Northeast Digestion Roundtable 2019

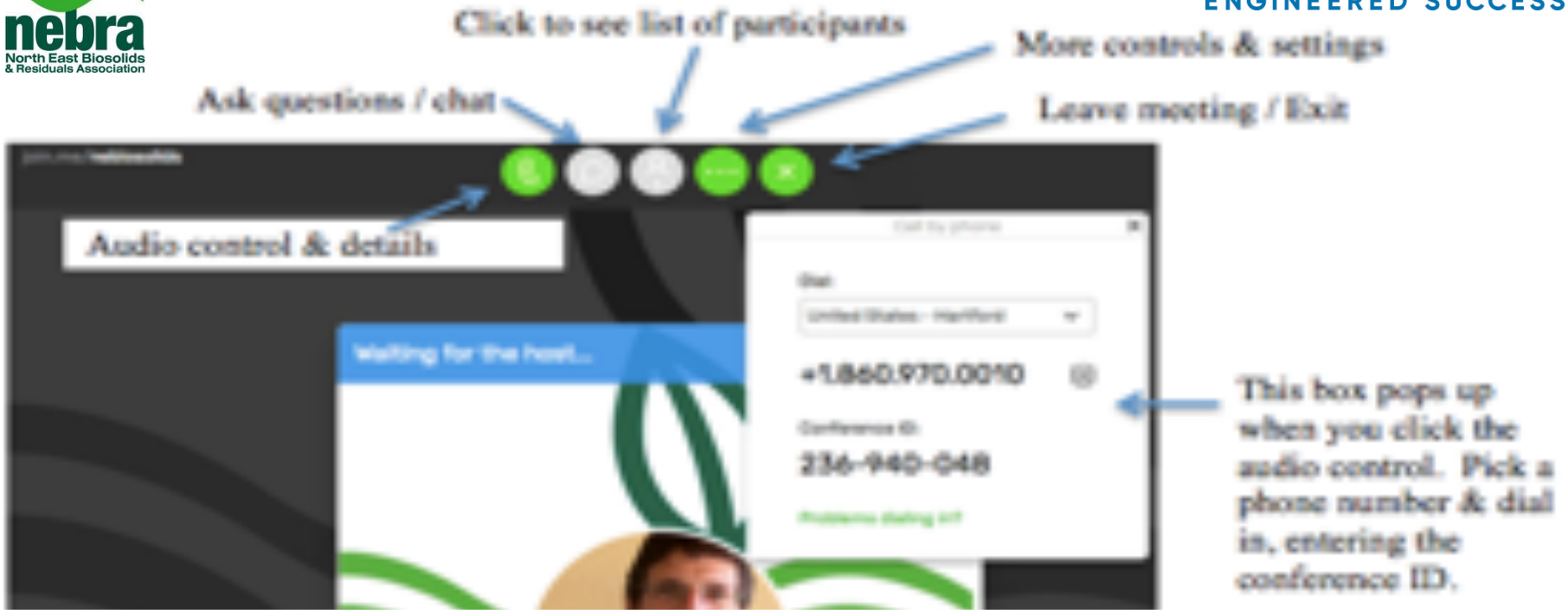
Quarterly webinars to share technical operations experiences & advance best practices regarding anaerobic digestion in this region.

