**JOINT IMPLEMENTATION PROJECT DESIGN DOCUMENT FORM
FOR SMALL-SCALE PROJECTS
Version 01.1 - in effect as of: 27 October 2006**

CONTENTS

Annexes

SECTION A. General description of the small-scale project

A.1. Title of the small-scale project:

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Project title: Small Hydropower station SHPS „Potochnitsa"
Version: 1.0
Date: 01/11/2006

A.2. Description of the small-scale project:

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The proposed project for a Small Hydro-power station SHPS „Potochnitsa" (called SHPS „Potochnitsa" or the Project further herein) is implemented by the company FINAUTO SPLLC - Sofia.

The Project contemplates the construction of a small run-of-the-river power station. Due to its proximity to Stouden Kladenets Dam, about 3,5km, it will operate in a mode subordinate to HPS Stouden Kladenets built on the dam. SHPS „Potochnitsa" will operate in compliance with the dispatch schedule of the Electric Power System (EPS) dam discharge and processing of waters passing through it for generation of electric power.

A.2.1 Water Economy Analysis

Currently, the developed discharge of Stouden Kladenets SHPS is $120m^3/s$. Dam waters are processed through four $30m^3/s$ Francis turbines. The following conclusions can be drawn from the existing data bases on dam discharges and water volumes processed through Stouden Kladenets HPS from its commissioning in 1958 till the beginning of 2006:

- The mean annual volumes run through for the whole period of operation of Stouden Kladenets HPS were 2252.0×10^6 m^3/year;
- The mean annual volumes of ecological water continuously released into the river bed downstream of the dam constitute 0,93% of the afflux thereby creating a very good environment for the ecosystems downstream of the dam;
- At the same time, the mean annual volumes let through the sluice over that period are $116.10^6 m^3$, without their utilization for power generation which shows that the development of Stouden Kladenets HPS has proven lower than the optimal possibilities of the river in that sector;

In addition to operating in the subordinate mode following the operation of Stouden Kladenets HPS, the Project will process water from r. Krumovitsa with place of confluence about 2km upstream of the weir of the prospective power station. A hydrology study report was developed on the mouth of r. Krumovitsa establishing the hydrological parameters of the river as well as the flood discharges and water volumes that are to pass through SHPS „Potochnitsa".

A.2.2 Determining the Development of SHPS „Potochnitsa"

A water economy analysis was prepared in order to determine the development of the Project taking into account the initial conditions described above.

Initially, the so-called "balance method" was applied to the analysis, where the afflux from Stouden Kladenets HPS was integrated with that of the river Krumovitsa and, on that basis, an averaged permanence curve of discharge upstream of the weir of SHPS „Potochnitsa" was elaborated.

It was found out, however, that the operation schedule of Stouden Kladenets HPS was variable and unpredictable in time, depending solely on the operation of the EPS that, in its turn, was controlled by the Central Dispatching Unit of NEK who quite frequently varied the operating parameters of the hydro-power cascade. With a view to the above said, the following development plan is adopted:

- For the water passing through the dam – the same development in relation to discharge as that at Stouden Kladenets HPS;
- For the water from r. Krumovitsa – development based on the standard water-economy analysis.

Currently, a project is starting for extension of Stouden Kladenets HPS with installation of an additional 5 hydropower unit with 16MW rated capacity. That reconstruction will permit an increase of the developed discharge from 120m^3/s to 160m^3/s, so that the overflow water volumes can be accommodated.

The water economy study of r. Krumovitsa came to the conclusion that the optimal development of the river water would be 10m^3/s.

In conclusion, as a result of the studies carried out it was finally decided that the developed discharge of HPS Potochnitsa should be 170m^3/s, as a sum of the developed discharge from Stouden Kladenets HPS - 160m^3/s and the optimal development of the water from r. Krumovitsa – 10m^3/s.

A.2.3 Description of the Project Activities

The design developed discharge 170m^3/s was confirmed by Water Use Permit No. 301074/24.10.2005 issued by the Basin Directorate of the East Aegean Region with headquarters in Plovdiv, within the Ministry of Environment and Water (MoEW). On the basis of that Permit the total installed capacity of SHPS „Potochnitsa" - 8,7 MW, was determined.

The total storage reservoir of the Project will be 1'640'000m^3, and the ponded areas will be 53'000m^2. Thus, the estimated energy density of the hydropower project will be equivalent to 164,15W/m^2.

The purpose of the Project is to utilize, as far as possible, the existing hydrological resources between the two existing large integrated hydropower works consisting of dams with hydropower stations, for electricity generation. The Project is intended to produce about 34,8GWh/a electric power per annum.

Besides, the Project will generate emission reduction units (ERU) as a Joint Implementation Project. That will be realized because, during operation of the hydropower station, primarily in a mode of parallel operation of Dolna Arda Hydro-Power Cascade, the marginal coal-fired power units in the EPS will be replaced. It is expected that the annual average reduction of GHG emissions from EPS calculated as ERU, will be 31'800÷33'650 tCO_2e per annum.

A.2.4 Economic and Environmental Benefits from performance of the Project as a Contribution to the Local Sustainable Development

The implementation of the HPS Potochnitsa Project will help to achieve economic and environmental benefits to the Haskovo District and will contribute to the local sustainable development of the region as a renewable energy source (RES). The following arguments can be cites as specific benefits to the sustainable development:

- Utilize, as fully as possible, the available hydrological resources for production of electric power from RES, thus creating conditions for sustainable development and sustainable power generation;

- Improve the investment opportunities in a definitely poor farming region, thus improving the local economy;
- Diversify and improve the mix of generating capacities, and more particularly, those of RES utilizing capacities that are capable of meeting the steadily growing energy demand in the country, and thence, reduce the dependence on coal-fired capacities;
- Reduce pollution with noxious gases and dust (SO_2, NOx, TSP), including greenhouse gases resulting from combustion of coal for power generation through their replacement by electricity supply from RES;
- Increase the opportunities for reduction of unemployment in the region by employment of about 100 workers during the construction phase, and about 20 employees during the operation of the SHPS;
- Part of the equipment and all building materials for the needs of the site will be produced in this country, thus assisting the sustainable development of local economy.

A.3. Project participants:

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Table No. 1

Name of Party involved	Private and/or public entity(ies) project participants	Does the party involved wish to be considered as project participant
Republic of Bulgaria (Host Party)	Project proponent: FINAUTO SPLLC	Yes
Republic of France	Project contractor and equipment supplier: MECAMIDI	No
Kingdom of Denmark	ERUs buyer: Danish Carbon	No

A.4. Technical description of the small-scale project:

A.4.1. Location of the small-scale project:

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A.4.1.1. Host Party(ies):

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Republic of Bulgaria

A.4.1.2. Region/State/Province etc.:

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Haskovo District

A.4.1.3. City/Town/Community etc.:

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Village of Dolno Cherkovishte, Stambolovo Municipality

A.4.1.4. Detail of physical location, including information allowing the unique identification of the small-scale project:

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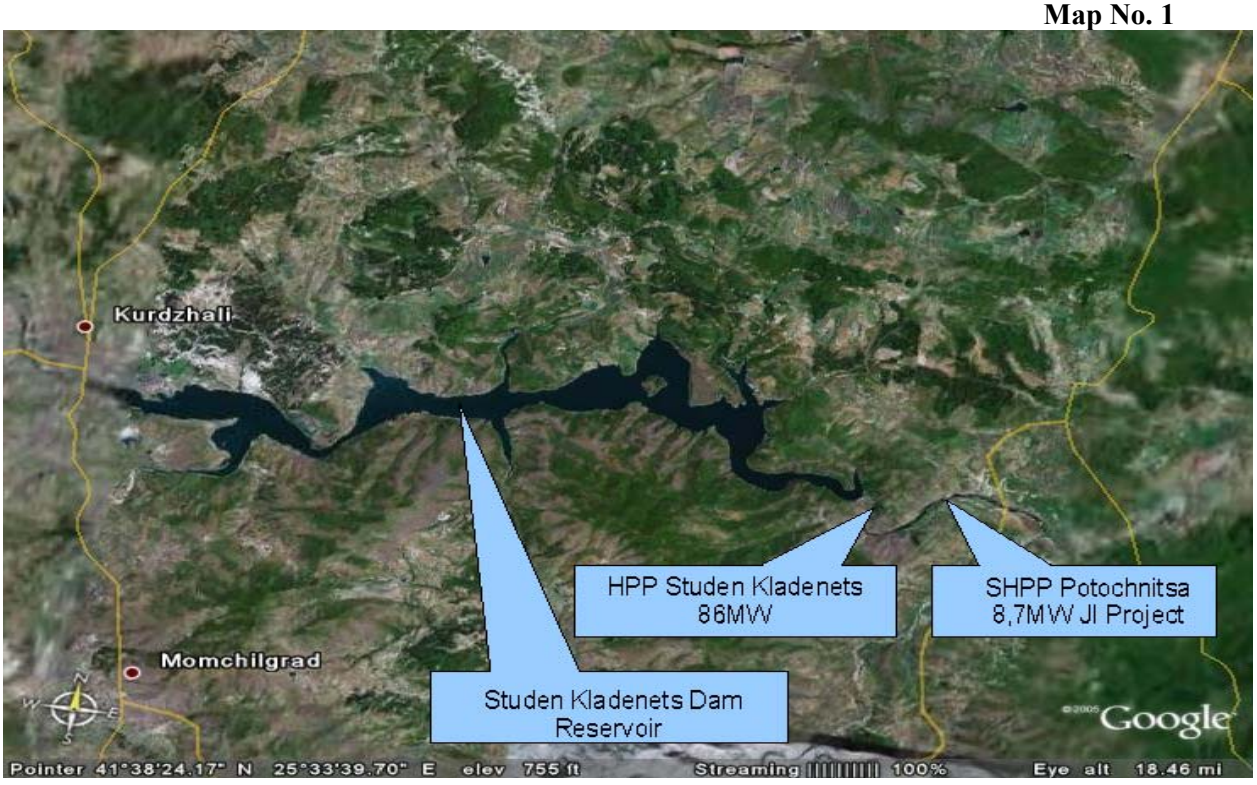
The coordinates of the prospective small-scale Project site are:

- Longitude 23^0 39' 53.05"E;
- Latitude 41^0 36' 45.93"N.

SHPS „Potochnitsa" will be located 3,5km away downstream of Stouden Kladenets HPS along the course of the river of Arda and 1 km downstream of the mouth of r. Krumovitsa. The Project will be implemented on a site on the territory of the village of Dolno Cherkovishte and is situated 350m away from the bridge across the river of the road Krumovgrad - Tunkovo.

The location of SHPS "Potochnitsa" is presented in Map No. 1

Map No. 1



A.4.2. Small-scale project type(s) and category(ies):

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The Joint Implementation Supervisory Committee (JISC) developed, provisions for small-scale (SSC) projects as defined in paragraph 6 (c) of decision 17/CP.7, as appropriate.

In accordance with paragraph 2 (f) of decision 10/CMP.1, referring to paragraph 6 (c) of decision 17/CP.7, three types of JI SSC projects are defined. Type I JI SSC projects refer to "Renewable energy projects with a maximum output capacity equivalent of up to 15 megawatts (MW) (or an appropriate equivalent)".

JI SSC projects have to conform to one of the SSC project categories approved by the Executive Board of the CDM7 or an additional SSC project category approved by the JISC.

According to the categorization of the above provisions the Project type and category are as follows:

Type I: Renewable energy project with maximum output capacity of 8,7MW
Category I.D: Power generation for EPS by RES
Subcategory: Hydropower

The Project consists of a small hydropower station with 3 hydro-power units with Caplan type turbines and hydro-generators, and 2,9MW capacity of each unit. The total installed capacity of SHPS „Potochnitsa" is 8,7MW which is less than the restrictive capacity 15MW of small-scale JI project activities. The power is generated by water which is a renewable energy source and the production is free of greenhouse gases. The generated electric power will be delivered to the transmission network of the country.

A.4.3. Technology(ies) to be employed, or measures, operations or actions to be implemented by the small-scale project:

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A.4.1 Project Layout and Physical Boundaries

SHPS Potochnitsa was designed in conformity with the classical dam plan using the pressure head created by the river barrage for power generation. The Project diagram is compact and includes the following main facilities:

- Overflow dam with ten overflow bays each 13m wide, or 130m overflow face;
- Station building with turbines situated coaxially with the overflow dam;
- Stilling basin downstream of the station and the overflow bays;
- Guiding walls downstream of the stilling basin;
- Administrative building;
- Electricals and automation (transformers, switchyard ORU 20kV, auxiliary electrical installation, earthing and automatics)

A.4.2 Substantiation and technical parameters of the main hydro-power facilities

1.) Overflow dam

The overflow dam will be constructed with 10 overflow bays divided by 9 intermediate support pillars 2m wide each. The overflow bays will be shut with back-supported radial gates. Each gate will be 13m wide and 6,5m high. So constructed, overflow dam is designed to let through flood waves with Q_p (probability of occurrence coefficient) 1%, in this case 3630m^3/s. The radial gates will rest on a low reinforced-concrete apron. The apron foundation will be an unbroken trench wall on the upper sector side and trench arrases on the lower side. The trench walls reach the impervious rock bed that lies at a depth of 6,5÷9,5m in this place. The impervious bed depth was determined on the basis of geophysical exploration.

2.) Hydro-technical parameters of SHPS Potochnitsa

- Calculated higher maximum level – 148,50m;
- Average calculated head – 4,3m;
- Mean annual energy-processed water – 2550.$10^6$$m^3$;
- Mean annual utilization ratio of the installed capacity – 4164h.

3.) Station Building

The station building is deployed on the right-hand bank, coaxially with the radial gates. Its design dimensions are 34m*32m, so as to accommodate the turbines and electrical equipment of the station. The design plan is to erect Caplan single-flow turbines made by MECAMIDI with the following technical parameters:

- Impeller axis – vertical;
- Number of turbines – 3;
- Developed discharge per turbine – 56,7m^3/s;
- Turbine power – 2,9MW;
- Total installed capacity at the station – 8,7MW.

By means of a gearbox (rpm accelerator), located between the turbine and the generator, the rotation speed of the turbine impeller is transformed into higher synchronized rotation speed of the generator shaft.

The hydro-generator is synchronized, 3-phase, brushless, for horizontal mounting and has the following technical data:

- Voltage – 690V
- Frequency – 50Hz;
- Rated rotation speed – 750rpm;
- Apparent (real) power – 3500MVA;
- Rated power – 2975kW;
- Protection – IP23;
- Isolation class – F.

The hydro-generator is fitted with integrated excitation controlled by an electronic card supplied with the process control computer, capable of monitoring the operating voltage and regulation of cosφ. The generator protection is of the digital relay type.

Process automation at the SHPS is provided by 3 double-faced control boards. One of the boards controls the operating parameters of the individual facilities. The other two boards control the operating parameters of the individual hydropower units. A common process-control computer controls the station operation.

4.) Stilling basin downstream of the spillway and the station

It is designed to quench the water flow energy in the process of letting through of flood waters at flow rate $Q_{1\%}$ = 3630m^3/s. The stilling basin has the structure of a water-hammer well with a slanting wall for easier flushing of the in wash in the well. After the quenching wall, a stilling sector is designed for connection to the water level downstream of the stilling basin.

A.4.4. Brief explanation of how the anthropogenic emissions of greenhouse gases by sources are to be reduced by the proposed small-scale project, including why the emission reductions would not occur in the absence of the proposed small-scale project, taking into account national and/or sectoral policies and circumstances:

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The proposed small-scale project for construction of SHPS „Potochnitsa" will generate approximately 34,8 GWh/a electric power per year using the hydropower potential of the river of Arda.

The power generated by the Project will be supplied to the national power system, and in that manner it will contribute directly to reduction of the output of marginal coal-fired power units in the EPS. Therefore, with the operation of SHPS „Potochnitsa" the GHG emissions that would be generated by the replaced power units at Thermal Power Plants would be reduced. Keeping in mind the above-mentioned facts the reductions of GHG emissions were calculated on the basis of the combined marginal method.

It should be also noted that, without the revenues from sale of ERUs, the Project is not financially lucrative. In these circumstances, the Project investor will face financial obstacles to implementation of the Project. Development of the Project as a Joint Implementation one, however, will permit to report reduction of the GHG emissions, and in that case the generated ERUs will be additional.

Besides, no reduction emissions would be achieved if the Project is not implemented due to financial and technical reasons and obstacles as listed here below:

- The Project implementation costs, as a specific indicator per installed kilowatt, are considerably higher than those for construction of conventional power units fired with fossil fuels;
- Due to the lack of experience in crediting of RES, the local banks do not consider such projects attractive and refuse to credit them;
- Besides, the Bulgarian commercial banks avoid offering long-term credit for such small energy projects since they consider them highly risky;
- SHPS „Potochnitsa" is considered a project hard to implement from technical point of view due to the need for construction of an overflow dam consisting of ten overflow bays shutting by means of radial gates.

Notwithstanding that the state policy in the energy sector favors the development of RES, their implementation is not a priority, because of the high cost per installed kilowatt, their relatively low utilization rate in hours, and the small output. In that situation, the Project is optional to the EPS because it is not included in the list of capacities to be constructed according to the annual plan for least-cost development of the energy sector.

A.4.4.1. Estimated amount of emission reductions over the crediting period:

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In accordance with the approved methodology AMS-I.D and applying it to SHPS „Potochnitsa", the Project will generate ex-ante calculated mean emission reduction of 32'701tonnesCO2e per annum for the report period 2008-2012.

The planned development of the energy sector envisages construction and commissioning of new RES capacities increasing over the years. That will result in gradual reduction of the EPS Compound Emission Factor which will be reflected in the reduction of GHG emissions in the System.

Provided that Bulgaria concludes an agreement with the Buyer country of carbon credits from the Project, for purchase of ERU, and their transfer from the register of the Seller country to the register of the Buyer country is legitimated for the next 5-year report period from 2013 till 2017 the generation of ERU by the Project may be carried further.

The annual emission reductions due to implementation of the SHPS Potochnitsa Project are presented in Table No. 2.

Table No. 2

Year	Annual estimation of emission reductions in tonnes of CO2e
2008	33 644
2009	33 291
2010	32 620
2011	32 172
2012	31 778
Total first crediting period 2008÷2012	**163 505**
Annual average	32 701

Note: The quantity of ERU generated by the Project is different for each year and varies with the future generated and measured net generated electric power at HPS Potochnitsa and with the EPS Compound Emission Factor that will be determined *ex-post* during the report period.

A.4.5. Confirmation that the proposed small-scale project is not a debundled component of a larger project:

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The Project participants declare that the small-scale project activities for construction and operation of SHPS „Potochnitsa" are not a debundled component of a larger project. It is also declared that there is no registered small-scale JI or request for registration of another small-scale JI project with the following characteristics:

- With the same Project participants;
- Project with registration of the last 2 years; and
- Within the same project category and with the same technology; and
- With design boundaries within 1km from the design boundaries of the proposed project in the point of closest proximity between them.

A.5. Project approval by the Parties involved:

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According to paragraph 20 of the JI guidelines, a "Party involved in an Article 6 project shall inform the secretariat of:

- Its designated focal point for approving projects pursuant to Article 6, paragraph 1 (a);
- Its national guidelines and procedures for approving Article 6 projects, including the consideration of stakeholders' comments, as well as monitoring and verification".

Paragraph 31 of the JI guidelines stipulates that project participants shall submit to an AIE a PDD that contains all information needed for the determination of whether the project has been approved by the Parties involved.

This approval by the Parties involved should be unconditional and in writing and shall be attached to the JI PDD at the latest before the final determination report is made publicly available.

Such written approval constitutes the authorization by a designated focal point of a specific legal entity to participate in the specific JI project. The approval will covers the requirements of paragraphs 29 and 31 (a) of the JI guidelines.

SECTION B. Baseline

B.1. Description and justification of the baseline chosen:

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According to Decision 10/CMP.1 paragraph 4 (a), the participants in JI projects may apply Baseline and Monitoring methodologies approved by the CDM Executive Board.

Therefore, the approved CDM baseline methodology for small-scale project activities AMS-I.D./Version 9, 28 July 2006: „Power Generation by RES Connected to the Transmission Network" can be used for this project.

The grounds for applicability of the AMS-I.D. methodology to this small-scale JI project activity are as follows:

- The Project is of a hydropower type, one of the several RES project types where the use of that methodology is allowed;
- The total installed capacity of SHPS „Potochnitsa" is 8,7MW which is within the permissible limits 15MW of the chosen methodology for small-scale project activities;
- The methodology is applicable to RES projects that will deliver electric power to the country's power transmission network;
- The design energy density calculated by dividing the installed power generation capacity by the ponded volume area of the Project is equivalent to 164,15W/m^2. That energy density is much higher than 10MW/m^2 which, according to the requirements of the CDM Executive Board, is the minimum value above which that of the Project should be. Therefore, the use of the approved methodology (AMS-I.D.) is possible and the design emissions from the ponded volume may be neglected since they are insignificant and slightingly low.

The AMS-I.D. methodology characterizes the project activity baseline for SHPS „Potochnitsa" in the following manner:

"For all other systems, the baseline is the kWh produced by the renewable generating unit multiplied by an emission coefficient (measured in kgCO2equ/kWh) calculated in a transparent and conservative manner as:

a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the approved methodology ACM0002. Any of the four procedures to calculate the operating margin can be chosen but the restrictions to use the Simple OM and the Average OM calculations must be considered

OR

b) The weighted average emissions (in kg CO2equ/kWh) of the current generation mix. The data of the year in which project generation occurs must be used.

Since the low-cost/must-run power units in the Bulgarian EPS constitute less than 50% of the total electricity output of the system, and that situation will continue during 2008÷2012, the Simple OM method is applicable to the Project.

According to the method used for Operating Margin calculation in the ACM 00002 methodology, two approaches are possible:

- (*ex-ante*) the full generation-weighted average for the most recent 3 years for which data are available at the time of PDD submission, if or,
- The year in which project generation occurs, if $EF_{OM,y}$ is updated based on *ex-post* monitoring.

The second approach was chosen as more reliable to determine the Operating Margin keeping in mind the development prospects of the country's EPS.

The spatial boundaries of the Project overlap with the country's EPS, because SHPS Potochnitsa will be connected to the common 110kV power transmission network of the country. Having in mind that circumstance, the multi-project approach was selected to develop the Baseline Methodology. For the purpose of creating the Baseline Scenario and determining the Baseline Emission Factor (BEF) of the system, a probabilistic forecast of the EPS power and energy balance was developed for the minimum and maximum Power Demand Forecast. The monthly and annual energy balance of EPS will be updated in the *ex-post* monitoring in order to determine the up-to-date BEF that will be used to determine the actual emission reduction levels.

For the purpose of determining the emission factors from energy balances, the power units within the EPS with capacities exceeding 10MW were divided in four categories:

- Operation Margin Power Units;
- Build Margin Power Units:
  - Existing Build Margin;
  - Future Build Margin.
- Low-cost Power Units;
- Must-run Power Units.

For power units falling within the Operation Margin, the weighted average emission factor EF_{OM}, was calculated as presented in Table No. 3

Table No. 3

Simple Operation Margin Emission Factor					
	2008	**2009**	**2010**	**2011**	**2012**
Minimum Power Demand Forecast	1,092	1,089	1,056	1,044	1,043
Maximum Power Demand Forecast	1,085	1,080	1,044	1,029	1,011

EF_{OM}, from the maximum Power Demand Forecast for the country was used in the further calculations since it is smaller, and therefore more conservative, in order to avoid overestimation of the forecast emission reduction quantities.

According to ACM00002, Build Margin is the weighted average emission factor EF_{BM} in kgCO2e/kWh of the most recently built power capacities in the EPS. These capacities should constitute 20% of the newly built power units, or the five most recently built power plants.

The 20% power excerpt made for the power units most recently connected to the EPS presents power generating capacities at four power plants, including units No.5 and No.6 at Kozloduy Nuclear Power Plant. Since the operation of Kozloduy Nuclear Power Plant as a base-load power plant in the EPS is by no means influenced by any Joint Implementation (JI) project, these units are excluded from the further Build Margin calculations. In the reference period 2007÷2012, all new power units that are currently in the process of construction and development of their implementation projects are added to the Build Margin. The calculated weighted average Build Margin for the years from 2008 till 2012 is presented in Table No. 4.

Table No. 4

Build Margin Emission Factor					
	2008	**2009**	**2010**	**2011**	**2012**
Minimum Power Demand Forecast	0,868	0,843	0,833	0,831	0,817
Maximum Power Demand Forecast	0,849	0,834	0,831	0,820	0,815

In further calculations of the Build Margin, the emission factor EF_{BM} of the maximum Power Demand Forecast for the country was used as more conservative.

The Baseline Compound Emission Factor, in accordance with the ACM00002 methodology, is calculated as the weighted average emission factor EF_{grid}, between the Operation Margin and Build Margin emission factors in kgCO2e/kWh. Here, that is based on the assumption that the JI Project will most probably have an impact on the operation of the existing and new power units in the short term (marginal operating cost), as well as in the delay of implementation of new capacities in the long term (marginal build costs). That is corroborated by the Integrated Resource Planning Program used as a model for the forecast of EPS energy balance, and reliably determines the power units in the Build Margin and in the Operation Margin.

The results of Baseline Compound Emission Factor calculations are presented in Table No. 5.

Table No. 5

Baseline Emission Factor with Simple Operation Margin EF					
	2008	**2009**	**2010**	**2011**	**2012**
Minimum Power Demand Forecast	0,972	0,964	0,947	0,938	0,930
Maximum Power Demand Forecast	0,967	0,957	0,937	0,924	0,913

The further calculations of Project emission reductions are based upon the Baseline Compound Emission Factor for maximum Power Demand Forecast in the EPS. These are the lowest values, and therefore, the most conservative from the viewpoint of avoiding overestimation of the generated ERUs.

