

October 30, 2003

## 12-1 Case with International Cooperation in EE & C

### 省エネルギー分野での国際協力事例

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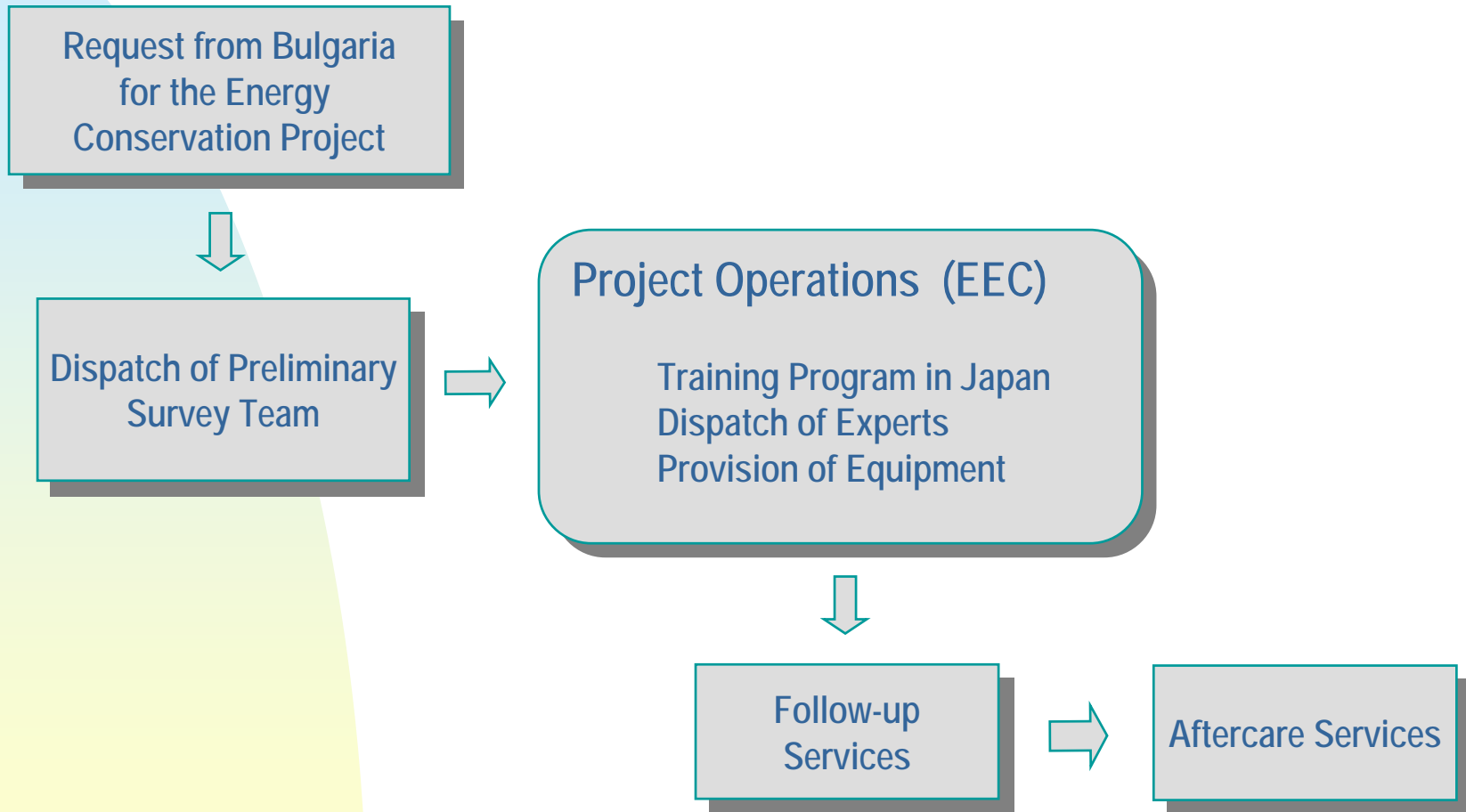
# Energy Efficiency Center in Bulgaria

The activities, achievement, and its future

October, 2003  
Toyo Engineering  
I. Toyoda

# Project-type Technical Cooperation

- Implementation Process



# Energy Efficiency Center (EEC)

- **About EEC**

- ◆ established in 1995 under the cooperation of JICA and the Ministry of Industry of Bulgaria