NEDR # 14:
Microbial Ecology of New England's Anaerobic Digesters

Sponsored by: ANDRITZ ENGINEERED SUCCESS

nebra North East Biosolids & Residuals Association

INSTRUCTIONS



Microbial Ecology of New England's Anaerobic Digesters

Caitlyn Butler and Nick Tooker
University of Massachusetts, Amherst

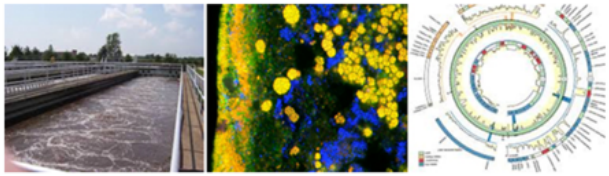
For

The New England Biosolids RoundTable

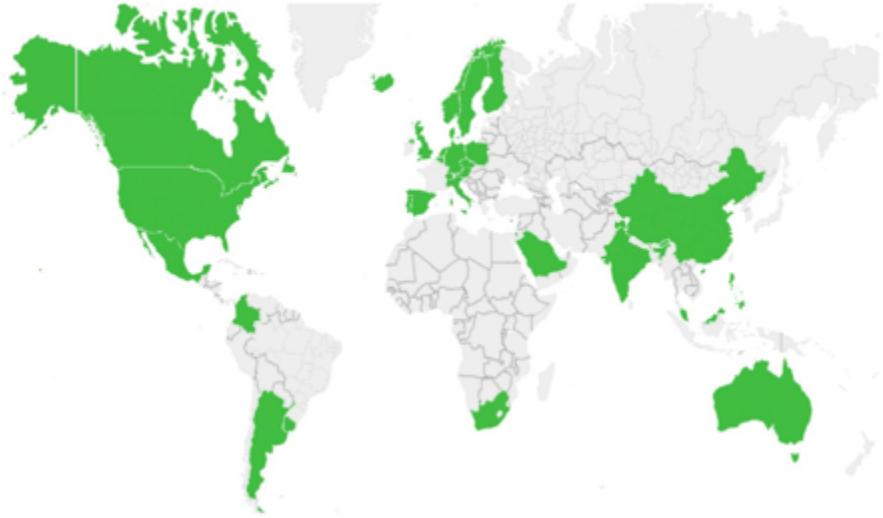
October 4, 2019

Global Sampling Campaign of Ecology of Wastewater Treatment

MiDAS: Field Guide to the Microbes of Activated Sludge and Anaerobic Digesters



Map and list of coordinators



First Sampling Campaign for Activated Sludge

Original article

MiDAS: the field guide to the microbes of activated sludge

Simon Jon McIlroy†, Aaron Marc Saunders†, Mads Albertsen, Marta Nierychlo, Bianca McIlroy, Aviaja Anna Hansen, Søren Michael Karst, Jeppe Lund Nielsen and Per Halkjær Nielsen*

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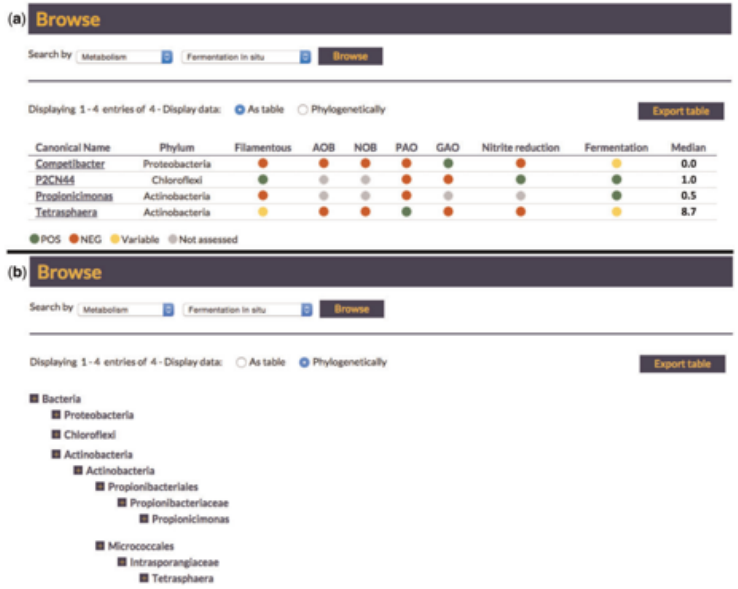
†These authors contributed equally to this work.

Citation details: McIlroy,S.J., Saunders,A.M., Albertsen,M., *et al.* MiDAS: the field guide to the microbes of activated sludge. *Database*, Vol. 2015, Article ID bav062; doi:10.1093/database/bav062

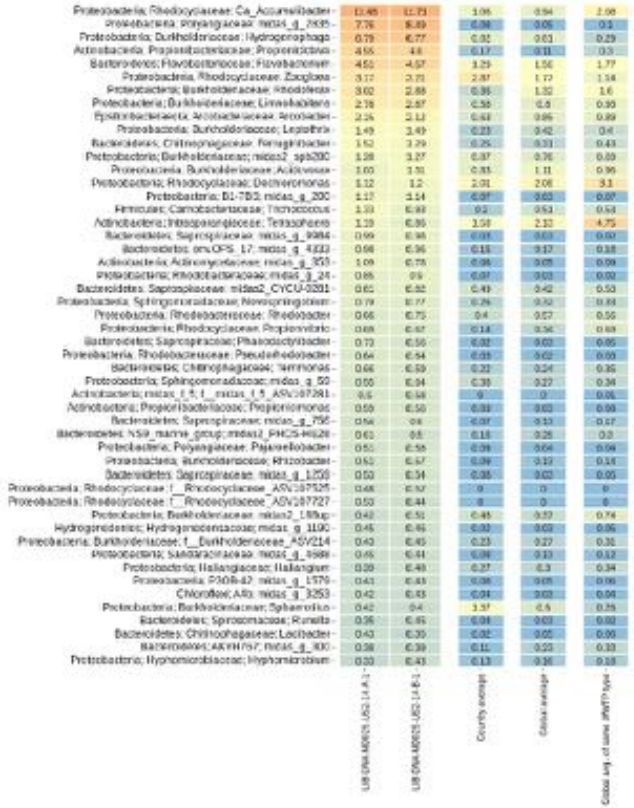
Received 25 February 2015; Revised 13 May 2015; Accepted 27 May 2015



