BH Estates

‘Phosphates, nitrogen and methane:
The case for on farm separation of slurry (industry and government perspective)’

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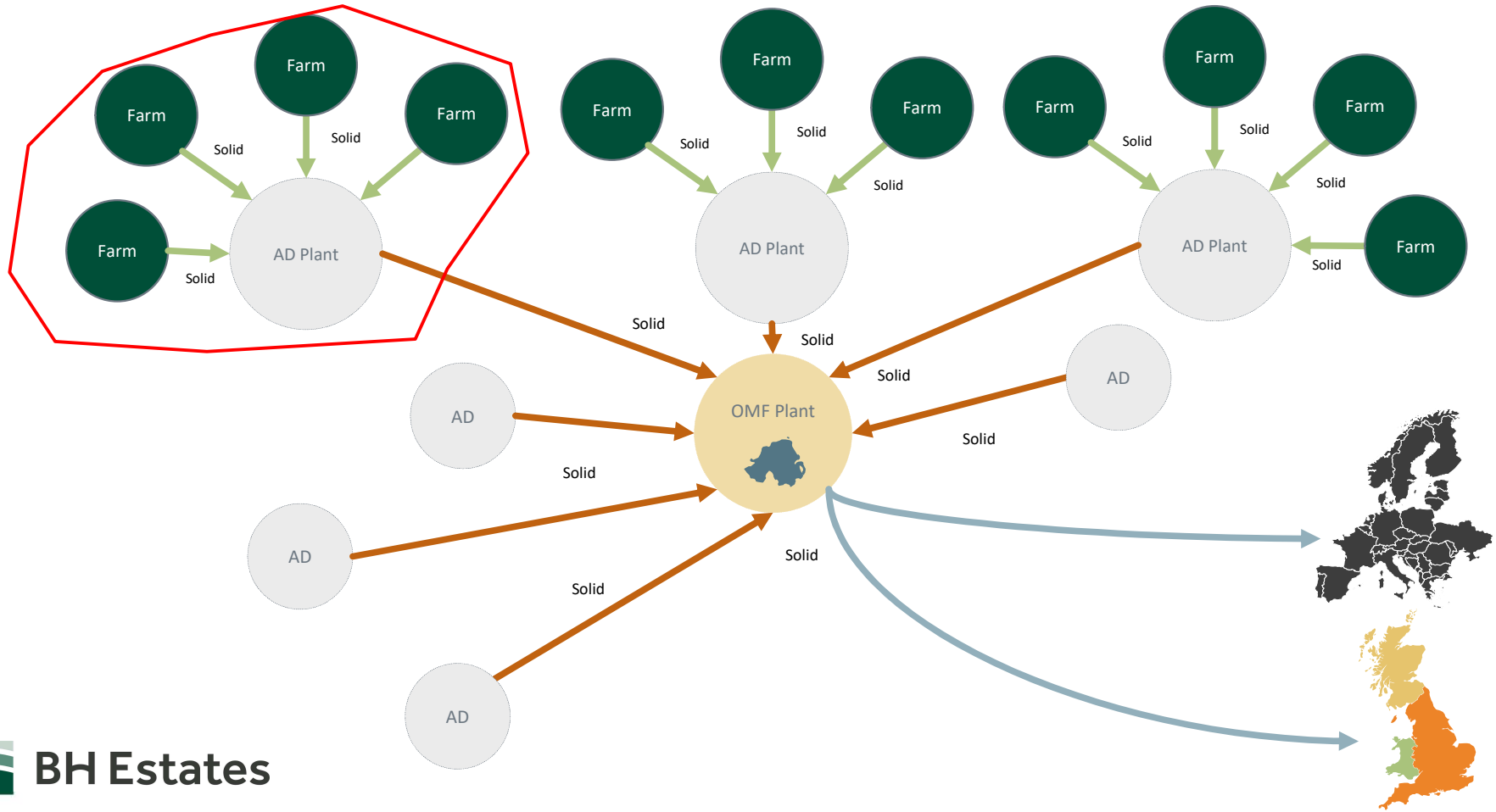
www.bhestates.com

Overall Schematic – shows the system a successful project will deliver



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sbri|ni the small business research initiative

