

Data base for the RUE project identification in the energy intensive industrial branches

Introduction

The activity aims at improving the existing information fund by developing data tables of the identified energy efficiency projects in the energy intensive branches, including the following main points:

- establishment of the national economic branches in agreement with the Static Year book;
- energy consumption analysis by the economic branches previously established;
- identification of the energy intensive branches (based on the energy intensive branches);
- energy efficiency projects identification the established energy intensive branches;
- table completion with identified UER projects;
- conclusions;

Chapter 1

Energy consumption Analysis by National Economics Branches in 1999

1.1 Romanian energy consumption structure analysis

The structure of the energy consumption by the entire national economy gives us an overall view on the economic branches. Branches and sectors of the national economy should carry out the analysis.

Tables 1.1 presents the energy activities of the national economy in 1999.

Table 1.1 Energy balance by activities of the national economy in 1999.

Consumption	Total energy [thousand t.c.c]	Electricity		Heat	
		[GWh]	[thousand t.c.c]	[thousand Gcal]	[thousand t.c.c]
Primary energy generation (output)	4070	18290	2249	12734	1821
Imports	136	1103	136	-	-
Stock at the beginning of the year	-	-	-	-	-
Resource – total	4206	19393	2385	12734	1821
Exports	237	1930	237	-	-
Bunkers	-	-	-	-	-
Stock at the end of the year	-	-	-	-	-
Gross domestic consumption	3969	17463	2148	12734	1821
Transformation input	1821	-	-	12734	1821
Traditional thermal power stations	-	-	-	-	-
NPP	1821	-	-	12734	1821
District heating station	-	-	-	-	-
Briquetted coal plants	-	-	-	-	-
Cocking plants	-	-	-	-	-
Furnaces	-	-	-	-	-
Oil refineries	-	-	-	-	-
Other fields	-	-	-	-	-
Transformation output	11357	32423	3988	51530	7369
Conventional therm, power statios	3349	27225	3349	-	-
Nuclear power station	639	5198	639	-	-
Heat plants	7369	-	-	51530	7369
Patent fuel plants	-	-	-	-	-
Coke- oven plants	-	-	-	-	-
Blast – furnace plants	-	-	-	-	-
Oil refineries	-	-	-	-	-
Other fields	-	-	-	-	-
Transfers	-	-	-	-	-
Consumption of the Energy Sector	1903	9573	1157	5075	726
Losses	1760	6387	786	6810	974

Available for final Consumption	9842	33926	4173	39645	5669
Non – energy	-	-	-	-	-
Final energy consumption	9415	31853	3918	38440	5497
Industry	3179	20348	2503	4728	676
Mining of metal ores	57	462	57	1	0
Other mining and quarrying	14	119	14	2	0
Food, beverages and tobacco	243	1192	146	682	97
Textile and textile products	59	298	37	157	22
Textile, fur and leather wearing apparel	33	134	16	120	17
Leather goods and foot wear	12	55	7	33	5
Wood and products of wood	39	184	23	109	16
Pulp, paper and paper product	88	536	66	151	22
Publishing printing and reproduction of recorded media	4	13	1	22	3
Chemistry and chemical products	585	2884	355	1606	230
Rubber and plastics products	48	257	32	116	16
Other non-metallic mineral products	251	1811	223	193	28
Metallurgy	934	7346	903	214	31
Metal products, machinery and equipment	475	2876	354	845	121
Furniture and other unclassified activities	70	339	42	195	28
Waste recovering	1	6	1	2	0
Water collection, treatment and distribution	162	1250	154	56	8
Constructions	104	586	72	224	32
Transport	240	1494	184	391	56
Households	5332	7883	970	30503	4362
Agriculture and forestry	203	786	97	740	106
Other economic activities	462	1342	165	2078	297
Statistical difference	427	2073	255	1205	172

*Including recovered products

Source: Energy balance of the final energy system, 2000

Table 1.2 presents the final energy consumption in 1999.

	Table 1.2 Thousand t.p.e
Industry (including constructions)	8638
Agriculture, forestry and fishing	464
Transport	3139*
Other activities	794
Population	8757

*In agreement with the international methodology, communications are included in other activities

Source: Romania's statistic yearbook 2000.

Fig 1.2 presents the share of the economic activity branches consumption within the total energy consumption in 1999.

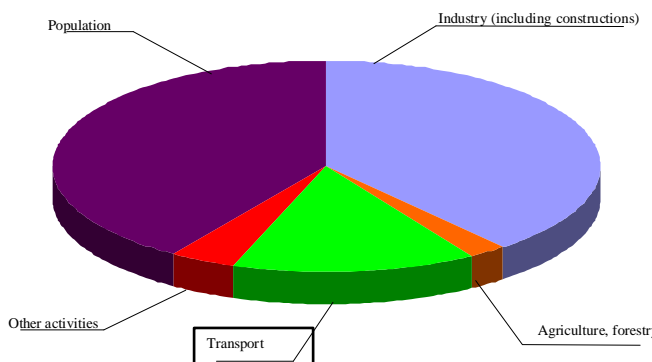


Fig 1.2 Share of economy branches consumption within total consumption in 1999.

