Turning the Tables on Large-Scale Composting

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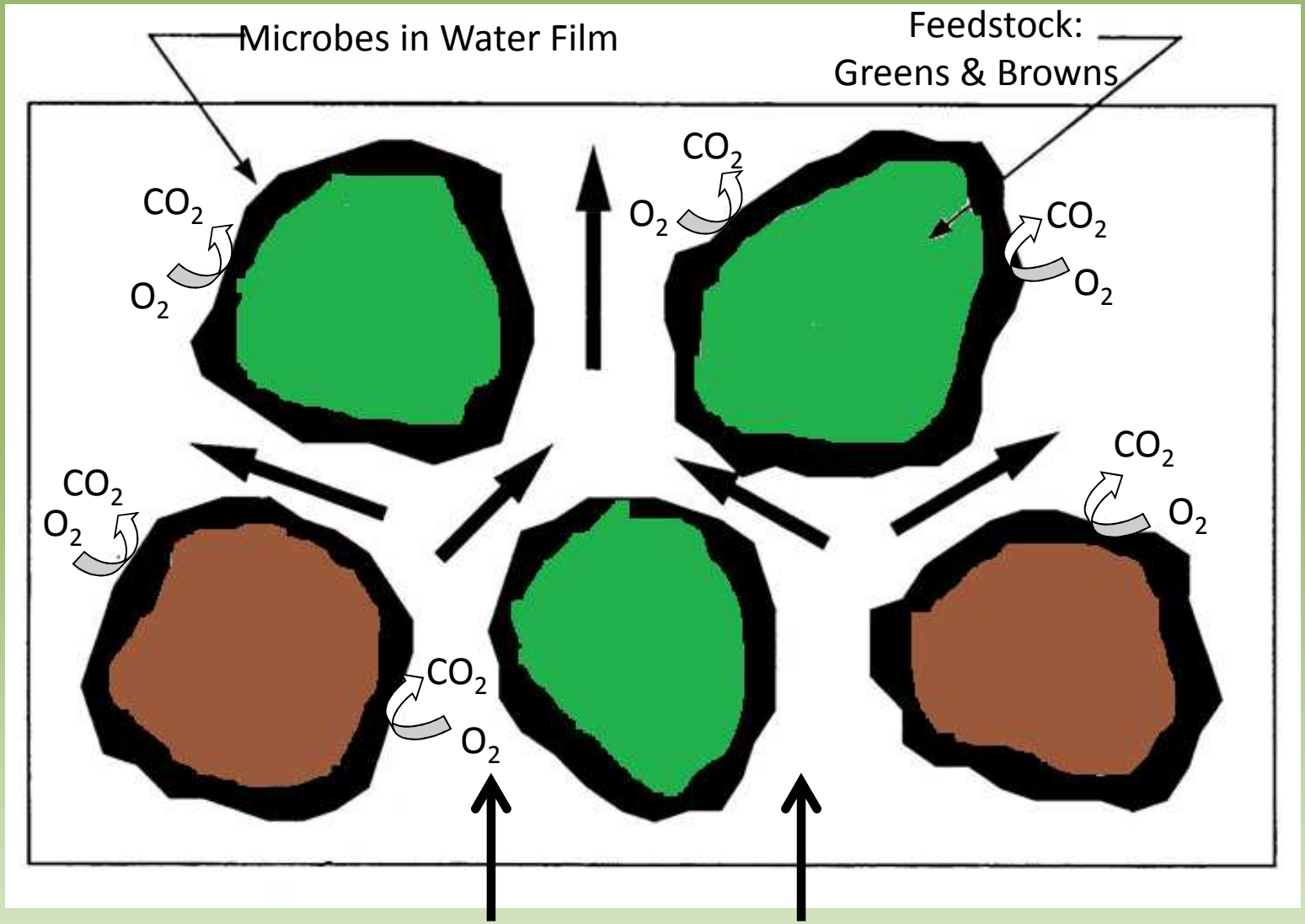
The Incentives

- Reduce landfill loading (+$)
- Reduce landfill leachate (+$) and gas production (nuisance, -$)
- Produces a marketable product (+$)
- The environmentally responsible thing to do.

