Cleaner and More Cost Effective Industry in Macedonia

EE Component OHIS PEOM - SKOPJE

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PROJECT TEAM

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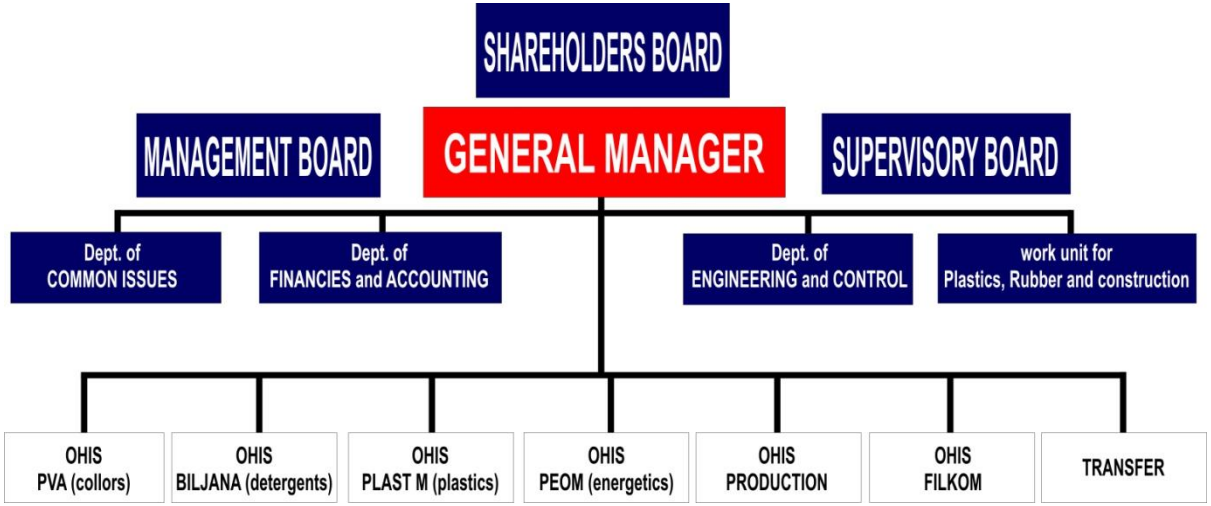
INTRODUCTION

Main activity of AD OHIS

Manufacturing and processing of chemical products.

Presently active companies within AD OHIS:

OHIS PVA, OHIS BILJANA, OHIS PLAST M, OHIS PEOM, OHIS PRODUCTION, OHIS FILKOM and TRANSFER.



Energy facilities in OHIS PEOM

OHIS Energetika supplies the other production facilities in AD OHIS with:

- process steam,
- electricity
- industrial, decarbonised and demineralised water.

OHIS Energetika PEOM consists of the following production units:

- Energy generation plant;
- Station for condensate collection;
- Plant for water chemical treatment and water supply;
- Unit for transportation and supply of circulating cooling water;
- Fuel oil storage space and re-tanking facility;
- Electricity generation and transformation of electric potential 35/6/0.4 kV.

OBJECTIVE

1) Analysis of heat production facilities

- Characteristics
- Operation
- Energy efficiency

2) Analysis of heat losses in the distribution system

- Steam distribution system
- Condensate return system

3) Identification of energy saving measures

4) Recommendations of activities for improvement of energy efficiency

BOILER PLANT - Properties

There are 7 boiler units in OHIS PEOM, but only one is in operation!