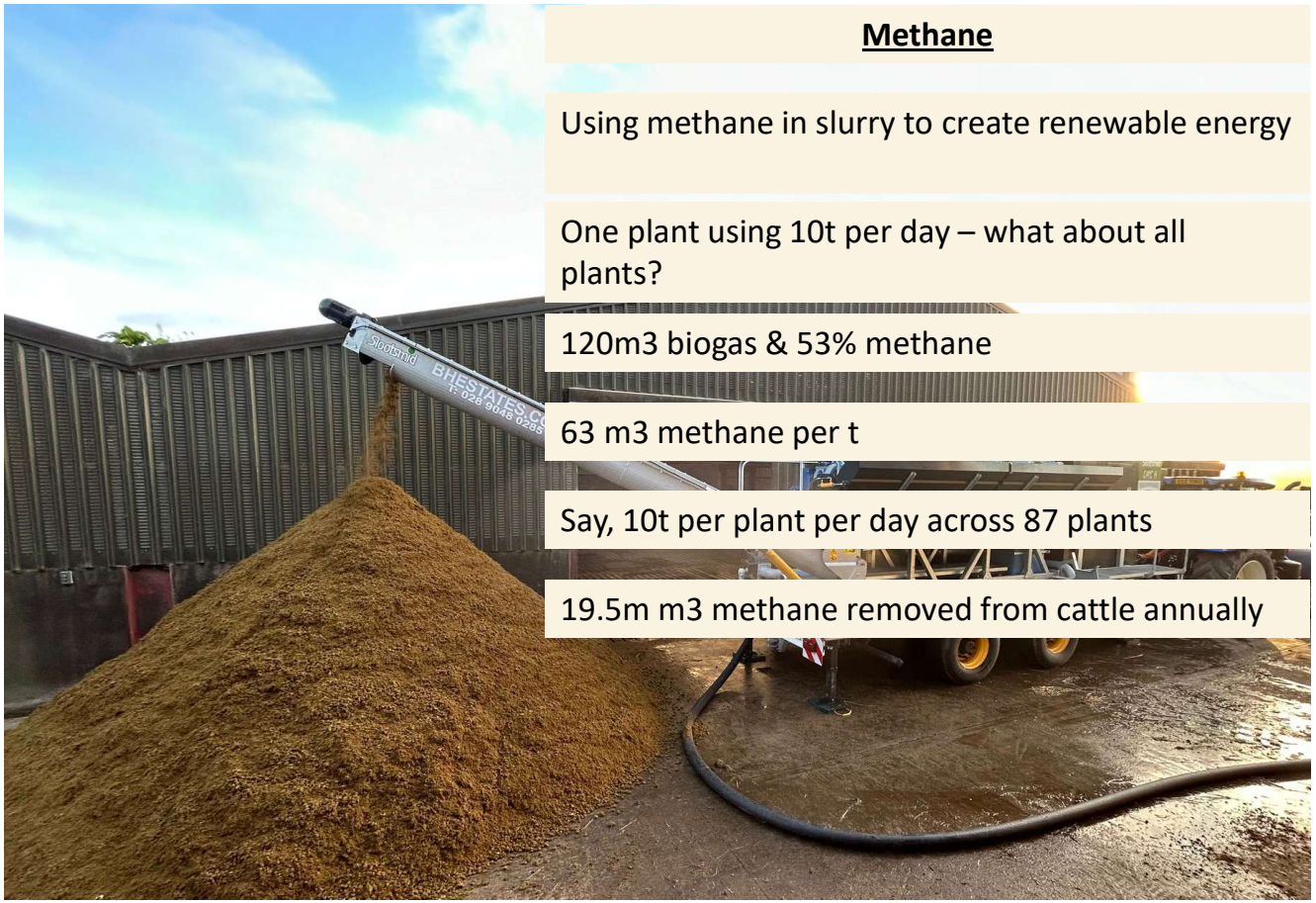
Department of Agriculture, Environment and Rural Affairs | An Roinn Talmhaíochta, Comhshaoil agus Gnóthaí Tuaithe | Department o' Fairmin, Environment an' Kintra Matthers

On farm separation – Recent Results & Widespread Uptake

7 weeks of operation

- 1,300 tonnes imported
- Aim to achieve gas yield of 120m3 / t
- Saved c.1,000 T silage
- 3 AD plants
- Averaging 10 t per plant per day over 90 days
- 10t per day across NI AD plants that already exist:

1/3 of slurry processed in NI



Methane

Using methane in slurry to create renewable energy

One plant using 10t per day – what about all plants?

120m3 biogas & 53% methane

63 m3 methane per t

Say, 10t per plant per day across 87 plants

19.5m m3 methane removed from cattle annually

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Is the liquid fraction easier to use?

"Less hassle to spread"

"Less slurry stripes after spreading"

"It's *(separation)* coming down the line"

"Noticed more space"

"Easier to mix"

"No real problems"

"Sustainable tick box"

"We may not need another slurry store"

"Less blockages"

"Easier to spread what was left"

"Fertiliser costs saved"

"Fantastic" (spreading)

"Dispersed well"

"Mixed well and went out well"

"More space"

"Not raking fibre back into the silage clamp"

"Could use remaining liquid in trailing shoe without blockages and so I could use it!"

