Ocean Energy Research at TU Delft

Henk Polinder
Associate Professor Electric Drive Systems
Chair Ocean Energy Platform TU Delft

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Ocean Energy Platform TU Delft

- Started 2015
- Brings people from different faculties working on Ocean Energy together, interdisciplinary
  - 3mE, CiTG, TPM, LR, EWI
- So that we can collaborate on
  - research
  - obtaining funding
  - education

http://oceanenergy.tudelft.nl/

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Why the Ocean Energy Platform?

- Oceans cover 70% of the Earth's surface and are a vast renewable energy resource
- Oceans are still relatively unexplored
- TU Delft is renowned in Water and Offshore Energy research (2nd position globally in Offshore Wind)
- TU Delft can build on an extensive network of knowledge partners and industry in the Water and Offshore field

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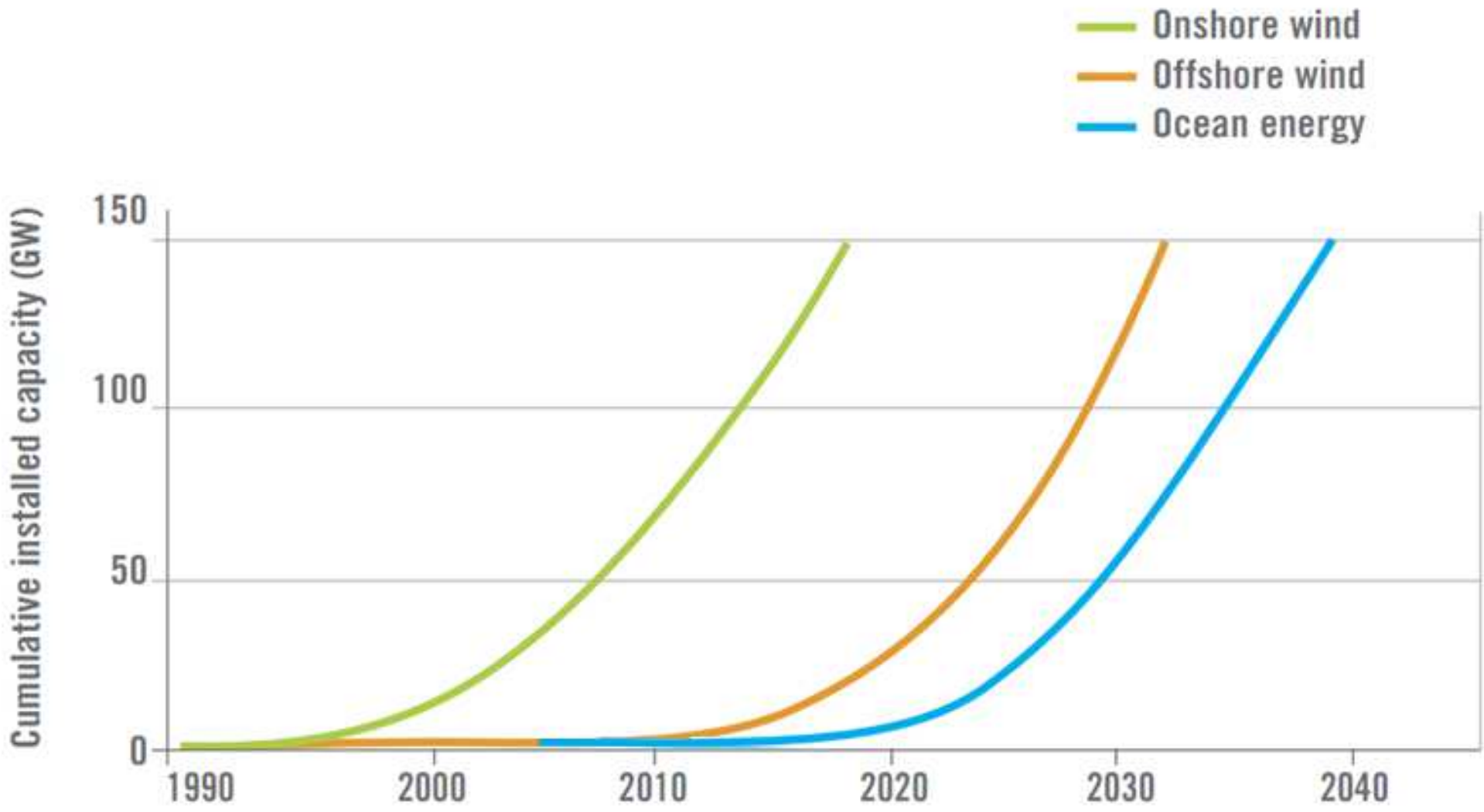
Ocean Energy projected growth



** Source: European Ocean Energy Association*

Ocean Energy Platform Board

Henk Polinder

Wave Energy

Chairman

Berend Jan Kleute

Thermal Gradient

(OTEC)

Antonio Larquin Laguna

Tidal/Current Energy

Peter Mooij

Aquatic Biomass

Kornelis Blok

Professor

Axelle Vire

Floating Wind Turbines

Lily Li

Senior Project Manager

DEI

Sukanya Prabhudesai

Energy Club

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http://oceanenergy.tudelft.nl/

Activities

20 TU Delft lunch lectures up to now:

- On average +60 people attend
- +200 online views via collegerama
- Speakers are researchers and industry experts, e.g. Tocardo, NIOZ, SBM Offshore, Marin and Deltares

Presentations at Ocean Energy events like:

- Presentation at Offshore Energy conference
- Top sector Water & Energy events
- TNO Aruba event with PM Aruba Mike Eman

Participation in Networks

- Part of the EERA Ocean Energy Joint Programme
- Ocean Energy Europe

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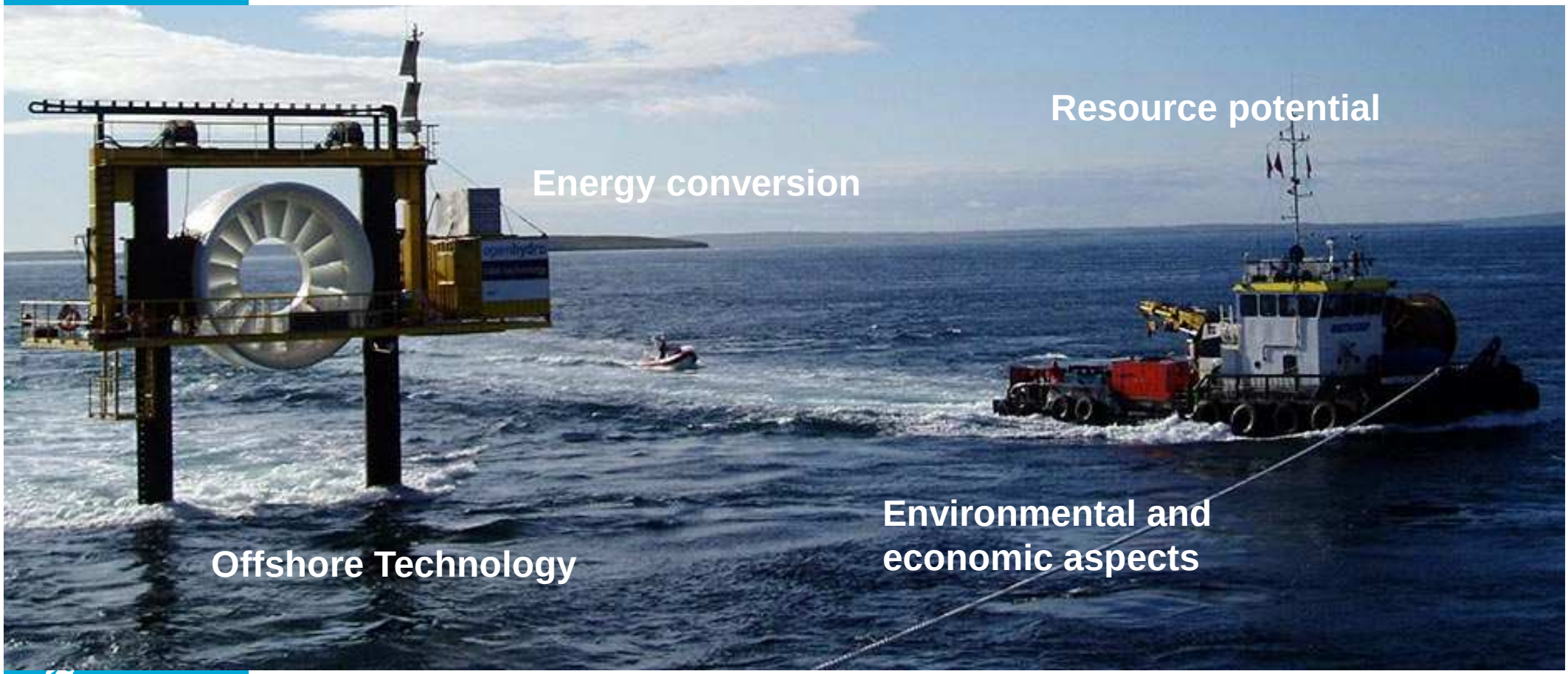
Course Introduction to Ocean Energy Technologies

- Gives an overview of the different technologies and the status of current development



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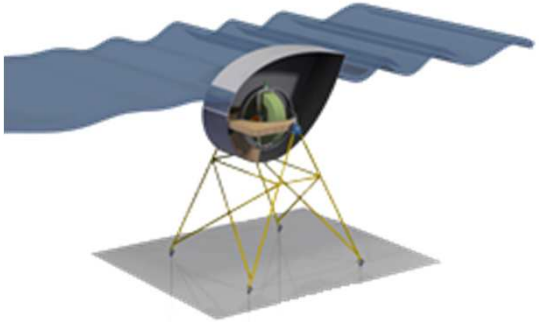
Different forms of Ocean Energy

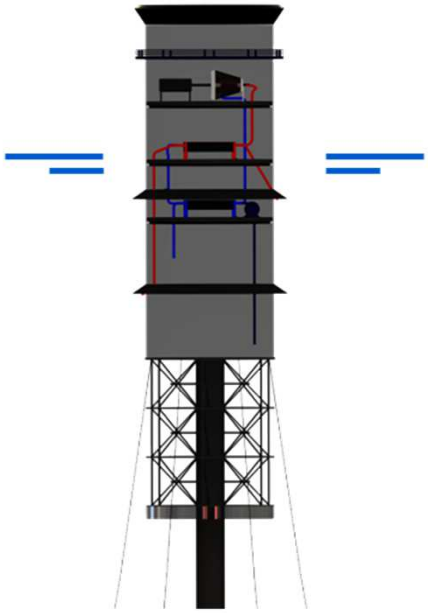
Tidal / current

Wave

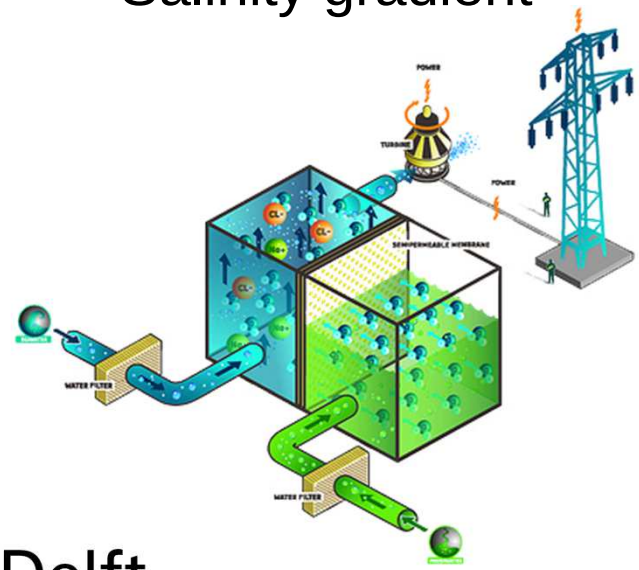


Aquatic biomass

OTEC



Salinity gradient



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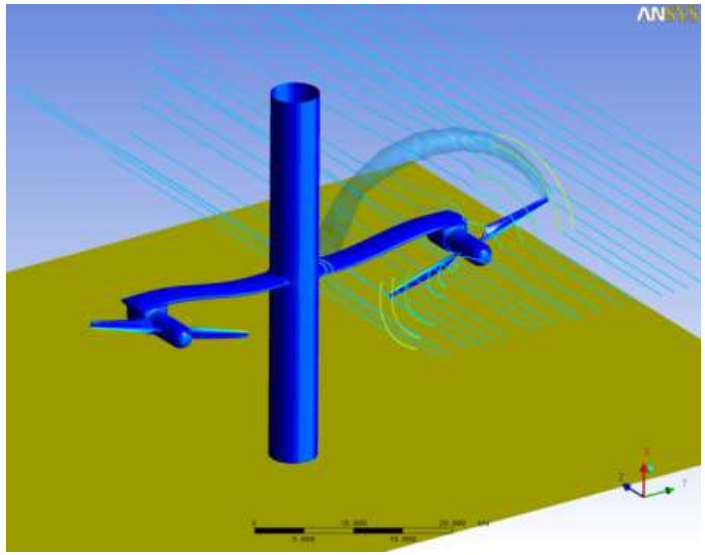
Research challenges ocean energy

- **Resource**
  - Assessment
  - Characterisation
- **Devices and technology**
  - Primary conversion
  - Power take off systems
  - Control
  - Support structures
- **Deployment and operations**
  - How to increase the reliability?
  - Farm array aspects
- **Energy system integration**
- **Environmental impact**



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Investigating flow interaction at storm surge barriers with tidal turbines

tidal stream turbines

ecosystem response

PhD Merel Verbeek (M.C.Verbeek@TUDelft.nl)

Physical models and numerical tools

Evaluate effects close by and far away

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Tocardo, Witteveen + Bos BV, Svasek Hydraulics BV, Province of Zeeland

Tidal power take off with Nova Innovation (EU H2020 funding)

- PhD at TUDelft: Faisal Wani (F.M.Wani@tudelft.nl)
- Nova Innovation, SKF, Siemens, Wood Group, the University of Edinburgh, RWTH Aachen University, TUDelft

TiPA

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SBM Offshore EAP WEC Concept

- Fully flexible tube filled with water, closed at both ends
- Energy conversion system = Electro-Active Polymers
- Employee of SBM Offshore does a PhD: Rick van Kessel, (C.L.vanKessel@tudelft.nl)

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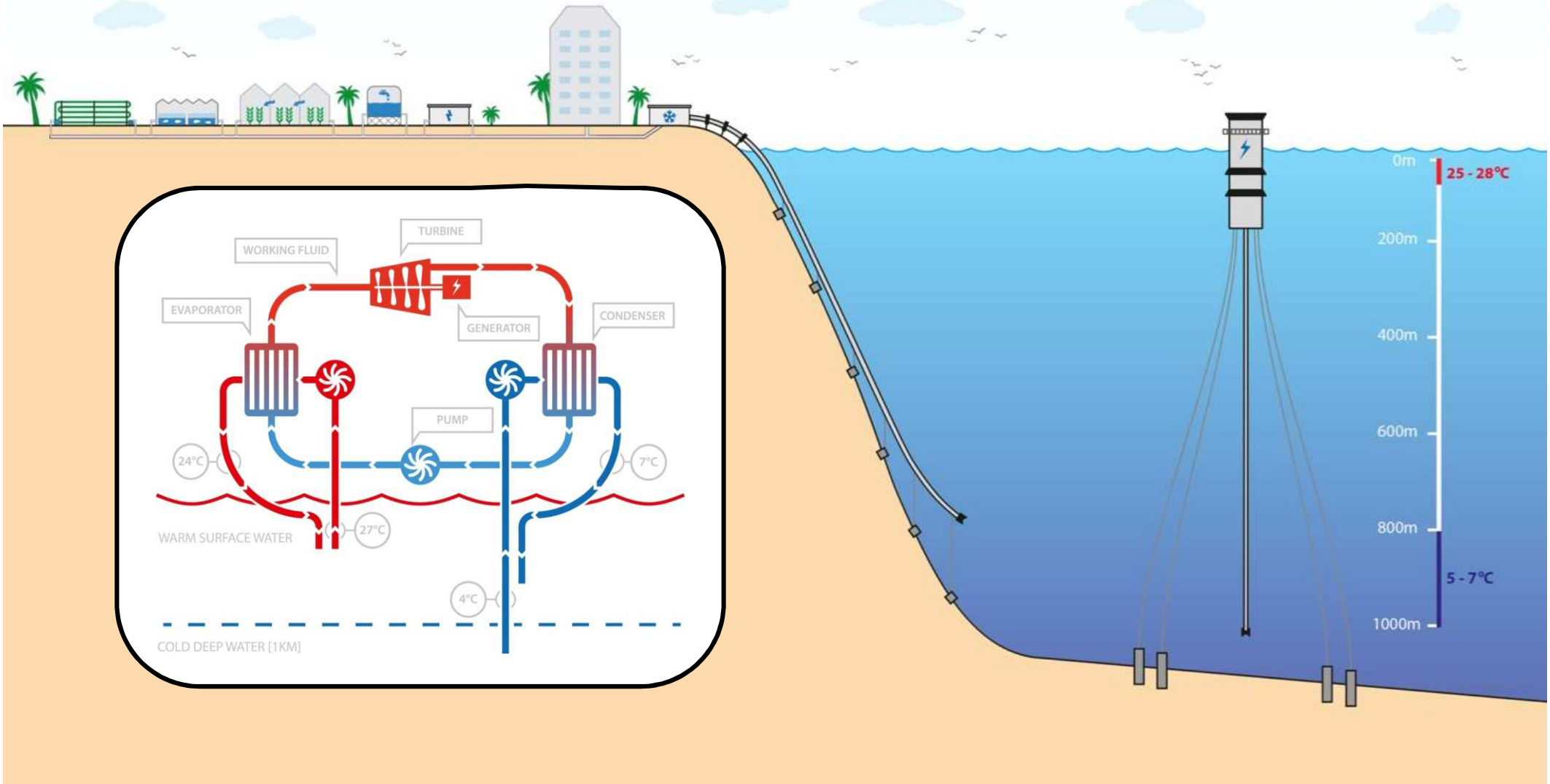
Ocean Thermal Energy: baseload

- PhD project heat exchangers Xuan Tao (X.Tao@tudelft.nl)
- OTEC prototype testing by Bluerise at Process & Energy
- Bluerise is a YES!Delft company



Aquatic biomass

- PhD thesis Peter Mooij, On the use of selective environments in microalgal cultivation, 2016
- Microalgae -> lipids -> biodiesel
- Microalgae cultivation takes place at small scale.
- Currently only economically interesting for high-value products
- Source for fuels for transportation

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Ocean Energy Research at TU Delft

- Wind and solar have become successful after decades of research and development
- Ocean Energy needs more research and development to become successful

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