European Network of
Transmission System Operators
for Electricity

# COMPLIANCE AUDIT REPORT ELES - ELEKTRO SLOVENIJA D.O.O.

18. – 19.9.2012

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

## 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 ELES was chosen for a Compliance Audit in 2012. CME conducted the audit on 18 - 19.9.2012 at the control centre of ELES in Ljubljana, ELES.

## 1.3 AUDITED OH STANDARDS

The Compliance Audit encompassed 18 standards of Operation Handbook Policy 5 which are related to Emergency Operations. In 2011 ELES 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 visited the ELES control room at the beginning of the audit. All questions of the Audit Team were answered in a very precise manner. The evidence presented in the control room helped the auditors to better understand the organisation of the work and the processes in ELES.

ELES was excellently prepared for the audit. All necessary documentation was easily available. The ELES' representatives answered all questions in a competent way and gave detailed but comprehensive explanations.

The Audit Team verified all levels declared by ELES: ELES is fully compliant for all the audited standards (17).

The table 1 describes ELES' 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. Downgrades are highlighted 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 2012 |
|---|---|---|---|
| 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 ELES didn't make any such objection. The ELES staff present during the compliance audit is given on table 3.

**TABLE 2. CME AUDIT TEAM FOR ELES**

| Audit Team role | Company or association | Name | Email address |
|---|---|---|---|
| Audit team leader | CEPS | Martin Rehacek | rehacekm@ceps.cz |
| Audit team member | REE | Jaime Sanchiz | jsanchiz@ree.es |
| Audit team member | RTE | Olivier Beck | olivier.beck@rte-france.com |
| Compliance Monitoring Advisor | ENTSO-E Secretariat | Lasse Konttinen | lasse.konttinen@entsoe.eu |

**TABLE 3. ELES AUDIT STAFF**

| Function in the company | Title | Name |
|---|---|---|
| System operation expert (CAM) | B.Sc. | Zoran Marčenko |
| Head of operation service | B.Sc. | Franc Kropec |
| Head of operational support service | B.Sc. | Jan Kostevc |
| Head of process control system service | M.Sc. | Emil Mandeljc |
| Deputy Head of operation service | B.Sc. | Gorazd Sitar |
| Head of real time operation department | B.Sc. | Enes Halilović |
| Head of operator training and operational documentation department | B.Sc. | Andrej Semprimožnik |
| OTS engineer | B.Sc. | Henrik Pižorn |



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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 ELES | **3 weeks prior to audit** |
| Initial draft of the audit report based on the Audit Worksheet sent to ELES by the Audit Team | **2 working days prior to audit** |
| Opening meeting of the Audit Team and CAM of ELES<br>(1) Introduction of the Audit Team members,<br>(2) Description of how the on-site audit will be conducted,<br>(3) Discussion on how confidential information will be handled,<br>(4) Discussion on data access required by the Audit Team,<br>(5) Announcement that the ELES will be asked to provide feedback on the audit process and results,<br>(6) Presentation of the TSO and TSO's organization<br>(7) Visit at the control room | **First audit day,**<br>18.9.2012<br>09:00 – 09:30 |
| Start of the OH standards' review | **First audit day,**<br>18.9.2012<br>09:30 – 17:30 |
| Continuation of the OH standards' review | **Second audit day,** |



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| | |
|---|---|
| | 19.9.2012<br>09:00 – 11:30 |
| Internal Audit Team meeting | **Second audit day,**<br>19.9.2012<br>11:30 – 12:30 |
| Closing meeting with CAM of ELES<br>(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,<br>(2) Discussion and feedback by the ELES with a possibility to object the findings, | **Second audit day,**<br>19.9.2012<br>12:30 – 14:00 |
| Delivery of the draft audit report to ELES for review | **2 weeks after the audit** |
| Remarks by ELES | **4 weeks after the audit** |
| Delivery of the final audit report to ELES | **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:

- 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



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- 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**



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- 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:**<br>'Automatic N-1 analysis is performed every 10 minutes taking into consideration all relevant scenarios. Status of the grid is declared in the Regional Alarm and Awareness System (RAAS) Related documents: - Bilateral agreement on Network and System operation between ELES and APG - Bilateral agreement on Network and System operation between ELES and HEP OPS - ELES -TERNA Bilateral Procedure for System Restoration'<br>**Additional Questions**<br>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:

Automatic N-1 analysis is performed every 10 minutes taking into consideration all relevant scenarios. If necessary, additional security analysis is performed in real-time using the load-flow analysis tool NEPLAN. In case of alarm state we control the power flow on SI-I border with phase shift transformer and perform topological changes in accordance with neighbouring TSOs.

Status of the grid is declared in the Regional Alarm and Awareness System (RAAS).

System states, procedures and remedial actions are declared in bilateral agreements with neighbouring TSOs (APG, HEP OPS and TERNA).

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



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

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

Yes ☒ No ☐

List of evidences, comments:

Tools available in the control room:

- Automatic contingency analysis in NCC
- Load flow calculation program NEPLAN for additional real-time analysis
- Regional Alarm and Awareness System (RAAS)

Documents:

1. Agreement on Network and System Operation Management between APG and ELES - concerning System Operation between APG and ELES; Annex 16: Information about network state, 10.02.2009 and Annex 13 - Measures in critical network situations, 09.09.2009.
2. Agreement on Network and System Operation Management between HEP-OPS and ELES - concerning System Operation between HEP-OPS and ELES; Appendix 16 - Information about network state, 11.02.2011 and Appendix 13 - Measures for maintenance and restoration of n-1 security, 11.02.2011.
3. ELES – TERNA Bilateral Procedure for System Restoration, 05.03.2007.
4. PENTALATERAL Handling of the Control Program on the Italian Northern Interconnection (Chapter 4), 27.12.2011.
5. Print screen of real-time contingency analysis.
6. Prints of real-time N-1 analysis with included remedial action (N-1 analysis 28.6.2012).

