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GENESIS O'AHU – WASTE TO FUEL PROJECT

Genesis O'ahu (GO) is a technology joint venture between project developers Blue Marble Innovations, Inc. (BMI) and Energy3 International, Inc. (E3i)

Technology & Project Risk Mitigation

Efficacy of Technologies: All the technology equipment sub-systems which will be installed at the Hawai'i GO E3i BioRefinery® plant have already been successfully deployed individually at commercial scale in the Americas, Europe and Asia and have many years of successful commercial operational history.

The uniqueness of the USPTO-patented "E3i BioRefinery®" design is in its integration of all these proven, commercial-grade, sub-systems in one location. Together they provide the novel ability to turn biogenic and hydrocarbon fractions of Municipal Solid Waste (MSW) into Renewable Diesel Fuel, or Sustainable Aviation Fuel (SAF), or Hydrogen. The full E3i system process and integration was evaluated at scale, and the fuels produced were independently 3rd party tested and certified in the US in 2020.

Competitive Advantage: Most companies that have attempted to enter the waste to renewable energy space have experience in either waste mitigation or in renewable fuels. E3i is unique in that it possesses deep expertise in both. Its patented E3i BioRefinery® integrated technology systems and commercial business model has been meticulously designed to mitigate technical, operational, financial and market risks for all of its stakeholders. Others in this space have promoted unproved first-of-a-kind technologies. E3i has designed its platform around only best-of-breed proven systems that have years of successful, full-scale, commercial implementation globally. These capabilities allow E3i to choose to enter only markets where the deployment risk can be substantially and reasonably reduced.

E3i's Technology Sub-System Suppliers collectively represent more than $197.4 billion global revenues, 779,000+ global employees & 2,043 combined years of industry experience.

Loesche, GmbH (Loesche)

- Loesche GmbH is the Düsseldorf, Germany-based parent company of Loesche Energy Systems, Ltd, London, UK, which is the operating subsidiary of the 115-year-old global engineering and technology equipment/system manufacturer which specializes in power, mining, cement and material solutions. Loesche has reference systems installed throughout the world.

- As E3I's prime contractor for the front-end system, Loesche has engineered the entire MSW-to-pellet solid fuel plant solution utilizing internationally-recognized Bulk Handling Systems. BHS is, in turn, one of the largest US/EU-based manufacturers of waste material recovery facility (MRF) sorting systems. BHS has more than 100 successful global installations.

- Loesche's solid fuel conditioning solution has been designed to include:

    - Stela Laxhuber GmbH's patented "rocket-mill" material sizing system. Stela is a 105-year-old Massing, German-based manufacturer.

    - Energy Technologies Inc.'s low-temperature industrial drying systems. ETI is a 28-year-old US-based manufacturer of industry-leading, patented inline spectrum material analyzing systems.

    - Andritz Group's pelletizer equipment. Andritz is a 170-year-old world leading manufacturer based in Graz, Austria.

  Each of these sub-systems has been engineered to operate as one complete system by Loesche and has been vetted by E3i, Chemex Global, BSI Engineering, and by AON/Ariel Green/Lloyds of London.

- Loesche has issued a corporate guarantee for the efficacy of the complete MSW-to-pellet front-end system, including the integration of all their manufacturers. Loesche has further agreed to issue a separate warranty for the full integration of the Loesche front-end system with the Proton Power Inc back-end pellet-to-fuel system - thus covering the full conversion from raw MSW to renewable transportation-grade fuels.

Proton Power, Inc. (PPI)

- PPI is a Knoxville, Tennessee-based technology systems manufacture. PPI will supply the back-end pellet feedstock to diesel fuel conversion system for Genesis O'ahu. For 15-years PPI has been a leading developer, engineer, and manufacturer of biomass and solid fuel to liquid fuel technology systems. Their unique system serves their international clientele with a highly proprietary process using their patented cellulose-to-hydrogen power CHyP™ pyrolysis system. Proton Power has a strong physical presence with five R&D, fabrication, and support facilities in Tennessee, with over 142,000 square feet of manufacturing and office space on 161 acres.

- The PPI pyrolysis system has nearly 10 years of commercial operations with more than 10,000 hours of successful processing time logged with zero environmental performance issues.

- PPI has installed privately owned systems currently operating in Tennessee, Alabama, and in Singapore. Their Tennessee facilities have over 10 years of successful operating history and more than 10,000 hours of process logged across the two plants. One is designed to generate electricity using syngas and the second facility was designed to reconstitute the syngas into transportation-grade liquid diesel fuel. This latter Tennessee facility was used in a full-scale test of the integrated E3i BioRefinery® plant systems in 2020.

- PPI demonstrated that it can process E3i's engineered MSW solid fuel pellets and efficiently convert them into a synthetic, hydrogen-rich natural gas (syngas) for electricity production, which in turn can be condensed into a renewable liquid transportation-grade diesel fuel.

