

MEMO



Discussion/Action Item #: 13

Meeting Date: January 20, 2023

To: Board of Directors
From: Director of Engineering & Compliance, Guy R. Petraborg
Approved by: General Manager, Felipe Melchor

Subject: Approve Terms of the Sitos Group's Biochar Technology Pilot Study

Recommendation

That the Board approve the terms of the Sitos Group's Biochar Technology Pilot Study so that a draft agreement can be developed for the Pilot Study and subsequently presented to the Board for their further consideration and approval in February 2023.

Background

Windrow composting of yard waste (aka "green waste") materials and food wastes have been conducted at ReGen's facility in northwestern Monterey County since about 1985 (~37 years). The Keith Day Company, Inc. (KDCI) has been ReGen's contracted operator of the windrow composting since about 2009 (~13 years) and is well established as a service provider in the tri-county area of Monterey, San Benito, and Santa Cruz counties. The main product that KDCI produces at the ReGen site is an organic certified compost for agricultural customers. One of those agricultural customers is Monterey Pacific, Inc. (MPI), a Soledad based company whose mission is to provide professional Applied Agricultural Science services for vineyards located in the Central Coast region. MPI has interest in a higher quality compost product that has improved moisture and nutrient retention characteristics and subsequent extended dispersal behavior such as exhibited by some biochar materials. MPI has connected with the Mayo Ryan, CEO of the Sitos Group, LLC (Sitos Group), regarding biochar production and has also joined the Sitos Group's Board of Directors in support of further developing biochar production. Last year they approached KDCI to explore the potential for producing biochar from the feedstock materials, or their derivatives, present at the ReGen facility. Potential biochar feedstocks were initially identified as natural woody materials and "compost overs" which are larger wood chips that are difficult to use other than as ground cover. With unanimous interest by the three parties (KDCI, MPI, and the Sitos Group) for those feedstocks, they approached ReGen in November 2022 to propose a Pilot Study.

This Board memo summarizes the scope and terms of the Biochar Technology Pilot Study proposed by the Sitos Group. Preceding this agenda item at the Board Meeting will be a presentation by the Sitos Group on biochar as a product and the biochar technology.

Discussion

The Sitos Group was formed in 2021 and consists of the following persons:

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Let's not waste this.



Sitos Group, LLC - Board of Directors



Mayo Ryan, AFM
Member
Founder/CEO



Sheila Macdonald Kyger
Member
Technology Patent Holder



James Macphail, MSc
Member
Carbon Market
Founder, Soil Scientist
and Biochar Expert



Steve McIntyre
Member
Vineyard
Management,
Winemaker



Dr. Doug Beck, Ph.D.
Member
Soil Scientist, Winegrape
Grower, Biochar
Researcher



Dr. Daryl Salm, Ph.D.
Member
Soil Scientist,
Winegrape Grower



Larry Mortorff, Esq.
Corporate Attorney
Environmentalist

Mayo Ryan is the CEO of the Sitos Group and is an experienced farm management, agricultural, and food industry executive with a Master of Business Administration (MBA) focused on Agribusiness and Food from Santa Clara University. The Sitos Group's Central Coast connection is Steve McIntyre of MPI, a long term customer of organic compost produced at the ReGen facility by KDCI. Collectively the parties have proposed a Biochar Technology Pilot Study at the ReGen Facility. The partnership for the Pilot Study is presented in the next figure below and consists of the Sitos Group as the lead and biochar operator; Applied Gaia as the major equipment supplier; KDCI to assist in feedstock transfer to Sitos Group for biochar production and subsequent blending of biochar with organic compost and delivery to MPI; and MPI's use of the biochar amended compost and associated field studies of those materials.

