

# Carbon Neutral Manufacturing

## Approach

**Titan Company Limited**

( Watch Manufacturing Unit - Hosur)

**24<sup>th</sup> September 2016**

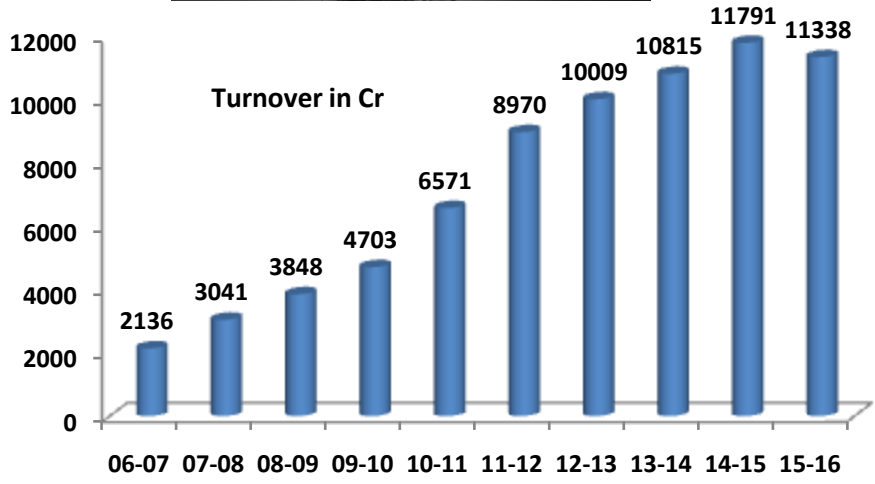
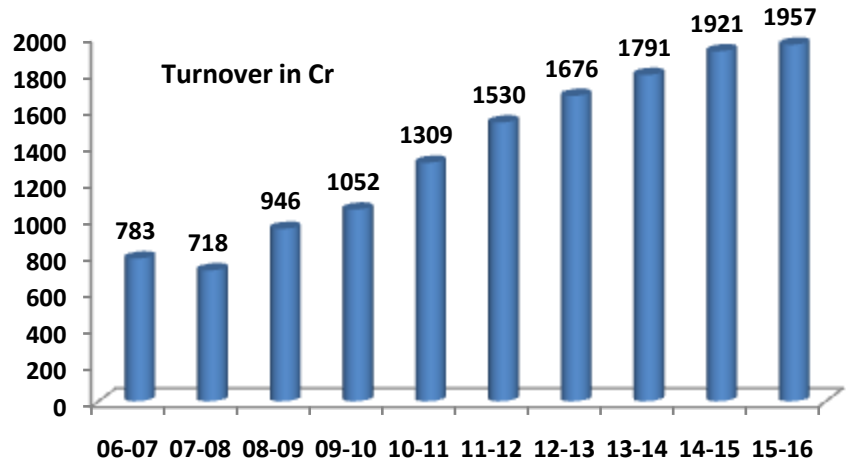
# Company profile



- Joint venture Promoted by TATAs & TIDCO.
- Year of Establishment - 1987
- Products - Quartz Analog Wrist Watches, Precious Jewellery , Precision Components & Fashion accessories .
- Brand – Titan, Sonata, Fast Track & Xylus in Watches & Accessories and Tanishq in Jewelry
- Watch market share - 60 %
- Exports -More than 39 countries



## Watches & Accessories Division



# Energy Management

# Policies

Green Perspective in all our business

*Conservation of Resources  
Elimination of Waste  
Renewable energy substitution*

Quality and Environmental Policy



Energy Policy



TATA Group Climate Change Policy





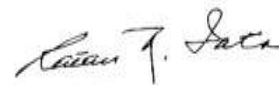
## Climate change policy for Tata companies

Tata companies will play a leadership role in climate change by being knowledgeable, responsive and trustworthy, and by adopting environment-friendly technologies, business practices and innovation, while pursuing their own growth aspirations and the enhancement of shareholder value.

Tata companies will measure their carbon footprint and will strive to:

- Be the benchmark in their segment of industry on the carbon footprint, for their plants and operations.
- Engage actively in climate change advocacy and the shaping of regulations in different business sectors.
- Incorporate 'green' perspective in all key organisational processes.

October, 2009



Ratan N Tata  
Chairman, Tata Sons



## TITAN COMPANY LIMITED

WATCHES & ACCESSORIES DIVISION

### Quality and Environmental Policy

Titan Company Limited, a leading player in Manufacturing and Sourcing of Watches & Accessories is committed to...

- Demonstrate excellence in each and every activity by its employees in order to provide products and services, which meet and exceed the expectations of our customers.
- Make a net contribution to the environment by minimizing the impact of its activities, products and services by specific actions to protect and enhance the environment in which we operate.

Titan will demonstrate the above by ...

- Developing employees, suppliers and service center associates through education, training and encouraging them to pursue continued improvement in quality, environment and achieve superior levels of customer satisfaction and delight.
- Incorporating quality and minimizing the consumption of materials while designing / selecting of our products and services and the processes through which they are produced.
- Creating significant customer value and developing relationship with suppliers and service center associates, driving quality initiatives and supporting their quality management efforts.
- Emphasizing conservation of natural resources such as energy, fuel & water, minimizing harmful emissions and waste, prevention of pollution, recycle, reuse viable process waste.
- Compliance with applicable legal and other requirements.
- Effective communication to persons working for and on behalf of Titan and to the public.
- Continual review of this policy for its suitability in line with QMS & EMS standards.

..sd..

CEO - Watches & Accessories Division

Dec - 2015

## TITAN COMPANY LIMITED WATCHES & ACCESSORIES DIVISION

### ENERGY POLICY

We, at TITAN – Watch Manufacturing, Hosur are committed to continually improve our energy performance at in-house manufacturing activities so as to make it environmentally sustainable for the future generations.

TITAN will demonstrate the above by:

Evaluating, reviewing and optimizing the energy requirements at in-house manufacturing activities through energy efficient methods and minimizing energy wastages.

Providing appropriate resources to enhance the energy performance of manufacturing activities including utility services.

Incorporating the energy performance requirements, while designing the manufacturing processes and procurement of energy products & services.

Complying with applicable Legal & Other requirements.

Harnessing Renewable Energy Resources wherever feasible, to reduce Carbon / Green House Gas emissions.

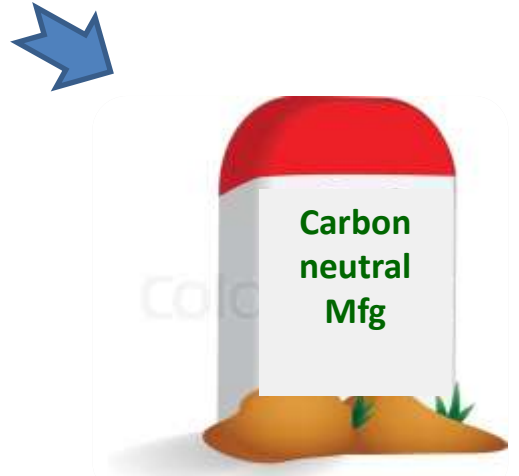
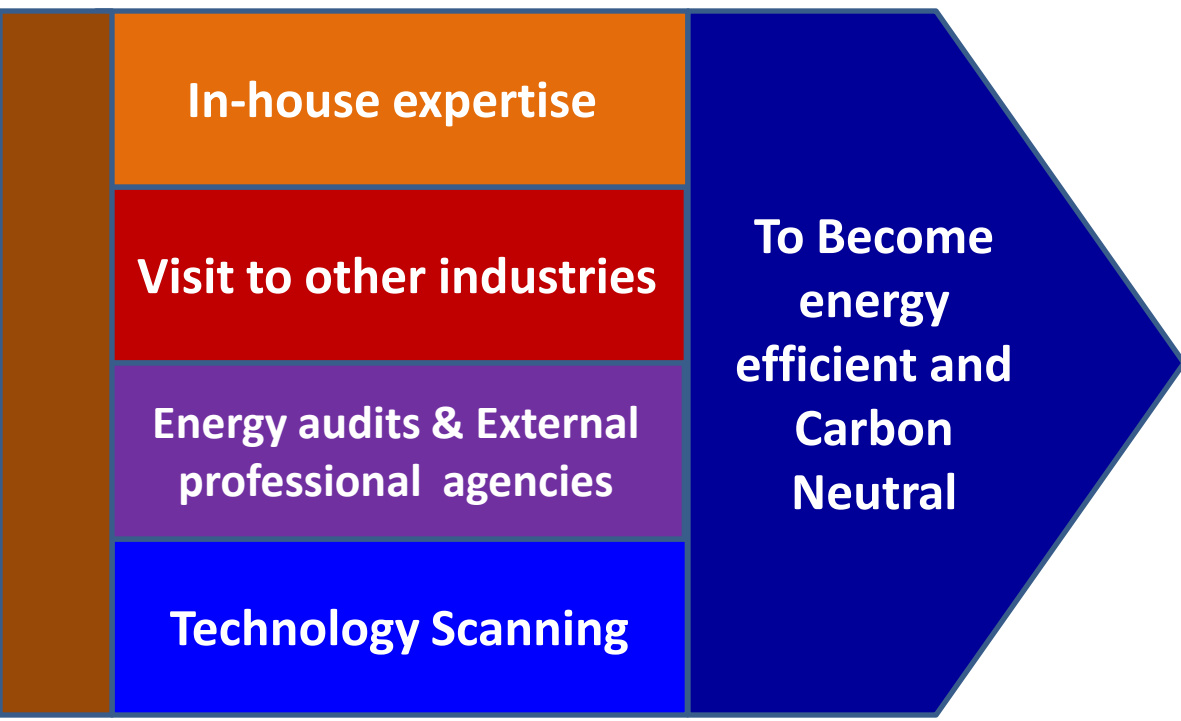
Communicating the policy and importance of energy management to all personnel in watch manufacturing, Hosur.

Head – ISCM, Watch Manufacturing

Energy  
Efficiency

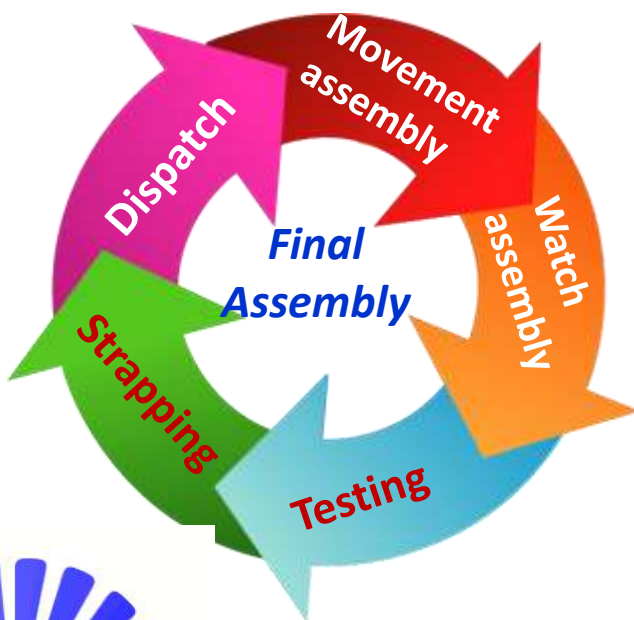
Carbon neutral  
manufacturing

# ENCON – Our Approach





# Manufacturing process



## *Key challenges*

- **Growing energy cost**
- **Increased energy requirement**
- **Reduction on specific energy consumption**
- **Concern on Carbon emission**

# Carbon Neutral Manufacturing

## Focus Areas

Phase - I

- Energy Management
- Fuel Management
- Renewable Energy Substitution
- Supply Chain Management
- Logistics
- Travel

# Energy Conservation

## Key Focus Areas

- Compressed Air system
- Air conditioning system
- Lighting system
- Fuel Conservation
- Energy efficiency in Production operations

