

Institutional support to the Bulgarian Ministry of Economy and Energy for building up its capacity for managing and developing public-private partnership for energy efficiency

Study on Contextual Issues, Concerning Energy Efficiency in Industry in Bulgaria

Activity 2.1

DRAFT REPORT

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Summary

This report starts with a description of the energy efficiency context in Bulgaria, including an overview of historical developments since the 1980's, current energy efficiency policies, institutional framework and quoted information about energy efficiency indicators. A general conclusion is that potential energy efficiency improvements in Bulgarian industry range typically between 15% and 30%, but they are branch specific and site specific.

Follows a brief presentation of the author's opinion on the main social, financial and legal thresholds for improvement of energy efficiency in Bulgarian industry.

A detailed analysis is made of the results from the opinion survey, concerning possible introduction of a Long-Term Agreement scheme in Bulgaria. The opinions were collected from representatives of industrial companies, industrial branch associations, national authorities, NGO's and energy consultants. In a general way, opinions converge about the suitability and applicability of a Long – Term Agreement scheme in Bulgaria, and also about the incentives to be provided to participating companies – technical and informational support and financial preferences. All participants agree that the incentives are of crucial importance for the success of the scheme. Some difference of opinions was expressed in relation to the formulation of indicative targets and the organizing of monitoring of results. The author's opinion is that a decentralized bottom-up approach should be applied for target specification. Monitoring and administration of the scheme should be assigned to a governmental institution, which should take into account recommendations from a steering committee, formed by representatives of industrial branches and of all willing industrial participants in the scheme.

Possible interactions were analysed with currently applied energy efficiency policies – specifically with the obligatory energy audits for large industrial energy consumers. Some complementarities are possible between these obligations and the suggested voluntary scheme. Also, some interesting types of interactions are possible with the currently prepared introduction of the EU Emission Trading Scheme in Bulgaria.

Follows a brief presentation of expected positive results from a future Long – Term Agreement scheme in Bulgaria.

And finally, at the end of the report is provided a detailed list of conclusions.

In the Appendix is presented a summary of the answers to the above mentioned questionnaire.

The introduction of a voluntary approach for energy efficiency improvements in Bulgaria could be highly valuable from several points of view and for this purpose is needed a careful planning of the scheme and a wise promotion campaign, corresponding to specific Bulgarian conditions.

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List of Acronyms and Units

CO ₂	Carbon Dioxide
EUR	Euro
koe/E00p	kg oil equivalent energy consumption per Euro from the year 2000 GDP
ktoe	Thousand tonnes of oil equivalent
LTA	Long Term Agreement
LTA1	First generation of LTA
LTA2	Second generation of LTA
LTP	Long Term Plan for energy-efficiency improvement
MJ	Megajoule (10 ⁶ joule)
NGO	Non-Governmental Organisation
PJ	Petajoule (10 ¹⁵ joule)
TJ	Terajoule (10 ¹² joule)
VA	Voluntary Agreement

1. Historical overview and current status of the energy efficiency of Bulgarian industry

The energy efficiency context in Bulgaria involves several particularities, so the approach for planning of a successful public-private partnership for energy management improvements should be based on identification of possible interactions between the universal trends of energy efficiency and the unique Bulgarian conditions. In order to have a general view on particular circumstances in our country, this first chapter includes a brief presentation of the following issues:

- history of energy efficiency activities,
- current energy efficiency programmes,
- related institutions and
- energy intensity indicators.

1.1 Background information about energy efficiency in Bulgaria

There are several historical stages of energy efficiency activities in Bulgaria. Here will be described the two most recent ones– the period following the first petrol crisis till 1989 and the transition period that started after 1989.

The first stage was characterized by strong energy saving requirements from the national authorities and strong support for energy efficiency activities. E.g., in 1979 was created the state owned company Promishlena Energetica (which means “industrial energy”), with a staff number of more than 2 500. This company had its own research and design institute and several enterprises in various towns of Bulgaria. Some of these enterprises are continuing to operate now (e.g., Promishlena Energetica – Varna). During the period 1979 – 1989 were adopted and implemented four successive national programmes, concerning energy efficiency in various sectors, including industry. Some typical activities from this period included: modernization of industrial furnaces and boilers (modern burners were produced in Bulgaria under Ray license), improvement of the steam and condensate systems, and installation of heat recovery boilers (e.g., in glass plants and oil refineries), biomass boilers, or introduction of automatic systems for energy management.

Energy consumption levels of industrial plants were supervised by an energy inspectorate (with several local branches). This inspectorate had the task (among other things) to prescribe energy efficiency improvements.

However, all these activities were taking place in the conditions of energy prices which were comparatively low from contemporary perspective. The employees of state owned industrial plants were not always motivated and financially interested to implement energy efficiency projects – such activities were mostly considered to be subject of fulfilment of obligations, or, in some cases, could be motivated by personal ambitions or enthusiasm. And another barrier consisted in difficult availability of some modern equipment items, imported from West European countries.

The next stage, which started since 1989, involved substantial changes in the energy efficiency situation.

From one side, there was a sharp increase of energy prices. This increase concerned mostly liquid fuels, but in a certain degree also electricity, natural gas, coal, heat energy, etc. A process of privatization of industrial plants took place and stronger motivation for energy savings appeared. Several actions for reduction of energy costs were taken in a natural way – there was even a case of introduction of night shifts, in order to use night tariff electricity.

Another positive factor was that some modern technology items became more easily available.

It is interesting to analyse what was happening in the framework of grant schemes – e.g., the one of the PHARE Project for implementation of a Regional Energy Centre in Lovetch, performed during the period 1995 – 1998. Most of the applications that came from industrial plants were very well conceived – both from technical and from financial point of view, and several out of them concerned similar activities – e.g., replacement of old steam traps with new more reliable ones, installation of new burners or replacement of reciprocating air compressors with more efficient screw compressors. This is an example that engineers in industrial plants had a very clear idea what the most needed low investment projects were in that period - both from technical and from financial point of view.

Energy efficiency was also influenced by the restructuring of industry that took place – several energy intensive industrial activities decreased since 1989.

However, jointly with these positive factors, there were some influences in the opposite direction. First of all, a lot of industrial plants had to operate at reduced load, because previous markets for their production were lost. As this is well known, operating at reduced load causes increase in the specific energy consumption. There was a case with a paper factory, which was operated during periods of 10 - 15 days per month and was stopped in the subsequent periods of 15 – 20 days - such schedule was conceived in order to operate the equipment at full capacity. It is interesting to note that even some energy efficiency measures were identified specifically for reduction of the losses due to operation at reduced load (e.g., replacement of old transformers with new ones of smaller capacity). .

Yet, maybe the most important barrier to energy efficiency consisted and still consists in the difficult investment conditions. Of course, after the financial crisis in 1996/97 came a slow process of recovery of crediting activities and of the capital market. But the investment risks here are still considered to be relatively high. Due to this reason, there are several cases of non-implementation of energy efficiency projects, even ones with very good financial indicators.

The simultaneous presence of such opposite trends in energy efficiency changes makes the evaluation of the current energy efficiency context quite complicated. Actually, the only way to prove what is happening with energy efficiency is to analyze quantitative indicators. This is why here is included (in p. 1.3) some information about energy intensity of Bulgarian industry. And, as this will be discussed further down in the text, there are substantial differences between various branches and individual companies – both from the point of view of their current energy efficiency conditions and also in respect to their investment capabilities.

Such historical zigzags of energy efficiency developments mean that a new system for public-private partnership should both be aimed to incorporate good experiences and skills from the past and still to be substantially different, because it will be implemented in new

conditions.

1.2 Current energy efficiency policy

The most recent Bulgarian energy policy document is the Energy Strategy of Bulgaria, adopted in 2002 [ref. 1]. It has a specific section concerning energy efficiency. After an alarming description of existing energy efficiency situation, the Energy Strategy describes a new philosophy, involving the application of a “proactive approach in order to ensure higher efficiency in all processes of energy supply (generation, transmission, distribution and consumption).” [ref.1]. Follows a description of “result oriented proactive measures”, some important ones of them from the point of view of this study being as follows [ref. 1]:

- “Promotion of investments in energy efficiency at the level of end users;
- Support, including through governmental guarantees, for demand-side management projects with a significant social effect;
- Improvement of the efficiency of energy transformation processes, promotion of cogeneration and reduction in losses.”

This quotation indicates that the need for active support of energy efficiency investment in Bulgaria is officially recognized.

Concerning greenhouse gas emissions in Bulgaria, the current level is lower by more than 50% in comparison with the emissions in 1988 [ref. 2]. This actual reduction is much greater than the Kyoto target (8% reduction of greenhouse gas emissions during the period 2008-2012, in comparison with the 1988 level). Of course, such big reduction resulted mostly from decrease of economic activities. But this explains why an important motive for Joint Implementation Projects (under the Kyoto Protocol mechanism) is, alongside with emission reductions, to provide through such projects financing for renewable energy and energy efficiency activities. According to information from the web site of the Ministry of Environment and Water [ref. 3] currently the overall number of Joint Implementation Projects, being developed in Bulgaria, is 13. These projects are of the following types:

- Construction of new CHP plants: 3 projects;
- Construction of new gas distribution networks: 3 projects;
- Rehabilitation of district heating networks: 2 projects;
- Biomass boilers: 2 projects (one of them concerning also energy efficiency measures);
- Energy efficiency in industry: 1 project;
- Hydro power: 1 project;
- Reduction of N₂O emissions of fertilizer plants: 1 project.

This classification indicates that 10 out of the 13 developed projects involve energy efficiency measures, 3 projects involve renewable energy and there is just 1 project, based on another type of emission reduction effect (the N₂O project).

However, it is important to indicate here that carbon trading financing covers only a small

part of energy efficiency investments, one of the reasons being the large size of such projects (typically they involve more than 50 000 tonnes CO₂ equivalent annually), yet in Bulgaria most of the potential energy efficiency improvements are of smaller size.

1.3 Institutional framework, legal framework and recent energy efficiency documents

As this was already mentioned, energy efficiency measures in Bulgaria had substantial support during the 1980's, in conditions of low energy prices. Then, in the 1990's, most energy prices rose sharply, but financial support for energy efficiency measures was very limited. Investment conditions were quite difficult and what happened was that a lot of good energy efficiency projects were available, but the actual investments concerned mostly low-cost measures.

In principle, it is considered that energy efficiency needs support when insufficient incentives exist for market actors and end users to take actions to improve energy efficiency. This may be due to market imperfections. Consequently, support for energy efficiency applications is needed even (in some cases) to start-up the normal operation of market forces. Some steps were already made for application of such energy efficiency policy in Bulgaria and they will be described further down in the text.

1.3.1 Institutional framework

The institutions with activities in energy efficiency are: the Ministry of Economy and Energy, the Energy Efficiency Agency, several regional energy centres and consulting or engineering companies.

➤ Ministry of Economy and Energy

The Ministry of Economy and Energy was created in the autumn of 2005 through the merger of two former ministries – respectively of economy and of energy. It is responsible for the national policy in these areas. The structure of this Ministry incorporates a specific Directorate called “Energy Efficiency and Environmental Protection”.

➤ Energy Efficiency Agency (EEA)

The Energy Efficiency Agency has this designation since 2002 and is continuing the following institutions:

- Project Implementation Unit for the PHARE Programme, created in 1992 by the Ministry of Energy;
- National Energy Efficiency Agency, created in 1997 and subordinated to the Council of Ministers;
- State Energy Efficiency Agency, since 1999.

EEA is directly subordinated to the Minister of Economy and Energy and is responsible for

the implementation of the national energy efficiency policy. It is a budgetary organization, with a staff of about 40 experts.

The activities of EEA are in the areas of energy efficiency and renewable energy and include:

- Drafting of legislation;
- Programs and project development;
- Transfer of technologies, skills and expertise;
- Organizing of co-financing of European projects;
- Project implementation;
- Consulting services;
- Administration of activities for energy audits of industrial plants and certification of buildings.

It should be noted that EEA has increasing capacities in recent years. This is even mentioned in the EU 2005 Monitoring Report on Bulgaria, where the paragraph about energy efficiency and renewable energy reads as follows (here the sentence about the Agency is marked with bold letters):

“In the area of energy efficiency and renewable energy, Bulgaria has achieved a good level of legal alignment, adopting the Energy Efficiency Act and the majority of implementing legislation in 2004. In addition, a target for the share of consumption of electricity from renewable energy sources of overall electricity consumption of 11% for 2010 has been set. **The Renewable Efficiency Agency has been established under the Energy Efficiency Act, but needs further strengthening.** Continued efforts should be devoted to developing and implementing the National Long-Term Programme 2005 – 2015 on efficiency and renewable energy sources, for which adequate financial means must be provided. The upgrading of Bulgaria’s considerable district heating system can make an important contribution to the realization of Bulgaria’s energy efficiency potential.”

