SKW GEN | ENERGY SERVICES

EVAPORATION ECONOMICS AND EMISSIONS

SWANA – FLORIDA – SUMMER 2024

CONTENTS

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Truck and Treat

- Cheap
- Reliable
- Easy

- Turbidity is too high
  - → **Reverse Osmosis**
- BOD is too high
  - → **Biological reactor**
- Ammonia is too high
  - → **Anoxic reactor**
- PFAS
  - → **Foam fractionation**
- What next??
  - → **?????**

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Truck and Treat

- Cheap (sometimes)
- Reliable (for some sites)
- Easy (until your kicked out)

- Turbidity is too high
  - Reverse Osmosis
- BOD is too high
  - Biological reactor
- Ammonia is too high
  - Anoxic reactor
- PFAS
  - Foam fractionation
- What next??
  - ?????

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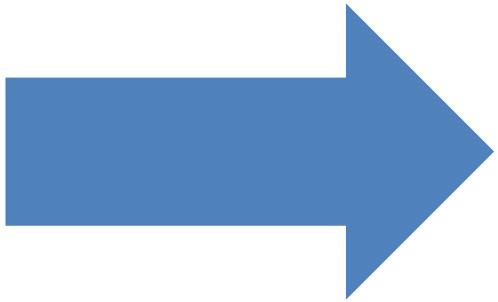
Evaporation



- Contains contamination on site
- Predictable cost
- Leachate disposal is in the sites control

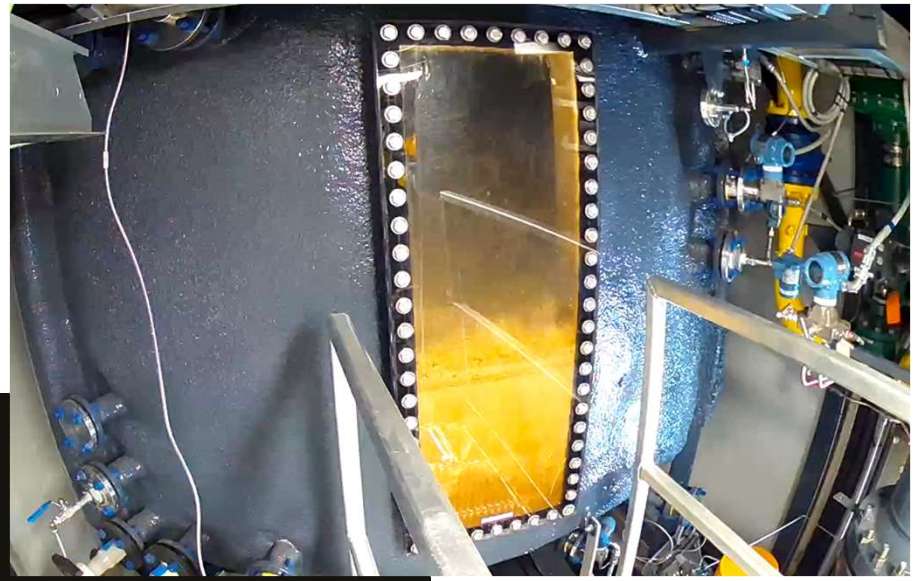
LEACHATE INJECTION

Leachate is injected into a hot exhaust stream. The water partially evaporates leaving a concentrate stream.

90-95% Thermal Efficiency

DIRECT HEAT INJECTION

Hot gas is bubbled through the water, driving evaporation.



98% Thermal Efficiency

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HOW EVAPORATOIN SYSTEMS DIFFER

- Residuals
- Mobility
- PFAS Capture
- Adaptability

01 30,000 gpd capacity

02 Three day set up

EMISSIONS
45,000 gpd

	Florida Air Permit	Skagen Stack Test	
	lb/hr	lb/hr	% Permit Limit
PM10	1.35	0.26	20%
PM2.5	1.59	0.76	48%
CO	6.81	5.68	83%
NMOC Destruction	20 ppm	13 ppm	65%
Fuel - Btu/gallon	504	437	

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PFAS EMMISSIONS

- **Exhaust test 1**
  - Tennessee
  - 99% capture
- **Exhaust test 2**
  - Florida
  - Method 1633
  - 99.5% capture
- **Exhaust test 3**
  - Florida
  - Method 1633+
  - 99.3% capture

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STATE AMBIENT AIR GUIDELINES

Ambient Air Guidelines		PFHxA	PFOA	PFBS	ΣPFHxS	Br-PFOS	L-PFOS
Michigan	ug/m3	None	0.0700	None	None	0.070	
New York	ug/m3	None	0.0053	None	None	None	
Minnisota	ug/m3	0.500	0.0630	0.030	0.034	0.011	
Texas	ug/m3	None	0.0050	None	None	0.010	
Most Stringent	ug/m3	0.500	0.0050	0.030	0.034	0.010	
% of most stringent	%	2.8%	65.8%	37.1%	23.7%	< LOQ	