# ENCON – Key Improvements so far ..

V Belt to Flat Belt conversion

Intermediate controllers

Screw air compressors

Refrigerant dryer

Transvector nozzle for clean air guns

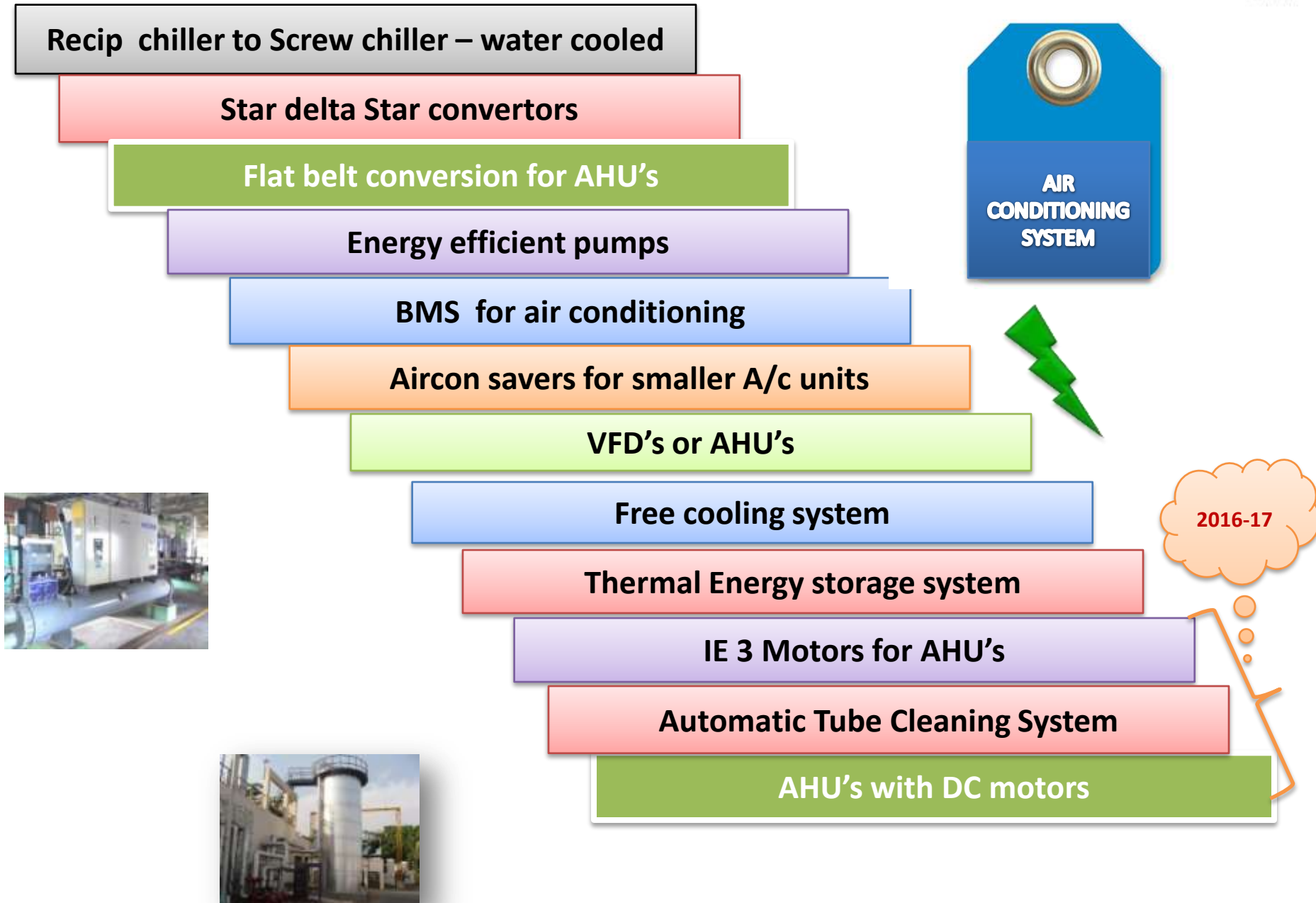
SCADA system for battery of compressors



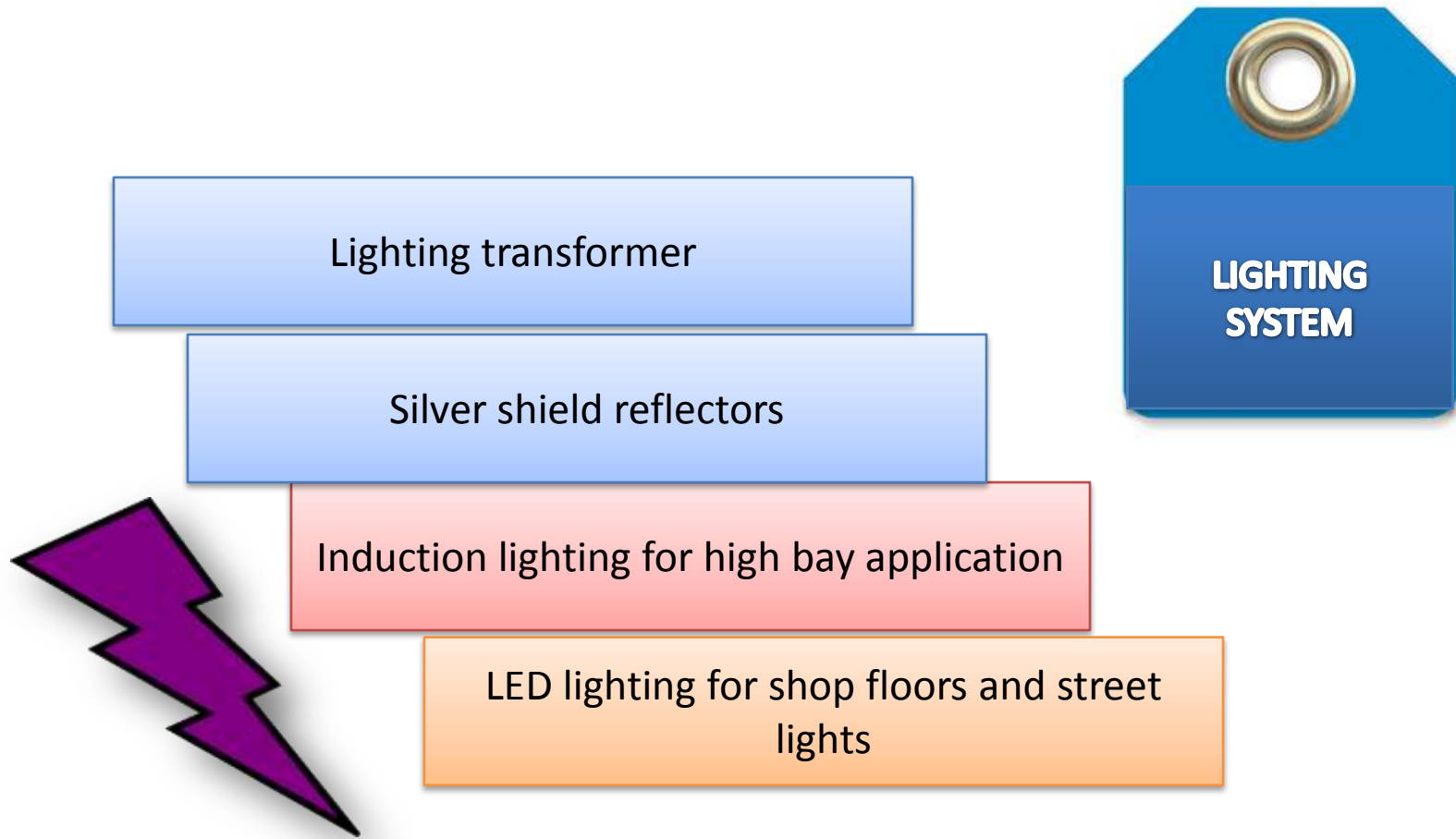
COMPRESSED  
AIR  
SYSTEM



# ENCON – Key Improvements so far ..



# ENCON – Key Initiatives



# Shop floor general lighting - LED Retrofitting



- Total No of fittings converted - 3000 Nos
- Investment – Rs 42 Lakh
- Energy saving - 2.60 LkWH
- Cost saving - Rs 26 Lakh
- Payback - 2 Years





# Fuel Conservation

# Fuel Conservation

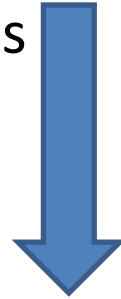
## Key Focus Areas

- Optimizing DG set utilization
- DG Waste Heat recovery
- Fuel Additives
- Solar energy harvesting

## Dedicated feeder system (DFS)

### Key Challenges

- Grid Availability
- Power & Demand restrictions

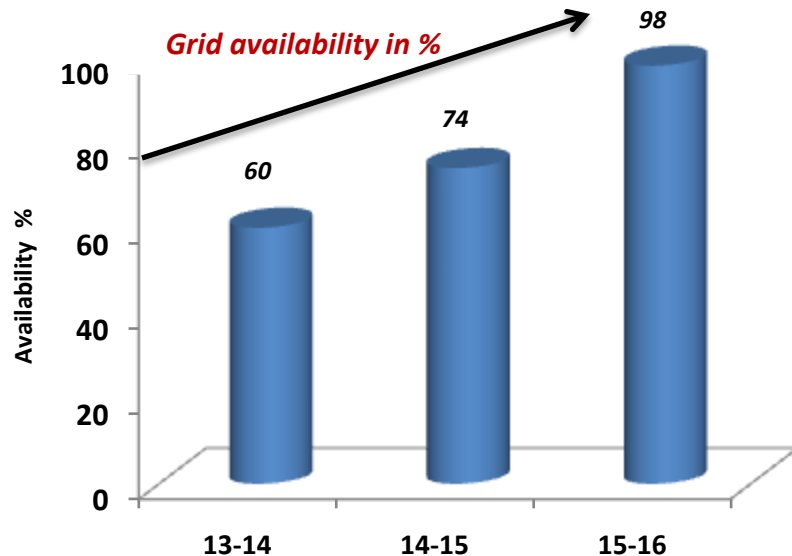


- Higher DG set operation
- Un Utilized Wind Power

# Optimizing DG set utilization – Dedicated feeder system



## Establishment of Dedicated 11 kV Power Feeder System

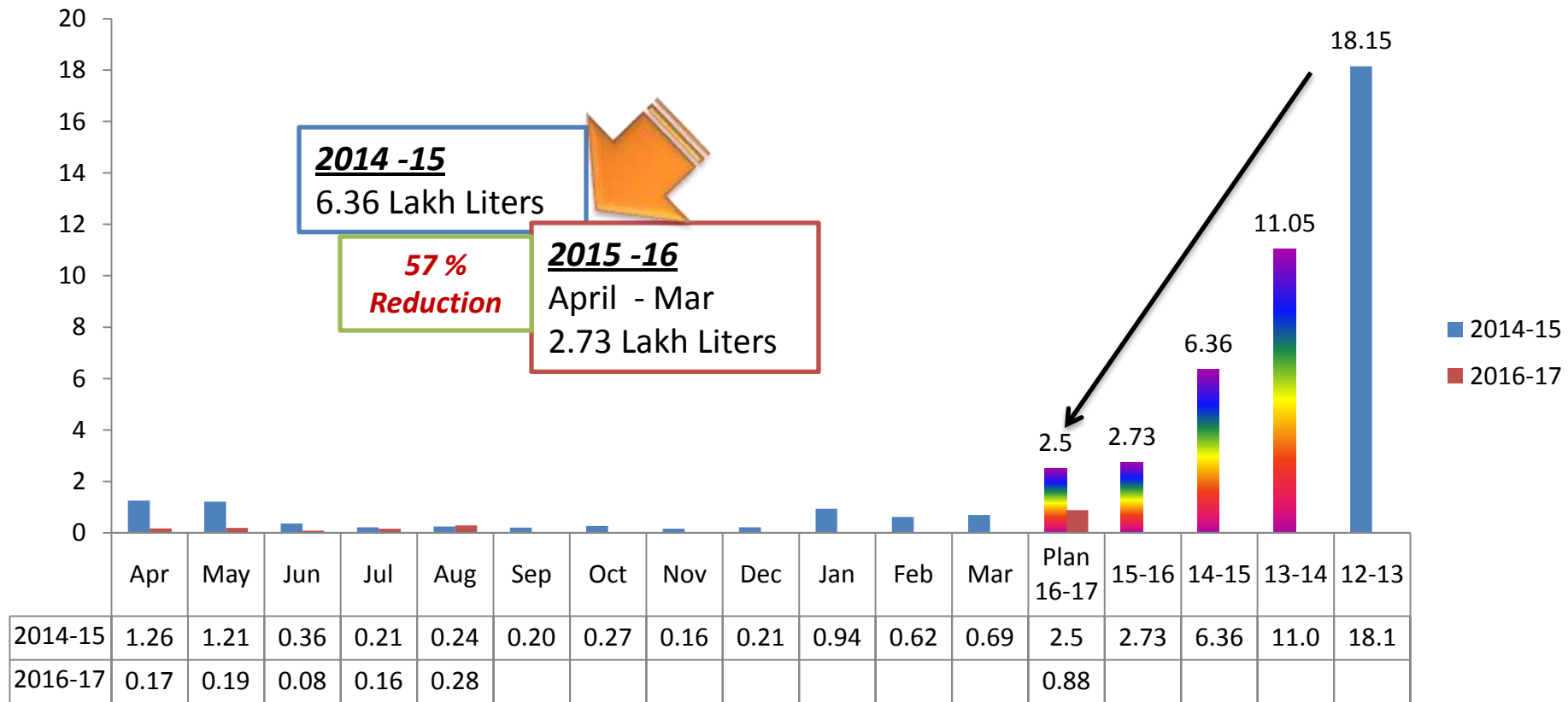


### *Project objective - Reduce HSD Consumption . . .*

- Initiated during 2013- 14
- Investment : Rs 60 Lakh
- System commissioned during Feb'15
- Assured grid availability of 98 %