EEA was responsible for the drafting of the new Energy Efficiency Act and currently implements or regulates most of the related activities, such as: regional and municipal energy efficiency and renewable energy programmes, certification of buildings, mandatory energy audits, etc. The Agency has a data base about energy efficiency indicators, probably the most detailed data base on this issue in our country. Also, EEA has initiated several financial mechanisms for soft loans for energy efficiency and renewable energy.

➤ **Energy Efficiency Center in Industry (EECI)**

EECI was created in 1995, with support from the Japanese International Cooperation Agency. From organizational point of view, the EECI is in the framework of the Ministry of Economy and Energy. The activities of this Center include:

- Implementation of energy efficiency policy;
- Consultations;
- Energy audits;
- Technology transfer;

- Information services;
- Organization of seminars & training;

EECI have considerable experience and skills in energy audits and various types of measurements in industrial plants, and the Centre has maybe the most complete in our country set of modern measurement equipment, related to energy efficiency in industrial plants.

➤ **Regional energy centres and NGO's**

Regional energy efficiency expertise is represented by the following energy centres and NGO's:

- The Centre for Energy Efficiency EnEffect is an NGO, specialized in the area of energy efficiency and renewable energy; EnEffect is very active in the area of municipal energy efficiency and renewable energy planning and has created networks with the participation of a large number of Bulgarian municipalities;
- Sofia Energy Agency (SOFENA);
- Sofia Energy Centre;
- Plovdiv Energy Agency;
- Municipal Energy Agency of Rousse;
- Regional Energy Centre of Lovetch;
- Regional Energy Centre of Haskovo.

Most of these centres were created by EU or US projects (e.g., the regional energy centres of Lovetch and Haskovo were created by a PHARE Project in 1996).

➤ **Companies**

Several companies provide consulting and/or engineering services in the area of energy efficiency in industry. E.g., in the list of companies, registered by the Energy Efficiency Agency for energy audits of industrial consumers includes (in May 2006) 9 companies from 4 different towns in Bulgaria.

1.3.2 Legal framework

The legal framework concerning energy efficiency in Bulgaria is based on the following documents:

- Law on Energy [ref. 4];
- Energy Efficiency Act [ref. 5];
- Territorial Arrangement Law [ref. 6];
- Law for Technical Requirements for Products [ref. 7];
- National Standardization Law [ref. 8].

Also, the following Regulations concerning energy certification of buildings and energy audits of large consumers should be mentioned here:

- Regulation No.18 for the energy characteristics of buildings and large energy consumers [ref. 9];
- Regulation No. 19 for the energy certification of buildings [ref. 10];
- Regulation No. 20 for the registration of persons and companies that can perform energy efficiency certification of buildings and energy audits [ref. 11];
- Regulation No. 21 for the energy audits [ref. 12].

Without making a full overview of Bulgarian energy efficiency legislation, we are going to mention here some issues, which are interesting from the point of view of this study.

In conformity with the EU Directive 2002/91/EC, in Bulgaria was introduced legislation for certification of buildings. According to the Energy Efficiency Act, art. 16.2, certification should be performed on each building with area exceeding 1 000 m². A particularity in Bulgarian legislation is that such certification can be performed only on the basis of a preceding detailed energy audit of the building (Regulation No. 19, article 3(2)).

Another specific feature of Bulgarian energy efficiency legislation is that obligatory energy audits were introduced (Energy Efficiency Act – art. 17) for “all producers and service providers with annual energy consumption exceeding 3 000 MWh” (Regulation No. 21 – art. 6.1).

Actually, obligatory energy audits existed for a specified time period in France during the late 1970s and the early 1980's. The obvious reason for introduction of such measure in Bulgaria is to accelerate energy efficiency activities.

Each large energy consumer can choose the company that will perform the audit (or certification) of his site (or building) from a list of companies, registered by the EEA. The requirements for registration include training of experts and availability of metering equipment. As this was already mentioned, 9 companies from 4 different towns in Bulgaria are already registered for energy audits of industrial plants.

The existing legislation for obligatory energy audits is important, because each energy audit includes an evaluation of the site – specific potential for energy efficiency improvements.

1.3.3 Reported energy efficiency projects, implemented in the period 2000 - 2003

Some information about the implemented energy efficiency projects during the period 2000 – 2003 [ref. 13] is presented here in Table 1:

Energy savings from implemented energy efficiency projects in Bulgaria during the period 2001 – 2003

Table 1

Number of energy efficiency projects	Investment, million USD	Energy savings, million kWh annually				Emission reductions, thousand tonnes of CO ₂ annually
		Heat	Electricity	Various types of fuel	Totals	
212	32.4	37.4	49.4	711	797.8	262

Source: The Energy Sector of Bulgaria 2001 – 2004, Ministry of Energy and Energy Resources, Sofia, 2005 (since September 2005 – Ministry of Energy and Economy), [ref.13]

According to the same publication, the above energy savings (about 800 GWh or 70 ktoe) represent 0.75% from the final energy consumption in 2003. It is interesting to note that the average payback period of the totality of projects amounted to about half a year (the overall investment being 32.4 million USD and the annual effect being 68 million USD).

This information once more indicates the need for stronger support of energy efficiency activities.

1.3.4 Current energy efficiency programs

Currently are applicable the following energy efficiency programmes:

- The National Long-Term Programme for Energy Efficiency till 2015 [ref. 14];
- The National Short-Term Programme for Energy Efficiency 2005 - 2007 [ref. 15];
- The Branch Short-Term Programme for Energy Efficiency [ref. 16], developed by the former Ministry of Economy in 2004.

From the point of view of designing of a public-private partnership for energy efficiency, the interesting items in these programmes are the targets, so they will be quoted here.

The planned energy savings for the period 2005 – 2007 in the various sectors are as follows [ref. 15]:

- Industry: 39.5 ktoe¹ (1.16% of the 2004 final energy consumption in industry)
- Agriculture: 0.4 ktoe (0.15% of the 2004 final energy consumption in agriculture)
- Transport: 0.22 ktoe (0.01% of the 2004 final energy consumption of transport)
- Services: 70,5 ktoe (10.3% of the 2004 final energy consumption of services)
- Households: 1.25 ktoe (0.05% of the 2004 final energy consumption of households)
- District heating: 23.10 ktoe
- Gasification: 5.2 ktoe
- Totals: 140 ktoe (1.4% of the 2004 final energy consumption)

Although these planned savings are higher in comparison with the actual savings during the period 2000 – 2003 (presented here in Table 1), still they are much lower than the existing potential in all sectors (the only exception being the sector of services). The reason is that these planned savings are based on already identified projects, known to the EEA, which are in various stages of development towards financial closure of the necessary investment.

The overall investment needed for these projects amounts to about Euro 150 million and the average payback period of all projects is 3.4 years. Concerning the industrial sector, these values are: about Euro 27 million investment and 1.7 years average payback period.

1.3.5 Financial support schemes for energy efficiency projects

The 2 main sources of financial support for energy efficiency investment projects are the Kozloduy International Decommissioning Support Fund (KIDSF) and the Energy Efficiency Fund.

Follows brief information about each one of these funds:

¹ ktoe means thousand tonnes of oil equivalent. 1 ktoe ≈ 41.9 TJ.

➤ **Kozloduy International Decommissioning Support Fund (KIDSF)**

This fund was created for financing of measures, compensating the negative effects of the premature decommissioning of Units 1 – 4 of the Kozloduy Nuclear Power Plant. KIDSF operates with financial resources, provided by the PHARE Programme and other donors. It is administered by the EBRD. Among other types of activities, KIDSF provides support also for energy efficiency measures (since 2004). This support includes 2 credit lines for soft loans and also grants for energy efficiency measures in public buildings – these mechanisms will be briefly presented here.

- Credit line “Energy Efficiency” (operational since 2004) is dedicated to support energy efficiency measures in the energy sector and in industry (including small CHP plants, reconstructions of distribution networks, heat recovery, automatic control of industrial processes and equipment). A precondition is the achieving of at least 10% energy savings and the maximum credit amount is Euro 1 500 000. Credit conditions are softened through a 7.5 % grant, provided by KIDSF, which is used also as credit security. However, additional credit security (140%) is needed from the credited organization and interests are in the range 9% - 12.5%. The credit period is 6 years. This credit line is serviced by 4 Bulgarian commercial banks.
- Credit line of Euro 50 million for energy efficiency of household buildings (operational since September 2005), developed by EBRD, with a Euro 10 million grant from KIDSF. These are credits ranging from Euro 500 to Euro 5 000, for activities such as: thermal insulation of outer walls, energy efficient windows, installation of energy efficient gas boilers or biomass fired boilers or stoves, solar collectors, heat pumps for heating and air conditioning. The credit conditions include 20% grant. Again, this credit line is serviced by 4 Bulgarian commercial banks.
- Pilot project for energy efficiency measures in public buildings (hospitals, schools, etc.), involving a Euro 5 million grant from KIDSF. After a selection procedure in 2004, this project is currently being implemented in 36 public buildings.

➤ **Bulgarian Energy Efficiency Fund (BEEF)**

The Bulgarian Energy Efficiency Fund was created in compliance with the Energy Efficiency Act. The equity capital of BEEF includes \$10 million, allocated by the UN Global Environmental Facility with support of the World Bank. The Government of Bulgaria participates with a budgetary contribution of Euro 1.5 million and the Austrian Government made a donation of Euro 1.5 million.

The Energy Efficiency Fund will support projects in industry, residential and public buildings, district heating and municipal services.

Project selection criteria are:

- At least 50% of the financial effect should result from provable energy saving;
- Well-known and proven technologies should be used;
- Project costs should range between BGN 30 000 and BGN 3 000 000

- Co-financing from the project owner should be at least 10% in case of co-financing from the BEEF and a commercial bank, or at least 25% in case of crediting from the BEEF only
- The payback period should not exceed 5 years.

Support from the BEEF includes the following three financial products: partial credit guarantee, joint crediting with commercial banks and technical assistance for project development from experts of the Fund.

The beneficiaries of BEEF support can be:

- Municipalities;
- Legal persons;
- Small companies and physical persons.

➤ **Tax relieves**

The following tax relieves exist in Bulgaria in relation to energy efficiency activities [ref. 17]:

- Buildings that have received A category certificate are liberated from taxes for a 10-year period; buildings with B category certificate are liberated from taxes during a 5-year period;
- Donations to the Energy Efficiency Fund from companies or natural persons are leading to tax relieves.

➤ **Conclusions**

- Currently Bulgarian incentives for energy efficiency projects are based on soft loans, no subsidies or grants are provided (the only exception being the KIDSF grant scheme for municipally owned public buildings);
- Although support funds for energy efficiency activities are insufficient to cover the existing potential for improvements, they are intended to serve as a prime mover for initiating more substantial commercial financing.

1.4 Analysis of the available information about various indicators of energy efficiency in industry – development trends in recent years

Current energy intensity characteristics in Bulgaria have a number of unusual features, which are important from the point of view of designing of a public-private agreement scheme. Cross-country comparisons give quite different results, if various types of money indicators or physical indicators are used.

Actually, Bulgarian situation is a good illustration of the opinion that “monetary indicators are only meaningful at current price and purchase parities” [ref. 18]. E.g., 2001 primary energy intensity in Bulgaria was evaluated to be 8 times higher in comparison with the EU average,

but if a purchase power adjustment is applied, Bulgarian primary energy intensity becomes 'only' 2.4 times higher than the EU average [ref. 19]. Final energy intensity differences are smaller and still smaller are the cross-country differences of physical indicators in specific industries, the Bulgarian ones exceeding typically by 15 – 30% the EU average [ref. 14].

Another peculiarity appears if the energy intensity values of various sectors are analyzed. Compared with the EU average, Bulgarian final energy intensities are higher in industry, on the same level as the European ones in services and lower than the respective EU values in agriculture and households.