## AUDIT PHASE

### COMPLIANCE AUDIT 2012

**Compliance Level suggestion by the audit team:**
FC

**Explanation for the suggested compliance level:**
The determination of system states has been agreed with neighbouring TSOs with bilateral "Agreement on Network and System Operation Management between HEP-OPS and ELES", "ELES – TERNA Bilateral Procedure for System Restoration", "Agreement on Network and System Operation Management between APG and ELES" and "PENTALATERAL Handling of the Control Program on the Italian Northern Interconnection" agreements which audit team reviewed.

The agreements have updated or new annexes to cover operational needs since signing of the main document. The contracts signature date refers to the signing date of the main document.



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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

| APG-Austrian Power Grid AG | Terna S.p.A. | HEP-OPS |
|---|---|---|
| yes | yes | yes |

**Explanation for the full compliance declaration:**

"ELES uses RAAS system to inform the regional partners about the current system state. E.g. In case of N-1 violation with possible influence on the neighbouring systems, we declare ""ALARM STATE"" (yellow light) Related documents: - Bilateral agreement on Network and System operation between ELES and APG - Bilateral agreement on Network and System operation between ELES and HEP OPS - ELES -TERNA Bilateral Procedure for System Restoration - RAAS-Rules of operation."

**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:

ELES informs neighbouring TSOs, members of control block Slovenia-Croatia-Bosnia and Hercegovina (SHB) and other members of Transmission System Security Cooperation initiative (TSC) about system state by phone, RAAS, EIS. All relevant SCADA data for 400 and 220 kV grid is provided in real-time to all neighbouring TSOs. System states are presented in bilateral agreements with neighbouring TSOs (APG, HEP OPS and TERNA.

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

| Neighbour | Yes | No |
|---|---|---|
| TERNA | ☒ | ☐ |
| HEP OPS | ☒ | ☐ |
| APG | ☒ | ☐ |

List of evidences, comments:

Tools:

- RAAS system and Emergency Information System (EIS) in NCC
- SCADA real-time data exchange

Documents:

1. Agreement on Network and System Operation Management between APG and ELES - concerning System Operation between APG and ELES; Annex 16: Information about network state, 10.02.2009.
2. Agreement on Network and System Operation Management between HEP-OPS and ELES - concerning System Operation between HEP-OPS and ELES; Annex 16: Information about network state, 11.02.2011.
3. ELES – TERNA Bilateral Procedure for System Restoration, 05.03.2007.
4. List of status changes in RAAS in years 2011 and 2012.

## AUDIT PHASE

### COMPLIANCE AUDIT 2012

**Compliance Level suggestion by the audit team:**
FC

**Explanation for the suggested compliance level:**
ELES have agreements with neighbouring TSOs with constrained TSO information exchange. APG and HEP-OPS belong to TSO Security Cooperation initiative with ELES which ensures adequate information flow among TSOs. ELES and TERNA have a bilateral arrangement for the information exchange. It is expected that the ENTSO-E Awareness System will be in service in a year, which will cover all ENTSO-E TSOs with common information exchange protocols.

Audit team reviewed the four documents which were presented as evidence in ELES Audit Questionnaire.



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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

| APG-Austrian Power Grid AG | Terna S.p.A. | HEP-OPS |
|---|---|---|

**Explanation for the full compliance declaration:**

"Inter TSO agreements with adjacent systems include all relevant contact information Related documents: - Bilateral agreement on Network and System operation between ELES and APG - Bilateral agreement on Network and System operation between ELES and HEP OPS - ELES -TERNA Bilateral Procedure for System Restoration"

**Additional Questions**

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

| APG-Austrian Power Grid AG | Terna S.p.A. | HEP-OPS |
|---|---|---|
| yes | yes | 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:

Bilateral agreements with neighbouring TSOs (APG, HEP-OPS and TERNA) include contact information about relevant personnel. Phone numbers of neighbouring TSOs via two different channels are stored in phone application in NCC. Printed versions of contact lists are used as backup.

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



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a mitigation plan, comments:

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

| Neighbour | Yes | No |
|---|---|---|
| TERNA | ☒ | ☐ |
| HEP-OPS | ☒ | ☐ |
| APG | ☒ | ☐ |

List of evidences, comments:

**Tool:**

1. Speed dial to neighbouring TSOs in NCC.

**Documents:**

1. Contact lists of neighbouring TSOs (APG, HEP-OPS, TERNA) in NCC

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

| Neighbour | Yes | No |
|---|---|---|
| TERNA | ☒ | ☐ |
| HEP OPS | ☒ | ☐ |
| APG | ☒ | ☐ |

List of evidences, comments:

1. Agreement on Network and System Operation Management between APG and ELES - concerning System Operation between APG and ELES; Annex 17: Communication ELES (Ljubljana) calling APG (Wien-Südost), 10.09.2009.
2. Agreement on Network and System Operation Management between HEP-OPS and ELES concerning System Operation between HEP-OPS and ELES; Annex 17: Communications, 11.02.2011.
3. ELES – TERNA Bilateral Procedure for System Restoration, 05.03.2007 - Annex 3, Table of contacts.
4. ENTSO-E RGCE CSO Contact list, 2012.

