

Optimal Recovery of Material and Energy Resources

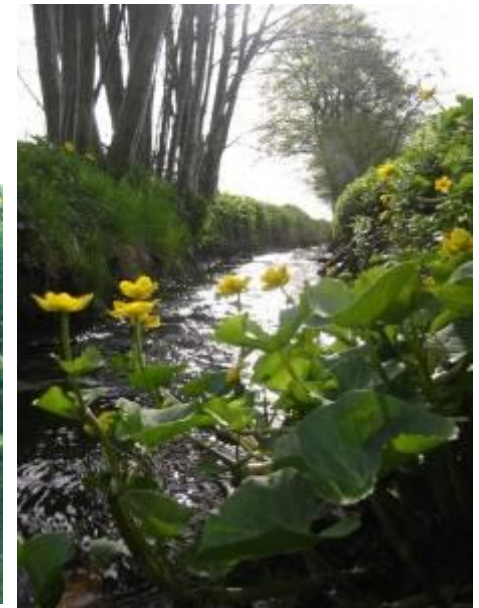
The Case of Sewage Sludge Composting in Odense

Presented by **Svend Byrial Poulsen**
Odense Waste Management Company Ltd. - Denmark
at
2nd Experts Seminar – 16th & 17th June 2010
Sevilla - Spain



City of Odense

- **1000 year old history**
- **City of fairy tale writer H.C. Andersen and composer Carl Nielsen**
- **Denmark's 3rd biggest city**
- **190.000 inhabitants**
- **90.000 households**



Odense Waste Management Company Ltd.



- Functioning as municipal waste management department since 1882
- 180 employees
- In 1994 transformed into a limited company (corporation) owned by the municipality of Odense
- Not-for-profit company
- All services paid by the users

Main Activities

- Collection from 90.000 households:
 - Household refuse
 - Paper
 - Batteries and other hazardous waste types
 - Bulky waste
- Operation of 155 bring banks for bottles placed throughout the municipality
- Operation of 8 recycling stations
- Street cleaning
- **Operation of Odense North Environmental Centre (modern waste treatment and landfill plant)**
- Extraction of landfill gas from old dumpsite, Stige Island
- Closure and aftercare of Stige Island old dumpsite
- Participation in operation of central sorting facility with a privat company.



History of Sewage Sludge Composting at Odense North Environmental Centre (ONEC)



1996 In general problems with the spreading of sewage sludge from municipal wastewater treatment plants

1997 Evaluation of various options:
- Recycling (composting)
- Incineration
- Deposit

1997-98 Tests with decomposition of organic xenobiotics (LAS, DEHP, PAH and NPE) contained in composted sewage sludge

Danish legislation in place with limit values for contents of heavy metals and xenobiotics in **BioCompost** (compost with sewage sludge)

1999 Starting large scale composting of sewage sludge at ONEC.

Limit values

	Mg/kg Dry Matter	Mg/kg total phosphorus
Cadmium	0,8	100
Mercury	0,8	200
Lead	120	10.000
Nickel	30	2.500

	Mg/kg Dry Matter
Chromium	100
Zinc	4.000
Copper	1.000

	Mg/kg Dry Matter
LAS	1.300
PAH	3
NPE	10
DEHP	50

Legislation

Type	Not stabilised	Stabilised	<i>Controlled (1) composted</i>	<i>Controlled (2) Sanitizing</i>
Sewage sludge	Not allowed for soil purposes	Not allowed on areas for direct eatable crops, private gardens and parks (have to be treated within 6 hours)	<i>Not allowed on areas for direct eatable crops, private gardens and parks</i>	<i>Allowed for all purposes</i>

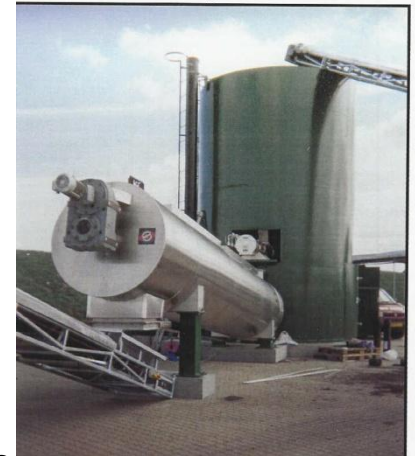
- (1) Minimum 55 degrees C in minimum 2 weeks (documented with temperature loggers)
- (2) Closed reactor, applying a temperature of minimum 70 degrees C in 1 hour (documented in time and temperature)

