Exhibit P

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF COLORADO
DENVER DIVISION

CRUSOE ENERGY SYSTEMS LLC,	§	
	§	
Plaintiff,	§	
	§	Civil Action No.
v.	§	
	§	
ALKANE MIDSTREAM LLC,	§	
	§	
Defendant.	§	

EXPERT DECLARATION OF DR. L. BRUN HILBERT, PHD, P.E.



Dr. Brun Hilbert, Ph.D., P.E.

August 21, 2022

Date

TABLE OF EXHIBITS

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I. INTRODUCTION

1. I make this declaration based upon my own personal knowledge and, if called upon to testify, would testify competently to the matters contained herein.

2. I have been retained by Norton Rose Fulbright US LLP to serve as a technical expert in this matter on behalf of Crusoe Energy Systems LLC ("Crusoe"). I have been asked to provide an independent analysis regarding whether U.S. Patent Nos. 10,862,307 (the "'307 Patent") and 10,862,309 (the "'309 Patent") (collectively, "the Asserted Patents") are infringed by any of the products and systems made, used, sold, or offered for sale by Alkane Midstream LLC ("Alkane").

3. This declaration is a statement of my opinions related to Alkane's infringement of claims 1-3 and 14-16 of the '307 Patent and claims 1-3 and 14 of the '309 Patent. My opinions are based on the information currently available to me. Should additional information, arguments, or evidence become available to me, I reserve all rights to supplement and/or amend my opinions to address such information, arguments, or evidence. In particular, my review of Alkane's products and systems has been limited to publicly available information, and I reserve all rights to supplement and/or amend my opinions based on information made available in the course of discovery.

II. SUMMARY OF OPINIONS

4. As described below and in **Exhibits C-D** hereto, it is my opinion that Alkane infringes claims 1-3 and 14-16 of the '307 Patent and claims 1-3 and 14 of the '309 Patent because its Flare Gas Management system satisfies each and every element of those claims, either literally or under the doctrine of equivalents.

III. BACKGROUND AND QUALIFICATIONS

5. I have summarized in this section my educational background, career history, publications, and other relevant qualifications. My full curriculum vitae is attached as **Exhibit A** to this report.

6. I am a Principal Engineer at Exponent, Inc. ("Exponent"). I hold a Ph.D. degree in Materials Science and Minerals Engineering from the University of California, Berkeley. I hold a B.S. degree in Mathematics and an M.S. degree in Mechanical Engineering from the University of New Orleans. I am a licensed Professional Mechanical Engineer in California, a licensed Mechanical and Petroleum Engineer in Texas, and a licensed Mechanical Engineer in New Mexico.

7. I have worked on and provided testimony and opinions in matters involving hydraulic fracturing operations, well stimulation design, well design and construction, drilling, completions, and production. This work includes using natural gas, including field gas, to generate electricity to power hydraulic fracturing operations.

8. I was a consulting expert on the Deepwater Horizon Macondo well blowout in 2010, including detailed analysis of the failures of the subsea blowout prevention ("BOP") and wellhead equipment. I have worked on several matters involving onshore and offshore blowouts and loss of well control.

9. I was appointed to the National Academy of Engineering ("NAE") Committee on Connector Reliability for Offshore Oil and Natural Gas Operations in 2017. This committee was assembled to investigate the causes and prevention of the premature failure of critical bolts on subsea BOPs and wellheads.

10. I was a Society of Petroleum Engineers ("SPE") Distinguished Lecturer for 2015-2016. I lectured on the topic, "Well Design and Integrity: Importance, Risk, and Scientific Certainty."

11. Over the past four decades, I have developed expertise in oil and gas well drilling, completion, and design, well production and wellhead equipment, well stability and sand production, well stimulation and hydraulic fracturing, drilling mechanics, petroleum rock mechanics, reservoir geomechanics, fixed and floating offshore platforms, and the structural integrity and leak resistance of the threaded connections.

12. From 1981 through 1992, I was employed in the Drilling and Completions Division of Exxon Production Research Company in Houston, Texas. While at Exxon Production Research Company, I conducted research and field specific applications in well design and construction for wells both onshore and offshore, both in the United States and internationally. I taught courses to Exxon and affiliate engineers in Well Completions and Workovers in the Middle East, Southeast Asia, Australia, Malaysia, and North America. I performed applied research and development in the areas of tubing and casing string design, well design, well completion design, and workovers, and well stimulation design.

13. During my career at Exxon, I worked with domestic and international Exxon Affiliates and their partners on site-specific well designs for challenging fields. While at Exxon Production Research Company, I consulted with Saudi Aramco, Esso Malaysia, and Esso Australia in drilling operations, drill string mechanics, well design, casing and tubing design, cementing design and operations, production and well stimulation, and well abandonment. The applications included High Pressure-High Temperature ("HPHT") wells in the United States

offshore in the Gulf of Mexico and onshore in, for example, Louisiana, Texas, Oklahoma, and Wyoming.

14. In 1992, I left Exxon Production Research Company to pursue doctoral studies at the University of California, Berkeley. I obtained a Ph.D. degree from the Department of Minerals Engineering and Material Science in 1995. My dissertation work involved the application of solid mechanics to rock engineering computations, also referred to as geomechanics. I also performed laboratory work on the micromechanics of wave propagation in sandstone rock, which is important in the interpretation of formation logging.

15. In 1996, I was hired by Exponent, Inc. (formerly Failure Analysis Associates, Inc.) in Menlo Park, California, where I have developed a consulting practice in the areas of Petroleum and Mechanical Engineering.

16. I have published over 100 technical journal articles, reports, and presentations during my career. I have written book chapters on computational geomechanics and underground gas storage. I have taught courses for preparation of taking the professional engineering license examination in Civil Engineering.

17. I am knowledgeable of the relevant skill set that would have been possessed by a hypothetical person of ordinary skill in the art at the time of the invention ("POSA") of the Asserted Patents, which I have been instructed was on or before August 1, 2018, for purposes of this proceeding.

18. Therefore, based on my education, professional experience of forty years, and scholarly books and publications, I am an expert in the relevant field of the '307 and '309 Patents at issue here and have been an expert in this field since before the '307 and '309 Patents were filed with the United States Patent and Trademark Office ("USPTO"). I am intimately familiar

with how a POSA would have understood and used the terminology found in the '307 and '309 Patents at the time of its filing.

IV. COMPENSATION

19. I am being compensated for my work in this litigation, including the drafting of this declaration, at my usual consulting rate of $535 an hour. My compensation does not depend in any way on the opinions that I express in this declaration, the outcome of this litigation, or the specifics of my testimony.

V. INFORMATION REVIEWED AND CONSIDERED

20. My conclusions in this report are based on my many years of professional experience in the relevant fields of the Asserted Patents, as well my review of the materials identified in **Exhibits B** and **Exhibits C-D** hereto.

21. I evaluated the information currently available to me concerning Alkane's products and systems to determine whether those products and systems include each element of the asserted claims of the Asserted Patents, as a person of ordinary skill in the art would understand them.

VI. OVERVIEW OF LEGAL STANDARDS APPLIED

22. I am not an attorney or a legal expert. I have been informed by counsel, however, of the various legal standards with regard to infringement of a United States patent, and I have applied those standards to the facts of this matter in my analysis to arrive at the opinions and conclusions expressed herein.

23. I have been informed that analysis of infringement is a two-step process, requiring: (1) construction of an asserted patent's claims to determine their scope and meaning, and (2) comparison of the construed claims to an accused product or system. I have been

informed that the patentee bears the burden of proving infringement on a claim-by-claim and limitation-by-limitation basis.

24. It is my understanding that patents include one or more claims that define the scope of the patentee's right to exclude. I have been informed that system claims, also known as apparatus claims, consist of claim elements that are structural parts that cooperate to achieve some useful result. I understand that a system claim cannot be infringed unless each limitation or element of the claimed system is present. I further understand that infringement can be literal or under the doctrine of equivalents, as explained below.

25. It is also my understanding that, to infringe a dependent claim, an accused product or system must include each and every limitation of the dependent claim and all claims from which it depends.

26. I understand that when a patent's claims are construed, they are to be given their plain and ordinary meaning to a person of skill in the art as of the time of the invention. I have applied that standard in my infringement analysis.

A. Literal Infringement

27. I have been informed that a patentee can prove literal infringement by showing that the product or system satisfies each and every element in a given claim. If the accused product or system does not literally contain each of the one or more elements recited in a system (or apparatus) claim, then there is no literal infringement of that claim.

B. Infringement Under the Doctrine of Equivalents

28. I have been informed that a patentee can establish that an accused instrumentality infringes under the doctrine of equivalents, even if it does not literally contain each of the one or more elements recited in the claim. The patentee may do so if, for each element of the claim not literally satisfied, the accused product or system contains a structure or performs a step or

function that is substantially equivalent to the element in the claim. Analysis under the doctrine of equivalents is performed on a limitation-by-limitation basis and not as to the claim as a whole.

29. I have also been informed that determination of infringement under the doctrine of equivalents requires a finding that, at the time of the alleged infringement, a person of ordinary skill in the art would consider the differences between the claimed subject matter and the accused product insubstantial.

30. I have been informed that one test of the insubstantiality of the differences between the claimed subject matter and a component of the accused product or system is whether, at the time of alleged infringement, a person of ordinary skill in the art would have known of the interchangeability of that component with the element claimed in the patent. Another test of the insubstantiality of the differences is whether, at the time of the alleged infringement, the component of the accused product or system performed substantially the same function, in substantially the same way, to achieve substantially the same result as the element in the patent claim.

C. Person of Ordinary Skill in the Art

31. In my opinion, a person of ordinary skill in the art relevant to the Asserted Patents at the time of the invention would have a Bachelor of Science degree in mechanical, petroleum, or electrical engineering, one-to-two years of work or research experience in the fields of power generation using natural gas or other fuel gases, and a general understanding of power generated by those means that could be used to power electronic devices, or the equivalent education based on work experience.

32. I am at least a person of ordinary skill in the art relevant to the Asserted Patents, based on my 40 years working in the field, my own industrial consulting experience, the knowledge obtained through my interactions with other professionals in the course of my work,

professional and educational activities, and my review of relevant literature both at the time of the inventions and since then.

33. My opinions herein are from the perspective of a person of ordinary skill in the art. My opinions would remain the same, however, even if the level of skill required of a person of ordinary skill in the art were adjusted up or down within reason.

VII. OVERVIEW OF THE '307 AND '309 PATENTS

34. On its face, the '307 Patent indicates that it was filed on August 1, 2019 as U.S. Patent Application No. 16/529,152 and claims priority to an application filed on August 1, 2018. The '307 Patent is entitled "Systems and Methods for Generating and Consuming Power from Natural Gas," and on its face states that it was issued by the U.S. Patent and Trademark Office on December 8, 2020. The named inventors of the '307 Patent are Charles Cavness, Chase Lochmiller, and Kenneth Parker.

35. On its face, the '309 Patent indicates that it was filed on November 25, 2019 as U.S. Patent Application No. 16/694,883 and claims priority to both the '307 Patent, as a continuation of that patent, and to an earlier provisional application filed on August 1, 2018. The '309 Patent is entitled "Systems and Methods for Generating and Consuming Power from Natural Gas," on its face states that it was issued by the U.S. Patent and Trademark Office on December 8, 2020. The named inventors of the '307 Patent are Charles Cavness, Chase Lochmiller, and Kenneth Parker.

36. The '307 and '309 Patents generally describe "[s]ystems and methods . . . to mitigate flaring of natural gas." *See* Abstract. For example, the patents disclose "process[ing] raw natural gas into a fuel gas stream that may be used to power any number of on-site power generation modules," which in turn "convert the fuel gas stream into an electrical output." *Id.* The electrical output may be "employed to power . . . distributed computing units houses within

one or more mobile data centers." *Id.* The distributed computing units may be used to perform computing operations such as cryptocurrency mining. *Id.*

VIII. INFRINGEMENT OF THE '307 PATENT

37. It is my opinion that Alkane infringes claims 1-3 and 14-16 of the '307 Patent because the materials I have reviewed indicate that Alkane has sold or offered to sell Flare Gas Management systems that satisfy each and every element of those claims, either literally or under the doctrine of equivalents.

38. The claim chart attached as **Exhibit C** includes an element-by-element explanation of my infringement analysis related to the '307 Patent, and identifies evidence supporting my conclusions that Alkane has sold or offered to sell Flare Gas Management systems that satisfy each and every element of claims 1-3 and 14-16 of the '307 Patent, either literally or under the doctrine of equivalents. **Exhibit C** is hereby incorporated by reference.

39. As stated above, my opinions are based on the materials and information currently available to me, which is limited to publicly available materials concerning Alkane's systems. I reserve the right to supplement and/or amend my opinions in light of additional information obtained through discovery and/or further investigation.