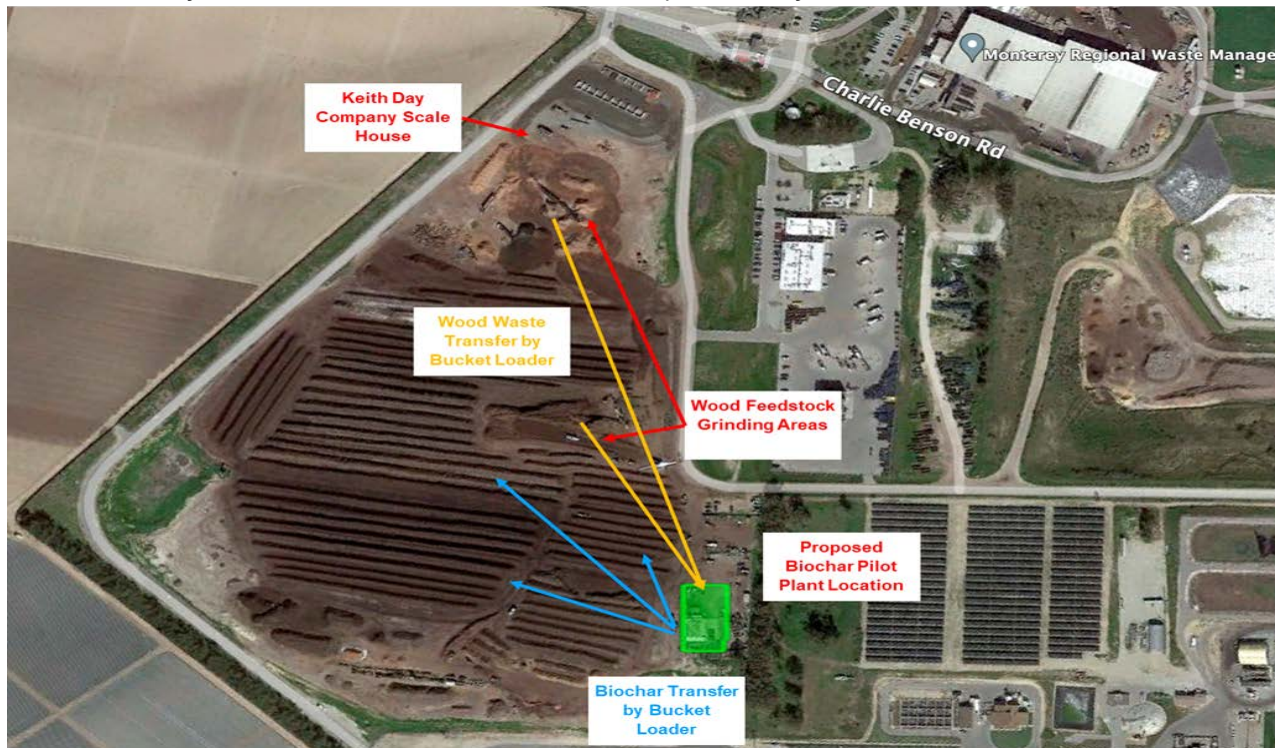
Natural woody materials and "compost overs" (aka wood chips) available at the ReGen facility are the initial biochar feedstocks of interest. Other organic materials and a relatively dry WWTP biosolid waste are possible materials that may be investigated as part of the Biochar Technology Pilot Study.



The Biochar Pilot Study Partnership

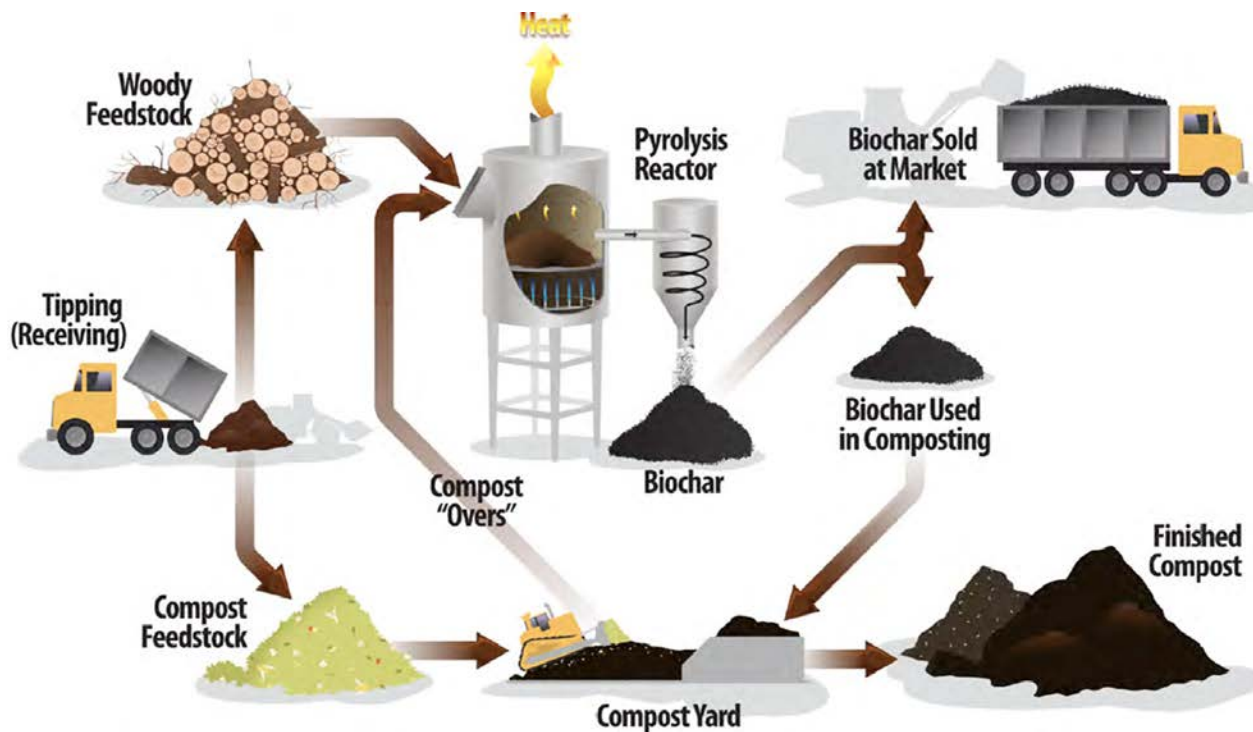


The Pilot Study would be located at the onsite Compost facility area as shown below:





Biochar is produced when plant matter is heated at elevated temperatures such as in nature by forest fires or by man in a controlled process called Pyrolysis. Pyrolysis is an oxygen limited (deficient) process with temperatures between 600 and 1500 degrees Fahrenheit that can transform woody materials or “compost overs” (aka wood chips) into a stabilized “coral like” carbon structure with relatively high surface area and related moisture/nutrient retention capacity characteristics. There are less carbon emissions in the Pyrolysis process as compared to the aerobic decomposition process of composting operations or the anaerobic decomposition process of landfills and digestors. This is known as ‘carbon sequestration’. The process to produce biochar is graphically illustrated below.



The Pyrolysis process does generate significant heat that can have other beneficial uses; such as to generate electricity, used as heat in other treatment processes, and/or for drying of materials biosolids, for example). These beneficial use alternatives are not proposed as part of the Pilot Study. However, the biochar alternative will be studied over the next six months or so as part of the Joint Feasibility Study (JFS) that M1W-ReGen have approved and for which GHD has been contracted for. The JFS will take into consideration these other potential beneficial uses of the Pyrolysis process and options such as a biosolids produced biochar as a concrete industry admixture. The Pilot Study will investigate the carbon content and the carbon stabilization process using the “Puro.earth” lifecycle assessment for the purpose to define the carbon efficiency of the process and to establish a basis for a Carbon Removal Certification (CORC), a trading market unit of monetary value.



Staff's discussions with the Sitos Group's principals have resulted in the following proposed terms for development of Biochar Technology Pilot Study Contract Agreement:

1. Term of Pilot Study

(Assumed) Board Approval of Terms	1/20/2023
Draft Agreement Finance Committee MTG	2/01/2023
(Assumed) Board Approval of Agreement	2/17/2023
Pilot Study Agreement Start Date	3/01/2023
Equipment Setup & Startup	Q2 Y2023
Pilot Study Agreement Termination Date	6/30/2024
Optional 1-Year Agreement Extension	6/30/2025

2. Delivery of Organic Waste Materials

ReGen to provide access to Organic Materials in Keith Day Company's possession
Annual Minimum/Maximum (tons) - N/A (not applicable) for Pilot Study
ReGen to arrange for biosolid materials, if available with suitable moisture conditions

3. Responsibilities

The Sitos Group -

Mobilization & Demobilization of equipment (1st pilot machine)
Complete Permitting (Building/Electrical; Authority To Construct, etc.)
Complete the Puro.earth Life-Cycle Assessment
Obtain emissions data for future Permit to Operate (PTO)
Operate up to full production capacity June 2023 through June 2024
Develop SCADA system for multi-machine, multi-plant operations
Provide Pilot Study CapEx Investment (~ \$1.2M)
Manages the Pilot Study, collects data, and reports findings

ReGen –

Provide access to land, utilities (at cost, where applicable)
Provide access to Organic Waste (Biomass) Materials (at 'no cost')

4. Compensation

"TO" the Sitos Group "FROM" ReGen – no compensation expected
"FROM" the Sitos Group "TO" ReGen – 'at cost' for any land/utilities/etc. (reimbursable)

