

Mistakes to Avoid in RNG

THE BEST MISTAKES TO LEARN FROM ARE OTHER'S MISTAKES

June 22, 2021



Disclaimer

This presentation is meant for discussion purposes. Novilla RNG is not responsible for any errors or omissions, or for the results obtained from the use of this information. All information in this presentation is provided "as is", with no guarantee of completeness, accuracy, timeliness or of the results obtained from the use of this information.

AGENDA

Novilla RNG Overview

Due Diligence (Both on the Part of the Dairy and Developer)

Contracting

Technical Selection

Metering and CARB/RIN Validation

Novilla RNG and AIMPERA Capital Partners Experience

NOVILLA RNG AND AIMPERA HAVE THE EXPERIENCE, CAPITAL, AND RELATIONSHIPS TO BUILD THE LEADING DAIRY RNG DEVELOPER AND OPERATOR

Novilla RNG Experience



Mark Hill (Co-CEO)

Mark Hill (Founder and Co-CEO)

- Mark has more than 14 years of experience in the RNG industry in operational roles with experience managing, developing, operating, and constructing landfill gas and dairy RNG projects
- Mark held a series of operational roles with DTE Biomass Energy, the largest operators of dairy RNG projects, most recently serving as VP of Business Development and Dairy RNG Operations where he was responsible for the safety, operations, and profitability of 21 landfill gas projects and 8 dairy RNG projects
- Mark served as a Cavalry Troop Commander (Captain) in Iraq and was awarded a Bronze Star
- Mark has a B.A from Dartmouth College and an MBA from the University of Michigan



Jared Williams (Co-CEO)

Jared Williams (Co-CEO)

- Jared has more than 10 years of RNG operations and development experience in landfill gas and dairy RNG projects
- Jared was most recently the Vice President of Operations at DTE Biomass Energy where he led an 80-person team managing 21 landfill gas projects and 9 dairy RNG projects, achieving 90%+ on-stream rates across his fleet
- Jared managed the first dairy virtual pipeline in the country with the first provisional CI scores
- Jared has a B.A from Arizona State University and an MBA from the University of Michigan

AIMPERA Overview



- Private investment firm specialized in investing in and supporting the growth of asset-rich operating businesses in partnership with family-owned businesses
- The AIMPERA senior team has worked together for 14+ years and has extensive experience working in partnership with management and family-owned businesses and, through a prior investment firm, American Infrastructure Funds, L.L.C., has managed nearly \$3.0 billion of equity capital
- Demonstrated expertise investing in, growing, enhancing the operations of, and realizing value from asset-rich businesses that are fundamental to the framework of American lives, including waste management, fuel distribution, distributed power generation, telecommunications, and cold storage facility development, among others
- Built 12 platform companies with over 140 add-on acquisitions

Novilla RNG – Dairy RNG Projects

NOVILLA RNG MANAGEMENT TEAM HAS EXTENSIVE EXPERIENCE OPERATING AND BUILDING DAIRY RENEWABLE NATURAL GAS PROJECTS

Dairy	Herd Size	Operations Date	Location	Est. Biogas (SCFM)	Injection Method
Pagel's Ponderosa	6,000+	2019	Casco, WI	400+	Virtual Pipeline
Dairy Dreams	4,000+	2019	Lincoln, WI	275+	Virtual Pipeline
Grotegut	3,500+	2019	Newton, WI	275+	Biogas Pipeline/ Direct Inject
Maple Leaf	4,000+	2019	Cleveland, WI	350+	Biogas Pipeline/ Direct Inject
Statz	4,500+	2020	Sun Prairie, WI	450+	Biogas Pipeline/ Direct Inject
Kinnard Farms	8,500+	2020	Lincoln, WI	700+	Virtual Pipeline
New Chester	8,500+	2020	Marshfield, WI	700+	Virtual Pipeline
Rosendale	8,500+	2020	Rosendale, WI	700+	Virtual Pipeline
Total	59,500+	N/A	N/A	4,700	N/A

Note: Above projects represent dairy RNG projects which the Novilla RNG management team played a significant role in developing and operating during their employment at DTE. These projects are owned by DTE and are not affiliated with Novilla RNG



**American Biogas Council
Project of the Year**

AGENDA

Novilla RNG Overview

Due Diligence (Both on the Part of the Dairy and Developer)

Contracting

Technical Selection

Metering and CARB/RIN Validation

Dairy Due Diligence on Developer (Letter of Intent Phase)

Common Mistake	Better Outcome
<p>Two Year LOI Signed with Developer</p> <p><i>Developer can sit on LOI for 2 years and dairy receives no royalty stream</i></p>	<p>Six-month LOI Signed with Developer</p> <p><i>Developer should be able to complete key points of due diligence in six months – Dairy can find new developer if progress is slow.</i></p>
<p>Developer can re-assign LOI to third party</p> <p><i>Developer will shop around looking to sell the LOI to another developer – that's money that could have gone straight the dairy</i></p>	<p>Developer can re-assign LOI to affiliated party</p> <p><i>Developer can only re-assign LOI to pre-designated companies (such as parent company or project LLC)</i></p>
<p>Funding source has not been determined</p> <p><i>Most small developers find projects and then find funding. Often this funding partner (large company) may require more time to do due diligence or layers on extra costs and bureaucracy.</i></p>	<p>Dairy should meet with the funding partner</p> <p><i>Dairy should understand and approve of funding source</i></p>
<p>No Milestones</p> <p><i>No milestone incorporated into LOI – meaning developer has no pressures to execute quickly, may be in “back of line”</i></p>	<p>Milestones</p> <p><i>Series of development milestones incorporated into LOI. Developer has limited number of dairies “signed up”</i></p>
<p>Beware the smiling salesmen</p> <p><i>There may be more profits in the dairy's manure rights than they are giving the dairy</i></p>	



Top Questions to ask a Developer

Q: How many renewable natural gas projects have you actually built and operated?

