DAIRY DIGESTER OVERVIEW

CLEAN & PROSPEROUS INSTITUTE CA STUDY MISSION 2 JUNE 23, 2022

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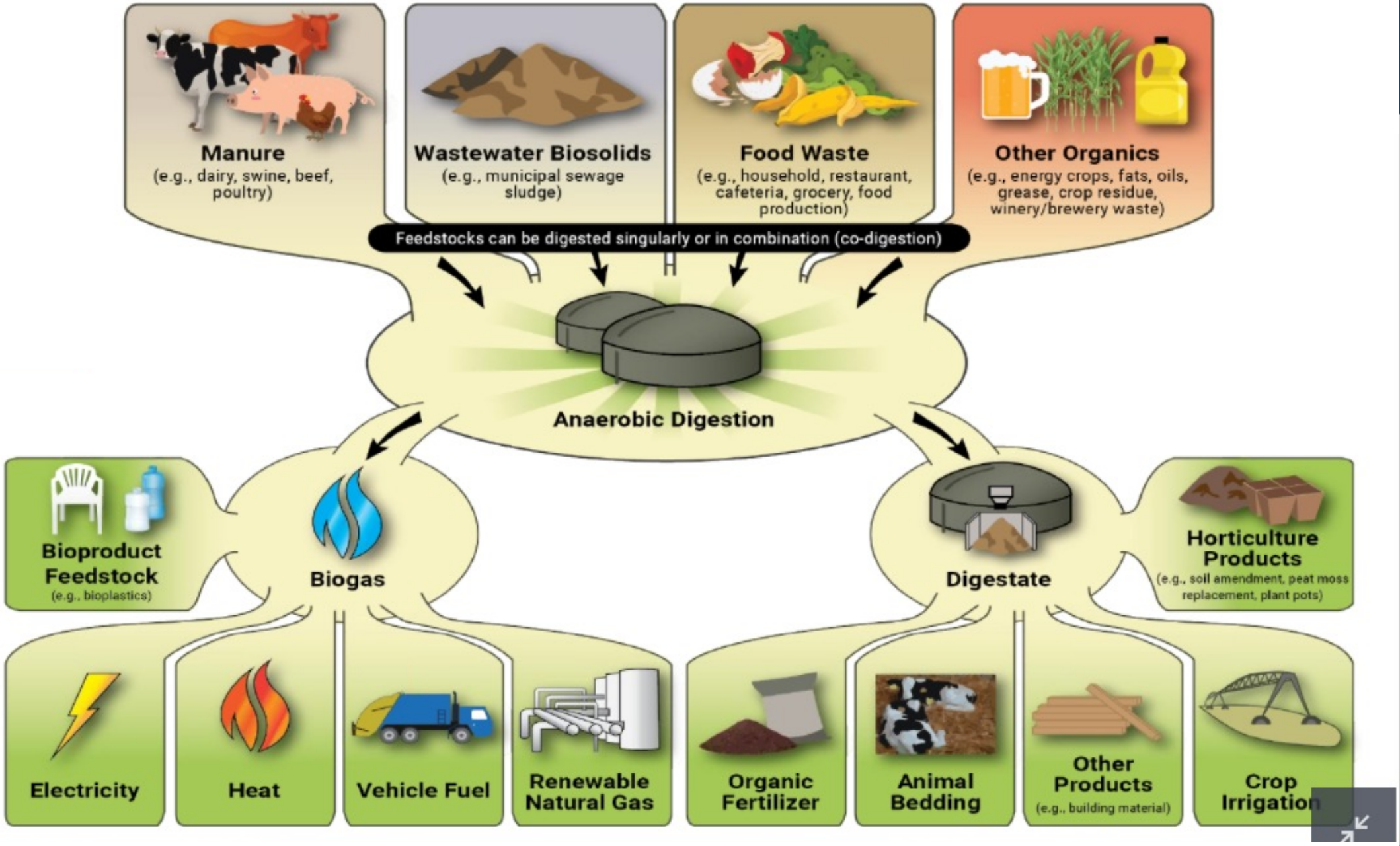
Dairy Digester Overview Presentation

1. Anaerobic Digestion 101 – digester uses and types
2. Biogas transportation fuel pathways – RNG, EV
3. Revenue sources – energy, state LCFS / CFS credit, federal RFS credit (D3 RIN, eRIN)
4. Pre-digester manure collection improvements, water conservation
5. Post-digester add-ons – nutrient recovery & mgt
6. Dairy digester incentives and limiting factors

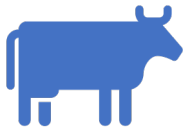
Lower Value Products $



Higher Value Products $$$

How do dairy digesters reduce GHG emissions?

Freestall Flush Barns, Flushed Feed Lanes

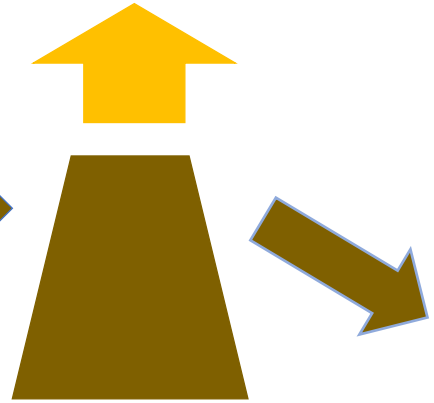


Manure and flush water

Before Digester Project

Manure solids / VS to anaerobic storage Lagoon (No Separation)

