

Site: Piramal

Location: India

Sector: Pharmaceuticals

Project Type: 3rd Party Kaizen

Date: Jun 2018

HVAC GMP Area Optimisation



- Site GMP Area ACPH are higher than Industry Guidelines (More detailed feasibility required)
- BMS Upgrade for GMP Areas. Modular approach. Cost reduction for combining
 - VSD, Volume Control, temperature, fan monitoring
- Low Energy Filters to reduce fan power further
- Site have advised 8 day requalification process. EECO2 support with Risk Assessment to reduce this
- H Block Project Proposed as Trial to integrate all ideas (This would include EC fans)

Block	Average ACPH	Block	Average ACPH
E Block	31	L Block	37
MPP	39	M Block	40
H Block	35	Vitamin	45
Pilot Plant	35	Kilo Lab	33
Micro encapsulation	40	K Block	33
A Block	35	D Block	39
C Block	34		



HIFLO M – 85 Pa

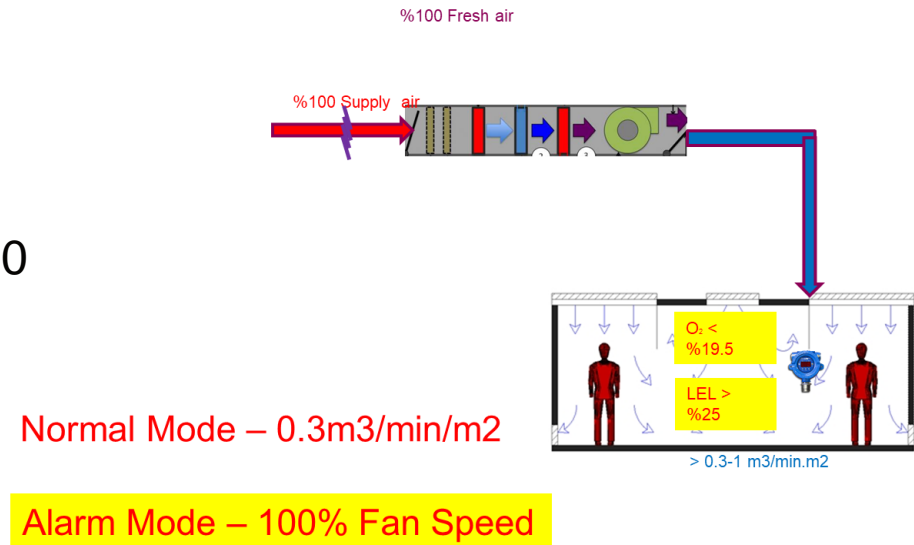
Description	Cost INR	Cost £	Saving INR	Saving £	Payback
HVAC GMP	39,500,000	434,000	11,731,371	145,513	3.4

HVAC Process Area Optimisation



- Areas are Ex Explosive Environments. Safety paramount
- ACPH's are higher than expected industry standards
- Calculate release rates for gases
- LEL Design for Solvent 0.3/m³/min/m²
- Nitrogen CO₂ Asphyxiation risk. 17% O₂ minimum
- Assessment made on ACPH reduced to 20
- Variable flow based on limits & detection
- VSD installed
- ECOMesh for improved cooling

Block	Average ACPH	Block	Average ACPH
E Block	42	L Block	35
MPP	50	M Block	38
H Block	29	Vitamin	27
Pilot Plant	34	Kilo Lab	44
C Block	39	F Block	35
D Block	35	J Block	37
K Block	32	B Block	37



Description	Cost INR	Cost £	Saving INR	Saving £	Payback
HVAC Process	43,954,545	483,500	12,843,894	144,507	3.4

HVAC Finished Goods Warehouse Central System

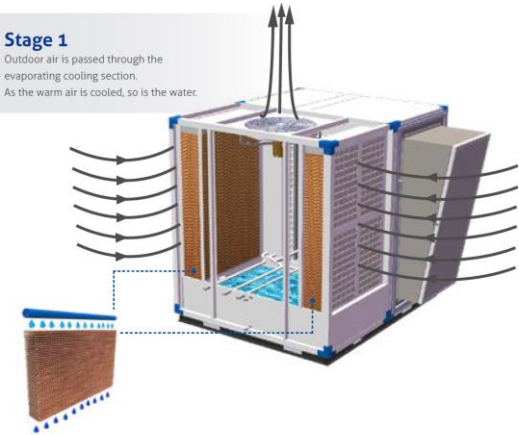


- Alternative Solution Proposed
- Indirect Adiabatic with Heat pump Boost
- 60- 80% Less Energy than traditional solution
- Fabric Duct Distribution for simplicity

Two Stage Cooling: **How it Works**

Stage 1

Outdoor air is passed through the evaporating cooling section. As the warm air is cooled, so is the water.



Description	Cost INR	Cost £	Saving INR	Saving £	Payback
FG Warehouse	1,500,000	16,500	354,179	3,896	4.2

Next Steps



- Engage EECO2 to support corporate Quality Engagement
- Develop Feasibility for GMP & Process area HVAC. Will exceed proposed savings
- Produce QRA Documentation for Pre-Approval
- Develop & Deliver Trial and Report
- Role out Solutions with Local Engineering Support
- Support 'Best Practice' delivery of all HVAC projects



Energy Kaizen Projects List



Project	TOTAL Capital Cost (RUP)	TOTAL Capital Cost (£)	Total Identified kWh	Total Identified CO2 Saving	Total Cost Saving (RUP)	Total Cost Saving (£)	Payback (years)
HVAC GMP	39,500,000	434,000	1,907,540	1,564	11,731,371	145,513	3.4
HVAC Process	43,954,545	483,500	2,088,438	1,713	12,843,894	144,507	3.4
FG Warehouse	1,500,000	16,500	57,590	47	354,179	3,896	4.2

- **Environmental Benefit :** **3,324 tCO₂ saving**
- **Energy Cost Saving Opportunity of** **25 m R p.a. (£ 293 k pa)**
- **Capital Required** **85 m R (£ 934 k)**
- **Energy Project Payback:** **3.7 years (average)**