Lakeside-02

Appendix A Supporting the Prepared Direct Testimony of Daryl Maas

(Pilot Project)

[PUBLIC VERSION VOLUME 8]

BuildSteel™ | Powered by the Steel Framing Industry Association

ROOF TRUSSES

Credit Union's Switch from Wood to CFS Trusses Saves Six Weeks and $40,000

Subscribe to our weekly newsletter

Get Updates Tailored to Your Interests

Email*

SUBSCRIBE

ABOUT COLD-FORMED STEEL

eBook: A Beginner's Guide to Cold-Formed Steel Framing

Infographic: Resiliency Facts about Cold-Formed Steel

Video: 5 Things You Didn't Know About Cold-Formed Steel Framing

Events: View upcoming CFS design and construction events

About BuildSteel

COLD-FORMED STEEL 101 →

SUPPORT

Job Board

Free Project Assistance

BuildSteel™ | Powered by the Steel Framing Industry Association

Free Specification Review

Learning Portal

Find a Provider

Latest Newsletter

Contact Us

GET PROJECT ASSISTANCE →

WHY STEEL?

Economics

Durability

Sustainability

Innovation

Prefabrication

BIM

Fire

Acoustics

Seismic

Codes & Standards

ALL TOPICS →

BuildSteel™

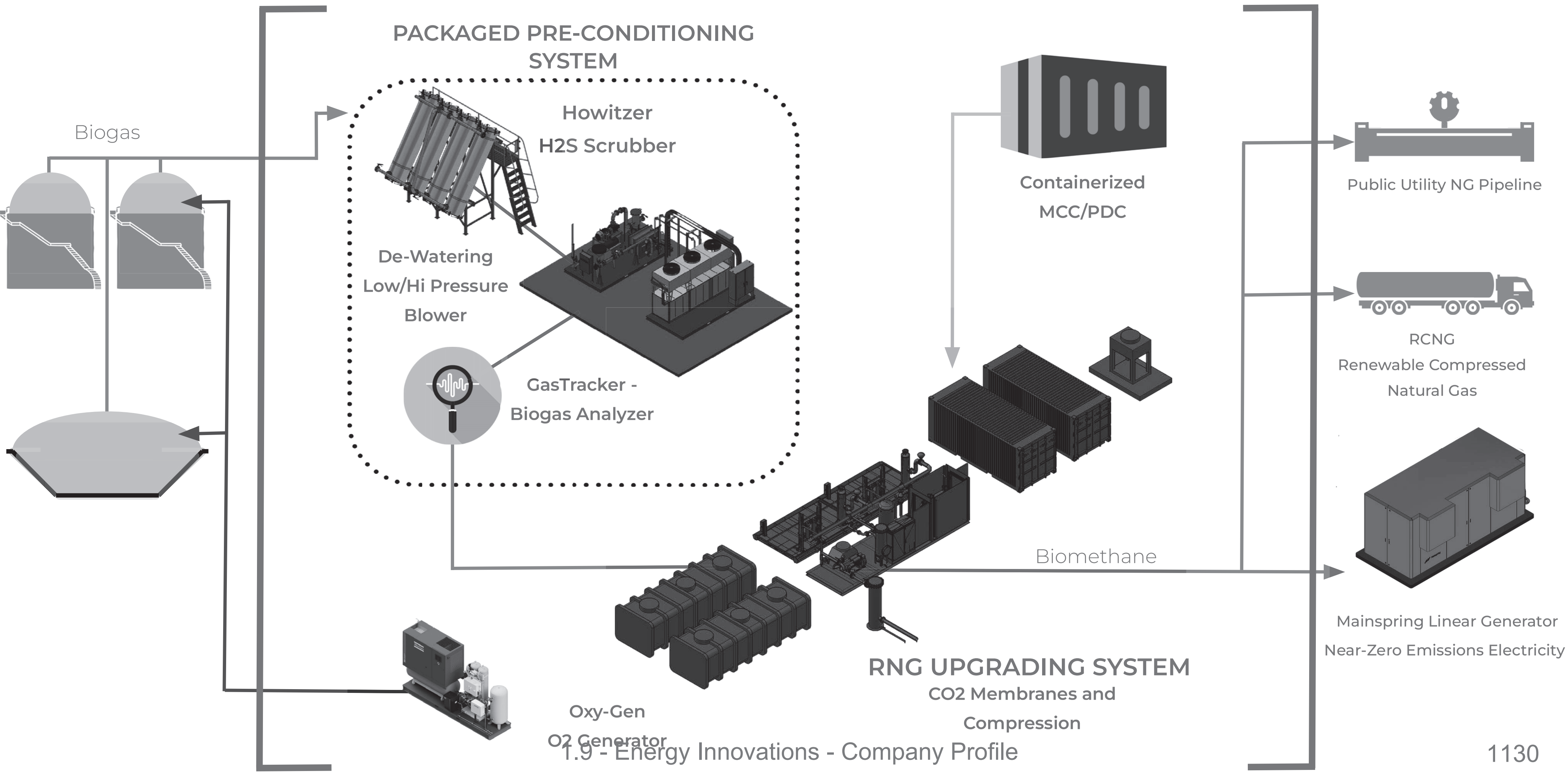
Powered by the Steel Framing Industry Association

Privacy Policy Terms and Conditions

A Division of Electric Innovations, Inc

energy
INNOVATIONS

Energy Innovations Equipment Offerings



Company History

2007

Company founded by Ted Thompson

Commercial and industrial electrical work in San Diego area, moving to Redding in 2010 and finishing certifications in Medium Voltage and programming

2012

Built First Biogas Power Gen Project

800 kW genset project in Galt CA for Sacramento Municipal Utility District

In the following years EI built 10 more projects totalling over 12 MW of power in PG&E, SCE and SMUD territory. Started 4-35 kV division. Primary Service Metering services

2017

Shifted to Biogas Cleanup and moving

Blowers, Compressors, heat exchangers, filters, h2s removal, 22,000 sq ft production space, welding team, built to 45 employees in numerous disciplines, including programing, UL panel shop, IT systems.

2022

Expansion continues

Adding membrane CO2 removal, trucking high pressure to 3,500 psi model, 230 to 1,300 kW genset packages

Orders for 8 upgrading projects secured for 2023

2023

Future Building - 2024

EI Acquires 15 acres in the Stillwater Business Park for expansion

By the Numbers

Currently Commissioned Systems

49 biogas processing projects to date

4+ Million MMBTU through EI Equipment 2022

31,768 Total wet gas SCFM movement capacity constructed

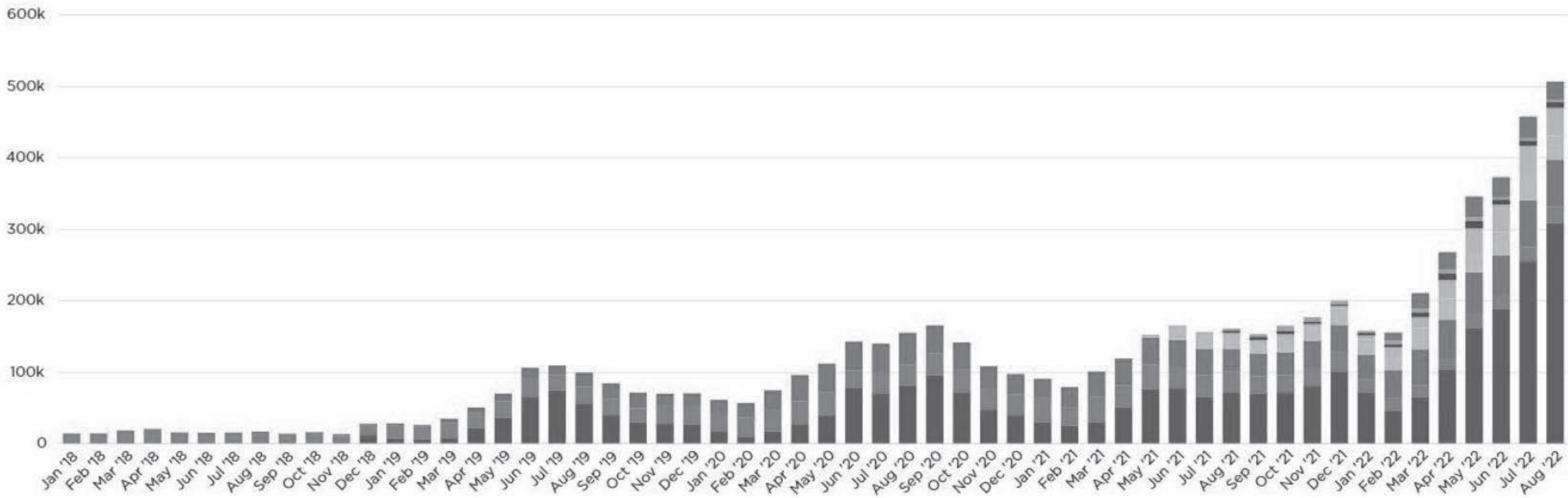
Projected End of 2023

59 Biogas processing projects to date

5+ Million MMBTU through EI Equipment

40,000+ Total wet gas SCFM movement capacity constructed

On pace to process 5M+ MMBTU's in 2023



Monthly MMBTU Production

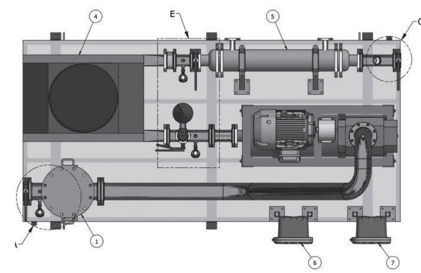
energy INNOVATIONS

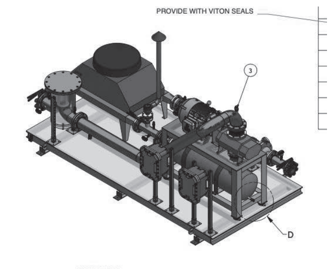
Energy Innovations Products & Services

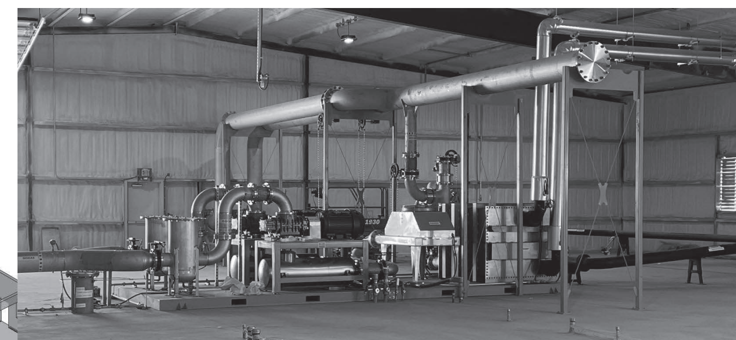
- Pad Mounted Biogas Moving and Pre-Conditioning Systems
- MediaSaver Oxygen Generator Systems
- H2s Removal Scrubbers
- Power Distribution Centers & Control Panels
- SCADA Controls Engineering & Integration
- High Pressure Upgrading Systems - First two systems rolling out December 2023, 4 more systems 2024

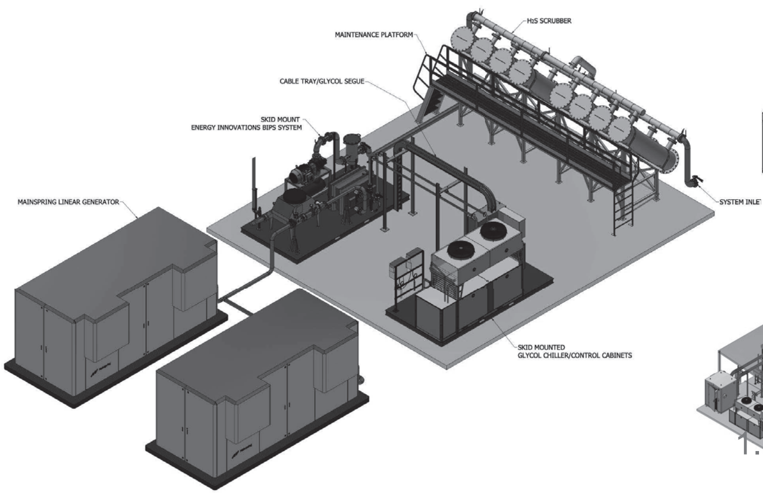
Pad Mount Biogas Moving & Pre-Conditioning Systems

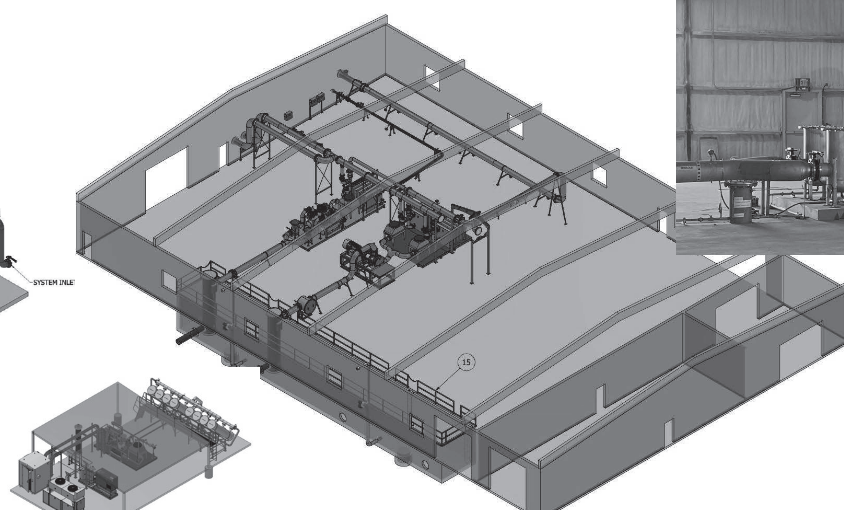
- Systems between 100 and 3500 SCFM
- Catered to handle wide variety of biogas content, including moisture, H2s and siloxanes
- Stainless steel, corrosion resistant, biogas rated construction
- Designed for simple installation
- Controls, sensors, power usage, flow, meters and analyzers included
- Design drawings, controls narrative











MediaSaver Oxygen Injection

SCFM from 3 - 50

93-95% pure O2

Turn Key, power up and go

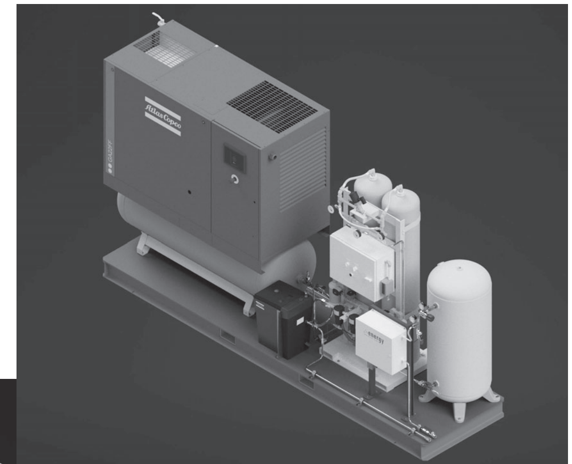
Stand alone SCADA standard, easy to integrate with other master system

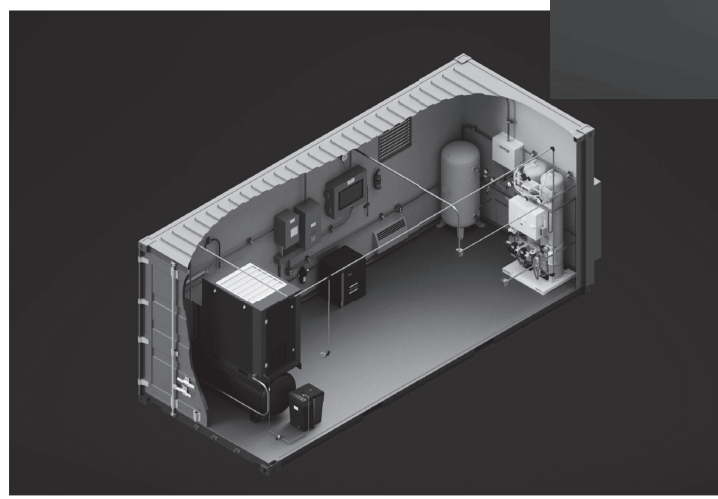
Flow Controller allows exact amount of O2 desired

O2 Purity sensor W/Automated shutdown assures high purity Oxygen is always delivered.

Cold weather capable down to -6 f

Easy Operation and Maintenance





Howitzer H2S Removal

Patent Pending

Ease of loading: Removable Hatches and catwalk make loading easier. Safer operation.

Ease of Unloading: Gravity assists unloading

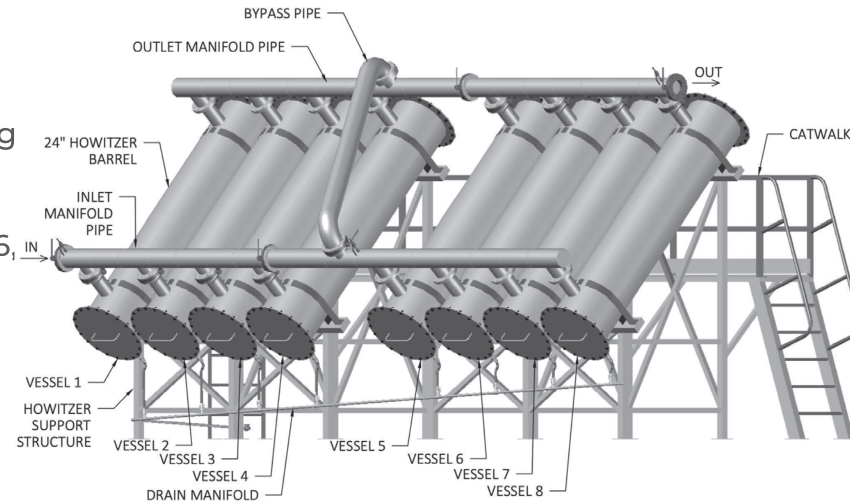
Maximize media: Individual tubes and internal diffusers spread biogas across the media evenly and reduce wasted or unused media

Keep running: Valves allow you to keep operational while changing out meda

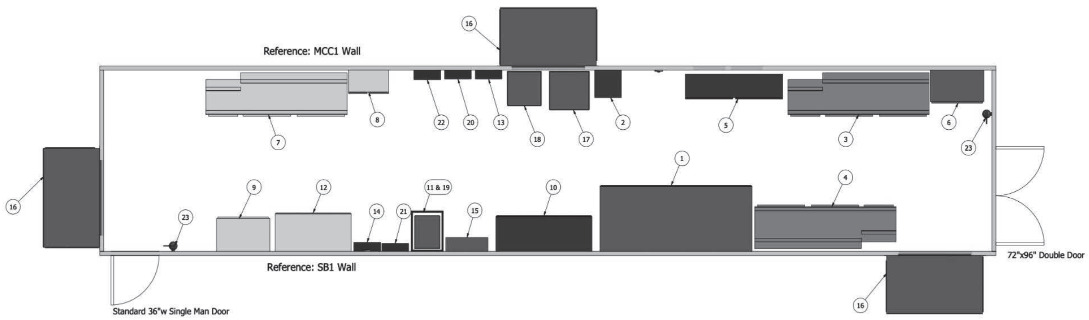
Scale up or down: Don't pay for what you do not need. Build in 4, 6, 8, 10, 12 tubes ranging in 120 cubic feet up to 588 cubic feet

Easy Field Installation: Connect inlet and outlet pipes and drain line for condensate.

Good price point: $ 346/ cubic foot



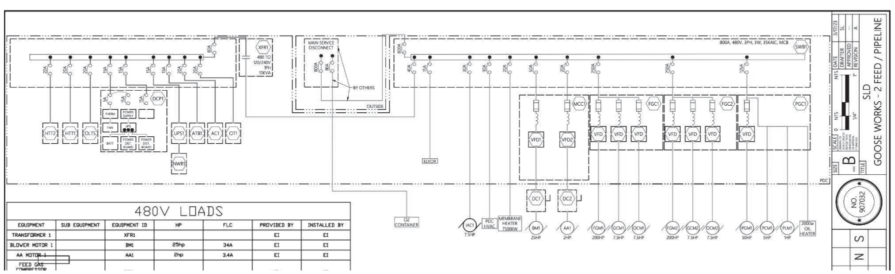
Power Distribution Centers & E Houses



Certified designs, electricians and power centers for critical distribution

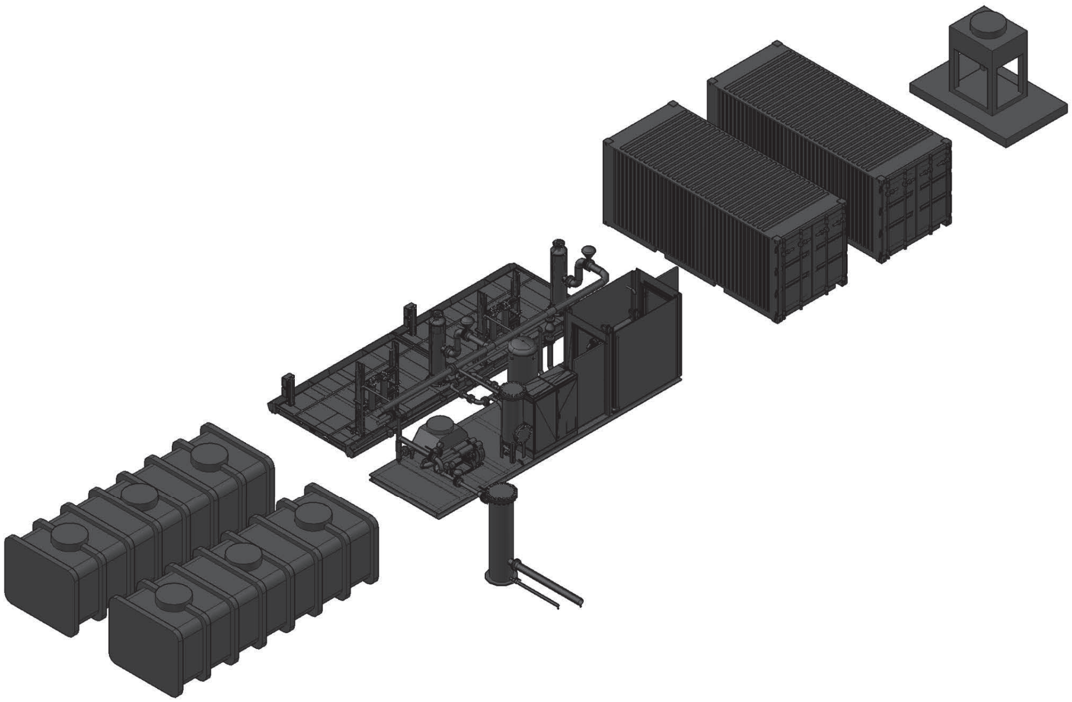
Metering, MCC, IT racks, UPS, backup gen, transformers, climate control

Sizes from 6x6 E houses up to 750 sq foot PDC



energy INNOVATIONS

Biogas Upgrading System



8 Units Ordered for 2023-2024

- Turn Key Upgrading Systems for pipeline for Trucking applications ranging from 250 - 1000 SCFM
- Stainless steel, corrosion resistant, biogas rated construction
- Designed for simple installation
- Controls, sensors, power usage, flow, meters and analyzers included
- Design drawings, controls narrative

Automation and Controls

Controls:

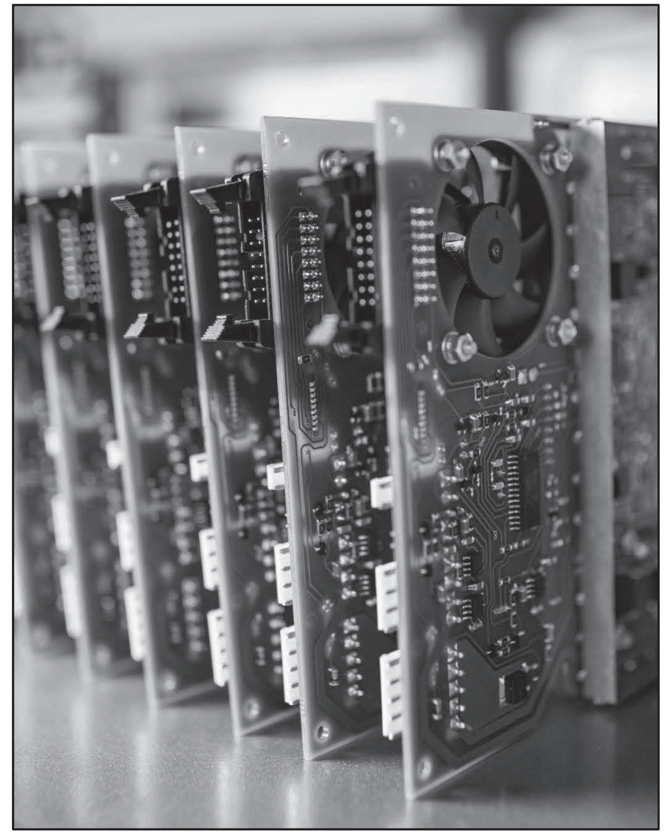
- Customer Choice Local HMI and PLC is standard
- Remote Access to Data and Controls
- Optional SCADA Package
  - Central Control
  - Central Alarming
  - Central Data Harvesting

Data:

- Redundant Data Capturing is Standard

Security:

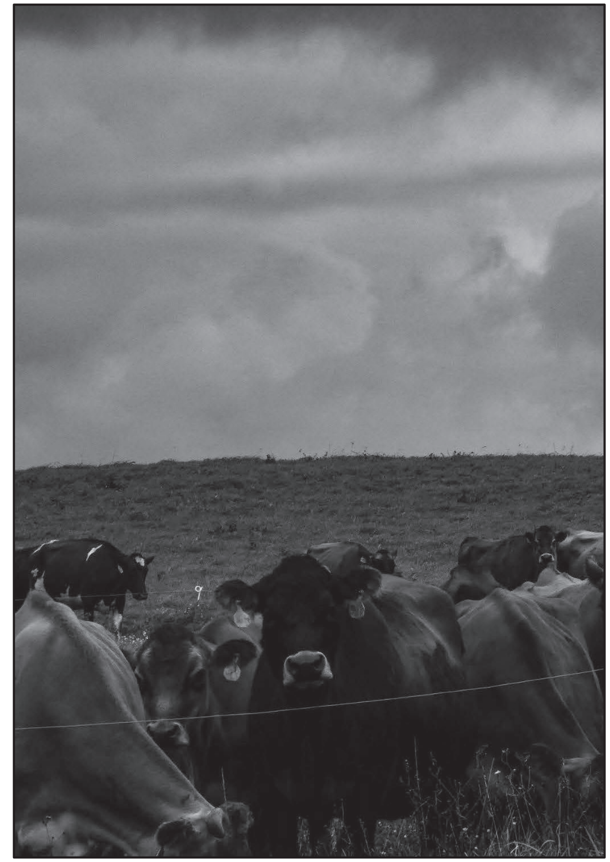
- Firewall at Site Level
- VPN access



Gas Analyzer

- Extensive experience designing and building our own analyzers, but also with integrating 3rd party analyzers such as Ohio Lumex, Ecotec, and LandTec
- Our newest product, the GasTracker, incorporates all of the lessons learned from the past 8+ years of experience.
- Everything incorporated in this product line is designed to meet the challenges that a biogas analyzer has to overcome.
  - Corrosion/Gas compatibility
  - Moisture Management
  - Dependable Trace O2 Measurement.

