lower than a dedicated threshold (49.8 Hz), TSOs shall take additional manual (or automatic if available) actions to increase the frequency (i) through stopping pumped-storage power plants or (ii) increasing the level of active power generation by activating extra primary reserve if available (next steps under the leadership of the frequency leader - refer to §C).

Compliance Level: FC

Explanation for the full compliance declaration:

If the system frequency is lower than 49,8 Hz we firstly reduced the ace to zero by manual actions (increase generation or stopping pumped-storage according merit order), after that we follow the guidelines of frequency leader. When the frequencie achieve 49,5 Hz the pumped-storage stop automatically and bellow 49 Hz we star the load sheeding.

Additional Questions

Do you have procedures to increase the output power of power plants?	no
Do you have procedures to stop pumps in case of under-frequency?	yes

AUDIT QUESTIONNAIRE 2012

P5-B-S6.4 MANAGEMENT OF ENTSO-E RG CE UNDER-FREQUENCY. In case the system frequency is lower than a dedicated threshold (49.8 Hz), TSOs shall take additional manual (or automatic if available) actions to increase the frequency (i) through stopping pumped-storage power plants or (ii) increasing the level of active power generation by activating extra primary reserve if available (next steps under the leadership of the frequency leader - refer to §C).

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

Our procedures (approved by regulator) describe which the frequency of our system wants to be inside a range defines by Entsoe.

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“

1.4.4.1.1 FREQUENCY

The frequency assigned to the system is 50 Hz or, alternatively, the value given by UCTE in order to correct the time synchronously.

Finding the interconnected national electricity system with the European system, the frequency variation margins shall be in accordance with the references established to maintain the frequency throughout the interconnected European system.

In case of operating an isolated network part of the domestic electrical off from the rest of the European system, the margins can be displayed temporarily exceeded.

“

Do you have a mitigation plan to the standard? Yes ☐ No ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you have procedures to increase the output power of power plants?

Yes ☐ No ☒

List of evidences, comments:

If the frequency still lower than 49.8 Hz the ACE will be different of zero for one ΔP ~ 0 MW, than our dispatcher will act to bring the ACE to zero (unless we receive instruction in other way from the frequency leader).

To bring the ACE to zero we select the generators according the merit order resulting from reserve offers made by producing agents.

Do you have procedures to stop pumps in case of under-frequency?

Yes ☒ No ☐

List of evidences, comments:

Only if the frequency still under 49.5 Hz (threshold of load shedding for the pumps facilities).

After that if the frequency still lower than 49.8 Hz the ACE will be different of zero for one ΔP ~ 0 MW, than our dispatcher will act to bring the ACE to zero (unless we receive instruction in other way from the frequency leader).

To bring the ACE to zer we select the generators according the merit order resulting from reserve offers made by producing agents.

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** "***System operator procedures***" defines REN procedures during under frequency. REN has market oriented approach to increase generation or decrease load based on utilities' bidding merit order in a dedicated IT-platform. REN classifies frequency under 49.8 Hz as an emergency state and has authority to redispatch generation and load based on TSO need to increase frequency over 49.8 Hz. REN has authority according to Portuguese Grid Code and "***System operator procedures***" to manage all generators and pumped storages in their grid if system situation demands it. Audit Team and REN staff discussed on REN answer to Audit Questionnaire 2012 the first additional question. They concluded that REN should have answered yes to that additional question. The improper answer was due to ambiguousness of the question.

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4.9 P5-B-S6.4.1.1 LOAD SHEDDING CAPABILITIES

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-B-S6.4.1.1

Load shedding capabilities.For cases where there is a major frequency drop, automatic function for load shedding in response to a frequency criterion must be installed in order to prevent a further frequency drop and the collapse of the system.

Compliance Level: FC

Explanation for the full compliance declaration:

As we said in the additional question we have installed automatic UFLS in our system. The regulations are described in the comment of P5-B-S6,4,1,2

Additional Questions

Do you have automatic UFLS installed in your system?	yes

AUDIT QUESTIONNAIRE 2012

P5-B-S6.4.1.1 LOAD SHEDDING CAPABILITIES. For cases where there is a major frequency drop, automatic function for load shedding in response to a frequency criterion must be installed in order to prevent a further frequency drop and the collapse of the system.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

We are in charge of proposing a National Plan for load shedding.

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“

1.8.2.1 Automatic Load Shedding

The TSO, considering the proposals made by the DSO, propose for approval by the regulator the Automatic Load Shedding required for cases where a very serious incident the balance between generation and consumption of the system cannot be restored by implementing other enforcement actions.

These plans are based on the operation of an automatic load shedding by a minimum

frequency to achieve a controlled disconnect such loads and may be coordinated at Iberian in order to improve its efficiency.

The Automatic Load Shedding plan establishes a load shedding step by step, firstly shedding the pumping and after non-critical loads pre-selected.

(…)

”

Do you have a mitigation plan to the standard? Yes ☐ No ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you have automatic UFLS installed in your system?

