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DEGLI STUDI  
DI PADOVA

# **“Floating Offshore Wind: opportunities and challenges of the Italian energy framework”**

Presenter:

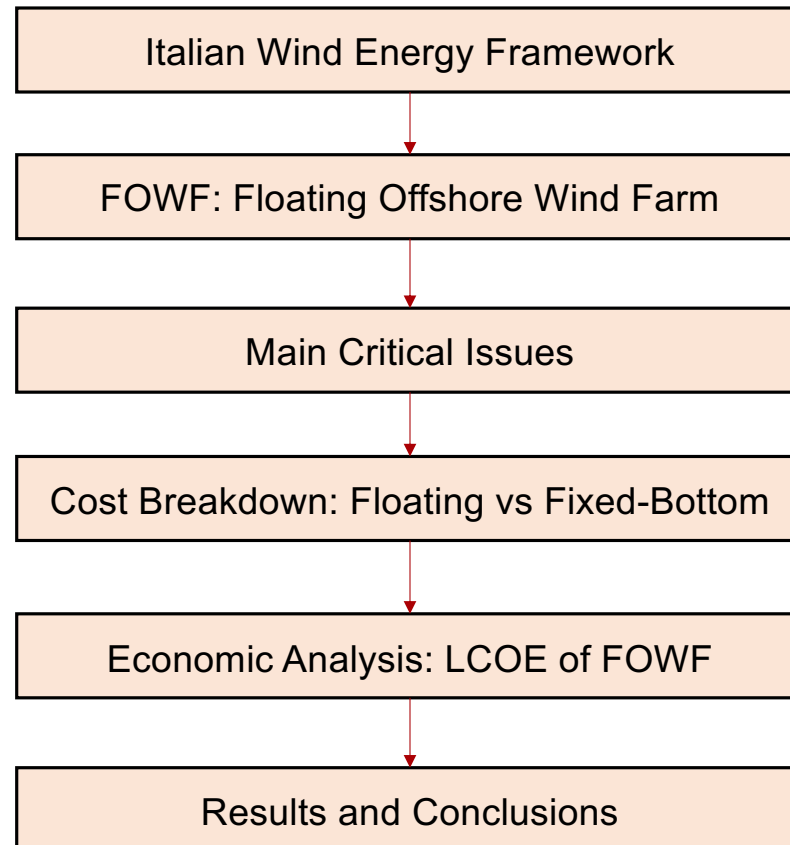
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Research Supervisors:

*Arturo Lorenzoni – Professor, University of Padua*



# Agenda

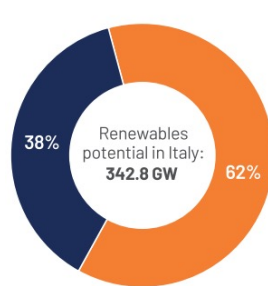




# Italian Wind Energy Framework

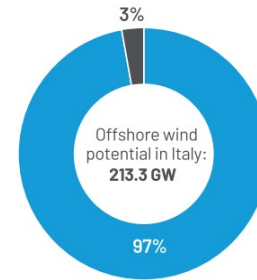
Renewables potential in Italy:

- ☐ 38% onshore
- ☐ **62 % offshore**



Offshore Onshore

Source: Ambrosetti Report



Floating offshore wind Fixed bottom offshore wind

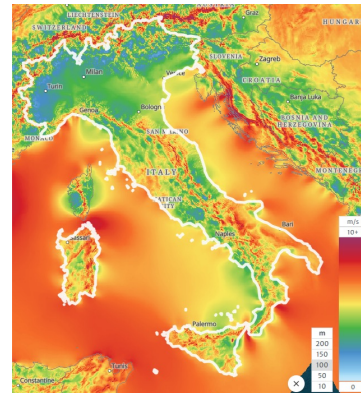
Source: Ambrosetti Report

Offshore Wind Potential in Italy:

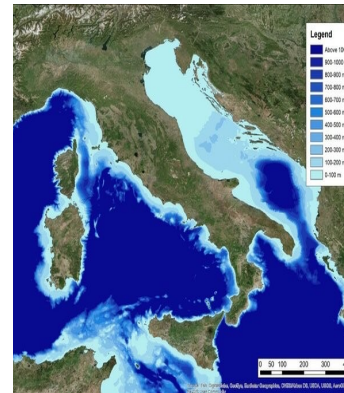
- ☐ 3% Fixed-Bottom technology
- ☐ **97% Floating technology**

