

Site: Parma

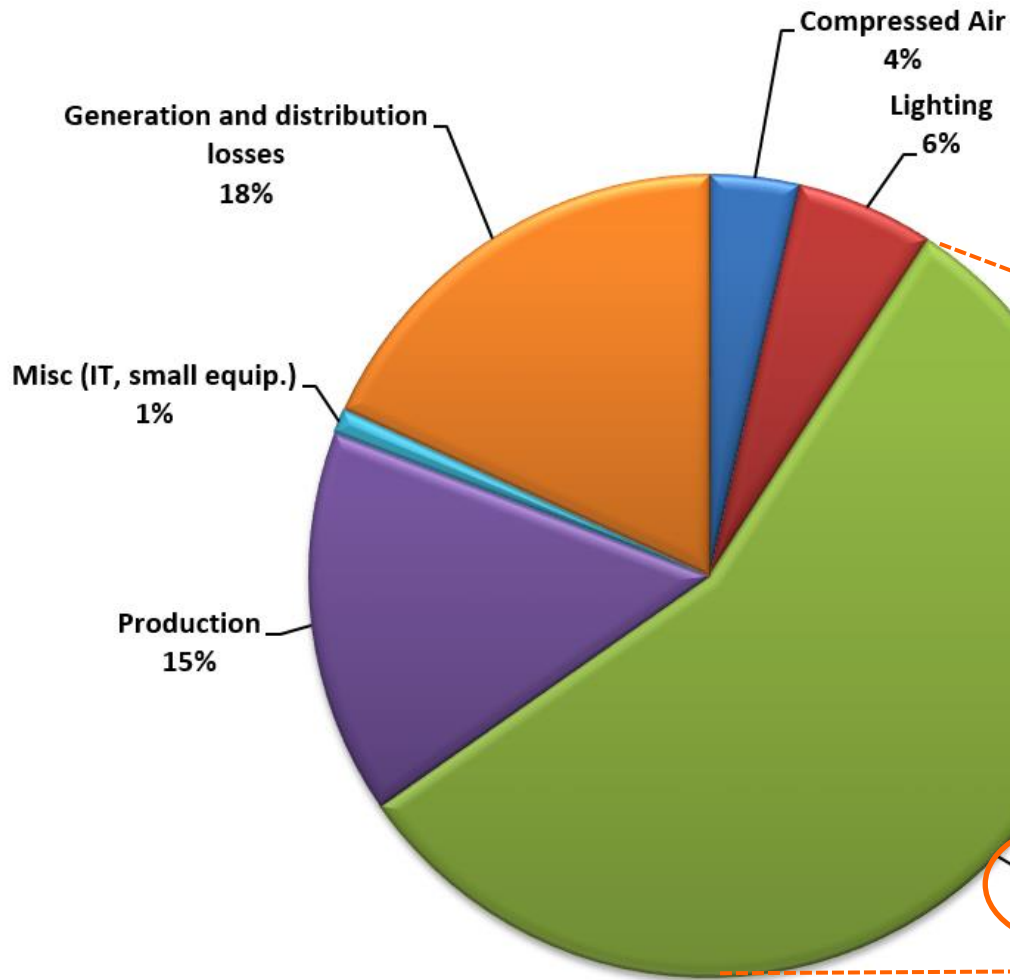
Location: Italy

Sector: GMS Manufacturing

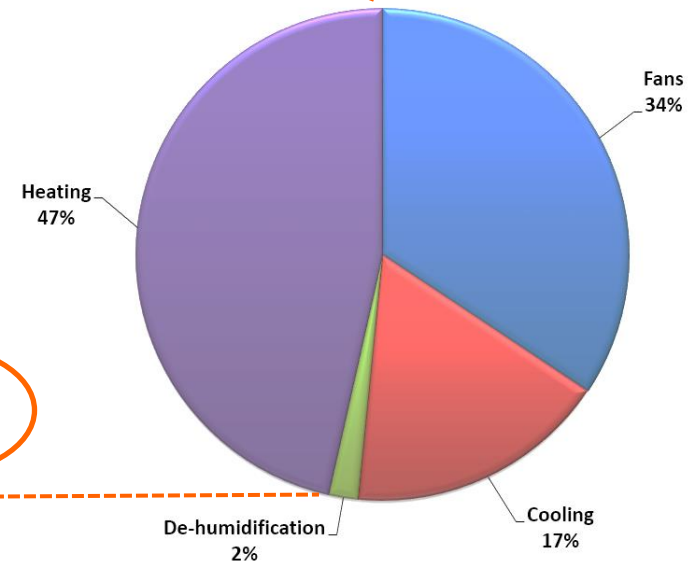
Project Type: Energy Kaizen

Date: November 2016

All energy by uses (Cost)



