October 30, 2003

12-2　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 Saving

Its necessity and procedure

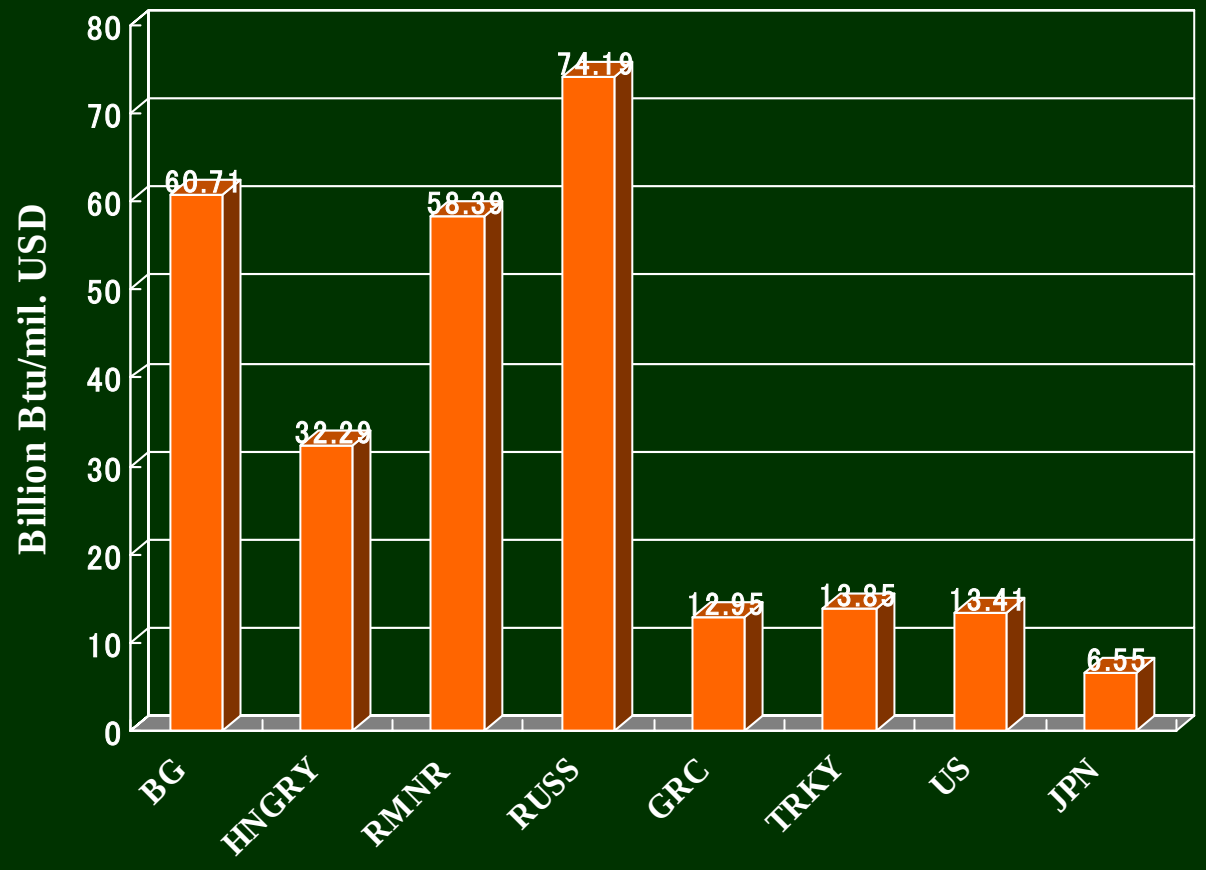
JICA
Ichiro Toyoda

2003/11/7

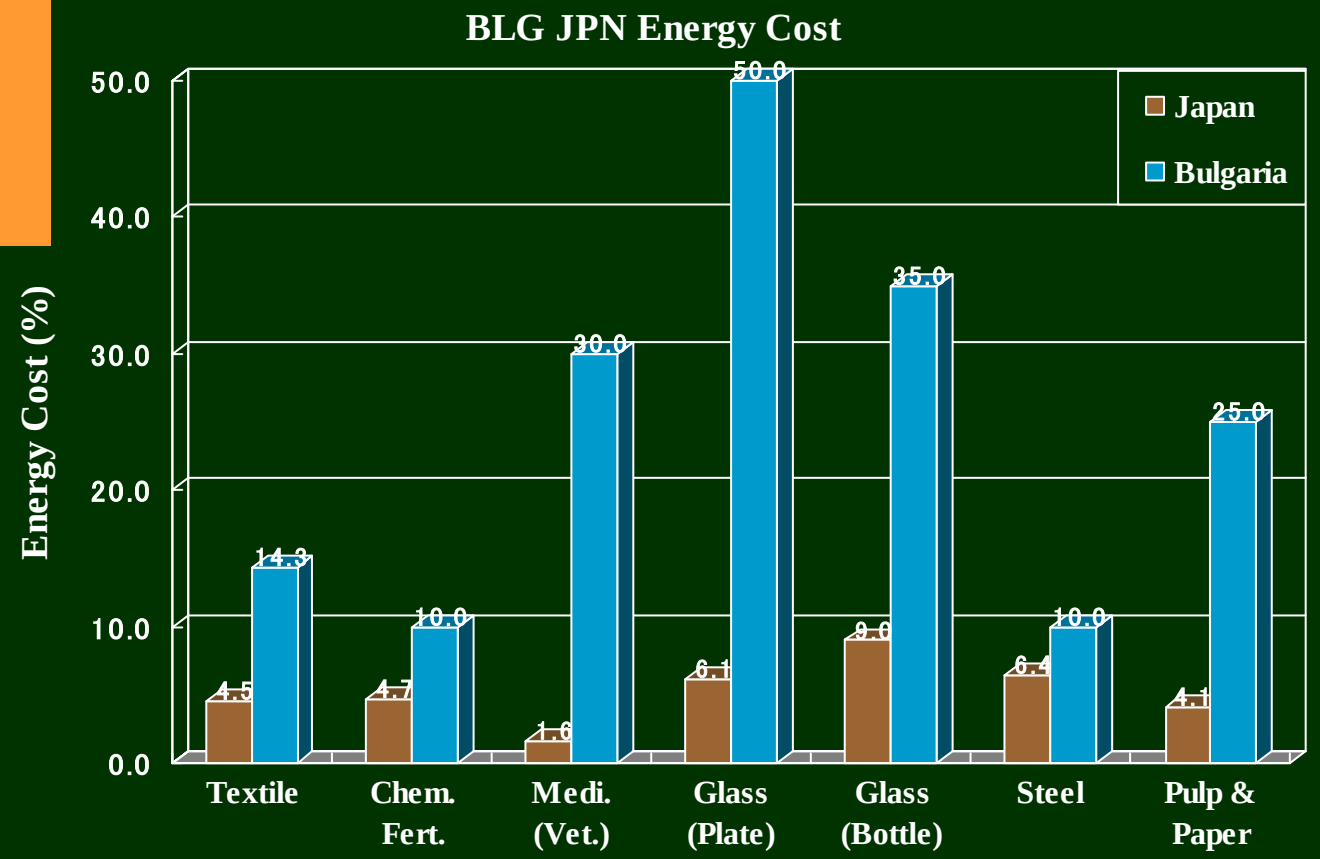
Why Energy Saving?