B.2. Description of how the anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the small-scale project:

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The prescribed rules of UNFCCC of the simplified modalities and procedures aim at establishing the additional nature of the Project according to Attachment A to Appendix B, where various restrictions are considered. At least one of these restrictions has to be identified as one as a result of which the Project would not be implemented in any case.

Appendix A requires the Project proponents to prove the correctness of additionality with explanation of the project activities and emission reductions in the light of the restrictions preventing them. It is for the purpose of overcoming these barriers that the Project is proposed as a small-scale JI Project. In that connection, the project proponents have identified the following project implementation restrictions:

1.) Investment restrictions.

The total investments for implementation of the small-scale Project are estimated at €12'888'134. Of these, €7'728'176 is needed for supply of the equipment and radial gates of the weir. This part of the investment will be covered by means of a financial commodity loan and constitutes (62%) of the total investment. In these circumstances, the Entrepreneur shall raise the rest of the investment (38%) from its own funds.

In Bulgaria, it is considered advisable for energy projects to have equity / debt capital relationship of the order 20% / 80%, so that the project can be attractive to the investor. In this case the Project requires a large share of equity investment and that is a very serious financial barrier to its implementation. Besides, the specific investment per installed kilowatt - 1481€/kW, is higher than that in similar hydro-power projects, and compared to that in conventional coal-fired power units.

With its registration as a JI Project and securing of revenues from ERU sales, the Project is going to be much more profitable to the potential investors and, in that case, the banks will be far more willing to grant loans for implementation of the Project.

2.) Technological restrictions

The Project will be implemented in complicated geological conditions. The bank slopes at the sites are severely eroded, and lateral support walls have to be built in the area of the whole overflow dam, as well as in the area downstream of the hydropower station from the beginning of the stilling sector to about 30m downstream of the bridge of the Krumovgrad-Tunkovo road. The walls will consist of metal mesh pockets filled with stone and reinforced with cement, to ensure protection of the banks against erosion.

The ten overflow courses of the weir upstream of the hydropower station will be closed with back-support radial gates. These radial gates are sophisticated and expensive facilities. Besides, they require automation of the hydraulic open/close drive for letting through the high water from the river.

Building of the overflow dam and protection of the river banks considerably increase the project cost, constituting 38% of the total investments, and are, therefore, technological barriers to implementation of the Project.

3.) Prevailing practice

An analysis of the country's electric power capacities that provide the power and energy balance of the EPS would bring to the finding that about 85% of the electricity output is generated by the Nuclear Power Plant and Thermal Power Plants. The four large hydro-power cascades consisting of dams and related diversion-type HPS of NEK EAD generate 8%÷12% of the total electricity in the country. In such conditions, the share of RES, mainly small hydro-power stations, is between 2% and 4% of the annual power generation within the EPS.

Viewed retrospectively, the large hydro-power stations in the EPS have been built by the state and for the present moment, it is the only party interested in the construction of large HPS with the related dams. The development of SHPS and other RES power capacities has been left to private investors. That means in practice that the RES projects will have to be developed in completely market conditions without depending on any financial support from the state.

The situation is due to the fact that the country is in a state of monetary board and cannot undertake any financial guarantees except those under the Energy Law provision that obligates NEK and the power distributors to off-take the whole quantity of power generated by RES. In order to keep in pace with the increasing power demand trend in the country, the least-cost planning of EPS stakes on an energy policy giving priority to the most advantageous construction of large power generating nuclear and thermal capacities.

All that shows that construction of SHPS and the other RES, is not a prevailing practice in Bulgaria and the energy sector will continue to rely on the large nuclear and coal-fired power capacities to meet the power demand in the country.

4.) Conclusions

The analysis of different restrictions and barriers shows that the Project is facing a number of difficulties and obstacles to its implementation. Since it is comparatively small and financially unattractive, the Project does not fit into the least-cost EPS planning, and is not, therefore, present in the basic EPS development scenario.

In these circumstances, without a financial support from the carbon credit sales revenues, as a JI Project, it can be stated that the Project is not economically beneficial. It is assumed that the additional financing through ERUs will provide 8÷10% of the overall project investment. That circumstance will improve the financial parameters of the Project and will also enhance the banks' and entrepreneurs' confidence in it.

The current practice in the country with respect to the energy policy is to lay the emphasis on electricity generation by thermal power plants, nuclear power plants and large hydro-power stations which, together with the difficulties of RES funding and the technological barriers shows that the SHPS Potochnitsa Project is facing substantial difficulties from implementation point of view. Thus, the Project is considered additional and is not included in the basic EPS development scenario in the process of least-cost planning.

B.3. Description of how the definition of the project boundary is applied to the small-scale project:

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The Project boundaries specified in Appendix B of simplified modalities and procedures are defined as the physical and geographic site of RES.

The system boundary of the proposed SHPS Potochnitsa Project is defined as the overall EPS of the country. The baseline project boundary includes the Project and all other power plants connected to the power transmission network of the country.

No leakages or indirect emissions have been identified on the part of SHPS Potochnitsa Project.

B.4. Further baseline information, including the date of baseline setting and the name(s) of the person(s)/entity(ies) setting the baseline:

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In conformity with Part B.2 of this PDD, the project activity is generation of electric power for the EPS which consists of nuclear, thermal and hydro-power generating capacities. Therefore, the applicable baseline methodology is like that described in Appendix B of indicative simplified baseline and monitoring. This methodology defines the baseline by multiplying the kWh produced by RES by the baseline emission factor measured in kgCO2e/kWh. The baseline is assessed using the method specified in Paragraph 9 of Type I.D in Appendix B, option (a) which is presented in full in item B.2 of the present document.

Date of completion of the first Baseline Version (DD/MM/YYYY):
30/10/2006

Name of the Baseline author:
Christo Schwabski

Legal entity determining the Baseline:
National Electric Company EAD

Address: 5 Veslets street, 1040 Sofia, Bulgaria
Telephone: +359 2 9263 445; Mobile: +3592 889 635 262
e-mail: hshvabski@nek.bg

The legal entity is not any of the Project Participants indicated in Annex 1 of this document.

SECTION C. Duration of the small-scale project / crediting period

C.1. Starting date of the small-scale project:

>>

01/01/2007

C.2. Expected operational lifetime of the small-scale project:

>>

50 years

C.3. Length of the crediting period:

>>

The Project Participants propose the years 2008÷2012 inclusive as credit period. This means 5 years or 60 months crediting period and with a starting date on January 1st 2008.

On provision that an Agreement is signed between Denmark and Bulgaria for transfer of carbon credits between the registers of the two countries for a further five-year period 2013÷2017 the generation of carbon credits by the Project may be continued.

SECTION D. Monitoring plan

D.1. Description of monitoring plan chosen:

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According to Decision 10/CMP.1 paragraph 4 (a), the JI Project Participants may apply Baseline and Monitoring Methodologies approved by the CDM Executive Board. Therefore, the approved CDM Monitoring methodology for small-scale projects AMS-I.D./Version 9, 28 July 2006: „Grid connected renewable electricity generation" may be used in this Project.

The monitoring methodology used for the Project is described in „Indicative simplified baseline and monitoring methodologies for selected small-scale CDM project activity categories". The monitoring methodology is entitled: AMS-I.D. monitoring methodology "Grid connected renewable electricity generation" (Version 09, 28 July 2006)

This monitoring methodology will be used jointly with the selected baseline methodology "AMS-I.D. Grid connected renewable electricity generation". SHPS Potochnitsa Project is a small-scale one and will be connected to the EPS grid.

Therefore, the choice of monitoring methodology of the Project is confirmed as justified.

D.2. Data to be monitored:

>>

The monitoring will consist in continuous measurement of the net electric power generated by Potochnitsa SHPS. The monthly value of net electric power from the power plant will be recorded on an electronic medium and will be entered in a special log book for that purpose. The measured quantities of electric power will be rechecked by means of the invoiced amounts of electric power from the project of Company's power transmission operator.

Hour dispatching of the two marginal power units in the EPS will be performed by NEK. Technical data required for calculation of the Baseline Emission Factor will be received from the respective thermal power plants whose power units have been marginal for a month's time. These data will be re-checked by NEK for succession, uncertainties and errors on the basis of the element composition of the fuel burned and the technical and cost indicators of thermal power plants for the respective month.

On the basis of verified technical data and the hours per month for which power units have operated in the EPS at the highest (marginal) operating costs, NEK will calculate the Baseline Emission Factor.

The Project monitoring team on the basis of net quantities of power generated by SHPS Potochnitsa and the baseline emission factor for the respective month will calculate the reduction of emissions by the Project in Emission Reduction Units measured in tonnes of saved CO2.

A similar description of the data to be measured, collected, computed and archived during Project monitoring is presented in Table No.6.

Table No. 6

I.D. number	Data variable	Source of data	Data unit	Measured calculated or estimated	Recording frequency	Proportion of data to be monitored	How will the data be archieved (electronic/ paper)	For how long is archived data to be kept	Comment
1.EG_M	Electricity supplied to the grid by the project	Measured and verified against sales data	MWh	Measured	monthly	100%	Electronic and paper	During the crediting period and plus 2 years	Electricity supplied by the project activity to the grid. Double check by receipt of sales
2. MU_H	Hours of the first 2 Marginal Units (MU) of EPS	Power Units merit order and software estimation of the 2 MUs	Hours	Estimated by software	hourly	100%	Electronic and paper	During the crediting period and plus 2 years	If the 1 MU is launch during the hour the second one will be use as MU
3. EF_Mi	Emission Factor of power unit serving at the margin	Actual data reported by the marginal TPP	tCO2/ MWh	Measured and calculated	monthly	100%	Electronic and paper	During the crediting period and plus 2 years	Fuel characteristics will be analysis and measured - Carbon content, LHV and Carbon unoxidized. The EF will be calculated
4. EF_{Mg}	Emission Factor of the grid	1. Power Units serving at the margin for determined hours - $Hours_i$ 2.Marginal Units EF_Mi	tCO2/ MWh	Calculated	monthly	100%	Electronic and paper	During the crediting period and plus 2 years	EF_Mgrid = $\Sigma H_i * EF_M i / H_M$ Hi – hours at the margin H_M – total monthly hours
5. ERU monthly	Emission Reduction Units per month	Project, marginal TPPs and NEK	tCO2	Calculated	monthly	100%	Electronic and paper	During the crediting period and plus 2 years	$ERU_{tCO2M} = EG_M * EF_M$
6. ERU annually	Emission Reduction Units per year	Project, marginal TPPs and NEK	tCO2	Calculated	monthly	100%	Electronic and paper	During the crediting period and plus 2 years	$ERU_{tCO2A} = \Sigma ERU_{tCO2M}$i where: I =1-12, are the months during year of crediting period

D.3. Quality control (QC) and quality assurance (QA) procedures undertaken for data monitored:

Table No. 7

Data (Indicate table and ID number)	Uncertainty level of data (High/Medium/Low)	Explain QC/QA procedures planned for these data, or why such procedures are not necessary
1.EG_M	Low	1.) Electric meters will be maintained in good repair and subjected annually to testing and calibration in conformity with the technical requirements for measurement accuracy assurance. 2.) The monthly invoices for electricity sold to the Grid Operator will be used in monitoring the performance of Project electric meters.
2. MU_H	Low	1.) The software for monitoring the hours during which power units have operated at the margin will check the operating units every hour against the merit order dispatching of the units. 2.) No QC/QA procedures are required for such assessment
3. EF_Mi	1.) Low 2.) Medium	1.) At TPPs, wherever there are installed gas analyzers for direct determining of CO_2 emissions, the emission factor per hour is received from the data logger of the measuring system. Depending on the electricity generated by the power unit, the weighted average emission factor of the marginal power unit is calculated for the respective month. Once in a year, the gas analyzer and data logger are subjected to mandatory testing and calibration outside the TPP beside the regular calibration and testing of the instruments in compliance with the manufacturer's instructions. 2.) At TPP's without gas analyzers the monthly emission factor is calculated on the basis of a procedure according to which the needed data will be obtained from the averaged monthly determination of the technical parameters of a TPP together with the data from analyses of the element composition of the fuels used. NEK will exercise quality control of the technical data from the TPP and will verify them by computation from the fuel analysis. A second data verification will be done on the basis of direct gas measurements carried out by the Regional Inspectorate of Environment and Water.
4. EF_{Mg} 5. ERU monthly 6. ERU annually	Low	Used for direct calculation of emission reduction. No QC/QA procedures are required for these data.

D.4. Brief description of the operational and management structure that will be applied in implementing the monitoring plan:

>>

The firm FINAUTO is planning to set up a JI Project Team who will be in charge of the Monitoring. The team members will be trained in the JI Project concept as well as in performance of the Monitoring Plan. The Team staff will allocate among themselves the assignments for collection, compiling, and calculation of the required data under the monitoring plan.

The monitoring archive will be checked weekly, and presented and analyzed with the Team Leader. Once a month, the Team will review and check the project activities of the previous month, will verify the collected data and the respective estimated Project emission reductions.

The monitoring reports will be prepared in conformity with the approved procedures of the JI Project, and will be acceptable for auditing by a third party in manner and structure. The annual monitoring reports will be submitted to DOE for validation and for the purpose of certification.

D.5. Name of person(s)/entity(ies) establishing the monitoring plan:

>>

Name of the person – developer of the Monitoring Methodology:
Christo Schwabski

Legal entity determining the Monitoring Plan:
National Electric Company EAD

Address: 5 Veslets street, 1040 Sofia, Bulgaria
Telephone: +359 2 9263 445; Mobile: +3592 889 635 262
e-mail: hshvabski@nek.bg

The person and legal entity indicated here above are not among the Project participants listed in Annex 1 of the present document.

SECTION E. Estimation of greenhouse gas emission reductions

E.1. Estimated project emissions and formulae used in the estimation:

>>

It is planned to build SHPS Potochnitsa as a run-of-the-river power station. The total ponded volume of the Project will be 1'640'000m^3, and the ponded areas will be 53'000m^2. In these circumstances the calculated energy density of the hydro-power project is equivalent to 164,15W/m^2.

According to the definition of energy density, when it is higher than 10W/m^2, the design emissions from the water equalizer may be neglected and are not identified with anthropogenic emissions from sources of GHGs within the project boundary.

Therefore, there are no anthropogenic emission formulae applicable to the Project within its boundaries.

E.2. Estimated leakage and formulae used in the estimation, if applicable:

>>

The Project proponent has not found any emissions of anthropogenic GHGs from sources outside the Project boundary that are significant, measurable, or can be accounted for by the project implementation activities. Therefore, there is no leakage that can be considered as resulting from the Project.

According to Paragraph 8 of Appendix B of the modalities for small-scale CDM projects, the Project proponent confirms that the process equipment to be used on the Project has not be transferred from or used by another project. Therefore, no leakage calculations are required.

E.3. Sum of E.1. and E.2.:

>>

The sum of emissions due to project activity and leakage is zero.

Therefore, the total project activity emissions are also zero.

E.4. Estimated baseline emissions and formulae used in the estimation:

>>

According to the procedures of the approved methodology ACM0002, the calculations and Baseline determination have to be done in a transparent and conservative manner.

As presented in Paragraph B.2, the baseline emissions are defined by multiplying the MWh of electric power produced by RES by an emission factor measured in tCO2e/MWh. The Baseline emissions, according to the calculations described, are expressed by the following equation:

$$BEm_y = EG_y * EF_{grid} \quad [tCO_2e] \qquad (1)$$

where:
BEm_y – the baseline emissions in tCO_2e;
EG_y – electric power generated per month by the Project, in MWh;
EF_{grid} – emission factor (coefficient) of EPS in tCO_2e/MWh.

The EPS emission factor is calculated as the weighted average between the emission factor of the Simple Operation Margin and the Build Margin emission factor which is expressed by the following equation:

$$EF_{grid} = ½ *EF\_OM + ½ *EF\_BM \quad [tCO_2e/MWh] \qquad (2)$$

The Operation Margin emission factor is calculated depending on the direct emissions from power units operating at the margin and the respective electricity output of such units. The equation whereby EF_OM is expressed is given below:

$$EF\_OM = \frac{\sum_{i=1}^{n} EmCO_{2i}}{\sum_{i=1}^{n} EG_i} \quad [tCO_2e/MWh] \qquad (3)$$

where:
EF_OM –Operation Margin emission factor;
$EmCO_{2i}$ - forecast CO_2 emissions for the respective year from the i-th power unit operating at the Operation Margin in the EPS measured in tCO_2e, calculated by Formula (4);
EG_i – forecast electricity output for the respective year from the i-th power unit operating at the Operation Margin in the EPS measured in *MWh*.

The forecast electricity output from power units was obtained on the basis of the Least-Cost Development Plan (LCDP) of the Bulgarian EPS. An Integrated Resource Planning computer model was used in the LCDP elaboration process. The US Company Electric Power Software is developer of the software, named IRP Manager. Since 1995 the model has been used for long-term least-cost planning in the energy sector by NEK - EAD.

The forecasts were developed on the basis of the minimum and maximum power demand forecasts. Respectively, two annual series were obtained for forecast power generation under the two power demand scenarios. All emission estimates were performed in accordance with the maximum and minimum forecasts. After that, the forecast with lowest emission factors was selected as more conservative and with a view to avoiding overestimation of the forecast emission reductions.

The forecast CO_2 emissions for the respective year from the i-th power unit are expressed by the following equation:

$$EmCO2_i = \frac{CC_j * EI_i * (100 - Unoxid_i) * 44}{LCV * 10^7 * 12} \ [tonnesCO_2e] \quad (4)$$

where:
CC_j – annual average carbon content in the j-th fuel in %;
EI_i – the annual amount of energy input in the i-th power unit in GJ/a, calculated by Formula (5);
$Unoxid_i$ – annual average unburnt carbon content at the i-th power unit, total in fuel residues – slag and ash in %;
LCV – annual average net-as-received calorific value of "as-received" fuel in GJ/Mg for coal and fuel oil, and in MJ/Nm^3 for natural gas.

The annual amount of energy input in the i-th power unit in GJ/a is expressed by the equation:

$$EI_i = EG_i * GHR_i \ [GJ/a] \quad (5)$$

where:
EGi – forecast annual electricity output by the i-th power unit in GWh/a;
GHR_i – gross Heat Rate of natural fuel at the i-th power unit in kJ/kWh.

The Build Margin emission factor is calculated depending on the direct emissions from power units operating at the Build Margin, and the respective electricity output by such units. The equation whereby EF_OM is expressed is given below:

$$EF\_BM = \frac{\sum_{j=1}^{n} EmCO_{2j}}{\sum_{j=1}^{n} EG_j} \ [tCO_2e/MWh] \quad (6)$$

where:
EF_OM –Operation Margin emission factor;
$EmCO_{2j}$ - forecast CO_2 emissions for the respective year from the j-th power unit operating at the Build Margin in the EPS, measured in tCO_2e, calculated by Formula (4);
EG_j – the forecast annual electricity output for the respective year by the j-th power unit operating at the Operation Margin in the EPS, measured in MWh.

E.5. Difference between E.4. and E.3. representing the emission reductions of the project:

>>

Reduction in *EmRy* emissions due to project activities during the report period is expressed by the following equation:

$$EmRy = BEm_y - EmP_y - EmL_y \ [\text{tonnes}CO_2e] \quad (7)$$

where:
BEm_y – annual baseline emissions;
EmPy – annual design emissions by project activities equal to zero, as per item E.3.

Therefore the annual reduction of the project emission is equal to the baseline emission for the respective year:

$$EmRy = BEm_y \ [\text{tonnesCO2e}] \quad (8)$$

E.6. Table providing values obtained when applying formulae above:

>>

Detailed calculations of emissions and the related emission factors are given in spreadsheets by years from 2005 till 2012 inclusive in Annex 2 to the present PDD.

The results of baseline emission calculations corresponding to project emission reductions are presented in Table No.8.

Table No. 8

Year	Project Power Generation	Simple OM_EF	Build Margin EF	Baseline EF	Baseline Emission	CO_2e Emission Reduction
	MWh	tCO_2e/MWh			tCO_2e	
2008	34 800	1,085	0,849	0,967	33 644	33 644
2009	34 800	1,080	0,834	0,957	33 291	33 291
2010	34 800	1,044	0,831	0,937	32 620	32 620
2011	34 800	1,029	0,820	0,924	32 172	32 172
2012	34 800	1,011	0,815	0,913	31 778	31 778
2008-2012	**174 000**	**1,050**	**0,830**	**0,940**	**163 505**	**163 505**

SECTION F. Environmental impacts

F.1. Documentation on the analysis of the environmental impacts of the project, including transboundary impacts, in accordance with procedures as determined by the host Party:

>>

On the grounds of Art.93, Paragraph 5 of the Environmental Protection Act (EPA), the Information Required for Estimation of the Need for EIA was presented to the Haskovo Regional Inspectorate of Environment and Water (RIEW).

That information is in substance a preliminary environmental assessment and presents written documents prepared by the Project proponent in conformity with Appendix No.2 to Art.6 of the Regulation on the Conditions and Procedure of EIA of Investment Proposals for Construction, Activities and Technologies.

The documentation presented for the purpose of assessing the need for analysis of Project environmental impact contains:

1. Characteristics of the investment proposal:
    a. Summary of the proposal. Proving the need for the investment proposal.
    b. Relation to other activities, existing and approved by a structural or another type of plan.
    c. Details on considered alternatives.
    d. Site location, inclusive of area required for temporary works during construction.
    e. Description of the main processes and their capacity.
    f. Plan of the new road infrastructure and modification of the existing one.
    g. Program of project activities, inclusive of construction, operation and the phases of closing down, restoration and subsequent use.
    h. Proposed methods of construction. Natural resources to be used during construction and operation.
    i. Types and quantities of waste expected to be generated and method of treatment.
    j. Information on considered measures for mitigation of the harmful environmental impacts.
    k. Other activities related to the investment proposal – extraction of building materials and treatment of sewerage effluent.

2. Investment proposal location:
    a. Plan, maps and photos showing the Project boundaries and providing information on the physical, natural and anthropogenic characteristics as well as elements of the National Ecological Network situated in its vicinity.
    b. Sensitive territories, inclusive of sensitive zones, vulnerable zones, protected zones, sanitary protection zones and National Ecological Network.
    c. Information on considered alternative Project locations.

3. Characteristics of potential environmental impacts in consequence of Project implementation:
    a. Impacts on the free air, atmosphere, water, soil, bowels of the earth, landscape, natural landmarks, mineral diversity, biological diversity and the protected territories of the monuments of culture.
    b. Impacts on the people and human health from different hazardous energy sources – noise, vibrations, radiation.
    c. Impact upon elements of the National Ecological Network including those situated in the Project vicinity.

d. Type of impacts – direct, indirect, secondary, cumulative, short-, medium- and long-term, permanent and temporary, positive and negative.
e. Probability of impact occurrence and impact scope – geographic region.
f. Impact duration, frequency and reversibility.
g. Measures to be included in the Project and related to prevention, mitigation or compensation of significant adverse environmental impacts.

F.2. If environmental impacts are considered significant by the project participants or the host Party, provision of conclusions and all references to supporting documentation of an environmental impact assessment undertaken in accordance with the procedures as required by the host Party:

>>

With Decision No.ХА-46-ПР/2005, the Regional Inspectorate of Environment and Water - Haskovo finds that it is not necessary to perform any Project EIA. It means that the environmental assessment of the Project contained in the written documentation is sufficient to assess the environmental impact during the construction of SHPS Potochnitsa and during Project operation.

At the same time, that Decision permits implementation of the Project as a completely lawful from environmental protection point of view.

SECTION G. Stakeholders' comments

G.1. Information on stakeholders' comments on the project, as appropriate:

>>

1. Notification of stakeholders

Notification of local stakeholders and feedback of their opinions and recommendations for the Project were carried out in conformity with the legislation regulating environmental protection. The procedures of notification and assessment of the need for EIA are described in Chapter Two of the Regulation on the Conditions and Procedure of EIA of Investment Proposals for Construction, Activities and Technologies adopted by Council of Ministers Ordinance No.59 / 07.03.2003.

In accordance with these procedures, by its letter of January 2005 FINAUTO Company informed RIEW – Haskovo on whose territory SHPS Potochnitsa will be located, of its project investment proposal. Simultaneously with notification of the competent authority, the Project proponent informed, by letter Incoming Ref. No.53-00-81, dated 18.03.2005. to the mayors of the municipalities concerned – Stambolovo and Krumovgrad, and to the mayors' offices in the villages of Dolno Cherkovishte, Rabovo (within Stambolovo Municipality) and Oreshari, Moryantsi and Potochnitsa (within Krumovgrad Municipality) of FINAUTO's investment intent to build the run-of-the-river SHPS Potochnitsa. In that letter, in accordance with the EPA and the abovementioned Regulation, written positions were requested from the municipalities and villages concerned with the Project implementation.

With its Letter Ref. No. 73/13.03.2005 to the Director of RIEW – Haskovo, the Project proponent presented the Information Required for Estimation of the Need for Project EIA.

On the grounds of Art.4 Paragraph 2 of the Regulation, FINAUTO informed the residents of Stambolovo and Krumovgrad Municipalities of its intention to implement the Project by an announcement in the local newspapers „NOVINAR YUG" and „New Life" published in the towns of Kirdzhali and Haskovo and distributed all over Haskovo District.

