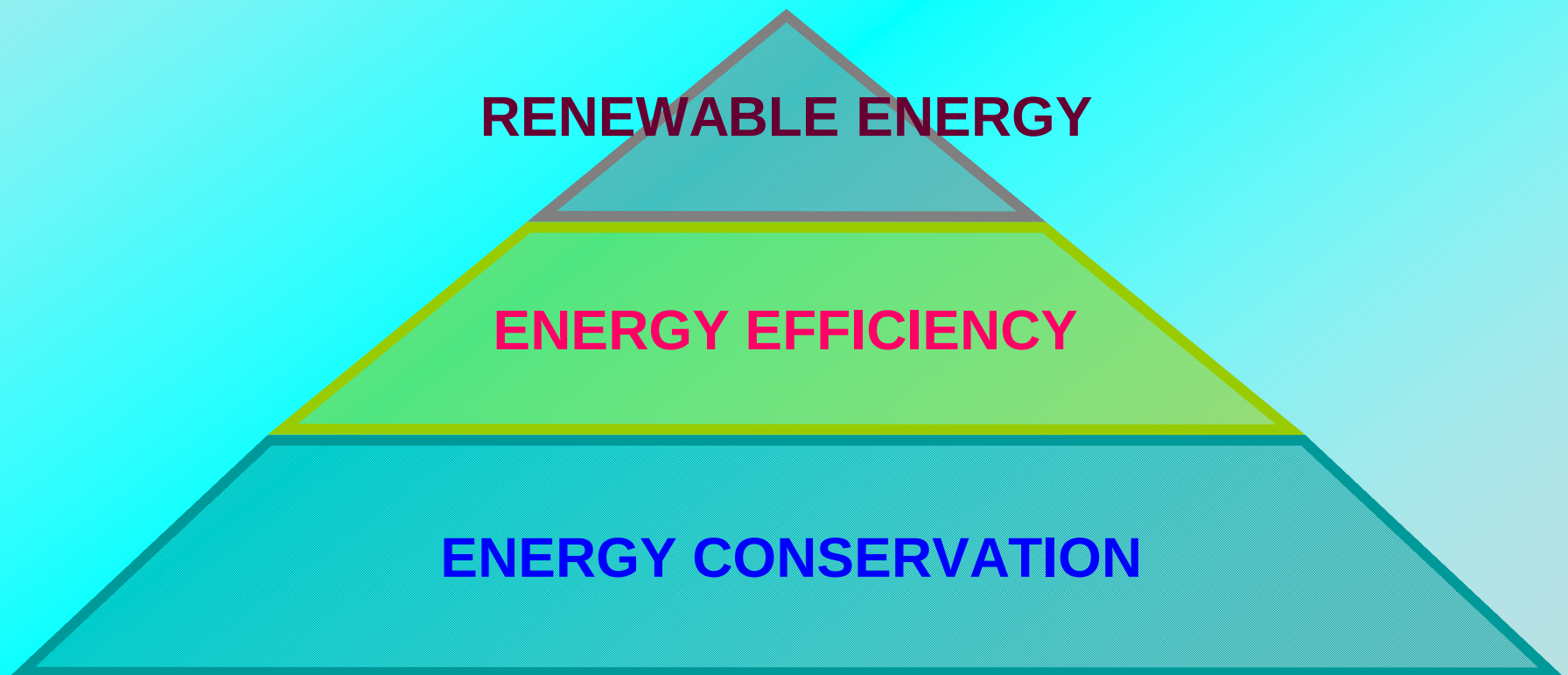


ENERGY FOR THE FUTURE – WHAT WE PLAN TO DO NOW?

LET US WORK ON BOTTOM OF PYRAMID NOW

WITH FOCUS ON ENERGY EFFICIENCY EARLY NEXT,

& ALWAYS EYEING FOR RENEWABLE ALTERNATIVES



National Mission for Enhanced Energy Efficiency



Missions under NAPCC

- National Solar Mission
- **National Mission for Enhanced Energy Efficiency**
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission for Sustainable Agriculture
- National Mission for Strategic Knowledge for Climate Change

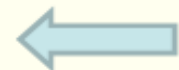


PAT – Energy Efficiency Mission Goals

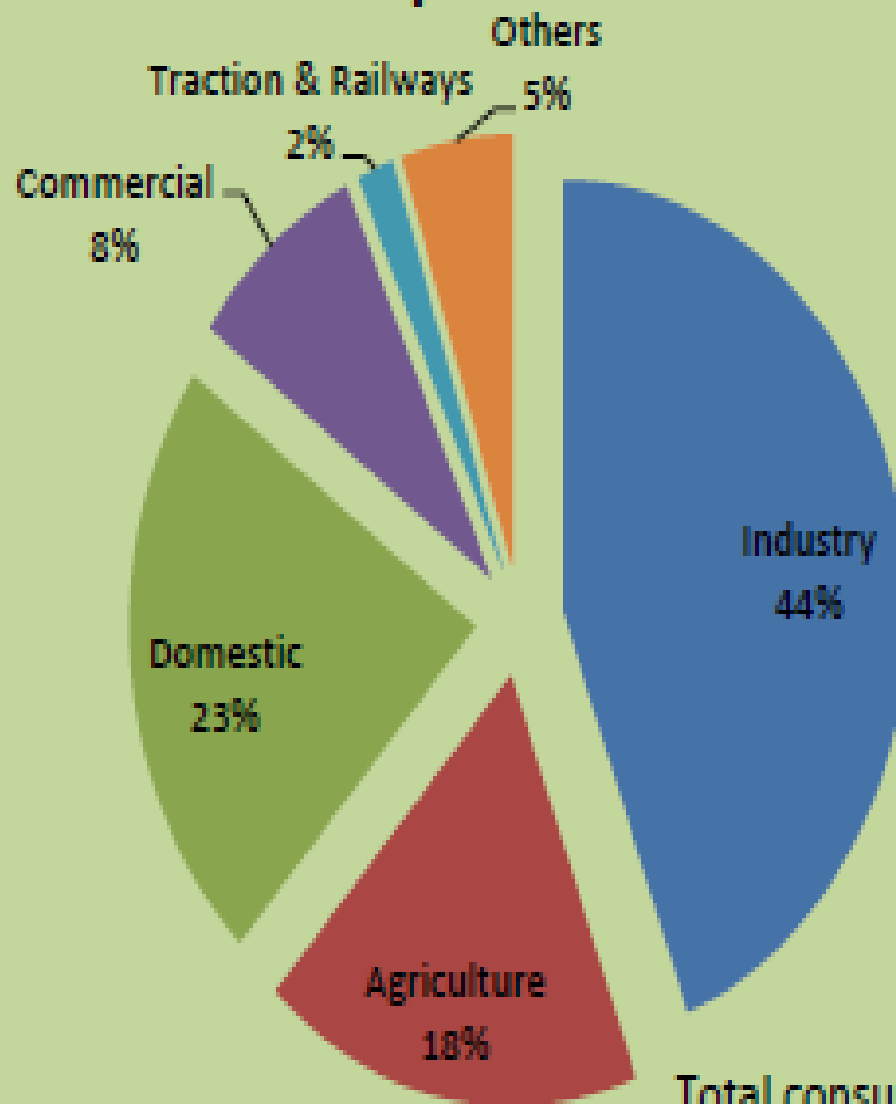


Mission Goals

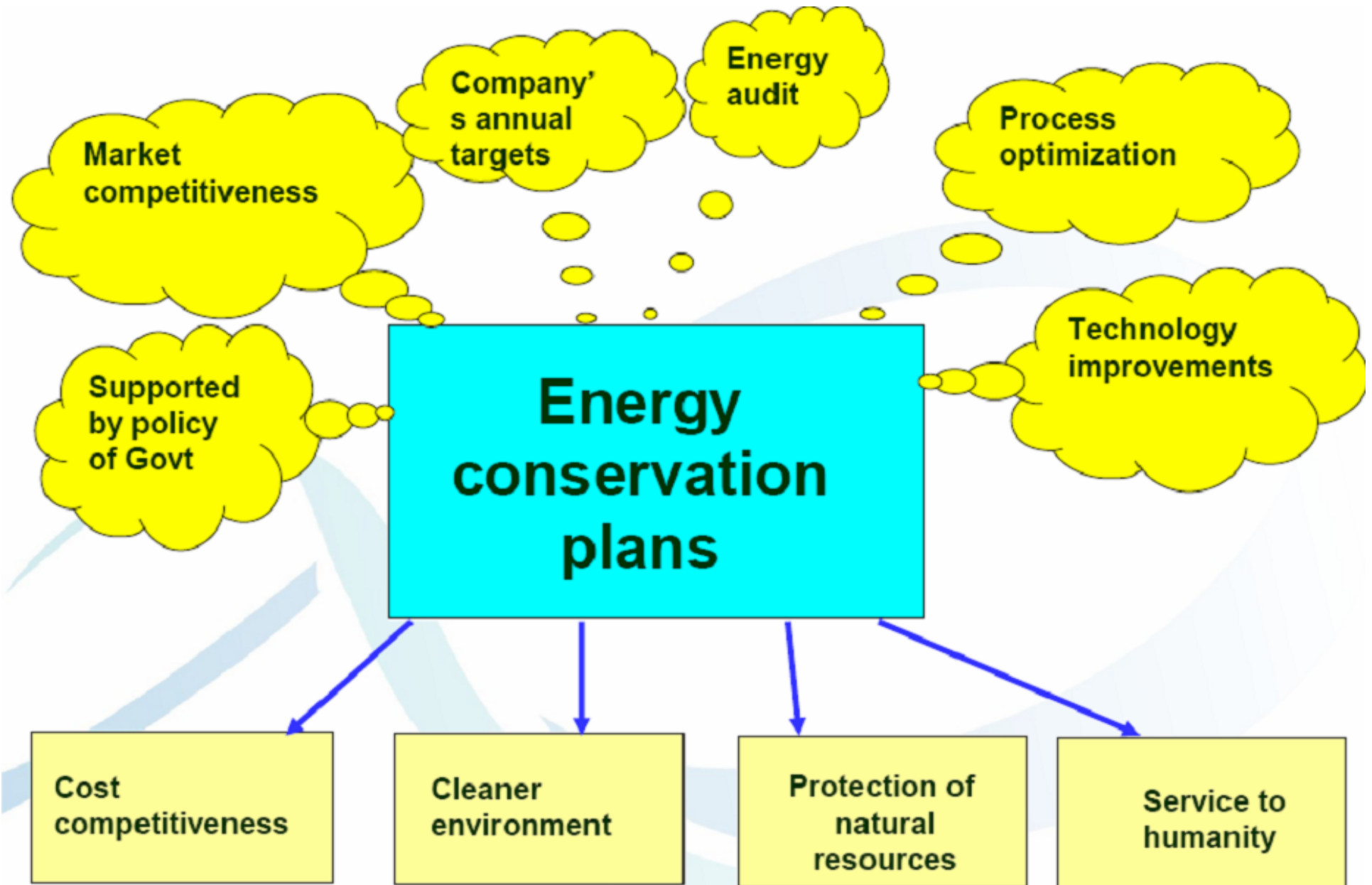
- Market-based approaches to unlock energy efficiency opportunities, estimated to be about Rs. 74,000 Crores
- By 2014-15:
 - Annual fuel savings in excess of 23 million toe
 - Cumulative avoided electricity capacity addition of 19,000 MW
 - CO₂ emission mitigation of 98 million tons per year