- Big energy cost.
- CO2 problem.
- The enforcement of the Energy Law.

Primary Energy Consumption per GDP (in 1998)



Big Energy Cost



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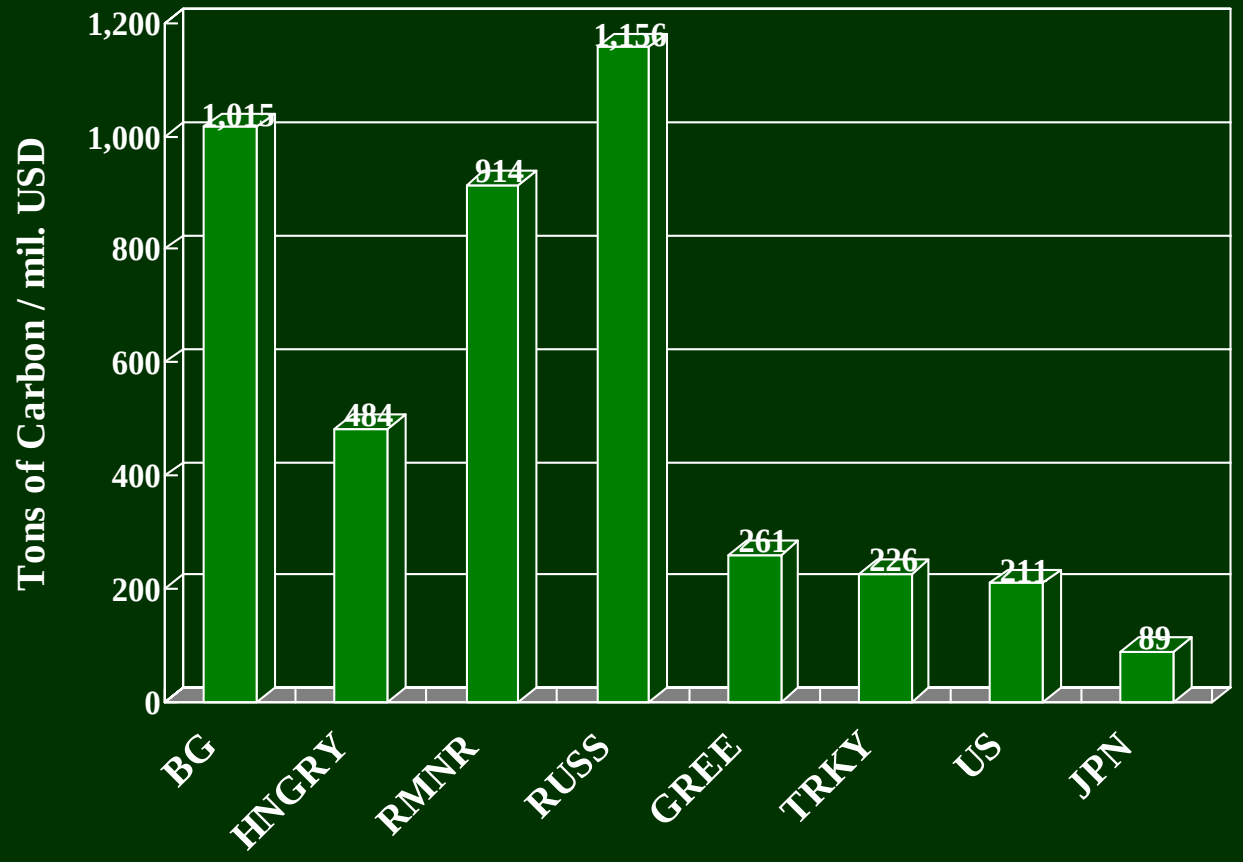
CO2 Emissions per GDP

(in 1998)



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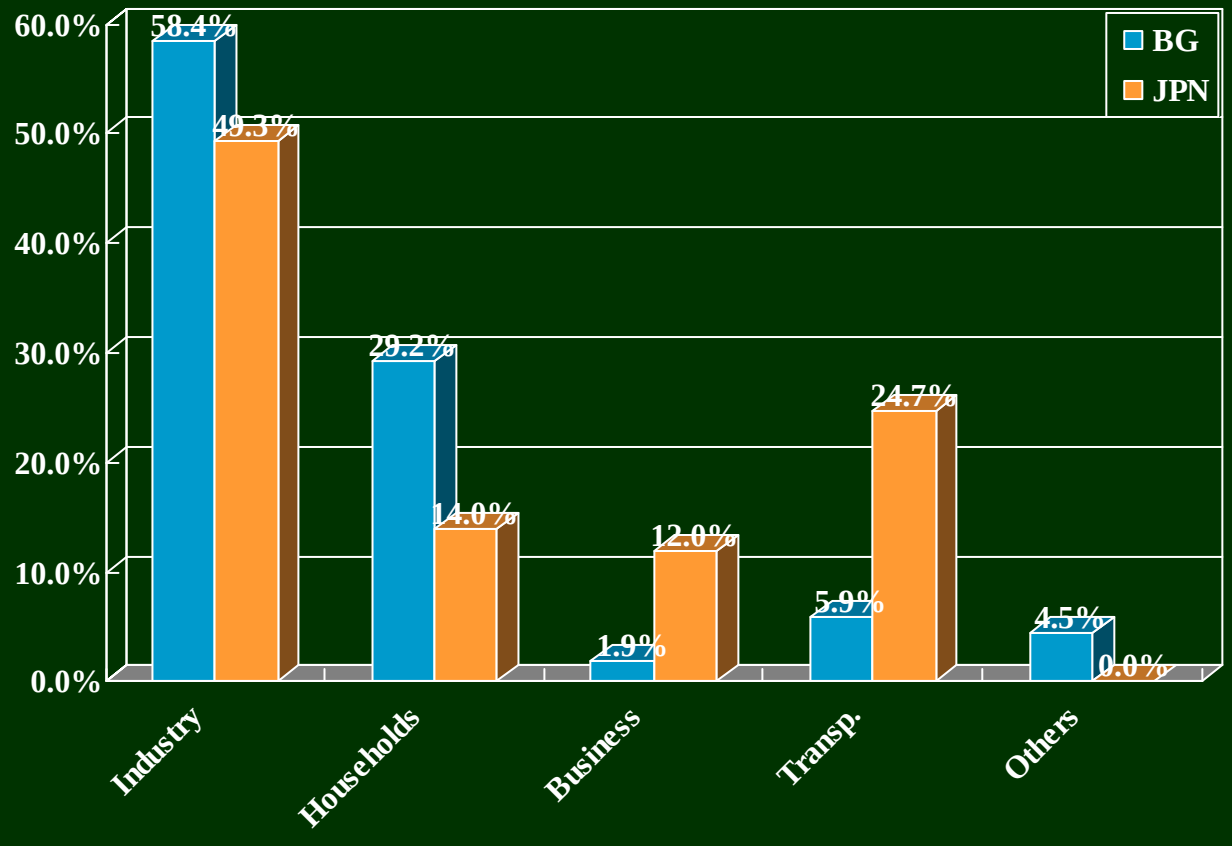
Energy Consumption Structure
(in 1997)