Yes ☒ No ☐

List of evidences, comments:

Automatic Load Shedding Plan

P REN-EDPD Anexo G - Plano nacional de

“

(…)

Currently, the plan is load shedding about 66% of the total load from transformers of national grid.

49,0 Hz		48,6 Hz	48,5 Hz		48,4 Hz	48,3 Hz
DSO	TSO	TSO	DSO	TSO	TSO	TSO
15%	11%	0%	12%	12%	6%	10%

“

AUDIT PHASE

COMPLIANCE AUDIT 2012

Compliance Level suggestion by the audit team:
FC

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Explanation for the suggested compliance level:
Audit Team reviewed "***Automatic Load Shedding Plan***" and "***System operator procedures***" which fulfil the requirements of the standard.

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4.10 P5-B-S6.4.1.2 LOAD SHEDDING CRITERION

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-B-S6.4.1.2
Load shedding criterion.At 49.0 Hz the automatic load shedding of customer consumption shall start and will reach at least 5% as the first step. The total control area consumption has to be considered in the stepwise percentages to shed on the basis of individual evaluations by TSOs.
Compliance Level: FC
Explanation for the full compliance declaration: Our load shedding --> 49 Hz - 26 %; 48,5 Hz - 24 %; 48,4 Hz - 6 %; 48,3 Hz - 10 %. **Additional Questions** Do you respect the first stage of load shedding of at least 5% of the total customer consumption at 49Hz? yes

AUDIT QUESTIONNAIRE 2012

P5-B-S6.4.1.2 LOAD SHEDDING CRITERION. At 49.0 Hz the automatic load shedding of customer consumption shall start and will reach at least 5% as the first step. The total control area consumption has to be considered in the stepwise percentages to shed on the basis of individual evaluations by TSOs.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

When we achieve 49 Hz our automatic load shedding plan foresee cut more than 25 % of load.

Do you have a mitigation plan to the standard? Yes ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

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Do you respect the first stage of load shedding of at least 5% of the total customer consumption at 49Hz?

Yes ☒ No ☐

List of evidences, comments:

Automatic Load Shedding Plan

P REN-EDPD Anexo G - Plano nacional de

“

(…)

Currently, the plan is load shedding about 66% of the total load from transformers of national grid.

49,0 Hz		48,6 Hz	48,5 Hz		48,4 Hz	48,3 Hz
DSO	TSO	TSO	DSO	TSO	TSO	TSO
15%	11%	0%	12%	12%	6%	10%

“

How many stages is your UFLS consisted of and what percentage of load is operated under the load shedding relays in each stage?

Four stages.

List of evidences, comments:

“

(…)

Currently, the plan is load shedding about 66% of the total load from transformers of national grid.

49,0 Hz		48,6 Hz	48,5 Hz		48,4 Hz	48,3 Hz
DSO	TSO	TSO	DSO	TSO	TSO	TSO
15%	11%	0%	12%	12%	6%	10%

“

AUDIT PHASE

COMPLIANCE AUDIT 2012

Compliance Level suggestion by the audit team:
FC

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Explanation for the suggested compliance level:
Audit Team reviewed "***Automatic Load Shedding Plan***" which fulfils the requirements of the standard.

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4.11 P5-B-S6.4.1.3 LOAD SHEDDING PLAN – CHECKS

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-B-S6.4.1.3
Load shedding plan - checks.TSOs organise in common with DSOs (or with other involved parties) the regular checking (at least once a year) of the load shedding plan in order to ensure the predicted load shedding when applied.
Compliance Level: FC
Explanation for the full compliance declaration: The protocol established between Dso and TSO is renewed annually. There are no Questions defined for this company and this policy! **Additional Questions**

AUDIT QUESTIONNAIRE 2012

P5-B-S6.4.1.3 LOAD SHEDDING PLAN – CHECKS. TSOs organise in common with DSOs (or with other involved parties) the regular checking (at least once a year) of the load shedding plan in order to ensure the predicted load shedding when applied.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

The protocol established between Dso and TSO is renewed annually.

Do you have a mitigation plan to the standard? **Yes** ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you have the load shedding plan?

Yes ☒ No ☐

List of evidences, comments:

Automatic Load Shedding Plan

P REN-EDPD Anexo G - Plano nacional de

See worksheets: "Tabela Resumo – subestação (Sum table - substation) " and "Parâmetros – detalhe (Parameters - Detail)"

Do you check the load shedding plan with DSOs at least once a year?

Yes ☒ No ☐

List of evidences, comments:

The automatic load shedding plan is included in a protocol established between DSO and TSO

Protocol between DSO and TSO

Protocolo REN-EDPD 2011.doc

"

2 SCOPE

a) The rules and procedures of this Protocol shall apply to the following activities / situations:

- Maneuvers reconfiguration of networks;
- Scheduling outages;
- Special Arrangements for Exploration and testing regimes;
- Rules of action before incidents;
- Plans for the transfer of cargo between points of delivery;
- Analysis of incidents and calculating the energy not supplied;
- Programming of entry into service of new facilities;
- Parameterization of automation facilities;
- Characterization of the Facilities;
- Characterization of production linked in HV, MV and LV;
- **Establishment of automatic load shedding plan;**
- Acting on energy shortages;
- Suspension of access arrangement and operation of networks.

b) They are within the scope of this protocol the following entities:

• REN TSO;
• EDP Distribution.

