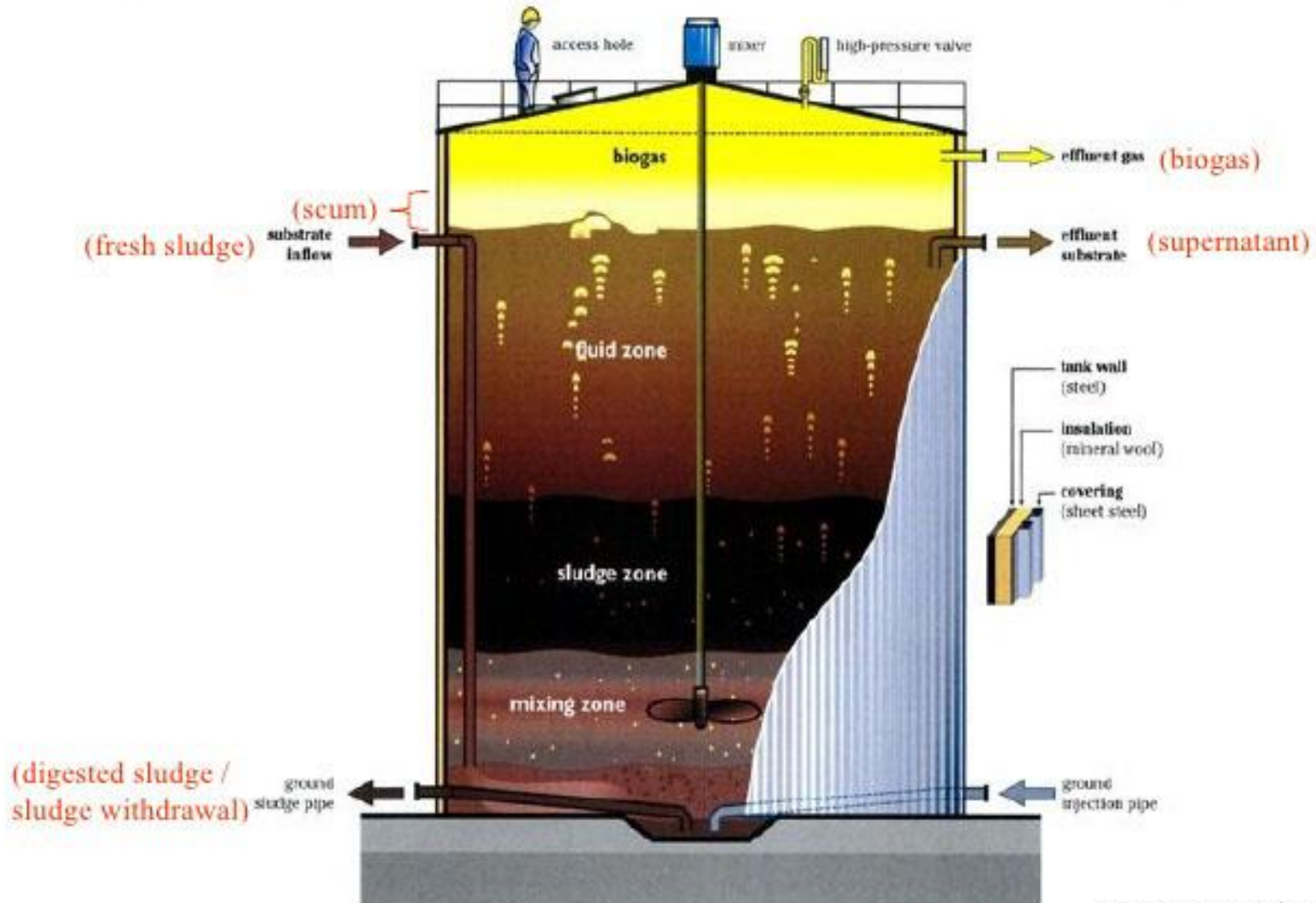


End Markets for Anaerobic Digestate



David Hill
Recycle Florida Today
October 20, 2020

Anaerobic Digester : Diagram



What is Digestate?

- ❑ Digestate is what remains after anaerobic digestion (biogas digestion).
- ❑ Comprised of the **solid fibrous material fraction** emanating from the AD bio-reactor, **and the liquid portion.**
- ❑ AD draws carbon, hydrogen, and oxygen from the feedstock. However, the **essential plant nutrients (N, P, and K) remain largely in the digestate.**

Methanogenic Digestate

Digestate liquid/slurry being poured from a bucket.

www.anaerobic-digestion.com

Is all anaerobic digestate the same?

