

# Virginia offshore wind port readiness

## Final review meeting

12 June 2015

Richmond, VA

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**10 tons**

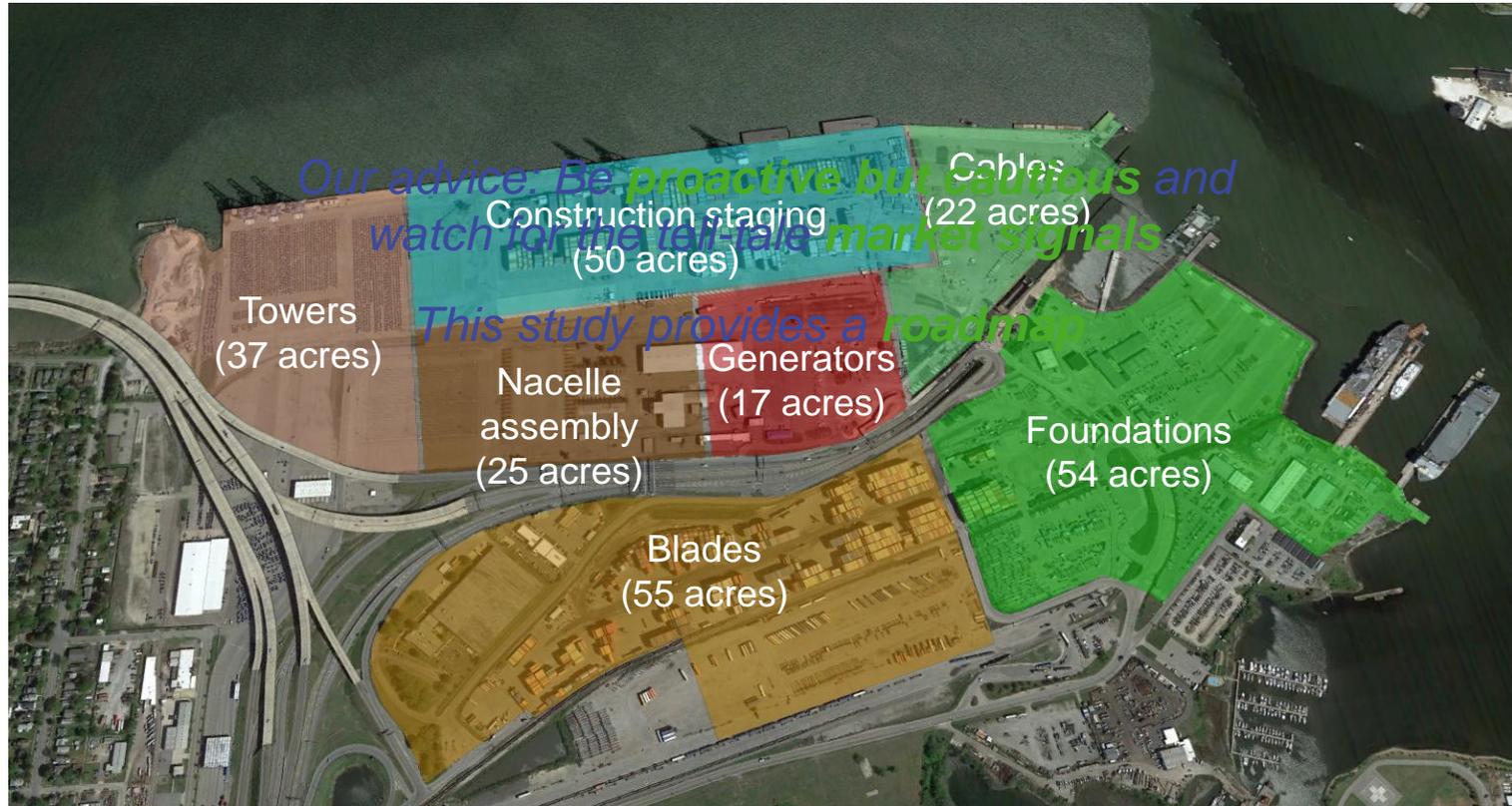


**350 tons**



We have completed our port readiness evaluation

There is a **big opportunity** for Virginia ports



More than 1500 sustained manufacturing jobs  
More than a billion dollars in annual turnover

