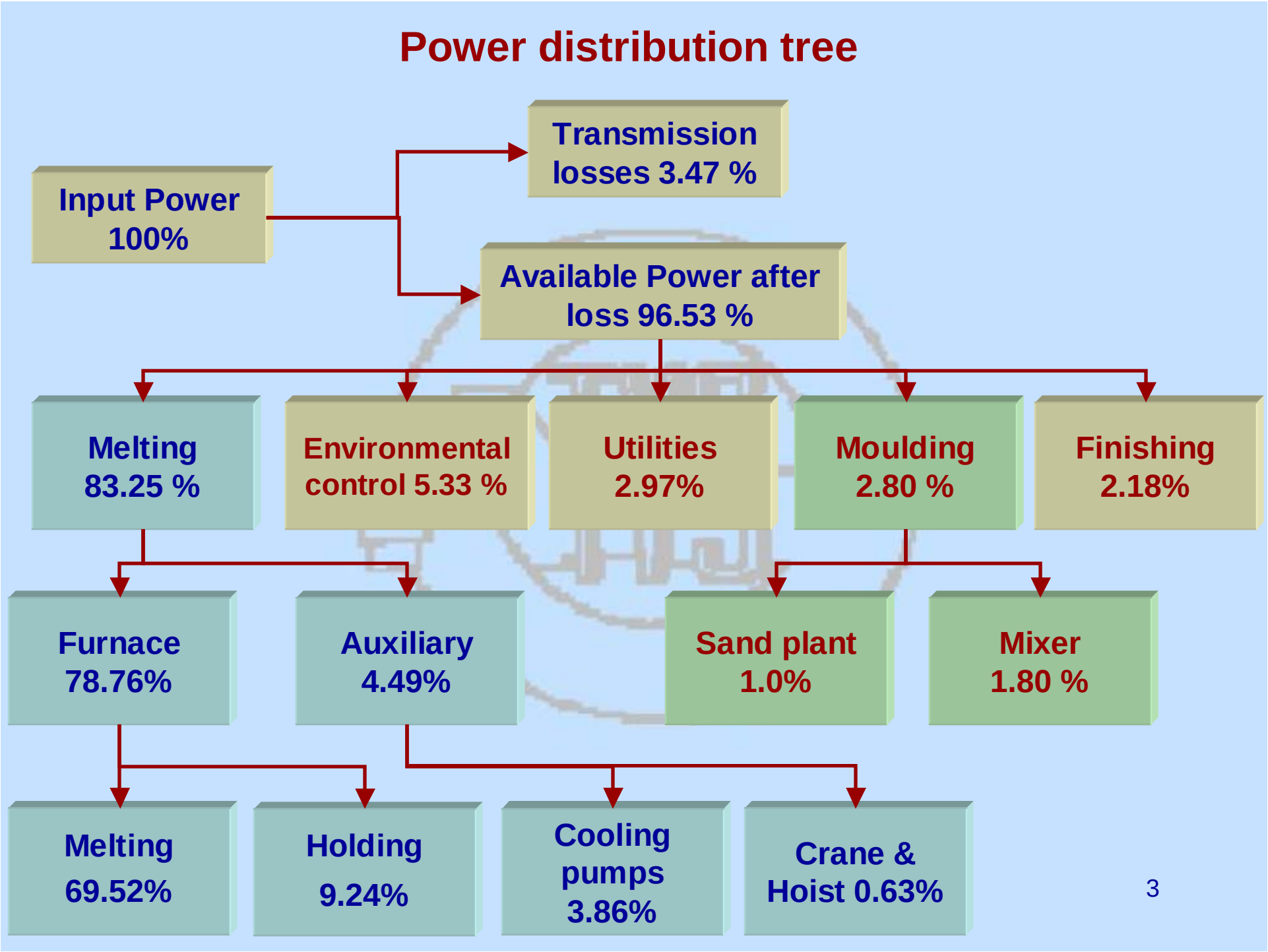
Latest trends in ENERGY EFFICIENCY – Foundry Industry

Brakes India Limited
Foundry Division

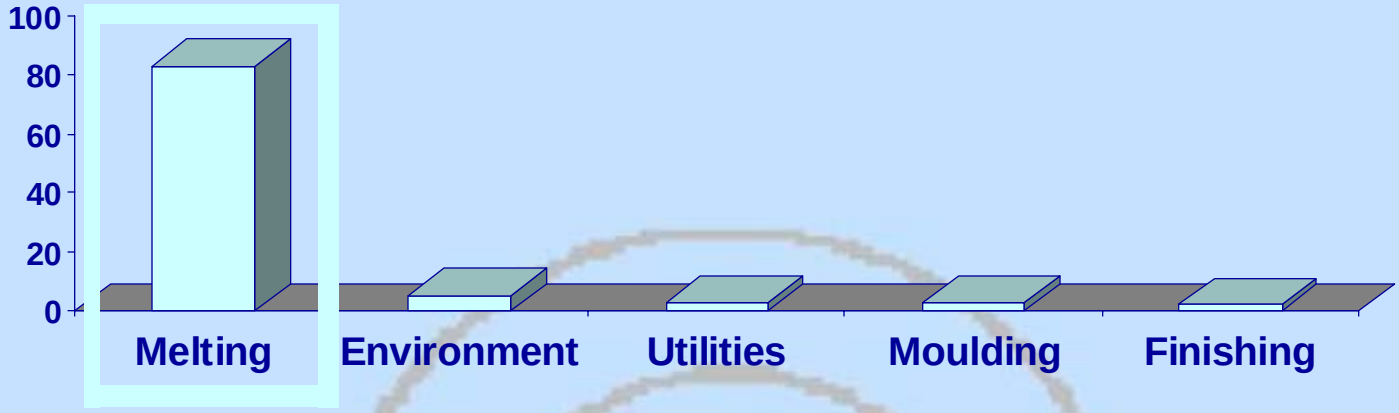
Methodology for energy conservation

Steps	Activities
Step – 1	Map a power distribution tree.
Step – 2	Prioritizing the major energy consumers.
Step – 3	Analyze the consumption pattern and arrive at specific energy conservation themes.
Step – 4	Implementation of the activities.
Step – 5	Review and sustain the benefits.

