Heliopacsystem LCA

COMPARATIVE LCA OF A COLLECTIVE DOMESTIC HYBRID HOT WATER HEATING SYSTEM BASED ON DIFFERENT SIZES AND CLIMATE ZONES

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Outline

Introduction
- Objectives
- System presentation

Scope of the study
- Functional unity
- LCA phases
- Impact categories

Evaluation of impact
- Results
- Comparisons

Conclusion

Introduction

Heliopac SAS

Localisation : Tourcoing (59)

1990 Year of creation of the company

25 Employees

100 New buildings with Heliopacsystem (per year)

20 000 Surface of Heliopac solar collector in Europe (m^2)

5 M Turnover (€)

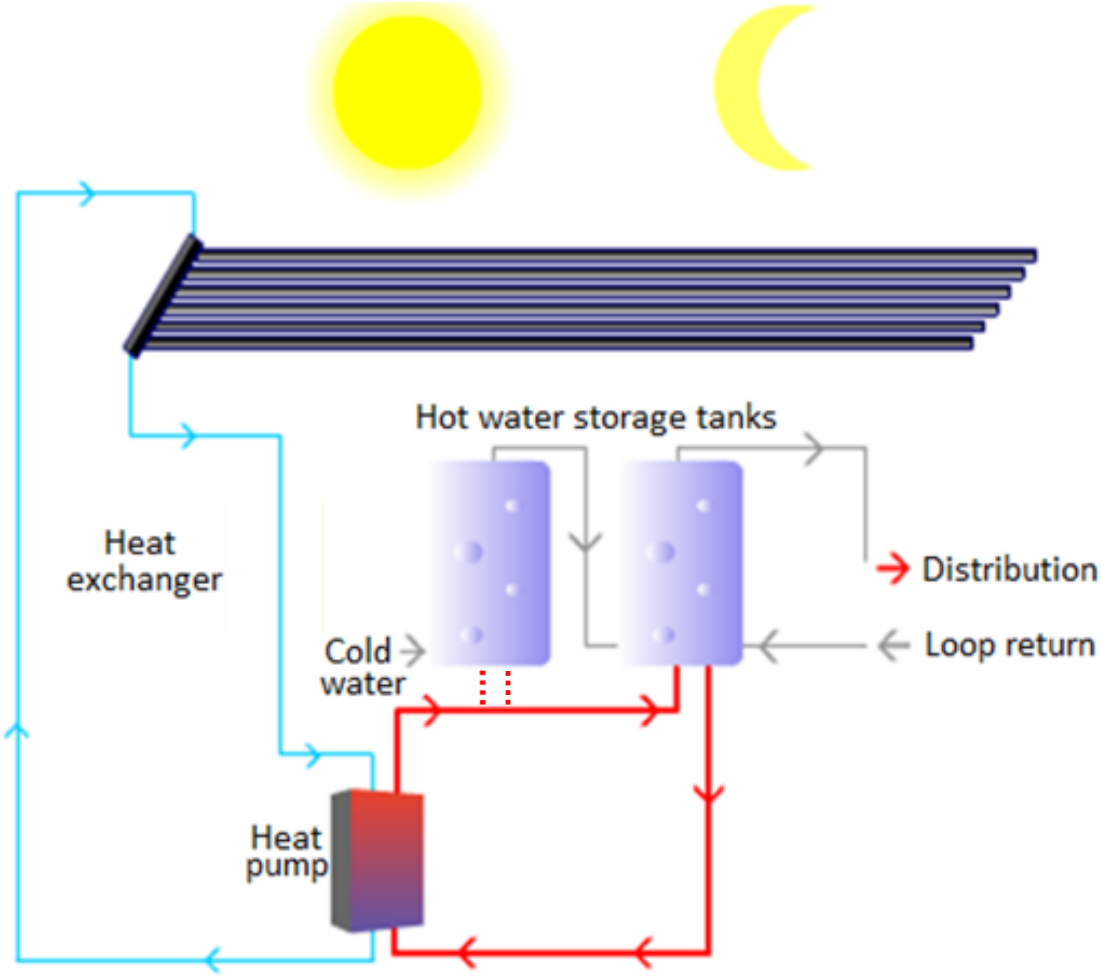
Introduction

Objectives

- LCA of Heliopac main product
  - Make an inventory of material and processes
  - List life cycle phases
  - Identify environmental main impacts
- Ecodesign
  - Improve the system
  - Integrate results in the design of new products
- Future vision
  - Anticipate regulation and standards
  - Prepare to market evolution