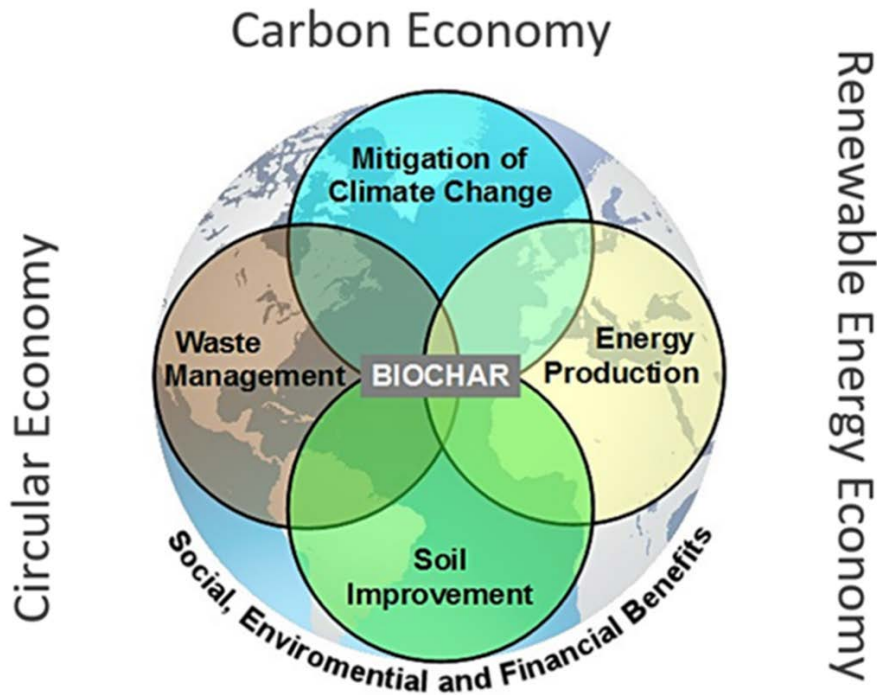
Financial Impact

There is no anticipated financial impact associated with ReGen's hosting of the proposed Biochar Technology Pilot Study with the Sitos Group. ReGen is not anticipating any increased revenue during the Pilot Study period (none are proposed). Additionally, ReGen is not anticipating any increased expenses during the Pilot Study period (ReGen costs for any land, utilities, or other support are proposed as 'reimbursable costs'. There will be ReGen staff support periodically during the Pilot Study that are anticipated to be part of ReGen's support of the Pilot Study and are not proposed to be compensated for during the Pilot Study.



Strategic Plan

The proposed Biochar Technology Pilot Study aligns with ReGen's Strategic Plan as it is intended to provide a higher beneficial reuse of an organic waste material by transforming that material to a biochar and using the biochar as an admix agent to organic compost produced onsite by the Keith Day Company. The biochar amended organic compost is an upgraded material as an agricultural product of higher quality which is desired by some Monterey County farmers.



Conclusion

Given the potential to i) increase beneficial use of woody feedstock and “compost overs” (aka wood chips), ii) produce a biochar-organic compost mix desired by the local agricultural industry, and iii) create a marketable asset of monetary value associated with carbon sequestration characteristics; staff encourages the Board's consideration and approval of the terms of the Sitos Group's Biochar Technology Pilot Study so that a draft agreement can be developed for the Pilot Study and subsequently presented to the Board for their further consideration and approval in February 2023.



Board of Director's Meeting

January 20, 2023

Approve Terms of The Sitos Group's Biochar Technology Pilot Study

WHO ? - The Biochar Pilot Study Partnership

The Biochar Pilot Study Partnership



Sitos Group's Board of Directors

Sitos Group, LLC - Board of Directors



Mayo Ryan, AFM
Member
Founder/CEO



Sheila Macdonald Kyger
Member
Technology Patent Holder



James Macphail, MSc
Member
Carbon Market
Founder, Soil Scientist
and Biochar Expert



Steve McIntyre
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Dr. Doug Beck, Ph.D.
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Dr. Daryl Salm, Ph.D.
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WHAT is Biochar ?

What is Biochar?

