

Optimize the Energy usage in Textile

Ashok Sethuraman
Energy Advisor
Conquest – Tirupur
ashok@conquestasia.com

About Conquest



Conquest
Improve, Sustain, Grow

Conquest was started in the year of 1997 with the objective of serving organizations in all spheres of the support services.

Conquest possess expertise in Training, Consulting & Auditing organization with 12 years experience in the field of quality management(ISO 9000) , Environment (ISO 14000) , social Process(SA 8000, WRAP, AVe & BSCI), C-TPAT(Customs Trade partnership against terrorism), & CDM (clean Development Mechanism).

The organization has Qualified Engineers with Lead assessor/ auditor qualification in ISO 9000, ISO 14000, SA 8000 and CDM.

- Our services are;
1. Management Consultancy
 2. Textile Quality Assurance Service
 3. Textile Testing service
 4. IT Service & Consultancy

Energy Conservation – @ Production & Product Life Cycle

Manufacturing Aspect

Fiber Processing

Spinning

Knitting / Weaving

Wet processing

Apparel Production

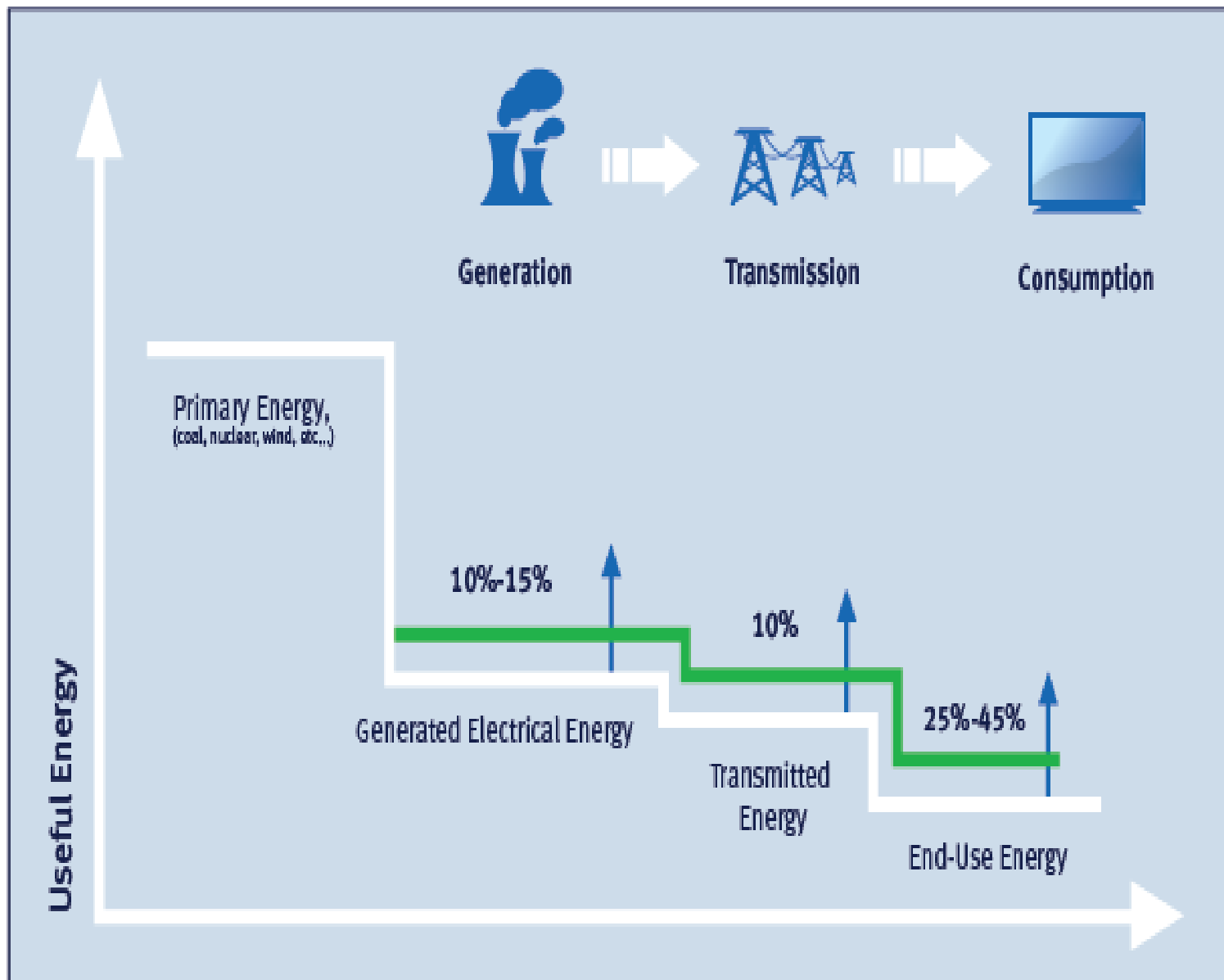
Vs

Consumer

Reduction in energy consumption
is the first step towards a
**Responsible Environment
Management Process.**

- Reduce Energy
- Raise Production
- Release less CO₂/SPM
- Replace traditional fuel
- Record & Research on Fuels & Productivity
- Restore the Nature around you & Globally.

