

---

# Project Finance for Ocean Energy: Issues to Consider

Don G. Roberts  
CEO, Nawitka Capital Advisors Ltd.  
Don.roberts@nawitka.com



**NOVEMBER 4-6, 2014**

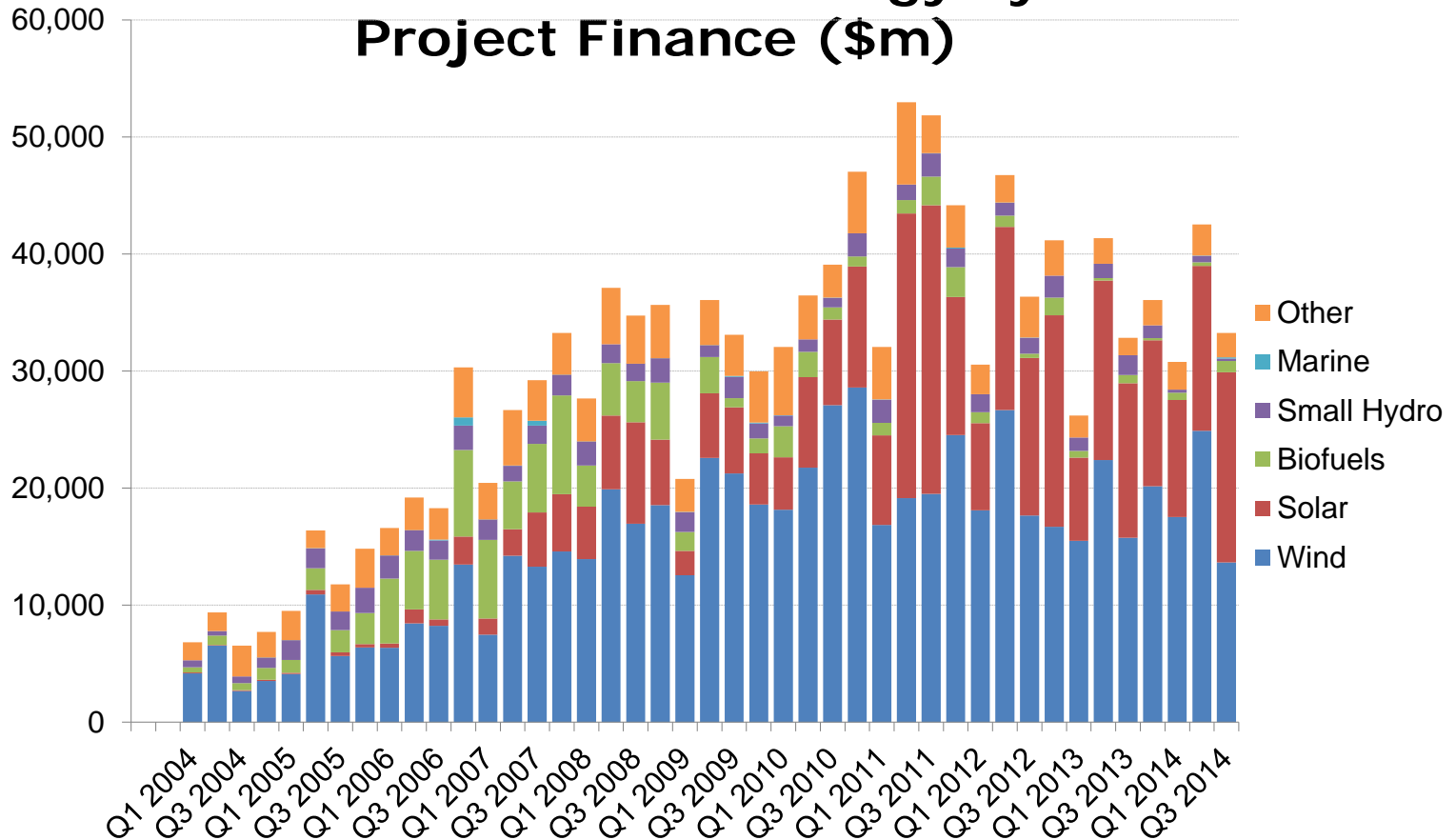
Halifax, NS Canada



- 1. Status of Project Finance**
- 2. What are the Lenders Monitoring?**
- 3. Structural Changes in the Debt Market?**



# New Investment in Clean Energy by Sector – Project Finance (\$m)



- Currently an **excess of financial capital** in the market, but it is quite risk averse.

