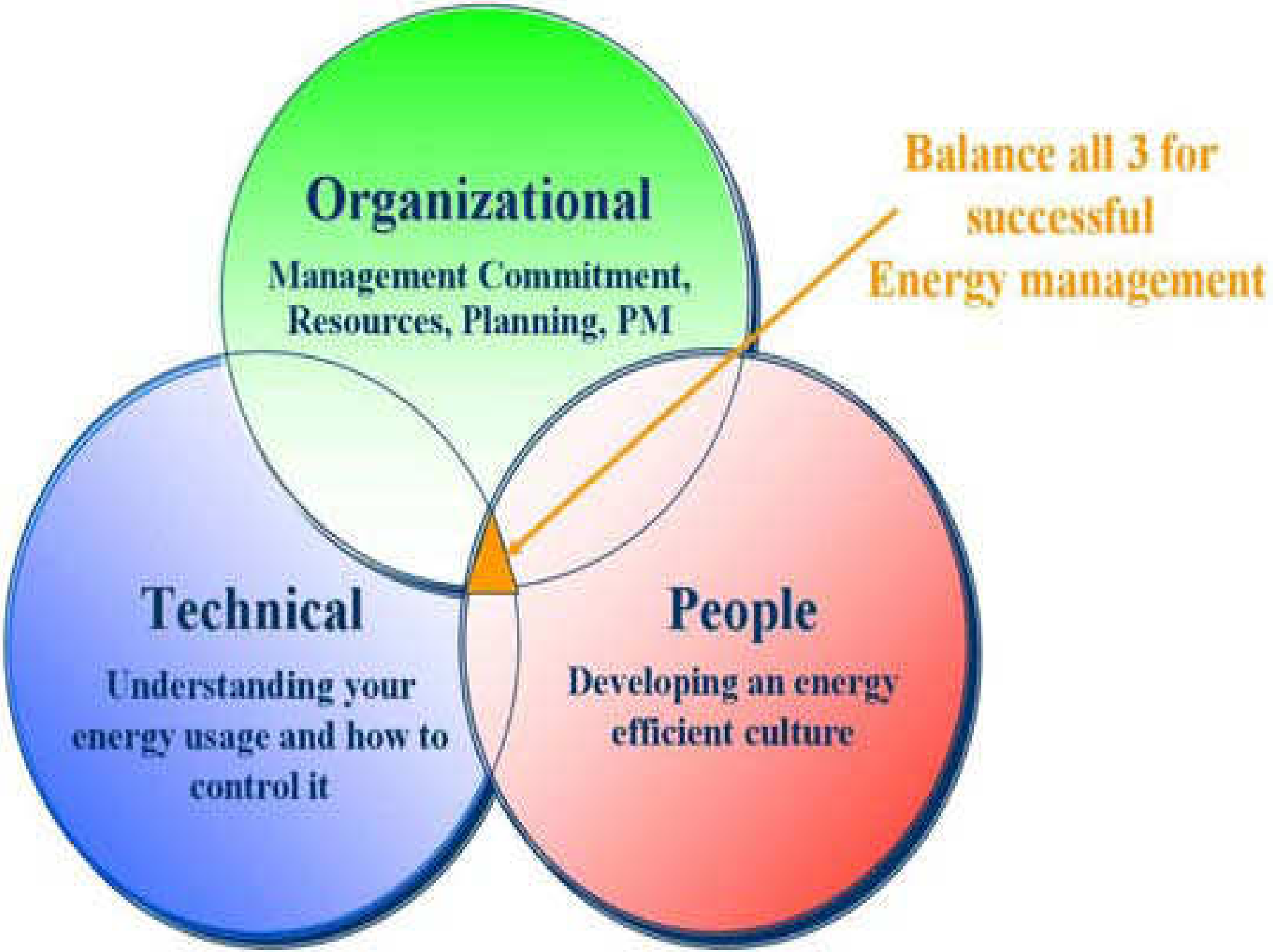
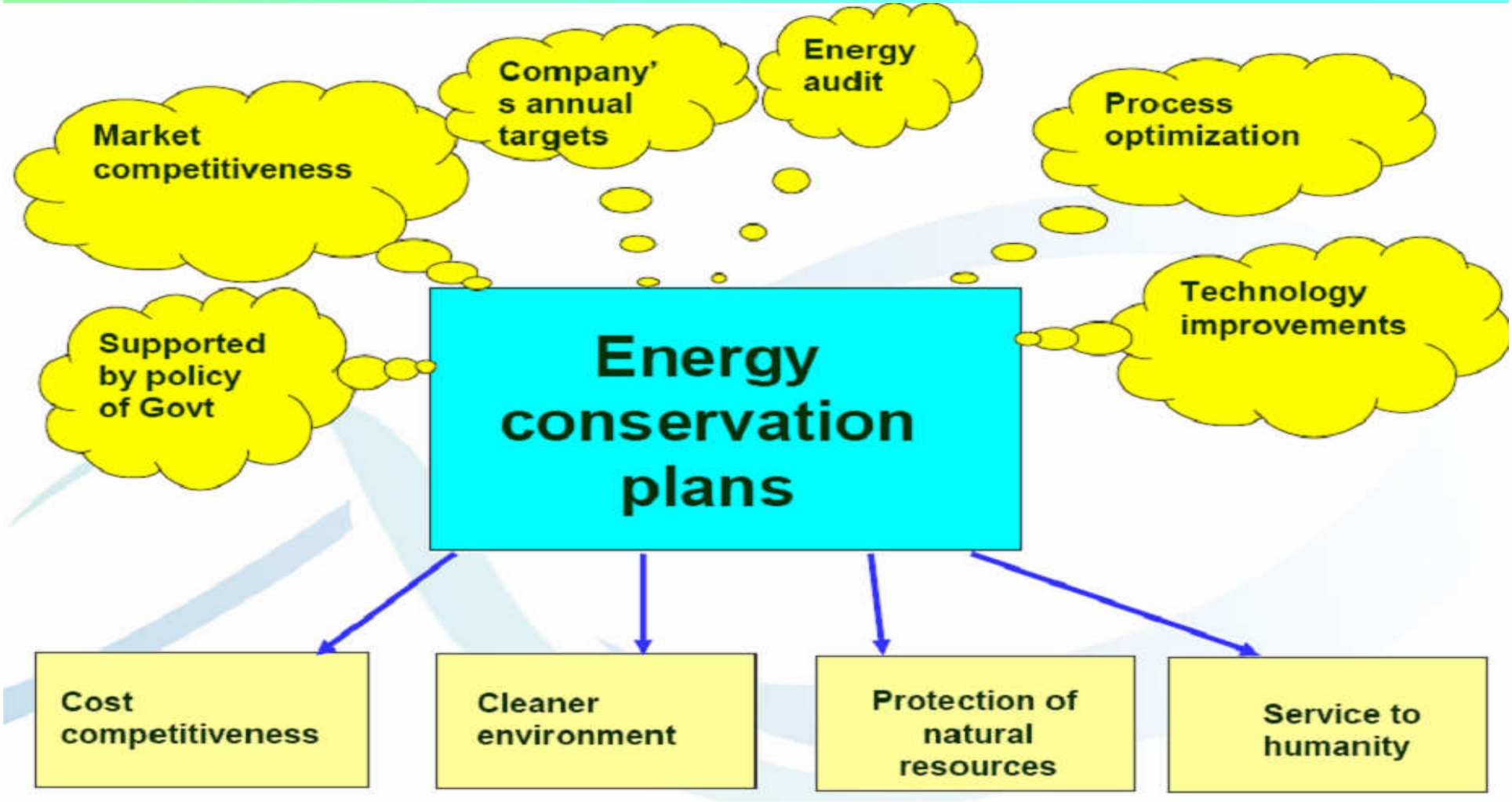

