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# The hidden picture of carbon dioxide pollution: how data discrepancies benefit the power plants in the 'Kovachki' ring

The report has been commissioned by Za Zemiata (Friends of the Earth Bulgaria) and prepared by an independent energy expert, based on publicly available information from annual emissions reports for the period 2017 - 2021

Sofia, February 2023

CONTENT

## List of abbreviations

| | |
|---|---|
| EF | Emission factor |
| NCV | Net calorific value |
| IPPCP | Integrated pollution prevention and control permit |
| GHGP | GHG emissions permit |
| CA | Competent authority |
| RDF | Refuse Derived Fuel |
| GHG | Greenhouse Gases |
| EWRC | Energy and Water Regulatory Commission |
| EEA | Executive Environment Agency |
| EC | Efficiency Coefficient |
| E-PRTR | European Pollutant Release and Transmission Register |
| EU ETS | EU Emissions Trading System |
| IPCC | Intergovernmental Panel on Climate Change |

## Introduction

The analysis refers to the reporting of greenhouse gas emissions (GHG emissions) under the EU ETS from the following installations: "District Heating – Pernik" JSC Pernik - TPP "Republica", "DISTRICT HEATING – SLIVEN" Ltd, TPP "Bobov dol" Ltd, "Brikel" Ltd. The analysis covers the reporting period from 2018 to 2022. This means that the years of emitting GHG - 2017, 2018, 2019, 2020 and 2021 are included.

The aim is to analyse the reported data on the quantities of fuels used, emission factors and GHG emissions from these installations, including a review and comparison of all publicly available reports from the installations.

- The Annual GHG Emissions Reports, available publicly on the EEA website, have been analysed - http://eea.government.bg/bg/r-r/r-te/verifitsirani-dokladi-21/dokladi-1r
- Where applicable, the IPPC Permits and Annual Environmental Reports made publicly available on the EEA website are analysed, namely:
    - Public register of the IPPC Permits - http://registers.moew.government.bg/kr/
    - Annual environmental reports - http://eea.government.bg/bg/r-r/r-kpkz/godishni-dokladi-14/index
    - National Inventory of GHG - http://eea.government.bg/bg/dokladi/dokumenti/BG_NIR_2021.pdf
- Where applicable, the reports from the responsible RIEW (Regional Inspectorate of Environment and Waters) have been analysed.
- Where applicable, data from the European pollutant release and transmission register (E-PRTR) have been analysed - http://pdbase.government.bg/forms/public_eprtr.jsp?a=1&t=1
- Where applicable, price applications submitted to KEVR/EWRC, available on the Internet have been analysed - https://www.dker.bg/bg/elektroenergetika/tseni-2.html and https://www.dker.bg/bg/toploenergetika/tseni-3.html

**WEBSITES**

| | |
|---|---|
| Annual GHG Emissions Reports | http://eea.government.bg/bg/r-r/r-te/verifitsirani-dokladi-21/dokladi-1r |
| Public register of IPPC Permits | http://registers.moew.government.bg/kr/ |
| Annual Environmental Reports | http://eea.government.bg/bg/r-r/r-kpkz/godishni-dokladi-14/index |
| National Inventory of GHG | https://unfccc.int/ghg-inventories-annex-i-parties/2022 |
| E-PRTR | http://pdbase.government.bg/forms/public_eprtr.jsp?a=1&t=1 |
| BAS | https://www.nab-bas.bg/ |
| EWRC | https://www.dker.bg/ |
| IPCC 2006 Chapter 2: Stationary Combustion | https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf |

# 1 Organisation of the GHG emission reporting activities in the Republic of Bulgaria

## 1.1 Reporting

In Bulgaria, installations producing heat and electric energy annually compile and submit several reports related to greenhouse gas emissions, pollutant emissions and quantities of energy produced and fuels burned:

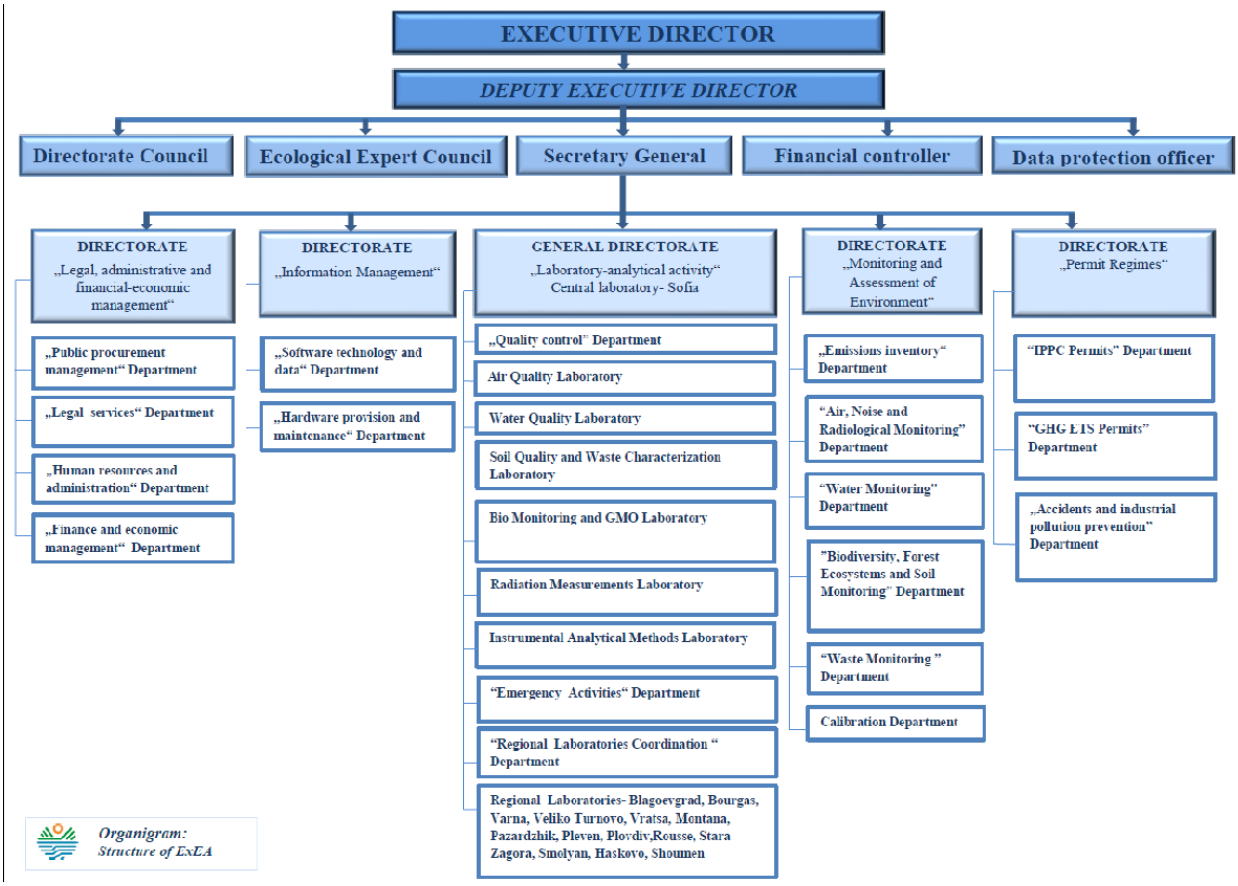
- ✔ Annual environmental reports
- ✔ Emission report of GHG
- ✔ Reporting under E-PRTR
- ✔ Reporting to EWRC

Each of the installations report data on the GHG emissions, fuels and raw materials used, and the produced energy to the following institutions and registers:

| Data | Reporting |
|---|---|
| GHG Emissions | Annual GHG emissions report - EEA<br>Annual environmental report - EEA<br>European pollutant release and transmission register (E-PRTR) – EEA,<br>Price applications - EWRC |
| Fuels and raw materials used | Annual GHG emissions report - EEA<br>Annual environmental report – EEA<br>Price applications - EWRC |
| Energy produced | Annual GHG emissions report - EEA<br>Annual environmental report – EEA<br>Price applications - EWRC |

## 1.2 Structure of the EEA

The competent authority for GHG emissions reports, Annual environmental report and E-PRTR reporting is the Directorate “Permit Regimes” at the EEA.




## 1.3 EEA - Directorate "Permit Regimes"

The Directorate "Permit Regimes" is structured in 3 departments:

- "IPPC Permits" Department
- „Accidents and industrial pollution prevention"
- "GHG ETS Permits" Department

The following two departments are engaged in the reporting process of emissions from the installations: "IPPC Permits" and "GHG ETS Permits"

- **"IPPC Permits" Department is responsible for** the procedures for issuing, reviewing, amending and updating of IPPC permits and keeping a public register with the results of the emission monitoring provided for in the IPPC permits. The department is also responsible for reporting to the European Pollutant Release and Transmission Register, as required by Regulation No 166/2006 establishing the European Pollutant Release and Transmission Register (E-PRTP).

- **"GHG ETS Permits" Department** is responsible for: conducting procedures for issuing, reviewing, updating and revoking greenhouse gas emissions allowances, in accordance with the requirements of the Climate Change Limitation Act (CCLA); approval of plans for monitoring of the annual emissions of greenhouse gases and ton-kilometers for aviation operators, according to the requirements of CCLA; acceptance and verification of the reports on greenhouse gas emissions provided by operators of installations and by aviation operators, according to the requirements of CCLA.

## 1.4 EEA – DIRECTORATE „Monitoring and Assessment of Environment“

Another directorate related to GHG emissions is the Monitoring and Assessment of Environment Directorate, which carries out an inventory of greenhouse gas emissions and harmful substances into the air in accordance with the requirements of the UN Framework Convention on Climate Change and the Convention on Cross-border Air Pollution over long distances.

The Emissions Inventories Bureau of this directorate develops national GHG emission inventories by collecting the necessary information, calculating the GHG emissions and preparing a National Report in accordance with the requirements of the UN Framework Convention on Climate Change (UNFCCC) and the Protocol from Kyoto.

## 1.5 GHG emission inventory

The National GHG Emission Inventory is being developed by the EEA. It is published on the website of the UNFCCC (https://unfccc.int/documents/461950) and it states that (p. 38) the inventory of emissions from the Energy sector is carried out by experts of the EEA and external consultants, as the methodology and emission factors are determined by the EEA and the NSI.