Last quarter over \$30 billion was raised in the form of Project Finance for Clean Energy assets around the world. Solar and Wind account for **by the bulk of the investment – “Marine” is a rounding error**



### Debt Ratio for conventional Renewable Energy Projects?

- 80% for Solar Thermal Energy Generation (STEG) with Storage
- 70% for Off-shore Wind, PV Solar, Bio/Waste, Small Run-of-River Hydro
- 60% for On-shore Wind
- 50% for Geothermal

### Debt Ratio for Marine Energy?

- From a Commercial Lender's perspective, there is no Tidal or Wave Energy Project which would get conventional Project Financing – they are **not “bankable”**.



**Some debt has been raised for a few Tidal/Wave projects, but mostly from gov't sources.**

- **Atlantis Resources achieved 34% Debt for the MeyGen Project** in Sept. 2014 from Scottish Enterprise & The Crown Estate. The ~\$85 million investment is the largest in the Marine Energy space to date.
- **Carnegie Wave Energy achieved 43% Debt for the Perth Project** in March 2014 from the Clean Energy Finance Corporation & Australian Renewable Energy Agency

**Ocean Thermal Energy Corp is reportedly negotiating with Deutsche Bank for debt financing 80% of its Seawater Air Conditioning System project in The Bahamas.**

- Limited technology risk due to no moving parts under water and scale-up risk minimal, but there exists some off-take risk due to volatility in the tourism industry.



**Project Financiers are monitoring the Marine Energy sector to see whether they should devote resources so they can accurately price the risk.**

**Getting mixed messages.**

**Some Fresh Disappointments:**

- ▲ Bankruptcy of **Oceanlinx** and **Wavebob**
- ▲ Major cutbacks at **AWS Ocean Energy** after Alstrom's decision to curtail funding for technology development.
- ▲ Cancellation of **Ocean Power Technologies'** project in Australia
- ▲ Apparent delays for **Marine Current Turbines' Anglesey Skerries array**.



...but also some encouraging news:

- ▲ **Atlantis Resources'** IPO in London and follow-up financing
- ▲ **Prudential** (the largest UK insurer) reports it may invest as much as 100 million pounds in **Tidal Lagoon Swansea Bay project**.
- ▲ Significant generation by the 1 MW devices of **Andritz Hydro Hammerfest** and **TGL/Alstro** in Orkney, Scotland.
- ▲ Progress with **Carnegie Wave Energy's Perth project**



**Increasing commitment of large corporate players to technology development. Eg., in the Tidal Stream Sector:**

- ▲ **Siemens** now owns 100% of **Marine Current Turbines**
- ▲ **Alstrom** owns 100% of **Tidal Generation/TGL**
- ▲ **DCNS** owns 60% of **OpenHydro**
- ▲ **Andritz** owns 59% of **Andritz Hydro Hammerfest**

## **Implications?**

- ▲ Helps avoid the corporate distress seen in the Wave Sector.
- ▲ Greater confidence in equipment warranties/guarantees.
- ▲ Initially construct with on-balance sheet financing, and then issue bonds after the project has been de-risked.





