

# Grandville CWP Egg Shaped Anaerobic Digester and Bio-gas Cogeneration

*Presented by:* Brian Hannon, P.E., Moore & Bruggink  
and Todd Wibright, City of Grandville CWP

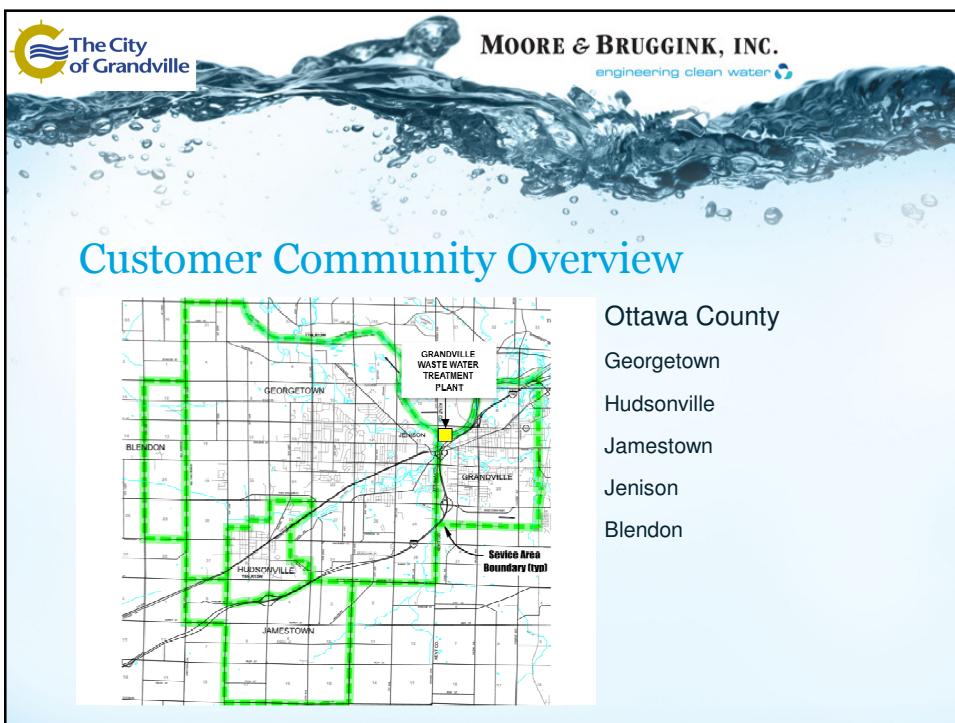


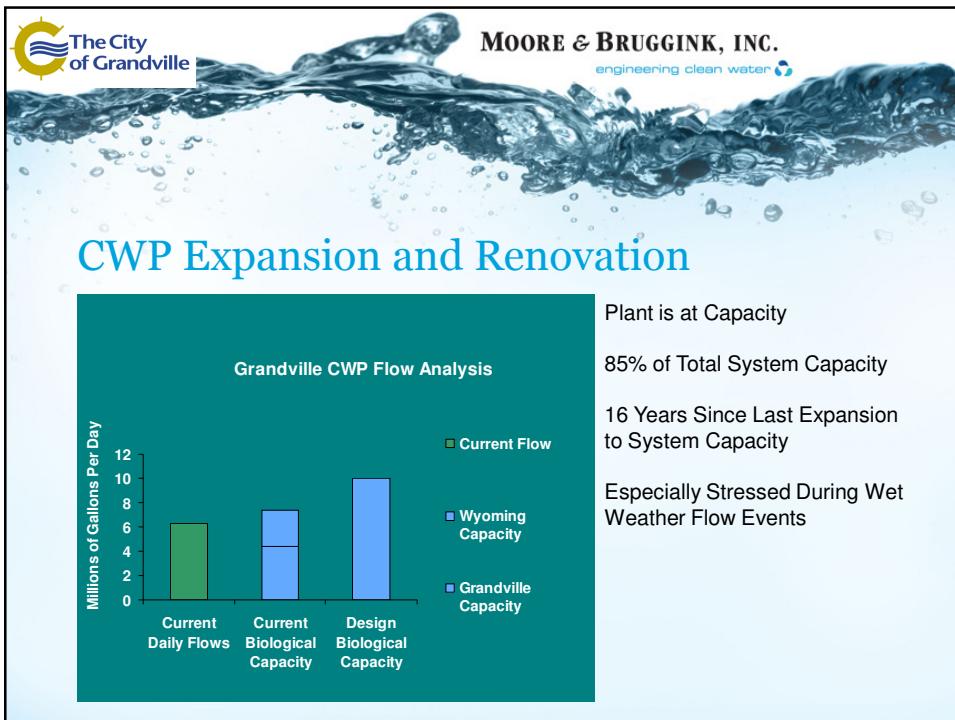
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## Presentation Agenda

