Empire Wind Development Status

Intergovernmental Renewable Energy Task Force for the New York Bight

May 9, 2018

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Sheringham Shoal, UK	Dudgeon, UK	Arkona, Baltic	Dogger Bank, UK
			
In operation	In operation	In construction	Permitted
317 MW	**402 MW**	**385 MW**	**3600 MW**
2012	**2017**	**2019**	**2020+**

Hywind Demo 2.3MW	Hywind Scotland 30MW	Utility Scale Hywind
		
2009	**2017**	**2020+**

** All capacity figures on 100% basis*

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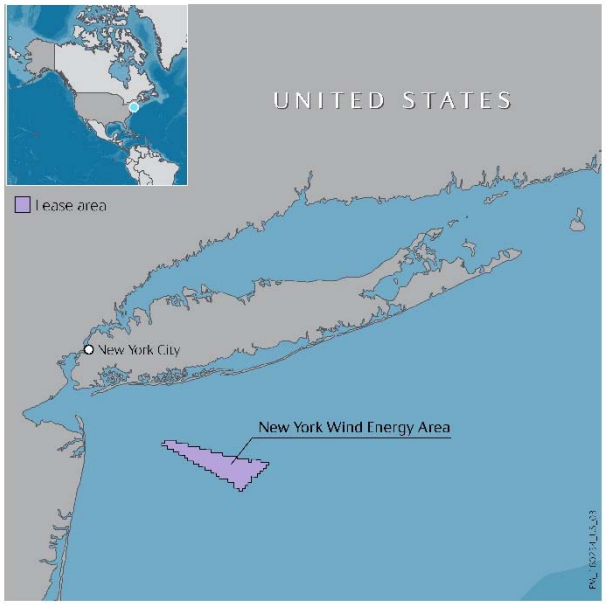
New York, Empire Wind



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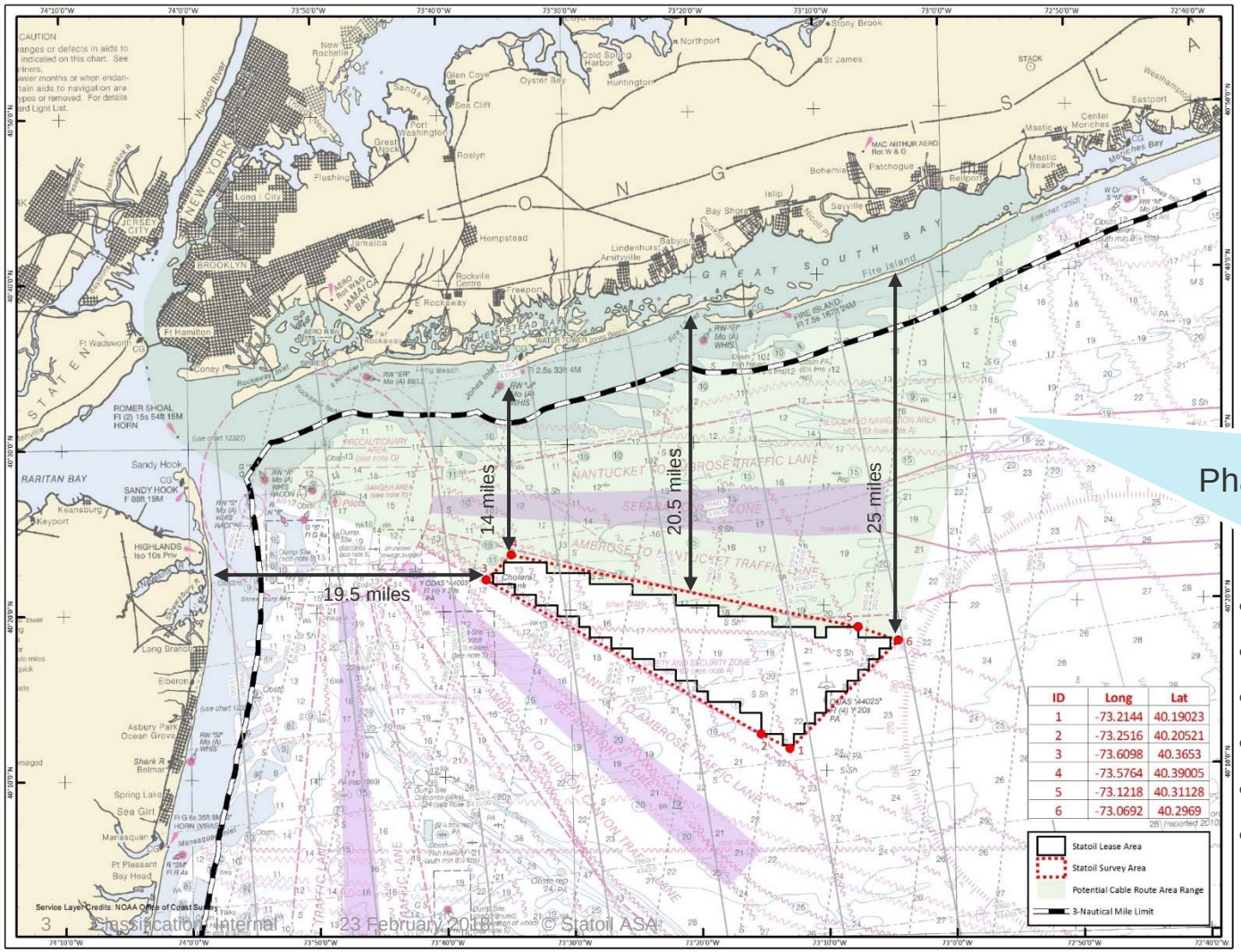