IX. INFRINGEMENT OF THE '309 PATENT

40. It is my opinion that Alkane infringes claims 1-3 and 14 of the '309 Patent because the materials I have reviewed indicate that Alkane has sold or offered to all Flare Gas Management systems that satisfy each and every element of those claims, either literally or under the doctrine of equivalents.

41. The claim chart attached as **Exhibit D** includes an element-by-element explanation of my infringement analysis related to the '309 Patent, and identifies evidence supporting my conclusions that Alkane has sold or offered to sell Flare Gas Management

systems that satisfy each and every element of claims 1-3 and 14 of the ’309 Patent, either literally or under the doctrine of equivalents. **Exhibit D** is hereby incorporated by reference.

42. As stated above, my opinions are based on the materials and information currently available to me, which is limited to publicly available materials concerning Alkane’s systems. I reserve the right to supplement and/or amend my opinions in light of additional information obtained through discovery and/or further investigation.

X. CONCLUSION

43. For the reasons explained herein and in **Exhibits C-D** hereto, it is my opinion that Alkane has sold or offered to sell systems that infringe claims 1-3 and 14-16 of the ’307 Patent and claims 1-3 and 14 of the ’309 Patent.



Exponent®
Engineering & Scientific Consulting

L. Brun Hilbert, Jr., Ph.D., P.E.
Principal Engineer | Mechanical Engineering
149 Commonwealth Drive | Menlo Park, CA 94025
(650) 688-6934 tel | bhilbert@exponent.com

Professional Profile

Dr. Hilbert has been consulting at Exponent since 1996 in the fields of mechanical and petroleum engineering, with special applications to engineering mechanics and geomechanics. He has worked in the petroleum exploration and production industry for 40 years.

Dr. Hilbert has expertise in mechanical and petroleum engineering. In the area of petroleum engineering, he has expertise in oil and gas well design and integrity, hydraulic fracturing, well production and wellhead equipment, blowouts and well control, drilling mechanics and directional drilling, reservoir geomechanics, reservoir reserves estimation, fixed and floating offshore platforms. He also has experience with natural gas and liquid hydrocarbon storage in solution-mined salt caverns and depleted hydrocarbon formations. In the area of geomechanics, Dr. Hilbert has expertise in evaluating the structural integrity of oil and gas wells in compacting or deforming reservoir rocks, in the stability of underground storage structures and nuclear waste repositories, and he assists clients in failure analysis involving soil-structure interaction, including pipelines. Dr. Hilbert has testifying experience in state and federal courts, intellectual property, and international arbitration, with particular focus on the oil and gas industry.

Prior to joining Exponent, Dr. Hilbert was employed as an Engineering Specialist for Exxon Production Research Company, where he performed research and taught courses in Well Completions and Workovers in the Middle East, Southeast Asia, Australia, and North America.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Mineral Engineering, University of California, Berkeley, 1995

M.S.E., Mechanical Engineering, University of New Orleans, 1981

B.S., Mathematics, University of New Orleans, 1979

National Academy of Engineering Committee on Connector Reliability for Offshore Oil and Natural Gas Operations, 2017-2018

Society of Petroleum Engineers Distinguished Lecturer, 2015-2016

Jane Lewis Fellowship in Geomechanics

Mathematical Association of America Membership Award

Outstanding Instructor, Exxon Production Research Company 1991

Outstanding Instructor, Exxon Company, U.S.A. 1990

Licenses and Certifications

Licensed Professional Mechanical Engineer, California, #M31490

Licensed Professional Engineer, New Mexico, #20939

Licensed Professional Engineer, Texas, #112060, Mechanical and Petroleum Engineering

Prior Experience

Lawrence Berkeley National Laboratory, 1996

University of California at Berkeley, 1992-1996

Exxon Production Research Company, 1981-1992

Professional Affiliations

American Society of Mechanical Engineers

Society of Petroleum Engineers

American Rock Mechanics Association

Publications

Papers and Articles

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engineering issues. Exponent Webinar, October 14, 2015.

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Hilbert LB, Stewart SE. Hydraulic fracturing: The process. Invited Speaker. Seminar on Fracking Law: From Land Contract Negotiations to Environmental Disputes, National Business Institute Attorney Presentations. Grand Rapids, MI. February 19, 2013.

Hilbert LB (Moderator), et al. Hydraulic fracturing science update and frontiers. Invited Speaker. Seminar presentation: Key Legal Issues and Future Directions in the Environmental Impacts of Shale Development and Hydraulic Fracturing. Sponsored by ALI CLW American Law Institute, November 29, 2012.

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Angeles Basin Section, Long Beach, CA, May 9, 2000.

Hilbert LB. Limitations and unfulfilled expectations of numerical methods in underground design and construction. Presentation, 3rd Geo-Institute Conference, Urbana, IL, June 1999.

Hilbert LB. Landslides! Presentation, Association of Defense Council, South Lake Tahoe, NV, June 1998.

Hilbert LB. Applications of forensics in geotechnical engineering. Presentation, Society of Civil Engineers of California Polytechnic State University, San Luis Obispo, CA, October 1998.

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Hilbert LB. Failure analysis in petroleum engineering. Invited Lecture, Stanford University Petroleum Engineering Seminar, February 1998.

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Hilbert LB. Discontinuum mechanics: The Manifold Method and the Finite Element Method. Presentation, Working Forum on the Manifold Method of Material Analysis, U.S. Army Corps of Engineers, Waterways Experiment Station, Timber Cove, CA, October 1995.

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Hilbert LB. A finite element method for jointed, fractured and faulted geomaterials. Invited Lecture, Earth Sciences Division Seminar, Lawrence Berkeley National Laboratory, Berkeley, CA, July 1994.

Hilbert LB. Computational discontinuum analysis geoengineering seminar. Invited Lecture, University of California at Berkeley, October 1994.

Hilbert LB. Tubular string design. Invited Lecture, Subsurface Engineering School, Exxon Company U.S.A., Houston, TX, October 1991.

Hilbert LB. Casing and tubing course. Invited Lecture, Esso Production Malaysia Inc., Kerteh, Malaysia, October 1991.

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Hilbert LB. Well completions and workovers school. Invited Lecture, Exxon Production Research Company, Houston, Texas; Kerteh, Malaysia; Ras Tanura and Dhahran, Saudi Arabia; Sale, Australia, 1983-1981.

Materials Considered

- US Pat No. 10,862,307 and prosecution history
- US Pat No. 10,862,309 and prosecution history
- Google Maps Image of Alkane's Seminole, TX Site - https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE
- Google Maps Image of Alkane's Seminole, TX Site - https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipOJa3hGV-yMcqO0U8XS4sdRTpspMGnrvQHRKffM!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipOJa3hGV-yMcqO0U8XS4sdRTpspMGnrvQHRKffM%3Dw114-h86-k-no!7i3968!8i2976!4m5!3m4!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529
- Google Maps Image of Alkane's Seminole, TX Site - https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMR2TliEw0Y9Boz82T8v2aUpBA0APULONFTgvmN!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMR2TliEw0Y9Boz82T8v2aUpBA0APULONFTgvmN%3Dw203-h270-k-no!7i1512!8i2016!4m5!3m4!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529
- Google Maps Image of Alkane's Seminole, TX Site - https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipN1n8PiBNC3Ft_zA0vQATKu6z95x9cZd55J7Hbf!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipN1n8PiBNC3Ft_zA0vQATKu6z95x9cZd55J7Hbf%3Dw367-h100-k-no!7i2426!8i660!4m5!3m4!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529

- Google Maps Image of Alkane's Seminole, TX Site - https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMLqMLUKniTbbb_ZEzmCuurpI8d42ZGIjxjWGji!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMLqMLUKniTbbb_ZEzmCuurpI8d42ZGIjxjWGji%3Dw203-h152-k-no!7i3264!8i2448!4m5!3m4!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529

- Alkane's WDEA Annual Meeting Presentation (Oct. 30, 2019).

- Crusoe's North Dakota Energy Development and Transition Committee Meeting Presentation (Nov. 14, 2019).

- Alkane's North Dakota Energy Development and Transition Committee Meeting Presentation (Nov. 14, 2019).

- NDPC Technical Solutions Group Agenda – Q1-2020 (Mar. 3, 2020)

- Alkane's North Dakota Energy Development and Transition Committee Meeting Presentation (Oct. 6, 2019).

- Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020).

- Alkane's Energy Development and Transition Committee Meeting Presentation (Oct 6, 2020).

- Power Profile Pad Power with Flare Gas Leaflet.

- Alkane Webpage - https://alkanenrg.com/

- Alkane Midstream LinkedIn webpage- https://www.linkedin.com/company/alkane

- Alkane Power Solutions LinkedIn webpage - https://www.linkedin.com/showcase/power-solutions_

- Taylor Power Systems TG400 Specification Sheet - https://www.taylorpowergenerators.com/generator/spec-sheets/TG400.pdf

- Taylor Power Systems TG450 Specification Sheet - https://www.taylorpowergenerators.com/generator/spec-sheets/TG450.pdf

- *See* Satoshi Nakamoto, Bitcoin: *A Peer-to-Peer Electronic Cash System* (2008).

- Arvind Narayanan et al., *Bitcoin and Cryptocurrency Technologies*, Princeton University Press (forthcoming 2016) (manuscript).

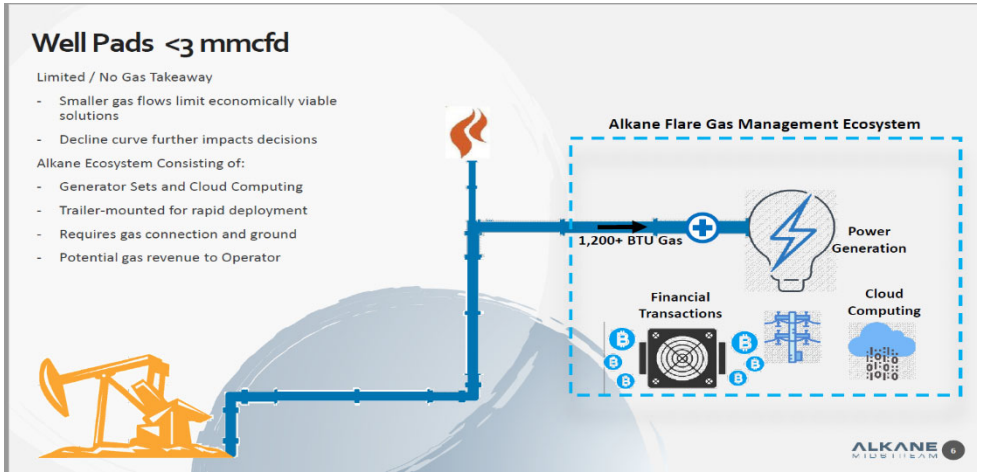
- Satish Ravindran et. al., *Bakken Flare Mitigation Field Trial*, Unconventional Resources Technology Conference (Aug. 1-3, 2016).

- Maria Andrei et. al., *Gas to Wire With Carbon Capture & Storage: A Sustainable Way for On-Site Power Generation by Produced Gas*, Society of Petroleum Engineers (Nov. 13-16, 2017).

- Rachel Henderson et. al., *Oilfield Flare Gas Electricity Systems (OFFGASES) Project*, National Energy Technology Laboratories (Apr. 28, 2008).

Claim	Claim Elements	Accused Product
1	1(a). "A flare mitigation system comprising: an electrical power generation system comprising:"	Alkane has committed and continues to commit acts of infringement under 35 U.S.C. § 271 by making, using, selling, and offering to sell *a flare mitigation system*—which it refers to as a "Flare Gas Management" system—that includes *an electrical power generation system* that is comprised of one or more generators used to convert natural gas into electrical power, which is in turn used to power a distributed computing system. The below image is from the title slide of a presentation given by Alkane on October 6, 2020[1], in which Alkane described its Flare Gas Management system.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 1. The image below is a diagram from Alkane's October 6, 2020 presentation that depicts Alkane's Flare Gas Management system at a high-level. The figure illustrates flare gas moving from the wellhead into Alkane's Flare Gas Management system. The figure further illustrates a "Power Generation" sub-system, which is depicted by a lightbulb icon. The figure also illustrates the electrical power generated by the Power Generation sub-system being used to power a distributed computing system used to conduct computing operations relating to "Financial Transactions" or "Cloud Computing." A person of ordinary skill in the art would understand from this figure that the Power Generation sub-system in Alkane's Flare Gas Mitigation system includes one or more generators that convert the flare gas flowing from the wellhead into electrical power.