Composting - Sanitizing



Controlled composting:

- Legislation demands
 - 2 weeks at 55 degrees C (temperature loggers)
- The process
 - Windrow composting



Controlled sanitizing:

- Legislation demands
 - 1 hour at 70 degrees C
- The process of sanitizing
 - Breaking the chain of infection in the final product
 - Low energy consumption
 - Use of steam for heating
 - Continuous and automated 24-hour operating

Investment and Quantities



- Investments :
 - Acquisition of new machinery etc. DKK 18,5 mio.
 - Establishment of composting plant 41,0 mio.
- Total composting plant area: 62.000 m²
- Average annual quantities:
 - Sludge 22.000 tons
 - Structural material 32.000 tons
 - Straw 3.000 tons
 - Produced BioCompost 21.000 tons



Equipment and Machinery

Composting Facility



5 Wheel Loaders



2 Windrow Turners

2 Screening Machines



2 Shredder Machines



40 Data Loggers

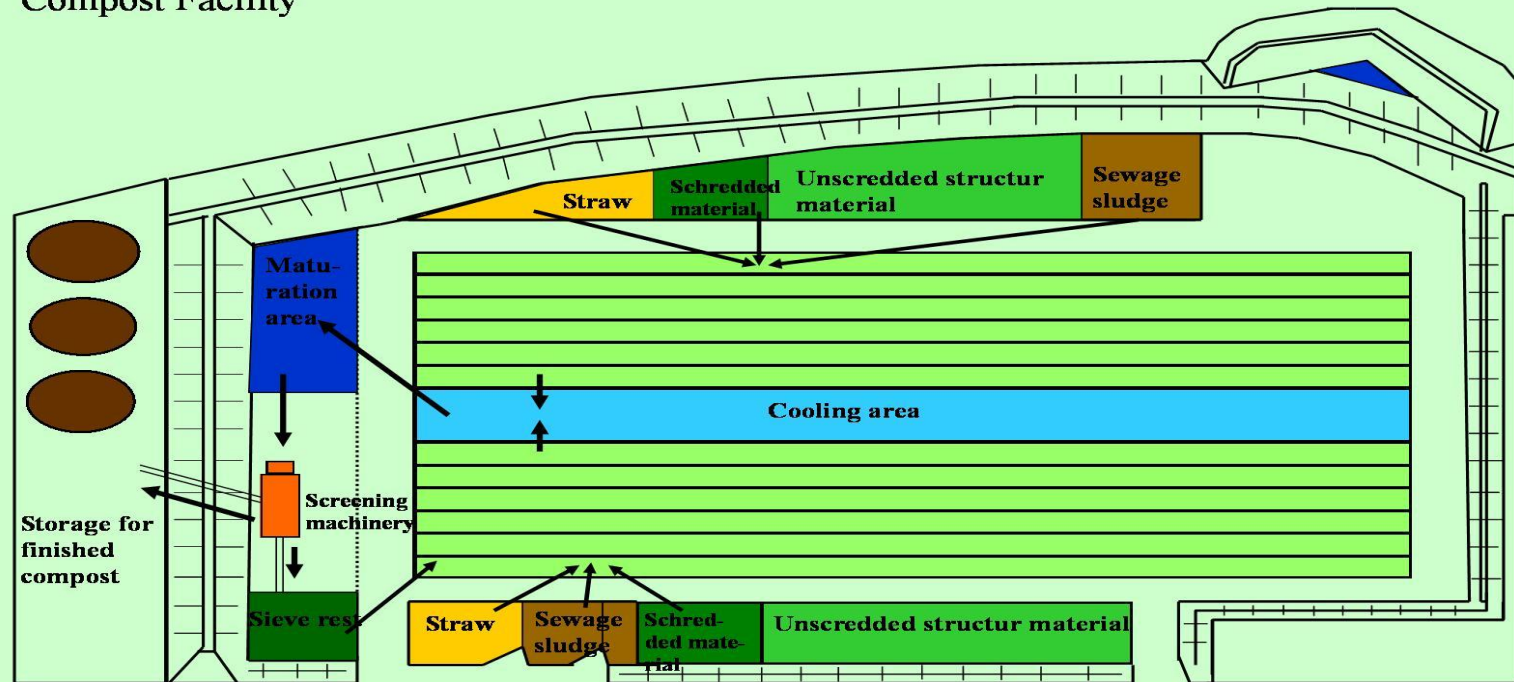
Experienced and Dedicated Staff



- 6 employees
- Stable and dedicated staff with many years of experience
- Training and practice gained from a constant focus on producing quality compost

Production Process of BioCompost

Odense North Enviromental Centre
Compost Facility



Data Registration and Analyses

Weight system in Wheel Loaders:

Registration of all raw materials, windrows, compost to maturation, finished compost.



Requirements for chemical analyses:

	Analysis
Sludge	Monthly
Straw	Annually
Structural material	Quarterly
Maturation (Batch)	Monthly
Finished Compost (Batch)	Monthly
Sieve rest (Batch)	Monthly



