

# Carbon Neutral Manufacturing

## Approach

**Titan Company Limited**

( Watch Manufacturing Unit - Hosur )

6<sup>th</sup> November 2015

# 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



# Carbon Neutral Manufacturing

## Focus Areas

Phase - I

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

# Energy Management

# Policies

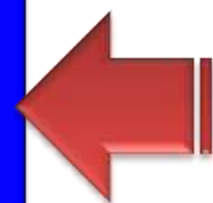
Green Perspective in all our business

*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.



**H G RAGHUNATH**  
CEO - Watches & Accessories Division  
Sep 2013

## 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.

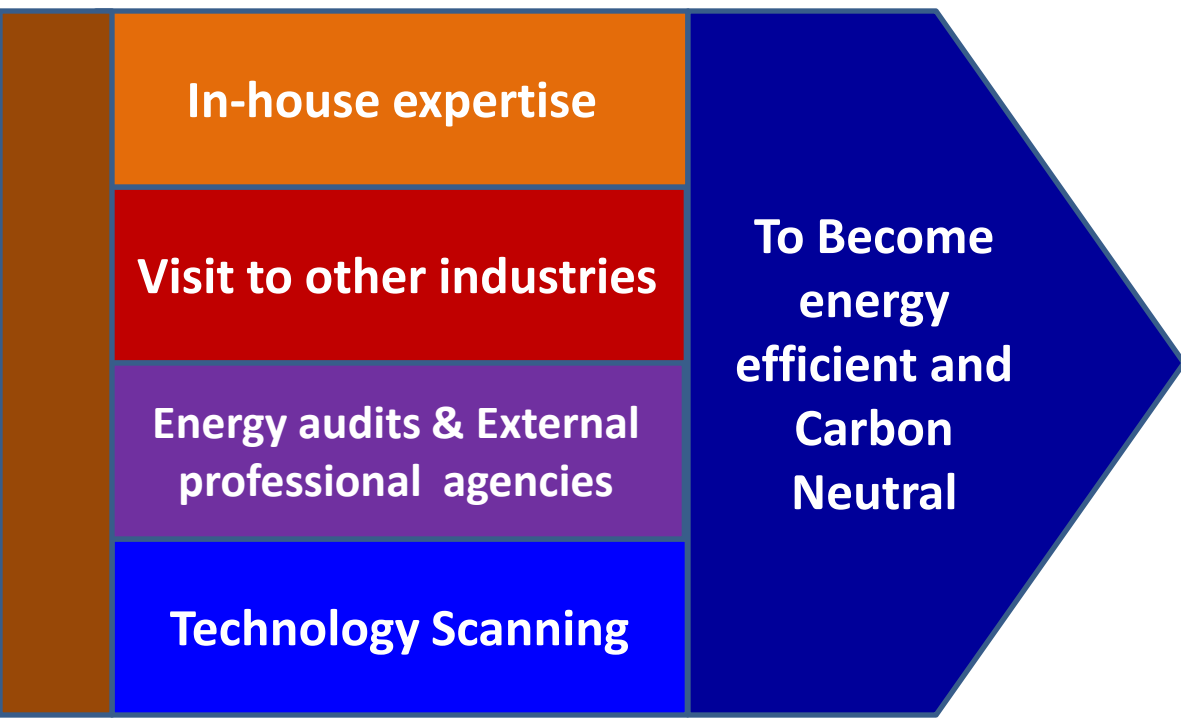
Head – ISCM, Watch Manufacturing

Energy  
Efficiency

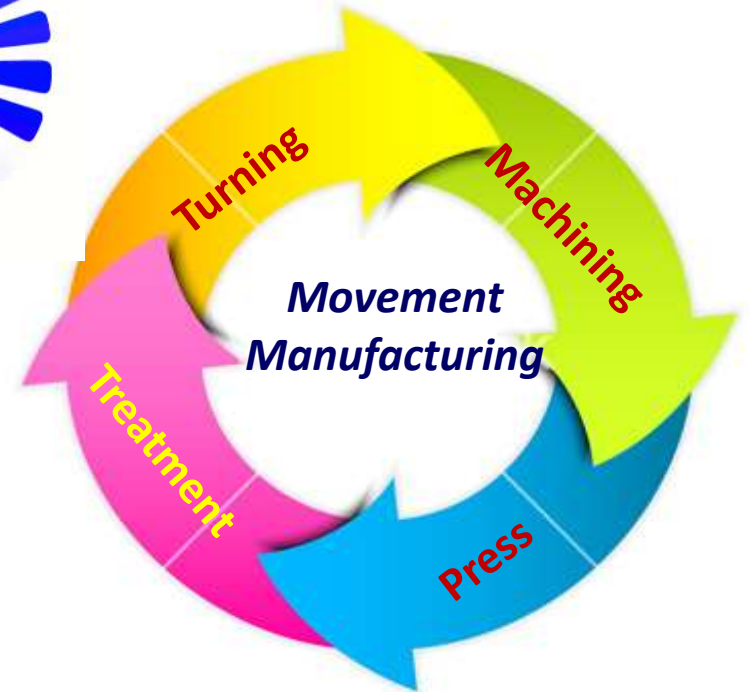
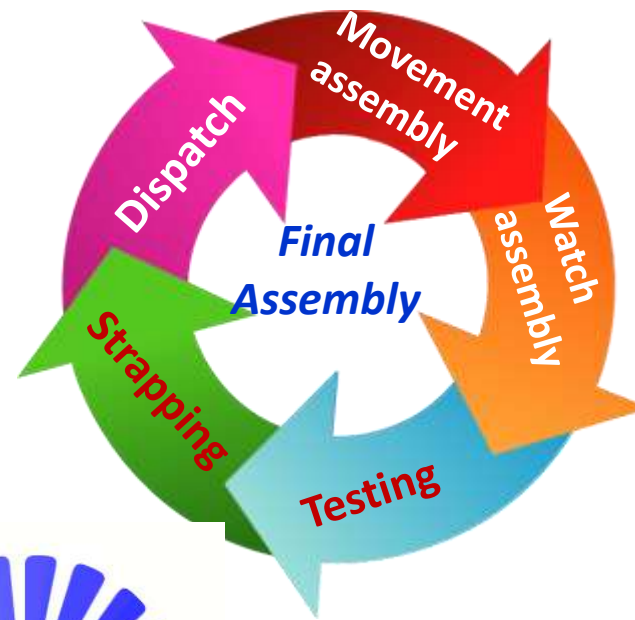
Carbon neutral  
manufacturing



# ENCON – Our Approach

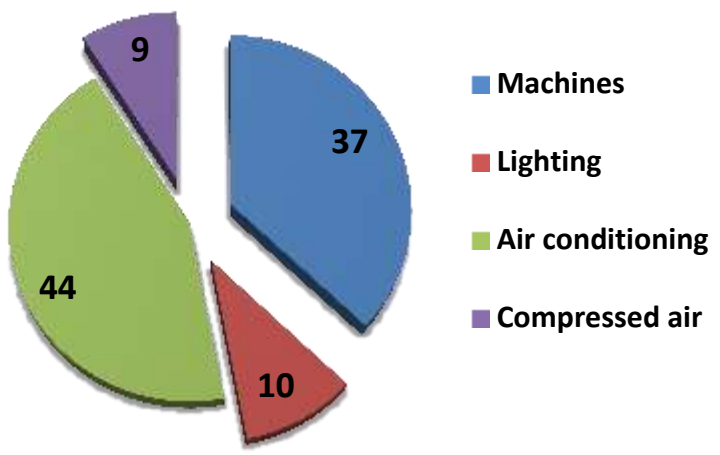
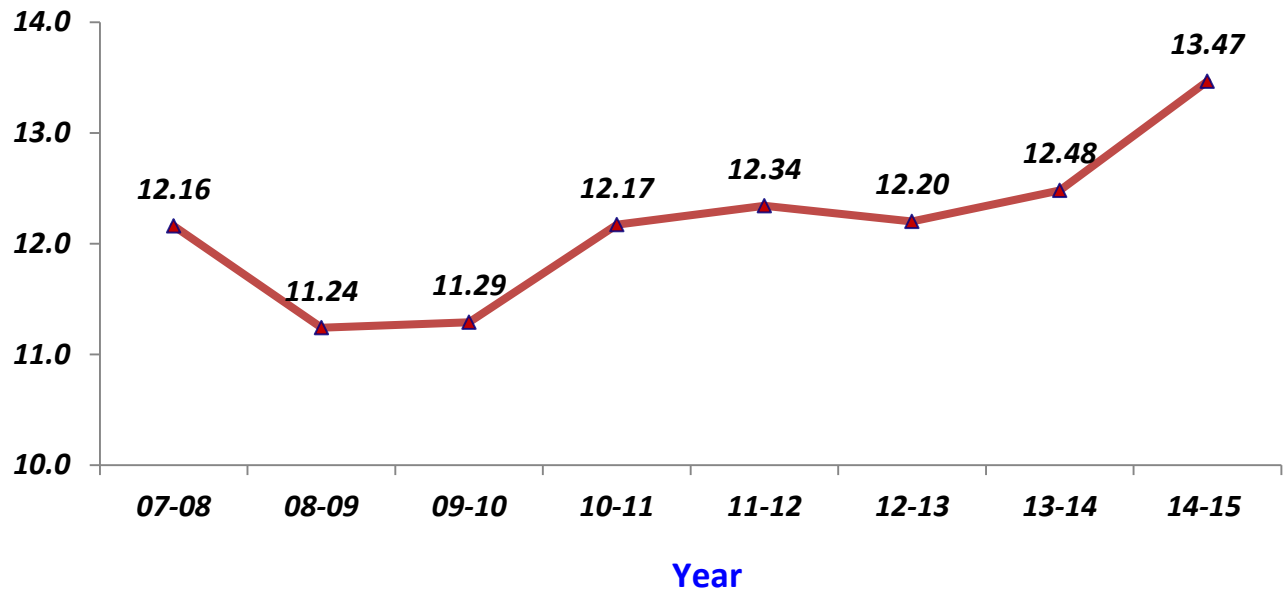


