



CERTIFICATION AUDIT REPORT

DIAMANTE GERACAO DE ENERGIA LTDA

15154492

*Bureau Veritas Certification Brasil on behalf of BVC Holding SAS
- UK Branch (Address: 5th Floor, 66 Prescott Street, London,
E18HG, United Kingdom)*

Auditoria de Recertificação / ISO 50001:2018

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1 GENERAL INFORMATION

1.1 ORGANIZATION INFORMATION

Organization Name	DIAMANTE GERACAO DE ENERGIA LTDA		
Address	Av. Paulo Santos Mello, 555		
City	Capivari de Baixo		
Postal Code	88745-000		
County/State	SC1		
Country	Brazil		
Phone N°	(48) 3221-7994	Fax N°	(48) 3221-7994
Contract n°	15154492		

1.2 CONTACT INFORMATION

Contact Name	André Zagroba		
Email Address	andre.zagroba@diamanteenergia.com.br	Phone N°	(48) 3221-7994

2 AUDIT INFORMATION

2.1 AUDIT STANDARDS

Audit Standard(s)	ISO 50001:2018
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2.2 SCOPE OF CERTIFICATION

Language	Standard	Site Name	Head Office	Scope of Certification
English	ISO 50001:2018	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	✓	ELECTRIC POWER GENERATION SERVICES IN THE JORGE LACERDA THERMOELETRIC COMPLEX
Portuguese-Brazilian	ISO 50001:2018	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	✓	SERVIÇOS DE GERAÇÃO DE ENERGIA ELÉTRICA NO COMPLEXO TERMOELÉTRICO JORGE LACERDA

Nº of Sites	1
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Nº of Employees	214
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Head Office	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL
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If this is a multi-site audit an Appendix listing all the relevant sites and/or remote locations has been established and attached to the audit report.

Type	Auditoria de Recertificação
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Audit Start Date	06/08/2023
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Audit End Date	14/08/2023
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Duration	6,5
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2.3 AUDITOR INFORMATION

Team Leader	Initials	Team Members	Initials
Carlos Alberto Mattos Taveira	CMT	Wellington Sanches	WSA
		Antonio Meireles Baeta - (Observer)	BAE

2.4 AUDIT SCOPE

Audit Objectives

1. To confirm that the management system conforms with all the requirements of the audit standard(s);
2. To confirm that the organization has effectively implemented its planned arrangements;
3. To confirm that the management system is capable of achieving the organization's policies and objectives and evaluation of the ability of the management system to ensure the client organization meets applicable statutory, regulatory and contractual requirements;
4. If applicable to identify areas for potential improvement of the management system.
5. The purpose of the stage 2 audit is to evaluate the implementation, including effectiveness, of the client's management system.

It shall include at least the following:

- a) information and evidence about conformity to all requirements of the applicable management system standard or other normative document;
- b) performance monitoring, measuring, reporting and reviewing against key performance objectives and targets (consistent with the expectations in the applicable management system standard or other normative document);
- c) the client's management system and performance as regards legal compliance;
- d) operational control of the client's processes;
- e) internal auditing and management review;
- f) management responsibility for the client's policies;
- g) links between the normative requirements, policy, performance objectives and targets (consistent with the expectations in the applicable management system standard or other normative document), any applicable legal requirements, responsibilities, competence of personnel, operations, procedures, performance data and internal audit findings and conclusions.

Audit Plan

Date - Time Activity	Site Name	Process	Auditor	Comment
03/07/2023 - 08:00 -	Off Site Brazil	Audit planning	CMT	
03/07/2023 - 10:00 -	Off Site Brazil	End of day	CMT	
07/08/2023 - 08:00 Opening meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	
07/08/2023 - 08:30 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Alta Direção (Top Management)	CMT, BAE	
07/08/2023 - 10:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Sistema de Gestão de Energia (Energy Management System)	CMT, BAE	
07/08/2023 - 12:00 Lunch	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	
07/08/2023 - 13:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Sistema de Gestão de Energia (Energy Management System)	CMT, BAE	
07/08/2023 - 16:45 Feedback meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	
07/08/2023 - 17:00 -	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	End of day	CMT, BAE	
08/08/2023 - 08:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Central de Utilidades (Utilities)	CMT, BAE	

Date - Time Activity	Site Name	Process	Auditor	Comment
08/08/2023 - 12:00 Lunch	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	
08/08/2023 - 13:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Engenharia e Manutenção (Engineering and Maintenance)	CMT, BAE	
08/08/2023 - 16:30 Feedback meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL		CMT, BAE	
08/08/2023 - 17:00 -	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	End of day	CMT, BAE	
09/08/2023 - 08:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Operação da Usina - UTLA (Power Plant A)	CMT, BAE	
09/08/2023 - 12:00 Lunch	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	
09/08/2023 - 13:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Operação da Usina - UTLB (Power Plant B)	CMT, BAE	
09/08/2023 - 16:45 Feedback meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	
09/08/2023 - 17:00 -	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	End of day	CMT, BAE	
10/08/2023 - 08:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Operação da Usina - UTLC (Power Plant C)	CMT, BAE	
10/08/2023 - 12:00 Lunch	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	

Date - Time Activity	Site Name	Process	Auditor	Comment
10/08/2023 - 13:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Suprimentos (Procurement)	CMT, BAE	
10/08/2023 - 16:30 Feedback meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	
10/08/2023 - 17:00 -	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	End of day	CMT, BAE	
11/08/2023 - 08:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Recursos Humanos (Human Resources)	CMT, BAE	
11/08/2023 - 08:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	CoRe – Commercialization and Regulation	WSA	
11/08/2023 - 10:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Sistema de Gestão de Energia (Energy Management System)	CMT, BAE	
11/08/2023 - 11:59 -	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	End of WSA auditor participation	WSA	
11/08/2023 - 12:00 Lunch	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, BAE	
11/08/2023 - 13:30 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Sistema de Gestão de Energia (Energy Management System)	CMT, BAE	
11/08/2023 - 15:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Pendings / Corrective actions	CMT, BAE	
11/08/2023 - 16:00 Closing meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----	CMT, WSA, BAE	

Date - Time Activity	Site Name	Process	Auditor	Comment
11/08/2023 - 17:00 -	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	End of day	CMT, WSA, BAE	
14/08/2023 - 08:00 -	Off Site Brazil	Report	CMT	
14/08/2023 - 12:00 Lunch	Off Site Brazil	-----	CMT	
14/08/2023 - 15:00 -	Off Site Brazil	Report	CMT	

Audit plan preparation date	03/07/2023
Comment	Audit plan sent to the client and revised according to requests and needs.

General & legal compliance requirements

Legal requirements are monitored by the Management Representative.

There is a systematic monitoring of applicability and compliance with legal requirements because of the company's activity (and 14k and 45k certification), however in practice and related to the energy management system, there is no legislation that is applicable.

Although the Brazilian electricity sector is heavily regulated, there is no specific legislation that refers to energy efficiency or the 50001 standard. The direct benefit of energy efficiency is related to the monetary reimbursement of the amount spent on coal, made by the Brazilian government.

3 AUDIT PROCESS

3.1 AUDITOR NOTES / SIGNIFICANT AUDIT TRAILS

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	07/08/2023	Alta Direção (Top Management)	ISO 50001:2018	Jefferson de Oliveira – Technical Operational Director Adilson Machado – Eng. UTLA operation Andre Zagroba – SESMT Engineer and SGI Leader Ariel Brambilla – Utilities Engineer and RD at 50k Antonio M Baeta – Observer auditor
Notes				
<p>Top Management</p> <p>Company characterization:</p> <p>Complex divided into 7 plants and 4 different technologies – 1 and 2 German from the 50s, 3 and 4 Italian technologies, started operation in 1970 and 5 and 6 Techcas technologies and started operation in 1980.</p> <p>Unit 7 – newest of all 90's Italian operation and technology.</p> <p>UTLA 1 - units 1 and 2 - 50MW each unit</p> <p>UTLA 2 - units 3 and 4 - 66 MW each unit</p> <p>UTLB - units 5 and 6 - 131 MW each unit</p> <p>UTLC - unit 7 - 363 MW</p> <p>Physical space: 345,782 Hectares²</p> <p>The SE Suite Portal was presented, which contains all the documentation of the 9k systems; 14k; 45k and 50k – There is a specific area for the Energy Management system.</p> <p>4.1 / 4.2</p> <p>Context analysis (change elements):</p> <p>ERP System Exchange</p> <p>Acquisition of a new energy company in other states.</p> <p>Sale of energy from the JL complex to (fair energy transition) – reserve energy contract 2025 - 2040 in charge of the energy ministry – sell energy from the complex to give the coal chain time to adapt.</p> <p>Installation of ammonia-based desulphurizers – to reduce the SOX content in combustion gases – the company's president is in China for negotiations.</p> <p>UTLA – already with a useful life ending in 2035. The oldest plant started operating in 1963.</p> <p>Ash from burning coal (bottom Ash) - are buried today - heavy ash - they are developing a project to convert ash into micro silica</p> <p>Railroad – “Ferrovia Teresa Cristina” seeks to renew its concession – importance in transport for the region.</p> <p>Project within the UTLC to create the UTLD – 440MW – It already has a license, but is awaiting an energy auction.</p> <p>Project Construction in Santa Catarina – North – thermoelectric with natural gas.</p> <p>Road Show – of the Diamante complex – Obtaining Operational insurance</p> <p>Maintain long-term efficiency – maintenance is the focus.</p>				

Ventilation studies and efficiency – UTLC cooling tower – Seeking to improve thermal exchange in the towers.

10/18/21 – Buyer Grupo Diamante (FRAN Capital Fund controls Diamante Holding) – transition year

Thermal efficiency - DTO, CEUT Commercialization - UTLs is individual.

2022 – Consolidation of the separation between the previous and current companies - Diamante operating alone.

2023 – Starting the company's expansion – Partnership (joint venture) with NEBRAS Power (international energy investment company and subsidiary of QATAR Electric and water company).

Changes in environmental issues.

Customer is "ONS" (National Operator of the Brazilian Electric System).

5 billion reais and 21,000 employees in the coal chain

There is environmental liability

LAWS:

14,299/05/01/2022 - Fair Electric Transition Law – enacted in 2022 – the law provides for the change from the use of coal to natural gas, preserving employees in the supply chain.

Law 18330 – State of Santa Catarina – State fair energy transition policy.

Management review:

Minutes of critical analysis – carried out on 29/Mar/23 – No. ATA-SEST-DTO-DI-TECHNICAL OPERATIONAL BOARD DIAMANTE_0001/23.

Previous review:

Actions defined for the 9k standard were concluded and for the SGI (internal training for the use of the SE suite) concluded.

Changes that may affect the GIS – STRATEGIC PLANNING REVIEW 2023; STRATEGIC OBJECTIVES 2023; ACQUISITION OF NEW PROJECTS; FAIR ENERGY TRANSITION POLICY; NEW TEAM OF INTERNAL AUDITORS; New representatives of the systems.

Changes in Relevant Internal and External Issues - ANEEL Authorizing Resolution No. 12 138 of June 14, 2022 and ANEEL Normative Resolution No. 1016 of 04 19 2022.

Indicators: CTJL's net efficiency had a target of 30.20% and as it reached 31.68, the new target of 31% was adopted and until the time of analysis by the Management (Feb/23) the result is 33.05% .

Performance and future projects described in the minutes.

Nonconformities and Corrective Actions - RNC.000001/22 and RNC.000008/22.

External audit: The external audit demonstrated the effectiveness of the SIG with the renewal of Certificates ISO 9k, 14k and 45k, as well as maintaining the ISO 50k Certification.

Other mandatory elements are present.

Normative Procedure PN SG-DGE 0003 - revision 02.

SIG (integrated management system) management review – carried out on 03/29/2023 – Termeletrica Diamante –

Evidence registered within the SE suite -n° ATA-SEST-DTO-DI-Diretoria-0001/2023.

Minutes have in their structure the elements of the norm as an index.

Analysis of Past Actions – There was no element of the 50001 standard for verification.

