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# **OLSZTYN WASTE MANAGEMENT PPP**

## **SUPPLEMENTARY ENVIRONMENTAL AND SOCIAL ANALYSIS REPORT**

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Revision       **7**  
Date           **July 2018**  
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List of abbreviations:

CCGT- Combined Cycle Gas Turbine  
CHP - Combined Heat and Power Plant  
PPP - Public-Private-Partnership  
HP – Heating Plant  
RDF - Refuse Derived Fuel  
EIA - Environmental Impact Assessment  
EBRD - European Bank for Reconstruction and Development  
IED - The Industrial Emissions Directive  
MPEC- Municipal Heating Company (Miejskie Przedsiębiorstwo Energetyki Ciepłej)  
SCR - Selective Catalytic Reduction  
SNCR - Selective Non-Catalytic Reduction  
CFB - Circulating Fluidized Bed  
BFB - Bubbling Fluidized Bed  
BAT- Best Available Techniques  
IPPC - Integrated Pollution Prevention and Control  
APCR - Air Pollution Control Residues  
OTNOC – Other than Normal Operational Conditions

## 1. INTRODUCTION

MPEC Olsztyn, a district heating company (the Company) of the city of Olsztyn is developing a combined heat and power plant (CHP) which will be the major source of heat for a district heating network in the city (the Project). The Project is being developed in a public-private-partnership system (PPP), a process of private partner selection is currently ongoing.

A need for a new heating source in the city is determined by the fact, that the second largest heating source, Michelin CHP, will terminate its operations in 2019/2020 as the CHP will not be able to meet environmental constraints imposed by the IED directive. The termination of the Michelin CHP will cause approximately 100 MWt deficit of heat energy, the city and the Company commenced feasibility studies in order to determine the optimal solution for future heat supply. As the result of these studies, a concept of a CHP fired with a refuse derived fuel (RDF) with auxiliary gas/oil fired boilers has been ultimately selected in 2012. The chosen technical concept secures that the future demand for heat in the City will be met despite the reduced thermal capacity of the Company's heating plant (HP) Kortowo, but also closes the municipal waste management concept in the central part of the Warmińsko-Mazurskie voivodship, by utilization of RDF produced by a new biological-mechanical treatment facility operated by ZGOK Sp. z o.o. in Olsztyn.

The Project was subject to environmental impact assessment (EIA) and was granted environmental decision which imposes environmental constraints that must be taken into account by the construction design and is attached to the application for the construction permit. The EIA was conducted based on an EIA report<sup>1</sup>, which discusses in wide extent environmental and social impacts generated during construction, operation and dismantling of the facility. This EIA report was available for review by all interesting parties.

The Project is considered for financing by the European Bank for Reconstruction and Development (the Bank, EBRD). As part of the detailed review against EBRD Environmental and Social Policy and Performance Requirements, a Gap Analysis Report has been prepared by Ramboll Environ and concluded that, the national EIA report prepared by Energoprojekt Katowice in April 2015 and approved by the competent authorities resulting in Environmental Decision (environmental permit) issued in 2016 was in line with the EU EIA Directive, Habitat Directive, IED Directive and other relevant European Legislation. The Gap Analysis Report identified that to meet EBRD Requirements the national EIA should be supplemented with independent studies regarding:

- BAT Assessment;
- Impacts related to the project associated facilities;
- Social impacts;
- Stakeholders engagement activities;
- Existing environmental and social management system
- Emission of carbon dioxide.

Additional review of the Project, its technical documentation and planning activities undertaken to date covering the above topics is presented in this Supplementary Environmental and Social Analysis Report, prepared by Ramboll Environ. In addition to Supplementary E&S Analysis Report, a Stakeholder Engagement Plan, Non-technical Summary and Environmental and Social Action Plan were prepared and will be part of the public disclosure package. Moreover, a national EIA report prepared by Energoprojekt Katowice will also be a part of the disclosure package.

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<sup>1</sup> Raport o oddziaływaniu na środowisko przedsięwzięcia pod nazwą: Budowa instalacji termicznego przekształcania frakcji palnej powstałej w wyniku przetworzenia odpadów komunalnych, zapewniającej odzysk energii i dostawę ciepła dla mieszkańców Olsztyna wraz z infrastrukturą towarzyszącą (in Polish). Energoprojekt Katowice, April 2015.

## 2. THE PROJECT

### 2.1 Project Sponsor

As indicated in the previous section, the Project will be developed by a SPV created by MPEC and a private partner, whose selection is currently ongoing. MPEC is a limited liability company wholly owned by the City of Olsztyn.

The company operates one boiler house, equipped with 5 coal fired boilers type WR-25 of a total nominal gross capacity of 179 MWt. Two of these can co-incinerate biomass. Another dedicated biomass fired boiler is under construction and it is expected to be ready for operations in 1<sup>st</sup> quarter of 2019. There are also two gas engines installed at the facility which produce both heat and electricity in co-generation. The heat capacity of the engines amounts 855 kWt and 427 kWt respectively and electrical capacity 800 kWe and 400 kWe. MPEC supplies heat to approximately 60% of apartments and public buildings in the city via a district heating network of a total length of approximately 155 km, of which approx. 99 km (64%) is made of pre-insulated pipelines, no older than 27 years. The district heating network supplies heat to 1289 heating nodes.

The company employs 290 people in Heat Generation Division (Kortowo heating plant), Heat Distribution Division and Technical Service Department.

The company implemented and certified an integrated management system based on the ISO 9001, ISO 14001 and PN-N 18001 standards.

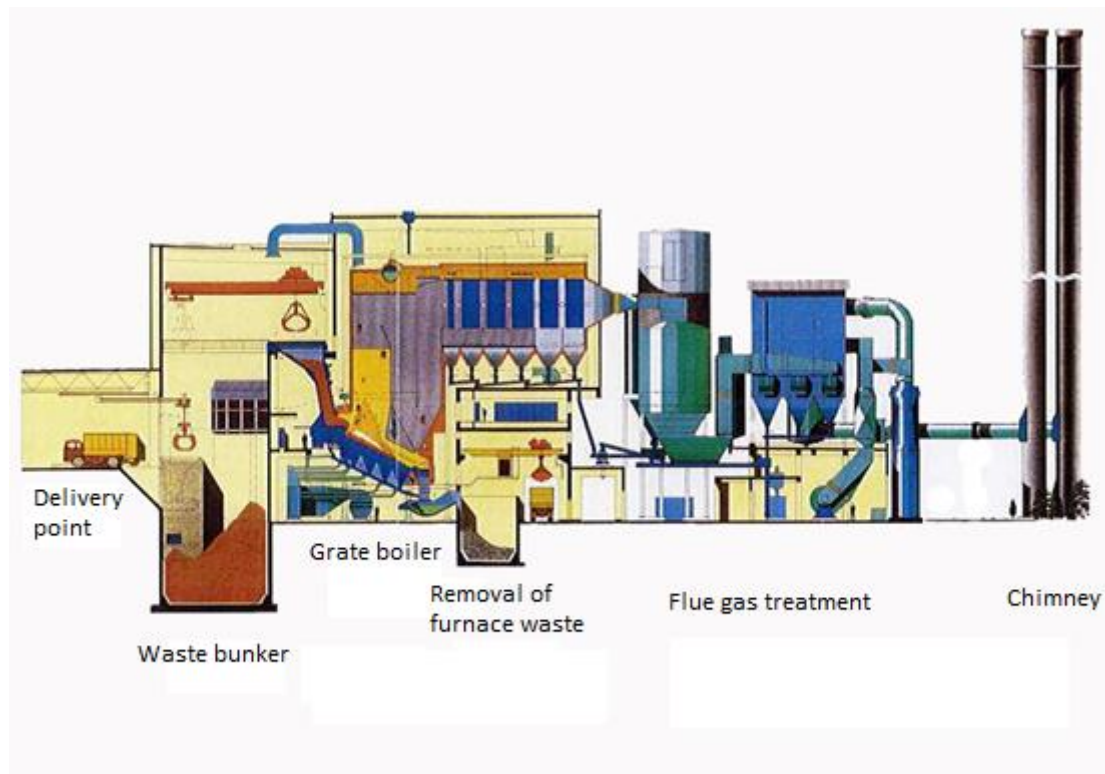
Apart from Kortowo CHP the municipal district heating network is also supplied by another heating source which is EC Michelin CHP of 100 MWt capacity. This CHP, however, will not be able to meet upcoming environmental standards and is planned for shut-down in 2019/2020.

Kortowo CHP after the modernization will be able to have a heat output of existing devices (mainly coal-fired) of 150-175MW<sub>t</sub> which will be increased by 25 MW after commissioning of the new biomass fired boiler. The demand for heat of MPEC Olsztyn thermal system is currently at the level of 240-250MW<sub>t</sub> and, according to existing MPEC's analysis, a significant decrease in demand is not expected. So, the withdrawal of EC Michelin from the system will result with approximately 90MW<sub>t</sub> deficit of heat.

### 2.2 Strategic Fit

In order to fill up this heating gap, as a result analysis, recommendations of the feasibility study (Feasibility Study for EC Olsztyn including alternative fuels from municipal waste processing –made by Ramboll Polska Sp. z o.o. in 2012) and the findings of the competitive dialogue with potential Private Partners, the company decided to implement a new energy source consisting of:

- point of fuel acceptance and unloading;
- waste bunker for fuel delivery to the process;
- grate pre-RDF (Refused Derived Fuel) and RDF fired Incineration Plant with the maximum capacity of 110.000 t/y with thermal power of 48MW<sub>t</sub>;
- flue gas cleaning (treatment) system;
- chimney with exhaust monitoring system;
- installation for furnace waste management;
- engine room;
- external installations;
- ancillary installations, including management of auxiliary fuel (light heating oil), process water pre-treatment plant, sorbent and ammonia (or urea) management installations;
- two reserve-peak boilers fired by natural gas or heating oil with a power of 38 MW each;
- Diesel emergency power generator with a power of 1 MW, constituting emergency power source during start-up or shutdown of facility's equipment as well as reserve power supply for peak boilers in case of blackout.



**Figure 1. An overview picture of the incineration technology. (Source: *The Environmental Impact Assessment Report prepared by the Company of Energoprojekt-Katowice SA in April 2015*).**

The facility will be equipped with effective flue gas treatment installation, which will utilize a semi-dry method with use of quicklime or hydrated lime for acid gases reduction, SCR or SNCR for NO<sub>x</sub> reduction and activated carbon for heavy metals and dioxins reduction. Particulate matter will be removed by bag filters. Waste incineration facility (WtE) as a new heat source will produce heat for the heating network, hot water and electricity.

The adopted solution allows for consistent and ecological implementation of two objectives:

- maintaining continuity of heat supply without the use of fossil fuels;
- and the efficient management of energy fraction of municipal waste delivered from Warmia-Mazury voivodship.

The following fuel streams will be used:

- waste from ZGOK Olsztyn - an alternative fuel with the code 19 12 10 - Combustible Waste;
- high-energy fraction remaining after the sorting of municipal waste;
- high-energy fraction remaining after composting fraction of 20-80mm;
- other wastes with similar parameters to the waste streams above.

The Project has been developed since 2012 and involved numerous activities, including wide scope public consultations (see section 7), preparation of the contractual documents for selection of a Private Partner and technical and economical studies (see section 3). The project was also subject to a full-scope environmental impact assessment in line with the national legislation successfully completed in 2016 and resulting in Environmental Decision issued by the President of the City of Olsztyn. Further, the Project is integrated into a Voivodeship Waste Management Plan (2016) which was subject to strategic environmental impact assessment.

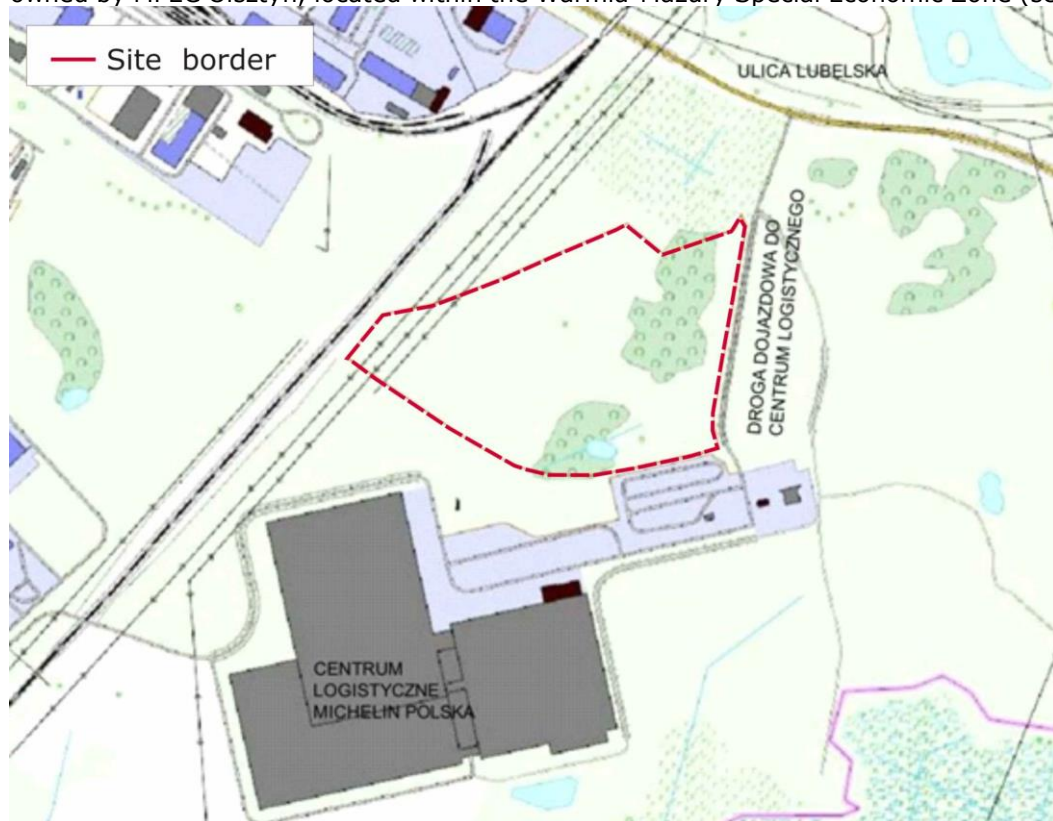




**Figure 2. Architectural conception of the Project.** (source: Website devoted to the Project developed by MPEC (available on the Internet: <http://ec.olsztyn.pl/plebiscyt>, access: April 2017).

### 2.3 Project Location

The facility is planned to be located in the Olsztyn municipality, at Lubelska Street, on the plots owned by MPEC Olsztyn, located within the Warmia-Mazury Special Economic Zone (see Figure 3).



**Figure 3. Site location** (Source: EIA report<sup>1</sup>)



The site is surrounded by railway lines (from the west), access road to the Michelin logistic center (from the east), Michelin logistic center (from the south) and area designated for the planned ring road of the city of Olsztyn (from the north). The site is not located in the close vicinity of nature protection areas. The nearest residential development is located in a distance of approximately 300 m to the northwest of the site. The subject site is an undeveloped idle land covered with vegetation of a non-anthropogenic character, including grasses and weeds (see Figure 5 and Figure 4). The subject site is not used for agricultural purposes.



**Figure 4. The Project site (view toward south) (source: EIA report)**



**Figure 5. The Project site (view towards northwest) (source: EIA report)**

The nearest located nature protection areas are as follows:

- Natura 2000 area established pursuant to Habitats and Birds Directives:
  - a) Ostoja Napiwodzko-Ramucka (PLH280052) - located approximately 8.9 km to the southeast of the site;

- b) Puszcza Napiwodzko-Ramucka (PLB280007) - located approximately 6.1 km to the south of the site.
- Landscape protected areas:
  - a) Dolina Środkowej Łyny located approximately 4 km to the north of the site;
  - b) Ostoja Puszczy Napiwodzko-Ramuckiej – located approximately 4.3 km to the south of the site;
  - c) Obszar Chronionego Krajobrazu Pojezierza Olsztyńskiego – located approximately 4.4 km to the east of the site.
- Nature reserves:
  - a) Mszar - located approximately 5.6 km to the northwest of the site;
  - b) Redykajny - located approximately 8.4 km to the northwest of the site;
  - c) Las Warmiński im prof. Benona Polakowskiego - located approximately 10.6 km to the south of the site;
  - d) Jezioro Kośno - located approximately 14.8 km to the southeast of the site;
  - e) Ostoja Bobrów na Rzece Pasłęce – located approximately 18 km to the southwest of the site;
  - f) Kamienna Góra - located approximately 18.4 km to the northwest of the site.

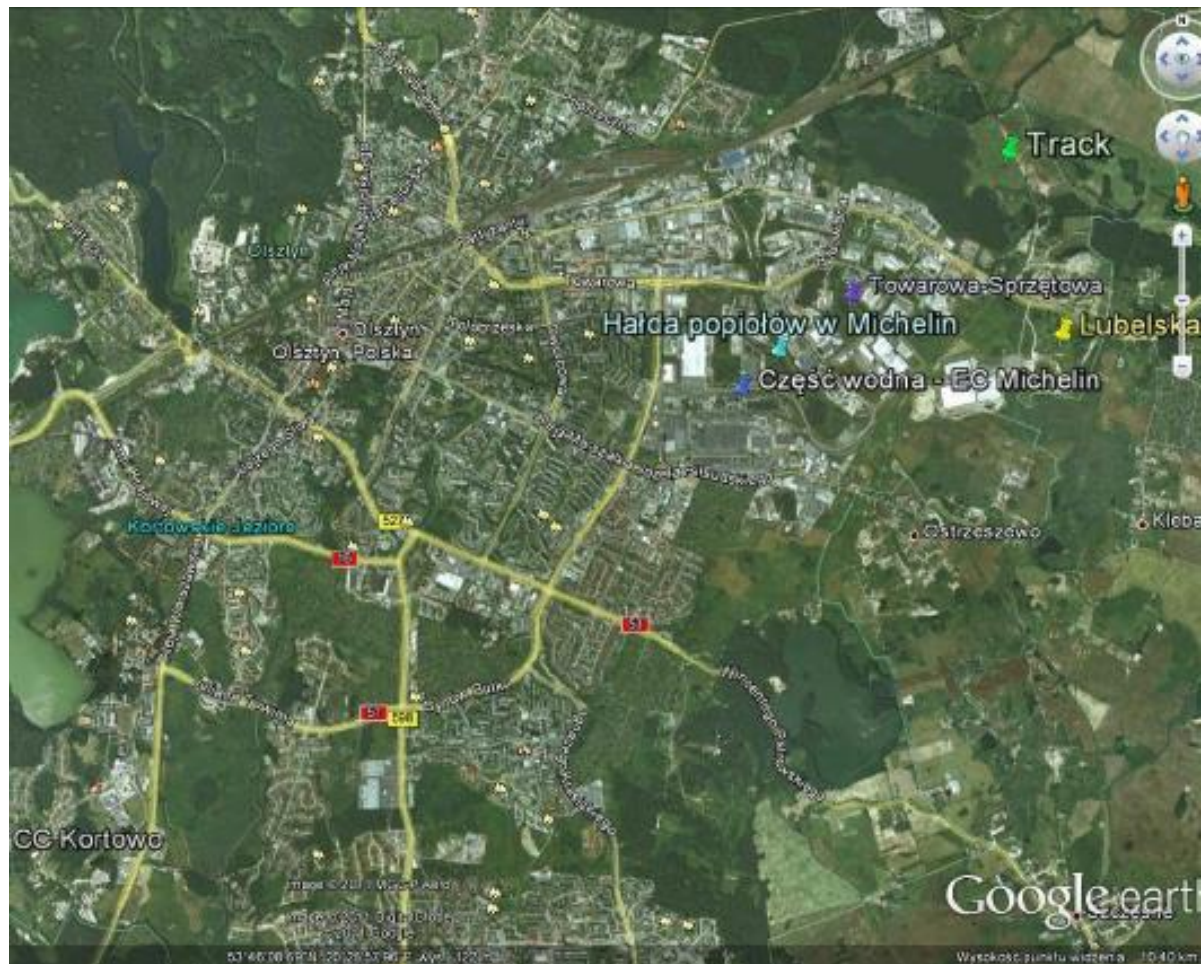


### 3. COMPARISON OF FEASIBLE ALTERNATIVES

The selection of ultimately chosen configuration of the CHP in Olsztyn was preceded with a number of different feasibility studies, which analyzed various configurations taking into account such criteria as possible locations and technical solutions, the latter including different fuels and boilers technologies.