Introduction

Heliopacsystem® : a collective hybrid DHW heating system



Scope

Functional unity

- Production of domestic hot water (55°C) for collective housing
- Reference flow definition based on the energy need in different climate zones
- Lifespan of the system : 20 years

System boundaries

- Heat pump, solar collector, collector support, storage tanks, backup heater, connections components
- Excluded : Electrical cabinet (sensivity analysis)


Heat Pump


Solar collector

Storage tank

Scope

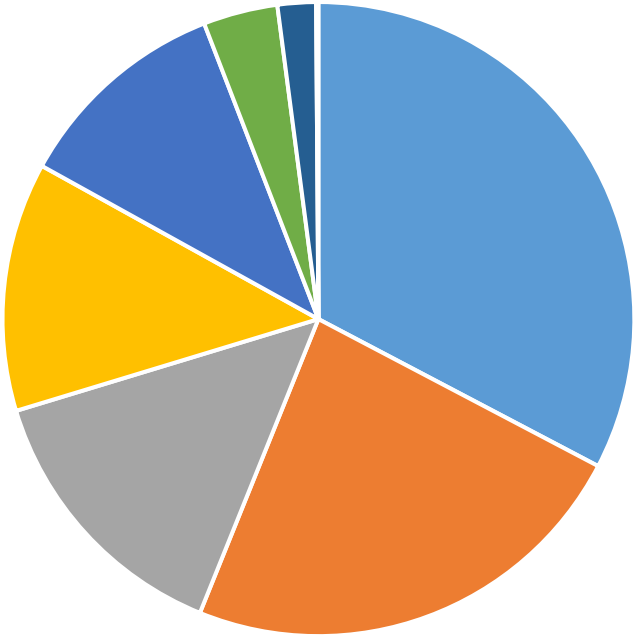
Origin of data

- Data collected (Heliopac or suppliers)
  - Composition of each component of the system (mass)
- Data from Ecoinvent® Database
  - Raw material extraction and processing
- Dynamic energy simulation (TRNSYS)
  - Energy performance
  - Energy consumptions
- Electricity
  - Heat Pump : French mix (nuclear plants 79 %)
  - Backup heater: fossil fuel plants

Scope

Material inventory (example)

Composition of hydraulic components

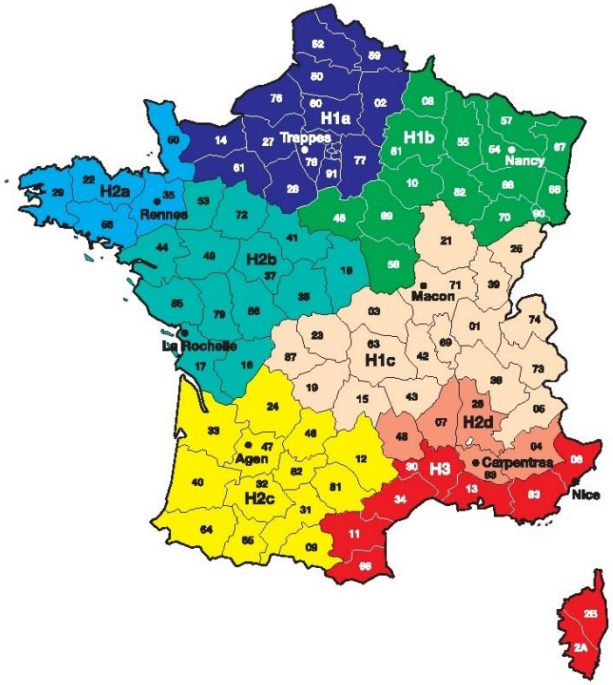


Material	Main component
BRASS	Plumbing
COPPER	Pipes
STEEL	Support
CAST IRON	Pumps
PUR FOAM	Insulation
STAINLESS STEEL	Pumps
BRONZE	Filter
PSE	Sound insulation

