

Industry Assessment: Manure Processing & Nutrient Recycling Technologies

European Nutrient Event

October 19, 2017

Steve Rowe, CEO

Newtrient LLC

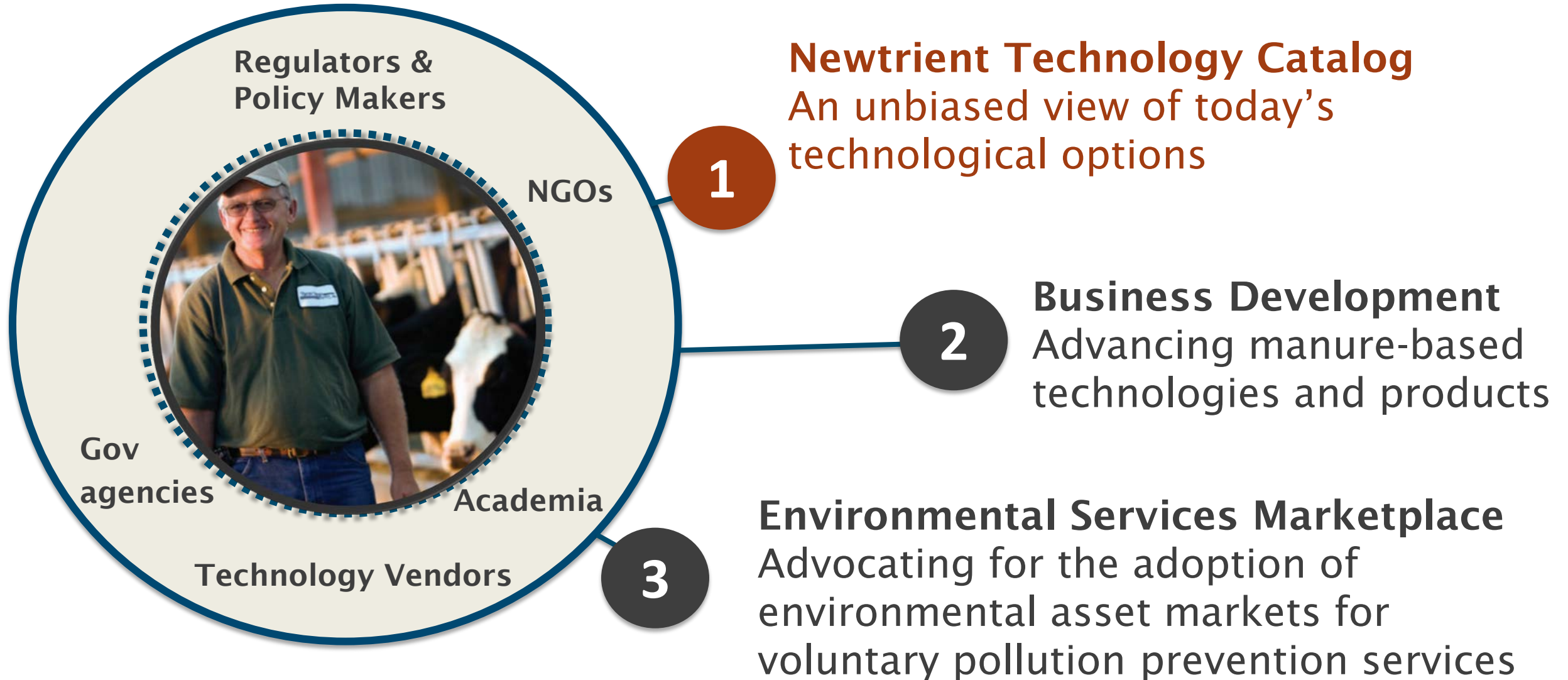
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Representing a vast amount of the milk produced in the United States...



Mission: Reducing the environmental footprint of dairy farming and making it economically viable to do so.



Increasing regulatory, judicial and societal pressures



Manure Is Spilling and Seeping into Wisconsin's Waterways and Wells

As the state's dairy farms get bigger, cow poop is polluting Lake Michigan and people's drinking water.