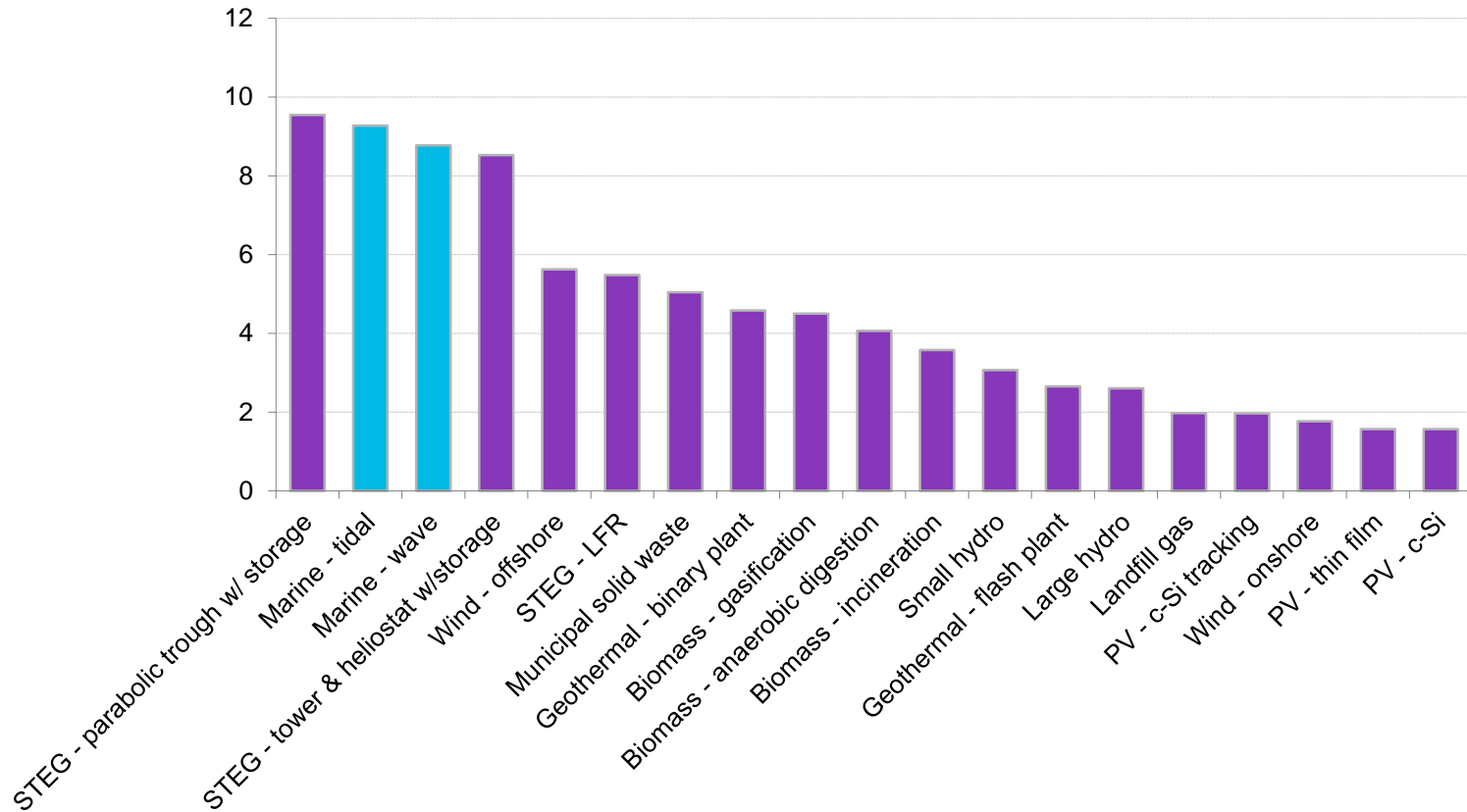
Before devoting significant resources to analyzing Marine Energy, **financiers need to be convinced that the fundamental value proposition is sound.**

**Consider variables like:**

- ▲ Capital intensity (\$/MWh)
- ▲ Levelised Cost of Electricity (now and trend)
- ▲ Capacity Factor
  - Important in the absence of good storage options



