ENERGY EFFICIENCY IN STEEL / ROLLING MILLS /FURNACES

About Us

Anama Enertech Solutions is a group company of 17-year-old Anama Energies Pvt. Ltd. dedicated to provide Cogeneration and Trigeneration solutions in Steam, Gas and Liquid fuel-based systems.

Energy conservation begins with Optimum utilization of energy resources and to optimize the same Anama has created a niche entity Anama Energy Solutions Pvt. Ltd. which is dedicated to offer services in the field Energy Audit and optimization.

Our Commitment

- **Mission:** Providing services to industrial sectors to improve their energy efficiency on a sustainable basis, thereby enhancing their competitive edge and profitability.

- **Vision:** To be a global leader in energy conservation domain, through energy audit services, energy efficiency project implementations, training in energy management and execution of green eco-friendly projects.

AREAS OF OPERATION

Anama Energies Pvt Ltd:

- **Steam Turbine Based Cogeneration and Trigeneration.**
  - Tailor made CHP solutions through extensive range of steam turbines
  - Back pressure, Extraction cum condensing as well as condensing turbines

- **Natural Gas based Cogen**.
  - CHP solutions using Gas Engines and Turbines with Waste heat recovery system
  - Vapor Absorption, Process heat projects from waste heat of gas engines

- **Biogas/Biomass based Power generation and CHP.**
  - Sole representative of Schmitt Enertech
  - Technology licensee of IISC – Bangalore
  - Biomass briquette based process steam and CHP
  - **Biomass gasification for process/power**

AREAS OF OPERATION

Anama Enertech Solutions Pvt Ltd:

- Comprehensive Energy Audits for Electrical and Thermal Systems.
- Energy Efficiency Project Implementation.
- Energy Management Training Programs.
- Energy Management services for Gas Turbine Power plants
- CDM Projects for Carbon Credits.
- Waste Heat Recovery and Cogeneration Feasibility.
- Water System Audits.

Objectives of Energy Audit

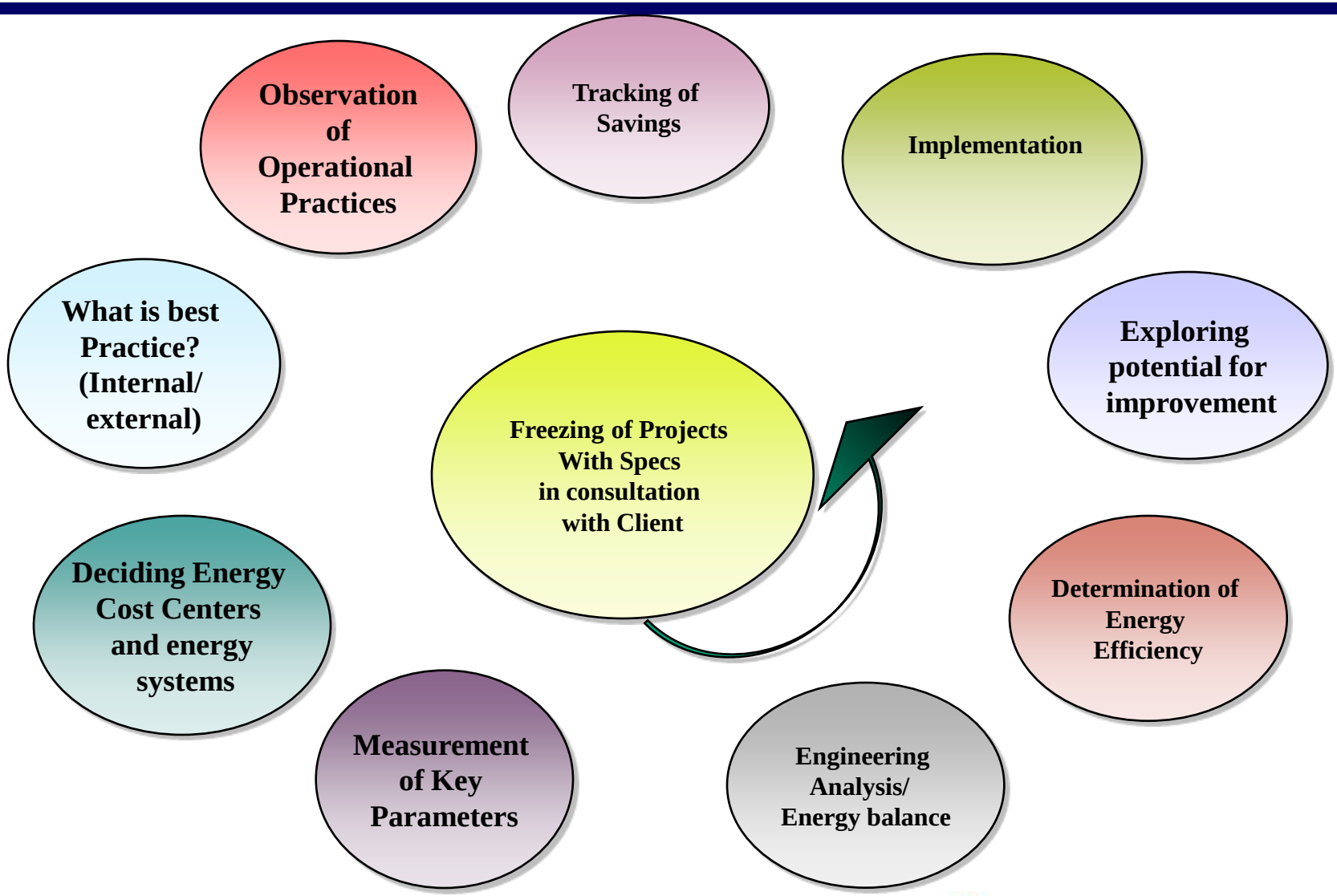
- ✓ To study the present pattern of energy consumption
- ✓ Examination and evaluation of energy efficiency of major energy consuming systems, processes and equipments
- ✓ Identify the potential areas for energy optimization
- ✓ To recommend energy conservation proposals with cost benefit analysis
- ✓ To identify CDM, cogeneration and renewable energy projects
- ✓ Training to plant personnel for effective energy management

