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UNITED STATES SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

☒ ANNUAL REPORT UNDER SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the fiscal year ended December 31, 2021

or

☐ TRANSITION REPORT UNDER SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

For the transition period from _____ to _____

Commission File Number 0-29185

QS ENERGY, INC.
(Exact name of registrant as specified in its charter)

Nevada	**52-2088326**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

3606 Challenger Way, Unit#1
Carson City, Nevada 89706
(Address, including zip code, of principal executive offices)

(775) 300-7647
(Registrant's telephone number, including area code)

_____
(Former name, former address and former fiscal year, if changed since last report)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Name of each exchange on which registered
None	N/A

Securities registered pursuant to Section 12(g) of the Exchange Act: Common Stock, $0.001 par value.

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.
Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act.
Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.
Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).
Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer", "smaller reporting company", and "emerging growth company" in Rule 12b-2 of the Exchange Act. (Check one)

Large accelerated filer ☐	Accelerated filer ☐
Non-accelerated filer ☒	Smaller reporting company ☒
	Emerging growth company ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act).

Yes ☐ No ☒

The aggregate market value of the voting and non-voting common equity held by non-affiliates (excluding voting shares held by officers and directors) as of December 31, 2021 was $12,784,000.

The number of shares of the Registrant's Common Stock outstanding as of March 25, 2022 was 356,491,888.

DOCUMENTS INCORPORATED BY REFERENCE - None

Transitional Small Business Disclosure Format (Check one)

Yes ☐ No ☒

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PART I

Forward-Looking Statements

This Annual Report on Form 10-K contains forward-looking statements. These forward-looking statements include predictions and statements regarding our future:

- revenues and profits;
- customers;
- research and development expenses and efforts;
- scientific and other third-party test results;
- sales and marketing expenses and efforts;
- liquidity and sufficiency of existing cash;
- technology and products; and
- the effect of recent accounting pronouncements on our financial condition and results of operations.

You can identify these and other forward-looking statements by the use of words such as “may,” “will,” “expects,” “anticipates,” “believes,” “estimates,” “intends,” “project,” “potential,” “forecast” “continues,” “strategies,” or the negative of such terms, or other comparable terminology, and also include statements concerning plans, objectives, goals, strategies and future events or performance.

Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth below under the heading “Risk Factors.” We cannot assure you that we will achieve or accomplish our expectations, beliefs or projections. All forward-looking statements included in this document are based on information available to us on the date hereof. We assume no obligation to update any forward-looking statements.

Item 1. Business

The discussion of our business is as of the date of filing this report, unless otherwise indicated.

Overview

QS Energy, Inc. (“QS Energy” or “Company” or “we” or “us” or “our”) develops and seeks to commercialize energy efficiency technologies that assist in meeting increasing global energy demands, improving the economics of oil transport, and reducing greenhouse gas emissions. The Company's intellectual properties include a portfolio of domestic and international patents, a substantial portion of which have been developed in conjunction with and exclusively licensed by us from Temple University of Philadelphia, PA (“Temple”). QS Energy's primary technology is called Applied Oil Technology (AOT), a commercial-grade crude oil pipeline transportation flow-assurance product. Engineered specifically to reduce pipeline pressure loss, increase pipeline flow rate and capacity, and reduce shippers’ reliance on diluents and drag reducing agents to meet pipeline maximum viscosity requirements, AOT is a 100% solid-state system that in lab and other tests has shown to reduce crude oil viscosity by applying a high intensity electrical field to crude oil while in transit. AOT technology has shown to deliver reductions in crude oil viscosity and pipeline pressure loss as demonstrated in independent third-party tests performed by the U.S. Department of Energy, the PetroChina Pipeline R&D Center, and ATS RheoSystems, a division of CANNON™, at full-scale test facilities in the U.S. and China, and under commercial operating conditions on one of North America’s largest high-volume crude oil pipelines. Prior testing on a commercial crude oil condensate pipeline demonstrated high correlation between laboratory analysis and full-scale AOT operations under commercial operating conditions with onsite measurements and data collected by the pipeline operator on its supervisory control and data acquisition (“SCADA”) system. The AOT product is still in development and testing and has transitioned from laboratory testing to initial demonstration and continued testing in advance of our goal of seeking commercial acceptance and adoption by the upstream and midstream pipeline marketplace. We continue to devote the bulk of our efforts to the promotion, design, testing and the commercial manufacturing and test operations of our crude oil pipeline products in the upstream and midstream energy sector. Our efforts in the foregoing regard have been substantially hampered by our lack of capital. We should be able to continue our efforts to commercialize our AOT product during 2022 only if we are able to raise sufficient capital to do so. We can provide no assurances that we will be able to raise the capital we need to continue our efforts in 2022, or that any such capital will be available to us on acceptable terms and conditions.

Our Company was incorporated on February 18, 1998, as a Nevada Corporation under the name Mandalay Capital Corporation. The Company changed its name to Save the World Air, Inc. on February 11, 1999. Effective August 11, 2015, the Company changed its name to QS Energy, Inc. The name change was affected through a short-form merger pursuant to Section 92A.180 of the Nevada Revised Statutes. Additionally, QS Energy Pool, Inc., a California corporation, was formed as a wholly owned subsidiary of the Company on July 6, 2015 to serve as a vehicle for the Company to explore, review and consider acquisition opportunities. To date, QS Energy Pool has not entered into any acquisition transaction. However, the Company will still consider entering into potential beneficial acquisitions. The Company is considering dissolving QS Energy Pool to reduce costs associated with operating this subsidiary. The Company’s common stock is quoted under the symbol “QSEP” on the Over-the-Counter Bulletin Board (Pink Sheets).

More information including the Company’s updates, fact sheet, logos and media articles are available at our corporate website, www.qsenergy.com.

Between 2011 and 2012, the Company transitioned from prototype testing of its AOT technology at the U.S. Department of Energy Rocky Mountain Oilfield Testing Center, Midwest, Wyoming (“RMOTC”), to the design and production of full-scale commercial prototype units. The Company worked in a collaborative engineering environment with multiple energy industry companies to refine the AOT Midstream commercial design to comply with the stringent standards and qualification processes as dictated by independent engineering audit groups and North American industry regulatory bodies. In May 2013, the Company’s first commercial prototype unit known as AOT Midstream, was completed.

In 2013, the Company entered into an Equipment Lease/Option to Purchase Agreement (“TransCanada Lease”) with TransCanada Keystone Pipeline, L.P. by its agent TC Oil Pipeline Operations, Inc. ("TransCanada") which agreed to lease and test the effectiveness of the Company’s AOT technology and equipment on one of TransCanada’s operating pipelines. As previously reported in our 10-K report filed with the SEC on March 16, 2015, in June 2014, the equipment was accepted by TransCanada and the lease commenced and the first full test of the AOT equipment on the Keystone pipeline was performed in July 2014 by Dr. Rongjia Tao of Temple University, with subsequent testing performed by an independent laboratory, ATS RheoSystems, a division of CANNON™ (“ATS”) in September 2014. Upon review of the July 2014 test results and preliminary report by Dr. Tao, QS Energy and TransCanada mutually agreed that this initial test was flawed due to, among other factors, the short-term nature of the test, the inability to isolate certain independent pipeline operating factors such as fluctuations in upstream pump station pressures, and limitations of the AOT device to produce a sufficient electric field to optimize viscosity reduction. Subsequent testing by ATS in September 2014 demonstrated viscosity reductions of 8% to 23% depending on flow rates and crude oil types in transit. In its summary report, ATS concluded that i) data indicated a decrease in viscosity of crude oil flowing through the TransCanada pipeline due to AOT treatment of the crude oil; and ii) the power supply installed on our equipment would need to be increased to maximize reduction in viscosity and take full advantage of the AOT technology. More testing is required to establish the commercial efficacy

of our AOT technology. The TransCanada Lease was terminated by TransCanada, effective October 15, 2014. Upon termination of the TransCanada Lease, all equipment was uninstalled, returned, inspected and configured for re-deployment.

On July 15, 2014, the Company entered into an Equipment Lease/Option to Purchase Agreement ("Kinder Morgan Lease") with Kinder Morgan Crude & Condensate, LLC ("Kinder Morgan") under which Kinder Morgan agreed to lease and test the effectiveness of the Company's AOT technology and equipment on one of Kinder Morgan's operating crude oil condensate pipelines. Equipment provided under the Lease included a single AOT Midstream pressure vessel with a maximum flow capacity of 5,000 gallons per minute. The equipment was delivered to Kinder Morgan in December 2014 and installed in March 2015. In April 2015, during pre-start testing, low electrical impedance was measured in the unit, indicating an electrical short. A replacement unit was installed May 2015. The second unit also presented with low impedance when flooded with crude condensate from Kinder Morgan's pipeline. Subsequent to design modifications, a remanufactured AOT unit was installed and tested at Kinder Morgan's pipeline facility in August 2015. Initial results were promising, with the unit operating generally as expected. However, voltage dropped as preliminary tests continued, indicating decreased impedance within the AOT pressure vessel. QS Energy personnel and outside consultants performed a series of troubleshooting assessments and determined that, despite modifications made to the AOT, conductive materials present in the crude oil condensate appeared to be the root cause of the decreased impedance. Based on these results, QS Energy and Kinder Morgan personnel mutually agreed to put a hold on final acceptance of equipment under the lease and suspended in-field testing to provide time to re-test crude oil condensate in a laboratory setting, and thoroughly review and test selected AOT component design and fabrication. Subsequent analysis and testing led to changes in electrical insulation, inlet flow improvements and other component modifications. These design changes were implemented and tested by Industrial Screen and Maintenance (ISM), one of QS Energy's supply chain partners in Casper, Wyoming. Tests performed by ISM at its Wyoming facility indicated significant improvements to system impedance and efficiency of electric field generation.

In February 2016, the modified AOT equipment was installed at Kinder Morgan's facility. Pre-acceptance testing was performed in April 2016, culminating in more than 24 hours of continuous operations. In-field viscosity measurements and pipeline data collected during this test indicated the AOT equipment operated as expected, demonstrating viscosity reductions equivalent to those measured under laboratory conditions. Supervisory Control And Data Acquisition ("SCADA") pipeline operating data collected by Kinder Morgan during this test indicated a pipeline pressure drop reduction consistent with expectations. Results of this test were promising; however, due to the short duration of the test and limited data collection, definitive conclusions regarding the AOT performance and its impact on pipeline operations could not be reached. Based on final analysis of in-field test results, SCADA operating data and subsequent analysis of crude oil condensate samples at Temple University, it became unlikely Kinder Morgan would use the AOT at the original test location or other condensate pipeline. Kinder Morgan expressed interest in AOT operations at one of their heavy crude pipeline locations subject to results of other AOT demonstration projects and provided the Company with additional crude oil samples which have been tested at Temple University for future test correlation and operational planning purposes. The Kinder Morgan Lease is currently in suspension and there are no current plans to resume the lease or reinstall an AOT device at a Kinder Morgan facility.

Southern Research Institute (SRI) was engaged by QS Energy in 2015 to investigate the root cause of the crude oil condensate impedance issue by replicating conditions experienced in the field utilizing a laboratory-scaled version of the AOT and crude oil condensate samples provided by Kinder Morgan. In addition, QS Energy retained an industry expert petroleum pipeline engineer to review the AOT design and suggest design modifications to resolve the crude oil condensate impedance issue. This engineer has studied design details, staff reports and forensic photographs of each relevant AOT installation and test. Based on these investigations, specific modifications were proposed to resolve the impedance issue, and improve the overall efficiency of the AOT device, resulting in a new value-engineered design of certain AOT internal components.

During the third quarter 2016, the Company developed an onsite testing program to demonstrate AOT viscosity reduction at prospective customer sites. This program utilized a laboratory-scale AOT device designed and developed by the Company and tested at the Southern Research Institute. Under this program, Company engineers set up a temporary lab at the customer's site to test a full range of crude oils. Fees charged for providing this service were dependent on scope of services, crude oil sample to be tested, and onsite time requirements. In the fourth quarter 2016, the Company entered a contract to provide these onsite testing services to a North American oil producer and pipeline operator over a one-week period in early 2017 at a fixed price of $50,000. This test was performed in January 2017; data analysis and final report was completed in March 2017. Test results demonstrated viscosity reduction under limited laboratory conditions. The oil producer requested access to observe a full-scale demonstration facility and view operating data when they become available.

In 2014, the Company began development of a new suite of products based around the new electrical heat system which reduces oil viscosity through a process known as joule heat ("Joule Heat"). The Company built and tested its first Joule Heat prototype in June 2015. The system was operational; however, changes to the prototype configuration would be required to determine commercial effectiveness of this unit. In December 2015, we suspended Joule Heat development activities to focus Company resources on finalizing commercial development of the AOT. We may resume Joule Heat development in the future depending on the availability of sufficient capital and other resources.

In July 2017, the Company filed for trademark protection for the word “eDiluent” in advance of rolling out a new marketing and revenue strategy based on the concept of using AOT to reduce pipeline dependence upon diluent to reduce viscosity of crude oils. A primary function of AOT is to reduce viscosity by means of its solid-state electronics technology, in essence providing an electronic form of diluent, or “eDiluent”. Subject to successful testing of our AOT technology and sufficient the availability of operating capital, the Company plans to market and sell a value-added service under the name eDiluent, designed to be upsold by the Company’s midstream pipeline customers in an effort to provide the Company with long-term recurring revenues.

During the third quarter 2017, the Company built a dedicated laboratory space at its then Tomball, Texas facility, providing onsite testing utilizing our laboratory-scale AOT device, among other equipment. Development of an AOT unit for use in crude oil upstream and gathering operations was restarted in September 2017, utilizing resources at the Tomball, Texas facility. Also, during the third quarter 2017, the Company built an outdoor facility at the Tomball, Texas site for onsite storage of AOT inventory and other large equipment.

Throughout 2018 our primary strategic goal was focused on installing and operating a demonstration AOT project on a commercial crude oil pipeline. Much of our time was spent meeting with industry executives and engineers in North and South America and working with local representatives in the Asian and the Middle Eastern markets. In December 2018, we reached mutual agreement with a major U.S.-based pipeline operator on a demonstration project under which we would install and operate our AOT equipment on a crude oil pipeline located in the Southern United States. We believed at the time that the selected project site would be ideal for demonstration purposes, delivering heavy crudes which, based on samples tested at Temple University, and, subject to the discussion below, would experience significant viscosity reduction when treated with our AOT technology.

While management focused on finding a partner and finalizing terms of the demonstration project, and in our continuing efforts to commercialize our AOT technology, our engineering team worked throughout 2018 to prepare one of our inventoried AOT units for deployment. All system upgrade, inspections and testing protocols were completed in December 2018. The pipeline operator finalized site selection and began site design and engineering in January 2019, completing site preparation and equipment installation in June 2019. The project was installed within budget, quality compliant, and without safety incidents. The system passed the pre-start safety review, data acquisition signal verifications, and mechanical inspections. Under full crude oil flow, the system was confirmed to have no leaks and no environmental issues were noted. Data collected during the full-flow startup phase confirmed internal differential pressures to be negligible and consistent with design specifications. However, when the system was energized, and the unit was run-up to high-voltage operations, the primary power supply began to operate erratically and had to be taken offline. Subsequent inspection determined the primary power supply had failed.

After removing the primary power supply, our engineers reconfigured the system to run off a smaller secondary power supply. Although this unit was not capable of achieving target treatment voltage, we performed limited testing and troubleshooting measures, after which the damaged power supply was shipped to the manufacturer for expedited repair and reconditioning. Inspections performed during the repair process indicated internal power supply components had been physically damaged. Though not definitive, it appears that damage may have occurred during transit prior to initial installation at the demonstration site. While the demonstration project was offline for power supply repairs, our engineering team worked with oil samples pulled from the operating pipeline for testing at our then Tomball laboratory facility. These tests were designed to confirm our target power requirements as accurately as possible and help us fine-tune enhancements planned for a new optimized AOT internal grid pack design we had planned to test at the demonstration site as part of our continuing value engineering effort.

During initial testing with the small power supply, current draw was greater than prior field deployments. While it was expected that the small power supply would not achieve treatment voltage, as voltage was increased, actual current draw experienced under test conditions exceeded the operating limit of the power supply. Subsequent laboratory and in-field testing performed at our then Tomball facility showed the electrical conductivity of the oil to be quite high and in line with field observations. Although these tests indicated the unit was generally functioning properly, results further indicated the damaged power supply, once repaired, would not be capable of providing sufficient power to fully treat the crude oil due to the oil’s high electrical conductivity. In anticipation of this result, the Company initiated in advance of testing parallel tasks of: i) installation of the repaired power supply to perform limited testing to confirm laboratory and in-field test results; and ii) procurement of a new power supply capable of providing significantly more power and a modified AOT grid pack assembly reconfigured and generally optimized based on the latest laboratory and in-field test results.

When the repaired power supply was installed in late August 2019, the system operated as expected, and limited testing was performed at that time. Results of this limited testing were consistent with laboratory tests performed to date. As expected, the repaired power supply was not capable of providing sufficient power to fully treat the crude oil under commercial operating conditions. Based on results of this limited testing, Company engineers completed designs and began implementation of modifications to the AOT internal grid pack assembly.

The new high capacity power supply and modified grid pack were installed in December 2019. However, prior to flooding the system with crude oil, early-phase startup testing indicated an electrical short circuit. Subsequent inspection revealed damage to the internal grid pack which likely occurred during installation. The grid pack was shipped offsite for repairs with reinstallation scheduled for January 2020.

The AOT demonstration project continued to experience setbacks during the first quarter of 2020. After repairing and re-installing the modified grid pack, the system shut down again during commissioning presenting with error conditions similar to the December 2019 failure. At that time, based on external inspections and on-site testing, our engineers suspected the grid pack had again been damaged during re-installation and that such suspected damage was the most likely cause of the electrical short circuit. It was determined at that time the best course of action would be to remove the modified grid pack and re-install the original grid pack which had previously been installed multiple times without sustaining damage, and perform a detailed inspection of the modified grid pack in an effort to determine the cause of the electrical short circuit.

Executing this plan, our team removed the modified grid pack and re-installed the original grid pack assembly in the AOT in January 2020. After removal, our engineers performed a detailed inspection of the modified grid pack. Inconsistent with expectations, no damage to the modified grid pack was found during this inspection, leaving the cause of the electrical short circuit undiagnosed.

In January and February 2020, our engineers tested and attempted to operate the AOT under a variety of conditions. In these tests, the system could be run at high voltage, but not high enough for treatment with the installed grid pack, under static “shut-in” conditions; however, the system continued to shut down due to an electrical short circuit when operated under pressure. In simple terms, this means the system could be flooded with crude oil and powered up in excess of 10,000 volts when the system was shut-in by closing the intake and outtake valves which isolates the system from the pipeline’s operating pressure. However, once the valves were opened and the system was subjected to the pipeline’s operating pressure, the system developed an electrical short circuit and shut down.

As the presence of high pressure appears to trigger the short circuit, it was the belief of our engineers that it is unlikely the fault is in the grid pack assembly as this component is fully submerged in crude oil and is generally subjected to equal pressure on all components. The electrical short is more likely developing in the electrical connection assembly built into the blind flange at the top of the pressure vessel, which is subjected to high pressure under normal operating conditions. Unfortunately, this electrical connection assembly could not be inspected without destroying the assembly itself. Instead, our engineers developed a plan to replace the installed blind flange and electrical connection assembly with components from inventory which would be rebuilt prior to installation.

As part of an ongoing reliability-engineering effort, our engineers at that time worked on incremental modifications to improve electrical isolation within the blind flange and electrical connection assembly. These previously developed plans allowed us to move quickly with vendors and present an expedited plan to the pipeline operator. In March 2020, our engineers designed modifications to the blind flange, electrical connections and related housing intended to minimize the effects of high pressure and likelihood of internal electrical short circuits. Concurrently, a blind flange with high voltage assembly was shipped from inventory to a shop with specialized equipment used to strip the flange of all electrical insulation materials. Once the stripping process was complete, castings were made to complete the internal assembly. Our engineers believed at the time that this modification could solve the electrical short issue we have experienced in prior tests.

While the blind flange assembly was being remanufactured, we took the opportunity to implement a number of relatively minor modifications to other system configurations which had been planned for future units based on results of our engineering team’s reliability engineering work over the past two years. These modifications were designed to improve the reliability of internal electrical connections, increase the structural support of the internal grid pack, and maintain higher quality control over internal component positioning and alignment during vertical installation.

Notwithstanding our efforts, the AOT system continues to be non-operational under normal operating conditions. As reported in previous updates on our website at https://qsenergy.com/updates and in our Form 8-K filed with the SEC on March 4, 2020, the AOT system experienced shutdowns during the commissioning process. In December 2019, after installing a modified grid pack and new high-capacity power supply, the system shut down presenting with an electrical short which was determined to be due to damage to the system’s internal grid pack likely incurred during installation. After repairing and re-installing the modified grid pack in January 2020, the system shut down again during commissioning presenting with error conditions similar to the December 2019 failure. At that time, based on external inspections and on-site testing, our engineers suspected the grid pack had again been damaged during re-installation and that such suspected damage was the most likely cause of the electrical short circuit. As reported in our January 24, 2020 website update page, it was determined at that time the best course of action would be to remove the modified grid pack and re-install the original grid pack which had previously been installed multiple times without sustaining damage, and perform a detailed inspection of the modified grid pack in an effort to determine the cause of the electrical short circuit.

Executing on this plan, our team removed the modified grid pack and re-installed the original grid pack assembly in the AOT. After removal, our engineers performed a detailed inspection of the modified grid pack. Inconsistent with our expectations, no damage to the modified grid pack was found during this inspection, leaving the cause of the most recent electrical short circuit undiagnosed.