All positions, opinions and recommendations concerning the Project were sent to the competent authority, in this case – RIEW - Haskovo, to be taken into account in the Decision on the need for EIA and, in that manner, the prerequisites were established for either obtaining a permit for further development of the Project or its rejection due to inadequate environmental conformity.

2. Summary of the comments received:

The comments, remarks and additional requirements towards the Project from the environmental protection point of view in the process of its implementation and operation are summarized below:

1.) The Project will produce electric power using a RES – the energy potential of the river which is an activity preferential in Bulgaria since the latter joined the Kyoto Protocol that was approved by an Act of Parliament of 16.05.2005, thereby becoming mandatory.

2.) Only areas within the river bed are affected by ponding after construction of the dam.

3.) Implementation of the proposal will not necessitate any change in the existing road infrastructure or construction of a new one.

4.) The new SHPS will be fully automated.

5.) During Project operation, there will be no sources of adverse physical factors: noise, vibrations and harmful radiation.

6.) The solid run-off-river drift and bottom silt – will be transported mainly while high waves are passing. The integrated works facilities designed for letting through the flood water will also ensure transportation of the solid run-off in conditions of conformity with the transportation mode of the natural river stream.

7.) Operation of SHPS Potochnitsa does not involve any risk of water pollution, and the water downstream of the turbines will have higher oxygen content.

8.) The Project does not affect any territories or habitats protected by law, existing monuments of culture and territories of specific sanitary status.

9.) The detailed design shall include construction and maintenance of a fish passage that will prevent interruption of fish migration and movement.

10.) The Project does not create any risk of significant water pollution provided that the equipment operation requirements are met and pollution by oils or lubricants is not allowed.

11.) Refueling and lubricant replacement shall be done outside the boundaries of the hydropower facility.

12.) A contract shall be concluded with a company holding a permit or registration under Art.12 of the Waste Management Act (WMA) published in State Gazette No. 86/30.09.2003г. for delivery of waste generated in the process of construction.

13.) Wastes generated during construction and operation shall be collected and transferred to an operating registered waste disposal site.

14.) Construction waste shall be treated in conformity with Art.18 of the WMA.

15.) Municipal waste shall be treated in conformity with Art.16, paragraph 1 and paragraph 2 of the WMA.

16.) Hazardous waste shall be treated in conformity with the WMA and the related secondary legislation.

17.) An Emergency Action Plan shall be elaborated.

18.) Before implementation of the investment proposal, a procedure for obtaining water use permit shall be carried out in accordance with the provisions of Chapter IV of the Water Act published in State Gazette No. 67 / 1999.

19.) The Project does not involve any risk to health or environment.

20.) No written or verbal objections against the Project have been received at the mayors' offices in the Krumovgrad and Stambolovo municipalities.

3. Report on how due account was taken of any comments received:

1.) Report on item 9 of the Comments:
The construction part of the detailed design of SHPS Potochnitsa includes construction of a fish passage going round the power station.

In order to let through the fish migrating to the river of Krumovitsa during the reproduction period, a fish passage version was selected in the form of a free channel with dimensions: width W = 2m; length L = 1200m; river floor elevation in the beginning of the fish passage – 147,50, rift in the gully; outfall elevation - 142,00 downstream of the bridge and rise H = 5,00m. The floor and walls of the channel will be partly in the natural ground and partly concreted. In order to provide near to nature conditions for the migrating fish, it is planned to cover the concreted sectors of the walls and floor with material taken from the river.

The envisaged slope of the channel (5m at about 900m), will ensure flow velocity about 1,0 ÷ 1,3m/sec, which migrating fish can overcome without problems. In order to regulate the flow rate of water released through the fish passage channel, an automatic outlet will be made in the weir, and then the quantity of water required for fish migration will be let through, while maintaining a permanent top water level irrespective of the influx. For overall protection of the facility, construction of a fence and permanent security monitoring by devices at Potochnitsa HPS and at the fish passage are envisaged.

2.) Report on item 12 of the Comments:
A contract will be concluded with the holder of a permit under Art.12 of the Waste Management Act for transfer of the waste generated during construction after a contract has been concluded with the contractor of the site construction works.

3.) Report on item 13 of the Comments:
The waste generated during construction and operation will be collected and transported to the operating dump site indicated by the mayor's office of Stambolovo municipality.

4.) Report on item 15 of the Comments:
The municipal waste will be treated in conformity with Art.16 Paragraph 1 of WMA with the existing waste management organization on the territory of Stambolovo municipality.

5.) Report on item 17 of the Comments:
Together with the detailed design of SHPS Potochnitsa, an Emergency Action Plan was drawn up taking into account the possibility of natural disasters including floods, earthquake, etc.

6.) Report on item 18 of the Comments:
The procedure of obtaining a water use permit in compliance with the Water Act was carried out.
Water Use Permit No. 301074 / 21.10.2005г. was received from the MoEW Basin Directorate of the East Aegean Region with central office in the city of Plovdiv.

Annex 1

CONTACT INFORMATION ON PROJECT PARTICIPANTS

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Annex 2

BASELINE CALCULATIONS

The Baseline Calculations were performed in the form of spreadsheets by years for the period 2005-2012 and in two versions – for maximum and minimum power demand in the EPS.

The same are enclosed in Annex 2 hereto.

- - - - -

	2005																					
	Scenario Stagnation - Minimum Demand																					
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																					
01	TPP Bobov dol	brown coal	555	1 716	3 155	0	11 068,00	0,00	34 919 540,00	34 919 540,00	9,58	28,72	29,98	1,93	1026,65	1026,65	3764,39	3764,39	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 781	2 603	0	10 884,00	0,00	28 331 052,00	28 331 052,00	24,1	64,90	26,93	4,70	727,08	727,08	2665,97	2665,97	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	236	0	10 906,00	0,00	2 573 816,00	2 573 816,00	24,18	67,8	28,04	3,83	69,40	69,40	254,48	254,48	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	349	0	12 725,35	0,00	4 441 147,15	4 441 147,15	10,38	23,765	22,89	2,64	98,99	98,99	362,97	362,97	10,80	1,040	81,73
	Total		**1 950**		**6 343**				**70 265 555,15**	**70 265 555,15**							**7047,82**	**7047,82**	**10,33**	1,111	100,30
	2.) Build Margin Power Plants																					
	2.1) Most resent power units																					
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 131**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-537	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		403	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	66	456	351	853 226	6 781,78	3 886,19	2 380 404,78	5 696 203,13	33,36	50,00	14,99	0,50	35,50	84,95	130,16	311,48	19,19	0,371	54,68
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	1 250	2 568	0	10 742,00	0,00	27 585 456,00	27 585 456,00	6,40	18,89	29,50	2,69	791,93	791,93	2903,74	2903,74	11,66	1,131	105,26
	Total fossil fuels		**466**		**2 919**				**29 965 860,78**	**33 281 659,13**							**3033,90**	**3215,21**	**12,57**	1,039	96,61
	Total included hydro and excluded nuclear		**896**		**3 322**				**29 965 860,78**	**33 281 659,13**							**3 033,90**	**3 215,21**	**11,07**	0,913	96,61
	2.2) Future Build Margin Power Plants																					
09	NPP Belene	nuclear	950	0	0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170	0	0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	0	0	6 547,00	4 000,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	0	0	6 001,10	3 800,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,00	0,000	0,00
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		0				0,00	0,00							0,00	0,00	0,00	0,000	0,00
	Total included hydro and excluded nuclear		**1 150**		**0**				**0,00**	**0,00**							**0,00**	**0,00**	**0,00**	0,000	0,00
	3.) Low Operation Cost Power Plants																					
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**6 523**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	540	1 864	1 493	0	12 427,54	0,00	18 554 317,22	18 554 317,22	6,47	19,76	30,54	2,39	553,07	553,07	2027,91	2027,91	13,48	1,358	109,30
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	1 250	2 298	0	10 722,23	0,00	24 639 684,54	24 639 684,54	6,47	19,76	30,54	2,49	733,67	733,67	2690,12	2690,12	11,84	1,171	109,18
18	TPP Maritsa East 3	lignite	614	1 918	3 347	0	11 312,00	0,00	37 861 264,00	37 861 264,00	6,562	19,61	29,88	2,92	1098,41	1098,41	4027,52	4027,52	10,64	1,203	106,38
	Total fossil fuels		**10 342**		**7 138**				**81 055 265,76**	**81 055 265,76**							**8745,54655**	**8745,54655**	**11,62**	1,225	107,90
	Total excluded nuclear		**10 342**		**7 138**				**81 055 265,76**	**81 055 265,76**							**8 745,55**	**8 745,55**	**11,62**	1,225	107,90
	4.) "Must-Run" Power Plants																					
19	Hydro Power Plants	hydro	1 800		4 664	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	1 374	910	1 150 898	10 509,00	5 950,00	9 563 190,00	16 411 032,51	9,650	20,00	20,73	1,86	194,51	333,80	713,22	1223,93	18,08	0,784	74,58
21	TPP Rousse East (cogeneration part)	antracite	60	785	437	399 369	11 444,00	4 209,00	5 001 028,00	6 681 971,28	25,17	67,80	26,94	2,58	131,24	175,35	481,20	642,94	15,18	1,101	96,22
22	Industrial TPP Lukoil	heavy oil	257	2040	1 098	1 771 511	9 217,43	4 376,65	10 120 738,14	17 874 021,76	40,4	85	21,04	1,00	210,81	372,30	772,96	1365,11	12,85	0,704	76,37
23	Industrial TPP Deven	antracite	219	1425	406	2 082 631	7 364,00	4 606,00	2 989 784,00	12 582 384,23	25,55	66,00	25,83	4,00	74,14	312,02	271,85	1144,09	12,54	0,670	90,93
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	274	1 183 660	9 260,00	5 645,00	2 539 570,94	9 221 330,51	4,069	12,00	29,49	0,50	74,52	270,59	273,24	992,16	17,45	0,996	107,59
25	Industrial TPP Sviloza	antracite	120	660	**142**	**484 957**	**12 521,70**	**4 314,70**	**1 778 081,40**	**3 870 524,07**	23,46	**64,00**	**27,28**	**1,83**	**47,62**	**103,66**	**174,60**	**380,08**	14,57	1,230	98,20
26	Industrial TPP Vidahim	antracite	50	471	**175**	**1 299 194**	**14 054,11**	**4 287,99**	**2 459 469,25**	**8 030 400,13**	**22,24**	**61,10**	**27,47**	**3,46**	**65,23**	**212,99**	**239,18**	**780,95**	15,28	1,367	97,25
27	Industrial TPP Himenergo	natural gas	50	324	0	450 000	8 003,90	3 396,75	0,00	1 528 537,50	33,36	50,00	14,99	0,50	0,00	22,80	0,00	83,58	14,23	0,000	54,68
28	Industrial TPP Nova Plama	natural gas	60	468	0	220 000	10 783,73	3 924,14	0,00	863 310,80	34,08	50,00	14,67	0,50	0,00	12,60	0,00	46,21	14,86	0,000	53,53
29	DHP Sofia East (Units #1, #2, #3, #4)	natural gas	120	1 558	320	2 276 392	6 781,78	3 886,19	2 170 169,60	11 016 660,26	33,36	50,00	14,99	0,50	32,36	164,29	118,67	602,40	19,19	0,371	54,68
30	DHP Sofia	natural gas	100	1 622	119	1 576 001	7 323,97	4 015,14	871 552,43	7 199 418,29	33,54	50,00	14,91	0,50	12,93	106,79	47,40	391,56	37,67	0,398	54,39
31	DHP Pleven	natural gas	24	661	69	402 024	7 062,83	4 341,92	489 799,39	2 235 354,13	33,49	50,00	14,93	0,50	7,28	33,21	26,68	121,76	23,28	0,385	54,47
32	DHP Plovdiv North	natural gas	85	628	141	688 780	6 857,97	3 830,50	966 973,77	3 605 344,41	33,40	50,00	14,97	0,50	14,40	53,70	52,81	196,91	10,50	0,375	54,62
33	DHP Republika	lignite	105	502	408	2 026 545	15 047,00	4 877,00	6 139 176,00	16 022 634,99	8,02	23,00	28,68	3,88	169,23	441,67	620,51	1619,47	24,80	1,521	101,07
34	DHP Sliven	subbit. coal	30	220	147	674 498	12 918,79	5 462,93	1 899 062,13	5 583 794,76	14,47	30,70	21,22	3,60	38,84	114,20	142,42	418,74	16,16	0,969	74,99
35	DHP Shoumen	natural gas	18	175	**17**	138 286	5 275,37	4 232,02	89 681,29	674 909,98	33,53	50,00	14,91	0,50	1,33	10,01	4,88	36,72	17,19	0,287	54,40
36	DHP Gabrovo	subbit. coal	18	196	**9**	83 455	6 592,00	6 100,00	59 328,00	568 403,50	26,50	63,00	23,77	8,40	1,29	12,38	4,74	45,39	35,06	0,526	79,85
37	DHP Kazanluk	heavy oil	12	114	3	32 255	**5 290,00**	**4 090,00**	15 217,31	147 141,90	39,8	87,5	21,98	1,00	0,33	3,20	1,21	11,74	23,42	0,422	79,81
	Total fossil fuels		**1 620**		**4 675**	**17 793 681**			**47 152 821,64**	**124 117 175,00**							**3 946**	**10 104**	**16,83**	0,844	81,40
	Total included hydro		3 420		9 339				47 152 821,64	124 117 175,00							3 945,58	10 103,73	8,55	0,422	81,40
	System Total		**21 408**		**44 259**				**228 439 503**	**308 719 655**							**22 772,84**	**29 112,31**	**8,94**	0,515	94,30
						NPP included															
	Low Cost and Must-Run Plants		**13 862**		**11 813**	23 944			**128 208 087,40**	**205 172 440,76**							**12 691,12**	**18 849,27**	**13,68**	1,074	91,87
	HPP included		**15 662**		**16 477**	28 608			**128 208 087,40**	**205 172 440,76**							**12 691,12**	**18 849,27**	**9,88**	0,770	
	Average Operation Margin Emission Factor				**18 156**				**198 473 642,55**	**275 437 995,91**							**19 738,94**	**25 897,09**	**14,53**	1,087	94,02
	HPP included				**22 820**				**198 473 642,55**	**275 437 995,91**							**19 738,94**	**25 897,09**	**11,62**	0,865	
	Simple Operation Margin Emission Factor				6 343				70 265 555,15	70 265 555,15							7047,81805	7047,81805	10,33	1,111	100,30
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 760	82	**0,009**																	
	HPP included		299	**0,034**																	
	Simple Adjusted Operation Margin Emission Factor			**1,110**	**100,08**																
	HPP included			1,083																	
	Build Margin Emission Factor		**1 446**		**2 919**				**29 965 860,78**	**33 281 659,13**							**3 033,90**	**3 215,21**	**12,57**	1,039	96,61
	HPP included		**2 046**		**3 322**				**29 965 860,78**	**33 281 659,13**							**3 033,90**	**3 215,21**	**11,07**	0,913	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**1,012**	1,062	**99,378**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,998**	**1,041**	**99,210**																
3.	**Average Operation Margin Emission Factor**		**0,889**	**0,877**	**94,668**																

	2006																				
	Scenario Stagnation - Minimum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific Value**	**Fuel Carbon**	**Carbon Emission**	**Fraction of Carbon**	**Actual Carbon Emission**		**CO2 Emission**		**Auxuliary Power**	**Specific CO2 Emission**	
	Power Plant		**Capacity**	**Output**	**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 716	2 107	0	11 068,00	0,00	23 320 276,00	23 320 276,00	9,58	28,72	29,98	1,93	685,63	685,63	2513,97	2513,97	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 781	2 404	0	10 884,00	0,00	26 165 136,00	26 165 136,00	24,1	64,90	26,93	4,70	671,50	671,50	2462,15	2462,15	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	427	0	10 906,00	0,00	4 656 862,00	4 656 862,00	24,18	67,8	28,04	3,83	125,58	125,58	460,45	460,45	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	196	0	12 725,35	0,00	2 494 168,60	2 494 168,60	10,38	23,765	22,89	2,64	55,59	55,59	203,85	203,85	10,80	1,040	81,73
	Total		**1 950**		**5 134**				**56 636 442,60**	**56 636 442,60**							**5640,42**	**5640,42**	**10,48**	1,099	99,59
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**11 154**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-567	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		425	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	66	456	145	687 576	6 781,78	3 886,19	983 358,10	3 655 409,08	33,36	50,00	14,99	0,50	14,66	54,51	53,77	199,88	19,19	0,371	54,68
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	1 250	2 225	0	10 742,00	0,00	23 900 950,00	23 900 950,00	6,40	18,89	29,50	2,69	686,15	686,15	2515,90	2515,90	11,66	1,131	105,26
	Total fossil fuels		**466**		**2 370**				**24 884 308,10**	**27 556 359,08**							**2569,67**	**2715,78**	**12,12**	1,084	98,55
	Total included hydro and excluded nuclear		**896**		**2 795**				**24 884 308,10**	**27 556 359,08**							**2 569,67**	**2 715,78**	**10,31**	0,919	98,55
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	0	0	6 547,00	4 000,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	0	0	6 001,10	3 800,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,00	0,000	0,00
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		0				0,00	0,00							0,00	0,00	0,00	0,000	0,00
	Total included hydro and excluded nuclear		**1 150**		**0**				**0,00**	**0,00**							**0,00**	**0,00**	**0,00**	0,000	0,00
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**6 896**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	574	1 980	1 427	0	12 427,54	0,00	17 734 099,58	17 734 099,58	6,47	19,76	30,54	2,39	528,62	528,62	1938,26	1938,26	13,48	1,570	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	1 250	2 168	0	10 722,23	0,00	23 245 794,64	23 245 794,64	6,47	19,76	30,54	2,49	692,16	692,16	2537,94	2537,94	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	628	1 962	3 640	0	11 312,00	0,00	41 175 680,00	41 175 680,00	6,562	19,61	29,88	2,92	1194,57	1194,57	4380,09	4380,09	10,64	1,347	119,04
	Total fossil fuels		**2 402**		**7 235**				**82 155 574,22**	**82 155 574,22**							**8856,29116**	**8856,29116**	**11,56**	1,384	121,89
	Total excluded nuclear		**2 402**		**7 235**				**82 155 574,22**	**82 155 574,22**							**8 856,29**	**8 856,29**	**11,56**	1,384	121,89
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	1 830		2 421	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	906	1 139 290	10 509,00	5 950,00	9 521 154,00	16 299 930,33	9,650	20,00	20,73	1,86	193,66	331,54	710,08	1215,64	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	183	407 836	11 444,00	4 209,00	2 094 252,00	3 810 832,38	25,17	67,80	26,94	2,58	54,96	100,00	201,51	366,68	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 082	2 192 919	9 217,43	4 376,65	9 973 259,26	19 570 898,20	40,4	85	21,04	1,00	207,74	407,65	761,70	1494,70	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	362	2 451 860	7 364,00	4 606,00	2 665 768,00	13 959 035,34	25,55	66,00	25,83	4,00	66,11	346,16	242,39	1269,26	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	243	1 175 087	9 260,00	5 645,00	2 254 571,27	8 887 937,84	4,069	12,00	29,49	0,50	66,16	260,81	242,58	956,29	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**235**	**468 808**	**12 521,70**	**4 314,70**	**2 942 599,50**	**4 965 364,60**	23,46	**64,00**	**27,28**	**1,83**	**78,81**	**132,98**	**288,96**	**487,59**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**254**	**1 299 194**	**14 054,11**	**4 287,99**	**3 569 743,94**	**9 140 674,82**	**22,24**	**61,10**	**27,47**	**3,46**	**94,68**	**242,43**	**347,15**	**888,92**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	220 000	10 783,73	3 924,14	394 339,44	1 257 650,24	34,08	50,00	14,67	0,50	5,76	18,36	21,11	67,32	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	393	2 266 747	6 781,78	3 886,19	2 662 874,21	11 471 883,03	33,36	50,00	14,99	0,50	39,71	171,08	145,61	627,30	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	121	1 999 618	7 323,97	4 015,14	889 107,03	8 917 852,36	33,54	50,00	14,91	0,50	13,19	132,28	48,36	485,02	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	66	438 114	7 062,83	4 341,92	467 617,29	2 369 871,58	33,49	50,00	14,93	0,50	6,95	35,20	25,47	129,08	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	278	669 025	6 857,97	3 830,50	1 906 515,66	4 469 216,77	33,40	50,00	14,97	0,50	28,40	66,57	104,13	244,09	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	523	1 835 527	15 047,00	4 877,00	7 868 327,57	16 820 192,17	8,02	23,00	28,68	3,88	216,90	463,66	795,28	1700,08	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	165	597 258	12 918,79	5 462,93	2 136 700,86	5 399 476,78	14,47	30,70	21,22	3,60	43,70	110,43	160,24	404,92	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**9**	138 470	5 275,37	4 232,02	44 925,14	630 931,85	33,53	50,00	14,91	0,50	0,67	9,36	2,44	34,33	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**11**	81 851	6 592,00	6 100,00	73 104,27	572 397,81	26,50	63,00	23,77	8,40	1,59	12,46	5,84	45,70	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	43 916	**5 290,00**	**4 090,00**	14 552,33	194 168,93	39,8	87,5	21,98	1,00	0,32	4,23	1,16	15,50	23,42	0,551	104,21
	Total fossil fuels		**1 686**		**4 977**	**18 563 095**			**50 330 450,46**	**131 117 891,21**							**4 151**	**10 563**	**16,88**	1,003	96,92
	Total included hydro		3 516		7 398				50 330 450,46	131 117 891,21							4 150,54	10 562,54	11,44	0,633	90,96
	System Total		**13 564**		**40 045**				**214 006 775**	**297 466 267**							**21 216,91**	**27 775,03**	**9,42**	0,530	93,37
						NPP included															
	Least Cost and Must-Run Plants		**4 888**		**12 212**	23 366			**132 486 024,68**	**213 273 465,43**							**13 006,83**	**19 418,83**	**13,73**	1,065	91,05
	HPP included		**6 718**		**14 633**	25 787			**132 486 024,68**	**213 273 465,43**							**13 006,83**	**19 418,83**	**11,50**	0,889	
	Average Operation Margin Emission Factor				**17 346**				**189 122 467,28**	**269 909 908,03**							**18 647,24**	**25 059,25**	**14,42**	1,075	92,84
	HPP included				**19 767**				**189 122 467,28**	**269 909 908,03**							**18 647,24**	**25 059,25**	**12,69**	0,943	
	Simple Operation Margin Emission Factor				5 134				56 636 442,60	56 636 442,60							5640,41574	5640,41574	10,48	1,099	99,59
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 760	465	**0,053**																	
	HPP included		935	**0,107**																	
	Simple Adjusted Operation Margin Emission Factor			**1,095**	**98,17**																
	HPP included			1,050																	
	Build Margin Emission Factor		**1 446**		**2 370**				**24 884 308,10**	**27 556 359,08**							**2 569,67**	**2 715,78**	**12,12**	1,084	98,55
	HPP included		**2 046**		**2 795**				**24 884 308,10**	**27 556 359,08**							**2 569,67**	**2 715,78**	**10,31**	0,919	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**1,009**	1,054	**99,331**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,985**	**1,017**	**98,264**																
3.	**Average Operation Margin Emission Factor**		**0,931**	**0,937**	**94,271**																

