



# In-vessel composting

APSE meeting

17<sup>th</sup> April

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GROWING THE RENEWABLE ENERGY ECONOMY

# In-vessel composting

- Different types of vessels - Pros & cons
- UK standards and regulations
- Quality, Quality, Quality
- Keeping workers safe

# What is composting?

- Composting – official definition
  - ‘the process of **controlled** biological decomposition of biodegradable materials under **managed** conditions that are **predominantly aerobic** and allow the development of thermophilic temperatures as a result of **biologically produced heat**’

Or..... a managed activity that converts a waste into a resource which can provide a wide range of benefits when applied to land. – this is why quality is important

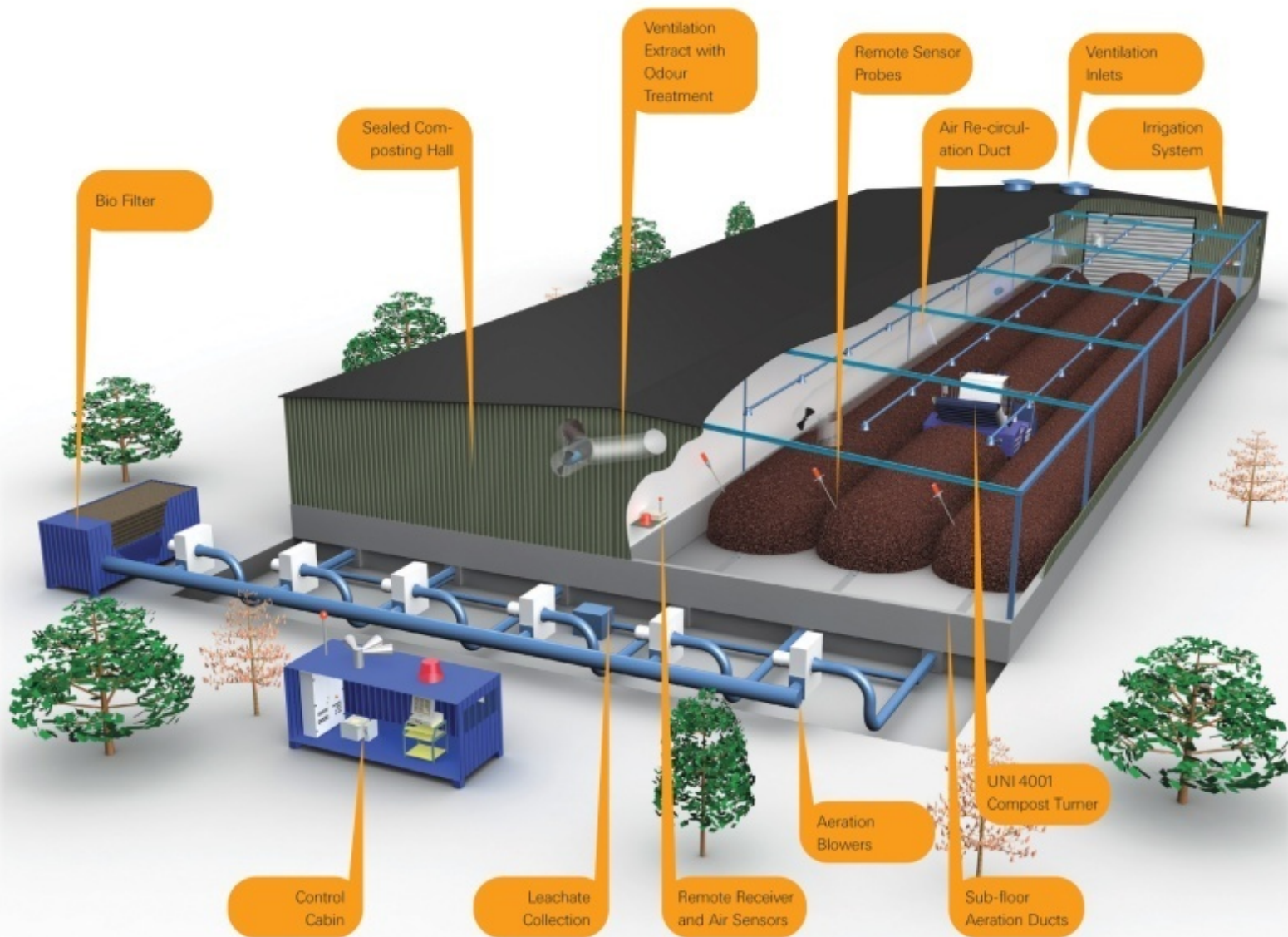
# Why In-vessel composting?