More than 40 Biogas Analyzers Deployed to date.



Case Study: Calgren Dairy Fuels

- First dairy biogas cluster in North America to inject into pipeline.
- 16 Systems currently online with two additional scheduled for 2023. Current capacity of 4,471 scfm.
- EI provided flange to flange design, construction, and installation of biogas processing equipment.

Warranty Information

ISSUE	COVERED?	EI ACTION	CLIENT RESPONSIBILITY
Equipment Failure	YES**	Work with OEM to process OEM Warranty claim for the failed equipment	Notify EI of any problem. Operate equipment within design specs, operate and maintain equipment according to OEM operating manual.
Faulty Wiring	YES*	Deploy EI rapid-response team to resolve	
Faulty Weldments	YES*	Deploy EI rapid-response team to resolve	
Faulty Programming	YES*	Resolve programming issues and upload corrected program	
Faulty Workmanship	YES*	Deploy EI rapid-response team to resolve	

Please review our TERMS AND CONDITION OF SALE for complete Warranty Coverage information

** Limitations apply. 12-month warranty.*

*** Limitations apply. Refer to OEM manufacturer Warranty for complete details*

Examples of Completed Projects (last 36 months)

Calgren Dairy Fuels:

1. Sixteen (16) biogas processing equipment projects across 16 dairy manure digesters.

North Texas:

1. Eight (8) biogas processing equipment projects across 6 dairy manure digesters, with several more in queue
2. Two (2) biogas flare projects at 2 sites
3. One (1) cluster-wide IT/ Automation project

Merced Pipeline:

1. Nine (9) biogas processing equipment projects across 9 dairy manure digesters
2. Two (2) projects related to cluster-wide IT/ Automation

Lakeside Pipeline:

1. Six (6) biogas processing equipment projects across 6 dairy manure digesters, with several more in queue
2. Two (2) projects related to IT / Automation

Five Points Pipeline:

1. Five (5) biogas processing equipment projects across 5 dairy manure digesters
2. One (1) O2 project
3. Two (2) projects related to cluster-wide IT/ Automation

Tipton Pipeline:

1. Two (2) biogas processing equipment projects across 2 dairy manure digesters

Oak Valley Energy

1. Two (2) biogas processing equipment projects across 2 dairy manure digesters
2. One (1) project related cluster-wide IT/Automation

OTHER CLIENTS

1. Three (3) biogas processing equipment projects
2. Nine (9) O2 injection only projects

Clients & Connections

MAAS ENERGY WORKS

CALGREN Renewable Fuels

SOUTHERN CALIFORNIA EDISON Energy for What's Ahead

Lakeside Pipeline, LLC

SMUD Sacramento Municipal Utility District

County of Shasta California

PG&E

Merced Pipeline, LLC

Oak Valley Energy

Iowa Dairy Farm

Certifications

AVO Training Institute

UL

Ignition Core Certified

American Biogas Council

AWS American Welding Society Certified Welding Services

energy INNOVATIONS

November 7, 2024

RE: Project Cost Variation Explanation – Decade Dairy

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012 and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter documents the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process low-pressure biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope for this Pilot Project based on our understanding of what would be necessary. But as we began to deploy early versions of these systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Equipment and Fabrication Costs

In addition to an increased scope of work, the equipment and labor costs associated with building these products rose sharply from 2018 to 2021. Our 2018 estimate of the building process underestimated the labor intensity of this type of equipment, which was corrected in proposals that were issued in subsequent years.

- Extended fabrication requirements for integrating additional components
- Increased material costs for enhanced system components
- Additional onsite work (electrical, welding and assembly requirements)
- Specialized equipment needs for complex installation procedures
- Equipment offloading and handling requirements

Labor Cost Adjustments

Labor costs were impacted by:

- Extended installation timeline due to increased system complexity
- Additional specialized labor for enhanced onsite welding and assembly
- Increased coordination requirements for complex system integration
- Extended planning and design revision hours
- Specialized technical expertise for advanced system components

Project Complexity Factors

The upgraded design specifications introduced additional complexity:

- Enhanced coordination requirements between various system components
- More intricate installation procedures
- Detailed quality control measures
- Extended testing and commissioning requirements

The following pages include detailed data on the key variables responsible for the delta in cost between our initial proposals issued in 2018 vs the product contracts issued in 2020 and 2021. If I can be of further service regarding this matter, please feel free to reach out via my email address included below.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Biogas Blower and O2 Injection System[1]

			Cost DELTA
	2018 Quoted Biogas Blower System Cost	$178,900	
	2018 Quoted Biogas O2 Air Injection System Cost	$171,856	
	2018 TOTAL QUOTED SYSTEM COST	**$350,756**	
1	Additional Design SOW, labor		$3,800
2	Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exchangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters		$65,977
3	Increased Blower Capacity		$15,000
4	Additional electrical infrastructure and equipment required to power and control modified design		$25,550
5	Addition of Automation/ Controls SOW, materials and labor		$51,100
6	Addition of Site Prep SOW, labor and mobilization costs		$4,500
7	Addition of Field Work SOW, materials and labor		$61,300
8	Addition of Commissioning SOW, materials and labor		$5,800
9	Back flow Prevention Device		$9,950
10	O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE (Quoted Price of $171,856 vs actual price of $89,700)		($82,156)
	Total Net Increases Due to Design Changes		**$160,821**
11	Pandemic Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$20,573
12	Pandemic Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$39,520
	Total Increases Due to Pandemic Inflation		**$60,093**
	TOTAL COST IMPACT		**$220,914**
	Final Cost	**$571,670**	

[1] Note that in 2018 these systems were budgeted separately but they were later procured together in one contract.

Notes on Above Table:

1. Additional Design SOW: After the short Pilot Project application period, our team realized based on experience and conversations with MEW that we would need to charge for additional design labor necessary to achieve the system's operational goals. As we prepared to deliver the system, it became increasingly complex with additional design needs, so we determined we needed to include costs for additional design labor to ensure the project met all requirements.
2. Changes to Biogas Equipment: through gained experience on 2018 and 2019 equipment deployments of earlier versions of this equipment we learned that HDPE plastic was not sufficient for biogas piping as it was less durable in the field and presented a risk of degradation or leaks, and so we switched to stainless steel to improve reliability and safety. We also realized that using air-to-air coolers was more reliable and more energy efficient than using glycol-based chillers by themselves, so we added and expanded the air-to-air coolers. We also introduced Field operations of early versions of these systems also showed that the equipment needed previously unquoted equipment such as gauges, meters, and sensors that allowed for gas analytics. During the 2018 period there was not time to fully specify all meters, gauges and sensors that would be necessary. But in the period after application, we determined that this gas analytics data was necessary for qualifying for certain regulatory programs, as well as to ensure proper operations of the biogas system. These changes improved compliance with carbon credit and other regulatory requirements, and improved operator efficiency and safety
3. Increased Blower Capacity: this cost was incurred beyond the original estimate as real-world performance data made it clear that enhancements needed to be made. In particular, Blowers that have factory specifications for a certain flow rate could technically achieve their data sheet flow rate in the field on our 2018 and 2019 deployments. But, we found that in order to perform at these rates in actual conditions that included dust, direct sunlight on some elements, and other field stresses, the blowers operated a very high temperatures, which caused risk of overheating and consumed oil, shortening operating life unacceptably and reducing equipment reliability by shutting down unexpectedly on thermal overloads. Based on those experiences we determined that a larger blower rated for approximately 125% of the needed flow would cause the system to operate at lower temperatures. These improvements improved safety by avoiding overheating and fire risks. The improvements also increased equipment reliability and longevity, and reduced power consumption.
4. Changes to Electrical Equipment: the addition of larger equipment and/or new equipment made it necessary to reconfigure the power distribution, including enhanced control room design, and upgraded electrical equipment to meet the power needs of larger and a different system.
5. Addition of Automation and Controls SOW: the addition of this SOW allowed remote operators to monitor and control the systems, rather than rely on on-site operators, which undoubtedly represents significant cost savings in ongoing operations expenses.
6. Additional Site Preparation SOW: After attempting to commission some of these early systems in the field, we found that they were more complicated to start up than most

biogas operators could handle. The technology was new and required skilled teams to set up the site properly. It thus became apparent that our team would need to travel to the site to prepare the location for our equipment. This SOW was not originally known, therefore it was not included in our quote. Our equipment is highly specialized and required our own internal staff to mobilize and ensure each project location was adequately prepared to receive our equipment.

7. Additional Field Work SOW: after preparing the initial bid, we identified that the sites required mixers within the lagoon to move the digestate to optimize gas production and the quality of the biogas. These mixers required extensive field electrical work, including the mobilization of heavy machinery and teams of people to perform extensive infrastructure work around the lagoons.
8. Addition of Commissioning SOW: In the same manner that site preparation and field work requirements were higher than expected, we found it was necessary to deploy a team for commissioning of these systems since they had multiple new electrical, mechanical, and controls features. We had to charge the customer for this additional service that we did not initially include in our 2018 estimates.
9. Back Flow Prevention Device: this is a critical safety feature that was subsequently added to our systems, ensuring that backflow from the higher pressure biogas gathering line did not over-pressurize the covered lagoons at the dairy digester sites. This safety feature was not caught during the 110 day submittal since there was not time to do a full engineering and safety review on the budget, but was added later as the design became more final.
10. O2 Price Impact: The original quote for O2 Air Injection was $171,856, but a series of costs were over-estimated during the limited time available to get quotes and make estimates in 2018. This SOW was included in the actual contracts in 2020 and2021, and a price of $89,700 was assigned, representing a savings of $82,156 in actual price vs the quote. We passed these savings on to the customer in the final package.
11. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 30-50% depending on the item, and over 25-45% for labor depending on the role.

H2S Scrubber aka Howitzer[2]

			Cost DELTA
	2018 Quoted Cost	**$39,720**	
1	Change in materials from HDPE to Stainless Steel		$23,832
2	Increase in size and addition of components and labor required to take product from concept to actual manufacturing.		$31,814
	Total Net Increases Due to Design Changes		**$55,646**
3	**Pandemic** Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$4,051
4	**Pandemic** Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$11,201
	Total Net Increases Due to Pandemic Inflation		**$15,252**
	TOTAL COST IMPACT		**$70,898**
	Final Cost	**$110,618**	

Notes on Above Table:

1. Change in materials from HDPE to Stainless Steel: this change was required to ensure materials withstood ambient conditions and guaranteed product longevity. Operational experience on early Howitzers revealed that HDPE could not handle the pressure increases and decreased that occurred during real-world operations such as hard shut downs. The switch to stainless steel improved operational performance and safety due to reduced risk of biogas containment failure and leaks.
2. Our patent-pending H2S scrubber design was a concept product at the time it was quoted in 2018. By the time manufacturing of these units began, a series of previously unknown challenges were overcome, which required additional components and safety features. This included everything from redesigning the quantity and sizing of the tubes, reconfiguring valves on the inlet and outlet of each tube, and adding a gangway with safety gates to allow for easy operator access. All these items improved operational performance and workplace safety.

---

[2] EI provided the 2018 budget quotes, and later worked with MEW on design improvements as we deployed similar systems in 2019. EI's licensed our final Howitzer design for construction, but did not perform the final physical work due to capacity constraints.

3. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 25-55% depending on the item, and over 15-35% for labor depending on the role.

Appendix A

Labor cost differences

1. The original bid only included 4 types of employees to build the system. The rates of those employees both in 2018 and 2021 and their respective change is shown in the table below.

Position	2018 Wages	2021 Wages	% Change
Office Admin	$18	$28.82	60%
Apprentice Electrician	$17	$31.68	86%
Construction Supervisor	$34	$52.80	55%
Master Electrician	$35	$54.12	54%

2. The list of positions needed to procure parts, construct, and install a biogas system was not comprehensive and should have also included:

Position	Approx. Labor Cost in 2021
Procurement/ Inventory Staff	$38.28
Welders/ Pipefitters	$52.80
Instrumentation / Controls Technicians	$59.40
Construction Laborers	$33.00
Mechanical/ Process Engineer or designer	$68.64

3. The amount of time required to procure, construct, test and install a biogas system was highly underestimated due to lack of industry experience at the time working in a higher pressure pipeline gas environment and should have been increased from 10 weeks to 11 months.

4. At the end of 2020 and continuing through 2021, manufacturing was still recovering from shipping delays and labor force destabilization.

    1. In late 2020, supply chain disruptions and labor shortages created significant issues for the construction industry, leading to project delays. COVID-19 restrictions severely disrupted the availability of materials, while high demand drove up prices.
    2. Key materials, including stainless and mild steel, experienced drastic price increases, forcing us to adjust pricing accordingly. For example, prices for some materials rose by more than 40%, and lead times extended significantly, leaving many projects at a standstill.
    3. Labor shortages compounded these problems, as we often faced delays filling open positions. We often hired personnel at rates above our posted wage rate. A survey by the Associated General Contractors of America (AGC) found that around 91% of firms had difficulty hiring, which further delayed project

timelines. The pandemic's impact on skilled labor availability, combined with a sharp increase in demand for construction workers, led to higher labor costs and worsened the backlogs already caused by material delays. These challenges led to increased construction costs.

5. Blower/O2 Injection System: It is estimated that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 25-45% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$268,600			Low Value	High Value
			25%	45%
Labor Share of Contract (%)	Low Value	28%	**7% - $18,802**	**12.6% - $33,844**
	High Value	35%	**8.8% - $23,503**	**15.8% - $42,305**

6. Howitzer System: It is estimates that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 15-35% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:
$79,440

			Labor Inflation Rate (%)	
			Low Value	High Value
			15%	35%
Labor Share of Contract (%)	Low Value	28%	4.2% - $3,336	9.8% - $7,785
	High Value	35%	5.3% - $4,171	12.3% - $9,731

Material/ Elemental Cost Differences

1. The following table highlights a sample of several components that we pulled comparative pricing for to highlight the types of pricing increases we saw from 2018 to 2021.

Component	Price Range 2018	Price Range 2021	Price Increase %
Gas Filter 316 SS Filtration Canister w/ Pressure Differential Gauge	$250 - $500	$500 - $800	60%
Gas Blower - Roots with Flex Couplings	$2,000 - $5,000	$4,500 - $7,000	50-70%
Gas Silencer 316 SS	$1,500 - $3,000	$2,500 - $4,500	40-50%
Sage Flow Meter with RS 485 Comms	$1,200 - $2,500	$2,500 - $4,000	60-75%
316 SS Gas Flanges and Tie-ins	$200 - $500	$400 - $700	50%
Gas Rated Manual Shut-off Valves	$200 - $1,000	$1,200 - $1,800	70-80%
Indoor Rated Cabinet with Climate Control	$1,500 - $5,000	$3,000 - $6,000	60-90%
VFDs and Line Reactors	$1,000 - $5,000	$3,000 - $7,000	80-90%
Red Lion Data Logging	$500 - $1,500	$1,200 - $2,500	100%
OLC and Data Logging	$300 - $1,000	$800 - $1,500	50-100%

2. In general, we saw components increase between 25-55% from 2018 to 2021 depending on the system and its inputs. This does not consider the fact that additional design and operational requirements resulted in the addition of components and equipment that was not contemplated in the original estimates.

3. A final example: The 2018 proposals included HDPE materials as opposed to steel. The actual projects were built using stainless steel. In 2018, HDPE (high-density polyethylene) piping costs varied by size but generally ranged from around $0.59 to $39.03 per foot depending on diameter and wall thickness.

    a. Steel pipes, typically used for similar applications, were generally more expensive, often by a factor of 2 to 1 for materials that met similar design requirements.

    b. In 2021, steel prices surged, particularly due to COVID-19 supply chain disruptions, labor shortages, and increased demand in construction, with typical per-foot costs for steel pipes ranging from $4 to $70, depending on specifications and coating type

4. Blower/O2 Injection System: It is estimated that materials comprise 48-52% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 30-50% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated

inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$268,600			Low Value	High Value
			30%	50%
Materials Share of Contract (%)	Low Value	48%	14.4% - $38,678	24% - $64,464
	High Value	52%	15.6% - $41,902	26% - $69,836

5. Howitzer System: It is estimated that materials comprise 55-65% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 25-55% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$79,440			Low Value	High Value
			25%	55%
Materials Share of Contract (%)	Low Value	55%	13.8% - $10,923	30.3% - $24,031
	High Value	65%	16.3% - $12,909	35.8% - $28,400

energy INNOVATIONS

November 7, 2024

RE: Project Cost Variation Explanation – Dixie Creek Dairy

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012 and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter documents the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process low-pressure biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope for this Pilot Project based on our understanding of what would be necessary. But as we began to deploy early versions of these systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Equipment and Fabrication Costs

In addition to an increased scope of work, the equipment and labor costs associated with building these products rose sharply from 2018 to 2021. Our 2018 estimate of the building process underestimated the labor intensity of this type of equipment, which was corrected in proposals that were issued in subsequent years.

- Extended fabrication requirements for integrating additional components
- Increased material costs for enhanced system components
- Additional onsite work (electrical, welding and assembly requirements)
- Specialized equipment needs for complex installation procedures
- Equipment offloading and handling requirements

Labor Cost Adjustments

Labor costs were impacted by:

- Extended installation timeline due to increased system complexity
- Additional specialized labor for enhanced onsite welding and assembly
- Increased coordination requirements for complex system integration
- Extended planning and design revision hours
- Specialized technical expertise for advanced system components

Project Complexity Factors

The upgraded design specifications introduced additional complexity:

- Enhanced coordination requirements between various system components
- More intricate installation procedures
- Detailed quality control measures
- Extended testing and commissioning requirements

The following pages include detailed data on the key variables responsible for the delta in cost between our initial proposals issued in 2018 vs the product contracts issued in 2020 and 2021. If I can be of further service regarding this matter, please feel free to reach out via my email address included below.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

Biogas Blower and O2 Injection System[1]

			Cost DELTA
	2018 Quoted Biogas Blower System Cost	$178,900	
	2018 Quoted Biogas O2 Air Injection System Cost	$171,856	
	2018 TOTAL QUOTED SYSTEM COST	**$350,756**	
1	Additional Design SOW, labor		$3,800
2	Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exchangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters		$122,693
3	Increased Blower Capacity		$27,894
4	Additional electrical infrastructure and equipment required to power and control modified design		$47,514
5	Addition of Automation/ Controls SOW, materials and labor		$35,000
6	Addition of Site Prep SOW, labor and mobilization costs		$7,500
7	Addition of Field Work SOW, materials and labor		$93,300
8	Addition of Commissioning SOW, materials and labor		$8,800
9	Back flow Prevention Device		$12,050
10	O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE (Quoted Price of $171,856 vs actual price of $73,708)		($98,148)
	Total Net Increases Due to Design Changes		**$260,403**
11	Pandemic Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$24,578
12	Pandemic Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$47,213
	Total Increases Due to Pandemic Inflation		**$71,791**
	TOTAL COST IMPACT		**$332,194**
	Final Cost	**$682,950**	

[1] Note that in 2018 these systems were budgeted separately but they were later procured together in one contract.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Notes on Above Table:

1. Additional Design SOW: After the short Pilot Project application period, our team realized based on experience and conversations with MEW that we would need to charge for additional design labor necessary to achieve the system's operational goals. As we prepared to deliver the system, it became increasingly complex with additional design needs, so we determined we needed to include costs for additional design labor to ensure the project met all requirements.
2. Changes to Biogas Equipment: through gained experience on 2018 and 2019 equipment deployments of earlier versions of this equipment we learned that HDPE plastic was not sufficient for biogas piping as it was less durable in the field and presented a risk of degradation or leaks, and so we switched to stainless steel to improve reliability and safety. We also realized that using air-to-air coolers was more reliable and more energy efficient than using glycol-based chillers by themselves, so we added and expanded the air-to-air coolers. We also introduced Field operations of early versions of these systems also showed that the equipment needed previously unquoted equipment such as gauges, meters, and sensors that allowed for gas analytics. During the 2018 period there was not time to fully specify all meters, gauges and sensors that would be necessary. But in the period after application, we determined that this gas analytics data was necessary for qualifying for certain regulatory programs, as well as to ensure proper operations of the biogas system. These changes improved compliance with carbon credit and other regulatory requirements, and improved operator efficiency and safety
3. Increased Blower Capacity: this cost was incurred beyond the original estimate as real-world performance data made it clear that enhancements needed to be made. In particular, Blowers that have factory specifications for a certain flow rate could technically achieve their data sheet flow rate in the field on our 2018 and 2019 deployments. But, we found that in order to perform at these rates in actual conditions that included dust, direct sunlight on some elements, and other field stresses, the blowers operated a very high temperatures, which caused risk of overheating and consumed oil, shortening operating life unacceptably and reducing equipment reliability by shutting down unexpectedly on thermal overloads. Based on those experiences we determined that a larger blower rated for approximately 125% of the needed flow would cause the system to operate at lower temperatures. These improvements improved safety by avoiding overheating and fire risks. The improvements also increased equipment reliability and longevity, and reduced power consumption.
4. Changes to Electrical Equipment: the addition of larger equipment and/or new equipment made it necessary to reconfigure the power distribution, including enhanced control room design, and upgraded electrical equipment to meet the power needs of larger and a different system.
5. Addition of Automation and Controls SOW: the addition of this SOW allowed remote operators to monitor and control the systems, rather than rely on on-site operators, which undoubtedly represents significant cost savings in ongoing operations expenses.
6. Additional Site Preparation SOW: After attempting to commission some of these early systems in the field, we found that they were more complicated to start up than most

biogas operators could handle. The technology was new and required skilled teams to set up the site properly. It thus became apparent that our team would need to travel to the site to prepare the location for our equipment. This SOW was not originally known, therefore it was not included in our quote. Our equipment is highly specialized and required our own internal staff to mobilize and ensure each project location was adequately prepared to receive our equipment.

7. Additional Field Work SOW: after preparing the initial bid, we identified that the sites required mixers within the lagoon to move the digestate to optimize gas production and the quality of the biogas. These mixers required extensive field electrical work, including the mobilization of heavy machinery and teams of people to perform extensive infrastructure work around the lagoons.
8. Addition of Commissioning SOW: In the same manner that site preparation and field work requirements were higher than expected, we found it was necessary to deploy a team for commissioning of these systems since they had multiple new electrical, mechanical, and controls features. We had to charge the customer for this additional service that we did not initially include in our 2018 estimates.
9. Back Flow Prevention Device: this is a critical safety feature that was subsequently added to our systems, ensuring that backflow from the higher pressure biogas gathering line did not over-pressurize the covered lagoons at the dairy digester sites. This safety feature was not caught during the 110 day submittal since there was not time to do a full engineering and safety review on the budget, but was added later as the design became more final.
10. O2 Price Impact: The original quote for O2 Air Injection was $171,856, but a series of costs were over-estimated during the limited time available to get quotes and make estimates in 2018. This SOW was included in the actual contracts in 2020 and 2021, and a price of $73,708 was assigned, representing a savings of $98,148 in actual price vs the quote. We passed these savings on to the customer in the final package.
11. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 30-50% depending on the item, and over 25-45% for labor depending on the role.

H2S Scrubber aka Howitzer[2]

			Cost DELTA
	2018 Quoted Cost	**$39,720**	
1	Change in materials from HDPE to Stainless Steel		$23,832
2	Increase in size and addition of components and labor required to take product from concept to actual manufacturing.		$31,814
	Total Net Increases Due to Design Changes		**$55,646**
3	**Pandemic** Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$4,051
4	**Pandemic** Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$11,201
	Total Net Increases Due to Pandemic Inflation		**$15,252**
	TOTAL COST IMPACT		**$70,898**
	Final Cost	**$110,618**	

Notes on Above Table:

1. Change in materials from HDPE to Stainless Steel: this change was required to ensure materials withstood ambient conditions and guaranteed product longevity. Operational experience on early Howitzers revealed that HDPE could not handle the pressure increases and decreased that occurred during real-world operations such as hard shut downs. The switch to stainless steel improved operational performance and safety due to reduced risk of biogas containment failure and leaks.
2. Our patent-pending H2S scrubber design was a concept product at the time it was quoted in 2018. By the time manufacturing of these units began, a series of previously unknown challenges were overcome, which required additional components and safety features. This included everything from redesigning the quantity and sizing of the tubes, reconfiguring valves on the inlet and outlet of each tube, and adding a gangway with safety gates to allow for easy operator access. All these items improved operational performance and workplace safety.

---

[2] EI provided the 2018 budget quotes, and later worked with MEW on design improvements as we deployed similar systems in 2019. EI's licensed our final Howitzer design for construction, but did not perform the final physical work due to capacity constraints.

3. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 25-55% depending on the item, and over 15-35% for labor depending on the role.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Appendix A

Labor cost differences

1. The original bid only included 4 types of employees to build the system. The rates of those employees both in 2018 and 2021 and their respective change is shown in the table below.

Position	2018 Wages	2021 Wages	% Change
Office Admin	$18	$28.82	60%
Apprentice Electrician	$17	$31.68	86%
Construction Supervisor	$34	$52.80	55%
Master Electrician	$35	$54.12	54%

2. The list of positions needed to procure parts, construct, and install a biogas system was not comprehensive and should have also included:

Position	Approx. Labor Cost in 2021
Procurement/ Inventory Staff	$38.28
Welders/ Pipefitters	$52.80
Instrumentation / Controls Technicians	$59.40
Construction Laborers	$33.00
Mechanical/ Process Engineer or designer	$68.64

3. The amount of time required to procure, construct, test and install a biogas system was highly underestimated due to lack of industry experience at the time working in a higher pressure pipeline gas environment and should have been increased from 10 weeks to 11 months.

4. At the end of 2020 and continuing through 2021, manufacturing was still recovering from shipping delays and labor force destabilization.

    1. In late 2020, supply chain disruptions and labor shortages created significant issues for the construction industry, leading to project delays. COVID-19 restrictions severely disrupted the availability of materials, while high demand drove up prices.
    2. Key materials, including stainless and mild steel, experienced drastic price increases, forcing us to adjust pricing accordingly. For example, prices for some materials rose by more than 40%, and lead times extended significantly, leaving many projects at a standstill.
    3. Labor shortages compounded these problems, as we often faced delays filling open positions. We often hired personnel at rates above our posted wage rate. A survey by the Associated General Contractors of America (AGC) found that around 91% of firms had difficulty hiring, which further delayed project

timelines. The pandemic's impact on skilled labor availability, combined with a sharp increase in demand for construction workers, led to higher labor costs and worsened the backlogs already caused by material delays. These challenges led to increased construction costs.