All energy by uses	€	£
Compressed Air	102,784	87,105
Lighting	157,912	133,823
HVAC	1,591,533	1,348,756
Production	439,417	372,388
Misc (IT, small equip.)	28,869	24,465
Generation and distribution losses	515,534	436,893
Total	2,836,048	2,403,431



Kaizen HVAC Overview

GSK Parma Site



Current State

- Good implementation of HVAC inverters – fan energy has been reduced vs. design
- 100+ HVAC units presents a very large maintenance workload – with complex SCADA system. Site is willing to split EMS and BMS to unlock more opportunity
- Setback, Switch-off, Demand control opportunities already implemented in support areas – Warehouse, Office, other support areas

Opportunities from Kaizen

- HVAC Setback of non-sterile production areas – Engagement with Quality very positive
 - Supportive of GSK TP02 approach, Risk assessment and trial project – Corridors and Secondary packaging
 - Good discussion on potential quality risks to address during evaluation
- SCADA optimisation of heating/cooling valves - reduce utility demand
 - achieve critical parameters with less energy wasted on heating and cooling by enhanced maintenance
- Focus on EC motor & fan replacements – Up to 30% motor savings,
 - reduced maintenance vs. belt driven fans, technology is improving continuously, higher pressures
- Laboratory is big energy user – further retrofit of existing systems,
 - using some good design principles from current Lab project (CD-28)

Kaizen HVAC Opportunity

GSK Parma Site



Project	Capital Cost (€)	Identified Savings (kWh)	Identified Saving (CO2)	Cost Saving (€)	Payback (years)
SCADA Optimisation Phase 1	6,935	263,000	52	€ 9,926	0.70
SCADA Optimisation Phase 2	20,805	775,000	153	€ 29,397	0.71
Ampoule Line 1 2020 set back	14,700	166,000	48	€ 18,885	0.78
EC Fan & Motor retrofit - Trial (CD-630)	4,500	31,000	11	€ 4,930	0.91
Heat recovery retrofit CDZ 900 - 910 THCF	48,400	453,000	96	€ 23,006	2.10
EC Fan & Motor retrofit - Phase 1 (24 Units)	136,568	395,000	135	€ 62,815	2.17
Chem & Micro labs VAV retrofit (supply and extract) - CD27	117,400	532,000	116	€ 29,769	3.94
Air change reduction in five areas of Building P	70,140	103,000	35	€ 16,380	4.28
Area set back (two Days) air flow and temperature and RH	294,000	612,000	171	€ 64,701	4.54
Totals	713,448	3,330,000	817	259,809	2.75
% of Modelled HVAC		10%	12%	19%	
% of Site Totals		5%	6%	9%	

Capital €713,448
ROI 2.75 Yrs

Most can be implemented in phases or trial basis to prove effectiveness

Maintain engagement with quality to support projects in non-sterile production areas

EC Fan & Motor retrofit

Trial project and Phase 1 roll out



Current Status:

- Site has a mixture of fan type, size and age (oldest 1980's), many running 24/7

Project Plan:

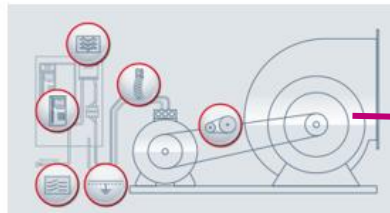
- Replace fan and motor/VSD with single high efficiency EC fan & motor to match the casing type for ease of installation

Quality Risk Assessment:

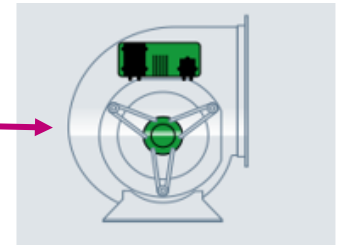
- No risk, fan will be selected to achieve same flow and pressure. Maintenance activity.