# Key results – DFS

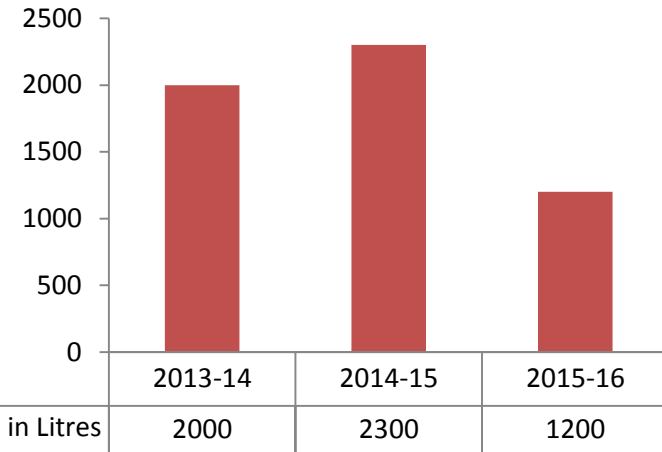
**Key outcome- diesel consumption**



# Solar Cooking System



Diesel saving

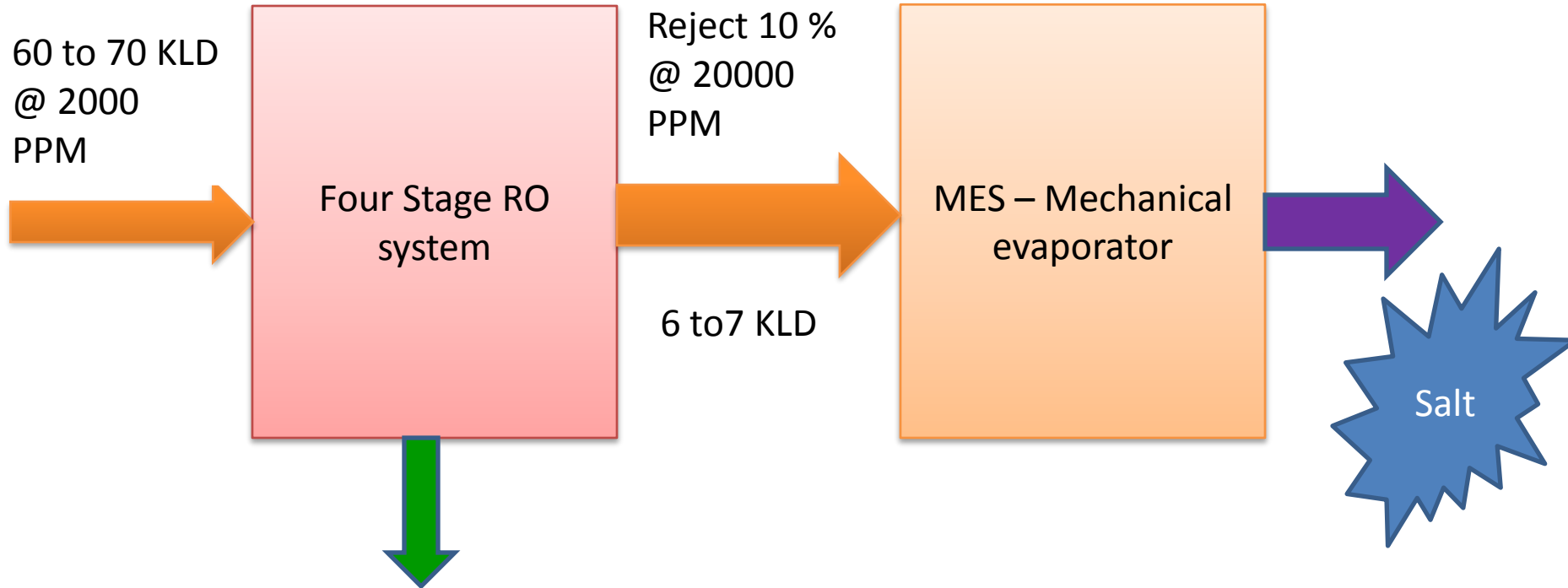


- Installed during – May 2012
- No of dishes :15
- Solar system capacity : 75 kg/ Hour
- Steam generation between 11.00 to 3.00 PM
- Supplementing our Canteen steam requirement about 4 Hrs
- Target diesel savings – 3000 Liters /Year
- Investment - Rs 43 Lakh

# MVR – Mechanical Vapor Recompressor

- **MVR is the evolving technology to evaporate water at optimal cost.**
- MVR evaporator uses the vapor that has been evaporated from the product, **compresses the vapor mechanically** using a radial type fan to a higher pressure.
- **Processes is happening under vacuum (200 mm/hg )and hence faster evaporation ( @ 63 Deg C) .**
- Compared to MES (Mechanical evaporation system), MVR **operates on lower temperature difference** but with higher surface area.
- **Higher Surface area of evaporation - in MVR ~ 200 Sq.mtr compared to 20 Sq.mtr in a MES.**

# ETP Process – with MES

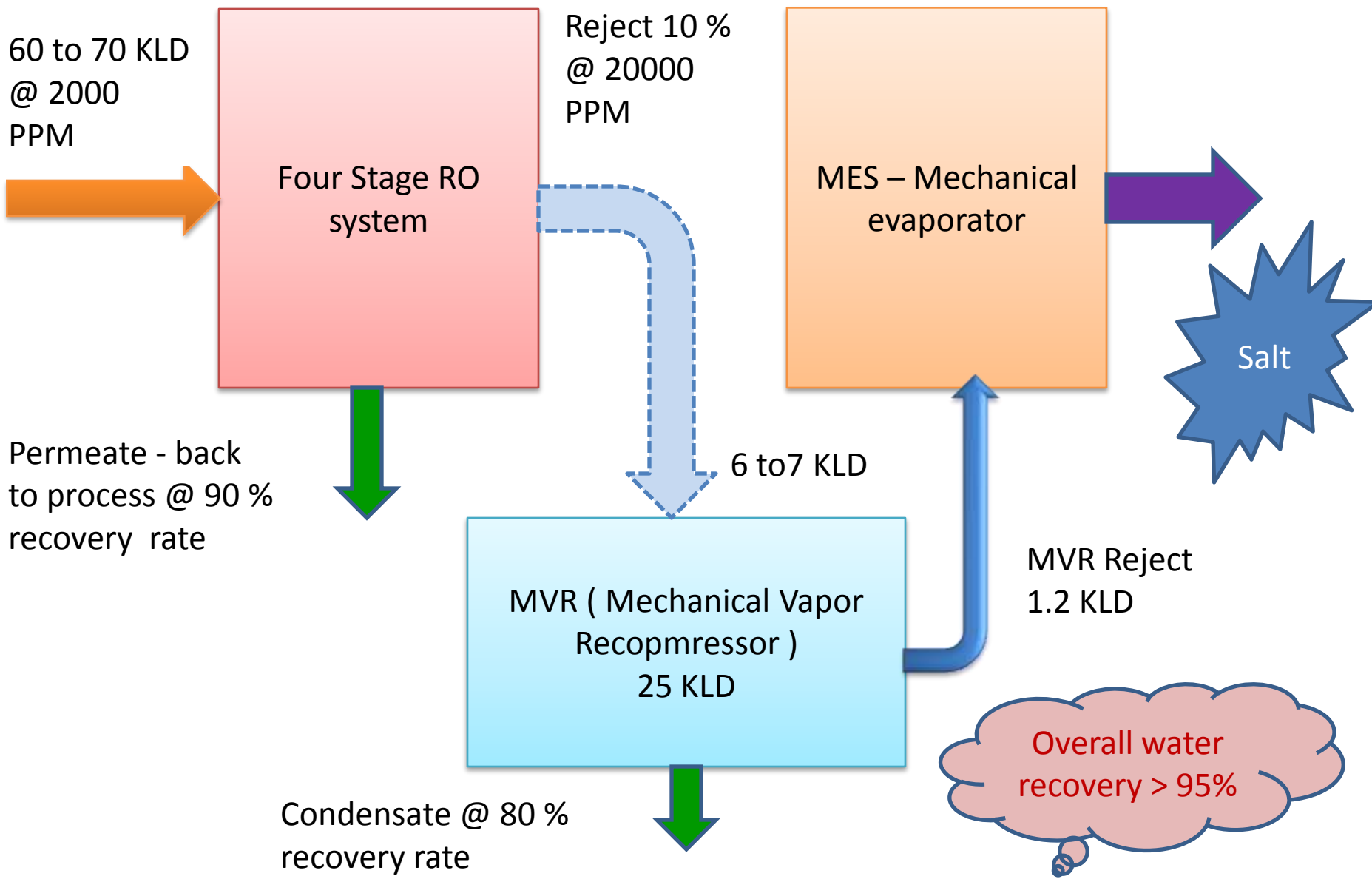


Permeate -  
back to process  
@ 90 %  
recovery rate

	Effluent KL/day	Op. Cost/KL, Rs	Op. Cost/day, Rs	Total Op. Cost/annum
<b>Existing MES</b>	6.0	3500	<b>21000</b>	<b>Rs 63.00 Lakh</b>



# ETP Process – with MES & MVR



# Key highlights

- Designed for smaller capacity (first of in its kind) - 25 KLD
- Larger surface area for heat transfer
- No expensive pre treatment



## Benefits

- |                                 |                     |
|---------------------------------|---------------------|
| ■ Reduction in fuel consumption | 50.0 KL / year      |
| ■ Cost reduction                | Rs.31.0 Lakh / year |
| ■ Carbon emission reduction     | 139 Tons/year       |

## Comparison

	Effluent/day		Operating cost/day, Rs	Operating cost/annum, Rs	Cost savings, Rs
	MVR @ Rs 1100/KL	MES @ Rs 3500/KL			
<b>MES</b>	<b>0</b>	<b>6.0 KL/day</b>	<b>21000</b>	<b>63.00 Lakh</b>	
<b>MVR + MES</b>	<b>6.0 KL/day</b>	<b>1.2 KL/day</b>	<b>10800</b>	<b>32.4 Lakh</b>	<b>30.60Lakh</b>