- 9k improvement

- Training in SE Suite

Changes that may affect the GIS – Energy transition policy and new projects

ANEEL Resolution 12,138 – release to operate with new powers – from 33.65% to 33.71% of energy efficiency. Not yet effective for 2023.

Resolution 1016/2022 - Energy efficiency - there was no change in the calculation.

Mission, Vision, Values, Policy – were in line with those of the Diamante group.

Change management plan – There are still changes taking place – new energy trading, IT, communications, Board and legal sectors.

IUS natura software agreement for legal requirements.

Just Energy Transition – 14,299 from 2021 – forecast to end coal-fired electric power generation by 2040.

Risks and business opportunity - Preparation of matrix by those responsible

Objectives and targets: 50001: 2022 completed and 2023 by February.

Energy efficiency – 2022 = 31.68% and 2023 = 33.05% (OVERALL) – Individually with target achieved and 2023 still in the beginning but with good results.

> Stakeholder communication – focus on 14001 and 50001

> Energy goals: (2022)

Net efficiency - target of 30.20% - in 2021 the Complex reached 30.64%

UTLA1 – reached 25.65% (on target)

UTLA2 – reached 29.77%. (on target)

UTLB and UTLC – reached the target.

> Performance compliance with legal requirements – RG-GE-DGE-0004 – revision 00.

ANEEL's normative and authorizing resolutions – all requirements are being met – In August 2023: 2258 items met for the 4 ISO standards. There are still 6 topics to be evaluated.

> Future projects:

Management program to increase the energy efficiency of the CTJL plants – a program with actions aimed at improving efficiency through maintenance + operation.

E.g.: UTLC - Low pressure heater retubing 4

UTLA - Coal yard drainage improvement project

UTLB - general maintenance (revision of units) - 2023/2024.

> Audit results: Minutes of the meeting have a table indicating the results of the integrated audits with the nonconformities pointed out for each standard.

50K – RNC 0001/22 Non-compliance in the presentation of uncombusted grain size analysis data – CEUT area. It was dealt with in the company's corrective action system.

50k - RNC 0008/22 - Calibration due date - coal process granulometry sieve.

Addressed in the company's corrective action system.

> Corrective and preventive actions: Actions on nonconformities were analyzed.

The management review serves the purpose and is efficient.

5.1 Leadership and commitment

It was observed that the company's Management participates in the management system processes, properly presenting the analysis of the context where the biggest change (threat/opportunity) is the possibility of purchasing the thermoelectric complex.

It has demonstrated leadership and commitment to continuous improvement of its energy performance and the effectiveness of the SGE.

Process considered Conform

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	07/08/2023	Sistema de Gestão de Energia (Energy Management System)	ISO 50001:2018	Adilson Machado – Eng. UTLA operation Ariel Brambilla – Engenheiro de utilidades and representative of 50k. Antonio Baeta – Auditor Observador.

Notes

SGE:

Verification of the data contained in the CR:

* Annual Energy Consumption from all energy sources (e.g. Electricity, Diesel, Gasoline, LPG, CNG, Coal, Furnace oil, Bio mass and renewable sources) in kWh. - 1,069,248,550 (average consumption of the last 5 years of the complex).

* No. of Energy Sources – 4 (Coal, Diesel Oil, Fuel Oil and Electricity)

* No. of Significant Energy Uses (SEUs) - 1 - (Fossil fuel).

Energy Type - % of a.e.c:

- Fossil Fuel - (Coal (1,027,319,640 kwh) + Fuel Oil ((Fuel Oil) 1,232,700kwh)) + Diesel Oil (3,893,640 kwh)) =

1,032,446,060 kwh = 96.56%

- Electricity - 36,802.49 MWh - 3.44%

Processes - Process of operation of thermoelectric plants:

Coal supply – Receives through railways - analyzes and prepares the best Blend

It delivers the Blend to a boiler that, through burning, activates the turbines and generates electricity.

The company (pre-operation) and ONS consolidate the daily Operational Program and at the end of the day define the electricity supply. (eg UTLB will supply 220MW on 07/Aug/2023 for the whole day).

4 Context of the organization

4.1 Understanding the organization and its context

PN-SG-DGE-0001 - Business planning - revision 03.

4.2 Understanding stakeholder needs and expectations

Normative procedure – PN-SG-DGE-0018 – revision 01 – Needs and Expectations of the interested parties.

Define stakeholders and their relationships.

4.3 Determining the scope of the energy management system

Validation of certification scope:

- The proposed scope was as follows:

ELECTRIC POWER GENERATION SERVICES IN THE JORGE LACERDA THERMOELECTRIC COMPLEX

- The scope was considered valid since it clearly shows the main activity of the organization covered in the management system as well as the type of products / services involved in the site specific to the scope.

- Scope does not contain generic words that do not specify processes or products / services.

- There are no trademarks described in the scope.

- Does not contain normative references.

- No adjectives are used.

4.4 Energy management system

RI-DGE-0001 - Integrated Management System Manual - revision 03.

5.2 ENERGY POLICY

PO-DGE-0001 - Sustainable Management Policy - revision 00

This policy is integrated with ISO 9001, 14001 and 45001, and covers specific topics of ISO 50001 requirements, such as Design and Acquisition.

The policy is approved by senior management.

The policy is communicated through training, wallpapers and internal website.

5.3 Organizational roles, responsibilities and authorities

Diamante (Diamond in english) Management Organization Chart.

Eng. Ariel Brambilla - is the management system representative.

PN-SG-DGE-0002 – Papéis, responsabilidade e autoridades organizacionais – revisão 01

6.1 Actions to address risks and opportunities

Risk analysis worksheet called CTJL - RG-OP-CTJL-DGE-0002 - Operational Risk Analysis - revision 01

Broken down by Sector, Probability (Occurrence, Severity and Level) and Prevention Measures.

Ex.:

Thermal cycle – Loss of steam turbine efficiency (greater severity) – action: preventive maintenance on the turbine.

Fuel – Poor quality – Reduces lower and higher calorific value and increases ash content – Likely, Harmful and

Substantial – Control actions: Control of fuel quality and coal shielding and use of “online” analyzers.

Boiler – Loss of unburned fuel – control: Analysis of granulometry and non-combustion analysis in yield tests.

The main risk lies in the failure of the thermal cycle due to the loss of steam turbine efficiency.

RG-OP-CTJL-DGE-0003 - Energy Measurement Plan - Key Features CTJL - Revision 01 and RG-OP-CTJL-DGE-0001

– Key features.

Ex.:

Combustion monitoring – coal pipelines (granulometry) – method IT-UT-REJL-0020 – relevant variable: Maintenance of mills.

Monitoring of fossil fuels – Diesel oil meter – Control by supervisory system.

6.2 Objectives, energy targets and planning to achieve them

Objective: Optimize the economic performance of the plants

Net efficiency - 2022 target - 30.20% - the UTJL Complex (Diamante) reached 31.68% (end of 2022).

UTLA1 – target for 2022 - 25.50% - reached 25.65%

UTLA2 - individual target 30% - reached 29.77%.

UTLB and UTLC - 2022 target - 28.50% and 33.60%, reached 29.89% and 34.60%, respectively.

Net efficiency - 2023 target - 31% - data up to June/23 = 33.04% (better than target)

UTLA1 – 2023 target - 25% - so far 24.73% (operating few times)

UTLA2 – 2023 target - 29% - so far 30.78% (better than target)

UTLB and UTLC - 2023 target - 29% and 34%, reached 30% and 35.08% respectively.

6.3 Energy review

Normative procedure: PN-SG-DGE-0014 - Energy review and energy baseline - Rev 01

In general we have:

Input: Fossil fuel and Electricity

Output – electrical energy.

The energy review that considers significant uses is reviewed every 2 years.

The organization carried out an baseline covering the last 5 years (January 2018 to December 2022), considering energy use and consumption, as follows:

For example:

UTLA.

- Coal Consumption: 55,149.39 Tons/month (average of the last 5 years)

- Physical heat power (kcal/kg) - 3,688.86 kcal/kg

- Electricity consumption - 7,979.42 MWh average of the last 5 years)

UTLC:

- 69,538.32 liters of diesel oil - average of the last 5 years.

- Lower calorific value (LHV) - 3,638.63 kcal/kg

General:

- Fossil fuel accounts for 96.56% of overall consumption (UTLA - 23%, UTLB - 35.5%, UTLC - 38%).

Comparison of Uses and Consumptions for the Scope (fuel and electricity). Average of the last 5 years:

GENERAL (MWh)

UTLA Comb. 240.008 MWh – 96,78%

UTLB Comb. 369.454,70 MWh -

UTLC Comb. 394.341,01 MWh

UTLA E.E. 7979,42 MWh – 3,22%

UTLB E.E. 11.270,16 MWh

UTLC E.E. 17.552,91 MWh

TOTAL 1.069.248,55 – 100%

Method described in the procedure:

There is a module called energy review in the SE SUITE software which contains all energy use and consumption by area of the company.

Significant energy uses are: fossil fuel consumption and electrical energy for the plant's auxiliary services

In the "SE Suite" software, operational controls are presented (yield test, coal quality control and energy measurement plan which includes: - combustion monitoring (relevant variable: granulometry).

- Monitoring of fuels (moisture, ash, volatile matter).

Others

The prioritization of significant uses and consumption is carried out in the Risk - Energy Review module in SE Suite, taking into account the following criteria:

Importance greater than or equal to 7 (IM=7);

Severity equal to 3 (SV=3);

Stakeholders (PI) - Use is a substantiated concern, expressed by stakeholder communication;

Potential for Improvement (PM) - The use has the potential to improve energy performance.

Determining the Importance of Energy Use

The importance of use is determined based on the evaluation of 3 (three) factors: Magnitude, Severity and Frequency.

This relationship is expressed by the following formula: $IMP = MG + SV + F$,

Where:

MG – Magnitude;

SV – Severity;

F - Frequency

The Energy Review portal (inside the SE Suite) shows the use and source of energy, the process and significance of the source and those responsible for each area.

Important clarification:

In Brazil, this form of interpretation of efficiency in thermoelectric plants is usual – in percentage. A good example is Normative Resolution 1016/2022, which deals with the issue of efficiency for thermoelectric plants. This ratio can be easily converted to kcal/kWh by the following ratio - 1 kWh \cong 860 kcal. The ratio used uses the net energy generated (MWh) by the energy available in the fuel (MWh) in the period.

The net efficiency calculation formula used by the indicators is that stipulated by ANEEL Resolutions, as follows:

$\eta_{plant} = \text{Electric} / (\text{Sum of } i=1 \text{ to } n) (Q_{comb} \times PCI)$

Being that:

- Plant: net energy efficiency of the Plant [%];
- Eelectric: net electric energy produced by the plant, measured at the point of connection to the grid [MWh];
- Qcomb: Amount of fuel consumed [m³] or [ton]
- PCI: Average lower calorific value [MW.h/m³ or MW.h/t]

The equation shows that net energy efficiency is given by the ratio between the energy delivered to the system and all the energy fed into the boundary. The energy that enters the border is given by the sum of the energies of all the fuels used (coal, diesel oil and fuel oil).

The improvement in performance is observed by the greater use of fuel energy converted into a higher percentage of conversion efficiency. In other words, efficiency expresses the production of electricity by energy (fuel and electricity) used in the period.

In the action plans, regarding the correction of deviations, we have the following assumptions:

Variation greater than 2.5% (for less) – isolated action plan or consolidated action plan;

Variation greater than 5% (for less) – consolidated action plan.

Significant Uses: Eg:

Utilities (CEUT)

- Water treatment - Auxiliary Steam and electricity - not significant
- Fuel supply - fossil fuel, Coal receiving and handling building and laboratory - Electricity - Not significant
- Fuel oil heating - Steam - not significant

UTLC

Auxiliary systems - Electricity _significant (monitoring by measurement and monitoring plan)

Combustion – Fossil Fuel – Significant (Coal Quality Control, Yield Testing, Energy Measurement Plan, Operational Instructions).

