Trickle Research

Every raging river, every great lake, every deep blue sea starts … with a trickle

Company Profile

FPE FIREPOINT ENERGY

Firepoint Energy, Inc.

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Disclosure: Portions of this report are excerpted from Firepoint Energy's website(s), presentations or other public collateral. We have attempted to identify those excerpts by *italicizing* them in the text.

Company Overview

Firepoint Energy, Inc. ("the Company" and/or "Firepoint") is a private company developing processes to convert waste coal into a handful of high value products. We intend to scale the technologies to process millions of tons of waste coal, coal, and fly ash. While Firepoint Energy is a new company, the principals of Firepont Energy have a history of developing and acquiring technologies to help the world transition to renewable energy. They have worked in the gasification, gas-to-liquids, hydrogen and ethanol industries since the early 1990s.

Firepoint Energy has acquired the rights to a site in Saltsburg, Pennsylvania, within the historical coal mining region known as Tunnelton. The location formerly served as the base of operations for the Tunnelton Mining Company. The site got its start when the industry as a whole was less concerned with its byproducts and the environmental consequences. The Company believes it can develop 4 million tons of waste coal from this initial site, and they have identified source piles of waste in Pennsylvania, Illinois, Kentucky, and potentially Texas. As they locate these resources, they will work to develop the methods that offer the lowest cost of extraction for the various products they are extracting.

As noted, the Company intends to use their processes to generate a handful of high value products, including syngas, synthetic aviation fuel (SAF), rare earth elements (REEs), hydrogen, and others. From the high level, their processes include gasifying the waste coal into a synthetic gas and then funneling it into a gas-to-liquids system. From that state, a subtle rearrangement of the molecules completes the transformation of the waste coal into SAF, which is a high demand aviation fuel. The gasification method can also be tailored to leave behind rare earth elements, like holmium, terbium, and dysprosium, which are also in high demand within the medical, automotive, and defense sectors. Clearly, the development of domestic sources of REEs is among the new Trump Administration's goals, and being able to do so from otherwise potentially hazardous coal dumps is in our view markedly valuable. Further, the Company believes its processes can also be used to convert Acid Mine Drainage (AMD) into renewable hydrogen. AMD is a detrimental byproduct of many coal piles and mining sites, and in many instances, ends up in nearby watersheds, thereby causing a host of environmental problems.

The Company expects to be able to process 500+ tons of waste coal per day from their initial site, which they believe contains 4 million tons of waste coal in total. Other sites they are evaluating contain from *10 million tons to over 75 million tons in place*. We will provide some metrics around the potential monetization of those types of stockpiles throughout this profile.

As we see it, the Company's plan to convert waste coal piles into valuable commodities hinges on three primary hurdles:

- the technical "know-how" to assemble existing processes/technologies to be able to cost effectively execute those conversions
- access to the capital necessary to establish and support those processes
- access to enough coal waste to scale the project(s) to support/justify the underlying required capex

We will address these items throughout this profile, but with respect to the most immediate of these, the Company recently commenced SEC registered capital campaigns involving both Regulation Crowd Funding ("Reg CF") as well as Regulation D. They have experienced initial success via these registrations. Further, they also recently announced the acquisition of a publicly traded shell company on the OTC Markets. Via that conduit, the Company believes their position as a publicly traded enterprise will enhance their access to the additional capital necessary to facilitate the execution of their business plan. To that end, as reflected in the bios provided in this profile, management has measurable collective experience with public markets and capital acquisition for prior associated companies.

Industry and Technical Overview

To reiterate some of the bullet points from the Company Overview above, there are some critical pieces to the Firepoint story that will likely determine the rate of their success. We will address the easiest and most straightforward of those first, which is their "access to enough coal waste to scale the project(s) to support/justify the required capex." To that end, we included some definitions to decipher industry vernacular that might be helpful.

- **What is "Waste Coal" or "GOB piles"?**

For all of its positive contributions to the energy requirements and industrialization of America, the coal industry has undeniably left behind some dirty and contaminating remnants. Those remnants include both waste coal piles and fly ash disposal sites.

Waste coal piles are generally byproducts of the coal mining process. From the Abandoned Mine Reclamation Clearinghouse (amrclearinghouse.org :::Burning Waste Coal in CFB Power Plants):

> *In the 19th and 20th centuries, unwanted waste product from coal mining was dumped into piles that sometimes grew to millions of tons. These coal refuse piles (also called waste coal, gob, culm, boney, or slate dumps) are composed of other minerals extracted incidentally along with coal. However, the process that separated the waste from coal was imperfect, so the piles invariably contain some coal as well.*

> *Today, these "gob piles" are common throughout Pennsylvania's coal country: huge eyesores with dangerous, unstable slopes. They absorb solar heat to become so hot they cannot support vegetation, and heavy erosion from these piles becomes a source of acid mine drainage, which contains heavy metals and acids that pollute streams and rivers. Besides the environmental degradation, gob piles sink property values and contribute to economic decline in Pennsylvania's communities.*

While we submit that we do not think anyone knows exactly how many gob piles there are throughout the coal mining belt(s) of the Northeast, or in other coal producing areas of the West for that matter, there are some state-specific assessments that help frame the problem. While there are many to choose form, here are just a few of them:

From The Appalachian Journal of Law (https://appalachian.scholasticahq.com/article/73814-addressing-virginia-s-legacy-gob-piles):

> *"Virginia Energy (formerly the Department of Mines, Minerals, and Energy) has identified 245 legacy GOB piles in Virginia concentrated in the southwest region."*

From Appalachian Region Independent Power Producers Association ("AIPPA") https://arippa.org/wp-content/uploads/2018/12/ARIPPA-Coal-Refuse-Whitepaper-with-Photos-10_05_15.pdf) :

> *"In Pennsylvania, there are more than 5,000 abandoned, unreclaimed mining areas covering approximately 184,000 acres. The coal refuse piles at these abandoned mine lands cover an aggregated area of 8,500 acres and contain a total volume of more than 200 million cubic yards. The total amount of coal refuse in Pennsylvania is unknown. Based on the known amount on abandoned mine lands and estimates of the amount of coal refuse associated with historical mining operations, the amount is between 200 million and 8 billion cubic yards. It has been speculated that the amount of coal refuse is approximately 2 billion cubic yards split almost equally between the anthracite and bituminous coal regions".*

From Appalachian Citizen's Law Center: (Mine Permits Report):

> *Our results show that a large portion of Kentucky's surface coal mines have idled production. We find that nearly forty percent of surface mine permits that are classified by the state of Kentucky as being in active status are functionally abandoned. These permits comprise nearly 12,000 disturbed acres. We also find that this issue is not specific to a handful of companies, but that many companies have functionally abandoned permits. We recognize that just because a mine has stopped producing, that does not necessarily mean that all work on the site and progress towards reclamation has stalled. However, we found that disturbed acreage has remained static on the majority of functionally abandoned mines for several years and that total highwall also remained nearly static during the first six months of 2023, suggesting that reclamation is not occurring on those sites.*

As this information intimates, and to one of our bullet points regarding Firepoint's keys to success, not only is there an abundance of potential feedstock for their gob-to-jet-fuel plan, but the states polluted by this refuse are actively searching for ways to mitigate it, and in most instances, they have remediation programs in place to do so. To that end, there are currently processes in place to help in that regard. For instance, we think it is reasonable to suggest that universities in the majority of the major coal producing states have research endeavors aimed at finding resources to mitigate the harmfulness of gob piles. In addition, the industry has attempted to address the problem the way industries generally do, which is to try to figure out how to profit from the gob piles, and there are examples of success in *that* regard. Specifically, there are energy companies that have been able to reclaim gob piles and burn them in their plants. On its face that makes sense since the cost of reclaiming them is offset by reductions in the costs to mine traditional feedstock. However, the economics of that approach generally requires a handful of optimum variables including things like the BTU content of the gob refuse, proximity of the pile to the plant, permitting requirements, and others. Further, even favorable variables in those instances need to be offset by the relative cost of existing supplies and inventories. In short, we suspect the legacy industry will continue to evaluate — and in some cases mitigate — some gob piles, but that approach is not likely to make a meaningful dent in the problem.

