



conEdison

Meeting the technical challenge of the new energy landscape

NYSERDA 2019 Workshop

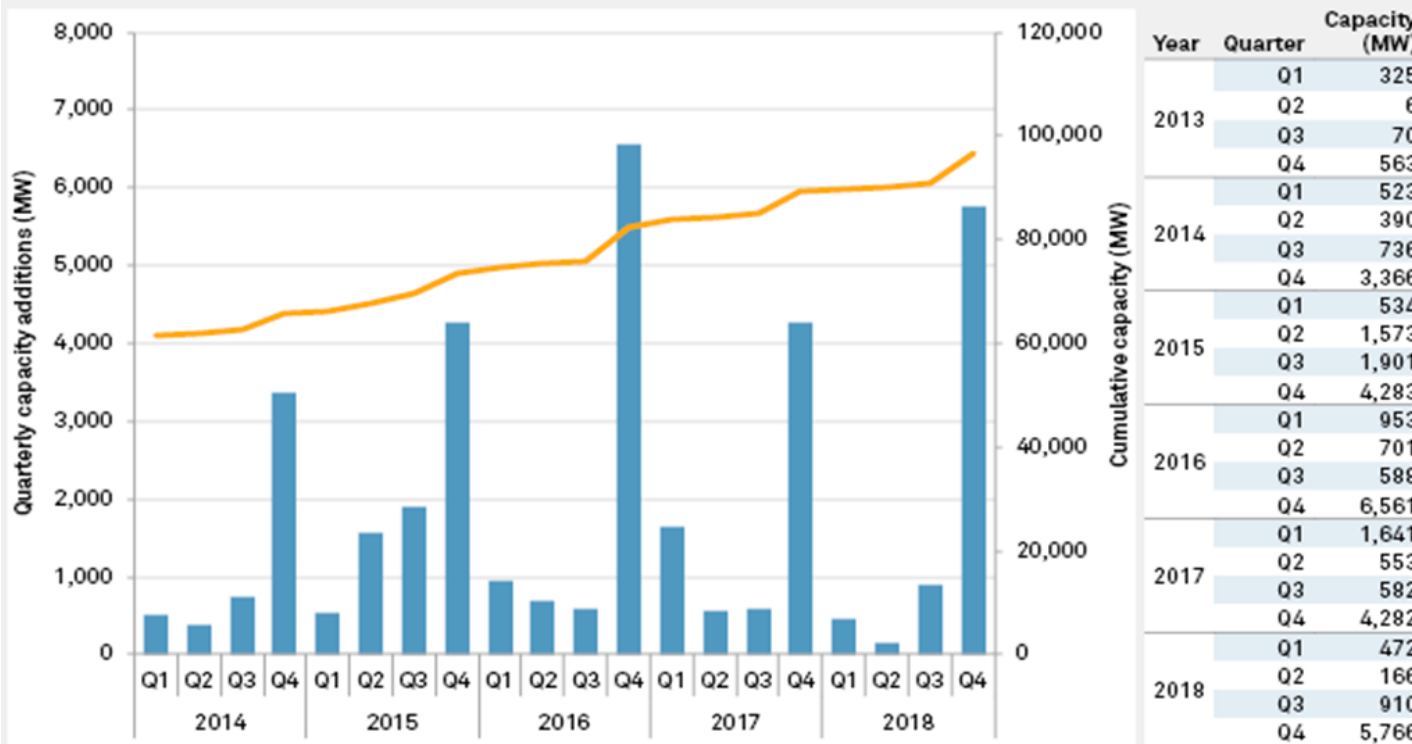
April 9, 2019

General theme

- The utility industry in general, and Con Edison specifically, is supportive of the goal to reduce emissions and to increase renewable sources of electricity.
- Con Edison is moving forward in a variety of ways to create a path towards a new energy landscape
- There are some barriers to full implementation that the industry and the company are working to overcome.