- Usually a regulatory requirement – any Animal By-products including food waste requires to be composted in an enclosed vessel – includes food and green waste mixed together.
- Greater control of composting conditions and environmental emissions.
- Range of different types of technology, from basic to very high tech.....

# Housed windrows



# Housed windrows





# In-vessel technologies examples: tunnels



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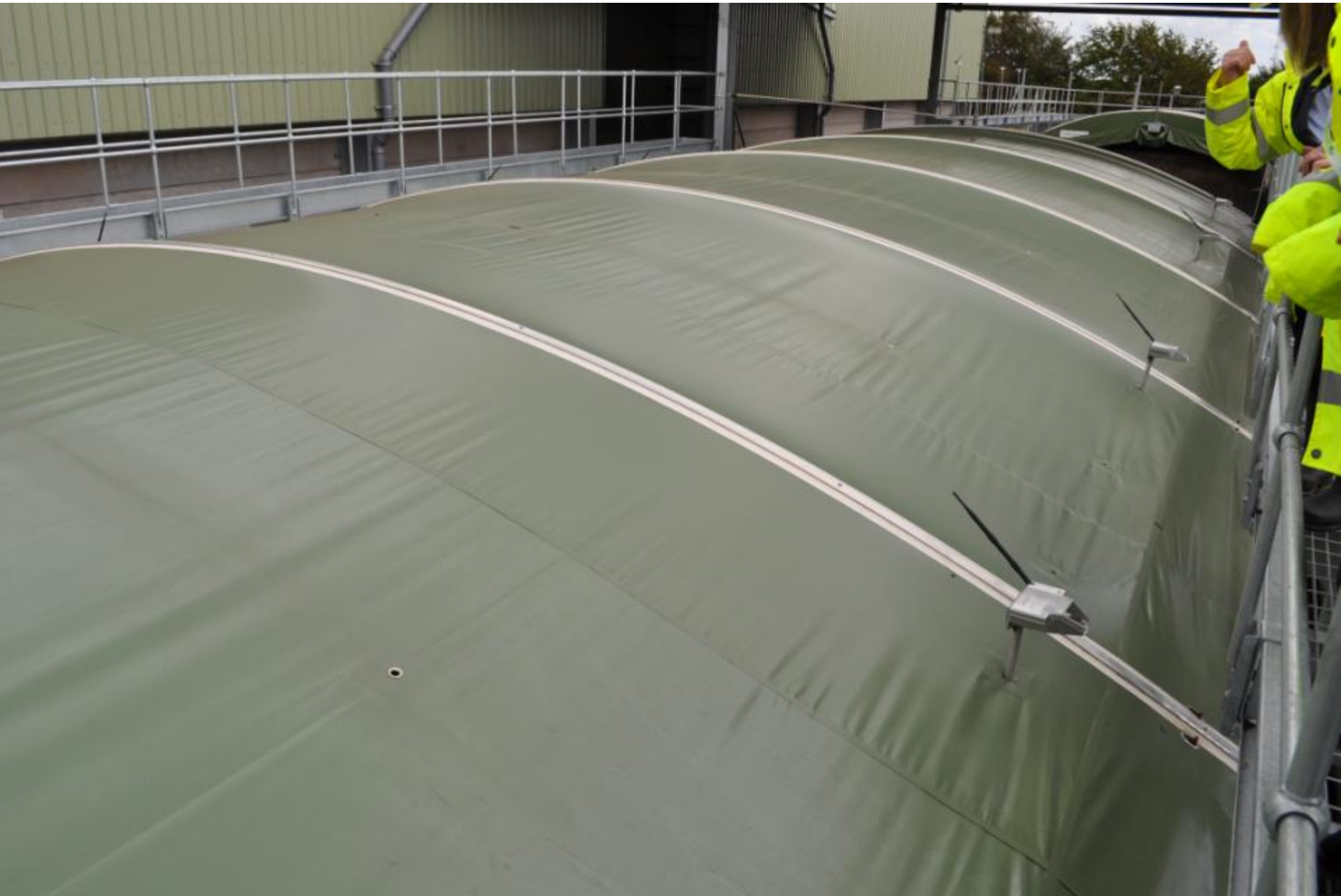