The following locations (see Figure 6) have been analyzed in the first prefeasibility study (2011) of the Project<sup>2</sup>:

- "Ash heap" – a land plot near Kołobrzaska street at Michelin Polska industrial site;
- A land plot in the area of Sprzętowa and Towarowa streets;
- "Lubelska" at the territory of the Warmińsko-Mazurska Special Economic Zone;
- "Water part" of the Michelin CHP;
- "Na Tracku" – land plots nearby Trackie lake, and
- Kortowo Heating Plant.



**Figure 6. CHP locations considered by the preliminary feasibility study**

Among the considered locations, three were rejected without more detailed analysis being conducted:

- At Kortowo CHP, due to unfavourable location versus existing heating network, which would require substantial remodelling of the major part of the network in the city center;

<sup>2</sup> Wstępne studium wykonalności budowy elektrociepłowni w Olsztynie. Intercon Consulting Group, Wrocław, 2011 (in Polish)

- Land plot in the area of Sprzętowa and Towarowa streets, due to limited possibility to acquire the land in short period of time (the land is owned by the City and leased by Michelin);
- "Water part" of Michelin CHP, due to negative attitude of Michelin with respect to land release to third party and a need for important remodelling of the existing technical infrastructure of the facility.

Further, the remaining three locations have been compared taking into account such criteria as ownership and availability of land, site connection to the existing infrastructure of heating network, electrical grid, roads and land purpose as per local zoning plan. Finally, the site at Lubelska street has been identified as the best for the Project development, due to:

- Availability of an easy to purchase land of an area of 4-8 ha or more;
- Short distance to:
  - the existing district heating main line (approx. 650 m);
  - power transmission grid: possibility to connect to the existing 110 kV line at the site or to Olsztyn 1 substation which is 3.4 km distant from the site;
  - natural gas pipeline (approx. 1 km);
  - railway line;
- Possibility for water supply and wastewater discharge from/to city infrastructure
- Access to a road;
- Ongoing procedure of establishing a local zoning plan for the site (the plan is already approved and allows to construct a CHP).

The major identified disadvantages of the site have been:

- High purchase price;
- Complex soil conditions which would demand relocation of large amount of soil across the site;
- Long lasting negotiations with road authorities
- A need for remodelling and construction of approx. 2.75 km of main heating network lines.

Various fuel options were considered by the prefeasibility study:

- Natural gas;
- Biomass;
- Refuse Derived Fuel (RDF) and
- Hard coal.

Based on the forecasted heat demand, availability of different fuels, the prefeasibility study considered the following technical options:

- Option 1G, which assumed construction of two CCGT of a total electrical output of 240 MW and heat output of 173 MW. Such option would require Kortowo CHP to work as a peak heating source.
- Option 1MPS, which assumed construction of two fluidized bed boilers with steam turbine of the electrical output of 86.5 MW. Option was excluded from deeper analysis due to high demand for land (more than 13 ha).
- Option 2G, which assumed construction of CCGT of a total output of 262 MWe and 183 MWt, which would require 2 boilers of Kortowo CHP to work for baseload.
- Option 2MPS which assumed construction of fluidized bed boiler (fired with hard coal, RDF and biomass) with a steam turbine of a total output of 183 MWt and 102 MWe. This option would require 2 boilers of Kortowo CHP as a peak heating source.
- Option 3G assumed construction of a CCGT of a total output of 116 MWe and 93 MWt, that would require 2 boilers of Kortowo CHP as a peak heating source;
- Option 3B which assumed construction of a biomass fired fluidized bed boiler and steam turbine, the option was abandoned due to overwhelming advantages of other technological variants.
- Option 3RDF assumed construction of a RDF fired fluidized bed boiler and steam turbine, the option was abandoned due to shortage of RDF at the date of prefeasibility study;
- Option 3MPS assumed construction of fluidized bed boiler (fired with hard coal, RDF and biomass) with a steam turbine of a total output of 93 MWt and 56 MWe. This option would require boilers of Kortowo CHP as a peak heating source;

- Option MPSiG which assumed construction of a RDF and biomass fire boiler and CCGT of a total capacity of 120 MWe and 93 MWt. In winter period the shortage of heat would be covered by Kortowo CHP.

Abovementioned options have been analyzed from the point of view of demand for land as well as investment and exploitation costs.



In 2014 more detailed analysis of the Project were provided by Ramboll, which prepared a detailed feasibility study<sup>3</sup> for the CHP fired with RDF as the main fuel given the availability of RDF produced by a newly constructed municipal waste management facility in Olsztyn. Following the feasibility study preparation MPEC Olsztyn announced selection of the private partner and collected the preliminary concepts of the CHP, which, along with the Kortowo CHP should cover heat demand of the city estimated as 240-250 MWt.

The 2014 feasibility study analyzed the following technological variants presented in the bidders' (potential operators) concepts:

- As the basic development waste incineration facility of a capacity 85 – 150 thousand t/a in grate and fluidized bed (CFB and BFB) technologies (grate boiler variants R85, R100 and fluidized bed variants BFB100, CFB100 and CFB200) with a cogeneration unit was analyzed;
- Variants which base on gaseous fuel of a capacity to maximize time of operation under nominal capacity, under assumption of high-efficiency cogeneration. Variants based on CCGT (PGP40) and gas engines (Sil30) were analyzed;
- Variant based on biomass fuel (BIO20);
- Variant assuming two separate cogeneration units which could be constructed in phases: RDF fired unit (R85) and gas fired unit (BGP40 or SIL30) and biomass unit (BIO20)
- Hybrid variant which assumed cogeneration unit fired with RDF (R85) and gas turbine and recovery boiler to supply a common steam turbine.

The undertaken analyses compared:

- RDF incineration technologies bases on assumed amounts and parameters of the fuel (grate, BFB, CFB);

<sup>3</sup> Studium wykonalności elektrociepłowni w Olsztynie z uwzględnieniem paliwa alternatywnego pochodzącego z przetwarzanych odpadów komunalnych. Ramboll Polska Sp. z o.o., Warszawa, 2014 (in Polish)

- Amounts of available RDF in a range between 85 -150 thousand tons (variants R85, R100 and CFB200);
- Rationale for CHP expansion by a gas or biomass fired cogeneration unit. For the biomass variant an alternative has been presented which assumed construction of a larger unit which would co-incinerate wastes and biomass (CFB200)

The feasibility study analyzed also:

- Technology of a machine room and a cooling system;
- Rationale for installation of flue gas condensing unit for RDF fired boilers.

Based on the multi-criterial analyses, which apart from technical and economic factors have taken into account also environmental constraints, the feasibility study concluded that due to existing potential for RDF supply and better financial figures, the CHP should aim at incineration of 100 thousand tons of RDF rather than 85 thousand. Such option would also reduce working time of peak boilers at the CHP and coal fired boilers at Kortowo CHP, i.e. would be beneficial for the environment through reduction of the air emissions and reduction of coal use.

Further, the feasibility study analyzed grate boilers versus CFB and BFB boilers. Based on pros and contras of the analyzed technologies, all three technologies have been recommended for further analysis. The report also recommended development of gas-oil fired peak boilers.

Finally, the proposed locations as presented above and technologies (sterilization of waste in autoclave, waste pyrolysis, incineration of waste, gasification of waste, plasma technologies, removal of acidic gaseous components in a fluidized bed) were also analyzed in the EIA report<sup>1</sup>, which considered variant preferred by the Investor, i.e. grate boiler and an alternative variant based on CFB technology. The analysis indicated that the grate boiler is characterized as compared to CFB of the same gross energy input (i.e. energy introduced to the boiler in fuel) with:

- Lower gross electrical energy production (11.3 versus 12.1 MW);
- Slightly higher gross heat energy (32 versus 31.1 MW);
- Less amount of flue gases treatment hazardous wastes (5.5 versus 10.56 thousand t/a);
- Higher amount of bottom ash (18.7 versus 14.52 thousand t/a);
- Higher water demand (13.7 versus 12.7 m<sup>3</sup>/h);
- Slightly higher amounts of generated wastewater (3.3 versus 3.1 m<sup>3</sup>/h).

Finally, the EIA report recommended for development a grate boiler technology, mainly due to the fact that this technology is widely used around the world and that the amount of generated hazardous waste is much smaller than in case of CFB technology.



## 4. BEST AVAILABLE TECHNIQUES AND IED ASSESSMENT

### 4.1 Introduction

The Project is aimed at production of heat and electrical energy with RDF as the main fuel and two reserve peak boilers fuelled with natural gas or heating oil, hence is classified as the waste incineration plant with energy recovery.

The conditions for construction and operation of waste incineration plants until 2014 were specified by the Directive 2000/76/EC on the incineration of waste (WID). WID was in large extent adopted by the Best Available Techniques (BAT) Reference Document (BREF) for waste incineration (2006). Although this BREF constitutes a reference document rather than binding law, the provisions provided therein should be adopted and implemented for the existing and planned waste incineration plants.

In 2014 the WID directive was repealed and replaced by the Directive 2010/75/EU, of 24 November 2010, on industrial emissions (IED). The vast majority of the construction and operation requirements for waste incineration plants was directly transferred from WID to this new directive. The IED directive provides special provisions for waste incineration plants in Chapter IV and a certain requirements with respect to emissions and monitoring in Parts 3-7 of Annex VI.

The IED introduces BAT conclusions as binding standards for various industrial sectors, including waste incineration. It must be noted, that the BAT conclusions for waste incineration sector has not been adopted yet, however, a working draft of BREF for waste incineration was published by the European IPPC Bureau in May 2017. This working draft has been published for informational purposes only and, as clearly stated on its cover page: "has not been adopted or endorsed by the European Commission. Any views expressed are the preliminary views of the Commission services and may not in any circumstances be regarded as stating an official position of the Commission". Despite of that the working draft sets general directions for waste incineration industry hence it is important for the Project safety whether its general assumptions comply with these directions.

The working draft is structured to meet the IED directive, hence the best available techniques are presented in a form of conclusions. These, if approved by the European Commission will constitute the law binding the waste incineration industry.

Below we provide the Project assessment versus BREF (2006), draft BREF (2014) and IED Directive. It should be noted here that the final design of the facility has not been completed yet, this will be provided by a private partner of the SPV. Due to its size and nature the Project will be subject to IPPC permitting, hence all adopted solutions will have to meet the criteria stipulated by the IED directive and Polish environmental legislation, hence also BREF or BAT Conclusions if adopted. MPEC requires from the private partner to deliver devices and installations which fully comply with binding national and EU law at the date of delivery, and if these do not comply then the EU directives prevail. Further, a detailed assessment of the compliance with BAT for the "as built" installation will be carried out again at the stage of IPPC permitting (to be issued by the Marshall of Warmińsko-Mazurskie Voivodeship) as required by the national legislation. Should any non-compliances are identified, the IPPC permit will not be granted and the facility will not be allowed to operate. Such constraints guarantee that ultimately designed and constructed Project will have to comply with all applicable BAT.



**4.2 Assessment of the Project Compliance with BAT (2006)**

The assessment of the Project Compliance with BAT (2006) is presented in the table below.

Chapter numbers provided in the column "Requirement" corresponds to respective chapters of the reference document. The BATs not applicable to the subject facility are excluded from the assessment.

Table 1. Assessment of the project against BREF (2006)

No.	Requirement	Status	Assessment																														
1.	Select an installation design which corresponds to the characteristics of the incinerated waste	<p>The design and installation are consistent with the meaning. The installation will be designed so as to meet the ecological requirements as much as possible, maximally recover the generated energy, clean the dust from the dust and minimize the pollution emission using a semi-dry method of flue gas cleaning combined with the method of blasting - with the injection of activated carbon.</p> <p>For the installation in question, the use of an oven with grate was accepted as the most commonly used and best suited for combustion of mixed municipal waste.</p> <p>The summary of the facility parameters is as following:</p> <table><tr><td>Kind of fuel</td><td></td><td>High calorific fraction for MSW (RDF)</td></tr><tr><td>Capacity</td><td>Mg/y</td><td>110 000</td></tr><tr><td>Capacity per hour</td><td>Mg/h</td><td>12,8</td></tr><tr><td>LCV</td><td>MJ/kg</td><td>11- 16</td></tr><tr><td>Availability</td><td>h/y</td><td>8 200</td></tr><tr><td colspan="3">Flue Gas Treatment (FGT)</td></tr><tr><td>Desulphurisation (SO<sub>x</sub>)</td><td></td><td>Semi dry with quicklime or hydrated lime</td></tr><tr><td>Denitrification (NO<sub>x</sub>)</td><td></td><td>SCR or SNCR 24% ammonia water or urea</td></tr><tr><td>De-dusting</td><td></td><td>Bag filter</td></tr><tr><td>Dioxins, furans, heavy metals reduction</td><td></td><td>Activated carbon</td></tr></table>	Kind of fuel		High calorific fraction for MSW (RDF)	Capacity	Mg/y	110 000	Capacity per hour	Mg/h	12,8	LCV	MJ/kg	11- 16	Availability	h/y	8 200	Flue Gas Treatment (FGT)			Desulphurisation (SO <sub>x</sub> )		Semi dry with quicklime or hydrated lime	Denitrification (NO <sub>x</sub> )		SCR or SNCR 24% ammonia water or urea	De-dusting		Bag filter	Dioxins, furans, heavy metals reduction		Activated carbon	Compliant
Kind of fuel		High calorific fraction for MSW (RDF)																															
Capacity	Mg/y	110 000																															
Capacity per hour	Mg/h	12,8																															
LCV	MJ/kg	11- 16																															
Availability	h/y	8 200																															
Flue Gas Treatment (FGT)																																	
Desulphurisation (SO <sub>x</sub> )		Semi dry with quicklime or hydrated lime																															
Denitrification (NO <sub>x</sub> )		SCR or SNCR 24% ammonia water or urea																															
De-dusting		Bag filter																															
Dioxins, furans, heavy metals reduction		Activated carbon																															
2.	The maintenance of the site in a generally tidy and clean state	The area of the plant will be fenced, properly managed, taking into account greenery and maintaining cleanliness.	Compliant																														

No.	Requirement	Status	Assessment
3.	Keep the equipment in good condition and carry out maintenance and preventive inspections.		
4.	Establish and carry out quality checks on the waste delivered, according to the types of waste that can be maintained by the installation, as described: 4.1.3.1 Determining load limits for installations and identifying key hazards; 4.1.3.2 Communicate with waste suppliers to improve the quality control of the waste delivered; 4.1.3.4 Quality control of waste delivered in the incineration plant; 4.1.3.4 Checking, sampling and testing of waste delivered; 4.1.3.5 Detectors of radioactive materials.	<p>Adequate procedures and rules for operation and operation of the installation will be provided. At the acceptance point each truck will be weight to determine the amount of waste delivered. Weight scale readings will be recorded in a computer system with identification of waste code and waste supplier. Delivered waste will go under a quality control process</p> <p>The installation operating instructions and operational procedures will contain information on the types and frequencies of inspections and maintenance necessary to maintain traffic as well as the dates and time of maintenance shutdowns.</p> <p>Detectors of radioactive materials is not foreseen since the fuel will be delivered from MBT installations.</p>	
5.	Storage of waste in accordance with the risk assessment of their properties, so that the potential risk of contamination can be minimized. Essentially, the BAT technique is to store waste in places that have tight and resistant surfaces, with controlled and separated sewerage systems as described in 4.1.4.1.	The bunker will be sealed and the possibility of draining the leachates will be ensured.	Compliant
6.	The techniques and procedures for reducing and managing the time of waste storage, as described in section 4.1.4.2, should be used to reduce the risk of emissions from the storage/disposal areas of containers, and to overcome any difficulties that may arise. In general, BAT is to: prevent the storage of excessive amounts of waste in unadapted warehouses; as much as possible, controlling and managing deliveries through communication with waste collections, etc.	Accepted RDF will be unloaded in a tipping hall into a waste bunker with a storage capacity of 5-days fuel demand, which guarantee the continuity of fuel supply during the days without waste delivery such as weekends and bank holidays.	Compliant
7.	Minimizing odors (and other potential uncontrolled emissions) from the areas of storage of large amounts	A negative pressure will be maintained in the tipping hall in order to prevent odors from escaping. The tipping hall will be a closed	Compliant

No.	Requirement	Status	Assessment
	of waste (including tanks and bunkers, but not small amounts of waste stored in containers), as well as areas where pre-treatment is carried out by air transfer to the furnace for incineration (see 4.1.4.4).	structure with automatic gates, which mitigates odours and noise impacts to the external environment during the RDF unloading activities. Furthermore, negative pressure will be kept within the hall, by drawing the air to incineration process as a primary air. Closing and opening the gates to the unloading hall will be automatically controlled with a signal light located at the hall gates, respectively.	
8.	Preparation of prevention, detection and control plans (described in 4.1.4.7) of the fire risk in the installation, in particular: storage and preliminary treatment areas for waste; areas of loading into the furnace; electrical control systems; bag filters and static bed filters; BAT is considered when plans include the use of: a) automatic fire detection and warning systems; b) using either manual or automatic control and fire prevention systems in accordance with the requirements of risk assessments.	In the area of the waste bunker, fire detection and fire alarm devices and devices for automatic extinguishing of fire events will be installed. Further, the internal space of the bunker will be visible from the central control room separated by glazing.	Compliant.
9.	Mixing (eg using a mixing crane in a hopper) or further processing (eg mixing of some liquid and past waste, or grinding of certain solid waste) of heterogeneous waste to the extent necessary to meet the specifications determined by the receiving installation (4.1.5.1). When considering the extent of mixing / processing utilization, it is particularly important to take into account the effects of cross-media transmission between environmental components (eg energy consumption, noise, odors or other emissions) of more extensive processing (eg grinding). Pre-treatment is usually required when the installation is designed for narrow specifications, homogeneous waste.	The waste in the bunker will be mixed to be homogenized and loaded to the feeding hopper by the cranes. Given that RDF from various external installations will be utilized the waste can be considered already pre-treated, hence no cross-media effect will occur at the facility. Homogenization of waste will therefore be focused on achievement of constant heating value in the most possible extent.	Compliant

No.	Requirement	Status	Assessment
10.	Providing operators with means for visual monitoring, directly or using television screens or similar, areas of storage and loading of waste	The interior of the warehouse will be visible from the rooms of the central control room, which will be separated from each other by means of glazing	Compliant.
11.	Removal of metals	Metal separation will be carried out at the fuel producers. As a precaution measure additional metals separation system will be installed at the site.	Compliant.
12.	Minimizing the uncontrolled entry of air into the combustion chamber by loading waste or other routes	Incineration of waste fed from the feeding hopper will take place on the travelling, air cooled grate. Feeding the waste by feeding hopper equipped with a lock ensures the sealing of the furnace against uncontrolled air inflow.	Compliant.
13.	In order to reduce overall emissions, to adopt operational regimes and implement procedures (e.g. continuous rather than batch operation, preventative maintenance systems) to minimise as far as practicable planned and unplanned shutdown and start-up operations.	The boiler will be equipped with continuous fuel charging system (by feeding hopper) and possible online boiler cleaning and will be designed and operated to minimize possibility of unplanned shutdowns and startup operations. The facility is expected to operate 8200 (as assumed by the EIA report) hours per year but not less than guaranteed by the manufacturer 7800 h/y.	Compliant.
14.	The identification of a combustion control philosophy, and the use of key combustion criteria and a combustion control system to monitor and maintain these criteria within appropriate boundary conditions, in order to maintain effective combustion performance, as described in 4.2.6. Techniques to consider for combustion control may include the use of infrared cameras (see 4.2.7), or others such as ultra-sound measurement or differential temperature control.	The Project assumes implementation of an effective combustion control system, based on continuous measurements of various parameters.	Compliant.
15.	The optimisation and control of combustion conditions by a combination of: a. the control of air (oxygen) supply, distribution and temperature, including gas and oxidant mixing b. the control of combustion temperature level and distribution, and c. the control of raw gas residence time.	The Project assumes implementation of an effective combustion control system, based on continuous measurements of various parameters.	Compliant.

