

EPRI-NYSERDA Workshop: “Climate Change Vulnerabilities of and Adaptation Strategies for New York State’s Future Electric System.”

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National Grid Climate Resiliency Initiatives

Utility Panel: “Climate resilience research needs and utility perspectives on project outcome.”



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Manager, Transmission Design-NY

May 16th, 2017



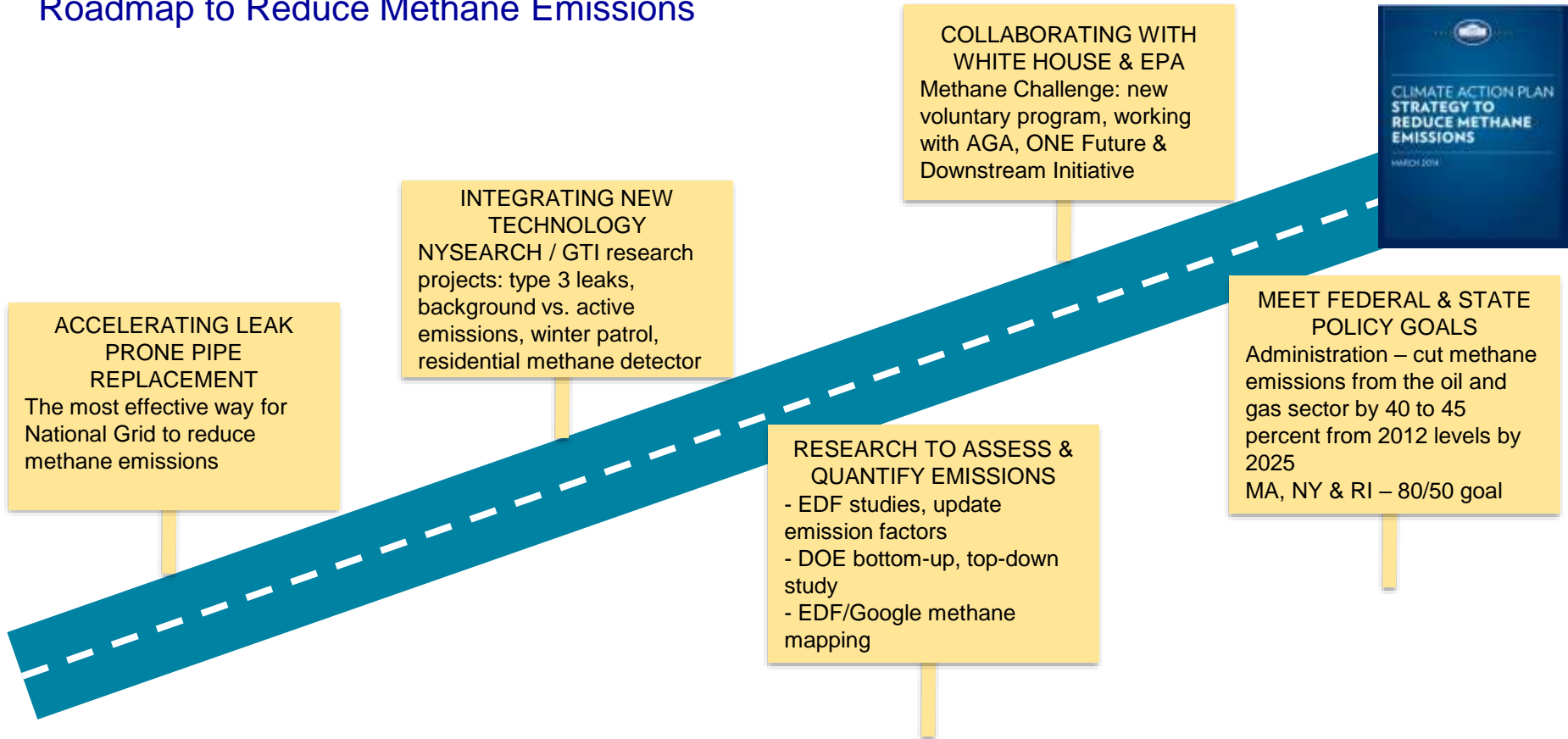
National Grid Climate Resiliency Initiatives:

- ◆ ‘Storm Hardening Collaborative’ – KEDNY rate case
 - Gas system hardening & long term planning based on climate change projections.
- ◆ DOE ‘Partnership for Energy Sector Climate Resilience’
 - Identifying vulnerabilities, experience & knowledge sharing of partners and establishing resilience strategies & guidelines.
- ◆ Climate Change Adaption Steering Committee
 - Senior Leadership Committee to establish framework for future organization and model.
- ◆ National Grid Electric & Gas Grid Resiliency Plan
 - Incorporating best practices into Standards

