

Biological Treatment - Process Control



What provisions are needed within a Biowaste Directive



Process Control



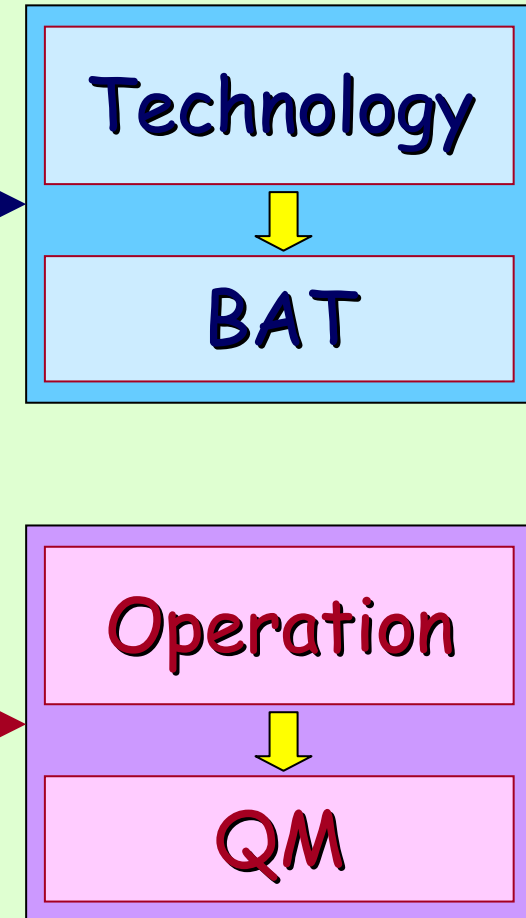
Florian Amlinger,
Austrian Compost & Biogas Association



The tools for tackling safe and environmentally sound OW processing

- Odour management, waste air treatment
- Reduction of bio-aerosols emission
- Pathogen reduction and hygienisation
- Waste water handling
- Storage/handling of digestion residues
- Emission standards of gas power stations
- Workers protection

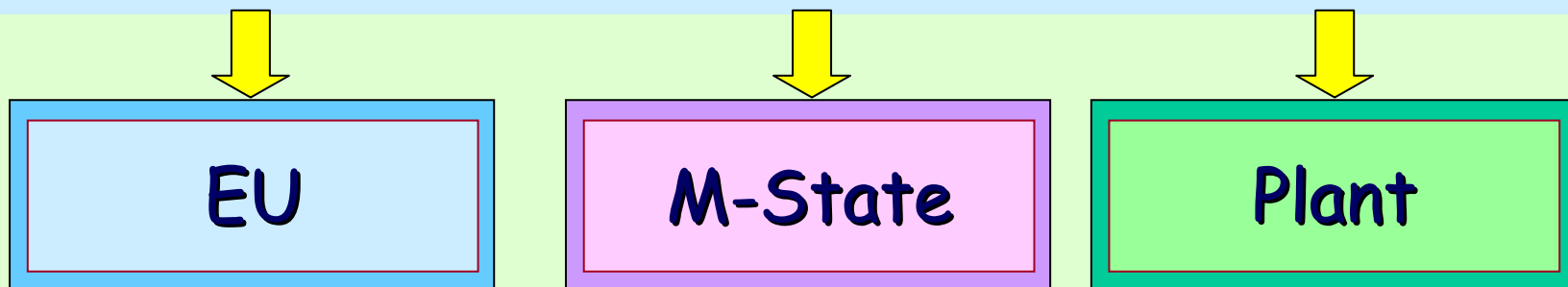
Process Control



Application of BAT to protect the environment and health ... what it involves

1 Costs involved have to be proportionate to the environment and health related benefit to be expected or factually achieved.