# Mechanical Vapor Recompressor



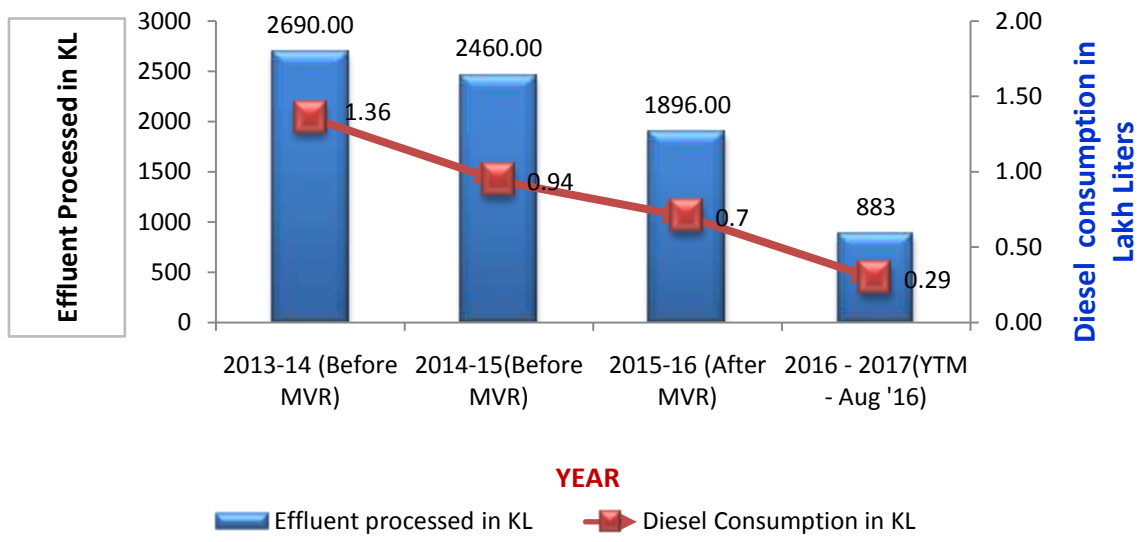
Pellet reactor



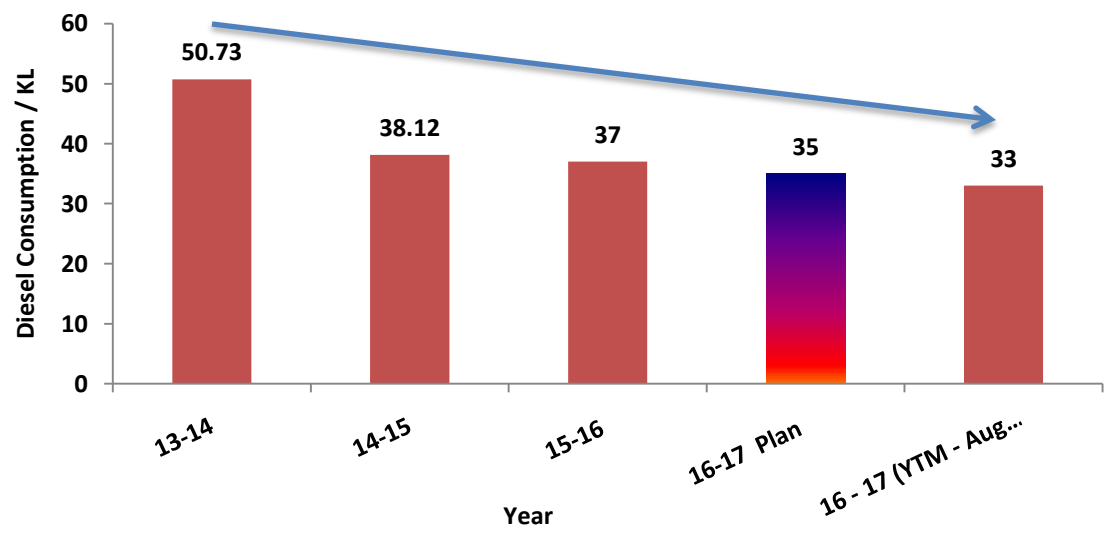
MVR vessel

# Mechanical Vapor Recompressor - Key results

**Diesel consumption Vs Effluent processed**



**Specific fuel consumption /KL**



# Fuel additive

Adding fuel additives in boilers  
fuel (HSD) improves fuel  
efficiency by 12 %  
Additive ratio 1:5000

<b>Application</b>	Canteen boilers
<b>Fuel reduction/ Annum</b>	12KL
<b>Investment</b>	Rs 3 Lakh
<b>Carbon emission reduction</b>	33 Tons



# DG waste Heat Recovery System

- Exhaust heat from 2X 750 kVA DG sets used to generate steam.
- Steam generation - 500 Kg/Hr
- Used for ETP – effluent evaporation



WHR Boiler

<b>Application</b>	Effluent processing
<b>Fuel reduction/ Annum</b>	20 KL
<b>Cost benefit</b>	Rs 10 Lakh
<b>Carbon emission reduction</b>	55 Tons

# Renewable Energy Substitution

# Renewable Energy substitution



Wind Energy

Solar light pipes

Solar cooking system

Solar lighting





# Renewable Energy substitution- Wind energy



## ***Captive Wind Power Plant***

Installed Capacity : 5.5 MW

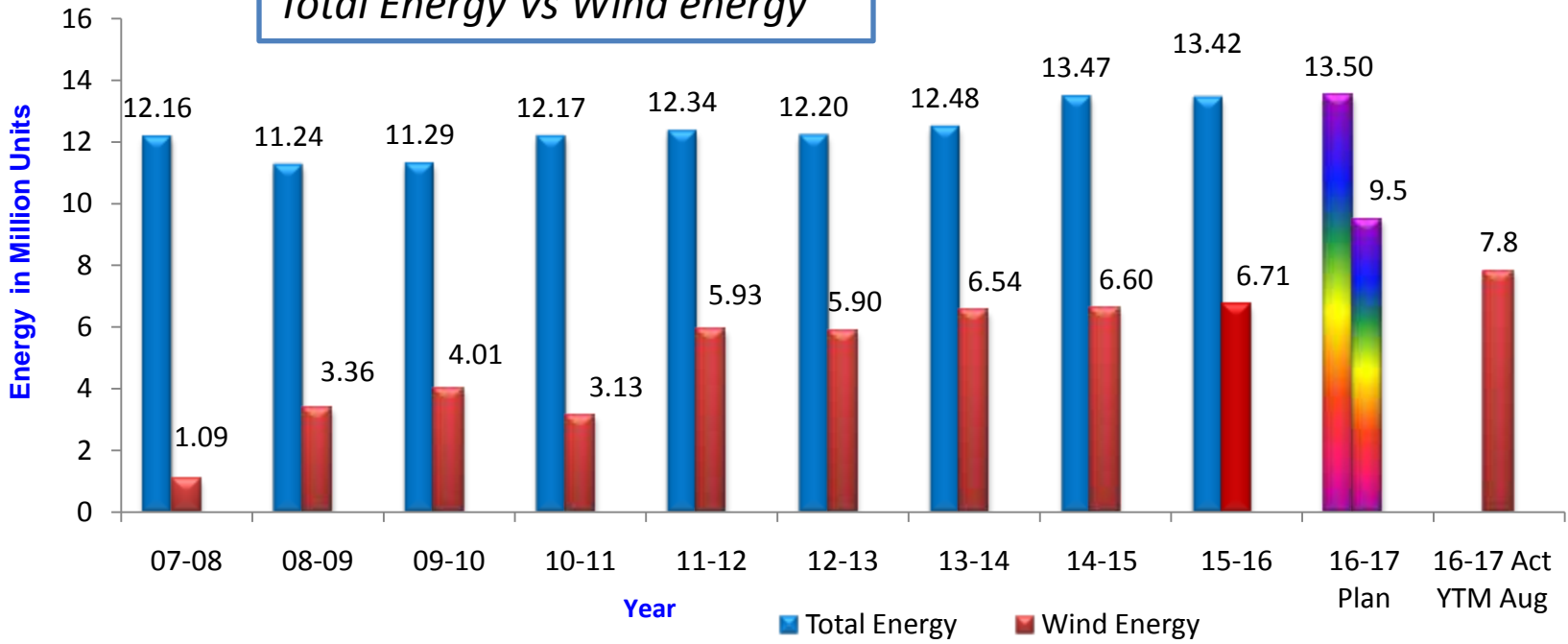
Energy generation

Capacity (kWh) : 10.5 Million /Year

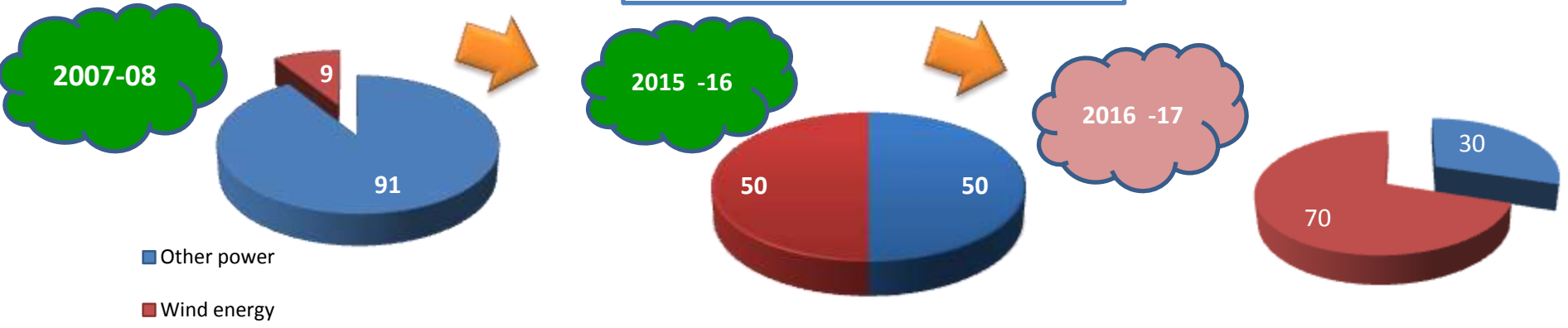
***We are supplementing our  
energy requirement  
through Wind Mills since  
2007-08***

# Renewable Energy substitution- Wind energy

*Total Energy Vs Wind energy*



*Wind energy contribution*



# Renewable Energy substitution- Rooftop solar system

**Capacity - 216 kW**

**( 6 Modules )**

**Investment - Rs.174 Lakh**

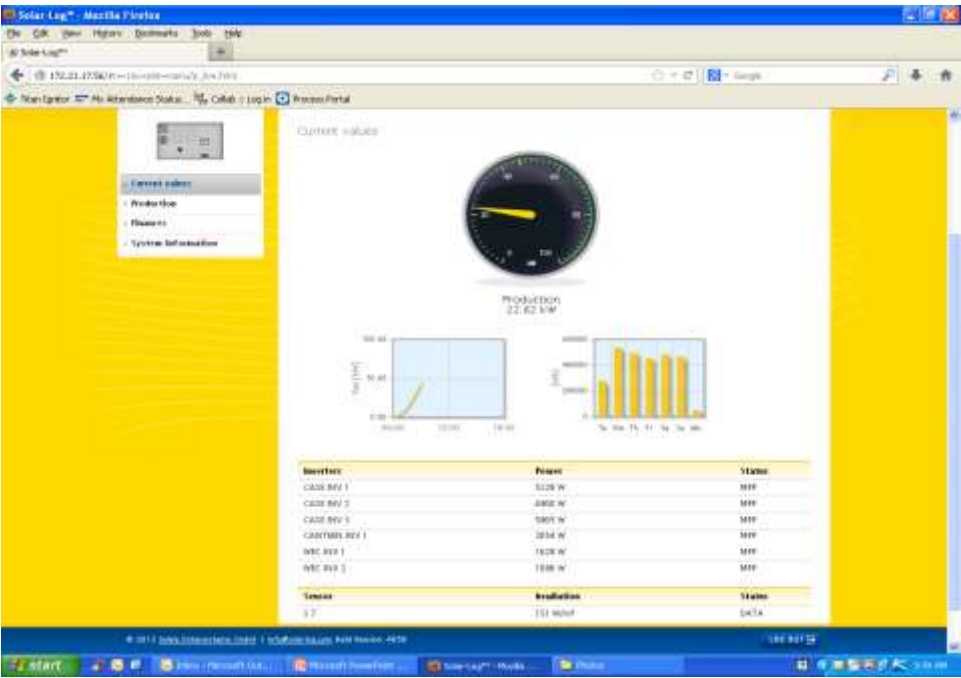
**MNRE subsidy - Rs 55 Lakh**

**Annual energy generation - 3 Lakh units**

**System installed during - May 2014**



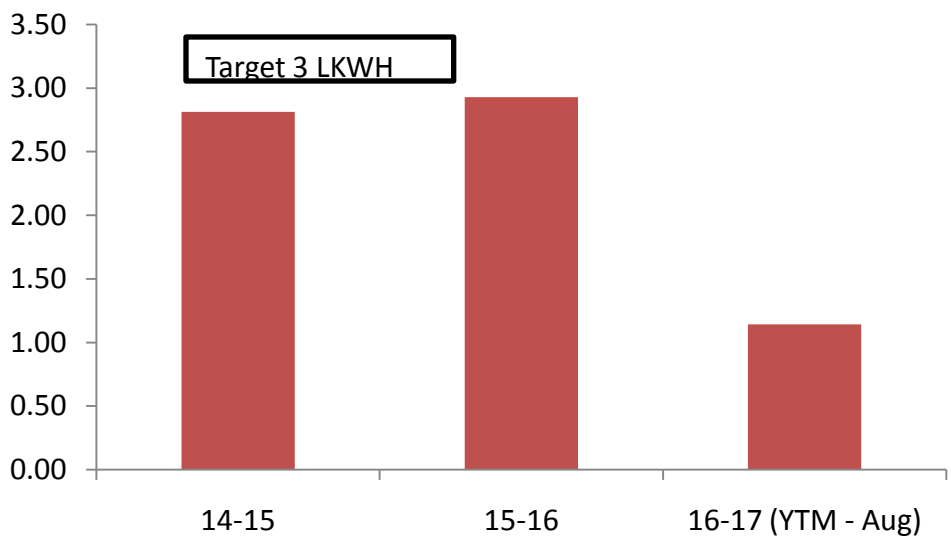
# Renewable Energy substitution- Rooftop solar system



**ON line monitoring**

- Daily generation
- Carbon emission reduction
- Unit wise production
- Solar radiation

**Solar Generation in L. kWhr**



# Solar Light Pipes



Area covered - 50000 Sq ft  
Energy saving / Annum - 25000 kWh  
Investment - Rs 24 Lakh



# Green Road Map



Water cooled screw chillers  
BMS  
Screw air compressors  
Flat belts for AHU's  
ENCON projects with  
Honeywell