Wind speed:

Higher and more constant  
off the coast



Source: Wind Atlas



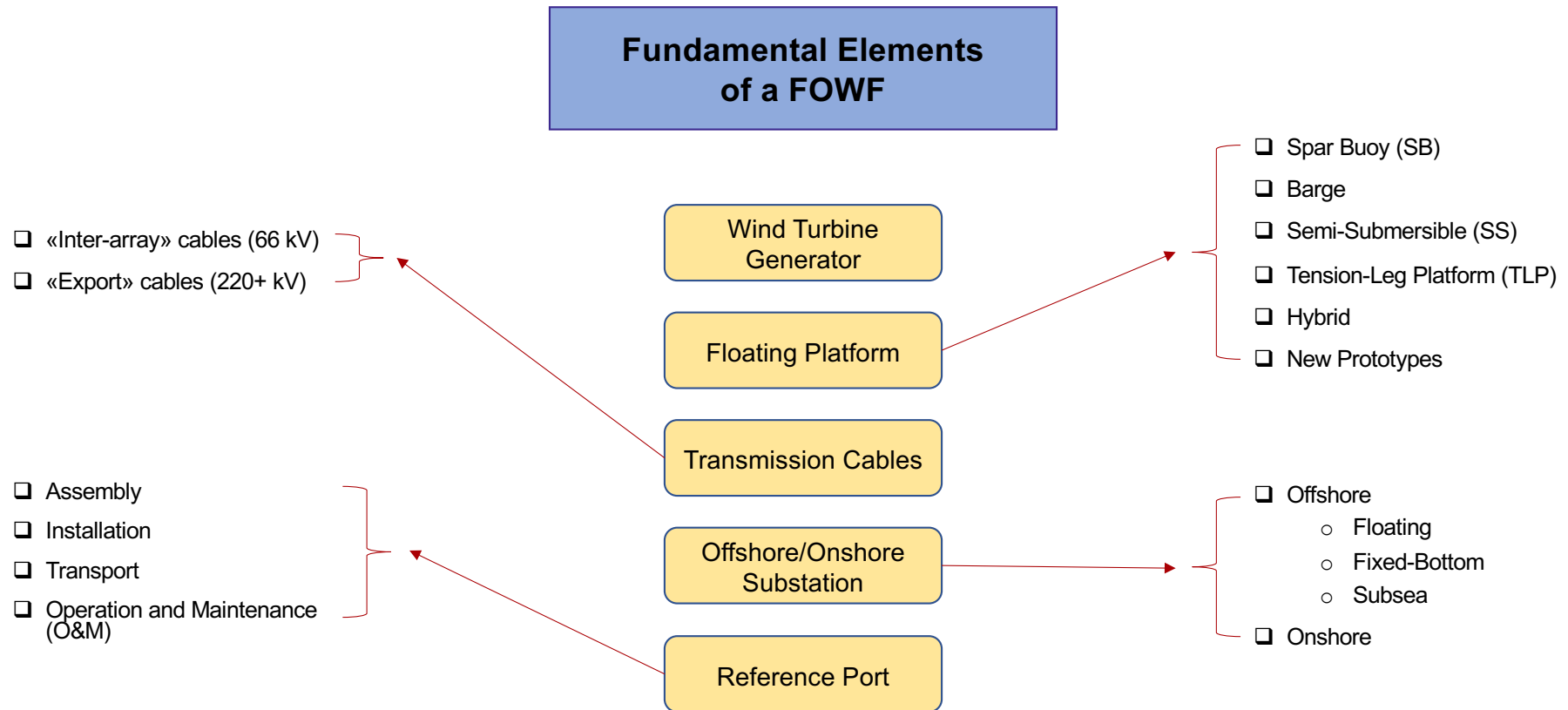
Source: Wind Atlas

Bathymetry:

Thousands of meters of  
water depth

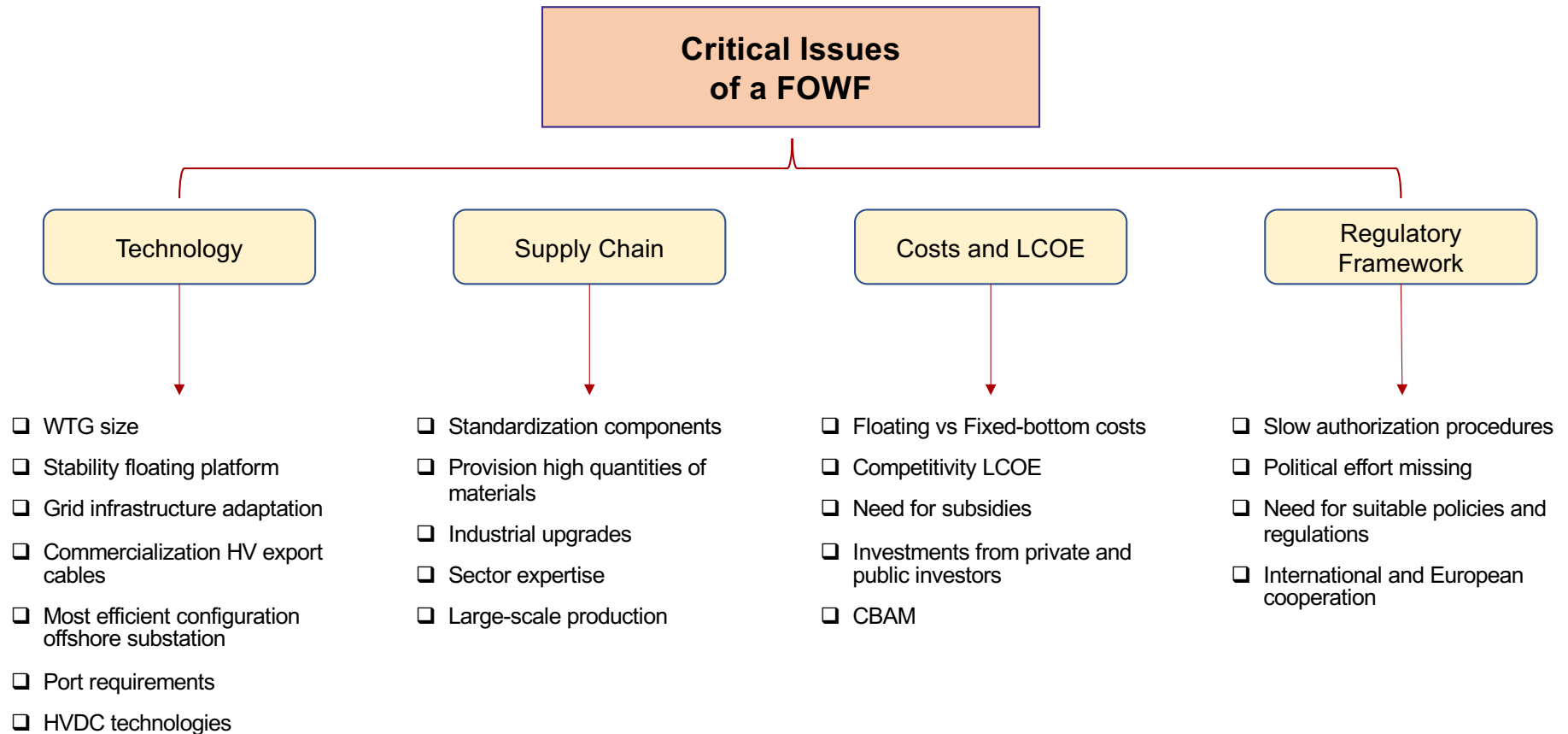


# FOWF: Floating Offshore Wind Farm





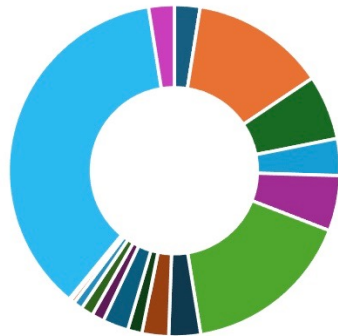
# Main Critical Issues





# Cost Breakdown: Floating vs Bottom-Fixed

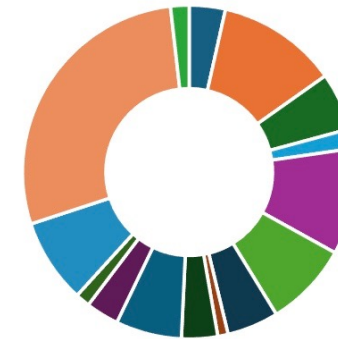
Offshore Floating Wind Farm



Source: Guide to a Floating  
Offshore Wind Farm  
by ORE Catapult

- Development and Project Management
- Turbine nacelle
- Turbine rotor
- Turbine tower
- Cables
- Floating substructure
- Mooring system
- Offshore substation
- Onshore substation
- Cable installation
- Mooring and anchoring pre-installation
- Foundation - Turbine assembly
- Foundation - Turbine installation
- Offshore substation installation
- Other installation
- Operation and maintenance
- Decommissioning