Computerized Monitoring Program

Calculations

Possible to make a suitable composition of each windrow, taking into account the expected precipitation during the composting period.

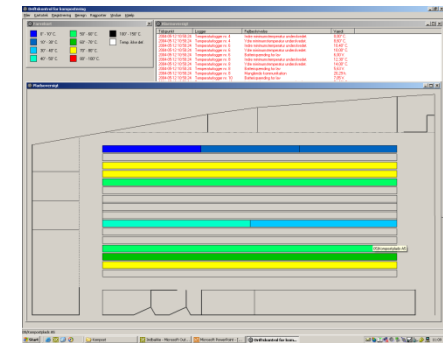
Registration

Physical and chemical data of the raw material, the windrows and the finished compost

Surveillance and collection


Processing operational data during the compost period, possibility of receiving an alarm, if the windrow is too warm or too cold

Reports, which document the composting process and the composition of the finished product.



Declarations for Final Product

Driftsjournal for Parti 1.Halvår 2003



Hygiejniserig
Timer > 70°C
Timer > 55°C

Parti 1.Halvår 2003

- Mile 1709-03-01-02-03-04-05.SL 0
- Mile 2508-03-01-02-03-04.SL 0
- Mile 2204-03-04 37
- Mile 1407-03-01-02-03.SL 0
- Mile 1703-03-03 0
- Mile 0707-03-01-02.SL 0
- Mile 1401-03-01 0
- Mile 2406-03-02.SL 0
- Mile 0302-03-01 0
- Mile 2602-03-02 14

Affaldsprodukt	Mængder		LAS.		DEHP.		NPE		PAH		
	Tons	% TS	Tons TS	mg/kg TS	Kg	mg/kg TS	Kg	mg/kg TS	Kg	mg/kg TS	
Råkompost	9033		3384		365,451		25,16		14,032		2,701
Halm 2002	351	89	312	0	0,000	0,22	0,069	0	0,000	0	0,000
Sigteret Januar 2002	141	50	71	0	0,000	2,2	0,156	0,67	0,048	0,49	0,035
Biomasse NO Dec 2002	98	28	28	1100	30,634	49	1,365	17	0,473	1,2	0,033
Biomasse NV Decr 2002	127	22	28	390	11,096	17	0,484	8,5	0,242	1,2	0,034
Sigteret Efterår 2002	100	62	62	0	0,000	0,89	0,055	0,47	0,029	0,55	0,034
Færdig kompost	4416	71	3135	0	0,000	1,4	4,389	0,7	2,195	0,5	1,568
Eudringer i masse:	-51%		-7%		-100%		-83%		-84%		-42%