MEMBERS  
TECHNOLOGIES  
**SECURITY**  
TRANSPORT  
SOCIATION  
CHANGES  
BUSINESS  
RESOURCES  
EMPLOY  
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RECYC  
COST  
CONFIDENCE  
ELECTRICITY  
FUNDING  
DEALOR  
INFO

# Tunnels





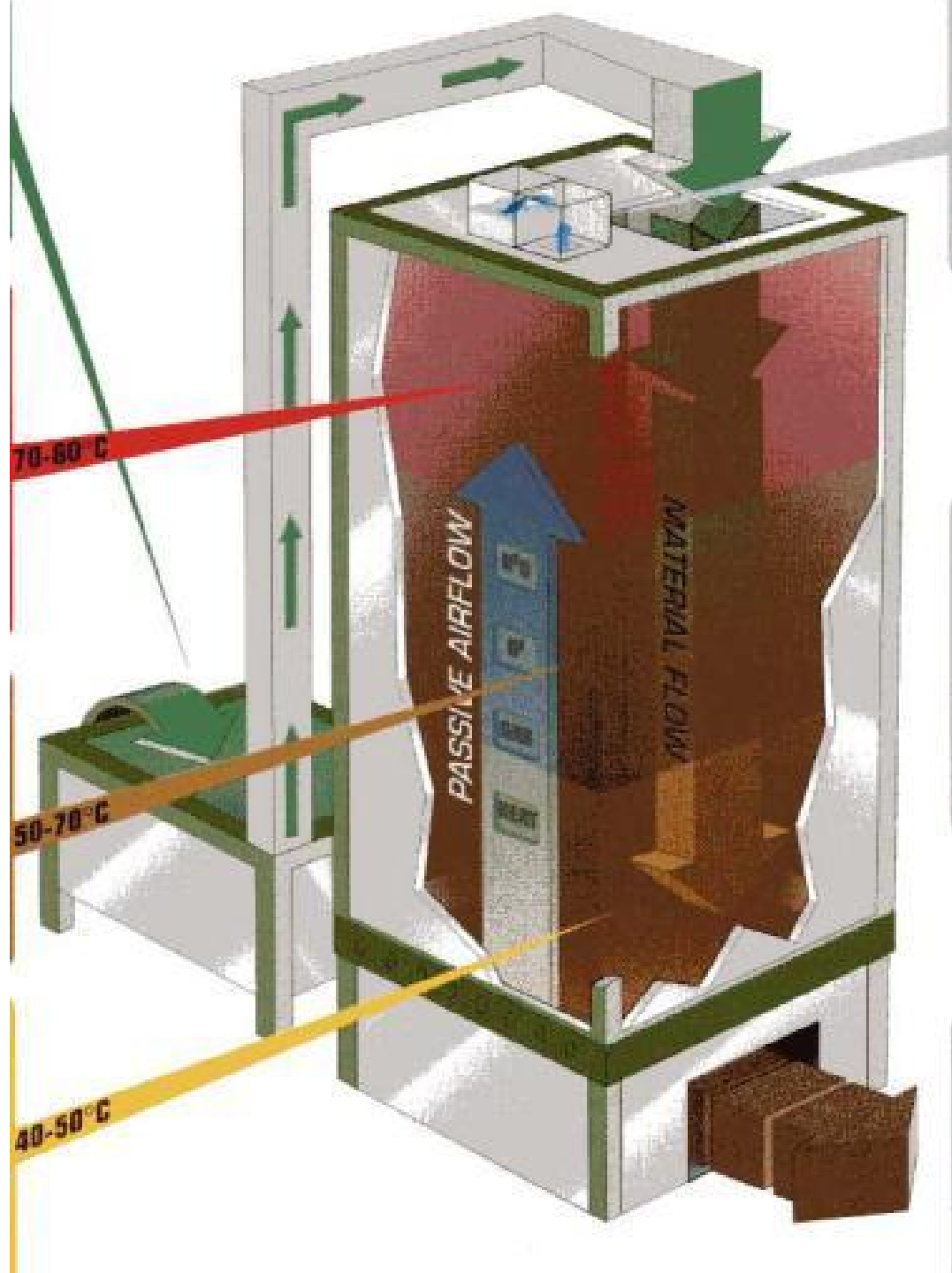


# In-vessel technologies examples: rotating drums, vertical and horizontal towers /silos

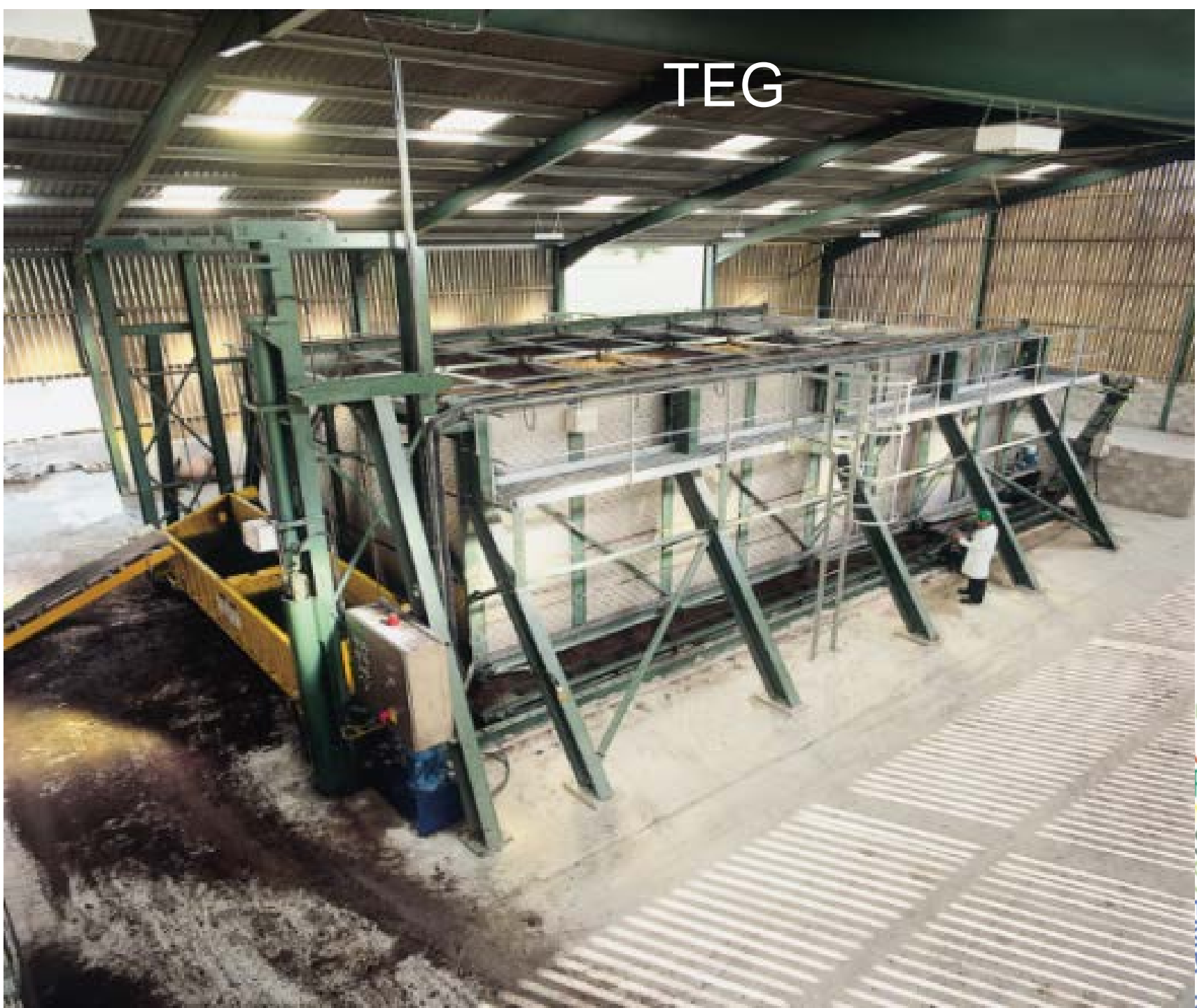


# In-vessel composting - VCU

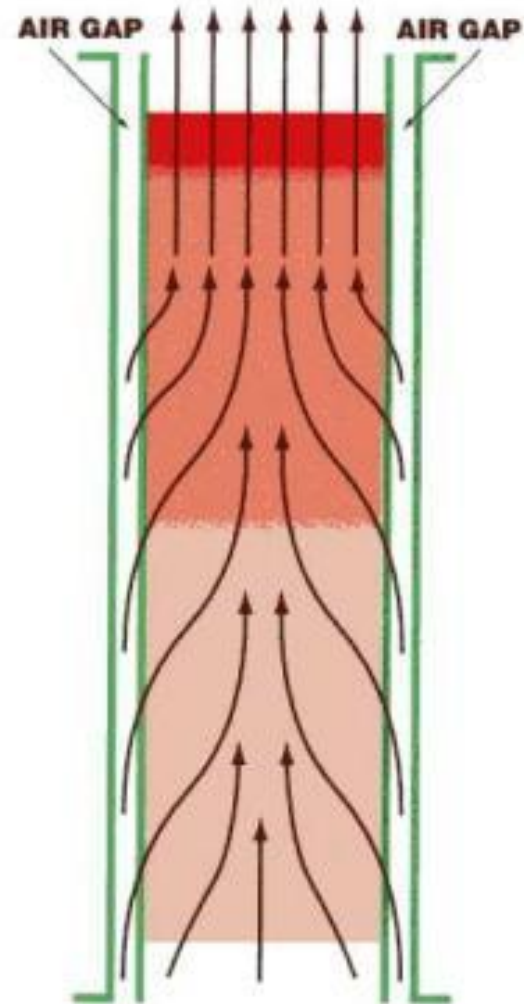