5. Blower/O2 Injection System: It is estimated that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 25-45% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:	
$252,608	

Labor Share of Contract (%)			Labor Inflation Rate (%)	
			Low Value	High Value
			25%	45%
	Low Value	28%	7% - $17,683	12.6% - $31,829
	High Value	35%	8.8% - $22,103	15.8% - $39,786

6. Howitzer System: It is estimates that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 15-35% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$79,440			Low Value	High Value
			15%	35%
Labor Share of Contract (%)	Low Value	28%	4.2% - $3,336	9.8% - $7,785
	High Value	35%	5.3% - $4,171	12.3% - $9,731

Material/ Elemental Cost Differences

1. The following table highlights a sample of several components that we pulled comparative pricing for to highlight the types of pricing increases we saw from 2018 to 2021.

Component	Price Range 2018	Price Range 2021	Price Increase %
Gas Filter 316 SS Filtration Canister w/ Pressure Differential Gauge	$250 - $500	$500 - $800	60%
Gas Blower - Roots with Flex Couplings	$2,000 - $5,000	$4,500 - $7,000	50-70%
Gas Silencer 316 SS	$1,500 - $3,000	$2,500 - $4,500	40-50%
Sage Flow Meter with RS 485 Comms	$1,200 - $2,500	$2,500 - $4,000	60-75%
316 SS Gas Flanges and Tie-ins	$200 - $500	$400 - $700	50%
Gas Rated Manual Shut-off Valves	$200 - $1,000	$1,200 - $1,800	70-80%
Indoor Rated Cabinet with Climate Control	$1,500 - $5,000	$3,000 - $6,000	60-90%
VFDs and Line Reactors	$1,000 - $5,000	$3,000 - $7,000	80-90%
Red Lion Data Logging	$500 - $1,500	$1,200 - $2,500	100%
OLC and Data Logging	$300 - $1,000	$800 - $1,500	50-100%

2. In general, we saw components increase between 25-55% from 2018 to 2021 depending on the system and its inputs. This does not consider the fact that additional design and operational requirements resulted in the addition of components and equipment that was not contemplated in the original estimates.

3. A final example: The 2018 proposals included HDPE materials as opposed to steel. The actual projects were built using stainless steel. In 2018, HDPE (high-density polyethylene) piping costs varied by size but generally ranged from around $0.59 to $39.03 per foot depending on diameter and wall thickness.

    a. Steel pipes, typically used for similar applications, were generally more expensive, often by a factor of 2 to 1 for materials that met similar design requirements.

    b. In 2021, steel prices surged, particularly due to COVID-19 supply chain disruptions, labor shortages, and increased demand in construction, with typical per-foot costs for steel pipes ranging from $4 to $70, depending on specifications and coating type

4. Blower/O2 Injection System: It is estimated that materials comprise 48-52% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 30-50% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated

inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$252,608			Low Value	High Value
			30%	50%
Materials Share of Contract (%)	Low Value	48%	**14.4% - $36,376**	**24% - $60,626**
	High Value	52%	**15.6% - $39,407**	**26% - $65,678**

5. Howitzer System: It is estimated that materials comprise 55-65% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 25-55% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$79,440			Low Value	High Value
			25%	55%
Materials Share of Contract (%)	Low Value	55%	**13.8% - $10,923**	**30.3% - $24,031**
	High Value	65%	**16.3% - $12,909**	**35.8% - $28,400**

November 7, 2024

RE: Project Cost Variation Explanation – Double L (Yokum) Dairy

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012 and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter documents the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process low-pressure biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope for this Pilot Project based on our understanding of what would be necessary. But as we began to deploy early versions of these systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Equipment and Fabrication Costs

In addition to an increased scope of work, the equipment and labor costs associated with building these products rose sharply from 2018 to 2021. Our 2018 estimate of the building process underestimated the labor intensity of this type of equipment, which was corrected in proposals that were issued in subsequent years.

- Extended fabrication requirements for integrating additional components
- Increased material costs for enhanced system components
- Additional onsite work (electrical, welding and assembly requirements)
- Specialized equipment needs for complex installation procedures
- Equipment offloading and handling requirements

Labor Cost Adjustments

Labor costs were impacted by:

- Extended installation timeline due to increased system complexity
- Additional specialized labor for enhanced onsite welding and assembly
- Increased coordination requirements for complex system integration
- Extended planning and design revision hours
- Specialized technical expertise for advanced system components

Project Complexity Factors

The upgraded design specifications introduced additional complexity:

- Enhanced coordination requirements between various system components
- More intricate installation procedures
- Detailed quality control measures
- Extended testing and commissioning requirements

The following pages include detailed data on the key variables responsible for the delta in cost between our initial proposals issued in 2018 vs the product contracts issued in 2020 and 2021. If I can be of further service regarding this matter, please feel free to reach out via my email address included below.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

Biogas Blower and O2 Injection System[1]

			Cost DELTA
	2018 Quoted Biogas Blower System Cost	$178,900	
	2018 Quoted Biogas O2 Air Injection System Cost	$171,856	
	2018 TOTAL QUOTED SYSTEM COST	**$350,756**	
1	Additional Design SOW, labor		$4,700
2	Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exchangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters		$72,611
3	Increased Blower Capacity		$16,508
4	Additional electrical infrastructure and equipment required to power and control modified design		$28,119
5	Addition of Automation/ Controls SOW, materials and labor		$49,720
6	Addition of Site Prep SOW, labor and mobilization costs		$4,500
7	Addition of Field Work SOW, materials and labor		$78,900
8	Addition of Commissioning SOW, materials and labor		$5,800
9	Back flow Prevention Device		$9,950
10	O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE (Quoted Price of $171,856 vs actual price of $89,700)		($82,156)
	Total Net Increases Due to Design Changes		**$188,652**
11	Pandemic Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$21,692
12	Pandemic Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$41,670
	Total Increases Due to Pandemic Inflation		**$63,362**
	TOTAL COST IMPACT		**$252,014**
	Final Cost	**$602,770**	

[1] Note that in 2018 these systems were budgeted separately but they were later procured together in one contract.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Notes on Above Table:

1. Additional Design SOW: After the short Pilot Project application period, our team realized based on experience and conversations with MEW that we would need to charge for additional design labor necessary to achieve the system's operational goals. As we prepared to deliver the system, it became increasingly complex with additional design needs, so we determined we needed to include costs for additional design labor to ensure the project met all requirements.
2. Changes to Biogas Equipment: through gained experience on 2018 and 2019 equipment deployments of earlier versions of this equipment we learned that HDPE plastic was not sufficient for biogas piping as it was less durable in the field and presented a risk of degradation or leaks, and so we switched to stainless steel to improve reliability and safety. We also realized that using air-to-air coolers was more reliable and more energy efficient than using glycol-based chillers by themselves, so we added and expanded the air-to-air coolers. We also introduced Field operations of early versions of these systems also showed that the equipment needed previously unquoted equipment such as gauges, meters, and sensors that allowed for gas analytics. During the 2018 period there was not time to fully specify all meters, gauges and sensors that would be necessary. But in the period after application, we determined that this gas analytics data was necessary for qualifying for certain regulatory programs, as well as to ensure proper operations of the biogas system. These changes improved compliance with carbon credit and other regulatory requirements, and improved operator efficiency and safety
3. Increased Blower Capacity: this cost was incurred beyond the original estimate as real-world performance data made it clear that enhancements needed to be made. In particular, Blowers that have factory specifications for a certain flow rate could technically achieve their data sheet flow rate in the field on our 2018 and 2019 deployments. But, we found that in order to perform at these rates in actual conditions that included dust, direct sunlight on some elements, and other field stresses, the blowers operated a very high temperatures, which caused risk of overheating and consumed oil, shortening operating life unacceptably and reducing equipment reliability by shutting down unexpectedly on thermal overloads. Based on those experiences we determined that a larger blower rated for approximately 125% of the needed flow would cause the system to operate at lower temperatures. These improvements improved safety by avoiding overheating and fire risks. The improvements also increased equipment reliability and longevity, and reduced power consumption.
4. Changes to Electrical Equipment: the addition of larger equipment and/or new equipment made it necessary to reconfigure the power distribution, including enhanced control room design, and upgraded electrical equipment to meet the power needs of larger and a different system.
5. Addition of Automation and Controls SOW: the addition of this SOW allowed remote operators to monitor and control the systems, rather than rely on on-site operators, which undoubtedly represents significant cost savings in ongoing operations expenses.
6. Additional Site Preparation SOW: After attempting to commission some of these early systems in the field, we found that they were more complicated to start up than most

biogas operators could handle. The technology was new and required skilled teams to set up the site properly. It thus became apparent that our team would need to travel to the site to prepare the location for our equipment. This SOW was not originally known, therefore it was not included in our quote. Our equipment is highly specialized and required our own internal staff to mobilize and ensure each project location was adequately prepared to receive our equipment.

7. Additional Field Work SOW: after preparing the initial bid, we identified that the sites required mixers within the lagoon to move the digestate to optimize gas production and the quality of the biogas. These mixers required extensive field electrical work, including the mobilization of heavy machinery and teams of people to perform extensive infrastructure work around the lagoons.
8. Addition of Commissioning SOW: In the same manner that site preparation and field work requirements were higher than expected, we found it was necessary to deploy a team for commissioning of these systems since they had multiple new electrical, mechanical, and controls features. We had to charge the customer for this additional service that we did not initially include in our 2018 estimates.
9. Back Flow Prevention Device: this is a critical safety feature that was subsequently added to our systems, ensuring that backflow from the higher pressure biogas gathering line did not over-pressurize the covered lagoons at the dairy digester sites. This safety feature was not caught during the 110 day submittal since there was not time to do a full engineering and safety review on the budget, but was added later as the design became more final.
10. O2 Price Impact: The original quote for O2 Air Injection was $171,856, but a series of costs were over-estimated during the limited time available to get quotes and make estimates in 2018. This SOW was included in the actual contracts in 2020 and2021, and a price of $89,700 was assigned, representing a savings of $82,156 in actual price vs the quote. We passed these savings on to the customer in the final package.
11. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 30-50% depending on the item, and over 25-45% for labor depending on the role.

H2S Scrubber aka Howitzer[2]

			Cost DELTA
	2018 Quoted Cost	**$34,520**	
1	Change in materials from HDPE to Stainless Steel.		$25,818
2	Increase in size and addition of components and labor required to take product from concept to actual manufacturing.		$42,131
	Total Net Increases Due to Design Changes		**$67,949**
3	**Pandemic** Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$8,450
4	**Pandemic** Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$24,303
	Total Net Increases Due to Pandemic Inflation		**$32,753**
	TOTAL COST IMPACT		**$100,702**
	Final Cost	**$135,222**	

Notes on Above Table:

1. Change in materials from HDPE to Stainless Steel: this change was required to ensure materials withstood ambient conditions and guaranteed product longevity. Operational experience on early Howitzers revealed that HDPE could not handle the pressure increases and decreased that occurred during real-world operations such as hard shut downs. The switch to stainless steel improved operational performance and safety due to reduced risk of biogas containment failure and leaks.
2. Our patent-pending H2S scrubber design was a concept product at the time it was quoted in 2018. By the time manufacturing of these units began, a series of previously unknown challenges were overcome, which required additional components and safety features. This included everything from redesigning the quantity and sizing of the tubes, reconfiguring valves on the inlet and outlet of each tube, and adding a gangway with safety gates to allow for easy operator access. All these items improved operational performance and workplace safety.

[2] EI provided the 2018 budget quotes, and later worked with MEW on design improvements as we deployed similar systems in 2019. EI's licensed our final Howitzer design for construction, but did not perform the final physical work due to capacity constraints.

3. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 25-55% depending on the item, and over 15-35% for labor depending on the role.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Appendix A

Labor cost differences

1. The original bid only included 4 types of employees to build the system. The rates of those employees both in 2018 and 2021 and their respective change is shown in the table below.

Position	2018 Wages	2021 Wages	% Change
Office Admin	$18	$28.82	60%
Apprentice Electrician	$17	$31.68	86%
Construction Supervisor	$34	$52.80	55%
Master Electrician	$35	$54.12	54%

2. The list of positions needed to procure parts, construct, and install a biogas system was not comprehensive and should have also included:

Position	Approx. Labor Cost in 2021
Procurement/ Inventory Staff	$38.28
Welders/ Pipefitters	$52.80
Instrumentation / Controls Technicians	$59.40
Construction Laborers	$33.00
Mechanical/ Process Engineer or designer	$68.64

3. The amount of time required to procure, construct, test and install a biogas system was highly underestimated due to lack of industry experience at the time working in a higher pressure pipeline gas environment and should have been increased from 10 weeks to 11 months.

4. At the end of 2020 and continuing through 2021, manufacturing was still recovering from shipping delays and labor force destabilization.

    1. In late 2020, supply chain disruptions and labor shortages created significant issues for the construction industry, leading to project delays. COVID-19 restrictions severely disrupted the availability of materials, while high demand drove up prices.
    2. Key materials, including stainless and mild steel, experienced drastic price increases, forcing us to adjust pricing accordingly. For example, prices for some materials rose by more than 40%, and lead times extended significantly, leaving many projects at a standstill.
    3. Labor shortages compounded these problems, as we often faced delays filling open positions. We often hired personnel at rates above our posted wage rate. A survey by the Associated General Contractors of America (AGC) found that around 91% of firms had difficulty hiring, which further delayed project

timelines. The pandemic's impact on skilled labor availability, combined with a sharp increase in demand for construction workers, led to higher labor costs and worsened the backlogs already caused by material delays. These challenges led to increased construction costs.

5. Blower/O2 Injection System: It is estimated that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 25-45% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$268,600			Low Value	High Value
			25%	45%
Labor Share of Contract (%)	Low Value	28%	**7% - $18,802**	**12.6% - $33,844**
	High Value	35%	**8.8% - $23,503**	**15.8% - $42,305**

6. Howitzer System: It is estimates that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 15-35% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

energy INNOVATIONS

Adjusted Contract Amount:
$69,040

			Labor Inflation Rate (%)	
			Low Value	High Value
			15%	35%
Labor Share of Contract (%)	Low Value	28%	**4.2% - $2,900**	**9.8% - $6,766**
	High Value	35%	**5.3% - $3,625**	**12.3% - $8,457**

Material/ Elemental Cost Differences

1. The following table highlights a sample of several components that we pulled comparative pricing for to highlight the types of pricing increases we saw from 2018 to 2021.

Component	Price Range 2018	Price Range 2021	Price Increase %
Gas Filter 316 SS Filtration Canister w/ Pressure Differential Gauge	$250 - $500	$500 - $800	60%
Gas Blower - Roots with Flex Couplings	$2,000 - $5,000	$4,500 - $7,000	50-70%
Gas Silencer 316 SS	$1,500 - $3,000	$2,500 - $4,500	40-50%
Sage Flow Meter with RS 485 Comms	$1,200 - $2,500	$2,500 - $4,000	60-75%
316 SS Gas Flanges and Tie-ins	$200 - $500	$400 - $700	50%
Gas Rated Manual Shut-off Valves	$200 - $1,000	$1,200 - $1,800	70-80%
Indoor Rated Cabinet with Climate Control	$1,500 - $5,000	$3,000 - $6,000	60-90%
VFDs and Line Reactors	$1,000 - $5,000	$3,000 - $7,000	80-90%
Red Lion Data Logging	$500 - $1,500	$1,200 - $2,500	100%
OLC and Data Logging	$300 - $1,000	$800 - $1,500	50-100%

2. In general, we saw components increase between 25-55% from 2018 to 2021 depending on the system and its inputs. This does not consider the fact that additional design and operational requirements resulted in the addition of components and equipment that was not contemplated in the original estimates.

3. A final example: The 2018 proposals included HDPE materials as opposed to steel. The actual projects were built using stainless steel. In 2018, HDPE (high-density polyethylene) piping costs varied by size but generally ranged from around $0.59 to $39.03 per foot depending on diameter and wall thickness.

    a. Steel pipes, typically used for similar applications, were generally more expensive, often by a factor of 2 to 1 for materials that met similar design requirements.

    b. In 2021, steel prices surged, particularly due to COVID-19 supply chain disruptions, labor shortages, and increased demand in construction, with typical per-foot costs for steel pipes ranging from $4 to $70, depending on specifications and coating type

4. Blower/O2 Injection System: It is estimated that materials comprise 48-52% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 30-50% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated

inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$268,600			Low Value	High Value
			30%	50%
Materials Share of Contract (%)	Low Value	48%	**14.4% - $38,678**	**24% - $64,464**
	High Value	52%	**15.6% - $41,902**	**26% - $69,836**

5. Howitzer System: It is estimated that materials comprise 55-65% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 25-55% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$69,040			Low Value	High Value
			25%	55%
Materials Share of Contract (%)	Low Value	55%	**13.8% - $9,493**	**30.3% - $20,885**
	High Value	65%	**16.3% - $11,219**	**35.8% - $24,682**

November 7, 2024

RE: Project Cost Variation Explanation – High Roller Dairy

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012 and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter documents the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process low-pressure biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope for this Pilot Project based on our understanding of what would be necessary. But as we began to deploy early versions of these systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

Equipment and Fabrication Costs

In addition to an increased scope of work, the equipment and labor costs associated with building these products rose sharply from 2018 to 2021. Our 2018 estimate of the building process underestimated the labor intensity of this type of equipment, which was corrected in proposals that were issued in subsequent years.

- Extended fabrication requirements for integrating additional components
- Increased material costs for enhanced system components
- Additional onsite work (electrical, welding and assembly requirements)
- Specialized equipment needs for complex installation procedures
- Equipment offloading and handling requirements

Labor Cost Adjustments

Labor costs were impacted by:

- Extended installation timeline due to increased system complexity
- Additional specialized labor for enhanced onsite welding and assembly
- Increased coordination requirements for complex system integration
- Extended planning and design revision hours
- Specialized technical expertise for advanced system components

Project Complexity Factors

The upgraded design specifications introduced additional complexity:

- Enhanced coordination requirements between various system components
- More intricate installation procedures
- Detailed quality control measures
- Extended testing and commissioning requirements

The following pages include detailed data on the key variables responsible for the delta in cost between our initial proposals issued in 2018 vs the product contracts issued in 2020 and 2021. If I can be of further service regarding this matter, please feel free to reach out via my email address included below.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

Biogas Blower and O2 Injection System[1]

			Cost DELTA
	2018 Quoted Biogas Blower System Cost	$178,900	
	2018 Quoted Biogas O2 Air Injection System Cost	$171,856	
	2018 TOTAL QUOTED SYSTEM COST	**$350,756**	
1	Additional Design SOW, labor		$4,900
2	Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exchangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters		$54,134
3	Increased Blower Capacity		$12,308
4	Additional electrical infrastructure and equipment required to power and control modified design		$20,964
5	Addition of Automation/ Controls SOW, materials and labor		$61,703
6	Addition of Site Prep SOW, labor and mobilization costs		$4,998
7	Addition of Field Work SOW, materials and labor		$84,483
8	Addition of Commissioning SOW, materials and labor		$11,840
9	Back flow Prevention Device		$12,050
10	O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE (Quoted Price of $171,856 vs actual price of $89,700)		($82,156)
	Total Net Increases Due to Design Changes		**$185,224**
11	Pandemic Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$21,555
12	Pandemic Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$41,405
	Total Increases Due to Pandemic Inflation		**$62,960**
	TOTAL COST IMPACT		**$248,184**
	Final Cost	**$598,940**	

[1] Note that in 2018 these systems were budgeted separately but they were later procured together in one contract.

Notes on Above Table:

1. Additional Design SOW: After the short Pilot Project application period, our team realized based on experience and conversations with MEW that we would need to charge for additional design labor necessary to achieve the system's operational goals. As we prepared to deliver the system, it became increasingly complex with additional design needs, so we determined we needed to include costs for additional design labor to ensure the project met all requirements.
2. Changes to Biogas Equipment: through gained experience on 2018 and 2019 equipment deployments of earlier versions of this equipment we learned that HDPE plastic was not sufficient for biogas piping as it was less durable in the field and presented a risk of degradation or leaks, and so we switched to stainless steel to improve reliability and safety. We also realized that using air-to-air coolers was more reliable and more energy efficient than using glycol-based chillers by themselves, so we added and expanded the air-to-air coolers. We also introduced Field operations of early versions of these systems also showed that the equipment needed previously unquoted equipment such as gauges, meters, and sensors that allowed for gas analytics. During the 2018 period there was not time to fully specify all meters, gauges and sensors that would be necessary. But in the period after application, we determined that this gas analytics data was necessary for qualifying for certain regulatory programs, as well as to ensure proper operations of the biogas system. These changes improved compliance with carbon credit and other regulatory requirements, and improved operator efficiency and safety
3. Increased Blower Capacity: this cost was incurred beyond the original estimate as real-world performance data made it clear that enhancements needed to be made. In particular, Blowers that have factory specifications for a certain flow rate could technically achieve their data sheet flow rate in the field on our 2018 and 2019 deployments. But, we found that in order to perform at these rates in actual conditions that included dust, direct sunlight on some elements, and other field stresses, the blowers operated a very high temperatures, which caused risk of overheating and consumed oil, shortening operating life unacceptably and reducing equipment reliability by shutting down unexpectedly on thermal overloads. Based on those experiences we determined that a larger blower rated for approximately 125% of the needed flow would cause the system to operate at lower temperatures. These improvements improved safety by avoiding overheating and fire risks. The improvements also increased equipment reliability and longevity, and reduced power consumption.
4. Changes to Electrical Equipment: the addition of larger equipment and/or new equipment made it necessary to reconfigure the power distribution, including enhanced control room design, and upgraded electrical equipment to meet the power needs of larger and a different system.
5. Addition of Automation and Controls SOW: the addition of this SOW allowed remote operators to monitor and control the systems, rather than rely on on-site operators, which undoubtedly represents significant cost savings in ongoing operations expenses.
6. Additional Site Preparation SOW: After attempting to commission some of these early systems in the field, we found that they were more complicated to start up than most

biogas operators could handle. The technology was new and required skilled teams to set up the site properly. It thus became apparent that our team would need to travel to the site to prepare the location for our equipment. This SOW was not originally known, therefore it was not included in our quote. Our equipment is highly specialized and required our own internal staff to mobilize and ensure each project location was adequately prepared to receive our equipment.

7. Additional Field Work SOW: after preparing the initial bid, we identified that the sites required mixers within the lagoon to move the digestate to optimize gas production and the quality of the biogas. These mixers required extensive field electrical work, including the mobilization of heavy machinery and teams of people to perform extensive infrastructure work around the lagoons.
8. Addition of Commissioning SOW: In the same manner that site preparation and field work requirements were higher than expected, we found it was necessary to deploy a team for commissioning of these systems since they had multiple new electrical, mechanical, and controls features. We had to charge the customer for this additional service that we did not initially include in our 2018 estimates.
9. Back Flow Prevention Device: this is a critical safety feature that was subsequently added to our systems, ensuring that backflow from the higher pressure biogas gathering line did not over-pressurize the covered lagoons at the dairy digester sites. This safety feature was not caught during the 110 day submittal since there was not time to do a full engineering and safety review on the budget, but was added later as the design became more final.
10. O2 Price Impact: The original quote for O2 Air Injection was $171,856, but a series of costs were over-estimated during the limited time available to get quotes and make estimates in 2018. This SOW was included in the actual contracts in 2020 and2021, and a price of $89,700 was assigned, representing a savings of $82,156 in actual price vs the quote. We passed these savings on to the customer in the final package.
11. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 30-50% depending on the item, and over 25-45% for labor depending on the role.

H2S Scrubber aka Howitzer[2]

			Cost DELTA
	2018 Quoted Cost	**$34,520**	
1	Change in materials from HDPE to Stainless Steel.		$25,818
2	Increase in size and addition of components and labor required to take product from concept to actual manufacturing.		$42,131
	Total Net Increases Due to Design Changes		**$67,949**
3	**Pandemic** Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$8,450
4	**Pandemic** Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$24,303
	Total Net Increases Due to Pandemic Inflation		**$32,753**
	TOTAL COST IMPACT		**$100,702**
	Final Cost	**$135,222**	

Notes on Above Table:

1. Change in materials from HDPE to Stainless Steel: this change was required to ensure materials withstood ambient conditions and guaranteed product longevity. Operational experience on early Howitzers revealed that HDPE could not handle the pressure increases and decreased that occurred during real-world operations such as hard shut downs. The switch to stainless steel improved operational performance and safety due to reduced risk of biogas containment failure and leaks.
2. Our patent-pending H2S scrubber design was a concept product at the time it was quoted in 2018. By the time manufacturing of these units began, a series of previously unknown challenges were overcome, which required additional components and safety features. This included everything from redesigning the quantity and sizing of the tubes, reconfiguring valves on the inlet and outlet of each tube, and adding a gangway with safety gates to allow for easy operator access. All these items improved operational performance and workplace safety.

[2] EI provided the 2018 budget quotes, and later worked with MEW on design improvements as we deployed similar systems in 2019. EI's licensed our final Howitzer design for construction, but did not perform the final physical work due to capacity constraints.

3. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 25-55% depending on the item, and over 15-35% for labor depending on the role.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Appendix A

Labor cost differences

1. The original bid only included 4 types of employees to build the system. The rates of those employees both in 2018 and 2021 and their respective change is shown in the table below.

Position	2018 Wages	2021 Wages	% Change
Office Admin	$18	$28.82	60%
Apprentice Electrician	$17	$31.68	86%
Construction Supervisor	$34	$52.80	55%
Master Electrician	$35	$54.12	54%

2. The list of positions needed to procure parts, construct, and install a biogas system was not comprehensive and should have also included:

Position	Approx. Labor Cost in 2021
Procurement/ Inventory Staff	$38.28
Welders/ Pipefitters	$52.80
Instrumentation / Controls Technicians	$59.40
Construction Laborers	$33.00
Mechanical/ Process Engineer or designer	$68.64

3. The amount of time required to procure, construct, test and install a biogas system was highly underestimated due to lack of industry experience at the time working in a higher pressure pipeline gas environment and should have been increased from 10 weeks to 11 months.

4. At the end of 2020 and continuing through 2021, manufacturing was still recovering from shipping delays and labor force destabilization.