The REN includes the following control rooms:

• Switching Center (Vermoim)
• Control Center (Sacavém)

The Distribution rooms includes the following command:

• AT North Dispacth (Alexander Herculano - Porto)
• AT South Dispatch (Palhavã - Lisboa)

The contacts are listed in Annex A.

3 - UPDATE

The protocol must be reviewed annually in the first quarter or whenever substantially alter their assumptions.

The revisions to compete REN TSO and EDP Distribution, which they will submit the new versions of the Protocol agreed to their Administration.

The Annexes to the Protocol will be updated throughout the year, where appropriate.

“

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** Audit Team reviewed “***Automatic Load Shedding Plan***“ and “***Protocol between DSO and TSO***“ which fulfil the requirements of the standard. Audit Team also checked previous versions of two above mentioned documents from 2008, 2009, 2011 and 2012 advanced draft which is under preparation. The 2010 update was skipped due to organisation change in the DSO company.

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4.12 P5-C-S1.2 TSO RESTORATION PLAN

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-C-S1.2

TSO restoration plan.Each TSO has to prepare in advance and update regularly a restoration plan. This restoration plan includes a bottom-up approach and a top-down approach.

Compliance Level: FC

Explanation for the full compliance declaration:

Our restoration plan considers the possibility of interconnection available or not (we are a small system with a lot of interconnections with Spain because that we only predict a bottom-up strategy when we don't have energy in the border). The plan is updated annually.

Additional Questions

Does your restoration plan include a bottom-up approach and a top-down approach?	yes
Do you update regularly your restoration plan?	yes

AUDIT QUESTIONNAIRE 2012

P5-C-S1.2 TSO RESTORATION PLAN. Each TSO has to prepare in advance and update regularly a restoration plan. This restoration plan includes a bottom-up approach and a top-down approach.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

Our restoration plan considers the possibility of interconnection available or not (we are a small system with a lot of interconnections with Spain because that we only predict a bottom-up strategy when we don't have energy in the border). The plan is updated annually.

Do you have a mitigation plan to the standard? **Yes** ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

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---

Do you have restoration procedures?

Yes ☒ No ☐

List of evidences, comments:

National Restoration Plan

P REN-EDPD Anexo M - Plano nacional de

"

1 - INTRODUCTION

This procedure is intended to establish strategies for service return, after a blackout. (…)

"

Does your restoration plan include a bottom-up approach and a top-down approach?

Yes ☐ No ☐

List of evidences, comments:

National Restoration Plan

P REN-EDPD Anexo M - Plano nacional de

"

1 - INTRODUCTION

This procedure is intended to establish strategies for service return, after a blackout. The strategies used will be different depending if the blackout is a national or Iberian:

- Blackout of Portuguese network (top-down approach)

(…)

- Blackout of Iberian network (bottom-up approach)

(…)

"

Do you update your restoration plan regularly?

Yes ☒ No ☐

List of evidences, comments:

This plan is part of protocol between DSO and TSO which is updated every year.

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Protocol between DSO and TSO

Protocolo REN-EDPD 2011.doc

“

2 SCOPE

a) The rules and procedures of this Protocol shall apply to the following activities / situations:

- Maneuvers reconfiguration of networks;
- Scheduling outages;
- Special Arrangements for Exploration and testing regimes;
- Rules of action before incidents;
- Plans for the transfer of cargo between points of delivery;
- Analysis of incidents and calculating the energy not supplied;
- Programming of entry into service of new facilities;
- Parameterization of automation facilities;
- Characterization of the Facilities;
- Characterization of production linked in HV, MV and LV;
- Establishment of automatic load shedding plan;
- Acting on energy shortages;
- Suspension of access arrangement and operation of networks.

b) They are within the scope of this protocol the following entities:

- REN TSO;
- EDP Distribution.

The REN includes the following control rooms:

- Switching Center (Vermoim)
- Control Center (Sacavém)

The Distribution rooms includes the following command:

- AT North Dispacth (Alexander Herculano - Porto)

• AT South Dispatch (Palhavã - Lisboa)

The contacts are listed in Annex A.

3 - UPDATE

The protocol must be reviewed annually in the first quarter or whenever substantially alter their assumptions.

The revisions to compete REN TSO and EDP Distribution, which they will submit the new versions of the Protocol agreed to their Administration.

The Annexes to the Protocol will be updated throughout the year, where appropriate.

“

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** Audit Team checked “***National Restoration Plan***“ from 2009 and reviewed in detail the 2012 version. The previous document and “***Protocol between DSO and TSO***“ fulfil the requirements of the standard. The “***National Restoration Plan***“ was updated after commission of new overhead lines in 2012. REN staff gave an exhaustive presentation with help of their SCADA for their bottom-up and top-down restoration plans to the Audit Team. REN confirmed that the missing answer to the first additional question in Audit Questionnaire 2012 is “yes”.

