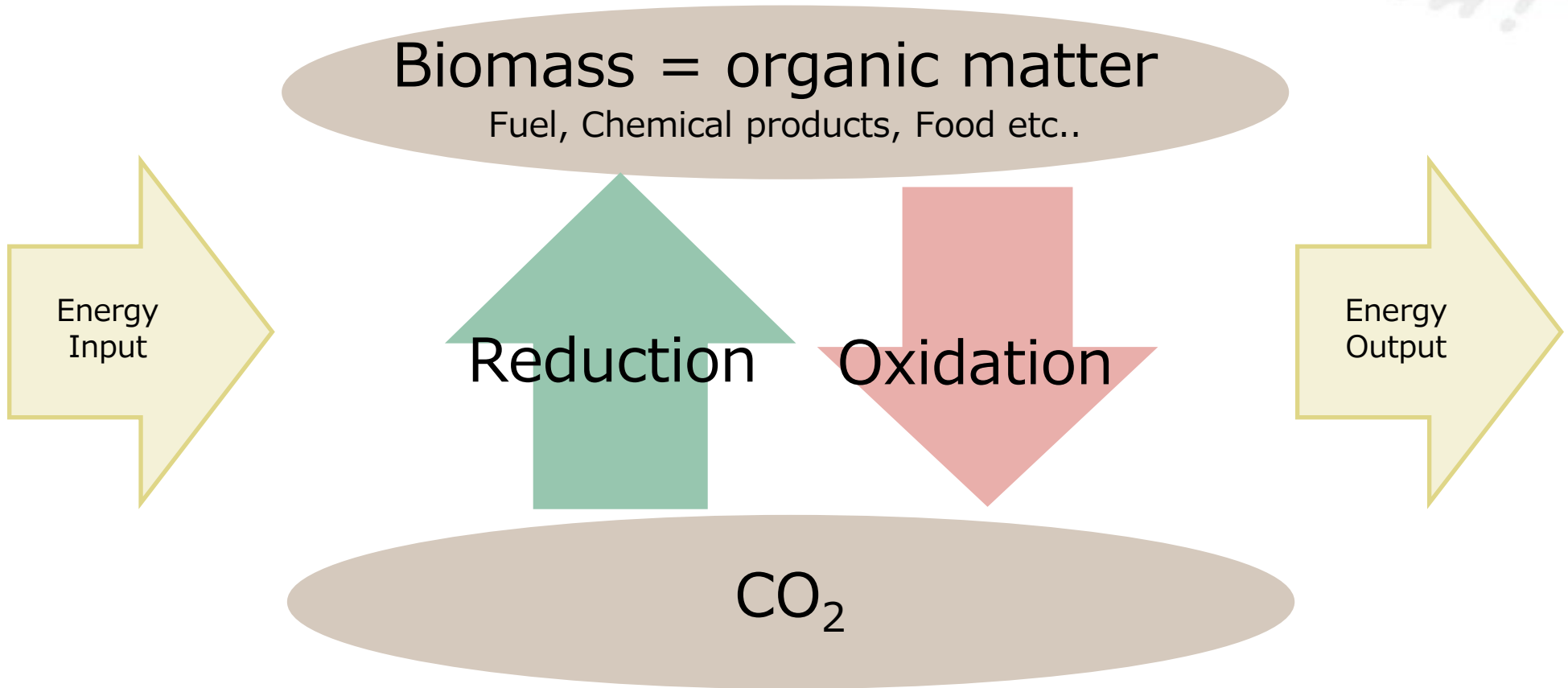


How to use efficiently the solar energy



Photosynthesis by microalgae

Generate new complex organic matters

Photosynthesis



Solar



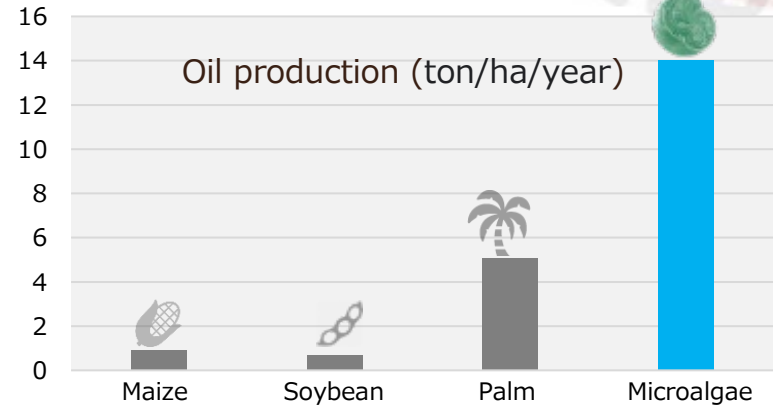
Electricity only

Wind



Electricity only

High productivity



Minimum water requirement

Freshwater required to produce 1 kg of proteins

Microalgae (Spirulina)