    1. In late 2020, supply chain disruptions and labor shortages created significant issues for the construction industry, leading to project delays. COVID-19 restrictions severely disrupted the availability of materials, while high demand drove up prices.
    2. Key materials, including stainless and mild steel, experienced drastic price increases, forcing us to adjust pricing accordingly. For example, prices for some materials rose by more than 40%, and lead times extended significantly, leaving many projects at a standstill.
    3. Labor shortages compounded these problems, as we often faced delays filling open positions. We often hired personnel at rates above our posted wage rate. A survey by the Associated General Contractors of America (AGC) found that around 91% of firms had difficulty hiring, which further delayed project

timelines. The pandemic's impact on skilled labor availability, combined with a sharp increase in demand for construction workers, led to higher labor costs and worsened the backlogs already caused by material delays. These challenges led to increased construction costs.

5. Blower/O2 Injection System: It is estimated that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 25-45% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$268,600			Low Value	High Value
			25%	45%
Labor Share of Contract (%)	Low Value	28%	**7% - $18,802**	**12.6% - $33,844**
	High Value	35%	**8.8% - $23,503**	**15.8% - $42,305**

6. Howitzer System: It is estimates that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 15-35% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:
$69,040

Labor Share of Contract (%)			Labor Inflation Rate (%): Low Value 15%	Labor Inflation Rate (%): High Value 35%
	Low Value	28%	**4.2% - $2,900**	**9.8% - $6,766**
	High Value	35%	**5.3% - $3,625**	**12.3% - $8,457**

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Material/ Elemental Cost Differences

1. The following table highlights a sample of several components that we pulled comparative pricing for to highlight the types of pricing increases we saw from 2018 to 2021.

Component	Price Range 2018	Price Range 2021	Price Increase %
Gas Filter 316 SS Filtration Canister w/ Pressure Differential Gauge	$250 - $500	$500 - $800	60%
Gas Blower - Roots with Flex Couplings	$2,000 - $5,000	$4,500 - $7,000	50-70%
Gas Silencer 316 SS	$1,500 - $3,000	$2,500 - $4,500	40-50%
Sage Flow Meter with RS 485 Comms	$1,200 - $2,500	$2,500 - $4,000	60-75%
316 SS Gas Flanges and Tie-ins	$200 - $500	$400 - $700	50%
Gas Rated Manual Shut-off Valves	$200 - $1,000	$1,200 - $1,800	70-80%
Indoor Rated Cabinet with Climate Control	$1,500 - $5,000	$3,000 - $6,000	60-90%
VFDs and Line Reactors	$1,000 - $5,000	$3,000 - $7,000	80-90%
Red Lion Data Logging	$500 - $1,500	$1,200 - $2,500	100%
OLC and Data Logging	$300 - $1,000	$800 - $1,500	50-100%

2. In general, we saw components increase between 25-55% from 2018 to 2021 depending on the system and its inputs. This does not consider the fact that additional design and operational requirements resulted in the addition of components and equipment that was not contemplated in the original estimates.

3. A final example: The 2018 proposals included HDPE materials as opposed to steel. The actual projects were built using stainless steel. In 2018, HDPE (high-density polyethylene) piping costs varied by size but generally ranged from around $0.59 to $39.03 per foot depending on diameter and wall thickness.

    a. Steel pipes, typically used for similar applications, were generally more expensive, often by a factor of 2 to 1 for materials that met similar design requirements.

    b. In 2021, steel prices surged, particularly due to COVID-19 supply chain disruptions, labor shortages, and increased demand in construction, with typical per-foot costs for steel pipes ranging from $4 to $70, depending on specifications and coating type

4. Blower/O2 Injection System: It is estimated that materials comprise 48-52% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 30-50% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated

inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$268,600			Low Value	High Value
			30%	50%
Materials Share of Contract (%)	Low Value	48%	14.4% - $38,678	24% - $64,464
	High Value	52%	15.6% - $41,902	26% - $69,836

5. Howitzer System: It is estimated that materials comprise 55-65% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 25-55% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$69,040			Low Value	High Value
			25%	55%
Materials Share of Contract (%)	Low Value	55%	13.8% - $9,493	30.3% - $20,885
	High Value	65%	16.3% - $11,219	35.8% - $24,682

November 7, 2024

RE: Project Cost Variation Explanation – Lakeside Dairy

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012 and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter documents the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process low-pressure biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope for this Pilot Project based on our understanding of what would be necessary. But as we began to deploy early versions of these systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

Equipment and Fabrication Costs

In addition to an increased scope of work, the equipment and labor costs associated with building these products rose sharply from 2018 to 2021. Our 2018 estimate of the building process underestimated the labor intensity of this type of equipment, which was corrected in proposals that were issued in subsequent years.

- Extended fabrication requirements for integrating additional components
- Increased material costs for enhanced system components
- Additional onsite work (electrical, welding and assembly requirements)
- Specialized equipment needs for complex installation procedures
- Equipment offloading and handling requirements

Labor Cost Adjustments

Labor costs were impacted by:

- Extended installation timeline due to increased system complexity
- Additional specialized labor for enhanced onsite welding and assembly
- Increased coordination requirements for complex system integration
- Extended planning and design revision hours
- Specialized technical expertise for advanced system components

Project Complexity Factors

The upgraded design specifications introduced additional complexity:

- Enhanced coordination requirements between various system components
- More intricate installation procedures
- Detailed quality control measures
- Extended testing and commissioning requirements

The following pages include detailed data on the key variables responsible for the delta in cost between our initial proposals issued in 2018 vs the product contracts issued in 2020 and 2021. If I can be of further service regarding this matter, please feel free to reach out via my email address included below.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

Biogas Blower and O2 Injection System[1]

			Cost DELTA
	2018 Quoted Biogas Blower System Cost	$178,900	
	2018 Quoted Biogas O2 Air Injection System Cost	$171,856	
	2018 TOTAL QUOTED SYSTEM COST	**$350,756**	
1	Additional Design SOW, labor		$4,900
2	Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exchangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters		$85,984
3	Increased Blower Capacity		$19,548
4	Additional electrical infrastructure and equipment required to power and control modified design		$33,298
5	Addition of Automation/ Controls SOW, materials and labor		$27,186
6	Addition of Site Prep SOW, labor and mobilization costs		$4,500
7	Addition of Field Work SOW, materials and labor		$78,300
8	Addition of Commissioning SOW, materials and labor		$5,800
9	Back flow Prevention Device		$9,950
10	O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE (Quoted Price of $171,856 vs actual price of $89,700)		($82,156)
	Total Net Increases Due to Design Changes		**$187,310**
11	Pandemic Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$21,638
12	Pandemic Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$41,566
	Total Increases Due to Pandemic Inflation		**$63,204**
	TOTAL COST IMPACT		**$250,514**
	Final Cost	**$601,270**	

[1] Note that in 2018 these systems were budgeted separately but they were later procured together in one contract.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Notes on Above Table:

1. Additional Design SOW: After the short Pilot Project application period, our team realized based on experience and conversations with MEW that we would need to charge for additional design labor necessary to achieve the system's operational goals. As we prepared to deliver the system, it became increasingly complex with additional design needs, so we determined we needed to include costs for additional design labor to ensure the project met all requirements.
2. Changes to Biogas Equipment: through gained experience on 2018 and 2019 equipment deployments of earlier versions of this equipment we learned that HDPE plastic was not sufficient for biogas piping as it was less durable in the field and presented a risk of degradation or leaks, and so we switched to stainless steel to improve reliability and safety. We also realized that using air-to-air coolers was more reliable and more energy efficient than using glycol-based chillers by themselves, so we added and expanded the air-to-air coolers. We also introduced Field operations of early versions of these systems also showed that the equipment needed previously unquoted equipment such as gauges, meters, and sensors that allowed for gas analytics. During the 2018 period there was not time to fully specify all meters, gauges and sensors that would be necessary. But in the period after application, we determined that this gas analytics data was necessary for qualifying for certain regulatory programs, as well as to ensure proper operations of the biogas system. These changes improved compliance with carbon credit and other regulatory requirements, and improved operator efficiency and safety
3. Increased Blower Capacity: this cost was incurred beyond the original estimate as real-world performance data made it clear that enhancements needed to be made. In particular, Blowers that have factory specifications for a certain flow rate could technically achieve their data sheet flow rate in the field on our 2018 and 2019 deployments. But, we found that in order to perform at these rates in actual conditions that included dust, direct sunlight on some elements, and other field stresses, the blowers operated a very high temperatures, which caused risk of overheating and consumed oil, shortening operating life unacceptably and reducing equipment reliability by shutting down unexpectedly on thermal overloads. Based on those experiences we determined that a larger blower rated for approximately 125% of the needed flow would cause the system to operate at lower temperatures. These improvements improved safety by avoiding overheating and fire risks. The improvements also increased equipment reliability and longevity, and reduced power consumption.
4. Changes to Electrical Equipment: the addition of larger equipment and/or new equipment made it necessary to reconfigure the power distribution, including enhanced control room design, and upgraded electrical equipment to meet the power needs of larger and a different system.
5. Addition of Automation and Controls SOW: the addition of this SOW allowed remote operators to monitor and control the systems, rather than rely on on-site operators, which undoubtedly represents significant cost savings in ongoing operations expenses.
6. Additional Site Preparation SOW: After attempting to commission some of these early systems in the field, we found that they were more complicated to start up than most

biogas operators could handle. The technology was new and required skilled teams to set up the site properly. It thus became apparent that our team would need to travel to the site to prepare the location for our equipment. This SOW was not originally known, therefore it was not included in our quote. Our equipment is highly specialized and required our own internal staff to mobilize and ensure each project location was adequately prepared to receive our equipment.

7. Additional Field Work SOW: after preparing the initial bid, we identified that the sites required mixers within the lagoon to move the digestate to optimize gas production and the quality of the biogas. These mixers required extensive field electrical work, including the mobilization of heavy machinery and teams of people to perform extensive infrastructure work around the lagoons.
8. Addition of Commissioning SOW: In the same manner that site preparation and field work requirements were higher than expected, we found it was necessary to deploy a team for commissioning of these systems since they had multiple new electrical, mechanical, and controls features. We had to charge the customer for this additional service that we did not initially include in our 2018 estimates.
9. Back Flow Prevention Device: this is a critical safety feature that was subsequently added to our systems, ensuring that backflow from the higher pressure biogas gathering line did not over-pressurize the covered lagoons at the dairy digester sites. This safety feature was not caught during the 110 day submittal since there was not time to do a full engineering and safety review on the budget, but was added later as the design became more final.
10. O2 Price Impact: The original quote for O2 Air Injection was $171,856, but a series of costs were over-estimated during the limited time available to get quotes and make estimates in 2018. This SOW was included in the actual contracts in 2020 and2021, and a price of $89,700 was assigned, representing a savings of $82,156 in actual price vs the quote. We passed these savings on to the customer in the final package.
11. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 30-50% depending on the item, and over 25-45% for labor depending on the role.

H2S Scrubber aka Howitzer[2]

			Cost DELTA
	2018 Quoted Cost	**$39,720**	
1	Change in materials from HDPE to Stainless Steel.		$23,832
2	Increase in size and addition of components and labor required to take product from concept to actual manufacturing.		$31,814
	Total Net Increases Due to Design Changes		**$55,646**
3	**Pandemic** Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$4,051
4	**Pandemic** Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$11,201
	Total Net Increases Due to Pandemic Inflation		**$15,252**
	TOTAL COST IMPACT		**$70,898**
	Final Cost	**$110,618**	

Notes on Above Table:

1. Change in materials from HDPE to Stainless Steel: this change was required to ensure materials withstood ambient conditions and guaranteed product longevity. Operational experience on early Howitzers revealed that HDPE could not handle the pressure increases and decreased that occurred during real-world operations such as hard shut downs. The switch to stainless steel improved operational performance and safety due to reduced risk of biogas containment failure and leaks.
2. Our patent-pending H2S scrubber design was a concept product at the time it was quoted in 2018. By the time manufacturing of these units began, a series of previously unknown challenges were overcome, which required additional components and safety features. This included everything from redesigning the quantity and sizing of the tubes, reconfiguring valves on the inlet and outlet of each tube, and adding a gangway with safety gates to allow for easy operator access. All these items improved operational performance and workplace safety.

[2] EI provided the 2018 budget quotes, and later worked with MEW on design improvements as we deployed similar systems in 2019. EI's licensed our final Howitzer design for construction, but did not perform the final physical work due to capacity constraints.

3. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 25-55% depending on the item, and over 15-35% for labor depending on the role.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Appendix A

Labor cost differences

1. The original bid only included 4 types of employees to build the system. The rates of those employees both in 2018 and 2021 and their respective change is shown in the table below.

Position	2018 Wages	2021 Wages	% Change
Office Admin	$18	$28.82	60%
Apprentice Electrician	$17	$31.68	86%
Construction Supervisor	$34	$52.80	55%
Master Electrician	$35	$54.12	54%

2. The list of positions needed to procure parts, construct, and install a biogas system was not comprehensive and should have also included:

Position	Approx. Labor Cost in 2021
Procurement/ Inventory Staff	$38.28
Welders/ Pipefitters	$52.80
Instrumentation / Controls Technicians	$59.40
Construction Laborers	$33.00
Mechanical/ Process Engineer or designer	$68.64

3. The amount of time required to procure, construct, test and install a biogas system was highly underestimated due to lack of industry experience at the time working in a higher pressure pipeline gas environment and should have been increased from 10 weeks to 11 months.

4. At the end of 2020 and continuing through 2021, manufacturing was still recovering from shipping delays and labor force destabilization.

    1. In late 2020, supply chain disruptions and labor shortages created significant issues for the construction industry, leading to project delays. COVID-19 restrictions severely disrupted the availability of materials, while high demand drove up prices.
    2. Key materials, including stainless and mild steel, experienced drastic price increases, forcing us to adjust pricing accordingly. For example, prices for some materials rose by more than 40%, and lead times extended significantly, leaving many projects at a standstill.
    3. Labor shortages compounded these problems, as we often faced delays filling open positions. We often hired personnel at rates above our posted wage rate. A survey by the Associated General Contractors of America (AGC) found that around 91% of firms had difficulty hiring, which further delayed project

timelines. The pandemic's impact on skilled labor availability, combined with a sharp increase in demand for construction workers, led to higher labor costs and worsened the backlogs already caused by material delays. These challenges led to increased construction costs.

5. Blower/O2 Injection System: It is estimated that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 25-45% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$268,600			Low Value	High Value
			25%	45%
Labor Share of Contract (%)	Low Value	28%	**7% - $18,802**	**12.6% - $33,844**
	High Value	35%	**8.8% - $23,503**	**15.8% - $42,305**

6. Howitzer System: It is estimates that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 15-35% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$79,440			Low Value	High Value
			15%	35%
Labor Share of Contract (%)	Low Value	28%	4.2% - $3,336	9.8% - $7,785
	High Value	35%	5.3% - $4,171	12.3% - $9,731

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Material/ Elemental Cost Differences

1. The following table highlights a sample of several components that we pulled comparative pricing for to highlight the types of pricing increases we saw from 2018 to 2021.

Component	Price Range 2018	Price Range 2021	Price Increase %
Gas Filter 316 SS Filtration Canister w/ Pressure Differential Gauge	$250 - $500	$500 - $800	60%
Gas Blower - Roots with Flex Couplings	$2,000 - $5,000	$4,500 - $7,000	50-70%
Gas Silencer 316 SS	$1,500 - $3,000	$2,500 - $4,500	40-50%
Sage Flow Meter with RS 485 Comms	$1,200 - $2,500	$2,500 - $4,000	60-75%
316 SS Gas Flanges and Tie-ins	$200 - $500	$400 - $700	50%
Gas Rated Manual Shut-off Valves	$200 - $1,000	$1,200 - $1,800	70-80%
Indoor Rated Cabinet with Climate Control	$1,500 - $5,000	$3,000 - $6,000	60-90%
VFDs and Line Reactors	$1,000 - $5,000	$3,000 - $7,000	80-90%
Red Lion Data Logging	$500 - $1,500	$1,200 - $2,500	100%
OLC and Data Logging	$300 - $1,000	$800 - $1,500	50-100%

2. In general, we saw components increase between 25-55% from 2018 to 2021 depending on the system and its inputs. This does not consider the fact that additional design and operational requirements resulted in the addition of components and equipment that was not contemplated in the original estimates.

3. A final example: The 2018 proposals included HDPE materials as opposed to steel. The actual projects were built using stainless steel. In 2018, HDPE (high-density polyethylene) piping costs varied by size but generally ranged from around $0.59 to $39.03 per foot depending on diameter and wall thickness.

    a. Steel pipes, typically used for similar applications, were generally more expensive, often by a factor of 2 to 1 for materials that met similar design requirements.

    b. In 2021, steel prices surged, particularly due to COVID-19 supply chain disruptions, labor shortages, and increased demand in construction, with typical per-foot costs for steel pipes ranging from $4 to $70, depending on specifications and coating type

4. Blower/O2 Injection System: It is estimated that materials comprise 48-52% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 30-50% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated

inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:				
$268,600			**Materials Inflation Rate (%)**	
			Low Value	High Value
			30%	50%
Materials Share of Contract (%)	Low Value	48%	**14.4% - $38,678**	**24% - $64,464**
	High Value	52%	**15.6% - $41,902**	**26% - $69,836**

5. Howitzer System: It is estimated that materials comprise 55-65% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 25-55% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:				
$79,440			**Materials Inflation Rate (%)**	
			Low Value	High Value
			25%	55%
Materials Share of Contract (%)	Low Value	55%	**13.8% - $10,923**	**30.3% - $24,031**
	High Value	65%	**16.3% - $12,909**	**35.8% - $28,400**

November 7, 2024

RE: Project Cost Variation Explanation – Lone Oak Farms

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012 and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter documents the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process low-pressure biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope for this Pilot Project based on our understanding of what would be necessary. But as we began to deploy early versions of these systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

Equipment and Fabrication Costs

In addition to an increased scope of work, the equipment and labor costs associated with building these products rose sharply from 2018 to 2021. Our 2018 estimate of the building process underestimated the labor intensity of this type of equipment, which was corrected in proposals that were issued in subsequent years.

- Extended fabrication requirements for integrating additional components
- Increased material costs for enhanced system components
- Additional onsite work (electrical, welding and assembly requirements)
- Specialized equipment needs for complex installation procedures
- Equipment offloading and handling requirements

Labor Cost Adjustments

Labor costs were impacted by:

- Extended installation timeline due to increased system complexity
- Additional specialized labor for enhanced onsite welding and assembly
- Increased coordination requirements for complex system integration
- Extended planning and design revision hours
- Specialized technical expertise for advanced system components

Project Complexity Factors

The upgraded design specifications introduced additional complexity:

- Enhanced coordination requirements between various system components
- More intricate installation procedures
- Detailed quality control measures
- Extended testing and commissioning requirements

The following pages include detailed data on the key variables responsible for the delta in cost between our initial proposals issued in 2018 vs the product contracts issued in 2020 and 2021. If I can be of further service regarding this matter, please feel free to reach out via my email address included below.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

Biogas Blower and O2 Injection System[1]

			Cost DELTA
	2018 Quoted Biogas Blower System Cost	$178,900	
	2018 Quoted Biogas O2 Air Injection System Cost	$171,856	
	2018 TOTAL QUOTED SYSTEM COST	**$350,756**	
1	Additional Design SOW, labor		$4,900
2	Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exchangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters		$133,590
3	Increased Blower Capacity		$30,372
4	Additional electrical infrastructure and equipment required to power and control modified design		$51,735
5	Addition of Automation/ Controls SOW, materials and labor		$35,000
6	Addition of Site Prep SOW, labor and mobilization costs		$7,500
7	Addition of Field Work SOW, materials and labor		$93,300
8	Addition of Commissioning SOW, materials and labor		$8,800
9	Back flow Prevention Device		$12,050
10	O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE (Quoted Price of $171,856 vs actual price of $71,121)		($100,735)
	Total Net Increases Due to Design Changes		**$276,512**
11	Pandemic Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$25,225
12	Pandemic Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$48,457
	Total Increases Due to Pandemic Inflation		**$73,682**
	TOTAL COST IMPACT		**$350,194**
	Final Cost	**$700,950**	

[1] Note that in 2018 these systems were budgeted separately but they were later procured together in one contract.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Notes on Above Table:

1. Additional Design SOW: After the short Pilot Project application period, our team realized based on experience and conversations with MEW that we would need to charge for additional design labor necessary to achieve the system's operational goals. As we prepared to deliver the system, it became increasingly complex with additional design needs, so we determined we needed to include costs for additional design labor to ensure the project met all requirements.
2. Changes to Biogas Equipment: through gained experience on 2018 and 2019 equipment deployments of earlier versions of this equipment we learned that HDPE plastic was not sufficient for biogas piping as it was less durable in the field and presented a risk of degradation or leaks, and so we switched to stainless steel to improve reliability and safety. We also realized that using air-to-air coolers was more reliable and more energy efficient than using glycol-based chillers by themselves, so we added and expanded the air-to-air coolers. We also introduced Field operations of early versions of these systems also showed that the equipment needed previously unquoted equipment such as gauges, meters, and sensors that allowed for gas analytics. During the 2018 period there was not time to fully specify all meters, gauges and sensors that would be necessary. But in the period after application, we determined that this gas analytics data was necessary for qualifying for certain regulatory programs, as well as to ensure proper operations of the biogas system. These changes improved compliance with carbon credit and other regulatory requirements, and improved operator efficiency and safety
3. Increased Blower Capacity: this cost was incurred beyond the original estimate as real-world performance data made it clear that enhancements needed to be made. In particular, Blowers that have factory specifications for a certain flow rate could technically achieve their data sheet flow rate in the field on our 2018 and 2019 deployments. But, we found that in order to perform at these rates in actual conditions that included dust, direct sunlight on some elements, and other field stresses, the blowers operated a very high temperatures, which caused risk of overheating and consumed oil, shortening operating life unacceptably and reducing equipment reliability by shutting down unexpectedly on thermal overloads. Based on those experiences we determined that a larger blower rated for approximately 125% of the needed flow would cause the system to operate at lower temperatures. These improvements improved safety by avoiding overheating and fire risks. The improvements also increased equipment reliability and longevity, and reduced power consumption.
4. Changes to Electrical Equipment: the addition of larger equipment and/or new equipment made it necessary to reconfigure the power distribution, including enhanced control room design, and upgraded electrical equipment to meet the power needs of larger and a different system.
5. Addition of Automation and Controls SOW: the addition of this SOW allowed remote operators to monitor and control the systems, rather than rely on on-site operators, which undoubtedly represents significant cost savings in ongoing operations expenses.
6. Additional Site Preparation SOW: After attempting to commission some of these early systems in the field, we found that they were more complicated to start up than most

biogas operators could handle. The technology was new and required skilled teams to set up the site properly. It thus became apparent that our team would need to travel to the site to prepare the location for our equipment. This SOW was not originally known, therefore it was not included in our quote. Our equipment is highly specialized and required our own internal staff to mobilize and ensure each project location was adequately prepared to receive our equipment.

7. Additional Field Work SOW: after preparing the initial bid, we identified that the sites required mixers within the lagoon to move the digestate to optimize gas production and the quality of the biogas. These mixers required extensive field electrical work, including the mobilization of heavy machinery and teams of people to perform extensive infrastructure work around the lagoons.
8. Addition of Commissioning SOW: In the same manner that site preparation and field work requirements were higher than expected, we found it was necessary to deploy a team for commissioning of these systems since they had multiple new electrical, mechanical, and controls features. We had to charge the customer for this additional service that we did not initially include in our 2018 estimates.
9. Back Flow Prevention Device: this is a critical safety feature that was subsequently added to our systems, ensuring that backflow from the higher pressure biogas gathering line did not over-pressurize the covered lagoons at the dairy digester sites. This safety feature was not caught during the 110 day submittal since there was not time to do a full engineering and safety review on the budget, but was added later as the design became more final.
10. O2 Price Impact: The original quote for O2 Air Injection was $171,856, but a series of costs were over-estimated during the limited time available to get quotes and make estimates in 2018. This SOW was included in the actual contracts in 2020 and2021, and a price of $71,121 was assigned, representing a savings of $100,735 in actual price vs the quote. We passed these savings on to the customer in the final package.
11. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 30-50% depending on the item, and over 25-45% for labor depending on the role.

H2S Scrubber aka Howitzer[2]

			Cost DELTA
	2018 Quoted Cost	**$39,720**	
1	Change in materials from HDPE to Stainless Steel		$23,832
2	Increase in size and addition of components and labor required to take product from concept to actual manufacturing.		$31,814
	Total Net Increases Due to Design Changes		**$55,646**
3	**Pandemic** Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$4,051
4	**Pandemic** Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$11,201
	Total Net Increases Due to Pandemic Inflation		**$15,252**
	TOTAL COST IMPACT		**$70,898**
	Final Cost	**$110,618**	

Notes on Above Table:

1. Change in materials from HDPE to Stainless Steel: this change was required to ensure materials withstood ambient conditions and guaranteed product longevity. Operational experience on early Howitzers revealed that HDPE could not handle the pressure increases and decreased that occurred during real-world operations such as hard shut downs. The switch to stainless steel improved operational performance and safety due to reduced risk of biogas containment failure and leaks.
2. Our patent-pending H2S scrubber design was a concept product at the time it was quoted in 2018. By the time manufacturing of these units began, a series of previously unknown challenges were overcome, which required additional components and safety features. This included everything from redesigning the quantity and sizing of the tubes, reconfiguring valves on the inlet and outlet of each tube, and adding a gangway with safety gates to allow for easy operator access. All these items improved operational performance and workplace safety.

---

[2] EI provided the 2018 budget quotes, and later worked with MEW on design improvements as we deployed similar systems in 2019. EI's licensed our final Howitzer design for construction, but did not perform the final physical work due to capacity constraints.

3. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 25-55% depending on the item, and over 15-35% for labor depending on the role.

3747 Meadow View Drive
Ste 600
Redding, CA 96003
530-222-3366
energyinnovations.com

Appendix A

Labor cost differences

1. The original bid only included 4 types of employees to build the system. The rates of those employees both in 2018 and 2021 and their respective change is shown in the table below.

Position	2018 Wages	2021 Wages	% Change
Office Admin	$18	$28.82	60%
Apprentice Electrician	$17	$31.68	86%
Construction Supervisor	$34	$52.80	55%
Master Electrician	$35	$54.12	54%

2. The list of positions needed to procure parts, construct, and install a biogas system was not comprehensive and should have also included:

Position	Approx. Labor Cost in 2021
Procurement/ Inventory Staff	$38.28
Welders/ Pipefitters	$52.80
Instrumentation / Controls Technicians	$59.40
Construction Laborers	$33.00
Mechanical/ Process Engineer or designer	$68.64

3. The amount of time required to procure, construct, test and install a biogas system was highly underestimated due to lack of industry experience at the time working in a higher pressure pipeline gas environment and should have been increased from 10 weeks to 11 months.

4. At the end of 2020 and continuing through 2021, manufacturing was still recovering from shipping delays and labor force destabilization.