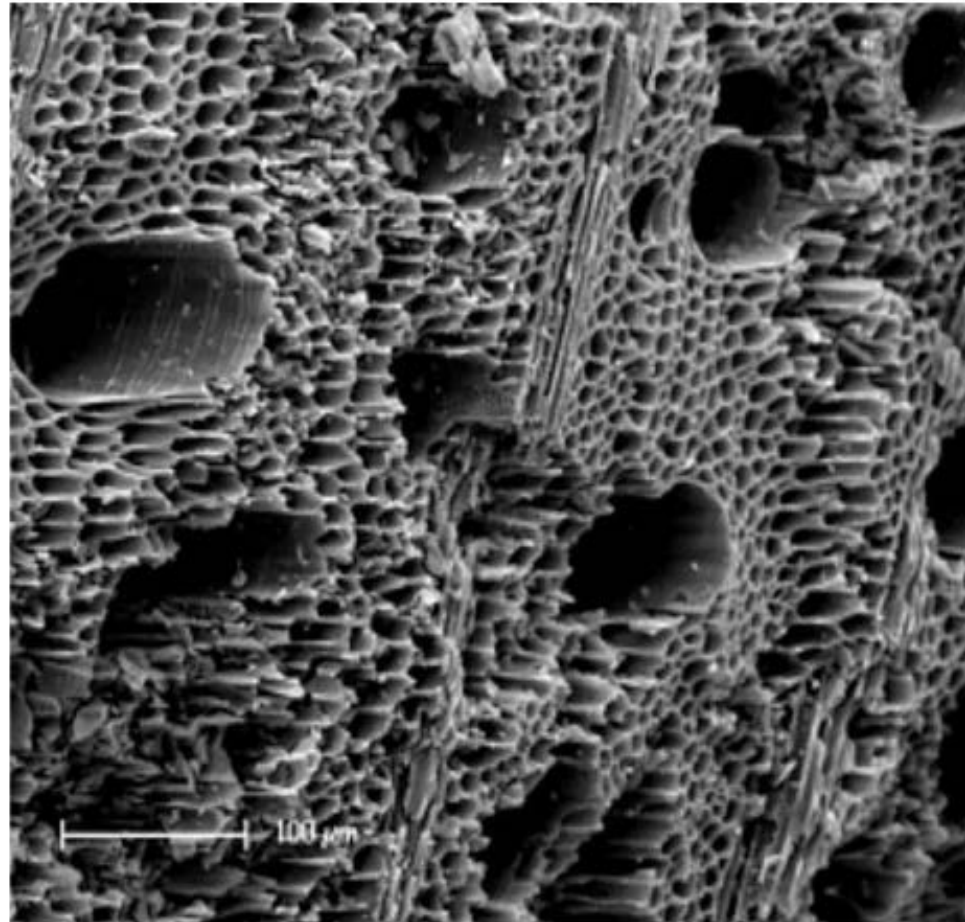
Biochar

/bīō, CHär /

noun

stable carbon produced from plant matter and stored in the soil as a means of removing carbon dioxide from the atmosphere.

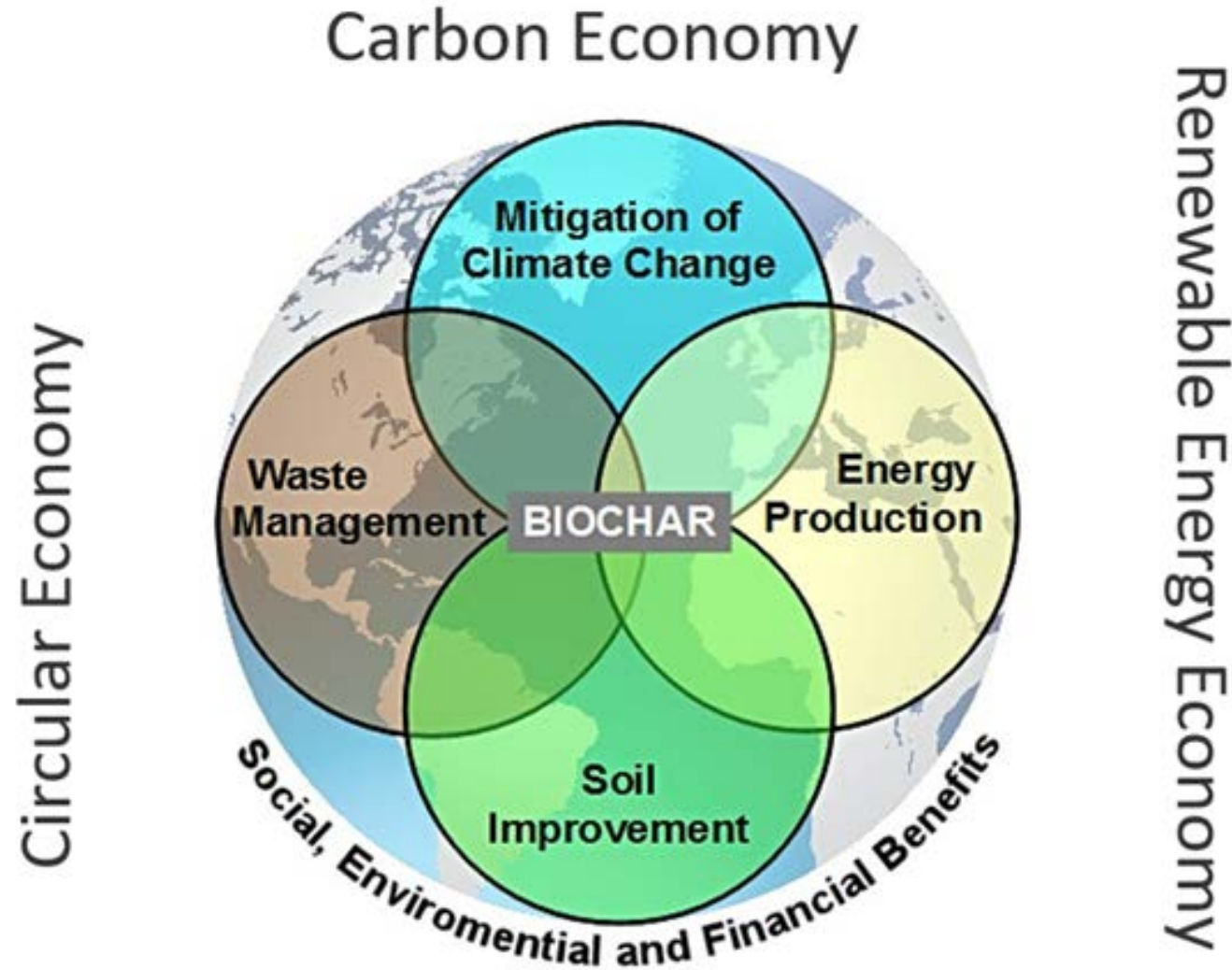
- Produced through pyrolysis at temperatures from about 320°C to 800°C (608°F to 1,472°F). Qualities can be customized
- Burning at these temps in an oxygen limited environment stabilizes carbon into a strong, long-lasting bond structure, >85% pure carbon
- This hard, crystal-like form lasts in soil for 100's of years
- Structure creates coral-like "habitat" for all manners of life and material with surface area of 500m²/g