Financial Summary:

Project	Capital Cost (€)	Identified Savings (kWh)	Identified Saving (CO2)	Cost Saving (€)	Payback (years)
EC Fan & Motor retrofit - Trial (CD-630)	4,500	31,000	11	4,930	0.91
EC Fan & Motor retrofit - Phase 1 (24 Units)	136,568	395,000	135	62,815	2.17



Belt drive AC centrifugal cased fan



HVAC setback outside of production hours (Non-sterile)



Airflow reduction, wider Temp & Humidity limits

Current Status:

- Site operates shift pattern, no production on some days. HVAC remains at full operation

Project Plan:

- Follow GSK TP02 Guidance for turndown of Non-Sterile areas. HVAC control will reduce airflow within agreed limits, temperature will remain within critical parameters (15-25°C). Install fan pressure control, CAV box for FA intake, improve CHW+HW valve control

Quality Risk Assessment:

- QA review as per TP02. Full change control procedure. Areas will require re-validation.

Financial Summary:

Project	Capital Cost (€)	Identified Savings (kWh)	Identified Saving (CO2)	Cost Saving (€)	Payback (years)
Area set back (two Days) air flow and temperature and RH	294,000	612,000	171	64,701	4.54



Heat recovery retrofit – THCF CDZ 900/910



100% Fresh air plate heat exchanger – bypass control

Current Status:

- THCF area is 100% fresh air and operates 24/7. Existing run around coil heat recovery is inefficient and not currently operational.

Project Plan:

- Install roof mounted plate heat exchanger (high efficiency > 65%, low pressure drop) with bypass duct for when conditions are not favourable. AHU control will look at outside air temperature and

Quality Risk Assessment:

- All current parameters will be measured before and after installation to prove operation. No change to airflow rate.

Financial Summary:

Project	Capital Cost (€)	Identified Savings (kWh)	Identified Saving (CO2)	Cost Saving (€)	Payback (years)
Heat recovery retrofit CDZ 900 - 910 THCF	48,400	453,000	96	23,006	2.10

Laboratory Variable Air Volume retrofit



Chem & Micro labs (supply and extract) - CD27

Current Status:

- Chem & Micro labs have around 18 fume exhausts operating 24/7 for safety and a central AHU (CD-27) providing makeup air. Some manual turn down of supply fans is done on SCADA already.

Project Plan:

- Central exhaust fans & stack with run/standby bifurcated fan connected to exhaust header with pressure control. Fresh air Bleed damper on roof, to maintain constant extract velocity. Remove individual extract fans, VAV retrofit on cupboards with face velocity sensor. Room pressure sensors and AHU static pressure controls modifications.

Quality Risk Assessment:

- Area is currently non classified. Change control will be carried out for SCADA .

Financial Summary:

Project	Capital Cost (€)	Identified Savings (kWh)	Identified Saving (CO2)	Cost Saving (€)	Payback (years)
Chem & Micro labs VAV retrofit (supply and extract) - CD27	117,400	532,000	116	29,769	3.94

Air change reduction – Building P



Phased rebalance of air volumes – to bring in-line with GSK standard

Current Status:

- Potential to reduce in-operation air change rates in production areas, Grade C or below

Project Plan:

- Complete review of current air change rates against site & GSK standards. Rebalance and re-validate areas to achieve fan power savings due to reduced airflow in production area following change control process. Initial focus recommended - Ampoules, two areas (CD-250,19 and 110,12) FDF (630/640) SSF (CD8,CD3,CD40) Nasal Spray (CD 5/2)

Quality Risk Assessment:

- Early engagement with QA to define critical acceptance parameters. Full risk assessment and change control process. Recommend trial project prior to implementation.

Financial Summary:

Project	Capital Cost (€)	Identified Savings (kWh)	Identified Saving (CO2)	Cost Saving (€)	Payback (years)
Air change reduction in five areas of Building P	70,140	103,000	35	16,380	4.28

Company	Grade A	Grade B	Grade C	Grade D	NC
GSK GMS	0.5 m/s	>20 acph	>20 acph	>10 acph >5 in setback	As required