



# BOTTLING PLANT EDENA: ENERGY MANAGEMENT AND ENVIRONMENTAL PROTECTION



IN LIGHT OF GETTING THE ISO CERTIFICATION 14 001, EDENA FIXED SOME OBJECTIVES IN TERMS OF ENVIRONMENT PROTECTION AND ENERGY MANAGEMENT.

THESE OBJECTIVES WERE:

- Reduce the energy bill (electricity and others)
- Reduce the energy consumption and direct (Boiler) and indirect (Electricity) greenhouse gas emissions

## OBJECTIVES

An energy audit was carried out in 2002 to define the principle important area of saving:

- è Optimizes the cooling demand and reduce its energy consumption (main energy user),
- è Reduce the air compressor energy consumption,
- è Reduce the power consumption during On Peak hours,
- è Reduce the fuel consumption,
- è Optimizes the utilities consumption.

← Edena Cies

## WORK DONE

- è Phase 1: Installation of a high efficiency boiler – February 2003.
- è Phase 2: Implementation of an ice storage system using latent heat connected to the cooling system – October 2003.
- è Phase 3: Shifting of some production hours to Off Peak – June 2004.
- è Phase 4: Interconnection of the HVAC system of the office block to the ice storage – 2005.
- è Phase 5: Recovery of compress air from the machines in order to be re-used – 2005.

Each phases are followed by a careful monitoring and energy management for internal purpose in light of the ISO 14 001 certification process.

EDENA has also launched a campaign to sensibly its staff by advertising on the efficient ways of managing its equipment. Each person is involved on his own field of activity on how to reduce the energy consumption.

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Zonage climatique / PERENE:  
Zone 1 (zone des Bas sous le vent)

## SITE CHARACTERISTICS

Field of activity: è **Bottling of mineral water and soft drinks**

Staff: è **50 persons**

Factory area: è **1000 m<sup>2</sup>**

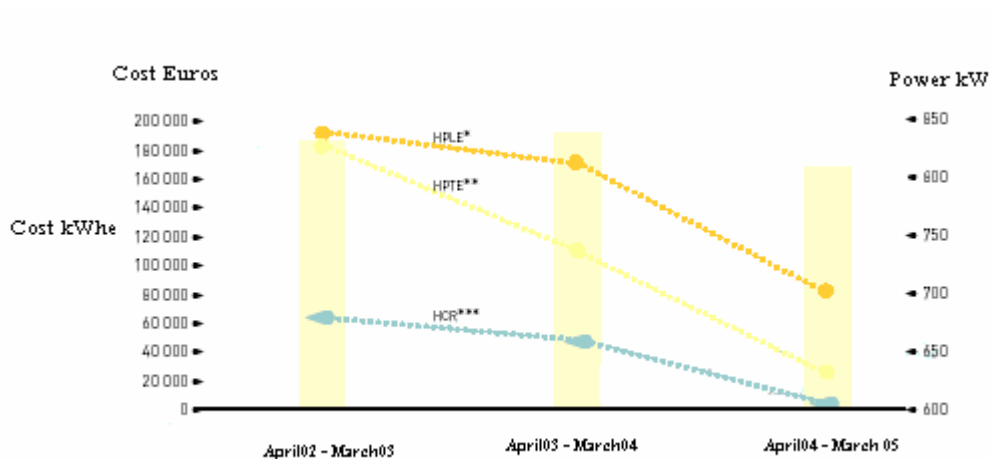
Office space area: è **840 m<sup>2</sup>**

## ENERGY BALANCE BEFORE THE UPGRADING WORK

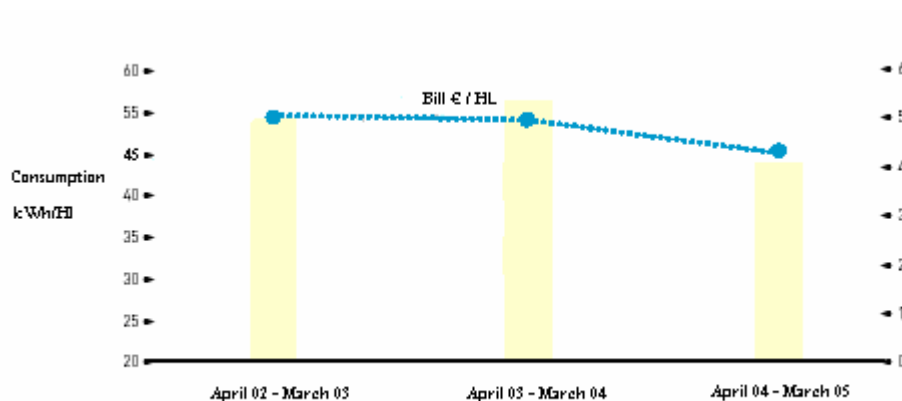
☹ Inefficient boiler and cooling plant.