Power distribution tree



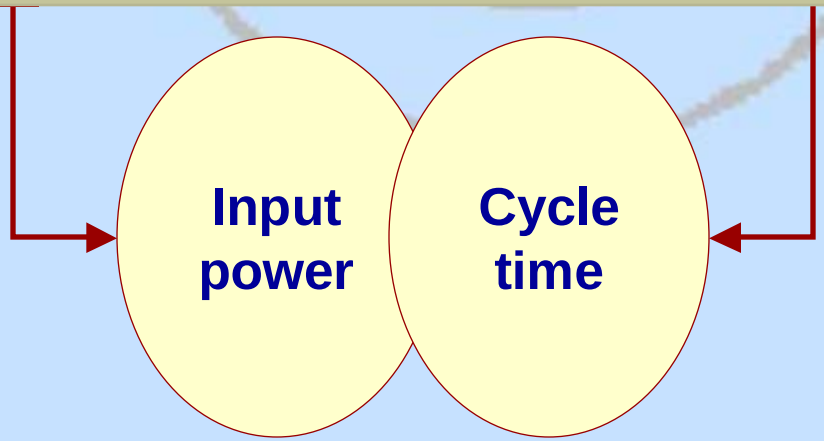
Prioritization of major energy consumer



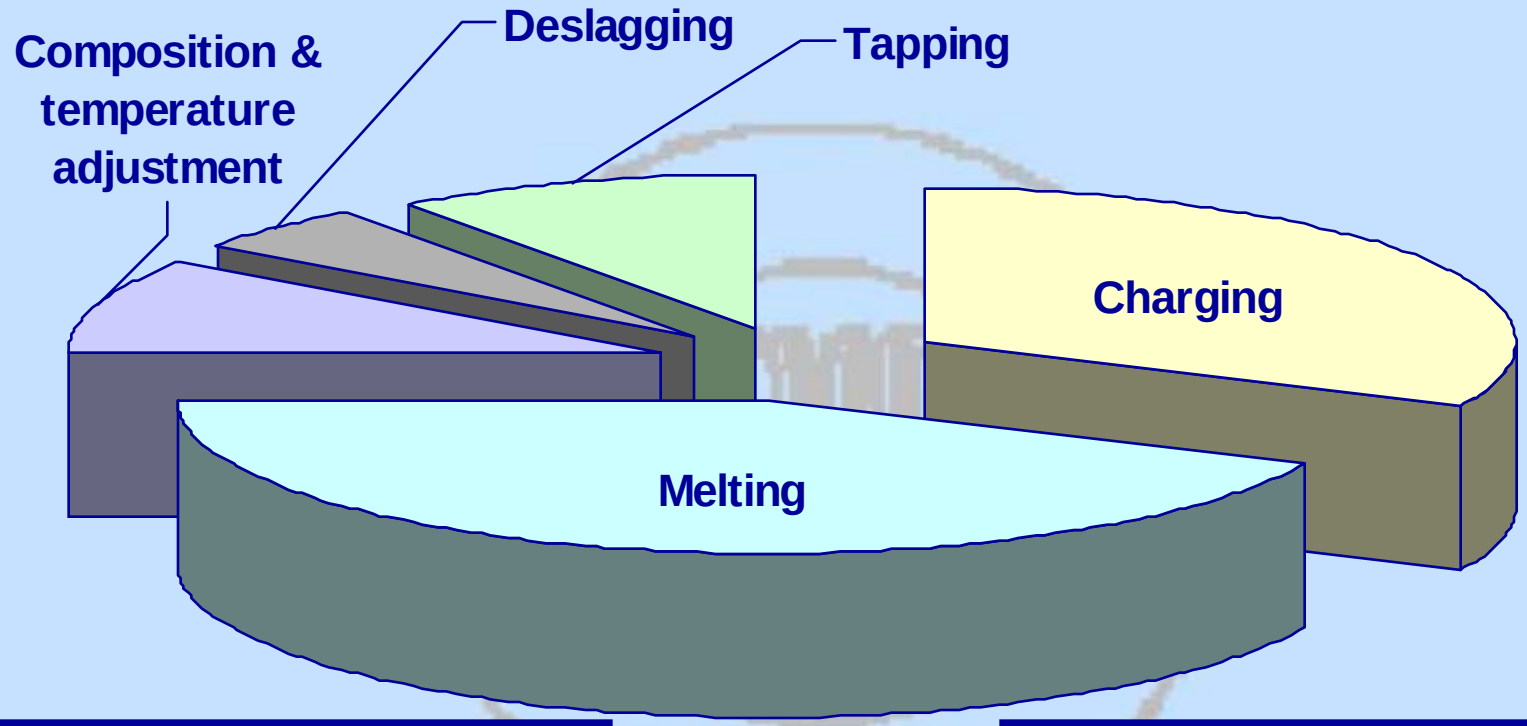
Energy (kWh) = Power (kW) X Time (Hour)

Melting energy can be conserved

by reducing



Cycle time of individual activities during melting operation



Reduce these activities

To reduce charging time

By automation through vibratory feeders

Before

Charging manually with magnet

After

Vibro chargers for faster & continuous charging

To reduce melting time

1. By improving the input power density

Before

After

Only manual On / Off control

Melt manager to track the changing impedance to deliver optimum power throughout the melting cycle.

To reduce melting time

2. By improving the bulk density of the input materials.

Before **After**

Loose steel

Bundled steel

Snap cutter for compacting the Runners

Low bulk density

Higher bulk density

To reduce melting time

3. By reducing the radiation losses.

Before

Furnace without hood

After

Furnace with closed capture hood

To reduce time for composition adjustment

By exactly weighing & charging the input materials

Charge hopper and furnace on load cells to achieve right composition at the first check.

To reduce de-slagging time

1. By using clean input charge materials.

Online shot basting machine

Shot blasted runners & risers to minimize slag generation

To reduce de-slagging time

2. By easing the method of de-slagging (back tilting)

Before

Manual slag removal

After

Quick slag removal through back tilting mechanism

To reduce tapping time

By tapping all the metal at a single stretch.

Before

Batch type transfer through ladles

After

Single stretch transfer through launder system Also, no power used for cranes, ladle heating etc

To avoid superheating of metal

By Online monitoring & controlling of tapping temperature

Before

Contact type measurement through thermocouple

After

Continuous monitor through Infra Red pyrometer

Best practice in melting

Control of Sintering cycle through automatic sintering cycle timer.

Best lining practice in melting

Dense lining through pneumatic ramming for improved lining life

Before

Manual Ramming

After

Pneumatic Ramming

Best lining practice in melting

Pneumatic lining push out mechanism for lining breakage

Before

Manual breakage

Minimum 12 hrs

After

Faster breaking by lining push out

Maximum 3 hrs

Best practice in melting

Maximize the continuous utilization of the furnaces

Before

After

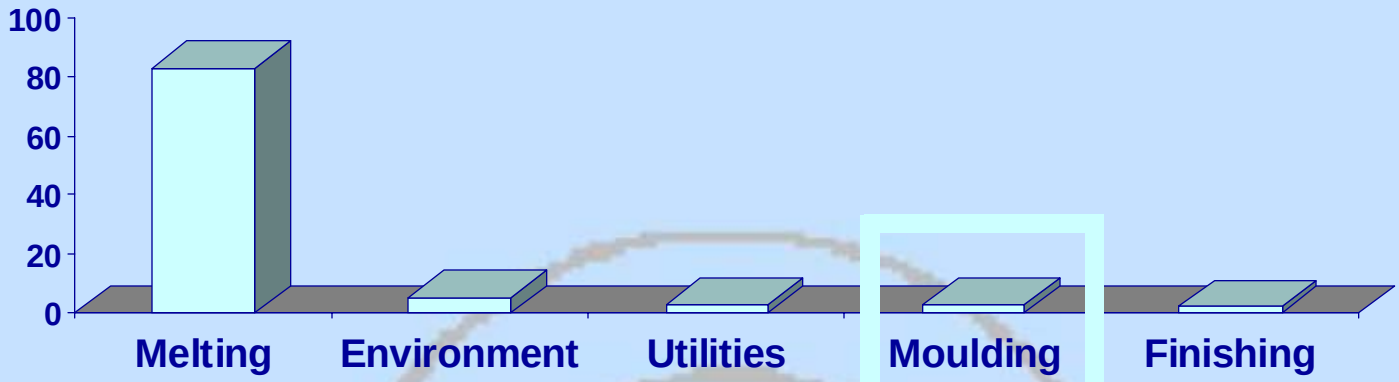
Continuous usage of a single furnace to achieve the required output and optimized lining life

