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Community BioRefineries,

# Discover the Sustainable Future of Biorefineries with Community BioRefinery

**I. Introduction.**

A. Imagine a world where truly sustainable energy, a complete plant protein containing all nine essential amino acids that our body is unable to produce on its own, and phytochemical (chemicals produced by plants) production are no longer just a dream but a reality. A world where we can effectively convert a variety of feedstocks into a range of sustainable products, from Plant Based foods to the next-generation biofuel – bio-butanol, while reducing greenhouse gas emissions and promoting a circular economy for the local community. This is the promise of true biorefineries, and today we will explore the unique advantages of the Community BioRefinery (CBR) compared to traditional ethanol plants. With its innovative approach, the CBR represents a new frontier in the quest for sustainable and environmentally friendly bioenergy production.

The CBR is a cutting-edge facility that offers investors a unique opportunity to be at the forefront of the next generation of Environmentally sustainable manufacturing. The CBR facility processes multiple feedstocks in a vertically integrated process to produce a range of high-quality products, including next-generation advanced biofuels, bio-butanol, plant-based protein isolate (90%+ purity), nutraceuticals, and biochemicals. The CBR's focus is on decentralizing local production, allowing for economic development in the agriculture sector and in participating communities, while also providing energy independence and reducing dependency on unsafe products produced in large centralized manufacturing plants. This innovative process is not only environmentally friendly but also offers a profitable investment opportunity for those who are looking to invest in sustainable technology.

But what is a 'biorefinery', anyway? We have been conditioned to think a "biorefinery" is a place where ethanol is made. Hardly. A true 'biorefinery' is place where multiple products are recovered and/or created using all of the plant material introduced into it. Both Departments of Energy and Agriculture have delineated this definition.

**B. Drawbacks of traditional ethanol factories.**

In contrast to traditional ethanol factories, CBR facilities offer a more diverse range of biofuel products and a higher level of sustainability with bio-butanol as their basis. While ethanol factories typically produce ethanol as their primary product, CBR is designed to integrate multiple feedstocks in its conversion processes and equipment to produce not only biofuels but a true protein isolate from plants, nutraceuticals, and biochemicals from the feedstock. Furthermore, the CBR process uses a closed system with no waste, making it a more sustainable option compared to traditional ethanol manufacturing processes. CBR facilities offer a great potential for economic development in local communities through decentralized production and the creation of "economic development clusters" in the agriculture sector.

Traditional ethanol factories have several drawbacks that make them less desirable than CBRs. First, conventional ethanol Factories typically produce only two products, ethanol, and Dry Distiller Grains (DDGs), where any nutrients originally present in the feed stocks used have been destroyed by heat, chemicals, and pressure, which limit their revenue stream and makes them less economically flexible. By contrast, CBRs can produce a range of high-value products, including advanced next-generation bio-butanol based biofuels, plant base true protein isolate foods, nutraceuticals, biodegradable plastics, green electricity, aquaculture, hydroponics, and bio-chemicals, allowing for a more diversified revenue stream. Second, traditional ethanol factories require large amounts of water and energy to operate, which can strain local resources and increase costs. CBRs, on the other hand, are designed to use closed systems with no waste, produce its own energy, and recycle its own Water. Due to the tremendous amount of heat necessary for them to cook and steep the feed stocks used, traditional ethanol factories require huge amounts of natural gas to operate, necessitating their access to natural gas pipelines as well as using a tremendous amount of energy to produce their ethanol. Finally, ethanol plants are largely located in remote areas, requiring truck and rail transport of their product to the oil company blending stations; ethanol cannot be moved through pipelines due to its caustic nature and that it attracts moisture from the air. Ethanol plants employe relatively few people and cannot be made available to the local markets and limiting economic development opportunities. By contrast, CBRs are designed to decentralize production, allowing for economic development and market access in local communities; its bio-butanol based biofuels do not have the same physical drawbacks as ethanol.

**C. A preview of the benefits of a CBR Butanol facility:**

A CBR offers numerous benefits over traditional ethanol factories:

- A CBR facility produces a range of high-value products, including the Next-Generation Biofuel Butanol, a true plant-based protein isolates (90%+ purity), nutraceuticals, renewable green electricity, and chemicals, allowing for a more diversified revenue stream;
- CBRs use closed-loop, cold process systems with no waste and are energy independent, and recycles its water, making them highly efficient and environmentally friendly;
- CBRs decentralize production, allowing for job creation, economic development, and market access in local communities;

- CBRs enable the production of environmentally safe, higher quality, and healthier products, reducing dependency on supply chain backups. CBR's will produce ecologically sound products in local communities;
- CBRs provide local communities with energy independence, replacing petroleum and coal power generation.