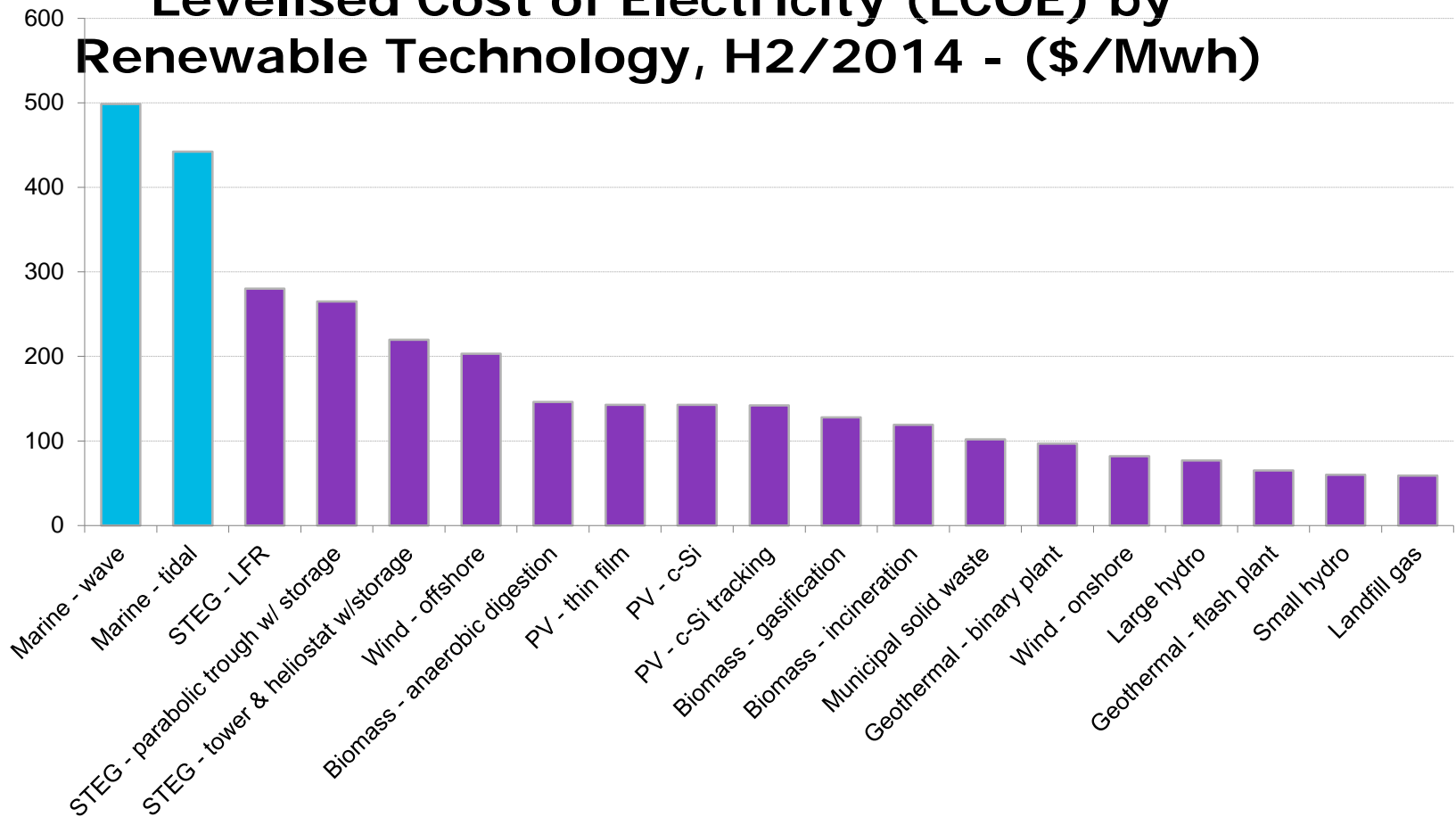
# Cap-ex by Renewable Technology (\$M/MW)



- **Marine is amongst the most capital intensive** forms of renewable energy.



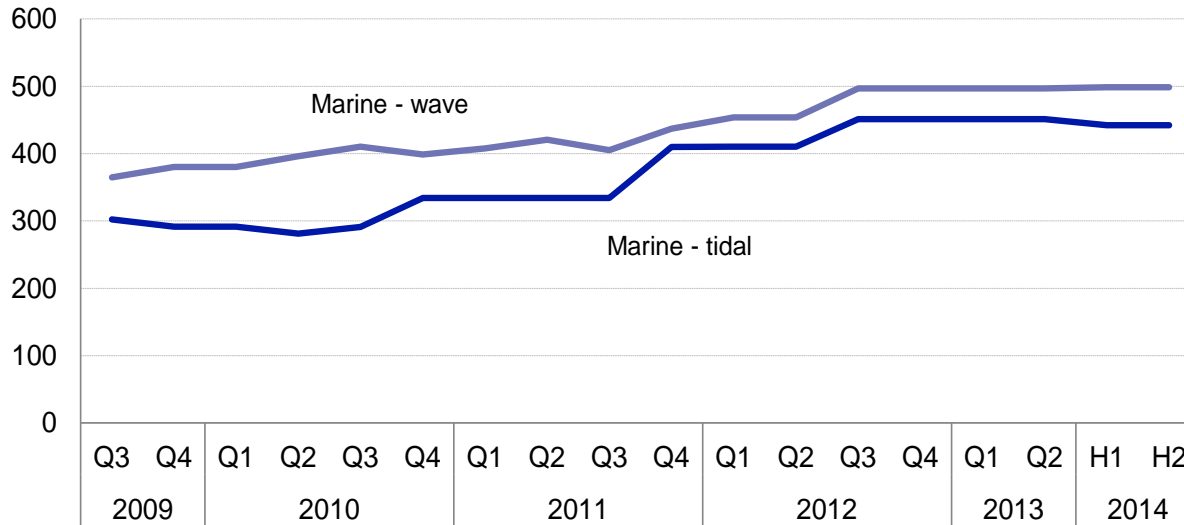
## Levelised Cost of Electricity (LCOE) by Renewable Technology, H2/2014 - (\$/Mwh)



- Due partly to its Pre-commercial stage of development, **the LCOE for Marine is difficult to estimate.**
- However, it currently has the **highest LCOE for a number of reasons** .
  - Does not yet enjoy: scale economies, higher efficiency rates (from fine-tuning) or the benefit of meaningful debt financing.



