CESA Webinar Series: Financing to Advance US Offshore Wind

Innovative Approaches for Financing US Offshore Wind Energy

December 6, 2011

Webinar Sponsored by
Clean Energy States Alliance
Co-Hosted by U.S. Department of Energy &
US Offshore Wind Collaborative

Clean Energy States Alliance

CESA is a non-profit, membership organization working with states, federal agencies, and municipalities to advance the renewable energy sector through:

- Information Exchange & Analysis
- Partnership Development
- Networking and Collaboration

www.cleanenergystates.org

Webinar Series: Financing to Advance US Offshore Wind

- Objectives:
  - Examine offshore wind financing gaps and possible solutions
  - Advance thinking and recommendations
  - Increase information exchange among states, federal agencies, the industry, and the investment community
- Webinar Series:
  - Kick off Webinar: lay foundation on initiative focus (July 13)
  - Webinar #2: the role of states and public support mechanisms (August 9)
  - Webinar #3: the role of private investors (September 14)
  - Webinar #4: **identifying innovative solutions (December 5)**
  - **New Series: Advances for US OSW including Financing (2012)**

Today's Webinar: **Innovative Approaches for Financing US Offshore Wind Energy**

Objectives:

- Examine the various approaches and tools being used of could be used to support offshore wind financing and deployment.
- Identify recommendations for government policies, regulatory approaches and public funding programs necessary to drive private investment.

Speakers:

- *Thinking Beyond Federal Production and Investment Tax Credits*, Jurgen Weiss, Brattle Group
- *The Use of an Offshore Wind Energy Procurement Authority*, Markian Melnyk, Atlantic Wind Connection
- P*ossible Model for US: United Kingdom Green Investment Bank*, Bruce Duguid, UK Government
- *Role of a Clean Energy Development Administration (CEDA)*, Bill Parsons from Congressman Chris Van Hollen MD -D

Contact Information

www.cleanenergystates.org

Ross Tyler
Phone: 202-603-2966
Email: RTyler@cleanegroup.org

Mark Sinclair
Phone: 802-223-2554
Email: MSinclair@cleanegroup.org

The Brattle Group

Innovative Approaches for Financing US Offshore Wind Energy

Presented to:

Clean Energy States Alliance

Presented by:
Jurgen Weiss

December 6, 2011

Content

- 1 Minute on my background
- The challenges to financing offshore wind in the US
- Evidence to-date
- Promising (and not so promising) approaches

1 Minute on myself

- Principal, The Brattle Group
- Energy Economist with emphasis on issues motivated by climate change
- PhD Business Economics, Harvard and MBA, Columbia
- Testified on behalf of the Massachusetts AG in the Cape Wind PPA proceedings
- The Brattle Group is an economic consulting firm with 200 professionals in the USA and Europe.

The US offshore wind industry faces many financing challenges

- No federal subsidy program like European FITs (and no deep commitment to moving away from fossil fuels)
- No utilities with the balance sheets and regulatory backing to finance OSW directly
- No default lender (especially with end of DOE loan guarantee program)
- Very little consumer and political appetite to pay above market rates
- On-shore wind has been coming down in cost very rapidly
- Solar is also coming down in cost rapidly and faces fewer siting and other permit challenges (at least PV)
- Myriad of state rules and regulations subject to risk
- NIMBO (not in my back ocean)

The few contracts/programs to-date have introduced some promising features

- Cape Wind PPA price contingent on actual construction and financing costs
  - Makes a higher initial PPA price possible (re PUC approval) since ratepayers can be assured that price is related to cost
  - Moves the project from a “venture” towards an privately built and operated public infrastructure project
- Bluewater PPA gets a multiple of RECs
  - Essentially concludes that the state has a budget for renewables support (more offshore may mean less total renewables, but total cost to ratepayers stays the same)
- New Jersey ORECs move towards FITs
  - Upfront commitment to pay for the difference between cost and expected market revenues
  - Similar to a version of the FIT considered by the UK

Given the impossibility of a federal FIT, other means for getting revenue stability are needed