http://www.midasfieldguide.org/en/search/

First Sampling Campaign - Example Output

The 50 most abundant genera found in the sample set



Known PAOs

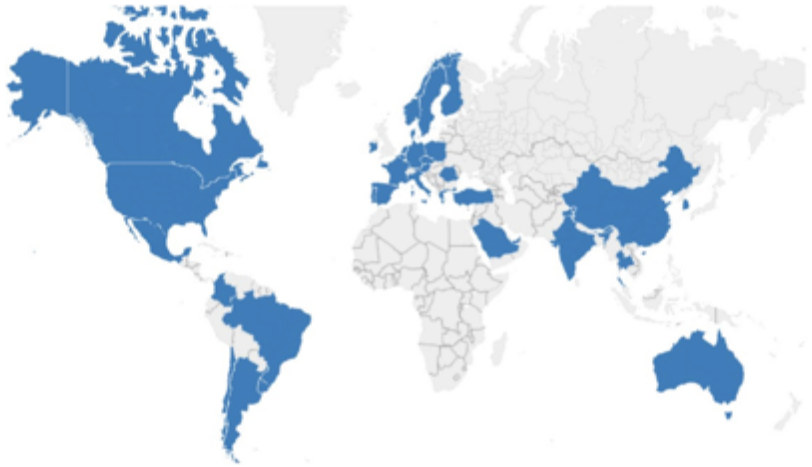
	LIB-DNA-M0025-US2-14-A-1	LIB-DNA-M0025-US2-14-B-1	Country average	Global average	Global avg. of same WWTP type
Proteobacteria; Rhodocyclaceae; Ca_Accumulibacter	11.48	11.71	1.06	0.94	2.08
Proteobacteria; Rhodocyclaceae; Dechloromonas	1.12	1.2	2.01	2.06	3.1
Actinobacteria; Intrasporangiaceae; Tetrasphaera	1.19	0.86	1.58	2.13	4.75
Actinobacteria; Propionibacteriaceae; Tessaracoccus	0.23	0.2	0.02	0.07	0.13
Gemmatimonadetes; Gemmatimonadaceae; Gemmatimonas	0.01	0.02	0.07	0.07	0.06
Cyanobacteria; midas_f_1485; Ca_Obscuribacter	0	0.01	0.15	0.13	0.19
Actinobacteria; Propionibacteriaceae; Microlunatus	0	0	0	0.02	0.02
Proteobacteria; Burkholderiaceae; Malikia	0	0	0	0.02	0
Proteobacteria; Rhodocyclaceae; Quatrionicoccus	0	0	0	0	0.01
Proteobacteria; Pseudomonadaceae; Pseudomonas	0	0	0.21	0.09	0.13

Known Nitrifiers

	LIB-DNA-M0025-US2-14-A-1	LIB-DNA-M0025-US2-14-B-1	Country average	Global average	Global avg. of same WWTP type
Proteobacteria; Nitrosomonadaceae; Nitrosomonas	0.34	0.33	0.48	0.62	0.49
Nitrospirae; Nitrospiraceae; Nitrospira	0.27	0.2	1.73	1.61	1.59
Proteobacteria; Gallionellaceae; Nitrotoga	0.04	0.03	0.13	0.24	0.24
Proteobacteria; Nitrosomonadaceae; Nitrosospira	0	0	0	0.01	0
Proteobacteria; Xanthobacteraceae; Nitrobacter	0	0	0	0.01	0

Second Campaign for Anaerobic Digesters

Map and list of coordinators (anaerobic digesters)



North America

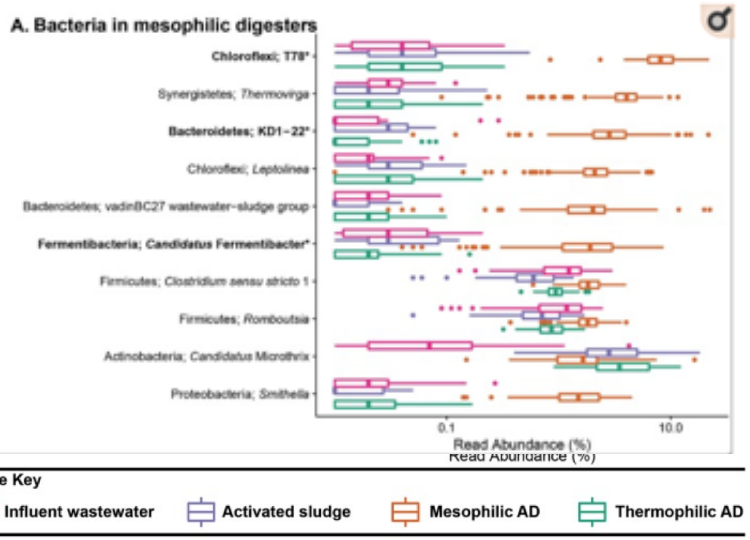
Canada
Associate Professor Brandon Gilroyed, School of Environmental Sciences, University of Guelph Ridgetown Campus. Ontario.