- Grandville System and CWP Overview
- Treatment Process Overview
- Project Overview
- Anaerobic Digestion and Egg Shaped Anaerobic Digester
- Bio-Gas Cogeneration with Combined Heat and Power System
- Cost/Payback
- Construction Photos / Update





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## Grandville CWP System Overview (Liquid)



- Screening
- Grit Removal
- Primary Clarification
- Biological Treatment
- Final Clarification
- UV disinfection
- Polishing Pond

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## Grandville CWP System Overview (Solids)



- Aerobic Digestion
- Anaerobic Digestion
- Thickening
- Storage
- Land Application

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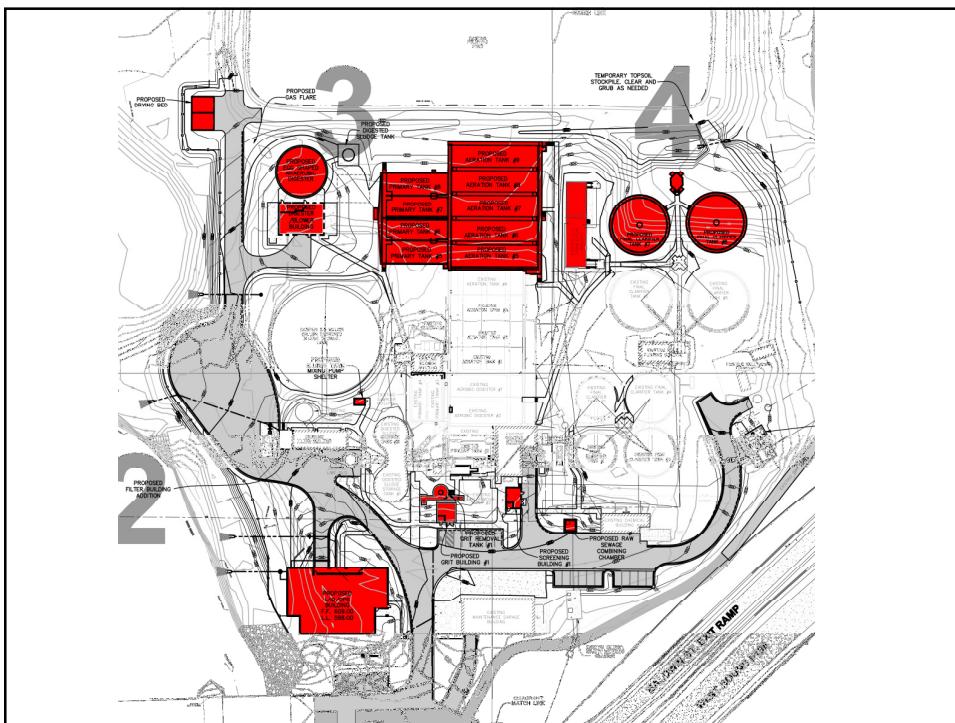
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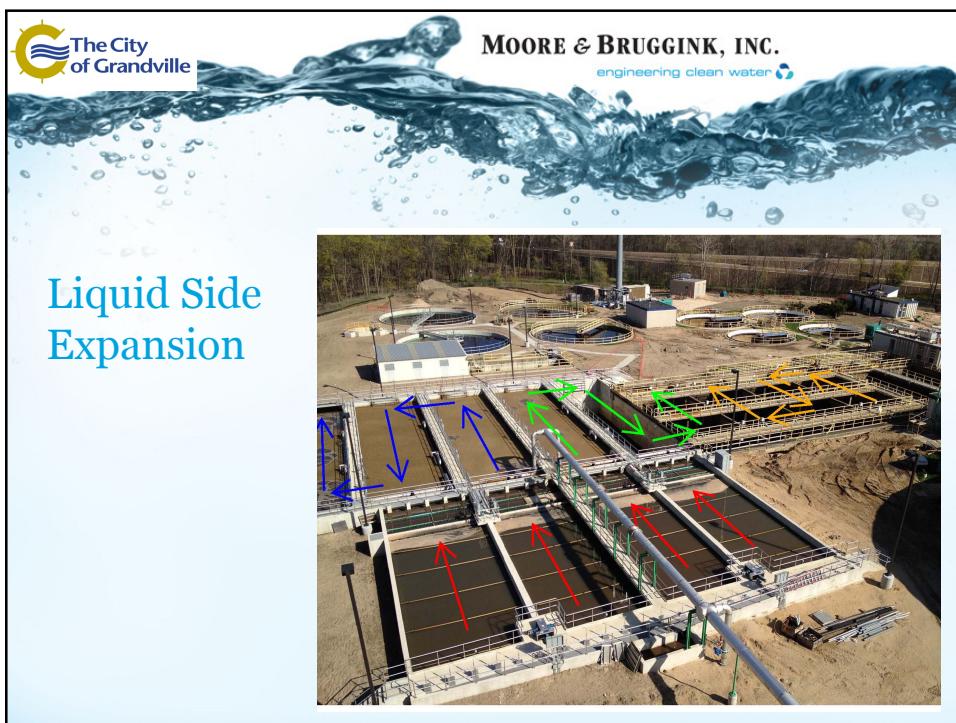


