2020 Regular Session

TAB

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#### The Florida Senate

#### **COMMITTEE MEETING EXPANDED AGENDA**

#### APPROPRIATIONS SUBCOMMITTEE ON AGRICULTURE, ENVIRONMENT AND GENERAL GOVERNMENT Senator Mayfield, Chair Senator Powell, Vice Chair

	MEETING DATE: Wednesday, November 13, 2019 TIME: 1:00—2:15 p.m. PLACE: Toni Jennings Committee Room, 110 Senate Building			
	MEMBERS:	Senator Mayfield, Chair; Senator Powell, Vice Chair; Senators Albritton, Bean, Berman, Broxson, Hooper, Hutson, Rodriguez, and Stewart		
3			BILL DESCRIPTION and SENATE COMMITTEE ACTIONS	COMMITTEE ACTION
	Presentation on Biosolids by Sedron Technologies			Presented

Presented

2 Presentation on Biosolids by Anuvia Plant Nutrients, LLC

Other Related Meeting Documents

# VARCOR<sup>™</sup> TECHNOLOGY OVERVIEW

Peter Janicki, CEO | November 2019





Peter Janicki CEO & Founder



- ✓ Founded 1993
- ✓ Aerospace Parts
- ✓ Advanced Composites
- ✓ Complex Tooling
- ✓ 5-Axis CNC Machining





**ORION CREW MODULE** 



Formerly JANICKI BIOENERGY

✓ Founded 2014✓ Water & Sanitation





JANICKI OMNI PROCESSOR





Janicki Industries was hired by the Gates Foundation in 2012 to begin working on transformative technology for sanitation in developing countries

# **DAKAR PILOT UNIT J-OP** S100

#### **2013**

Pilot was manufactured & assembled

#### 2014

Plant underwent testing in WA

#### 2015

Commissioned in Dakar, Senegal

#### 2016

Dakar team managing without onsite assistance.

#### 2018

Plant reached milestone of 1M kg of sludge processed and 1500 hours of operation.



## JANICKI OMNI PROCESSOR S250 Model



This unit will process waste from 250,000 people in West Africa while simultaneously making a profit.



# THE DAIRY PROBLEM:

Dairies generate large amounts of manure and must make costly investments in traditional handling methods to ensure responsible stewardship. Even with these costly investments, dairies are criticized as a leading contributor to surface and ground water contamination.



# STORAGE LAGOONS









## VARCOR<sup>™</sup> PROCESSOR Plant Layout



## VARCOR<sup>™</sup> Process Flow





#### VARCOR<sup>™</sup> EFFICIENCY Process evaporates water extremely efficiently & effectively

(simplified thermodynamic analysis)





## VARCOR<sup>™</sup> PROCESSOR Outputs for Dairy:



### CLEAN WATER

This pathogen-free water can be recycled for on-farm purposes such as animal drinking water, flush water, or irrigation.

> Since the water is recycled back to the cows, the farm becomes a zero discharge facility.



## VARCOR<sup>™</sup> PROCESSOR Outputs for Dairy:



#### 15-20% AQUEOUS AMMONIA

Concentrated, pathogen-free nitrogen-rich fertilizer for use on-site or as an exportable, transportable product.



## VARCOR<sup>™</sup> PROCESSOR Outputs for Dairy:



## Varcor on Texas Farm



# **Evaporator in final laser inspection**





# **Disk Assembly in Fabrication**





# **Preheater Assembly in Fabrication**





# **Ammonia Recovery Assembly in Fab**





# **Evaporator Spindles in Fabrication**





# **Condensate Assembly in Fabrication**





# Can VARCOR<sup>™</sup> be used to process biosolid at public WWTPs? **Yes, and it's easier, both technically and economically.**



Seattle, WA

One of Seattle's Wastewater Treatment Plants



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Take solids directly off of the clarifier and eliminate the dewatering equipment.