Staying on the gob pile issue, the Company's initial focus is to turn these piles into synthetic aviation fuel (SAF), but they also believe they can extract rare earth elements (REEs) from many of these piles as well, creating other potential revenue streams. This requires some color. From the University of Utah College of Science (Tapping coal mines for rare-earth materials | College of Science):

> *In a groundbreaking study led by the University of Utah, researchers have discovered elevated concentrations of rare earth elements (REEs) in active coal mines rimming the Uinta coal belt of Colorado and Utah. This finding suggests that these mines, traditionally known for their coal production, could potentially serve as secondary sources for critical minerals essential for renewable energy and high-tech applications. "The model is if you're already moving rock,*

> *could you move a little more rock for resources towards energy transition? " Lauren Birgenheier, an associate professor of geology and geophysics, explains, In those areas, we're finding that the rare earth elements are concentrated in fine-grain shale units, the muddy shales that are above and below the coal seams." …"The coal itself is not enriched in rare earth elements," Vanden Berg said. "There's not going to be a byproduct from mining the coal, but for a company mining the coal seam, could they take a couple feet of the floor at the same time? Could they take a couple feet of the ceiling? Could there be potential there? That's the direction that the data led us."*

First, while this study may in fact be "groundbreaking" we would note that universities in other coal producing states are *also* researching the potential extraction of REEs from gob piles. To that end, it is important to recognize something from the paragraph above from the university of Utah. That is, … *"the coal itself is not enriched in rare earth elements," … There's not going to be a byproduct from mining the coal, but for a company mining the coal seam, could they take a couple feet of the floor at the same time? Could they take a couple feet of the ceiling?"* To translate, the potential for extracting REEs from gob piles stems from the reason gob piles exist in the first place. That is, REEs are not typically contained within coal itself, but rather from the surrounding geology of many coal deposits. Again, gob piles generally consist of an amalgamation of mined remnant coal as well as the rock surrounding the target coal seams. In simplified terms, as material is removed from the mine, the coal rich portions are retained or processed, while the portions that include predominant amounts of non-coal rock, dirt, etc. are sent to the gob pile. As it turns out, those "non-coal" portions may include REEs, making the gob piles valuable beyond whatever remnant coal they may possess as well. That brings us back to an additional industry definition we alluded to above.

- **What is Coal Ash?**

Aside from gob piles, the coal industry has another byproduct of waste disposal, which is typically referred to as "coal ash" or "coal combustion residuals" (CCRs). Unlike gob piles, which are accumulated from the coal *mining* process, coal ash is created from the burning of coal in coal-fired power plants. There are different types of coal ash depending on where they are created over the course of the coal burning process, but coal ash typically contains a host of heavy metals and other dangerous components that can be hazardous to animals and humans. As a result, the Environmental Protection Agency has created regulations for the impoundment and disposal of coal ash.

Much like gob piles, the potential to recycle or mitigate coal ash is the subject of ongoing research in many of the same coal state universities we noted above. However, in the case of coal ash, those endeavors may have more environmental focus (as opposed economic focus) because of their higher relative potential for contaminating a variety of environments, including watersheds and ground water. We would note, *there are* existing commercial applications of some types of coal ash (i.e., making cement), but other types are more problematic. Again, our point here is to delineate the Company's focus on gob piles as opposed to coal ash dumps.

Further to the above, while waste coal and coal ash are not the same, and present different problems in terms of their mitigation, they are similar in terms of their potential to harm the environment the longer they sit on land that abuts a waterway.

Revisiting the Company's "hurdles to success", the Company will need to identify and acquire access to waste coal piles in order to provide them with the feedstock to deliver high value adjuncts. As we attempted to characterize above, waste coal piles are plentiful, and are frankly a black mark on the industry. They have presented environmental hazards, and will continue to do so, especially to surrounding and connected watersheds. They are also the subject of multiple research projects attempting to mitigate them. From that perspective, while we submit, each pile has its own unique circumstances around their ownership and potential remediation, we do not view limited or restricted access to the feedstock necessary to execute the Company's plan as a major impediment to their success. Further, as with their first site, and perhaps counterintuitive to the environmental push to clean them up, they may have to acquire access to these sites, which may require capital. Again, as we survey the landscape today, we do not view finding enough gob piles to clean up as a major risk in the story.

Revisiting the Company Overview above, Firepoint's *primary* focus is to convert gob piles into two valuable commodities: synthetic aviation fuel (SAF), rare earth elements (REEs). Industry projections for these potential products suggest that each is already in high demand and will remain so for the foreseeable future.

- **Synthetic Aviation Fuel**

From the U.S. Department of Energy (Synthetic Aviation Fuels | Department of Energy):

> *SAF is a biofuel used to power aircraft that has similar properties to conventional jet fuel but with a smaller carbon footprint. Depending on the feedstock and technologies used to produce it, SAF can reduce emissions dramatically compared to conventional jet fuel. Some emerging SAF pathways even have a net-negative emissions footprint.*
>
> *SAF's lower carbon intensity makes it an important solution for reducing emissions, which make up 9%–12% of U.S. transportation emissions, according to the U.S. Environmental Protection Agency…The U.S. Department of Energy's 2023 Billion-Ton Report: An Assessment of U.S. Renewable Carbon Resources concluded that the United States could triple its production of biomass to more than 1 billion tons per year producing an estimated 60 billion gallons of low emission liquid fuels.*

In response to the U.S Government's desire to increase the domestic production of SAF, in 2021 an interagency collaboration called "The Synthetic Aviation Fuel Grand Challenge" was formed with input from various agencies, including U.S. Department of Energy (DoE), the U.S. Department of Transportation (DoT), the U.S. Department of Agriculture (USDA), and others, with the goal of developing *"a comprehensive strategy for scaling up new technologies to produce SAF on a commercial scale".* More specifically, the mission of the challenge is to boost domestic production of SAFs to 3 billion gallons per year to achieve a *"minimum of a 50% reduction in life cycle greenhouse gas emissions (GHG) compared to conventional fuel by 2030 and 100% of projected aviation jet fuel use, or 35 billion gallons of annual production, by 2050".*

In addition to the Synthetic Aviation Fuel Grand Challenge, in August 2022, as part of the Biden Administration's Inflation Reduction Act, SAF was afforded advantages that included:

- *a two-year tax credit for those who blend SAF;*
- *a subsequent three-year tax credit for those who produce SAF;*
- *a grant program of $290 million over four years to carry out projects that produce, transport, blend, or store SAF, or develop, demonstrate, or apply low-emission aviation technologies.*

Regarding these credits, from the U.S. Department of Energy (Alternative Fuels Data Center: Clean Fuel Production Credit):

> *"Beginning January 1, 2025, the Treasury Department will offer tax credits for the production and sale of low emission transportation fuels, including sustainable aviation fuel (SAF). The tax credit amount is $0.20 per gallon for non-aviation fuel and $0.35 per gallon for SAF. For facilities that*

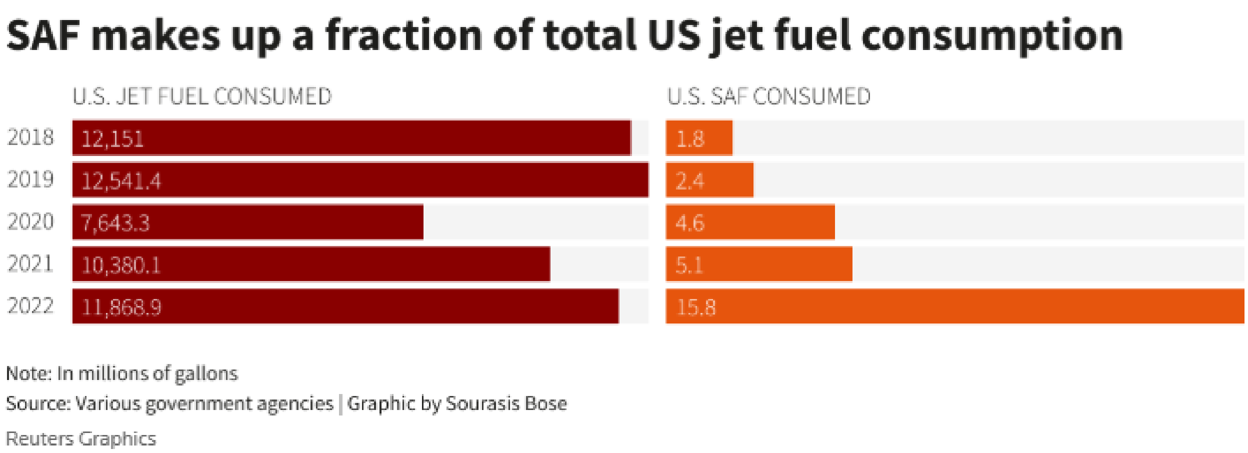
*satisfy the prevailing wage and apprenticeship requirements, the credit amount is $1.00 per gallon for non-aviation fuel and **$1.75 per gallon for SAF**. For any taxable year, the Clean Fuel Production Credit is equal to the applicable credit amount per gallon multiplied by the fuel's carbon dioxide emissions factor. Emissions factors will be published annually by the Secretary of the Treasury. Beginning January 1, 2025, tax credits will be adjusted for inflation".*

The U.S. government's efforts to foster the development of an abundant SAF supply as well as encouraging subsequent adoption is clear. However, that development and adoption is also being fostered by others around the world. For instance, in October 2023 the European Union adopted the ReFuelEU Aviation regulation, which mandates that (European Union Aerospace and Defense Sustainable Aviation Fuel Regulation) *"beginning in 2025, fuel uplift at EU airports must contain at least 2% SAF. That percentage will increase gradually each year, with mandates including 6% by 2030, 20% by 2035, and eventually 70% by 2050. These requirements will apply to all flights originating in the EU, regardless of destination."* Recognize, unlike the U.S. approach of encouraging SAF production and adoption through various incentives, the EU has actually mandated the adoption by air carriers in the EU. Beyond governments, many air transport and aviation organizations are also promoting the adoption of SAF as a means of meeting assorted emissions goals.