No.	Requirement	Status	Assessment
16.	In general it is BAT to use those operating conditions (i.e. temperatures, residence times and turbulence) as specified in Article 6 of Directive 2000/76. The use of operating conditions in excess of those that are required for efficient destruction of the waste should generally be avoided. The use of other operating conditions may also be BAT – if they provide for a similar or better level of overall environmental performance. For example, where the use of operational temperatures of below the 1100 °C (as specified for certain hazardous waste in 2000/76/EC) have been demonstrated to provide for a similar or better level of overall environmental performance, the use of such lower temperatures is considered to be BAT.	The Project assumes maintaining operational conditions the most effective for efficient destruction of wastes.	Compliant.
17.	The preheating of primary combustion air for low calorific value wastes, by using heat recovered within the installation, in conditions where this may lead to improved combustion performance (e.g. where low LCV/high moisture wastes are burned) as described in 4.2.10.	The project assumes implementation of the technical measures which will secure the most effective waste incineration and operational performance.	Compliant.
18.	The use of auxiliary burner(s) for start-up and shut-down and for maintaining the required operational combustion temperatures (according to the waste concerned) at all times when unburned waste is in the combustion chamber, as described in 4.2.20	Waste from the feeding hopper can be continuously supplied on the grate when the temperature in the combustion chamber reaches 850°C, which is required by the regulations. This temperature is achieved by using the burners fuelled by gas. The burners are used during start-up and shutdown of the facility and when the temperature of the incineration chamber falls below the required 850°C.	Compliant.
19.	The use of a combination of heat removal close to the furnace (e.g. the use of water walls in grate furnaces and/or secondary combustion chambers) and furnace insulation (e.g. refractory areas or other lined furnace walls) that, according to the NCV and corrosiveness of	The heat of the flue gas will be recovered by the convection surfaces (water walls) of the boiler to produce steam. The combustion air inflow and circulation will be driven by negative pressure within the combustion chamber. The walls of the boiler	Compliant.

No.	Requirement	Status	Assessment
	the waste incinerated, provides for: a. adequate heat retention in the furnace (low NCV wastes require higher retention of heat in the furnace) b. additional heat to be transferred for energy recovery (higher NCV wastes may allow/require heat removal from earlier furnace stages)	will be made of a sealed membrane. Boiler heat exchange system will consist of water heaters, evaporator and superheater.	
20.	The use of furnace (including secondary combustion chambers etc.) dimensions that are large enough to provide for an effective combination of gas residence time and temperature such that combustion reactions may approach completion and result in low and stable CO and VOC emissions	Construction of the boiler will secure that the flue gases will stay in a temperature of at least 850°C for approximately 2 seconds.	Compliant
21.	In order to avoid operational problems that may be caused by higher temperature sticky fly ashes, to use a boiler design that allows gas temperatures to reduce sufficiently before the convective heat exchange bundles (e.g. the provision of sufficient empty passes within the furnace/boiler and/or water walls or other techniques that aid cooling), as described in 4.2.23 and 4.3.11. The actual temperature above which fouling is significant is waste type and boiler steam parameter dependent. In general for MSW it is usually 600 – 750 °C, lower for HW and higher for SS. Radiative heat exchangers, such as platten type super heaters, may be used at higher flue-gas temperatures than other designs (see 4.3.14).	The heating chamber will be designed to avoid any operational problems during exploitation of the boiler, e.g. by reduction of flue gases temperature to 650°C before the convection part.	Compliant.
22.	The overall optimisation of installation energy efficiency and energy recovery, taking into account the techno-economic feasibility (with particular reference to the high corrosivity of the flue-gases that results from the incineration of many wastes e.g. chlorinated	The facility will be designed in a way securing high efficiency and reliability.	Compliant.



No.	Requirement	Status	Assessment
	wastes), and the availability of users for the energy so recovered, as described in 4.3.1, and in general:		
23.	to secure where practicable, long-term base-load heat/steam supply contracts to large heat/steam users (see 4.3.1) so that a more regular demand for the recovered energy exists and therefore a larger proportion of the energy value of the incinerated waste may be used	The facility will cover heat demand of the city of Olsztyn in the summer season and part of the heat demand in the winter season. During summer entire heat demand will be covered by the facility except for the maintenance break (assessed as for 1000 hours) during which the heat demand will be covered by Kortowo CHP.	Compliant.
24.	The location of new installations so that the use of the heat and/or steam generated in the boiler can be maximised through any combination of: a. electricity generation with heat or steam supply for use (i.e. use CHP) b. the supply of heat or steam for use in district heating distribution networks c. the supply of process steam for various, mainly industrial, uses (see examples in 4.3.18) d. the supply of heat or steam for use as the driving force for cooling/air conditioning systems	Location of the facility was selected based on a multi-criterial analysis. The location secures optimal use of generated heat.	Compliant.
25.	In cases where electricity is generated, the optimisation of steam parameters (subject to user requirements for any heat and steam produced), including consideration of (see 4.3.8): a. the use of higher steam parameters to increase electrical generation, and b. the protection of boiler materials using suitably resistant materials (e.g. claddings or special boiler tube materials). The optimal parameters for an individual installation are highly dependent upon the corrosivity of the flue-gases and hence upon the waste composition.	The unit will be designed as to produce steam of the optimum parameters for both electricity generation and heating network supply.	Compliant.

No.	Requirement	Status	Assessment
26.	<p>The selection of a turbine suited to:</p> <ul style="list-style-type: none"> <li>a. the electricity and heat supply regime, as described in 4.3.7</li> <li>b. high electrical efficiency</li> </ul>	<p>The facility will be equipped with a back pressure turbine, a degasser and two heat exchangers in the water-steam circuit. The turbine will power a generator to produce electricity, while the turbine exhaust steam will be directed to a heat exchanger to produce district heat (cogeneration mode –CHP). The second heat exchanger will receive steam from the turbine bleed. During summer, excessive heat will be discharged by mean of a dry cooler installed on the heating network to allow for production of electricity.</p>	Compliant.
27.	<p>The general minimisation of overall installation energy demand, including consideration of the following (see 4.3.6):</p> <ul style="list-style-type: none"> <li>a. for the performance level required, the selection of techniques with lower overall energy demand in preference to those with higher energy demand</li> <li>b. wherever possible, ordering flue-gas treatment systems in such a way that flue gas reheating is avoided (i.e. those with the highest operational temperature before those with lower operational temperatures)</li> <li>c. where SCR is used; <ul style="list-style-type: none"> <li>i. to use heat exchangers to heat the SCR inlet flue-gas with the flue-gas energy at the SCR outlet</li> <li>ii. to generally select the SCR system that, for the performance level required (including availability/fouling and reduction efficiency), has the lower operating temperature</li> </ul> </li> <li>d. where flue-gas reheating is necessary, the use of heat exchange systems to minimise flue-gas reheating energy demand</li> <li>e. avoiding the use of primary fuels by using self-produced energy in preference to imported sources</li> </ul>	All of these are considered.	Compliant

No.	Requirement	Status	Assessment
28.	Where cooling systems are required, the selection of the steam condenser cooling system technical option that is best suited to the local environmental conditions, taking particular account of potential cross-media impacts	Dry cooler will be installed on the district heating network to allow for production of electricity during summer period.	Compliant.
29.	The use of a combination of on-line and off-line boiler cleaning techniques to reduce dust residence and accumulation in the boiler	The design assumes implementation of such measures.	Compliant
30.	The use of an overall flue-gas treatment (FGT) system that, when combined with the installation as a whole, generally provides for the operational emission levels.	The Project requires installation of a FGT system which will secure that emission levels will not exceed the levels permitted by IED directive and its national implementation.	Compliant.
31.	When selecting the overall FGT system, to take into account: a. the general factors described in 4.4.1.1 and 4.4.1.3 b. the potential impacts on energy consumption of the installation, as described in section 4.4.1.2 c. the additional overall-system compatibility issues that may arise when retrofitting existing installations (see 4.4.1.4)	The Project will follow this provision of BREF.	Complaint.
32.	When selecting between wet/ semi-wet/ and dry FGT systems, to take into account the (non-exhaustive) general selection criteria given as an example in Table 5.3.	Will be implemented.	Compliant.
33.	To prevent the associated increased electrical consumption, to generally (i.e. unless there is a specific local driver) avoid the use of two bag filters in one FGT line (as described in 4.4.2.2 and 4.4.2.3)	The filter will be composed of a few modules, which will allow for maintenance and repair without shutting down the entire filter.  Particulate matter emission will be guaranteed to fit the emission standards for all exploitation conditions, including fuel parameters.	Compliant
34.	The reduction of FGT reagent consumption and of FGT residue production in dry, semiwet, and intermediate FGT systems by a suitable combination of:	Will be implemented.	Compliant.

No.	Requirement	Status	Assessment
	a. adjustment and control of the quantity of reagent(s) injected in order to meet the requirements for the treatment of the flue-gas such that the target final operational emission levels are met b. the use of the signal generated from fast response upstream and/or downstream monitors of raw HCl and/or SO <sub>2</sub> levels (or other parameters that may prove useful for this purpose) for the optimisation of FGT reagent dosing rates, as described in 4.4.3.9 c. the re-circulation of a proportion of the FGT residues collected, as described in 4.4.3.7		
35.	The use of primary (combustion related) NO <sub>x</sub> reduction measures to reduce NO <sub>x</sub> production, together with either SCR (4.4.4.1) or SNCR (4.4.4.2), according to the efficiency of flue-gas reduction required. In general SCR is considered BAT where higher NO <sub>x</sub> reduction efficiencies are required (i.e. raw flue-gas NO <sub>x</sub> levels are high) and where low final flue-gas emission concentrations of NO <sub>x</sub> are desired.	Reduction of NO <sub>x</sub> emissions from a grate boiler is implemented using primary and secondary methods. Reducing of NO <sub>x</sub> emissions by primary methods consists in keeping down the combustion temperature (850 - 900°C), which inhibits the formation of nitrogen oxides and limits the passage of nitrogen from fuel to flue gases and by proper feeding the combustion air, hence controlling the excess to optimize the combustion process. The Project allows for both SCR and SNCR method application.	Compliant.
36.	For the reduction of overall PCDD/F emissions to all environmental media, the use of: a. techniques for improving knowledge of and control of the waste, including in particular its combustion characteristics, using a suitable selection of techniques described in 4.1, and b. primary (combustion related) techniques (summarised in 4.4.5.1) to destroy PCDD/F in the waste and possible PCDD/F precursors, and c. the use of installation designs and operational controls that avoid those conditions (see 4.4.5.2) that may give rise to PCDD/F reformation or generation, in	Activated carbon will be injected to flue gases before dedusting process in the bag filter. Injected activated carbon adsorbs dioxins, mercury and furans.	Compliant

No.	Requirement	Status	Assessment
	<p>particular to avoid the abatement of dust in the temperature range of 250 – 400 °C. Some additional reduction of de-novo synthesis is reported where the dust abatement operational temperature has been further lowered from 250 to below 200 °C, and</p> <p>d. the use of a suitable combination of one or more of the following additional PCDD/F abatement measures:</p> <ul style="list-style-type: none"> <li>i. adsorption by the injection of activated carbon or other reagents at a suitable reagent dose rate, with bag filtration, as described in 4.4.5.6, or</li> <li>ii. adsorption using fixed beds with a suitable adsorbent replenishment rate, as described in 4.4.5.7, or</li> <li>iii. multi-layer SCR, adequately sized to provide for PCDD/F control, as described in 4.4.5.3, or</li> <li>iv. the use of catalytic bag filters (but only where other provision is made for effective metallic and elemental Hg control), as described in 4.4.5.4</li> </ul>		
37.	<p>For the control of Hg emissions where semi-wet and dry FGT systems are applied, the use of activated carbon or other effective adsorptive reagents for the adsorption of PCDD/F and Hg, as described in 4.4.6.2, with the reagent dose rate controlled so that final air emissions are within the BAT emission ranges given for Hg</p>	<p>Activated carbon will be injected to flue gases before dedusting process in the bag filter. Injected activated carbon adsorbs dioxins, mercury and furans.</p>	Compliant.
38.	<p>The use of separate systems for the drainage, treatment and discharge of rainwater that falls on the site, including roof water, so that it does not mix with potential or actual contaminated waste water streams, as described in 4.5.9. Some such waste water streams may require only little or no treatment prior to their discharge, depending on contamination risk and local discharge factors</p>	<p>Sections of roads on which pollution may occur, e.g. leakage of petroleum-derived substances, will be hardened with materials resistant to these substances and a separate sewage will be developed for such areas along with sewage pretreatment installation, such as oil-water separator. It is not allowed to drain rainwater from roofs directly onto the land surface or into lymphatic pits. Rainwater before entering the drainage system and / or to the ground in the planned project will be cleaned in a rainwater sewage treatment system.</p>	Compliant.

No.	Requirement	Status	Assessment
39.	<p>The use of a suitable combination of the techniques and principles described in 4.6.1 for improving waste burnout to the extent that is required so as to achieve a TOC value in the ash residues of below 3 wt % and typically between 1 and 2 wt %, including in particular:</p> <ul style="list-style-type: none"> <li>a. the use of a combination of furnace design (see combustion technology selection in 4.2.1), furnace operation (see 4.2.17) and waste throughput rate (see 4.2.18) that provides sufficient agitation and residence time of the waste in the furnace at sufficiently high temperatures, including any ash burn-out areas</li> <li>b. the use of furnace designs that, as far as possible, physically retain the waste within the combustion chamber (e.g. narrow grate bar spacings for grates, rotary or static kilns for appreciably liquid wastes) to allow its combustion. The return of early grate riddlings to the combustion chamber for re-burn may provide a means to improve overall burn out where they contribute significantly to the deterioration of burnout (see 4.2.21)</li> <li>c. the use of techniques for mixing and pretreatment of the waste, as described in BAT 11, according to the type(s) of waste received at the installation</li> <li>d. the optimisation and control of combustion conditions, including air (oxygen) supply and distribution, as described in BAT 18</li> </ul>	All such measures are foreseen for the Project.	Compliant
40.	<p>The separate management of bottom ash from fly ash and other FGT residues, so as to avoid contamination of the bottom ash and thereby improve the potential for bottom ash recovery, as described in 4.6.2. Boiler ash may exhibit similar or very different levels of contamination to that seen in bottom ash (according to local operational, design and waste specific factors) –</p>	<p>The bottom ash will be removed from the bottom of the grate then cooled and transported by the conveyor to the bottom ash storage yard.</p> <p>The bottom ash storage yard will be roofed and divided by sufficiently high walls and equipped with effluent water drainage and collecting system. On the yard the bottom ash will be matured during 10 week period. After the maturation process</p>	Compliant.

No.	Requirement	Status	Assessment
	it is therefore also BAT to assess the levels of contaminants in the boiler ash, and to assess whether separation or mixing with bottom ash is appropriate. It is BAT to assess each separate solid waste stream that arises for its potential for recovery either alone or in combination.	<p>the it will be transferred for further management to eligible companies having appropriate permissions. It is also permissible to transfer bottom ash to authorized companies without maturation process. The bottom ash is classified as non-hazardous waste.</p> <p>The fly ash is a waste arising during the flue gas cleaning and is classified as hazardous waste. Fly ash will be transported by tight installation into a dedicated silo where it will be matured. Transfer of fly ash to external authorized company for further treatment is also possible.</p>	
41.	The treatment of FGT residues (on or off-site) to the extent required to meet the acceptance requirements for the waste management option selected for them, including consideration of the use of the FGT residue treatment techniques described in 4.6.11	Bottom ash will be matured at the site and transferred as hazardous waste to external authorized companies. Transfer of not-treated residues is also acceptable. It is expected that the facility will generate approximately 5.500 tons of this kind of waste per annum.	Compliant.
42.	The implementation of noise reduction measures to meet local noise requirements	The vast majority of noise sources will not exceed the level of 85 dBA sound pressure at a distance of 1m from the machine The walls and roofs of the buildings will be equipped with minimum thermal and acoustic insulation to guarantee the fulfilment of environmental standards.	Compliant.
43.	Apply environmental management. A number of environmental management techniques are determined as BAT. The scope (e.g. level of detail) and nature of the EMS (e.g. standardised or non-standardised) will generally be related to the nature, scale and complexity of the installation, and the range of environmental impacts it may have. BAT is to implement and adhere to an Environmental Management System (EMS) that incorporates, as appropriate to individual circumstances, the following features: (see Chapter 4.8)	SPV will develop and maintain an environmental management system. This is also a requirement of the Lenders.	Compliant.



No.	Requirement	Status	Assessment
44.	The storage of all waste, (with the exception of wastes specifically prepared for storage or bulk items with low pollution potential e.g. furniture), on sealed surfaces with controlled drainage inside covered and walled buildings	Waste for incineration will be stored in a bunker of a capacity securing undisturbed operation of the plant for a period of 5 days.	Compliant.
45.	When waste is stockpiled (typically for later incineration) it should generally be baled (see Section 4.1.4.3) or otherwise prepared for such storage so that it may be stored in such a manner that risks of odour, vermin, litter, fire and leaching are effectively controlled.	Waste for incineration will be prepared in external BMT plants, which operate in line with the applicable national regulations (Executive order of the Minister of Environment of September 11, 2012 on mechanical and biological treatment of mixing communal waste).	Compliant.
46.	To pretreat the waste, in order to improve its homogeneity and therefore combustion characteristics and burn-out, by: a. mixing in the bunker (see 4.1.5.1), and b. the use of shredding or crushing for bulky wastes e.g. furniture (see 4.1.5.2) that are to be incinerated, to the extent that is beneficial according to the combustion system used.		
47.	The use of a grate design that incorporates sufficient cooling of the grate such that it permits the variation of the primary air supply for the main purpose of combustion control, rather than for the cooling of the grate itself. Air-cooled grates with well distributed air cooling flow are generally suitable for wastes of average NCV of up to approx. 18 MJ/kg. Higher NCV wastes may require water (or other liquid) cooling in order to prevent the need for excessive primary air levels (i.e. levels that result in a greater air supply than the optimum for combustion control) to control grate temperature and length/position of fire on the grate (see section 4.2.14)	The grate will be designed as for appropriate heat removal.	Compliant.

