

An aerial photograph of a coastal region. On the left, a large, white, ring-shaped offshore structure is visible in the dark blue sea. The coastline curves from the bottom left towards the top right. To the right of the coast, there is a coastal town with buildings and a large industrial or port facility. The land is a patchwork of green fields and brown areas.

# iLand

*Offshore Pumped Hydro-electric Storage*

*PIANC, Oostende, 07/05/2015*

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1. Introduction

2. Legal aspects

3. Base Case

4. Planning

5. Application example

# 1. INTRODUCTION

# iLand Renewable Energy

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C-POWER, Oostende

**WIND and  
SOLAR are  
INTERMITTENT.**



TERRANOVA, Zelzate

**STORE ENERGY at times  
of excess generation,  
RELEASE ENERGY at  
times of shortages.**

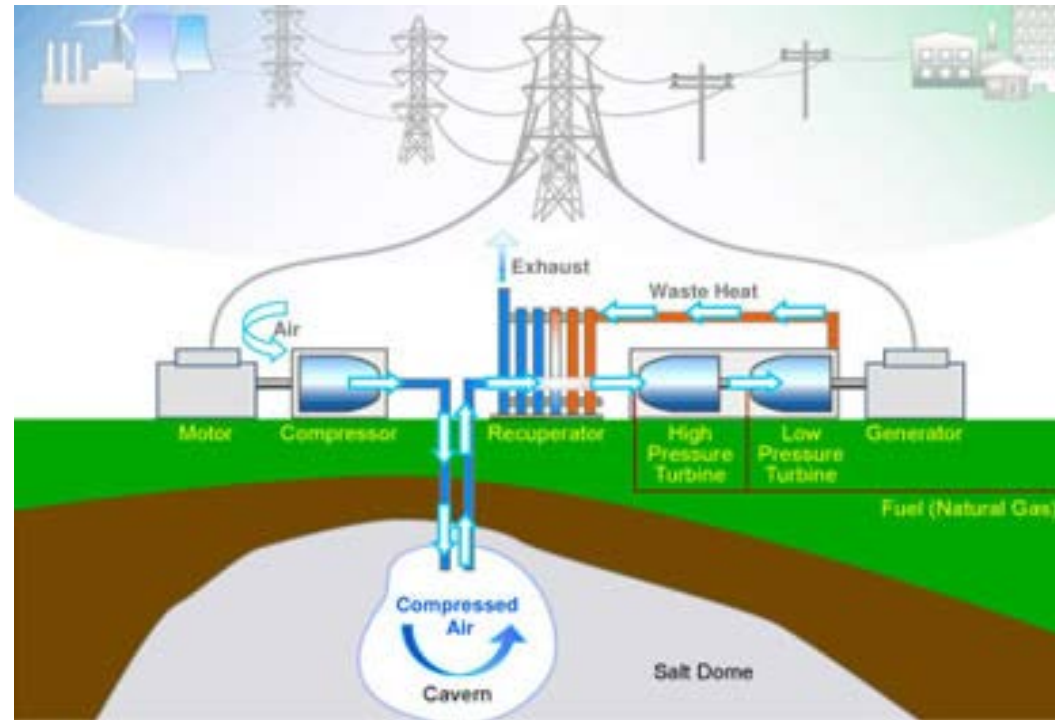
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# LARGE SCALE ENERGY STORAGE



**PUMPED HYDRO STORAGE:**  
98% of all large scale energy storage worldwide.

***In Belgium: important on-shore spatial constraints.***



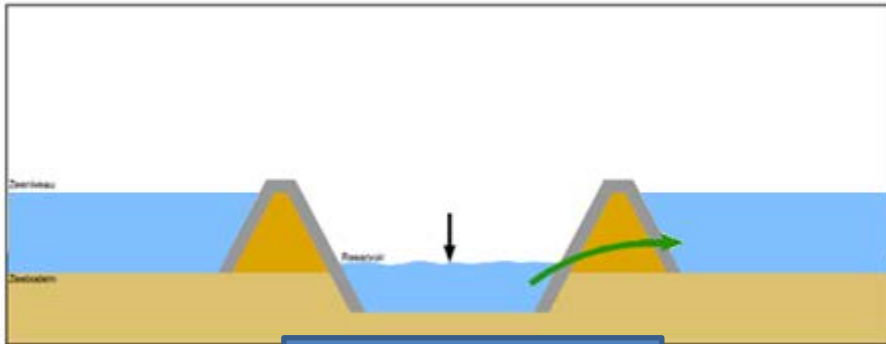
**COMPRESSED AIR ENERGY STORAGE:**  
2 stations (1 in USA, 1 in Germany) built since 1978.