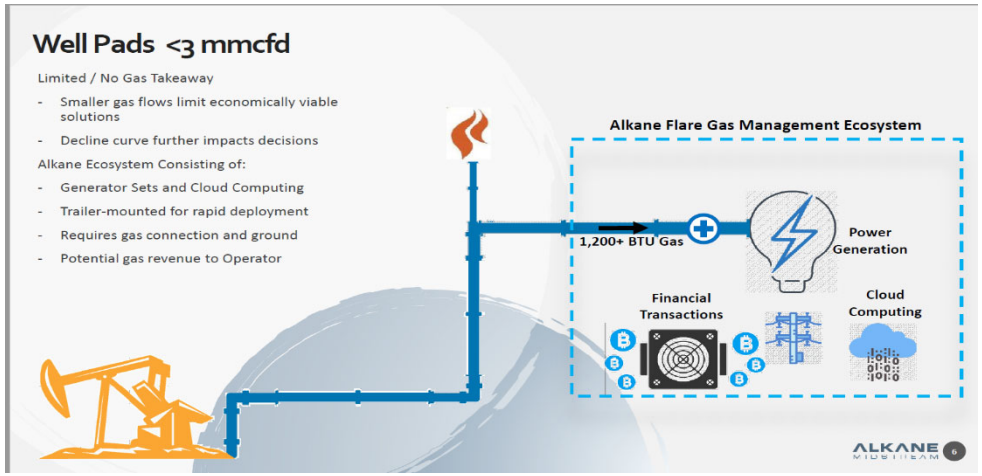
[1] The title slide of Alkane's "Flare Gas Management and LNG Distribution" presentation is dated October 5, 2020. As per the Energy Development and Transition Committee meeting minutes, the presentation was delivered on October 6, 2020. *See Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020). The presentation will be referred to herein according to the date the presentation was given.

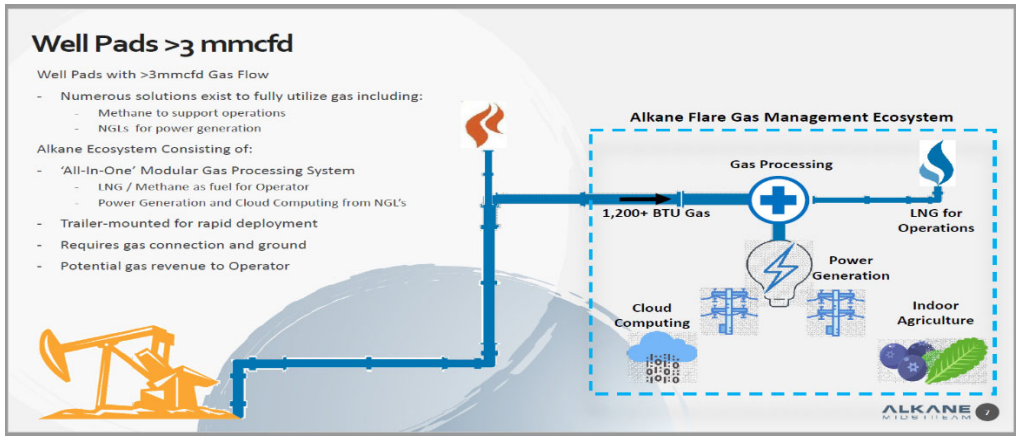


Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 6.

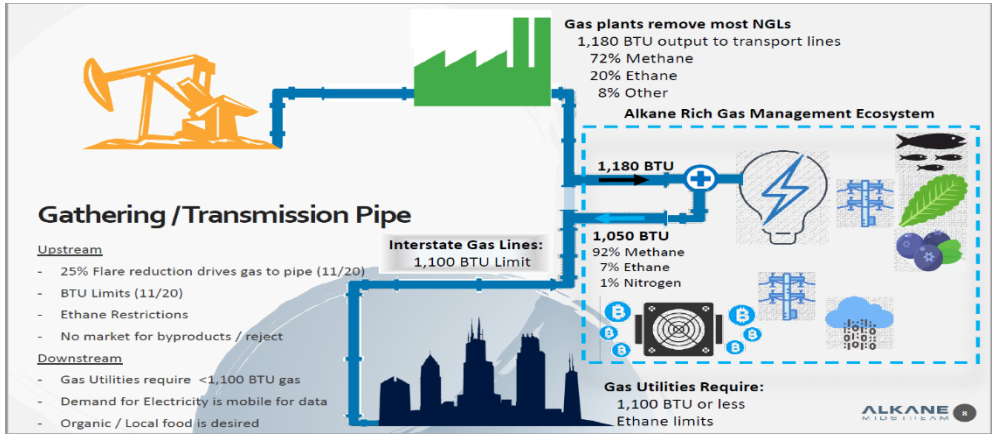
The photo below depicts a version of Alkane's Flare Gas Management systems installed at a site in Seminole, TX. As shown in this photo, the system includes one or more generators (red arrow) that are used to generate electrical power, which is in turn used to power a distributed computing system (red box).

		 *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE
	1(b). "one or more power generation modules, each adapted to:"	Alkane's system includes *one or more power generation modules*. Specifically, as explained above with respect to element 1(a), Alkane's system includes one or more generators that are used to convert natural gas into electrical power.
	1(c). "receive a fuel gas stream comprising a	Each of the generators in Alkane's system *receives a fuel gas stream comprising a fuel gas associated with a heat value of at least about 1,000 Btu/scf*.

	fuel gas associated with a heat value of at least about 1,000 Btu/scf; and"	As shown in the three figures below, natural gas with a heat value of at least 1,000 BTU/scf flows into the Power Generation sub-system, which—as explained above with respect to elements 1(a) and 1(b)—includes *one or more power generation modules*. Specifically, the first two figures included below illustrate that natural gas with a heat value of "1,200+ BTU" flows into the Power Generation sub-system. Similarly, the third figure illustrates that natural gas with a heat value over 1,000 BTU—either 1,180 BTU or 1,050 VTU—flows into the Power Generation sub-system.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6.



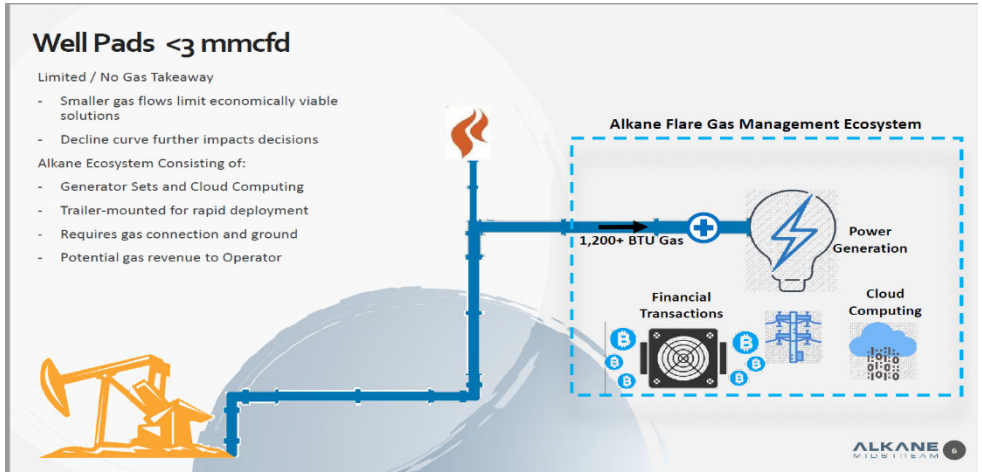
Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 7.



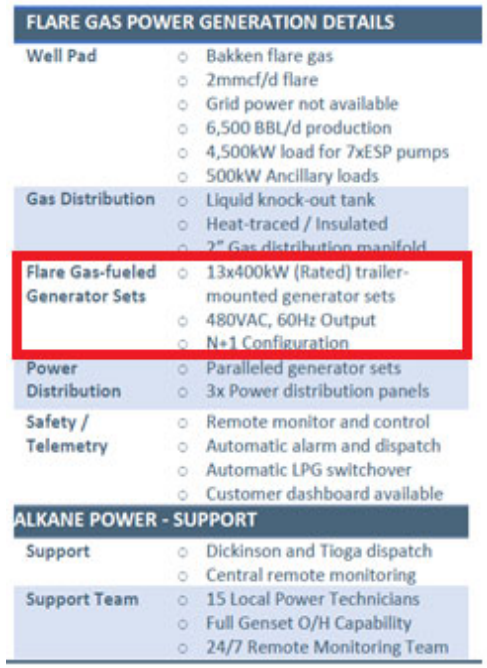
Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 8.

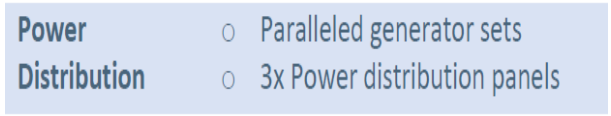
The photo included below depicts a version of Alkane's Flare Gas Management systems installed at a site in Seminole, TX. As shown in the photo, the system includes a fuel gas stream in the form of liquid natural gas or compressed natural gas (identified by the red arrow) that flows to one or more generators (identified by the red box).

		 *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE
	1(d). "consume the fuel gas stream to generate a high-	Alkane's system uses generators that *consumes the fuel gas to generate a high-voltage electrical output associated with a first voltage*.

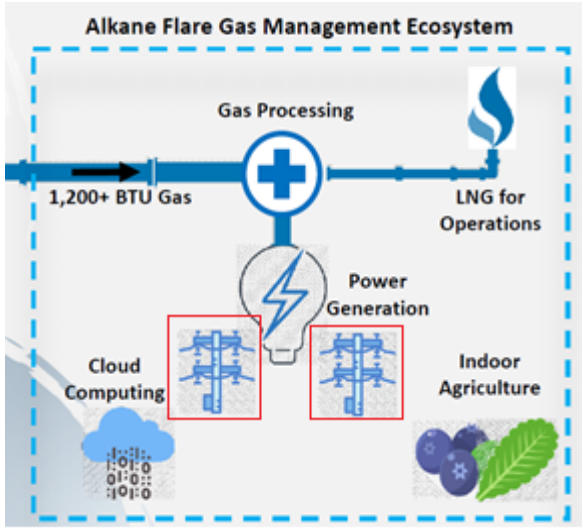
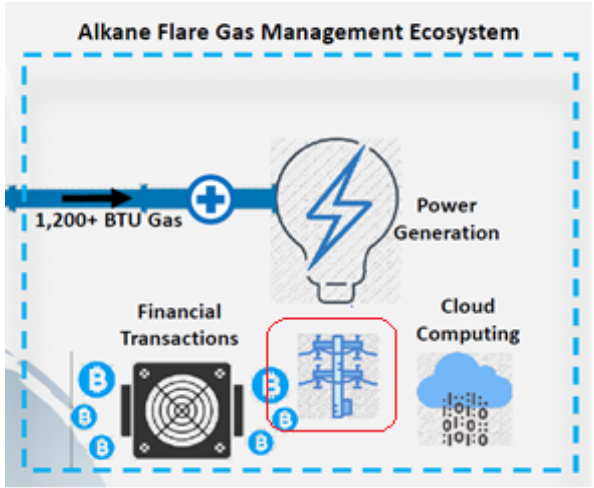
	voltage electrical output associated with a first voltage; and"	As explained above with respect to elements 1(a) and 1(b), the Power Generation sub-system of Alkane's system includes one or more generators that convert natural gas into electrical power, which is in turn used to power a distributed computing system. This is further illustrated in the figure included below, which depicts a fuel gas stream flowing into the Power Generation sub-system, which is then converted to electrical power that is output by the Power Generation sub-system. A person of ordinary skill in the art would understand from this figure that the Power Generation sub-system *consumes the fuel gas stream to generate* electrical power.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6. The photo included below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, depicts Taylor Power Systems® gas generators. According to the specification for these generators, they generate an electrical power output between 400-450 kW, though the specific output voltage depends on the configuration in which the generators are being operated. Alkane's product literature—an excerpt of which is also included below—indicates the generators used in Alkane's systems are configured to have an output volage of "480 VAC." This is consistent with what the specification of the '307 Patent describes as *a high-voltage electrical output associated with a first voltage.* Specifically, the specification describes "a high-voltage electrical output" as one that ranges "from about 70kW to about 2MW" and a "first voltage" associated with that output as one that ranges "from about 480 V to about 4.16 kV." *See* '307 Patent at 3:22-28. Thus, a person of ordinary skill in the art would understand the

		electrical output of the generators used by Alkane to be *a high-voltage electrical output associated with a first voltage*.  *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE

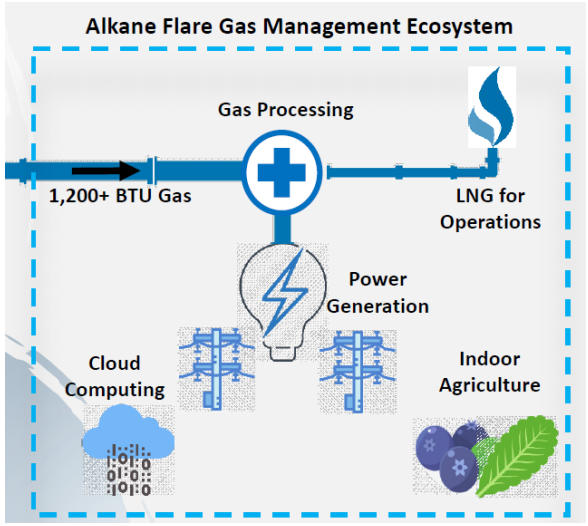
		 Alkane Midstream, Leaflet, *Power Profile Pad Power with Flare Gas*.
	1(e). "a parallel panel in electrical communication with each of the power generation modules, the parallel panel adapted to: receive the high-voltage	Alkane's system includes *a parallel panel in electrical communication with each of the power generation modules, the parallel panel adapted to receive the high-voltage electrical output from each of the power generation modules; and combine and synchronize said high-voltage electrical outputs into a combined high-voltage electrical output*. As explained above with respect to element 1(d), Alkane's system includes a Power Generation sub-system that includes one or more generators that generate a high-voltage electrical output (in the range of 400-450 kW) that is associated with a first voltage of about 480 V. Alkane's documentation indicates that those one or more generators are used in parallel sets.

	electrical output from each of the power generation modules; and combine and synchronize said high-voltage electrical outputs into a combined high-voltage electrical output"	 Alkane Midstream, Leaflet, *Power Profile Pad Power with Flare Gas*. Because Alkane's Power Generation sub-system uses parallel sets of generators, in order to have a single power source to power a distributed computing system, it must—as a matter of necessity—include a parallel panel (or other component equivalent thereto) that receives the separate outputs from those generators, and combines and phase-synchronizes them into a single high-voltage electrical output. This is so because the separate, un-synchronized outputs from the parallel generators could not be used to power the distributed computing system. The photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, shows a parallel panel (identified by the upward red arrow) disposed between and connected to the parallel sets of generators (identified by red box) and the distributed computing system (identified by downward arrow). A person of ordinary skill in the art would understand, based on this photo, that the parallel panel receives the separate high-voltage electrical outputs from each of the generators. In order for those electrical outputs to ultimately be used to power the distributed computing system, the parallel panel must necessarily combine and phase synchronize them into a single high-voltage electrical output.