Offshore Fixed-Bottom Wind Farm



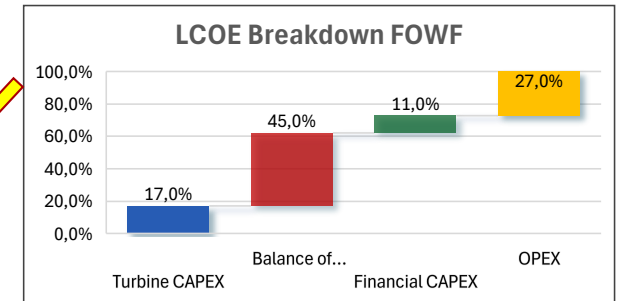
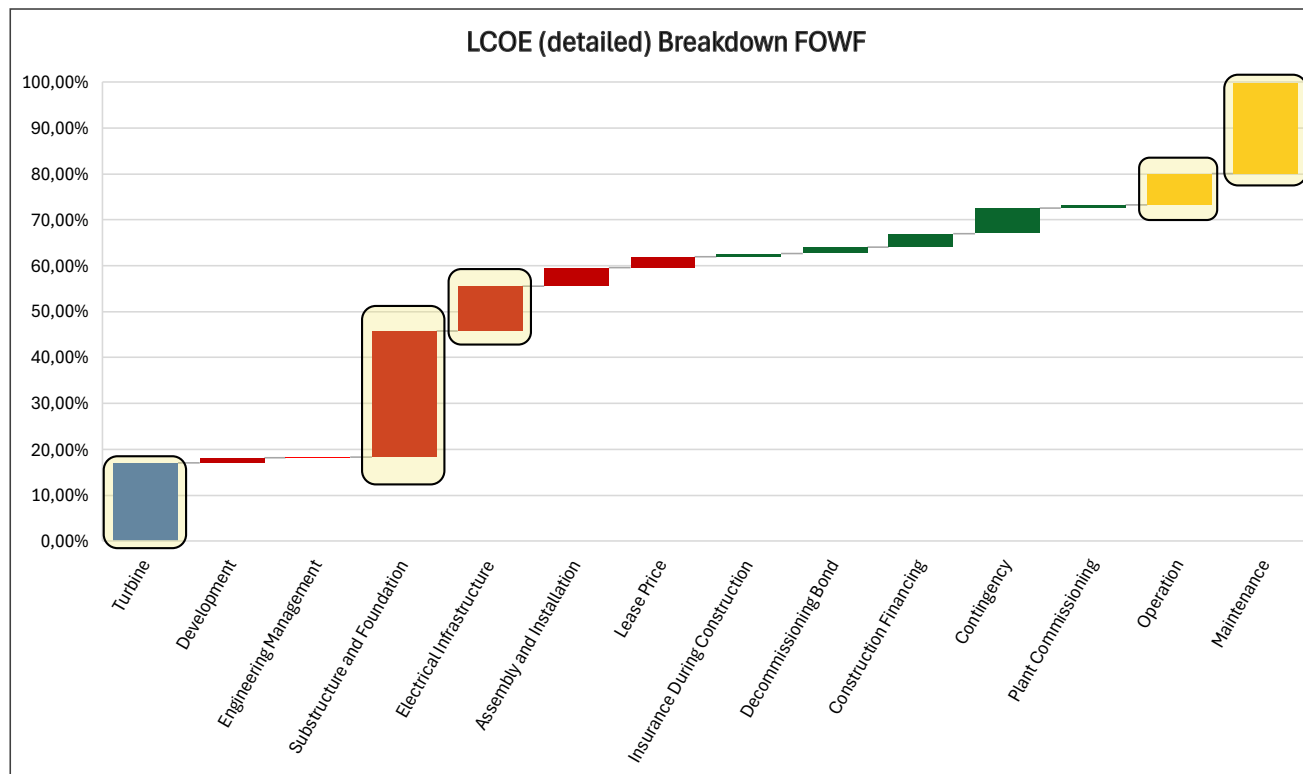
Source: Guide to an Offshore Wind  
Farm by ORE Catapult

- Development and Project Management
- Turbine nacelle
- Turbine rotor
- Turbine tower
- Other turbine
- Turbine foundation
- Cables
- Other balance of plant
- Offshore substation
- Cable installation
- Foundation installation
- Foundation - Turbine installation
- Other installation
- Operation and maintenance
- Decommissioning



# Economic Analysis: LCOE of FOWF (1/2)

LCOE = Levelized Cost Of Electricity



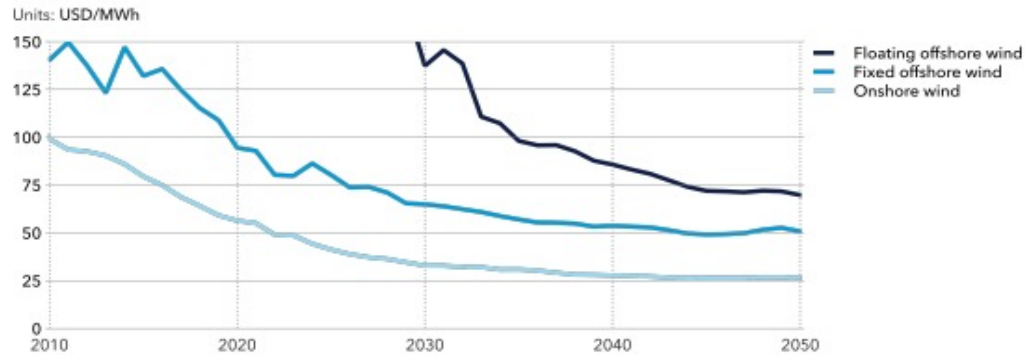
Main elements composing LCOE:

- Substructure and Foundation (27,4%)
- Maintenance (19,8%)
- Turbine (17,1%)
- Electrical Infrastructure (9,8%)
- Operation (6,8%)

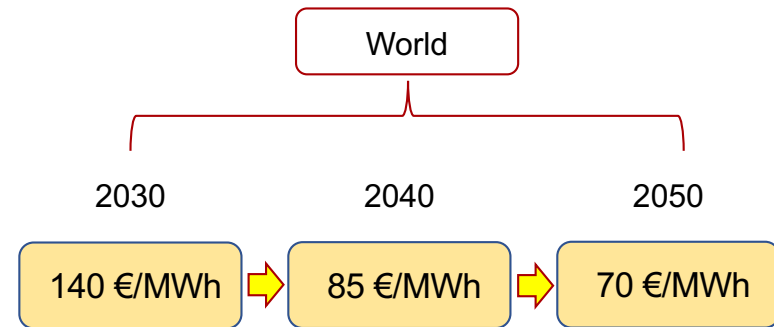


# Economic Analysis: LCOE of FOWF (2/2)

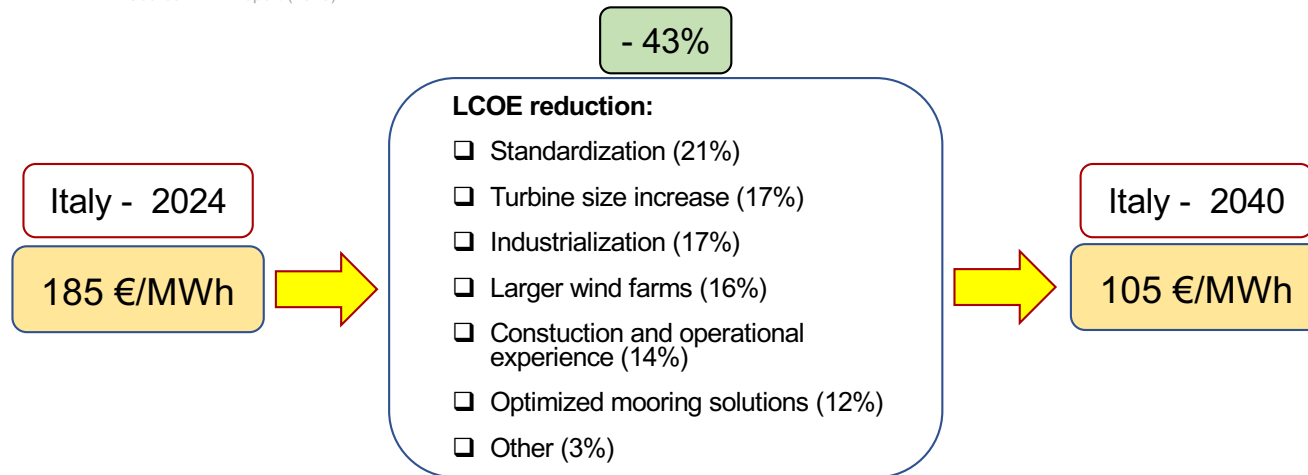
World average levelized cost of wind energy



Source: DNV Report (2023)



Source: Ambrosetti Report

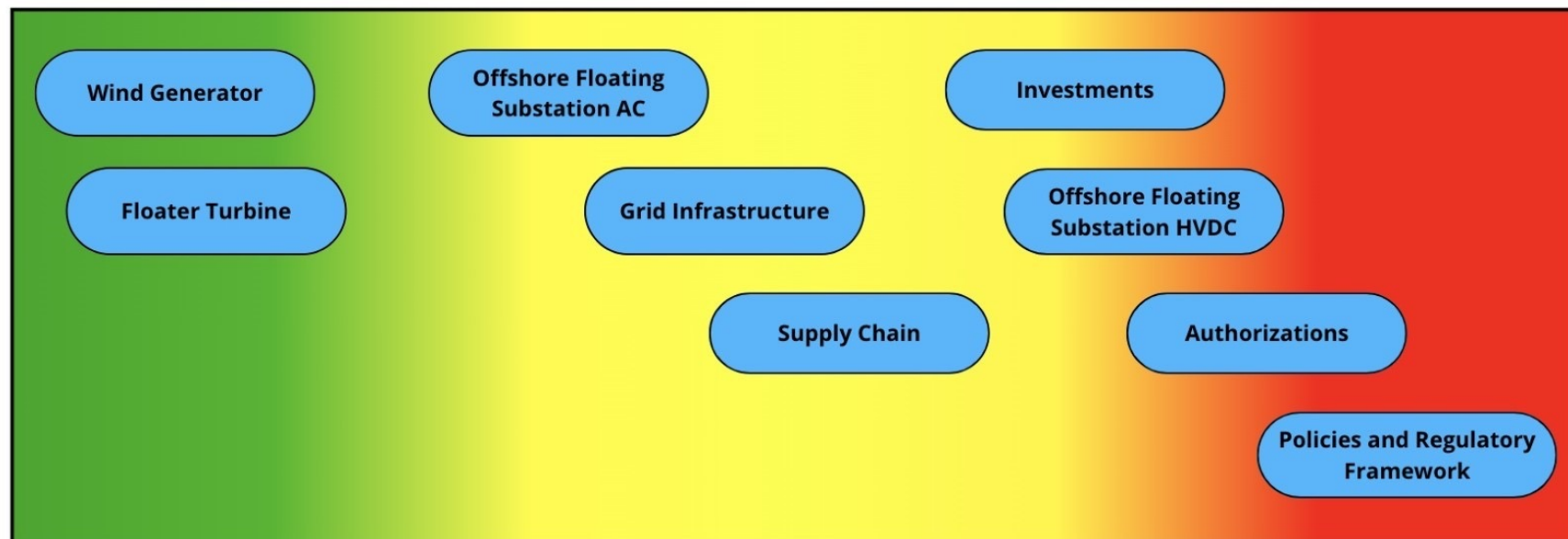






# Results

## 'Traffic Light' of the Technology Readiness Level (TRL) of offshore wind floating generation





## Conclusions

- ❑ Technology: Smallest issue. Almost ready for AC; more efforts needed on DC and grid infrastructure
- ❑ Supply chain: Still at early stage. Waiting for standardization and initial incentives to move to large-scale
- ❑ Economic perspective: Not competitive generation. Need for starting investments and subsidies to lower LCOE
- ❑ Authorization phase: Not yet adequate. Work to accelerate permission procedures
- ❑ Regulatory framework: Far from targets. Need for immediate and effective policies.



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*Thank you for the attention*