

**INDEPENDENT ASSESSMENT SUMMARY
 ENERGY3 INTERNATIONAL, INC. (E3i)
 ENVIRONMENTAL, SOCIAL & GOVERNANCE (ESG) SUSTAINABILITY IMPACTS FOR
 HAWAII- MSW TO RENEWABLE FUEL BIOREFINERY**

*“Environmental, Social & Financial Sustainability Are Not Mutually Exclusive”
 E3i 2025*

International Finance Corporation Sustainability Performance Standards (IFC):

IFC and the World Bank Group have established guidelines which measure the Environmental and Social impact of major projects financed under their authority across the globe. These institutions along with affiliated organizations, like the Equator Principles, work together to establish acceptable frameworks from which these projects activities can be measured and monitored over their lifetime, in the interest of improved outcomes to both the environment and mankind.

Projects are assessed relative to the degree of impact which occurs over their lifetime, against a range of inputs and outputs during construction, operating history and, following project completion, the winding-down and decommissioning phase of a project. Depending on the magnitude of the impact, follow-on mitigation and or reporting may be required during the project lifetime.



World Bank Group Environmental and Safety Guidelines (World Bank):

As E3i's outside consultant, we have also used the following categorization of activities under the World Bank Guidelines baseline definitions, to frame its analysis throughout this document:

“Environmental”:

- Air Emissions and Ambient Air Quality
- Energy Conservation
- Wastewater and Ambient Water Quality and Conservation
- Hazardous Waste Management
- Waste Management
- Noise
- Contaminated Land

“Occupational Health and Safety”:

- General Facility Design and operation
- Communications and Training
- Physical; Chemical; Biological; Radiological Hazards
- Personal Protective Equipment
- Special Hazards Environment
- Monitoring

“Community Health and Safety”:

- Water Quality and Availability
- Structural Safety Project Infrastructure
- Life and Fire Safety
- Traffic Safety
- Hazardous Waste Transport
- Disease prevention
- Emergency preparedness and response

“Construction and Decommissioning”:

- Impacts on the Environment during Construction
- Occupational Health and Safety
- Community Health and Safety

PROJECT ASSESSMENT

E3i's independent 3rd party Environmental Health and Social Consultant, James W. Bohlig, CEO of Carbon Sweep, has studied and measured the impacts of the proposed E3i BioRefinery®. It is his assessment that the E3i projects will qualify as a Type C Category project under the IFC Performance Standards, Equator Principles and the World Bank Group Environmental and Safety (EHS) Guidelines, with "...no or very limited negative impacts on the environment or local community or society". No special provisions are expected to be required for this facility to meet International Standards.

ASSESSMENT PROCESS

Project Impacts Were Measured Against 10 Environmental & Social Sustainability Categories:

1. *Air Quality*: Protect air quality through the application of the best appropriate technologies for controlling or reducing air emissions.
2. *Water Use and Quality*: Protect fresh, marine and ground water resources through efficient use of resources and appropriate treatment of effluent discharges.
3. *Waste Management*: Sound management, recycling and storage treatment practices.
4. *Natural and Manmade Hazards*: Design and locate projects to avoid environment and social risk.
5. *Biodiversity*: Protect ecological resources and diversity and support critical natural habitats.
6. *Involuntary Resettlement*: Indigenous People, Cultural Property. Develop project to protect cultural and indigenous people, address indigenous and cultural impacts.
7. *Noise*: Control and reduced levels of noise to meet quantitative international guidelines.
8. *Protection of Workers*: Establish suitable controls to promote safe working conditions and fair treatment of workers.
9. *Community Health and Safety*: Establish measures and plans to avoid or minimize adverse project related impacts on local communities meeting international standards.
10. *Global Climate*: Promote measures to reduce the emission of carbon dioxide and other greenhouse gases that impact global climate.

E3i intends to support these objectives in all E3i waste-to-fuel (WtF) BioRefinery projects that they develop and are committed to adopting measures throughout the projects' lifetimes, as necessary to improve and/or mitigate these impacts with project committed covenants.

Environmental Impact: GHG

There are two major project activities (Activity #1 and Activity #2) within the scope of each project(s) being developed by E3i having “primary” and “secondary” effects under the Green House Gases (GHGs) protocol.

