



Port
Czystej Energii

Clean energy modern Gdańsk



Metropolitan responsibility



Residents' safety



European inspirations



Environmental protection



Green energy



Circular economy



Education and development



www.portczystejenergii.pl
#releasingenergy



Dear Sir or Madam,
 in the face of ongoing climate change, we need solutions that will as much as possible help us to protect the environment. When looking for such measures, a number of factors must be taken into account, in particular the improvement of the living conditions of residents. I want to assure you that the City of Gdańsk assumes the responsibility, including the metropolitan one, and acts in such a way as to provide residents with heat and electricity from various sources, while at the same time disposing of useless waste. Port Czystej Energii is the largest waste management investment in the history of Pomerania. Using funds from the European Union's Cohesion Fund we are building a modern and environmentally friendly combined heat and power plant that will help us achieve climate neutrality.

*Aleksandra Dulkiewicz
 Mayor of the City of Gdańsk*



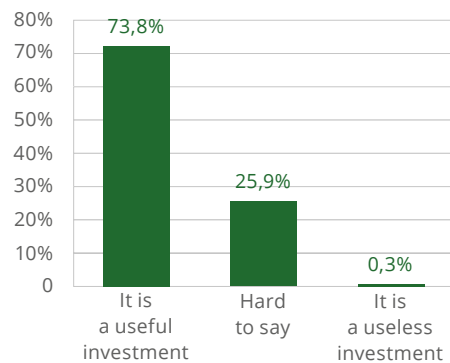
*Sławomir Kiszurno
 President of the Management
 Board of Port Czystej Energii*

Dear Sir or Madam,
 Port Czystej Energii will be one of the most environmentally advanced energy recovery plants from useless waste, not only in Poland, but also in the whole Europe. It has been designed in accordance with the latest guidelines, ensuring the application of the best technological solutions in the world. Ultimately, the Gdańsk facility will accept 160,000 tonnes of non-recyclable municipal waste with a high energy value per year. High-efficiency cogeneration will generate clean electricity and heat, which will allow, over 25 years of the plant operation alone, to save several million tonnes of very expensive and troublesome coal. It will also mean several million tonnes less CO₂ emissions from Gdańsk into the atmosphere.

What is Port Czystej Energii?

It is a modern, environmentally friendly combined heat and power plant. In the process of thermal treatment of municipal waste, electricity and heat will be generated in cogeneration. Only the residues from the sorting process that are not recyclable will be incinerated in the plant. Energy recovered from waste will be green energy, as it will not come from traditional – fossil sources, whereas the highly efficient flue gas cleaning system will help to reduce emissions into the environment very effectively. Hence the name Port Czystej Energii.

How do you assess the sense of constructing Port Czystej Energii, i.e. the Gdańsk incineration plant?*



*Opinion survey carried out by the BIOSTAT Research and Development Centre on behalf of Port Czystej Energii Sp. z o.o., April 2022.

Benefits of the thermal waste treatment plant

For residents:

- clean electricity and heat
- diversified energy sources, independent of coal or gas supply
- closure of the municipal waste management system in Gdańsk and the region
- management of troublesome non-recyclable waste
- stabilisation of fees paid by residents for municipal waste management
- new jobs



For the environment:

- reduction of GHG emissions
- reduction of fossil fuel consumption
- reduction of the amount of waste sent to landfill
- lower carbon footprint due to the reduction of waste transport



Port Czystej Energii in numbers



160,000 tonnes
Annual efficiency



495 tonnes
Daily (nominal) capacity



850-1,050°C
Combustion temperature



8,5-16 MJ/kg
Calorific value range



7,800 h
Annual availability



62,7 MW
Boiler nominal power



11 MJ/kg
Average calorific value



One
process line

109 GWh

Annual electricity production in Port Czystej Energii is sufficient to meet the demand of:



3,5 years
of the Gdańsk tram fleet



11 years
of the road lighting in Gdańsk



54,000
households per year

509 TJ

Annual heat production in Port Czystej Energii is sufficient to meet the demand of:



19,000
households supplied (in winter)