# Manufacturing process



# Energy consumption -Scenario

Energy - Million kWh



Around 63% of total energy consumption was for service load

## *Key challenges*

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

# Energy Conservation

## Key Focus Areas

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

# ENCON – Key Initiatives.....

V Belt to Flat Belt conversion

Intermediate controllers

Screw air compressors

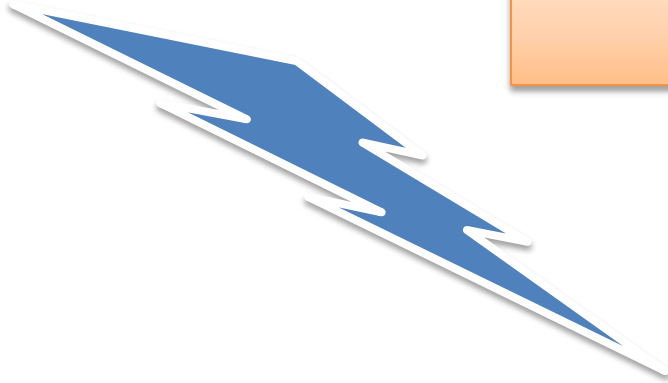
Refrigerant dryer

Transvector nozzle for clean air guns

SCADA system for battery of compressors



COMPRESSED  
AIR  
SYSTEM



# ENCON – Key Initiatives.....



Screw air compressor



SCADA system - SAM



Air gun with transvector nozzle

# ENCON – Key Initiatives

Recip chiller to Screw chiller – water cooled

Star delta Star convertors

Flat belt conversion for AHU's

Energy efficient pumps

BMS for air conditioning

Aircon savers for smaller A/c units

VFD's or AHU's

Free cooling system

Thermal Energy storage system



**AIR  
CONDITIONING  
SYSTEM**





# ENCON – Key Initiatives



Screw chiller



Thermal Energy Storage system

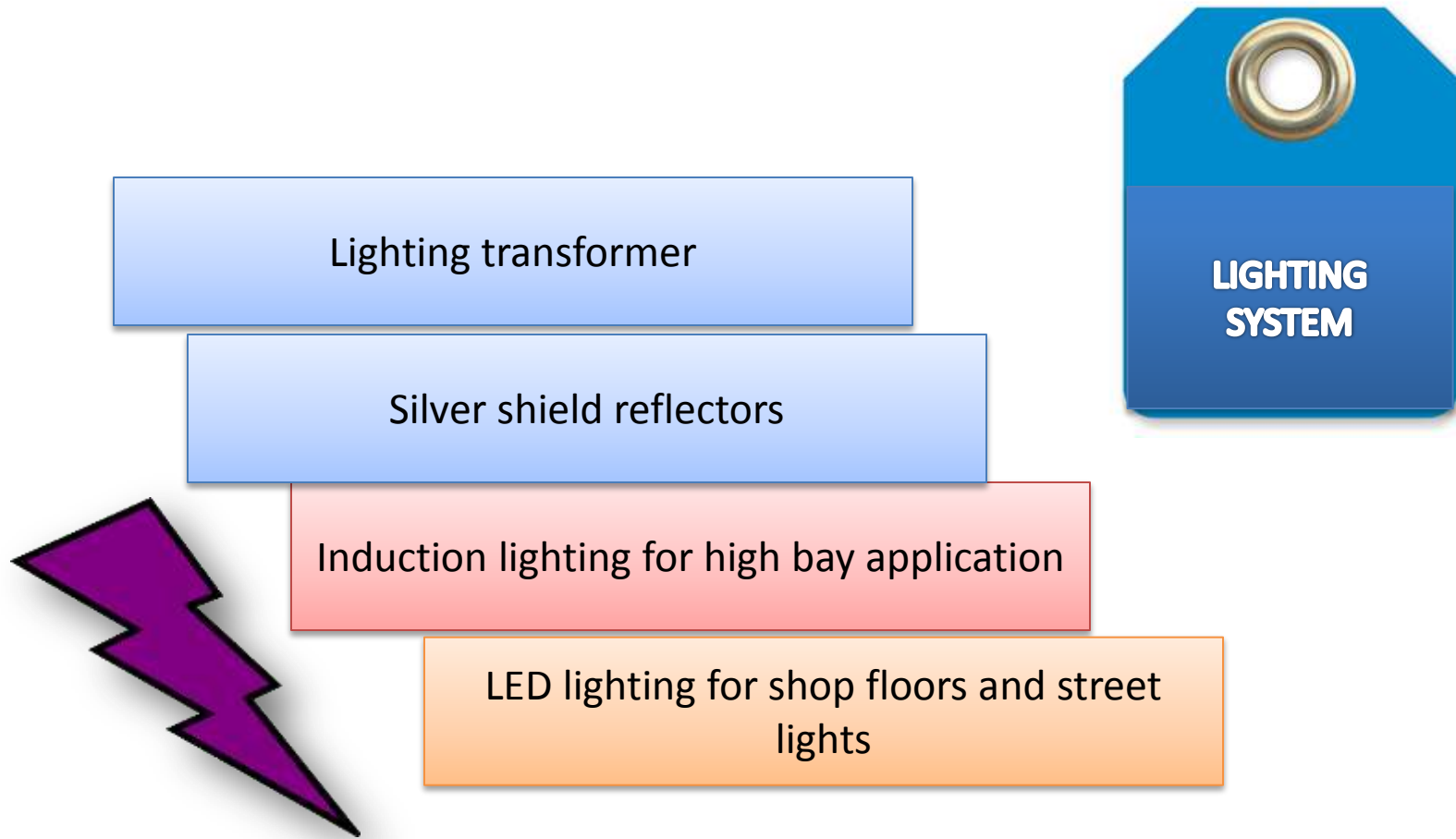


AIRCO saver



VFD for AHU

# ENCON – Key Initiatives



# Shop floor general lighting - LED Retrofitting

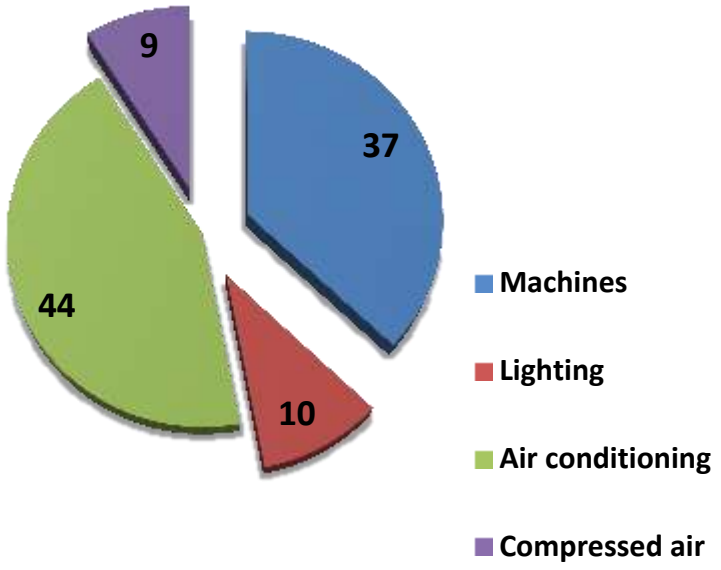


- Total No of fittings converted - 3000 Nos
- Investment – Rs 42 Lakh
- Energy saving - 2.60 LkWH
- Cost saving - Rs 26 Lakh
- Payback - 2 Years

