

GOA- Ventures

Set the stage for Upscaling  
& Improve the Revenue model





## Background / birth of GOA Ventures

**What is needed to make seaweed a more solid business with impact?**

- Improve costs model, specifically farming
- Improve revenues model

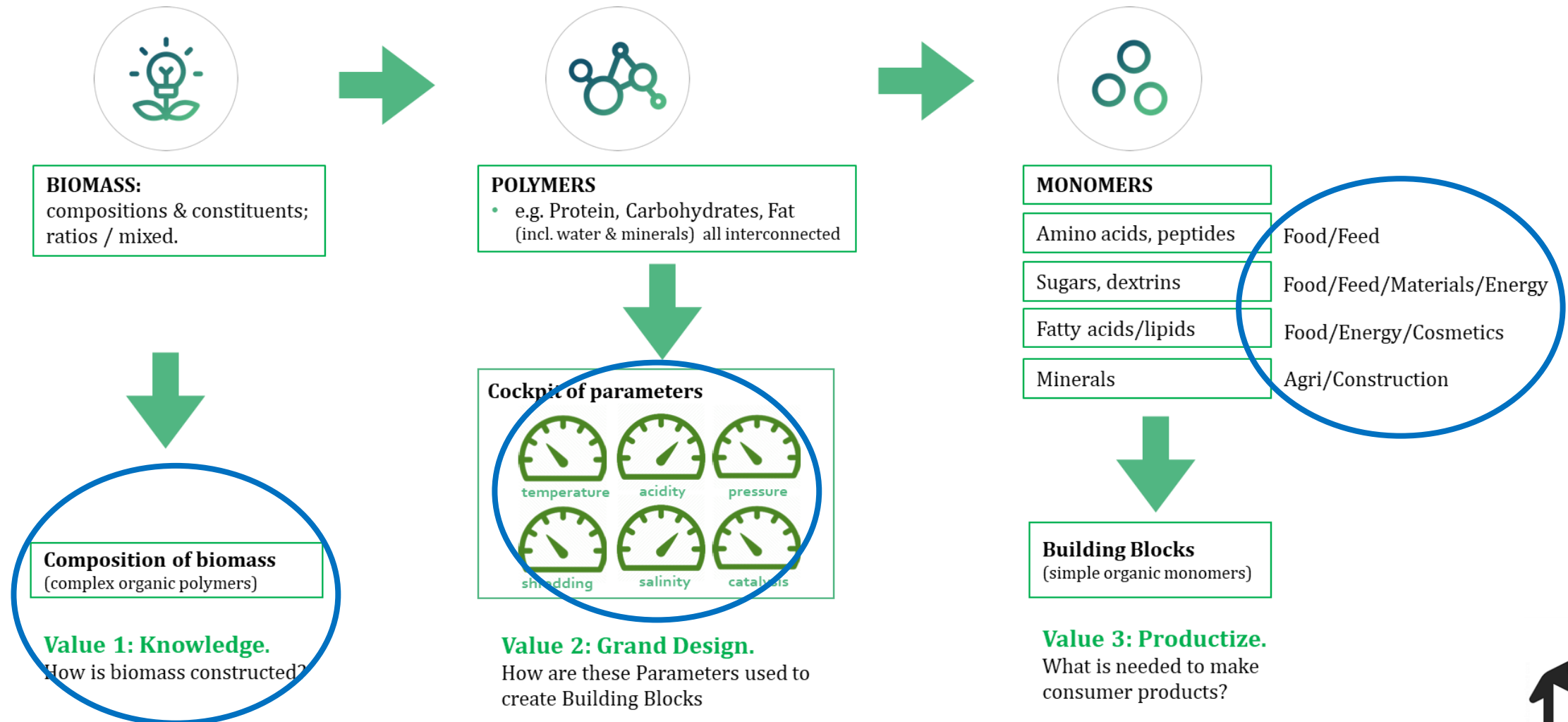
**GOA thinks it can create a breakthrough in Revenues model (explained by 2 steps )**

It mastered a new (IP) approach;

**large scale cascaded value extraction starting with fresh seaweeds.**



# First step: understand basics industrial bio-processing and 3 relevant values



## Second step: understand seaweed projects so far & turn learnings into new approach

### Analyzed all seaweed developments so far, mix of following elements:

All  
relevant  
to learn

- **99% projects start with seaweed drying** -> **mainly one species of seaweed (complex and costly)**
- Focus on 1 extractant -> low yields
- No integrated chain and/or process flow -> high(er) logistics & conversion costs
- R&D/Science approach -> lack of entrepreneurship
- “copycat cowboys” -> messy vibes / overpromising
- Limited biotech involvement -> focus mechanics/physics
- Limited customer involvement -> lack of market demand insights
- Weak vision on sizing -> seaweed for niche 1 on 1 consumption (e.g. restaurants)
- Focus on floating & wild harvest seaweed -> poor logistics, high costs, labor intensive

### New approach to improve Revenue economics and get to upscale breakthrough:

- **Shift in using fresh seaweed** -> **to control logistics, costs, food grade and sustainability**
- Design best-of-breed consortium -> covering the whole value chain (customer centric)
- Tech is not the issue -> required hardware and bio-chemicals exist. Use in new order/design
- Cascaded refinery -> design sweet spot for best combined outputs



## Our new process

## Why do we do this?

### 1. Harvest seaweed

- Wash/slice offshore –start incubation– transport to harbor

Reduce logistic volume.

Make it pumpable

Leave fauna in habitat

Use logistic time as part of process time

### 2. Back on land

- Separate water (with proteins) from solids
- Remove water/minerals from protein fraction.

Avoid drying / freezing energy input.

Preserve high (food grade) quality output

Remove minerals / contaminants

Use existing hardware

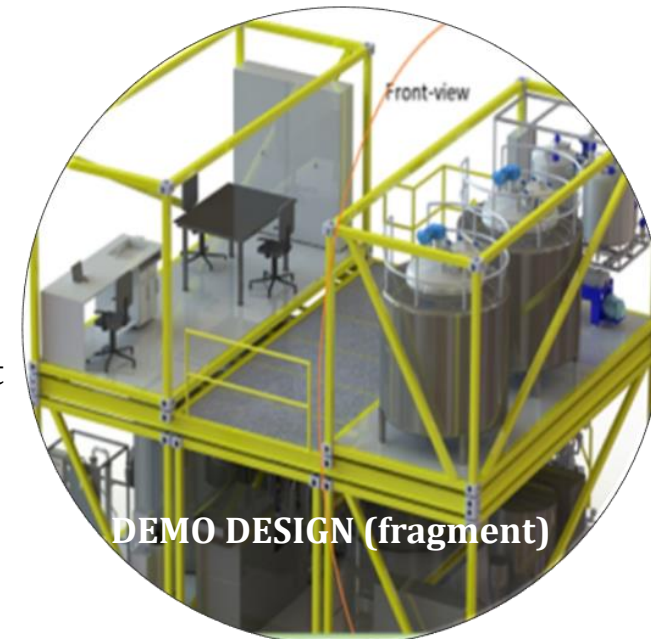
### 3. Remaining solids

- Options;
  - alginate/carrageenan or fucoidan extraction
  - total hydrolysis into sugar broth
    - feed into anaerobic biogas process.
    - fermentation technology i.e. to produce bio EtOH/biopolymers/bioplastics.