- ❑ Although the name is used generically, several types of digestate are common, and are defined by the feedstock or input sources:
 - ❑ Municipal wastewater solids
 - ❑ Livestock manures
 - ❑ Food wastes
 - ❑ Green wastes
 - ❑ High strength industrial wastewater and residuals
 - ❑ Fats, oils and greases (FOGS)

Regulations For Digestate Distribution

- ❑ Federal – EPA
 - ❑ CFR 40, Part 503 (biosolids)
- ❑ State – FDACS or FDEP
 - ❑ Processing:
 - ❑ 62-709.550 through .600, F.A.C.
 - ❑ Chapter 62.640 F.A.C. (if ANY biosolids)
 - ❑ FDACS Fertilizer and Feed Program under Chapter 576, F.A.C (reporting sales)

What Type Digestion Process? Start with the Answer!

Process dictates end use markets for wet and dry digestate

- ❑ Wet Digestion (~5% total solids)
 - ❑ soluble nutrients (e.g., ammonia nitrogen and potassium) from feedstocks go into solution – liquid can be used for quick release fertilizer
- ❑ Dry Digestion (35-40% total solids, stackable)
 - ❑ nutrients are concentrated in the solids – solids can be used as slow release, low nutrient fertilizer

Without an upfront and understood outlet, unforeseen costs may be incurred by the facility.

Anaerobic Digestion Market

- ❑ **Global Size, Trends, Competitive & Forecast Analysis, 2019-2025**
- ❑ Vegetative and Yard trimmings co-digestion widely used in Europe. Less so in US but growing
- ❑ Key factors fueling growth of the Anaerobic Digestion Market
 - ❑ Increasing demand for renewable energy resources, rising energy costs
 - ❑ Stringent government regulations to reduce greenhouse gas emissions are the

AD Market valued at USD 7.54 Billion in 2018 and expected to reach USD 15.28 Billion by 2025 with the CAGR of 10.62% over the forecast period.

Horticultural Uses

- Home garden products
- Landscaping
- Commercial fruit and vegetable production
- Compost teas
- Mushroom growing media
- Fertilizer for commercial nurseries and herbaceous shrubs
- Forestry
- Use on publicly owned flower beds and green spaces
- Fertilizer for organic crops and farms



Use as potting media component to replace peat, coir and bark

Industrial Uses

- ❑ **Nutrient extraction via Struvite Recovery**
(magnesium-ammonium-phosphate)
- ❑ **Algal growth for nutrient removal, ethanol production**
- ❑ **Construction material**
- ❑ **Cellulosic Ethanol Production**
- ❑ **Biodiesel production**
- ❑ **solid fuel**
- ❑ **Biopesticides production**
- ❑ **Animal bedding**
- ❑ **Annual Daily Cover**



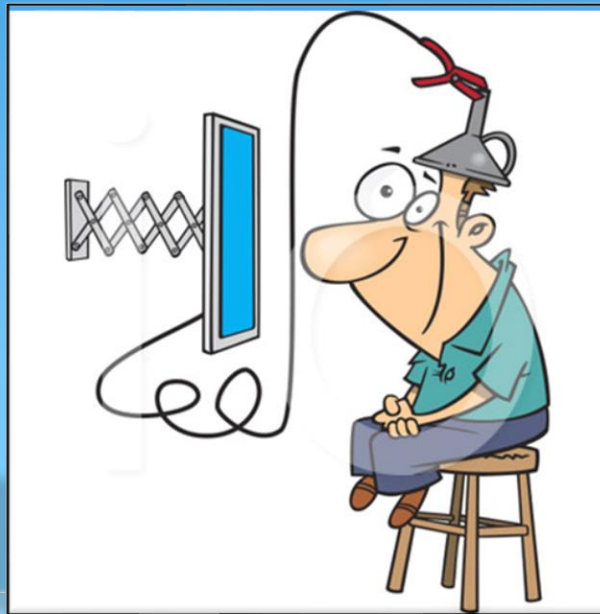
Is There Market Opportunity?

- ❑ Wholesale prices range between \$6 and \$16 per cubic yard, F.O.B. the processing site.*
- ❑ Retail pricing is generally twice that amount.
- ❑ Bagged price equates to \$400 per cubic yard.



Thank You

And now you know the rest of the story.



David Hill

hilldm@gmail.com

(240) 393-0492