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# **BIOSOLIDS AT LOCAL WWTP**

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# **BIOSOLIDS LAND APPLICATION**



- 1. Phosphorus and Nitrogen go together whether we like it or not
- 2. Cannot be stored so we have to apply it now.
- 3. Diluted with water so we have to use it locally



# **BIOSOLIDS LAND APPLICATION**



# Fertilizers that cause algae blooms

Nitrogen:

Nitrogen is normally a gas and makes up 78% of the air we breath in the form of N2. Plants require nitrogen in almost any form other than N2 such as ammonia which is NH3. Waste water treatment plants are very effective at converting almost all forms of nitrogen into N2 that is released into the atmosphere. This takes a lot of energy, is expensive and a waste of valuable nitrogen fertilizer. Phosphorus as P2O5:

Phosphorus is a mineral, never a gas. Plants want phosphorus as P2O5 which is prevalent in waste water. Waste water treatment plants do a reasonable job of concentrating the phosphorus in the solids along with lots of carbon and residual water. The only way to keep phosphorus from re-entering the environment is to put it in truck and haul it away.





Solids in dewatered biosolids



Combustion reduces Volume 9X



- Pure Water in solids after Varcor
- Solids after Varcor
- 1.7% Phosphorus in solids after Varcor
- 5.5% Nitrogen Solids after Varcor





# WWTP SLUDGE APPLICATION



# WWTP WITH ANAEROBIC DIGESTION



#### **VARCOR<sup>™</sup>** Process Outputs for WWTPs:

#### **CLEAN, RECLAIMED WATER**

can be recycled for beneficial reuse purposes or sent back to headworks.



#### **VARCOR<sup>™</sup>** Process Outputs for WWTPs:

#### NITROGEN FERTILIZER

(Aqueous Ammonia) that is pathogen-free and concentrated for beneficial use as a fertilizer or as an exportable, easily transportable product.

Shir Station of Station



#### **VARCOR<sup>™</sup>** Process Outputs for WWTPs:

G

DRY CLASS A (EQ) BIOSOLID

for use as a nutrient-rich fertilizer, soil amendment, or other beneficial reuse purpose.



#### VARCOR<sup>™</sup> Technology captures and concentrates nitrogen. It does not destroy nitrogen as a fertilizer.



Nitrogen Fertilizer Plant Making Nitrogen Fertilizer from Fossil fuels

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Waste Water Treatment Plant Destroying Nitrogen Fertilizer at Large Capital & Energy Cost


## **MINING VALUABLE PHOSPHORUS** The Environmental Impact





The phosphorus content in the ash from the Janicki Omni Processor is greater than 14%.



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## VARCOR<sup>™</sup> PROCESSOR Inputs & Outputs





# FLORIDA PROJECT PROCESS FLOW





## **BIOMASS POWER PLANT** Emissions Regulations

	SOLID WASTE	FUEL (NHSM)
CLASSIFICATON OF SUBSTANCE		
	Discarded as waste	Managed as a valuable commodity
HEATING VALUE	No meaningful heating value <5000 BTU/lb	Meaningful heating value >5000 BTU/lb
CONTAMINANT LEVELS		
	SOLID WASTE COAL/BIOMASS	FUEL COAL/BIOMASS
	Contaminants greater than traditional fuels	Contaminants comparable to or less than traditional fuels



- ✓ Remove or destroy contaminants
- ✓ Significantly improve fuel characteristics
- ✓ Sizing or drying the material



## **FUEL DESIGNATION** VARCOR<sup>™</sup> Fuel Used in Biomass Power Plant

TRADITIONAL INCINERATOR	BIOMASS POWER PLANT
Functions as an incinerator	Functions as a boiler
Primary purpose is disposal of waste	Primary purpose is recovery of useful energy
Combustion of solid waste	Combustion of valuable fuel
Input (solid waste) is discarded as waste	Input (fuel) is managed as a valuable commodity
Input has heating value below 5,000 BTU/lb	Input has heating value above 5,000 BTU/lb
Input has higher contamination levels than traditional fuels	Input has comparable or lower contamination levels to traditional fuels
INCINERATOR	BOILER S

**40** 

### **Combustion destroys:**

- 1. Pathogens
- 2. PCBs
- 3. Pharmaceuticals
- 4. Odor
- 5. Cosmetics
- 6. Herbicides
- 7. Fire Retardants
- 8. VOCs
- 9. Dioxins