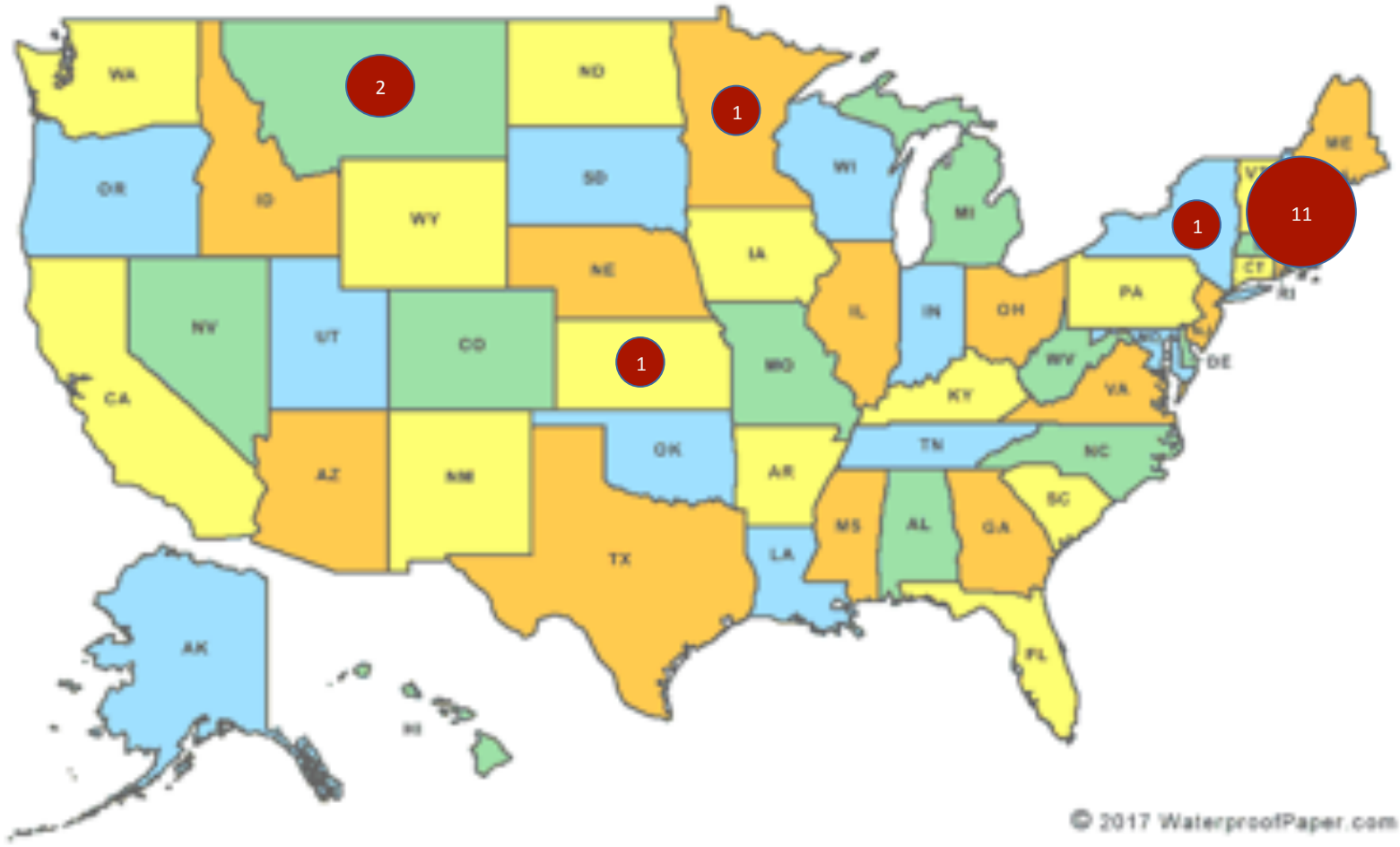
USA
Aloke Vaid, Operations Manager Veolia (California). San Diego, CA.

Professor of practice Nick Tooker, Department of Civil and Environmental Engineering, University of Massachusetts Amherst. Amherst, MA.

