VARCOR™
TECHNOLOGY OVERVIEW

Peter Janicki, CEO | January 2019

SEDRON TECHNOLOGIES

SEDRON TECHNOLOGIES

Peter Janicki
CEO & Founder

JANICKI INDUSTRIES

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

ORION CREW MODULE

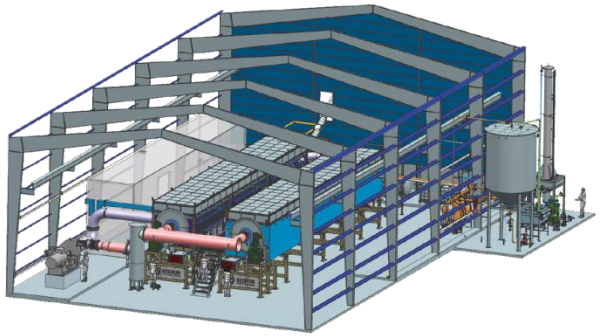
JOINT STRIKE FIGHTER

SEDRON TECHNOLOGIES

Formerly **JANICKI BIOENERGY**

- ✓ Founded 2014
- ✓ Water & Sanitation

JANICKI OMNI PROCESSOR



VARCOR 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.

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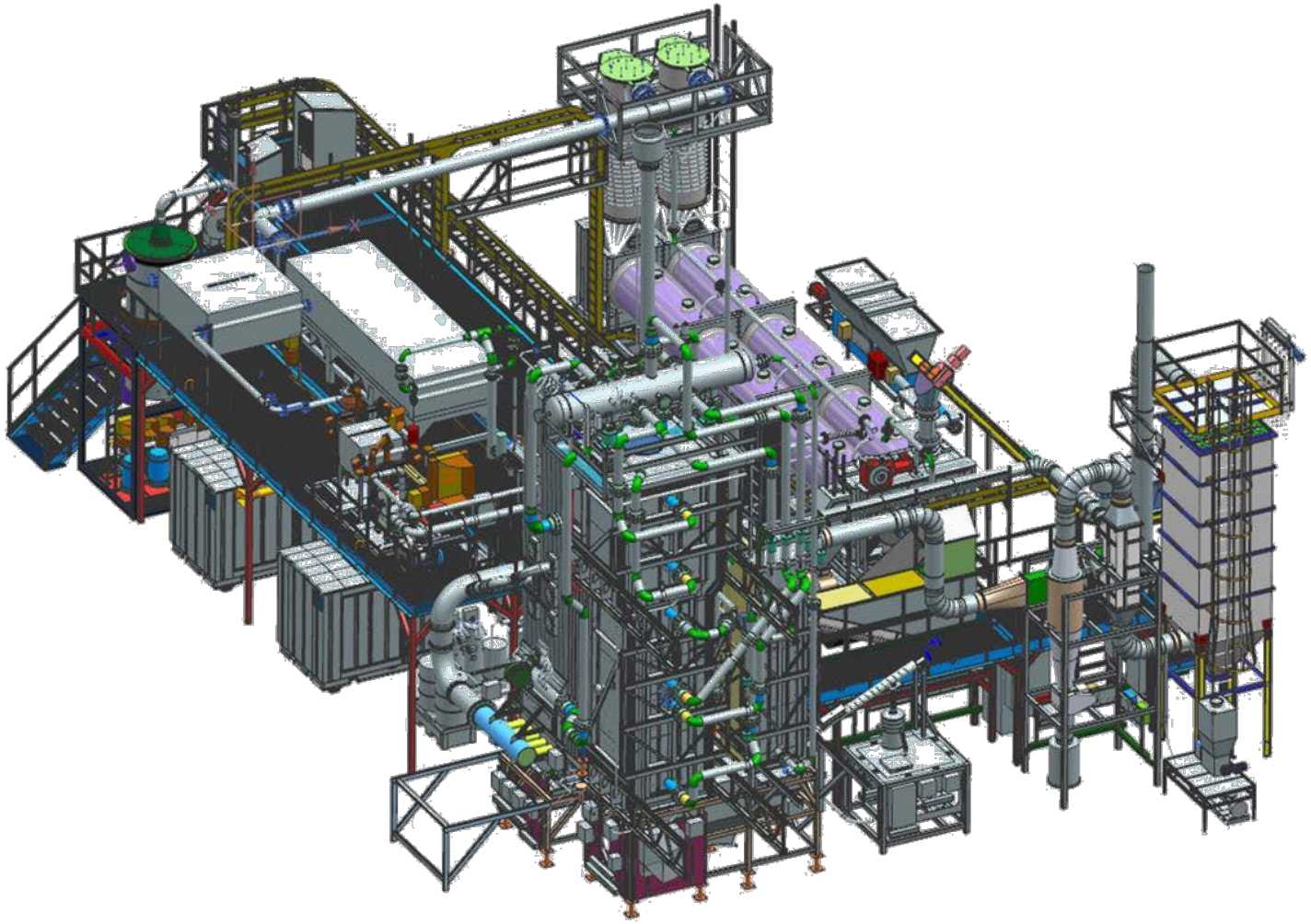
JANICKI OMNI PROCESSOR

