Qualco Energy

Monroe, WA

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What is Qualco?

Werkhoven Dairy

- “Where two rivers come together”
- Nonprofit
- Partnership
- Sno-sky ag alliance
- NW Chinook Recovery
- Sustainable farming and protecting/restoring salmon habitat

Native American Tulalip tribes

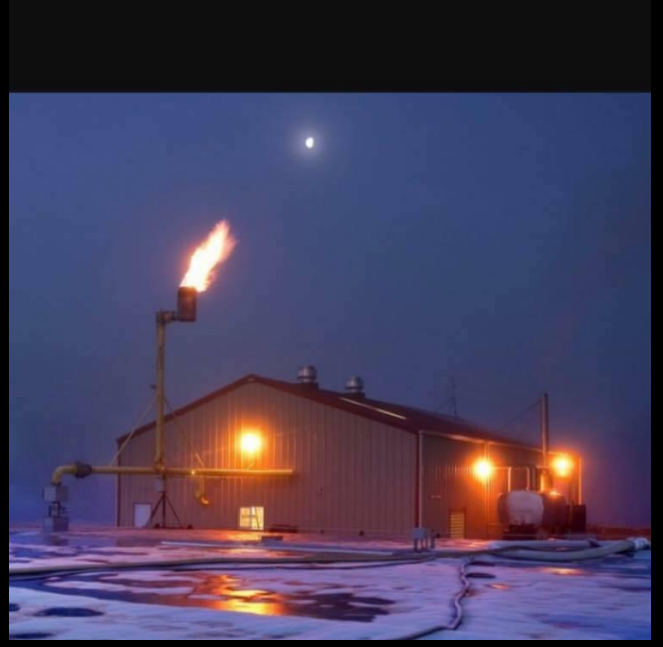
Qualco Energy

- Located on a repurposed prison farm near the confluence of the Skykomish and Snoqualmie rivers
- Operating since 2008
- 450KW electrical generation (enough gas for 2 megawatts)
- Voluntarily ran by Werkhoven dairy with oversite from a board of directors from each entity
- $3,000,000 initial cost for construction
- Vision: demonstration center for renewable energy, food waste recycling, state of the art farming, and salmon habitat recovery

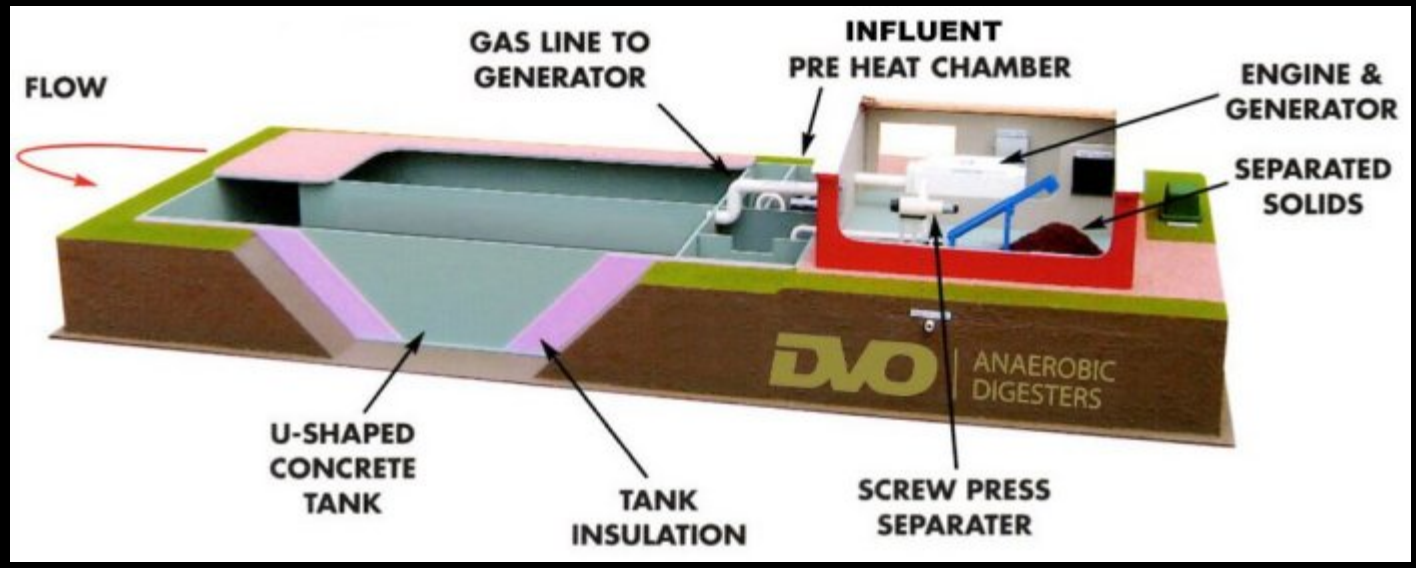
Werkhoven Dairy (est 1959)

- 3rd generation (5 family units working on the farm)
- 1800 Milking cows (2500 feeding digester)
- 2 dairies
- 2000 farmed acres
  - Alfalfa
  - Grass silage
  - Corn Silage
  - Winter wheat
- Sand bedded freestalls
- Flush cleaned barns
- Strong vision of being stewards of soil, water, animals
- Recipient of the first national dairy sustainability award

The Digester



- Modified plug flow
- 1rst generation Regenis built (Andgar) Ferndale Washington (DVO design)
- 1,452,000 gallons (19-20 day retention time)
- 70% manure 30% substrate diet
- Solid waste exemption



Manure pre-treatment

- Manure on farms is flushed out of barns using recycled water
- Sand is recycled and washed using Daritech One Shot
- 1rst stage Daritech DT 360s screen out manure solids
- 2nd stage clarifier creates clean flush water and empties fine solids into the mixing tank with screened solids that will pump 1.5 miles to the digester
- Sand is used as clean comfortable bedding for the cows
- Consistant, automatic digester feeding

