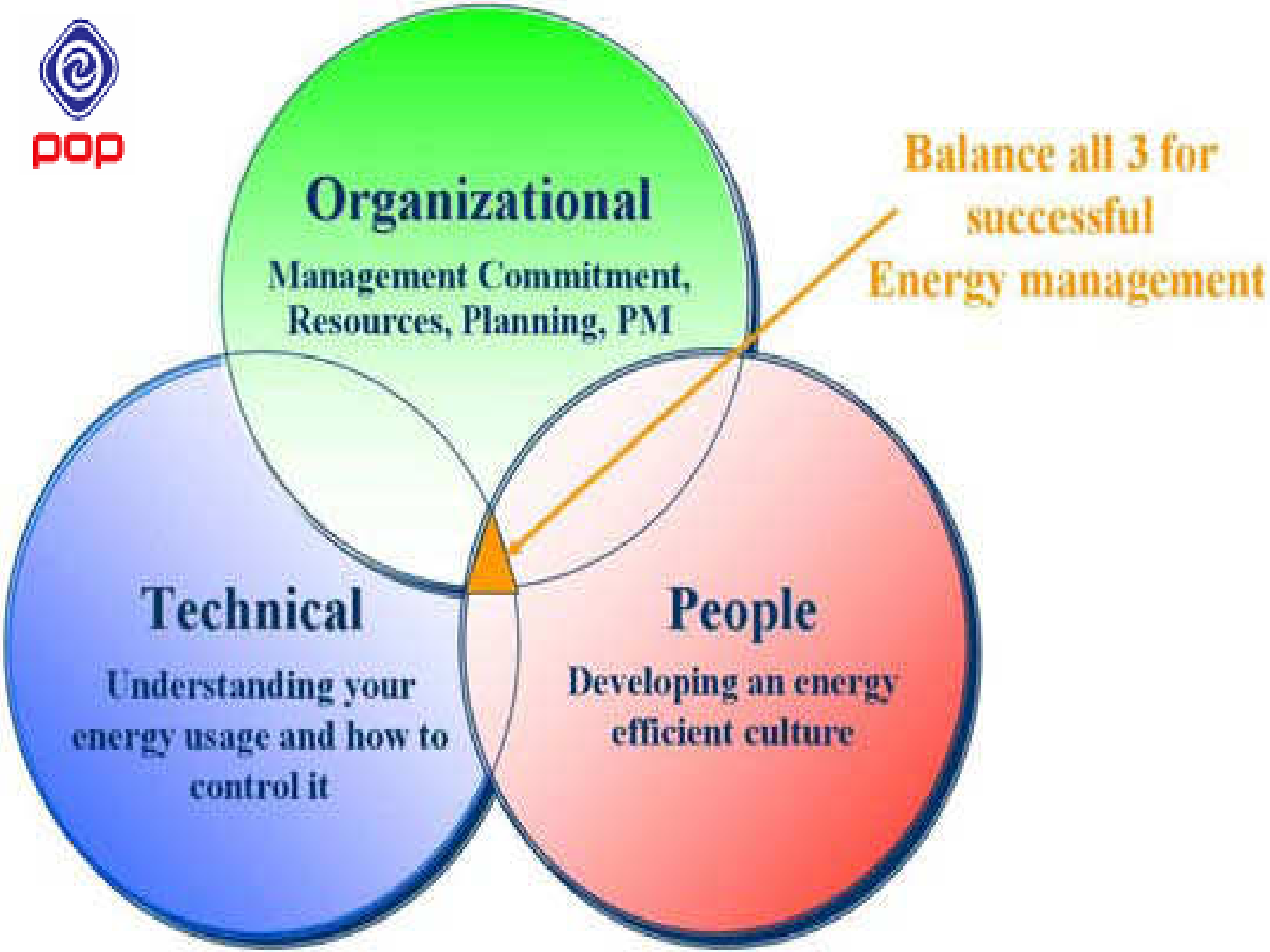