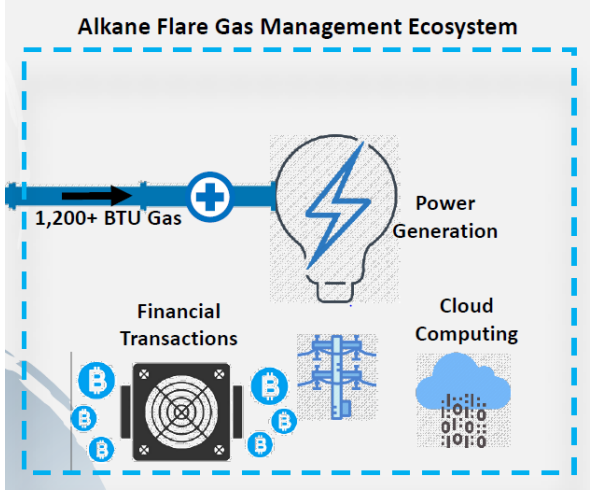
		 *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE
	1(f). "an electrical transformation module in electrical communication with the parallel	Alkane's system includes *an electrical transformation module in electrical communication with the parallel panel*. The figures below from Alkane's October 6, 2020 presentation illustrate a transformer (outlined in red) that sits between the "Power Generation" sub-system and the distributed computing system, which in these figures is illustrated as being used for "Financial Transactions" and "Cloud Computing."

	panel, the electrical transformation module adapted to: receive the combined high-voltage electrical output; and transform the combined high-voltage electrical output into a low-voltage electrical output associated with a second voltage that is lower than the first voltage;”	 *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 7.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6.

		A transformer (or equivalent component) must necessarily be included in order for the system to operate. As explained above with respect to element 1(e), Alkane's system includes a parallel panel that combines the separate high-voltage electrical outputs from each of the generators into a single high-voltage electrical output. To do so, the parallel panel combines the magnitudes of the separate outputs from each generator, thus creating a combined high-voltage output that is at such a high voltage that passing it directly from the parallel panel to the distributed computing system would cause damage to the computing system. Thus, the combined high-voltage electrical output from the parallel panel must first pass through a transformer to step-down the voltage to a level that can be used to power the distributed computing system.
	1(g). "a distributed computing system powered by the electrical power generation system, the distributed computing system comprising:"	Alkane's system includes *a distributed computing system powered by the electrical power generation system*. As explained above with respect to elements 1(a)-(d), Alkane's system includes a Power Generation sub-system that generates electrical power that is used to power a distributed computing system. The figures included below, which are excerpted from Alkane's October 6, 2020 presentation, illustrate both the Power Generation sub-system and the distributed computing system that it powers, which (in these figures) is used for computing operations relating to "Financial Transactions" and "Cloud Computing."



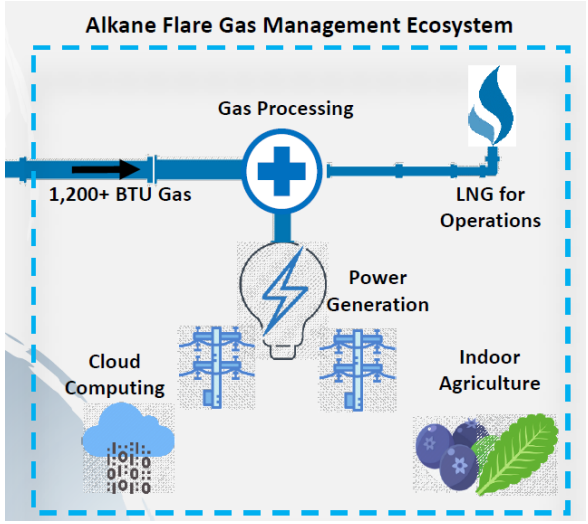
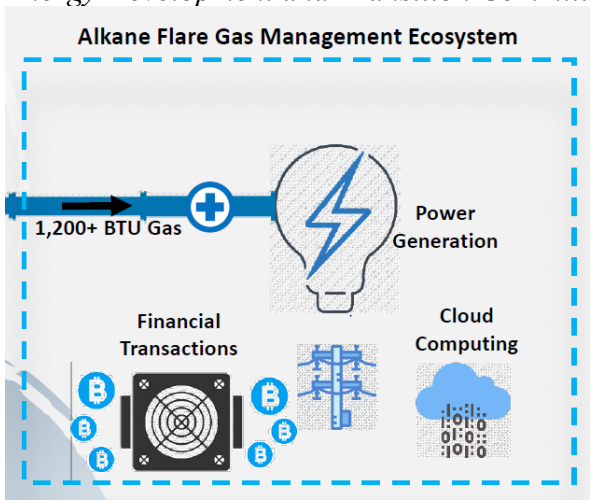
Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 7.



Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 6.

The photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, shows a distributed computing system (identified by a red arrow) in electrical connection with the Power

		Generation sub-system (identified by the red box). Indeed, there is no other observable mechanism or sub-system in this installation that could supply power to the distributed computing system.  *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE
	1(h). "a communications system comprising one	The distributed computing system in Alkane's system includes *a communications system comprising one or more data satellite antennas adapted to provide a network*.

	or more data satellite antennas, the communications system adapted to provide a network; and”	The figures included below from Alkane’s October 6, 2020 presentation indicate that the distributed computing system included in Alkane’s Flare Gas Management system is used to perform computing operations related to “Financial Transactions” and/or “Cloud Computing.”  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 7. 

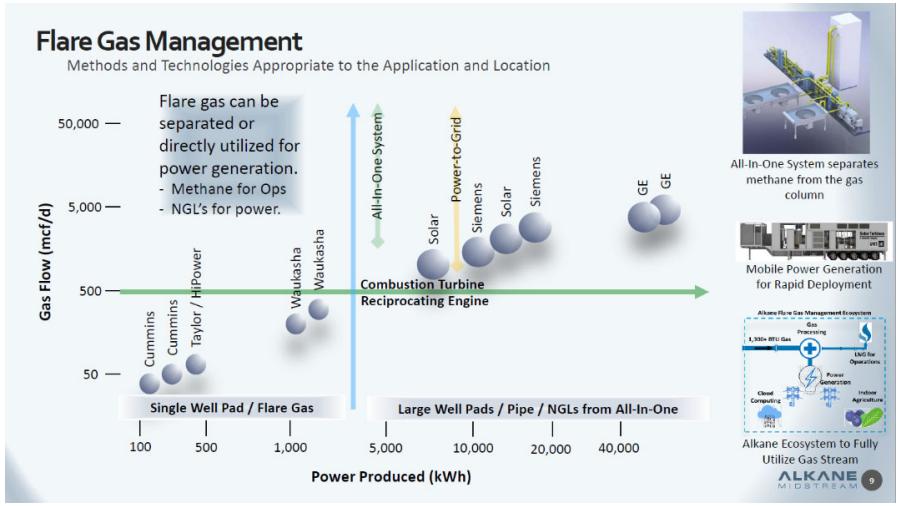
		Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 6. In order to perform such computing operations, the distributed computing system must necessarily include a communications system that connects the distributed computing system to a communications network.[2] Based on a review of Alkane's materials, most (if not all) of Alkane's systems are installed in remote locations where a broadband or other wired network connection would not be available. Thus, the communications system would require data satellite antennas or an equivalent thereto to establish a network connection. The photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, shows data satellite antennas or their equivalent (indicated by the red arrow).  *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfw

[2] The figures illustrating Alkane's system link the "Financial Transactions" performed by the distributed computing system to Bitcoin mining because the Bitcoin logo is depicted around "Financial Transactions." The following two references state that Bitcoin mining operations require a network connection. *See* Satoshi Nakamoto, Bitcoin: *A Peer-to-Peer Electronic Cash System*, 2–4 (2008); Arvind Narayanan et al., *Bitcoin and Cryptocurrency Technologies*, Princeton University Press (forthcoming 2016) (manuscript at 8).

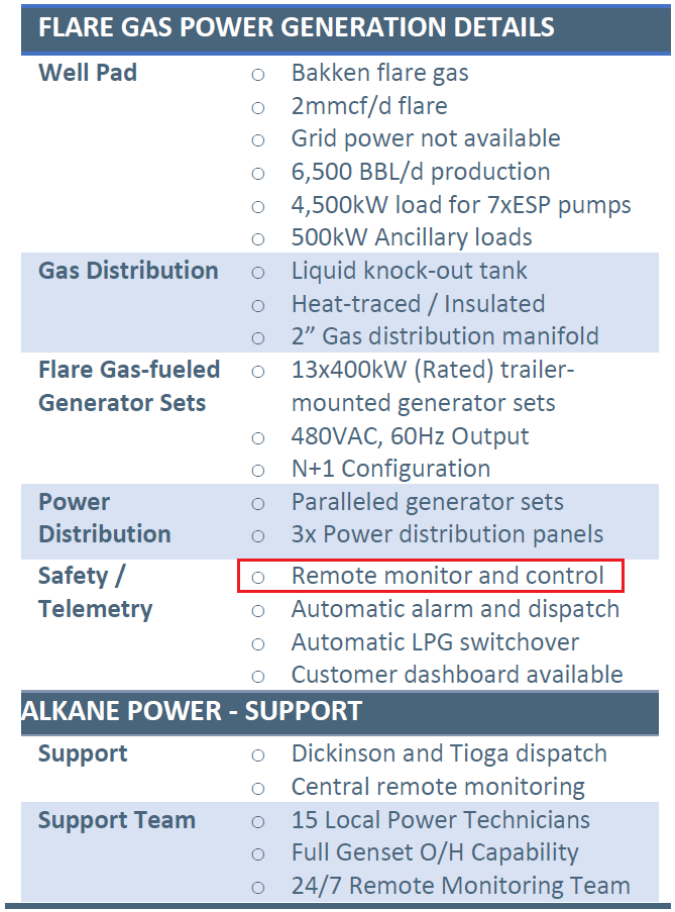
		pukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE
	1(i). "a first mobile data center comprising: an enclosure defining an interior space, a plurality of distributed computing units located within the interior space of the enclosure, each of the plurality of distributed computing units in communication with the network; and"	The distributed computing system of Alkane's system includes *a first mobile data center comprising: an enclosure defining an interior space* and *a plurality of distributed computing units located within the interior space of the enclosure, each of the plurality of distributed computing units in communication with the network*. As shown in the photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, the data centers in Alkane's systems are housed in shipping containers (identified by the red arrow). These containers are enclosures that define an interior space.  *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-

		no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE As explained above with respect to elements 1(g)-(h), materials relating to Alkane's Flare Gas Management system indicate that the distributed computing system is used to perform computing operations related to Financial Transactions (such as Bitcoin mining) and Cloud Computing. Such operations would not be profitably performed with a single distributed computing unit, nor with a computing unit that has no network connection. Thus, Alkane's distributed computing system must necessarily include *a plurality of distributed computing units in communication with the network*.
	1(j): "a power system located at least partially within the interior space of the enclosure, the power system in electrical communication with the electrical transformation module and the plurality of distributed computing units such that the power system receives the low-voltage electrical output and powers each	The first mobile data center of Alkane's system also includes *a power system located at least partially within the interior space of the enclosure.* Further, the power system is (a) *in electrical communication with the electrical transformation module and the plurality of distributed computing units*, and (b) *receives the low-voltage electrical output and powers each of the plurality of distributed computing units*. As explained above with respect to element 1(f), Alkane's system includes a transformation module that steps-down the voltage of the high-voltage electrical output from the parallel panel to a second, lower voltage that can be used to power the distributed computing system. In order to power the distributed computing units within the mobile data center, that transformer must necessarily be in electrical communication with a power system within the mobile data center such that it receives the low-voltage output from the transformer. The power system in the mobile data center must in turn be in electrical communication with the distributed computing units such that it powers each of the distributing computing units using the low-voltage electrical output from the transformer. If these components of the system are not in electrical communication with one another, the system would not function.

