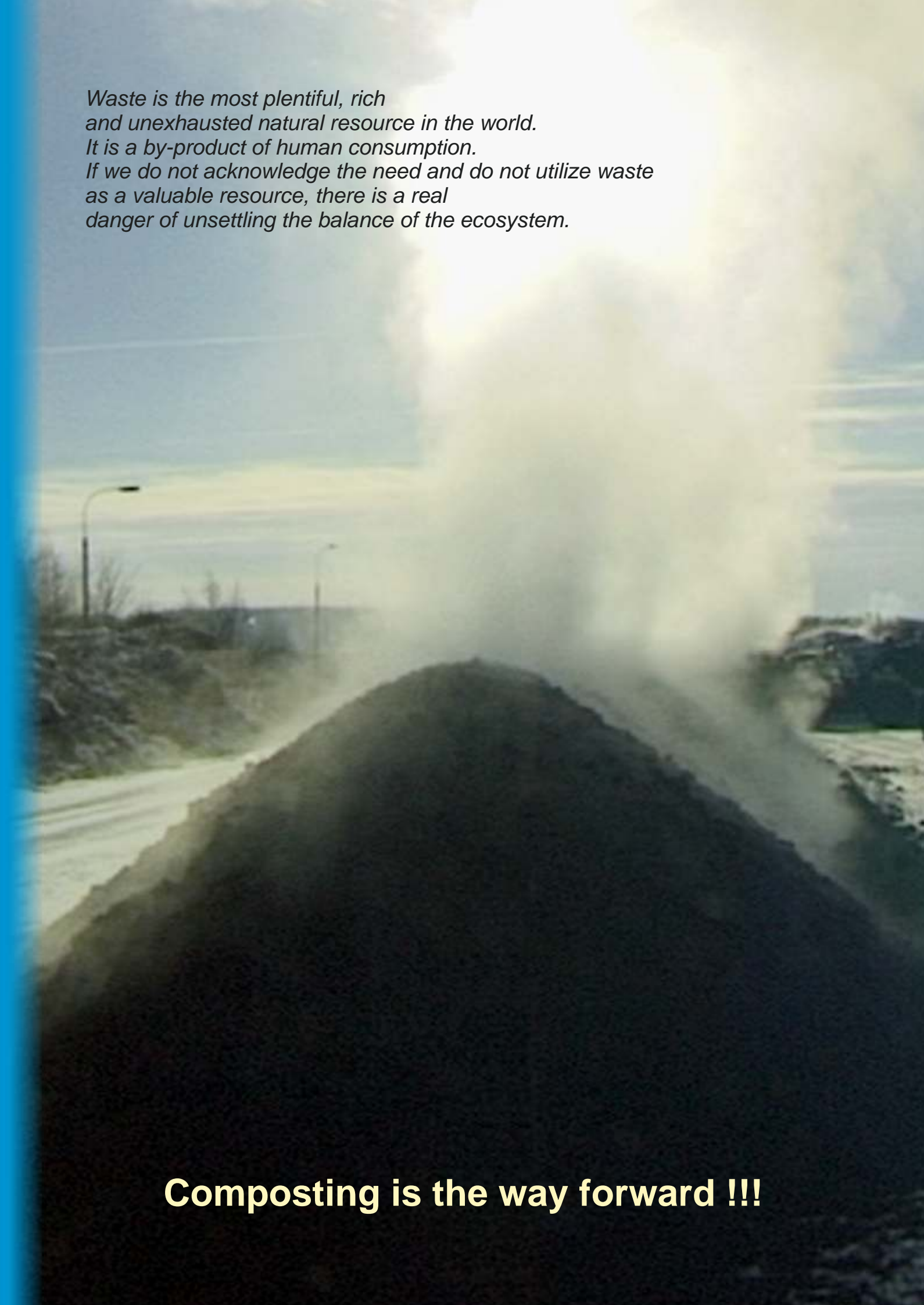


COMPOSTING OF SLUDGE AND WASTE GREEN MATTER

ŚLUPSK WASTEWATER TREATMENT PLANT





*Waste is the most plentiful, rich
and unexhausted natural resource in the world.
It is a by-product of human consumption.
If we do not acknowledge the need and do not utilize waste
as a valuable resource, there is a real
danger of unsettling the balance of the ecosystem.*

Composting is the way forward !!!

Why composting?

- **A reduction in the quantity of waste**

Composting is a method of stabilizing waste. In the process of composting, 2/3 of the carbon is metabolized as energy and CO₂. Composting also reduces humidity. Consequently, from 20.000 tons of waste material we obtain 10.000 tons of compost.