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4.13 P5-C-S1.2.1.1 SUCH PROCEDURES HAVE TO BE PROVED AT LEAST BY SIMULATION OR OFF-LINE CALCULATIONS

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-C-S1.2.1.1
Such procedures have to be proved at least by simulation or off-line calculations.
Compliance Level: FC
Explanation for the full compliance declaration: We simulated our plan in DTS at least annually. **Additional Questions** Do you test your restoration plan by simulation or by off-line calculations? yes

AUDIT QUESTIONNAIRE 2012

P5-C-S1.2.1.1 SUCH PROCEDURES HAVE TO BE PROVED AT LEAST BY SIMULATION OR OFF-LINE CALCULATIONS

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

We simulated our plan in DTS at least annually.

Do you have a mitigation plan to the standard? Yes ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

How do you test your restoration plan?

We test our national restoration plan using the DTS facilities.

List of evidences, comments:

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We usually have two courses of two days every year which are frequented by all operators (switching and dispatch). At least one of the annual courses we simulated a national blackout in DTS, requiring operators to undertake the restoration of service using the presuppositions established in this plan.

In the winter course of this year we simulated the national restoration plan using the top-down approach, namely validating the strategy established using the new 400 kV interconnection between Aldeadávilla and Lagoaça.

AUDIT PHASE

COMPLIANCE AUDIT 2012

Compliance Level suggestion by the audit team:
FC

Explanation for the suggested compliance level:
Audit reviewed DTS course plans number 16 held in Autumn 2011 including a test for bottom-up approach and number 17 held in Spring 2012 including a test for top-down approach for restoration plan training. All REN grid operators participate in every DTS course.

The Audit Team recommends creation of reports from lessons learned during DTS courses.

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4.14 P5-C-S1.2.1.2 EACH TSO HAS TO EVALUATE THE NUMBER OF UNITS CAPABLE OF BLACK START AND ISLANDED OPERATION TO CONTRIBUTE TO THE RESTORATION AND TO GET KNOWLEDGE OF UNITS IN HOUSE LOAD OPERATION

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-C-S1.2.1.2
Each TSO has to evaluate the number of units capable of black start and islanded operation to contribute to the restoration and to get knowledge of units in house load operation.
Compliance Level: FC
Explanation for the full compliance declaration: We have 2 power plants with black start capabilities and all convencional thermals have the possibilitie of house load operation. **Additional Questions** Have you evaluated your needs for black start units? yes

AUDIT QUESTIONNAIRE 2012

P5-C-S1.2.1.2 EACH TSO HAS TO EVALUATE THE NUMBER OF UNITS CAPABLE OF BLACK START AND ISLANDED OPERATION TO CONTRIBUTE TO THE RESTORATION AND TO GET KNOWLEDGE OF UNITS IN HOUSE LOAD OPERATION

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

We have 2 power plants with black start capabilities and all conventional thermals have the possibility of house load operation.

Do you have a mitigation plan to the standard? **Yes** ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Have you evaluated your needs for black start units?

Yes ☒ No ☐

List of evidences, comments:

We only foresee change our needs when one of the power plant with this capability will be decommissioned (Tapada do Outeiro wil be decommissioned in 2024).

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** REN has six units with black start capabilities in two power plants and all conventional thermal units are able to operate in house load.

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4.15 P5-C-S1.2.1.3 BLACK START CAPABILITIES OF UNITS SHALL BE TESTED REGULARLY ON-SITE AT LEAST ONCE PER THREE YEARS

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-C-S1.2.1.3
Black start capabilities of units shall be tested regularly on-site at least once per three years.
Compliance Level: FC
Explanation for the full compliance declaration: we test the black start capabilities of units at least once per three years **Additional Questions** Do you test the black start capabilities of units at least once per three years? yes

AUDIT QUESTIONNAIRE 2012

P5-C-S1.2.1.3 BLACK START CAPABILITIES OF UNITS SHALL BE TESTED REGULARLY ON-SITE AT LEAST ONCE PER THREE YEARS

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

Usually the producer performs tests after each schedule maintenance.

Do you have a mitigation plan to the standard? Yes ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you test the black start capabilities of units at least once per three years?

Yes ☒ No ☐

List of evidences, comments:

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Usually the producer performs tests after each schedule maintenance.

In 2012 REN requested the establishment of two black start tests:

- 19/Mar/2012 – Hydro power plant of Castelo de Bode (the test it wasn't fully satisfactory so we expect to repeat the test in April). The last test requested by REN was in 27/Feb/2008 (4 years ago).
- 21/Mar/2012 – CCGT of Tapada do Outeiro.

This test was performed in group 1, which was isolated from the network through a substation bus (the other two groups remain commercial operation using the other busbar). After that we did the black start test: the group was able to power the busbar, complementary we put in service one pump unit from this group.

The test it was a success.

Tapada do Outeiro Blackstar test

Teste de Balck Start_procedimento.c

AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** Audit Team reviewed black start test report of Tapada do Outeiro on 21 March 2012. Failed black start test of Castelo de Bode on 19 March 2012 will be repeated on 24 May 2012.

