

# **ENERGY CONSERVATION PRACTICES**

## **AT**

### **MARUTI SUZUKI INDIA LIMITED**

**By:-**  
**S R Rana**

*New* **Race** @ *New* **Pace**



KNOWING  
MARUTI SUZUKI



## OVERVIEW

- **Location:**
  - Gurgaon
  - Manesar
- **Products: Passenger cars**
  - 800 , Alto, Omni, Ecco, Gypsy, A-Star, Zen Estilo, Wagon-R, Ritz, Swift, Swift Dzire, SX4
- **Production level : ~ 10 + lacs / annum**
- **Our Corporate Philosophy**
  - Smaller, Fewer, Lighter, Shorter & Neater

## TYPE OF ENERGY

- Electricity
- Natural Gas / LPG / Propane
- Steam
- Compressed Air
- Water

# SOURCES OF ENERGY

- Electricity
  - Captive Power Plant – Gas Turbine
  - Solar Energy
- Natural Gas / LPG / Propane
  - From GAIL, Oil Companies
- Steam
  - Waste Heat Recovery Boiler
- Compressed Air
  - Centrifugal Compressor, Steam Driven Compressor
- Water
  - Canal water and Tube wells

## CONCERNS...

- Energy :
  - Global warming (Automobile manufacturing is energy intensive)
  - Energy Cost
  
- Water :
  - Scarcity of Water (Depleting water levels)

# OUR PROCESS FOR ENERGY CONSERVATION

## Production Management System

## WHAT IS PMS ?

- A system which is **people driven** and involves all levels to formulate a fool-proof **strategy** for **sustainable** Manufacturing Excellence evolved through **bottoms up** participative approach.

# Methodology Adopted – Bottoms Up

Production Management System

Director

Department / Plant Head

Executives & Managers

Supervisors

Technicians

Alignment and nurturing system

CFT's & Various functional head's Roles & responsibilities evaluated & Roadmap prepared.

Ideas generated through discussion forums and presentations by supervisors

Group interactions, Ideas consolidation and presentations

Daily inputs based on practical problems

# Production Management System - Framework

- **Genchi** (Go to the actual spot)
- **Genbutsu** (See the actual problem)
- **Genjitsu** (Take decision based on actual problem)

**3G**

- **Kimerareta Koto Ga** (What has been decided)
- **Kichin to mamoru** (Must be followed)
- **Kihon Dori Ni** (As per the standards)

**3K**

- **Seiri** (Sort)
- **Seiton** (Arrange)
- **Seiso** (Clean)
- **Seiketsu** (Standardize)
- **Shitsuke** (Self-Discipline)

**5S**

Inbuilt check system for sustainability



**Production Management System (PMS)**



**Bottoms Up Approach**  
(Involvement from Line Operators till Top)

# BRAINSTORMING

- Topics decided on basis of **Energy**/Safety/  
Quality/ Productivity/ Cost targets to be  
achieved.
- Brainstorming sessions
- Presentations : Risen commitment level