- The renewable diesel fuel generated by the PPI CHyP system was tested and certified by the US Environmental Protection Agency (EPA) and by the United Kingdom Ministry of Transport – Renewable Transportation Fuels Obligation Agency as an approved on-the-road use transportation-grade fuel: a 100% replacement for fossil diesel fuel. In addition three global ISO 9000 certified independent labs (SGS Laboratories, Intertek Laboratories and Iowa Central Fuel Testing Laboratory) have tested the PPI/E3i renewable diesel and have confirmed that it is fully compliant with ultra-low-sulfur transportation-grade diesel fuel (ULSD) meeting the USA standards for ASTM D975 and the European Union standards for EN590 fuels (and similar to EN15940 fuel).

- Unique in their space, PPI accomplishes the conversion from solid fuel to liquid fuel without the deployment an expensive and high-risk Fischer–Tropsch back-end catalyst system.

- In addition to the two PPI owned and operated CHyP system technology plants in Lenoir City and Rockwood, Tennessee, a third, privately owned, system is in operation in Bay Minette, Alabama, and a fourth operates in Singapore. PPI is in partnership with another private company in the USA to build a new commercially viable plant for demonstrations and R&D in Oakridge, Tennessee. This new plant is expected to be commissioned and fully in production in 2028.

  - **Lenoir City, TN USA Plant:** A large private food processor in Tennessee had a desire to reduce its dependance on electricity from the local grid and wanted to reduce the environmental footprint of its processing plant. Contracting with PPI, this processor installed a PPI CHyP waste to electricity plant system demonstrating that waste could generate a fuel-grade synthetic natural gas that could power gas/electricity generators, significantly, reducing the client's reliance on power from the local electrical utility. The PPI power plant has been a tremendous success and in operation since 2013.

  - ***Rockwood, TN USA Plant:*** Initially owned and operated by PPI, the Rockwood facility was subsequently sold to a private investor group. This plant demonstrated a further refinement of PPI's CHyP system by taking syngas created from waste and further processing it into a renewable diesel fuel, which is chemically identical to fossil diesel. The Rockwood facility was used in the 2020 efficacy test that produced renewable ULSD fuel which was 3rd party independently tested (as described above). The new private owners of this facility have since undertaken to convert the plant to hydrogen production.

  - **Bay Minette, AL USA Plant:** Another private PPI CHyP WtF system was commissioned in 2021. Since start up, the Bay Minette plant has been producing and selling more than 15,000 gallons of renewable diesel fuel per month. Once all 8 CHyP reactors are commissioned, this BioRefinery is forecast to produce about 1.5m gallons of renewable diesel per year.

  - **Oakridge, TN USA Plant:** This privately owned PPI CHyP WtF plant is a joint venture between PPI and the plant developer, CarbonSweep, LLC. Its MSW waste conditioning systems in Alabama and Mississippi have been in successful operation since 2010. Upon commissioning of the fuel conversion systems, scheduled for 2027, this plant will be a 48 CHyP reactor WtF plant generating more than 10m gallons of renewable diesel fuel per year. The facility will have a small portion of its operation devoted to PPI's ongoing R&D, facilitating ongoing system upgrades as technology efficiencies are developed

  - **Singapore, Southeast Asia:** Commissioned in 2022-23, operational details are not yet available for this privately owned PPI CHyP WtF plant.

Testing of the integrated E3i WtF Biorefinery Plant: In 2020 E3i commissioned a virtual waste-to-fuel plant using the full Loesche and PPI technologies to assess the integrated systems proposed for all its BioRefineries. Contracting with the same technology equipment suppliers that will supply their full-scale sub-systems and which will be built under one roof at each of the planned facilities, E3i identified a MSW waste stream in the USA with a similar waste profile to that of its target plants. The test generated more than 10,000 lbs. of engineered Solid Recovered Fuel (SRF) pellets, these pellets were then shipped to the Rockwood PPI plant where they were processed into renewable diesel fuel. The fuel was then tested by independent 3rd party labs, confirming that the renewable diesel fuel was chemically identical to ULSD derived from crude oil. The renewable fuel met the US ASTM D-975 and European Union-EU (& UK) EN590 standards for transportation-grade ultra-low-sulfur-diesel (ULSD) fuel. As tested, it also meets all the US Department of Defense (DoD) requirements for a Drop-In renewable diesel fuel and can be further refined to Sustainable Aviation Fuel (SAF). (see attached E3i Virtual BioRefinery Test)

Manufacturer Warranties & Guarantees: Each contracted equipment technology manufacturer is issuing a manufacturer system performance warranty guaranteeing successful sub-system commissioning, followed by a minimum of 12-months performance to design “name plate” standards.