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Looking through a P lens

Phosphate – have a responsibility for food production to look after phosphate carefully

2023 Imports

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Looking through a P lens

** BHE Nutrient Database Analysis

Farm

Raw Slurry**

P (kg/t)	0.71

Screw press (mobile or static)

Produces

Solid (SP) Slurry Separate**

P (kg/t)	1.00
Amm N (kg/t)	1.20

Transport to biogas plant

Northern Ireland (waste or agri-by-product) origins

AD Plant

Produces

Digestate**

P (kg/t)	0.76

Remains on farm

Liquid (SP) Slurry Separate**

P (kg/t)	0.52

Produces

- **90% of phosphorous removed from the farm would be captured in the bioeconomy**
- **Barriers for AD plants to focus on collection of hard to handle organic materials in the economy**

Transport back to ag

Liquid (DCF) Digestate Separate**

P (kg/t)	0.46
Amm N (kg/t)	5.43

Change NAP regulations to regulate in same manner as bovine slurry provided certain low P parameters are demonstrably met

Produces

AD Plant located digestate Processing (efficient)

Produces

Solid (DCF) Digestate Separate**

P (kg/t)	8.63

Keep current NAP regulations

Transport to bioeconomy use (inc export)

Assuming agriculture provides 500t of separated solids for AD feedstock and that legislation (NAP) allows the same level of ammoniacal nitrogen to be returned to agriculture, in this scenario:

- 600 kg of ammoniacal nitrogen would leave the farm.
- 500 kg of phosphorous would leave the farm
- 600 kg of ammoniacal nitrogen would return to the farm
- 51 kg of phosphorous would return to the farm in a very low phosphate liquid

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What about ammonia?

Looking through an N lens

SOME Critical principles of integrated sustainable nitrogen management

5. Strategies aimed at jointly decreasing losses of N, P and other nutrients are a win-win.

7. Measures must be cost-effective, and relevant stakeholders have sufficient resources to implement them.

9. Possible trade-offs will require priorities to be set.

https://measures.inms.international/

What about nitrogen?

* NAP Values
** BHE Nutrient Database Analysis

Farm

Raw Slurry*	
Dry Matter (%)	7.38
Total N (kg/t)	3.76
Amm N (kg/t)	1.87

Screw press (mobile or static)

Produces

Solid (SP) Slurry Separate**	
Dry Matter (%)	25.00
Total N (kg/t)	4.8
Amm N (kg/t)	1.2

Transport to biogas plant

AD Plant

Produces

Digestate**	
Dry Matter (%)	6.27
Total N (kg/t)	4.49
Amm N (kg/t)	2.76

Produces

Liquid (SP) Slurry Separate**	
Dry Matter (%)	5.17
Total N (kg/t)	4.09
Amm N (kg/t)	2.35

Remains on farm

Transport back to farm

Liquid (DCF) Digestate Separate**	
Dry Matter (%)	3.10
Total N (kg/t)	6.67
Amm N (kg/t)	5.43

1. Dilution of Slurry and digestate:

(*Options for Ammonia Mitigation – Guidance from UNECE Task Force - 2014*

'Emission reduction is proportional to the extent of dilution. A 50% reduction in dry matter will give a 30% reduction in ammonia emissions'

Solid (DCF) Digestate Separate**	
Dry Matter (%)	26.16
Total N (kg/t)	6.82
Amm N (kg/t)	2.79

Transport to bioeconomy use (inc export)

<u>For Government / Processers</u>

- 30% reduction in DM for slurry.
- 45% reduction in DM for digestate.

<u>For Farmers</u>

- Less nitrogen loss – less financial loss

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2. Enabling LESSE

- LESSE would achieve by itself a 5 to 10% reduction in total ammonia emissions across NI agriculture. (DAERA – Draft Ammonia Strategy)
- 7.38% DM slurry is difficult with LESSE equipment *(UNECE)*
- **Could use remaining liquid in trailing shoe without blockages and so I could use it!"**

Produces

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Transport back to farm

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Produces

Remains on farm

"

<u>For Government / Processers</u>

- Enabling band spreading - 30% reduction
- Enabling trailing shoe – 60% reduction.

<u>For Farmers</u>

- Less nitrogen loss – less financial loss

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What about nitrogen?

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AD Plant located digestate Processing (efficient)

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Transport to bioeconomy use (inc export)

Further processing with abatements

Abatement technology will achieve significant ammonia emissions capture

Must be economic with abatement but in making OMF fertiliser economics act in favour of capturing reactive nitrogen

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Thank you

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