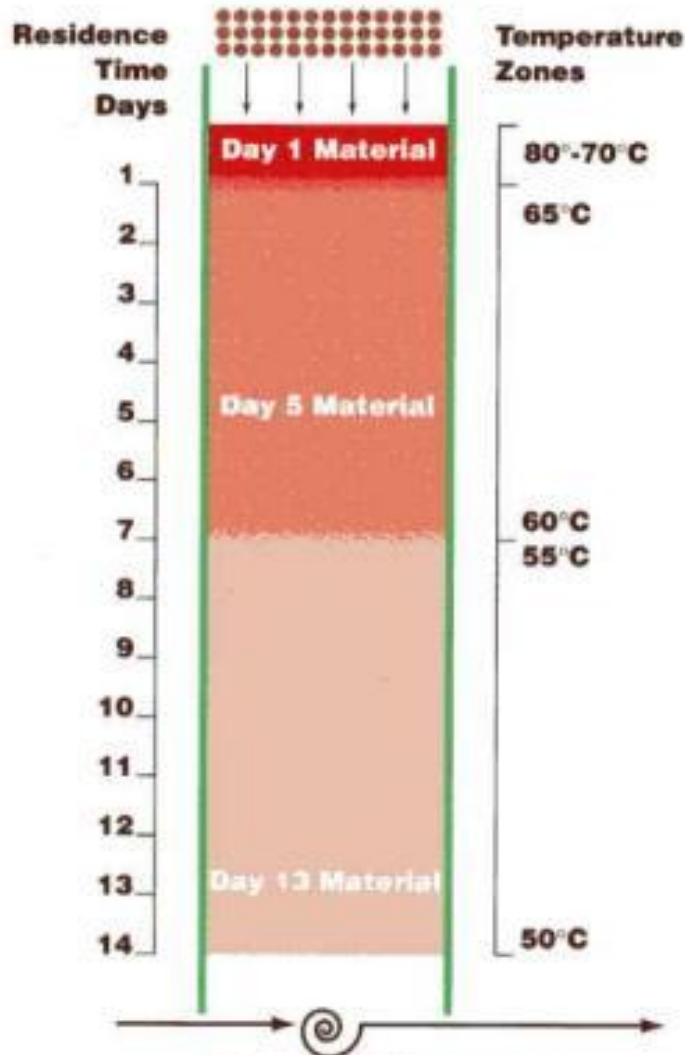




TEG



The daily load to Silo-Cages of c. 2.5m<sup>2</sup> is shredded on to the hot zone of composting material and descends in the appropriate residence time.



