

Design features of the upcoming Coastal & Ocean Basin – COB @ Greenbridge campus Ostend (Belgium) for coastal and offshore engineering applications

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Flanders Maritime Laboratory, Ostend



Ostend, March 2020

Flanders Maritime Laboratory, Ostend



Ostend, March 2018

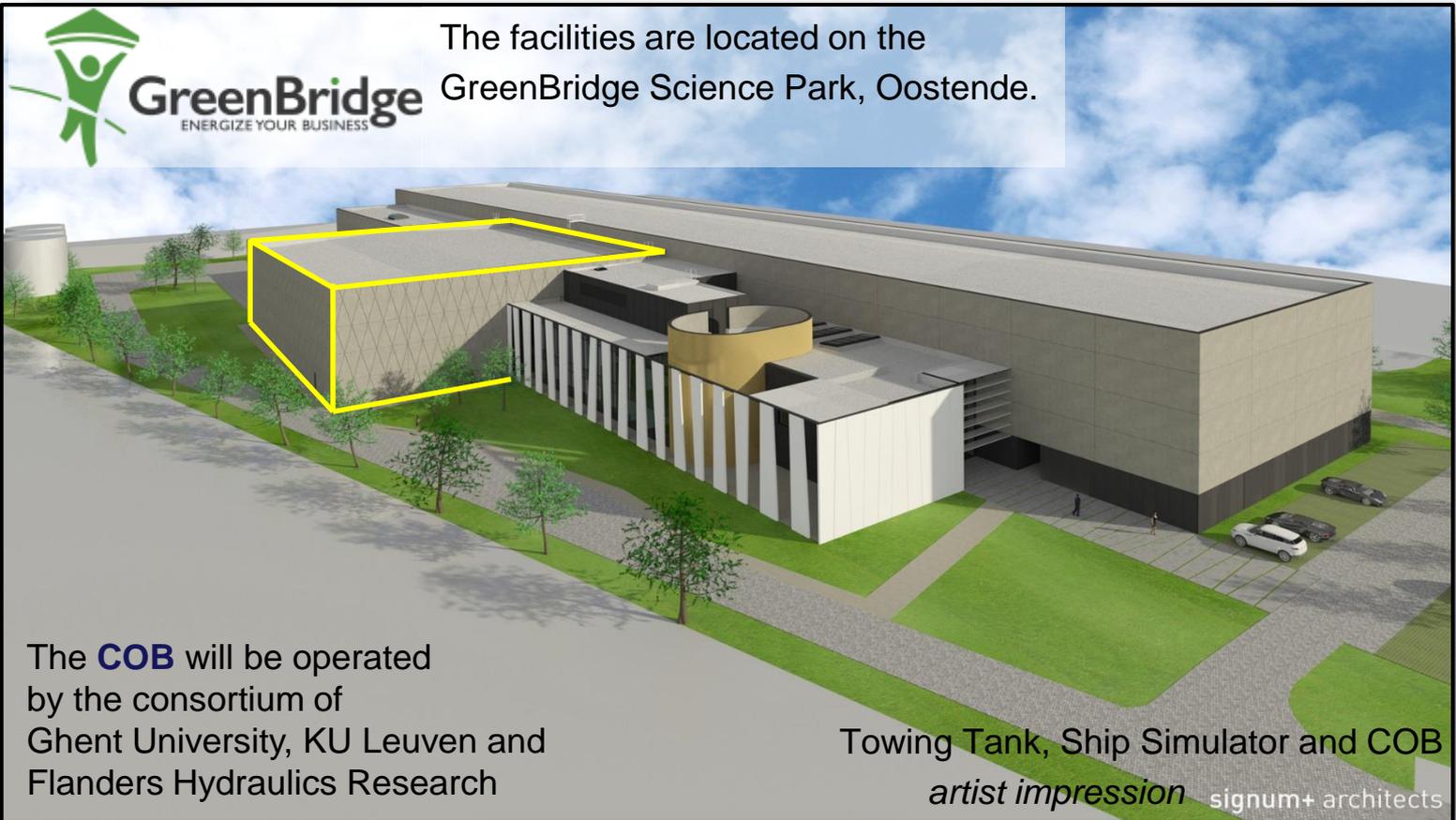
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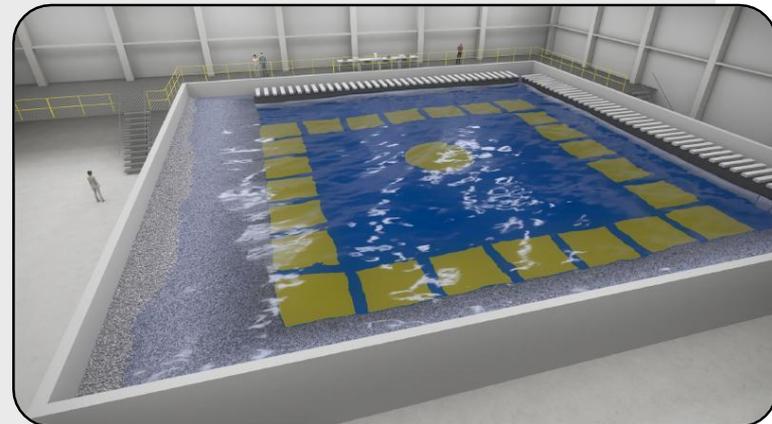