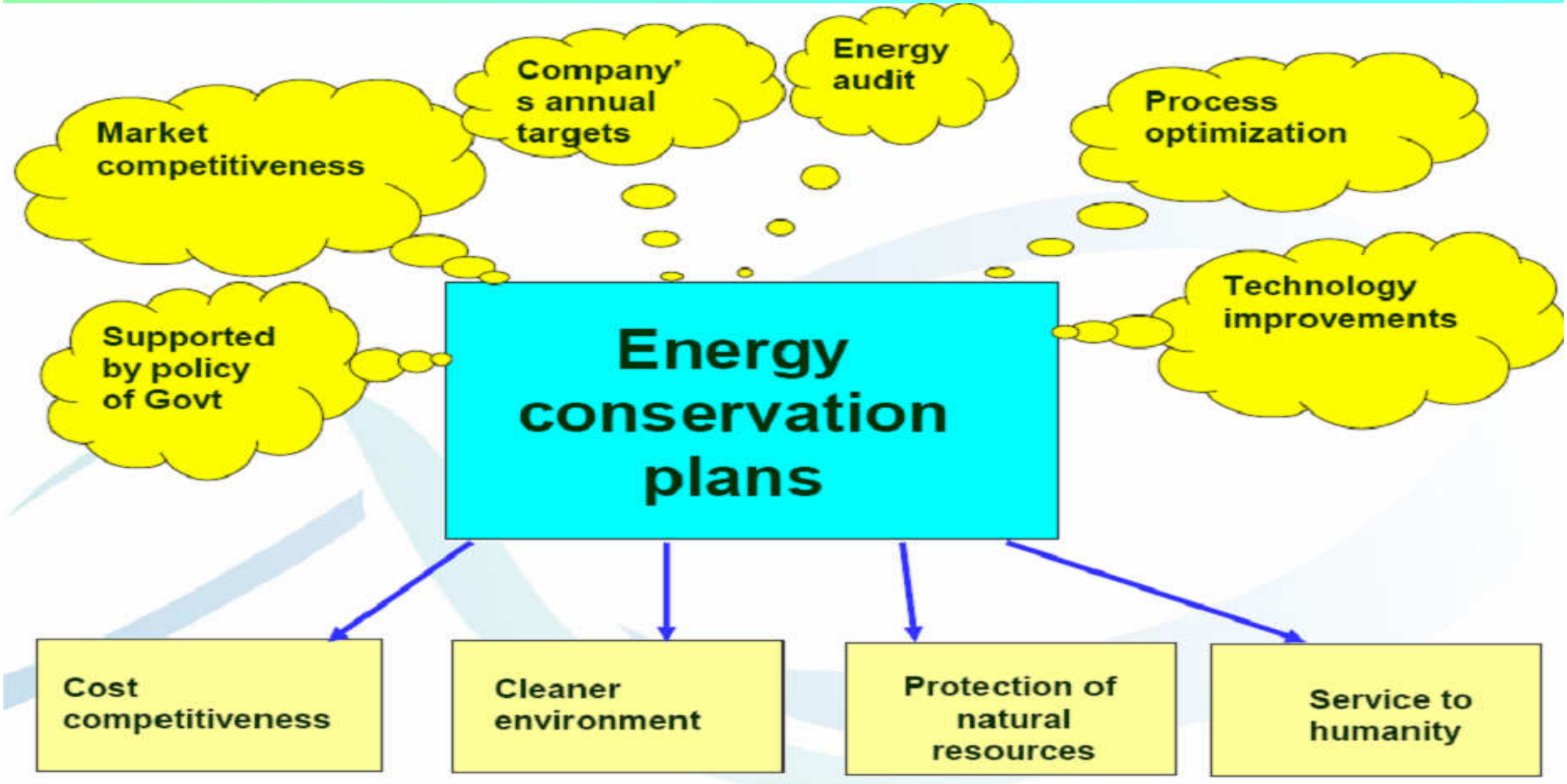