The changes since 1988 of some basic indicators, such as gross domestic product (GDP), primary energy consumption (PEC), final energy consumption (FEC) and greenhouse gas emissions (GGE) are presented in the following diagram:

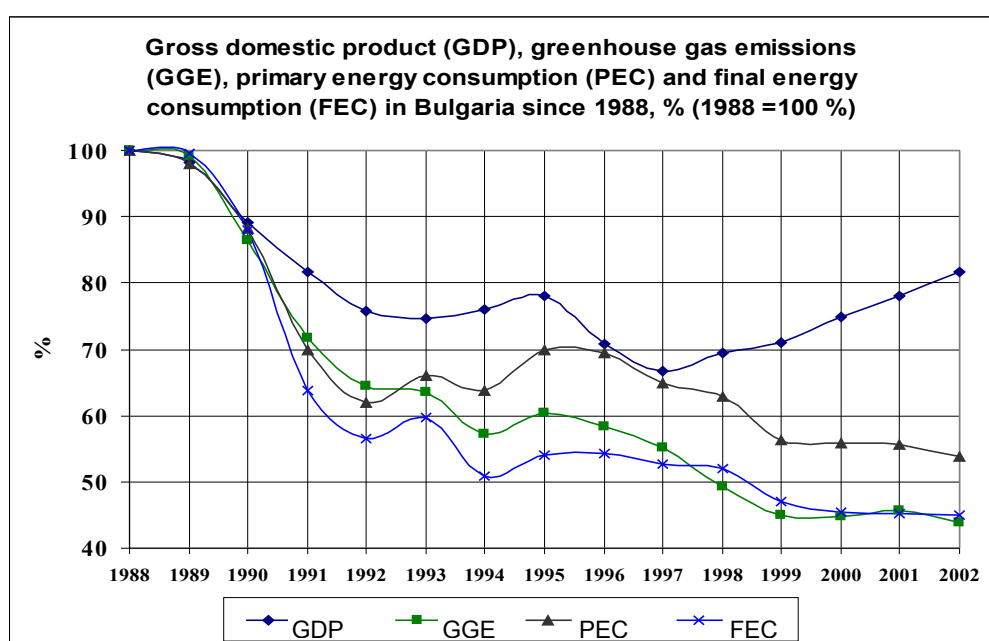


Figure 1: Energy consumption indicators in Bulgaria during the period 1988 – 2002

Source: National Long-Term Programme for Energy Efficiency till 2015 – [ref. 14]

In 2002 the general trend of decrease of energy consumption changed and, since that moment, a certain increase was observed in both primary and final energy consumption, as this is presented on Figure 2 and Figure 3 respectively:

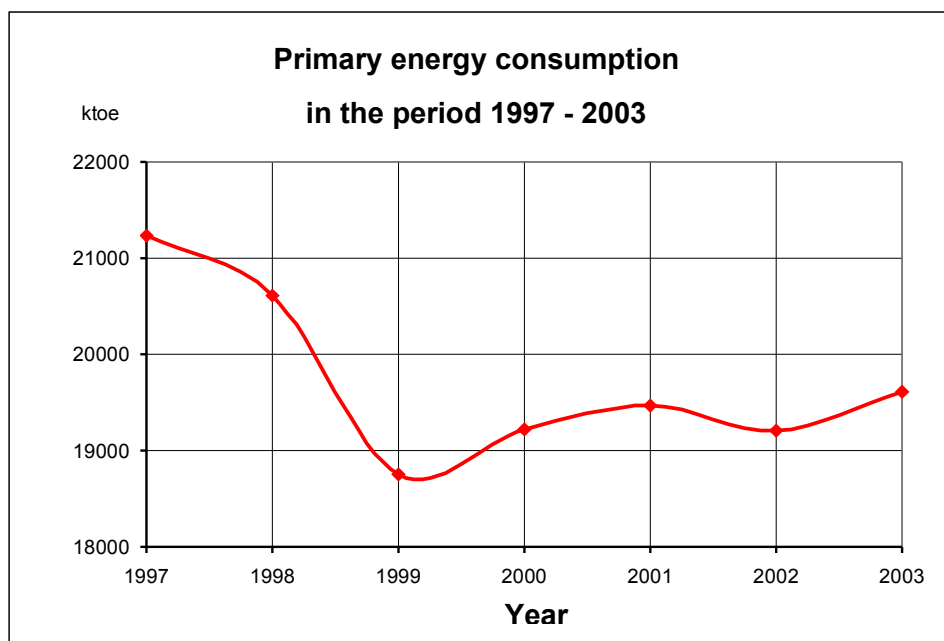


Figure 2: Bulgarian primary energy consumption since 1997

Source: National Long-Term Programme for Energy Efficiency till 2015 – [ref. 14]

Yet, in 2004 primary energy consumption (gross inland energy consumption) had a decrease down to 19 017 ktoe [ref. 21].

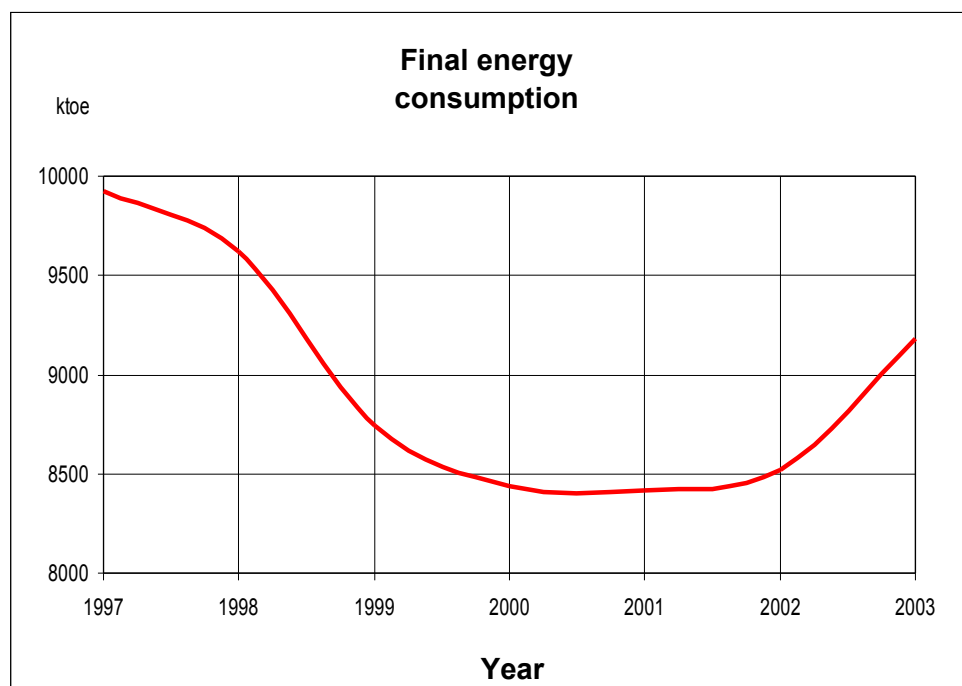


Figure 3: Bulgarian final energy consumption since 1997

Source: National Long-Term Programme for Energy Efficiency till 2015 – [ref. 14]

Here too, in 2004 was observed a decrease, down to 8 907 ktoe [ref. 21].

In a similar way to energy consumption, energy intensity also had a general trend of decrease in the 1990's. Of course, this decrease was due not only to energy efficiency improvements, but also to other factors (restructuring of industry, lower energy consumption in sectors that don't have a direct influence on GDP – e.g., lower energy consumption for heating of residential and public buildings, lower fuel consumption of private cars, etc.). This means that a rebound effect of energy intensity could be expected with the improvement of the economic conditions. Such effect is not yet observed in primary energy intensity (Figure 4), but a recent increase of final energy intensity (Figure 5) could indicate its beginning. The values on Figures 4, 5 and 6 are expressed in kg oil equivalent energy consumption per Euro from the year 2000 GDP, with purchase parity adjustment (koe/E00p).

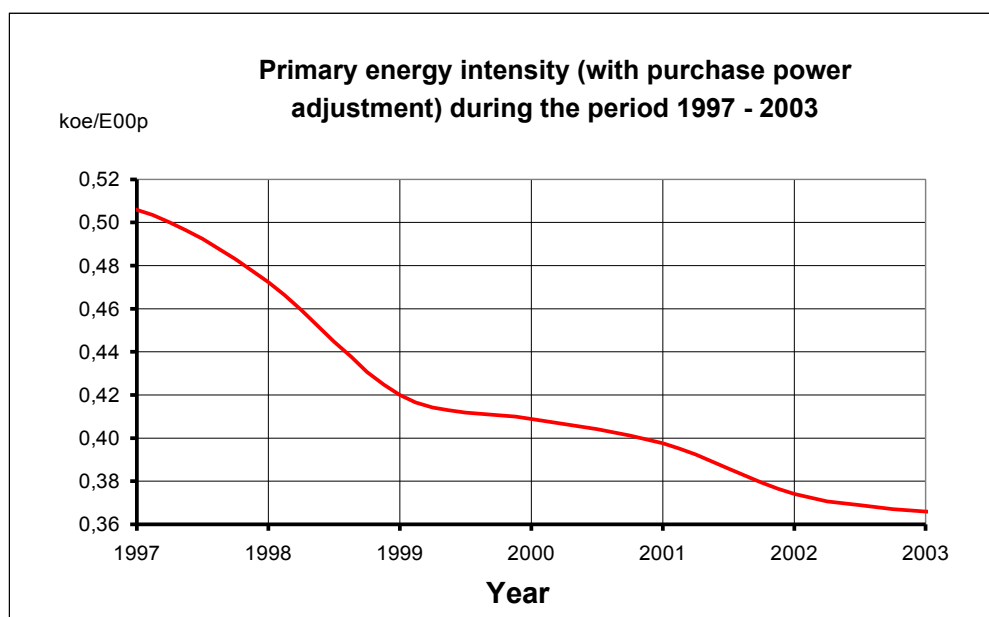


Figure 4: Primary energy intensity in Bulgaria (1997 – 2003)

Source: National Long-Term Programme for Energy Efficiency till 2015 – [ref. 14]

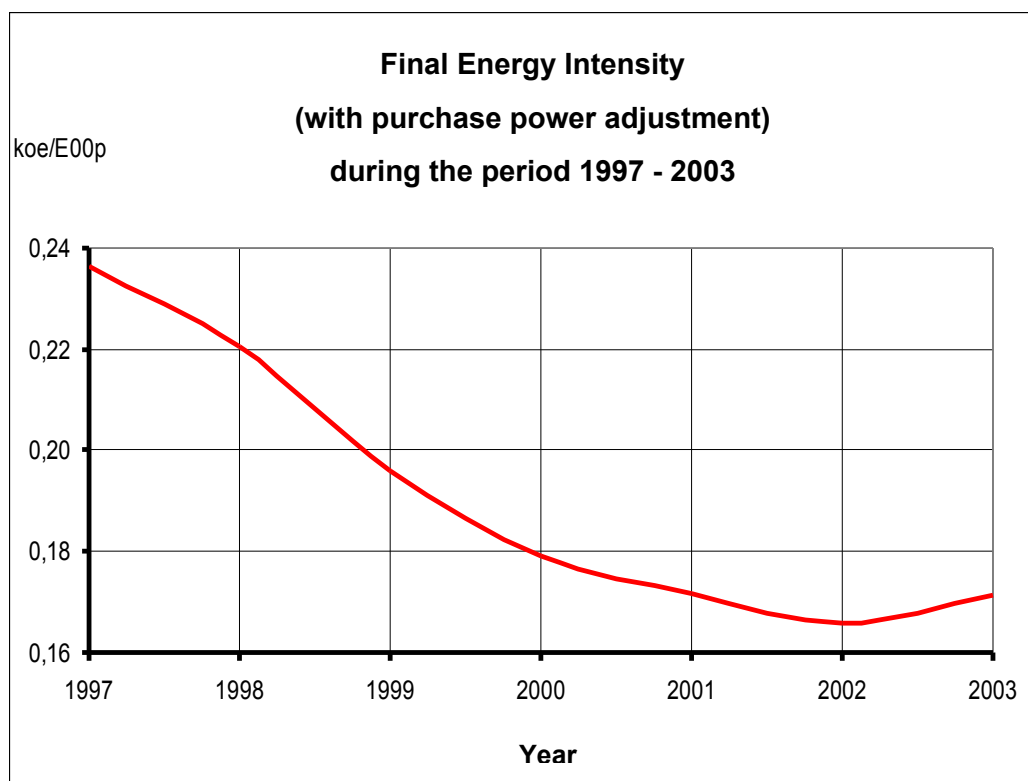


Figure 5: Final energy intensity in Bulgaria (1997 – 2003)

Source: National Long-Term Programme for Energy Efficiency till 2015 – [ref. 14]

In the National Long-Term Programme for Energy Efficiency till 2015 [ref. 14] is also included an analysis of the final energy intensity of the basic economic sectors. The following conclusions that are made there are important for also for the current study:

- **Only the industrial sector has higher final energy intensity than the average one of the country, so “the industrial sector is determinative for the high final energy intensity”;**
- **In 2003 the final energy intensity of the industrial sector started to increase.**

Some basic indicators about the Bulgarian industrial sector are as follows:

- The industrial sector percentage from the national final energy consumption decreased from about 45% in 1998 to about 38% in 2004 [ref. 21]
- The contribution of the industrial sector to the gross value added in 2004 was 30% [ref. 22];
- The industrial branches with highest energy consumption are metallurgy, chemical industry, food processing, glass, ceramics and pulp & paper industries;
- The unit energy consumption (which is related to physical output) is higher by 15 – 30% (and in some cases even more) than the one in EU countries [ref. 14].