## AUDIT PHASE

### COMPLIANCE AUDIT 2012

**Compliance Level suggestion by the audit team:**
FC

**Explanation for the suggested compliance level:**



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| |
|---|
| All bilateral agreements with neighbouring TSOs have annexes including inter-TSO contact lists for system operation. Audit team checked the relevant documents and also found the up to date printed contact lists in the national control centre. |



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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 | | |
| **APG-Austrian Power Grid AG** | **Terna S.p.A.** | **HEP-OPS** |
| **Explanation for the full compliance declaration:**<br>"ELES has written bilateral agreements including emergency procedures with all adjacent TSOs Related documents: - Bilateral agreement on Network and System operation between ELES and APG - Bilateral agreement on Network and System operation between ELES and HEP OPS - ELES -TERNA Bilateral Procedure for System Restoration" | | |
| **Additional Questions**<br>Do you have written agreements concluded with all adjacent TSOs which take into consideration emergency procedures? | | |
| **APG-Austrian Power Grid AG**<br>yes | **Terna S.p.A.**<br>yes | **HEP-OPS**<br>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:

Bilateral agreements with neighbouring TSOs (APG, HEP-OPS and TERNA) include emergency procedures such as topology changes, load flow control with PST and cross border redispatch.

ELES and TERNA signed a contract for Mutual Emergency Assistance Service. Such contract is in preparation with HEP-OPS as well.

ELES as a member of TSC signed the Agreement for Mutual Remedial Action which is first of all multilateral redispatch.

**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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*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…)*

Emergency issues, such as overload of single internal element, overload on one or more tie-lines and high voltages in border substation are considered. Bilateral procedures consider remedial actions such as topology changes, regulation of PST tap position and cross-border redispatch.

List of evidences, comments:

1. Agreement on Network and System Operation Management between APG and ELES - concerning System Operation between APG and ELES; Annex 13 - Measures in critical network situations, 09.09.2009.
2. Agreement on Network and System Operation Management between HEP-OPS and ELES - concerning System Operation between HEP-OPS and ELES; Appendix 13 - Measures for maintenance and restoration of N-1 security, 11.02.2011.
3. PENTALATERAL Handling of the Control Program on the Italian Northern Interconnection (Proceeding 2 / 4 Proceeding steps for keeping security in case of violation on Slovenian internal grid), 27.12.2011.
4. Agreement for a Mutual Emergency Assistance Service between TERNA and ELES.
5. Coordinated operation of Phase Shifter Transformers at Slovenia-Italy border (Chapter 7.2 Real time Operation (day D) ).
6. Agreement on Trial Phase of Multilateral Remedial Actions within TSC, 5.12.2011.

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

| Neighbour | Yes | No |
|---|---|---|
| TERNA | ☒ | ☐ |
| HEP OPS | ☒ | ☐ |
| APG | ☒ | ☐ |

List of evidences, comments:

1. Agreement on Network and System Operation Management between APG and ELES - concerning System Operation between APG and ELES; Annex 13 - Measures in critical network situations, 09.09.2009.
2. Agreement on Network and System Operation Management between HEP-OPS and ELES - concerning System Operation between HEP-OPS and ELES; Appendix 13 - Measures for maintenance and restoration of N-1 security,, 11.02.2011.
3. PENTALATERAL Handling of the Control Program on the Italian Northern Interconnection (Proceeding 2 / 4 Proceeding steps for keeping security in case



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of violation on Slovenian internal grid), 27.12.2011.

4. Agreement for a Mutual Emergency Assistance Service between TERNA and ELES, 2009.
5. Coordinated operation of Phase Shifter Transformers at the Slovenia-Italy border (Chapter 7.2 Real-time Operation (day D) ).

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>All bilateral agreements with neighbouring TSOs have annexes for coordination in emergency issues. Audit team checked the bilateral contracts for relevant chapters which are mentioned in the ELES Audit Questionnaire.<br><br>"Mutual Emergency Assistance Service" is a complimentary procedure between TERNA and ELES beyond the requirements of the standard to ensure even higher level of security. |



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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:**<br>All vital functions are backed up in one of regional centres that serves as BCC. The next test is planned in October 11<br>**Additional Questions**<br>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 company ELES has arranged a scheme of uninterrupted operations of its control centres in the following way: Backup centre for National Control Centre (NCC), Regional Control Centres (RCC Nova Gorica and RCC Maribor) is established in RCC Beričevo as the third operator's working place in its control room. The operators log in with their username and password in order to obtain the very same well-known desktop environment as well as the same authorization rights they have at their normal working place. The telephone interface system is configured just the same as the NCC's one and enables the very same connections and manipulations as the intermediary in the NCC's room.

Backup centre for the Regional Control Centre Beričevo is set up in the NCC control room at the leftmost operator's working place. The operator logs in with his username and password in order to obtain the very same well-known desktop environment as well as the same authorization rights he has at his normal working place.

Backup EMS-SCADA is located in the RCC Beričevo. Its normal status is the hot standby reserve.

When activated (Fail Over) backup system takes over all functions of the main power system control centre, such as AGC, delivery of commands, PST regulation, data



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exchange, network analysis.