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Coastal & Ocean Basin

- background, funding and consortium
- motivation and unique positioning
- COB design characteristics
- project integration on various scales
- conclusions



background and funding

- **Gen4Wave project**
 - initiated by **UGent** + **AGORIA - Generaties**
 - organised by **UGent** + **KU Leuven** + **FHR**
- **Hercules foundation project (now under FWO)**
 - large research infrastructure only
 - wavemaker and current generator
- **VLAIO (formerly IWT)**
 - research infrastructure and personnel
- **Department of Mobility and Public Works**
 - housing and concrete structures for COB
- **network of innovative companies**
 - contractors, consultancy, developers, ...





DEME

Dredging, Environmental
& Marine Engineering



Vrije Universiteit Brussel

R&D-DEPARTEMENT



**COMPANIES AND INSTITUTES
SUPPORTING THE DEVELOPMENTS
FROM THE EARLY START**



ondernemingen

Jan De Nul n.v.



unique positioning in Europe

recently constructed basins in Europe

Edinburgh University, UK

ϕ 30 m x 5 m, $v = 0.8$ m/s
very large

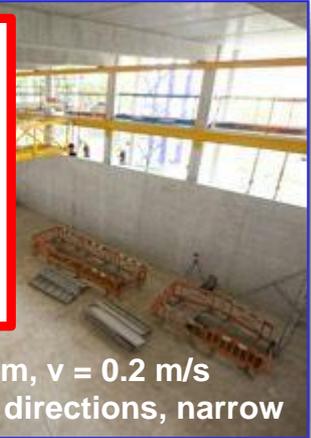


unique (scarce) European research facility

- generation of **waves + currents + wind**
- midsize (30 x 30 m, **water depth 1.4 m**, pit)
- balance between **scale effects** and cost

confirmed by international reviewers!

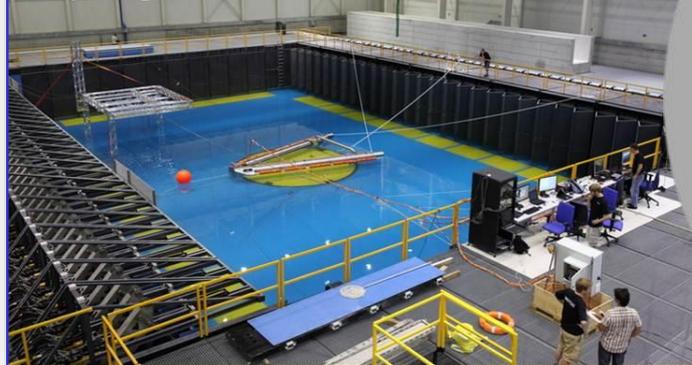
Plymouth University, UK



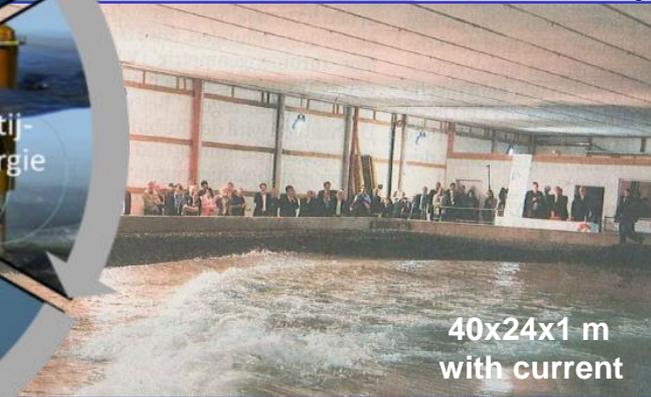
35x15x3 m, $v = 0.2$ m/s
2 current directions, narrow

IH Cantabria, Santander, Spain

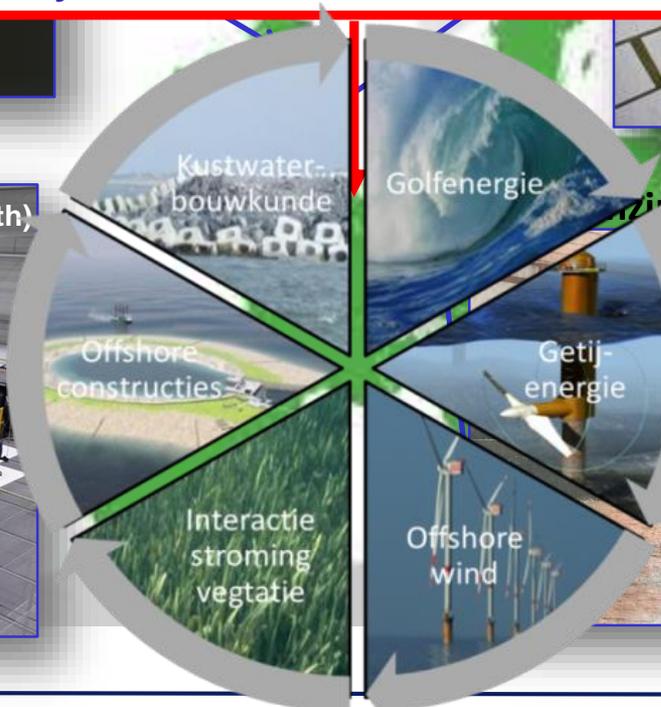
44x30x5 m, $Q = 19$ m³/s (0.2 m/s for 3m depth),
very large