STATE-OF-THE-ART INSTRUMENTS AT ANAMA

Major instruments used for energy audit

- ✓ 3 phase power quality analyser
- ✓ Single phase power analyser
- ✓ Flue gas analyser – Measurement of parameters in flue gas
- ✓Contact type temperature indicators
- ✓ Infra-red non contact temperature indicator
- ✓ Ultrasonic flow meter – Fluid flow
- ✓ Anemometer – Air velocity

OUR APPROACH FOR ENERGY AUDIT



Areas Covered in Audits

- **Thermal System:** Boilers, Hot Water Generators, Waste Heat Recovery Systems, Steam distribution system, Insulation, Steam Traps, Condensate and Flash Recovery system, Thermic Fluid Heaters, Instrumentation and Controls, Monitoring , Cogeneration & Fuel switch over options.
- **Electrical System:** Transformers, Distribution, Analysis of Demand, PF, Improvement, Motor Loading, Optimizing measures for equipment and system performance such as Blowers, Pumps, Fans, Compressors, option of Variable Speed Drives, Controls and Monitoring System, Cable Size analysis etc.
- **Compressed Air System:** Compressor Efficiency, Distribution, Distribution, Line Sizing, Layout, Accessories, Air Quality, Leakage Identification, Pressure Drop, Controls and Monitoring system
- **Water System:** Water Balance, Line Sizing, Pump Selection, Piping Layout, Accessories, Optimization of Consumption,
- **HVAC and Refrigeration System :**Chiller performance , AHU , optimization of A/C loads, Cooling Towers , Pumps
- **Lighting Systems**

OUR ESTEEMED CLIENTELE
ENERGY AUDITS - 2008

AUTOMOTIVE & TYRE
• BAJAJ AUTO LTD.
• BADVE GROUP
•APPOLO TYRES

STEEL
• ISPAT INDUSTRIES LTD.
• UTTAM GALVA STEELS LTD.

HOTELS
• TAJ GROUP OF HOTELS
• INTERCONTINENTAL GROUP OF HOTELS
• LE-MERIDIEN
• BHARAT GROUP OF HOTELS

STARCH
• RIDDHI SIDDHI GLUCO BIOLS

PHARMA
•BRIOCIA
•BIOCON

OUR INTERNATIONAL CLIENTS

• Al Sallan Foods SAOG – Oman
• Strategic Foods – Dubai (Britannia group)
• Bidco Oil Refineries (Kenya)
• Ispat / Kremikovetzi(Bulgaria)
• Pure Ice cream (Sharjah)
• Taj Pamodzi (Zambia)

TEXTILE INDUSTRY
• BHARAT VIJAY MILLS – TEXTILE DIV.

FOOD & BEVERAGE INDUSTRY
• KWALITY BRAND COMPANIES
• UNITED BREWERIES LTD.

ENERGY EFFICIENCY IN IRON & STEEL / FOUNDRIES / ROLLING SECTOR

ENERGY CONSERVATION AVENUES

HEAT TREATMENT FURNACE EFFICIENCY OPTIMIZATION
WASTE HEAT RECOVERY FROM FURNACES / DG SETS
OPTIMIZATION OF BOILERS / STEAM SYSTEM
COGENERATION POSSIBILITY THROUGH WASTE HEAT RECOVERY
TEMPERATURE CONTROL OF MELT TO AVOID OVER HEATING
INSULATION FOR FURNACE LID
OPTIMIZATION FOR FURNACE LOADING AND CHARGE PREPARATION
OPTIMIZING CYCLE TIME FOR THE PROCESS (INCLUDING CHARGE HOLDING TIME)
ALTERNATE FUELS FOR FIRED FURNACES
CHANGE OVER FROM ELECTRICAL HEATING TO GAS / LPG
USE OF BLAST FURNACE GAS FOR HEATING / COGENERATION
CONTINUOUS OPERATION OF FURNACE ….OPTIMIZE CYCLE TIME
REDUCE WEIGHT OF JIGS AND FIXTURES
OPTIMIZATION OF FURNACE SIZE

UTILITIES

MAXIMUM DEMAND CONTROL
OPTIMIZATION OF MOTOR LOADING
OPTIMIZATION OF COMPRESSED AIR SYSTEM
OPTIMIZATION OF PUMPING SYSTEMS / BLOWERS
OPTIMIZATION OF A/C AND LIGHTING SYSTEMS
COOLING TOWERS OPTIMIZATION
MAXIMUM DEMAND CONTROL
PF OPTIMIZATION / TRANSFORMER LOADING OPTIMIZATION
LIGHTING OPTIMIZATION

ENERGY AUDIT FINDINGS AT UTTAM GALVA

ANAMA Energies Pvt. Ltd.
COGENERATION : An Investment in Productivity

S.NO.	DETAILS	SAVINGS RS. LAKH/year	INVESTMENT RS.LAKH	PAYBACK MONTHS
1	SHORT TERM MEASURES WITH MODERATE INVESTMENT	312.5	111.4	5
2	LONGTERM MEASURES WITH CAPITAL INVESTMENT	541.5	360	8
	Total	**854.1**	**471.4**	**7**

ENERGY AUDIT FINDINGS AT ISPAT-DOLVI

S.NO.	DETAILS	SAVINGS RS. LAKH	INVESTMENT RS.LAKH	PAYBACK MONTHS
1	SHORT TERM MEASURES WITH MODERATE INVESTMENT	489	175	5
2	LONGTERM MEASURES WITH CAPITAL INVESTMENT	8364	3990	6
	Total	**8853**	**4165**	**6**

Case Study 1: Pumping Power Optimization

Pump House – With all 3 VFD at fixed frequency
No feedback of pressure

To plant

To machine

Pump House – With 2 running completely and 1 pressure sensing VFD

Auto - throttling

Auto valve shut
When section stopped

Case Study 1: Pumping power optimization

Before Implementation

There is no feedback of pressure for VFD operation. Water flow is continuous even though particular section/machinery are not in operation

Water flow in few section not optimized.

Present power consumption of pumps	=	646	kW

After Implementation

- Optimization water usage in all sections by throttling,
- Automating the usages of water in each section based on return temperature
- Installation of pressure boosters for specific applications
- Pressure sensor feedback to be given to pump VFD
- Operation of one/two pumps on full load and modulating the final pump

Saving Achieved	=	53	kW
Total saving	=	24	lakh/yr
Investment	=	10	lakh
Payback period	=	5	months

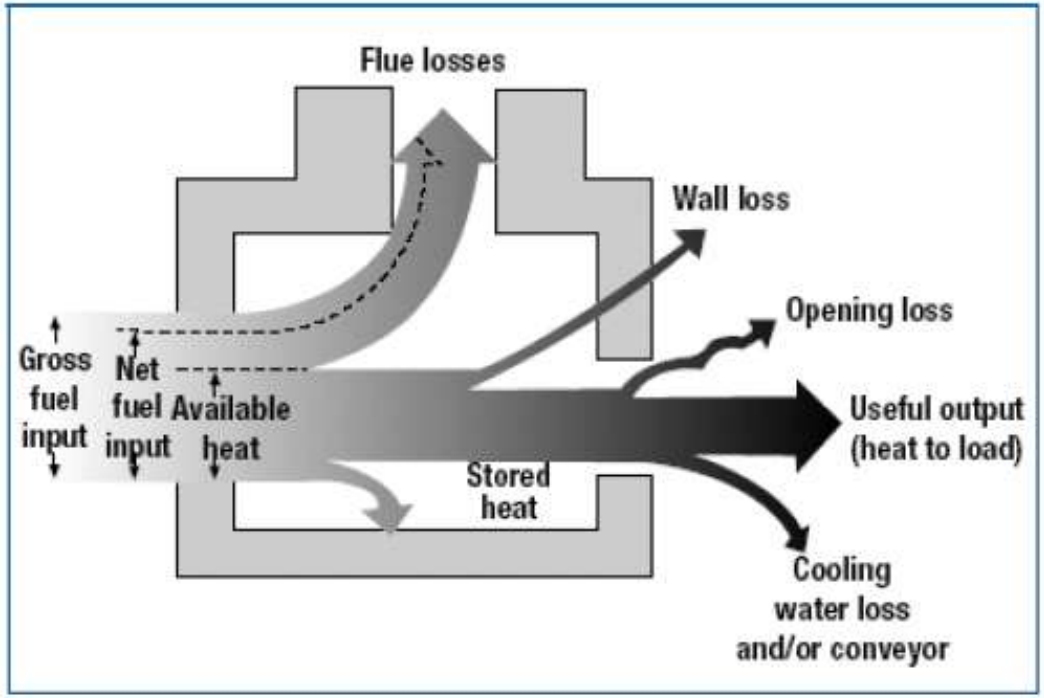
Energy Balance of a Furnace

Heat Loss Contributors

1. Useful heat carried by material
2. Flue gas loss
3. Stored heat
4. Opening loss by radiation
5. Wall losses
6. Miscellaneous losses