	2007																					
	Scenario Stagnation - Minimum Demand																					
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																					
01	TPP Bobov dol	brown coal	555	1 716	2 387	0	11 068,00	0,00	26 419 316,00	26 419 316,00	9,58	28,72	29,98	1,93	776,74	776,74	2848,05	2848,05	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 781	2 685	0	10 884,00	0,00	29 223 540,00	29 223 540,00	24,1	64,90	26,93	4,70	749,99	749,99	2749,95	2749,95	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	412	0	10 906,00	0,00	4 493 272,00	4 493 272,00	24,18	67,8	28,04	3,83	121,16	121,16	444,27	444,27	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	223	0	12 725,35	0,00	2 837 753,05	2 837 753,05	10,38	23,765	22,89	2,64	63,25	63,25	231,93	231,93	10,80	1,040	81,73
	Total		**1 950**		**5 707**				**62 973 881,05**	**62 973 881,05**							**6274,20**	**6274,20**	**10,43**	1,099	99,63
	2.) Build Margin Power Plants																					
	2.1) Most resent power units																					
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**13 558**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-798	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		599	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	1 250	2 256	0	10 742,00	0,00	24 233 952,00	24 233 952,00	6,40	18,89	29,50	2,69	695,71	695,71	2550,95	2550,95	11,66	1,131	105,26
	Total fossil fuels		**400**		**2 256**				**24 233 952,00**	**24 233 952,00**							**2550,95**	**2550,95**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**830**		**2 855**				**24 233 952,00**	**24 233 952,00**							**2 550,95**	**2 550,95**	**9,26**	0,894	105,26
	2.2) Future Build Margin Power Plants																					
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	0	0	6 547,00	4 000,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	0	0	6 001,10	3 800,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,00	0,000	0,00
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		0				0,00	0,00							0,00	0,00	0,00	0,000	0,00
	Total included hydro and excluded nuclear		**1 150**		**0**				**0,00**	**0,00**							**0,00**	**0,00**	**0,00**	0,000	0,00
	3.) Low Operation Cost Power Plants																					
15	NPP Kozloduy (Units #3, #4)	nuclear	800		0	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	608	2 098	1 456	0	12 427,54	0,00	18 094 498,24	18 094 498,24	6,47	19,76	30,54	2,39	539,36	539,36	1977,65	1977,65	13,48	1,570	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	1 250	2 428	0	10 722,23	0,00	26 033 574,44	26 033 574,44	6,47	19,76	30,54	2,49	775,17	775,17	2842,30	2842,30	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	642	2 006	4 060	0	11 312,00	0,00	45 926 720,00	45 926 720,00	6,562	19,61	29,88	2,92	1332,41	1332,41	4885,49	4885,49	10,64	1,347	119,04
	Total fossil fuels		**2 450**		**7 944**				**90 054 792,68**	**90 054 792,68**							**9705,44151**	**9705,44151**	**11,53**	1,381	121,81
	Total excluded nuclear		**2 450**		**7 944**				**90 054 792,68**	**90 054 792,68**							**9 705,44**	**9 705,44**	**11,53**	1,381	121,81
	4.) "Must-Run" Power Plants																					
19	Hydro Power Plants and other Renewables	renewables	1 910		2 382	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	907	1 311 670	10 509,00	5 950,00	9 531 663,00	17 336 098,46	9,650	20,00	20,73	1,86	193,87	352,61	710,87	1292,92	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	182	403 520	11 444,00	4 209,00	2 082 808,00	3 781 221,63	25,17	67,80	26,94	2,58	54,66	99,23	200,41	363,83	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 134	2 223 876	9 217,43	4 376,65	10 455 953,73	20 189 082,37	40,4	85	21,04	1,00	217,79	420,52	798,56	1541,92	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	416	2 507 484	7 364,00	4 606,00	3 063 166,83	14 612 637,38	25,55	66,00	25,83	4,00	75,96	362,37	278,53	1328,69	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	239	1 135 849	9 260,00	5 645,00	2 212 430,61	8 624 296,36	4,069	12,00	29,49	0,50	64,92	253,07	238,04	927,92	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**343**	**474 215**	**12 521,70**	**4 314,70**	**4 294 943,10**	**6 341 038,29**	23,46	**64,00**	**27,28**	**1,83**	**115,02**	**169,82**	**421,75**	**622,68**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**235**	**1 299 194**	**14 054,11**	**4 287,99**	**3 302 715,85**	**8 873 646,73**	**22,24**	**61,10**	**27,47**	**3,46**	**87,60**	**235,35**	**321,19**	**862,95**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	220 000	10 783,73	3 924,14	394 339,44	1 257 650,24	34,08	50,00	14,67	0,50	5,76	18,36	21,11	67,32	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	397	2 233 836	6 781,78	3 886,19	2 691 507,21	11 372 619,26	33,36	50,00	14,99	0,50	40,14	169,60	147,17	621,87	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	93	1 990 411	7 323,97	4 015,14	678 312,03	8 670 090,06	33,54	50,00	14,91	0,50	10,06	128,60	36,89	471,55	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	63	433 927	7 062,83	4 341,92	442 884,20	2 326 961,64	33,49	50,00	14,93	0,50	6,58	34,57	24,12	126,75	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	248	656 551	6 857,97	3 830,50	1 700 776,56	4 215 696,31	33,40	50,00	14,97	0,50	25,33	62,79	92,89	230,24	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	524	1 842 174	15 047,00	4 877,00	7 884 301,22	16 868 584,76	8,02	23,00	28,68	3,88	217,34	464,99	796,90	1704,97	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	179	603 583	12 918,79	5 462,93	2 315 893,20	5 613 226,24	14,47	30,70	21,22	3,60	47,37	114,80	173,67	420,95	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**8**	142 155	5 275,37	4 232,02	41 318,47	642 919,86	33,53	50,00	14,91	0,50	0,61	9,54	2,25	34,98	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**11**	83 666	6 592,00	6 100,00	70 582,83	580 947,02	26,50	63,00	23,77	8,40	1,54	12,65	5,64	46,39	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	2	45 392	**5 290,00**	**4 090,00**	11 772,85	197 424,64	39,8	87,5	21,98	1,00	0,26	4,30	0,94	15,76	23,42	0,551	104,21
	Total fossil fuels		**1 686**		**5 123**	**18 057 503**			**52 026 407,82**	**133 883 717,44**							**4 317**	**10 812**	**16,67**	1,011	96,91
	Total included hydro		3 596		7 505				52 026 407,82	133 883 717,44							4 317,46	10 811,79	11,46	0,650	91,20
	System Total		**13 626**		**36 771**				**229 289 034**	**311 146 343**							**22 848,06**	**29 342,39**	**12,33**	0,621	94,30
						NPP included															
	Least Cost and Must-Run Plants		**4 936**		**13 067**	26 625			**142 081 200,50**	**223 938 510,12**							**14 022,91**	**20 517,24**	**13,54**	1,073	91,62
	HPP included		**6 846**		**15 449**	29 007			**142 081 200,50**	**223 938 510,12**							**14 022,91**	**20 517,24**	**11,49**	0,908	
	Average Operation Margin Emission Factor				**18 774**				**205 055 081,55**	**286 912 391,17**							**20 297,11**	**26 791,44**	**12,59**	1,081	93,38
	HPP included				**21 156**				**205 055 081,55**	**286 912 391,17**							**20 297,11**	**26 791,44**	**12,45**	0,959	
	Simple Operation Margin Emission Factor				5 707				62 973 881,05	62 973 881,05							6274,20173	6274,20173	10,43	1,099	99,63
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 760	975	**0,111**																	
	HPP included		1926	**0,220**																	
	Simple Adjusted Operation Margin Emission Factor			**1,094**	**97,36**																
	HPP included			1,028																	
	Build Margin Emission Factor		**1 380**		**2 256**				**24 233 952,00**	**24 233 952,00**							**2 550,95**	**2 550,95**	**0,00**	1,131	105,26
	HPP included		**1 980**		**2 855**				**24 233 952,00**	**24 233 952,00**							**2 550,95**	**2 550,95**	**9,26**	0,894	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,996**	1,048	**101,040**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,961**	**0,994**	**99,336**																
3.	**Average Operation Margin Emission Factor**		**0,926**	**0,943**	**96,350**																

	2008																				
	Scenario Stagnation - Minimum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 716	2 215	0	11 068,00	0,00	24 515 620,00	24 515 620,00	9,58	28,72	29,98	1,93	720,77	720,77	2642,83	2642,83	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 781	3 045	0	10 884,00	0,00	33 141 780,00	33 141 780,00	24,1	64,90	26,93	4,70	850,54	850,54	3118,66	3118,66	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	485	0	10 906,00	0,00	5 289 410,00	5 289 410,00	24,18	67,8	28,04	3,83	142,63	142,63	522,99	522,99	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	226	0	12 725,35	0,00	2 875 929,10	2 875 929,10	10,38	23,765	22,89	2,64	64,10	64,10	235,05	235,05	10,80	1,040	81,73
	Total		**1 950**		**5 971**				**65 822 739,10**	**65 822 739,10**							**6519,53**	**6519,53**	**10,42**	1,092	99,05
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 543**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-667	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		500	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	1 250	2 334	0	10 742,00	0,00	25 071 828,00	25 071 828,00	6,40	18,89	29,50	2,69	719,77	719,77	2639,15	2639,15	11,66	1,131	105,26
	Total fossil fuels		**400**		**2 334**				**25 071 828,00**	**25 071 828,00**							**2639,15**	**2639,15**	**11,66**	1,131	105,26
	Total included hydro and excluded nuclear		**830**		**2 834**				**25 071 828,00**	**25 071 828,00**							**2 639,15**	**2 639,15**	**9,64**	0,931	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	0	0	6 547,00	4 000,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	333	854 325	6 001,10	3 800,00	1 998 366,30	5 244 801,30	33,3	50,00	15,02	0,50	29,86	78,36	109,47	287,31	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		333				1 998 366,30	5 244 801,30							109,47	287,31	8,00	0,329	54,78
	Total included hydro and excluded nuclear		**1 150**		**333**				**1 998 366,30**	**5 244 801,30**							**109,47**	**287,31**	**8,00**	0,329	54,78
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	676	2 334	1 526	0	10 610,00	0,00	16 190 860,00	16 190 860,00	6,47	19,76	30,54	2,39	482,62	482,62	1769,59	1769,59	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	1 250	2 520	0	10 722,23	0,00	27 020 019,60	27 020 019,60	6,47	19,76	30,54	2,49	804,55	804,55	2950,00	2950,00	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	856	2 675	4 790	0	9 660,00	0,00	46 271 400,00	46 271 400,00	6,562	19,61	29,88	2,92	1342,41	1342,41	4922,15	4922,15	10,64	1,150	119,04
	Total fossil fuels		**2 732**		**8 836**				**89 482 279,60**	**89 482 279,60**							**9641,74576**	**9641,74576**	**11,47**	1,233	121,71
	Total excluded nuclear		**2 732**		**8 836**				**89 482 279,60**	**89 482 279,60**							**9 641,75**	**9 641,75**	**11,47**	1,233	121,71
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	1 940		2 530	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	899	1 301 740	10 509,00	5 950,00	9 447 591,00	17 192 946,22	9,650	20,00	20,73	1,86	192,16	349,70	704,60	1282,24	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	182	403 294	11 444,00	4 209,00	2 082 808,00	3 780 272,44	25,17	67,80	26,94	2,58	54,66	99,20	200,41	363,74	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 083	2 268 172	9 217,43	4 376,65	9 981 464,19	19 908 460,40	40,4	85	21,04	1,00	207,91	414,68	762,32	1520,48	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	420	2 752 296	7 364,00	4 606,00	3 095 132,94	15 772 207,65	25,55	66,00	25,83	4,00	76,75	391,13	281,43	1434,13	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	310	1 120 351	9 260,00	5 645,00	2 870 600,00	9 194 980,89	4,069	12,00	29,49	0,50	84,23	269,82	308,86	989,32	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**356**	**474 005**	**12 521,70**	**4 314,70**	**4 457 725,20**	**6 502 916,69**	23,46	**64,00**	**27,28**	**1,83**	**119,38**	**174,16**	**437,74**	**638,57**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**229**	**1 299 194**	**14 054,11**	**4 287,99**	**3 218 391,19**	**8 789 322,07**	**22,24**	**61,10**	**27,47**	**3,46**	**85,36**	**233,11**	**312,99**	**854,75**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	220 000	10 783,73	3 924,14	394 339,44	1 257 650,24	34,08	50,00	14,67	0,50	5,76	18,36	21,11	67,32	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	329	2 243 835	6 781,78	3 886,19	2 231 205,62	10 951 174,57	33,36	50,00	14,99	0,50	33,27	163,32	122,01	598,82	19,19	0,459	67,67
30	DHP Sofia	natural gas	50	1 622	70	1 134 409	7 323,97	4 015,14	512 364,67	5 067 173,92	33,54	50,00	14,91	0,50	7,60	75,16	27,87	275,59	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	59	440 962	7 062,83	4 341,92	415 743,85	2 330 366,95	33,49	50,00	14,93	0,50	6,18	34,62	22,65	126,93	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	205	647 486	6 857,97	3 830,50	1 407 678,47	3 887 872,99	33,40	50,00	14,97	0,50	20,97	57,91	76,88	212,34	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	557	1 840 849	15 047,00	4 877,00	8 381 179,00	17 359 000,42	8,02	23,00	28,68	3,88	231,03	478,51	847,12	1754,54	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	174	591 730	12 918,79	5 462,93	2 243 536,05	5 476 113,71	14,47	30,70	21,22	3,60	45,89	112,00	168,25	410,67	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**6**	144 344	5 275,37	4 232,02	33 592,85	644 459,80	33,53	50,00	14,91	0,50	0,50	9,56	1,83	35,06	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**12**	84 573	6 592,00	6 100,00	79 002,56	594 897,44	26,50	63,00	23,77	8,40	1,72	12,95	6,31	47,50	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	2	48 610	**5 290,00**	**4 090,00**	9 725,86	208 540,01	39,8	87,5	21,98	1,00	0,21	4,54	0,78	16,64	23,42	0,551	104,21
	Total fossil fuels		**1 636**		**5 036**	**18 320 175**			**51 713 119,56**	**131 297 932,59**							**4 350**	**10 759**	**16,68**	1,037	98,35
	Total included hydro		3 576		7 566				51 713 119,56	131 297 932,59							4 349,66	10 758,78	11,19	0,647	92,27
	System Total		**13 888**		**37 416**				**234 088 333**	**316 919 581**							**23 259,55**	**29 846,51**	**9,78**	0,622	94,18
						NPP included															
	Least Cost and Must-Run Plants		**5 168**		**13 872**	13 872			**141 195 399,16**	**220 780 212,19**							**13 991,41**	**20 400,53**	**13,36**	1,009	92,40
	HPP included		**7 108**		**16 402**	16 402			**141 195 399,16**	**220 780 212,19**							**13 991,41**	**20 400,53**	**11,34**	0,853	
	Average Operation Margin Emission Factor				**19 843**				**207 018 138,26**	**286 602 951,29**							**20 510,94**	**26 920,05**	**13,99**	1,034	93,93
	HPP included				**22 373**				**207 018 138,26**	**286 602 951,29**							**20 510,94**	**26 920,05**	**12,44**	0,917	
	Simple Operation Margin Emission Factor				5 971				65 822 739,10	65 822 739,10							6519,5259	6519,5259	10,42	1,092	99,05
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 784	1352	**0,154**																	
	HPP included		2130	**0,243**																	
	Simple Adjusted Operation Margin Emission Factor			**1,070**	**96,78**																
	HPP included			0,996																	
	Build Margin Emission Factor		**1 380**		**2 667**				**27 070 194,30**	**30 316 629,30**							**2 748,62**	**2 926,45**	**11,20**	1,031	96,53
	HPP included		**1 980**		**3 167**				**27 070 194,30**	**30 316 629,30**							**2 748,62**	**2 926,45**	**9,47**	0,868	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,980**	1,036	**98,417**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,932**	**0,964**	**96,718**																
3.	**Average Operation Margin Emission Factor**		**0,892**	**0,905**	**94,578**																

	2009																				
	Scenario Stagnation - Minimum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific Value**	**Fuel Carbon**	**Carbon Emission**	**Fraction of Carbon**	**Actual Carbon Emission**		**CO2 Emission**		**Auxuliary Power**	**Specific CO2 Emission**	
	Power Plant		**Capacity**	**Output**	**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	370	1 144	2 106	0	11 068,00	0,00	23 309 208,00	23 309 208,00	9,58	28,72	29,98	1,93	685,30	685,30	2512,78	2512,78	10,60	1,193	107,80
02	TPP Varna	antracite	1 000	2 318	3 125	0	10 884,00	0,00	34 012 500,00	34 012 500,00	24,1	64,90	26,93	4,70	872,89	872,89	3200,59	3200,59	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	451	0	10 906,00	0,00	4 918 606,00	4 918 606,00	24,18	67,8	28,04	3,83	132,63	132,63	486,32	486,32	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	223	0	12 725,35	0,00	2 837 753,05	2 837 753,05	10,38	23,765	22,89	2,64	63,25	63,25	231,93	231,93	10,80	1,040	81,73
	Total		**1 565**		**5 905**				**65 078 067,05**	**65 078 067,05**							**6431,62**	**6431,62**	**10,38**	1,089	98,83
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 359**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-484	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		363	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	0	0	2 554	0	10 742,00	0,00	27 435 068,00	27 435 068,00	6,40	18,89	29,50	2,69	787,61	787,61	2887,91	2887,91	11,66	1,131	105,26
	Total fossil fuels		**0**		**2 554**				**27 435 068,00**	**27 435 068,00**							**2887,91**	**2887,91**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**430**		**2 917**				**27 435 068,00**	**27 435 068,00**							**2 887,91**	**2 887,91**	**10,23**	0,990	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		105	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	328	814 267	6 547,00	4 000,00	2 147 416,00	5 404 484,00	33,3	50,00	15,02	0,50	32,08	80,74	117,63	296,06	8,50	0,359	54,78
12	GTCC in DHS Sofia	natural gas	100	450	352	874 268	6 001,10	3 800,00	2 112 387,20	5 434 605,60	33,3	50,00	15,02	0,50	31,56	81,19	115,72	297,71	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		680				4 259 803,20	10 839 089,60							233,35	593,76	8,24	0,343	54,78
	Total included hydro and excluded nuclear		**1 150**		**785**				**4 259 803,20**	**10 839 089,60**							**233,35**	**593,76**	**7,17**	0,297	54,78
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	676	2 334	1 556	0	10 610,00	0,00	16 509 160,00	16 509 160,00	6,47	19,76	30,54	2,39	492,10	492,10	1804,38	1804,38	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	809	2 528	2 570	0	10 722,23	0,00	27 556 131,10	27 556 131,10	6,47	19,76	30,54	2,49	820,51	820,51	3008,53	3008,53	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	856	2 675	5 782	0	9 660,00	0,00	55 854 120,00	55 854 120,00	6,562	19,61	29,88	2,92	1620,42	1620,42	5941,52	5941,52	10,64	1,150	119,04
	Total fossil fuels		**3 141**		**9 908**				**99 919 411,10**	**99 919 411,10**							**10754,4352**	**10754,4352**	**11,40**	1,225	121,48
	Total excluded nuclear		**3 141**		**9 908**				**99 919 411,10**	**99 919 411,10**							**10 754,44**	**10 754,44**	**11,40**	1,225	121,48
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	1 940		2 866	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	880	1 284 294	10 509,00	5 950,00	9 247 920,00	16 889 471,56	9,650	20,00	20,73	1,86	188,10	343,53	689,71	1259,61	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	182	401 730	11 444,00	4 209,00	2 082 808,00	3 773 688,42	25,17	67,80	26,94	2,58	54,66	99,03	200,41	363,10	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 006	2 192 425	9 217,43	4 376,65	9 272 619,16	18 868 094,90	40,4	85	21,04	1,00	193,14	393,01	708,18	1441,03	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	422	2 635 910	7 364,00	4 606,00	3 110 520,37	15 251 520,96	25,55	66,00	25,83	4,00	77,14	378,21	282,83	1386,78	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	283	1 103 700	9 260,00	5 645,00	2 620 580,00	8 850 967,76	4,069	12,00	29,49	0,50	76,90	259,72	281,96	952,31	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**386**	**474 670**	**12 521,70**	**4 314,70**	**4 833 376,20**	**6 881 435,14**	23,46	**64,00**	**27,28**	**1,83**	**129,44**	**184,29**	**474,63**	**675,74**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**237**	**1 299 194**	**14 054,11**	**4 287,99**	**3 330 824,07**	**8 901 754,95**	**22,24**	**61,10**	**27,47**	**3,46**	**88,34**	**236,10**	**323,92**	**865,69**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	220 000	10 783,73	3 924,14	394 339,44	1 257 650,24	34,08	50,00	14,67	0,50	5,76	18,36	21,11	67,32	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	361	2 159 650	6 781,78	3 886,19	2 448 222,58	10 841 034,75	33,36	50,00	14,99	0,50	36,51	161,67	133,87	592,80	19,19	0,459	67,67
30	DHP Sofia	natural gas	50	1 622	65	1 941 765	7 323,97	4 015,14	477 430,46	8 273 888,89	33,54	50,00	14,91	0,50	7,08	122,73	25,97	450,00	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	56	431 623	7 062,83	4 341,92	398 898,83	2 272 969,45	33,49	50,00	14,93	0,50	5,93	33,77	21,73	123,81	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	222	646 094	6 857,97	3 830,50	1 520 915,94	3 995 779,33	33,40	50,00	14,97	0,50	22,65	59,52	83,07	218,23	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	530	1 759 286	15 047,00	4 877,00	7 976 346,99	16 556 385,95	8,02	23,00	28,68	3,88	219,87	456,39	806,20	1673,42	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	174	598 159	12 918,79	5 462,93	2 253 344,34	5 521 045,49	14,47	30,70	21,22	3,60	46,09	112,92	168,98	414,04	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**6**	143 395	5 275,37	4 232,02	29 017,60	635 868,89	33,53	50,00	14,91	0,50	0,43	9,43	1,58	34,59	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**13**	83 773	6 592,00	6 100,00	82 491,37	593 509,14	26,50	63,00	23,77	8,40	1,80	12,92	6,59	47,39	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	2	46 999	**5 290,00**	**4 090,00**	8 921,54	201 147,41	39,8	87,5	21,98	1,00	0,19	4,38	0,71	16,05	23,42	0,551	104,21
	Total fossil fuels		**1 636**		**4 968**	**19 561 203**			**50 939 615,55**	**131 945 789,42**							**4 278**	**10 712**	**16,65**	1,033	97,40
	Total included hydro		3 576		7 834				50 939 615,55	131 945 789,42							4 277,97	10 712,03	10,65	0,611	90,86
	System Total		**13 512**		**39 224**				**247 631 965**	**335 217 425**							**24 585,29**	**31 379,76**	**9,68**	0,627	93,61
						NPP included															
	Least Cost and Must-Run Plants		**5 577**		**14 876**	14 876			**150 859 026,65**	**231 865 200,52**							**15 032,41**	**21 466,47**	**13,15**	1,011	92,58
	HPP included		**7 517**		**17 742**	17 742			**150 859 026,65**	**231 865 200,52**							**15 032,41**	**21 466,47**	**11,07**	0,847	
	Average Operation Margin Emission Factor				**20 781**				**215 937 093,70**	**296 943 267,57**							**21 464,03**	**27 898,09**	**12,63**	1,033	93,95
	HPP included				**23 647**				**215 937 093,70**	**296 943 267,57**							**21 464,03**	**27 898,09**	**12,40**	0,908	
	Simple Operation Margin Emission Factor				5 905				65 078 067,05	65 078 067,05							6431,62438	6431,62438	10,38	1,089	98,83
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 760	1560	**0,178**																	
	HPP included		2586	**0,295**																	
	Simple Adjusted Operation Margin Emission Factor			**1,065**	**96,40**																
	HPP included			0,975																	
	Build Margin Emission Factor		**980**		**3 234**				**31 694 871,20**	**38 274 157,60**							**3 121,26**	**3 481,67**	**1,73**	0,965	90,97
	HPP included		**1 580**		**3 702**				**31 694 871,20**	**38 274 157,60**							**3 121,26**	**3 481,67**	**9,58**	0,843	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,966**	1,028	**96,864**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,909**	**0,942**	**95,045**																
3.	**Average Operation Margin Emission Factor**		**0,875**	**0,892**	**93,205**																