	of the plurality of distributed computing units."	
2.	2(a): "A system according to claim 1, wherein: at least one of the power generation modules comprises an engine-type generator;"	As explained above with respect to claim 1, Alkane's system includes multiple power generation modules (*i.e.*, generators). One or more of those generators is *an engine-type generator*. The photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, depicts Taylor Power Systems® gas generators, which are engine-type generators.  *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE Similarly, the figure below from Alkane's October 6, 2020 presentation indicates that the Taylor generators used in Alkane's system are engine-type generators. Specifically, the figure includes a green

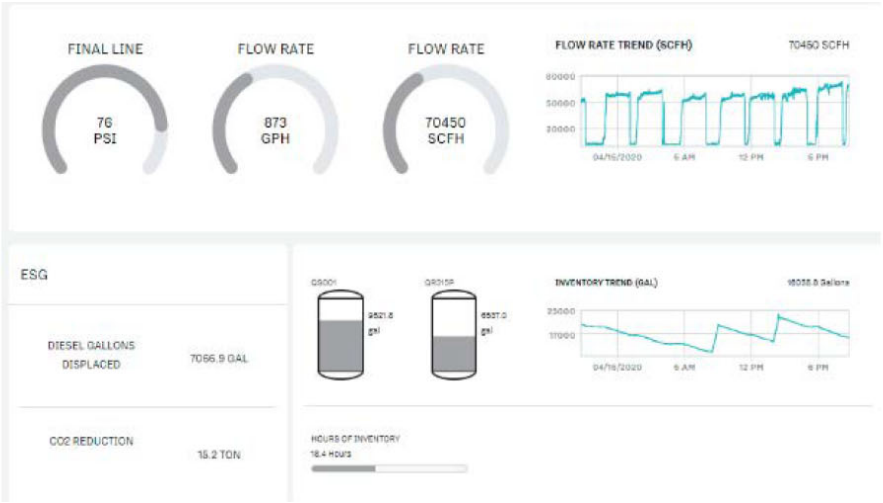
		line running through the middle and a notation indicating that the generators below the line—such as the Taylor generators—are "reciprocating engine" generators, while those above the line are "combustion turbine" generators.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 9.

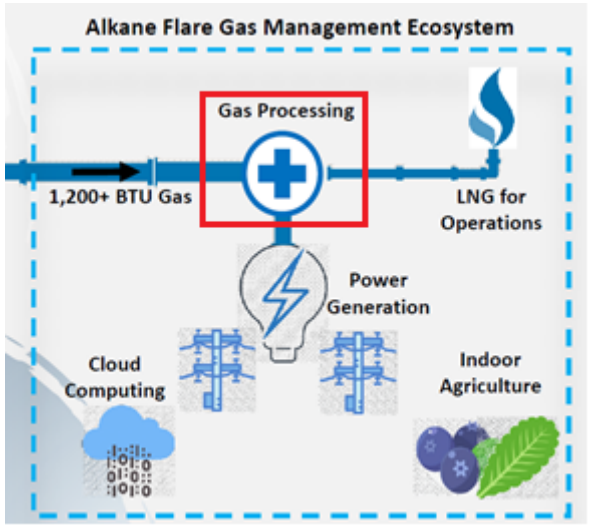
	2(b): "the high-voltage electrical output generated by the engine-type generator is from about 70 kW to about 2 MW; and "the first voltage is from about 480 V to about 4.16 kV."	The *high-voltage electrical output generated by the engine-type generator* of Alkane's system *is from about 70kW to about 2MW, and the first voltage is from about 480V to about 4.16kV.* As explained above with respect to element 1(d), the generators used in Alkane's system generate an electrical output of 400-450 kW at a voltage of 480 VAC.
3.	"A system according to claim 2, wherein the second voltage is from about 208 V to about 240 V."	In Alkane's system, the second voltage (*i.e.*, the voltage associated with the electrical output from the transformation module) is *from about 208 V to about 240 V*. A person of skill in the art would understand the distributed computing units in Alkane's system to be standard, distributed computing units, which require an input voltage in the range of *from about 208 V to about 240 V*. Accordingly, the transformation module of Alkane's system, which steps-down the high-voltage output from the parallel panel, would necessarily be within the range of about 208 V to about 240 V.
14.	"A system according to claim 1, further comprising a monitoring and control system in communication with the	Alkane's system includes *a monitoring and control system in communication with the distributed computing system via the network.* Specifically, Alkane's product literature (excerpted below) demonstrates that Alkane's system includes remote monitoring and control capabilities. To enable ***remote*** monitoring and control, the monitoring and control system must be connected to a communications network, such as the one provided by the communications sub-system discussed above with respect to element 1(h).

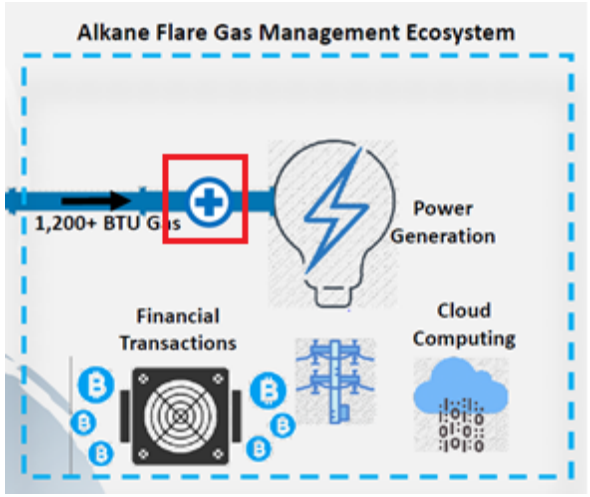
	distributed computing system via the network.”	 Alkane Midstream, Leaflet, *Power Profile Pad Power with Flare Gas*.

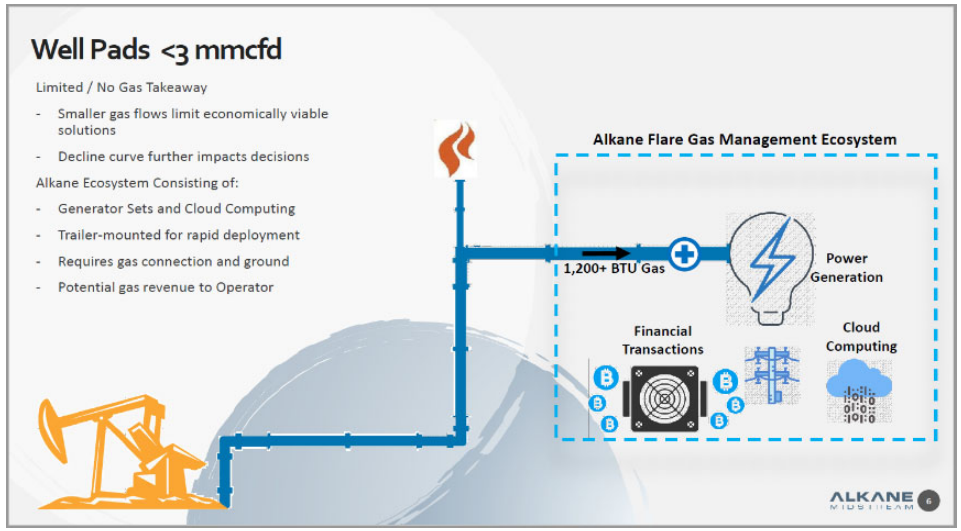


Alkane Midstream, Leaflet, *Power Profile Pad Power with Flare Gas*.

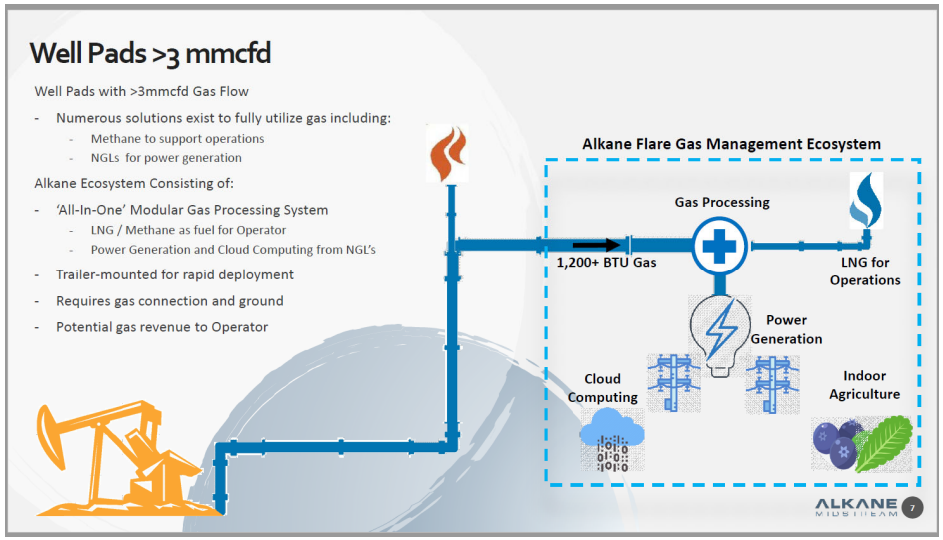
		Remote Monitoring  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 17.
15.	"A system according to claim 1, further comprising a natural gas processing system in communication with the electrical power generation system, the natural gas processing system adapted	Alkane's system includes *a natural gas processing system in communication with the electrical power generation system, the natural gas processing system adapted to process raw natural gas into the fuel gas*. The figures below from Alkane's October 6, 2020 presentation illustrate a "Gas Processing" sub-system (outlined in red) that sits between and is physically connected to the "Power Generation" sub-system. The figure illustrates that an incoming stream of raw natural gas flows through the Gas Processing sub-system and the output of the Gas Processing sub-system flows to the Power Generation sub-system. A person of ordinary skill in the art would understand that the output of the Gas Processing sub-system is a fuel gas stream, and thus that the Gas Processing sub-system processes raw natural gas into fuel gas that is delivered to the Power Generation sub-system. In light of the description in the '307 Patent's specification, a person of ordinary skill in the art would understand the Gas Processing sub-system and the Power Generation sub-system to be "in communication with" one another because they are physically connected such that a gas stream flows between them. For example, when describing the embodiment

	to process raw natural gas into the fuel gas."	illustrated in Figure 3, the patent states that the "power generation module 311" is "in communication with a gas supply line such that it may receive fuel gas 302 therefrom." *See* '307 Patent at 15:37-41.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 7.

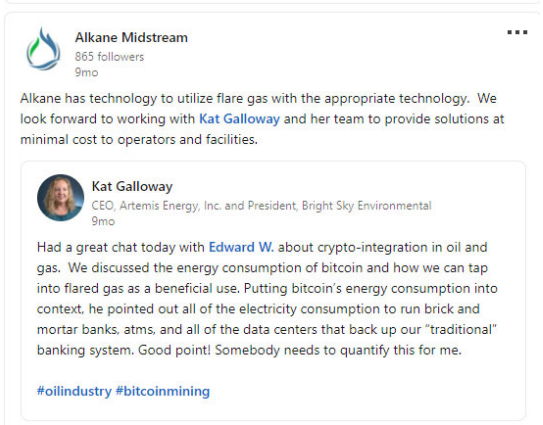
		 *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6.
16.	"A system according to claim 1, wherein the plurality of distributed computing units are adapted to mine a cryptocurrency."	The distributed computing units of Alkane's system *are adapted to mine a cryptocurrency*. The figures included below from Alkane's October 6, 2020 presentation illustrate that the distributed computing units of Alkane's system are used to perform computing operations relating to "Financial Transactions." Further, the inclusion of the Bitcoin logo in and around the illustration of the computing equipment used for "Financial Transactions" indicates that the operations performed by those distributed computing units involve cryptocurrency mining.



Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 6.

