

NERC

NORTH AMERICAN ELECTRIC
RELIABILITY CORPORATION

Project 2019-01

Modifications to TPL-007-3

Standard Drafting Team Meeting

May 15, 2019

11:00 a.m. – Noon Eastern

RELIABILITY | ACCOUNTABILITY



Administrative

- Review NERC Antitrust Compliance Guidelines and Public Announcement
- Roll Call and Determination of Quorum

Agenda

- History of TPL-007
- Assignment Leads

It is NERC's policy and practice to obey the antitrust laws and to avoid all conduct that unreasonably restrains competition. This policy requires the avoidance of any conduct that violates, or that might appear to violate, the antitrust laws. Among other things, the antitrust laws forbid any agreement between or among competitors regarding prices, availability of service, product design, terms of sale, division of markets, allocation of customers or any other activity that unreasonably restrains competition. It is the responsibility of every NERC participant and employee who may in any way affect NERC's compliance with the antitrust laws to carry out this commitment.

Participants are reminded that this meeting is public. Notice of the meeting was widely distributed. Participants should keep in mind that the audience may include members of the press and representatives of various governmental authorities, in addition to the expected participation by industry stakeholders.

Chair	Emanuel Bernabeu	PJM Interconnection
Vice Chair	Per-Anders Lof	National Grid
Members	Mike Steckelberg	Great River Energy
	Rui Sun	Dominion Energy
	Jow Ortiz	Florida Power & Light (NextEra Energy)
	Cynthia Yiu	Hydro One Networks Inc.
	Reynaldo Ramos	Southern Company Services
	Aster Amahatsion	American Electric Power
	Justin Michlig	MISO

Insufficient scientific-engineering foundation for a GIC studies.

Insufficient scientific foundation. Supplemental is designed similar to an extreme event in TPL-001-4 (old Category D).

EOP-10

TPL-007-1
Benchmark

TPL-007-2
Supplemental

TPL-007-3
CAP for Supplemental

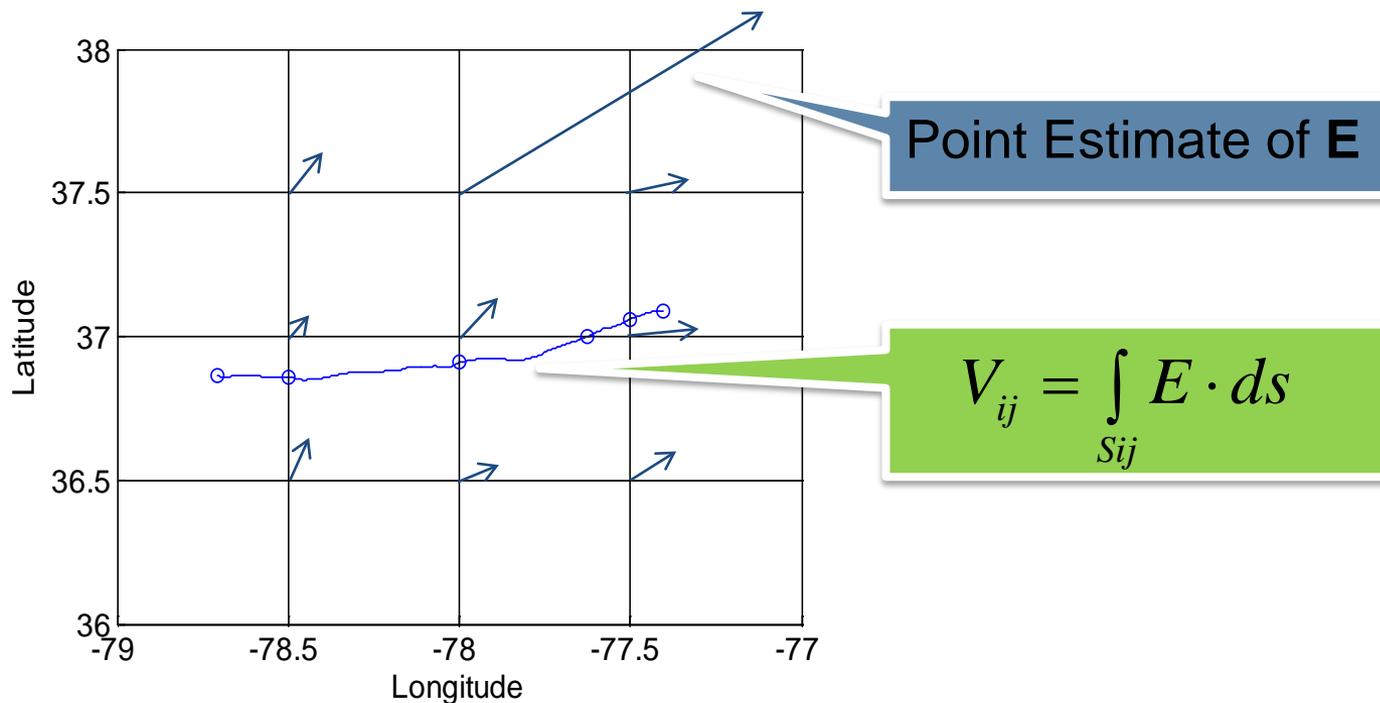
Main concern: wide area impacts.
Benchmark based on **E field**:

- Amplitude & Angle.
- Spatial characteristics.
- Time series signature.

We need to add a CAP.

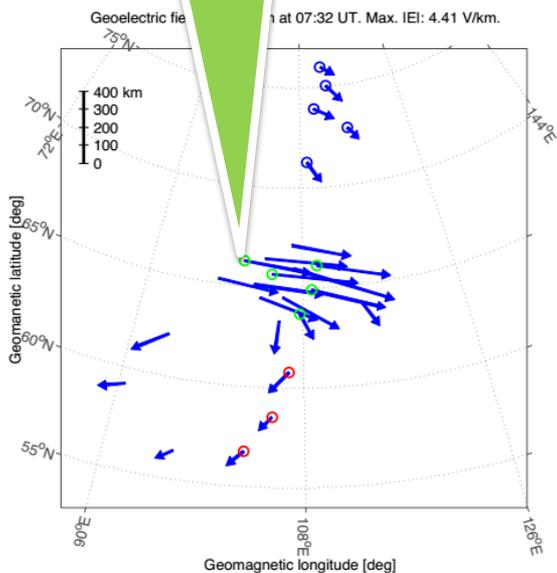
- The Main Issue: **Spatial Average**

- Scientist and engineers were not talking the same language.
- Scientist: point-estimation of geoelectric field.
- Engineers: integral of geoelectric field across the line.

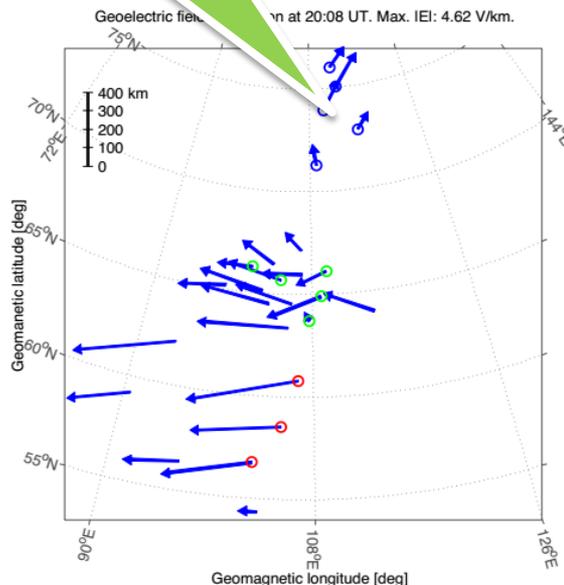


- 1-in-100 Year Benchmark: Extreme Value Analysis
 - Estimate stochastic behavior of GMD events more extreme than any that have already been observed.
- Cannot ignore spatial characteristics: IMAGE array.