FIGURE 1.4: ROLE OF ELECTRICAL ENERGY EFFICIENCY ALONG THE ENERGY VALUE-CHAIN

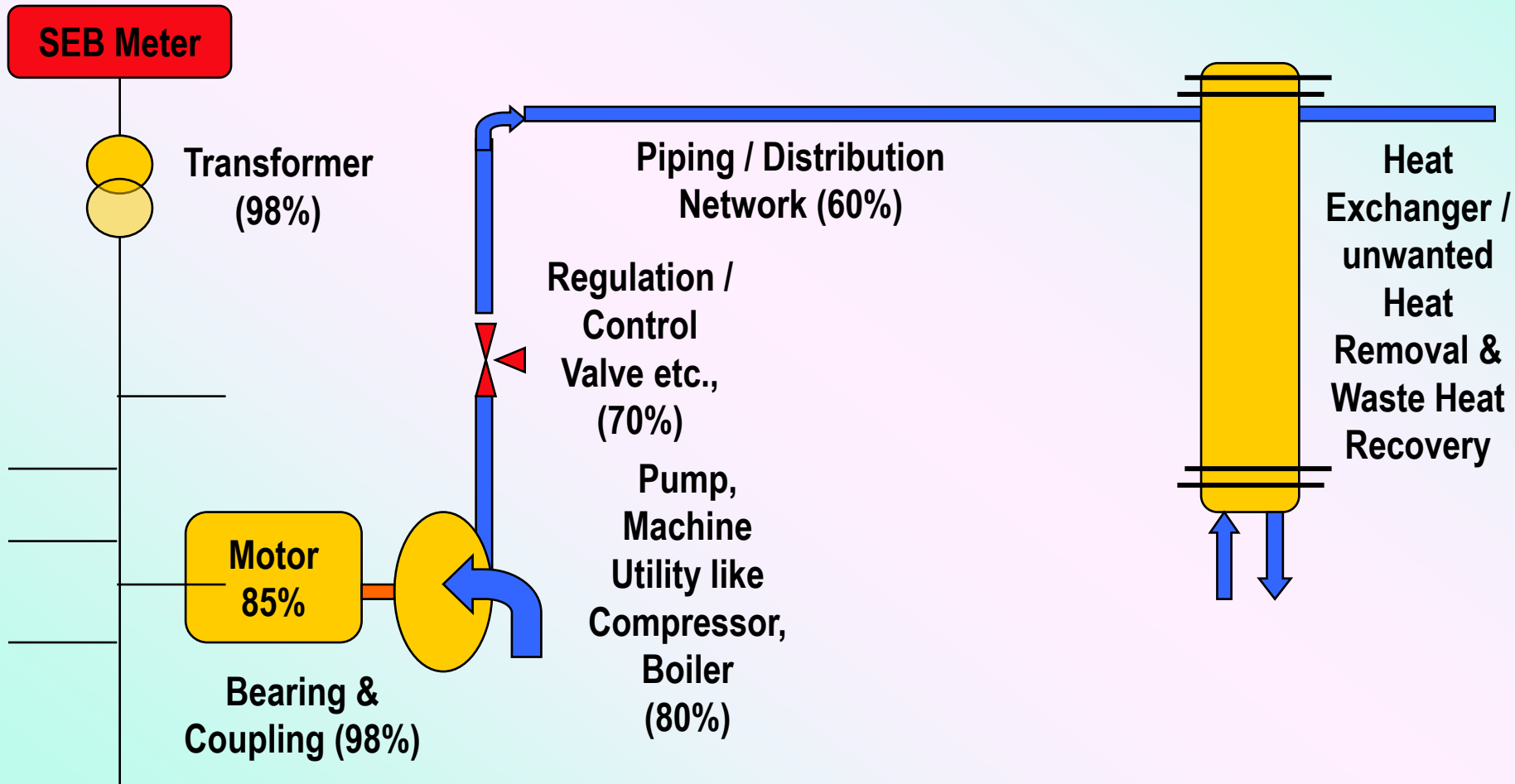


Source: World Energy Council

Energy Efficiency along Energy Value Chain in the Industry

Conquest

Improve, Sustain, Grow

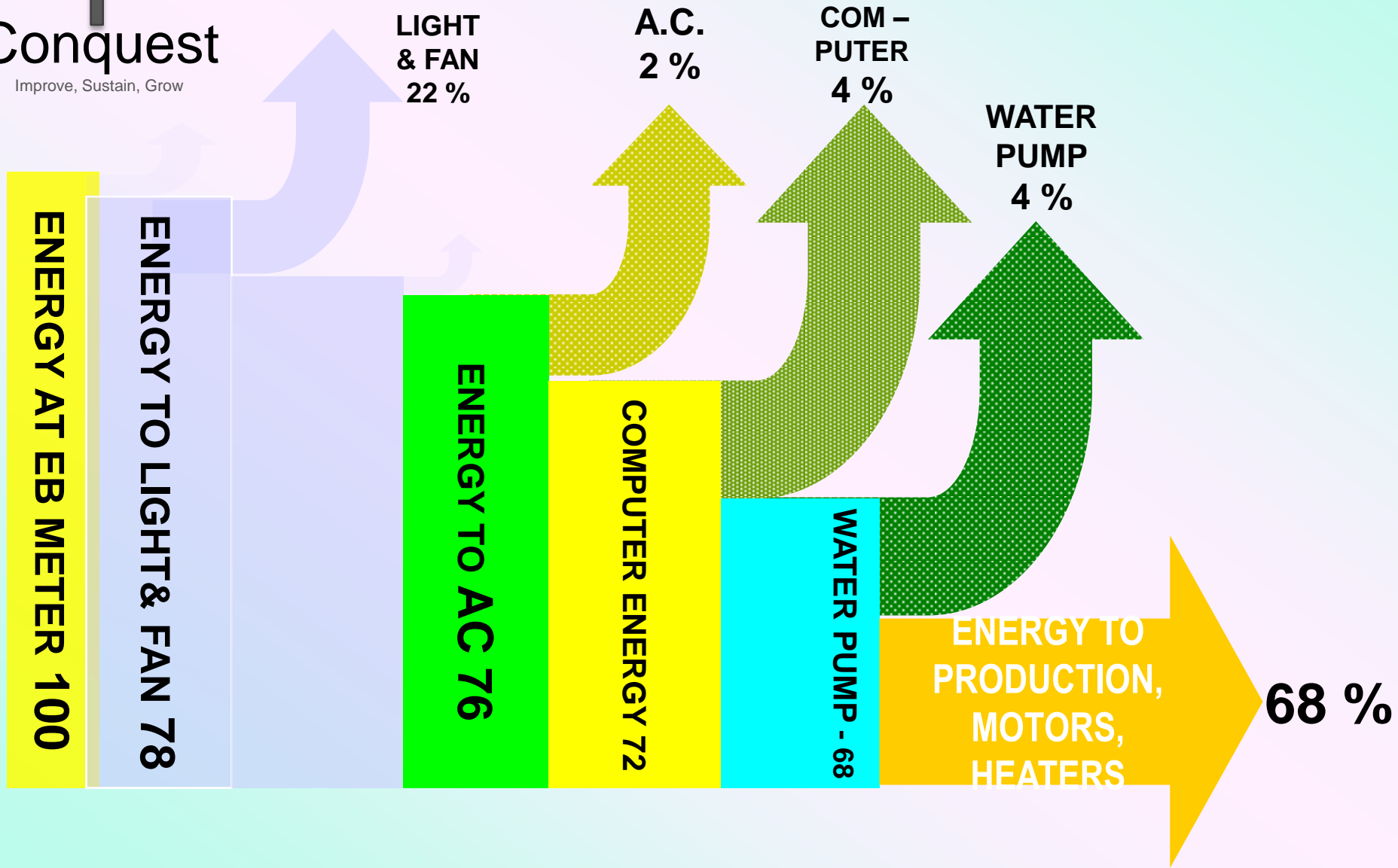


Optimize the Energy usage in Textile

- Tropicalize the Textile Machine & Utility to conserve Energy and enhance the Productivity.
- The Thermal Imaging visualizes the HOT-SPOTS in the Utility & in Process as Predictive Management.
- Before we followed time based maintenance schedules and now we follow Condition Based Monitoring.
- Thanks to BEE guidelines and practical thumb rules on energy saving, we are now optimizing our design to suit to the operating levels of equipments & process.
- We understand that Energy Savings can be achieved only if we adhere to the safety norms of process & Utility.

Energy Flow diagram in Stitching / Garment industry

Conquest
Improve, Sustain, Grow



The industry to become Carbon Neutral

Conquest

Improve, Sustain, Grow

- Use of Daylight, natural extensively inside premises
- Task based LED lighting comfort & cool
- 5 Star labelled ceiling fans to give comfortable breeze,
- To improve of indoor air quality, to think of Evaporative cooling using Celdek cellulose pads
- Making roof cool or green to avoid heat & reflect out
- To plan to use renewable energy sources like solar water preheating the feed water to boilers
- Condensate recovery gives 50 liters of diesel saving per day in the diesel run boilers.