Assumptions for Energy Balance

1. Steady state condition
2. Leakage/ infiltration etc. considered as miscellaneous losses



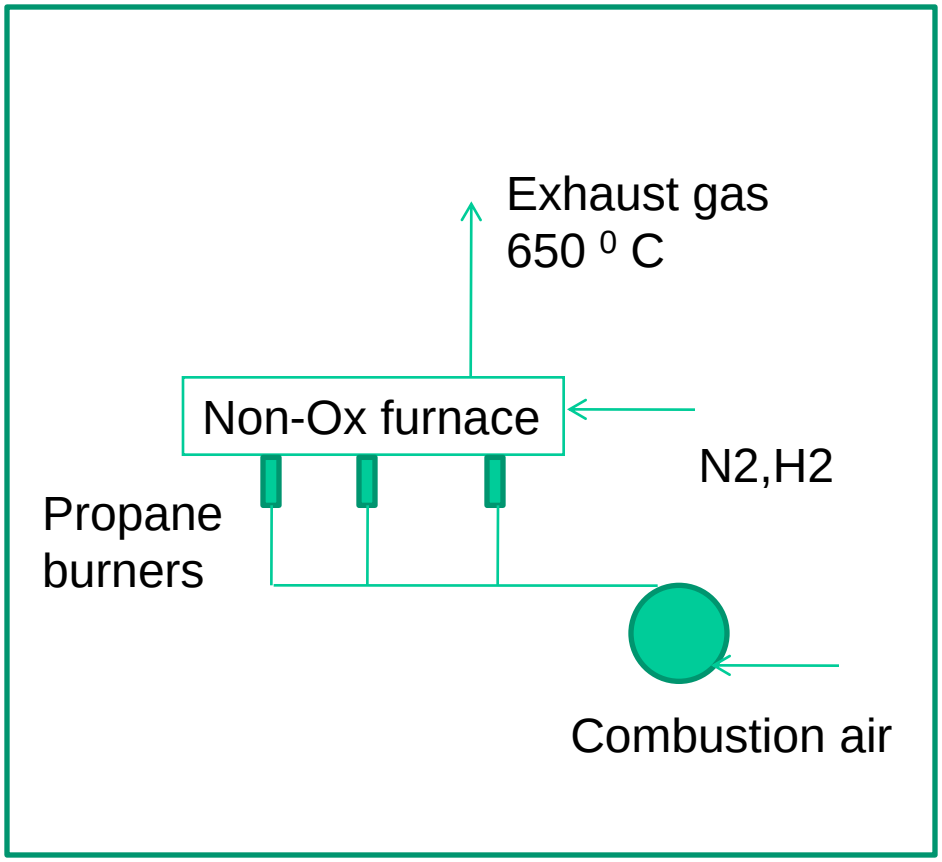
Efficiency (Direct Method) : The ratio of useful heat input to total energy consumption

Efficiency (Indirect Method) : Total Heat input – Unused heat losses

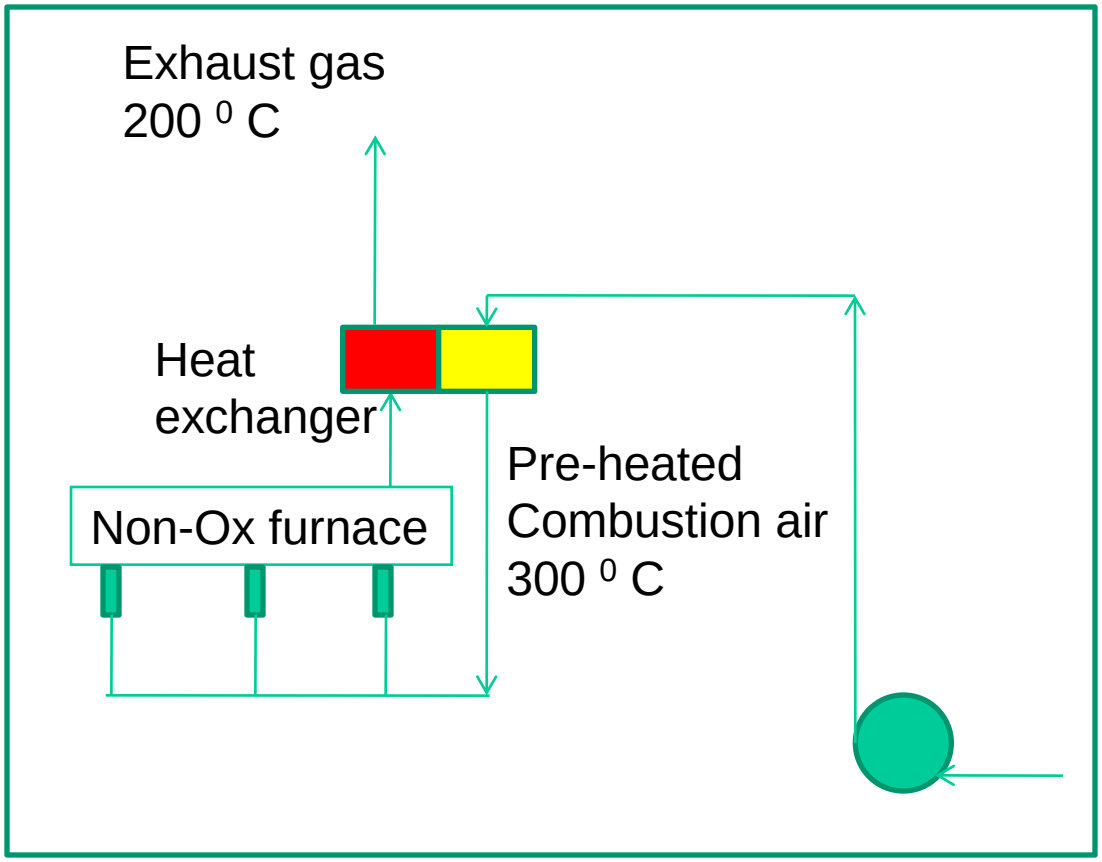
Case Study 2: Waste Heat Recovery from Non-Ox furnace - Recuperator

