

# OPEC – Structural Engineering What is Realistic?



# Engineering Challenges

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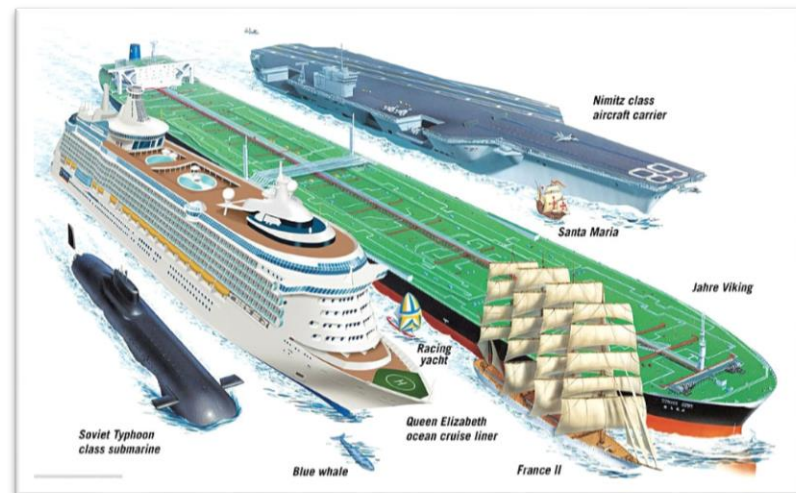
- Structural strength
  - Survival and operational loads (Wind, wave, current forces)
  - Deck load and buoyancy forces
- Stability
  - 3 degrees rotation for typical wind turbine.
  - Mooring forces and equipment
- Durability
  - Operation requirements, fatigue susceptibility
- Buildability
  - Shipyard size and installation vessels





# Initial Design Criteria

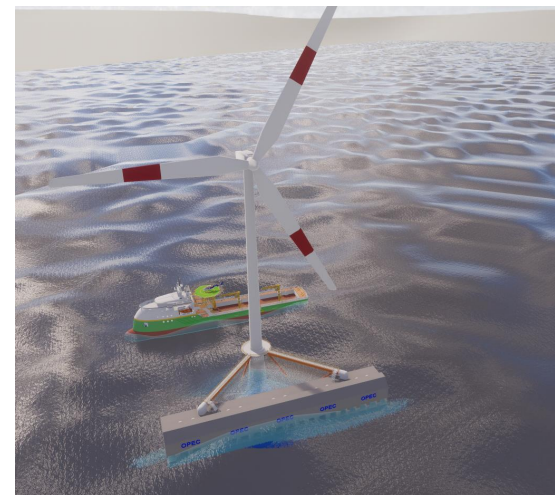
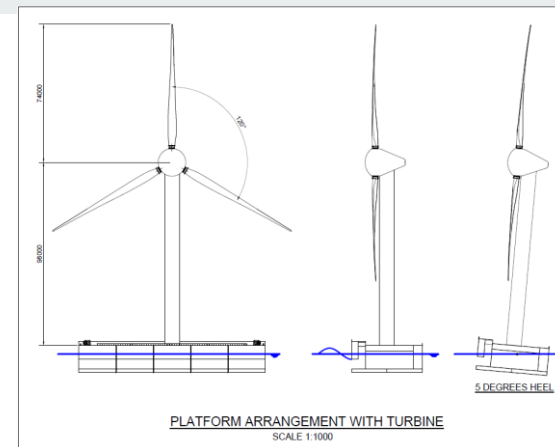
- Multiple Wind Turbines versus Single Large turbine
  - Losses associated with multiple turbines are unattractive. 450m width required for 3 Turbines
- Wave Power Generation
  - 100m of wave frontage to generate sizable power output.
  - Draft requirement to capture wave energy
- Aquaculture
  - >100,000 m<sup>3</sup> to hold 3000te salmon or 1000te Abalone





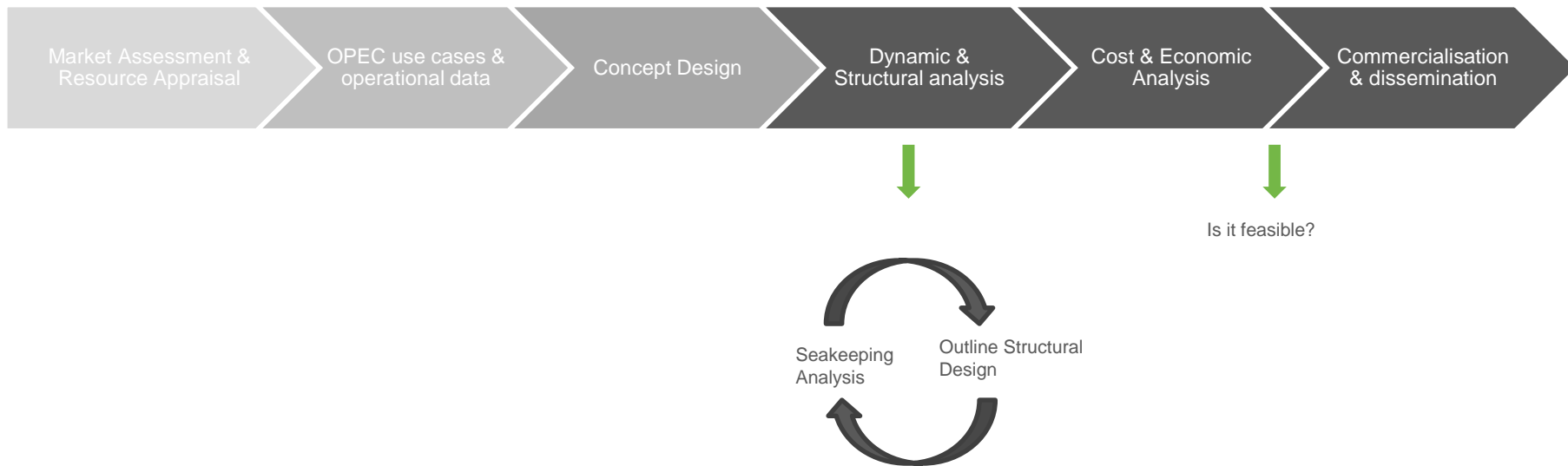
# Initial Design Criteria

- Breakwater Platform
  - Large, stable, wave energy compatible,.
  - Prohibitively expensive due to required depth of wave device
- Steel Truss Framed Structure
  - Difficult to incorporate a sufficient wave energy frontage
  - Can be optimised for Wind with a volume for aquaculture
- Hybrid
  - >100,000 m<sup>3</sup> to hold 3000te salmon or 1000te Abalone

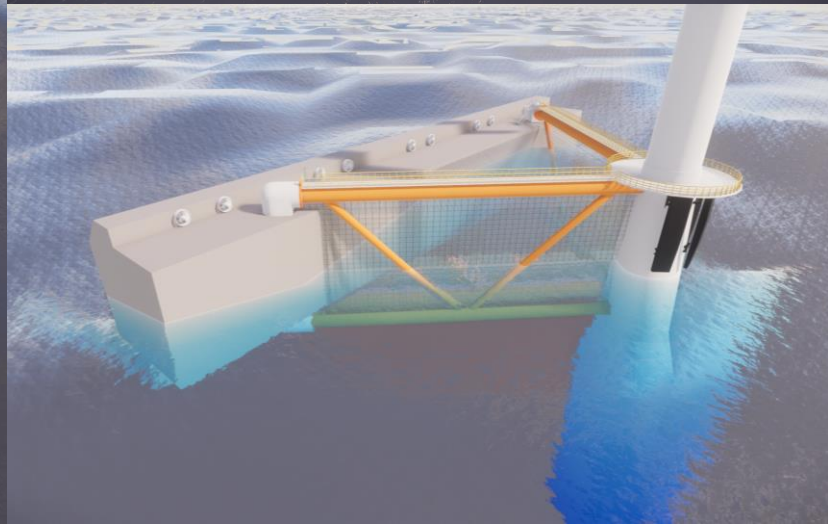
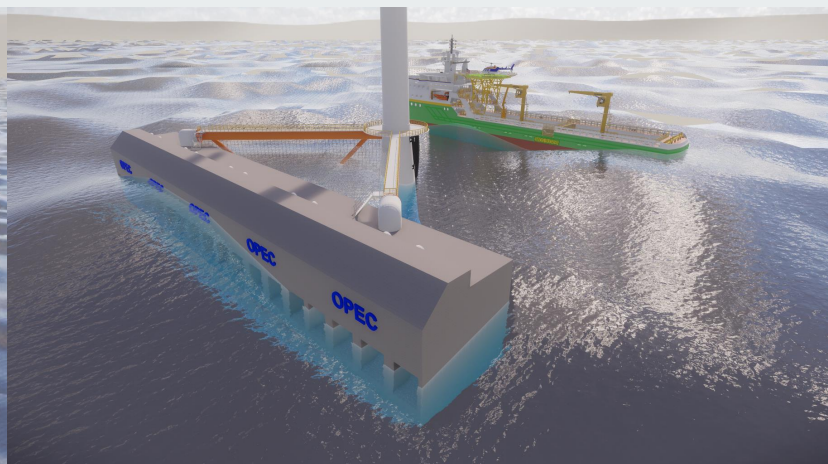
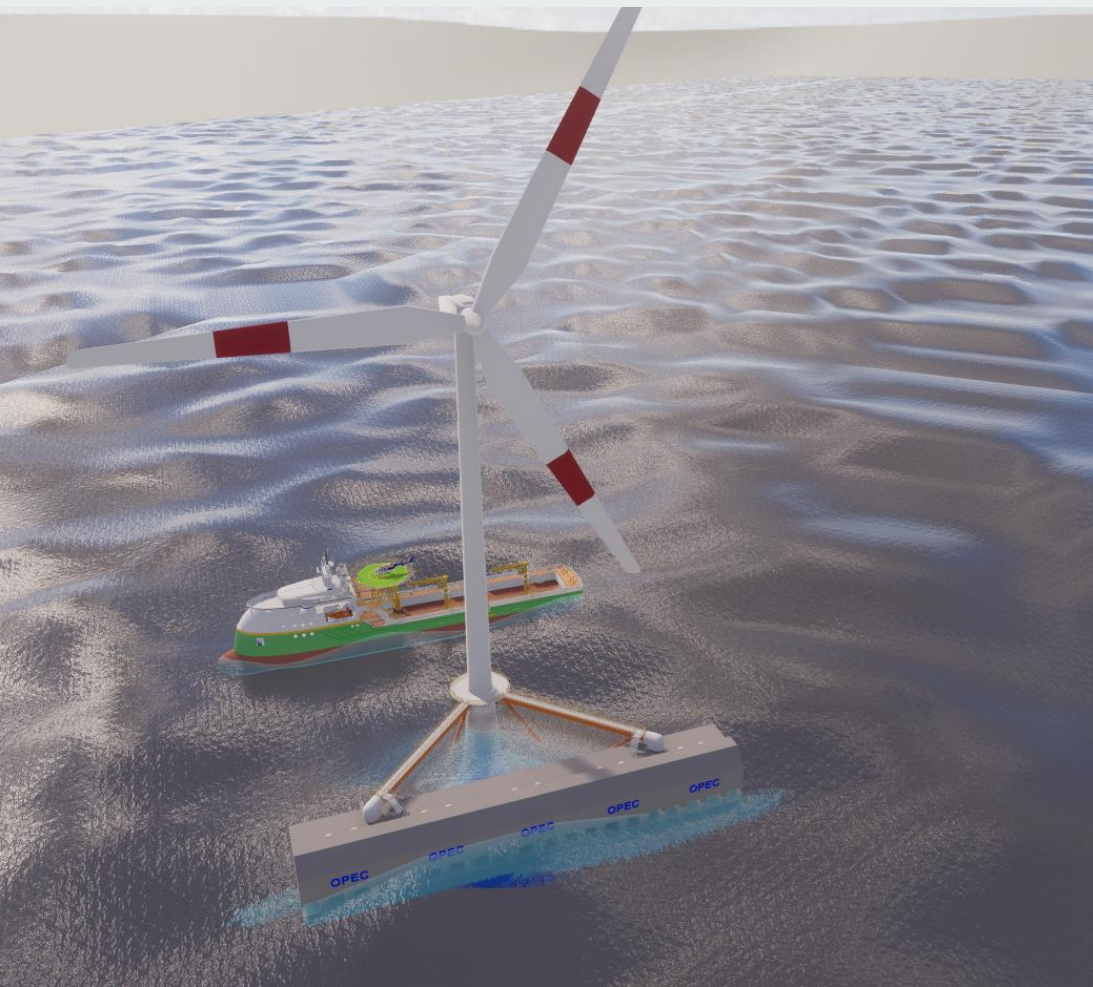




# What does the future hold?











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