Why: Several developers claim to be working with dozens of dairies while only purchasing small scale electric production projects that are going to struggle to become RNG projects

Q: What do you think the CI score for my dairy is?

Why: If they are offering you royalties, but don't understand the value of your gas, then they haven't done their homework and will likely need to renegotiate the contract

Q: How much biogas do you expect to produce at my dairy? How much digestion capacity do you expect, what is the expected residence time, and what style digester.

Why: The volume of gas produced will have a tangible impact on revenue

Q: What kind of RNG upgrading technology will you be using and will you have a thermal oxidizer for the tail gas:

Why: Technology has a large impact on the footprint and viability of the project. If there is hydrogen sulfide in the tail gas, not having a thermal oxidizer will lead to odors.



Top Questions to ask a Developer (Continued)

Q: Where are you going to sell your gas?

A: This is particularly important to know if the dairy is taking a % of revenue for a royalty. If the developer locks in prices at a lower price, lowering the royalty payment, the dairy should have a say in the placement of the gas

Q: How will this project be financed?

A: If they need to get loans through the USDA program or grant money, development will take longer



Q: What permits will you need and what do I need to change?

A: The developer should already be thinking about necessary changes to the Dairy's nutrient management plan, environmental permitting, and meeting with local zoning boards

Developer Due Diligence (Letter of Intent Phase)

Task
Lease Area Identified
Lease Area Wetlands Delineation
Geotechnical Study Conducted
Lease Area Surveyed
General Layout of Plant Completed
Utility studies
CI interview completed
CI score calculated
Dairy Background/Financial Study Completed
Manure Sampling and corresponding digester sizing
Manure handling and sand handling upgrades defined
Sand handling upgrade quotes and schedule received
Project Engineer contracted for Phase I Engineering Study
Project Engineer Site Visits
Environmental Permits identified, process to approval started
Digester Technology package chosen
RNG Upgrading package chosen
Draft of Definitive Agreements Sent to Dairy
CARB Metering Package finalized
Historian report outline for CARB/RIN Validation
Interconnect and CNG Trucking agreements negotiated
Offtake Agreements Negotiated

List above is abbreviated



A lot of due diligence needs to happen in the six-month Letter of Intent time frame.

Accurate Carbon Intensity Estimates are Crucial to the Success of a Project

CALIFORNIA'S LCFS METHODOLOGY REWARDS DEVELOPERS WHO "FIX" FARMS THAT ARE THE LARGEST EMITTERS OF METHANE

- The LCFS Carbon Intensity ("CI") score is determined using avoided methane emissions
 - Farmers who have current practices that result in lower methane emissions will have a worse CI score
- The following practices, while being progressive, will damage the profitability of the project:
 - Separating solids for field application
 - Minimal lagoon storage
 - Open lot farms
 - Frequent cleaning of the lagoons
 - Smaller cows/less manure
 - Sawdust/straw bedding
 - Adding other organic materials to the manure stream



As a result of California's methane avoidance methodology, there are several 15,000 cow farms that won't make economic sense for an RNG project, whereas there are 4,000 cow farms that will make economic sense

Illustrative Carbon Intensity Scores

THE CARBON INTENSITY (CI) SCORE IS A MEASUREMENT OF AVOIDED EMISSIONS, ADJUSTED FOR THE ENERGY NEEDED TO PRODUCE THE GAS, DIVIDED BY THE AMOUNT OF RNG PRODUCED

Illustrative CI Calculation #1: All Manure to Lagoon, No cleanouts (gCO₂/MJ)

$$\begin{array}{rcl} \textcircled{-325} & \text{Avoided methane emissions from} & \\ & \text{the lagoon per MJ produced} & \\ + & & \\ \textcircled{50} & \text{Carbon emissions from energy} & \\ & \text{needed to produce transport RNG} & \\ & \text{per MJ produced} & \\ + & & \\ \textcircled{65} & \text{Tailpipe and fueling emissions from} & \\ & \text{compressed natural gas vehicles per} & \\ & \text{MJ consumed} & \\ = & & \\ \textcircled{-210} & \text{CI Score per MJ consumed} & \end{array}$$

Illustrative Revenue / MMBtu: \$81.68 [1]

Illustrative CI Calculation #2: Fiber Separation, Minimal Lagoon Storage (gCO₂/MJ)

$$\begin{array}{rcl} \textcircled{-130} & \text{Avoided methane emissions from} & \\ & \text{the lagoon per MJ produced} & \\ + & & \\ \textcircled{50} & \text{Carbon emissions from energy} & \\ & \text{needed to produce transport RNG} & \\ & \text{per MJ produced} & \\ + & & \\ \textcircled{65} & \text{Tailpipe and fueling emissions from} & \\ & \text{compressed natural gas vehicles per} & \\ & \text{MJ consumed} & \\ = & & \\ \textcircled{-15} & \text{CI Score per MJ consumed} & \end{array}$$