Condition monitoring of equipments

Conquest

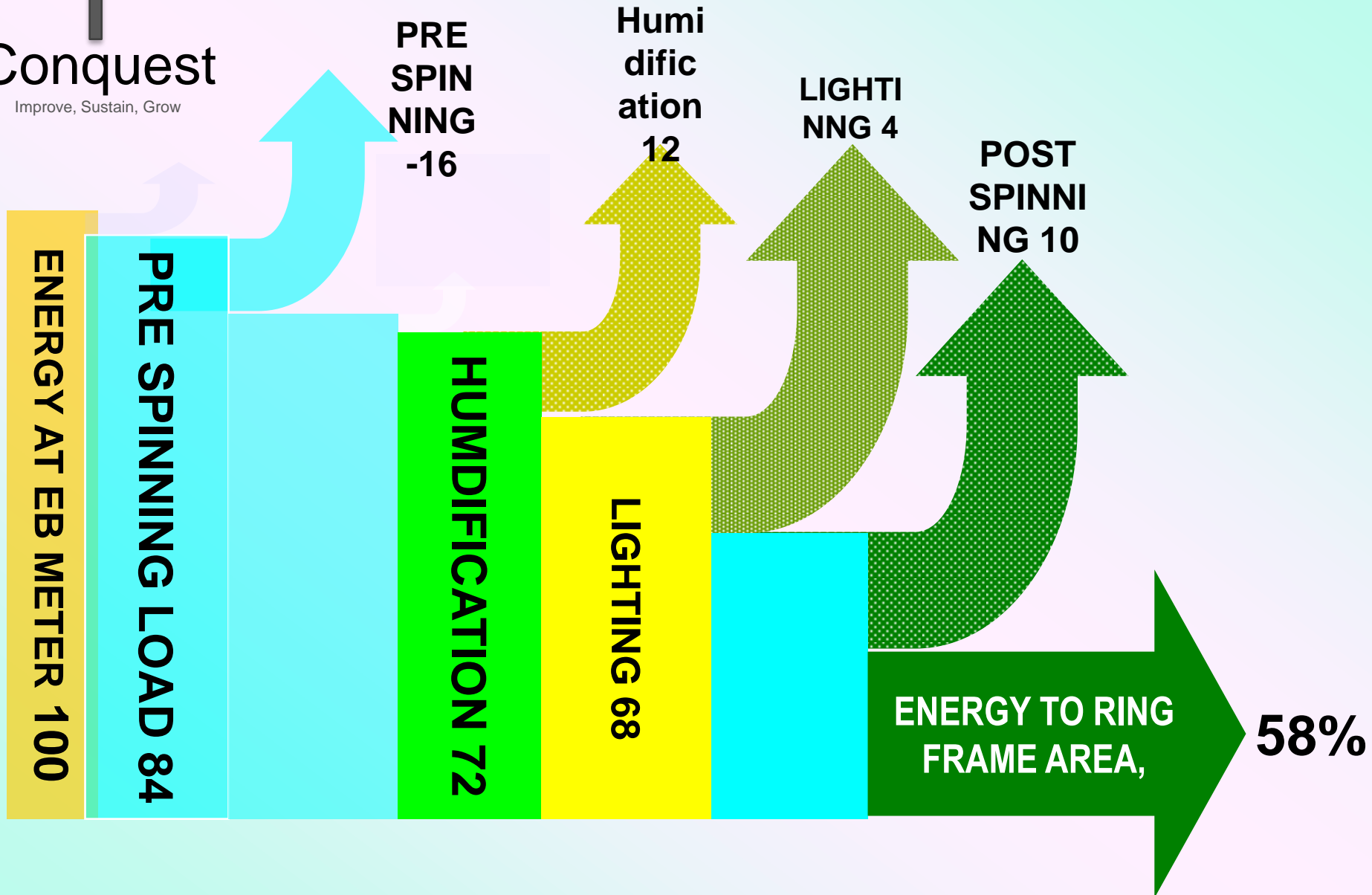
Improve, Sustain, Grow

- Stitching motors 250 watts in hundreds working running continuously, many rewound many times.
- Simple energy meter to retrofit in each of the motor circuit to know the condition of motor and taking average of all motors.
- The fusing machine heaters radiate more heat to surroundings & useful heat to cloth is reduced & heats up the surroundings.
- The boiler big or small, the potential on insulation is always condition based, continuous and always scope for improvement. Pay back in Astonishing few days.

Energy breakup in Spinning

Conquest

Improve, Sustain, Grow



Energy losses in low HP motors more and our Focus area is old Rewound EFF 3 motors

Oversized / Under loaded motors

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

- ❖ Approach -1 :
Downsizing motor
 - Matching requirement
 - Improved loading – Improved efficiency
 - Possible energy savings <5%
 - Max efficiency for low capacity motors less

The Pneumafill motor in Ring frame application – worth the replacement with Inverter duty type

Conquest

Improve, Sustain, Grow

- In our Case Study during Energy Audit thro SIMA, in a textile mill we found that The 5.5 KW old standard & rewound motors in many long frames of textile mill studied for higher consumption due to load, higher ambient around.
- Based on no-load power consumptions and running power consumption, we found after replacing the same, each motor yielded around 10 to 15 % savings.