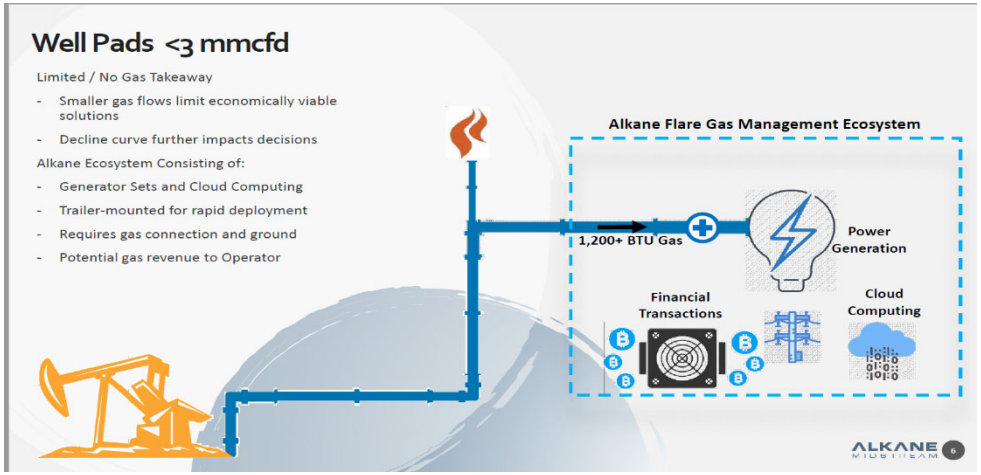


Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 7.

		In addition, a LinkedIn user posted in August 2022 about a conversation she had with an Alkane representative about Alkane's cryptocurrency mining capabilities.  Alkane Midstream, LinkedIn (last visited: Aug 3, 2022), available at: https://www.linkedin.com/company/alkane.

Claim	Claim Elements	Accused Product(s)
1	1(a): "A flare mitigation system comprising: an electrical power generation system comprising:"	Alkane has committed and continues to commit acts of infringement under 35 U.S.C. § 271 by making, using, selling, and offering to sell *a flare mitigation system*—which it refers to as a "Flare Gas Management" system—that includes *an electrical power generation system* that is comprised of one or more generators used to convert natural gas into electrical power, which is in turn used to power a distributed computing system. The below image is from the title slide of a presentation given by Alkane on October 6, 2020[1], in which Alkane described its Flare Gas Management system.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 1. The image below is a diagram from Alkane's October 6, 2020 presentation that depicts Alkane's Flare Gas Management system at a high-level. The figure illustrates flare gas moving from the wellhead into Alkane's Flare Gas Management system. The figure further illustrates a "Power Generation" sub-system, which is depicted by a lightbulb icon. The figure also illustrates the electrical power generated by the Power Generation sub-system being used to power a distributed computing system used to conduct computing operations relating to "Financial Transactions" or "Cloud Computing." A person of ordinary skill in the art would understand from this figure that the Power Generation sub-system in Alkane's Flare Gas Mitigation system includes one or more generators that convert the flare gas flowing from the wellhead into electrical power.

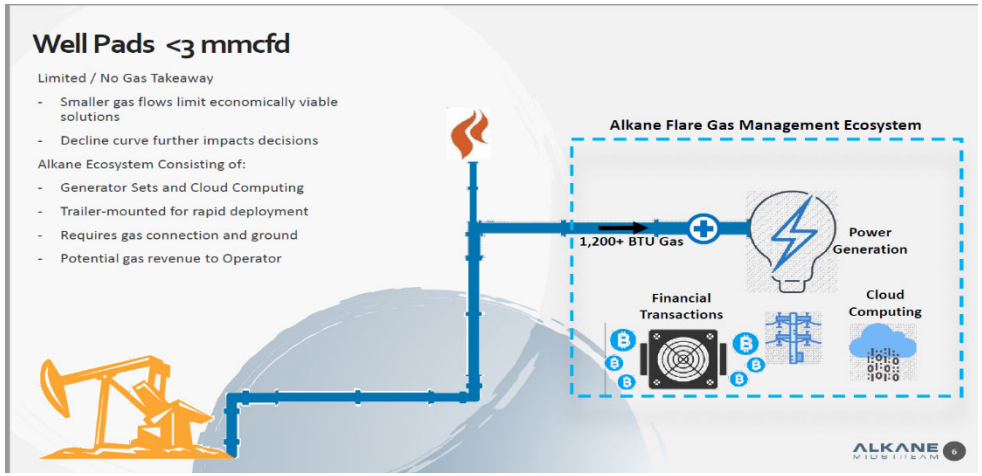
[1] The title slide of Alkane's "Flare Gas Management and LNG Distribution" presentation is dated October 5, 2020. As per the Energy Development and Transition Committee meeting minutes, the presentation was delivered on October 6, 2020. *See Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020). The presentation will be referred to herein according to the date the presentation was given.

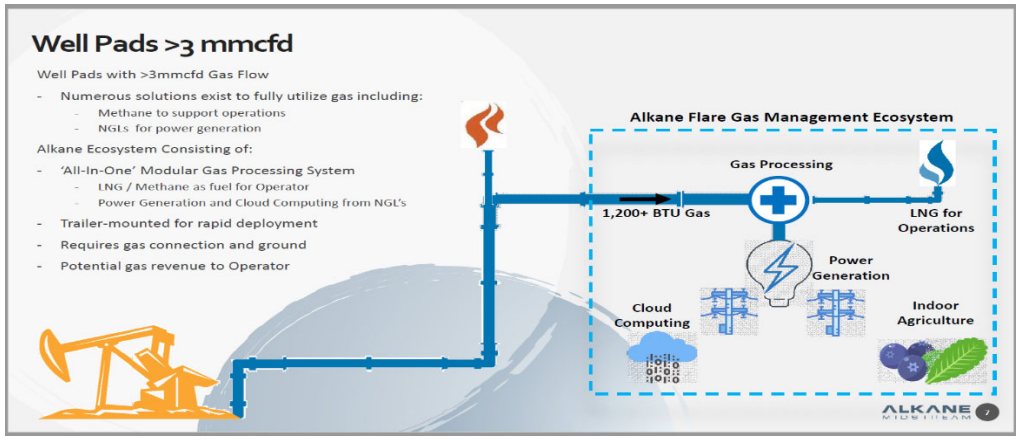


Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 6.

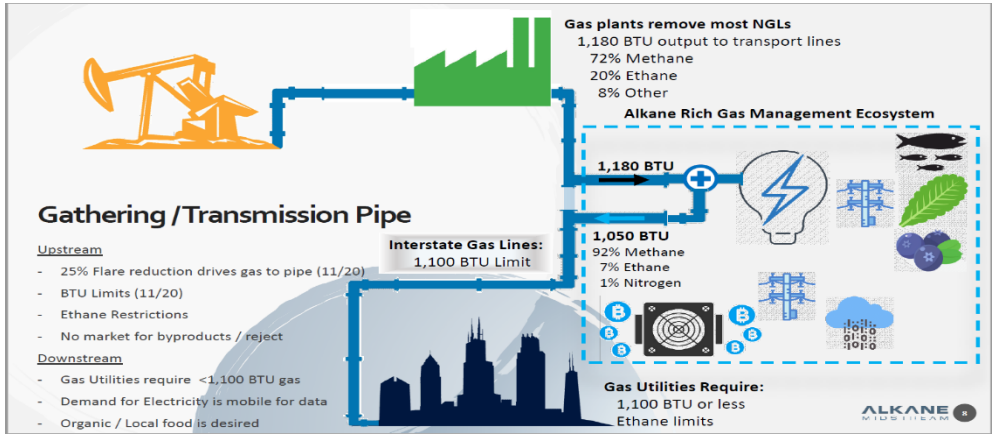
The photo below depicts a version of Alkane's Flare Gas Management systems installed at a site in Seminole, TX. As shown in this photo, the system includes one or more generators (red arrow) that are used to generate electrical power, which is in turn used to power a distributed computing system (red box).

		 Google Maps, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5Rok2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE
	1(b): "a power generation module adapted to:"	Alkane's system includes *a power generation module*. Specifically, as explained above with respect to element 1(a), Alkane's system includes multiple generators that are used to convert natural gas into electrical power.
	1(c): "receive a fuel gas stream comprising a fuel gas associated with a gas profile, the fuel gas	Each of the generators in Alkane's system *receives a fuel gas stream comprising a fuel gas associated with a gas profile, the fuel gas having a heat value of at least about 1,000 Btu/scf*. A person of ordinary skill in the art would understand the term *gas profile* to refer to the physical and chemical characteristics of the gas. Such characteristics would include, for example, the composition

	having a heat value of at least about 1,000 Btu/scf; and”	and the heat-value of the gas, among other things. Accordingly, a person of ordinary skill in the art would understand that any fuel gas has an associated gas profile. Indeed, the profile of a fuel gas is an inherent property of the gas mixture. As shown in the three figures below, natural gas with a heat value of at least 1,000 BTU/scf flows into the Power Generation sub-system, which—as explained above with respect to elements 1(a) and 1(b)—includes *a power generation module.* Specifically, the first two figures included below illustrate that natural gas with a heat value of “1,200+ BTU” flows into the Power Generation sub-system. Similarly, the third figure illustrates that natural gas with a heat value over 1,000 BTU—either 1,180 BTU or 1,050 VTU—flows into the Power Generation sub-system.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6.



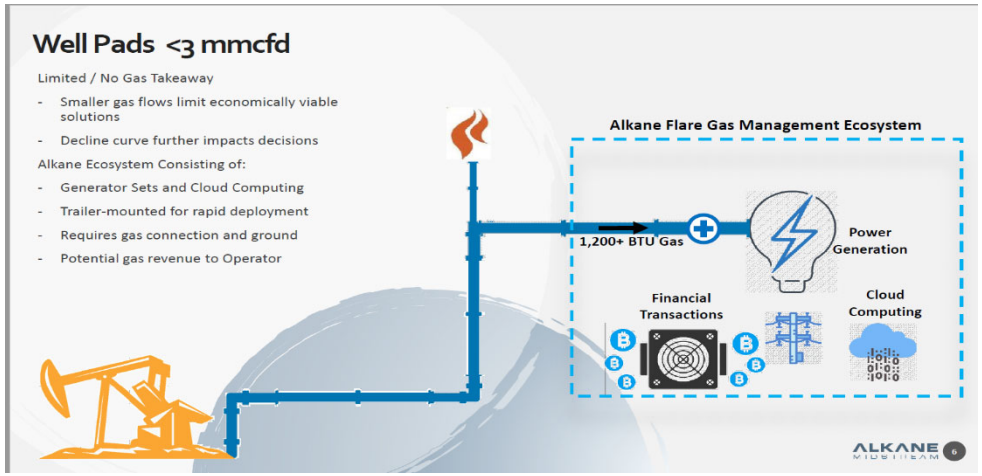
Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 7.



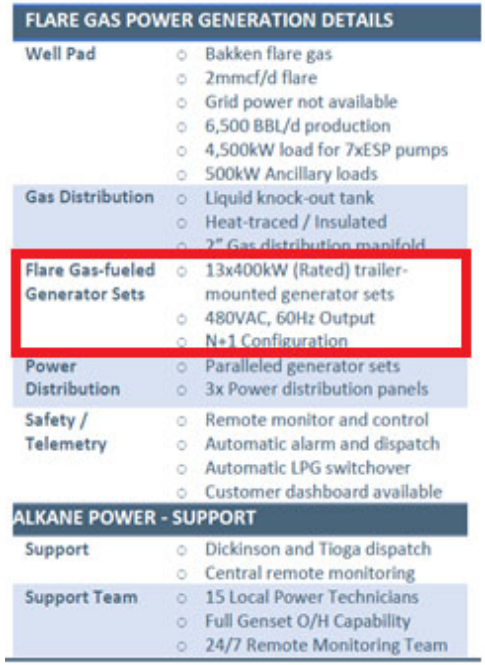
Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 8.

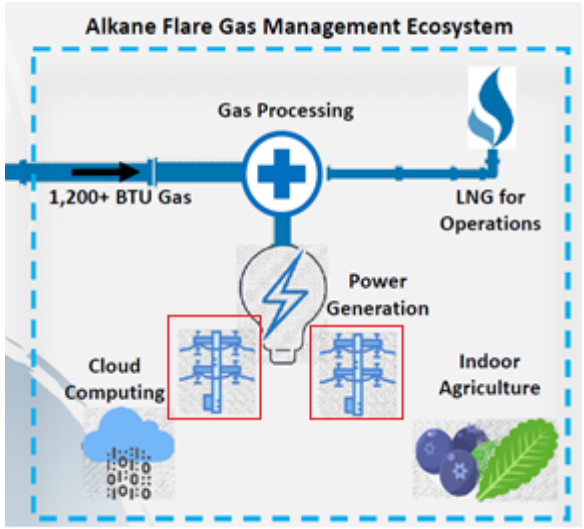
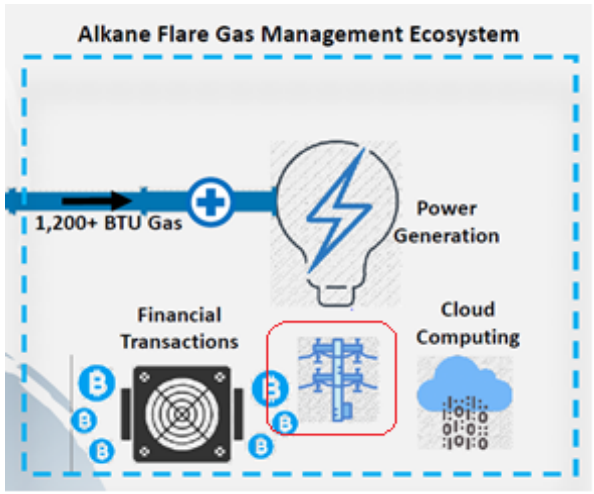
The photo included below depicts a version of Alkane's Flare Gas Management systems installed at a site in Seminole, TX. As shown in the photo, the system includes a fuel gas stream in the form of liquid natural gas or compressed natural gas (identified by the red arrow) that flows to one or more generators (identified by the red box).