Best practice in melting

By introducing harmonics filters

Reduction of harmonics in the power system thereby minimizing the transmission losses

Prioritization of major energy consumer



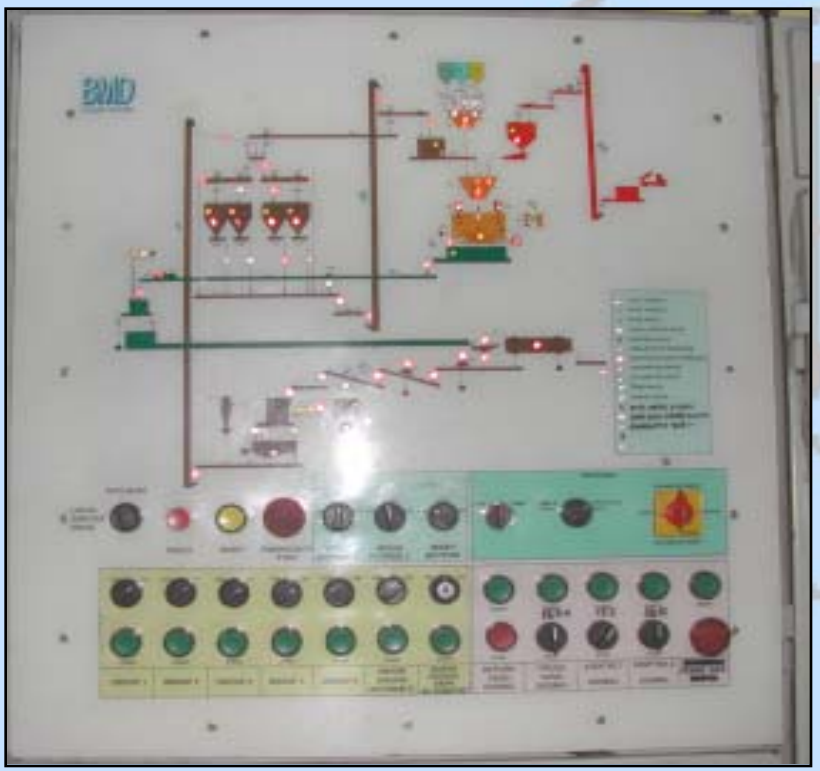
Moulding

1. Reduce energy consumption in sand plant.
2. Reduce the mixer energy consumption

Best practice in molding

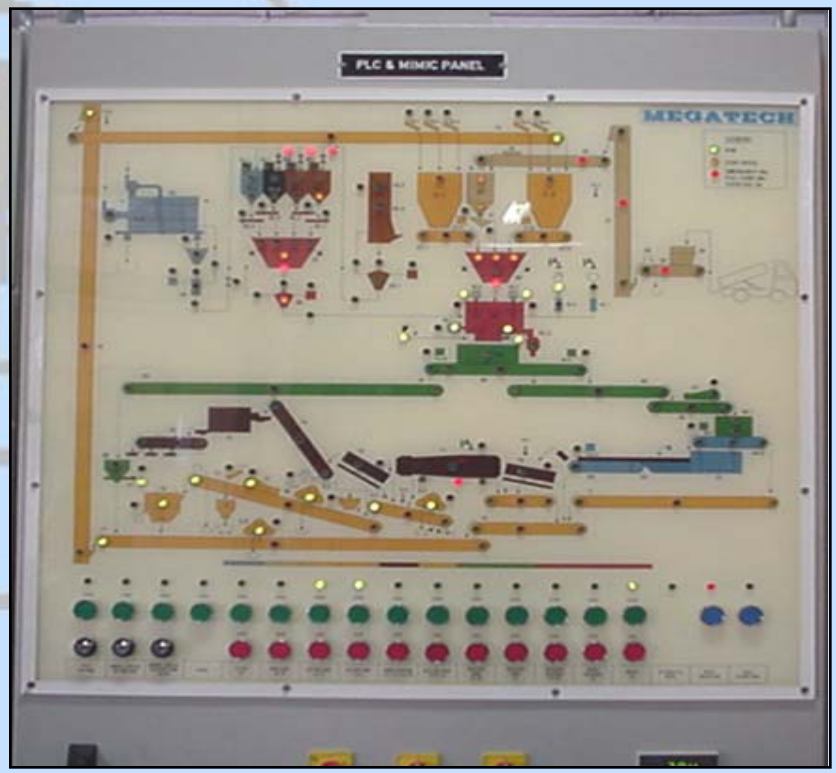
By minimizing the number of conveyors in sand plant during the design stage