WZL Institute, Hannover, Germany



40x24x1 m
with current



Coastal and Ocean Basin – COB, Oostende



KU LEUVEN
& Techn. campus Oostende

Waterbouwkundig
Laboratorium



Vlaanderen
is wetenschap

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signum+ architects



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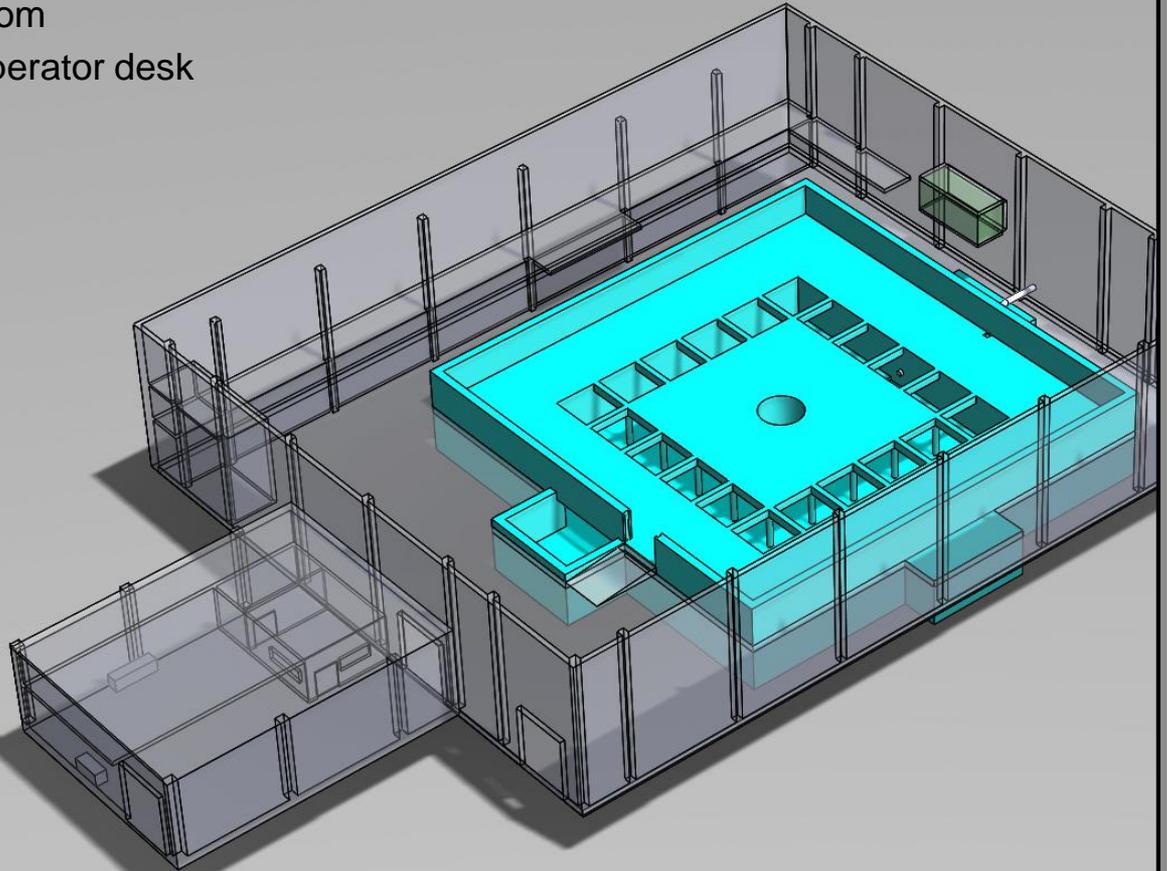