- **Composting is recycling**

The ecological aspect of composting is an indisputable fact. From waste we retrieve nutrients and organic material singularly necessary in, among other fields, agriculture. Unwanted waste becomes a sought-after product.

- **An economic enterprise**

Composting brings a reduction in the economic costs of sludge. In the case of the Słupsk WWTP there has been a reduction of 30%.

- **A transfer of proven technology**

It is difficult to describe composting as a novel technology. Composting is a technologically proven process, functioning well in the climatic conditions of Poland.

- **Social costs**

The production of sludge constitutes 22% of all municipal waste arising in the city of Słupsk. The deposit of waste in storage areas curtails its term of usage, and therefore influences the costs of building new storage areas with taxpayer's money.

- **Composting promotes the development of segregation**

The functioning of composting in Słupsk has so resulted that, in the process of being composted, green waste has been segregated at the point of origin. The free collection of clean waste for composting has made it so, that segregation has become very commercially viable for producers of this type of waste.

- **Accordance of the project with international, national, provincial and regional environmental projects**

From the EU directive, through the ecological policy of the Republic of Poland, provincial and local environmental programs, and finally in the programs of action of ecological funds, composting, as a form of recycling, has priority everywhere. Preparing the financial propositions to the ecological funds may with ease indicate the compatibility of this enterprise with the eco-development strategies at every level of administration and organization.

- **The location of composting**

Wastewater treatment plant, in which the majority of waste material is produced, are the best locations for composting. Another important point is the technological and laboratory services together with social, administration and logistical facilities which already function at treatment plant.

PROJECTED YIELD OF THE INSTALLATION 20,000 tons / annum

TOTAL COST OF THE INSTALLATION 5.4 m PLN

TERM OF CONSTRUCTION 2000 - 2003

ADMINISTRATOR OF INSTALLATION / INVESTOR "Wodoci gi Słupsk" sp.

PURCHASED EQUIPMENT

A - Turner BACKHUS 15.50



B - Compost screen TIM Envipro TS 2000



C - Grinder JENZ AZ 30-80



D - Loader FADROMA Ł-34 B



E - Small loader TUR 5



COMPLETED OBJECTIVES

1 - reinforced concrete surface 8 100 m²



2 - open sided steel structure 9 000 m²



3 - composting maturation site

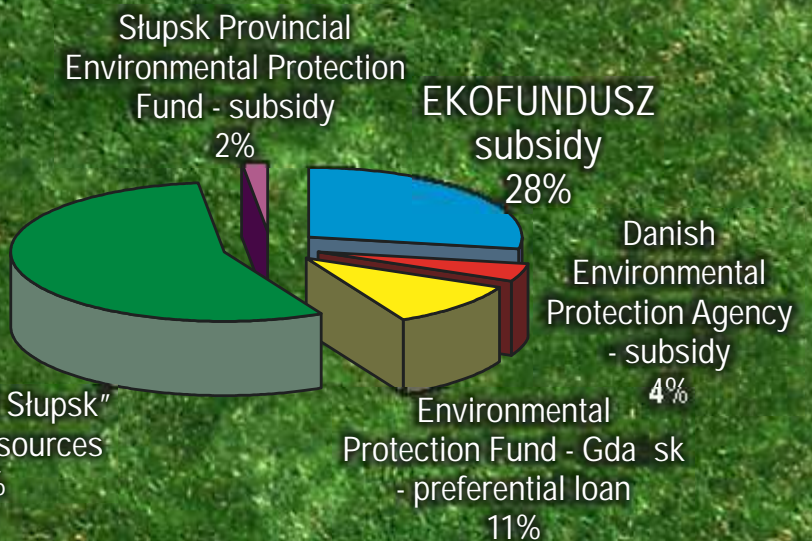


Investment Process

Z O.O.



FINANCIAL INVESTMENT STRUCTURE



4 - materials depot



Elements of the controlled technological process

1. Reception of the compost materials

Practically any organic waste receptive to biological biodegradation, and not contaminated above normal levels with heavy metals may be composted.

2. Fragmentation

The delivered green waste is collected in a designated box, and is next fragmented in the JENZ AZ 30-80 into pieces of 1-7cm.

3. Formation of the initial prism

Examined in the laboratory, the materials, according to composition, are mixed in appropriate proportions by the loader. The proportion is determined on the basis of humidity and the C/N ratio of that particular material. To the initial prism is added a fraction of the waste from the sieve.