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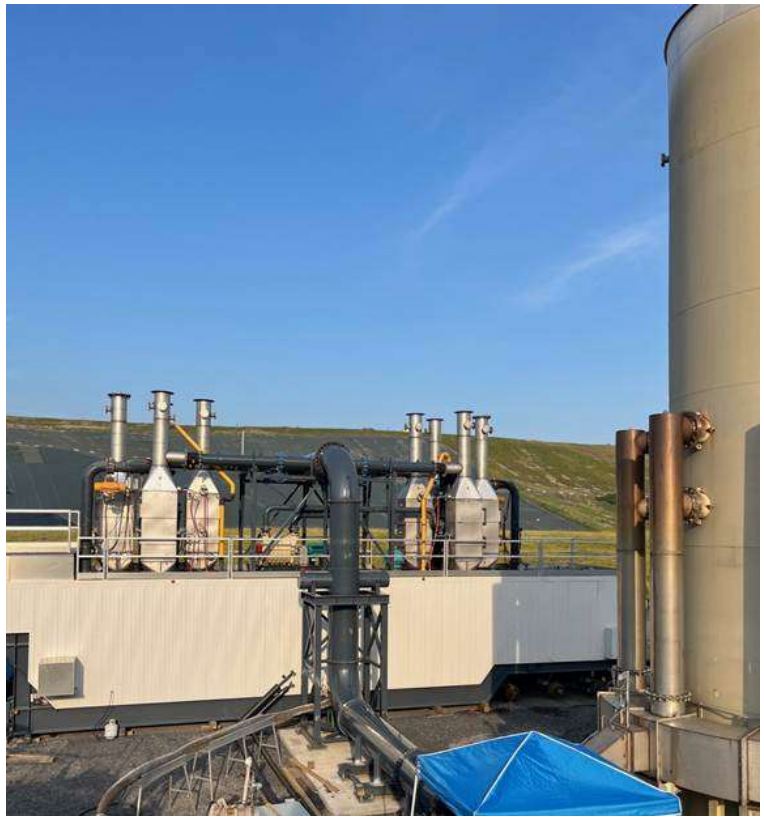
AIR EMMISSIONS CHANGES

Drive for insignificance

Ultra-low emissions option

- Increases PFAS capture to 99.9%
- 98% VOC's removal
- 98% Ammonia removal
- Factory option or future retrofit



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F700 Series

30,000 gpd
Multi Fuel

F1400 Series

60,000 gpd
Multi Fuel
Split Fuel

F1200 Series

50,000 gpd
Multi Fuel + Waste Heat

ADAPTABILITY

FEARING 1200 SERIES

Standard Features include:

- Multi-Fuel
- VOC Stripping
- Low Particulate
- Zero Liquid Discharge Capability
- Mobile

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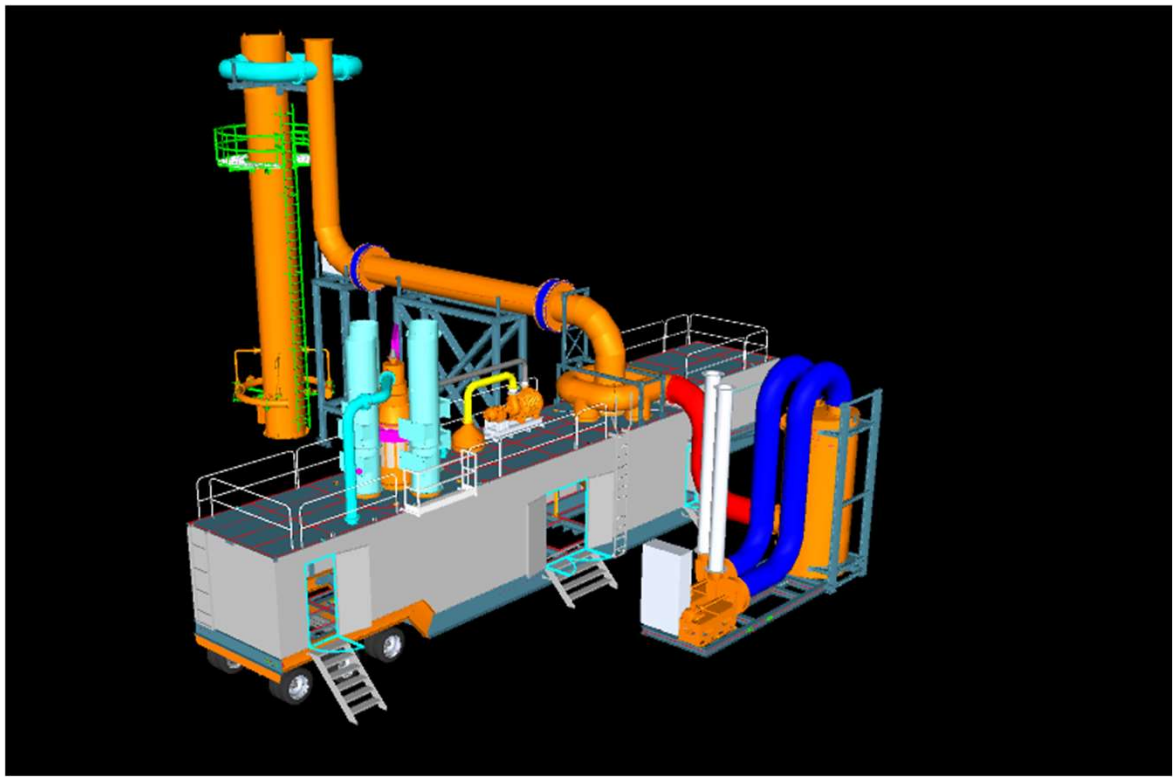
01 50,000 gpd capacity