Illustrative Revenue / MMBtu: \$44.53 [1]

Due to the RNG production being a denominator, projects that flare a significant amount of gas will end up with a more negative CI score

Hypothetical \$10,000,000 LCFS pool
on 200,000 MMbtu's of RNG
production and no flaring = \$50/MMbtu

Hypothetical \$10,000,000 LCFS pool
on 100,000 MMbtu's of RNG
production and 100,000 MMbtu's of
flaring = \$100/MMbtu



For RNG projects selling into LCFS, the CI score may improve (get more negative) the less you produce and the more that is flared. Thus the incremental revenue tends to be limited to RIN's and geological gas replacement

AGENDA

Novilla RNG Overview

Due Diligence (Both on the Part of the Dairy and Developer)

Contracting

Technical Selection

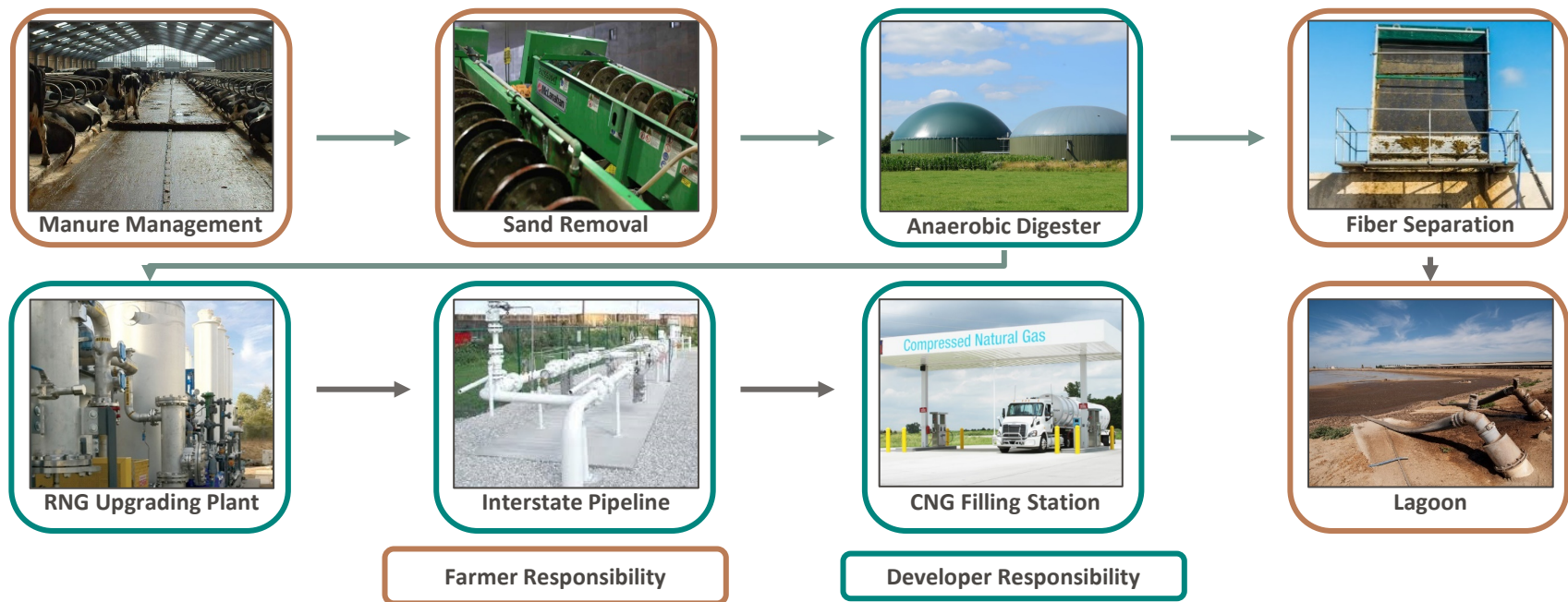
Metering and CARB/RIN Validation

The key to a good marriage is a good contract and good royalty structure

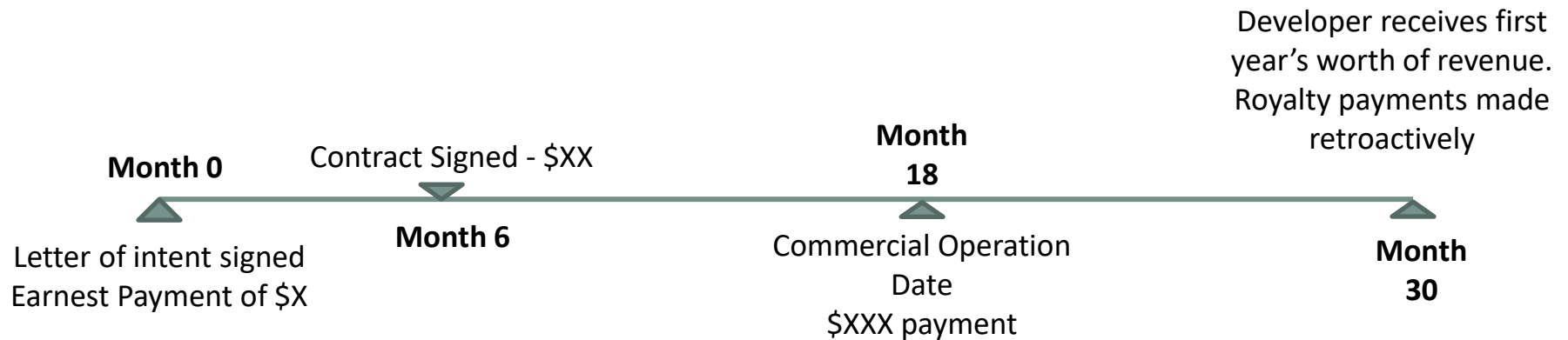
Structure	Advantages	Disadvantages
Fixed Annual Payment	Simple, reliable payment to farmer	No incentive to farmer to provide quality manure for digestion or to increase the quantity of manure
Per Cow Annual Payment	Simple calculation, encourages growth	No incentive to farmer to provide quality manure for digestion. Illogical – 10,000 th cow is worth far more than the 1,000 th cow
Per MMBtu Produced Payment	Protects farmer against plant down time, encourages quality manure delivery	Developer is at more risk if the LCFS or RIN price drops. Farmer does not have incentive to supply data for calculation of CI score
Per MMBtu Sold Payment	Easy calculation based on monthly sales invoice from pipeline company	Farmer is affected by Producer's plant run-time. Farmer is not incentivized to supply data for calculation of CI score. Developer benefits from LCFS that increases value the fewer MMBTU's sold
Percent of Revenue	Simple calculation based on checks received by developer. Farmer incentivized to supply data for calculation of CI score and deliver quality manure	Farmer is affected by changes in LCFS and RIN prices
Percent of Net Income	Very strong alignment of incentives to maximize revenue	Farmer is affected by developer plant performance, costs, and changes in LCFS and RIN prices. Net income can be manipulated
Equity Share	Near perfect alignment	Farmer takes on liabilities and risks of RNG project

Novilla RNG prefers the Percent of Revenue model as it insulates the dairy farm from cost over-runs, but ensures the farmer is sending high quality manure to the digesters and is providing data for CARB and RIN validation

Logical separation of responsibilities leads to long term success



Because of the long construction time and up to a year of operation before the developer receives revenue, a series of defined payments makes sense