Utility industry has been embracing new generation types

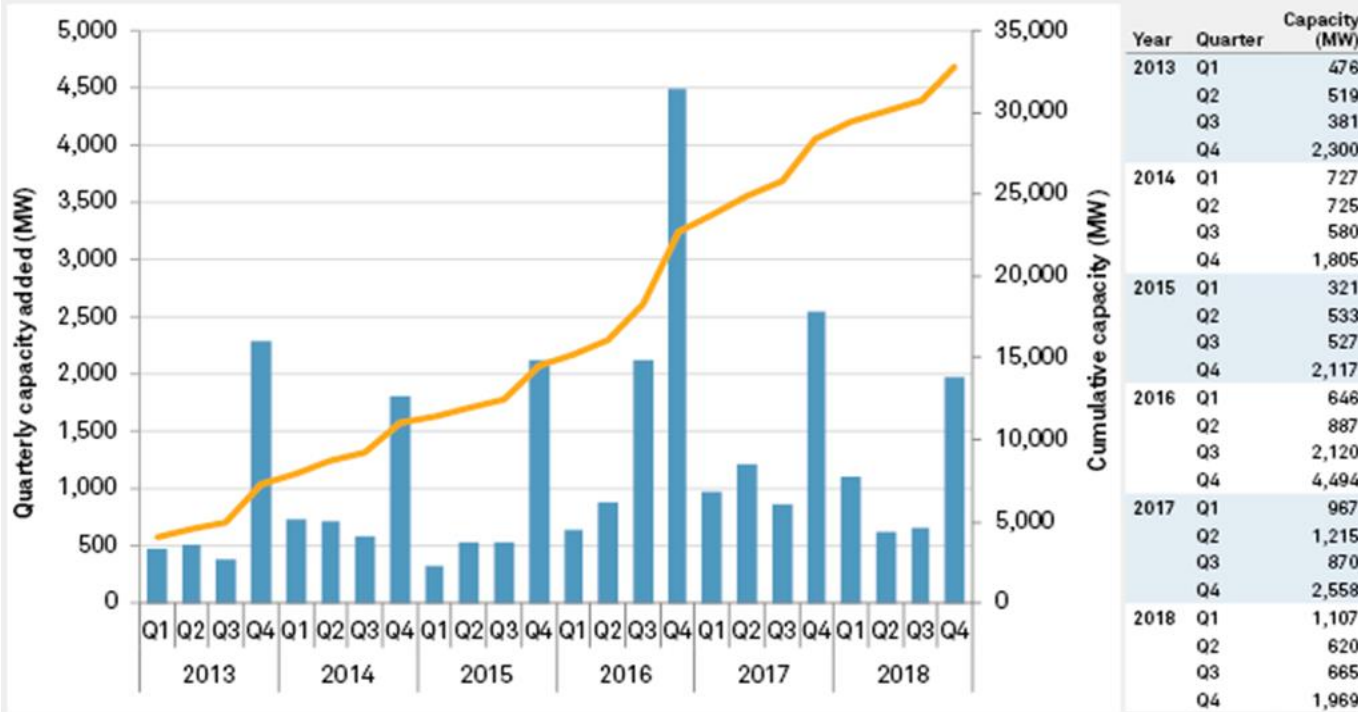
US wind capacity by quarter in service



Data compiled March 8, 2019.
Source: S&P Global Market Intelligence

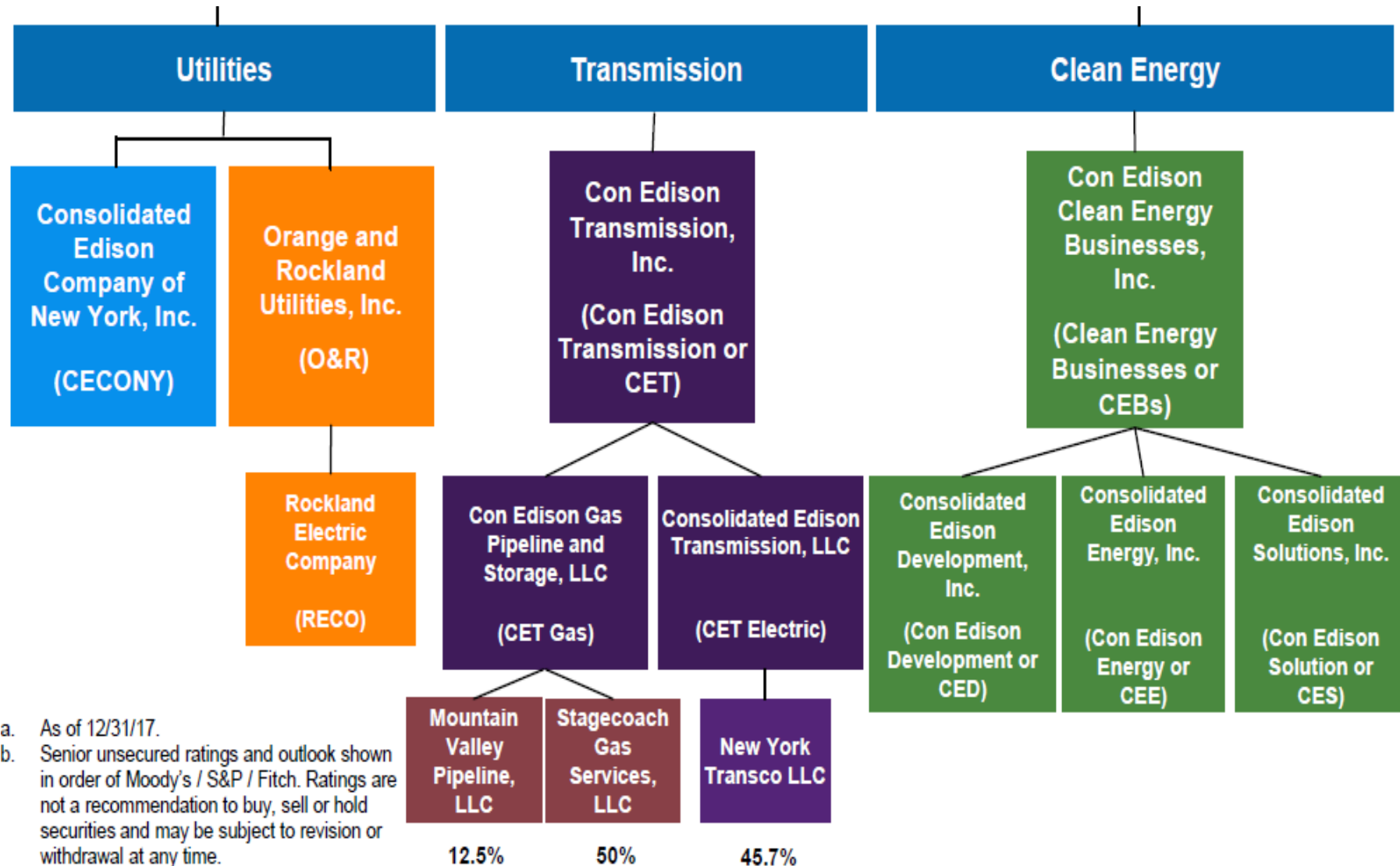
Utility industry has been embracing new generation types (2)

US utility-scale solar capacity by quarter in service



Data compiled March 12, 2019.
Source: S&P Global Market Intelligence

Con Edison Incorporated



Not your “typical” Con Edison generating station!



Three areas of new technology – what are the barriers to implementation?