Pre consumer food waste

- Expired beer, wine, soda
- Trap grease from
  - Grocery stores
  - Restaurants
  - Casinos
  - Hotels
- Fish waste
- Food waste
- Anything municiple wastewater plants cant handle but still has fuel/fertilizer value
- Providing responsible recycling for wastes that need a home other than a landfill
- Tipping fees generate income

Digester benefits

- Environmental
  - Greenhouse gas capture and utilization (renewable energy)
  - Pathogen and weed seed free organic compost as crop fertilizer
  - Precision farming
    - Gps, flowmeters, automation allow for nutrient mapping and spoonfeeding plants
  - Mineralization of nutrients in digester makes manure readily available for plant uptake
  - Good microbes for healthy, active soils
  - Healthy soils are the most efficient water filters
  - Cows are better than condos

Digester benefits

- Financial
  - Electrical generation sales (450KW $20,000 per month)
    - Depends on power purchaser
  - Food waste tipping fees
    - Don’t get greedy. It’s still a living digester!
  - Soil amendment sales
    - Compost
    - Peat moss replacer
  - Infrastructure for automation and precision farming
    - Spoon feeding crops accurately
    - Reducing need for commercial fertilizers

Nutrient recovery technologies

- 1rst and 2nd generation Struvite recovery demonstrations (magnesium ammonium phosphate) Washington State University
  - Phosphorus reduction
  - Slow release, easy to transport and saleable fertilizer
- Centrifuge separation of fine settleable solids
  - Phosphorus reduction in lagoons
  - Retain original volume capacities in lagoons
- Pilot scale DAF/Membrane filtration
  - Clean water for reuse as drinking water or irrigation
- $1 per cow per day (technology must pay)

Digester rehab

Lid removed, grit removed

New lid being installed

Digester rehab

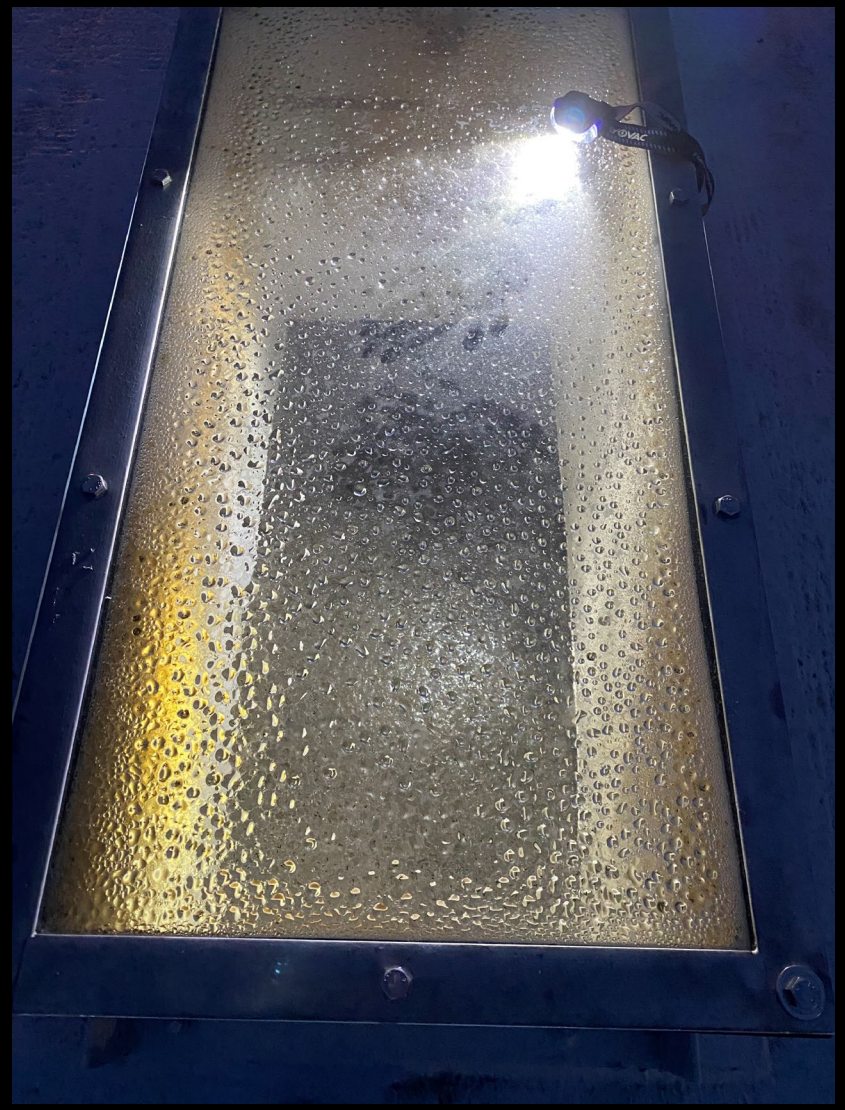
Enclosed flare

Stainless and HDPE gas lines, re-engineered lid, agitation, and maintenance techniques (improved safety, reduced downtime)

Digester rehab

Internal concrete protection and sealing

External viewing windows



Digester needs

- Funding opportunities to get more farms to adapt technologies that reduce carbon footprints

- Regulatory climate that promotes success (unlike entities work together towards a common goal)
  - Farmer budget, high capital/low margins
- Longstanding partnerships
  - Its easy to get excited about new technologies that make big promises but don't forget the long term proven successes
- Technical assistance, and open communication
- Boots on the ground to "get it done" Digesters and Dairy farming are both 24/7

Thank you

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