2 Proper assessment of magnitude of impact
→ in order to justify an adequate technical (BAT) or operational standard on level:



Pathogen Control // Hygienisation

- **Animal By-Products Regulation (EC) Nr. 1069/2009**
Category 3 Material shall be “composted or transformed into biogas”

- Catering Waste

- All other
Cat. 3 material

➤ **Article 15** → Implementing measures

- Processing methods (time-temperature, pressure, particle size etc.)
- parameters for the transformation of animal by-products, including catering waste, into biogas or compost
- **Annexes: Implementation rules**

➤ Catering Waste

➤ National rules

➤ **Article 15 (2) (a) (ii)**

➤ *Pending the adoption of common (EU) rules ...*

- Member States may adopt or maintain national rules for:
the transformation of animal by-products referred to in
Article 10(p) [=catering waste]

This includes all aspects of handling and treatment of catering waste in biogas and composting plants

APPROVAL of all composting and biogas plants !!

**FORMER FOODSTUFF should be treated
like CATERING WASTE**

Time - Temperature Regime

➤ Other Cat. 3 Material

➔ 70 °C ➔ 1 hr ➔ particle size: 12 mm

➤ does not reflect the reality of hygienisation processes. A more flexible system is necessary.....

... therefore ...

Process Control and Hygienisation

➤ Thermal hygienisation

- ✓ Temperature records during thermophilic phase over a minimum time period ... **10-14 days (> 55 °)**

➤ Aerobic Biochemical Stabilisation

- ✓ Degradation of microbiological biomass
- ✓ Withdrawal of the nutrition basis for pathogens
- ✓ Microbial equilibrium is shifted in favour of soil organisms