We have tested and attempted to operate the AOT under a variety of conditions. We have been able to bring the system up to high voltage under static "shut-in" conditions; however, as reported above, the system continued to shut down due to an electrical short circuit when operated under pressure. In simple terms, as also reported above, this means we can flood the system with crude oil, shut-in the system by closing the intake and outtake valves isolating the system from the pipeline's operating pressure, and power up the system in excess of 10,000 volts. Once the valves are opened and the system is subjected to the pipeline's operating pressure, the system develops an electrical short circuit and shuts down. Because of our inability to fully diagnose the cause of our current electrical problems, we can provide no assurances that we will not face other operational issues after completing a full diagnosis and evaluation of our technology.

As previously reported, in December 2018, we entered into an agreement with a major U.S.-based pipeline operator under which the Company installed its AOT equipment on a crude oil pipeline located in the Southern United States for testing and demonstration purposes. Based on laboratory tests and operations of prototype equipment at other locations, we had a reasonable expectation that the equipment would operate successfully and that test results would demonstrate quantifiable benefits to pipeline operators. This has not occurred.

As reported in the Company's Form 10-K and Form 10-Q filed with the SEC on March 31, 2020 and June 29, 2020, respectively, and in website updates published on the Company's website at https://qsenergy.com/updates, the Company has experienced a number of difficulties and delays at the demonstration site. Despite identifying and implementing numerous design modifications over the past several months, the Company has been unable to successfully operate its AOT equipment.

In late June 2020, equipment modifications intended to mitigate electrical short circuit issues identified in earlier tests were completed. During startup testing, the system experienced a new failure mode in which the system could be operated at a baseline high voltage (well below operational voltage required to treat heavy crude), but after a period of time, the system would drop to very low voltage indicating a reduction in electrical resistance in the AOT. This voltage drop was both dynamic, developing over time as electrical current was applied; and transient, in that the power supply could be shut-down and re-started with this voltage drop characteristic repeating. After reviewing these results and running subsequent in-field tests at the direction of the power supply manufacturer, they recommended a configuration modification to the control module of the system's high-voltage power supply which, in their experience, could resolve the system's ability to maintain constant voltage under our unique operating conditions in which the AOT essentially acts as a very large capacitor. During the first week of July 2020, we modified the power supply control module at the direction of the power supply manufacturer. Though this modification did appear to solve the voltage drop issue, the AOT could not achieve operational voltage as the system control module indicated arc-faults when high voltage was applied above the baseline voltage levels. After many attempts to bring the system up to operating voltage, arc-faults continued until the AOT demonstrated symptoms of what appeared to be a dead short (electrical short-to-ground; voltage dropped to zero) and the system could no longer be re-started.

Our engineers have working concepts as to what may be causing this most recent failure but will not be able to fully diagnose these issues at the demonstration site. After discussions with our demonstration pipeline partner, it has been mutually agreed that the best course of action will be to move the equipment from the demonstration site to another location where our engineers could disassemble and inspect the equipment. Our AOT equipment has been moved to storage, inspection, and testing sites in the state of Mississippi and in Tomball, Texas. Our former demonstration partner has indicated their continued interest in our AOT technology and may consider installation and operation of a new AOT demonstration project if our operational issues can be resolved.

Though our engineers have working concepts as to what may be causing the most recent voltage drop and arc-fault issues, it is unknown whether these issues can be solved with minor modifications to the current design. To fully diagnose and resolve these issues, new testing would likely need to be performed in a laboratory setting. The time and cost of implementing such a plan would likely be significant. The Company does not currently have sufficient capital to take on this endeavor. We shut down all testing of our AOT product in July 2020, due to a lack of operating capital, except we received limited capital in 2021, allowing us to commence some additional testing of our AOT product.

Following our receipt of such limited capital, our engineer commenced re-testing operations in June 2021. Our engineer has reported that the AOT has been unloaded and the electrical connection has been ordered. The unit will undergo testing to try and duplicate the electrical short condition experienced at the test site. After initial testing, a troubleshooting sequence will be performed to attempt to identify the location of the short. If an electrical short can be found based on our hypothesis, we intend to resolve it. If the electrical short cannot be found the AOT will be disassembled and tested in pieces, assuming we are able to raise sufficient capital to do so. Additionally, laboratory materials testing of the electrical insulation will be initiated. Measurement of the electrical properties of both newly cast and material both exposed and submerged in fluid will be done to determine if the resin remains our material of choice. Our engineer reports that he is expecting to visit the AOT in July 2021 to inspect all the connections and conduct initial testing while the AOT is empty. He further reports that lab test fixtures are being designed and initial designs could be available for review in August 2021. Because of our inability fully to diagnose the cause of our current electrical problems, we can provide no assurances that we will not face other operational issues after completing a full diagnosis and evaluation of our technology, requiring additional capital, which, as pointed out, may not be available to us.

Additionally, if we are able to raise sufficient capital we would also consider designing, testing and commercializing a smaller scale AOT unit targeting upstream, trucking and rail applications. This strategy could reduce development time and costs, with the intention of moving back into the midstream crude oil pipeline market subsequent to successful commercial operations at a smaller scale.

The Company currently has limited capital resources and will need to raise substantial capital to continue operations. We are considering all options but can provide no assurances that additional capital will be available to us, or if it is, that such additional capital will be offered at acceptable terms, nor can we provide any assurances that if capital would be available to us on acceptable terms, any redesign and testing of our AOT equipment would prove successful.

Assuming the corrective actions discussed above are achieved, our plans moving forward are centered on achieving commercial adoption of our AOT device. Assuming successful operations, we believe the AOT project should provide data requested by prospective customers such as real-time changes in viscosity, pipeline pressure drop reduction and increases in pipeline operating flowrates. All collected data at the AOT demonstration site will be normalized such that it can be used to evaluate the financial and operational benefits across a wide range of commercial operating scenarios without disclosing confidential details of our demonstration partner’s operations. We believe that real-world data from our AOT project may be used to accelerate our desire to achieve commercial adoption of our AOT technology, positioning us to re-engage with industry executives.

The results of the electrical testing of the insulating material showed that the material is functioning as designed. However, during the testing it was discovered that the material swells when exposed to crude oil. The current design does not accommodate a change in size of the parts. New materials were sourced and tested as potential replacements. A couple of new materials have been found that offer improved stability when submerged in crude oil for extended periods of time. To expedite the search several materials tested were purchased of the shelf while working with our vendors to source new commercial materials. The data has been shared with our vendors and they are working on providing us with samples of commercial versions of the promising materials.

We have also validated that a new design concept for the grid pack will reduce arcing and allowed us to apply full voltage during a recent test. A 3rd party engineering firm with proper experience and three-dimensional modeling software was engaged. A design review has been completed and final drawings have been received. Drawings have been sent to our vendors for review and pending no issues the ordering process for prototype parts, for fit and electrical testing, should commence at some point during fiscal year 2022.

QS Energy is working to maintain normal operations during the current COVID-19 pandemic under social distancing and shelter-in-place guidelines as recommended or required by the CDC, federal, state and county government agencies. Over the past few years, the Company moved much of its operations to the cloud. Our employees can perform most vital functions remotely. Currently, most day-to-day operations have been minimally impacted by COVID-19.

It is unclear, however, what impact COVID-19 may have on our supply chain, or on our ability to operate and test our AOT technology. As of the date of this report, few suppliers related to our testing efforts have announced reduced operating capacity or advised us of delays related to COVID-19 restrictions; furthermore, we have not been made aware of any COVID-19 restrictions at that would impact our ability to restart our onsite testing activities.

COVID-19 has had a significant negative financial impact across a wide spectrum of industries, both in terms of operations and access to operating capital. The Company's ability to continue operations is, in part, dependent on our access to funding. A published by the National Association of Manufacturers in March 2020 reports that due to COVID-19, 35% of manufacturers surveyed anticipate supply chain disruptions, 53% anticipate changes to operations, and 78% anticipate a negative financial impact. With these facts in mind, no assurances can be made that COVID-19 will not affect our supply chain, will not negatively affect access or operating restrictions on our AOT technology, or negatively impact our ability to fund continued operations.

Our expenses to date have been funded through the sale of shares of common stock and convertible debt, as well as proceeds from the exercise of stock purchase warrants and options. We will need to raise substantial additional capital through 2022, and beyond, to fund work on our AOT, our sales and marketing efforts, continuing research and development, and certain other expenses, including without limitation, legal and accounting expenses, until we are able to achieve a revenue base. We can provide no assurances that additional capital will be available to us, or if it is, that such additional capital will be offered at acceptable terms. Please see note 12 (Subsequent Events) of our Consolidated Financial Statements, attached hereto.

There are significant risks associated with our business, our Company and our stock. See "Risk Factors," below.

Our Business Strategy

Assuming we are able to raise sufficient capital, we intend to continue to seek commercialization and marketing of our current technologies. Our current and primary product portfolio is dedicated to the crude oil production and transportation marketplace, with a specifically targeted product offering for enhancing the flow-assurance parameters of new and existing pipeline gathering and transmission systems.

Our primary goal is to provide the oil industry with a cost-effective method by which to increase the number of barrels of oil able to be transported per day through the industry's existing and newly built pipelines. The greatest impact on oil transport volume may be realized through reductions in pipeline operator reliance on diluent for viscosity reduction utilizing AOT technology; a process the Company refers to as electronic diluent, or "eDiluent". The Company filed for trademark protection of the term eDiluent in 2017. We also seek to provide the oil industry with a way to reduce emissions from operating equipment. We believe our goals are realizable via viscosity reduction using our AOT product line.

We believe QS Energy's technologies will enable the petroleum industry to gain key value advantages boosting profit, while satisfying the needs of regulatory bodies at the same time. Key players in the pipeline industry continue to demonstrate interest in our technologies.

Our manufacturing strategy is to contract with third-party vendors and suppliers, each with a strong reputation and proven track record in the pipeline industry. These vendors are broken up by product component subcategory, enabling multiple manufacturing capacity redundancies and safeguards to be utilized. In addition, this strategy allows the Company to eliminate the prohibitively high capital expenditures such as costs of building, operating and maintaining its own manufacturing facilities, ratings, personnel and licenses, thereby eliminating unnecessary capital intensity and risk.

Our identified market strategy is to continue meeting with oil and gas industry executives in the upstream, gathering, and midstream sectors from both domestic and foreign companies. Our goal is to introduce our technology to oil and gas companies and to demonstrate potential value for the purposes of negotiating commercial implementation of our AOT technology to their existing infrastructures.

Our strategy includes:

1. Continue optimization and value engineering of our AOT Midstream commercial product line.
2. Install and operate AOT equipment on a commercial midstream pipeline.
3. Directly market AOT technology to midstream pipeline operators based on results and analysis of data from the AOT demonstration project.
5. Present demonstration project results and analysis at various trade conferences.
6. Continue to make inroads and meet with key strategic potential customers in the following geographic regions:

a. United States
b. Canada
c. South and Central America
d. Middle East
e. Asia

7. Continue to make inroads and strategic alliances with additional supply chain and logistics support to rapidly expand our production capacity beyond its current physical limitations, adding capacity, reach and stability with pre-approved supply chain members that meet the criteria of the customers' procurement divisions.
8. Develop new AOT technologies crude oil technologies with the potential to expand our market reach upstream and gathering pipeline, offshore pipelines, rail and trucking containers, and crude oil container ships.
9. Continue to collaborate on scientific and technical whitepaper reports, product development enhancements, and additional products with our engineering support, consultants and relationships.
10. Seek long-term recurring revenues by directly offering or licensing electronic viscosity reduction (electronic diluent, or "eDiluent") as a service to reduce reliance on physical diluent.

Market Analysis Overview

QS Energy's AOT crude oil viscosity reduction technology directly targets the heavy crude oil transportation industry, initially targeting the midstream crude oil pipeline operations which deliver high volumes of heavy crude oil to market. The U.S. Energy Information Administration (EIA) forecasts U.S. crude oil production will average 13.0 million barrels per day in 2020, up 0.8 million barrels per day from 2019, but then fall to 12.7 million barrels per day in 2021. The forecast decline in 2021 is in response to lower oil prices and would mark the first annual U.S. crude oil production decline since 2016. Worldwide, EIA forecasts crude oil prices averaging $43.30 per barrel in 2020, increasing to $55.36 per barrel in 2021. In recent months, oil prices have been driven to local lows due to a number of external factors. In March 2020, combined factors of the coronavirus pandemic and increase OPEC output drove Brent Crude prices as low as $20 per barrel compared to an average $64 per barrel for Brent Crude in 2019. Despite this quick drop in crude prices, long-term forecasts remain strong. The EIA forecasts that, by 2025, the average price of a barrel of Brent crude oil will rise to $82 per barrel, growing to $93 per barrel (quoted in 2018 dollars to remove the effects of inflation). Prices are expected to continue to increase as cheap sources of oil are exhausted, making it more expensive to extract oil.

In 2019, demand for crude oil averaged 101 million barrels per day. The EIA forecasts demand will remain flat, averaging 102 million barrels per day by the end of 2021. Long-term, EIA forecasting demand to grow at an average of 0.4% annually. Commitments to stop climate change introduced more uncertainty into future oil demand. Barclays predicted that oil demand could peak by 2025, falling by as much as 30% by 2050 if countries kept their Paris Climate Accord commitments.

2018 worldwide crude oil production at 82 million barrels per day. North American production (U.S. and Canada) is estimated at 16 million barrels per day. At $50 per barrel, this represents annual worldwide and North American sales of $1.5 trillion and $292 billion, respectively. The EIA estimates 71% worldwide crude oil production is transported by midstream pipelines, with 90% of North American production transported by midstream pipelines. In 2014, the Congressional Research Service estimated the average cost of midstream pipeline transportation at $5 per barrel. Assuming a $5 per barrel transportation cost and 2018 crude oil production rates, annual worldwide and North American midstream crude oil transportation costs are approximately $83 billion and $22 billion, respectively.

The energy sector continues to operate in a period of both rapid change and expansion. Due to the relatively recent and widespread adoption of advanced oilfield drilling and completion technologies, known as enhanced oil recovery (EOR) techniques, enormous reserves of "tight" oil and gas are now recoverable from shale formations throughout North America and the world. This historic surge in upstream crude oil production has resulted in costly and persistent transportation bottlenecks when moving upstream production to downstream storage, offloading facilities and refineries. This persistent and severe industrywide problem is stimulating investments in new and existing pipeline infrastructure and a reliance on less desirable alternate forms of transport, including rail and freight truck.

Since the initial use of EOR or tertiary recovery techniques in the 1970s, oil and gas producers have progressively relied more heavily on the application of gas and chemical injection as well as thermal recovery. These extraction techniques, coupled with a much greater number of new wells in active oilfields, has raised the output of reservoirs by 30 to 60 percent above traditional primary and secondary recovery practices. Due to the rapid adoption of advanced extraction technologies throughout the U.S. energy industry, a 34-year decline in domestic oil and gas production was reversed in 2006. Historically high output from massive shale formations such as North Dakota's Bakken, Texas' Eagle Ford and Permian Basin, Colorado's Green River and Utah's Uintah Basin continues to the present day.

Other nations with significant exploitable shale formations include Russia, China, Argentina, Colombia, Ecuador, Libya, Australia, Venezuela, Mexico and dozens of others, providing a ready market for crude oil pipeline optimization technologies as production comes online. All told, the U.S. Energy Information Administration estimates there to be 345 billion barrels of identified and recoverable shale oil worldwide.

Consequently, oil production exceeds the capacity of existing pipelines in the U.S., Canada, South and Central America, and many other regions of the world, often resulting in delivery delays to refineries and increased reliance on more costly rail and tanker truck transport.

Recently, the softening of oil prices worldwide has incentivized producers and transporters to reduce costs and seek technologies that can provide greater operational efficiencies. AOT is specifically designed to increase pipeline capacity, while reducing reliance on diluent, pipeline operating costs and overhead, thereby increasing margins and delivering measurable competitive advantages.

Projected Pipeline Infrastructure Investment

Among the challenges facing the global crude oil production and transportation sectors, few are as intransigent or detrimental to the industry as the transportation bottlenecks and well-to-market delivery delays that are endemic here in North America and overseas. While new pipeline infrastructure projects are underway here in the U.S., Canada and in foreign markets, gaining legislative approval is a lengthy process and their construction is highly capital-intensive.

Although pipelines are by far the safest and most economical transportation method, outmoded pipeline infrastructure constructed primarily in the 1950s and 1960s cannot provide the capacity necessary to move production downstream to storage, refinery and offloading facilities. Consequently, delivery delays to refineries and reliance on less desirable rail and tanker truck transport have increased exponentially since 2008 when the shale boom began in earnest. Data compiled by the U.S. Energy Information Administration, IHS Global and the American Petroleum Institute identify billions in lost revenue opportunities for E&P companies and tax collection agencies in leading oil producing states such as Texas, North Dakota, Alaska, California, Colorado, Wyoming and Utah directly attributable to production takeaway constraints.

Despite the recently depressed price level of global oil benchmarks, experts forecast continued growth in crude oil pipeline capital expenditures. In June 2018, the Interstate National Gas Association of America published a study titled “North America Midstream Infrastructure through 2035.” Among its key findings, this report estimates $321 billion will be invested in midstream crude oil infrastructure between 2018 and 2035. This demand is largely due to capacity constraints coupled with the high cost of delivering crude oil by truck or rail.

We believe QS Energy’s AOT technology is strategically aligned with the major requirements and challenges facing the petroleum pipeline economy. The AOT is designed to increase pipeline flowrate while relaxing pipeline viscosity requirements, effectively increasing pipeline capacity and reducing or eliminating bottlenecks. This has the ancillary benefit of reducing the need to add diluent or heat to reduce viscosity while reducing reliance on more costly truck and rail transport to meet increasing capacity demands. Our AOT technology may also mitigate costly operating factors such as vapor pressure, pigging (pipeline cleaning) frequency, power consumption, and onset of turbulent flow. Of these factors, vapor pressure, which may be mitigated by AOT through reduced reliance on diluent and a reduction in heat buildup in transit, is of high importance to many pipeline operators as vapor pressure is tightly controlled by the EPA and is very expensive to mitigate by other means. We are now seeking to commercialize AOT as a cost-efficient solution for both new and existing pipeline operations.

Target Markets

The oil and gas sector market can be segmented into three primary categories: Upstream Producers, Midstream Transporters and Downstream Refiners:

- The Upstream segment is involved in the exploration and production (E&P) of oil and gas.
- Midstream companies and partnerships transport oil and gas to markets via pipelines, rail and shipping, and provide storage in the field and at the destination location.
- The Downstream sector refines oil and gas into finished products and, in cooperation with manufacturers and retailers, markets and distributes fuels and other refined petroleum products.

Upstream Producers

The Upstream segment has the greatest exposure to commodity prices. When prices fall as has been the case recently, they feel the brunt of this realignment. They also have the most to gain from additional flow throughput capacity and therefore would see immediate benefit from QS Energy's AOT.

This sector is typically nimble and faces few barriers to entry. With clear financial upside for every additional barrel of crude oil that they are able to transport, these companies are often open to new and innovative technology capable of providing greater efficiencies, lower costs and improved cash flow. Upstream producers physically move the most volume of product. They are customers to the Midstream transporters and enter into long-term contractual shipping obligations (tariff-based transportation contracts) with Midstream transporters to secure the movement of product from their fields to the refiners and markets downstream.

Producers make the spot market price for every barrel delivered to refinery, minus the transport costs, tariffs, and marketing discounts associated with bringing the product to market. A rough rule of thumb for this market is that the further away they are from the refinery, the higher the transport costs to deliver the product. Discussions with Upstream entities has uncovered strong interest in solutions that unlock chokepoints from their field equipment to the transmission line loading terminals through viscosity reduction (AOT). In addition, this group would also benefit from transporters implementing our AOT transmission-line series due to its ability to increase the overall flow capacity of pipelines transporting product from loading terminals to market.

Midstream Gathering Transporters

A subset of the Midstream transporters sector is the gathering line operators. This group often functions as a part of the Upstream producers' operations, or within the Midstream transporter's operations. Midstream gathering lines are the regional transportation infrastructure that connect Upstream oilfield gathering lines to Midstream long-distance main trunk lines. Typically, these pipelines are of a relatively short length (20-100 miles) and have diameters between 6" and 12", and could benefit from our smaller, lower cost AOT technology.

Midstream entities transport the bulk of the world's crude oil output via the 400,000 miles of crude oil pipelines globally. Domestically, they deliver a large percentage of the U.S. daily production of 9.2 million barrels per day through 160,000 miles of crude pipelines. Midstream operators represent a strong and ready market for AOT, and field test deployments for both solutions are underway.

The pipeline transport operators' business model is to charge a tariff to transport each barrel of oil through their pipeline. Due to the high daily volume of oil being transported and its value as a commodity, even incremental performance efficiencies can drive significant reductions in overhead reduction and increases in toll revenues. AOT may also provide pipeline operators the opportunity to offer on-demand electronic diluent as a service at a premium fee to customers highly dependent on diluent to meet viscosity requirements.

The potential benefits of AOT includes increased flow, reduced pipeline operating pressure and reduced friction losses and friction-induced heat build-up, providing economic benefits through increased capacity and toll rate income, and regulatory benefits through reductions in BTU per ton-mile, off-gassing and reduced carbon emissions (CO2).

Other heavy crude oil transporters

Truck, rail and marine crude oil carriers rely on heat and other costly and potentially hazardous measures to address the difficulties of onloading and offloading thick, heavy crudes. The Company is investigating AOT equipment designs specifically targeting this market's viscosity and vapor pressure requirements and related evaporation mitigation practices mandated by the U.S. Environmental Protection Agency.