“Primary Effects” included in this analysis, incorporates the following:

- Activity #1: Annual Processing of 381,425 tons of MSW (residential and commercial waste) plus yard waste previously earmarked for disposal in regional waste dumps, converted into recoverable feedstock products:
 - *Carbon Reduction* associated with:
 - 100% of Recoverable Recyclables: ~ 39,000 tpy (compost, metals, plastics, etc.)
 - diversion of 212,000 tpy of non-recoverable recyclables (and associated moisture), now alternatively to be used as low carbon biogenic feedstock after solid fuel conditioning (calculated after volume reduction from moisture content of the MSW).
- Activity #2: Conversion via High Temperature Pyrolysis of conditioned solid fuel pellets to low carbon non-fossil derived liquid diesel fuel (and/or SAF).
 - production of ~20,000,000 gals/yr low-carbon ultra-low-sulfur-diesel (ULSD) ASTM D-975 & EN-590 compliant renewable non-fossil derived transportation-grade diesel fuel for direct displacement of fossil resourced diesel. (not used in these calculations...a percentage of this fuel could be converted to sustainable aviation fuel [SAF] if warranted)
 - production of Biochar and Graphene including Sequestered Carbon

“Secondary Effects” included in the analysis, incorporates the following:

- Activity #1 & #2:
 - *GHG Emissions associated with:*
 - generating electric power for processing MSW and Engineered Feedstock pellets into low carbon diesel fuel. (not used in these calculations...a percentage of the power required could and may be self-generated, if warranted)
 - fossil-sourced carbon used to create low-carbon renewable diesel
 - transporting low-carbon diesel via tanker truck and/or via marine tankers for distribution of renewable diesel to market
 - Consumption of this fully compliant renewable non-fossil ULSD fuel will be a full replacement for the consumption of the equivalent volume of fossil diesel to support national, state and county governments and private industry’s renewable non-fossil fuels, zero-waste and energy security commitments

- generating electric power for BioRefinery Activities (not used in these calculations...a percentage of the power required could and may be self-generated, if warranted)
- Biogenic Absorption and Re-release of biogenic carbon from combustion of diesel fuel

E3i Environmental and Social Assessment E3i BioRefinery® Projects - Impact Category

Considerations:

1. Air Quality Protection:

- a. General fugitive air emissions (GHGs) will be greatly reduced at the existing waste landfills/dumps, originally earmarked to dispose of 381,425 tpy of waste plus organic waste/project, which upon commissioning will be presented for processing at E3i's enhanced BioRefinery plant designed for recycling and diversion of more than 90% of 381,425 tpy of waste generated by area communities.
- b. No new material air quality emissions will occur other than combustion air emissions associated with a small, packaged boiler system, fired with propane or natural gas or solar electricity for thermal input at the BioRefinery.

2. Water Use and Quality:

- a. No significant water consumption is required by the process. In fact, excess water recovery from the MSW will return water to the local infrastructure as irrigation quality water or discharge into the plant's wastewater system after final processing. Treated water quality will be well above local wastewater standards and is designed to meet local irrigation/agricultural water standards.

3. Waste Management:

- a. Nearly 100% of the received waste will be recycled and/or repurposed as opposed to less than 10% in the baseline condition. Regional landfills' life expectancy may be projected to increase more than ten (10) times in useful life through the diversion of more than 90%+ of the previous incoming waste under baseline conditions. There is a case to be made that most, if not all, of the area waste landfills/dumps serving participating municipalities may be closed or operationally suspended permanently. Many of the current inventory of landfill/dumps are currently under review by Federal State/Provincial and Local Government closure orders and legislation.