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CO2 Problem

- Bulgaria's 8% Commitment
- 6.6 mil. ton of CO2 reduction is necessary.
  (total emission in 1990 is 82.6 mil. ton)
- CO2 reduction has been done by less fossil fuel burning
  (Energy Saving)

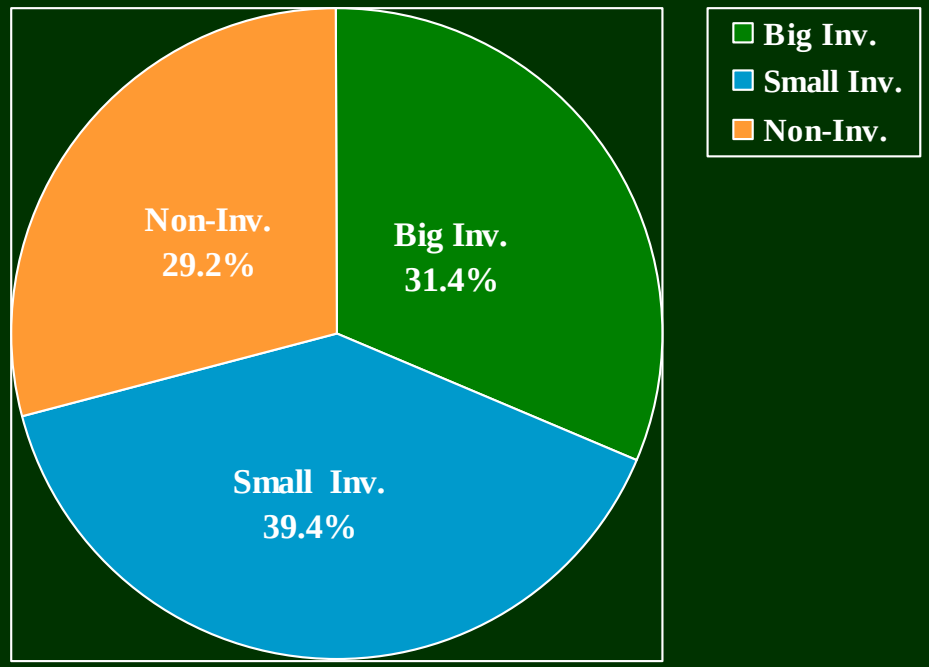
The New Energy Law

- Obligation of energy audit
- Enforcement of remedy
  (if you have been pointed out some violations)
- Penalty
  (when you do not conform the norms)

Invest or Not Invest?

(We can do without Money)

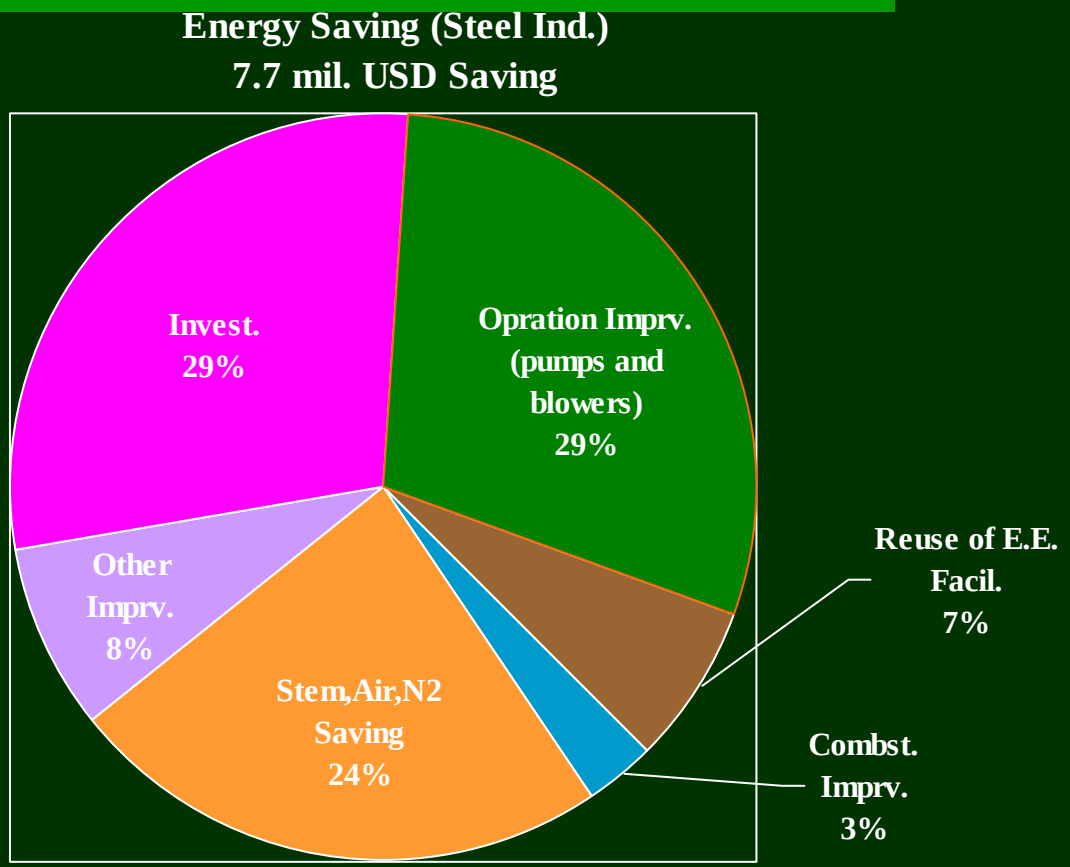
- Investment is not always needed
  - Small Inv. : less than 200,000 USD
  - Big Inv. : more than 200,000 USD



Invest or Not Invest (cont'd)

- Operation Improvement (non investment)
- Plant Retrofit (investment)
- First priority is Operation Improvement

Japanese Experience of Non-invested Energy Saving



The Procedure of Energy Saving

- Get to know the current energy loss
  - Measure the energy consumption
  - Identify the energy loss
- Set the target
  - How much energy saving should be done?
  - Let’s say, 10% or 15%