# Concept

- Reduce Waste
- Improve Efficiency
- Alternate Technology
- Go to Basics

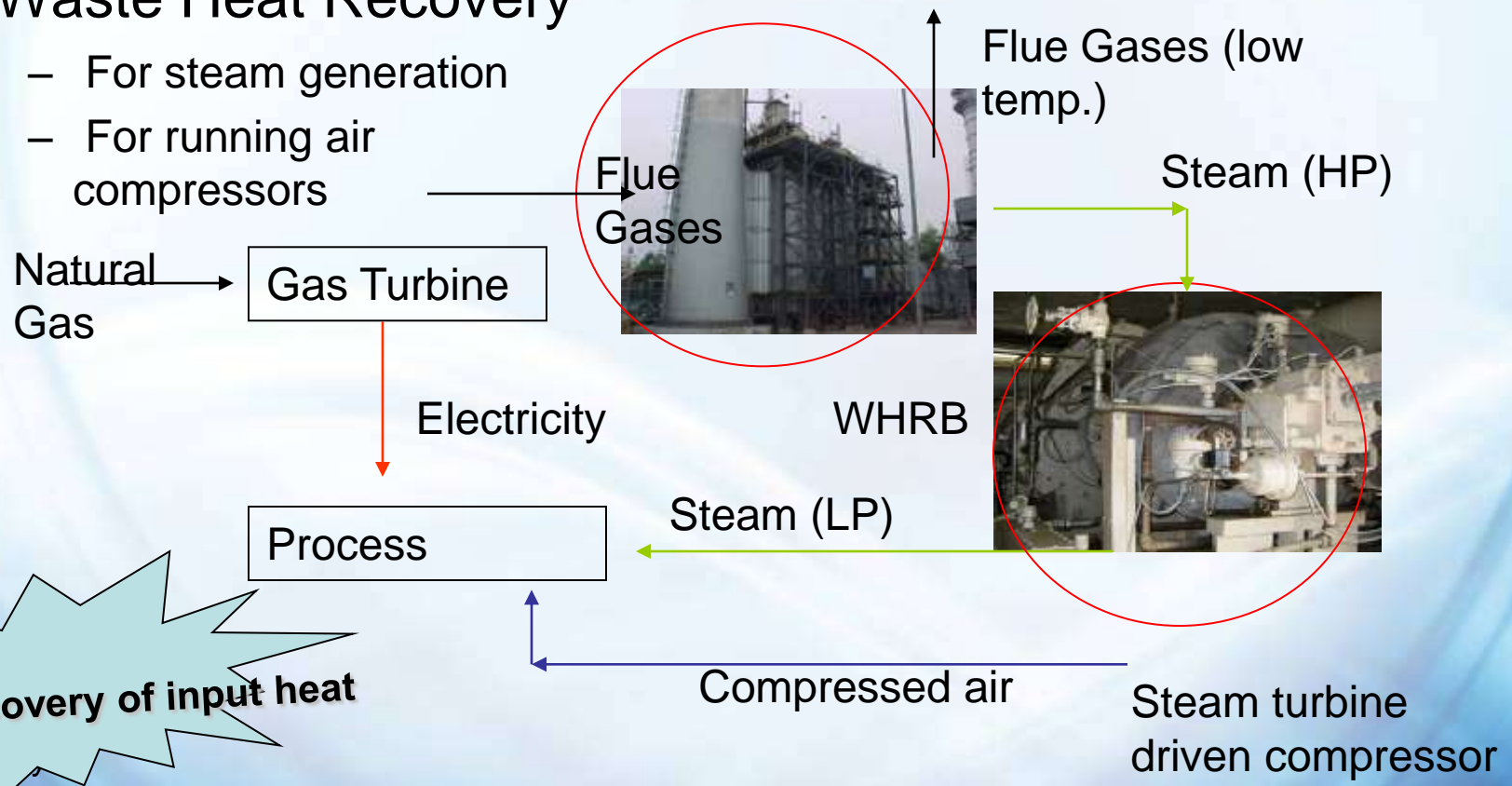
# Reduce Waste

# Reduce Waste – Waste Heat Recovery

➤ Increased use of Co generation (installed Turbine for centrifugal compressor)