4. Natural and Manmade Hazards:

- a. A licensed local 3rd party environmental engineering consultancy, with the support of internationally recognized Peterson/Control Union, will be engaged to support the licensing and permitting required for the E3i WtF BioRefinery facilities so as to avoid/mitigate natural and manmade hazards (Peterson/Control Union- Mandeville, Louisiana Office).
- b. The applications and environmental study submissions from E3i via its consultant will result in (as may be required):

- i. Environmental Certification from the Department/Ministry of Health/Environment
- ii. Certificate of Non-Objection from the Department/Ministry of Agriculture
- iii. Certificate of Non-Objection from the plant site's local government
- iv. State/Provisional Concession Agreement from the state Energy Office
- v. Support from regional and federal leadership for environmental carbon net-negative mandate, led by government regulators

5. Biodiversity:

- a. The target locations for the processing plants require only a ~20-acre industrial site. This is a surprisingly small footprint for a facility that will perpetually mitigate up to 400,000 tons of MSW per year, as much as 16 million tons of MSW over the plant's 30–40-year active life. Unlike an MSW landfill, at the end of its operational life, the biorefinery can be decommissioned and its acreage can easily be returned to the community's developmental inventory.
- b. Most cities (or groups of communities) with an aggregate population of 500,000 residents generate enough MSW annually (@ about 4 lbs./day/person) to meet the 1,000 ton per day volume requirement to support a full-sized E3i BioRefinery®. Residential, commercial, green (yard) waste and some agricultural crop waste are perfect feedstocks for the biorefinery plants.
- c. Often Industrial Parks, Enterprise Zones, or Property near Existing Industries, Decommissioned Waste Mass Burn Plants or Landfill Operations can become perfect sites for an E3i BioRefinery®.
- e. Each E3i BioRefinery® will permanently mitigate hundreds of acres of land which will be otherwise permanently lost to waste landfilling/dumping and incineration operations should tons of regional MSW over the next 40 years be disposed of through conventional MSW landfilling or incineration ash-producing operations. This significant loss of land can be mitigated with the implementation of the E3i BioRefinery® project(s).
- f. Abandonment of controlled and uncontrolled waste dumping could eventually in time allow for the restoration of many acres of native land back to its original habitat.
- g. There is negligible risk to biodiversity or adverse impact to natural habitat. In fact, each project will preserve hundreds of acres of land for habitat, agriculture and other public and private use that would otherwise be lost to waste disposal landfilling/incineration operations over the next 30-40 years.

6. Involuntary Resettlement:

- a. No indigenous or cultural property is located on this site. No people will be displaced.
- b. This plant may in fact preserve the ability for many local families to remain in the area by providing the local residents with net new good full-time employment.
- c. The 250 new permanent full-time jobs and skills training created by this project will provide employment to many in the regions who otherwise may have found good-paying benefit-bearing permanent jobs a challenge.
- d. Extra efforts will be taken by E3i to recruit and train indigenous male and female employees, unskilled, low-income and the underemployed for plant administration operations and maintenance positions, as this is often an underserved sector of the local jobs market.

7. Noise:

- a. E3i has hired a Prime 3rd party EPC Contractor who has been charged to ensure that the facility noise emissions are designed to be acceptable within federal and local regulatory boundaries during construction.
- b. The plant mechanical operation is relatively quiet and will produce negligible noise. All processing operations are contained within industrial buildings which will further mitigate noise pollution.

8. Protection of Workers:

- a. E3i has hired a 3rd party experienced European-based global Prime O&M Contractor who has been charged with enforcing strict worker protection, safety, equal opportunity employment policies, and all other required labor standards.

9. Community Health and Safety:

- a. EPC Contractor is charged with minimizing or avoiding any adverse project related activities associated with neighboring communities. Adherence to Local, State and Federal Zoning requirements will be met.
- b. Mountains of garbage at regulated and/or uncontrolled landfills/dumps contain decaying waste which can become a breeding ground for disease, toxic and poisonous leachate, pests, toxic fumes, and explosions from trapped methane gas. This risk is avoided.
- d. Leachate, (the toxic semi-liquid soup derived from decaying waste) when it gets into the environment can compromise the local precious safe-water supply. Aquifer contamination crises are happening with increased regularity. Many believe that even with modern “lined” waste landfills, it is not a question of “if” landfill leachate will eventually breach its liner, but “when”. The requirement to constantly monitor groundwater at landfill operations is a constant reminder of the significant public health and environmental risk that results when toxic materials leak into the local aquifers and water supply.
- d. Local municipalities, county governments or non-profits who choose to support these projects by collecting and diverting their MSW waste to E3i BioRefinery® processing plants, could share in an E3i Green Fund of approximately \$2,300,000/

year or \$0.10 for each gallon of renewable fuel sold, an annual community allocation of revenues generated by an E3i plant. These revenues can be used by the municipalities, county or local non-profits to fund, as needed, health clinics, safety programs, schools, education and/or other environmental projects, etc.

