Re-oil Coast
An algae-based biofuel production and recreation coastal development

Nan Yang
P4 PRESENTATION
05/20/2016
Introduction

Problem statement

Objective

Research

Masterplan

Design

Story
Renewable energy problems

Introduction

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ELECTRICITY

FOSSIL FUEL
To design an
Architectural Composition
based on sustainable fuel production

REOIL
Biomass production comparisons

CROPS BIOFUEL PRODUCTION

PRODUCTIVITY

Soy 118
Safflower 206
Sunflower 251
Castor 373
Coconut 605
Palm 1,572

ALGAE BIOFUEL PRODUCTION

Algae

26,417
Biomass production comparisons

CROPS BIOFUEL PRODUCTION

PRODUCTIVITY
- Soy: 118
- Safflower: 206
- Sunflower: 251
- Castor: 373
- Coconut: 605
- Palm: 1,572

ALGAE BIOFUEL PRODUCTION
Microalgae products
Conditions: light and temperature

- **Philips**: 12-17W/m²
- 0-20 °C winter
- 20-30 °C summer

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**Introduction**

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**Algae production**

- Land creation

**Context**

**Masterplan**

**Design**

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**Algae production**
- Land creation
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**Algae farmhouse design**

1

2

3

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Rise in sea level

12 million m³/year

Minimum sustainable function retained by adapting coastal foundation to sea-level rise.

Volume
Distribution
Form and frequency

Sand motors (20 years)
Reference coastline (5 years)

Maintain reference coastline

- Beach nourishments
- Foreshore nourishments
- Exceeding reference coastline area

Nourishment volumes (10³ m³)

Exceeding reference coastline area (%)

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Land construction

1. Dumping sand
2. Reinforcements
3. Tension piles
4. Diagonally driven
5. Upper pavement
6. Barrier casting

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Land protection: seawall

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Land creation

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1 Sand
2 Gravel
3 Cobblestones
4 Quarrystone
5 Concrete blocks
6 Toe construction
7 Water levels
Coastal development

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Gems on the coast
- Type of challenge
  - Urban challenge
  - Recreational challenge
  - Water challenge
  - Nature challenge, such as Nature 2000
  - Wadden Sea Region
  - Ebb-tidal deltas in the tidal flats system

Economic drivers
- Economy
  - Tourism services
  - Other coast-specific sectors (defence, marine contracting and shipbuilding, residential care)
- Water and leisure
  - Recreation
  - Shipping
  - Wind energy
  - Ports, shipping (and fishing)
- Agriculture
  - Land infrastructure
    - Railway
    - Station
    - A-roads
  - Water infrastructure
    - Ferry – Wadden Islands
    - Ferry – international route
    - Shipping lanes
    - Port of Sall
Opportunities: Tata steel

extra heat from manufacture

CO2 emission: 35.8 million tons/year
Opportunities: Sustainable energy potentials

Netherlands wind speed map

Netherlands solar radiation map
Opportunities: Sustainable energy potentials

Netherlands average solar radiation: 110W/m²/year

- 46.0%  
  50.6W/m²

- 27.6%  
  30.36W/m²

- 23.3%  
  25.63W/m²

- 12.6%  
  13.86W/m²
Sand nourishment for land creating

Development steps
  Program
Design
Story
Agae farm and new beach

Development steps

Program

Design

Story
Biofuel infrastructure and new harbour
Recreation coast and oil rig transformation

Development steps

Program

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Production area

- Biogas plant
- Biofuel factory
- Algae farm
- Fishing net
- Wind turbine

Program

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Recreation area

hotel

harbour

market

hotel

harbour

new beach

museum

new beach
Production

9300 b/day 141050 m³/day 6MWh

motor gasoline residential gas Housing
9.3% consumption 0.5% consumption 525600 m²

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Oil platform
Future technology Expo
Existing facilities Collection
Fossil ages Exhibition
Education and Entertainment

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Experience

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Existing oil rig
New platform
Floating boat and support structure
Floating deck as entrance
Vertical circulation and horizontal movements
Existing interior
Remove living support parts and drilling pipes
Meeting point
Hanging library
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Servant spaces
1st Exhibition level
Introduction
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**Design**
Story

**2nd Exhibition level**
Old deck

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Remove useless parts
New platform
3rd Exhibition level
Store and restaurant
Kitchen and toilet
4th Exhibition level
Viewing deck, test raceway, openable roof
Old section
Ventilation system
Summer situation
Winter situation
Energy production system

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Design

Story
In 2026, this project will be realized, then...
Story
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Thanks for attention,
Questions?