As a result of these developments, industry experts expect marked growth from the SAF industry through the current and coming decades. From McKinsey (Securing a sustainable fuel supply: Airline strategies | McKinsey) :

> *The SAF industry is still in its infancy: in 2024, production capacity will not exceed 1.5 million metric tons (Mt),3 barely 0.5 percent of total jet fuel needs, according to International Air Transport Association estimates. We expect demand to rise, however, due to regulation and voluntary airline commitments. The estimated global demand from mandated SAF is around 4.5 million Mt in 2030. Considering mandated and target demand, this number increases by 2 million Mt from Asia and 10 million Mt from North America to a total of 16 million Mt or more. Airlines have voluntarily pledged to use even more: announcements of the largest airlines would accumulate to more than 20 million Mt in 2030.*

Table 1.



U.S. sustainable aviation fuel production target faces cost, margin challenges | Reuters

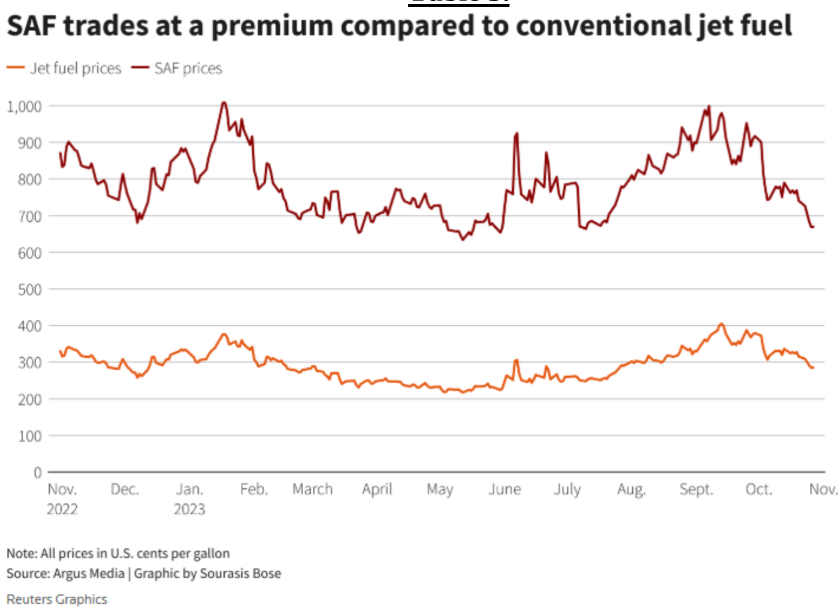
Table 2.

As **Table 1** illustrates, SAF currently accounts for a very small, albeit growing fraction of aviation fuel demand, while **Table 2** reflects that production of SAF will need to expand dramatically for many of these goals and mandates to be achievable. In the meantime, as a result of current supply/demand imbalances, the price of SAF vis-à-vis standard aviation fuel is stark. From Ibex Publishing (*Is Sustainable Aviation Fuel (SAF) Really More Expensive? - Green Mobility Magazine by Ibex Publishing - Sustainable Transport News & Policy Intelligence.*):

> *As of 2022, SAF was priced at approximately 2400 USD per tonne, approximately 2.5x the price of conventional jet fuel. This disparity is largely attributed to SAF's small production runs. The cost of waste-based SAF sources hovers around twice that of traditional jet fuel, while synthetic fuels created through carbon capture can be up to 6-10 times more costly. Despite these figures, the aviation sector has committed to six billion litres of SAF in forward purchase agreements, indicating a strong move towards this sustainable alternative.*
>
> Further, from www.AvBuyer.com (*When will Sustainable Aviation Fuel Get Cheaper? | AvBuyer):*
>
> *Owing to its low production volume, Sustainable Aviation Fuel (SAF) typically costs 3-5 times as much as traditional jet fuel, depending at any given time on the price of fossil jet fuel, the cost of renewable feedstocks, the related processing costs, and more. Meanwhile, supply and demand dynamics naturally impact price levels too. Nevertheless, Michael Sargeant, Vice President Americas for Finnish refiner Neste's Renewable Aviation business unit is optimistic that relative pricing levels of conventional jet fuel and SAF will eventually converge. "Over time and as the industry scales up production of SAF, the cost of SAF could benefit from economies of scale in its production and learning benefits as we get smarter at how to make it," he suggests.*

Table 3 below provides a graphic illustration of some of the recent pricing disparities:

Table 3.



U.S. sustainable aviation fuel production target faces cost, margin challenges | Reuters

To review, Firepoint's initial focus is to convert waste coal into SAF. That approach may be supported by a handful of factors surrounding the SAF market both today and into the apparent future. While we submit that much of the demand for sustainable or green energy alternatives is driven by the policies and mandates around them, which may ebb and flow with the political winds, and those may be different from one country and one period of time to the next, if the estimates for future SAF production and demand prove reasonably accurate, producers should enjoy robust markets into the future, which should bode well for Firepoint's SAF plan.

- **Rare Earth Elements**

The U.S. Geological Survey describes Rare Earth Elements as follows (Rare-earth elements | U.S. Geological Survey):

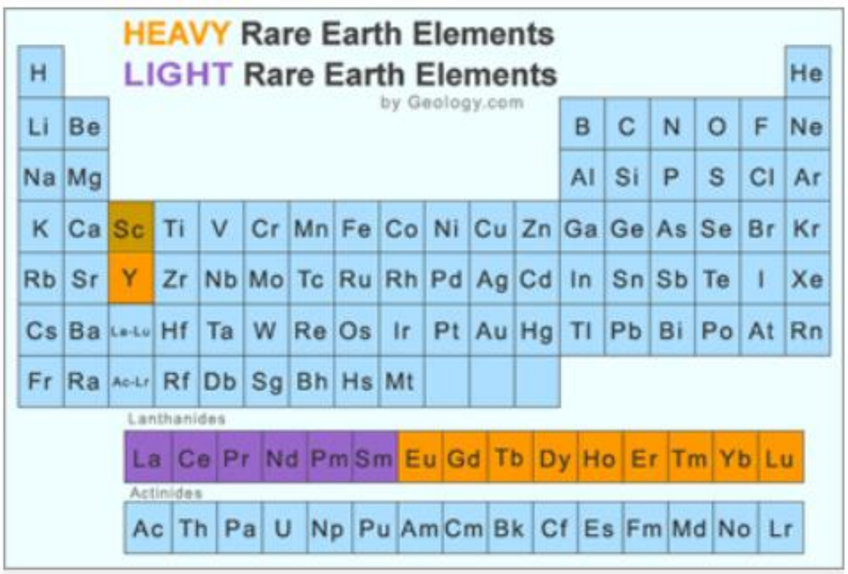
> *The rare-earth elements (REEs) are 15 elements that range in atomic number from 57 (lanthanum) to 71 (lutetium); they are commonly referred to as the "lanthanides." Yttrium (atomic number 39) is also commonly regarded as an REE because it shares chemical and physical similarities and has affinities with the lanthanides. Although REEs are not rare in terms of average crustal abundance, the concentrated deposits of REEs are limited in number.*
>
> *Because of their unusual physical and chemical properties, the REEs have diverse defense, energy, industrial, and military technology applications. The glass industry is the leading consumer of REE raw materials, which are used for glass polishing and as additives that provide color and special optical properties to the glass. Lanthanum-based catalysts are used in petroleum refining, and cerium-based catalysts are used in automotive catalytic converters. The use of REEs in magnets is a rapidly increasing application. Neodymium-iron-boron magnets, which are the strongest known type of magnets, are used when space and weight are restrictions. Nickel-metal hydride batteries use anodes made of a lanthanum-based alloys.*
>
> *China, which has led the world production of REEs for decades, accounted for more than 90 percent of global production and supply, on average, during the past decade. Citing a need to*

retain its limited REE resources to meet domestic requirements as well as concerns about the environmental effects of mining, China began placing restrictions on the supply of REEs in 2010 through the imposition of quotas, licenses, and taxes. As a result, the global rare-earth industry has increased its stockpiling of REEs; explored for deposits outside of China; and promoted new efforts to conserve, recycle, and substitute for REEs.

Information relevant to the environmental aspects of REE mining is limited. Little is known about the aquatic toxicity of REEs. The United States lacks drinking water standards for REEs. The concentrations of REEs in environmental media are influenced by their low abundances in crustal rocks and their limited solubility in most groundwaters and surface waters. The scarcity of sulfide minerals, including pyrite, minimizes or eliminates concerns about acid-mine drainage for carbonatite-hosted deposits and alkaline-intrusion-related REE deposits. For now, insights into environmental responses of REE mine wastes must rely on predictive models.