***In Belgium: unfavourable subsoil conditions.***

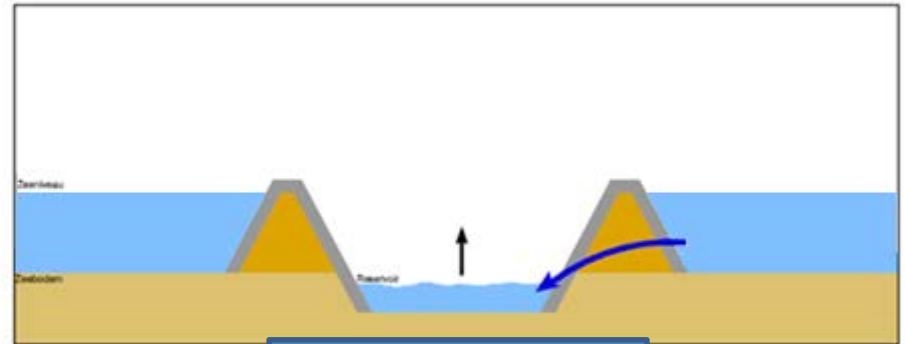


# iLand = ENERGY STORAGE at SEA

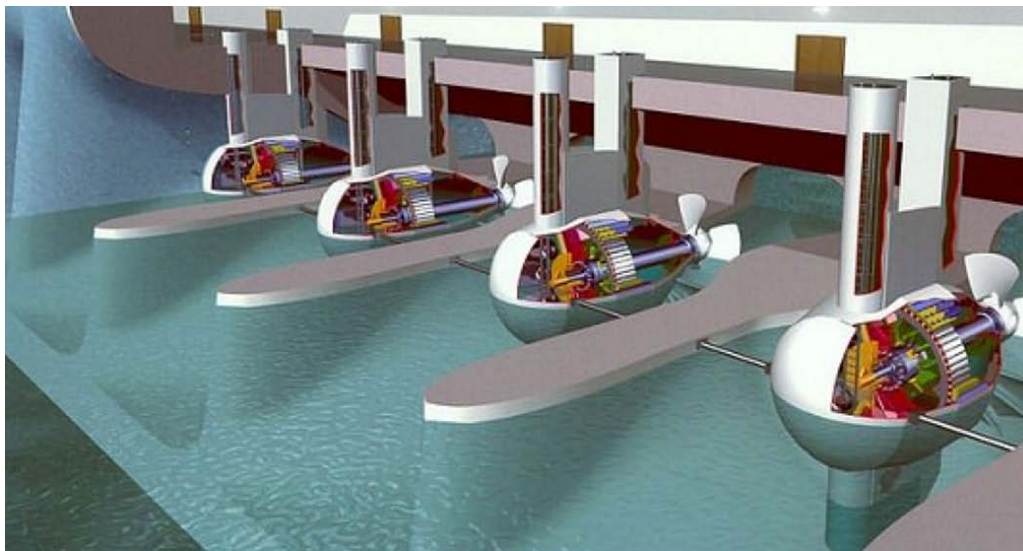
**iLand THV**  
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STORE ENERGY



RELEASE ENERGY



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# 2. LEGAL ASPECTS

# Legal framework in Belgium: Marine Spatial Plan RD (20 March 2014)

- ✓ Definition of 2 zones for Energy storage concessions, including “active environmental measures”:
  - Zone 1 – near Wenduinebank
  - Zone 2 – east of Zeebrugge harbour extension
- ✓ Visitor’s centre included



**Energie, kabels & pijpleidingen in het BNZ**

Zone bestemd voor domeinconcessies voor de productie van elektriciteit uit water, stromen of winden

Zone bestemd voor een installatie voor het transport van elektriciteit ('stopcontact op zee')