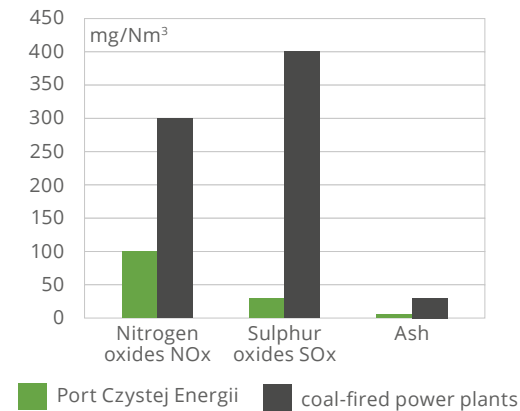
70,000
households supplied (in summer)

Calculations based on publicly available data on average electricity and heat consumption.

Green energy

While looking for the best solutions, the City of Gdańsk is investing in a modern CHP plant that will generate green electricity and heat from non-recyclable waste in cogeneration. The plant will contribute to closing the waste management cycle and will allow for diversification of energy sources, taking a significant step in the decarbonisation process. Port Czystej Energii is an environmentally friendly facility thanks to a highly efficient flue gas cleaning and monitoring system compliant with the latest BAT (Best Available Techniques) guidelines, which will allow to reduce emissions into the atmosphere very effectively. The plant under construction will significantly contribute to the development of Gdańsk and Pomerania in line with the assumptions of climate neutrality.

Comparison of permissible emission limits for substances from Port Czystej Energii and traditional coal-fired power plants



1,84 million m³
Reduction of landfill gas emissions per year



52,800 tonnes
Annual saving of hard coal



47,200 tonnes
Annual saving of lignite



164,000 tonnes
Lower annual CO₂ emission compared to separate coal-based energy production

Source: Data from the European Commission's notification decision approving the amount of state aid for the ZTPOK project, Brussels, October 2019.

Cogeneration

It is a process of simultaneous production of electricity and heat. The use of such a solution will significantly reduce CO₂ emissions. With cogeneration, it is possible to regulate the amount of energy generated and the proportions between electricity and heat generation. This allows to adapt production to the current needs of the district heating network.

BAT (Best Available Techniques)

Port Czystej Energii has introduced the latest BAT (Best Available Techniques) guidelines to the plant under construction, which, in accordance with the European Commission's Implementing Decision 2019/2010/EU, regulate emission levels, among others, in thermal treatment plants of municipal waste.

The already small amount of pollutant air emissions has been reduced by:

- **reducing air emission limits**

Increasing the efficiency of the existing system (bag filter)	Ash
Increasing the efficiency of the existing systems (limestone reagent dosing, bag filter) Adding a new magnesium reagent injection system	Acidic pollutants (sulphur oxides, hydrogen chloride)
Increasing the efficiency of the existing system (dosing of activated carbon into the flue gas, selection of a more suitable type of activated carbon)	Dioxins, furans, heavy metals
Adding a new selective catalytic reduction (SCR) system	Nitrogen oxides and ammonia

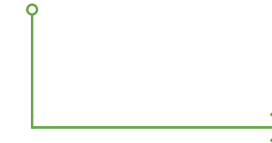
- **extending the scope of continuous monitoring of pollutant air emissions**

Extension of the exhaust gas analyser (CEMS) with a continuous measurement of mercury and ammonia content

By introducing the best possible solutions, Port Czystej Energii will be one of the most modern plants of this type in Europe.

How will flue gases be cleaned in Port Czystej Energii?

Pollutants resulting from waste incineration will be removed from the flue gases by means of many devices constituting the flue gas cleaning system. This system is one of the largest and the most important elements of the entire plant. Flue gases will be subjected to many physical and chemical processes, divided into different stages:



The effectiveness and correctness of the flue gas cleaning system will be verified on an ongoing basis through the plant control system and continuous monitoring of substances emitted into the atmosphere. The monitoring results will be made publicly available, not only for the plant managers, but also for residents and controlling institutions, e.g. Provincial Inspector of Environmental Protection.

Glossary:

Primary methods – methods aimed at limiting the formation of harmful substances.

Semi-dry method – removal of pollutants from the flue gas using a liquid reagent and dry reagents.

Dry method – removal of pollutants from the flue gas using a dry reagent.

SNCR – Selective Non-Catalytic Reduction.

SCR – Selective Catalytic Reduction.

