COMPOSTING
OF SLUDGE AND WASTE GREEN MATTER
SŁUPSK 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 Ślupsk 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 Ślupsk. 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 Ślupsk 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.

According to 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.
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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  "Wodociągi Słupsk" sp.

PURCHASED EQUIPMENT

A - Turner BACKHUS 15.50
B - Compost screen TIM Enviipro TS 2000
C - Grinder JENZ AZ 30-80
D - Loader FADROMA L-34 B
E - Small loader TUR 5

FINANCIAL INVESTMENT STRUCTURE

- EKOFUNDUSZ subsidy 28%
- Danish Environmental Protection Agency - subsidy 4%
- Environmental Protection Fund - Gdańsk - preferential loan 11%
- "Wodociągi Słupsk" our own resources 55%
- Ślsupsk Provincial Environmental Protection Fund - subsidy 2%

Investment Process

COMPLETED OBJECTIVES

1 - reinforced concrete surface 8 100 m
2 - open sided steel structure 9 000 m
3 - composting maturation site
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INVESTMENT Process

1 - open sided steel structure 9000 m²
2 - reinforced concrete surface 8100 m²
3 - composting maturation site
4 - materials depot

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.
The controlled technological process

OF THE CONTROLLED PROCESS OF COMPOSTING AS THE SŁUPSK WWTP

1. Reception of the compost materials
   - The delivered green waste is collected in 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 oxidisation. The mature compost is marketed under the trade name of BIOTOP. The recipient receives the mature compost is characterised by stable concentrations of heavy metals by the ASA method. Testing is conducted at every stage of the composting process. Data are recorded in reports and on certificates for each of controlled composting process. Data are examined in the laboratory, the materials, incorporated investigations into the appropriate proportions by the loader.

2. Fragmentation
   - This fraction has the function for injection into new compost prisms.

3. Formation of the initial prism
   - 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 oxidisation. The mature compost is marketed under the trade name of BIOTOP. The recipient receives the mature compost is characterised by stable concentrations of heavy metals by the ASA method. Testing is conducted at every stage of the composting process. Data are recorded in reports and on certificates for each of controlled composting process. Data are examined in the laboratory, the materials, incorporated investigations into the appropriate proportions by the loader.

4. The hot phase of the composting
   - According to the climatic conditions, this phase lasts 4-8 weeks. The compost mixture is transported of "fresh" compost for screening to recomposting.

5. Sieving of the fresh compost
   - This fraction has the function for injection into new compost prisms.

6. Maturation of the 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 material. To the initial prism is added a fraction of humidity and the C/N ratio of that particular batch of compost, and recovering the material which is equally valuable material for injecting into new compost prisms. This process has the aim of categorising the reprocessed.

7. Laboratory supervision
   - Examined in the laboratory, the materials, incorporated investigations into the appropriate proportions by the loader.

8. Laboratory research
   - Diversion of "large" pieces > 20 mm to recomposting.

9. Tailoring of the compost
   - The purposeful of the tailoring of units of compost.

10. Mixing and packed compost
    - Mixed and packed compost for maturation.

11. Purposeful of the tailoring of compost
    - Purposeful of the tailoring of compost for coniferous trees.

12. Purposeful of the purification of gas for the biofilter
    - Purposeful of the purification of gas for the biofilter.

13. Site of active composting
    - Site of active composting.

14. Periodical examination of soil and of the efficacy of fertilisation
    - Periodical examination of soil and of the efficacy of fertilisation.

15. Transport of "fresh" compost for screening
    - The controlled work of composting.

16. Laboratory examination of batches of stored compost
    - Laboratory examination of batches of stored compost.

17. Preparation of the composting material
    - Preparation of the composting material.

18. Purposeful of the tailoring of the compost
    - Purposeful of the tailoring of the compost.

19. Mixed and packed compost
    - Mixed and packed compost.

20. Certified compost
    - Certified compost.

21. Laboratory monitoring
    - Laboratory monitoring.

22. Data register
    - Data register.

23. Writing of quality certificates and instructions for application and destinations of BIOTOP compost
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24. Certification: Research Institute and Certification toward the attainment of EKOZNAK
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25. Purposeful of the tailoring of the compost
    - Purposeful of the tailoring of the compost.