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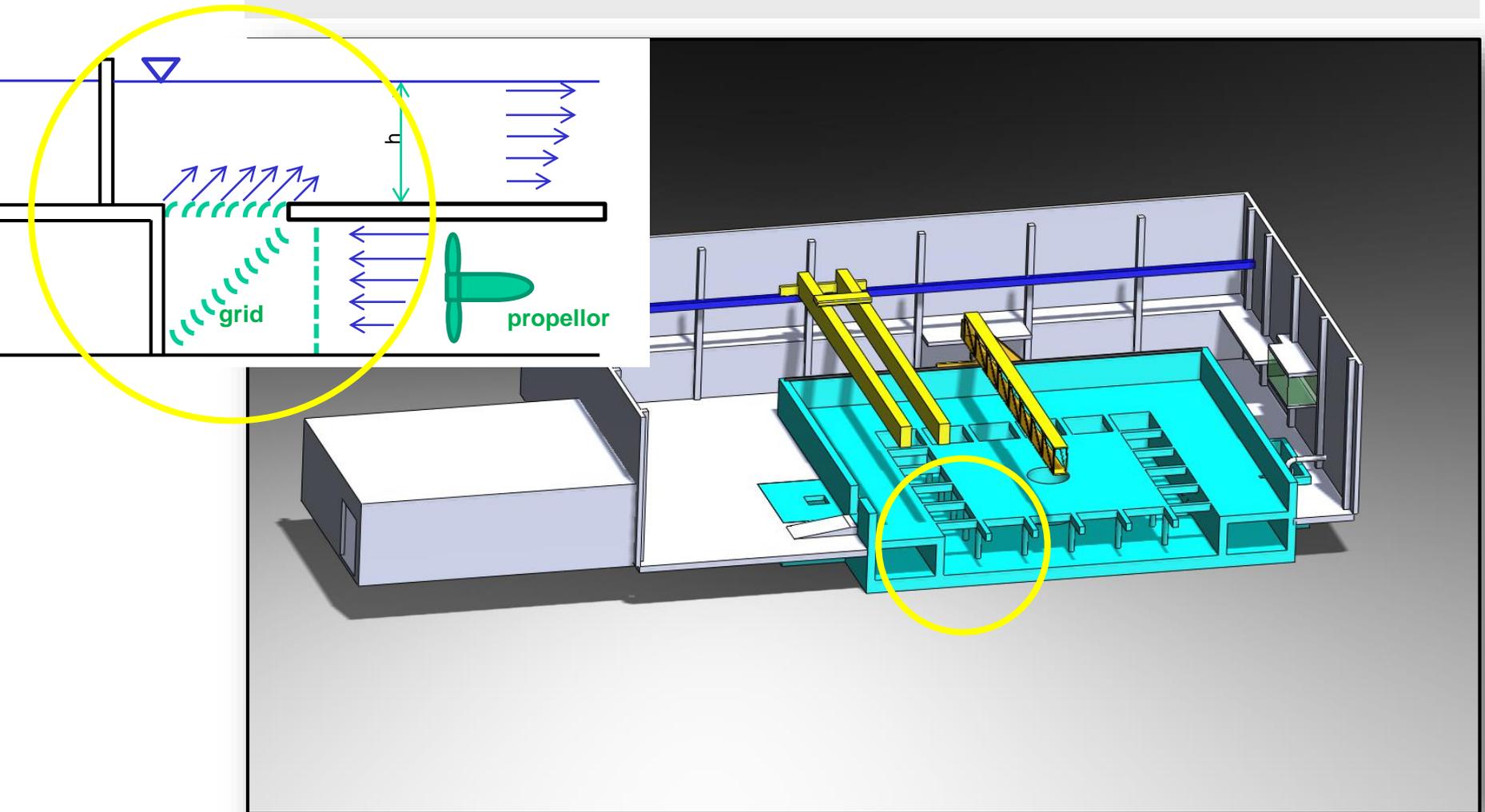


Coastal and Ocean Basin – COB, Oostende

- COB main hall
- main operator room
- Gangway with operator desk
- Wave tank
- Current tank
- Central pit
- Working area
- Workshop
- Wave generator
- Wind generator
- Current pumps
- Bridge crane
- Passerelle
- Pumping station
- Wheelloader
- Forklift
- DAQ