Energy consumption indicators of the industrial sector are presented on Figure 6 and Figure 7:

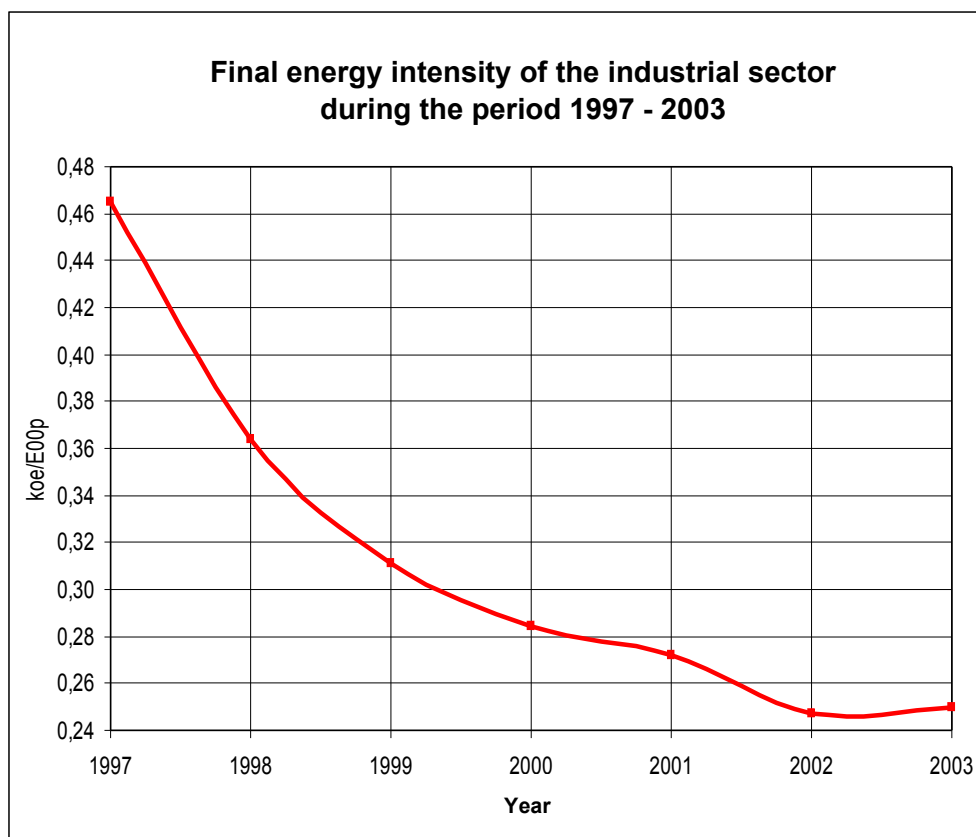


Figure 6: Final energy intensity of the industrial sector Bulgaria (1997 – 2003)

Source: National Long-Term Programme for Energy Efficiency till 2015 – [ref. 14]

As this can be seen from the above diagram, there was a small increase of final energy intensity in industry in 2003. Yet, this trend didn't continue in the following year, when a simultaneous decrease of final energy consumption and increase of industrial output was observed [ref. 21 and 22].

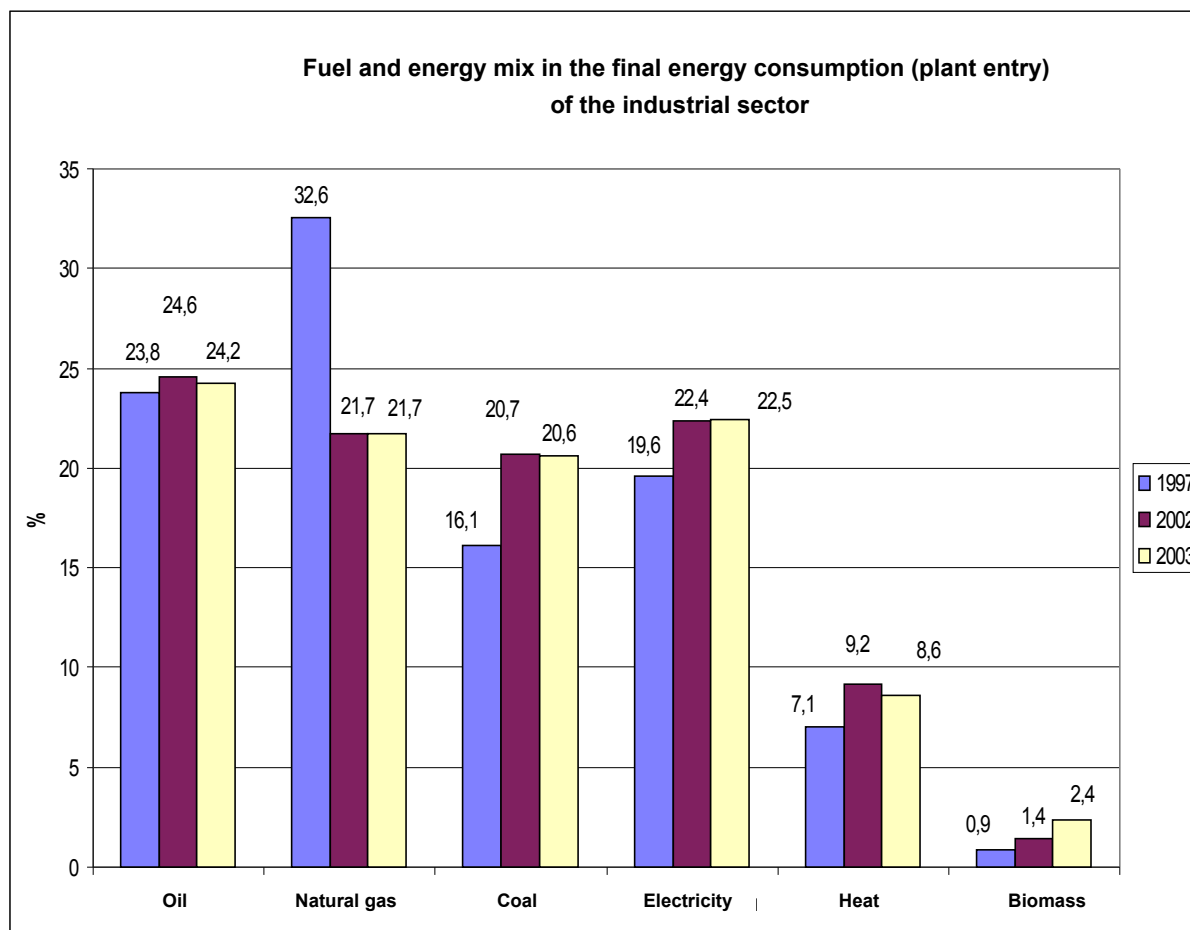


Figure 7: Fuel and energy mix in the Bulgarian industrial sector

Source: National Long-Term Programme for Energy Efficiency till 2015 – [ref. 14]

There aren't any recent studies that summarize the potential for energy efficiency demand side improvements of entire sectors or in a national plan in our country. Some evaluations from official documents that were mentioned above are as follows:

- For the industrial sector:

In [ref. 14] is mentioned that unit energy consumption is higher by 15 – 30% (and in some cases even more) than the one in EU countries

- For the transport sector:

Again in [ref. 14] is written that unit consumption indicators related to ton-km or passenger-km are estimated to be 30 – 40% higher than the EU average ones.

- For residential buildings:

In the National Programme for Rehabilitation of Residential Buildings [ref. 17] is estimated that energy efficiency measures (such as replacement of windows, thermal insulation of the roof and the outer walls, etc.) could result in 35 – 40% energy savings.

Also, it should be noted that the energy efficiency situations is dynamic and site specific. E.g., the following diagram about the unit energy consumption in paper manufacturing indicates a substantial improvement in Bulgaria since 1995.

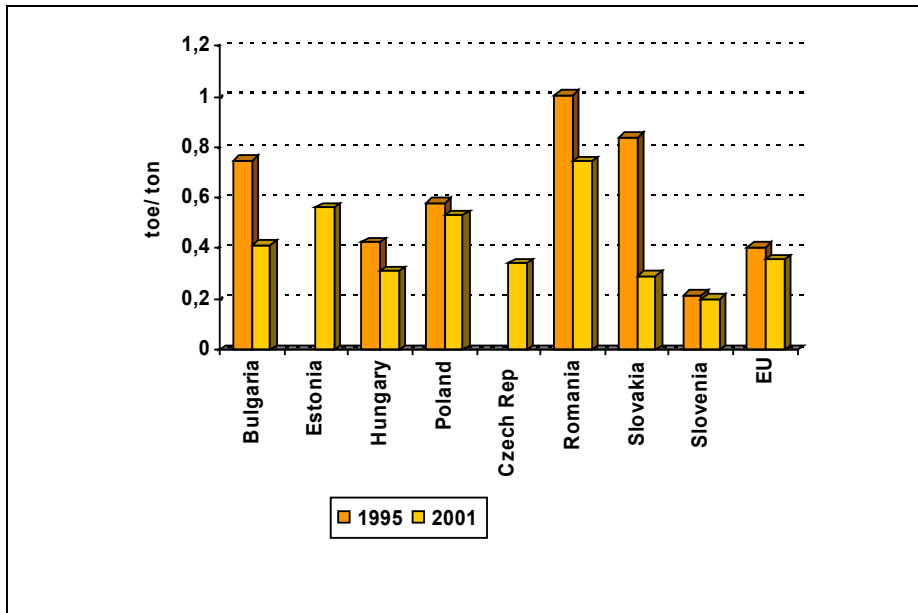


Figure 8: Unit energy consumption of paper production

Source: B. Lapillonne, Enerdata [ref. 19]

Yet, if steel manufacturing is taken as an example, the situation is quite different:

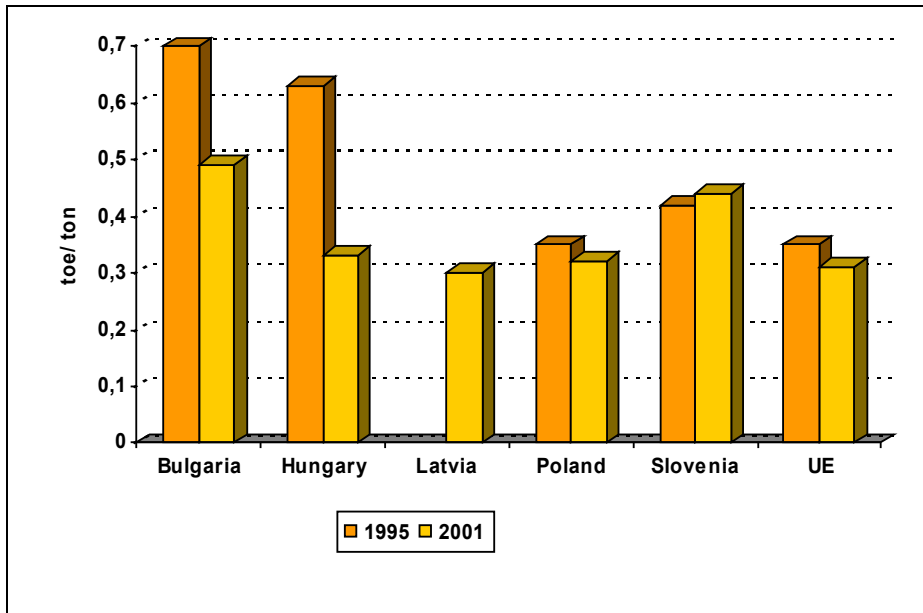


Figure 9: Unit energy consumption of steel production

Source: B. Lapillonne, Enerdata [ref. 19]

It is interesting to note that in the case of paper industry the difference with the EU average

value is less than 15% and in the case of steel industry – more than 30%. This shows once more the approximate character of the above evaluation for a 15 – 30% range of differences in unit energy consumption in industry.