	2010																				
	Scenario Stagnation - Minimum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	408	1 262	2 096	0	10 894,00	0,00	22 833 824,00	22 833 824,00	9,58	28,72	29,98	1,93	671,33	671,33	2461,53	2461,53	10,60	1,174	107,80
02	TPP Varna	antracite	1 018	2 360	3 267	0	10 390,00	0,00	33 944 130,00	33 944 130,00	24,1	64,90	26,93	4,70	871,13	871,13	3194,16	3194,16	9,51	0,978	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	421	0	10 906,00	0,00	4 591 426,00	4 591 426,00	24,18	67,8	28,04	3,83	123,81	123,81	453,98	453,98	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	209	0	12 725,35	0,00	2 659 598,15	2 659 598,15	10,38	23,765	22,89	2,64	59,28	59,28	217,37	217,37	10,80	1,040	81,73
	Total		**1 621**		**5 993**				**64 028 978,15**	**64 028 978,15**							**6327,03**	**6327,03**	**10,33**	1,056	98,82
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 852**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-600		-489	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	640		367	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	0	0	2 375	0	10 742,00	0,00	25 512 250,00	25 512 250,00	6,40	18,89	29,50	2,69	732,41	732,41	2685,51	2685,51	11,66	1,131	105,26
	Total fossil fuels		**0**		**2 375**				**25 512 250,00**	**25 512 250,00**							**2685,51**	**2685,51**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**640**		**2 742**				**25 512 250,00**	**25 512 250,00**							**2 685,51**	**2 685,51**	**10,13**	0,979	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		225	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	425	834 598	6 547,00	4 000,00	2 782 475,00	6 120 867,00	33,3	50,00	15,02	0,50	41,57	91,45	152,42	335,30	8,50	0,359	54,78
12	GTCC in DHS Sofia	natural gas	100	450	380	862 520	6 001,10	3 800,00	2 280 418,00	5 557 994,00	33,3	50,00	15,02	0,50	34,07	83,04	124,92	304,47	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	1 440	0	9 410,00	0,00	13 550 400,00	13 550 400,00	6,489	18,40	28,36	2,00	376,55	376,55	1380,67	1380,67	8,95	0,959	101,89
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		2 245				18 613 293,00	25 229 261,00							1658,01	2020,43	8,70	0,739	80,08
	Total included hydro and excluded nuclear		**1 150**		**2 470**				**18 613 293,00**	**25 229 261,00**							**1 658,01**	**2 020,43**	**7,93**	0,671	80,08
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	676	2 334	2 585	0	10 610,00	0,00	27 426 850,00	27 426 850,00	6,47	19,76	30,54	2,39	817,54	817,54	2997,64	2997,64	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	818	2 556	2 668	0	10 024,00	0,00	26 744 032,00	26 744 032,00	6,47	19,76	30,54	2,49	796,33	796,33	2919,87	2919,87	11,84	1,241	123,84
18	TPP Maritsa East 3	lignite	856	2 675	5 861	0	9 660,00	0,00	56 617 260,00	56 617 260,00	6,562	19,61	29,88	2,92	1642,56	1642,56	6022,70	6022,70	10,64	1,150	119,04
	Total fossil fuels		**3 150**		**11 114**				**110 788 142,00**	**110 788 142,00**							**11940,209**	**11940,209**	**11,59**	1,215	121,90
	Total excluded nuclear		**3 150**		**11 114**				**110 788 142,00**	**110 788 142,00**							**11 940,21**	**11 940,21**	**11,59**	1,215	121,90
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	2 000		2 826	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	845	1 351 730	10 509,00	5 950,00	8 880 105,00	16 922 897,82	9,650	20,00	20,73	1,86	180,62	344,21	662,27	1262,10	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	182	403 114	11 444,00	4 209,00	2 082 808,00	3 779 512,76	25,17	67,80	26,94	2,58	54,66	99,18	200,41	363,67	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 282	2 186 365	9 217,43	4 376,65	11 820 972,90	21 389 925,23	40,4	85	21,04	1,00	246,22	445,54	902,81	1633,63	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	424	2 744 638	7 364,00	4 606,00	3 119 750,40	15 761 551,46	25,55	66,00	25,83	4,00	77,36	390,86	283,67	1433,16	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	271	1 386 660	9 260,00	5 645,00	2 506 668,94	10 334 366,91	4,069	12,00	29,49	0,50	73,56	303,25	269,70	1111,92	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**396**	**478 406**	**12 521,70**	**4 314,70**	**4 958 593,20**	**7 022 772,09**	23,46	**64,00**	**27,28**	**1,83**	**132,80**	**188,08**	**486,92**	**689,62**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**281**	**1 899 195**	**14 054,11**	**4 287,99**	**3 949 204,91**	**12 092 933,18**	**22,24**	**61,10**	**27,47**	**3,46**	**104,74**	**320,73**	**384,06**	**1176,03**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	220 000	10 783,73	3 924,14	394 339,44	1 257 650,24	34,08	50,00	14,67	0,50	5,76	18,36	21,11	67,32	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	371	2 287 371	6 781,78	3 886,19	2 516 040,38	11 405 198,28	33,36	50,00	14,99	0,50	37,52	170,09	137,58	623,65	19,19	0,459	67,67
30	DHP Sofia	natural gas	50	1 622	50	755 177	7 323,97	4 015,14	364 766,38	3 396 907,95	33,54	50,00	14,91	0,50	5,41	50,39	19,84	184,75	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	53	416 921	7 062,83	4 341,92	377 020,37	2 187 256,29	33,49	50,00	14,93	0,50	5,60	32,49	20,54	119,14	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	233	682 969	6 857,97	3 830,50	1 596 331,98	4 212 446,08	33,40	50,00	14,97	0,50	23,78	62,75	87,18	230,07	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	529	1 466 715	15 047,00	4 877,00	7 959 863,00	15 113 033,14	8,02	23,00	28,68	3,88	219,42	416,60	804,53	1527,53	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	179	744 686	12 918,79	5 462,93	2 313 617,93	6 381 787,25	14,47	30,70	21,22	3,60	47,32	130,52	173,50	478,59	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**5**	138 111	5 275,37	4 232,02	25 161,79	609 651,71	33,53	50,00	14,91	0,50	0,37	9,05	1,37	33,17	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**13**	82 792	6 592,00	6 100,00	85 754,65	590 786,65	26,50	63,00	23,77	8,40	1,87	12,87	6,85	47,17	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	2	36 598	**5 290,00**	**4 090,00**	10 580,00	160 266,58	39,8	87,5	21,98	1,00	0,23	3,49	0,84	12,79	23,42	0,551	104,21
	Total fossil fuels		**1 636**		**5 259**	**19 428 566**			**53 812 617,94**	**134 998 519,79**							**4 510**	**11 124**	**16,35**	1,025	98,51
	Total included hydro		3 636		8 085				53 812 617,94	134 998 519,79							4 509,73	11 124,41	10,72	0,625	92,30
	System Total		**13 847**		**42 767**				**272 755 281**	**360 557 151**							**27 120,49**	**34 097,59**	**9,70**	0,634	94,57
						NPP included															
	Least Cost and Must-Run Plants		**5 586**		**16 373**	16 373			**164 600 759,94**	**245 786 661,79**							**16 449,94**	**23 064,62**	**13,12**	1,005	93,84
	HPP included		**7 586**		**19 199**	19 199			**164 600 759,94**	**245 786 661,79**							**16 449,94**	**23 064,62**	**11,22**	0,857	
	Average Operation Margin Emission Factor				**22 366**				**228 629 738,09**	**309 815 639,94**							**22 776,97**	**29 391,65**	**13,24**	1,018	94,87
	HPP included				**25 192**				**228 629 738,09**	**309 815 639,94**							**22 776,97**	**29 391,65**	**12,89**	0,904	
	Simple Operation Margin Emission Factor				5 993				64 028 978,15	64 028 978,15							6327,03312	6327,03312	10,33	1,056	98,82
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 760	1647	**0,188**																	
	HPP included		2862	**0,327**																	
	Simple Adjusted Operation Margin Emission Factor			**1,038**	**96,73**																
	HPP included			0,954																	
	Build Margin Emission Factor		**980**		**4 620**				**44 125 543,00**	**50 741 511,00**							**4 343,52**	**4 705,94**	**4,23**	0,940	92,74
	HPP included		**1 790**		**5 212**				**44 125 543,00**	**50 741 511,00**							**4 343,52**	**4 705,94**	**9,09**	0,833	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,945**	1,000	**97,297**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,894**	**0,924**	**95,733**																
3.	**Average Operation Margin Emission Factor**		**0,869**	**0,886**	**94,337**																

	2011																					
	Scenario Stagnation - Minimum Demand																					
Item	**Parameter**	**Fuel**	**Available Capacity**	**Thermal Output**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific Value**	**Fuel Carbon**	**Carbon Emission**	**Fraction of Carbon**	**Actual Carbon Emission**		**CO2 Emission**		**Auxuliary Power**	**Specific CO2 Emission**	
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																					
01	TPP Bobov dol	brown coal	555	1 380	2 265	0	10 750,00	0,00	24 348 750,00	24 348 750,00	9,58	28,72	29,98	1,93	715,87	715,87	2624,84	2624,84	10,60	1,159	107,80
02	TPP Varna	antracite	1 036	2 402	3 361	0	10 223,60	0,00	34 361 519,60	34 361 519,60	24,1	64,90	26,93	4,70	881,85	881,85	3233,44	3233,44	9,51	0,962	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	484	0	10 906,00	0,00	5 278 504,00	5 278 504,00	24,18	67,8	28,04	3,83	142,34	142,34	521,91	521,91	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	267	0	12 725,35	0,00	3 397 668,45	3 397 668,45	10,38	23,765	22,89	2,64	75,73	75,73	277,69	277,69	10,80	1,040	81,73
	Total		**1 786**		**6 377**				**67 386 442,05**	**67 386 442,05**							**6657,88**	**6657,88**	**10,38**	1,044	98,80
	2.) Build Margin Power Plants																					
	2.1) Most resent power units																					
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 354**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-600		-365	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	640		272	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	0	0	2 354	0	10 742,00	0,00	25 286 668,00	25 286 668,00	6,40	18,89	29,50	2,69	725,93	725,93	2661,76	2661,76	11,66	1,131	105,26
	Total fossil fuels		**0**		**2 354**				**25 286 668,00**	**25 286 668,00**							**2661,76**	**2661,76**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**640**		**2 626**				**25 286 668,00**	**25 286 668,00**							**2 661,76**	**2 661,76**	**10,47**	1,014	105,26
	2.2) Future Build Margin Power Plants																					
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		485	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	586	964 782	6 547,00	4 000,00	3 836 542,00	7 695 670,00	33,3	50,00	15,02	0,50	57,32	114,97	210,16	421,57	8,50	0,359	54,78
12	GTCC in DHS Sofia	natural gas	100	450	535	864 923	6 001,10	3 800,00	3 210 588,50	6 497 295,90	33,3	50,00	15,02	0,50	47,97	97,07	175,88	355,92	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	3 300	0	9 410,00	0,00	31 053 000,00	31 053 000,00	6,489	18,40	28,36	2,00	862,92	862,92	3164,03	3164,03	8,95	0,959	101,89
14	TPP Rousse East (Unit #3)	antracite	100	284	367	0	10 550,00	0,00	3 871 850,00	3 871 850,00	25,81	65,90	25,53	2,20	96,68	96,68	354,51	354,51	9,60	0,966	91,56
	Total fossil fuels		**980**		4 788				41 971 980,50	49 117 815,90							3904,58	4296,03	8,84	0,815	87,46
	Total included hydro and excluded nuclear		**1 150**		**5 273**				**41 971 980,50**	**49 117 815,90**							**3 904,58**	**4 296,03**	**8,04**	0,740	87,46
	3.) Low Operation Cost Power Plants																					
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	676	2 334	3 264	0	10 610,00	0,00	34 631 040,00	34 631 040,00	6,47	19,76	30,54	2,39	1032,28	1032,28	3785,03	3785,03	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	818	2 556	2 612	0	10 024,00	0,00	26 182 688,00	26 182 688,00	6,47	19,76	30,54	2,49	779,61	779,61	2858,58	2858,58	11,84	1,241	123,84
18	TPP Maritsa East 3	lignite	856	2 675	6 060	0	9 660,00	0,00	58 539 600,00	58 539 600,00	6,562	19,61	29,88	2,92	1698,33	1698,33	6227,19	6227,19	10,64	1,150	119,04
	Total fossil fuels		**3 150**		**11 936**				**119 353 328,00**	**119 353 328,00**							**12870,8006**	**12870,8006**	**11,68**	1,221	122,10
	Total excluded nuclear		**3 150**		**11 936**				**119 353 328,00**	**119 353 328,00**							**12 870,80**	**12 870,80**	**11,68**	1,221	122,10
	4.) "Must-Run" Power Plants																					
19	Hydro Power Plants and other Renewables	renewables	2 050		2 905	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	866	987 449	10 509,00	5 950,00	9 100 794,00	14 976 112,95	9,650	20,00	20,73	1,86	185,11	304,61	678,73	1116,91	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	183	442 890	11 444,00	4 209,00	2 094 252,00	3 958 376,23	25,17	67,80	26,94	2,58	54,96	103,88	201,51	380,88	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 251	2 000 880	9 217,43	4 376,65	11 531 004,93	20 288 154,43	40,4	85	21,04	1,00	240,18	422,59	880,67	1549,48	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	421	3 066 298	7 364,00	4 606,00	3 100 753,63	17 224 122,15	25,55	66,00	25,83	4,00	76,89	427,13	281,94	1566,15	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	154	1 269 432	9 260,00	5 645,00	1 430 016,46	8 595 959,35	4,069	12,00	29,49	0,50	41,96	252,24	153,86	924,87	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**331**	**475 087**	**12 521,70**	**4 314,70**	**4 144 682,70**	**6 194 539,78**	23,46	**64,00**	**27,28**	**1,83**	**111,00**	**165,90**	**407,00**	**608,29**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**223**	**1 357 308**	**14 054,11**	**4 287,99**	**3 134 066,53**	**8 954 189,66**	**22,24**	**61,10**	**27,47**	**3,46**	**83,12**	**237,49**	**304,78**	**870,79**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	220 000	10 783,73	3 924,14	394 339,44	1 257 650,24	34,08	50,00	14,67	0,50	5,76	18,36	21,11	67,32	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	393	2 113 878	6 781,78	3 886,19	2 665 239,54	10 880 169,39	33,36	50,00	14,99	0,50	39,75	162,26	145,74	594,94	19,19	0,459	67,67
30	DHP Sofia	natural gas	50	1 622	40	1 902 342	7 323,97	4 015,14	293 939,65	7 932 108,66	33,54	50,00	14,91	0,50	4,36	117,66	15,99	431,41	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	51	440 688	7 062,83	4 341,92	357 028,72	2 270 458,96	33,49	50,00	14,93	0,50	5,30	33,73	19,45	123,67	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	248	665 814	6 857,97	3 830,50	1 703 510,03	4 253 909,41	33,40	50,00	14,97	0,50	25,37	63,36	93,04	232,33	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	335	867 710	15 047,00	4 877,00	5 040 745,00	9 272 566,16	8,02	23,00	28,68	3,88	138,95	255,60	509,49	937,21	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	181	223 965	12 918,79	5 462,93	2 342 417,81	3 565 921,67	14,47	30,70	21,22	3,60	47,91	72,93	175,66	267,42	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**4**	119 274	5 275,37	4 232,02	21 605,44	526 373,97	33,53	50,00	14,91	0,50	0,32	7,81	1,18	28,64	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**14**	71 401	6 592,00	6 100,00	92 706,98	528 252,14	26,50	63,00	23,77	8,40	2,02	11,50	7,40	42,18	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	1	91 514	**5 290,00**	**4 090,00**	6 367,30	380 660,70	39,8	87,5	21,98	1,00	0,14	8,29	0,51	30,38	23,42	0,551	104,21
	Total fossil fuels		**1 636**		**4 840**	**18 595 632**			**48 304 508,82**	**123 439 102,04**							**3 945**	**9 903**	**16,00**	0,970	95,51
	Total included hydro		3 686		7 745				48 304 508,82	123 439 102,04							3 944,59	9 902,98	10,09	0,566	89,23
	System Total		**14 062**		**45 946**				**302 302 927**	**384 583 356**							**30 039,61**	**36 389,45**	**9,58**	0,654	94,62
						NPP included															
	Least Cost and Must-Run Plants		**5 586**		**16 776**	16 776			**167 657 836,82**	**242 792 430,04**							**16 815,39**	**22 773,78**	**12,93**	1,002	93,80
	HPP included		**7 636**		**19 681**	19 681			**167 657 836,82**	**242 792 430,04**							**16 815,39**	**22 773,78**	**11,05**	0,854	
	Average Operation Margin Emission Factor				**23 153**				**235 044 278,87**	**310 178 872,09**							**23 473,27**	**29 431,66**	**14,05**	1,014	94,89
	HPP included				**26 058**				**235 044 278,87**	**310 178 872,09**							**23 473,27**	**29 431,66**	**13,57**	0,901	
	Simple Operation Margin Emission Factor				6 377				67 386 442,05	67 386 442,05							6657,87831	6657,87831	10,38	1,044	98,80
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 760	1986	**0,227**																	
	HPP included		2989	**0,341**																	
	Simple Adjusted Operation Margin Emission Factor			**1,028**	**96,55**																
	HPP included			0,947																	
	Build Margin Emission Factor		**980**		**7 142**				**67 258 648,50**	**74 404 483,90**							**6 566,34**	**6 957,79**	**5,93**	0,919	93,51
	HPP included		**1 790**		**7 899**				**67 258 648,50**	**74 404 483,90**							**6 566,34**	**6 957,79**	**8,85**	0,831	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,938**	0,991	**97,479**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,889**	**0,918**	**95,793**																
3.	**Average Operation Margin Emission Factor**		**0,866**	**0,883**	**94,543**																

	2012																				
	Scenario Stagnation - Minimum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific Value**	**Fuel Carbon**	**Carbon Emission**	**Fraction of Carbon**	**Actual Carbon Emission**		**CO2 Emission**		**Auxuliary Power**	**Specific CO2 Emission**	
	Power Plant		**Capacity**	**Output**	**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 716	2 958	0	10 482,00	0,00	31 005 756,00	31 005 756,00	9,58	28,72	29,98	1,93	911,59	911,59	3342,48	3342,48	10,60	1,130	107,80
02	TPP Varna	antracite	1 054	2 444	3 067	0	10 131,00	0,00	31 071 777,00	31 071 777,00	24,1	64,90	26,93	4,70	797,42	797,42	2923,87	2923,87	9,51	0,953	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	452	0	10 906,00	0,00	4 929 512,00	4 929 512,00	24,18	67,8	28,04	3,83	132,93	132,93	487,40	487,40	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	218	0	12 725,35	0,00	2 774 126,30	2 774 126,30	10,38	23,765	22,89	2,64	61,83	61,83	226,73	226,73	10,80	1,040	81,73
	Total		**1 804**		**6 695**				**69 781 171,30**	**69 781 171,30**							**6980,48**	**6980,48**	**10,42**	1,043	100,03
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 355**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-600		-386	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	640		287	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	0	0	2 372	0	10 742,00	0,00	25 480 024,00	25 480 024,00	6,40	18,89	29,50	2,69	731,49	731,49	2682,11	2682,11	11,66	1,131	105,26
	Total fossil fuels		**0**		**2 372**				**25 480 024,00**	**25 480 024,00**							**2682,11**	**2682,11**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**640**		**2 659**				**25 480 024,00**	**25 480 024,00**							**2 682,11**	**2 682,11**	**10,42**	1,009	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		485	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	726	984 523	6 547,00	4 000,00	4 753 122,00	8 691 214,00	33,3	50,00	15,02	0,50	71,01	129,85	260,37	476,10	8,50	0,359	54,78
12	GTCC in DHS Sofia	natural gas	100	450	680	768 421	6 001,10	3 800,00	4 080 748,00	7 000 747,80	33,3	50,00	15,02	0,50	60,97	104,59	223,54	383,50	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	3 880	0	9 410,00	0,00	36 510 800,00	36 510 800,00	6,489	18,40	28,36	2,00	1014,58	1014,58	3720,14	3720,14	8,95	0,959	101,89
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		5 286				45 344 670,00	52 202 761,80							4204,05	4579,74	8,77	0,795	87,73
	Total included hydro and excluded nuclear		**1 150**		**5 771**				**45 344 670,00**	**52 202 761,80**							**4 204,05**	**4 579,74**	**8,05**	0,728	87,73
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	676	2 334	3 946	0	10 610,00	0,00	41 867 060,00	41 867 060,00	6,47	19,76	30,54	2,39	1247,97	1247,97	4575,89	4575,89	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	818	2 556	2 662	0	10 024,00	0,00	26 683 888,00	26 683 888,00	6,47	19,76	30,54	2,49	794,54	794,54	2913,30	2913,30	11,84	1,241	123,84
18	TPP Maritsa East 3	lignite	856	2 675	6 864	0	9 660,00	0,00	66 306 240,00	66 306 240,00	6,562	19,61	29,88	2,92	1923,65	1923,65	7053,37	7053,37	10,64	1,150	119,04
	Total fossil fuels		**3 150**		**13 472**				**134 857 188,00**	**134 857 188,00**							**14542,5695**	**14542,5695**	**11,71**	1,223	122,14
	Total excluded nuclear		**3 150**		**13 472**				**134 857 188,00**	**134 857 188,00**							**14 542,57**	**14 542,57**	**11,71**	1,223	122,14
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	2 100		3 106	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	0	0	0	0	10 509,00	5 950,00	0,00	0,00	9,650	20,00	20,73	1,86	0,00	0,00	0,00	0,00	18,08	0,000	0,00
21	TPP Rousse East (cogeneration part)	antracite	60	785	172	400 858	11 444,00	4 209,00	1 968 368,00	3 655 578,99	25,17	67,80	26,94	2,58	51,65	95,93	189,40	351,74	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 105	2 250 320	9 217,43	4 376,65	10 185 260,15	20 034 123,48	40,4	85	21,04	1,00	212,15	417,29	777,89	1530,08	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	425	2 738 570	7 364,00	4 606,00	3 127 981,32	15 741 834,44	25,55	66,00	25,83	4,00	77,57	390,37	284,42	1431,37	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	137	1 103 249	9 260,00	5 645,00	1 266 571,20	7 494 412,84	4,069	12,00	29,49	0,50	37,17	219,91	136,28	806,35	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**361**	**476 996**	**12 521,70**	**4 314,70**	**4 520 333,70**	**6 578 427,48**	23,46	**64,00**	**27,28**	**1,83**	**121,06**	**176,18**	**443,89**	**645,99**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**125**	**1 299 194**	**14 054,11**	**4 287,99**	**1 756 763,75**	**7 327 694,63**	**22,24**	**61,10**	**27,47**	**3,46**	**46,59**	**194,35**	**170,84**	**712,61**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	220 000	10 783,73	3 924,14	394 339,44	1 257 650,24	34,08	50,00	14,67	0,50	5,76	18,36	21,11	67,32	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	374	2 205 692	6 781,78	3 886,19	2 536 385,72	11 108 122,50	33,36	50,00	14,99	0,50	37,83	165,66	138,69	607,41	19,19	0,459	67,67
30	DHP Sofia	natural gas	50	1 622	33	1 975 129	7 323,97	4 015,14	244 267,81	8 174 685,86	33,54	50,00	14,91	0,50	3,62	121,26	13,29	444,60	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	48	434 015	7 062,83	4 341,92	338 936,87	2 223 395,91	33,49	50,00	14,93	0,50	5,03	33,03	18,46	121,11	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	264	644 550	6 857,97	3 830,50	1 813 552,46	4 282 502,17	33,40	50,00	14,97	0,50	27,01	63,79	99,05	233,89	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	242	1 828 160	15 047,00	4 877,00	3 641 374,00	12 557 308,69	8,02	23,00	28,68	3,88	100,38	346,15	368,05	1269,22	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	180	601 164	12 918,79	5 462,93	2 330 569,75	5 614 685,07	14,47	30,70	21,22	3,60	47,67	114,83	174,78	421,06	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**3**	145 135	5 275,37	4 232,02	18 258,76	632 473,58	33,53	50,00	14,91	0,50	0,27	9,38	0,99	34,41	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**15**	84 965	6 592,00	6 100,00	96 587,45	614 876,92	26,50	63,00	23,77	8,40	2,10	13,39	7,71	49,10	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	47 711	**5 290,00**	**4 090,00**	15 870,00	211 007,26	39,8	87,5	21,98	1,00	0,35	4,59	1,27	16,84	23,42	0,551	104,21
	Total fossil fuels		**1 456**		**3 631**	**18 658 651**			**35 106 459,06**	**109 888 356,24**							**2 893**	**8 873**	**15,32**	0,941	95,36
	Total included hydro		3 556		6 737				35 106 459,06	109 888 356,24							2 892,64	8 873,20	8,37	0,469	88,13
	System Total		**13 950**		**47 303**				**310 569 512**	**392 209 501**							**31 301,85**	**37 658,11**	**9,40**	0,662	96,02
						NPP included															
	Least Cost and Must-Run Plants		**5 406**		**17 103**	17 103			**169 963 647,06**	**244 745 544,24**							**17 435,21**	**23 415,77**	**12,48**	1,019	95,67
	HPP included		**7 506**		**20 209**	20 209			**169 963 647,06**	**244 745 544,24**							**17 435,21**	**23 415,77**	**10,60**	0,863	
	Average Operation Margin Emission Factor				**23 798**				**239 744 818,36**	**314 526 715,54**							**24 415,69**	**30 396,26**	**13,84**	1,026	96,64
	HPP included				**26 904**				**239 744 818,36**	**314 526 715,54**							**24 415,69**	**30 396,26**	**13,31**	0,908	
	Simple Operation Margin Emission Factor				6 695				69 781 171,30	69 781 171,30							6980,4817	6980,4817	10,42	1,043	100,03
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 784	2278	**0,260**																	
	HPP included		3178	**0,363**																	
	Simple Adjusted Operation Margin Emission Factor			**1,033**	**97,95**																
	HPP included			0,949																	
	Build Margin Emission Factor		**980**		**7 658**				**70 824 694,00**	**77 682 785,80**							**6 886,17**	**7 261,85**	**6,05**	0,899	93,48
	HPP included		**1 790**		**8 430**				**70 824 694,00**	**77 682 785,80**							**6 886,17**	**7 261,85**	**8,80**	0,817	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,930**	0,986	**98,396**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,883**	**0,916**	**96,836**																
3.	**Average Operation Margin Emission Factor**		**0,862**	**0,885**	**95,851**																