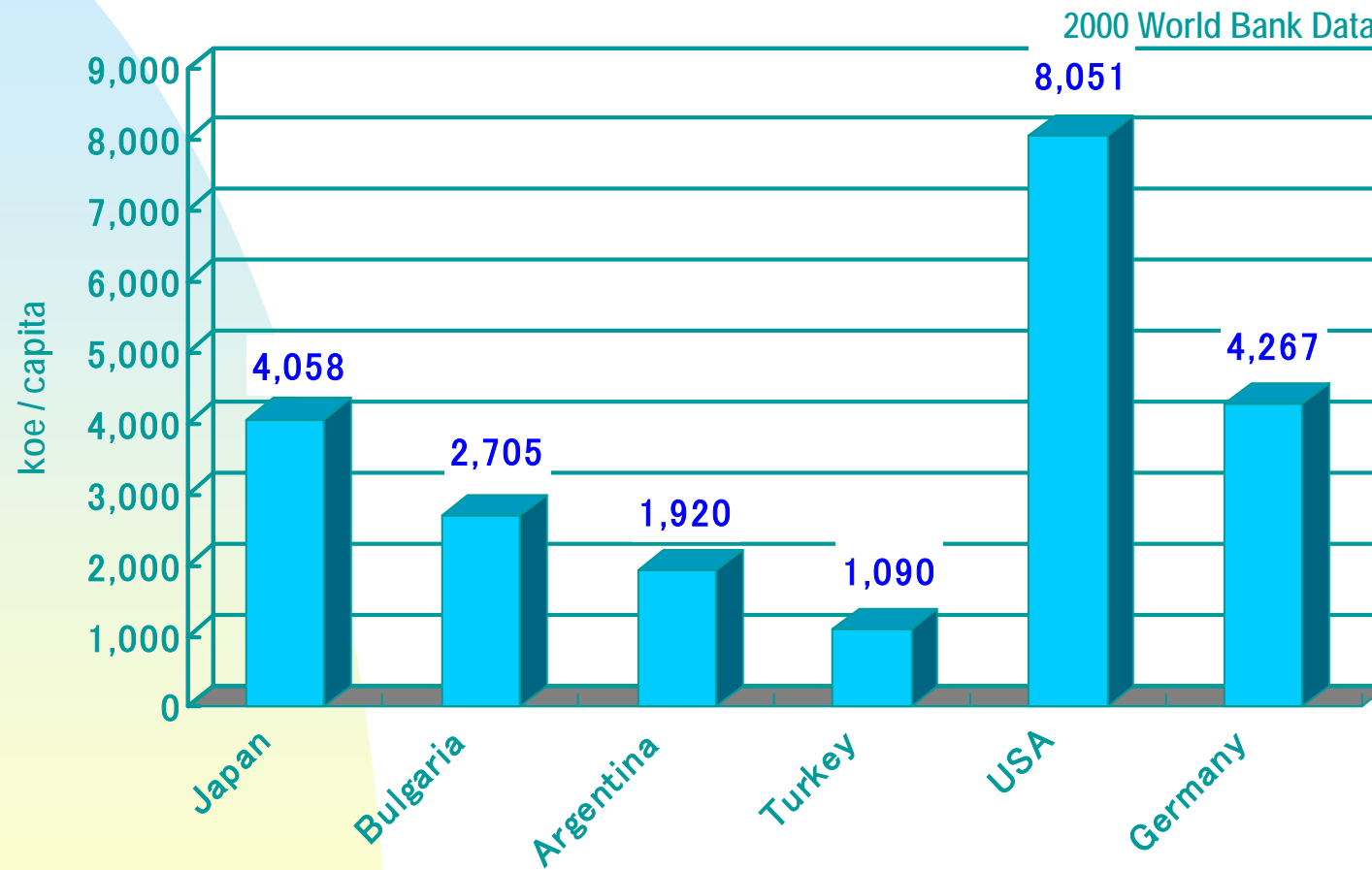
- **Objective of EEC**

- ◆ reduction of your energy cost by the energy audits

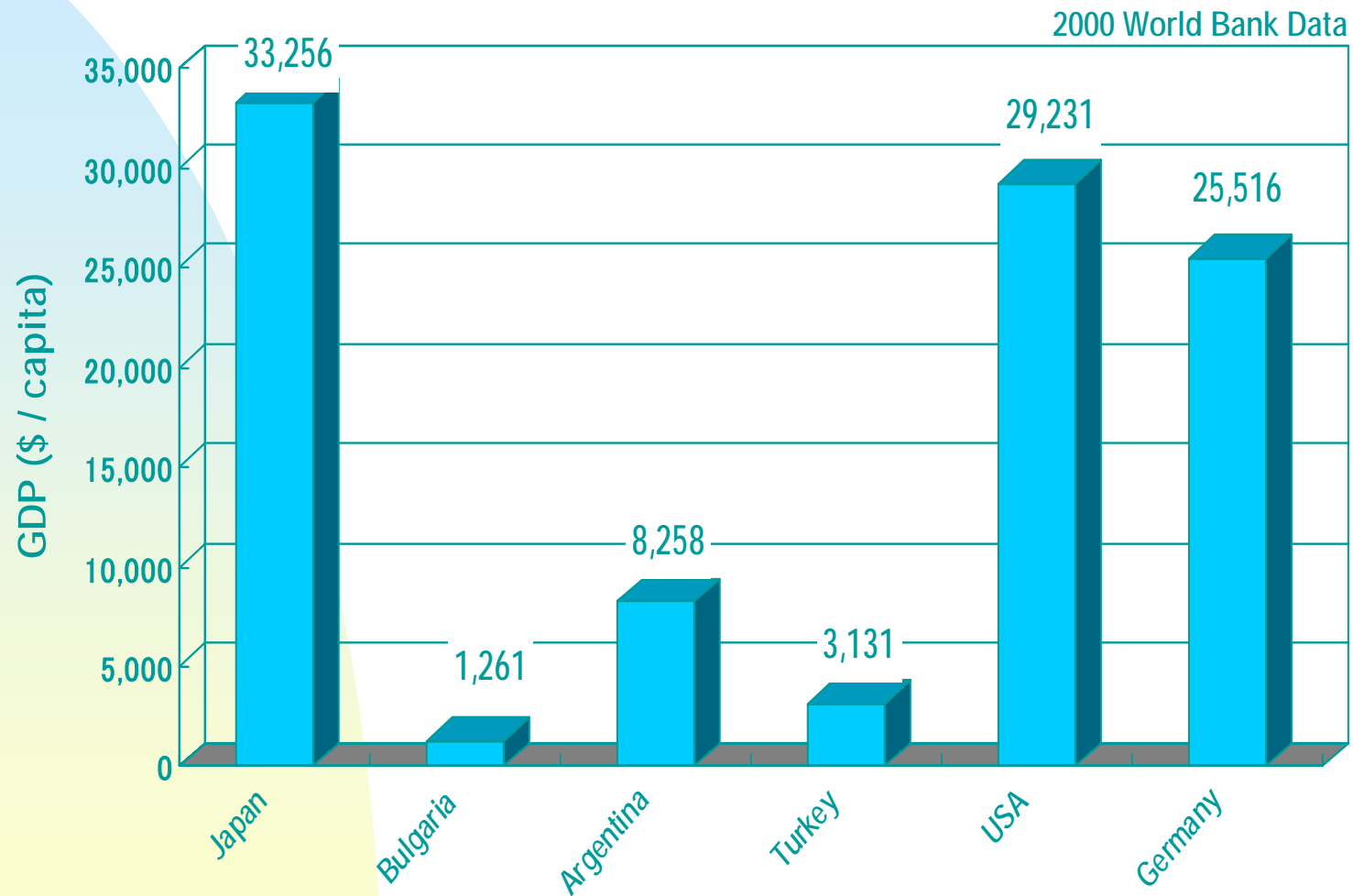
- **Energy audit resources**

- ◆ technical assistance by Japanese experts