Electricity	April 02 – March 03	April 03 – March 04	April 04 – March 05 (Forecast)
Consumption	1 928 MWh	2 102 MWh	1 867 MWh
EDF Bill	184 k€	188 k€	168 k€
Production capacity – all products	35 445 670 l / year	37 343 978 l / year	40 000 000 l / year

## KWHELEC COST VERSUS THE POWER USED



## ELECTRICITY CONSUMPTION AND COST BY HECTOLITER OF DRINKS



### NOTICE:

These two figures show the reduction of the electricity bill between 2002 and 2004. This reduction is due to both the shifting of power from On Peak to Off Peak and also by reducing the specific energy consumption (total energy consumption by hectolitre of drink bottled).

## TECHNICAL ASPECTS

### TECHNICAL DESCRIPTION

è **Phase 2 and 4:** Installation of an air cooled reciprocating chiller, an STL Cristopia of 28 m<sup>3</sup> of IN.03 nodules, a CristoControl to control and manage the cooling plant and an Air Handling Unit.

Usage : Chilling of syrup, bottling facilities, office and plant air conditioning.

è **Phase 3:** Shifting of the operation hours. BRSA production line (carbonate drink) stops before the night On Peak hours and the 5 liters manufacturing bottle machine operate during the afternoon only.

è **Phase 5:** Installation of a compress air recovery devise at the blowing machine allowing according to the manufacturer to save 423,720 kWh<sub>elec</sub> / year. This recovery devise off set 1 low pressure (7 bars) air compressor of 50 kW<sub>elec</sub>



STL tank with Nodules (Encapsulated Phase change Material)  
Source: Cristopia.

### PRODUCTION SITE UP GRADING

Installation of a new production line with an additional energy consumption of 82 547 kWh<sub>elec</sub> / year.

### ENERGY BALANCE

The energy saving is the difference between the energy consumption before and after the upgrading work which was done. The direct and indirect saving correspond to the energy saving versus the same equipment and production.

In fact, between 2002 and 2004, EDENA bought a new production line with an additional energy consumption of 82 547 kWh<sub>elec</sub> / year.



Chiller. Source: Cristopia.

### ENERGY SAVING

Direct Saving: è **61 MWh / year, thus 3% (including new production line)**  
Indirect Saving: è **144 MWh / year, thus 7%**

### MAXIMUM DEMAND

	2003	2004	2005	Saving in kW <sub>elec</sub>	Saving in %
HPL (Shadow))	839	812	700	27	3
HPTE (On Peak)	830	736	630	94	11
HCR (Off Peak )	679	658	600	21	3

Ddirect saving On Peak: è **94 kW, thus 11% versus 2003**  
Environment impact: è **88 tons of CO<sub>2</sub> saved in 2004**



## ECONOMICAL VIEW

### COST OF THE PHASES 2 AND 3

Cristopia Thermal Energy Storage STL - IN.03 - 28:      € +256 k€ cost increase vs conventional system  
Shifting of production hours:                              € 0 €

### OPERATING COST SAVING

Direct Saving:    € 16 k€/ year  
Indirect Saving:    € 42 k€/ year

### OTHER IMPORTANT POINTS

Conform to the ISO 14 001 requirement, well fare of the company and better quality product due to better cooling energy management.

### INDICATIVE FINANCE AND PERCENTAGE AGAINST TOTAL INSTALLATION COST

INCENTIVE FROM ADEME:                                      € 44 k€  
INCENTIVE FROM EDF:                                         € 45 k€  
TOTAL:    € 89 k€, thus 34% of the over cost of the STL.

### PAY BACK ON THE PHASE 2 AND 3 INCLUDING THE INCENTIVE

- € With direct financial incentive (real): 10 years (non representative).
- € With indirect financial incentive (comparing identical equipment): 4 years

Several demonstration projects for better energy management and renewable energy can be visited at the Reunion Island in order to see, understand and learn..