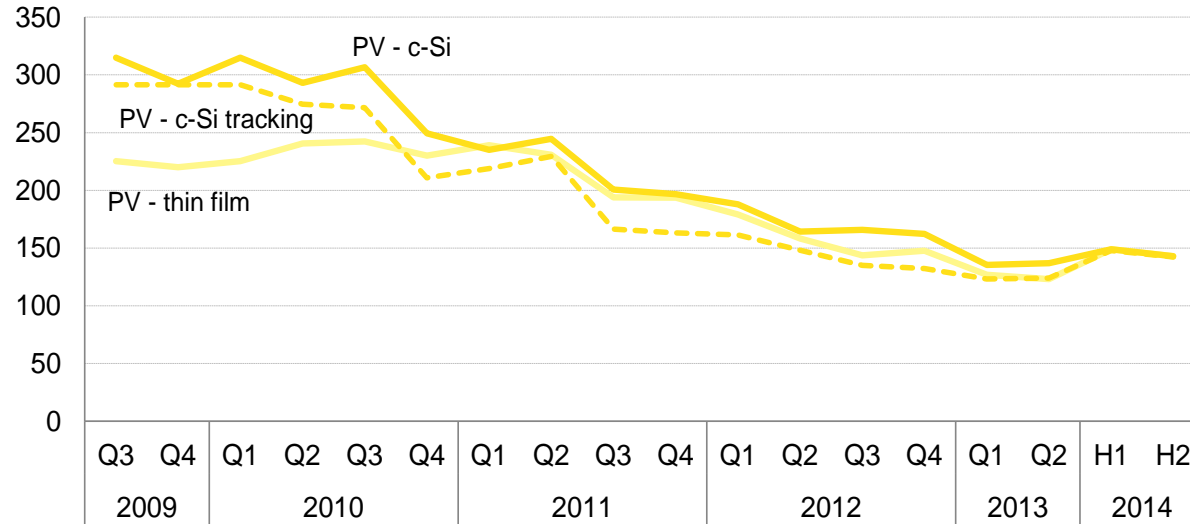
## LCOE: Marine - *Central Scenario:* H2 2009-H2 2014 (\$/MWh)



- Contrary to the case for other technologies, **the LCOE of both Wave and Tidal technologies have been trending upward** in response to new data points.
- Estimates of Fixed O&M costs ~doubled when figures of \$100,000/year/MWh were reported by the **UK Carbon Trust's Marine Energy Accelerator (MEA)** in Q3/2012. This raised the estimated LCOE by 9-10%.