4. The hot phase of the composting

According to the climatic conditions, this phase lasts 4-8 weeks. The compost mixture is subjected in this time to intensive rotation by a specialised machine, the BACKHUS 15.50, with the specified purpose of stirring the compost materials, homogenisation, airing and loosening.

Daily monitoring is conducted of the temperature in the prisms and in accordance with the technological conditions the prism is rotated at a rate of 1-3 times a week.

5. Sieving of the fresh compost

The sieving of the compost after the hot phase takes place in the TIM 2000 sieve through perforations of 20mm. A small fraction of the waste is brought to maturation, the waste is reprocessed.

This process has the aim of categorising the compost, and recovering the material which is not broken down into a suitable form, which is equally valuable material for injecting into the material of the prisms.

6. Maturation of the compost

The sieved raw material is stored in covered boxes for 4-6 months. In this time it is rotated 1-2 times a month by the loader with the aim of eliminating intense oxidation. The mature compost is characterised by stable physicochemical parameters tested in the works laboratory.

7. Laboratory supervision

The Słupsk WWTP is equipped with professional analytical laboratory. Examinations are performed on a range of works norms, incorporating investigations into the concentrations of heavy metals by the ASA method. Testing is conducted at every stage of controlled composting process. Data are recorded in reports and on certificates for each individual prism.

8. Supervised distribution of the compost

The mature compost is marketed under the trade name of BIOTOP. The recipient receives together with the compost full documentation concerning the procedure of the production process of that given batch of compost, and instructions for application and attestation. We also provide free agro-technical consultation for our greatest recipients incorporating control of the efficacy of fertilisation.