10.Detergents





## **FLORIDA PILOT PROJECT CAPACITY** 2 Varcor<sup>™</sup> Processors & 1 Power Plant

### **1** VARCOR<sup>™</sup> PROCESSING CAPACITY

FOR BOTH VARCOR<sup>™</sup> PROCESSORS TOGETHER

- ✓ 8% solids (1-15% allowable)
- ✓ Sludge in 150 GPM (75 GPM for each VARCOR<sup>™</sup> unit)
- ✓ 73 dry tons/day
- ✓ 362 equivalent wet tons/day of biosolids at 20% solids cake
- ✓ 581 tons of Phosphorus captured and concentrated for shipment out of state
- ✓ 409 tons of Nitrogen captured and concentrated assuming 1500 PPM ammonia in sludge
- ✓ Electric cost to operate <0.8 cent/gallon

### 2 **BIOMASS POWER PLANT PROCESSING CAPACITY**

- ✓ 90 Dry tons per day
- ✓ 2 MW Electrical Output
- ✓ 1 MW net power to WWTP after powering two Varcor<sup>™</sup> Processors
- ✓ Value of net power \$788,400 @ \$.09/kW-hr
- $\checkmark$  Concentrates Phosphorus for shipping out of state



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20-Year Cost Summary Comparison

\$50 Cost per wet ton of biosolids for 2-Varcor processors and 2 MW power plant Capex and Opex over 20 years

\$60 Cost per wet ton of biosolids to land apply.



## VARCOR<sup>™</sup> Flexible Implementation Options

1

**ZERO CAPITAL COST** A WWTP can contract out treatment to Sedron.

Sedron will then install and operate a Varcor<sup>™</sup> system to process the material at a contracted rate. Sedron would also handle the offtake of biosolids and aqueous ammonia fertilizer for beneficial re-use. This allows a WWTP to utilize the most advanced and reliable biosolids and nitrogen handling systems without having to secure the funds required for a capital purchase.

If at anytime during the contract period the WWTP wants to purchase the Varcor<sup>™</sup> system, a buyout agreement is available. This would allow the Varcor<sup>™</sup> to be implemented quickly while capital funding is secured for the purchase.

#### **CASH PURCHASE**

A WWTP can purchase a Varcor<sup>™</sup> outright and keep operations in-house.

Sedron will work closely with the WWTP's preferred engineering consultant firm to support the installation and commissioning of the Varcor<sup>™</sup> system to ensure it integrates properly with the WWTP. It is a complete turnkey installation that can include different levels of service plans to ensure continued reliable usage throughout the life of the unit.



**APPEARANCE RECORD** 

THE FLORIDA SENATE

(Deliver BOTH copies of this form to the Senator or Senate Professional Staff conducting the meeting)

Meeting Date	Bill Number (if applicable)
Topic Sedron	Amendment Barcode (if applicable)
Name Peter Janicki	
Job Title CEO	
173 In State Street	Phone
Address <u>ISS</u> <u>W</u> State Z	84 Email Peter JANICKI. Com
City     State     Z       Speaking:     For     Against     Information	Waive Speaking: In Support Against (The Chair will read this information into the record.)
Representing	
Appearing at request of Chair: Yes No Lobby	ist registered with Legislature: Yes No
While it is a Senate tradition to encourage public testimony, time may not meeting. Those who do speak may be asked to limit their remarks so tha	

This form is part of the public record for this meeting.

S-001 (10/14/14)



### Anuvia's focus today: bio-based plant nutrients

#### Four benefits:

1

Bigger, better crops Improves Soil Health GhG reduction on the Acre Reduce nutrient loss & runoff into water supply

#### Plug and play technology.

2

Works within current large-scale farming practices, processes and machinery. NO barriers or requirements.