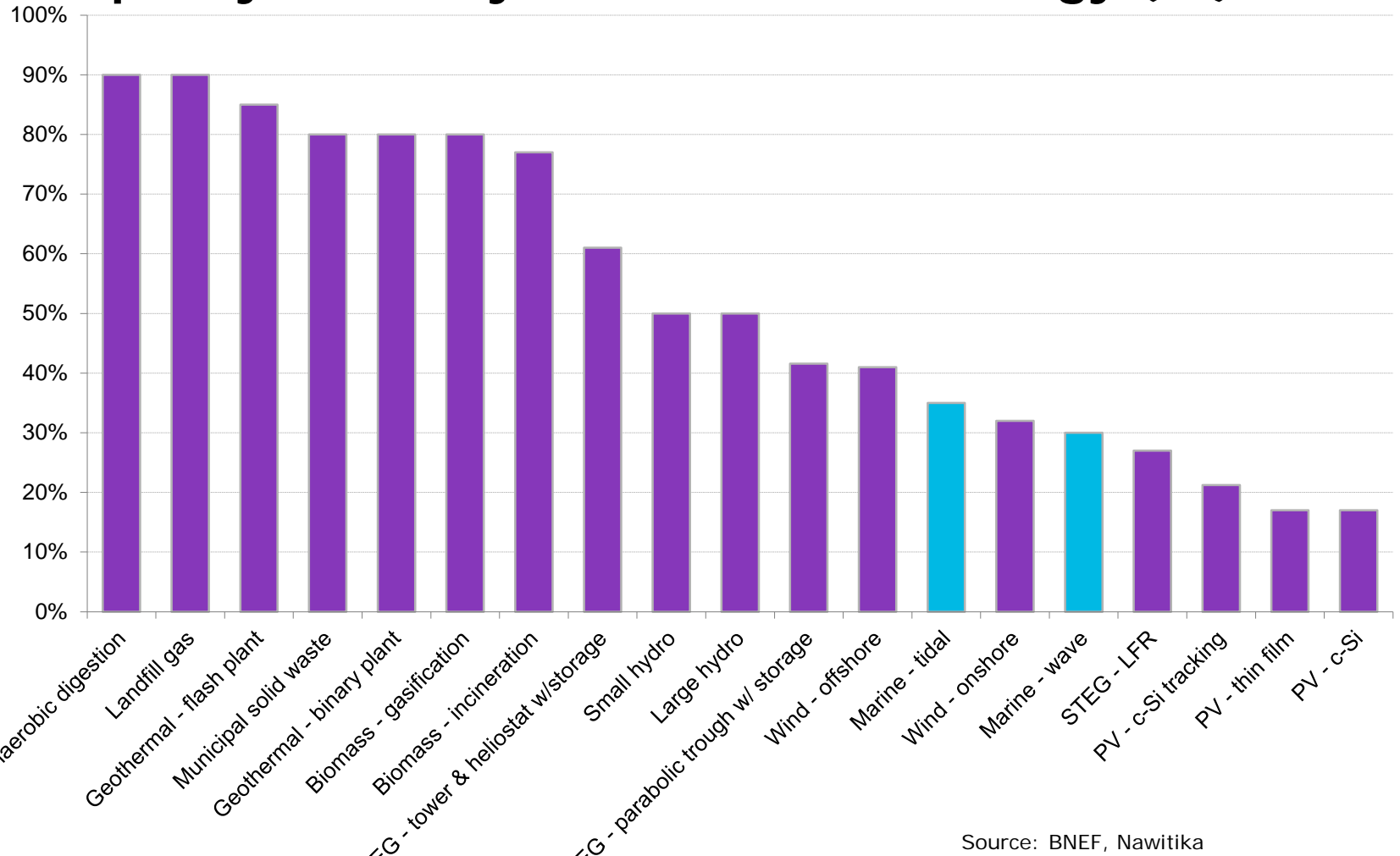
# LCOE: PV Solar (No tracking) – Central Scenario H2 2009- H2 2014 (\$/MWh)



- It is important to note that **the relative cost of Marine power has arguably been deteriorating** compared to other sources like natural gas, wind and solar.
- The cost of Photo-voltaic **Solar** has arguably experienced the largest declines – **down by ~50% just since mid-2009**. This drop is due mainly to improvements in technology and the achievement of economies of scale in production.



# Capacity Factor by Renewable Technology (%)



Source: BNEF, Nawitika

- With the exception of Solar PV, current **Wave & Tidal technologies generally have lower capacity factors** than other forms of renewable energy.



## Project Financiers looking for:

1. Sufficient scale ...generally >\$50 million.
2. Credit worthy Off-take partner (with a Purchase Power Agreement)
3. Technology demonstrated at commercial scale
4. Predictable repair & maintenance costs
5. Performance warranties from a credible technology provider
6. Experienced EPC contractor who offers a “full-wrap”
7. Development team with an established track record



## Experienced Developer with a PPA & Proven Technology (H2/2014)

- **Pricing:**
  - <165 bps over floating rate (LIBOR/CDOR) if financed by the banks
    - ~150 bps over Libor if the project is operating.
  - <300 bps over fixed (Gov' t) if financed by the LifeCos.
    - LifeCos often prefer less experienced developers.
- **Upfront fee:**
  - ~250 bps for the banks; <200 bps for the LifeCos
    - Banks have gone as low as 175 bps for a very desirable borrower (eg., Pattern Energy)
- **Tenor:**
  - LifeCos will do 20+ years
  - Foreign banks will do up to 18 years
  - Most Canadian banks choose to stay below 10 years.