Coastal and Ocean Basin – COB, Oostende

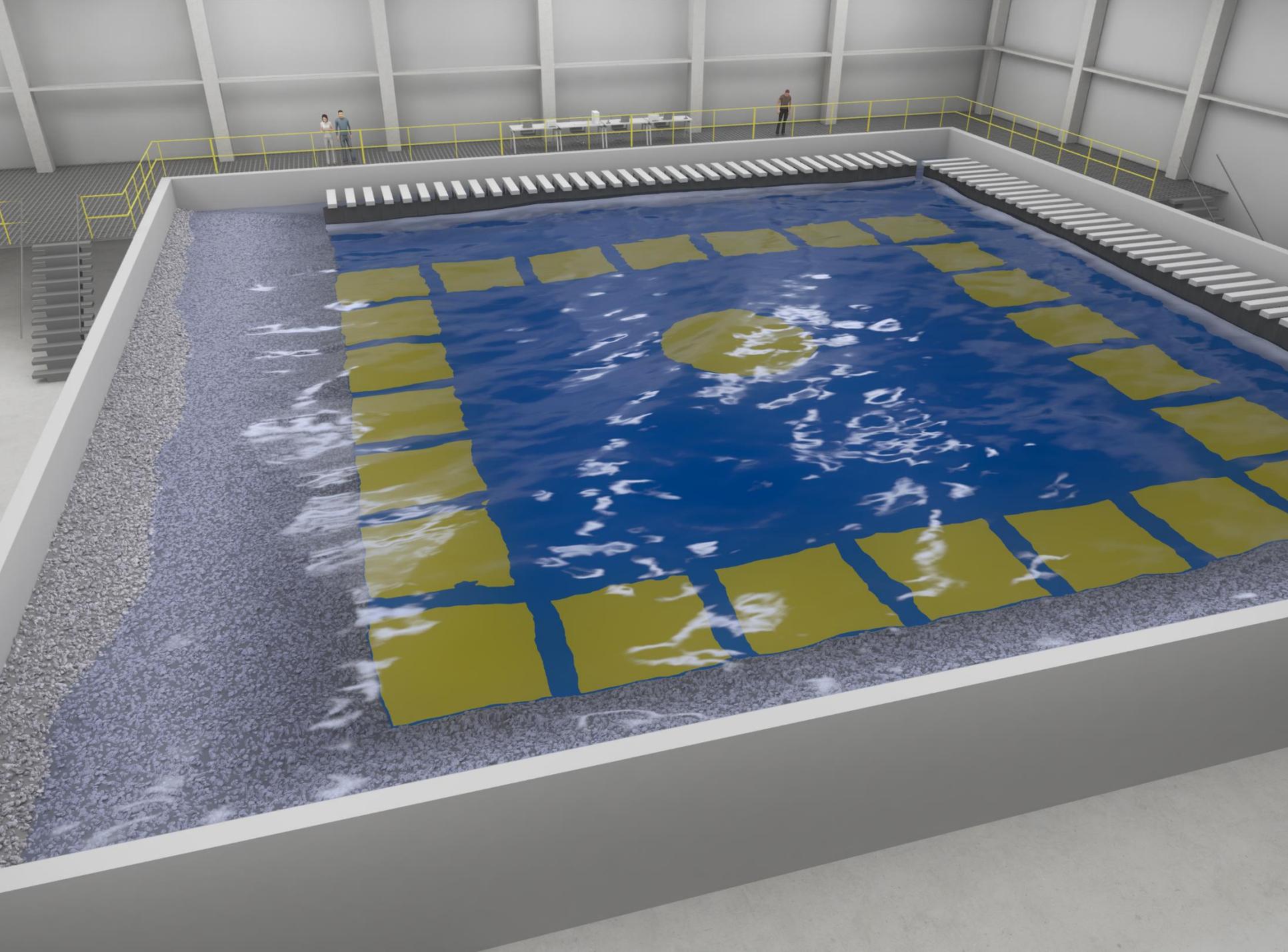


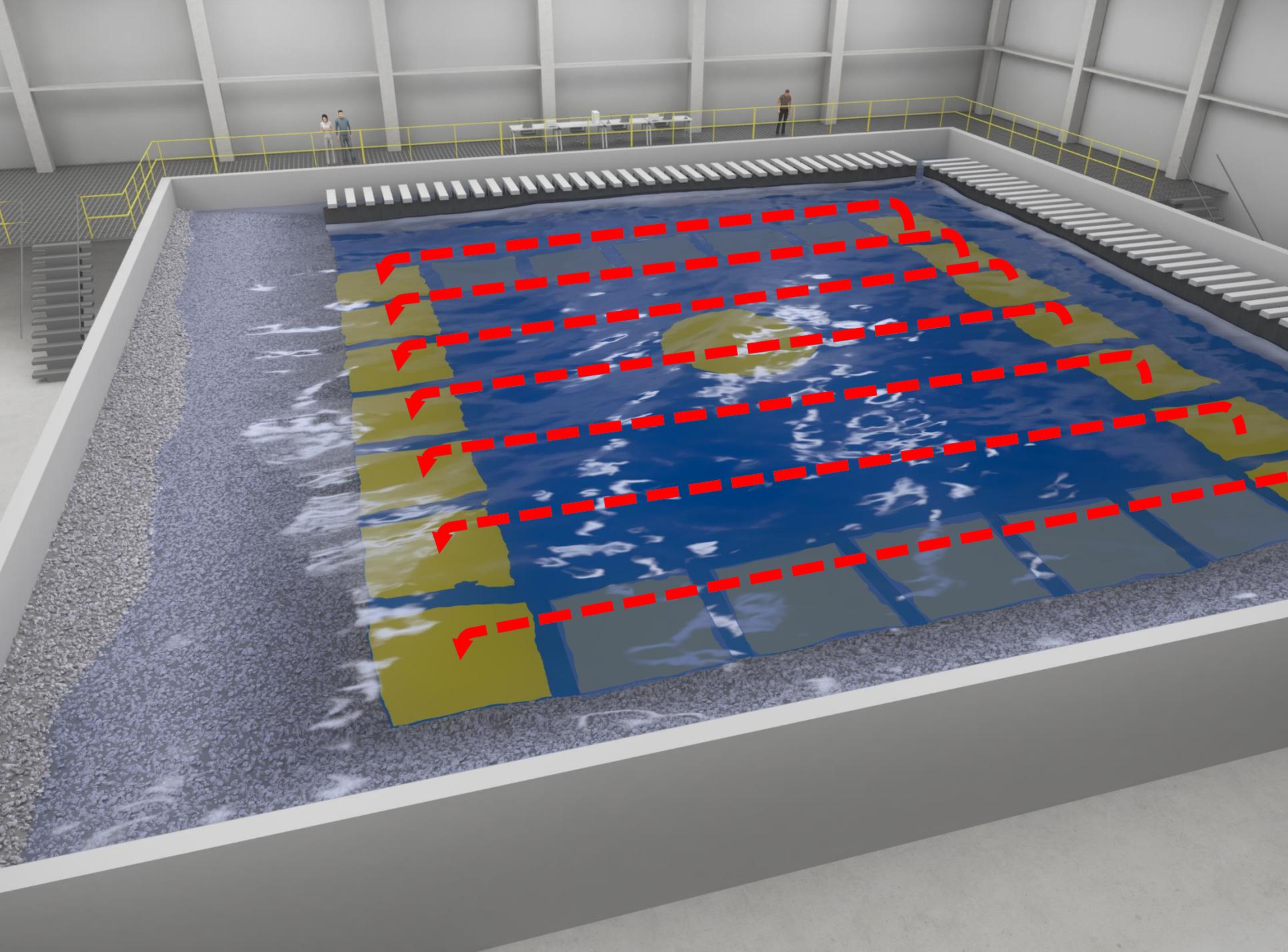
Coastal and Ocean Basin – COB, Oostende

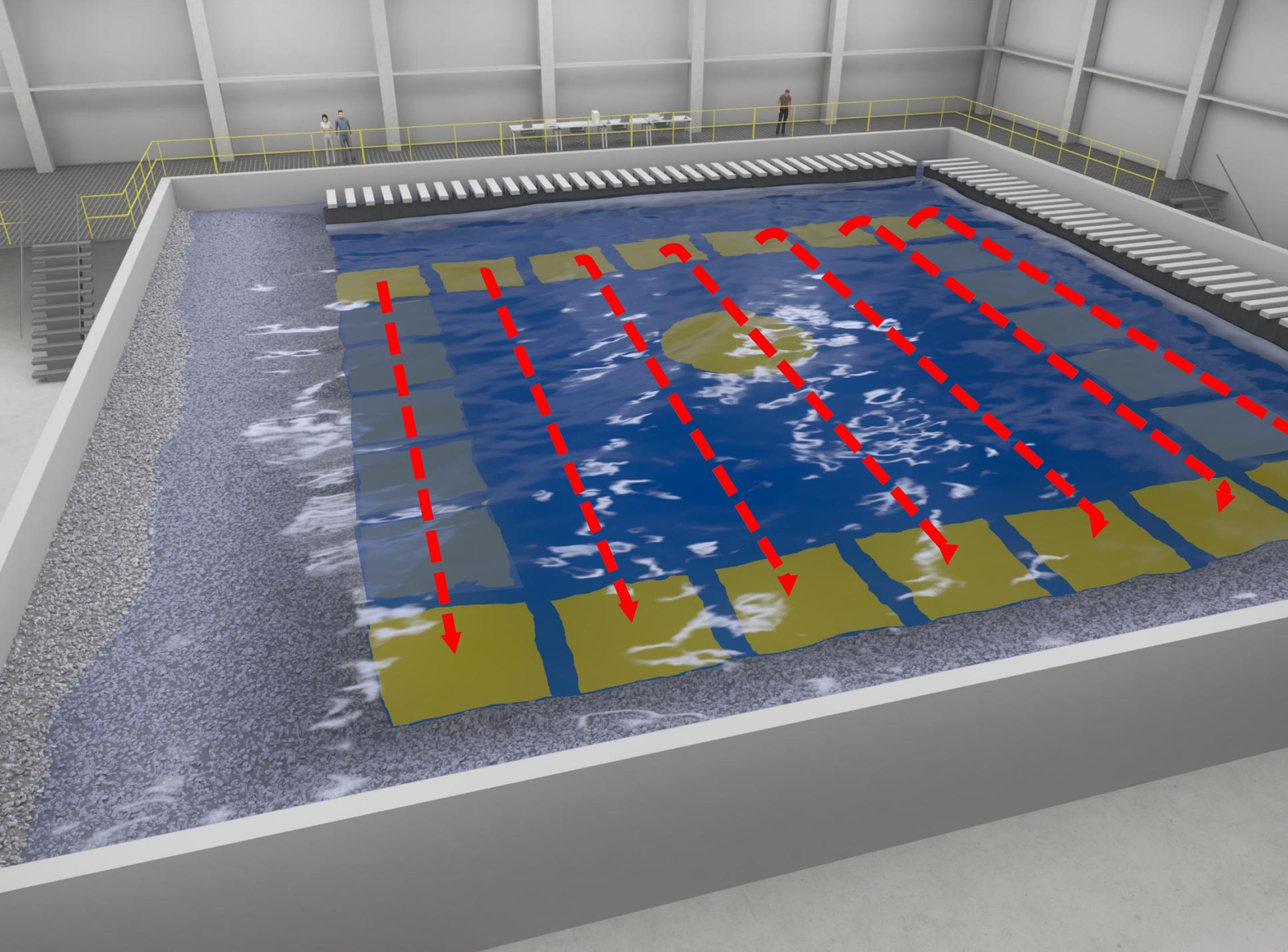


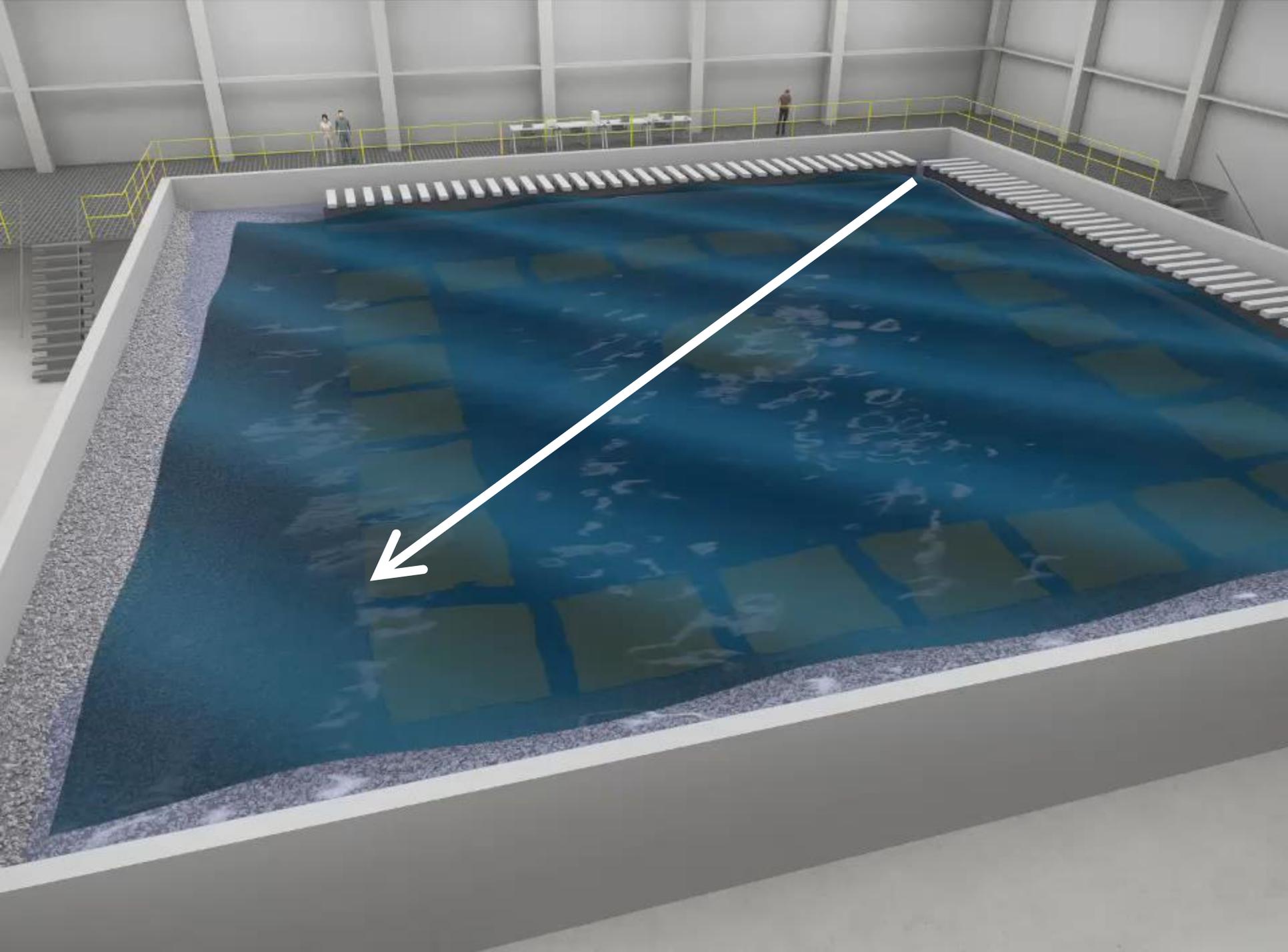
COB competitive strengths:

- variable **water depth** (0.4 – 1.4 m)
- modular multi-directional **wave generator** in L lay-out ($H_{\max} = 0.55$ m)
- **currents** up to 0.4 m/s
- **wave-current** interaction in any direction
- **wind** up to 15 m/s in 2 x 2 m flow section
- exceptional quality **velocity profile** (< 10%) based on numerically design of inlet grid vanes









project integration on various scales

- **research roadmaps** defined by research groups (PhDs)
- studies defined by FHR supporting **the governmental policy**
- availability of COB for **commercial usage by companies**
- integration in the “**Blue Growth@UGent**” strategy
 - *Ghent University clusters its ongoing marine and maritime research and valorization activities under the Blue Growth umbrella coupling this to its Campus in Ostend.*
- integration in the action plan of the province of West-Flanders, **Factory of the Future “Blue Energy”**
 - *supporting developments in the blue energy field to satisfy the demands from the academic sector and private companies developing coastal and offshore technology.*
- integration on the “**EU research infrastructure**” level
 - *The new Coastal and Ocean Basin (COB) is included in the HORIZON2020 Marinerg-i (www.marinerg-i.eu) project for the development of an integrated European distributed test infrastructure to accelerate research & development for offshore renewable energy.*