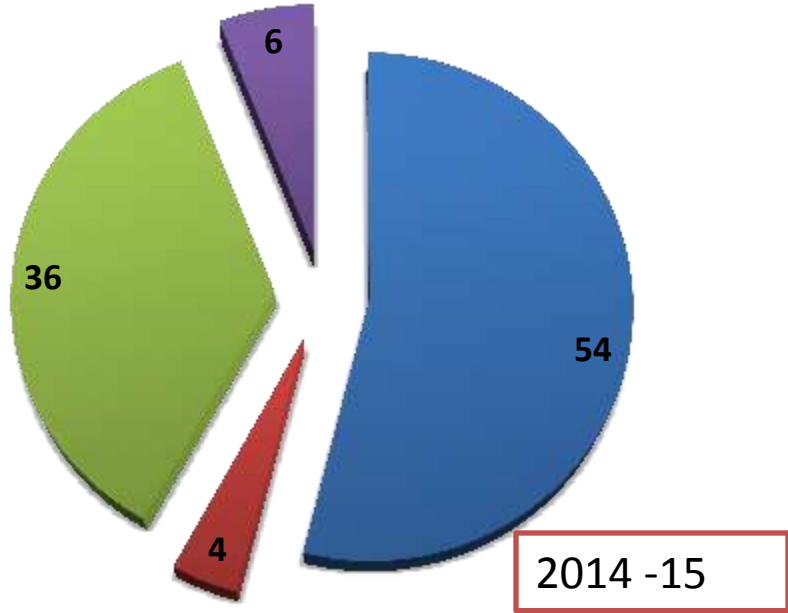
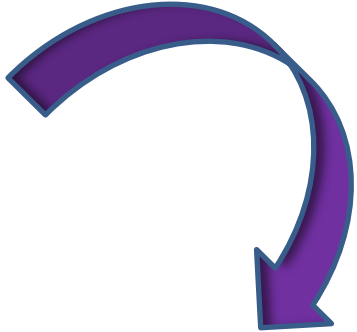


# Energy Consumption -Scenario

**% of power**



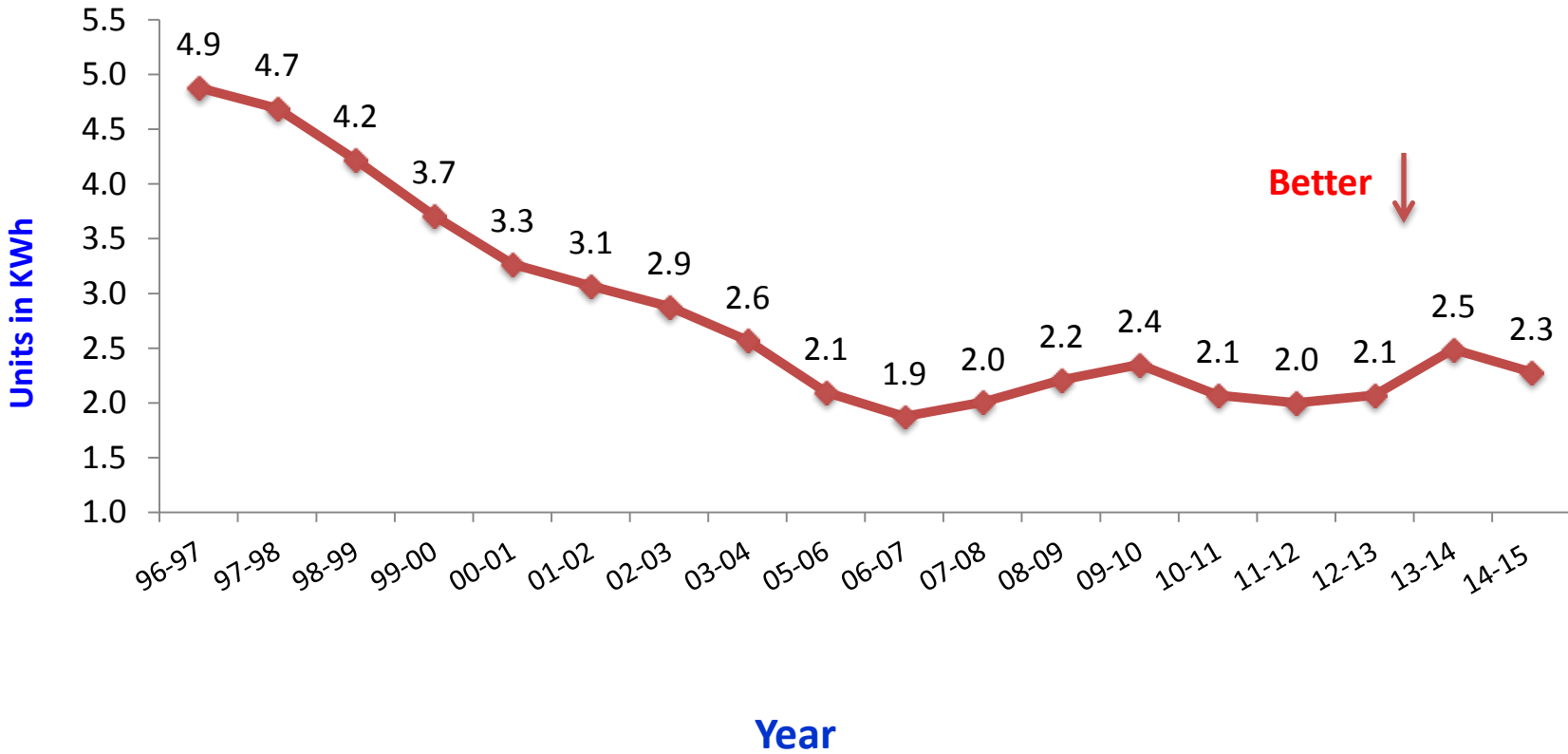
**Machine power increased by 46 %**



**2014 -15**

# Energy Trend – Specific Energy Consumption

## Specific Energy Consumption



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

# Fuel Conservation

# Fuel Conservation

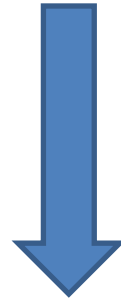
## Key Focus Areas

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

# Dedicated feeder system ( DFS)

## Key Challenges

- Grid Availability
- Power & Demand restrictions



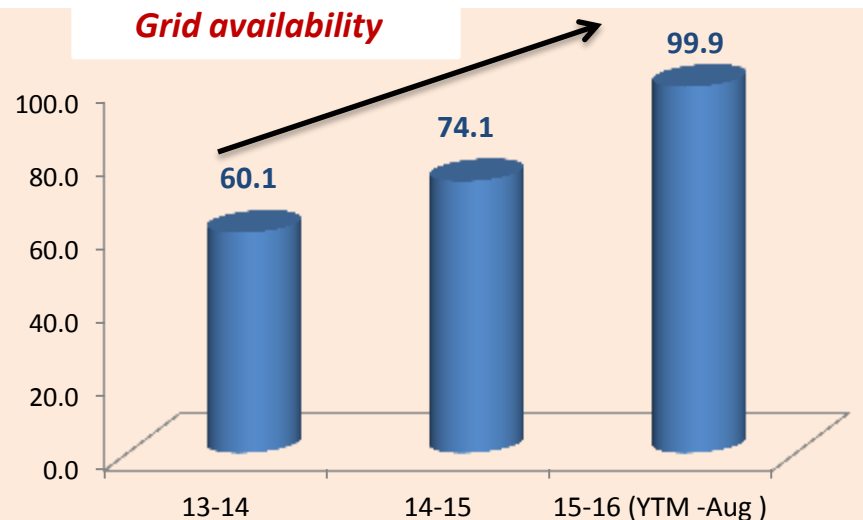
- Higher DG set operation
- Un Utilized Wind Power