Boiler unit No. 7

BOILER PLANT – Operating conditions

Present working parameters of the boiler

Steam production	from 3,5 to 9 t/h
Steam pressure	15 bar
Steam temperature	200 ^{o}C
Feed water temperature	65 ^{o}C
Natural gas consumption	300-800 m_n^3/h
Burner regulation	ten stages, manual regulation

Boiler operation

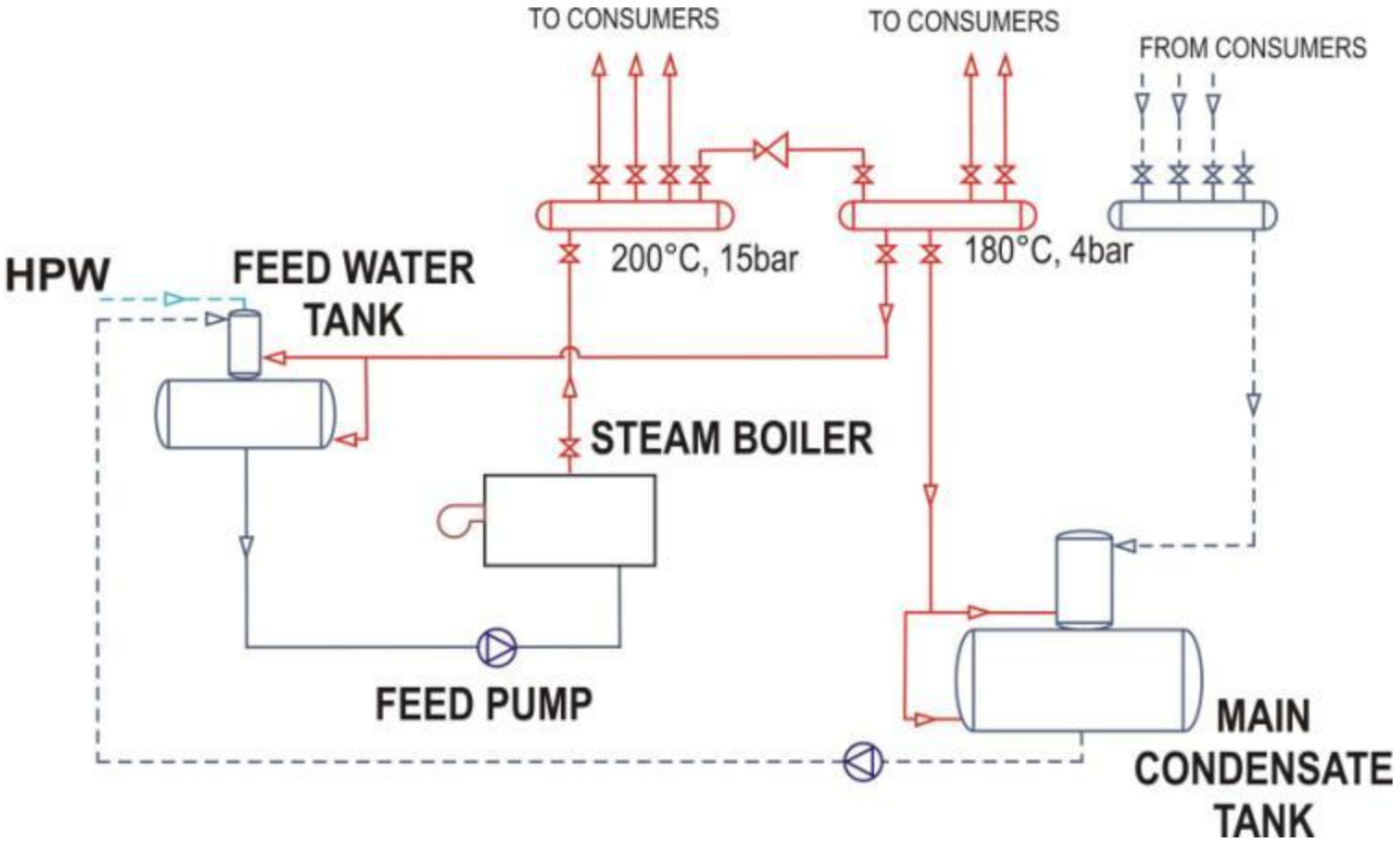
Boiler is in operation less than 10 days per month

It never works at its optimum load! All the time it operates from 12 up to 30 % of its maximum load!

Radiation and start-up losses are very high!