S250 Model



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

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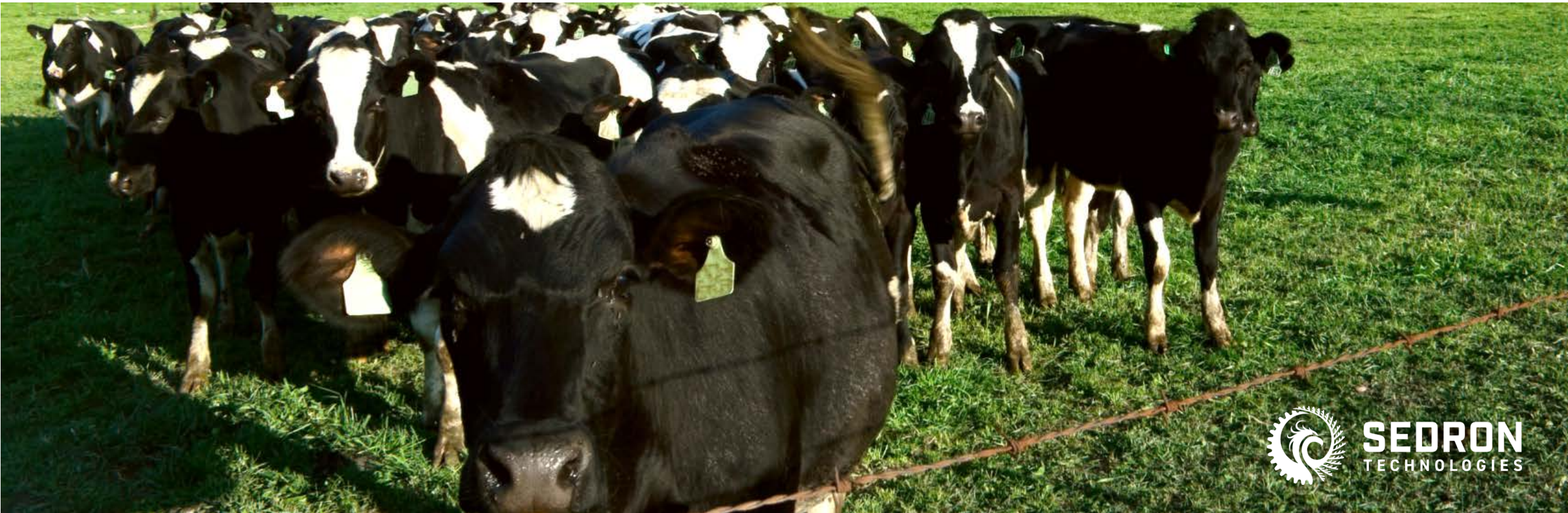
THE DAIRY PROBLEM:

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.