Without a series of contractually defined fixed payments, the farmer may have to **wait two and a half years before receiving a royalty payment**. For the sake of transparency and good relations between the developer and farmer, it is best to lay out this timeline during initial conversations.

Other Key Contractual Mistakes

- Lack of milestones

A reasonable COD should be established, with cushion for permitting issues. After that date, reasonable penalties should be paid to dairy.
- Consider future expansions

Expansions should be paid at a higher royalty rate than the base cow count
- What happens at the end of the project

Typically, digesters transfer over to the farm, as do buildings. RNG upgrading equipment goes with Developer
- Process for when things go poorly

Every project has issues – a reasonable process to solve those issues is necessary



RNG is currently in a gold rush.... and few gold miners actually find gold

Avoid developers claiming to be constructing dozens of projects and are releasing weekly press statements

Building 5 or 6 new RNG projects a year is difficult and there are only so many qualified people who can do it. If a company claims to have “signed up 70 dairies”, you need to ask them how are they going to execute on 70 projects?

The reality is there probably aren't 70 top-tier RNG projects in the USA— let alone all going to one developer.



RNG project under construction – imagine trying to do 70 of these in the next year

AGENDA

Novilla RNG Overview

Due Diligence (Both on the Part of the Dairy and Developer)

Contracting

Technical Selection

Metering and CARB/RIN Validation

To make pipeline quality RNG there are several technologies available

Membrane



Biogas is compressed through membranes that have tiny tubes that allow smaller molecules to permeate through membranes. Methane is separated from CO₂, H₂O, and H₂S and compressed. Tail gases should be destroyed in thermal oxidizer

Amine /Solvent



Biogas bubbles through contact towers filled with basic solvent that absorbs carbon dioxide and hydrogen sulfide. As the temperature of the solvent changes, it releases the carbon dioxide and hydrogen sulfide.

Pressure Swing Absorption (PSA)



Biogas is compressed and put into vessels containing absorption media. As the pressure decreases, different gases are released at different times, with the methane release being captured and compressed. Tail gases should be destroyed in a thermal oxidizer

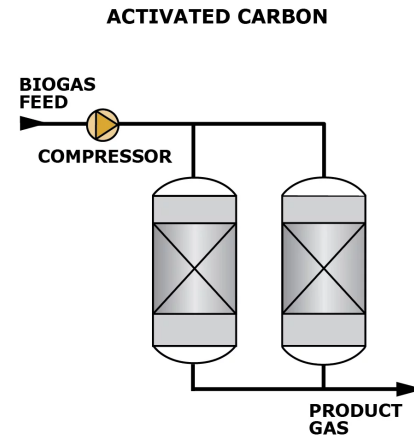
Water Wash



Biogas bubbles through towers filled with water that absorbs carbon dioxide and hydrogen sulfide. As the temperature/ pressure of the water changes, it releases the carbon dioxide and hydrogen sulfide.