    1. In late 2020, supply chain disruptions and labor shortages created significant issues for the construction industry, leading to project delays. COVID-19 restrictions severely disrupted the availability of materials, while high demand drove up prices.
    2. Key materials, including stainless and mild steel, experienced drastic price increases, forcing us to adjust pricing accordingly. For example, prices for some materials rose by more than 40%, and lead times extended significantly, leaving many projects at a standstill.
    3. Labor shortages compounded these problems, as we often faced delays filling open positions. We often hired personnel at rates above our posted wage rate. A survey by the Associated General Contractors of America (AGC) found that around 91% of firms had difficulty hiring, which further delayed project

timelines. The pandemic's impact on skilled labor availability, combined with a sharp increase in demand for construction workers, led to higher labor costs and worsened the backlogs already caused by material delays. These challenges led to increased construction costs.

5. Blower/O2 Injection System: It is estimated that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 25-45% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$250,021			Low Value	High Value
			25%	45%
Labor Share of Contract (%)	Low Value	28%	**7% - $17,501**	**12.6% - $31,503**
	High Value	35%	**8.8% - $21,877**	**15.8% - $39,378**

6. Howitzer System: It is estimates that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 15-35% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:
$79,440

			Labor Inflation Rate (%)	
			Low Value	High Value
			15%	35%
Labor Share of Contract (%)	Low Value	28%	4.2% - $3,336	9.8% - $7,785
	High Value	35%	5.3% - $4,171	12.3% - $9,731

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Material/ Elemental Cost Differences

1. The following table highlights a sample of several components that we pulled comparative pricing for to highlight the types of pricing increases we saw from 2018 to 2021.

Component	Price Range 2018	Price Range 2021	Price Increase %
Gas Filter 316 SS Filtration Canister w/ Pressure Differential Gauge	$250 - $500	$500 - $800	60%
Gas Blower - Roots with Flex Couplings	$2,000 - $5,000	$4,500 - $7,000	50-70%
Gas Silencer 316 SS	$1,500 - $3,000	$2,500 - $4,500	40-50%
Sage Flow Meter with RS 485 Comms	$1,200 - $2,500	$2,500 - $4,000	60-75%
316 SS Gas Flanges and Tie-ins	$200 - $500	$400 - $700	50%
Gas Rated Manual Shut-off Valves	$200 - $1,000	$1,200 - $1,800	70-80%
Indoor Rated Cabinet with Climate Control	$1,500 - $5,000	$3,000 - $6,000	60-90%
VFDs and Line Reactors	$1,000 - $5,000	$3,000 - $7,000	80-90%
Red Lion Data Logging	$500 - $1,500	$1,200 - $2,500	100%
OLC and Data Logging	$300 - $1,000	$800 - $1,500	50-100%

2. In general, we saw components increase between 25-55% from 2018 to 2021 depending on the system and its inputs. This does not consider the fact that additional design and operational requirements resulted in the addition of components and equipment that was not contemplated in the original estimates.

3. A final example: The 2018 proposals included HDPE materials as opposed to steel. The actual projects were built using stainless steel. In 2018, HDPE (high-density polyethylene) piping costs varied by size but generally ranged from around $0.59 to $39.03 per foot depending on diameter and wall thickness.

    a. Steel pipes, typically used for similar applications, were generally more expensive, often by a factor of 2 to 1 for materials that met similar design requirements.

    b. In 2021, steel prices surged, particularly due to COVID-19 supply chain disruptions, labor shortages, and increased demand in construction, with typical per-foot costs for steel pipes ranging from $4 to $70, depending on specifications and coating type

4. Blower/O2 Injection System: It is estimated that materials comprise 48-52% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 30-50% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated

inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$250,021			Low Value	High Value
			30%	50%
Materials Share of Contract (%)	Low Value	48%	14.4% - $36,003	24% - $60,005
	High Value	52%	15.6% - $39,003	26% - $65,005

5. Howitzer System: It is estimated that materials comprise 55-65% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 25-55% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$79,440			Low Value	High Value
			25%	55%
Materials Share of Contract (%)	Low Value	55%	13.8% - $10,923	30.3% - $24,031
	High Value	65%	16.3% - $12,909	35.8% - $28,400

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

November 7, 2024

RE: Project Cost Variation Explanation – Poplar Lane Dairy

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012 and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter documents the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process low-pressure biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope for this Pilot Project based on our understanding of what would be necessary. But as we began to deploy early versions of these systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

Equipment and Fabrication Costs

In addition to an increased scope of work, the equipment and labor costs associated with building these products rose sharply from 2018 to 2021. Our 2018 estimate of the building process underestimated the labor intensity of this type of equipment, which was corrected in proposals that were issued in subsequent years.

- Extended fabrication requirements for integrating additional components
- Increased material costs for enhanced system components
- Additional onsite work (electrical, welding and assembly requirements)
- Specialized equipment needs for complex installation procedures
- Equipment offloading and handling requirements

Labor Cost Adjustments

Labor costs were impacted by:

- Extended installation timeline due to increased system complexity
- Additional specialized labor for enhanced onsite welding and assembly
- Increased coordination requirements for complex system integration
- Extended planning and design revision hours
- Specialized technical expertise for advanced system components

Project Complexity Factors

The upgraded design specifications introduced additional complexity:

- Enhanced coordination requirements between various system components
- More intricate installation procedures
- Detailed quality control measures
- Extended testing and commissioning requirements

The following pages include detailed data on the key variables responsible for the delta in cost between our initial proposals issued in 2018 vs the product contracts issued in 2020 and 2021. If I can be of further service regarding this matter, please feel free to reach out via my email address included below.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

Biogas Blower and O2 Injection System[1]

			Cost DELTA
	2018 Quoted Biogas Blower System Cost	$178,900	
	2018 Quoted Biogas O2 Air Injection System Cost	$171,856	
	2018 TOTAL QUOTED SYSTEM COST	**$350,756**	
1	Additional Design SOW, labor		$4,700
2	Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exchangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters		$61,787
3	Increased Blower Capacity		$14,047
4	Additional electrical infrastructure and equipment required to power and control modified design		$23,927
5	Addition of Automation/ Controls SOW, materials and labor		$49,720
6	Addition of Site Prep SOW, labor and mobilization costs		$4,500
7	Addition of Field Work SOW, materials and labor		$78,300
8	Addition of Commissioning SOW, materials and labor		$5,800
9	Back flow Prevention Device		$9,950
10	O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE (Quoted Price of $171,856 vs actual price of $89,700)		($82,156)
	Total Net Increases Due to Design Changes		**$170,575**
11	Pandemic Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$20,965
12	Pandemic Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$40,274
	Total Increases Due to Pandemic Inflation		**$61,239**
	TOTAL COST IMPACT		**$231,814**
	Final Cost	**$582,570**	

[1] Note that in 2018 these systems were budgeted separately but they were later procured together in one contract.

Notes on Above Table:

1. Additional Design SOW: After the short Pilot Project application period, our team realized based on experience and conversations with MEW that we would need to charge for additional design labor necessary to achieve the system's operational goals. As we prepared to deliver the system, it became increasingly complex with additional design needs, so we determined we needed to include costs for additional design labor to ensure the project met all requirements.
2. Changes to Biogas Equipment: through gained experience on 2018 and 2019 equipment deployments of earlier versions of this equipment we learned that HDPE plastic was not sufficient for biogas piping as it was less durable in the field and presented a risk of degradation or leaks, and so we switched to stainless steel to improve reliability and safety. We also realized that using air-to-air coolers was more reliable and more energy efficient than using glycol-based chillers by themselves, so we added and expanded the air-to-air coolers. We also introduced Field operations of early versions of these systems also showed that the equipment needed previously unquoted equipment such as gauges, meters, and sensors that allowed for gas analytics. During the 2018 period there was not time to fully specify all meters, gauges and sensors that would be necessary. But in the period after application, we determined that this gas analytics data was necessary for qualifying for certain regulatory programs, as well as to ensure proper operations of the biogas system. These changes improved compliance with carbon credit and other regulatory requirements, and improved operator efficiency and safety
3. Increased Blower Capacity: this cost was incurred beyond the original estimate as real-world performance data made it clear that enhancements needed to be made. In particular, Blowers that have factory specifications for a certain flow rate could technically achieve their data sheet flow rate in the field on our 2018 and 2019 deployments. But, we found that in order to perform at these rates in actual conditions that included dust, direct sunlight on some elements, and other field stresses, the blowers operated a very high temperatures, which caused risk of overheating and consumed oil, shortening operating life unacceptably and reducing equipment reliability by shutting down unexpectedly on thermal overloads. Based on those experiences we determined that a larger blower rated for approximately 125% of the needed flow would cause the system to operate at lower temperatures. These improvements improved safety by avoiding overheating and fire risks. The improvements also increased equipment reliability and longevity, and reduced power consumption.
4. Changes to Electrical Equipment: the addition of larger equipment and/or new equipment made it necessary to reconfigure the power distribution, including enhanced control room design, and upgraded electrical equipment to meet the power needs of larger and a different system.
5. Addition of Automation and Controls SOW: the addition of this SOW allowed remote operators to monitor and control the systems, rather than rely on on-site operators, which undoubtedly represents significant cost savings in ongoing operations expenses.
6. Additional Site Preparation SOW: After attempting to commission some of these early systems in the field, we found that they were more complicated to start up than most

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

biogas operators could handle. The technology was new and required skilled teams to set up the site properly. It thus became apparent that our team would need to travel to the site to prepare the location for our equipment. This SOW was not originally known, therefore it was not included in our quote. Our equipment is highly specialized and required our own internal staff to mobilize and ensure each project location was adequately prepared to receive our equipment.

7. Additional Field Work SOW: after preparing the initial bid, we identified that the sites required mixers within the lagoon to move the digestate to optimize gas production and the quality of the biogas. These mixers required extensive field electrical work, including the mobilization of heavy machinery and teams of people to perform extensive infrastructure work around the lagoons.
8. Addition of Commissioning SOW: In the same manner that site preparation and field work requirements were higher than expected, we found it was necessary to deploy a team for commissioning of these systems since they had multiple new electrical, mechanical, and controls features. We had to charge the customer for this additional service that we did not initially include in our 2018 estimates.
9. Back Flow Prevention Device: this is a critical safety feature that was subsequently added to our systems, ensuring that backflow from the higher pressure biogas gathering line did not over-pressurize the covered lagoons at the dairy digester sites. This safety feature was not caught during the 110 day submittal since there was not time to do a full engineering and safety review on the budget, but was added later as the design became more final.
10. O2 Price Impact: The original quote for O2 Air Injection was $171,856, but a series of costs were over-estimated during the limited time available to get quotes and make estimates in 2018. This SOW was included in the actual contracts in 2020 and2021, and a price of $89,700 was assigned, representing a savings of $82,156 in actual price vs the quote. We passed these savings on to the customer in the final package.
11. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 30-50% depending on the item, and over 25-45% for labor depending on the role.

H2S Scrubber aka Howitzer[2]

			Cost DELTA
	2018 Quoted Cost	**$34,520**	
1	Change in materials from HDPE to Stainless Steel.		$25,818
2	Increase in size and addition of components and labor required to take product from concept to actual manufacturing.		$42,131
	Total Net Increases Due to Design Changes		**$67,949**
3	**Pandemic** Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$8,450
4	**Pandemic** Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$24,303
	Total Net Increases Due to Pandemic Inflation		**$32,753**
	TOTAL COST IMPACT		**$100,702**
	Final Cost	**$135,222**	

Notes on Above Table:

1. Change in materials from HDPE to Stainless Steel: this change was required to ensure materials withstood ambient conditions and guaranteed product longevity. Operational experience on early Howitzers revealed that HDPE could not handle the pressure increases and decreased that occurred during real-world operations such as hard shut downs. The switch to stainless steel improved operational performance and safety due to reduced risk of biogas containment failure and leaks.
2. Our patent-pending H2S scrubber design was a concept product at the time it was quoted in 2018. By the time manufacturing of these units began, a series of previously unknown challenges were overcome, which required additional components and safety features. This included everything from redesigning the quantity and sizing of the tubes, reconfiguring valves on the inlet and outlet of each tube, and adding a gangway with safety gates to allow for easy operator access. All these items improved operational performance and workplace safety.

[2] EI provided the 2018 budget quotes, and later worked with MEW on design improvements as we deployed similar systems in 2019. EI's licensed our final Howitzer design for construction, but did not perform the final physical work due to capacity constraints.

3. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 25-55% depending on the item, and over 15-35% for labor depending on the role.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Appendix A

Labor cost differences

1. The original bid only included 4 types of employees to build the system. The rates of those employees both in 2018 and 2021 and their respective change is shown in the table below.

Position	2018 Wages	2021 Wages	% Change
Office Admin	$18	$28.82	60%
Apprentice Electrician	$17	$31.68	86%
Construction Supervisor	$34	$52.80	55%
Master Electrician	$35	$54.12	54%

2. The list of positions needed to procure parts, construct, and install a biogas system was not comprehensive and should have also included:

Position	Approx. Labor Cost in 2021
Procurement/ Inventory Staff	$38.28
Welders/ Pipefitters	$52.80
Instrumentation / Controls Technicians	$59.40
Construction Laborers	$33.00
Mechanical/ Process Engineer or designer	$68.64

3. The amount of time required to procure, construct, test and install a biogas system was highly underestimated due to lack of industry experience at the time working in a higher pressure pipeline gas environment and should have been increased from 10 weeks to 11 months.

4. At the end of 2020 and continuing through 2021, manufacturing was still recovering from shipping delays and labor force destabilization.

    1. In late 2020, supply chain disruptions and labor shortages created significant issues for the construction industry, leading to project delays. COVID-19 restrictions severely disrupted the availability of materials, while high demand drove up prices.
    2. Key materials, including stainless and mild steel, experienced drastic price increases, forcing us to adjust pricing accordingly. For example, prices for some materials rose by more than 40%, and lead times extended significantly, leaving many projects at a standstill.
    3. Labor shortages compounded these problems, as we often faced delays filling open positions. We often hired personnel at rates above our posted wage rate. A survey by the Associated General Contractors of America (AGC) found that around 91% of firms had difficulty hiring, which further delayed project

timelines. The pandemic's impact on skilled labor availability, combined with a sharp increase in demand for construction workers, led to higher labor costs and worsened the backlogs already caused by material delays. These challenges led to increased construction costs.

5. Blower/O2 Injection System: It is estimated that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 25-45% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$268,600			Low Value	High Value
			25%	45%
Labor Share of Contract (%)	Low Value	28%	**7% - $18,802**	**12.6% - $33,844**
	High Value	35%	**8.8% - $23,503**	**15.8% - $42,305**

6. Howitzer System: It is estimates that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 15-35% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$69,040			Low Value	High Value
			15%	35%
Labor Share of Contract (%)	Low Value	28%	**4.2% - $2,900**	**9.8% - $6,766**
	High Value	35%	**5.3% - $3,625**	**12.3% - $8,457**

Material/ Elemental Cost Differences

1. The following table highlights a sample of several components that we pulled comparative pricing for to highlight the types of pricing increases we saw from 2018 to 2021.

Component	Price Range 2018	Price Range 2021	Price Increase %
Gas Filter 316 SS Filtration Canister w/ Pressure Differential Gauge	$250 - $500	$500 - $800	60%
Gas Blower - Roots with Flex Couplings	$2,000 - $5,000	$4,500 - $7,000	50-70%
Gas Silencer 316 SS	$1,500 - $3,000	$2,500 - $4,500	40-50%
Sage Flow Meter with RS 485 Comms	$1,200 - $2,500	$2,500 - $4,000	60-75%
316 SS Gas Flanges and Tie-ins	$200 - $500	$400 - $700	50%
Gas Rated Manual Shut-off Valves	$200 - $1,000	$1,200 - $1,800	70-80%
Indoor Rated Cabinet with Climate Control	$1,500 - $5,000	$3,000 - $6,000	60-90%
VFDs and Line Reactors	$1,000 - $5,000	$3,000 - $7,000	80-90%
Red Lion Data Logging	$500 - $1,500	$1,200 - $2,500	100%
OLC and Data Logging	$300 - $1,000	$800 - $1,500	50-100%

2. In general, we saw components increase between 25-55% from 2018 to 2021 depending on the system and its inputs. This does not consider the fact that additional design and operational requirements resulted in the addition of components and equipment that was not contemplated in the original estimates.

3. A final example: The 2018 proposals included HDPE materials as opposed to steel. The actual projects were built using stainless steel. In 2018, HDPE (high-density polyethylene) piping costs varied by size but generally ranged from around $0.59 to $39.03 per foot depending on diameter and wall thickness.

    a. Steel pipes, typically used for similar applications, were generally more expensive, often by a factor of 2 to 1 for materials that met similar design requirements.

    b. In 2021, steel prices surged, particularly due to COVID-19 supply chain disruptions, labor shortages, and increased demand in construction, with typical per-foot costs for steel pipes ranging from $4 to $70, depending on specifications and coating type

4. Blower/O2 Injection System: It is estimated that materials comprise 48-52% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 30-50% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated

inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$268,600			Low Value	High Value
			30%	50%
Materials Share of Contract (%)	Low Value	48%	14.4% - $38,678	24% - $64,464
	High Value	52%	15.6% - $41,902	26% - $69,836

5. Howitzer System: It is estimated that materials comprise 55-65% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 25-55% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$69,040			Low Value	High Value
			25%	55%
Materials Share of Contract (%)	Low Value	55%	13.8% - $9,493	30.3% - $20,885
	High Value	65%	16.3% - $11,219	35.8% - $24,682

energy INNOVATIONS

November 7, 2024

RE: Project Cost Variation Explanation – River Ranch

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012 and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter documents the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process low-pressure biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope for this Pilot Project based on our understanding of what would be necessary. But as we began to deploy early versions of these systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Equipment and Fabrication Costs

In addition to an increased scope of work, the equipment and labor costs associated with building these products rose sharply from 2018 to 2021. Our 2018 estimate of the building process underestimated the labor intensity of this type of equipment, which was corrected in proposals that were issued in subsequent years.

- Extended fabrication requirements for integrating additional components
- Increased material costs for enhanced system components
- Additional onsite work (electrical, welding and assembly requirements)
- Specialized equipment needs for complex installation procedures
- Equipment offloading and handling requirements

Labor Cost Adjustments

Labor costs were impacted by:

- Extended installation timeline due to increased system complexity
- Additional specialized labor for enhanced onsite welding and assembly
- Increased coordination requirements for complex system integration
- Extended planning and design revision hours
- Specialized technical expertise for advanced system components

Project Complexity Factors

The upgraded design specifications introduced additional complexity:

- Enhanced coordination requirements between various system components
- More intricate installation procedures
- Detailed quality control measures
- Extended testing and commissioning requirements

The following pages include detailed data on the key variables responsible for the delta in cost between our initial proposals issued in 2018 vs the product contracts issued in 2020 and 2021. If I can be of further service regarding this matter, please feel free to reach out via my email address included below.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

Biogas Blower and O2 Injection System[1]

			Cost DELTA
	2018 Quoted Biogas Blower System Cost	$178,900	
	2018 Quoted Biogas O2 Air Injection System Cost	$171,856	
	2018 TOTAL QUOTED SYSTEM COST	**$350,756**	
1	Additional Design SOW, labor		$3,800
2	Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exchangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters		$52,986
3	Increased Blower Capacity		$12,046
4	Additional electrical infrastructure and equipment required to power and control modified design		$20,519
5	Addition of Automation/ Controls SOW, materials and labor		$35,000
6	Addition of Site Prep SOW, labor and mobilization costs		$7,500
7	Addition of Field Work SOW, materials and labor		$87,100
8	Addition of Commissioning SOW, materials and labor		$8,800
9	Back flow Prevention Device		$12,050
10	O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE (Quoted Price of $171,856 vs actual price of $89,700)		($82,156)
	Total Net Increases Due to Design Changes		**$157,645**
11	Pandemic Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$21,482
12	Pandemic Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$41,267
	Total Increases Due to Pandemic Inflation		**$62,749**
	TOTAL COST IMPACT		**$220,394**
	Final Cost	**$571,150**	

[1] Note that in 2018 these systems were budgeted separately but they were later procured together in one contract.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Notes on Above Table:

1. Additional Design SOW: After the short Pilot Project application period, our team realized based on experience and conversations with MEW that we would need to charge for additional design labor necessary to achieve the system's operational goals. As we prepared to deliver the system, it became increasingly complex with additional design needs, so we determined we needed to include costs for additional design labor to ensure the project met all requirements.
2. Changes to Biogas Equipment: through gained experience on 2018 and 2019 equipment deployments of earlier versions of this equipment we learned that HDPE plastic was not sufficient for biogas piping as it was less durable in the field and presented a risk of degradation or leaks, and so we switched to stainless steel to improve reliability and safety. We also realized that using air-to-air coolers was more reliable and more energy efficient than using glycol-based chillers by themselves, so we added and expanded the air-to-air coolers. We also introduced Field operations of early versions of these systems also showed that the equipment needed previously unquoted equipment such as gauges, meters, and sensors that allowed for gas analytics. During the 2018 period there was not time to fully specify all meters, gauges and sensors that would be necessary. But in the period after application, we determined that this gas analytics data was necessary for qualifying for certain regulatory programs, as well as to ensure proper operations of the biogas system. These changes improved compliance with carbon credit and other regulatory requirements, and improved operator efficiency and safety
3. Increased Blower Capacity: this cost was incurred beyond the original estimate as real-world performance data made it clear that enhancements needed to be made. In particular, Blowers that have factory specifications for a certain flow rate could technically achieve their data sheet flow rate in the field on our 2018 and 2019 deployments. But, we found that in order to perform at these rates in actual conditions that included dust, direct sunlight on some elements, and other field stresses, the blowers operated a very high temperatures, which caused risk of overheating and consumed oil, shortening operating life unacceptably and reducing equipment reliability by shutting down unexpectedly on thermal overloads. Based on those experiences we determined that a larger blower rated for approximately 125% of the needed flow would cause the system to operate at lower temperatures. These improvements improved safety by avoiding overheating and fire risks. The improvements also increased equipment reliability and longevity, and reduced power consumption.
4. Changes to Electrical Equipment: the addition of larger equipment and/or new equipment made it necessary to reconfigure the power distribution, including enhanced control room design, and upgraded electrical equipment to meet the power needs of larger and a different system.
5. Addition of Automation and Controls SOW: the addition of this SOW allowed remote operators to monitor and control the systems, rather than rely on on-site operators, which undoubtedly represents significant cost savings in ongoing operations expenses.
6. Additional Site Preparation SOW: After attempting to commission some of these early systems in the field, we found that they were more complicated to start up than most

biogas operators could handle. The technology was new and required skilled teams to set up the site properly. It thus became apparent that our team would need to travel to the site to prepare the location for our equipment. This SOW was not originally known, therefore it was not included in our quote. Our equipment is highly specialized and required our own internal staff to mobilize and ensure each project location was adequately prepared to receive our equipment.

7. Additional Field Work SOW: after preparing the initial bid, we identified that the sites required mixers within the lagoon to move the digestate to optimize gas production and the quality of the biogas. These mixers required extensive field electrical work, including the mobilization of heavy machinery and teams of people to perform extensive infrastructure work around the lagoons.
8. Addition of Commissioning SOW: In the same manner that site preparation and field work requirements were higher than expected, we found it was necessary to deploy a team for commissioning of these systems since they had multiple new electrical, mechanical, and controls features. We had to charge the customer for this additional service that we did not initially include in our 2018 estimates.
9. Back Flow Prevention Device: this is a critical safety feature that was subsequently added to our systems, ensuring that backflow from the higher pressure biogas gathering line did not over-pressurize the covered lagoons at the dairy digester sites. This safety feature was not caught during the 110 day submittal since there was not time to do a full engineering and safety review on the budget, but was added later as the design became more final.
10. O2 Price Impact: The original quote for O2 Air Injection was $171,856, but a series of costs were over-estimated during the limited time available to get quotes and make estimates in 2018. This SOW was included in the actual contracts in 2020 and 2021, and a price of $89,700 was assigned, representing a savings of $82,156 in actual price vs the quote. We passed these savings on to the customer in the final package.
11. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 30-50% depending on the item, and over 25-45% for labor depending on the role.

H2S Scrubber aka Howitzer[2]

			Cost DELTA
	2018 Quoted Cost	**$39,720**	
1	Change in materials from HDPE to Stainless Steel		$23,832
2	Increase in size and addition of components and labor required to take product from concept to actual manufacturing.		$31,814
	Total Net Increases Due to Design Changes		**$55,646**
3	**Pandemic** Inflation Impact on Original Proposal's Labor Costs (See Appendix A for value determination)		$4,051
4	**Pandemic** Inflation Impact on Original Proposal's Equipment Costs (See Appendix A for value determination)		$11,201
	Total Net Increases Due to Pandemic Inflation		**$15,252**
	TOTAL COST IMPACT		**$70,898**
	Final Cost	**$110,618**	

Notes on Above Table:

1. Change in materials from HDPE to Stainless Steel: this change was required to ensure materials withstood ambient conditions and guaranteed product longevity. Operational experience on early Howitzers revealed that HDPE could not handle the pressure increases and decreased that occurred during real-world operations such as hard shut downs. The switch to stainless steel improved operational performance and safety due to reduced risk of biogas containment failure and leaks.
2. Our patent-pending H2S scrubber design was a concept product at the time it was quoted in 2018. By the time manufacturing of these units began, a series of previously unknown challenges were overcome, which required additional components and safety features. This included everything from redesigning the quantity and sizing of the tubes, reconfiguring valves on the inlet and outlet of each tube, and adding a gangway with safety gates to allow for easy operator access. All these items improved operational performance and workplace safety.

---

[2] EI provided the 2018 budget quotes, and later worked with MEW on design improvements as we deployed similar systems in 2019. EI's licensed our final Howitzer design for construction, but did not perform the final physical work due to capacity constraints.

3. Pandemic Inflation Impacts on Labor and Materials costs of the 2018 quote vs final contracts. Please note in Appendix A our general notes on the impact of inflation on labor and materials. In general, we saw materials inflation in ranges between 25-55% depending on the item, and over 15-35% for labor depending on the role.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Appendix A

Labor cost differences

1. The original bid only included 4 types of employees to build the system. The rates of those employees both in 2018 and 2021 and their respective change is shown in the table below.

Position	2018 Wages	2021 Wages	% Change
Office Admin	$18	$28.82	60%
Apprentice Electrician	$17	$31.68	86%
Construction Supervisor	$34	$52.80	55%
Master Electrician	$35	$54.12	54%

2. The list of positions needed to procure parts, construct, and install a biogas system was not comprehensive and should have also included:

Position	Approx. Labor Cost in 2021
Procurement/ Inventory Staff	$38.28
Welders/ Pipefitters	$52.80
Instrumentation / Controls Technicians	$59.40
Construction Laborers	$33.00
Mechanical/ Process Engineer or designer	$68.64

3. The amount of time required to procure, construct, test and install a biogas system was highly underestimated due to lack of industry experience at the time working in a higher pressure pipeline gas environment and should have been increased from 10 weeks to 11 months.