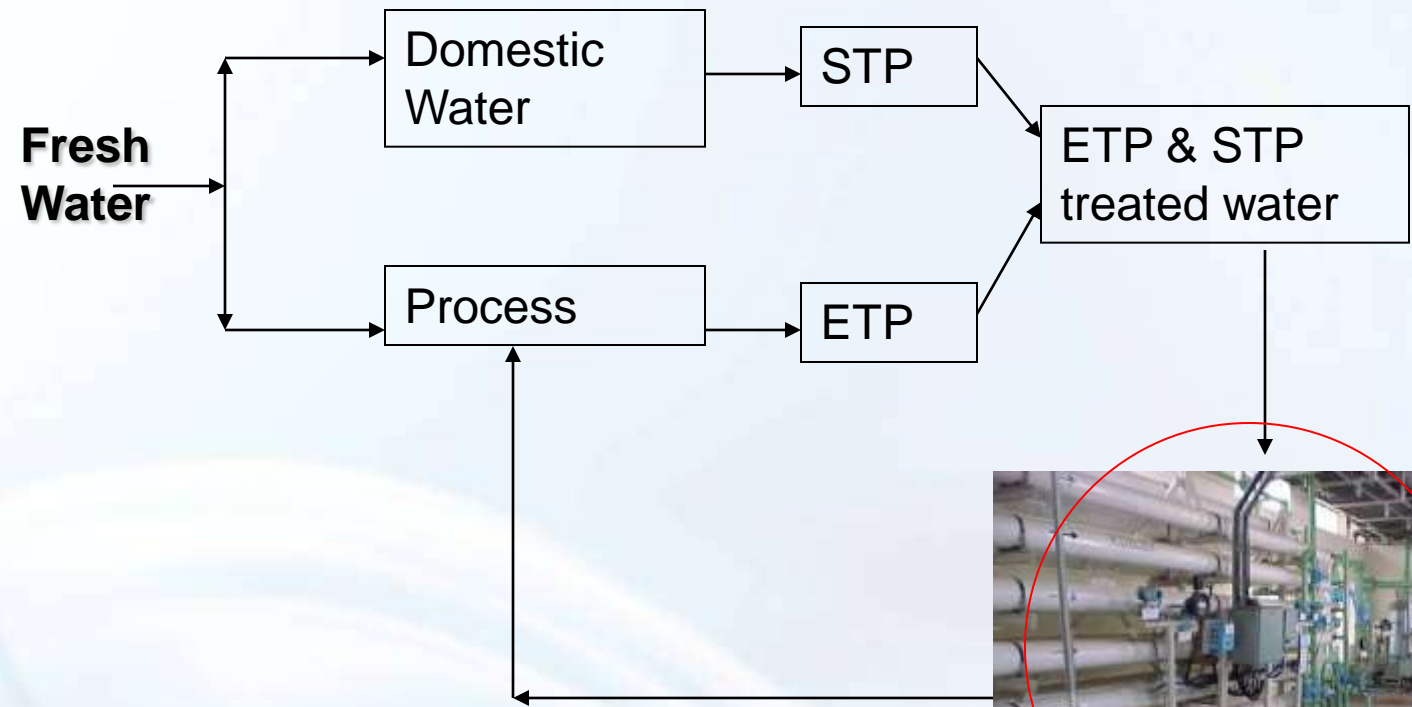
## ➤ Waste Heat Recovery

- For steam generation
- For running air compressors



**22% recovery of input heat**

# Reduce Waste – Reuse of Water



**Approx 50% reduction in water consumption**

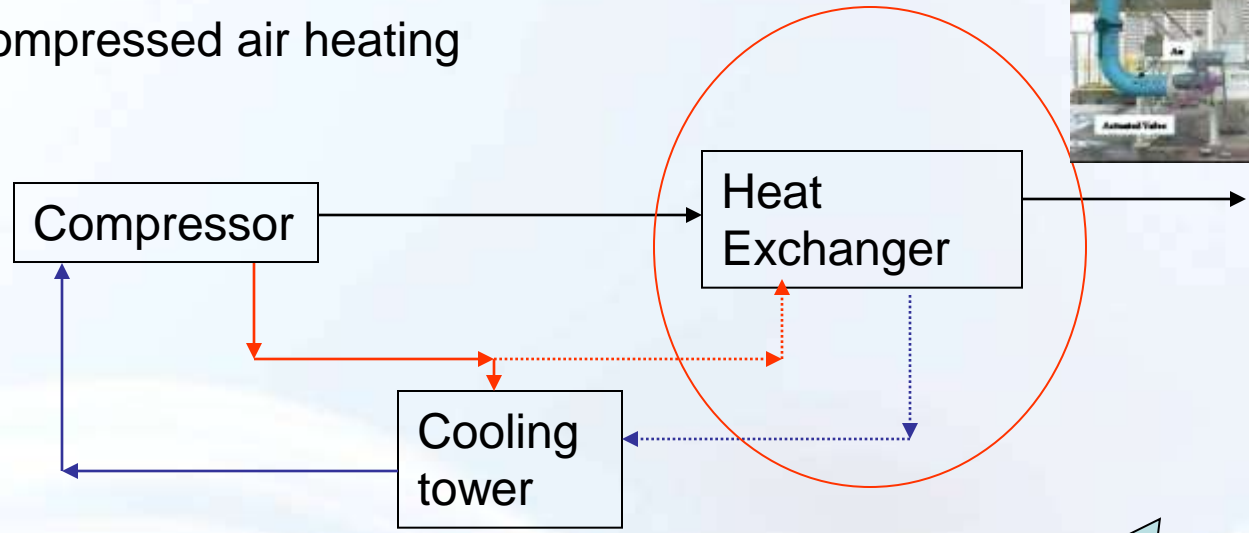


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# Reduce Waste – Waste Heat Recovery

