WIERDOK
SEAWEEDFARM, SEAWEEDLOAMBRICK
FACTORY AND EXPLORATION SITE
RIANNE REIJNDERS
Problem statement

WORLDWIDE STRUGGLES IN THE BUILDING INDUSTRY

- depletion of non-renewable materials
- increasing CO₂ production from the building industry
- high water use and pollution
- high energy use in building industry non-green energy

Problem statement
OBJECTIVES OF THE NETHERLANDS

Nationwide program Circular Economy
The Netherlands circular before 2050

Focus on use of renewable resources
Optimizing material-use during the lifetime of a building
building sector that innovative and proactive regarding societal changes and needs
reduce CO₂ emissions in building and use phases
Problem statement

HOW TO FILL THE GAP?
Problem statement
HOW TO FILL THE GAP?

very limited choice in sustainable building materials
Problem statement
WHAT ABOUT SEAWEED AS BUILDING MATERIAL?

seaweed as solution

promotes biodiversity
absorbed co2
Insulating
fire proof
biodegradable
filters polluted water

Execution program Circular Economy
2019 - 2023

The Netherlands
The best seaweed producer in the world
## Material Research

**What seaweed-based building skins are currently developed?**

<table>
<thead>
<tr>
<th>1. board</th>
<th>3. insulation</th>
<th>6. cladding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seawood-Blue Blocks</td>
<td>Seaweed insulation</td>
<td>Sargablock - Omar Vazquez</td>
</tr>
<tr>
<td>Seaweed Insulation-Neptutherm</td>
<td>Seaweed insulation - Aerogel</td>
<td>Seaweed rolls - The Modern Seaweed House Vandkunsten:</td>
</tr>
<tr>
<td>Seaweed insulation Mats- Advanced Nonwoven</td>
<td></td>
<td>KNOT seaweed house - Warwick McLeod</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2. vapour tight layer</th>
<th>4. load bearing layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>vapour open, water tight layer</td>
<td></td>
</tr>
<tr>
<td>Sargablock - Omar Vazquez</td>
<td>Seaweed and unfired clay bricks</td>
</tr>
<tr>
<td></td>
<td>Seaweed thatching - Kathryn Larsen</td>
</tr>
</tbody>
</table>

- Seaweed biopolymers and unfired clay bricks
- Seaweed paviljoen - Kathryn Larsen
<table>
<thead>
<tr>
<th>4</th>
<th>load bearing layer</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.jpg" alt="Sargablock - Omar Vazquez" /></td>
<td><img src="image2.jpg" alt="Seaweed and unfired clay bricks" /></td>
</tr>
</tbody>
</table>

Sargablock - Omar Vazquez

Seaweed and unfired clay bricks
Material Research

LOAM

SEAWEED
Seaweed loambrick

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<table>
<thead>
<tr>
<th>Material</th>
<th>quantity</th>
<th>kg CO2 emissions</th>
<th>m3 water-usage</th>
<th>MJ energy-usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seaweed brick (140 mm)</td>
<td>1 m²</td>
<td>11</td>
<td>0.017</td>
<td>13,848</td>
</tr>
<tr>
<td>fired brick (100 mm)</td>
<td>1 m²</td>
<td>74</td>
<td>0.022</td>
<td>172,800</td>
</tr>
</tbody>
</table>
Goal

growing seaweed
Goal

growing seaweed    producing the seaweed building product
Goal

- growing seaweed
- producing the seaweed building product
- building with the seaweed product
Goal

- growing seaweed
- producing the seaweed building product
- building with the seaweed product
- create informational experience for visitor
Location
WHY SEAWEED IN THE HARBOR OF AMSTERDAM?

Off-shore farms
- producing seaweed
- making products from seaweed
- buiding from seaweed

Noord - Holland

Amsterdam

Westpoort

The Seaweed Farmers
- producing seaweed?
- producing seaweed
- making products from seaweed
- buiding from seaweed

Noord - Holland

Westpoort

Amsterdam

- producing seaweed?
- producing seaweed
- making products from seaweed
- buiding from seaweed

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Why Seaweed in the Harbor of Amsterdam?

2022

2030

2040

2050

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influx of seaweed expertise and products

further incentive of researching new building materials

growth neighborhoods like harbor city
Phase 0:
Phase 1:

SEAWEEDFARM 2022-2026
EXPLORING TESTING AND SETTING UP

1. Start collecting baseline data
2. Dismantle excess components
3. Setting up seaweed farm
4. Temporary housing of production
5. Setting up seagrass basin
6. Dug-out water pond
Production facilities
Production facilities

8 production facilities

- people and proces parallel
- full transparancy in production
- showcase of material
Production facilities
Production facilities
Production facilities
Phase 1:
SEAWEEDFARM 2022-2026
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Phase 2:
SEAWEED LOAM BRICK 2026-2030
SET UP FULL PRODUCTION CIRCLE

1. close production circle
2. new production facility Wierbogen
3. all workshops
4. start defining central point
5. active use as workspace by artist and start-up
References

SUIKERFABRIEK TERREIN, GRONINGEN

METAAL KATHEDRAAL, UTRECHT
Silo Steel materials
Relationship

Seaweed loam brick

Silo Steel materials
Relationship

Seaweed loam brick

Silo Steel materials

relationship
Experience
South facade
Model
Load bearing structure

- Barrel Vault, inverted catenary curve
- Mirroring vault to neutralize horizontal load & using superimposed load
- Using butresses to prevent buckling when carrying roof beams
Phase 3:

SOCIAL OPENING 2030-2034
START SOCIAL CHARACTER
Public buildings

2. public space

- heritage of location
- housing social and service functions
- contrast old and new materials
Restaurant en exhibition
Construction Silo

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Phase 4:
PUBLIC DOMAIN CIRCA 2040
EXPERIMENTATION AND LEARNING SITE
Goals

- Growing seaweed
- Producing the seaweed building product
- Building with the seaweed product
- Create informational experience for visitor
9,43 hectare to grow seaweed

188600 kg dry seaweed per year

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360 bricks per hour

Making all the bricks for Wierbogen would take 6 weeks

producing the seaweed building product
building with the seaweed product
Thank you for your attention!

Feel free to look at the posters and materials on the table!
References