Organizational
Management Commitment, Resources, Planning, PM
Technical
Understanding your energy usage and how to control it
People
Developing an energy efficient culture
Balance all 3 for successful Energy management

ECON PLAN – SHALL WE SAVE ENERGYTO IMPROVE HEALTH OF US & SURROUNDINGS



CONSUMER POWER BILL – WHAT IS THE BREAKUP ?

EB charges the industry in terms of KWH, KVA, PF and we

® in the industry maintenance must measure the same KW,

® KVA, PF, KVAR and Harmonics at our load end machines.

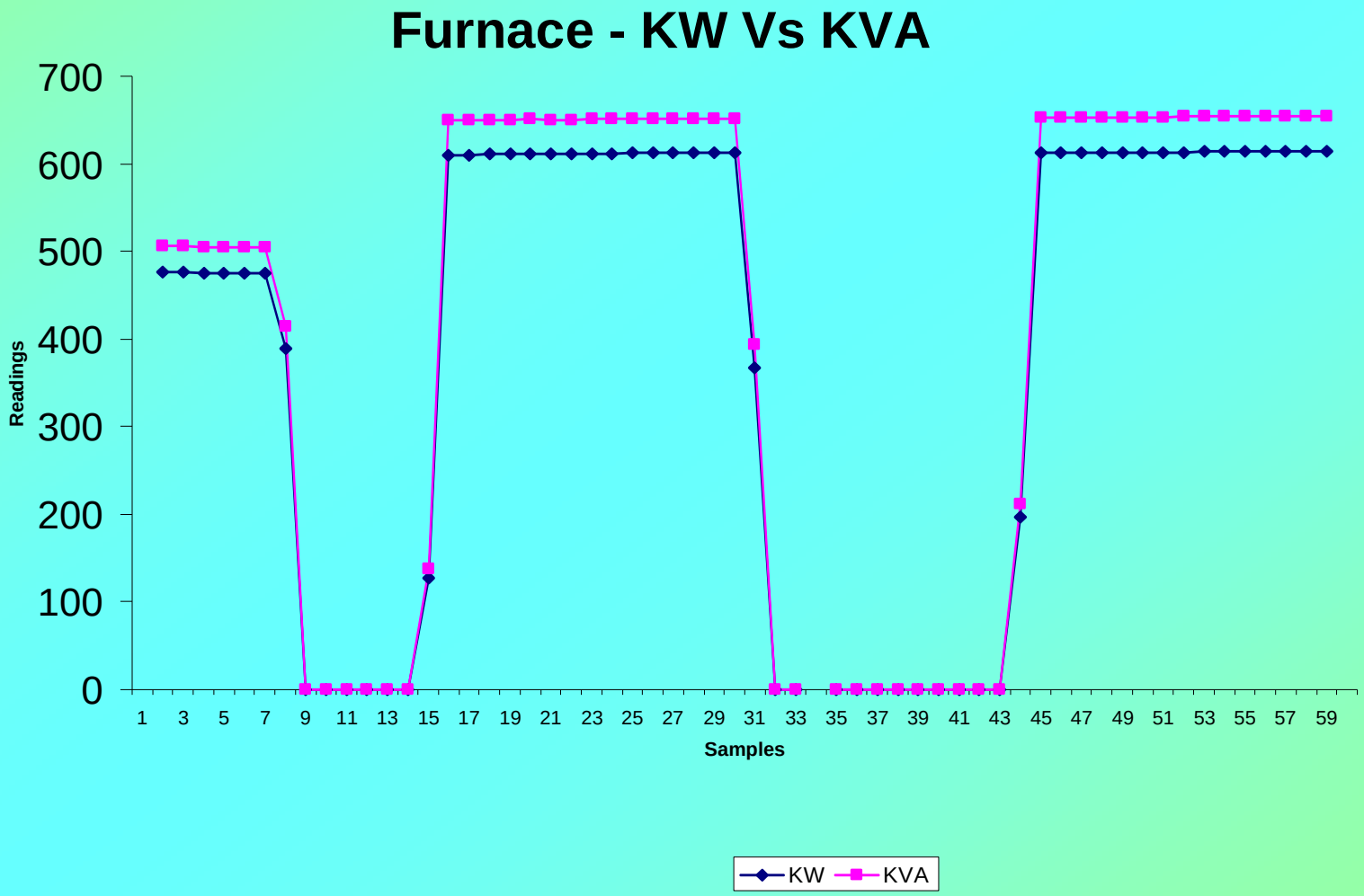
- *By energy conservation in industry, we try to recover the losses*

which go as waste as Excess input, and wasted output of machines.

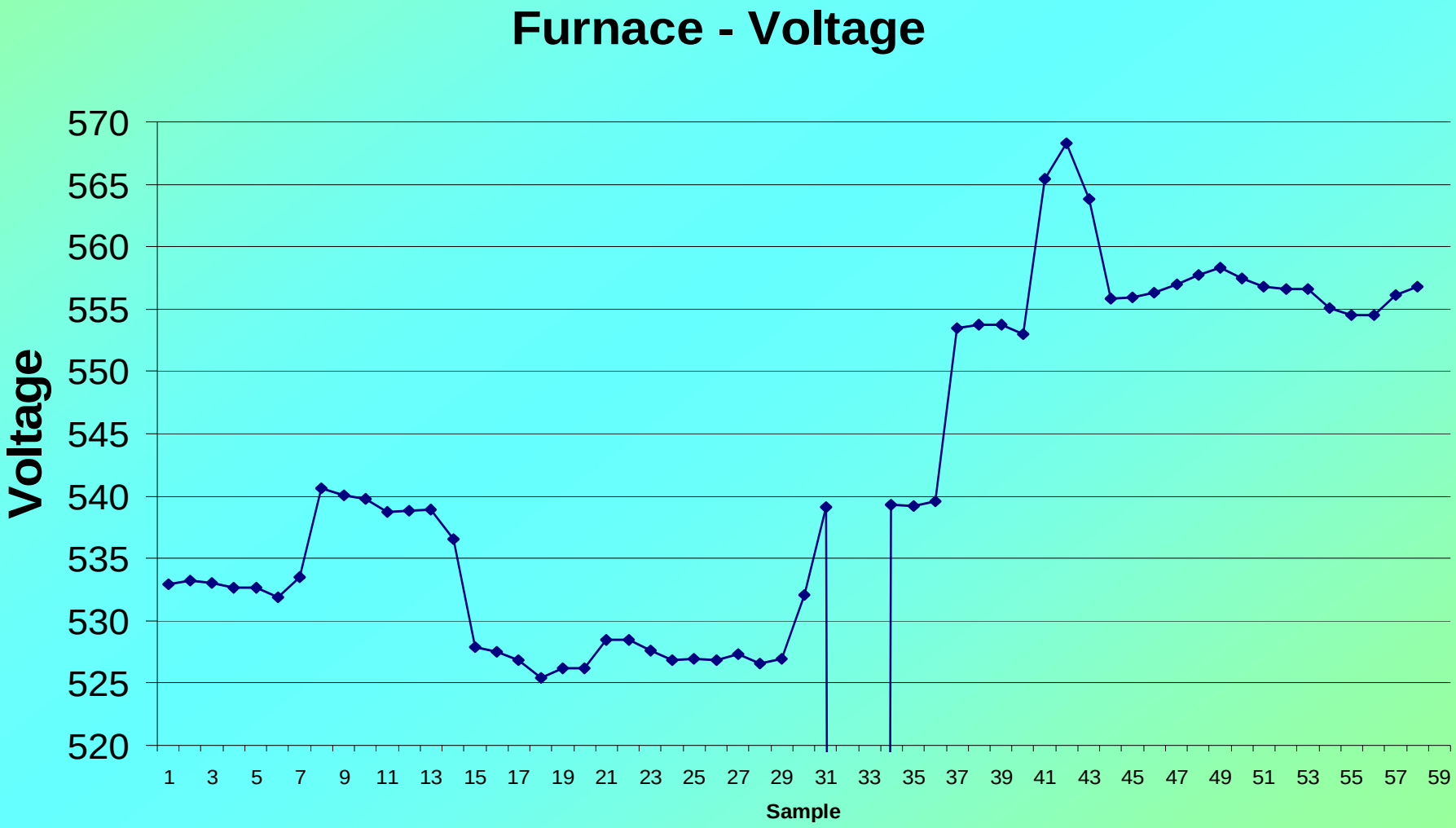
- By Energy Measurement, we draw a line between Avoidable and

Unavoidable Losses and plan to minimize same.