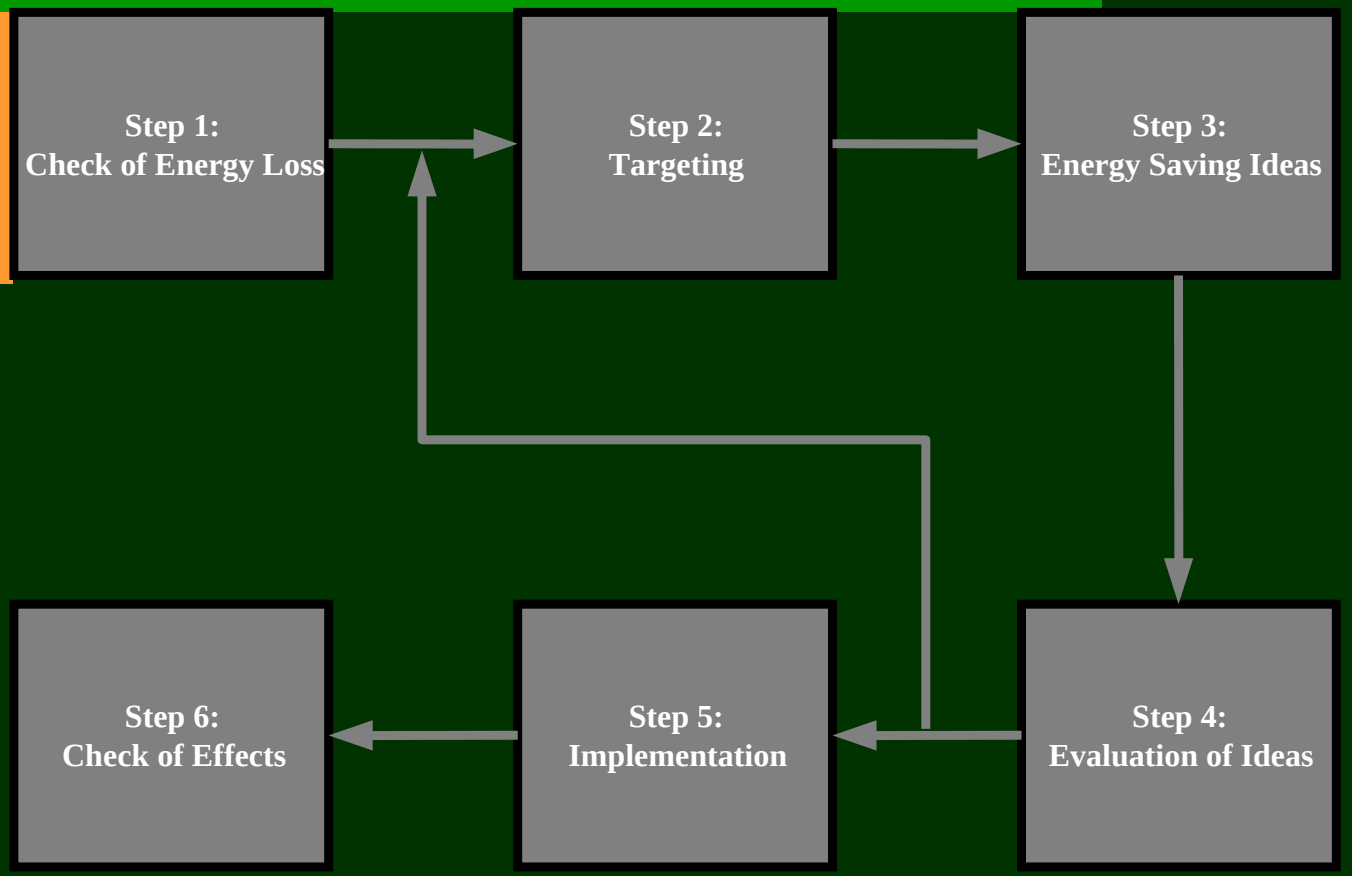
The Procedure of Energy Saving (cont'd)

- Create ideas
  - How to hit the target?
  - The more, the better
- Evaluate the ideas
  - Sort out the practical ideas
  - Make rough cost estimation for the each idea
  - Take another look at the target

The Procedure of Energy Saving (cont'd)

- Select ideas (in case of investment)
  - The payback period
  - Return On Investment (ROI)
- Implement selected ideas
  - Who takes charge the implementation?
    - The energy division
- And keep an eye on the energy consumption change
  - The energy division is the watchdog

The Procedure of Energy Saving (cont'd)



What makes Energy Saving Successful?

- Organize Energy Saving Group
  - Hold the regular meetings
  - Establish the energy policy
- Give the incentive to your employees
  - Give your employees rewards (Let them create more ideas, etc.)
  - But…

The Biggest Driving Force

- None but the **CEO** and his **MANAGEMENT TEAM** can be a engine of Energy Saving.

Investment for Energy Efficiency & Emissions Reductions (EEER) in Bulgaria

Date: September 19, 2000

ECC BG

Difficulties of Financial Arrangement

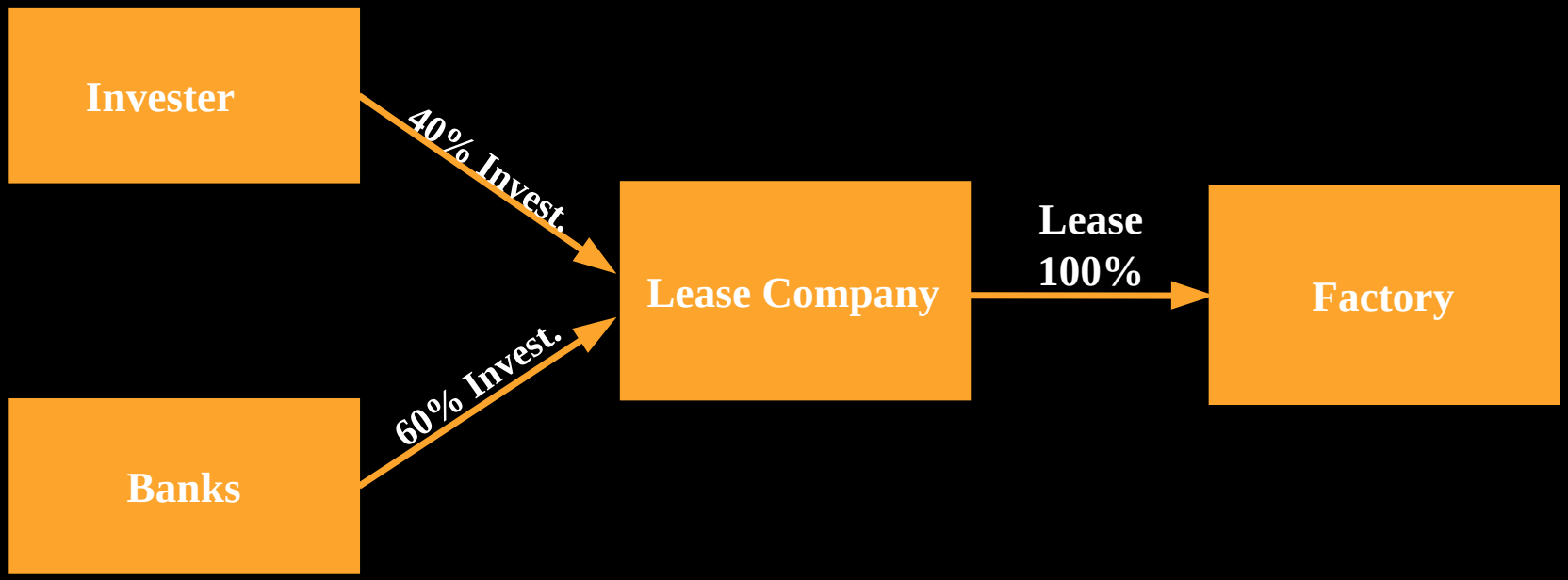
- **Official Finance**
  - **Guarantee Required**
  - **Complicated and Slow Procedure**
- **Private Finance**
  - **Guarantee Required**
  - **Severe Loan Condition**

