

# **Eversource 345-kV Structure Replacement Projects (2021-2022)**

Reliability Committee Meeting

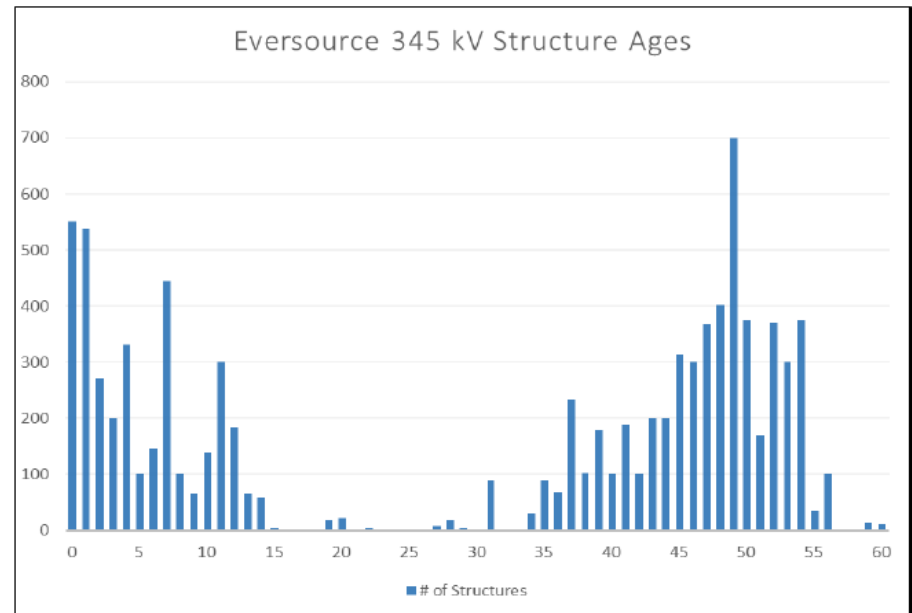
December 14<sup>th</sup>, 2021

# Agenda

- Eversource 345-kV System Summary
- Project Drivers
  - Reliability and Safety
  - Asset Condition
  - OPGW
  - Hardware
- Project Geographic Locations
- Project Summary

# Eversource 345-kV System Summary

- Eversource manages ~1250 miles of 345-kV overhead lines
  - Over 40% of all New England 345-kV PTF
  - Eversource has over 9,000 345-kV structures
- The majority of New England's 345-kV system was constructed in the 1960s and 1970s
  - The 345-kV structures targeted by this presentation are typically wood, single circuit structures in an H-frame configuration for replacement in 2021 and 2022



# Project Drivers – Reliability & Safety

- Eversource is focused on safe and reliable operation of the transmission system, and frequent inspections are performed in accordance with the Eversource Maintenance Program
- Inspection results are reviewed by Maintenance and Engineering personnel
- Factors such as cost of structure components vs. cost of future access, environmental impact, and abutter impact will be assessed
  - Where there is significant cost and/or impacts associated with access to the structure in need of replacement (matting, etc.), the adjacent structure will be reviewed for consideration of replacement at the same time
- Structures that are being replaced will be reviewed for storm hardening and compliance with the most recent National Electric Safety Code (NESC) and Massachusetts Department of Public Utilities loading and clearance criteria
  - New structures are typically light-duty steel (wood pole equivalent) direct embed poles

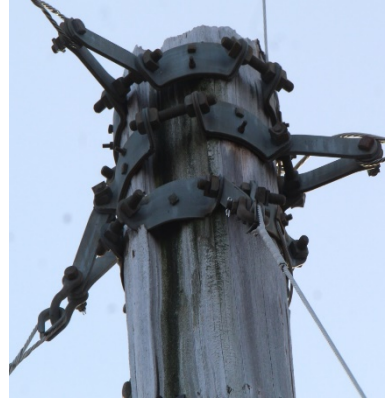
# Project Drivers – Asset Condition

- Structure Inspections:
  - Foot Patrol – line crews walk/drive along line to observe general condition of structures above ground level and general ROW conditions
  - Structure Ground Line – specialized crews excavate ~18” below grade at each structure to determine subsurface integrity of pole and apply treatment as necessary
  - High Resolution Aerial – entire system flown with detail hover review at most structures resulting in high resolution photos
  - Thermography – infra-red camera (typically on helicopter) observes line for hot-spots
  - Comprehensive Drone – combines foot patrol and high-resolution aerial aspects of inspection
- Inspections of the 345-kV system indicate a need to replace wood structures such as splitting and cracking of poles, woodpecker and insect damage, rot and decay, and other forms of aging, degradation, and damage
- Replacing wood structures with light duty steel poles resolves structural and hardware issues, and supports safe and reliable operation