Wind power  
substitution 30 %  
Solvent recycling

Wind power substitution -35%

2009-2010

2008-2009

2010-2011

EE lighting  
V belt to Flat belt  
Lighting  
transformer  
Refrigerant dryer

2004-2007

2011-2012

Wind power  
substitution -26%  
WHR, TES  
Free cooling

2000-2003

2012-2013

Wind power  
substitution-48 %  
TES – Phase II  
LED lighting  
Induction lamps

2004-05

Wind power  
substitution-48 %  
LED lighting  
Solar cooking  
RO up gradation

2014-15

2013-2016

Wind power contribution 51%  
Dedicated Feeder  
Rooftop Solar  
MVR, LED lighting, VFD's, IE3  
motors , ATCS

Plan  
2016-17

4900 Tons

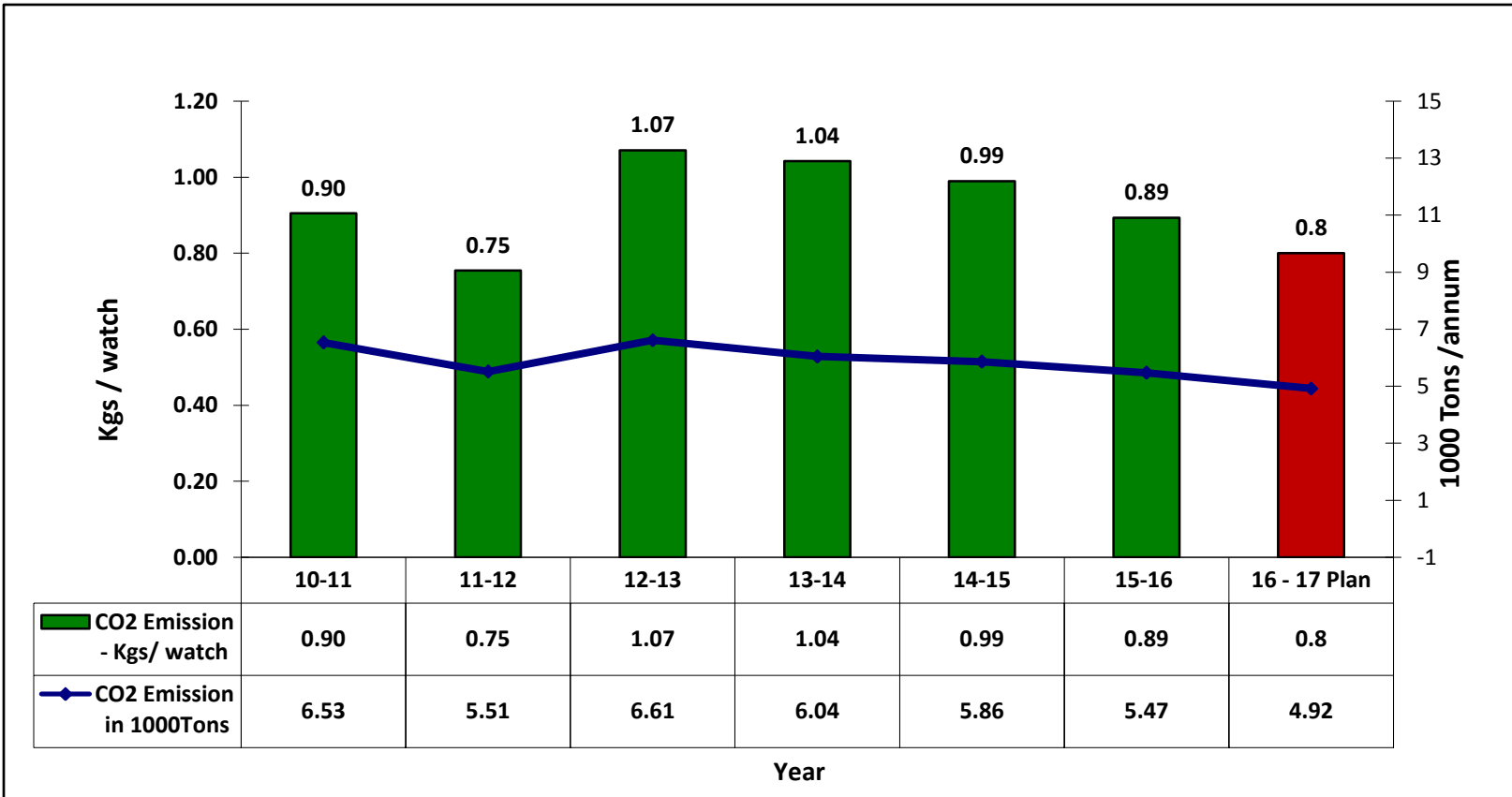
5400 Tons

11900 Tons

56%  
reduction



# Carbon Emission – Scenario



***Want to become “ Carbon Neutral “ in our Manufacturing operations by 2018-19***

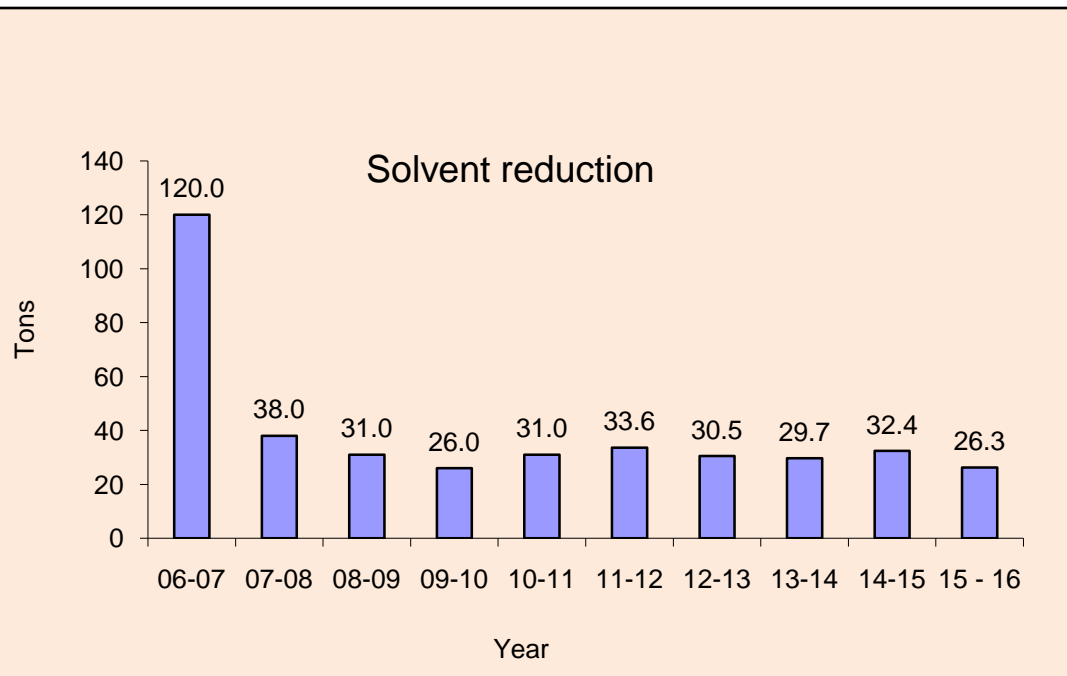
# Production Technology

## Cleaner Manufacturing Processes

- Elimination of TCE
- Reduction of Solvent consumption by > 73%
- Process Optimization & Automation
- Resource Conservation –Raw material Optimization,
- Recycling of Brass Scrap & Used Solvent
- Cleaner Production process – Ion Plating Process in place of conventional electro plating
- Pro Active Pollution Control Measures – WPC & APC measures
- Hazardous Waste Management Processes

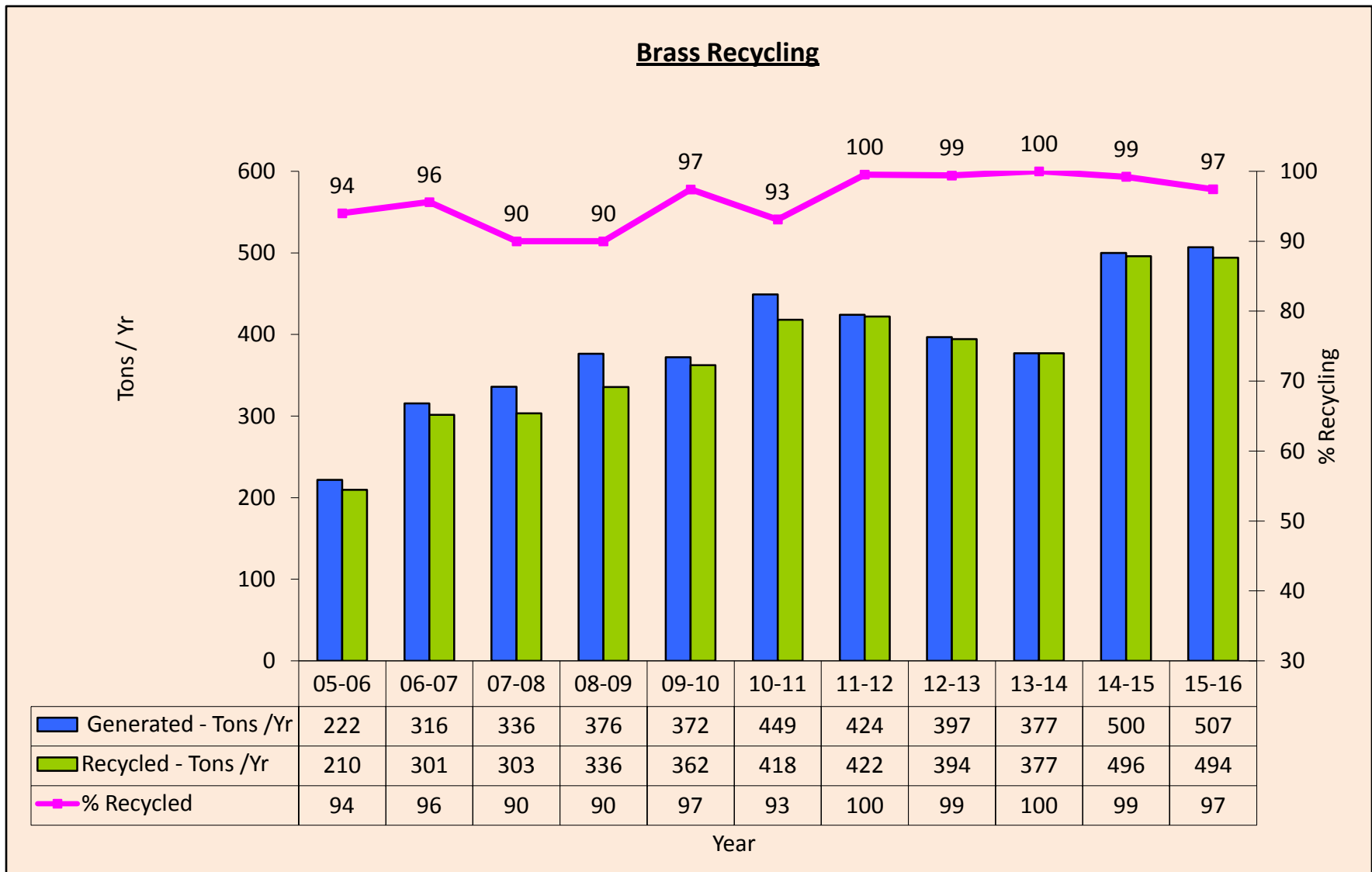


Manual cleaning to Automatic cleaning machine





# Process Scrap Recycling



**99% of the manufacturing process scrap ( Brass material) is recycled**

# Production Technology – Cyanide reduction / elimination

- Cyanide is used for
  - Rust removal / cleaning process
  - Gold stripping process



Leading to operational risk in storage , handling and treatment

Target to eliminate cyanide from our manufacturing process



- Interaction with external professionals
- CECRI, Karaikudi
  - CSIR-NML , Jamshedpur
  - SRM – Research Institute
  - Pyro Technologies, Bangalore

## Average Consumption

SODIUM CYANIDE - CP GRADE ( Kgs)									
Dept	07 - 08	08 - 09	09 - 10	10 - 11	11 - 12	12 - 13	13-14	14-15	15-16
E.Plating	35	40	35	43	30	15	10	13	10
Ion Plating	0	0	15	24	40	10	31	26	20
MTL	50	15	10	10	4	10	5	4	0
Surface Treatment	30	30	30	29	36	35	25	36	25
<b>Total</b>	<b>115</b>	<b>85</b>	<b>90</b>	<b>106</b>	<b>110</b>	<b>70</b>	<b>71</b>	<b>79</b>	<b>55</b>

Engaged with M/s CSIR –NML Jamshedpur to develop alternate process ( for cyanide elimination )