- ◆ the most up-to-date instruments

# Comparison of energy consumption in BG with other countries

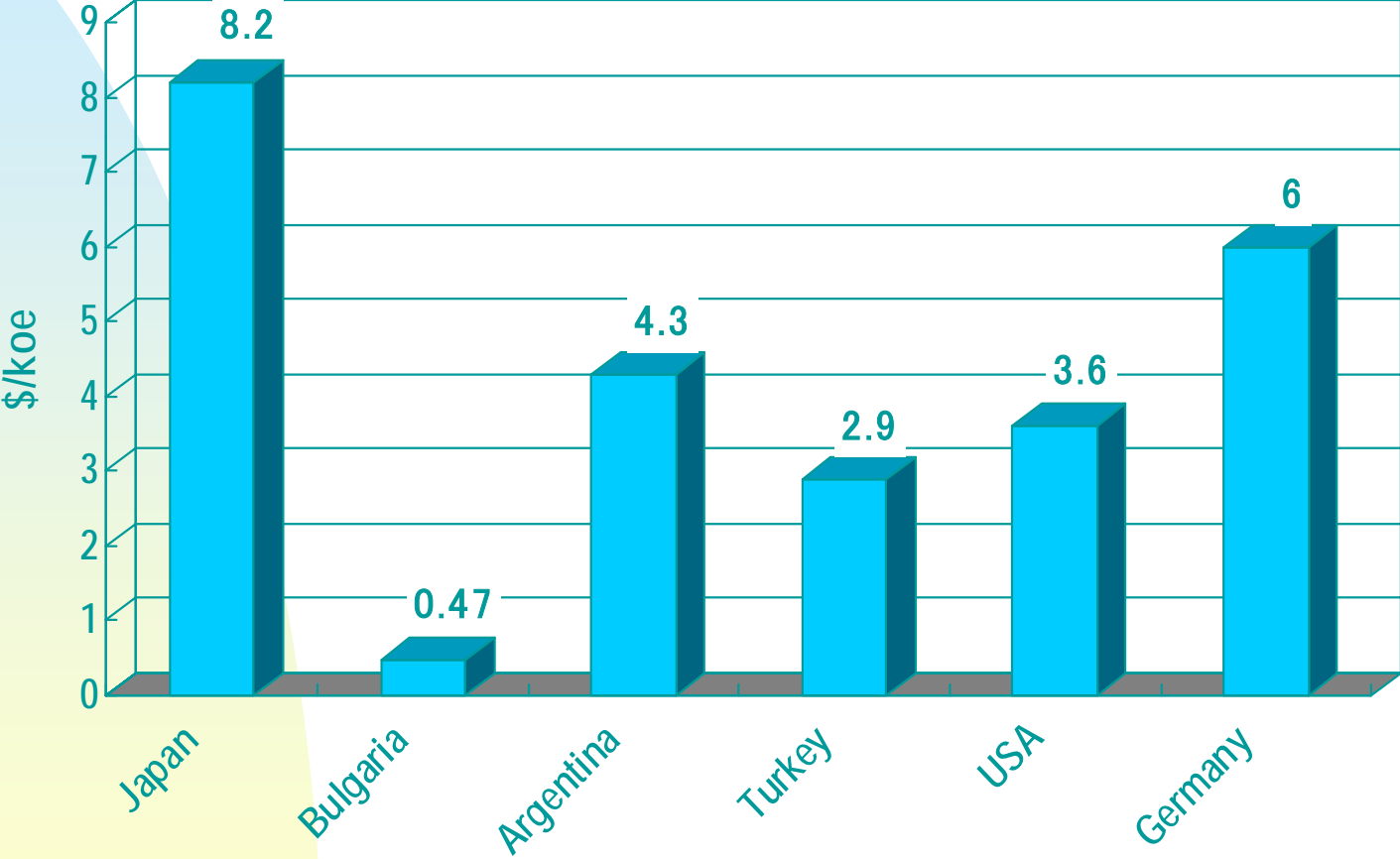


# GDP per capita



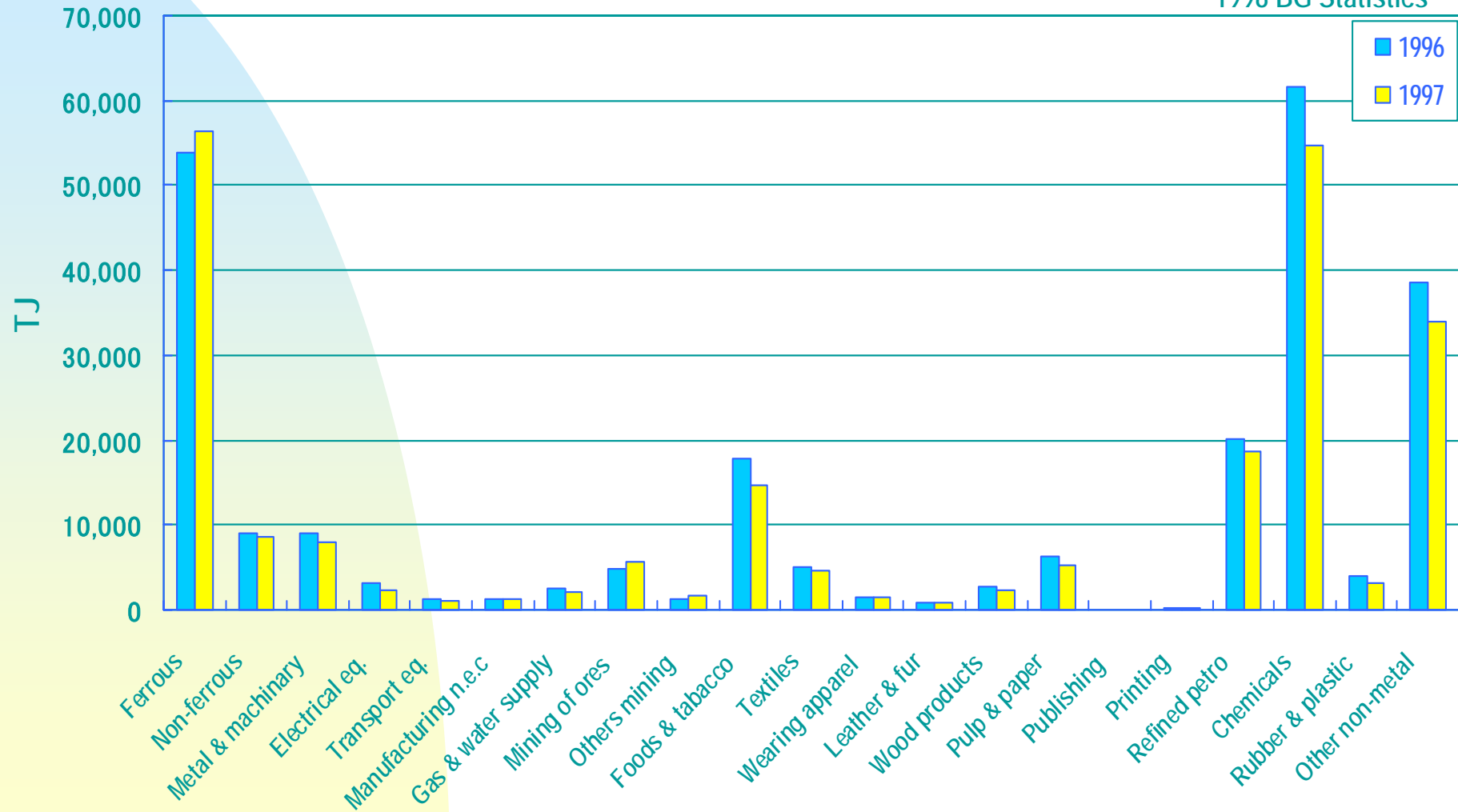
# GDP vs. Energy Use

2000 World Bank Data



