

Energy Efficiency opportunities in the Agri-Food Sector: a success case in using efficient refrigeration systems

Matteo Locati



Final Conference of the EU-MERCI project, London 23rd January 2018

Agenda

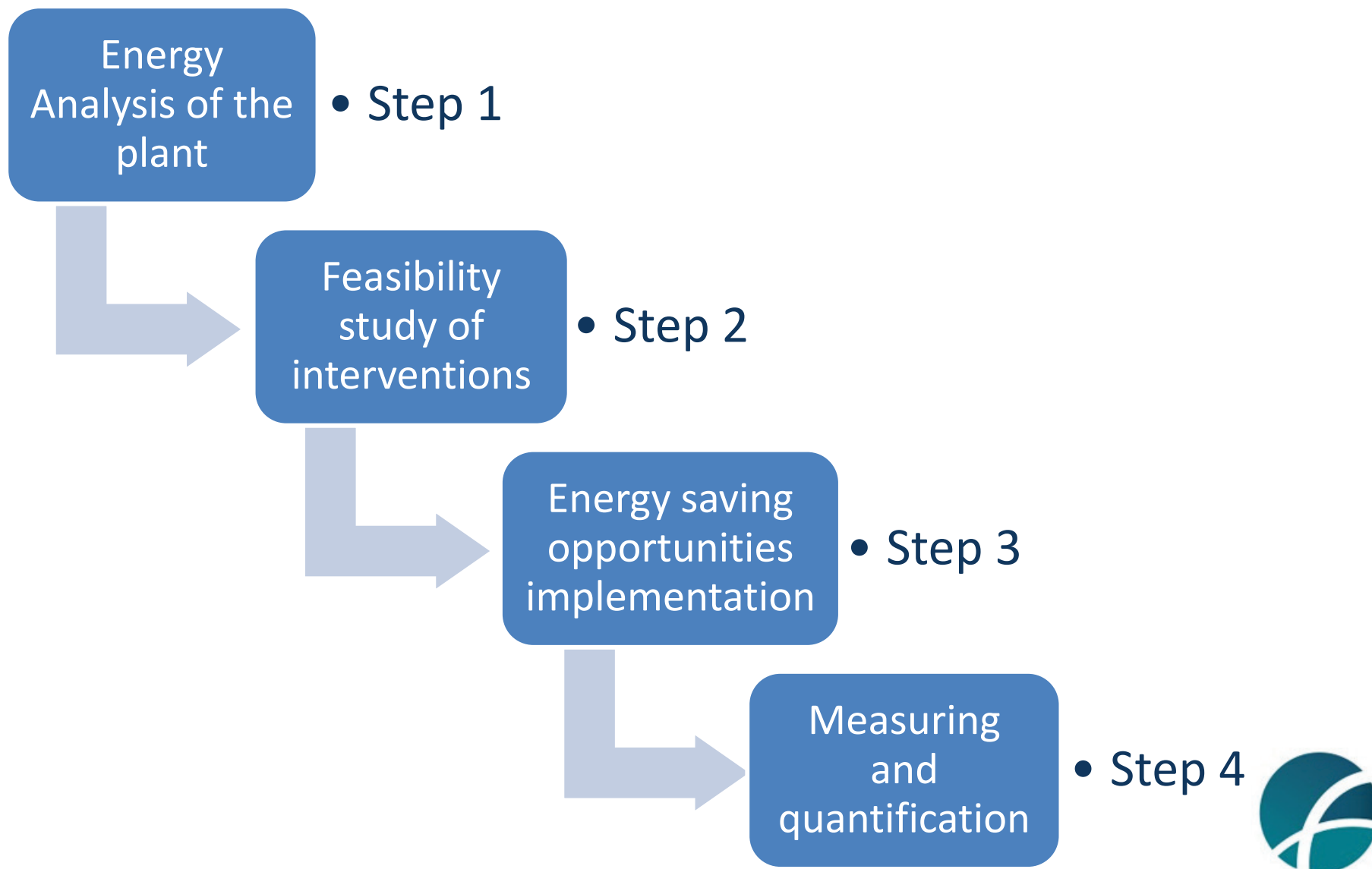
Energy Efficiency opportunities in the Agri-Food Sector: a success case in using efficient refrigeration systems

- Plant Energy Analysis
 - Context
 - Results
- Technical-economic feasibility study
- Energy saving intervention implementation
- Other Energy Saving intervention



Project road map

Integrated approach towards Energy Efficiency



Energy Analysis

Structured analysis of the energy consumption of the plant aimed at:



Classification and
quantification of
consumption centers

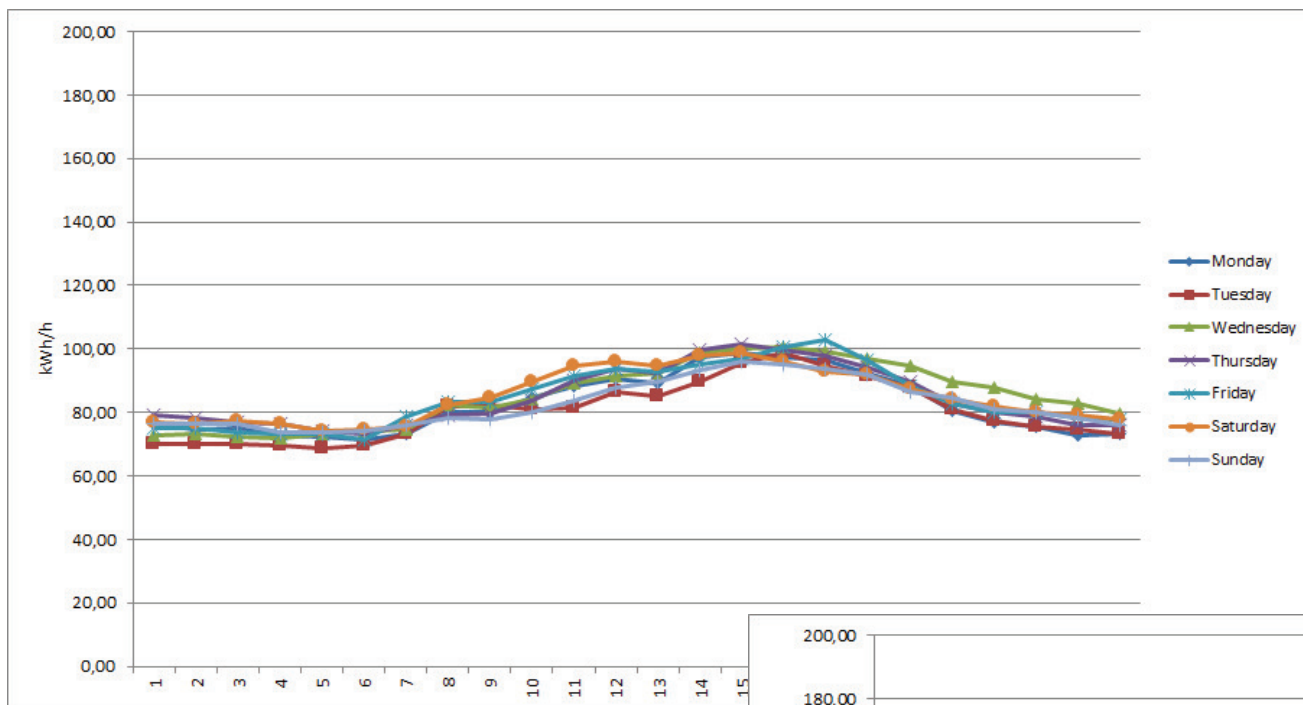


Individuation of critical
areas



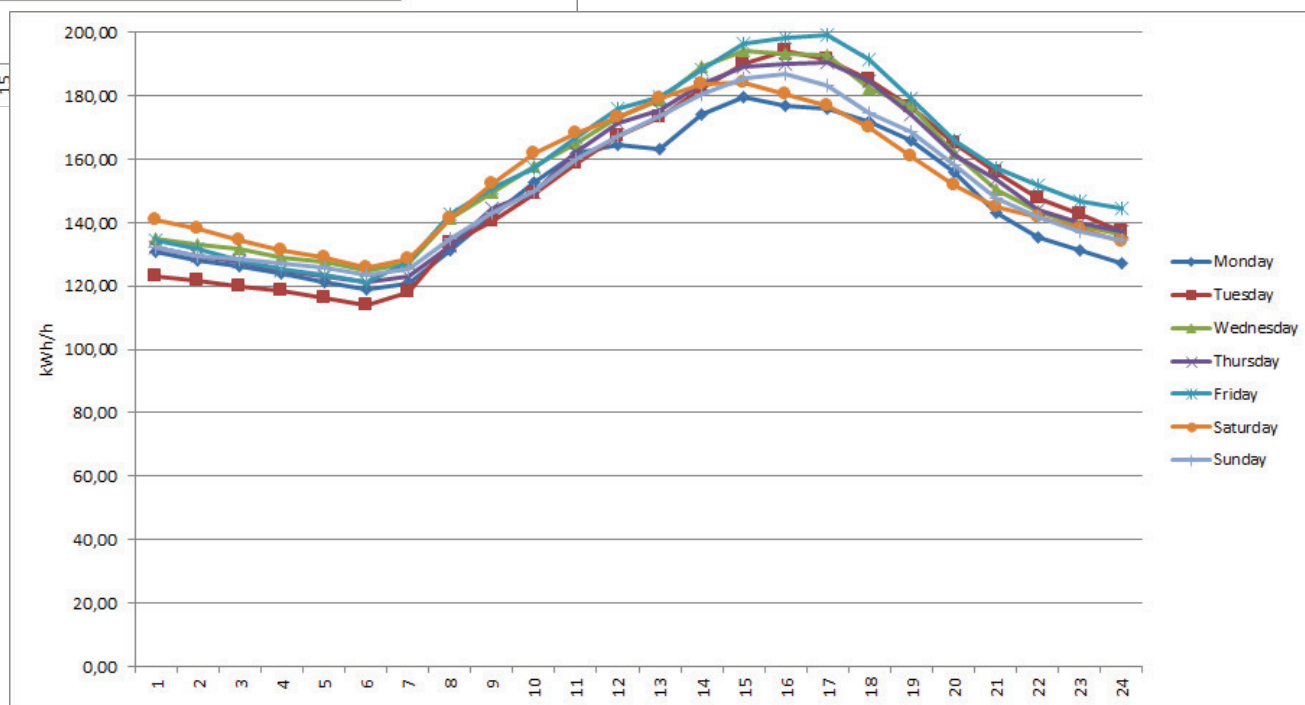
Proposal of energy saving
interventions