It also specifies the methodology for determining the country-specific emission factors. The text of the methodology is quoted here:

“3.3.8.2.2 Country specific emission factors for $CO_2$ for solid fuels

*Emission data reported under the European Emission Trading Scheme*

*A total of 109 operators have provided their verified CO2 emission reports required under the EU ETS for the years 2007-2020. These emissions have been incorporated in the inventory to the best extent possible (see respective subchapters for more information). Furthermore, the background data for the emission calculations under the EU ETS has been used for further QA/QC checks.*

*Data from the verified ETS reports has been analysed in order to apply a Tier 2 methodology for the national emission calculations. Out of all operators reporting in 2020, only the 20 largest industrial plants used plant specific methodologies. That made it possible to derive country-specific EFs for the major solid fuels. There were no plants, which applied plant-specific EFs for liquid or gaseous fuels. The country-specific* ***emission factors were derived from the verified ETS reports*** *as a weighted average from* ***all operators****, which declared that they had used plant-specific emission factors (Tier 3 according to Commission Regulation 601/2012 on the monitoring and reporting of greenhouse gas emissions). The EFs including oxidation factor are calculated as the total sum of the verified CO2 emissions divided by the total amount of the respective fuel as reported by the operators. For the years 2007 to 2020 the respective annual emission factors were applied, whereas for the years 1988 to 2006 an EF calculated as a weighted average was applied. A subset of all operators reported plant-specific oxidation factors, based on which country-specific EFs excluding oxidation factor were calculated, by using the country-specific EFs including oxidation factor.*

From the text above it follows that for the national inventory of coal combustion emissions in the installations (TPPs) has been used the average emission factors as reported by the installations. In the GHG inventories the following emissions factors are used (ibid.):

Table 24 Country-specific EFs excl. oxidation factor for $CO_2$ for solid fuels [t/TJ]

| Fuel | Anthracite | Lignite | Other Bituminous Coal | Petroleum Coke | Refinery gas |
|---|---|---|---|---|---|
| **1988-2006** | 103.3470 | 108.4102 | 98.1099 | 94.5477 | 57.3994 |
| **2007** | 100.7572 | 107.7673 | 100.1419 | 95.7545 | 57.3994 |
| **2008** | 105.7566 | 109.3540 | 98.7324 | 95.0147 | 57.3994 |
| **2009** | 105.0817 | 108.1742 | 98.1845 | 93.1192 | 57.3994 |
| **2010** | 102.6484 | 108.2456 | 96.6078 | 94.0772 | 57.3994 |
| **2011** | 101.6126 | 107.5715 | 97.3695 | 92.3894 | 57.3994 |
| **2012** | 100.0003 | 107.7340 | 98.5004 | 93.5463 | 57.3994 |
| **2013** | 99.9368 | 107.4805 | 97.4401 | 94.1364 | 57.3994 |
| **2014** | 100.7522 | 107.7140 | 95.9336 | 94.7654 | 62.8025 |
| **2015** | 100.9712 | 107.5652 | 95.0989 | 94.5517 | 56.3114 |
| **2016** | 107.5904 | 108.0331 | 95.6798 | 94.9888 | 56.2921 |
| **2017** | 108.3525 | 107.3327 | 93.2018 | 94.4801 | 56.7220 |
| **2018** | 109.9769 | 104.2675 | 91.4866 | 93.9125 | 56.0144 |
| **2019** | 106.5831 | 106.9063 | 91.3130 | 93.7125 | 57.9159 |
| **2020** | 107.4568 | 104.6709 | 86.8363 | 94.0517 | 57.0886 |

## 1.6 Verification bodies

The GHG emission reports of the installations must be verified by accredited Verification bodies. The accredited Verification bodies are accredited by the Bulgarian Accreditation Service, which must annually inspect their activities.

## 1.7 Verification of GHG emission reports

The following organizations and bodies participate in the process of development and verification of the Annual GHG Emission Reports:

- **The installation** - according to the procedures described in the GHG Emission Monitoring Plan issued by the EEA.
- **Laboratory** - an independent accredited laboratory performing the analysis of fuels and raw materials.
- **Verification body** - independent verifier, in the case of the considered installations - GREEN AND FAIR JSC (for the reports until 2018) and GMI Verify Ltd (from 2018 onwards). In 2022, the report of TPP Bobov dol was verified again by GREEN AND FAIR JSC.
- **The EEA -** accepts and verifies the emission reports from the operators of the installations. The GHG emission report is considered as accepted after verification by the EEA and after the issuance of a final opinion.
- **Indirect inspection by the EEA** - every year, for the development of the National GHG Inventory, a review and analysis of all reports from the installations is performed for the development of the country-specific emission factors and NCV. This is done by the Emissions Inventory Department of the EEA, with the help of an external consultant - **Denkstatt Bulgaria Ltd** (this is stated in some of the national GHG inventories).
- **Inspection by the Bulgarian Accreditation Service (BAS) -** Every year the Verification bodies are subject to inspection by BAS. It should also check the reports from the installations, together with the internal documentation of the Verification body.

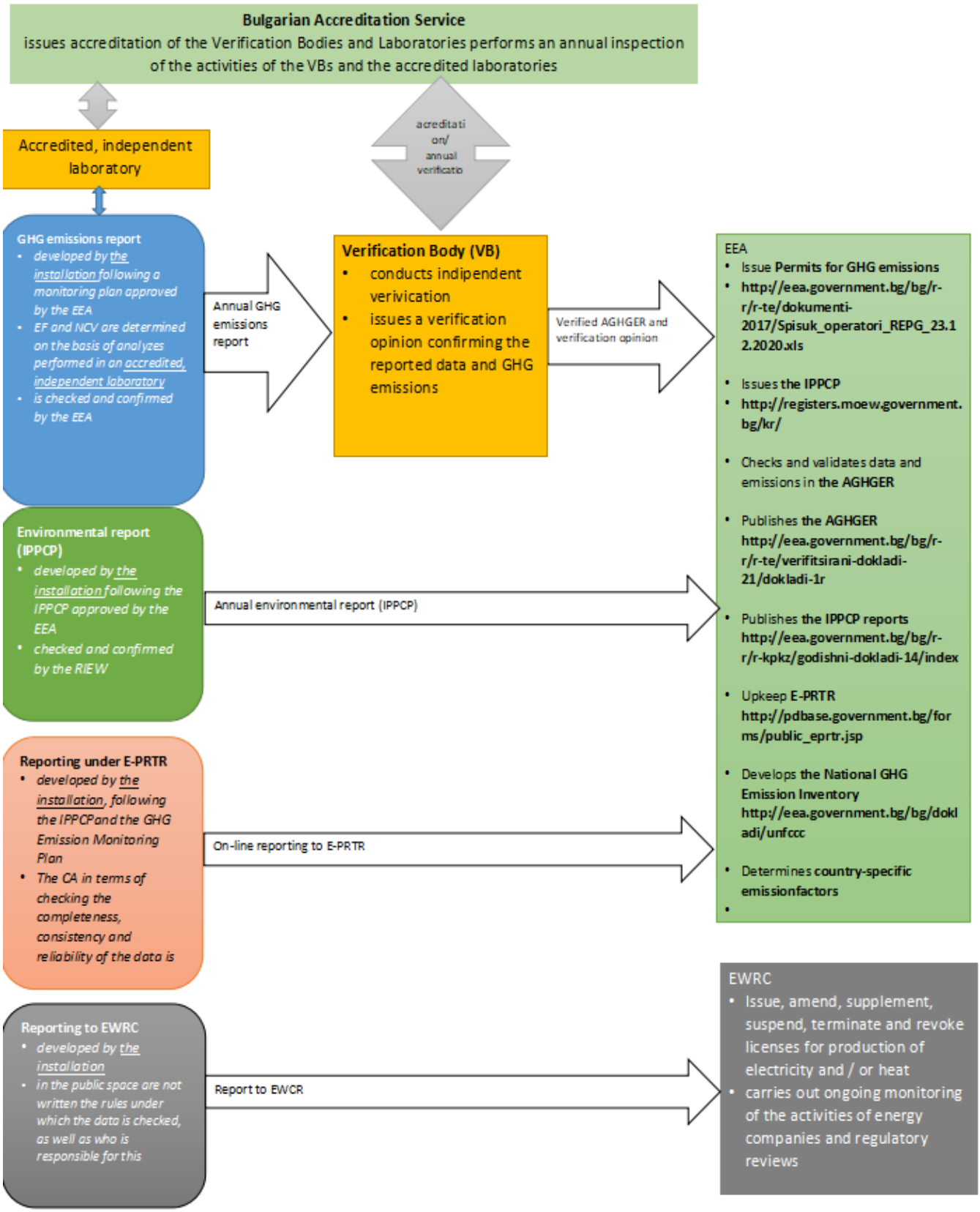
## 1.8 Conclusions

The majority of the reports from the installations are received by the EEA, in the same directorate - the Permit Regimes Directorate. These reports are subject to review by the EEA and the RIEW, as competent authorities, and are expected to contain the same data on emissions, fuel and raw materials used and energy produced, and in case of any discrepancies, they will be corrected before the reports are formally approved.

The data from the GHG emission reports are used for the development of the country-specific emission factors and NCV. This activity is again performed by the EEA with the help of an external consultant (Denkstatt Bulgaria Ltd).

The Bulgarian Accreditation Service carries out an inspection of the Verification Body, and in case of irregularities, it should limit or revoke the accreditation.

Organisation of the GHG emission reporting activities in the Republic of Bulgaria



# 2 ANALYSIS BY INSTALLATIONS

The analysis for each of the installations "District Heating - Pernik" JSC, Pernik; TPP "Republika", "District Heating -Sliven - eng. Angel Angelov" EAD, TPP "Bobov dol" EAD, “Brikel” EAD and Maritsa 3 TPP JSC was made over the years, mainly in two directions:

- Correspondence of the information presented in the Annual environmental report, the Annual GHG emissions report, E-PRTR and the report to EWRC, regarding the determination of electricity and heat prices
- The emission factors applied

## 2.1 “District Heating - Pernik” JCS, Pernik; TPP ”Republika”

| | |
|---|---|
| IPPCP | IPPCP: № 53/2005 - updated with Decision № 53-H1-И0-A0 / 2014 of the EEA |
| GHGP | Decision № 28-H3-A0 / 2015 for issuance of GHGP № 28-H3 / 2015 |
| Activity | production of electricity and heat |
| Fuels permitted under the IPPCP | natural gas, coal, briquettes |
| Fuels used | natural gas, brown coal, sub bituminous - mixture with a content of 25-35% low sulfur coal, lignite briquettes, RDF, biomass |

### 2.1.1. Compatibility of the information presented in the Annual environmental report, the GHG report and the E-PRTR

**2017**

1. The $CO_2$ emissions reported have **different values** in the GHG report and in the Annual environmental report, being higher in the Annual environmental report.
2. The $CO_2$ emissions reported in the European Pollutant Release and Transfer Register (E-PRTR) **coincide** with those in the Environmental Report (IPPCP) 449 450.670 $tCO_2$.

| 2017 | Annual environmental report under IPPCP | GHG Report | E-PRTR |
|---|---|---|---|
| Emissions, t $CO_2$ | 449 450.67 | 364 567 | 449 450.67 |

3. According to the Annual environmental report, the gross amount of heat produced is 4 389.98 TJ, and according to the Annual GHG Report, the amount of energy consumed from the fuel is 3 772.05 TJ. This means that the installation has an **efficiency coefficient (EC) of 116.4%**, ie less energy is used than produced. **In reality, the efficiency coefficient of solid fuel boilers is of the order of 90%.** It can be concluded that the installation did not report the total amount of fuels used, as a result of which the reported emissions are lower than actual $CO_2$ emissions.
4. According to the data submitted to EWRC for determining the price https://www.dker.bg/uploads/zaqvlenia_ceni/2018/toplo/TF_Pernik_AD.zip, the quantities of consumed fuels are higher. Considering the unrealistically high EC (according to the GHG report), the data from this report is much more realistic (80% efficiency).

| Fuel | EWRC | GHG report | Δ |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Brown coal, t | 520 398.00 | 368 108.35 | -152 289.65 |
| Natural gas, 1000 m3 | 6 243.24 | 6 243.24 | 0.00 |
| Mix of coal - lignite, t | 22 772.00 | | -22 772.00 |
| Briquettes, t | 37 820.00 | 15 675.95 | -22 144.05 |

**2018**

1. GHG emissions are different in the GHG report and in the Annual environmental report, being higher in the Annual environmental report.
2. The $CO_2$ emissions reported in the European Pollutant Release and Transfer Register (E-PRTR) coincide with those in the environmental report - 305 355.03 $tCO_2$.

| 2018 | Annual environmental report under IPPCP | GHG Report | E-PRTR |
|---|---|---|---|
| Emissions, t $CO_2$ | 305 355.03 | 197 328 | 305 355.03 |