Preferentiële zone bestemd voor concessies voor kabels en pijpleidingen

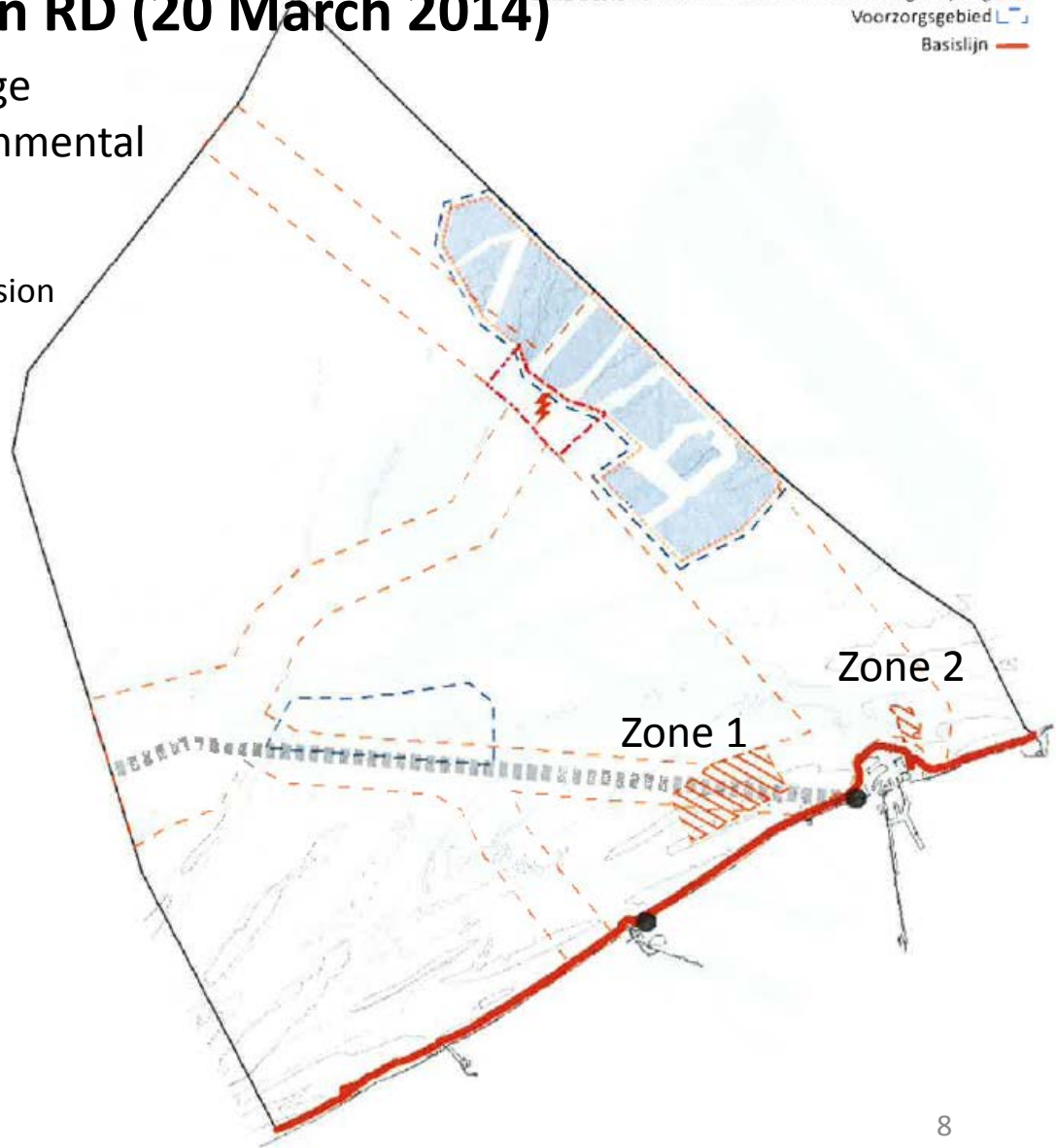
concessiezone elektriciteitskabel naar Groot-Brittannië

aanlandingspunt voor offshore energie

zone bestemd voor een concessie voor energie-opslag

Voorzorgsgebied

Basislijn



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# Legal framework in Belgium: Concession RD (8 May 2014)

