

TECHNICAL PROPOSAL: DETAIL ENERGY AUDIT

PT. INDAH KIAT PULP & PAPER TBK Perawang Mill

Proposal Reference No. 205Q1409011-Rev(03)
Date 20 October 2014



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Proposal Prepared for

PT. INDAH KIAT PULP & PAPER TBK PERAWANG MILL

To provide: **Detail Energy Audit**

This proposal has been prepared for:

Mr. PK Nath

PWP Division

PT. Indah Kiat Pulp & Paper Tbk, Perawang Mill

Jl. Raya Minas-Perawang Km. 26 Kecamatan Tualang

Kab. Siak 28772 - Riau

Phone : +62 761 - 91088

Fax : +62 761 - 91376

Email :

by: Ms. Dian Kuswardhani
Sales & Business Development Manager of Inspection Service

TÜV SÜD INDONESIA

For information concerning this proposal, please contact:

Murtianik

TÜV SÜD INDONESIA

Dipo Tower 9th floor suite C-D

Dipo Business Center

Jl. Gatot Subroto Kav. 51-52 Petamburan, Tanah Abang

Jakarta Pusat 10260

Tel: +62 (21) 2986 5796 ext. 123,

Fax: +62 (21) 2986 5799

Mobile: 0878 8812 7268 / 0821 101 80 580

Email: Murtianik.Anik@tuv-sud.co.id



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1. Introduction: TÜV SÜD

TÜV SÜD is a multinational company that provides Testing, Certification, Inspection, Training and Technical Consultancy services. TÜV SÜD is headquartered in Munich Germany, is a pioneer and 'Global Market Leader' in the Testing, Certification, Inspection, Training and Consultation industry.

TÜV SÜD has the philosophy "Choose Certainty. Add Value ". With the core of this philosophy TÜV SÜD is dedicated to adding real economic value and measurable to our customers

With more than 140 years of experience and supported by 19,000 professionals in 800 locations spread across the world, TÜV SÜD helps companies to optimize performance and improve the company competitiveness to enter the global market.

One of innovative services of TÜV SÜD is **the Energy Audit with** following advantages:

- Professional auditors who are certified as Energy Auditor
- Have experience in the energy audit in various industries.
- Methods audit in accordance with international standards
- Using a measuring tool with the best technology that can provide accurate results and strongly recommended for energy audit in the world
- Comprehensive audit report with details identifying the critical points and opportunities for improvement company performance
- Recommendations that can be used by management in optimizing the company performance and competitiveness
- Provide a comprehensive solution to the problem of project management, conservation engineering, infrastructure "outsourcing", risk management at the power plant through a technical study and financial feasibility strictly
- Sustainable collaboration related to follow-up the implementation of audit recommendations.

2. Detail Energy Audit

2.1. Scope of Detail Energy Audit

The energy audit is conducted based on selected area at **PT.KPP Perawang particularly for Multi fuel Boiler 11-12 (MB #11-12) and Turbine Generator #11-12(TG #11-12).**

Scope of work to be included in this energy audit as the below:

2.1.1. **Preliminary Audit** at **MB #11-12 and TG #11-12**

2.1.2. **Detail Audit** will be focused in **MB #11-12 and TG #11-12** with below scope of work:

I. Boiler

- **Steam Generation**

- ✓ Boiler Efficiency & Performance
- ✓ Steam to fuel ratio, SFC w.r.t production
- ✓ Feed water analysis & temperature optimization
- ✓ Blow-down heat recovery
- ✓ Steam quality etc.

- **Steam Distribution**

- ✓ Steam Pipe sizing & layout
- ✓ Pr. Reducing valves, pr. Drop study
- ✓ Steam Trap selection & performance
- ✓ Insulation survey
- ✓ Steam leakages etc.

- **Steam Utilization**

- ✓ Steam pr. & temp. required as per process
- ✓ Moisture separator
- ✓ Steam flow rate measurement (*Not applicable for MB*)

- **End-Use and/or Cogeneration**

- ✓ Steam Turbines
- ✓ Turbin efficiency

- **Condensate Recovery**

- ✓ Condensate recovery from process
- ✓ Steam trap design & installation
- ✓ Condensate line size & layout
- ✓ Flash Steam generation
- ✓ Thermo-compressor etc.

II. Pumping System

III. Electrical System

IV. Air Compressor System

V. Cooling Towers

VI. Auxiliaries System

Added Value of Energy Audit at MB and TG:

- Measurement in this audit is conducted by using measurement tool with the best technology and suitable software. All measurements tool are strongly recommended in energy audit process in the world.
- Audit in MB and TG will also use a predictive measurement tool that will be very important in analyzing of the reliability of machine. The result of the measurement is recommendation related with the reliability of some main utility in MB and TG.