Still more precise data are the site specific ones, which are obtained through energy auditing of individual industrial plants.

Actually, unit energy consumption (related to physical output) gives the most precise information about the potential of improvement of energy efficiency through organizational and technical measures. Financial indicators express more or less also the influence of market conditions. Consequently, the actual potential for improvements in the industrial plants can be identified through comparison of unit energy consumption values.

Information about energy consumption in industry is collected both by the Energy Efficiency Agency and the National Statistical Institute, yet the data processing does not include yet procedures for calculation of unit energy consumption of various industrial branches.

If we try to make a similar evaluation of energy efficiency of various branches in Bulgarian industry, the available data concerns mostly monetary indicators – e.g., final energy intensities of food processing, textiles, wood processing, pulp and paper industry, chemical industry, etc., and the corresponding values give a general trend of improvement, as this can be seen from Table 2:

Evolution of final energy intensities of certain industrial branches in Bulgaria

Source: Information provided by the Energy Efficiency Agency

Table 2

Industrial branches	Final energy intensity, koe/€00		
	1997	2000	2003
Food processing	0.867	0.783	0.614
Textiles	0.576	0.437	0.345
Wood processing	2.243	1.233	1.143
Chemical industry	6.977	5.780	5.118

The above figures give a general picture of improvement of energy efficiency. Yet, it is clear that such sharp improvement as the one of the wood processing industry can't be explained by technical improvements only – obviously, there was some change in market conditions.

If we go to more specific branches, e.g. breweries, or cement factories, what currently is possible to provide is just an expert evaluation. E.g., breweries in our country are in good financial conditions, several modernization projects have been implemented, their owners have good understanding of energy efficiency, so most probably their unit energy consumption (related to physical output) is close to the one in Western Europe. Concerning cement plants, again several energy efficiency measures are known to have been implemented, but some potential for future improvements still exists. Yet, both these

conclusions are of qualitative nature, quantitative indicators can be identified only with through specialized studies.

From this point of view, it is interesting to note that the LTA-1 and LTA-2 schemes in the Netherlands use an energy efficiency index, based entirely on unit energy consumption. The collection and comparative analysis of such information can provide indications in which industries in our country improvements are most needed. E.g., valuable information about unit energy consumption in several industrial branches in the Netherlands is presented in the appendices of the Senter Novem report, prepared in the framework of the current project: "Overview of Voluntary Approaches in the European Union with focus on Long-Term Agreements on Energy Efficiency Improvements in the Netherlands" [ref. 23], covering the following industrial branches: steel industry, iron foundries, cement industry, brick industry, oil refineries, potato processing industry, breweries, cocoa, industry, soft drinks industry, coffee roasting plants, the Dutch railway company, etc. The application of a similar model for evaluation of energy efficiency changes could be very useful in Bulgarian conditions.

2 Main thresholds (social, financial and legal) for improvement of energy efficiency in Bulgarian industry

The principal social threshold consists in achieving of an improved social status of professionals, involved in energy efficiency activities. Good experts and specifically young people should be attracted to perform such activities in the most practical way as possible – with a specific aim to achieve a real positive influence on the operation of industrial sites.

The energy efficiency approach, used in the 1980's, involved (among other things) administrative obligations of employees of state-owned enterprises. After a comparatively recent privatization, there is a natural sensitivity in respect to everything that looks like an obligation. Consequently, from this point of view, public-private partnership seems to be a very suitable approach for organizing of energy efficiency improvement activities on a completely different basis from the one in the 1980's.

The structural scheme of social interactions concerning energy efficiency activities involves the following types of relationships:

- A) Industrial company people – all participants from outside the industrial company;
- B) Company engineers and technical staff – company owners and managers;
- C) Project developers – financial institutions.

Concerning the A type of relationship, it is very important to increase the participation of company people in energy efficiency activities. Let's take as an example the obligatory energy audits. According to the law, they have to be performed by an auditing firm, selected by the industrial company from a list of firms registered by the Energy Efficiency Agency. Consequently, from formal point of view, the audits are performed by people from outside the industrial company. Yet, every energy expert knows very well how important is the information that he will take from people working in the company – both in respect to continuously metered operational and energy consumption data and for having their opinion about things that could be improved. Such greater participation of local company people in the energy audits also increases the awareness and the interest of the operational and maintenance staff in energy efficiency improvements. So, it is very important to achieve increased involvement of **all** the employees of industrial companies in energy efficiency improvements and to provide moral and financial incentives for such participation. That sort of interest should be encouraged even from the part of people that haven't yet got special technical qualification for energy efficiency activities. However, there is a general attitude in our country that each task should be carried out by an expert in the respective field. E.g., if boiler burners are to be tuned, this should be performed periodically by specialized companies. Yet, if boiler operators have the related training and metering equipment, they too could make similar measurements of the boiler efficiency more frequently and improve the boiler operation. In my opinion, a Long – Term Agreement system could contribute for achieving an increased interest in energy efficiency from the part of operating and maintenance staff.

Concerning the B type of relationship, again the Long – Term Agreement scheme could be beneficial, because company owners and managers will have to rely more on their technical experts for the performance of the various procedures and activities, related to the scheme.

Finally, in respect to the C type of relationship, an important objective of a Long – Term Agreement scheme should be to improve the image of energy efficiency activities among financial circles.

An interesting issue from social point of view represents the public awareness of the link between environmental protection and energy efficiency. Generally speaking, this link is being understood by Bulgarian society. Yet, somehow energy efficiency is not among the priorities of environmental protection activities.

E.g., in Bulgaria exist from the early 1990's two funds for support of environmental protection activities. Among other activities, they have supported also several energy efficiency projects. Yet, the launching of a specifically dedicated energy efficiency fund took more than 12 years.

It would be very valuable, if some of the idealistic energy, dedicated by large circles of Bulgarian society to environmental protection, could be directed also to energy efficiency. A well designed Long-Term Agreement scheme could be very useful in this respect.

The principal financial threshold consists in improving the communication between technical experts and financial decision-makers. Usually what happens in our country is that engineers think that a lot of good investment possibilities exist, but financing is insufficient. From the opposite side, bankers think that they have some financing possibilities, but can't identify really good projects. It is obvious that both sides should adapt to each other and a good Long-Term Agreement scheme should contribute somehow for achieving such results.

From legal point of view, what is undoubtedly needed is increased level of legal support for energy efficiency activities. So, the text of the Long – Term Agreements should give a clear signal about this – e.g., it could be stated, that the national authorities shall consider all energy efficiency activities to have an equal status and the same preferences as high technology activities and innovations.

3. Opinions, expressed during the interviews and in response to questionnaires

In this chapter are presented the results from a survey of public opinion, concerning the suggested introduction of a Long –Term Agreement scheme in Bulgaria. For this purpose were collected answers of questionnaires and, in some cases, were made personal interviews with a number of stakeholders. The complete text of the answers to questionnaires is provided in the Appendix to this report.

3.1 List of participants

The participants in the opinion survey were from the following types of organizations:

- Industrial companies
- Industrial branch organizations
- National authorities and institutions
- NGO's and energy consulting companies

The participants from industrial companies are as follows:

- Mr. Tzvetan Todorov, Stomana Industry AD
- Mr. Simeon Vakarelov and Mr. Nikolay Bekiarov, Assarel – Medet AD
- Mr. Ivan Dimitrov, Plumbum and Zink Complex AD
- Mr. Kosta Tanev, Alcomet AD
- Mr. Alexander Valkov, Electroservice KCM EOOD
- Mr. Slav Slavov, VDC OOD
- Mr. Evgeni Genov, SD Qualitet
- Mr. Evgeni Spirov, Naslada AD
- Mr. Atanas Dimitrov, Maritza East -2 Thermal Power Plant

The participants from industrial branch organizations are as follows:

- Mrs. Politimi Paunova, Trade Association of the Ferrous and Non-ferrous Metallurgy
- Mr. Nikolay Minkov – Industrial Cluster Srednogorie Copper

The participants from national authorities and institutions are as follows:

- Mr. Dobrin Oreshkov, Energy Efficiency Center in Industry
- Mr. Angel Danin, Ministry of Transport
- Mrs. Borianna Uzunova, Energy Efficiency Agency

- Mr. Krassimir Naydenov, Energy Efficiency Agency
- Mrs. Irena Hristova, Energy Efficiency Agency
- Mrs. Nadezhda Staneva, Energy Efficiency Agency
- Mrs. Rayna Grigorova, Energy Efficiency Agency
- Mr. Todor Totev, Energy Efficiency Agency
- Mr. Ludmil Kostadinov, Energy Efficiency Agency
- Mr. Nikolay Nikolov, Energy Efficiency Agency
- Mr. Ognian Markovski, Energy Efficiency Agency
- Mr. Vladimir Minev, Bulgarian Small and Medium Enterprises Promotion Agency

The participants from NGO's and energy consulting companies are as follows:

- Mr. Pavel Manchev, EnEffect Consult
- Mr. Dimitar Baev, Energy Efficient Systems Ltd.

3.2 Applicability of Long-Term Agreements (LTA) for energy efficiency in Bulgaria

Concerning the applicability of Long-Term Agreements in Bulgaria, all answers are positive. Some reasons for such answers are:

- The voluntary principle of participation in the scheme (Mr. Vakarelov and Mr. Bekiarov, Mr. Kostadinov);
- The possibilities for good co-operation between the contractual parties (Mr. Tzvetan Todorov);
- The fact that the national administration will take some obligations (Mr. Dobrin Oreshkov);
- The good results in the Netherlands – twice accelerated improvement of the energy efficiency index (Mr. Nikolay Nikolov);
- Subsidies and tax relieves that are involved in such schemes (Mrs. Boriana Uzunova, Mr. Krassimir Naydenov);
- Financial incentives, methodological support, energy efficiency improvement plans and energy management systems (Mr. Angel Danin);
- Financial incentives, methodological support and consistent energy policy (Mr. Atanas Dimitrov);
- Because in the contractual relationships are completely clear, contribute for achieving of good results and don't involve any corruption (Mr. Vladimir Minev);
- The incentives for energy efficiency (Mr. Pavel Manchev);
- Because LTA could contribute for organizing of the implementation of the recommendations of the obligatory energy audits (Mr. Dimitar Baev);

3.3 Approach for target formulation

Here the opinions of the participants in the survey are different:

- From the industrial plants, this question was answered by 5 participants. Two out of them think that the targets should be specified by the national authorities, 1 answer suggests the targets to be specified by the respective companies, 1 answer suggests both parties to be involved and finally, 1 answer suggests the targets to be specified by a third party.
- The answers from industrial branches are: 1 answer in favour of target formulation by the respective companies and 1 answer reads that both parties should be involved.
- The answers from national authorities and institutions are: 5 answers in favour of the target formulation by the authorities, 6 answers suggesting target formulation by the authorities and finally 1 answer in favour of involvement of both parties (because an agreement should take into account the interests of all participating parties).
- Finally, the answers from NGO's and energy consultants are: 1 answer in favour of target formulation by the companies and 1 suggesting this activity to be taken by the authorities.

3.4 Monitoring of the results

Here again, the opinions about who should perform the monitoring differ:

- From the industrial plants, 2 answers are in favour of an independent institution, 2 answers are in favour of a governmental agency (e.g., the Energy Efficiency Agency) and 1 answer suggests both contractual parties to be involved.
- Both answers from industrial branches are in favour of an independent institution.
- Almost all answers from national authorities (with 3 exceptions) are in favour of a governmental institution and most of them specify the Energy Efficiency Agency.
- Both answers from representatives of NGO's and energy consultants are in favour of an independent institution.

3.5 Technical and informational support, needed by industrial companies

Here the listed items include:

- Information about possibilities for funding of investment projects;
- Access to data bases and industrial branch analyses of EU countries;
- Summary information about typical effectiveness of various energy efficiency measures;
- Description of good practice examples;
- Catalogue information about energy efficient equipment, including price data;

- Feasibility analysis of specific cases, according to Bulgarian conditions and energy prices;
- Results from various international projects with Bulgarian participation and research activities;
- Energy audit methodologies, models for ESCO contracts.

There is one opinion here that technical will be found by the companies, if they have economic interests.

3.6 Financial support instruments, that could be introduced in Bulgaria

Here almost all answers include:

- Tax relieves;
- Funding of energy audits;
- Simplification of administrative procedures (e.g., construction permits, related to energy efficiency improvements).

Yet, one of the answers (Mr. Vakarelov and Mr. Bekiarov) states that it is too optimistic to expect tax relieves in the near future.