# Dedicated feeder system ( DFS)



**Establishment of  
Dedicated 11 kV Power  
Feeder System**



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

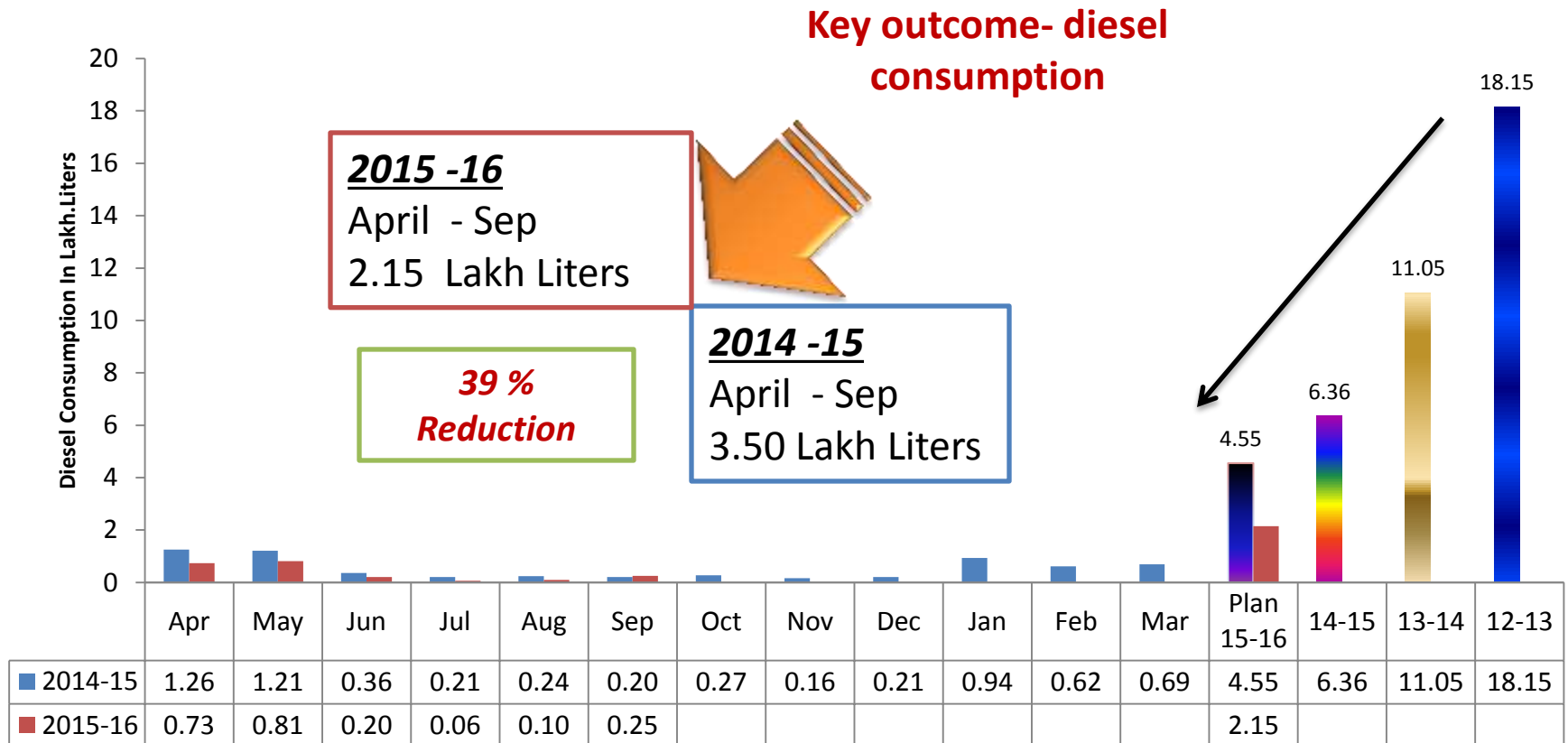
- Initiated during 2013- 14
- Investment : Rs 60 Lakh
- System commissioned during Feb'15
- Assured grid availability of 99 %

# Dedicated Power Feeder System

## Key Deliverables

Enable to

- Maximize the wind power substitution
- Drastically reduce the DG set operation and diesel consumption



# Solar Cooking System

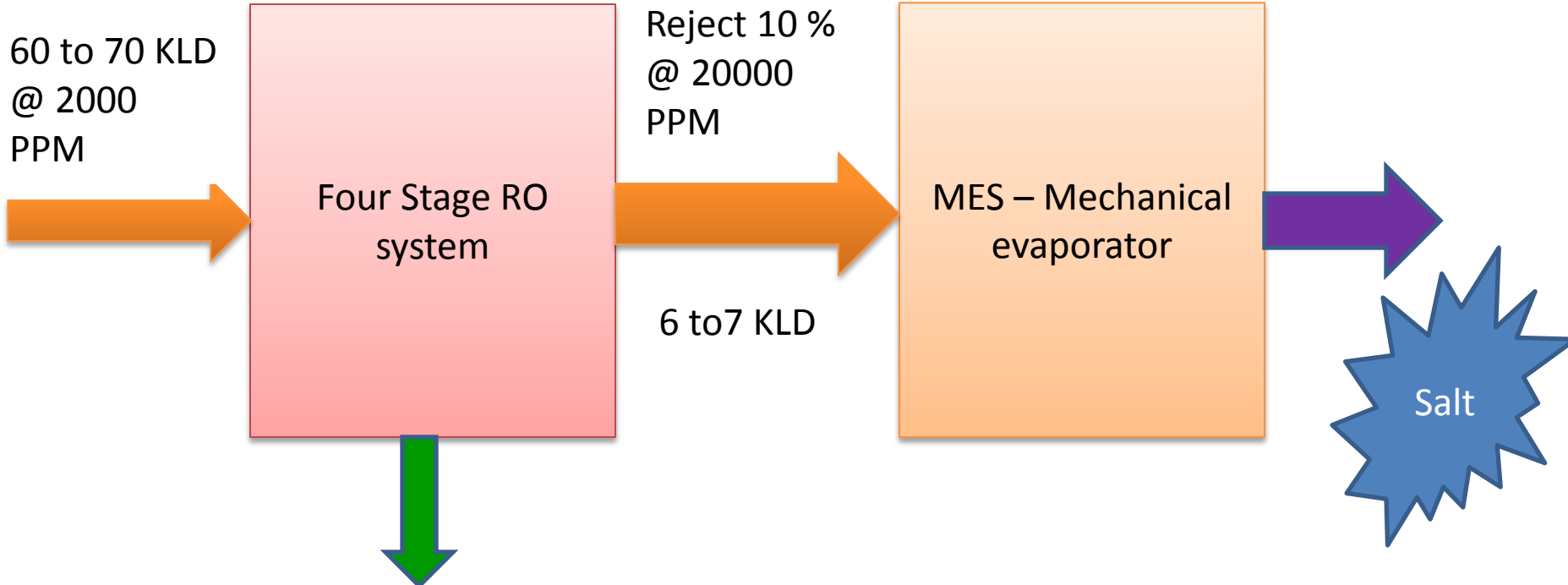


- No of dishes :15
- Solar system capacity : 75 kg/ Hour
- Steam generation between 11.00 to 3.00 PM
- Supplementing our Canteen steam requirement about 4 Hrs
- Diesel savings – 3000 Liters /Year
- Investment - Rs 43 Lakh

