Ref. No……

Date ……..

FAO

MR TRAYCHO TRAYCHOV

MINISTER OF THE ECONOMY, ENERGY AND TOURISM

VIA

MR DELYAN DOBREV

DEPUTY MINISTER OF THE ECONOMY, ENERGY AND TOURISM

REPORT

ON: The request of the Commission for a report in accordance with Article 6(3) and Article 10(2) of Directive 2004/8/EC of the European Parliament and of the Council on the promotion of cogeneration based on a useful heat demand in the internal market

Dear Sir,

In accordance with Bulgaria's obligation under Articles 6 and 10 of Directive 2004/8/EC of the European Parliament and of the Council on the promotion of cogeneration based on a useful heat demand in the internal market, in 2008 the cogeneration commission of DG Energy was provided with the report 'Analysis of the national potential for high-efficiency cogeneration in Bulgaria, a requirement under Articles 2 and 10 of Directive 25004/8/EC'. Regularly, every four years, and when requested to do so, an evaluation pursuant to Article 6 of the Directive is compiled and submitted. Bulgaria submitted a preliminary evaluation in March 2010.

The national policy supporting high efficiency cogeneration has been drafted on the basis of Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 and is regulated in the Energy Act (ZE), the Regulation determining the quantities of electricity produced through heat and power cogeneration, and the Regulation on issuing certificates of origin for energy produced by cogeneration.

This assessment was carried out according to the requirements of Directive 2004/8/EC of 11 February 2004 and Regulation No RD-16-267 of 19 March 2008 on determining the quantities of electricity produced through cogeneration. In drafting the evaluation, the data provided by cogeneration suppliers for the energy balances for 2008, 2009 and 2010 were used, along with official data from the State Energy and Water Regulatory Commission (DKEVR) with regard to certificates of the origin of cogenerated electricity issued in 2009 and 2010. The 2008 figures were determined on the basis of the requirements of the Directive without any certificates of origin being issued.

At the end of 2010, 15 thermal power stations and 18 industrial power stations were operational. The power generating capacity of the installations was 1.566 GW and thermal capacity was 4.616 GW. The total electricity produced through cogeneration for which certificates of origin were issued was 3.839 TWh and total thermal energy was 11.831 TWh.

The data provided in Sheet1, Sheet2 and Sheet3 on operating cogeneration units in Bulgaria lead us to the following conclusions: Cogenerated energy in 2009 fell by 38 % compared with 2008. Bringing units and their operation in line with European requirements for high efficiency cogeneration resulted in a 4 % increase in the production of cogenerated energy compared with 2009.

The same trend has also been observed with the cogeneration of thermal energy. There was a decline of 28 % in 2009 compared with 2008, and after the technological operation regime was brought in line with high efficiency combined production, there was an increase in cogenerated thermal energy of 10 % in 2010 over 2009. The share of cogenerated thermal energy in total thermal energy generated grew from 70.70 % in 2009 to 78.17 % in 2010. Because of the increase in the share of energy generated from renewable sources, despite the upward trend in the production of electricity through cogeneration, the share of cogenerated energy in total electricity output in Bulgaria in 2010 fell from 8.53 % in 2009 to 8.21 % in 2010.

Following a drop in output in 2009 at heating power stations and industrial thermal power plants, in 2010 there was a stabilisation of the thermal energy produced at such plants with slight upward trend of 3.3 % observed on 2009. At industrial thermal power plants thermal energy produced increased by 16 % on 2009.

The amounts of fuel used in cogeneration followed the output of electricity and heat: a decrease in 2009 compared with 2008, and an increase in 2010.

The reductions in CO2 emissions have been calculated for each cogeneration unit on the basis of the primary energy (fuel) savings and the emissions ratios for each fuel:

- Natural gas: $56.1*10^3$ tCO_2/PJ
- Coal: $98.3*10^3$ tCO_2/PJ

The total CO_2 emissions avoided in 2009 were 689 214 tCO_2 and 767 953 tCO_2 in 2010.