In summary, the opinions of the participants in this survey were close on almost all issues, excluding the question about the formulation of targets.

My personal opinion on this issue is in favour of a decentralized bottom-up approach, based on results from energy audits. Such approach seems to be more suitable, because great differences exist between various companies in respect to their energy efficiency level and financial capabilities. What could be introduced as universal obligation of all participating companies should be the implementation of energy management systems and other low-investment measures. For this purpose could be designed a point system, similar to the one used in LTA-2.

Of course, the above survey of opinions is a preliminary one. All interested stakeholders are invited to express their position in respect to the conclusions of the report, presented in Chapter 6.

4 Suggestions of ways to harmonize Long-Term Agreements with other policies, currently pursued for energy efficiency of Bulgarian industry: obligatory energy audits and the EU emission trading scheme

Currently in Bulgaria exists an obligation for energy audits to be performed by all large energy consumers (with annual consumption exceeding 3 000 MWh). These audits have to be performed in 3-annual periods by energy audit firms, selected by the respective companies from a list of firms, registered by the Energy Efficiency Agency.

According to information received from the Energy Efficiency Agency, currently in Bulgaria are existing 352 industrial sites that are large energy consumers and their overall final energy consumption amounts to 31 332 665 MWh, which corresponds approximately to about 2 690 ktoe, which is about 80% of the overall final energy consumption of the industrial sector.

Consequently, a primary objective of a LTA scheme in Bulgaria should be to include as much as possible from these 352 industrial sites (operated by 330 companies). Of course, inclusion in the scheme should be possible for all interested industrial companies.

As this was discussed already in Chapter 2 and Chapter 3, LTA and obligatory energy audits could be complementary in several ways:

- LTA could increase the pre-audit and post-audit measurement and analysis activities, performed internally by the respective companies;
- Energy audit results could be used for setting of site specific targets for LTA, taking into account also the financial capabilities of the respective companies;
- LTA could be used as a legal framework for the implementation of the recommendations of the energy audits (such suggestion was made in the response of Mr. Dimitar Baev);
- Finally, if the obligatory status of energy audits is changed in future to a voluntary one, LTA will still continue to be applicable.

The EU emission trading scheme will become applicable in Bulgaria from the moment of accession to the EU. According to the Consultative Document for the National Allocation Plan which is currently being developed, this scheme will cover 159 industrial and energy sector sites in Bulgaria.

There are 2 possible interactions between LTA and the EU Emission Trading Scheme:

- Firstly, energy efficiency activities will represent a way for these companies to fulfil their obligations for reduction of CO₂ emissions;
- Also, LTA related tools could be quite valuable for quota determination.

In the case of our country, we have more than 50% reduction of our greenhouse gas emissions, and most of this reduction resulted from decrease of energy consumption. However, in conditions of economic recovery, some increase of energy consumption could be expected. So, it would be wise to base the emission quotas on specific energy consumption, and not on the current emission levels. It is interesting to note that such approach was used in the Netherlands, with the Benchmarking Covenant, described in [ref. 23]. According to the so-called Benchmarking Agreements, each company could specify its own emission quota, provided that it corresponds to the “best in the world” energy efficiency practice.

5. Expected positive results from the application of Long – Term Agreements in Bulgaria

The principal positive result from LTA would be the introduction of a voluntary approach in an area which traditionally was subject of obligatory requirements. This is much more suitable approach for exertion of some type of influence in the conditions of a free market economy. From one side, the voluntary approach will result in a more positive attitude of the industrial companies. From the other side, the national authorities will be able to clearly specify and organize their support for energy efficiency activities.

From material point of view, a basic objective of a LTA scheme in Bulgaria should be to accelerate energy efficiency improvements. But the actual rate of increase should be identified through a decentralized bottom-up approach, because the proclaiming of a general target still seems something unusual in Bulgarian conditions, both from practical and psychological point of view.

An important benefit should be the spreading among all LTA participants of energy management systems and other low-investment measures.

Finally, a major objective should be the achievement of the 3 thresholds, formulated in Chapter 2:

- From social point of view: improved prestige of energy efficiency activities;
- From financial point of view: improved communication between project development and financial decision making;
- From legal point of view: increased legal support for energy efficiency activities.

Of course, the important issue is how to attract as much as possible from the 352 big energy consumers in the future LTA scheme. In our recent history, there aren't strong traditions in completely voluntary schemes, concerning economic activities. So, of crucial importance will be the designing of the scheme, the formulation of clear and realistic benefits and incentives for the participants and finally, the promotion of the LTA scheme.

In addition to the possibilities for energy savings, in Bulgaria exist also a substantial potential for substitution of conventional fuels by renewables (e.g., biomass).

Having in mind that biomass is a local resource, it is suitable to treat energy savings and conventional fuel substitution in a similar way. Due to this reason, it is suggested here to have 2 types of energy efficiency indexes – one based on the overall energy consumption and a second one, based on non-renewable energy consumption only.

6 Conclusions

The following conclusions can be made about the energy efficiency of Bulgarian industry:

- 1) The industrial sector share in the national final energy consumption decreased from about 45% in 1998 to about 38% in 2004. This was due both to industrial restructuring and to energy efficiency improvements. The average annual decrease of energy intensity in the industrial sector during the above period was about 3.2%².
- 2) The industrial branches with highest energy consumption are: metallurgy, chemical industry, food processing, glass, ceramics and pulp and paper industries. Large energy consumers in the industrial sector are 330 companies (with 352 sites) which have about 80% of the final energy consumption in industry.
- 3) From the point of view of evaluation of the existing potential for energy efficiency improvements, physical energy efficiency indicators are more reliable than the monetary indicators, especially in conditions like the ones in Bulgaria. From such point of view, the experience of the Dutch LTA scheme represents a very interesting experience. Actually, it is a significant innovation that the Dutch LTA scheme involves the use of an energy efficiency index, based entirely on physical indicators, in all types of industrial plants
- 4) It should be noted that an important potential for energy efficiency improvements still exists in our country. According to expert evaluations, unit energy consumption (related to physical output) is higher by 15 – 30% (and in some cases even more) in comparison with the average one of the EU-15 countries. This means that additional efforts are needed for improvement of the energy efficiency situation.
- 5) In Bulgaria traditionally exists high environmental awareness among broad public circles and this was demonstrated also in recent years in several ways. Yet, this awareness is not universal – it is not shared by everybody, and that it does not include everything related to improvement of the environmental impact. From such point of view, the relation between energy efficiency and environmental protection still needs to be further clarified and a LTA scheme could be a good procedure for such improvement.
- 6) Due to investment difficulties, several good and financially feasible projects remain not implemented. An interesting example in this respect is the comparatively low average payback period – 0.5 year, of the totality of energy efficiency projects, reported to have been implemented during the period 2000 – 2003 in the National Long-Term Programme for Energy Efficiency till 2015. This means that only some of the most attractive projects were fulfilled. In general, productive investment financing is still insufficient, so there should be some national planning for the use and gradual increase of such rare resource. Consequently, maybe the most important input that the national authorities could provide to industrial companies in the framework of a LTA scheme is advice and guidance for participation in various projects, programmes, use of structural funds and other sources of financing, as this is specified further down in p. 9.
- 7) Most opinions, expressed during the survey of opinions are coinciding or complementary. They concern: the applicability of a LTA scheme in Bulgaria, and the technical and financial support that could be provided to industrial companies, the institution that should administer the scheme. The only points of different opinions concern the formulation of the indicative targets and the supervision of their implementation.

² The energy intensity being defined as the relation between the energy consumption and the product, expressed in Euro from the year 2000.

- 8) Energy efficiency conditions are not the same in various industrial sub-sectors and individual plants. Some industrial facilities are quite modern from energy efficiency point of view, yet others still have potential for substantial improvement. Similar is the situation with the productive investment capabilities of various companies. In such conditions, a decentralized bottom-up approach for setting of targets and commitments seems to be the most appropriate one – similar to the one, used in LTA-2, each individual company being responsible for the setting of its own target. In Bulgaria exists a legal obligation for energy audits of big energy consumers (> 3 000 MWh annually), which will be performed in 3-year periods. The results from these audits could be used for setting of LTA targets. In the case of smaller companies, targets could be based on simpler energy efficiency studies, performed either by internal staff of the respective company, or external consultants.
- 9) The input from the national authorities could consist in the following:
- Periodical information about available sources of financing (such as projects, programmes, structural funds, etc.) that could be used for support of energy efficiency investment;
 - Methodological assistance for elaboration of bankable project proposals, evaluation of the proposals and providing of recommendations - in cases when this is appropriate;
 - Technical information;
 - Organizing of training courses;
 - Commitment of the national authorities to treat in all cases energy efficiency activities as equal to high technologies and technical innovations; in such way, some planned incentives for high technologies would apply also to energy efficiency activities;
 - Finally, some promotion activities concerning the LTA companies, including issuing of certificates, publications, etc. Such commendations should be expressed also to individual engineers and experts, who have contributed for energy efficiency improvements.
- 10) Concerning the low cost energy efficiency measures, several of them have been identified and then implemented since 1989 in a natural way, as a result of the sharp increase in energy prices. Yet, formal energy management systems, with detailed measurement and analysis of energy consumption data, typically need a lot of improvement in our country (and in some small companies may be not existing at all). From such point of view, there should be a general commitment of all participating companies in a future LTA scheme to implement low cost measures and to have energy management systems. This could be organized with a point system, similar to the one in LTA-2.
- 11) In our opinion, the activities for the monitoring and administration of the proposed LTA scheme should be organized as a on a project basis, as follows:
- Monitoring, administration and support activities should be performed by a special LTA Unit of an executive agency (e.g., the Energy Efficiency Agency).
 - The activities of the LTA Unit will be observed by a Steering Committee, acting on behalf of all companies, participating in the LTA scheme. This Committee will consist of representatives of industrial branch organizations, but its periodical meetings could be attended also by representatives of individual companies. The Steering Committee will have the right to make recommendations, concerning the activities of the LTA Unit.
- 12) The energy efficiency index should be calculated in a similar way as in the Dutch LTA scheme. A second type of index could also be defined, taking into account only the

non-renewable energy consumption.

- 13) An important objective of a LTA scheme for Bulgaria should be to achieve decentralization of energy efficiency skills and competences, so that they should be readily available at the sites, where they are most needed. Specific energy efficiency works should be performed not only by specialized experts, but as much as this is possible, also by the operating staff of the respective plants.
- 14) In comparison with the Dutch experience, a LTA scheme in Bulgaria most probably would not have such immediate success and coverage, as in the case of LTA-1 and LTA-2. Yet, even some small steps and gradual increase of participation would be highly valuable for improvement of energy efficiency conditions in our country.

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Appendix: Summary of the answers to the questionnaire

Summary of interviews and inquiries carried out with representatives of industrial branch organizations (Questions 1-5)

Institution Representative	Are the energy efficiency activities prestigious as a professional occupation?	According to you, how good experts could be attracted to participate in such activity?	Is stimulation from the state administration for activities for improvement of EE in industry necessary?	According to you, does the described Dutch have model any advantages which are of interest from practical point of view and if yes, what are they?	Who has to determine the indicative purposes – the state administration or the companies?
Brach Chamber Black and Ferrous Metallurgy – Mrs. Politimi Paunova	No	<p>- It should be a priority in the state policy for the entire sector of economy. Until now the activities are related mainly with the energy sector;</p> <p>-To establish mechanisms to stimulate and support this activity;</p>	Yes. Until now, the problem to a larger extent is lead by the energy sector and is concentrated mainly in this sector, in spite the fact that the energy efficiency in industry is of considerable importance for the country.	Yes! Covers the different sectors, which identify the energy consumption of the country; establish conditions for transparency and equality; distribution of responsibilities for solving the problem between the state and the business.	Companies
Srednogorie Med Industrial Cluster – Mr. Nikolai Minkov	Yes	On pre-feasibility study base	Yes. To implement the economic and energy policy of the government and coordinate the efforts to increase the competitiveness of the Bulgarian industry.	Transfer of know-how, discipline effect, engagement of the industrial enterprises in the project, reduction of bureaucratic formalities, etc.	Both parties

Summary of interviews and inquiries carried out with representatives of industrial branch organizations (Questions 6-10)

