**BIOCHAR WEBINAR**

**CLEANER ENERGY FUTURE INITIATIVE FOR ASEAN (CEFIA) FLAGSHIP**

**15 January 2024**

**Online**

## INTRODUCTION

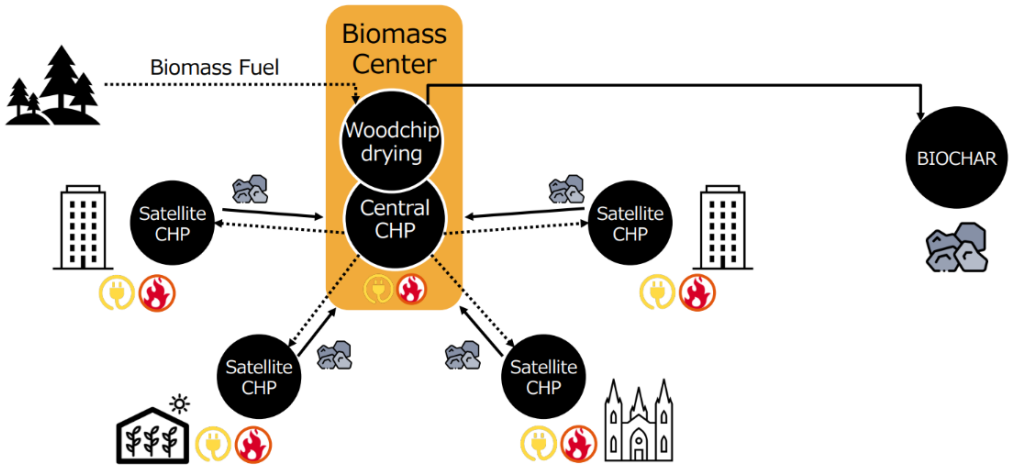
1. The Biochar Webinar under the Cleaner Energy Future Initiative for ASEAN (CEFIA) Flagship on Biochar was held online on 15 January 2024
2. The Webinar was co-organised by the Ministry of Economy, Trade and Industry (METI) and the ASEAN Centre for Energy (ACE) under the new CEFIA Flagship Project on the "Biochar", which aims to promote the implementation of Biochar in achieving carbon-negative energy production.
3. The Webinar was attended by representatives from five (5) ASEAN Member States (AMS): Cambodia, Lao PDR, Malaysia, Philippines, and Thailand. Representatives from various sectors in ASEAN and Japan were also in attendance, including government institutions, private companies, industries, academia, researchers, METI, and ACE. The list of participants is attached as **ANNEX 01**.

## OPENING SESSION

4. **Ms. Haruna Yoshizawa**, representative from METI, delivered her welcoming remarks and briefly introduced the CEFIA initiative and its objective to provide capacity building for accelerating the deployment of cleaner energy and decarbonisation technologies in the ASEAN region. She underscored the purpose and benefits of establishing CEFIA, emphasising its potential to assist the ASEAN region in its transition toward a carbon-neutral society

**PRESENTATION SESSION**

5. **Mr. Shingo Numa,** CEO of Forest Energy Inc., presented his presentation titled “Biochar Carbon Removal (BCR) Using Local Biomass for Power Generation”. The presentation material is available in **ANNEX 02**. The presentation noted the following items:
    a. Biochar, a charcoal-like material produced by pyrolysing or gasifying biomass in an oxygen-limited environment, offers a promising approach to carbon sequestration. By storing carbon captured during the process, biomass power plants can potentially achieve "carbon negativity."
    b. The process involves heating biomass at high temperatures without oxygen, producing syngas (a combustible gas) and biochar as a by-product. Notably, the specific process parameters must be adjusted based on the type of biomass used. Biochar is a stable form of carbon with a high content (up to 90%) that effectively binds carbon long-term without negative environmental impacts. Biochar Carbon Removal (BCR) is recognised as a highly durable Carbon Sequestration/Carbon Dioxide Removal (CDR) technology.
    c. Pyrolysis and gasification are thermochemical processes that convert solid biomass into valuable products using a limited oxygen supply. During these processes, biomass is treated at high temperatures, with the chosen temperature significantly impacting the resulting biochar properties. Optimal biochar characteristics are typically achieved through pyrolysis temperatures ranging from 500 to 600°C.
    d. Forest Energy Inc. develops a new power generation model using biochar as the centre of it. The model can be depicted as below:




e. This model prioritises energy resilience through a decentralised energy source. Given the on-site heat demand and the lack of district heating infrastructure, it is particularly suited for combined heat and power (CHP) applications. While the current market for biochar is modest, there is significant growing interest in this technology. However, it's important to note that the current gasification technology is optimised for wood and may require adjustments for agricultural residues.

6. **Mr. Shogo Okishio,** Overseas Business Development of the Business Development Department from TOWING Co., Ltd, presented his presentation titled “Agriculture and Biochar”. The presentation material is available in **ANNEX 03**. The presentation noted the following items:
   a. TOWING Co., Ltd. has developed a high-performance biochar product called Soratan. Soratan is a unique blend of organic materials, combining soil-derived microorganisms, biochar, and organic fertiliser. Notably, Soratan leverages microorganism cultivation technology as its core functionality.
   b. TOWING Co., Ltd.'s Soratan biochar offers a range of user benefits. These include significantly faster soil preparation (60 times quicker than conventional methods, requiring only one month), improved crop yields (10-70% increase compared to chemical fertilisers), disease suppression through targeted microbial inoculation, and biomass waste upcycling via the use of rice husk and chicken manure.
   c. Furthermore, Soratan's biochar component boasts long-term carbon sequestration, storing an estimated 10 tonnes of $CO_2$ equivalent per

hectare of farmland and contributing to a potential global storage capacity of 7 billion tonnes of $CO_2$ equivalent.