No possibility for most of companies to arrange finance

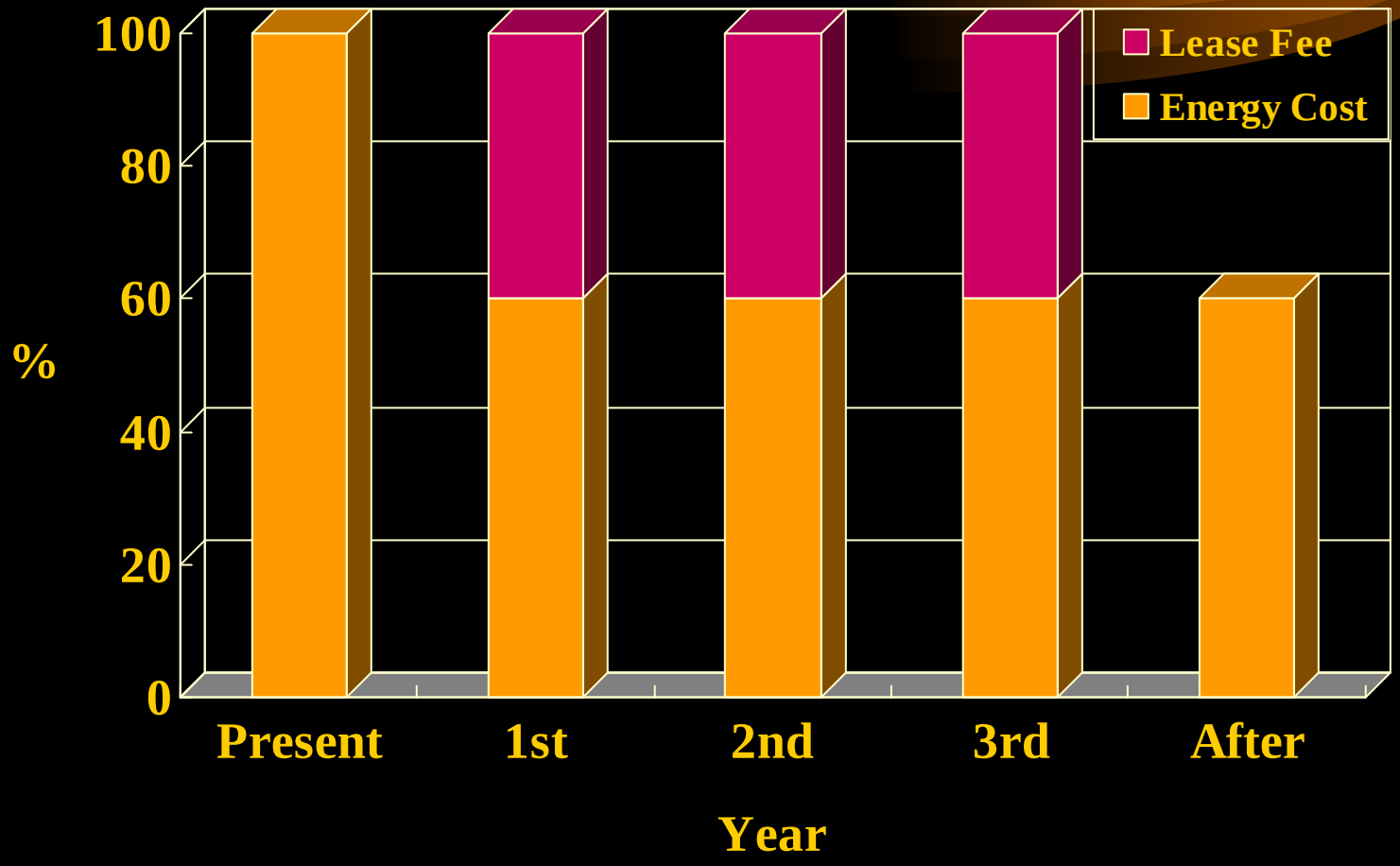
Features of EEER Project

- **Establishment of Lease Company**
- **Lease of Asset**
- **Lease fee without additional burden**
- **3 to 5 years Lease Period**
- **Guarantee, No Need**
- **Lease Assets, Your Property**

Scheme of Lease Company

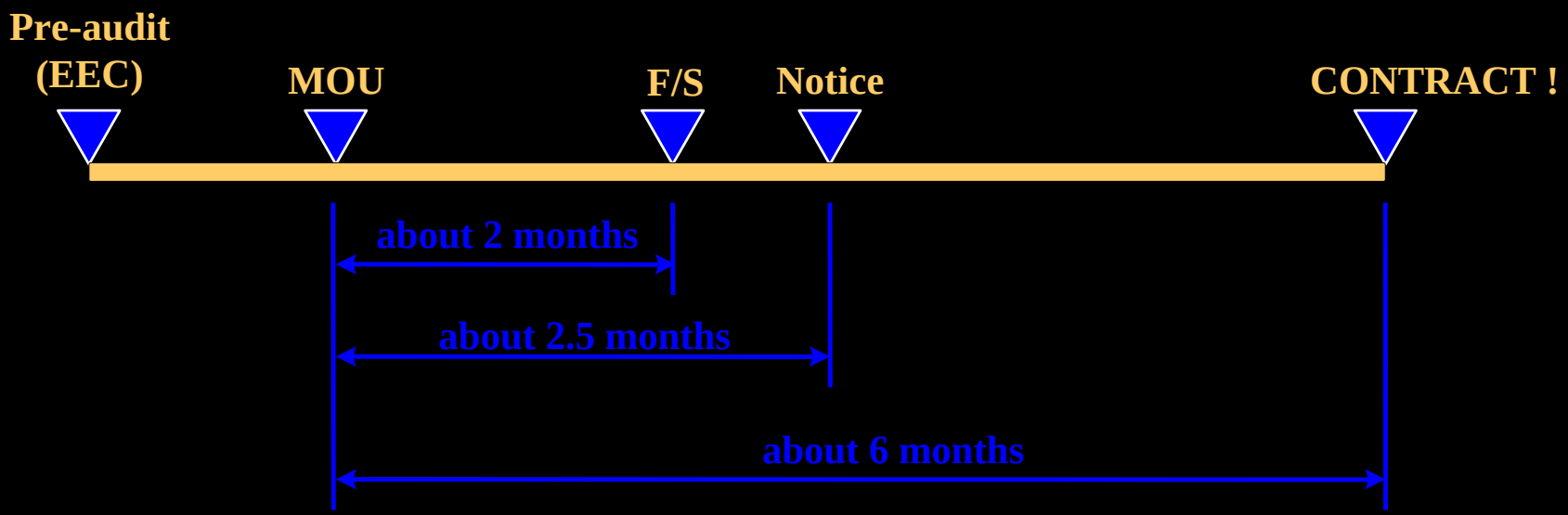


Lease Fee Payment



The Way to the Contract

EEC: Energy Efficiency Center
MOU: Minutes of Understanding
F/S: Feasibility Study
MCEC: MC ENGINEERS