Before



25 conveyor

After

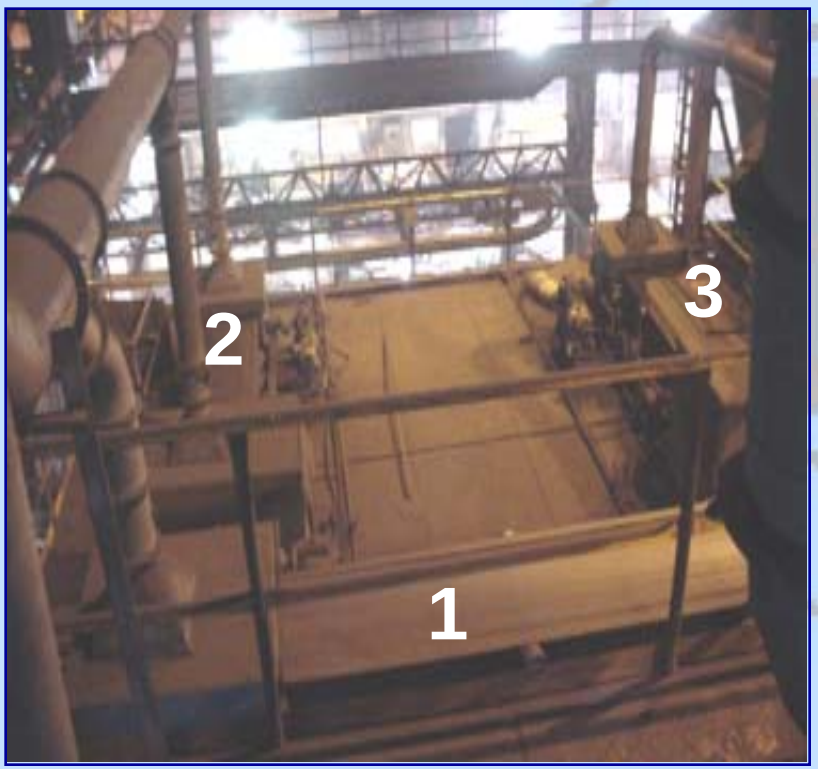


16 conveyors

Best practice in molding

By minimizing the number of conveyors in sand plant

Before



3 conveyors

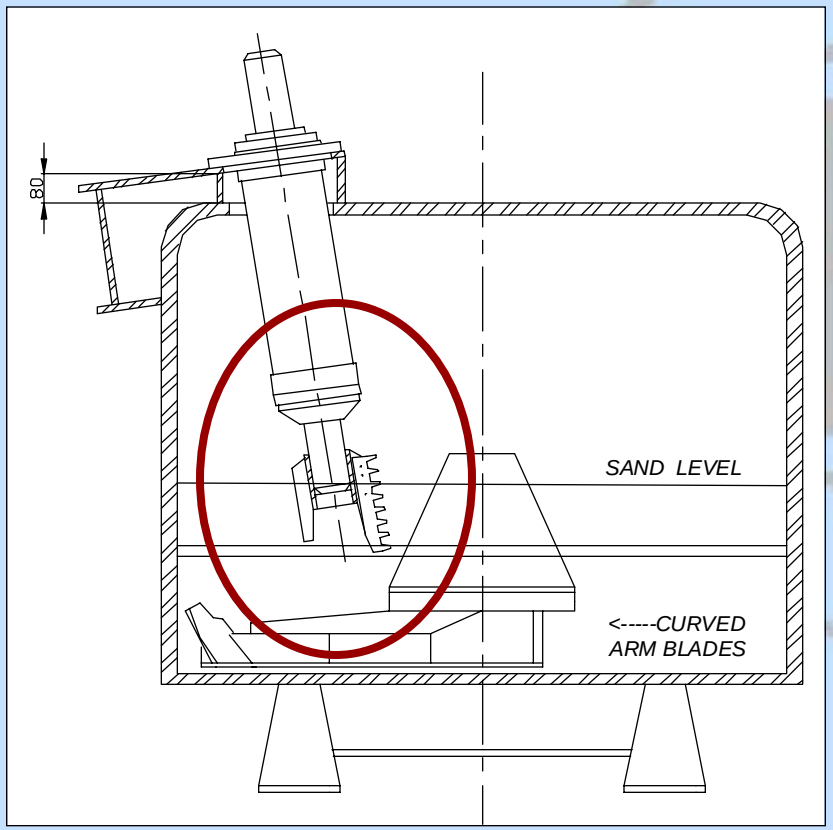
After

1 conveyor

Improved practice in molding

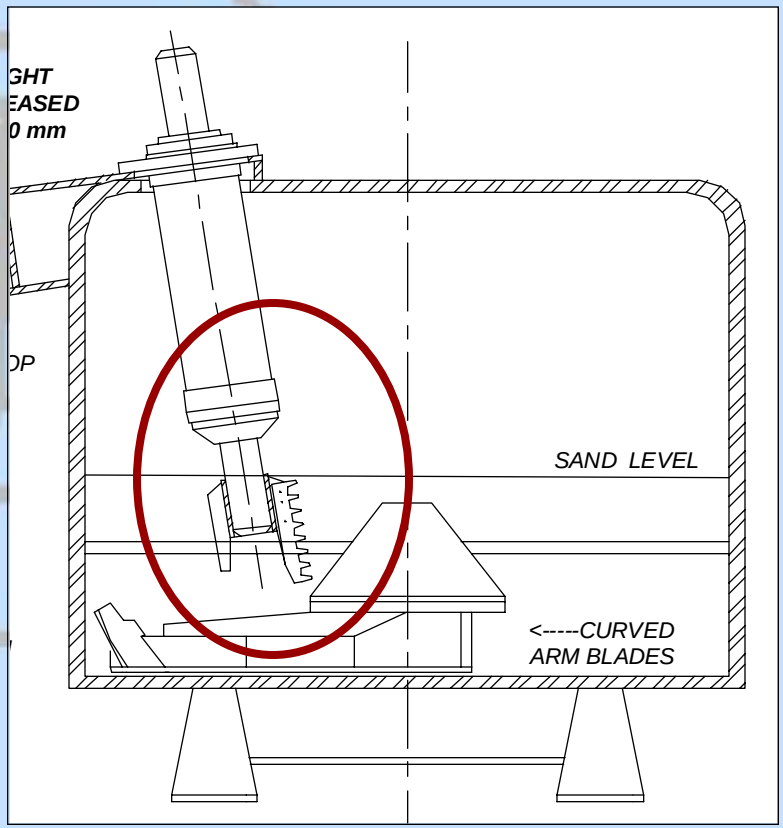
By optimizing mixing cycle time by improving the efficiency of the mixer