Our Products and Technology

AOT Commercial Products

Beginning in the second quarter of 2012, the Company began the design and engineering efforts required to transition from laboratory and prototype testing to AOT units designed for full-scale commercial testing. The Company established its supply chain, designs, drawings, engineering, certifications and specifications to comply with the engineering audit processes as dictated by the energy industry regulation processes and North American regulatory bodies. We have built, delivered and tested, under limited duration and conditions, AOT equipment on a high-volume commercial pipeline. We have not proven the commercial viability of this product. Please see "ITEM 1A, Risk Factors", for a discussion associated with the commercial viability of our products.

The first commercial deployment of AOT occurred on the Keystone Pipeline in Udall, Kansas in May 2014, utilizing four AOT pressure vessels in a parallel “4-Pack” configuration for a cumulative capacity of 600,000 barrels per day. This system was operated under normal pipeline operating conditions as reported in the ATS RheoSystems field test summary report dated February 5, 2015. See section titled “Laboratory and Scientific Testing” below for more information on test procedures and results. Subsequent to testing and termination of the TransCanada lease, the AOT 4-Pack was uninstalled and reconfigured for deployment as four individual AOT units.

Our second AOT commercial installation was a single AOT deployment initially installed in March 2015 on the Kinder Morgan Crude & Condensate pipeline, which provides takeaway capacity for the Eagle Ford Shale in South Texas, primarily delivering light crude oil. As discussed in the Overview section above, equipment was installed limited operations and tests were performed in 2015 and 2016. Based on final analysis of in-field test results, SCADA operating data and subsequent analysis of crude oil samples at Temple University, it is unlikely Kinder Morgan would use the AOT at the original test location or other condensate pipeline. Kinder Morgan may consider AOT operations at one of their heavy crude pipeline locations subject to results of other AOT demonstration projects.

The Company continues to optimize and value engineer its AOT product line, targeting both midstream and upstream markets. The Company has installed an AOT demonstration project in cooperation with a major U.S. pipeline operator. As described in the Overview section above, this project has experienced numerous failures during initial testing which the Company is working to correct. As reported above, the project was removed from the demonstration site.

Joule Heat Product Development

The Company began development of its Joule Heat product in 2014, based around the new electrical heat system which reduces oil viscosity through a process known as joule heat, specifically targeting the upstream crude oil transportation market. The Company’s first Joule Heat prototype was installed for testing purposes under a joint development agreement with Newfield Exploration Company in June 2015 and the system was operational; however, changes to the prototype configuration will be required to determine commercial effectiveness of this unit. In December 2015, we suspended Joule Heat development activities to focus Company resources on finalizing commercial development of the AOT. We may resume Joule Heat development in the future depending on the availability of sufficient capital and other resources.

AOT Commercial Supply Chain

The Company has developed a supply chain for fabrication of the commercial AOT. The supply chain consists of multiple component suppliers and manufacturing companies engaged under Independent Contractor Agreements according to their respective fields of expertise. The supply chain entities have been chosen for their ability to work collaboratively with QS Energy and for their existing relationships with current and potential future customers of QS Energy technologies. The external components such as pressure vessels, inlet and outlet piping header systems, personnel and equipment shelters have been manufactured under contract with Power Service Inc. with offices in Wyoming, Utah, Colorado, Montana, North Dakota, and Texas. Internal components such as grid packs, electrical connections and other machined parts have been manufactured by Industrial Screen and Maintenance, with offices in Wyoming and Colorado. All equipment is manufactured in the United States of America, using only approved raw materials and vendors for quality control and import/export compliance purposes and meet the certifications and specifications as dictated by our customers and their independent oversight and auditing authorities.

Other components such as power systems, electrical junction boxes, cabling, hardware, switches, circuit breakers, computer equipment, sensors, SCADA/PLC, software and other power and integration equipment are purchased as complete units from various suppliers with operations based throughout North America. All component vendors are required to meet or exceed the same specifications as the parts manufacturers to maintain compliance as dictated by our customers and their independent oversight and auditing authorities.

AOT Intellectual Property

The Company began its own independent audit process for the updating of its intellectual property portfolio in 2012. The goal of this process was to streamline unnecessary legacy items left over from prior management, consolidate efforts to countries and regions of interest and retire items that were no longer valid or had been replaced with new intellectual property developments. In 2013, the Company retained the law firm of Jones Walker LLP, with operations based in Houston, Texas and began consolidation and streamlining efforts to manage intellectual properties.

QS Energy is currently maintaining and licensing from Temple University a portfolio of domestic and international patents, which have either been granted or have been published and are pending subject to final approval by the respective patent agency. Each of these intellectual properties are related to QS Energy's AOT, Joule Heat and Fuel Injector technologies. Subject to additional capital funding, we intend actively to continue to develop and market our AOT technology. Development of QS Energy's Fuel Injector and Joule Heat technologies have been suspended. The Company continues to maintain a license agreement with Temple University with respect to the underlying Fuel Injector patents, and is considering its options to re-start commercialization, sublicense the technology, or terminate the fuel injector license agreement with Temple. For details of the licensing agreements with Temple University, see Financial Statements attached hereto, Note 6. Please see ITEM 1A, Risk Factors below for a discussion of risks associated with these intellectual properties.

Current Business Status

As reported above, our AOT technology had design and operational flaws, and continues to require substantial testing and development, requiring a substantial infusion of capital in the Company. We can provide no assurances that we will be able to raise additional capital required to continue our efforts to commercialize our AOT technology. With limited capital, reported above, the Company is currently seeking to correct the failures associated with its AOT technology. Once operational, the Company plans to analyze and use AOT performance data to re-engage current and new prospective customers in our primary target North American and South American midstream crude oil markets. See the Overview section above for details.

Throughout 2021, our efforts have been tightly focused on executing our AOT demonstration project strategy. A number of companies in North America, South America and the Middle East have expressed interest in our technology and a desire to review demonstration project test results and visit the demonstration site. Assuming successful operations, we believe our AOT project should provide data requested by prospective customers such as real-time changes in viscosity, pipeline pressure drop reduction and increases in pipeline operating flowrates. All collected data will be normalized such that it can be used to evaluate the financial and operational benefits across a wide range of commercial operating scenarios without disclosing confidential details of our operations. We believe that real-world data from our AOT project could be used to accelerate our desire to achieve commercial adoption of our AOT technology, positioning us to re-engage with industry executives.

Laboratory and Scientific Testing

From 2010 through 2013, the Company worked with the U.S. Department of Energy ("US DOE") to test its technology at the Department of Energy's Rocky Mountain Oilfield Testing Center ("RMOTC"), near Casper, Wyoming. This third-party testing independently verified the efficacy of the Company's technology operating in a controlled facility, using commercial-scale prototype of our AOT equipment. These tests were summarized in the US DOE Rocky Mountain Oilfield Test Center report dated April 4, 2012 ("ROMRC Report"), which reported AOT measured pressure loss reduction of 40% and viscosity reduction of 40%; and reported observed reductions in line-loss and gains in pump operation efficiency across the entire length of the 4.4-mile test pipeline. A subsequent long-duration (24-hour) test at the RMOTC facility tested the effectiveness of AOT in treating oil overnight, as pipeline oil temperatures and viscosities drop. In its report dated May 3, 2012 to May 4, 2012, US DOE engineers recorded 56% reduction in viscosity of the AOT-treated oil versus untreated oil, with AOT effectively stabilizing oil viscosity throughout the overnight run despite dropping temperatures.

Laboratory testing of our AOT technology has been conducted by Dr. Rongjia Tao. Testing of the technology as applied to crude oil transmission has been conducted at Temple University in their Physics Department, in addition to the US DOE, at their Rocky Mountain Oilfield Testing Center, located on the Naval Petroleum Reserve #3 Teapot Dome Oilfield, north of Casper, Wyoming. In addition, a group led by Dr. Rongjia Tao, Chairman, Department of Physics of Temple University conducted experiments, using the laboratory-scale Applied Oil Technology apparatus at the National Institute of Standards and Technology (NIST) Center for Neutron Research (CNR). NIST is an agency of the U.S. Department of Commerce, founded in 1901 in Gaithersburg, Maryland.

Independent laboratory testing was also conducted as a collaborative effort by Temple University and PetroChina Pipeline R&D Center ("PetroChina") in 2012. In its report dated June 26, 2012 ("PetroChina Report"), PetroChina concluded, "The above series of tests show that it is very effective to use AOT to reduce the viscosity of crude oil. We can see that AOT has significantly reduced the viscosity of Daqing crude oil, Changqing crude oil, and Venezuela crude oil, and greatly improved its flow rate."

As previously reported in 2014, QS Energy installed and tested its commercial AOT equipment, leased and operated by TransCanada on TransCanada's high-volume Keystone pipeline operation. The first full test of the AOT equipment on the Keystone pipeline was performed in July 2014, with preliminary data analyzed and reported by Dr. Rongjia Tao of Temple University. Upon review of the July 2014 test results and preliminary report by Dr. Tao, QS Energy and TransCanada mutually agreed that this initial test was flawed due to, among other factors, the short-term nature of the test, the inability to isolate certain independent pipeline operating factors such as fluctuations in upstream pump station pressures, and limitations of the AOT device to produce a sufficient electric field to optimize viscosity reduction. Although Dr. Tao's preliminary report indicated promising results, QS Energy and TransCanada mutually agreed that no conclusions could be reliably reached from the July 2014 test or from Dr. Tao's preliminary report. As a result of this test, the Company modified its testing protocols and contracted with an independent laboratory, ATS RheoSystems, a division of CANNON ("ATS"), to perform follow-up tests at the TransCanada facility. This independent laboratory performed viscosity measurements at the TransCanada facility during subsequent testing in September 2014. As detailed in its field test report dated October 6, 2014, ATS measured AOT viscosity reductions of 8% to 23% depending on flow rates and crude oil types in transit. Over the duration of a 24-hour test intended to measure the recovery of the AOT treated oil from its reduced-viscosity treated state to its original pre-treated viscosity, ATS measured viscosity reductions of 23% three hours after treatment and 11% thirteen hours after treatment, with the crude oil returning to its untreated state approximately twenty-two hours after treatment. In its summary report dated February 5, 2015, ATS concluded that i) data indicated a decrease in viscosity of crude oil flowing through the TransCanada pipeline due to AOT treatment of the crude oil; and ii) the power supply installed on our equipment would need to be increased to maximize reduction in viscosity and take full advantage of the AOT technology.

Although, as reported by ATS, the efficacy of the AOT technology operated in the TransCanada field test was constrained due to limitations of the electric field applied by that unit's power supply, subsequent analysis by QS Energy personnel of ATS test results compared against laboratory tests performed at Temple University on oil samples provided by TransCanada revealed a single test run in which the electric field generated by the AOT was sufficient to fully treat the oil given operating conditions at the time of the test. In this test run, ATS measured a 23% reduction in viscosity three hours after AOT treatment. Laboratory tests at Temple University performed on a sample of crude oil provided by TransCanada of the same type treated in that specific field test measured a 27% reduction in viscosity in the laboratory immediately following treatment. Allowing for the actual three-hour of recovery time of the field test measurement, the resulting field test viscosity reduction of 23% correlates very well to the 27% viscosity reduction achieved in the laboratory setting.

Due to the small sample size of tests performed during the TransCanada field test, results reported by ATS are statistically inconclusive and cannot be relied upon to provide proof of AOT efficacy. While more testing is required to establish the efficacy of our AOT technology, we are encouraged by the findings of our independent research laboratory and the results of subsequent comparative analysis of data collected under laboratory and commercial operating conditions. We look forward to further development and commercialization of our technology. The TransCanada Lease was terminated by TransCanada, effective October 15, 2014. The Company has modified the design of the AOT power supply such that future installations of the AOT device are expected to achieve sufficient electric field to optimize viscosity reduction.

The Company contracted Southern Research Company ("SRI") in 2015 to perform independent laboratory tests on its prototype Joule Heat units AOT Upstream units. SRI performed tests on a prototype Joule Heat unit in September 2015, which showed promising results in which the Joule Heat prototype was observed to increase crude oil temperatures. In December 2015, we suspended Joule Heat and AOT Upstream development activities to focus Company resources on finalizing commercial development of the AOT Midstream.

See also our discussion above in Item 1. Under the section labeled Overview.

Competition

The oil transportation industry is highly competitive. We are aware of only three currently available competitive technologies in widespread use for reducing the viscosity of oil throughout the world. Many of our competitors have greater financial, research, marketing and staff resources than we do. For instance, oil pipeline operators use heat, diluents such as naphtha and/or natural gasoline, and/or chemical viscosity reduction additives, or chemical drag-reducing agents to improve flow in pipelines. Our research indicates that these methods are either very energy-intensive, or costly to implement on a day-to-day basis. Management believes that the Company's AOT technology presents advantages over traditional methods, yet the industry's willingness to experiment with new technology may pose some challenges in acceptance.

We are not aware of any other technology using uniform electrical field crude oil viscosity reduction technology which is designed to significantly improve pipeline operation efficiency. Although we are unaware of any technologies that compete directly with our technologies, there can be no assurance that any unknown existing or future technology will not be superior to products incorporating our AOT technology. Major domestic and international manufacturers and distributors of pipeline flow-improvement chemical solutions include Pemex, Petrotrin, Pluspetrol, Repsol, Glencore, Conoco-Philips, and Baker-Hughes. According to our research, heater skid manufacturers are generally local to the oilfield and pipeline regions, and are comprised of a large number of relatively small businesses in a fragmented industry. Major heater skid manufacturers are Parker, KW International, Thermotech Systems, LTD.

Government Regulation and Environmental Matters

Our research and development activities are not subject to any governmental regulations that would have a significant impact on our business and we believe that we are in compliance with all applicable regulations that apply to our business as it is presently conducted. Our products, as such, are not subject to certification or approval by the EPA or other governmental agencies domestically or internationally. Depending upon whether we manufacture or license our products in the future and in which countries such products are manufactured or sold, we may be subject to regulations, including environmental regulations, at such time.

Non-Disclosure Agreements

To protect our intellectual property, we have entered into agreements with certain employees and consultants, which limit access to, and disclosure or use of, our technology. There can be no assurance, however, that the steps we have taken to deter misappropriation of our intellectual property or third-party development of our technology and/or processes will be adequate, that others will not independently develop similar technologies and/or processes or that secrecy will not be breached. In addition, although management believes that our technology has been independently developed and does not infringe on the proprietary rights of others, there can be no assurance that our technology does not and will not so infringe or that third parties will not assert infringement claims against us in the future. Management believes that the steps they have taken to date will provide some degree of protection; however, no assurance can be given that this will be the case.

Employees

As of December 31, 2021, the Company had two (2) full-time employees. We also utilized the services of part-time consultants on an as-needed basis to assist us with various matters, including engineering, logistics, investor relations, public relations, accounting and sales and marketing. We intend to hire additional personnel to provide services when they are needed on a full-time basis. We recognize that our efficiency largely depends, in part, on our ability to hire and retain additional qualified personnel as and when needed and we have adopted procedures to assure our ability to do so.

Item 1A. Risk Factors

We have a history of losses, and we cannot assure you that we will ever become or remain profitable. As a result, you may lose your entire investment.

We generated insignificant revenues from operations in late 2006 and subsequently did not generate any revenues until 2014 and we have incurred recurring net losses every year since our inception in 1998. For the fiscal years ended December 31, 2021 and 2020, we had net losses of $1,420,000 and $2,415,000 respectively. To date, we have dedicated most of our financial resources to research and development, general and administrative expenses and initial sales and marketing activities. We have funded all of our activities through sales of our debt and equity securities for cash. We anticipate net losses and negative cash flow to continue until such time as our products are brought to market in sufficient amounts to offset operating losses. Our ability to achieve profitability is dependent upon our continuing research and development, product development, and sales and marketing efforts, to deliver viable products and the Company’s ability to successfully bring them to market. Although our management is optimistic that we will succeed in marketing products incorporating our technologies, there can be no assurance that we will ever generate significant revenues or that any revenues that may be generated will be sufficient for us to become profitable or thereafter maintain profitability. If we cannot generate sufficient revenues or become or remain profitable, we may have to cease our operations and liquidate our business.

Our independent auditors have expressed doubt about our ability to continue as a going concern, which may hinder our ability to obtain future financing.

In their report dated March 31, 2022, our independent auditors stated that our consolidated financial statements for the year ended December 31, 2021 were prepared assuming that we would continue as a going concern. Our ability to continue as a going concern is an issue raised as a result of our recurring net losses and accumulated deficit from operations since inception. During the year ended December 31, 2021, we incurred a net loss of $1,420,000 and used cash in operations of $722,000 and had a stockholders' deficit of $4,173,000 as of December 31, 2021. Our ability to continue as a going concern is subject to our ability to obtain significant additional capital to fund our operations and to generate revenue from sales, of which there is no assurance. The going concern qualification in the auditor's report could materially limit our ability to raise additional capital. If we fail to raise sufficient capital, we may have to liquidate our business and you may lose your investment.

Since we have not yet begun to generate positive cash flow from operations, our ability to continue operations is dependent on our ability to either begin to generate positive cash flow from operations or our ability to raise capital from outside sources.

We have not generated cash flow from operations since our inception in February 1998 and have relied on external sources of capital to fund operations. We had $114,000 in cash at December 31, 2021 and used cash in operations of $722,000 for the year ended December 31, 2021.

We currently do not have credit facilities available with financial institutions or other third parties, and historically have relied upon best efforts third-party funding. Though we have been successful at raising capital on a best-efforts basis in the past, we can provide no assurance that we will be successful in any future best-efforts financing endeavors. We will need to continue to rely upon financing from external sources to fund our operations for the foreseeable future. If we are unable to raise sufficient capital from external sources to fund our operations, we may need to curtail operations.

We will need substantial additional capital to meet our operating needs, and we cannot be sure that additional financing will be available.

During fiscal 2021, our cash burn rate amounted to approximately $60,000 per month and could increase during the remainder of fiscal 2022. In order to fund our capital needs, we conducted private offerings of our securities in 2020 and 2021. While discussion regarding additional interim and permanent financings are being actively conducted, management cannot predict with certainty that an equity line of credit will be available to provide adequate funds, or any funds at all, or whether any additional interim or permanent financings will be available at all or, if it is available, if it will be available on favorable terms. If we cannot obtain needed capital, our research and development, and sales and marketing plans, business and financial condition and our ability to reduce losses and generate profits will be materially and adversely affected.

Our business prospects are difficult to predict because of our limited operating history, early stage of development and unproven business strategy. Since our incorporation in 1998, we have been and continue to be involved in development of products using our technology, establishing manufacturing and marketing of these products to consumers and industry partners. Although we believe our technology and products in development have significant profit potential, we may not attain profitable operations and our management may not succeed in realizing our business objectives.

If we are not able to devote adequate resources to product development and commercialization, we may not be able to develop our products.

Our business strategy is to develop, manufacture and market products incorporating our AOT technology. We believe that our revenue growth and profitability, if any, will substantially depend upon our ability to raise additional necessary capital for research and development, complete development of our products in development and successfully introduce and commercialize our products.

Certain of our products are still under various stages of development. Because we have limited resources to devote to product development and commercialization, any delay in the development of one product or reallocation of resources to product development efforts that prove unsuccessful may delay or jeopardize the development of other product candidates. Although our management believes that it may finance our product development through private placements and other capital sources, if we do not develop new products and bring them to market, our ability to generate revenues will be adversely affected.

The commercial viability of QS Energy's technologies remains largely unproven and we may not be able to attract customers.

Despite the fact that we leased AOT equipment in 2014 to a major oil pipeline operator and tested the equipment on their high-volume pipeline under normal operating conditions, entered into a lease agreement with a second major oil pipeline operator to operate and test AOT equipment in 2015, and have initiated a project to demonstrate our AOT technology on a commercial pipeline in 2019, the commercial viability of our devices is not known at this time. If commercial opportunities are not realized from the use of products incorporating the AOT technology, our ability to generate revenue would be adversely affected. There can be no assurances that we will be successful in marketing our products, or that customers will ultimately purchase our products. Failure to have commercial success from the sale of our products will significantly and negatively impact our financial condition. There can be no assurances that we will be successful in marketing our products, or that customers will ultimately purchase our products. Failure to have commercial success from the sale of our products will significantly and negatively impact our financial condition.

If our products and services do not gain market acceptance, it is unlikely that we will become profitable.

At this time, our technology is commercially unproven, and the use of our technology by others is limited. Specific examples of use to date include:

- Temple University, testing, research and joint development;
- U.S. Department of Energy Rocky Mountain Oilfield Testing Center, testing and research;
- PetroChina Pipeline R&D Center, testing and research;
- TransCanada, short-term testing;
- Kinder Morgan Crude and Condensate, short-term testing;
- On-site short-term testing of a laboratory-scale AOT at a Canadian oil producer's facility in Alberta Canada.
- A demonstration project in cooperation with a commercial pipeline operator in the Southern United States

The commercial success of our products will depend upon the adoption of our technology by the oil industry. Market acceptance will depend on many factors, including:

- the willingness and ability of consumers and industry partners to adopt new technologies;
- our ability to convince potential industry partners and consumers that our technology is an attractive alternative to other technologies;
- our ability to manufacture products and provide services in sufficient quantities with acceptable quality and at an acceptable cost; and,
- our ability to place and service sufficient quantities of our products.

If our products do not achieve a significant level of market acceptance, demand for our products will not develop as expected and it is unlikely that we will become profitable.

We outsource and rely on third parties for the manufacture of our products.

Our business model calls for the outsourcing of the manufacture of our products in order to reduce our capital and infrastructure costs, capital expenditure and personnel. Accordingly, we must enter into agreements with other companies that can assist us and provide certain capabilities that we do not possess, and to increase our manufacturing capacity as necessary. We can provide no assurances that any such outsourcing will be at commercially acceptable rates or profitable. Moreover, we do not have the required financial and human resources or capability to manufacture, market and sell our products. Our business model calls for the outsourcing of the manufacture, and sales and marketing of our products in order to reduce our capital and infrastructure costs as a means of potentially improving our financial position and the profitability of our business. Accordingly, we must enter into agreements with other companies that can assist us and provide certain capabilities that we do not possess. We may not be successful in entering into additional such alliances on favorable terms or at all. Furthermore, any delay in entering into agreements could delay the development and commercialization of our products and reduce their competitiveness even if they reach the market. Any such delay related to our existing or future agreements could adversely affect our business.

If any party to which we have outsourced certain functions fails to perform its obligations under agreements with us, the development and commercialization of our products could be delayed or curtailed.

To the extent that we rely on other companies to manufacture, sell or market our products, we will be dependent on the timeliness and effectiveness of their efforts. If any of these parties do not perform its obligations in a timely and effective manner, the commercialization of our products could be delayed or curtailed because we may not have sufficient financial resources or capabilities to continue such development and commercialization on our own.

Any revenues that we may earn in the future are unpredictable, and our operating results are likely to fluctuate from quarter to quarter.

We believe that our future operating results will fluctuate due to a variety of factors, including delays in product development, market acceptance of our new products, changes in the demand for and pricing of our products, competition and pricing pressure from competitive products, manufacturing delays and expenses related to and the results of proceedings relating to our intellectual property.

A large portion of our expenses, including expenses for our facilities, equipment and personnel, is relatively fixed and not subject to further significant reduction. In addition, we expect our operating expenses will increase in the future as we continue our commercialization efforts and increase our production and marketing activities, among other activities. Although we expect to generate revenues from sales of our products, revenues may decline or not grow as anticipated and our operating results could be substantially harmed for a particular fiscal period. Moreover, our operating results in some quarters may not meet the expectations of stock market analysts and investors. In that case, our stock price most likely would decline.

Nondisclosure agreements with employees and others may not adequately prevent disclosure of trade secrets and other proprietary information.

In order to protect our proprietary technology and processes, we rely in part on nondisclosure agreements with our employees, licensing partners, customers, consultants, agents and other organizations to which we disclose our proprietary information. These agreements may not effectively prevent disclosure of confidential information and may not provide an adequate remedy in the event of unauthorized disclosure of confidential information. In addition, others may independently discover trade secrets and proprietary information, and in such cases, we could not assert any trade secret rights against such parties. Costly and time-consuming litigation could be necessary to enforce and determine the scope of our proprietary rights, and failure to obtain or maintain trade secret protection could adversely affect our competitive business position. Since we rely on trade secrets and nondisclosure agreements, in addition to patents, to protect some of our intellectual property, there is a risk that third parties may obtain and improperly utilize our proprietary information to our competitive disadvantage. We may not be able to detect unauthorized use or take appropriate and timely steps to enforce our intellectual property rights.

The manufacture, use or sale of our current and proposed products may infringe on the patent rights of others, and we may be forced to litigate if an intellectual property dispute arises.

We have taken measures to protect ourselves from infringing on the patent rights of others; however, if we infringe or are alleged to have infringed another party’s patent rights, we may be required to seek a license, defend an infringement action or challenge the validity of the patents in court. Patent litigation is costly and time consuming. We may not have sufficient resources to bring these actions to a successful conclusion. In addition, if we do not obtain a license, do not successfully defend an infringement action or are unable to have infringed patents declared invalid, we may incur substantial monetary damages ,encounter significant delays in marketing our current and proposed product candidates, be unable to conduct or participate in the manufacture, use or sale of product, candidates or methods of treatment requiring licenses, lose patent protection for our inventions and products; or find our patents are unenforceable, invalid, or have a reduced scope of protection.

Parties making such claims may be able to obtain injunctive relief that could effectively block our ability to further develop or commercialize our current and proposed product candidates in the United States and abroad and could result in the award of substantial damages. Defense of any lawsuit or failure to obtain any such license could substantially harm the company. Litigation, regardless of outcome, could result in substantial cost to and a diversion of efforts by the Company to operate its business.

We may face costly intellectual property/ license agreements disputes.

Our ability to compete effectively will depend in part on our ability to develop and maintain proprietary aspects of our technologies and either to operate without infringing the proprietary rights of others or to obtain rights to technology owned by third parties. Our pending patent applications, specifically patent rights of the AOT technology and Joule Heating process may not result in the issuance of any patents or any issued patents that will offer protection against competitors with similar technology. Patents we have licensed for our technologies, and which we may receive, may be challenged, invalidated or circumvented in the future or the rights created by those patents may not provide a competitive advantage. We also rely on trade secrets, technical know-how and continuing invention to develop and maintain our competitive position. Others may independently develop substantially equivalent proprietary information and techniques or otherwise gain access to our trade secrets. See Note 6 of our financial statements attached hereto for a discussion and status of our license agreements with Temple University.

Changes in governmental regulations and policies may affect export of our technologies.

The Company recognizes domestic and foreign governmental actions, including but not limited to trade restrictions and tariffs, may adversely affect our ability to export our technologies, or may adversely affect the economics of cross-border transactions.

We may not be able to attract or retain qualified senior personnel.

We believe we are currently able to manage our current business with our existing management team. However, as we expand the scope of our operations, we will need to obtain the full-time services of additional senior management and other personnel. Competition for highly skilled personnel is intense, and there can be no assurance that we will be able to attract or retain qualified senior personnel. Our failure to do so could have an adverse effect on our ability to implement our business plan. As we add full-time senior personnel, our overhead expenses for salaries and related items will increase compensation packages, these increases could be substantial.

If we lose our key personnel or are unable to attract and retain additional personnel, we may be unable to achieve profitability.

Our future success is substantially dependent on the efforts of our senior management. The loss of the services of members of our senior management may significantly delay or prevent the achievement of product development and other business objectives. Because of the scientific nature of our business, we depend substantially on our ability to attract and retain qualified marketing, scientific and technical personnel, including consultants. There is intense competition among specialized automotive companies for qualified personnel in the areas of our activities. If we lose the services of, or do not successfully recruit key marketing, scientific and technical personnel, the growth of our business could be substantially impaired. We do not maintain key man insurance for any of these individuals.

Currently, there is only very limited trading in our stock, so you may be unable to sell your shares at or near the quoted bid prices if you need to sell your shares, and there is currently a lack of publicly available information about us, which could substantially affect a shareholders' ability to sell our shares.

The shares of our common stock are thinly traded on the OTC Bulletin Board, meaning that the number of persons interested in purchasing our common shares at or near bid prices at any given time may be relatively small or non-existent. This situation is attributable to a number of factors, including the fact that we are a small company engaged in a high-risk business which is relatively unknown to stock analysts, stock brokers, institutional investors and others in the investment community that can generate or influence daily trading volume and valuation. Should we even come to the attention of such persons, they tend to be risk-averse and would be reluctant to follow an unproven, early stage company such as ours or purchase or recommend the purchase of our shares until such time as we became more seasoned and viable. As a consequence, there may be periods of several days or more when trading activity in our shares is minimal or non-existent, as compared to a seasoned issuer which has a large and steady volume of trading activity that will generally support continuous trading without negatively impacting share price. We cannot provide any assurance that a broader or more active public trading market for shares of our common stock will develop or be sustained. Due to these conditions, we cannot give any assurance that shareholders will be able to sell their shares at or near bid prices or at all. Moreover, we are delinquent in our required filings with the SEC, and, as such, there is currently a lack of public information about us available to the public, which could substantially affect a shareholders' ability to sell our shares.

The market price of our stock is volatile.

The market price for our common stock has been volatile during the last year, ranging from a closing price of $0.02 on January 4, 2021 to a closing price of $0.07 on February 8, 2021, and a closing price of $0.04 on March 25, 2022. Additionally, the price of our stock has been both higher and lower than those amounts on an intra-day basis in the last year. Because our stock is thinly traded, its price can change dramatically over short periods, even in a single day. The market price of our common stock could fluctuate widely in response to many factors, including, developments with respect to patents or proprietary rights, announcements of technological innovations by us or our competitors, announcements of new products or new contracts by us or our competitors, actual or anticipated variations in our operating results due to the level of development expenses and other factors, changes in financial estimates by securities analysts and whether any future earnings of ours meet or exceed such estimates, conditions and trends in our industry, new accounting standards, general economic, political and market conditions and other factors.

Substantial sales of common stock could cause our stock price to fall.

In the past year, there have been times when average daily trading volume of our common stock has been extremely low, and there have been many days in which no shares were traded at all. At other times, the average daily trading volume of our common stock has been high. Nevertheless, the possibility that substantial amounts of common stock may be sold in the public market may adversely affect prevailing market prices for our common stock and could impair a shareholder's ability to sell our stock or our ability to raise capital through the sale of our equity securities.

Potential issuance of additional shares of our common stock could dilute existing stockholders.

We are authorized to issue up to 500,000,000 shares of common stock and up to 100,000,000 of preferred stock. To the extent of such authorization, our Board of Directors has the ability, without seeking stockholder approval, to issue additional shares of common stock or preferred stock in the future for such consideration as the Board of Directors may consider sufficient. The issuance of additional common stock or preferred stock in the future may reduce the proportionate ownership and voting power of shareholders.

We may not be successful in identifying, making, financing and integrating acquisitions.

A component of our business strategy is to make selective acquisitions that will strengthen our core services or presence in selected markets. The success of this strategy will depend, among other things, on our ability to identify suitable acquisition candidates, to obtain acceptable financing, to timely and successfully integrate acquired businesses or assets and to retain the key personnel and the customer base of acquired businesses. Any future acquisitions could present a number of risks, including but not limited to:

- incorrect assumptions regarding the future results of acquired operations or assets or expected cost reductions or other synergies expected to be realized as a result of acquiring operations or assets;
- failure to integrate successfully the operations or management of any acquired operations or assets in a timely manner;
- failure to retain or attract key employees; and
- diversion of management's attention from existing operations or other priorities.

If we are unable to identify, make and successfully integrate acquired businesses, it could have a material adverse effect on our business, financial condition, results of operations and cash flows.

Our common stock is subject to penny stock regulation, which may make it more difficult for us to raise capital.

Our common stock is considered penny stock under SEC regulations. It is subject to rules that impose additional sales practice requirements on broker-dealers who sell our securities. For example, broker-dealers must make a suitability determination for the purchaser, receive the purchaser's written consent to the transaction prior to sale, and make special disclosures regarding sales commissions, current stock price quotations, recent price information and information on the limited market in penny stock. Because of these additional obligations, some broker-dealers may not affect transactions in penny stocks, which may adversely affect the liquidity of our common stock and shareholders' ability to sell our common stock in the secondary market. This lack of liquidity may make it difficult for us to raise capital in the future.

Current COVID-19 (coronavirus) pandemic.

See Overview section above regarding risks associated with the current COVID-19 (coronavirus) pandemic.

Item 1B. Unresolved Staff Comments

None

Item 2. Properties

As of June 1, 2021, our executive offices were moved to 3606 Challenger Way, Unit 1, Carson City, Nevada 89706, under a lease providing for a four year term at approximately $4,100 per month. The Company intends to seek to sublease a portion of this office space.

The Company's former executive offices were located in Tomball, Texas ("Tomball Facility") and leased from JBL Energy Partners, an entity owned by Jason Lane, former Director and Chairman of the Board of the Company who resigned in April 2021. The Tomball Facility was under a month-to-month lease at a lease rate of $5,000 per month, as amended. Total rent expense under this lease during the years ended December 31, 2021, and 2020 was $8,000 and $60,000. The Tomball Facility lease with Lane was terminated in connection with the resignation of Mr. Lane. At May 1, 2021, the Company agreed to continue to lease a portion of the Tomball facility from the landlord on a month to month basis at $1,000 per month. The Company also rents a storage facility on a month to month basis for $250 per month.

We believe our facilities are adequate to meet our current and near-term needs.

Item 3. Legal Proceedings

There is no litigation of any significance with the exception of the matters that have arisen under, and are being handled in, the normal course of business.

Item 4. Mine Safety Disclosures.

None.

PART II

Item 5. Market for Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities

Effective August 11, 2015, the Company changed its name to QS Energy, Inc., and changed its trading symbol to "QSEP". The following table sets forth the high and low bid prices of the Company's common stock for the quarters indicated as quoted in the Pink Sheets as reported by Yahoo Finance. These quotations reflect inter-dealer prices, without retail mark-up, mark-down or commission, and may not represent actual transactions.

	2021		2020	
	High	Low	High	Low
First Quarter	$ 0.08	$ 0.02	$ 0.15	$ 0.03
Second Quarter	$ 0.04	$ 0.02	$ 0.10	$ 0.03
Third Quarter	$ 0.06	$ 0.01	$ 0.06	$ 0.02
Fourth Quarter	$ 0.06	$ 0.02	$ 0.04	$ 0.01

According to the records of our transfer agent, we had approximately 1,000 stockholders of record of our common stock at March 25, 2022. The Company believes that the number of beneficial owners is substantially higher than this amount.

We do not pay a dividend on our common stock and we currently intend to retain future cash flows to finance our operations and fund the growth of our business. Any payment of future dividends will be at the discretion of our Board of Directors and will depend upon, among other things, our earnings, financial condition, capital requirements, level of indebtedness, contractual restrictions in respect to the payment of dividends and other factors that our Board of Directors deems relevant.

Issuances of Unregistered Securities in Current Fiscal Year

During the year ended December 31, 2021, the Company issued an aggregate of 32,118,979 shares of its common stock as follows:

- The Company issued 8,533,333 shares of its common stock upon the private sale for proceeds of $128,000 valued at $0.015 per share.
- The Company issued 22,085,646 shares of its common stock upon the conversion of $261,000 in convertible notes pursuant to convertible notes conversion prices of $0.02 to $0.03 per share.
- The Company issued 500,000 shares of its common stock as compensation valued at $20,000 at a price of $0.04 per share.
- The Company issued 1,000,000 shares of its common stock for services valued at $40,000 at a price of $0.04 per share.
- The Company issued convertible notes in aggregate value of $723,000 for net proceeds of $657,000, convertible into 28,794,327 shares in common stock of the Company at a conversion price of $0.02 to $0.03 per share, and in connection with these notes, issued warrants to purchase 18,907,157 shares of common stock of the Company at an exercise price of $0.03 to $0.04 per share and expiring one year from the date of issuance, summarized by month as follows:

Shares of Common Stock Issuable upon conversion of Notes Issued in 2021

Month of Issuance	Principal amount of convertible notes	Conversion Price	Shares of common Stock issuable upon Conversion of Principal
February 2021	$ 33,000	$0.02 per share	1,650,000
April 2021	$ 27,000	$0.02 per share	1,375,000
May 2021	$ 73,000	$0.02 per share	3,630,000
June 2021	$ 129,000	$0.02 per share	6,435,000
July 2021	$ 20,000	$0.02 per share	990,000
August 2021	$ 171,000	$0.03 per share	5,694,333
October 2021	$ 82,000	$0.03 per share	2,749,998

November 2021	$	97,000	$0.03 per share	3,226,665
December 2021	$	91,000	$0.03 per share	3,043,331
	$	723,000		28,794,327

Issuances of Unregistered Securities in Prior Fiscal Year

During the year ended December 31, 2020, the Company issued an aggregate of 13,069,707 shares of its common stock as follows:

- The Company issued 2,000,000 shares of its common stock upon the private sale for proceeds of $30,000 valued at $0.015 per share.

- The Company issued 9,854,707 shares of its common stock upon the conversion of $410,000 in convertible notes pursuant to the convertible notes conversion prices of $0.02 to $0.15 per share.

- The Company issued 1,155,000 shares of its common stock upon the exercise of warrants for proceeds of $58,000 at exercise price of $0.05 per share.

- The Company issued 60,000 shares of its common stock upon the exercise of options for proceeds of $3,000 at exercise price of $0.05 per share.

- The Company issued convertible notes in aggregate value of $329,000 for net proceeds of $299,000, convertible into 11,434,037 shares in common stock of the Company at a conversion price of $0.02 to $0.035 per share, and in connection with these notes, issued warrants to purchase 5,717,017 shares of common stock of the Company at an exercise price of $0.03 to $0.035 per share and expiring one year from the date of issuance, summarized by month as follows:

Shares of Common Stock Issuable upon Conversion of Notes issued in 2020

Month of Issuance	Principal amount of convertible note	Conversion Price	Shares of common Stock issuable upon Conversion of Principal
March 2020	$ 39,000	$0.035 per share	1,100,000
April 2020	$ 3,000	$0.035 per share	86,429
May 2020	$ 81,000	$0.035 per share	2,316,609
June 2020	$ 110,000	$0.035 per share	3,145,999
November 2020	$ 68,000	$0.02 per share	3,410,000
December 2020	$ 28,000	$0.02 per share	1,375,000
	$ 329,000		11,434,037

Item 6. Selected Financial Data

None.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operation

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with the Consolidated Financial Statements and supplementary data referred to in this Item 7 of this Form 10-K.

This discussion contains forward-looking statements that involve risks and uncertainties. Such statements, which include statements concerning future revenue sources and concentration, selling, general and administrative expenses, research and development expenses, capital resources, additional financings and additional losses, are subject to risks and uncertainties, including, but not limited to, those discussed above in Item 1 and elsewhere in this Form 10-K, particularly in "Risk Factors," that could cause actual results to differ materially from those projected. Unless otherwise expressly indicated, the information set forth in this Form 10-K is as of December 31, 2021, and we undertake no duty to update this information.

Overview

The Company has not generated significant revenues since its inception in February 1998. We continue to devote the bulk of our efforts to the promotion, design, testing and the commercial manufacturing and operations of our crude oil pipeline products in the upstream and midstream energy sector. We anticipate that these efforts will continue during 2022.

Our expenses to date have been funded primarily through the sale of shares of common stock and convertible debt, as well as proceeds from the exercise of stock purchase warrants and options. We raised capital in 2021 and also need to raise substantial additional capital in 2021, and possibly beyond, to fund our sales and marketing efforts, continuing research and development, and certain other expenses, until our revenue base grows sufficiently.

QS Energy operations have been minimally impacted by COVID-19; however, COVID-19 has had a significant negative financial impact across a wide spectrum of industries, both in terms of operations and access to operating capital. The Company's ability to continue operations is, in part, dependent on our access to funding. A published by the National Association of Manufacturers in March 2020 reports that due to COVID-19, 35% of manufacturers surveyed anticipate supply chain disruptions, 53% anticipate changes to operations, and 78% anticipate a negative financial impact. With these facts in mind, no assurances can be made that COVID-19 will not materially affect operations or negatively impact our ability to fund continued operations.

Results of Operation

QS ENERGY, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS

	Year ended			
	12/31/2021			
	2021	2020	Change	% Change
Revenues	$ –	$ –	$ –	–
Operating expenses	837,000	1,468,000	(631,000)	(43%)
Research and development expenses	350,000	355,000	(5,000)	(1%)
Loss from operations	(1,187,000)	(1,823,000)	(636,000)	(35%)
Interest and financing expense	(233,000)	(592,000)	(359,000)	(61%)
Net Loss	$ (1,420,000)	$ (2,415,000)	$ (995,000)	(41%)

Revenue Comparison, 2021 and 2020

The Company recognized no revenues during the twelve-month periods ended December 31, 2020 and December 31, 2021.

Operating Expense Comparison, 2021 and 2020

Operating expenses were $837,000 for the fiscal year ended December 31, 2021, compared to $1,468,000 for the fiscal year ended December 31, 2020, a decrease of $631,000. This decrease was attributable to a decreases in non-cash expenses of $272,000 and in cash expenses of $359,000. Specifically, the decrease in non-cash expenses is attributable to a decrease in stock-based compensation related to directors and employees of $310,000, offset by an increase in stock-based compensation related to consultants of $38,000. The decrease in cash expenses is attributable to decreases in salaries and benefits of $302,000, insurance of $86,000, legal and accounting fees of $39,000, public and investor relations of $28,000, corporate expenses of $8,000, market expenses of $6,000, mail and freight of $4,000, and travel expenses of $3,000, offset by increases in office expenses of $35,000, consulting fees of $32,000, rent of $25,000, computer expenses of $12,000, auto expenses of $5,000, patent maintenance expenses of $5,000, meals and entertainment of $2,000, and other expenses of $1,000.

Research and development expenses were $350,000 for the fiscal year ended December 31, 2021, compared to $355,000 for the fiscal year ended December 31, 2020, a decrease of $5,000. This decrease is attributable to AOT prototype and demonstration project development costs.

Interest expenses were $233,000 for the fiscal year ended December 31, 2021, compared to $592,000 for the fiscal year ended December 31, 2020, a decrease of $359,000. This decrease is attributable to a decrease in interest and financing expense of $96,000 to account the relative fair value of the warrants issued with our convertible notes and the notes' beneficial conversion feature that were recorded as note discounts.

We had a net loss of $1,420,000 or $0.00 loss per share for the fiscal year ended December 31, 2021 compared to a net loss of $2,415,000 or $0.01 loss per share for the fiscal year ended December 31, 2020.

Liquidity and Capital Resources

General

We have incurred negative cash flow from operations since our inception in 1998. As of December 31, 2021, we had cash of $114,000 and a stockholders' deficit of $4,173,000. Our operating cash flow in 2021 was funded primarily through cash reserves, the exercise of stock purchase warrants and options for cash, and the issuance of convertible notes for cash.

The accompanying consolidated financial statements have been prepared on a going concern basis, which contemplates the realization of assets and the settlement of liabilities and commitments in the normal course of business. As reflected in the accompanying consolidated financial statements, the Company had a net loss of $1,420,000 and used cash in operations of $722,000 for the year ended December 31, 2021. In addition, as of December 31, 2021, notes payable with an aggregate balance of $1,333,000 and certain obligation to a former officer are past due. These factors raise substantial doubt about our ability to continue as a going concern within one year after the date that the financial statements are issued. Our ability to continue as a going concern is dependent upon our ability to raise additional funds and implement our business plan. The consolidated financial statements do not include any adjustments that might be necessary if we are unable to continue as a going concern.