MiDAS 2.0: an ecosystem-specific taxonomy and online database for the organisms of wastewater treatment systems expanded for anaerobic digester groups

Simon Jon McIlroy, Rasmus Hansen Kirkegaard, Bianca McIlroy, Marta Nierychlo, Jannie Munk Kristensen, Søren Michael Karst, Mads Albertsen and Per Halkjær Nielsen*

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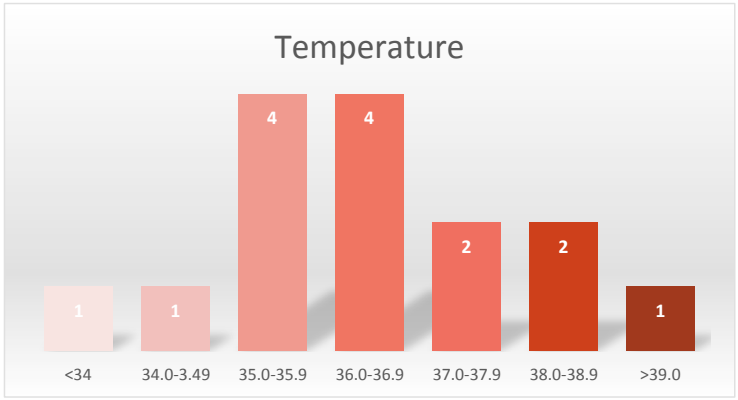
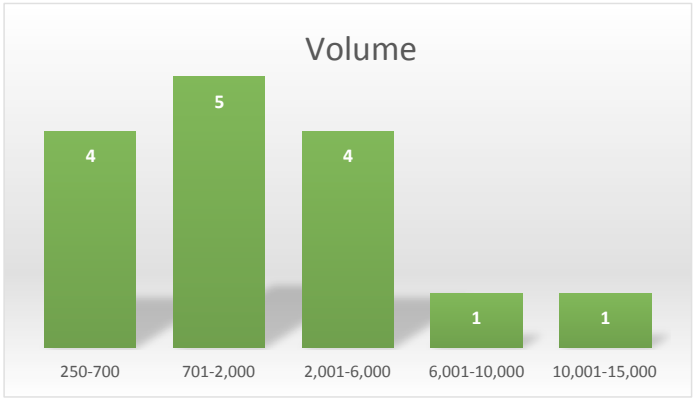
Generalized AD profiles



(°C)



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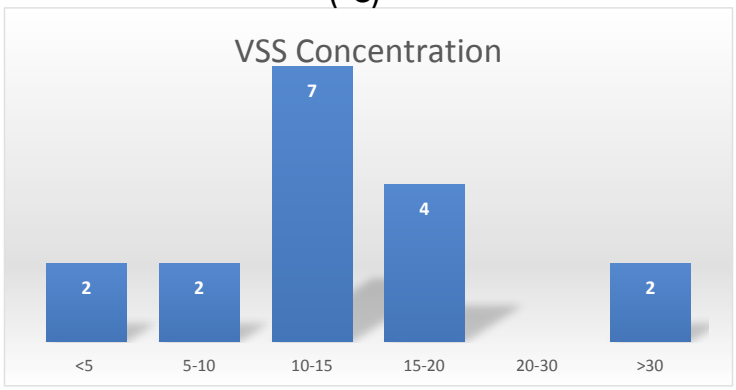
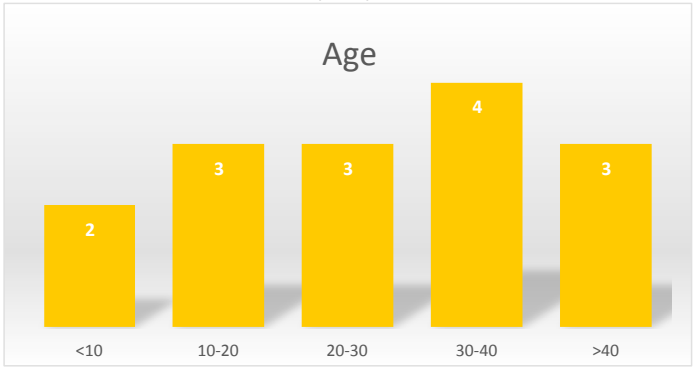
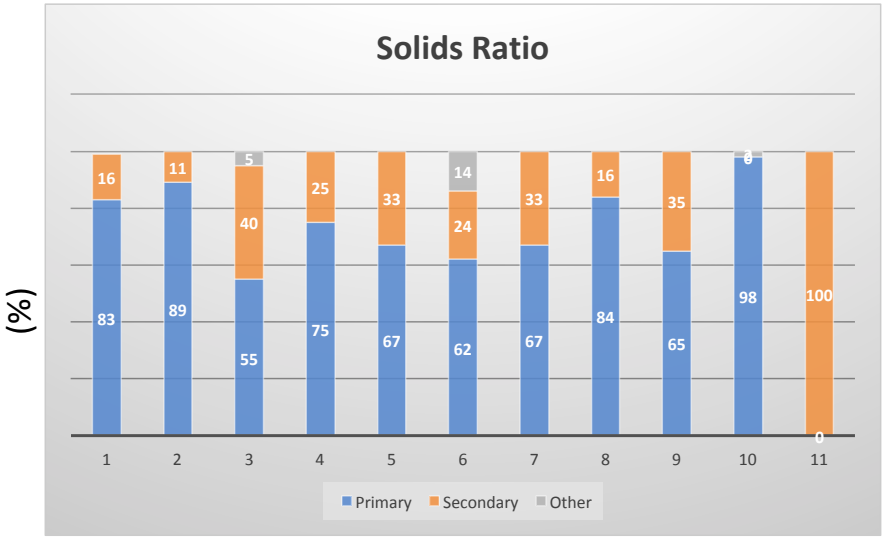