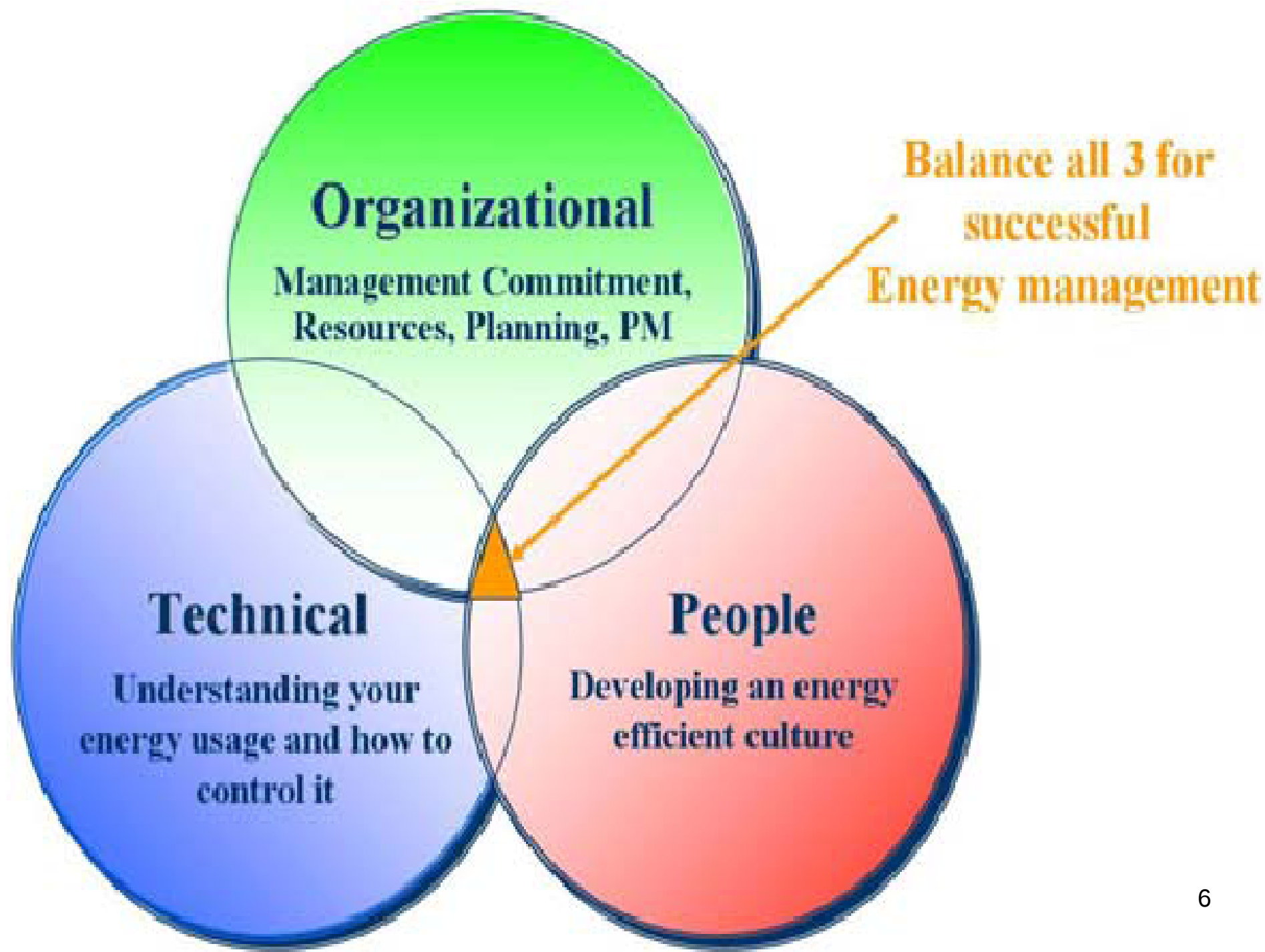


Sectorwise consumption of Electricity in India



Total consumption = 948,328 GWh

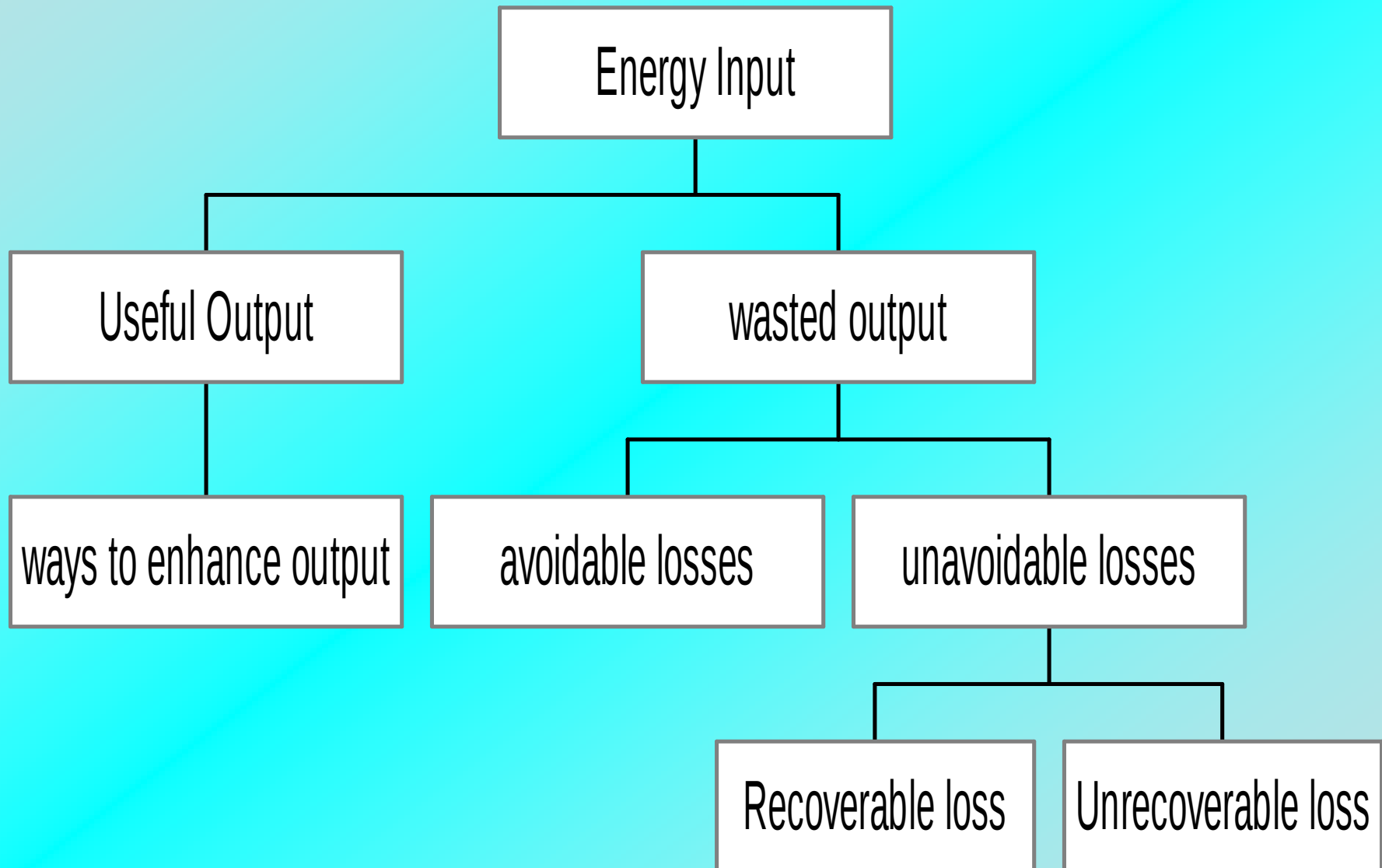




ENERGY AUDIT MACRO VIEW

- Production & utility – Linear & Non linear loads
- Now convert the utility to VSD for better saving
- Energy measure in individual utility is the need
- Power quality is disturbing other loads now.
- Relative Condition Monitoring of equipments

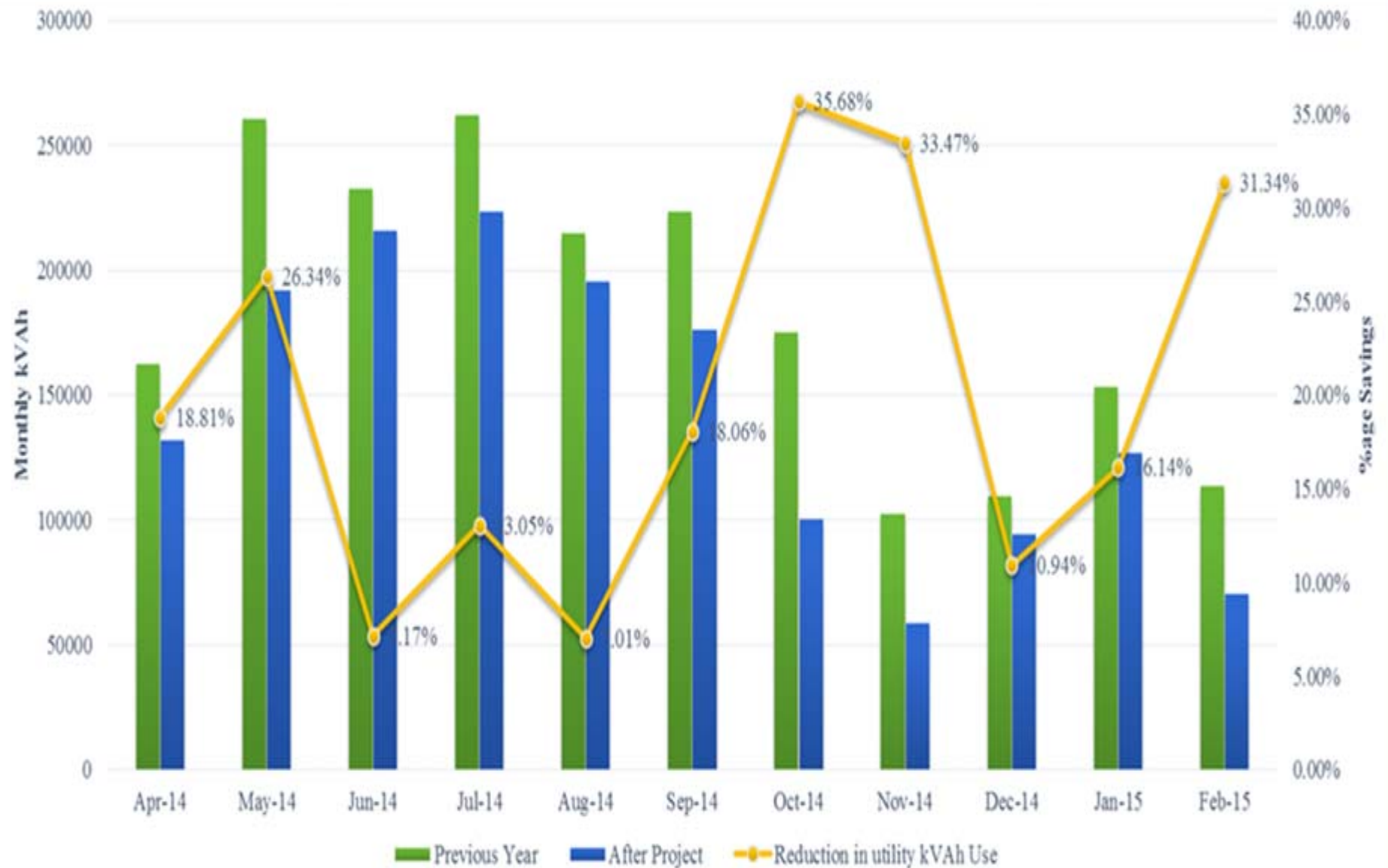
ENERGY AUDIT



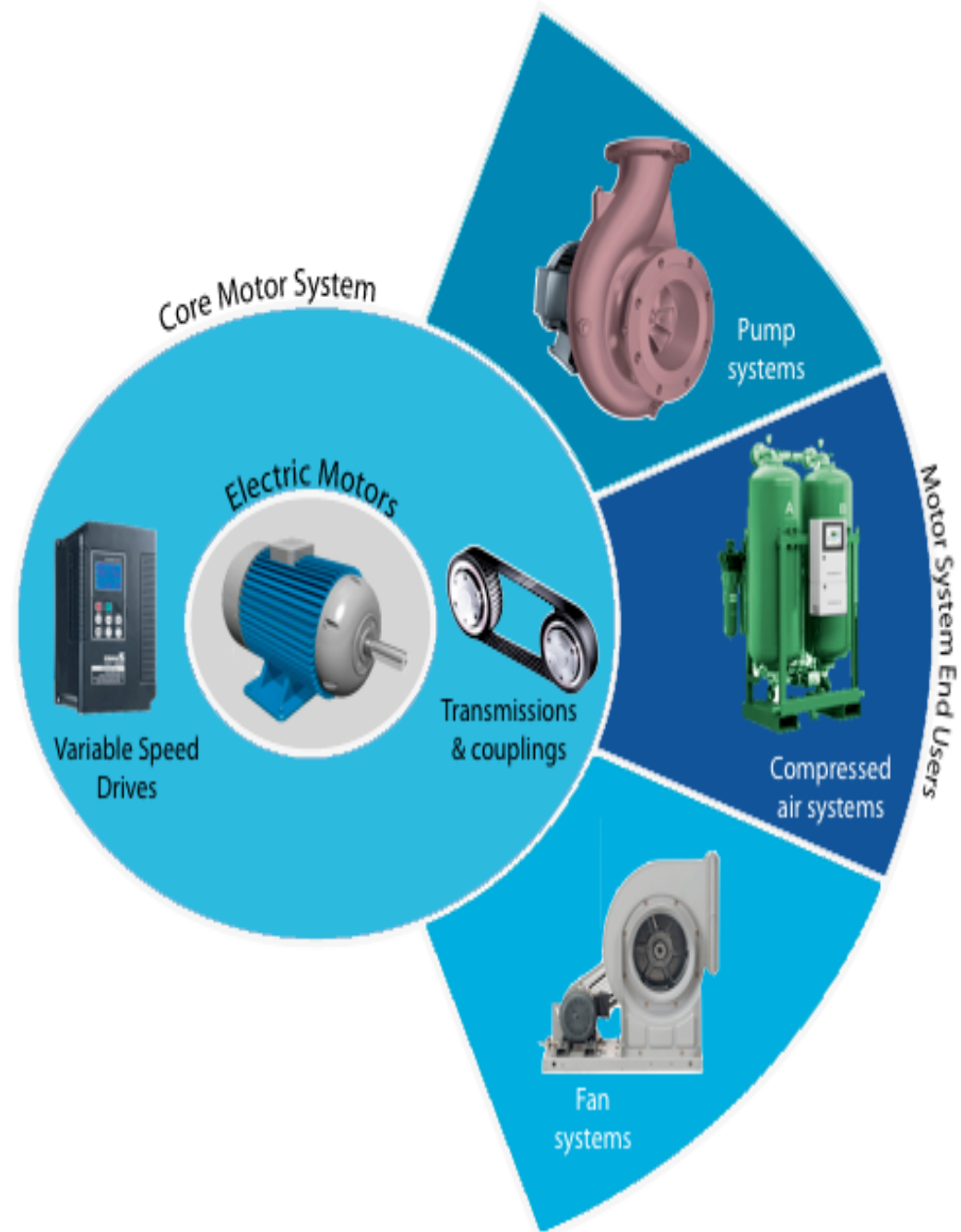
Features of Energy Audit – Electrical

- **Monthly consumption vs production 3 year**
 - **Study PF & load factor improvements**
 - **Rationalisation of motor loads**
 - **Rationalisation of transformer capacity**
- **Rationalise lighting & illumination loads**
- **Judicious usage of compressed air systems**
 - **Alter parameters of Airconditioning plants**

Year on Year Monthly Energy Savings in KVAh



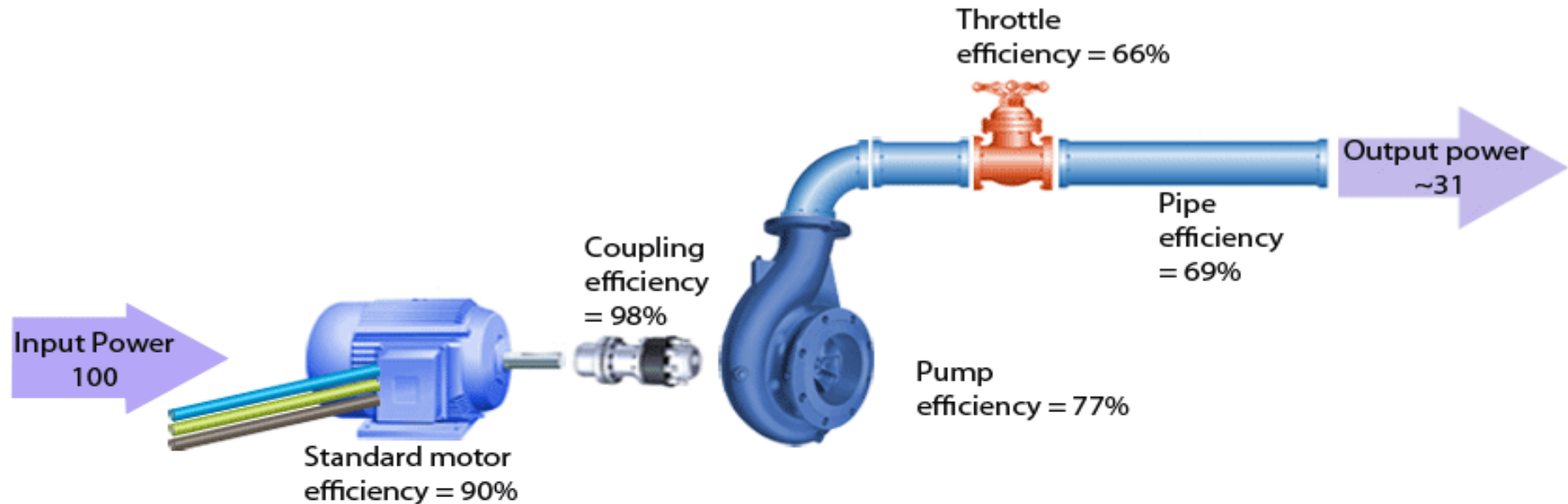
INPUT VOLTAGE VARIATION	POSSIBLE APPX. POWER SAVING	
	Motor Load below 10 hp	Lighting Load
380 - 400 volts	Nil	Nil & no servo stabilizer required
400 - 420 volts	3%	5%
420 - 440 volts	5%	10%
440 - 460 volts	7%	20%
460 - 480 volts	10%	30%



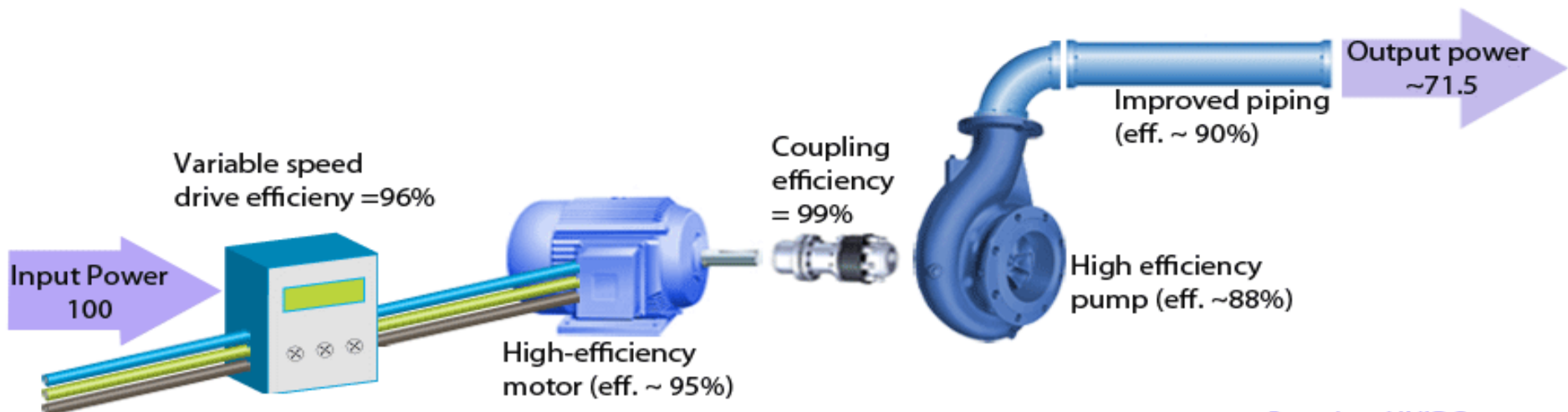
Pumping system – savings

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	--	36.7 %
• Input power reduction	29.66 %	--
• Saving in Energy	--	48.44 %

Conventional Pumping System (Efficiency ~ 31%)



Efficiency Optimized Pumping System (Efficiency ~ 72%)



Based on UNIDO, 2011.