WHERE ? – Biochar Pilot Study Proposed Location

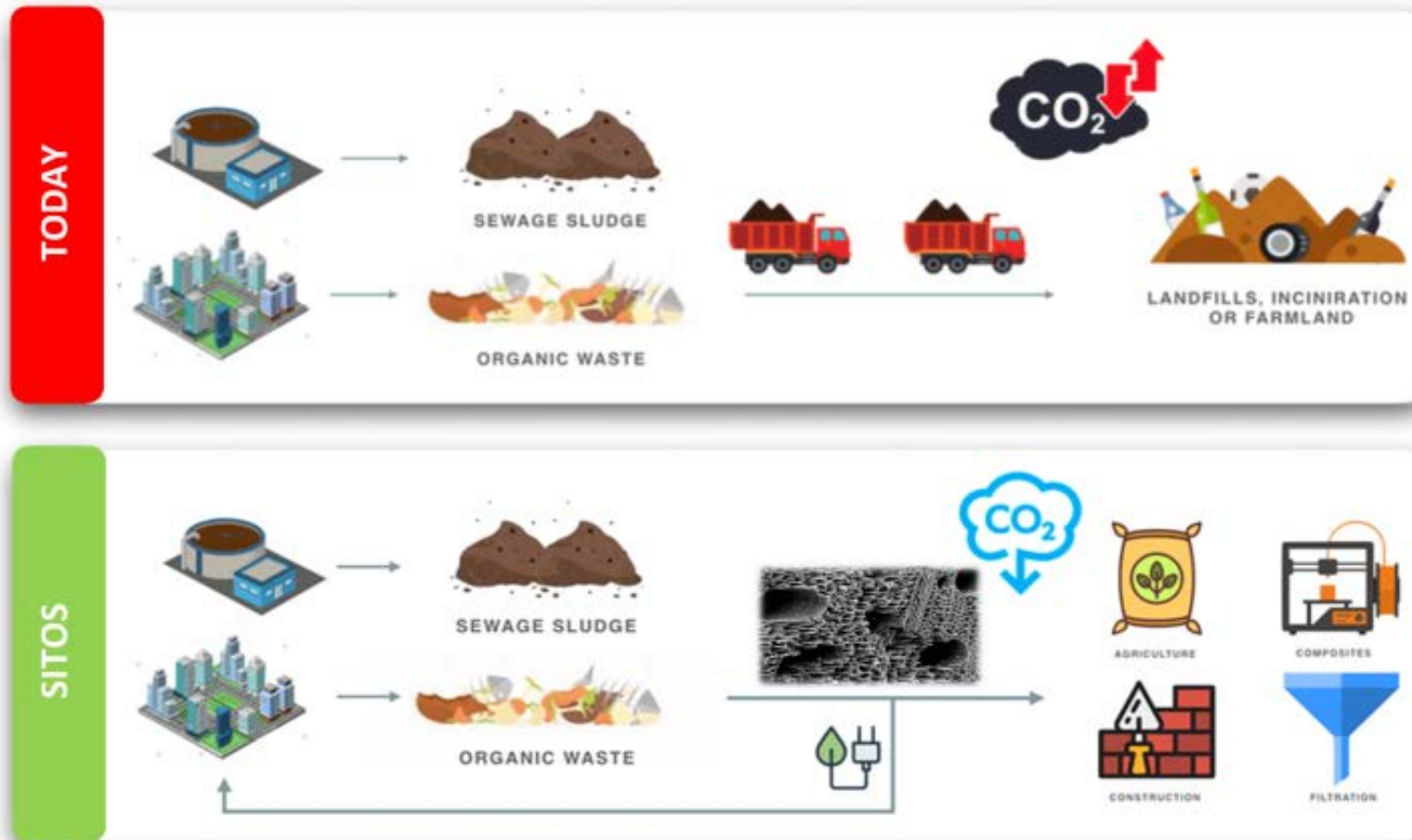


WHY ? - Benefits of Biochar Process

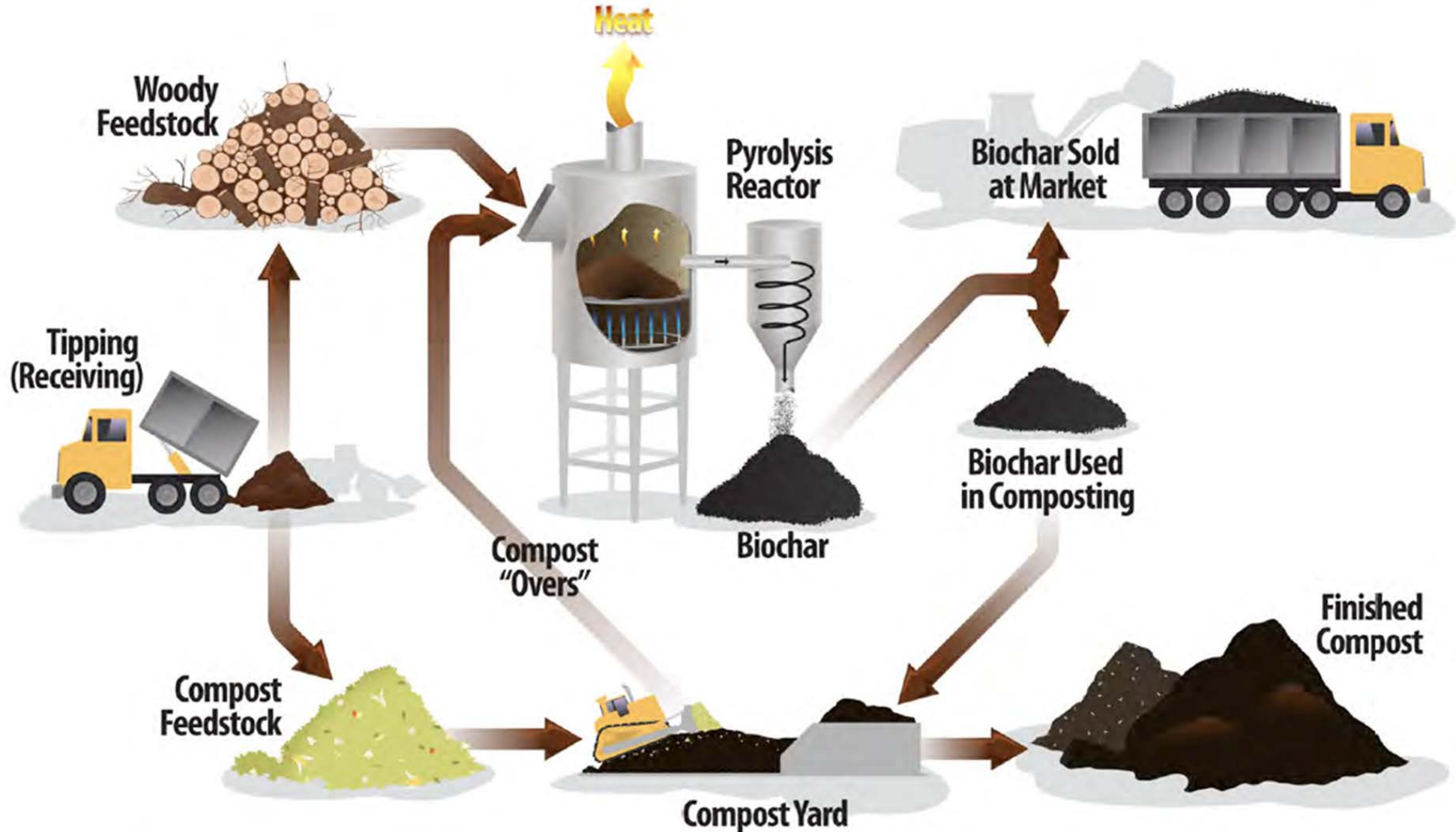


WHY ? The Process Change with Biochar

Organic ~~Waste~~



HOW ? - Wood Waste to Biochar for Compost Amendment Example





New Pyrolysis Technology – The Applied Gaia B3



Other Benefits of Biochar Process

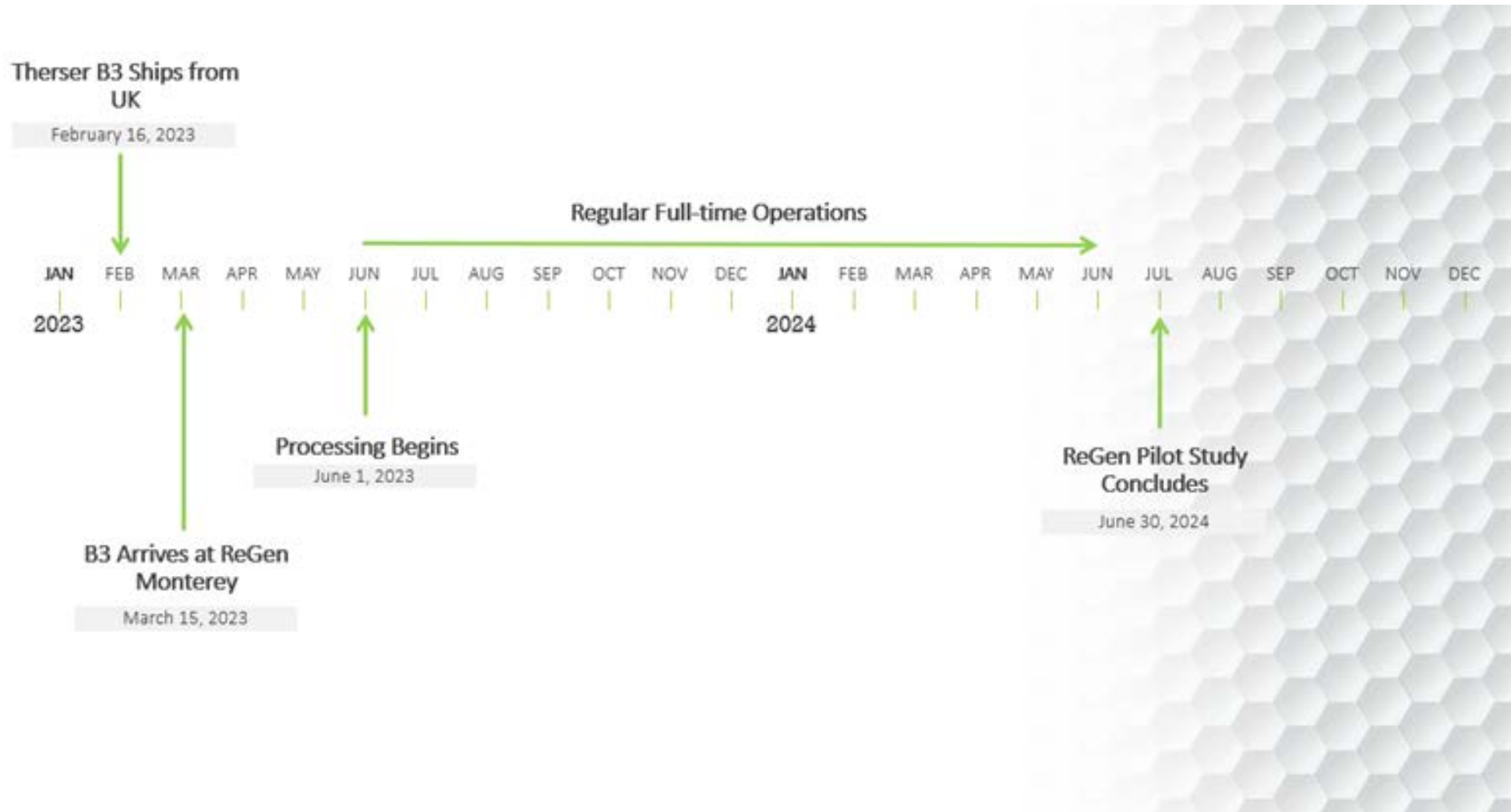
- Primary product is high-quality **biochar**.
- For every ton of biochar produced, **3 tons of Carbon Removal Certificates (CORC's)** verified through [Puro.earth](https://puro.earth) are produced.



puro •
earth

- In addition to biochar and CORC's, significant heat is generated and can be used for **rotary power energy production**.

WHEN ? - Pilot Study Schedule Plan



Pilot Study Goals - Summary

- Deploy 1st pilot machine; Commission & Startup operations – Q2 2023
- Complete Permitting (Building/Electrical; Authority to Construct; etc.)
- Complete the Puro.earth Life-Cycle Assessment