- Aerobic Digestion
- Anaerobic Digestion
- Thickening
- Storage
- Land Application

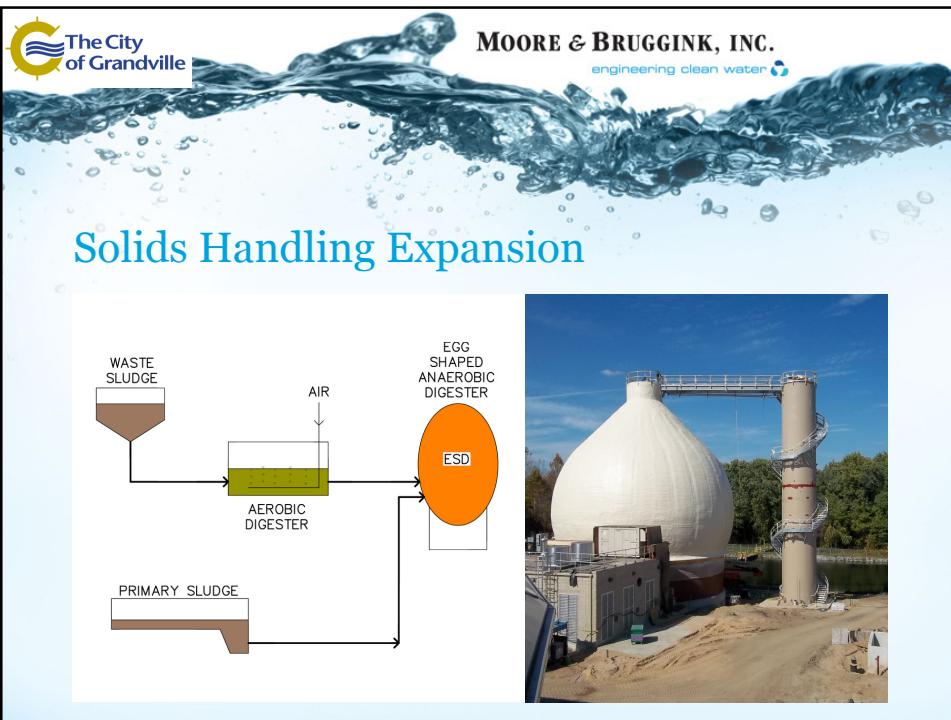












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## Solids Handling Expansion

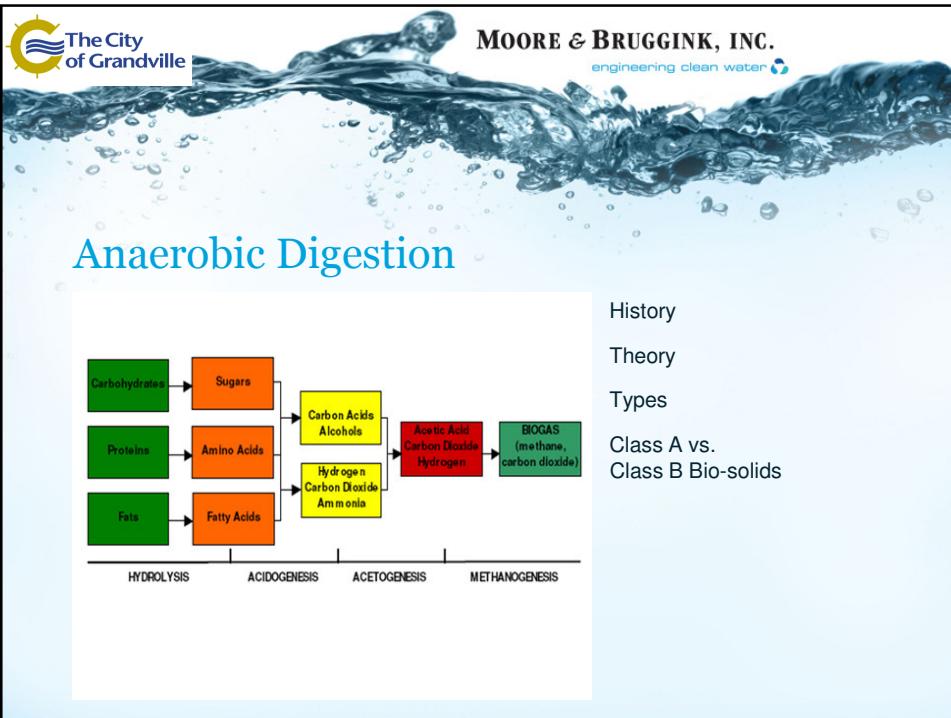


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## Solids Handling Expansion





History

Theory

Types

Class A vs.  
Class B Bio-solids

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## Why Egg Shaped Anaerobic Digester (ESD)?