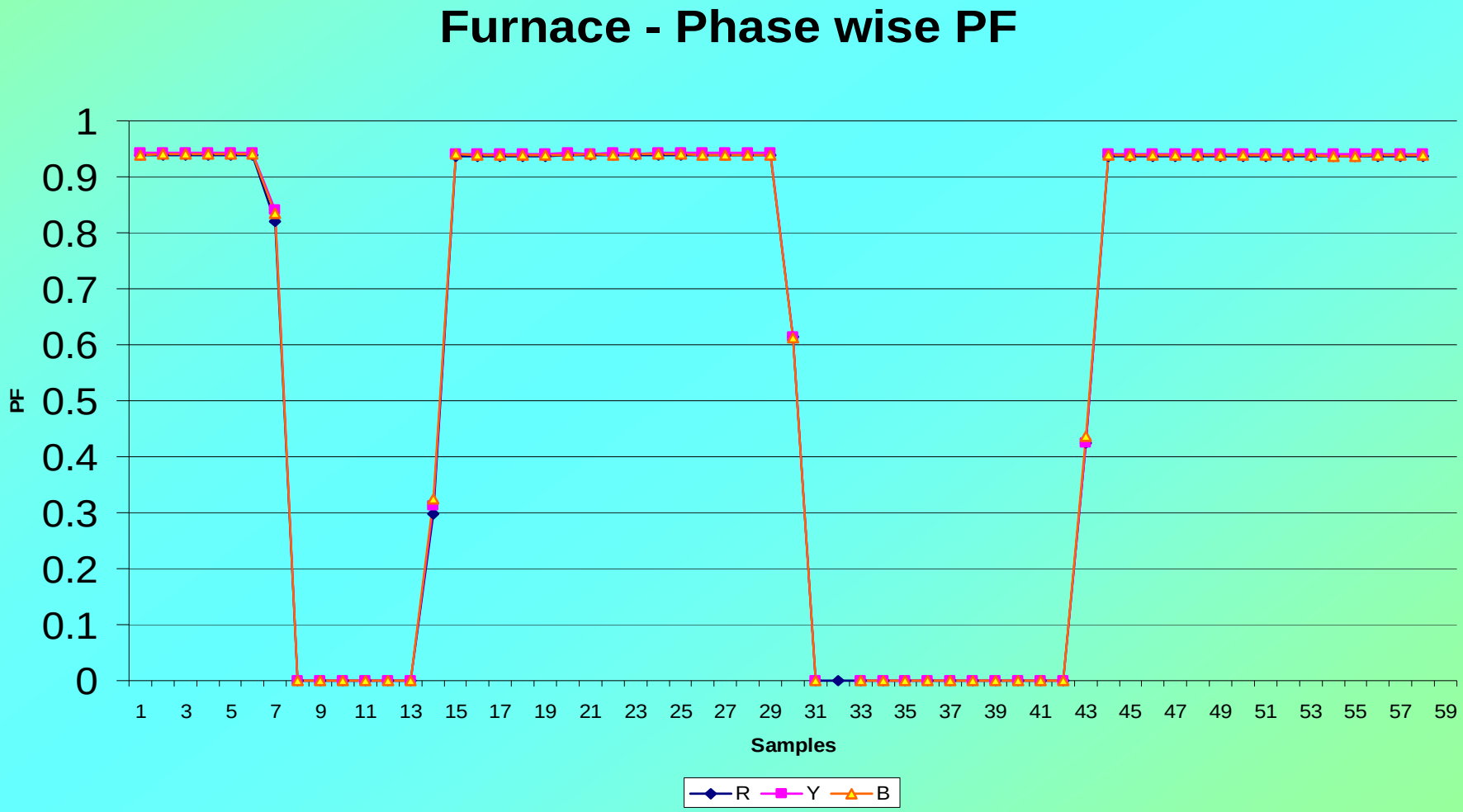
Induction Furnace KW & KVA
To make use of Maximum Demand Controller to Maximize & Automate the demand from load