Before



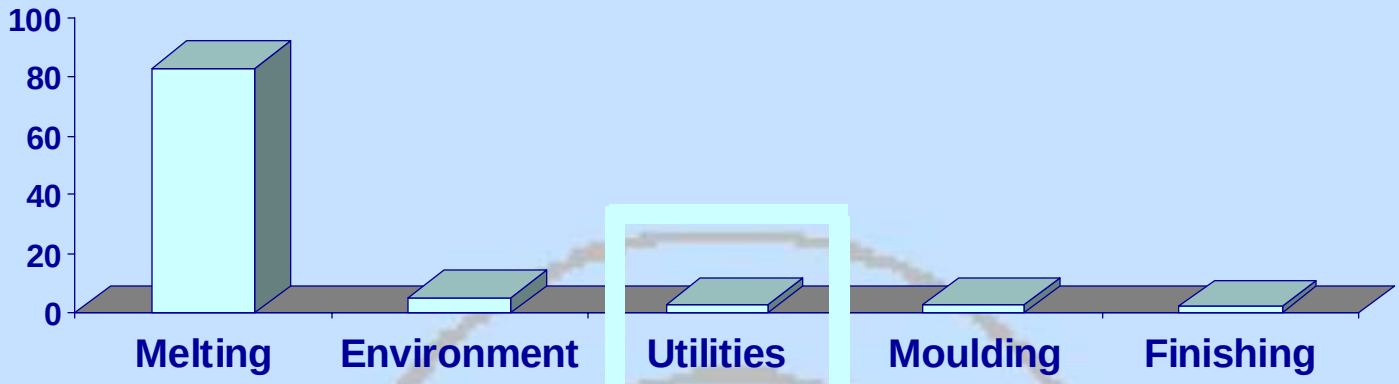
Blender blades – manufacturer's design

After



Lowered blender blades for better mixing efficiency

Prioritization of major energy consumer



Utilities

Reduce energy consumption by the compressors

Regulate the input voltage to the circuit

LIGHTING

WHEN IT IS BRIGHT

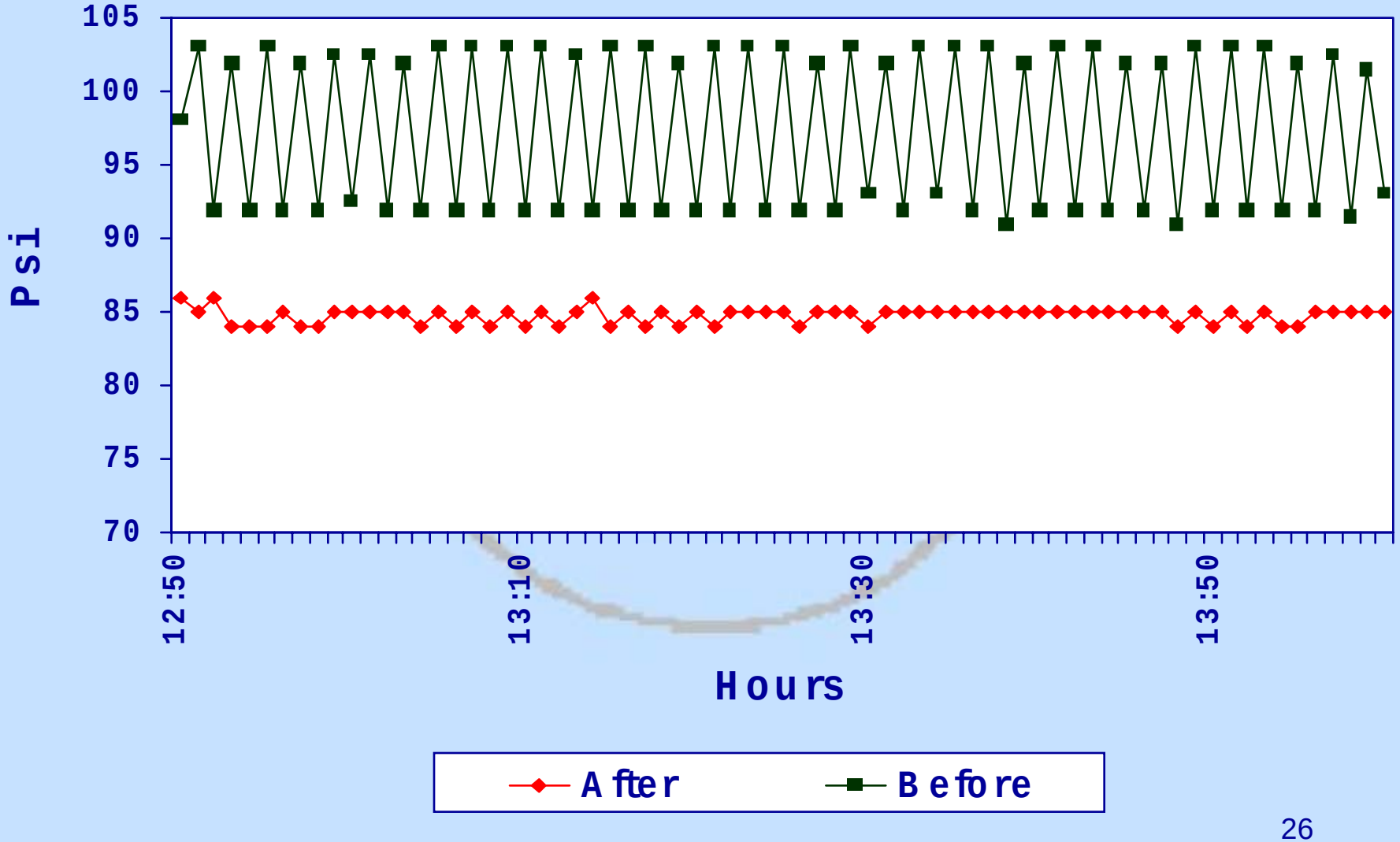
SWITCH OFF THE LIGHT

Optimize utilization of compressed air

Intermediate diaphragm controlled pressure regulator to supply compressed air at constant pressure

Optimize utilization of compressed air

Demand analysis



Best practice in compressors

Screw compressors with variable frequency drive in the design stage

Before

Balanced opposed reciprocating compressor

More energy consumption / CFM

After

Screw compressors

Less energy consumption / CFM

Best practice in lighting

Servo controlled lighting stabilizer for controlling the input voltage

GREEN POWER

- Installed **59** windmills.
- Each windmill capacity is **250 kW**.
- Wind energy consumed in this year is **15 million kWh**.
- **25%** of power requirement of Foundry is met by wind power.

We have installed equipments for creating congenial & eco-friendly work environment that consume around 5.33% of the total input power.

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Rain water harvesting tank

Dust collector

Energy conservation proposals in progress ….

1. Installing a shredding machine for increasing the bulk density of the input charge

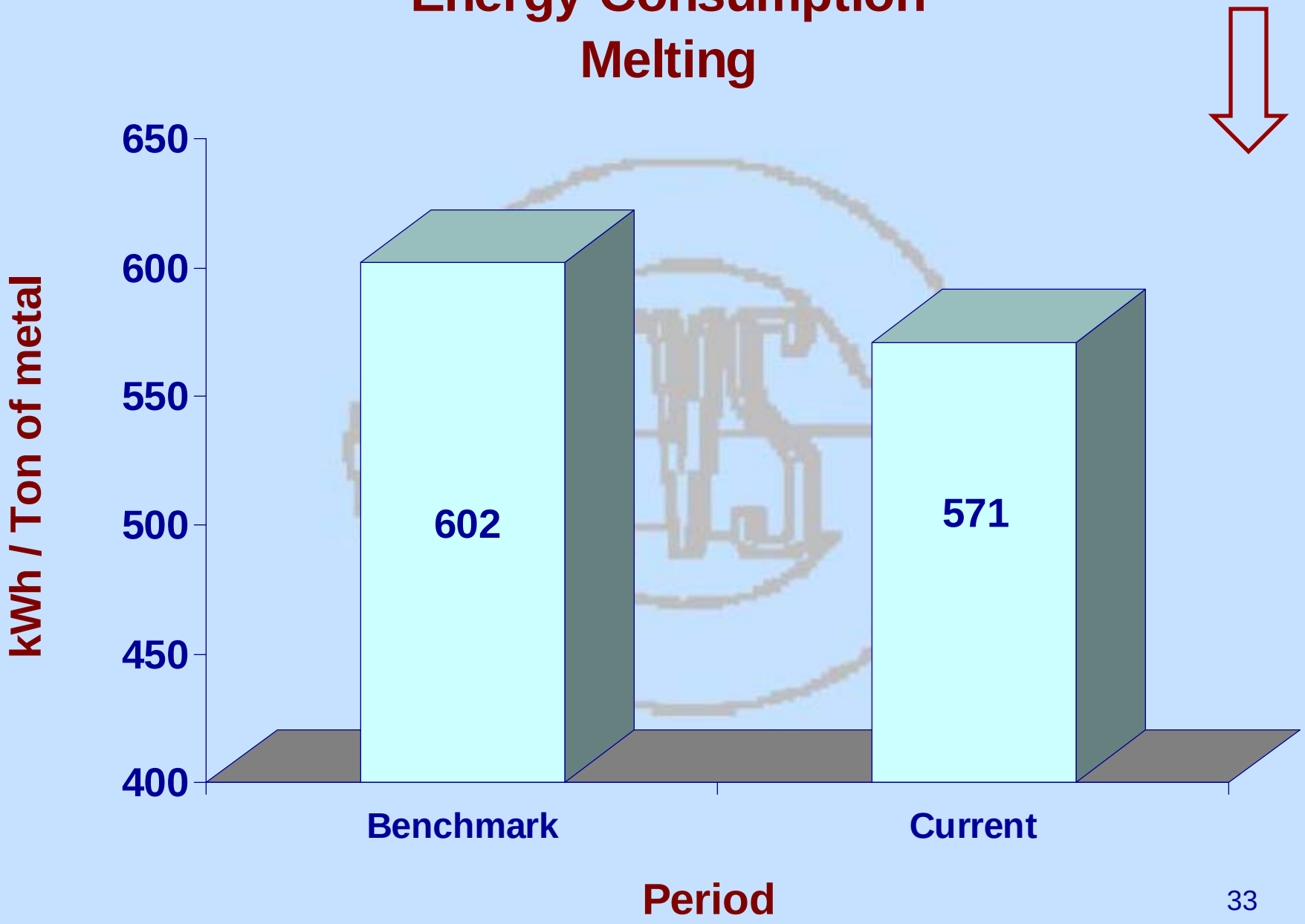
2. Preheating the charge material to reduce melting energy