Stages:

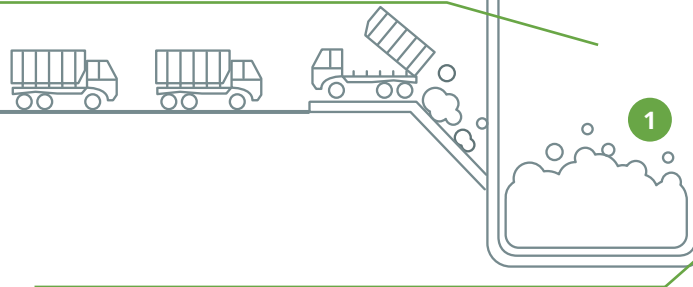
- 1. First stage of nitrogen oxides reduction** – primary methods and selective non-catalytic reduction SNCR
- 2. First stage of removing acidic pollutants** such as sulphur oxides, hydrogen chloride and hydrogen fluoride – dry method in the first boiler pass
- 3. Second stage of reduction of acidic pollutants** and heavy metals, dioxins and furans – semi-dry method using lime milk, calcium hydroxide and two types of activated carbon
- 4. Ash and reaction product capture in the flue gas cleaning process** – bag filter
- 5. Second stage of reduction of nitrogen oxides** – selective catalytic reduction (SCR)

KEY

1. Bunker
2. Magnesium reagent silo
3. Combustion chamber
4. SNCR
5. Reciprocating grate
6. Four-pass steam boiler
7. Steam turbine and generator
8. Lime milk tank
9. Fly ash silo
10. Spray absorber
11. Dry reactor
12. Flue gas cleaning waste silo
13. Bag filter
14. SCR
15. Flue gas condensation system
16. Chimney

Bunker

This is where residues from sorting of non-recyclable municipal waste go. The vacuum system applied prevents the emission of unpleasant odours outside.



Reciprocating grate

It is a waste incineration area where the appropriate grate movements ensure the required level of waste mixing and burning. Air is necessary for the combustion process. Primary air is supplied from the bottom of the grate and secondary air is supplied above the grate.

Combustion scheme

Four-pass steam boiler

This is where the energy is recovered. The heat from the flue gases is used to produce steam, which later goes to the turbine that drives the power generator. In the boiler, the first stage of reduction of acidic pollutants takes place. By dosing a calcium-magnesium reagent, concentrations of substances such as sulphur oxide, hydrogen chloride and hydrogen fluoride are reduced.

Combustion chamber

The waste fed in here is incinerated at the temp. 850-1,050°C and the flue gas cleaning process begins. The injection of 25% ammonia water into the chamber reduces the concentrations of nitrogen oxides.

Flue gas cleaning system

Flue gases are cleaned by dosing several types of reagents, which bind harmful substances through chemical and physical reactions. The ash from waste incineration and reaction products of flue gas cleaning processes are captured by the bag filter. The entire flue gas cleaning process is characterised by very high efficiency.

Chimney

It is responsible for releasing the cleaned flue gases into the atmosphere at a specific height to ensure their optimal dispersion in the atmosphere. The flue gas monitoring system installed in it controls trace amounts of substances emitted from it, and the monitoring result is publicly available.

Steam turbine and generator

An engine that uses thermal energy of steam to drive an electric generator.