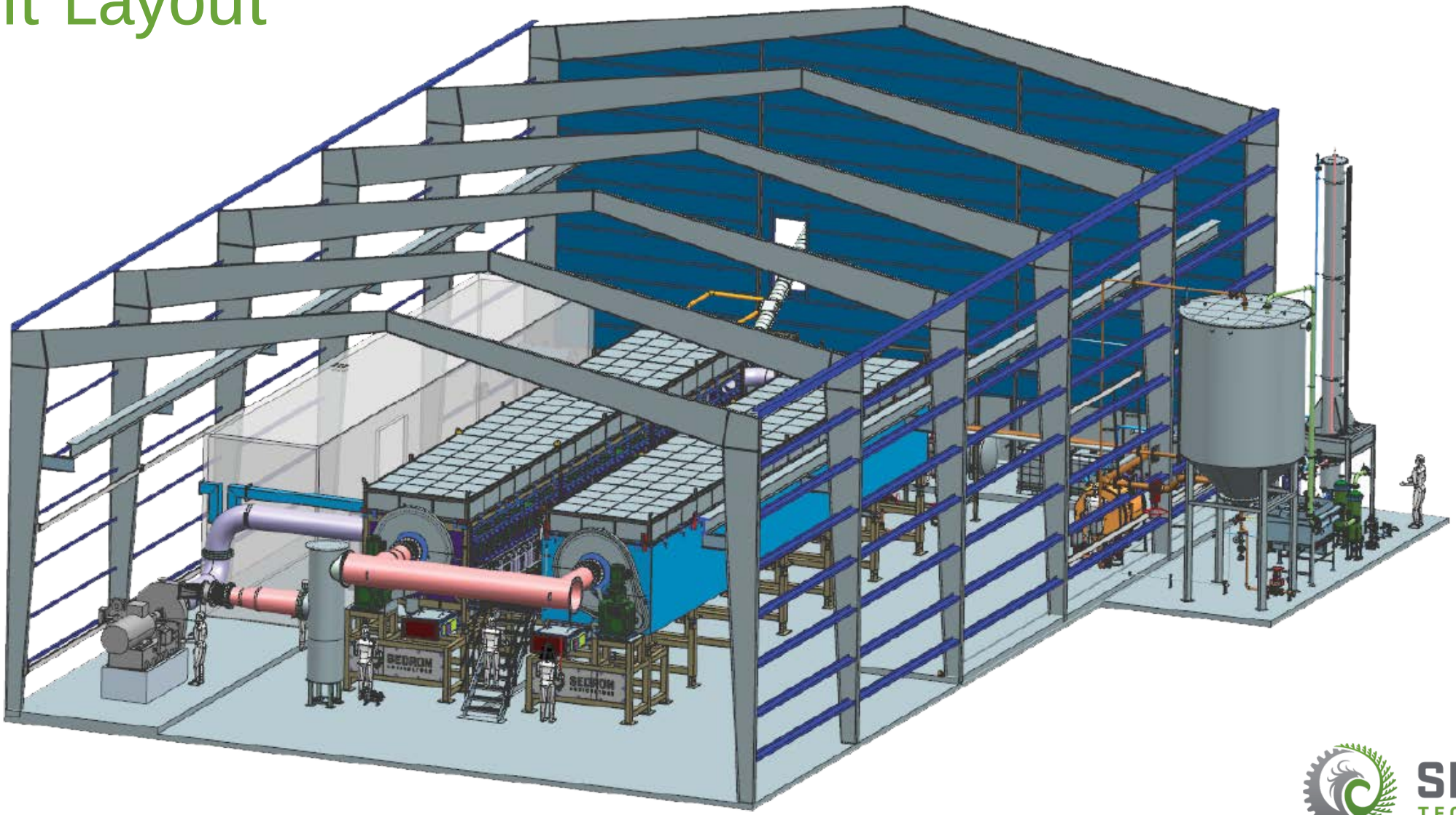


STORAGE LAGOONS

SEDRON TECHNOLOGIES

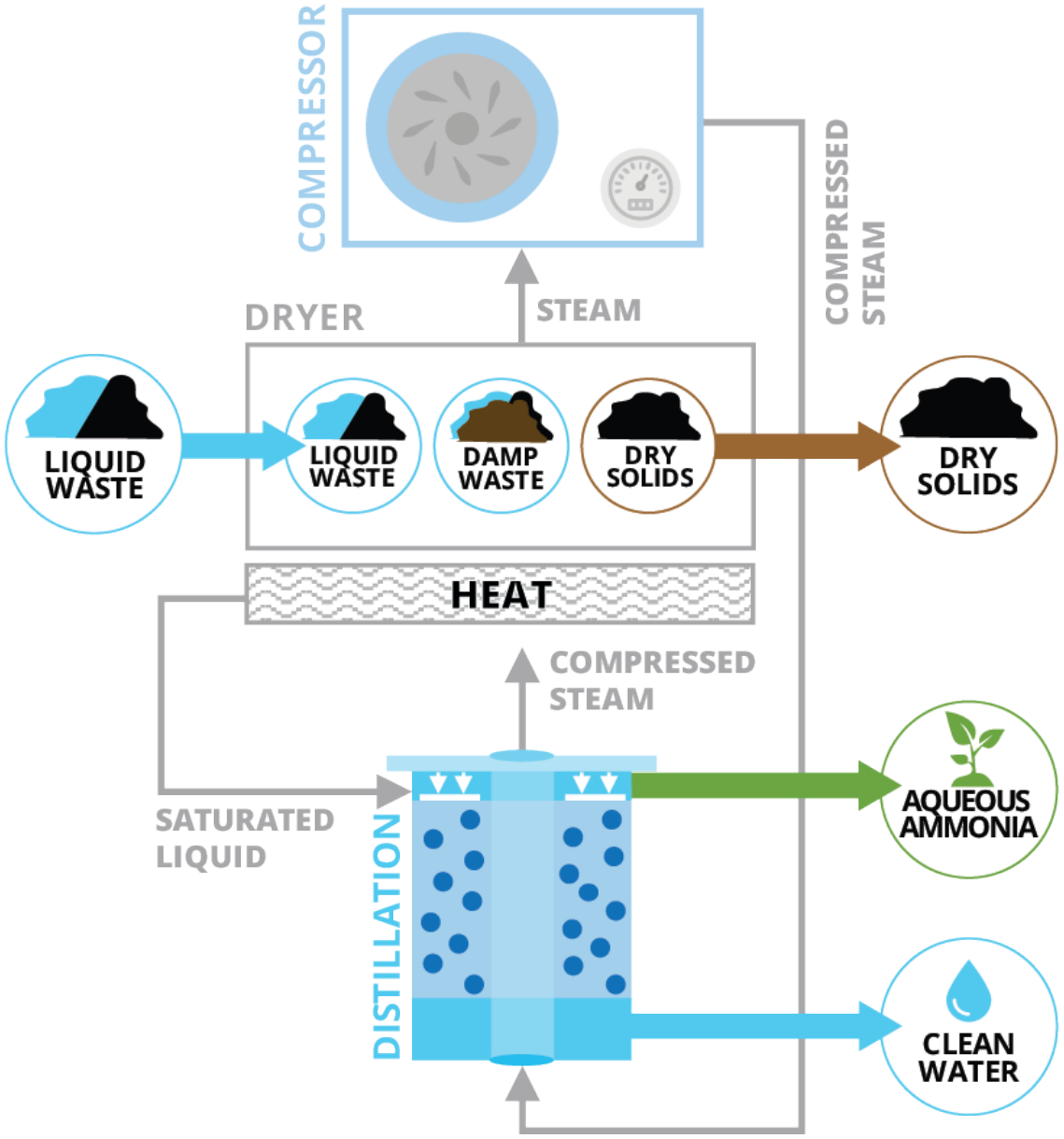
VARCOR™ PROCESSOR

Plant Layout



SEDRON TECHNOLOGIES

VARCOR™
Process Flow



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VARCOR™ PROCESS FLOW

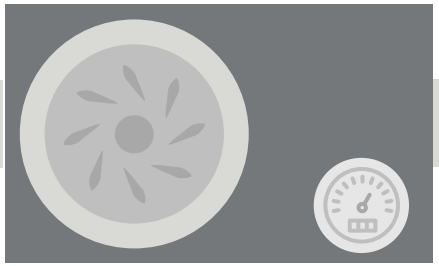
SEDRON TECHNOLOGIES

LIQUID WASTE

FEEDSTOCK TO SYSTEM:

- Scalable to wide range of flow rates (5 to 500 GPM)
- TS = <1%-15%

STEAM
14.7 PSIG and 212°F



COMPRESSOR

STEAM
20 PSIG and 227°F

ORGANIC AMMONIA SOLUTION:

- 20-0-0
- Pathogen-Free

AQUEOUS AMMONIA

CLEAN WATER:

- Pathogen-Free

CLEAN WATER

DRIED SOLIDS:

- Pathogen-Free
- Rich in N-P-K
- <10% Moisture

DRY SOLIDS

DISTILLATION

DRYING

LIQUID WASTE

LIQUID WASTE

DRY SOLIDS

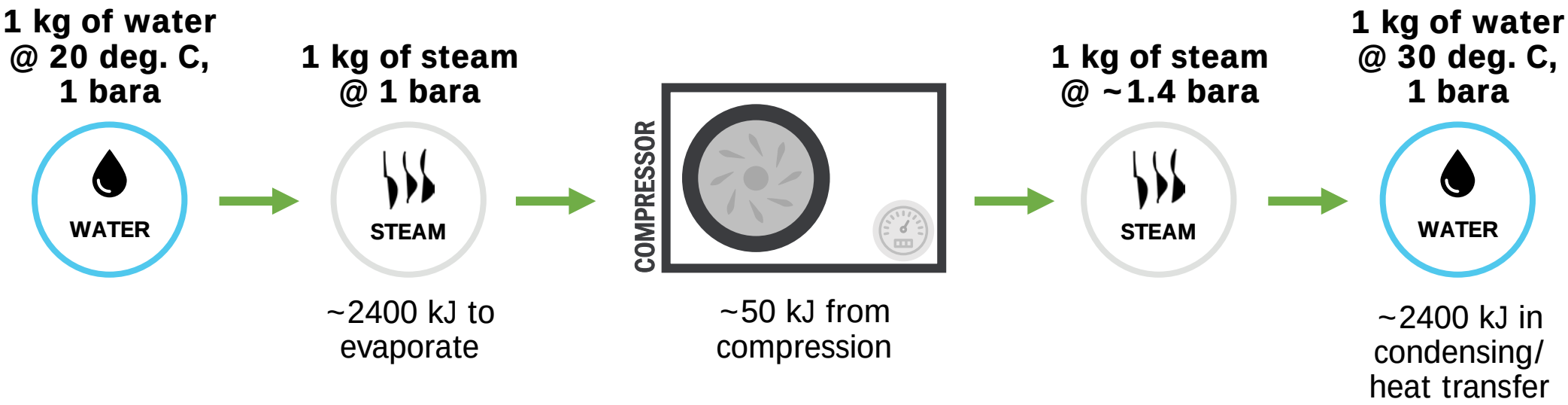
HEAT

SATURATED LIQUID

VARCOR™ EFFICIENCY

Process evaporates water extremely efficiently & effectively

(simplified thermodynamic analysis)

