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Introduction

• Production processes involve the usage of energy to convert raw materials to final products, in quantities that can vary from production process to production process, resulting in fluctuating negative impacts derived of the depletion of the energy resources (Jorgenson et al, 2014).

• It is urgent to think on its impact from the societal, economic and environmental perspectives, making it a key element for the accomplishment of sustainable development (Stern, 2010).
Introduction

This work shows the results of the application of energy efficiency audit with the objective to reduce the negative impacts to the environment due to the operation of a meat processing industry. In order to increase efficiency and upgrade its competitiveness.
Methodology

Guidelines for the Integration of Cleaner Production and Energy Efficiency.
Results

Energy input

Processes

Elements

Production

Cooling

Lighting

Butcher saws, sterilizers, injectors, vacuum machines, meat grinders, meat mixers, meat slicers, etc.

Freezing and ventilation systems

Fluorescent and high intensity discharge systems
Impacts of Electricity Usage

Estimation of GHG emissions:

Activity data * emission factor = Carbon Dioxide Equivalent

Mexico’s emission factor equals to 550.1 CO₂ Equivalent by MWh.

[Climate Registry, 2014]

Mexican energy Mix 2012 [Adapted from SENER, 2013]
Impacts of electricity use

<table>
<thead>
<tr>
<th>Yearly Carbon Dioxide Emissions</th>
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<tbody>
<tr>
<td>2012</td>
</tr>
<tr>
<td>4,192,023</td>
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<tr>
<td>2891</td>
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<tr>
<td>94</td>
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</tbody>
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**Electricity**

- **Quantity [KWh]**
  - 2012: 4,192,023
  - 2013: 3,832,094
  - 2014: 1,660,109

- **CO₂ E [Metric tons]**
  - 2012: 2891
  - 2013: 2642
  - 2014: 1145

- **Share of total CO₂ E**
  - 2012: 94
  - 2013: 74
  - 2014: 73
Quantification of energy usage

- Machine
- Daily operation hours
- Quantity
- Daily total consumption (KW)
- Cost
- CO2 E
- Share of total CO2 (%)

- Information Technology
- Ventilation and Air Conditioning
- Production
- Lighting
The daily KWh consumption of each category is described in terms of the environmental impacts of these categories are expressed in CO$_2$ Equivalents.
Energy efficiency potentials

- Illumination
- Pneumatic systems
- Electric drives
- Pumping systems
- Ventilation and air-conditioning technology
- Space heating and cooling systems
- Hot tap water systems
Conclusions

- Energy efficiency is one of the main topics that should be addressed in matters of cleaner production.
- Measures for energy efficiency can be achieved without affecting the regulatory compliance.
- The result serve as the basis to a more energy efficient and cleaner production processes in Company A. Therefore a more depth analysis of materials flow is recommended.
- Opportunities on cleaner sources for energy should be noted and are also part of the company’s transition to cleaner energy.

As a summary, the main opportunities in this company are described:
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