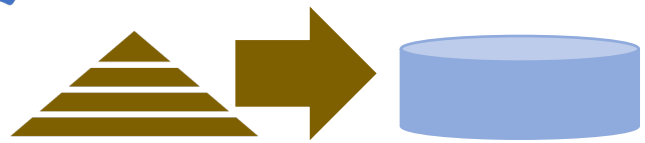
CH4 Emissions



Field Application

Reduced CH4 Emissions

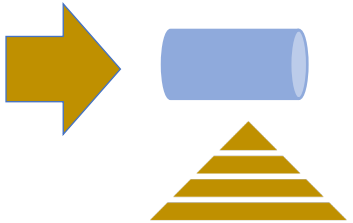
With Digester and Nutrient Recovery



Anaeerobic Digesters

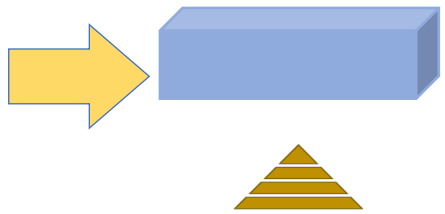
BIOGAS > FUEL

Primary Separation
Borger screwpress x3

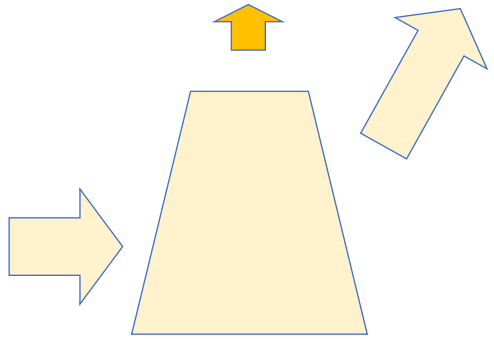


Fiber Bedding
(No Composting)

Advanced Solids Removal



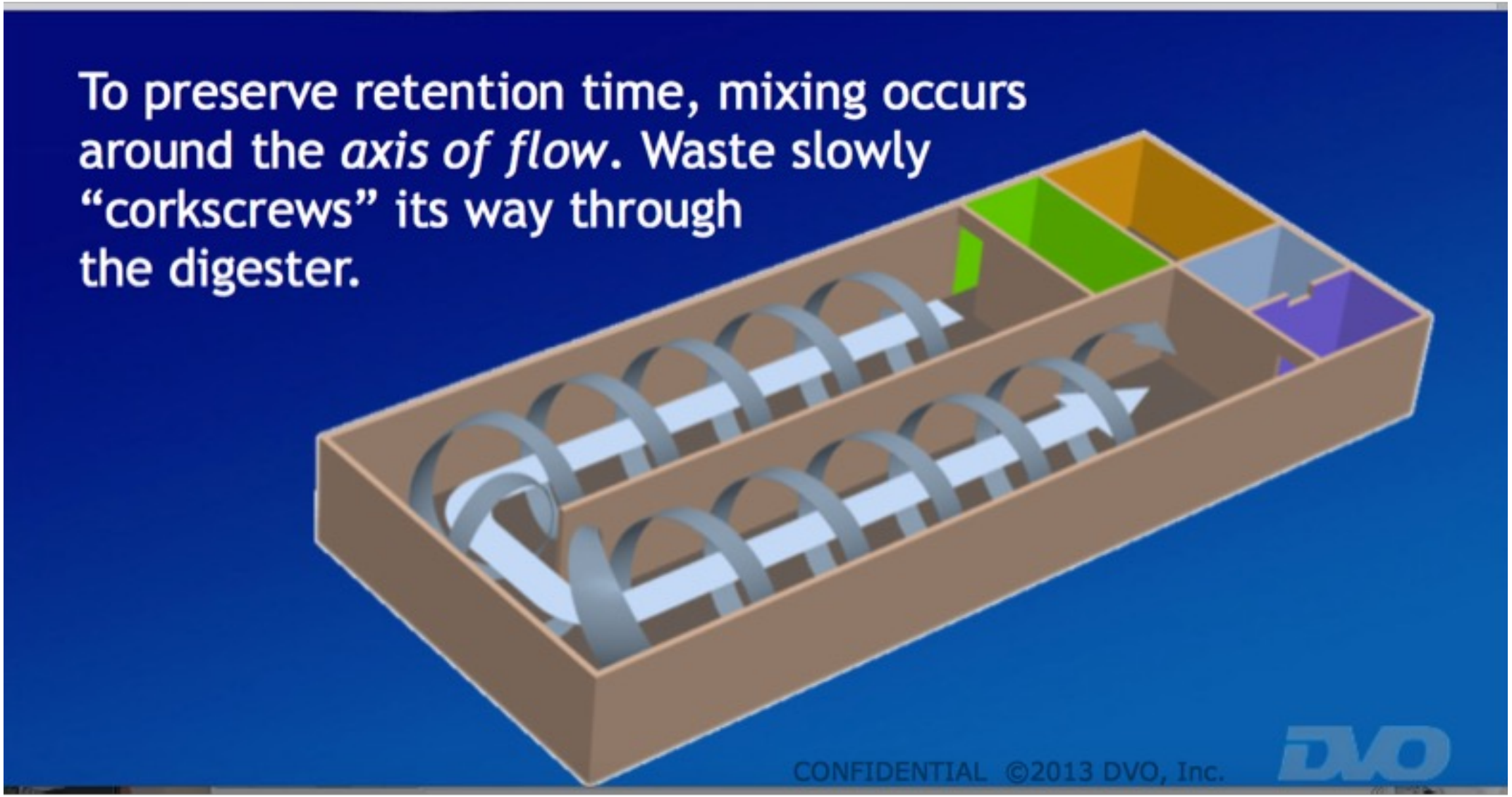
Nutrient Rich Solids (biofertilizer)