## 1. Subject:

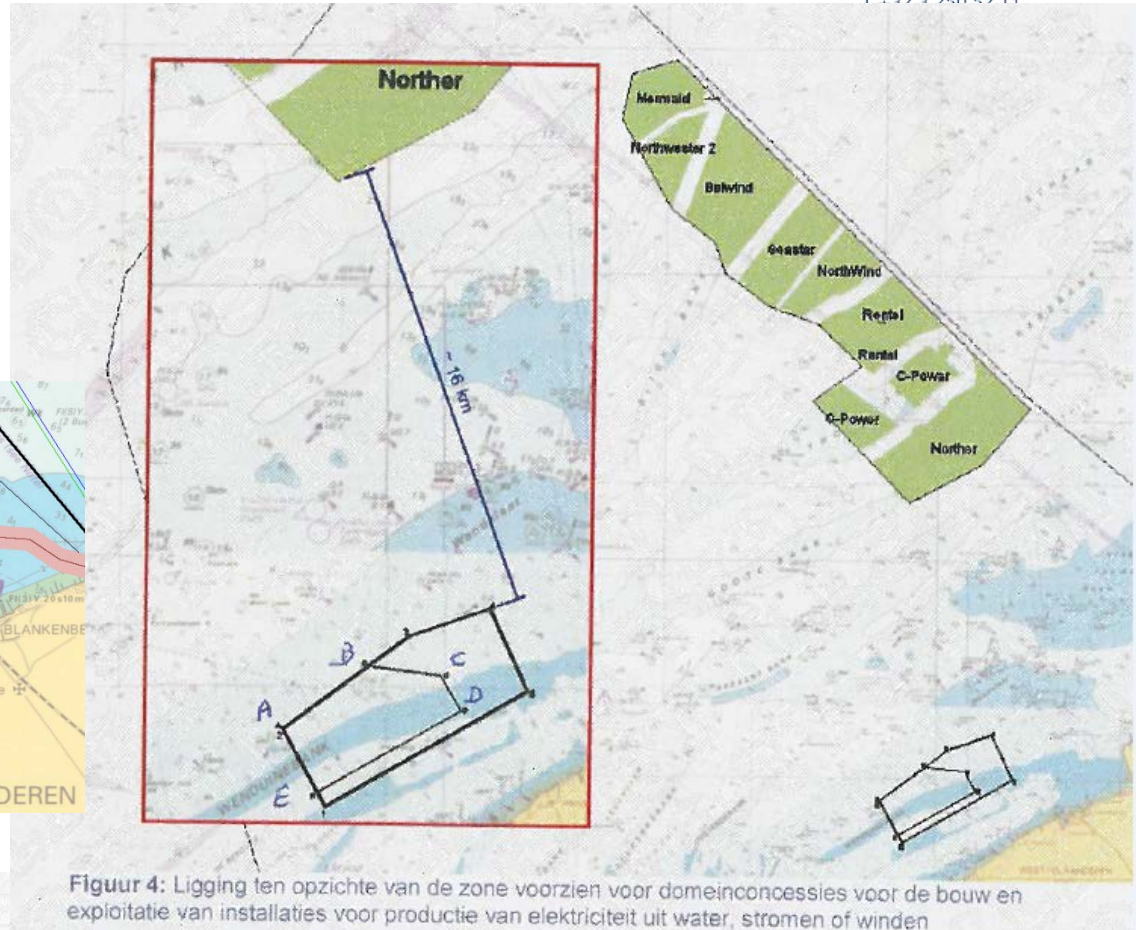
Conditions and procedure for awarding a domain concession for an energy storage island with parallel environmental function.

## 2. Award criteria are similar to those for Offshore Wind Farms, except:

- Redesignation after expiry of legal concession period of 50y+25y max.
- Located within contour of zone 1 / zone 2 (Marine Spatial Plan)
- Quality of active environmental measures
- Strength of the JV at technical, economical and societal level

# 3. BASE CASE

Requested domain concession ABCDE within zone 1 (Wenduinebank) of the Marine Spatial Plan.



Figuur 4: Ligging ten opzichte van de zone voorzien voor domeinconcessies voor de bouw en exploitatie van installaties voor productie van elektriciteit uit water, stromen of winden

### Domeinconcessie binnen afgebakende zone 1

ETRS89 coördinatensysteem

ID	WGS84 Geographical				UTM Zone31 (WGS84)		WGS84 Geographical							
	Oost (OL)		Noord (NB)		X	Y	Oost OL	Noord NB	Oost OI	Noord NB				
A	2	56	58,628	51	19	11,388	496489,15	5685393,38	2	56,977	51	19,190	2,949619	51,31983
B	2	59	28,864	51	20	21,912	499397,58	5687570,72	2	59,481	51	20,365	2,991351	51,33942
C	3	1	37,196	51	20	13,128	501880,75	5687299,96	3	1,620	51	20,219	3,026999	51,33698
D	3	2	14,741	51	19	33,384	502607,87	5686072,22	3	2,246	51	19,556	3,037428	51,32594
E	2	58	0,163	51	18	0,756	497679,33	5683210,60	2	58,003	51	18,013	2,966712	51,30021