No.	Requirement	Status	Assessment
48.	The location of new installations so that the use of CHP and/or the heat and/or steam utilisation can be maximised, so as to generally exceed an overall total energy export level of 1.9 MWh/tonne of MSW (ref. Table 3.42), based on an average NCV of 2.9 MWh/tonne (ref. Table 2.11)	The facility primary function is supply of heat to the district heating network.	Compliant.
49.	In situations where less than 1.9 MWh/tonne of MSW (based on an average NCV of 2.9 MWh /tonne) can be exported, the greater of: a. the generation of an annual average of 0.4 – 0.65 MWh electricity/tonne of MSW (based on an average NCV of 2.9 MWh/tonne (ref. Table 2.11) processed (ref. Table 3.40), with additional heat/steam supply as far as practicable in the local circumstances, or b. the generation of at least the same amount of electricity from the waste as the annual average electricity demand of the entire installation, including (where used) on-site waste pretreatment and on-site residue treatment operations (ref. Table 3.48)	The new facility will meet the requirements.	Compliant.
50.	To reduce average installation electrical demand (excluding pretreatment or residue treatment) to be generally below 0.15 MWh/tonne of MSW processed (ref. Table 3.47 and section 4.3.6) based on an average NCV of 2.9 MWh/tonne of MSW (ref. Table 2.11)	Own needs of the plant will be 1,7MW <sub>e</sub>	Compliant
51.	The storage of wastes: a. in enclosed hoppers or, b. on sealed surfaces with controlled drainage inside covered and walled buildings.	Will be implemented.	Compliant.
52.	At new and existing installations, the generation of the greater of:	The Project will meet the requirements.	Compliant.

No.	Requirement	Status	Assessment
	a. an annual average of generally at least 0.6 – 1.0 MWh electricity/tonne of waste (based on an average NCV of 4.2 MWh/tonne), or b. the annual average electricity demand of the entire installation, including (where used) on-site waste pretreatment and on-site residue treatment operations		
53.	The location of new installations so that: a. as well as the 0.6 – 1.0 MWh/ tonne of electricity generated, the heat and/or steam can also be utilised for CHP, so that in general an additional thermal export level of 0.5 – 1.25 MWh/tonne of waste (ref. section 3.5.4.3) can be achieved (based on an average NCV of 4.2 MWh/tonne), or b. where electricity is not generated, a thermal export level of 3 MWh/tonne of waste can be achieved (based on an average NCV of 4.2 MWh/tonne)	The facility will produce heat and electricity in cogeneration.	Compliant.
54.	To reduce installation energy demand and to achieve an average installation electrical demand (excluding pretreatment or residue treatment) to generally below 0.2 MWh/tonne of waste processed (ref. Table 3.47 and section 4.3.6) based on an average NCV of 4.2 MWh/tonne of waste	The own needs of the facility will be 1,7MWe	Compliant.

### 4.3 The Major BAT Changes Introduced by the Working Draft of BREF (2017)

As introduced in section 4.1 a working draft of BREF for waste incineration was published by the European IPPC Bureau in May 2017. This working draft has been published for informational purposes only and, as clearly stated on its cover page: "this draft has not been adopted or endorsed by the European Commission. Any views expressed are the preliminary views of the Commission services and may not in any circumstances be regarded as stating an official position of the Commission". The working draft sets general directions for waste incineration industry and therefore the Project was assessed for compliance with the requirements of the draft 2017 BREF.

The 2017 working draft BREF is structured to meet the IED directive, hence the best available techniques are presented in a form of conclusions. These, if approved by the European Commission will constitute the law binding the waste incineration industry. The conclusions in general address the same issues as in the BAT (2006) although some aspects are discussed in a different way. These may be grouped as following:

#### 1. General management aspects

The draft BREF form more detailed requirements with respect to content and structure of the environmental management system (EMS) required for the incineration plants. These in particular include consideration of the environmental impacts during decommissioning at the design stage as well as preparation, implementation and maintenance of management plans (MP) addressing various operational issues, such as waste stream MP, OTNOC MP, accident MP, odour MP and others. Relevant requirements for the detailed Management Plans meeting draft BREF requirements are addressed in the Environmental and Social Action Plan for the Project.

#### 2. Monitoring of emissions

The BREF (2006) does not define precise requirements with respect to monitoring of plant performance including the environmental and social impacts, instead, redirects to BREF document for emission monitoring. The working draft addresses this aspect in much more detailed way, providing requirements with respect to:

- Key process parameters: flue-gas incineration parameters, waste water from flue-gas treatment, waste water from bottom ash treatment (continuous monitoring);
- Air emissions: continuous monitoring of substances listed in Part 6 of the Annex VI to the IED directive and additionally continuous monitoring of Hg, and periodic measurements of substances listed therein plus benzo(a)pyrene;
- Wastewater: periodical measurements on monthly basis of heavy metals listed in the cited above Annex plus molybdenum – in the stream originating from flue gas treatment and periodical measurements on monthly basis of TOC, TSP, NH<sub>4</sub>-N, chlorides, and SO<sub>4</sub><sup>2-</sup> for the stream originating from bottom ash treatment (which is not the case of the Project as dry methods will apply)
- Bottom ash: monitoring of TOC and loss on ignition once per three months.

These detailed monitoring requirements are in majority fulfilled in the Project as resulting either from the IED directive or national legislation, in particular the Executive Order of the Minister of Environment of October 30, 2014 on requirements with respect to emission measurements and measurements of taken water (JoL Pos. 1542/2014). The identified discrepancies include a need for continuous Hg monitoring in flue gases (currently only periodical measurements are required by the Polish law) and molybdenum content in wastewater. Detailed monitoring requirements for the Project, addressing all applicable national and international legislation and standards, are provided in section 4.5

#### 3. Waste (fuel) handling

The provisions of the draft 2017 BREF are generally compliant with the currently binding BREF, therefore no issues with regards to Project compliance with future BREF are foreseen.

#### 4. Environmental performance

The environmental performance in both, the 2006 binding BREF and the 2017draft BREF address similar aspects of plant operations, such as advanced control systems which optimize the combustion process by e.g. adjustment of air supply, temperature and its distribution and effective recovery of energy. The binding BREF directly refers to the Waste

Directive which was adopted by the IED Directive while the 2017 draft BREF outlines more general approach to the environmental performance through adoption of advanced control system, proper design of the plant and use of procedures and management plans. Relevant requirements for the detailed Management Plans meeting draft BREF requirements are addressed in the Environmental and Social Action Plan for the Project.

5. Energy efficiency

The working draft specifies such methods of energy efficiency improvements as use of heat recovery boiler or cogeneration of heat and electricity, which both are fulfilled by the Project. The BAT related electrical efficiency levels are related for the power plants or combined heat and power plants oriented mainly to electricity production, hence do not apply to the Project as its main rationale is production of heat. The BAT-AEELs for gross heat efficiency for new plants producing only or mainly heat are 72-91%. The new installation will have efficiency of 86%,

6. Air emissions

Both analyzed BREFs provide a similar methods possible to use in order to reduce the emission levels of particular pollutants. While the binding BREF (2006) provides achievable emission limits for ½ hour average and daily average, the working draft provides only daily averages in most cases. The figures provided in the working draft are often less strict than in the binding BREF (e.g. for SO<sub>2</sub> where the new range is 10-20 mg/Nm<sup>3</sup> and in the binding BREF 10-30 mg/Nm<sup>3</sup>). The Project will comply with exact emission limits as defined by the IED directive and its national implementation. The Project will be therefore compliant with this element of draft BREF.

7. Emission to water

Methods for achieving desired wastewater quality presented in the binding 2006 BREF and the 2017 draft BRAEF are aligned. The Project will therefore comply with this element of draft BREF.

8. Material efficiency, noise and vibrations

The Project will implement general requirements in these areas as set up by the binding BREF (2006) and expressed in the draft BREF (2017). In particular, the bottom ashes will be treated separately and ageing which is BAT according to draft BREF (2017) and the design will take into account noise and vibration emissions so the environmental standards shall not be exceeded.

Resulting from the assessment against the 2017 draft BREF on waste incineration, the Project which will utilize the well-known technology and adopt the best industry practice is fully capable to meet the requirements stipulated by the 2017 draft BREF. The current Project design is already in vast extend compliant with the 2017 draft and a full compliance will require limited technical additions, such as e.g. installation of the continuous monitoring system for mercury. The costs of such additions are not expected to be very high and is addressed in the Environmental and Social Action Plan for the Project. The organizational aspects, including environmental and social management system and appropriate procedures and management plans, will be prepared, implemented and maintained during the Project lifetime, as committed in the ESAP.

A need for project assessment versus BAT, EU and national regulations during the project lifetime is directly related to EIA procedure as well as IPPC permitting and committed in the ESAP. By the time the project is implemented it is expected that final revisions to the 2017 draft BREF will be published and binding for the new projects.

The Project will be subject to ongoing monitoring by the regional and national environmental authorities and by the Lenders.

#### 4.4 Compliance of the Project with IED

The conditions for construction and operation of waste incineration plants by 2014 were specified in Directive 2000/76/EC on the incineration of waste (WID). In 2014 this directive was repealed and replaced by the Directive 2010/75/EU, of 24 November 2010, on industrial emissions (IED). The vast majority of the construction and operation requirements for waste incineration plants was

transferred from WID to this new directive. It should be noted here that the WID is in wide extend adopted by the BREF for waste incineration (2006). As shown in section 4.1 above the Project has already been assessed as compliant with the BREF requirements if all provisions of BREF are implemented at the preliminary designing stage.

The IED directive provides special provisions for waste incineration plants in Chapter IV and a certain requirements with respect to emissions and monitoring in Parts 3-7 of Annex VI. In the following sections we present the assessment of the Project compliance with these articles of the IED which directly apply to the projects. Discussion on other compliance aspects which shall be secured by the authorities is not provided, given that Poland has fully adopted the IED directive into the Polish legal framework.

#### 4.4.1 Emissions Control

According to the article 46 of IED, the flue gases from waste incineration plants shall be discharged to the air in a controlled way by mean of a sufficiently high stack. At the same time, the emission limit values stipulated by the Annex VI apply to the waste incineration plants, as presented below.

**Table 2. Permissible emissions from waste incineration as per IED directive**

	Daily average emission limit values for the following polluting substances (mg/Nm <sup>3</sup> ) at 11 % oxygen in flue gas		
	Daily average	Half-hourly average	
		A	B
Total dust	10	30	10
Gaseous and vaporous organic substances, expressed as total organic carbon (TOC)	10	20	10
Hydrogen chloride (HCl)	10	60	10
Hydrogen fluoride (HF)	1	4	2
Sulphur dioxide (SO <sub>2</sub> )	50	200	50
Nitrogen monoxide (NO) and nitrogen dioxide (NO <sub>2</sub> ), expressed as NO <sub>2</sub> for existing waste incineration plants with a nominal capacity exceeding 6 tonnes per hour or new waste incineration plants	200	400	200
Emission limit values (mg/Nm <sup>3</sup> ) for carbon monoxide (CO) in the waste gases			
Carbon monoxide (CO)	50	100	150 (10 min. average)
Average emission limit values (mg/Nm <sup>3</sup> ) for the following heavy metals over a sampling period of a minimum of 30 minutes and a maximum of 8 hours			
Cadmium (Cd)+ Thallium (Tl)	0,05		
Mercury (Hg)	0,05		
Antimony (Sb) + Arsenic (As) + Lead (Pb) + Chromium (Cr) + Cobalt (Co) + Copper (Cu) + Manganese (Mn) + Nickel (Ni) + Vanadium (V)	0,5		

Average emission limit value (ng/Nm <sup>3</sup> ) for dioxins and furans over a sampling period of a minimum of 6 hours and a maximum of 8 hours.	
Dioxins and furans	0,1 As the sum of the products of the concentrations of dioxins and furans in waste gases and their toxic equivalency factors

Following both national and EU environmental legislation the subject facility will need to achieve operationally emissions not higher than the limits presented above in order to be granted integrated permit necessary for the facility to operate, hence the limit values constitute the guaranteed emission levels for the Project.

In the EIA report the presented above emission limit values were used for the calculation of the pollutants dispersion in the air. The dispersion modelling proved that the permissible air quality standards will not be exceeded hence no additional technical measures as e.g. increase of the stack height are necessary and the permissible emissions can be stipulated as equal to the limit values.

It should be noted here, that according to the BREF (2006) most of the European waste incineration installations generally meet the emission limits as per WID hence also the IED directive, so achievement of the emission limits is technically feasible.

The article 46 states also that discharges of waste waters originating from flue gas cleaning facilities to aquatic environment shall be limited as far as practicable and that the concentrations of polluting substances should not exceed the values set out in Part 5. This, however, does not apply to the Project since a semi-dry flue gas treatment will be adopted for SO<sub>2</sub> reduction which does not generate wastewater. Other wastewater streams will be pre-treated at the site to the purity level agreed with the sewage network operator and then will be directed to the WWTP.

Paragraph 5 of article 46 sets up a requirement for a safe storage of waste by proper designing eliminating release of any substance to soil or groundwater and requirements with respect to runoff of contaminated rainwater. The Project will adopt the storage of RDF in designated bunker capable to store fuel for 5 days of operations. The construction of the bunker will secure full protection of soil and groundwater environment and the fuel will not be exposed to atmospheric precipitation. Further, air intake for the boiler will be situated in the bunker which will reduce odor nuisance of the facility.

The Article 46 in paragraph 6 stipulates obligation to terminate operation of the plant if for the period of four hours the emission limit values are exceeded. The facility will implement a continuous emission monitoring system for the basic pollutants as per Annex VI and will stop incineration of waste if the emission limit values are exceeded. All measure emissions will be recorded and the limit of maximum 60 hours of such emission breaches will not be exceeded.

The flue gases from the two reserve-peak boilers are discharged into the air by one two-channel stack. On this regard, from an environmental perspective, the flue gas emissions introduced to the atmosphere are actually equivalent to an installation with a total thermal power capacity of 76 MW<sub>t</sub> (2x 38 MW = 76 MW). Therefore the peak boilers fall under IED directive and the emission standards stipulated by Annex VI part 1 for installations with a thermal capacity higher than 50 MW<sub>t</sub> apply, as well additional requirements as per BAT Conclusions for Large Combustion Plants (2017), as presented in the table below.

**Table 3. Permissible emissions from the peak boilers as per IED directive and BAT Conclusions for LCP**

	IED [mg/m <sup>3</sup> ]		BAT Conclusions [mg/m <sup>3</sup> ]			
	Gas	Heating oil	Gas		Heating oil	
			Yearly average	Daily average	Yearly average	Daily average

SO <sub>2</sub>	35	350			50-175	150-200
NO <sub>x</sub>	100	300	10-60	30-85	75-200	100-215
Dust	5	20			2-10	7-18
CO	100	100	5-15		10-30	

MPEC requires explicitly in the conditions for the Private Partner that the given above emission limits shall be met in the whole operational range of the main and peak boilers. The emissions are subject to guarantee by the Private Partner.

#### 4.4.2 Breakdown

The facility will reduce or close down operations as soon as practicable in case of breakdown, until normal operations can be restored.

#### 4.4.3 Monitoring of Emissions

Following the article 48 of IED, the monitoring of emissions should be conducted in line with parts 6 and 7 of Annex VI to the directive. This obligation is implemented into the Polish legal framework by the Executive Order of Minister of Environment of October 30, 2014 on requirements with respect to emission measurements and measurements of taken water. This Order follows among others the Annex VI of IED. Emission measurements will be conducted at the stack. Results of the continuous and periodical monitoring will be recorded and submitted to the authorities twice a year, unless the integrated permit states other frequency (e.g. continuously for continuous monitoring program).

With respect to the peak boilers, the continuous monitoring of emission is not required according to IED, however, the BAT conclusions for LCP adopted in 2017 impose an obligation for continuous monitoring with the exclusions for plants of a total rated thermal input below 100 MW and operated less than 1500 h/a, for which periodic measurements are allowed. As the BAT conclusions constitute binding law in permitting, the facility will need to adopt continuous monitoring system. Appropriate continuous monitoring system of emissions will be installed at the stacks. Other important operational parameters will be monitored continuously in line with the technical requirements.

The detailed monitoring measures will be listed in each Environmental and Social Management Plan developed for the construction and operational phases of the Project, and will include a description of parameters to be monitored, how these are monitored, how often, and who is responsible for the monitoring.

MPEC via SPV will also develop a suite of key performance indicators, which will be used to track the success of environmental and social management.

#### 4.4.4 Operating Conditions

The EIA Report includes the requirement of the IED Directive that the total organic carbon content in the IBA (incinerator bottom ash) is less than 3 % or its loss on ignition is less than 5 % of the dry weight of the material.

The waste incineration technology in consideration assumed the proper design and use of auxiliary burners to guarantee that the flue gases passing through the combustion chamber will be kept on a temperature not lower than 850°C for at least 2 seconds. The burners will be switched on automatically when the temperature of the combustion gases falls below 850°C. They will be also used during the startup and shutdown of the boiler.

Planned emergency diesel generator allows a safe shut down of the installation.

#### 4.4.5 Delivery and Reception of Waste

As presented in previous subsections of this section, the waste delivery to the facility will be done by car transport from the nearby ZGOK. The planned waste acceptance facility, which includes waste acceptance point, tipping hall and waste bunker will be designed in a way providing the top-level mitigation of any risk to soil and groundwater environment and substantial reduction of an



odor nuisance existence. Hence the Project meets the general provisions of the paragraphs 1 and 2 of Article 52 of the IED. The facility will not incinerate any hazardous waste so the other paragraphs of this article do not apply.

#### **4.5 Summary of Emission Monitoring Requirements**

In order to make easier understanding of all emission monitoring requirements, as stipulated by the reference documents (binding and working drafts), IED directive, BAT conclusions for Large Combustion Plants national implementation of the EU environmental law (i.e. the Executive Order of the Minister of Environment on requirements for emission monitoring and measurements of consumed water), below we provide summary of the permissible emissions and monitoring requirements.