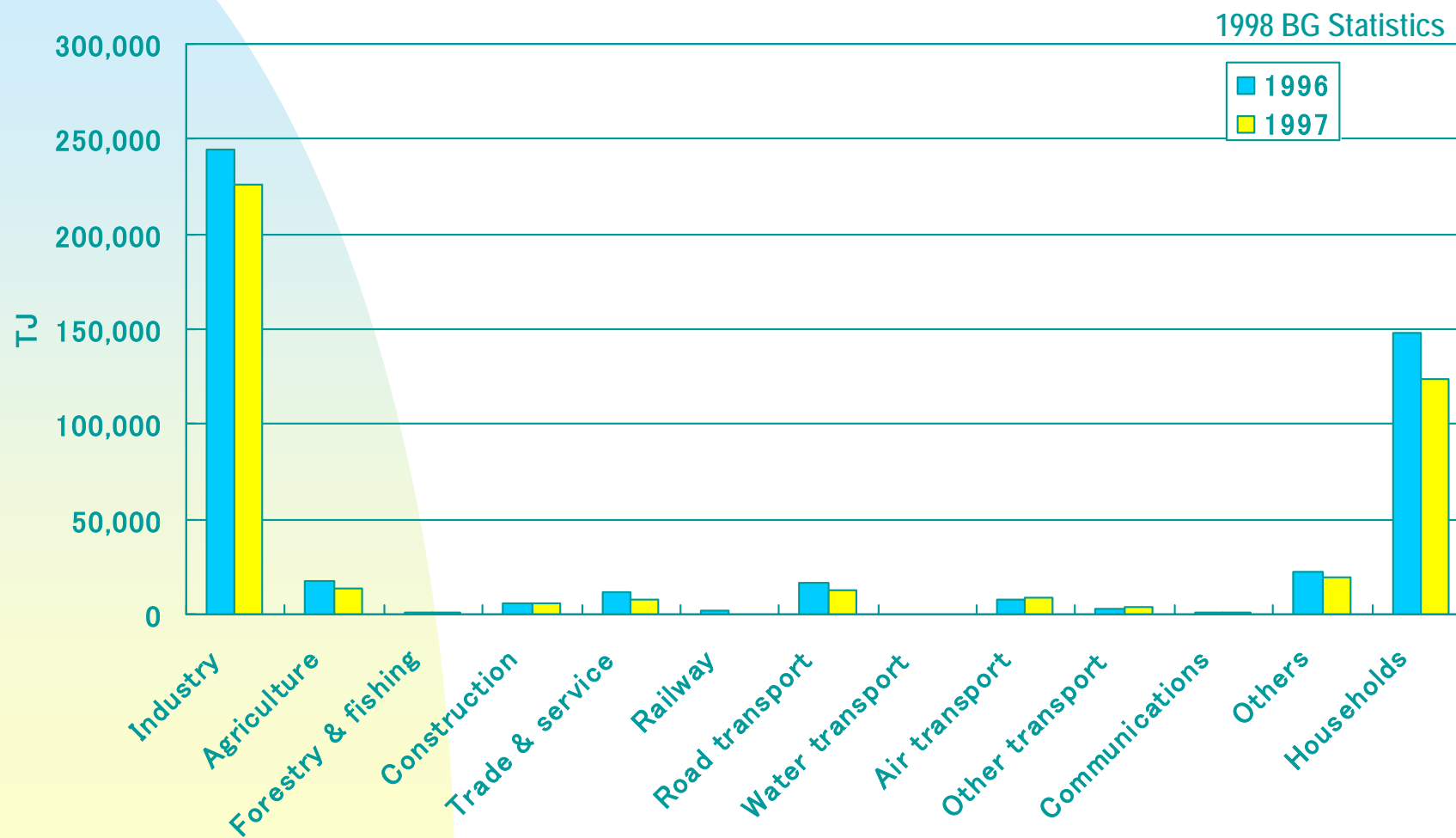
# Final energy consumption in Industry

1998 BG Statistics



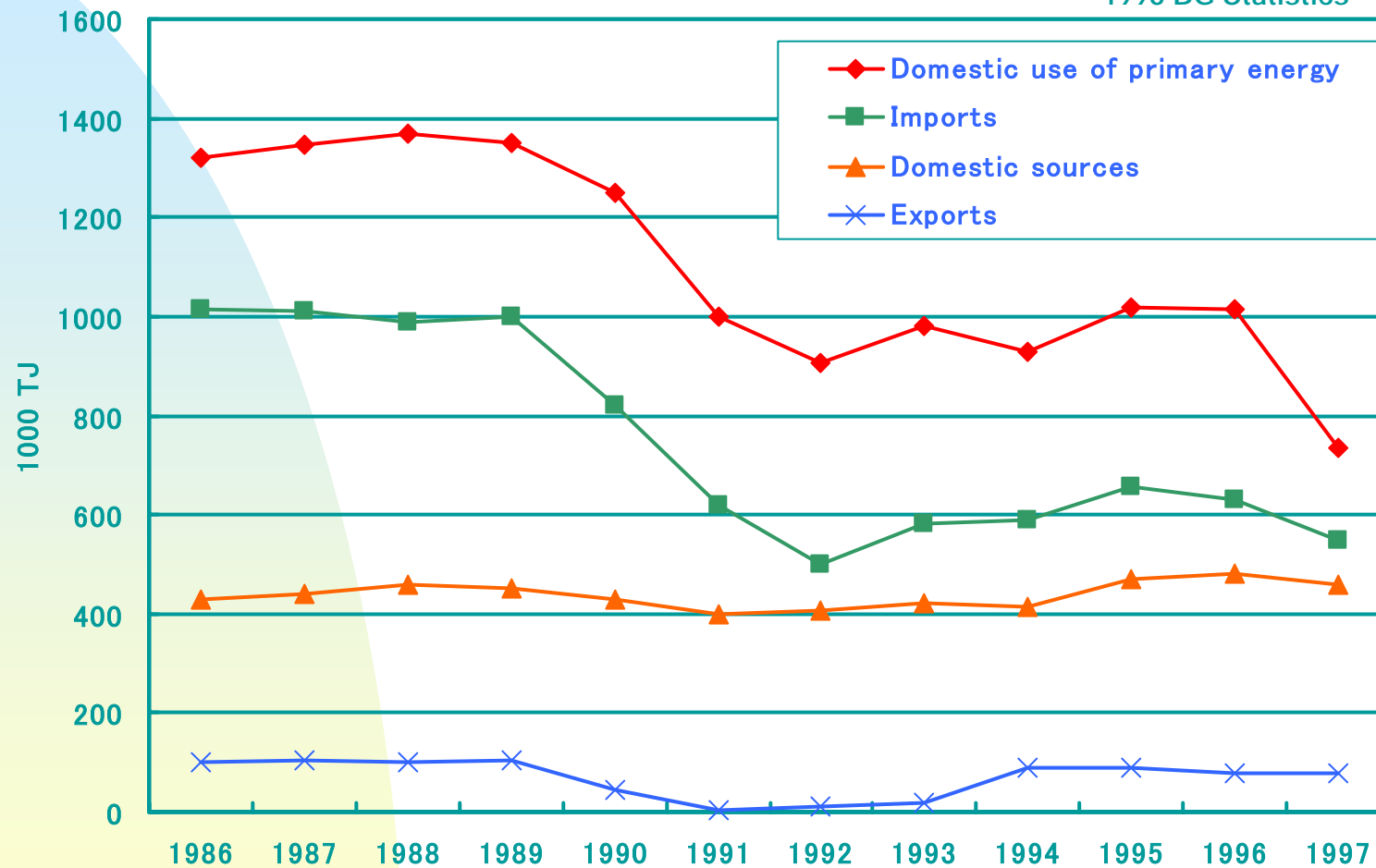


# Final energy consumption by economic activity groups

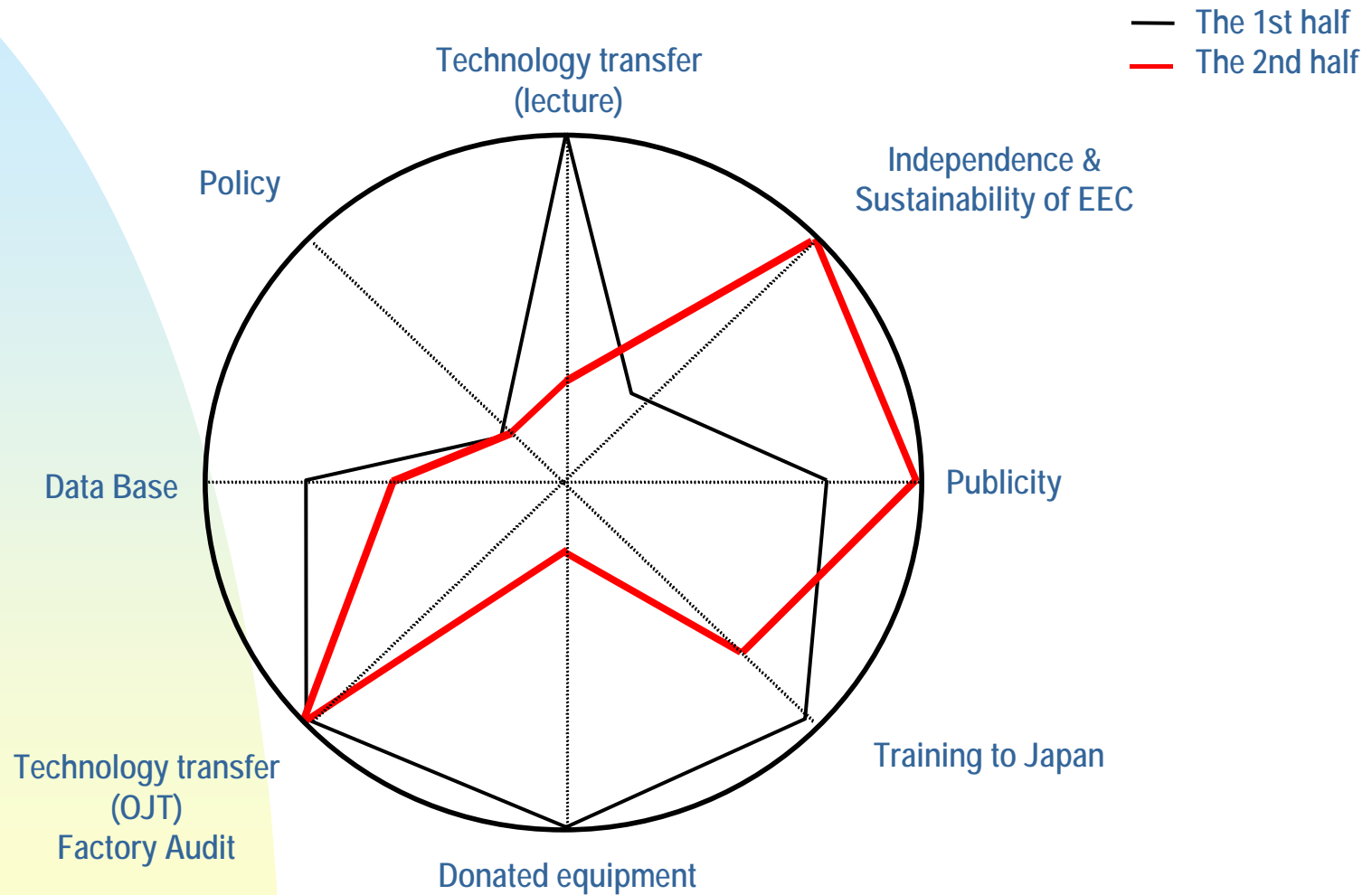