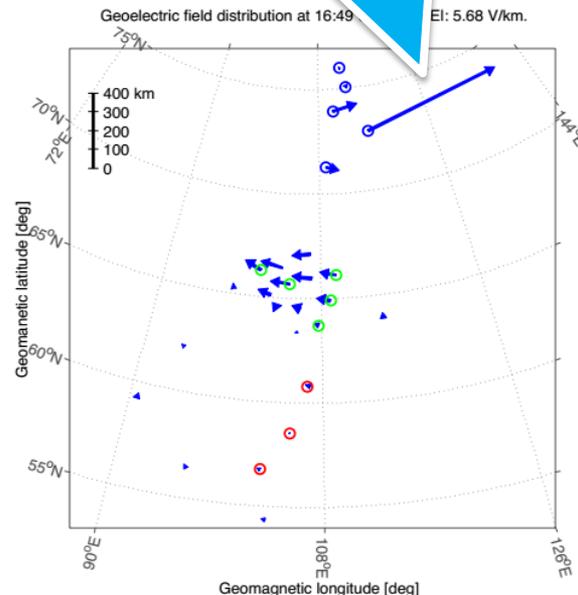
Coherent E



Coherent E



Local enhancement

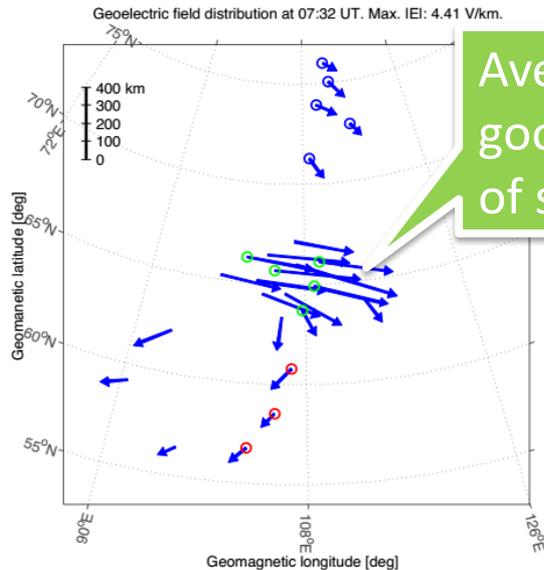


- GEV is similar to CLT
 - Joint distribution of $\max(X)$ converges to GEV.
 - Blocks of maxima (yearly).
- POT
 - Joint distribution of exceedances over threshold.
 - Better use of available data.

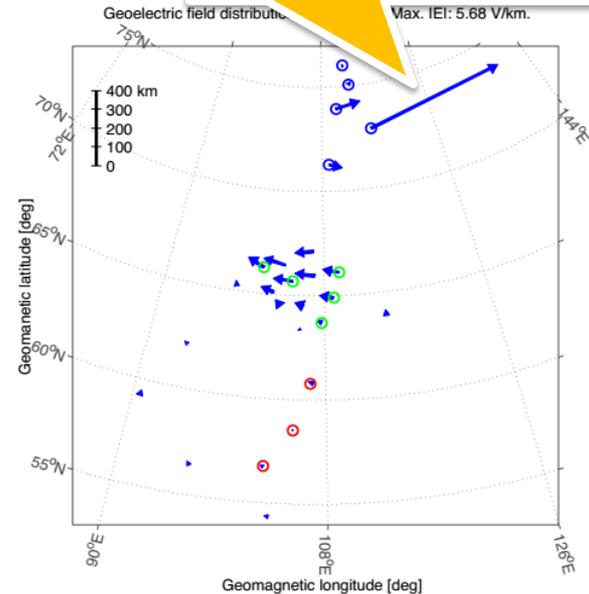
$$G(y) = \exp\left(-\left[1 + \xi\left(\frac{y - \mu}{\sigma}\right)\right]^{-1/\xi}\right)$$