# Agenda

Item	Start	End	Duration
Gathering (remote joiners dial in)	9:45	10:00	30 minutes
Welcome and study overview	10:00	10:10	10 minutes
Presentation: Regional port assessment	10:10	10:25	15 minutes
Presentation: Impact of local manufacturing on cost of energy	10:25	10:35	10 minutes
Presentation: Recommendations	10:35	11:00	25 minutes
Stakeholder input and discussion	11:00	12:00	60 minutes
Break – lunch provided	12:00	12:30	30 minutes
Continued discussion and project close-out	12:30	1:00	30 minutes
Adjourn	1:00		

# Goals of the study

Evaluate the readiness of Virginia's ports to host manufacturing and staging activities

Evaluate suitability of 10 ports for 7 activities

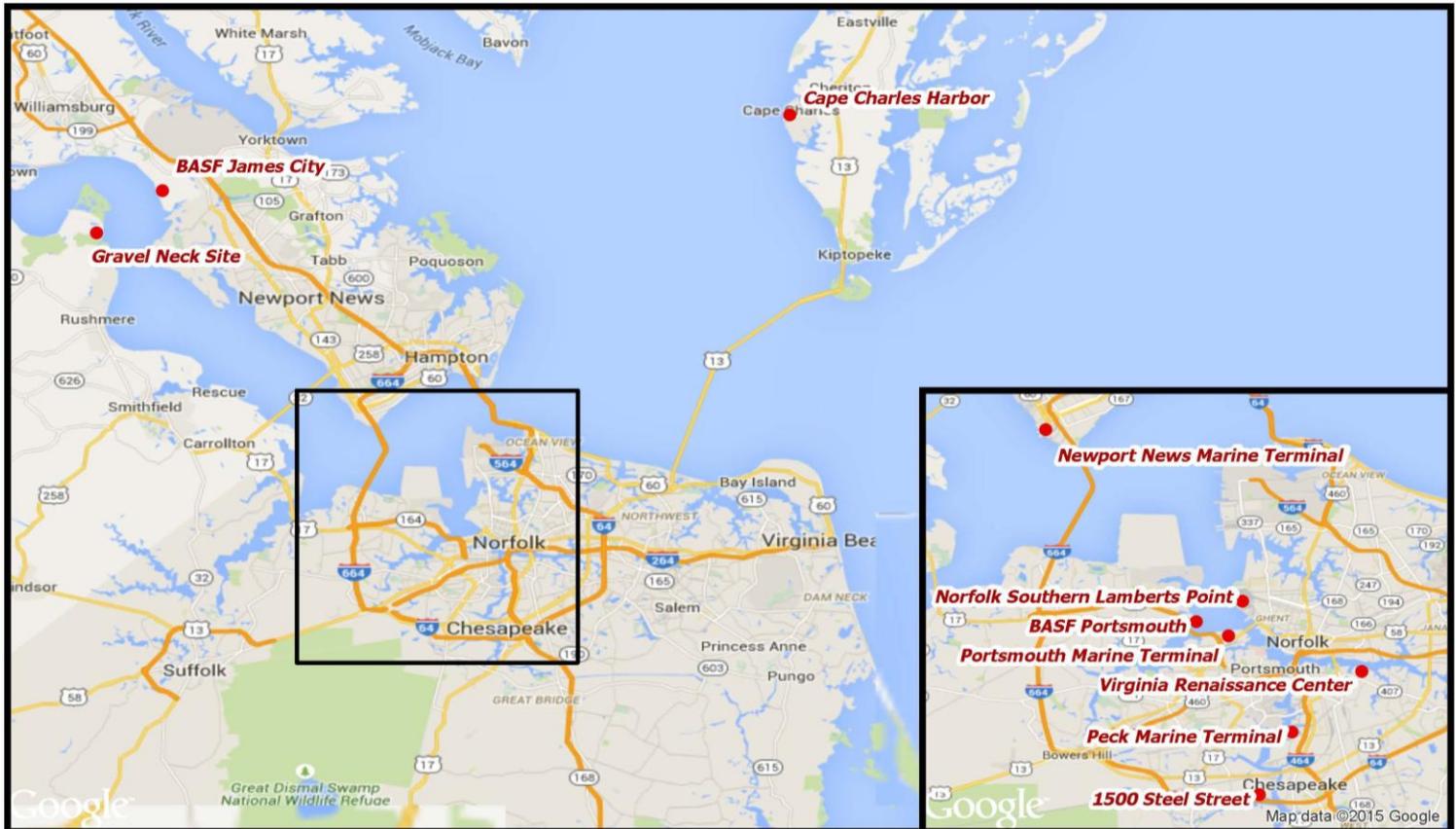
Develop onshore site build-out scenarios for manufacturing