While the majority of the concern is centered around carbon dioxide removal, hydrogen sulfide removal is actually the hard part

The majority of systems on the market today employ a low-capital, high OPEX solution – Activated Carbon



While the activated carbon solution is simple, it may cost up to \$800,000 per year for a 5,000 cow farm and require frequent changeouts

Other solutions to remove hydrogen sulfide (H₂S) exist, but are not without their own issues

Solution for H ₂ S removal	Drawbacks
Oxygen injection into digester <i>Can remove over half of hydrogen sulfide</i>	Requires monitoring, can lead to out of spec RNG, slightly lower methane production
Ferric Chloride injection into digester <i>Combined with oxygen injection, can get down to ~300PPM H₂S</i>	Ferric Chloride can be expensive, needs adjustment, can be messy
Biological H ₂ S removal <i>Can remove majority of hydrogen sulfide and produce sulphur fertilizer</i>	Large capital expenditure, requires activated carbon polishing, frequent adjustment and attention
Use of Specialized Membranes <i>Can remove up to 99% of H₂S through stationary membranes</i>	Higher electric usage, require thermal oxidizer for tail gas, more capital costs
Iron Chelate <i>Chemical removal of majority of hydrogen sulfide, lower OPEX</i>	Large up-front capital expenditure
Other H ₂ S removal media than activated carbon <i>Typically less expensive and longer lasting than activated carbon</i>	Significant OPEX, may need some level of oxygen.

Several logistics challenges exist to business developer's on-paper solutions



Trucking Manure to a Centralized Digester

It can be done, but presents many challenges

- Costs of trucking manure can be considerable
- Public perception of increased manure trucks on the road
- Impact to CI score
- Difficulty calculating CI score due to multiple farms
- It just takes one farm's mistakes to mess up the entire project

Consider piping manure if possible, or separate digesters at each farm and moving the biogas via pipeline



Trucking Raw Biogas to centralized processing plant

It is extraordinarily difficult to do

- Hydrogen Sulfide would need to be removed
- CNG trailers are not meant for liquids and carbon dioxide liquifies above ~1000 PSI.
- More logistics costs moving raw biogas than processed gas due to mass of carbon dioxide – trailers limited to ~1000 PSI and are only ~57% methane

Consider raw biogas pipelines to a centralized processing facility

Finally....avoid Engineering Marvels of the World



Vs.



The three most expensive and complicated RNG sites in the US have either shutdown or changed ownership since inception

AGENDA

Novilla RNG Overview

Due Diligence (Both on the Part of the Dairy and Developer)

Contracting

Technical Selection

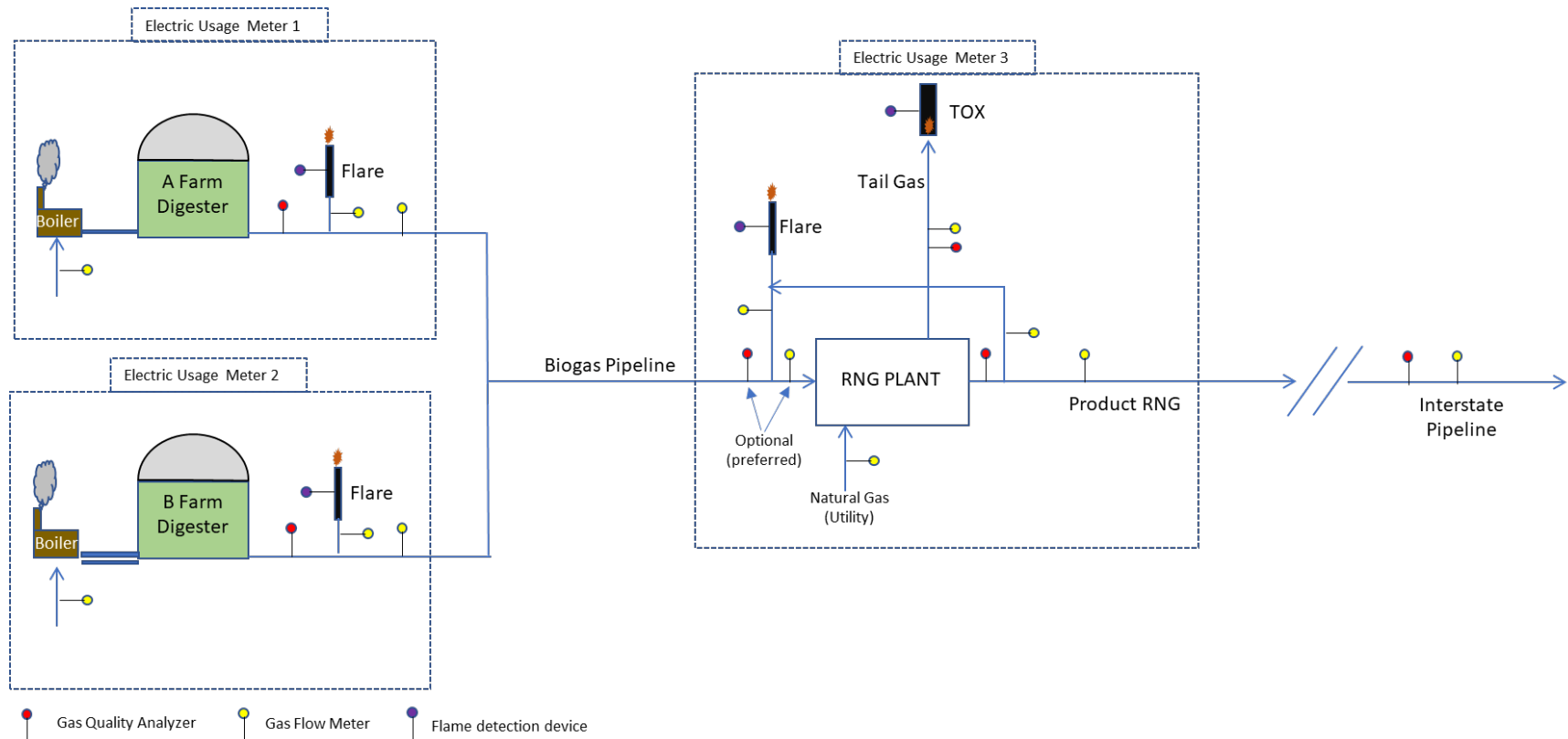
Metering and CARB/RIN Validation

Metering is your cash register and is often more important than your RNG plant on-stream rate