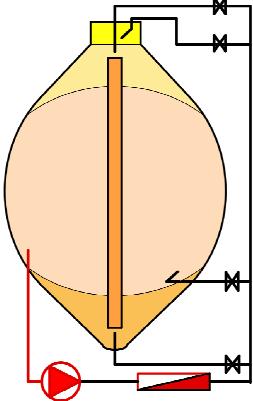


- Process
- Footprint
- Cost (life cycle)
  - cleaning
  - efficiency
- Client comfort
- Ability to go to Class A

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## Why Egg Shaped Anaerobic Digester (ESD)?

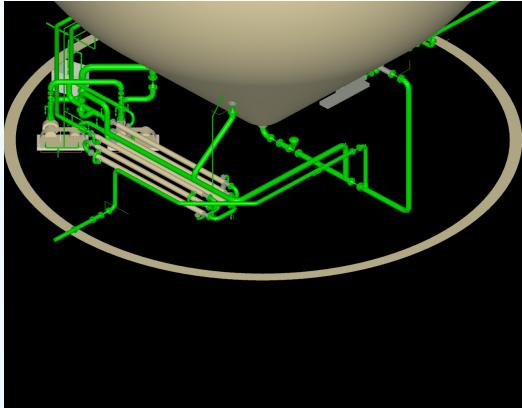


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## Why Egg Shaped Anaerobic Digester (ESD) ?