# Trend of Energy Flows

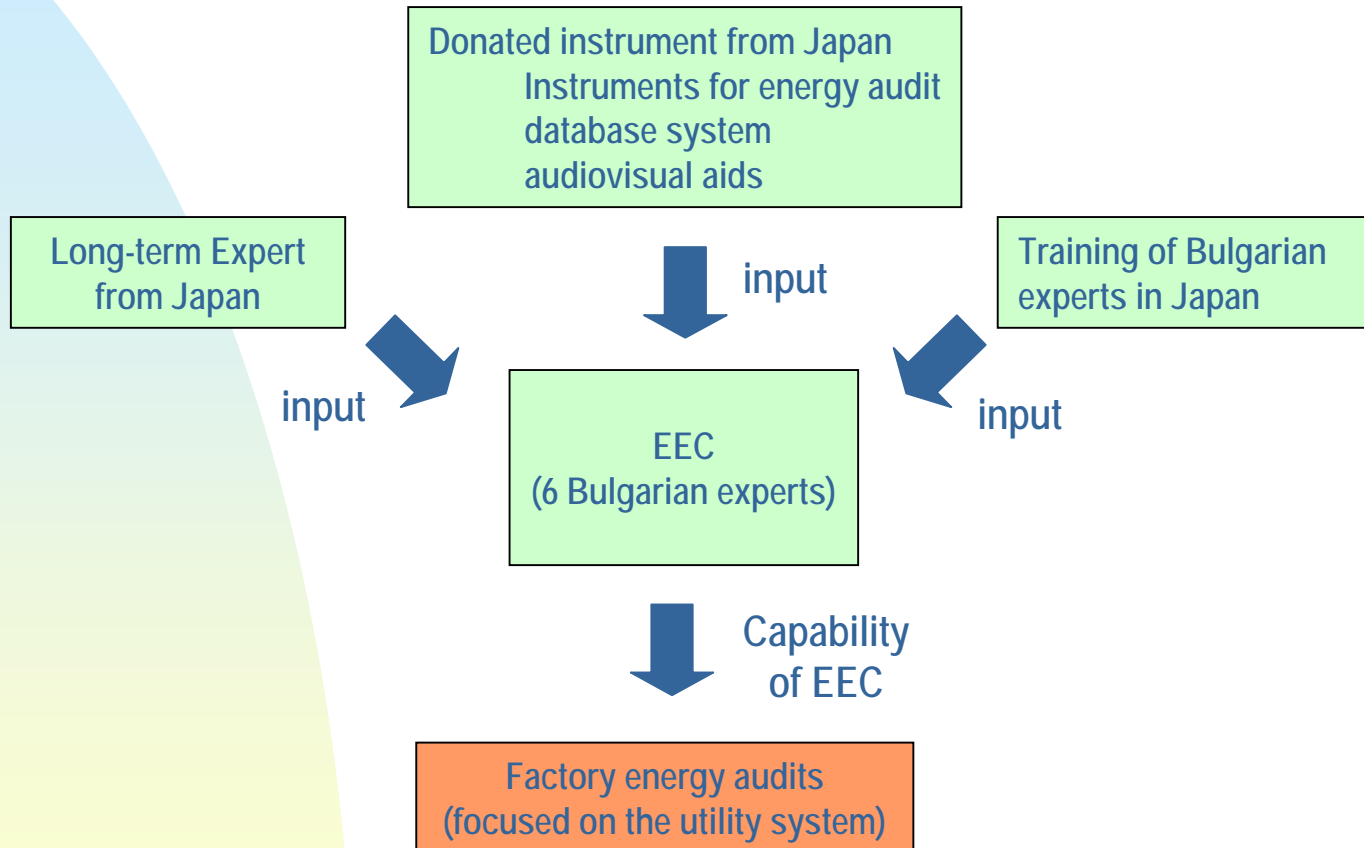
1998 BG Statistics



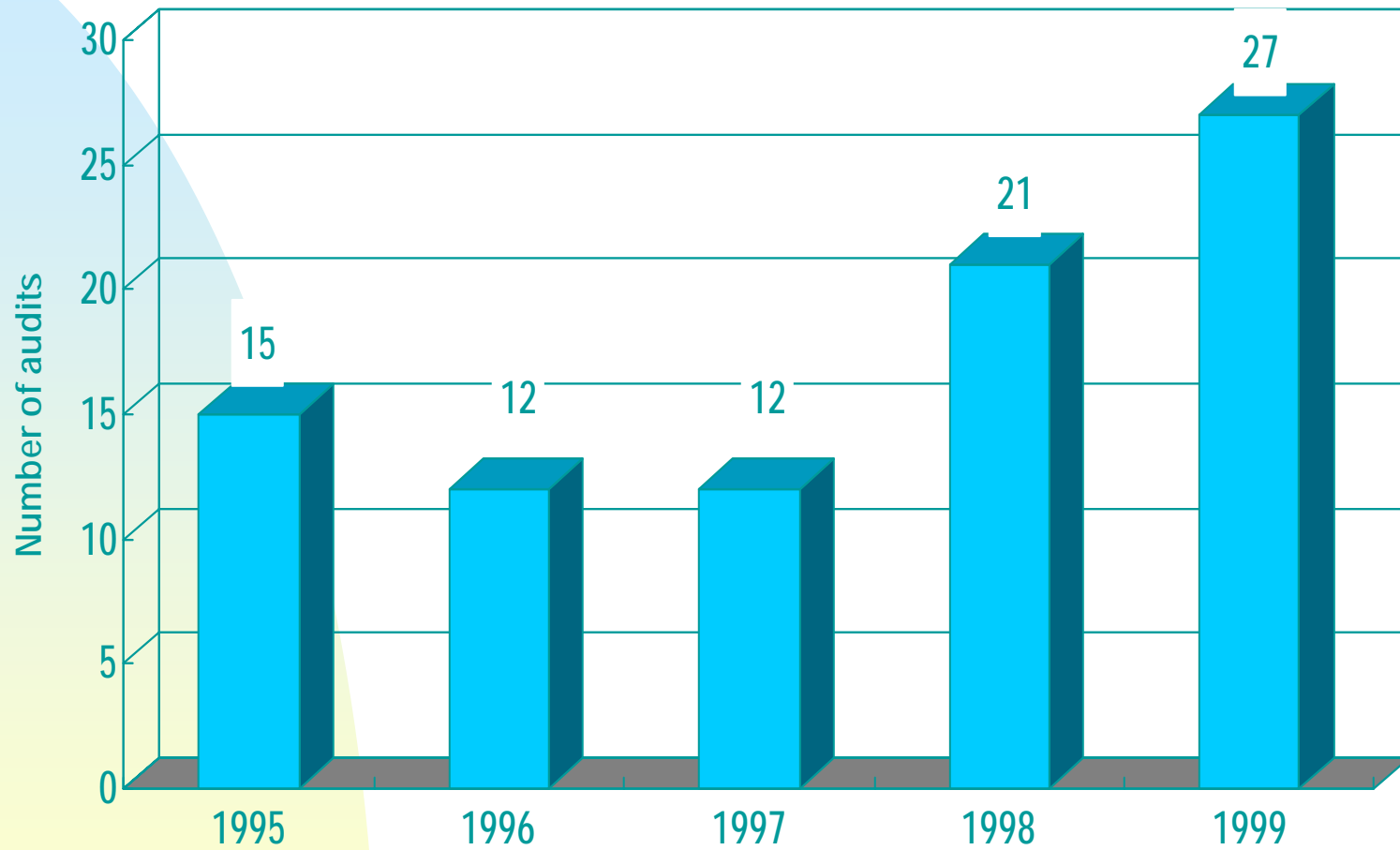
# Main activities in EEC (the first half & the second half)



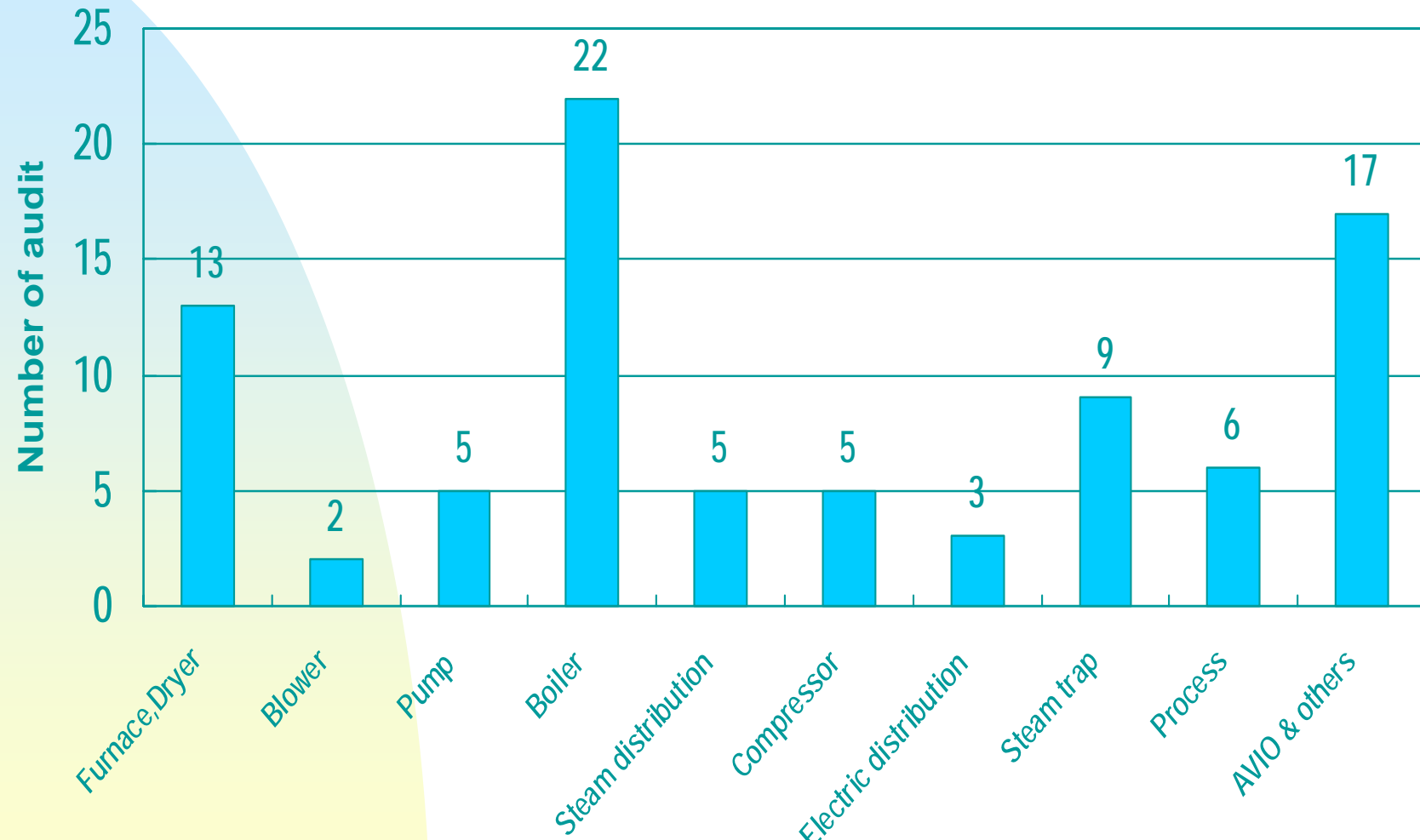
# Capability of EEC at the end of the project