$$H(y|X_i > u) = 1 - \left(1 + \xi\frac{y}{\sigma_u}\right)^{-1/\xi}$$

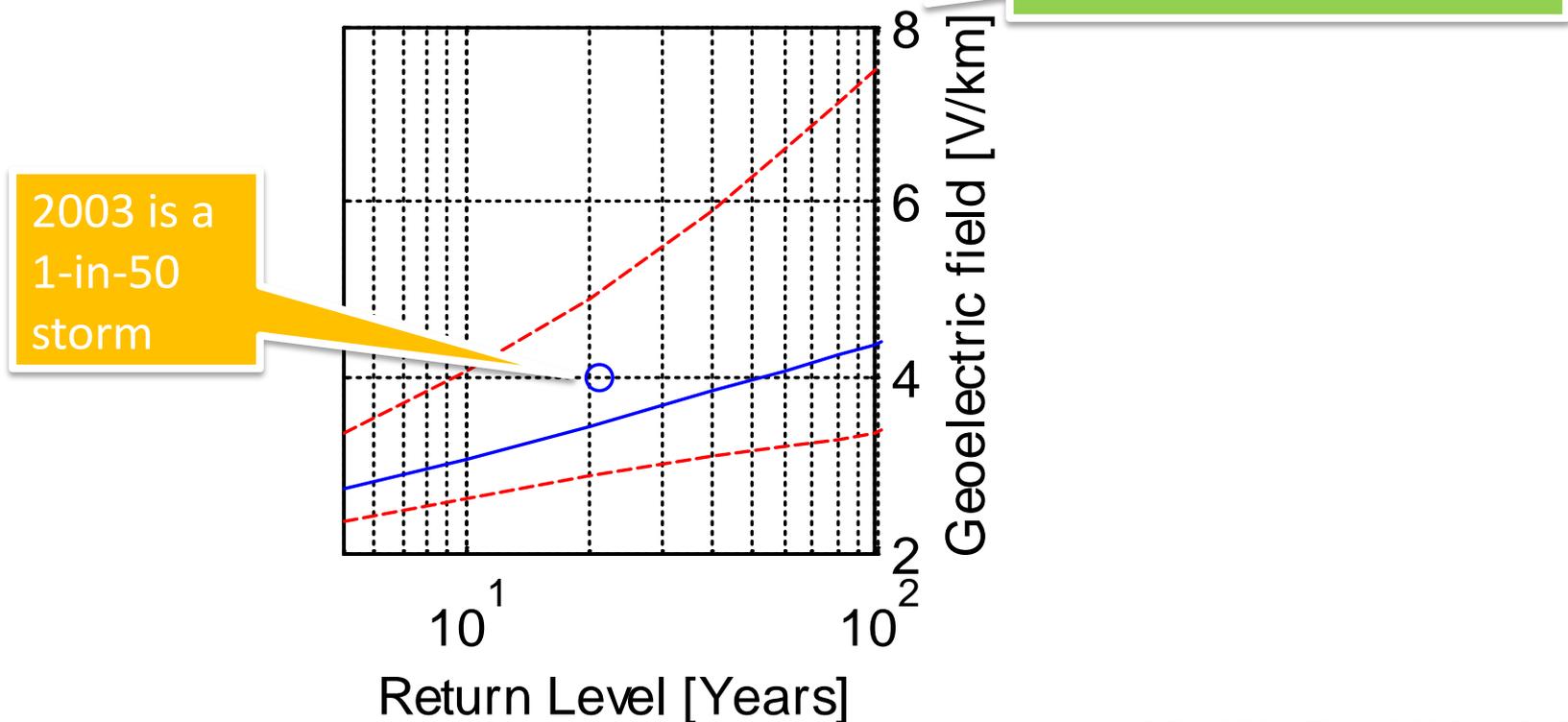
Average E prevents overestimating extreme value



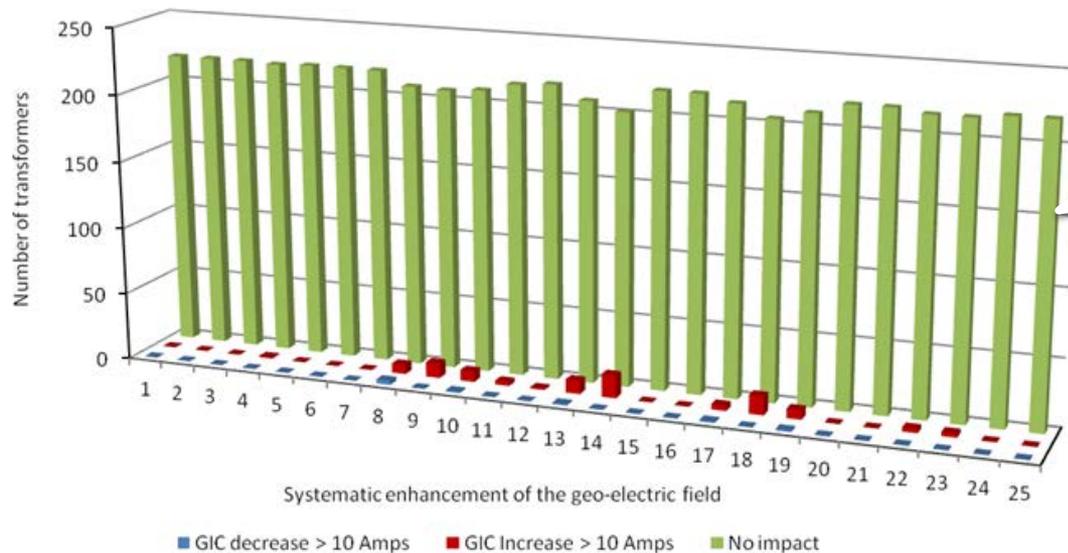
Average E provides a good representation of spatial coherency