If we analyse the tables 1.1 and 1.2 and figure 1.2 we shall notice that:

- Final energy consumption at the level of the entire economy significantly increased in 1999 at the level of population (8757 thousand t.p.e) and decrease at the level of industry (8638 thousand t.e.p) registering comparable values.;
- Although energy consumption in industry registered a significant decrease, it still holds an important share within the total energy consumption (39,6% of the total energy consumption). Considering that the privatization process is drawing to its end it is to be expected that an industry energy consumption stabilization be registered in the following period of time, and even its slight increase on the medium term was a result of economic recovery;
- Domestic consumption share is of about 40,1% of the total energy consumption on the increase due to the households equipping with household appliances, especially heating devices (solution) consuming electricity (electric radiators, resistance heating, etc.) in the context of the district heating system. We expect that an increase in domestic consumption will be registered at the same time with the medium term increase of the living standard.
- Energy consumption in agriculture had a relatively steady evolution over the last years, amounting to about 2.1% of the total consumption in 1999. The very low value of consumption is due to giving the irrigation systems, which were great every consumers. In the context of the expected future development of agriculture, consumption will probably increase in this economic branch as well.
- Consumption in the transportation sector holds about 14.4% of the total consumption in Romania. As the railroad infrastructure will develop the Bucharest underground will be extended, urban electric transportation developed (out of environmental reasons), it is expected that electricity consumption register a significant increase in this field.
- In agreement with the international methodology, communications are included in "other activities" with an approximate share of 3.6% of the total consumption.

Considering the actual situation of energy consumption, we can classify the branches of the national economy as follows:

1. domestic consumption;
2. industry (including constructions);
3. transport;
4. other activities (including communications);
5. agriculture, forestry and fishing.

Further we will develop an analysis of energy consumption by industrial branches.

1.2 Analysis of electricity consumption by industry

The economic branch with the highest energy consumption, besides population, is industry. The structure of energy consumption by industry is presented in table 1.3.

Table 1.3.

Consumption	Total energy [thousand t.c.c]	Electricity		Heat	
		[GWh]	[thousand t.c.c]	[thousand Gcal]	[thousand and t.c.c]
Industry	3179	20348	2503	4728	676
Mining of metal ores quarrying	57	462	57	1	0
Other extractive activities	14	119	14	2	0
Food, beverages and tobacco	243	1192	146	682	97
Textiles and textile products	59	298	37	157	22
Textile, fur and leather wearing apparel	33	134	16	120	17
Leather goods and foot wear	12	55	7	33	5
Wood processing (excluding furniture)	39	184	23	109	16
Pulp, paper and cardboard	88	536	66	151	22

Publishing houses, polygraphy and records reproduction on supports	4	13	1	22	3
Chemistry and synthetic and man made fibres	585	2884	355	1606	230
Rubber and plastics processing	48	257	32	116	16
Other nonmetallic products	251	1811	223	193	28
Metallurgy	934	7346	903	214	31
Metallic construction, machinery and equipment	475	2876	354	845	121
Furniture and other non-classified activities	70	339	42	195	28
Waste and recyclable material recovery	1	6	1	2	0
Water collection, treatment and distribution	162	1250	154	56	8
Constructions	104	586	72	224	32

Source: Energy balance of the final energy system, 2000

Figures 1.3 – 1.5 present the shares of industrial branches consumption in 1999.

Fig 1.3 Share of consumption by industrial branches within total industry consumption (1999).

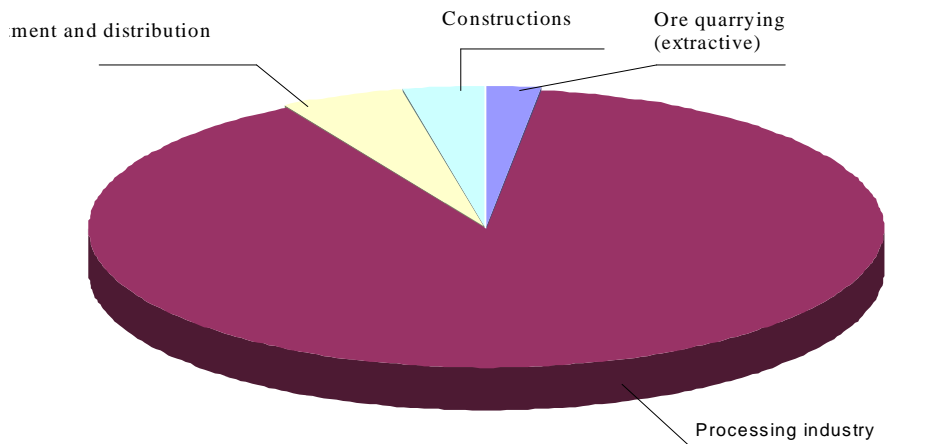


Fig. 1.4 Share of consumption of the extractive industry branches (1999).