- Multi-state purchase programs can create critical mass for OSW programs to get to scale, but
  - Programs/contracts that require PUC approval will likely remain difficult
    - Cape Wind experience
    - Lots of uncertainty if similar approvals were needed in more than one state for a specific project
- Purchasing by entities that do not need PUC approval and can pursue public policy may be preferable
  - State/federal agencies
  - State authorities with large power needs (MTA, MBTA, etc.)
  - Large regional/national corporations interested in making a policy statement

The key of any program is to address OSW challenges

- In the US, transparency about cost is likely important if ratepayers are involved
  - Perception that renewable support goes into the pocket of financiers should be addressed head-on
- Contract/support structures that lock in prices or subsidies in the presence of lots of uncertainty are probably unwise
  - Ex-post, there will be either big winners or losers
- Decent revenue certainty is key
  - Without it, unlikely to get financing
  - Reducing exposure to political and regulatory risk
  - Tying the subsidy to market prices (CfD FIT type) creates incentives to build at the right spot
  - Getting close to that through contracts with non-PUC approval entities seems most promising

Thank-you

For questions or comments, please contact

Jurgen Weiss

Principal, *The Brattle Group*

Jurgen.weiss@brattle.com

Benefits of an Offshore Wind Energy Procurement Authority

December 6, 2011

Markian Melnyk
Atlantic Wind Connection
(240) 396-0344
MMelnyk@AtlanticWindConnection.com

Agenda

- Industry trends
- Market dysfunction
- How an offshore wind energy procurement authority can build a stronger market