4.16 P5-C-S2.3 CHOICE OF LOAD FREQUENCY CONTROLLER MODES OR STATES IN CASE OF BLACKOUT

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-C-S2.3
Choice of Load Frequency controller modes or states in case of blackout. In case of blackout, the load frequency secondary control mode switching depends on the reenergisation strategy.For the bottom-up strategy, it is up to the TSO to choose the load frequency secondary controller in stopped control state (or in frequency control mode) in order to share the contribution to frequency regulation with all the units of the control area.For the top-down strategy, the frequency secondary controller shall be in stopped control state in the area that called for reenergising.
Compliance Level: FC
Explanation for the full compliance declaration: As we said in the aditional question we have a procedure which defines the chioce of the LFC depending on the reenergisation strategy. **Additional Questions** Do you have procedure which defines the choice of the load frequency secondary controller depending on the reenergisation strategy? yes

AUDIT QUESTIONNAIRE 2012

P5-C-S2.3 CHOICE OF LOAD FREQUENCY CONTROLLER MODES OR STATES IN CASE OF BLACKOUT. In case of blackout, the load frequency secondary control mode switching depends on the reenergisation strategy.

For the bottom-up strategy, it is up to the TSO to choose the load frequency secondary controller in stopped control state (or in frequency control mode) in order to share the contribution to frequency regulation with all the units of the control area.

For the top-down strategy, the frequency secondary controller shall be in stopped control state in the area that called for reenergising.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

The methodology which will use is describing in the national plan of restoration. Additionally we signed an agreement with REE establishing actions in case of frequency deviation,

sync loss or significant interruption in the supply.

Do you have a mitigation plan to the standard? Yes ☐ No ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you have procedure which defines the choice of the load frequency secondary controller depending on the reenergisation strategy?

Yes ☒ No ☐

List of evidences, comments:

National Restoration Plan

P REN-EDPD Anexo M - Plano nacional de

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2.4. AGC Preparation

2.4.1. Iberian blackout (bottom-up strategy)

In the case of Iberian blackout (asynchronous reset), the operators of ELGS-CD should begin by preparing the AGC to regulate frequency, changing the mode of regulation of TLBC (Tie-Line Bias Control) Frequency. For this you need to call the page "LFC" Display "AGC" field and select "Control Mode" option "Frequency". Afterwards select "AREAPARA" and "Frequency Filter" (see document AGC - Control Frequência.doc. In "Frequency Filter" have the following selection options:

1) TFS1 (frequency of available busbar 220 kV SSV via GPS1);

2) TFS2 (the same via GPS2);

3) Measurement 1 (first busbar frequency of 220 kV SSV);

4) Measurement 2 (frequency of a busbar 220 kV CTG);

5) Measurement 3 (frequency of a busbar 220 kV SZR);

6) Measurement 4 (frequency of the second busbar 220 kV SZR);

7) Measurement 5 (measured by the frequency of the power interconnection equipment);

8) Measurement TFS1 + p (+ Measurement TFS1 1, 2, 3, 4 and 5 in that order of priority in accordance with the availability of steps);

9) Measurement TFS2 + p (+ Measurement TFS2 1, 2, 3, 4 and 5 in that order of priority in accordance with the availability of measurements).

The display "Interconnections" You can consult the list of available frequencies, as well as correspondence between the various measures (number of measure in parentheses) and their installation.

Thus, if replacement is chosen using the start of CCB would be chosen option 5) Measurement 3. In case this is not possible to start up and opt for replacement through the CTG, we should choose option 4) Measurement 2.

NOTE: Before connecting the first interconnection, should contact the REE together to set the control mode of the LFC. After the interconnection of networks, remain with the LFC mode "Frequency" can be very dangerous. Being the Iberian network synchronously with the European network and fully stabilized should be decided together with REE return the AGC mode with the option TLBC 8) Measurement TFS1 + p in "Frequency Filter".

2.4.2. Portuguese Blackout

To restore the service after a Portuguese blackout (synchronous reset) will be necessary ask permission to REE to activate our AGC control mode "Interchange", that is, regulating only the traffic on interconnections and ignoring frequency. You must bear in mind that we have to start considering a replacement program for interlinking null. Thus, the operators of ELGS-CD should put ITS into emergency mode via the Display "AGC":

- Open the tab "LFC" and then the tab "EmSched";

- In the "Current Interchange Source" select the "emergency";

- In the "Desired target" enter the value "0";

- In the "Control Mode" select "Interchange".

After the restoration of the Portuguese network, will be necessary inform REE, which as leader frequency shall indicate the time that we should put our back to AGC mode of regulation of TLBC (Tie-Line Bias Control).

“

Actions coordinated in case of frequency deviation, sync loss or significant interruption in the supply (agreement signed between REE and REN)

Acordo REN-REE alteracoes_frequenci

“

6.2.4. LFC management

REE and REN should change its AGC mode setting in accordance with the requirements of the "policy 5 'ENTSO EC RG-E, as follows:

CASE 1 to 5: The 'Frequency Leader' of each zone shall management the frequency and the state of your AGC. In all cases, the TSOs with generation in the affected area shall ensure that these units do not participate in secondary reserve managed by an AGC in a control area which does not coincide with the affected area.