Site Key Data	
Area	79,350 acres (124 sqm)
Water Depth	65-130 ft
Distance to shore	From 14 miles
Capacity	Up to 1.8GW

Phased development?

Indicative

Phase 1

Phase 2

Phase 3

- Grid
- Offtake
- Supply chain
- Design envelope
- Seabed conditions
- Enviro & social impacts

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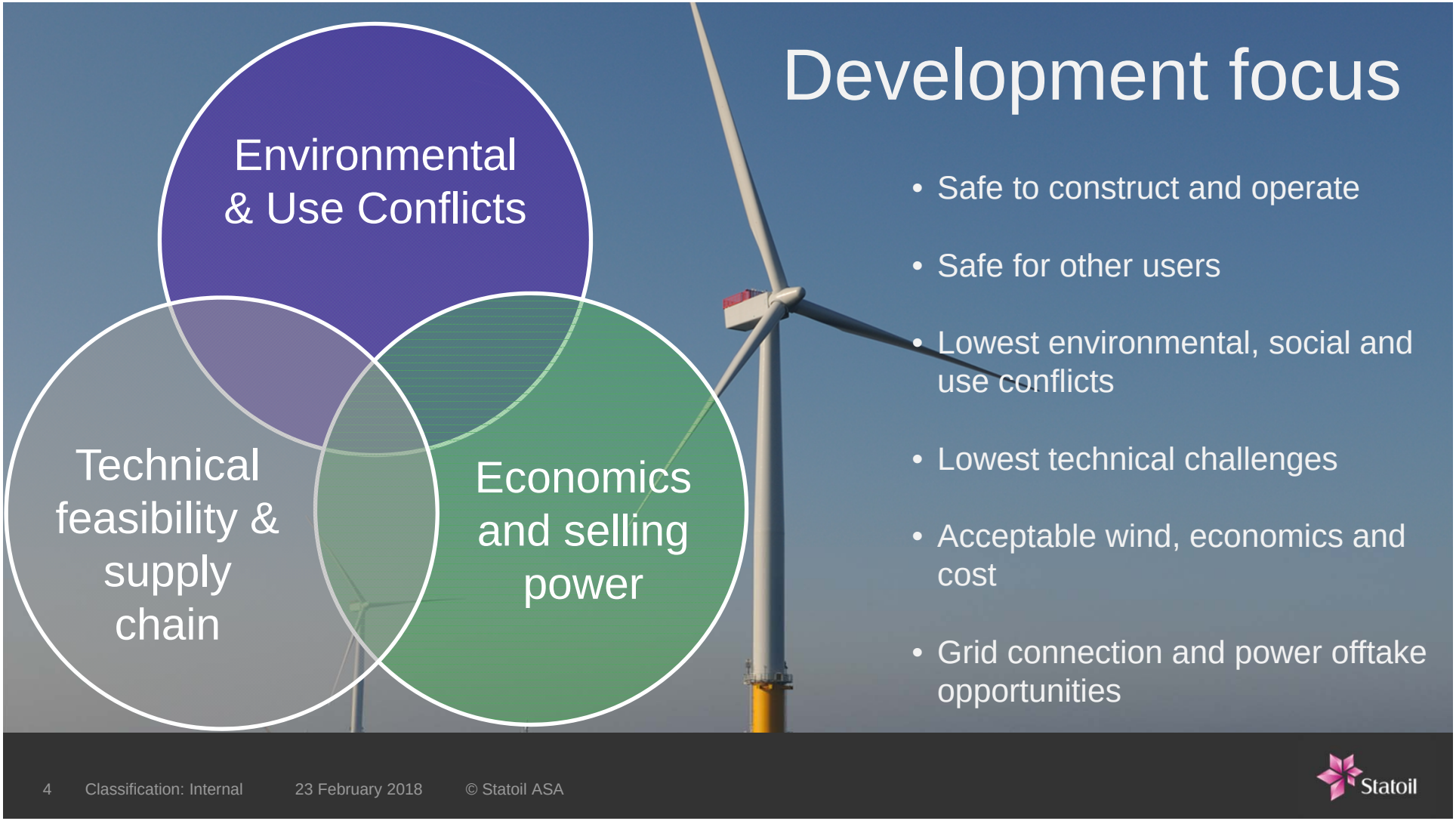
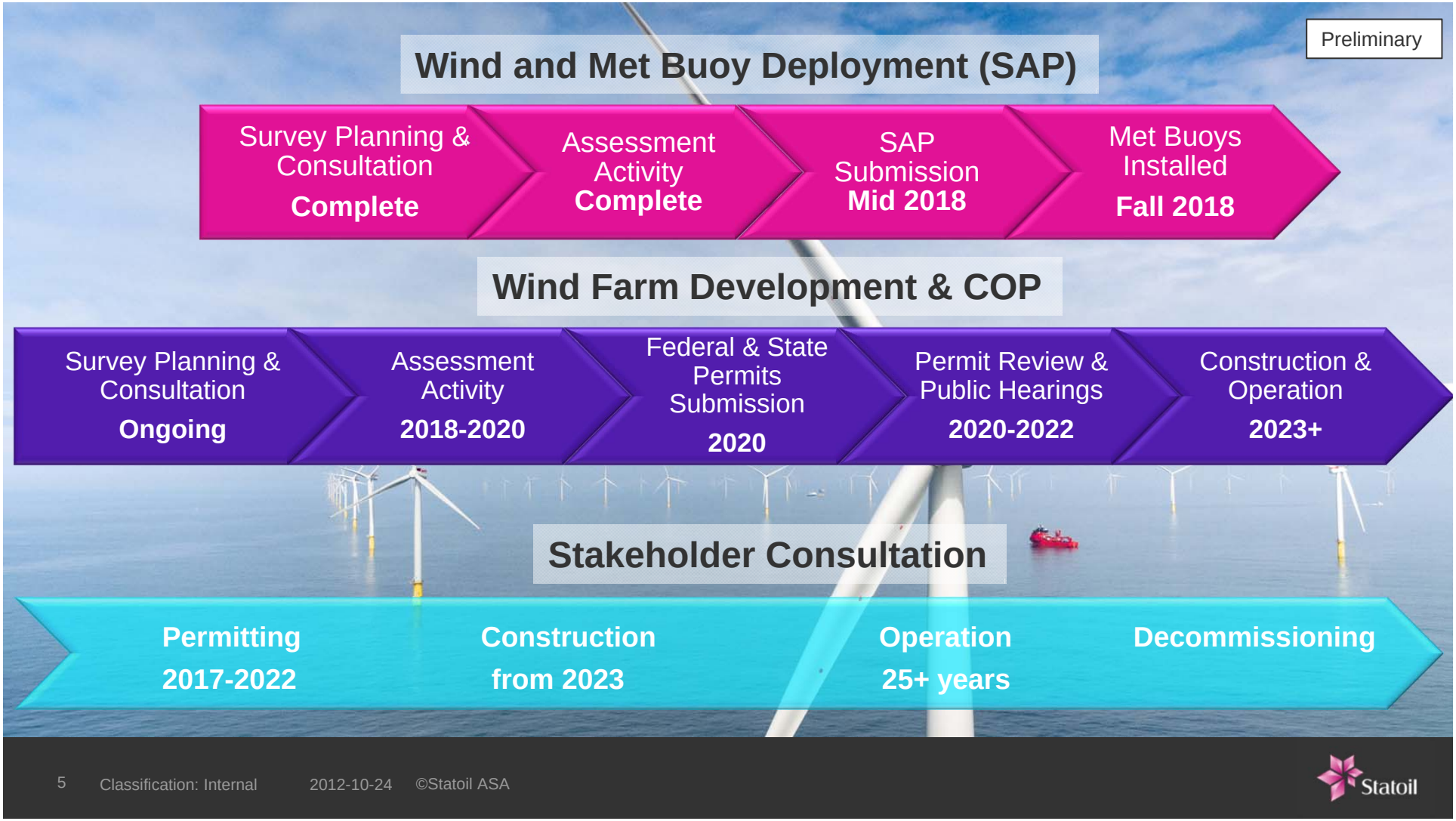