CASE STUDY 5 STAR rated AGRI PUMP REPLACEMENT

- **BEE decided to swap old inefficient Agricultural pump with 5 star rated pump to save up to 40 % power.**
- **3530 pumps to replace in 6 months project cost Rs.7 Crores**
 - **Pump OEM committed cumulative energy savings of 36 % PA over 5 years**
- **Cost of pump Rs.20,000/- includes the dismantling the existing pump set, procurement & installation.**
- **For maintenance and repair / replacement for 60 months provided free of cost to farmers.**
- **Rate of return = Rs.7200/- Hassle free investment of Rs.20,000**
- **ROI – Return on Investment say Rs.1000 in one year = Rs.360**
 - **News Item as appeared in Economic Times Newspaper.**

System Energy losses viewed from Input KW to motor

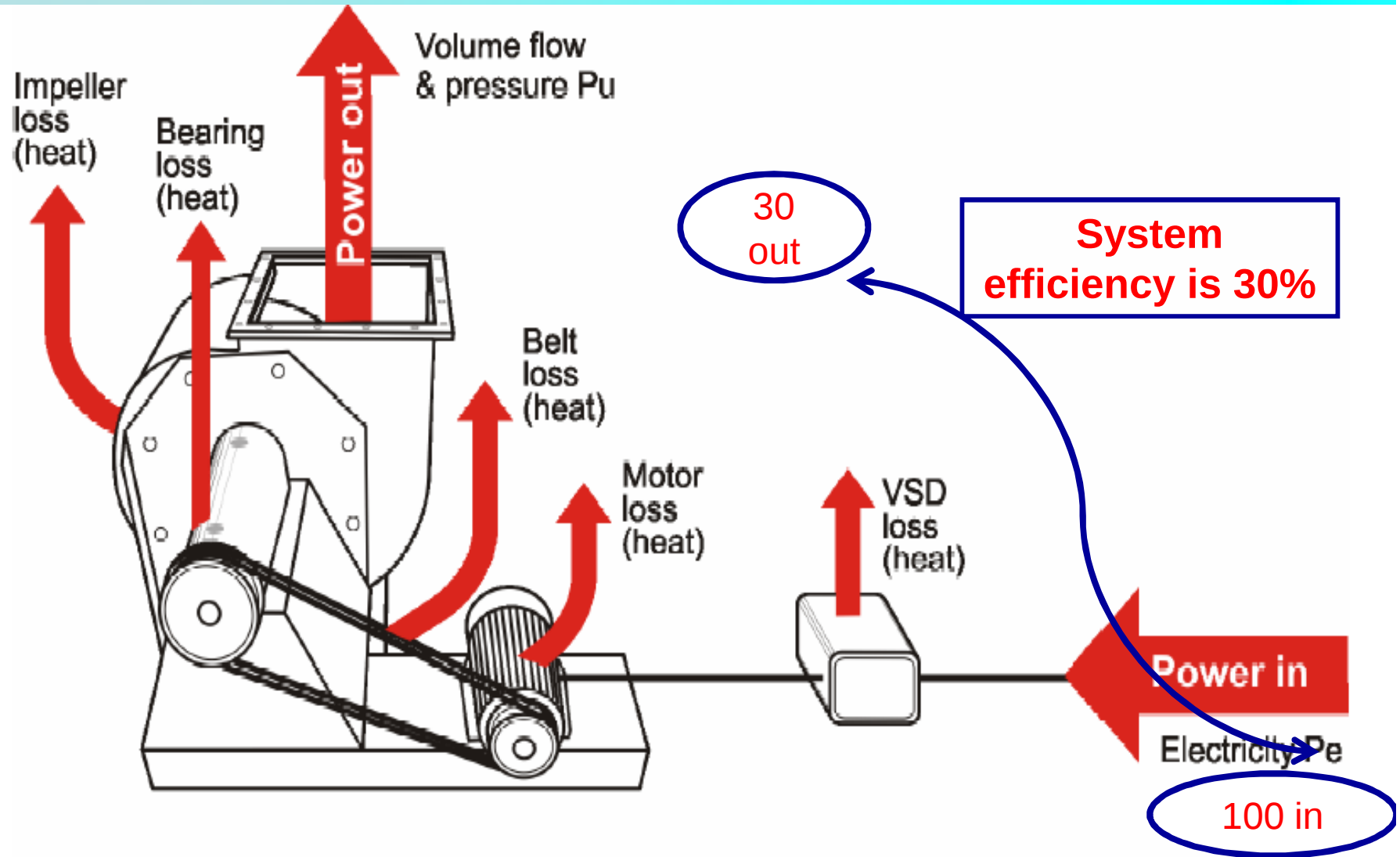
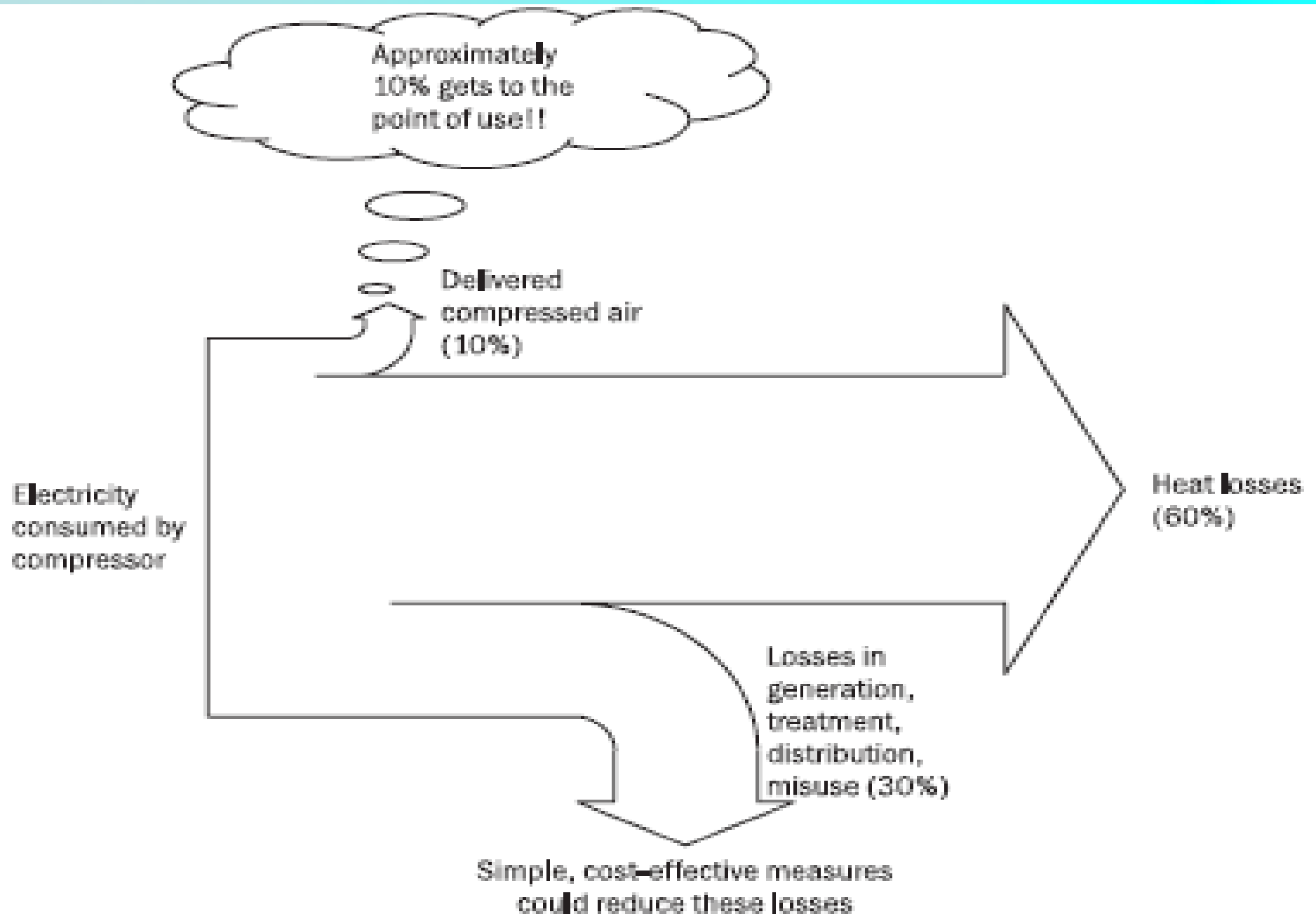


Diagram showing the losses from a fan system including VSD, motor and belt drive.

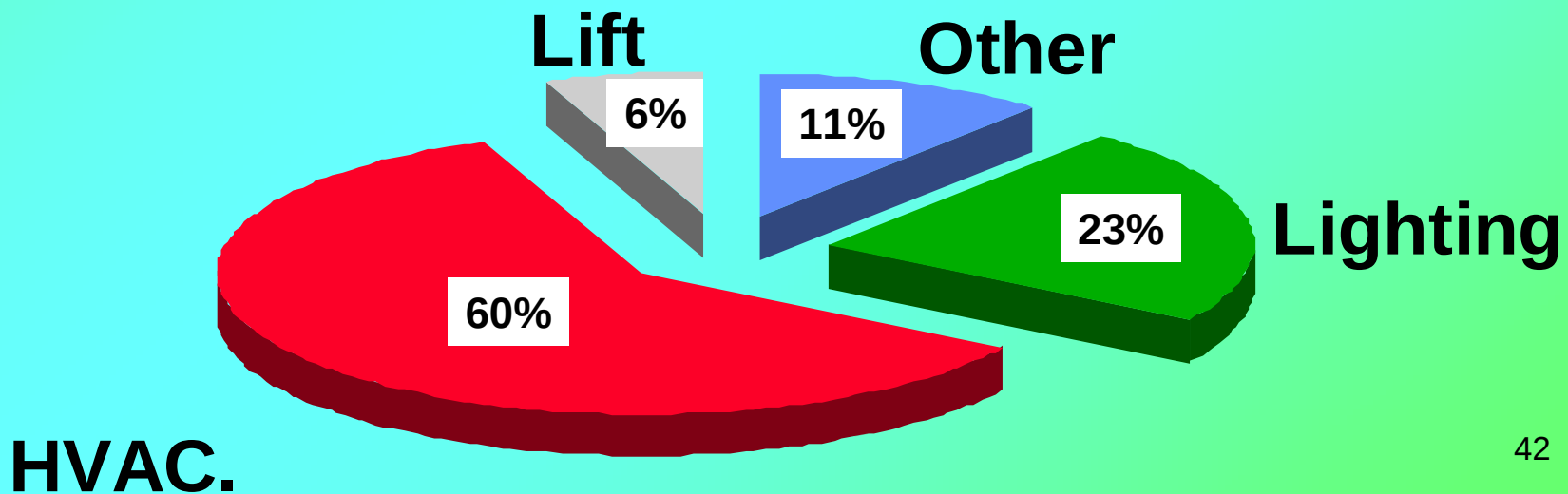
Compressed Air Delivered to Machine is only a Fraction ?



Benefits of Building Automation System

The AC Run hour tool indicates the daily relative efficiency
HVAC and lighting is major electrical load in building

- Improves and documents occupant comfort
- Reduces heating, ventilation, and cooling costs through improved sub-system management
- Reduces time required to monitor & manage building operation.



The move towards AC



Room conditions
Air movement

Energy Demand
9 W/m²

Energy Consumption
15 kWh/m²

CO₂ emission
20 kg/m²



Room conditions
29 ° C/ 70 % RH

Energy Demand
39 W/m²

Energy Consumption
70 kWh/m²

CO₂ emission
90 kg/m²



Room conditions
24 ° C/ 60 % RH

Energy Demand
194 W/m²

Energy Consumption
244 kWh/m²

CO₂ emission
310 kg/m²

Air conditioner cutting / Savings

Our body temperature is 37*c we have to set at 27 *c
at is 10* minus body temp. 27*C (instead of 22* set now)

Cool air breeze is better to health & 15 % power savings
You can pls help environment by not warming up more.

Put your outdoor unit under shade in open terrace &
will consume around 10% less electricity & run healthy.

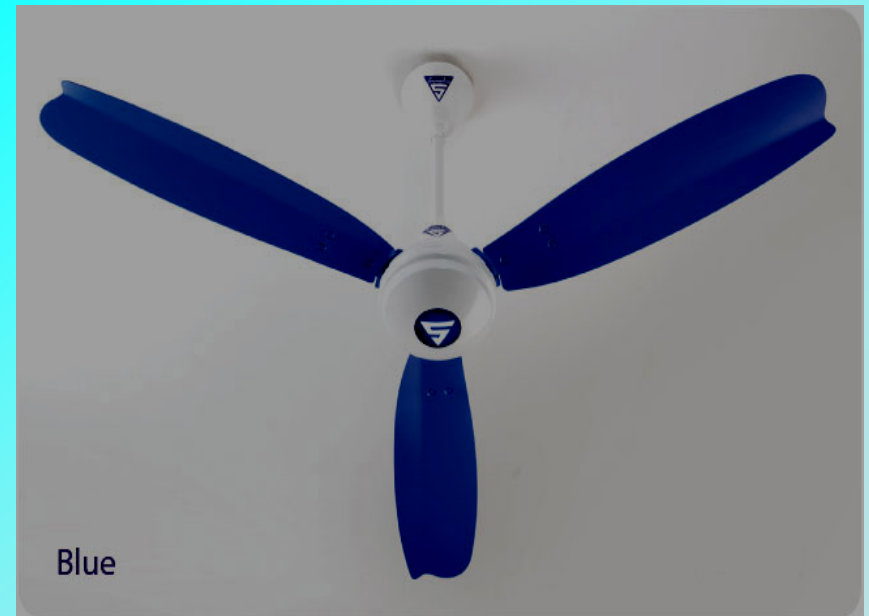
AC efficiency improves and it can be seen by fitting
AC machine Run hour meter & gives run hours / day.