32m<sup>3</sup> capacity vented, insulated wall Silo-Cages providing natural aeration.

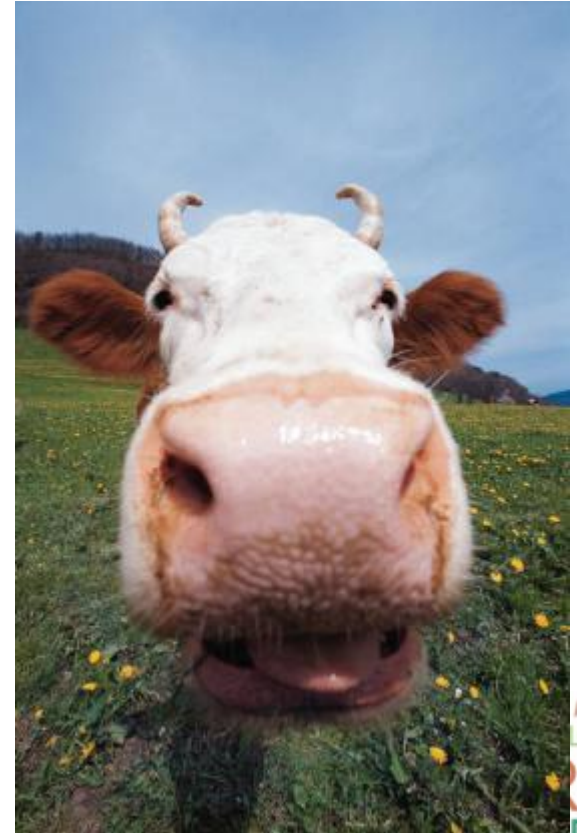
HotRot





# UK Regulations – Animal By-Product Regulations

- Controls processing of all ABP wastes, including food
- Enforced by Animal and Plant Health Agency (APHA) or equivalent in Northern Ireland
- Only ABP waste that is fit for human consumption can be composted - category 3 material
- Separate EU and UK regulations
- All facilities processing ABP waste must be **licensed by APHA** or equivalent in Northern Ireland



# Animal By-Products – EU & UK Regulations

- **EU regulation 1774 / 2002**
  - ‘Standard Transformation Parameters’ = enclosed, min 70 °C, min 1 hour, max 12 mm particles.
  - ‘Alternative Transformation Parameters’ = enclosed, with min temp, min time & max particle size decided by operator and proved effective by extra assessment
- **UK national regulations for food / catering waste**
  - If 2 treatment stages, first must be enclosed.

System	Closed Reactor	Closed Reactor	Housed Windrow
Maximum particle size	400 mm	60 mm	400 mm
Minimum temperature	60 °C	70 °C	60 °C
Minimum time	2 days	1 hour	8 days (at least 3 turns at 2 day intervals)

# UK Regulations – Environmental Permitting

- Launched in England and Wales in April 2008
- Standard permits
  - Standard conditions
  - Cheaper and easier to apply for
- Bespoke permits
  - For complex processes, novel technologies or large scale sites
- Different technical competence requirements

# Industry Standards and Guidelines

- **Compost Production**
  - BSI PAS 100:2011 and Quality Protocol
- **Compost Use**
  - RB209/SAC Guidelines
  - Codes of Good Agricultural Practice (Soil)
  - Prevention of Environmental Pollution from Agricultural Activity (PEPFAA)code

# Key drivers for PAS100

- Local authority service procurement:
  - Specify compliance with BSI PAS 100 in composting contracts
  - Improved composters' success in winning contracts
- Easier to market products → Higher sales revenues
- Reduced regulatory burden and associated cost (compost has 'product status')
- Reduced liability when supplying compost to end users