The Disincentives

- Separate container (-$)
- Additional collection (-$)
- Additional processing (-$)
- Difficult to locate facilities
- Odour control issues
- Additional enforcement challenges.

Composting in a Nutshell



For Starters…….

- Backyard compost programs
- Leaf & yard waste operations

Introducing Food Waste……

- Wetter
- Denser
- Readily deteriorates
- Have a much higher appetite for oxygen

Significant (Unexpected) Challenges

Original SSO Model

SSO

Tip Fee +$$$$

Compost Plant
-$$$$$

Product

Revenue +$$

3-6 months

Tip Fee + Revenue ≈ Operating Costs + Amortized Capital + Profit

$$$$ $$ $$$ $$ $

Emerging SSO Model

SSO

Tip Fee +$$$$$

Compost Plant
-$$$$$$

Odour

Leachate

Immature Compost
-$

Secondary Curing Area
-$

Blended Product ($)
or landfill cover ($0)

1-2 years

Tip Fee + Revenue < Operating Costs + Amortized Capital + Secondary Curing + Profit

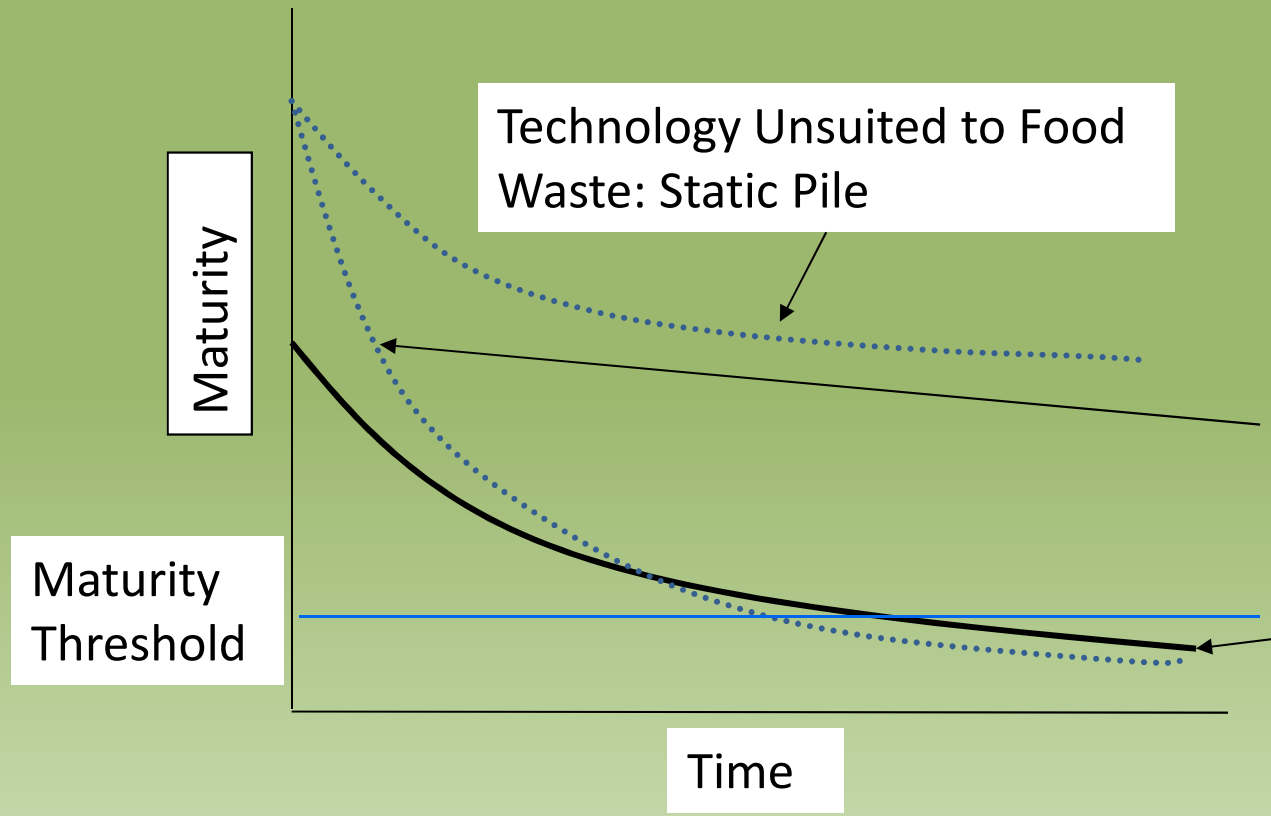
$$$$$ $ or $0 $$$$ $$ $$ 0

Something's gotta give!