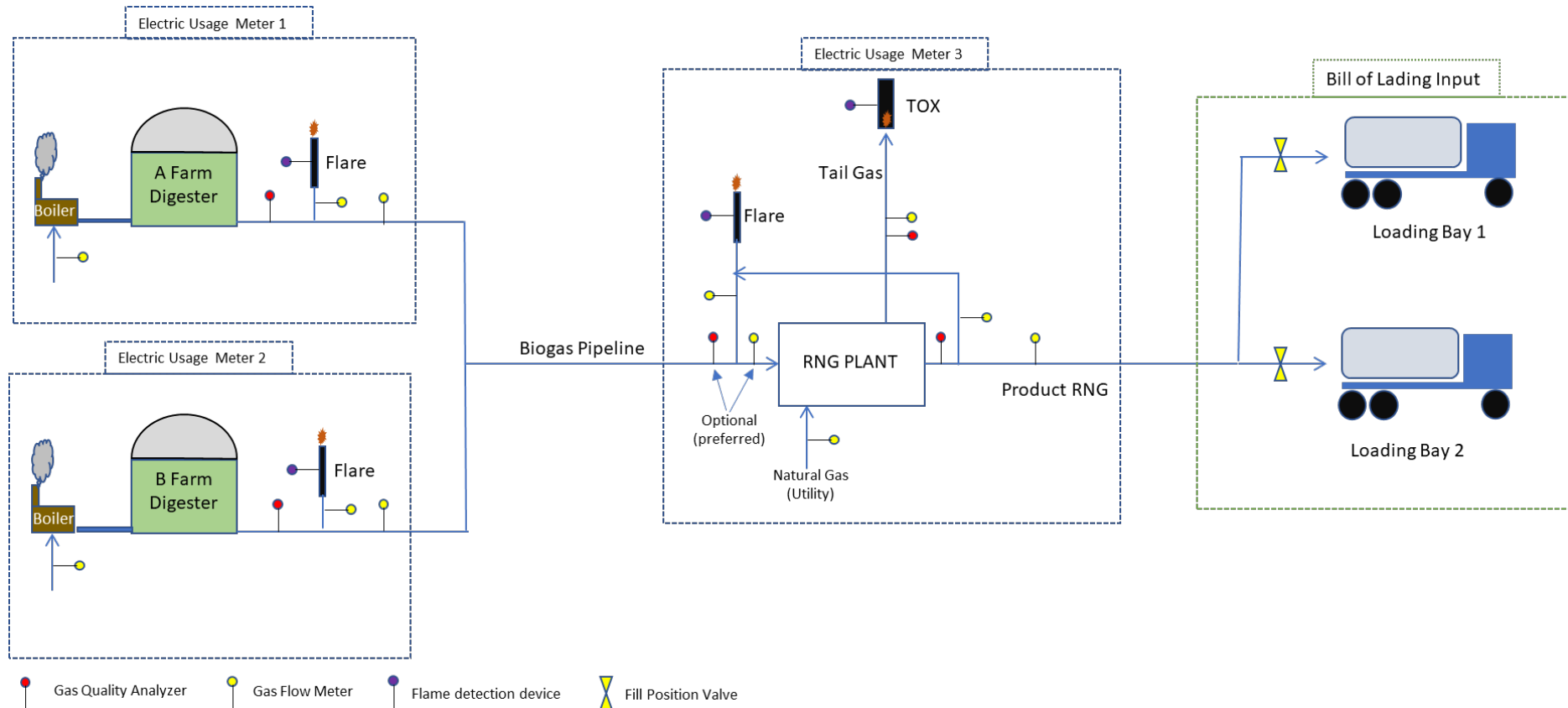
- RNG plants should be built around CARB and RIN validation requirements
- Several developers have lost tens of millions of dollars because they did not have the proper metering and data collection in place
- Methane energy balance needs to be within 2% or penalties/lack of validation may occur
- Trucking RNG creates another set of complications