4. At the end of 2020 and continuing through 2021, manufacturing was still recovering from shipping delays and labor force destabilization.

    1. In late 2020, supply chain disruptions and labor shortages created significant issues for the construction industry, leading to project delays. COVID-19 restrictions severely disrupted the availability of materials, while high demand drove up prices.
    2. Key materials, including stainless and mild steel, experienced drastic price increases, forcing us to adjust pricing accordingly. For example, prices for some materials rose by more than 40%, and lead times extended significantly, leaving many projects at a standstill.
    3. Labor shortages compounded these problems, as we often faced delays filling open positions. We often hired personnel at rates above our posted wage rate. A survey by the Associated General Contractors of America (AGC) found that around 91% of firms had difficulty hiring, which further delayed project

timelines. The pandemic's impact on skilled labor availability, combined with a sharp increase in demand for construction workers, led to higher labor costs and worsened the backlogs already caused by material delays. These challenges led to increased construction costs.

5. Blower/O2 Injection System: It is estimated that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 25-45% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount: $268,600			Labor Inflation Rate (%)	
			Low Value	High Value
			25%	45%
Labor Share of Contract (%)	Low Value	28%	**7% - $18,802**	**12.6% - $33,844**
	High Value	35%	**8.8% - $23,503**	**15.8% - $42,305**

6. Howitzer System: It is estimates that labor comprises 28-35% of the total cost of contracted work for this system. Also, based on the increase in labor rates outlined above and the additional employees needed to complete the designated work, it is estimated that the labor inflation during this period ranged from 15-35% for this system over the span of the project. By interacting these two variables a final impact for labor inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Adjusted Contract Amount:			Labor Inflation Rate (%)	
$79,440			Low Value	High Value
			15%	35%
Labor Share of Contract (%)	Low Value	28%	**4.2% - $3,336**	**9.8% - $7,785**
	High Value	35%	**5.3% - $4,171**	**12.3% - $9,731**

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

Material/ Elemental Cost Differences

1. The following table highlights a sample of several components that we pulled comparative pricing for to highlight the types of pricing increases we saw from 2018 to 2021.

Component	Price Range 2018	Price Range 2021	Price Increase %
Gas Filter 316 SS Filtration Canister w/ Pressure Differential Gauge	$250 - $500	$500 - $800	60%
Gas Blower - Roots with Flex Couplings	$2,000 - $5,000	$4,500 - $7,000	50-70%
Gas Silencer 316 SS	$1,500 - $3,000	$2,500 - $4,500	40-50%
Sage Flow Meter with RS 485 Comms	$1,200 - $2,500	$2,500 - $4,000	60-75%
316 SS Gas Flanges and Tie-ins	$200 - $500	$400 - $700	50%
Gas Rated Manual Shut-off Valves	$200 - $1,000	$1,200 - $1,800	70-80%
Indoor Rated Cabinet with Climate Control	$1,500 - $5,000	$3,000 - $6,000	60-90%
VFDs and Line Reactors	$1,000 - $5,000	$3,000 - $7,000	80-90%
Red Lion Data Logging	$500 - $1,500	$1,200 - $2,500	100%
OLC and Data Logging	$300 - $1,000	$800 - $1,500	50-100%

2. In general, we saw components increase between 25-55% from 2018 to 2021 depending on the system and its inputs. This does not consider the fact that additional design and operational requirements resulted in the addition of components and equipment that was not contemplated in the original estimates.

3. A final example: The 2018 proposals included HDPE materials as opposed to steel. The actual projects were built using stainless steel. In 2018, HDPE (high-density polyethylene) piping costs varied by size but generally ranged from around $0.59 to $39.03 per foot depending on diameter and wall thickness.

    a. Steel pipes, typically used for similar applications, were generally more expensive, often by a factor of 2 to 1 for materials that met similar design requirements.

    b. In 2021, steel prices surged, particularly due to COVID-19 supply chain disruptions, labor shortages, and increased demand in construction, with typical per-foot costs for steel pipes ranging from $4 to $70, depending on specifications and coating type

4. Blower/O2 Injection System: It is estimated that materials comprise 48-52% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 30-50% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to pull out the extra costs budgeted for O2 injection). These values were used as guardrails for the above stated

inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$268,600			Low Value	High Value
			30%	50%
Materials Share of Contract (%)	Low Value	48%	**14.4% - $38,678**	**24% - $64,464**
	High Value	52%	**15.6% - $41,902**	**26% - $69,836**

5. Howitzer System: It is estimated that materials comprise 55-65% of the total cost of contracted work. Also, based on the increase in component costs outlined above, it is estimated that the materials inflation during this period ranged from 25-55% for this system over the span of the project. By interacting these two variables a final impact for materials inflation is determined based on the original contract amount (adjusted to add the significant extra labor and materials due to size increase). These values were used as guardrails for the above stated inflation impact, but the final number was determined for each individual system based on the individual original and final contract.

Adjusted Contract Amount:			Materials Inflation Rate (%)	
$79,440			Low Value	High Value
			25%	55%
Materials Share of Contract (%)	Low Value	55%	**13.8% - $10,923**	**30.3% - $24,031**
	High Value	65%	**16.3% - $12,909**	**35.8% - $28,400**

November 7, 2024

RE: Project Cost Variation Explanation – Lakeside Cluster IT Network Infrastructure

To Whom it May Concern:

Energy Innovations (also doing business and Electric Innovations) is a leading national designer and fabricator of biogas handling equipment. We were founded in 2012, and have built and deployed equipment to almost 70 biogas projects nationally. Our product lineup includes biogas pretreatment systems, biogas upgrading systems, oxygen injection systems, power distribution systems, and H_2S scrubbers. We are a licensed California General contractor 907032 and the company welds to B31.3 standards with each welder carrying personal certification.

This letter explains the necessity of the cost variations between our original 2018 quote provided for the Lakeside Pipeline Pilot Project, and the final project costs for the biogas systems ultimately delivered to the project, by our company and others. During this time period, I served as CFO of the company, and had access to the detailed cost numbers necessary to perform this analysis.

Modifications to the Scope of Work

In 2018 the field of biogas processing systems was an industry with more unknowns than knowns. Up until that point, nearly all biogas processing equipment made by our company and all other US companies, was designed to process biogas for on-site electrical power generation on a single dairy. The Pilot Project required us to design systems that could process biogas for feeding into a gathering pipeline system for delivery into a natural gas utility line—something almost entirely new. A pipeline injection project of this type required greatly upgraded capacities for moisture removal, sulfur removal, high pressure gas compression, and other standards well above common dairy biogas industry practice. Our initial attempts to evaluate the equipment and labor requirements to build an operational biogas system for a pipeline injection project took place in the context of an evolving understanding of the industry's operational needs. During a few months in 2018 we quoted a scope based on our understanding of what would be necessary. But as we began to deploy systems and gain experience at some early pipeline projects in late 2018 and early 2019, the Lakeside Pipeline scope was later expanded to include enhanced design and operational requirements that were necessary to ensure optimal system performance, safety, economic efficiency, and long-term reliability. These design changes increased the costs of the systems we provided, and we consequently charged the project a larger amount than we estimated in the 2018 budgets.

3747 Meadow View Drive
Ste 600
Redding, CA 96003

530-222-3366
energyinnovations.com

IT Network Infrastructure

In addition to the site-specific design changes described in the various letters regarding the individual projects, our company also provided a centralized internet networking and remote control system for the entire cluster. Our original design from 2018 was based on the Calgren Dairy Fuels design, where a single programmable logic controller at each digester would regulate biogas flow and log data for carbon credit generation and operational needs. However, our experiences after the Calgren Dairy Fuels startup showed that this level of networking was insufficient for a project of this size and complexity. In response to this, for the Lakeside Pipeline project, we added cluster-level telecommunications. This networking addition was packaged as a single contract and included the following capabilities:

- EI provided consultation, design, administrative and field installation of the IT network needed to communicate between multiple digester sites and the biogas injection hub. This proposal included a 5GHZ network wireless system, as well as supporting equipment. This allowed SCADA interface, cameras and internet connectivity to each digester and the biogas injection hub. This network is critical to provide RS485 communication between the cluster-wide network and the biogas injection hub SCADA system through the SCADA interface cabinet located within the PDC at the Hub.
- We included site-level radio communications towers, with airfiber, powerbeam 5AC Gen2, and airmax AC antennas.

Sincerely,

Marc Catalano, CEO
marc.catalano@energyinnovations.com

The table below details the actual reimbursable cost overages incurred by MEW to procure biogas blower and O2 injection systems for each digester relative to the initial budget cost for the biogas blower and O2 injection systems. The first section of the table from the "Initial Budget Price" row down to the "Final Contract Total" row shows the initially budgeted cost for the system followed by all inflation and design change impacts which added to the initial design cost to reach the final signed contract for a biogas blower and O2 injection system. The initial budget price can be found in the PISCE file in Appendix A, and the final contract total shown at the bottom of this first section matches the provided biogas processing contracts in Appendix A supporting document "1.9 - Lakeside Pipeline LLC - Biogas Processing Contracts." Since some of the invoices for this equipment were paid for by the farmer directly, the full cost of the system was not reimbursable as stipulated by the pilot project requirements. For these digesters, the overage allocations have been adjusted according to the reimbursable portion of the system's cost. Some digesters required additional work above what was stipulated in the executed system contract to meet the operational standard deemed necessary by Energy Innovations. These additional expenses were included for reimbursement as change orders (CO) and are included in the overall system cost. Shown at the very bottom of the table are the overage amounts requested by each overage category (design changes and inflation impacts) for each system.

Lakeside Pilot Project - Biogas Blower & O2 Injection Overage Justification Summary

	Decade	Clear Lake	Dixie Creek	Double L	High Roller	Lakeside Energy	Lone Oak	Poplar	River Ranch	IT Network	Total:
Initial Budget Price ($)	**$350,756**	**$350,756**	**$350,756**	**$350,756**	**$350,756**	**$350,756**	**$350,756**	**$350,756**	**$350,756**	**$0**	**$3,156,804**
Additional Design SOW, labor	$3,800	$0	$3,800	$4,700	$4,900	$4,900	$4,900	$4,700	$3,800	$0	$35,500
Changes To and/or Additions of new Biogas equipment including the switch from HDPE piping to 304SS, augmented air to air heat exhangers and glycol chilled equipment, new stainless-steel filters, moisture traps, sensors, gauges and meters	$65,977	$0	$122,693	$72,611	$54,134	$85,984	$133,590	$61,787	$52,986	$0	$649,761
Increased Blower Capacity	$15,000	$0	$27,894	$16,508	$12,308	$19,548	$30,372	$14,047	$12,046	$0	$147,723
Additional electrical infrastructure and equipment required to power and control modified design	$25,550	$0	$47,514	$28,119	$20,964	$33,298	$51,735	$23,927	$20,519	$0	$251,626
Addition of Automation/Controls SOW, materials and labor	$51,100	$0	$35,000	$49,720	$61,703	$27,186	$35,000	$49,720	$35,000	$0	$344,429
Addition of Site Prep SOW, labor and mobilization costs	$4,500	$0	$7,500	$4,500	$4,998	$4,500	$7,500	$4,500	$7,500	$0	$45,498
Addition of Field Work SOW, materials and labor	$61,300	$0	$93,300	$78,900	$84,483	$78,300	$93,300	$78,300	$87,100	$0	$654,983
Addition of Commissioning SOW, materials and labor	$5,800	$0	$8,800	$5,800	$11,840	$5,800	$8,800	$5,800	$8,800	$0	$61,440
Back flow Prevention Device	$0	$0	$0	$0	$12,050	$0	$0	$0	$0	$0	$12,050
IT Network Infrastructure, materials and labor	$0	$0	$0	$0	$0	$0	$0	$0	$0	$183,252	
O2 generation equipment: Difference saved between ORIGINAL QUOTE vs. CONTRACT PRICE	($82,156)	$0	($98,148)	($82,156)	($82,156)	($82,156)	($100,735)	($82,156)	($82,156)	$0	($691,819)
Contract Design Changes ($)	**$150,871**	**$0**	**$248,353**	**$178,702**	**$185,224**	**$177,359**	**$264,462**	**$160,625**	**$145,595**	**$183,252**	**$1,694,443**
Inflation Impact on Original Proposal's Labor Costs	$20,573	$0	$24,578	$21,692	$21,555	$21,638	$25,225	$20,965	$21,482	$0	$177,709
Inflation Impact on Original Proposal's Equipment Costs	$39,520	$0	$47,213	$41,670	$41,405	$41,566	$48,457	$40,274	$41,267	$0	$341,372
Contract Inflation ($)	**$60,093**	**$0**	**$71,791**	**$63,362**	**$62,960**	**$63,205**	**$73,682**	**$61,239**	**$62,749**	**$0**	**$519,081**
Final Contract Total	**$561,720**	**$350,756**	**$670,900**	**$592,820**	**$598,940**	**$591,320**	**$688,900**	**$572,620**	**$559,100**	**$183,252**	**$5,370,327**
Contract Progress Billing Completion (%)	100.0%	0.0%	100.0%	100.0%	95.0%	50.0%	100.0%	95.0%	100.1%	100.0%	N/A
Base Contract Recovery Request ($)	**$561,720**	**$0**	**$670,900**	**$592,820**	**$568,993**	**$295,660**	**$688,900**	**$543,989**	**$559,900**	**$183,252**	**$4,666,134**
Base Contract Recovery Request Breakdown											
Initial Budget Recovery Request ($)	$350,756	$0	$350,756	$350,756	$333,218	$175,378	$350,756	$333,218	$351,258	$0	$2,596,096
Incomplete Billing Finalization Recovery Reduction ($)	$0	($350,756)	$0	$0	($17,538)	($175,378)	$0	($17,538)	$502	$0	($560,708)
Contract Design Changes Recovery Request ($)	$150,871	$0	$248,353	$178,702	$175,963	$88,680	$264,462	$152,594	$145,803	$183,252	$1,588,679
Contract Inflation Recovery Request ($)	$60,093	$0	$71,791	$63,362	$59,812	$31,602	$73,682	$58,177	$62,839	$0	$481,358
Backflow Prevention CO Price ($)	$9,950	$0	$12,050	$9,950	$0	$9,950	$0	$0	$12,050	$0	$53,950
Gas Condensate Separator (GCS) CO Price ($)	$0	$0	$12,589	$13,781	$0	$0	$0	$0	$0	$0	$26,370
Biogas Analyzer CO Price ($)	$0	$0	$0	$0	$0	$0	$0	$0	$25,790	$0	$25,790
C-Unit CO Price ($)	$0	$0	$0	$48,627	$0	$0	$0	$0	$0	$0	$48,627
CO Recovery Request ($)	**$9,950**	**$0**	**$24,639**	**$72,358**	**$0**	**$9,950**	**$0**	**$0**	**$37,840**	**$0**	**$154,737**
Total Recovery Request ($)	$571,670	$0	$695,539	$665,178	$568,993	$305,610	$688,900	$543,989	$597,740	$183,252	$4,820,871
Base Approved Budget ($)	$350,756	$350,756	$350,756	$350,756	$350,756	$350,756	$350,756	$350,756	$350,756	$0	$3,156,804
Overage Recovery Request ($)	**$220,914**	**($350,756)**	**$344,783**	**$314,422**	**$218,237**	**($45,146)**	**$338,144**	**$193,233**	**$246,984**	**$183,252**	**$1,664,067**

Overage Category	Decade	Clear Lake	Dixie Creek	Double L	High Roller	Lakeside Energy	Lone Oak	Poplar	River Ranch	IT Network	Total:
Total Overage Recovery Request ($)	$220,914	($350,756)	$344,783	$314,422	$218,237	($45,146)	$338,144	$193,233	$246,984	$183,252	**$1,664,067**
Inflation Overage Recovery Request ($)	$60,093	$0	$71,791	$63,362	$59,812	$31,602	$73,682	$58,177	$62,839	$0	**$481,358**
Design Changes Overage Recovery Request ($)	$160,821	($350,756)	$272,992	$251,060	$158,425	($76,748)	$264,462	$135,056	$184,145	$183,252	**$1,182,708**

Attachment 9: PROJECT SCOPING AND COST ESTIMATION

INPUTS (ORANGE CELLS)

PROJECT NAME:	Lakeside Pipeline Project	Project Start Date:	2/19/2018
LOCATION (CITY):	Hanford, CA	Project In-service Date:	4/15/2020
NATURAL GAS UTILITY:	SoCalGas	Project Length (Months)	27

PROJECT SCOPE & COST[1]

Scope	Labor	Contract Labor	Material	Other	Total Installed Cost	Annual O&M
1. Digesters	$ -	$ 26,836,600	$ -	$ 893,394	$ 27,729,994	$ 2,031,122
2a. Biogas Treatment	$ -	$ 3,493,484	$ -	$ -	$ 3,493,484	$ 1,654,433
2b. Collection Lines	$ -	$ 5,833,811	$ -	$ -	$ 5,833,811	$ 234,190
3a. Biogas Conditioning	$ -	$ -	$ -	$ -	$ -	$ -
3b. Biogas Upgrading Facilities	$ -	$ 8,194,305	$ -	$ -	$ 8,194,305	$ 2,049,362
4. Pipeline Lateral and Compression	$ 19,350	$ 1,232,300	$ 867,430	$ 26,660	$ 2,145,740	$ 208,750
5. Interconnection (point of receipt)	$ 361,945	$ 863,811	$ 395,779	$ 450,290	$ 2,071,825	$ 5,000
6. Pipeline Extension	$ 294,000	$ 162,600	$ 27,600	$ 133,800	$ 618,000	$ -
7. NGV or Other (Optional)	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL	$ 675,295	$ 46,616,911	$ 1,290,809	$ 1,504,144	$ 50,087,159	$ 6,182,857

1: Not all cost estimate categories provided here are reimbursable. See Chapter 1, Section 4 for details.

Attachment 9: PROJECT SCOPING AND COST ESTIMATION

INPUTS (ORANGE CELLS)

PROJECT NAME:	**Lakeside Pipeline Project**	**Project Start Date:**	**2/19/2018**
LOCATION (CITY):	**Hanford, CA**	**Project In-service Date:**	**4/15/2020**
NATURAL GAS UTILITY:	**SoCalGas**	**Project Length (Months)**	**27**

PROJECT SCOPE & COST[1]

Scope	Labor	Contract Labor	Material	Other	Total Installed Cost	Annual O&M
1. Digesters	$ -	$ 26,836,600	$ -	$ 893,394	$ 27,729,994	$ 2,031,122
2a. Biogas Treatment	$ -	$ 3,493,484	$ -	$ -	$ 3,493,484	$ 1,654,433
2b. Collection Lines	$ -	$ 5,833,811	$ -	$ -	$ 5,833,811	$ 234,190
3a. Biogas Conditioning	$ -	$ -	$ -	$ -	$ -	$ -
3b. Biogas Upgrading Facilities	$ -	$ 8,194,305	$ -	$ -	$ 8,194,305	$ 2,049,362
4. Pipeline Lateral and Compression	$ 19,350	$ 1,232,300	$ 867,430	$ 26,660	$ 2,145,740	$ 208,750
5. Interconnection (point of receipt)	$ 361,945	$ 863,811	$ 395,779	$ 450,290	$ 2,071,825	$ 5,000
6. Pipeline Extension	$ 294,000	$ 162,600	$ 27,600	$ 133,800	$ 618,000	$ -
7. NGV or Other (Optional)	$ -	$ -	$ -	$ -	$ -	$ -
TOTAL	$ 675,295	$ 46,616,911	$ 1,290,809	$ 1,504,144	$ 50,087,159	$ 6,182,857

1: Not all cost estimate categories provided here are reimbursable. See Chapter 1, Section 4 for details.

Instructions: List all tasks used to complete project implementation. Clearly and concisely describe the activities (i.e., procuring permits, site planning, engineering, construction, equipment, field supervision, etc.) required to accomplish the goals/objectives proposed in the Project Narrative. Identify who will perform each task/activity, including project partners, contractors/consultants, etc. Provide a timeline in chronological order for all proposed tasks with estimated start and end dates for each task. As needed, add rows to the table below.

WORK PLAN

Task #	Description/Activity	Performed By	Start Date (Month/ Year)	End Date (Month/ Year)
	Preconstruction Tasks			
1	Project Management and Oversight (project duration)	Utility	Mar-2019	Dec-2019
2	Project Engineering and Design	Utility and Engineering Sub	Mar-2019	Aug-2019
3	Environmental Reviews and Compliance (project duration)	Utility and Environmental Sub	Jul-2019	Nov-2019
4	Material Procurement	Utility	Apr-2019	Nov-2019
5	Contracting Procurement	Utility	Aug-2019	Nov-2019
6	Project Permitting, Secure Easements/ROW's if needed	Utility and Permitting Sub	Jul-2019	Sep-2019
7	Preconstruction Surveys/GPR/Locate and Mark	Utility and GPR Sub	Nov-2019	Dec-2019
	Construction Tasks			
8	Field Engineering/Construction Management (construction duration)	Utility	Dec-2019	Apr-2020
9	Mobilization - Haul Equipment and Materials, Set-up yard	Utility or Construction Sub	Dec-2019	Dec-2019

10	Clearance - Turn over Transmission Pipe to Construction (Clear Pipe of Gas or Reduce Pressure if Needed)	Utility	Dec-2019	Dec-2019
11	Construction - Install Compressors, Collector, Analytics, Power, SCADA, Meter and Pipe/Valves	Utility or Construction Sub	Dec-2019	Mar-2020
12	Tie-in - Make Final Connections Between Clients Assets and Gas Company's System, Return Assets to Operating Pressure	Utility or Construction Sub	Mar-2020	Mar-2020
13	Test and Commission System	Utility	Mar-2020	Apr-2020
14	System Operational Date	Utility	Apr-2020	Apr-2020
15	Site Restoration/Construct Station - Install Fence, Final Site Grading	Utility or Construction Sub	Apr-2020	Apr-2020
16	Demobilization - Yard Clean-up, Remove Equipment and Materials	Utility or Construction Sub	Apr-2020	May-2020
	Post Construction Tasks			
17	As-builts/Records/Materials	Utility	May-2020	Sep-2020
18	Financial Close - Final True-up	Utility	Aug-2020	Oct-2020
	Construction of Digesters:			
19	Decade /Westra Centralized Digester	MEW and Subcontractors	Dec-19	Jul-19
20	Clearlake	MEW and Subcontractors	Feb-19	Aug-19
21	Dixie Creek Ranch	MEW and Subcontractors	Apr-19	Nov-19
22	Double L Cattle	MEW and Subcontractors	Feb-19	Oct-19
23	High Roller Dairy	MEW and Subcontractors	Feb-18	Nov-19
24	Lakeside	MEW and Subcontractors	Feb-19	Aug-19

25	Lone Oak Farms #1	MEW and Subcontractors	Feb-19	Sep-19
26	Poplar Lane Dairy	MEW and Subcontractors	Apr-19	Nov-19
27	River Ranch Dairy	MEW and Subcontractors	Jan-19	Aug-19
	Biogas Conditioning and Upgrading Facilities:			
28	Site Civil Improvements	MEW and Subcontractors	Oct-18	Mar-19
29	Install Major Equipment	MEW and Subcontractors	Mar-19	Sep-19
30	Site Startup and Commissioning	MEW and Subcontractors	Sep-19	Dec-19
	Gathering Line Installation:			
31	Survey and Pothole Alignments	MEW and Hartman Engineering	Oct-18	Nov-18
32	Final Pipeline Engineering	MEW and Hartman Engineering	Nov-18	Feb-19
33	Install Pipeline	MEW and Hartman Engineering	Feb-19	Sep-19
34	Pressure Test Pipeline and Startup	MEW and Hartman Engineering	Sep-19	Oct-19
	Pipeline Project Permitting:			
35	County Permitting and CEQA	MEW and Subcontracted Engineers	Apr-18	Dec-18
36	Air district	MEW	Aug-18	Apr-18
37	Building Permits	MEW	Oct-18	Dec-18
38	Encroachment Permits	MEW	Oct-18	Dec-18

Directions: In the table below, list all equipment units to be purchased and describe how it will support the purpose and goal of the proposal. As needed, add rows to the bottom of this page. For each item, provide:

DIGESTER EQUIPMENT

Task #	Item Description	Cost per Unit	Number of Units	Task Total	Labor Cost per Unit	Contract Labor Cost per Unit	Material Cost per Unit	Other Cost per Unit	Task Annual O&M
19	Decade Centralized (Digester #1) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 450,000	1	$ 450,000	$	$ 450,000	$	$	$
19	Decade Centralized (Digester #1) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 76,120	1	$ 76,120	$	$ 76,120	$	$	$
19	Decade Centralized (Digester #1) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 169,620	1	$ 169,620	$	$ 169,620	$	$	$
19	Decade Centralized (Digester #1)- Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 269,919	1	$ 269,919	$	$ 269,919	$	$	$
19	Decade Centralized (Digester #1) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 413,835	1	$ 413,835	$	$ 413,835	$	$	$
19	Decade Centralized (Digester #1) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 653,400	1	$ 653,400	$	$ 653,400	$	$	$
19	Decade Centralized (Digester #1) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 609,075	1	$ 609,075	$	$ 609,075	$	$	$ 297,114
19	Decade Centralized (Digester #1) - Manure Pumps - necessary for feedstock transportation to separation and biogas control system	$ 22,000	3	$ 66,000	$	$ 22,000	$	$	$
19	Decade Centralized (Digester #1) - Mechanical Separation Equipment - necessary to remove fibrous solids at Richard Westra Dairy and improve longevity of digester	$ 148,500	1	$ 148,500	$	$ 148,500	$	$	$
19	Decade Centralized (Digester #1) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
19	Decade Centralized (Digester #1) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$

19	Decade Centralized (Digester #1) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$ -	$	$ 82,500	$
19	Decade Centralized (Digester #1) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$ -	$	$ 700	$
20	Clear Lake (Digester #2) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 300,000	1	$ 300,000	$	$ 300,000	$	$	$
20	Clear Lake (Digester #2) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 203,060	1	$ 203,060	$	$ 203,060	$	$	$
20	Clear Lake (Digester #2) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 143,233	1	$ 143,233	$	$ 143,233	$	$	$
20	Clear Lake (Digester #2) - Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 323,297	1	$ 323,297	$	$ 323,297	$	$	$ 138,429
20	Clear Lake (Digester #2) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 6,600	1	$ 6,600	$	$ 6,600	$	$	$
20	Clear Lake (Digester #2) - Earth Work Contractor - Over-excavate and spread organics. Back-fill with suitable soil and compact to engineered specifications	$ 37,813	1	$ 37,813	$	$ 37,813	$	$	$
20	Clear Lake (Digester #2) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 176,550	1	$ 176,550	$	$ 176,550	$	$	$
20	Clear Lake (Digester #2) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 911,129	1	$ 911,129	$	$ 911,129	$	$	$
20	Clear Lake (Digester #2) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
20	Clear Lake (Digester #2) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$
20	Clear Lake (Digester #2) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$ -	$	$ 82,500	$
20	Clear Lake (Digester #2) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$ -	$	$ 700	$