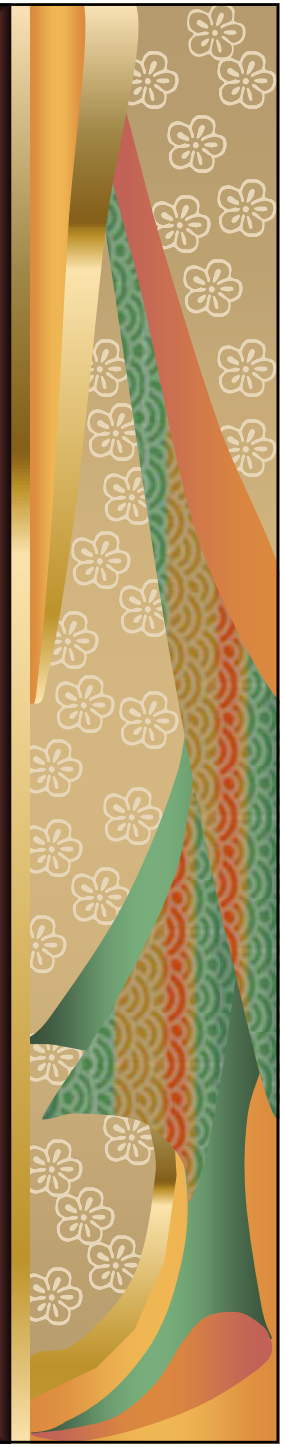
Energy conservation diagnosis report

(Kremikovtzi Co., Ltd.)

Energy Efficiency Center BG

Problem findings

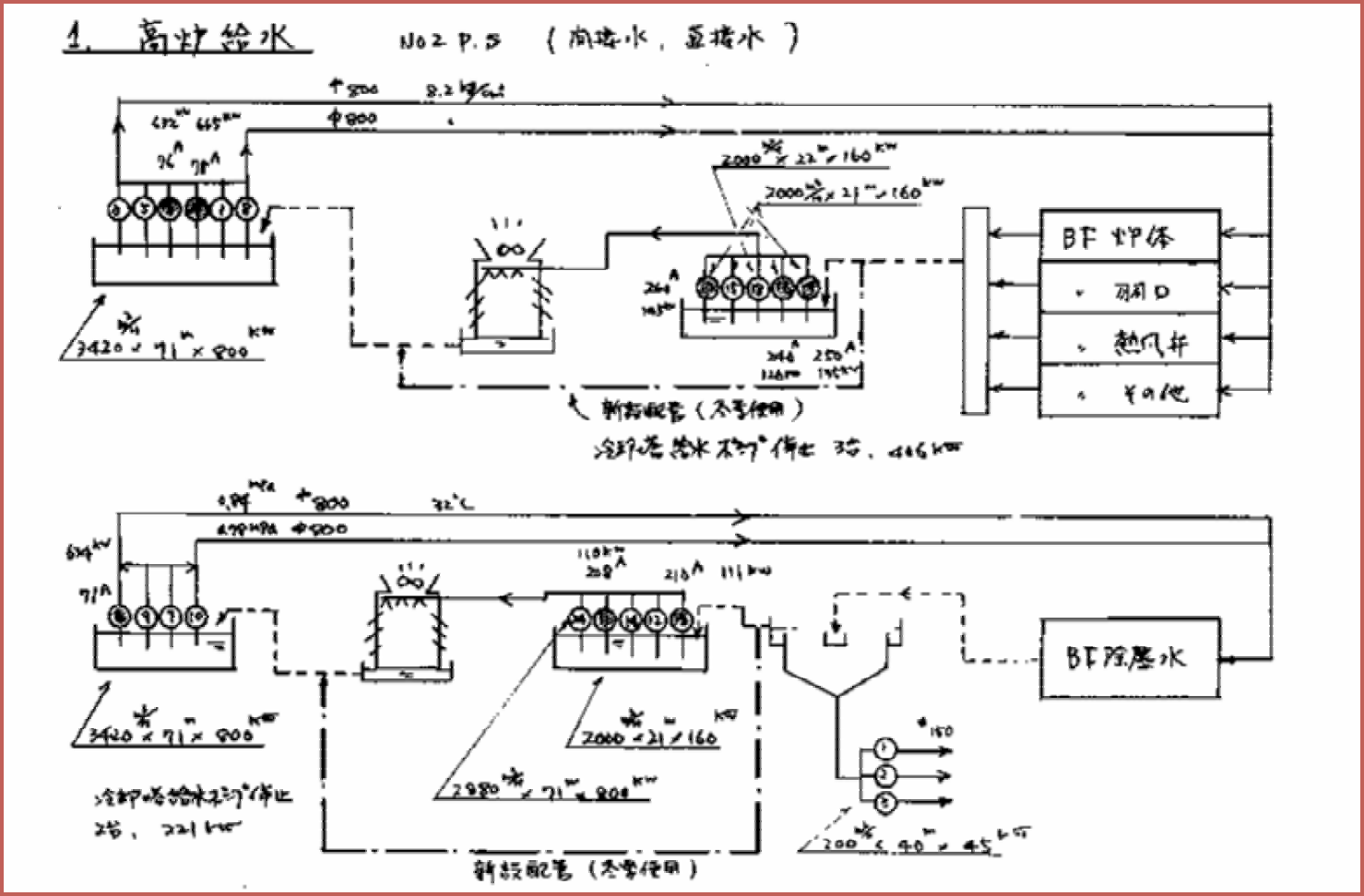
- No close communication is taken among the energy section and the production sections.
- The energy section has no idea on how and how much energy is consumed in the production process.
- No one cares about the optimum point on energy consumption.



Cooling Water Pump System Energy Saving

(examples)

Blast Furnace cooling water system



Compressed Air System Energy Saving

(optimum operation)

The Effect of the Saving

Merit estimation

Power consumption (current)	21,800 kW
Power consumption (energy saving)	19,500 kW
Effect	
(Elec. Price = 0.04 USD/kWh)	2,300 kW 20,148,000 kWh/y 806,000 USD/y

Present Operation

	Nm3/h	kW
Supply side	95,000	8,500
	95,000	8,500
total	190,000	17,000

	Nm3/h
02 PLANT	85,000
02 PLANT	65,000
Factory	60,000
total	210,000

	Nm3/h	kW
Supply side	15,000	1,200
	15,000	1,200
	15,000	1,200
	15,000	1,200
total	60,000	4,800