	2005																				
	Scenario Stagnation - Minimum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MW_{el}**	**MW_{th}**	**$GW_{el}h$**	**$MW_{th}h$**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 716	3 155	0	11 068,00	0,00	34 919 540,00	34 919 540,00	9,58	28,72	29,98	1,93	1026,65	1026,65	3764,39	3764,39	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 781	2 603	0	10 884,00	0,00	28 331 052,00	28 331 052,00	24,1	64,90	26,93	4,70	727,08	727,08	2665,97	2665,97	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	236	0	10 906,00	0,00	2 573 816,00	2 573 816,00	24,18	67,8	28,04	3,83	69,40	69,40	254,48	254,48	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	349	0	12 725,35	0,00	4 441 147,15	4 441 147,15	10,38	23,765	22,89	2,64	98,99	98,99	362,97	362,97	10,80	1,040	81,73
	Total		**1 950**		**6 343**				**70 265 555,15**	**70 265 555,15**							**7047,82**	**7047,82**	**10,33**	1,111	100,30
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 131**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-537	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		403	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	66	456	351	853 226	6 781,78	3 886,19	2 380 404,78	5 696 203,13	33,36	50,00	14,99	0,50	35,50	84,95	130,16	311,48	19,19	0,371	54,68
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	1 250	2 568	0	10 742,00	0,00	27 585 456,00	27 585 456,00	6,40	18,89	29,50	2,69	791,93	791,93	2903,74	2903,74	11,66	1,131	105,26
	Total fossil fuels		**466**		**2 919**				**29 965 860,78**	**33 281 659,13**							**3033,90**	**3215,21**	**12,57**	1,039	96,61
	Total included hydro and excluded nuclear		**896**		**3 322**				**29 965 860,78**	**33 281 659,13**							**3 033,90**	**3 215,21**	**11,07**	0,913	96,61
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	0	0	6 547,00	4 000,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	0	0	6 001,10	3 800,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,00	0,000	0,00
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		0				0,00	0,00							0,00	0,00	0,00	0,000	0,00
	Total included hydro and excluded nuclear		**1 150**		**0**				**0,00**	**0,00**							**0,00**	**0,00**	**0,00**	0,000	0,00
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**6 523**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	540	1 864	1 493	0	12 427,54	0,00	18 554 317,22	18 554 317,22	6,47	19,76	30,54	2,39	553,07	553,07	2027,91	2027,91	13,48	1,570	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	1 250	2 298	0	10 722,23	0,00	24 639 684,54	24 639 684,54	6,47	19,76	30,54	2,49	733,67	733,67	2690,12	2690,12	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	614	1 918	3 347	0	11 312,00	0,00	37 861 264,00	37 861 264,00	6,562	19,61	29,88	2,92	1098,41	1098,41	4027,52	4027,52	10,64	1,347	119,04
	Total fossil fuels		**10 342**		**7 138**				**81 055 265,76**	**81 055 265,76**							**8745,54655**	**8745,54655**	**11,62**	1,386	122,08
	Total excluded nuclear		**10 342**		**7 138**				**81 055 265,76**	**81 055 265,76**							**8 745,55**	**8 745,55**	**11,62**	1,386	122,08
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants	hydro	1 800		4 664	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	1 374	910	1 150 898	10 509,00	5 950,00	9 563 190,00	16 411 032,51	9,650	20,00	20,73	1,86	194,51	333,80	713,22	1223,93	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	437	399 369	11 444,00	4 209,00	5 001 028,00	6 681 971,28	25,17	67,80	26,94	2,58	131,24	175,35	481,20	642,94	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 098	1 771 511	9 217,43	4 376,65	10 120 738,14	17 874 021,76	40,4	85	21,04	1,00	210,81	372,30	772,96	1365,11	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	406	2 082 631	7 364,00	4 606,00	2 989 784,00	12 582 384,23	25,55	66,00	25,83	4,00	74,14	312,02	271,85	1144,09	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	274	1 183 660	9 260,00	5 645,00	2 539 570,94	9 221 330,51	4,069	12,00	29,49	0,50	74,52	270,59	273,24	992,16	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**142**	**484 957**	**12 521,70**	**4 314,70**	**1 778 081,40**	**3 870 524,07**	23,46	**64,00**	**27,28**	**1,83**	**47,62**	**103,66**	**174,60**	**380,08**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**175**	**1 299 194**	**14 054,11**	**4 287,99**	**2 459 469,25**	**8 030 400,13**	**22,24**	**61,10**	**27,47**	**3,46**	**65,23**	**212,99**	**239,18**	**780,95**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	0	450 000	8 003,90	3 396,75	0,00	1 528 537,50	33,36	50,00	14,99	0,50	0,00	22,80	0,00	83,58	14,23	0,000	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	0	220 000	10 783,73	3 924,14	0,00	863 310,80	34,08	50,00	14,67	0,50	0,00	12,60	0,00	46,21	14,86	0,000	62,87
29	DHP Sofia East (Units #1, #2, #3, #4)	natural gas	120	1 558	320	2 276 392	6 781,78	3 886,19	2 170 169,60	11 016 660,26	33,36	50,00	14,99	0,50	32,36	164,29	118,67	602,40	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	119	1 576 001	7 323,97	4 015,14	871 552,43	7 199 418,29	33,54	50,00	14,91	0,50	12,93	106,79	47,40	391,56	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	69	402 024	7 062,83	4 341,92	489 799,39	2 235 354,13	33,49	50,00	14,93	0,50	7,28	33,21	26,68	121,76	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	141	688 780	6 857,97	3 830,50	966 973,77	3 605 344,41	33,40	50,00	14,97	0,50	14,40	53,70	52,81	196,91	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	408	2 026 545	15 047,00	4 877,00	6 139 176,00	16 022 634,99	8,02	23,00	28,68	3,88	169,23	441,67	620,51	1619,47	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	147	674 498	12 918,79	5 462,93	1 899 062,13	5 583 794,76	14,47	30,70	21,22	3,60	38,84	114,20	142,42	418,74	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**17**	138 286	5 275,37	4 232,02	89 681,29	674 909,98	33,53	50,00	14,91	0,50	1,33	10,01	4,88	36,72	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**9**	83 455	6 592,00	6 100,00	59 328,00	568 403,50	26,50	63,00	23,77	8,40	1,29	12,38	4,74	45,39	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	32 255	**5 290,00**	**4 090,00**	15 217,31	147 141,90	39,8	87,5	21,98	1,00	0,33	3,20	1,21	11,74	23,42	0,551	104,21
	Total fossil fuels		**1 620**		**4 675**	**17 793 681**			**47 152 821,64**	**124 117 175,00**							**3 946**	**10 104**	**16,83**	1,015	97,88
	Total included hydro		3 420		9 339				47 152 821,64	124 117 175,00							3 945,58	10 103,73	8,55	0,462	89,02
	System Total		**21 408**		**44 259**				**228 439 503**	**308 719 655**							**22 772,84**	**29 112,31**	**8,94**	0,515	94,30
						NPP included															
	Least Cost and Must-Run Plants		**13 862**		**11 813**	23 944			**128 208 087,40**	**205 172 440,76**							**12 691,12**	**18 849,27**	**13,68**	1,074	91,87
	HPP included		**15 662**		**16 477**	28 608			**128 208 087,40**	**205 172 440,76**							**12 691,12**	**18 849,27**	**9,88**	0,770	
	Average Operation Margin Emission Factor				**18 156**				**198 473 642,55**	**275 437 995,91**							**19 738,94**	**25 897,09**	**14,53**	1,087	94,02
	HPP included				**22 820**				**198 473 642,55**	**275 437 995,91**							**19 738,94**	**25 897,09**	**11,62**	0,865	
	Simple Operation Margin Emission Factor				6 343				70 265 555,15	70 265 555,15							7047,81805	7047,81805	10,33	1,111	100,30
		annually hours	hours	λ	Lambda																
	Operating at the margin	8 760	82		**0,009**																
	HPP included		299		**0,034**																
	Simple Adjusted Operation Margin Emission Factor				**1,110**	**100,08**															
	HPP included				1,083																
	Build Margin Emission Factor		**1 446**		**2 919**				**29 965 860,78**	**33 281 659,13**							**3 033,90**	**3 215,21**	**12,57**	1,039	96,61
	HPP included		**2 046**		**3 322**				**29 965 860,78**	**33 281 659,13**							**3 033,90**	**3 215,21**	**11,07**	0,913	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**1,012**	1,062	**99,378**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,998**	**1,041**	**99,210**																
3.	**Average Operation Margin Emission Factor**		**0,889**	**0,877**	**94,668**																

	2006																				
	Scenario Prosperity - Maximum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MWel**	**MWth**	**$GW_{el}h$**	**MWthh**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 716	2 125	0	11 068,00	0,00	23 519 500,00	23 519 500,00	9,58	28,72	29,98	1,93	691,49	691,49	2535,45	2535,45	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 781	2 812	0	10 884,00	0,00	30 605 808,00	30 605 808,00	24,1	64,90	26,93	4,70	785,46	785,46	2880,02	2880,02	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	260	0	10 906,00	0,00	2 835 560,00	2 835 560,00	24,18	67,8	28,04	3,83	76,46	76,46	280,36	280,36	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	211	0	12 725,35	0,00	2 685 048,85	2 685 048,85	10,38	23,765	22,89	2,64	59,85	59,85	219,45	219,45	10,80	1,040	81,73
	Total		**1 950**		**5 408**				**59 645 916,85**	**59 645 916,85**							**5915,28**	**5915,28**	**10,26**	1,094	99,17
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 568**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-592	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		444	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	66	456	204	853 226	6 781,78	3 886,19	1 385 721,11	4 701 519,46	33,36	50,00	14,99	0,50	20,67	70,11	75,77	257,08	19,19	0,371	54,68
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	1 250	2 497	0	10 742,00	0,00	26 822 774,00	26 822 774,00	6,40	18,89	29,50	2,69	770,03	770,03	2823,46	2823,46	11,66	1,131	105,26
	Total fossil fuels		**466**		**2 701**				**28 208 495,11**	**31 524 293,46**							**2899,23**	**3080,54**	**12,23**	1,073	97,72
	Total included hydro and excluded nuclear		**896**		**3 145**				**28 208 495,11**	**31 524 293,46**							**2 899,23**	**3 080,54**	**10,53**	0,922	97,72
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	0	0	6 547,00	4 000,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	0	0	6 001,10	3 800,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,00	0,000	0,00
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		0				0,00	0,00							0,00	0,00	0,00	0,000	0,00
	Total included hydro and excluded nuclear		**1 150**		**0**				**0,00**	**0,00**							**0,00**	**0,00**	**0,00**	0,000	0,00
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**6 894**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	540	1 980	1 129	0	12 427,54	0,00	14 030 692,66	14 030 692,66	6,47	19,76	30,54	2,39	418,23	418,23	1533,50	1533,50	13,48	1,570	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	1 250	2 177	0	10 722,23	0,00	23 342 294,71	23 342 294,71	6,47	19,76	30,54	2,49	695,04	695,04	2548,47	2548,47	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	614	1 962	3 340	0	11 312,00	0,00	37 782 080,00	37 782 080,00	6,562	19,61	29,88	2,92	1096,12	1096,12	4019,10	4019,10	10,64	1,347	119,04
	Total fossil fuels		**2 354**		**6 646**				**75 155 067,37**	**75 155 067,37**							**8101,06331**	**8101,06331**	**11,52**	1,378	121,82
	Total excluded nuclear		**2 354**		**6 646**				**75 155 067,37**	**75 155 067,37**							**8 101,06**	**8 101,06**	**11,52**	1,378	121,82
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	1 830		2 678	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	1 125	1 410 453	10 509,00	5 950,00	11 822 625,00	20 214 820,23	9,650	20,00	20,73	1,86	240,47	411,17	881,73	1507,61	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	194	415 906	11 444,00	4 209,00	2 220 136,00	3 970 685,34	25,17	67,80	26,94	2,58	58,26	104,20	213,62	382,06	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 020	2 460 950	9 217,43	4 376,65	9 402 316,16	20 173 033,91	40,4	85	21,04	1,00	195,84	420,19	718,09	1540,69	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	422	3 092 869	7 364,00	4 606,00	3 107 084,27	17 352 841,14	25,55	66,00	25,83	4,00	77,05	430,32	282,52	1577,85	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	250	1 301 071	9 260,00	5 645,00	2 315 563,75	9 660 109,56	4,069	12,00	29,49	0,50	67,95	283,46	249,14	1039,37	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**213**	**461 250**	**12 521,70**	**4 314,70**	**2 667 122,10**	**4 657 275,42**	23,46	**64,00**	**27,28**	**1,83**	**71,43**	**124,73**	**261,91**	**457,33**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**178**	**1 426 009**	**14 054,11**	**4 287,99**	**2 501 631,58**	**8 616 342,44**	**22,24**	**61,10**	**27,47**	**3,46**	**66,35**	**228,53**	**243,28**	**837,93**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	200 000	10 783,73	3 924,14	398 998,01	1 183 826,01	34,08	50,00	14,67	0,50	5,82	17,28	21,36	63,37	14,86	0,678	62,87
29	DHP Sofia East	natural gas	120	2 014	358	2 354 509	6 781,78	3 886,19	2 428 539,89	11 578 607,50	33,36	50,00	14,99	0,50	36,22	172,67	132,80	633,13	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	147	2 036 575	7 323,97	4 015,14	1 079 959,22	9 257 093,42	33,54	50,00	14,91	0,50	16,02	137,31	58,74	503,47	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	69	449 243	7 062,83	4 341,92	487 624,56	2 438 203,03	33,49	50,00	14,93	0,50	7,24	36,22	26,56	132,81	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	162	716 343	6 857,97	3 830,50	1 114 395,85	3 858 346,08	33,40	50,00	14,97	0,50	16,60	57,47	60,86	210,73	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	515	1 862 782	15 047,00	4 877,00	7 749 205,00	16 833 995,13	8,02	23,00	28,68	3,88	213,61	464,04	783,24	1701,48	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	166	606 174	12 918,79	5 462,93	2 149 633,17	5 461 117,12	14,47	30,70	21,22	3,60	43,97	111,69	161,21	409,54	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**9**	134 354	5 275,37	4 232,02	45 190,51	613 778,16	33,53	50,00	14,91	0,50	0,67	9,11	2,46	33,39	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**11**	80 894	6 592,00	6 100,00	72 233,03	565 686,26	26,50	63,00	23,77	8,40	1,57	12,32	5,77	45,17	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	47 879	**5 290,00**	**4 090,00**	14 933,99	210 757,57	39,8	87,5	21,98	1,00	0,33	4,59	1,19	16,82	23,42	0,551	104,21
	Total fossil fuels		**1 620**		**4 986**	**20 360 486**			**50 428 230,76**	**139 026 094,50**							**4 151**	**11 223**	**17,19**	1,005	97,49
	Total included hydro		3 450		7 664				50 428 230,76	139 026 094,50							4 151,00	11 222,87	11,27	0,610	90,98
	System Total		**13 450**		**41 734**				**213 437 710**	**305 351 372**							**21 066,58**	**28 319,76**	**9,29**	0,505	92,74
						NPP included															
	Least Cost and Must-Run Plants		**4 774**		**11 632**	18 526			**125 583 298,13**	**214 181 161,87**							**12 252,06**	**19 323,94**	**13,95**	1,053	90,22
	HPP included		**6 604**		**14 310**	21 204			**125 583 298,13**	**214 181 161,87**							**12 252,06**	**19 323,94**	**11,39**	0,856	
	Average Operation Margin Emission Factor				**17 040**				**185 229 214,98**	**273 827 078,72**							**18 167,35**	**25 239,22**	**14,72**	1,066	92,17
	HPP included				**19 718**				**185 229 214,98**	**273 827 078,72**							**18 167,35**	**25 239,22**	**12,76**	0,921	
	Simple Operation Margin Emission Factor				5 408				59 645 916,85	59 645 916,85							5915,28215	5915,28215	10,26	1,094	99,17
		annually hours	hours	λ	Lambda																
	Operating at the margin	8 760	793		**0,091**																
	HPP included		1035		**0,118**																
	Simple Adjusted Operation Margin Emission Factor				**1,087**	**96,98**															
	HPP included				1,037																
	Build Margin Emission Factor		**1 446**		**2 701**				**28 208 495,11**	**31 524 293,46**							**2 899,23**	**3 080,54**	**12,23**	1,073	97,72
	HPP included		**2 046**		**3 145**				**28 208 495,11**	**31 524 293,46**							**2 899,23**	**3 080,54**	**10,53**	0,922	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**1,008**	1,051	**98,810**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,979**	**1,008**	**97,163**																
3.	**Average Operation Margin Emission Factor**		**0,922**	**0,921**	**93,559**																

	2007																				
	Scenario Prosperity - Maximum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MWel**	**MWth**	**$GW_{el}h$**	**MWthh**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 716	2 153	0	11 068,00	0,00	23 829 404,00	23 829 404,00	9,58	28,72	29,98	1,93	700,60	700,60	2568,86	2568,86	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 781	3 522	0	10 884,00	0,00	38 333 448,00	38 333 448,00	24,1	64,90	26,93	4,70	983,78	983,78	3607,20	3607,20	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	461	0	10 906,00	0,00	5 027 666,00	5 027 666,00	24,18	67,8	28,04	3,83	135,57	135,57	497,11	497,11	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	216	0	12 725,35	0,00	2 748 675,60	2 748 675,60	10,38	23,765	22,89	2,64	61,27	61,27	224,65	224,65	10,80	1,040	81,73
	Total		**1 950**		**6 352**				**69 939 193,60**	**69 939 193,60**							**6897,81**	**6897,81**	**10,33**	1,086	98,63
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**13 958**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-839	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		629	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	66	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	1 250	2 511	0	10 742,00	0,00	26 973 162,00	26 973 162,00	6,40	18,89	29,50	2,69	774,35	774,35	2839,29	2839,29	11,66	1,131	105,26
	Total fossil fuels		**466**		**2 511**				**26 973 162,00**	**26 973 162,00**							**2839,29**	**2839,29**	**11,66**	1,131	105,26
	Total included hydro and excluded nuclear		**896**		**3 140**				**26 973 162,00**	**26 973 162,00**							**2 839,29**	**2 839,29**	**9,36**	0,904	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	0	0	6 547,00	4 000,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	0	0	6 001,10	3 800,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,00	0,000	0,00
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		0				0,00	0,00							0,00	0,00	0,00	0,000	0,00
	Total included hydro and excluded nuclear		**1 150**		**0**				**0,00**	**0,00**							**0,00**	**0,00**	**0,00**	0,000	0,00
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	540	2 098	1 556	0	12 427,54	0,00	19 337 252,24	19 337 252,24	6,47	19,76	30,54	2,39	576,40	576,40	2113,48	2113,48	13,48	1,570	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	1 250	2 373	0	10 722,23	0,00	25 443 851,79	25 443 851,79	6,47	19,76	30,54	2,49	757,61	757,61	2777,92	2777,92	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	614	2 006	4 090	0	11 312,00	0,00	46 266 080,00	46 266 080,00	6,562	19,61	29,88	2,92	1342,25	1342,25	4921,59	4921,59	10,64	1,347	119,04
	Total fossil fuels		**2 354**		**8 019**				**91 047 184,03**	**91 047 184,03**							**9812,9841**	**9812,9841**	**11,55**	1,383	121,85
	Total excluded nuclear		**2 354**		**8 019**				**91 047 184,03**	**91 047 184,03**							**9 812,98**	**9 812,98**	**11,55**	1,383	121,85
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	1 910		2 919	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	915	1 405 702	10 509,00	5 950,00	9 615 735,00	17 979 659,77	9,650	20,00	20,73	1,86	195,58	365,70	717,14	1340,92	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	184	411 616	11 444,00	4 209,00	2 105 696,00	3 838 188,75	25,17	67,80	26,94	2,58	55,26	100,72	202,61	369,31	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 209	2 505 990	9 217,43	4 376,65	11 143 872,87	22 111 714,24	40,4	85	21,04	1,00	232,12	460,57	851,10	1688,75	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	417	3 144 635	7 364,00	4 606,00	3 072 525,85	17 556 713,54	25,55	66,00	25,83	4,00	76,19	435,38	279,38	1596,39	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	278	1 292 439	9 260,00	5 645,00	2 571 068,56	9 866 886,63	4,069	12,00	29,49	0,50	75,44	289,53	276,63	1061,62	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**193**	**463 255**	**12 521,70**	**4 314,70**	**2 416 688,10**	**4 415 496,01**	23,46	**64,00**	**27,28**	**1,83**	**64,72**	**118,25**	**237,31**	**433,59**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**178**	**1 554 507**	**14 054,11**	**4 287,99**	**2 501 631,58**	**9 167 341,10**	**22,24**	**61,10**	**27,47**	**3,46**	**66,35**	**243,14**	**243,28**	**891,51**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	105	450 000	8 003,90	3 396,75	840 409,50	2 368 947,00	33,36	50,00	14,99	0,50	12,53	35,33	45,95	129,54	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	200 000	10 783,73	3 924,14	398 998,01	1 183 826,01	34,08	50,00	14,67	0,50	5,82	17,28	21,36	63,37	14,86	0,678	62,87
29	DHP Sofia East	natural gas	120	2 014	345	2 453 593	6 781,78	3 886,19	2 340 536,99	11 875 664,06	33,36	50,00	14,99	0,50	34,90	177,10	127,98	649,38	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	157	2 067 618	7 323,97	4 015,14	1 148 947,03	9 450 723,98	33,54	50,00	14,91	0,50	17,04	140,18	62,49	514,00	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	71	431 320	7 062,83	4 341,92	501 460,93	2 374 218,78	33,49	50,00	14,93	0,50	7,45	35,27	27,31	129,32	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	155	738 969	6 857,97	3 830,50	1 065 498,21	3 896 119,58	33,40	50,00	14,97	0,50	15,87	58,03	58,19	212,79	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	513	1 837 323	15 047,00	4 877,00	7 725 952,57	16 686 578,25	8,02	23,00	28,68	3,88	212,97	459,98	780,89	1686,58	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	169	684 335	12 918,79	5 462,93	2 183 322,97	5 921 797,34	14,47	30,70	21,22	3,60	44,65	121,12	163,73	444,09	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**10**	136 214	5 275,37	4 232,02	52 348,49	628 809,55	33,53	50,00	14,91	0,50	0,78	9,33	2,85	34,21	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**11**	88 662	6 592,00	6 100,00	70 651,82	611 488,17	26,50	63,00	23,77	8,40	1,54	13,32	5,64	48,83	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	43 155	**5 290,00**	**4 090,00**	15 661,33	192 165,44	39,8	87,5	21,98	1,00	0,34	4,18	1,25	15,34	23,42	0,551	104,21
	Total fossil fuels		**1 620**		**4 950**	**19 909 333**			**49 771 005,80**	**140 126 338,19**							**4 105**	**11 310**	**17,05**	1,000	97,30
	Total included hydro		3 530		7 869				49 771 005,80	140 126 338,19							4 105,11	11 309,53	10,82	0,585	90,50
	System Total		**13 530**		**38 499**				**237 730 545**	**328 085 878**							**23 655,19**	**30 859,61**	**9,62**	0,614	94,06
						NPP included															
	Least Cost and Must-Run Plants		**4 774**		**12 969**	12 969			**140 818 189,83**	**231 173 522,22**							**13 918,09**	**21 122,51**	**13,65**	1,073	91,37
	HPP included		**6 684**		**15 888**	15 888			**140 818 189,83**	**231 173 522,22**							**13 918,09**	**21 122,51**	**11,19**	0,876	
	Average Operation Margin Emission Factor				**19 321**				**210 757 383,43**	**301 112 715,82**							**20 815,90**	**28 020,32**	**14,07**	1,077	93,06
	HPP included				**22 240**				**210 757 383,43**	**301 112 715,82**							**20 815,90**	**28 020,32**	**12,27**	0,936	
	Simple Operation Margin Emission Factor				6 352				69 939 193,60	69 939 193,60							6897,80892	6897,80892	10,33	1,086	98,63
		annually hours	hours		λ Lambda																
	Operating at the margin	8 760	1233		**0,141**																
	HPP included		2512		**0,287**																
	Simple Adjusted Operation Margin Emission Factor				**1,083**	**96,32**															
	HPP included				0,998																
	Build Margin Emission Factor		**1 446**		**2 511**				**26 973 162,00**	**26 973 162,00**							**2 839,29**	**2 839,29**	**11,66**	1,131	105,26
	HPP included		**2 046**		**3 140**				**26 973 162,00**	**26 973 162,00**							**2 839,29**	**2 839,29**	**9,36**	0,904	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,995**	1,041	**100,285**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,951**	**0,975**	**98,558**																
3.	**Average Operation Margin Emission Factor**		**0,920**	**0,928**	**96,108**																