Asset	Climate Variables that Impact Asset	Estimated Climate/Weather Thresholds that Trigger Changes and Current Mitigation
Gas Mains	Coastal and Inland Flooding	Intensity of rainfall 2-3" per 24 hour period – Proactive Actions such as storm patrol Storm Surge – Forecasted 3-4ft above street can potentially trigger isolation of systems
	Temperature (e.g., cold)	Temperature of gas kept ~40F with heaters; rapid ambient ΔT hasn't been a concern Extended cold could trigger frost heave – monitor frost levels
	Sea Level Rise	Water won't overtake HP main force; can be submerged as long as cathodically protected Storm Surge – Forecasted 3-4ft above street can potentially trigger isolation of systems
	Seismic Activity	Not in a geographical area of concern
	Lightning	Induced voltage flow can damage pipe coating – annually checked per code and repaired
Regulator Stations	Coastal and Inland Flooding	Intensity of rainfall – Proactive Actions such as draining vaults
	Temperature (e.g., cold)	Temperature of gas kept ~40F with heaters; rapid ambient ΔT hasn't been a concern
	Sea Level Rise	System is designed to sustain flooding if properly ventilated – monthly visits
	Seismic Activity	Not in a geographical area of concern
	Lightning	Induced voltage flow can damage pipe coating – annually checked per code and repaired
	Wind	100 MPH winds – may cause concern to look at heater stacks; vent poles sturdy foundation Proximity to substations should be addressed when designing/prioritizing for lightning
LNG Plants	Coastal and Inland Flooding	To be updated after 2 nd Quarterly
	Temperature (e.g., cold)	
	Sea Level Rise	
	Seismic Activity	
	Lightning	
	Wind	

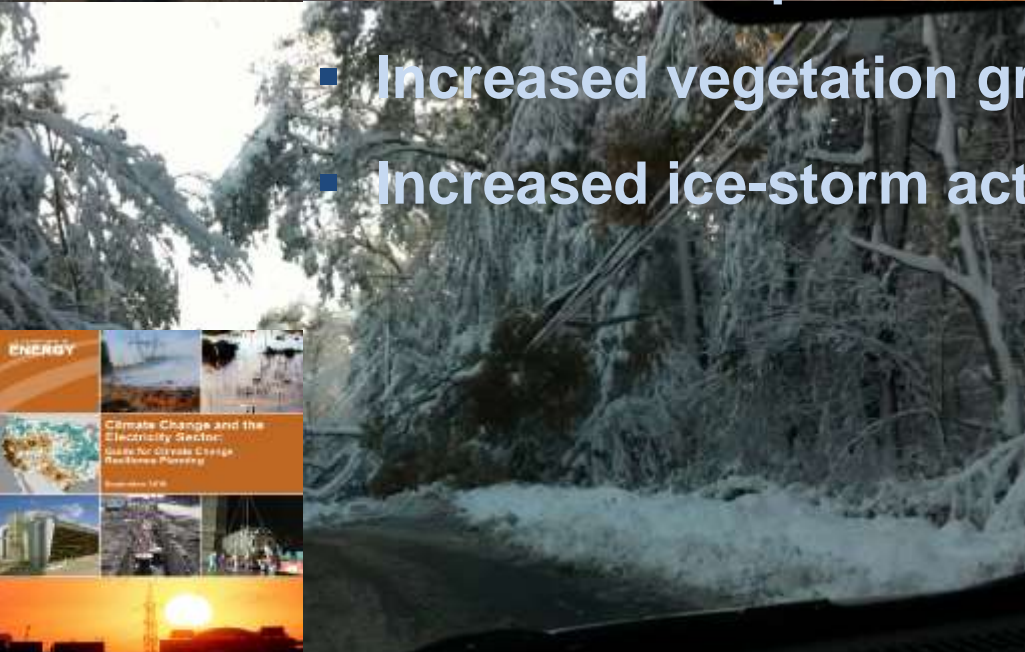
****Corporate Process Safety Analyses cover weather related impacts – all assets**

Roadmap to Reduce Methane Emissions



◆ Northeast Weather Stressors

- Higher winds
- **Increased flooding & heavy rainfall: INITIAL FOCUS**
- Increase sea level rise
- Increased coastal erosion
- Increased temperatures
- Increased vegetation growth
- Increased ice-storm activities