WISCONSIN
PUBLIC RADIO
Wisconsin and the World. **npr**

Dairy Farmers Band Together To Pay For Clean Water



USA TODAY

**Massive dairy farms and locals debate:
Can manure from so many cattle be safely spread on the land?**

Our Mission

CURRENT STATE

- Increasing regulatory, judicial and societal pressures
- Surface and ground water issues related to nitrogen and phosphorus
- Erosion in consumer trust



DESIRED STATE

- Farms help resolve societal issues related to water pollution and GHG emissions
- Farmers realize economic benefits from voluntary actions
- Farmers improve their social license to operate and increase



Manure-management technology challenges

Challenge #1: Abundance of technologies, shortage of technology knowledge and information available to farmers

Challenge #2: Vendors don't always have the resources needed to break into the agriculture space



Solution: An open-access technology catalog



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Evaluating all manure-based technologies in North America



COMMERCIAL VIABILITY

- **Operational History** (operating on 3+ farms)
- **Operational Reliability** (12+ months reliable performance)
- **Market Penetration** (installed on 10+ farms)

TRANSPARENCY & INTERACTION

- **Capital Costs Identified** (installed CAPEX is clear)
- **Operations and Maintenance Cost Identified** (actual OPEX)
- **Vendor Information Sharing** (Business & Technology Information)

ECONOMICS & INDUSTRY VALUE


- **Value Proposition** (delivers identifiable value to the farm)
- **Case Study** (completed case study)
- **Customer Reviews** (3 farms “recommend”)

Evaluating all manure-based technologies in North America

DVO, Inc. - Phosphorus Recovery
Renewables at Work

Company Description:

DVO is the U.S. market leader for AD and environmental engineering, providing reliable, proven solutions and services to industry and agriculture. Since 2001, DVO has installed over 100 of its patented Two Stage Linear Vortex™ digesters across the nation, producing 80 MW of electricity. DVO also has expanded internationally, with installations in Canada, Chile, China, Serbia and South Korea. In addition, DVO's Phosphorus and Nitrogen Recovery systems economically capture nutrients, allowing customers to safely and reliably remove nutrients from sensitive watersheds and transport them to land in need of these valuable natural fertilizers.



Technology Description:

DVO's Phosphorus Recovery (PR) step economically captures for re-use up to 95% of the phosphorus found in agricultural and industrial wastes – creating a nutrient-condensed, stackable solid product that can be sold and/or transported away from sensitive watersheds to land that really needs it. Significant amounts of nitrogen and micronutrients that are absent from long-depleted farmland are also recovered.

DVO's "PR", is a recent recipient of the U.S. EPA's Nutrient Challenge Award, allows DVO to optionally and cost-effectively perform more aggressive waste treatment, even to the point of water reuse. DVO solutions kill pathogens and minimize odors, recycle valuable nutrients, reduce greenhouse gas emissions and produce renewable energy 24/7 – while remaining highly robust, scalable, and providing a positive economic return.

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Newtrient Comments/Opinions:

Suspended solids/phosphorus recovery technologies:

- Produces a concentrated source of phosphorus from a renewable source
- Include belt presses, centrifuges, dissolved air flotation systems and others
- There is significant variation of chemical and energy use by site and by technology
- There is significant variation of operational intensity by site and by technology
- There is significant variation of cost by site and by technology

DVO has invested years of R&D into modifications of traditional dissolved air flotation concepts for

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<http://www.dvoinc.com/phosphorus-recovery.php>

Vendor

- Equipment Vendor
- Project Developer

Equipment

- Vortexer Digester (AD)
- AD Support System
- Solids Recovery
- Nutrient Recovery