Summary

At December 31, 2021, the Company had cash on hand in the amount of $114,000. Management estimates that the current funds on hand will be sufficient to continue operations through September 2022. Management is currently seeking additional funds, primarily through the issuance of debt and equity securities for cash to operate our business, including without limitation the expenses it will incur in connection with the license agreements with Temple; costs associated with product development and commercialization of the AOT technology; costs to manufacture and ship the products; costs to maintain an effective system of internal controls and disclosure controls and procedures; costs of maintaining our status as a public company by filing periodic reports with the SEC and costs required to protect our intellectual property. In addition, as discussed below, the Company has substantial contractual commitments, including without limitation certain payments to a former officer, during the remainder of 2021 and beyond. No assurance can be given that any future financing will be available or, if available, that it will be on terms that are satisfactory to the Company. Even if the Company is able to obtain additional financing, it may contain undue restrictions on our operations, in the case of debt financing or cause substantial dilution for our stock holders, in case of equity financing.

Contractual Obligations

The Company's contractual commitments for future periods, including minimum guaranteed compensation payments and other agreements as described in the following table and associated footnotes:

Year ending December 31,	License Agreements (1)	Compensation Agreements	Total Obligations
2022	$ 187,500	$ 197,000	$ 384,500
2023	187,500	–	187,500
2024	187,500	–	187,500
2025	187,500	–	187,500
2026	187,500		187,500
Total	$ 937,500	$ 197,000	$ 1,134,500

(1) Consists of license maintenance fees to Temple University in the amount of $187,500 paid annually through the life of the underlying patents or until otherwise terminated by either party. For details of the Temple Licensing Agreements, see Note 6 of the Financial Statements, attached hereto.

Licensing Fees to Temple University

For details of the licensing agreements with Temple University, see Financial Statements attached hereto, Note 6.

Critical Accounting Policies and Estimates

Our discussion and analysis of financial condition and results of operations is based upon our consolidated financial statements, which have been prepared in accordance with accounting principles generally accepted in the United States of America. The preparation of these consolidated financial statements and related disclosures requires us to make estimates and judgments that affect the reported amounts of assets, liabilities, expenses, and related disclosure of contingent assets and liabilities. We evaluate, on an on-going basis, our estimates and judgments, including those related to the useful life of the assets. We base our estimates on historical experience and assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates.

The methods, estimates and judgments we use in applying our most critical accounting policies have a significant impact on the results that we report in our consolidated financial statements. The SEC considers an entity's most critical accounting policies to be those policies that are both most important to the portrayal of a company's financial condition and results of operations and those that require management's most difficult, subjective or complex judgments, often as a result of the need to make estimates about matters that are inherently uncertain at the time of estimation. For a more detailed discussion of the accounting policies of the Company, see Note 1 of the Notes to the Consolidated Financial Statements, "Summary of Significant Accounting Policies".

We believe the following critical accounting policies, among others, require significant judgments and estimates used in the preparation of our consolidated financial statements.

Estimates

The preparation of consolidated financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of expenses during the reporting period. Certain significant estimates were made in connection with preparing our consolidated financial statements as described in Note 1 to Notes to Consolidated Financial Statements. Actual results could differ from those estimates.

Stock-Based Compensation

The Company periodically issues stock options and warrants to employees and non-employees in non-capital raising transactions for services and for financing costs. The Company accounts for stock option and warrant grants issued and vesting to employees based on the authoritative guidance provided by the Financial Accounting Standards Board whereas the value of the award is measured on the date of grant and recognized over the vesting period. From prior periods until December 31, 2018, the Company accounted for share-based compensation issued to non-employees and consultants in accordance with the provisions of FASB ASC 505-50, Equity - Based Payments to Non-Employees. Measurement of share-based payment transactions with non-employees is based on the fair value of whichever is more reliably measurable: (a) the goods or services received or (b) the equity instruments issued. The final fair value of the share-based payment transaction is determined at the performance completion date.

In June 2018, the FASB issued ASU No. 2018-07, Compensation - Stock Compensation (Topic 718): Improvements to Nonemployee Share-Based Payment Accounting ("ASU 2018-07"). The guidance was issued to simplify the accounting for share-based transactions by expanding the scope of ASU 2018-07 from only being applicable to share-based payments to employees to also include share-based payment transactions for acquiring goods and services from nonemployees. As a result, nonemployee share-based transactions will be measured by estimating the fair value of the equity instruments at the grant date, taking into consideration the probability of satisfying performance conditions. We adopted ASU 2018-07 on January 1, 2019. The adoption of the standard did not have a material impact on our financial statements for the year ended December 31, 2020 or the previously reported financial statements.

The fair value of the Company's common stock options and warrants grant is estimated using the Black-Scholes Option Pricing model, which uses certain assumptions related to risk-free interest rates, expected volatility, expected life of the common stock options, and future dividends. Compensation expense is recorded based upon the value derived from the Black-Scholes Option Pricing model and based on actual experience. The assumptions used in the Black-Scholes Option Pricing model could materially affect compensation expense recorded in future periods.

Recent Accounting Pronouncements

See Note 1 of the financial statements for discussion of recent accounting pronouncements.

Item 7A. Quantitative and Qualitative Disclosures About Market Risk

We issue from time to time fixed rate discounted convertible notes. Our convertible notes and our equity securities are exposed to risk as set forth above, in Item 1A, “Risk Factors.” Please also see Item 7, above, “Management’s Discussion and Analysis of Financial Condition and Results of Operations.”

Item 8. Financial Statements and Supplementary Data

Our consolidated financial statements as of and for the years ended December 31, 2021 and 2020 are presented in a separate section of this report following Item 15 and begin with the index on page F-1.

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

1. Disclosure Controls and Procedures

The Company's management, with the participation of the Company's Chief Executive Officer and Chief Financial Officer, conducted an evaluation of the effectiveness of disclosure controls and procedures, pursuant to Exchange Act Rule 13a-15(b), as of December 31, 2021. Based on that evaluation, the Chief Executive Officer and Chief Financial Officer concluded that our disclosure controls and procedures were not effective as of December 31, 2021 due to the material weaknesses discussed below.

2. Internal Control over Financial Reporting

(a) Management's Annual Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting for the Company. Internal control over financial reporting is defined in Rule 13a-15(f) or 15d-15(f) promulgated under the Exchange Act as a process designed by, or under the supervision of, the company’s principal executive and principal financial officers and effected by the company’s board of directors, management and other personnel, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles and includes those policies and procedures that:

Pertain to the maintenance of records that in reasonable detail accurately and fairly reflect the transactions and dispositions of the assets of the Company;

Provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the Company; and

Provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of the company’s assets that could have a material effect on the financial statements.

Management assessed the effectiveness of our internal control over financial reporting as of December 31, 2021, at the reasonable assurance level described above. In making this assessment, management used the criteria set forth by the Committee of Sponsoring Organizations of the Treadway Commission (“COSO”) in Internal Control – Integrated Framework (2013). Based on this assessment, our Chief Executive Officer and Chief Financial Officer concluded, that our internal controls over financial reporting was not effective as of December 31, 2021 due to the material weaknesses. A material weakness is a deficiency, or a combination of deficiencies, in internal control over financial reporting such that there is a reasonable possibility that a material misstatement of the registrant’s annual or interim financial statements will not be prevented or detected on a timely basis.

The material weaknesses identified include (i) the Company had inadequate segregation of duties consistent with control objectives; and (ii) the Company had an insufficient number of personnel with an appropriate level of U.S. GAAP knowledge and experience and ongoing training in the application of U.S. GAAP and SEC disclosure requirements commensurate with the Company’s financial reporting requirements.

Notwithstanding the identified material weaknesses, management has concluded that the Financial Statements included in this Annual Report on Form 10-K present fairly, in all material respects, the Company’s financial position, results of operations and cash flows for the periods disclosed in conformity with U.S. GAAP.

This Annual Report on Form 10-K does not include an attestation report of the Company’s independent registered public accounting firm regarding internal control over financial reporting. Management’s report was not subject to attestation by our registered public accounting firm pursuant to rules of the Securities and Exchange Commission that permit us to provide only management’s report in this Annual Report on Form 10-K.

(b) Changes in Internal Control over Financial Reporting

No change in the Company's internal control over financial reporting (as defined in Rules 13a-15(f) and 15d-15(f) under the Exchange Act) occurred during the fourth quarter ended December 31, 2021 that has materially affected, or is reasonably likely to materially affect, the Company's internal control over financial reporting.

Item 9B. Other Information

None.

PART III

Item 10. Directors, Executive Officers and Corporate Governance

Composition of Board of Directors

Our bylaws provide that the Board shall consist of between one and eight directors, as determined by the Board from time to time. The number of directors is currently fixed at seven (7) members. Each board member serves a term of three years and will serve until their successors are elected and qualified, or until their earlier resignation or removal. Currently, the Board consists of three (3) members.

In 2016, the Board of Directors of the Company amended the Bylaws of the Company to divide Directors into three classes: Class I, Class II, and Class III. To implement this classified board structure, the initial term of the Class I, Class II, and Class III Directors was one (1), two (2), and three (3) years respectively, with subsequent three-year terms for all classes of Directors.

Officers are appointed by our Board of Directors and their terms of office are, except to the extent governed by an employment contract, at the discretion of our Board of Directors. There are no family relationships among any of our current directors or our executive officers.

The following constitutes the Board of Directors as of December 31, 2021:

Name	Age	Position	Director Class	Director Since	Term Expires
Cecil Bond Kyte	50	Chief Executive Officer, Director (Non-Independent)	Class I	2021	2022
Donald Dickson	66	Director (Independent)	Class II	2013	2023
Eric Bunting	53	Director (Independent)	Class I	2017	2022

Biographical Information Regarding Directors

Cecil Bond Kyte, Chief Executive Officer (Non-Independent Director) was elected to serve as Chairman of the Board of the Company in December 2007, then known as Save The World Air, Inc. (“STWA”). In January 2010, he was appointed to serve as CEO of STWA. In November 2013, Mr. Kyte voluntarily resigned as a director, Chairman of the Board, and CEO of STWA. Since then, Mr. Kyte has held positions with the following public companies: MassRoots, Inc., where he served as a board member from late 2017, through July 2019. Massroots, Inc. was a technology platform for the cannabis industry during the time Mr. Kyte served as a director of the company; Rightscorp, Inc., where, since 2015, Mr. Kyte has served and continues to serve as the company’s CEO, and since 2016, has served and continues to serve as the company’s CFO. Mr. Kyte is also a member of the board of Rightscorp. Rightscorp’s mission is to support copyright holders’ abilities to litigate and monetize their music and other copyrights against piracy and peer to peer infringement on the internet. Mr. Kyte has mainly been associated with “start overs” rather than “start ups,” using his abilities to restructure and develop a company’s management, financial condition, compliance, and product commercialization. In addition to his current roles as CEO, CFO, and board member of Rightscorp, Mr. Kyte is currently supporting the funding and business development for Bye Aerospace’s suite of products including the development and manufacturing of advanced civilian/military aerospace technologies. Mr. Kyte has been a pilot for 35 years. He received a B.S. Degree in accounting from Long Beach State University.

Prior to his appointment as CEO, CFO, and Chairman of the Company, effective July 31, 2020, Mr. Kyte entered into an agreement (“Agreement”) with the Company whereby he agreed to purchase 10,560,000 shares of common stock of the Company for $0.015 per share for a total purchase price of $158,000, $10,000 of which was due and payable on August 7, 2020, $40,000 on August 31, 2020, and $108,000 on September 14, 2020. Mr. Kyte did not meet this funding schedule; instead, during the period August 2020, through October 2020, he purchased 2,000,000 shares of common stock of the Company for a total purchase price of $30,000 or $0.015 per share.

Beginning January 14, 2021, through June 7, 2021, Mr. Kyte purchased an additional 8,533,333 shares of common stock of the Company for a total purchase price of $128,000 or $0.015 per share. During this time, Mr. Kyte also provided the Company additional capital in the amount of $117,000 in exchange for a convertible promissory note (“Note”), together with a related Warrant. The Note does not bear any interest; however, the implied interest rate used was 10% since the Note was issued for 10% less than its face value of $128,700. The Note is unsecured, matures in twelve months from issuance and is convertible into 6,435,000 shares of common stock of the Company at $0.02 per share. As part of the issuance of the Note, the Company granted Mr. Kyte a Warrant to purchase 3,217,500 shares of the Company’s common stock. The Warrant is fully vested, exercisable at $0.03 per share and expires one year from the date of issuance.

During the period August 2020, through June 2021 (the "Relevant Period"), Mr. Kyte provided the Company with $275,000 in working capital. During this Relevant Period, Mr. Kyte also introduced capital to the Company in the sum of $150,000 from third-party sources. This capital was received by the Company in exchange for convertible promissory notes and related warrants. With this additional third-party capital infusion, during this Relevant Period, Mr. Kyte was responsible, directly and indirectly, for providing the Company with working capital in the amount of $425,000.

The Agreement also provided that subject to the Company's receipt of working capital directly and indirectly from Mr. Kyte in the amount of no less than $500,000 by a date no later than September 29, 2020, Mr. Kyte would be appointed to the Company's Board and to serve as the Company's Chairman, CEO, and CFO, without compensation through the balance of calendar year 2020. Neither of the foregoing conditions was satisfied; thus Mr. Kyte was not appointed to the Company's Board or management in calendar year 2020. Nonetheless, given the resignations of Messrs. Mann and Green from the Board, effective April 9, 2021, and the resignations of Messrs. Lane and Bundros from the Board, effective April 15, 2021, and the resignation of Mr. Dickson as CEO of the Company, effective April 15, 2021, and the resignation of Mike McMullen as CFO of the Company, effective April 15, 2021, the remaining two directors of the Company, namely, Mr. Dickson and Dr. Bunting, appointed Mr. Kyte, and Mr. Kyte agreed, to serve on the Company's Board as a Class I Director and to serve as the Company's CEO, CFO, and Chairman, effective April 15, 2021, with compensation to be determined at a later time subject to the Company's financial condition and viability.

Don Dickson (Independent Director), appointed to Board of Directors on August 6, 2013, and currently is employed with Cherokee, Inc. which allows him to consult on different energy projects around the nation in the oil and gas industry. Don retired from Kinder Morgan in 2017, during his time there he worked on projects such as the Northeast Energy Direct Project and the Cortez Expansion project as project manager / engineering principal / construction support. The NED project will serve the Northeast United States delivering natural gas to the region, while the Cortez expansion project will increase the volume of CO2 being shipped from Southwest Colorado to West Texas for oil recovery. Prior to rejoining Kinder Morgan Mr. Dickson served as Chief Executive Officer for Advanced Pipeline Services (APS). APS was established for the purpose of providing a full range of services to the oil and gas industry. Core business areas are in new construction of pipeline and facilities, horizontal directional drilling and pipeline integrity/rehabilitation. Prior to APS, Mr. Dickson worked for Kinder Morgan in their natural gas operations, retiring after twenty-six years. During his time at Kinder Morgan served in different engineering capacities including as Director of Operations on two major pipeline projects, the 42" (REX) Rockies Mountain Express through the state of Illinois, and the 42" (MEP) Midcontinent Express Pipeline through the state of Louisiana. He also was Director of Operations with Tetra Resources completing various onshore and offshore oil and gas wells and a Senior Engineer with Halliburton Services. Mr. Dickson earned his B.S. in Engineering from Oklahoma State University.

Eric Bunting M.D. (Independent Director) was appointed to the Board effective April 1, 2017. Dr. Bunting is a board-certified Ear, Nose, and Throat physician, and he is an owner and partner in an independent specialty group. This group has partnered with Wichita Surgical Specialist ("WSS"), which remains one of the country's largest surgical multispecialty groups. Dr. Bunting has been on the board of directors of WSS for the last 10 years. Dr. Bunting graduated from Kansas University School of Medicine and subsequently received specialty training at Kansas University Medical Center. Dr. Bunting has many diverse business and entrepreneurial interests. Dr. Bunting has an interest in early startup companies and franchising opportunities. He is an owner and partner in approximately 40 fast-casual restaurant franchises in 10 states. He has board of director experience in the health care industry with multiple ambulatory surgical centers and a radiation center. Dr. Bunting has been an integral part of these boards through merger and acquisition periods. Other interests are in the wine and spirits industry where Dr. Bunting has been involved in a successful spirit start-up, which is poised for an acquisition opportunity. Dr. Bunting has other ongoing active business investments in the evolving internet artificial intelligence industry, as it relates to marketing and advertising. Dr. Bunting has been an investor in the Company, acquiring a significant number of shares over the last four years. During this period, he has been and will remain an unbiased shareholder advocate looking forward to commercialization, deployment, and eventual profitability for the Company.

Director Compensation Policy

Effective January 1, 2014, the Board passed a resolution suspending the July 1, 2013 Board compensation policy. Effective May 6, 2014, the Board approved a compensation policy which includes two annual grants of options, including i) an option to purchase a number of shares of common stock equal to $25,000 divided by the per share closing price on the date of grant with an exercise price equal to the stock closing price on the date of grant, a one year vesting period and an expiration date 10 years from the date of grant; and ii) an option to purchase a number of shares of common stock equal to $25,000 divided by the per share fair market value of the option calculated using the Black-Scholes Option Pricing Model based on market conditions, including stock closing price, risk free interest rate and stock volatility, on the date of grant with an exercise price equal to the stock closing price on the date of grant, vesting immediately and an expiration date 10 years from the date of grant. Also, effective July 1, 2013, the Board approved an annual grant of options to purchase 25,000 shares of common stock at a price equal to the stock's closing price on the date of grant, vesting immediately and expiring 10 years from the date of grant as compensation to the chairman of the Board's Audit Committee. Effective January 1, 2015, the Board amended the policy such that there is only one annual grant as follows: i) all options granted would vest over one year; and ii) options granted mid-year due to appointment to the Board or appointment to Chairman of the Audit Committee would be adjusted such that the number of shares would be calculated on a pro

rata basis depending on the number of day remaining in the calendar year, and the options would vest December 31 of the year of grant. Board compensation for the calendar year 2021, payable to members of the Board was suspended.

Executive Officers

The following table sets forth certain information regarding our executive officers as of December 31, 2021:

Name	Age	Position
Cecil Bond Kyte	50	Chief Executive Officer and Chief Financial Officer

Cecil Bond Kyte, Chief Executive Officer and Chief Financial Officer. Please see above under "Biographical Information Regarding Directors."

CORPORATE GOVERNANCE

We maintain a corporate governance page on our corporate website at www.qsenergy.com, which includes information regarding the Company's corporate governance practices. Our codes of business conduct and ethics, Board committee charters and certain other corporate governance documents and policies are posted on our website. In addition, we will provide a copy of any of these documents without charge to any stockholder upon written request made to Corporate Secretary, QS Energy, Inc., 3606 Challenger Way, Carson City, Nevada 89706. The information on our website is not, and shall not be deemed to be, a part of this Form 10-K or incorporated by reference into this or any other filing we make with the Securities and Exchange Commission (the "SEC").

Board of Directors

Director Independence

Our Board of Directors as of December 31, 2021, consisted of three (3) members. As of that date, the Board has affirmatively determined that Mr. Dickson and Dr. Bunting are independent directors. Mr. Kyte, our Chief Executive Officer is not considered independent.

Meetings of the Board

The Board held five (5) meetings in 2021. A majority of the members attended all 5 board meetings held in 2021. No meetings in 2022 have been held as of the date of this report.

Communications with the Board

The following procedures have been established by the Board in order to facilitate communications between our stockholders and the Board:

Stockholders may send correspondence, which should indicate that the sender is a stockholder, to the Board or to any individual director, by mail to Corporate Secretary, QS Energy, Inc. 3606 Challenger Way, Carson City, Nevada 89706, or by e-mail to info@qsenergy.com.

Our Secretary will be responsible for the first review and logging of this correspondence and will forward the communication to the director or directors to whom it is addressed unless it is a type of correspondence which the Board has identified as correspondence which may be retained in our files and not sent to directors. The Board has authorized the Secretary to retain and not send to directors communications that: (a) are advertising or promotional in nature (offering goods or services), (b) solely relate to complaints by customers with respect to ordinary course of business customer service and satisfaction issues or (c) clearly are unrelated to our business, industry, management or Board or committee matters. These types of communications will be logged and filed but not circulated to directors. Except as set forth in the preceding sentence, the Secretary will not screen communications sent to directors.

The log of stockholder correspondence will be available to members of the Board for inspection. At least once each year, the Secretary will provide to the Board a summary of the communications received from stockholders, including the communications not sent to directors in accordance with the procedures set forth above.

Our shareholders may also communicate directly with the non-management directors, individually or as a group, by mail c/o Corporate Secretary, QS Energy, Inc. 3606 Challenger Way, Carson City, Nevada 89706, or by e-mail to info@qsenergy.com.

The Audit Committee has established procedures, as outlined in the Company's policy for **"**Procedures for Accounting and Auditing Matters", for the receipt, retention and treatment of complaints regarding questionable accounting, internal controls, and financial improprieties or auditing matters. Any of the Company's employees may confidentially communicate concerns about any of these matters by calling our toll-free number, +1 (844) 645-7737. Upon receipt of a complaint or concern, a determination will be made whether it pertains to accounting, internal controls or auditing matters and if it does, it will be handled in accordance with the procedures established by the Audit Committee.

Committees of the Board

Effective July 21, 2021, the Board dissolved the Company's Audit Committee, and the functions thereof were assumed by the full Board.