- e. Each E3i Biorefinery® project will recruit, train and hire 250 local citizens for various operational roles. These positions will all have full benefits including healthcare paid for by E3i. Priority training and employment will be given to those who may be displaced from current waste dump/landfill operations or recyclable activities and/or underserved citizens. Students from local schools and Universities and other groups interested in Environmental Studies, Engineering and other disciplines may intern and become permanent staff members of the biorefineries' workforce.

10. Global Climate:

- a. Each BioRefinery project under a detailed GHG Protocol Analysis is estimated to result in a **net reduction of related GHGs in excess of -370,410 mt co2e/yr.** (including yard and agricultural waste the saving is estimated at **over 400,000 mt of co2e/yr.**) Over the project(s) lifetime, each project is projected to remove in excess of 10,000,000 mt co2e from the earth's existing inventory of co2e. This will be one of the largest "net negative GHG projects" ever undertaken in our selected markets. Replicated across each market, these Waste-to-Fuel E3i BioRefineries® can make a significant contribution to the host nation's decarbonization, energy transition and energy independence objectives.

Responsibility for Minimizing Project Impacts:

E3i has assumed and assigned responsibility for the following activities to BioRefinery project consortium 3rd party members under contract to E3i for its project(s):

- Environment management assigned as direct responsibility of E3i supported by Peterson/Control Union
- Occupational Health and Safety management assigned as direct responsibility to the EPC Contractor (Chemex Global) as design agent and the Operations and Maintenance Contractor (PrimeTec) as long-term O&M plant operator
- Community Health and Safety management assigned as direct responsibility of PrimeTec as long-term O&M plant operator
- Construction and Decommissioning management assigned as direct responsibility of Chemex Global

IFC Performance Standards, Equator Principles and World Bank Group Environmental and Safety Guidelines

Based on IFC Performance Standards, Equator Principles and the World Bank Group Environmental Health and Safety (EHS) Guidelines, the E3i project is assessed to be a Type C Category project with no or extremely limited negative impacts on the environment or local community or society. No additional special provisions are expected to be applied to the facility

to meet these International Standards as E3i executed design objective from its inception, to meet or exceed all International EHS standards.

Other Sustainability Considerations:

Local Employment & Job Quality

E3i projects will create training and full-time employment for over 250 long term (20 years) “green” positions including system supervisors, machine operators, maintenance, engineering, security and CDL accredited truck drivers. All jobs will include full benefits and E3i paid healthcare in a region where some area citizens historically may be underemployed and/or have not had access to employer provided health benefits. Preference for training and employment will be given to local men and women, those displaced by recent technologies and unskilled low-income workers, and underemployed citizens, as they comprise an underserved segment of the local community’s jobs market.

These green jobs are considered highly resistant to displacement by traditional competitive pressures of world markets. The skills and credentials gained will make biorefinery employees attractive in the global market, as a growing number of employment markets move toward green renewables and energy-independence-supporting industries.

The new jobs can also form the backbone of a new Low Carbon Manufacturing Sector. These will be highly coveted “green long-term jobs” available to replace those that may be displaced by old technology jobs in declining markets as industries turn away from fossil fuels and less-sustainable energy production systems. The plant will provide new employment opportunities and thus may retain more local university and community college graduates upon completion of their studies.

Once established, E3i believes that this technology platform, utilizing waste as a feedstock, can be expanded to serve the entire market and grow to mitigate a significant amount of total MSW waste generated in country.

Mitigating Economic Threat

Today most communities are paying waste disposal fees (“tipping fees” in USD) between \$81-\$150/ton for MSW (and as high as \$256/ton for special waste commodities). As current landfills reach capacity and reluctance to build new waste landfills grows, the result is that MSW must be transported even further distances at an increasing economic and environmental cost to the local citizens. This situation is not unique and ultimately unsustainable worldwide. In countries that are heavily populated, or raw development industrial land is scarce, the problem can be significantly more challenging. Waste mitigation is a cost that continues to grow with no end in sight. Recycling by itself, though environmentally positive, cannot survive without being underwritten by taxpayers and their governments. Excluding waste metals, recyclables do not come close to offsetting their associated costs of waste transportation, sorting, processing and product reconstruction. Unlocking the energy in our waste streams and processing it as a replacement for fossil crude oil provides new and significant revenue streams that can help offset the costs of waste transportation, sorting and processing. Under E3i’s model, this is an environmentally and financially sustainable, enterprise. Though E3i can be advantaged by existing regulatory support, E3i’s BioRefineries® do not require additional taxpayers or government subsidies to be

viable.