Institution Representative	Who should monitor the activities for the implementation of the indicative purposes?	Do you have comparative data for specific energy consumption for particular technological sectors in other countries?	Do you have any information for good practices in specific technologies?	What additional technical information concerning energy efficiency do you think will be of interest for industrial enterprises in our country?	According to you, how the state could help companies which conclude such long-term agreements?
Brach Chamber Black and Ferrous Metallurgy – Mrs. Politimi Paunova	Independent body	Yes	Yes, for the main technological schemes	The conditions are different for the different sectors and for the different companies, therefore the information is very specific.	Tax exempts Administrative incentives Assistance for energy studies, audits While undertaking the obligation, the government will demonstrate their interest and priorities to solve the problem, while having clear commitments and obligations on the part of the business as well.
Srednogorie Med Industrial Cluster – Mr. Nikolai Minkov	Independent body	Not enough	Not enough	Methodology for energy audit, ESCO contractual models , etc..	All the listed plus energy statistics

Summary of interviews and inquiries carried out with representatives of organizations and institutions (Questions 1-5)

Organization, Representative	Are the energy efficiency activities prestigious as a professional occupation?	According to you, how good experts could be attracted to participate in such activity?	Is stimulation from the state administration for activities for improvement of EE in industry necessary?	According to you, does the described Dutch model have any advantages which are of interest from practical point of view and if yes, what are they?	Who has to determine the indicative purposes – the state administration or the companies?
1	2	3	4	5	6
Energy Efficiency Agency – Mr. Ognian Markovski	Yes	Through creating special units in the different administrations, experienced in the different long-term agreement issues, unified in administrative group	Yes, due to the considerable potential of the energy supply in the Bulgarian industry	Yes, this is the expected considerable increase of the energy indices as a result of the implemented EE measures in relation with the long-term agreement	State administration
Bulgarian Small and Medium Enterprises Promotion Agency – Mr. Vladimir Minev	Yes	Good salary, requirement for language fluency, constant training on the basis of the international experience, support students organizations (exp. Bulgarian Velikden), media, etc.	Yes, the government should provide all the regulatory and organizational mechanisms, providing opportunities to the business to improve the energy efficiency in industry and households, too.	The positive side of the Dutch model is that through a very clear contractual agreements with the business maximum results without any means of investments and corruption can be reached	State administration

1	2	3	4	5	6
Energy Efficiency Agency – Mr. Nikolay Nikolov	Yes	Through popularization of the opportunities for increasing the EE and the positive impact on the economy, ecology and social environment, as well as through the international experience in this field	Yes. An important factor for increasing the EE is the availability of the government support, expressed in the availability of the respective stimulus.	Yes, I consider that the reached high improvement in EE, shows how positive the Dutch experience is.	State administration
Energy Efficiency Agency – Mr. Lyudmil Kostadinov	Yes	The increasing prices of energy and the necessity to observe the European requirements will force the companies to consider more these issues and to attract more experts in this field.	Yes, because thus quick results can be reached	The positive aspect is, that the companies cooperate on voluntary basis with the state for the assessment and improvement of EE	Companies, (voluntary agreement)
Energy Efficiency Agency – Mr. Todor Totev	No	Through good payment, as it is in EU	No, large part of the industry is private and only the market regulates the level of EE and the existence of the competition	The positive aspects are the environmental preservation	Companies
Energy Efficiency Agency – Mrs. Raina Grigorova	Yes	The activity in itself is attractive, but not very popular	No, the owner of the enterprise is interested in EE	Yes, simplification of the procedures for issuing ecological permissions	State administration

1	2	3	4	5	6
Energy Efficiency Agency – Mrs. Nadejda Staneva	Yes	Participation of experts from companies, included in the public register	Yes, due to old and energy intense technologies and equipment	Yes. 1) Encourage the investment in the field of EE; 2) Reduce the specific energy consumption per unit GDP at the production of goods and services and increase of competitiveness 3) Less pollution environment	State administration
Energy Efficiency Agency – Mrs. Irena Hristova	Yes		Yes, in order to increase the competitiveness of the Bulgarian economy	Yes, from a point of view of the reached result – improvement of the energy indices, for the first cycle of agreements and the commitments, undertaken on the part of the government administration and industrial	Companies

1	2	3	4	5	6
Energy Efficiency Agency – Mrs. Boriana Uzunova	Yes	Through attractive payment	Yes, for defining the most efficient EE measures, which should be introduced as a priority	Yes, this is the state subsidy and possibly tax exempts	Companies
Energy Efficiency Agency – Mr. Krasimir Naidenov	Yes	Through payment, committed with the realized energy savings	Yes, for the initial determination of the economically efficient measures	Subsidizing and tax exempts	Companies
Ministry of transport – Mr. Angel Danin	No	Good payment, depending and compared with the results from the implementation of the respective EE projects, developed and integrated by the experts	It is due to the fact that the energy efficiency is not only a problem of the separate commercial companies in the industrial sector, but it is also a national (state) problem. The reduction of the energy costs per production unit in any enterprise makes it more competitive on the market, but this in return leads to reduction of energy costs per GDP too, which means higher competitiveness of the national capital and richness of nation as a whole.	<p>1.Reduction of taxes, charges and duties in relation with the equipment and the activities in the field of energy efficiency;</p> <p>2. Provision of methodological support and audits of equipment, covered by the long-term agreements;</p> <p>3. Development of plan for the respective company for energy efficiency improvement, while identifying the activities to reach the set objectives;</p> <p>4.Establishment of system for energy management of the respective company;</p>	The identification of the indicative objectives should be a two-way process. When agreements are signed between two parties the interests of the both parties should be satisfied.

1	2	3	4	5	6
Energy Efficiency Center – Mr. Dobrin Oreshkov	No	With greater publicity when recruiting and with higher payment	Yes, because energy efficiency policy is closely related with ecology and it should be state policy	Undertaking of engagements from the state	Companies

Summary of interviews and inquiries carried out with representatives of organizations and institutions (Questions 6-10)

Organization, Representative	Who should monitor the activities for the implementation of the indicative purposes?	Do you have comparative data for specific energy consumption for particular technological sectors in other countries?	Do you have any information for good practices in specific technologies?	What additional technical information concerning energy efficiency do you think will be of interest for industrial enterprises in our country?	According to you, how the state could help companies which conclude such long-term agreements?
1	2	3	4	5	6
Energy Efficiency Agency – Mr. Ognian Markovski	Independent body	Yes			Tax incentives. They will encourage industrial enterprises to undertake energy efficiency measures. It will increase the total amount of taxes, paid by these enterprises in future.
Bulgarian Small and Medium Enterprises Promotion Agency – Mr. Vladimir Minev	State administration	Не, не ми е необходимо, но мога да намеря	No	Regular notes for good practices in this field, supported by financial data for savings already made.	Tax incentives. Administrative incentives. Technical data. Co-operation for energy audits and pre-feasibility studies.
Energy Efficiency Agency – Mr. Nikolay Nikolov	Independent body	Yes	Yes	All additional information concerning the possibilities for financing energy efficiency projects will be useful	Tax incentives. The main issue is the availability of tax incentives and other motivations.
1	2	3	4	5	6

<p>Energy Efficiency Agency – Mr. Lyudmil Kostadinov</p>	<p>Government represented by the Energy Efficiency Agency</p>	<p>Yes</p>	<p>Yes</p>	<p>Pre-feasibility study for possible measures on our conditions and electricity price, with specific examples. Catalogues with information for energy efficient equipment including prices.</p>	<p>Administrative incentives. Technical data. Co-operation for energy audits and pre-feasibility studies. Some of the main barriers for increasing the EE measures in industry are:</p> <ul style="list-style-type: none"> - limited finances of the companies and impending costs for implementation of some EU requirements; - insecure market positions which prevents from serious investments in EE projects - unfavorable correlation (in Bulgaria) between the prices of the imported energy efficient equipment and the prices of the saved energy, which change for the worse the financial indicators of the projects <p>Some of the main reasons for the lower energy efficiency in Bulgarian industry than in EU are:</p> <ul style="list-style-type: none"> - large share of the chemistry and metallurgy in the industry structure - insufficient development of machinery construction, research development and design for production of local EE equipment for industry.
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1	2	3	4	5	6
Energy Efficiency Agency – Mr. Todor Totev	Government represented by the Energy Efficiency Agency	Yes	Yes		Simplification of the procedure for giving permissions for utilisation of RES.
Energy Efficiency Agency – Mrs. Raina Grigorova	Government represented by the Energy Efficiency Agency	Yes			Administrative incentives. Technical data. Co-operation for energy audits and pre-feasibility studies.
Energy Efficiency Agency – Mrs. Nadejda Staneva	Government represented by the Energy Efficiency Agency	Yes, from the National long-term energy efficiency programme	Yes	Dissemination of the results from projects with international co-operation - 4EM-MCP project, project for utilisation of thermo-pumps, scientific research in the field of energy savings made by the Technical University in Sofia.	
Energy Efficiency Agency – Mrs. Irena Hristova	Government represented by the Energy Efficiency Agency	Yes	No		Administrative incentives. Technical data. Co-operation for energy audits and pre-feasibility studies.

1	2	3	4	5	6
Energy Efficiency Agency – Mrs. Boriana Uzunova	Government represented by the Energy Efficiency Agency	Yes, possible to be found	Comprehensive if possible		Tax incentives. Administrative incentives. Technical data. Co-operation for energy audits and pre-feasibility studies.
Energy Efficiency Agency – Mr. Krasimir Naidenov	Government represented by the Energy Efficiency Agency	Yes	Yes	Yes	All. The state should determine the fields with priority, where all the efforts should be focused, in order most efficient utilisation of the available financial resources and organizational possibilities.
Ministry of transport – Mr. Angel Danin	Government represented by the Energy Efficiency Agency, because it concerns state policy, but clauses for arbitration should be included in the agreements.	No	No	If you could engage their economic interest they could find the technical data by themselves.	Tax incentives. Administrative incentives. Co-operation for energy audits and pre-feasibility studies. <i>If the industrial enterprises are convinced that the implementation of such a project will increase their profit, the project will be successful. Otherwise it has no chances of successful implementation.</i>
Energy efficiency center – Mr. Dobrin Oreshkov	Independent body	Yes	Yes		Tax incentives. Co-operation for energy audits and pre-feasibility studies.

Summary of interviews and inquiries carried out in industrial sector (Questions 1-5)

Organization, Representative	Are the energy efficiency activities prestigious as a professional occupation?	According to you, how good experts could be attracted to participate in such activity?	Is stimulation from the state administration for activities for improvement of EE in industry necessary?	According to you, does the described Dutch have model any advantages which are of interest from practical point of view and if yes, what are they?	Who has to determine the indicative purposes – the state administration or the companies?
1	2	3	4	5	6
Assarel-Medet AD, Mr. S. Vakarelov, Mr. N. Bekiarov	No	<p>Improvement of the normative base.</p> <p>Synchronization of all the laws, related with the issue.</p> <p>Targets identification for each one of the industrial plans.</p> <p>Experts stimulation</p>	<p>Yes. State as a part of the of the process:</p> <ol style="list-style-type: none"> 1. Compensates partially for the efforts and costs of the companies 2. Stimulation and dissemination of good practices 3. Provides business climate, where the separate industrial enterprises should consider the application of EE measures as very prestigious 	<p>The described model is attractive mainly due its voluntary principle and the possibility to reduce the energy costs of the different companies.</p>	State administration

1	2	3	4	5	6
Steel Industry AD, Mr. Tsvetan Todorov	Yes	Good Payment. Adequate education.	<i>Yes, but considering the fact that the encouragement on the part of the state administration can be manifested in a different manner and/or it might not be applicable in different cases. What is important is that the energy efficiency improvement in industry and for all the enterprises as a whole is related with reaching certain economic objectives and in this respect the state administration might not be in a position to adequately encourage all the activities in this field. Naturally, the long-term agreements are proven in time in some countries, but on condition, that in this cases the respective participants will guarantee their sustainable development, which means that in the Republic of Bulgaria certain specific and applicable forms for encouragement should be sought on the part of the state administration, meeting the local economic needs, state of development, mentality and legislation.</i>	The effort to reach symbiosis between the countries in the respective agreements. The answer of this question can be further discussed, but for the purposes of this inquiry, I suppose the above statement (sentence) is clear enough and detailed on one hand and on the other provides a lot of open questions, which can be identified while looking for suitable and applicable for our conditions scheme.	Please do not forget, that in this case third party can be involved, namely: Mediator between the State administration and the Companies. As a whole if a large (large turnover/energy intensive) companies, the process should be two way from the very beginning.