We expect a **bifurcation in the debt market** for renewable energy/clean tech projects

### 1. Traditional project finance

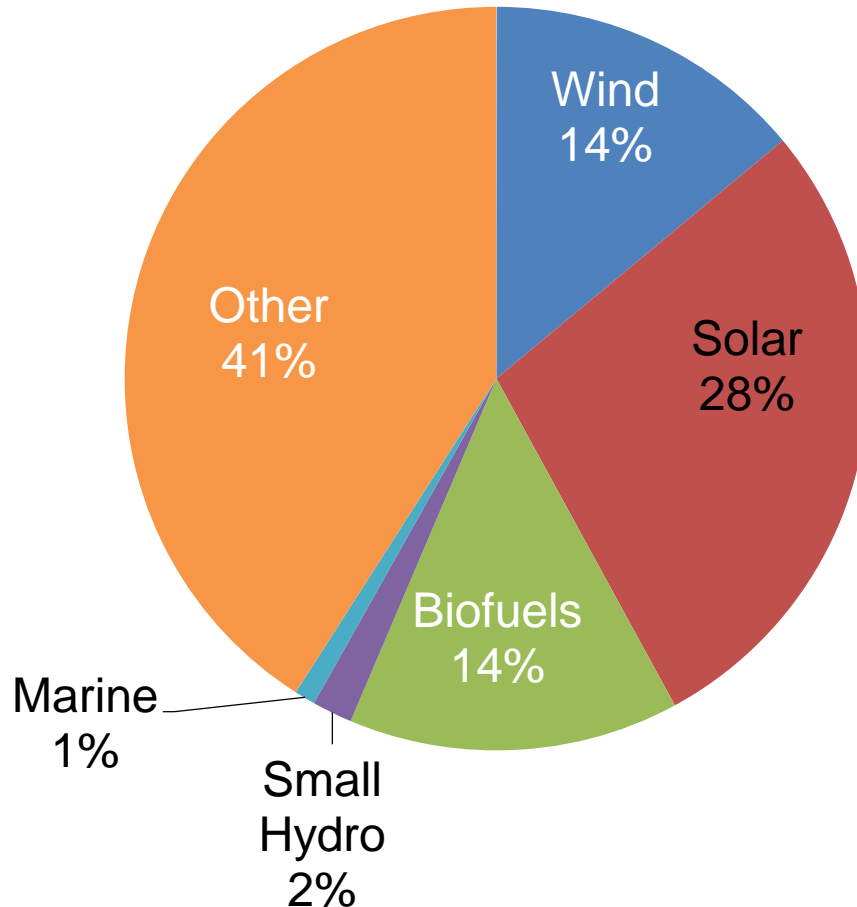
- True investment grade with long-term off-take and low risk profile.
- Accepts zero technology risk, and minimal market risk

### 2. Leverage finance model

- High yield/junk bonds
  - Mezzanine debt (quasi equity)
    - Eg., Energy Capital; Carlyle Group
- 
- **A larger slice of the overall “project finance market” may move from banks to institutional investors over time.**
  - **Expect this shift to accelerate due to aggregate excess of financial capital.**