## ➤ Waste Heat Recovery

- Compressed air heating



**Approx 2.5% reduction in energy required for compressed air production**

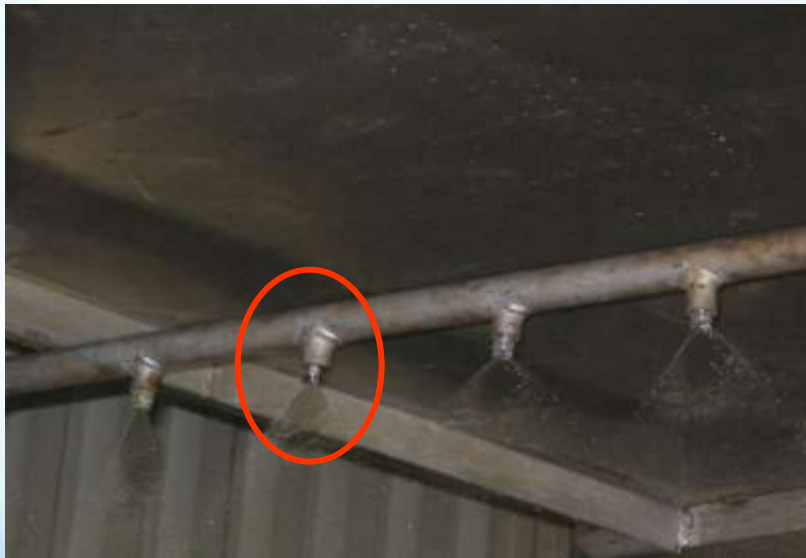
# Reduce Waste – Energy Monitoring

- Monitoring & optimization of machine running hours through SCADA
  - Switching off load during night shift and holidays.



# Reduce Waste – Water Saving

- Elimination of wastages
  - Optimize water dispensing nozzle diameter
  - Auto water dispensing in Hand wash area



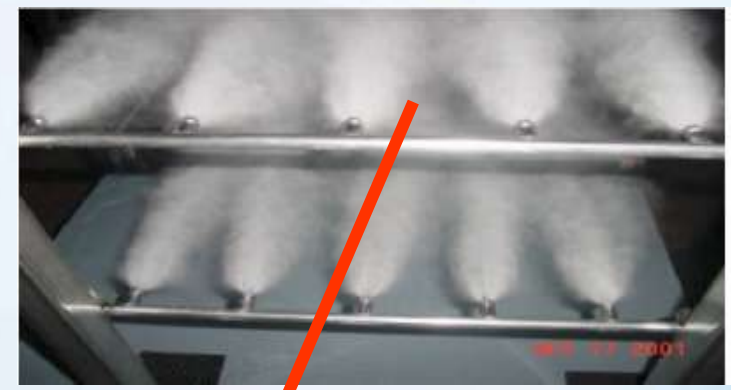
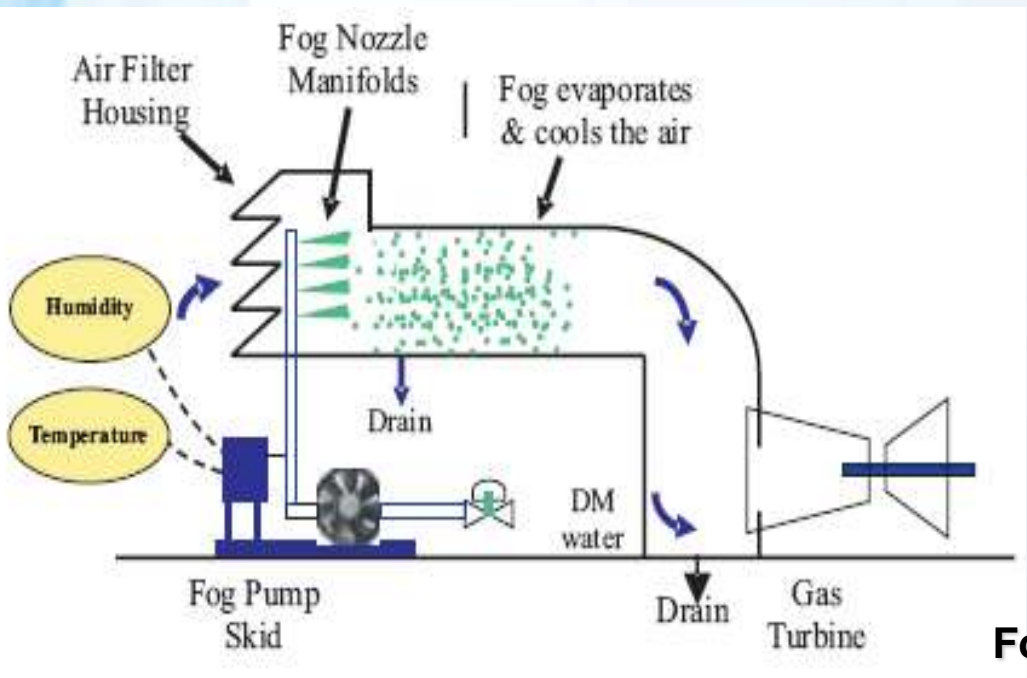
Paint Shop