ENERGY
Climate Change and the Electricity Sector: Strategic Policy Options for the United States
July 2010

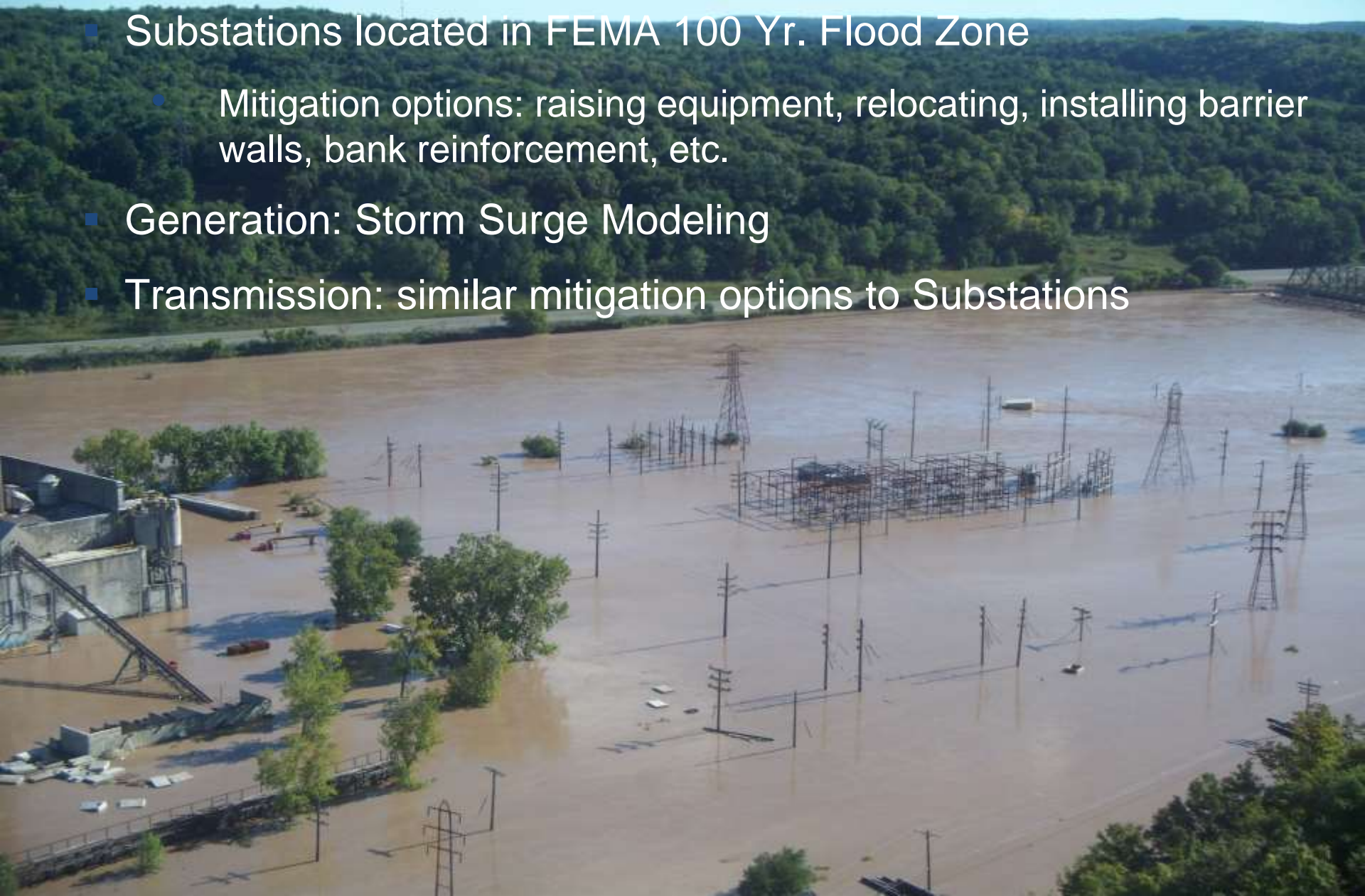


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Weather Stressor: Increased Flooding & Heavy Rainfall