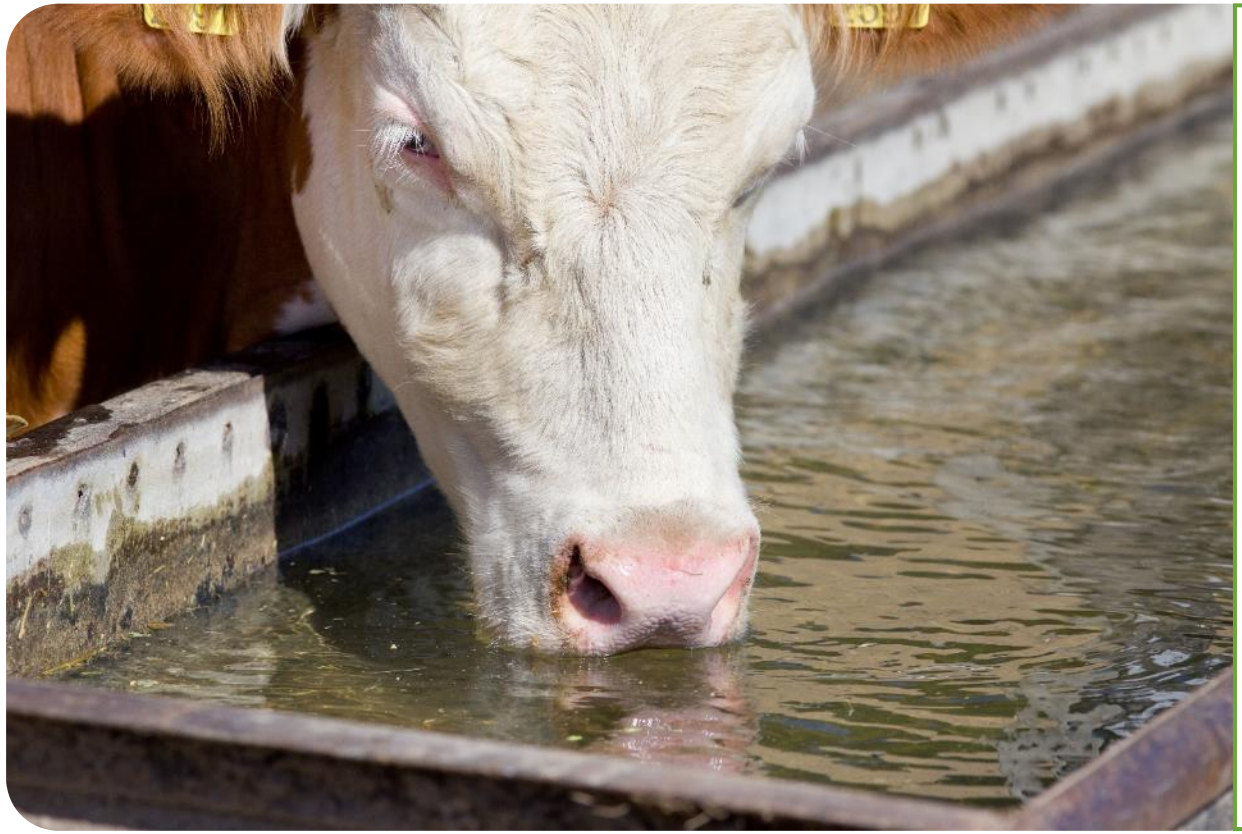


$$2400\ kJ + 50\ kJ - 2400\ kJ \quad = 50\ kJ$$

SEDRON TECHNOLOGIES

VARCOR™ 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.

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VARCOR™ PROCESSOR

Outputs for Dairy:

15-20% AQUEOUS AMMONIA

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

2

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VARCOR™ PROCESSOR

Outputs for Dairy:

DRY SOLIDS

Rich in nitrogen and phosphorus, this valuable, organic material can be sold or used as bedding, a nutrient-rich soil amendment, or a fuel source for energy production.

3

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Varcor on Texas Farm

Evaporator in final laser inspection

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Disk Assembly in Fabrication

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Preheater Assembly in Fabrication

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Ammonia Recovery Assembly in Fab

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Evaporator Spindles in Fabrication

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Condensate Assembly in Fabrication

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Can VARCOR™ 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

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BIOSOLIDS LAND APPLICATION

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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.

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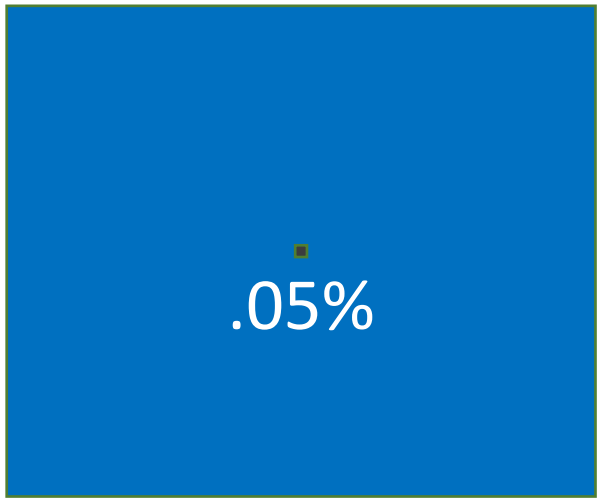
% solids in different waste streams