Leak quantity	40,000

total	250,000	21,800

Energy Saving Case

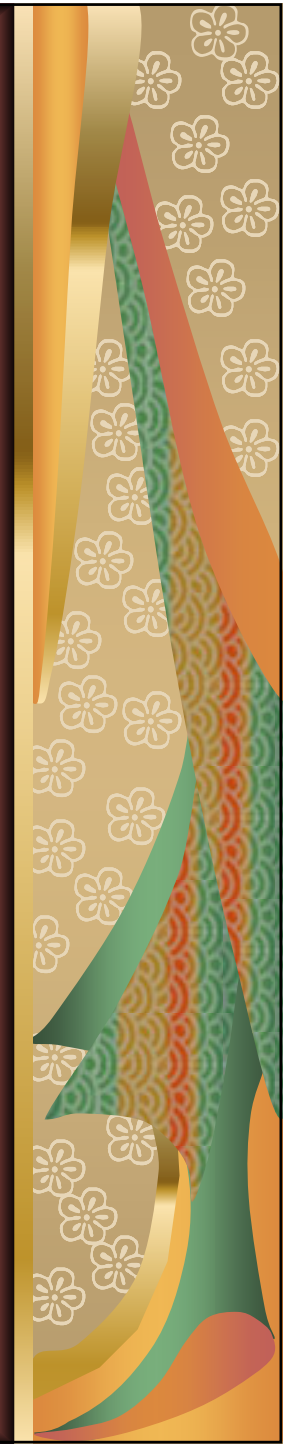
	Nm3/h	kW
Supply side	95,000	8,500
	65,000	6,200
total	160,000	14,700

	Nm3/h
02 PLANT	85,000
02 PLANT	65,000
Factory	60,000
total	210,000

	Nm3/h	kW
Supply side	15,000	1,200
	15,000	1,200
	15,000	1,200
	15,000	1,200
total	60,000	4,800

Leak quantity	10,000

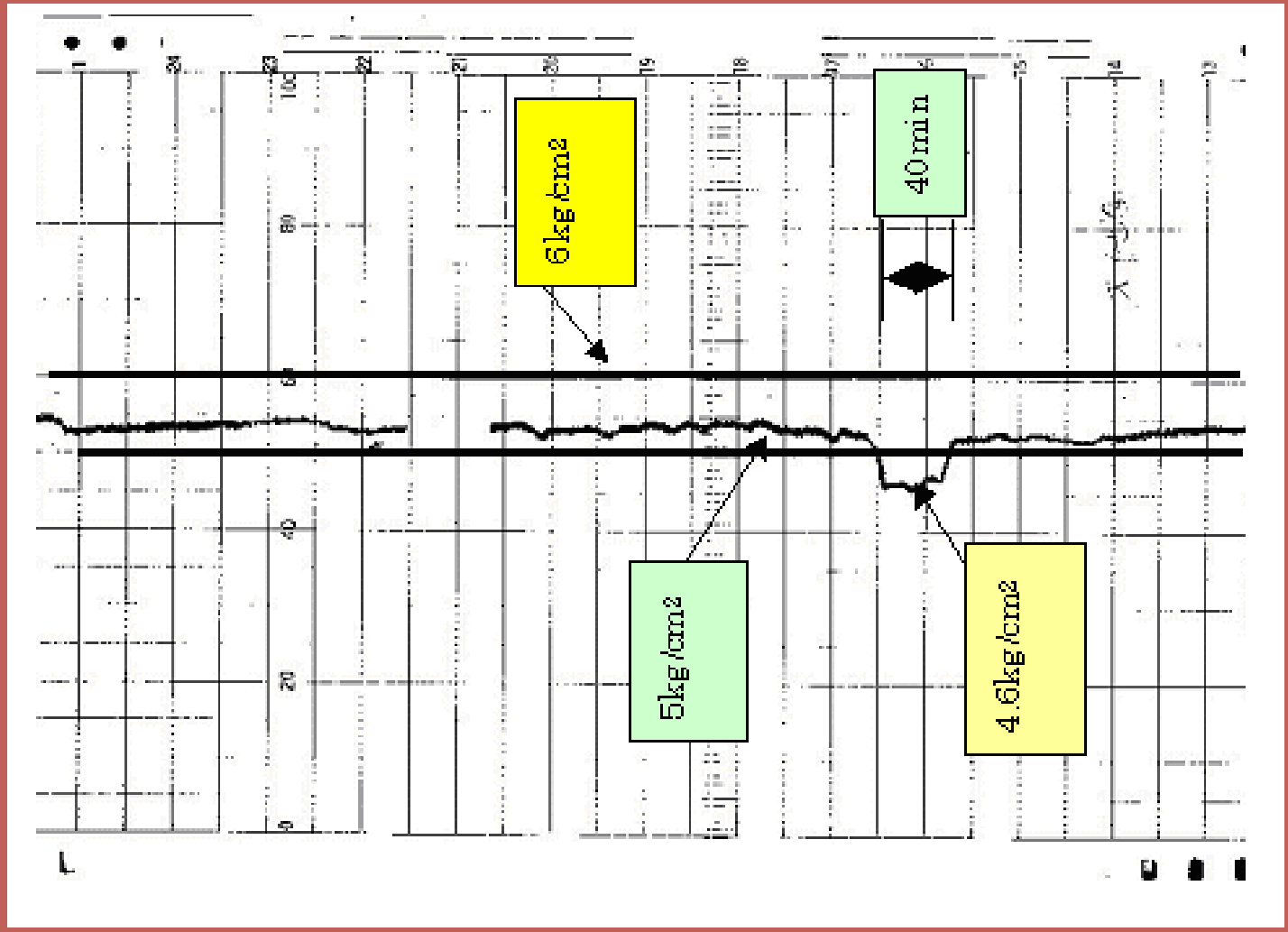
total	220,000	19,500



Compressed Air System Energy Saving

(operation pressure)