Change of the operators' shift to the alternate Backup location is carried out once per year for NCC and each of RCC, respectively. Operators' logbook of events and manipulations is written at both locations when active. At the time of executing the NCC functions at the backup location, we are checking the operation of AGC, NGC, the PST regulation and phone connections. During the executing of RCC functions at the backup location, we are checking switching functions and the voltage control.

Backup control system is in test operation once per year during which we make the complete check of functionalities and write down findings in the final test report.

**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:

---

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

Yes ☒ No ☐

List of evidences, comments:

1. PCSS (Process control system service) and OS (Operation service) Management Continuity Plan (Načrt neprekinjenega poslovanja SPSV in SO)
   - PCSS and OS strategy (Strategija SPSV in SO)
   - PCSS and OS response plan (Načrt odziva Službe za procesni sistem vodenja in Službe za obratovanje)
   - PCSS and OS recovery plan (Okrevalni načrt Službe za procesni sistem vodenja in Službe za obratovanje)
2. Final test reports (Poročila o testiranju)

*How often do you test such ability?*

Once a year.

List of evidences, comments:

1. Final test reports (Poročila o testiranju)

## AUDIT PHASE

**COMPLIANCE AUDIT 2012**



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**Compliance Level suggestion by the audit team:**
FC

**Explanation for the suggested compliance level:**
Audit team checked back up control centre procedures and documents ("Načrt odziva Službe za procesni sistem vodenja in Službe za obratovanje" and "Okrevalni načrt Službe za procesni sistem vodenja in Službe za obratovanje") which cover the requirements of the standard. Also a test report for switching the control room functions to a backup control centre in July 2012 verifies the findings.



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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

| APG-Austrian Power Grid AG | Terna S.p.A. | HEP-OPS |
|---|---|---|

**Explanation for the full compliance declaration:**

"Opening of tie-line is an ultimate remedial action. It is declared as such in the bilateral agreements. Related documents: - Bilateral agreement on Network and System operation between ELES and APG - Bilateral agreement on Network and System operation between ELES and HEP OPS - Operational rules for tie lines between ELES and TERNA"

**Additional Questions**

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

| APG-Austrian Power Grid AG | Terna S.p.A. | HEP-OPS |
|---|---|---|
| yes | yes | 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** ☐



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Concise explanation and list of evidences for declared compliance level:

Disconnection of tie-line is considered as an ultimate remedial action and final resort. It is declared as such in provisions in bilateral agreements with neighbouring TSOs (APG, HEP OPS and TERNA).

**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:

---

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

| Neighbour | Yes | No |
|---|---|---|
| APG | ☒ | ☐ |
| HEP OPS | ☒ | ☐ |
| TERNA | ☒ | ☐ |

List of evidences, comments:

1. Agreement on Network and System Operation Management between APG and ELES - concerning System Operation between APG and ELES (page 15)
2. Agreement on Network and System Operation Management between HEP-OPS and ELES - concerning System Operation between HEP-OPS and ELES (page 13).
3. Operational rules 400 kV Divača-Redipuglia and 220 kV Divača-Padriciano (pages 12 and 17).
4. PENTALATERAL Handling of the Control Program on the Italian Northern Interconnection (Proceeding 2 / 4 Proceeding steps for keeping security in case of violation on Slovenian internal grid and Proceeding 2/5 Manual disconnection of interconnectors in case of violation on the Slovenian internal grid), 27.12.2011.

## AUDIT PHASE

### COMPLIANCE AUDIT 2012

**Compliance Level suggestion by the audit team:**
FC

**Explanation for the suggested compliance level:**
The bilateral agreements with neighbouring TSOs and pentalateral agreement state that tie-line disconnection is the ultimate remedial action to preserve security of supply. ELES also has agreements with its neighbouring TSOs for exchange of tie-line parameters. Overload disconnection automatics are removed from ELES' tie-lines.



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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:**

"In critical situations the production units are obliged by legislation to follow the orders from operational staff of TSO. If needed and avalible the pumping power plant should start pumping and help reducing the overfrequency Related documents: -Slovenian Grid Code (Sistemska obratovalna navodila za prenosno omrežje električne energije, Uradni list R.S. 27/07)"

**Additional Questions**

| | |
|---|---|
| Do you have procedures to limit the output power of power plants? | yes |
| Do you have procedures to start pumps in case of over-frequency? | yes |

#### 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:

In case of over-frequency and exhausted system reserves, operator declares “state of crisis” according to grid code, which gives him expended power (higher authority). He is allowed to activate power plants via telephone call with a purpose to bring the frequency within allowed limits and to release system reserves. This applies to all kinds of production units connected to transmission network and all operating modes of units.

Operators are trained in the international operator training simulator (DUtrain) how to manage the frequency within prescribed limits. 6 of 11 NCC operators have already joined international training in DUtrain performing simulated system restoration with top down approach. Knowledge from international training has been shared with remaining 5 operators.

List of evidences:



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1. Grid code chapter IV. 5.3 Abnormal operation (Sistemska obratovalna navodila za prenosno omrežje električne energije).

Reports of DTS sessions:

1. Certificate of attendance at the international training in DUtrain for 6 NCC operators.
2. Report of international training (Poročilo s službene poti v tujini).
3. Certificate of shared knowledge from Inter-TSO training (Prenos znanja z mednarodnih treningov operaterjev).