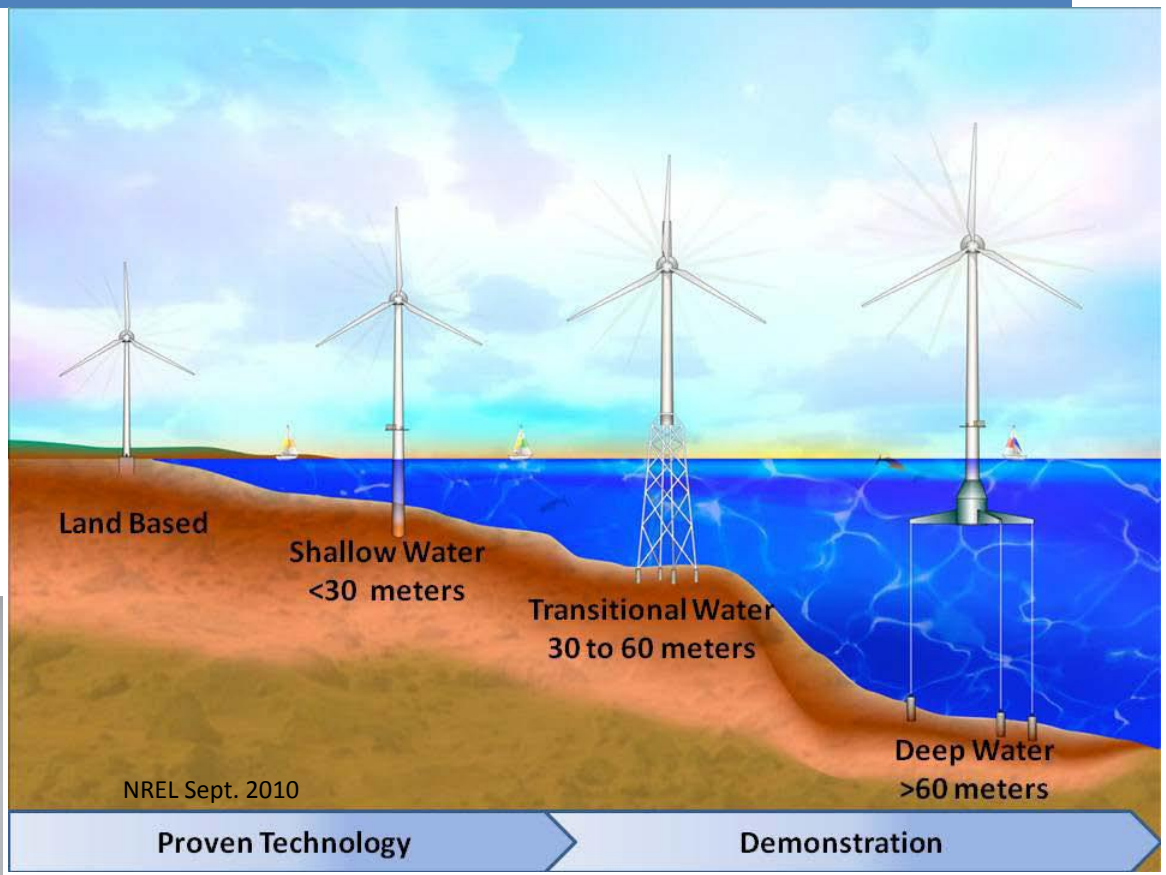
Industry trends

- **Scale**: Larger turbines and bigger wind farms help to achieve economies of scale
- **RPS as economic development driver**: States expect wind developers to demonstrate local benefits
- **Logistics**: Local production can save approximately 20% of capital cost as compared to imported components.
- **Opportunity**: States can get industrial investment, jobs and lower cost offshore wind with a sustained demand signal vs. less investment, fewer jobs and higher cost wind with a weak demand signal.
  - **The right policy would promote long-term demand to support a large scale industry.**

Offshore wind technology progresses

- Offshore turbines initially followed terrestrial example
  - Now scaling up and becoming specialized – e.g. Vestas V164 7MW

Courtesy: Vestas



Starting with shallow, fixed foundations, moving to floating foundations.

"[T]he financing components of the cost of offshore wind energy, ***roughly half of the modeled cost*** of offshore wind energy in U.S. markets, can be reduced by reducing project risk." - DOE

Potential Path to Reduce Cost of Offshore Wind Energy in Class 6 Wind ($2009 USD) (NREL 2010) Component

	2010	2020	2030	2010 -Land
Installed Capital Cost ($/kW)	$ 4,259	$ 2,900	$ 2,600	$ 2,120
Discount Rate Factor (DRF)	**20%**	**14%**	**8%**	12%
Turbine Rating (MW)	3.6	8.0	10.0	1.5
Rotor Diameter (m)	107	156	175	77
Annual Energy Production / Turbine (MWh)	12,276	31,040	39,381	4,684
Capacity Factor	39%	44%	45%	36%
Array Losses	10%	7%	7%	15%
Availability	95%	97%	97%	98%
Rotor Coefficient of Power	0.45	0.49	0.49	.47
Drivetrain Efficiency	0.9	0.95	0.95	0.9
Rated Windspeed (m/s)	12.03	12.03	12.03	10.97
Average Wind Speed at Hub Heights (m/s)	8.8	9.09	9.17	7.75
Wind Shear	0.1	0.1	0.1	.143
Hub Height (m)	80	110	120	80
Cost of Energy ($/kWh)	**0.27**	**0.10**	**0.07**	0.09
Cost of Energy ($/kWh) at constant 7% DR	0.12	0.08	0.07	0.08