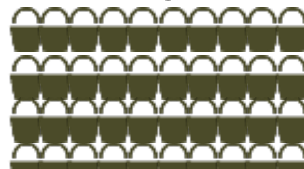
2 t

Soybean



9 t

Beef



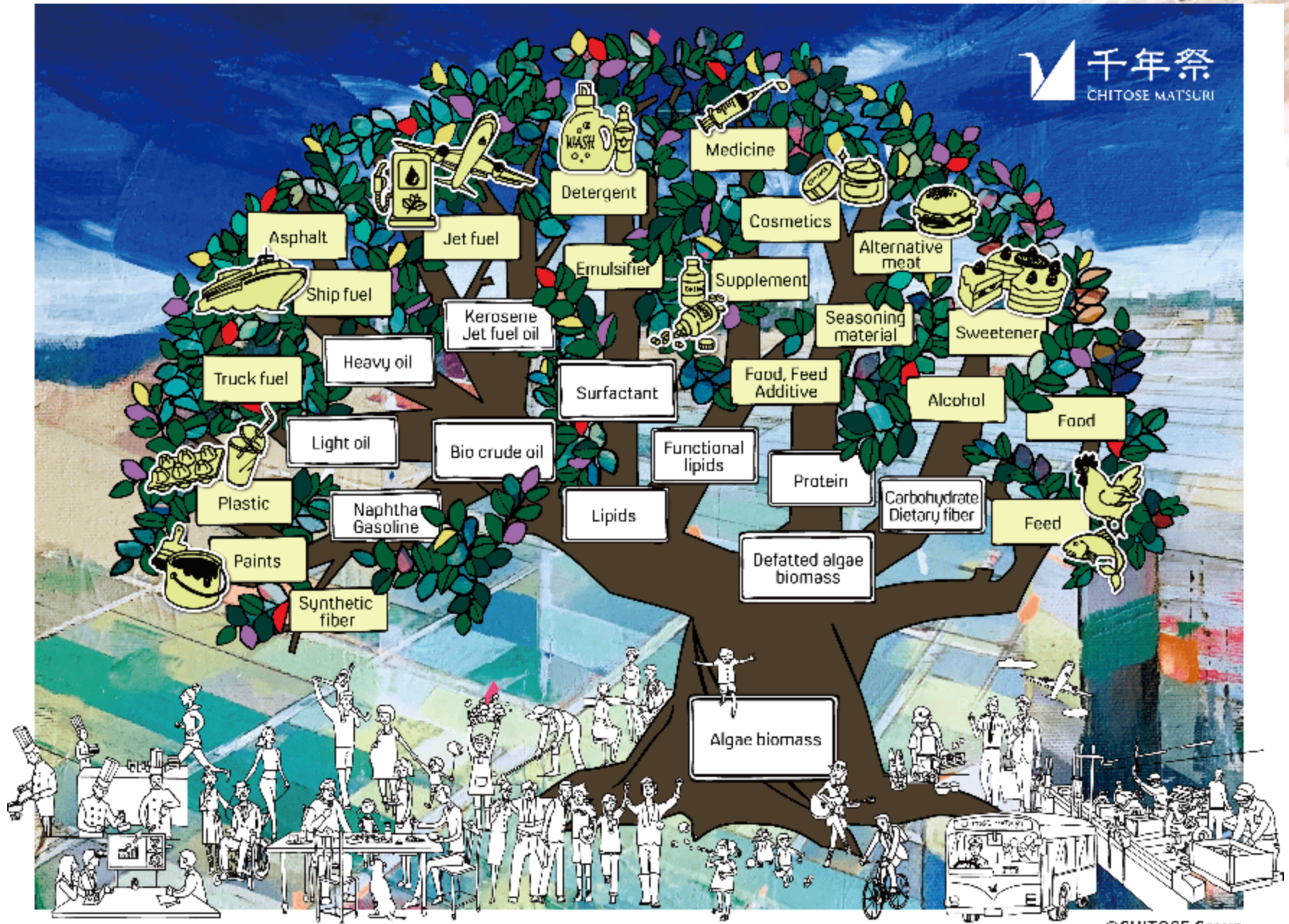
105 t

Minimum cultivation land requirement



値：FAO(2009)
 図：世界の土壌劣化の種類と程度(Oldeman et al.,1991)

What we aim at with microalgae



Potential of microalgae



If we establish **microalgae farm**^{*1}
as large as the **corn field**^{*2} in the world

^{*1} Biomass productivity was assumed to be 70 ton_{dry} ha⁻¹ year⁻¹ in which lipid, protein and carbohydrate contents were assumed to be 25, 55, and 15%, respectively.

^{*2} World total harvested area of corn was c.a. 190,000,000 ha

40 times
of protein^{*3}
annually
required
by the world

^{*3} 65 g of protein is required daily
by each individual of
7.8B world population.

2.2 times
of calories^{*4}
annually
required
by the world

^{*4} 2000 kcal are required daily
by each individual of
7.8B world population.

11 times
of oil production
compared to
Ghawar Field^{*5}

^{*5} Daily oil production at Ghawar field is
assumed to be 5M barrels

4.9 times
more CO₂ fixed
than CO₂ emitted
by Japan^{*6}

^{*6} 62022, Statistics Bureau, Ministry of
Internal Affairs and Communications. 80%
of CO₂ fixed as wet biomass is assumed to
be used for the production.

Challenges in establishment of microalgae industry



Lack of Mass Production

Very limited production of 20K to 30K ton year⁻¹