Item 11. Executive Compensation

EXECUTIVE COMPENSATION DISCUSSION AND ANALYSIS

The following table sets forth certain information regarding the compensation earned during the last three fiscal years by the Named Executive Officers:

Summary Compensation Table

		Long-Term Compensation Awards					
Name and Principal Position	Fiscal Year	Annual Compensation Salary ($)	Stock Awards ($)	Securities Underlying Options (#)	Full Value of Options ($)	All Other Compensation ($)	Total ($)
Cecil Bond Kyte (1)	2021	$ –	$ –	–	$ –	$ –	$ –
Chief Executive Officer							
Don Dickson (2)	2021	$ –	$ –	300,000	$ 9,000	$ –	$ 9,000
Former Chief Executive Officer	2020	$ –	$ –	900,000	$ 35,000	$ –	$ 35,000
Michael McMullen (3)	2021	$ 46,200	–	–	$ –	$ –	$ 46,200
Former Chief Financial Officer	2020	$ 158,400	$ –	–	$ –	$ –	$ 158,400
	2019	$ 158,400	$ –	–	$ –	$ –	$ 158,400

(1) Mr. Kyte was appointed Chief Executive Officer ("CEO") effective April 15, 2021.

(2) Mr. Dickson will not receive any cash compensation for his role as interim CEO; rather, his compensation will be in the form of options that will be granted ("Grant") to Mr. Dickson to purchase 100,000 shares of restricted common stock of the Company (the "Options"), each month of his employment as interim CEO during the Term. The Options will vest on the 30th day following the date of Grant, provided that Mr. Dickson remains in his role as interim CEO on the vesting date. All of the Options shall be priced as of the closing market price of the Company's common stock as reported by the OTCBB (Pink Sheets) on the date of Grant. The Options issued to Mr. Dickson in exchange for serving as the Company's interim CEO shall expire ten (10) years from the date of Grant. Mr. Dickson resigned as interim CEO, effective April 15, 2021.

(3) Mr. McMullen was appointed Chief Financial Officer ("CFO") effective April 1, 2017. Mr. McMullen's annual base salary under his employment agreement as CFO is $158,400, for a two-year term. Effective March 31, 2019, the Company amended Mr. McMullen's employment agreement. As amended, the contract was extended by 90 days with no other change in terms. Effective July 1, 2019 through November 15, 2019, Mr. McMullen was employed on a month-to-month basis with no other changes in terms. Effective November 15, 2019, Mr. McMullen's employment agreement was amended extending the term of the agreement to February 15, 2020 with no other changes in terms.

Mr. McMullen's Employment Agreement was amended and restated effective February 15, 2020. As amended, Mr. McMullen's employment agreement was extended on a month-to-month basis with no other terms modified. Mr. McMullen resigned as CFO, effective April 15, 2021.

OPTION GRANTS IN LAST FISCAL YEAR

During the year ended December 31, 2021, the Company granted options to purchase 300,000 shares of common stock to Named Executive Officers as follows:

- The Company granted options ("Grant") to Mr. Dickson in exchange for serving as the Company's interim CEO under terms as follows:

  Mr. Dickson was granted the right to purchase 100,000 shares of restricted common stock of the Company (the "Options"), each month of his employment as interim CEO during the Term. The Options will vest on the 30th day following the date of Grant, provided that Mr. Dickson remains in his role as interim CEO on the vesting date and shall expire ten (10) years from the date of Grant. All of the Options shall be priced as of the closing market price of the Company's common stock as reported by the OTCBB on the date of Grant. Total fair value of these options at grant date was approximately $9,000 using the Black-Scholes Option Pricing model with the following assumptions: life of 10 years; risk free interest rate of 1.11% to 1.62%; volatility of 141% to 147%; and dividend yield of 0%. During the year ended December 31, 2020, the Company recognized compensation costs of $9,000 based on the fair value of Mr. Dickson's options that vested.

AGGREGATED OPTION EXERCISES IN LAST FISCAL YEAR AND YEAR-END OPTION VALUES

No options were exercised by any of the Named Executive Officers during the 2021 fiscal year. The following table sets forth the number of shares of our common stock subject to exercisable and unexercisable stock options which the Named Executive Officers held at the end of the 2021 fiscal year.

	Shares Acquired on Exercise	Value Realized	Number of Securities Underlying Unexercised Options at Fiscal Year-End (#)		Value of Unexercised In-the-Money Options ($) (1)	
Name	**(#)**	**($)**	**Exercisable**	**Unexercisable**	**Exercisable**	**Unexercisable**
Don Dickson	–	$ –	3,892,314	–	$ –	$ –
Michael McMullen	–	$ –	800,000	–	$ –	$ –

(1) Market value of our common stock at fiscal year-end minus the exercise price. The closing price of our common stock on December 31, 2021 the last trading day of the year was $0.04 per share.

EMPLOYMENT AGREEMENTS

Employment Agreement with Don Dickson

Mr. Dickson's acceptance of the appointment as interim CEO of the Company for a term of 90 days became effective April 15, 2020 under terms as follows:

Compensation will be in the form of options that will be granted ("Grant") to Mr. Dickson to purchase 100,000 shares of restricted common stock of the Company (the "Options"), each month of his employment as interim CEO during the Term. The Options will vest on the 30th day following the date of Grant, provided that Mr. Dickson remains in his role as interim CEO on the vesting date. All of the Options shall be priced as of the closing market price of the Company's common stock as reported by the OTCBB (Pink Sheets) on the date of Grant. The Options issued to Mr. Dickson in exchange for serving as the Company's interim CEO shall expire ten (10) years from the date of Grant. Mr. Dickson resigned as the Company's CEO effective April 15, 2021.

Employment Agreement with Michael McMullen

Mr. McMullen's employment agreement ("McMullen Employment Agreement") with the Company became effective April 1, 2017, pursuant to which he is serving as the Company's Chief Financial Officer. The term ("Term") of the McMullen Employment Agreement is two years. Annual base salary under the McMullen Employment Agreement for the full Term is $158,400. The Company will also issue options ("Options") to Mr. McMullen to purchase 250,000 shares of restricted shares of common stock of the Company at a per share exercise price equal to the stock price listed on the OTCBB market at market close on April 3, 2017. The 125,000 of the Options vested on April 1, 2017, and 125,000 Options vested on April 1, 2018. The Options shall expire 10 years from the date of grant of the Options.

Effective March 31, 2019, the Company amended the McMullen Employment Agreement. As amended, the contract was extended by 90 days with no other change in terms. Effective July 1, 2019 through November 15, 2019, Mr. McMullen was employed on a month-to-month basis with no other changes in terms. Effective November 15, 2019, the McMullen Employment Agreement was amended extending the term of the agreement to February 15, 2020 with no other changes in terms.

Mr. McMullen's Employment Agreement was amended and restated effective February 15, 2020. Mr. McMullen's Employment Agreement had been scheduled to terminate February 15, 2019. As amended, his employment agreement was extended on a month-to-month basis. As of July 16, 2020, the Company deferred Mr. McMullen's salary. As of December 31, 2020 deferred salary due to Mr. McMullen had accrued to $72,600. Deferred salaries were reported in operating expenses and related party payable. Mr. McMullen resigned as the Company's CFO, effective April 15, 2021.

DIRECTORS COMPENSATION

Board compensation for calendar year 2021, payable to members of the Board under the Company's May 6, 2014, Board compensation policy, as amended January 1, 2015, was suspended.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT

The following table sets forth certain information regarding the beneficial ownership of our common stock as of December 31, 2021.

- each person, or group of affiliated persons, known by us to be the beneficial owner of more than 5% of the outstanding shares of our common stock;
- each of our directors;
- the Company's Chief Executive Officer and President, and Chief Financial Officer, are the only persons serving as a Named Executive as of December 31, 2021 whose total annual salary and bonus exceeded $100,000, for services rendered in all capacities to the Company (such individuals are hereafter referred to as the "Named Executive Officers"); and all of our directors and executive officers serving as a group.

Named Executive Officers and Director Name and Address of Beneficial Owner (1)	Number of Shares of Common Stock Beneficially Owned (2)	Percentage of Shares Beneficially Owned (2)
Kyte, Cecil Bond, Chief Executive Officer, Chief Financial Officer	16,968,333	4.56%
Dickson, Donald, Director	6,329,073	1.88%
Bunting, Eric – Director	13,852,621	3.78%
All directors and executive officers as a group	32,114,587	9.13%

(1) Unless otherwise indicated, the address of each listed person is c/o QS Energy, Inc., 3606 Challenger Way, Unit #1, Carson City, Nevada 89706.

(2) Percentage of beneficial ownership is based upon 355,300,222 shares of the Company's common stock outstanding as of December 31, 2021. Beneficial ownership is determined in accordance with the rules of the SEC and generally includes voting or investment power with respect to securities. Shares of common stock subject to options and warrants currently exercisable or convertible, or exercisable or convertible within 60 days, are deemed outstanding for determining the number of shares beneficially owned and for computing the percentage ownership of the person holding such options, but are not deemed outstanding for computing the percentage ownership of any other person. Except as indicated by footnote, and subject to community property laws where applicable, the persons named in the table have sole voting and investment power with respect to all shares of common stock shown as beneficially owned by them.

As of the date of this report Mr. Kyte beneficially owns 16,968,333 shares of common stock of the Company, and a Warrant to purchase 3,217,500 shares of common stock of the Company.

Item 13. Certain Relationships and Related Transactions, and Director Independence

Accrued Expenses - Related Parties

As of December 31, 2021 and 2020, total accrued expenses – related parties amounted to $0 and $95,000, respectively. Included in the December 31, 2020 accrued amount are $74,000 in unpaid salaries due to an executive officer of the Company, $5,000 in accrued payroll taxes associated with unpaid salaries, $12,000 in unpaid directors fees owed to members of the Board of Directors, and $4,000 in unpaid out-of-pocket expenses due to an executive officer.

Director Independence

The Company believes Mr. Dickson and Dr. Bunting are independent, and Mr. Kyte is not independent.

Item 14. Principal Accounting Fees and Services

The Audit Committee has selected Weinberg & Company, P.A. to audit our financial statements for the fiscal year ended December 31, 2021.

Weinberg & Company, P.A. was first appointed in fiscal year 2002, and has audited our financial statements for fiscal years 2002 through 2020.

Audit and Other Fees

The following table summarizes the fees charged by Weinberg & Company, P.A. for certain services rendered to the Company during 2021 and 2020.

	Amount	
Type of Fee	**Fiscal Year 2021**	**Fiscal Year 2020**
Audit (1)	$ 62,000	$ 34,000
Audit Related (2)	–	–
Taxes (3)	17,010	14,000
All Other (4)	–	–
Total	$ 79,010	$ 48,000

(1) This category consists of fees for the audit of our annual financial statements included in the Company's annual report on Form 10-K and review of the financial statements included in the Company's quarterly reports on Form 10-Q. This category also includes advice on audit and accounting matters that arose during, or as a result of, the audit or the review of interim financial statements, statutory audits required by non-U.S. jurisdictions and the preparation of an annual "management letter" on internal control matters.

(2) Represents services that are normally provided by the independent auditors in connection with statutory and regulatory filings or engagements for those fiscal years, aggregate fees charged for assurance and related services that are reasonably related to the performance of the audit and are not reported as audit fees. These services include consultations regarding Sarbanes-Oxley Act requirements, various SEC filings and the implementation of new accounting requirements.

(3) Represents aggregate fees charged for professional services for tax compliance and preparation, tax consulting and advice, and tax planning.

(4) Represents aggregate fees charged for products and services other than those services previously reported.

PART IV

Item 15. Exhibits, Financial Statement Schedules

(a) The following documents are filed as part of this Form 10-K.

Financial Statements:

Reference is made to the contents to the consolidated financial statements of QS Energy, Inc. under Item 7 of this Form 10-K.

(b) Exhibits:

The exhibits listed below are required by Item 601 of Regulation S-K.

Exhibit No.	Description
3.1(1)	Articles of Incorporation, as amended, of the Registrant
3.1(6)	Articles of Merger
3.1(5)	Amendment to Articles of Incorporation (12/20/13)
3.1(15)	Second amendment to Articles of Incorporation (10/12/17)
3.2(4)	Amended and Restated Bylaws of the Registrant
3.2(8)	Amendment to the Amended and Restated Bylaws
10.1(2)	License Agreement between the Registrant and Temple University dated February 2, 2007
10.2(3)	License Agreement between the Registrant and Temple University dated August 9, 2011
10.4(7)	Registrant's Business Plan
10.8(9)	Jason Lane Employment Agreement effective April 1, 2017
10.9(10)	Michael McMullen Employment Agreement effective April 1, 2017
10.10(11)	Bigger Separation Agreement effective April 1, 2017
10.13(12)	Forms of Convertible Note, Warrant, and Securities Purchase Agreement in 2017 Spring Offering
10.11(13)	Amendment to the License Agreement between the Registrant and Temple University
10.12(14)	Submission of Matters to a Vote of Security Holders
10.13(16)	Amendment to Jason Lane employment agreement
10.14(17)	Form of Spring 2018 Securities Purchase Agreement
10.15(18)	Form of Winter 2018-2019 Offering Securities Purchase Agreement
10.16(18)	Amendment to Jason Lane employment agreement effective April 1, 2019
10.17(18)	Amendment to Michael McMullen employment agreement effective April 1, 2019
10.18(19)	Fourth Amendment to Jason Lane employment agreement effective February 15, 2020
10.19(19)	Third Amendment to Michael McMullen employment agreement effective February 15, 2020
21(17)	List of Subsidiaries
24*	Power of Attorney (included on Signature Page)
31.1*	Certification of Chief Executive Officer of Annual Report Pursuant to Rule 13(a)—15(e) or Rule 15(d)—15(e).
31.2*	Certification of Chief Financial Officer of Annual Report Pursuant to 18 U.S.C. Section 1350.
32.1*	Certification of Chief Executive Officer and Chief Financial Officer of Annual Report pursuant to Rule 13(a)—15(e) or Rule 15(d)—15(e).
101.INS*	Inline XBRL Instance Document
101.SCH*	Inline XBRL Schema Document
101.CAL*	Inline XBRL Calculation Linkbase Document
101.DEF*	Inline XBRL Definition Linkbase Document
101.LAB*	Inline XBRL Label Linkbase Document
101.PRE*	Inline XBRL Presentation Linkbase Document
104	Cover Page Interactive Data File (formatted in iXBRL, and included in exhibit 101)

*	Filed herewith.
**	Confidential treatment previously requested.
†	Management contract or compensatory plan or arrangement.

(1) Incorporated by reference from Registrant's Registration Statement on Form 10-SB (Registration Number 000-29185), as amended, filed on March 2, 2000
(2) Incorporated by reference from Registrant's Form 8-K filed on February 8, 2007
(3) Incorporated by reference from Registrant's Form 8-K filed on August 11, 2011
(4) Incorporated by reference from Registrant's Form 8-K filed on July 8, 2013
(5) Incorporated by reference from Registrant's Form 8-K filed on December 20, 2013
(6) Incorporated by reference from Registrant's Form 8-K filed on August 11, 2015
(7) Incorporated by reference from Registrant's Form 8-K filed on December 1, 2015
(8) Incorporated by reference from Registrant's Form 8-K filed on November 14, 2016
(9) Incorporated by reference from Registrant's Form 10-K filed March 31, 2017
(10) Incorporated by reference from Registrant's Form 10-K filed March 31, 2017
(11) Incorporated by reference from Registrant's Form 10-K filed March 31, 2017
(12) Incorporated by reference from Registrant's Form 8-K filed June 6, 2017
(13) Incorporated by reference from Registrant's Form 8-K filed July 14, 2017
(14) Incorporated by reference from Registrant's Form 8-K filed July 19, 2017
(15) Incorporated by reference from Registrant's Form 8-K filed October 12, 2017
(16) Incorporated by reference from Registrant's Form 10-Q filed November 14, 2017
(17) Incorporated by reference from Registrant's Form 10-K filed April 2, 2018
(18) Incorporated by reference from Registrant's Form 10-K filed April 1, 2019
(19) Incorporated by reference from Registrant's Form 10-K filed March 30, 2020

Item 16: Form 10-K Summary

None

SIGNATURES

In accordance with Section 13 or 15(d) of the Exchange Act, the Registrant has caused this report to be signed on its behalf by the undersigned, hereunto duly authorize.

QS Energy, Inc.

Date: March 30, 2022

By: /s/ Cecil Bond Kyte
Cecil Bond Kyte
Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Cecil Bond Kyte as his or her true and lawful attorneys-in-fact and agents, with full power of substitution and re-substitution, for him or her and in his or her name, place and stead, in any and all capacities, to sign any and all amendments to this Annual Report on Form 10-K, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or their or his or her substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934 this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated.

NAME	TITLE	DATE
/s/ Cecil Bond Kyte Cecil Bond Kyte	Chief Executive Officer, Chief Financial Officer, and Chairman of the Board of Directors	March 30, 2022
/s/ Donald Dickson Donald Dickson	Director	March 30, 2022
/s/ Eric Bunting, M.D. Eric Bunting, M.D.	Director	March 30, 2022

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS
QS ENERGY, INC. AND SUBSIDIARIES
DECEMBER 31, 2021 AND 2020

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of
QS Energy, Inc. and Subsidiaries
Carson City, Nevada

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of QS Energy, Inc. and Subsidiaries (the "Company") as of December 31, 2021 and 2020, the related consolidated statements of operations, shareholders' deficit, and cash flows for the years then ended, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the consolidated financial position of the Company as of December 31, 2021 and 2020, and the consolidated results of its operations and its cash flows for the years then ended, in conformity with accounting principles generally accepted in the United States of America.

Going Concern

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the financial statements, the Company has experienced recurring operating losses and negative operating cash flows since inception, has a stockholders' deficit, and has financed its working capital requirements through the recurring sale of its debt and equity securities. In addition, as of December 31, 2021, notes payable with an aggregate balance of $1,333,000 and certain obligations to a former officer are past due. These conditions raise substantial doubt about the Company's ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1 to the financial statements. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the consolidated financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the consolidated financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the consolidated financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the consolidated financial statements that was communicated or required to be communicated to the audit committee and that (1) relates to accounts or disclosures that are material to the consolidated financial statements and (2) involved especially challenging, subjective, or complex judgments. The communication of critical audit matters does not alter in any way our opinion on the consolidated financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing a separate opinion on the critical audit matter or on the accounts or disclosures to which it relates.

Convertible note transactions

As described in Notes 4 and 9 to the consolidated financial statements, during 2021 the Company issued investment units consisting of secured promissory notes which are convertible into shares of the Company's common stock and warrants to acquire shares of the Company's common stock. The Company allocated the proceeds received from the sale of the investment units to the convertible notes and warrants based upon their relative fair value. The Company used a Black Scholes Option Pricing Model, which uses certain assumptions related to expected life of the warrants, expected volatility, risk-free interest rates, and future dividends, to determine the fair value of the warrants.

We identified the accounting for the issuance of the convertible notes and warrants as a critical audit matter because of the significance of the account balances, and due to the complexity involved in assessing the classification and presentation of the convertible notes and warrants. The auditing for these transactions required a high degree of audit judgement including evaluating the reasonableness of the significant judgements made by management in determining the appropriate accounting.

The primary audit procedures we performed to address this critical audit matter included the following, among others:

- We read the convertible note and warrant agreements, and relevant documentation.

- We evaluated the reasonableness of the Company's methodology for allocation of proceeds including the Company's consideration of relevant accounting standards.

- We developed independent estimates for the fair value of the warrants issued based on the assumptions and data used by management.

We have served as the Company's auditor since 2002.

/s/ Weinberg & Company, P.A.

Los Angeles, California
March 31, 2022

QS ENERGY, INC.
CONSOLIDATED BALANCE SHEETS

	December 31 2021	December 31 2020
ASSETS		
Current assets:		
Cash	$ 114,000	$ 52,000
Prepaid expenses and other current assets	14,000	46,000
Total current assets	128,000	98,000
Property and equipment, net	9,000	16,000
Operating lease right of use asset	143,000	–
Total assets	$ 280,000	$ 114,000
LIABILITIES AND STOCKHOLDERS' DEFICIT		
Current liabilities:		
Accounts payable-license agreements-past due	$ 1,726,000	$ 1,491,000
Accounts payable and accrued expenses	930,000	700,000
Accrued expenses-related parties	–	95,000
Convertible notes payable, net of discounts of $86,000 and $83,000, respectively: including $1,333,000 and $1,128,000, respectively, in default	1,503,000	1,183,000
PPP Loan payable	150,000	152,000
Operating lease liabilities	38,000	–
Total current liabilities	4,347,000	3,621,000
Operating lease liabilities, net of current portion	106,000	–
Total liabilities	4,453,000	3,621,000
Commitments and contingencies		
Stockholders' deficit		
Common stock, $0.001 par value: 500,000,000 shares authorized, 355,300,222 and 323,181,243 shares issued and outstanding at December 31, 2021 and 2020, respectively	355,301	323,182
Additional paid-in capital	118,065,699	117,373,818
Accumulated deficit	(122,594,000)	(121,204,000)
Total stockholders' deficit	(4,173,000)	(3,507,000)
Total liabilities and stockholders' deficit	$ 280,000	$ 114,000

The accompanying notes are an integral part of these consolidated financial statements.

QS ENERGY, INC.
CONSOLIDATED STATEMENTS OF OPERATIONS

	Year ended December 31	
	2021	**2020**
Revenues	$ –	$ –
Operating expenses	837,000	1,468,000
Research and development expenses	350,000	355,000
Loss from operations	(1,187,000)	(1,823,000)
Interest and financing expense	(233,000)	(592,000)
Net Loss	$ (1,420,000)	$ (2,415,000)
Net loss per common share, basic and diluted	$ (0.00)	$ (0.01)
Weighted average common shares outstanding, basic and diluted	336,041,213	316,461,135

The accompanying notes are an integral part of these consolidated financial statements.