Development focus

- Safe to construct and operate
- Safe for other users
- Lowest environmental, social and use conflicts
- Lowest technical challenges
- Acceptable wind, economics and cost
- Grid connection and power offtake opportunities


Preliminary
Wind and Met Buoy Deployment (SAP)
Survey Planning & Consultation
Complete
Assessment Activity
Complete
SAP Submission
Mid 2018
Met Buoys Installed
Fall 2018
Wind Farm Development & COP
Survey Planning & Consultation
Ongoing
Assessment Activity
2018-2020
Federal & State Permits Submission
2020
Permit Review & Public Hearings
2020-2022
Construction & Operation
2023+
Stakeholder Consultation
Permitting
2017-2022
Construction
from 2023
Operation
25+ years
Decommissioning

Physical Surveys 2018

- Multibeam depth sounder
- Side scan sonar
- Magnetometer
- Shallow / Medium penetration sub bottom profilers
- Sediment samples
- Benthic fauna samples
- Underwater digital video camera
- Preliminary geotechnical samples

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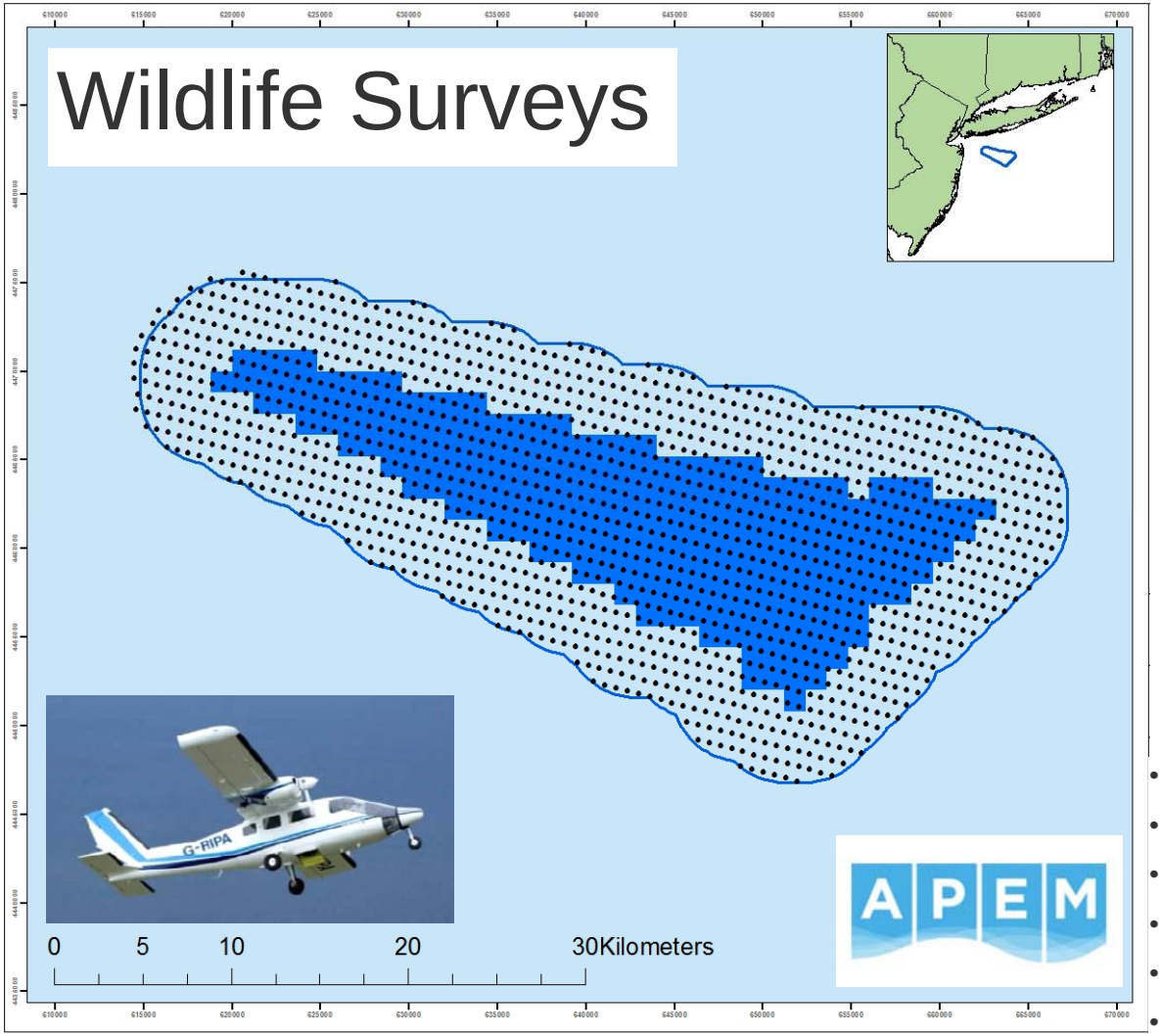
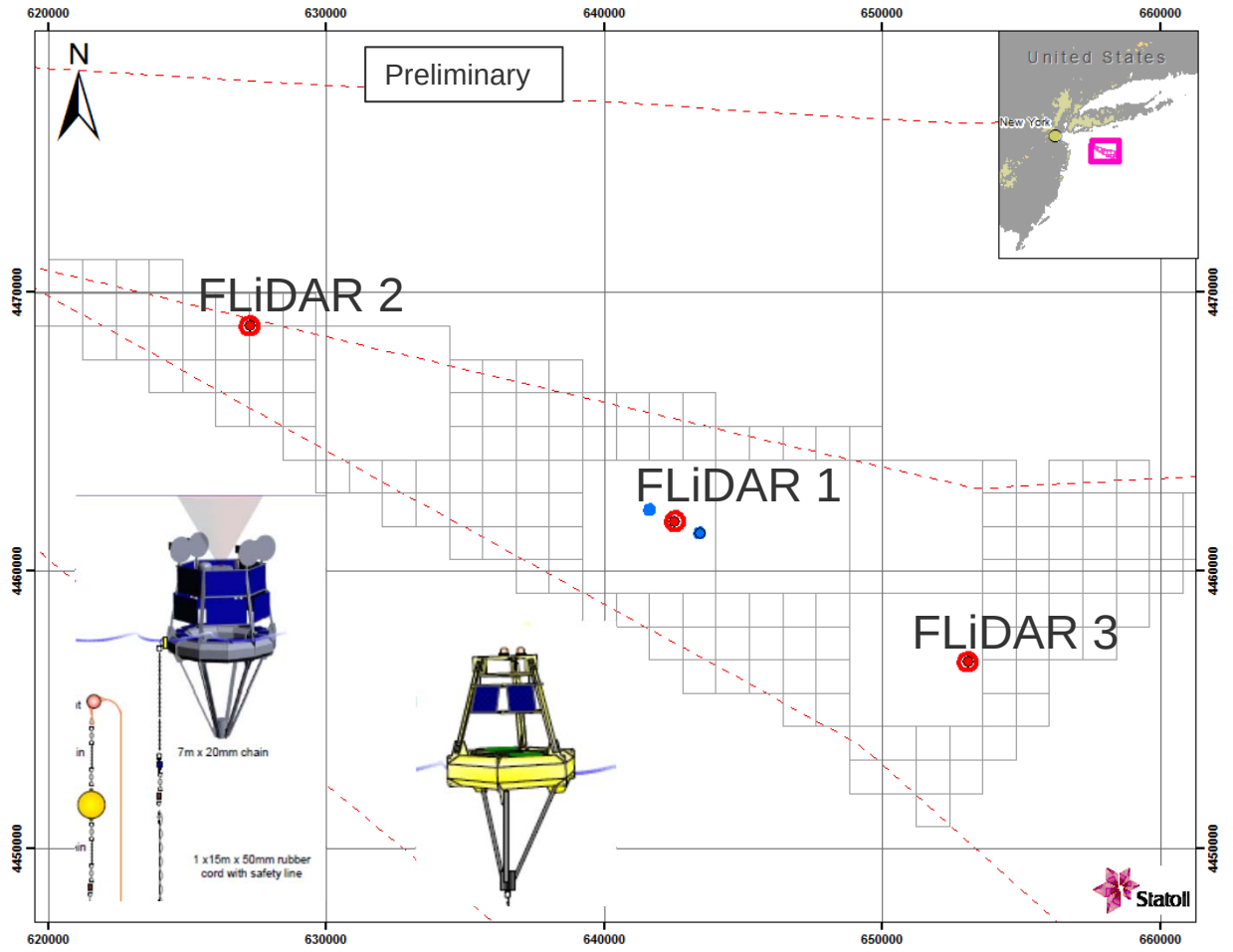
Wildlife Surveys