- Practically we use mid position 3 in our ceiling fans.
 - **BLDC fan consumes only 11 Watts**
 - **ONLY 25 % power of what our existing fan consumes.**

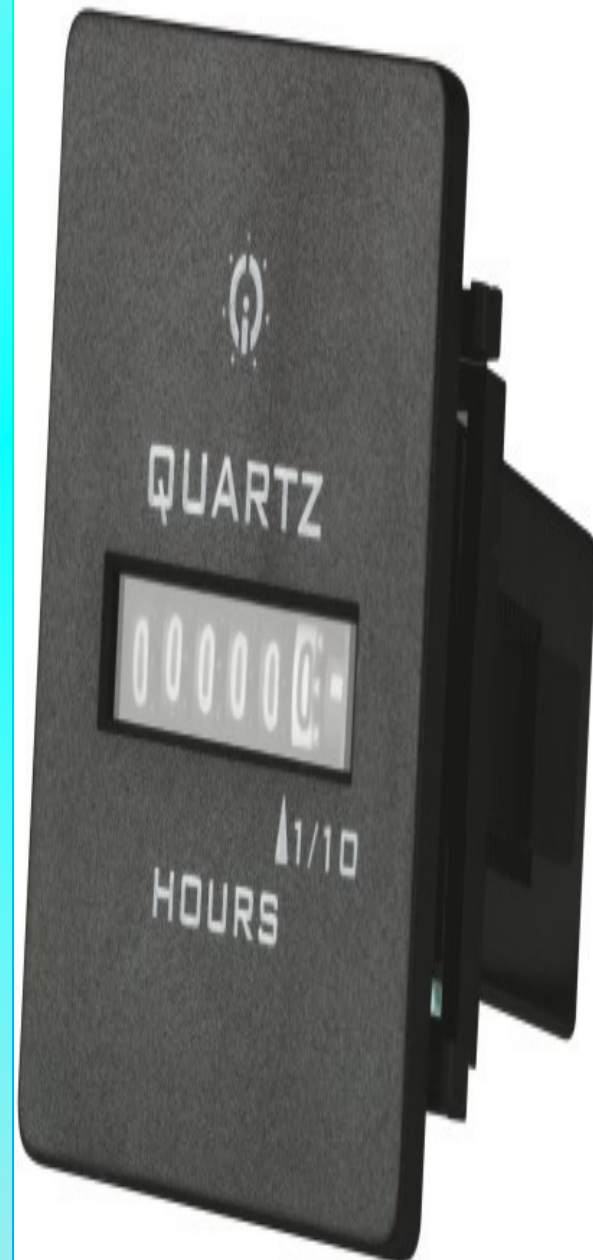
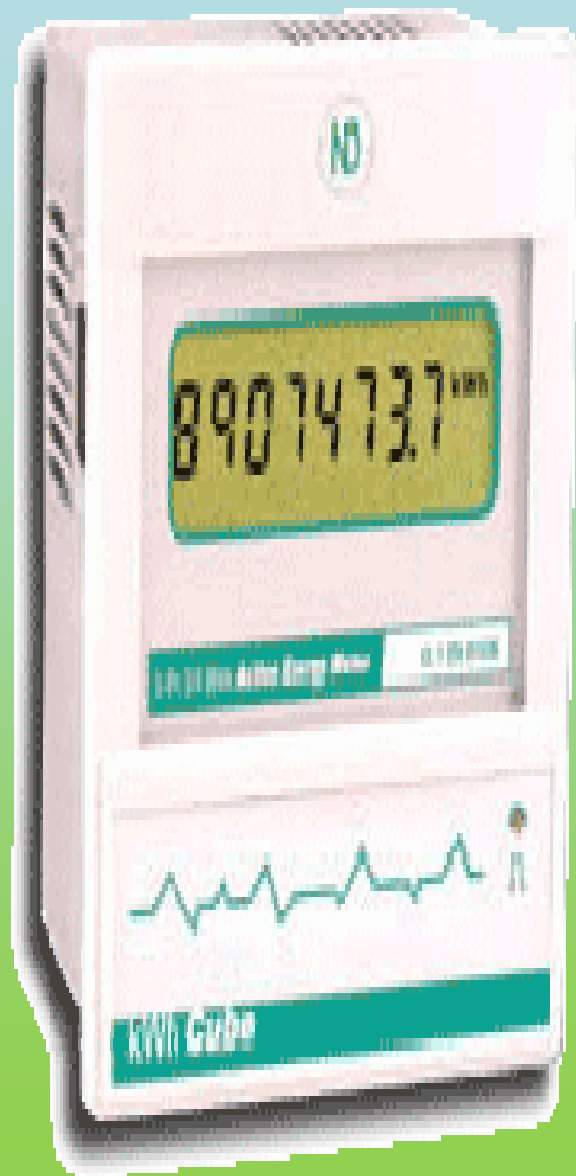
Knob Position	1	2	3	4	5
Old Fan Watts	18	33	46	56	67
BLDC Fan Watts	3	6	11	20	31