21	Dixie Creek (Digester #3) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 475,000	1	$ 475,000	$	$ 475,000	$	$	$
21	Dixie Creek (Digester #3) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 203,060	1	$ 203,060	$	$ 203,060	$	$	$
21	Dixie Creek (Digester #3) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 168,286	1	$ 168,286	$	$ 168,286	$	$	$
21	Dixie Creek (Digester #3) - Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 434,397	1	$ 434,397	$	$ 434,397	$	$	$
21	Dixie Creek (Digester #3) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 414,365	1	$ 414,365	$	$ 414,365	$	$	$
21	Dixie Creek (Digester #3) - Earth Work Contractor - Over-excavate and spread organics. Back-fill with suitable soil and compact to engineered specifications	$ 88,000	1	$ 88,000	$	$ 88,000	$	$	$
21	Dixie Creek (Digester #3) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 273,900	1	$ 273,900	$	$ 273,900	$	$	$
21	Dixie Creek (Digester #3) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 1,321,276	1	$ 1,321,276	$	$ 1,321,276	$	$	$ 311,229
21	Dixie Creek (Digester #3) - Manure Pumps - necessary for feedstock transportation to separation and biogas control system	$ 22,000	1	$ 22,000	$	$ 22,000	$	$	$
21	Dixie Creek (Digester #3) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
21	Dixie Creek (Digester #3) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$
21	Dixie Creek (Digester #3) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$ -	$	$ 82,500	$
21	Dixie Creek (Digester #3) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$ -	$	$ 700	$

22	Double L (Digester #4) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 475,000	1	$ 475,000	$	$ 475,000	$	$	$
22	Double L (Digester #4) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 203,060	1	$ 203,060	$	$ 203,060	$	$	$
22	Double L (Digester #4) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 175,643	1	$ 175,643	$	$ 175,643	$	$	$
22	Double L (Digester #4) - Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 269,122	1	$ 269,122	$	$ 269,122	$	$	$
22	Double L (Digester #4) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 6,600	1	$ 6,600	$	$ 6,600	$	$	$
22	Double L (Digester #4) - Earth Work Contractor - Over-excavate and spread organics. Back-fill with suitable soil and compact to engineered specifications	$ 97,778	1	$ 97,778	$	$ 97,778	$	$	$
22	Double L (Digester #4) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 313,500	1	$ 313,500	$	$ 313,500	$	$	$
22	Double L (Digester #4) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 1,426,506	1	$ 1,426,506	$	$ 1,426,506	$	$	$ 173,289
22	Double L (Digester #4) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
22	Double L (Digester #4) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$
22	Double L (Digester #4) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$ -	$	$ 82,500	$
22	Double L (Digester #4) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$ -	$	$ 700	$
23	High Roller (Digester #5) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 400,000	1	$ 400,000	$	$ 400,000	$	$	$

23	High Roller (Digester #5) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 203,060	1	$ 203,060	$	$ 203,060	$	$	$
23	High Roller (Digester #5) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 142,698	1	$ 142,698	$	$ 142,698	$	$	$
23	High Roller (Digester #5) - Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 324,122	1	$ 324,122	$	$ 324,122	$	$	$
23	High Roller (Digester #5) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 41,894	1	$ 41,894	$	$ 41,894	$	$	$
23	High Roller (Digester #5) - Earth Work Contractor - Over-excavate and spread organics. Back-fill with suitable soil and compact to engineered specifications	$ 37,547	1	$ 37,547	$	$ 37,547	$	$	$
23	High Roller (Digester #5) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 395,450	1	$ 395,450	$	$ 395,450	$	$	$
23	High Roller (Digester #5) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 771,190	1	$ 771,190	$	$ 771,190	$	$	$ 88,714
23	High Roller (Digester #5) - Manure Pumps - necessary for feedstock transportation to separation and biogas control system	$ 22,000	2	$ 44,000	$	$ 22,000	$	$	$
23	High Roller (Digester #5) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
23	High Roller (Digester #5) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$
23	High Roller (Digester #5) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$ -	$	$ 82,500	$
23	High Roller (Digester #5) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$ -	$	$ 700	$
24	Lakeside (Digester #6) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 475,000	1	$ 475,000	$	$ 475,000	$	$	$
24	Lakeside (Digester #6) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 203,060	1	$ 203,060	$	$ 203,060	$	$	$

24	Lakeside (Digester #6) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 188,279	1	$ 188,279	$	$ 188,279	$	$	$
24	Lakeside (Digester #6) - Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 434,397	1	$ 434,397	$	$ 434,397	$	$	$
24	Lakeside (Digester #6) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 204,600	1	$ 204,600	$	$ 204,600	$	$	$
24	Lakeside (Digester #6) - Earth Work Contractor - Over-excavate and spread organics. Back-fill with suitable soil and compact to engineered specifications	$ 115,084	1	$ 115,084	$	$ 115,084	$	$	$
24	Lakeside (Digester #6) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 276,466	1	$ 276,466	$	$ 276,466	$	$	$
24	Lakeside (Digester #6) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 1,600,978	1	$ 1,600,978	$	$ 1,600,978	$	$	$ 263,745
24	Lakeside (Digester #6) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
24	Lakeside (Digester #6) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$
24	Lakeside (Digester #6) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$ -	$	$ 82,500	$
24	Lakeside (Digester #6) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$ -	$	$ 700	$
25	Lone Oak Farms (Digester #7) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 475,000	1	$ 475,000	$	$ 475,000	$	$	$
25	Lone Oak Farms (Digester #7) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 203,060	1	$ 203,060	$	$ 203,060	$	$	$
25	Lone Oak Farms (Digester #7) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 162,485	1	$ 162,485	$	$ 162,485	$	$	$
25	Lone Oak Farms (Digester #7) - Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 269,892	1	$ 269,892	$	$ 269,892	$	$	$
25	Lone Oak Farms (Digester #7) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 234,776	1	$ 234,776	$	$ 234,776	$	$	$

25	Lone Oak Farms (Digester #7) - Earth Work Contractor - Over-excavate and spread organics. Back-fill with suitable soil and compact to engineered specifications	$ 52,213	1	$ 52,213	$	$ 52,213	$	$	$
25	Lone Oak Farms (Digester #7) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 355,300	1	$ 355,300	$	$ 355,300	$	$	$
25	Lone Oak Farms (Digester #7) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 982,624	1	$ 982,624	$	$ 982,624	$	$	$ 264,857
25	Lone Oak Farms (Digester #7) - Manure Pumps - necessary for feedstock transportation to separation and biogas control system	$ 22,000	4	$ 88,000	$	$ 22,000	$	$	$
25	Lone Oak Farms (Digester #7)- Mechanical Separation Equipment - necessary to remove fibrous solids and improve longevity of digester	$ 297,000	1	$ 297,000	$	$ 297,000	$	$	$
25	Lone Oak Farms (Digester #7) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
25	Lone Oak Farms (Digester #7) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$
25	Lone Oak Farms (Digester #7) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$ -	$	$ 82,500	$
25	Lone Oak Farms (Digester #7) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$ -	$	$ 700	$
26	Poplar Lane (Digester #8) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 400,000	1	$ 400,000	$	$ 400,000	$	$	$
26	Poplar Lane (Digester #8) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 258,500	1	$ 258,500	$	$ 258,500	$	$	$
26	Poplar Lane (Digester #8) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 168,397	1	$ 168,397	$	$ 168,397	$	$	$
26	Poplar Lane (Digester #8) - Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 351,347	1	$ 351,347	$	$ 351,347	$	$	$
26	Poplar Lane (Digester #8) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 138,600	1	$ 138,600	$	$ 138,600	$	$	$
26	Poplar Lane (Digester #8) - Earth Work Contractor - Over-excavate and spread organics. Back-fill with suitable soil and compact to engineered specifications	$ 485,100	1	$ 485,100	$	$ 485,100	$	$	$
26	Poplar Lane (Digester #8) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 266,200	1	$ 266,200	$	$ 266,200	$	$	$

26	Poplar Lane (Digester #8) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 1,295,988	1	$ 1,295,988	$	$ 1,295,988	$	$	$ 133,286
26	Poplar Lane (Digester #8) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
26	Poplar Lane (Digester #8) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$
26	Poplar Lane (Digester #8) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$ -	$	$ 82,500	$
26	Poplar Lane (Digester #8) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$ -	$	$ 700	$
27	River Ranch (Digester #9) - Digester Project Management - T&M Contract for Project Management/Development including: Coordinate project design, project schedule, and all interactions between all project contractors. Coordinate with Air District regarding digester system and compliance with all regulatory requirements. Apply for and Secure CEQA approvals and land use permitting. Secure and record property easements for underground biogas pipeline connection to the CDF cluster's main biogas pipeline trunk; Coordinate pipeline installation, biogas handling installation, and digester/pipeline startup. Configure Greenhouse Gas reduction monitoring system and calibrate flow meters and test sensors. Confirm automated data logging. Register with ARB and CAR.	$ 475,000	1	$ 475,000	$	$ 475,000	$	$	$
27	River Ranch (Digester #9) - Digester Engineering - Fixed price contract to provide site plans and designs before construction; Supply as-built drawings after construction; Water Board Coordination including Waste Management Plan, engineering reports and compliance, and correspondence with Water Board.	$ 203,060	1	$ 203,060	$	$ 203,060	$	$	$
27	River Ranch (Digester #9) - General and Electrical Contractor - T&M contract for all Electrical Contractor work including: Purchase and install automation controls and data logging; Install mechanical building electrical, communications, cameras, and networking; Install electrical for mixers and lights.	$ 211,915	1	$ 211,915	$	$ 211,915	$	$	$
27	River Ranch (Digester #9) - Mechanical Contractor - T&M contract for all mechanical welding for equipment and piping installations as well as fixed price contract to install mechanical building	$ 269,672	1	$ 269,672	$	$ 269,672	$	$	$
27	River Ranch (Digester #9) - Concrete Contractor - Concrete work including mechanical building pad, separation equipment pad, sand lane, manure processing pit, and wet well	$ 6,600	1	$ 6,600	$	$ 6,600	$	$	$
27	River Ranch (Digester #9) - Earth Work Contractor - Over-excavate and spread organics. Back-fill with suitable soil and compact to engineered specifications	$ 133,907	1	$ 133,907	$	$ 133,907	$	$	$
27	River Ranch (Digester #9) - Piping Contractor - Biogas and manure piping and installation on project site including connection between Richard Westra Dairy and Decade Dairy	$ 258,500	1	$ 258,500	$	$ 258,500	$	$	$
27	River Ranch (Digester #9) - Digester Contractor - Liner, cover, and baffles. Necessary for compliance with Water Board Tier 1 groundwater protection requirements, and for collection of biogas	$ 1,609,995	1	$ 1,609,995	$	$ 1,609,995	$	$	$ 360,459
27	River Ranch (Digester #9) - County Building Permit - for site improvements including mechanical building	$ 7,816	1	$ 7,816	$	$ -	$	$ 7,816	$
27	River Ranch (Digester #9) - Air Permit - for digester authority to construct and permission to operate	$ 8,250	1	$ 8,250	$	$ -	$	$ 8,250	$
27	River Ranch (Digester #9) - Utility Fees - for electrical service to be brough to project site for manure management equipment and biogas handling equipment	$ 82,500	1	$ 82,500	$	$	$	$ 82,500	$

27	River Ranch (Digester #9) - Climate Action Reserve - Registration for Carbon Credit verification service	$ 700	1	$ 700	$	$	$	$ 700	$
			Subtotal:	**$ 27,729,994**	**$ -**	**$ 26,836,600**	**$ -**	**$ 893,394**	**$ 2,031,122**

Directions: In the table below, list all equipment units to be purchased and describe how it will support the purpose and goal of the proposal. As needed, add rows to the bottom of this page. For each item, provide:

- Task number(s) that correspond to the Work Plan attachment.
- A detailed description of the item and how it is necessary for the completion of the project's objectives and outcomes. All equipment must be tied to specific project activities.
- The cost per unit.
- The number of units to be purchased.

BIOGAS TREATMENT EQUIPMENT									
Task #	Item Description	Cost per Unit	Number of Units	Task Total	Labor Cost per Unit	Contract Labor Cost per Unit	Material Cost per Unit	Other Cost per Unit	Task Annual O&M
19	Decade Centralized (Digester #1) - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 39,720	1	$ 39,720	$	$ 39,720	$	$	$ 121,006
19	Decade Centralized (Digester #1) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 60,503
19	Decade Centralized (Digester #1) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 60,503
20	Clear Lake (Digester #2) - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 34,520	1	$ 34,520	$	$ 34,520	$	$	$ 56,378

20	Clear Lake (Digester #2) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 28,189
20	Clear Lake (Digester #2) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 28,189
21	Dixie Creek Ranch - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 39,720	1	$ 39,720	$	$ 39,720	$	$	$ 126,755
21	Dixie Creek (Digester #3) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 63,377
21	Dixie Creek (Digester #3) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 63,377
22	Double L (Digester #4) - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 34,520	1	$ 34,520	$	$ 34,520	$	$	$ 70,576
22	Double L (Digester #4) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 35,288

22	Double L (Digester #4) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 35,288
23	High Roller (Digester #5) - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 34,520	1	$ 34,520	$	$ 34,520	$	$	$ 36,131
23	High Roller (Digester #5) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 18,065.25
23	High Roller (Digester #5) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 18,065
24	Lakeside (Digester #6) - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 39,720	1	$ 39,720	$	$ 39,720	$	$	$ 107,416
24	Lakeside (Digester #6) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 53,707.75
24	Lakeside (Digester #6) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 53,708

25	Lone Oak Farms (Digester #7) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 107,869
25	Lone Oak Farms (Digester #7) - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 39,720	1	$ 39,720	$	$ 39,720	$	$	$ 53,934
25	Lone Oak Farms (Digester #7) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 53,934
26	Poplar Lane (Digester #8) - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 34,520	1	$ 34,520	$	$ 34,520	$	$	$ 54,284
26	Poplar Lane (Digester #8) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 27,142
26	Poplar Lane (Digester #8) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 27,142
27	River Ranch (Digester #9) - HDPE Tube System-Howitzer with Carbon Media for H2S filtration	$ 39,720	1	$ 39,720	$	$ 39,720	$	$	$ 146,805

27	River Ranch (Digester #9) - Blower package with automation controls, biogas chilling, plate & frame, moisture controls and sensors. Necessary for metering biogas production, dewatering biogas, transporting biogas to main cluster pipeline, and monitoring and controlling associated equipment.	$ 178,900	1	$ 178,900	$	$ 178,900	$	$	$ 73,402
27	River Ranch (Digester #9) - Air fixation system for H2S reduction; oxygen generator, compressor, cover injections, and PLC systems to track and maintain injection	$ 171,856	1	$ 171,856	$	$ 171,856	$	$	$ 73,402
			Subtotal:	**$ 3,493,484**	**$ -**	**$ 3,493,484**	**$ -**	**$ -**	**$ 1,654,433**

Directions: In the table below, list all equipment units to be purchased and describe how it will support the purpose and goal of the proposal. As needed, add rows to this page. For each item, provide:

- Task number(s) that correspond to the Work Plan attachment.
- A detailed description of the item and how it is necessary for the completion of the project's objectives and outcomes. All equipment must be tied to specific project activities.
- Tasks should include footage of collection line installation with type of pipe, valve quantity and type, methane detection quantities, etc.
- Footages and descriptions of installation type (private/public ROW, improved/unimproved ROW, bore/HDD, and special crossings such as streets, streams, etc.)

COLLECTION LINES									
Task #	**Item Description**	**Cost per Unit**	**Number of Units**	**Task Total**	**Labor Cost per Unit**	**Contract Labor Cost per Unit**	**Material Cost per Unit**	**Other Cost per Unit**	**Task Annual O&M**
31	Survey Pipeline Route. Required for pipeline engineering.	$ 27,000	1	$ 27,000	$	$ 27,000	$	$	$
32	Pothole pipeline route. Required for specific profile engineering.	$ 35,000	1	$ 35,000	$	$ 35,000	$	$	$
32	Pipeline engineering. Required for building gathering lines.	$ 280,000	1	$ 280,000	$	$ 280,000	$	$	$
33	Procure and Install 4" SDR 21 HDPE Biogas Pipeline. Includes 15 butterfly valves and 3 condensation collection points. All Private Easements. Required for moving biogas to injection point. Units in linear ft.	$ 35	56,953	$ 1,993,355	$	$ 35	$	$	$ 110,033
33	Procure and Install 6" SDR 21 HDPE Biogas Pipeline. Includes 10 butterfly valves and 3 condensation collection points. All Private Easements. Required for moving biogas to injection point. Units shown in linear ft.	$ 42	45,208	$ 1,898,736	$	$ 42	$	$	$ 87,099

33	Procure and Install 8" SDR 21 HDPE Biogas Pipeline. Includes 7 butterfly valves and 2 condensation collection points. All Private Easements. Required for moving biogas to injection point. Units shown in linear ft.	$ 48	11,009	$ 528,432	$	$ 48	$	$	$ 21,269
33	Procure and Install 10" SDR 21 HDPE Biogas Pipeline. Includes 7 butterfly valves and 2 condensation collection points. All Private Easements. Required for moving biogas to injection point. Units shown in linear ft.	$ 54	8,172	$ 441,288	$	$ 54	$	$	$ 15,788
33	Railway Bore (HDD or Jack and Bore). Required to cross railways.	$ 55,000	2	$ 110,000	$	$ 55,000	$	$	$
33	Canal HDD or Open Cut (if permissible). Required to cross canals.	$ 25,000	10	$ 250,000	$	$ 25,000	$	$	$
33	Street HDD or Open Cut (if permissible). Required to cross streets.	$ 15,000	18	$ 270,000	$	$ 15,000	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
			Subtotal:	**$ 5,833,811**	**$ -**	**$ 5,833,811**	**$ -**	**$ -**	**$ 234,190**

Directions: In the table below, list all equipment costing more than $5,000 per unit to be purchased and describe how it will support the purpose and goal of the proposal. As needed, add rows to the bottom of this page. For each item, provide:

- Task number(s) that correspond to the Work Plan attachment.
- A detailed description of the item and how it is necessary for the completion of the project's objectives and outcomes. All equipment must be tied to specific project activities.
- The cost per unit.
- The number of units to be purchased.

BIOGAS CONDITIONING EQUIPMENT									
Task #	Item Description	Cost per Unit	Number of Units	Task Total	Labor Cost per Unit	Contract Labor Cost per Unit	Material Cost per Unit	Other Cost per Unit	Task Annual O&M
	All costs included in 3b	$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
			Subtotal:	$ -	$ -	$ -	$ -	$ -	$ -

Directions: In the table below, list all equipment costing more than $5,000 per unit to be purchased and describe how it will support the purpose and goal of the proposal. As needed, add rows to the bottom of this page. For each item, provide:

- Task number(s) that correspond to the Work Plan attachment.
- A detailed description of the item and how it is necessary for the completion of the project's objectives and outcomes. All equipment must be tied to specific project activities.
- The cost per unit.
- The number of units to be purchased.

BIOGAS UPGRADING FACILITIES									
Task #	Item Description	Cost per Unit	Number of Units	Task Total	Labor Cost per Unit	Contract Labor Cost per Unit	Material Cost per Unit	Other Cost per Unit	Task Annual O&M
29	CO2 Membrane Equipment	$ 1,292,262	1	$ 1,292,262	$	$ 1,292,262	$	$	$ 160,106
29	Digester Gas Compression (includes electrical consumption)	$ 1,484,150	1	$ 1,484,150	$	$ 1,484,150	$	$	$ 1,408,936
29	Biogas Chiller, Heat Exchanger, Mechanical	$ 636,064	1	$ 636,064	$	$ 636,064	$	$	$ 213,475
29	Backup H2S Scrubber / Polisher	$ 339,271	1	$ 339,271	$	$ 339,271	$	$	$ 266,844
29	Electrical Switchgear, Transformers, SCADA System, PLC's, and Install	$ 1,558,333	1	$ 1,558,333	$	$ 1,558,333	$	$	$
29	Mechanical Installation and Piping	$ 1,445,000	1	$ 1,445,000	$	$ 1,445,000	$	$	$
28	Grading and Concrete	$ 489,167	1	$ 489,167	$	$ 489,167	$	$	$
35, 36, 37, 38	Permitting	$ -	1	$ -	$		$	$	$
29	Engineering and Project Management	$ 814,225	1	$ 814,225	$	$ 814,225	$	$	$
30	Testing and Comissioning	$ 135,833	1	$ 135,833	$	$ 135,833	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
			Subtotal:	**$ 8,194,305**	**$ -**	**$ 8,194,305**	**$ -**	**$ -**	**$ 2,049,362**

PIPELINE LATERAL AND COMPRESSION

Task #	Item Description	Cost per Unit	Number of Units	Task Total	Labor Cost per Unit	Contract Labor Cost per Unit	Material Cost per Unit	Other Cost per Unit	Task Annual O&M	Comments
1	Company Labor	$ 45	430	$ 19,350	$ 45	$	$	$	$	Includes all company labor for pipeline lateral
2	Materials	$ 31	430	$ 13,330		$	$ 31	$	$	Pipeline cost are based on diameter of 4-inch steel and 430 feet long, miscellaneous valves, fittings, and non-spec gas recirculation (330 feet of the 430 feet)
3	Methane/Leak detection	$ 97,500	1	$ 97,500		$	$ 97,500	$	$ 14,750	Includes 4 above ground sensors
4	Compression Equipment	$ 756,600	1	$ 756,600			$ 756,600	$	$ 194,000	200 hp with redundant compressor, Annual O&M plus annual electrical costs
5	Third Party Charges	$ 610	430	$ 262,300		$ 610	$	$	$	Includes construction contractor, electrical contractor, construction inspection, engineering and design, etc.
6	Compression Contractor	$ 970,000	1	$ 970,000		$ 970,000	$	$	$	Compressor installation and set up cost
7	Permits & Other	$ 62	430	$ 26,660		$	$	$ 62	$	Includes Right-of-Way, electrical power drop, telecommunication, permitting, etc.
			Subtotal:	**$ 2,145,740**	**$ 19,350**	**$ 1,232,300**	**$ 867,430**	**$ 26,660**	**$ 208,750**	See Summary tab for Cost Estimate Notes and Assumptions

PIPELINE LATERAL AND COMPRESSION Project Summary from above

Task #	Item Description	Cost per Unit	Number of Units	Task Total		Comments
1, 2, 5, & 7	Pipeline Lateral (per foot)	$ 295	430	$ 126,850		Includes (Company Labor, Materials, Third Party Charges, and Permit & Other), excluding Compressor Foundation, and Electrical Drop
4 & 6	Compression Equipment	$ 1,726,600	1	$ 1,726,600		Total Installed Cost (Materials and Construction) for two 200 hp Compressors, excluding Annual O&M costs

PIPELINE LATERAL AND COMPRESSION Historical Cost

Task #	Item Description	Cost per Unit	Number of Units	Task Total		Comments
1, 2, 5, & 7	Pipeline Lateral (per foot)	$ 283	1	$ 283		See Summary tab for Cost Estimate Notes and Assumptions, SoCalGas Pipeline Historical Cost
4 & 6	Compression Equipment	$ -	1	$ -		SoCalGas does not have recent historical compression costs for this horsepower

INTERCONNECTION

Task #	Item Description	Cost per Unit	Number of Units	Task Total	Labor Cost per Unit	Contract Labor Cost per Unit	Material Cost per Unit	Other Cost per Unit	Task Annual O&M	Comments
1	Company Labor	$ 361,945	1	$ 361,945	$ 361,945	$	$	$	$	Includes all company labor for interconnection (Point of Receipt)
2	Materials	$ 395,779	1	$ 395,779	$ -	$	$ 395,779	$	$ 5,000	Include steel pipes, fittings, valves, control valves, miscellaneous, filter separator, 2- inch orifice meter, gas chromatograph, H2S monitor, odorizer, guges, transmitters, SCADA, and panels
3	Methane/Leak detection	$ -		$ -	$ -	$		$		Included with Pipeline Lateral and Compression costs
4	Third Party Charges	$ 863,811	1	$ 863,811	$ -	$ 863,811	$	$	$	Includes construction contractor, electrical contractor, construction inspection, engineering and design, etc.
5	Permits & Other	$ 450,290	1	$ 450,290	$ -	$	$	$ 450,290	$	Includes Right-of-Way, telecommunication, permitting, etc.
			Subtotal:	**$ 2,071,825**	**$ 361,945**	**$ 863,811**	**$ 395,779**	**$ 450,290**	**$ 5,000**	See Summary tab for Cost Estimate Notes and Assumptions

INTERCONNECTION Project Summary from above

Task #	Item Description	Cost per Unit	Number of Units	Task Total		Comments
1, 2, 4, & 5	Point of Receipt	$ 2,071,825	1	$ 2,071,825		Based on 2-inch orifice meter and other associated equipment

INTERCONNECTION Historical Cost

Task #	Item Description	Cost per Unit	Number of Units	Task Total		Comments
1, 2, 4, & 5	Point of Receipt	$ 1,516,667	1	$ 1,516,667		Based on 2-inch orifice meter and other associated equipment

PIPELINE EXTENSION

Task #	Item Description	Cost per Unit	Number of Units	Task Total	Labor Cost per Unit	Contract Labor Cost per Unit	Material Cost per Unit	Other Cost per Unit	Task Annual O&M	Comments
1	Company Labor	$ 490	600	$ 294,000	$ 490	$	$	$	$	Includes all company labor for pipeline extension
2	Materials	$ 46	600	$ 27,600		$	$ 46	$	$	Pipeline cost are based on the predominate diameter of 4-inch steel and 600 feet long, miscellaneous valves, and fittings
3	Methane/Leak detection	N/A								Per D.17-12-004 SCG is proposing to implement a monitoring plan for methane leak detection in accordance with 49 CFR 192.723 and SCG's internal procedure that describes the methods, required intervals, and recordkeeping.
4	Third Party Charges	$ 271	600	$ 162,600	$ -	$ 271	$	$	$	Includes construction contractor, construction inspection, engineering and design, etc.
5	Permits & Other	$ 223	600	$ 133,800	$ -	$	$	$ 223	$	Includes Right-of-Way, permitting, etc.
			Subtotal:	**$ 618,000**	**$ 294,000**	**$ 162,600**	**$ 27,600**	**$ 133,800**	**$ -**	See Summary tab for Cost Estimate Notes and Assumptions