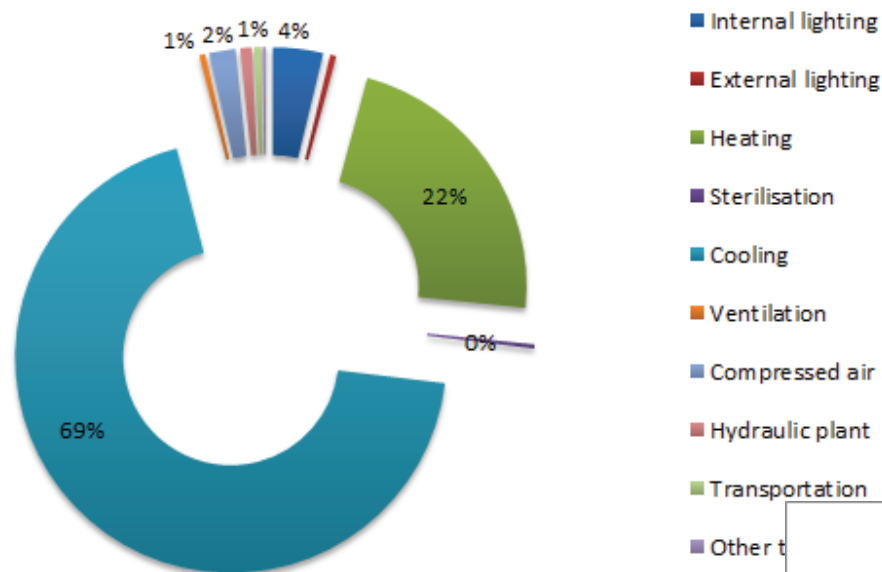
Electric energy seasonal load profile (winter)

Electric energy seasonal load profile (summer)



Energy Analysis

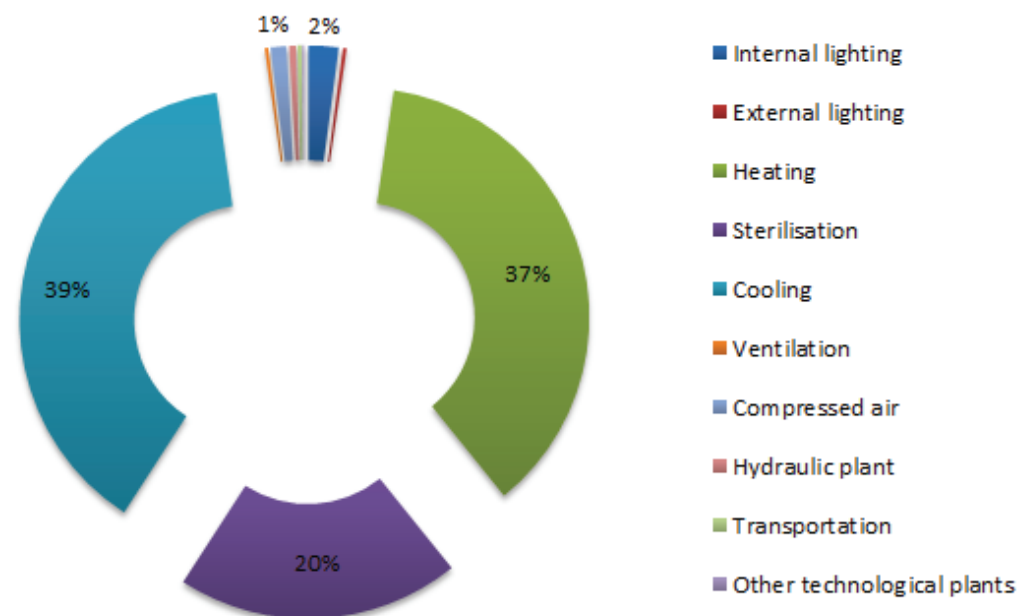
Electricity annual consumption per technological area (kWh)