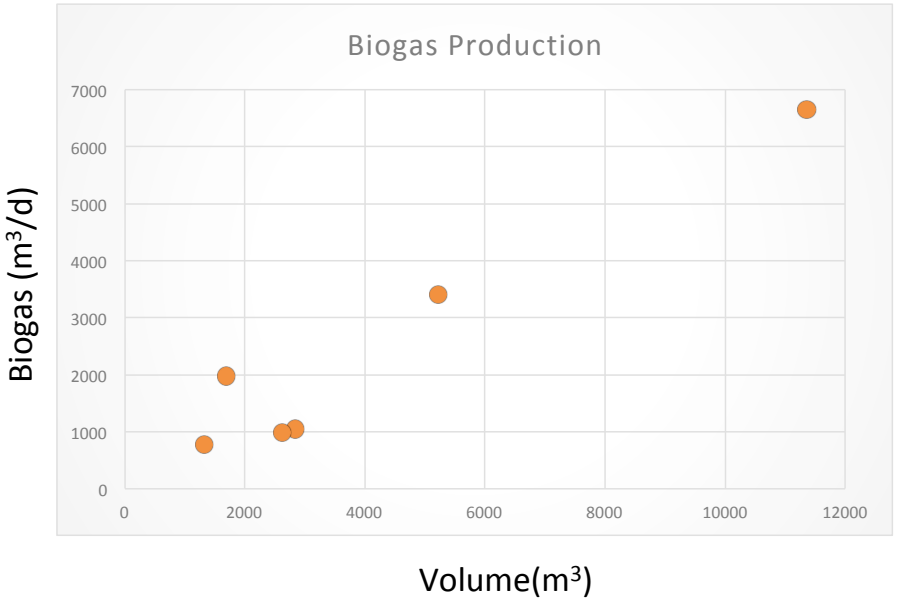
(g/L)



(years)

Generalized Operational Data





Questions for this data set

- Who are the communities in these digesters?
- Is there a geographic correlation to the microbial ecology?
- Does a single operational parameter strongly correlate with community structure?
- Are there community structures that correlate strongly with biogas production?

How can we use this data set to answer your questions?

- Are there questions/curiosities/ needs that we can support with the analysis of this data set?
- We welcome ideas that would be useful to the broader community
- Are there other data needs that are not currently met?
- Things to keep in mind:
  - This is a single sampling time point
  - This will primarily cover the bacterial (and some archael) populations


SEPARATION
SUSTAINABLE BIOSOLIDS SOLUTIONS
GLOBAL PERSPECTIVES
FROM YOUR MOST EXPERIENCED PARTNER
OCTOBER 4, 2019
ANDRITZ
ENGINEERED SUCCESS

WHO IS ANDRITZ?

World leader in high performance process equipment

PULP & PAPER

39

% order intake*

PRODUCT OFFERING

Equipment for production of all types of pulp, paper, tissue, and board; energy boilers

METALS

29

% order intake*

PRODUCT OFFERING

Presses/press lines for metal forming (Schuler); systems for production of stainless steel, carbon steel, and non-ferrous metal strip; industrial furnace plants

HYDRO

22

% order intake*

PRODUCT OFFERING

Electromechanical equipment for hydropower plants (turbines, generators), pumps; turbo generators

SEPARATION

10

% order intake*

PRODUCT OFFERING

Equipment for solid/liquid separation for municipalities and various industries; equipment for production of animal feed and biomass pellets

* Share of total Group order intake 2018

HQ in Austria with 280 locations in over 40 countries

SALES

- > USD 7 Billion/year

EMPLOYEES

- > 29,600 globally

SEPARATION – PRODUCT OVERVIEW

OUR STRENGTH IS PROVIDING SOLUTIONS – WE HELP EVALUATE THE OPTIONS

SCREENING, THICKENING, DEWATERING, DRYING (all the top technology choices)

MECHANICAL SEPARATION

- Decanter Centrifuges
- Filter Centrifuges
- Separators
- Disc and Drum Filters
- Filter Presses
- Screens, Drains, Presses
- Thickener and Flocculant Plants