2.2. Objective of Energy Audit

- Identify critical areas where energy is wasted and opportunity for energy saving
- Establish a Baseline Energy Consumption as a reference for all the measurement and analysis activity in the plant
- Define Specific Energy Consumption with respect to the utilities in **MB #11-12 and TG #11-12 area**
- Develop Energy Conservation (ENCON) opportunity with respect to mentioned utilities in **MB #11-12 and TG #11-12 area**
- Assess technical feasibility, economic viability, and prioritization of ENCON options for implementation
- Estimate the reliability of main machine in the **MB #11-12 and TG #11-12 area**
Study of the maintenance system compared with the standard

2.3. Energy Audit Process

Energy Audit process conducted in accordance stages as follows:

1. Preliminary Assessment (Facility tour and Kick off Meeting)
The purpose of this step is to understand customer concern/needs and define scope of audit by observing the infrastructure, main installed equipments, identify of main energy consumption and identify energy saving opportunities.
2. Data Collection
This step is to get all data and information related to infrastructure and layout, Single Line Diagram, energy consumption data, production process flow, amount of electricity bills as well as other energy resources are used. This data will be used as a reference in conducting analysis of company's energy consumption.
3. On site Measurement
Field measurements aimed for measuring performance of installed equipment and company's energy consumption. Measurements were taken using a measurement tools with the best technology for all major parameters according to utility which has significant energy consumption
4. Data Analysis
This step is to analyze data that taken from step 2 and step 3. The data analysis result will identify critical points for corrective action, cost benefit analysis and feasibility study.
5. Report Preparation and Discussion
Data analysis result, audit findings and audit recommendations are summarized in a report to be submitted to the Customer.





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6. Final Report and Closing Meeting

Energy audit results are reported in a comprehensive report in the form of "word document" and "power point" which will be presented by TÜV SÜD Indonesia.

Submission of the final report within 2 weeks after the completion of "Step 5". The audit team will present the audit result and its recommendations to management team. It is highly recommended that members of Top Management to attend this closing meeting.

7. Monitoring Energy Audit Implementation

This step is needed to ensure consistent implementation of all necessary follow-up to improve the energy performance. Therefore the savings targets as addressed in energy audit recommendations can be achieved.

Monitoring program for the implementation of audit recommendations can be proceed with following approaches:

- Using internal resources who is designated as team or program coordinator to follow-up implementation of energy audit results; or
- Using TÜV SÜD Indonesia's resource as "Technical Expert" which can help Customer to follow up implementation program of energy audit results

Implementation program of energy audit results can be categorized:

No	Energy audit finding category	Re-energy audit plan
1	Short term	3 months after closing meeting
2	Medium term	6 months after closing meeting
3	Long term	≥1 year after closing meeting

2.4. Audit Team Composition

From TÜV SÜD Indonesia:

- Project Manager
- Energy Auditor TÜV SÜD Indonesia comprise of senior engineers (mechanical and electrical) who certified as Energy Auditor and has long experience on energy auditing at many kind of industry such as oil and gas, food and beverages, textile industry, PLN, PDAM, pulp & paper, etc.
- The number of auditors at IKPP Perawang Mill will comprise minimal 4 auditors. The number of auditor can be increased depended on the scope, the size and complexity of the company.
- Back office team for documentation and co-ordination support

From Customer:

- Single point coordinator for the activities related to this audit program.
- Operational personnel in the field to assist the audit team.

2.5. Measurement Tool

Audit at **MB #11-12 and TG #11-12** are conducted by using measurement tool with the best technology and suitable software. All measurements tool are strongly recommended in energy audit process in the world.

List of the measurement tool is shown as the below:

1. Power Quality Analyzer
2. Clamp On Hi Tester
3. Thermal Imager
4. Combustion Analyzer
5. Vibration Analyzer
6. Leak Detector
7. Infra Red Thermometer
8. Etc.

All data that taken from on site measurement will be analyzed in depth and detail by using some suitable software such as Gates Cycle or SSST/SSAT, PSAT/SEAI for pumping system, etc.

2.6. Time table

The Kick off meeting and onsite energy audit at PT. IKPP Perawang Mill with focusing in MB #11-12 and TG #11-12, will be finished during 7 (seven) working days. Including final report, it will be finished during 7 (seven weeks).

Audit schedule will be decided based on agreement between both parties.

3. Deliverable

Energy audit results are reported in a comprehensive report in the form of "word document" and "power point" which will be presented by TÜV SÜD Indonesia.

The energy audit report consists of:

1. Executive Summary
 - 1.1. Scope of energy audit
 - 1.2. Description of energy consumption and costs
 - 1.3. Description of Specific Energy Consumption (SEC) and cost for major utilities
 - 1.4. Critical point to improve utility's performance
 - 1.5. Recommendation to improve performance and energy savings, including investment and return on investment
 - 1.6. Estimation of economic value that can be achieved, including cost savings and energy consumption savings.
 - 1.7. Energy Conservation Opportunity & Action Plan



- 2. Introduction
 - 2.1. Audit Objectives
 - 2.2. Scope and Methodology
 - 2.3. Audit Team and Audit Schedule
 - 2.4. Audit Equipment
- 3. Assumption
 - 3.1. Estimation of Energy Cost
 - 3.2. Estimation of Energy Consumption
 - 3.3. Estimation of the Operating Hours
 - 3.4. Other Assumption
- 4. Production
 - 4.1. Factory Description
 - 4.2. Factory Facility
 - 4.3. Process Description
- 5. Energy Overall
 - 5.1. Energy Mapping
 - 5.2. Energy Intensity
- 6. Audit results:
 - 6.1. Energy Efficiency Improvement in Each Equipment
 - 6.2. Energy Conservation Opportunities in Each Equipment
 - 6.3. Recommendation
- 7. Energy Management System (EnMS)
 - 7.1. Energy Management Information System
 - 7.2. Energy management
 - 7.3. Reliability Centered Maintenance
 - 7.4. Energy Champion Program

4. Commercial Consideration and Term & Condition

4.1. Commercial Consideration

Audit fees are determined based on the number of days auditors are required to perform the audit.