Affaldsprodukt	Mængder		Cd. Cadmium		Hg. Kviksølv.		Pb. Bly.		Ni. Nikkel.		Cr. Chrom.		Zn. Zink.		Cu. Kobber.		
	Tons	% TS	Tons TS	mg/kg TS	mg/kg TS	Kg	mg/kg TS	Kg	mg/kg TS	Kg	mg/kg TS	Kg	mg/kg TS	Kg	mg/kg TS	Kg	
Råkompost	9033		3384	0,824	1,898	47,838	19,567	31,294	857,813	361,394							
Halm 2002	351	89	312	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	
Sigteret Januar 2002	141	50	71	0,37	0,026	0,58	0,041	38	2,699	9,7	0,689	14	0,994	200	14,205	71	5,043
Biomasse NO December 2002	98	28	28	0,76	0,021	4,3	0,120	30	0,835	16	0,446	15	0,418	560	15,595	480	13,368
Biomasse NV December 2002	127	22	28	0,71	0,020	0,6	0,017	50	1,423	20	0,569	28	0,797	920	26,176	310	8,820
Sigteret Efterår 2002	100	62	62	0,18	0,011	0,15	0,009	6,8	0,422	3	0,186	3,3	0,205	86	5,343	21	1,305

Affaldsprodukt	Cd. Cadmium		Hg. Kviksølv.		Pb. Bly.		Ni. Nikkel.	
	mg/kg total P		mg/kg total P		mg/kg total P		mg/kg total P	
Halm 2002	0		0		0		0	
Sigteret Januar 2002	43		68		4400		1100	
Biomasse NO December 2002	23		130		890		490	
Biomasse NV December 2002	32		27		2200		910	
Sigteret Efterår 2002	80		67		3000		1300	

Declarations for BioCompost:

- Contents of nutrients
- Contents of xenobiotecs
- Contents of impurities
- Contents of seeds
- Etc.

Marketing Possibilities for BioCompost

Restructuring city centres



Golf courses etc.