Significant energy efficiency improvement potential exists, especially in operating practices

MAIN EQUIPMENT IN THE BOILER ROOM



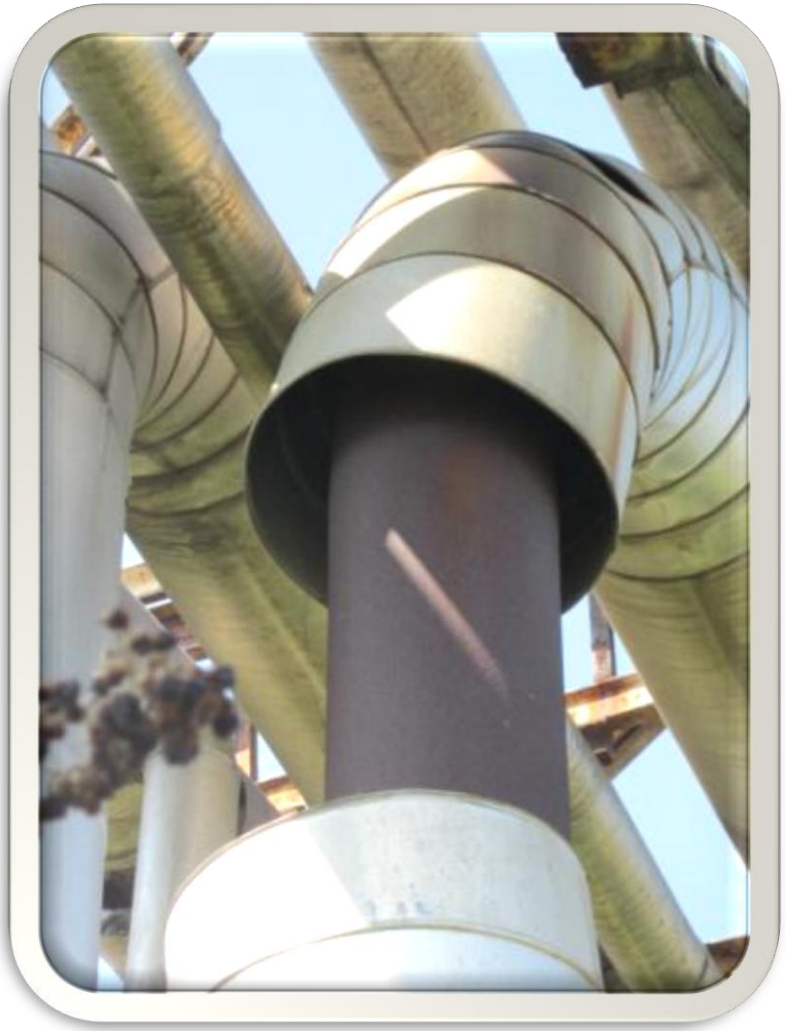
STEAM DISTRIBUTION SYSTEM

Main steam pipelines characteristics

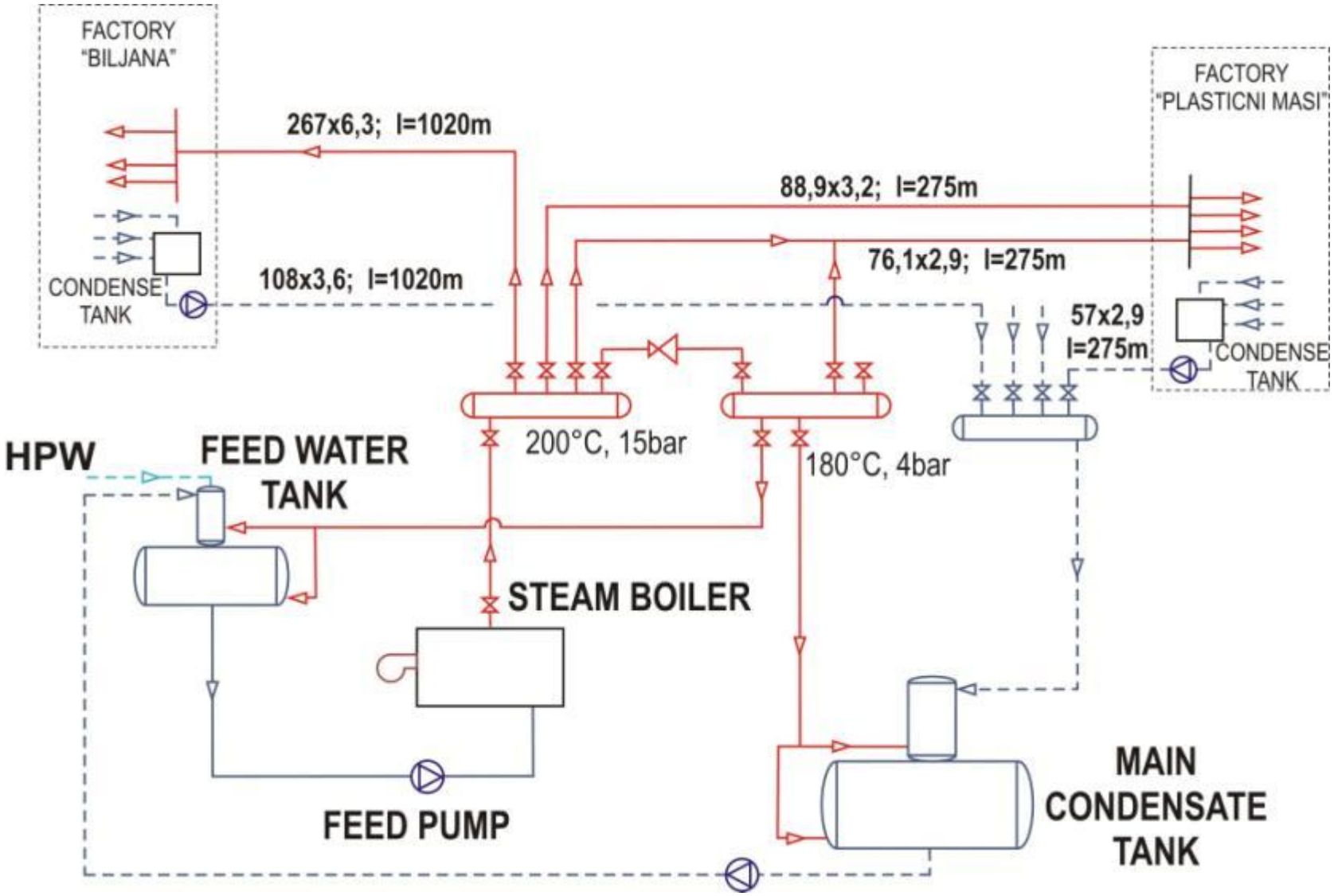
- Damaged insulation that causes enormous heat loses, there is no regular maintenance, significant temperature and pressure drop at the consumer side

Pipeline	DN [mm]	$d_n$xd, [mm]	d_{ins}, [mm]	*L*, [m]	Steam/condensate flow rate [t/h]	P/t, [bar/°C]	Note, comment
Steam pipeline from header in boiler plant (15 bar, 200°C) to header in "AD Biljana"	250	267x 6.3	70	1020	4 / 1	15 / 200	Insulation with visible damages
New steam pipeline from header 1 (15 bar, 200°C) in boiler plant to "Plasticni masi"	80	88.9x 3.2	50	265+ 10	4 / 2	15 / 200	Insulation with visible damages
Old steam pipeline from header 1 (15 bar, 200°C) or from header 2 (4 bar, 180°C) in boiler plant to "Plasticni masi"	65	76.1x 2.9	50	265+ 10	4 / 2	4 / 180	Pipeline insulation is damaged in many places