Construction Activity

Construction of each E3i facility is estimated to create approximately 350 good paying construction jobs, most of which will go to local workers. Construction will occur over approximately 24-30 months from Notice to Proceed (NTP) and is scheduled to begin immediately upon the required permits being issued. In most cases, construction will involve privately-funded infrastructure and construction spending of \$350,000,000; the majority spent acquiring and installing state-of-the-art technologies that will be deployed at the local plant site. The cost of engineering and professional services is estimated at <\$100,000,000 of the total. E3i has completed master designs/layouts for their E3i BioRefineries® so designs only need to be localized to meet all prevailing commercial industrial building standards.

State of the Art Technology Provided by Global Leaders

The E3i WtF Biorefinery® plant is a USPTO patented integrated system that represents the best technology available today, engineered and fabricated by some of the world's leading highly patented technology equipment suppliers, contractors and professional services teams. In aggregate E3i's contracted service companies represent more than \$230 billion in annual revenues globally and more than 750,000 employees worldwide with more than 2,000 years of combined corporate experience.

High Tech Training

Extensive managerial training can be scheduled if advantageous to take place at a similar waste to fuel facility in the United States or the Dominican Republic. Local senior managers who will be hired to manage and run the local project will be advantaged by orientations at these or other E3i operating facilities. This practical training will provide the local project team with the advantage of exposing its key managers to the technology platform months in advance of their plant's start-up. As each plant is nearly identical, upon the successful commission each of E3i's 12 initial "seed" plants, those facilities will become the training facility for all of the follow-on biorefinery projects in that country (market).

These projects have the potential to help their host countries be among the first globally to achieve the goal of "Zero Waste" while proportionately producing one of the largest reductions in carbon footprint per-capita of any of their peers, thus helping them to realize their statutory or voluntary Net Carbon-Negative objectives.

Largest Net Carbon (co₂e/CH₄ GHG) Avoided and Repurposed Project

The E3i technology platform can provide their host governments and communities with the largest carbon reduction and avoidance co₂e/ch₄ GHG to date. E3i's avoided co₂e is equal to a minimum of >370,410 mt of carbon per year per plant or more than 7 million mt of carbon savings over the first 20-years of the plant operation. There are no other technologies today that can produce this volume of carbon reduction. i.e.: It could take 225 times more solar (4,500 acres) to achieve the same carbon offset that will be achieved with relatively small 20-acre footprint for one E3i BioRefinery® plant.

Climate/Carbon Reduction Leadership:

With surging momentum in global climate action and public health, the tipping point is already

being reached. Over 70% of the global economy is expected to be on a net-zero trajectory by the end of the decade. The race to move to net zero carbon is not a green race but an economic race. Decarbonization strategies are not just about reducing emissions or being responsible – they are now an economic opportunity for the states, countries and companies that take action. There are many that are seeing this change realized, given that in 2020 despite the economic impacts of the pandemic, a record amount of \$500 billion USD was invested in decarbonization.

Economic Development Impact:

E3i estimates that the plant construction and 40-year operating contract will measurably contribute to the local economy/plant to include:

Local Payroll Spend	Annualized	Over 40 Yr Project Lifetime
• Local Payroll	\$5,830,000/yr	\$233,200,000 Payroll
• Local Utility Revenue*	\$10,400,000/yr	\$8,320,000,000 Revenue
• Local Maintenance	<u>\$700,000/yr</u>	<u>\$28,000,000 Budget</u>
Annualized	\$16,930,000/yr	\$8,581,200,000 Total
Local Economy Impact		