Lack of Diversity in Applications

Limited to high value applications

A Few Successful
Businesses

How CHITOSE overcomes the challenges



Mass Production of Microalgal Biomass
= Establishment of Stable Supply

Development of Microalgal Applications & the
Supply Chains
= Establishment of High Demand

New Sustainable
Industry

Establishment of mass production

CULTIVATE
THE FUTURE



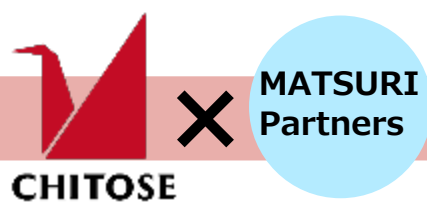
Coal-fired power plant

CO₂

5ha microalgae cultivation facility

NEDO Project 5ha Flat Panel Photobioreactor in Malaysia

Development of applications and supply chain



MATSURI partners (as of 31st, Oct. 2023)



	Financing the Project/Business						
	Develop Processing Plant						
	Manufacture Machinery/Equipment						
	Transport Materials/Products						
	Extraction of Biomass Components (Crude Lipids)						
	Refine Biomass Components (Refined Lipids)						
	Processing the Biomass Components (Polymers)						
	Manufacture the Intermediate Products (Paint)						
	Manufacture the Final Products (Car)						
	Market/Distribute the Final Products						
	Organize the Regulations/Standards/Laws						

What CHITOSE aims at



Laboratory research (8 years)

2018
Demonstration

0.1ha

- **2023**
World's largest microalgae production plant starts

5 ha

2027-

100 ha

- Under NEDO project (funded)