Washrooms

# Improve Efficiency

# Improve Efficiency – Inlet Air Fogging





Fog spray inside gas turbine inlet air duct to enhance MW Generation of Gas Turbine.

- Increase in MW Output of Gas Turbine : 8 %

# Improve Efficiency – Energy Efficient Drives

Replacement of old equipment with energy efficient equipment (VFD, Motors, pumps, air guns etc)

## Plant Improvement Album

Company : Maruti Suzuki India limited		Department : Paint shop-2		Result : Energy saving	Month of Report
Topic : Energy saving				Process : Electrodeposition	Jun'08
<p align="center"><b>Before Improvement</b> (Photo or Explanation Drawing)</p> 			<p align="center"><b>After Improvement</b> (Photo or Explanation Drawing)</p> 		
<p><b>Comment:</b> 4 ED pumps used to run continuously throughout the shifts on direct supply</p>			<p><b>Comment:</b> 4 ED pumps are now running though VFDs at reduced frequency, which has resulted in energy saving of 30 Ton Co2 per yaer.</p>		
					<p><b>Improved Item (Check the No.)</b></p> <ol style="list-style-type: none"> <li>1. Manpower, Man-hour Saving</li> <li>2. Physical Distribution (Transporting distance)</li> <li>3. Space Saving</li> <li>4. Commansation, unification</li> <li>5. Weight reduction</li> <li><b>6. Energy Saving</b></li> <li>7. Yield</li> <li>8. Quality improvement</li> <li>9. 5S</li> <li>10. Reducing cost, Others</li> </ol>
					* Horizontal application
					<p>Suggested by: TS Chauhan</p>

# Alternate Technology

## Alternate Technology – Air Cooled Cooling Towers

- Process Change (Reduction in use of water)
  - Air Cooled Condenser
  - Closed Cycle Cooling Towers



# Alternate Technology – Solar Energy

- Solar powered lighting & Heating



IDTR



IDTR



CANTEEN

## Alternate Technology – Wind Ventilator

- Natural Ventilation in shops



# Alternate Technology – Magnetic Fuel Saver

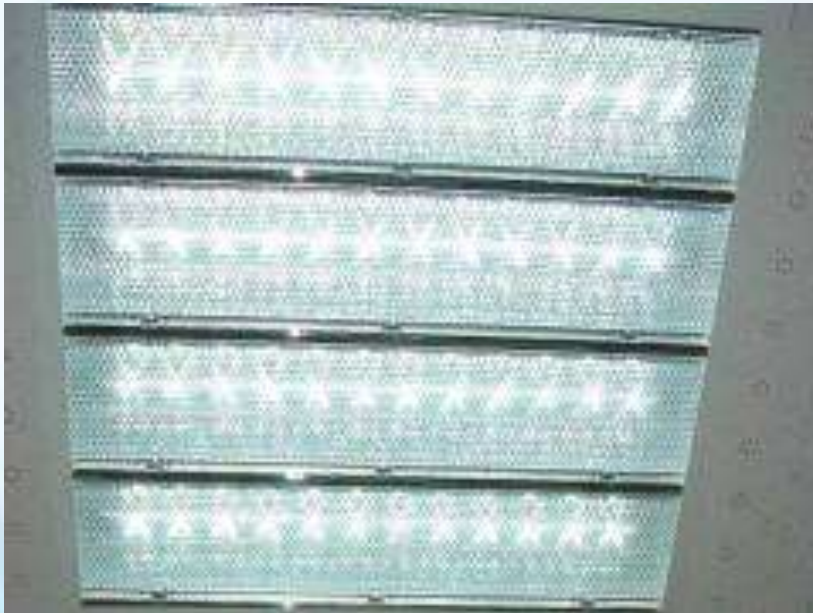
## Magnetic Fuel Saver Used in Gas Turbine NG Line