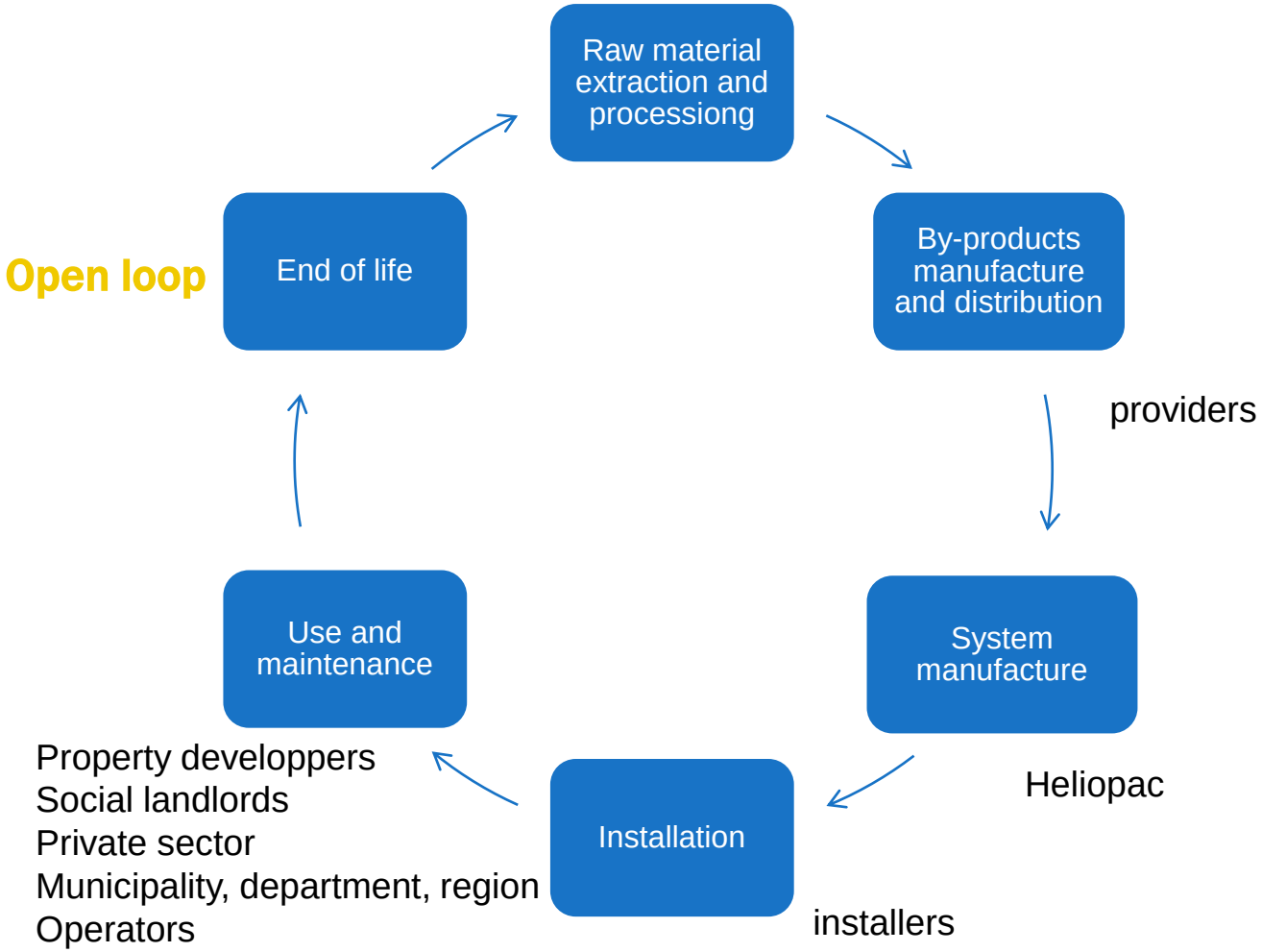
Scope

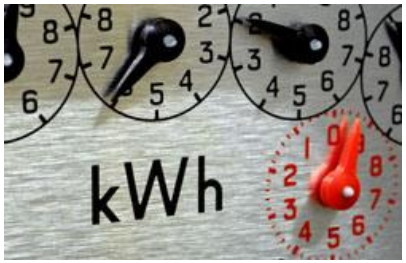
Scenarios

- Size
  - Small : 1 HP, 50 m2 of solar collector, 1 storage tank (1500 L)
  - Large : 4 HP, 300 m2 of solar collector, 4 storage tanks (4 x 2000L)
- Type of support (solar collector)
  - Galvanized steel
  - Concrete blocks
- Backup heating energy
  - Electricity
  - Gas
- Climate zone
  - North of France (H1a)
  - South of France (H3)