**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:

---

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

Yes ☒ No ☐

List of evidences, comments:

Grid code based procedure is described in internal operational instruction which defines the procedures of NCC operator (limiting the output power of power plants, starting pumps):

1. Grid code chapter IV. 5.3 Abnormal operation (Sistemska obratovalna navodila za prenosno omrežje električne energije).
2. Action of NCC operator in case of frequency deviations (Ukrepanje odgovornega operaterja EES ob odstopanju sistemske frekvence).

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

Yes ☒ No ☐

List of evidences, comments:

Grid code based procedure is described in internal operational instruction which defines the procedures of NCC operator (limiting the output power of power plants, starting pumps):

1. Grid code chapter IV. 5.3 Abnormal operation (Sistemska obratovalna navodila za prenosno omrežje električne energije).
2. Action of NCC operator in case of frequency deviations (Ukrepanje odgovornega operaterja EES ob odstopanju sistemske frekvence).

## AUDIT PHASE



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| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>The Slovenian Grid Code and internal procedure "Action of NCC operator in case of frequency deviations" define the dispatcher procedures during abnormal operation to counter frequency deviations. ELES also presented reports and certificates on completed DTS training. |



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## 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:**

"In critical situations the production units are obliged by legislation to follow the orders from operational staff of TSO. If needed and avalible the pumping power plant should stop pumping and / or start generating in order to help reducing the underfrequency Related documents: -Slovenian Grid Code (Sistemska obratovalna navodila za prenosno omrežje električne energije, Uradni list R.S. 27/07)"

**Additional Questions**

| | |
|---|---|
| Do you have procedures to increase the output power of power plants? | yes |
| 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:

In case of under-frequency and exhausted system reserves, operator declares “state of crisis” according to grid code, which gives him expanded power (higher authority). Using those powers he is allowed to activate power plants via telephone call with purpose to bring the frequency within the allowed limits and to release system reserves. This applies to all kinds of production units connected to transmission network and all operating modes of units.

Operators are trained how to manage frequency within prescribed limits in the operator training simulator (DUtrain). 6 of 11 NCC operators have already joined international training in DUtrain performing simulated system restoration with top down approach. Knowledge has been shared with remaining 5 operators who will perform the training in 2013.



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List of evidences:

1. Grid code chapter IV. 5.3 Abnormal operation (Sistemska obratovalna navodila za prenosno omrežje električne energije).

Reports of DTS sessions:

1. Certificate of attendance at the international training in DU-TRAIN for 6 NCC operators.
2. Reports of international training (Poročilo s službene poti v tujini).
3. Certificate of shared knowledge from Inter-TSO training (Prenos znanja z mednarodnih treningov operaterjev).

**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:

---

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

Yes ☒ No ☐

List of evidences, comments:

Grid code based procedure is described in internal operational instruction which defines the procedures of NCC operator (limiting the output power of power plants, starting pumps):

1. Grid code chapter IV. 5.3 Abnormal operation (Sistemska obratovalna navodila za prenosno omrežje električne energije).
2. Action of NCC operator in case of frequency deviations (Ukrepanje odgovornega operaterja EES ob odstopanju sistemske frekvence).

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

Yes ☒ No ☐

List of evidences, comments:

Grid code based procedure is described in internal operational instruction which defines the procedures of NCC operator (limiting the output power of power plants, starting pumps):

1. Grid code chapter IV. 5.3 Abnormal operation (Sistemska obratovalna navodila za prenosno omrežje električne energije).
2. Action of NCC operator in case of frequency deviations (Ukrepanje odgovornega operaterja EES ob odstopanju sistemske frekvence).

## AUDIT PHASE

[redacted]



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| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>The Slovenian Grid Code and internal procedure "Action of NCC operator in case of frequency deviations" define the dispatcher procedures during abnormal operation to counter frequency deviations. ELES also presented reports and certificates on completed DTS training. |



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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:**<br>"Automatic load shedding function is installed according to the legislation Related documents: -Slovenian Grid Code (Sistemska obratovalna navodila za prenosno omrežje električne energije, Uradni list R.S. 27/07)"<br>**Additional Questions**<br>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:

Automatic load shedding function is installed in the middle voltage grid (controlled by DSO) and is in accordance with the legalization related documents.

**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:

---

*Do you have automatic UFLS installed in your system?*

Yes ☒ No ☐

List of evidences, comments:

1. Grid code chapter IV.1.7. Load shedding (Sistemska obratovalna navodila za



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prenosno omrežje električne energije).

2. Regulation on the load shedding plan in the electric power system (Uredba o omejevanju obtežb in porabe električne energije v elektroenergetskem sisitemu, Ur. L RS 42/95 in 64/95 )
3. Minutes of the meeting between TSO and DSO regarding renovation of load shedding plan in the electric power system (Zapisnik sestanka ELES, SODO in distribucijskih podjetij v zvezi z ažuriranjem razbremenjevanja EES)

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>Slovenian Grid Code, "Regulation on the load shedding plan in the electric power system" and Minutes of the meetings between TSO and DSO, and between TSO and directly connected consumer in 2012. ELES also presented the list of load shedding capability of DSOs. All these elements present the legal background for load shedding and its practical implementation in Slovenian grid. |



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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:**

"At 49,0 Hz 10% load shedding is applied According to the Slovenian Grid Code (Sistemska obratovalna navodila za prenosno omrežje električne energije, Uradni list R.S. 27/07): - at 49,0 Hz 10% - at 48,8 Hz aditional 15% - at 48,4 Hz aditional 15% - at 48,0 Hz aditional 15%."