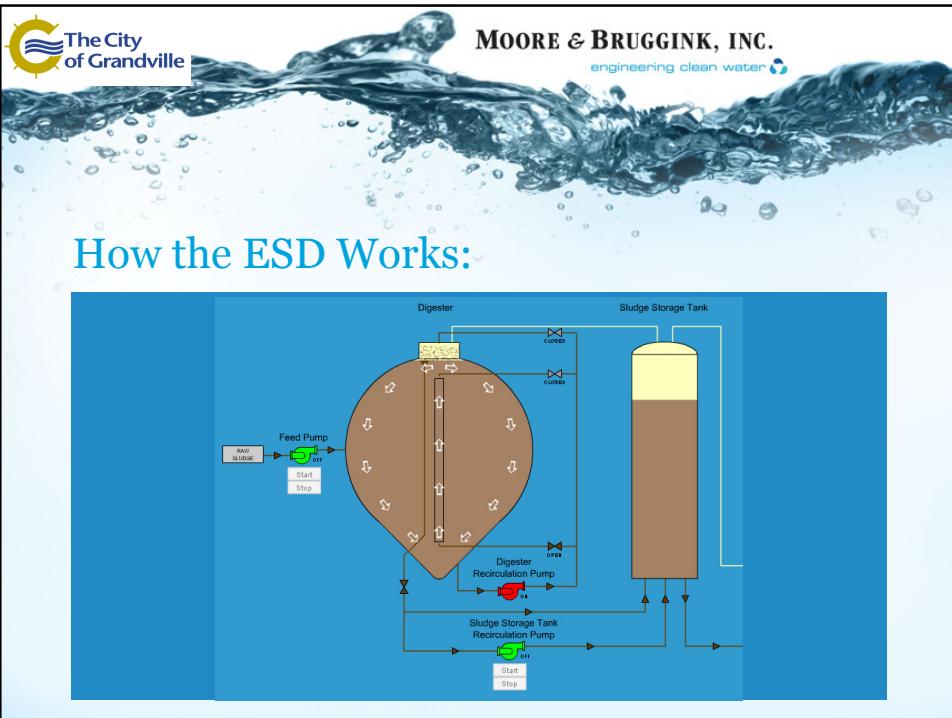
- Process
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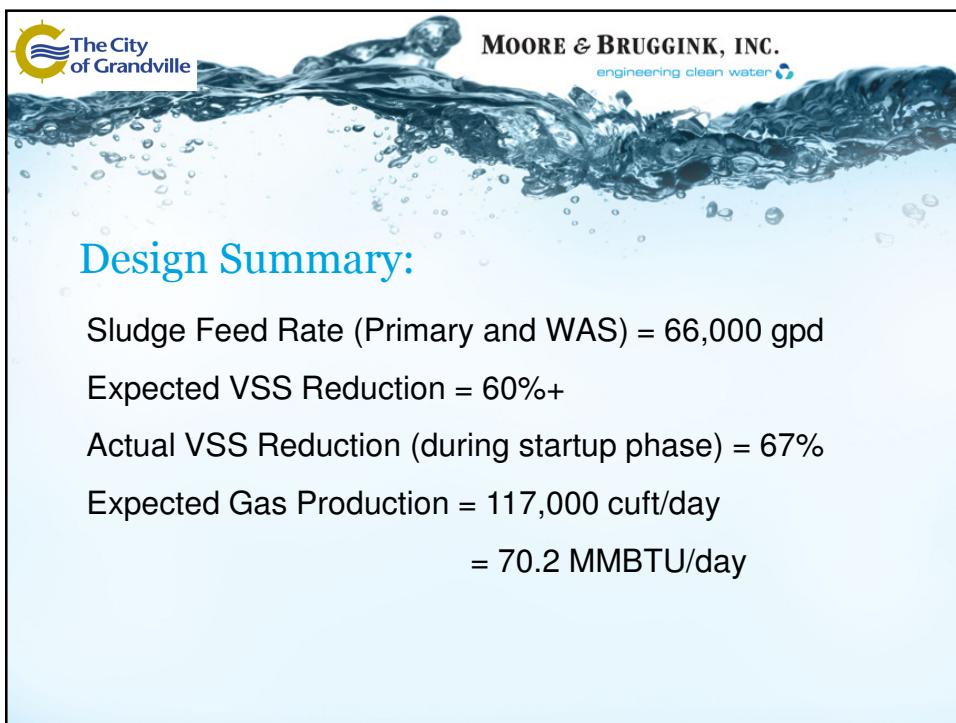
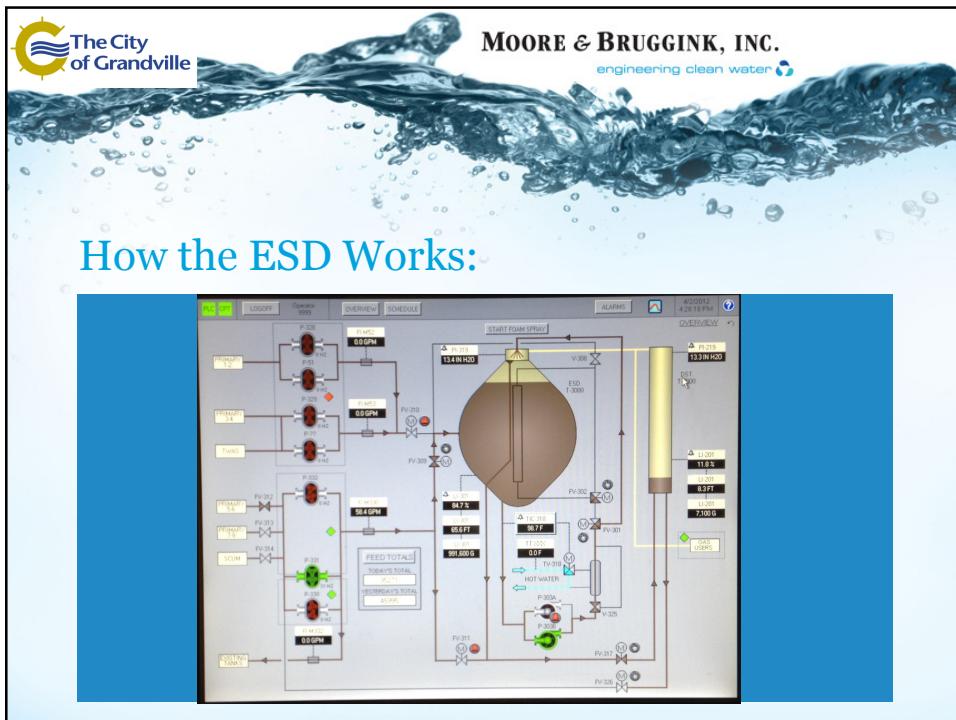
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## How the ESD Works:









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## Bio-Gas Discussion



Energy Content of Methane (Bio-gas) vs. Natural Gas

Contaminants

- Hydrogen Sulfide
- CO<sub>2</sub>
- Siloxanes

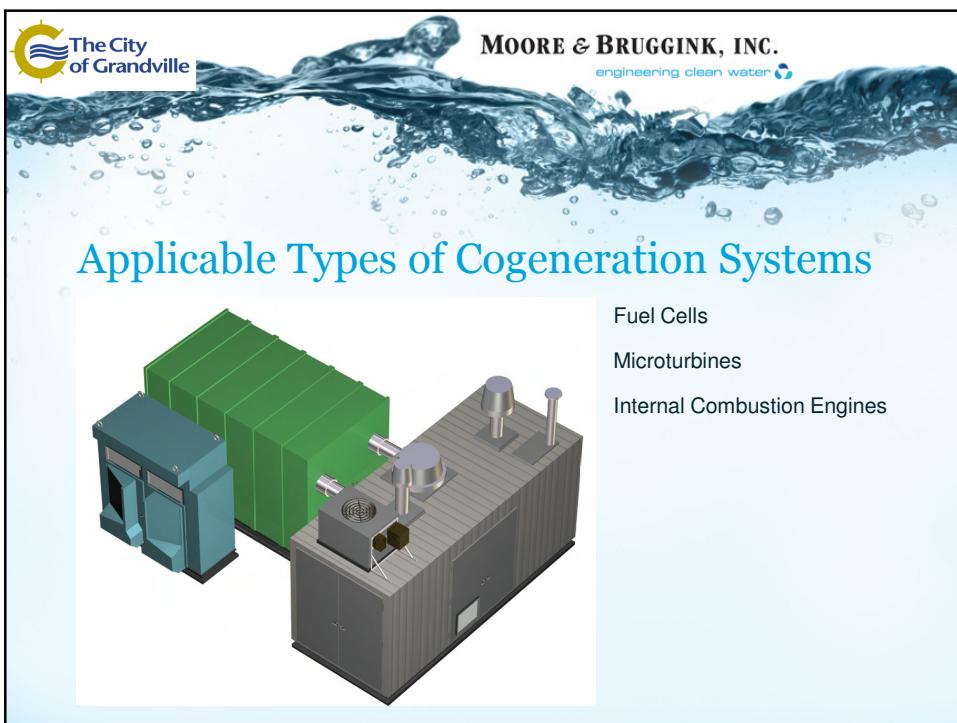
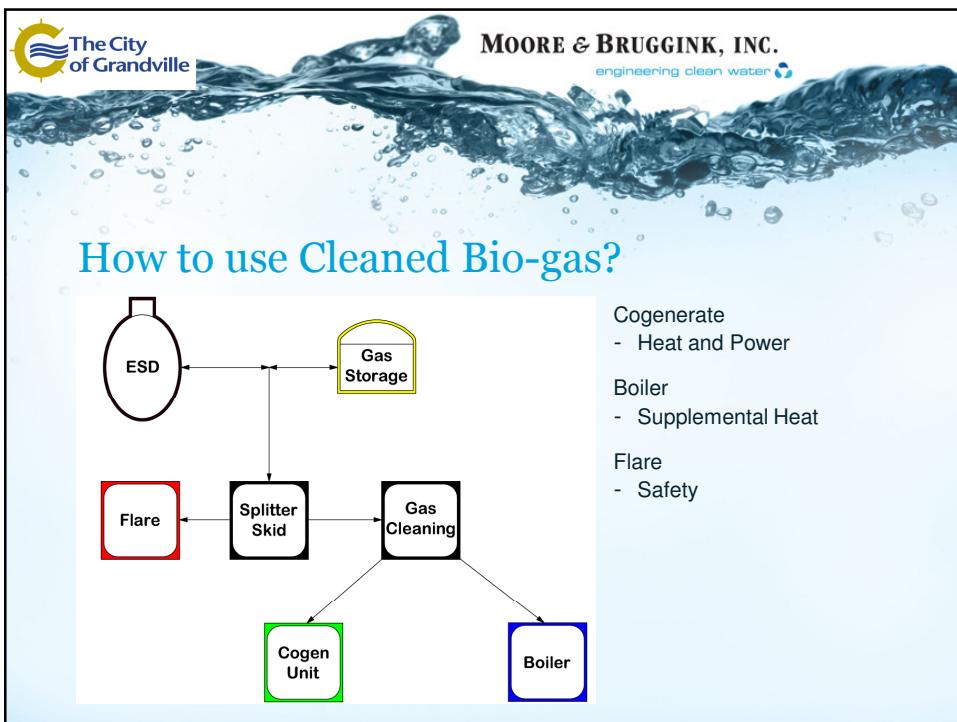
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## Gas Cleaning Skid



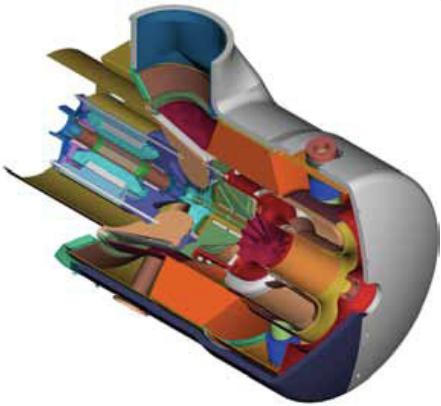
Unison Solutions



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## Applicable Types of Cogeneration Systems