actual status of the COB

24 May 2018



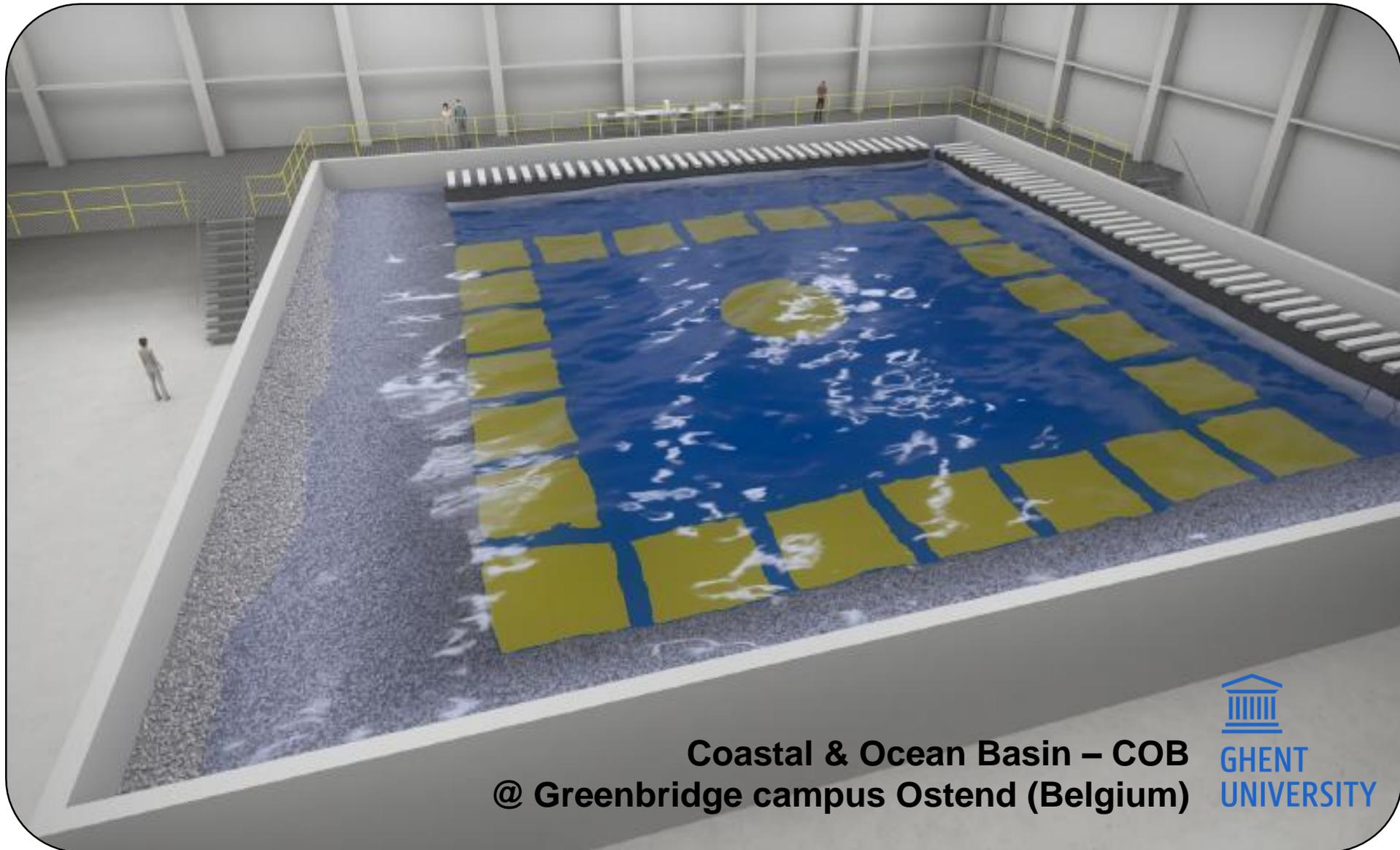
actual status of the COB



conclusions

- **Coastal & Ocean Basin – COB** is under construction in Ostend, Belgium
- **consortium** composed of Ghent University, KU Leuven and Flanders Hydraulics Laboratory
- **wide range of applications**, from ocean energy to coastal and ocean engineering
- COB competitive **strengths**:
 - variable **water depth** (0.4 – 1.4 m)
 - modular **wavemaker** in L lay-out
 - **currents** up to 0.4 m/s (for 1 m water depth)
 - wave-current interaction **in any direction**
 - excellent quality **velocity profile** (< 10%)
- **operational** from end 2019 onwards

thank you for your attention



**Coastal & Ocean Basin – COB
@ Greenbridge campus Ostend (Belgium)**