Organizational
Management Commitment, Resources, Planning, PM
Balance all 3 for successful Energy management
Technical
Understanding your energy usage and how to control it
People
Developing an energy efficient culture

ECON PLAN – SHALL WE SAVE ENERGY !
TO 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, we try to recover the losses***

***going as waste as Excess input, & wasted output of machines*.**

- **By Energy Measurement, we draw a line between**

Avoidable & Un-avoidable Losses and plan to minimize same.

WE CAN REDUCE THE KVA demand from MOTORS !

Case study of 5 H.P MOTOR AT HIGHER THAN 400 Volt

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

Purchase cost to Running cost

When we buy motor cycle for Rs.50,000, monthly petrol cost & expenses run for1000 km in a month = Rs.2000/-

When we buy 20 hp motor for Rs.50,000, our monthly motor power bill is Rs.40,000/ to Rs.50,000/- So measure Motor First

Life cost of a motor is often over 100 times the purchase cost

Every time a motor is rewound, its efficiency drops by 2%

Every 10°C drop in inlet air temperature will lead to a 2% saving in fuel costs

Decade old Rewound motor silently kills industry profits

- Our industry motor 15 KW loading at 75 %,

unit @ Rs. 4.50 Existing - running cost per motor per year

- Rewound Motor 75 % efficient – Rs.6.0 Lacs – Rs.50K pm.

Std. ordinary motor 83 % efficient – Rs.5.4 Lacs – Rs.45 K pm.

Energy Efficient motor 91 % efficient - Rs.4.8 Lacs – Rs.40 K pm.

- Please look into our Existing Running motors working Efficiently & how much we gain / loss in motor running ?

- Are we losing Rs.10,000/- per month per motor?

Sustained & Regulated & Metered Energy intake makes the industry profitable in the long run.
This happens to our human body and machine.

நாட்டில் உண்டு களைத்தவனை விட

களைத்து உண்டவனே

நெடுநாள் ஆரோக்கியமாக

உயிர் வாழ்கிறான் !

நொறுங்க தின்னா நூறு வயசு,

பல்லு ,சொல்லோட நல்லா வாழலாம் !