**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:

Automatic load shedding scheme in Slovenian power system consists of four stages. First stage is activated in case that frequency drops below 49,2 Hz - 10% of load in Slovenian power system is disconnected.

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



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Yes ☒ No ☐

List of evidences, comments:

1. Regulation on the load shedding plan in the electric power system (Uredba o omejevanju obtežb in porabe električne energije v elektroenergetskem sisitemu, Ur. L RS 42/95 in 64/95 )
2. Minutes of the meeting between TSO and DSO regarding renovation of load shedding plan in the electric power system (Zapisnik sestanka ELES, SODO in distribucijskih podjetij v zvezi z ažuriranjem razbremenjevanja EES)

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

Slovenian UFLS is consisted of four stages:

- at 49,2 Hz 10% load shedding is applied
- at 48,8 Hz additional 15%
- at 48,4 Hz additional 15%
- at 48,0 Hz additional 15%

List of evidences, comments:

1. Regulation on the load shedding plan in the electric power system (Uredba o omejevanju obtežb in porabe električne energije v elektroenergetskem sisitemu, Ur. L RS 42/95 in 64/95).
2. Minutes of the meeting between TSO and DSO regarding renovation of load shedding plan in the electric power system (Zapisnik sestanka ELES, SODO in distribucijskih podjetij v zvezi z ažuriranjem razbremenjevanja EES).

## AUDIT PHASE

### COMPLIANCE AUDIT 2012

**Compliance Level suggestion by the audit team:**
FC

**Explanation for the suggested compliance level:**
"Regulation on the load shedding plan in the electric power system" and "Minutes of the meeting between TSO and DSO regarding renovation of load shedding plan in the electric power system" present the load shedding steps in Slovenia:

- at 49,2 Hz 10% load shedding is applied
- at 48,8 Hz additional 15%
- at 48,4 Hz additional 15%
- at 48,0 Hz additional 15%



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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:**<br>Load shedding is regularly checked with DSOs. Next revision is planned in autumn 11<br>There are no Questions defined for this company and this policy!<br>**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:

A setting of each UFLS plan is reviewed regularly with partners.

**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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*Do you have the load shedding plan?*

Yes ☒ No ☐

List of evidences, comments:

1. Regulation on the load shedding plan in the electric power system (Uredba o omejevanju obtežb in porabe električne energije v elektroenergetskem sisitemu, Ur. L RS 42/95 in 64/95).
2. Minutes of the meeting between TSO and DSO regarding renovation of load



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shedding plan in the electric power system (Zapisnik sestanka ELES, SODO in distribucijskih podjetij v zvezi z ažuriranjem razbremenjevanja EES).

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

Yes ☒ No ☐

List of evidences, comments:

1. Load Shedding plans (Plani podfrekvenčnega razbremenjevanja)

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>Audit team reviewed the revised load shedding plans from 2010, 2011 and 2012. |



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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:**

"Restoration plan includes top-down and bottom-up scenario Related documents: - Procedure for system restoration after black out - Procedure for establishment of power island ( separate document for each foreseen power island) "

**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:

Basic principles of system restoration are included in Slovenian Grid Code. Each area of Slovenian grid has detailed procedure for restoration with bottom-up approach, including reconnection of power islands.

Restoration plan with top-down approach is described in bilateral agreements with neighbouring TSOs (APG, HEP-OPS and TERNA).

**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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*Do you have restoration procedures?*

Yes ☒ No ☐

List of evidences, comments:

1. Detailed procedure for creating a power island around GPP Brestanica including house load of NPP Krško.(NA 7.5.1.146 Otočno obratovanje TE Brestanica z odjemom lastne rabe NE Krško).
2. Detailed Procedure for island operation with GPP Brestanica (7.5.1.141 Obratovalna navodila za otočno obratovanje v energetskem otoku TE Brestanica).
3. Agreement on Network and System Operation Management between APG and ELES- concerning System Operation between APG and ELES; Annex 20 System restoration after black-out accident, 30.01.2012.
4. Agreement on Network and System Operation Management between HEP-OPS and ELES - concerning System Operation between HEP-OPS and ELES; Appendix 20 System restoration after black-out accident, 10.4.2012.
5. ELES – TERNA Bilateral Procedure for System Restoration, 05.03.2007.
6. Internal rule of system restoration procedure containing TOP-DOWN and BOTTOM UP approach (Vzpostavitev omrežja po razpadu).

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

Yes ☒ No ☐

List of evidences, comments:

1. Detailed procedure for creating a power island around GPP Brestanica including house load of NPP Krško (NA 7.5.1.146 Otočno obratovanje TE Brestanica z odjemom lastne rabe NE Krško).
2. Detailed Procedure for island operation with GPP Brestanica (7.5.1.141 Obratovalna navodila za otočno obratovanje v energetskem otoku TE Brestanica).
3. Agreement on Network and System Operation Management between APG and ELES - concerning System Operation between APG and ELES; Annex 20 System restoration after black-out accident, 30.01.2012.
4. Agreement on Network and System Operation Management between HEP-OPS and ELES - concerning System Operation between HEP-OPS and ELES; Appendix 20 System restoration after black-out accident, 10.4.2012.
5. ELES – TERNA Bilateral Procedure for System Restoration, 05.03.2007.
6. Internal rule of system restoration procedure containing TOP-DOWN and BOTTOM UP approach (Vzpostavitev omrežja po razpadu, interna procedura).