Develop a roadmap for Virginia ports

Provide feedback on Virginia's value proposition

Deliver insights from UK and European experience

# Ports evaluated



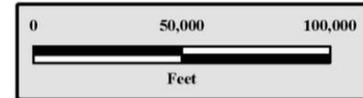
## Virginia Port Terminals Evaluated For Readiness to Support Offshore Wind

### Virginia DMME Port Readiness Evaluation



125 Broad Street, 5th Floor  
Boston, MA 02210  
Phone: 617-728-0070

Norfolk, Virginia  
Project No.: 6825-001



Digital Data Courtesy ESRI

# Screening Analysis

## Summary

	Portsmouth M.T.	Newport News M.T.	Cape Charles Harbor	Lamberts Point	Peck M.T.	BASF James City	Gravel Neck	Virginia Renaissance	Steel St. Chesapeake	BASF Portsmouth
Blades	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Generators	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Towers	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Nacelles	Yellow	Yellow	Yellow	Red	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow
Foundations	Yellow	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Yellow
Cables	Green	Green	Yellow	Red	Green	Yellow	Yellow	Green	Yellow	Green
Substations	Red	Red	Red	Red	Red	Red	Red	Red	Red	Red
Construction	Yellow	Yellow	Red	Red	Red	Red	Red	Red	Red	Yellow

# Port upgrades: An overview

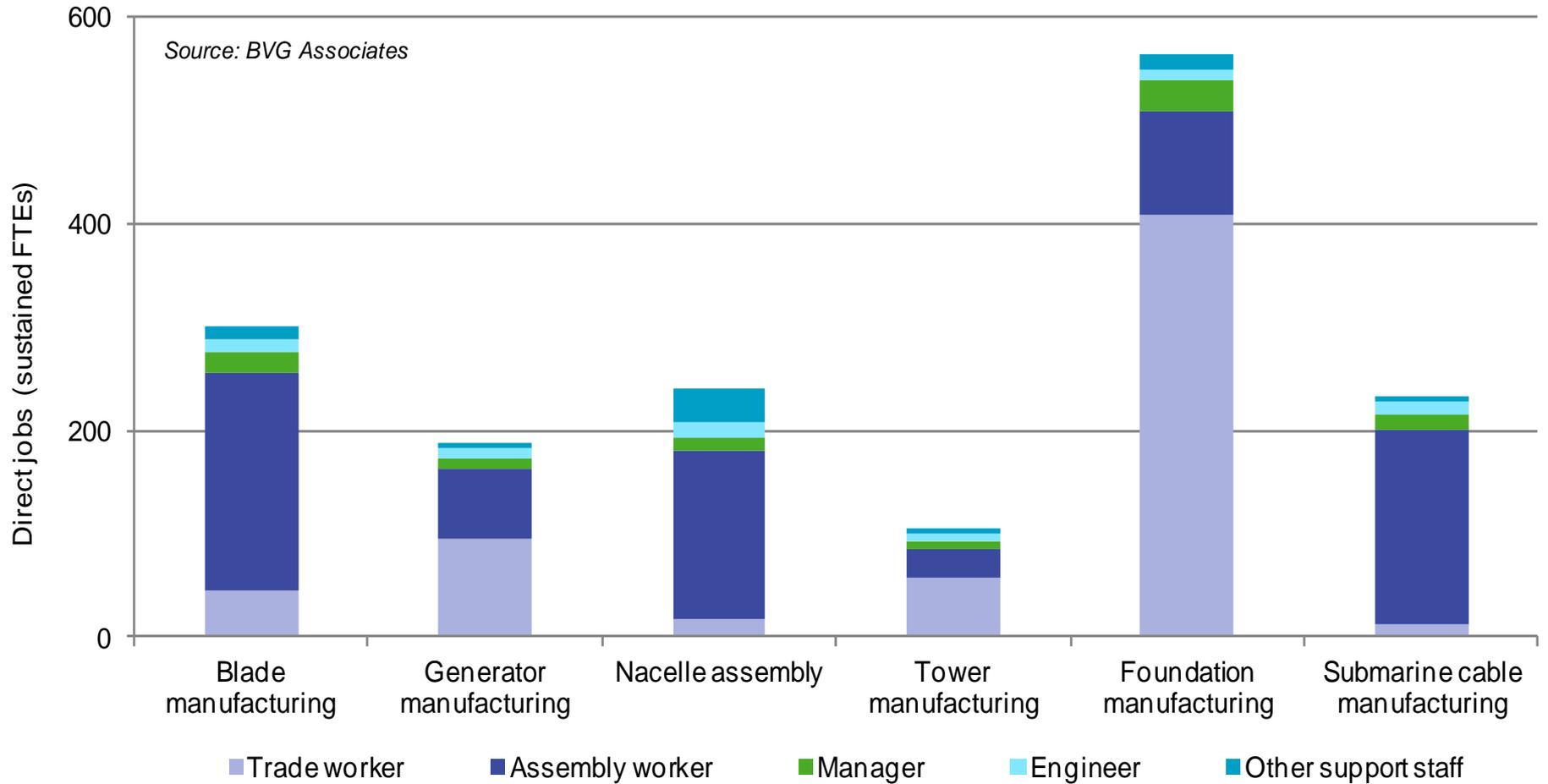
Activity	Portsmouth Marine Terminal	Newport News Marine Terminal	Peck Marine Terminal	Virginia Renaissance Center	BASF Portsmouth
Blade manufacturing	Quay strength improvements		Quay length extension	Quay strength improvement	Major dredging New pier
Generator manufacturing			Quay strength improvement		
Nacelle assembly	Quay and ground strength improvements		Minor dredging		Major dredging New Pier Ground strength improvements
Tower manufacturing					
Foundation manufacturing and staging					
Submarine cable manufacturing and load-out	None		Minor dredging	None	Major dredging New Pier
Construction staging	Quay and ground strength improvements				Major dredging New pier Ground strength improvements