QS ENERGY, INC.
CONSOLIDATED STATEMENTS OF STOCKHOLDERS' DEFICIT
FOR THE YEARS ENDED DECEMBER 31, 2021 AND 2020

	Common Stock Shares	Common Stock Amount	Additional Paid-in Capital	Accumulated Deficit	Total Stockholders' Deficit
Balance, December 31, 2019	310,111,536	$ 310,111	$ 116,209,889	$ (118,789,000)	$ (2,269,000)
Proceeds from the exercise of options and warrants	1,215,000	1,215	59,785	–	61,000
Common stock issued on conversion of convertible notes payable	9,854,707	9,856	400,144	–	410,000
Value of warrants and beneficial conversion feature of issued convertible notes	–	–	299,000	–	299,000
Fair value of options and warrants issued as compensation	–	–	377,000	–	377,000
Common stock issued for sale of common stock	2,000,000	2,000	28,000	–	30,000
Net loss	–	–	–	(2,415,000)	(2,415,000)
Balance, December 31, 2020	323,181,243	323,182	117,373,818	(121,204,000)	(3,507,000)
Cumulative effect adjustment for adoption of ASU 2020-06 (see Note 4)	–	–	(60,000)	30,000	(30,000)
Issuance of common stock for cash	8,533,333	8,533	119,467	–	128,000
Common stock issued on conversion of convertible notes	22,085,646	22,086	238,914	–	261,000
Value of warrants issued with convertible notes	–	–	290,000		290,000
Fair value of common stock issued for services	1,000,000	1,000	39,000	–	40,000
Fair value of common stock issued as compensation	500,000	500	19,500	–	20,000
Fair value of options and warrants issued as compensation	–	–	45,000		45,000
Net loss	–	–	–	(1,420,000)	(1,420,000)
Balance, December 31, 2021	355,300,222	$ 355,301	$ 118,065,699	$ (122,594,000)	$ (4,173,000)

The accompanying notes are an integral part of these consolidated financial statements.

QS ENERGY, INC.
CONSOLIDATED STATEMENTS OF CASH FLOWS

	Year ended December 31	
	2021	**2020**
Cash flows from Operating Activities		
Net loss	$ (1,420,000)	$ (2,415,000)
Adjustments to reconcile net loss to net cash used in operating activities:		
Fair value of common stock issued for services	40,000	–
Fair value of common stock issued as compensation	20,000	–
Fair value of options and warrants issued as compensation	45,000	377,000
Amortization of debt discount	59,000	398,000
Accrued interest expense	124,000	145,000
Amortization of operating lease right of use asset	22,000	–
Depreciation	7,000	7,000
Changes in operating assets and liabilities:		
Prepaid expenses and other current assets	32,000	52,000
Accounts payable and accrued expenses	230,000	143,000
Accounts payable – license agreements	235,000	236,000
Accrued expenses – related parties	(95,000)	88,000
Operating lease liabilities	(21,000)	–
Net cash used in operating activities	(722,000)	(969,000)
Cash flows from financing activities		
Net proceeds from sale of common stock	128,000	30,000
Net proceeds from issuance of convertible notes and warrants	658,000	299,000
Net proceeds from exercise of warrants and options	–	61,000
(Payment of) proceeds from loan payable	(2,000)	152,000
Net cash provided by financing activities	784,000	542,000
Net increase (decrease) in cash	62,000	(427,000)
Cash, beginning of period	52,000	479,000
Cash, end of period	$ 114,000	$ 52,000
Supplemental disclosures of cash flow information		
Cash paid during the year for:		
Interest	$ –	$ –
Income Taxes	$ 1,600	$ 1,600
Non-cash investing and financing activities		
Adjustment for adoption of ASU 2020-06	$ 30,000	$ –
Recording of operating lease right of use asset and liability	$ 165,000	$ –
Conversion of convertible notes to common stock, net	$ 261,000	$ 410,000
Value of warrants and beneficial conversion feature associated with issued convertible notes	$ 290,000	$ 299,000

The accompanying notes are an integral part of these consolidated financial statements.

1. Business and Summary of Significant Accounting Policies

QS Energy, Inc. ("QS Energy", "Company") was incorporated on February 18, 1998, as a Nevada Corporation under the name Mandalay Capital Corporation. The Company changed its name to Save the World Air, Inc. on February 11, 1999. Effective August 11, 2015, the Company changed its name to QS Energy, Inc. The Company's common stock is quoted under the symbol "QSEP" on the Over-the-Counter Bulletin Board (Pink Sheets). More information including the Company's fact sheet, logos and media articles are available at our corporate website, www.qsenergy.com.

QS Energy develops and seeks to commercialize energy efficiency technologies that assist in meeting increasing global energy demands, improving the economics of oil transport, and reducing greenhouse gas emissions. The Company's intellectual properties include a portfolio of domestic and international patents, a substantial portion of which have been developed in conjunction with and exclusively licensed from Temple University of Philadelphia, PA ("Temple"). QS Energy's primary technology is called Applied Oil Technology (AOT), a commercial-grade crude oil pipeline transportation flow-assurance product. Engineered specifically to reduce pipeline pressure loss, increase pipeline flow rate and capacity, and reduce shippers' reliance on diluents and drag reducing agents to meet pipeline maximum viscosity requirements, AOT is a 100% solid-state system that in a lab and other tests has shown to reduce crude oil viscosity by applying a high intensity electrical field to crude oil while in transit. AOT technology has shown to deliver reductions in crude oil viscosity and pipeline pressure loss as demonstrated in independent third-party tests performed by the U.S. Department of Energy, the PetroChina Pipeline R&D Center, and ATS RheoSystems, a division of CANNON™, at full-scale test facilities in the U.S. and China, and under commercial operating conditions on one of North America's largest high-volume crude oil pipelines. The AOT product is still in development and testing and has transitioned from laboratory testing to initial demonstration and continued testing in advance of our goal of seeking commercial acceptance and adoption by the upstream and midstream pipeline marketplace. The Company continues to devote the bulk of efforts to the promotion, design, testing and the commercial manufacturing and test operations of crude oil pipeline products in the upstream and midstream energy sector. QS Energy's efforts in the foregoing regard have been substantially hampered by a lack of capital. The Company should be able to continue its efforts to commercialize its AOT product during 2021 only if sufficient capital is raised to do so. The Company can provide no assurances in its ability to raise the capital needed to continue efforts in 2021, or that any such capital will be available to it on acceptable terms and conditions.

Going Concern

The accompanying consolidated financial statements have been prepared on a going concern basis, which contemplates the realization of assets and the settlement of liabilities and commitments in the normal course of business. As reflected in the accompanying consolidated financial statements, during the twelve-months ended December 31, 2021, the Company incurred a net loss of $1,420,000, used cash in operations of $722,000 and had a stockholders' deficit of $4,173,000 as of December 31, 2021. In addition, as of December 31, 2021, twenty-eight notes payable with an aggregate balance of $1,333,000 and certain obligations to a former officer are past due. These factors raise substantial doubt about the Company's ability to continue as a going concern. The ability of the Company to continue as a going concern is dependent upon the Company's ability to raise additional funds and implement its business plan. The financial statements do not include any adjustments that might be necessary if the Company is unable to continue as a going concern.

At December 31, 2021, the Company had cash on hand in the amount of $114,000. Management estimates that the current cash on hand will be sufficient to continue operations through September 2022, or, subject to actual costs incurred in implementing design modifications to our AOT demonstration project described. Management is currently seeking additional funds, primarily through the issuance of debt and equity securities for cash to operate our business, including without limitation the expenses it will incur in connection with the license agreements with Temple; costs associated with product development and commercialization of the AOT technologies; costs to manufacture and ship the products; costs to design and implement an effective system of internal controls and disclosure controls and procedures; costs of maintaining our status as a public company by filing periodic reports with the SEC and costs required to protect our intellectual property. In addition, as discussed below, the Company has substantial contractual commitments, including without limitation salaries to our executive officers pursuant to employment agreements, certain payments to a former officer and consulting fees, during the remainder of 2022 and beyond.

No assurance can be given that any future financing will be available or, if available, that it will be on terms that are satisfactory to the Company. Even if the Company is able to obtain additional financing, it may contain undue restrictions on our operations, in the case of debt financing or cause substantial dilution for our stockholders in case of equity financing.

Covid-19

During the year ended December 31, 2021, the COVID-19 pandemic did not have a material net impact on our operating results. The Company has not observed any impairments of its assets or a significant change in the fair value of its assets due to the COVID-19 pandemic. As of December 31, 2021, the Company has been following the recommendations of local health authorities to minimize exposure risk for its employees, including having employees work remotely and utilizing electronic submission of invoices and payments. At this time, it is not possible for the Company to predict the duration or magnitude of the adverse results of the outbreak and its effects on the Company's business or results of operations, financial condition, or liquidity. The Company's ability to continue operations is, in part, dependent on our access to funding. No assurances can be made that COVID-19 will not materially affect operations or negatively impact our ability to fund continued operations.

Principles of Consolidation

The consolidated financial statements include the accounts of QS Energy Inc. and its wholly owned subsidiaries, QS Energy Pool, Inc. and STWA Asia Pte. Limited. Intercompany transactions and balances have been eliminated in consolidation.

Use of Estimates

The preparation of financial statements in conformity with generally accepted accounting principles requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of expenses during the reporting period. Significant estimates include those related to assumptions used in impairment analysis for property and equipment, assumption used in valuing the issuance of convertible notes and the corresponding debt discount, assumptions used in valuing equity instruments issued for services, and valuation allowance for deferred tax assets, among others. Actual results could differ from these estimates.

Revenue Recognition

Under its business plan, the Company anticipates the leasing of its primary technology. The Company will recognize lease revenue ratably over the life of the lease upon commencement of the lease. Revenue on future product sales will be recognized in accordance with Accounting Standards Codification ("*ASC*") 606, *Revenue from Contracts with Customers*. The underlying principle of ASC 606 is to recognize revenue to depict the transfer of goods or services to customers at the amount expected to be collected. ASC 606 creates a five-step model that requires entities to exercise judgment when considering the terms of contract(s), which includes (1) identifying the contract(s) or agreement(s) with a customer, (2) identifying our performance obligations in the contract or agreement, (3) determining the transaction price, (4) allocating the transaction price to the separate performance obligations, and (5) recognizing revenue as each performance obligation is satisfied. Under ASC 606, revenue is recognized when performance obligations under the terms of a contract are satisfied, which occurs for the Company upon shipment or delivery of products or services to our customers based on written sales terms, which is also when control is transferred. Revenue is measured as the amount of consideration we expect to receive in exchange for transferring the products or services to a customer.

Cash

Cash consists of cash and demand deposits with banks. The Company holds no cash equivalents as of December 31, 2021 and 2020, respectively. The Company maintains its cash with domestic financial institutions. At times, cash balances may exceed federally insured limits of $250,000 per depositor at each financial institution. The Company believes that no significant concentration of credit risk exists with respect to this cash balances because of its assessment of the creditworthiness and financial viability of the financial institutions.

Property and Equipment

Property and equipment are stated at cost less accumulated depreciation. Depreciation is computed using the straight-line method based on the estimated useful lives of the assets, generally ranging from three to ten years. Expenditures for major renewals and improvements that extend the useful lives of property and equipment are capitalized. Expenditures for repairs and maintenance are charged to expense as incurred. Leasehold improvements are amortized using the straight-line method over the shorter of the estimated useful life of the asset or the lease term.

Impairment of Long-lived Assets

Our long-lived assets, such as property and equipment, are reviewed for impairment at least annually, or when events and circumstances indicate that depreciable or amortizable long-lived assets might be impaired and the undiscounted cash flows estimated to be generated by those assets are less than the carrying amount of those assets. When specific assets are determined to be unrecoverable, the cost basis of the asset is reduced to reflect the current value.

We use various assumptions in determining the current fair value of these assets, including future expected cash flows and discount rates, as well as other fair value measures. Our impairment loss calculations require us to apply judgment in estimating future cash flows, including forecasting useful lives of the assets and selecting the discount rate that reflects the risk inherent in future cash flows.

If actual results are not consistent with our assumptions and judgments used in estimating future cash flows and asset fair values, we may be exposed to future impairment losses that could be material to our results. Based upon management's annual review, no impairments were recorded for the years ended December 31, 2021 and 2020.

Leases

The Company accounts for its leases in accordance with the guidance of FASB Accounting Standards Codification ("ASC") 842, *Leases.* The Company determines whether a contract is, or contains, a lease at inception. Right-of-use assets represent the Company's right to use an underlying asset during the lease term, and lease liabilities represent the Company's obligation to make lease payments arising from the lease. Right-of-use assets and lease liabilities are recognized at lease commencement based upon the estimated present value of unpaid lease payments over the lease term. The Company uses its incremental borrowing rate based on the information available at lease commencement in determining the present value of unpaid lease payments (see Note 3).

Income Taxes

The Company follows the asset and liability method of accounting for income taxes. The Company recognizes deferred tax assets and liabilities to reflect the estimated future tax effects, calculated at anticipated future tax rates, of future deductible or taxable amounts attributable to events that have been recognized on a cumulative basis in the financial statements. A valuation allowance related to a deferred tax asset is recorded when it is more likely than not that some portion of the deferred tax asset will not be realized.

Research and Development Costs

Research and development expenses relate primarily to the development, design, testing of preproduction prototypes and models, compensation, and consulting fees, and are expensed as incurred. Total research and development costs recorded during the years ended December 31, 2021 and 2020, amounted to $350,000 and $355,000, respectively.

Patent Costs

Patent costs consist of patent-related legal and filing fees. Due to the uncertainty associated with the successful development of our AOT product, all patent costs are expensed as incurred. During the years ended December 31, 2021 and 2020, patent costs were $20,000 and $15,000, respectively, and were included as part of operating expenses in the accompanying consolidated statements of operations.

Stock-Based Compensation

The Company periodically issues stock options and warrants to employees and non-employees in non-capital raising transactions for services and for financing costs. The Company accounts for stock-based payments to officers, directors, employees, and consultants by measuring the cost of services received in exchange for equity awards utilizing the grant date fair value of the awards, with the cost recognized as compensation expense on the straight-line basis in the Company's financial statements over the vesting period of the awards. Recognition of compensation expense for non-employees is in the same period and manner as if the Company had paid cash for the services.

The fair value of the Company's stock options and warrants grant is estimated using the Black-Scholes Option Pricing model, which uses certain assumptions related to risk-free interest rates, expected volatility, expected life of the stock options or warrants, and future dividends. Compensation expense is recorded based upon the value derived from the Black-Scholes Option Pricing model and based on actual experience. The assumptions used in the Black-Scholes Option Pricing model could materially affect compensation expense recorded in future periods.

Fair Value of Financial Instruments

Accounting standards require certain assets and liabilities be reported at fair value in the financial statements and provide a framework for establishing that fair value. Fair value is defined as the price that would be received upon the sale of an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date. When determining fair value, the Company considers the principal or most advantageous market in which it transacts and considers assumptions that market participants would use when pricing the asset or liability. The framework for determining fair value is based on a hierarchy that prioritizes the inputs and valuation techniques used to measure fair value:

Level 1—Quoted prices in active markets for identical assets or liabilities.

Level 2—Inputs, other than the quoted prices in active markets, are observable either directly or indirectly.

Level 3—Unobservable inputs based on the Company's assumptions.

The Company is required to use observable market data if such data is available without undue cost and effort.

The carrying amounts for cash, accounts payable, accrued expenses and convertible notes payable approximate their fair value due to the short-term nature of such instruments.

Loss per Share

Basic loss per share is computed by dividing net loss available to common stockholders by the weighted average number of common shares outstanding during the period. Diluted loss per share reflects the potential dilution, using the treasury stock method that could occur if securities or other contracts to issue common stock were exercised or converted into common stock or resulted in the issuance of common stock that then shared in the loss of the Company. In computing diluted loss per share, the treasury stock method assumes that outstanding options and warrants are exercised, and the proceeds are used to purchase common stock at the average market price during the period. Options and warrants may have a dilutive effect under the treasury stock method only when the average market price of the common stock during the period exceeds the exercise price of the options and warrants.

For the years ended December 31, 2021 and 2020, the dilutive impact of outstanding stock options of 31,080,601 shares and 32,480,601 shares; outstanding warrants of 19,977,149 shares and 8,683,677 shares; and notes convertible into approximately 24,100,887 and 13,184,099 shares of our common stock, respectively, have been excluded because their impact on the loss per share is anti-dilutive.

Recent Accounting Pronouncements

Recent accounting pronouncements issued by the FASB, including its Emerging Issues Task Force, the American Institute of Certified Public Accountants, and the Securities and Exchange Commission did not or are not believed by management to have a material impact on the Company's present or future consolidated financial statement presentation or disclosures.

In August 2020, the FASB issued ASU 2020-06, Debt — Debt with Conversion and Other Options (Subtopic 470-20) and Derivatives and Hedging—Contracts in Entity’s Own Equity (Subtopic 815-40): Accounting for Convertible Instruments and Contracts in an Entity’s Own Equity (“ASU 2020-06). ASU 2020-06 simplifies the accounting for convertible debt by eliminating the beneficial conversion and cash conversion accounting models. Upon adoption of ASU 2020-06, convertible debt proceeds, unless issued with a substantial premium or an embedded conversion feature that is not clearly and closely related to the host contract, will no longer be allocated between debt and equity components. This modification will reduce the issue discount and result in less non-cash interest expense in financial statements. ASU 2020-06 also updates the earnings per share calculation and requires entities to assume share settlement when the convertible debt can be settled in cash or shares. ASU 2020-06 will be effective January 1, 2024, and a cumulative-effect adjustment to the opening balance of retained earnings is required upon adoption. Early adoption is permitted, but no earlier than January 1, 2021, including interim periods within that year. The adoption of ASU 2020-06 is not expected to have any impact on the Company’s consolidated financial statement presentation or disclosures subsequent to its adoption, with any effect being largely dependent on the composition and terms of outstanding financial instruments at the time of adoption.

2. Property and Equipment

At December 31, 2021 and 2020, property and equipment consists of the following:

	December 31, 2021	December 31, 2020
Office equipment	$ 34,000	$ 36,000
Furniture and fixtures	5,000	5,000
Testing equipment	37,000	37,000
Leasehold Improvements	25,000	25,000
Subtotal	101,000	103,000
Less accumulated depreciation	(92,000)	(87,000)
Total	$ 9,000	$ 16,000

Depreciation expense for the years ended December 31, 2021 and 2020 was $7,000 and $7,000, respectively.

3. Operating Lease

The Company leases certain corporate office space under an operating lease agreement. We determine if an arrangement is a lease at inception. Lease assets are presented as operating lease right-of-use assets and the related liabilities are presented as lease liabilities in our consolidated balance sheets.

Operating lease right-of-use (“ROU”) assets and liabilities are recognized at commencement date based on the present value of lease payments over the lease term. ROU assets represent our right to use an underlying asset for the lease term and lease liabilities represent our obligation to make lease payments arising from the lease. Generally, the implicit rate of interest in lease arrangements is not readily determinable and the Company utilizes its incremental borrowing rate in determining the present value of lease payments. The Company’s incremental borrowing rate is a hypothetical rate based on its understanding of what its credit rating would be. The operating lease ROU asset includes any lease payments made and excludes lease incentives.

The components of lease expense and supplemental cash flow information related to leases for the period are as follows:

	December 31, 2021
Lease costs:	
Operating lease (included in general and administrative in the Company’s consolidated statement of operations)	$ 30,000
Other information:	
Cash paid for amounts included in the measurement of lease liabilities	$ 21,000
Weighted average remaining lease term – operating leases (in years)	3.4
Average discount rate – operating leases	4%
The supplemental balance sheet information related to leases for the period is as follows:	
Long-term right-of-use assets	$ 143,000
Short-term operating lease liabilities	$ 38,000
Long-term operating lease liabilities	106,000
Total operating lease liabilities	$ 144,000

Maturity of the Company's lease liabilities are as follows:

Year Ending December 31:	Operating Lease
2022	$ 43,000
2023	45,000
2024	46,000
2025	19,000
2026 and thereafter	–
Total lease payments	153,000
Less: Imputed interest/present value	(9,000)
Present value of lease liabilities	$ 144,000

4. Other Lease Formerly with Related Party

The Company's former executive offices were located in Tomball, Texas ("Tomball Facility") and leased from JBL Energy Partners, an entity owned by Jason Lane, former Director and Chairman of the Board of the Company who resigned in April 2021. The Tomball Facility was under a month-to-month lease at a lease rate of $5,000 per month, as amended. Total rent expense under this lease during the years ended December 31, 2021, and 2020 was $8,000 and $60,000. As of December 31, 2021, balance payable to JBL Energy Partners was $13,000 which is included as part of accounts payable and accrued expenses in the accompanying consolidated balance sheets. The Tomball Facility lease with Lane was terminated in connection with the resignation of Mr. Lane. At May 1, 2021, the Company agreed to continue to lease a portion of the Tomball facility from the new landlord on a month to month basis at $1,000 per month. The Company also rents a storage facility on a month to month basis for $250 per month.