ANAMA Energies Pvt. Ltd.
COGENERATION : An Investment in Productivity

EXISTING SYSTEM



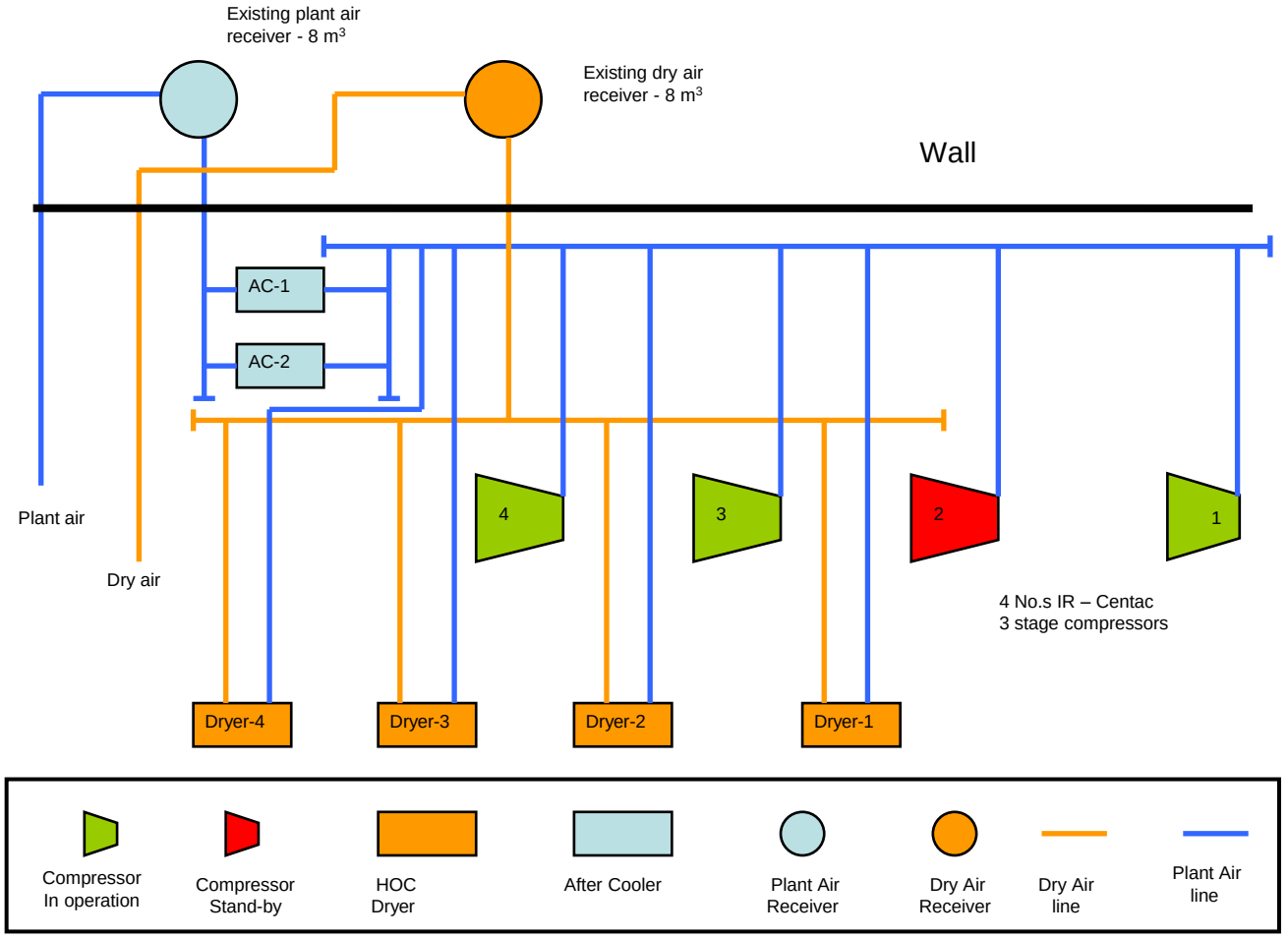
PROPOSED SYSTEM



Saving Potential	=	Rs. 27	lakh/year
Payback period	=	9	months

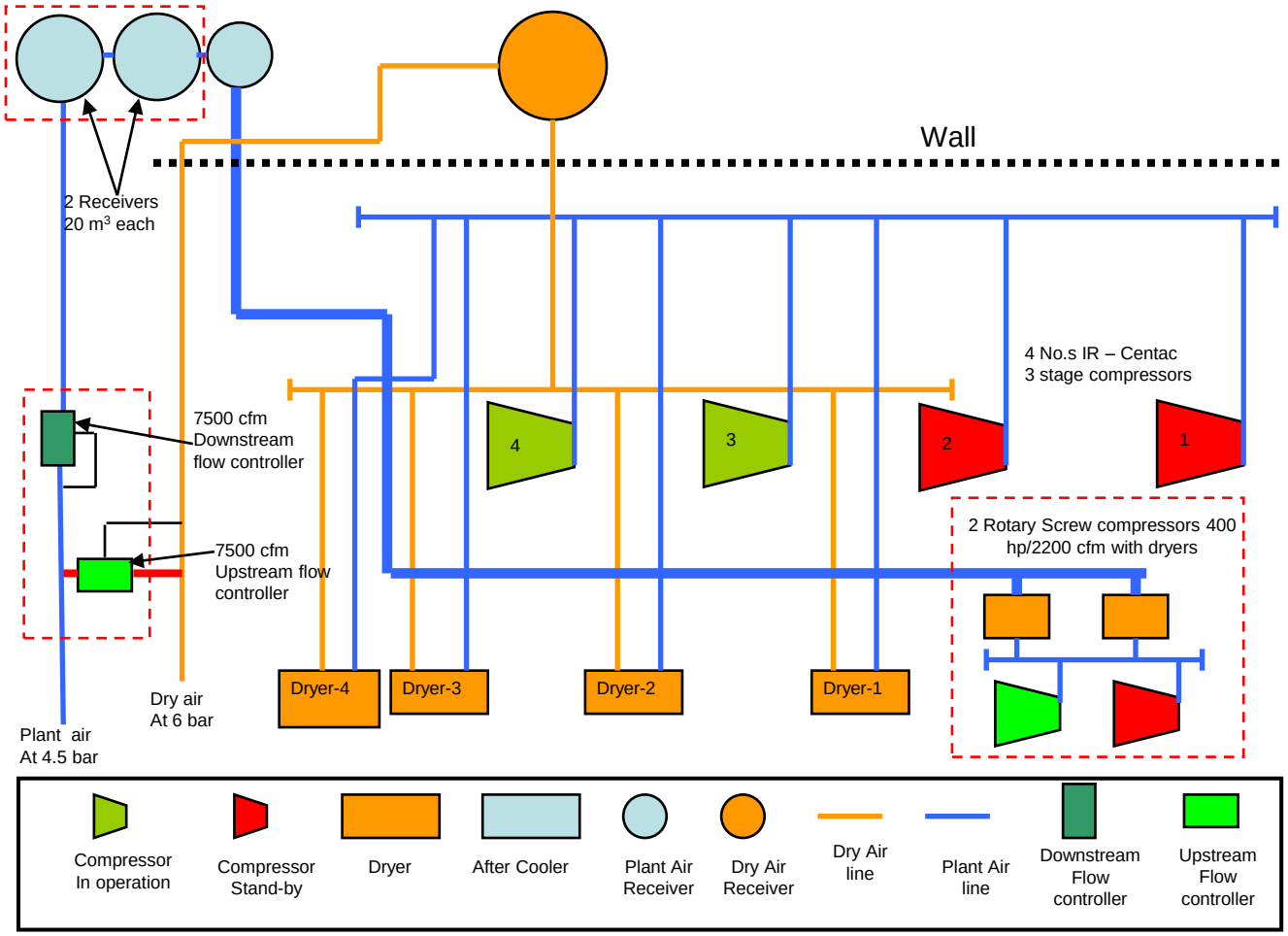
Case Study 3: Implemented scheme for compressed air

System before implementation of project