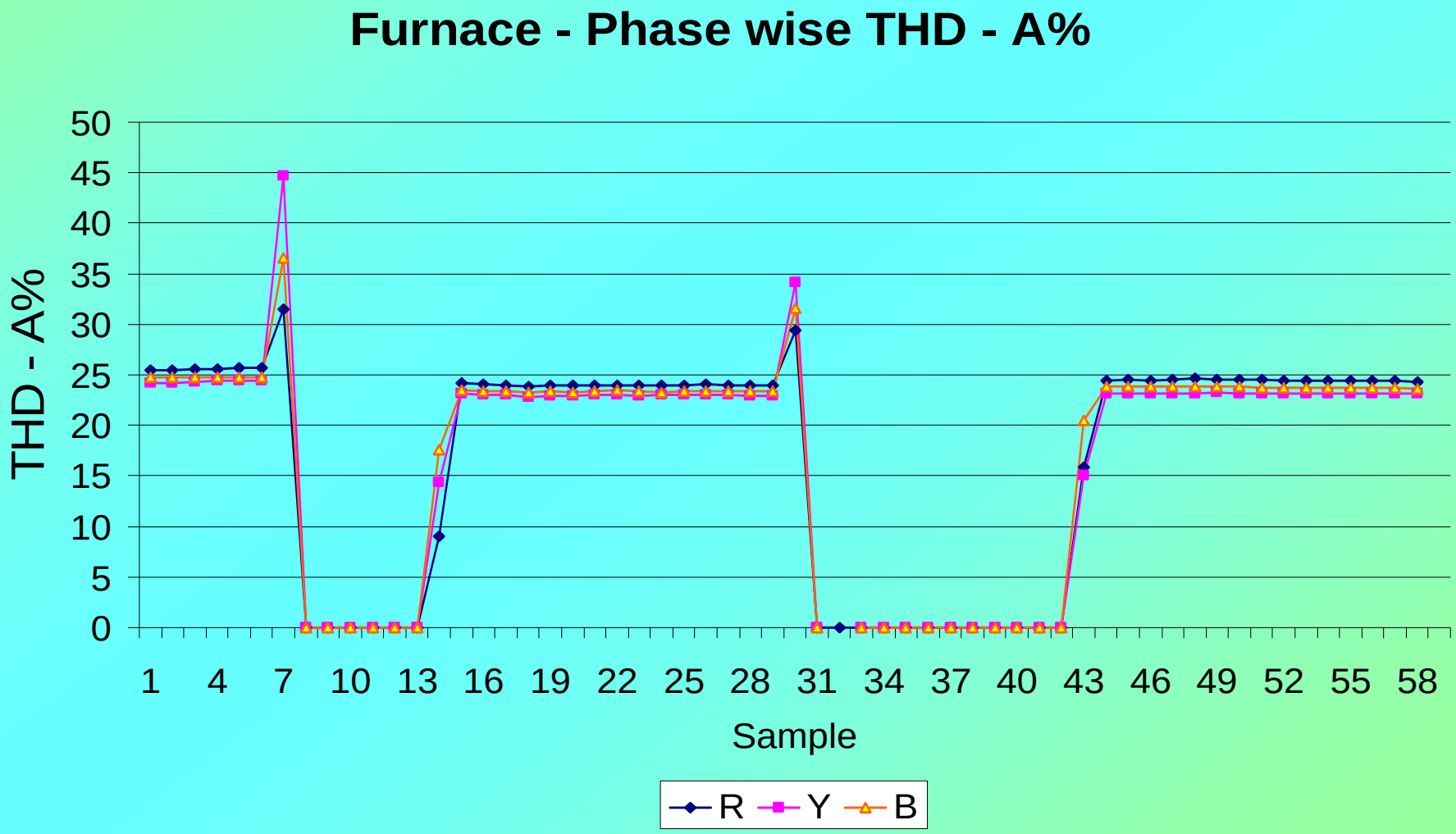
Induction Furnace – voltage Drops and voltage Fluctuations increase the heat time for the same KWH consumed & for same KG of metal melted.



Induction Furnace – compensate with adequate sized reactance coupled capacitor to increase PF & reduce the demand KVA



Induction Furnace – Steps to reduce Harmonics dumped to EB side by sized Harmonic Filtering



Energy usage Break-up in Foundry

Approximate power consumption of Major Equipments (Typical)

- Total Energy input 100 %
- Melting Furnaces 60 %
- Annealing Furnaces 17 %
- Compressors 11 %
- Sand plant 3 %
- Other loads 7 %
- lighting 2 %