- For the centrifugal application, we suggested to the mill to select the **new motor on Inverter duty type.**
- That can give after the inverter retrofit, an additional savings of 25 % without compromising suction pressure mmWC at other end.

Motor derates at higher ambient temperature

Conquest

Improve, Sustain, Grow

Ambient temperature, ° C	30	40	45	50	55	60	70	80
Permitted output,								
% of rated output	107	100	96,5	93	90	86,5	79	70

Height above sea level, m	1000	1500	2000	2500	3000	3500	4000
Permitted output,							
% of rated output	100	96	92	88	84	80	76

Ring motor loses up to 3 % efficiency due to Harsh ambient higher temperature & thin air

Conquest

Improve, Sustain, Grow

- In one of on-going Energy Study in a textile mill, thermal imaging showed 5* to 7 * C higher temperature inside the hood.
- Instead of washing the motor with Pneumafil Hotter & thin air, the same air is ducted out and below straight to trench.
- The motor with horizontal fins is allowed to suck the outer air thro its own fan from hood side cover and blow it cool.
- Like in the latest Autoconer, the hood cover is fixed with Netlon type mesh on the side for easy intake of fresh air.
- For the motor with vertical fins, provision can be from top to cool the motor thro other side pneumafil impeller
- This makes motor healthy, cool and deliver more and the efficiency will not reduce due to accelerated Ageing.