STEAM DISTRIBUTION SYSTEM



CONDENSATE RETURN SYSTEM



CONDENSATE RETURN SYSTEM

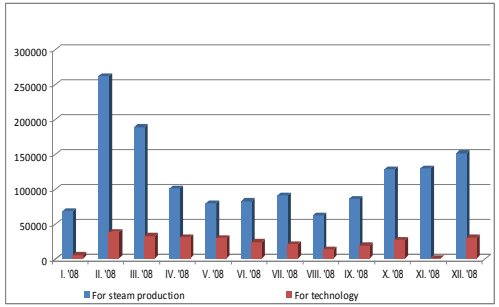
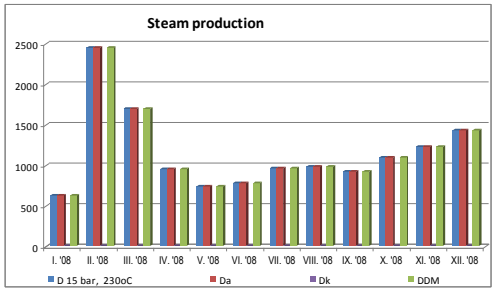
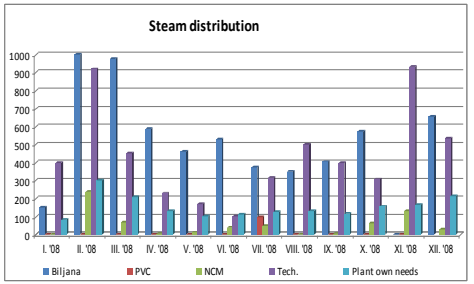
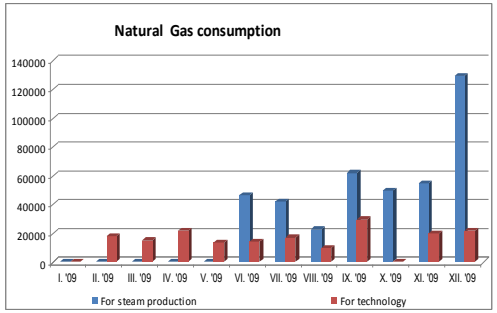
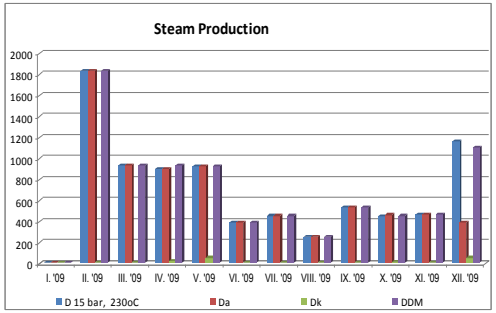
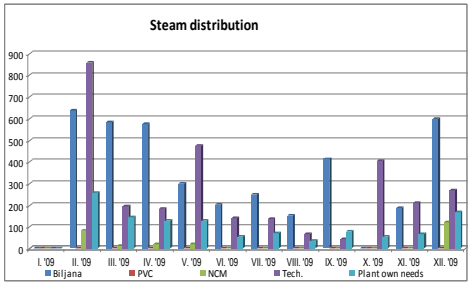
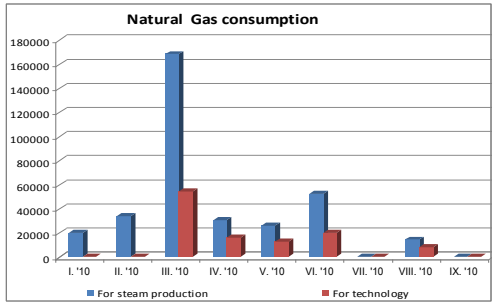
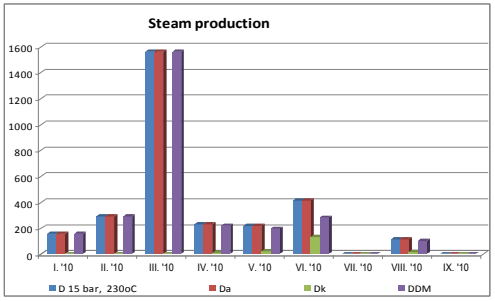
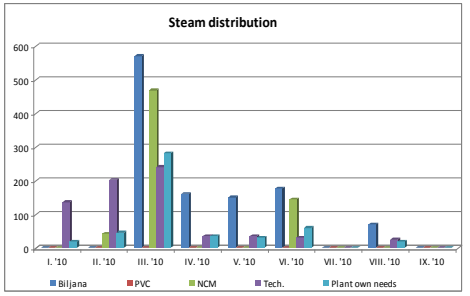
Main condensate pipelines characteristics