# End product markets and specifications

- PAS100 contains minimum end product quality requirements but can incorporate commitment to additional end market requirements in Quality Policy
- Range of different end markets
  - Agriculture, landscaping, restoration, turf, growing media/horticulture
- Important to be clear about the end user's requirements
- Quality Specifications available for certain sectors
  - Landscaping
  - Growing media

# Importance of 'fit-for-purpose' composts

- Protect long term soil health
- Play a long term role in food production
- Vital for sustainable markets for recycled organics



# Quality feedstocks

- Quality of compost vital – fit for purpose
- Feedstock into site along with operations directly affect quality
- Important to agree the acceptance and rejection criteria
  - What materials accepted and not accepted
  - Contamination levels
  - Actions take if levels exceeded or feedstock is out with agreement



Green waste  
feedstock with  
contamination

MEMBERS  
TECHNOLOGIES  
SECURITY  
TRANSPORT  
ASSOCIATION  
CHANGES  
BUSINESS  
RESOURCES  
SUPPLY  
SECTOR  
COST  
FUNDING  
ELECTRICITY  
EMPLOY  
ORGANIZATION  
PROJECT  
RECYCLE  
DEALOR  
INFO



Food waste?

MEMBERS  
TECHNOLOGIES  
**SECURITY**  
TRANSPORT  
ASSOCIATION  
CHANGES  
BUSINESS  
RESOURCES  
SUPPLY  
SECTOR  
COST  
FUNDING  
ELECTRICITY  
EMPLOY  
ORGA  
PROJE  
RECYC  
INFO  
DEALOR  
NO  
STYL





Contaminated  
oversize

MEMBERS  
TECHNOLOGIES  
SECURITY  
TRANSPORT  
ASSOCIATION  
CHANGES  
BUSINESS  
RESOURCES  
SUPPLY  
SECTOR  
COST  
DEALOR  
FUNDING  
ELECTRICITY  
EMPLOY  
ORG,  
PROJE  
RECYC  
CONFIDENCE  
INFO

# Health and safety in the waste industry

## Safety:

The fatality rate is **15 times greater** than the rate across all industries and 3 times higher than the rate in construction.

Main issues for the sector are transport and falls from height.

## Fatalities:

14 fatal injuries in 2016/17

Average of 7 for the previous 5 years

# Key issues

- Many safety issues relate to maintenance activities such as repairing of plant or entry into confined spaces.
  - Companies need to plan for such events rather than trying to sort them out when it needs doing.

## Some of the potential Issues

- 1 Risk assessments are superficial – goal setting rather than producing clear method statements
- 2 ‘Struck-by’ associated with vehicle movements
- 3 Pedestrian interface with on-site traffic
- 4 Large shredders/screeners take no prisoners! They are dangerous and need treating with respect!

# Health

- Around 4.8% of 'waste industry' workers suffer from a work-related illness each year which is statistically higher than the rate for workers across all other industries

Ill health types include musculoskeletal disorders & Occupational Lung Disease. One area for concern is exposure ref organics is **bioaerosols**.

# Bioaerosols

- This is a general term for micro-organisms suspended in the air. They include **fungi** and **bacteria** as well as mycotoxins, endotoxins and glucans. Due to their size they can penetrate the respiratory system resulting in inflammatory and allergic responses.
- They will be associated with composting and obviously more will be released during turning and shredding operations. **There could also be issues with cleaning including pressure washing.**
- EA and ORG have produced a standardised protocol for monitoring
- There is **no set workplace exposure** limit set for Bioaerosols. The EA have set a limit for what they regard as “Appropriate Levels”
- HSE/ HSL have produced some guidance – see HSE web site & research RR786.

# Prudent approach

- Respiratory protection should be worn for all the dust-generating tasks, unless working inside an **enclosed cab** with its own air filtration equipment.
- The respirator should be able to filter 95% of particles at 0.3 microns in diameter or greater – thus removing most mould spores and other fine dusts. (FFP3)
- Some guidance on what HSE think should be done can be found in sector targeted inspections document
- There is also guidance in HSE COSHH essentials for agriculture – Composting AG7

# THANK YOU

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