**may be offset by self-generated power – will vary based on local value of electricity/kwh*

Domestic Use/Exports	Annualized	Over 40 Yr Project Lifetime
• Low Carbon Fuel/Incent.*	\$170,300,000/yr	\$6,812,000,000 Sales
• Biochar	\$5,100,000/yr	\$204,000,000 Sales
• Wood Vinegar Sales	<u>\$4,900,000/yr</u>	<u>\$196,000,000 Sales</u>
Total Sales	\$180,300,000/yr	\$7,212,000,000 Total

**will vary based on prevailing low carbon incentives*

It is important to recognize that the above chart describes economic impact is for only one (1) full-sized project E3i BioRefinery®. Replicating biorefineries will deliver a positive ESG impact, which will be multiples of the figures above.

Respectfully Submitted,
James W. Bohlig, B.Eng., CEO

Carbon Sweep
335 Tamarack Lane
Rutland, Vermont 05701 USA
802-236-2141 cell
jwbohlig@gmail.com

Greenhouse Gas GHG Emissions E3i Hawaii Project

Background Information

Methodologies Used

E3i Project followed the GHG Protocol for Project Accounting principles in developing their GHG results. Specific steps undertaken included the following discrete steps:

- Identification of Specific GHG Project Activity to be Examined
 - Alternative Waste Management Practice (GHG Activity #1)
 - Transportation Fuel Switching Project (GHG Activity #2)
- Establishment of Existing Baseline Emissions
- Identification of Boundary Conditions and Additionalities
- Deployment of Recognized GHG Calculational Tools
 - GHG Genius Model
 - EPA's Waste Reduction Model WARMV15
- Consideration of full Upstream and Downstream Effects (Primary and Secondary effects)
- Close adherence to GHG Accounting Policies and Practices

E3i Mass Balance and Waste Quality Considerations

E3i overall project involves the diversion of 420,000 tons annually of MSW from traditional landfilling in Hawai'i to sophisticated MSW processing. MSW processing was used to recover all marketable recyclables and produce an engineered fuel deemed suitable for use as a feedstock for the fuel conversion technology's high-temperature pyrolysis conversion process necessary to meet EU-590 diesel fuel standards.

Waste surveys and characteristic studies were undertaken to properly define the cross section of the waste stream expected to be processed. This waste characterization determination was used as the WARM V15 GHG emissions input characterization to the WARM model.

Approximately 25% of the Hawai'i waste stream (105,000 tons) was determined to be yard/green waste which will be source-separated, size reduced and rejoined with the processed MSW (Engineered Feedstock) for drying and conditioning prior to pelletization. After processing, rejoining, drying and pelletization the overall process is forecasted to produce approximately 203,000 tons of pellets at a moisture level of 10%. These pellets in turn are forecasted to yield approximately 23,000,000 gals of EU-590 compliant low carbon diesel (and/or SAF).

GHG Emission Narrative by Activity (termed Project below)

The following table is used in the Investment Memorandum and will be referred to in the narrative below.

Description	Annual M tons /yr co2e GHG Emissions	Reduction/Addition of GHG mtco2e
MSW Handling Component: GHG Project #1		
Avoided GHG Emissions from Baseline Waste Management Scenario	(162,181)	Reduction
GHG Emissions From Alternative Waste Management Scenario "Recycling Only"	50,890	Addition
Avoided GHG Emissions from Diverted Material to Biorefinery	(82,378)	Reduction
Net GHG Emissions From Project #1	(193,669)	Reduction
Renewable Diesel Biorefinery Component: GHG Project #2		
Avoided GHG Emissions from Fossil Diesel Displacement	(208,695)	Reduction
Avoided GHG Emissions from BioChar co2e Sequestration	(40,985)	Reduction
Add Back Non Biogenic GHG Emissions Fossil Diesel Combustion	2,835	Addition
Add Back Biogenic GHG Emissions from Diesel Combustion	208,695	Addition
Less Biogenic GHG Emissions Absorbed from Waste Material Previously	(208,695)	Reduction
Add back GHG Emissions From Processing Electricity Consumed ; Sea Transport; Domestic Truck Transport	70,104	Addition
Net GHG Emission Reduction From Project #2	(176,741)	Reduction
Net Reduction Global Co2e GHG Reductions Per Year	(370,410)	Net Total Project #1, #2 Reduction

A. Alternative Waste Management Practice Activity #1

The baseline existing GHG emissions for permanently landfilling 420,000 tons/yr of MSW under the waste characterization (37 categories) used, was determined by inserting these values into the model yielding 162,181 mt co2/yr Baseline Emissions.