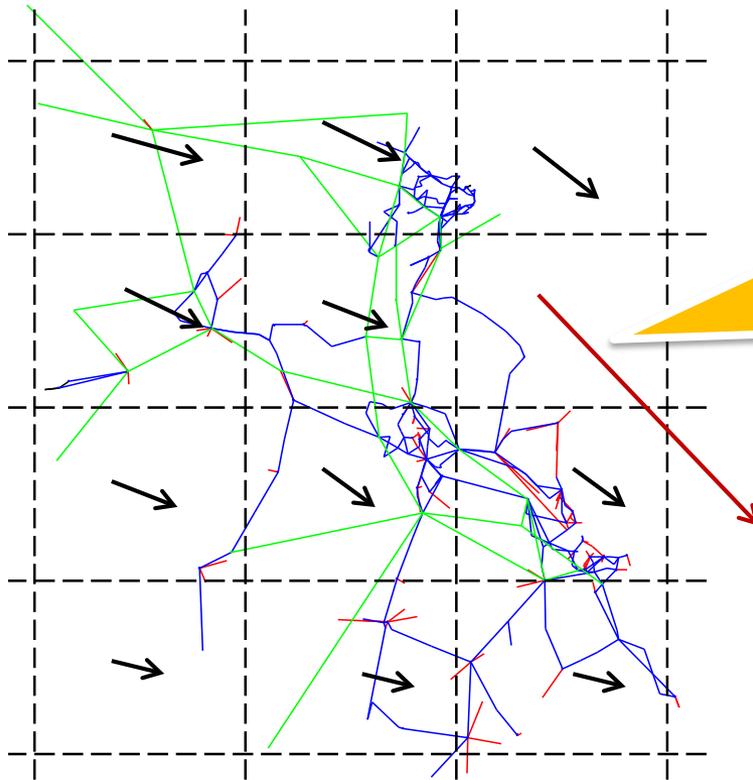
- Steps to create the benchmark:
 - Three groups of stations (each group spans less than 500 km).
 - Calculate the maximum **E** for each group.
 - Used exceedances (POT) of **all** groups.



- We were **unsuccessful** in explaining the concept of spatial averaging to integrate **E** across the length of transmission lines to FERC.
 - The perceived problem was that we were “averaging down” the numbers.
 - This was fueled by previous research that focused on point-estimates of **E**.



We tried to show that local enhancement of 100x100 km only has local impacts



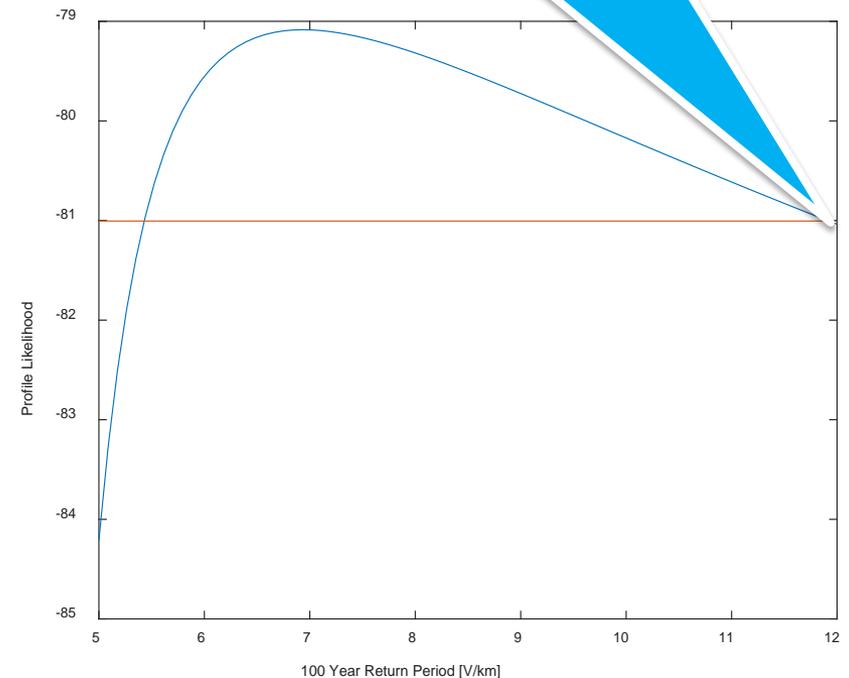
1. What's the amplitude of E inside the box?
2. How big is this box?
3. What's the amplitude of E outside the box?
4. What's the angle of E inside/outside the box?

- Drafting team decided not to include a CAP (science, local impact, tools, etc.)
 - “If the analysis concludes there is Cascading caused by the occurrence of extreme events, an evaluation of possible actions designed to reduce the likelihood or mitigate the consequences and adverse impacts of the event(s) shall be conducted.”

Flexibility to apply the supplemental.

1. Uniform field: 12 V/km.
2. A moving box (pick size, field outside, orientation, etc.)

1. Amplitude of E inside the box: 12 V/km



- The Commission also directs NERC to develop and submit modifications to Reliability Standard TPL-007-2:
 - (1) to require the development and implementation of corrective action plans to mitigate assessed supplemental GMD event vulnerabilities; and
 - (2) to authorize extensions of time to implement corrective action plans on a case-by-case basis.
- Things for the drafting team to consider:
 - Benchmark and Supplemental are **conservative**: (1) all stations considered high-latitude, (2) high POT threshold.
 - The Benchmark is NOT a subset of the Supplemental.
 - Science is still evolving (will not be ready for this standard?).
 - We must stop endless TPL-007 iterations (“meet FERC half-way”).

- Options:
 - 1) Add a CAP to the Supplemental and keep flexibility on how to apply it. Caveat: auditable? Too ambiguous?
 - Develop a guidance for Supplemental? (GDMTF)
 - 2) Add a CAP to the Supplemental and properly define the local enhancement (box size, field inside/outside, etc.). Caveat: science is not there.
 - 3) Any other options?

- (1) to require the development and implementation of corrective action plans to mitigate assessed supplemental GMD event vulnerabilities; and
 - I want to hear everybody before drafting language. In person? Next WebEx?
- (2) Authorize extensions of time to implement corrective action plans on a case-by-case basis.
 - We can start drafting this language now. Volunteers?
- (3) Split the GTB into Technical Rational and Implementation Guidance
 - Volunteers to work on product to split into two documents

Anticipated Date	Location	Event	Comments
April 30, 2019	Conference Call	SDT webEx	Review deliverables and walk through standards. Request draft language from members.
May 15, 2019	Conference Call	SDT WebEx	Review history of standard. Begin discussion on draft language.
June 4-5, 2019	Atlanta, GA	SDT in-person meeting to modify TPL-007-3	
July 8, 2019	-	Submit document for SC Meeting	
July 24, 2019	-	Request authorization from SC to post the modified standard for initial posting.	
July 29 – September 12, 2020	-	Post TPL-007 Standard for initial comment and ballot	45 day comment period
Week of August 5, 2019	Conference Call	Webinar to educate industry on changes	
Week of September 23, 2019	TBD	Second SDT in-person meeting to respond to comments and modify as necessary	
October 21 –December 5, 2019	-	Post for a additional comment and ballot	45 day comment period (second ballot)
Week of December 16, 2019	TBD	Third SDT in-person meeting to respond to comments and modify as necessary	
January 23 – March 9, 2020	-	Post for a additional comment and ballot	45 day comment period (third ballot)
Week of March 23, 2020	TBD	Fourth SDT Meeting to respond to comments and move to a final ballot	If needed
April 20 – 30, 2020	-	Post for Final Ballot	10 day final ballot
May 13 – 14, 2020	-	NERC Board of Trustees Adoption	
July 2020	-	NERC Files Petition with the Applicable Governmental Authorities	Filing deadline is July 1, 2020



Questions and Answers