#### Fast Adoption/Fast Impact

3

Anuvia technology delivers up to a five-time return on investment for the farmer.
Immediate impact – use on 1 million acres is equivalent of removing GHG of 30,000 cars

Already used on over 1 million acres of cropland in the USA











Commercial Agriculture



Commercial Lawn Care



Consumer Lawn Care



> \$3.5 billion dollar value loss from Nitrogen leaching per year

- \$7 bn Nitrogen applied annually
- ~50% lost through leaching and evaporation



Soil quality continues to deteriorate with intensive farming



Agriculture contributes to ~10% of U.S. greenhouse gas emissions



### WHAT'S DRIVING SUSTAINABLE AGRICULTURE

Public and private forces are aligning to shift production agriculture toward more sustainable practices





### **Enabling the Circular Economy**

- Anuvia utilizes organic feedstocks recycling back to the land to feed the soils and improve soil health
- Recycles nutrients that would be bound in organics (eg Phosphate in Smithfield manure)
- Enabling Sustainable Solutions
  - Influence of Big Food on production Agriculture – Driving sustainable strategies
- Strategic partners
  - Smithfield Foods
  - A tangible example of Field to Table strategies
  - Recycling organic materials back into agriculture
  - Nutrient recycling

#### **Traditional Linear Approach**





## **Novel Technology**

- US and International patents issued
- Uses multiple sources of organic materials
  - Animal organics
    - Digested manures
  - Industrial organics
    - Whey
    - Soy protein
    - Nut hulls
    - Peanut hulls
  - Food Waste
  - Wastewater organics (Biosolids)

### **Organic Materials Neutral**



#### **Manufacturing Process Features**

- Provides high stress hydrolytic reaction conditions
- Liquefaction of all materials- Sterility is achieved
- Fuses inorganic nutrients with organic constituents



Anuvia Manufacturing Process

#### No waste stream from production of product Exceed EPA EQ standards

#### ANUVIA'S CURRENT PLANT ALREADY RUNS AT SCALE WITH HIGH CUSTOMER ACCEPTANCE

- Production plant operating since 2016
- Zellwood's established operating capacity at 72,625 tons of capacity
  - -Production enough to treat >1mm acres
- New large- scale production facility in partnership with **The Mosaic Company** to provide up to 1.2 million tons for Ag Markets

#### Zellwood, FL facility



Top 5 customers





### Anuvia – Mosaic Manufacturing Relationship

- A manufacturing relationship
  - Long term lease of the Mosaic Plant City manufacturing facility
  - Site to be retrofitted to manufacture Anuvia's bio-based products
  - Provides viable economics to manufacture a bio-based nutrient product with scale
- Site Provides
  - Site can produce up to 1.2 million tons of product
  - Scalability 3 lines that can be phased into production Balance Supply and Demand
  - Meaningful storage to stage product
  - Direct line rail to serve the market
  - Ready access to water to serve both domestic and international market.





### **ANUVIA TECHNOLOGY – HOW IT WORKS**

- Reaction process attaches inorganic nutrients (N, S, P) to the charged amino acids forming the Organic MaTRX
- Organic MaTRX releases bound nutrients over time
  - 65% of nitrogen release in first 2-3 weeks; 35% over the next 4-6 weeks
- Organic matter (OM) serves as a docking site for the nutrients products deliver up to 16% OM back to the soil
  - Microbes feed on the Organic MaTRX and break the bonds between the amino acids and the nutrient
- Current products deliver Nitrogen, Phosphorus and Sulfur
  - Ability to serve as carrier for other nutrients







Cation and anion absorption (sequestration) by organic matter (OM)



## SymTRX: Enhanced Efficiency Homogenous Multi-Nutrient





- Nitrogen as Ammonium N (NH<sub>4</sub>+)
   Most efficient form of N used by crops
- Sulfur as Sulfur Sulfate (SO<sub>4</sub>=)

Plant available source of sulfur

Phosphate as Orthophosphate (H<sub>2</sub>PO<sub>4</sub>)





#### The Future of Fertilizer

A DIFFERENT KIND OF FERTILIZER HAT VIELDS MORE GREEN SynTRX fertiliser provides slow-release. bio based nutration that feed crops today and improves sail health for tomorrow. With bigger yields and 3 to 5 times returnoning startment y cold probably think it load much release it unit on the rest:

Askyan relative david using the immediate and inspection provided the provided the



		Conventional fertilizer
Benefits for the Farmer		
Improves yield	$\checkmark$	$\checkmark$
Enhances soil health	$\checkmark$	×
Delivers organic matter back to the soil	$\checkmark$	×
Stimulates soil microbes	$\checkmark$	×
Low-cost input	+\$5 / Acre	Standard
Benefits for the Planet		
Reduces GHG emissions	$\checkmark$	×
Re-uses organic matter	$\checkmark$	×
Slow-release nitrogen	$\checkmark$	×
Minimizes nutrient leaching and volatility – improves water quality	$\checkmark$	×

### **High Quality Product**

- High Commercial Quality:
  - Spherical granules
  - Size 300 SGN
  - 6-8 # hardness
  - Dry = >98% solids
- Uses proven granulation equip
- Product in bulk, super sack and 25kg bag





#### Consistent with Current Agricultural Practices

#### Replicated Research Trials "Creating High Confidence"

- 100+ trials University and Private Research trial completed
- Across multiple crops

ANUVIA

• Across USA and Canada



#### ANUVIA'S PRODUCT PROVIDES SIGNIFICANT YIELD BENEFIT AND RETURN ON INVESTMENT



#### SymTRX® incremental cost per acre ~\$5/acre

Source: Anuvia 3<sup>rd</sup> Party Trial data <sup>1</sup> Data collected from 2016–2018

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### POSITIVE CARBON FOOTPRINT

Manufacturing - Cradle to Gate

- Assessment completed by Environmental Management Resources (ERM)
- Anuvia products have a smaller carbon footprint
- Contributes to reducing GHG emissions from Agriculture



#### Anuvia's Fertilizers vs Commercial Inorganic Fertilizers (kg CO2e/kg product)



- The processes used in the comparative analysis consider the Ecoinvent<sup>®</sup> global market processes (not specific to USA), without transportation to the client.
- Anuvia's products showed best performance related to Carbon Footprint compared to commercial inorganic fertilizers analyzed.

## **Impact with Significance**

Cradle to Grave

- Drop in replacement for Urea or AMS provides instant reductions in Agriculture's carbon footprint
- Reduction of GHG per acre compared to standard practice
- 1 Millions acres results in a reduction of GhG up to 170,000 tons or equivalent removing up to 30,000 cars



Anuvia Fertilizer Carbon Footprint



In Corn: SymTRX combination has 10% smaller carbon footprint In Cotton/Rice: SymTRX combination has ~ 25% smaller carbon footprint

GHG reduction correlates with amount of SymTRX used in crop blend Corn = high nitrogen (urea larger part of blend) Cotton/Rice = less nitrogen required (SymTRX larger portion of blend)

#### SymTRX Improves Nutrient Utilization - Reducing Nutrient Loses

- Independent University research compared nitrogen leaching of Urea, AMS and SymTRX
- SymTRX use resulted in a
  - 39.9% reduction vs AMS
  - 50.2% reduction vs urea
- SymTRX reduces loss of nutrients into the environment protection water ways



#### Total N Leaching (mg/L)

Source: Dr. Gerald Henry – University of Georgia



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### **Soil Health Assessment**



Change in Carbon Efflux (mol m<sup>-2</sup>s<sup>-1</sup>)

Source: Dr. Gerald Henry – University of Georgia

- Carbon efflux studies look at microbial activity in the soil higher respiration indicates healthy more active microbial populations
- SymTRX feeds microbes increasing microbial activity contributing to soils ability to regenerate



### Anuvia Feeding Plants & Soil - Improving Soil Health



- Soil Health Improves:
  - Nutrient utilization
  - Water usage
  - Soil structure
  - Microbial colonies
  - Healthy crops
- Supports Sustainability



#### **Better Soil Health = Better Plant Performance + Better Environment**

# ANUVIA'S PRODUCTS ADDRESS THE ECONOMIC AND ECOLOGICAL CHALLENGES OF AGRICULTURE



- Nutrient retention = More yield
   = More profit
- ✓ Less environmental impact
- ✓ Improved soil health
- Reuses agricultural and animal substrate
- ✓ Proven in the field