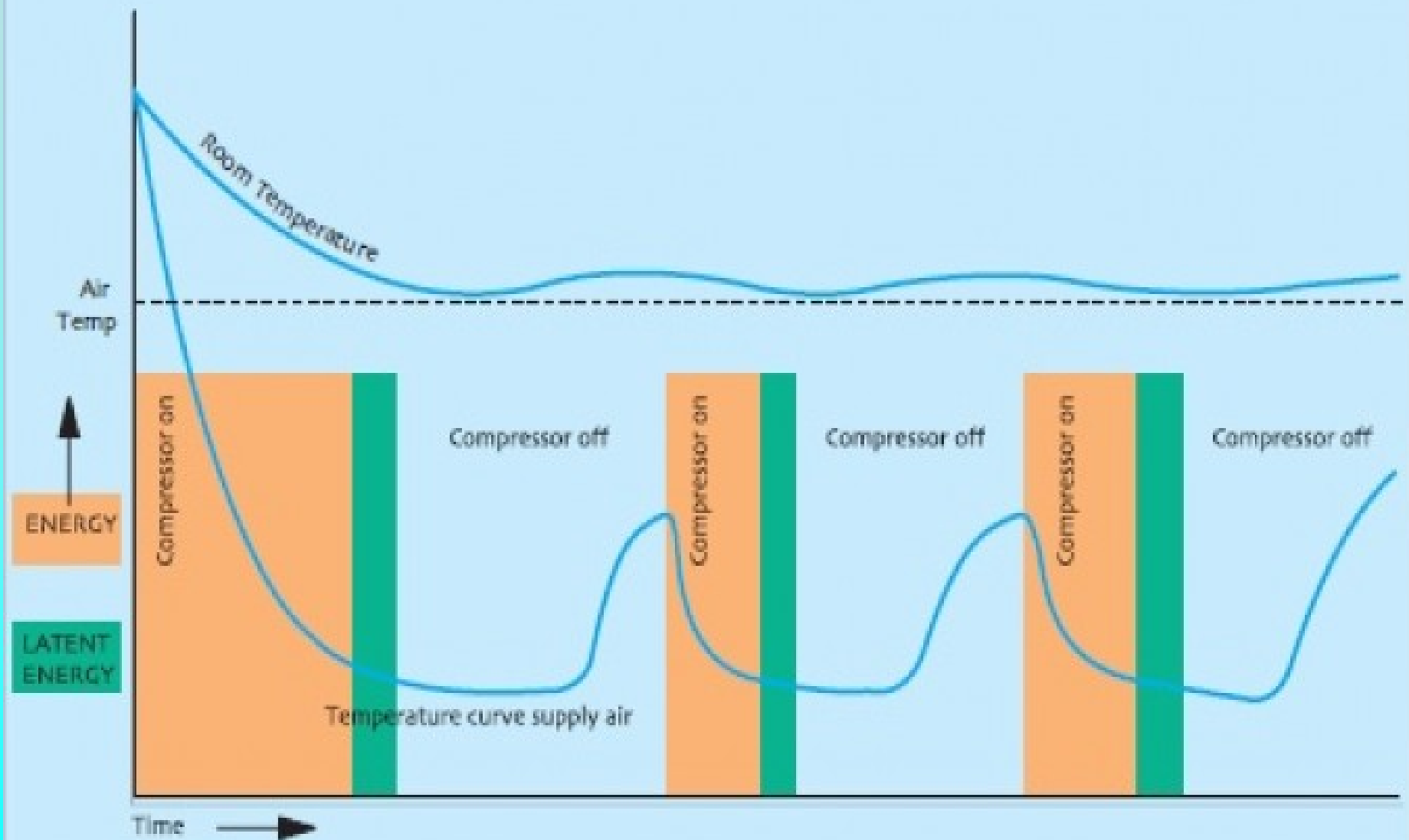
IMG_0353



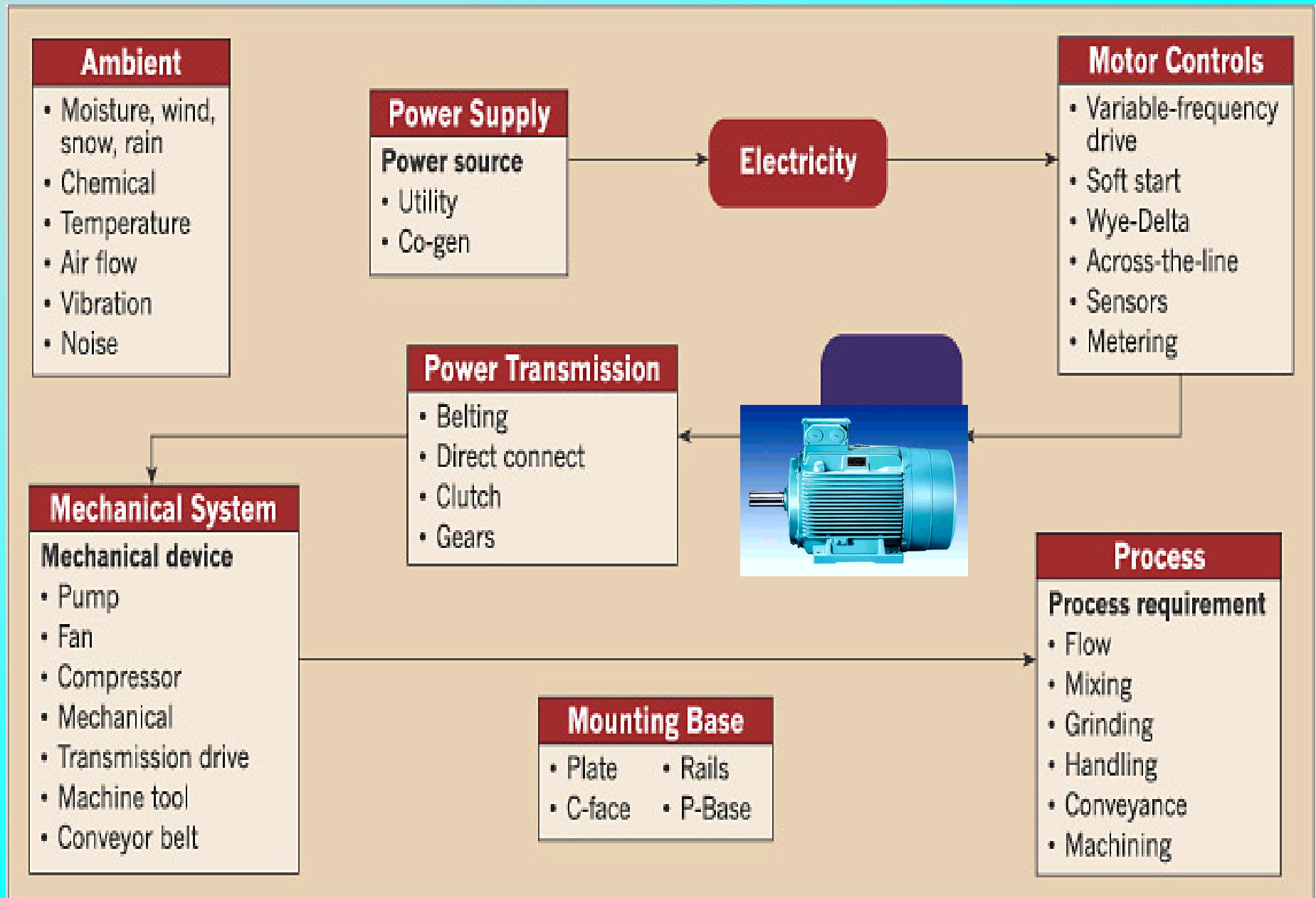
Blue



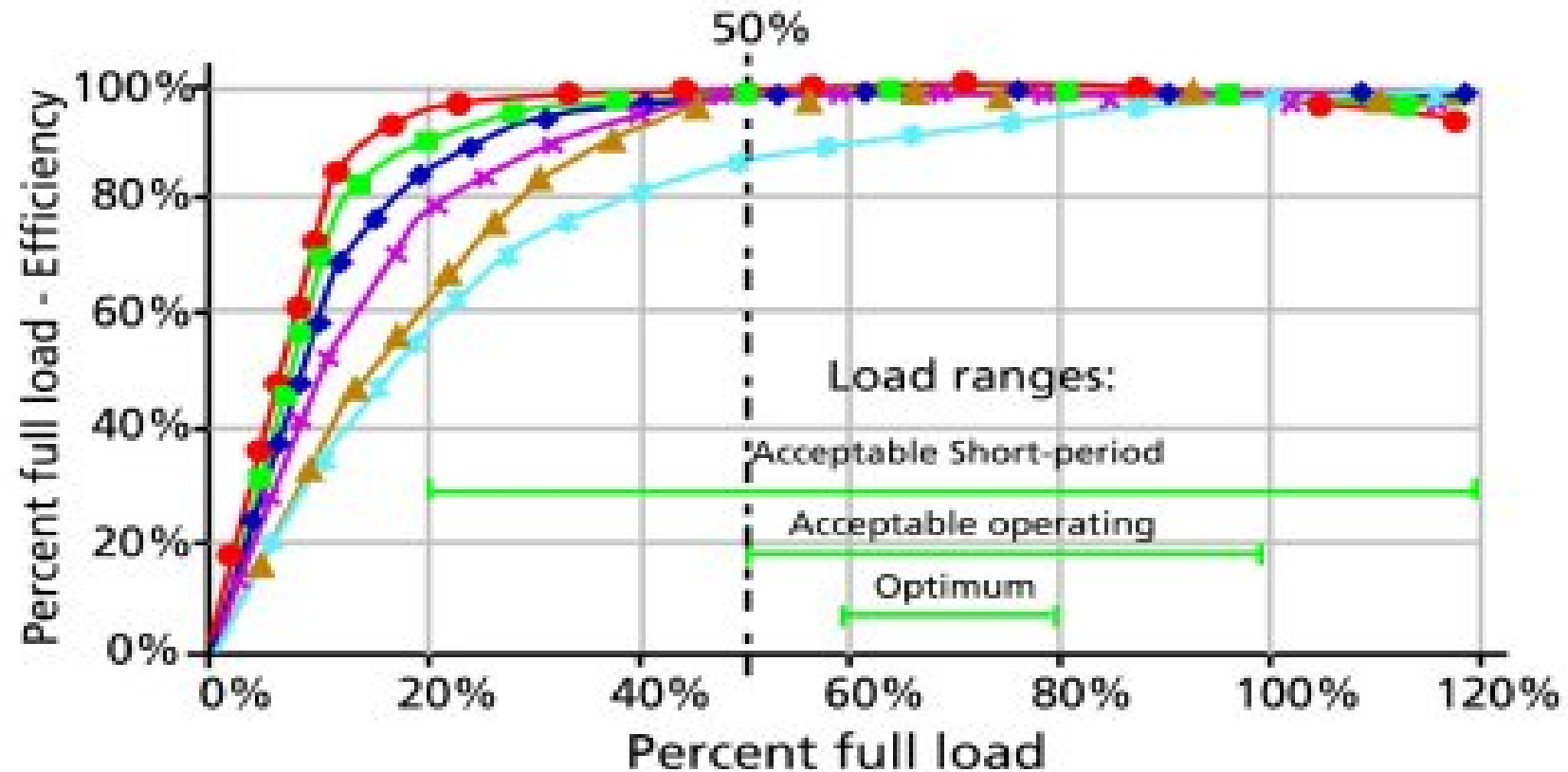
Unit controlled by AIRCON



Motor System – Ambient – Input – App – control – process

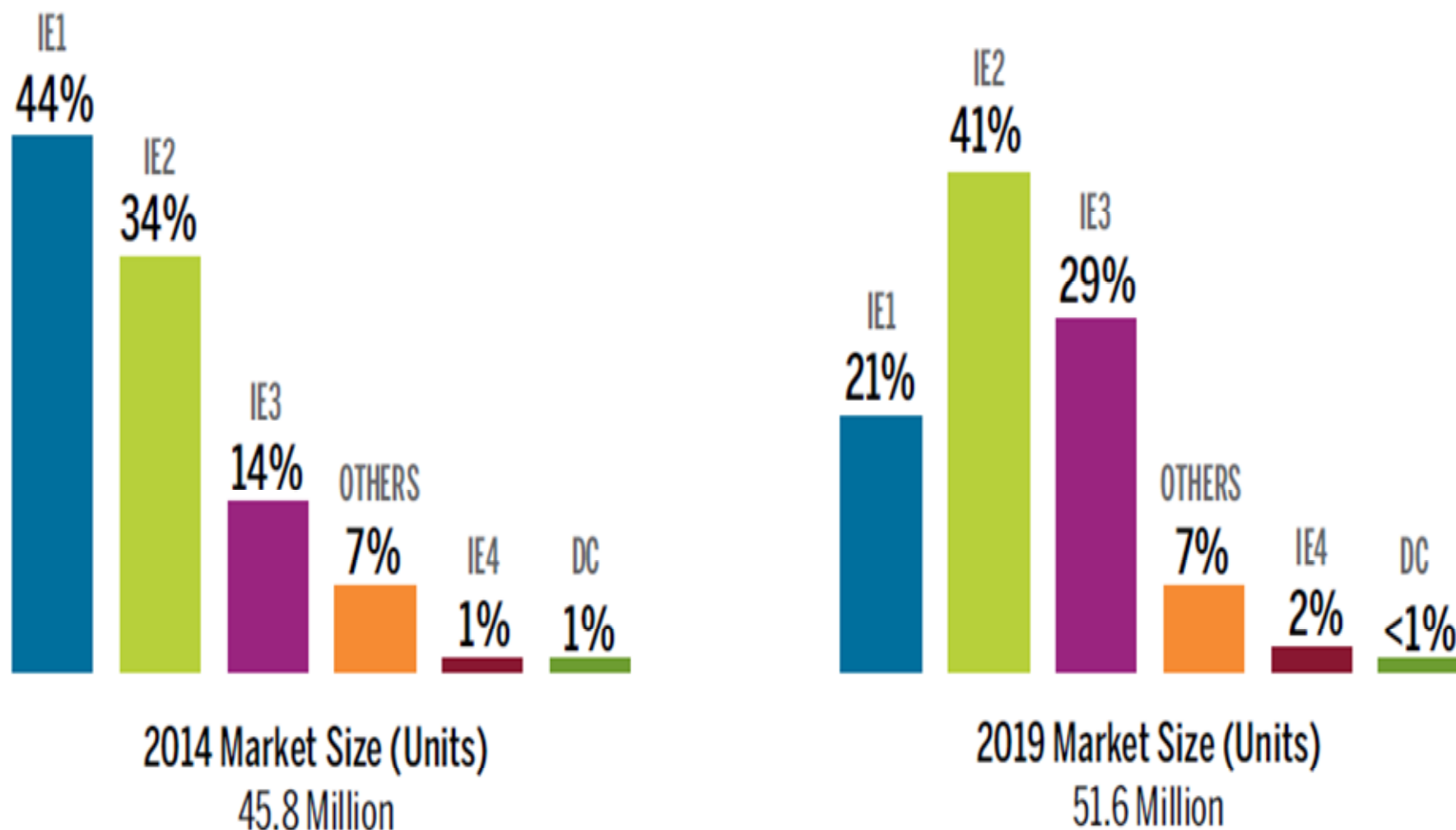


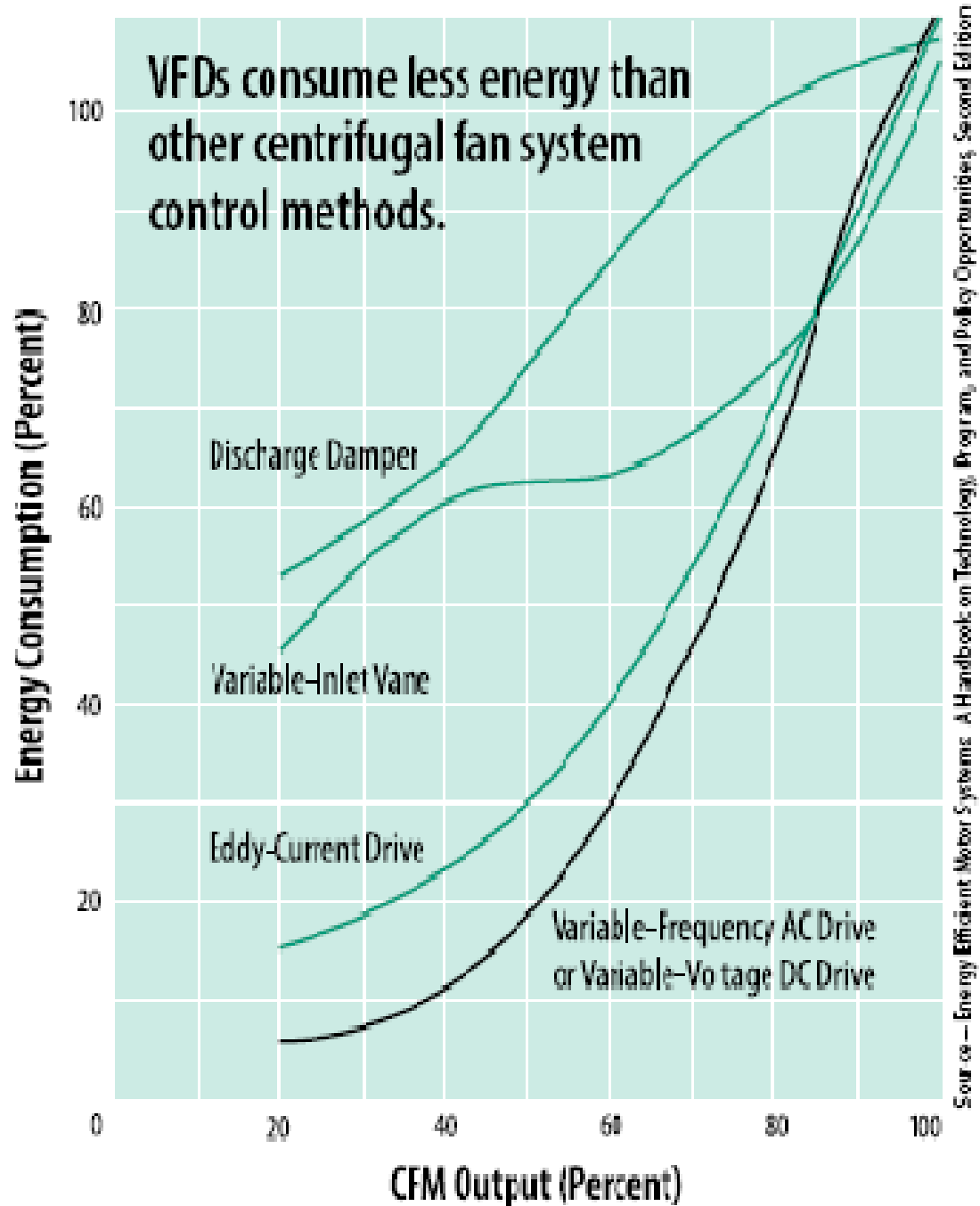
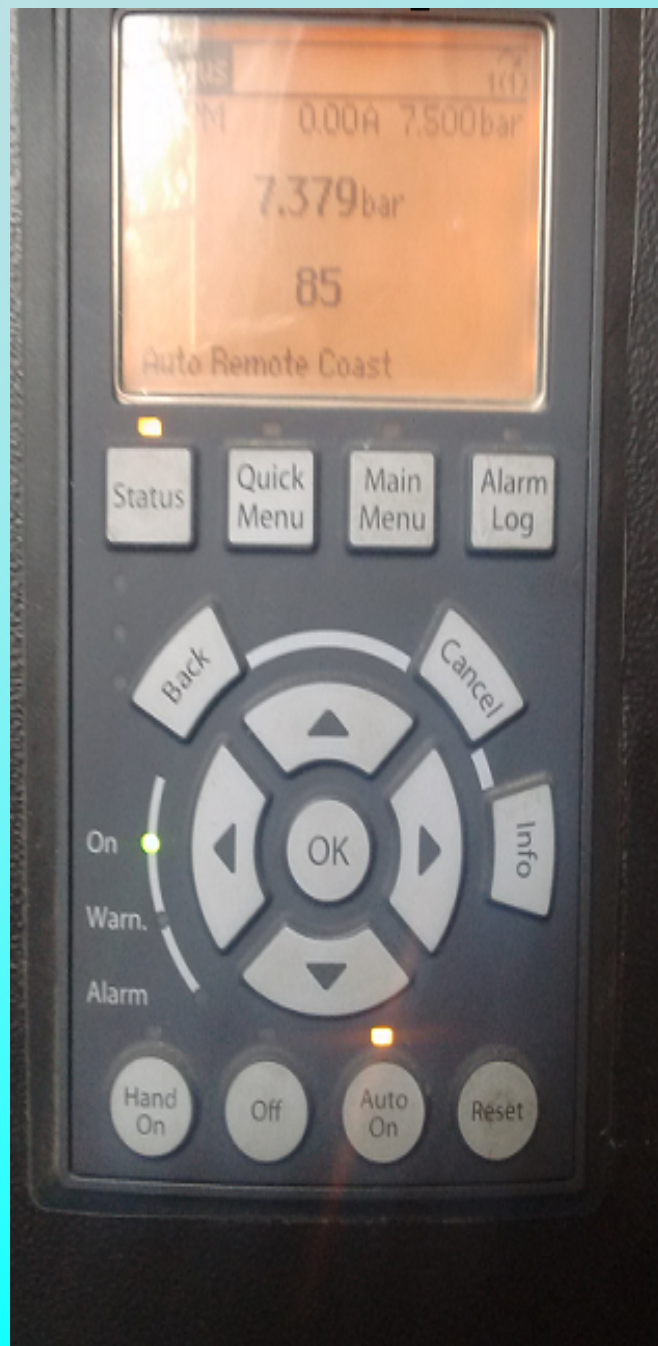
MOTOR PART LOAD EFFICIENCY IS PRIORITY NOW.



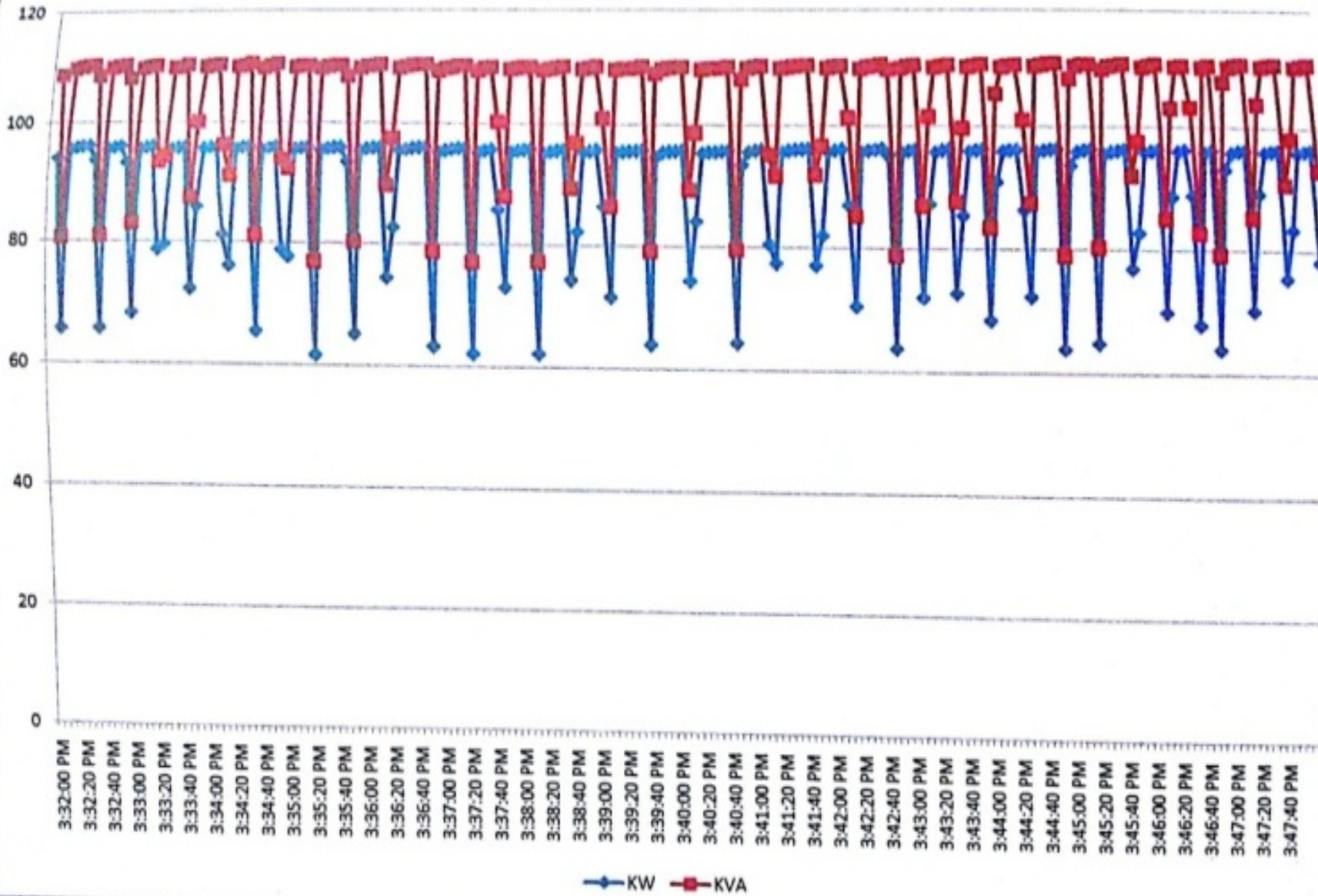
Why IE 3 motor growth is doubling now?