- Supplementing NYSERDA's Master Plan surveys
- 20% of the Lease Area and 2 mile buffer will be imaged,
- 12 x monthly surveys, started November 2017
- Approx. 1/2" pixel resolution at sea surface
- Birds, marine mammals, turtles & large fish
- Data publicly available online



Wind Resource & Metocean

- Wind data required for project design and economics
- 2 Floating Light Detection and Range buoys (FLiDAR) – wind profile to 600ft
- 1 wave and met buoy
- 1 current profile and water properties oceanographic mooring
- Deployment fall 2018
- A Site Assessment Plan (SAP) will be submitted to BOEM that describes the deployment activity and demonstrates there will be no significant impact.
- Potential for other underwater sensors

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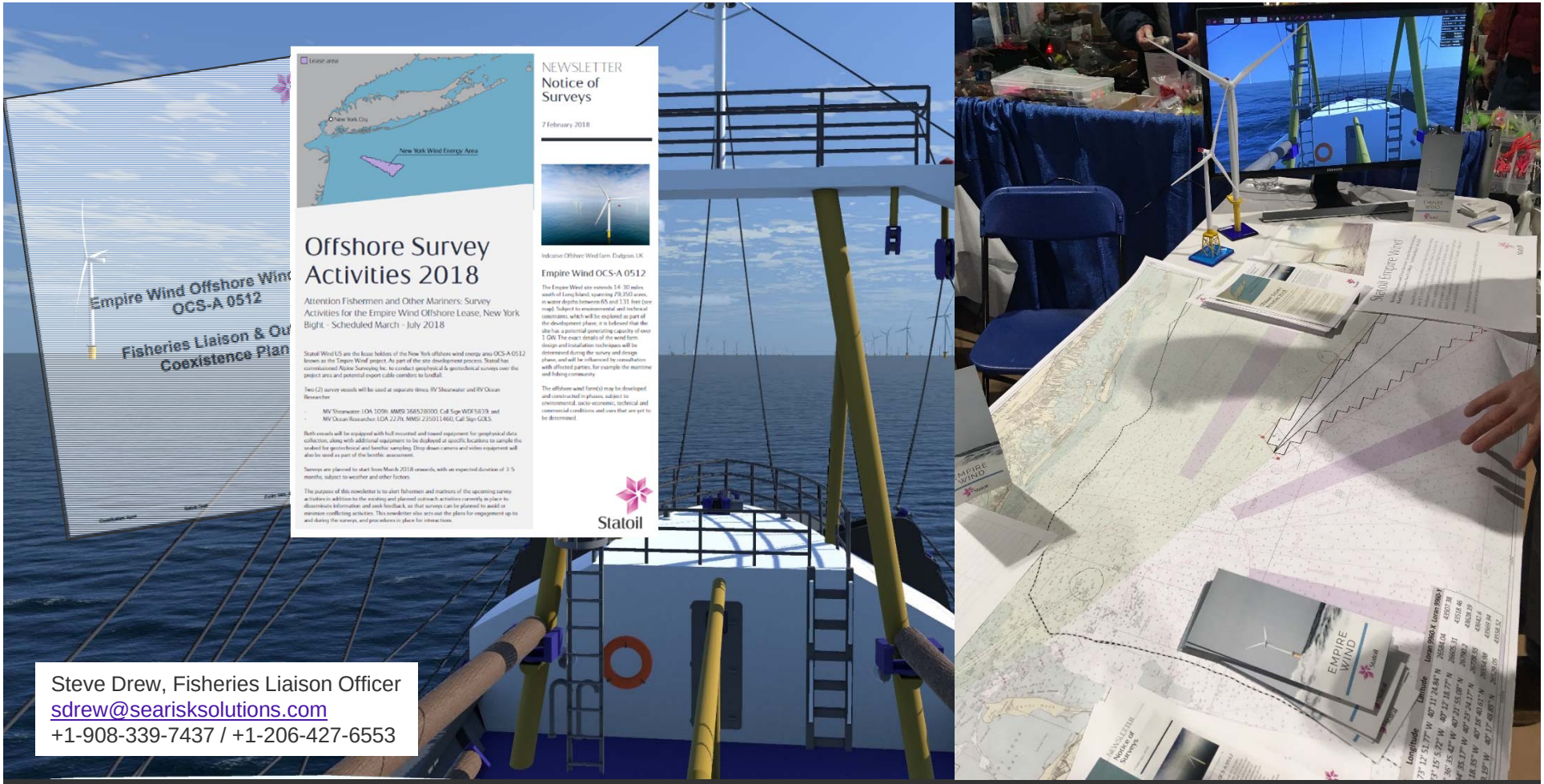

