

**COMPOSTING
of Organic Wastes**

**Technologies, Decentralized
Solutions, Costs**

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**The Management of the Biological
Transformation Process**

- Organic feedstocks & additives
- Humidity
- Oxygen
- Temperature

09/09/2009

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**The right Mix
is the key**

Dry Leaves High C Dry Bulky		Grass High N Wet Dense
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- **Providing the C-Source**
 - ✓ Shredding of woody materials (bush / tree cuttings) Slow rotating hammer mills
 - ➔ Creating maximum of accessible surfaces
 - ➔ Providing stable pore space
- **Fresh food for your microflora**
 - ✓ Grass, leaves, legumes, crop processing residues
 - ➔ important for sludge, (badly fermented) inactive raw material, manure
- **10 % Old Compost + 10% clay soil**
 - ✓ Drives humification (clay-humus complex), reduces odours

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Mixing the „Ingredients“

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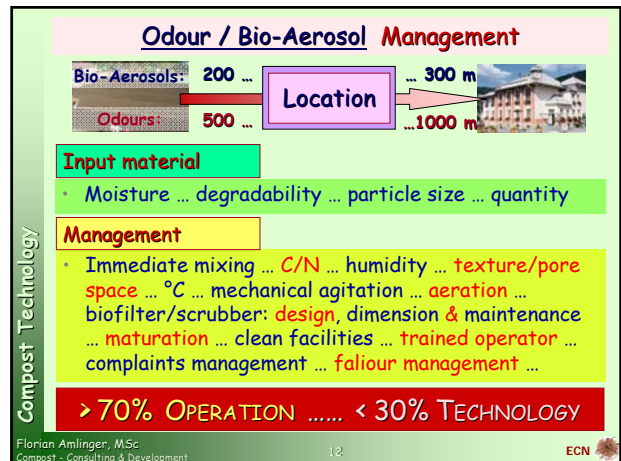
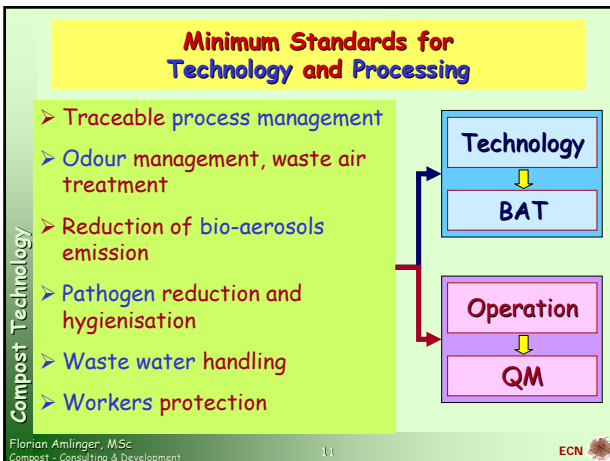
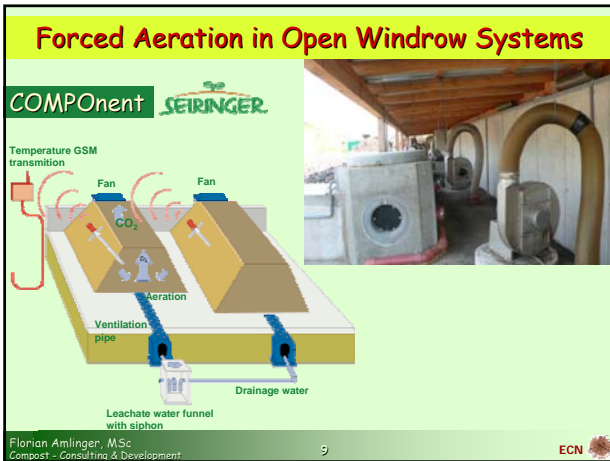
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Composting-Systems

- ~~**Static Systems**~~
 - ✓ windrow-systems without turning
 - ✓ boxes
 - ✓ containers
- **Semi-dynamic Systems**
 - ✓ (aerated) windrows (triangle, trapezoid, table) with turning machine
 - pulled or self-propelled or wheel loader
 - ✓ boxes, chambers
 - ✓ vertical reactors
- **Dynamic Systems**
 - ✓ composting drums

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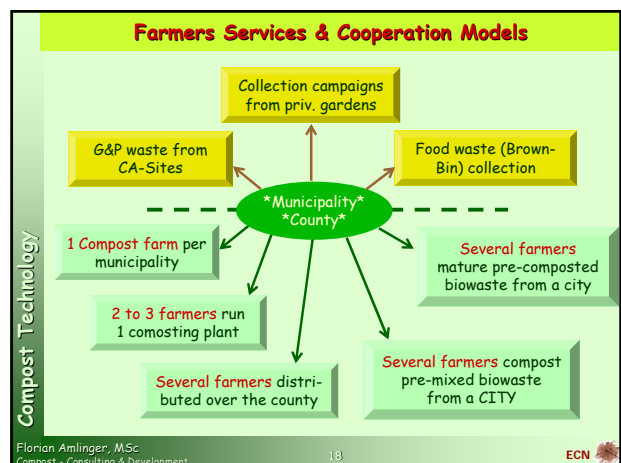
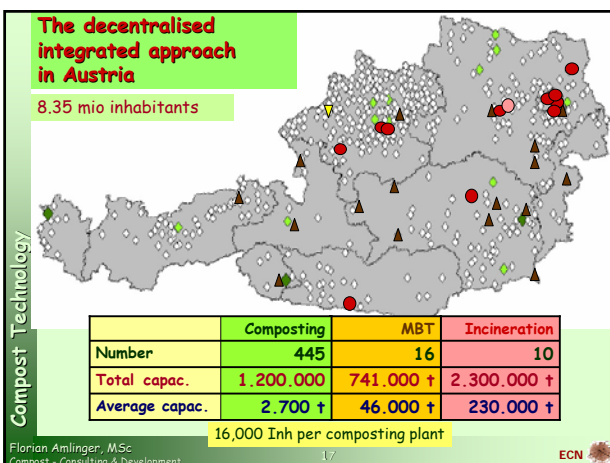
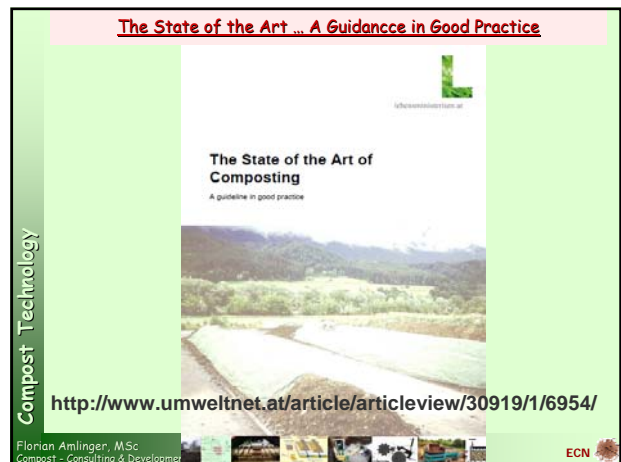


Optimum Temperature Ranges for different Requirements of the Composting Process

Process Optimum for	Temperatur Range
Hygienisation ... [e.g. 3 to 10 days]	> 55 - 65 °C
Maximum Decomposition Start of Formation of Humic Substances	45 - 55 °C
Max. Biodiversity + Decomposition of Microbial Biomass; Max. Formation of Humic Substances	35 - 40 °C

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3rd Baltic Biowaste Conference, 23/24 Nov. 2011, Vilnius
" Composting of Organic Waste - Technologies, Decentralized Solutions, Costs"
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Cooperative Investment & Financing