"Clean" Water Use & Storage

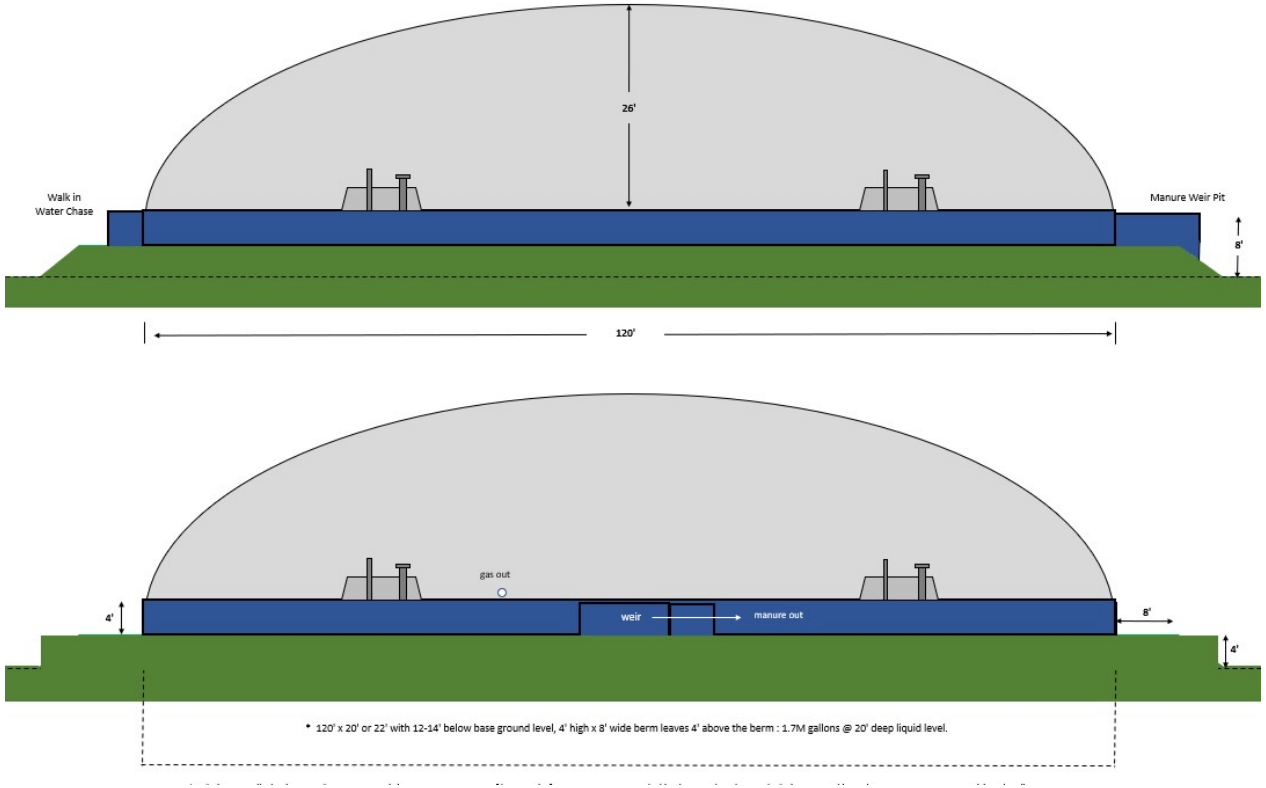
No trucking Lagoon Water

DVO Mixed Plug Flow Anaerobic Digester Diagram



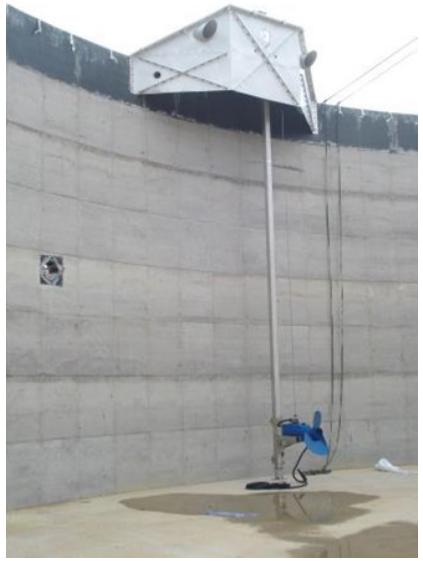
Martin EM-21 “Complete Mix” (CSTR) Digester

Example of a 1.52 M gallon tank.



EM -21 digester

by Martin Construction Resource



Hartman Engineering Covered Lagoon Digester (CA)

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Covered Lagoon under construction – lined with sludge pipes

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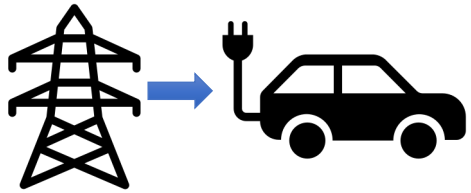
Biogas-to-Power for Electric Vehicle Charging Pathway

Manure with
"Lagoon Baseline"

Anaerobic Digestion > Biogas

Digested Manure

Biogas-Fueled Generator
(approved by CARB)



Ultra-Low Carbon Intensity (CI) Electricity & Hi-Value State & Federal Credits

Electric Vehicle (EV) charging

Pathogens, odor nearly eliminated; enhanced fiber & nutrient recovery options; sustainability story

Dairy Gets guaranteed payment per cow & equity share with investment

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Biogas Fueled Electric Generator Set