6.4 Energy performance indicators

Net efficiency - 2022 target - 30.20% - the UTJL Complex (Diamante) reached 31.68% (end of 2022).

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UTLB and UTLC - 2022 target - 28.50% and 33.60%, reached 29.89% and 34.60%, respectively.

Net efficiency - 2023 target - 31% - data up to June/23 = 33.04% (better than target)

UTLA1 – 2023 target - 25% - so far 24.73% (little operation)

UTLA2 – 2023 target - 29% - so far 30.78% (better than target)

UTLB and UTLC - 2023 target - 29% and 34%, reached 30% and 35.08% respectively.

Auditor's comment: In Brazil, energy dispatch is determined by the ONS - National System Operator, and in order of merit, dispatching first, the hydroelectric plants. In addition, the ONS rarely determines that the Thermal Complex dispatches at 100% of its installed capacity, resulting in a lower performance of the Central.

6.5 Energy baseline

The baseline is reviewed annually as described below:

The baseline is also used to define indicator targets and is defined as the average of significant energy uses over the last 5 years. In other words, for the year 2023 it is defined by the weighted average of the net efficiency and consumption of auxiliaries presented between the years 2018 and 2022 (last 5 years). The baseline values for the year 2023 are:

Frontier / ScopeBaseline Net Efficiency [%]

UTLA123.10

UTLA228.63

UTLB	28.76
UTLC	33.61
CTJL	30.56

Border / ScopeBaseline Auxiliary consumption (mills, pumps, boiler ventilation system for example) [%]

UTLA1	11.02
UTLA2	9.48
UTLB	9.61
UTLC	11.33
CTJL	10.48

Presented the IT-OP-CTJL-DGE-0010 – revision 00 – Description of the calculation of standard performance of CTJL units – monitoring of the efficiency of the units.

6.6 Planning for energy data collection

The main risk is thermal cycle failure due to loss of steam turbine efficiency.

RG-OP-CTJL-DGE-0001 - Energy Measurement Plan - Main Characteristics CTJL - Revision 01

Ex.:

Combustion monitoring – coal pipelines (granulometry) – method IT-UT-CTJL-0020 - revision 00 – relevant variable:

Maintenance of mills.

Fossil fuel monitoring – Diesel oil meter – Continuous supervisory system control.

7 support

7.1 Resources

It was verified that the company has allocated and applied the necessary resources for the adequate maintenance of the management system, through the definition and application of monitoring of the significant characteristics for the energy performance and by the application of improvements in the processes as described throughout the notes of this report.

7.3 Awareness

It occurs through company-wide disclosures through corporate panels and TVs.

7.4 Communication

Procedure PN-SG-DGE-0005 - Communication - revision 01

The organization defined that the communication on energy efficiency is made at its discretion.

Item 5.2.5 defines that interested parties may request information through defined communication channels (e-mail and telephones).

CCEE WebSite – (Electric Energy Trading Chamber) - Presents a report on the energy efficiency of the various thermoelectric plants benefiting from the CDE (energy development account), including “Diamante”.

7.5 Documented information

RI-DGE-0001 - Integrated Management System Manual - MSIG - revision 03.

PN-SG-DGE-0006 - Management of normative documentation - revision 01

Documents are properly managed in an online platform (SE Suite)

The records required by the standard and those that manage the SGE are duly implemented and managed.

The SE suite system was presented throughout the audit.

9 Performance evaluation

9.1 Monitoring, measurement, analysis and evaluation of energy performance and EMS

9.1.1 General

The organization has implemented a monitoring plan for the relevant variables, in the document:

RG-OP-CTJL-DGE-0003 - Energy Monitoring Plan - revision 01

Parameters are monitored, measured and analyzed at the defined interval and records are kept.

Eg: Gross Yield – Collection point is the EtaPRO or yield test (UTLA) – monthly frequency – Analysis parameters

(boiler yield; thermal cycle yield; unit yield).

9.1.2 Assessment of compliance with legal requirements and other requirements

The system sends monthly update information on possible legislation applicable to the system and the representative analyzes it and, if necessary, contacts the SIG committee.

A major preparatory review for internal audit takes place annually.

Legal requirements are monitored by the Management Representative.

They currently use the CAL worksheet of the IUS Natura system – The system was implemented in Jul/22 and the transition is finalizing.

The system presents a dashboard with quantitative graphs of compliance with legal requirements classified as applicable, not applicable, met and not met – currently 17% are still being evaluated considering the GIS (9,14,45,50).

The system sends monthly update information on possible legislation applicable to the system and the representative analyzes it and, if necessary, contacts the SIG committee.

A major preparatory review for internal audit takes place annually.

Specifically for the energy efficiency management system, there is no legislation that defines any efficiency value for the company's activity. The target of 33.65% refers to the subsidy program to refund the amount of mineral coal used to generate energy.

Presented procedures:

Procedure RG-GE-DGE-0004 - legal requirements 50001 - revision 01

Procedure PN-SG-DGE-0009 - Legal and other requirements - Revision 02

9.2 Internal Audit

The frequency of internal audits is annual.

Procedure PN-DGE-0007 – SIG Internal Audits – revision 02

Internal audit report (form RG-GE-DGE-0012) – carried out between 05/29/23 and 06/02/23 – with internal and external auditors (subcontractors) for QHSE, for standard 50001 auditors form only internal auditors .

Auditors: Adilson, Thiago Thomé, Ariel, Rui das Neves, Gilberto Alves Pinter – certificates (BV) for internal auditors were presented – adequate.

All processes were audited and there is a record of compliance in the report.

Nonconformities: 02

- Table of summary of the standard in invalid revision and with outdated targets.

- No evidence of assessment of energy efficiency requirements in the service contract in the overhaul of boiler unit 3.

Defined corrective actions:

RNC 12/23 – (valid for all standards) – Lack of physical update routine.

RNC 19/23 – It is not the responsibility of the commercial to take care of this indicator.

The process was considered adequate, compliant and effective.

9.3 Management Review

The frequency of critical analyzes of the management system is annual.

Minutes of critical analysis – carried out on 29/Mar/23 – No. ATA-SEST-DTO-DI-TECHNICAL DIRECTORY OPERATIONAL DIAMANTE_0001/23.

Previous review:

Actions defined for the 9k standard were concluded and for the SGI (internal training for the use of the SE suite) completed.

Changes that may affect the GIS – STRATEGIC PLANNING REVIEW 2023; STRATEGIC OBJECTIVES 2023; ACQUISITION OF NEW PROJECTS; FAIR ENERGY TRANSITION POLICY; NEW TEAM OF INTERNAL AUDITORS;

New representatives of the systems.

Changes in Relevant Internal and External Issues - ANEEL Authorizing Resolution No. 12 138 of June 14, 2022 and ANEEL Normative Resolution No. 1016 OF 04 19 2022.

Indicators: CTJL's net efficiency had a target of 30.20% and as it reached 31.68, the new target of 31% was adopted and until the time of analysis by the Management (Feb/23) the result is 33.05% .

Performance and future projects described in the minutes.

Nonconformities and Corrective Actions - RNC.000001/22 and RNC.000008/22.

External audit: The external audit demonstrated the effectiveness of the SIG with the renewal of Certificates

ISO 9k, 14k and 45k, as well as maintaining the ISO 50k Certification.

Other mandatory elements are present.

2022:

SIG (integrated management system) Critical analysis – carried out on 08/04/22 – Jorge Lacerda thermoelectric complex.

Minutes LC-0002/2022.

Analysis of Past Actions – There was no element of the 50001 standard for verification.

> Changes that affect the GIS (9/14/18/EnMS):

Changes – main focus is the purchase of the plant and its adjustments and review of the strategic planning.

Mission, Vision, Values, Policy – were in line with those of the Diamante group.

Change management plan – creation of the internal GIS committee to monitor the transition.

Purchase of the SE Suite to manage the GIS.

IUS natura software agreement for legal requirements.

Others.

Mandatory elements are presented.

The process was considered adequate, compliant and effective.

10 Improvement

10.1 Non-compliance and corrective action

PN-SG-DGE-0004 - Nonconformities, corrective and preventive action and nonconforming product - Rev 03

The company uses the SE Suite system to register non-conformities (RNC) or the IUS Natura system for legal requirements.

RNC 01/22 – Presentation and analysis of granulometry and non-combustion data – last issued not related to internal audit and directly related to 50k.

RNC 10/23 – Coal ovens with expired calibration – registered as 9k but affects 50k as well. Cause: Inadequate system configuration – Implemented actions.

10.2 Continuous Improvement.

The systematic is the same for the 09/14/45 and 50k patterns.

PN-SG-DGE-0004 - Nonconformities, corrective and preventive action and nonconforming product - Rev 03

The actions are controlled by the SE Suite Diamante system.

OM 18/23 – Drainage of the UTLA coal yard – project preparation should end in 2023

OM 19/23 – Moisture Analyzer for UTLA 3 & 4 – forecast for 2024.

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	08/08/2023	Central de Utilidades (Utilities)	ISO 50001:2018	Ariel Brambilla – Eng. Utilities and RD of SGE Thuany Santos – Tech. In Utilities Daniel Rolim – Tech. utilities Eduardo Felix – Tech. utilities Adilson Machado – Eng. UTLA Operation
Notes				
Utilities - CEUT				
It is responsible for contract management and the quality of the supply of coal and diesel oil.				
Diesel Controls: NF; FISPQ; Inventory control;				
Coal Control: Coal; Quality control; Distribution control; Inventory control				
Process:				
The process is responsible for Coal (Fuel) Management, and performs incoming analysis (sample analysis), Coal Mixing, Granulometric Analysis in Coal Mills, Analysis of Non-Fuel Coal in the Boiler.				
Flowchart in Procedure PR-DGE-0006 - Fuel supply process - revision 00				
IT-UT-CTJL-DGE-0018 - Weighing, receiving and storage of coal - Revision 00.				
Analysis of Coal Received				
Quality				
To manage coal quality, the organization uses the software SIGECAM – Quality Control Journal.				
Among the 7 Suppliers (4 are large suppliers): Ex.:				
Presented the SIGECAM System which includes for the month of August/23:				
Metropolitana (provision for the estimated year: 57,385 Tons) - The sum of all suppliers represent 208,885 Tons.				
Annual target is 2,400,000 Tons of coal/year 2023.				
Contract No. REJL.NAJL.21.16728 (valid until 2027), establishes in Annex A, the Coal specifications, such as:				
- Higher calorific value (HHV): 4,500 kcal/kg (according to ASTM D 5865)				
- Gray: Specified - 43% (max: 44%) per ASTM D 7582				
- Volatile material content: minimum of 18% (if other conditions are favorable) according to ASTM D 7582.				
- Moisture content 6% (normal with a limit of 10%)				
- Granulometry - above 1 inch - maximum of 10% and below 0.6mm must be a maximum of 15%.				
- Sulfur content - between 2.3 and 1.5% - according to ASTM D 4239.				
Carboniferous Rio Deserto (estimated year supply: 627,000 tons)				
Contract No. REJL.NAJL.21.16729, establishes in Annex A, the specifications of Coal.				
Coal input analysis sampling: Monitoring by AED (Shipment and Unloading Tracking).				
Carbonífera Catarinense – received on 07/10/23 – Lot 281; 282;283.				
Shipping (supplier details)				
Total Humidity (%) - 6.93%				
Gray (%) - 42.11%				
Volatile Matter (%) - 21.49%				
Superior calorific value (HHV) (%) – 4617 kcal/kg				
Diamond Analysis				
Total Humidity (%) - 10.70%				
Gray (%) - 38.94%				
Volatile Matter (%) – 20.48%				
Higher calorific value (HHV) (%) – 4789 kcal/kg				

Laec – Contracted laboratory analysis.

Total Humidity (%) - 12.75%

Gray (%) - 42.05%

Volatile Matter (%) – 25.73%

Superior calorific value (HHV) (%) – 4511 kcal/kg

The supplier's analysis takes place at the end of the month based on the results of the analysis of deliveries in the month – In the month of July/23, Catarinense would be subject to fines based on the Humidity criterion.