3. Usage of eco friendly high calorific SKO instead of LDO

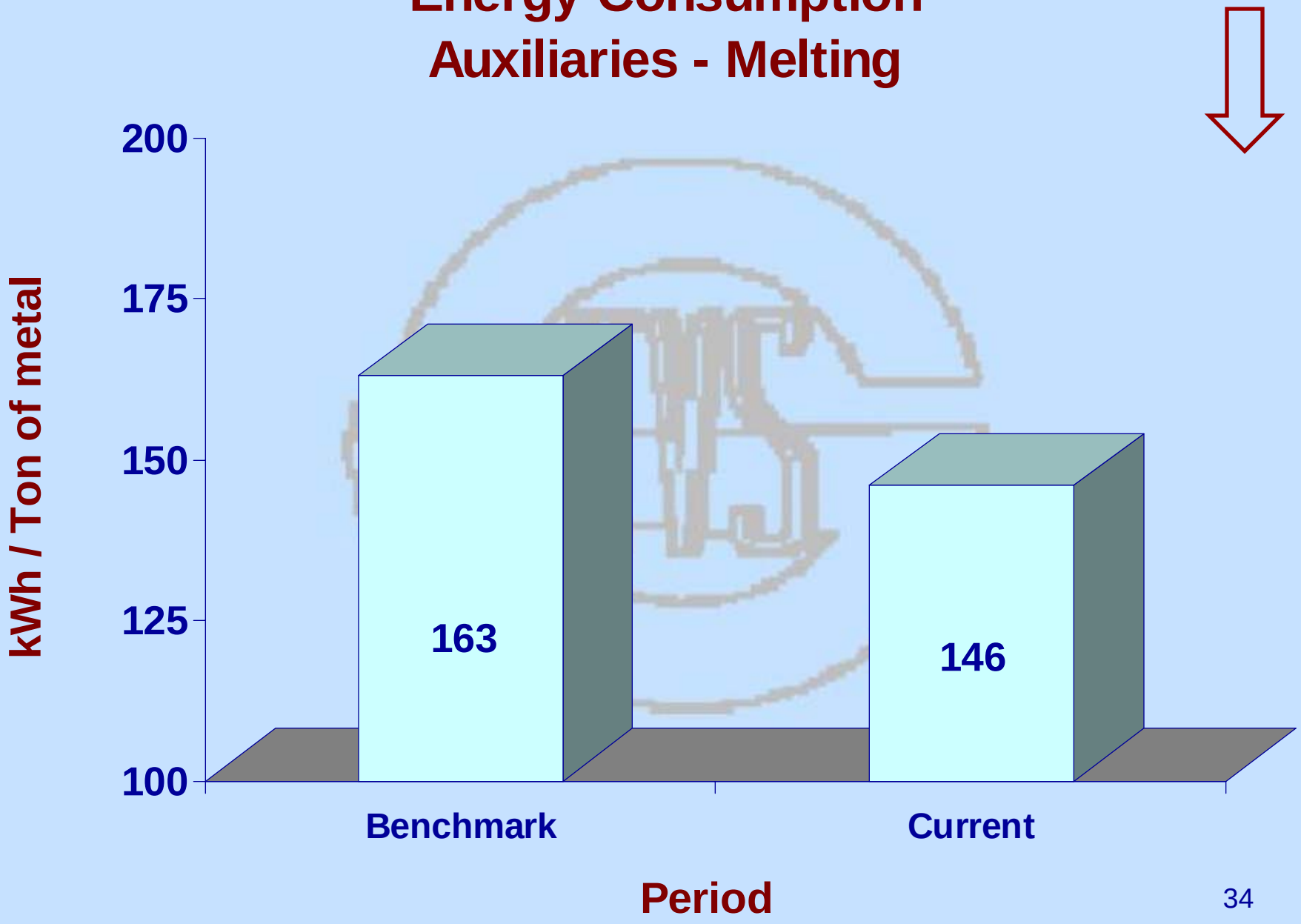
4. Installing magnetic resonators in the fuel line for high efficiency.