**Trials are under progress**

**52 % Reduction**

# Effluent management



pH – 6.97  
 TDS – 1500 ppm  
 BOD – 440 ppm  
 COD – 1400ppm

## Domestic treatment flow

Effluent from domestic wastes /wash rooms

Waste water from Canteen

Bar screen chamber

Anaerobic tank

Collection tank

UASBR

Grit chamber

pH – 7.2  
 TDS – 1490 ppm  
 BOD – 5 ppm  
 COD – 35 ppm



Filtration system – ACF /PSF

Collection sump

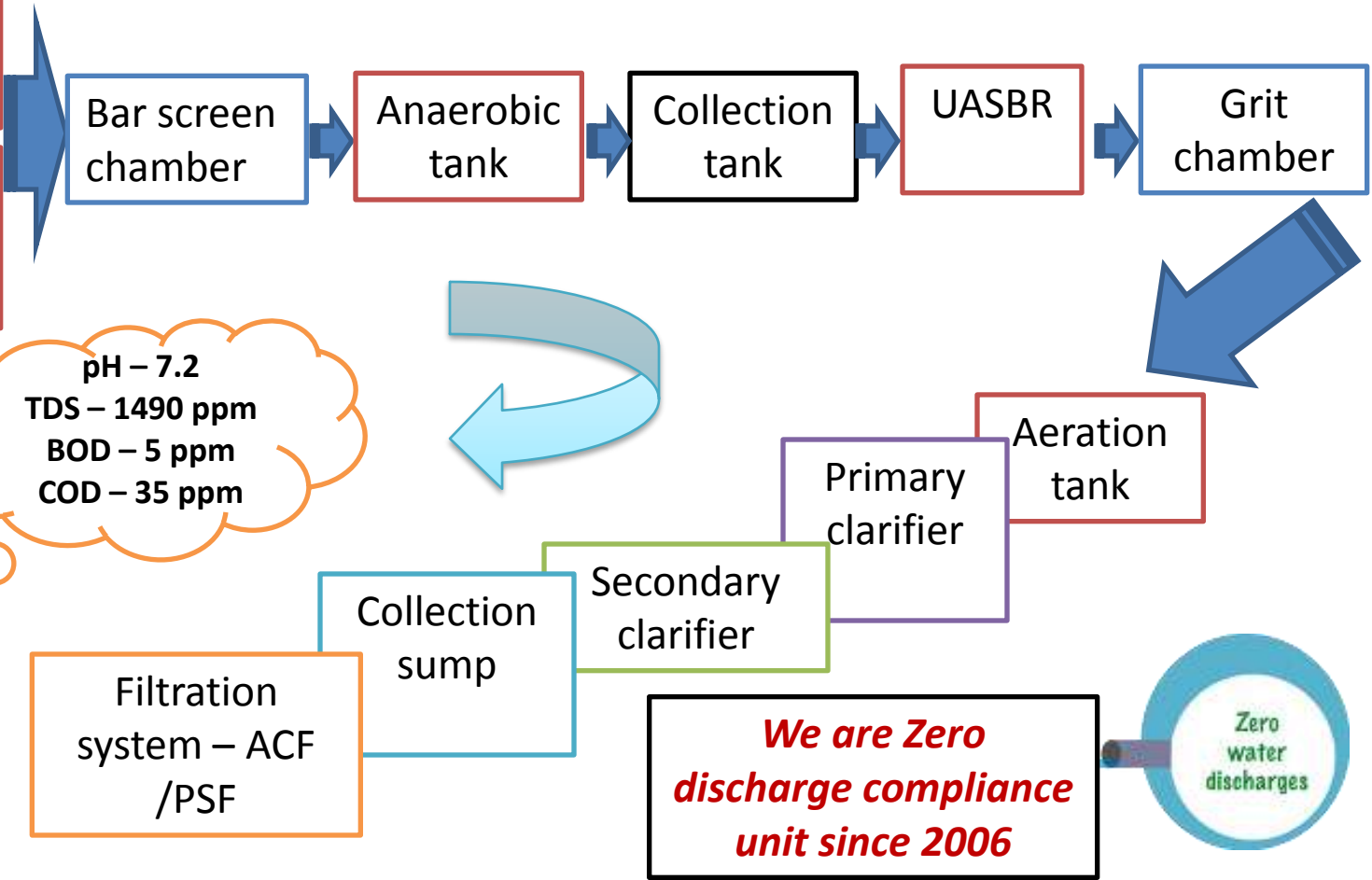
Secondary clarifier

Primary clarifier

Aeration tank

**We are Zero discharge compliance unit since 2006**

Zero water discharges

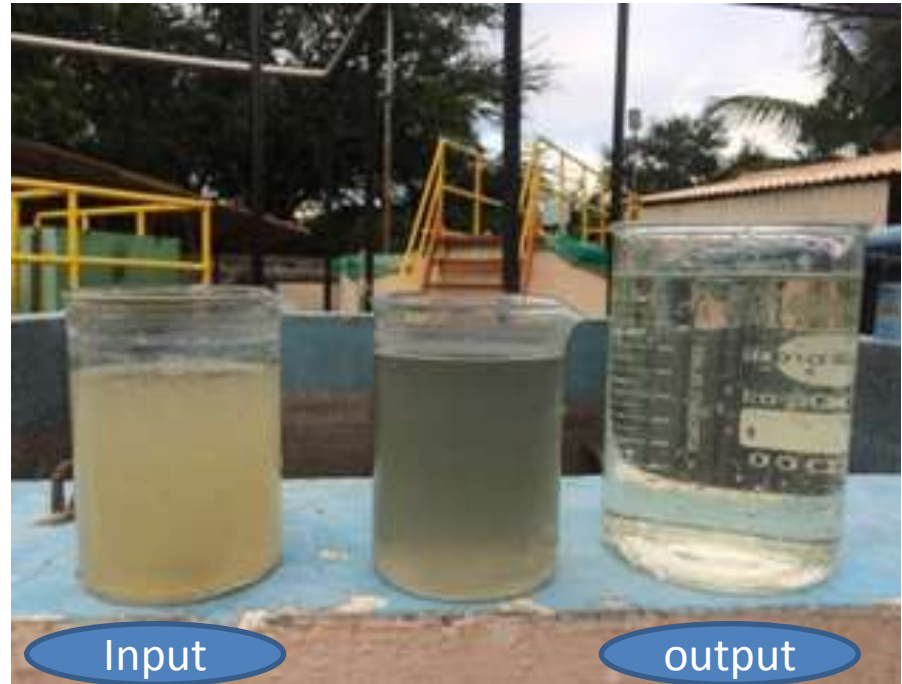


# STP Upgradation - Anaerobic Treatment System

- Installed Anaerobic treatment System prior to existing Sewage Treatment Plant
- Reduction in COD load to the plant by 64% ( from 1400 ppm to 500 ppm)
- Treated water output Quality is fairly stable ( BOD between 5 and 10 ppm)



**Anaerobic System**



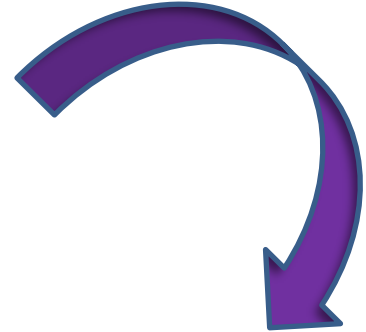
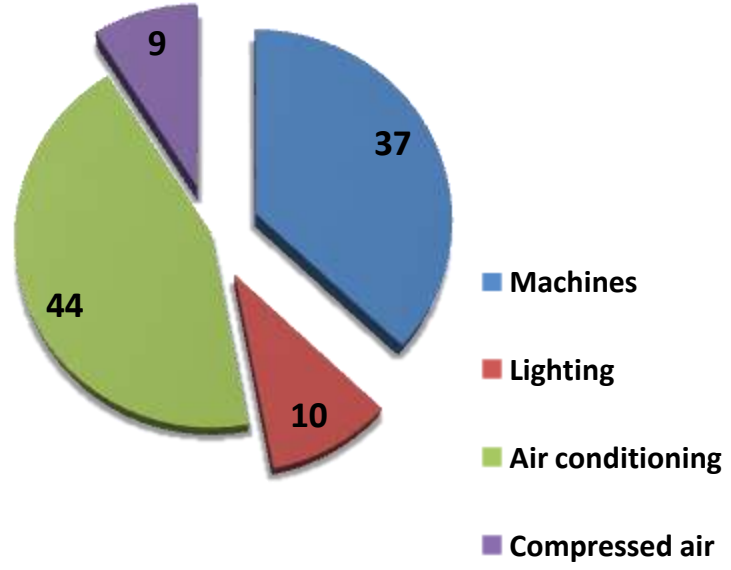
**Treated water quality**