Supplier "Rio Deserto" (Provision for estimated year: 627,000 tons) – Wet deliveries occurred – also subject to contractual fines.

Supplier "Metropolitana" - (Provision for estimated year: 627,000 tons) – parameters within the contracted ones.

Coal mix (called Apensamento)

In this case, there is a mixture (Blend) of coal -

Analysis report No. 3703/23 presented - Sample: BEL27323 - Carbonifera Belluno - 04/Aug/23- Volatile matter below 18%.

Mixed lots metropolitan MTR293/23 (analysis report n°3707/23 which was with volatile material in 18.83%) - combined has result of 18.40%. Blend Approved.

E.g.: NCI (internal non-compliance – South Brasil supplier – contract: REJL.NAJL.22.18858 – Coal supply CE 4500 – Moisture content fine for July and August 2022 deliveries.

Diamante -SCO internal system (fuel system) presented.

- Fuel Report (Coal supplied at the plant) - Month of July/23

UTLA - consumption and quality - Machine B3 - 26,361.60 Tons - Specific consumption of the machine 0.622 T/Mwh)

- the index is within expectations.

- Monthly Fuel Oil Report - July/23

UTLA - unit B3 - consumed 31,900.00 Liters and units 1 and 2 consumed 62,500.00 Liters.

Granulometry Analysis in Coal Mills:

UTLB - Report from mill 2 - Unit 5 - test on 07/26/23

% passed and % retained on the 50 mesh sieve: 2.41 (retained) and 97.59% (passed) on average.

Results outside the reference parameters - Actions taken by the Plant.

Calibration:

Railway scale - Toledo - serial number: 10770000589 - certificate P23/42666-1 - of 18/Jul/23 - scale approved.

Greenhouse 03 - coal laboratory - certificate 2022-17586 of 14/jun/23 - use of standard thermometer - validity 2 years - Approved.

Greenhouse 04 – EG027729 – Calibration Certificate n° 2022-17589 – revision 00 – date 04/03/22 – Validity 2 years – Approved.

Sartorius Scale - Active EG100777 - Certificate No. M31488/2022 - Calibrated on 06/14/22 - Valid for 2 years.

"E" sieve set – 4 sieves:

NS: 112504600 - Mesh 150 - OS 2021-16069 - calibration on 08/01/22 - validity 2 years

NS: 144915473 - Mesh 106 - OS 2021-16068 - Calibration on 08/01/22 - Validity for 2 years.

NS: 144714531 - Mesh 75 - OS 2021-16067 - Calibration on 08/01/22 - Validity for 2 years.

NS: 144714124 - Mesh 300 - OS 2021-16071 - Calibration on 07/22/22 - Validity for 2 years.

Sieves set F:

Mesh of 150 Microns - Mesh 150 - M711329 - Calibrated on 11/Jul/23 - Validity 2 years - Approved.

LECO TGA 701 analyzer - calibration performed with LECO standard coal - Validity: 20/apr/2024 - lot 21258.

Sulfur analyzer - TRUSPEC S - calibrated on 23/Jun/23 - calibration performed with batch 1001 standard - validity

21/Apr/2030

AC600 calorimeter analyzer - Calorimeter calibrated by the benzoic acid standard - batch 1001 - expiration date:

25/feb/2024.

Process risks:

The report of important topics of the ETAPRO process was presented, where there are alerts of changes in variables that can affect energy efficiency.

E.g.: Alert on 21/Jul/23 – net efficiency chart for unit 3 and 4 (UTLA) – efficiency drop of 3% on average – data show that there was a higher ash rate and consequently there was a loss of power calorific (coal supplied with lower calorific value) – isolated event – no corrective action required.

Site visit:

Entrance of the train loaded with coal – weighing on the railway scale – Unloading using a vibrator – The sampling process begins on the conveyor belt where 60 kg bags are formed.

Verified: Calibrated scales, Kiln thermometers, Coal analysis equipment, Calibration standards, access to analysis systems.

Ex.: Apensado – 4/aug – Metropolitana BEL27223 and CAT 32823 – wagon 19 and 17 – variation in volatile matter and granulometry.

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	08/08/2023	Engenharia e Manutenção (Engineering and Maintenance)	ISO 50001:2018	Murilo Camisão – Engineering coordinator. André Pasqual – Maintenance and Engineering Manager. Daniel Poletti – Maintenance Engineer. Leandro da Rosa – Maintenance engineer. Andre Oliveira – Maintenance engineer Gregori Daros – Maintenance engineer

Notes

Engineering and Maintenance.

Engineering

The 50k1 management system is heavily involved in new projects and equipment changes

Ex.:

1 - Contract CTJL 23.4873 for the modernization (retrofit) of the UTLC synchronism panel (machine "phase and voltage" synchronism with the national system).

It has not yet been installed (end forecast for August/23) but there is a forecast for greater operational gains.

Proposal informs that energy efficiency will be considered in the evaluation of the project.

2 – Contract UTLA.NAJL.20.11505 – Voltage regulator – modernization of UTLA units 3 and 4 – implemented in 2022 – highly critical equipment for the process – improvement to avoid failures in the process of dispatching electricity to the Brazilian system.

General actions:

- Exchange of fluorescent lamps for LED – Total installed (common - 30% and LED – 70%) forecast gain of 566 KWh – exchanges occur when burns occur.
- Devices to turn off air conditioners at certain times of the day.

Maintenance

Organization implemented predictive, preventive and corrective maintenance.

Maintenance Plans and the necessary activities carried out in the Annual Maintenance and Routine Stops were verified.

Maintenance is programmed, planned and executed, according to the SAU Software (Plant Monitoring System).

Ex.:

Thermographic inspection of boiler thermal insulation and accessories – UTLB unit 6.

OS 2023-11107 - JL-TERM

May 18 and 19, 2023 – around 70 points of thermal loss identified that will have to be worked on during the general overhaul of unit 6 (general shutdown) – It should take place between September and November (90 days).

Ex.:

Analysis of Steam Traps VKP 42 Plus Ex. – Report evaluated 44 traps and identified that 9 are leaking steam (loss of effectiveness). June/23 report.

Ex.: Preventive - OS 2023-12511 - Mill 1 - UTLC

Supplementary maintenance report - PMP (preventive maintenance plan) OP hours (operation) MCC (coal mill) 01 - April/23 - intervention of 6000 hours - completed on 08/May/23 -

The result of this maintenance is the stability of the coal granulometry, improving the efficiency of burning.

The granulometry analysis was verified, before and after maintenance:

before intervention - 12/may/23 = 79 microns
then maintenance 21/Jul/23 = 82.4 microns.

Eg: Preventive - OS 2023 27611 - Coal mill unit 1 - unit 5 - UTLB

Supplementary maintenance report - PMP (preventive maintenance plan) OP hours (operation) MCC (coal mill) 01 - May/23 - intervention of 6000 hours - completed on Jun/28/23

The result of this maintenance is the stability of the coal granulometry, improving the efficiency of burning.

The granulometry analysis was verified, before and after maintenance:

before intervention 06/jun/23 = 87.9 microns
later on 21/Jul/23 granulometry = 92.3 microns.

Ex.:

PLA-PG-003/2022 – Management plan for expansion/maintenance of CTJL power plants.

- Replacement of turbine rotors
- Retubing of high pressure heaters
- Repiping of the low pressure heater of the BP4 thermal cycle – UTLC report – OS 1123 of 11/Apr/23 – Replacement of tubes, insulation, replacement of the outer shell and others. Hydrostatic tests and others.
- Study for changing the fan in one of the UTLC towers.

Ex.:

Chromatographic and Physical-Chemical Analysis of Transformer Oil – UTLA – LACTEC Laboratory 01832/23.

Trafo MT3 - 79 MVA – 44,000 Liters – collection in Jun/23.

result: Chromatography - Normal (pass). Physico-chemical: Normal (approved)

Process Risk:

Old equipment and manufacturers no longer make them – parts are not off-the-shelf.

Electric meters - output of UTJL products (Diamond):

ION 8650 Meter – Multimeter.

Introduced SX dashboard – system that shows a value at 5-minute intervals of the actual situation of dispatch energy meters.

Eg: UTLB

UTLB GT5 MB – 111.02 MW – calibration certificate 2021-22514 – rev00 of 22/feb/21 – validity: 4 years.

UTLB GT5 ML – 102.23 MW – calibration certificate 2021-22515 – rev00 of 22/feb/21 – validity: 4 years.

UTLB GT6 MB – 110.64 MW – calibration certificate 2021-22519 – rev00 of 22/feb/21 – validity: 4 years.

UTLB GT6 ML – 101.83 MW – calibration certificate 2021-22520 – rev00 of 22/feb/21 – validity: 4 years.

Same information was presented for UTLA – machines 3 and 4 - calibrated gauges.

The “Máximo” system (management SW) is presented, which is used to control equipment calibration dates.

Single-line diagram presented - UTLB – DOP – 003 – position of meters in the electrical diagram of the plant.

Field sampling:

Flow meter - Feed water flow - Certificate 2020-16643 - Validity: 4 years

Pressure Gauge - Boiler inlet water pressure - Certificate 2020-16646 - Val.: 4 years

Pressure gauge – Diesel oil pressure – PT-84 Certificate – 2023-1219 Certificate – Val.: 1 year.

Flow Meter – Boiler oil inlet – preventive maintenance checks.

Upkeep maintenance:

Mill C - UTLA unit 4 - Defective thermocouple - OS 2023-31423/1 assembly of scaffolding and 2023-30788/1

execution of thermocouple replacement.

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	09/08/2023	Operação da Usina - UTLA (Power Plant A)	ISO 50001:2018	<p>Adilson Machado – Eng. UTLA operation</p> <p>Julio Renato Ribeiro Albien – UTLA Manager</p> <p>Urias Souza Filho – Head of the business hours shift.</p> <p>Ariel Brambilla – Utilities Engineer and RD at 50k</p> <p>Antonio Baeta – Observer Auditor.</p> <p>Units 3 and 4 control room</p> <p>Kleiner Idalêncio – Operator 3</p> <p>Thiago Thomé – Operator 3</p> <p>Jorge Quadra – Shift manager</p> <p>Aguinaldo Tavares – Operator 3</p>
Notes				
<p>UTLA</p> <p>Shift 1 - Group D – 07:30 to 15:30. – Audit time.</p> <p>Shift 2 – Group C – 15:30 to 23:30.</p> <p>Shift 3 – Group B – 23:30 to 07:30.</p> <p>There is a rotation of 6 shifts and 4 days off.</p> <p>Thermal Power Plant, with 4 turbogenerators, as follows:</p> <p>2 x 50 MWh(nominal) – Manufacturer: MAN (UTLA 1, Units 1 and 2) – the company re-declared new powers to be compatible with reality – declared power: 40 MWh</p> <p>2 x 66 MWh (nominal) – Manufacturer: Ansaldo (UTLA 2, UNITS 3 and 4) – the company re-declared new powers to be compatible with reality – declared power: 55 MWh</p> <p>This pair of generators is fed by two boilers, as follows:</p> <p>UTLA1 boiler: Units 1 and 2.</p> <p>IT-OP-UTLA-DGE-0001 - General Considerations for Boilers - Revision 03</p> <p>Superheated steam temperature: 515°C</p> <p>Superheated steam at pressure: 92 kgf/cm2</p> <p>Design pressure: 106 Kg/cm2</p> <p>Steam production at nominal load: 165 Tons/hour</p> <p>UTLA2 boiler: Units 3 and 4.</p> <p>IT-OP-UTLA-DGE-0126 - General Considerations for Boilers - Revision 02</p> <p>Nominal capacity: 208 ton/hour</p> <p>Superheated steam temperature: 540°C</p> <p>Superheated steam under pressure: 147 kgf/cm2</p> <p>Energy efficiency: Monthly ASME PTC 4.1 and ASME PTC 6.1 tests are performed – Last test performed on machine 4. Thermal and boiler cycle input data and fuel data are entered.</p> <p>Ex.:</p> <p>Machine performance/yield test 4 - carried out on 20/Jul/23 - presented in Excel spreadsheet with process flow design - - 09:00 to 11:00hs.</p> <p>Thermal cycle performance - 37.25%</p> <p>Boiler efficiency - 86.91%</p> <p>Gross efficiency of unit 4 – 32.37%</p>				

Unit 4 net income – 30.07%

The UTLA2 target (units 3 and 4) – 29%

Energy efficiency: Monthly ASME PTC 4.1 and ASME PTC 6.1 tests are performed – Last test performed on machine

3. Thermal and boiler cycle input data and fuel data are entered.

Ex.:

Machine 3 performance/yield test - carried out on 28/Jun/23 - presented in Excel spreadsheet with process flow design - 9:00 am to 11:00 am.