- Utility scale battery storage
- Utility scale solar generation
- Off-shore wind

Utility scale battery storage

- Energy “footprint”

Project	Power (MW) / Energy (MWh)	Footprint (sq ft.)	Power Density (sq ft per MW)	Energy Density (sq ft per MWh)
BQDM Floral Park	2 / 10	9,000	4,500	900
Mira Loma - SCE	20 / 80	64,000	3,200	800
Altagas Pomona	20 / 80	10,800	540	135
GE – LMS100	100 / 2400	37,500	375	16

Utility scale battery storage

- Safety focus:
- Company has worked with FDNY and NYC DOB to do fire testing, establish setbacks, separation distances, etc.
- Some utility installations have advanced R&D in off-gas monitors to determine potential for adverse outcomes
- Korean experience:
 - 20+ battery fires over last 18 months
 - All lithium ion, majority linked to wind and PV balancing
 - Precautionary de-rates: 5%/95% to 10%/90%
 - Developing new siting standards

Con Ed initiatives – battery storage

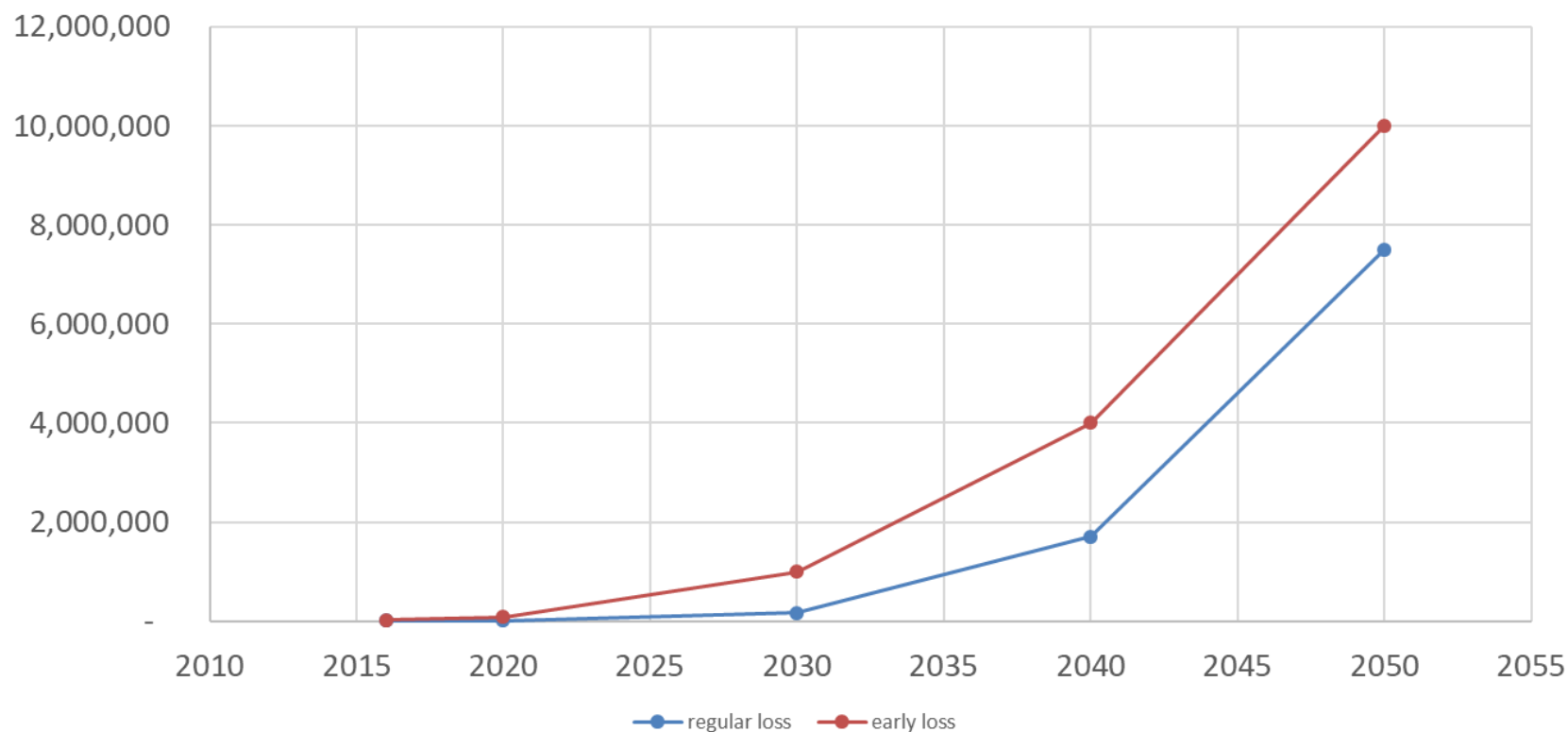
- First affordable housing microgrid in NYC
 - Fuel cell, solar, battery
- Ozone Park BQDM battery installation
 - 12 MW-hr installation on company-owned land
 - Neighborhood-focused demand response tool
 - Developed extensive emergency response plan with FDNY and community groups
- Commercial Battery Storage pilot project
 - 1MW/1MW-hr front-of-meter installations
 - Creates three value streams, simplifies implementation