- Fuel Cells
- Microturbines
- Internal Combustion Engines

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## I-power 280 Cogen Unit



Dual Fuel (bio-gas and natural gas)  
- 280 kW using Bio-gas,  
- 360 kW using Nat Gas

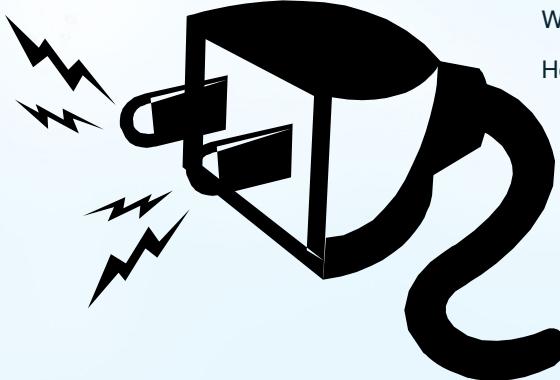
Internal exchangers to capture heat from engine cooling jacket and exhaust

Efficiency of 86%

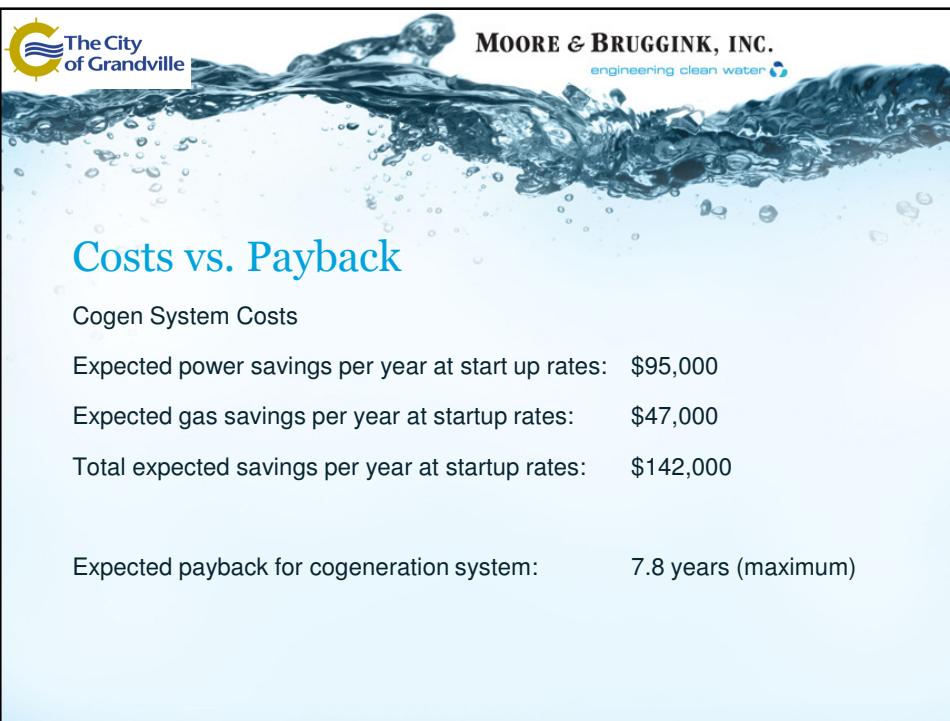
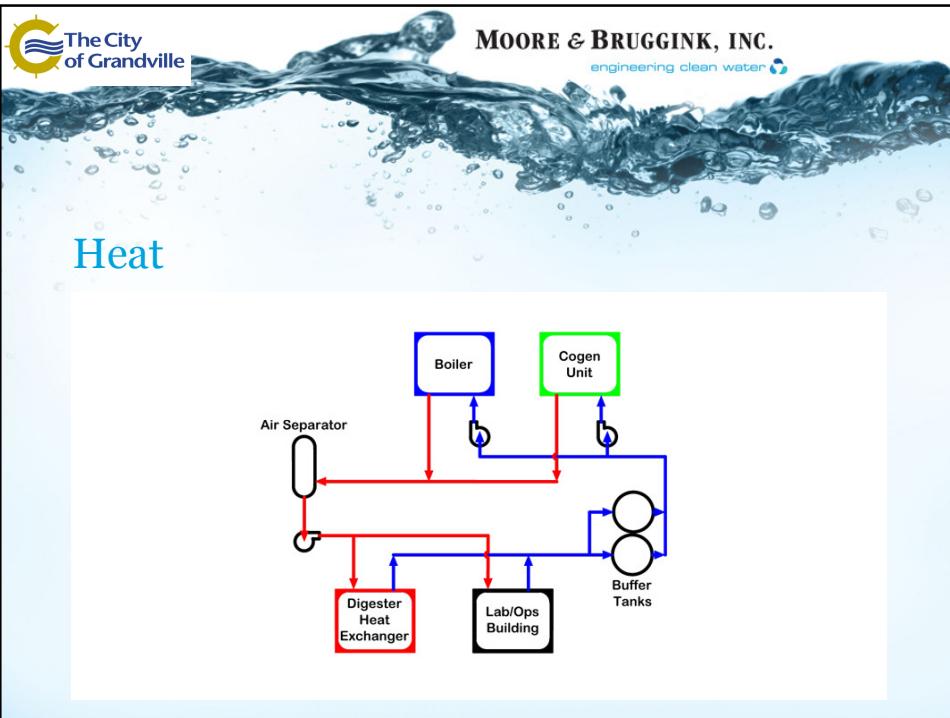
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## Power