# Key Results

# Energy Consumption -Scenario

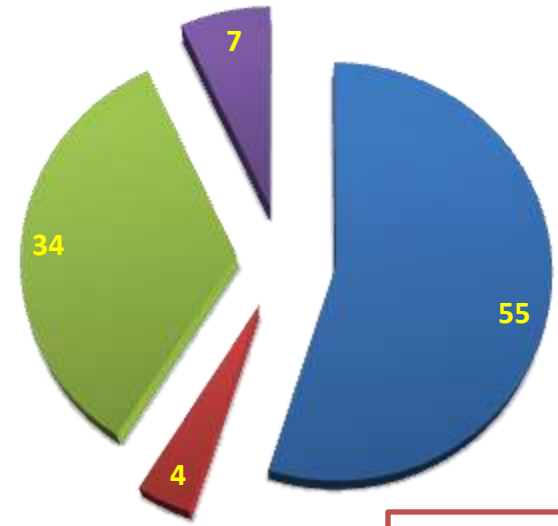
2002-03

% of power



% of power consumption 2015 -16

Machine power increased by 48 %

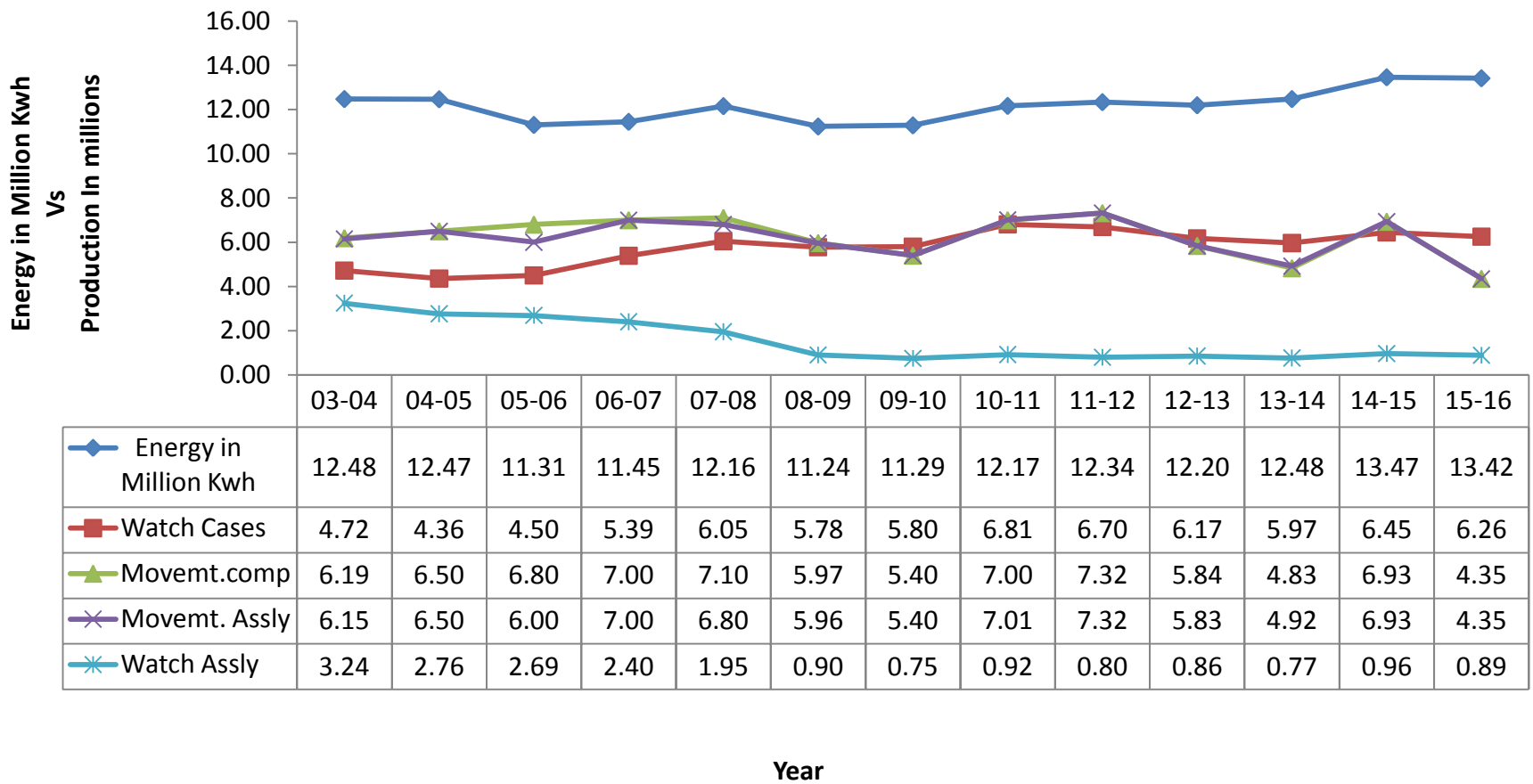


2015-16

# Energy Trend – Energy Vs Production

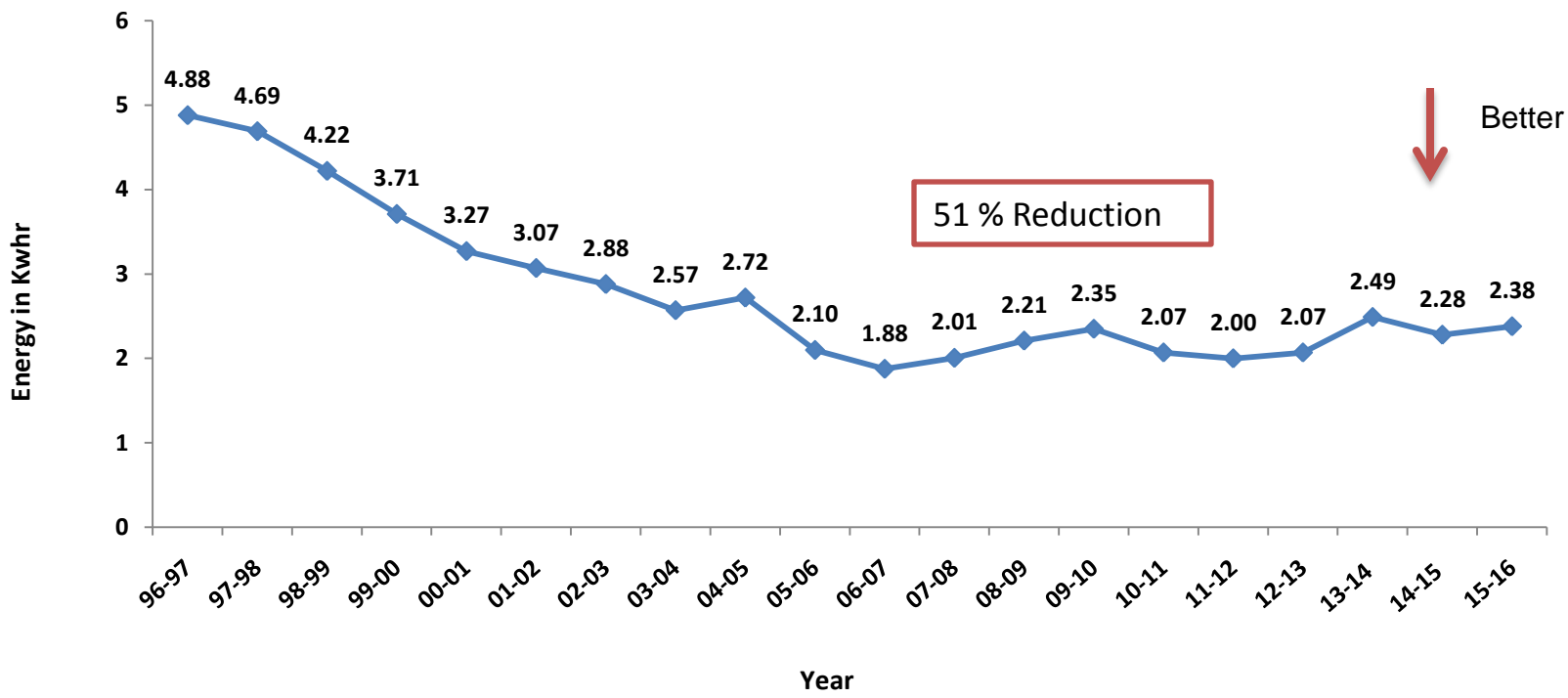


Energy Vs Production



# Energy Trend – Specific Energy Consumption

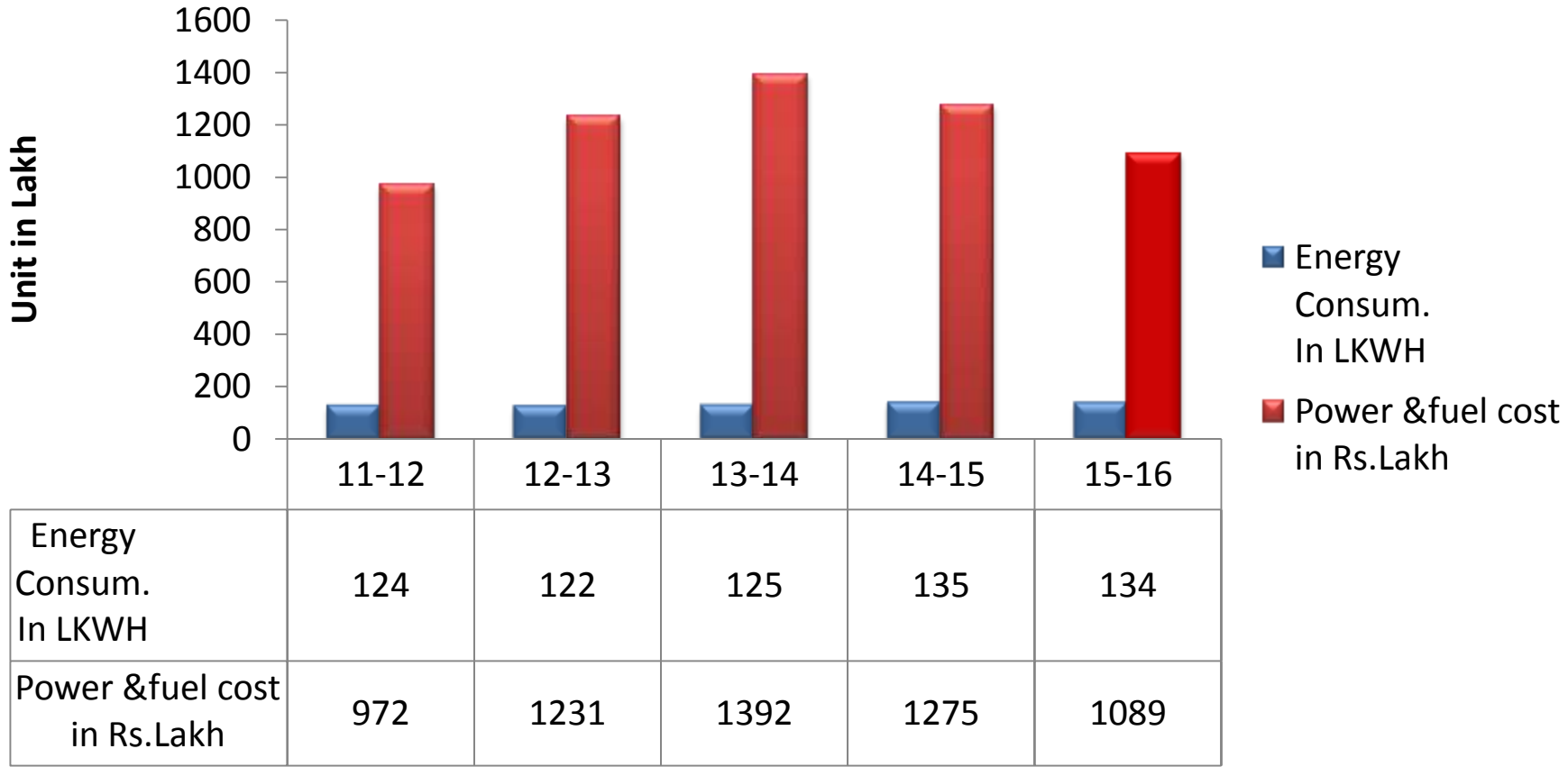
Specific Energy consumption



**Long term objective - Specific energy consumption of 1 kWH / Watch**



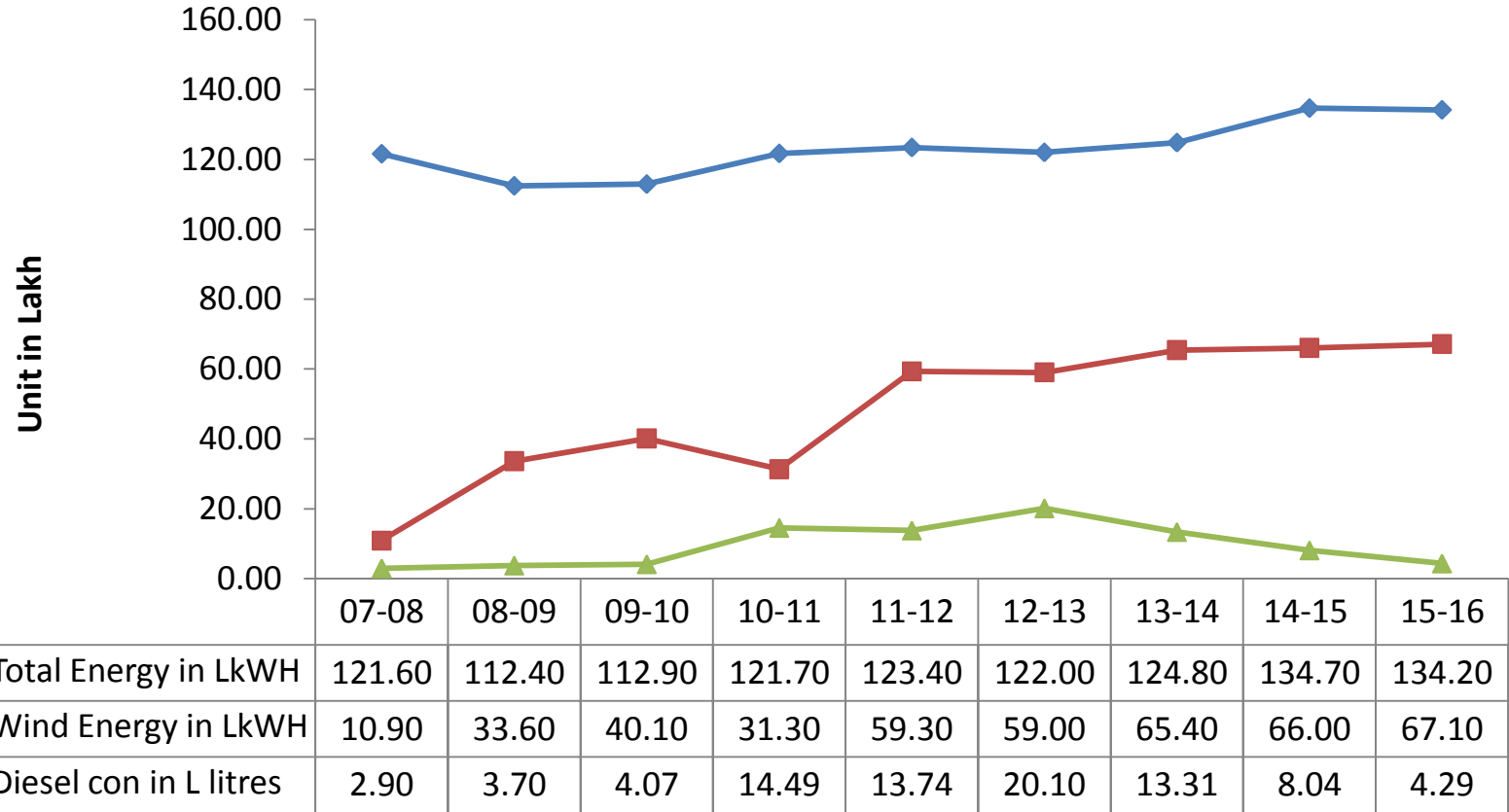
# Energy Consumption Vs Power & fuel Cost