3. **RDF and biomass** are used as fuel, **which is in violation of the IPPCP**. The amount of biomass used is 47.9% of the total energy used on the site, expressed in TJ.
4. According to the data submitted to EWRC for determining the price https://www.dker.bg/uploads/zaqvlenia_ceni/2019/toplo/9_TF_Pernik_29_03_2019.zip the quantities of consumed fuel are higher.

| Fuel | EWRC | GHG report | Δ |
|---|---|---|---|
| Brown coal, t | 295 480 | 244 800 | -50 680.00 |
| Natural gas, 1000 m3 | 6 114 | 6 115 | 0 |
| Mix of coal - lignites t | 5 430 | | -5 430.00 |
| Briquettes, t | 23 880 | 17 156 | -6 724.00 |

**2019**

1. GHG emissions are different in the GHG report and in the Annual environmental report, being higher in the Annual environmental report.
2. The $CO_2$ emissions reported in the European Pollutant Release and Transfer Register (ERIP) coincide with those in the environmental report - 273 175 $tCO_2$.

| 2019 | Annual environmental report under IPPCP | GHG Report | E-PRTR |
|---|---|---|---|
| Emissions t $CO_2$ | 273 175 | 143 561 | 273 175 |

3. The use of biomass continues this year as well **in violation of the IPPCP.**
4. The amount of biomass used is **51.8%** of the total energy used on the site, expressed in TJ.
5. According to the data submitted to EWRC for determining the price https://www.dker.bg/uploads/zaqvlenia_ceni/2020/toplo/9_TF_Pernik.zip the quantities of fuel consumed are higher.

| Fuel | EWRC | GHG report | Δ |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Brown coal, t | 300 930 | 212 872 | -88 058 |
| Natural gas, 1000 m3 | 6 254 | 6 255 | |
| Mix of coal - lignites | 9 830 | | -9 830 |
| Briquettes, t | 19 940 | 10 928 | -9 012 |

**2020**

1. According to the Annual environmental report, the gross amount of thermal energy produced is 4 166.78 TJ, and according to the Annual GHG Report, the amount of fuel energy consumed is 1 600.52 TJ. This means that the installation has an **EC of 260.34%**, that is, it has used less energy than it has produced. **The real efficiency coefficient of solid fuel boilers is around 90%**. It can be concluded that the installation did not report the full amount of fuels it used, that results in underreporting of the actual emissions.
2. According to the data submitted to EWRC for determining the price https://www.dker.bg/uploads/zaqvlenia_ceni/2021/toplo/9_TF_Pernik.zip, the quantities of fuel consumed are higher. Considering the unrealistically high efficiency coefficient (according to the GHG report), the data from this report is much more realistic.

| **Fuel** | **EWRC** | **GHG report** | **Δ** |
|---|---|---|---|
| Brown coal, t | 427 610 | 145 205 | -282 405 |
| Natural gas, 1000 m3 | 7 090 | 7 090 | 0 |
| Mix of coal - lignites, t | 29 310 | 272 | -29 038 |
| Briquettes, t | 68 360 | 7 990 | -60 370 |

**2021**

1. There is no discrepancy between the Annual environmental report and the GHG report, but the EWRC report is presented with confidential data and the quantities are hidden https://www.dker.bg/uploads/zaqvlenia_ceni/2022/toplo/9_TF_Pernik.zip therefore, comparison and verification of the reliability of the data cannot be performed.

## 2.1.2. Emission factors

### *2.1.2.1 Brown coal*

In 2020, the emission factor (EF) of brown coal has decreased by 32.4 % in comparison with 2017 (106.59 t $CO_2$ / TJ) and its value is 72.07 t $CO_2$ / TJ. In 2019, the emission factor is even lower - 69.48 t $CO_2$ / TJ. These emission factors are typical for liquid fuels such as: diesel, RFO, gasoline and other petrol products.

| | EF $tCO_2$ /TJ | NCV GJ/t |
|---|---|---|
| 2017 | 106.59 | 9.05 |
| 2018 | 76.23 | 9.38 |

| | | |
|---|---|---|
| 2019 | 69.48 | 8.96 |
| 2020 | 72.07 | 8.64 |
| 2021 | 88.55 | 7.15 |

The minimum EF according to the IPCC 2006 for brown coal is **92.8** t $CO_2$ / TJ. Emission factor of **96.1** t $CO_2$ / TJ is used in the National GHG Emission Inventory Report.

**The overly low EF** should have been registered by the developing team of the National GHG Emission Inventory (EEA and an external consultant).

Applying the minimum EF, in accordance with the IPCC 2006 for brown coal an assessment of the minimum deviation can be made.

#### *2.1.2.2 Lignite briquettes*

In 2020, the Emission Factor (EF) of lignite briquettes compared to 2017 decreased by 16.6%, with a value of 88.27 t $CO_2$ / TJ. In 2019, the emission factor is even lower - 86.23 t $CO_2$ / TJ. These emission factors are close to the IPCC 2006 minimum value and may be real.

| | EF $tCO_2$ /TJ | NCV GJ/t |
|---|---|---|
| 2017 | 105.8 | 14.41 |
| 2018 | 86.01 | 14.67 |
| 2019 | 86.23 | 13.04 |
| 2020 | 88.27 | 12.62 |
| 2021 | 92.69 | 11.71 |

The minimum EF according to IPCC 2006 for lignite briquettes is **87.3** t $CO_2$ / TJ. EF **97.5** t $CO_2$ / TJ is used in the National GHG Emission Inventory Report.

### 2.1.3. Reduction of the reported $CO_2$ emissions

**2017**

- **Not all fuels burned at the site are reported** in the GHG emissions report. This is confirmed by the fact that when recalculating the database for the consumption rate specified in the Annual environmental reports, much higher amounts of fuels are obtained. The energy of the reported fuels is not sufficient to produce the amount of heat and electricity indicated in the Annual environmental reports. In addition, according to the data submitted to EWCR for determining the price https://www.dker.bg/uploads/zaqvlenia_ceni/2018/toplo/TF_Pernik_AD.zip, the quantities of fuel consumed are higher.
- Based on the report submitted to EWRC and applying an emission factor in accordance with IPCC 2006 for lignite coal - not reported in the GHG report (90.90 t $CO_2$/TJ), the estimated $CO_2$ emissions are **544 678 $tCO_2$**, or with **180 110 t $CO_2$** less than reported in the GHG report **364 567 $tCO_2$**, which at an average price of allowances in 2018 - 17 EUR/t expressed in monetary equivalent is **3 062 113 EUR** (lower costs for the purchase of emission allowances).

**2018**

- The applied emission factor of brown coal is very low. The low emission factor results in reporting lower $CO_2$ emissions.

- Based on the report to EWRC and after applying the emission factor in accordance with IPCC 2006 for brown coal (92.8 t CO2 /TJ) and for lignite coal ( 90.90 t $CO_2$/TJ) the estimated $CO_2$ emissions are **285 391 $tCO_2$** or with **88 064 $tCO_2$** less than the reported in the GHG report **197 328 $tCO_2$**, which at an average price of the emission allowances in 2019 – EUR 25.61/t expressed in monetary equivalent is **EUR 2 255 496** (less expenditures for the purchase of emission allowances)

**2019**

- The applied emission factor of brown coal is very low. The low emission factor results in reporting lower $CO_2$ emissions.
- Based on the report to EWRC and after applying the emission factor in accordance with IPCC 2006 for brown coal (92.8 t $CO_2$ /TJ) and for lignite coal ( 90.90 t $CO_2$/TJ) the estimated $CO_2$ emissions are **264 326 $tCO_2$** or with **120 765 $tCO_2$** less than the reported in the GHG report **143 561 $tCO_2$**, which at an average price of the emission allowances in 2019 – EUR 25.09/t expressed in monetary equivalent is **EUR 3 029 831** (less expenditures for the purchase of emission allowances)

**2020**

- The applied emission factor of brown coal is very low. The low emission factor results in reporting lower $CO_2$ emissions.

- Based on the report to EWRC and after applying the emission factor in accordance with IPCC 2006 for brown coal (92.8 t $CO_2$ /TJ) the estimated $CO_2$ emissions are **416 676 $tCO_2$** or with **311 567 $tCO_2$** less than the reported in the GHG report **105 109 $tCO_2$**, which at an average price of the emission allowances in 2019 – EUR 50.00/t expressed in monetary equivalent is **EUR 15 578 328** (less expenditures for the purchase of emission allowances)

**2021**

- The assessment shows that with an emission factor under IPCC 2006 92.80 $tCO_2$/TJ and consumption of brown coals of 209 340 t, the emissions of brown coals are 127 673 $tCO_2$ while the reported quantities are 121 303 $tCO_2$. This makes a difference of **6 370 $tCO_2$**, which at an average price of the emission allowances – EUR 85.00 (average April 2022), expressed in monetary equivalent is **EUR 541 482.**

### 2.1.4. Discrepancies on the site:

| Year | Discrepancies | Unrepored emissions of GHG – estimated in $tCO_2$/ | Financial profit EUR – estimated |
|---|---|---|---|
| 2017 | • Reported data result in EC of 116%<br>• The emissions in the GHG, E-PRTR and the annual environmental report differ<br>• The amount of fuel reported to EWRC for pricing of thermal energy are significantly higher | 180 110 | 3 062 113 |

| Year | Discrepancies | Unrepored emissions of GHG – estimated in $tCO_2$/ | Financial profit EUR – estimated |
|---|---|---|---|
| 2018 | ● Used RDF and biomass in violation of IPPCP<br>● The amount of biomass is 47.9 % of the fuel used at the site, expressed in TJ<br>● The emissions in the GHG, E-PRTR and in the environmental report differ – lower amounts of fuel are reported<br>● The reported to EWRC amounts of fuel for pricing of thermal energy are significantly higher<br>● Unrealistically low emission factor for brown coal that results in underestimation of the emissions | 88 064 | 2 255 496 |
| 2019 | ● Use of biomass in violation of IPPCP<br>● The amount of biomass is 51.8 % of the fuel used at the site, expressed in TJ<br>● The reported to EWRC amounts of fuel for pricing of thermal energy are significantly higher<br>● Unrealistically low emission factor for brown coal that results in underestimation of the emissions | 120 765 | 3 029 831 |

| Year | Discrepancies | Unrepored emissions of GHG – estimated in $tCO_2$/ | Financial profit EUR – estimated |
|---|---|---|---|
| 2020 | • Incorrect fuel quantities reported resulting in 260% EC<br>• The reported to EWRC amounts of fuel for pricing of thermal energy are significantly higher<br>• Unrealistically low emission factor for brown coal | 311 567 | 15 578 328 |
| 2021 | • Unrealistically low emission factor for brown coal | 6 370 | 541 482 |
| **Total for the period 2017-2021** | | **526 766** | **21 405 137** |

### 2.1.5. Steps to determine the actual emissions of the installation

1. Obtain data from the EWRC for the amount of heat energy produced by the boilers for 2021.
2. Obtain data from EWRC for the quantities of the fuels used for 2021.
3. Use all data available in the EEA and EWRC on the quantities of fuels used in 2021.
4. Make a new verification (check) of all data. By law, these data are stored on site for 10 years and the accounting documentation for 5 years.
5. Review of the certificates of analysis from the accredited laboratory that tested the coal.
6. Calculate the correct $CO_2$ emissions, on the basis of data from EWRC, EEA - IPPCP and the data stored on the site, including accounting data.

## 2.2 "District Heating - Sliven" LTD

| | |
|---|---|
| IPPCP | 510/2015 - updated with Decision № 510-H1-И0-A1 / 2019 of the EEA |
| GHGP | Decision № 35-H3-A0 / 2019 for issuance of GHGP № 35-H3 / 2019 |
| Activity | production of electricity and heat |
| Fuels allowed under IPPCP | coal, fuel oil, diesel, biomass, RDF |
| Fuels used | other types of bituminous coal - black coal, sub-bituminous coal - Brikel OEG coal, anthracite coal - hard coal, lignite, fuel oil, diesel fuel, biomass, Modified RDF fuel |

### 2.2.1. Compatibility of the information presented in the Environmental Report, the GHG report and the E-PRTR

**2017**

1. For 2017, the data reported in the Environmental Report and GHG Report, as well as E-PRTR match, but in the reports submitted to EWRC natural gas (1 205 000 m3) is mentioned, and in the report on GHG, this fuel is missing, which leads to reporting fewer emissions.

**2018**

1. The amount of biomass reported in the GHG report and the report submitted to EWRC (57 683.79 t) is 4.68 times higher than that reported in the Environmental Report (12 334.00 t) and **exceeds the limit set under the IPPCP** (19 029 t / year).

| 2018 | Annual environmental report under IPPCP | GHG report |
|---|---|---|
| biomass, t | 12 334 | 57 683.79 |

2. The amount of biomass used is **26.8 %** of the total energy used on the site.
3. In the reports submitted to the EWRC, natural gas is also indicated as a fuel, and in the GHG report this fuel is missing, resulting in fewer emissions being reported.

**2019**

1. The amount of biomass reported in the GHG report is 10.7 times higher than that reported in the IPPCP Report and **exceeds the limit set under the IPPCP** (19 029 t / year).

| 2018 | Annual environmental report under IPPCP | GHG report |
|---|---|---|
| biomass, t | 8 734.43 | 93 354.99 |

2. If the amount of biomass reported in the Environmental Report is considered real, t**he boiler efficiency coefficient comes to 130 %**. **The actual efficiency of solid fuel boilers is of the order of 90%.**
3. The amount of biomass used is **48.4 %** of the total energy used on the site.

**2020**

1. The amount of biomass reported in the GHG report and the EWRC report is **25 times higher** than that reported in the Environmental Report.

| 2020 | Annual environmental report under IPPCP | GHG report |
|---|---|---|
| biomass, t | 4 020.09 | 100 696 |

2. If the amount of biomass reported in the Environmental Report is accepted as true, the efficiency of the boilers would be **200%**. The real efficiency of solid fuel boilers is around 90%.
3. The amount of biomass used is **56 %** of the total fuels used at the site, expressed in TJ.
4. In the report to EWRC, it is stated that in that year the installation also burned 2 920 t of gas oil. This amount is not reported in the GHG report, the value shown there is 0. This results in less GHG emissions being reported.

**2021**

1. The amount of biomass reported in the GHG report is **203 times higher** than that reported in the IPPCP Report.

| 2021 | Annual environmental report under IPPCP | GHG report |
|---|---|---|
| biomass t | 614.82 | 124 995 |

2. If the amount of biomass reported in the Environmental Report is accepted as true, the **efficiency coefficient of the boilers would be 337 %. The real efficiency of solid fuel boilers is around 90 %.** Based on the Environmental and GHG reports, the efficiency coefficient reported by the installation is 99.5 %, which is also an unrealistically high value.
3. The amount of biomass used is **70.9 %** of the fuels used at the site, expressed in TJ.
4. According to the data submitted to EWRC for determining the price https://www.dker.bg/uploads/zaqvlenia_ceni/2022/toplo/10_TF_Sliven.zip the quantities of consumed fuels are higher, with the exception of biomass.

| Fuel | EWRC | GHG report | Δ |
|---|---|---|---|
| Coal, t | 124 368 | 42 389 | -81 979 |
| biomass, t | 43 016 | 124 995 | -81 979 |

Probably the places of the two types of fuel were exchanged. A check of the report to EWRC on the coal excise duty paid shows that the data in the annual GHG report is wrong. On the basis of DECISION No. C-18 of 01.07.2022 of the ENERGY AND WATER REGULATION COMMISSION https://www.dker.bg/uploads/reshenia/2022/res_c-18_01072022.pdf it can also be concluded that the data in the annual GHG report do not correspond to the real data.

## 2.2.2. Emission factors

### *2.2.2.1 RDF*

**2019**

For the RDF used on the site, a **biomass content of 84.4 %** is indicated. This is a very high content of biomass, compared to data from other installations in the country burning RDF, such as: Holcim (Bulgaria) JSC 46 – 56 %, Devnya cement JSC 44-45 %. The high percentage of biomass should definitely be questioned, as it directly affects the GHG emissions reported by the installation. It is important to clarify whether the laboratory that issued the certificate of analysis (№1138 B-2 / 20.12.2018) has accreditation to perform such analysis. In accordance with the international standards, the analysis should be performed according to EN 15440 "Solid recovered fuels. Methods for the determination of biomass content".

RDF was also burned in 2018 and 2020, but then the biomass content was 0%.

It is not clear how the relevant quantities and parameters are taken into account, as the RDF is not included in the GHG emission Permit and in the monitoring plan.

The reported emissions from the biomass fraction of RDF in 2018 are **5 593 $tCO_2$**, which should not be considered as biomass if the laboratory that performed the analysis is not accredited according to the relevant standards. At the average then price of allowances - 25.09 EUR, expressed in monetary terms is **EUR 114 392.**

### *2.2.2.2 Black coal - other types of bituminous coal, mine Balkan*

In 2017, the Emission Factor (EF) of coal was **74.51 $tCO_2$ / TJ** - much lower than the minimum presented in the IPCC 2006[1]. In 2020, the emission factor is **83.25 $tCO_2$ / TJ**, also lower than the minimum presented in the IPCC 2006. The EF used in the National GHG Emission Inventory Report is in the range 91.31 - 95.68 $tCO_2$ / TJ.

| | EF $tCO_2$/TJ | NCV GJ/t |
|---|---|---|
| 2017 | 74.51 | 16.04 |
| 2018 | 91.62 | 13.35 |
| 2019 | 91.82 | 13.31 |
| 2020 | 83.25 | 11.62 |
| 2021 | 104.91 | 22.21 |

The minimum EF according to the IPCC 2006 is **87.3** $tCO_2$ / TJ as for black coal it is **89.5** $tCO_2$ / TJ.

**The fact that the EF is too low** should have been registered by the developing team of the National GHG Emission Inventory (EEA and an external consultant).

An assessment can be made by applying the minimum EF, in accordance with the IPCC 2006 for black coal.

***2.3.2.3 Brown coal - sub-bituminous coal - Brikel OEG-***

[1] 2006 IPCC Guidelines for National Greenhouse Gas Inventories / Table 2.2 Default Emission Factors For Stationary Combustion In The Energy Industries

In 2017, the Emission Factor (EF) of coal was **82.59** $tCO_2/TJ$. In 2018, the emission factor is **86.29** $tCO_2/TJ$. In 2020 the emission factor is **87.05** $tCO_2/TJ$ and in 2021 it is **88.64** $tCO_22/TJ$

| | EF $tCO_2/TJ$ | NCV GJ/t |
|---|---|---|
| 2017 | 82.59 | 12.57 |
| 2018 | 86.29 | 13.05 |
| 2019 | 92.98 | 14.01 |
| 2020 | 87.05 | 11.98 |
| 2021 | 88.64 | 11.78 |

The minimum EF for brown coal according to IPCC 2006 is **92.8** $tCO_2/TJ$. In the National GHG Emissions Inventory Report EF **96.1** $tCO_2/TJ$ is used.

**The fact that the EF is too low** should have been registered by the developing team of the National GHG Emission Inventory (EEA and an external consultant).

An assessment can be made by applying the minimum EF, in accordance with the IPCC 2006 for brown coal.

#### *2.3.2.4 Brown coal - sub-bituminous coal – low-calorie*

In 2017, the Emission Factor (EF) of coal was **57.79** $tCO_2/TJ$. In 2018, the emission factor is **41.69** $tCO_2/TJ$. In 2019, the emission factor is **48.68** $tCO_2/TJ$. In 2020, the emission factor is **66.07** $tCO_2/TJ$. These emission factors are characteristic of liquid and even gaseous fuels such as: natural gas, diesel, fuel oil, gasoline and other petroleum products.

| | EF tCO2/TJ | NCV GJ/t |
|---|---|---|
| 2017 | 57.79 | 4.99 |
| 2018 | 41.69 | 9.03 |
| 2019 | 48.68 | 8.89 |
| 2020 | 66.07 | 6.78 |
| 2021 | 0 | 0 |

The IPCC 2006 minimum EF for coal is **87.3** $tCO_2/TJ$, and for brown coal it is **92.8** $tCO_2/TJ$. The National GHG Emissions Inventory Report used EF of **96.1** $tCO_2/TJ$. It is not clear what fuel was burned at the site as these are not coal indicators. There are no known solid, liquid or gaseous fossil fuels with an emission factor below 55 $tCO_2/TJ$ (except methane)

**The fact that the EF is too low** should have been registered by the developing team of the National GHG Emission Inventory (EEA and an external consultant).

An assessment can be made by applying the minimum EF, in accordance with the IPCC 2006 for brown coal.

#### *2.3.2.5 Other types of bituminous coal mine Balkan 2000 - black coal*

In 2019, the emission factor is **45.19** $tCO_2/TJ$. The National GHG Emissions Inventory Report used an EF in the range of 91.31 – 95.68 $tCO_2/TJ$.

| | EF | NCV |
|---|---|---|

| | $tCO_2/TJ$ | GJ/t |
|---|---|---|
| 2017 | 90.29 | 10.13 |
| 2018 | 95.3 | 9.96 |
| 2019 | 45.19 | 8.33 |
| 2020 | 101.66 | 12.64 |
| 2021 | 0 | 0 |

The minimum EF according to IPCC 2006 for coal is **87.3** $tCO_2/TJ$, and for black coal it is **89.5** $tCO_2/TJ$.

**The fact that the EF is too low** should have been registered by the developing team of the National GHG Emission Inventory (EEA and an external consultant).

An assessment can be made by applying the minimum EF, in accordance with the IPCC 2006 for black coal.

### 2.2.3. Reduction of the reported $CO_2$ emissions

**2017**

- Based on the report submitted to EWRC, IPCC 2006 emission factor **89.5** $tCO_2/TJ$ for black coal, IPCC 2006 emission factor **92.8** $tCO_2/TJ$ for brown coal, IPCC 2006 emission factor **92.8** $tCO_2/TJ$ for sub-bituminous coal - low calorific, the estimated emissions of $CO_2$ are **231 628 $tCO_2$**, or **32 842 $tCO_2$** less than the reported GHG report of **198 786 $tCO_2$**, which at the then average price of allowances – EUR 17.00, expressed in monetary equivalent is **EUR 558 357** (lower purchase costs of emission allowances).

**2018**

- Based on the report submitted to EWRC, IPCC 2006 emission factor **92.8** $tCO_2/TJ$ for brown coal, IPCC 2006 emission factor **92.8** $tCO_2/TJ$ for sub-bituminous coal - low calorific, the estimated $CO_2$ emissions are **161 279 $tCO_2$**, or by **41 511 $tCO_2$** less than reported in the report for GHG **119 768 $tCO_2$**, which at the then average price of allowances – EUR 25.61, expressed in monetary equivalent is **EUR 1 063 181** (lower purchase costs of emission allowances).

**2019**

- Based on a conservative estimate of the biomass content of RDF, an IPCC 2006 emission factor of **92.8** $tCCO_2/TJ$ for sub-bituminous coal - low calorific, an IPCC 2006 emission factor of **89.5** $tCO_2/TJ$ for black coal, the estimated $CO_2$ emissions are **99 314 $tCO_2$**, or **27 010 $tCO_2$** less than reported in the GHG report **72 304 $tCO_2$**, which at the then average price of allowances – EUR 25.09, expressed in monetary equivalent is **EUR 677 618** (lower purchase costs of emission allowances).

**2020**

- Based on the report submitted to the EWRC, of an IPCC 2006 emission factor of **89.5** $tCO_2/TJ$ for black coal, an IPCC 2006 emission factor of **92.8** $tCO_2/TJ$ for brown coal, and an IPCC 2006 emission factor of **92.8** $tCO_2/TJ$ for sub-bituminous coal – low calorific, the estimated CO2 emissions were **89 319 tCO2,** or **18 225 $tCO_2$** less than the **71 094 $tCO_2$** reported in the GHG report, which at the then average price of allowances - EUR 50.00, expressed in cash equivalent is **EUR 911 244** (lower costs to purchase allowances).

**2021**

- Based on the report submitted to the EWRC, and DECISION No. C-18 of 01.07.2022 of the EWRC https://www.dker.bg/uploads/reshenia/2022/res_c-18_01072022.pdf,

На база верифицирания доклад на дружеството като оператор на инсталация по ЗОИК
2021 г. са изчислени среднопретеглените стойности на показателите на общия микс от гориво
средните стойности на емисионния фактор, долната топлина на изгаряне, коефициентът
окисление на общия микс и количеството гориво за прогнозния период 01.07.2022 г.
30.06.2023 г. Въз основа на утвърдения от ИАОС образец-формуляр за попълване на ежегодна
информация от дружествата (с нанесени формули за изчисление) е изчислено общото количест
отделени емисии, както следва:

| Показател | Димeнсия | Въглища | ВЕИ | Мазут | ОБЩО |
|---|---|---|---|---|---|
| 1. Емисионен фактор | t.CO2/TJ | 88,73 | | 77,4 | |
| 2. Долна топлина на изгаряне | GJ/t. (1000 nm$^3$) | 14,07 | | 42,00 | |
| 3. Коефициент на окисление | - | 94,25 | | 100 | |
| 4. Количество гориво | t. (1000 nm3) | 113 900 | 25,453 | 240 | |
| 5. Емисии $CO_2$ | t. | 134 020,01 | 0 | 780,192 | 134 800,21 |

the estimated CO2 emissions are **147 399 $tCO_2$**, or **95 879 $tCO_2$** less than reported in the GHG report **51 520 $tCO_2$**, which at an average price of allowances – EUR 85.00 (average price for the month of April 2022), expressed in monetary terms equivalent is **EUR 8 149 730** (lower costs of purchasing allowances).

### 2.2.4. Discrepancies on the site:

| Year | Discrepancy | Unreported GHG emissions - estimated $tCO_2$ | Financial profit - estimated EUR |
|---|---|---|---|
| 2017 | The emission factor of black coal - other types of bituminous coal at Balkan mine is very low | 1 266 | 21 517 |
| | The emission factor of **brown coal - subbituminous coal - Brikel OEG** is very low | 19 102 | 324 767 |
| | The emission factor of **brown coal - subbituminous coal - low calorific** is very low | 10 169 | 172 892 |
| | Consumed amounts of natural gas that are not reported in the GHG report, but are reportable in the EWRC report | 2 305 | 39 182 |
| | **Total for the year** | **32 842** | **558 357** |
| 2018 | The emission factor of **brown coal - Subbituminous Coal - Brikel OEG** is very low | 5 606 | 143 582 |
| | The emission factor of **brown coal - subbituminous coal - low calorific** is very low | 35 755 | 915 764 |
| | Consumed amounts of natural gas that are not | 150 | 3 835 |

| Year | Discrepancy | Unreported GHG emissions - estimated $tCO_2$ | Financial profit - estimated EUR |
|---|---|---|---|
| | reported in the GHG report, but are reported in the EWRC report | | |
| | Total for the year | **41 511** | **1 063 181** |
| 2019 | The emission factor of **brown coal - subbituminous coal - low calorific** is very low | 11 922 | 299 116 |
| | The emission factor of the **other types of bituminous coal at mine Balkan 2000 - black coal** is very low | 10 527 | 264 110 |
| | Biomass fraction in RDF – 84.4% | 4 560 | 114 392 |
| | **Total for the year** | **27 009** | **677 618** |
| 2020 | The emission factor of black coal - other types of bituminous coal Balkan mine is very low | 1 049 | 52 428 |
| | The emission factor of **brown coal - subbituminous coal - Brikell OEG** is very low | 2 850 | 142 493 |
| | The emission factor of **brown coal - subbituminous coal - low calorific** is very low | 5 247 | 262 364 |
| | Consumed amounts of gas oil that are not reported in the GHG report, but are reported in the EWRC report | 9 079 | 453 959 |
| | The amount of biomass reported in the GHG report is 25 times higher than that reported in the Annual environmental report<br><br>If the amount of biomass reported in the IPPCP report is accepted as true, the efficiency of the boilers would be 200%.<br><br>The amount of biomass used is 56% of the fuels | - | - |

| Year | Discrepancy | Unreported GHG emissions - estimated $tCO_2$ | Financial profit - estimated EUR |
|---|---|---|---|
| | used on site, expressed in TJ. | | |
| | **Total for the year** | **18 225** | **911 244** |
| 2021 | The reported data indicate efficiency coefficient of 99.5%<br><br>The amount of biomass reported in the GHG report is 203 times higher than that reported in the IPPCP Report. If the amount of biomass reported in the Annual environmental report is accepted as true, the efficiency of the boilers would be 337%.<br><br>The amount of biomass used is 71% of the fuels used on the site, expressed in TJ. | - | - |
| | The quantities of coal reported to EWRC exceed those reported in GHG report | 95 879 | 8 149 730 |
| | **Total for the year** | **95 879** | **8 149 730** |
| **Total for the year 2017-2021** | | **215 466** | **11 360 130** |

### 2.2.5. Steps to determine the actual emissions of the installation

1. Obtain data from EWRC for the amount of heat energy produced by the boilers.
2. Obtain data from EWRC for the amount of consumed fuels.
3. Use all data available in the EEA for reporting under the IPPCP and the E-PRTR on the quantities of fuels used..
4. Make a new verification (check) of all data. By law, these data are stored on site for 10 years and the accounting documentation for 5 years.
5. Review of the certificates of analysis from the accredited laboratory that tested the coal.
6. Review the certificates of analysis of the accredited laboratory (if accredited) that tested the biomass fraction of RDF.
7. Calculate the correct $CO_2$ emissions, on the basis of data from EWRC, EEA - IPPCP and the data stored on the site, including accounting data.

## 2.3 TTP “Bobov dol” Ltd

| | |
|---|---|
| IPPCP | 45-H4/2019 |
| GHGP | Decision № 58-H3-A0 / 2019 for issuance of GHGP № 58-H3 / 2019 |
| Activity | Combustion installation for electricity production |
| Fuels allowed under IPPCP | coal, fuel oil, diesel fuel, biomass (from 2019), RDF (after letter No. 26-00-239 / 14.08.2018 of the Ministry of Environment and Water), urea |
| Fuels used | subbituminous coal - a mixture of brown and lignite, fuel oil, urea, biomass, waste wood |

### 2.3.1. Compatibility of the information presented in the Environmental Report (IPPCP), the GHG Report and the E-PRTR

**2017**

1. The biomass burned on site **is not reported in the Annual environmental report**, probably because in 2017 the combustion of biomass from the installation was not allowed and it was burned **in violation of the IPPCP.**

**2018**

1. The CO2 emissions reported in the European Pollutant Release and Transfer Register (E-PRTR) coincide with those in the environmental report, but do not coincide with those in the GHG (the difference is insignificant).

| 2018 | Annual environmental report under IPPCP | GHGP report | E-PRTR |
|---|---|---|---|
| Emissions, tCO2 | 1 192 715 | 1 193 696 | 1 192 715 |

2. Biomass is burned **in violation of the IPPCP.**

**2019**

1. No significant discrepancies were found.

**2020**

1. There is a discrepancy in the reported biomass in the Annual environmental and GHG reports. According to the GHG report, the installation burned 614 967.28 t of biomass or 49% of the fuels used on site, expressed in TJ.

**2021**

1. The installation burned 891 424.27 t of biomass or 62% of the fuels used on site, expressed in TJ.
2. There is no inconsistency between the Annual environmental report, GHG report and the EWRC report.

## 2.3.2. Emission factors

### *2.3.2.1 RDF*

The Annual environmental report states that with letter No. 26-00-239 / 14.08.2018 of the Ministry of Environment and Water (MOEW) the company is allowed to conduct trial tests in operational conditions for a period of 6 months under certain conditions and under strict control of the relevant control authorities for co-incineration of non-hazardous waste coal with code and name, according to Ordinance №2 on the waste classification for the whole period as follows: 19 12 10 - combustible wastes / RDF - modified fuels derived from wastes / 19 12 12 - other wastes (including mixtures of materials) from mechanical treatment of wastes other than those mentioned in 19 12 11.

With letter ex.№ 26-00-1279 / 1 / 07.09.2018 of RIEW-Pernik a plan for conducting a trial co-incineration of coal and non-hazardous waste has been approved. On November 12, 2018, trial tests for co-incineration of non-hazardous waste and coal began. By the end of 2018, 47 000 t of RDF had been burned. In 2019 - 31 000.00 t of RDF were burned, and in 2020 - 1 325.20 t of RDF.

For the RDF used on the site, a **biomass content of 84% (2018), 81.3% (2019 and 2020)** is indicated - this is a **very high biomass content**, compared to the data from other installations in the country burning RDF, such as: **Holcim (Bulgaria) JSC 46 - 56%, Devnya cement JSC 44-45%.**

The high percentage of biomass should definitely be questioned, as it directly affects the GHG emissions reported by the installation. It is important whether the laboratory that issued the certificate of analysis (№1138 B-2 / 20.12.2018) **has accreditation** to perform such analysis. In accordance with international standards, the analysis should be performed according to EN 15440 “Solid recovered fuels. Methods for the determination of biomass content ”.

The reported emissions from the RDF biomass fraction are 36 203 tCO2 (in 2018), 40 541 (in 2019) and 1 733 (in 2020), which should not be considered as biomass if the laboratory that performed the analysis is not accredited according to the relevant standard. Expressed in monetary terms at the average then allowances prices - EUR 25.61, EUR 25.09 and EUR 50.00 respectively is **EUR 927 241 (2018), EUR 1 017 114 (2019) and EUR 86 655 (2020).**

It is not clear how the relevant quantities and parameters are taken into account, as the RDF does not appear in the GHG emission permit and in the monitoring plan.

### *2.3.2.2 Sub-bituminous coal - a mixture of brown and lignite coal*

In 2020, the Emission Factor (EF) of a mixture of brown and lignite coal decreased compared to 2017 (**99.57** $tCO_2$ / TJ) by **34.4%**, with a value of **65.30** $tCO_2$ / TJ. The National GHG Emission Inventory Report used an EF of 96.1 $tCO_2$ / TJ for brown coal and EF of 104 - 108 $tCO_2$ / TJ for lignite.

| | EF tCO2/TJ | NCV GJ/t |
|---|---|---|
| 2017 | 99.57 | 6.92 |
| 2018 | 79.41 | 7.96 |
| 2019 | 72.19 | 7.5 |
| 2020 | 65.3 | 7.53 |
| 2021 | 84.90 | 6.95 |

The emission factors used to determine the emissions from the installation are typical for liquid fuels such as: diesel, fuel oil, gasoline and other petroleum products. The net calorific value (NCV) has not changed significantly during this period.