## II. Drawbacks of Traditional Ethanol Factories

Traditional ethanol factories have several drawbacks. First, they typically produce only ethanol, limiting their revenue stream and making them vulnerable to fluctuations in ethanol prices. Second, they generate large amounts of a by-product called 'Dried Distillers Grains' (DDGs), which are used as a relatively low-quality animal feed. Even so, the market for DDGs is limited and subject to low prices, which can negatively impact the profitability of ethanol factories. Additionally, the disposal of DDGs can lead to environmental issues, such as soil and water pollution. Finally, traditional ethanol factories are often located far away from their markets, resulting in significant transportation costs and emissions.

### A. Ethanol Plants have High energy consumption in grinding and milling

In contrast to traditional ethanol factories, a CBR facility offers several benefits:

- CBRs produce multiple products, including advanced butanol-based biofuels, plant-based protein isolates (90%+ purity), nutraceuticals, and green electricity;
- A diversified revenue stream makes CBRs more resistant to market fluctuations;
- CBRs use a closed-loop, cold process, and energy self-sufficiency that minimizes waste and pollution;
- Significant energy savings and a smaller carbon footprint compared to traditional ethanol factories
- A vertically-integrated approach produces multiple high-value products;
- CBR facility provides a more sustainable and profitable solution for local communities.

### B. Ethanol Plants have High Energy Consumption in Hydrolysis and Fermentation

The USDA has recognized CBRs as the next generation in fermentation due to their innovative and sustainable approach to producing biofuels and other high-value products. By avoiding the high energy consumption typically associated with traditional ethanol factories during the hydrolysis and fermentation process, CBRs can offer significant energy savings and a smaller carbon footprint. Additionally, their closed-loop, self-powered minimize waste and pollution, making them more environmentally friendly than traditional facilities. These benefits, combined with their ability to produce multiple products, make CBRs a promising solution for local communities looking to promote sustainability and economic development.

### C. Ethanol Plants have High Energy Consumption in Distillation and Dehydration

In addition to high energy consumption during the hydrolysis and fermentation process, traditional ethanol factories also

consume a significant amount of energy during distillation and dehydration. By contrast, a CBR uses a unique bio-butanol recovery system that operates at a lower temperature and pressure, resulting in lower energy consumption during the water separation process. In addition, bio-butanol has a lower boiling point than ethanol, requiring less energy to separate it from the water and other by-products. As a result, the CBR bio-butanol element can achieve significant energy savings and reduce greenhouse gas emissions compared to traditional ethanol factories. The USDA has recognized this innovative approach to butanol recovery as the next generation in fermentation technology.

**D. Energy loss in waste treatment**

Compared to traditional ethanol manufacturing, a CBR is more efficient in reducing energy loss in waste treatment. In traditional ethanol factories, the waste generated from the production process needs to be treated and disposed of properly, which often involve using large amounts of energy. Further, fermentation waste is often just dumped into local waterways, resulting in the death of all aquatic life and its associated heavy EPA fines for such behavior. However, in a CBR, the "waste" produced during its production process is reused as feedstock to generate additional products such as animal feed, fertilizer, and green electricity. This closed-loop system significantly reduces waste and energy loss while also generating additional revenue streams for the facility. By minimizing waste and maximizing resource utilization, a CBR is a more efficient and sustainable solution for biofuel production.

**E. Overall inefficiency of the ethanol production process**

A Community BioRefinery (CBR) is a highly efficient manufacturing facility that produces a variety of products, including advanced biofuels, food, nutraceuticals, and green electricity. Compared to traditional ethanol factories, a CBR is designed to use a closed-loop, cold process that minimizes/eliminates waste and pollution. This process reduces overall inefficiencies of the CBR compared to ethanol production processes. In a CBR, the feedstock is ground and milled into a fine powder before being hydrolyzed (specialized milling) and fermented to produce the desired products. This process reduces the high energy consumption associated with traditional ethanol factories, which require significant amounts of energy during the hydrolysis (i.e., cooking) and fermentation process. Additionally, CBRs are more efficient in energy loss during waste treatment, as they are designed to use a closed-loop/cold process that recovers and recycles waste materials for further use. Overall, the efficiency of a CBR allows for a more sustainable and profitable solution for local communities while also reducing the environmental impact of traditional manufacturing processes.