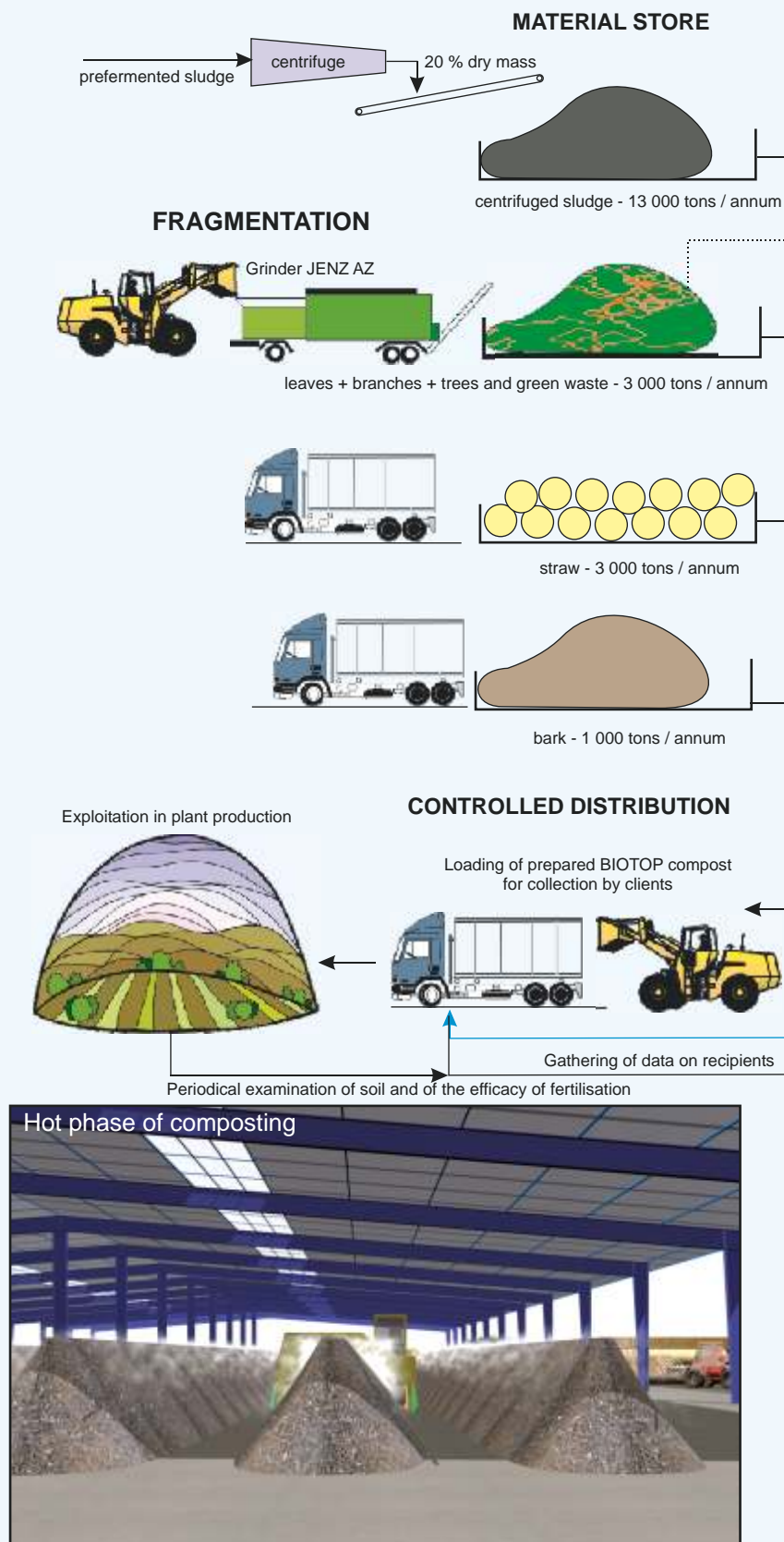
9. Tailoring of the compost

It is a forecast option for implementation in the coming years. We want to formulate a commercial offer for packaged compost to clients' special requirements, for instance for the cultivation of acidophilic plants, flowers, etc.