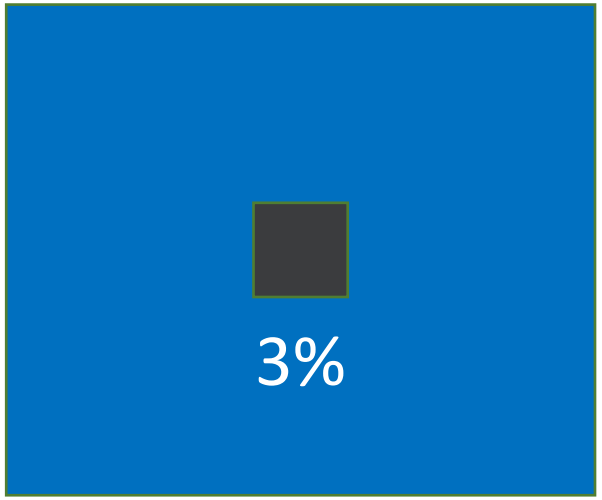
1



Pure Water in Raw Sewage

Solids in Raw Sewage

2

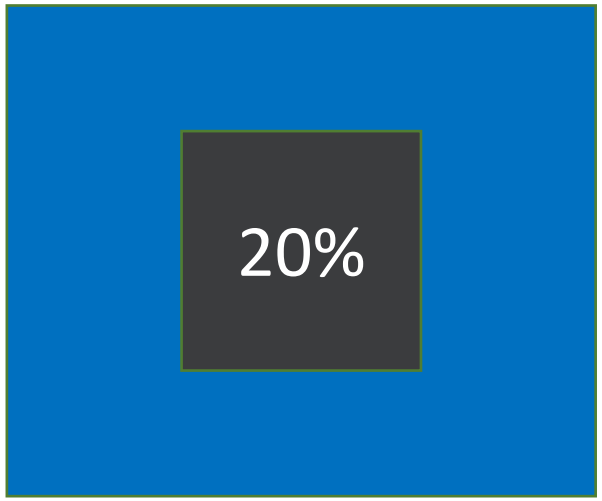


This also contains 1000ppm of ammonia

Pure Water from bottom of clarifier

Solids from bottom of clarifier

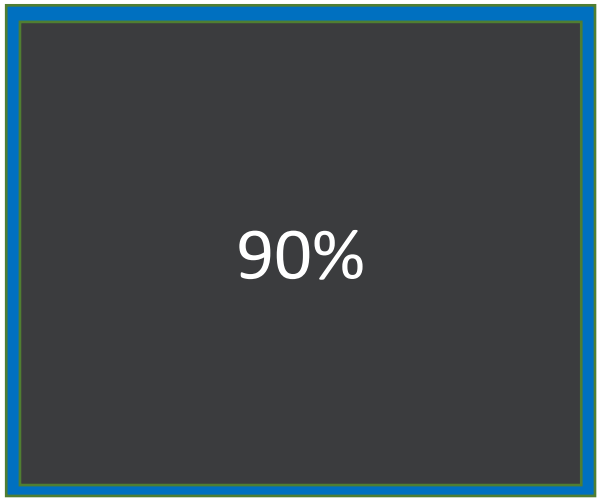
3



Pure Water in dewatered biosolids

Solids in dewatered biosolids

4



Pure Water after Varcor

Solids after Varcor

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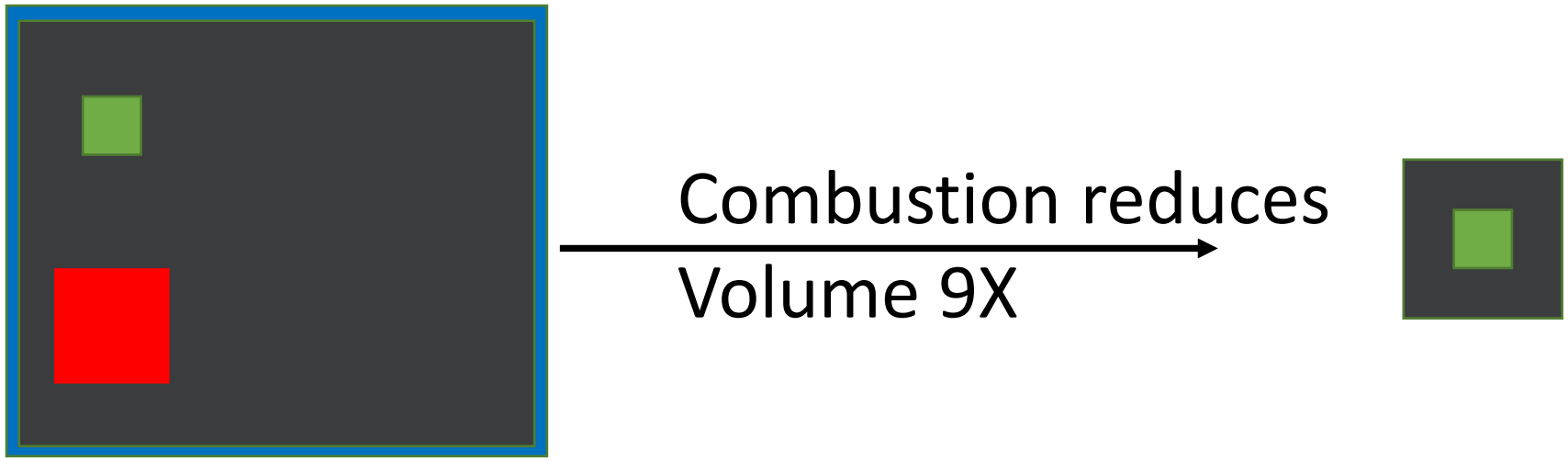

- Pure Water in solids after Varcor
- Solids after Varcor
- 1.7% Phosphorus in solids after Varcor
- 5.5% Nitrogen Solids after Varcor
- 14% Phosphorus in solids after Combustion