The periodic table below highlights both the Heavy and the light REEs:

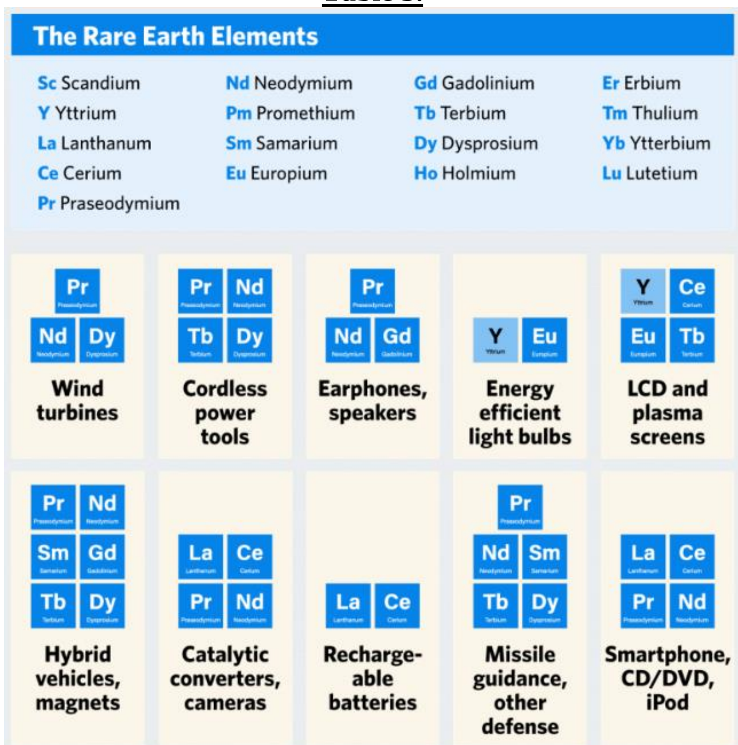
Table 4.



To reiterate, while REEs are not necessarily "rare," they do tend to occur naturally in small concentrations, which makes their economic exploitation difficult. That notion is perhaps even more acute with the "heavy" REEs. On the other hand, collectively (although some more than others) REEs have characteristics including strength, weight, and durability that make them ideal for many popular manufacturing applications, and the number and breadth of those applications seem to be growing with the advance of a number of emerging technologies. For instance, many of the new "green technologies" utilize REEs.

Succinctly, the applications of REEs are expanding across a wide swath of industries:

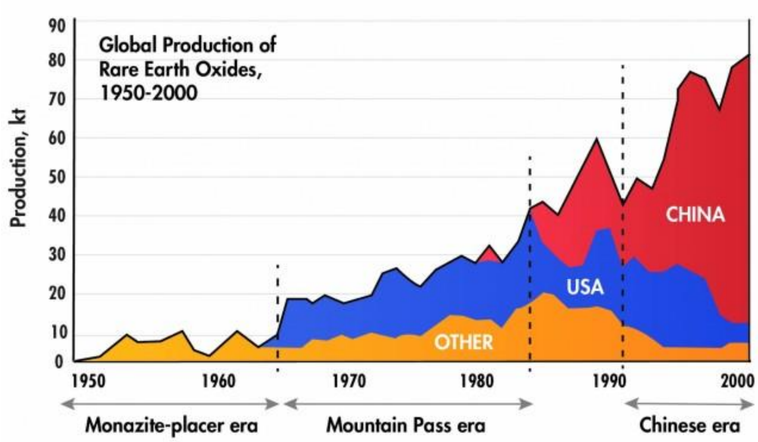
Table 5.



An introduction to Rare Earth Elements (REEs) - Digbee Content Hub

While REEs have been identifiable since the 18th century, there were limited commercial applications for them until the second half of the 20th Century. The emergence of color television in the mid-1960s drove demand for europium, which was essential for producing color images. As a result of that demand, the U.S. became a major producer of REEs through the mid-1990s, primarily via MolyCorp's Mountain Pass Rare Earth Mine in California. However, in the mid-1980s the Chinese began to exploit domestic rare earth sources and ultimately became the dominant player in REEs worldwide as illustrated in the all-too-familiar chart below.

Table 6.



https://www.army.mil/article/227715/an_elemental_issue

China's dominance of the REE market beginning in the early 1990s was the result of a handful of factors. First, the emergence of their own technology manufacturing drove domestic demand for REEs. Further, their comparative advantages in terms of the usual suspects (i.e., low wages, sparse regulation, etc.) provided an opening for REE production to both feed their own domestic demand and to arrest growing portions of international market share as those comparative advantages made them a low-cost producer. As perfect storms go, those advantages happened to coincide with free trade agreements during the same period. Those factors, at least in part, ultimately led to the demise of MolyCorp and ostensibly the U.S. REE industry. Moreover, China has worked to further solidify its control of the worldwide REE market. For instance, the U.S. Army notes that: "*Chinese efforts to monopolize rare earth do not end with domestic sources. China has aggressively pursued rare-earth mines in Africa, often exchanging infrastructure development or the sale of excess defense articles for exclusive mining rights. In the Democratic Republic of the Congo, China gained rights to the country's lithium, cobalt and coltan mines... In exchange, China agreed to build much-needed projects such as urban roads, highways and hospitals… Kenya is another Chinese target. The East African nation has huge mineral potential, and its exploration efforts have picked up in the last five years with the awarding of commercial licenses in prospecting for oil, gold, coal, geothermal minerals and rare earths…"*

As a result of the aforementioned, industry sources estimate that China currently controls approximately 90% of the worldwide REE supply. That fact has been alarming to many industry observers for some number of years now but has become even more acute with recent USA-China trade disputes. By some calculations, China's near monopoly in REEs carries potentially catastrophic implications for a variety of emerging industries, including green technologies, as well as for several strategic aerospace and defense applications.

The combination of China's stranglehold on worldwide supply of REEs in the face of growing demand, especially in terms of strategic initiatives (military and defense applications) is disconcerting to say the least.

From the U.S. Army (https://www.army.mil/article/227715/an_elemental_issue) :

> *The U.S. military is facing a potential crisis at the very bottom of its supply chain. Rare-earth elements have become the new oil, playing a major role in the technological advancements made in the last 50 years. Everything from GPS navigation capability, cell phones, fiber optics, computers, automobiles and missiles relies heavily on rare-earth elements for development and production. For example, according to a 2013 report from the Congressional Research Service, each F-35 Lightning II aircraft requires 920 pounds of rare-earth materials. Rare earths, including yttrium and terbium, are used for laser targeting and weapons in combat vehicles. Rare earths are a critical part of laser and precision-guided missile technology. Lockheed Martin Corp. is working on a small, high-power laser weapon, heavily reliant on the rare earths erbium and neodymium, that the U.S. Air Force Research Laboratory wants to test in a tactical fighter aircraft by 2021.*
>
> *As rare-earth elements grow in importance, they have become both carrot and stick for international political trade negotiations. In the past 20 years, according to the U.S. Geological Survey, China has emerged as the biggest player, controlling approximately 90 percent of the world's rare earth either through territorial control or exclusive mining rights. Additionally, China is less burdened with environmental or labor regulatory requirements that can greatly increase costs incurred in mining and manufacturing rare-earth products.*
>
> *The rare-earth supply problem will have no easy solutions. According to the U.S. Government Accountability Office, it would take 15 years to overhaul the defense supply chain, meaning that any changes to it need considerable lead time. The American Mineral Security Act, passed in*

2015, is meant to determine which minerals are critical and diversify the supply chain, according to the NATO Association of Canada. Currently, switching from present suppliers (e.g., China) would cause major disruptions to supply chains.

The U.S. military supply chain is highly vulnerable to any Chinese efforts to limit access to rare earths. The Chinese have already used rare-earth minerals as a weapon. The result of the resumption of rare-earth trade was a global collapse in prices, which eliminated the incentive for private industry to perform any additional rare-earth exploration or to establish new plants for processing.

As full disclosure, some of the narrative above has been excerpted from prior research we provided within the REE space. The ironic part is we wrote much of this a few years ago, and as near as we can tell, the supply chain has not changed much, as China still controls it. However, there are clearly growing efforts to commit federal assistance to the problem, and we believe those include financial incentives, the expediting of permitting and regulatory requirements, and a host of others. Further, while we think the prior administration recognized the problems associated with the REE supply chain and the critical nature of at least some of its elements, and facilitated some direct support in that regard, we also think it is fair to say that the current administration is likely to be more proactive in terms of fostering the domestic production of REEs.