# Alternate Technology – LED Lights

## Use of LED Lights

**Office Light**



**Street Light**



**New Race @ Pace**  
...Let's set a New Base



# Go to Basics

Save Energy

# Go to Basics – Over Size Equipments

Reduce Over Size Equipments



**30 kW Motor**



**18.5 kW Motor**

**Replacement of High Rating Pump- Motor set with Low Rating set for Cooling tower.**

# Go to Basics – Natural Energy

## ➤ Natural Lighting in Shops



# Go to Basics – Natural Energy

## ➤ Natural Lighting for Office/Meeting Room



# Go to Basics – Natural Energy

## Rain Water Harvesting



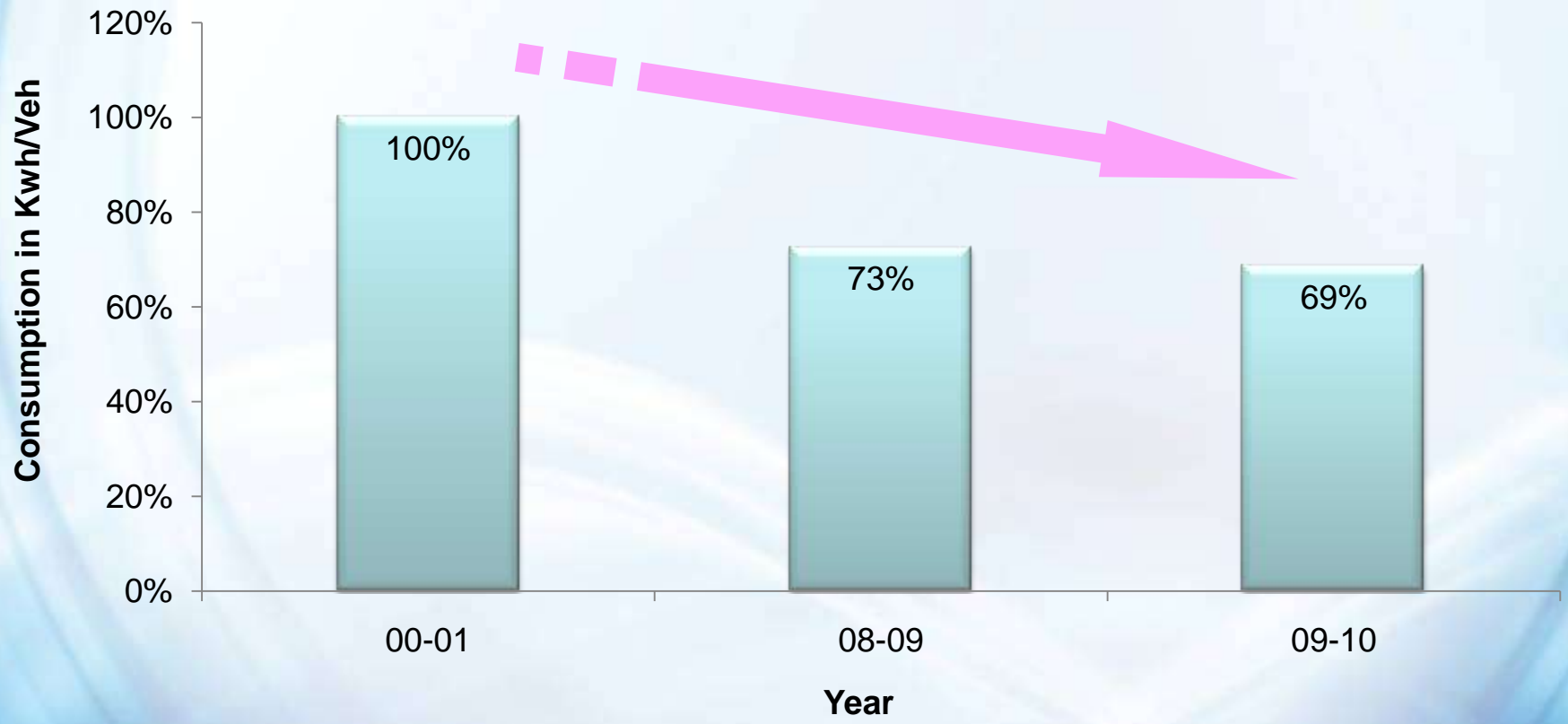
## Some other energy saving measures...