About 90 % of cogeneration capacity of steam backpressure and condensing turbines have been in operation for more than 20 years. The proposed changes in the harmonised reference values for separate energy generation and harmonised reference values for separate heat energy in the implementation of Directive 2004/8/EC will have a negative effect on power generation and, according to preliminary estimates, high efficiency cogeneration will decline by about 30 %. European legislation activates the construction of small, high efficiency cogeneration units. The new cogeneration systems installed in recent years have low-capacity, gas-fired compressor engines and guarantee high efficiency power cogeneration.

The implementation of the legal framework to promote cogeneration in the European Union, harmonised into Bulgarian law, particularly since certificates of origin were started to be issued, has resulted in a re-think of the system of operating and using installed capacity to achieve greater economies in primary energy resources.

Yours Sincerely,

DIMITAR KUYUMDZHIEV

Director,

Directorate of Energy Security

RESPONSE

WITH REGARD TO THE REPORT PURSUANT TO ARTICLE 6(3) AND ARTICLE 10(2) OF DIRECTIVE 2004/8/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE PROMOTION OF COGENERATION BASED ON A USEFUL HEAT DEMAND IN THE INTERNAL ENERGY MARKET AND AMENDING DIRECTIVE

92/42/EC

1. Transposition/implementation of the legal text of Directive 2004/8/EC

Q1 *To what extent has the Directive been implemented in your country? What are the timescales for the remaining aspects of transposing the directive, if any?*

Directive 2004/8/EC of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market has been sufficiently transposed into Bulgarian law to support the development of cogeneration.

Some provisions of the Energy Act (ZE) and Regulation No RD-16-267 of 19 March 2008 allowed a transitional period for bringing facilities and their operations into line with European requirements for high efficient cogeneration.

As of the end of 2011:

- The criterion for high efficiency heat and power cogeneration in the case of thermal power plants built prior to 2003 is **at least 5 % savings on the fuel** needed to generate the same amount of heat and electricity separately.
- In the case of heat and energy cogeneration units with steam condensing extraction turbines using energy boilers whose main fuel is coal, the overall energy efficiency criteria for energy consumption during the reporting year is 75 %.

Annex II(b) gives the calculations of the amount of electricity obtained from cogeneration, applying the heat to power ratio coefficients adopted.

As of 01 January 2012, there will be changes in the Energy Act (ZE) and Regulation No RD-16-267 of 19 March 2008 on determining the quantities of electricity produced through heat and power cogeneration.

Q2 *What are the timescales for implementing the measures based on the Commission Decision of 19 November 2008 for establishing detailed guidelines? Please state how this was carried out (review of the general law on energy, a specific law, decree, regulation...).*

The measures in the Commission Decision of 19 November 2008 are implemented in the issue of certificates of origin of electricity produced through cogeneration. The procedures and definitions needed to apply the methods for determining the amounts of cogenerated electricity issued by the Commission on 19 November 2008 are reflected in Regulation No RD-16-267 of 19 March 2008.

As of 01 January 2012, the following changes will take place:

1. The Energy Act (ZE)

The criterion for high efficiency cogeneration for power stations built before 2003 will be changed from minimum savings of 5 % of the fuel needed to generate the same amount of heat and power separately to a minimum of 10 %.

2. Regulation No RD-16-267 of 19 March 2008 determining the quantities of electricity produced through heat and power cogeneration.

In the case of cogeneration units with steam condensing extraction turbines using energy boilers whose main fuel is coal, the overall energy efficiency criterion for energy consumption during the reporting year will be changed from 75 % to 80 %.

Q3 *To what extent do you believe that your country has implemented the directive to a significant degree?*

The Directive has been implemented in Bulgaria to a significant degree.

The national policy of supporting high efficiency cogeneration has been drafted on the basis of Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 and is regulated by the Energy Act (ZE), the Regulation determining the quantities of electricity produced through heat and power cogeneration and the Regulation on issuing certificates of origin for energy produced by cogeneration.