# 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.**

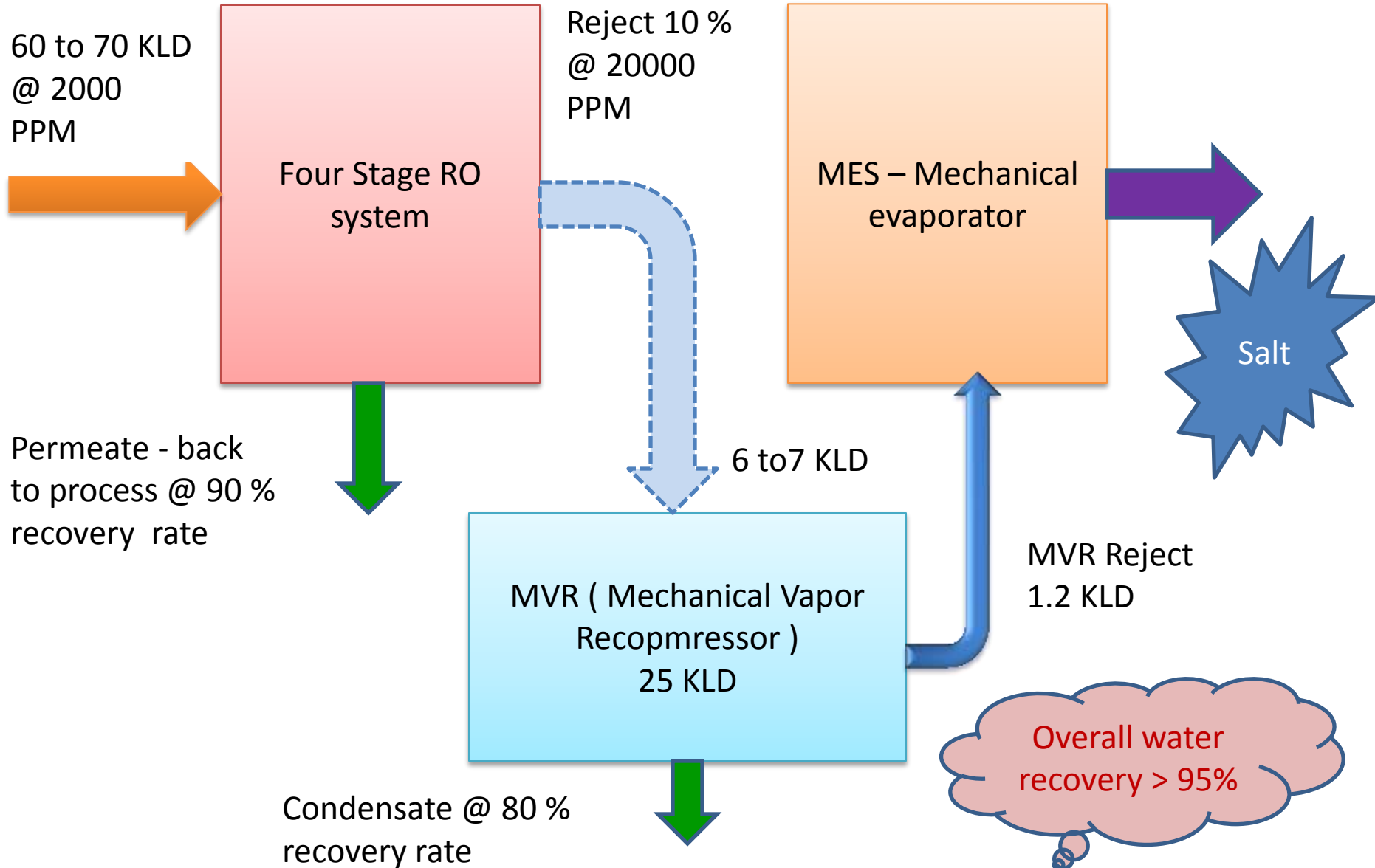
# ETP Process – with MES



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	21000	Rs 63.00 Lakh

# 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

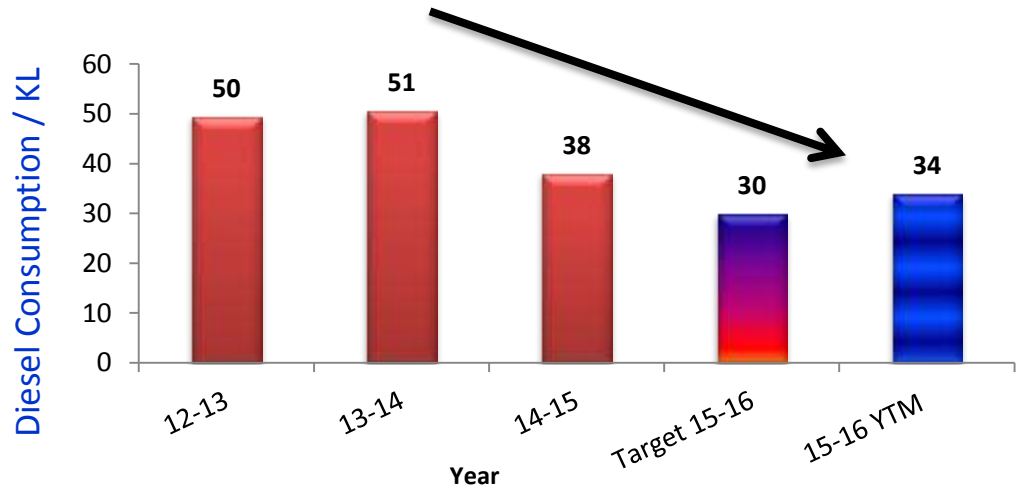
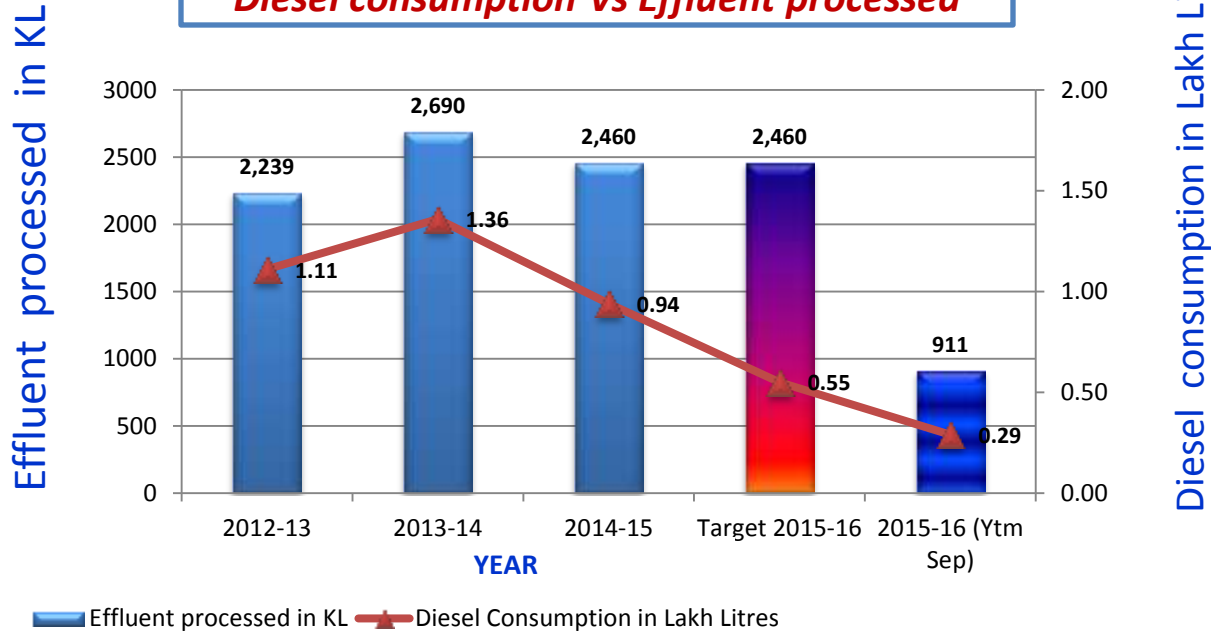


MVR vessel



# 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

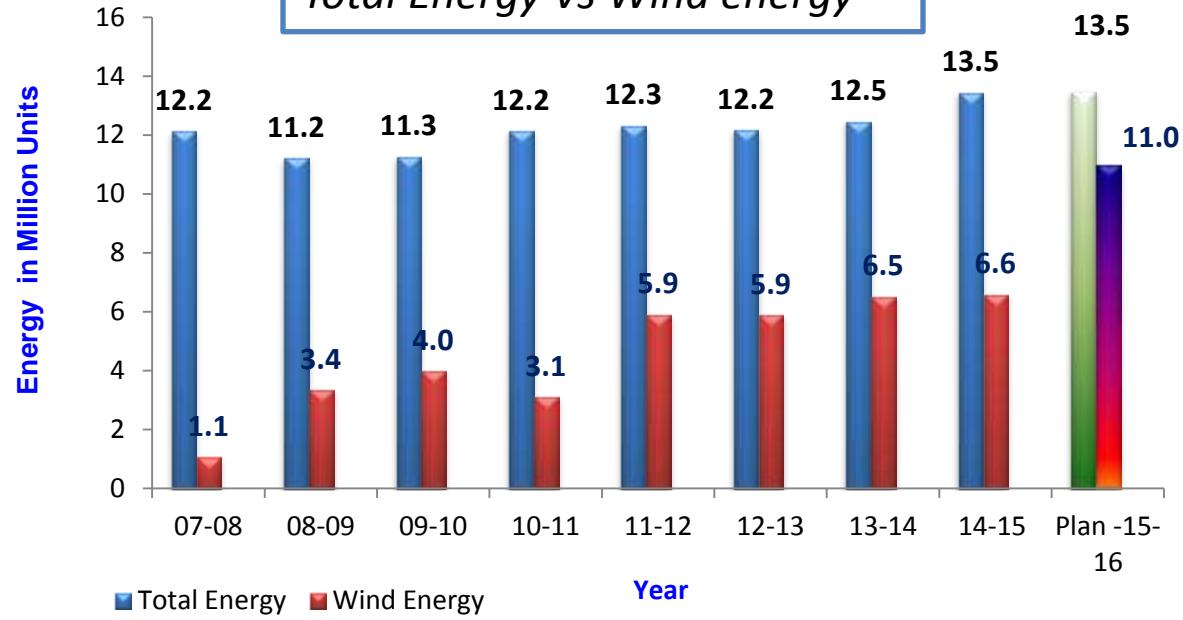
Energy generation

Capacity (kWh) : 10.5 Million /Year

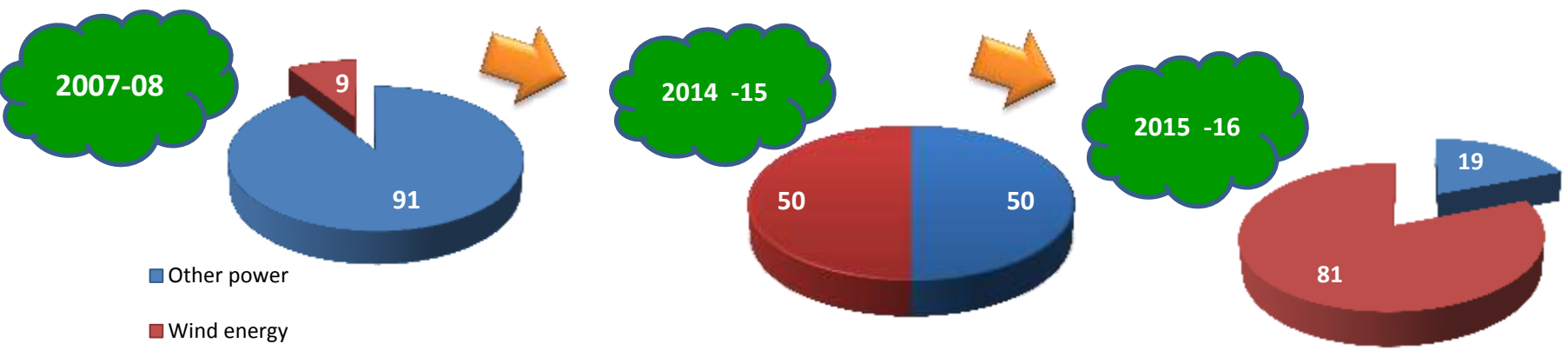
***We are supplementing our  
energy requirement  
through Wind Mills since  
2007-08***