- Optimization of Compressed air supply pressure : Reduction in air supply pressure to shop .
- Energy saving in high automation area . Weld shop Robot area lighting control with safety gate plug.
- Energy saving by replacing pneumatic motors with servo motors in Engine shop.
- Lighting transformer voltage reduction (232 to 217 V)
- Optimization of steam supply pressure . Steam pressure regulation as per demand (season to season) through PRV's in steam line.
- Awareness for Energy conservation among employees & their family (through centralized screen saver, energy saving articles in in-house magazine- Gatirang

# RESULTS

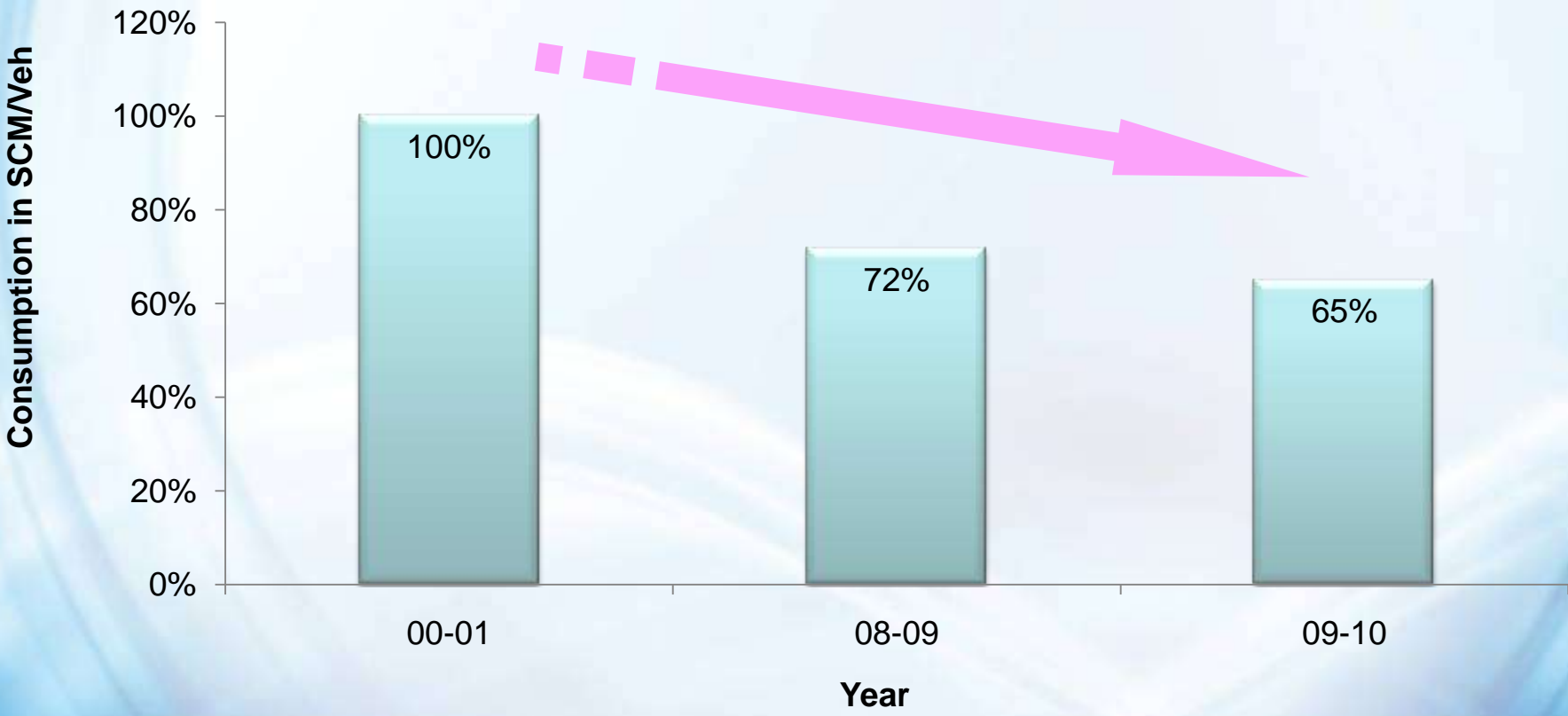
# 31% Reduction in last 10 years

## Electriciy Consumption



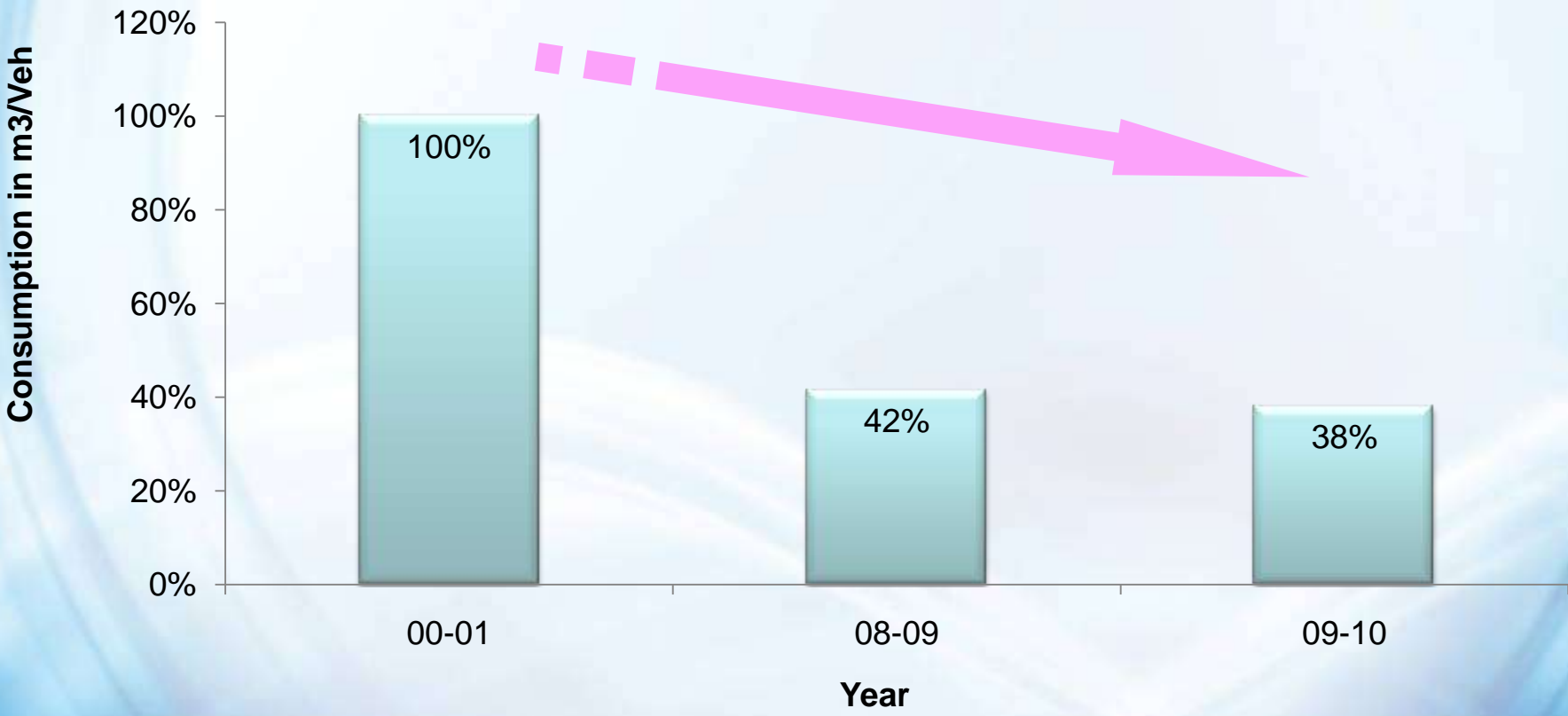
# 35% Reduction in last 10 years

## Process Gas Consumption



# 62% Reduction in last 10 years

## Fresh Water Consumption



Thank You