The ZE has provided a framework which maintains and helps the development of the cogeneration of heat and electricity as a widely recognised, efficient and environmentally friendly form of generating electricity, while making allowance for the specific national energy structure and energy development strategy. The main priorities in promoting cogeneration are:

- The mandatory purchase of all energy produced through high efficiency cogeneration, registered with a certificate of origin, with the exception of energy generated for internal use, or energy used on the free energy market;
- Energy produced through high-efficiency cogeneration must be purchased at preferential rates;
- Where there is a declared need for thermal energy, new installations with an output exceeding 5 MW powered with natural gas must be designed as cogeneration plants.
- All power stations producing electricity through high efficiency cogeneration with an installed capacity of up to 10 MW are given priority in being connected to the grid.

Q4 *Does your country use the alternative calculation method referred to in Article 12(2)?*

Bulgaria does not use the alternative calculations in Article 12(2). The values used to calculate cogenerated power are determined on the basis of the actual performance of units under actual operating conditions.

Q5 *Is your country required under Article 13 to review the threshold values used for calculation of the efficiency of cogeneration production, and/or the threshold values used for calculating the efficiency of cogeneration production and primary energy savings?*

About 90% of steam backpressure and condensing turbine cogeneration capacity has been in operation for more than 20 years. The proposed changes in the harmonised reference values for separate power generation and harmonised reference values for separate heat energy in the implementation of Directive 2004/8/EC would have a negative effect on power generation. According to preliminary estimates, high efficiency cogeneration of electricity would fall by about 30 %. The new cogeneration systems installed in recent years have low-capacity, gas-fired compressor engines with guaranteed, high efficiency power cogeneration.

2. National potential for increasing the share of high efficiency cogeneration

Q6 *Can your country already demonstrate progress in high efficiency energy cogeneration since the latest national potential report, and can this progress be ascribed to European or national legislation and aid schemes?*

In 2008 the cogeneration committee of DG Energy was provided with the report ’Analysis of national potential for high efficiency cogeneration in Bulgaria, a requirement under Articles 26 and 10 of Directive 25004/8/EC’. Bulgaria submitted a preliminary evaluation in March 2010.

With regard to the current evaluation, it should be taken into account that 2009 is the first year for which certificates of origin for cogenerated electricity have been official documents. In this respect, we can report a 4 % increase in high efficiency cogeneration energy for 2010 compared with 2009.

The implementation of the legal framework to promote cogeneration in the European Union, harmonised into Bulgarian law, particularly since certificates of origin started to be issued, has resulted in a re-think of the operational regime and use of installed capacity to achieve greater economies in primary energy resources.

Q7 *What is your evaluation of the progress in increasing the share of high efficiency cogeneration in your country?*

Your evaluation should be based on specific data entered into the **enclosed spreadsheet (Excel file)** which is there to facilitate submission of your data.

The evaluation was carried out in compliance with the requirements of Directive 2004/8/EC of 11 February 2004 and Regulation No RD-16-267 of 19 March 2008 on determining the quantities of electricity produced through cogeneration.

The potential for existing cogeneration units has been assessed using the database of installed capacity, energy and heat output and fuel consumption for 2008, 2009 and 2010. For all units operating in 2008, 2009 and 2010, the high efficiency portion guaranteeing primary energy (fuel) savings compared with the separate generation of thermal and electrical energy was evaluated.

Because of the increase in the shares of energy generated from renewable sources, despite the upward trend in the production of electricity through cogeneration, the share of cogenerated energy in the total electricity output for Bulgaria in 2010 fell from 8.53 % in 2009 to 8.21 % in 2010.

The data provided in Sheet1, Sheet2 and Sheet3 on operating cogeneration units in Bulgaria lead us to the following conclusions: Cogenerated energy in 2009 fell by 38 % compared with 2008. Bringing units and their operation in line with European requirements for high efficiency cogeneration resulted in a 4 % increase in the production of cogenerated energy compared with 2009.

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The total CO_2 emissions avoided in 2009 were 689 214 tCO_2 and 767 953 tCO_2 in 2010.

3. Barriers to high efficiency energy cogeneration

Q8 *Please state your views regarding current barriers to high efficiency energy cogeneration in your country:*

- barriers due to administrative procedures (permits, coordination between the relevant authorities, fast-track and simplified procedures, etc);

Insufficient administrative capacity at municipal level for preparing zoning plans based on energy master-plans showing which form of energy provision is most economically and environmentally beneficial.

