9th Workshop for Energy Management Action Network for Industrial Efficiency under the International Partnership for Energy Efficiency Cooperation

CMPC EnMS: EXPERIENCE & BEST PRACTICES

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A Global Leader in P&P

CMPC is a P&P company, established in 1920, that produces solid wood products, pulp, paper and packaging products and tissue in Latin America.

CMPC Figures

1 Source: CMPC. Figures for the LTM as of June, 2018 (USD million)
2,3 Source: Hawkins Wright, RISI

Global Market Producer 2nd

Pulp

Producer in LatAm 3rd

Tissue

Competitive

BEKP & BSKP

Cash Cost

Investment

Grade Company

Fitch: BBB (stable)
Moody’s: Baa3 (stable)
S&P: BBB- (stable)
**CMPC Energy Inputs**

- **32,500 GWhe**
- **38 Industrial Sites**
- **8 Countries**

**Breakdown:**

- **75%** Biomass: 24,383 GWhe
- **12%** Natural Gas & LPG: 3,864 GWhe
- **5%** Fuel Oils: 1,674 GWhe
- **8%** Others: 2,608 GWhe

2017 Data
CMPC ENERGY INPUTS PER BUSINESS

- **Pulp**
  - 4 Sites
  - 26,115 GWh
  - 80%

- **Tissue**
  - 17 Sites
  - 3,074 GWh
  - 10%

- **Packaging**
  - 11 Sites
  - 2,029 GWh
  - 6%

- **Wood**
  - 6 Sites
  - 1,329 GWh
  - 4%

2017 Data
At CMPC we want to be more efficient and competitive in the markets we participate, thus securing the sustainability of our processes and activities.
ENERGY MANAGEMENT SYSTEM IMPLEMENTATION AT CMPC

2013: PHASE I PULP (3 SITES)

2016: PHASE II TISSUE, WOOD & PACKAGING (25 SITES)
<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
<th>Stage 4</th>
<th>Stage 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISO 50001 Gap Analysis &amp; Action Plan</td>
<td>EnMS Model Design</td>
<td>EnMS Implementation</td>
<td>EnMS Internal Audit</td>
<td>ISO 50.001 Certification</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>8 SITES</th>
<th>4 SITES</th>
<th>10 SITES</th>
<th>2 SITES</th>
<th>4 SITES</th>
</tr>
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**CURRENT STATUS**

**IMPLEMENTATION PROCESS**

- Stage 5: ISO 50.001 Certification
- Stage 4: EnMS Internal Audit
- Stage 3: EnMS Implementation
- Stage 2: EnMS Model Design
- Stage 1: ISO 50001 Gap Analysis & Action Plan
CMPC started working in the beginning of 2013 in the EnMS implementation process of the 3 Mills of Pulp in Chile and obtained the certification ISO 50001 in October 2014.

<table>
<thead>
<tr>
<th>Pulp Mill</th>
<th>Production [Ton/year]</th>
<th>Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laja</td>
<td>360.000 70.000</td>
<td>Bleached Softwood Kraft Pulp, Unbleached Kraft Pulp Sack Kraft Paper</td>
</tr>
<tr>
<td>Pacifico</td>
<td>500.000</td>
<td>Bleached Softwood Kraft Pulp</td>
</tr>
<tr>
<td>Santa Fe</td>
<td>1,490.000</td>
<td>Bleached Eucalyptus Kraft Pulp</td>
</tr>
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Annual Energy Consumption: 17,324 GWhe
After defining the EnMS base lines, a goal of reducing 20% the consumption of external energy sources per unit of produced pulp was established for the year 2020.

**Focus of developed projects**

- Biomass quality improvements, electricity savings (motors y lighting), steam savings and residual heat recoveries.
- Fuel use improvements and energy monitoring systems upgrades.
- New technologies for the use of: black liquor, fuel oil, biomass and insulation improvements.

Until 2016, **32 energy efficiency projects** were developed in relation to the EnMS, with a total **investment of 12,6MM USD** and an energy **saving impact** of over **137 GWh**.
Pacifico`s project “Steam use reduction via White Liquor preheating with heat recovered from the Black Liquor outlet” received the prize for best energy efficiency project within the Gold Seal price, given by the Chilean Ministry of Energy.

This project provided the following benefits:

- Medium pressure steam (MPS) use reduction
- Cold water use reduction
- Availability of MPS to generate electricity

### Results

<p>| | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Thermal Energy Savings</td>
<td>53.1 GWh/\text{year}</td>
</tr>
<tr>
<td>Electricity Generation</td>
<td>17.3 GWh\text{e}/\text{year}</td>
</tr>
<tr>
<td>Economic Benefit</td>
<td>1.1 MM USD/\text{year}</td>
</tr>
<tr>
<td>Investment</td>
<td>450 MUSD</td>
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</tbody>
</table>
LEgal Requirements Cycle

1. CMPC Area: Legal

2. CMPC Area: Energy - External
   - Breakdown of Legal Bodies by Articles
   - Verifiers Recommendation

3. CMPC Area: Plants - Energy - External

4. CMPC Area: Environment
   - Load Verifiers to Compliance Software
   - Analisys Meeting

5. CMPC Area: Energy and Mills
   - Compliance

6. CMPC Area: Plants - Energy - External
   - + Annual Compliance Audit

Quarterly Legal Requirements Compliance Cycle
How is our Information Infrastructure defined?

Advanced Tools

- Devices and Sensors
- Monitoring and Control Systems
- Field Level
- Energy Manager
- EMS
- Measurement Consumption in Process
- Advanced Tools
- Pulp Mills
- Data
- SCADA, DCS, PLC
- Control Level
- Management Level
- Cloud

Phase I Pulp

IoT

Advanced Tools

Devices and Sensors

Pulp Mills

Monitoring and Control Systems

Data

Control Level

Management Level

Energy Manager

Field Level

Measurement Consumption in Process

SAP

OSIsoft

cmpc
CMPC has achieved a 22% of improvement of its energy performance of its 3 certified Pulp Mills in 3 years.

**Energy Costs Savings**
- $40.2 MM USD between 2014 & 2017

**Total Investments**
- $12.6 MM USD in projects, trainings & maintenance of the EnMS

**Total Energy Saved**
- 5,000 GWhe between 2014 & 2017
RECOMMENDATIONS & BEST PRACTICES

Organizational

• Continuous and explicit Management support, ensuring resources
• Dedicated Energy Management Leader with support in every business
• Clear Energy Policy with ambitious goals
• Energy teams definition at the beginning of each implementation process
• Consideration for local cultures and legislations
• i-Cel

Resources

• CMPC Operating Model
• Integration with existing management systems (ISO standards, Lean, TPM)
• Procedure standardization if possible
• Energy monitoring tools as early as possible
• Minimum competencies establishment, trainings and awareness
• External implementation consultancy support