DOE goal: 54 GW at $0.07/kWh by 2030

COE = ((DRF x ICC) + O&M + LRC + Fees)/AEP

Market dysfunction

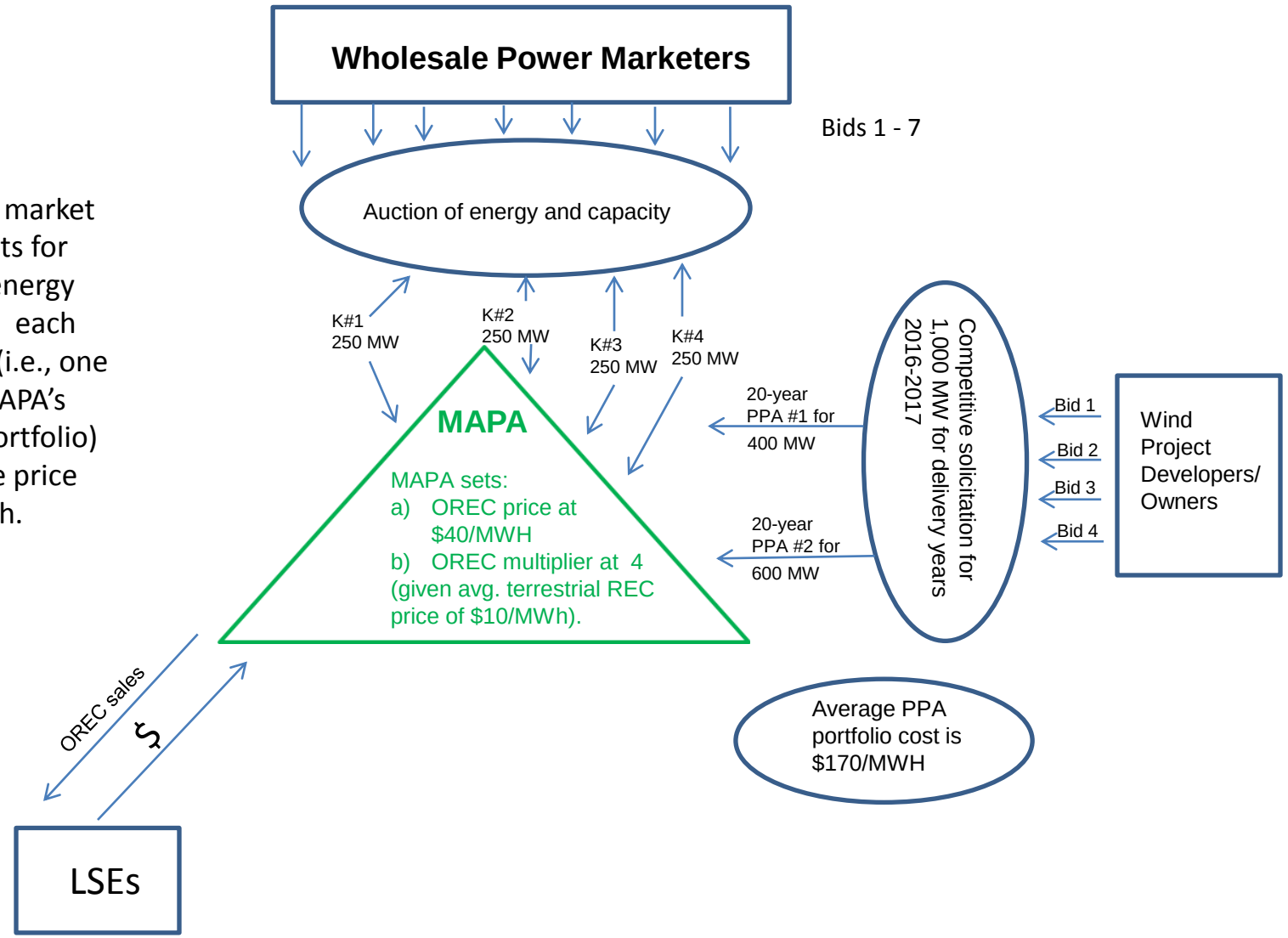
- **Developers**: Wind farm developers need to build large projects to drive down costs
- **Debt funding**: Needs stable, 20-year revenue stream
- **Purchasers**:
  - Don't want PPAs on their books
  - Don't want to commit to large quantities of offshore wind energy for 20 years.
- **States:** Want jobs, but no one state is big enough to send the demand signal needed to single-handedly grow an industry

Building a stronger market

- Regional OSW Power Authority
  - Combines demand of several states
    - Strong demand signal drives investment and jobs
  - Predictable, competitive procurement lowers risks and costs
  - Enters into 20-year PPAs for large-scale projects
  - Re-sells power to various purchasers in smaller chunks
  - Recovers net subsidy through participating state RPS programs

Example: Mid-Atlantic Power Authority

Four 20-year market price contracts for commodity energy and capacity, each for 250 MW (i.e., one quarter of MAPA's 1,000 MW portfolio) at an average price of $130/MWh.