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Generator Building at Dairy

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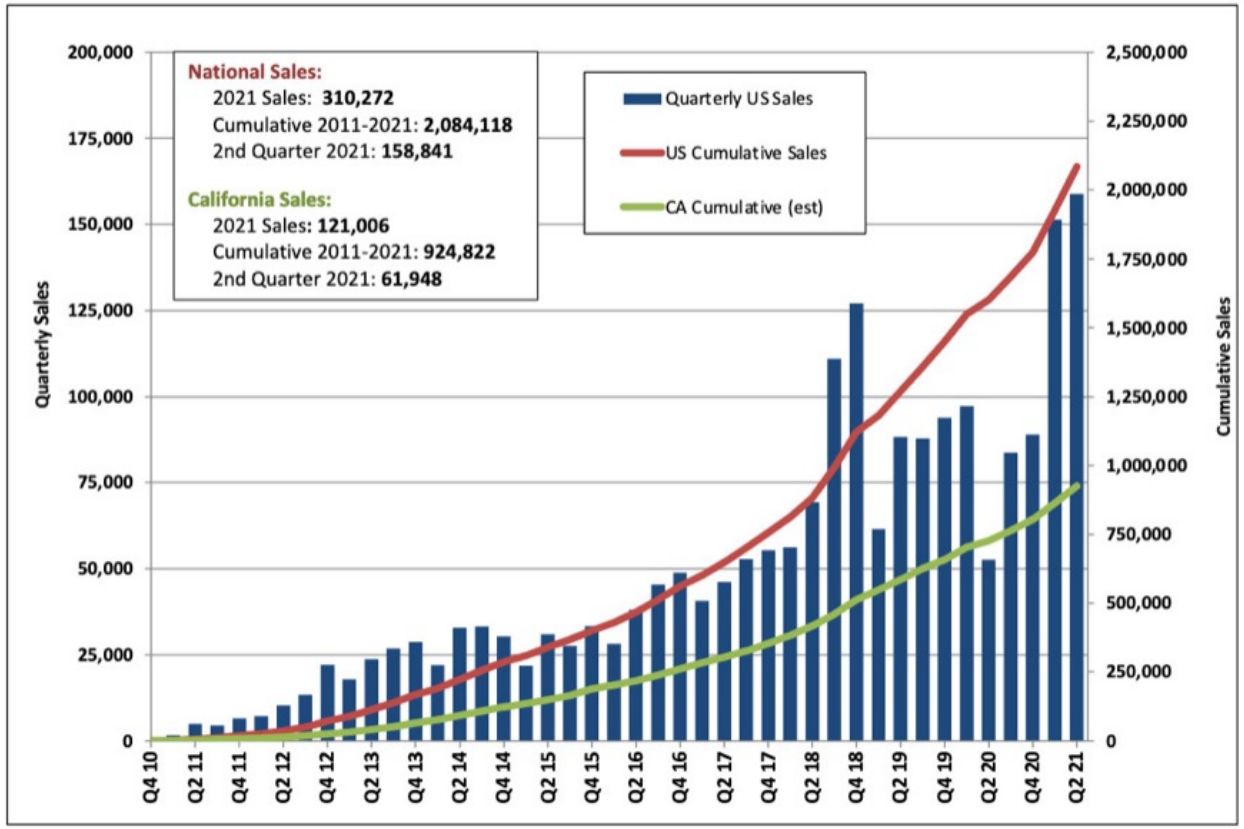
Dairy Digester for Electric Vehicle (EV) Charging – Growing Demand for EV Power

Demand for EVs and power for EV charging is surging and will continue to grow due to:

- Low cost of “fuel” compared to gasoline/diesel
- Declining cost of EVs, especially w/ gov’t incentives for EVs and
- Restrictions on internal combustion engine (ICE) vehicles sales
- Rapidly expanding network of charging stations

VELOZ

Electric Vehicle Sales in California and the U.S.



Note: CA sales are 39% of national sales.
Data Source: California Energy Commission (2021).
Retrieved August 3, 2021 from http://www.energy.ca.gov/zevstats

Q2 2021 Data Update.

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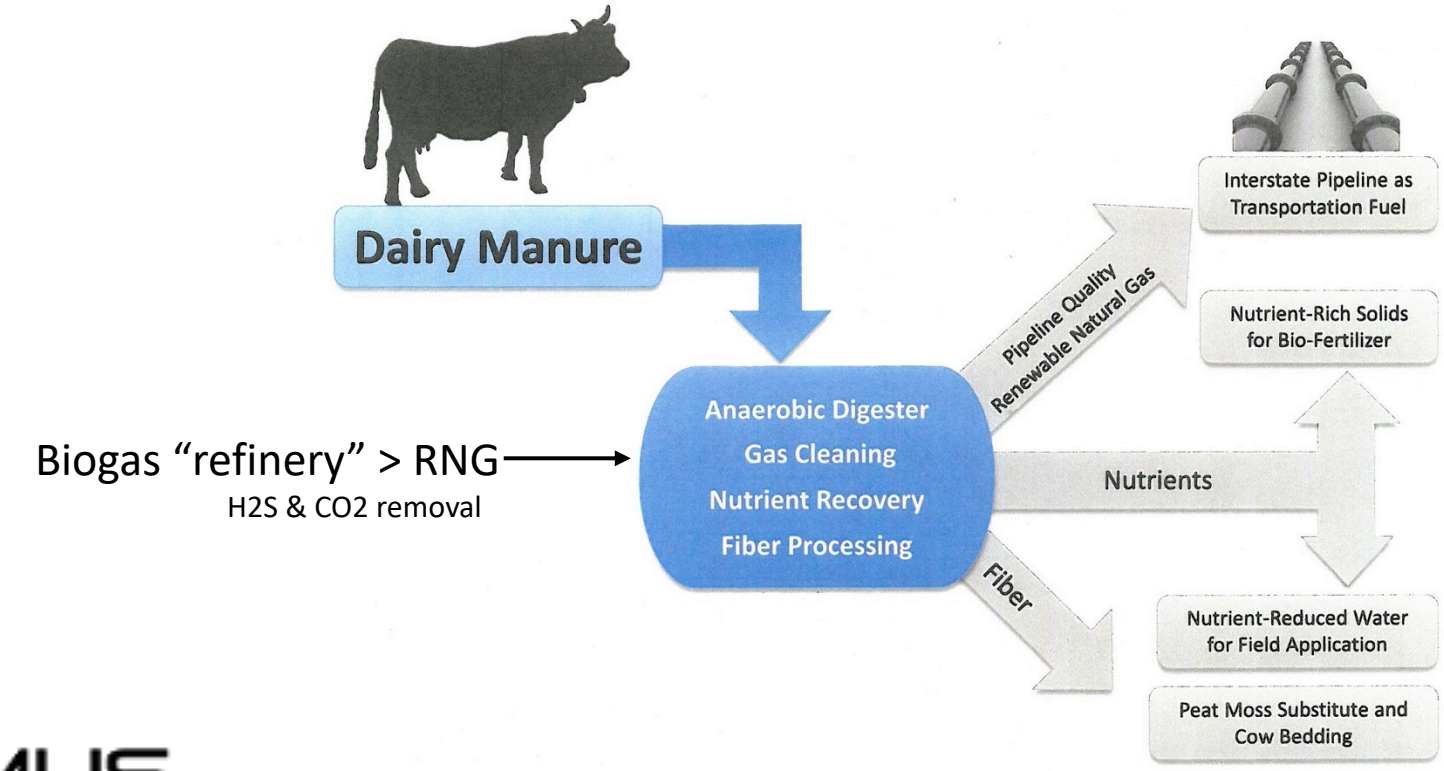
Dairy Digester Biogas to RNG Pathway