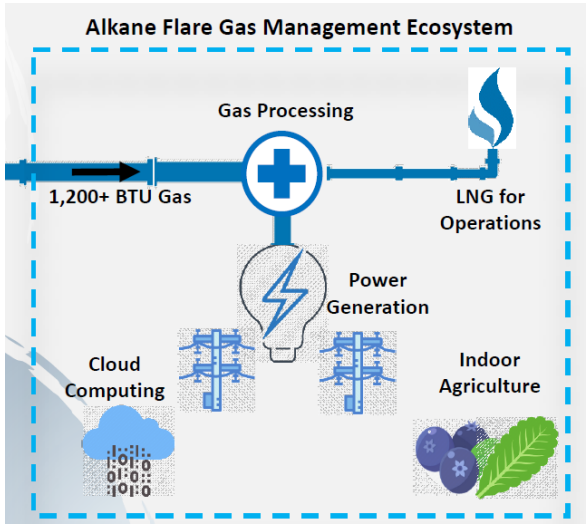
		 *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE

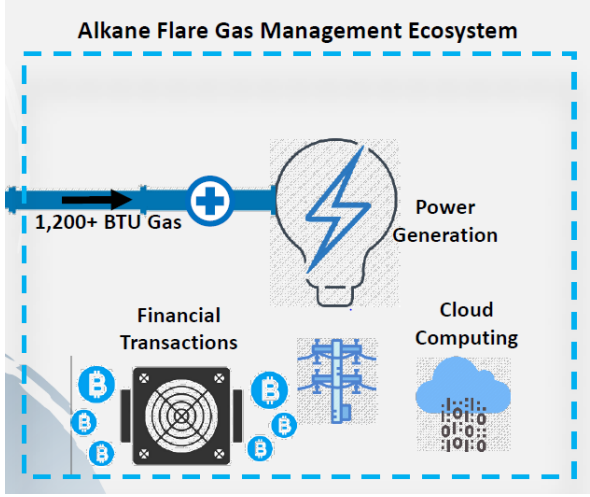
	1(d): "consume the fuel gas stream to generate a high-voltage electrical output associated with a first voltage; and"	Alkane's system uses generators that *consume the fuel gas* **stream** *to generate a high-voltage electrical output associated with a first voltage*. As explained above with respect to elements 1(a) and 1(b), the Power Generation sub-system of Alkane's system includes one or more generators that convert natural gas into electrical power, which is in turn used to power a distributed computing system. This is further illustrated in the figure included below, which depicts a fuel gas stream flowing into the Power Generation sub-system, which is then converted to electrical power that is output by the Power Generation sub-system. A person of ordinary skill in the art would understand from this figure that the Power Generation sub-system *consumes the fuel gas stream to generate* electrical power.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6. The photo included below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, depicts Taylor Power Systems® gas generators. According to the specification for these generators, they generate an electrical power output between 400-450 kW, though the specific output voltage depends on the configuration in which the generators are being operated. Alkane's product literature—an excerpt of which is also included below—indicates the generators used in Alkane's systems are configured to have an output volage of "480 VAC." This is consistent with what the specification of the '307 Patent describes as *a high-voltage electrical output associated with a first*

		voltage. Specifically, the specification describes "a high-voltage electrical output" as one that ranges "from about 70kW to about 2MW" and a "first voltage" associated with that output as one that ranges "from about 480 V to about 4.16 kV." *See* '307 Patent at 3:22-28. Thus, a person of ordinary skill in the art would understand the electrical output of the generators used by Alkane to be *a high-voltage electrical output associated with a first voltage*.  *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE

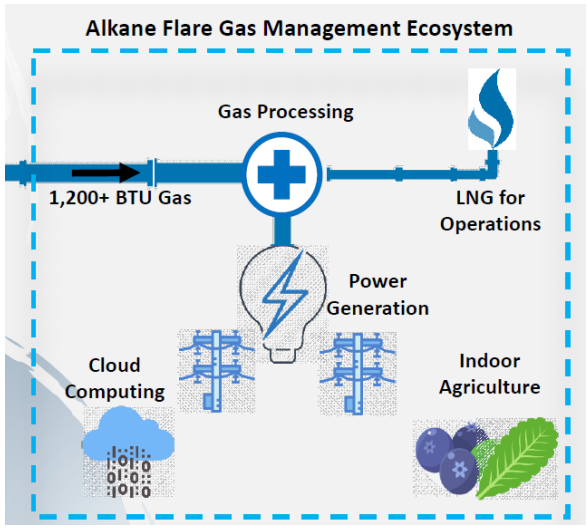
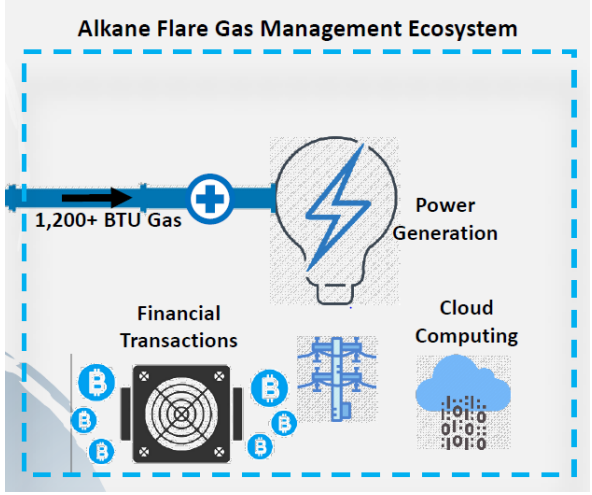
		 Alkane Midstream, Leaflet, *Power Profile Pad Power with Flare Gas*.
	1(e): "an electrical transformation module in electrical communication with the power generation module, the electrical transformation module adapted to: receive the high-voltage electrical output generated by the power generation module; and	Alkane's system includes *an electrical transformation module in electrical communication the power generation module*. As explained above with respect to element 1(a)-(d), Alkane's system includes a *power generation module*, which is labeled as the Power Generation sub-system in the figures from Alkane's October 6, 2020 presentation. The figures below from Alkane's October 6, 2020 presentation also illustrate a transformer (outlined in red) that sits between and is in communication with the "Power Generation" sub-system and the distributed computing system. The distributed computing system in these figures is illustrated as being used for "Financial Transactions" and "Cloud Computing."

	transform the high-voltage electrical output into a low-voltage electrical output associated with a second voltage that is lower than the first voltage;"	 *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 7.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6.

		A person of ordinary skill in the art would understand that a transformer (or equivalent component) must necessarily be included for the system to operate. As explained above with respect to element 1(d), Alkane's Power Generation sub-system includes one or more generators that generate an electrical output of 480 V. Passing a 480 V output directly to the distributed computing system would cause damage to the computing system. Thus, the electrical output of the Power Generation sub-system must first pass through a transformer to step-down the voltage to a level that can be used to power the distributed computing system.
	1(f): "a distributed computing system powered by the electrical power generation system, the distributed computing system comprising:"	Alkane's system includes *a distributed computing system powered by the electrical power generation system*. As explained above with respect to elements 1(a)-(d), Alkane's system includes a Power Generation sub-system that generates electrical power that is used to power a distributed computing system. The figures included below, which are excerpted from Alkane's October 6, 2020 presentation, illustrate both the Power Generation sub-system and the distributed computing system that it powers, which (in these figures) is used for computing operations relating to "Financial Transactions" and "Cloud Computing." 

		Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 7.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6. The photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, shows a distributed computing system (identified by a red arrow) in electrical connection with the Power Generation sub-system (identified by the red box). Indeed, there is no other observable mechanism or sub-system in this installation that could supply power to the distributed computing system.

		 *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE
	1(g): "a communications system comprising one or more data satellite antennas, the communications system adapted to	The distributed computing system in Alkane's system includes *a communications system comprising one or more data satellite antennas adapted to provide a network.* The figures included below from Alkane's October 6, 2020 presentation indicate that the distributed computing system included in Alkane's Flare Gas Management system is used to perform computing operations related to "Financial Transactions" and/or "Cloud Computing."

	provide a network; and”	 *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 7.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6. In order to perform such computing operations, the distributed computing system must necessarily include a communications system that connects the distributed computing system to a communications

		network.[2] Based on a review of Alkane's materials, most (if not all) of Alkane's systems are installed in remote locations where a broadband or other wired network connection would not be available. Thus, the communications system would require data satellite antennas or an equivalent thereto to establish a network connection. The photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, shows data satellite antennas or their equivalent (indicated by the red arrow).  *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE

[2] The figures illustrating Alkane's system link the "Financial Transactions" performed by the distributed computing system to Bitcoin mining because the Bitcoin logo is depicted around "Financial Transactions." The following two references state that Bitcoin mining operations require a network connection. *See* Satoshi Nakamoto, *Bitcoin: A Peer-to-Peer Electronic Cash System*, 2–4 (2008); Arvind Narayanan et al., *Bitcoin and Cryptocurrency Technologies*, Princeton University Press (forthcoming 2016) (manuscript at 8).

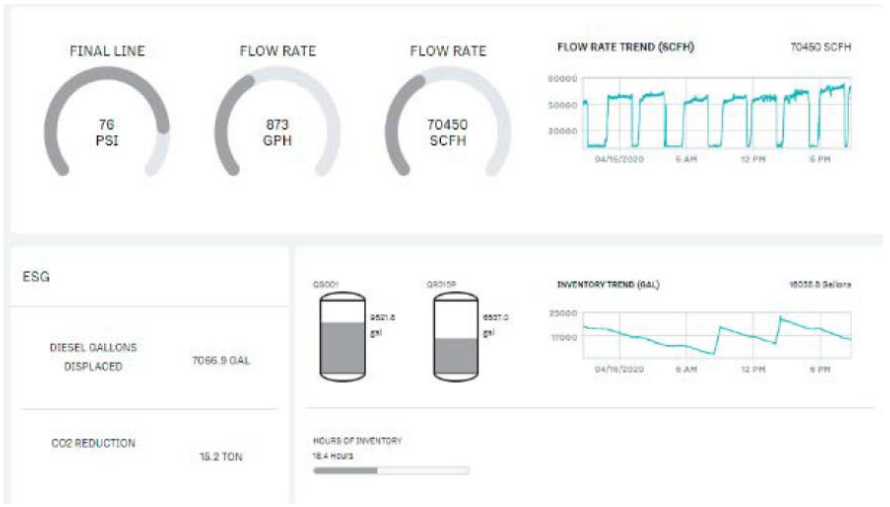
	1(h): "a first mobile data center comprising: an enclosure defining an interior space; a plurality of distributed computing units located within the interior space of the enclosure, each of the plurality of distributed computing units in communication with the network; and"	The distributed computing system of Alkane's system includes *a first mobile data center comprising: an enclosure defining an interior space* and *a plurality of distributed computing units located within the interior space of the enclosure, each of the plurality of distributed computing units in communication with the network.* As shown in the photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, the data centers in Alkane's systems are housed in shipping containers (identified by the red arrow). These containers are enclosures that define an interior space.  *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE As explained above with respect to elements 1(f)-(g), materials relating to Alkane's Flare Gas Management system indicate that the distributed computing system is used to perform computing