Electric consumption
classification by
technological area

Overall consumption
classification by
technological area

Yearly consumption per technological area (toe)



Feasibility study

Intervention:

- Replacement of the existing chiller with a new high-efficiency machine

Quantification of
the correct cooling
needs

Evaluation of
different
technological
alternatives

Choice of the new
machine through
economic
indicators

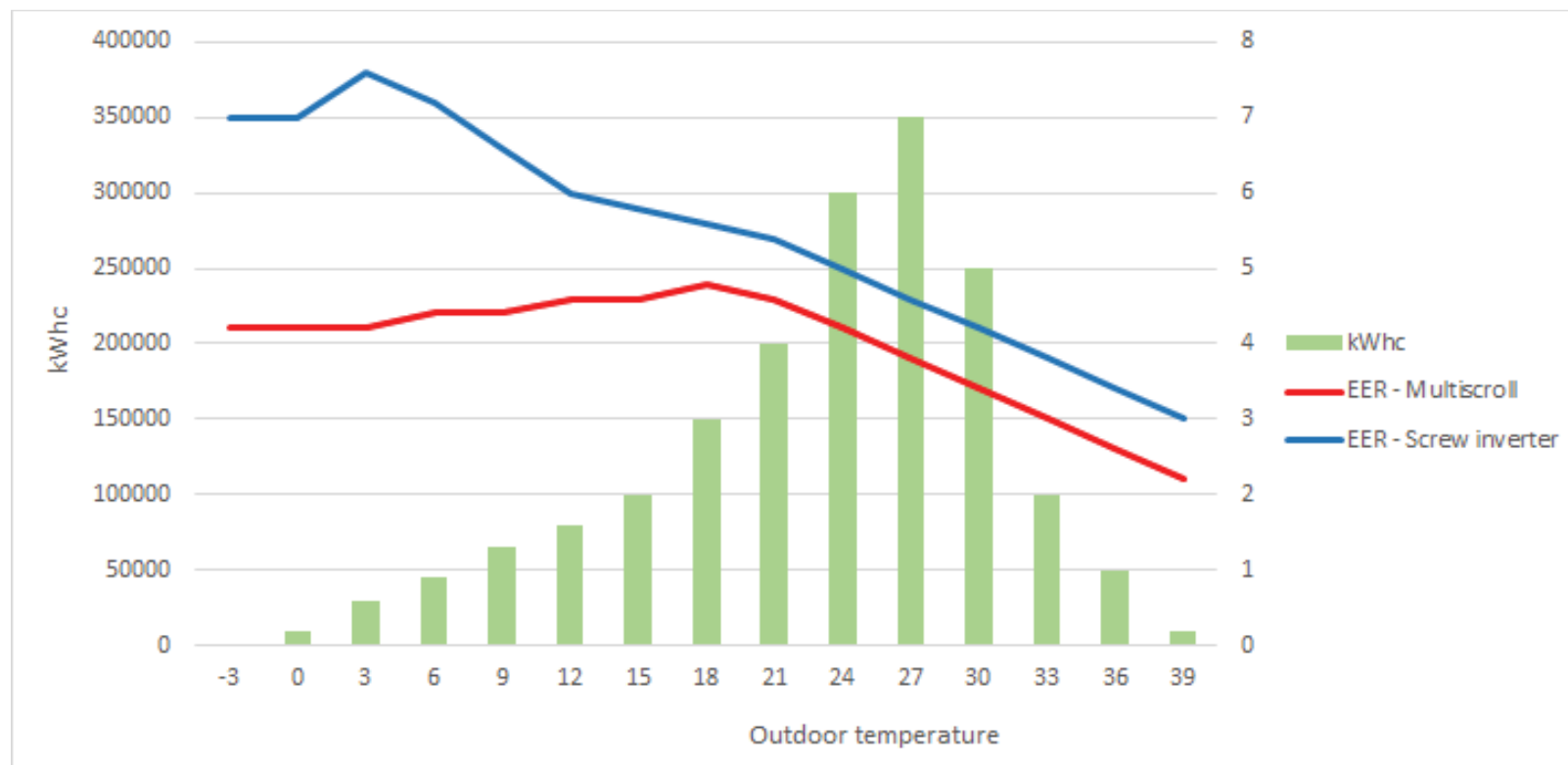
Feasibility study

CHILLER	Circuits	kWc	kWe *	EER
30 GX 247 (EXISTING)	2	809	297,0	2,72
30 RB 0802 - MULTISCROLL	3	768,8	300,7	2,56
30 XAV 0800 - SCREW INVERTER	2	813,1	242,5	3,35