Thermal cycle performance - 38.53%

Boiler efficiency - 84.42%

Gross efficiency of unit 3 – 32.53%

Unit 3 net income – 29.97%

The UTLA2 target (units 3 and 4) – 29%

Implemented improvements:

In 2022, the improvement was implemented in unit 4 (1st semester) and unit 3 (2nd semester).

Low Pressure Heaters – Level controls were analogue and became digital – by stabilizing water levels, heat exchanges occur more efficiently.

New engineering project: Drainage of the coal yard: Started hiring the company to prepare the engineering project, to raise the yard's quota and adjust the drainage to keep the coal drier. Efficiency improvement expected by up to 1% in the year.

Use of ETAPro software – Adopted efficiency management software that works in parallel with the supervisory system, acquiring data and generating a daily income report called "controllable losses", where significant losses are highlighted for analysis and team action

Preventive maintenance:

Ex.: Maintenance at the coal mill – Unit 4 – OS 2023-10002 – 22/Feb/23 – Sensor B of the primary air inlet temperature was damaged – repair performed.

Maintenance plan presented - described in the "Maximum" system - verified existence of approximately 80 verification topics for preventive maintenance.

Ex.: OS 2023-1249 – MPP circulating water – Unit 3 – 40 verification items – in progress on the day of the audit.

Corrective maintenance:

Ex.: Feb/27/23 – Boiler repair 4 – Boiler hole identified. Water wall tubes 41 and 42. Damage caused by hydrogen.

Repairs carried out by welding and hydrostatic tests carried out for release.

Monitoring:

Multimeter U4 - OS 2023-6939 – Internal calibration by comparison – Val.: 3 years - Measures the generator output (active power, current and voltage).

Multimeter U3 - OS 2023-6940 - Internal calibration by comparison – Val.: 3 years - Measures the generator output (active power, current and voltage).

Single-line diagram - Billing measurement - UTLA - OPEUTLA0002 - revision 03.

Control room

Control desk and vertical alarm panel checked.

Security cameras checked - in normal working order

The supervisory control of the thermal cycle of Unit 4 was verified

- Dispatching 48.5MWh

- Feed water flow - 175 Ton/h

- Flow rate of superheated steam – 174 Ton/h

- Superheated steam pressure - 137.2 Kgf/cm²

Checked the Boiler Screen where the net yield of the unit calculated by the supervisory board is verified - Online:

Presented B4 net yield of 31.23% with last hour average of 28.95%

"Unit losses" screen checked – they show online data on the variation of operating parameters with an impact on efficiency.

Operation alarms verified – 09/aug/23 – Absence of mill flame on coal position 1 - side B – normalized in 60 seconds.

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	09/08/2023	Operação da Usina - UTLB (Power Plant B)	ISO 50001:2018	Rui César das Neves – HC Shift Manager Fábio Kleveston – Operation Engineer Nelson Hartman Jr. – Plant Manager Ariel Brambilla – Utilities Engineer and RD at 50k Antonio M Baeta – Observer Auditor

Notes

UTLB

Shifts

Shift 1 – Group D – 07:30 to 15:30. – Audit time.

Shift 2 – Group C – 15:30 to 23:30. – Audit time.

Shift 3 – Group B – 23:30 to 07:30.

There is a rotation of 6 shifts and 4 days off.

Thermal Power Plant, with 2 turbogenerators, as follows:

2 x 110 MWh (nominal) – Manufacturer: SCODA (UTLB - Units 5 and 6) – the company re-declared new powers to be compatible with reality.

This pair of generators is fed by two boilers, as follows:

UTLB boiler: Units 5 and 6.

IT-OP-UTLB-DGE-0001 - Water and steam system - Revision 00

Nominal capacity: 395 ton/hour

Superheated steam temperature: 510 °C – turbine inlet

Superheated steam under pressure: 110 kgf/cm²

Energy efficiency:

Use of EtaPRO Efficiency Control Software – used for yield monitoring, including Thermodynamic Modeling.

Checking the system with data on efficiency – data from the last 120 days – efficiency was hovering at 28% and after the end of May it was at efficiency close to 29.7%.

Ex.: Relatório de 09/ago/2023 – “Relatório de perdas controláveis” - período de 07:30hs de 08/ago a 07:30 hs de 09/ago.

Data: 6/ago/23 7:30 - Relatório de Perdas Controláveis - Início: 6/8/23 7:30

Unidade:	5	Fim:	7/8/23 7:30		
Perdas Controláveis	Valor Atual	Projeto	Meta		
	.....Valor	.....Valor	ΔHR (kcal/kWh)	.....Valor	
ΔHR (kcal/kWh)					
Pressão vapor entrada					
turbina (barg)	109,2	110,0	1,45	110,0	
1,45					
Temperatura vapor SH (°C)	517,5	515,0	-1,94	510,0	-5,82
Temperatura vapor RH quente (°C)	511,8	515,0	2,44	510,0	-1,42
Pressão condensador (bara)	0,041	0,050	-1,56	0,1	-5,66
Vazão atemperação RH (kg/h)	8,0	21,6	-19,31	8,6	-0,79

Temperatura de água de alimentação (°C)	.....145,1	153,5	9,33	.....	..... 153,5
					9,33
Temperatura dos gases saídas Aq3 (°C)	.....151,6	159,4	-5,24	....	..... 158,8
					-4,85

Average Daily Efficiency - 29.73% - was below target 0.07% - No need for actions.

Verified data from EtaPRO on the day of the audit - unit 6: Boiler Efficiency – Heat losses.

Indicates that the boiler efficiency (PCS 87.5%) and (PCI 92.5%) does not deviate from the defined target.

Verified Management programs to increase/maintain efficiency - PLA PG-003/22 - Revision of UTLB units 5 and 6:

General boiler maintenance – tube replacement, thickness measurement, Spring support adjustments in high energy networks, others.

General maintenance of the turbines – Replacement of the first turbine blade.

Replacement of diesel oil burners (starter oil).

Measuring the thickness of the condenser.

Others.

Expectation to maintain energy efficiency values.

Indicators:

UTLB net efficiency – SE suite system.

Target of 29% - 2023.

- January – 28.77%

- February - N.A. - No operation

- March - N.A. - No operation

- April – Better than target

- May – Better than target

- June – Better than target – 30.34%

- July – Better than target – 29.67%

Corrective maintenance:

OS 2023-7453 – Recirculation pump – Taproge 1 System – Complementary maintenance report – carried out between Jan and March/23.

Preventive maintenance:

OS 2023-26173 PMP Hours OP - MCC Coal Mill 2 – carried out on May 24, 2023 – Preventive 6000 hours – Inversion of the mill roll.

Control room

Shift C – entry at 3:30 pm.

Igor Ignácio da Silva – Operator 3

Jailson Fernandes- Shift Manager

Supervisory control – SCADA base.

Control desk and vertical alarm panel checked.

Security cameras checked - in normal working order

Checked Air and Gas System - Boiler SH Pressure 109.7 Kg/cm²

The supervisory control of the thermal cycle of Unit 5 was verified

- Dispatching 110 MWh

- Feed water flow - 329 Ton/h

- Flow rate of superheated steam – 334 Ton/h

- Superheated steam pressure – 110 Kgf/cm2

Checked the Boiler Screen where the net yield of the unit is found - Online:

Shown net yield 29.7%.

Verified the operation alarms:

– 25/Apr/23 – Area operator noticed vibration in the fan bearing – Preventive maintenance requested – Alarm originated in preventive maintenance.

- UTLB – unit 5 – 07/mar/22 – 08:48 – Forced partial restriction due to forced shutdown of fan 2 which blocked due to loss of temperature information in the bearing – unavailability of 51 MWh – for 1 hour and 2 minutes in this condition. Maintenance activated.

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	10/08/2023	Suprimentos (Procurement)	ISO 50001:2018	Glauco Boppre Rodrigues – Purchasing coordinator. Devaldo Pollo – Purchasing Analyst Igor Mannes – Guesser – Purchasing Analyst Ariel Brambilla – Utilities Engineer and Representative of 50k Antonio M Baeta – Observer auditor
Notes				
<p>Suprimentos (Procurement)</p> <p>Process:</p> <p>Entry: Purchase request via the system</p> <p>Activity: Quotation of the companies that exist in the register</p> <p>Output: Acquisition of the requested products or services.</p> <p>Ex.:</p> <p>BASE D system presented – purchasing system – works in parallel with the “Senior” ERP.</p> <p>Request 5755 – Miscellaneous chemical products for treatment of WTP water. Stock item. A quotation was carried out with the suppliers in the register.</p> <p>Quoted from 8 suppliers – Acquisition of different products from each supplier: Mercolab, LABshynt, Quimlab.</p> <p>Delivery on 20/Jul/23 – Invoice 831687 from the supplier LABSynth – basic sodium phosphate.</p> <p>Vendor Assessment – LABSynth – Approved Delivery.</p> <p>The energy assessment for the decision to purchase the relevant system, equipment or services is communicated to suppliers.</p> <p>Ex.: MD-JU-DGE-0023 – Additional conditions – appears in item 7 “energy management” – When issuing the technical specification, you must verify the need to include specific conditions in this energy management item for products that have a significant impact in energy management.</p> <p>The energy requirements of fuels (coal and diesel oil) are defined in the contract:</p> <p>Contract / Coal Supplier:</p> <p>REJL.NAJL.21.16726 - CARBONIFERA CATARINENSE LTDA</p> <p>REJL.NAJL.21.16728 - CARBONIFERA METROPOLITANA S.A.</p> <p>REJL.NAJL.21.16729 - INDÚSTRIA CARBONIFERA RIO DESERTO LTDA</p> <p>These contracts have in Annex A - Technical Specification of Coal, definitions of energy and ash content, among others.</p> <p>Diesel oil purchase – occurs on a “spot” basis (not by contract):</p> <p>Ex.: Supplier Vibra Energia - Order 6143 on Jul/04/23 - 200kL - Invoice 262379 - received on Jul/12.</p> <p>Process deemed compliant.</p>				

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	10/08/2023	Operação da Usina - UTLC (Power Plant C)	ISO 50001:2018	Leonardo Mrozinski – Operation Eng. Marcelo Bzuneck – Plant Manager Ariel Brambilla – Utilities Engineer and RD at 50k Antonio M Baeta – Observer auditor
Notes				
<p>UTLC</p> <p>Shifts</p> <p>Shift 1 – Group D – 07:30 to 15:30. – Audit time</p> <p>Shift 2 – Group C – 15:30 to 23:30. – Audit time</p> <p>Shift 3 – Group B – 23:30 to 07:30.</p> <p>There is a rotation of 6 shifts and 4 days off.</p> <p>Visit to the control room:</p> <p>Operators:</p> <p>Fabricio Semonetti – Shift manager</p> <p>Gilberto Alves Pinter – Operator 3</p> <p>Daniel Machado Costa – Operator 3</p> <p>Johnny de Oliveira – Operator 1</p> <p>Rogério Mafei – Operator 1.</p> <p>The entire operation process of the plant was presented.</p> <p>The system screens are displayed:</p> <ul style="list-style-type: none"> - Air and Gases. - Mills - Water and Steam - Consensus - Turbine lubrication oil - Soot Blowers (HMI) - Diesel oil burners (HMI). - Electrostatic precipitators. <p>Use of EtaPRO Efficiency Control Software – used to monitor yield. including Thermodynamic Modeling.</p> <p>Boiler efficiency – 89.06% (online)</p> <p>AP turbine efficiency – 85.74% (online)</p> <p>MP turbine efficiency – 94.09% (on line)</p> <p>Unit net efficiency – 31.91% (online)</p> <p>Heat Rate:</p> <p>Turbine and thermal cycle - (Gross) - 2167.8 kCal/Kwh</p> <p>Turbine and thermal cycle - (Liquid) - 2682.6 kCal/Mwh</p> <p>The relationship between current condition and thermodynamic modeling is presented:</p> <p>Gross Generation - 300.8 MW</p> <p>Net Generation - 271.4 MW</p> <p>It is a Thermal Power Station, with 1 turbogenerator, as follows:</p> <p>1 x 330 MWh (dispatch) - Ansaldo Turbine (Unit 7) - ANEEL Authorizing Resolution 12138/22</p> <p>Turbine: Ansaldo</p> <p>Generator: Skoda</p>				

Boiler: Babcock

Nominal capacity: 1,038 ton/hour

Superheated steam temperature: 540°C

Superheated steam at pressure: 180 bar

Documentation:

Work Instruction IT-OP-UTLC-DGE-002 - Boiler - revision 02

Work Instruction IT-OP-UTLC-DGE-003 - Handling coal in silos - revision 02

Several others (about 15 instructions).