Utility scale solar generation

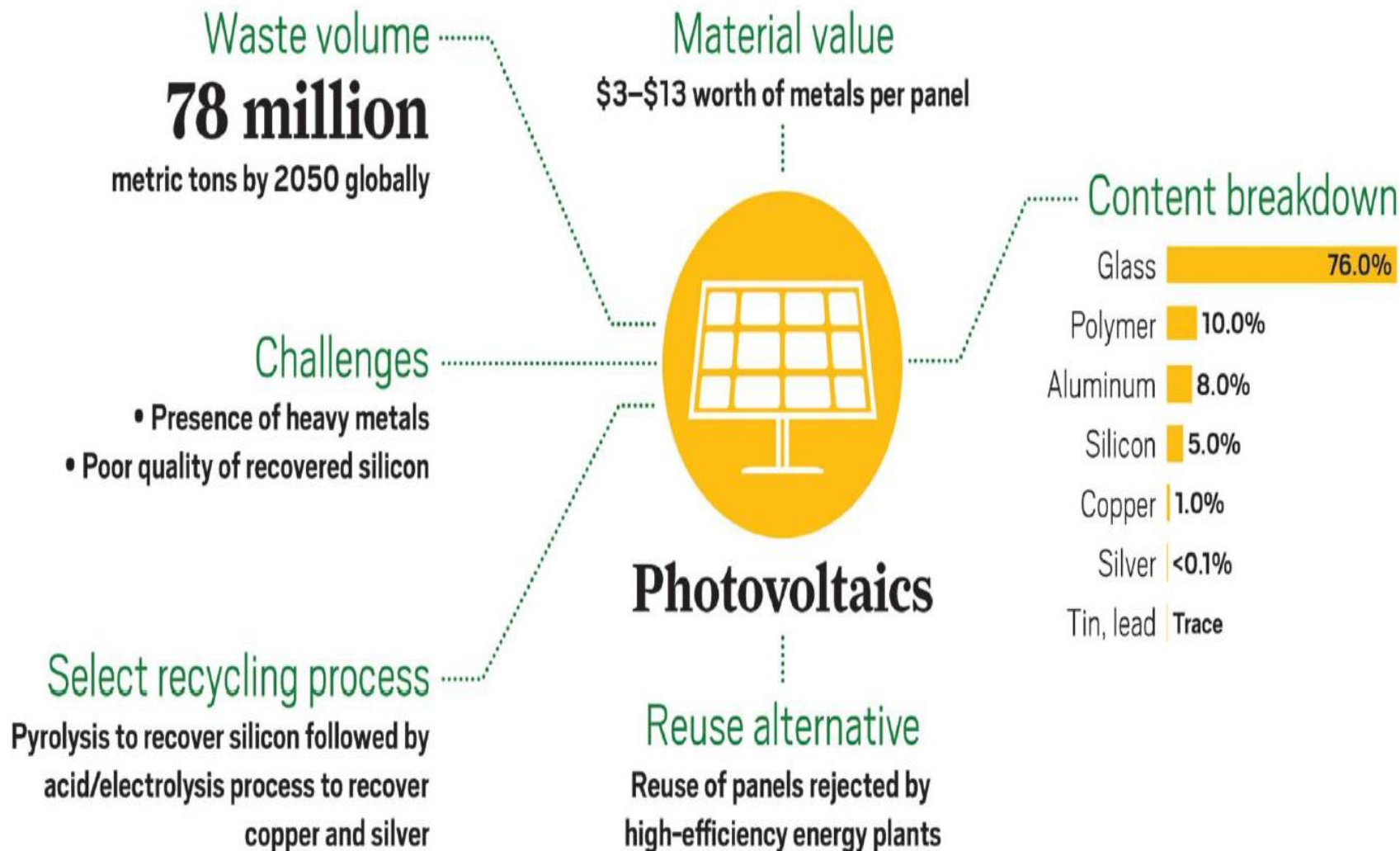
- Energy “footprint” also presents complexity – finding open space near load
 - New Jersey facility: 50 acres / 12 MW /17% capacity factor
 - Property former farmland crossed by existing transmission line
- “Duck curve” issues – greatest power available when power demand is lowest
- End of life issues
 - Recycling industry nascent
 - Increasing waste stream
- Avian issues