02 Waste heat units use any hot source of hot exhaust gas to drive evaporation.

RNG PLANT INTEGRATION



ADATABILITY

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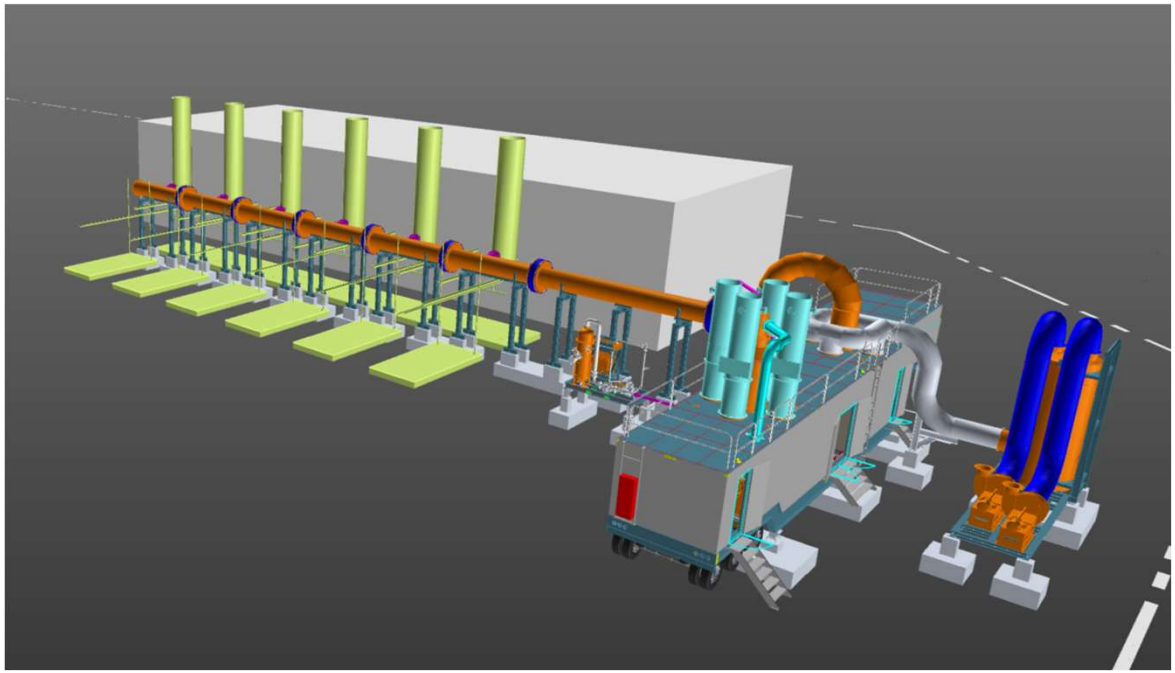
GAS TO POWER PLANT INTEGRATION



ADAPTABILITY

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Deliver a biogas fueled system.
Install an RNG plant.
Convert one tank to waste heat, the other to natural gas.

ADAPTABILITY

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COST

Three cost components:

- Operations and maintenance
- Equipment cost, capital or noncapital
- Heat source

Payback Period: Two to eight years

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CONTRACTING RNG PLANTS

- Close to 90% of the revenue is in the **RNG credits**, not the gas.
- Three tips:

1. Hold back enough energy to supply the evaporator.
   - Don’t hold back biogas, hold back the natural gas equivalent.
   - RNG credits are still produced and shared.
2. Make sure the custody transfer to the mainline natural gas system is as close to the site as possible, preferably on site.
3. PUT A TIME LIMIT ON THE START.

THANK YOU