d. While biochar technology remains in its pre-industrialisation phase, research suggests significant potential. TOWING Co., Ltd. recognises this potential and sees an opportunity for collaborative development with research institutions. ASEAN presents a particularly attractive market due to the abundance of biomass waste and extensive agricultural land, making it an ideal region for Soratan's implementation.
e. TOWING's Soratan biochar product aligns with several Sustainable Development Goals (SDGs), including SDG 3 (Good Health and Well-being), SDG 12 (Responsible Consumption and Production), SDG 13 (Climate Action), SDG 14 (Life Below Water), and SDG 15 (Life on Land)

7. **Mr. Shinya Yamamoto,** Center for Social System Engineering of Technology Research Institute from Shimizu Corporation, presented his presentation titled “Carbon Sequestration by Mixing Biochar into Concrete”. The presentation material is available in **ANNEX 04**. The presentation noted the following items:
    a. Biochar concrete offers a compelling solution for sustainable construction. This innovative material boasts several advantages:
        i. Ease of Use and Production: biochar concrete can be readily used and manufactured at existing plants and cast on construction sites, minimising disruption.
        ii. Performance Comparable to Conventional Concrete: biochar concrete can achieve performance levels equivalent to general-purpose concrete.
        iii. Efficient Carbon Removal: biochar concrete effectively removes carbon dioxide, boasting a carbon dioxide fixation rate of 2.29 kg-CO2/kg. This translates to not just emission avoidance but also active carbon removal.
        iv. Potential for Carbon-Negative Concrete: if the carbon dioxide removal by biochar concrete surpasses the emissions associated with concrete materials, the concrete itself becomes carbon negative

b. Biochar concrete offers a promising approach to sustainable construction by effectively sequestering carbon dioxide. Biochar, a key component, has a high absorption capacity for atmospheric carbon and decomposes at a very slow rate, enabling long-term carbon storage within the concrete structure. Concrete's durability minimises the risk of biochar runoff or combustion, further enhancing its effectiveness as a carbon sequestration medium.
c. The design of biochar concrete mixes follows a straightforward process. Initially, a standard concrete mix that meets the project's specific requirements for workability, strength, and durability is selected. Most concrete plants offer a range of pre-defined standard mixes to cater to varying needs. Biochar concrete is then created by replacing a portion of the sand in the chosen standard mix with biochar. This substitution is feasible because biochar has minimal impact on the overall performance of the concrete. Following this replacement, the resulting biochar concrete mix undergoes testing to refine the amount of chemical admixtures and confirm its compressive strength. Once these adjustments are finalised and the mix achieves the desired performance, it is ready for practical use.

**PANEL DISCUSSION AND Q&A SESSION**

The Webinar noted the following discussions during the panel and Q&A session as follows:

8. The speakers highlighted the significant potential for biochar technology adoption in ASEAN. This stems from the region's abundant biomass resources, offering a diverse range of feedstocks. This variety allows for the selection of optimal and highly effective biomass types for biochar production. Consequently, biochar presents a promising alternative to natural gas use in ASEAN.
9. The adoption of biochar in ASEAN agriculture presents a compelling economic opportunity. As a region heavily reliant on agriculture, ASEAN is susceptible to fertiliser price fluctuations, with some fertilisers experiencing threefold price

increases. These volatile costs can disrupt supply and raise production costs for farmers. TOWING's Soratan biochar offers an organic solution that can stabilise crop yields, fostering regional agricultural business models. Furthermore, biochar's carbon sequestration potential positions it as a gateway to the carbon credit market, creating additional economic benefits.

10. Biochar technology and its products offer a range of advantages that contribute significantly to sustainable development goals. These benefits include:
    i. Enhanced food and energy security: biochar can improve agricultural yields and potentially serve as a bioenergy source.
    ii. Climate change mitigation: biochar's carbon sequestration capabilities help mitigate climate change impacts.
    iii. Circular economy promotion: biochar production utilises waste biomass, fostering a circular economic model.
    iv. Improved rural livelihoods: biochar adoption can support rural communities through job creation and economic opportunities.
11. Biochar adoption in ASEAN faces some hurdles. Firstly, much of the available gasification technology originates from the EU and is designed for their specific feedstock, often denser woods. This technology may not be optimised for the lighter-density tropical woods prevalent in ASEAN. Secondly, the cost of these imported technologies can be high. Finally, the level of automation may differ from what is suitable for a region with a readily available manual workforce.
12. For cost-effective biochar integration in ASEAN agriculture, targeting high-value crops is a strategic approach, given the typically lower fertiliser costs for staple crops. Additionally, collaboration between agricultural users and biochar facilities involved in power generation or drying processes could offer cost reductions. Considering the dispersed nature of ASEAN farmland, long-term offtake agreements with biochar suppliers would be preferable to ensure consistent supply and minimise logistical costs.

**CLOSING SESSION**

13. **Mr. Septia Buntara Supendi**, Acting Manager of the Conservation and Energy Efficiency (CEE) Department, on behalf of **Dr. Nuki Agya Utama**, Executive

Director of ACE, delivered his closing remarks. He highlighted the projected significant surge in ASEAN's energy demand. He then emphasised the promising potential of the presented biochar initiative for reducing energy consumption and optimising the utilisation of local materials and resources. He also hoped that this webinar would offer valuable insights and that the best practices shared today would be a powerful catalyst for government and private sector action toward carbon neutrality.

**ACKNOWLEDGEMENT**

14. The Webinar expressed its sincerest thanks and appreciation to ACE and METI, for the technical and secretariat assistance provided as well as excellent arrangements made for the Webinar.

********End of Summary Record********