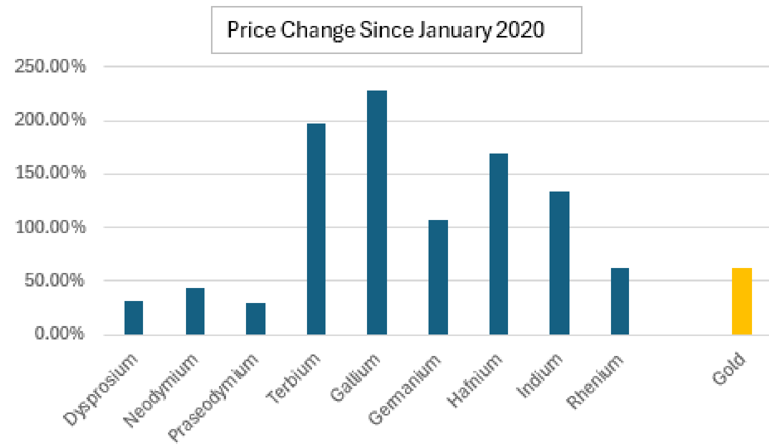
Clearly, anything being done domestically to support the domestic production of REEs is by extension a positive development for Firepoint and its REE endeavors therein. That said, while we would not discount the potential for the Company to attract grants, tax incentives, or other associated benefits for producing domestic REEs, or for that matter, producing domestic REEs *from otherwise potentially hazardous coal waste*, the Company's pro forma financial models are built around assumptions regarding future REE prices. To that end, **Table 7** below reflects some recent pricing data regarding several of the higher profile REEs. In addition, we included an associated graph (**Table 8**), which reflects those data as well, but also provides a comparison to the price of gold. Notice, despite gold's march to new all-time highs, several of the REEs have outperformed gold prices over the January 2020 to present time frame. We think that price inflation speaks to the problematic nature of the current REE supply chain, as well as providing a reference to future prices and those used in the pro forma assumptions of Firepoint. We will cover some of that pricing more specifically in the **Operating Overview** below, but suffice it to say, REE prices are likely to remain elevated well into the foreseeable future as demand continues to grow.

Table 7.

REE	Current Price (as of 04/22/25)	Price Change Year to Date	Price Change Since Jan 2020
Dysprosium	$453.90 per kg.	28.55%	31.47%
Neodymium	$93.60 per kg.	-2.60%	44.00%
Praseodymium	$94.30 per kg.	-1.87%	29.59%
Terbium	$1983.40 per Kg.	42.03%	196.91%
Gallium	$980.70 per Kg.	4.27%	228.87%
Germanium	$4230.60 per Kg.	2.66%	106.87%
Hafnium	$4219.20 per Kg.	-3.34%	169.47%
Indium	$734.10 per Kg.	5.05%	132.97%
Rhenium	$2765.90 per Kg.	11.26%	61.61%

Current Rare Earth Element and Technology Metals Prices

Table 8.



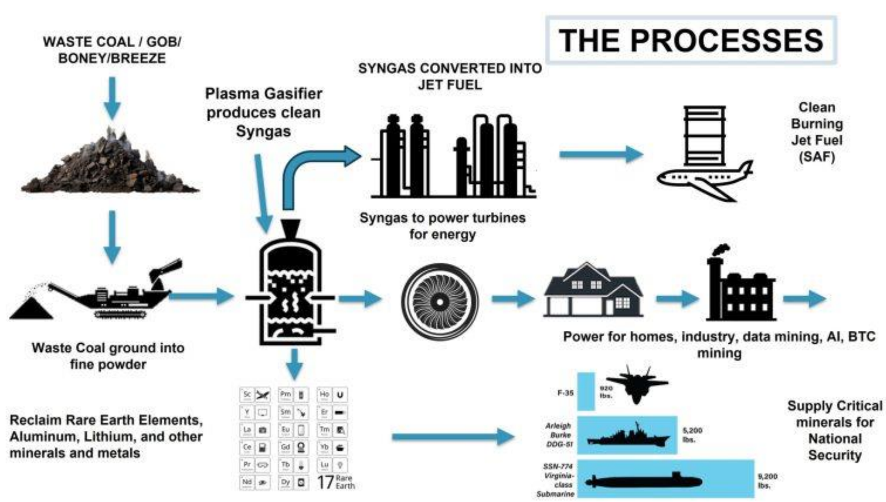
Project/Technical Overview

Firepoint's pilot project involves the aforementioned Tunnelton property, and they estimate the project will require capex of between $150 million and $200 million. To that end, we estimate the combined contribution from proforma SAF and REE base case recoveries would yield compelling Internal Rates of Return (IRR) of 23%, with capex payback in 4.4 years. We have provided proforma information around those projections in the **Projected Operating Overview** below.

The above said, providing a cogent review of the technology around the project is complex, so we have attempted to provide some high points to at least illustrate the basic footprint of the project. We would add, aside from Tunnelton, the Company has identified projects/piles with 8, 10, 12, 15, 75, 90 and 250 million tons each, which they have sampled via third party labs and believe they could access. For perspective, Tunnelton possesses a comparatively small 4-million-ton pile.

The Company's basic anticipated plant configuration is illustrated here in **Table 9.**:

Table 9



In conjunction with **Table 9**, the following discussion regarding some of the off-the-shelf pieces of their process may be helpful, and we have also provided some additional color around the proprietary IP they include in pieces that they believe will make their platform, faster and less expensive to both stand up and to operate, as well as more efficient than what these pieces can yield on their own.

First, recognize that in terms of SAF production, turning coal into liquid fuels is not a new discovery. Processes that can achieve that end have been around for some time, but their drawbacks include inefficiencies that typically result in prohibitive operating costs and high CO2 emissions and/or sequestration. From that perspective, trading one environmental benefit (cleaning up gob piles and the brackish water that goes with them) for another (higher CO2 levels) is not an optimal solution, especially if it is not economically practical.

As **Table 9** reflects, the two primary off-the-shelf pieces of Firepoint's process are a plasma gasifier and a gas-to-liquids converter, often referred to as "liquefaction." That noted, there are two primary approaches to converting coal — or other carbon-based biomass for that matter — to liquid fuel of one kind or another.

From StudentEnergy.org (Coal Liquefaction — Conversions — Student Energy) :

> *The process of coal liquefaction creates synthetic liquid fuels from solid coal as substitutes for various petroleum products. There are two types of liquefaction – direct and indirect.*
>
> *Direct liquefaction converts solid coal directly into liquid form with no intermediate step, which results in only the partial dismantling of the coal structure. Indirect liquefaction requires an intermediate gasification of the solid coal to form a synthesis gas, which is then converted to the liquid product. This process results in the complete dismantling of the coal structure.*
>
> *In **direct liquefaction**, coal is exposed directly to hydrogen at high temperatures (450C) and high pressures (14000-20000kPa) for approximately one hour in the presence of a solvent that breaks down the hydrocarbon structure. Catalysts are used to improve rates of conversion of coal from solid to liquid form. The resulting liquid coals have molecular structures that require further upgrading to produce usable fuels like gasoline and fuel oil.*
>
> *This process was developed as a commercial process in Germany and produced about 90% of aviation fuel for the German war effort. Though there are very few programs that continued beyond the late 1980s, the technology has been adapted as a more efficient modification of the German original concept. One of these modifications is a simultaneous coal and oil refining process.*
>
> ***Indirect coal liquefaction** takes solid coal through a gas phase before being converted into a raw liquid form. This process was developed in Germany at approximately the same time as direct coal liquefaction and was patented by Franz Fischer and Hans Tropsch to become known as the **Fischer-Tropsch (F-T) process**. The synthesis gas (syngas) is made up of hydrogen and carbon monoxide, which is then reacted over an F-T catalyst to form a liquid hydrocarbon. The resulting liquid forms a range of hydrocarbon fuels and products including gasoline, diesel, methanol, and other chemicals.*
>
> *This method was also used to produce motor fuel during World War II, and has been used in South Africa since the 1960s to produce motor fuels and petrochemical feedstocks. Though this indirect process yields a larger number of byproducts and has a lower overall thermal efficiency, it results in more clean fuels.*

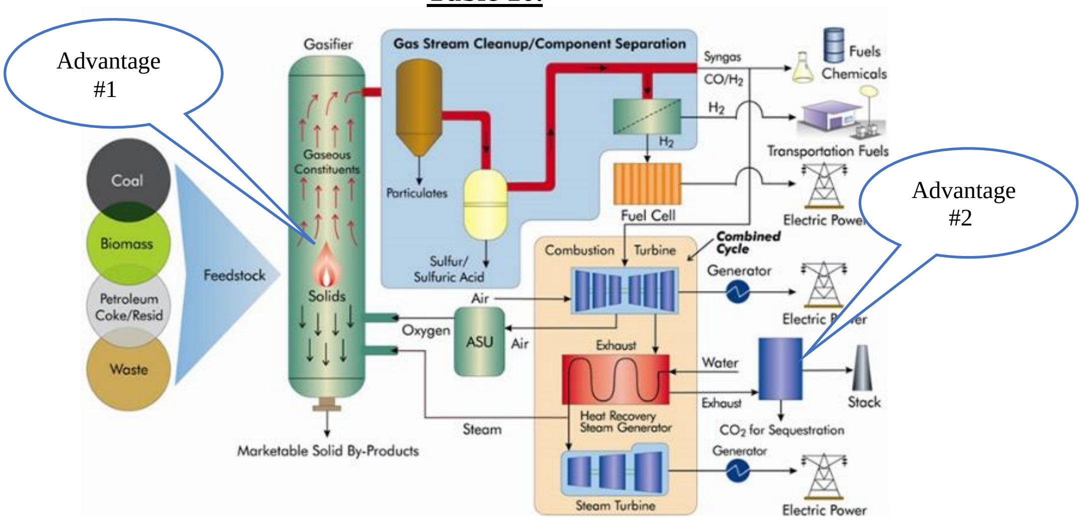
As **Table 9** above illustrates, Firepoint's process utilizes an indirect liquefaction process, which in part allows them to create a clean SAF fuel. That said, and again as illustrated by **Table 9**, their process starts with the gasification of the coal to convert it to synthesis gas (syngas).