Energy Balance in Induction Furnace

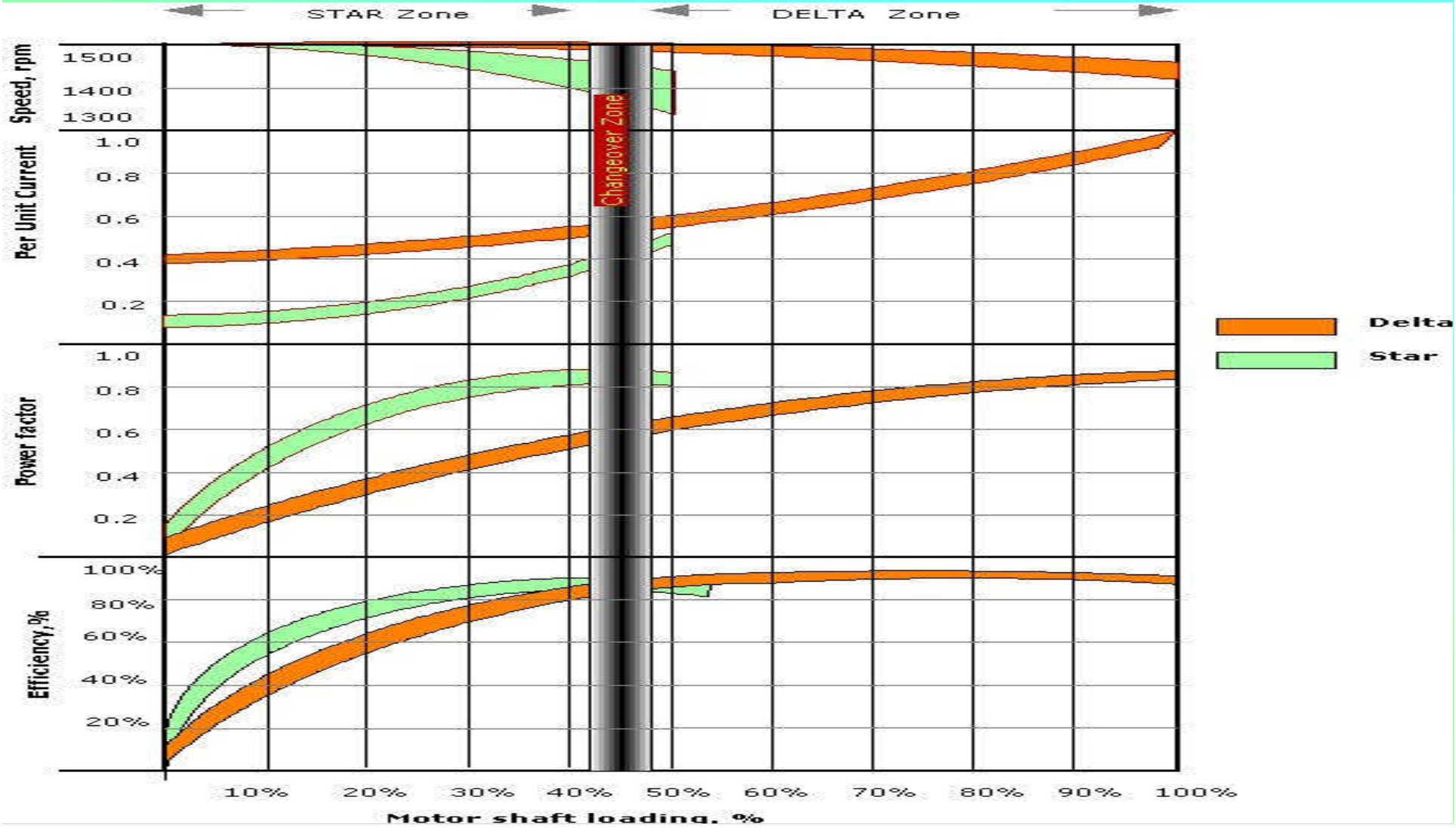
Material Grey Iron	Crucible Capacity	3200 Kg
Input Energy	660 Units / Ton	100 %
USEFUL HEAT	380 units / ton	58.5 %
Coil I2R losses	130 units / ton	20 %
Radiation losses	97.5 units / ton	15 %
Conduction losses	34 units / ton	5.2 %
Unaccounted loss	18.5 units / ton	1.3 %

Radiation losses in foundry

Temperature * C -	Energy loss in kwh units.
1100	15 units / sq ft.
1400	36 units / sq ft.