2050-

10 M ha

*1/20 of corn field in the world

- Steady expansion and stable commercial production

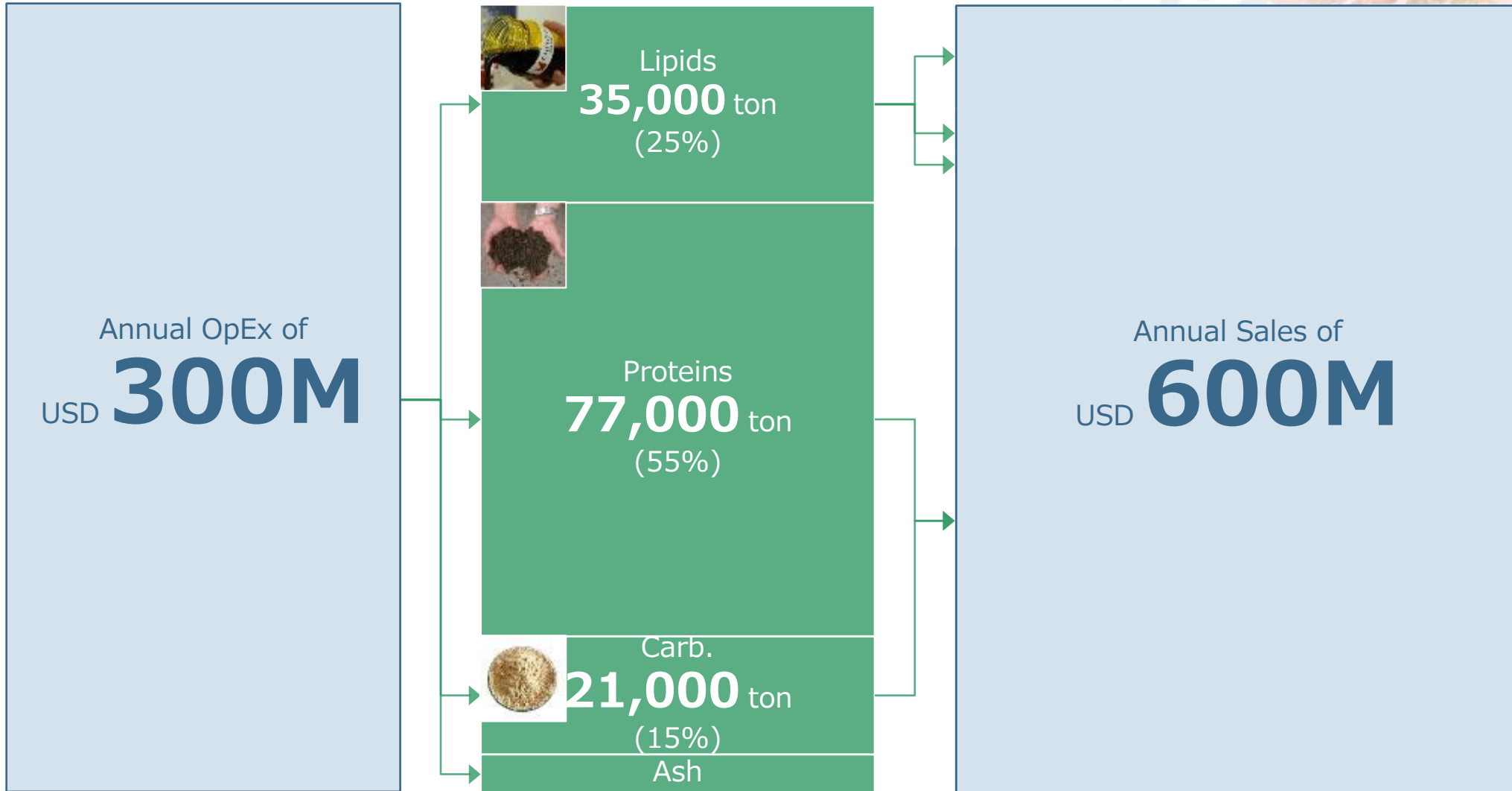
2030-

2,000 ha

*Minimum commercial unit

- Launch various microalgae derived products

Economy based on 2,000 ha production



Potential of microalgae derived SAF



	2030	2050
Required SAF amount of a Japanese airline (kl)	500,000	4,285,714
UCO NEAT SAF (kl)	60,000	60,000
-Demand coverage (%)	12	1.4
Microalgae production scale (ha)	2,000	10,000,000
Microalgae derived NEAT SAF (kl)	4,025	20,125,000
-Demand coverage (%)	0.8	469.6

Thank you for listening!



<https://matsuri.chitose-bio.com/en/>