Fly ash silo

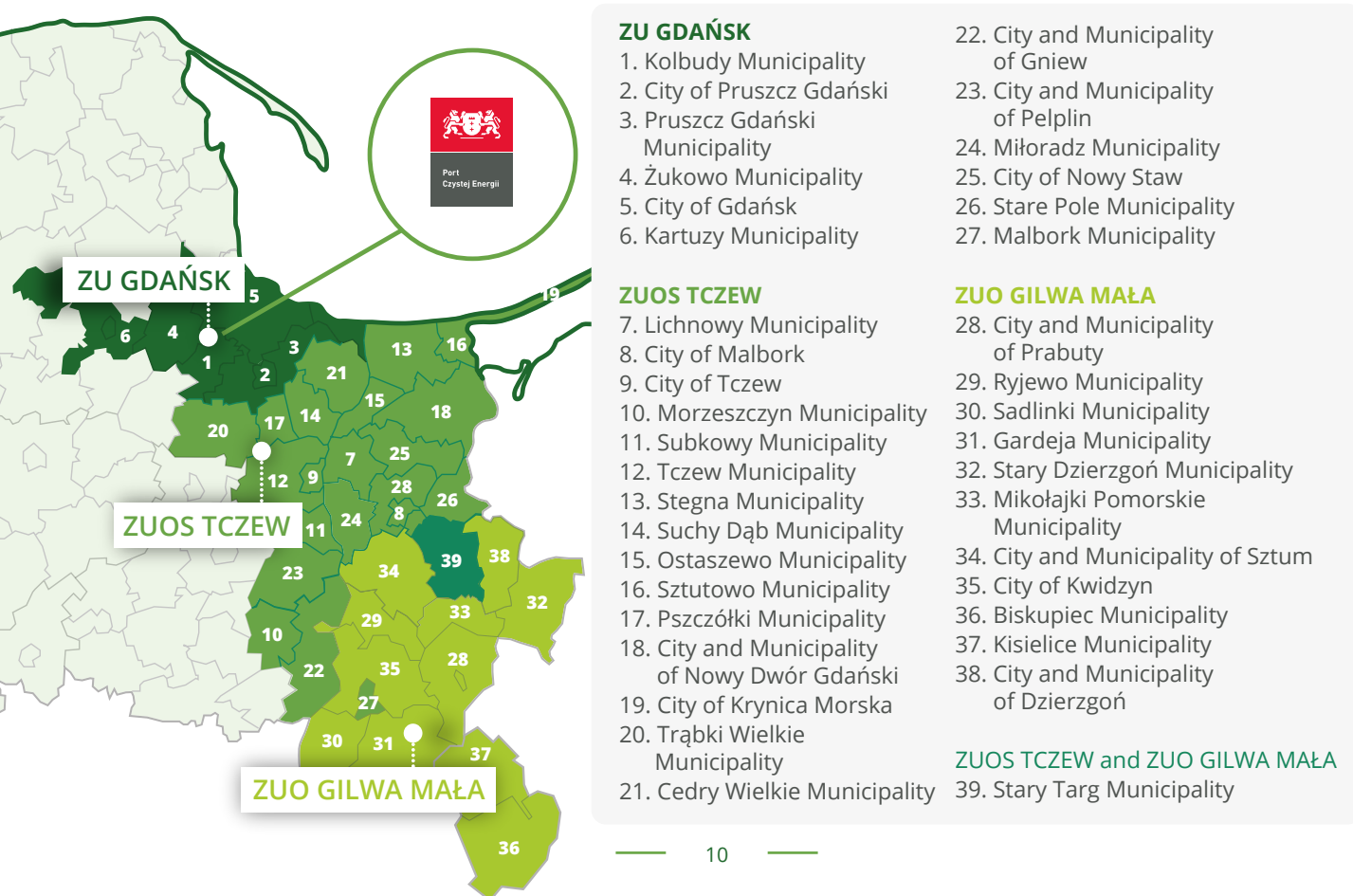
A tank for boiler ash and fly ash remaining after the combustion process.

Flue gas cleaning waste silo

A tank for ash and reaction products of flue gas cleaning processes captured by the bag filter

Municipalities involved in the Port Czystej Energii Project

When creating Port Czystej Energii, the City of Gdańsk took metropolitan responsibility and, as the Project leader, engaged neighbouring municipalities to cooperation. As a result, smaller municipalities in the region and the region as a whole will be able to meet their own environmental protection and waste management objectives. The incineration plant will guarantee the residents of these municipalities a long-term stabilisation of the municipal waste management fees. Useless waste used as an energy resource will be converted into green energy, and the profit from its sale will reduce the costs of waste management. Waste from 3 municipal plants will be sent for thermal treatment. Most of it (over 70%) will go to the CHP plant from the nearby Waste Disposal Plant in Gdańsk (ZU Gdańsk). The others will be transferred from the Solid Waste Disposal Plant in Tczew (ZUOS Tczew) and the Waste Disposal Plant in Gilwa Mała (ZUO Gilwa Mała).