Conclusion

- Power Authority:
  - Uses competitive solicitations and auctions to make a more efficient market and drive down the subsidy cost
  - Uses aggregated demand to increase industrial investment and job creation
  - Uses state RPS programs to recover the net subsidy cost (using a REC multiplier or OSW carve out)
- Challenges
  - Getting states to cooperate
  - Amendments to state RPS programs
  - Ensuring balance between energy purchases and benefits

BIS | Department for Business Innovation & Skills

Green Investment Bank

Update

December 2011

Why are we creating a Green Investment Bank?

- The Government has ambitious green targets
  - Requires investment of ~£200-£300bn to 2020
- The Government is leading the way in developing policies to achieve these targets
- Even after these measures, finance-related issues will continue to limit the scale and pace of our transition
  - Risk aversion due to novelty of technology/ business models and policy risk exposure
  - High third party financing transaction costs
  - Temporary restrictions to balance sheets
- These market failures are particularly pronounced in Green infrastructure
  - Need for rapid scale up
  - The capital intensity of many green projects
  - The novelty of some green technologies
  - Green projects' reliance on long-term policy

The Government has laid out plans for the world's first Green Investment Bank

BIS Department for Business Innovation & Skills

- Focus on infrastructure including energy efficiency
- £3bn of funding over the period 2012-2015
- Delivering a wide range of finance products which complement other Government policies
  - Risk mitigation - to improve a project's risk profile to a level acceptable to banks and institutional investors
  - Innovative finance mechanisms - to overcome high transaction costs of investment, introduce new capital pools and share risks
  - Capital provision - via either equity or debt, to address key capital shortages
- The GIB will be enshrined in legislation to confirm its independent status as an enduring institution with a key public role

The GIB's proposed mission sets the broad objectives

BIS Department for Business Innovation & Skills

First cut mission

"To accelerate investment in the United Kingdom's transition to a green economy"

1. Focus on accelerating investment
2. UK remit (but within framework of EC Renewable Energy Directive)
3. Focus on the broader green economy – not just climate change

GIB charter – a broad green mission with enduring Operating Principles

BIS Department for Business Innovation & Skills

GIB's Mission: 'To accelerate investment in the United Kingdom's transition to a Green economy'.

Operating principles

'The GIB will operate to a double bottom line of delivering positive portfolio returns and Green Impact through the following objectives:

Green impact	Accelerating investment to advance the UK's transition towards a Green economy, including reducing greenhouse gas emissions; improving resource efficiency; and protecting and enhancing the natural environment and biodiversity … (1)
Sound Finance	Deploying capital and expertise as a responsible investor and managing risks to achieve positive portfolio returns and, in so doing, preserving and building its capital base as an institution with enduring Green Impact
Market additionality	Operating alongside other market participants in response to market failures, leveraging their capabilities where appropriate, to introduce and mobilise additional investment and achieve Green Impact