**Table 4. Comparison of emission monitoring requirements for the grate boiler as per applicable laws/BREFs**

Parameter	IED		BREF (2006)		Draft BREF (2017)		National Regulations	
	Method	Frequency	Method	Frequency	Method	Frequency	Method	Frequency
Particulate matter	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	Generic EN standards and EN 13284-2	Continuous	Gravimetric	Continuous
Dust (bottom ash)	-	-	-	-	EN 13284-1	Once a year	-	-
SO <sub>2</sub>	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	Generic EN standards	Continuous	IR or UV absorption or other optical method based on the PN-ISO 7935 standard	Continuous
NO <sub>x</sub> as NO <sub>2</sub>	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	Generic EN standards	Continuous	Chemiluminescence or IR absorption, or other optical method based on the PN-ISO 10849 standards), unless periodical measurements are permitted	Continuous unless periodical are permitted
CO	CEN standards and if not	Continuous	Not directly specified.	Not directly specified.	Generic EN standards	Continuous	IR absorption	Continuous

	available, ISO, national or other international standards							
HCl	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	Generic EN standards	Continuous	IR absorption	Continuous unless periodical are permitted
Organic matter expressed as total organic carbon	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	Generic EN standards	Continuous	Flame-ionization detection	Continuous
HF	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	Generic EN standards	Continuous	IR absorption	Continuous unless periodical are permitted
O <sub>2</sub>	CEN standards and if not available, ISO, national	Continuous	Not directly specified.	Not directly specified.	-	Continuous	paramagnetic, zirconium cell or another electrochemical guaranteeing	Continuous

	or other international standards						uncertainty of measurement not less than $\pm 1\%$	
Temperature of the off-gases	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	-	Continuous	Uncertainty not greater than $\pm 5K$	Continuous
Static or absolute pressure	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	-	Continuous	Uncertainty not greater than $\pm 10$ hPa	Continuous
Flow					-	Continuous	-	
Absolute humidity	CEN standards and if not available, ISO, national or other international standards	-	Not directly specified.	Not directly specified.	-	-	Uncertainty not greater than 20%	Continuous
Water vapour content	CEN standards and if not available, ISO, national	Continuous unless flue gases sample is dried before measurement	Not directly specified.	Not directly specified.	-	Continuous unless flue gases sample is dried before measurement	-	-

	or other international standards							
Pb	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
Cr	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
Cu	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
Mn	CEN standards and if not available, ISO, national or other	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency

	international standards							
Ni	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
As	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
Cd	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
Hg	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	Generic EN standards and EN 14884	Continuous	PN-EN 13211 or instrumental method compliant with PN-EN 14884 expanded by Hg determination in solid phase compliant with z PN-EN 13211	At least twice a year unless the integrated permit states other frequency

TI	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
Sb	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
V	CEN standards and if not available, ISO, national or other international standards	At least twice a year, every 3 months for the first 12 months of operations	Not directly specified.	Not directly specified.	EN 14385	Every six months	PN-EN 14385	At least twice a year unless the integrated permit states other frequency
CO	CEN standards and if not available, ISO, national or other international standards	Continuous	Not directly specified.	Not directly specified.	-	-	IR absorption	Continuous
Dioxins and Furans	CEN standards	At least twice a year, every	Not directly specified.	Not directly specified.	EN 1948	Once every six months	PN-EN 1948, 1,2,3	At least twice a year unless

	and if not available, ISO, national or other international standards	3 months for the first 12 months of operations						the integrated permit states other frequency
Dioxin-like PCB	-	-	-	-	EN 1948-1	Once every six months	-	-

**Table 5. Summary of emission monitoring requirements for peak boilers of a total rated input below 100 MW as per applicable laws.**

Parameter	IED		BAT Conclusions for LCP		National regulations	
	Method	Frequency	Method	Frequency	Method	Frequency
PM	CEN standards and if not available, ISO, national or other international standards	Once every 6 months		Continuous	Gravimetric	Twice a year
SO2	CEN standards and if not available, ISO, national or other international standards	Once every 6 months	EN standards and EN 14791	Continuous	IR or UV absorption or other optical method based on the PN-EN 14791	Twice a year
NO2	CEN standards and if not available, ISO, national or other international standards	Once every 6 months	EN standards	Continuous	Chemiluminescence or IR absorption, or other optical method	Twice a year
CO	CEN standards and if not	Once every 6 months	EN standards	Continuous	IR absorption	Twice a year



	available, ISO, national or other international standards					
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## 5. IMPACTS RELATED TO PROJECT ASSOCIATED FACILITIES

### 5.1 Sources of RDF and related impacts

The facility will be fuelled with RDF which will be delivered mainly from the nearby municipal waste treatment facility operated by Zakład Gospodarki Odpadami Komunalnymi (ZGOK). Based on horizontal and commercial agreements, the facility can be also supplied with fuel from:

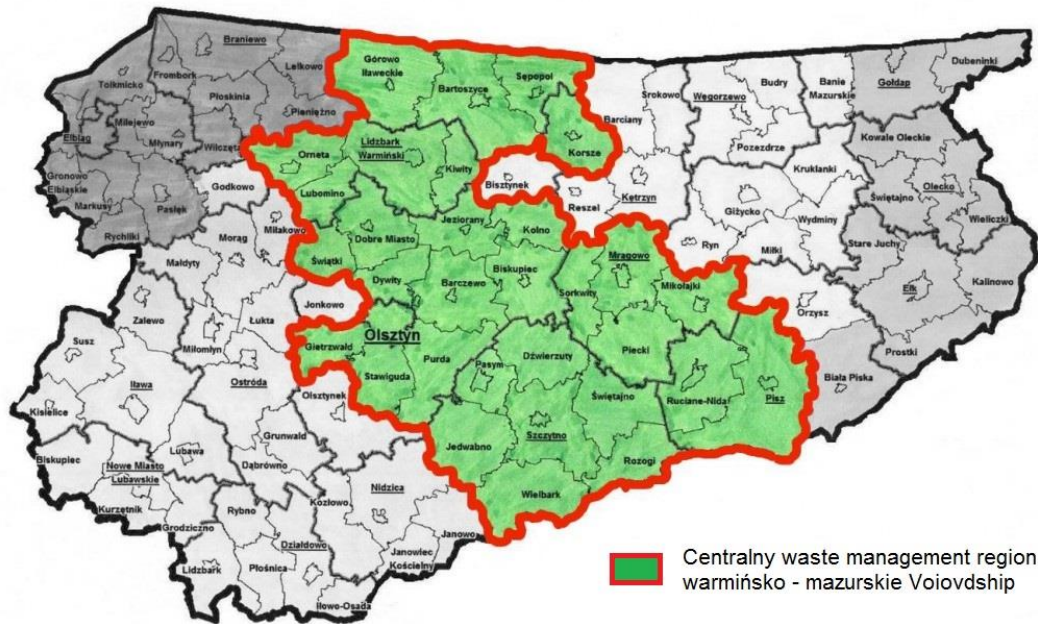
- Ekologiczny Związek Gmin „Działdowszczyzna” in Działdowo
- Przedsiębiorstwo Gospodarki Odpadami „Eko-MAZURY” Sp. z o.o. in Siedliska
- Zakład Unieszkodliwiania Odpadów Komunalnych Spytkowo Sp. z o.o.
- Zakład Utylizacji Odpadów Sp. z o.o. in Elbląg
- Novago Sp. z o.o. in Mława

ZGOK is a municipal company owned by the local authorities of 37 municipalities located in Warmia-Mazury voivodship and was created on the basis of the agreement on cooperation signed on May 26, 2009, which is valid until the end of 2034. According to the regional Waste Management Plan, all these municipalities belong to the Centralny waste management region.

The core business of ZGOK is organization of the waste management system in the Centralny region (see figure Figure 8) including collection and transport of municipal waste and operation of the MBT installation, which according to the WMP is classified as RIPOK (regional municipal waste treatment installation).

Since August 2015 ZGOK operates a mechanical-biological treatment (MBT) installation of municipal waste located at 53 Lubelska Street in the city of Olsztyn. The installation has the capacity of approximately 342.5 tons per day (i.e. approx. 125,000 tons per year) and is operated 365 days per year on three shifts.

For operation of the IPPC installation ZGOK has obtained the Integrated Permit (further referred as IPPC permit). Decision No. OŚ-PŚ.7222.25.2015 was issued by the Marshall of Warmia-Mazury voivodship on August 11, 2015 with unlimited validity. The IPPC permit has two amendments issued by Decision No. OŚ-PŚ.7222.57.2015 from January 27, 2016 and Decision No. OŚ-PŚ.7222.42.2016 from November 10, 2016.



**Figure 8. . Centralny waste management region located in Warmia-Mazury voivodship. Source: Waste Management Plan of Warmia-Mazury voivodship for the years 2016-2022**

The IPPC permit covers also operation of non-IPPC installations:

- sorting installation of separately collected packaging waste, approximate capacity of 16,000 t/y, which is operated 312 days per year on one shift;
- treatment and storage installation of construction and demolition waste, approximate capacity of 5,000 t/y, which is operated 104 days per year on one shift;
- disassembly installation of separately collected bulky waste, approximate capacity of 5,000 t/y, which is operated 260 days per year on two shifts.

Operation of the MBT installation was strictly defined in the IPPC permit. Technological process is conducted in the waste processing hall (Hala przerobu odpadów) and comprises of three major steps:

- acceptance of municipal waste to the MBT installation and pre-treatment;
- bio-drying process;
- mechanical treatment of dried waste.

Pre-treatment of waste includes manual sorting conducted in order to separate from the waste stream fractions of waste, which potentially may have a negative impact on the operation of the technological lines. The high-energy fractions of waste is directed to the initial shredding and then to the process of bio-drying of waste and recyclable fractions of waste (such as metals and glass) are directed to the dedicated waste bunkers.

The process of bio-drying is conducted in the separate portion of the technological hall (Segment Biosuszenia Przerobu Odpadów) in 14 reinforced concrete chambers. During an average time of 8 days, organic fractions contained in the municipal waste are decayed. The bio-drying process is associated with heat generation, which is used for evaporation of water in a further process step.

Mechanical treatment of dried waste is conducted in the separate portion of the technological hall (Segment Mechanicznego Przetwarzania Odpadów) and includes treatment on an electromagnetic separator, a ballistic separator, an optical separator and a shredder.

According to the IPPC permit, the permitted amounts of alternative fuel generated in the MBT installation is 100,000 tons per year and is classified under waste code 19 12 10. As specified in

the IPPC permit, alternative fuel comprises biodegradable fractions, paper, cardboard, multi-material packaging, plastic, textiles, timber and small amounts of non-combustible materials and has moisture content below 20%, calorific value approximately 16 MJ/kg and chlorine content below 1%. According to the verbal information obtained from the facility personnel, generated alternative fuel in the MBT installation have the following average parameters:

- calorific value of 18 MJ/kg;
- moisture content of 14-20%.

The facility passed an appropriate EIA procedure prior to achieving the construction permit. The development was also financed by EU hence was assessed by the EC. The conducted assessment comprised analysis of feasibility studies cost-benefit analysis, including a risk assessment and the foreseeable impact on the sector concerned and on the socio-economic situation, analysis of the environmental impact and the financing plan. Approving financing of the investment within the operational program "Infrastructure and Environment" the EC issued on November 25, 2013 the Decision No. C(2013) 8273 which stated among others that:

*"The Commission, taking into account the opinion of the European Investment Bank has undertaken an assessment of the large project against the factors specified in article 40 of the Regulation No. (EC) 1083/2006 and considers that it is compliant with the priorities of the operational program, contributes in achieving the goals of these priorities and is in line with the EU policies".*

During the site inspection the facility was found to be well maintained. Good housekeeping was observed at the site. For all waste treatment facility a common issue of concern can be odor nuisance. At ZGOK site, however, such nuisance was observed in a very limited extent. As explained the installation is designed in such a way, that in the technological areas a slightly negative pressure is maintained by mean of air suction. Such air is then directed to the biological treatment chambers to maintain oxygen content, and further is discharged to the atmosphere via a biological filter. Wastes delivered to the site are unloaded from trucks inside the buildings, no wastes are stored outdoor. As reported by the facility personnel, no complaints with respect to odors or any other generated impacts have ever been submitted.

The review of the facility, undertaken as part of the Projects supply chain review, suggests that it has been designed and currently operates in line with environmental standards, local regulations and best international industry practice, thus environmental and social issues related to supply chain of the waste to the Project are considered appropriately mitigated.

## 5.2 Transportation of wastes

From the perspective of the Project, transport of wastes may generate impacts during delivery of wastes to ZGOK and then during delivery from ZGOK to the facility

Municipal waste collected from 37 municipalities that belong to the Centralny waste management region are transported to one of the nearest located transfer stations, each equipped with compacting machines in order to decrease the volume of transported waste prior to transport to the MBT installation in Olsztyn. ZGOK operates three waste transfer stations (see Figure 9):

- Medyny located in the municipality of Lidzbark Warmiński - to the north from the city of Olsztyn.
- Polska Wieś located in the municipality of Mrągowo - to the east from the city of Olsztyn;
- Trelkowo located in the municipality of Szczytno - to the southeast from the city of Olsztyn.

On transfer stations in Medyny and Polska Wieś, Separate Waste Collection Points (PSZOK) are also operated.

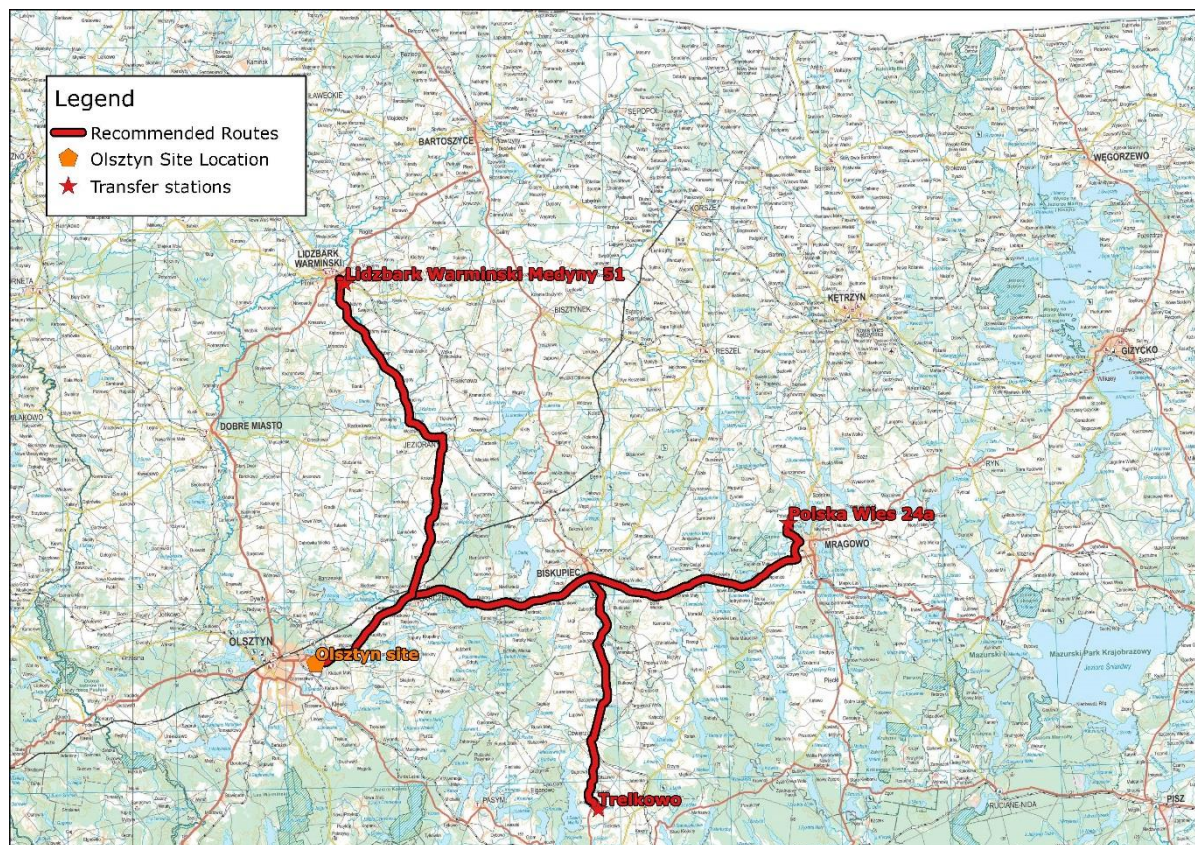
Waste collected in the municipalities are transported by garbage trucks owned and operated by local waste collection companies to the transfer stations, that are situated at the locations previously occupied by landfills, thus not generating additional traffic at these routes. The average capacity of garbage trucks varies between 10 m<sup>3</sup> and 24 m<sup>3</sup>. Location of the transfer stations at



the sites previously used as landfills secures that the waste transport does not expose other groups of people than previously.

From the transfer stations compacted municipal wastes are transported to the city of Olsztyn by container trucks with 20 maximum tons of waste load. From the southeast, the entrance road to the city of Olsztyn is Lubelska Street (national road No. 16). Based on the publicly available maps (published on Google Maps), recommended communication routes are:

- From the transfer station located in Medyny: regional road No. 593 to the southeast, then since Jeziorany the regional road No. 595 to the south and then since Barczewo the national road No. 16 to the southwest (total distance is approximately 48 km).
- From the transfer station located in Polska Wieś: local road to the south to Mrągowo, then ring road of the city of Mrągowo (road No. 59) to the southwest and then since Marcinkowo the national road No. 16 to the southwest (total distance is approximately 62 km).
- From the transfer station located in Trelkowo: local road to the west, then the national road No. 57 to the north and then since Biskupiec the national road No. 16 to the southwest (total distance is approximately 63 km).



**Figure 9. Locations of waste transfer stations**

Operation of the MBT installation with the capacity of 342.5 tons of municipal waste per day requires of at least 18 container vehicles with approximate load of 20 tons of municipal waste to be delivered to the facility daily. The containers are tight which protects from losing their load underway as well as limits odor nuisance. As reported by the ZGOG personnel, no complaints with respect to transport of wastes to ZGOK have been submitted so far.



**Figure 10 Example of a garbage truck used for collection and transport of municipal waste. Source: Website of Lidzbark municipality (available on the Internet: <http://www.odpady.gminalidzbark.com/>).**

After processing in ZGOK, the alternative fuel will be delivered to the CHP with use of a truck transport. The planned delivery road passes mostly on the access roads from the road No. 16 to ZGOK and from the road No. 16 to the CHP, of a total approximate length of 1550m. Only approx. 50 m of the route passes on the road No. 16. Delivery of 110 thousand tons of fuel will, according to EIA report require approximately 40 drives every working day. Further, fuel will be delivered in dedicated trucks so will be protected from atmospheric precipitation and losing load on the way. Apart from delivery of fuel also other materials, such as chemicals for flue gases treatment installation, light oil will be delivered and generated wastes (ash and slag) will need to be transferred off the site. The number of necessary drives should not exceed 4-6 per day. The total number of truck drives per day is negligible to the current traffic on the road No. 16 and as such should not generate any negative social issues.

Deliveries of wastes and alternative fuel are not considered by Ramboll Environ as an issue of environmental or social concern.

## 6. SOCIAL IMPACTS ANALYSIS AT ALL STAGES OF THE PROJECT

### 6.1 Baseline conditions

Olsztyn, the Capitol of Warmińsko-Mazurskie voivodship occupies an area of 88.31 km<sup>2</sup> and has approximately 173.5 thousand inhabitants, of which 53.5% are women and 46.5% are men. Between 2002-2016 number of inhabitants increased by 0.7%. An average age of inhabitants is 41.5 years and is slightly higher than the average for the voivodship. 62.9% of inhabitants are at age between 18 and 65, 16.7% are 17 or younger and 20.3% are over 65 years old.

In Olsztyn there are 365 employed per 1000 inhabitants, of which 53.6% are women and 47.4% are men. An average gross monthly salary in Olsztyn is 4 104.05 PLN which amounts 98.90% of the average for the country.