## III. Benefits of CBR

A CBR offers significant benefits to the environment and local communities compared to traditional ethanol plants. First, CBRs are designed to use a closed-loop/cold process that minimizes waste and pollution. This results in a smaller carbon footprint and no pollution of local water sources, which can be a major concern for traditional ethanol plants. Additionally, CBRs can produce multiple high-value products, including advanced biofuels, food, nutraceuticals, biodegradable plastics, and green electricity, which diversifies the revenue stream and creates jobs for the local community. Furthermore, since CBRs are designed to use a variety of

feedstocks and biomass, they can help to reduce waste and support sustainable agriculture. Overall, a CBR facility provides a more sustainable and environmentally-friendly solution for local communities compared to traditional ethanol plants.

**A. Lower energy consumption in feedstock processing**

A CBR offers several benefits over traditional ethanol plants. One significant advantage is that a CBR uses much lower energy consumption in feedstock processing. Traditional ethanol plants require significant energy to grind and mill corn, which is the primary feedstock used in ethanol production, as well as tremendous volumes of natural gas for their cooking, steeping and drying processes. In contrast, CBRs use a cold process that requires less energy to process feedstock, resulting in a smaller carbon footprint and greater energy efficiency. This reduces the environmental impact of biofuel production and lowers costs for local communities. In addition, by producing multiple high-value products, including advanced biofuels and green electricity, a CBR provides a more sustainable and profitable solution for local communities. CBR's green electricity is used to power all the internal production equipment with enough excess to put back onto the local power grid. Overall, the benefits of a CBR over an ethanol plant extend far beyond energy efficiency to include environmental and economic advantages.

**B. More efficient conversion of feedstock to biofuel**

A CBR offers a more efficient feedstock conversion into various valuable products than traditional ethanol plants. The CBR process starts with a patented milling technology that grinds the feedstock into micron-sized particles, reducing energy consumption in the grinding process. The powder is then converted into a slurry, which is fed into a recovery device to recover any food components present; thereafter the remainder is continuously fed into the fermentation tanks. The CBR process allows for a more efficient fermentation process with lower energy consumption, resulting in higher yields of bio-butanol and other valuable co-products. In addition, the facility can produce advanced biofuels, bioplastics, hydrogen fuel cell electricity, and a patented true protein isolate from grain. This diversifies the revenue stream and reduces waste and pollution while creating more sustainable and valuable products for local communities. A CBR offers a more efficient and profitable biofuel and co-product production solution.

**C. Higher quality biofuel produced.**

A CBR has a much higher quality biofuel; the next generation biofuel in the form of bio-butanol, acetone, ethanol, and enabling the production of green hydrogen electricity. Moreover, a CBR can produce hydrogen, green electricity, and bioplastics, making it a Versatile and sustainable solution for local communities.

**D. Production of multiple high-value products**

By using a patented process, a CBR can also extract a high-quality true protein isolate from the grain, which has a range of food and

nutraceutical applications. This makes the CBR a more efficient and environmentally friendly way to convert feedstock into multiple high-value products. Compared to traditional ethanol factories, a CBR offers several benefits, including producing multiple high-value products. In addition to next-generation biofuels, a CBR can produce bio-based plastics, hydrogen fuel cell electricity, and a patented true protein isolate from grain. Furthermore, using an integrated approach that maximizes the use of all feedstocks, a CBR can extract the highest possible value from each ton of biomass. This creates a more sustainable and diversified revenue stream and provides a more cost-effective solution for local communities. Furthermore, by producing a variety of high-value products, a CBR can reduce the dependence on fossil fuels, promote local economic development, and contribute to a cleaner and more sustainable environment.

**E. Green energy production**

The Community Biorefinery (CBR) is a leader in green energy production. The facility is designed to produce advanced biofuels, including bio-butanol, acetone, and ethanol, and hydrogen fuel cell electricity, which can be sold to the grid and/or used on-site. This integrated approach not only maximizes the value of the feedstock but also minimizes waste and reduces the facility's carbon footprint. By producing multiple high-value products and green energy, the CBR is a sustainable and profitable solution for local communities.