Decade old rewound Motor – when it consumes more; then becomes a Slow Consumable

---

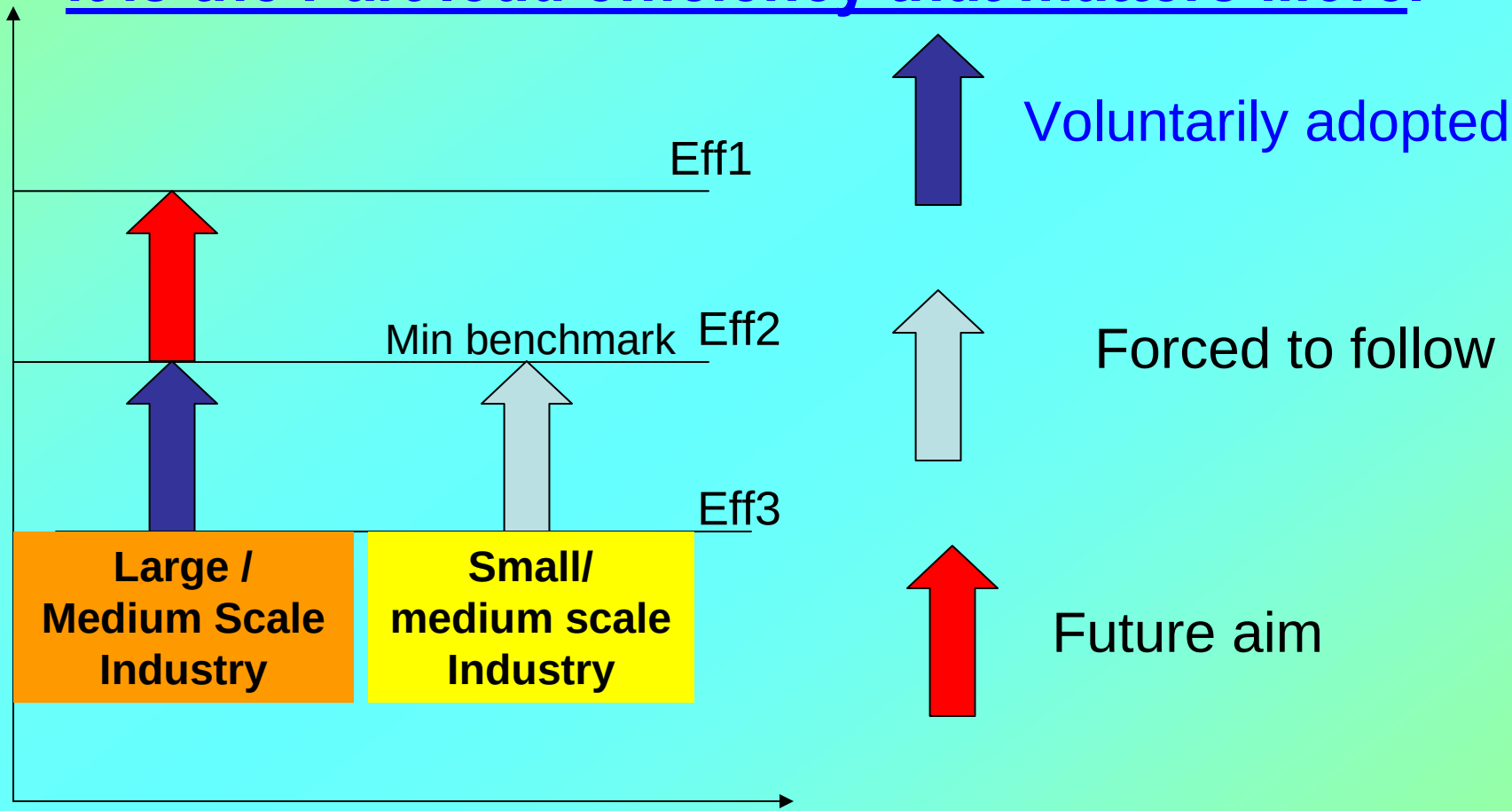
- **Where Your Motor Efficiency Stands is that the efficiency of our motor is to be tested in the Hot Running Conditions.**
-
- **This indicates the real efficiency practically at the part loaded condition after running for years**

Textile is the only industry segment where in the individual equipment motor, the prime mover is enclosed in a hood and

in other industry segments the prime mover motor works comfortably in the open.

Motor Efficiency is a differentiator for Major Motor manufacturer OEM and for the user industry

it is the Part load efficiency that matters More.

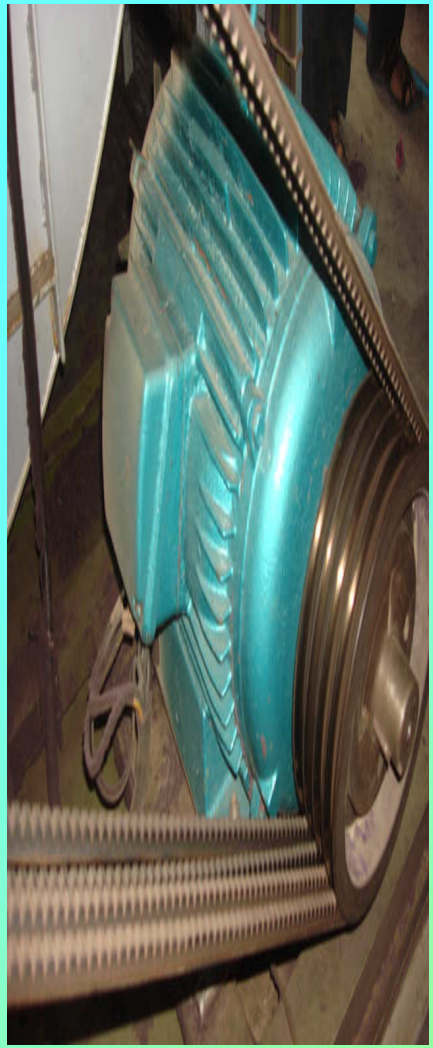


Motor drive transmission efficiency - Visible losses seen in Belt Losses from motor to load

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



THE RECOMMENDATIONS AFTER MOTOR SURVEY

Identify motors for LOADING

with less than 50 % loading – Ring frame, card, AC plant fans etc.
50 – 75 % loading,
75 – 100 % loading,
over 100 % loading. Example – Compressors operated as S.F.

Identify motors with Electrical Distribution improvement

low voltage
power factor
voltage unbalance
& current imbalance,
THD due to non linear loads etc.

.