(renewable natural gas)



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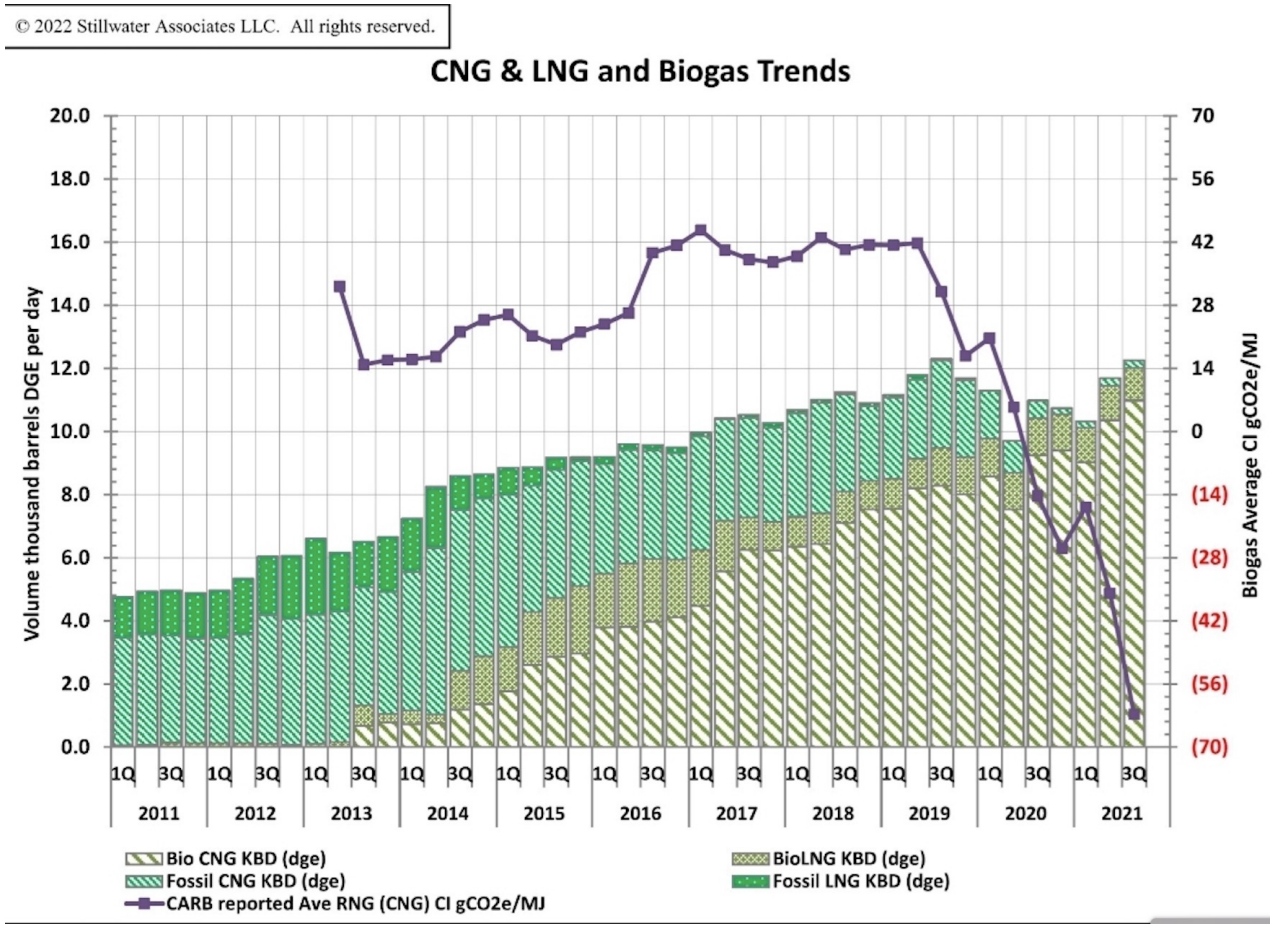
Augean RNG Project Gas Cleaning Facility (“Refinery”) in Yakima Valley

Dairy Digester RNG Has Displaced Fossil CNG, Reduced CI for NGVs

The chart to the right demonstrates:

1. RNG has now fully displaced fossil CNG in the CA NGV (Nat Gas Vehicle) market
2. The carbon intensity (CI) of NGV fuel is dropping fast as ultra-low CI dairy RNG floods the market



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Dairy Digester EV Project Revenue Sources
(similar for RNG)

- Commodity electricity generated from digester biogas (Power Purchase Agreement with utility) (12% of revenue)
- Renewable Energy Certificate (REC) credits sold to our off-taker EVCS (58%)
- Federal eRIN credits* (30%)*

* EPA is expected to approve eRIN rule in 2023, providing additional layer of credit value

Additional Revenue Sources

- Fiber: digester dairy fiber (DDF) worth $5-10/cu yd (peatmoss replacement)
- Recovered concentrated bio-fertilizer: nutrient solids from DAF, MF/RO
- Future “bio-refinery” value – CO2, fiber, recovered water, nutrients provide valuable inputs for co-located:
  - Greenhouses
  - Algae ponds
  - Vermiculture
  - Industrial materials
- Premium market for sustainably produced, low-CI milk products

