Zero emission's port using floating wind turbines

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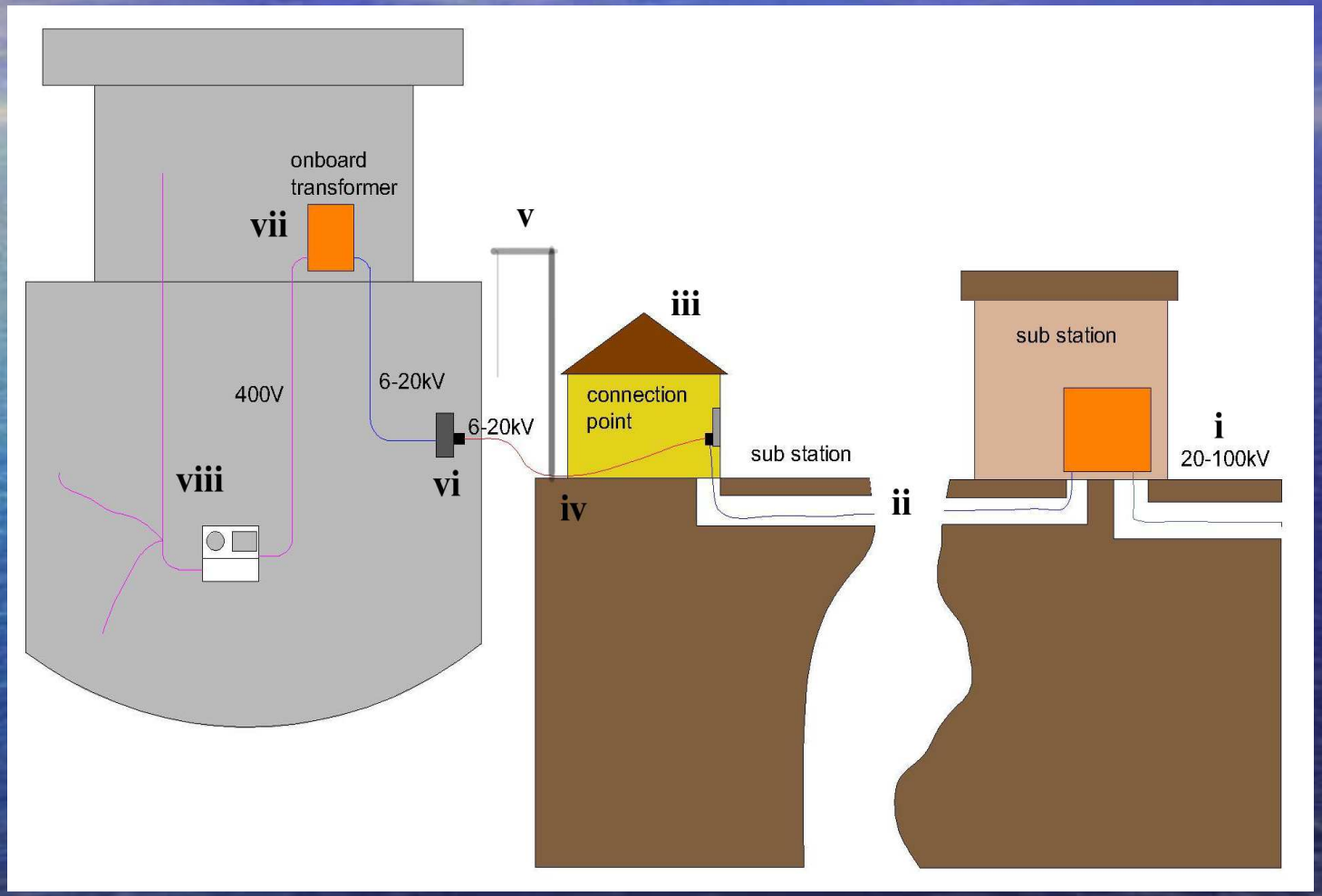
Outlines

- **Introduction**
- Cold ironing systems
- Practical applications
- Use of floating wind turbines
- Conclusions

Introduction

- Cold ironing = connection of all ship's electrical distribution systems with shore's connection during ship's port berthing .
- Traditionally during maintenance periods or in shipyards dry docking.
- New ship's emission control in port rules requiring electrical energy from shore.

General arrangement



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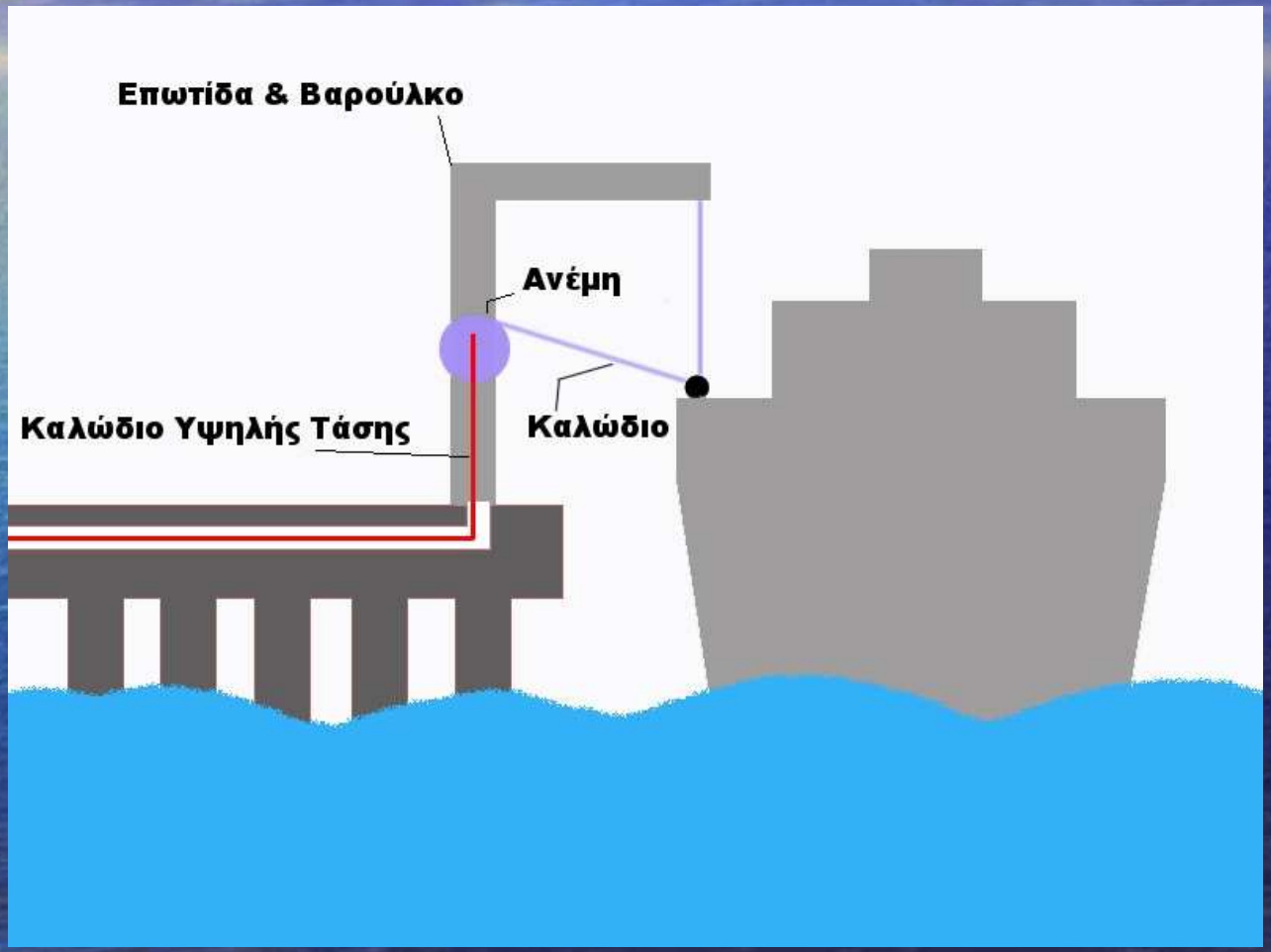
Practical problems

- Frequency
- Voltage (M/V on board)
- Safety during HV cables handling
- Several ship’s types - berthing procedures

Electrical connection 1/2



Electrical connection 2/2

Implementation in International Ports

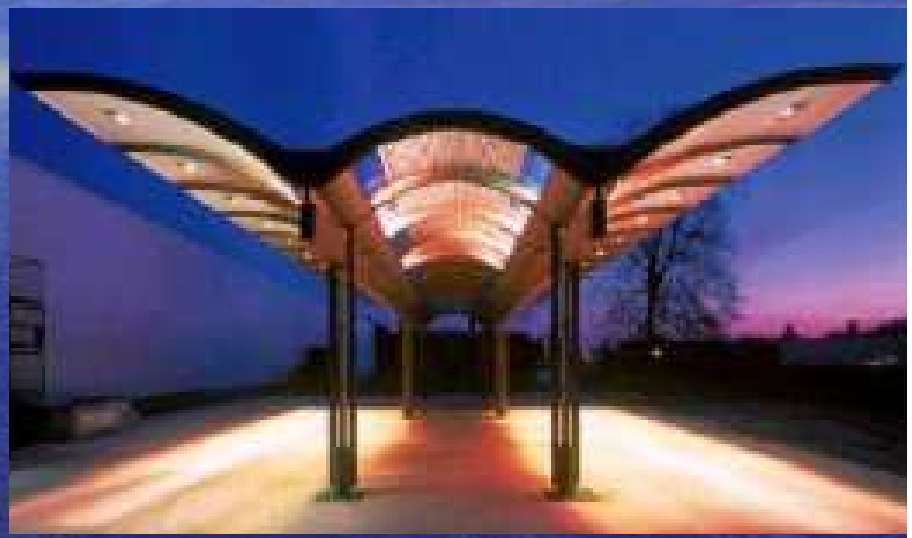
• Göteborg, Lübeck, Zeebrügge,	Ro/ro and/or
• Kotka, Kemi, Oulu	Ferries
• Juneau, Seattle	Cruise
• Antwerp	Container
• Port of Los Angeles	Container
• Port of Long Beach	Container
• San Fransisco, San Diego ...	

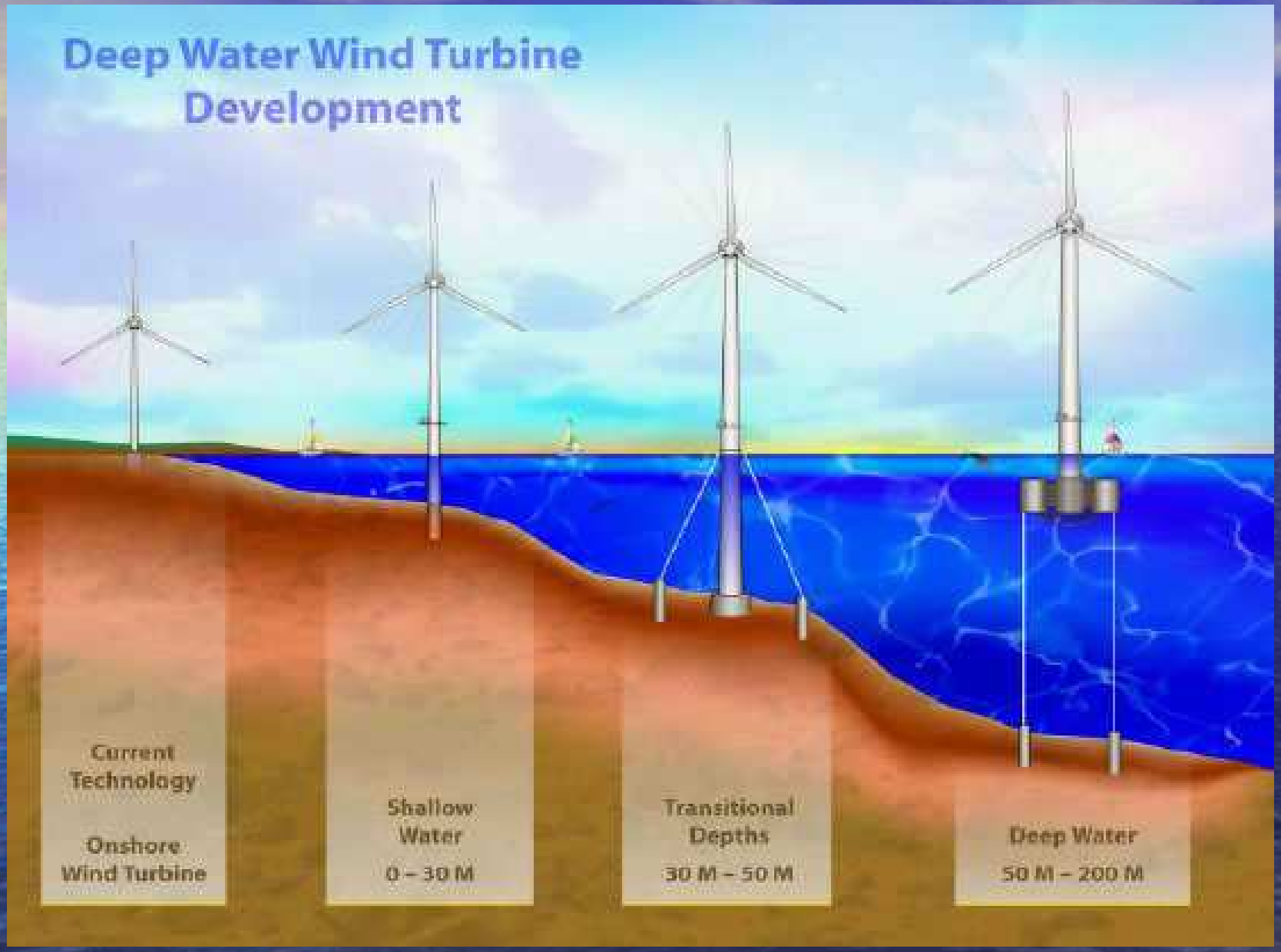
Port of Los Angeles

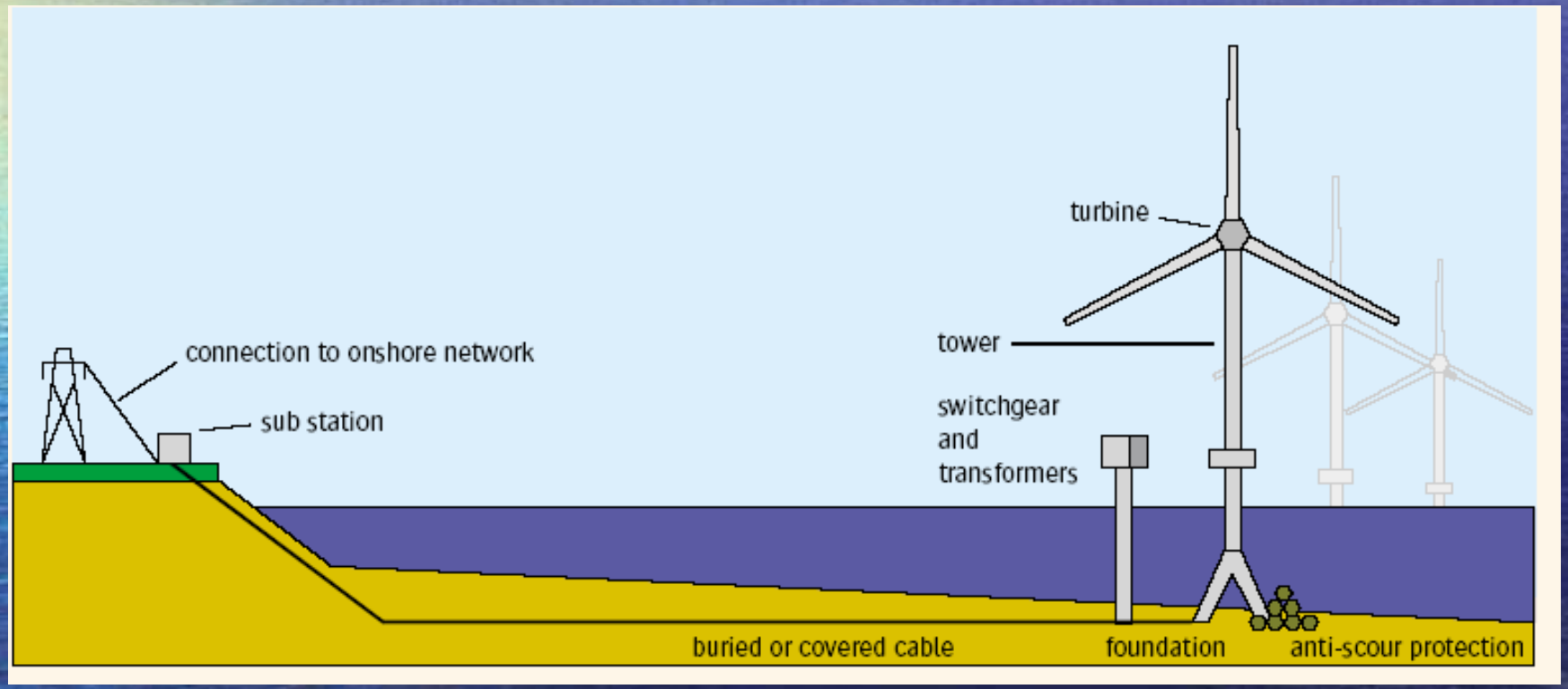
Port of Long Beach

On-board Cable Connection

Proposals

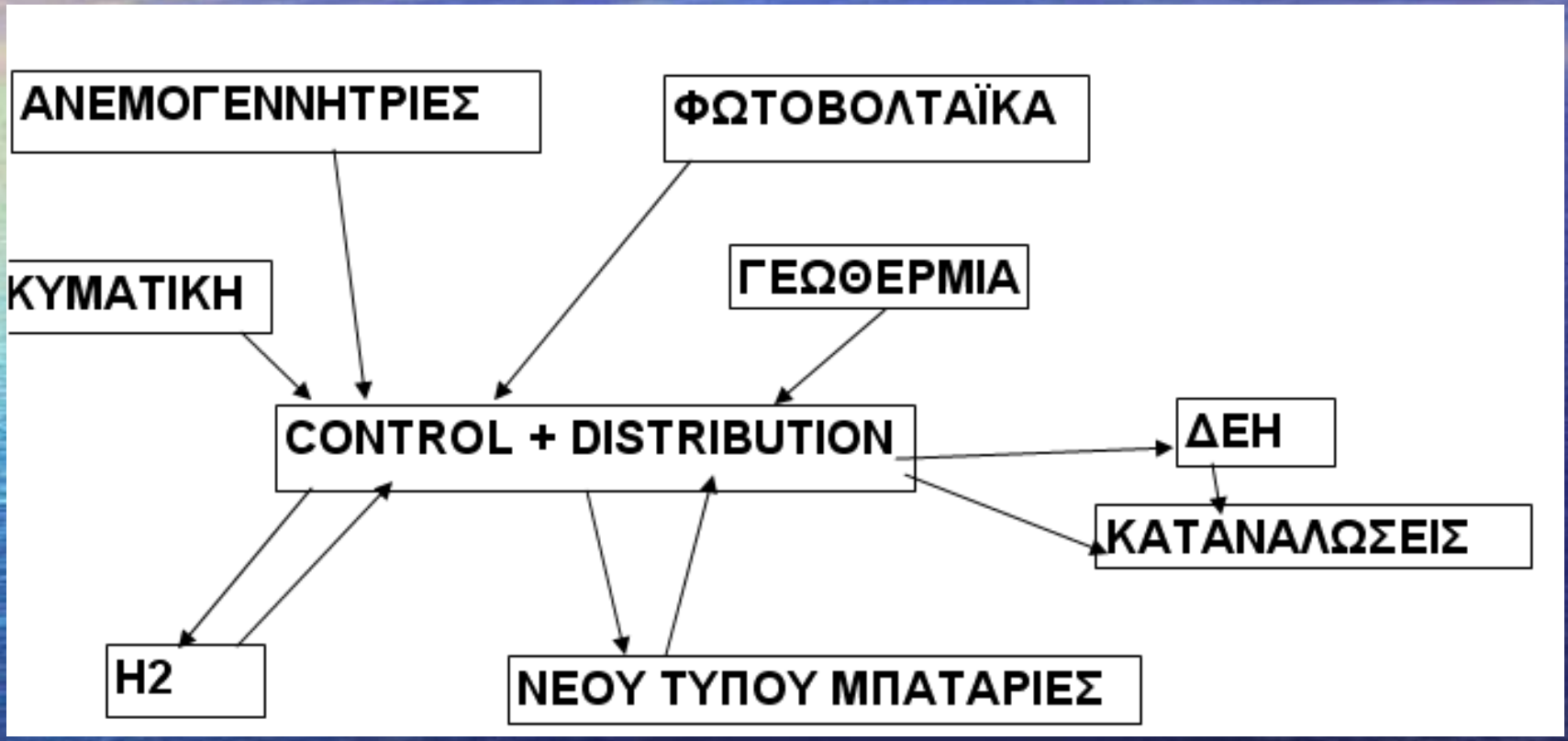



Deep Water Wind Turbine Development
Current Technology
Onshore Wind Turbine
Shallow Water
0 – 30 M
Transitional Depths
30 M – 50 M
Deep Water
50 M – 200 M

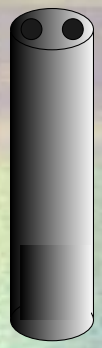

turbine
tower
switchgear
and
transformers
connection to onshore network
sub station
buried or covered cable
foundation
anti-scour protection

ΒΑΣΙΛΗΣ

Smart grid in port

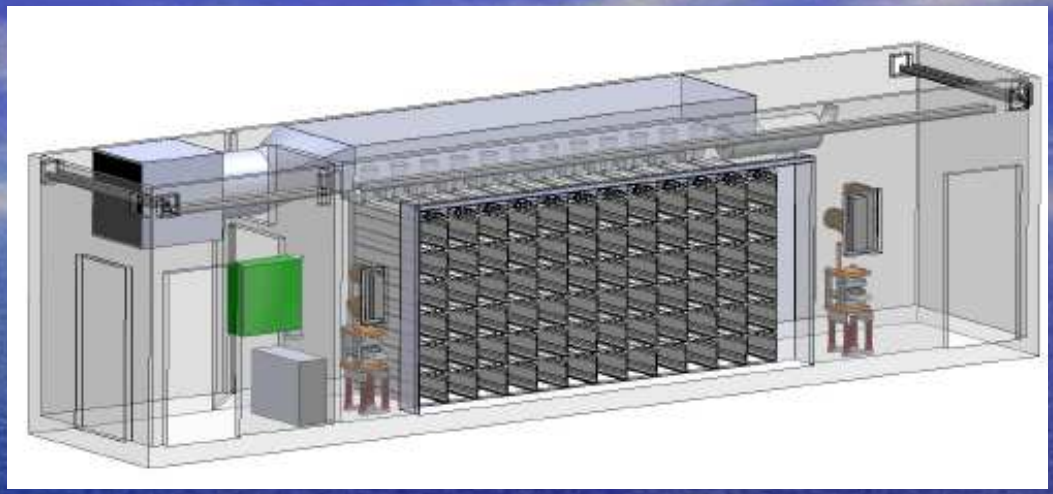


Solutions

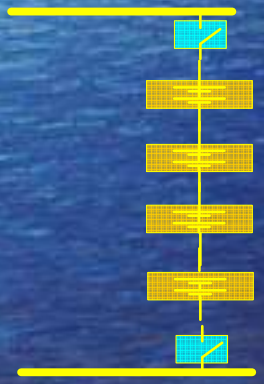


Cell

Module



Room



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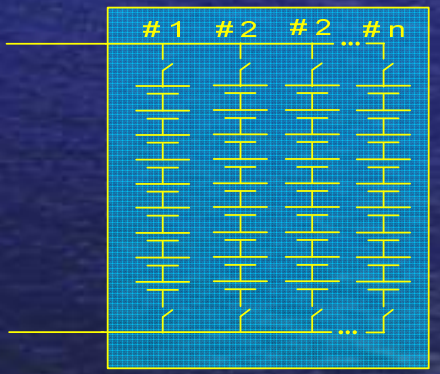

Storage

ABB SVC Light with Energy Storage 5-50MW

Intelligent grid

- Available systems
  - Floating windturbines
  - Photovoltaic s
  - Wave energy
- New batteries
- Control systems
- Load’s control
- Grid’s stability
- RES penetration
- Energy saving

- Examples
  - Ydriada , Green island

ΕΝΕΡΓΕΙΑΚΗ ΑΚΑΔΗΜΙΑ
Wind turbine
Transformer
Control & regula system
Electrolyser & compressor
Fuel cell
H_2 storage
H_2 engine
Άη Στράτης
ΦΩΤΟΒΟΛΤΑΪΚΑ
ΚΛΕΙΣΤΟ ΥΔΡΟΠΟΝΙΚΟ ΘΕΡΜΟΚΗΠΙΟ +ΓΕΩΘΕΡΜΙΑ
ΥΒΡΙΔΙΚΑ ΚΑΪΚΙΑ
ΚΥΜΑΤΙΚΗ ΕΝΕΡΓΕΙΑ
ΑΥΤΟΚΙΝΗΤΑ Η2 και ΗΛΕΚΤΡΙΚΑ
ΤΟΥΡΙΣΤΙΚΟ ΤΑΧΥΠΛΟΟ ΚΙΝΟΥΜΕΝΟ ΜΕ ΑΠΕ
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
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Thank you for your attention

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