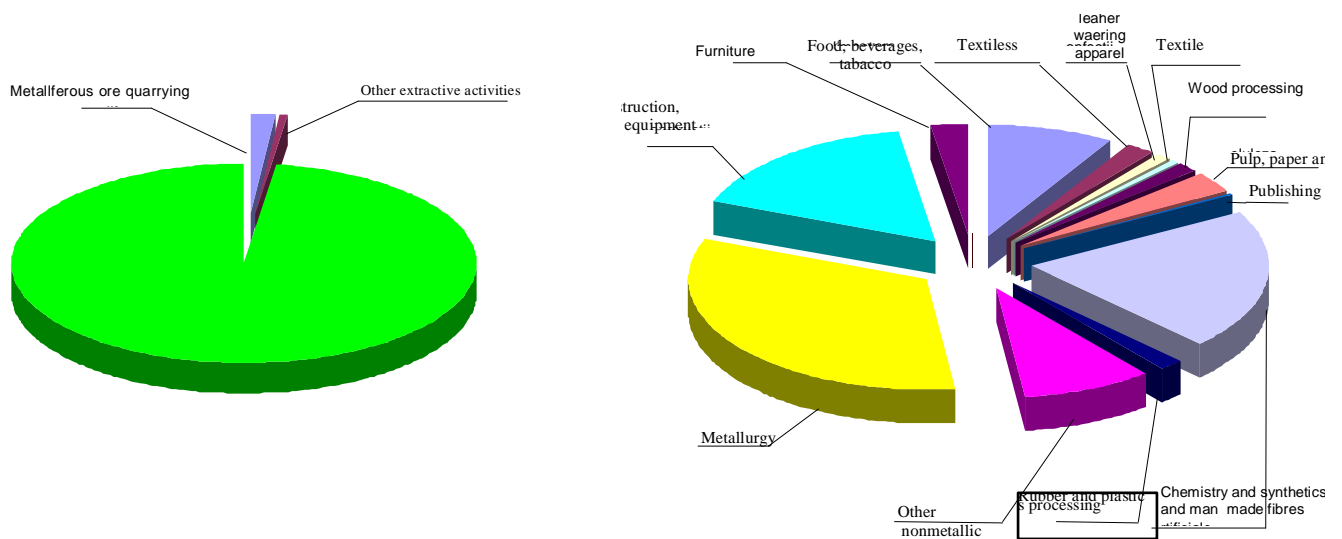


Fig. 1.5 Share of consumption by the processing industry branches (1999)

The analysis of table 1.3 and figures 1.3-1.5 point out that:

- Extractive industry has a 2.5% of the total energy consumption by industry. Within it, metalliferous ore quarrying has the highest development potential. Other extractive activities consume only 20%.
- The processing industries consumption amounts to 90% of type industrial consumption.
- Metallurgy, chemical industry, machine building in industry, other products industry made of non-metallic minerals and food processing, beverages and tobacco industry consume over 85% of the total processing (manufacturing) industries. All these industrial branches are on the first five places relating to energy industrial consumption.
- Water collection, treatment and distribution needs about 5% of the total industry consumption.
- Constructions consume about 3.27% of the total industrial consumption. The analysis of the energy consumption by industrial branches in 1999 shows that the branches with the highest energy consumption are:
 1. metallurgy (29.38%);
 2. chemical industry (18.41%);
 3. metallic construction, machinery and equipment (14.94%);
 4. other non-metallic products (7.9%);
 5. food processing, beverage and tobacco (7.6%).

Chapter 2

Identification and Presentation of REU Projects

2.1 Presentation of the list of consumers whose REU projects have been identified in 2000.

To identify the energy efficiency projects a questionnaire requiring data about the energy efficiency projects (to be implemented, under development or in the proposal stage) they have . They questionnaire is presented in the Annex to the study.

The consumers this questionnaire was sent to are:

***Furniture industry:**

- S.C IMAR S.A Arad;
- S.C PAL S.A Braila;
- S.C MOBAM S.A Baia Mare;
- S.C DUMBRAVA Falticeni;

***Metallic construction and metallic products industry:**

- DAEWOO Mangalia Heavy Industries;

***Machine building industry:**

- S.C FORTUS S.A Iasi;
- UCMR Resita;
- SUBEX Bacau;
- VULCAN S.A Bucuresti;
- S.C NICOLINA S.A Iasi;
- S.C GRIMEX S.A Targu-Jiu;

***Metallurgical industry:**

- S.C SILCOTUB S.A Zalau;
- S.C PETROBUS S.A Roman;
- S.C INTFOR S.A Galati;
- S.C CROMSTEEL Industries S.A Targoviste;

***Chemistry and chemical products:**

- S.C TEROM S.A;
- S.C. CHIMIA Orastia S.A;
- S.C CARMESIN S.A Bucuresti;

***Other non-metallic products and minerals industry:**

- S.C ELECTROCARBON S.A Slatina;
- S.C CIMUS S.A Campulung;
- S.C MOLDOCIM S.A Bicaz;