**The fact that the EF is too low** should have been detected by the developing team of the National GHG Emission Inventory (EEA and external consultant).

The minimum EF according to IPCC 2006 for lignite is **90.9** $tCO_2$ / TJ and for brown coal it is **92.8** $tCCO_2$ / TJ.

An assessment can be made by applying the minimum EF, in accordance with the IPCC 2006 for lignite.

### 2.3.3. Reduction of the reported $CCO_2$ emissions

**2018**

- Based on an IPCC 2006 emission factor of **90.9** $tCO_2$/TJ for a mixture of lignite and brown coal, and a conservative estimate of the RDF biomass fraction, the estimated $CO_2$ emissions are **1 400 241 $tCO_2$**, or **206 545 $tCO_2$** less than reported in the GHG report **1 193 696 $tCO_2$**, which at the then average price of allowances – 25.61 EUR, expressed in monetary equivalent is **EUR 5 290 068** (lower costs for purchasing allowances).

**2019**

- Based on an IPCC 2006 emission factor of **90.9** $tCO_2$/TJ for a mixture of lignite and brown coal, and a conservative estimate of the biomass fraction of RDF, the estimated $CO_2$ emissions are 1 137 414 $tCO_2$ while 875 384 $tCO_2$ are reported. The difference is **262 030 $tCO_2$**, which at the price of allowances – EUR 25.09, expressed in monetary equivalent is **EUR 6 573 962.**

**2020**

- Based on an IPCC 2006 emission factor of **90.9** $tCO_2$/TJ for a mixture of brown and lignite coal, and a conservative estimate of the RDF biomass fraction, the estimated $CO_2$ emissions are 818 389 $tCO_2$ against the reported 591 099 $tCO_2$. The difference is **227 290 $tCO_2$**, which at the price of allowances – EUR 50.00, expressed in monetary equivalent is **EUR 11 364 485.**

**2021**

- Based on an IPCC 2006 emission factor of **90.9** tCO2/TJ, the estimated $CO_2$ emissions are 804 249 $tCO_2$ against the reported 752 943 $tCO_2$. The difference is **51 306 $tCO_2$**, which at an average price of allowances – EUR 85.00 (average price for the month of April 2022), expressed in monetary equivalent is EUR **4 361 013.**

### 2.3.4. Discrepancies on the site:

| Year | Discepancy | Unreported GHG emissions - estimated $tCO_2$ | Financial profit - estimated EUR |
|---|---|---|---|
| 2017 | ● The biomass burned on the site is not reported in the Annual environmental report and was used in violation of the IPPC Permit | - | - |
| 2018 | ● Use of biomass, in violation of the IPPC Permit | - | - |

| Year | Discepancy | Unreported GHG emissions - estimated $tCO_2$ | Financial profit - estimated EUR |
|---|---|---|---|
| | ● The biomass content of RDF is very high 84% | 36 203 | 927 241 |
| | ● Unrealistically low emission factor for brown and lignite coal mixture, as a result of which emissions are underestimated | 170 342 | 4 362 826 |
| | **Total for the year** | **206 545** | **5 290 067** |
| 2019 | ● The biomass content in RDF is very high 81.3% | 40 541 | 1 017 114 |
| | ● Unrealistically low emission factor for brown and lignite coal mixture, as a result of which emissions are underestimated | 221 489 | 5 556 848 |
| | **Total for the year** | **262 030** | **6 573 962** |
| 2020 | ● The biomass content in RDF is very high 81.3% | 1 733 | 86 655 |
| | ● Unrealistically low emission factor for brown and lignite coal mixture, as a result of which emissions are underestimated | 225 557 | 11 277 830 |
| | **Total for the year** | **227 290** | **11 364 485** |
| 2021 | ● Unrealistically low emission factor for brown and lignite coal mixture, as a result of which emissions are underestimated | **51 306** | **4 361 013** |
| **Total for the period 2017-2021** | | **747 171** | **27 589 527** |

### 2.3.5. Steps to determine the real emissions of the installation

1. Obtain data from the EWRC for the amount of heat energy produced by the boilers.
2. Obtain data from EWRC for the quantities of the fuels used.
3. Make a new verification (check) of all data. By law, these data are stored on site for 10 years and the accounting documentation for 5 years.
4. Review the certificates of analysis of the accredited laboratory that tested the coal and RDF, as well as the scope of accreditation of the laboratory.
5. Calculate the correct $CO_2$ emissions, based on EWRC, EEA - IPPCP data and data stored on the site, including accounting data.

## 2.4 "Brikel" LTD

| | |
|---|---|
| IPPCP | №40-H1/2011 |
| GHGP | Decision № 92-H2-A0 / 2015 for the issuance of GHGP № 92-H2 / 2015 |
| Activity | production of electricity and heat |
| Fuels allowed under IPPCP | coal |
| Fuels used | lignite, fuel oil, biomass, wood wastes, RDF |

### 2.4.1. Compatibility of the information presented in the Environmental Report (IPPCP), the GHG Report and the E-PRTR

**2017**

1. The CO2 emissions reported in the European Pollutant Release and Transfer Register (E-PRTR) are the same as those in the GHG report but do not match those in the IPPCP.

| 2017 | Annual environmental report under IPPCP | GHG report | E-PRTR |
|---|---|---|---|
| Emissions, tCO2 | 583 822.00 | 683 822 | 683 822.00 |

2. Biomass was burned on the site **in violation of the IPPCP.**
3. According to the data submitted to EWRC for determining the price https://www.dker.bg/uploads/zaqvlenia_ceni/2018/toplo/Brikel_EAD.zip, no use of biomass was reported. In the Application for approval of electricity and thermal energy prices of "Brikel" LTD for the period 01.07.2018-30.06.2019, it is stated that supply of biomass is planned: "during the new period, we also plan to supply symbolic amounts of biomass." In 2017, expenditures have been made for the purchase of coal, but not for biomass. However, in the Environmental Report and GHG reports quantities of biomass burned are reported and, there are indications that biomass was purchased as a product.

| Fuel | EWRC | GHG report | Δ |
|---|---|---|---|
| Biomass and wooden waste, t | 0 | 55 184 | 55 184 |

**2018**

1. The CO2 emissions reported to the European Pollutant Release and Transfer Register (E-PRTR) are the same as those in the GHG report but do not match those in the Environmental Report.

| 2018 | Annual environmental report under IPPCP | GHG report | E-PRTR |
|---|---|---|---|
| Emissions, tCO2 | 375 689.00 | 475 689 | 475 689.00 |

2. Biomass was burned on the site **in violation of the IPPCP.** In 2018, 34.7% of the energy used on the site is from biomass.
3. According to the data submitted to EWRC for determining the price https://www.dker.bg/uploads/zaqvlenia_ceni/2019/toplo/16_Brikel_01_04_2019.zip, the

quantities of coal reported in the GHG and IPPCP reports are significantly underestimated, at the expense of biomass.

| Fuel | EWRC | GHG report | Δ |
|---|---|---|---|
| Lignite, t | 787 854 | 659 888 | -127 966 |
| Biomass, t | 92 842 | 220 808 | 127 966 |

This results in significantly lower CO2 emissions being reported.

**2019**

1. The $CO_2$ emissions reported to the European Pollutant Release and Transfer Register (E-PRTR) are the same as those in the GHG report but do not match those in the Environmental Report.

| 2019 | Annual environmental report under IPPCP | GHG report | E-PRTR |
|---|---|---|---|
| Emissions, tCO2 | 251 248.00 | 351 248.00 | 351 248.00 |

2. Biomass and RDF were burned on the site **in violation of the IPPCP.** In 2019, 44% of the energy used on the site is from biomass and biomass fraction of RDF.

**2020**

1. Biomass was burned on the site **in violation of the IPPCP.** In 2020, 53% of the energy used on the site is from biomass.

**2021**

1. In 2021, it is already allowed to burn biomass, but the quantities that have been burned are **in violation of the IPPCP**. The authorized quantities are 357 335 t per year, and 369 939 tons were burned.
2. In the data submitted to EWRC for the purpose of pricing https://www.dker.bg/uploads/zaqvlenia_ceni/2022/toplo/16_Brikel.zip, data for 2021 are missing, but according to Appendix 2, the consumption of solid fuels exceeds those reported in the GHG report with 227 879 t. Based on these data alone, a correct assessment of the differences in quantities cannot be given.

## 2.4.2. Emission factors

### *2.4.2.1 RDF*

In 2019, 17 566.55 t of RDF were burned. For the RDF that was used on the site is reported **biomass content of 82.4%**. This is a **very high content of biomass**, compared to the data from other plants in the country burning RDF, such as: **Holcim (Bulgaria) JSC 46 - 56%, Devnya cement JSC 44-45%**.

The high percentage of biomass should definitely be questioned, as it **directly affects the GHG emissions reported by the installation.** It is important to find out whether the laboratory that issued the certificate of analysis has **accreditation** to perform such analysis. In accordance with international standards, the analysis should be performed according to EN 15440 “Solid recovered fuels. Methods for the determination of biomass content”.

The reported emissions from the RDF biomass fraction are 21 893 tCO2, which should not be considered biomass if the laboratory performing the analysis is not accredited according to the relevant standard. At the average at the time price of allowances - EUR 25.09 expressed in monetary terms this makes **EUR 549 271.**

It is not clear how the relevant quantities and parameters are taken into account, as the RDF is not included in the GHG emission permit and in the monitoring plan.

#### *2.4.2.2 Lignite*

In 2021, the Emission Factor (EF) of lignite coal decreased compared to 2017 ( average **88.60** tCO2 / TJ) by **25%**, with averaged value of **66.72** $tCO_2$ / TJ. The National GHG Emission Inventory Report used EF 104 - 108 $tCO_2$ / TJ for lignite coal.

| | EF $tCO_2$/TJ | NCV GJ/t |
|---|---|---|
| 2017 | 88.6 - averaged for lignite | 9.24- averaged for lignite |
| 2018 | 90.5 | 8.75 |
| 2019 | 79.48 | 8.95 |
| 2020 | 76.23 | 8.3 |
| 2021 | 66.72 | 9.50 |

These emission factors are typical for liquid fuels such as: diesel, fuel oil, gasoline and other petrol products. The net calorific value (NCV) has not changed significantly during this period.

**The overly low EF** should have been detected by the developing team of the National GHG Emission Inventory (EEA and external consultant), because these emission factors must be included in the calculation of the country-specific emission factor (CS EF) for lignite.

The minimum EF according to IPCC 2006 for lignite coal is 90.9 $tCCO_2$ / TJ

An assessment can be made by applying the minimum EF, in accordance with the IPCC 2006 for lignite.