# Renewable Energy substitution- Wind energy

*Total Energy Vs Wind energy*



*Wind energy contribution*



# Renewable Energy substitution- Rooftop solar system

**Capacity - 216 kW**

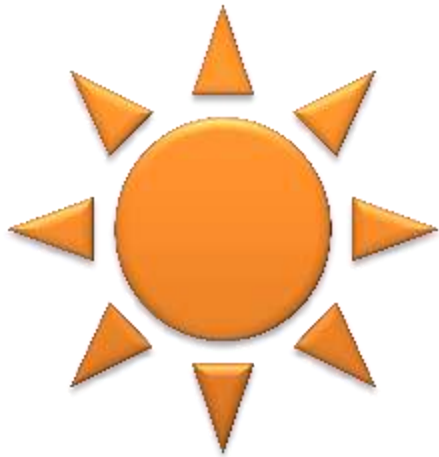
**( 6 Modules )**

**Investment - Rs.174 Lakh**

**MNRE subsidy - Rs 55 Lakh**

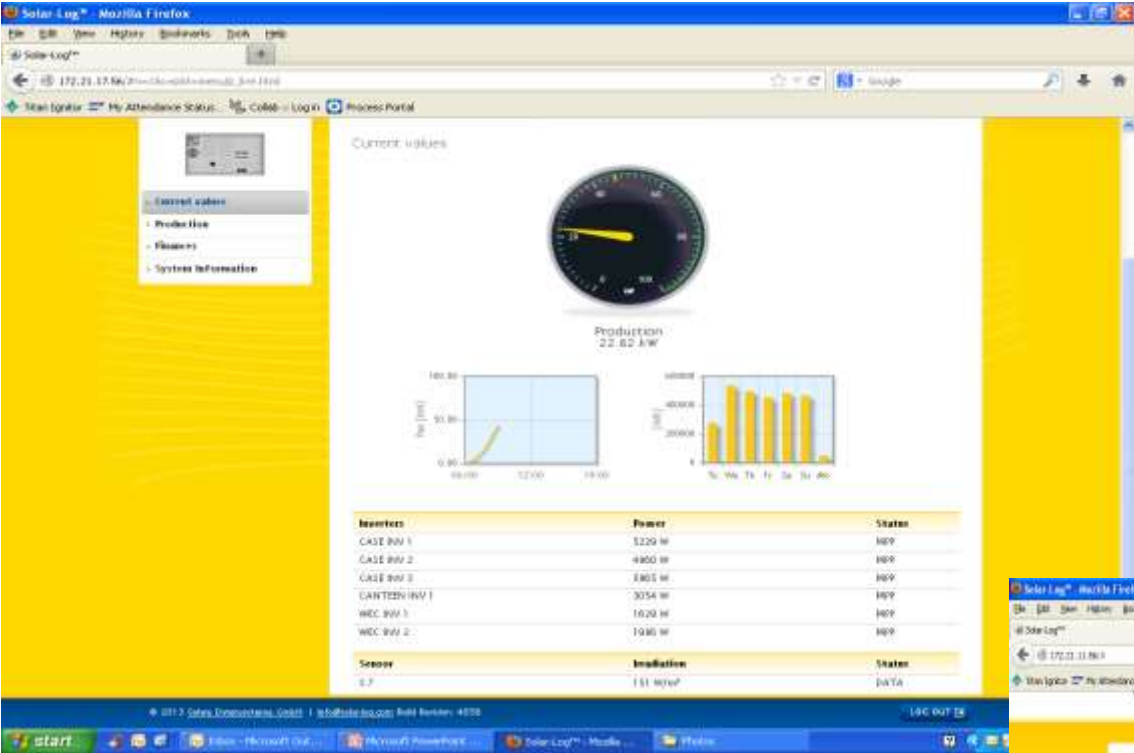
**Annual energy generation - 3 Lakh units**

**System installed during - May 2014**

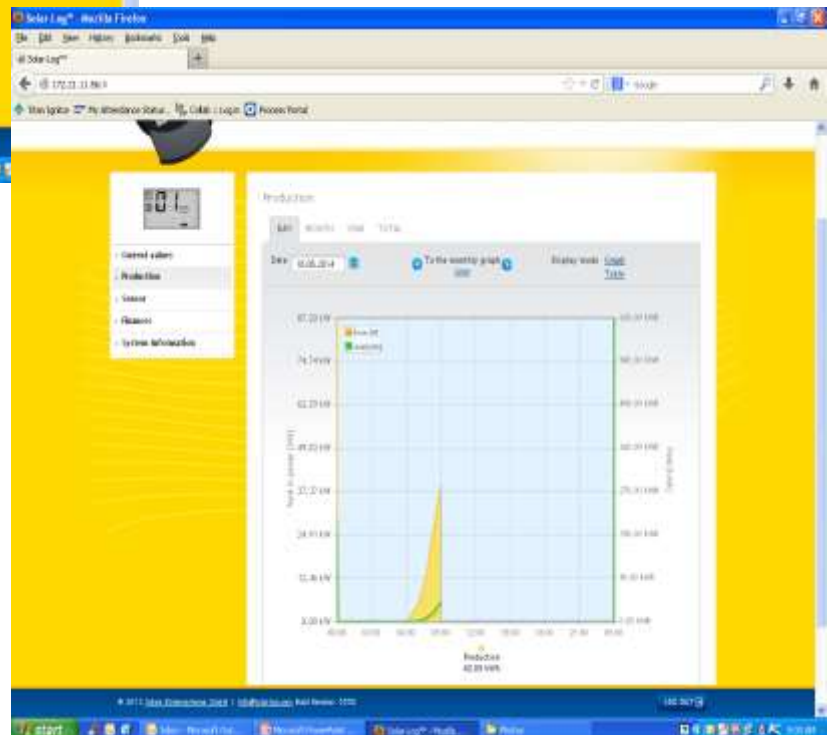




# Renewable Energy substitution- Rooftop solar system



- ON line monitoring**
- Daily generation
- Carbon emission reduction
- Unit wise production
- Solar radiation



# Solar Light Pipes



<b>Application</b>	Shop floor General lighting
<b>Area covered</b>	50000 Sq ft
<b>No of light pipes installed</b>	60
<b>Energy saving/Annum</b>	35000 kWH
<b>Cost benefit</b>	Rs 3.15 lakh
<b>Investment</b>	Rs 24 Lakh
<b>Payback</b>	8 Years