Life cycle phases





Scope

Selected impacts categories

Category	Indicator		Unity
RESSOURCE DEPLATION	ILCD midpoint : Abiotic Resource Depletion Potential for elements (ADP_e)	ADP_e	kg Sb eq.
ACIDIFICATION	LCD midpoint : Acidification Potential (AP)	AP	Modecule H^+ eq.
EUTROPHICATION	CML 2001 : Eutrophication Potential (EP)	EP	kg PO_4^{3-} eq.
CLIMATE CHANGE	ILCD midpoint : Global Warming Potential (GWP100)	CC	kg CO_2 eq.
PRIMARY ENERGY CONSUMPTION	Impact 2002 + : NRED	NRED	MJ primary (MJ_p)

Evaluation of impacts

Results :

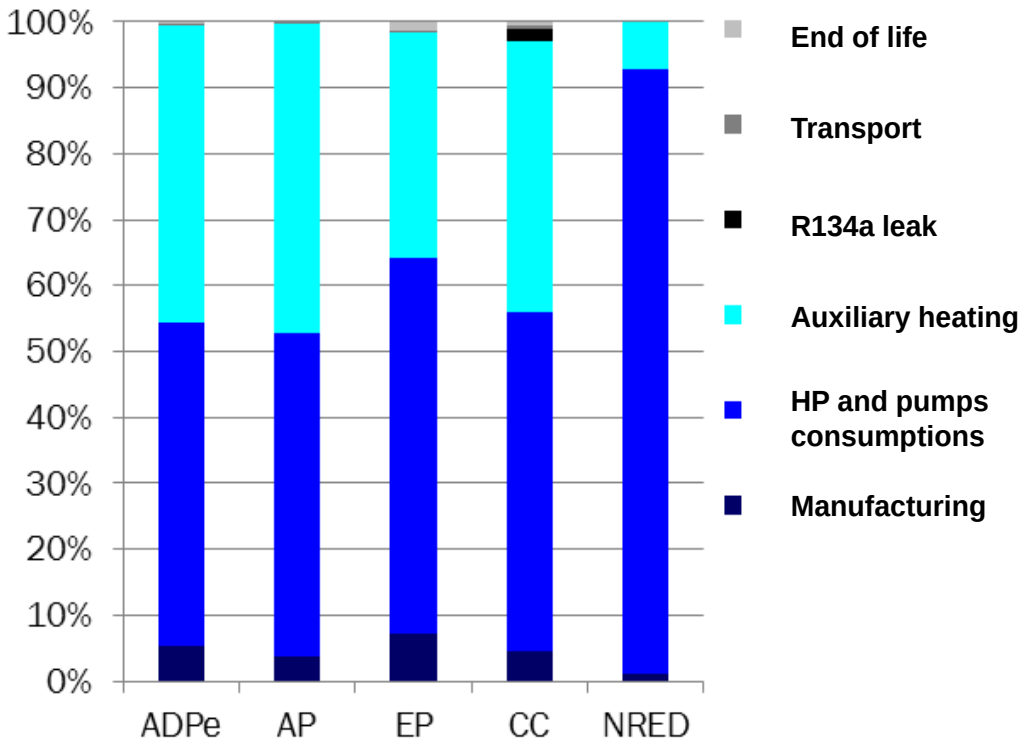
REFERENCE

Size : « small » system

Climate : H1a (Paris)