**iLand requests Zone 1 as constructional advantages are expected.**

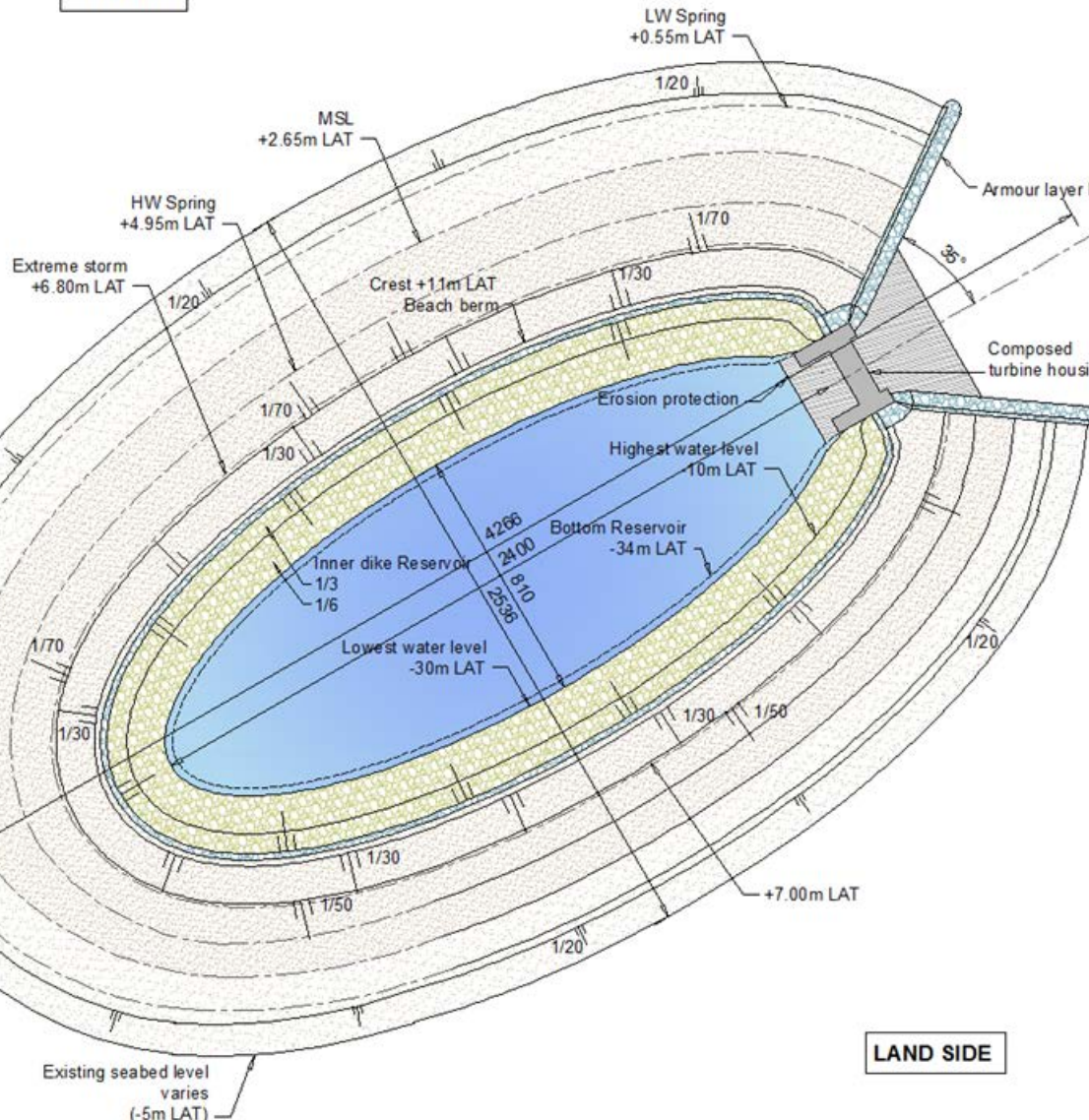
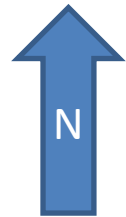