*Do you update your restoration plan regularly?*

Yes ☒ No ☐

List of evidences, comments:

Procedures are updated if necessary (e.g. after installation of new power element,



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permanent reconfiguration of the grid etc).

1. Previous versions of Procedure for creating of power island with GTPP Brestanica (7.5.1.141 Obratovalna navodila za otočno obratovanje v energetskem otoku TE Brestanica).
2. Previous versions of Appendixes 20 of bilateral agreement with HEP-OPS and APG.

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>Audit team reviewed ELES' top-down approach by checking bilateral agreements with APG and HEP-OPS plus written procedures with TERNA. Bottom-up approach is implemented with black start or in-house load capable power plant islands. The bottom-up re-energisation plans are written step-wise for dispatchers. Audit team reviewed a bottom-up restoration plan of Brestanica island operation. |



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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:**<br>"Restoration procedure is checked by static model tools in program NEPLAN. Related documents: - Procedure for system restoration after black-out "<br>**Additional Questions**<br>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:

Restoration procedures was checked by static model in NEPLAN application and tested by DTS sessions.

6 of 11 NCC operators have already joined international training in DUtrain performing simulated system restoration with top down approach. Knowledge has been shared with remaining 5 operators who will perform the training in 2013.

Internal procedure for system restoration was tested in off-line simulation.

**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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*How do you test your restoration plan?*



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Restoration plans are checked in DTS sessions:

- Inter-TSO training at DUtrain
- Internal training (island operation of GPP Brestanica)

And:

- Off-line simulations

List of evidences, comments:

Reports of DTS sessions:

1. Certificates of attendance at the international training in DUtrain for 6 NCC operators.
2. Reports of international training (Poročilo s službene poti v tujini).
3. Certificates of performed internal training consisting of island operation of GPP Brestanica (Napotnica in poročilo o izobraževanju).

And:

4. Off-line analysis of internal procedure of system restoration (Analiza vzpostavitve omrežja s pomočjo sosednjih držav po popolnem razpadu EES Slovenije).
5. On-line test of island operation GPP Brestanica.

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>ELES provided reports and certificates for frequent DTS sessions and off-line calculation analysis principles. Audit team also reviewed in depth on-line test of island operation of Brestanica area. |



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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:**

"List of production units capable of black-start is declared in auxilary service contracts Related documents: - Contract for auxilary services between ELES and HSE - Contract for auxilary services between ELES and GEN-E"

**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:

ELES defined a set of production units that have to provide black start capability. It is foreseen to form islands around these units and to start bottom up restoration of the Slovenian power system.

Black start ancillary services are annually contracted between ELES and service providers.

**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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*Have you evaluated your needs for black start units?*

Yes ☒ No ☐

List of evidences, comments:

Internal document:

1. Internal expertise of needs for production units with black start capability (Nabor proizvodnih enot s sposobnostjo zagona brez zunanjega vira napajanja)

Agreements with producer companies:

1. Agreement on the provision of ancillary services for 2012 and 2013 with GEN-E (Pogodba o zagotavljanju sistemskih storitev v letu 2012 in 2013 z GEN-E)
2. Agreement on the provision of ancillary services for 2012 and 2013 with HSE (Pogodba o zagotavljanju sistemskih storitev v letu 2012 in 2013 s HSE)

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>ELES showed an adequacy study which defined the amount of black start capable units needed in Slovenian grid and agreements with contracted power plants. Also Slovenian Grid Code defines black start principles. |



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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:**<br>The most important black start unit, responsible for supply of nuclear power plant, house load is tested regularly, other occasionally (least once in three years).<br>**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:

The black start capabilities of power units are tested regularly.

**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:

---

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

Yes ☒ No ☐

List of evidences, comments:

1. Grid code chapter IV.1.4. Black start of the power unit (Sistemska obratovalna navodila za prenosno omrežje električne energije)



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2. Black start test reports.

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>The black start tests are repeated every three years for all contracted power plants and audit team reviewed complete set of reports from 2009 and 2012. |



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## 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:**

"For the bottom up approach each island has a unit in function of frequency leader, others have stopped frequency control Related documents: -Slovenian Grid Code (Sistemska obratovalna navodila za prenosno omrežje električne energije, Uradni list R.S. 27/07) - Procedure for establishment of power island ( separate document for each foreseen power island)"

**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 choosing of LFC controller mode is defined in internal rule.

Bottom-up procedure: LFC controller should be in stopped state or in frequency control mode (if adequate conditions are fulfilled).

Top down procedure: LFC controller should be in stopped state. In special case can be in power control mode, helping to control the power flow on border.



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List of evidences:

1. Internal rule of system restoration procedure containing TOP-DOWN and BOTTOM-UP approach (Vzpostavitev omrežja po razpadu).

**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:

---

*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:

Internal operational rule:

1. Internal rule of system restoration procedure containing TOP-DOWN and BOTTOM-UP approach (Vzpostavitev omrežja po razpadu).