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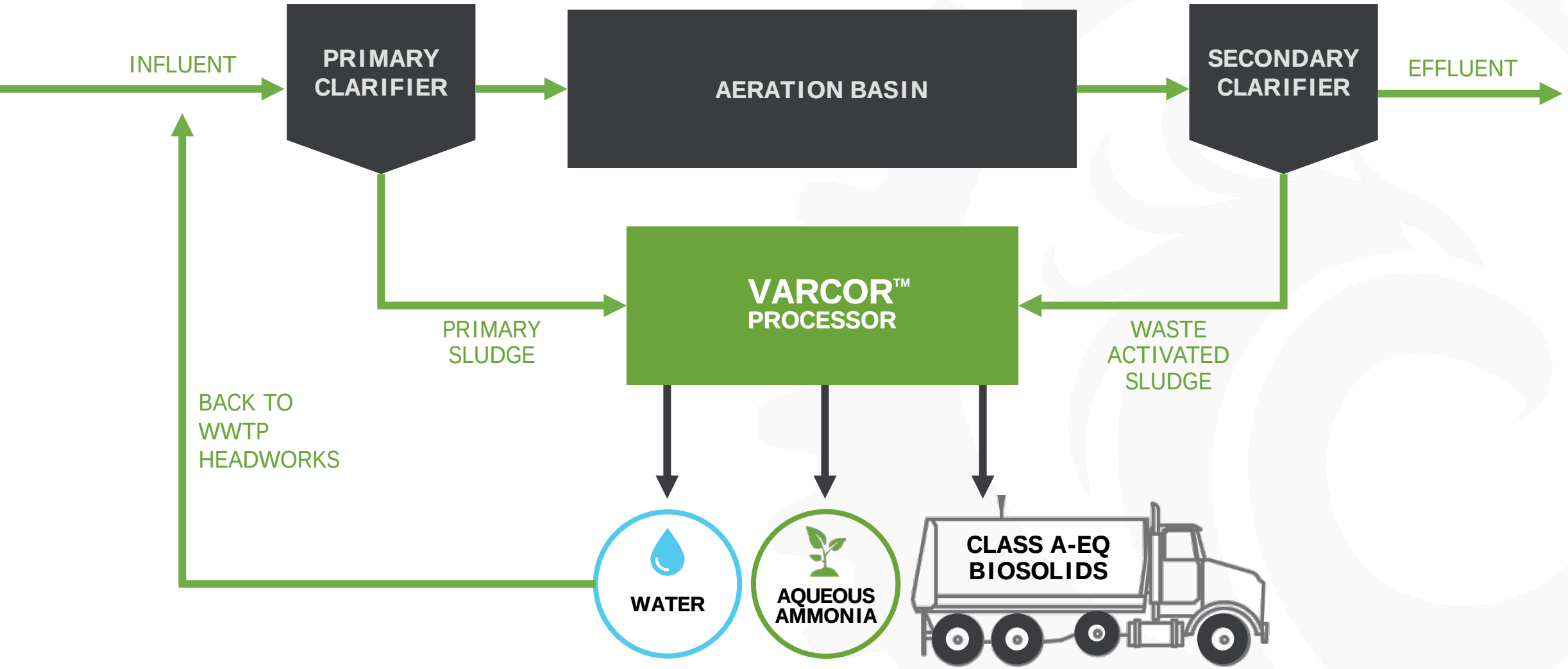
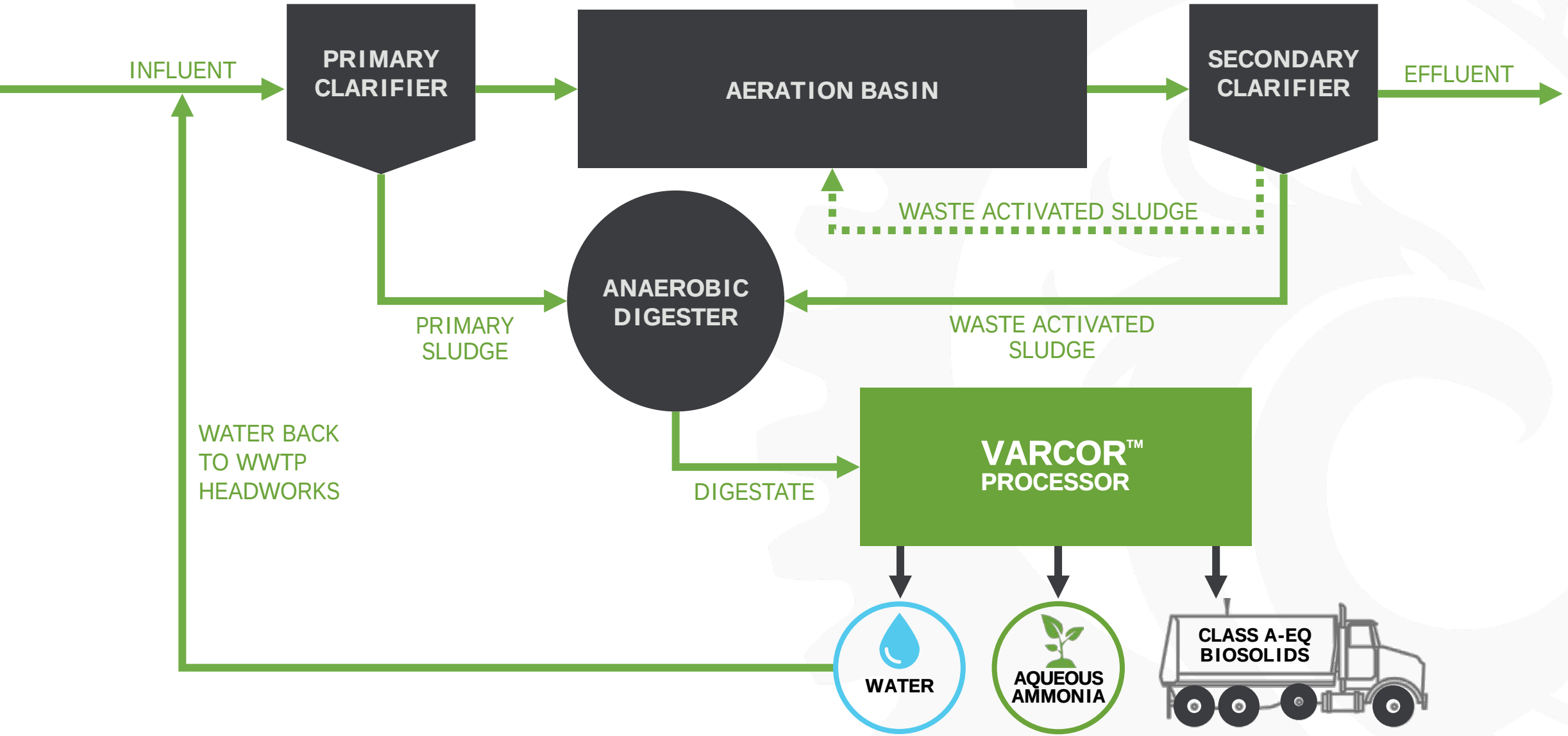
WWTP SLUDGE APPLICATION