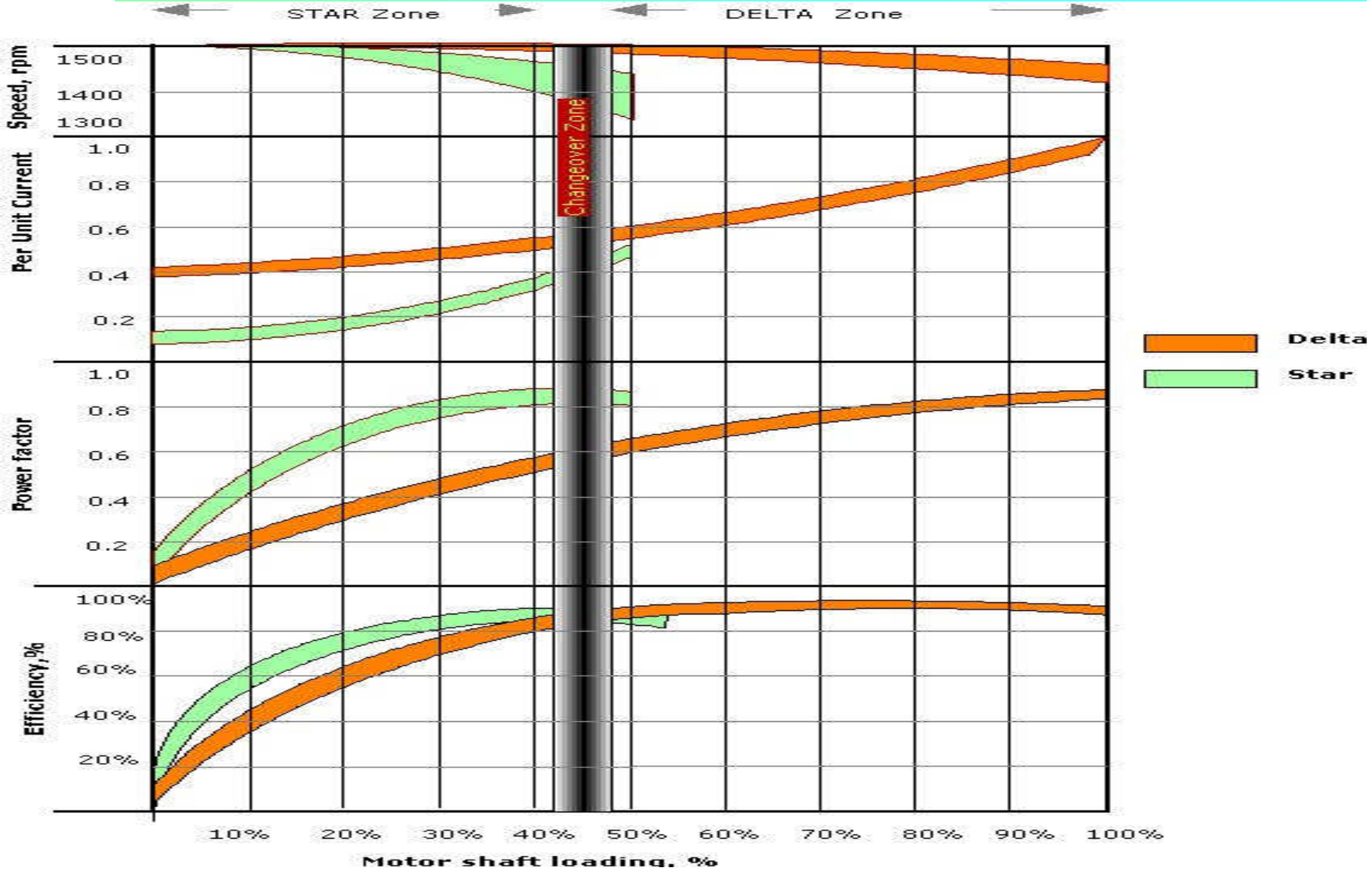
Losses in Machine = Losses in motor + Linkage loss + Load Loss

Of which Load loss is always majority share and chances of improvement more

Identify motors with machine side losses / Utilization
Inefficiencies like idle operations, throttling / damper operations for avenues like automatic controls / interlocks, VSD etc.

For less 50 %loading on motors, to go for Auto Delstar or Replace with small size motors.
Reduce load on 100% load motors or replace with higher size motors

BEE guidelines to under- loaded motors
Option to save energy thro Auto Delstar



Carding machine energy Saving case study

The machine can be run on in Star mode after starting in Delta mode.

Carding Machine DK 800 Cylinder Motor 7.5 KW	Before in Delta (Without CSC Delstar)	After in Star (With CSC Delstar)
Study Duration in hours	4	4
Total Units	13.4	10.9
Units per Hour	3.35	2.73
Motor loading	38 %	
Units per Day	80.4	65.4
Saving Units / Day		15.00
% saving in units per Hr.		18 %
Pay back period		< 6 months

Ring frame Motor – energy savings based on loading pattern & spindle RPM

Motor loading at 35 % to suit to frame & needs

Long frame Main Motor 55 KW	Before in Delta (Without CSC Delstar)	After in Star (With CSC Delstar)
Average Spindle Speed	**13700**	**13700**
Study Duration in Hours	**1.88**	**1.82**
Total Units	**38.9**	**36.2**
Production in Kgs.	**51.6**	**49.2**
UKG (Actual)	**0.754**	**0.736**
Units per Hour	**20.69**	**19.89**
Units per Day	**475.9**	**457.5**
Saving Units / Day		**18.4**
Percentage of savings		**4 %**
Pay back period in Months		**< 5 MONTHS.**