The employment structure in the city is as following:

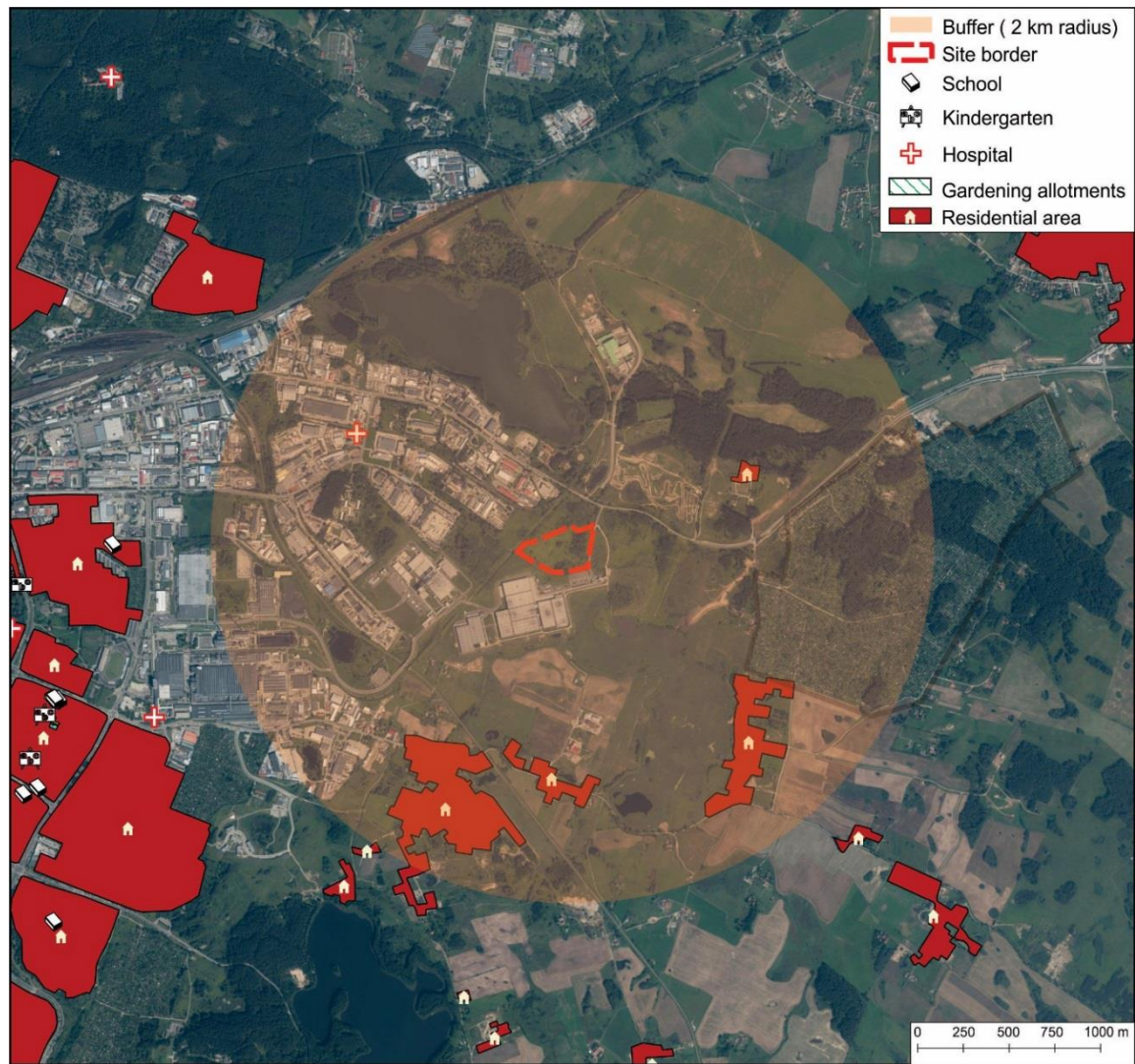
- 0,7% employed work in agricultural sector (agriculture, forestry, hunting, fishing);
- 22,1% work in the industry and construction segment;
- 3,1% work in services
- 3,1% work in financial sector;

and the other work in other sectors (e.g. administration or education).

The city is divided into 23 settlements (districts). The heat supply in the city is provided by (as for 2010):

- Kortowo CHP and Michelin CHP via a district heating network;
- 16 local boiler houses of a thermal capacity above 1 MW;
- 67 local boiler houses of a thermal capacity between 0.1 and 1 MW;
- 17 local boiler houses of a thermal capacity below 0.1 MW; and
- Individual boilers/furnaces, in large extent coal fired.





**Figure 11. Socially sensitive receptors around the site** (Source: Google Maps®, OpenStreet and Geoportal.gov.pl)

Olsztyn is an important regional cultural center. There are 2 theatres, 4 cinemas, museums, art galleries, philharmonic and other cultural objects in the city.

There are 6 universities and numerous primary and secondary schools in the city.

The healthcare system in the city is well developed, it includes:

- 10 hospitals;
- 5 emergency stations,
- 2 hospices;
- numerous private and public health clinics.

The Project site is situated in the outskirts of the city and is distant from the sensitive receptors (see Figure 11):

- approximately 1.2 km away from the nearest health clinic;
- approximately 2.8 km away from the nearest hospital;
- approximately 2.2 km away from the nearest school;
- approximately 1 km away from the gardening allotments;
- approximately 350 m away from the nearest residential area.

It must be noted, that according to the Polish environmental regulations only certain developments/industries (such as e.g. airports) are allowed to create limited usage zones in which



some environmental standards can be exceeded. The CHPs, including the Project, are not allowed to generate any environmental impacts that exceed the environmental standards out of their sites. As proved by the EIA, all environmental impacts generated by the Project will not cause breaches of the environmental standards.

## 6.2 Social impacts at the construction stage

Following the Feasibility Study<sup>2</sup>, development of the CHP may last as long as 32-36 months, of which approximately 27 months may take construction of the facility. During this phase the following social impacts may occur:

- Increased road traffic, in particular on the road No. 16 may occur due to a need for delivery of technological components, construction materials and workers. According to the available source<sup>4</sup> the traffic volume at the road No. 16 in Barczewo direction (i.e. in the proximity of the site) amounts 16.4 thousand cars per day. Given already existing heavy traffic on this road the increase of traffic density is not expected to be significant even in the period of the most intense construction works. Nevertheless the traffic related to construction works will contribute to overall roads nuisance such as emission of noise and primary (related to fuel incineration) and secondary (e.g. dust emission caused by moving vehicles) air emissions. Moreover the increased traffic may cause nuisance to drivers traveling on the road No. 16, in particular by creation of traffic jams, increased risk of car accidents can be also foreseen. The Olsztyn citizens will be exposed to the nuisances in a limited extend due to the location of the site in the outskirts of the city and far of sensitive receptors (see Figure 11). All traffic related impacts are reversible and will not occur after completion of the construction works.
- Construction works at the site will be a source of noise nuisance related to operation of building machines and assembly works. Primary and secondary fugitive air emission may also occur. Such impacts may affect the human residences located in the proximity of the site (a few hundred meters). These impacts will be reversible and limited in time to the construction period only.
- Connection of the new CHP to the existing district heating network will require remodeling of approximately 2.5 km of the main pipes of the network. This will affect citizens supplied with heat from the network by temporarily limited access to the hot water and heating. Such impact may be reduced if the remodeling works are conducted in the standard network/HP maintenance periods (when heat is not supplied to end users anyway). Further, remodeling works in the city will require exclusion of the certain parts of the streets from traffic hence will make traveling across the city more time consuming. Also citizens living along the main district heating pipes, where the works will be conducted, will be exposed to noise and primary and secondary air emissions. These impacts, however, will be reversible.
- The district heating network in need of remodeling is not located on the land belonging to private owners, hence there will be no need for acquisition of a new land or physical resettlement of the citizens.
- Both construction of the CHP and remodeling of the district heating network is likely to create new working places, both in the company (increased demand for employees to perform remodeling works) and in contractors and subcontractors of the construction works.
- Employees of the construction works' contractors and subcontractors may be hired from the Olsztyn area but also from other parts of the country or even from abroad. As the general requirements of the national law, all workers, never mind they origin, must have an appropriate medical examination, must be provided with PPE appropriate for the type of undertaken works, and must have appropriate H&S training. Other rules guaranteed by the constitution and the Labor Code, such as ban on any form of discrimination or forced labor, employment of children or pregnant women and other rules will be also in force. The compliance of the contractor/subcontractors with the law can be checked at any time of the works by the national labor inspectorate. Hence the workers' rights shall be considered secured by the national law and practice.

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<sup>4</sup> "General Measurement of the Traffic Volume - GDDKiA 2015" (Generalny Pomiar Ruchu 2015 in Polish)

- Provision of accommodation to the contractor/subcontractors' employees will depend on the individual or group contracts with them. Both individual and group accommodation of workers will the most likely be provided by use of hotels, B&B or apartments'/rooms' rental.
- The construction stage is not expected to have a negative impact on the employment of the Company. But it is possible that it will positively influence employment rates in the area as well as stimulate local businesses, by creation of working places and new business opportunities.
- Some H&S risks may occur during the construction phase of the project both due to the character of works at the construction site (e.g. deep excavations, manoeuvring of heavy equipment, work at height, electric issues, etc) and at the delivery routes (e.g. risk of traffic accidents).

### 6.3 Social impacts at the exploitation stage

After the Project is fully operational the following social impacts are expected:

- Undisturbed heat supply to current and future customers. If, due to any reasons, the planned construction of the CHP is not completed, the city would suffer approximately 90 MWt deficit of heating energy. This would result with installation of individual or group heating sources (individual boilers or local boiler houses), very likely fueled with hard coal or wood (these fuels are the cheapest currently in Poland). This would require a significant costs to be covered by the citizens, but on the other hand also increase of low emission and consequently environmental deterioration and reduction of the quality of life. It is worth mentioning here, that the Company does not predict any significant changes in the current heat tariff after implementation of the Project. Further, any change of heating tariff in Poland must be approved by the energy regulator (Urząd Regulacji Energetyki) who does not accept any unjustified economically or technically increases.
- The Project in light of the EIA report<sup>3</sup> as well as BAT and IED analysis presented in section 4 is not likely to generate adverse social impacts, including health impacts due to air or noise emissions.
- As indicated in section 5, the traffic or odor nuisance from waste transfer are appropriately mitigated under current ZGOK supply system.
- Based on the feasibility study, the Project will have a neutral impact on employment at Kortowo CHP. Total employment at both CHP and Kortowo CHP is estimated as 100 people and in heating season additional 100 people. The Company does not plan any retrenchments after implementation of the Project. This is secured by a Collective Agreement which was signed in 2016 for a period of 7 years. Also a Social Package was agreed with the employees and signed in March 2016. These were negotiated between the Company management and the unions and employees since 2014. The unions were supported by a legal expert whose service was paid by MPEC.
- During the operational phase of the Project the employees will be exposed to different H&S risks typical for the type of conducted operations (e.g. related to electric hazards or working at heights but also burns, wounds, etc.) and related to accidents at the site, such as e.g. fire events.
- The CHP will utilize RDF produced by ZGOK hence the communal waste after separation of the high energetic fraction will be utilized locally. This will allow reduction of cost related to utilization of municipal waste and reduce the waste management costs charged to the public in the region.

### 6.4 Social impacts at the liquidation stage

The social impacts at the liquidation stage will be similar to these at the construction stage.

### 6.5 Mitigation of social impacts

The social impacts related to construction and then operation of the project can be mitigated at different levels, depending on their nature and area of influence.

The impacts generated during construction and dismantling phase will be mainly associated with nuisances for the local society, risks related to increased traffic and H&S risk for the construction

workers and drivers. Mitigation of such impacts will be achieved by proper impacts' management by SPV and MPEC.

The nuisances to the local society will be limited by proper organization of the construction\dismantling works, such as:

- Conducting delivery of equipment and building materials during the day hours only, unless delivery at night is necessary due to technological reasons (e.g. construction of concrete floors or foundations) or legal requirements (e.g. delivery of oversize cargo). Further, delivery of materials to the construction site should be properly planned by meaning of a Delivery Management Plan which will optimize delivery routes to reduce impact on residential areas, avoiding increased impact on traffic jams and improving road safety;
- Conducting the works during day hours only, unless such works must be conducted at night due to technological requirements. Such action would prevent to some extent emissions of noise that might be detrimental to health and comfort of people residing in the nearby area, as well as:
- Maintaining the Stakeholders Engagement Plan and informing in advance the local society about planned works on the district heating network so the people are aware of the upcoming shortage in heat supply and possible streets exclusions from normal traffic.

The impacts to the local society during the operational phase of the Project will be mitigated by:

- Monitoring of the facility environmental performance, in particular air and noise emission and consequently securing the quality of citizens' life and exposure to air quality related diseases and noise nuisance. The continuous emission monitoring system will be installed for certain pollutants and for other pollutants periodical measurements will be conducted in line with the IED and the environmental management system procedures, which will secure that the overall performance of the facility will comply with BAT, IED and good industry practice. Undisturbed and controlled operations of the plant will secure that the air quality standards will not be exceeded so the people will not be exposed to risks related with polluted air. The air quality monitoring system is not planned for the facility as such in Poland is maintained by Inspectorates of Environment Protection which assures the same quality of measurements and unified methodology of observations for the entire country. The nearest monitoring station is located at Puzzkina 10 Str., approximately 4.5 km to the north-west of the site.
- MPEC and SPV will maintain a Stakeholders Engagement Plan and grievance mechanism to secure appropriate exchange of information with all the stakeholders, including local society, and properly address all situations assessed by individuals or organizations as the issues of concern.

The mitigation of impacts to the internal stakeholders, i.e. own workers and supply chain will be achieved by implementation of the following measures:

- MPEC and the SPV will comply with all Polish labor and health and safety regulations, specifically Labor Code and EBRD PR 2 requirements including Core ILO conventions during all phases of the project. Worker health and safety management systems are currently in place for the operation of the Kortowo CHP and relevant management systems and operating procedures will be developed for operations of the Waste to Energy Facility.
- MPEC via SPV will develop a Labour Management Plan, which will apply to SPV and its contractors during construction and operation of the Project, and will outline procedures and requirements to ensure that SPV and its Contractors respect and protect the fundamental principles and rights of workers through promoting personal respect and a safe work place. This will include, despite of the nationality of workers:
  - fair treatment;
  - non-discrimination and equal opportunities for all workers;
  - establishing, maintaining and improving a sound worker-management relationship;
  - compliance with applicable national labour and employment laws;
  - protecting and promoting the safety and health of workers, especially by promoting safe and healthy working conditions;

- preventing the use of forced labour and child labour (as defined by the ILO and Polish legislation).
- MPEC via SPV will monitor employee standards of its contractors throughout the lifetime of the Project through regular labour and OHS audits.
- MPEC via SPV will develop an Emergency Response Plan, which will provide the process and procedures for the Operator to follow, together with local emergency service organisations, in the event of an occupational safety or environment incident during the life of the Project.
- Requirement imposed by the draft contract for the construction works to follow all applicable H&S standards and regulations, which means that the employees as a minimum will be:
  - provided with H&S training appropriate for the type of executed works;
  - sufficiently skilled and experienced and will possess necessary authorizations;
  - equipped with appropriate PPE;
- Implementation of the H&S plan prepared as a part of the building design.

## 7. STAKEHOLDER ENGAGEMENT ANALYSIS

The Project was commenced in 2011 when the owner of the second largest heating source (Michelin) decided to terminate its operations in the future and when the Olsztyn City Council adopted "Assumptions for the heat, electricity and gas fuels for the City of Olsztyn".

The first phase of the Project development was concentrated on a wide range of public consultations. The milestones of this phase were as following:

- On November 30, 2011, the City Council adopted mentioned above "Assumptions". Prior to its adoption the document had been made available for public review and posted on an official website ("Biuletyn Informacji Publicznej" (BIP) – "Public Information Bulletin") of the City. During the consultation period the document was commented and recommendations were submitted, among others by the labor unions of MPEC.
- In March/April 2012 the meetings with the City Council members were arranged and a new strategy of energy supply for Olsztyn after 2015 in public-private partnership model was presented.
- On May 24, 2012 the President of Olsztyn assisted by the representatives of MPEC presented to the Presidents of the Housing Cooperatives the concept of the CHP to be developed by a SPV.
- On May 28, 2012 an official website of the Project ([www.ec.olsztyn.pl](http://www.ec.olsztyn.pl)) was officially launched.
- Between June 18 and July 31, 2012 a first round of public consultations were undertaken, which included two meetings with the citizens on June 26 and July 24.
- Between October 1 and 31, 2012 the second round of public consultations took place. The consultations included experts' debate on October 17 and meeting with the citizens on October 18, 2012, during which use of alternative fuel from waste was widely discussed. Also group interview was arranged on October 30. The company's labor unions applied for undertaking efforts in order to use of alternative fuel from waste use for heat production. The report on this consultations includes a declaration of undertaking an investigation on a possibility to join the Communal Waste Management Company (ZGOK) project with the MPEC Project in order to utilize alternative fuel.
- Between November 5 and December 20, 2013 a number of meetings with the members of the City Council in order to present status of the Project development.
- On December 31, 2013 the Project was presented among others to the Marshal of the Voivodeship in order to achieve support for the concept of the use of alternative fuel originating from the entire Voivodeship.
- On January 29, 2014 the City Council approved concept of heat supply to the city with use of the alternative fuel originating from communal waste.
- On March 19, 2014 the Project was presented on a conference "The method of waste utilization as an alternative fuel in the communes of Warmińsko-Mazurskie Voivodeship", arranged by the Marshall of the Voivodeship.
- On April 2, 2014 the Project development status was presented to Olsztyn City Council for District Heating Development.
- On May 19, 2014 the Project's feasibility study was presented to the City authorities.
- On July 23, 2014 the Project was presented on a conference arranged by the Marshall's Office.
- Between 4 and 20 December, 2015 plebiscite on an architectural concept of the facility was arranged, the concept by Mr. Maciej Pawązek was selected on December 30.
- On February 22, 2016 as a part of an information campaign a meeting with citizens of Olsztyn. The participants could ask questions related to the Project to the experts on heat generation, renewable energy, environment protection and waste management.
- On July 4, 2016, the President of Olsztyn met presidents of the Housing Cooperatives, during which the President applied for Housing Cooperatives support on behalf of the citizens to the concept of the city heat supply with use of the alternative fuel. Such concept had been discussed in details previously and had been also discussed by the presidents of the housing cooperatives

with the citizens. The concept was fully approved by the presidents of the Housing Cooperatives.

In parallel to the consultation process, the company worked on selection of a private development partner. On November 30, 2012 MPEC has initiated procedure for "Selection of a private partner in order to serve heat supply to district heating network in Olsztyn", based on the Act of December 19, 2008 on public-private partnership. The procedure has been conducted in line with the Public Procurement Act, namely in a concurrent dialogue mode of proceeding. In the first phase of the proceeding, MPEC established a number of requirements, including certain borrowing power and turnover during the previous 3 years, experience in power generating project etc. Eight bidders applied among which 5 were selected for further dialogue.