What Is Happening?

- Technology providers oversold their product & technologies are under-performing (leachate, odour, **significantly** reduced rate of decomposition)
- Municipalities not provided with good counsel on organic waste management (lack of experience, understanding)
- Municipalities unwilling to spend the capital that's needed for effective operations, under-estimate increasing operating costs
- Under-estimation of the power of browns
- Under-estimation of the need for agitation
- Changing maturity standards, misleading tests.

Impact of Feedstock on Compost Technology Performance



Original Maturity Standards

One of the following set of criteria must be met to qualify as mature compost:

Set 1*	- C:N Ratio ≤ 25:1 - An oxygen uptake rate of <150 mg O_2 /kg organic matter-hr - Cress and radish germination shall be >90% of the control sample and plant growth shall be ≥ 50% of the control sample
Set 2	- Compost must be cured for ≥ 21 days - Compost will not reheat to >20^{o}C above ambient temperature
Set 3	- Compost must be cured for ≥ 21 days - Organic matter reduction > 60% by weight
Set 4	- Compost cured (post-thermophilic stage) for six months in aerobic environment

* Two of three required

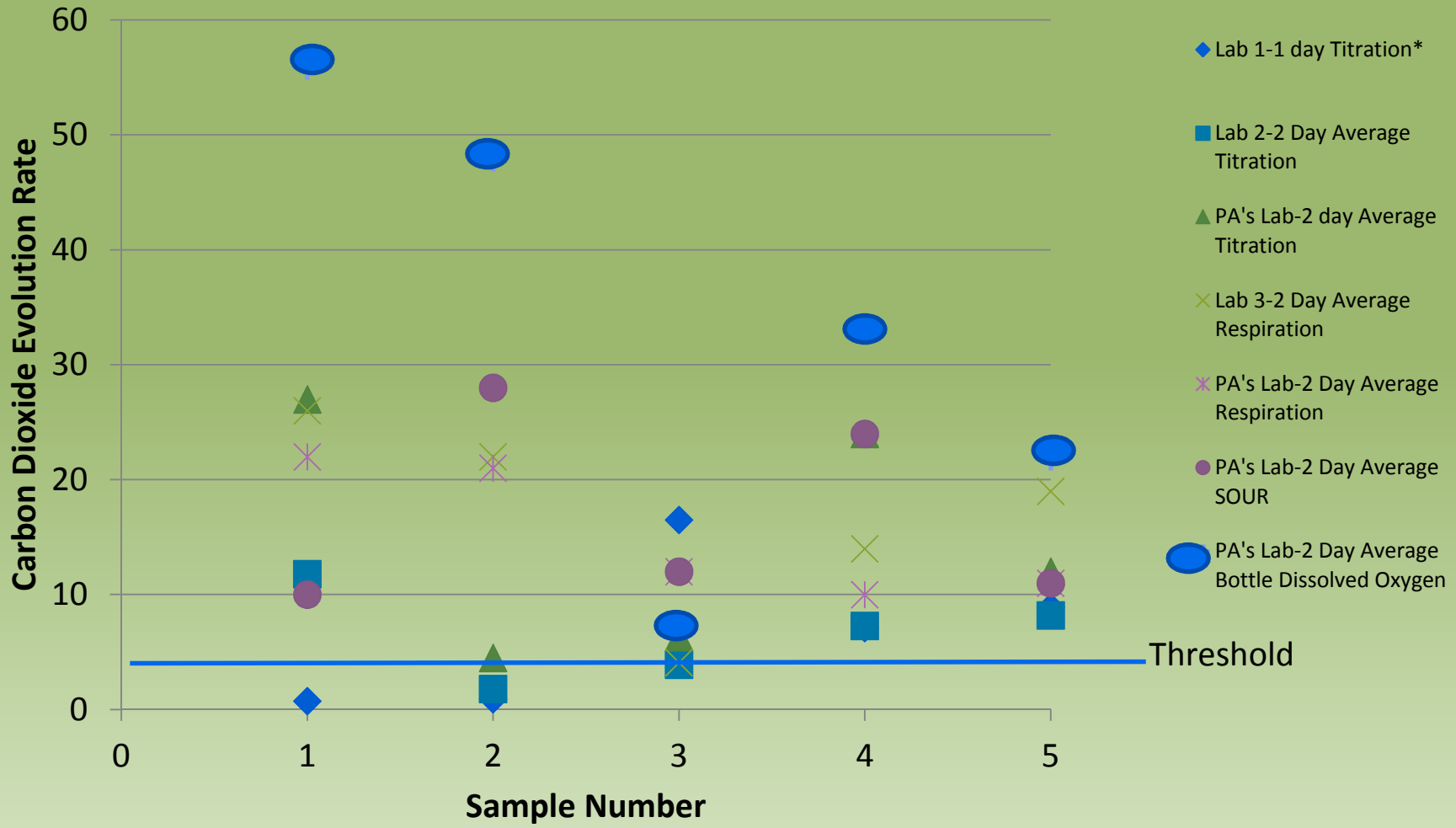
New Maturity Standards

- Dewar (re-heat) test (<8°C)
- Respiration test:

  ≤400 mg O_2/kg OM/h, or

  ≤4 mg CO_2-C/g OM/d

Misleading (Over-estimating) Maturity Tests



The Fallout

- Product receiving next-to-no revenue, often used only as landfill cover
- Plants being (temporarily) closed down
- Plants requiring **substantial** additional investment beyond original expectations including secondary compost sites
- Now looking to alternative technologies (biochar, gasification, pyrolysis, AD) that are more expensive and even **less** likely to be financially viable than composting
- Municipal compost management costs rising
- Environmental risk spread over more sites
- Revised NS guidelines (2010) are changing to accommodate under-performing technologies.