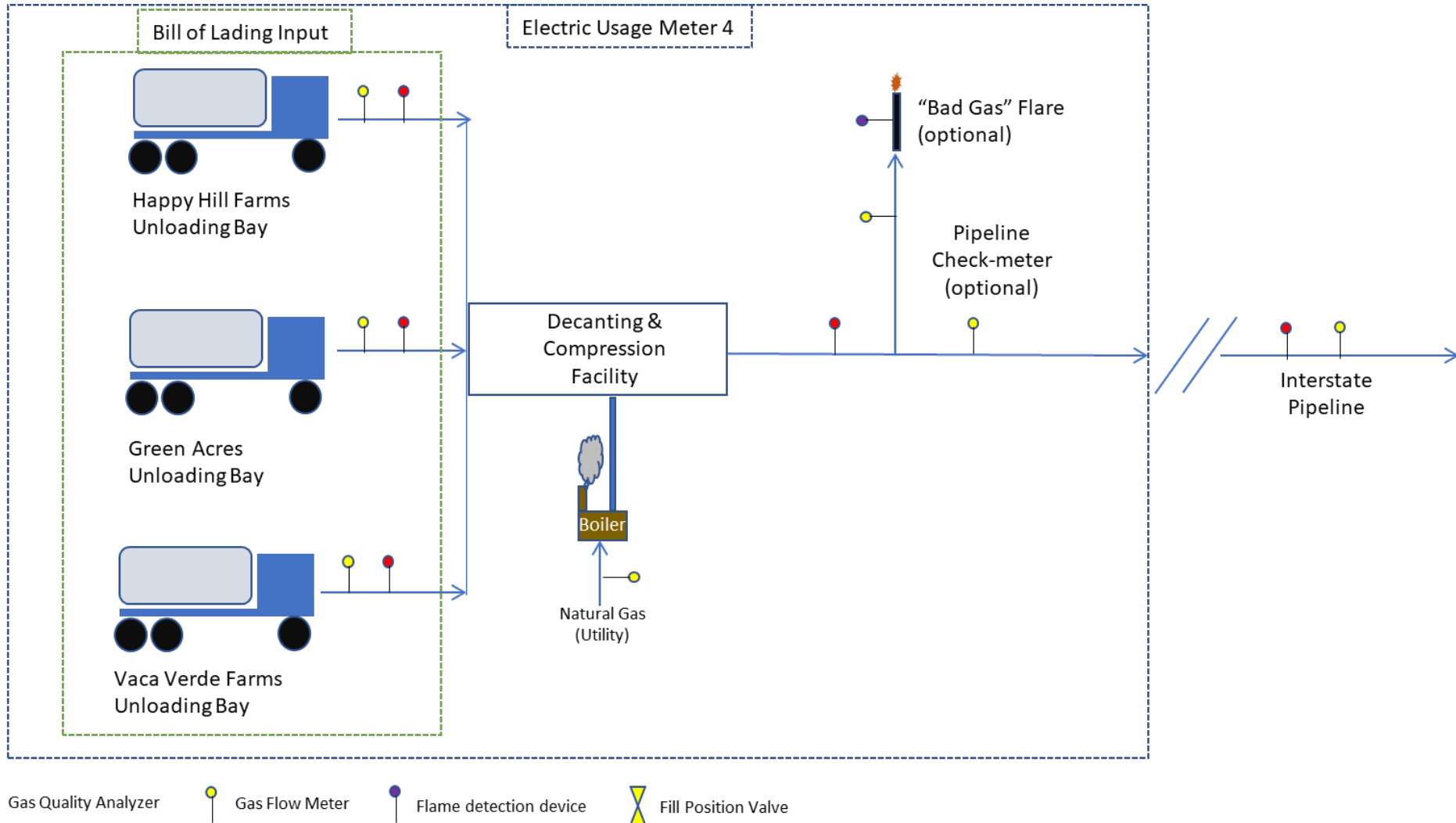
Metering layout from a direct pipeline injection, which has two separate farms feeding it