Imbalance of the turbo alternator assembly shaft:

2021 – Appearance of the problem

07/aug/23 - OS 2023-31177 and 29283 - are OSs for turbine balancing - Bearing 4.

Photos of the work carried out are presented.

It is currently indicating 14.5 mm/sec – Absolute vertical vibration in bearing 5.

In the week from 01 to 03/Aug - bearings 5 and 7 had relative vibration values around 100 microns peak-to-peak.

A graph of current values with a trend line for the last 6 months was analyzed, which shows the net efficiency of the plant between Jan and Jul/23: (calculated efficiency based on data from the supervisory system).

Average efficiency for the period oscillates between 33 and 35% (depending on the dispatch load) and a target of 34%.

Improvements:

- The replacement of the cooling tower fan blades is under study, although 1 of the 12 cells has been replaced, the study does not present a conclusion.

Tried replacing a set of 8 fan blades – first results indicate improvement of around 14%.

- Repiping of low pressure heat exchanger 4 - from 05/19 to 04/17/2023

Data presented in the supervisory system on the operation of unit C on the day of the performance test.

Presentation of the summary of performance tests - RG-OP-UTLC-DGE-0013 - Jul/23

Periodically, a "Performance/Yield Test" of the boiler and the thermal cycle is carried out.

Test: 09/jun/23 – Net power: 289.77 MW – unit 7 – Load: 319.31 MW.

Thermal cycle net heat consumption - 2296.90 kCal/kWh

Thermal cycle corrected for the heat rate - 20.84.46 kCal/kWh

Thermal cycle performance - 41.26%

Boiler Yield – 89.66%

Unit net income - 33.57%

Test: 18/Jul/23 – Net power: 292.24 MW – unit 7 – Load: 321.79 MW.

Thermal cycle net heat consumption - 2539.03 kCal/kWh

Thermal cycle corrected for the heat rate - 2098.34 kCal/kWh

Thermal cycle performance - 40.98%

Boiler Yield – 91%

Unit net income - 33.87%

RG-OP-UTLC-DGE-0017 - Incombustion flow analysis and granulometry - Ex.: Mills 1, 2 and 3 - target should be 70% passing through a 200 mesh sieve - Result: Below target in some cases - Actions awaiting maintenance stop.

Indicators:

UTLC net efficiency: (SGE official) - Target 34%.

Jan – 35.15%

Feb - 34.90%

Sea - 34.58%

Apr - 35.33%

May – 35.36%

Jun - 35.19%

Jul - 33.74%

Base Resolution 1016/22 – ANEEL – Used to refund the value of coal.

Internal monitoring worksheet presented for debate in case of disallowance by CCEE.

In 2022 the value presented by the CCEE was 34.37%

Auditor	Date	Process	Standard	Contacts
Wellington Sanches	11/08/2023	CoRe – Commercialization and Regulation	ISO 50001:2018	Andre Zagroba, Adilson Geraldo Machado, João Miguel Mongelli Martin, Edilson Borba Rodrigues, Ivan Luiz Bianchini, Macelo Gregory Cunha
Notes				
<p>The activities carried out by this process can be summarized in planning and managing the operation with interactions with the NOS; support activities; commercialization; management of energy contracts; support with institutional relations.</p> <p>Regulatory activities are already well developed and are part of the routine.</p> <p>This audit evaluated the procedure "Process planning and measurement of generation", revision 1. According to the document, the following are part of the scope of the process:</p> <ul style="list-style-type: none"> •Shutdown schedule, including ONS approval procedures. •Operation/generation programming, performed at several different levels and frequencies. The programming must observe the thermal efficiency of the units. •Generation situation assessment. •Unit status change calculation. •Change in documents and procedures. Includes design changes. •Regulatory documents – electricity sector legislation. <p>The operation/generation schedule already has mechanisms for operating the units at maximum load, in order to obtain a better use of the burning.</p> <p>One of the priorities of the process is to operate at partial load only under special conditions, due to unfavorable operating conditions.</p> <p>Another priority of the process is starting the most efficient machines and only then activating the other equipment.</p> <p>The SGE indicators are present and available in the "Software Expert". The graph of the energy efficiency indicator was shown in the period between January 2022 and July 2023. No significant influences of stops were observed.</p> <p>The best results in December 2022 were due to the concentration of operations in unit 7, the most efficient.</p> <p>The process does not operate any USE.</p> <p>The process has no third party under its influence.</p>				

Auditor	Date	Process	Standard	Contacts
Carlos Alberto Mattos Taveira	11/08/2023	Recursos Humanos (Human Resources)	ISO 50001:2018	Daiane Machado – People and Management - Manager Sheila Martins – HR Analyst. Marina Batista – HR Assistant Ariel Brambilla – Utilities Engineer and Representative of 50k Antonio M Baeta – Observer auditor

Notes

Human Resources:

During recruitment, the relationship between existing and required skills is assessed and training is prepared for adaptation.

Mandatory and optional recycling training is provided to employees.

Reaction and training assessments are performed.

Competency requirements are defined in "Job Descriptions".

Ex.:

Power Plant Operator Position – Job description last amended on 29/Sep/2019 – Hired: Wagner Borges for UTLB – hired on 13/Jul/23 as Power Plant Operator 1.

Required:

- Technical training in electromechanics, or generation process
- Knowledge of plant equipment and systems (basic); Safety standards and procedures (basic); Communication (basic)

Introduced:

- Technician Diploma in Electric Power Generation Processes – adequate.
- School Transcript - approved
- Attendance list for training in safety standards
- Communication training program – will still be carried out in a group of 200 people – online training.

The performance evaluation was carried out from 2017 to the 2022 cycle by the previous company's system. A system is currently being developed by the company "Diamante" Matiz de Gestão NINE BOX within the "Senior" system.

Employee performance appraisal review project:

Presentation of the skills development project for the company "Diamante" – after the final separation with the previous company:

After supervisors indicated the necessary competencies, employees defined the most important ones from their point of view:

- Team work
- Commitment
- Communication
- Openness to learning
- Interpersonal relationship

PN-SG-DGE-0002 – revision 01 – Organizational roles, responsibilities and authorities – defines responsibilities.

List RG-GE-DGE-0017 - List of SIGRG Internal Auditors – Adilson, Ariel, Filipe, Rui, Gilberto, Thiago.

Procedure PN-SG-DGE-008 - Competence, Training and Awareness - revision 02

This procedure, in section 5 Procedures – defines mandatory training program by "MD-GG-DGE-0002 Training Program", behavioral training and others.

Ex.:

2023 training program presented – “Condensate system – module 3” training – Onsite – Applicant Leonardo Mrozinski – Participants Amanda, Bruno, Marco João Otávio and Juliano (all plant operators) – 4 hours of workload – Held on 3/ July/23 – Presented the training attendance list with signatures of the participants – Effectiveness evaluation must take place on the “Treinas” platform (training and registration system) – evaluation must take place within 2 months – deadline 03/Sep/23.

Ex.: “Training” Platform - Evaluation of training effectiveness – Alexandre Izodoro – Module 13 – Generator assistants – Evaluation carried out 19/Jul/23 – Marcelo Bzuneck – Considered effective.

Sampling:

Kleiner Idalêncio – Operator 3 – Presented: Diploma of technician in mechanics, electrical technician, certificate of qualification of Operator.

Thiago Thomé – Operator 3 – Presented: Technician diploma in electricity generation processes, Operator qualification certificate

Jorge Quadra – Shift manager – Former employee – qualified by history, Operator qualification certificate.

Aguinaldo Tavares – Operator 3 – Presented: Technician diploma in electric energy generation processes, Operator qualification certificate.

Igor Ignácio da Silva – Operator 3 – Presented: Technician diploma in power generation, Operator qualification certificate. Admission on 13/Apr/2018.

Jailson Fernandes- Shift Manager - Former employee – qualified by history, Operator qualification certificate.

When changing positions or levels, there is a theoretical assessment of the technical and operational aspects involved, the change of position only occurs if approved.

E.g.: Samuel Nascimento – Presented in the “MOODLE” system – record of the technical evaluation of thermal panel operators and shift managers – UTLA – carried out on May 30, 2023 – theoretical test with a final grade of 96 – Approved – Changed position from Operator 1 to Operator 3.

IT-OP-CORE-DGE-0004 – revision 01 – contains matters for operator certification.

Process considered compliant.

3.2 DOCUMENT REVIEW

Document Review Item	Compliant	Comments
A documentation indicating the scope of your Energy Management System (EnMS)	X	audit notes - RI-DGE-0001 - Integrated Management System Manual - revision 03.
If available, a documentation setting out the issues, the relevant stakeholders and their relevant requirements for the EnMS	X	audit notes - PN-SG-DGE-0018 – revision 01
A description of the risks and opportunities considered and the processes determined for the EnMS	X	audit notes - CTJL - RG-OP-CTJL-DGE-0002
A documentation dealing with your key performances and significant energy uses : elements related to the energy review, identification of significant energy uses and the criteria applied to determine those that are significant	X	SGE - audit notes
A documentation of your energy compliance obligations relating to the activities and equipments : list of applicable legal requirements and other requirements related to energy use, consumption and efficiency	X	SGE - audit notes
The energy policy, the energy objectives and targets and the informations on the associated planning	X	SGE - audit notes
The minutes of your last management review	X	SGE - audit notes
Internal audit plans (realised and scheduled)	X	SGE - audit notes
Document Review and Initial Audit Comments		
Organisation Manual - Revision Date or number	03	Doc. Review Completed on
		07/08/2023

3.3 AUDIT SUMMARY REPORT PER STANDARD ISO 50001:2018

Clauses	Department / Activity / Process													Total		
	Alta Direção (Top Management)	Sistema de Gestão de Energia (Energy Managem)	Recursos Humanos (Human Resources)	Central de Utilidades (Utilities)	Operação da Usina - UTLA (Power Plant A)	Operação da Usina - UTLB (Power Plant B)	Operação da Usina - UTLC (Power Plant C)	Suprimentos (Procurement)	Engenharia e Manutenção (Engineering and Maint	CoRe - Commercialization and Regulation	Report	Pendings / Corrective actions	Audit planning		End of day	End of WSA auditor participation
4.1 Understanding the organization and its context	✓	✓														
4.2 Understanding the needs and expectations of interested p...	✓	✓														
4.3 Determining the scope of the energy management system		✓														
4.4 Energy management system		✓														
5.1 Leadership and commitment	✓															
5.2 Energy policy		✓	✓	✓	✓	✓	✓	✓	✓	✓						
5.3 Organization roles, responsibilities and authorities										✓						
6.1 Actions to address risks and opportunities		✓														
6.2 Objectives, energy targets and planning to achieve them		✓														
6.3 Energy review		✓														
6.4 Energy performance indicators		✓		✓	✓	✓	✓		✓	✓						
6.5 Energy baseline		✓														
6.6 Planning for collection of energy data		✓														
7.1 Resources	✓									✓						
7.2 Competence			✓													
7.3 Awareness			✓													
7.4 Communication			✓													
7.5 Documented information		✓	✓	✓	✓	✓	✓		✓							
8.1 Operational planning and control				✓	✓	✓	✓		✓	✓						
8.2 Design									✓							
8.3 Procurement							✓									
9.1 Monitoring, measurement, analysis and evaluation of ener...		✓		✓	✓	✓	✓			✓						
9.2 Internal audit		✓														
9.3 Management review	✓	✓														
10.1 Nonconformity and corrective action		✓														
10.2 Continual improvement		✓														
Total																
4 Context of the organization		✓														
5 Leadership																
6 Planning																
7.5.1 General																
7.5.2 Creating and updating																
7.5.3 Control of documented information																
9 Performance evaluation							✓									
9.1.1 General																
9.1.2 Evaluation of compliance with legal requirements and o...																