CASE 6: After detecting the situation all TSOs will change the AGC state to 'freeze'. The TSO called 'Frequency Leader' shall change your AGC for FC mode until there is resynchronization with the continental European system or the cause of the frequency deviation is eliminated.

It being understood by:

LFC - Adjustable frequency - power;

LC - Power regulation;

FC - frequency control;

Off - AGC off;

Freeze - AGC frozen.

“

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AUDIT PHASE

COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** Audit Team reviewed "***National Restoration Plan***" and "***Actions coordinated in case of frequency deviation, sync loss or significant interruption in the supply (agreement signed between REE and REN)***" which fulfil the requirements of the standard.

4.17 P5-C-S3.6 COORDINATION WITH DSOS FOR RECONNECTION OF SHED LOAD

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-C-S3.6
Coordination with DSOs for reconnection of shed load.TSOs have to coordinate the reconnection of shed load with DSOs. Local and remote reconnection of customer's loads has to be agreed in advance in cooperation between the TSO and its DSOs. Automatic reconnection has to be avoided.
Compliance Level: FC
Explanation for the full compliance declaration: If the system is in restoration process the TSO manage all the process to return to normal operation **Additional Questions** Do you have procedures for reconnection with DSOs which are connected to TSO's grid and are involved in load shedding? — yes Are you in a position to avoid automatic reconnection of loads after load shedding? — no

AUDIT QUESTIONNAIRE 2012

P5-C-S3.6 COORDINATION WITH DSOS FOR RECONNECTION OF SHED LOAD. TSOs have to coordinate the reconnection of shed load with DSOs. Local and remote reconnection of customers' loads has to be agreed in advance in cooperation between the TSO and its DSOs. Automatic reconnection has to be avoided.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

If the system is in restoration process the TSO manage all the process to return to normal operation.

Do you have a mitigation plan to the standard? **Yes** ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Do you have procedures for reconnection with DSOs which are connected to TSO's grid and are involved in load shedding?

Yes ☒ No ☐

List of evidences, comments:

Protocol between DSO and TSO

Protocolo REN-EDPD 2011.doc

"

13 National load shedding plan

In Annex G, the sheet "Rules of the plan," describes the outline of the national load shedding plan; the sheet "Parameters" identifies the installations with the load shedding and its parameters (frequency and temporizations).

If the load shedding is activated the EDP-Dispatch (DSO) and the Switching Center of REN shall so inform each other and await instructions from the Dispatch Center.

"

Are you in a position to avoid automatic reconnection of loads after load shedding?

Yes ☐ No ☒

List of evidences, comments:

In the protocol the DSO is committed they don't reconnect loads after load shedding as we said in the last question ("If the load shedding is activated the EDP-Dispatch (DSO) and the Switching Center of REN shall so inform each other and await instructions from the Dispatch Center.") but REN doesn't commands your circuit breakers.

In the case where the relays are propriety of REN we are able to ensure that the load is not reconnected. The percentage of load in this circumstances are the follow (which is enough to compliance the minimums contained in policy 5):

49,0 Hz	48,5 Hz	48,4 Hz	48,3 Hz
TSO	TSO	TSO	TSO
11%	12%	6%	10%

AUDIT PHASE

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COMPLIANCE AUDIT 2012
Compliance Level suggestion by the audit team: FC **Explanation for the suggested compliance level:** Audit Team reviewed "***Protocol between DSO and TSO***", chapter 13 which covers the requirements of the standard. The protocol forbids DSO to reconnect shed load without REN approval. Answer to the second additional question in Audit Questionnaire should be "yes" instead of "no" based on the evidence which REN displayed to the Audit Team. There is no automatic reconnection of shed load in REN grid.

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4.18 P5-C-S3.7 RECONNECTION OF GENERATORS AFTER ABNORMAL FREQUENCY EXCURSION

PREPARATORY PHASE

SELF-ASSESSMENT QUESTIONNAIRE 2011

P5-C-S3.7

Reconnection of generators after abnormal frequency excursion.The TSO has to coordinate the reconnection of generators tripped due to abnormal frequency excursion.In this case of loss of generation, the TSO reconnects generators, based on the instructions of frequency leader, keeping adequate margins of the downward balancing reserve sufficient at least to cope with the next generation power to reconnect. The reconnection of generators is managed step by step in order to minimize the impact on the frequency deviation and the reserve margins. The process of reconnecting generators has to be done stepwise in blocks of maximum power defined by the TSO with respect to the operating reserve of the own TSO's grid.The TSOs define the criteria for reconnection and disconnection with the constraint to avoid over-frequency conditions.For installation connected to DSOs grids the local and remote reconnection has to be agreed in advance in cooperation between the TSO and DSOs for the main units. Automatic reconnection of all generators has to be forbidden when in accordance with legislation.