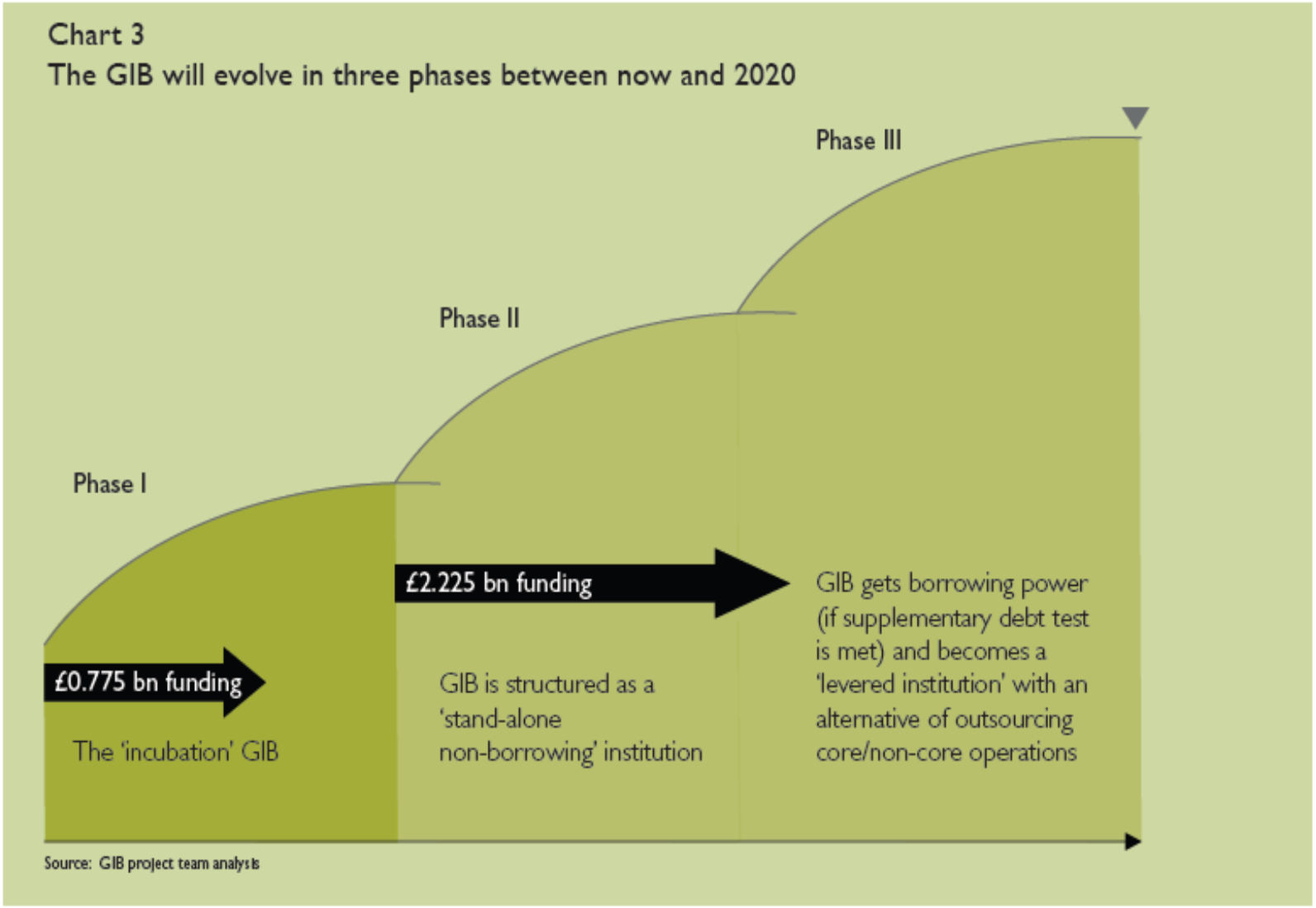
And the GIB will also adhere to three further Operating Principles:

Strategic alignment with Gov't	Aligning strategic priorities with Government Green policy objectives and initiatives and avoiding duplication.
Operational independence	Putting management and operational decision making at arm's length from Government.
Operational independence	Operating consistently with EU State Aid rules, including the terms of any State Aid approvals, and seeking to overcome market failures and improve market effectiveness, whilst minimising any inappropriate competition or adverse impacts on market pricing'

1 the text continues 'which includes improving water and air quality, reducing noise pollution and improving land use amenity'