Renewable energy producers have no incentive to use cogeneration technologies as the pricing of renewable energy provides an adequate financial guarantee of a return on their investment.

- barriers due to the electricity grid and problems with tariffs (including specific measures for small-scale and micro cogeneration units).

The conditions for connecting new units to the grid are a barrier that can be overcome and are not an obstacle to building new cogeneration units.

- other barriers (conversion of external into internal expenditure, energy prices, financial and technical barriers, etc) according to Articles 9 and 6 of the Cogeneration Directive (Directive 2004/8/EC).

Please describe the measures for dealing with these.

The downward trend in the consumption of thermal energy in some sectors of industry and in the domestic sector has resulted in a deterioration in the high-efficiency indicators. The construction of new installations proportionate to this trend with the added fall in consumption because of active energy efficiency measures are a suitable measure for overcoming this barrier.

Some energy consumers fail to pay their bills in time on various social and other grounds. All heat distribution enterprises are owed money by consumers and operate at a loss, which makes it difficult to implement investment projects to improve efficiency.

A technical barrier to installing cogeneration systems for heating enterprises are the restricted operating hours of the schemes, because of great seasonal load fluctuations.

The rising trend in gas prices is a serious barrier to building combined systems.

4. Guarantees of origin and aid schemes

Q9 *Article 5 of the Directive requires Member States to guarantee that they will issue accurate and reliable guarantees of origin in accordance with objective, transparent and non-discriminatory criteria. What is the position with this measure in your country (information on primary energy savings, type of registration system, etc.)?*

Bulgaria has appointed the State Energy and Water Regulation Commission (DKEVR) as the independent competent authority for issuing certificates of origin for electricity and guaranteeing that the criteria and rules for issuing certificates of origin are kept.

Under Article 21(1)(14) of the Energy Act (ZE), the DKEVR issues power generators with certificates of origin for cogenerated electricity.

The amount of cogenerated energy and the efficiency evaluation of cogeneration units are determined according to Regulation No RD-16-267 on determining the amounts of electricity produced through heat and power cogeneration issued by the Ministry of Economics, Energy and Tourism (SG No 37 of 08 April 2008, amended SG No 77 of 01 October 2010).

Under the Regulation, certificates of origin are issued by the DKEVR as official, non-transferable documents, which identify the producer, the amount of cogenerated energy, the period of generation, the generation facility and its capacity. Certificates of origin are issued on the basis of a declaration by the producer and a Decision of the DKEVR according to the form in Annex 2 of the Regulation. Certificates of origin contain the following details: the certificate type; a unique number including the producer's registration number and the sequential number of the certificate; the issuing authority; the date of issue and the period of power generation covered by the certificate; the amount of cogenerated electricity; the amount of useful heat energy cogenerated; the type and lower heating value of the fuel used and the results of the efficiency evaluation of the cogeneration units, including the primary fuel energy saved for each installation; the generation plant and total power generating capacity of the power plant; the installed capacity of the cogeneration units; the producer's name; and BULSTAT/EIK codes. One certificate is issued for the amount of cogenerated electricity within one calendar year for each plant operated by the producer. The DKEVR publishes a register of certificates of origin on its website, which names the holder and the generation capacity, the amount of energy for which the certificate was issued and the period of production. Entries in the register are made on the basis of decisions by the commission.

Q10 Does your country have schemes to aid cogeneration/combined thermal and electrical generation based on Directive 2004/8/EC (aid for the operation and/or encouragement of investments)? What kind of aid (preferential feed-in tariffs, certificates and quotas, priority access to the electricity grid, etc) is provided? Are they designed to provide stable conditions for long-term investments? To which sectors will they be directed (energy cogeneration in agriculture and/or industry and/or district heating)?

Under the Energy Act (ZE), the DKEVR sets preferential prices, exclusive of VAT, for the sale of 1 MWh of electricity produced by electrical and heat energy cogeneration facilities based on individual production costs and supplements per producer group according to the following criteria:

- Predominant nature of the main thermal load;
- Type of fuel used;
- Cogeneration technology;
- Unit/station capacity.