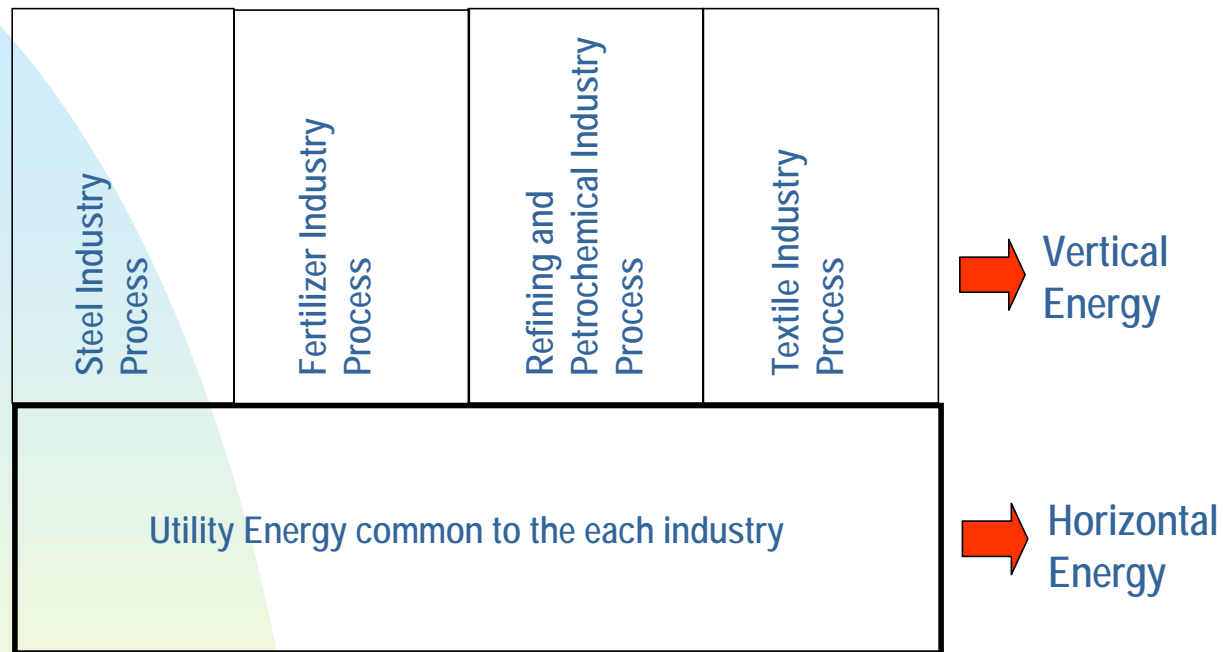
# Number of audits



# Contents of audit



# Main working sector of EEC



Horizontal energy, utility, is commonly used in the each industry sector. This means that the improvement of utility usage gives great impact on the energy consumption reduction in Bulgaria

Scope of work of EEC

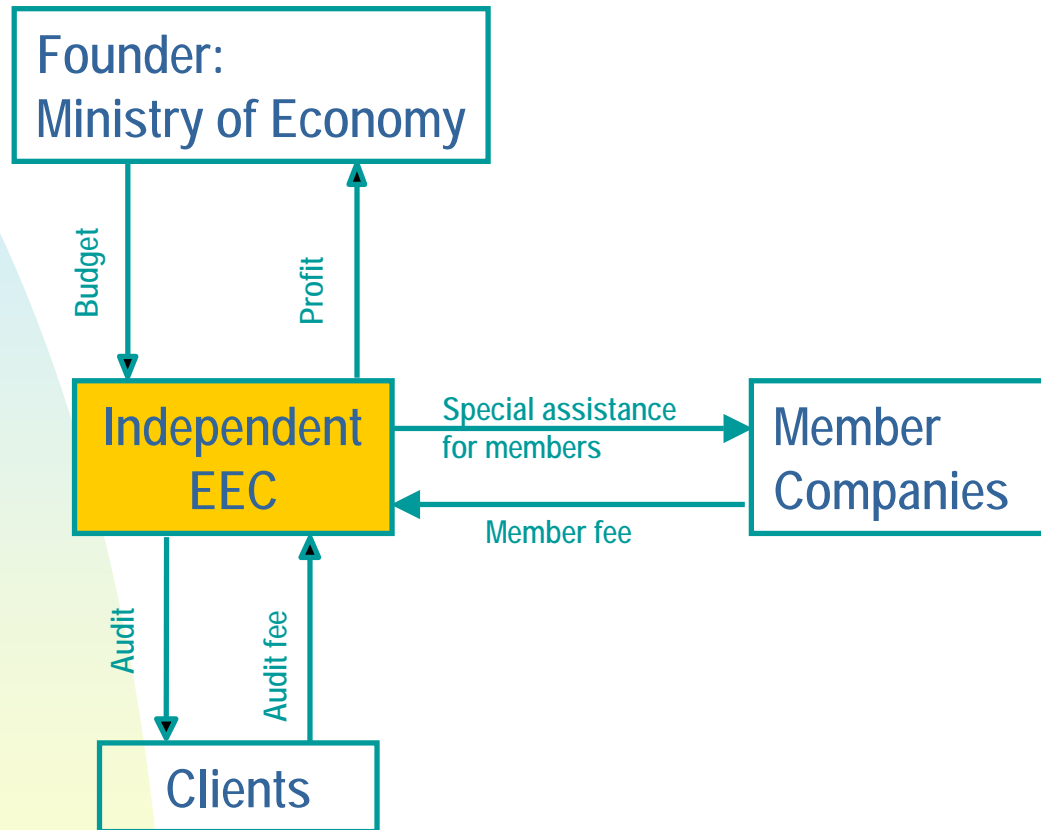
# Evaluation of our project

	Evaluation items	Rating at project	Importance future
1	Effectiveness	3	-
2	Achievement	5	4
3	Impact	3	-
4	Relevance	4	-
5	Sustainability	2	5

1: very low  
2: low  
3: lower than the target  
4: achieved target  
5: beyond the target



# EEC organization scheme



# Energy consumption structure in Bulgaria

	Company scale	No. of employees	Ratio
1	Small size	50 or less	98.6 %
2	Medium size	100 or less	
3	Big size	more than 100	1.4 %

The majority of energy is consumed in the big size company, such as steel works, refinery, and petrochemical complex, which account for only 1.4% of the total numbers.



# To be sustainable

## 1. Initial support from the government

(initial support, such as budget, from the government is crucial for firms a few years)

## 2. Definite principle of management

### 2-1. Clients finding

(Big energy consumers, such as steel works, refinery, and petrochemical complex)

### 2-2. Clear job description on each position

### 2-3. Improvement of energy saving procedures

# The future development of its function

Energy Saving Target of Bulgaria, Environment protection

CO2 reduction is essential.

- EU accession conditions, 31 items, are fixed. Energy and, environment are listed up in the conditions.
- Implementation of the energy saving law from April 2000

**Strong necessity of the expansion of EEC function**

Narrow coverage of EEC activities and expanding of requirements in energy saving sector

# Future EEC function

Future EEC

Policy Making

**Audit (large energy consumer)**

1. Comprehensive energy saving in big factories
2. Energy saving by process improvement  
(EEC covers this field at present, but exclude process improvement.)

Auditor Training

(Effective use of donated equipment.)