**F. Reduced waste and environmental impact**

Through vertical integration, a CBR reduces waste and environmental impact. Traditional ethanol factories produce a large amount Of waste and consume significant amounts of energy during production cycles. Conversely, a CBR is designed to use a closed-loop, cold process that minimizes waste and pollution. This approach reduces waste and maximizes the value of every part of the feedstock, resulting in a more sustainable and efficient production process. By producing multiple high-value products and reducing waste and environmental impact, a CBR represents a more sustainable and profitable solution for local communities.

## IV. Comparison of Energy Efficiency

Compared to an ethanol plant, a CBR has several energy efficiency advantages:

- **A.** CBRs use a closed-loop, cold process that minimizes waste and pollution, resulting in significant energy savings and a smaller carbon footprint.
- **B.** A CBR can produce multiple high-value products, including hydrogen fuel cell electricity. This enables each CBR facility to operate energy self-sufficient.
- **C.** CBRs use lower energy consumption in feedstock processing, which is a significant advantage over ethanol plants that consume high amounts of energy during grinding, milling, hydrolysis, and fermentation.

**D. The energy consumption of traditional ethanol factories and CBR Butanol facilities.**

The energy consumption of these facilities can also vary depending on factors such as location, feedstock used, and production process. However, it is generally accepted that CBRs have higher energy efficiency compared to traditional ethanol factories due to their closed-loop, cold process design, and production of multiple high-value products as well as the CBR's ability to operate energy self-sufficient.

**V. Conclusion.**

While traditional ethanol factories have played a significant role in the biofuel industry, there are limitations to their production process and environmental impact. The development of the Community BioRefinery (CBR) offers a more sustainable and efficient solution, particularly with the potential for multiple high-value products and reduced energy consumption. The closed-loop, cold process used by CBRs results in significant energy savings and a smaller carbon footprint compared to traditional ethanol factories. The ability to diversify the revenue stream and reduce dependency on the volatile ethanol market also offers potential for cost savings and increased profitability. The CBR represents a promising next-generation solution for local communities and the environment.

**VI. Summary.**

A CBR offers several advantages over traditional ethanol factories. The ability to produce multiple high-value products, including biofuels, food, nutraceuticals, and green electricity, diversifies the revenue stream and reduces dependency on any single market. CBRs use a closed-loop, cold process that minimizes waste and pollution, resulting in significant energy savings and a smaller carbon footprint. The vertical integration of multiple production steps, including feedstock processing, fermentation, distillation, and waste treatment, leads to higher overall efficiency and reduced environmental impact. The potential for cost savings and increased profitability makes CBR facilities a more sustainable and profitable solution for local communities.

A Community BioRefinery offers significant potential for cost savings and increased profitability compared to traditional ethanol Factories. First, the ability to produce multiple high-value products diversifies the revenue stream, making the facility less dependent on the volatile ethanol market. This reduces the risk of financial losses due to market fluctuations. Additionally, the closed-loop, cold process used by CBRs results in significant energy savings, which can translate to lower operating costs. According to the USDA, CBRs can achieve an energy balance of up to 10:1, meaning that for every unit of energy used in the process, 10 units of energy are produced. This energy efficiency, combined with the ability to produce multiple high-value products, can lead to increased profitability for the facility. Furthermore, the reduced waste and pollution associated with CBRs also result in lower environmental compliance costs, further contributing to cost savings. Overall, the potential for cost savings and increased profitability make a CBR an attractive investment opportunity.

**VII. Potential for investment opportunity in CBR facility**

Throughout this document, we have discussed the benefits of a Community BioRefinery (CBR) over traditional ethanol factories.

The CBR offers significant potential for cost savings and increased profitability through the production of multiple high-value Products, including bio-butanol, protein isolate, bio plastics, and green electricity. This diversifies the revenue stream and reduces the risk of financial losses due to market fluctuations. Additionally, the closed-loop, cold process used by CBRs results in significant energy savings and a smaller carbon footprint compared to traditional ethanol factories. With its innovative approach to biofuel production, the CBR represents an exciting opportunity for investors interested in sustainable, profitable solutions for local communities.

**VIII. A call to action for investors.**

The CBR presents a compelling investment opportunity with its potential for cost savings, increased profitability, and sustainable Production of multiple high-value products. Investors should consider the benefits and potential of this next-generation biofuel technology and explore the opportunities for partnership or investment. By investing in CBR facilities, we can support the development of more sustainable and profitable solutions for local communities while also promoting a cleaner and more sustainable energy future.