Maximize motor life- Focus : proper lubrication & temperature

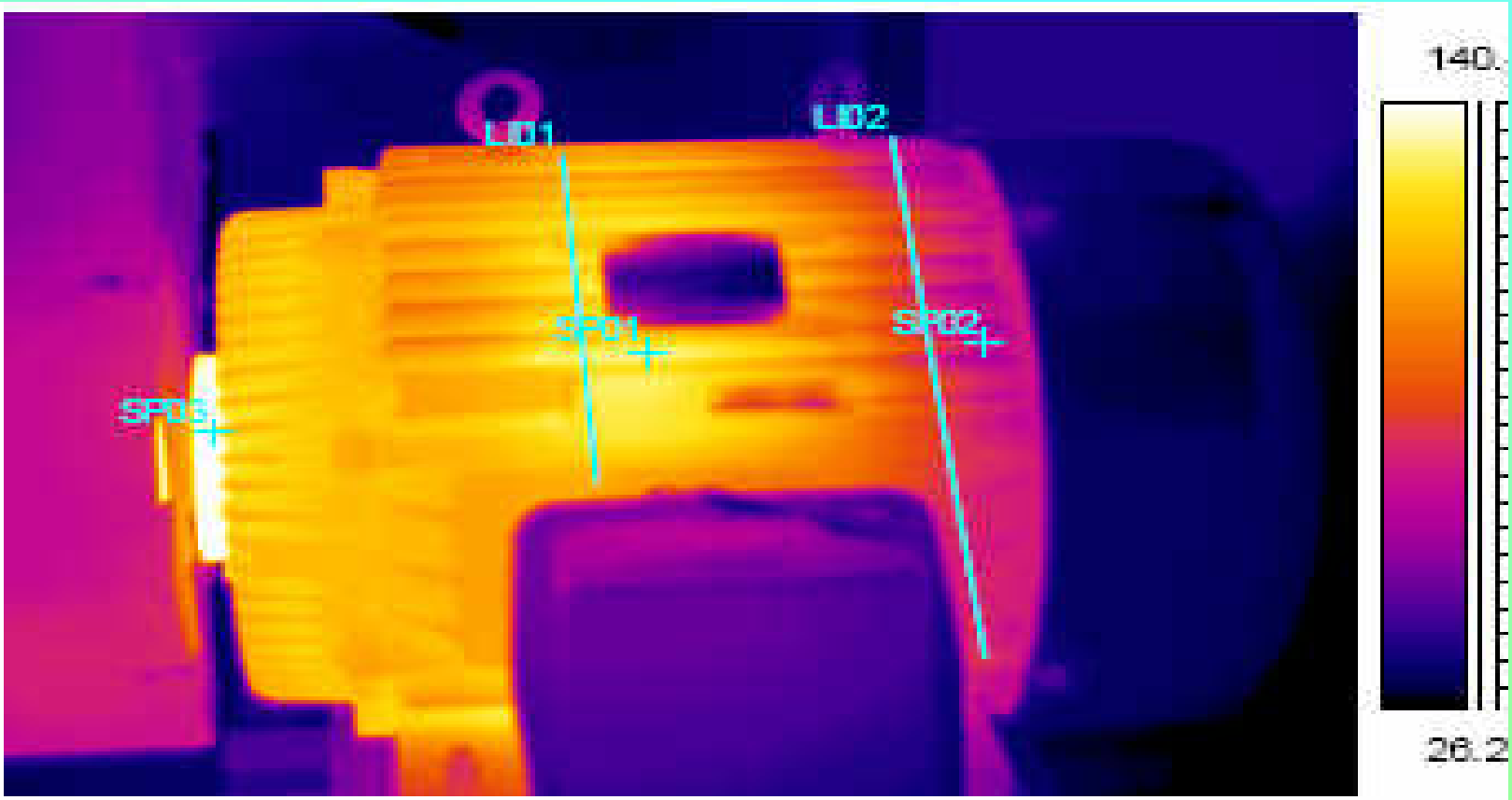
- Bearings must receive not only a good, quality lubricant but the correct quantity at the proper intervals in order to obtain optimum life and reliability.

- Under-greasing does not provide the lubricant at the time it is needed, resulting in bearing wear or heat damage.

- Over-greasing can damage shields or significantly increase operating temperatures due to fluid shear friction & reduces grease's lubing capability.

Fig. 5. Extrapolated distribution of failure by motor component

Healthy Running MOTOR SKIN TEMPERATURE
To be less than 20 *C above Ambient.
Symptoms for healthy Running –
Warm & not Hot motor, Temperature difference in Drive & Non drive, Left & Right, Top & Bottom' to be minimum



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

EARTHING TO BE WELL MAINTAINED TO PREVENT THE SURGES ATTACKING THE MACHINES

CONVENTIONAL EARTHING –

PAINTING LOOKS OK BUT EARTHING IS POORLY MAINTAINED

MAINTENANCE FREE EARTHING :

EARTHING IS GOOD IN THE LONG RUN and well maintained.

Automation – a Tool to improve productivity with less power consumption

- Achieve more & accurate output with less input.
- Reduction of Peak Loads by AUTO M.D.Controller
- Environment Protection.
- Improve Safety and Health.
- Reduce Maintenance.

- Minimize Energy consumption in following:-

- Now the compressor, pump, boiler level, fans, are not operated in wide band of cut in – cut out settings.
- But with closed loop VFD, our process variables, Energy inputs are steady at fixed values.

ENERGY CONSERVATION IS IN YOUR HANDS

- There are two kinds of Employees / Managers in your industry.
  - Some believe **they can make things happen,**
  - and others believe **that things happen to them.**
  - The first group believes that the outcome of

Energy conservation works is more or less in their own hands

  - The other group takes **wait and watch approach**: -
- They sit around & **wait for bus** to take them somewhere slowly.
- Now please Decide where & how fast you can save **our energy**

Nozzles not to jetting / pissing /oozing but Fogging but spray dwell time of water in air must be more for mill.