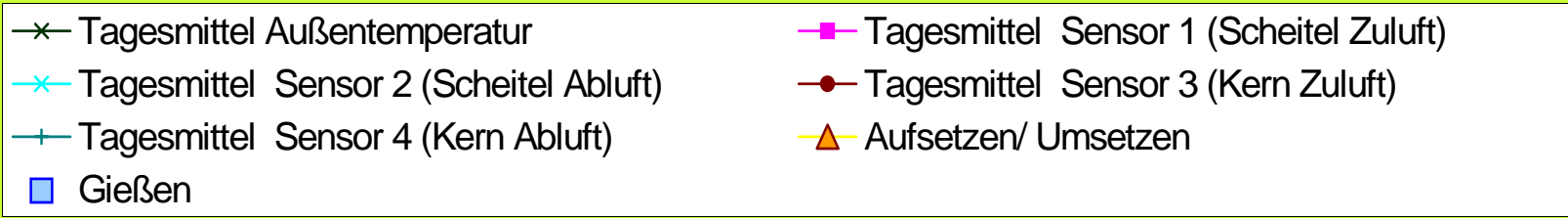
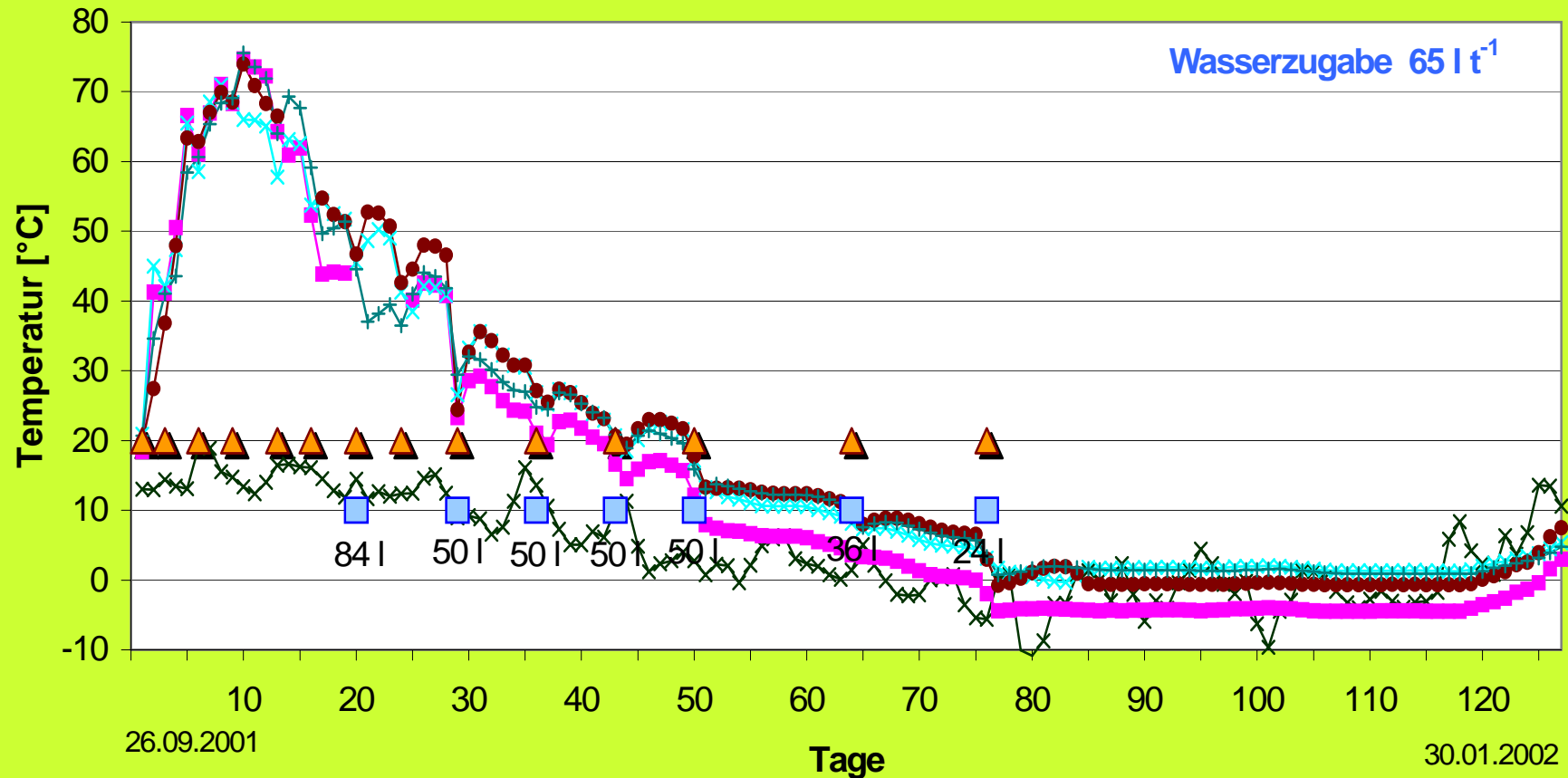
➤ Further Records (as part of the QM)

- ✓ watering, turning, aeration, material additions, screening, etc.

Time - Temperature Regime ... flexible ... well experienced and investigated !

Composting system	°C	Time	Further conditions
<u>OPEN</u> windrows	> 55 °C 65 °C	10 days 3 days	<ul style="list-style-type: none"> ➤ At least 3 to 5 times of physical agitation (turning) ➤ > 40 to 55% moisture ➤ Min 6 - 8 weeks composting
<u>CLOSED</u> Systems	60 °C	3 days	
ANAEROBIC Digestion <u>thermophile</u>	> 50 to 55 °C	14 days	<ul style="list-style-type: none"> ➤ Followed by composting ➤ see above
ANAEROBIC Digestion <u>mesophile</u>	< 40 °	28 days	<ul style="list-style-type: none"> ➤ Followed by composting ➤ see above

Process monitoring



Process Control

Alternative transformation parameters ...