### 2.4.3. Reduction of the reported emissions of $CO_2$

**2017**

- The assessment showed that with an IPCC 2006 emission factor of 90.9 $tCO_2$ / TJ and consumption of 888 360.28 t of lignite, the emissions were 701 530 $tCO_2$ while the reported amount was 679 681 $tCO_2$. The difference is **21 850 $tCO_2$**, which expressed in monetary terms at allowances price of EUR 17.00 is **EUR 371 474.**

**2018**

The assessment showed that with an IPCC 2006 emission factor of 90.9 $tCO_2$ / TJ and consumption of 659 887.83 t of lignite, the emissions were **569 534 $tCO_2$** while the reported amount was **475 689 $tCO_2$**. The difference is **93 845 $tCO_2$**, which expressed in monetary terms at allowances price of EUR 25.61 is **EUR 2 403 574.**

**2019**

The assessment showed that based on the IPCC 2006 emission factor of 90.9 $tCO_2$2/TJ and adjusted reports for RDF emissions were 422 402 $tCO_2$ against the reported 351 248 $tCO_2$. The difference is **71 154 $tCO_2$**, which at the price of allowances – EUR 25.09, expressed in monetary equivalent is **EUR 1 785 152.**

**2020**

- The assessment showed that with an IPCC 2006 emission factor of 90.9 $tCO_2$ / TJ and consumption of 553 323 t of lignite, the emissions were 336 155 $tCCO_2$ while the reported amount was 281 915 $CO_2$. The difference is **54 239 $tCO_2$**, which expressed in monetary terms at allowances price of EUR 50.00 is **EUR 2 711 970.**
- It should also be noted the reduction of the **oxidation factor**, which also reduces the reported GHG emissions. In 2018 it was **90.24%**, and in 2020 it dropped to **80.4%**, which leads to a reduction in reported emissions. It is not clear how the oxidation factor was defined, but it is usually around **98%** for coal-fired power plants.

**2021**

- The assessment showed that with an IPCC 2006 emission factor of 90.9 $tCO_2$/TJ, emissions were 292 378 $tCO_2$ against the reported 250 241 $tCO_2$. The difference is **42 137 $tCO_2$**, which at an average price of allowances – EUR 85.00 (average price for the month of April 2022), expressed in monetary terms is **EUR 3 581 616**.

- Also of note is the reduction in **oxidation factor**, which also reduces reported GHG emissions. In 2018, it was **90.24%**, and in 2021 it drops to an average of **86%**, leading to a reduction in reported emissions. It is not clear how this factor is determined, but typically for coal-fired plants it is in the order of **98%**.

### 2.4.4. Discrepancies on the site:

| Year | Discrepancies | Unreported GHG emissions -estimated, $tCO_2$ | Financial profit - estimated EUR |
|---|---|---|---|
| 2017 | ● Biomass was burned on the site in violation of the IPPCP | - | - |
| | ● Unrealistically low emission factor for lignite, as a result of which emissions are underestimated | **21 850** | **371 474** |
| 2018 | ● Biomass was burned on the site in violation of the IPPCP - 34.7% of the total energy input | - | - |
| | ● The quantities of coal reported to EWRC for price determination are significantly higher.<br>● Unrealistically low emission factor for lignite, as a result of which emissions are underestimated | **93 845** | **2 403 574** |
| 2019 | ● Biomass was burned at the site in violation of the IPPCP - 44% of the total energy input, expressed in TJ | - | - |
| | ● Unrealistically low emission factor | 49 261 | 1 235 882 |

| | | | |
|---|---|---|---|
| | for lignite, as a result of which emissions are underestimated | | |
| | ● The biomass content of RDF is very high 82.4% | 21 893 | 549 271 |
| | **Total for the year** | **71 154** | **1 785 153** |
| 2020 | ● Biomass was burned at the site in violation of the IPPCP - 52% of the total energy input, expressed in TJ | - | - |
| | ● Unrealistically low emission factor for a mixture of brown and lignite coal, as a result of which emissions are underestimated | **54 239** | **2 711 970** |
| 2021 | ● Biomass was burned at the site in quantities higher than those allowed in the IPPCP | | |
| | ● Unrealistically low emission factor for a mixture of brown and lignite coal, as a result of which emissions are underestimated | **42 137** | **3 581 616** |
| **Total for the period 2017-2021** | | **283 225** | **10 853 787** |

### 2.4.5. Steps to determine the real emissions of the installation

1. Obtain data from the EWRC for quantities of heat produced by the boilers.
2. Obtain data from the EWRC for the quantities of fuels used.
3. Make a new verification (check) of all data. By law, these data are stored on site for 10 years and the accounting documentation for 5 years.
4. Review the certificates of analysis of the accredited laboratory that tested the coal and RDF, as well as the scope of accreditation of the laboratory.
5. Calculate the correct $CO_2$ emissions, based on data from EWRC, EEA - IPPCP and site storage data, including accounting data.

## 2.5 TTP “Maritsa 3” JSC

| | |
|---|---|
| IPPCP | 41-H1-И0-A2/2021 |
| GHGP | Decision No. 84-H2--A0/2018 on the issuance of the GHGP No. 84-H2/2018. |
| Activity | production of electricity and thermal energy (for own needs) |
| Fuels allowed under IPPCP | lignite, fuel oil, natural gas, biomass |
| Fuels and materials used | lignite, fuel oil, natural gas, biomass, limestone |

### 2.5.1 Compatibility of the information presented in the environmental report (IPPCP) and the report on GHG, E-PRTR and to EWRC

**2017**

1. There is no discrepancy regarding emissions in the two reports. In the Annual environmental report on IPPCP, the amount of thermal energy produced was reported as 127 199 MWh or 457.92 TJ. The consumed amount of fuels is 458.29 TJ. This means that the installation has an **EC of 99.9%**, which is physically impossible. This means that the GHG report does not report all the fuel consumed on site and lower $CO_2$ emissions are reported.

**2018**

1. The GHG report indicates the amount of natural gas consumed, while in the Annual environmental report the amount of natural gas indicates is 0.
2. In the Annual environmental report the reported amount of thermal energy produced is 38 223.86 MWh or 137.61 TJ. The consumed amount of fuels is 117.17 TJ. This means that the installation has **an EC of 117%,** which is physically impossible. This means that the GHG report does not report all of the fuel consumed on site and underreports the emissions of $CO_2$.

**2021**

1. The GHG report indicates the amount of natural gas consumed, while in the Annual environmental report the amount of natural gas indicates is 0.
2. In the Annual environmental report the reported amount of thermal energy produced is 717 110 MWh or 2 582 TJ. The consumed amount of fuels is 117.17 TJ. This means that the installation has an **EC of 119 %**, which is physically impossible. This means that the GHG report does not report all of the fuel consumed on site and underreports the emissions of $CO_2$.
3. The amount of biomass burned exceeds that allowed under the IPPCP (20% of the total amount of fuels). Biomass is 54.6% of the fuels used at the site, expressed in TJ.

   For the three years, the data on the EWRC website do not contain essential information on the basis of which a comparison can be made:

https://www.dker.bg/uploads/zaqvlenia_ceni/2021/el/tec-maritsa-3-21.zip,
https://www.dker.bg/uploads/zaqvlenia_ceni/2018/el/tec-marica-3-ad.pdf
https://www.dker.bg/uploads/zaqvlenia_ceni/2022/el/tec_maritsa_3_22.zip

### 2.5.2 Emission factors

#### 2.5.2.1 Lignite

In 2021, the Emission Factor (EF) of lignite has decreased compared to 2017 by 17% and is 85.24 $tCO_2/TJ$. The National GHG Emissions Inventory Report used an EF of 104 - 108 $tCO_2/TJ$ for lignite.

| | EF $tCO_2/TJ$ | NCV GJ/t |
|---|---|---|
| 2017 | 102.10 | 7.87 |
| 2018 | 94.31 | 6.31 |
| 2019 | - | - |
| 2020 | - | - |
| 2021 | 85.24 | 7.23 |

**The overly low EF** should have been detected by the developing team of the National GHG Emission Inventory (EEA and external consultant), because these emission factors must be included in the calculation of the country-specific emission factor (CS EF) for lignite.

The minimum EF according to IPCC 2006 for lignite coal is 90.9 $tCCO_2$ / TJ

An assessment can be made by applying the minimum EF, in accordance with the IPCC 2006 for lignite.

**2021**

The assessment showed that with an IPCC 2006 emission factor of 90.9 $tCO_2/TJ$ and lignite consumption of 128 712 t, emissions were 79 422 $tCO_2$ against the reported 74 477 $tCO_2$. The difference is **4 945 $tCO_2$**, which at an average price of allowances – EUR 85.00 (average price for the month of April 2022), expressed in monetary equivalent is **420 353 EUR**.

### 2.5.3 Reduction of the reported $CO_2$ emissions

The main factors for this are:

- In 2021, **the emission factor of lignite is very low.** The low emission factor results in lower $CO_2$ emissions being reported.
- In 2017, 2018 and 2021, **the efficiency coefficient of the installation is 99.9, 117 and 119%**, respectively. This means that the GHG report does not report all of the fuel consumed on site and underreports $CO_2$ emissions. The available data do not allow an estimate to be made, but it can be guaranteed that the emissions from the plant are underestimated.

### 2.5.4 Discrepancies on the site

| Year | Discrepancies | Unreported GHG emissions – estimated $tCO_2$/ | Financial profit EUR – estimated |
|---|---|---|---|
| **2017** | Reported data yielding 99.9% EC | - | - |
| **2018** | Reported data yielding EC 117% | - | - |
| **2021** | Reported data yielding EC 119% | - | - |
| **2021** | Unrealistically low EF for lignite, resulting in underrated emissions | 4 945 | 420 353 |
| **Total for the period 2017-2021** | | **4 945** | **420 353** |

### 2.5.5 Steps to determine the real emissions of the installation

1. Obtain data from the EWRC for quantities of heat produced by the boilers.
2. Obtain data from the EWRC for the quantities of fuels used.
3. Make a new verification (check) of all data. By law, these data are stored on site for 10 years and the accounting documentation for 5 years.
4. Review the certificates of analysis of the accredited laboratory that tested the coal and RDF, as well as the scope of accreditation of the laboratory.
5. Calculate the correct $CO_2$ emissions, based on data from EWRC, EEA - IPPCP and site storage data, including accounting data.

# 3 General conclusions

## 3.1 About the installations

- The installations systematically **violate their IPPC Permits (IPPCP)** by burning fuels that are not allowed according to it - biomass and RDF. Often the quantities of fuels used in violation of the IPPCP **are around 50% of the total fuels** burned on the sites.
- Compared to the emission factors registered at other installation sites in Bulgaria, as well as compared to the global emission factors recognized by the IPCC, the emission factors applied by the installations are **too low**. This leads to the reporting of **much lower than the actual GHG emissions.**
- Emission factors for coal with values of 41.69 $tCO_2$ / TJ at calorific value - 9.03 TJ / t have been reported. The only fuel that is close to this emission factor is coke oven gas (lower limit), with a calorific value of 19.6 TJ / t (lower limit).
- There are cases of reported data on fuels and heat production where the efficiency coefficient of the installations turns out to be **more than 100%**, which is **technically impossible** and again leads to the reporting of lower emissions than the real ones.
- The oxidation factor, the low value of which also reduces the amount of the reported emissions, is very low for all installations, as in the case with "Brikel" Ltd, it even reached 80% in 2020. Normally, the oxidation factor is about 97-98%.
- Installations submit applications to EWRC for determining the prices of electricity and heat energy. In most cases, the submitted data does not match the data from the GHG reports. When data reported to EWRC is applied, significantly higher $CO_2$ emissions are obtained, and the efficiency coefficient of the installations has realistic values. This shows that the data submitted to EWRC are real, unlike the understated data submitted in the GHG reports.