- The main condensate return pipelines is almost without installation, what causes enormous heat losses
- Some of the steam traps are not functioning, and the condensate from the steam traps is returned directly in the condensate pipelines

Pipeline	DN [mm]	$d_n$xd, [mm]	d_{ins}, [mm]	*L*, [m]	Steam/condensate flow rate [t/h]	P/t, [bar/°C]	Note, comment
Condensate return line from local condensate tank in "AD Biljana" to collecting header in boiler plant	100	108x 3.6	60	1020	2 / 0.5	- / 60°C	Pipeline is partially insulated
Condensate return pipeline from local condensate tank in "Plasticni masi" to header in the boiler plant	50	57.0x 2.9	50	265+ 10	4 / 2	-/ 60°C	The pipeline is without insulation

CONDENSATE RETURN SYSTEM

FUEL CONSUMPTION AND STEAM GENERATION

	Natural Gas Consumption	Steam Production	Steam Distribution
2008			
2009			
2010			

MAIN ENERGY CONSUMERS

OHIS BILJANA dooel

- Unit for powder detergents;
- Unit for liquid detergents;
- Water glass (Vodeno staklo);
- HIPO;
- Pesticides (equipment in use)

OHIS PLAST M

- Foils;
- Rubber filler (gumeno polnilo);
- Granulates;
- Mixtures;
- Pipes;
- Pogonski servisni;

OPERATING EFFICIENCY OF FACILITIES FOR HEAT PRODUCTION

Boiler plant main losses

- Stack losses;
- Blow down losses;
- Radiation and convection losses;
- Start up losses;
- Energy consumption of auxiliary equipment.

Design efficiency of the boiler is 86 %

Calculated efficiency of the boiler is from 65 to 70 %.

OPERATING EFFICIENCY OF FACILITIES FOR HEAT PRODUCTION

Heat losses in the distribution system

- Inadequately dimensioned pipeline for the current needs;
- Dysfunctional steam traps;
- Damaged insulation;

The heat losses in the steam distribution pipelines are 5,6% of the input energy in the boiler at 4 t/h produced and distributed steam.

IDENTIFICATION OF ENERGY SAVING MEASURES

STEAM GENERATION AND DISTRIBUTION AND CONDENSATE RECOVERY SYSTEM

- Insulation of all hot areas
- Inspection, repairing and replacement of steam traps
- Improvement of boiler's combustion efficiency (optimization, adjustment of air-fuel ratio)
- Condensate recovery - return condensate to the main reservoir and to the boiler
- Minimization of boiler blow down (proper feed-water treatment, automatic blow down control)
- Recovering heat from boiler blow down
- Minimization of boiler short cycling losses
- Improvement of the production processes