Prozess Validation

- ➔ Used in practice only by 3 Member States
- ➔ far too complicated and expensive
- ➔ Common and broadly recognised methodologies still do not exist

Urgently needed: SIMPLIFICATION

- NO reduction approval of of indicator organisms
- BUT intensified microbiological end product control in a recognition period (e.g. 6 - 12 months)
- PLUS: Documentation of process parameters

Odour / Bio-Aerosol Management



Input material

- Moisture ... degradability ... particle size ... quantity

Management

- Immediate mixing ... **C/N** ... humidity ... **texture/pore space** ... °C ... mechanical agitation ... **aeration** ...
biofilter/scrubber: **design**, dimension & maintenance
... **maturation** ... clean facilities ... **trained operator** ...
complaints management ... **faliour management** ...

> 70% OPERATION < 30% TECHNOLOGY

Green House Gas Emissions Open Windrow composting

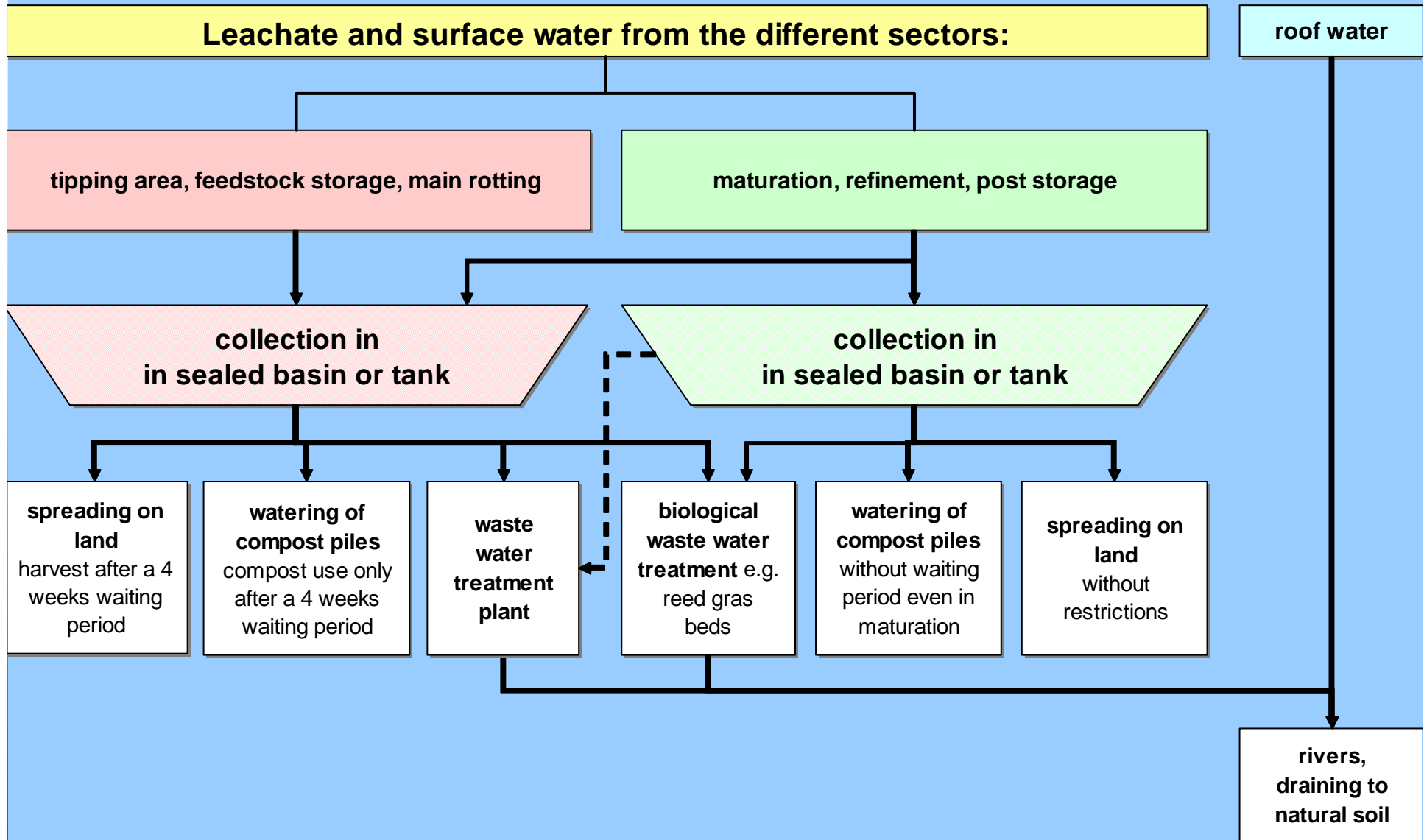
Kg/t f.m.	CO ₂	CH ₄	NH ₃	N ₂ O	CO ₂ -Equ
Biowaste	115	0.24	0.57	0.12	41
Green Waste	194	0.60	0.35	0.18	68