THERMAL SEPARATION

- Contact and Paddle Dryers
- Belt, Drum, and Fluid Bed Dryers

OTHER EQUIPMENT

SERVICE AND AUTOMATION

- Process Monitoring, Improvement, and Training

SEPARATION NORTH AMERICA

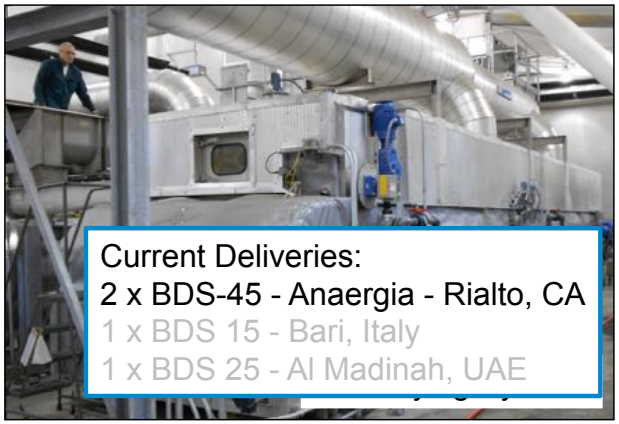
THE KEY TO MAKING THE BEST SELECTION – DATA – SEPARATION LAB - TEXAS

SEPARATION NORTH AMERICA

FULL SERVICE SHOP IN TEXAS - LAB, EQUIPMENT AND PLANT DESIGN AND LONG TERM SERVICE

Current Deliveries:
1 x DDS-70 - City Of Hamilton, ON
1 x DDS60 – Irvine Ranch, CA
1 x DDS-180 - Almerdingen, DE

Current Deliveries:
FDS-60 – CRD Victoria, BC
2 x FDS 60 - Istanbul, Turkey
9 x FDS 100 - Shanghai, China

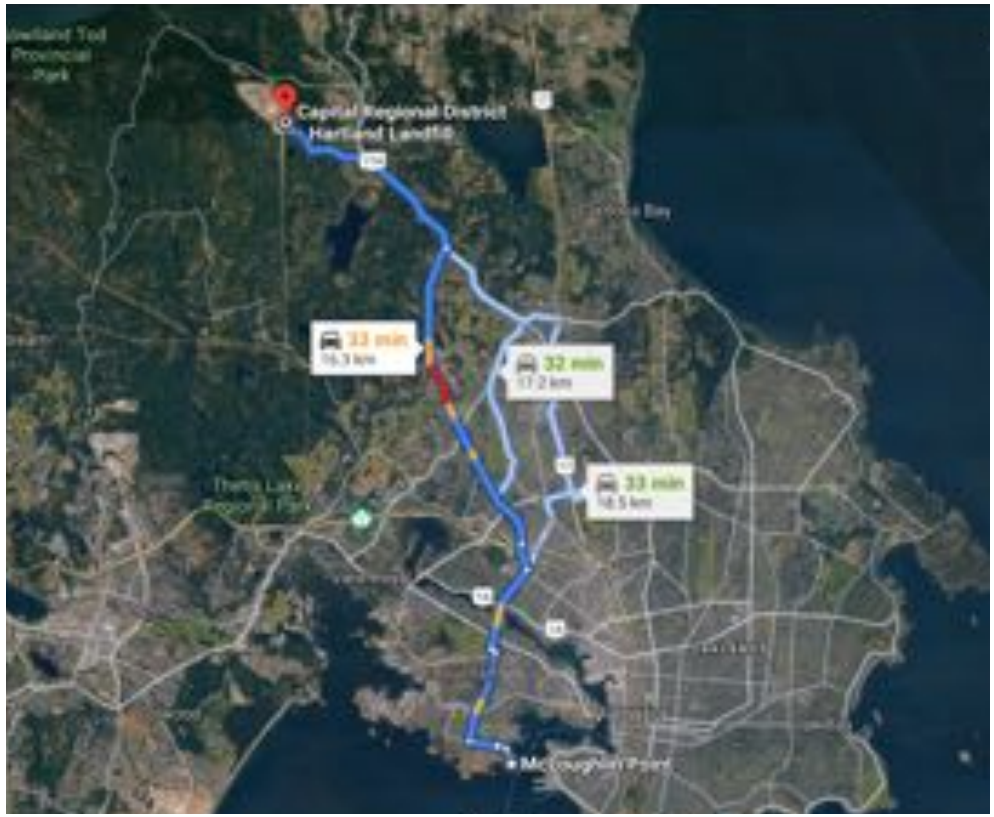


Current Deliveries:
2 x BDS-45 - Anaergia - Rialto, CA
1 x BDS 15 - Bari, Italy
1 x BDS 25 - Al Madinah, UAE

Current Deliveries:
1 x 10W80 Stephens Point, WI
3 x 14W190 - Zhengzhou China
3 x 17W300 - Jebel Ali, Dubai

OVERVIEW – FLUID BED DRYING SYSTEM (FDS)

CAPITAL REGIONAL DISTRICT, VICTORIA BC



KEY POINTS

Design Build Operate for 20 years (Synagro)

Landfill location 18km pipeline from new WWTP (landfill gas dedicated to engine generators)

