A close up of a logo

Description automatically generated

**INDUSTRIAL ASSESSMENT CENTER REPORT**

A picture containing text

Description automatically generated

**Prepared by**

**Industrial Assessment Center**

**Department of Mechanical Engineering and Mechanics**

**Lehigh University**

**Bethlehem, Pennsylvania 18015**

**A PROGRAM SPONSORED BY THE**

**US DEPARTMENT OF ENERGY**

**OFFICE OF MANUFACTURING AND ENERGY SUPPLY CHAINS (MESC)**

A picture containing text, clipart

Description automatically generated

Report Number: ${LE}

Assessment Date: ${VDATE}

Plant Location: ${LOC}

Plant Principal Product: ${PROD}

SIC Code: ${SIC}

NAICS Code: ${NAICS}

Report Date: ${RDATE}

**LEHIGH UNIVERSITY INDUSTRIAL ASSESSMENT CENTER**

**REPORT ${LE}**

**ASSESSMENT PARTICIPANTS**

${ASSE} - Lead Assessor

${LEAD} - Lead Student

${SAFE} - Safety Student

${PART}

**CONTRIBUTORS TO REPORT**

${CONT}

**INDUSTRIAL ASSESSMENT CENTER PERSONNEL**

Dr. Alparslan Oztekin

Dr. Sudhakar Neti

JoAnn Casciano

Muhannad Altimemy

Justin Caspar

Tong Su

Guanyang Xue

# PREFACE

The work described in this report was performed under the direction of the Industrial AssessmentCenter (IAC) at Lehigh University. The Lehigh University IAC consists of a Director, Assistant Director, and undergraduate and graduate students who serve a major role in visit participation, energy calculations, and report writing. The IAC program is managed by Rutgers, The State University of New Jersey, under agreement with the U. S. Department of Energy through the Office of Manufacturing and Energy Supply Chains, which financially supports the program.

The objective of the IAC is to identify, evaluate, and recommend – through analyses of industrial plant operations – opportunities to conserve energy, minimize waste, and reduce the overall cost of operations. Our recommendations are based upon observations and measurements made at your plant. As our time was limited, we do not claim to have complete detail regarding every aspect of the plant's operations. At all times we endeavor to offer specific and quantitative recommendations regarding cost savings, energy conservation, and waste minimization of the plants we serve. However, we do not attempt to prepare engineering designs or otherwise perform services that one would expect from an engineering firm, a vendor, or a manufacturer's representative. When the need for that type of assistance occurs, you are urged to consult them directly. If, however, you would like to discuss the contents of this report, or if you have other questions regarding energy use and/or waste minimization, please feel welcome to contact us to follow up.

# DISCLAIMER

The contents of this report are offered as guidance. The U. S. Department of Energy, Rutgers, The State University of New Jersey, Lehigh University, and all technical sources referenced in this report do not: (a) make any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe on privately owned rights, (b) assume any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method or process disclosed in this report. This report does not reflect official views or policy of the above-mentioned institutions. Mention of trade names or commercial products does not constitute endorsement or recommendation of use.

# EXECUTIVE SUMMARY

Assessment ${LE} was conducted on ${VDATE}, at a company located in ${LOC}, that manufactures ${PROD}. The facility has an area of ${AREA} ft2 for its manufacturing and office areas. It was reported during the assessment that production occurs ${PROH}. The office operates ${OFOH}.

Energy consumption for a twelve-month period of electricity (${StartMo} to ${EndMo}) consisted of the following:

|  |  |  |
| --- | --- | --- |
| **Energy** | **Quantity** | **Total Cost** |
| Electricity | ${TotalEkWh} kWh or ${TotalEBtu} MMBtu  ${TotalDkW} kW | ${TotalECost} |
| ${FuelType} | ${TotalFBtu} MMBtu | ${TotalFCost} |
| **Total** | **${TotalBtu} MMBtu** | **${TotalCost}** |

The energy costs for the plant, and those used for calculations, are as follows.

* **Electricity**
  + **Average Electricity Rate** ${EC}/kWh
  + **Average Demand Rate** ${DC}/kW
* **${FuelType}**
  + **Average ${FuelType} Rate** ${FC}/MMBtu

Energy bills for twelve-months are tabulated at the end of this report, followed by graphical representations of the energy usage and cost.

A summary of assessment recommendations (ARs) described in this report is contained in Table 1. If all the recommendations shown in Table 1 were implemented, the **total annual cost savings** would be **${ARACS}.** The **total implementation cost** for these recommendations is **${ARIC},** with an **average payback period** of about **${PB}**. This would save approximately **${ARMMBtu} MMBtu/yr** or **${CO2} tons CO2/yr**.

Note for electrical energy consumption: a 33% efficiency at the power plant level is considered for conversion from kWh to MMBtu. Tons of CO2 are calculated from the DOE MEASUR Tool where 1.0 MMBtu of Natural Gas = 53 kg CO2 and 1.0 kWh = 0.22 kg CO2.

|  |  |  |
| --- | --- | --- |
| **Total Annual Cost Savings** | **Total Implementation Cost** | **Average Payback Period** |
| **${ARACS}** | **${ARIC}** | **${PB}** |

All the assessment recommendations are described in detail in this report. The annual cost savings and implementation costs represent our best estimates. You may want to consult other sources to verify these estimates before a final decision for implementation of these recommendations is made. As previously discussed, we will contact you in six months regarding the success of this report. For additional information, please contact the Lehigh University Industrial Assessment Center [phone: 610-758-5741; email: [inluiac@lehigh.edu](mailto:inluiac@lehigh.edu)].

A picture containing text, clipart

Description automatically generated

**Assessment Recommendations (ARs)**

The assessment recommendations, based on the plant visit with associated possible **annual cost savings or profit generation** of **${ARACS}** are given in Table1. <AAR>An additional assessment recommendation, based on the plant visit with an associated possible **annual cost savings or profit generation** of **${AARACS}**, is given in Table 2.</AAR>

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ARC No.** | **Description** | **Annual Savings** | | **Annual Cost Savings** | **Implementation Cost** | **Pay Back Period (yrs)** |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Total** |  |  | **${ARMMBtu} MMBtu** | **${ARACS}** | **${ARIC}** | **${ARPB}** |

**Table 1: Summary of Assessment Recommendations (ARs). <AAR>**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **ARC No.** | **Description** | **Annual Savings** | | **Annual Cost Savings** | **Implementation Cost** | **Pay Back Period (yrs)** |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
| **Total** |  |  | **${AARMMBtu} MMBtu** | **${AARACS}** | **${AARIC}** | **${AARPB}** |

**Table 2: Summary of Additional Assessment Recommendations (AARs).</AAR>**