

Cross Talk

1. Advantages / benefits / opportunities

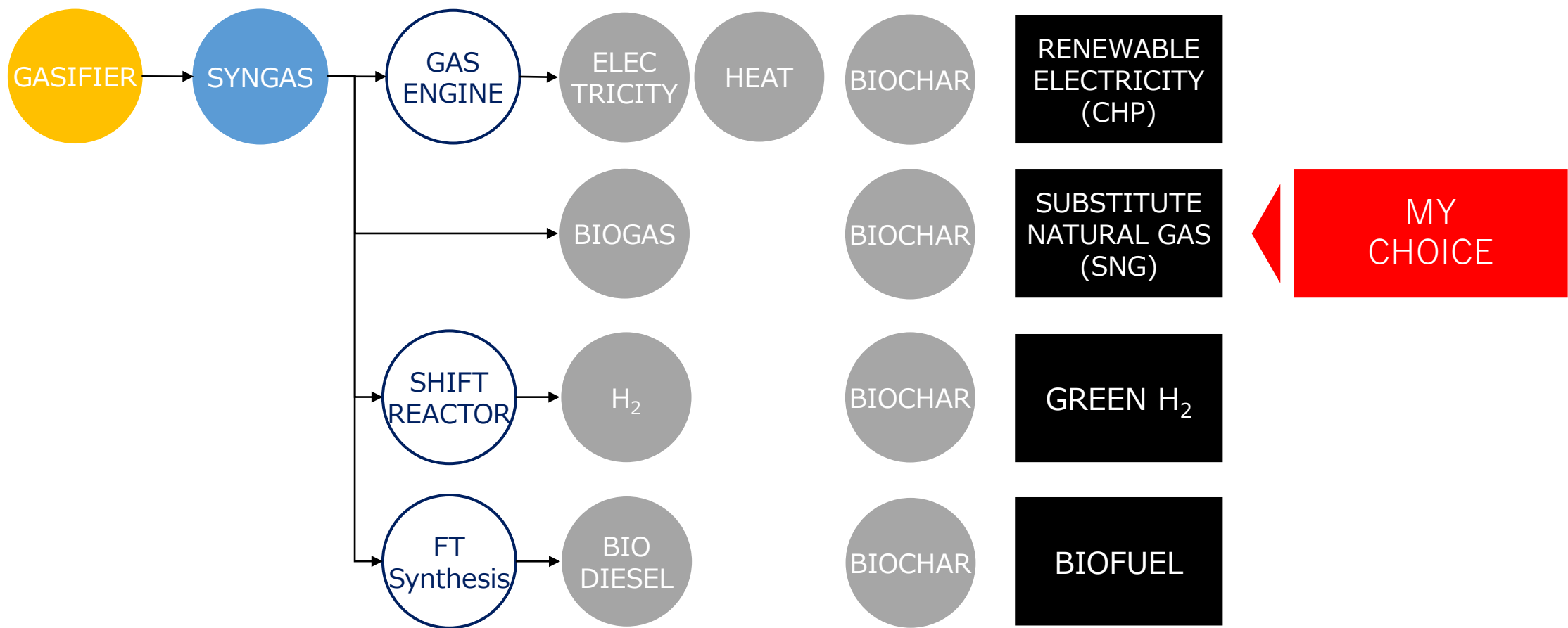
- What are the advantages of implementing biomass technologies and biochar products in ASEAN countries?

2. Challenges?

- What challenges are associated with introducing biomass technologies and biochar to ASEAN countries in terms of regulations and business development? Are there any expectations for improvements?"

ASEAN countries have big potential in biomass energy

1. Large quantity of biomass in ASEAN region
2. Variety of energy output. Important to choose where biomass is most effective

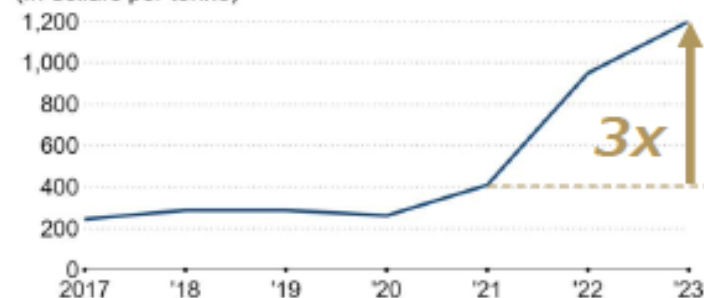


Agricultural use of biochar is efficient to enhance ASEAN economy

Regional agricultural economy

Average fertilizer prices in Thailand

(In dollars per tonne)