WWTP WITH ANAEROBIC DIGESTION



VARCOR™ Process Outputs for WWTPs:

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1 CLEAN, RECLAIMED WATER

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

VARCOR™ Process Outputs for WWTPs:

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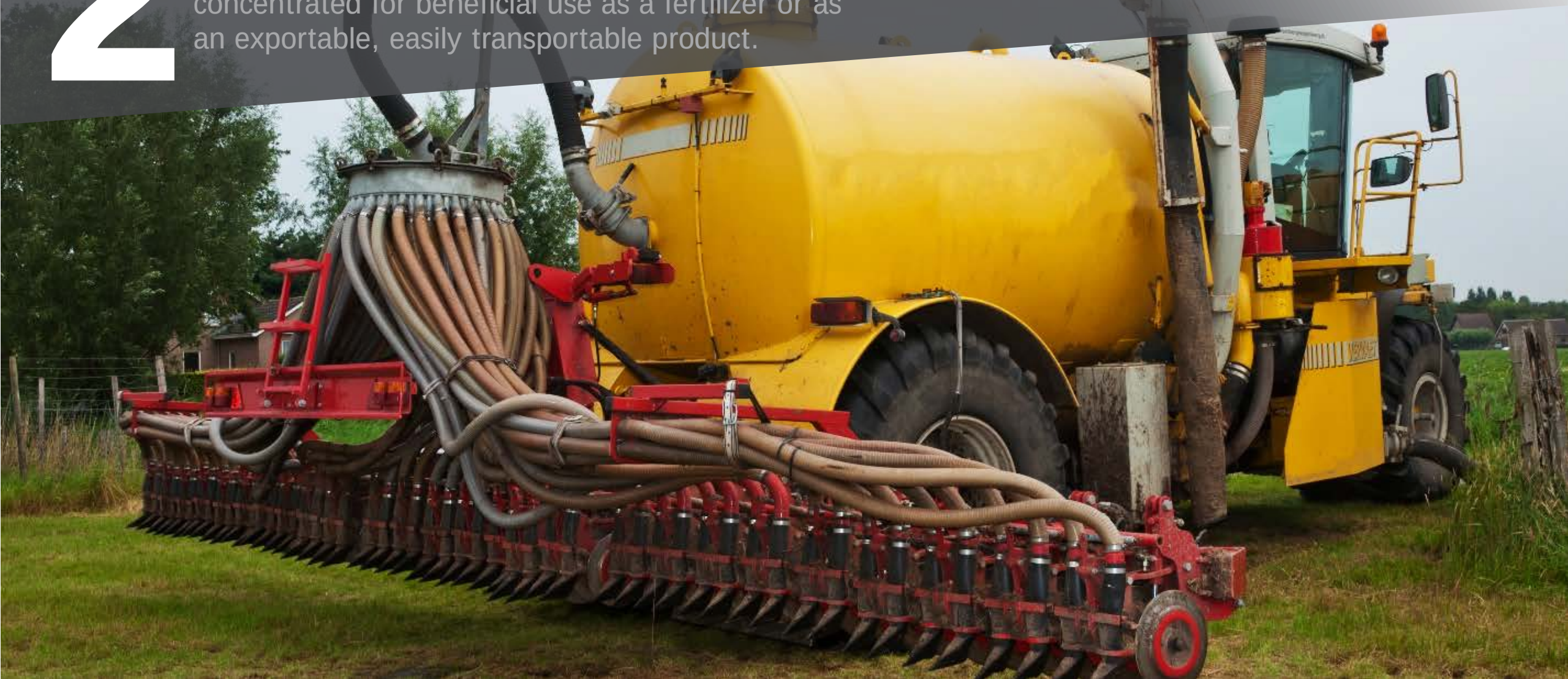
2 NITROGEN FERTILIZER

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



VARCOR™ Process Outputs for WWTPs:

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3 DRY CLASS A (EQ) BIOSOLID

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

VARCOR™ Technology captures and concentrates nitrogen. It does not destroy nitrogen as a fertilizer.

Nitrogen Fertilizer Plant Making Nitrogen Fertilizer from Fossil fuels

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

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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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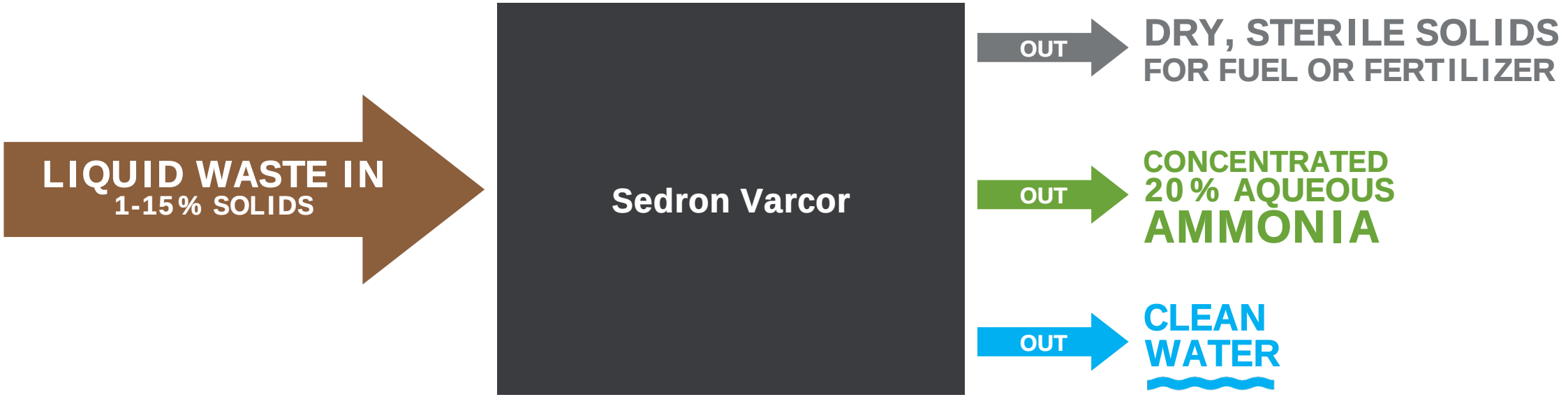
VARCOR™ PROCESSOR