Technological alternatives

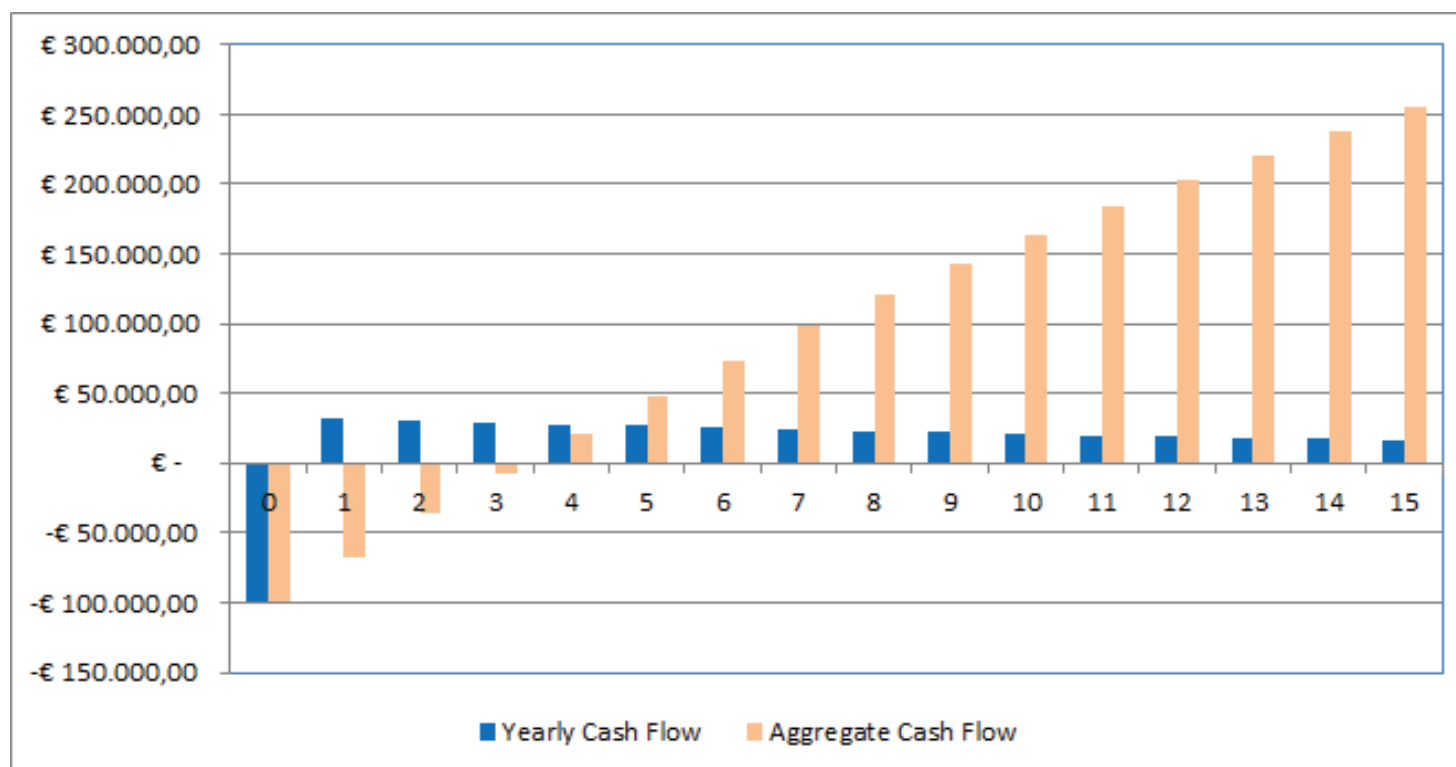
* Standard Eurovent Conditions: Evaporator entering/leaving water temperature 12°C and 7°C. Outdoor air temperature 35°C