Mesophilic digestion after gravity table thickening to ~6% DS – anticipated VSD of 45-50% - digester gas for use in dryer

High solids Centrifuge dewatering to estimated 22% DS dewatered cake

Fluid Bed Drying 24/7 to produce Class A Biosolids at 94% DS – granular form for use in agriculture or as fuel at cement plant

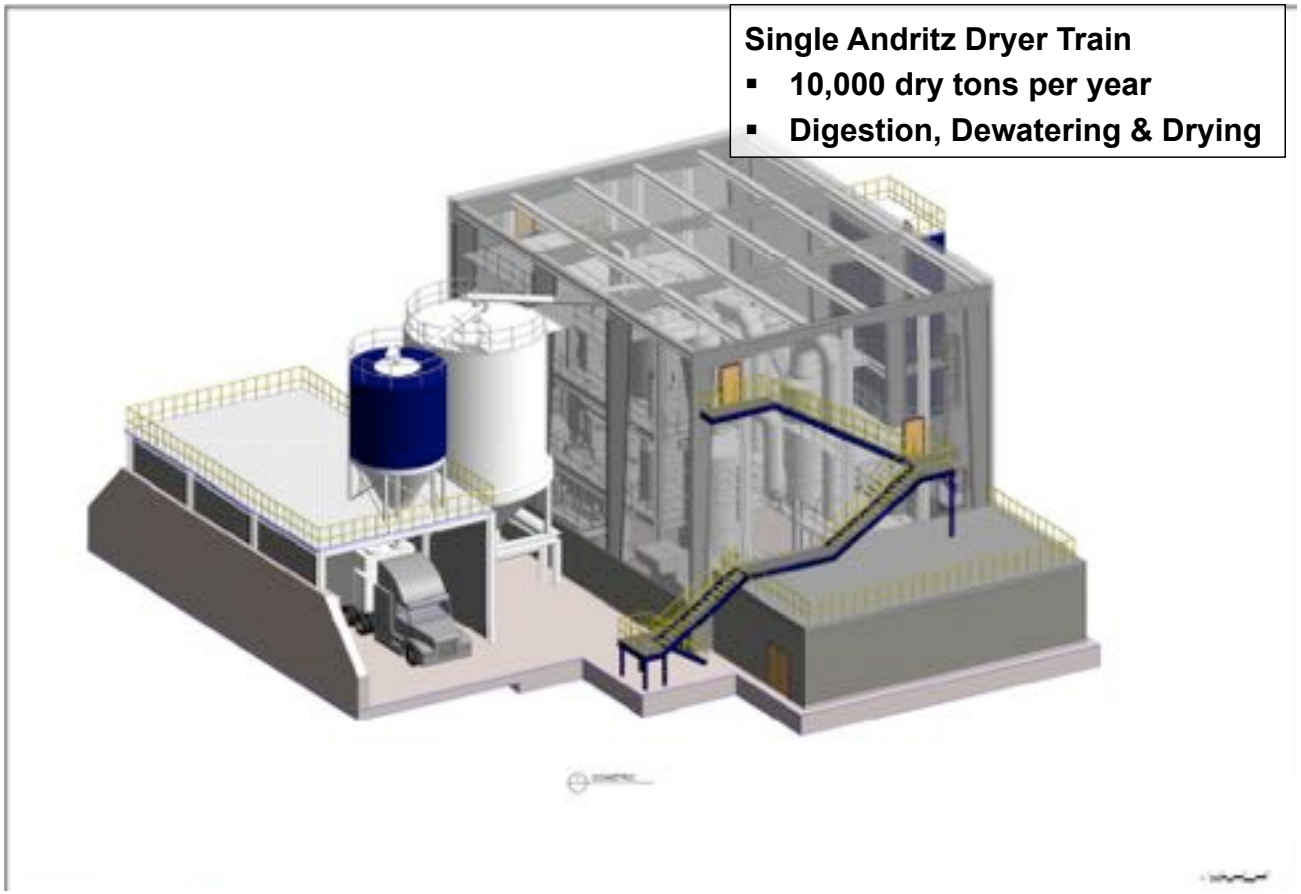
Heat recovery from dryer - ~75% of input

Plant will run without use of natural gas/propane

OVERVIEW – FLUID BED DRYING SYSTEM (FDS)

CAPITAL REGIONAL DISTRICT, VICTORIA BC

SYNAGRO AT VICTORIA, BC



Single Andritz Dryer Train

- **10,000 dry tons per year**
- **Digestion, Dewatering & Drying**

CONSTRUCTION UPDATE

CAPITAL REGIONAL DISTRICT, VICTORIA BC – AUGUST, 2019

SEPARATION

OCTOBER 16-18 IN SPRINGFIELD

STEVE MACOMBER
817-235-6577
STEVE.MACOMBER@ANDRITZ.COM

OCTOBER 4, 2019

ANDRITZ

ENGINEERED SUCCESS

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