- **Gasification**

From the U.S. Department of Energy ("DoE") (5.1. Gasification Introduction | netl.doe.gov) :

> *Gasification is a technological process that can convert any carbonaceous (carbon-based) raw material such as coal into fuel gas, also known as synthesis gas (syngas for short). Gasification occurs in a gasifier, generally a high temperature/pressure vessel where oxygen (or air) and steam are directly contacted with the coal or other feed material causing a series of chemical reactions to occur that convert the feed to syngas and ash/slag (mineral residues). Syngas is so called because of its history as an intermediate in the production of synthetic natural gas. Composed primarily of the colorless, odorless, highly flammable gases carbon monoxide (CO) and hydrogen (H2), syngas has a variety of uses. The syngas can be further converted (or shifted) to nothing but hydrogen and carbon dioxide (CO2) by adding steam and reacting over a catalyst in a water-gas-shift reactor. When hydrogen is burned, it creates nothing but heat and water, resulting in the ability to create electricity with no carbon dioxide in the exhaust gases. Furthermore, hydrogen made from coal or other solid fuels can be used to refine oil, or to make products such as ammonia and fertilizer. More importantly, hydrogen enriched syngas can be used to make gasoline and diesel fuel.* ***Polygeneration plants that produce multiple products are uniquely possible with gasification technologies.*** *Carbon dioxide can be efficiently captured from syngas, preventing its greenhouse gas emission to the atmosphere and enabling its utilization (such as for Enhanced Oil Recovery) or safe storage.*
>
> *Gasification offers an alternative to more established ways of converting feedstocks like coal, biomass, and some waste streams into electricity and other useful products.* ***The advantages of gasification in specific applications and conditions, particularly in clean generation of electricity from coal, may make it an increasingly important part of the world's energy and industrial markets****. The stable price and abundant supply of coal throughout the world makes it the main feedstock option for gasification technologies going forward. The technology's placement markets with respect to many techno-economic and political factors, including costs, reliability, availability and maintainability (RAM), environmental considerations, efficiency, feedstock and product flexibility, national energy security, public and government perception and policy, and infrastructure will determine whether or not gasification realizes its full market potential.*
>
> *The graphic below is a representation of a gasification process for coal, depicting both the feedstock flexibility inherent in gasification, as well as the wide range of products and usefulness of gasification technology.*

Table 10.



With respect to Firepoint's technology, there are two primary proprietary items we have added to the DOE's illustration (**Table 10**) that are paramount to Firepoint's technological advantages as we understand them. First, the Firepoint platform utilizes a plasma gasifier (described further below), which uses less energy than other non-plasma gasifiers. One of the steps (**Advantage #1** above) is to "*scrub the syngas inside the gasifier prior to sending it to the turbines or gas-to-liquids plants." That process concentrates the ash/ore so we can then cost-effectively extract REEs and other minerals* (the "Marketable Solid By-Products" reference above). As noted, this bit of IP not only improves the efficiency of the system but also provides for recovery of the REEs. The second advantage of the Company's modifications (**Advantage #2**) is that their process ultimately captures and converts nearly all of the leftover CO_2 into SAF. Recognize, the excess CO_2 byproduct is typically a major drawback to gasification processes. Since rising CO_2 levels are implicated as detrimental greenhouse emissions, typical gasification technologies need to capture or sequester the excess CO_2 whereas Firepoint intends to exploit a benefit from its presence.

- **Indirect Liquification**

From the National Energy Technology Laboratory (10.5. Indirect Liquefaction Processes | netl.doe.gov) :

> *Indirect liquefaction processes require first gasifying the solid feedstocks into a syngas. Therefore, while direct coal liquefaction (DCL) takes coal directly into a liquid phase, indirect coal liquefaction (ICL) consists of two major steps: (a) gasification to produce a synthesis gas (syngas); and (b) conversion of the carbon monoxide (CO) and hydrogen (H2) in the syngas to a range of hydrocarbon fuels/products such as gasoline, diesel, methanol and chemicals). Most frequently, Fischer-Tropsch (FT) synthesis followed by subsequent liquids product refining is used to convert syngas to fuels; alternately, methanol formed from syngas can be converted to gasoline via ExxonMobil's MTG process.*
>
> *Direct coal liquefaction requires an external source of hydrogen, which may have to be provided by gasifying additional coal feed and/or the heavy residue produced from the DCL reactor.* ***Many argue that indirect liquefaction with the current state-of-the-art technologies is more competitive than direct liquefaction****. ICL has been demonstrated commercially by Sasol since the 1950s, and the ICL process is more amenable to carbon dioxide (CO2) capture.*

Volatile fuel costs and concern over the sustainability of fossil fuel resources and sourcing are driving interest in decarbonized or net-zero carbon fuels and chemicals. Traditionally refined liquid transportation fuels such as gasoline, diesel fuel, and aviation fuel have a significant greenhouse gas/carbon footprint that conflicts with goals for extensive decarbonization across the economy of the United States. ***Routes to synthesis of liquid fuels from solid feedstocks such as wastes, waste coal, and biomass could add substantial diversity in fuel supply capability and increased energy security that accompany these factors.*** *Gasification's abilities to accept these otherwise difficult to convert feedstocks, co-gasification options, plus the relative ease of carbon capture in gasification process systems, enables the viability of gasification-based production of sustainable, decarbonized liquid fuels.*

Although there are a number of different demonstrated process routes for production of liquid fuels from solid feedstocks like coal (e.g. direct coal liquefaction), the most important methods have been based on production of syngas from gasification of coal, which is converted to liquid hydrocarbons or alcohol for use as fuel or fuel refining feedstock. Because the coal is first gasified, followed by conversion of the syngas to liquid products, these are termed indirect liquefaction methods. Since impurities such as sulfur and mercury are removed from the syngas prior to fuels synthesis, the result is ultra-clean liquid fuels that burn with lower emissions than conventional gasoline and diesel fuel. In fact, South Africa's Sasol has been producing large amounts of these clean-performing, coal-derived fuels since 1955, with 30% of the entire country's gasoline and diesel needs produced from indigenous coal. Sasol's coal to liquid fuels also include jet fuel, meeting stringent approval for utilization in commercial jet aircraft.

- **Fischer-Tropsch**

From the National Energy Technology Laboratory (10.5. Indirect Liquefaction Processes | netl.doe.gov):

Fischer-Tropsch (FT) synthesis is a very important liquefaction technology used since the World War II era. FT catalysts are used to facilitate the formation of hydrocarbons or alcohols from the carbon monoxide (CO) and hydrogen (H2) in syngas. ***The end products of the process are influenced by choice of catalyst, feed composition, and reactor conditions such as internal temperature and pressure*** *(temperatures of 150–300°C (300–570°F) and pressures of 15 psi to pressure up to 500 psi)****.*** *The FT synthesis step produces a range/mixture of straight-chain, saturated hydrocarbons, of the form CnH2n+2 (termed paraffin hydrocarbons), aromatic hydrocarbons, olefins, and other species. From these, gasoline, diesel, and aviation fuel can be refined.*

From Science Direct (Hydrocarbons from synthesis gas - ScienceDirect) :

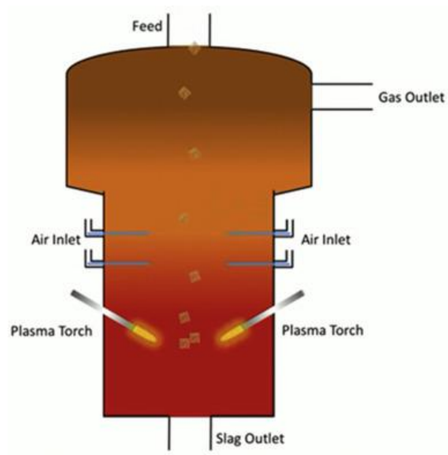
Catalysts play a pivotal role in synthesis gas conversion reactions. *In fact, fuels and chemicals synthesis from synthesis gas does not occur in the absence of appropriate catalysts. The basic concept of a catalytic reaction is that reactants adsorb onto the catalyst surface and rearrange and combine into products that desorb from the surface. One of the fundamental functional differences between synthesis gas synthesis catalysts is whether or not the adsorbed carbon monoxide molecule dissociates on the catalyst surface. For FTS and higher alcohol synthesis, dissociation of the carbon monoxide is a necessary reaction condition. For methanol synthesis, the carbon-oxygen bond (of the carbon monoxide) bond remains intact. Hydrogen has two roles in catalytic synthesis gas synthesis reactions: (i) hydrogen is the reactant needed for carbon monoxide hydrogenation and (ii) the hydrogen is commonly used to reduce the metalized synthesis catalysts and activate the metal surface.*