Emission factors of the installations - summary and comparison with EF under IPCC 2006 and the National GHG emission inventory of Bulgaria, EF, $tCO_2$ / TJ

| | | "District Heating - Pernik" JSC | "District Heating – Sliven" LTD | TTP "Bobov dol" LTD | "Brikel" LTD | TTP "Maritsa 3" LTD | IPCC 2006 min EF | National GHG emissions inventory |
|---|---|---|---|---|---|---|---|---|
| Black coal | 2017 | | **74.51** | | | | 89.5 | 91.31 – 95.68 |
| | 2018 | | 91.62 | | | | | |
| | 2019 | | 91.82 | | | | | |
| | 2020 | | **83.25** | | | | | |
| | 2021 | | 104.91 | | | | | |
| Black coal - Balkan mines | 2017 | | 90.29 | | | | 89.5 | 91.31 – 95.68 |
| | 2018 | | 95.3 | | | | | |
| | 2019 | | **45.19** | | | | | |
| | 2020 | | 101.66 | | | | | |
| | 2021 | | - | | | | | |
| Brown coal | 2017 | 106.59 | **82.59** | | | | 92.8 | 96.1 |
| | 2018 | **76.23** | **86.29** | | | | | |
| | 2019 | **69.48** | 92.98 | | | | | |
| | 2020 | **72.07** | **87.05** | | | | | |
| | 2021 | **88.55** | **88.64** | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Brown coal low calorie | 2017 | | **57.79** | | | | 92.8 | 96.1 |
| | 2018 | | **41.69** | | | | | |
| | 2019 | | **48.68** | | | | | |
| | 2020 | | **66.07** | | | | | |
| | 2021 | | - | | | | | |
| Lignite briquettes | 2017 | 105.80 | | | | | 90.9 | 97.5 |
| | 2018 | **86.01** | | | | | | |
| | 2019 | **86.23** | | | | | | |
| | 2020 | **88.27** | | | | | | |
| | 2021 | **92.69** | | | | | | |
| Mixture of brown coal and lignite | 2017 | | | 99.57 | | | 90.9 | 104 - 108 |
| | 2018 | | | **79.41** | | | | |
| | 2019 | | | **72.19** | | | | |
| | 2020 | | | **65.3** | | | | |
| | 2021 | | | **84.90** | | | | |
| Lignite | 2017 | | | | **88.6** | **102.10** | 90.9 | 104 - 108 |
| | 2018 | | | | 90.5 | 94.31 | | |
| | 2019 | | | | **79.48** | | | |
| | 2020 | | | | **76.23** | | | |
| | 2021 | | | | **66.71** | **85.24** | | |

Marked in red are EFs that exceed the minimum EFs under IPCC and those used in the national GHG emission inventory.

For comparison can be used the reported data from "AES - 3C Maritsa Iztok 1" LTD, TPP Maritsa Iztok 2 JSC and "Contour Global Maritsa Iztok 3" JSC:

- **emission factors for lignite coal** are in the range **99 - 108 t$CCO_2$ / TJ**
- **oxidation factor - 97 - 98%**

## 3.2 About the verification bodies, laboratories and their accreditation

**Verification body and the Bulgarian Accreditation Service**

The GHG reports are verified by an independent **Verification Body**, which is accredited by the **Bulgarian Accreditation Service**. The aim is to ensure that the Verification Bodies are independent from the operators and the reports verified by them **contain accurate and correct data** (no significant inaccuracies).

In the case of these installations, the verification was performed by **GREEN AND FAIR JSC** (for the reports until 2018) and **GMI Verify Ltd** (from 2018 onward).

It should be noted that until 2019 **GREEN AND FAIR JSC** was registered as a **bearer share company** (as can be seen from the commercial register), therefore, the lack of connection with the inspected installations and the independence of the Verification Body is not guaranteed. **The Bulgarian Accreditation Service** is obliged to monitor the independence of the Verification Bodies but has issued and maintained for more than 10 years a certificate for accreditation of a joint stock company with an unclear owner.

The verification body is required (in accordance with Article 15 of IMPLEMENTING REGULATION (EU) 2018/2067) to assess the **plausibility of fluctuations** and trends over time or between comparable items; and to identify **immediate outliers**, unexpected data and data gaps.

The operator's report is considered satisfactory only when it is **free from material misstatements**. The inaccuracies of the reported GHG emissions described above **are significant and exceed the materiality level.** In such a case, the Verification Body should promptly inform the operator and request the necessary corrections.

As can be seen, no such corrections were made and the Verification Body certified reports with material misstatements. This applies to both verification bodies - **GREEN AND FAIR JSC** (for reports until 2018) and **GMI Verify LTD** (from 2018 onward).

These **material misstatements** should be detected during an inspection by **the Bulgarian Accreditation Service**. These inspections by BAS are carried out annually.

BAS should temporarily suspend the action or limit the scope of accreditation in the following cases: a) The verification body has committed a serious violation of REGULATION 2018/2067; b) The verification body permanently commits repeated violations of the requirements under REGULATION 2018/2067.

When checking the BAS register, it can be seen that on 15.03.2022, the BAS amended the accreditation order for **GMI Verify LTD, expanding the scope instead of limiting it.** The BAS did not report the gross violations of the reporting under REGULATION 2018/2066 and the verification process under REGULATION 2018/2067, although the issue of these installations was already brought to the public attention.

When the national Accreditation Authority (BAS) receives a complaint about an examining body from the competent authority (EEA) or other interested parties, it: a) makes a decision on the merits of the complaint; b) ensures that the relevant examining authority is given an opportunity to make comments; c) takes appropriate action to consider the complaint; d) put the complaint on record and undertakes actions; and e) responds to the complaint.

Member States shall **regularly monitor their national accreditation bodies** to ensure that they consistently meet the requirements of IMPLEMENTING REGULATION (EU) 2018/2067. Where a national accreditation body does not meet the requirements of this Regulation or **does not fulfill its obligations**, the Member State concerned shall take the necessary corrective action or ensure that such corrective action is taken and **notify the Commission** thereof.

**Accredited laboratories and the Bulgarian Accreditation Service**

**The laboratory**, which performs the fuel analyzes must also be **accredited and independent.** The accreditation of these laboratories are also issued and maintained by the **Bulgarian Accreditation Service.**

Some of the considered installations have their own accredited laboratories such as:

- COAL LABORATORY AT TPP - BOBOV DOL LTD,
- TEST LABORATORY FOR SOLID FUELS AT BRIKEL LTD,
- LABORATORY FOR COAL TESTING AT DISTRICT HEATING - PERNIK LTD

Thus, the analysis of the fuels on which these low emission factors are obtained are actually performed **by the installations themselves** and no one checks how reliable these results are.

Characteristic of many laboratories in Bulgaria is the application of internal laboratory methods. The development and application of internal laboratory methods, instead of available Bulgarian or international standards, may be necessary:

- if no suitable methods exist,
- if existing test methods are modified when the laboratory has **more modern equipment** than described in the relevant standard or
- due to economic considerations.

The accreditations of the laboratories issued by BAS involve a **huge amount of internal laboratory methods**, provided that Bulgarian or international standards are **available.** This is not a good practice and the reasons for this are not clear.

This also applies to laboratories that carry out **periodic measurements of air pollutant emissions and control of continuous measurement systems from stationary sources.**

This practice is extremely rare in the accreditation of laboratories in the EU.

## 3.3 Other state authorities

- **The reports on GHG, IPPCP and E-PRTR** are submitted to the **EEA, but apparently no one checks or compares the data** there, as a result of which there are often **drastic discrepancies** between the three reports.
- Every year, the respective **RIEW** inspects the installations, issuing opinions from the inspections in which apparently ***there is no information at all*** about any ***discrepancies*** found in the data on the emission factors and the fuels.
- The installations report part of their data to the **EWRC**. Energy prices are determined on the basis of these data. Apparently, the **EWRC** ***does not check*** to what extent the information provided to them corresponds to that presented in the GHG reports although the pricing also takes into account data on required emission allowances, the costs for which are an essential part of the cost of energy.
- Most of the considered installations participate in the so-called derogation. The annual reports of the installations on the derogation are also verified and submitted to **the Ministry of Energy**. Apparently, **ME** ***does not check the accuracy*** **of the information presented to them as well.**
- Every year, the data are used and verified by **the developers of the National GHG Inventory, Sector Energy** (EEA and external consultant - **Denkstatt Bulgaria LTD**), as based on the reports of the GHG installations, the country-specific emission factors are developed. In reality, these are the experts who have access to and a comprehensive view of the information on emission factors and calorific value of all fuels and installations in Bulgaria. The inadequate emission factors of these installations are deliberately excluded from the national emission factor estimates. It is not clear why the data on inadequate emission factors did not lead to consequences for the Verification Authorities and the installations.
- The facilities report different data to the various government authorities and the impression is that there is a lack of any communication between them.

## 3.4 Underestimated emissions and saved financial resources

The underestimated emissions and the saved financial resources, as a result of the actions and inactions of the installations, laboratories, EEA, the Bulgarian Accreditation Service, RIEW, EWRC and ME are presented in the following table:

| | Year | "District Heating - Pernik" JSC | "District Heating - Sliven" LTD | TPP "Bobov dol" LTD | "Brikel" LTD | TTP "Maritsa 3" LTD | TOTAL |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| t $CO_2$ | 2017 | 180 110 | 32 842 | | 21 850 | | 234 802 |
| | 2018 | 88 064 | 41 511 | 206 545 | 93 845 | | 429 965 |
| | 2019 | 120 765 | 27 009 | 262 029 | 71 154 | | 480 957 |
| | 2020 | 311 567 | 18 225 | 227 290 | 54 239 | | 611 321 |
| | 2021 | 6 370 | 95 879 | 51 306 | 42 137 | 4 945 | 200 638 |
| | **2017-2021** | **706 876** | **215 466** | **747 170** | **283 225** | **4 945** | **1 957 682** |
| EUR | 2017 | 3 062 113 | 558 357 | | 371 474 | | 3 991 944 |
| | 2018 | 2 255 496 | 1 063 181 | 5 290 068 | 2 403 574 | | 11 012 319 |
| | 2019 | 3 029 831 | 677 618 | 6 573 962 | 1 785 152 | | 12 066 563 |
| | 2020 | 15 578 328 | 911 244 | 11 364 485 | 2 711 970 | | 30 566 027 |
| | 2021 | 541 482 | 8 149 730 | 4 361 013 | 3 581 616 | 420 353 | 17 054 194 |
| | **2017-2021** | **24 467 250** | **11 360 130** | **27 589 528** | **10 853 787** | **420 353** | **74 691 047** |

The financial resources saved are calculated on the basis of the average price of the quotas for the relevant year and on the basis of the estimated CO2 emissions from the reports submitted to EWRC, and with the application of an emission factor in accordance with IPCC 2006 for the relevant fuel. The presented estimates are **conservative**, since it is not possible with the available data to make a sufficiently accurate assessment of the quantities of **unreported emissions** as a result of the **impossibly high** (over 100%) efficiency coefficients of the installations.

| | 2017 | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|---|
| “District Heating – Pernik” JSC, Pernik; TTP “Republika” | 116.38 | 82.38 | 88.18 | 260.34 | 86.56 |
| "District Heating-Sliven-eng. Angel Angelov" LTD | 75.23 | 80.06 | 73.15 | 93.15 | 99.50 |
| “Brikel” LTD | 88.71 | 88.57 | 85.17 | 85.85 | 85.85 |
| TTP "Maritsa 3" LTD | 99.92 | 117.44 | - | - | 119.33 |

Given the clear evidence of underestimation of GHG emissions from these installations and the fact that, in accordance with the legislation, data related to the reporting of GHG emissions under the EU ETS are stored for 10 years, it is mandatory an estimation of the actual emissions for the entire period 2011-2021 to be made by the competent authority (EEA). The inspection should be carried out together with EWRC, since the data available to it are visibly closer to the real ones.