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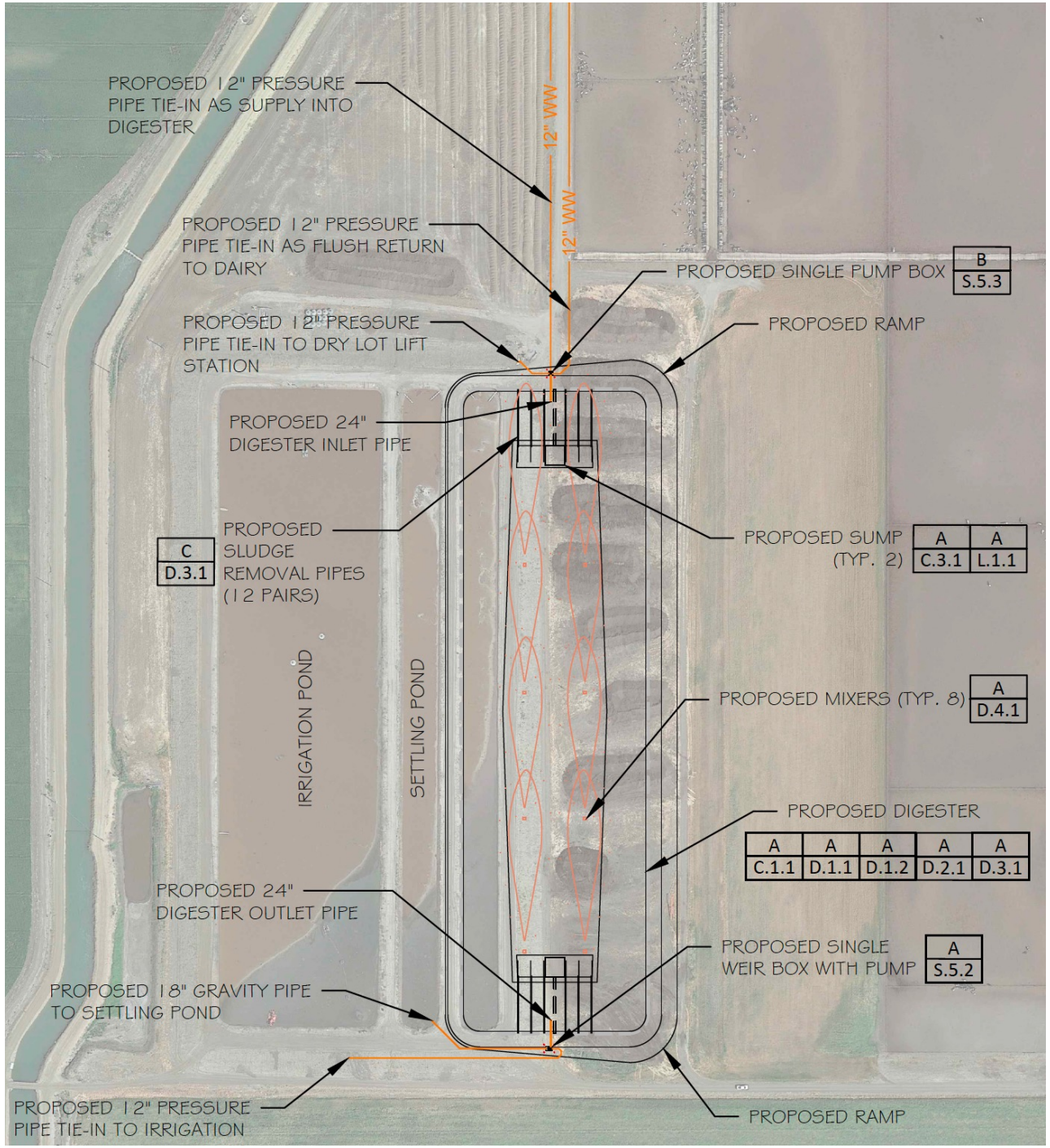
“Front-End” Incentives & Limiting Factors for AD Projects

- Grid Access Infrastructure Grants
  - RNG: pipeline, interconnect (meter, compressor stations)
  - EV: electrical infrastructure (power lines, transformers, utility)
- Cost of Capital
  - Private equity, debt
  - credit risk / floor (credit market stability)
  - Govt programs: REAP grants/loan guarantees, US DOE, WA CEF & CCA (CA GGRF & DDRDP)
- Streamlined permitting, approvals, upgrades
  - *Grid infrastructure assessments & approvals*
  - Air permit
  - Land use & SEPA / CEQA
- Support for pre-digester
  - Grants for demonstration / pilot
  - Govt procurement programs
  - Long-term credit market support

“Back-End” Incentives & Limiting Factors for AD Projects

- Strong, reliable markets for “environmental attributes” (credits)
  - State LCFS / CFS credits based on carbon intensity
  - Federal RFS Cellulosic (D3) RIN / eRIN (for Evs)
  - Long-term, reliable value for ultra-low CI biofuels
- Tax credits
  - Extension of Investment Tax Credits (ITC) to biogas energy projects
  - State and local tax breaks for system components
- Support for innovation
  - Grants for demonstration of innovative nutrient recovery, water conservation, “full circle” nutrient & water use (green houses, algae production, vermiculture, industrial materials)
  - Govt procurement programs