- **Plasma Gasification**

From ScienceDirect (Plasma Gasifiers - an overview | ScienceDirect Topics) :

> *Plasma gasification is a new technology which uses electrically ionized gas approximately up to 10,000°C, via plasma torches with pressure between 1 and 30 bar to break down MSW into synthesis gas and forming slag (Molino et al., 2016). In plasma reactor, the technology is slightly different from other gasification. Feedstock is entered at the top of the chamber whereas gasifying agent is introduced at the side of the reactor which would enable to activate reactions. The thermal plasmas are built as the significant technology in plasma gasifier. Plasmas as a heat source are a superheated column of electrical conductivity resulting in a high temperature in the reactor so that all materials can be destroyed and vaporized into gas products. Also, the inorganic materials can be transformed into inert and vitrified slag (Gomez et al., 2009). In this case, the high-temperature condition can crack the organic materials effectively resulting in clean synthesis gas and low emission. Besides, previous study by Circeo (2007), reported about various types of feedstock that can be decomposed in plasma gasification without the requirement of pre-processing and pre-treatment. In contrast, the need of high temperature condition of this gasification can increase the operational cost of the reactor. According to Arena (2012a), plasma reactor requires a very large amount of electricity in the system roughly 1200–2500 MJ per tonne of MSW so it would be a critical point using as a commercial MSW gasification. Table 11. shows the main structure of plasma gasifier.*

Table 11.



To summarize our **Project/Technical Overview**, there are a handful of takeaways from the above analysis that we think are important to highlight.

Firepoint's founder Bill Smith has spent decades working with and implementing the major parts of the Company's process, including gasification and liquefaction, but more specifically the variables (and combinations therein) that make these processes more efficient. We submit, we do not know how to quantify the aggregation of those aptitudes, but they clearly form the basis for the plan. To reiterate, much of the Company's platform comprises proven technologies largely built and provided by major entrenched processing technology companies. On the other hand, as we noted above, and in conjunction with the founders' "aggregation of aptitudes," as we understand it, there are also proprietary portions of the process Firepoint will be utilizing that are instrumental in what the Company believes will be its superior efficiency and resulting profitability. For instance, as we noted in **Table 10** above, the Company benefits from access to IP as part of its gasification system that "*scrubs the syngas inside the gasifier prior to sending it to the turbines or gas-to-liquids plants." That process concentrates the ash/ore so we can then cost-effectively extract RREs and other minerals*.

In addition, they also have access to IP that is used in the liquefaction process. Notice under the above Fischer-Tropsch heading, we have highlighted some of the narrative around the role(s) that specific catalysts have in the ultimate transformation of syngas to liquid fuels such as SAF. To that end, the Company makes use of proprietary catalysts that they believe will measurably impact those yields. Recognize, as we have attempted to address in the industry overview above, many of the drawbacks associated with the production of the high value products the Company is attempting to produce are economic. That is, for a variety of reasons, producing SAFs and/or mining and processing REEs is challenging and expensive, especially relative to their legacy counterparts. As a result, solutions that can drive down the costs of these commodities, can open the door to their supply-demand disconnects.

To that end, we would note that over the years, we have seen our share of environmental solutions to "clean" a variety of hazards, and more times than not, those solutions include prohibitive economic price tags. On the face, we think everyone can embrace the deployment of technologies and solutions that clean up the environmental hazards left behind by legacy industries and processes, or for that matter, technologies that allow for the cleaner operation of industries in the first place. However, the economic realities of these approaches are critical variables to their practical implementation and use, and those realities often mitigate the adoption of those solutions. That said, we think it's important to note that Firepoint believes it has a solution with "win-win" economic *and* environmental benefits. That is, their process can reclaim existing environmental hazards while also producing a more environmentally friendly jet fuel alternative. Moreover, they can do this while also generating favorable internal rates of returns to capex, and measurable economic profit. That would in our view represent a sort of "holy grail" in terms of environmental remediation solutions.

The following Projected Operating/Capital may shed some light on the favorable operating outcomes the Company anticipates achieving.

<u>Projected Operating/Capital Overview</u>

Firepoint Energy is in the early stages of developing its first waste coal reclamation project. To reiterate, that project is referred to as "Tunnelton." Tunnelton is located in Saltsburg, Pennsylvania, within the historical coal mining region that was once the base of operations for the Tunnelton Mining Company. Specifically, The Company believes it can develop 4 million tons of waste coal from this initial site. To be clear, there are a handful of reasons why Tunnelton is an ideal first project for Firepoint to pursue, and the following projected operating overview should shed some light on that.

To clarify, the Company identified "*9700 waste coal piles in Pennsylvania alone, and they have access to piles with 8, 15, 10, 12, 75, 90, and 250 million tons each*." Further they have tested many of these piles via independent laboratories, and aside from the example used in this overview, we assume the Company will be willing to share that data upon proper request. The Tunnelton project is the example we will reference in this overview, and for perspective, this is a 4-million-ton project, which is considerably smaller than the other sites the Company has identified and tested. To that end, recognize that Tunnelton essentially represents a sort of pilot or proof-of-concept project. We submit, it is somewhat large as far as proof-of-concept projects go, but it is intended to be. More to the point, this initial project should allow the Company to demonstrate the viability of the technology and the profitability of the platform, with a lower capex outlay. Furthermore, they believe this initial plant will demonstrate the scalability of the platform to address other larger throughput plants. Presumably, once they can demonstrate the viability of the technology at Tunnelton, subsequent projects will be much easier to finance through traditional project finance options, presumably with lower costs of associated capital.

- **Capex**

Table 12 reflects the Company's estimates of capex necessary to operate Tunnelton, which will be designed to process approximately 550 tons per day or 200,000 tons per year. At that rate, Tunnelton will operate for 20 years. For reference, each ton of coal processed will translate into approximately 1.2 barrels of sustainable aviation fuel (SAF). Obviously, much of the Company's efforts in the coming months will be dedicated to raising the capital necessary to launch Tunnelton.

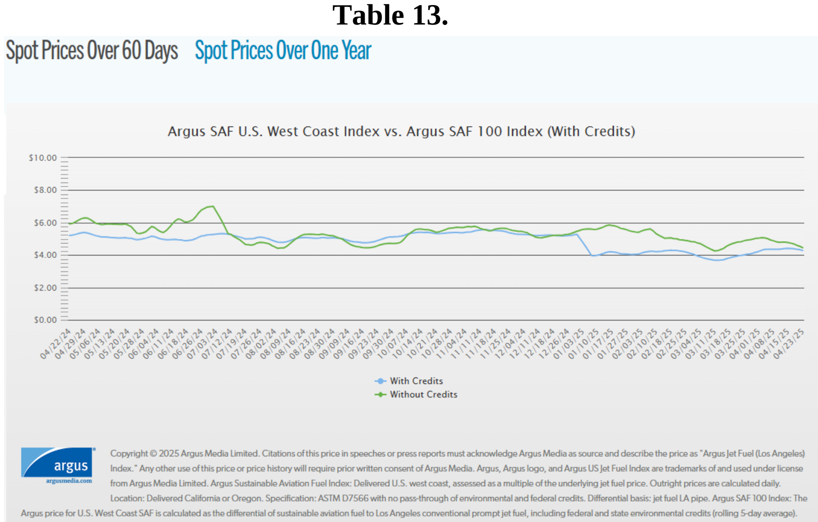
Table 12.

Plant Cost		
Gasifiers	$	49,315,068
GTL Plant	$	78,000,000
REE Processing	$	9,863,014
Turbine	$	2,819,132
Engineering	$	20,999,582
Site Development	$	8,049,840
Cost of Waste Coal	$	-
Plant / Site Cost	**$**	**169,046,637**

In addition to the capex assumptions above, the Company's proforma operating estimates are based on a handful of primary variables. First, they are assuming two primary revenue streams from the project, and those include SAF sales and REE sales.

In terms of SAF, the Company's modeling assumes 548 ton of processed coal per day, yielding 600 barrels (25,200 gallons) of SAF. Those assumptions also include a sale price of $4 per gallon. For reference, **Table 13** below reflects recent prices of SAF per Argusmedia. Clearly, the future prices that Firepoint may receive for SAF are unknown, and they likely vary from one global location to the next, but **Table 13** provides some basis for the Company's model pricing of SAF. That noted, expanding the math, 25,200 gallons per day translates into 9.2 million gallons of SAF per year, and gross SAF revenues of just under $37 million at $4.00 per gallon.

Table 13.



In addition to SAF sales, the Company has also modeled the sale of rare earth elements (REEs) and other metals they have identified in tested gob piles, which they believe they can extract through their processes. For these projections, the Company has assumed yields of various REEs and other metals based on the content of those metals identified in the reports from the independent laboratory assessments they commissioned. **Table 14** is a sample of one of those reports:

Table 14.