		Department / Activity / Process															
		Alta Direção (Top Management)	Sistema de Gestão de Energia (Energy Managem	Recursos Humanos (Human Resources)	Central de Utilidades (Utilities)	Operação da Usina - UTLA (Power Plant A)	Operação da Usina - UTLB (Power Plant B)	Operação da Usina - UTLC (Power Plant C)	Suprimentos (Procurement)	Engenharia e Manutenção (Engineering and Maint	CoRe – Commercialization and Regulation	Report	Pendings / Corrective actions	Audit planning	End of day	End of WSA auditor participation	Total
10 Improvement																	
BVC BVC LOGO																	
8 Operation						✓	✓	✓		✓							
7 Support			✓														
Not Applicable		Justification For Not Applicable															
		No exclusion															

3.4 NON CONFORMITY REPORT

Non conformities detailed herein shall be addressed through the organization's corrective action process, in accordance with the relevant corrective action requirements of the audit standard.

Hereunder you will find Bureau Veritas Certification requirements for:

- expected timelines to address the nonconformity (a)
- response content (b)

Expected timelines to address the non conformity (a)

Corrections and Corrective actions (if possible) to address identified major nonconformities shall be carried out immediately. Correction, Root Cause Analysis and Corrective action plan together with satisfactory evidences of implementation shall be submitted within **90 days after the last day of the audit unless Bureau Veritas Certification and client agree on a longer period of time.**

Review of nonconformities is done through desktop review. However, depending of severity of the findings, our auditor may perform a follow up visit to confirm the actions taken, evaluate their effectiveness, and determine whether certification can be recommended or continued.

For a minor nonconformity, correction, root cause analysis and corrective action plan shall be approved by the team leader and verification of implementation and effectiveness of corrective action(s) taken will be performed at the next visit.

It is recommended that the Client provide responses early to allow time for additional reviews if needed.

For recertification time limits to address nonconformities will be defined by the team leader in order to have them implemented prior to expiration of certification.

Any responses to the nonconformities which were raised may be either in hard copy or electronically using the NCR herein (preferred) and forwarded to the Bureau Veritas Certification office.

Expected response content (b)

Client response to NCR should be reviewed by the lead auditor in three parts; correction, root cause analysis and corrective actions.

In reviewing the three parts, the auditor looks for a plan and then evidence that plan is being implemented.

Correction

1. The extent of the nonconformity has been determined (NCR has been corrected & the client has examined the system to see if there are other examples that need to be corrected). Ensure that correction answers the question "Is this isolated case or not?" in other words "Is there a risk that this can reoccur at the other site / department?"
2. If correction cannot be immediate; a plan to correct the NCR may be appropriate (responsible & date).
3. Evidence that the correction was implemented or evidence that the plan is being implemented.

Root Cause Analysis

1. The Root Cause is not simply repeating the finding, neither is the direct cause of the issue.
2. Well thought out analysis to determine the true root cause: e.g. someone did not follow a process would be direct cause; determining why someone did not follow a process would lead to the true root cause.
3. The root cause statement must focus on a single issue without any obvious why questions remaining.
If a why question can reasonably be asked about the root cause analysis, this indicates that the analysis did not go far enough.
4. Ensure that the root cause answers the question, "What in the system failed such that the problem occurred?"
5. Blaming the employee will not be accepted as the only root cause
6. Address problems with the process as well as what detection system failed

Corrective Action

1. The corrective action or corrective action plan addresses the root cause(s) determined in the root cause analysis. If you have not defined true root cause you cannot prevent the problem from its reoccurrence
2. In order to accept the plan it shall include;
 - actions to address the root cause(s)
 - identification of responsible parties for the actions and
 - a schedule (dates) for implementation.
 - always include a "change" to your system. Training and/or publishing a newsletter are generally not changes to your system
3. In order to accept the evidence of implementation:
 - a. Enough evidence is provided to show the plan is being implemented as outlined in the response (and on schedule).
 - b. Note: Evidence in full is not required to close the NCR; some evidence may be reviewed during future audit when verifying the corrective actions.

Auditing is based on a sampling process of the available information and the audit methods used were interviews, observations, sampling of activities and review of documentation and records.

To be completed by Bureau Veritas

Date	Organization	Contract n°	Report n°
Non Conformity Observed During			
Process			
Standard			
Clause			
Site Name			
Non Conformity Description			
Grade	Lead Auditor	Auditor	Organization Rep.
To be completed before			

To be completed by the organization

Root Cause Analysis (What failed in the system to allow this non conformity to occur ?)	
Correction (What is done to solve this problem)	
Corrective Action (What is done to prevent reoccurrence)	
Implementation of	Date of Completion
Corrective Actions	Org. Representative

To be completed by Bureau Veritas

Verification of corrective Actions	Date	Status	Auditor
Comment			

4 PERFORMANCE TO DATE

The reports of the previous audit cycle were analyzed, as follows:

Main - 2017 - No nonconformities were identified.

Surv 1: 2018 - No non-compliance identified.

Surv 2: 2019 - No non-compliance identified.

Main - 2020 - No nonconformities were identified.

Surv 1: 2021 - No non-compliance identified.

Surv 2: 2022 - No non-compliance identified

Analysis of the previous cycle: It was verified that no non-conformities were identified in the previous cycle and that all processes and shifts were audited throughout the certification cycle.

This result is consistent with the results of audits in standards 9, 14 and 45 and for a company that operates in an environment strongly regulated by the Brazilian regulatory body ONS/ANEEL.

Non conformity number	Non conformity description	Process	Standard	Clause	Grade	Issued Date	Date of Completion	Verification of Corrective action

5 EXECUTIVE AUDIT SUMMARY

5.1 AUDIT CONCLUSIONS

Auditing is based on a sampling process of the available information and the audit methods used were interviews, observations, sampling of activities and review of documentation and records.

The audit was carried out in a sampling process based on available information. The methods used were: interviews, observations, sampling of activities and analysis of documents and records.

This maintenance audit was carried out in person, except for the "CoRe" process.

The SURV2 maintenance audit will be contracted later.

The variation in available capacity was adjusted in accordance with the Brazilian regulatory body ONS/ANEEL.

Based on the evidence collected, NO non-compliances were identified.

It was possible to verify that the Energy Performance of the organization presents itself in increasing levels, with objectives and EnPis being reached.

Based on these findings and conclusions, the organization's management system is being recommended for ISO 50001:2018 REcertification.

Attendance List for the Opening and Closing Meetings in the attached files.

5.2 SUMMARY OF AUDIT FINDINGS

	Major	Minor
N° of Non Conformities recorded	0	0

5.3 MANAGEMENT SYSTEM EFFECTIVENESS

Basic Inputs:

The organization's recertification audit was carried out by a Bureau Veritas audit team, in a face-to-face audit, except for the "CoRe" process, which was carried out remotely, using the "TEAMS" software.

Audit criteria:

The audit was conducted against the criteria of the ISO 50001:2018 standard

Objective:

The objective of the audit was to assess the conformance of the organisation to the standard.

REVISION OF MANDATORY REQUIREMENTS OF:

1. Management system documentation

The Organization is ISO 9001, 14001 and 45001 certified. They have a Management System Documentation software, provided by Softexpert (SE Suite), in which all necessary evaluations are parameterized, such as, for example, creation, revision, approval, updating of Management Documents.

2. Effective implementation and maintenance

The data presented show that the energy efficiency management system is implemented.

The company has had the system in place since January 2015.

It could be confirmed that energy management is part of the organization's culture. The EnMS is Implemented, and showing improvements.

Net efficiency - 2022 target - 30.20% - the UTJL Complex (Diamante) reached 31.68% (end of 2022).

UTLA1 – target for 2022 - 25.50% - reached 25.65%

UTLA2 - individual target 30% - reached 29.77%.

UTLB and UTLC - 2022 target - 28.50% and 33.60%, reached 29.89% and 34.60%, respectively.

Net efficiency - 2023 target - 31% - data up to June/23 = 33.04% (better than target)

UTLA1 – 2023 target - 25% - so far 24.73% (little operation)

UTLA2 – 2023 target - 29% - so far 30.78% (better than target)

UTLB and UTLC - 2023 target - 29% and 34%, reached 30% and 35.08% respectively.

3. Improvement

The organization has implemented an Energy Target plan and implemented it in relevant EnPI processes, and it can be demonstrated that improvement in energy performance is being achieved.

Clearly, there has been an evolution in efficiency over the years of EnMS implementation.

Important clarification:

In Brazil, this form of interpretation of efficiency in thermoelectric plants is usual – in percentage. A good example is Normative Resolution 1016/2022, which deals with the issue of efficiency for thermoelectric plants. This ratio can be easily converted to kcal/kWh by the following ratio - 1 kWh \cong 860 kcal. The ratio used uses the net energy generated (MWh) by the energy available in the fuel (MWh) in the period.

The net efficiency calculation formula used by the indicators is that stipulated by ANEEL Resolutions, as follows:

$$\square_{\text{plant}} = \text{Electric} / (\text{Sum of } i=1 \text{ to } n) (\text{Qcomb} \times \text{PCI})$$

Being that:

- Plant: net energy efficiency of the Plant [%];

- Eelectric: net electric energy produced by the plant, measured at the point of connection to the grid [MWh];

- Qcomb: Amount of fuel consumed [m³] or [ton]
- PCI: Average lower calorific value [MW.h/m³ or MW.h/t]

The equation shows that net energy efficiency is given by the ratio between the energy delivered to the system and all the energy fed into the boundary. The energy that enters the border is given by the sum of the energies of all the fuels used (coal, diesel oil and fuel oil).

The improvement in performance is observed by the greater use of fuel energy converted into a higher percentage of conversion efficiency. In other words, efficiency expresses the production of electricity by energy (fuel and electricity) used in the period.

In the action plans, regarding the correction of deviations, we have the following assumptions:

Variation greater than 2.5% (for less) – isolated action plan or consolidated action plan;

Variation greater than 5% (for less) – consolidated action plan.

4. Key performance objectives and the monitoring of these towards achievement

Objectives Targets and associated Planning: Documented available in SE Suite.

5. Internal Audit programme

The frequency of internal audits is annual.

Procedure PN-DGE-0007 – SIG Internal Audits – revision 02

Internal audit report (form RG-GE-DGE-0012) – carried out between 05/29/23 and 06/02/23 – with internal and external auditors (subcontractors) for QHSE, for standard 50001 auditors form only internal auditors .

Auditors: Adilson, Thiago Thomé, Ariel, Rui das Neves, Gilberto Alves Pinter – certificates (BV) for internal auditors were presented – adequate.

All processes were audited and there is a record of compliance in the report.

Nonconformities: 02

- Table of summary of the standard in invalid revision and with outdated targets.

- No evidence of assessment of energy efficiency requirements in the service contract in the overhaul of boiler unit 3.