The GIB policy will evolve over three phases due to legal and fiscal constraints

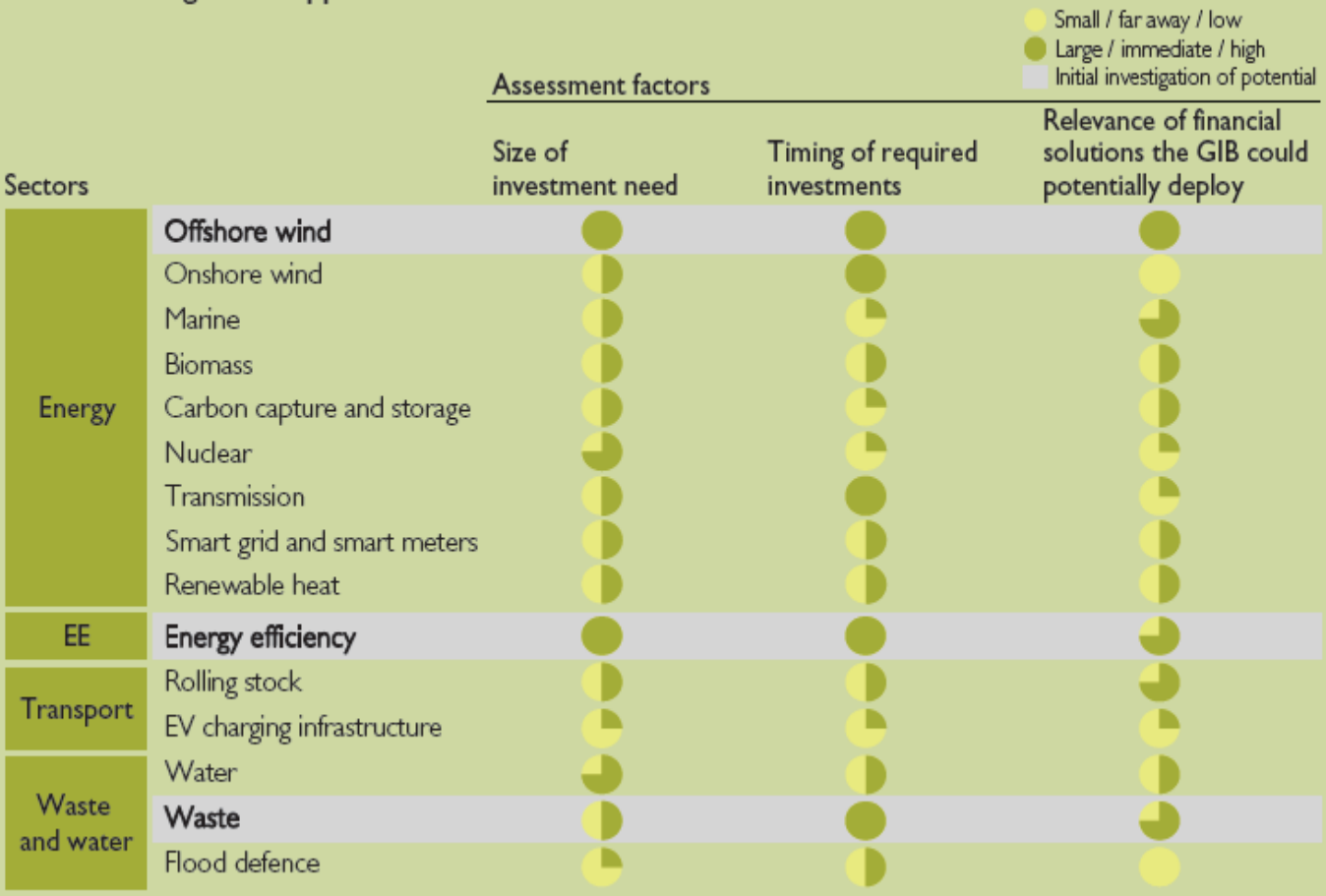
BIS Department for Business Innovation & Skills