# Project Drivers – Asset Condition (cont'd)



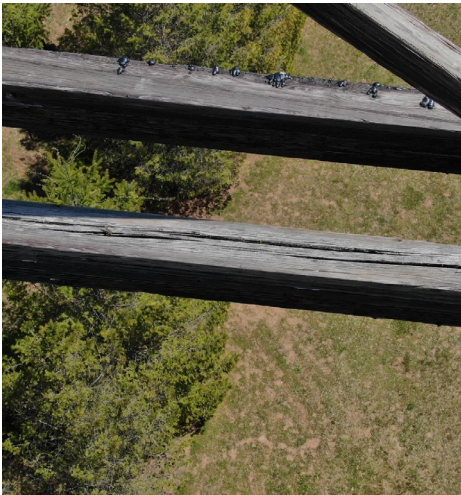
387  
Pole Top Rot



310  
Pole Splits



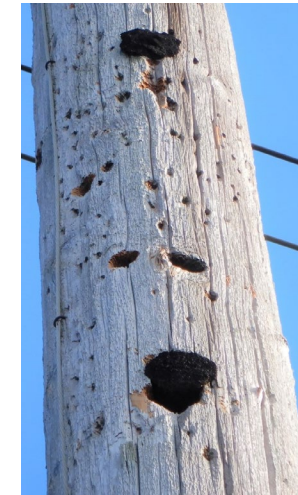
3041  
Woodpecker Damage



3754  
Cross Arm Damage



319  
Pole Splits



387  
Woodpecker Damage

# Project Drivers – OPGW

- New OPGW
  - Similar cost to a like-for-like shield wire replacement
  - OPGW both shields lines and increases communication and reliability within the Eversource System
  - OPGW installation expands a private Eversource OPGW / Synchronous Optical Networking (SONET) loop
  - CIP: OPGW provides the necessary bandwidth for physical security monitoring and triaging of alarms for BES Cyber Systems
  - OPGW is considered generally immune to the effects of geomagnetic disturbances

# Project Drivers – Hardware

- PINCO insulators must be replaced to ensure continued reliability
  - PINCO insulators have not been installed on Eversource system since the late 1980s
  - May 2017 PINCO insulator failure on 310 line prompted additional testing
  - EPRI testing revealed that PINCO insulators were defective and failed below mechanical and electrical ratings
- Replacements of PINCO insulators, where applicable, will be coordinated with structure replacements