- Obtain emissions data for Permit to Operate (local Air District)
- Operate at full production capacity June 2023 through June 2024
- Develop SCADA system for multi-machine, multi-plant operations
- Pilot CapEx is \$1.2M for a 1-machine plant (Sitos Group investment)

Pilot Study Relationships - Summary

- **ReGen Monterey**
 - Provides access to Land, Water, Electricity (at cost, where applicable)
 - Provides access to Biomass Materials (no cost)
- **The Sitos Group**
 - Provides Capital (~\$1.2M) for equipment, site improvements, utilities, & labor
 - Owns, Mob/Demob, operates, & maintains the equipment for the Pilot Study
 - Manages the Pilot Study, collects data, and reports findings

Proposed Terms of the Pilot Study

1. Term of Pilot Study

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Annual Minimum/Maximum (tons) - Not applicable for Pilot Study

ReGen to arrange for biosolid materials, if available with suitable moisture conditions

Proposed Terms of the Pilot Study - continued

3. Responsibilities

The Sitos Group -

- Mobilization & Demobilization of equipment (1st pilot machine)
- Complete Permitting (Building/Electrical; Authority To Construct, etc.)
- Complete the Puro.earth Life-Cycle Assessment
- Obtain emissions data for future Permit to Operate
- Operate up to full production capacity June 2023 through June 2024
- Develop SCADA system for multi-machine, multi-plant operations
- Provide Pilot Study CapEx Investment (~ \$1.2M)
- Manages the Pilot Study, collects data, and reports findings

Proposed Terms of the Pilot Study - continued

3. Responsibilities (continued)

ReGen –

Provide access to land, utilities (at cost, where applicable)

Provide access to Organic Waste (Biomass) Materials (at 'no cost')

4. Compensation

“TO” The Sitos Group “FROM” ReGen – none expected

“From” The Sitos Group “TO” ReGen – ‘at cost’ for any land, utilities provided



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ReGen Monterey
is the public name of
Monterey Regional Waste
Management District

For more information, please contact:

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