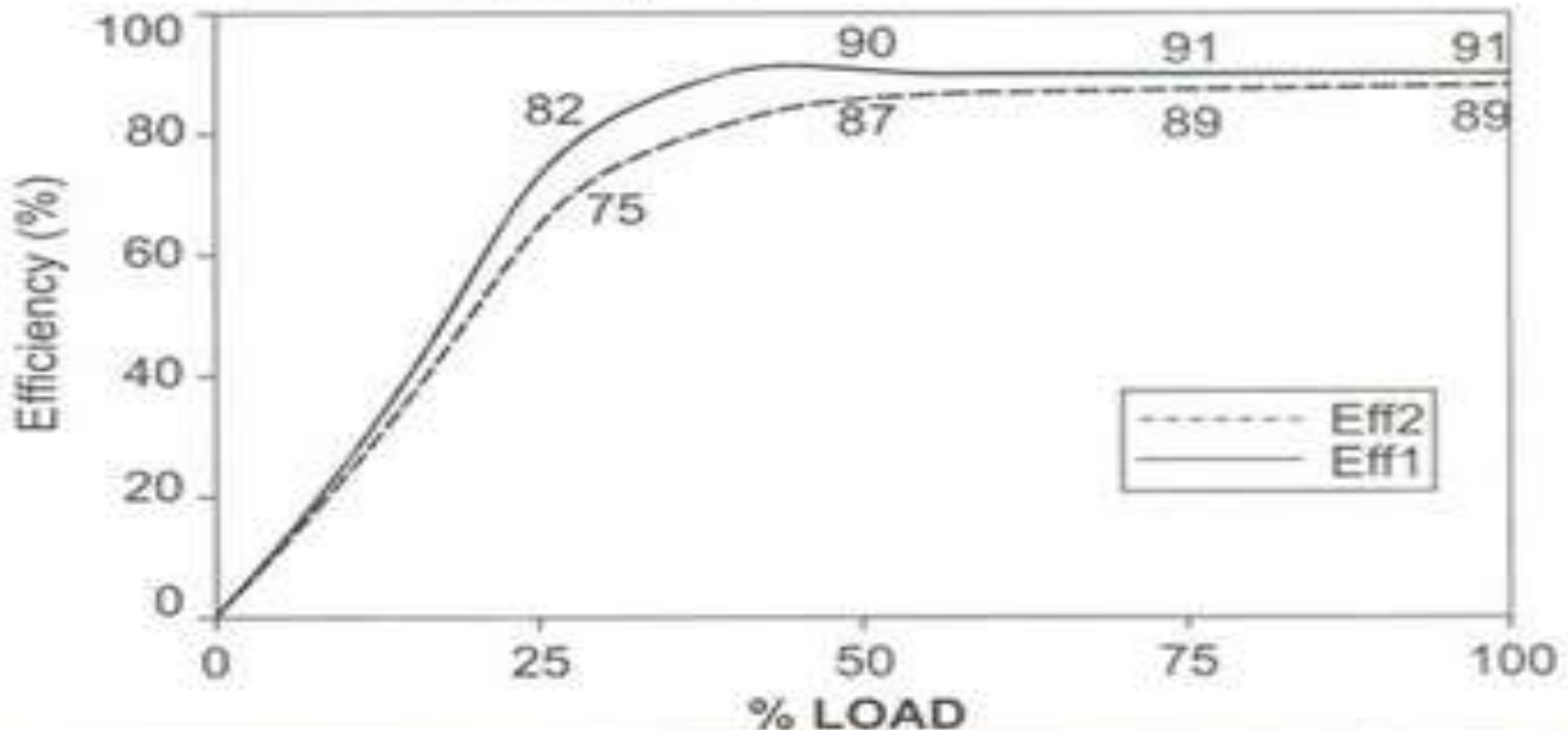
Are we selecting / loading our EE motors rightly ?