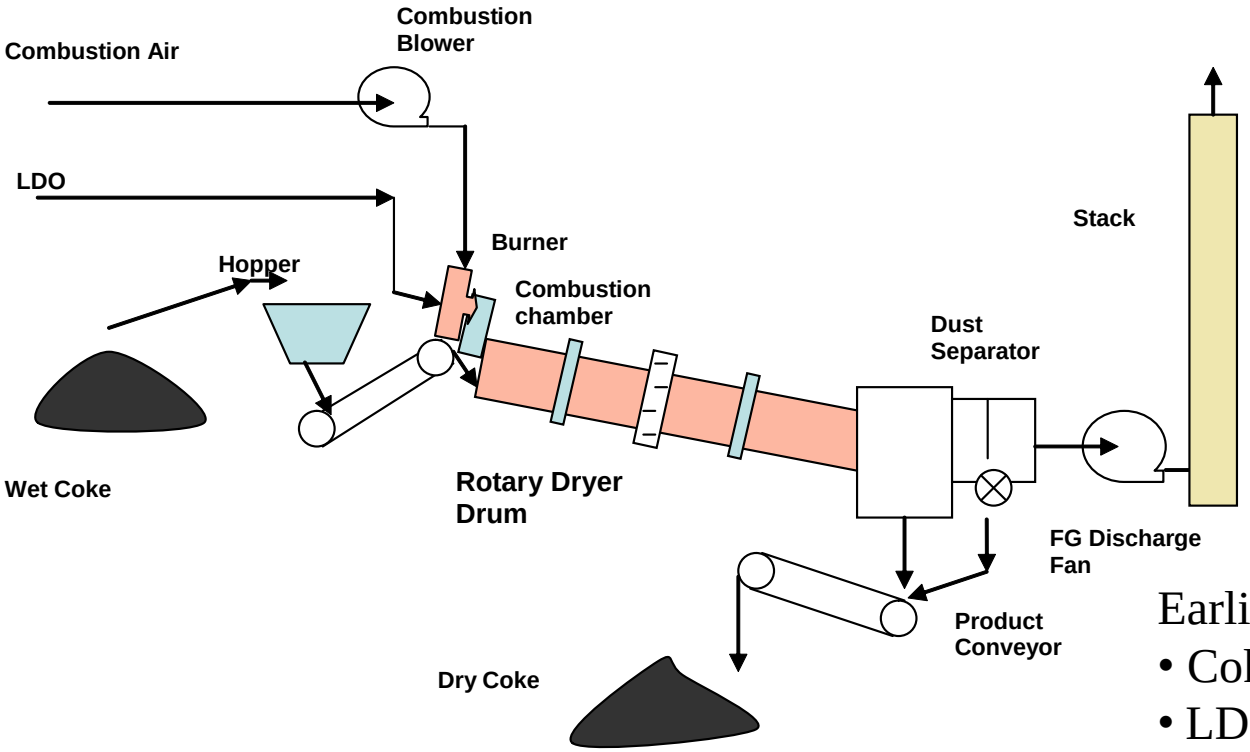
- Separate supply of plant air and dry air
- Dry air & Plant air both at 6.5 kg/cm^2
- One receiver of 8 m^3
- Large variation in compressed air usage
- Venting of air from centrifugal air compressors
- No control for compressed air
- Total power consumption = 3.5 MW