		operations related to Financial Transactions (such as Bitcoin mining) and Cloud Computing. Such operations would not be profitably performed with a single distributed computing unit, nor with a computing unit that has no network connection. Thus, Alkane's distributed computing system must necessarily include *a plurality of distributed computing units in communication with the network*.
	1(i): "a power system located at least partially within the interior space of the enclosure, the power system in electrical communication with the electrical transformation module and the plurality of distributed computing units such that the power system receives the low-voltage electrical output and powers each of the plurality of distributed computing units; and"	The first mobile data center of Alkane's system includes *a power system located at least partially within the interior space of the enclosure.* Further, the power system is (a) *in electrical communication with the electrical transformation module and the plurality of distributed computing units*, and (b) *receives the low-voltage electrical output and powers each of the plurality of distributed computing units*. As explained above with respect to element 1(e), Alkane's system includes a transformation module that steps-down the voltage of the high-voltage electrical output to a second, lower voltage that can be used to power the distributed computing system. In order to power the distributed computing units within the mobile data center, that transformer must necessarily be in electrical communication with a power system within the mobile data center such that it receives the low-voltage output from the transformer. The power system in the mobile data center must in turn be in electrical communication with the distributed computing units such that it powers each of the distributing computing units using the low-voltage electrical output from the transformer. If these components of the system are not in electrical communication with one another, the system would not function.
	1(j): "a monitoring and control system in communication with the electrical power generation system and the distributed	Alkane's system includes *a monitoring and control system in communication with the electrical power generation system and the distributed computing system via the network.* Alkane's product literature (excerpted below) demonstrates that Alkane's system includes remote monitoring and control capabilities. To enable ***remote*** monitoring and control, the monitoring and

	computing system via the network, the monitoring and control system adapted to:"	control system must be connected to a communications network, such as the one provided by the communications sub-system discussed above with respect to element 1(g). **FLARE GAS POWER GENERATION DETAILS** **Well Pad**: Bakken flare gas; 2mmcf/d flare; Grid power not available; 6,500 BBL/d production; 4,500kW load for 7xESP pumps; 500kW Ancillary loads **Gas Distribution**: Liquid knock-out tank; Heat-traced / Insulated; 2" Gas distribution manifold **Flare Gas-fueled Generator Sets**: 13x400kW (Rated) trailer-mounted generator sets; 480VAC, 60Hz Output; N+1 Configuration **Power Distribution**: Paralleled generator sets; 3x Power distribution panels **Safety / Telemetry**: Remote monitor and control; Automatic alarm and dispatch; Automatic LPG switchover; Customer dashboard available **ALKANE POWER - SUPPORT** **Support**: Dickinson and Tioga dispatch; Central remote monitoring **Support Team**: 15 Local Power Technicians; Full Genset O/H Capability; 24/7 Remote Monitoring Team *Alkane Midstream, Leaflet, Power Profile Pad Power with Flare Gas.*

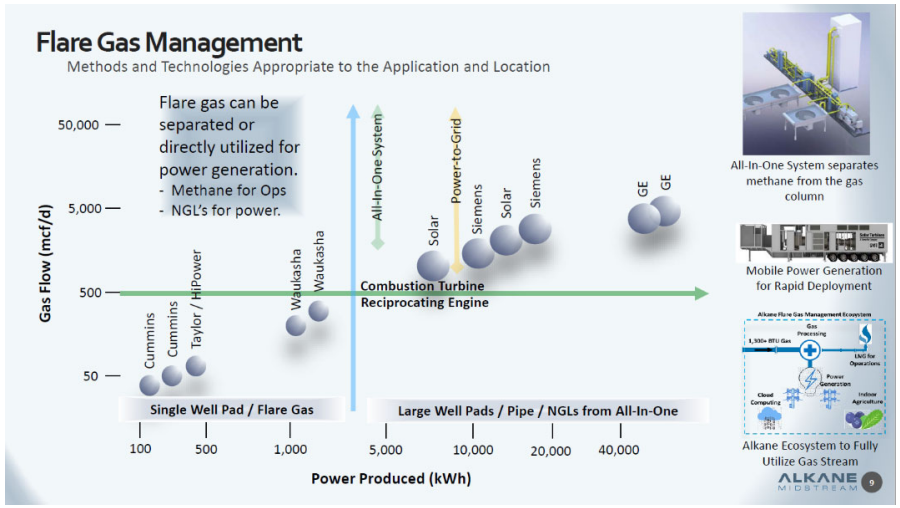


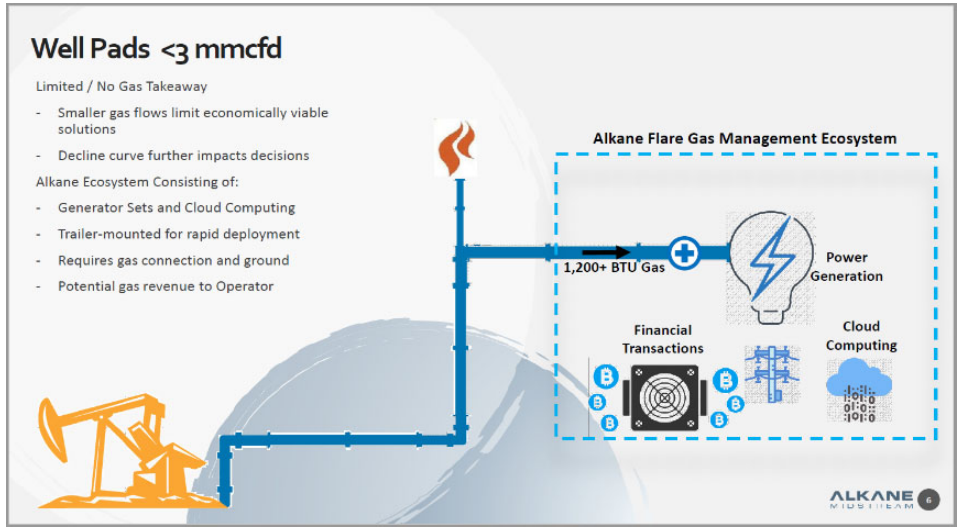
Alkane Midstream, Leaflet, Power Profile Pad Power with Flare Gas.

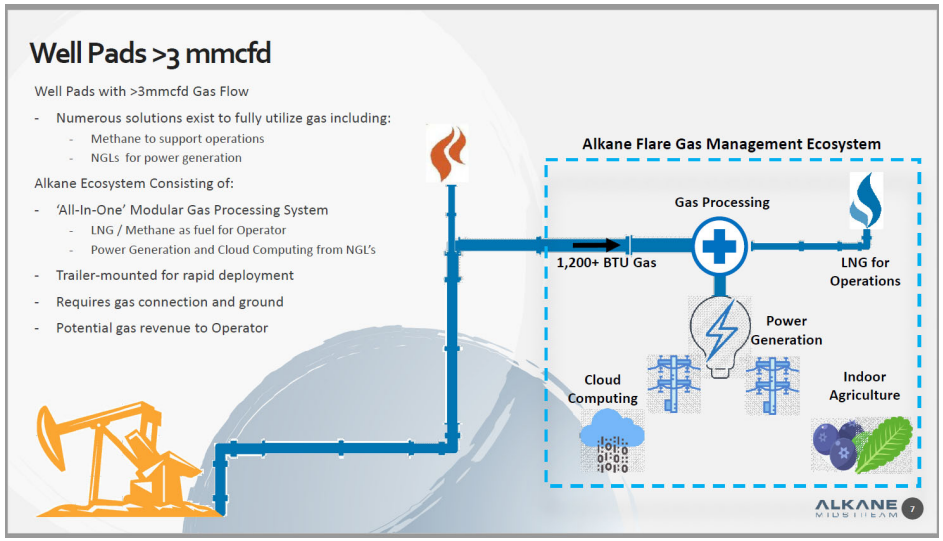
		Remote Monitoring  *Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 17.*
	1(k). "monitor the gas profile of the fuel gas received by the electrical power generation system; and upon determining a change in the gas profile, automatically modulate an electrical load of the distributed computing system."	The monitoring and control system is *adapted to: monitor the gas profile of the fuel gas received by the electrical power generation system, and upon determining a change in the gas profile automatically modulates an electrical load of the distributed computing system.* As explained above with respect to element 1(j), Alkane's system includes a monitoring and control system in communication with the electrical power generation system. And as explained above with respect to element 1(c), a person of ordinary skill in the art would understand the term *gas profile* to refer to the physical and chemical characteristics of the gas, including but not limited to the composition of the gas. A person having ordinary skill in the art would understand that it is necessary to monitor the gas profile of the flare gas stream, and in particular its composition, given that a flare gas stream's composition varies over time. A person of ordinary skill in the art would further understand that changes in the composition of the flare gas stream would require that the ability to modify one or more operational parameters of the system based on changes in the composition. Such operational parameters would include, among other things, the electrical load of the distributed computing system. In light of Alkane's disclosure (excerpted below) that its systems include a "remote monitor and control"

		capabilities, and Alkane's marketing of its systems as "turn-key fuel, power and stranded gas solutions" it is likely that modification of operational parameters—including modulating an electrical load of the distributed computing system—in response to changes in the gas profile would be automated. Alkane Midstream provides virtual pipeline solutions for natural gas in the Williston Basin. We provide turn-key fuel, power and stranded gas solutions, helping customers save money and increase production while reducing their environmental impact. Alkane Midstream, Leaflet, *Power Profile Pad Power with Flare Gas*.
2.	2(a): "A system according to claim 1, wherein: the power generation module comprises an engine-type generator;"	As explained above with respect to claim 1, Alkane's system includes multiple power generation modules (*i.e.*, generators). One or more of those generators is *an engine-type generator*. The photo below, which illustrates a version of Alkane's system installed at a site in Seminole, TX, depicts Taylor Power Systems® gas generators, which are engine-type generators.

		 *Google Maps*, June 2020 (last visited: Aug. 16, 2022), Alkane Midstream Seminole, TX (placed by owner), available at: https://www.google.com/maps/place/Alkane+Midstream/@32.6528598,-102.8162514,3a,75y,90t/data=!3m8!1e2!3m6!1sAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv!2e10!3e12!6shttps:%2F%2Flh5.googleusercontent.com%2Fp%2FAF1QipMZuo9AubVyF6n5RokTXcCUeicjX4KhAGfwpukv%3Dw203-h152-k-no!7i3968!8i2976!4m7!3m6!1s0x86fc899ec4647283:0xdcc54f7ac60124dd!8m2!3d32.6526757!4d-102.8162529!14m1!1BCgIgARICEAE Similarly, the figure below from Alkane's October 6, 2020 presentation indicates that the Taylor generators used in Alkane's system are engine-type generators. Specifically, the figure includes a green line running through the middle and a notation indicating that the generators below the line—such as the Taylor generators—are "reciprocating engine" generators, while those above the line are "combustion turbine" generators.

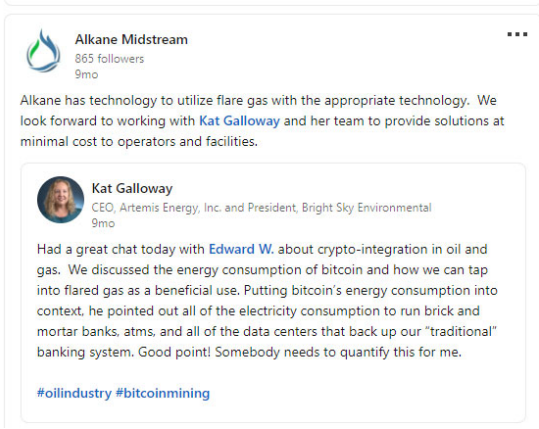
		 *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 9.
	2(b): "the high-voltage electrical output is from about 70 kW to about 2 MW; and the first voltage is from about 480 V to about 4.16 kV"	The *high-voltage electrical output generated by the engine-type generator* of Alkane's system *is from about 70kW to about 2MW, and the first voltage is from about 480V to about 4.16kV.* As explained above with respect to element 1(d), the generators used in Alkane's system generate an electrical output of 400-450 kW at a voltage of 480 VAC.
3.	"A system according to claim 2, wherein the second voltage is from about 208 V to about 240 V."	In Alkane's system, the second voltage (*i.e.*, the voltage associated with the electrical output from the transformation module) is *from about 208 V to about 240 V*. A person of skill in the art would understand the distributed computing units in Alkane's system to be standard, distributed computing units, which require an input voltage in the range of *from about 208 V to about 240 V*. Accordingly, the transformation module of Alkane's system, which steps-down the high-voltage output from the gas generators, would necessarily be within the range of about 208 V to about 240 V.

14.	" A system according to claim 1, wherein the plurality of distributed computing units are adapted to mine a cryptocurrency."	The distributed computing units of Alkane's system *are adapted to mine a cryptocurrency*. The figures included below from Alkane's October 6, 2020 presentation illustrate that the distributed computing units of Alkane's system are used to perform computing operations relating to "Financial Transactions." Further, the inclusion of the Bitcoin logo in and around the illustration of the computing equipment used for "Financial Transactions" indicates that the operations performed by those distributed computing units involve cryptocurrency mining.  *Energy Development and Transition Committee Meeting Minutes* (Oct 6, 2020), at app. D, slide 6.



Energy Development and Transition Committee Meeting Minutes (Oct 6, 2020), at app. D, slide 7.

In addition, a LinkedIn user posted in August 2022 about a conversation she had with an Alkane representative about Alkane's cryptocurrency mining capabilities.



		Alkane Midstream, LinkedIn (last visited: Aug 3, 2022), available at: https://www.linkedin.com/company/alkane.