Cooling needs

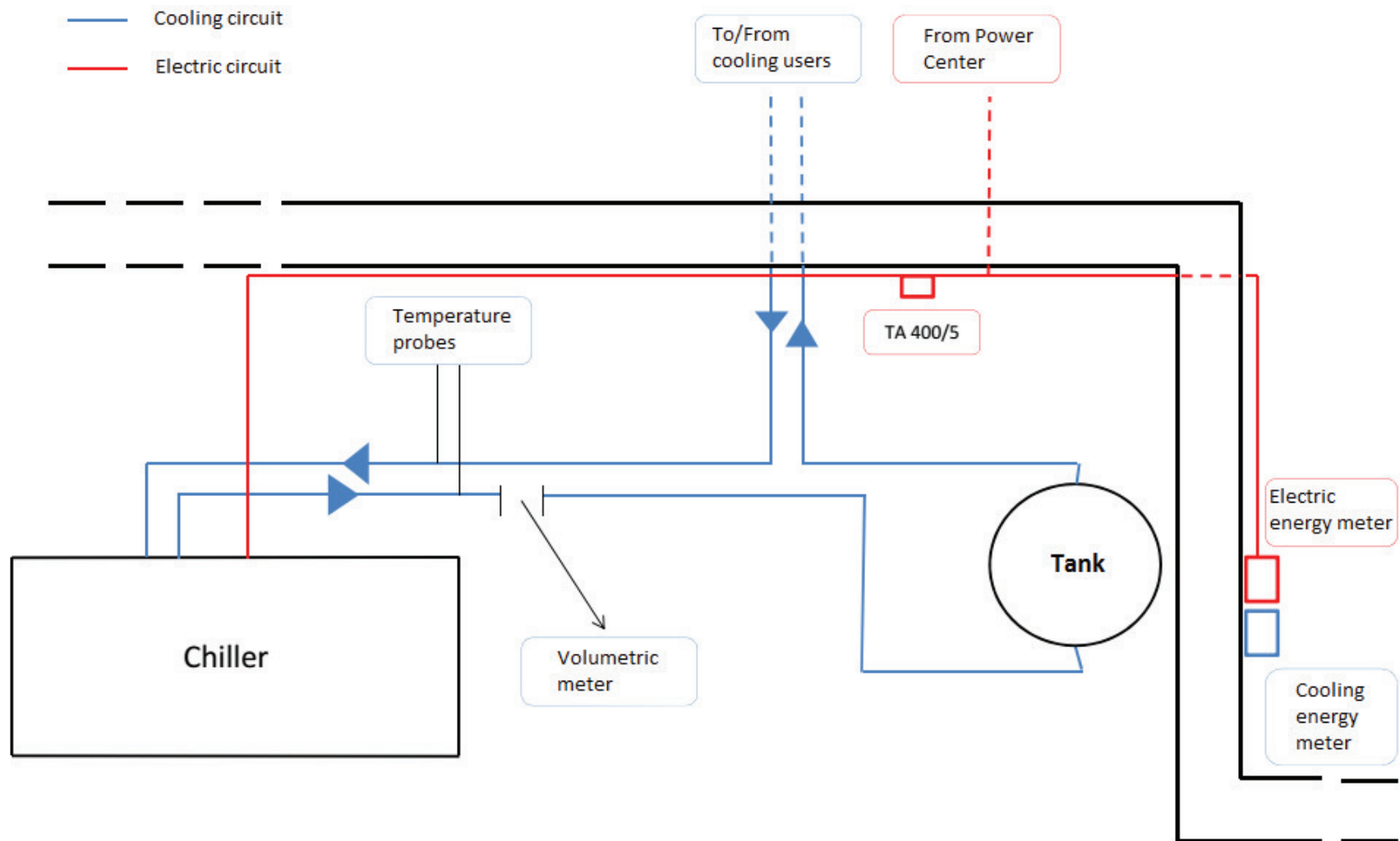


Feasibility study

Economic Indicator	Value
Pay-Back Time (PBT)	3,2
Net Present Value (NPV)	255.000 €
Internal Rate of Return (IRR)	33,8%