PIPELINE EXTENSION Project Summary from above

Task #	Item Description	Cost per Unit	Number of Units	Task Total		Comments
1, 2, 4, & 5	Pipeline Lateral (per foot)	$ 1,030	600	$ 618,000		Includes (Company Labor, Materials, Third Party Charges, and Permit & Other)

PIPELINE EXTENSION Historical Cost

Task #	Item Description	Cost per Unit	Number of Units	Task Total		Comments
1, 2, 4, & 5	Pipeline Lateral (per foot)	$ 283	1	$ 283		See Summary tab for Cost Estimate Notes and Assumptions, SoCalGas Pipeline Historical Cost

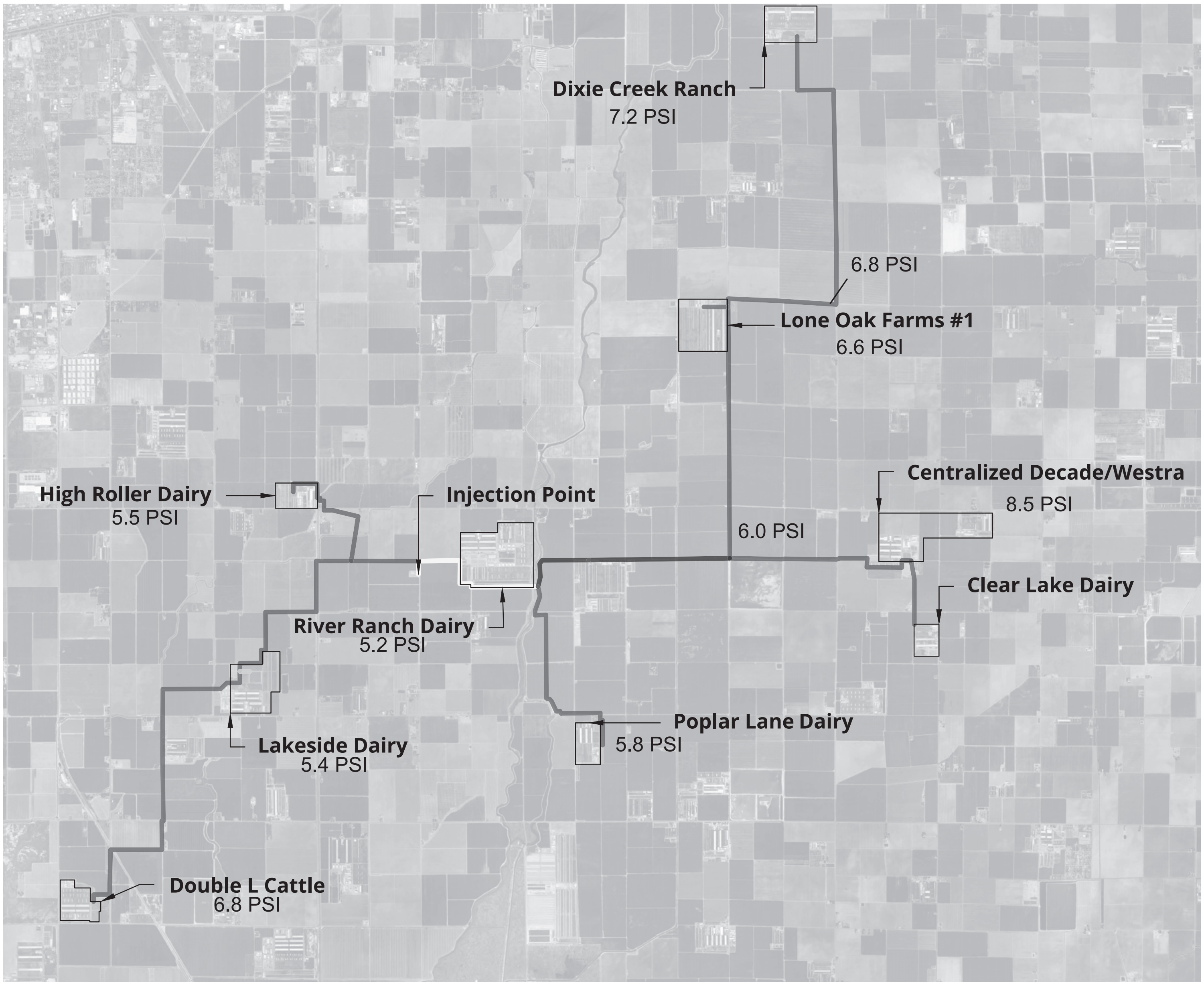
Directions: In the table below, list all equipment costing more than $5,000 per unit to be purchased and describe how it will support the purpose and goal of the proposal. As needed, add rows to the bottom of this page. For each item, provide:

- Task number(s) that correspond to the Work Plan attachment.
- A detailed description of the item and how it is necessary for the completion of the project's objectives and outcomes. All equipment must be tied to specific project activities.
- The cost per unit.

NGV FUELING OR OTHER END-USE (OPTIONAL)

Task #	Item Description	Cost per Unit	Number of Units	Task Total	Labor Cost per Unit	Contract Labor Cost per Unit	Material Cost per Unit	Other Cost per Unit	Task Annual O&M
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
		$ -		$ -	$	$	$	$	$
			Subtotal:	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**

1.13 - Lakeside Pipeline LLC - Lakeside Cluster Map Original vs Actual - 06.2024 - 24x36



General Notes

ORIGINAL PROJECTED PIPE SIZES

Materials: 10" HDPE, SDR 21

Materials: 8" HDPE, SDR 21

Materials: 6" HDPE, SDR 21

Materials: 4" HDPE, SDR 21

CURRENT PIPE SIZES

Materials: 12" HDPE, SDR 21

Materials: 18" HDPE, SDR 21

Materials: 8" HDPE, SDR 21

Materials: 6" HDPE, SDR 21

MAAS ENERGY WORKS

Firm Address
3711 Meadowview Dr.
Redding, CA, 96002

Project Name and Address
Lakeside Pipeline Project

Date
10/18/2024

Drawn By
Hudson Davis

Version
2.7

1.14 - Lakeside Pipeline LLC - Pipeline Pressure Map

Title

The Effects of Prevaling Wage Requirements on the Cost of Low-Income Housing

Authors

Dunn, Sarah
Quigley, John M.
Rosenthal, Larry A.

Publication Date

2005-10-03

Peer reviewed

THE EFFECTS OF PREVAILING WAGE REQUIREMENTS ON THE COST OF LOW-INCOME HOUSING

SARAH DUNN, JOHN M. QUIGLEY, and LARRY A. ROSENTHAL*

Recent California legislation extends the application of prevailing wage regulations to construction workers building subsidized low-income residential projects. Econometric evidence based on micro data covering 205 residential projects subsidized by the California Low Income Housing Tax Credit since 1996 and completed by mid-2002 demonstrates that construction costs increased substantially under prevailing wage requirements. Estimates of additional construction costs in the authors' most extensive models range from 9% to 37%. The analysis controls for variations in cost by geographical location and for differences in project characteristics, financing, and developer attributes. The authors estimate the effect of uniform imposition of these regulations on the number of new dwellings for low-income households produced under the tax credit program in California. Under reasonable assumptions, the mid-range estimate of the prospective decrease exceeds 3,100 units per year.

In October 2001, following heated political debate, the California legislature voted to extend the application of the state's "prevailing wage" laws to many construction projects not previously covered, including housing subsidized with public funds and even some private construction. The passage of Senate Bill 975 (SB 975) amended section 1720 of the California Labor Code, expanding the scope of "public funds" that trigger prevailing wage obligations when used to finance new construction.

The new law brings to the forefront of the policy debate concerns about the costs and benefits of prevailing wage laws, specifically in the context of subsidized housing for low-income households. Since prevailing wage rates are almost invariably higher than market wages, the new law may significantly increase construction costs in affected projects, perhaps to the point that they will no longer be financially feasible. Although SB 975 and subsequent enactments exempted some subsidized projects—

*Sarah Dunn is Research Associate at the Berkeley Program on Housing and Urban Policy, John M. Quigley is I. Donald Terner Distinguished Professor and Professor of Economics, and Larry A. Rosenthal is Executive Director of the Berkeley Program on Housing and Urban Policy and Lecturer at the Goldman School of Public Policy, all at the University of California, Berkeley. This research is supported by a grant from the U.S. Department of Housing and Urban Development and by the Berkeley Program on Housing and Urban Policy. The authors are grateful for the comments of Andrew Blauvelt, Shawn Blosser, Scott Littlehale, Matt Newman, Jeanne Peterson, Scott Smith, and Fran Wagstaff.

The dataset on which this paper is based is available for download at http://urban policy.berkeley.edu/publist.htm.

Industrial and Labor Relations Review, Vol. 59, No. 1 (October 2005).
0019-7939/00/5901 $01.00

such as those already under way at the time of the new law's passage, as well as certain self-help projects and transitional housing for the homeless—prevailing wage requirements have come to affect more and more residential development in California, including many housing projects targeted toward low- and moderate-income families.

While SB 975 itself applies only in California, the impact of prevailing wage policy is of national importance. Several studies have estimated the impact of the provisions of long-standing federal prevailing wage laws, the Davis-Bacon and Related Acts, on the cost of government contracts, but there is little hard evidence on the impact of prevailing wage policy on housing or residential construction costs, or on subsidized projects in particular. While some supporters argue that prevailing wage laws increase the efficiency or stability of construction labor markets, these claims remain unsubstantiated. Rather, redistribution of income appears to be the ultimate goal, and the principal effect (Allen 1983; Goldfarb and Morrall 1981).

This paper presents new evidence on some of these issues. It estimates the effect of prevailing wage requirements on the cost of construction of state-subsidized low-income housing in California. The evidence is based on micro data covering newly constructed units funded in part by the Low-Income Housing Tax Credit Program (LIHTC) from 1997 to 2002.

Prevailing Wage Legislation in California

California's prevailing wage law was passed in 1931, the same year as the Davis-Bacon Act. A 1995 study of state prevailing wage laws found it to be one of the most stringent in the nation (Thieblot 1995). The California statute extends to areas beyond the scope of the federal law, such as demolition work, site and sewer construction, and some janitorial and hauling work.

The administration of the California statute falls under the jurisdiction of the state's Department of Industrial Relations (DIR), and determination of the regulated wage rates is left to the discretion of the director of the DIR. California's determination of "prevailing wages" is similar to the federal standard, in that it effectively employs the modal wage rate. This usually results in the selection of a negotiated wage rate (under a union collective bargaining agreement), since free market wages are unlikely to be identical to the penny.

Local prerogative on construction wage regulation varies within the state. By 1995, two California localities had won judicial approval of ordinances exempting certain projects from prevailing wage requirements. A handful of other cities imposed prevailing wage obligations on some industrial construction projects wholly outside the public sphere (Thieblot 1995).

Since passage of the Davis-Bacon Act, construction of low-income housing sponsored directly by the U.S. Department of Housing and Urban Development (HUD), such as public housing and most Section 8 New Construction and Substantial Rehabilitation projects, has necessitated payment of "prevailing wages."[1] But there has been some ambiguity about coverage of housing projects subsidized indirectly through tax credits or federal grants to lower levels of government. The 2001 California law resolved this ambiguity. It extended this coverage to subsidized housing construction using federal, state, and local public funding sources such as the Community Development Block Grant Program and other common sources of grants for subsidized housing.

Effects of Prevailing Wage Requirements

Effects on Construction and Costs

A large literature has developed on the efficiency and distributional effects of mini-

[1]The application of the Davis-Bacon Act to HUD-sponsored construction is subject to a variety of detailed regulations, and HUD has provided wage surveys to assist the U.S. Department of Labor in its determination of wage rates (see HUD 1981).

mum wage laws generally (for a review, see Card and Krueger 1995) and Davis-Bacon and state prevailing wage legislation in particular. Goldfarb and Morrall (1981) reviewed a number of the early empirical studies of the costs of Davis-Bacon, and concluded that the legislation could hardly be attractive on efficiency grounds. The same authors (Goldfarb and Morrall 1978) examined construction wage data to estimate the large cost savings achievable by using mean wages (rather than modes) as the regulatory benchmark for defining prevailing wages. Metzger and Goldfarb (1983) developed an economic model to evaluate claims that output quality improves under a prevailing wage regime, and concluded that quality may easily decrease as a consequence of the increased costs imposed by regulation.

Estimates of increased project costs under Davis-Bacon vary considerably, most likely due to the difficulty in finding a control group unaffected by the Davis-Bacon Act with which to compare construction costs of Davis-Bacon projects. Two studies focused on a one-month suspension of the Act in 1971, which forced contractors to rebid for projects in the pre-award phase. Thieblot (1975) found an increase of about .5% on prevailing wage projects. By accounting more fully for institutional factors and inflation, Gould and Bittlingmayer (1980) estimated the increase to be between 4% and 7%. Using contractor surveys to compile a sample of affected and unaffected projects in rural areas, Fraundorf et al. (1984) concluded that the Act increased costs by an average of more than 26%.

More recent literature has addressed the control group problem by exploiting the variation in state prevailing wage laws among states and over time. A number of studies have used intrastate variation in prevailing wage laws resulting from the introduction of a new law, temporary suspension of an existing law, or the repeal of the state's prevailing wage law. Philips et al. (1995) examined the effect on construction wages of the repeal of state prevailing wage laws in nine states. They found that construction wages declined more in repeal states than in non-repeal states, but claimed that any savings to the government in construction costs was offset by losses in income tax revenue. Thieblot (1996) questioned these conclusions on methodological grounds. Bilginsoy and Philips (2000) used intra-provincial variation in prevailing wage laws to estimate the impact of the law on school construction costs, and found that the introduction of a prevailing wage law in British Columbia increased construction costs by at least 16% in the most restrictive model. The robustness of their results was limited by a small sample (54 projects). Philips (2001) also examined the impact of state prevailing wage laws on school construction using intrastate variation, finding a positive but not statistically significant effect of prevailing wage laws on construction costs.

Other studies have exploited the interstate variation in prevailing wage laws. Prus (1996) used FW Dodge data on various project types and found construction costs to be 18% higher in prevailing wage states than in states without prevailing wage laws, but the unconventional manner in which results were reported makes the level of statistical significance unclear. Prus (1999), Philips (1999), and Azari-Rad, Philips, and Prus (2003, 2002) all used the interstate variation and FW Dodge data on school construction costs and found positive yet statistically insignificant effects of prevailing wage laws on construction costs. The results of these latter studies are questionable, as the authors did not control for many important project characteristics, and some unmeasured differences among state institutions may affect the results.

Kessler and Katz (2001) examined the impact of repeal of state prevailing wage laws on construction wages, comparing variations across states and over time. The authors found a small (2–4%) but statistically significant decrease in the average wages of construction workers in a state after the repeal of its prevailing wage law.

Table 1. Rough Estimates of Increased Housing Costs Due to Prevailing Wage Requirements for Selected California Cities.

Location	*Labor Share of Construction Cost (%)*	*Prevailing Wage Differential (%)*	*Project Cost Increase (%)*
Major Cities			
Los Angeles	43.5	48.9	21.3
Sacramento	44.9	41.7	18.7
San Diego	43.6	37.6	16.4
San Francisco	47.2	28.7	13.5
Average Major Cities	44.8	39.2	17.5
Other Cities			
Bakersfield	42.6	60.0	25.6
Fresno	42.6	45.2	19.2
Marysville	45.0	50.1	22.5
Oxnard	43.9	50.1	22.0
Redding	43.2	56.5	24.4
San Bernardino	42.6	56.3	24.0
Average Other Cities	43.3	53.0	23.0

Source: http://www.building-cost.net; Newman and Blosser (2003). See text for assumptions and methods.

Effects on Housing Markets

One paper prepared for the President's Commission on Housing related housing construction costs to prevailing wage legislation (HUD 1981), but that document is merely a compendium of assertions. There is apparently no other direct evidence on the link between prevailing wage regulations and housing costs.

However, cost estimators used by house builders, and rules of thumb used by lenders, may yield rough estimates of the link between prevailing wage requirements and housing costs. For California, we can use existing information—on the labor share of residential construction costs, and on the premium of prevailing wages over market wages—to make some rough approximations.

Rough estimates for selected California cities—the labor share in housing output[2] times the wage premium—are presented in Table 1. Increases in project cost due to prevailing wages average 20.8% for the ten cities considered. Increases range from 13.5% in Stockton to 25.6% in Bakersfield. Major cities have a lower average increase in project cost (17.5%) than the six smaller cities included in the table (23%).

Of course, these rough estimates do not account for a number of influences prevailing wage legislation could have on overall project cost. For example, affected developers can substitute away from more expensive labor inputs by such means as using more prefabricated components, thus reducing the costs of on-site assembly. The enforcement of wage regulations might impose increased administrative cost due to more complex reporting requirements. There are likely labor and materials econo-

[2]The labor share of construction cost, available at http://www.building-cost.net, is based on a wood-frame, single-family home of average quality and size. Percent increases in mean market wages were obtained from the California Employment Development Department's "Occupational Employment Statistics" survey and state prevailing wage determinations published by the Department of Industrial Relations (as compiled in Newman and Blosser 2003). An average of wages from four construction occupations—Carpenters, Electricians, Plumbers, and Drywall Installers—was used to yield an overall labor rate.

mies present in multi-unit projects for lower-income families, compared to the single-family basis used in the published wage-share figures. Finally, increased wage levels may attract more productive workers, working fewer hours over the duration of an affected project. The subtle interactions of these effects are ignored in these rough approximations. We now turn to more precise econometric models estimating the cost effects based on the actual cost of housing projects completed in California.

Empirical Analysis

Our analysis extends the literature on the effects of prevailing wages by analyzing micro data on a large sample of individual construction projects, and by relying on observations from a single state. Our concentration on subsidized housing projects also permits explicit consideration of the tradeoff between the use of public resources to benefit two different sets of deserving households—low-income housing consumers, and workers within the residential construction industry.

We analyze the structure of costs for newly constructed dwellings for California Low-Income Housing Tax Credit (LIHTC) housing projects whose applications for funding were filed after January 1, 1997, and that were placed in service before May 1, 2002. All projects were selected to receive federal (and some state) tax credits by the California Tax Credit Allocation Committee (TCAC), the administrator of the federal LIHTC program in California.[3]

In accordance with program regulations, only rental housing projects are eligible for credits. The allocation process is competitive, so that projects that best fulfill housing needs and public policy objectives (as determined by TCAC) have priority. For newly constructed units to be eligible for tax credits, they must meet both rent and income requirements. The rents charged may not exceed 30% of the "imputed income" for the unit.[4] At initial occupancy, the income of a resident household may not exceed 50% or 60% of the area median income (AMI). Developers choose between a "20/50" or "40/60" minimum set aside, meaning that at least 20% (or 40%) of the units must be "affordable" to families with incomes at 50% (or 60%) of the median income. Only "affordable" units are eligible for tax credits. To increase the attractiveness of projects in the competition for credits, most applicants designate a greater proportion than the minimum set aside as "affordable," and many target occupants with incomes lower than the 50%/60% AMI threshold. Units receiving federal tax credits are required to remain "affordable" according to the above definition for 15 years.[5]

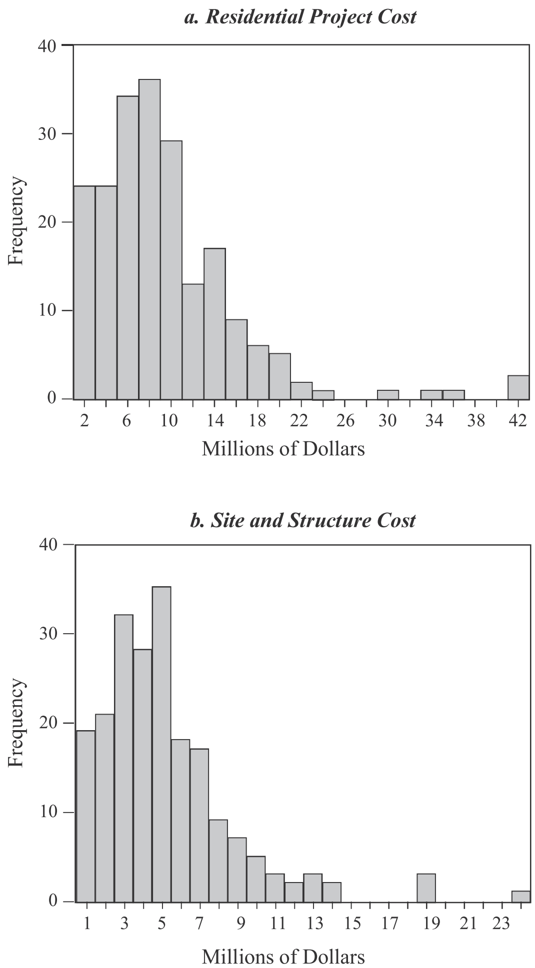
A number of criteria are considered in the allocation process. Federal guidelines grant priority to those projects that serve the lowest-income tenants and that maintain affordability for the longer periods. Other selection criteria include project location and the housing needs of that location (including consideration of public housing waiting lists and target populations with special needs), project characteristics, and projects intended for eventual tenant ownership. In California, the demand for credits usually exceeds their availability by about four to one, and elabo-

[3]The federal LIHTC program, authorized by Congress in 1986 and administered nationally by the Internal Revenue Service, enables developers of qualifying rental housing to raise project equity through the sale of federal tax credits to investors. TCAC allocates additional state tax credits to those projects that are selected to receive federal credits. TCAC may also authorize tax credits for rehabilitation of low-income housing. Due to their heterogeneity, housing rehabilitation projects are excluded from this analysis.

[4]Income is imputed assuming an occupancy of 1.5 persons per bedroom, and the area median income for a family of that size. The rent charged must not exceed 30% of this imputed income.

[5]Units benefiting from California state tax credits are generally required to maintain "affordability" for 55 years.

Figure 1. Cost Distributions for Sample Projects, 1997-2002.



rate priorities and guidelines have been established.[6]

Two hundred and ninety-two New Construction Projects were approved by TCAC from the application years 1997 through 2002 and completed before May 1, 2002. We compiled a dataset covering 205 of these projects, including *ex post* cost data on each project, reflecting certification by external auditors upon completion of construction.[7] Other project characteristics were assembled from the Committee's electronic database, from paper files of TCAC, and from telephone interviews.

Two measures of project costs were compiled based on expenditures reported *ex post* in the final cost certification. The first and most inclusive, *Residential Project Cost,* includes all costs associated with residential construction. These costs include land acquisition and development, construction (labor, materials, contractor profit, and overhead), survey and engineering costs, financing, legal fees, developer fees, and other expenses. *Site and Structure Cost* includes only site preparation and building-construction costs (that is, excluding contractor overhead and profit and general requirements). This measure of cost is most closely linked to changes in labor and materials costs. As shown in Figure 1, the distribution of these cost measures is highly skewed and roughly lognormal.[8] On a per unit basis, *Site and Structure Cost* averages about 56% of *Residential Project Cost.*

We also compiled information on a number of project characteristic variables: tar-

[6]For example, both state and federal law require that 10% of annual credit be awarded to projects that involve non-profit developers. In addition, the state law requires that at least 20% of the credits be used for projects located in rural areas, and at least 2% be set aside for small projects (consisting of 20 or fewer units). California also has guidelines to maintain geographic distribution of the tax credits, awarding a certain percentage of annual credits to each of 12 geographic regions across the state. Preference for credit allocation is also given to projects that promote certain public policies, such as smart growth, energy efficiency, and community revitalization efforts.

[7]There were a total of 454 approved projects, of which 162 were classified as Acquisition or Rehabilitation projects. Project files for 76 of 292 New Construction projects were not available at the time of data collection during the fall of 2002. (This typically meant that the files were in use by TCAC staff or other state officials at the time data were collected.) Complete data could not be assembled for 11 of the 216 remaining projects.

[8]In simple linear regressions, the intercept terms are insignificantly different from zero, implying a proportional relationship between *Residential Project Cost* and *Site and Structure Cost.*

get populations (senior citizens and special needs residents, for example), affordability levels, and the minimum set aside chosen by the applicant ("20/50" or "40/60"). All of these indicia are reflected in the criteria for allocating tax credits. In addition, we gathered information on project location, special facilities and features, structure and construction details, the applicant and developer, and financing.

We also determined whether project developers paid construction workers "prevailing wages." Beginning in 1999, applicants for LIHTC funding were asked to specify whether "use of federal, state or local subsidies requires that higher than normal wages must be paid."[9] We collected developers' responses to this question in the project information extracted from TCAC files. We then briefly interviewed developers by telephone to verify the payment of prevailing wages for each project. These interviews determined whether prevailing wages were paid on LIHTC projects whose applications were filed pre-1999 and also confirmed the "higher than normal wages" information extracted from TCAC files for project applications filed after 1998. We identified payment or nonpayment of prevailing wages for 175 of the 205 projects.[10] In the analysis below, the prevailing wage indicator variable has a value of one when we have confirmed that prevailing wages were paid, and is zero otherwise. We have made no independent determination concerning whether developers' choices about the payment of prevailing wages were legally mandated or, if so, whether the requirement arose from federal, state, or local requirements.

Table 2 presents summary information on the observed projects.

The Basic Statistical Models

Table 3 presents results of simple ordinary least squares (OLS) regressions[11] relating various measures of residential construction costs to the descriptors listed in Table 2. Regressions are presented for both measures of project cost: "site and structure" cost, including all construction wage expenditures, and total "residential project cost." In the first specification (columns 1 and 2), the dependent variable is the logarithm of cost, and the logarithm of the number of units is included as a regressor. In the second specification (columns 3 and 4), we impose constant returns to scale; the logarithm of cost per unit is the dependent variable.

As reported in Table 3, project costs vary by type of project, type of developer, and type of structure. There is also some evidence that projects with larger fractions of "affordable" units had lower total costs and lower costs per unit. Projects completed more recently tended to be more expensive, and those providing beneath-structure parking had higher costs. Projects with larger dwellings were more costly, as were those constructed on urban infill sites. There are some differences in costs by location; projects located in San Francisco, Sacramento, and Los Angeles tended to be more expensive to build.

The cost relationships reported in Table 3 are generally consistent for both specifications and both definitions of cost. In particular, the simple OLS models indicate that, holding other factors constant,

[9]The LIHTC application thus clearly refers to requirements imposed as conditions for the attainment of government subsidies, thereby eliminating the possibility that "higher than normal" wages are interpreted by the respondents to be higher-than-market union scale. Interviews with developers confirmed that builders understood "prevailing wages" to be those required by regulators, and hence the term is not to be considered synonymous with "union wages."

[10]In the remaining thirty cases, the developer lacked information or could not be reached.

[11]In preliminary regressions, eleven project characteristics in the TCAC data were individually and jointly statistically insignificant. Excluding them affected the magnitude of the prevailing wage coefficient only negligibly and therefore they were omitted from these regressions. Fourteen geographical identifiers are retained within the models but, for the sake of simplicity, are not reported in the tables below. These results are available from the authors on request.