**IE 1 MOTORS GROWTH HALVED &
IE3 MOTORS GROWTH DOUBLING NOW.**

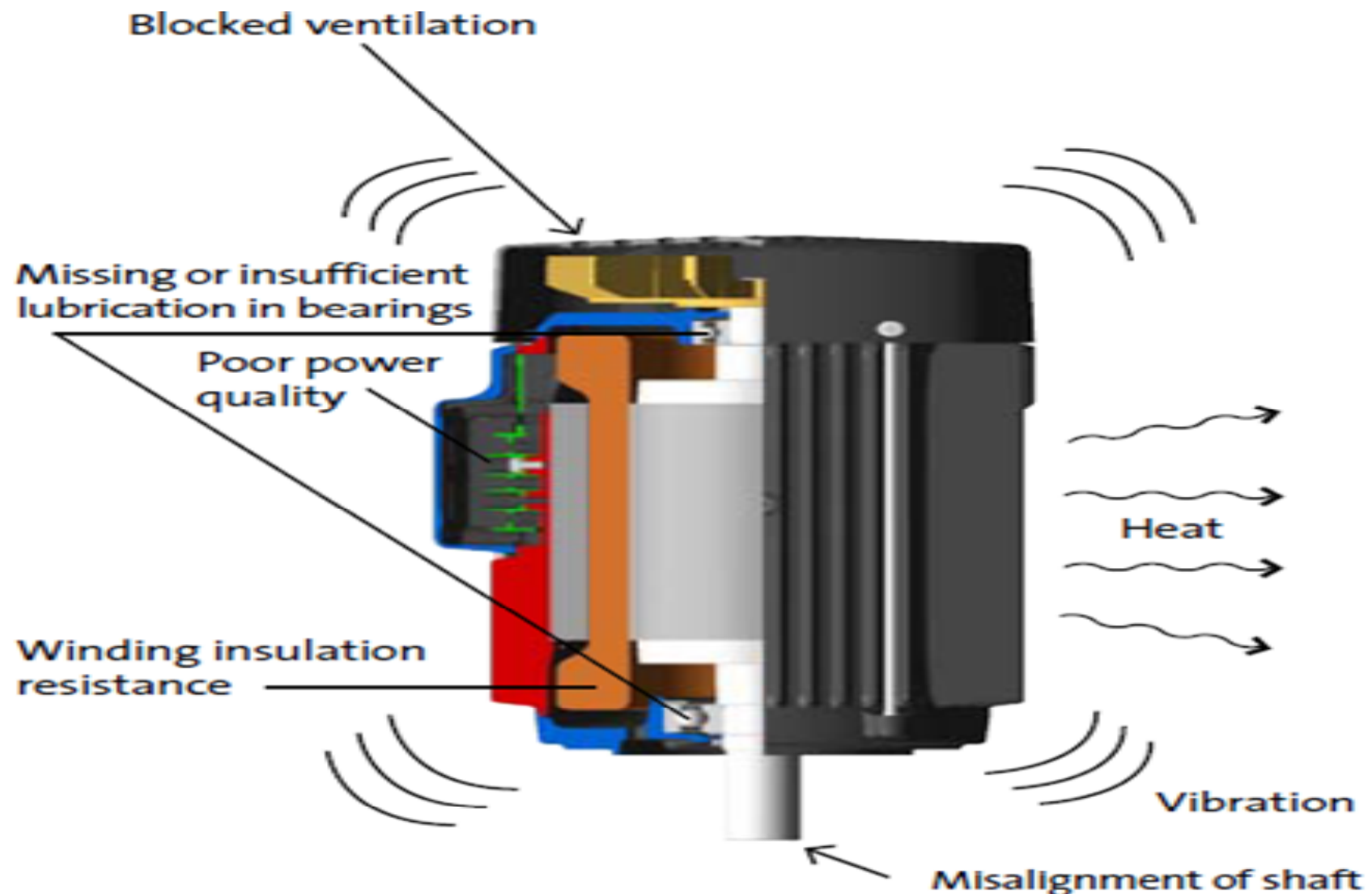




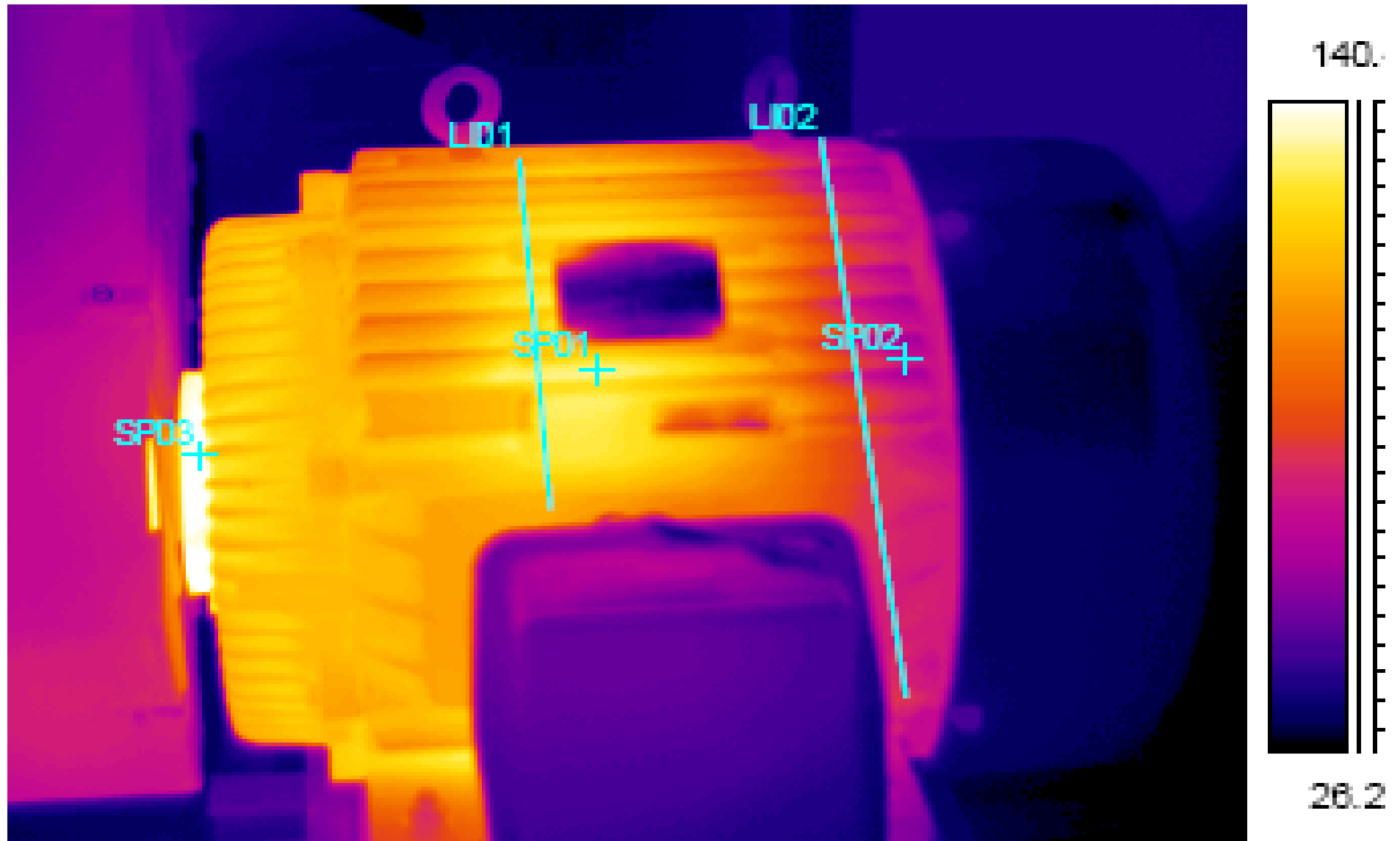
Air Compressor No.1 - KW VS KVA



Motor life span – Factors affecting the life due to lack of Conditioned Maintenance



Hot spots motor bearing DE & NDE



How the VFD can be used effectively?

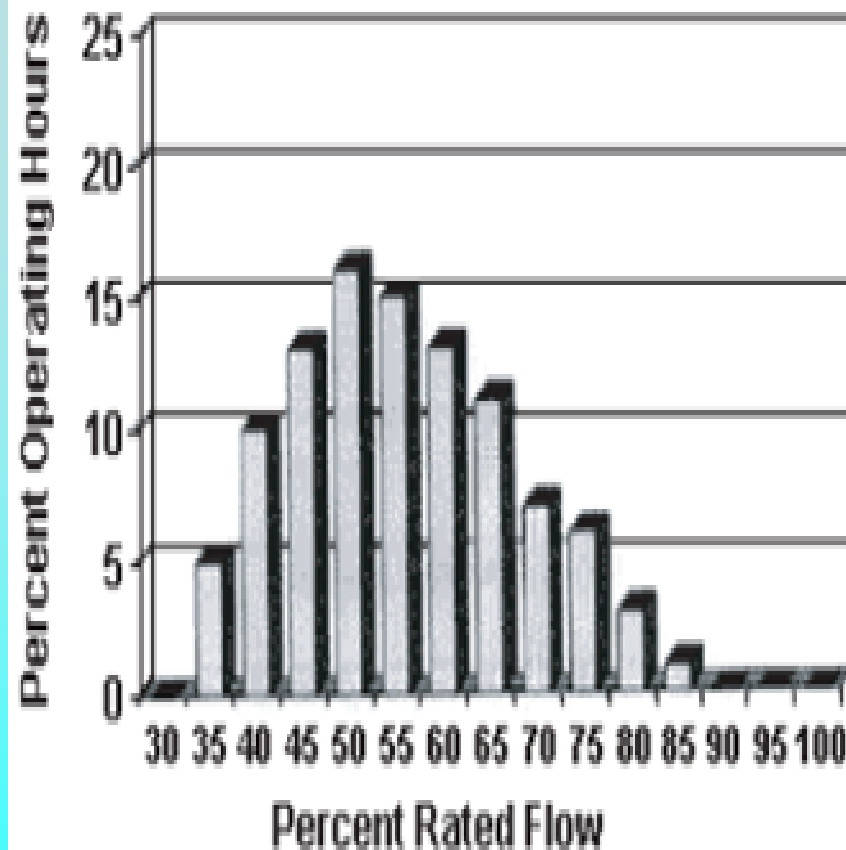


Figure 5.3 Example of an excellent variable speed drive candidate

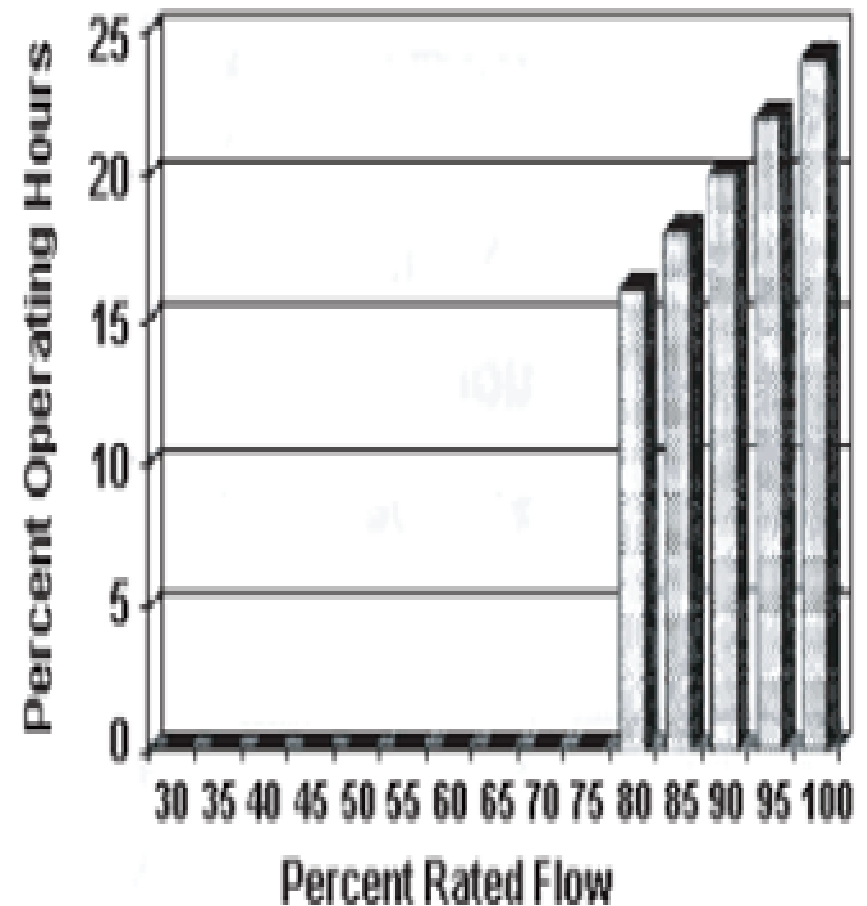
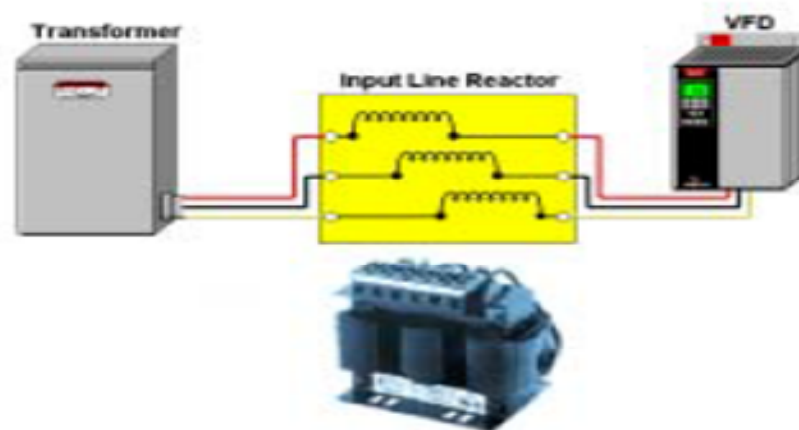


Figure 5.4 Example of a poor variable speed drive candidate

Harmonic Mitigation in VFD – It is mandatory to fix Input line reactor cum harmonic filter in front of VFD.

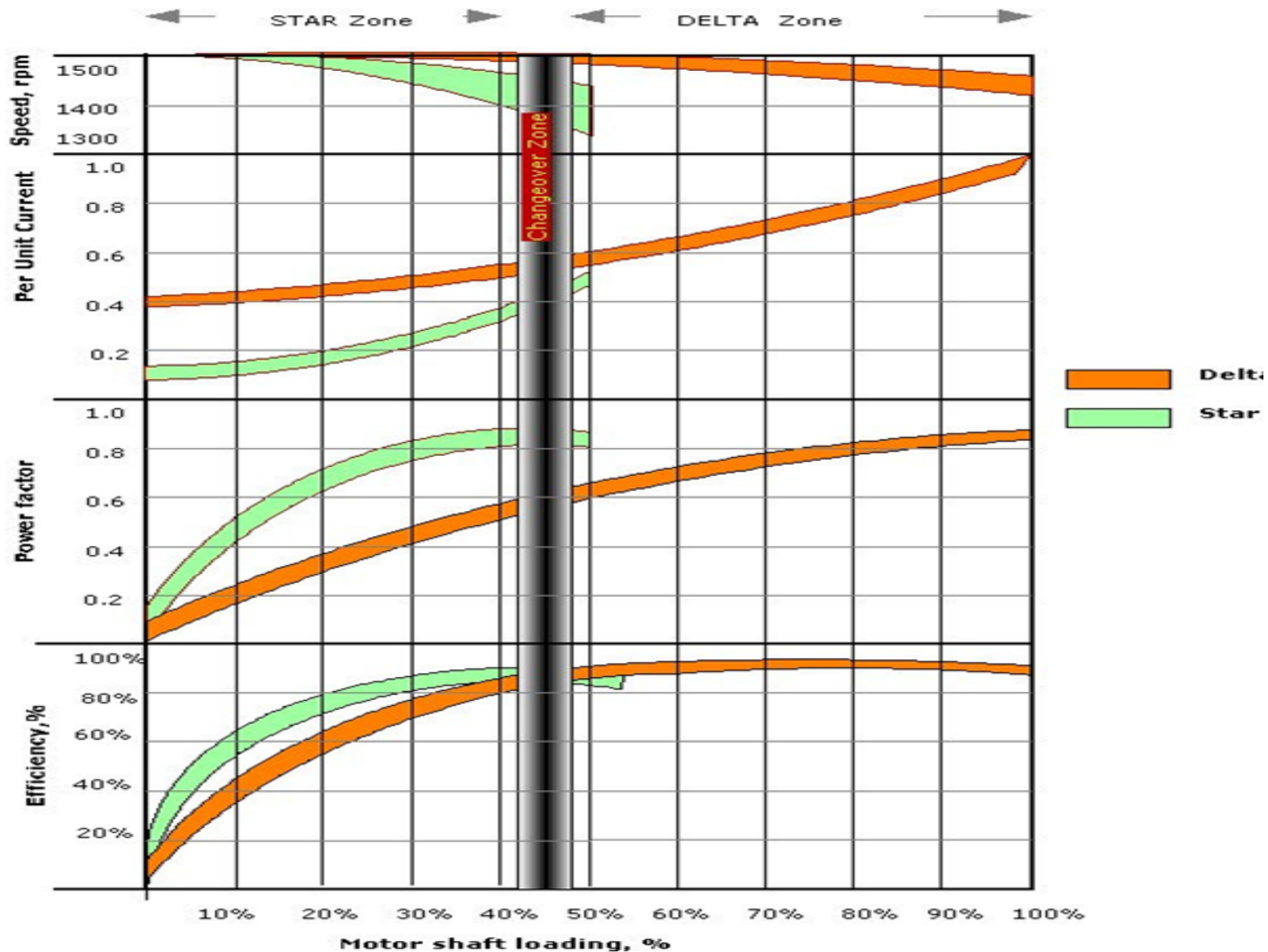
c) Managing Harmonic Distortion Remedial Hardware

Danfoss



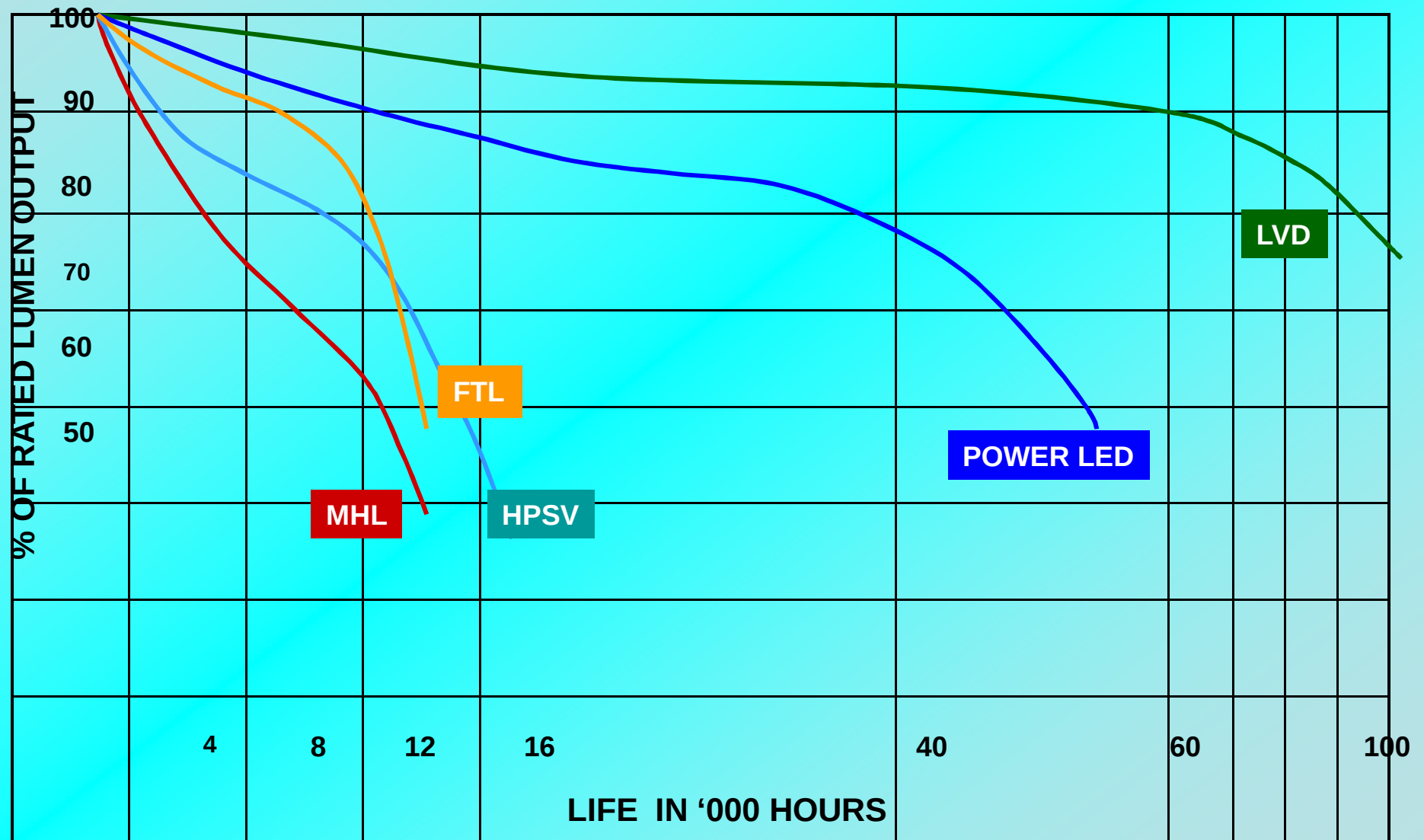
- Input Line Reactor

One of the most common remedies used by many drive manufacturers is to place an input line reactor (between 3% to 5%) between the drive and the power supply. This does reduce the harmonic noise, but it also reduces the voltage going to the drive. This reduced voltage might be a problem when the drive is used at maximum load and maximum speed. The motor can become voltage starved. This might require the VFD to be a size larger to avoid nuisance tripping.



LUMEN MAINTENANCE CURVES FOR DIFFERENT TYPES OF LAMPS

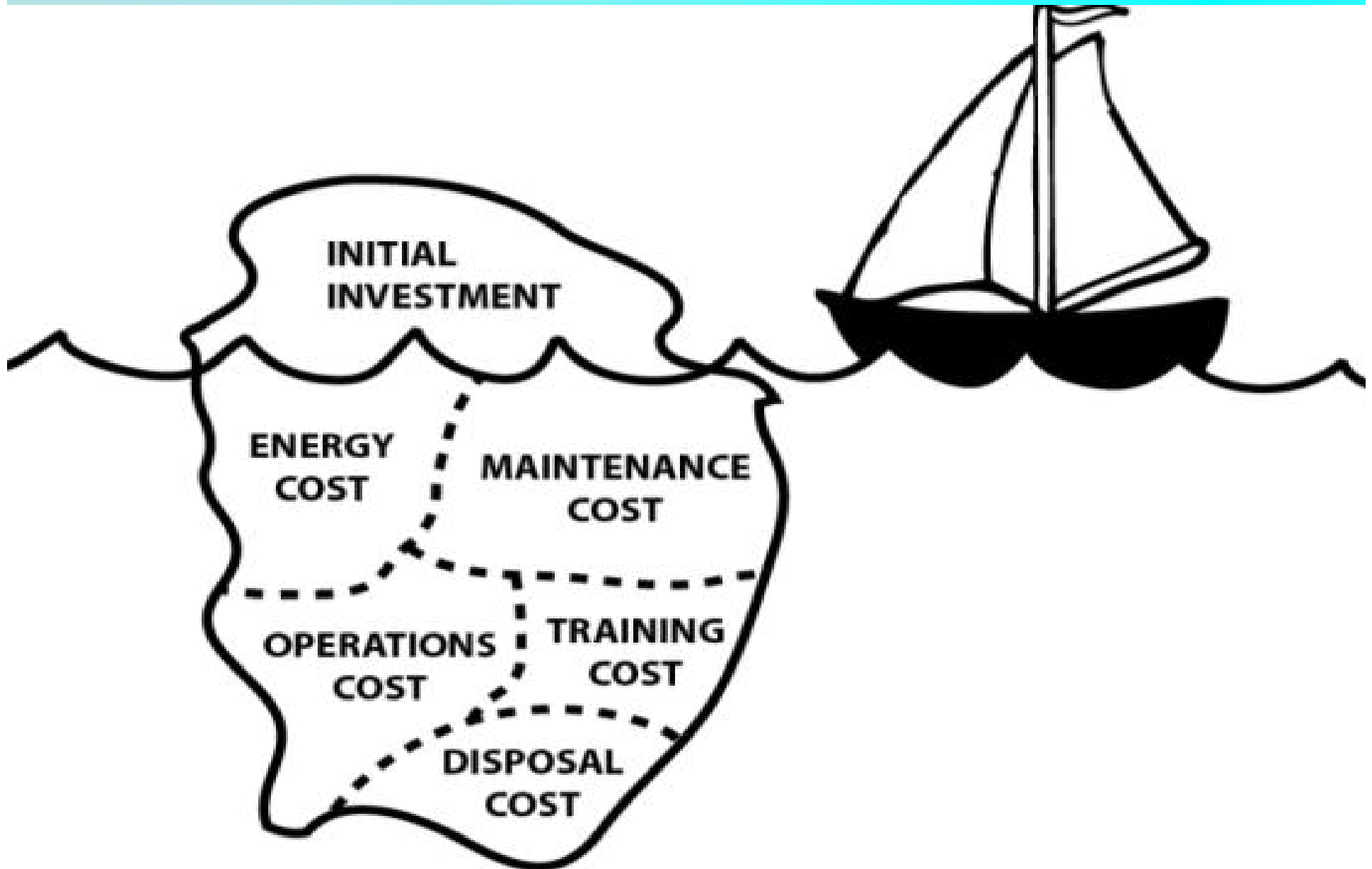
LED light – Lumens Depreciation as per LM 79 rating specs ?



Automation – a Tool to improve productivity with less power consumption

- **Automation with Human intervention even Semi-auto.**
 - **Reduction of Peak Loads**
 - **Environment Protection.**
 - **Improve Safety and Health.**
- **Easy diagnosis of fault & Reduce Maintenance.**
 - **Minimize Energy consumption**
- **Reduction in Resources(water , energy etc.)**

The essence of life cycle costing



Purchase cost to Running cost

When we buy motor cycle for Rs.50,000, monthly petrol cost & expenses run for 1000 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 Industry to 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

Necessity of Energy Management

Energy Management is necessarily required because it influences a number of aspects of company operation and activities including the following:

- 1. - energy costs which affect the company profitability**
- 2. - energy costs which affect market competitiveness**
- 3. - local and global environments**
- 4. - occupational safety and health**
- 5. - loss prevention and waste disposal reduction**
- 6. - productivity**
- 7. - quality**

Energy Monitor to Target - BEE Mantra.

THE Industry CONSUMES say LAKHS UNITS / DAY;

**BUT DOES NOT HAVE Full Fledged ENERGY METER
for Relative Condition Monitoring**

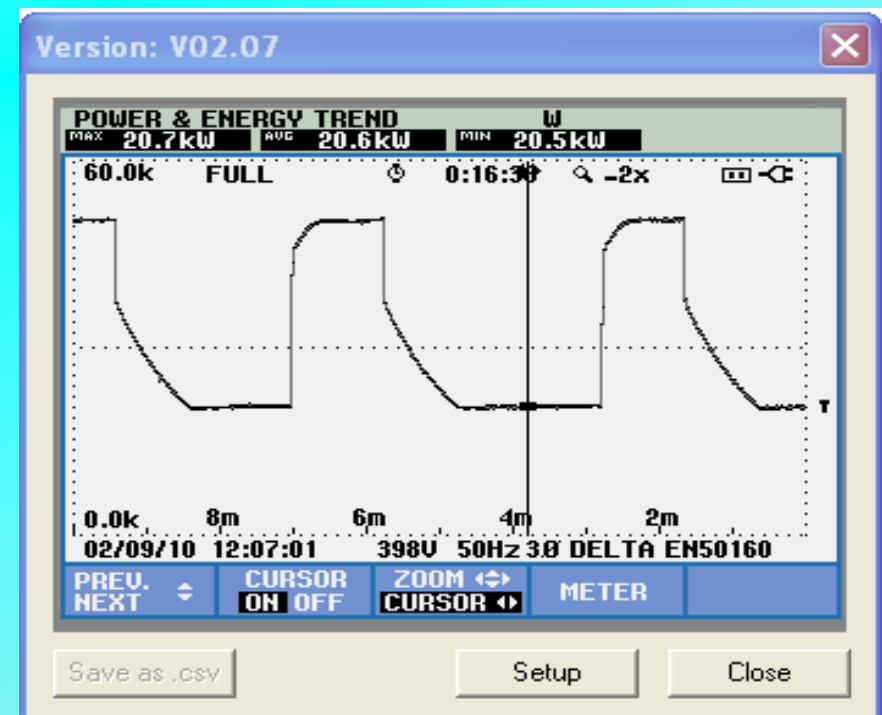
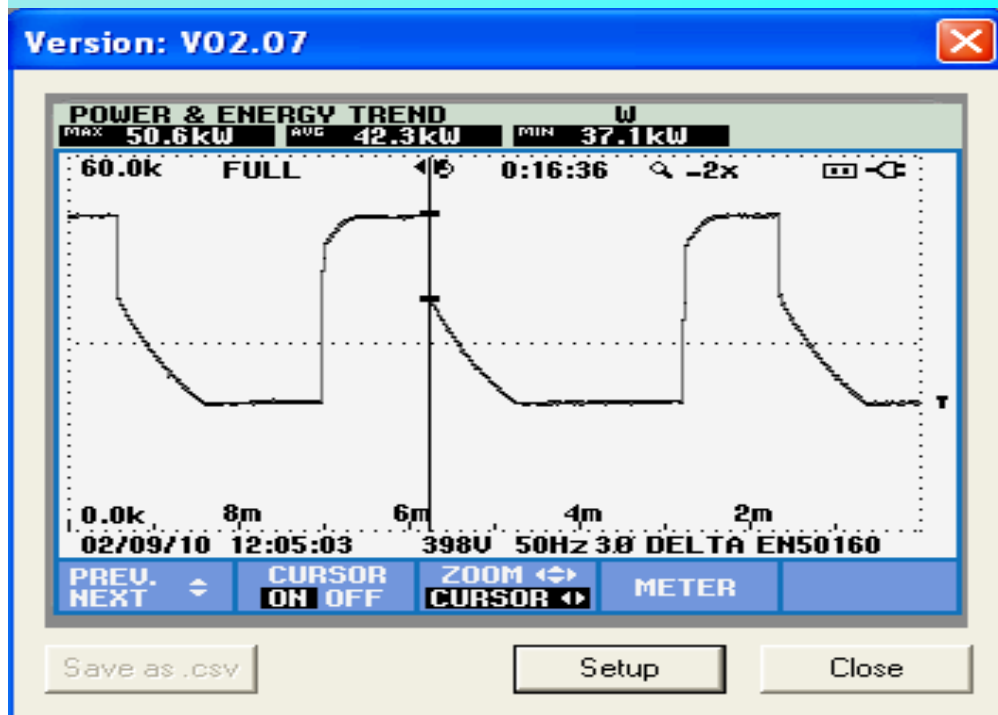
**TO DO NOW, THE ENERGY METERING & MONITORING
AT MV, SSB & HIGHER HP MACHINES, etc**

**Machine to machine variations are more in our Industry
and this is around 10 % in some cases.**

**The Electricity for machines from 10 hp and above in kwh
is a good indicator About the health of machine.
BEE mandatory guidelines suggest any motor above 10 hp
operating more than 6000 hours an year
i.e. 2 shifts per day to be metered for energy kwh.**

Electricity KWH can be used as tool to monitor daily health of Machine

The machines run from no load to full load in a day;
This custom built panel multi function energy meter can provide
to the user what are the no load KWH and load KWH of machine.