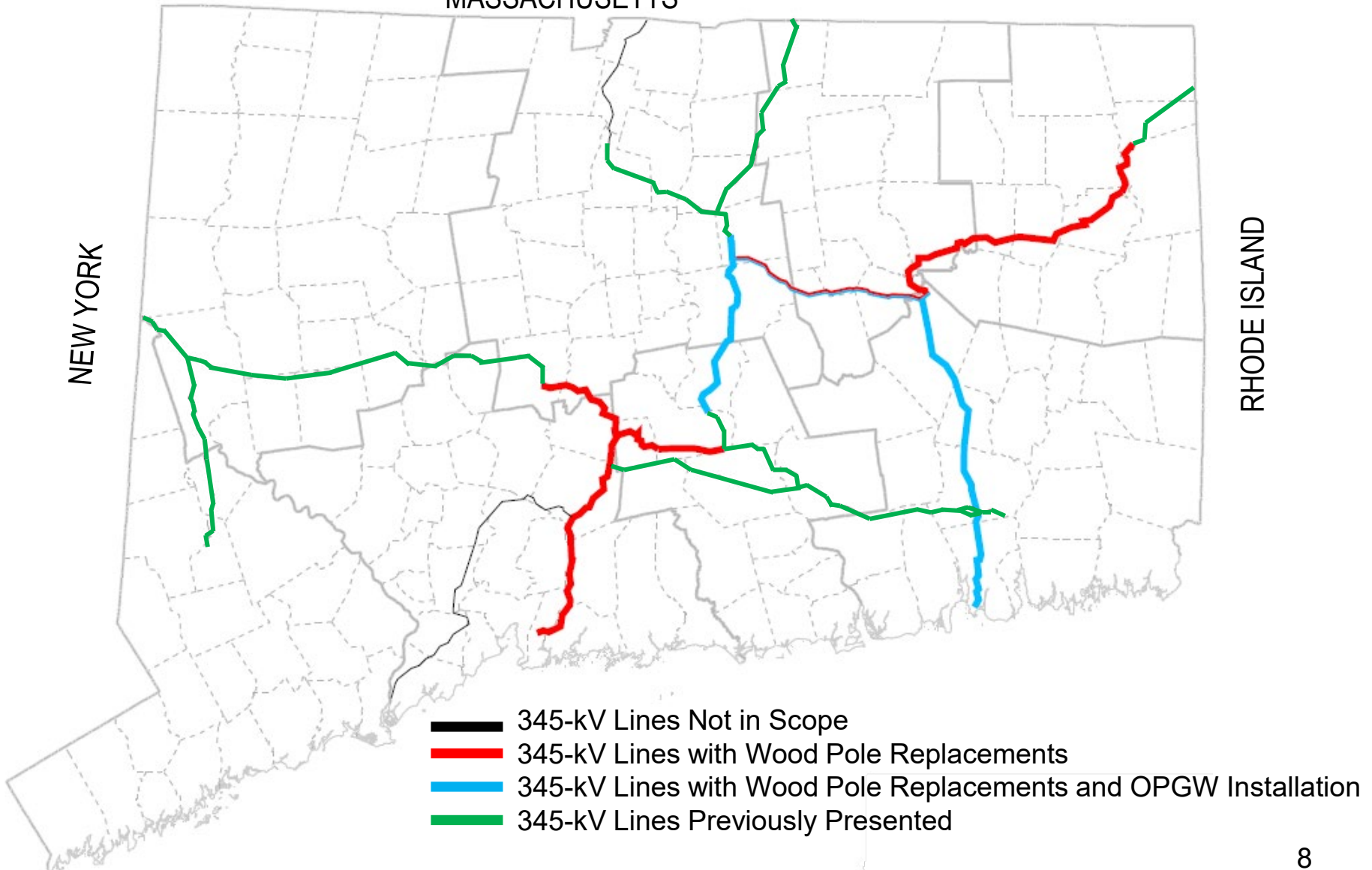


Fragments of Failed PINCO Insulator –  
Line 310



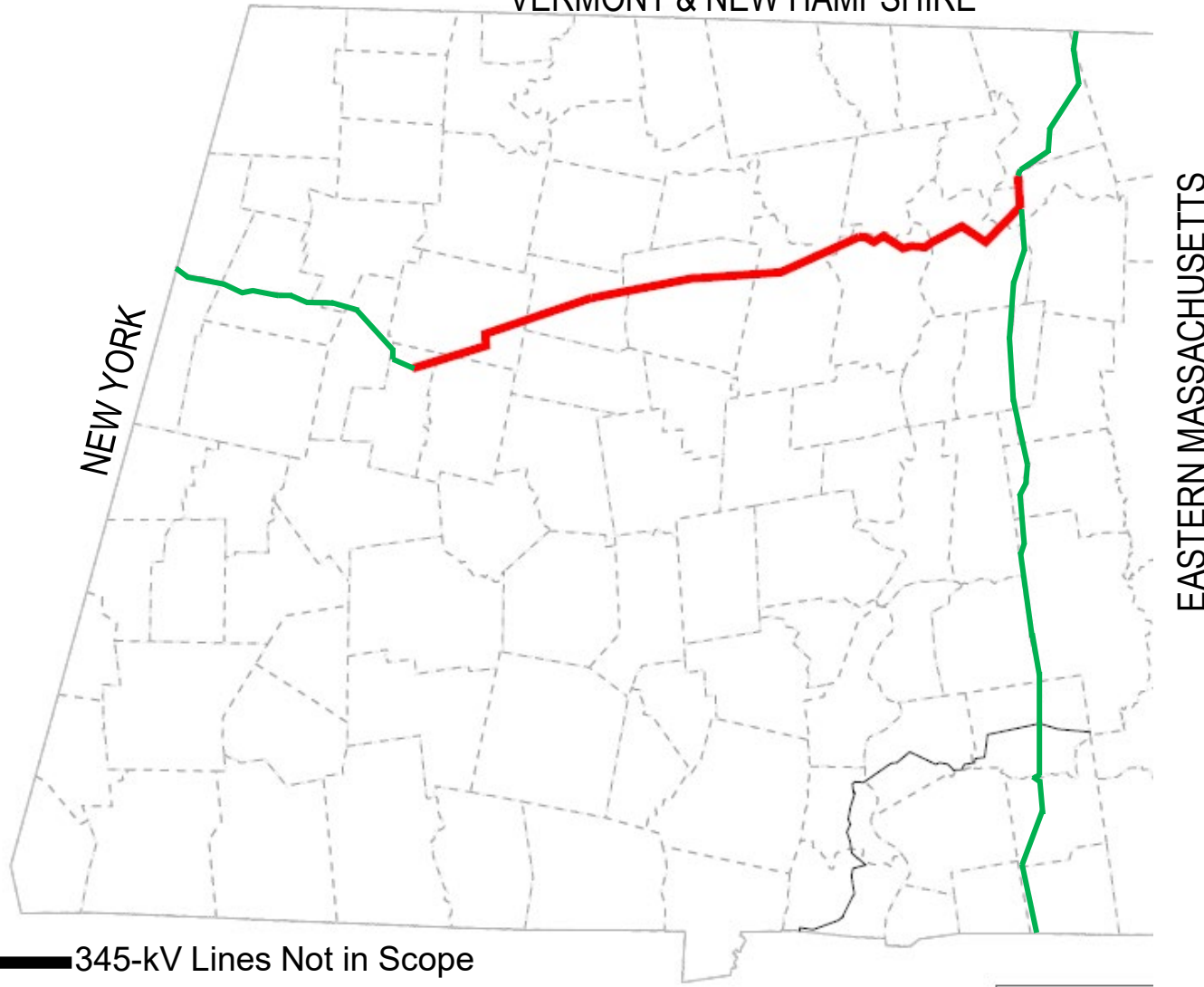