# Port utilization scenarios

Story	Scenario	Ports	Implementation cost	Construction jobs (FTE-years)
<b>Super-port</b>	1	Portsmouth Marine Terminal	\$11 million to \$25 million	29.5
<b>Cluster ports</b>	2	Portsmouth Marine Terminal Newport News Marine Terminal	\$15 million to \$36 million	46.0
	3	Portsmouth Marine Terminal Peck Marine Terminal	\$14 million to \$38 million	42.8
	4	Newport News Marine Terminal Peck Marine Terminal	\$11 million to \$33 million	37.1
<b>Distributed port network</b>	5	Portsmouth Marine Terminal Newport News Marine Terminal Peck Marine Terminal Virginia Renaissance Center	\$20 million to \$50 million	64.0

# Manufacturing jobs

(based on 100 units per year)



# Regional port assessment

# Regional Port Assessment – Clarendon Hill Consulting

## Goal & Methodology

### Goal

- Evaluate US east coast ports for their potential to compete with Virginia to serve the regional offshore wind market

### Methodology

- Geographic scope:
  - Wind energy areas within 250 nm of Cape Henry, Virginia:
    - New York call area
    - New Jersey call area
    - Delaware proposed lease area
    - Maryland lease area
    - Virginia lease area
    - North Carolina (Kitty Hawk) call area
  - Ports within 250 nm from these wind energy areas
- Developed evaluation criteria:
  - Potential super port
  - Cluster port

# Regional Port Assessment – Clarendon Hill Consulting

## Initial screening Results: Distance to Wind Energy Areas

Wind Energy Area	Estimated Distance from Ports (nm) to Wind Energy Area (WEA)								
	Norfolk, VA	Philadelphia, PA	Penn Terminal, PA	Paulsboro, NJ	Wilmington, DE	Baltimore, MD	PANYNJ	Quonset Point, RI	New Bedford, MA
New York WEA	250	210	199	204	187		19	145	157
New Jersey WEA	185	138	127	132	116		89	196	207
Delaware WEA	143	92	82	87	75		121	243	
Maryland WEA	120	118	107	112	95		134.5		
Virginia WEA	30	209	198	203	186	170			
North Carolina WEA Kitty Hawk	74	241	230	235	218	215			

# Regional Port Assessment – Clarendon Hill Consulting

## Port Evaluations & Screening

### Assessment of port capability for the following offshore wind activities

- Blade manufacturing
- Nacelle assembly
- Tower manufacturing
- Jacket foundation manufacturing
- Generator manufacturing
- Submarine cable manufacturing and load out

### 1<sup>st</sup> tier screening of ports

- First tier screening assessed all ports within the geographic scope based on a minimum criteria set for all offshore wind activities.
  - Result: 17 ports meet the minimum requirements for offshore wind activities.