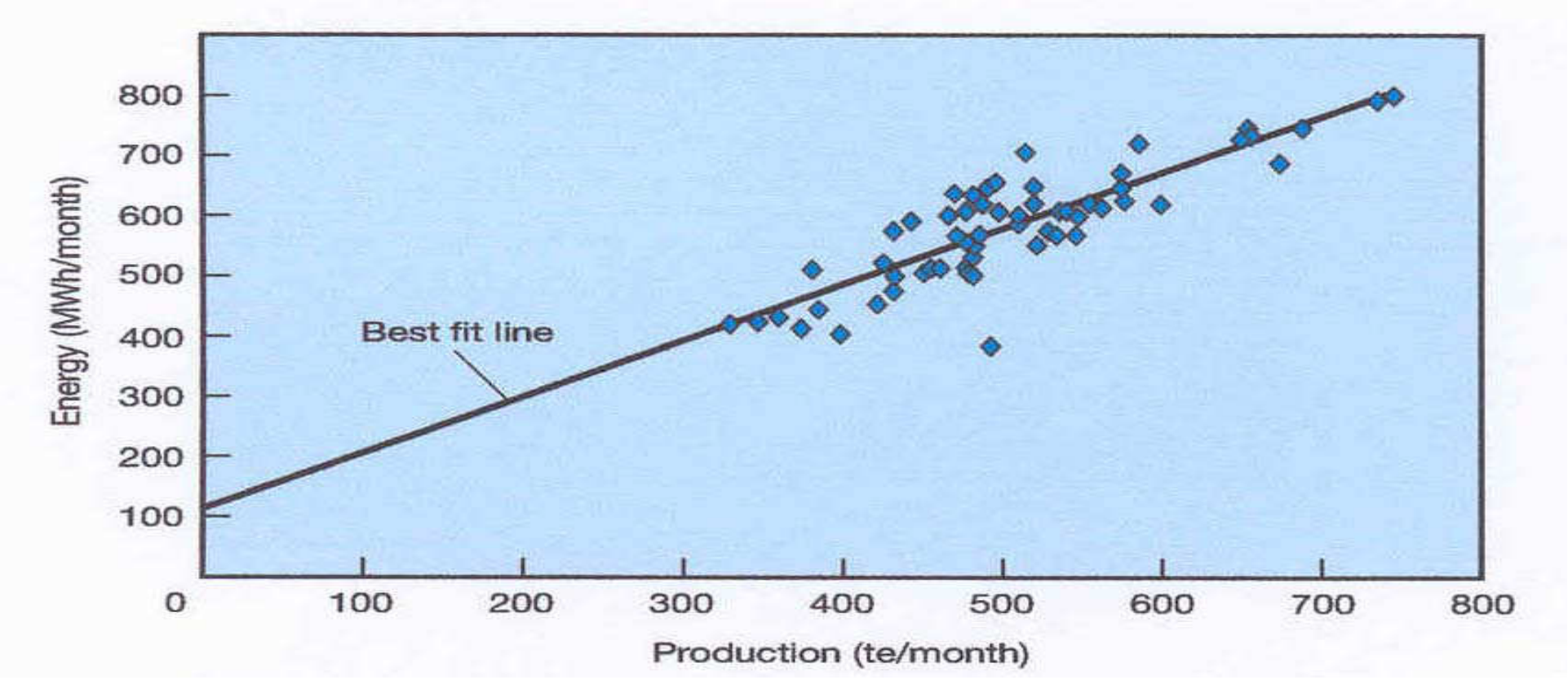
Modification of air washer no 1 of spinning hall in Rayon Plant.

Old Air Washer

New Air Washer

Y = MX + C : Energy consumed for the period Y = M x Production for same period + C

M is the energy consumption directly related to production (variable) and C is the "fixed" energy consumption (i.e. energy consumed for general auxiliary services



HARE & TORTOISE OF ENERGY MANAGEMENT – I

DO YOU ADHOC / CONTINOUS ENERGY MANAGE?

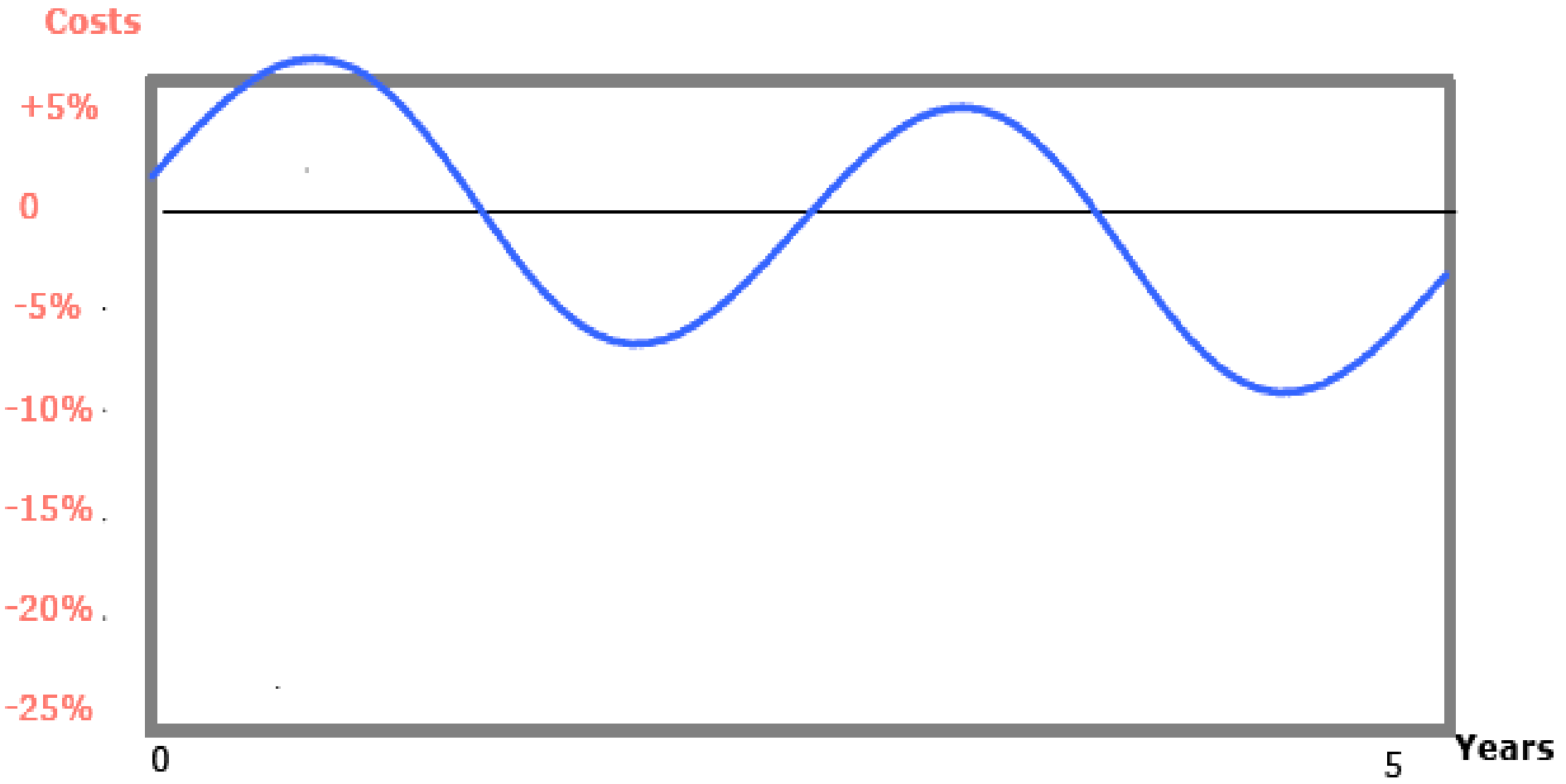
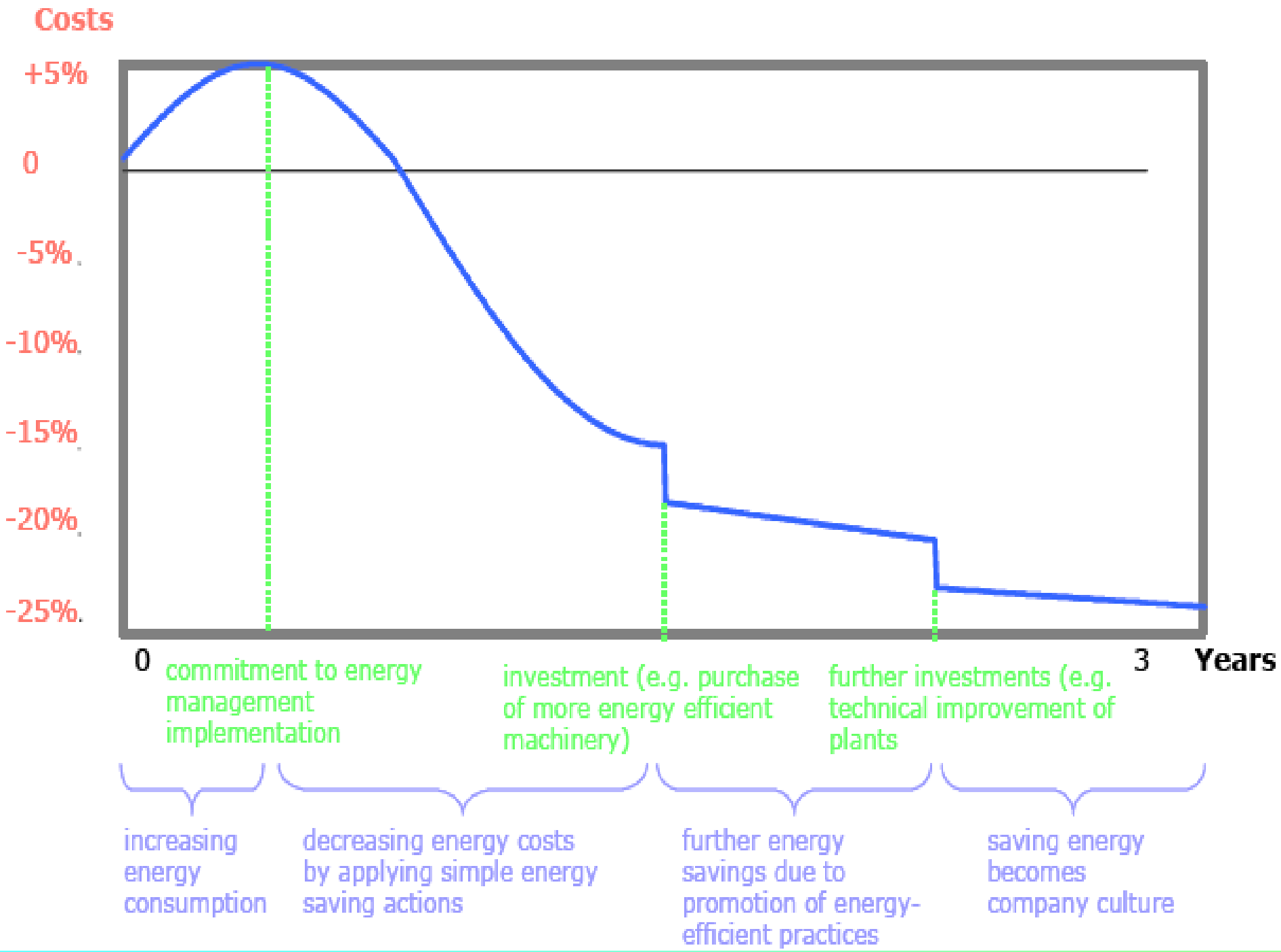


Figure 1: course of ad hoc energy management


Costs
+5%
0
-5%
-10%
-15%
-20%
-25%
0
3
Years
commitment to energy management implementation
investment (e.g. purchase of more energy efficient machinery)
further investments (e.g. technical improvement of plants
increasing energy consumption
decreasing energy costs by applying simple energy saving actions
further energy savings due to promotion of energy-efficient practices
saving energy becomes company culture

Safe & Best operating practices Automatically yield Energy Savings along with better machines' health

- Thinking & Acting on Conservation Measures
- **catalyzes our social responsibility,**
- **caring for others and sacrificing our selfish comforts.**
- **When we are safe and healthy, conservation prevails.**
- If safety fails, conservation fails and Pollution starts.

The industry to adapt to flexible practices – Learn - Lean Management in Thirukkural

478. ஆகாறு அளவிட்டி தாயினும் கேடில்லை
போகாறு அகலாக் கடை.

பொருள் வரும் வழி(வரவு) சிறியதாக இருந்தாலும்,
போகும் வழி(செலவு) விரிவு படாமல் இருந்தால்,
கேடு இல்லை.

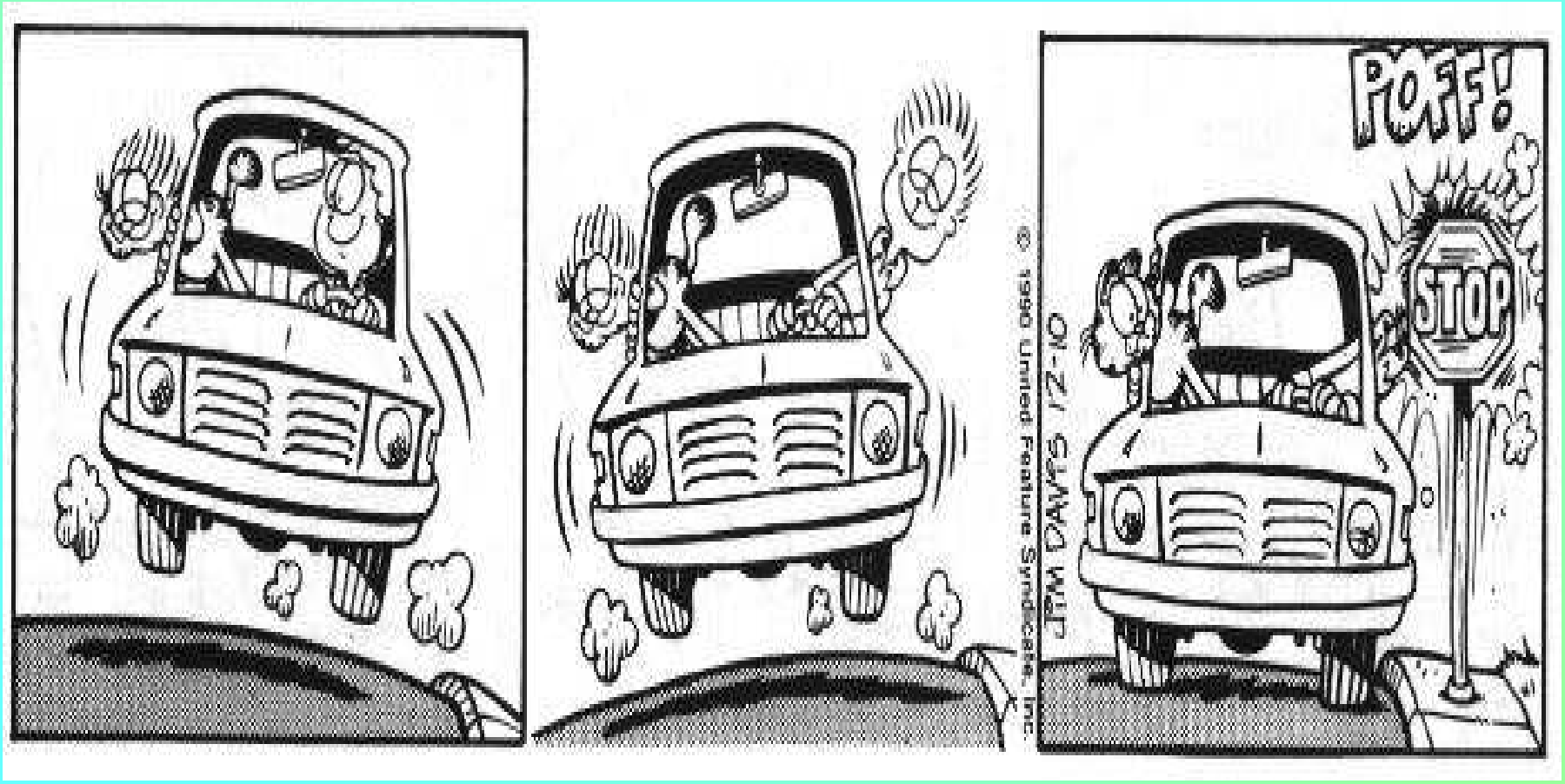
பொருள் வரவு சிறியாதனால், செலவு பெரிசாகமல் பார்க்கணும் !

Energy consumption and Conservation pattern

Varies from machine to machine and industry to industry

What suits to one consumer may not suit next consumer

So 1 to 1 copy of Energy savings from mill to mill impossible ?



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

- **Having done Energy audit in the mill / foundry now, we have given 5 to 10 % savings with One year Payback period.**

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

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

- **ASK YOURSELF**

- **How much product / yarn to sell to earn Rs.15 Lakhs net / year**

- **This 15 Lakh Rs is within yourself and make use of it NOW !**

Thanks to TECA & C I I ECON Initiatives!

Thanks for your kind attention & Interaction Please !

We are pleased to share energy audit case studies.

நன்மையையும் தீமையும் பிறர் தர வாரா.

S.ASHOK, BEE certified Energy Auditor, Call 94437 20220.

For more details, please contact ' POWER ON PROJECTS', Coimbatore.

Email – ashok.anbesivam@gmail.com, poweronprojects@gmail.com

Pls. visit my site www.energymeasuretosave.com for energy saving tips.

Sharing knowledge to SAVE OUR ENERGY!