# CT 345-kV Geographic Locations

MASSACHUSETTS



# WMA 345-kV Geographic Locations

VERMONT & NEW HAMPSHIRE

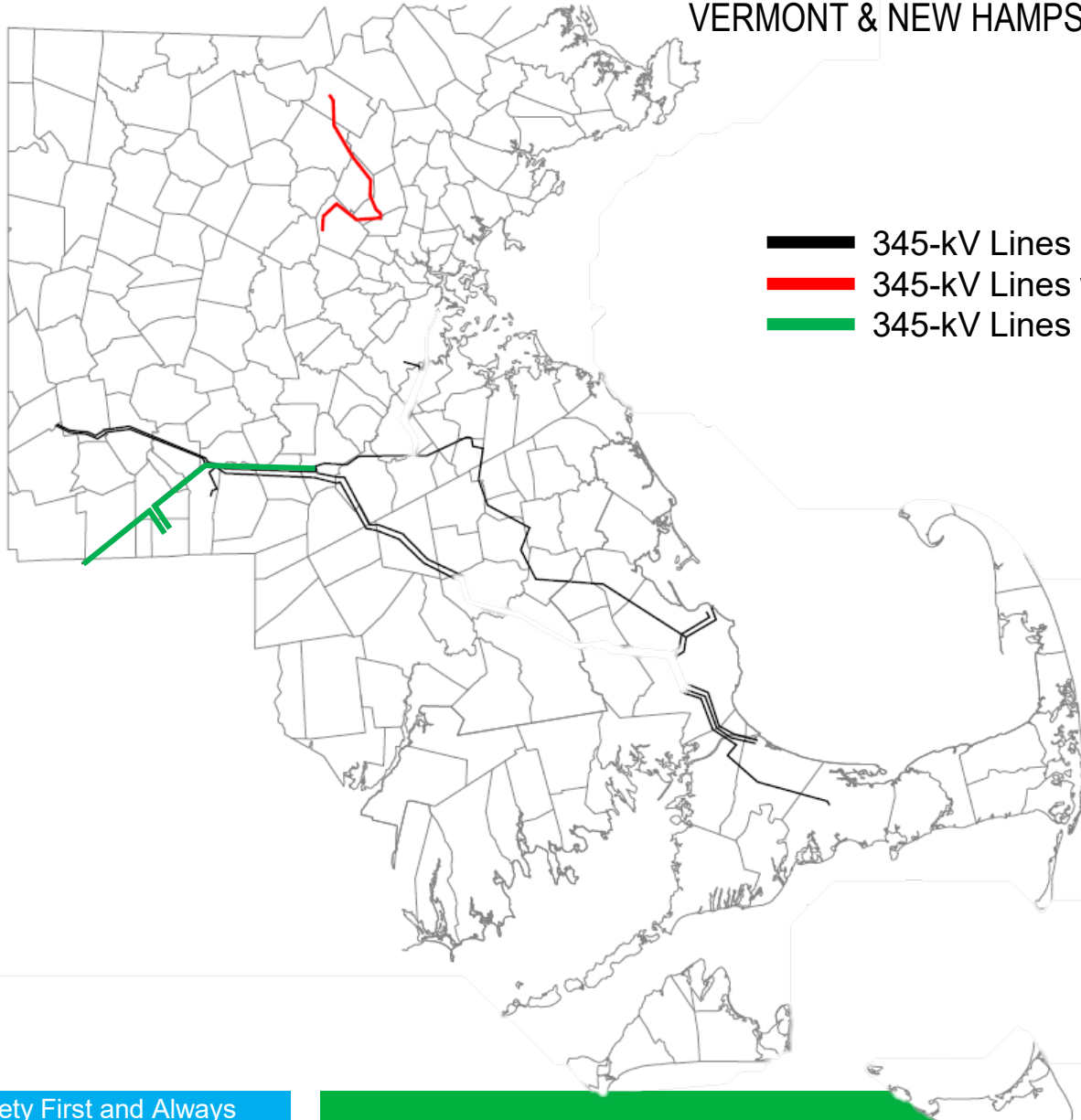


- 345-kV Lines Not in Scope
- 345-kV Lines with Wood Pole Replacements
- 345-kV Lines Previously Presented