26. Mixed and packed compost
    - Mixed and packed compost.

27. Power compost
    - Power compost.
The quality of BIOTOP compost

<table>
<thead>
<tr>
<th>Correct attributes of the compost</th>
<th>BIOTOP compost</th>
<th>Norm BN-89 9103-09 compost I class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Features:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>brown colour, fragrance of fresh garden soil, rubble structure for sprinkling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dry mass [%]</td>
<td>50</td>
<td>40 - 70</td>
</tr>
<tr>
<td>Organic dry mass [%]</td>
<td>50</td>
<td>45 - 60</td>
</tr>
<tr>
<td>Nitrogen [%]</td>
<td>2,0</td>
<td>1,5 - 3</td>
</tr>
<tr>
<td>Phosphorus [%]</td>
<td>1,0</td>
<td>0,9 - 3</td>
</tr>
<tr>
<td>Potash [%]</td>
<td>0,2</td>
<td>0,15 - 0,25</td>
</tr>
<tr>
<td>Acidity [pH in H₂O]</td>
<td>7,4</td>
<td>7 - 7,8</td>
</tr>
<tr>
<td>Molecular quantity [mm]</td>
<td>0 - 20</td>
<td>0 - 25</td>
</tr>
<tr>
<td>Inclusion of glass [%]</td>
<td>not occurrent</td>
<td>absent</td>
</tr>
<tr>
<td>Inclusion of heavy metals, not more than:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cadmium Cd [mg/kg d.m.]</td>
<td>0,8</td>
<td>0 - 2,5</td>
</tr>
<tr>
<td>Chrome Cr [mg/kg d.m.]</td>
<td>5,0</td>
<td>0 - 25</td>
</tr>
<tr>
<td>Copper Cu [mg/kg d.m.]</td>
<td>40</td>
<td>1 - 80</td>
</tr>
<tr>
<td>Nickel Ni [mg/kg d.m.]</td>
<td>9,5</td>
<td>1 - 20</td>
</tr>
<tr>
<td>Lead Pb [mg/kg d.m.]</td>
<td>20</td>
<td>2 - 40</td>
</tr>
<tr>
<td>Zinc Zn [mg/kg d.m.]</td>
<td>600</td>
<td>80 - 1000</td>
</tr>
<tr>
<td>Mercury Hg [mg/kg d.m.]</td>
<td>&lt; 0,01</td>
<td>0 - 0,1</td>
</tr>
<tr>
<td>Sanitary index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonella sp.</td>
<td>Not affirmed</td>
<td>absent</td>
</tr>
<tr>
<td>Parasites [pc./kg d.m.]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascaris sp., Trichuris sp.</td>
<td>Not affirmed</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Toxocara sp.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Quality and composition of the compost

COMPOSITION OF BIOTOP COMPOST

- Straw: 32%
- Stabilized Sludge: 32%
- Bark Waste: 11%
- Green Waste: 25%

Features:
- Brown colour, fragrance of fresh garden soil, rubble structure for sprinkling

Dry mass [%]:
- 50
- 40
- > 40

Organic dry mass [%]:
- 50
- 45
- > 40

Nitrogen [%]:
- 2.0
- 1.5
- > 1.4

Phosphorus [%]:
- 1.0
- 0.9
- > 0.9

Potash [%]:
- 0.2
- 0.15
- > 0.2

Acidity [pH in H2O]:
- 7.4
- 7
- > 7.8

Molecular quantity [mm]:
- 0 - 20
- > 20

Inclusion of glass [%]:
- Not occurred

Inclusion of heavy metals, not more than:
- Cadmium Cd [mg/kg d.m.]:
  - 0.8
  - 0
  - > 2.5
- Chrome Cr [mg/kg d.m.]:
  - 5.0
  - 0
  - > 25
- Copper Cu [mg/kg d.m.]:
  - 40
  - 1
  - > 80
- Nickel Ni [mg/kg d.m.]:
  - 9.5
  - 1
  - > 20
- Lead Pb [mg/kg d.m.]:
  - 20
  - 2
  - > 40
- Zinc Zn [mg/kg d.m.]:
  - 600
  - 80
  - > 1000
- Mercury Hg [mg/kg d.m.]:
  - < 0.01
  - 0
  - > 0.1

Sanitary index:
- Salmonella: Not affirmed
- Parasites [pc./kg d.m.]:
  - Ascaris sp., Trichuris sp., Toxocara sp.: < 10, < 20
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.

**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.
NIC FERTILIZER, NUTRITIVE FOR PLANTS

INTENSIVE PLANT PRODUCTION AND CONDITIONS SOIL

THE ENVIRONMENT

FERTILIZING MATERIAL SOIL TYPES

OUT THE WHOLE YEAR

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.
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