Farmers



Green Houses

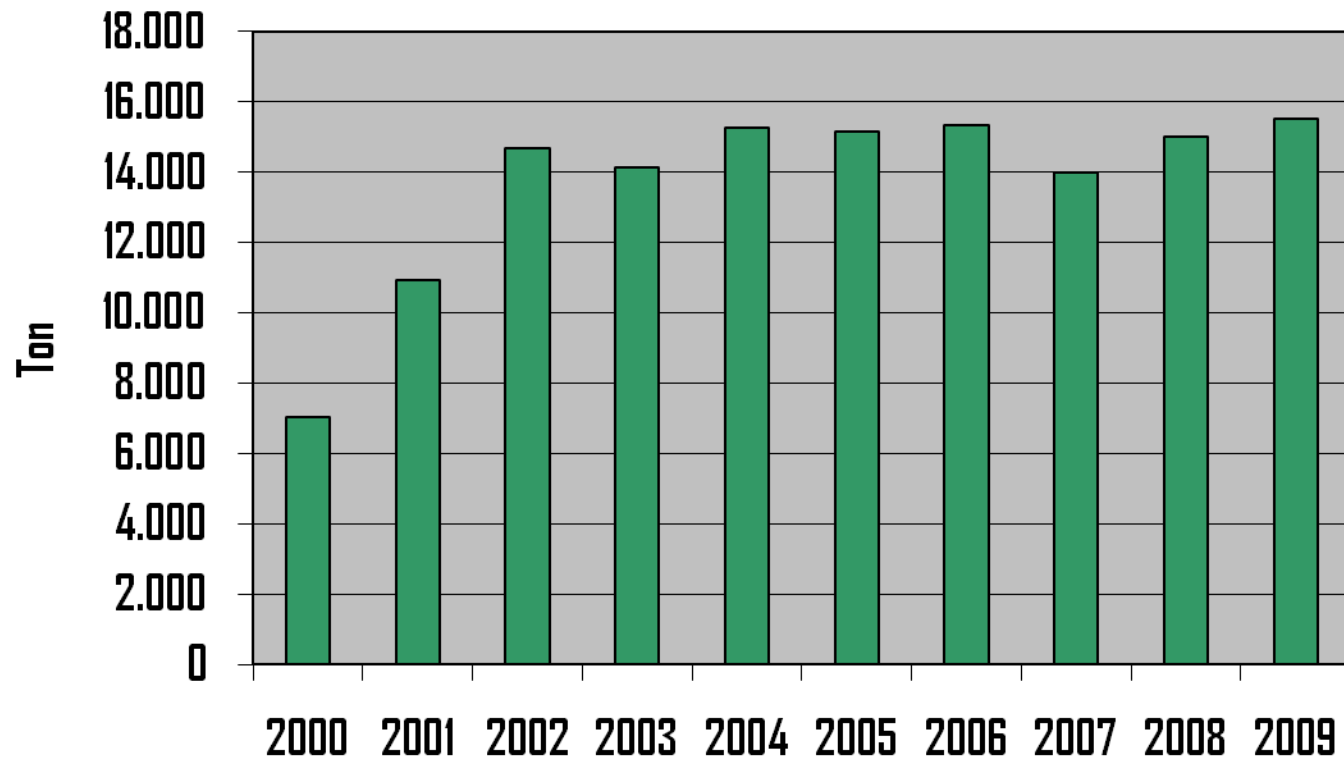


Nurseries



Marketed BioCompost

(some of the final product is used internally in ONEC)



Knowledge Sharing

Is your need training and operational support? - or just a committed colleague to talk solid waste with?

You'll always be welcome for a talk and a visit at Odense Waste Management Company.

We willingly share our recipes of biomass-composting, which is composting sewage sludge together with straw and cuttings from parks and gardens transforming it into a nutrient bio compost.

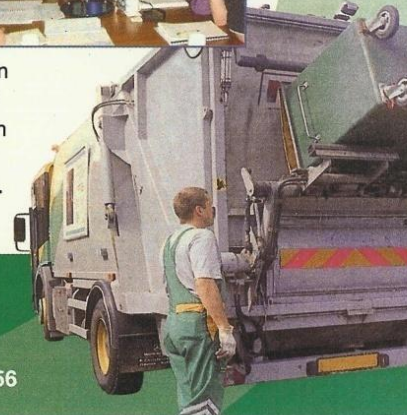
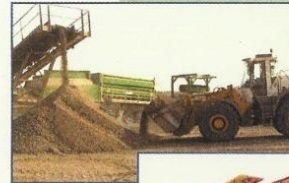
Many colleagues from Denmark and abroad have already visited our Environmental Centre, which includes one of the environmentally safest landfills in Northern Europe.

Maybe you would be more interested in visiting the closed Stige Island landfill taking a look at the landscape aftercare, the newly established systems for monitoring, collection and treatment of leachate - or at the gas extraction and energy production systems established here.

If you need support to operation and training within biomass-composting, or some kind of project support or advice in connection with establishing a new landfill or a solid waste treatment facility we would be glad to assist you in for instance providing training courses at our newly established Training Centre.

Or what about participating in a professional exchange-relationship together with some committed colleagues from our company?

If any of this may catch your interest, please contact our Project and Planning Department.



We enjoy sharing our experience and recipes for composting with colleagues in Denmark and abroad

We may give advice and flexible project support to operation and training etc.

 **Odense**

Waste Management Company Ltd.

www.snapind.dk

E-mail: snapind@snapind.dk

Snapindvej 21 · DK - 5200 Odense V

Tel. +45 63 13 82 10 · Fax: +45 65 91 44 56

Thank you for your attention

This was a brief introduction to the composting process being applied in Odense at the moment.

We are constantly following the newest scientific results concerning the safe use of composted sewage sludge, - and not least the public opinion on this matter.

E.g. the fate of pharmaceuticals and personal care products (PCPs) are carefully watched and analyzed.

Further, the political, legislative and economic frame conditions for treatment of sewage sludge seem to be under change, not least as a consequence of EU legislation.

Finally, the application of new LCA based evaluation tools as well as new technologies for improved energy recovery from sewage sludge may also to a large extent change the scene for feasible future sewage sludge treatment.

So what may today be the most acceptable solution for treatment of sewage sludge, will not necessarily be tomorrow's best alternative.

Please visit us at www.odensewaste.com