1	2	3	4	5	6
<p>Leaden-zinc factory AD, Mr. Ivan Dimitrov</p>	<p>Yes</p>	<p>Provision of authority, funding</p>	<p>Yes</p>	<p><i>Preferences</i></p>	<p><i>Companies</i></p>
<p>Alkomet AD, Mr. Kosta Tanev</p>	<p>No</p>	<p>With motivation and competitive payment</p>	<p>Yes</p>	<p><i>Subsidizing of energy efficiency activities; Reduction of taxes, duties and fees in relation with the equipment and activities in the field of EE; Provision of methodological support and assessment of equipment, included in the long-term agreements;</i></p>	<p><i>State administration</i></p>
<p>Electroservice KTM EOOD, Mr. Alexander Valkov</p>	<p>No</p>	<p>The state should be engaged with the methodological and financial support for the implementation of energy audits and realization of the prescribed energy saving measures.</p>	<p>Yes. The management of the company is responsible for the application of the EE measures. The state administration can provide methodological support and to summarize the results on national level.</p>	<p><i>The interrelation between the government and the companies is of considerable interest. However it is not clear what will be the commitments of the government. The preferences with the ecological approvals in Bulgaria will not work.</i></p>	<p><i>Companies and State administration</i></p>

Summary of interviews and inquiries carried out in industrial sector (Questions 6-10)

Organization, Representative	Who should monitor the activities for the implementation of the indicative purposes?	Do you have comparative data for specific energy consumption for particular technological sectors in other countries?	Do you have any information for good practices in specific technologies?	What additional technical information concerning energy efficiency do you think will be of interest for industrial enterprises in our country?	According to you, what benefits would you expect, if you participated in such long-term agreement?
1	2	3	4	5	6
Assarel-Medet AD, Mr. S. Vakarelov, Mr. N. Bekiarov	Independent body	No	Yes	The technical data is accessible. It is more interesting how to have more and wider access to the specific information on the manners of funding, amendments in the normative base, etc.	At this stage it is too optimistic to expect any specific tax exemptions. What can be expected is the simplification of the administrative procedures for the construction and setting into operation of equipment improving the energy efficiency and RES utilization. We consider that the government does not have the necessary resources for providing support in energy audits, measurements, etc. Maybe here the important role of the BEEF for preferential funding of such type of activities should be mentioned.

1	2	3	4	5	6
Steel Industry AD, Mr. Tsvetan Todorov	Parties in the agreement	Yes	Yes		Tax exempts Administrative incentives Assistance in energy audits All other means, from economic point, which can justify the efforts of the investor
Leaden-zinc factory AD, Mr. Ivan Dimitrov	Independent body	No	No		Administrative and tax exempts, crediting
Alkomet AD, Mr. Kosta Tanev	Government represented by the Energy Efficiency Agency	No	No		Tax exempts Administrative incentives Technical information
Electroservice KTM EOOD, Mr. Alexander Valkov	Government represented by the Energy Efficiency Agency	No	Yes		Tax exempts Administrative incentives Technical information

Summary of interviews and inquiries carried out in industrial sector (Questions 10-16)

Organization, Representative	Has your company already performed energy efficiency measures? In what field were they? Do you plan EE measures in future?	What was the main reason for implementation of these improvements?	How did you select the EE measures? Were they proposed by your experts or through energy audit?	Did you use the services of external experts for the development of pre-feasibility study, design and implementation?	How did you finance the implementation of EE measures – with own funding, with commercial credits or with the financial support of a specific financial institution?	Do you have energy department in your company? Do you put into practice a regular control and analysis of the energy efficiency indicators in your company?
1	2	3	4	5	6	7
Assarel-Medet AD, Mr. S. Vakarelov, Mr. N. Bekiarov	<p>Yes, there are. We implement our EE program. The following measures have been implemented:</p> <ul style="list-style-type: none"> - Energy audit of buildings; - Partial substitution of the fuel base; - Technical measures for reduction of specific energy costs; - Pre-feasibility studies for utilization of all types of RES; 	Reduce energy costs, as a part of production costs	This is non-stop process in our company and is implemented both ways	Yes. Regularly	Own sources and commercial credits	Yes. “Energy supply” Department and full time operating EE committee, which analyses the indexes on monthly basis, providing corrective measures

1	2	3	4	5	6	7
Steel Industry AD, Mr. Tsvetan Todorov	Yes, we have plans	Economic effect Quality Security	Our experts	Yes	Own sources and commercial credits	Constant monitoring – Yes Analysis – partial. Currently concept paper is developed
Lead-zinc factory AD, Mr. Ivan Dimitrov	Steam production and steam distribution	Financial – reduce the consumption of fuel oil and heating costs	Own experience	Yes	Own sources	Yes
Alkomet AD, Mr. Kosta Tanev	New efficiency gas equipment Improvement of oven isolation. New steam and hot water boilers. New efficiency compressor equipments.	Energy saving measures, reduce the costs per production ton, environmental preservation	Upon suggestion of external experts and implemented by our experts	Yes, concerning some of the projects	Own sources	There is an energy department Performed are partial EE analysis

1	2	3	4	5	6	7
<p>Electroservice KTM EOOD, Mr. Alexander Valkov</p>	<p>EE measures in the field of energy consumption, fuel switching from heavy oil to natural gas, optimization of the distribution for natural gas have been implemented</p>	<p>Energy saving measures leading to reduction of costs price of the product</p>	<p>Suggested by our experts on the basis of undertaken internal audit.</p>	<p>External experts in the field of co-generation</p>	<p>Own sources and commercial credits</p>	<p>There is an energy department and energy audit team Monitoring of the main energy consumption</p>

Summary of interviews and inquiries carried out with consultants (Questions 1 - 5)

Organization, Representative	Are the energy efficiency activities prestigious as a professional occupation?	According to you, how good experts could be attracted to participate in such activity?	Is stimulation from the state administration for activities for improvement of EE in industry necessary?	According to you, does the described Dutch have model any advantages which are of interest from practical point of view and if yes, what are they?	Who has to determine the indicative purposes – the state administration or the companies?
EnEffect Consult – Mr. Pavel Manchev	Yes	Through good payment and opportunity for development	Yes, because at the moment the activities in this area is not enough. Our country is leader in energy intensity. It is necessary to stimulate the financial poor firms Очевидно е, че за да се променят нещата трябва да се стимулират фирмите, които са много по-слаби финансово, а обществото е много по-толерантно по отношение на пораженията в екологията	Yes, this is the incentives. The energy efficiency is one of the arguments of the function of unit cost minimization for energy efficiency manager. If the energy efficiency provide better result, the energy efficiency manager will prefer activities and investment in it instead of new equipment or another article.	State administration

1	2	3	4	5	6
<p>Energy Efficiency Systems OOD – Mr. Dimiter Baev</p>	<p>No</p>	<p>It is necessary to make popular vision of energy management function and position of the energy manager. Should be accelerate the training of energy manager about industry. I think that prestige and payment of this specialist will increase presently.</p>	<p>Yes, energy efficiency is with high priority in state politics and administration. On this stage the measures of compulsion predominate by energy efficiency law. There are not information about visible changes in industry. The encouraging measures will assist in increasing of interest in energy efficiency measures.</p>	<p>Yes. In energy efficiency law implementation of energy audit is obligation for the big energy consumers. There is instruction about regular activities in the area of energy management with preparation of periodical reports. The part of implementation of assign measures is not good developed. There is vision that will be object of administrative control and sanctions. LTA in combination with necessarily of develop of industry in condition of EU membership is a good opportunity. The roll of sector association can be branch association of BIA.</p>	<p>Companies</p>

Summary of interviews and inquiries carried out with consultants (Questions 6 - 10)

Organization, Representative	Who should monitor the activities for the implementation of the indicative purposes?	Do you have comparative data for specific energy consumption for particular technological sectors in other countries?	Do you have any information for good practices in specific technologies?	What additional technical information concerning energy efficiency do you think will be of interest for industrial enterprises in our country?	According to you, how the state could help companies which conclude such long-term agreements?
EnEffect Consult – Mr. Pavel Manchev	Independent body	No	No	There is not clear what is available information to talk about additional In my opinion in many firms isn't basic information about what is possible to do and the necessary investment and returns of investment and how to finance all process.	All shown stimulus are suitable. In my opinion the key towards next steps is funding of energy audit with and state assistance.
Energy Efficiency Systems OOD – Mr. Dimiter Baev	Independent body	Yes	No	Access to basic data and sectoral analyses with energy efficiency index in different country. General assessment about effectiveness of different kind energy savings measures. Description of best projects and practices.	Tax exempts Administrative incentives Assistance for energy studies, audits Technical information

Summary of interviews and inquiries carried out with representatives of industrial enterprises (Question 1- 5)

Organization, Representative	Are the energy efficiency activities prestigious as a professional occupation?	According to you, how good experts could be attracted to participate in such activity?	Is stimulation from the state administration for activities for improvement of EE in industry necessary?	According to you, does the described Dutch have model any advantages which are of interest from practical point of view and if yes, what are they?	Do you have comparative data for specific energy consumption in your sector in other countries?
VDS OOD, Mr. Slav Slavov	Yes	With economic stimulus	Yes	Yes. All that encourage energy efficiency	No
SD“Kvalitet”, Mr. Evgeni Genov	No	I think that currently there is no qualified personnel	Yes	Subsidizing the activities, reduction of fee and taxes in this field	No
“Naslada “ AD, Mr. Evgeni Spirov	Yes	With honoraria; Tax exempts	Yes. Subsidy: Tax preferences	Reduce production costs	No
TPP “Maritsa Iztok” 2, Mr. Atanas Dimitrov	No	Important and well paid work	Yes	<ul style="list-style-type: none"> - Reduce taxes, fees and duties in relation with the equipment and activities in the field of EE; - Provision of methodological support and audit of equipment, included in the long-term agreements; - Sequence of energy policy and prevention from new energy acts in industry 	Yes

Summary of interviews and inquiries carried out with representatives of industrial enterprises (Question 6 - 10)

Organization, Representative	Do you have any information for good practices in technologies similar to yours?	What additional technical information concerning energy efficiency do you think will be of interest for industrial enterprises in our country?	According to you, what benefits would you expect, if you participated in such long-term agreement?	Has your company already performed energy efficiency measures? In what field were they? Do you plan EE measures in future?	What was the main reason for implementation of these improvements?
1	2	3	4	5	6
VDS OOD, Mr. Slav Slavov	Yes		Tax preferences; Administrative preferences; Technical information; Assistance of energy research, measuring and auditing	Thermal isolation of walls, stores, production halls; Implementation of new energy efficiency equipment.	Energy saving
SD“Kvalitet”, Mr. Evgeni Genov	No		Tax preferences; Administrative preferences; Technical information;	1. Participation in EE consortium in building on national level; 2. Implementation of new methods of isolation in building in two our plants.	Heat energy saving

1	2	3	4	5	6
<p>“Naslada “ AD, Mr. Evgeni Spirov</p>	<p>No</p>	<p>New invents, technologies, start using from developed countries</p>	<p>Tax preferences; Administrative preferences; Technical information; Assistance of energy research, measuring and auditing Subsidy for implementation of energy efficiency technologies</p>	<p>Partial auditing; Substitution of electricity of natural gas with another benenergy careas</p>	<p>Resources saving</p>
<p>TPP “Maritsa Iztok” 2, Mr. Atanas Dimitrov</p>	<p>Yes</p>	<p>Technological schemes and realized technical indexes of new Thermal electric power plants</p>	<p>Tax preferences; Administrative preferences; Ecology; Improvement of EE proportionally of tax reduction (profit)</p>	<p>Yes. Renovation of equipments.</p>	<p>Extend of the activity – electric power production from coals, received from local mining associations</p>

Summary of interviews and inquiries carried out with representatives of industrial enterprises (Question 11-14)

Organization, Representative	How did you select the EE measures? Were they proposed by your experts or through energy audit?	Did you use the services of external experts for the development of pre-feasibility study, design and implementation?	How did you finance the implementation of EE measures – with own funding, with commercial credits or with the financial support of a specific financial institution?	Do you have energy department in your company? Do you put into practice a regular control and analysis of the energy efficiency indicators in your company?
1	2	3	4	5
VDS OOD, Mr. Slav Slavov	From our experts	Yes	Commercial credit on special conditions.	No
SD“Kvalitet”, Mr. Evgeni Genov	Recommendation from the Government commission and Ministry of Education and Science	No	Private resources.	There is no such department, but we are managing the energy expenditures and results from the implemented EE measures.
“Naslada “ AD, Mr. Evgeni Spirov	Private estimations	No	Private resources.	No. This is a responsibility of a technical director.
TPP “Maritsa Iztok” 2, Mr. Atanas Dimitrov	EE measures was suggested by our experts	Yes	Financing by commercial credit.	Monitoring and analysis of EE is doing by PTO department.