- Practice to allow 100 –150 *C higher temp for melt to take care of heat loss in sadle & during transit up to the Mould machine
- Radiation – Line of sight phenomenon : Heat loss roportional to difference of 4^{th} power of hot & cold surface temperature.
- Each 1* extra temp > 1 to 2 units extra consumed / ton melted.
- To lid the furnace or at least lid the ladle during pre-heating to reduce heat losses due to radiation

Motor Energy Saver – Current Sensing Controller to run in Delta or Star – apply to Shot Blasting, Muller, Dust Extraction Fan, Conveyor motors etc.



THE TABLE BELOW COMPARES THE BEHAVIOUR of

5 H.P MOTOR AT HIGHER THAN 400 VOLTS

Study taken by Reputed Servo stabilizer Manufacturer

The savings are more visible in lower HP motors than the higher HP motors in the industry

Input Voltage	Current	KVA	PF
400	7.5 Amps	5.2 Kva	0.8
425	8.3 Amps 11% More	6.2 Kva 18% More	0.7

Old 1 HP standard motor at Minimum Efficiency 65 % and New EE motor max Efficiency 82.5 %

Range (H.P)	% of Loss	At FL efficiency %
1-10	14-35	65-86
10-50	09-15	85-91
50-200	06-12	88-94
200-1500	04-07	93-96
1500 & above	4	95-96

Electrical Systems 2008

Energy Efficiency in Electrical System

CII – Godrej GBC

Focus area to replace your motor –

The Existing 10 year old standard conventional Rewound more than once, has more invisible losses & needs urgent attention.

Till yesterday, it was Shock to you to accept to the losses.
Today, it is a Relief to replace with the Eff1 EE motor.
Tomorrow, it will be a Delight to visualize energy savings.

Fig. 5. Extrapolated distribution of failure by motor component

Motor drive transmission efficiency –

Visible losses seen in Belt Losses from motor to load

The efficiency of mechanical power transmission depends on grip between pulley and belt, further depends on μ (Co-efficient of friction) and strength (Tensile) of the belt. In case of

Table 3.4: Losses in V Belts

Sr. no.	Motor HP	Losses %
1	2	8-15
2	3	7-13
3	4	6-12
4	6	5.5-10
5	8	5-9
6	10	4.5-8.2
7	20	3.5-7
8	30	3.2-6
9	40	3-5.5
10	60	2.8-5
11	80	2.5-4.5
12	100	2.5-4.5

Pumping system – savings

parameters	existing'	new pump
• Motor rating hp	7.5	5
• Suction pipe mm	65	75
• Delivery pipe mm	50	75
• Piping material	GI	White PVC
• Foot valve	local	ISI
• Discharge LPS	3.68	5.03
• Input power KW	6.18	4.35
• Increase in discharge	--	36 %
• Input power reduction	30 %	--
• Saving in Energy	--	48 %

Compressor takes 20 % more power due to inadequate maintenance. House keeping improves the compressor health instantly.

Worn-out piston ring, gland packing	**2 – 3 % higher power**
Worn, broken, leaking valves	**5 –6 % higher power**
Worn, improperly aligned bearings	**1 – 3 % higher power**
Dirty, non recommended lube oil	**1 % higher**
Clogged suction filter	**2 – 3 % higher power**
Short circuited air to suction air intake from Heat exchanger exhaust	**2 % higher power. To do the duct out TODAY.**

DG house / Compressor HOUSE keeping measures to ensure cool dry air intake give 2 % instant saving

ECON is a Low Hanging Fruit now.
If left un-plucked now, this will silently eat your operating profit margin soon & later too.

- **Put energy efficiency into perspective.**

- **If your Power Bill is Rs.150 Lakhs per year,**

- **you could save 10% thro better energy practices**

- **<u>ASK YOURSELF</u>**

- **How many castings to sell to earn Rs.15 Lakhs net ?**
- **This 15 Lakh Rs is within yourself and make use of it !**

Energy Auditing is a tool to foundry to know where we are daily losing internally say in Production / Utility equipment And Savings possible up to 10 % in Few months payback less than a Year.

Having done recently Energy Audits in many foundries in this region, we share with you now, Energy Study findings.

For more details, pls contact ' POWER ON PROJECTS', Cbe.
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Email – ashok.anbesivam@gmail.com, poweronprojects@gmail.com

–Sharing knowledge to save our Energy

Conserving Energy is OUR Collective Responsibility, for a Better Tomorrow!

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