The alternative waste management practice deployed was to process 420,000 tons/yr of MSW, recover 39,000 tons of recyclables, divert 227,000 tons from landfilling for use as an Engineered Feedstock for conversion to low carbon diesel and dispose of the balance (154,000 tons) in approved local landfills.

This alternative waste management practice was used as the “alternative practice” input into the WARM model yielding a GHG emission of 50,890 mt co2e/yr were we only to recover the 39,000 tons of recyclables and landfill the balance. The Net GHG Emission would be the difference (162,181-50,890) = **-111,291 mt co2e/yr**.

However, E3i also diverted 227,000 tons of material from landfilling as biogenic feedstock further reducing the landfill GHG emissions by **-82,378 mt co2e/yr** resulting in a Net Reduction of **-193,669mt co2e/yr** associated with Activity #1.

B. Transportation Fuel Switching Activity #2 Renewable Diesel Biorefinery

E3I's Biorefinery will accept for conversion 221,695 tons/yr of pellets at 0% moisture yielding 15,177,903 gals of low carbon diesel. Of these 14,419,008 gallons produced, approximately 95.0% was attributed to diverted biogenic feedstock otherwise to be disposed in the landfill and 5.0% of fossil derived feedstock destined to be disposed of in the landfill (by mass).

Utilizing the GH Genius model analysis for the PPI process, yields a Carbon Intensity CI of **-94.29 gco2e/MJ** producing a GHG emission of **-208,695 mt co2e/yr**. associated with diesel displacement and PPI lifecycle GHG emissions. Further reduced by the lifetime emissions associated with Bio-Char carbon sequestration produces a further **-40,985 mt co2e/yr**. associated with Bio-Char carbon sequestration.

Next, we are required to add back the co2e produced from the non-biogenic portion (20.8%) of the Engineered Feedstock which equates to (20.9%*318,716=66,930 mt co2e/yr) plus the biogenic portion of the diesel feedstock from combustion of the low carbon diesel 251,786 mt co2e less that same biogenic co2e previously absorbed prior to it becoming a waste material **-208,695 mt co2e/yr**.

Finally, we must account for the electrical energy consumed to process the waste material and the electrical consumption associated with BioRefinery as well as the GHG emissions associated with the offset of land and sea transport of fossil carbon diesel to Hawaii.

Using an assumed Hawai'i grid co2e generation rate of 578,124 gco2e/kw-hr consumed yields a co2e GHG emission of 43,302 mt co2e/yr due to electrical generation and 11,705 mt co2e/yr due to land and sea transport.

Adding all of these factors up for Activity #2 produces a **Net GHG Reduction of 176,741 mt co2e/yr**.

Combining this with the Net Reduction associated with Activity #1 produces an overall GHG Reduction Emission of **-370,410 mt co2e/yr**.

Equivalent CO2E Comparison Analysis to Solar Installation

Solar Array installations are well accepted around the world, as effective mt co2e avoidance devices. It is useful therefore, to compare E3i's avoided mt co2e footprint on an equivalency basis to the size of a solar installation sized to achieve an identical mt co2e reduction of

-370,410 mt co2e/yr.

Solar panels generally are effective for 5.67 peak full time noon hours per day. This results in only ~ 2,070 hours/yr of available operation at full power recovery. Using this fact in combination with the HAWAII grid carbon footprint of 578.124 gco2e/kw-hr associated with a HAWAII installed solar installation would require 309.6 MW solar installation. This in turn would require approximately 1,240 acres of land mass to host the solar array installation using 4 ac/MW fact as compared to the Biorefinery of 50 acres.

Occasionally it is also useful to compare these technologies on a Land Mass Intensity factor basis.

- Solar Installation Meeting Identical co2e reduction would remove 216.1 mt co2e/ac
- E3i's Biorefinery providing an identical mt co2e reduction has a 11,231 mt co2e /ac.
- A significant landmass savings of over 1,195 acres available for biogenic cultivation.