Case Study 3: Implemented scheme for compressed air



- Additional receivers for plant air
- Smaller capacity compressors for trim load
- Downstream / Upstream flow meter
- Pressure lowered for plant air
- Pressure regulated for dry air
- Stoppage of 1 centrifugal compressor
- Total expected power saving = 450 kW
- Total saving potential
= 450 x 8760 x 4.3
(@ 8760 hrs/year, Rs. 4.3/kWh)
= Rs. 1.7 crore / year
- Investment = Rs. 1.8 crore
- Payback period = 13 months

Case Study 4: BF gas for coke drying



Earlier System

- Coke drying by burning LDO
- LDO consumption = 14000 lit/month
- Blast Furnace (BF) gas being flared
- Low temperature requirements for drying
- Temperature variation acceptable

Case Study 4: BF gas for coke drying

Given calorific value of the BF gas	=	750	kCal/Nm^3
Equivalent BF gas consumption	=	1210	Nm^3/hr
Present fuel consumption	=	14850	lit/month
Expected reduction in the LDO consumption (Considering 10% LDO support for BF burner)	=	90%	
Expected annual savings	=	Rs. 40 lakh /year	

Cost benefits :

Total investment	=	Rs. 50 lakhs	
Payback period	=	14	months

Replacement of inefficient descaling centrifugal pumps with plunger type pumps

- **Present descaling pumps are centrifugal with motor rating of 2.6 MW. The no load power**
- **consumption of these motors is very high at 2 MW. The operation needs only 1 min. loading time**
- **and 3 min. of unloading type. It is recommended to replace these pumps with piston type positive**
- **displacement pumps with considerably less no load power consumption.**

• **Present average power bill of de-scaling pump**	**: Rs 40 Lacs per month**
• **Expected savings @ 30% with plunger pump**	**: Rs 12 Lacs per month**
• **Potential savings per annum**	**: Rs 144 Lacs per month**
• **Investment**	**: Rs. 200 Lacs**
• **Simple payback**	**: 16 months**