# Green Road Way



Wind power substitution -35%

**2009-2010**



Wind power substitution 30 %  
Solvent recycling

**2008 -2009**



**2010 -2011**



Wind power substitution -26%  
WHR, TES  
Free cooling

**2011 -2012**



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

**2012 -2013**



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

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

**2004 -2007**



EE lighting  
V belt to Flat belt  
Lighting transformer  
Refrigerant dryer

**2000 -2003**

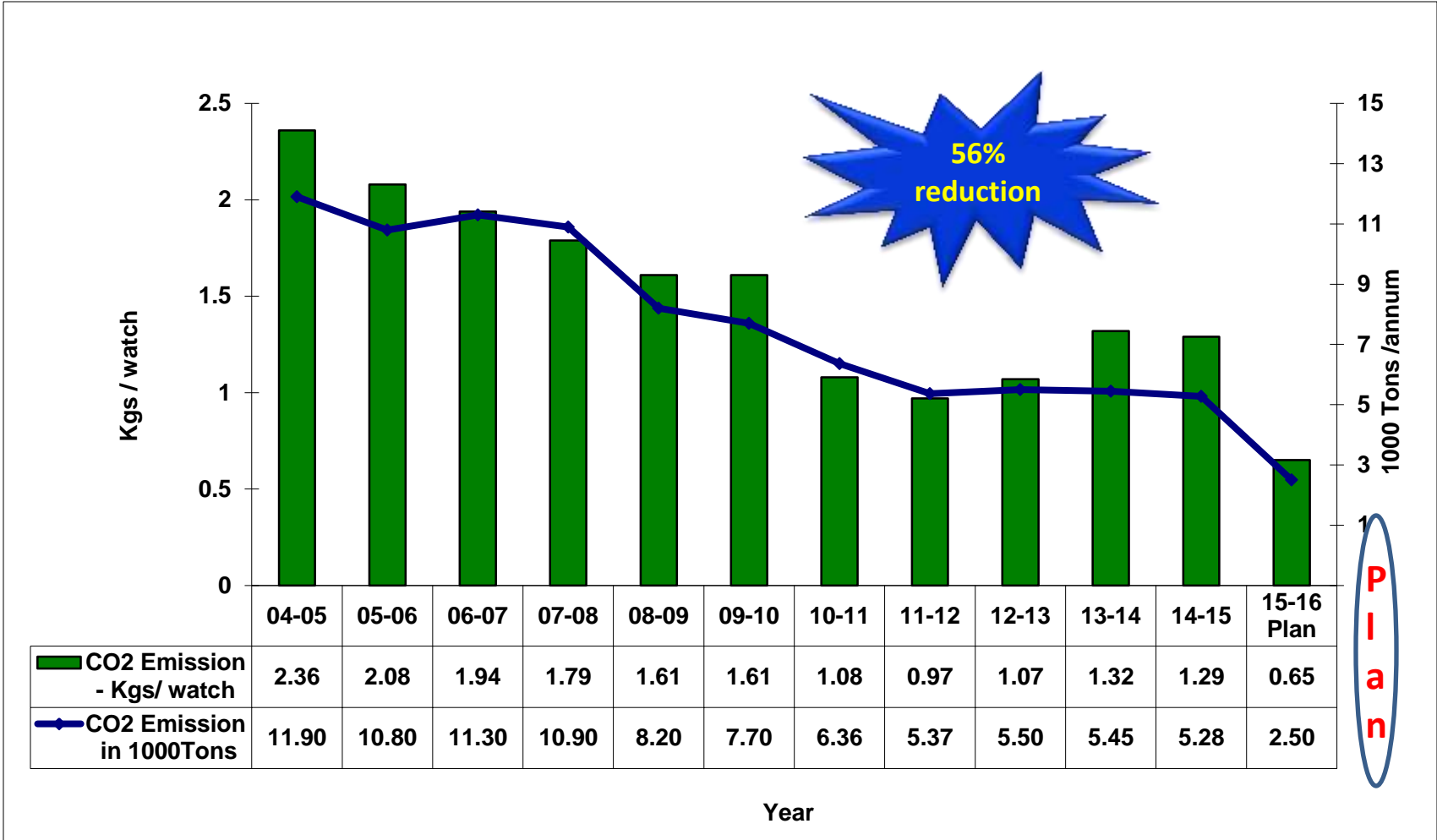


**2013-2015**

Wind power contribution > 80%  
Dedicated Feeder  
Rooftop Solar  
MVR, LED lighting, VFD's

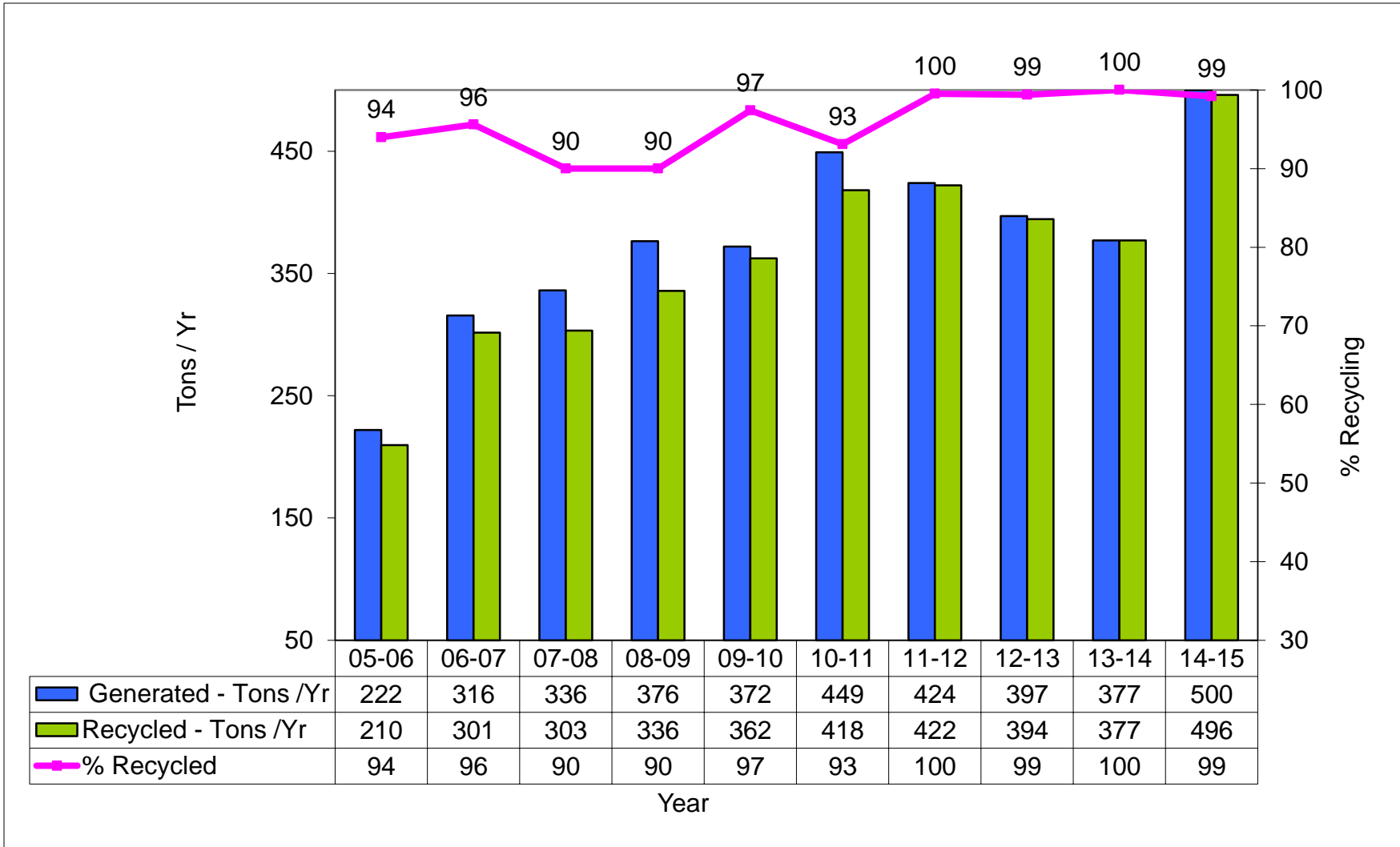


# Carbon Emission – Scenario



***Want to become “ Carbon Neutral “ in our Manufacturing operations by 2017-18***

# Process Scrap Recycling



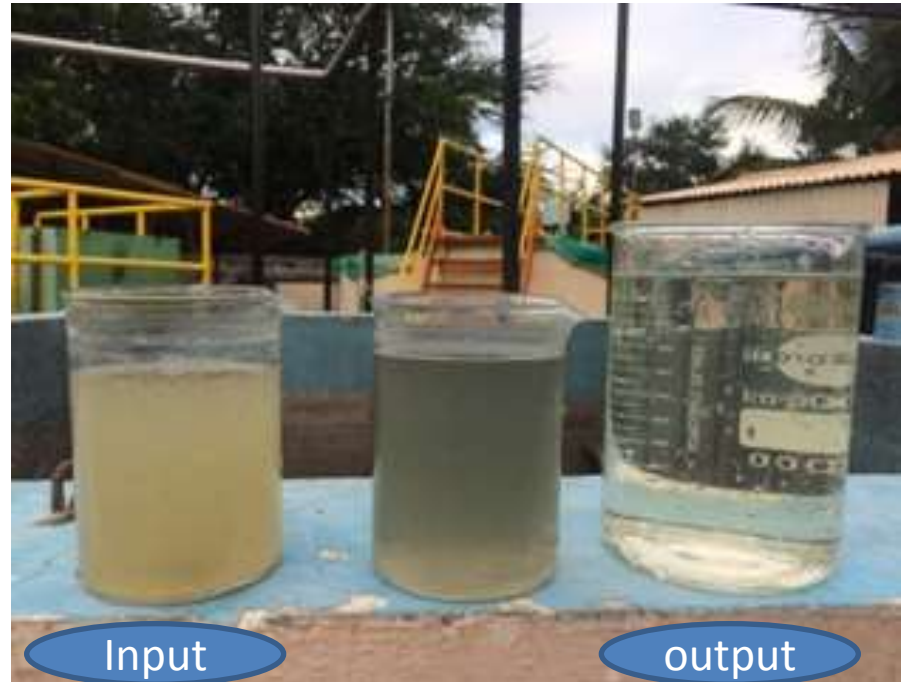
**99% of the manufacturing process scrap ( Brass material) is recycled**