Revised Guidelines (NS)

SSO → Compost Plant → Immature Compost

- Cured for at least 21 days and must not reheat above 20oC; or
- Cured for least 21 days and organic matter is reduced by at least 60% by weight; or
- Able to germinate 90% of cress seed vs control and has a plant growth rate of compost/soil at least 50% of control

Secondary Curing Area

- Dewar (re-heat) test (<8^{o}C); or
- Respiration test:
  - ≤400 mg O_2/kg OM/h, or
  - ≤4 mg CO_2-C/g OM/d

Product

Impact of Revised NS Guidelines

- Too accommodating for operators
- Dilutes the issue
- Addresses the symptom and not the problem
- Reduces the chances of the intended goal of retail-grade (bagged) product
- Does not promote improved industry performance
- Will (probably) not reduce net cost to municipalities
- Stretches regulatory staff resources further; twice the sites to regulate, twice the reports to review.

Recommendations

1. Municipalities
    1. Stop investing in under-performing technologies
    2. Search out knowledgeable consultants (bigger not necessarily better)
    3. Stand by for BNQ/CCME compost maturity updates
    4. Optimize what you have before investing in further expansion
    5. Invest in operations that truly accelerate the process, reduce process time
    6. Give composting the respect of wastewater treatment

2. Operators
    1. Increase aeration *and* agitation at the front end of your process
    2. Eliminate free-standing water (leachate) from the process
    3. Bulk up!

3. Government
    1. Maintain (high) quality standards, discourage use of secondary sites
    2. Develop policy that addresses the true issue and not the symptom
    3. Invest in knowledgeable staff.

Impact

- Faster rate of decomposition
- Less offensive odour, leachate production
- Smaller overall footprint
- (Probably) less overall net costs
- Process is more contained, easier to regulate
- Better product control
- Higher valued product.

Take-Away Message

- How long?
- How good?
- How much?