40

COMPRESSOR LOAD KW = 50.6 KW

COMPRESSOR UNLOAD KW = 20.7 KW

Energy Audit Indicates you

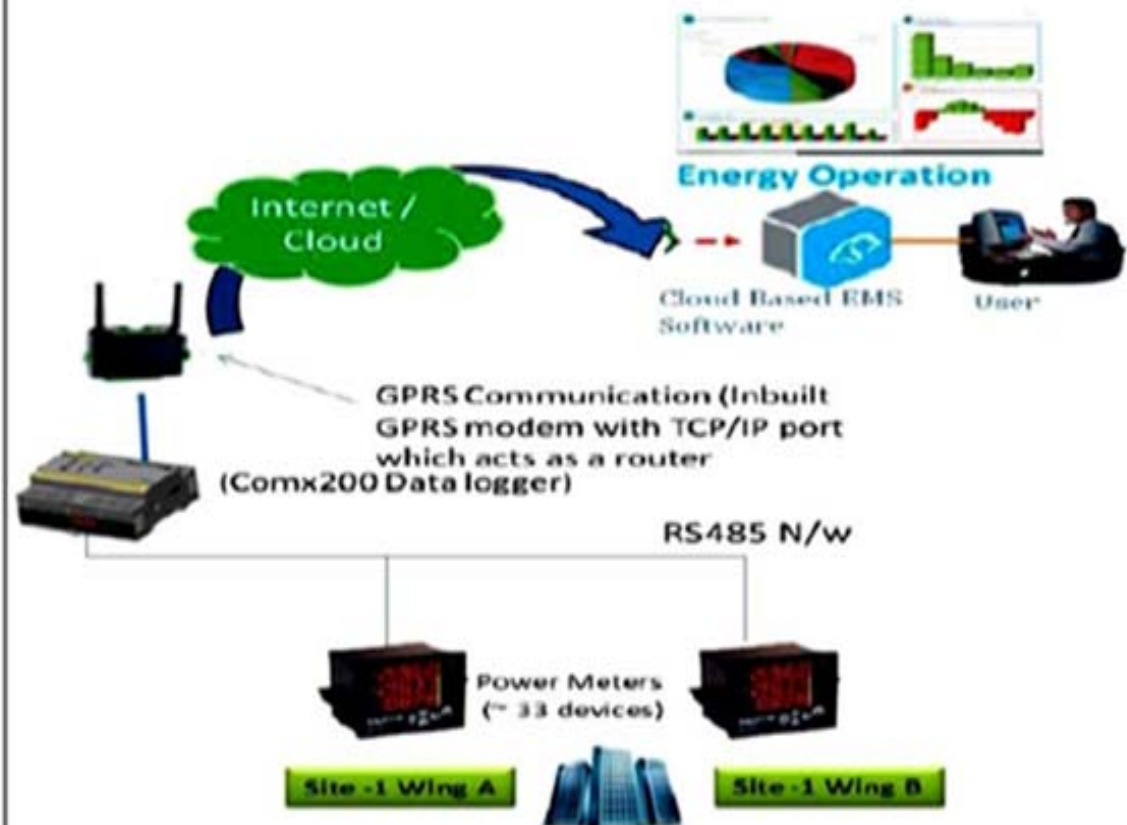
- What to do,
- where to start,
- at what cost and
- for what benefits
- Indicative saving potential to achieve
- Good House-keeping yields 5-10%
- Minor Investment gives 10-15%
- Reasonable Investment pays back 20-25%

**ENERGY AUDIT INSTRUMENTS USED by us FOR INSTANT
AND TREND MEASUREMENTS to measure Electrical,
Power Quality, Lighting lumens, fans flow, temperature in *C**



Cloud Based Energy Management and Information System

- Enables setting up baselines, measurable targets and tracking of same in real time
- Seamless integration of the system within the existing electrical distribution network with minimum downtime
- Cloud based systems obviates the need for costly servers at client site
- Enables reporting and compliance as per norms such as for ISO:50001, ECBE, etc.
- Acts as a strong measurement and verification tool
- Effectively captures areas of possible energy wastage to yield additional cost savings, thereby securing energy efficiency investment in long term.



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.



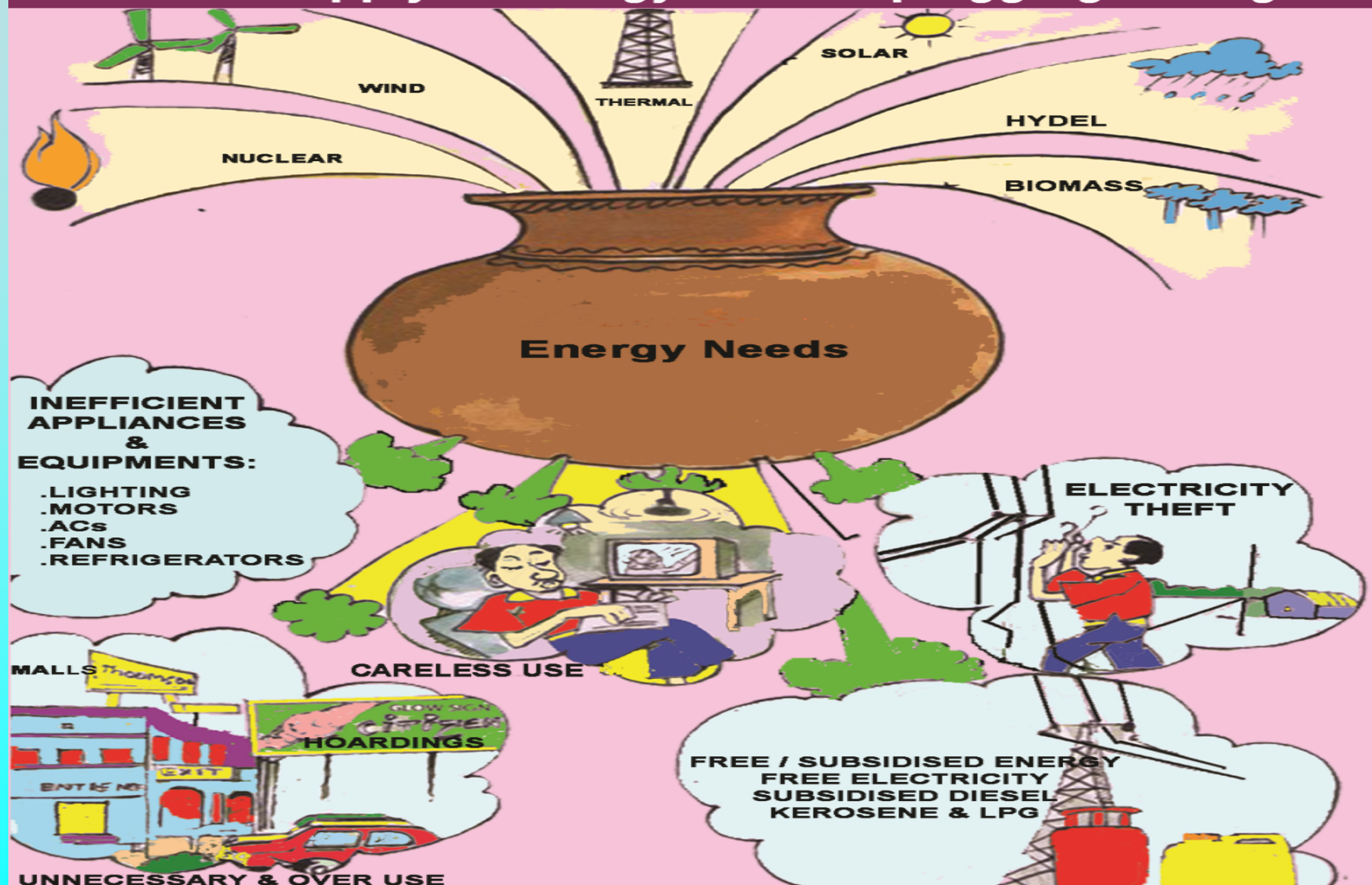
20% OF INDUSTRIAL ENERGY IS WASTED OR MISMANAGED

use our cutting edge solutions for energy monitoring, control and analytics

Pillars of Successful Energy Management

- **Key ingredient- Top Management support is First**
- **Well chartered strategy plan, collectively done.**
- **Effective Monitoring system before and after.**
- **Adequate technical capability for Monitoring.**
 - **Analysing and Implementing Energy Saving options, involving Production & Utility Heads.**
- **Good communication downwards from senior management to the Bottom, is the first vital step**

Endless supply of energy without plugging leakages

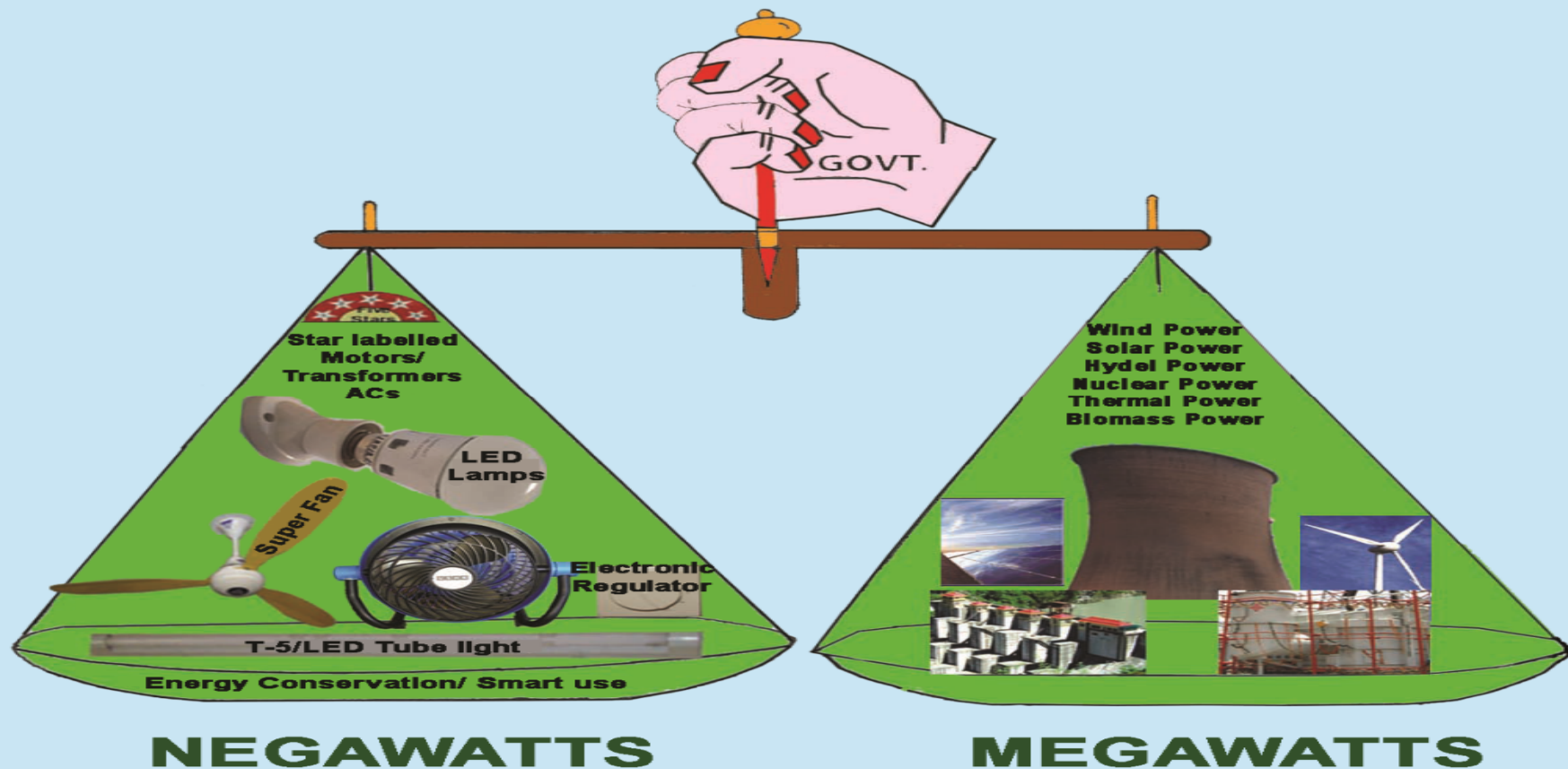


www.kaunbanegaconservepati.com

“Creating True Wealth from Conservation and Efficiency”

NEGAWATTS or more MEGAWATTS- which is better ?

There is a need to treat
Negawatts (negating the requirement of power plants by conservation and efficiency)
at par with
Megawatts (more power plants)
and allocated equal funds



www.kaunbanegaconservepati.com
“Creating True Wealth from Conservation and Efficiency”

SERVE NATURE BY CONSERVING ENERGY

Air we Breathe, Water we Drink & Earth we live

in are the Loan from our Ancestors and not the Gift.

We need to preserve the same

for our Future Generation

- *by Mahathma Gandhi*

Thank you for your kind attn Pls!
Please Feel Free to ask More Questions!!

- S.ASHOK, BEE Accredited Energy Auditor /
 - Chairman IAEMP Coimbatore Chapter.
- POWERON Projects / Coimbatore / 94437 20220
ashok@energymeasuretosave.com

Please visit :- www.energymeasuretosave.com

- we take pride on saving Electricity, LPG in house.
- Conservation is a Habit and begins at Home only.
 - *As Conservation is all about*

our collective responsibility for better tomorrow.