**iLand from the air, viewed parallel to the coastline**  
*(realistical visualisation by 3D Engineering company CSO-Lievensse)*

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# Base Case: Conceptual design

SEA SIDE



## GEOMETRICAL

- Elliptic ring dyke with:
- crest <10m below mean sea level
  - long axis +/- 2.800m
  - short axis +/- 1.200m
  - Bottom +/- -34m LAT
  - Circumference +/- 6.500m
  - iLand beach at land side:  
+/- 250m at high tide  
+/- 500m at low tide
  - no "dune" nor "wall".

Elliptic footprint on the sea bed:

- long axis +/- 4.200m
- short axis +/- 2.500m

Water level in reservoir varies between -10m LAT en -30m LAT

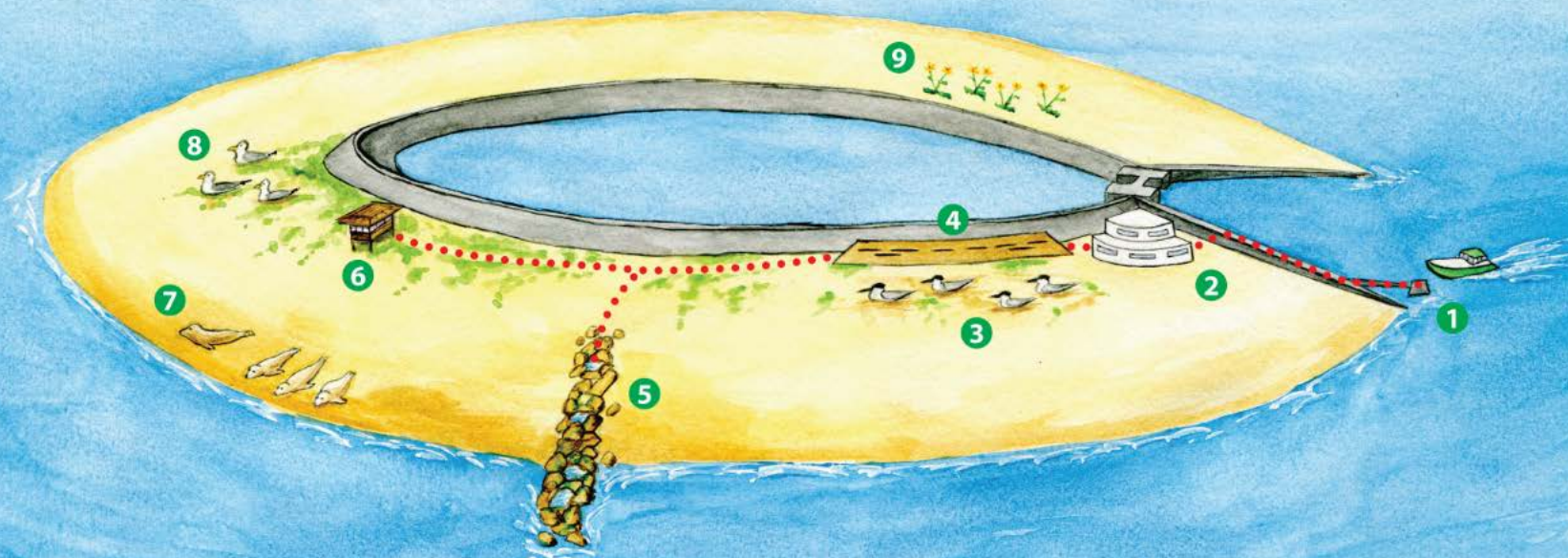
## ELECTRICAL / ENERGETIC

- Energy contents +/- 2.220 MWh hydraulically, i.e., +/- 2.000 MWh net output
- Pump-turbine power +/- 550 MW

## iLand

Artist impression (niet op schaal)

- |                    |                       |
|--------------------|-----------------------|
| 1 pier             | 6 kijkhut             |
| 2 bezoekerscentrum | 7 zeehondenrustplaats |
| 3 sternenkolonie   | 8 meeuwenkolonie      |
| 4 uitkijkpunt      | 9 vloedmerkplanten    |
| 5 strandhoofd      |                       |
- ..... route geleide wandeling