# 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)

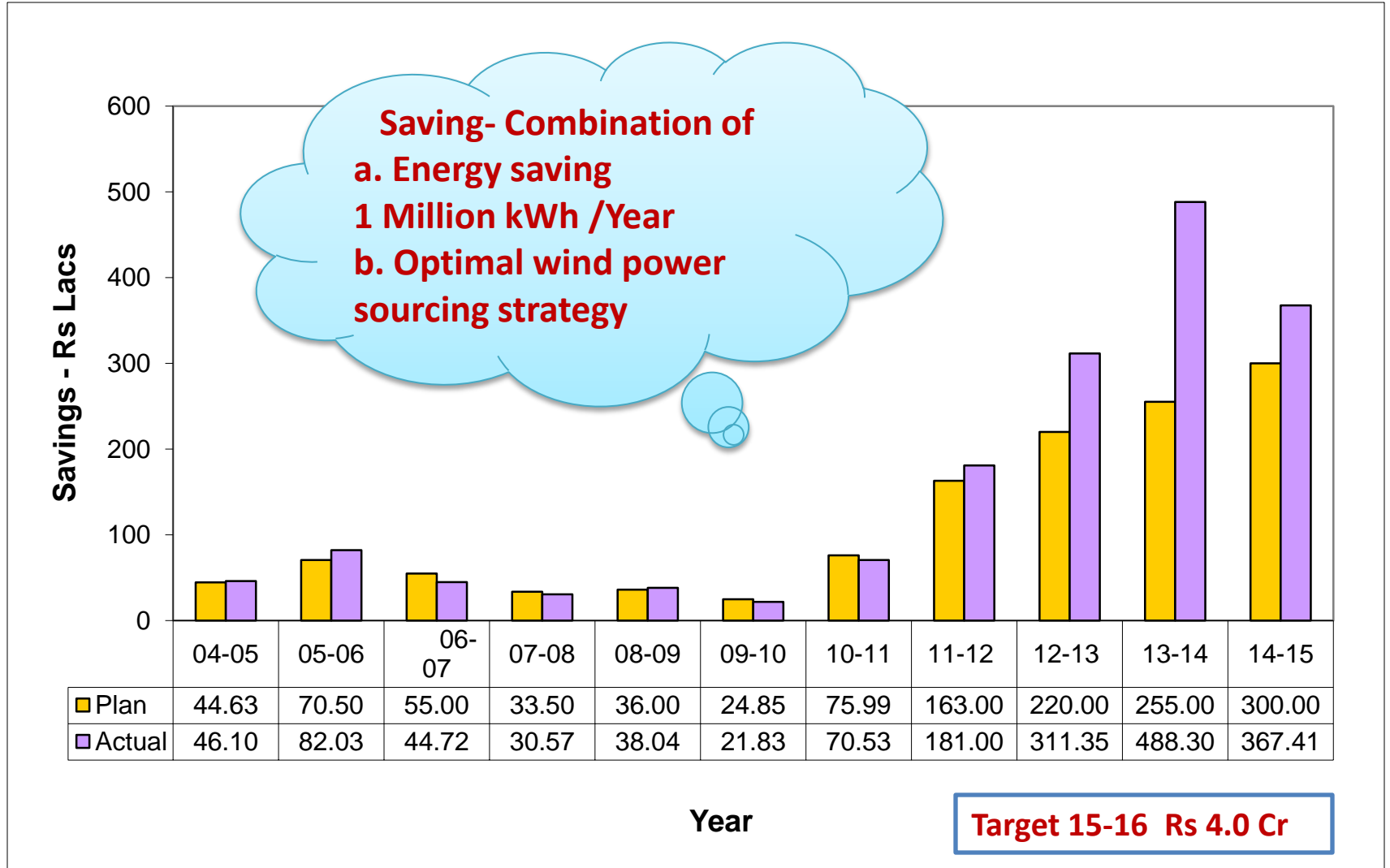


**Anaerobic System**

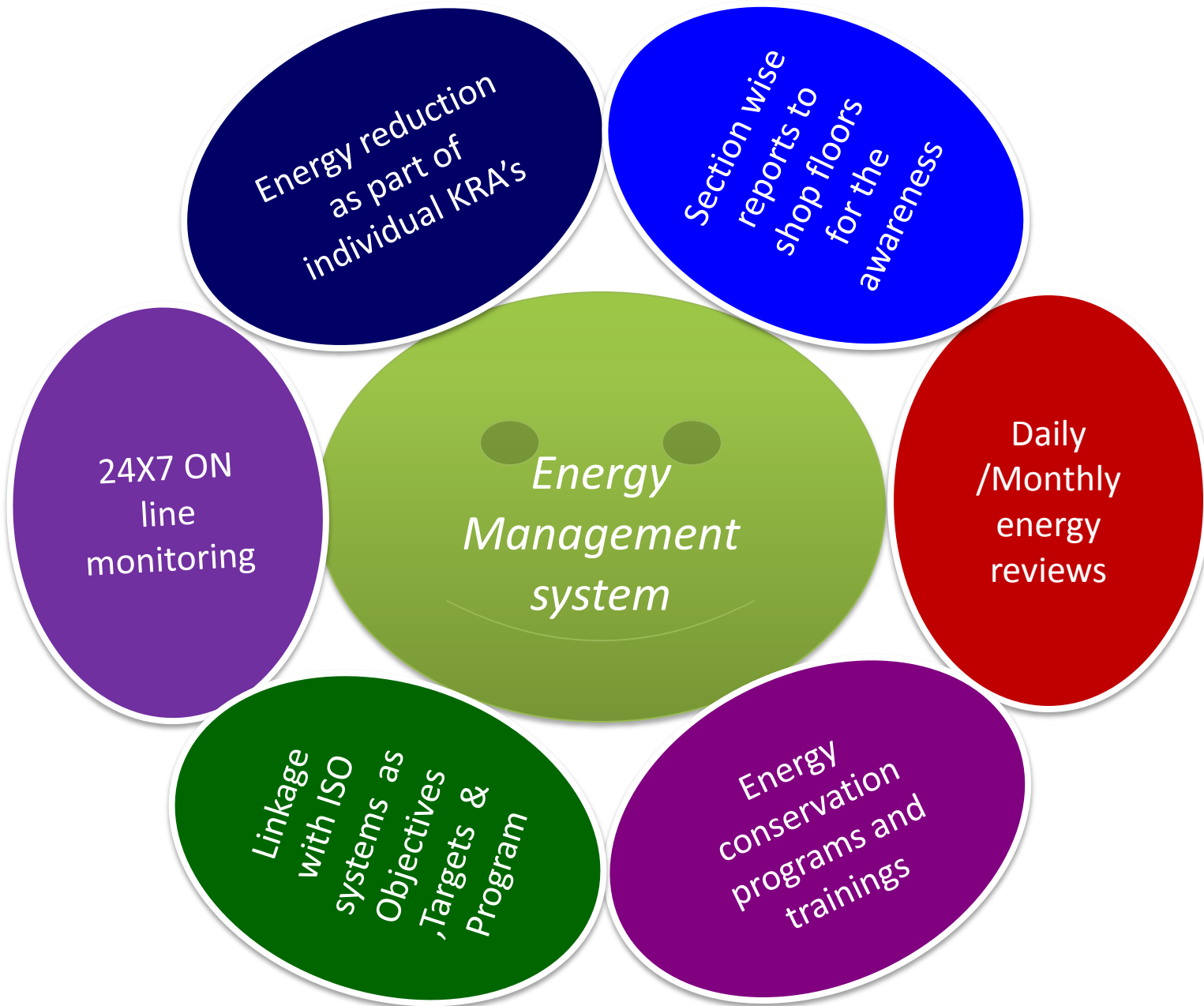


**Treated water quality**

# Cost Savings – ENCON Initiatives

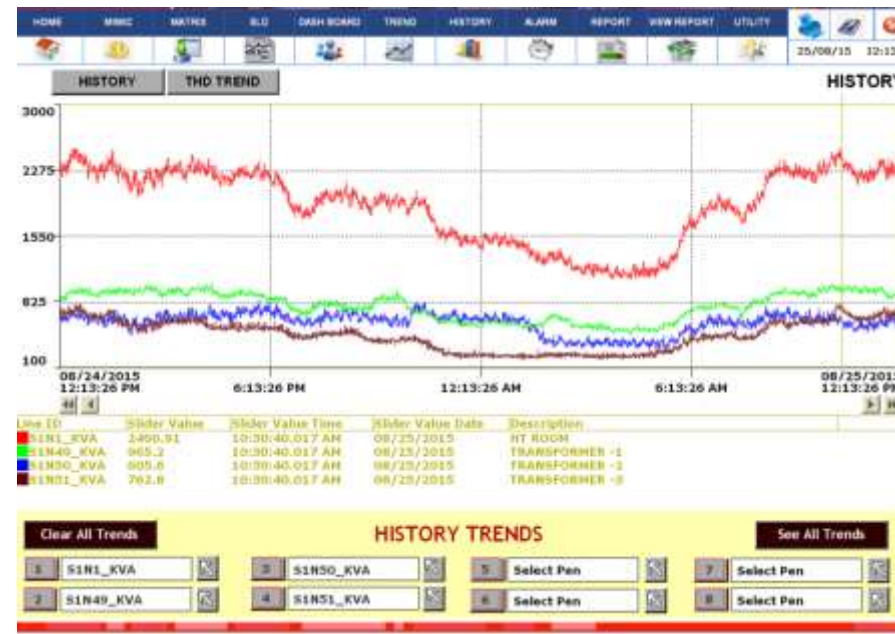


# ENCON Team work - Energy Management System





# 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

# 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



# Way forward

1. ISO 50001 Certification
2. Micro level energy monitoring
3. Enhance wind power contribution to 100%
4. Green Co Certification
5. Cyanide Elimination
6. Watch Battery life Enhancement 30 to 70 months /  
Mercury free Watch batteries

***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!**