RESERVE SLIDES FOR Q&A


PROPOSED 12" PRESSURE PIPE TIE-IN AS SUPPLY INTO DIGESTER
PROPOSED 12" PRESSURE PIPE TIE-IN AS FLUSH RETURN TO DAIRY
PROPOSED 12" PRESSURE PIPE TIE-IN TO DRY LOT LIFT STATION
12" WW
12" WW
PROPOSED SINGLE PUMP BOX
B
S.5.3
PROPOSED RAMP
PROPOSED 24" DIGESTER INLET PIPE
PROPOSED SLUDGE REMOVAL PIPES (12 PAIRS)
C
D.3.1
PROPOSED SUMP (TYP. 2)
A
C.3.1
A
L.1.1
IRRIGATION POND
SETTLING POND
PROPOSED MIXERS (TYP. 8)
A
D.4.1
PROPOSED DIGESTER
A
C.1.1
A
D.1.1
A
D.1.2
A
D.2.1
A
D.3.1
PROPOSED 24" DIGESTER OUTLET PIPE
PROPOSED SINGLE WEIR BOX WITH PUMP
A
S.5.2
PROPOSED 18" GRAVITY PIPE TO SETTLING POND
PROPOSED 12" PRESSURE PIPE TIE-IN TO IRRIGATION
PROPOSED RAMP

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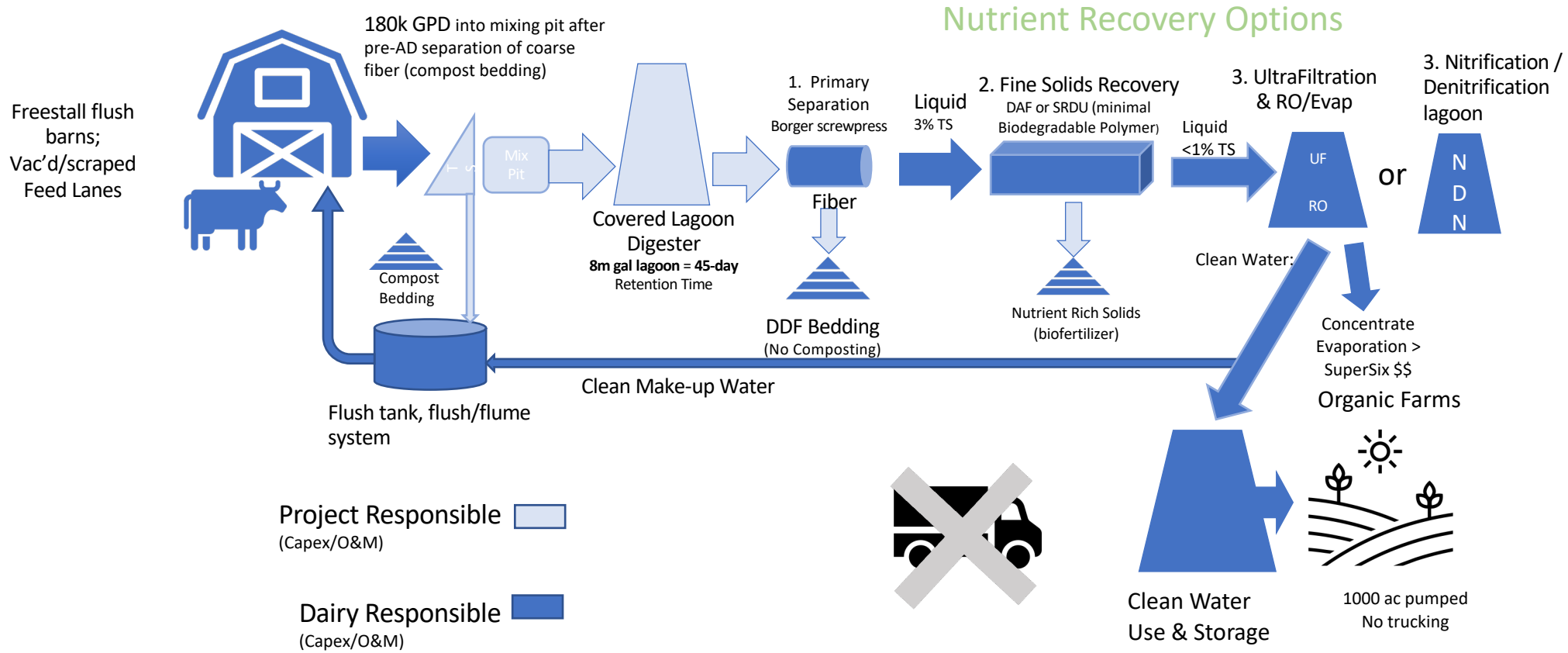
Example Dairy Manure & Nutrient Management Options (primary separation, Fine Solids Removal, UF/RO)