# Regional Port Assessment – Clarendon Hill Consulting

## 2<sup>nd</sup> tier Port Screening - Per Activity

Offshore Wind Activities						
	Blade manufacturing	Nacelle Assembly	Tower fabrication	Jacket fabrication	Generator manufacturing	Cable manufacturing
<i>Navigational Access criteria</i>						
Overhead clearance	20 m (65')	20 m (65')	20 m (65')	85 m (279')	20 m (65')	30 m (98')
Horizontal clearance	25 m (82')	25 m (82')	25 m (82')	35m (115')	35m (115')	27.5 m (90')
Channel depth	5 m (16') - barge or general cargo vessel	5 m (16') - barge or general cargo vessel		barge or general cargo vessel OR heavy lift coaster vessel		3-9 m draft
<i>Port Facility Infrastructure</i>						
Quay side pier linear length	200m	300 m	300 m	125m	200m	125m
Continuous terminal area	15 - 25 ha (37 - 62 acres)	7-10 ha (15 - 25 acres)	12 - 20 ha (30 - 50 acres)	12-20 ha (30 - 50 acres)	6 - 7 ha (15 - 19 acres)	8-9 ha (20 - 22 acres)
Developed port site	applies to all					
<i>Infrastructure</i>						
Road and Rail Access	either rail or road; oversized trucks			either rail or road		

# Regional Port Assessment – Clarendon Hill Consulting

Activity	Packer Terminal Philadelphia	Tioga Terminal Philadelphia	Penn Terminal Eddystone, PA	Paulsboro Terminal Gloucester City	Wilmington, DE	Seagirt Terminal Baltimore	Dundalk Terminal Baltimore	Sparrows Point Baltimore	Masonville / Fairfield Autoport (Baltimore)	
<b>Blade manufacturing</b>	Exclusivity	Terminal area too small (conservative measurement)		Exclusivity		Manufacturing conflicts with port's business model	Exclusivity	Aging Infrastructure	Exclusivity	
<b>Nacelle assembly</b>	Exclusivity	Exclusivity Potentially maneuverability issues (limited waterfront quay side)	Exclusivity		Exclusivity		Exclusivity	Maneuverability	Exclusivity	
<b>Tower fabrication</b>	Exclusivity	Terminal area too small (conservative measurement)		Exclusivity			Exclusivity		Exclusivity	
<b>Jacket foundation fabrication</b>	Precluded	Precluded due to overhead restrictions						Precluded due to overhead restrictions		
<b>Generator manufacturing</b>	Exclusivity	Exclusivity Potentially maneuverability issues due to limited waterfront quay side	Exclusivity		Exclusivity		Exclusivity	Aging Infrastructure Maneuverability	Exclusivity	
<b>Cable manufacturing</b>	Exclusivity	Exclusivity		Exclusivity			Exclusivity		Exclusivity	

# Regional Port Assessment – Clarendon Hill Consulting

Activity	AMPORT Auto Terminal Baltimore, MD	Global Container T Bayonne, NY	Global Container T New Jersey	APM Terminal New Jersey	Maher Terminal New Jersey	Port Newark Container T PNCT	Quonset Point Davisville, RI	New Bedford Marine Commerce Terminal
Blade manufacturing	Exclusivity	Manufacturing conflicts with port's business model	Exclusivity	Manufacturing conflicts with port's business model	Exclusivity	Exclusivity	Available terminal area too small (current lease options)	Terminal too small
Nacelle assembly	Exclusivity		Exclusivity				Exclusivity	Terminal too small
Tower fabrication	Exclusivity		Exclusivity					
Jacket foundation fabrication	Precluded due to overhead restrictions		Precluded due to overhead restrictions		Precluded due to overhead restrictions	Precluded due to limited terminal size		
Generator manufacturing	Exclusivity		Exclusivity		Exclusivity			
Cable manufacturing	Exclusivity		Exclusivity		Exclusivity			