There are three main groups of producers:

1. Heat producers, where the main heat load is for heating and domestic hot water;

2. Industrial producers which supply industry with the required thermal energy, mainly steam and hot water required by the food industry;

3. Agriculture, where thermal energy is required for greenhouses, mainly for growing vegetables.

Q11 *What is the amount of annual funding secured this way in recent years specifically to promote high-efficiency cogeneration? What is the amount of funding that is expected to be provided on an annual basis to promote high-efficiency cogeneration in the coming years?*

During the pricing period from 01 July 2010 to 30 June 2011 for which the DKEVR set preferential prices, funding only from the high efficiency power generation supplement stood at BGN 80 million, while for the next pricing period from 01 July 2011 to 30 June 2012 an increase of around 21 % is expected.

Sheet 1 Overview				CHP electricity[1] generation, capacity, fuel input	Main activity producers generation, capacity, fuel input	Auto-producers generation, capacity, fuel input	Share of CHP in total electricity generation	CHP Heat production	Main activity producers	Auto-producers
2008	electricity	capacity	[GW]	1.5430000			13.24827172			
		output	[TWh]	5.960000						
	heat	capacity	[GW]					6.6900000		
		output	[TWh]					14.9000000		
	fuel	total	[PJ]	51.0859295				59.2720705		
		natural gas	[PJ]							
		coal with a calorific value >5700 kcal/kg	[PJ]							
		coal with a calorific value <5700 kcal/kg								
		renewables	[PJ]							
		oil & oil products	[PJ]							

		biomass	[PJ]								
		biogas	[PJ]								
		waste incineration	[PJ]								
		landfill gas	[PJ]								
		other fuels	[PJ]								
2009	electricity	capacity	[GW]	1.305642			8.536059411				
		output	[TWh]	3.678188							
	heat	capacity	[GW]					5.395653			
		output	[TWh]					10.69624			
	fuel	total	[PJ]	29.81606677				34.8916512			
		natural gas	[PJ]								
		coal with a calorific value >5700 kcal/kg	[PJ]								
		coal with a calorific value <5700 kcal/kg									
		renewables	[PJ]								

		oil & oil products	[PJ]								
		biomass	[PJ]								
		biogas	[PJ]								
		waste incineration	[PJ]								
		landfill gas	[PJ]								
		other fuels	[PJ]								
2010	electricity	capacity	[GW]	1.566462			8.212474545				
		output	[TWh]	3.839299							
	heat	capacity	[GW]					4.616793			
		output	[TWh]					11.83154			
	fuel	total	[PJ]	30.45684949				39.53983051			
		natural gas	[PJ]								
		coal with a calorific value >5700 kcal/kg	[PJ]								
		coal with a calorific value <5700 kcal/kg									

		renewables	[PJ]								
		oil & oil products	[PJ]								
		biomass	[PJ]								
		biogas	[PJ]								
		waste incineration	[PJ]								
		landfill gas	[PJ]								
		other fuels	[PJ]								

[1] only regarding high efficiency CHP according to Article 3 and Annex III of Directive 2004/8/EC

[2] All kinds of electricity and heat producing units

[3] compared to the separate production of electricity and heat

Sheet 2 Sector				TOTAL	Industry	Residential, Commercial and Services				Others
						District Heating	Non-District Heating	Micro CHP	District Cooling	
2000	electricity	capacity	[GW]	0						
		output	[TWh]	0						
	heat	capacity	[GW]	0						
		output	[TWh]	0						
	fuel	input	[PJ]	0						
2004	electricity	capacity	[GW]	0						
		output	[TWh]	0						
	heat	capacity	[GW]	0						
		output	[TWh]	0						
	fuel	input	[PJ]	0						
2005	electricity	capacity	[GW]	0						
		output	[TWh]	0						
	heat	capacity	[GW]	0						

		output	[TWh]	0						
	fuel	input	[PJ]	0						
2006	electricity	capacity	[GW]	0						
		output	[TWh]	0						
	heat	capacity	[GW]	0						
		output	[TWh]	0						
	fuel	input	[PJ]	0						
2007	electricity	capacity	[GW]	0						
		output	[TWh]	0						
	heat	capacity	[GW]	0						
		output	[TWh]	0						
	fuel	input	[PJ]	0						
2008	electricity	capacity	[GW]	0	1.543	0.8175	0.725		0.0005	
		output	[TWh]	0	5.96	3.5538	2.405		0.0012	
	heat	capacity	[GW]	0	6.69005	3.5604	3.129		0.00065	
		output	[TWh]	0	14.9	9.8369	5.061		0.0021	
	fuel	input	[PJ]	0	110.34	70.63	39.6962		0.0138	