Size, timing & relevance of financial interventions for green sectors

Chart 2

Provisional high level appraisal of sectors for GIB financial interventions



Source: GIB project team analysis; non-exhaustive range of sectors

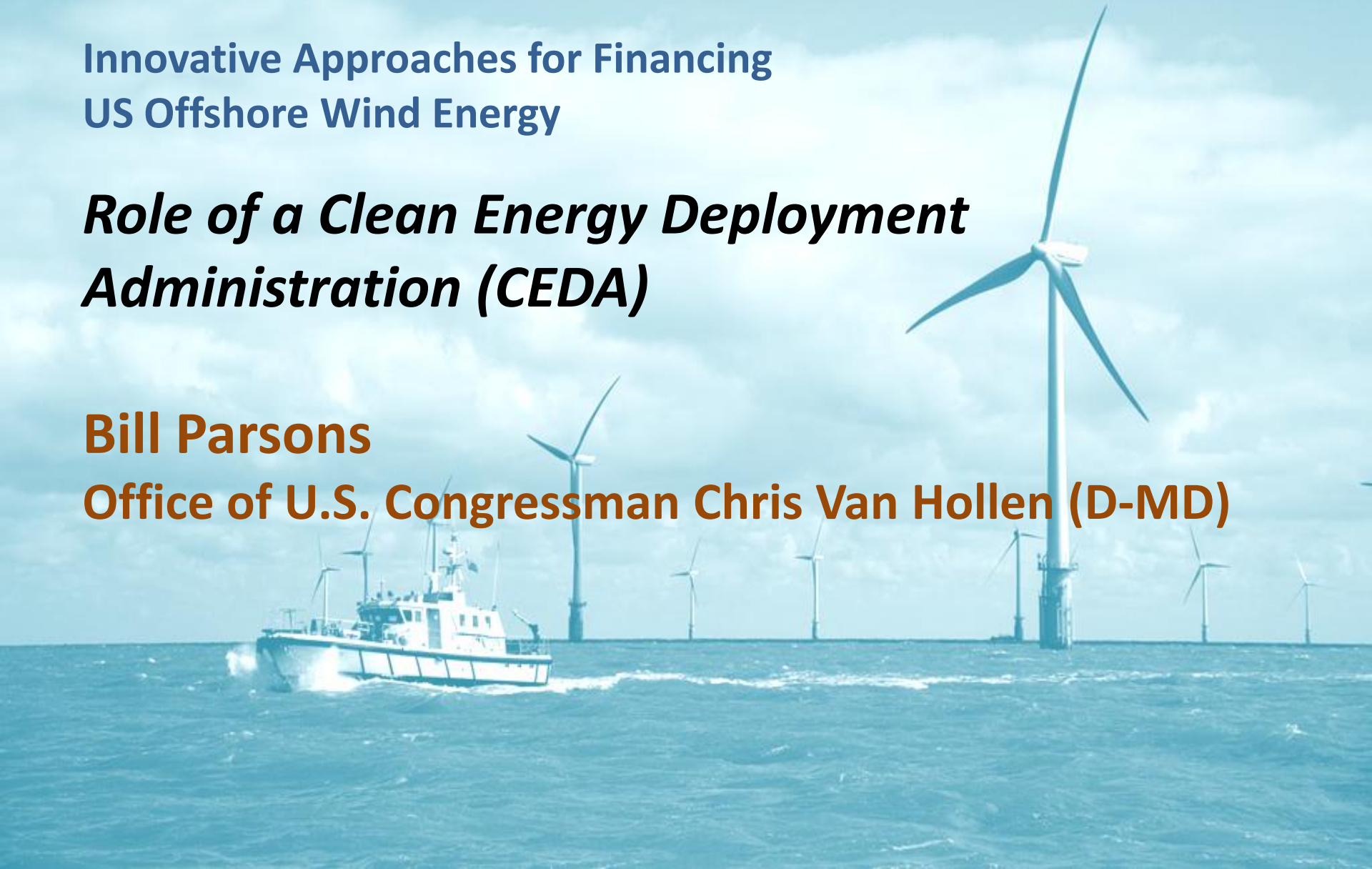
Next steps

- Finalise State Aid application
- Establish Phase 1 “Incubation Operations”
- Prepare for establishment of full GIB following State Aid approval
- Advisory Group input
  — Chairman: Sir Adrian Montague

CESA Webinar Series: Financing to Advance US Offshore Wind

Innovative Approaches for Financing US Offshore Wind Energy

Role of a Clean Energy Deployment Administration (CEDA)



Bill Parsons

Office of U.S. Congressman Chris Van Hollen (D-MD)