-
- S.C. CASIAL S.A Deva;
 - S.C. ELSID S.A Titu;
 - S.C. CESAROM S.A Bucuresti;
 - S.C. ROMCARBON S.A Buzau;
 - S.C. MACON S.A Deva;
 - ***Wood processing industry:**
 - S.C. SIGSTRAT S.A Sighetu Marmatiei;
 - ***Rubber and plastic products:**
 - S.C. ROLAST S.A Pitesti;
 - ***Textile, fur and leather, wearing apparel:**
 - S.C. IASITEX S.A Iasi;
 - S.C. MOVATEX S.A Pitesti;
 - * **Leather goods and foot wear:**
 - S.C. DAMBOVITA S.A Bucuresti;
 - ***TV and Communications equipment and radio devices:**
 - S.C. FEPA S.A Barlad;
 - ***Optical and watch industry, etc:**
 - IOR S.A Bucharest;
 - ***Extractive and processing industry:**
 - FORADEX S.A Bucharest;
 - ***Public service:**
 - City Council BERCA – Buzau Country;
 - Braila, Country Water Authority;

The consumers that answered the questionnaire and returned it completed (filled in) were:

- S.C. IOR S.A Bucharest;
- S.C. SUBEX S.A Bacau;
- S.C. TEROM S.A Iasi;
- S.C. VULCAN S.A Bucharest;
- S.C. ROMCARBON S.A Buzau;
- S.C. DAEWOO Mangalia Heavy Industries;
- S.C. MOBAM S.A Baia Mare;
- S.C. MOLDOCIM S.A Bicaș;
- S.C. NICOLINA S.A Iasi;
- S.C. CROMSTEEL INDUSTRIES S.A Targoviste;
- S.C. ELECTROCARBON S.A Slatina;
- City Council BERCA – Buzau Country.

2.2 Description of identified REU projects

- ❖ **S.C. IOR S.A Bucharest** – has four energy efficiency projects, namely:
 - **“Compressor station modernization”** – in the proposal stage. The project requires changing the existing Resita 2V – 15/7 (2 pieces) piston type compressors with screw compressors of 16 m³/min whose efficiency is higher. The investment amounts to US\$ 25.000, the projects life time is to years, the estimated power saving amounts to 110kW and the annual electric city saving is of 125.000kW.
 - **“Electroplating coating installation modernization”** – proposal. The project envisages the replacement of 10 heating baths with smaller ones, for smaller component changes. The value of investment is of ROL 100 million (US \$ 3533.5) the life time of 20 years, estimated power saving of 30kW, and annual electricity saving of 30.000kWh;
 - **“Electricity metering system modernization”** – proposal. The projects proposed the replacement of the existing induction meters the life time of which surpasses 20 tears, by electronic meters in production sections and the sub-consumers. The investment amounts to US\$ 10.000 and the project life time is of 20 years.
 - **“ New water plant development completion”** – in waiting (to be fulfilled). The project proposes the completion go the new water plant (PIF pumping station and back – up tank and new distribution network installation/mounting). Value of investment is ROL 2 billion (US \$ 70.671) and project life time – 30 years; the estimated power saving amounts to 30kW, and the annual electricity saving is 180.000kWh.
- ❖ **S.C. SUBEX S.A Bacau** has got two energy efficiency projects:

- **“Replacement of the Resita type compressors by modern compressors”** – proposal. The project proposes the replacement of the existing compressors by modern compressors of the (GA 132 Pand GA 75 USD types, reliable, with automatic regulation, to fit the compressed air demand of the consumers. The existing compressor plant is equipped with 2X IV-15/7 compressors and 3X 2V- 30/7. Resita type compressors, dating back to 1966, 1969, 1972 with very low efficiency and almost spent life times. For several years, these compressors maintenance in operation has been costly, as the quality of the compressed air is inadequate, containing water and oil particles that cause deterioration of the machinery tools. The value of the investment amounts to DM 130.000(US\$ 65.000) their life time of 12 years and the annual electricity saving after the investment completion will be of minimum 165.000kWh;
- **“Replacement of the rotate generators by static generators – 2 pieces presses screw presses of AM 20 type”**.- under development. At first (1973), the medium frequency generators for material warming were British, but they were replaced by Romanian rotate generators of 2500Hz, against the necessary 4000 Hz. Their operation was faulty, required great operation costs and high-energy consumption. They are no longer manufactured. Due to the high demand of assembly components manufactured by means of these installations and of the quality increase required, existing installations, which are both worn and obsolete, have to be replaced. The electricity consumption by manufactured product is 3-4 times greater. Cooperation with the AAGES firm from Targu-Mures was initiated in 1997 in 2001, by means of an Additional act to the initial Contract no. 234/2020.11.1997, the contract was resumed. The value of the investment amounts to DM 106.000 (US\$ 53.000), the average life time is of 20 years, the estimated annual power saving is of 250 kW, and the annual electricity saving after the investment completion is of 330.000kWh/year.

❖ S.C TEROM S.A Yassy - has an energy efficiency project:

- **“Modernization of the technical wires manufacturing by means of a drawing – rolling machine acquisition”** – proposal - . The project envisages to replace part of existing installation (slots, rolling machine, pre – twisting machine and, the drawing installation replacement with a compact vertical drawing – simultaneous rolling system). The value of investment amounts to Dm 1.769.000 (US % 884.500); the life time is of 10 years, the annual power saving of 225 kW, and the annual energy saving made after the investment completion of 2.000.000 kWh/year.