2009	electricity	capacity	[GW]	0	1.305642	0.534042	0.769991		0.007609	
		output	[TWh]	0	3.678188	1.906816	1.7677171		0.003655	
	heat	capacity	[GW]	0	5.395653	3.244526	2.149142		0.001985	
		output	[TWh]	0	10.69624	6.104143	4.5873047		0.004789	
	fuel	input	[PJ]	0	64.70772	35.99894	28.672265		0.036515	
2010	electricity	capacity	[GW]	0	1.566462	0.794221	0.770382		0.001859	
		output	[TWh]	0	3.839299	1.94189	1.8914264		0.005983	
	heat	capacity	[GW]	0	4.616793	2.585393	2.029		0.002400	
		output	[TWh]	0	11.83154	7.084913	4.7390648		0.007558	
	fuel	input	[PJ]	0	69.99668	40.27878	29.657846		0.060062	

Sheet 3 Technologies			TOTAL	CCGT with heat recovery	steam back pressure turbine	steam condensing extraction turbine	gas turbine with heat recovery	internal combustion engine	micro-turbines	Stirling engine	fuel cells	steam engine	organic Rankine cycle
2000	electricity	capacity [GW]	0										
		output [TWh]	0										
	heat	capacity [GW]	0										
		output [TWh]	0										
	fuel	input [PJ]	0										
2004	electricity	capacity [GW]	0										
		output [TWh]	0										
	heat	capacity [GW]	0										
		output [TWh]	0										
	fuel	input [PJ]	0										
2005	electricity	capacity [GW]	0										
		output [TWh]	0										
	heat	capacity [GW]	0										

		output [TWh]	0											
	fuel	input [PJ]	0											
2006	electricity	capacity [GW]	0											
		output [TWh]	0											
	heat	capacity [GW]	0											
		output [TWh]	0											
	fuel	input [PJ]	0											
2007	electricity	capacity [GW]	0											
		output [TWh]	0											
	heat	capacity [GW]	0											
		output [TWh]	0											
	fuel	input [PJ]	0											
2008	electricity	capacity [GW]	0	1.543	0.068	0.437	0.9857	0.0185	0.0338					
		output [TWh]	0	5.96367	0.28737	1.1228	4.172	0.142	0.2395					
	heat	capacity [GW]	0	6.69	0.464	1.893	4.274	0.024	0.035					
		output [TWh]	0	14.9005	0.3555	5.7	8.157	0.185	0.503					
	fuel	input [PJ]	0	110.338	3.145	32.33	70.21	1.5	3.153					

2009	electricity	capacity	[GW]	0	1.305642	0.068	0.284	0.88	0.0185	0.055142			
		output	[TWh]	0	3.678190	0.248713	0.704322	2.242220	0.141055	0.341880			
	heat	capacity	[GW]	0	5.395653	0.464	1.869800	2.980000	0.024000	0.057853			
		output	[TWh]	0	10.69524	0.344287	3.702991	6.104136	0.171354	0.372469			
	fuel	input	[PJ]	0	64.70772	2.668586	19.123726	38.297243	1.433689	3.184477			
2010	electricity	capacity	[GW]	0	1.566462	0.068	0.421	1.00	0.0185	0.058962			
		output	[TWh]	0	3.839299	0.262723	0.847377	2.213583	0.158633	0.356983			
	heat	capacity	[GW]	0	4.616793	0.464	1.5288	2.537	0.024	0.062993			
		output	[TWh]	0	11.83154	0.417286	4.849905	6.013763	0.166579	0.384003			
	fuel	input	[PJ]	0	69.99668	3.059982	23.843714	38.178173	1.561012	3.353803			

[4] within the scope of Directive 2004/8/EC