Inputs & Outputs



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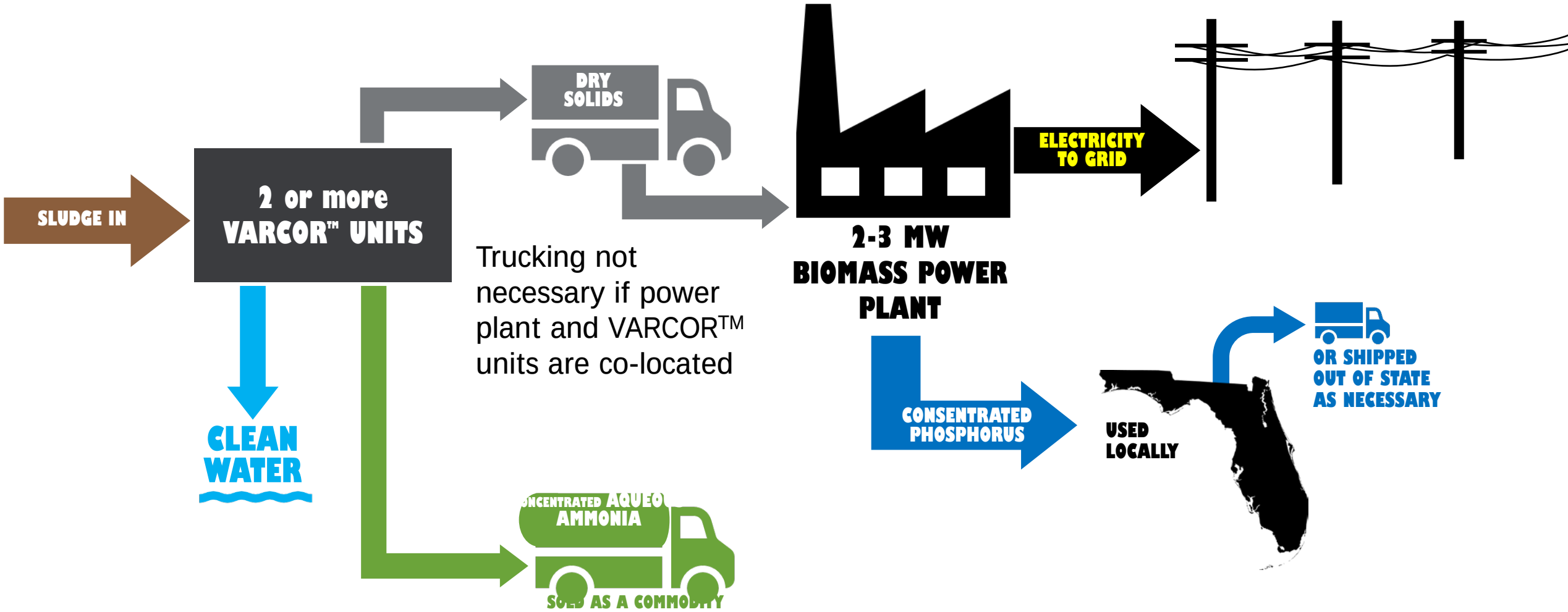
FLORIDA PROJECT PROCESS FLOW



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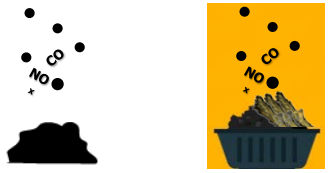
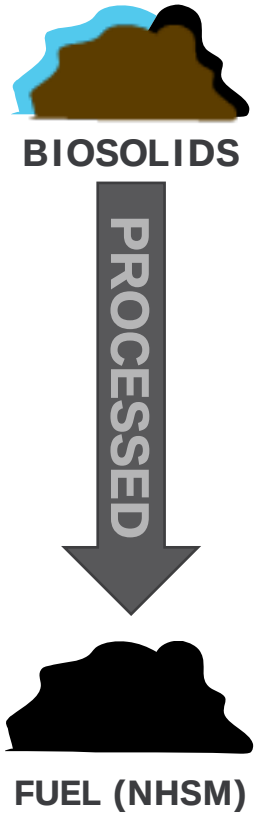
BIOMASS POWER PLANT

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 Contaminants greater than traditional fuels	 FUEL COAL/BIOMASS Contaminants comparable to or less than traditional fuels



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

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FUEL DESIGNATION

VARCOR™ 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

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Combustion destroys:

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

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FLORIDA PILOT PROJECT CAPACITY

2 Varcor™ Processors & 1 Power Plant

1 VARCOR™ PROCESSING CAPACITY

FOR BOTH VARCOR™ PROCESSORS TOGETHER

- ✓ 8% solids (1-15% allowable)
- ✓ Sludge in 150 GPM (75 GPM for each VARCOR™ 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™ Processors
- ✓ Value of net power $788,400 @ $.09/kW-hr
- ✓ 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.

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VARCOR™

Flexible Implementation Options

1 ZERO CAPITAL COST

A WWTP can contract out treatment to Sedron.

Sedron will then install and operate a Varcor™ 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™ system, a buyout agreement is available. This would allow the Varcor™ to be implemented quickly while capital funding is secured for the purchase.

2 CASH PURCHASE

A WWTP can purchase a Varcor™ 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™ 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.

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