Plants in Poland and Europe

There are currently nearly 500 waste incineration plants in operation across Europe. These plants have been in operation for many years and constitute a significant link in energy and municipal waste management systems. In Poland, there are still too few plants of this type. Eight plants are in operation and this is still not enough for the proper market regulation. The investment process takes a very long time. Only the most determined municipalities, looking far into the future, win. Currently, two new plants are under construction, in Gdańsk and Olsztyn. The plants in Warsaw and Rzeszów are being expanded.



Activities in the social field

We are a company that acts in the social interest of the residents of Gdańsk. In our work, we focus on active communication and sharing knowledge and experience. We know that only through proper education we are able to build a conscious society that will act and make responsible decisions for the benefit of residents and the environment. We strive to achieve our goals through dialogue with the local community, educational activities, cooperation with the academic community and the exchange of experience among the industry and local governments.

We cooperate with the Gdańsk University of Technology in the field of creating and modifying educational programmes. We organise joint study visits, lectures and seminars for students, and our plant will be used by scientists to conduct research.



We actively participate in the organisation of industry and local government meetings. Among the events regularly co-organised by us are: Local Government Waste Management Forum or the Pomeranian Eco Forum.

We are members of the following organisations and associations:

- Gdańsk-Gdynia-Sopot Metropolitan Area
- Association of Waste-to-Energy Producers

Together with Zakład Utylizacyjny Sp. z o.o., we run a Stakeholders' Council, whose task is the ongoing exchange of information and experience in the field of planning, coordination and implementation of investment activities related to waste management in both companies.

Education in practice

We have created an educational cycle **"Port of knowledge: climate-energy-waste"**, the idea of which is to shape the awareness of human impact on the environment in the young generation.

We have developed original lesson plans with worksheets, educational boards and presentations, in two thematic areas:

- **"The climate is changing - let's change our habits"**
- **"Waste is a valuable resource."**

Both lesson plans were prepared for two age groups – primary school students (7th and 8th grade) and secondary schools.

DOWNLOAD EDUCATIONAL MATERIALS



With our information and education stand, we are present at events aimed at the local community. For the younger group we run dedicated ecological workshops.



Port Czystej Energii is part of the **School Educational Programme Clean City of Gdańsk**, which aims to ensure the improvement of ecological competences among Gdańsk students. As part of the programme, 2nd grade secondary school students, starting from the 2024/2025 school year, will visit our plant and learn, among others, about the safe recovery of energy from waste.

Investment works schedule

May 2020
work commencement order

July 2020
commencement of earthworks

August 2021
commencement of installation of technological equipment – installation of grate

January 2022
installation of steam drum

June 2022
installation of turbine

End of 2023
completion of construction works

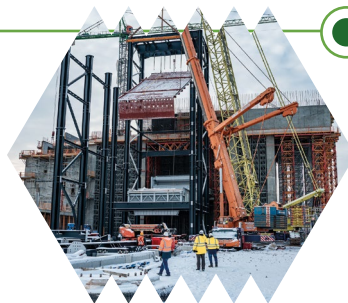
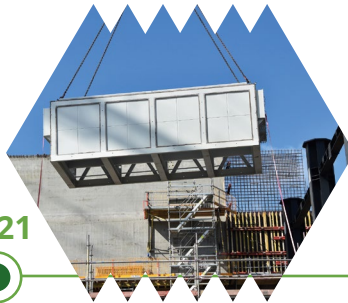
2020

2021

2022

2023

2024



In May 2020, the Contractor received an official order to commence construction works. The first stage of the works was earthworks, which started in July 2020. Then, in November of the same year, the first typical construction works began. The foundation stone laying ceremony took place on 18 December 2020. Construction and reinforcement works continued in the following months and in June 2021 the installation of the supporting structure was commenced, followed by the installation of the individual technology components. At first, a grate was installed, and then subsequent components of the boiler followed. On 16 May 2022, a steam drum, the most important element of the steam boiler, was solemnly named "STOLEM". On 14 July 2022, a successful pressure test of the boiler was carried out. According to the schedule, the construction is to be completed by the end of 2023.