Measuring and quantification



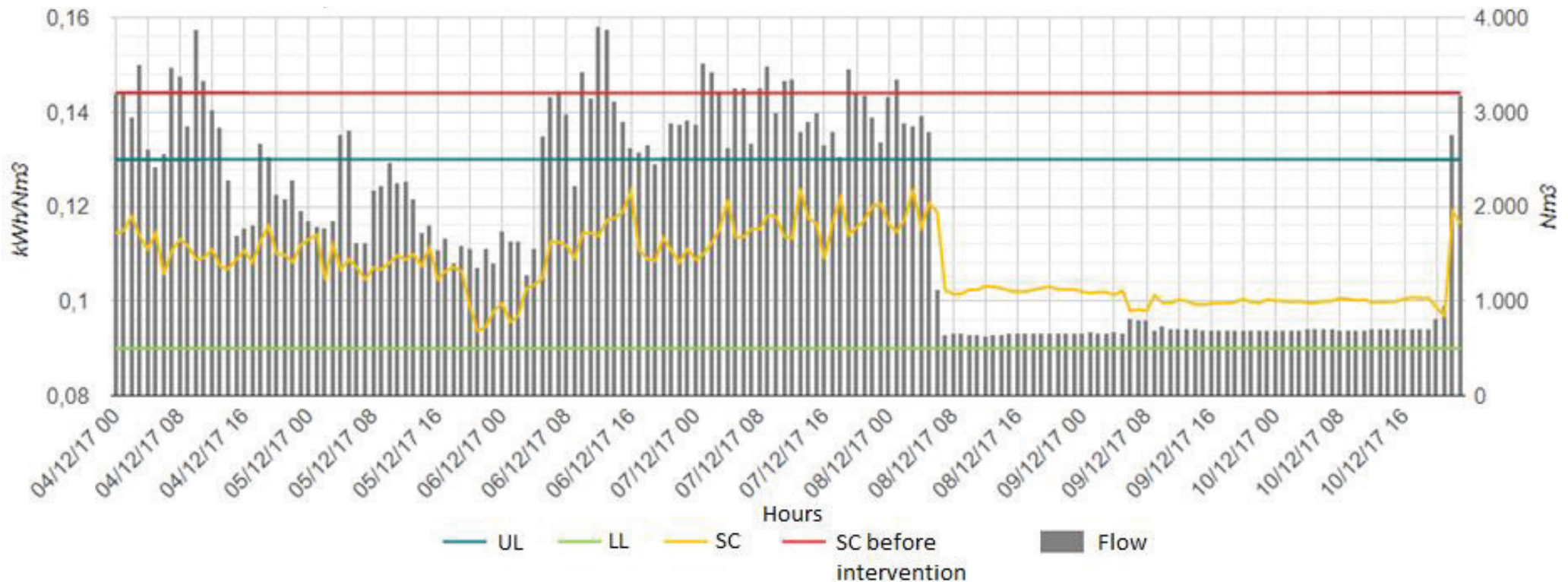
Intervention proposals

Intervention	Priority	Intervention classification	Good practice EU MERCI
Replacement of the current chiller with a high-efficiency unit	High	Technological	Yes
Installation of speed-regulation systems according to effective load on pumps for chilled water	High	Technological	Yes
Enlarge the tolerance of temperature and humidity set-points to avoid continuous heating/cooling and humidifying/drying in cells	High	Procedural	
Specific maintenance activities on air treatment centres	High	Procedural	
Introduction of maintenance and equipment/machinery purchase policies, focusing on energy consumption drivers and costs on plant lifecycle	High	Procedural	
Installation of a VSD machine for compressed air production	Medium	Technological	Yes
Intervention on batteries of condensers of the current re-phasing system (the value of the power factor is below 0,9 in all months)	Medium	Technological	
Installation of a plant for pre-cooling in summer and pre-heating in winter for external air of all air treatment centers	Medium	Technological	Yes
Replacement of current fluorescent T8 tube bulbs having a ferromagnetic power unit with LED lamps	Medium	Technological	
Replacement of heaters burners (now using agricultural diesel) with new biomass burners	Medium	Technological	Yes
Installation of a natural gas trigeneration plant	Medium	Technological	Yes
Installation of a high-pressure humidification plant	Low	Technological	

Compressed air production:

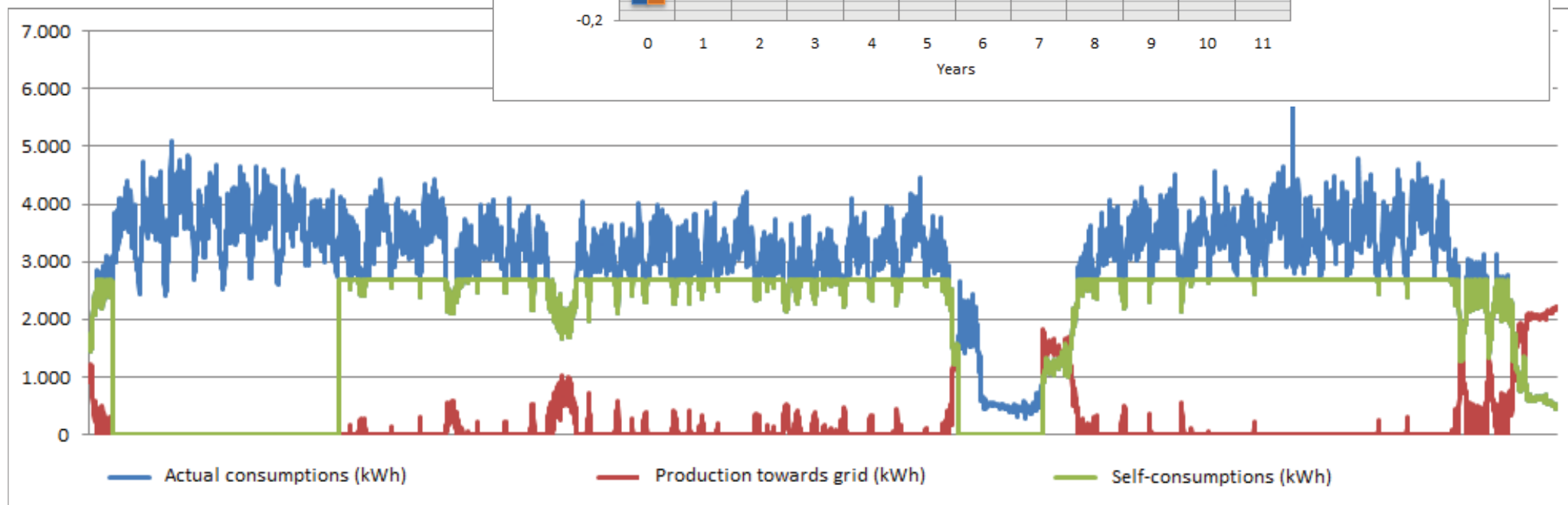
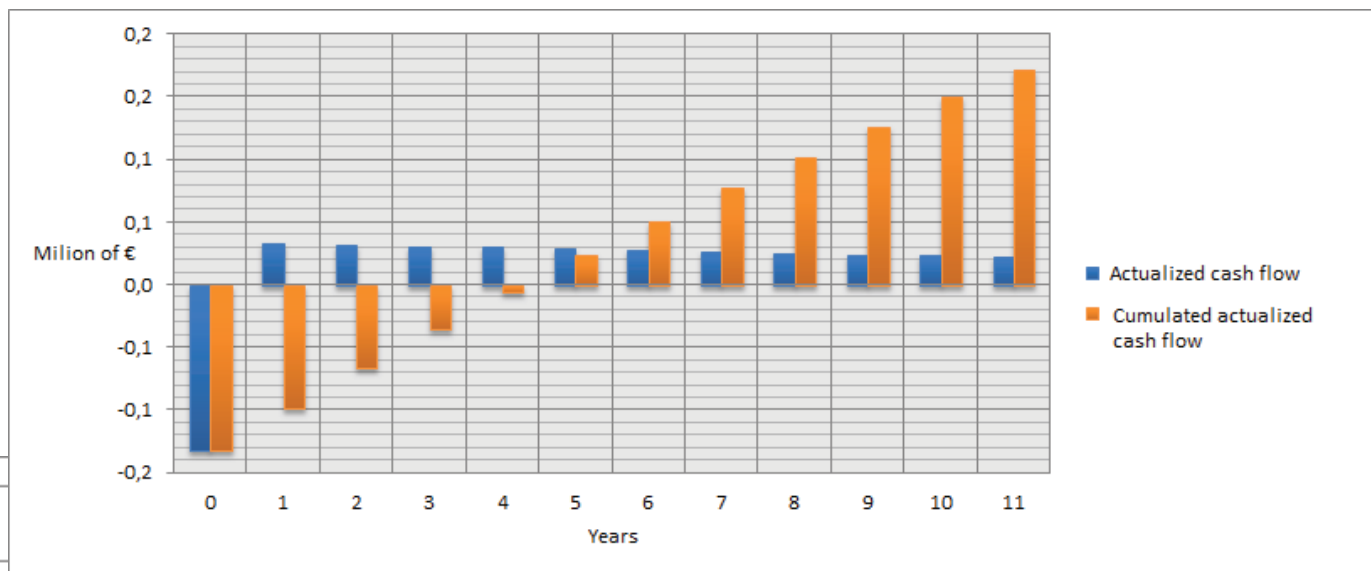
1. Leaks detection and reduction
2. Reduction of circuit pressure
3. Substitution of a load/unload machine with a VSD machine

Specific Consumption (SC – kWh/Nm³) before and after interventions



Trigeneration plant:

Feasibility study through simulation of future consumptions in different scenarios



Perspectives

ENERGY
COSTS
REDUCTION



ISO 50001
Certification



Energy Management
System (EMS)



Energy Analysis and
interventions





FEDABO S.p.A.

via Romolo Galassi, 22
25041 Darfo Boario Terme (Bs)

Tel. +39 0364 538000

Fax +39 0364 538068

www.fedabo.com



FEDABO

L'ENERGIA GESTITA BENE