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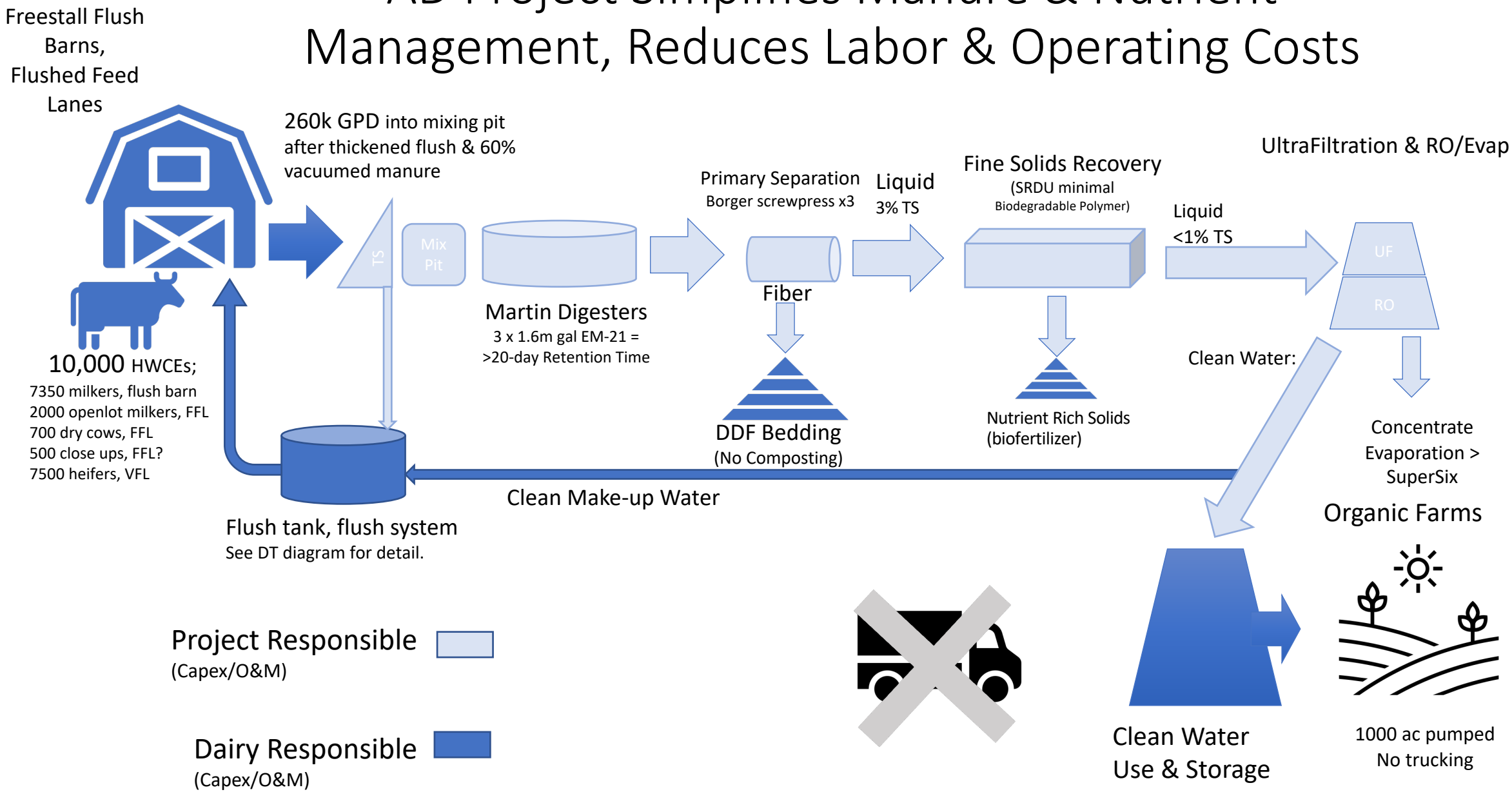
DAF (Dissolved Air Flotation)
Fine Solids Recovery

Nutrient Rich DAF Solids
(concentrated biofertilizer)

Project Responsible (Capex, Opex)

AD Project Simplifies Manure & Nutrient Management, Reduces Labor & Operating Costs



Tertiary Treatment Option

NDN (Nitrification-DeNitrification)

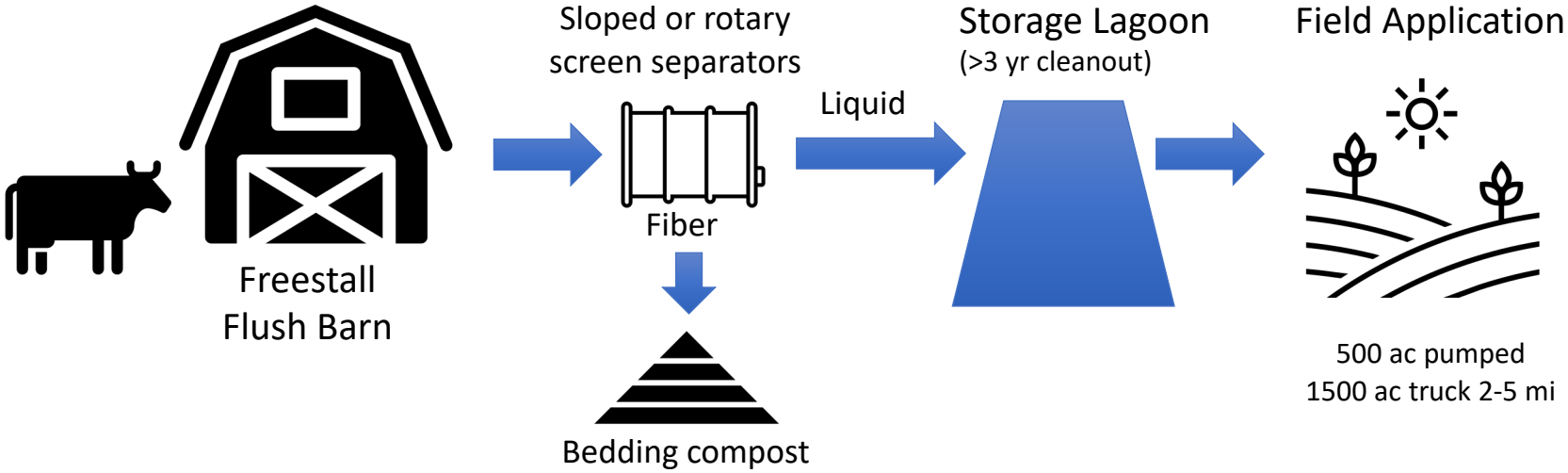
At GDR Dairy (Anchor Environmental Engineers)

Even with fall startup and winter temps in 2019, and non-professional operation, NDN achieved 57% ammonia reduction; 83% reduction in October 2019 before winter temps reduced performance (Anchor data).

Anchor and AgPro currently building an improved NDN in Sunnyside ($800k for 216k GPD system).

Project Responsible ($1M Capex)

Example Dairy Baseline Manure Collection



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Who is Koe Energy?

Vertically integrated energy company

- Produces ultra-low carbon intensity (CI) electricity from dairy digester projects
- Power delivered to Electric Vehicle (EV) charging stations on West Coast

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Three Koe partners:

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NEU DAIRY, INC
Capturing " Neu" income for Methane, Milk, Manure and More

EVCS
Stay Charged