# Regional Port Assessment – Clarendon Hill Consulting

## Port capability for number of offshore wind activities

Capability for number of offshore manufacturing activities	Port Terminal	Location
3-4	Seagirt*	Baltimore, MD
	Dundalk	Baltimore, MD
	Sparrows Point	Baltimore, MD
	New York Global Container Terminal*	New York
	Bayonne Global Container Terminal*	New Jersey
	APM Terminal*	New Jersey
	Maher Terminal*	New Jersey
	Port Newark Container Terminal*	New Jersey
2-3	Paulsboro	Gloucester County, NJ
	Masonville / Fairfield (auto terminal)	Baltimore, MD
	AMPORT Auto Terminal	Baltimore, MD
1-2	Wilmington	Wilmington, DE
1	Packer Avenue Terminal*	Philadelphia, PA
	Tioga Terminal	Philadelphia, PA
	Penn Terminal	Eddystone, PA
	Quonset Point	Davisville, RI
	Marine Commerce Terminal	New Bedford, MA

# Regional Port Assessment – Clarendon Hill Consulting

## Screening Analysis – Paulsboro Marine Terminal, Gloucester County, NJ

### Overview

- Under construction
- Operated by Holt Logistics
- Multi-purpose terminal
- 150 acres
  - thereof 50 acres leased to NLMK
  - 100 acres available for development
- Quay: 450 m (2<sup>nd</sup> phase)
- Laid out for high ground bearing strength
- Navigational clearance of 57 m

### Key statements

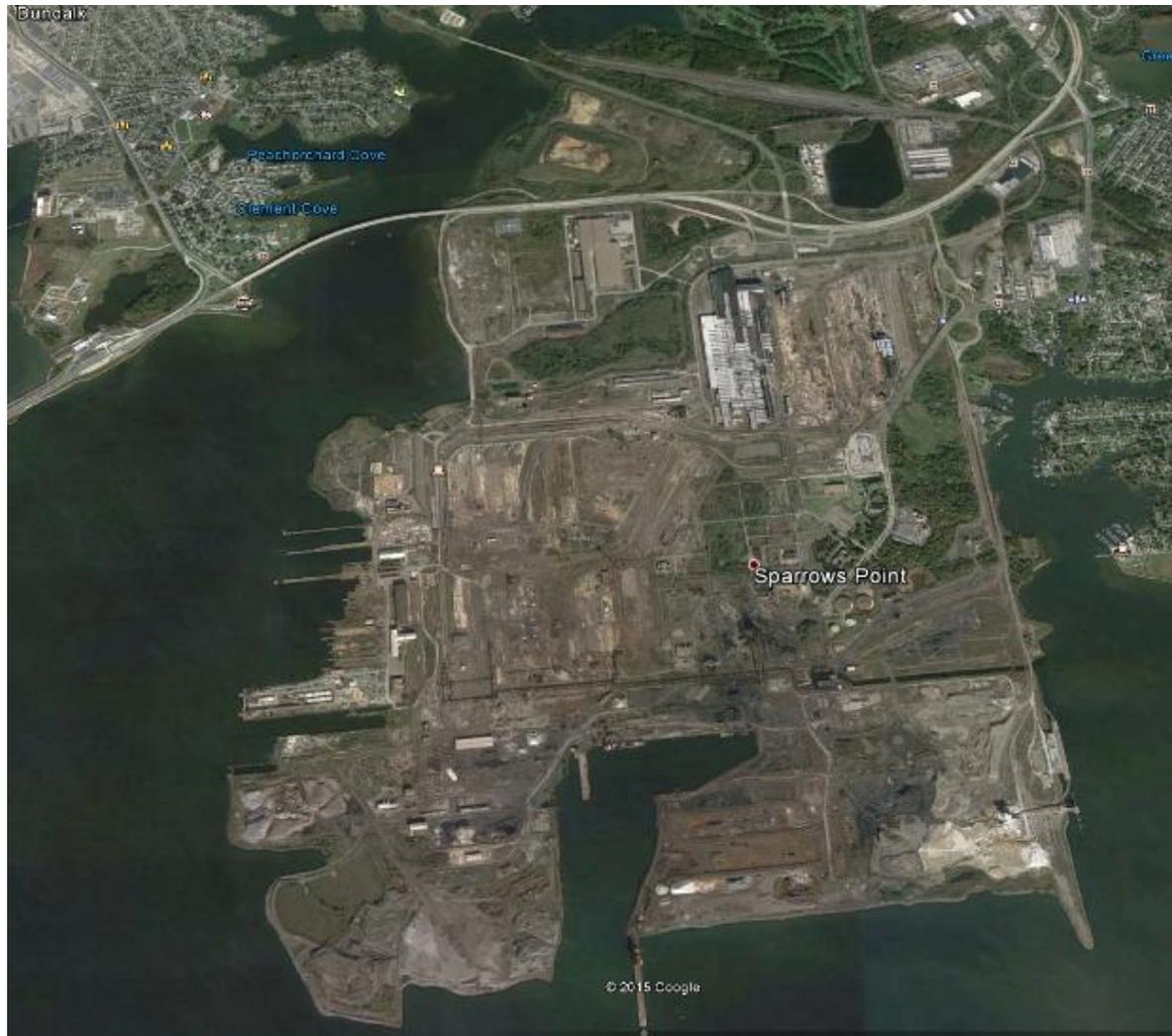
- Cluster port with 2-3 activities possible
  - All activities except for jacket fabrication
- Paulsboro could compete with Virginia over all wind energy areas
- Distance to sea: about 65 nm