What is power used for?  
How to get to Equipment?



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## Pictures and Facts



ESD and  
Digester/Blower  
Building  
Basement  
Foundation

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## Pictures and Facts



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## Pictures and Facts

42" Thick Concrete  
Base Slab



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## Pictures and Facts

Egg "Cup" and  
Basement Walls



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## Pictures and Facts



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## Pictures and Facts



Digester  
Blower  
Building  
Block Walls



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## Pictures and Facts



Egg  
Sheets  
Being  
Erected

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## Pictures and Facts

Egg Exterior      Egg Interior



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## Pictures and Facts

Top Cone Section



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## Pictures and Facts



Lifting Draft Tube and Piping assembly into place

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## Pictures and Facts

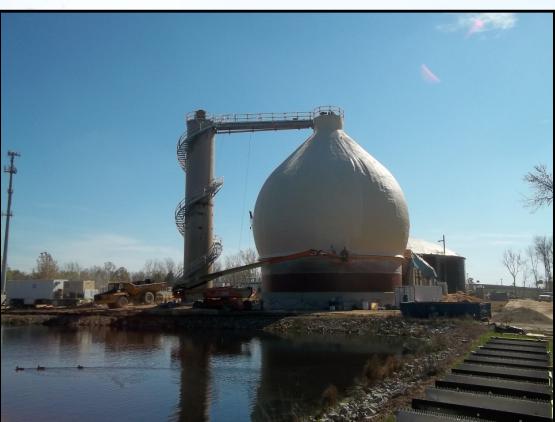
“Topping”  
The Egg



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## Pictures and Facts



Putting Insulation  
and Coating onto  
ESD Exterior

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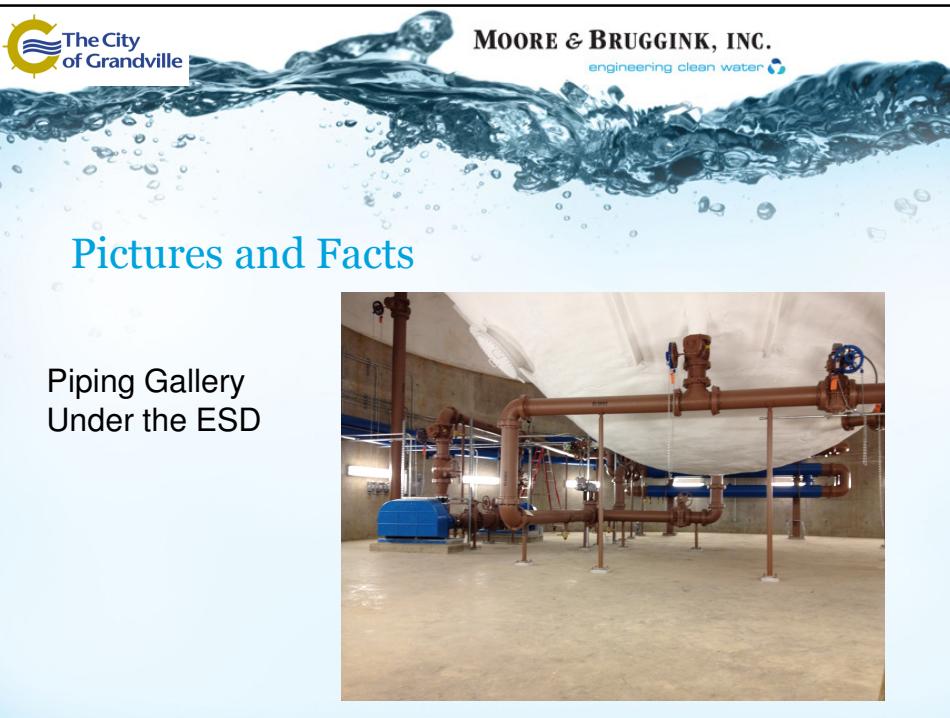
Picture of  
Painted Egg and  
Day Storage  
Tank

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## Pictures and Facts









Thanks!