Convertible Notes Payable

	December 31, 2021	December 31, 2020
Convertible notes	$ 1,154,000	$ 953,000
Accrued interest	435,000	313,000
Subtotal, including $1,333,000 and $1,128,000 in default at December 31, 2021 and 2020, respectively	1,589,000	1,266,000
Convertible note discount	(86,000)	(83,000)
Total	$ 1,503,000	$ 1,183,000

At December 31, 2019, total outstanding notes payable amounted to $1,019,000. During the year ended December 31, 2020, the Company issued convertible promissory notes in the aggregate of $329,000 for cash proceeds of $299,000, net of original issue discount ("OID") of $30,000. The notes do not bear any interest; however, the implied interest rate used was 10% since the notes were issued 10% less than its face value, are unsecured, mature in twelve months from issuance and convertible into 11,434,037 shares of the Company's common stock at $0.02 to $0.035 per share. In addition, the Company also granted these note holders warrants to purchase 5,717,017 shares of the Company's common stock. The warrants are fully vested, exercisable at $0.03 to $0.035 per share and expire one year from the date of issuance. As a result, the Company recorded a note discount of $329,000 to account for the relative fair value of the warrants, the notes' beneficial conversion feature, and OID. During 2020, a total of $395,000 of convertible notes payable and $16,000 of accrued interest payable were converted into 9,854,707 shares of common stock. At December 31, 2020, total outstanding notes payable amounted to $953,000.

During the year ended December 31, 2021, the Company issued convertible promissory notes in the aggregate of $723,000 for cash proceeds of $658,000, net of OID of $65,000. The notes implied interest rate was 10%, mature in twelve months from issuance, and are convertible into 28,794,327 shares of the Company's common stock at $0.02 to $0.03 per share. In addition, the Company also granted these note holders warrants to purchase 18,907,157 shares of the Company's common stock. The warrants are fully vested, exercisable at $0.03 to $0.04 per share and expire one year from the date of issuance. As a result, the Company recorded a note discount of $356,000 to account for the relative fair value of the warrants and OID. During 2021, a total of $522,000 of convertible notes payable and $2,000 of accrued interest payable were converted into 22,085,646 shares of common stock. As of December 31, 2021, total outstanding notes payable amounted to $1,154,000.

At December 31, 2019, the balance of the unamortized discount was $153,000. During the year ended December 31, 2020, debt discount of $328,000 was recorded and debt discount of amortization of $398,000 was recorded. During 2020, the note discounts are being amortized over the life of the notes or were amortized in full upon the conversion of the corresponding notes to common stock. At December 31, 2020, the unamortized debt discount was $83,000. On January 1, 2021 debt discount was decreased by $30,000 due to the adoption of ASU 2020-06 (see below). During 2021, due to the adoption of ASU 2020-06, unamortized note discounts are included in the carrying value of the corresponding convertible notes upon the conversion into common stock. During the year ended December 31, 2021, debt discount of $355,000 was recorded, debt discount of amortization of $59,000 was recorded, and $263,000 of debt discount was removed and included in the carrying amount of convertible notes that were converted. At December 31, 2021, the unamortized debt discount was $86,000.

As of December 31, 2019 total accrued interest amounted to $184,000. During the year ended December 31, 2020, the Company accrued interest of $145,000 related to certain past due notes payable. As of December 31, 2020 total accrued interest amounted to $313,000. During the year ended December 31, 2021, the Company accrued interest of $124,000 related to certain past due notes payable. As of December 31, 2021 total accrued interest amounted to $435,000 which was included as part of convertible notes payable in the accompanying consolidated balance sheet.

At December 31, 2021 and 2020, twenty-eight (28) and twenty-two (22) notes payable, respectively, with aggregate principal and accrued balances of $1,333,000 and $1,128,000, respectively, are past due. The Company is currently in negotiations with these note holders to settle these past due notes payable.

As of December 31, 2021, convertible notes payable and accrued interest are convertible into approximately 24,101,000 shares of common stock at conversion rates ranging from $0.02 to $0.48 per share.

The Company early adopted ASU No. 2020-06 effective January 1, 2021 using the modified retrospective approach. Upon adoption, the following changes resulted: (i) the intrinsic value of the beneficial conversion features recorded in 2020 was reversed as of the effective date of adoption, thereby resulting in an increase in the convertible debentures with an offsetting adjustment to additional paid in capital and (ii) interest expense recorded in 2020 that was related to the amortization of the discount related to the beneficial conversion feature was reversed against opening accumulated deficit. Accordingly, the adoption of ASU 2020-06 resulted in a decrease to accumulated deficit of $30,000, a decrease in addition paid in capital of $60,000, and an increase in total stockholders' deficit of $30,000 on January 1, 2021.

5. PPP Loan Payable

In June 2020, the Company was granted a loan (the "PPP loan") from Cadence Bank in the aggregate amount of $151,000, pursuant to the Paycheck Protection Program (the "PPP") under the CARES Act.

The PPP loan agreement is dated June 18, 2020, matures on June 18, 2025, bears interest at a rate of 1% per annum, with the first six months of interest deferred, and is unsecured and guaranteed by the U.S. Small Business Administration ("SBA"). The Company applied ASC 470, Debt, to account for the PPP loan. The PPP loan may be prepaid at any time prior to maturity with no prepayment penalties. Funds from the PPP loan may only be used for qualifying expenses as described in the CARES Act, including qualifying payroll costs, qualifying group health care benefits, qualifying rent and debt obligations, and qualifying utilities. Management believes the entire loan amount has been used for qualifying expenses and all of the conditions outlined in the PPP loan program were adhered to by the Company. Under the terms of the PPP, certain amounts of the loan may be forgiven if they are used for qualifying expenses. The terms of the PPP loan provide for customary events of default including, among other things, payment defaults, breach of representations and warranties, and insolvency events. The Company was in compliance with the terms of the PPP loan as of December 31, 2021.

In January 2022, the Company received notice that $24,000 of the PPP loan was forgiven (see Note 12).

6. Research and Development

The Company constructs, develops and tests the AOT technology with internal resources and through the assistance of various third-party entities. Costs incurred and expensed include fees such as license fees, purchase of test equipment, viscometers, SCADA systems, computer equipment, direct costs related to AOT equipment manufacture and installation, payroll and other related equipment and various logistical expenses for the purposes of evaluating and testing the Company's AOT prototypes.

Costs incurred for research and development are expensed as incurred. Purchased materials that do not have an alternative future use are also expensed. Furthermore, costs incurred in the construction of prototypes with no certainty of any alternative future use and established commercial uses are also expensed.

For the years ended December 31, 2021 and 2020, our research and development expenses were $350,000 and $355,000, respectively.

AOT Prototypes

During the years ended December 31, 2021 and 2020, the Company incurred total expenses of $153,000 and $167,000, respectively, in the manufacture and testing of the AOT prototype equipment. These expenses have been reflected as part of Research and Development expenses on the accompanying consolidated statements of operations.

Temple University Licensing Agreement-amount past due

On August 1, 2011, the Company and Temple University ("Temple") entered into two (2) Exclusive License Agreements (collectively, the "License Agreements") relating to Temple's patent applications, patents and technical information pertaining to technology associated with an electric and/or magnetic field assisted fuel injector system (the "First Temple License"), and to technology to reduce crude oil viscosity (the "Second Temple License"). The License Agreements are exclusive, and the territory licensed to the Company is worldwide and replace previously issued License Agreements.

Pursuant to the two licensing agreements, the Company paid Temple a non-refundable license maintenance fee of $300,000, and agreed to pay (i) annual maintenance fees of $187,500; (ii) royalty fee ranging from 4% up to 7% from revenues generated from the licensing agreements; and (iii) 25% of all revenues generated from sub-licensees to secure or maintain the sub-license or option thereon. The term of the licenses commenced in August 2011 and will expire upon expiration of the patents. The agreements can also be terminated by either party upon notification under terms of the licensing agreements or if the Company ceases the development of the patent or fails to commercialize the patent rights.

As of December 31, 2019, the total unpaid fees and interest due to Temple pursuant to these agreements was $1,255,000. During 2020 the Company incurred an additional $236,000 of costs, including $188,000 annual license fee and $48,000 of interest. As of December 31, 2020, total unpaid fees and interest due to Temple was $1,491,000. During 2021 the Company incurred an additional $235,000 of costs, including $187,000 annual license fee and $48,000 of interest. As of December 31, 2021, total unpaid fees and interest due to Temple was $1,726,000. With regards to the unpaid fees to Temple, a total of $135,000 are deferred until such time the Company achieves a revenue milestone, as defined, or upon termination of the licensing agreements and the remaining $1,591,000 are deemed past due. The Company intends to enter into negotiations with Temple to settle or cure the past due balance.

7. Income Taxes

The Company did not provide for any Federal and State income tax for the years ended December 31, 2021 and 2020 due to the Company's net losses. A reconciliation of income taxes with the amounts computed at the statutory federal rate follows:

	December 31,	
	2021	2020
Computed tax provision (benefit) at federal statutory rate (21%)	$ (150,000)	$ (295,000)
Valuation allowance	150,000	295,000
Income tax provision	$ –	$ –

The deferred tax assets and deferred tax liabilities recorded on the balance sheet are as follows:

	December 31,	
	2021	2020
Net operating loss carry forwards	$ 13,008,000	$ 12,842,000
Stock based compensation	(9,000)	(79,000)
Other temporary differences	18,000	(17,000)
Valuation allowance	(13,017,000)	(12,746,000)
Total deferred taxes net of valuation allowance	$ –	$ –

As of December 31, 2021, the Company had net operating losses available for carry forward for state and federal tax purposes of approximately $62 million expiring through 2040. These carry forward benefits will be subject to annual limitations due to the ownership change limitations imposed by the Internal Revenue Code and similar state provisions. The annual limitation, if imposed, may result in the expiration of net operating losses before utilization.

As of December 31, 2021, the Company recorded a valuation allowance of $13,017,000 for its deferred tax assets since the Company believes that such assets did not meet the more likely than not criteria to be recoverable through projected future profitable operations in the foreseeable future. This valuation is based on the federal corporate tax rate of 21%.

Effective January 1, 2007, the Company adopted FASB guidance that addresses the determination of whether tax benefits claimed or expected to be claimed on a tax return should be recorded in the financial statements. Under this guidance, the Company may recognize the tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities, based on the technical merits of the position. The tax benefits recognized in the financial statements from such a position should be measured based on the largest benefit that has a greater than 50% likelihood of being realized upon ultimate settlement. The FASB also provides guidance on de-recognition, classification, interest and penalties on income taxes, accounting in interim periods and requires increased disclosures. As of December 31, 2021 and 2020, the Company does not have a liability for unrecognized tax benefits.

The Company files income tax returns in the U.S. federal jurisdiction and the State of Texas. The Company is subject to U.S. federal or state income tax examinations by tax authorities for years after 2002. During the periods open to examination, the Company has net operating loss and tax credit carry forwards for U.S. federal and state tax purposes that have attributes from closed periods. Since these net operating losses and tax credit carry forwards may be utilized in future periods, they remain subject to examination. The Company's policy is to record interest and penalties on uncertain tax provisions as income tax expense. As of December 31, 2020, the Company has no accrued interest or penalties related to uncertain tax positions. The Company believes that it has not taken any uncertain tax positions that would impact its consolidated financial statements as of December 31, 2021 and 2020.

8. Common Stock

Year Ending December 31, 2021

During the year ended December 31, 2021, the Company issued an aggregate of 32,118,979 shares of its common stock as follows:

- The Company issued 8,533,333 shares of its common stock at $0.015 per share upon the private sale for proceeds of $128,000.

- The Company issued 22,085,646 shares of its common stock upon the conversion of $524,000 in convertible notes pursuant to the convertible notes conversion prices of $0.02 to $0.03 per share.

- The Company issued 500,000 shares of its common stock as compensation valued at $20,000 with price of $0.04 per share.

- The Company issued 1,000,000 shares of its common stock for services valued at $40,000 with price of $0.04 per share.

Year Ending December 31, 2020

During the year ended December 31, 2020, the Company issued an aggregate of 13,069,707 shares of its common stock as follows:

- The Company issued 2,000,000 shares of its common stock at $0.015 per share upon the private sale for proceeds of $30,000.

- The Company issued 9,854,707 shares of its common stock upon the conversion of $410,000 in convertible notes pursuant to the convertible notes conversion prices of $0.02 to $0.15 per share.

- The Company issued 1,155,000 shares of its common stock upon the exercise of warrants for proceeds of $58,000 at exercise price of $0.05 per share.

- The Company issued 60,000 shares of its common stock upon the exercise of options for proceeds of $3,000 at exercise price of $0.05 per share.

9. Stock Options and Warrants

The Company periodically issues stock options and warrants to employees and non-employees in capital raising transactions, for services and for financing costs. Options and warrants vest and expire according to terms established at the grant date.

Options

Employee options vest according to the terms of the specific grant and expire from 5 to 10 years from date of grant. The weighted average, remaining contractual life of employee and non-employee options outstanding at December 31, 2021 was 4.9 years. Stock option activity for the period January 1, 2020 to December 31, 2021, was as follows:

	Options	Weighted Avg. Exercise Price
Options outstanding, December 31, 2019	39,750,603	$ 0.20
Options granted	3,599,998	0.12
Options exercised	(60,000)	0.05
Options cancelled	(10,810,000)	0.25
Options outstanding, December 31, 2020	32,480,601	$ 0.18
Options granted	800,000	0.03
Options exercised	–	–
Options cancelled	(2,200,000)	0.30
Options outstanding, December 31, 2021	31,080,601	$ 0.17

The weighted average exercise prices, remaining contractual lives for options granted, exercisable, and expected to vest as of December 31, 2021 were as follows:

	Outstanding Options			Exercisable Options	
Option Exercise Price Per Share	Shares	Life (Years)	Weighted Average Exercise Price	Shares	Weighted Average Exercise Price
$ 0.02 - $ 0.24	22,305,551	6.1	$ 0.10	22,305,551	$ 0.10
$ 0.25 - $ 0.49	8,153,552	2.0	0.30	8,153,552	0.30
$ 0.50 - $ 0.99	471,052	2.3	0.85	471,052	0.85
$ 1.00 - $ 2.00	150,446	1.6	1.18	150,446	1.18
	31,080,601	4.9	$ 0.17	31,080,601	$ 0.17

As of December 31, 2021, the market price of the Company's stock was $0.04 per share. At December 31, 2021 the aggregate intrinsic value of the options outstanding was $22,000. Future unamortized compensation expense on the unvested outstanding options at December 31, 2021 is $0.

Year Ending December 31, 2021

During the year ended December 31, 2021, the Company issued options to purchase a total of 800,000 shares of common stock to an employee and former officer with a fair value of $32,000 determined using the Black-Scholes Option Pricing model. The options are exercisable at $0.02 to $0.05 per share, vesting immediately or over one month and expire ten years from the date of grant. During the year ended December 31, 2021, the Company recognized compensation costs of $32,000 based on options that vested.

Year Ending December 31, 2020

During the year ended December 31, 2020, the Company issued options to purchase a total of 3,599,998 shares of common stock to employees, officers and members of the Board of Directors with a fair value of $373,000 determined using the Black-Scholes Option Pricing model. The options are exercisable at $0.02 to $0.15 per share, vesting over three to twelve months and expiring ten years from the date of grant. During the year ended December 31, 2020, the Company recognized compensation costs of $361,000 based on options that vested.

Black-Scholes Option Pricing

The Company used the following average assumptions in its calculation using the Black-Scholes Option Pricing model:

	Years Ended	
	2021	2020
Expected life (years)	4.9	5.5
Risk free interest rate	1.3%	1.7%
Volatility	148%	138%
Expected dividend yield	0%	0%

The assumptions used in the Black Scholes models referred to above are based upon the following data: (1) the contractual life of the underlying non-employee options is the expected life. The expected life of the employee option is estimated by considering the contractual term of the option, the vesting period of the option and the employees' expected exercise behavior. (2) The expected stock price volatility was based upon the Company's historical stock price over the expected term of the option. (3) The risk-free interest rate is based on published U.S. Treasury Department interest rates for the expected terms of the underlying options. (4) The expected dividend yield was based on the fact that the Company has not paid dividends to common shareholders in the past and does not expect to pay dividends to common shareholders in the future.

Warrants

The following table summarizes certain information about the Company's stock purchase warrants.

	Warrants	Weighted Avg. Exercise Price
Warrants outstanding, December 31, 2019	13,065,084	$ 0.11
Warrants granted	6,117,013	0.03
Warrants exercised	(1,155,000)	0.05
Warrants cancelled	(9,343,420)	0.07
Warrants outstanding, December 31, 2020	8,683,677	$ 0.11
Warrants granted	19,307,153	0.04
Warrants exercised	–	–
Warrants cancelled	(8,013,681)	0.10
Warrants outstanding, December 31, 2021	19,977,149	$ 0.04

At December 31, 2021 the price of the Company's common stock was $0.04 per share and the aggregate intrinsic value of the warrants outstanding was $76,000. As of December 31, 2021, 19,943,816 warrants were fully vested and 33,333 warrants vest in January 2022.

	Outstanding Warrants			Exercisable Warrants	
Warrant Exercise Price Per Share	Shares	Life (Years)	Weighted Average Exercise Price	Shares	Weighted Average Exercise Price
$ 0.02 - $ 0.24	19,907,149	0.7	$ 0.04	19,873,816	$ 0.04
$ 0.25 - $ 0.49	–	–	–	–	–
$ 0.50 - $ 1.00	70,000	2.3	0.80	70,000	0.80
	19,977,149	0.7	$ 0.04	19,943,816	$ 0.04

Year Ending December 31, 2021

- In February through December 2021, pursuant to terms of convertible notes issued, the Company granted warrants to purchase 18,907,157 shares of common stock with an exercise price of $0.03 to $0.04 per share, vesting immediately upon grant and expiring one year from the date of grant. See Note 4 for further discussion.

- In January through December 2021, pursuant to terms of a consulting agreement, the Company granted warrants to purchase 399,996 shares of common stock with an exercise price of $0.02 to $0.05 per share, vesting one month from the date of grant and expiring two years from the date of grant. Total fair value of these options at grant date was approximately $13,000 determined using the Black-Scholes Option Pricing model with the following assumptions: life of 2 years; risk free interest rate of 0.11% to 0.7%; volatility of 204% to 242%; and dividend yield of 0%. During the year ended December 31, 2021, the Company recognized compensation expense of $13,000 based on the fair value of the warrants that vested.

Year Ending December 31, 2020

- In March through December 2020, pursuant to terms of convertible notes issued, the Company granted warrants to purchase 5,717,017 shares of common stock with an exercise price of $0.03 to $0.035 per share, vesting immediately upon grant and expiring one year from the date of grant. See Note 4 for further discussion.

- In April through December 2020, pursuant to terms of a consulting agreement, the Company granted warrants to purchase 399,996 shares of common stock with an exercise price of $0.02 to $0.08 per share, vesting 1 to 3 months from the date of grant and expiring two years from the date of grant. Total fair value of these options at grant date was approximately $16,000 using the Black-Scholes Option Pricing model with the following assumptions: life of 2 years; risk free interest rate of 0.11% to 0.19%; volatility of 188% to 200%; and dividend yield of 0%. During the year ended December 31, 2020, the Company recognized compensation expense of $16,000 based on the fair value of the warrants that vested.

10. Related Party Transactions

Accrued Expenses – Related Party

Accrued Expenses – Related Parties consists of unused vacation of officers, unreimbursed out-of-pocket expenses incurred by officers, and unpaid board and committee fees to members of the Company's Board of Directors. As of December 31, 2021 and 2020, total accrued expenses – related parties amounted to $0 and $95,000, respectively.

11. Commitments and Contingencies

We are involved in certain legal proceedings that arise from time to time in the ordinary course of our business. Except for income tax contingencies, we record accruals for contingencies to the extent that our management concludes that the occurrence is probable and that the related amounts of loss can be reasonably estimated. Legal expenses associated with the contingency are expensed as incurred. There is no current or pending litigation of any significance with the exception of the matters that have arisen under, and are being handled in, the normal course of business.

Contractual Commitments

The Company's contractual commitments for future periods, licensing agreements and minimum guaranteed compensation payments as described in the following table and associated footnotes:

Year ending December 31,	License Agreements (1)	Compensation Agreements (2)	Total Obligations
2022	$ 187,500	$ 197,000	$ 384,500
2023	187,500	–	187,500
2024	187,500	–	187,500
2025	187,500	–	187,500
2026	187,500	–	187,500
Total	$ 937,500	$ 197,000	$ 1,134,500

(1) Consists of license maintenance fees to Temple University in the amount of $187,500 paid annually through the life of the underlying patents or until otherwise terminated by either party (see Note 6).

(2) Consists of certain contractually provided benefits to a former executive officer pursuant to a severance agreement and amendments thereto. The balance due as of December 31, 2021, of $197,000 is included as part of Accounts payable and accrued expenses in the accompanying consolidated balance sheets, of which the total amount is in arrears. The former executive officer disputes the amount identified in the above table, claiming the above amount is less than the amount to which he believes he is owed. Absent an agreement to settle the dispute, and in the event the former executive officer elects to initiate litigation regarding the dispute, including claims for interest and penalties to which the former executive officer believes he is entitled, the Company has reserved, and if necessary and appropriate will assert, all factual and legal defenses, counter-claims, rights, and remedies it may have in any such suit.

12. Subsequent Events

In January 2022, pursuant to terms of a consulting agreement, the Company granted warrants to purchase 1,000,000 shares of common stock with an exercise price of $0.04 per share, vesting immediately upon grant and expiring five years from the date of grant.

In February 2022, the Company issued 825,000 shares of its common stock upon the exercise of warrants for proceeds of $35,000 at an exercise price of $0.03 per share.

In January through March 2022, the Company issued 366,666 shares of its common stock upon the conversion of notes for proceeds of $10,000 at a conversion price of $0.03 per share.

In January 2022, the Company received notice that $24,049 of the PPP loan (see Note 5) was forgiven. The PPP loan liability will be reduced by the amount forgiven, and a $24,049 gain on extinguishment will be recorded in January 2022. The balance of the PPP loan after recording the forgiveness will be $127,151.