Total energy audit fee for PT. IKPP Perawang Mill: Rp. 88.500.000,00

(The price covered kick of meeting, document review, 7 working days for onsite audit with minimal 4 auditors complete with measurement tools, closing meeting/ presentation and final report)



4.2. Term and Condition:

1. This proposal is valid for 30 days from the date of issue.
 2. The price exclude VAT 10%
 3. Air ticket, local transportation, accomodation cost and meal during onsite audit provided by client
 4. The proposal is only valid for scope that has been indicated at point 2.
 5. The price covered at least 4 auditors. Number of auditor can be increased to 5 auditors depending on the audit progress in the field and this is already covered in the offered price.
 6. The audit will be conducted in accordance with our *TÜV SÜD Terms & Conditions*
 7. Audit conducted must be ordered in writing prior to the work commencing. Any modification to the proposal scope or price shall be in writing. Customer shall not be entitled to sell, give, or otherwise transfer, any TÜV SÜD Indonesia work, product or deliverables to any third party without written consent.
8. Payment Term

The project cost quoted shall be made payable to TÜV SÜD INDONESIA maximum 14 (fourteen) days after invoice received with below payment term:

1. 50% payment of the charges will be released after on site audit.
2. Balance 50% must be paid upon completion of Closing Meeting (before final report submission).

Payment to be transferred directly to the following account:

Account Name : PT TÜV SÜD Indonesia
Bank : HSBC – Jakarta Office
Name of Branch : World Trade Centre
Bank Address : Jl. Jend. Sudirman Kav. 29 – 2 Jakarta 12920, Indonesia
Account Number : 050 – 138940 – 115

5. Reference of Energy Audit Experiences

Energy audit experiences in various industries:

1. PT. Pakerin Pulp and Paper, Mojokerto, 2012 (Including power plant)
2. Pertamina UBEP-Sangasanga Tarakan, East Kalimantan in 2012, (Including pump machine are used)
3. Pertamina EP Hall, South Sumatra in 2012 (Including pump machine are used)
4. Power Plant Pauh Limo, 2012
5. PLTP Lahendong, 2012





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6. PT. Indolakto at Jakarta, Sukabumi and Pasuruan, 2013
7. PT. Amerta Indah Otsuka Kejayan, 2013
8. PT. Star Energy, Natuna Sea, 2014
9. PT. Indah Kiat Pulp & Paper, Tangerang, 2014
10. PT. Panarub Industry, Tangerang, 2014
11. PT. Nikomas Gemilang, Serang, 2014
12. PT. Parkline World Indonesia, Serang, 2014
13. PT. Glostar Indonesia 1 & 2, Sukabumi, 2014
14. PT. Lumbung Nasional Flour Mill, Cikarang, 2014
15. PT. Chingluh Indonesia 1 & 2, Tangerang, 2014

6. Dedicated Key Contact Person

Murtianik

TÜV SÜD INDONESIA

Dipo Tower 9th floor suite C-D
Dipo Business Center
Jl. Gatot Subroto Kav. 51-52
Petamburan, Tanah Abang
Jakarta Pusat 10260

Tel: +62 (21) 2986 5796 ext. 123,
Fax: +62 (21) 2986 5799
Mobile: 0878 8812 7268 / 0821 101 80 580
Email: Murtianik.Anik@tuv-sud.co.id



Indonesia

To:
TÜV SÜD Indonesia
Dipo Tower 9th floor suite C-D
Dipo Business Center
Jl. Gatot Subroto Kav. 51-52 Petamburan, Tanah Abang
Jakarta Pusat 10260

Dear Sir,

Subject: Acceptance and Order for Services

We refer to Proposal No **205Q1409011-Rev(02)** dated 20 October 2014. By submitting this Acceptance Letter, **we herewith agree to the rates proposed as Contractual Price (detail energy audit at IKPP Perawang Mill).**

By signing below, we are responsible to inform TÜV SÜD Indonesia on changes related to the implementation scope as contain in the proposal.

Company Name : **PT. Indah Kiat Pulp & Paper Tbk - Perawang Mill**
Contact Person : **Mr. PK Nath**
Position : PWP Division
Address : Jl. Raya Minas-Perawang Km. 26 Kecamatan Tualang Kab. Siak 28772 - Riau
Telephone : +62 (761) 91088
Fax : +62 (761) 91030
Email :

Name and Authorized Signature and Company Stamp / Date