❖ S.C VULCAN S.A Bucharest has three energy efficiency projects:

- **“Modernization and corresponding to the 10 kV voltage of S.C VULCAN S.A, - D. Spirii complet – solution study”** – to be considered. The work will cover:
 - modernization of each connection station on the primary and secondary commutation ride;
 - modernization and adequate adaptation of the internal services, especially the on d.c side;
 - endowment with a centralized signalling installation;
 - modernization of 10kV VULCAN SRA – 10kV distribution.

The rehabilitation and modernization works ensuring electricity supply at a 10kV voltage provide;

- safety in operation;
- uninterrupted electricity supply;
- increase installation reliability;
- adequate monitoring of the installation operation.

The investment amounts to ROL 2.720.716 thousand (US \$ 96.138), (considering the variant without SRA and autochthonous equipment). The annual power saving is of 44 kW, and electricity savings of 78.8 MWh.

- **“S.C VULCAN S.A – Berceni – complex – electricity supply”** to be examined.

The project aims at separating the electricity supply of S.C VULCAN S.A – Berceni complex – from the IMGB and its direct connection to the TDEB network. Four electricity supply variants have been analyzed – from the 110/20 kV station. Heavy Machines Underground. The second variant envisaging the supply only through the FDEB network by means of Heavy Machines Underground 20 kV station bars is proposed. Two 22/6.3 kV transformers, one of 10MVA and the other of 4 MVA will be used. The value of the investment is of ROL 41,878.10 (Us \$ 1.479.8). Energy is saved by contracting electricity directly from the main supplier (S.C ELECTRICA) S.D.B) for the Berceni complex. This would lead to eliminating energy losses of the IMGB distribution network (50.53 MWh) and the power saving is estimated to 22 kW.

- **“Modernization of the 6 kV Sc 220 transformer stations and of its six 0.4 kV transformer substations within the Berceni industrial complex – the Membrane Walls Hall”** – to be developed – The project has two parts:

I Modernization of the 6 kV Sc 220 envisage:

- replacement of the 6 kV existing cells by modern cells with similar characteristics;

- Provision of new internal services including the storage battery. The value of the investment amounts to ROL 904, 230.3 thousand (US \$ 31.951)
 - II Modernization of six PT B1... PT B6 transformer substations within the hall:
 - replacement of the general distribution panels;
 - mounting of the power factor or automatic compensation installations;
 - lighting, ventilation and grounding installations;
- The investment amounts ROL 622.428 thousand (US \$ 21.993). The annual electricity savings by the entire project will be of 28.124 MWh with 20 kW power savings.
For all the VULCAN S.A industrial unit projects the project life time will be of 15 years.

❖ S.C ROMCARBON S.A Buzau has two energy efficiency projects.

- **“Modernization of the thermal power plant by replacing three IPROM type 16.5 t/steam boilers the efficiency of which is under 75% by three steam boilers with an efficiency above 90%”** - to be developed. The project proposes the replacement of three IPROM type, 6.5t/h steam boilers with a higher efficiency plant of the company. The existing boilers are worn (were manufactured in 1953) and absolute (their efficiency is less than 75%).
The investment amounts to US \$ 800.000 and the life time is of 28 years; the estimated annual power savings will amount to 5 kW and the annual electricity savings, after the project development will be of 50.000kWh (it will save mainly fuel, excluding electricity).
- **“Air compressor replacement”** under development. The centralized compressed air supply is to be replaced by a compressed air supply by technological lines or sections. The existing compressors of the compressors plant are of the Resita type with pistons and both are worn and absolute. They will be replaced by rotary compressors which consume less electricity and function automatically (are automatic). Until now 6 compressors have been acquired, but because of the lack of funding the investment was stopped. The investment amounts to US \$ 120.000, the project life time is of 12 years, and the estimated annual power savings is of 50kW; the electricity savings to be obtained after the investment development will amount to 415.000kWh.

❖ S.C DAEWO S.A Mangalia Heavy Industries has two energy efficiency projects:

- **“Implementation of the centralized electricity dispatching centre”**, under development. Thus, by implementing the electricity remote control management system we envisage the load curve flattening by means of the facilities offered by this system. The project implementation is planned to be developed in 2 stages: during the first stage the network enabling data transmission from 6 measurement points (locations) to a computer mounted within the central dispatcher will be developed (during this stage we accomplish the electric parameters of the company monitoring by product type; during the second stage the system will be extended over the entire 6 kV network of the yard, for 51 consumption points besides the existing ones, respectively. The investment amount to US \$ 42.718.0 (the first stage will amount to US \$ 9.244, and the second stage to 33.474.0); the project life time will be of 10 years and the estimated annual power savings will amount to 426 kW, and the annual electricity savings to 1938.3 MWh;
- **“6 transformer substations equipping with automatic installations for reactive energy compensation –** under development – The project development envisages diminishing of active power losses due to reactive power transmission by 12%, reducing the costs of invoiced reactive power increasing the local level of voltage, obtaining a $\cos \varphi > 0.92$ increasing the transformer loading capacity. The investment amounts to US \$ 29.115 and the project life time, the annual power savings will amount to 1021 kW, and electricity savings to 3323.99 MWh.