On December 22, 2015 the Project was granted by the President of Olsztyn environmental decision No. SD.6220.15.2015.MJ. The decision was granted based on a full scope environmental impact assessment of the Project. The EIA procedure included the following milestones:

- In February, 2015, MPEC applied to the Environmental Department of the Olsztyn City Hall for environmental decision (document No. MPEC/PT-DBT-TS/018/15).
- After submission of the application, MPEC was asked three times for supplements to the application, i.e. on February 17<sup>th</sup>, on March 5<sup>th</sup> and on March 18<sup>th</sup>, 2015. All information required by the Olsztyn City Hall to be supplemented was delivered by MPEC within the required period of time.
- On April 3<sup>rd</sup>, 2015 the Olsztyn City Hall commenced the environmental procedure (document No. SD.6220.15.2015.MJ) and applied to the Regional Environmental Protection Directorate in Olsztyn (RDOŚ) (document No. SD.6220.15.2015.MJ) and to the State County Sanitary and Epidemiological Inspectorate (SANEPID) in Olsztyn (document No. SD.6220.15.2015.MJ) to determine the scope of the EIA report.
- On May 7<sup>th</sup>, 2015 MPEC, based on the application No. MPEC/PT-DBT-TS/018/15 dated February 3<sup>rd</sup>, 2015, submitted EIA report to the Environmental Department of the Olsztyn City Hall.
- Based on the resolution issued by RDOŚ on May 20<sup>th</sup>, 2015 (document No. WOŚ.4240.142.2015.MT.1) determining the scope of the EIA and based on the opinion issued by the SANEPID (document No. ZNS.4083.20.2015), on May 21<sup>st</sup>, 2015 the President of Olsztyn City imposed the need to conduct the EIA procedure and requested MPEC to provide the EIA report (document No. SD.6220.15.2015.MJ).
- MPEC was requested by RDOŚ, on June 30<sup>th</sup>, 2015 to submit supplementary information (document No. WOŚ.4242.54.2015.MT), which was accomplished on August 4<sup>th</sup>, 2015 and the supplementary information were submitted to both RDOŚ and President of Olsztyn City (document No. MPEC.PT-DBT-TS/108/15).
- Additionally, on August 7<sup>th</sup>, 2015, MPEC was requested to submit supplementary information to SANEPID (document No. ZNS.4083.20.2015).
- On August 25<sup>th</sup>, 2015 RDOŚ in Olsztyn issued notification and determined the conditions for the project implementation (document No. WOŚ.4242.54.2015.MT.1) and on November 12<sup>th</sup>, 2015 SANEPID also issued positive opinion and determined the conditions for the project implementation (document No. ZNS.4083.20.2015).
- The society was informed about commencement of the EIA procedure and 21 days long period for submission of comments and concerns between November 20<sup>th</sup>, 2015 and December 10<sup>th</sup>, 2015. The notifications were published on the website of the Olsztyn City Hall as well as on the information board of the Environmental Department of the Olsztyn City Hall. Neither concerns nor comments have been submitted by private citizens and by the ecological organization.
- The environmental decision No. SD.6220.15.2015.MJ was issued on December 22<sup>nd</sup>, 2015 issued by the President of Olsztyn City. Correction to the decision No. SD.6220.15.2015.MJ was issued by the President of Olsztyn City on January 14<sup>th</sup>, 2016. Correction was related to the validity period of the environmental decision and the period of time, when the building permit can be submitted.
- On January 14<sup>th</sup>, 2016, Olsztyn City Hall forwarded to the Local Governmental Appeals Board in Olsztyn (in Polish, 'Samorządowe Kolegium Odwoławcze') an appeal submitted by an ecological organization from Oświęcim 'Towarzystwo na Rzecz Ziemi'. Due to the large amount

- of documents, Local Governmental Appeals Board extended the period for response until April 14<sup>th</sup>, 2016 (document No. SKO.60.5.2016).
- On February 29<sup>th</sup>, 2016, the Local Governmental Appeals Board in Olsztyn issued decision on upholding the decision issued by the first instance authority, i.e. by the President of Olsztyn City (document No. SKO.60.5.2016).
  - On February 29<sup>th</sup>, 2016, the ecological organization from Oświęcim 'Towarzystwo na Rzecz Ziemi' appealed decision issued on February 29<sup>th</sup>, 2016, the Local Governmental Appeals Board in Olsztyn (document No. SKO.60.5.2016).
  - On July 12<sup>th</sup>, 2016, MPEC submitted an answer to the Voivodeship Administrative Court in Olsztyn regarding the ecological organization's appeal (document No. MPEC/PT-DT-TS/125/16).
  - On July 13<sup>th</sup>, 2013 MPEC sent a copy of the answer submitted to the Voivodeship Administrative Court in Olsztyn to all interested parties, i.e. 'Towarzystwo na Rzecz Ziemi' (document No. MPEC/PT-DT-TS/126/16), Warmińsko – Mazurska Special Economic Zone S.A. (document No. MPEC/PT-DT-TS/130/16), Local Governmental Appeals Board in Olsztyn (document No. MPEC/PT-DT-TS/131/16), President of Olsztyn City (document No. MPEC/PT-DT-TS/128/16), Department of Geodesy and Real Estate Management in Olsztyn (document No. MPEC/PT-DT-TS/127/16) and General Directorate for National Roads and Highways (document No. MPEC/PT-DT-TS/129/16).
  - On July 19<sup>th</sup>, 2016 the Voivodeship Administrative Court in Olsztyn dismissed the appeal (document No. II SA/OI 509/16) submitted by the ecological organization from Oświęcim 'Towarzystwo na Rzecz Ziemi' on February 29<sup>th</sup>, 2016.

The participation of the local communities and stakeholders was secured in line with the law in force. As a part of the EIA procedure a disclosure of project related information and securing of public participation in the procedure was maintained by the commune authorities, which is Olsztyn City Hall. The EIA procedure was conducted in line with the environmental law; in particular the EIA report and other documents were available for review by interested stakeholders who had also a right to submit their concerns. The Olsztyn City Hall disclosed information to the stakeholders by posting appropriate notifications on their website (Biuletyn Informacji Publicznej in Polish, available on the Internet: [www.bip.olsztyn.eu](http://www.bip.olsztyn.eu)) as well as on the information board of the Environmental Department of the Olsztyn City Hall. Moreover, information related to the EIA procedure was published on the website dedicated for the project, i.e. <http://www.ec.olsztyn.pl>. During the EIA procedure, no applications and grievances from ecological organizations, stakeholders and local residents were submitted to the local authorities. After issuing the environmental decision, appeal from the ecological organization was submitted to the Local Governmental Appeals Board in Olsztyn. The appeal was dismissed by the Voivodeship Administrative Court in Olsztyn.

The consultations with the identified stakeholders are currently conducted on standard day-to-day basis. In terms of the communication with internal stakeholders, MPEC uses the following communication channels:

- Intranet system DGA Quality - a system that allows access to all necessary documents, forms, system instructions, ordinances and regulations, which organizes the work of the Company.
- E-mail accounts in the domain business mpec.olsztyn.pl
- Information boards in administrative/office buildings and heating plants - changes in the regulations, ordinances and important events of the Company.
- Regular meetings of the heads of individual organizational units with employees.
- Weekly meetings of the managers of the technical department of the Company.
- Regular meetings between managers and the Company Management Board;
- Periodic meetings of the Company Management Board with employees - information about the finances of the Company, plans, planned changes, reports on the implementation of the tasks, plans.
- Custom publishing – information company newspaper MPEC 'Dobra Energia' (paper version).
- Programs for employees, e.g. 'Aktywność pracownicza (*employees' activity*) – program, which supports employees in the implementation of their life passion, combined with the promotion

of the Company MPEC. Competition 'Share an idea' (in Polish, '*Podziel się pomysłem*') - a competition for suggestions for improvement and innovation, integration events – e.g. Dzień Ciepłownika.

Moreover, the MPEC uses the following communication channels in order to maintain good relation with external stakeholders:

- Distribution of the information via websites:
  - a. [www.bip.mpec.olsztyn.pl](http://www.bip.mpec.olsztyn.pl) – basic information about formal issues connected with the company's operations.
  - b. [www.mpec.olsztyn.pl](http://www.mpec.olsztyn.pl) – communication channel created for the heat receivers designed to provide information about current activities of the Company, heating system failures and planned outages; also a source of access to necessary applications and documents, information about services, products, it is also a place for the presentation of the Company's activities as a part of Corporate Social Responsibility (available the so-called. "Sponsorship package"), etc.
  - c. [www.ec.olsztyn.pl](http://www.ec.olsztyn.pl) – communication channel to inform about the project.
  - d. [www.facebook.com/dobraenergiaolsztyn](https://www.facebook.com/dobraenergiaolsztyn) – social media website presenting basic information about the Company.
  - e. YouTube channel 'TV Dobra Energia' – movies about the project, which are prepared in cooperation with TV Kopernik.
- Articles in local newspapers (local, regional and nationwide) as well as broadcasts on the radio.
- Information stands during city events (fairs, music festivals, cultural and sport events).
- Open Days – open days for Olsztyn inhabitants combined with activities for whole families.
- Educational tours for groups – children from primary schools, middle schools, high schools and technicians, students of faculties related to environmental protection, district heating and energy.
- Customer Satisfaction Survey - regularly distributed among all consumers of district heat and hot water.
- Annual meetings with key customers and business partners - information about completed and planned investments.
- Press briefings for the media - according to the needs.
- Information sent via traditional mail - pricing, tariffs, information on services and products.

All stakeholders' engagement actions undertaken by the company are assessed by Ramboll Environ as significantly exceeding Polish standards. All stakeholders of the development process have been properly engaged and informed.



## **8. REVIEW OF CLIENTS EXISTING E&S MANAGEMENT SYSTEMS AND PRACTICES AND ASSESSMENT OF THEIR CAPACITY TO UNDERTAKE THE PROJECT IN LINE WITH EBRD PRS**

MPEC operations are ruled by an integrated management system which adopts ISO 9001, ISO 14001, and PN-N 18001 standards. The system is certified by IQNet and PCBC.

Moreover, MPEC holds an Integrated Management System Policy (functioning since 2008), which includes elements of the environmental and social policy. The book of integrated management system regulates the following aspects (and calls out respective procedures and instructions):

- Identification of environmental legal requirements and compliance assessment;
- Planning, execution and assessment of environmental trainings;
- Assessment and qualifications of environmental aspects in MPEC
- Environmental audit;
- Waste monitoring and recording;
- Monitoring of key properties of significant environmental impacts;
- A list of key environmental impacts;
- Environmental impact register;
- Identification and assessment of the key environmental impacts;
- Identification of H&S legal requirements and compliance assessment;
- Planning, execution and assessment of H&S trainings;
- Identification of risk and health risk assessment;
- Accidents' investigation and identification of potentially risky events;
- H&S monitoring;
- Works particularly dangerous.

MPEC via SPV will develop a suite of Environmental and Social Management Plans which will form part of its Environmental and Social Management System. The Management Plans will describe how MPEC via SPV and the Operator will ensure that environmental and social risks are managed and that identified management activities are carried out by staff and contractors. It will make clear who is responsible for each activity, when tasks need to be completed and how they will be monitored and reviewed.

Management of Environmental and Social Impacts will be carried out through development of the following Management Plans:

- Environmental and Social Management System- Framework
- Air Quality Management Plan
- Noise and Vibration Management Plan
- Community Health and Safety Plan
- Contractor Management Plan
- Emergency Response Plan
- Hazardous Materials Management Plan
- Supply Chain Management Plan
- Waste Management Plan
- Waste Water Management Plan
- Traffic and Road Safety Plan
- Human Resource Management Plan
- Employees Grievance Mechanism
- Security Management Plan
- Occupational Health and Safety Plan
- Updated Stakeholder Engagement Plan
- External Grievance Mechanism
- Labor Management Plan

- Other than Normal Operation Management Plan

In line with requirements of the national EIA, the Environmental Decision and this Supplementary Environmental and Social Report and the accompanying Environmental and Social Action Plan the MPEC via SPV will develop and implement detailed monitoring measures to ensure that it can check that environmental and social management measures and commitments are working and that it is fulfilling its regulatory requirements and other commitments. The detailed monitoring measures will be listed in each Environmental and Social Management Plan, and will include a description of what needs to be monitored, how it is monitored, how often, and who is responsible for the monitoring.

MPEC via SPV will also develop a suite of key performance indicators, which will be used to track the success of environmental and social management.

MPEC via SPV will continue to monitor environmental and social risks throughout all phases of the Project, including during decommissioning, and after the Project is closed.

As part of the Project assessment the company and the Project was evaluated against EBRD Performance Requirements (PRs). The evaluation results are summarized in the following table. The term SPV refers to special vehicle company created by MPEC and Private Partner, which will develop and then operate the CHP.

<b>Performance Requirement</b>	<b>Status</b>	<b>Actions needed to achieve full compliance</b>
PR 1: Environmental and Social Assessment	The Company and the Project have been found compliant with this PR. In particular, the environmental and social assessment of the Project has been conducted in a structural way and all environmental and social issues have been properly identified and addressed. Further, the Company operations are regulated by the integrated management system, which is based on the integrated management policy which addresses also environmental and social matters. The listed above procedures of the integrated management system constitute environmental and social management program. And finally, the company has organizational structure in which environmental and social roles and responsibilities are assigned to dedicated organizational units.	<p>As stipulated by the ESAP, the SPV will develop a certified environmental and social management system. The system should be aligned with MPEC Integrated Management System. Further, the SPV will establish, maintain and strengthen, as necessary, an organizational structure that defines roles, responsibilities and authority to implement the ESMS for ensuring ongoing compliance with relevant national regulatory requirements, and the PRs. Specific personnel, including management representative, will be designated with clear lines of responsibility and authority to maintain and implement the ESMS. The SPV will secure appropriate resources, including financing, to maintain an appropriate system maintenance and improvements.</p> <p>Further, the SPV will develop and implement a Supply Chain Management Plan to monitor environmental and social performance of the alternative fuel suppliers as well as the issues</p>

		<p>related to waste and fuel transportation.</p> <p>In order to fully meet PR 1, the SPV will also develop a Project monitoring procedures and report the environmental and social performance to the lenders.</p>
PR 2: Labor and working conditions	<p>The Company and the Project complies with the applicable national labor, social security and occupational health and safety laws and fundamental principles and standards. The human resources relationship in MPEC are regulated by a collective agreement as well as by a social package signed between the management and employees. The package is valid until December 31, 2022. The rules of internal communication are defined in a dedicated procedure of the integrated management system.</p>	<p>In order to meet this PR the SPV will comply with all national regulations with respect to social, security and occupational health and safety laws and fundamental principles and standards, which is imposed by the ESAP. The environmental and social management system implemented in the SPV will include procedures for proper monitoring and management of labor and H&amp;S issues.</p> <p>For the construction period the works contractor will strictly follow all respective H&amp;S rules, including these related to provision of appropriate PPE, training and medical examinations of the workers and supervision on this obligations will be ruled by the Management Plans listed above.</p>
PR 3: Resources efficiency and pollution prevention and control	<p>The Company operates in line with applicable environmental laws and regulations and SPV will follow this practice.</p> <p>The resources efficiency of the project as well as pollution prevention and control have been widely discussed in the feasibility studies (see section 3) and EIA report and all identified environmental risks have been properly addressed. The Project shall meet the IED provisions and its operations will be regulated by an integrated permit. The CHP will utilize network water only and generated wastes will be handled in line with good practice and transferred for re-use or disposal by certified companies.</p>	<p>In order to properly address the need for resources efficiency and pollution prevention and control the SPV will need to apply for integrated permit. The operations of the CHP will follow all provisions of the permit, including these related to monitoring of environmental impacts and use of energy and substances.</p> <p>As stipulated by ESAP the designing of the plant will take into account all provisions of IED and BREF for waste incineration, including advanced control system and continuous emission monitoring system to secure safe and environmental friendly performance of the plant at the operational stage.</p>
PR 4: Health and Safety	<p>MPEC properly addresses a need for identification of potential accidents, injury or diseases by appropriate procedures of the integrated</p>	<p>As stipulated by ESAP in order to meet the PR 4 requirements the SPV will adopt similar procedures as MPEC. These will be elements of</p>

	<p>management system. The system also addresses a need for proper information and training. Every accidents and near misses are investigated, recorded and analysed in order to reduce a risk for similar events in the future.</p> <p>The Health and Safety (H&amp;S) issues in the company are managed by the Department of Health and Safety and Professional Training. The scope of Department's responsibilities cover all matters related to safety at work, training, medical examination, maintaining H&amp;S registers and other H&amp;S issues. The department and the whole company routinely follow the national H&amp;S regulations and respective procedures of the integrated management system.</p> <p>The Company maintains a register of work related accidents.</p> <p>The workers are provided with appropriate personal protective equipment (PPE) wherever it is required and are encouraged and controlled to apply the equipment as necessary.</p> <p>The technological part of the facility is properly protected against unauthorized access, no other potentially adverse impact to the society is associated with the facility operations.</p> <p>Emergency preparedness is regulated by certain procedures of the integrated management system of MPEC. Among others, there are procedures for identification of risks and environmental accidents and potentially accidental situations.</p>	the environmental and social management system.
PR 5: Land Acquisition, Involuntary Resettlement and Economic Displacement	The land designated for construction of the CHP is an idle land currently not used for any commercial purposes. Development of the project will not require any resettlement and will not generate any risk of economical displacement. Moreover, the project will be beneficial for the city.	
PR 6: Biodiversity	The project will be developed on a currently idle land of low natural value.	As identified in the Gap Analysis Report in order to confirm findings

Conservation and Sustainable Management of Living Natural Resources	The baseline natural conditions have been determined in the EIA report. Further, in the EIA report the impact on nature due to air emissions, generation of wastes and wastewater and water consumption was assessed and no significant adverse impacts have been identified.	of the biodiversity assessment, the Contractor, following the ESAP provisions, will be obliged to carry out biodiversity inventory on site prior to commencement of construction works.
PR 7: Indigenous people	This performance requirement is not applicable to the Project.	
PR 8: Cultural heritage	As indicated in the EIA Report, the Project will be developed on an idle land and no impact on historical monuments is predicted. However, in October 2016 MPEC requested the Voivodeship Historical Monuments Conservator for a permit for archaeological screening of the development site. In the course of the screening in November 2016, two archaeological stands were identified. Based on these findings, the Voivodeship Historical Monuments Conservator issued a decision No. 471/16 of December 29, 2016 requesting pre-construction archaeological investigations at the land plot No. 6/16.	As stipulated by ESAP, if the pre-construction archaeological investigations give a positive result, the full archaeological research will be undertaken at the site prior to commencement of the construction works.
PR 9: Financial Intermediaries	This PR is not applicable to the Project	
PR 10: Information disclosure and stakeholder engagement	The Project has been developed with a full respect to the need of intensive stakeholders engagement (see section 7).	For the construction and then operational phase of the Project the SPV will adopt and implement a Stakeholder Engagement Plan

Ramboll Environ assesses that the Company and the Project via SPV are fully capable to meet EBRD's performance requirements, as per bank's Environmental and Social Policy (2014). Further, the company management proved its commitment to run the business following national standards and good international industry practice. The SPV will be capable to meet the Performance Requirements if the actions listed above, as well as Environmental and Social Action Plan prepared for the Project are implemented.

## 9. CUMULATIVE IMPACT OF THE PROJECT ON AIR QUALITY

### 9.1 Air Quality in the City of Olsztyn

The air quality in the city is generally satisfactory, as indicated in the table below<sup>5</sup>.