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>Audit team reviewed internal rule "Vzpostavitev omrežja po razpadu" which describes the choice of frequency control modes in all operational situations. AGC control modes can be easily changed in SCADA. |



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## 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:**

"Reenergization of shedd load takes place according to the detail plan and in close cooperation with RCCs and DSOs -Slovenian Grid Code (Sistemska obratovalna navodila za prenosno omrežje električne energije, Uradni list R.S. 27/07) - Procedure for establishment of power island ( separate document for each foreseen power island)"

**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? | yes |

#### 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:

Grid Code defines that reconnection of shed load is allowed in coordination with TSO only.

**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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*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:

1. Grid code, chapter IV.1.7. Load shedding (Sistemska obratovalna navodila za prenosno omrežje električne energije).
2. Internal rule of system restoration procedure containing TOP-DOWN and BOTTOM-UP approach (Vzpostavitev omrežja po razpadu).
3. Minutes of the meeting between TSO and DSOs (Zapisnik sestanka ELES, SODO in distribucijskih podjetij v zvezi z ažuriranjem razbremenjevanja EES).

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

Yes ☒ No ☐

List of evidences, comments:

1. Grid code, Chapter IV.1.7. Load shedding (Sistemska obratovalna navodila za prenosno omrežje električne energije).
2. Minutes of the meeting between TSO and DSOs (Zapisnik sestanka ELES, SODO in distribucijskih podjetij v zvezi z ažuriranjem razbremenjevanja EES).

## AUDIT PHASE

| COMPLIANCE AUDIT 2012 |
|---|
| **Compliance Level suggestion by the audit team:**<br>FC<br><br>**Explanation for the suggested compliance level:**<br>The Slovenian Grid Code states that DSOs are allowed to reconnect shed load only in coordination with the TSO. The internal rules for load reconnection are stated in "Ukrepanje odgovornega operaterja EES ob odstopanju sistemske frekvence". ELES also provided minutes of the meeting on TSO/DSO coordination about load shedding issues. |



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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:** SC

| APG-Austrian Power Grid AG | Terna S.p.A. | HEP-OPS |
|---|---|---|

**Actions taken to reach compliance:**

ELES will follow the standard but the frequency leader is not foreseen in the current legislation, restoration procedures and agreements with adjacent TSOs. Such a situation was a part of international operators training in DUTRAIN. Update the current legal provisions and procedures with the role of frequency leader.

**Deadline:** 12\2012

**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? | yes |

#### 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.



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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:

Generating units connected to transmission network (110 kV, 220 kV and 400 kV) are fully compliant with the standard. Those are all generating units with rated power higher than 10 MW.

All generating unites connected to the Slovenian transmission network are remotely controlled from production control centres. In case of emergency, ELES is empowered to engage production units according to the needs of the power system. This is done directly from NCC in coordination with the production control centres, which are directly informed about the emergency conditions in the power system. According to the Slovenian Grid Code, in emergency conditions ELES can disconnect all users (production units and consumers) of the system that jeopardize security of its operation.

The Slovenian DSOs cover medium and low voltage levels (up to 20kV) and generating units connected to the distribution network cannot exceed 10 MW. Thus all generation on the DSO side is considered distributed generation. Only the accumulated value of all DSOs' generation (less than 200 MW) is monitored and does not exceed the network's tertiary reserve (348 MW).

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

Yes ☒ No ☐

List of evidences, comments:

1. Grid code, Chapter IV. 5.3. Abnormal operation (Sistemska obratovalna navodila za prenosno omrežje električne energije)
2. Internal instructions (Ukrepanje odgovornega operaterja EES ob odstopanju sistemske frekvence).

*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:

1. The register of grants recipients for June 2012 (Register prejemnikov podpor

- stanje junij 2012)

The total installed capacity of generating units connected to the distribution network (distributed generation, up to 20 kV), is less than 200 MW, while the amount of tertiary reserve is 348 MW.

The installed capacity of distributed generation is lower than system's tertiary reserve and thus special measures are not foreseen in case of abnormal frequency deviations due to distributed generation disconnection. Regardless, ELES has already started negotiations with DSOs to change the rules for the connection of distributed generation to the distribution network that would allow better control in case the total amount would become significant and could affect system operation.

## 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.



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# 5 CONCLUSIONS

ELES was excellently prepared for the audit. All necessary documentation was easily available. The ELES' representatives answered all questions in a competent way and gave detailed but comprehensive explanations. The Audit Team wants to stress its satisfaction with the approach of ELES to the compliance audit.

The Audit Team visited the ELES control room at the beginning of the audit. All questions of the Audit Team were answered in a very precise manner. The evidence presented in the control room helped the auditors to better understand the organisation of the work and the processes in ELES.

The Audit Team found ELES is fully compliant with all audited standards.

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).

Moreover, during the Audit two proposals on improvement has arisen from the discussion.

Improvement of P5-C-S2.3 application:

Despite ELES' controller enables to be switched to power control mode, use of this mode has no support in Operation Handbook and while used it could be confusing for partners during emergency communication. The restoration coordination commonly trained among ELES and their CEE partners considers only frequency, stopped or frozen control mode.

General improvement to the agreements:

Although Audit showed that ELES' agreements are sufficient and they (or their annexes) are updated regularly, the conclusion date mentioned on cover page are usually older than conclusion date of their annexes. Better document control the readers would surely appreciate.

The Audit Team made the experience that ELES is an excellently organized TSO with a very high level of expertise.

The ELES representatives reported they had spent about 250 working man-hours on audit preparation.

The Audit Team wishes to express its gratitude to the ELES company management for fulfilling all preconditions for an excellent and successful audit.



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# 6 SIGNATURE PAGE

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