BLOCK DIAGRAM

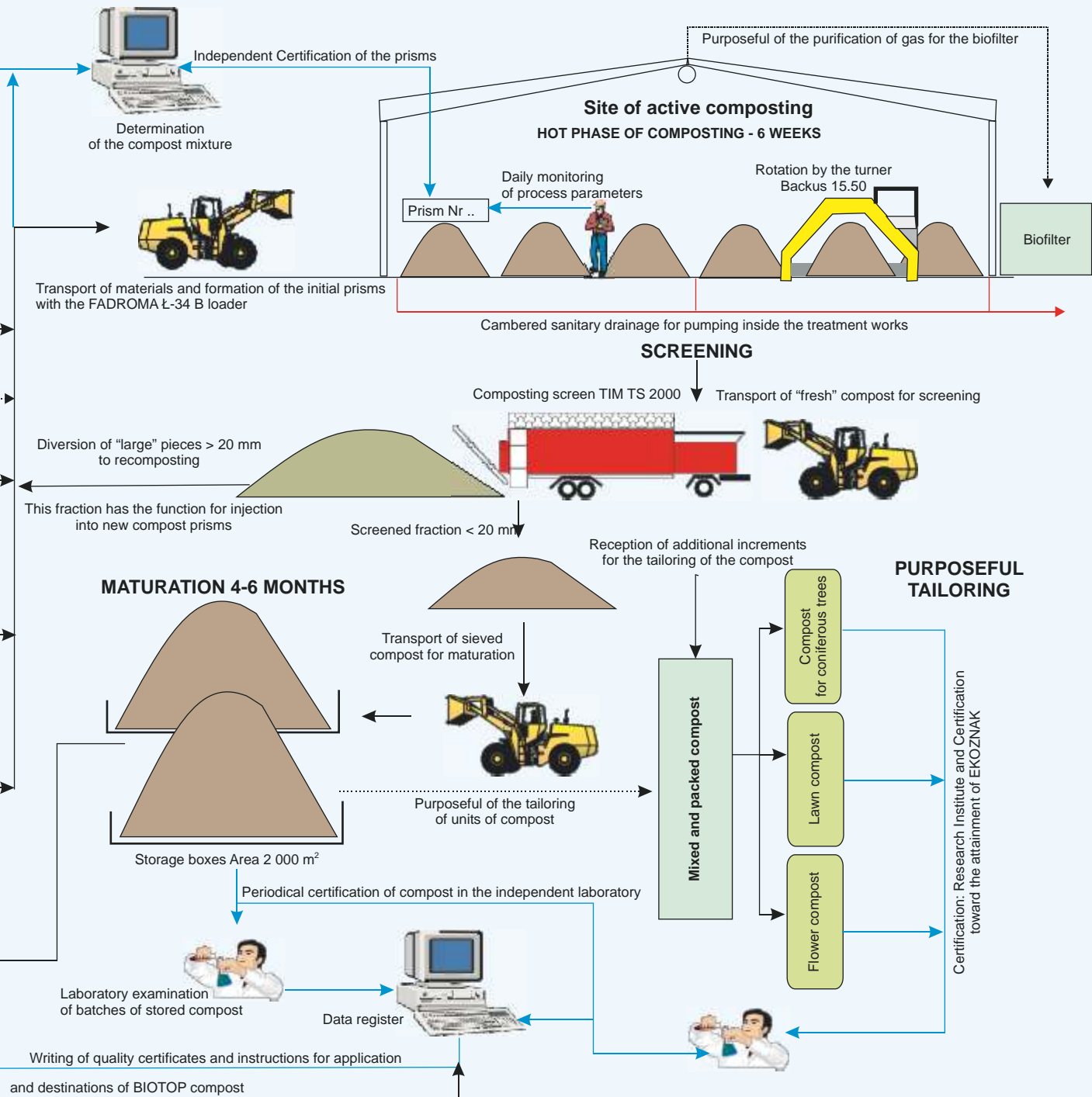


Laboratory monitoring of the compost material



The controlled technological process

OF THE CONTROLLED PROCESS OF COMPOSTING AS THE SŁUPSK WWTP



The quality of BIOTOP compost

Correct attributes of the compost	BIOTOP compost			Norm BN-89 9103-09 compost I class
	average value	min - max value	firm norm	
Features: <i>brown colour, fragrance of fresh garden soil, rubble structure for sprinkling</i>				
Dry mass [%]	50	40 - 70	> 40	> 40
Organic dry mass [%]	50	45 - 60	> 40	> 40
Nitrogen [%]	2,0	1,5 - 3	> 1,4	> 0,8
Phosphorus [%]	1,0	0,9 - 3	> 0,9	> 0,6
Potash [%]	0,2	0,15 - 0,25	> 0,2	> 0,2
Acidity [pH in H ₂ O]	7,4	7 - 7,8	6,5 - 8	6,5 - 8
Molecular quantity [mm]	0 - 20	0 - 25	< 20	< 25
Inclusion of glass [%]	not occurent		absent	< 0,5
Inclusion of heavy metals, not more than:				
Cadmium Cd [mg/kg d.m.]	0,8	0 - 2,5	< 5	< 5
Chrome Cr [mg/kg d.m.]	5,0	0 - 25	< 100	< 300
Copper Cu [mg/kg d.m.]	40	1 - 80	< 300	< 300
Nickel Ni [mg/kg d.m.]	9,5	1 - 20	< 50	< 100
Lead Pb [mg/kg d.m.]	20	2 - 40	< 100	< 350
Zinc Zn [mg/kg d.m.]	600	80 -1000	< 1500	< 1 500
Mercury Hg [mg/kg d.m.]	< 0,01	0 - 0,1	< 1,0	< 5
Sanitary index				
Salmonella sp.	Not affirmed		absent	not permitted
Parasites [pc./kg d.m.] Ascaris sp., Trichuris sp. Toxocara sp.	Not affirmed		< 10	< 20

Quality and composition of the compost



COMPOSITION OF BIOTOP COMPOST



BIOTOP is applied to improving physical and biological qualities and chemical components of the soil in the primary production of a plant.

Above all it is supremely suited to shaping green areas of town, lawns, pitches and golf courses, in forest management, the cultivation of ornamental plants, in nurseries, communal farming, conservation of railway and road embankments, dikes, the recovery and recultivation of degraded sites and rubbish tips.



**ATTESTED ORGA
INCLUSIVE OF
INGREDIENTS**

A REVELATION IN INTENS

IMPROVES FERTILITY

FULLY SAFE FOR

**BIOTOP IS THE CHEAPEST
FOR ALL**

AVAILABLE THROUGH

*Square planted with BIOTOP compost
(Stupsk, Sienkiewicza Street)*



BIOTOP IS A GUARAN

Did you know?

BIOTOP compost applied at 15 tons/ha accounts, in terms of contribution of nutrients NPK, for mineral fertilization to the value of 1000 PLN





The standards of quality described in the Works Documentation of Norms guarantee an improvement in physical qualities and chemical composition of soil. Equally, they protect against a harmful influence on the environment