Conti Testing Laboratories, Inc.
PO Box 174
Bethel Park, PA 15102
412-833-7766 (o), 412-854-0373 (f)
contilab@contitesting.com
PA DEP Reg 02-00869 EPA PA01711, WDBE 12013 WBENC 2005128964 ISO/IEC 17025:2017-97677

Fire Point Energy Inc.
1500 N Sam Houston Prkwy E
Houston, TX 77032
Attn: Mr. Bill Smith
bsmith@firepoint.energy
gdintinc@gmail.com

7/8/2024

Received: 5/20/2024
Sampled by: client
CTL ID: 330670

Sample ID: [redacted] **waste coal 5/20/24 14:45** **Additional Elements**

RESULTS

	wt%
Moisture	7.72

Element	Dry Basis mg/Kg
Cerium (Ce)	157.98
Dysprosium (Dy)	7.24
Erbium (Er)	4.34
Europium (Eu)	2.38
Gadolinium (Gd)	9.59
Holmium (Ho)	1.46
Lanthanum (La)	62.04
Lutetium (Lu)	0.72
Neodymium (Nd)	64.49
Praseodymium (Pr)	16.30
Samarium (Sm)	12.62
Scandium (Sc)	38.55
Terbium (Tb)	1.38
Thulium {Tm}	0.67
Ytterbium (Yb)	4.43
Yttrium (Y)	33.62
Lithium (Li)	220.50
Aluminum (Al)	133,433
Molybdenum (Mo)	5.62
Cobalt (Co)	4.75
Gold (Au)	<0.50
Nickel (Ni)	31.36
Magnesium (Mg)	3,688
Silver (Ag)	0.45

Method ASTM D 6357

Approved By: *T.G. Otroba, Chemist*

Given these assumed yields, the Company's analysis includes selling prices for each of the anticipated REE yields to derive projected sales from the aggregation of REEs and other minerals. The Company's analysis also includes various estimations ("low," "midrange," and "high") around future prices, and applies those to the yield assumptions to arrive at annual assumed revenues from REEs. There are far too many variations within those assessments to reflect here, but as a summary, the Company's "low assumed REE prices" model reflects annual REE revenues of $60 million, which yields annual gross revenues of approximately $97 million when combined with assumed SAF revenues.

On the expense side, the Company expects operating Expenses ("Opex") of about $290 per ton of processed coal, or about 60% of revenues. That assessment would yield an annual operating profit of approximately $39 million. Given the aforementioned capex and 20 year facility life, we believe that equates to an assumed Internal Rate of Return of approximately 23% for the Tunnelton project.

We would add, there are some additional potential revenue streams the Company may garner from the project(s) that they have not included in their modeling. For instance, they indicate the state of Pennsylvania provides an incentive of $8 per ton to clean up waste coal piles, which in the case of Tunnelton would result in $1.6 million of additional annual revenue. Further, while we only briefly alluded to this above, the Company believes their process may also encompass the remediation of Acid Mine Drainage (AMD). AMD ponds are associated with most waste coal piles, and are particularly concerning because they often leach or simply drain into nearby watersheds. The Company believes they can utilize the acid mine drainage in their gasifiers to help liberate REEs. In addition, the water content in the gasifiers will convert to Hydrogen (and Oxygen). They believe they will be able to capture and sell that residual Hydrogen, although the above analysis does not reflect that contribution. In addition, it is not clear to us if they may be able to capture additional state or federal credits for the mitigation of AMDs, but that seems plausible to us.

Lastly, as we noted above, the Company is in the process of raising capital through two current SEC registered offerings, and anticipates entering the public markets later this year through a reverse merger with an identified public entity.

Management Overview

Bill Smith
Founder, CEO, Chairman

Bill Smith has several decades of experience building and leading a wide range of businesses and has taken multiple companies public across different industries. His career includes more than 20 years of high-level experience in the alternative energy sector, and he has extensive knowledge of alternative energy technologies, including hydrogen, gas-to-liquids (GTL), ethanol, and several others. Mr. Smith's background includes frequent interactions with government agencies at the state and federal levels, including the Environmental Protection Agency.

Shelly Befumo
President /COO

Ms. Befumo is a corporate finance executive with more than 20 years of diverse experience in building, leading, and advising organizations through capital finance transactions, complex restructuring, and IPO readiness. Her background includes regulatory compliance, public securities offerings, and SEC filings. Shelly holds a Bachelor of Science in Accounting from Strayer University, and an MBA from The College of William & Mary. Befumo has successfully orchestrated multiple public and private funding rounds and has spearheaded numerous crowdfunding campaigns. She is also adept at managing investor relations, financial reporting, and risk management.

Ian Douglass
Senior VP/CCO

Ian Douglass has several years of experience in communications and marketing leadership roles in both the public and private sector. This includes roles as a reporter for NBC News in Flint, Michigan, a role on the leadership team of the Michigan House of Representatives, and more than a decade as a content specialist and business communications consultant for several companies, including waste-to-energy ventures. Mr.

Douglass has degrees from the University of Michigan, Northwestern University, and the Quantic School of Business & Technology.

Shannon Doyle
Business Development

Shannon Doyle is a retired CPA with more than 35 years of experience in accounting, finance, tax, and business advisory. He currently occupies leadership roles in several businesses in the defense, energy, technical, financial, and professional industries, and continues to advise private clients through his boutique tax firm. Mr. Doyle is a graduate of the Georgetown University School of Business in Washington, D.C.

Rich Sivils
Consulting Engineer

Rich Sivils has been directly involved in the mining industry for more than 20 years. Formerly a Board Member of the Alaska Mining Association, Rich currently sits on the Board of the American Society of Reclamation Sciences as the Technical Division Chairman for the Engineering and Construction Division. He holds a B.S. Degree in Mining and Mineral Processing Engineering from the University of Arizona and is a Professional Mining and Mineral Processing Engineer licensed in Alaska, Pennsylvania, Kentucky and Tennessee.

Robert (Bob) Beatty Jr.
Board of Directors

Robert (Bob) Beatty has spent more than two decades in the natural gas business. Over the course of his career, Robert has been acquiring and folding smaller natural gas companies into his portfolio. He serves in a leadership position with the Pittsburgh Region Clean Sities, and is also a board member for the Pennsylvania Independant Oil and Gas Association (PIOGA). Robert strives to develop technologies that will advance the use for natural gas on several fronts.

Dale Rasmussen
Board of Directors

Dale Rasmussen has 30 years of experience in clean tech, alternative energy, and banking. He was a founding member of the Board of Directors of Fisker Automotive and served as the Chairman of the Board since its formation. Mr. Rasmussen has served as a member of the Board of Directors for more than a dozen private and public companies, raising more than $1 billion in his tenure. Three of the companies he co-founded reached market capitalizations of over half a billion dollars.

Summary and Conclusion

We recognize that Firepoint Energy is an early-stage venture, and as such, visibility around many of the critical portions of the business plan is limited. These include but are not limited to the following:

- technical hurdles that may limit the functionality of their processes and platform that may render it less efficient than they anticipate
- access to significant amounts of capital to prove and then ultimately scale the technology and the business in general
- future demand and prices for SAF and REEs, which are very important to the assessments of their models, may ultimately be determined in part by government mandates or other edicts, as well as other market forces that are not easily predictable
- competitors that may or may not be known or even exist today that may have better solutions and/or resources to advance them
- reliance on a very small number of people who can execute the business plan

The above noted, the Firepoint business plan is very open-ended.

First, as we have attempted to demonstrate throughout the above profile, management believes it has or can overcome any technical obstacles that would prevent them from building a plant that will perform the way they believe. Obviously, that is likely paramount to their success, but that is their view, and it is augmented by their experiences and attitudes around the pieces that compose the platform.

Second, cleaning up coal waste is top-of-mind for many stakeholders in coal mining states. Those stakeholders include legislators, environmental officials, universities, citizens in proximity to the waste piles, and others. We believe those constituents will enthusiastically embrace solutions that can mitigate that waste, some of which will likely be willing to assist or otherwise optimize those solutions.

Third, as we noted throughout this report, in and of itself, purifying or maintaining an otherwise clean environment is a goal that everyone can support. Unfortunately, few things operate in and of themselves, so certain realities, most of which end up being economic in nature, often compromise that goal. As a result, in our experience the most effective and adoptable environmental solutions are those that can pay for themselves. Unfortunately, those are hard to find. Recognize, Firepoint believes it can achieve that unique outcome, which in our view could lead to extraordinary financial results.

Fourth, while visibility around the ultimate size and pricing in the markets for SAF and REEs is limited, we do not think it is unreasonable to believe that these markets are poised for growth in the coming years, and that growth could be extraordinary. That may be especially true as legislation or government policy encourages domestic production of these commodities. Here again, if we are correct about that assessment, and Firepoint is able to position itself to participate in that trajectory, it could lead to extraordinary financial results in our view.

Lastly, generally speaking, it is easier to keep track of the progress of public companies via their required financial filings than their private counterparts. Given that the Company’s plan is to merge its way into a public listing, visibility around the items we have highlighted throughout this profile should improve as they progress. Those emerging and disclosed data points should provide a basis for more accurate valuation assessments.

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