Compressed Air Operation Pressure Data

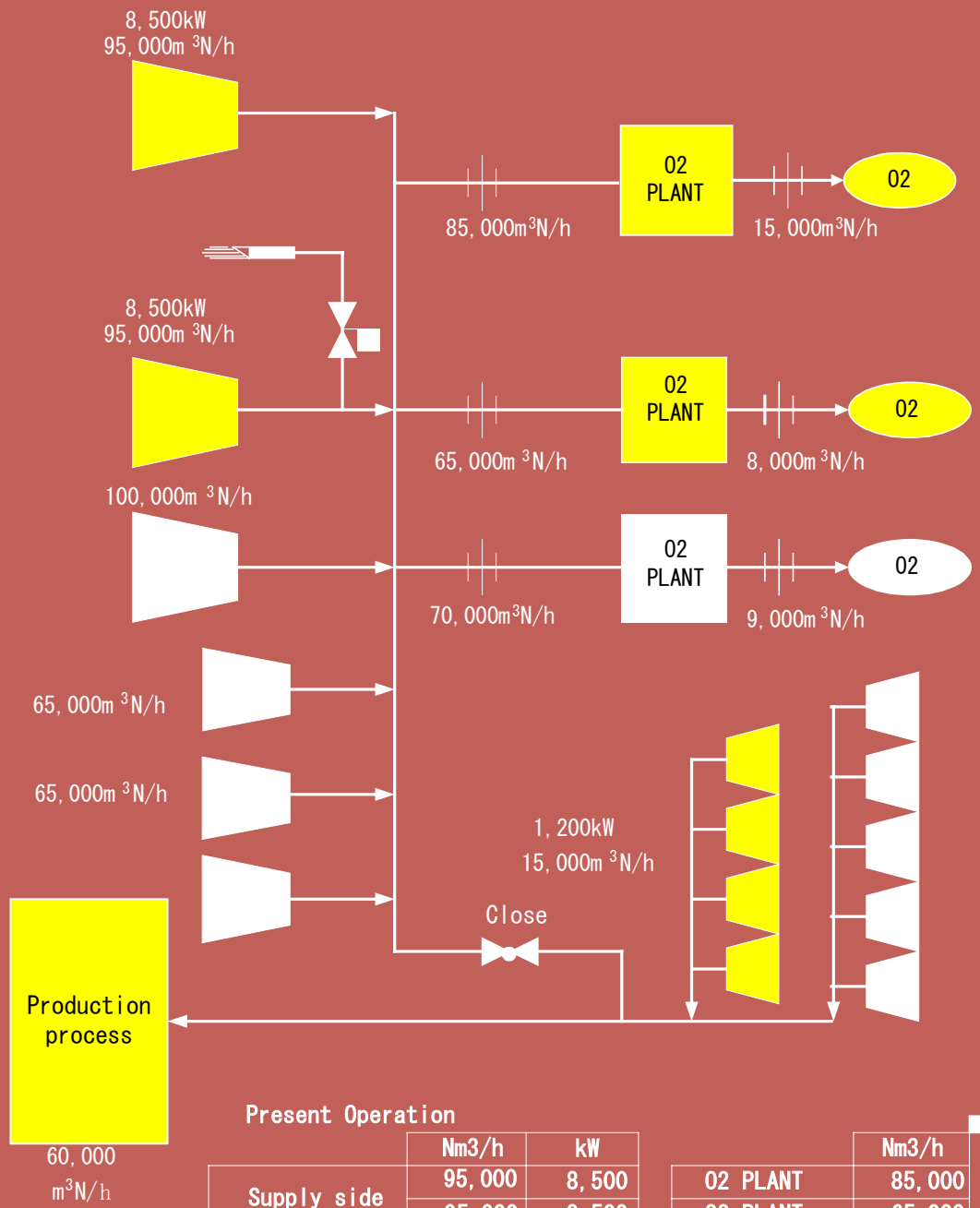


The Effect of the Saving

Merit estimation

Power consumption (current at 5.1 KG)	**6,300 kW**
Power consumption (energy saving case at 4.6 KG)	**5,900 kW**
Effect	
(Elec. Price = 0.04 USD/kWh)	**400 kW** **3,504,000 kWh/y** **140,160 USD/y**

Air Compressor Operation Mode of Kremikovtzi (Present Operation)



Present Operation

	Nm3/h	kW
Supply side	95, 000	8, 500
	95, 000	8, 500
total	190, 000	17, 000

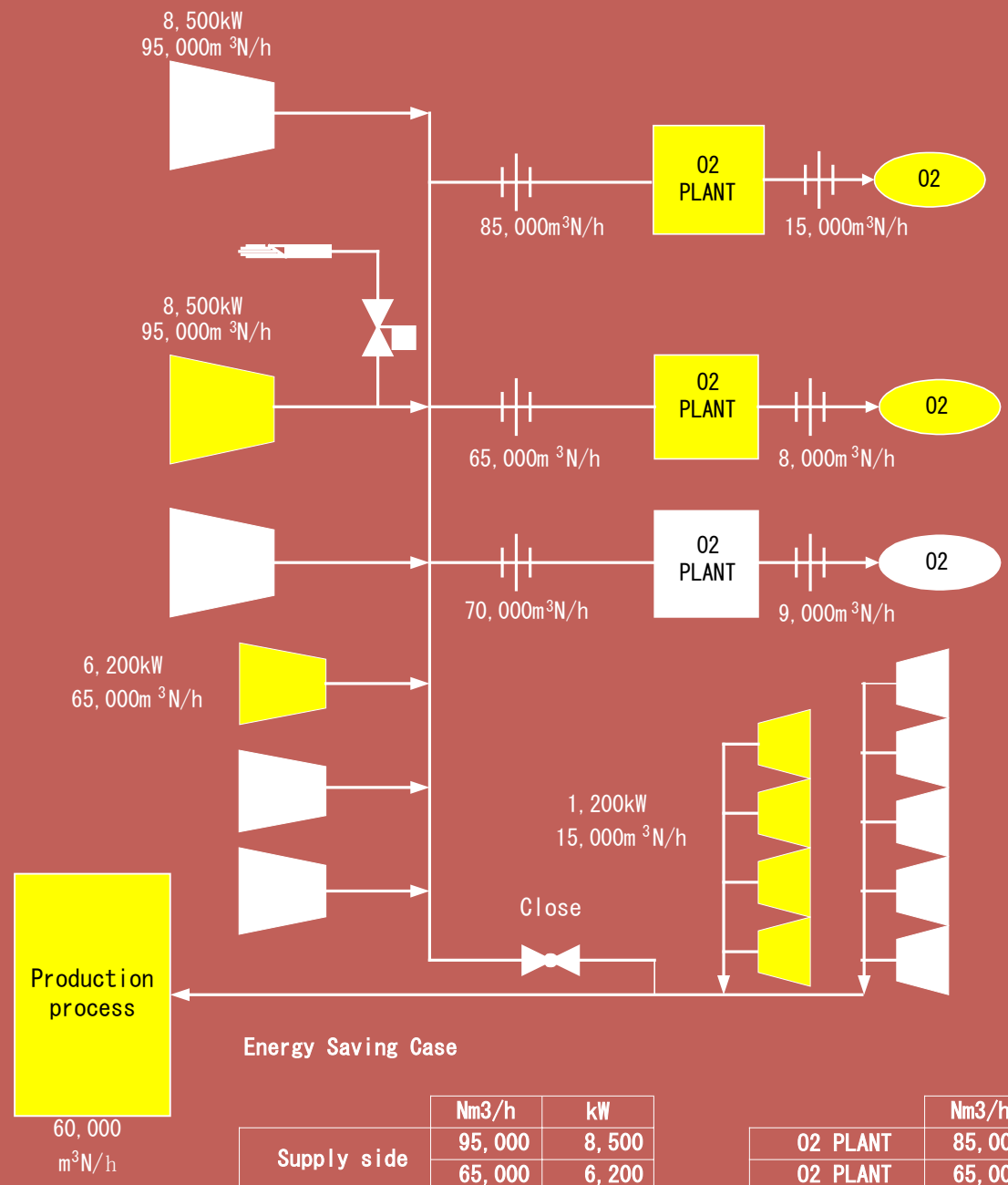
	Nm3/h	kW
Supply side	15, 000	1, 200
	15, 000	1, 200
	15, 000	1, 200
	15, 000	1, 200
total	60, 000	4, 800

total	250, 000	21, 800

	Nm3/h
02 PLANT	85, 000
02 PLANT	65, 000
Factory	60, 000
total	210, 000

Leak quantity	40, 000

Air Compressor Operation Mode of Kremikovtzi (Energy saving operation)



Energy Saving Case

	Nm3/h	kW
Supply side	95, 000	8, 500
	65, 000	6, 200
total	160, 000	14, 700

	Nm3/h
02 PLANT	85, 000
02 PLANT	65, 000
Factory	60, 000
total	210, 000

	Nm3/h	kW
Supply side	15, 000	1, 200
	15, 000	1, 200
	15, 000	1, 200
	15, 000	1, 200
total	60, 000	4, 800

Leak quantity	10, 000

total	220, 000	19, 500