ESCO business

Technology development

Information Technology

(Database service)

Publication service

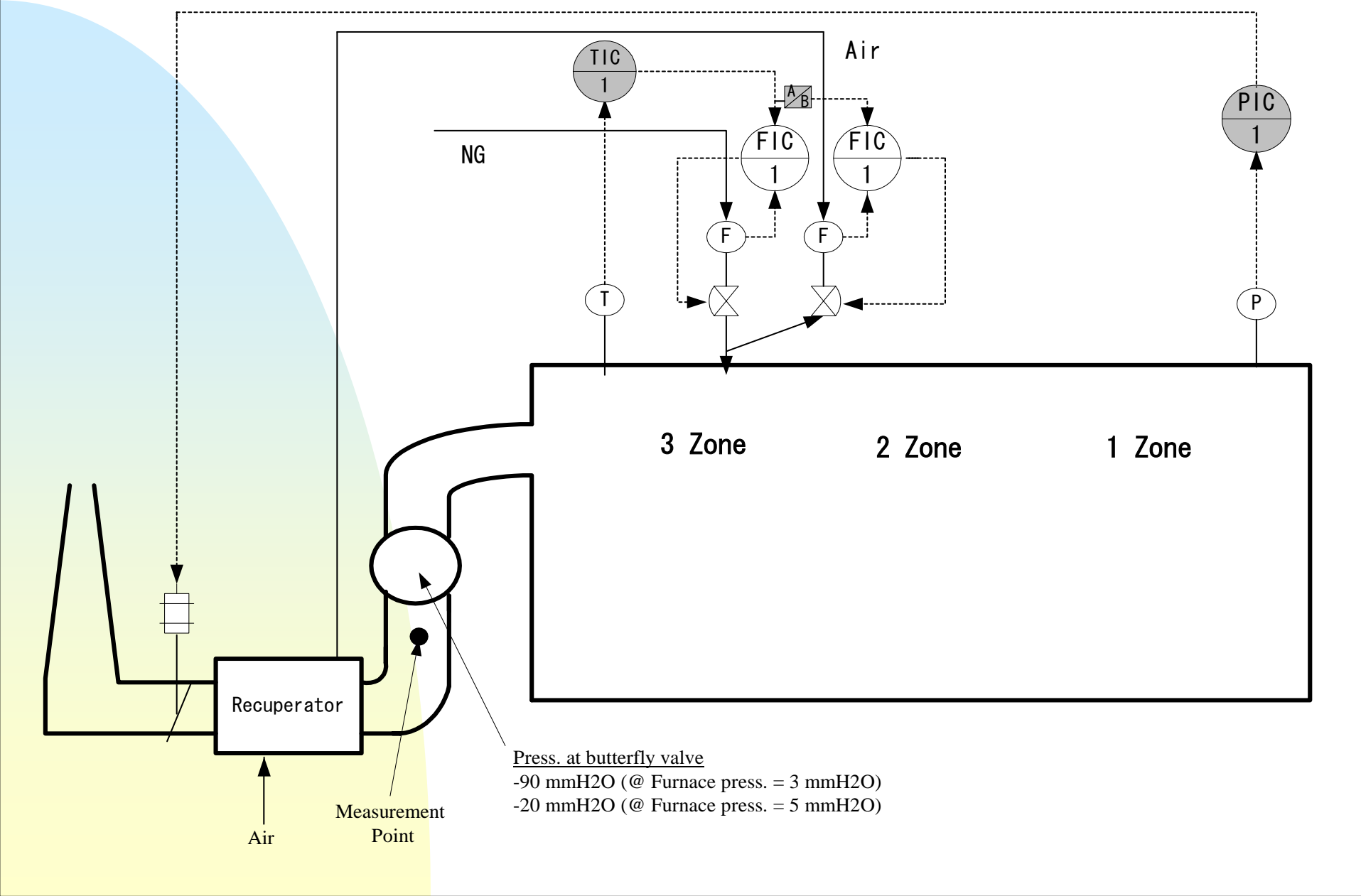
Auditor certificate issue



# Audit activities (example 1)

(Forging furnace)

# Furnace in steel industry



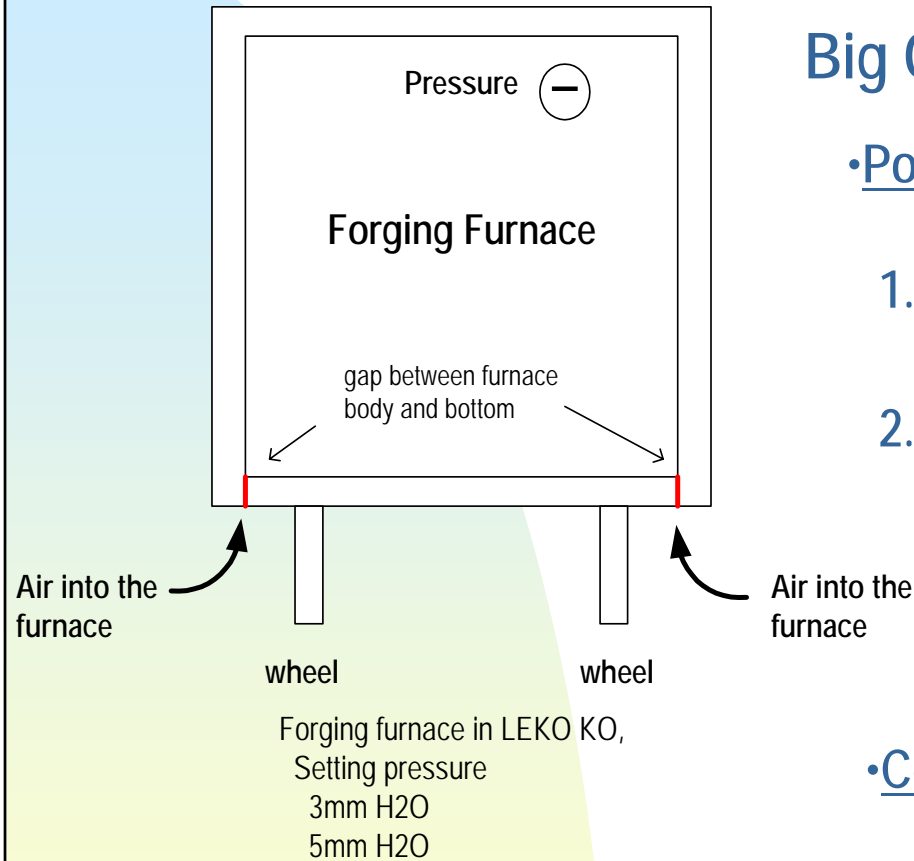


## What was the problem?

- High energy consumption
- High scale production (low yield)



# Solution to the problem



## Big O<sub>2</sub> content in the flue gas

### •Possible causes

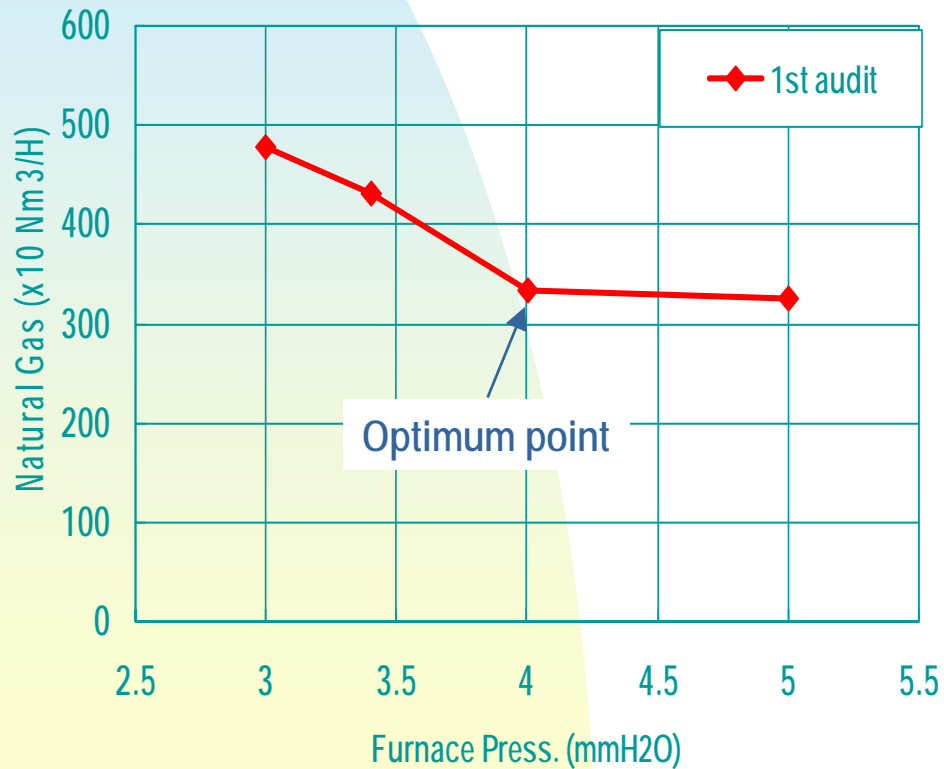
1. Air goes into the furnace through opening
2. Furnace pressure is lower than the design condition

### •Countermeasure

Slight increase of the furnace pressure

# Final recommendation

The optimum operation was confirmed as 4mmH2O.