Waste volumes will be significant (IEA 2016)

U.S. modelled results
end-of-life waste volumes, (metric tons)



Let's Just Recycle Everything!



[Chemical & Engineering News](#)

Avian interactions – ongoing studies



Argonne National Laboratory photo

Con Edison initiatives – utility solar

New York City – affordable housing “sharing”



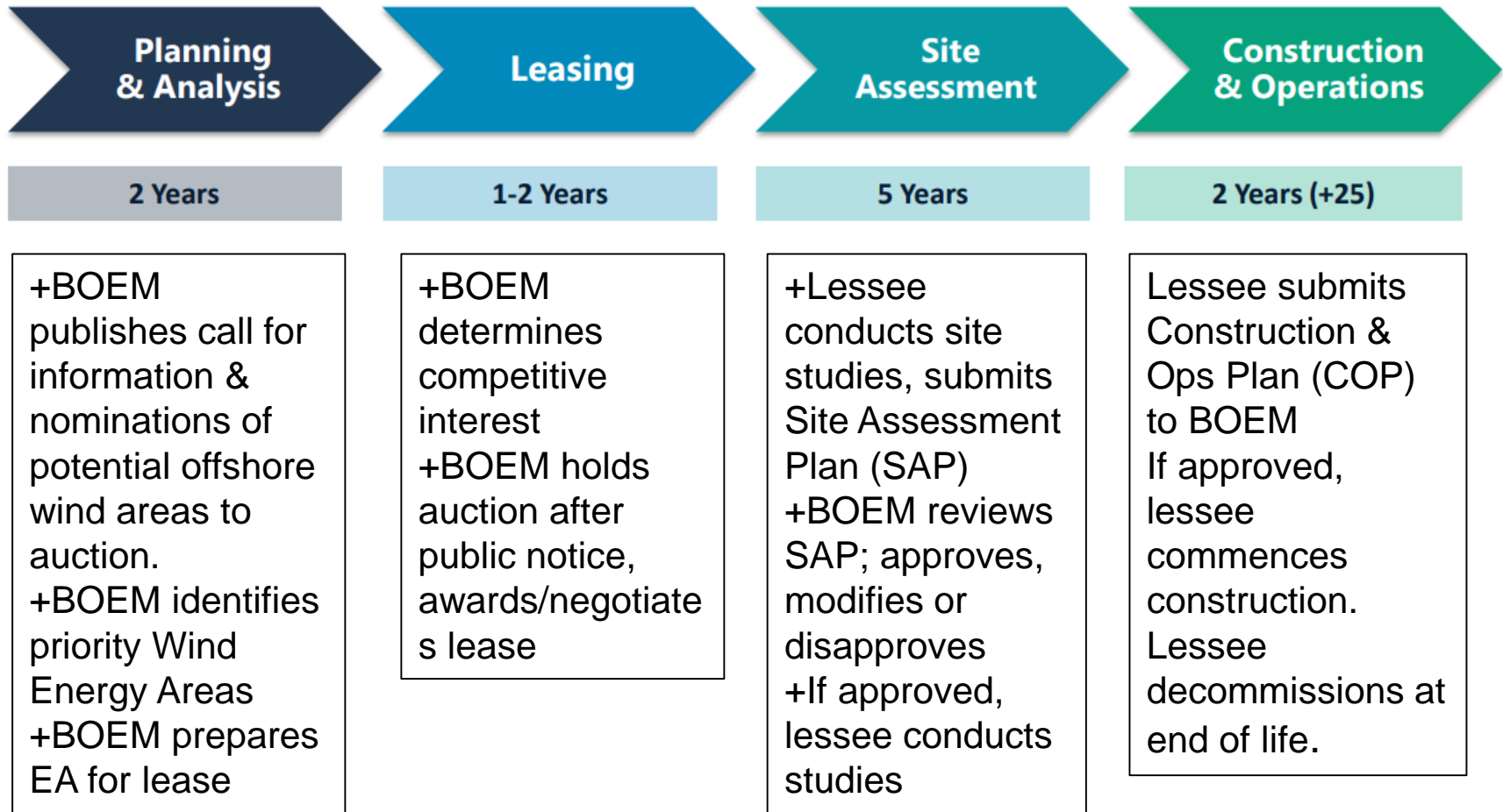
Large scale national level purchase



Offshore wind

- Siting timeframes
- Construction and natural resources interactions
- End of life issues

Federal leasing and permitting process



Natural Resources Interactions

- November 2018: Workshop on “The State of the Science on Wildlife and Offshore Wind Energy Development” sponsored by NYSERDA
- January 2019: Agreement among Vineyard Wind, the National Wildlife Federation, the Natural Resources Defense Council, and the Conservation Law Foundation
 - Sets out mitigation and protections for the North Atlantic right whale
 - “...intended to serve as a model for similar agreements pertaining to offshore wind projects along the East Coast.”
 - May set the pace of construction