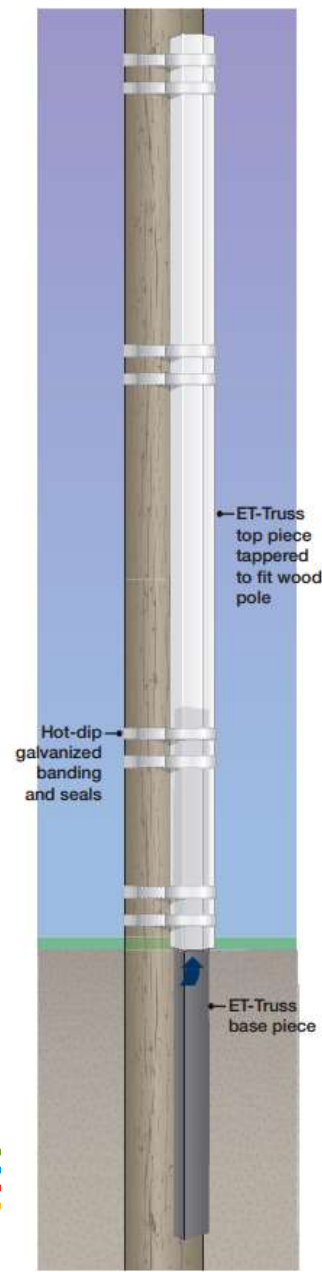
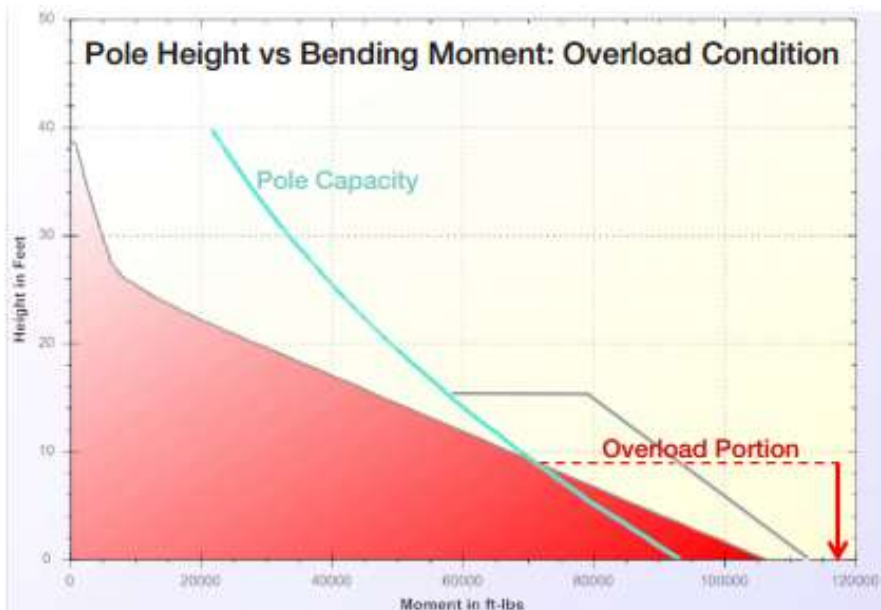
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- Substations located in FEMA 100 Yr. Flood Zone
 - Mitigation options: raising equipment, relocating, installing barrier walls, bank reinforcement, etc.
- Generation: Storm Surge Modeling
- Transmission: similar mitigation options to Substations



Weather Stressors: Early Ice/Snow Storms & High Winds

- ◆ Feeder Hardening efforts to allow structures to withstand greater loading conditions during extreme weather events.
 - Larger class poles
 - Osмосe ET-truss reinforcement
 - Adding termination/dead-end structures.



Weather Stressors: Increased Air & Water Temperatures

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3M™ Aluminum Fiber Core



- ◆ Generation: Clean Water Act regulations for plant cooling water intake & discharge temperatures
- ◆ Substations: added load on equipment and reduction in efficiencies.