Defined corrective actions:

RNC 12/23 – (valid for all standards) – Lack of physical update routine.

RNC 19/23 – It is not the responsibility of the commercial to take care of this indicator.

The process was considered adequate, compliant and effective.

6. Management Review

The frequency of critical analyzes of the management system is annual.

Minutes of critical analysis – carried out on 29/Mar/23 – No. ATA-SEST-DTO-DI-TECHNICAL DIRECTORY OPERATIONAL DIAMANTE_0001/23.

Previous review:

Actions defined for the 9k standard were concluded and for the SGI (internal training for the use of the SE suite) completed.

Changes that may affect the GIS – STRATEGIC PLANNING REVIEW 2023; STRATEGIC OBJECTIVES 2023; ACQUISITION OF NEW PROJECTS; FAIR ENERGY TRANSITION POLICY; NEW TEAM OF INTERNAL AUDITORS; New representatives of the systems.

Changes in Relevant Internal and External Issues - ANEEL Authorizing Resolution No. 12 138 of June 14, 2022 and ANEEL Normative Resolution No. 1016 OF 04 19 2022.

Indicators: CTJL's net efficiency had a target of 30.20% and as it reached 31.68, the new target of 31% was adopted and until the time of analysis by the Management (Feb/23) the result is 33.05% .

Performance and future projects described in the minutes.

Nonconformities and Corrective Actions - RNC.000001/22 and RNC.000008/22.

External audit: The external audit demonstrated the effectiveness of the SIG with the renewal of Certificates

ISO 9k, 14k and 45k, as well as maintaining the ISO 50k Certification.

Other mandatory elements are present

The process was considered adequate, compliant and effective.

7. Corrective action

10.1 Non-compliance and corrective action

PN-SG-DGE-0004 - Nonconformities, corrective and preventive action and nonconforming product - Rev 03

The company uses the SE Suite system to register non-conformities (RNC) or the IUS Natura system for legal requirements.

RNC 01/22 – Presentation and analysis of granulometry and non-combustion data – last issued not related to internal audit and directly related to 50k.

RNC 10/23 – Coal ovens with expired calibration – registered as 9k but affects 50k as well. Cause: Inadequate system configuration – Implemented actions.

10.2 Continuous Improvement.

The systematic is the same for the 09/14/45 and 50k patterns.

PN-SG-DGE-0004 - Nonconformities, corrective and preventive action and nonconforming product - Rev 03

The actions are controlled by the SE Suite Diamante system.

OM 18/23 – Drainage of the UTLA coal yard – project preparation should end in 2023

OM 19/23 – Moisture Analyzer for UTLA 3 & 4 – forecast for 2024.

Company Characterization:

Complex divided into 7 plants and 4 different technologies – 1 and 2 German from the 50s, 3 and 4 Italian technologies, started operation in 1970 and 5 and 6 Techcas technologies and started operation in 1980.

Unit 7 – newest of all 90's Italian operation and technology.

UTLA 1 - units 1 and 2 - 50MW each unit

UTLA 2 - units 3 and 4 - 66 MW each unit

UTLB - units 5 and 6 - 131 MW each unit

UTLC - unit 7 - 363 MW

Physical space: 345,782 Hectares²

The SE Suite Portal was presented, which contains all the documentation of the 9k systems; 14k; 45k and 50k –

There is a specific area for the Energy Management system.

SITE CONDITIONS AND SPECIAL NEEDS

No specific needs were identified for the main audit.

The current resources are adequate to conduct the audit

Processes:

Sistema de Gestão de Energia (Energy Management System)

Alta Direção (Top Management)

Suprimentos (Procurement)

Engenharia e Manutenção (Engineering and Maintenance)

Central de Utilidades (Utilities)

Recursos Humanos (Human Resources)

UTLA (Power Plant A)

UTLB (Power Plant B)

UTLC (Power Plant C)

CoRe

Comment:

Some processes are included in a general process, as e.g:

1. Coal Handling Plant - Doesnt part of the Boundary. Managed by a thyrd company.
2. Ash Handling Plant - Doesnt part of the Boundary. Managed by a thyrd company, in order to coprocess it.
3. Coal receipt area- unloading - item 1
4. Water Treatment Plant - UTL A, B, and C

5. Raw water pumping station - UTL A, B and C
6. Electrical switchyard /sub-station - Power plants of the Units: UTLA, B and C

Shifts:

Power plant operates in shifts (Operating and maintenance). Shall be observed that periodically operators change shifts. All operates in all Shifts.

Site operates in 5 operational shifts:

- 1 - 07:30 – 15:30
- 2 - 15:30 – 23:30
- 3 - 23:30 – 07:30

The operators Works in all shifts, alternating: 2 days is shift 1, 2 days in shift 2, 2 days in shifts 3, and 1 day rest.

Considering the audit times, we audit shift 1 and shifts 2 and 3 were audited by operational records.

Considering that the plant operates 24 hours a day, all operators (teams A, B, C, D and E) carry out their activities in all shifts (1, 2 and 3) alternately and considering that the supervisory systems record the operations and feed the monthly indicators of the EnMS system regardless of shifts, the audit in shift 3 is considered unnecessary.

Validation of Certification Scope.

Portuguese:

SERVIÇOS DE GERAÇÃO DE ENERGIA ELÉTRICA NO COMPLEXO TERMOELÉTRICO JORGE LACERDA

English:

ELECTRIC POWER GENERATION SERVICES IN THE JORGE LACERDA THERMOELETRIC COMPLEX

The scope was considered valid since it clearly shows the main activity of the organization covered in the management system as well as the type of products / services involved in the site specific to the scope.

- Scope does not contain generic words that do not specify processes or products / services.
- There are no trademarks described in the scope.
- Does not contain normative references.
- No adjectives are used.

Use of logo - There was no instance observed of the improper /incorrect use of the BV logo. The logo is not used.

Verification of previous Bureau Veritas Certification audit non-conformities - There were no non-conformities for verification.

Verification of the data contained in the CR:

* Annual Energy Consumption from all energy sources (e.g. Electricity, Diesel, Gasoline, LPG, CNG, Coal, Furnace oil, Bio mass and renewable sources) in kWh. - 1,069,248,550 (average consumption of the last 5 years of the complex).

* No. of Energy Sources – 4 (Coal, Diesel Oil, Fuel Oil and Electricity)

* No. of Significant Energy Uses (SEUs) - 1 - (Fossil fuel).

Energy Type - % of a.e.c:

- Fossil Fuel - (Coal (1,027,319,640 kwh) + Fuel Oil ((Fuel Oil) 1,232,700kwh)) + Diesel Oil (3,893,640 kwh)) = 1,032,446,060 kwh = 96.56%
- Electricity - 36,802.49 MWh - 3.44%

The stage 2 audit confirms and demonstrates that stage 2 objectives were achieved.

- The management system documentation demonstrated compliance with the standard requirements and adequate structure for maintaining the management system,
- The organization demonstrated effective implementation, maintenance and improvement of its management system.
- The organization has demonstrated adequate establishment and monitoring of management system objectives.
- The organization demonstrated the effectiveness of the internal audit program and its critical analysis of the system.
- The management system demonstrated compliance with regulatory requirements.

5.4 BEST PRACTICES

5.5 OPPORTUNITIES OF IMPROVEMENT

Number	Process	OFI - Opportunity(ies) for Improvement

5.6 OBSERVATIONS

Number	Process	Clause
Observations		

5.7 UNRESOLVED POINTS ON DIVERGING OPINIONS

Unresolved points concerning diverging opinions about evidences and findings

6 TEAM LEADER RECOMMENDATIONS

Standard	Accreditation	Certificate Copies	Language
ISO 50001:2018	UKAS	1	English

Standard	ISO 50001:2018
Recommendation	Issue Certificate
Reason for issue or change of the certificate	Re-certification audit
Scope Modification Comments	
Is a follow up audit required	No
Follow up audit start date	
Duration (days)	

7 SURVEILLANCE PLAN

Site Name	Process	Clause	Surveillance								Recer
			1	2	3	4	5	6	7	8	
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Sistema de Gestão de Energia (Energy Management System)		X	X							
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Recursos Humanos (Human Resources)			X							
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Alta Direção (Top Management)		X	X							
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Central de Utilidades (Utilities)			X							
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Operação da Usina - UTLA (Power Plant A)		X								
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Operação da Usina - UTLB (Power Plant B)		X								
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Operação da Usina - UTLC (Power Plant C)			X							
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Suprimentos (Procurement)			X							
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	Engenharia e Manutenção (Engineering and Maintenance)		X								
COMPLEXO TERMOELETRIC O JORGE LACERDA - CTJL	CoRe – Commercialization and Regulation			X							
Man Days			3,5								

All processes shall be audited during the recertification audit. Performance of the management system over the period of certification shall be considered, which includes a review of the previous surveillance audit reports

Surv. plan prepared / modified by	Carlos Alberto Mattos Taveira	Date	14/08/2023
Comment	Currently, Empresa Diamante has not contracted surv2 with the BVC yet. It is expected that this will normally occur in the same way as it did in the previous cycle. This is the company's systematic approach to closing contract cycles. Considering this situation, the audit program and plan for the next audit were prepared considering hiring under the same conditions approved in the CR.		

8 AUDIT PROGRAMME ISO 50001:2018

Sites	Audits	
	Main	Surv1
COMPLEXO TERMOELETRICO JORGE LACERDA - C	6.5	3.5
Man Days	6.5	3.5

Tentative number of days for recertification	6
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Date	11/08/2023	Prepared / revised by	Carlos Alberto Mattos Taveira
Comment			

9 NEXT VISIT AUDIT PLAN

Date - Time Activity	Site Name	Process	Auditor	Comment
14/08/2024 - 08:00 Opening meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----		
14/08/2024 - 08:30 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Alta Direção (Top Management)		
14/08/2024 - 10:30 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Sistema de Gestão de Energia (Energy Management System)		
14/08/2024 - 12:00 Lunch	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----		
14/08/2024 - 13:30 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Sistema de Gestão de Energia (Energy Management System)		
14/08/2024 - 16:30 Feedback meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----		
15/08/2024 - 08:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Operação da Usina - UTLA (Power Plant A)		
15/08/2024 - 12:00 Lunch	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----		
15/08/2024 - 13:30 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Operação da Usina - UTLB (Power Plant B)		
15/08/2024 - 16:30 Feedback meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----		
16/08/2024 - 08:00 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Engenharia e Manutenção (Engineering and Maintenance)		

Date - Time Activity	Site Name	Process	Auditor	Comment
16/08/2024 - 12:00 Lunch	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----		
16/08/2024 - 13:30 Audit	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	Sistema de Gest3o de Energia (Energy Management System)		
16/08/2024 - 16:30 Closing meeting	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL	-----		
17/08/2024 - 08:00 -	Off Site Brazil	Report		
17/08/2024 - 12:00 -	Off Site Brazil	Report		

Audit plan preparation date	14/08/2024
Comment	Audit plan is a forecast that can be reviewed by the lead auditor of the event. The initial objective is to develop the audit according to this plan.

10 SITES APPENDIX

Head Office

Site Name	COMPLEXO TERMOELETRICO JORGE LACERDA - CTJL
Address	Av. Paulo Santos Mello, 555
City	Capivari de Baixo
County/State	SC1
Country	Brazil
Postal Code	88745-000

Other Site(s)

Site Name	Off Site Brazil
Address	Av. Alfredo Egídio de Souza Aranha, 100 - Torre C - 4º andar
City	São Paulo
County/State	SP1
Country	Brazil
Postal Code	04726-170

11 Certificate information

11.1 ISO 50001:2018 - UKAS - English

Certificate information

Site Name	DIAMANTE GERACAO DE ENERGIA LTDA
Address	Av. Paulo Santos Mello, 555
City	Capivari de Baixo
Postal Code	88745-000
County/State	SC1
Country	Brazil
Scope	ELECTRIC POWER GENERATION SERVICES IN THE JORGE LACERDA THERMOELECTRIC COMPLEX
Number of certificates	1