Compliance Level: FC

REE

Explanation for the full compliance declaration:

If the system is in restoration process the TSO manage all the process to return to normal operation

Additional Questions

Are you able to coordinate the reconnection of all generators connected to the TSO's grid,	yes
Are you able to coordinate the reconnection of all generators connected to the DSOs' grids except small distributed generation, in coordination with DSOs?	no

AUDIT QUESTIONNAIRE 2012

P5-C-S3.7 RECONNECTION OF GENERATORS AFTER ABNORMAL FREQUENCY EXCURSION. The TSO has to coordinate the reconnection of generators tripped due to abnormal frequency excursion.

In this case of loss of generation, the TSO reconnects generators, based on the instructions of frequency leader, keeping adequate margins of the downward balancing reserve

sufficient at least to cope with the next generation power to reconnect. The reconnection of generators is managed step by step in order to minimize the impact on the frequency deviation and the reserve margins. The process of reconnecting generators has to be done stepwise in blocks of maximum power defined by the TSO with respect to the operating reserve of the own TSO's grid.

The TSOs define the criteria for reconnection and disconnection with the constraint to avoid over-frequency conditions.

For installation connected to DSOs grids the local and remote reconnection has to be agreed in advance in cooperation between the TSO and DSOs for the main units. Automatic reconnection of all generators has to be forbidden when in accordance with legislation.

Compliance level **FC** ☒ **SC** ☐ **NC** ☐

Concise explanation and list of evidences for declared compliance level:

If the system is in restoration process the TSO manage all the process to return to normal operation

Do you have a mitigation plan to the standard? Yes ☐ **No** ☒

In case of an existing Addendum or a Non Compliance Declaration; list of evidences for a mitigation plan, comments:

Not applicable.

Are you able to coordinate the reconnection of all generators connected to the TSO's grid?

Yes ☒ No ☐

List of evidences, comments:

System operator procedures ***(approved by regulator)***

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"(…)

1.8.3 RESTORATION PLANS

The Restoration Plan aim to restore the electrical system to normal operation after serious incidents that have caused the separation of part of the transmission and interruptions of supply in large parts of the system.

The development and updating of the Restoration Plans are the responsibility of Spanish and Portuguese TSOs.

These plans systemize the actions that the different control centers / switching and operating personnel in local should undertake, in the event with the consequences described.

In the case of producing a local or national incident the control centers / switching of production, distribution and transport shall carry the replacement service coordinated by the TSO, as established in their respective Restoration Plans.

In general, the restoration of loads should be carried out by agents in the terms that were

established in Restoration Plans. These plans should also refer the automatic devices installed for restoration, where they are permitted and their interrelationship with the actions of the agents mentioned. Consequently, **the performance of autonomous devices automatically reset charge will be limited to cases that are included in these plans.**

These simulations will be conducted Restoration Plans whenever the TSO considers it appropriate, using for this purpose the training simulator.

(…)

10.6.4 OPERATION IN A STATE OF EMERGENCY

During operation, if the system is in a state of emergency, the TSO will give urgent priority to restoring security to return the system to its normal state.

In this situation, the TSO take whatever measures it considers necessary, acting on the production and transport system, to achieve, as quickly as possible, the variables of control electrical system back to its normal state.

Performances will be similar to those listed in section 10.6.3, except that give priority to measures that may be more effective considering that the speed of their implementation is essential when violations of the existing safety criteria are severe.

In the case of occur some interruption in power supply motivated by an incident in the national electrical system, the TSO will give the necessary instructions to affected companies and coordinate their actions to achieve the restoration of service in a safe and in the shortest possible time.

10.6.5 ACTION IN STATE OF RESTORATION

The restoration process will be coordinated and directed at all times by TSO to return the system to normal operation.

Once detected the loss of consumption in a given zone or the whole system, the TSO will meet urgent priority to restore electricity supply.

In the this state the TSO, **with the contribution of enterprises engaged of network facilities, producers and operators of distribution**, will act on the elements of the national electrical system as follows:

- Active the Restoration Plans (RP) corresponding, when they are applicable in the characteristics and / or extension of the incident, the TSO can complement them or modify as circumstances dictate it.
- If there are no specific RP, coordinates repositioning maneuvers giving the necessary instructions for the order, basing their decisions on their own experience and the help tools available to it.
- When the system is in restoration state, the first objective will be to maintain or restore the interconnections with Spain. For this, the TSO will take measures that will be needed to eliminate the operation conditions that put in risk the interconnections. If necessary, cancel exchange programs established requesting energy assistance, in the terms stated in procedures agreed with the corresponding TSO.
- Implement the necessary measures to achieve, as soon as possible, the balance between generation and consumption, avoiding prolonged use of the support provided by the interconnected systems, through their international interconnections.
- Adopt the appropriate measures to ensure the supply of ancillary services in electricity generation in general, and as a priority in the case of thermal power stations.
- Suspends the current outages which may have implications in the process of restoration.

(…)
“

Are you able to coordinate the reconnection of all generators connected to the DSOs’ grids except small distributed generation, in coordination with DSOs?