Source: Gloucester County Brochure 2015

# Regional Port Assessment – Clarendon Hill Consulting

Screening Analysis – Sparrows Point near Baltimore (undergoing clean up & redevelopment)



# Regional Port Assessment – Clarendon Hill Consulting

## Screening Analysis – Sparrows Point near Baltimore, MD (undergoing clean-up & re-development)

### Overview

- Used for steel manufacturing for the last 125 years
- Privately owned:
  - 3,100 acre owned by Sparrows Point LLC
    - 100 acres leased to Kinder Morgan include southerly turning basin
    - 150 acres owned by Sparrows Point Shipyard include dry-dock and finger piers
- Quay length (southerly turning basin): about 660 m
- Aging infrastructure in need of repair
  - Sparrows Point Shipyard plans to refurbish their piers
- Barge services suggested: shallow westerly berths, limited maneuverability at Sparrow Point Channel
- Navigational clearance of 55.5 m

### Key statements

- Very large site
- Cluster port with several activities possible
  - All activities except for jacket fabrication
- Sparrows Point could compete with Virginia over two wind energy areas
- Distance to sea: about 140 nm

## Impact on cost of energy

# Impact on cost of energy

## Local manufacturing can create cost savings

### Avoided cost of transporting components

- Saves \$26 million for a 500 MW wind farm

### Avoided cost of handling components

- Varies, depending on port utilization scenario

### Avoided borrowing costs

- Importing components introduces execution risk
- Mitigate risk with longer construction period
- 1 extra year of construction adds \$60 million in borrowing costs

### Avoided cost of extra lay-down area

- Importing components introduces execution risk
- Mitigate risk with larger construction staging area to stockpile components
- Cost varies depending on strategy and port lease rates



*Total avoided costs are 3% of CAPEX and 2% of LCOE*

*LCOE unlikely to be the driver for local manufacturing*

## Recommendations

# A roadmap for Virginia

3 leases granted; more expected (“round 1”)

First projects complete consent applications

New lease areas announced (“round 2”)

2015-2017

2018-2020

2021-2023

2024 and beyond

Make the case  
(socioeconomics)

Develop a port plan

Monitor other ports

Create a prospectus

# A roadmap for Virginia

3 leases granted; more expected (“round 1”)

First projects reach FID

First projects complete consent applications

New lease areas announced (“round 2”)

Lease awards (“round 2”)

Consent applications complete (“round 2”)

New lease areas announced (“round 3”)

2015-2017

2018-2020

2021-2023

2024 and beyond

Make the case (socioeconomics)