Product

- Concentrated Nutrients
- Energy
- Fiber

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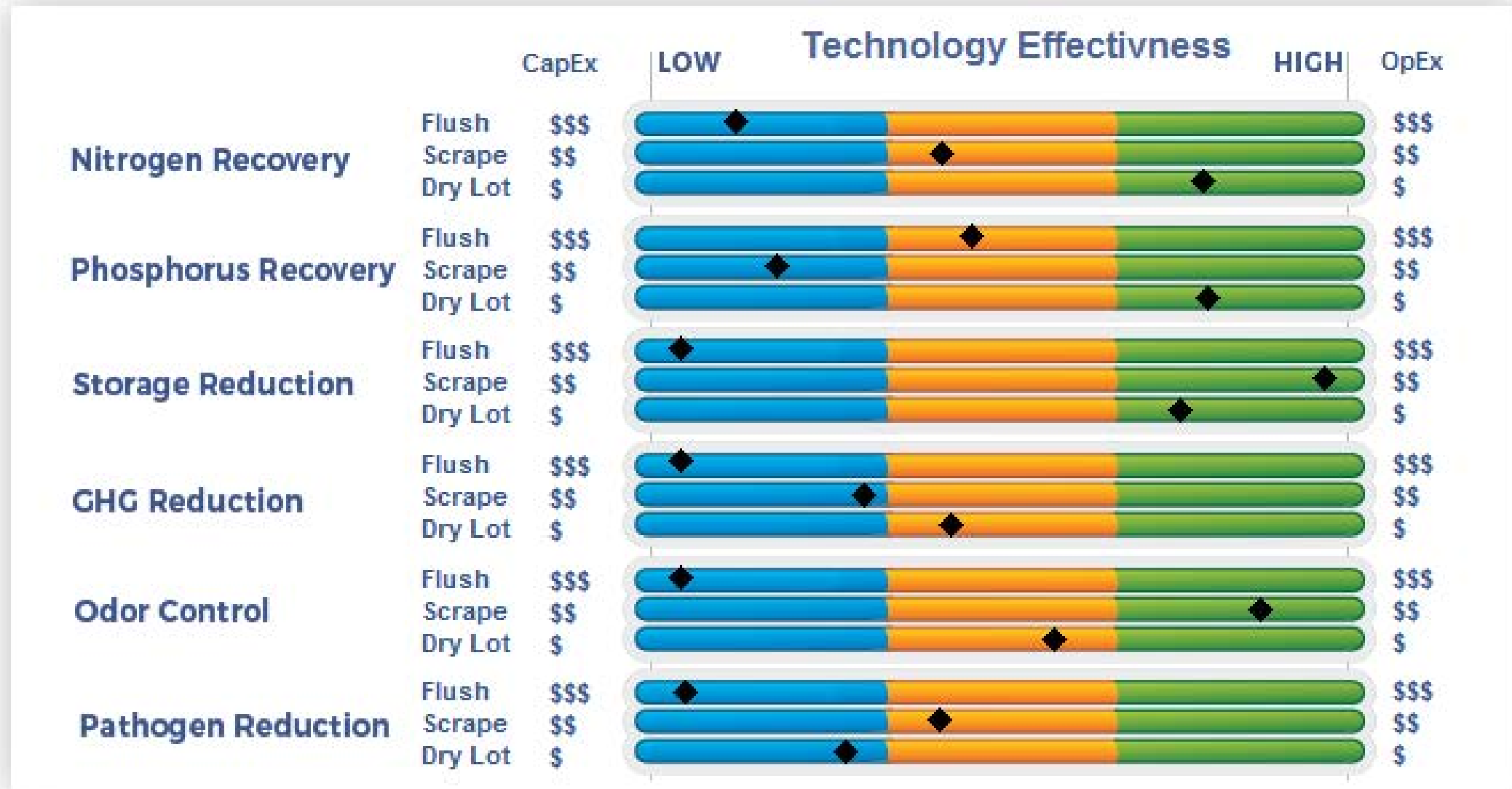
RESERVED FOR THE MOST PROMISING TECHNOLOGIES

RESERVED FOR TECHNOLOGIES HEADED IN THE RIGHT DIRECTION

TECHNOLOGY IS EVALUATED ON A 9-POINT CRITERIA BY NEWTRIENT'S TEAM OF EXPERTS

ECONOMICS & INDUSTRY VALUE
TRANSPARENCY & INTERACTION
COMMERCIAL VIABILITY

What's Next? Identifying Critical Environmental Indicators



Contact Us

- Check out the Technology Catalog at www.newtrient.com
- Contact us for more information on the Catalog and North American manure-management technologies
Email: info@newtrient.com