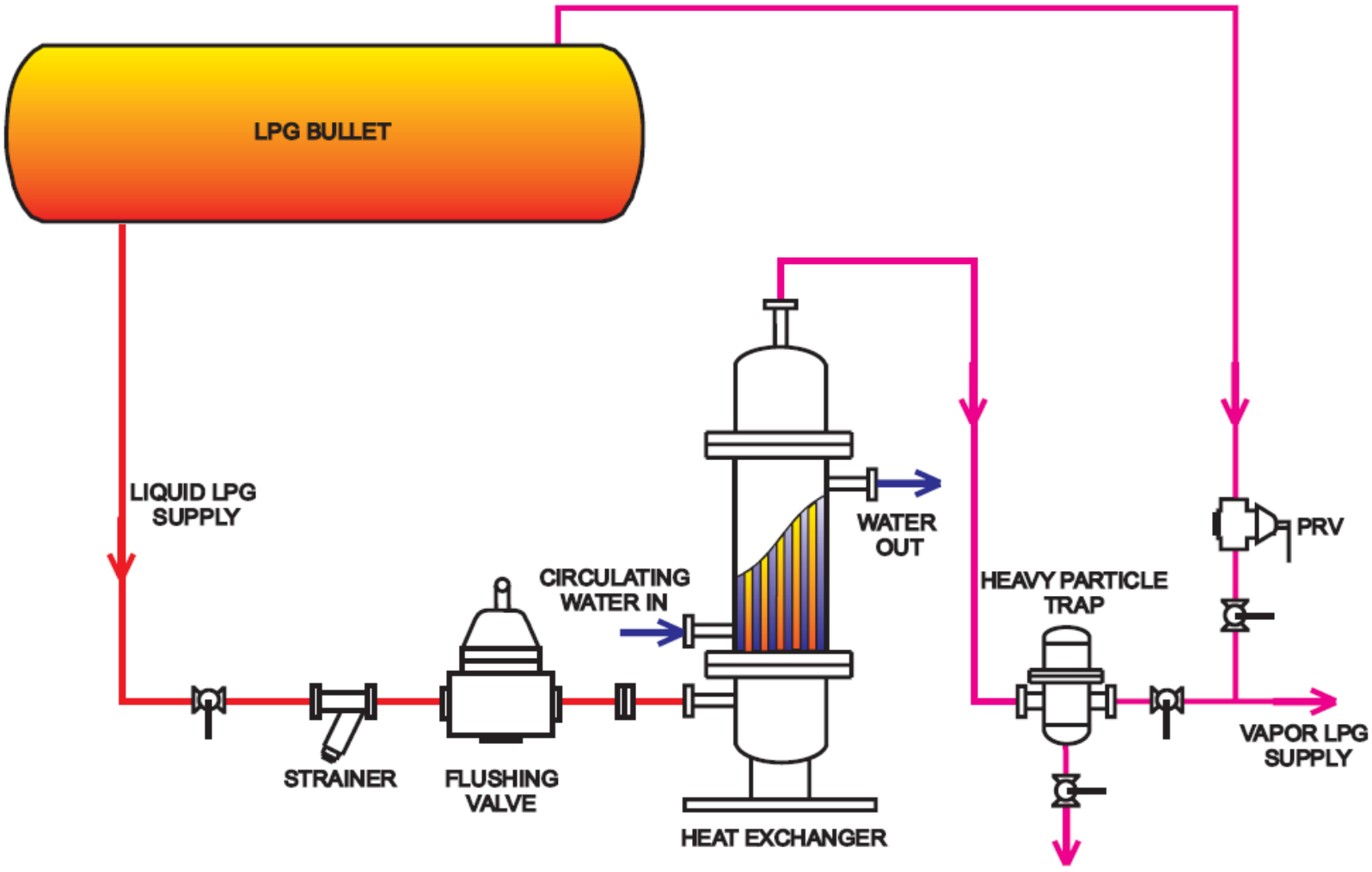
Energy efficient Pumps

- **Replacement of inefficient pumps with energy efficient pumps**

- **Present efficiency of the following pumps is less. So it is recommended to replace inefficient**
- **pumps energy efficient pumps to reduce power consumption by meeting present duty conditions.**

Pump Identification	WTP sand filter pump-6	Make up water pump-CRM	Group-2 CRM pump-4	Group-2 CRM Pump-6	Group-3 CRM Pump-10	Total
Present efficiency	37.4	19.7	28	37	40	
Proposed efficiency	75	75	75	75	75	
Present power consumption (kW)	30	11	13	25	16.8	96
Proposed power consumption (kW)	14	5.3	10	12	10	51
Annual savings (Rs lacs)	5	2	1	4	2	14
Investement,Rs Lacs	5	2	1	4	2	14
Simple payback, months	12	13	13	12	11	12

CASE STUDY 5 - LPG Vaporiser using environmental heat



CASE STUDY 5 - LPG Vaporiser using environmental heat

- Boiling point of LPG at 1.2 kg/cm^2 (g) = 1^0 C
- Vaporiser uses electrical power to vaporise LPG
- As pressure decreases, boiling point lower (easy vaporisation)

Average present power consumption of LPG vaporiser	=	20	kW
No. of units consumed per day	=	480	kWh/day
Power requirement after installation vaporiser	=	50	kWh/day
Saving potential= 430 x 300 x 5	=	Rs. 6.5	lakh/year

Investment	=	Rs. 8.75	lakh/year
Payback	=	16	months

Case Study 6 - Heat recovery from flash steam for FO heating

Present System

Electric heater is used to maintain the temperature of FO.

Average Power consumption of electric heater used for FO heating = 13 kW

Equivalent heat = 13 x 860 = 11180 kCal/hr

Proposed System

It is proposed to use flash steam to stop this electric heater.

Quantity of flash steam required = 11180/ (647-123) = 21 kg/hr

This amount of flash steam is easily available.

Saving calculation

Electrical energy savings = 13 x 330 x 24 x 4.3 = Rs. 4.4 lakh per year

(@330 days per year, 2 hrs/day and Rs. 4.3/kWh)

Investment	=	Negligible
Payback	=	Immediate

Case Study 7 – Energy Efficient motors for continuous duty applications

Present System

Present air compressor motors are not energy efficient type and do not have an optimal full load efficiency. Present full load efficiency is about 85 %

Proposed System

It is recommended to replace the motors by energy efficient motrs.
It is estimated that there will be about 5% reduction of power consumption by implementation of this measure. Full load efficiencies of 93-95 % is possible with energy efficient motors.

Saving calculation

Total saving potential= 130 x 2 x 0.05 x 8000 x 4.3 = 4.5 lakh/year
(@ 130 kW for each motor, 2 motors and 8000 hours operation per year)

Investment	~	10	lakh
Payback Period	=	26	months


Thank You