Third Party Technology Performance Guarantees: The Developers have worked with technology insurance underwriters Energi/Munich RE, New Energy Risk and AON/Ariel Green/Lloyds of London Insurance underwriters for more than five years. All three company groups specialize in Technology Performance Wrap (TPW) policies for energy projects. Based on their due diligence, each offered to issue a performance insurance policy for the full Loesche and PPI technology systems. E3i ranked the AON/Ariel Green/Lloyds group as providing the most comprehensive coverage. AON/Ariel Green/Lloyds have since completed their underwriting and issued policies to E3i for a plant system repair warrantee to mitigate any technology system equipment and integration risk through the plant commissioning and performance testing and an additional 10-year TPW to guarantee performance, in support of the plant lenders/investors, after successful plant commissioning and performance testing, to the benefit of the plant investors and lenders.

Design Engineer and EPC Contractors: Upon selecting BSI Engineering, headquartered in Cincinnati, Ohio, USA as its Prime Design and Engineering Contractor, E3I reviewed and vetted more than 10 Engineering/Procurement/ Construction (EPC) companies; eventually shortlisting three before selecting Shaw/ Chemex Global, a $6-billion EPC with headquarters in Houston, Texas. Shaw/ Chemex Global, is one of the most respected oil & gas industrial contractors in the United States.

The Shaw Group has fabrication and support operations in North America, Europe and the Middle East. For more than 45-years the Shaw Group has distinguished itself as a leading global North American-based fabricator, engineering, construction and modularization contractor in the oil and gas sector.

- E3i's contract engineers have spent considerable time understanding all details associated with each of the E3i plant equipment and technology suppliers over the past 5-years. E3i, with support from BSI Engineering, has executed FEL1 and FEL2 studies and completed all the initial site design, plant layout and equipment engineering necessary to facilitate GMP (guaranteed maximum price) contracts to build and commission these game-changing plants. This mature engineering and design activity from BSI Engineering has resulted in the execution of all required GMP supplier contracts.

- As was done in the Dominican Republic and as is proposed in Hawai'i, BSI and Shaw as E3i's global Prime Engineer and EPC will vet, interview, select and contract with local engineering and build contractor teams for each project, who will become their local project labor and sub-contractors. BSI and Chemex are fully committed to engineering, building and bonding these projects as required and to issue performance guarantees for all their work products and that of their sub-contractors.

- E3i's BioRefinery® project in the Dominican Republic (DR) is now fully shovel ready and is targeted to start construction in Q3 2026. The DR plant design, operation and all the associated contracts is the exact platform to which Hawai'i and all follow-on E3i BioRefinery® plants will be modeled. Great effort has been taken to ensure that each selected technology system supplier, contractor and professional services provider has the depth and capacity to support the projects anywhere in the world.

O&M Contractor: E3i has contracted PrimeTec, Ltd. as its Operations and Maintenance (O&M) contractor. PrimeTec is the global O&M subsidiary of Loesche Group GmbH, the prime contract manufacturer for the front-end system. As such they bring intimate knowledge of the manufacturers and systems which gives them a significant operational advantage. PrimeTec's Chief Operations Officer has spent substantial time with E3i's backend system supplier, PPI, and has established a deep understanding of that system as well. PrimeTec has executed an O&M contract with E3i to operate its plants on behalf of their owners to manufacture name-plate standards, with appropriate rewards and penalties tied to each plant's performance.

Permitting and Licensing:
E3i has contracted with Peterson/Control Union, which has its global headquarters in Rotterdam, to manage all local environmental impact studies and provide all required environmental engineering support. Peterson/Control Union operates in 70-countries globally and is one of the largest and most credentialed environmental consultants in the world.

Independent Certifications, Accreditations and Audits: E3i has also charged Peterson/Control Union with initial and ongoing biorefinery environmental plant certifications & accreditations and audits. With their historic roots in agricultural inspections, they have been operating for more than 100 years in the field of logistics, quality certifications, and risk management. Peterson/Control Union employs more than 4,000 people worldwide. Their in-depth knowledge and experience covers all aspects of the supply chain in many industries including agriculture, energy, forestry, sustainability, and textiles. Peterson's scope of activities has expanded over the years, including expertise in the global oil and gas marketplace. Peterson has provided integrated logistics services to the world's leading players in the oil and gas exploration and production industry since 1968, delivering cost-effective and innovative supply chain solutions that meet the highest possible standards of safety to man and the environment.

Guaranteed Diesel Sales "Offtake": E3i has executed a renewable diesel offtake contract with DCC plc -a €30-billion/yr company that is one of Europe's largest energy and fuel distribution companies- for the fuel product of the Dominican Republic plant. This agreement guarantees that 20,000,000 gallons of renewable diesel produced by E3i will be purchased by the Offtaker at a revenue stable minimum floored-price for the next 10-years. The guaranteed revenues and the contractual split of the EU government mandated incentives bring the value of this E3i contract to more than €1.6 billion over the life of the agreement. The DR Offtake Agreement is the structure that all E3i BioRefinery® Offtake agreements, including Genesis O'ahu, will be modeled.

GENESIS O'AHU
WASTE CONVERSION
Hōʻola Hou i ka ʻÓpala