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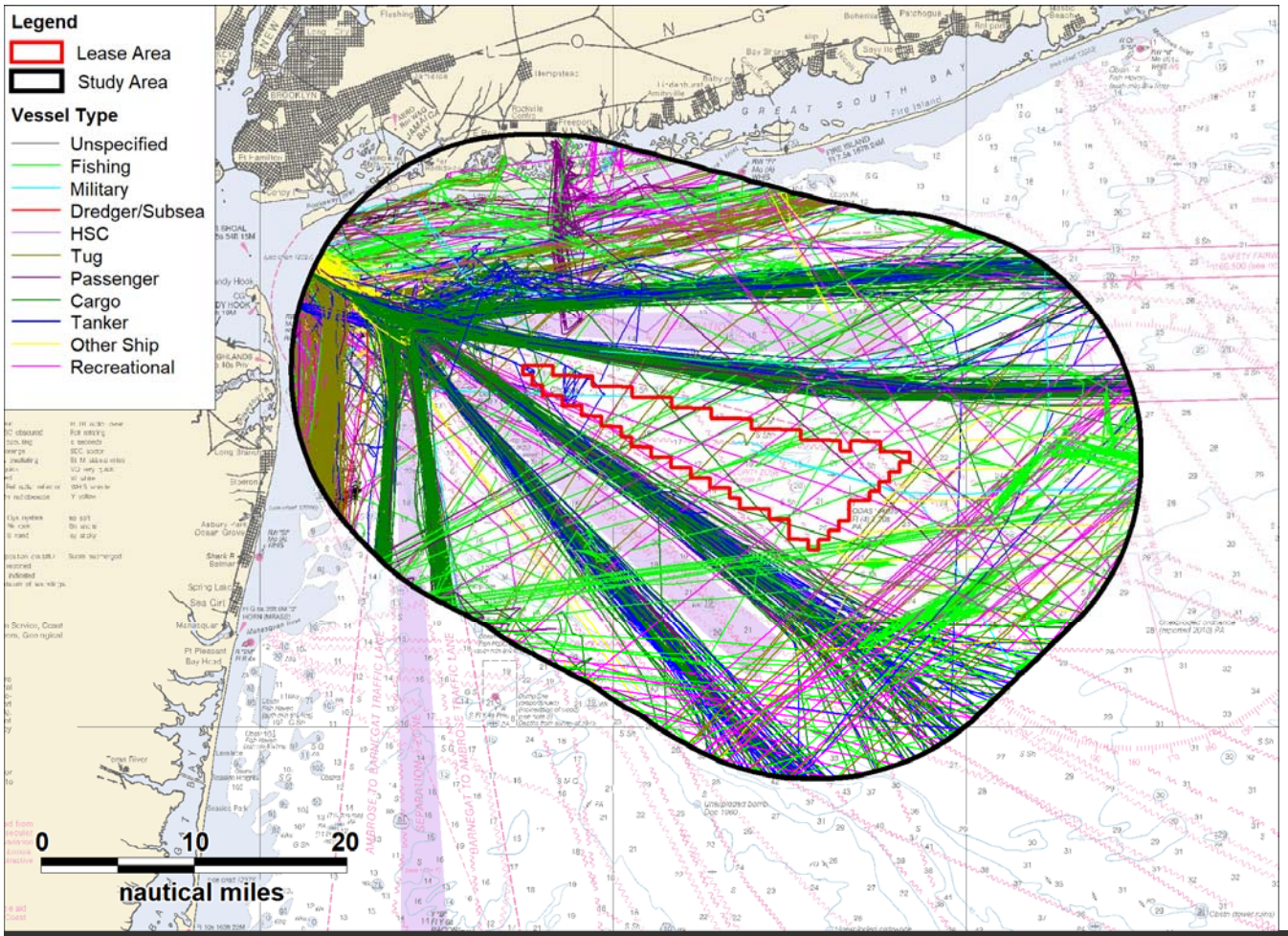
Maritime Assessments



Assessment Activity

Current

- Birds & bats
- Marine Mammals & Sea Turtles
- Fisheries (including benthic habitat)
- Marine Transportation & Hazards to Navigation
- Marine Archaeology
- Geology & Sediment Quality
- Onshore grid & export cable routes
- Supply chain and ports & harbors

Planned

- Geotechnical surveys
- Wind and metocean measurements
- Wetlands, onshore ecology
- Onshore Archaeology & Historic Properties
- Noise (underwater / on-land)
- Aviation
- Onshore routing social impact studies
- Marine mammal mitigation systems

Before we can build, we need a contract to sell our electricity

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Martin Goff

Environment & Permitting

Julia Bovey

External Affairs

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