Relative contribution of Open Windrow composting to national GHG emissions

%	0.06 - 0.25	0.01 - 0.11	0.03 - 0.47	0.87 - 2.71	0.01-0.06
---	----------------	----------------	----------------	----------------	-----------



Drainage water: storage & use



Registered Composting Plant



INPUT

Receipt Control

Storage

Mixing

Conditioning

batch composition ...
batch monitoring ...
°C, turning, watering ...

K3

K2

K1

Residues

Compost = Product

QM: the principle of a traceably documented process

Which criteria to be ruled at what level ?

Criterion	Example of provision	EU Dir.	MS	Plant
Plant / Process description	EU: Process model; basic requirements; control points	✓		✓
List of input materials	EU: binding positive list	✓	✓	✓
Receipt control	EU: complete & traceable records	✓		✓
Batch records	EU: traceable documentation system from input to final compost	✓	✓	✓
Cleanliness of the plant	MS: good practice guide		✓	✓
Availability of machinery	Plant: Technical description			✓

Which criteria to be ruled at what level ?

Criterion	Example of provision	EU Dir.	MS	Plant
BAT: intensive decomposition	Flexible: open & closed systems		✓	✓
Hygienisation	EU: flexible time-temperature schemes	✓	✓	✓
Odour	MS: good practice guide		✓	✓
Bio-aerosols	MS: good practice guide		✓	✓
GHG emissions	MS: good practice guide		✓	✓
Maturation	EU: Product criteria; no reinfection	✓	✓	✓
Storage of digestate	EU: covered & gas capture ?	✓	✓	✓

Process Control



Decentralised to large scale composting





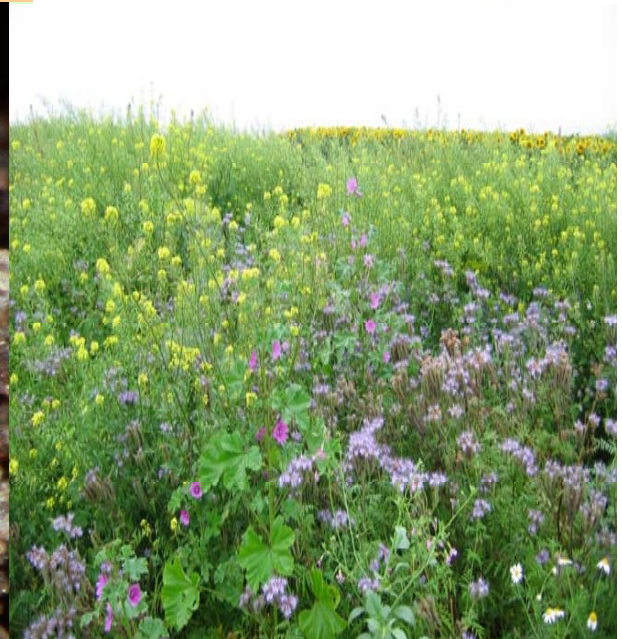
European
Compost
Network
ECN

Florian Amlinger
f.amlinger@kabsi.at
www.compostnetwork.info



arge
kompost
& biogas

Process Control



Comp
Dipl.: