Floating Offshore wind
A growth opportunity

WavEC Seminar

4th of December, 2018
EDP GROUP OVERVIEW

EDP CONSOLIDATED 2017
Clients: ~12Mn
Market Cap: ~ €10Bn
EBITDA: €4Bn
Generation Cap: ~26.8GW (73% Renewables)

EDP PORTUGAL
29% of EBITDA
#1 Producer, distributor and trader in Portugal

EDP BRASIL
18% of EBITDA
#4 private wholesale market player
#5 private power generation

EDP RENEWABLES
WIND & SOLAR POWER
40% of EBITDA
#4 player in wind power worldwide

EDP SPAIN
13% of EBITDA
#2 in gas retail
EDPR is a market leader with 11 GW of wind energy installed capacity worldwide...
Introduction to EDPR
A global leader in the renewable energy sector

- World’s fourth-largest wind energy producer
- 11GW of installed capacity
- Presence in 16 markets
- 1220 employees
- Increasing capacity in solar and energy storage
- Featured on the Dow Jones Sustainability Index for ten consecutive years
- Principal shareholder Energias de Portugal, S.A. (EDP), the principal shareholder of EDPR, is a global energy company and a leader in value creation, innovation, and sustainability
EDPR Offshore Wind

- Involved in the offshore wind sector since 2008
- Played a key role in the development of the UK offshore wind sector:
  - Moray East secured a Contract for Difference (CfD) at a market-leading price of £57.50/MWh and will enter into construction in late 2018.
  - Moray West under development with agreement for lease and grid connections secured, consent applications submitted and site investigations underway.
- Offshore projects in, France, Portugal, Poland and USA
- Actively expanding offshore portfolio globally
- Team of 100+ (and growing) based in EDPR’s offshore headquarters in Edinburgh (incl. joint venture partners)
The WindFloat has demonstrated its feasibility and is on a quick pace towards commercialization several years ahead of the competition.

1. Strategic Investment
   - Shareholder of PPI
   - Provides a sustainable growth opportunity
   - Diversification of generation portfolio

2. Anticipate market trend
   - Leader in floating offshore wind
   - Support the development of the floating offshore market

3. Controlled Risk
   - Develop technology in incremental steps (Prototype, Pre-commercial, Commercial)
   - Acquire know-how at an early stage of the technology

WindFloat 1

- The WF1, with a 2 MW wind turbine completed 5 years of operation with high availability.
- The prototype was successful decommissioned in July 16, completing the successful demonstration of the concept

WindFloat Atlantic (WFA)

- The WindFloat Atlantic is a pre-commercial windfarm using 3 x 8.4MW wind turbines, of the coast of Viana do Castelo. It is going to be the first project financed floating offshore wind farm, proving its bankability.

Les éoliennes flottantes du golfe du Lion (EFGL)

- The LEFGL project was awarded by the French government.
- The project consist in 4x6 MW installed in the Mediterranean, lead by Engie.

Redwood Coast Offshore Wind Project (US)

- Public-Private Consortium with Redwood Coast Energy Authority awarded in March,2018
- 150MW farm with 8+MW WTGs
A successful implementation of a technology is supported in three pillars: Technology, LCOE and Bankability.
WindFloat – Proved to be technically feasible with excellent performance during 5 years of operation and was capable to overcome waves reaching 17m

- EDPR has been involved in the Floating Offshore Wind Sector since 2008
- EDP a shareholder of Principle Power, Inc.
- **WINDFLOAT 1:**
  - First deployment of a semi-submersible structure supporting a multi-megawatt wind turbine.
  - Single demonstration unit using a commercial 2MW WTG
  - First offshore wind turbine in open Atlantic waters
  - Installed 5km from the Portuguese coast, in the north of Portugal in water depths of 45m
  - Operated for 5 years, 2011 - 2016
  - Generated 17GWh
  - Survived significant wave heights of 7m and waves in excess of 17m
  - Successfully demonstrated the Windfloat Technology
  - Decommissioned safely in the yard in July 2016 with negligible impact to the environment
Project: Windfloat Atlantic

Windfloat 1’s outstanding performance encouraged the launch Phase 2: WindFloat Atlantic.

- **Partnership:** Windplus - EDPR, Repsol & Principle Power Inc.
- **Location:** Portugal, 20 km from Viana do Castelo at a depth of 85-100 metres.
- **Capacity:** 25MW, 3 x MHIV 8.4 MW WTGs
- **Progress**
  - Financial close reached in Oct 2018
- **Funding:**
  - European Investment Bank (EIB)
  - Horizon 2020 InnovFin Energy Demonstration Project
  - EU’s NER300 programme
  - Portuguese Carbon Fund, Government of Portugal
- **Objectives:**
  - First pre-commercial stage of the WindFloat technology
  - Demonstrate industrial capacity to build several units
  - Identify synergies and cost potential of bigger arrays

**Timeline:**

- **Financial Close:** Q4 2018
- **Generation:** 2019

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Project: Leucate
Les Eoliennes Flottantes du Golfe du Lion (LEFGL)

- **Partnership:** ENGIE, EDPR & Caisse de Depots
- **Industrial Partners:** Eiffage Métal, GE, PPI
- **Location:** France, 18km offshore from leucite on the French Mediterranean coast in a water depth of 70-100 metres.
- **Capacity:** 24MW, 4 x GE 6 MW WTGs
- **Progress:**
  - Floating LiDAR unit installed
  - Offshore geotechnical campaign commenced
- **Objectives:**
  - Incorporate innovative solutions in the design of the foundation and coupling with turbine
  - Support development of local industry

**Timeline:**
- Development: 2016 - 2020
- Construction: 2020
- Generation: 2021 Onwards
- Financial Close: 2020
Project: Redwood Coast Offshore Wind Project

- **Partnership:** Public-Private Consortium between Redwood Coast Energy Authority and a consortium of EDPR, Aker Solutions, Principle Power, H. T. Harvey & Associates & Herrera Environmental Consultants Inc.

- **Location:** Area approx. 25 miles from Eureka, CA (Humboldt County), 600 – 1000m water depths.

- **Capacity:** 150 MW, 10-15 WTGs with 8+MW Capacity

- **Progress:**
  - Consortium selected by RCEA’s RFQ in March 2018
  - Lease application submitted to BOEM in September 2018

- **Objectives:**
  Partnership with RCEA brings shared objectives:
  - Developing local renewable resources
  - Supporting energy-related local economic development
  - Offtake arrangements
  - Strong local community involvement and support
  - Potential to drive investment, create jobs, and revitalize Port of Humboldt Bay

**Timeline:**
- **Financial Close:** 2022
- **Generation:** 2024
- **Development:** 2018 - 22
- **Construction:** 2023 - 24
- **Operations:** 2024 - 49
Thank you!