### ANUVIA RECOGNIZED







#### **Awards & Recognition**

Anuvia is well recognized within the industry by a wide range of respected organizations. Some of our most prestigious awards include:

- SymTRX awarded "2019 Product of the Year" by Environmental Leader
- Anuvia awarded honorable mention in the food category for Fast Company's 2019 World Changing Ideas Award
- 2019 Business Intelligence Group BIG Innovation Awards, Winner
- 2018 InnoSTARS Innovation Competition, Finalist
- 2018 SEAL (Sustainability Environmental Achievement Leadership) Awards, Winner
- 2018 Business Intelligence Group Sustainability Awards, Product of the Year
- 2017 Edison Awards, Bronze for Sustainability



THE FLORIDA SENATE	
APPEARANCE RECORD	
(Deliver BOTH copies of this form to the Senator or Senate Professional Staff conducting the meeting) Meeting Date Bill Number (if applicable)	)
	,
Topic ANUVIA PLANT NUTRIENTS Amendment Barcode (if applicable	— Э)
Name HUGH MACGILLIVRAY	
Job Title _ Et Chief Commercial Officer -	
Address <u>6751 West Jones Ave RO Box 220.</u> Phone <u>612-810-9689</u> . Street	_
City State Zip Email ANDRANO	- CA
Speaking:       For       Against       Information       Waive Speaking:       In Support       Against         (The Chair will read this information into the record.)	
RepresentingANUVIA PLANT NUTRIENTS	
Appearing at request of Chair: Yes No Lobbyist registered with Legislature: Yes No	)
While it is a Senate tradition to encourage public testimony, time may not permit all persons wishing to speak to be heard at this meeting. Those who do speak may be asked to limit their remarks so that as many persons as possible can be heard.	

This form is part of the public record for this meeting.

S-001 (10/14/14)

#### CourtSmart Tag Report

Room: EL 110

Case No.:

Type:

Caption: Senate Appropriations Subcommittee on Agriculture, Environment, and General Government Judge:

Started: 11/13 Ends: 11/13		Length: 00:49:25
1:00:44 PM 1:01:58 PM 1:02:37 PM 1:27:11 PM 1:27:15 PM 1:28:31 PM 1:29:25 PM 1:31:18 PM 1:32:05 PM 1:32:58 PM 1:33:24 PM 1:33:53 PM 1:34:21 PM 1:34:30 PM 1:34:53 PM 1:48:19 PM	Peter Janicki, CEO, Sed Sen. Mayfield Sen. Broxson P. Janicki Sen. Mayfield P. Janicki Sen. Mayfield P. Janicki Sen. Mayfield P. Janicki Sen. Broxson Sen. Mayfield TAB 2 - Presentation on	Biosolids by Sedron Technologies ron Technologies Biosolids by Anuvia Plant Nutrients, LLC f Commercial Officer, Anuvia Plant Nutrients



#### THE FLORIDA SENATE

Tallahassee, Florida 32399-1100

COMMITTEES: Appropriations Subcommittee on Transportation, Tourism, and Economic Development, *Chair* Appropriations Appropriations Subcommittee on Agriculture, Environment, and General Government Commerce and Tourism Infrastructure and Security Innovation, Industry, and Technology Judiciary Rules

SENATOR TRAVIS HUTSON 7th District

November 13, 2019

The Honorable Debbie Mayfield 404 S. Monroe Street Tallahassee, FL 32399-1100

Chair Mayfield,

I am writing to request to be excused from today's Appropriations Subcommittee on Agriculture, Environment, and General Government. Thank you for your consideration of this request.

Respectfully,

Ante n

**Travis Hutson** 

REPLY TO:

□ 4875 Palm Coast Parkway, NW, Suite 5, Palm Coast, Florida 32137 (386) 446-7610 FAX: (888) 263-3475 □ 314 Senate Building, 404 South Monroe Street, Tallahassee, Florida 32399-1100 (850) 487-5007

Senate's Website: www.flsenate.gov

DAVID SIMMONS President Pro Tempore