❖ S.C MOBAM S.A Baia Mare - has got one energy efficiency project:

- **“Exhaust system retrofitting (within the exhaust air filtering and recirculation installation)”** – proposal S.C MOBAM S.A Baia Mare has initiated a complex environmental protection program, including air pollution diminishing activities. The program has already developed several important stages amounting to approximately DM 600.000 about US \$ 300.000). They have reached the last stage of this environmental protection program to carry out the following:
 - mounting of the technological flow installations on their final locations;
 - development of the technical documentation (specification) for the pneumatic transportation
 - installation, the installations for modern, particle filtering and separation from the air and connections to the installations that were carried out in the previous stages;
 - development of the offer and feasibility studies;
 - acquisitions and mounting of the pneumatic transportation, filtering, air circulation installations.

The installation for the wooden material particle collection from the wood processing installations within the production section works on two principles:

The pneumatic transportation of the particles from the suction intake mounted on the installation, p to the OPTIFLOW and the mechanized transportation of particles into OPTIFLOW up to the separations filters.

By combining the two systems for the particle transportation the installation in the flow can be moved without changing the efficiency of the installation operation. More over, the entire installation is controlled by process computers; with, by means of frequency converters diminish the fan motor rotation speed resulting in electricity savings of about 40-60% of the monthly electricity bill. The investment amounts to US \$ 617.899, including both the technical execution documentation and the equipment acquisition, and the construction mounting part. The life time is of 20 years, the annual power savings amount to 284 kW, and the annual electricity savings after the investment development to 864.070 kWh/year.

❖ S.C MOLDOCIM S.A Biczaz - has of energy efficiency projects:

- **“Replacement of the existing drive of the clincker oven no 1”** under development. The investment amounts to Euro 250 thousand (US \$ 225.000), the annual power savings of 451 kW, the annual electricity savings obtained after the investment development of 800.000 kWh;
- **“Modernization of the flour transportation installation”** – to be carried out. The investment amounts to EURO 1450 thousand (US \$ 1.305.000) and the annual estimated power savings of 77 kW; the annual electricity savings to be obtained after the investment development will be of 100.000 kWh;
- **“Modernization of the flour will separation”** – to be developed – the investment amounts to EURO 700 thousand (US \$ 630.000) and the annual power savings will be of 50 kW; the energy estimated savings will be of 100.000 kWh.
- **“Replacement of the cement will no. 1 driving motor”** – to be developed. The investment amounts to EURO 700 thousand (US \$ 630.000), and the annual power saving will be of 670 kW and annual estimated energy savings of 100.000 kWh.
- **“Modernization of the slag drying installation”** – under development. The investment amounts to EURO 400 thousand (US \$ 360.000) the annual power savings of 100 kW, the estimated annual energy savings of 100.000 kWh.
- **“The manufacturing process control of the line 1 clincker”** – under development. The investment amounts to EURO 220 thousand (US \$ 198.000), and the estimated annual electricity savings will be 100.000 kWh. This project envisages the permanent operation of the fabrication line at the optimum parameters.
- **“Automatization of the reactive power compensation and maintenance of the power factor within the 0.98-1.00 range”**, to be developed. The project aims at maintaining the power factor within the 0.98-1.00 range and avoiding reactive energy injection into the national system. The energy savings result from compensation. The investment amounts to DM 202954 (US \$ 101.477) and the estimated annual electricity savings are of 100.000 kWh. All the projects aim at diminishing the receiver power, increasing productivity of installations, there fore increasing energy efficiency. The life time of all projects is of about 15 years,

❖ S.C NICOLINA - Iasi – 1 energy efficiency project:

- **“Rehabilitation of the compressed air generation installation”**: - proposal. Due to the structural changes in the production system of S. C NICOLINA S.A- the compressed air generation should be able made in lesser steps than the existing ones. At present, the compressed air is produced by the L 100 type compressors of 100 cm/min and CV 45 type, of 45 cm/min. The consumption curve can be monitored more efficiency by means of automatic start compressors with air compressed production capacities operating in intermediate steps as compared to the existing ones, of 10 cm/min and 20 cm/min, respectively. The investment amounts to ROL 1.4 billion and the project life time is of 12 years; the estimated annual power savings will be of 130.00 kW and the annual electricity savings of 135.000 kWh, after the development of the investment.

❖ S.C CROMSTELL Industries S.A Targoviste – has one energy efficiency project:

“Electricity remote control management system”: - proposal. The project objective is to perform the real time (on-line) monitoring of electricity, active and reactive power, analyses the distorting regime and the events that occur in the installation and the water and natural gas consumption in the future.

The main component elements are-the remote control management (three – phase electronic meters of active and reactive energies, computer, summators, modems, WINDOWS operating system coaxila cable for data transmission) and the dispatcher system (provides data relating to the electric quantifies , and their variation with time, as well as the communication devices condition). The investment amounts to about ROL 50 million (US \$

17.667); the project life time is of 25 years, the annual power savings of 150 KW, and the annual electricity savings of 350.000 kWh, after the project development.