Substance	Zone class for assessed substance	
	City of Olsztyn	Warmińsko-mazurska Zone
	2012/2013/2014/2015	2012/2013/2014/2015
Assessment against health protection criteria		
SO <sub>2</sub>	A/A/A/A	A/A/A/A
NO <sub>2</sub>	A/A/A/A	A/A/A/A
CO	A/A/A/A	A/A/A/A
C <sub>5</sub> H <sub>6</sub> (benzene)	A/A/A/A	A/A/A/A
O <sub>3</sub> (ozone)	A+D2/A+D2/A+D2/A+D2	A+D2/A+D2/A+D2/A+D2
PM <sub>10</sub>	A/A/C/A	C/A/C/C
PM <sub>2,5</sub>	A/A/A/A	A/A/A/A
Pb (in PM <sub>10</sub> )	A/A/A/A	A/A/A/A
Ni (in PM <sub>10</sub> )	A/A/A/A	A/A/A/A
Cd (in PM <sub>10</sub> )	A/A/A/A	A/A/AA
As (in PM <sub>10</sub> )	A/A/A/A	A/A/A/A
Benzo(a)pyrene in PM <sub>10</sub>	C/C/C/A	C/C/C/C
Assessment against plants protection criteria		
SO <sub>2</sub>	-	A/A/A/A
NO <sub>x</sub>	-	A/A/A/A
O <sub>3</sub>	-	A+D2/A+D2/A+D2/A+D2

Class A – concentration of assessed pollutant did not exceed the appropriate permissible level or target level; class C – concentration of assessed pollutant in the zone exceeded permissible level (PM<sub>10</sub>) or target level (BaP); class D2 – ozone concentration exceeded long term target level by 2020

Based on the air quality monitoring for the years 2012–2015, in Olsztyn<sup>9</sup>:

- Concentrations of: SO<sub>2</sub>, NO<sub>2</sub>, CO, C<sub>6</sub>H<sub>6</sub>, O<sub>3</sub>, PM<sub>2,5</sub> and Pb, Ni, Cd, As in particulate matter PM<sub>10</sub> did not exceed the appropriate permissible level or target level;
- Exceedances of long-term target level for ozone occurred;
- Concentrations of heavy metals in PM<sub>10</sub> are below the lower measurement thresholds;
- In the years 2012-2014 the target values of benzo(a)pyrene in particulate matter PM<sub>10</sub> occurred, but in 2015 the Olsztyn zone was not classified to C class;
- Exceedance of PM<sub>10</sub> concentration occurred only in 2014.

As evaluated by the cited source, the exceedance of the long-term target value for ozone was caused by traffic on the road No. 51 nearby Puszkina street where the monitoring station was located, and of PM<sub>10</sub> and BaP in 2012-2015 by increased emission from the communal sources caused by unfavourable meteorological conditions (e.g. cold along with temperature inversion, i.e. growth of temperature with high) during winters and incineration of poor quality fuels in low-efficiency boilers located in individual houses. Further, different analysis and monitoring results indicate that Olsztyn may potentially be threatened by increased air pollution, mainly due to

<sup>5</sup> Source: Program ochrony środowiska dla miasta Olsztyna do 2020 r (*Environment protection program for Olsztyn by 2020*, in Polish), Olsztyn City Office, 2016

increased traffic and inadequate location of industry, i.e. upgradient the prevail prevailing wind direction<sup>6</sup>.

Due to exceedance of PM<sub>10</sub> concentrations in the city in 2014, in August 2016 a strategic document was adopted by the Warmińsko-Mazurskie Local Parliament<sup>7</sup> in order to mitigate this issue. The adopted mitigation measures are aimed mainly at reduction of low PM emission from traffic and individual households heating. No actions related to reduction of emission from large combustion plants have been identified as necessary for air quality improvement in the city.

Based on the analysis presented above, Olsztyn has no air quality issues related to the emissions from large combustion plants, however it has localised problems related to road traffic and seasonal heating from local residential boilers. Moreover, it is expected that the situation in respect to air quality will improve after shut-down of the Michelin CHP, planned for 2020.

## 9.2 Assessment of the Cumulative Impact on Air Quality

As mentioned in section 2.1, the district heating network operated by MPEC supplies with heat approximately 60% of public, commercial and private buildings in the city of Olsztyn. The remaining 40% is heated by individual or small heating sources that supply heat to a few to several households.

Assessment of air emissions from the individual sources would require detailed information about structure and annual consumption of fuels, which is not publicly available. Therefore the assessment presented takes into account only large heating sources, i.e. the Kortowo and Michelin CHPs.

No detailed data about the emission from the Michelin CHP in the recent years was available to Ramboll Environ. The most recent data for 2010<sup>8</sup> indicate the following annual emissions of basic pollutants from this CHP:

- SO<sub>2</sub>: 654 tons/year;
- NO<sub>x</sub>: 475 tons/year;
- PM: 83 tons/year;

It must be noted that operation of Michelin CHP is aimed primarily at coverage of the Michelin facility needs for electricity, heat and steam hence only some portion of these emissions may be considered as related to production for the needs of the municipal district heating network. More reliable seems to be application of the average emission factors calculated for Kortowo CHP<sup>9</sup>. The average emission factors calculated for the years 2009-2014 are:

- SO<sub>2</sub>: 0.315 kg/GJ;
- NO<sub>x</sub>: 0.122 kg/GJ;
- PM: 0.048 kg/GJ;

Given that the average heat production for the district heating for the years 2005-2010<sup>10</sup> amounts 1135997.5 GJ/y, the roughly calculated annual emissions from the Michelin CHP generated to cover heat demand of the city are:

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<sup>6</sup> Source: Raport o stanie środowiska województwa warmińsko-mazurskiego w 2015 r (*Report on environment quality in warmińsko-mazurskie voivodeship*, in Polish), WIOŚ Olsztyn, 2015

<sup>7</sup> Program Ochrony Powietrza dla strefy Miasto Olsztyn ze względu na przekroczenie poziomu dopuszczalnego pyłu PM<sub>10</sub> (*Air protection program for the zone of the city of Olsztyn due to exceedance of the permissionle level of particulate matter PM10*)

<sup>8</sup> Prognoza oddziaływania na środowisko „Założeń do planu zaopatrzenia w ciepło, energię elektryczną i paliwa gazowe miasta Olsztyna” (*Environmental impacts forecast for „Assumptions for supply with heat, electrical energy and gaseous fuels of the city of Olsztyn”*, in Polish), Energoexport, 2011

<sup>9</sup> Aktualizacja założeń do planu zaopatrzenia w ciepło, energię elektryczną i paliwa gazowe Miasta Olsztyna (*Update of the assumptions for the plan for supply with heat, electrical Energy and gaseous fuels of the city of Olsztyn*, in Polish), Consus Carbon Engineering and KAPE, 2015

<sup>10</sup> Założenia do planu zaopatrzenia w ciepło, energię elektryczną i paliwa gazowe Miasta Olsztyna (*Assumptions for the plan for supply with heat, electrical Energy and gaseous fuels of the city of Olsztyn*, in Polish), Energoexport, 2011

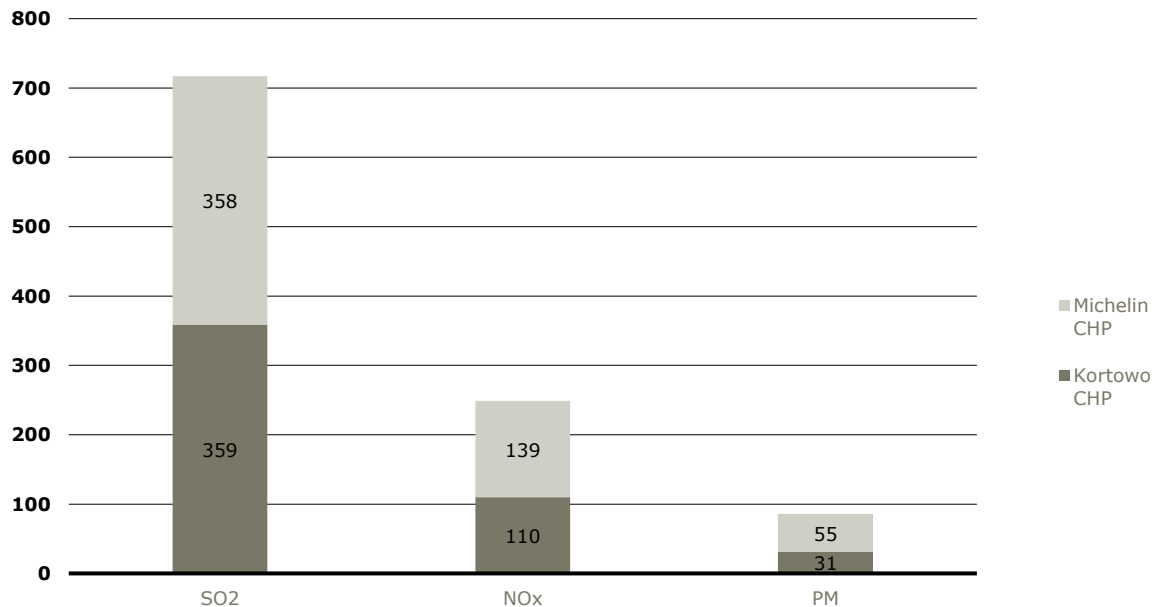
- SO<sub>2</sub>: 358 tons/year;
- NO<sub>x</sub>: 139 tons/year;
- PM: 55 tons/year;

In 2015 the Kortowo CHP emitted the following amounts of pollutants:

- SO<sub>2</sub>: 359 tons;
- NO<sub>x</sub>: 110 tons;
- PM: 31 tons/year;

Total estimated emission for both CHPs is presented on the below chart:

#### EMISSION [TONS/A]



ESTIMATION OF CURRENT EMISSION FROM KORTOWO AND MICHELIN CHPS

In order to estimate consequences of the Project implementation on the air emissions, we assume, that after shut-down of the Michelin CHP the district heating will be supplied with heat mainly by the new facility, supported in some extent by Kortowo CHP.

Based on the EIA report, the annual emissions of the basic pollutants originating from the new CHP will amount approximately:

Pollutant	Grate Boiler [ton/a]	Peak boilers * [ton/a]	Total [ton/a]
SO <sub>2</sub>	44	106	150
NO <sub>x</sub>	175	66	241
PM	9	7	16

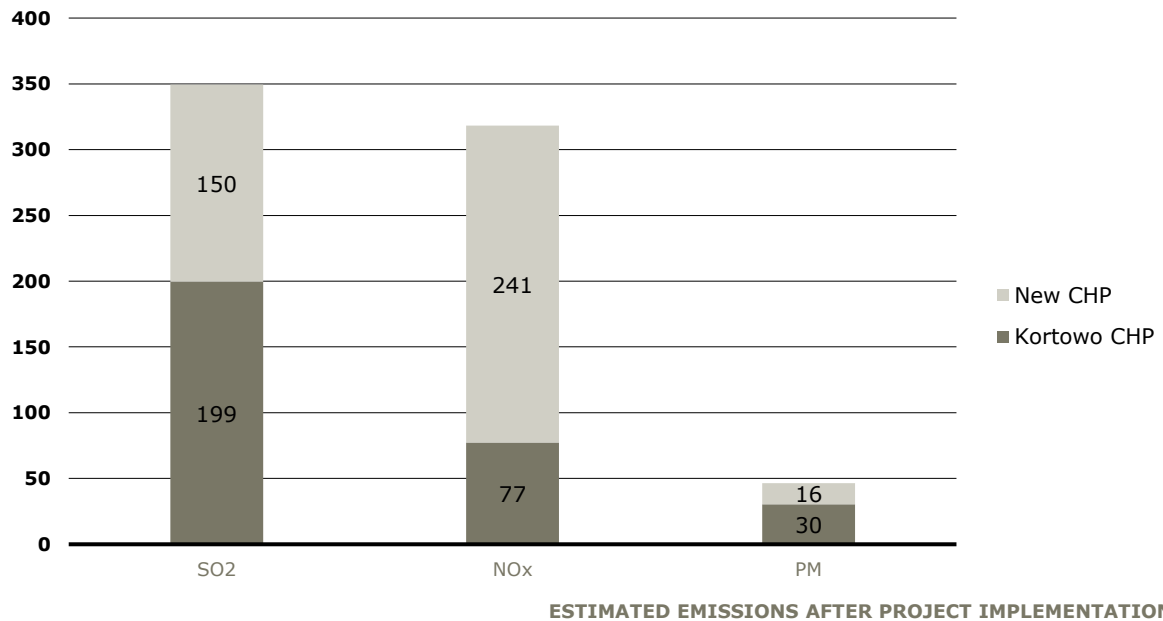
\* average for oil and gas incineration

The new CHP will cover heat demand in an amount of approximately 1432780 GJ per annum, while the annual heat demand in the city is 2066000 GJ hence 633220 GJ/a will need to be covered by Kortowo CHP. Such energy production will correspond to generation of the following emissions:

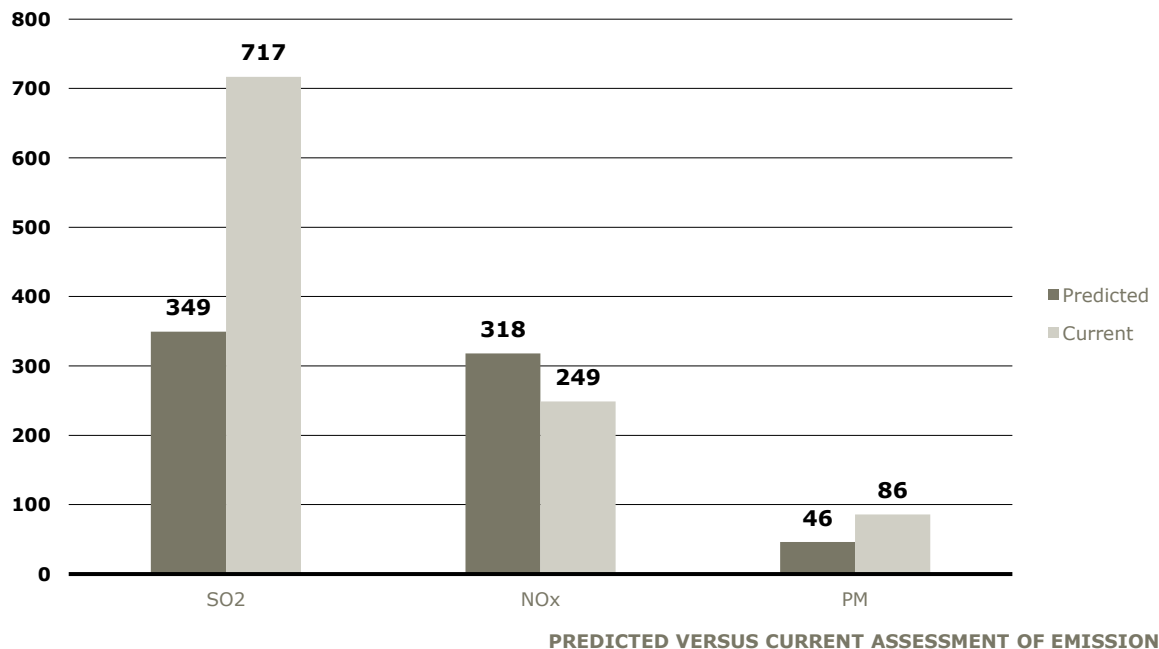
- SO<sub>2</sub>: 199 tons;
- NO<sub>x</sub>: 77 tons;
- PM: 30 tons/year;

The total emission after Project implementation will therefore amount as presented below.:



**EMISSION [TONS/A]**

Concluding, the implementation of the Project will result with reduction of total air emissions for SO<sub>2</sub> and PM and increase of emission of NO<sub>2</sub>, as presented on the following figure. However, in order to meet the emission standards after 2020 the Kortowo CHP will install de-NO<sub>x</sub> installations on all boilers, therefore further reduction of NO<sub>x</sub> will occur which is not included in this estimation.

**EMISSION [TONS/A]**

### 9.3 Assessment of CO<sub>2</sub> Emission

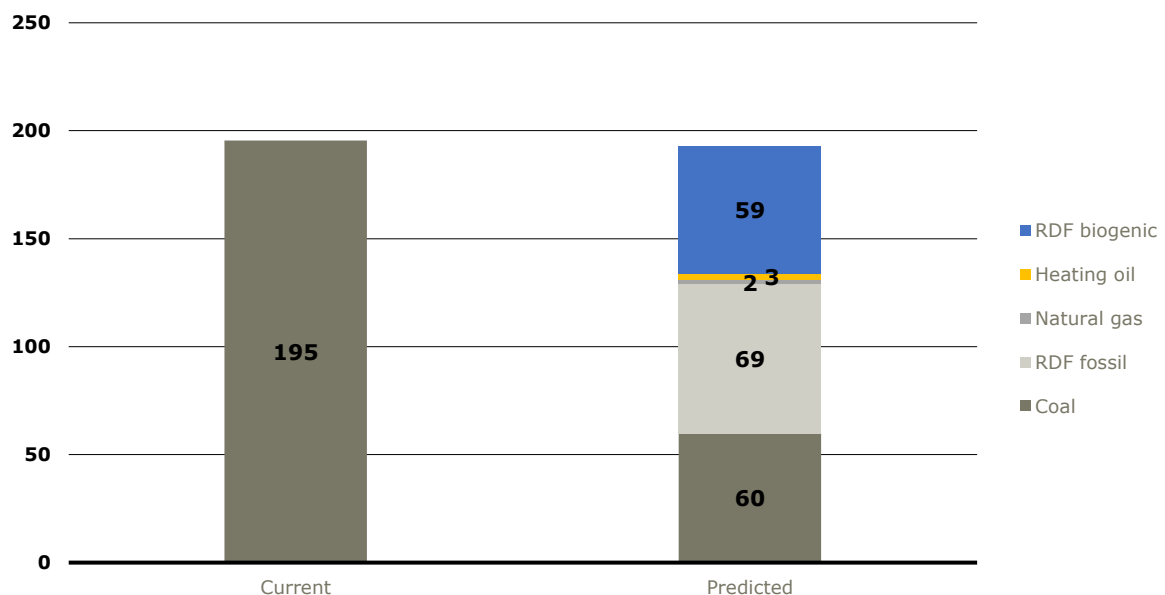
Emission of carbon dioxide from the planned facility is presented in the Environmental Impact Assessment report<sup>3</sup>, however without detailed calculation. Therefore in this supplementary report additional assessment of this issue is provided.

Based on the EIA Report, the new facility will incinerate RDF in an amount equivalent to 1350.7 TJ/a of energy. Based on publicly available data, municipal type waste is composed on biogenic and fossil fractions, which content in the fuel may vary. According to the publicly available sources<sup>11</sup> typical contribution of biogenic fraction varies between 33 and 50%, i.e. 44% on average. The content of biogenic fraction matters as its incineration is considered as neutral from the CO<sub>2</sub> emission perspective, similarly and due to the same reasons as in case of biomass incineration. Following the most recent emission factors published by KOBIZE<sup>12</sup>, incineration of 1 TJ equivalent biogenic fraction corresponds to emission of 100 tons of CO<sub>2</sub>, and incineration of 1 TJ equivalent fossil fraction to emission of 91.7 tons of CO<sub>2</sub>.

Apart from RDF, the new facility will also use peak boilers fired either with fuel oil or natural gas. For the purpose of this assessment it has been assumed that both fuels will be used equally, to generate approximately 82080 GJ of heat. The CO<sub>2</sub> emission factors as published by KOBIZE amount 77.4 and 56.1 kg/GJ for oil and gas respectively.

Based on the energy production data presented in previous section estimation of the current emission from both Michelin CHP and Kortowo CHP and predicted emission from new CHP and Kortowo CHP has been completed. Results of the estimation are presented below.

### CO<sub>2</sub> EMISSION [THOUSAND TONS/A]



CURRENT AND PREDICTED ESTIMATION OF CO<sub>2</sub> EMISSION

Please note that total reduction of CO<sub>2</sub> emission is 2 thousand tons per year (195 versus 193 thousand tons), however, 59 thousand tons originating from biogenic RDF incineration is considered neutral for the environment, hence the actual reduction of CO<sub>2</sub> emission is 61 thousand tons per year which corresponds to reduction by 31%.

<sup>11</sup> E.g. Refuse Derived Fuel, current practice and perspectives (B4-3040/2000/306517/MAR/E3). European Commission, 2003