Source: Ministry of Commerce

Reason of fluctuation
→ **Chemical fertilizer**

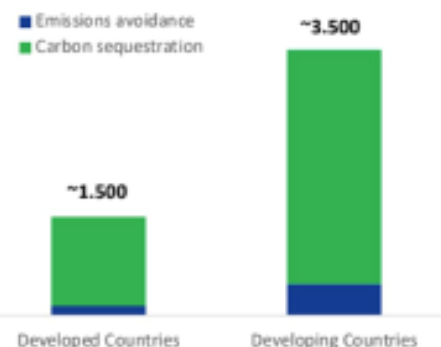
- Supply disruption
- Transportation cost

Organic conversion with SORATAN enable to stabilize cost and yield of farmers

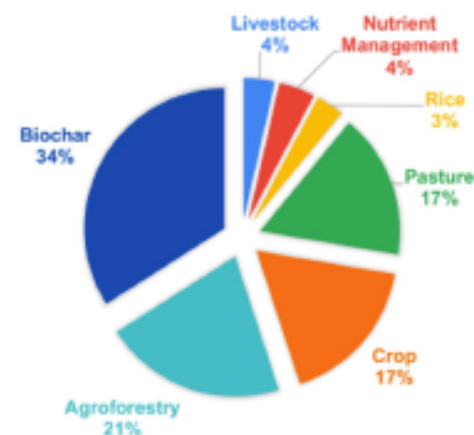
Creating regional business model of agriculture

Decarbonization economy

GHG emissions
MtCO₂e/y



Assumed reduction



Biochar is effective method for carbon sequestration

Entry to carbon credit market

What do you think are the benefits of the introduction of biomass technologies and biochar products in ASEAN countries?

Sustainable Development

- ❑ Food and energy security
- ❑ Mitigating climate change
- ❑ Circular economy

- ❑ Improving rural livelihoods

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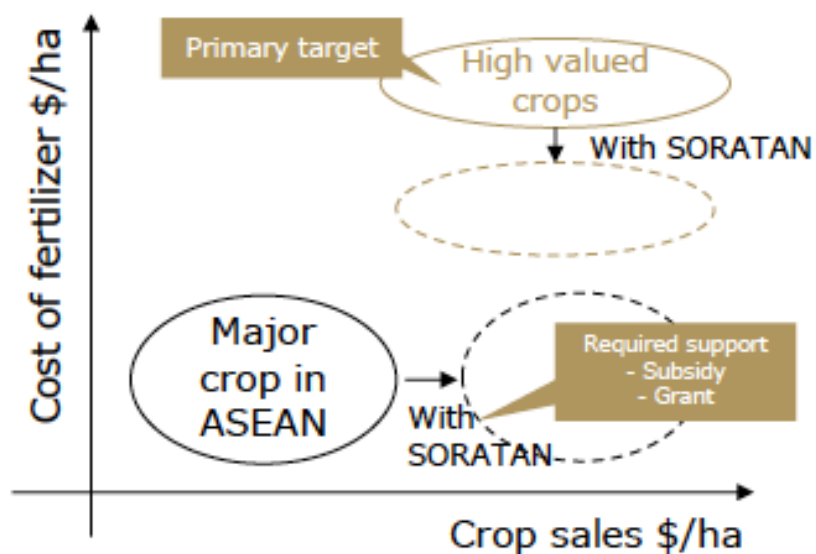
Business development challenges for energy production using gasification technology

Majority of gasification units are made in EU, designed for EU

1. It is not designed for tropical woods (Light density wood)
2. It is expensive

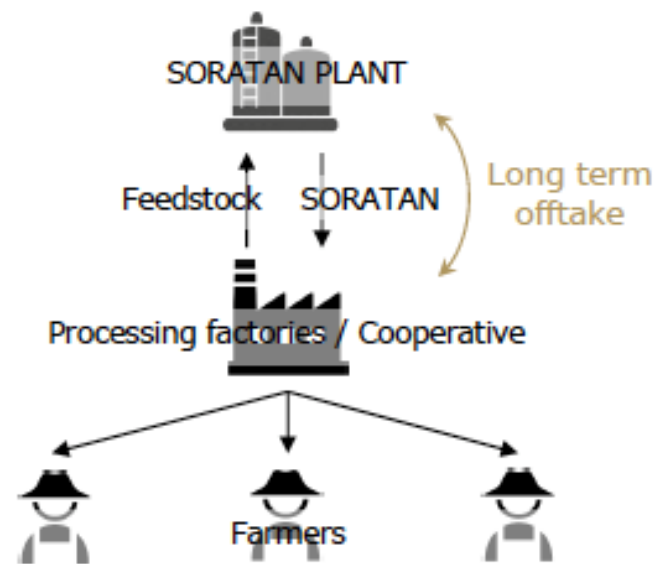
Forest Energy is preparing product suited for ASEAN environment