❖ S.C ELECTROCARBON S.A Slatina – has one energy efficiency project:

“ **Optimization of the carbonic product graphitization phase**” – to be developed. The project aims at developing an installation made up of 6 longitudinal graphitization ovens (castner type) to replace part of the graphitization ovens based on the Acheson technology the investment amounts to DM 10.600.000 (US \$ 5.300.000); the project life time is of 15 years, the annual power savings will be of 220 kW and the annual electricity savings of 18.125.000 kWh.

❖ The BERCA (Buzau country) water council – has 1 energy efficiency project:

“ **Rehabilitation of the water supply system of BERCA, with a view electricity consumption diminishing** ” – proposal.

Water is supplied from the under ground water sources by means of 10 deep – going drillings, out of which 6 are in operation, two are no longer equipped, two are out of operation. The drillings are equipped with HEBE and HB under water electric pumps, the total installed flow of which amounts to 226 cm/h, and total installed power of 73 kW. The pumps are permanently in operation. As the pumps efficiency is low it will be replaced by a HB 80*H pump (Q= 80 cm/h, P= 17.5 kW) a GRUNFOSS pump, SP 75*4 type, which, consumes 11 kW at the same flow. The estimated electricity consumption diminishing is of minimum 156 kW/day.

At the same time, the two unused drillings will be equipped with SP 60* 4 type pump water into network (The Vernesti pumping plant) and to the Satuc repumping station, the station is equipped with five Lotru 125 electric pumps (Q = 125 cm/h and P = 37 kW). The project proposes their replacement by GRUNFOSS pumps, NK 65-200/200 type, Q= 120 cm/h and P = 22 kW. The first thing that should be done is to acquire at least two such pumps. This investment would result in 360 kWh/day savings.

The first station within the Satuc repumping station is equipped with 3 AN 65 pumps of; P = 75 kW out of which one is permanently in operation. The project proposes the acquisition of a GRUNFOSS, NK – 65-200/200 type pump, of: Q = 120 cm/h and P = 22 kW.

This would result in 360 kWh/day electricity consumption savings. The Satuc 2 repumping station has 4 SADU pumps of Q = 60 cm/h, P= 37 kW and 2 SADU 100 pump of: Q = 80 cm/h and P = 75 kW, that are not functioning (operating). The project proposes the acquisition of two GRUNFOSS pumps of the NK 65 200/200 type, Q = 120 m³/h, and P= 22 kW). The electricity consumption will diminish by 104 kWh/day.

The investment (in its first necessity stage) amounts to US \$ 21.426 to life time of 15 years, the estimated annual power savings of 66.5 kW and the estimated annual electricity savings of 226.06 MWh/year.

2.3 Information relating to the ERU project to be included in the data base.

The information relating to the ERU projects to be included in the data base is:

- the energy efficiency project name;
- the beneficiary of the project;
- the project investment;
- energy savings;
- life time.

2.4 Analysis of the projects and presentation of data in the form of tables

The analysis of the investment energy and fuel savings underline the following:

1. Same projects require very important (high) investment while the energy savings are very little.
To underline this we calculated and presented the energy efficiency simple payback time of the investment. We notice a series of projects do not meet the minimum return on investment requirement, namely the simple payback time of the investment that should be shorter than the respective installation life time.
2. There are projects whose benefits are very high considering the utilized technologies and their specific characteristic.
The electricity metering and remote control management projects, the power factor compensation annual electricity dispatching are include in this category.

It is known that the electricity metering projects do not result in direct energy savings. Implementation of modern meters and remote control system does not lead to important energy savings but enables us to see how energy was consumed. Thus, we can develop subsequent programs to result in electricity consumption diminishing which require other investment in their turn.

This is the category where projects no. 5 and 9 can be included which relate to an electricity centralized dispatching system implementation and reactive energy compensation automatic installations equipping. The projects relate to the same consumer and the power saved amounts to about 1.45 MW. Although the DAEWOO Mangalia yard is a great energy consumer, we consider that the power savings at this level are great taking into consideration the type of the projects presented.

3. Same projects have a great estimated life time, in relationship with the utilized technologies and their specific characteristics.

Thus, 19 projects out of 26 (73%) have average estimated life times of at least 15 years. For some of them such a long life time is justified, according to the norms and regulations in force, but most of the projects do not justify such an approach.

Here are several examples:

- Project no.6 – electricity remote control management, whose estimated life time is of 25 years, although the technological progress in this field and the characteristics of the utilized apparatus lead to the “wear” of these systems in a few years after their putting into operation (commissioning).
A 8-10 life time would better reflect to situation existing on the market of this equipment.
- Project no. 14 – electricity metering system modernization, whose estimated life time is of 20 years. The comments we have already made suit this case, too.
- Project no. 15 – thermal power station modernization by replacing the boilers, with an estimated life time of 28 years, which surpasses by far the average life time of certain steam boilers, even that of the state – of art ones.
- Project no. 10 – completion of a water supply development whose estimated life time is of 30 years. It is true that the water supply development has a 30 years life time, but the equipment which we are interested in from the energy efficiency point of view, mainly the pump driving motors do not have the same life time.