5. High efficiency fan for blowers and cooling towers.

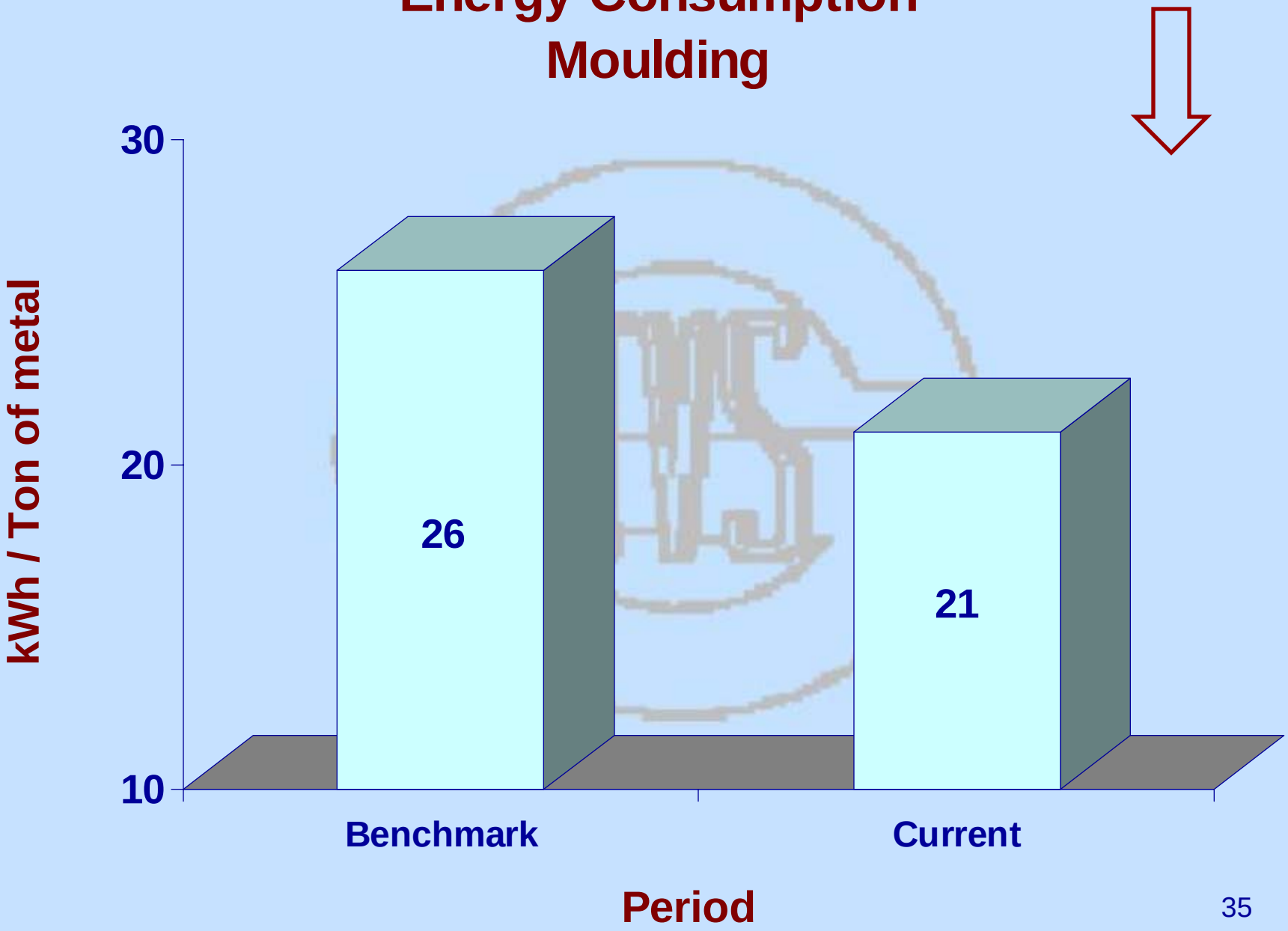
Energy Consumption
Melting



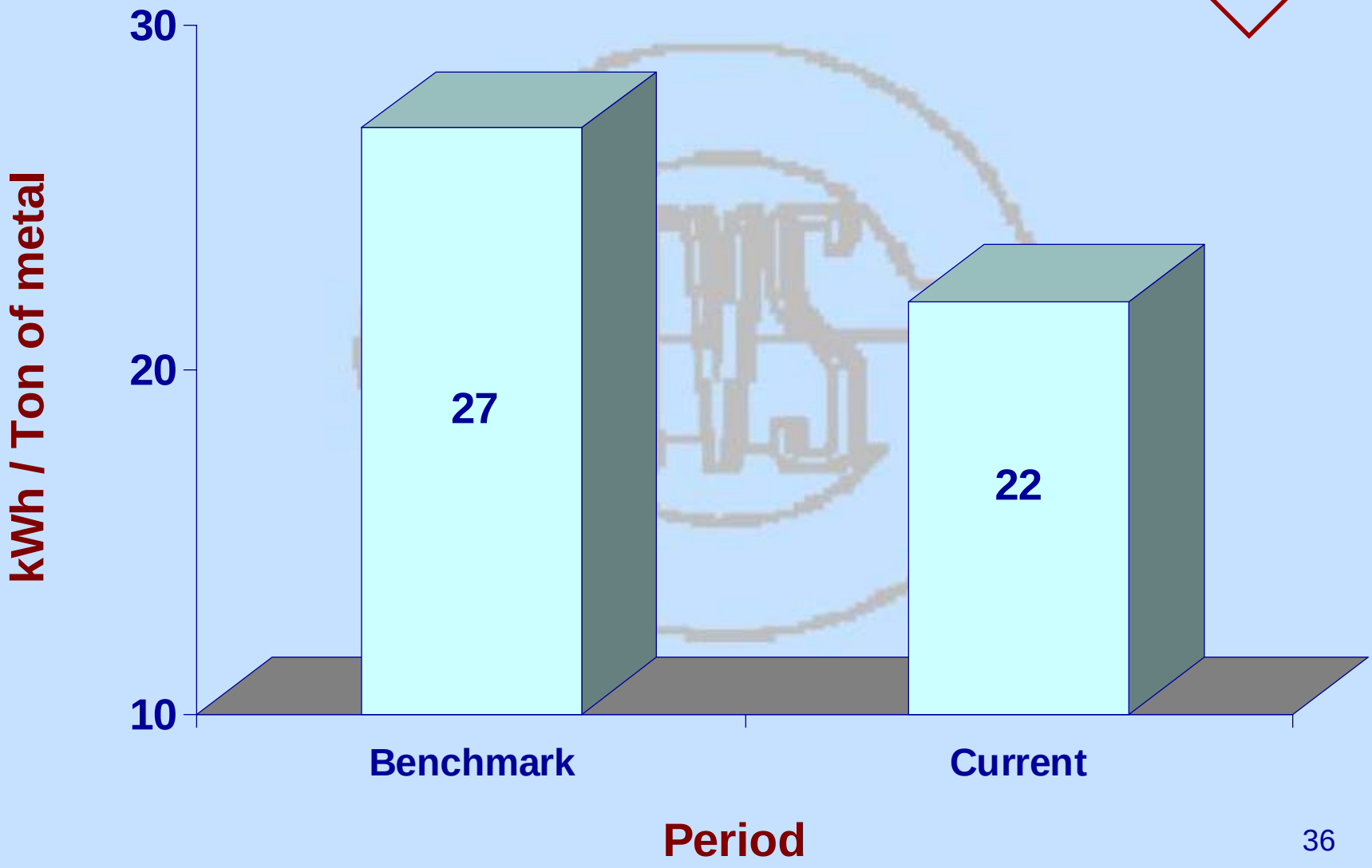
Energy Consumption
Auxiliaries - Melting