	2008																				
	Scenario Prosperity - Maximum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MWel**	**MWth**	**$GW_{el}h$**	**MWthh**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 716	2 145	0	11 068,00	0,00	23 740 860,00	23 740 860,00	9,58	28,72	29,98	1,93	697,99	697,99	2559,31	2559,31	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 781	3 621	0	10 884,00	0,00	39 410 964,00	39 410 964,00	24,1	64,90	26,93	4,70	1011,43	1011,43	3708,59	3708,59	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	453	0	10 906,00	0,00	4 940 418,00	4 940 418,00	24,18	67,8	28,04	3,83	133,22	133,22	488,48	488,48	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	214	0	12 725,35	0,00	2 723 224,90	2 723 224,90	10,38	23,765	22,89	2,64	60,70	60,70	222,57	222,57	10,80	1,040	81,73
	Total		**1 950**		**6 433**				**70 815 466,90**	**70 815 466,90**							**6978,95**	**6978,95**	**10,32**	1,085	98,55
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**13 380**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-846	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		634	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	66	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	1 250	2 697	0	10 742,00	0,00	28 971 174,00	28 971 174,00	6,40	18,89	29,50	2,69	831,71	831,71	3049,60	3049,60	11,66	1,131	105,26
	Total fossil fuels		**466**		**2 697**				**28 971 174,00**	**28 971 174,00**							**3049,60**	**3049,60**	**11,66**	1,131	105,26
	Total included hydro and excluded nuclear		**896**		**3 331**				**28 971 174,00**	**28 971 174,00**							**3 049,60**	**3 049,60**	**9,48**	0,916	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	0	0	6 547,00	4 000,00	0,00	0,00	33,3	50,00	15,02	0,50	0,00	0,00	0,00	0,00	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	428	876 329	6 001,10	3 800,00	2 568 470,80	5 898 521,00	33,3	50,00	15,02	0,50	38,37	88,12	140,70	323,12	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		428				2 568 470,80	5 898 521,00							140,70	323,12	8,00	0,329	54,78
	Total included hydro and excluded nuclear		**1 150**		**428**				**2 568 470,80**	**5 898 521,00**							**140,70**	**323,12**	**8,00**	0,329	54,78
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	540	2 334	1 654	0	10 610,00	0,00	17 548 940,00	17 548 940,00	6,47	19,76	30,54	2,39	523,10	523,10	1918,03	1918,03	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	1 250	2 216	0	10 722,23	0,00	23 760 461,68	23 760 461,68	6,47	19,76	30,54	2,49	707,49	707,49	2594,13	2594,13	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	614	2 675	5 212	0	9 660,00	0,00	50 347 920,00	50 347 920,00	6,562	19,61	29,88	2,92	1460,67	1460,67	5355,80	5355,80	10,64	1,150	119,04
	Total fossil fuels		**2 354**		**9 082**				**91 657 321,68**	**91 657 321,68**							**9867,9482**	**9867,9482**	**11,45**	1,227	121,58
	Total excluded nuclear		**2 354**		**9 082**				**91 657 321,68**	**91 657 321,68**							**9 867,95**	**9 867,95**	**11,45**	1,227	121,58
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	1 940		2 725	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	921	1 464 130	10 509,00	5 950,00	9 678 789,00	18 390 361,44	9,650	20,00	20,73	1,86	196,87	374,06	721,84	1371,55	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	198	414 882	11 444,00	4 209,00	2 265 912,00	4 012 149,94	25,17	67,80	26,94	2,58	59,46	105,29	218,03	386,05	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 215	2 447 258	9 217,43	4 376,65	11 196 058,29	21 906 851,63	40,4	85	21,04	1,00	233,21	456,30	855,09	1673,11	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	417	3 153 762	7 364,00	4 606,00	3 071 347,18	17 597 573,50	25,55	66,00	25,83	4,00	76,16	436,39	279,27	1600,11	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	291	1 397 733	9 260,00	5 645,00	2 697 380,35	10 587 583,52	4,069	12,00	29,49	0,50	79,15	310,68	290,22	1139,16	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**191**	**462 556**	**12 521,70**	**4 314,70**	**2 391 644,70**	**4 387 436,09**	23,46	**64,00**	**27,28**	**1,83**	**64,05**	**117,50**	**234,85**	**430,84**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**178**	**1 694 584**	**14 054,11**	**4 287,99**	**2 501 631,58**	**9 767 990,43**	**22,24**	**61,10**	**27,47**	**3,46**	**66,35**	**259,07**	**243,28**	**949,93**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	200 000	10 783,73	3 924,14	398 998,01	1 183 826,01	34,08	50,00	14,67	0,50	5,82	17,28	21,36	63,37	14,86	0,678	62,87
29	DHP Sofia East	natural gas	120	2 014	347	2 420 981	6 781,78	3 886,19	2 351 335,76	11 759 727,37	33,36	50,00	14,99	0,50	35,07	175,37	128,57	643,04	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	175	1 207 052	7 323,97	4 015,14	1 278 578,75	6 125 061,51	33,54	50,00	14,91	0,50	18,97	90,85	69,54	333,13	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	72	416 177	7 062,83	4 341,92	508 596,40	2 315 604,76	33,49	50,00	14,93	0,50	7,56	34,40	27,70	126,13	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	150	788 892	6 857,97	3 830,50	1 031 125,93	4 052 975,45	33,40	50,00	14,97	0,50	15,36	60,37	56,32	221,36	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	513	1 881 226	15 047,00	4 877,00	7 722 652,70	16 897 389,86	8,02	23,00	28,68	3,88	212,88	465,79	780,56	1707,88	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	170	714 130	12 918,79	5 462,93	2 193 519,16	6 094 763,14	14,47	30,70	21,22	3,60	44,86	124,65	164,50	457,06	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**11**	128 538	5 275,37	4 232,02	57 082,36	601 059,54	33,53	50,00	14,91	0,50	0,85	8,92	3,11	32,70	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**11**	83 871	6 592,00	6 100,00	69 565,76	581 177,19	26,50	63,00	23,77	8,40	1,51	12,66	5,55	46,41	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	38 397	**5 290,00**	**4 090,00**	17 127,66	174 170,17	39,8	87,5	21,98	1,00	0,37	3,79	1,37	13,90	23,42	0,551	104,21
	Total fossil fuels		**1 620**		**5 006**	**20 240 498**			**50 282 384,27**	**138 815 277,73**							**4 148**	**11 326**	**17,13**	1,000	98,45
	Total included hydro		3 560		7 731				50 282 384,27	138 815 277,73							4 147,69	11 325,82	11,18	0,604	91,86
	System Total		**13 560**		**39 539**				**244 294 818**	**336 157 761**							**24 184,89**	**31 545,44**	**9,75**	0,612	93,84
						NPP included															
	Least Cost and Must-Run Plants		**4 774**		**14 088**	14 088			**141 939 705,95**	**230 472 599,41**							**14 015,63**	**21 193,77**	**13,47**	0,995	91,96
	HPP included		**6 714**		**16 813**	16 813			**141 939 705,95**	**230 472 599,41**							**14 015,63**	**21 193,77**	**11,33**	0,834	
	Average Operation Margin Emission Factor				**20 521**				**212 755 172,85**	**301 288 066,31**							**20 994,59**	**28 172,72**	**14,18**	1,023	93,51
	HPP included				**23 246**				**212 755 172,85**	**301 288 066,31**							**20 994,59**	**28 172,72**	**12,55**	0,903	
	Simple Operation Margin Emission Factor				6 433				70 815 466,90	70 815 466,90							6978,95184	6978,95184	10,32	1,085	98,55
		annually hours	hours	λ	Lambda																
	Operating at the margin	8 784	1575		**0,180**																
	HPP included		2683		**0,306**																
	Simple Adjusted Operation Margin Emission Factor				**1,059**	**96,12**															
	HPP included				0,973																
	Build Margin Emission Factor		**1 446**		**3 125**				**31 539 644,80**	**34 869 695,00**							**3 190,30**	**3 372,72**	**11,16**	1,021	96,72
	HPP included		**2 046**		**3 759**				**31 539 644,80**	**34 869 695,00**							**3 190,30**	**3 372,72**	**9,31**	0,849	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,967**	1,026	**98,094**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,911**	**0,942**	**96,269**																
3.	**Average Operation Margin Emission Factor**		**0,876**	**0,890**	**94,312**																

	2009																				
	Scenario Prosperity - Maximum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MWel**	**MWth**	**$GW_{el}h$**	**MWthh**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 144	2 165	0	11 068,00	0,00	23 962 220,00	23 962 220,00	9,58	28,72	29,98	1,93	704,50	704,50	2583,17	2583,17	10,60	1,193	107,80
02	TPP Varna	antracite	1 200	2 318	4 254	0	10 884,00	0,00	46 300 536,00	46 300 536,00	24,1	64,90	26,93	4,70	1188,25	1188,25	4356,90	4356,90	9,51	1,024	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	445	0	10 906,00	0,00	4 853 170,00	4 853 170,00	24,18	67,8	28,04	3,83	130,87	130,87	479,85	479,85	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	217	0	12 725,35	0,00	2 761 400,95	2 761 400,95	10,38	23,765	22,89	2,64	61,55	61,55	225,69	225,69	10,80	1,040	81,73
	Total		**1 950**		**7 081**				**77 877 326,95**	**77 877 326,95**							**7645,62**	**7645,62**	**10,24**	1,080	98,18
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**13 457**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-400		-650	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	430		487	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	66	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	400	0	2 783	0	10 742,00	0,00	29 894 986,00	29 894 986,00	6,40	18,89	29,50	2,69	858,23	858,23	3146,85	3146,85	11,66	1,131	105,26
	Total fossil fuels		**466**		**2 783**				**29 894 986,00**	**29 894 986,00**							**3146,85**	**3146,85**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**896**		**3 270**				**29 894 986,00**	**29 894 986,00**							**3 146,85**	**3 146,85**	**9,95**	0,962	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		123	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	184	0	6 547,00	4 000,00	1 204 648,00	1 204 648,00	33,3	50,00	15,02	0,50	18,00	18,00	65,99	65,99	8,50	0,000	0,00
12	GTCC in DHS Sofia	natural gas	100	450	458	874 268	6 001,10	3 800,00	2 748 503,80	6 070 722,20	33,3	50,00	15,02	0,50	41,06	90,70	150,56	332,55	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	0	0	9 410,00	0,00	0,00	0,00	6,489	18,40	28,36	2,00	0,00	0,00	0,00	0,00	8,95	0,000	0,00
14	TPP Rousse East (Unit #3)	antracite	100	284	0	0	10 550,00	0,00	0,00	0,00	25,81	65,90	25,53	2,20	0,00	0,00	0,00	0,00	9,60	0,000	0,00
	Total fossil fuels		**980**		642				3 953 151,80	7 275 370,20							216,55	398,54	8,14	0,337	54,78
	Total included hydro and excluded nuclear		**1 150**		**765**				**3 953 151,80**	**7 275 370,20**							**216,55**	**398,54**	**6,87**	0,283	54,78
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	540	2 334	1 726	0	10 610,00	0,00	18 312 860,00	18 312 860,00	6,47	19,76	30,54	2,39	545,87	545,87	2001,52	2001,52	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	400	2 528	2 411	0	10 722,23	0,00	25 851 296,53	25 851 296,53	6,47	19,76	30,54	2,49	769,75	769,75	2822,40	2822,40	11,84	1,328	123,84
18	TPP Maritsa East 3	lignite	614	2 675	5 774	0	9 660,00	0,00	55 776 840,00	55 776 840,00	6,562	19,61	29,88	2,92	1618,17	1618,17	5933,30	5933,30	10,64	1,150	119,04
	Total fossil fuels		**2 354**		**9 911**				**99 940 996,53**	**99 940 996,53**							**10757,2205**	**10757,2205**	**11,43**	1,225	121,52
	Total excluded nuclear		**2 354**		**9 911**				**99 940 996,53**	**99 940 996,53**							**10 757,22**	**10 757,22**	**11,43**	1,225	121,52
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	1 940		2 812	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	939	1 352 790	10 509,00	5 950,00	9 867 951,00	17 917 052,62	9,650	20,00	20,73	1,86	200,71	364,43	735,95	1336,25	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	183	421 105	11 444,00	4 209,00	2 099 202,31	3 871 634,47	25,17	67,80	26,94	2,58	55,09	101,60	201,99	372,53	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 216	2 261 578	9 217,43	4 376,65	11 206 146,50	21 104 281,86	40,4	85	21,04	1,00	233,42	439,59	855,86	1611,81	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	416	3 195 971	7 364,00	4 606,00	3 062 494,78	17 783 139,39	25,55	66,00	25,83	4,00	75,95	440,99	278,47	1616,98	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	293	1 536 349	9 260,00	5 645,00	2 709 527,26	11 382 215,05	4,069	12,00	29,49	0,50	79,51	334,00	291,53	1224,66	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**175**	**457 423**	**12 521,70**	**4 314,70**	**2 191 297,50**	**4 164 939,04**	23,46	**64,00**	**27,28**	**1,83**	**58,69**	**111,54**	**215,18**	**408,99**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**179**	**1 847 283**	**14 054,11**	**4 287,99**	**2 515 685,69**	**10 436 818,59**	**22,24**	**61,10**	**27,47**	**3,46**	**66,72**	**276,81**	**244,65**	**1014,97**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	200 000	10 783,73	3 924,14	398 998,01	1 183 826,01	34,08	50,00	14,67	0,50	5,82	17,28	21,36	63,37	14,86	0,678	62,87
29	DHP Sofia East	natural gas	120	2 014	325	2 332 419	6 781,78	3 886,19	2 206 929,70	11 271 152,60	33,36	50,00	14,99	0,50	32,91	168,09	120,68	616,32	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	139	1 314 364	7 323,97	4 015,14	1 021 080,78	6 298 436,25	33,54	50,00	14,91	0,50	15,15	93,42	55,53	342,56	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	70	417 245	7 062,83	4 341,92	495 966,46	2 307 610,73	33,49	50,00	14,93	0,50	7,37	34,28	27,01	125,69	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	153	844 496	6 857,97	3 830,50	1 045 971,16	4 280 811,53	33,40	50,00	14,97	0,50	15,58	63,76	57,13	233,80	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	514	2 005 512	15 047,00	4 877,00	7 734 158,00	17 515 038,19	8,02	23,00	28,68	3,88	213,20	482,81	781,72	1770,31	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	171	751 257	12 918,79	5 462,93	2 207 288,56	6 311 351,57	14,47	30,70	21,22	3,60	45,14	129,08	165,53	473,30	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**10**	124 495	5 275,37	4 232,02	53 668,15	580 532,22	33,53	50,00	14,91	0,50	0,80	8,61	2,92	31,58	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**10**	85 231	6 592,00	6 100,00	67 996,20	587 904,34	26,50	63,00	23,77	8,40	1,48	12,80	5,43	46,94	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	35 072	**5 290,00**	**4 090,00**	15 017,77	158 461,07	39,8	87,5	21,98	1,00	0,33	3,45	1,20	12,65	23,42	0,551	104,21
	Total fossil fuels		**1 620**		**4 940**	**20 506 857**			**49 750 418,49**	**139 534 781,72**							**4 109**	**11 433**	**16,98**	1,002	98,70
	Total included hydro		3 560		7 752				49 750 418,49	139 534 781,72							4 108,66	11 432,83	10,91	0,595	91,97
	System Total		**13 560**		**41 586**				**261 416 880**	**354 523 461**							**25 874,90**	**33 381,06**	**9,68**	0,622	94,16
						NPP included															
	Least Cost and Must-Run Plants		**4 774**		**14 851**	14 851			**149 691 415,02**	**239 475 778,25**							**14 865,88**	**22 190,05**	**13,28**	1,001	92,66
	HPP included		**6 714**		**17 663**	17 663			**149 691 415,02**	**239 475 778,25**							**14 865,88**	**22 190,05**	**11,20**	0,842	
	Average Operation Margin Emission Factor				**21 932**				**227 568 741,97**	**317 353 105,20**							**22 511,50**	**29 835,67**	**12,53**	1,026	94,01
	HPP included				**24 744**				**227 568 741,97**	**317 353 105,20**							**22 511,50**	**29 835,67**	**12,45**	0,910	
	Simple Operation Margin Emission Factor				7 081				77 877 326,95	77 877 326,95							7645,62063	7645,62063	10,24	1,080	98,18
		annually hours	hours	λ	Lambda																
	Operating at the margin	8 760	1786		**0,204**																
	HPP included		2625		**0,300**																
	Simple Adjusted Operation Margin Emission Factor				**1,056**	**96,05**															
	HPP included				0,978																
	Build Margin Emission Factor		**1 446**		**3 425**				**33 848 137,80**	**37 170 356,20**							**3 363,40**	**3 545,39**	**1,53**	0,982	95,38
	HPP included		**2 046**		**4 035**				**33 848 137,80**	**37 170 356,20**							**3 363,40**	**3 545,39**	**9,37**	0,834	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,957**	1,018	**97,477**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,906**	**0,942**	**95,883**																
3.	**Average Operation Margin Emission Factor**		**0,872**	**0,891**	**94,356**																

	2010																				
	Scenario Prosperity - Maximum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MWel**	**MWth**	**$GW_{el}h$**	**MWthh**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	408	1 262	2 135	0	10 894,00	0,00	23 260 025,13	23 260 025,13	9,58	28,72	29,98	1,93	683,86	683,86	2507,48	2507,48	10,60	1,174	107,80
02	TPP Varna	antracite	1 018	2 360	4 415	0	10 390,00	0,00	45 877 022,84	45 877 022,84	24,1	64,90	26,93	4,70	1177,38	1177,38	4317,05	4317,05	9,51	0,978	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	422	0	10 906,00	0,00	4 602 332,00	4 602 332,00	24,18	67,8	28,04	3,83	124,11	124,11	455,05	455,05	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	209	0	12 725,35	0,00	2 659 598,15	2 659 598,15	10,38	23,765	22,89	2,64	59,28	59,28	217,37	217,37	10,80	1,040	81,73
	Total		**1 621**		**7 182**				**76 398 978,12**	**76 398 978,12**							**7496,95**	**7496,95**	**10,20**	1,044	98,13
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900	0	**12 967**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-600	0	-598	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	640	0	448	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	0	0	2 859	0	10 742,00	0,00	30 711 378,00	30 711 378,00	6,40	18,89	29,50	2,69	881,67	881,67	3232,78	3232,78	11,66	1,131	105,26
	Total fossil fuels		**0**		**2 859**				**30 711 378,00**	**30 711 378,00**							**3232,78**	**3232,78**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**640**		**3 307**				**30 711 378,00**	**30 711 378,00**							**3 232,78**	**3 232,78**	**10,11**	0,978	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950	0	0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170	0	285	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	543	826 240	6 547,00	4 000,00	3 555 021,00	6 859 981,00	33,3	50,00	15,02	0,50	53,11	102,49	194,74	375,79	8,50	0,359	54,78
12	GTCC in DHS Sofia	natural gas	100	450	638	862 520	6 001,10	3 800,00	3 828 701,80	7 106 277,80	33,3	50,00	15,02	0,50	57,20	106,17	209,74	389,28	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	2 156	0	9 410,00	0,00	20 287 960,00	20 287 960,00	6,489	18,40	28,36	2,00	563,77	563,77	2067,17	2067,17	8,95	0,959	101,89
14	TPP Rousse East (Unit #3)	antracite	100	284	386	0	10 550,00	0,00	4 072 300,00	4 072 300,00	25,81	65,90	25,53	2,20	101,69	101,69	372,86	372,86	9,60	0,966	91,56
	Total fossil fuels		**1 050**		3 723				31 743 982,80	38 326 518,80							2844,51	3205,10	8,79	0,764	83,63
	Total included hydro and excluded nuclear		**1 135**		**4 008**				**31 743 982,80**	**38 326 518,80**							**2 844,51**	**3 205,10**	**8,18**	0,710	83,63
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	676	2 334	1 815	0	10 610,00	0,00	19 257 150,00	19 257 150,00	6,47	19,76	30,54	2,39	574,02	574,02	2104,73	2104,73	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	818	2 556	2 656	0	10 024,00	0,00	26 623 744,00	26 623 744,00	6,47	19,76	30,54	2,49	792,75	792,75	2906,73	2906,73	11,84	1,241	123,84
18	TPP Maritsa East 3	lignite	856	2 675	6 009	0	9 660,00	0,00	58 046 940,00	58 046 940,00	6,562	19,61	29,88	2,92	1684,03	1684,03	6174,79	6174,79	10,64	1,150	119,04
	Total fossil fuels		**4 250**		**10 480**				**103 927 834,00**	**103 927 834,00**							**11186,2454**	**11186,2454**	**11,44**	1,205	121,53
	Total excluded nuclear		**4 250**		**10 480**				**103 927 834,00**	**103 927 834,00**							**11 186,25**	**11 186,25**	**11,44**	1,205	121,53
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	2 000		3 007	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	1 054	1 371 578	10 509,00	5 950,00	11 076 486,00	19 237 376,80	9,650	20,00	20,73	1,86	225,29	391,29	826,08	1434,72	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	214	425 395	11 444,00	4 209,00	2 449 016,00	4 239 505,31	25,17	67,80	26,94	2,58	64,27	111,25	235,64	407,93	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 256	2 282 781	9 217,43	4 376,65	11 577 092,08	21 568 025,75	40,4	85	21,04	1,00	241,14	449,24	884,19	1647,23	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	416	2 874 667	7 364,00	4 606,00	3 061 751,40	16 302 466,05	25,55	66,00	25,83	4,00	75,93	404,28	278,40	1482,34	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	286	1 581 599	9 260,00	5 645,00	2 648 881,92	11 577 009,57	4,069	12,00	29,49	0,50	77,73	339,71	285,00	1245,62	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**198**	**449 695**	**12 521,70**	**4 314,70**	**2 479 296,60**	**4 419 595,28**	23,46	**64,00**	**27,28**	**1,83**	**66,40**	**118,36**	**243,46**	**433,99**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**178**	**2 013 743**	**14 054,11**	**4 287,99**	**2 501 631,58**	**11 136 540,44**	**22,24**	**61,10**	**27,47**	**3,46**	**66,35**	**295,37**	**243,28**	**1083,02**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	200 000	10 783,73	3 924,14	398 998,01	1 183 826,01	34,08	50,00	14,67	0,50	5,82	17,28	21,36	63,37	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	358	2 468 214	6 781,78	3 886,19	2 431 267,84	12 023 216,13	33,36	50,00	14,99	0,50	36,26	179,30	132,94	657,44	19,19	0,459	67,67
30	DHP Sofia	natural gas	50	1 622	146	1 298 867	7 323,97	4 015,14	1 072 033,92	6 287 166,77	33,54	50,00	14,91	0,50	15,90	93,26	58,31	341,95	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	69	417 920	7 062,83	4 341,92	486 400,89	2 300 974,22	33,49	50,00	14,93	0,50	7,23	34,18	26,49	125,33	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	166	866 217	6 857,97	3 830,50	1 136 211,42	4 454 254,22	33,40	50,00	14,97	0,50	16,92	66,35	62,06	243,27	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	511	1 573 944	15 047,00	4 877,00	7 695 688,76	15 371 812,57	8,02	23,00	28,68	3,88	212,14	423,73	777,83	1553,69	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	167	764 521	12 918,79	5 462,93	2 152 252,13	6 328 777,95	14,47	30,70	21,22	3,60	44,02	129,44	161,40	474,61	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**9**	122 196	5 275,37	4 232,02	44 866,06	562 001,26	33,53	50,00	14,91	0,50	0,67	8,34	2,44	30,58	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**11**	86 524	6 592,00	6 100,00	75 711,25	603 508,54	26,50	63,00	23,77	8,40	1,65	13,14	6,05	48,19	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	33 733	**5 290,00**	**4 090,00**	13 625,01	151 593,84	39,8	87,5	21,98	1,00	0,30	3,30	1,09	12,10	23,42	0,551	104,21
	Total fossil fuels		**1 636**		**5 185**	**20 970 354**			**52 152 249,55**	**140 127 226,89**							**4 293**	**11 415**	**16,98**	0,997	98,13
	Total included hydro		3 636		8 192				52 152 249,55	140 127 226,89							4 292,56	11 415,49	10,84	0,588	91,37
	System Total		**14 932**		**45 538**				**294 934 422**	**389 491 936**							**29 053,04**	**36 536,56**	**9,64**	0,638	93,81
						NPP included															
	Least Cost and Must-Run Plants		**6 686**		**15 665**	15 665			**156 080 083,55**	**244 055 060,89**							**15 478,80**	**22 601,73**	**13,27**	0,988	92,61
	HPP included		**8 686**		**18 672**	18 672			**156 080 083,55**	**244 055 060,89**							**15 478,80**	**22 601,73**	**11,17**	0,829	
	Average Operation Margin Emission Factor				**22 847**				**232 479 061,67**	**320 454 039,02**							**22 975,75**	**30 098,68**	**13,74**	1,006	93,93
	HPP included				**25 854**				**232 479 061,67**	**320 454 039,02**							**22 975,75**	**30 098,68**	**13,47**	0,889	
	Simple Operation Margin Emission Factor				7 182				76 398 978,12	76 398 978,12							7496,94808	7496,94808	10,20	1,044	98,13
		annually hours	hours	λ Lambda																	
	Operating at the margin	8 760	1860	**0,212**																	
	HPP included		2956	**0,337**																	
	Simple Adjusted Operation Margin Emission Factor			**1,026**	**95,90**																
	HPP included			0,943																	
	Build Margin Emission Factor		**1 050**		**6 582**				**62 455 360,80**	**69 037 896,80**							**6 077,29**	**6 437,88**	**4,97**	0,923	93,25
	HPP included		**1 775**		**7 315**				**62 455 360,80**	**69 037 896,80**							**6 077,29**	**6 437,88**	**9,05**	0,831	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,937**	0,991	**96,910**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,887**	**0,915**	**95,236**																
3.	**Average Operation Margin Emission Factor**		**0,860**	**0,874**	**93,757**																