# Cumulative VC/PE Investment by Clean Energy Sector, Q1/2004-Q3/2014



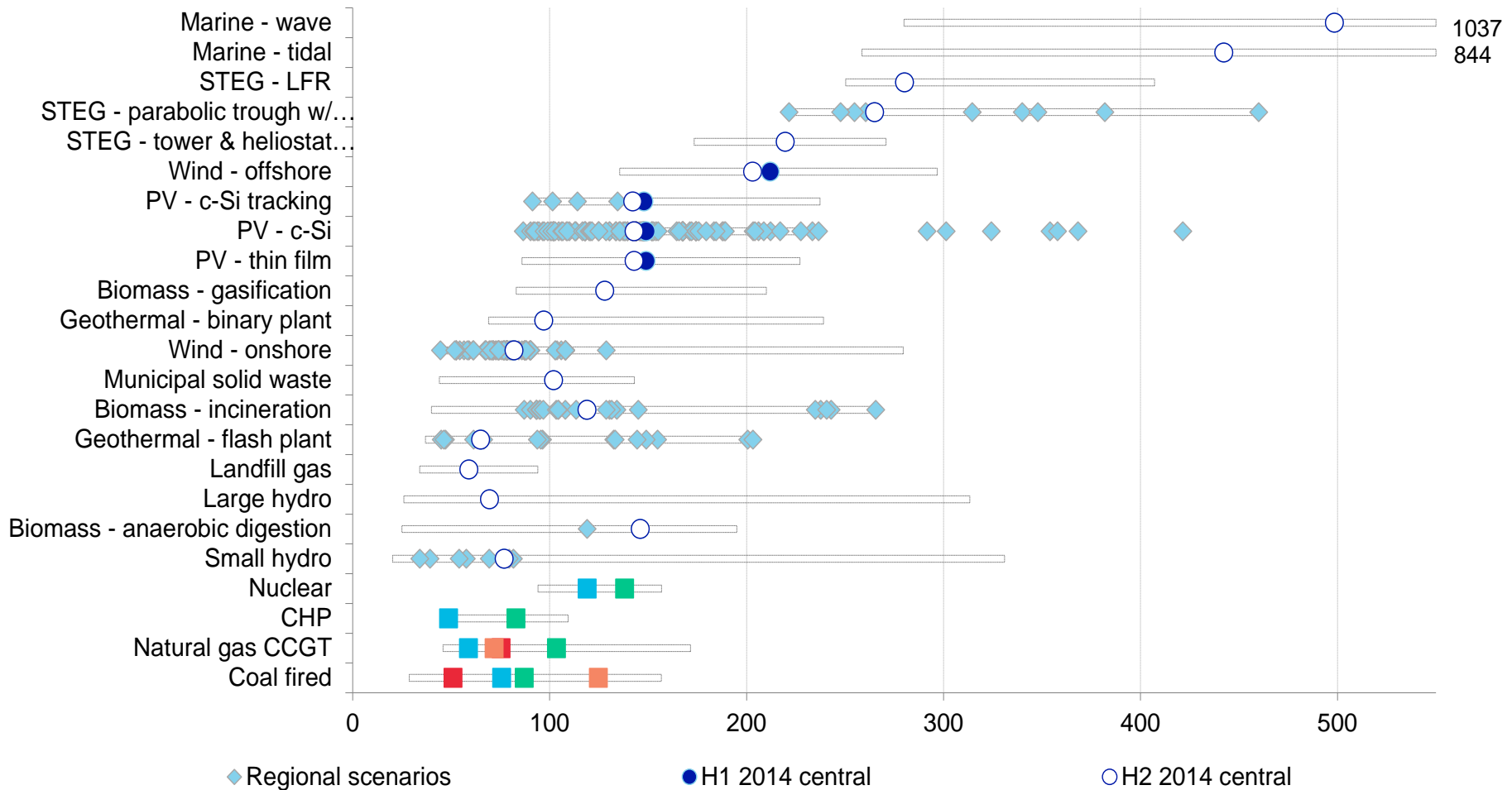
- An emerging sector will generally **first start attracting capital from Venture Capital/Private Equity Investors** before it gets debt capital for financing projects.
- **Marine Energy has attracted only 1% of the total VC/PE capital** in the Clean Energy space over the past ten years.
- We should **be modest in our expectations** regarding the ability to attract significant project debt finance over the next 5 years.



**APPENDIX 1:  
LEVELISED COST OF ELECTRICITY  
WITH REGIONAL SCENARIOS**



# H2 2014 Levelised Cost of Electricity, Central and Regional Scenarios (\$/mWh)



Fossil technologies: ■ US ■ China ■ Europe ■ Australia

Note: carbon prices note included for fossil fuel LCOEs.

Source: Bloomberg New Energy Finance, Nawitka Capital Advisors



Mr. Roberts is CEO of Nawitka Capital Advisors Ltd, a firm which provides advice on strategic direction and raising capital for companies in the Renewable Energy, Clean Technology & Forest Products Industries.

In 2012, Mr. Roberts was chosen by Corporate Knights Magazine as the individual in the Financial Services sector who contributed the most to sustainable development in Canada.

Prior to starting Nawitka in July 2013, Mr. Roberts was a Vice-Chair of Wholesale Banking, and Managing Director in Investment Banking with CIBC World Markets Inc. In this position he founded and led the Bank's cross-functional Renewable Energy & Clean Technology Team. He also provided senior coverage for companies in the global forest products industry.

Mr. Roberts was recognized in 2006 by Forbes Magazine as one of the Best Brokerage Analysts in North America. From 1995-2009, investor surveys consistently ranked him among the top equity research analysts covering the North American forest products industry. Prior to joining the financial sector, Mr. Roberts was Chief Economist for the Canadian Forest Service.

In addition to his work with Nawitka Ltd., Mr. Roberts is also

- An Adjunct Professor in the Department of Forest Resource Management at the University of British Columbia (Vancouver);
- On the Board of Directors/Advisors of Kruger Inc. (Montreal), Ensyn (Ottawa), Endurance Wind Power (Vancouver) and Rights & Resources Institute (Washington, D.C.); and,
- Serves in an advisory capacity for a range of government, industry, and NGO groups.

Mr. Roberts has a Bachelor's degree in Agricultural Economics from the University of British Columbia, a Master's degree in Forestry Economics from the University of California at Berkeley, and both an MBA and doctoral studies in International Finance and Economics from the University of Chicago. He is also a certified Board Director with the Institute of Corporate Directors.