Please select your motor based on its operating band *Part-load Efficiency* And the Motor OEMs as

Conquest well recommend 60 % loading during Test Trial Study

Improve, Sustain, Grow

Efficiency comparison for 11kW/4P motor



Humidification effect on mill

- Nozzles to operate at rated Pressure and Flow
- Hour meter on water pump, water meter online.
- High Efficiency Aerofoil designed Aluminum Pressure die cast alloy fan Exhaust fan to suit to air changes
- Nozzles not to jetting / pissing /oozing but Fogging but spray dwell time of water in air must be more for mill.
- Ring main type water distribution to the nozzles in water circuit, instead of the present Radial system
- Latest Technology calls for CELDEK pads Evaporative cooling usage which limits the AC plant consumption to only 20 % and proven in other industry sectors.

Humidification plant fan – gravity die casting type weighs 35 kgs. 1200 mm dia by 15 KW 4 pole motor - RUN BEFORE.

Conquest

Improve, Sustain, Grow



Replaced with Pressure die-casted Aerofoil design fan blade weighs 15 Kgs without compromising on operating CFM and the static pressure in Exhaust fan location and power savings around 15 to 20 % achieved in one of our energy audit study



Pumping system – savings

parameters existing' new pump

Conquest

Improve, Sustain, Grow

• 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 %

Compressed Air loss - Examples

- Any Audible leak heard by our human ear, is equal to 30 % of loss of air flow in the pipe location. This is symptom of Loss.
- Hour meter on small Compressor Load/ Unload Status.
- Compressor works like Submersible pump in air-Visualize.
- Cool Compressor delivers more air.
- Continuously run Compressor delivers less than a compressor intermittently run . Hence Make use of Standby compressor.

Compressor discharge air temperature is an indication of compressor health

Conquest
Improve, Sustain, Grow

- In one of our Energy study in Air jet loom, we found 2000 liter receiver tank skin temp read 50 *C plus, Compressor is 75 KW Screw compressor 520 CFM machine. The Ref dryer rated 750 CFM still could not handle the higher air intake temperature.
- Production suffered due to low speed on looms & all looms could not be run due to want of steady compressed air.
- The mill serviced the compressor, added an after cooler and the temperature dropped to 40 * C plus and dryer functioning normal; pressure drop inside compressor house normalized. The unit was able to run one more loom
- It is even better to relocate the Heat Exchanger in compressor skid so that better heat transfer is achievable. This is one of ways of Tropicalizing the compressor skid instead of small hood cover

Compressed Air loss - Examples

Conquest

Improve, Sustain, Grow

- Any Audible leak heard by our human ear, is equal to 30 % of loss of air flow in the pipe location. This is the visible symptom of Loss. It should not be allowed now.
- Hour meter on small Compressor Load/ Unload Status
- Compressor works like Submersible pump in air- Visualize.
- Please try to achieve savings in compressor generation itself.
- Cool Compressor delivers more air.
- Continuously run Compressor delivers less than an intermittently run Compressor. Make use of Standby compressor facility and toggle between the compressors.

Automation – a Tool to improve productivity with less power consumption

Conquest

Improve, Sustain, Grow

- Achieve more with less.
- Reduction of Peak Loads
- Environment Protection.
- Improve Safety and Health.
- Reduce Maintenance.
- **Minimize Energy consumption**
- Easy diagnosis of fault
- Reduction in Resources
- (Chemicals ,water , energy etc.)

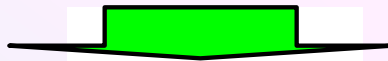
FIVE COST REDUCTION MEASURES OF ENERGY CONSERVATION

- **Identify inefficient energy use**
- **Upgrade machinery & process in context of energy efficiency**
- **Improve maintenance practice**
- **Promote employee awareness and**
- **Conservation in domestic consumption.**

Collectively Act & Consistently Educate

$\Sigma(\text{Little Ideas}) = \text{Big Result}$

$\Sigma (\text{Wisdom} + \text{Effort}) = \text{Reduction of Energy Cost Without Investment}$



Many Drops Make a SHOWER

SHARING KNOWLEDGE TO SAVE
OUR ENERGY

Thank You!