Simplify operations

Work at ambient conditions

Keep flexibility on input and output



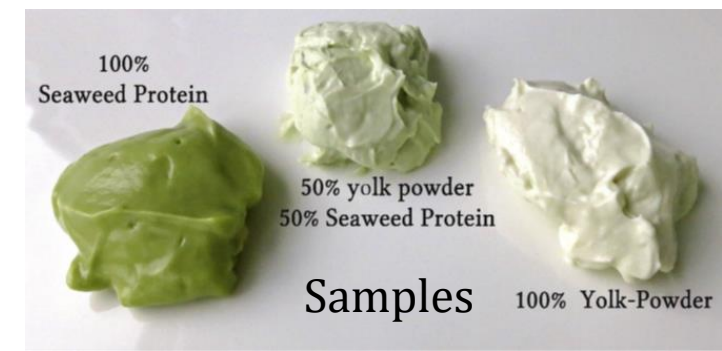
## Key drivers for solid economics

### Cascaded value extraction - **tech is not the issue!**

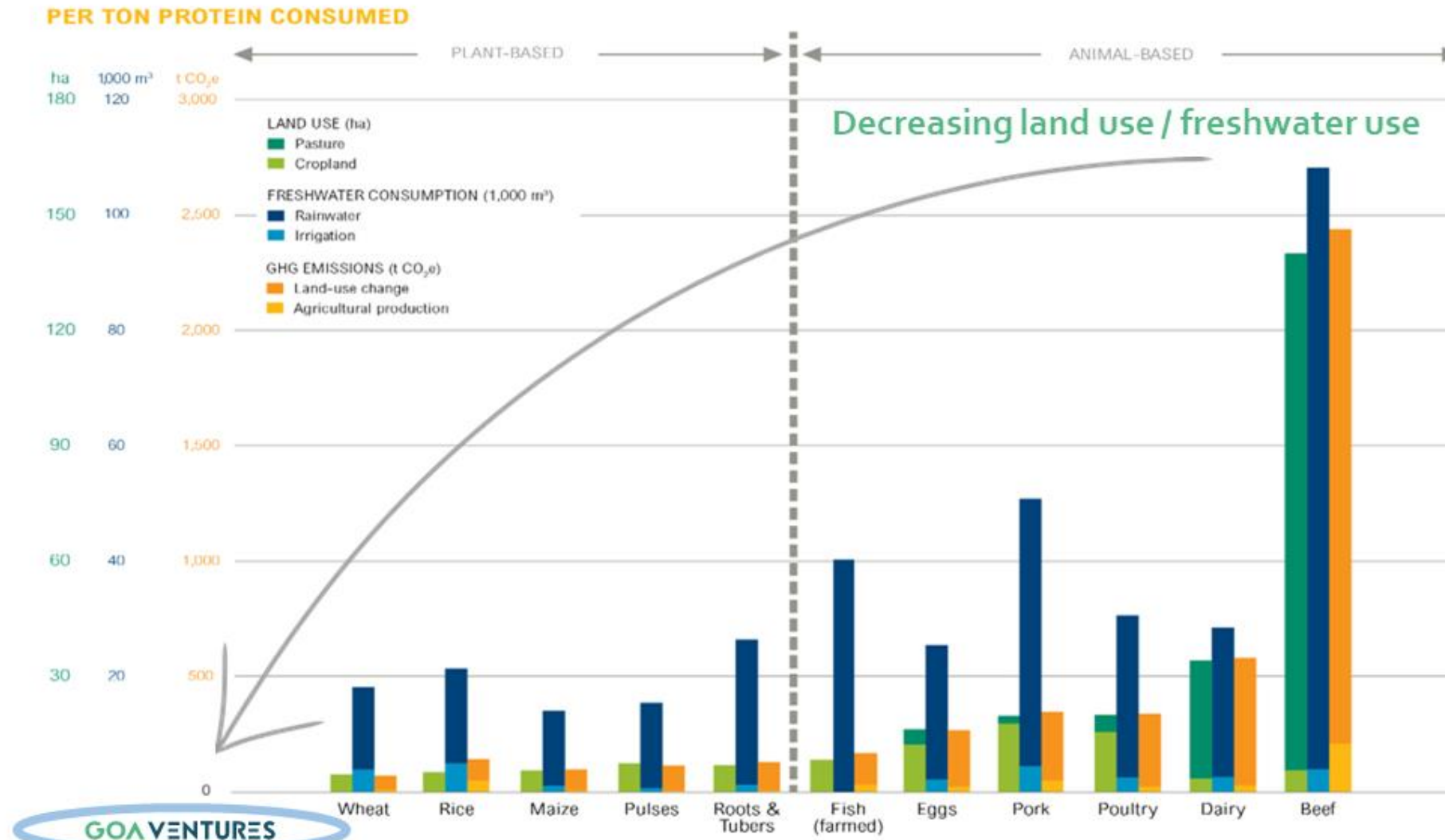
- Products to Protein & Energy transition seem to have best fit (both have firm sustainable targets thus markets)
- Try to be flexible in traction / roadmap from niche to bulk markets ( roadmap to upscaling....)
- One well defined fresh raw-material; convert it to multiple fractions
- Right mix of seaweed sorts to cover seasonality and optimum yields
- Samples, samples, samples for innovation products, products, products

### Selecting the right farmer(s) is most crucial factor

- Experience and/or vision on upscaling is key
- Tangible roadmap to cut farming costs drastically. From ~700€/WT to 50-100€/WT
- Offshore mechanization and lab breeding have huge potential but still under development
- Multiple (year-round) species farming is still in infancy