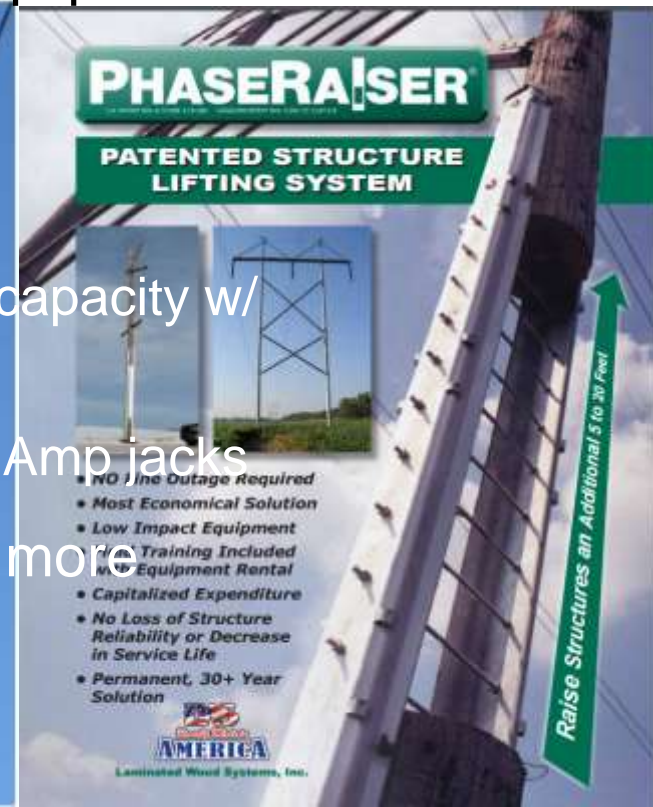
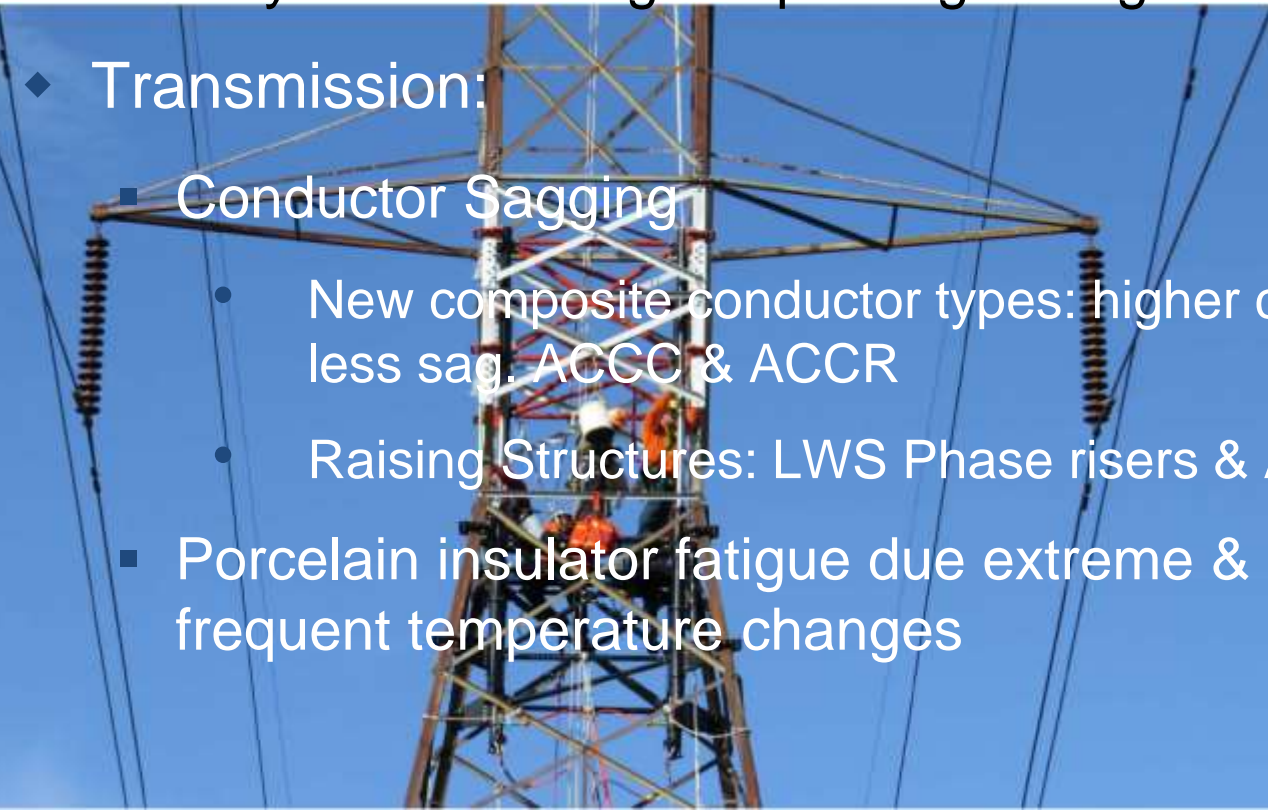
- Rely on air cooling or updating to larger equip.

◆ Transmission:

■ Conductor Sagging

- New composite conductor types: higher capacity w/ less sag. ACCC & ACCR
- Raising Structures: LWS Phase risers & Amp jacks

- Porcelain insulator fatigue due extreme & more frequent temperature changes



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