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Collection and Treatment Costs of Decentralised Biowaste Composting Schemes

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Collection Schemes

Brown Bin [120 l]
100 l / week*HH

Bio Bag
15 l / week*HH

Bio Bucket
23 l / week*HH

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Basic collection data - 3 Districts

	Bag [15 L]	Bucket [23 L]	Bin [100 L]
participating households	25 %	35 %	42 %
Food waste /per participant	88 kg/INH	109 kg/INH	223 kg/INH
/per total population	17 kg/INH	38 kg/INH	134 kg/INH
Garden waste /per total population	94 kg/INH	119 kg/INH	124 kg/INH
Total organics (kg/Inh)	114	169	258
Residual waste (kg/Inh)	89	93	204
Recycling Rate	84%	81%	67%

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Costs of Collection & Treatment

per INHABITANT or [HOUSEHOLD]	Bag [15 L]	Bucket [23 L]	Bin [100 L]
Residual Waste	18.- [59.-]	17.- [45.-]	43.- [105.-]
Food Waste	2.- [7.-]	5.- [19.-]	16.- [40.-]
Green Waste	4.- [9.-]	3.- [11.-]	9.- [21.-]
Food & Green Waste	6.- [16.-]	8.- [25.-]	25.- [60.-]
Food & Green Waste collection + composting... total per TON	€ 43.-	€ 58.-	€ 94.-

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The Value of Compost:
Carbon-N-P-K fertiliser equivalent

Compost: = 20-35 % OM = 11-20 % C = 6-11 % Humus-C

	Humus C	N available: 25%	P	K	total
Concentr. kg/t f.m.	67	total: 11.7 available: 2.9	3.7	9.7	
Load kg/ha [12t/ha]	804	total: 140 available: 35	44	116	
av. value €/t f.m.	11.40	2.10	2.90	5.30	21.70
TOTAL /ha:					€ 260.-

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Investment and Operation Costs

Open Windrow Composting Treatment:
2,000 & 10,000 t / yr

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Investment Costs

Total Capacity (t) footprint	2,000 t 2,800 m ²	10,000 t 13,000 m ²
Pavement	175,000	812,000
Drainage / Watertank	26,400	89,500
Permits/ fees /Consultancy	12,000	45,000
TOTAL CONSTRUCTION	213,400	946,500
Loader	40,000	60,000
Weigh bridge	---	35,000
Shredder	---	200,000
Screen	---	170,000
Turner	25,000	150,000
Fabric fleece	4,800	17,000
Temperature ... Test kids etc	1,000	5000
Training	1,000	2500
TOTAL MASHINERY	71,800	639,500
TOTAL INVEST COSTS	285,200	1,586,000
Specific Invest-Costs	143.- / t	159.- / t

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Operation Costs

Total Capacity (t) / footprint	2,000 t / 2,800 m ²	10,000 t / 13,000 m ²
Site construction (10 years; Capital Costs: 6%/a)	27,742	123,045
Machinery + Equipment (10 years; Capital Costs: 6%/a; Repair costs: 3%/a)	11,488	108,715
Personell /Petrol etc. (10 years; Capital Costs: 6%/a;	66,500	205,000
Total OPERATION costs	105,730	437,760
Specific OPERATION costs	~ 53.- / t input	~ 44.- / t input
	~ 105.- / t compost	~ 87.- / t compost

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- On-Farm Composting Scheme**
- **Why decentralised ON-FARM Composting**
- ✓ Creates rural income, strengthens family farm structures
 - ✓ Guarantees high agricultural recycling rate
 - ✓ Reduces costs and efforts for marketing
 - ✓ Guarantees short distance carbon sequestration in soil
 - ✓ Farmer = educated in organic material handling
 - ✓ Opens the door to organic farming
 - ✓ Own use of compost drives quality management
 - ✓ Strengthen traceability & confidence
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800 + biowaste or 1 800 households
create 1 full working place !!!

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Thank you!

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