NIC FERTILIZER, NUTRITIVE FOR PLANTS

IVE PLANT PRODUCTION
AND CONDITIONS SOIL
THE ENVIRONMENT

FERTILIZING MATERIAL
SOIL TYPES

OUT THE WHOLE YEAR

TEE OF A GOOD CROP



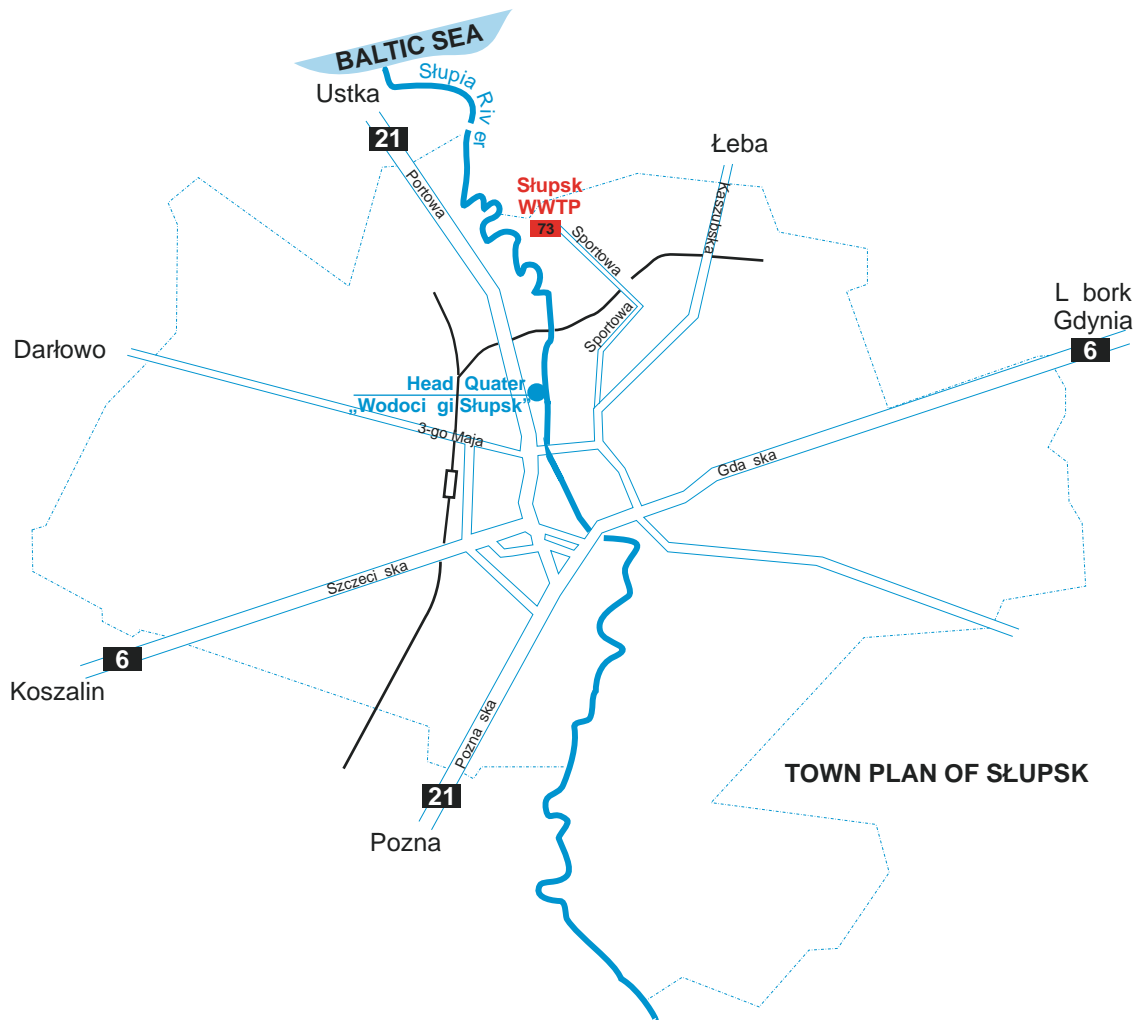
Conditions of production continuously supervised (prism temperature monitor)



Dosage:
In a general pool of fertilizers applied in the aforementioned applications, a single dose of BIOTOP compost shouldn't require the incorporation of more than 170kg of clean nitrogen on 1 ha of agricultural land (91/676/EWG) This represents 15-20 tons of compost per hectare.

Terms of Application
- in spring before seeding or planting
- in autumn for the cultivation of winter plants; in case of secondary harvest, apply the fertilizer in the post-harvest period.

Detailed information is contained in the Instructions for application and storage of the fertiliser available from the producer of BIOTOP.



„Wodociąg Słupsk” sp. z o.o
 ul. Orzeszkowej 1
 76-200 SŁUPSK
www.wodociagi.slupsk.pl



Centrale:	(0-59) 842 60 51-57
Secretary:	(0-59) 842 29 63
Composting:	(0-59) 842 92 29
Fax:	(0-59) 842 22 07
e-mail	go@wodociagi.slupsk.pl