*Wrt 2013-14*

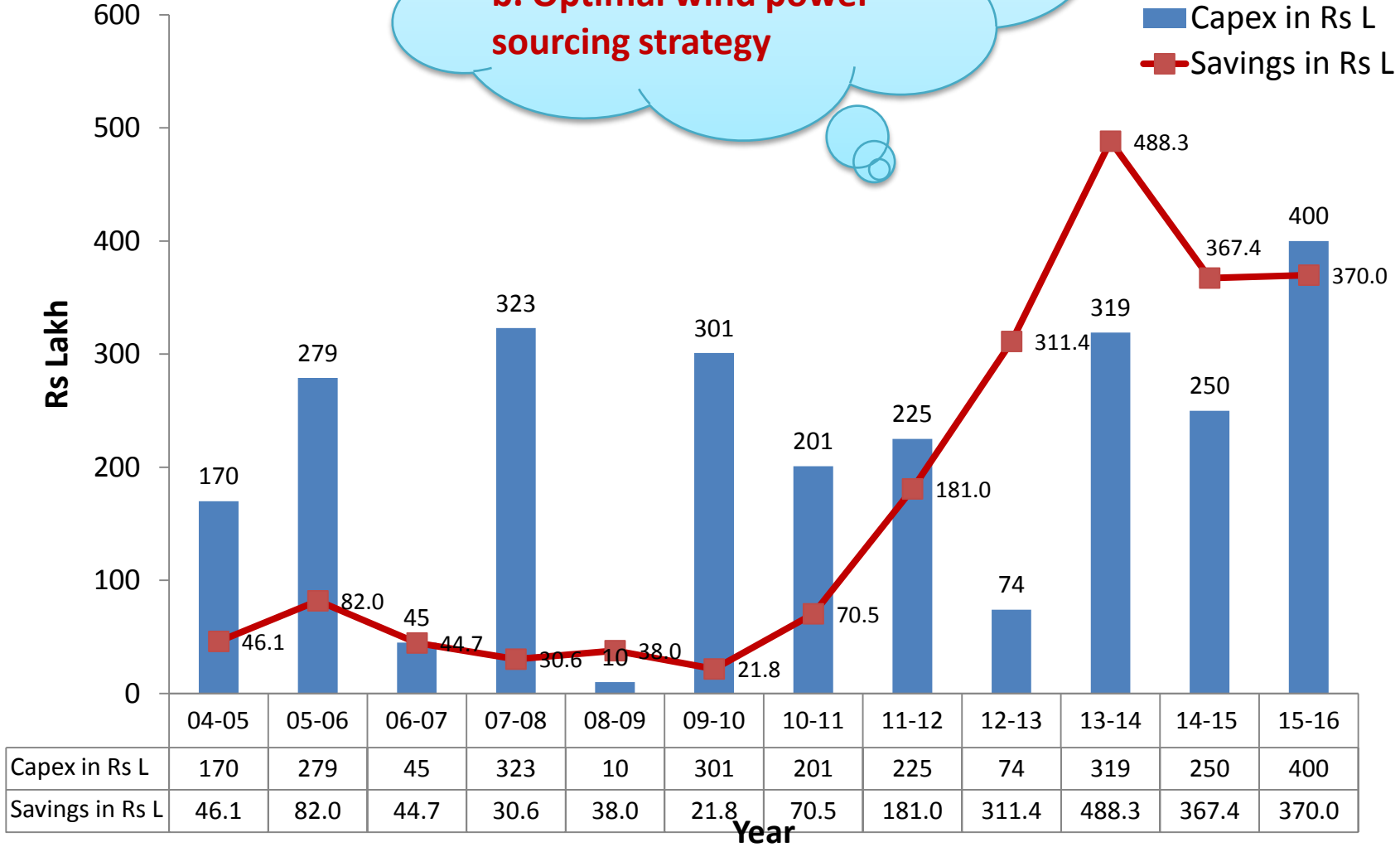
- Increase in energy consumption by 7 %
- Decrease in power & fuel cost by 22 %
- Increase in energy tariff by 59 %

# Total Energy Vs Wind energy Vs Diesel consumption

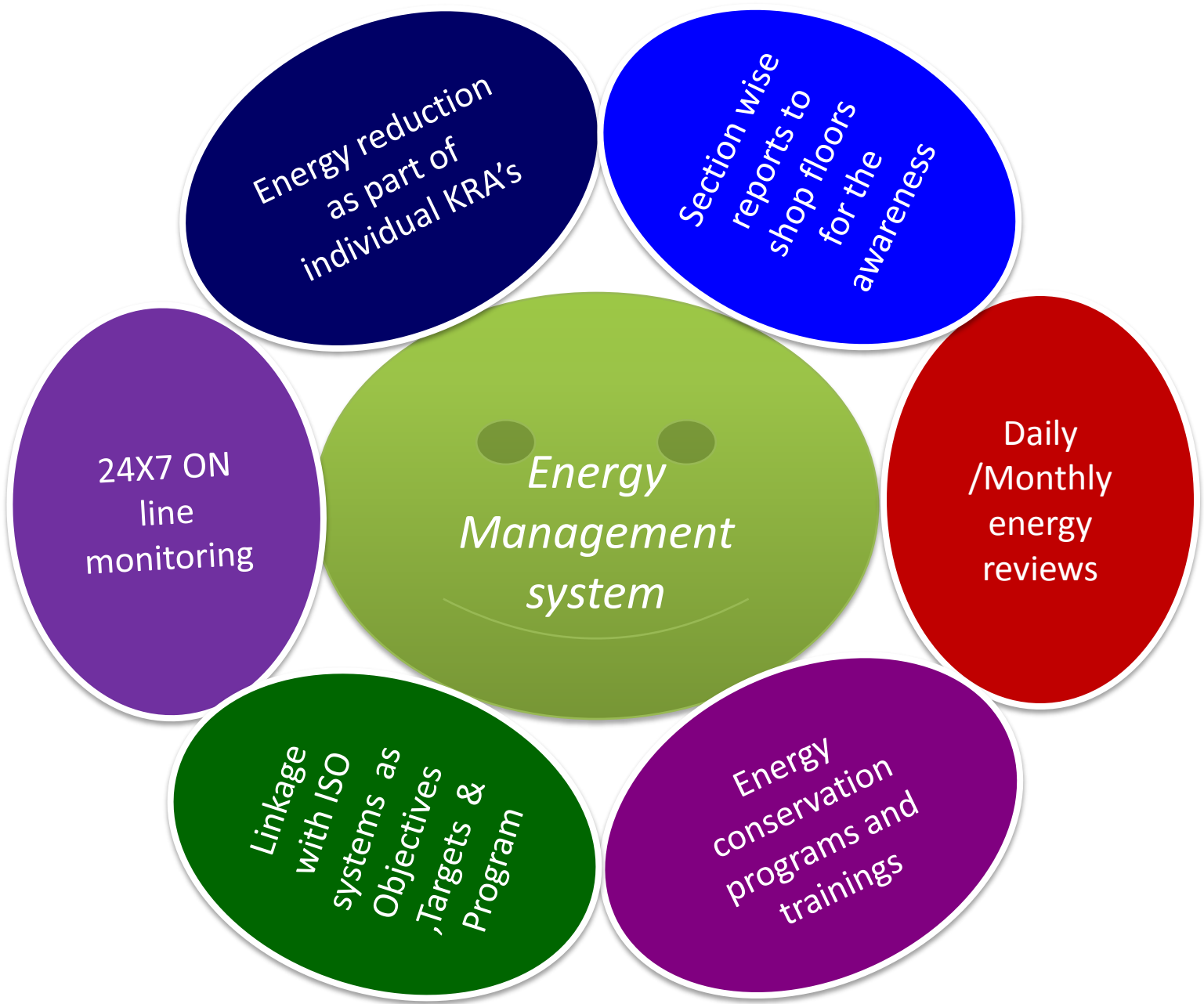


# CAPEX Vs Savings

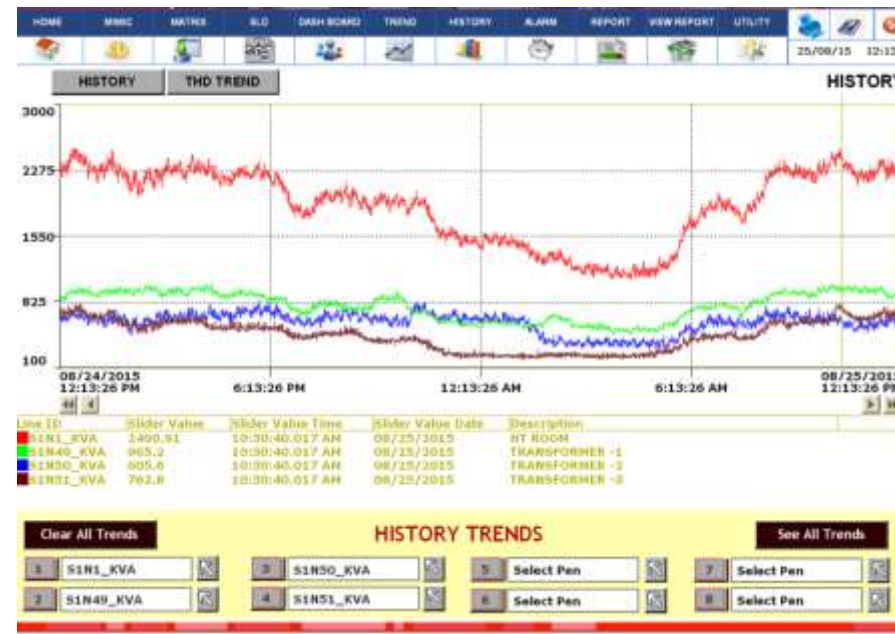
**Saving- Combination of**  
**a. Energy saving**  
**1 Million kWh /Year**  
**b. Optimal wind power**  
**sourcing strategy**



# ENCON Team work - Energy Management System



# ENCON Team work - On line monitoring system



**SLD**  
**Daily reporting**  
**ON line trend**  
**History**

# ENCON Team work - Energy /Fuel Management System

## Bench Marking

Visit to group companies / peer industries to learn the best practices

Sharing our best practices among industries

## Rewards & Recognitions

MOF / Dream team award /SGA's /Idea +

Common transport system for employees

# ISO 50001 – EnMS certification



Energy Management System (EnMS ) – ISO 50001 certification was one of the key objective set for the year 2015-16

M/s BSI have been engaged with us for the end to end implementation / certification process

Certified during April'16

# Beyond the fence ...

## Vendor Energy Audit

To educate our vendor community on Energy Conservation and its importance

To share our best practices / expertise on ENCON

To optimize their energy cost

To support (technical & finance ) vendors for implementing ENCON solutions

Awareness programs / Knowledge sharing/Project execution

<b>No of vendors covered</b>	23
<b>Saving potential identified</b>	Rs 60 Lakh
<i>With out investment</i>	Rs 17 Lakh
<i>With investment</i>	Rs 43 Lakh





# Awards & Accolades

- “SRISHTI “ good green governance award for the year 2006 for practicing better EMS .
- “Golden Peacock Eco Innovation Award” for the year 2007 for innovating alternate solvent for TCE .
- “Golden Peacock Environment Management Award” for the years 2003, 2006 & 2008 for practicing better Environmental Management System.
- “Greentech Environment Excellence award 2008” for the outstanding achievement in the Environmental Management.
- “Golden Peacock Eco Innovation Award 2008 “for design and Process Innovating – KLOTZ micro precision plastic component development.



# Awards & Accolades

- CII - National Award for excellence in energy management for the year 2013 .
- CII – National energy management award under excellent energy efficient category for year 2015
- Greentech Environment award under Gold category for the year 2015



# Way forward

1. Enhancing wind power contribution from 80 to 100%
2. Enhancing roof top solar power system capacity - 0.25  
~ 0.5 MW
3. Magnetic chiller for the air conditioning system
4. Green Co Certification
5. Micro level energy monitoring

***A healthy, wealthy, sharing, caring, clean  
and green Company that is admired by a  
billion people across the globe!***



*Mr. Bhaskar Bhat  
Managing Director*

**Thank you!**



## ◆ BENGALURU

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### EXTREME WEATHER EVENTS IN THE MONTH OF SEPTEMBER

Year	Temperature(°C)		Rainfall (mm)	
	Highest Maximum(Date)	Lowest Minimum(Date)	24 Hours Highest (Date)	Monthly Total
2015	33.2(25)	18.7(25)	37.1(07)	189.8
2014	31.1(24)	19.1(09)	132.3(26)	319.0
2013	31.4(03)	18.5(23)	79.8(02)	352.6
2012	32.5(24)	19.2(16)	40.8(14)	68.4
2011	30.8(29)	18.2(23)	57.7(20)	111.1
2010	31.8(24)	18.7(01)	114.1(25)	190.3
2009	31.3(14)	18.2(24)	66.8(24)	345.8
2008	31.6(29)	18.4(15)	64.5(02)	140.0
2007	31.3(11)	18.8(13)	79.4(13)	271.4
2006	32.4(07)	19.5(23)	28.7(07)	45.3
ALL TIME RECORD	33.3(16/1951)	15.0(25/1883,01/1906)	177.6(12/1988)	516.6(1986)