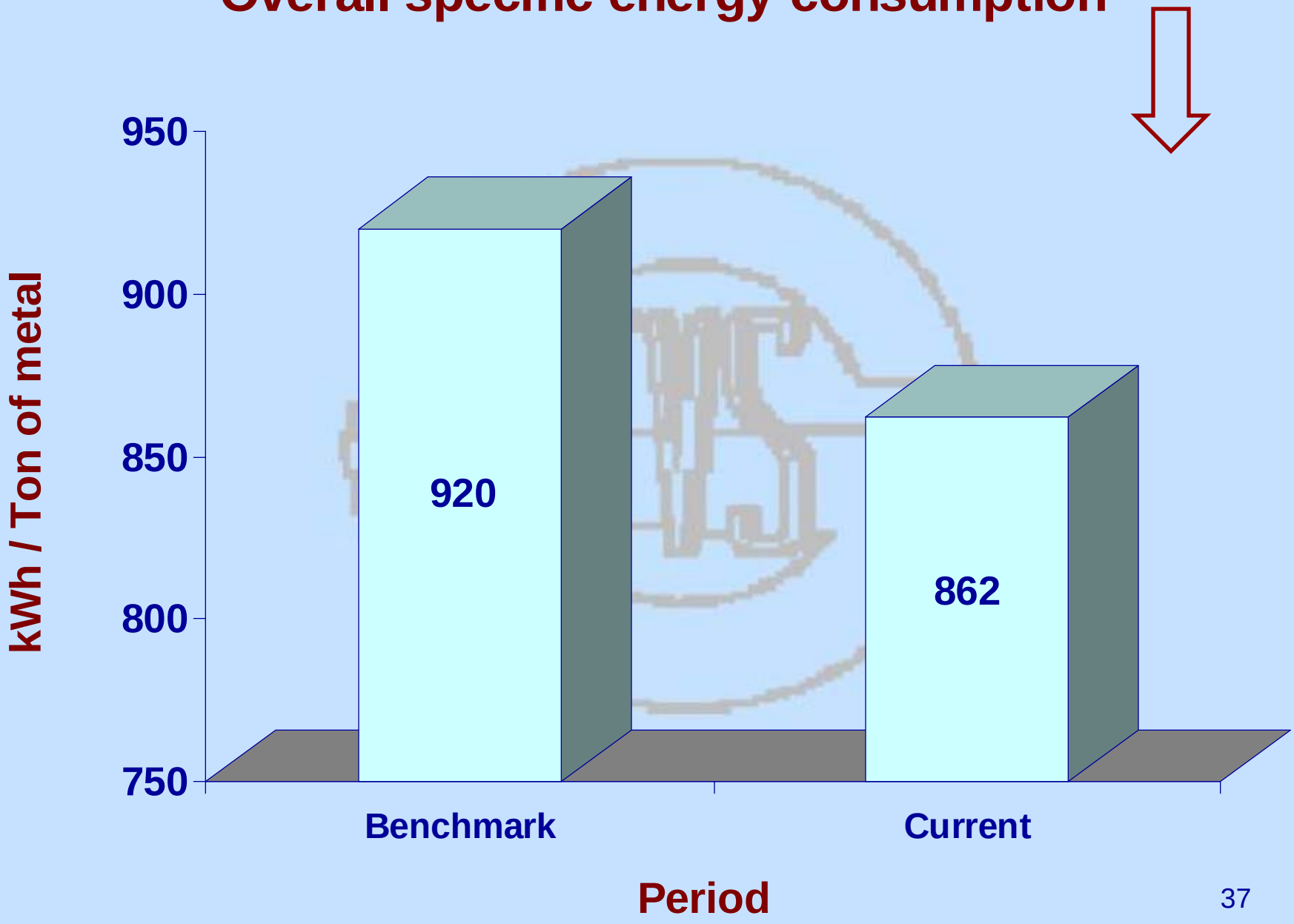
Energy Consumption
Moulding



Energy Consumption
Utilities

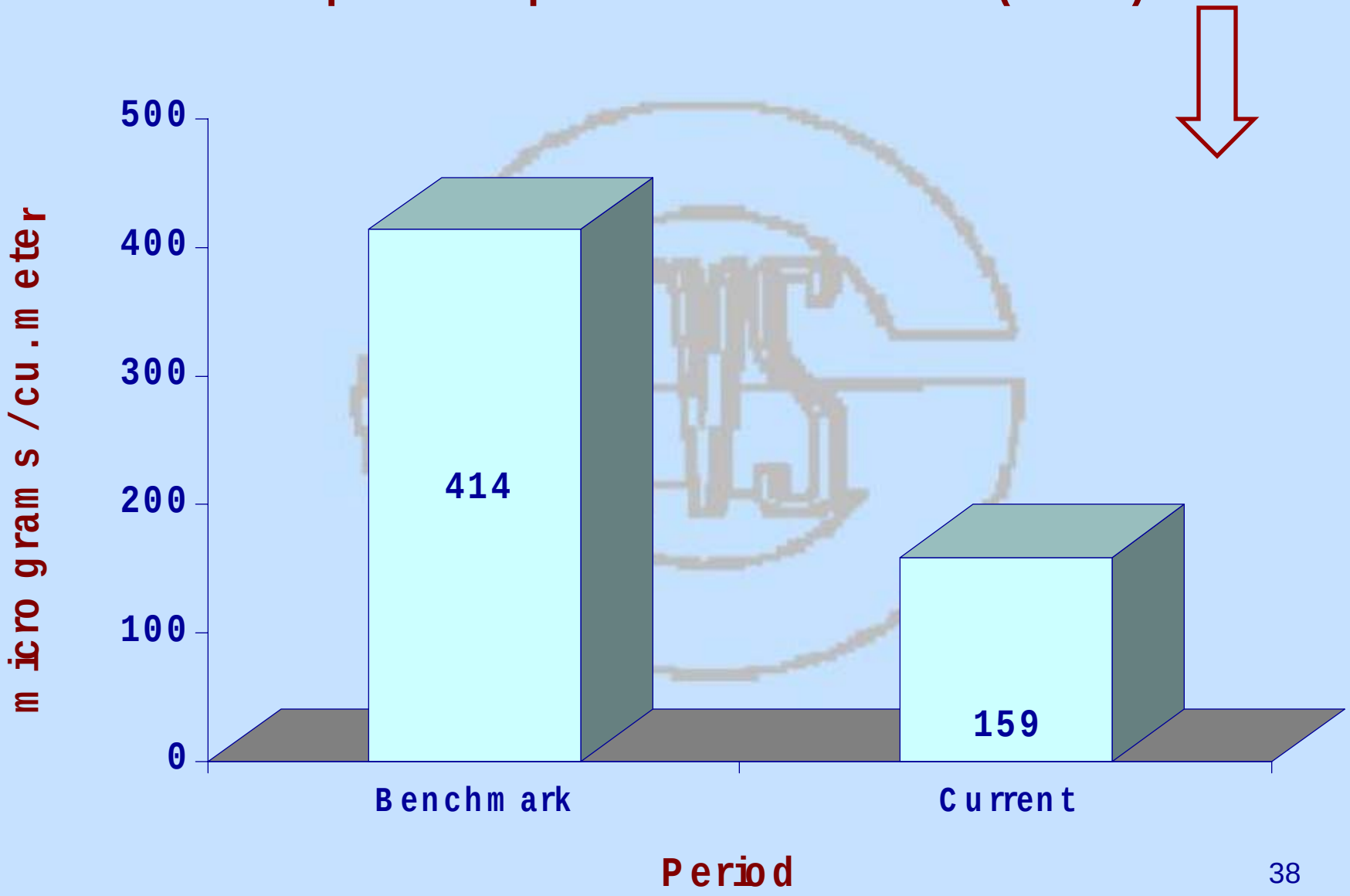


Overall specific energy consumption



ENVIRONMENTAL IMPROVEMENT

Suspended particulate matter (SPM)



CONSERVE ENERGY TODAY

AVOID CRISIS TOMORROW

Thank You