Yes ☒ No ☐

List of evidences, comments:

System operator procedures ***(approved by regulator)***

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Our procedures foresee that situation:

“

10.4 RESPONSIBILITIES (System operation)

The TSO is responsible for operating instructions to companies with facilities allocated to the transmission network, distribution companies and generation.

The concessionaire of national grid, operators of distribution networks, producers under ordinary and special regime are responsible for the adequate execution of the instructions emitted by the TSO, so you will need, where appropriate, that they be transmitted to the generators in special arrangements by the operator of the distribution network

“

In the Portuguese system the large majority of power plants connect directly to DSO grid has less than 50 MW.

AUDIT PHASE

COMPLIANCE AUDIT 2012

Compliance Level suggestion by the audit team:
Although the 2012 Onsite Audit Program includes this standard within those to be audited onsite, the audit team omits finally any statement on the compliance level of this standard.

During the onsite audit the audit team focused on the dispersed generation aspects, the critical issue concerning this standard according to the SG CME criteria. However, in the RG CE Plenary it was later decided (in the meeting on November 28th, 2012) that this standard does not apply to non-conventional dispersed generation but only to conventional large generation units connected to TSO grids.

The audit team considers that re-evaluation of the compliance with this standard is not feasible for the following reasons:

– an assessment about the compliance level based on unfocussed onsite gathered materials would

be unfair

- an assessment about the compliance level based on additional information provided ex-post by the TSO, not onsite, would be a biased process
- it is not possible to repeat the onsite audit process for this standard, due to the large effort required both from the audit team and the audited TSO.

Thus, the audit team decided not being in condition to state an audited compliance level for this standard.

The audit team recognises reconnection of generators after abnormal frequency excursions as a critical issue for the security of supply, especially in the light of the increasing penetration of dispersed generation. Therefore the audit team suggests the development of the necessary efficient rules intended to promote the secure operability of the synchronous zone by the RG CE Plenary. From a technical point of view, it is important to remind that the issue is well taken into account by the SG SPD (which is analysing the problem and looking for solutions at the Continental Europe level) and, the Draft Network Code for Requirements for Grid Connection Applicable to all Generators (Article 8(1)(g), 26 June 2012 version[1]).

[1] The Relevant TSO shall define while respecting the provisions of Article 4(3) the conditions under which a Power Generating Module shall be capable of connecting automatically to the Network. These conditions shall include:
- frequency ranges, within which an automatic connection is admissible, and a corresponding delay time
- maximum admissible gradient of increase of Active Power output Automatic connection is allowed unless determined otherwise by the Relevant Network Operator in coordination with the Relevant TSO.

ENTSO-E AISBL • Avenue Cortenbergh 100 • 1000 Brussels • Belgium • Tel +32 2 741 09 50 • Fax +32 2 741 09 51 • info@entsoe.eu • www.entsoe.eu

5 CONCLUSIONS

The Audit Team found that REN is fully compliant with all audited standards. REN estimates that its staff needed about 200 man hours for the preparation of the compliance audit. The Audit Team visited the REN control room at the beginning of the audit. The evidences presented in the control room helped the auditors to better understand the organisation of the work and the processes.

REN was excellently prepared for the audit. All necessary documentation was easily available during the audit. Documentation was also available to the audit team in the preparation phase with translation of all relevant parts from Portuguese to English and that fact has significantly eased the audit process. The REN representatives answered all questions in a competent way and gave detailed explanations.

REN had followed the recommendations made by REN Audit Team 2009 which shows REN's committed attitude to constantly improve its practices:

- Implementation of traffic light system with REE to improve communication with neighbouring constrained TSO
- Formalisation of tie-line opening policy with REE in a written document.

The audit team considers that an evaluation of the compliance with the P5-C-S3.7 standard is not feasible, as explained in the relevant section in the audit work sheet (section 4.18). An improvement plan which was created for the standard P5-C-S3.7 during the on-site audit should be considered obsolete.

Audit team made one recommendation for REN regarding P5-C-S1.2.1.1 even though assessed the standard fully compliant. The Audit Team recommends creation of reports from lessons learned during DTS courses.

In case of the REN Compliance Audit, all preconditions for an excellent and successful audit were fulfilled and the Audit Team wishes to express its gratitude to the REN company management.

ENTSO-E AISBL • Avenue Cortenbergh 100 • 1000 Brussels • Belgium • Tel +32 2 741 09 50 • Fax +32 2 741 09 51 • info@entsoe.eu • www.entsoe.eu

6 SIGNATURE PAGE

ENTSO-E Audit Team Members:

Vladimir Ilic (Audit Team Leader)

Laszlo Galambos (Audit Team Member)

Martin Jedinak (Audit Team Member)

Silvia Moroni (Audit Team Member)

Lasse Konttinen (Compliance Monitoring Advisor)

Date and Place: 06.02.2013, Brussels, Belgium

ENTSO-E AISBL • Avenue Cortenbergh 100 • 1000 Brussels • Belgium • Tel +32 2 741 09 50 • Fax +32 2 741 09 51 • info@entsoe.eu • www.entsoe.eu