Market pricing



- Typical cost of fertilizer per crop is low
→ Targeting high valued crops as first step
- To reduce cost of biochar
→ combine with other facilities
e.g. power generation system, drying furnace

Biochar offtake



- Tends to have dispersed farmland
- To reduce cost and supply constantly, long term offtake would be preferred

Q2

What are the challenges of introducing biomass technologies and biochar to ASEAN countries in terms of regulations or business development? Is there any expectation on improvements?

When it comes to biochar application to industrial products such as biochar concrete,

Challenge

How to commercialize

Low environmental awareness of customers, immature carbon credit market and etc.

Quality control of biochar from different raw materials and production methods

In order to use biochar in industrial products, solid quality control methods are needed.

Laws and regulations concerning building materials

The biochar concrete hasn't been permitted to use for structural members yet in Japan due to the building standard law.

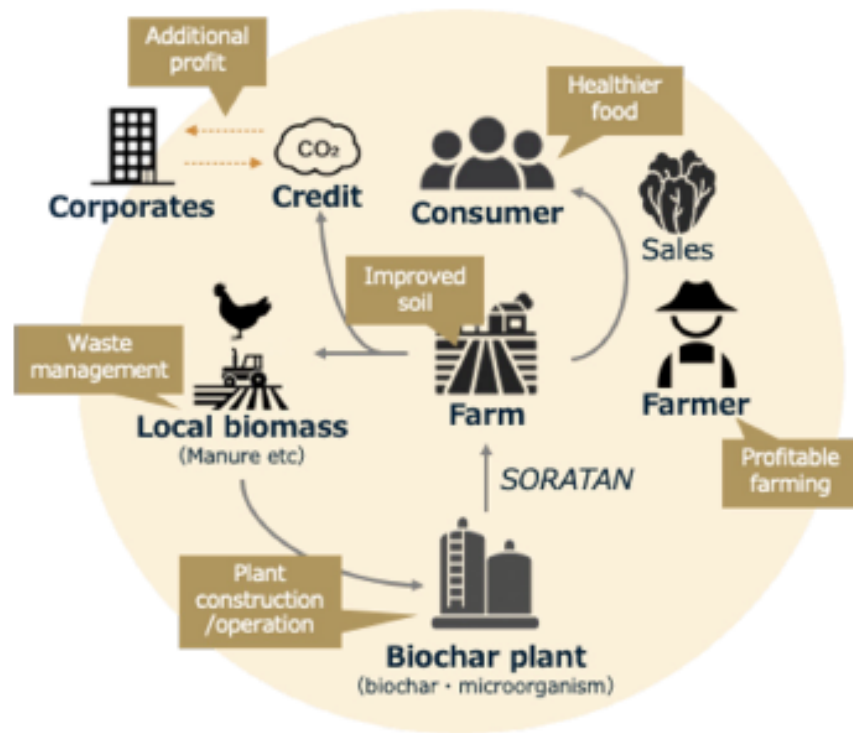
Expectation

Development of an open carbon credit market and continued incentives for biomass projects

Establishing and enforcing standards and guidelines on the quality and safety of biochar products and services.

Revitalizing regional economy

Creating biochar (SORATAN) industry



Measures to support initial introduction

Incentives for carbon removal

To achieve net-zero by 2050

- Widespread value of CO₂ removal (CDR)
- Increase amount of CDR

Example of CDR solutions*	Permanence	Cost \$/t-CO ₂
Wetland and peatland restoration	<100	15-40
Cropland and agroforestry	<100	10-30
Reforestation and afforestation	<1000	10-40
Blue carbon management	<1000	25-250
Biochar and bio-oil	<1000	90-220
Enhanced weathering	>1000	120-800
Bioenergy with carbon capture and storage	>1000	60-270
Direct air capture and storage	>1000	500-1000

Create incentives to select biochar as decarbonization method