**Environmental potential of iLand:  
developping, exploring and experiencing coastal nature.**  
*(Report by marine research company eCoast)*

# 4. Further Planning

## *Planning in concession file:*

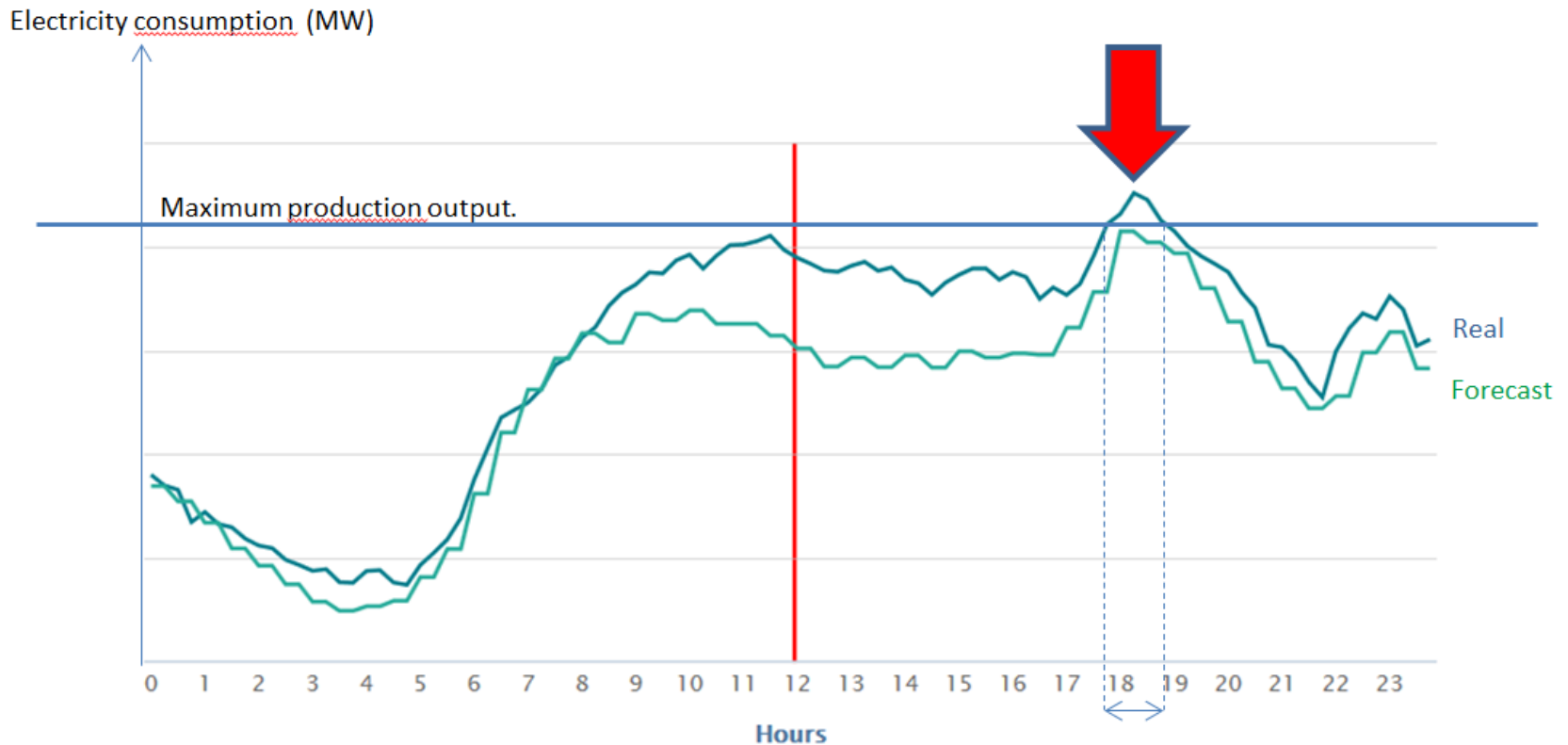
- Awarding concession: mid 2015
- Permitting/Engineering/Studies: mid 2015 – mid 2018
- Construction: mid 2018 – mid 2021
- Operation: mid 2021

# 5. APPLICATION EXAMPLE



# 5. Application example: iLand and security of supply

Electricity shortage, solved by iLand.



# Thank you!

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