November 2020
commencement of the first foundation works for the bunker building

December 2021
commencement of installation of boiler components

May 2022
installation of chimney

2023
commencement of commissioning works

Public-Private Partnership

The public order for the design, construction and operation of Port Czystej Energii was awarded under the PPP Act. A contractor was selected through a competitive dialogue procedure and on 7 May 2018 an agreement was signed with the Italian-French consortium of Astaldi (WeBuild), Termomeccanica Ecologia and TIRU (TIRU Paprec Energies). Using the potential of experienced companies and the commitment of public funds, a modern and environmentally friendly CHP plant will be built in Gdańsk. The private partner has taken the risk of designing and building the plant. They will also be responsible for its operation for the next 25 years. The public partner will guarantee the supply of the waste stream for disposal and will ensure that the entire process of construction and operation of the Plant is carried out in accordance with the provisions of the PPP agreement.

Division of possible risks in the Project

Private Partner	Public Partner
Design, construction and 25 years of operation of the plant	Providing waste stream with specific parameters, in the amount of 160,000 tonnes/year, throughout the lifetime
Capacity to operate of 7,800 h/year	Obtaining financing for the investment implementation
Maintaining the assumed operating parameters (electricity and heat)	Providing remuneration to the operator for the operation of the Plant
Management of waste from flue gas cleaning	Slag management
Ensuring transport of waste to the plant	Risk of changes in the law

Benefits of the Public-Private Partnership:

-  Management of the plant by an experienced Private Partner.
-  Higher efficiency in the management of public funds.
-  Transfer of part of the responsibility to the Private Partner.
-  Greater operational efficiency.
-  Sharing of the risk incurred.
-  Better access to innovative solutions for the public sector.

General contractor:

webuild

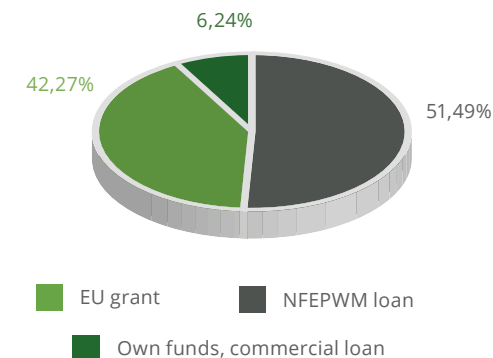


Termomeccanica Ecologia
Termomeccanica Group



TIRU
PAPREC ENERGIES

Financial structure of Port Czystej Energii:



Project financing

The total cost of the construction of the combined heat and power plant in Gdańsk consists of the construction of a modern thermal treatment plant of municipal waste and its adaption to the current – very restrictive environmental requirements, including those resulting from EU legislation. For its implementation the project received funding from the EU Cohesion Fund under the Operational Programme Infrastructure and Environment 2014-2020 and a loan granted by the National Fund for Environmental Protection and Water Management. Considering the market conditions and the changing business environment, Port Czystej Energii also signed a commercial loan agreement, which made it possible to close the financing of the investment.



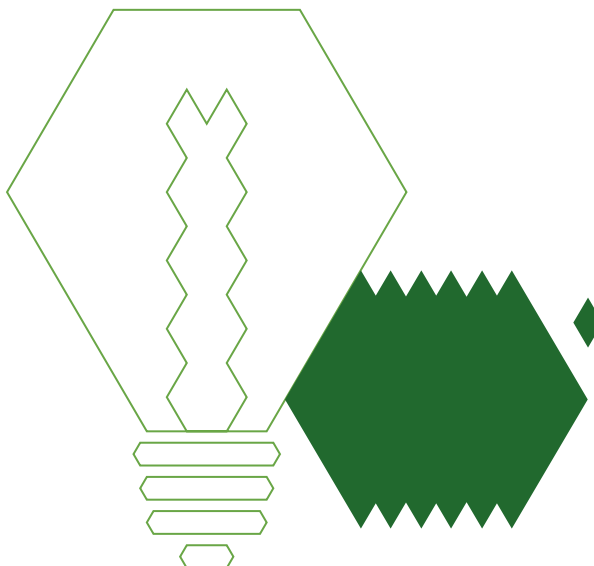
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PROJECT FOR THE CONSTRUCTION OF A THERMAL WASTE TREATMENT PLANT IN GDAŃSK



Unia Europejska
Fundusz Spójności



Dofinansowano ze środków
Narodowego Funduszu
Ochrony Środowiska
i Gospodarki Wodnej