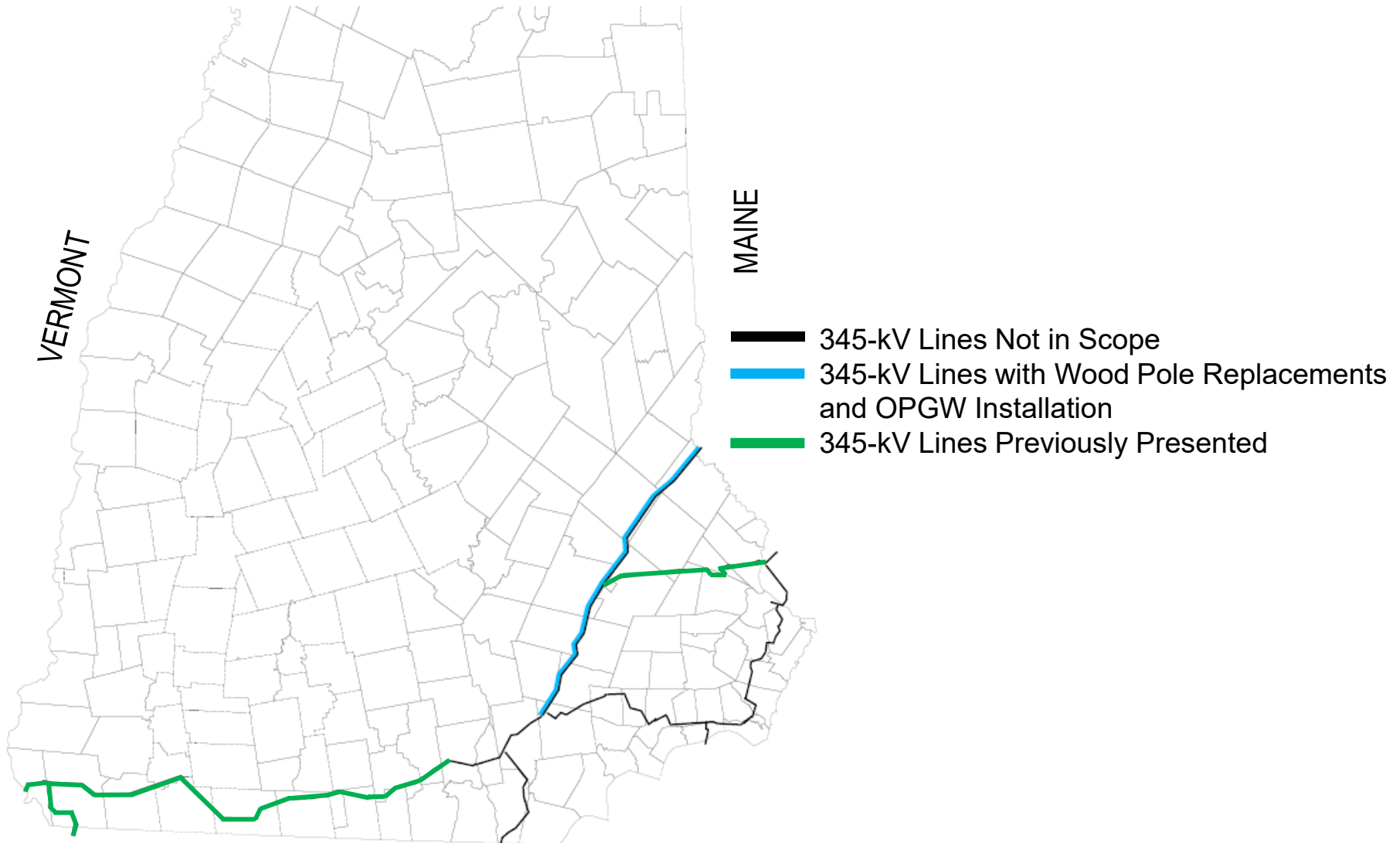
# EMA 345-kV Geographic Locations

VERMONT & NEW HAMPSHIRE

WESTERN MASSACHUSETTS



# NH 345-kV Geographic Locations



# 345-kV Lines Summary - Costs

115-kV and 230-kV Wood Pole and Shield Wire Replacements 2021-2022				
Location	Line	TCA #	Description	TCA Submitted Cost (\$Ms)
CT	310*	ES-21-TCA-42	Manchester Substation – Millstone Substation	\$61.333
CT	330	ES-21-TCA-35	Card Substation – Killingly Substation	\$8.039
CT	368*	ES-21-TCA-27	Card – Substation – Manchester Substation	\$9.860
CT	383*	ES-21-TCA-29	Millstone Substation – Card Substation	\$16.778
CT	387*	ES-21-TCA-46	Scovill Rock Substation – East Shore Structure 8879	\$12.781
CT	3041*	ES-21-TCA-24	Southington Substation – Scovill Rock Substation	\$14.534
CT	3424*	ES-21-TCA-25	Manchester Substation – Kleen Energy Substation	\$14.900
CT	3754*	Not Required/<\$5M	Southington Substation – Beseck Substation	-
MA	312	ES-21-TCA-30	Berkshire Substation – Northfield Substation	\$21.160
MA	319	ES-21-TCA-26	Woburn Substation – Lexington Substation	\$7.838
MA	338	ES-21-TCA-40	Woburn Substation – NGRID Border	\$9.704
NH	373	ES-21-TCA-01	Deerfield Substation – Scobie Pond Substation	\$9.351
<b>Total</b>				<b>\$186.278</b>

\* Scope includes PINCO insulator replacements

# Project Summary

- Inspections have indicated significant degradation of system-wide 345-kV wood poles
  - Replacing the structures with light-duty tubular steel pole structures resolves multiple structural and hardware issues to support safe and reliable operation
- Install OPGW for increased communication and reliability throughout the system
- Replace failing PINCO insulators
- All replacements and upgrades will be designed to meet current design criteria

**The total estimated TCA cost for the 345 kV structures, shield wire, and PINCO replacements is \$186.3 M**

Note: The ISO-NE PAC presentation was on January 21, 2021

# Questions