Same setup, but now with virtual pipeline



Unloading CNG trailers at an interconnect



Your historian data collection is your cash register – monitor it

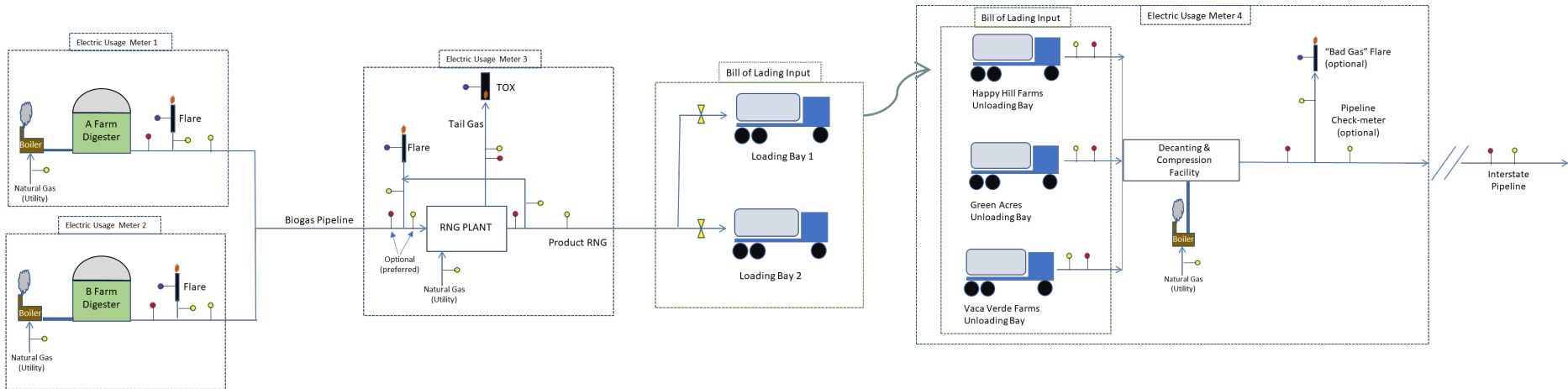
Happy Hill Farms Historian Data

Time	Date	Farm A Digester Boiler NG usage (mmbtu)	Farm A Digester electric Usage (kwh)	Farm A Digester Flow to plant (SCF)	Farm A digester flow to flare (SCF)	Farm A flare Temp (F)	Farm A methane digester %	Farm B Boiler NG usage (mmbtu)	Farm B NG Usage (kwh)	Farm B Digester Flow to plant (SCF)	Farm B Digester Flow to flare (SCF)	Farm B Digester Methane % to plant	Plant NG usage (mmbtu)	Plant electric usage (kwh)	Plant Inlet Flow (SCF)	Plant Inlet Methane
1315	8/1/20	4.3	21.0	5339	-	83	56.2%	2.2	10.5	3421	0	55.5%	1.1	124.16	8792	55.9%
1330	8/1/20	4.4	22.0	5105	-	85	56.2%	2.2	11.0	3769	0	55.5%	1.2	113.13	8946	55.9%
1345	8/1/20	4.6	24.2	4878	-	86	56.2%	2.3	12.1	3376	0	55.6%	1.2	121.98	8313	55.9%
1400	8/1/20	4.7	26.0	5247	-	86	56.2%	2.4	13.0	3755	0	55.6%	1.3	113.63	9059	55.9%
1415	8/1/20	4.4	27.0	4898	-	86	56.2%	2.2	13.5	3305	0	55.6%	1.1	113.46	8256	55.9%
1430	8/1/20	4.3	28.8	5007	-	87	56.2%	2.2	14.4	3406	0	55.6%	1.2	123.43	8429	55.9%
1445	8/1/20	4.4	30.4	5070	-	88	56.2%	2.2	15.2	3543	0	55.6%	1.2	114.20	8616	55.9%
1500	8/1/20	4.6	28.4	5113	-	88	56.2%	2.3	14.2	3306	0	55.6%	1.3	123.61	8477	55.9%
1515	8/1/20	4.7	33.6	5116	-	88	56.1%	2.4	16.8	3758	0	55.6%	1.1	119.65	8896	55.9%
1530	8/1/20	4.4	35.2	5158	-	89	56.1%	2.2	17.6	3667	0	55.8%	1.2	118.53	8902	56.0%
1545	8/1/20	4.3	28.6	5171	-	88	56.1%	2.2	14.3	3668	0	55.8%	1.2	113.02	8919	56.0%
1600	8/1/20	4.4	25.4	5071	-	88	56.1%	2.2	12.7	3733	0	55.6%	1.3	116.78	8854	55.9%
1615	8/1/20	4.6	24.7	5131	-	87	56.1%	2.3	12.4	3399	0	55.4%	1.1	114.07	8601	55.8%
1630	8/1/20	4.7	27.8	1115	3,712.00	870	56.1%	2.4	13.9	3702	0	55.4%	1.2	112.86	4817	55.8%
1645	8/1/20	4.4	28.8	0	5,102.06	1,245	56.1%	2.2	14.4	3323	0	55.4%	1.2	118.58	3323	55.8%
1700	8/1/20	4.4	28.3	0	4,876.53	1,230	56.1%	2.2	14.2	3354	0	55.4%	1.3	120.04	3354	55.8%

Flow to TOX (SCF)	TOX Methane %	TOX Temp (F)	Product Gas Flow	Product Gas Methane %	Plant Flare Flow (SCF)	Plant Flare Temp (F)	Interconnect Flow	Interconnect Methane %
3957	5.20%	1441	4836	98.7%	0	83	4787	99.7%
4026	5.60%	1438	4920	98.8%	0	85	4871	99.8%
3741	5.30%	1435	4572	98.7%	0	86	4526	99.7%
4077	6.70%	1432	4983	98.8%	0	86	4933	99.8%
3715	8.20%	1439	4541	98.7%	0	86	4496	99.7%
3793	5.20%	1434	4636	98.8%	0	87	4589	99.8%
3877	5.60%	1433	4739	98.7%	0	88	4691	99.7%
3814	5.30%	1434	4662	98.8%	0	88	4616	99.8%
4003	6.70%	1438	4893	98.7%	0	88	4844	99.7%
4006	8.20%	1439	4896	98.8%	0	89	4847	99.8%
4014	5.20%	1441	4906	98.7%	0	88	4856	99.7%
3984	5.60%	1431	4870	98.8%	0	88	4821	99.8%
3870	5.30%	1437	4730	98.7%	0	87	4683	99.7%
2168	6.70%	1439	2649	98.8%	0	89	2623	99.8%
1495	6.70%	1438	1828	98.7%	0	90	1809	99.7%
1509	5.80%	1437	1845	98.8%	0	90	1826	99.8%

- Daily reviews of MMBtu balance
- PLC alerts if meter is faulted or MMBtu imbalance exceeds 2%
- Redundant data backup

If you think RNG Metering is complicated, it is....



- Have an Instrumentation and Controls Technician on Staff
- Dedicated LCFS/RIN Management Team
- Daily reviews of metering and gas analysis data
- Retain a qualified pathway consultant
- Spare meters and gas analysis equipment on-hand

Novilla RNG is ready to help dairies realize the environmental and financial benefits of biogas



Mark Hill
CO-CEO Novilla RNG
734-395-2452

mark@novillarng.com

Jared Williams
CO-CEO Novilla RNG
804-704-1974

jared@novillarng.com

Key benefits of working with Novilla RNG

- Staff Experience building and operating 8 Dairy RNG Projects
- Six Month Letters of Intent – not two years
- Direct contracting with farms so that middlemen do not earn a commission
- Open and transparent financial analysis of the project
- Financial and business support from AIMPERA Capital Partners
- Only 5 RNG projects per year go into construction

*Transparency and Honesty from a Nationwide
Biogas Developer*