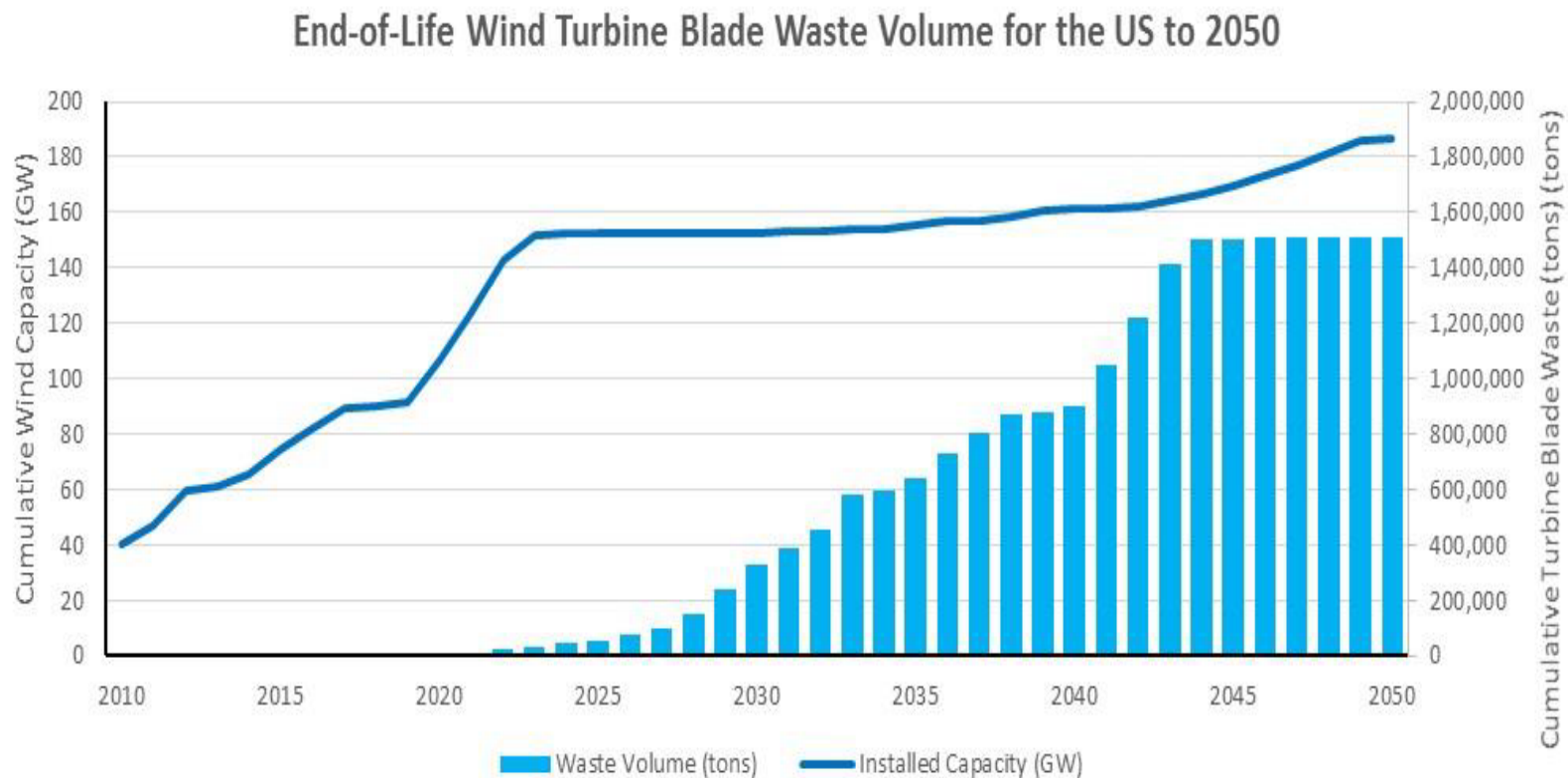
Illustrative provisions – Vineyard Wind / NGO agreement

- January 1 – April 30: no pile driving
- November 1 – December 31 & May 1 - 14: Enhanced mitigation protocol required for pile driving
 - No night work*
 - 10,000 meter clearance zone
 - Trained observers to monitor presence of whales
- May 15 – October 31: Comprehensive monitoring & clearance zone protocols for pile driving
 - No night work*
 - 1000 meter clearance zone with passive acoustic monitors

Illustrative provisions (continued)

- Geophysical surveys during construction / post construction
 - None over specific sound levels Jan 1 – May 14
 - Clearance zone protocols remainder of year
 - Site assessment survey restrictions TBD
- Vessel speed restrictions
 - Limit of 10 knots in Dynamic Management Areas
- Underwater noise attenuation

End of life issues



EPRI estimates based on EIA 2017 annual energy outlook

Con Edison and offshore wind

- Committed to participate in study announced by Governor in summer 2018
- NYPA will lead study, Con Edison will collaborate with NYISO, NYSERDA, and LIPA
 - Learn from European infrastructure design
 - Identify best practices in connecting wind-generated power
 - Identify successful efforts to reduce consumer costs
- Will work with NYC to develop landside facilities as opportunities arise

Summary – change is never simple!