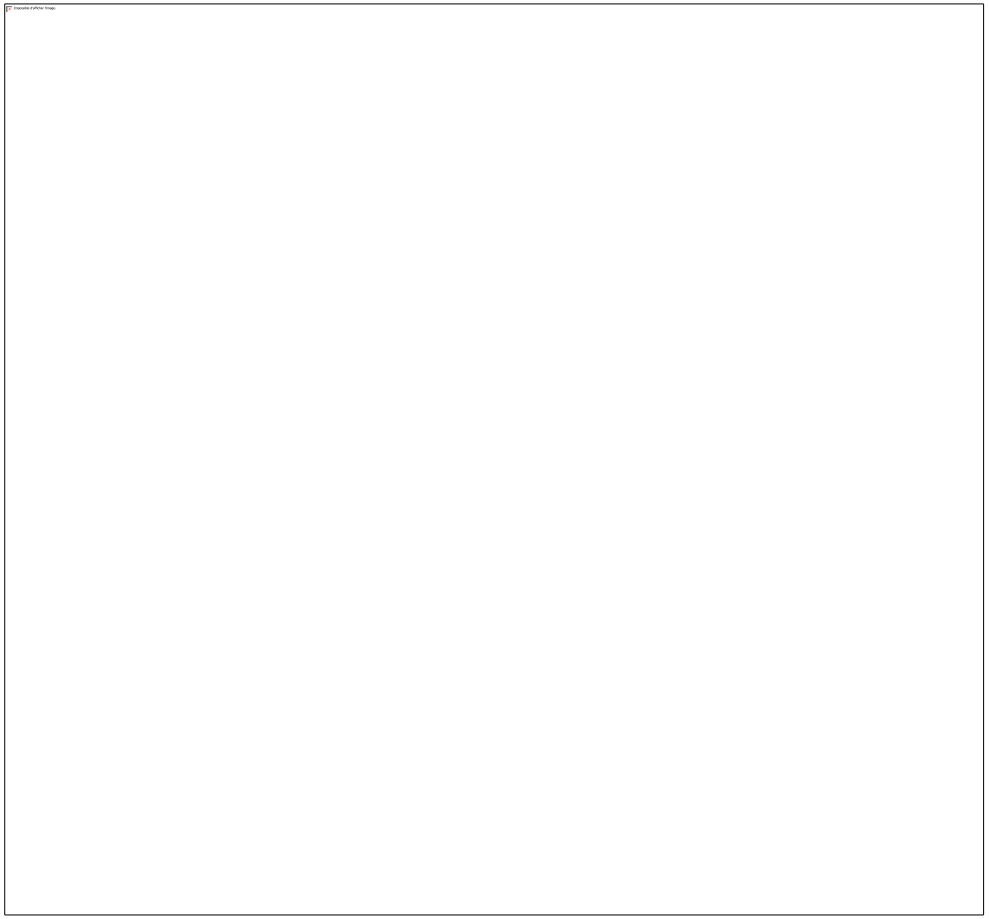
Support : galvanised steel

Backup heater energy: electricity



Evaluation of impacts

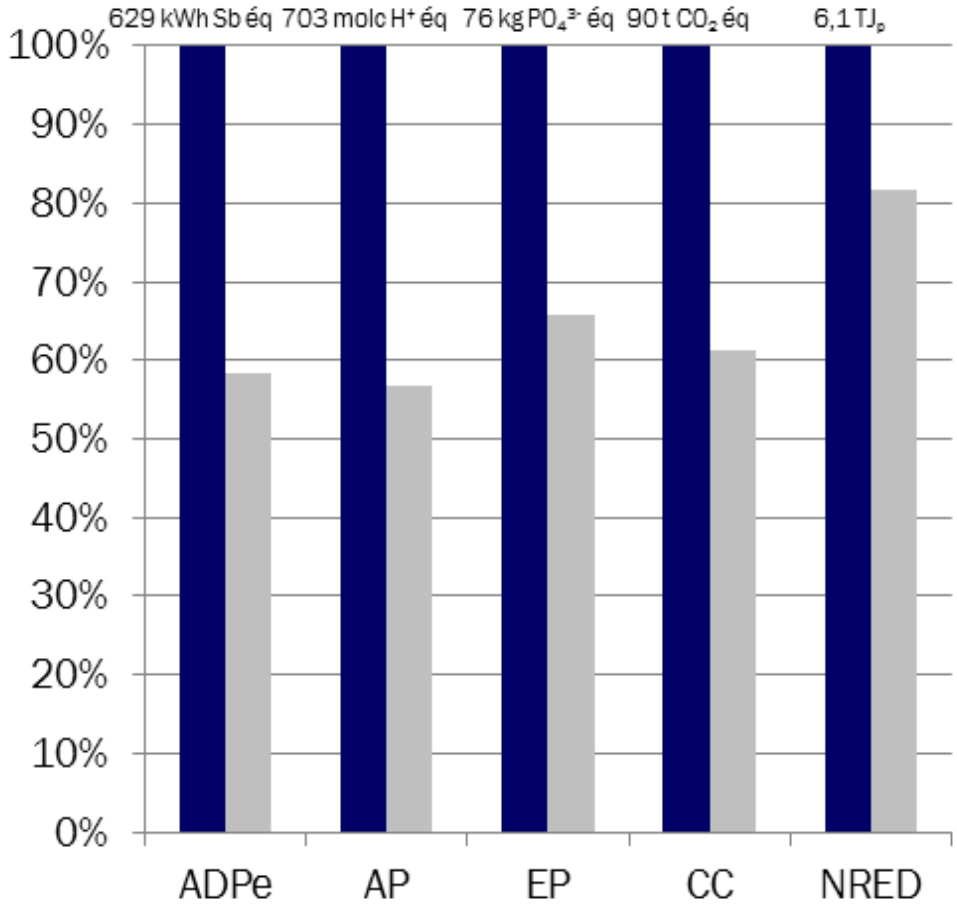
Type of support



These results exlude the « use » phase of the system

Evaluation of impacts

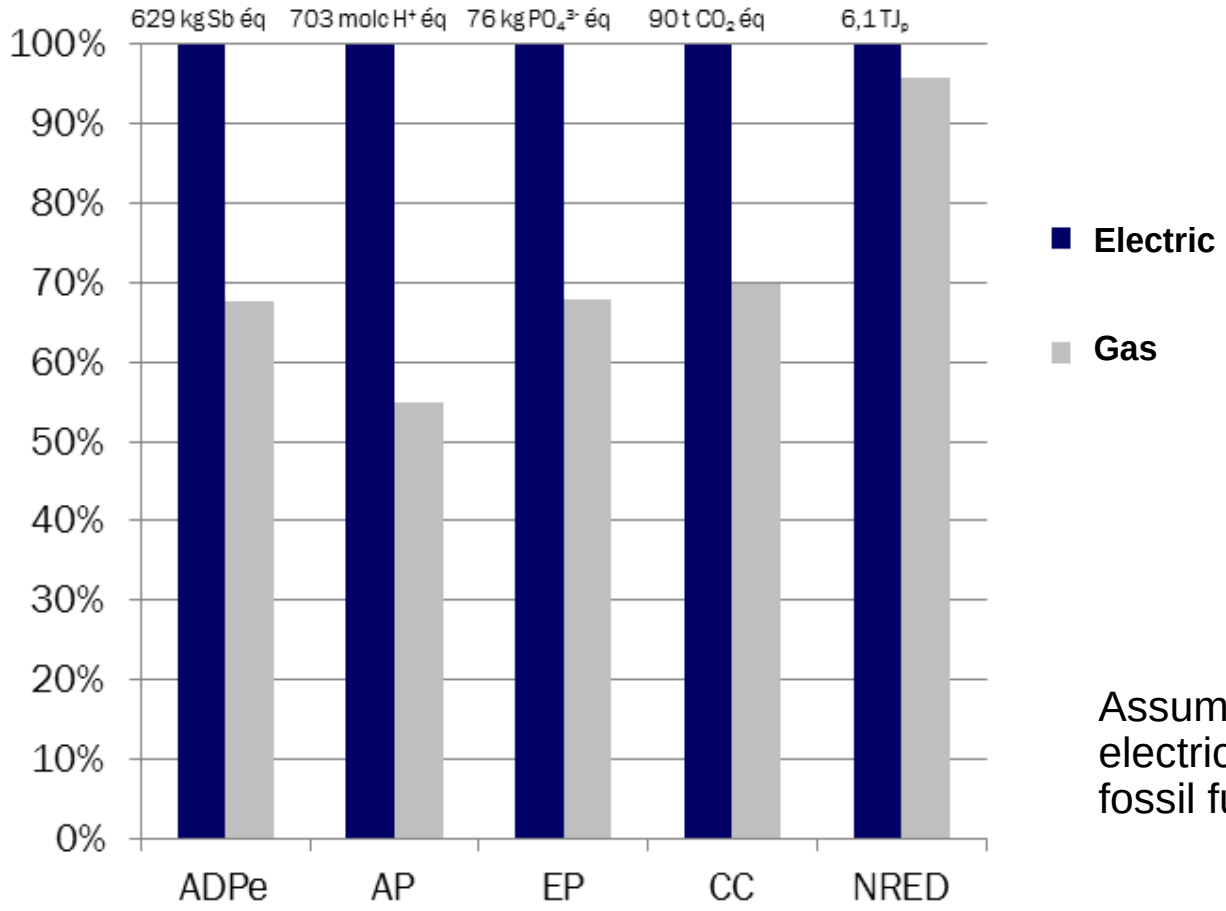
Climatic areas



Auxilary heater and HP compressor comsuptions higher in Paris than in Marseille

Evaluation of impacts

Backup heater energy



Assumption on the origin of electricity for backup heater : fossil fuel plants

Conclusion

Results validation

Critical review / ISO 14044 Std

LCA benefits

Better knowledge of the entire system production process

Map of processes

Material inventory

Improvement of the system

Based on highlighted « hot spots »

Lower environmental footprint

Energy consumption and manufacturing phase

Eco-design of new products

thank you

www.heliopac.fr

www.avnir.org