1. 30% of fuel consumption reduction
2. 1-2% of scale production

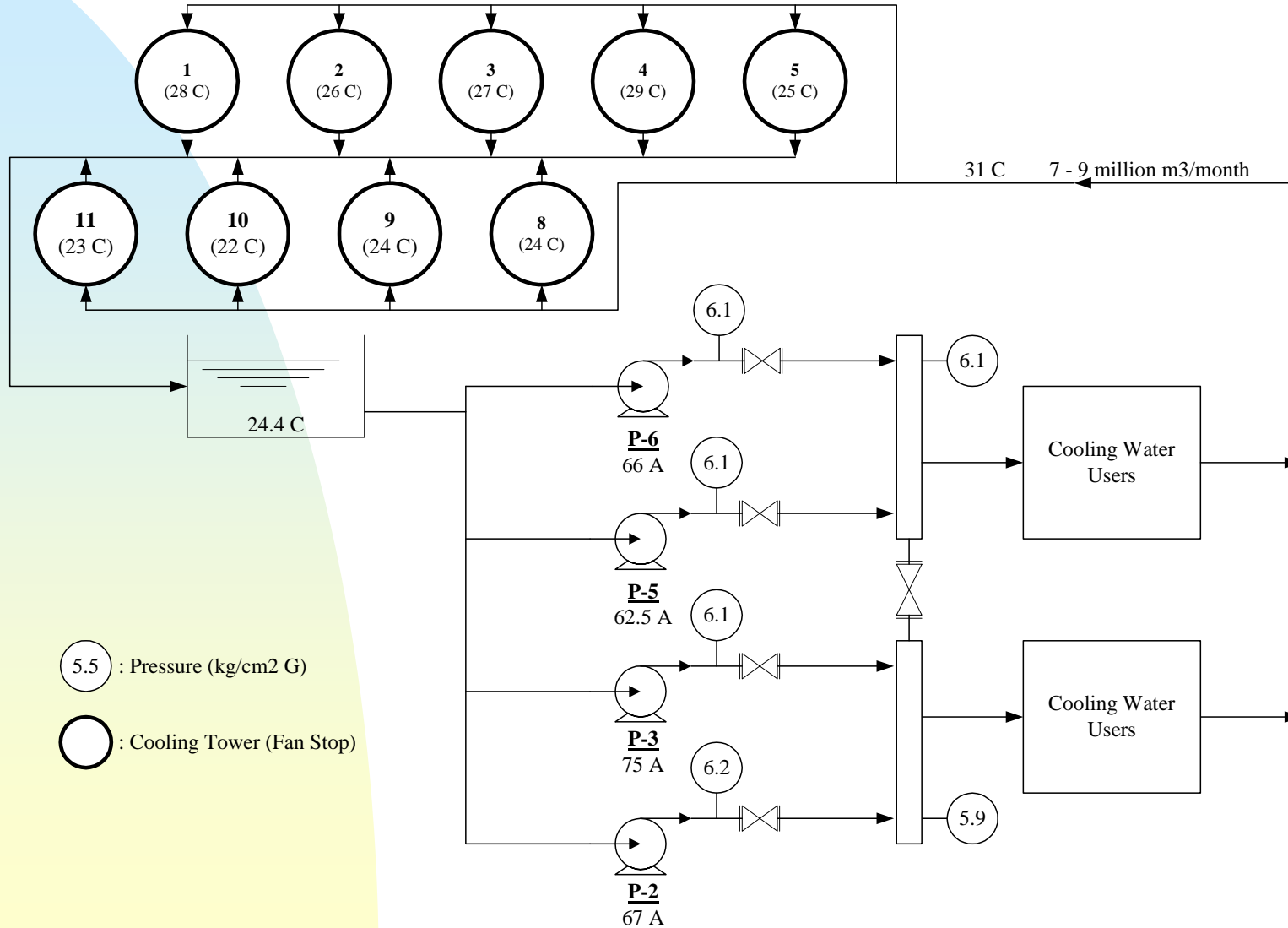


# Audit activities (example 2)

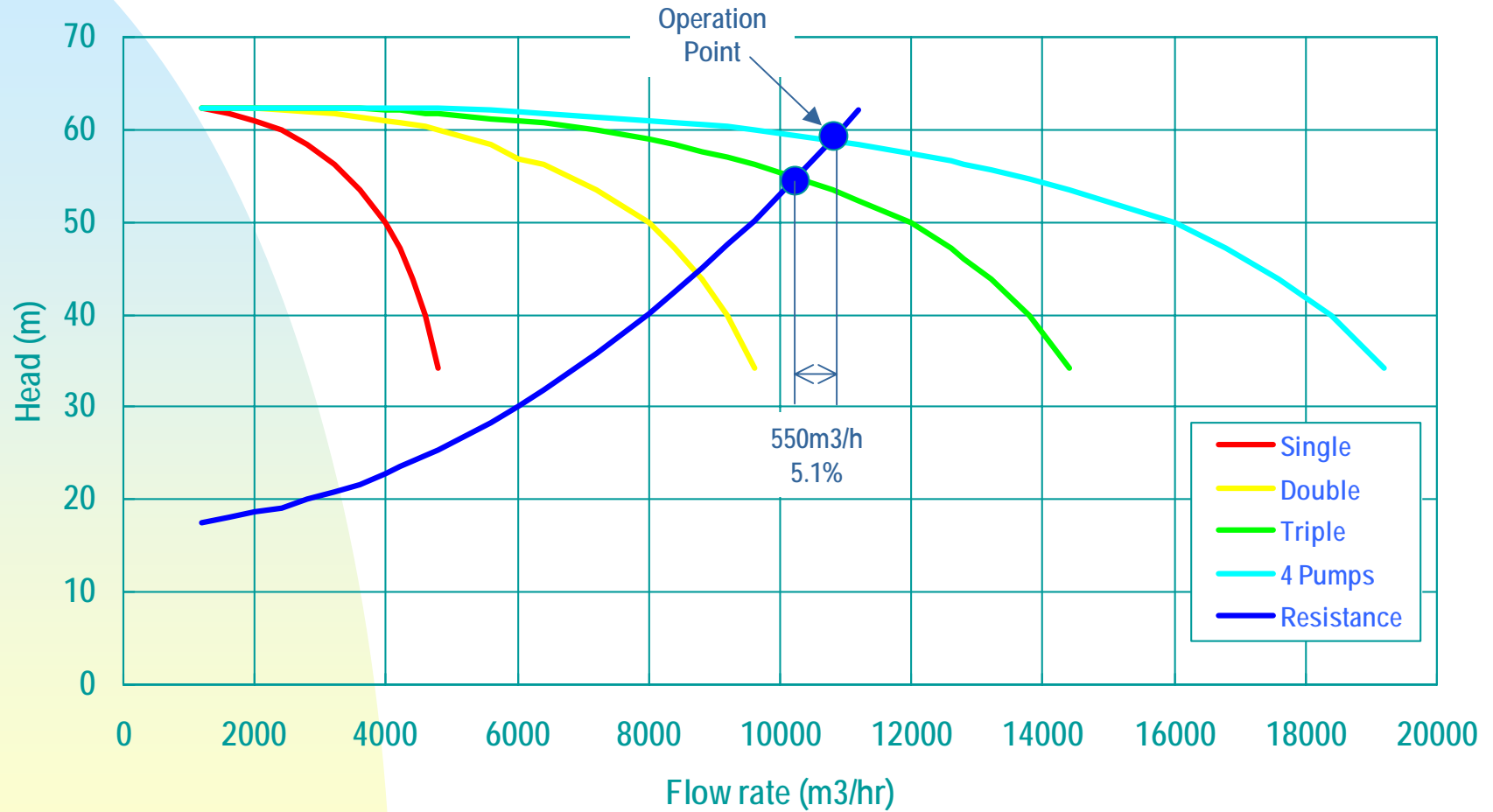
(Cooling water pumps)

# Cooling water system

## Pump Station No. 4 System



# Operation condition analysis



# Audit results

- The factory stopped one pump
  - Electricity saving is 374 kWh, which is 115,000 USD/year
- The factory agreed to check all of the pump stations with EEC, they have 10 big pump stations



# Photographs

(Bulgaria energy saving project)



Steel works  
(flue gas rate measurement)



Steel works  
(flue gas composition analysis)



Ruse water department  
(presentation on the audit results)



Seminar by EEC director  
(at Black sea energy center)





Textile factory audit  
(Japanese expert and counterparts)



Textile factory audit  
(Dryer exhaust gas rate measurement)



Steel works audit  
(Blower performance check)



EEC Seminar  
(at Varna)



Equipment  
(Donation from Japan)



Let's have a party !



Textbooks on energy saving  
(Bulgarian language version)



EEC locates in this building  
(Annex of the Ministry of Economy)



Our town Sofia

Thank you