Very long life times lead to energy efficiency calculation distortion within the projects, which occur due to two main reasons:

- discounting is carried out over a such longer period of time than the actual project life over which the project development should result in benefits based on the initial investment and finally, in even higher energy and money savings;
- the investment costs due to surpassing the life cycle of the respective equipment are not taken into consideration, in order to consider the technological progress and to develop a profit yielding business.

In energy efficiency project practice, both in Romania and in the European countries, the study duration covers 10-12 years to prevent to above mentioned distortions.

4. There are projects requiring very low investment relating to the utilized technologies and their specific characteristics.

This is the case of projects 5,6 and 9. An explanation would be the fact that the companies presenting these projects filled in the questionnaires without mentioning the full investment necessary for the project development.

Thus, an over occurred, as total energy savings are considered for partial investments, leading to putting the project in a very favourable position.

Presentation of data in tables:

Crt. no	ERU Project	Beneficiary	Investment	Energy savings	Power savings	Life time	Payback time
			\$	KWh/year	kW	years	years
1.	Replacement of the existing drive of the clincker oven no. 1	MOLDOCIM Bicaz	225.000	800.000	451	15	8.04
2	Replacement of the motor drive of the cement mill no. 1	MOLDOCIM Bicaz	630.00	1.200.00	670	15	15.00
3	Optimization of the carbonic product graphitization phase	ELECTROC ARBON Slatina	5.300.000	18.125	2.200	15	8.35
	Manufacturing process	MOLDOCIM	198.000	100.000	0	15	56.57

4	monitoring (control) of the clinker on line 1	Bicaz					
5	Implementation of the centralized electricity dispatching system	DAEWOO Mangalia	42.718	1.938.300	426	10	0.63
6	Electricity remote control management system	CROMSTEE L Targoviste	17.667	350.000	150	25	1.44
Crt. no	ERU Project	Beneficiary	Investment	Energy savings	Power savings	Life time	Payback time
			\$	KWh/year	kW	Years	years
7	S.C VULCAN S.A electricity supply system – Berceni industrial complex	VULCAN Bucuresti	1.480	50.530	22	15	0.84
8	Automation of reactive power compensation and factor maintenance within the 0.98-1.00 interval	MOLDOCIM Bicaz	101.477	100.000	0	15	28.99
9	Equipping of 6 transformer substations with automatic reactive energy compensation installations.	DAEWOO Mangalia	29.115	3.323.900	1021	15	0.25
10.	Completion of the new watter supply project	IOR Bucharest	70.671	180.000	30	30	11.22
11	Replacement of the air compressors	ROMCARBO N Buzau	120.000	415.000	50	12	8.26
12.	Replacement of the existing Resita type compressors by modern ones	SUBEX Bacau	65.000	165.000	75	12	11.26
13	Replacement of rotary generators by static ones for two AMP 20 press	SUBEX Bacau	53.000	330.000	250	20	4.59
14.	Electricity metering system modenization	IOR Bucharest	10.000	0	0	20	-
Crt. no	ERU Project	Beneficiary	Investment	Energy savings	Power savings	Life time	Payback time
			\$	KWh/year	kW	years	years
15	Thermal power station modernization by replacing three 6.5t/h IPROM type steam boilers	ROMCARBO N Buzau	800.000	50.000	5	28	457.14
	Modenization of the	MOLDOCIM	1.305.000	100.000	77	15	372.86

16.	flour transportation installation	Bicaz					
17.	Modernization of the slag drying installation	MOLDOCIM Bicaz	360.000	100.000	100	15	102.86
18.	Modernization of the technical wires manufacturing process by acquiring a winding machine	TEROM Iasi	884.500	2.000.000	225	10	12.64
19.	Modernization of the flour mill separators	MOLDOCIM Bicaz	630.000	100.000	50	15	180.000
20.	Modernization and suitable adapting of the electricity supply voltage to the S.C VULCAN S.A – Dealu Spirii industrial complex 10 kV voltage	VULCAN Bucharest	110.330	78.800	44	15	40.00
21.	Modernization of the 6 kV station and of its six 0.4 transformer	VULCAN Bucharest	53.944	28.124	20	15	54.80
Crt. No	ERU Project	Beneficiary	Investment	Energy savings	Power savings	Life time	Payback Time
			\$	KWh/year	kW	years	years
	Substations within the Berceni industrial complex – Membrane Walls hall						
22.	Modernization of the covering installation	IOR Bucuresti	25.000	125.000	110	20	5.71
23.	Compressors station	IOR Bucharest	3.534	30.000	30	20	3.37
24.	Rehabilitation of the compressed air capacities	NICOLINA Iasi	49.469	135.000	130	12	10.47
25.	Rehabilitation of the BERCA water supply system in order to diminish electricity consumption	Berca Country	21.426	226.300	66.5	15	2.71
26.	Exhaust installation recovery (building up), and endowment with an exhaust air filtering and recirculation installation	MOBAM Baia Mare	617.899	869.070	284	20	20.31