Complete engineering and permitting

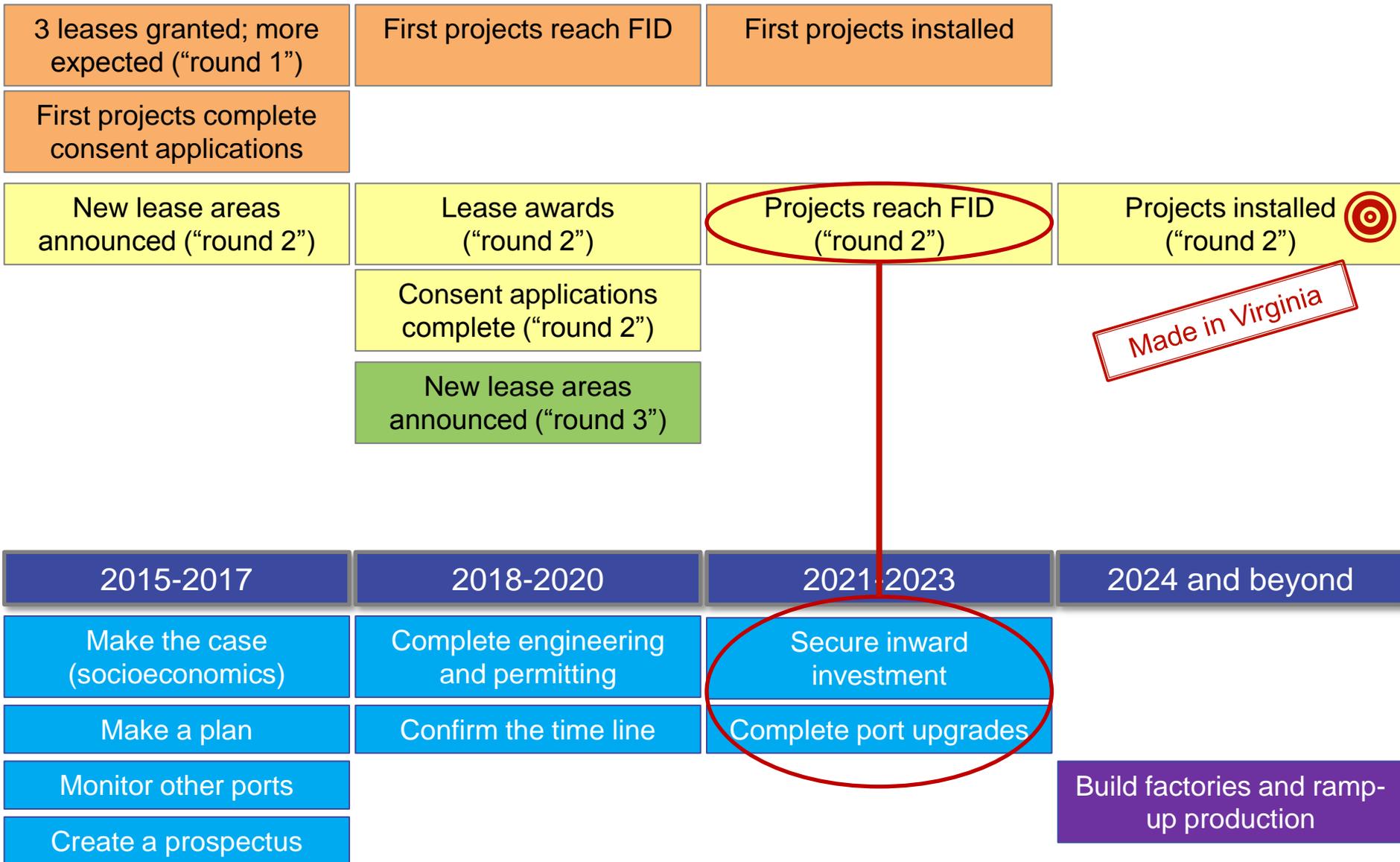
Make a plan

Confirm the time line

Monitor other ports

Create a prospectus

# A roadmap for Virginia



# A roadmap for Virginia

3 leases granted; more expected ("round 1")	First projects reach FID	First projects installed	
First projects complete consent applications			
New lease areas announced ("round 2")	Lease awards ("round 2")	Projects reach FID ("round 2")	Projects installed ("round 2")
	Consent applications complete ("round 2")		
	New lease areas announced ("round 3")	Lease awards ("round 3")	Projects reach FID ("round 3")
		Consent applications ("round 3")	
2015-2017	2018-2020	2021-2023	2024 and beyond
Make the case (socioeconomics)	Complete engineering and permitting	Secure inward investment	Develop the supply chain
Make a plan	Confirm the time line	Complete port upgrades	
Monitor other ports			Build factories and ramp-up production
Create a prospectus			