# The no. 1 key driver: proteins and carbon footprint



## The protein market

	+	--
<b>Soy</b>	Big, established, lots of application knowhow, low costs	Image(Amazon/health effects), land, water, hormones
<b>Pea</b>	Emerging product, safe image	Land use, fresh water use, taste/ mouthfeel issues
<b>Egg</b>	Global reference / high quality food / Platform of functionalities	Animal derived
<b>Wheat</b>	Image/premium positioning / health claims	Energy intensive to retrieve, Digestion (gluten) intolerance. Land use, fresh water use.
<b>Meat / fish / poultry</b>	Well known – established use including blood, collagen applications	Land & fresh water use. Hormones, contaminations and antibiotics intolerance.
<b>Milk (protein)</b>	Big, established, lot of application and value extraction knowhow.	Animal derived, environmental pressure,
<b>Micro-Algae</b>	High quality protein. Emerging market. Contained operations.	Energy balance, R&D intensive, fresh water use.
<b>Seaweed</b>	No land / No fresh water / carbon capture/ fast growth per day / environment cleanup / ...	Current cost levels farming in EU/NA, Quantity, innovation and automation in infancy.



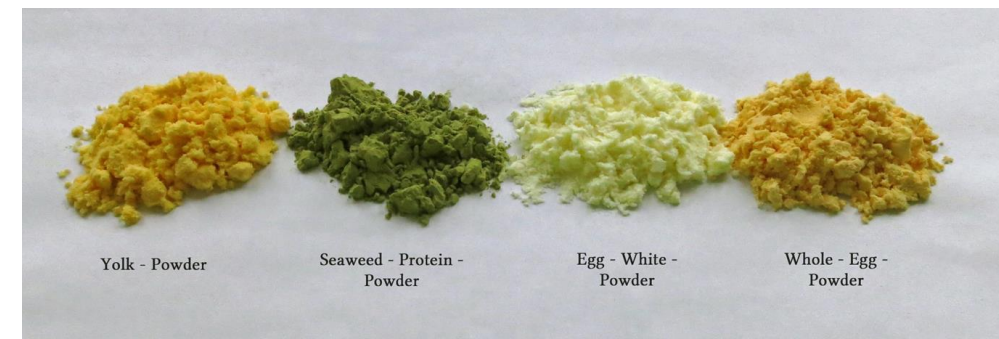
## Potential(s)

### If we go big there is outlook on **subsidy free** business case, example:

- 1 GOA plant needs total of 20-30 km<sup>2</sup> in windmill park environment (combi 4x5km<sup>2</sup> or alike)
- Requires 500.000ton wet weight fresh seaweed / year-round (year round harvest/different species)
- Delivers 30 million m<sup>3</sup> (1 PJ) of biogas & 6000ton functional protein (Soy import in NL: 2,5 billion ton/yr)
- Protein satisfies 250.000 persons and Biogas will fuel 25000 households – every year

### If we think big to 2050 (3500 km<sup>2</sup> within ecological boundaries according St. Natuur & Milieu):

- 125 PJ or 3,5 billion m<sup>3</sup> of biogas – good for >50% of households
- 1 billion ton of protein – good for 30 million persons
- GHG reduction is more than 10 Mton - Seaweed contribution to SDG's
  - 3,9 Mton Carbon Capture due to short cycles
  - + 3,4 Mton via Protein transition ( replacement meat )
  - + 3,1 Mton via Energy Transition ( replacement fossil fuels )
  - + addition extractants like – fertilizer -



# What is needed now to *(support the farmers and change the industry to)* make it happen?

## Farming is needed - in a bigger and better way

- Only with big we impact for a better world – deliver on SDG's
- Only with big mass markets for FOOD & ENERGY step in
- **BUT:** you cannot expect from small farmers they change the industry...
- **AND:** go beyond likeable niche and ballgame for research...

## What is needed in the Netherlands/NorthSea?

- 1. VISION ON BIG:**
  - clear roadmap to 2035 & 2050 from government to invite/incentive big players
  - connect with other countries to create synergies ( e.g. Denmark and/or US )
  - Value chain coordination with societal needs covered – spearheaded by 2035 roadmap.
- 2. DEMO/DEMO/DEMO:**
  - go beyond R&D & Science ballgame....
  - install seaweed programs to: 1. cut costs 2. improve revenues 3. continue R&D eco
- 3. CONSORTIA:**
  - multinationals who 'need' a seaweed constituent & science in 1 force (US as an example)
  - CO<sub>2</sub> Tax on FOOD might trigger earlier adaptation



Thank you!

What else you like to know?

Theo Verleun – CEO GOA-Ventures

[Theo@goa-ventures.com](mailto:Theo@goa-ventures.com)

+31-653230244