	2011																				
	Scenario Prosperity - Maximum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MWel**	**MWth**	**$GW_{el}h$**	**MWthh**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 380	2 356	0	10 750,00	0,00	25 327 000,00	25 327 000,00	9,58	28,72	29,98	1,93	744,63	744,63	2730,30	2730,30	10,60	1,159	107,80
02	TPP Varna	antracite	1 036	2 402	4 985	0	10 223,60	0,00	50 964 646,00	50 964 646,00	24,1	64,90	26,93	4,70	1307,95	1307,95	4795,80	4795,80	9,51	0,962	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	458	0	10 906,00	0,00	4 994 948,00	4 994 948,00	24,18	67,8	28,04	3,83	134,69	134,69	493,87	493,87	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	217	0	12 725,35	0,00	2 761 400,95	2 761 400,95	10,38	23,765	22,89	2,64	61,55	61,55	225,69	225,69	10,80	1,040	81,73
	Total		**1 691**		**8 016**				**84 047 994,95**	**84 047 994,95**							**8245,66**	**8245,66**	**10,19**	1,029	98,11
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900		**12 867**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-600		-685	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	640		514	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	0	0	2 975	0	10 742,00	0,00	31 957 450,00	31 957 450,00	6,40	18,89	29,50	2,69	917,44	917,44	3363,95	3363,95	11,66	1,131	105,26
	Total fossil fuels		**0**		**2 975**				**31 957 450,00**	**31 957 450,00**							**3363,95**	**3363,95**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**640**		**3 489**				**31 957 450,00**	**31 957 450,00**							**3 363,95**	**3 363,95**	**9,97**	0,964	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950		0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170		534	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	546	754 682	6 547,00	4 000,00	3 574 662,00	6 593 390,00	33,3	50,00	15,02	0,50	53,41	98,50	195,82	361,18	8,50	0,359	54,78
12	GTCC in DHS Sofia	natural gas	100	450	665	879 235	6 001,10	3 800,00	3 990 731,50	7 331 824,50	33,3	50,00	15,02	0,50	59,62	109,54	218,61	401,64	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	3 210	0	9 410,00	0,00	30 206 100,00	30 206 100,00	6,489	18,40	28,36	2,00	839,38	839,38	3077,74	3077,74	8,95	0,959	101,89
14	TPP Rousse East (Unit #3)	antracite	100	284	485	0	10 550,00	0,00	5 116 750,00	5 116 750,00	25,81	65,90	25,53	2,20	127,77	127,77	468,49	468,49	9,60	0,966	91,56
	Total fossil fuels		**1 050**		4 906				42 888 243,50	49 248 064,50							3960,66	4309,05	8,84	0,807	87,50
	Total included hydro and excluded nuclear		**1 135**		**5 440**				**42 888 243,50**	**49 248 064,50**							**3 960,66**	**4 309,05**	**7,99**	0,728	87,50
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	676	2 334	2 314	0	10 610,00	0,00	24 551 540,00	24 551 540,00	6,47	19,76	30,54	2,39	731,83	731,83	2683,38	2683,38	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	818	2 556	2 846	0	10 024,00	0,00	28 528 304,00	28 528 304,00	6,47	19,76	30,54	2,49	849,46	849,46	3114,67	3114,67	11,84	1,241	123,84
18	TPP Maritsa East 3	lignite	856	2 675	6 145	0	9 660,00	0,00	59 360 700,00	59 360 700,00	6,562	19,61	29,88	2,92	1722,15	1722,15	6314,54	6314,54	10,64	1,150	119,04
	Total fossil fuels		**4 250**		**11 305**				**112 440 544,00**	**112 440 544,00**							**12112,5888**	**12112,5888**	**11,52**	1,211	121,75
	Total excluded nuclear		**4 250**		**11 305**				**112 440 544,00**	**112 440 544,00**							**12 112,59**	**12 112,59**	**11,52**	1,211	121,75
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	2 050		3 410	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	180	865	1 154	1 081 578	10 509,00	5 950,00	12 127 386,00	18 562 776,80	9,650	20,00	20,73	1,86	246,67	377,56	904,46	1384,40	18,08	0,957	91,04
21	TPP Rousse East (cogeneration part)	antracite	60	785	283	426 351	11 444,00	4 209,00	3 238 652,00	5 033 162,47	25,17	67,80	26,94	2,58	84,99	132,08	311,62	484,29	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 007	2 071 465	9 217,43	4 376,65	9 282 276,84	18 348 353,46	40,4	85	21,04	1,00	193,34	382,18	708,92	1401,33	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	422	3 117 541	7 364,00	4 606,00	3 105 249,74	17 464 642,86	25,55	66,00	25,83	4,00	77,01	433,10	282,35	1588,02	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	269	1 377 820	9 260,00	5 645,00	2 495 115,85	10 272 912,28	4,069	12,00	29,49	0,50	73,22	301,45	268,46	1105,30	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**199**	**450 163**	**12 521,70**	**4 314,70**	**2 491 818,30**	**4 434 136,22**	23,46	**64,00**	**27,28**	**1,83**	**66,73**	**118,75**	**244,69**	**435,42**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**178**	**1 595 202**	**14 054,11**	**4 287,99**	**2 501 631,58**	**9 341 840,99**	**22,24**	**61,10**	**27,47**	**3,46**	**66,35**	**247,77**	**243,28**	**908,48**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	200 000	10 783,73	3 924,14	398 998,01	1 183 826,01	34,08	50,00	14,67	0,50	5,82	17,28	21,36	63,37	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	352	2 755 573	6 781,78	3 886,19	2 390 167,45	13 098 847,96	33,36	50,00	14,99	0,50	35,64	195,34	130,70	716,26	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	159	1 880 849	7 323,97	4 015,14	1 163 234,99	8 715 105,58	33,54	50,00	14,91	0,50	17,25	129,27	63,27	474,00	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	70	404 066	7 062,83	4 341,92	496 901,65	2 251 325,74	33,49	50,00	14,93	0,50	7,38	33,44	27,07	122,63	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	156	920 222	6 857,97	3 830,50	1 071 409,28	4 596 318,29	33,40	50,00	14,97	0,50	15,96	68,46	58,52	251,03	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	517	948 600	15 047,00	4 877,00	7 774 014,59	12 400 334,59	8,02	23,00	28,68	3,88	214,30	341,82	785,75	1253,35	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	168	819 168	12 918,79	5 462,93	2 168 442,15	6 643 502,08	14,47	30,70	21,22	3,60	44,35	135,88	162,62	498,21	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**10**	118 660	5 275,37	4 232,02	50 429,88	552 602,17	33,53	50,00	14,91	0,50	0,75	8,20	2,74	30,06	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**11**	87 456	6 592,00	6 100,00	69 941,36	603 423,76	26,50	63,00	23,77	8,40	1,52	13,14	5,58	48,18	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	29 938	**5 290,00**	**4 090,00**	16 251,61	138 698,26	39,8	87,5	21,98	1,00	0,35	3,02	1,30	11,07	23,42	0,551	104,21
	Total fossil fuels		**1 686**		**5 101**	**20 368 569**			**51 692 959,98**	**136 021 385,71**							**4 269**	**10 906**	**17,24**	1,011	96,87
	Total included hydro		3 736		8 511				51 692 959,98	136 021 385,71							4 269,22	10 905,54	10,43	0,560	89,51
	System Total		**15 102**		**48 943**				**323 027 192**	**413 715 439**							**31 952,08**	**38 936,79**	**9,58**	0,653	94,11
						NPP included															
	Least Cost and Must-Run Plants		**6 736**		**16 406**	16 406			**164 133 503,98**	**248 461 929,71**							**16 381,80**	**23 018,12**	**13,30**	0,999	92,64
	HPP included		**8 786**		**19 816**	19 816			**164 133 503,98**	**248 461 929,71**							**16 381,80**	**23 018,12**	**11,05**	0,827	
	Average Operation Margin Emission Factor				**24 422**				**248 181 498,93**	**332 509 924,66**							**24 627,46**	**31 263,78**	**14,05**	1,008	94,02
	HPP included				**27 832**				**248 181 498,93**	**332 509 924,66**							**24 627,46**	**31 263,78**	**13,62**	0,885	
	Simple Operation Margin Emission Factor				8 016				84 047 994,95	84 047 994,95							8245,65992	8245,65992	10,19	1,029	98,11
		annually hours	hours	λ	Lambda																
	Operating at the margin	8 760	2095		**0,239**																
	HPP included		3021		**0,345**																
	Simple Adjusted Operation Margin Emission Factor				**1,019**	**95,84**															
	HPP included				0,936																
	Build Margin Emission Factor		**1 050**		**7 881**				**74 845 693,50**	**81 205 514,50**							**7 324,61**	**7 673,00**	**5,50**	0,929	94,49
	HPP included		**1 775**		**8 929**				**74 845 693,50**	**81 205 514,50**							**7 324,61**	**7 673,00**	**8,76**	0,820	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,924**	0,977	**97,202**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,878**	**0,907**	**95,505**																
3.	**Average Operation Margin Emission Factor**		**0,853**	**0,869**	**94,140**																

	2012																				
	Scenario Prosperity - Maximum Demand																				
Item	**Parameter**	**Fuel**	**Available**	**Thermal**	**Energy Output**		**Gross Heat Rate**		**Energy Input**		**Net Caorific**	**Fuel**	**Carbon**	**Fraction**	**Actual Carbon**		**CO2 Emission**		**Auxuliary**	**Specific CO2 Emission**	
			Capacity	**Output**							**Value**	**Carbon**	**Emission**	**of Carbon**	**Emission**				**Power**		
	Power Plant				**Electricity**	**Heat**	**Electricity**	**Heat**	**Electricity**	**Total**	**GJ/Mg**	**Content**	**Factor**	**Unoxidized**	**Electricity**	**Total**	**Electricity**	**Total**	**needs**	**Electricity**	**Total**
	Unit		**MWel**	**MWth**	**$GW_{el}h$**	**MWthh**	**kJ/kWh**	**MJ/MWh**	**GJ/a**	**GJ/a**	**MJ/Nm^3**	**%**	**kgC/GJ**	**%**	**kt/a**	**kt/a**	**kt/a**	**kt/a**	**%**	**tonne/MWh**	**kg/GJ**
	1.) Operating Margin Power Plants																				
01	TPP Bobov dol	brown coal	555	1 716	2 681	0	10 482,00	0,00	28 102 242,00	28 102 242,00	9,58	28,72	29,98	1,93	826,22	826,22	3029,48	3029,48	10,60	1,130	107,80
02	TPP Varna	antracite	1 054	2 444	6 225	0	10 131,00	0,00	63 065 475,00	63 065 475,00	24,1	64,90	26,93	4,70	1618,50	1618,50	5934,49	5934,49	9,51	0,953	94,10
03	TPP Rousse East (Unit #4)	antracite	100	284	482	0	10 906,00	0,00	5 256 692,00	5 256 692,00	24,18	67,8	28,04	3,83	141,75	141,75	519,75	519,75	15,18	1,078	98,87
04	TPP Maritsa #3	lignite	95	290	220	0	12 725,35	0,00	2 799 577,00	2 799 577,00	10,38	23,765	22,89	2,64	62,40	62,40	228,81	228,81	10,80	1,040	81,73
	Total		**1 709**		**9 608**				**99 223 986,00**	**99 223 986,00**							**9712,53**	**9712,53**	**10,13**	1,011	97,88
	2.) Build Margin Power Plants																				
	2.1) Most resent power units																				
05	NPP Kozloduy (Units #5, #6)	nuclear	1 900	0	**13 350**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
06	PSHPP Chaira - pumping regime	hydro	-600	0	-757	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
	- generating regime	hydro	640	0	568	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,20	0,000	0
07	DHP Sofia East (Units #5, #6, #7)	natural gas	0	0	0	0	6 781,78	3 886,19	0,00	0,00	33,36	50,00	14,99	0,50	0,00	0,00	0,00	0,00	19,19	0,000	0,00
08	TPP Maritsa East 2 (Units #7-#8, 200MW)	lignite	0	0	3 209	0	10 742,00	0,00	34 471 078,00	34 471 078,00	6,40	18,89	29,50	2,69	989,60	989,60	3628,54	3628,54	11,66	1,131	105,26
	Total fossil fuels		**0**		**3 209**				**34 471 078,00**	**34 471 078,00**							**3628,54**	**3628,54**	**0,00**	1,131	105,26
	Total included hydro and excluded nuclear		**640**		**3 777**				**34 471 078,00**	**34 471 078,00**							**3 628,54**	**3 628,54**	**9,94**	0,961	105,26
	2.2) Future Build Margin Power Plants																				
09	NPP Belene	nuclear	950	0	0	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	6,50	0,000	0
10	HP Cascade Gorna Arda	hydro	170	0	584	0	0,00	0,00	0,00	0,00	0	0,00	0	0,00	0	0	0	0	0,20	0,000	0
11	GTCC in DHS's Zemliane and Lyulin	natural gas	130	585	663	884 523	6 547,00	4 000,00	4 340 661,00	7 878 753,00	33,3	50,00	15,02	0,50	64,85	117,71	237,78	431,60	8,50	0,359	54,78
12	GTCC in DHS Sofia	natural gas	100	450	704	768 421	6 001,10	3 800,00	4 224 774,40	7 144 774,20	33,3	50,00	15,02	0,50	63,12	106,74	231,43	391,39	8,00	0,329	54,78
13	TPP Maritsa East 1 (replacing capacity)	lignite	650	2 050	3 486	0	9 410,00	0,00	32 803 260,00	32 803 260,00	6,489	18,40	28,36	2,00	911,56	911,56	3342,37	3342,37	8,95	0,959	101,89
14	TPP Rousse East (Unit #3)	antracite	100	284	486	0	10 550,00	0,00	5 127 300,00	5 127 300,00	25,81	65,90	25,53	2,20	128,03	128,03	469,46	469,46	9,60	0,966	91,56
	Total fossil fuels		**1 050**		5 339				46 495 995,40	52 954 087,20							4281,04	4634,81	8,83	0,802	87,53
	Total included hydro and excluded nuclear		**1 135**		**5 923**				**46 495 995,40**	**52 954 087,20**							**4 281,04**	**4 634,81**	**7,98**	0,723	87,53
	3.) Low Operation Cost Power Plants																				
15	NPP Kozloduy (Units #3, #4)	nuclear	800		**0**	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	7,00	0,000	0
16	TPP Maritsa East 2 (Units #1-#4, 150MW)	lignite	676	2 334	2 665	0	10 610,00	0,00	28 275 650,00	28 275 650,00	6,47	19,76	30,54	2,39	842,84	842,84	3090,41	3090,41	13,48	1,340	126,32
17	TPP Maritsa East 2 (Units #5-#6, 200MW)	lignite	818	2 556	3 056	0	10 024,00	0,00	30 633 344,00	30 633 344,00	6,47	19,76	30,54	2,49	912,13	912,13	3344,49	3344,49	11,84	1,241	123,84
18	TPP Maritsa East 3	lignite	856	2 675	6 321	0	9 660,00	0,00	61 060 860,00	61 060 860,00	6,562	19,61	29,88	2,92	1771,47	1771,47	6495,39	6495,39	10,64	1,150	119,04
	Total fossil fuels		**4 250**		**12 042**				**119 969 854,00**	**119 969 854,00**							**12930,2988**	**12930,2988**	**11,57**	1,214	121,89
	Total excluded nuclear		**4 250**		**12 042**				**119 969 854,00**	**119 969 854,00**							**12 930,30**	**12 930,30**	**11,57**	1,214	121,89
	4.) "Must-Run" Power Plants																				
19	Hydro Power Plants and other Renewables	renewables	2 100	0	3 911	0	0,00	0,00	0,00	0,00	0	0	0	0,00	0	0	0	0	0,25	0,000	0,00
20	TPP Brikel	lignite	0	0	0	0	10 509,00	5 950,00	0,00	0,00	9,650	20,00	20,73	1,86	0,00	0,00	0,00	0,00	18,08	0,000	0,00
21	TPP Rousse East (cogeneration part)	antracite	60	785	223	432 015	11 444,00	4 209,00	2 552 012,00	4 370 362,82	25,17	67,80	26,94	2,58	66,97	114,69	245,55	420,52	15,18	1,298	113,44
22	Industrial TPP Lukoil	heavy oil	257	2040	1 003	2 463 858	9 217,43	4 376,65	9 248 836,85	20 032 283,14	40,4	85	21,04	1,00	192,65	417,26	706,37	1529,94	12,85	0,808	87,63
23	Industrial TPP Deven	antracite	219	1425	414	3 227 587	7 364,00	4 606,00	3 052 332,99	17 918 597,70	25,55	66,00	25,83	4,00	75,69	444,35	277,54	1629,29	12,54	0,766	103,96
24	Industrial TPP Kremikovtsi	blast gas	112	1 070	300	1 809 406	9 260,00	5 645,00	2 778 636,32	12 992 735,35	4,069	12,00	29,49	0,50	81,54	381,26	298,96	1397,94	17,45	1,207	130,34
25	Industrial TPP Sviloza	antracite	120	660	**185**	**445 014**	**12 521,70**	**4 314,70**	**2 316 514,50**	**4 236 616,34**	23,46	**64,00**	**27,28**	**1,83**	**62,04**	**113,46**	**227,48**	**416,03**	14,57	1,439	114,95
26	Industrial TPP Vidahim	antracite	50	471	**176**	**2 393 012**	**14 054,11**	**4 287,99**	**2 473 523,36**	**12 734 735,68**	**22,24**	**61,10**	**27,47**	**3,46**	**65,60**	**337,76**	**240,55**	**1238,44**	15,28	1,613	114,79
27	Industrial TPP Himenergo	natural gas	50	324	106	450 000	8 003,90	3 396,75	851 038,68	2 379 576,18	33,36	50,00	14,99	0,50	12,69	35,49	46,54	130,12	14,23	0,510	63,75
28	Industrial TPP Nova Plama	natural gas	60	468	37	200 000	10 783,73	3 924,14	398 998,01	1 183 826,01	34,08	50,00	14,67	0,50	5,82	17,28	21,36	63,37	14,86	0,678	62,87
29	DHP Sofia East	natural gas	186	2 014	335	1 851 220	6 781,78	3 886,19	2 272 370,35	9 466 563,56	33,36	50,00	14,99	0,50	33,89	141,18	124,26	517,64	19,19	0,459	67,67
30	DHP Sofia	natural gas	100	1 622	165	1 462 304	7 323,97	4 015,14	1 207 962,66	7 079 318,06	33,54	50,00	14,91	0,50	17,92	105,01	65,70	385,03	37,67	0,639	87,26
31	DHP Pleven	natural gas	24	661	72	401 734	7 062,83	4 341,92	507 409,42	2 251 708,06	33,49	50,00	14,93	0,50	7,54	33,45	27,64	122,65	23,28	0,501	71,00
32	DHP Plovdiv North	natural gas	85	628	149	972 959	6 857,97	3 830,50	1 023 280,14	4 750 198,64	33,40	50,00	14,97	0,50	15,24	70,76	55,89	259,44	10,50	0,418	61,02
33	DHP Republika	lignite	105	502	512	1 974 618	15 047,00	4 877,00	7 701 397,13	17 331 608,73	8,02	23,00	28,68	3,88	212,29	477,76	778,41	1751,77	24,80	2,022	134,41
34	DHP Sliven	subbit. coal	30	220	171	842 700	12 918,79	5 462,93	2 209 376,47	6 812 985,79	14,47	30,70	21,22	3,60	45,19	139,34	165,69	510,92	16,16	1,156	89,45
35	DHP Shoumen	natural gas	18	175	**11**	114 133	5 275,37	4 232,02	58 100,39	541 112,37	33,53	50,00	14,91	0,50	0,86	8,03	3,16	29,44	17,19	0,347	65,70
36	DHP Gabrovo	subbit. coal	18	196	**10**	86 430	6 592,00	6 100,00	68 883,45	596 106,75	26,50	63,00	23,77	8,40	1,50	12,98	5,50	47,60	35,06	0,811	122,96
37	DHP Kazanluk	heavy oil	12	114	3	27 641	**5 290,00**	**4 090,00**	16 465,51	129 518,08	39,8	87,5	21,98	1,00	0,36	2,82	1,31	10,34	23,42	0,551	104,21
	Total fossil fuels		**1 506**		**3 874**	**20 807 576**			**38 737 138,23**	**124 807 853,26**							**3 292**	**10 460**	**17,07**	1,025	101,07
	Total included hydro		3 606		7 785				38 737 138,23	124 807 853,26							3 291,90	10 460,47	8,62	0,463	91,72
	System Total		**14 990**		**51 728**				**338 898 052**	**431 426 858**							**33 844,31**	**41 366,65**	**9,32**	0,654	95,88
						NPP included															
	Least Cost and Must-Run Plants		**6 556**		**15 916**	15 916			**158 706 992,23**	**244 777 707,26**							**16 222,20**	**23 390,77**	**12,91**	1,019	95,56
	HPP included		**8 656**		**19 827**	19 827			**158 706 992,23**	**244 777 707,26**							**16 222,20**	**23 390,77**	**10,41**	0,818	
	Average Operation Margin Emission Factor				**25 524**				**257 930 978,23**	**344 001 693,26**							**25 934,73**	**33 103,30**	**13,71**	1,016	96,23
	HPP included				**29 435**				**257 930 978,23**	**344 001 693,26**							**25 934,73**	**33 103,30**	**13,20**	0,881	
	Simple Operation Margin Emission Factor				9 608				99 223 986,00	99 223 986,00							9712,53049	9712,53049	10,13	1,011	97,88
		annually hours	hours	λ	Lambda																
	Operating at the margin	8 784	1960		**0,224**																
	HPP included		3309		**0,378**																
	Simple Adjusted Operation Margin Emission Factor				**1,013**	**97,06**															
	HPP included				0,926																
	Build Margin Emission Factor		**1 050**		**8 548**				**80 967 073,40**	**87 425 165,20**							**7 909,58**	**8 263,36**	**5,51**	0,925	94,52
	HPP included		**1 775**		**9 700**				**80 967 073,40**	**87 425 165,20**							**7 909,58**	**8 263,36**	**8,74**	0,815	
	Baseline Emission Factor - BEF		Hydro	Wind	Projects																
1.	**Simple Operation Margin Emission Factor**		**0,913**	0,962	**97,043**																
2.	**Simple Adjusted Operation Margin Emission Factor**		**0,871**	**0,899**	**96,423**																
3.	**Average Operation Margin Emission Factor**		**0,848**	**0,865**	**95,802**																

Baseline Calculations
of Bulgarian Electric Power System
Summary

Annex No. 2

		Unit	2000	2001	2002	2003	2004	2005	
1.	**Total system power generation**	**GWh**	**41 805**	**44 785**	**41 943**	**41 990**	**43 621**	**44 259**	
2.	**Total system heat generation**	**$MW_{th}h$**	**14 398 244**	**17 092 947**	**17 104 183**	**18 945 487**	**15 622 107**	**17 793 681**	
3.	**Total CO2 emission of power generatio**	**kt/a**	**20 686,07**	**24 186,09**	**21 130,37**	**23 502,96**	**26 141,93**	**22 772,84**	
4.	**Total CO2 emission of energy transfor**	**kt/a**	**25 364,83**	**29 868,93**	**27 206,40**	**29 968,99**	**31 566,24**	**29 112,31**	
	Baseline Emission Factor - BEF								
	Hydropower Projects								
1.	**Simple_OM_EF**	**tCO2/MWh**	1,215	1,287	1,214	1,226	1,199	1,012	
2.	**Simple Adjusted_OM_EF**	**tCO2/MWh**	1,159	1,222	1,150	1,160	1,138	0,998	
3.	**Average_OM_EF**	**tCO2/MWh**	1,269	1,307	1,231	1,237	1,239	0,889	
	Windpower and Solarpower Projects								
1.	**Simple_OM_EF**	**tCO2/MWh**	1,144	1,184	1,106	1,160	1,165	1,062	
2.	**Simple Adjusted_OM_EF**	**tCO2/MWh**	1,065	1,106	1,032	1,067	1,078	1,041	
3.	**Average_OM_EF**	**tCO2/MWh**	1,101	1,149	1,040	1,073	1,108	0,877	
	Windpower and Solarpower Projects								
1.	**Simple_OM_EF**	**kg/GJ**	106,38	109,57	110,86	111,24	110,03	99,38	
2.	**Simple Adjusted_OM_EF**	**kg/GJ**	106,93	109,05	110,68	111,09	109,91	99,21	
3.	**Average_OM_EF**	**kg/GJ**	109,43	108,79	109,00	109,47	110,63	94,67	
	Forecast								
	Minimum demand	**Unit**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
1.	**Total system power generation**	**GWh**	40 045	36 771	37 416	39 224	42 767	45 946	47 303
2.	**Total system heat generation**	**$MW_{th}h$**	18 563 095	18 057 503	18 320 175	19 561 203	19 428 566	18 595 632	18 658 651
3.	**Total CO2 emission of power generatio**	**kt/a**	21 216,91	22 848,06	23 259,55	24 585,29	27 120,49	30 039,61	31 301,85
4.	**Total CO2 emission of energy transfor**	**kt/a**	27 775,03	29 342,39	29 846,51	31 379,76	34 097,59	36 389,45	37 658,11
	Baseline Emission Factor - BEF								
	Hydropower Projects								
1.	**Simple_OM_EF**	**tCO2/MWh**	1,009	0,996	0,980	0,966	0,945	0,938	0,930
2.	**Simple Adjusted_OM_EF**	**tCO2/MWh**	0,985	0,961	0,932	0,909	0,894	0,889	0,883
3.	**Average_OM_EF**	**tCO2/MWh**	0,931	0,926	0,892	0,875	0,869	0,866	0,862
	Windpower and Solarpower Projects								
1.	**Simple_OM_EF**	**tCO2/MWh**	1,054	1,048	1,036	1,028	1,000	0,991	0,986
2.	**Simple Adjusted_OM_EF**	**tCO2/MWh**	1,017	0,994	0,964	0,942	0,924	0,918	0,916
3.	**Average_OM_EF**	**tCO2/MWh**	0,937	0,943	0,905	0,892	0,886	0,883	0,885
	Windpower and Solarpower Projects								
1.	**Simple_OM_EF**	**kg/GJ**	99,331	101,040	98,417	96,864	97,297	97,479	98,396
2.	**Simple Adjusted_OM_EF**	**kg/GJ**	98,264	99,336	96,718	95,045	95,733	95,793	96,836
3.	**Average_OM_EF**	**kg/GJ**	94,271	96,350	94,578	93,205	94,337	94,543	95,851
	Forecast								
	Maximum demand	**Unit**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
1.	**Total system power generation**	**GWh**	41 734	38 499	39 539	41 586	45 538	48 943	51 728
2.	**Total system heat generation**	**$MW_{th}h$**	20 360 486	19 909 333	20 240 498	20 506 857	20 970 354	20 368 569	20 807 576
3.	**Total CO2 emission of power generatio**	**kt/a**	21 066,58	23 655,19	24 184,89	25 874,90	29 053,04	31 952,08	33 844,31
4.	**Total CO2 emission of energy transfor**	**kt/a**	28 319,76	30 859,61	31 545,44	33 381,06	36 536,56	38 936,79	41 366,65
	Baseline Emission Factor - BEF								
	Hydropower Projects								
1.	**Simple_OM_EF**	**tCO2/MWh**	1,008	0,995	0,967	0,957	0,937	0,924	0,913
2.	**Simple Adjusted_OM_EF**	**tCO2/MWh**	0,979	0,951	0,911	0,906	0,887	0,878	0,871
3.	**Average_OM_EF**	**tCO2/MWh**	0,922	0,920	0,876	0,872	0,860	0,853	0,848
	Windpower and Solarpower Projects								
1.	**Simple_OM_EF**	**tCO2/MWh**	1,051	1,041	1,026	1,018	0,991	0,977	0,962
2.	**Simple Adjusted_OM_EF**	**tCO2/MWh**	1,008	0,975	0,942	0,942	0,915	0,907	0,899
3.	**Average_OM_EF**	**tCO2/MWh**	0,921	0,928	0,890	0,891	0,874	0,869	0,865
	Windpower and Solarpower Projects								
1.	**Simple_OM_EF**	**kg/GJ**	98,810	100,285	98,094	97,477	96,910	97,202	97,043
2.	**Simple Adjusted_OM_EF**	**kg/GJ**	97,163	98,558	96,269	95,883	95,236	95,505	96,423
3.	**Average_OM_EF**	**kg/GJ**	93,559	96,108	94,312	94,356	93,757	94,140	95,802