*** These measures are viable only if the capacity of the system is higher than the current**

IDENTIFICATION OF ENERGY SAVING MEASURES

ENERGY EFFICIENCY AND ENERGY SAVING MEASURES ON THE DEMAND SIDE

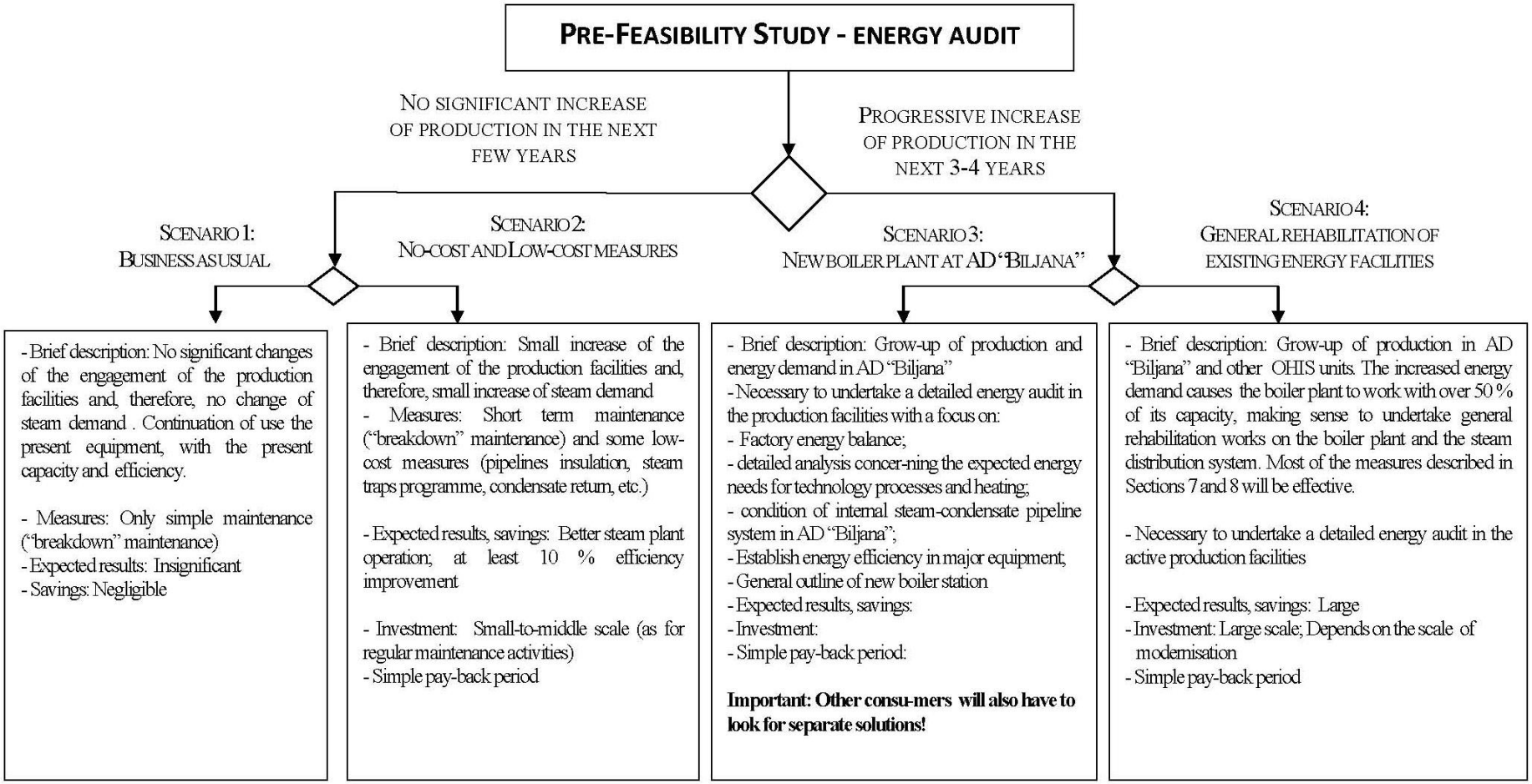
main focus of the preliminary audits was put on

- **Ohis Biljana;**
- **Ohis PVA;**
- **Ohis Plast M.**

- The local steam distribution and condensate pipelines and auxiliary equipment are in bad shape
- Most of the steam traps are not functioning properly
- Local condensate tanks are not in function

Under the present operating conditions, and particularly, considering the expected production in 2011, a substantial energy audit and an in-depth analysis of the energy flow of different consumers plants is not viable!

RECOMMENDATIONS



CONCLUSIONS

THE OVERALL EFFICIENCY OF THE ENERGY SYSTEM IN THE PRESENT CONDITION IS VERY LOW

THE ENERGY SAVING POTENTIAL IS SIGNIFICANT

VIABILITY OF THE MEASURES MAINLY DEPEND ON THE SCENARIOS FOR FUTURE ENGAGEMENT OF OHIS!

THANK YOU FOR YOUR ATTENTION!