WEQ-006: Manual Time Error Correction in the Eastern Interconnection

NAESB Business Practices Subcommittee
May 22, 2020

Purpose & Key Takeaways

Purpose:

Inform Time Error Correction (TEC) discussion: retain, revise or retire?

Key Takeaways:

- Analyze past Time Error Correction (TEC) in the Eastern Interconnection
- Projected impact of DERs on TEC
- Discussion of possible next steps

While We Desire to Retire NAESB's Time Error Correction Standard, More Work is Needed Before We Can Implement

- MISO is interested in retiring the NAESB Time Error Correction (TEC) standard for EI
- The data shows that we still have a problem
- What steps do we need to take to identify the root cause so we can retire TEC?
  - Work with NERC RS and Eastern Interconnection Balancing Authorities to identify the root cause
  - Once corrected, revisit retirement proposal with NAESB
- What steps can NAESB take in parallel?

FERC Order 676-I

- NAESB to revisit Time Error Correction (TEC) standard, WEQ-006 (*see* ¶46-47)
  - Insufficient justification provided to retire
  - Determine whether to retain or revise
- Next step: analyze historic TEC data
  - What does the data indicate?

Time Error Correction Data

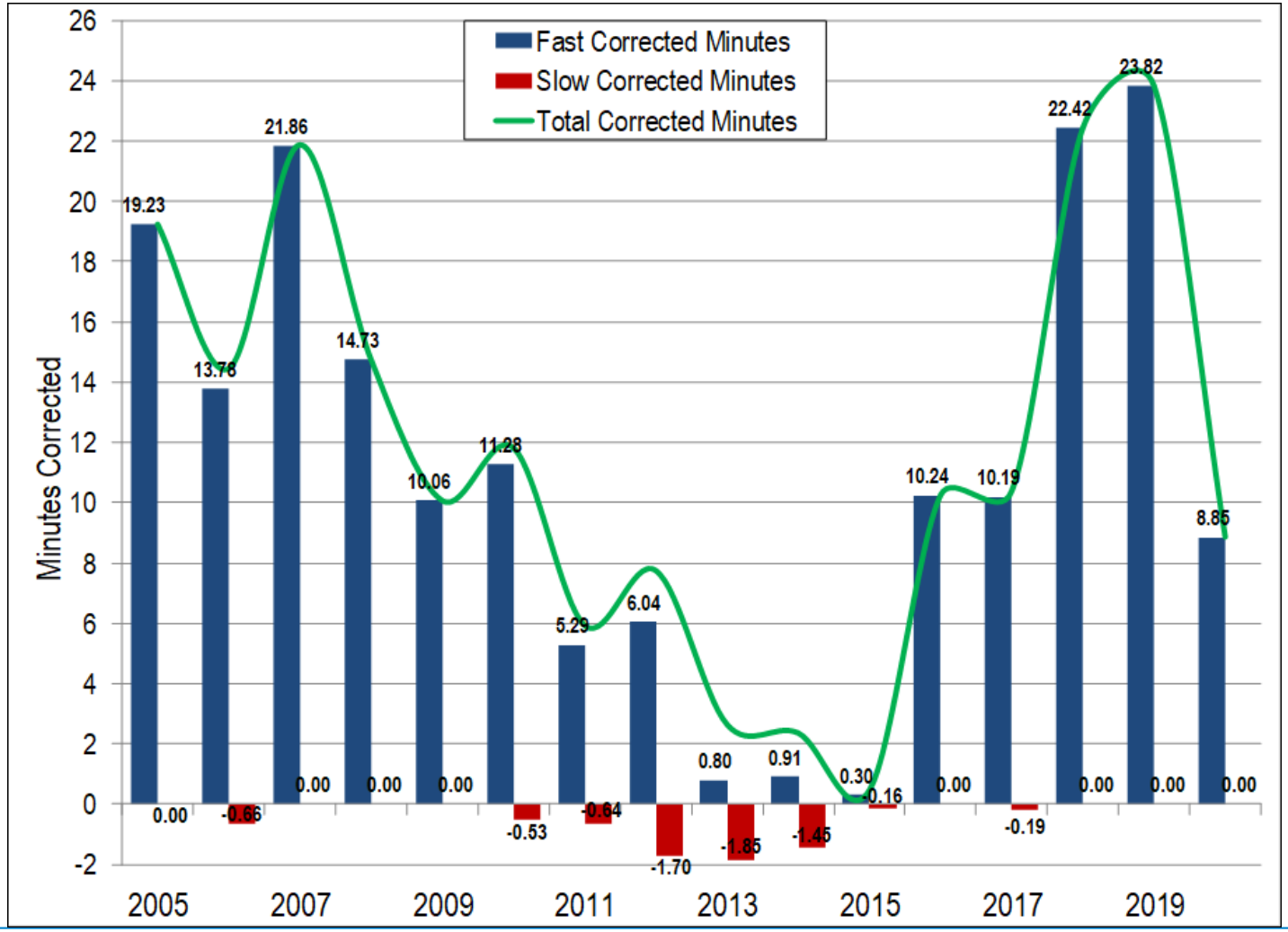
- As frequency and Time Error Correction are unique to each Interconnection, experience in each Interconnection should be evaluated independently
- Focus of this presentation is the Eastern Interconnection (EI)
  - Current Time Monitor: Southeastern RC (2/1/20-1/31/21)
  - Data provided by PJM
- TEC data presented quarterly at NERC Resources Subcommittee (RS) meetings

Time Error Correction Data for EI

Year to Date	# OF CORRECTIONS (FAST)	# OF CORRECTIONS (SLOW)	TOTAL HOURS (FAST)	TOTAL HOURS (SLOW)	AVERAGE DURATION (FAST)	AVERAGE DURATION (SLOW)	Total Fast Seconds Corrected	Total Slow Seconds Corrected	Total Seconds Corrected	Total Fast Minutes Corrected	Total Slow Minutes Corrected	Total Minutes Corrected
2005	213	0	1470.00	0.00	7.00	0.00	1153.76	0.00	1153.76	19.23	0.00	19.23
2006	140	6	993.50	37.00	7.05	3.52	826.66	-39.77	866.44	13.78	-0.66	14.44
2007	215	0	1596.00	0.00	7.45	0.00	1311.65	0.00	1311.65	21.86	0.00	21.86
2008	138	0	1064.00	0.00	7.03	0.00	884.07	0.00	884.07	14.73	0.00	14.73
2009	71	0	640.00	0.00	7.20	0.00	603.80	0.00	603.80	10.06	0.00	10.06
2010	85	3	757.00	33.00	8.71	11.00	676.84	-31.56	708.39	11.28	-0.53	11.81
2011	47	5	333.00	38.00	6.58	7.11	317.33	-38.34	355.67	5.29	-0.64	5.93
2012	46	11	448.00	95.00	9.19	8.37	362.42	-102.21	464.62	6.04	-1.70	7.74
2013	6	11	50.00	104.00	8.20	9.23	47.73	-110.79	158.52	0.80	-1.85	2.64
2014	6	9	53.00	80.00	8.89	9.25	54.36	-87.06	141.41	0.91	-1.45	2.36
2015	2	1	16.50	9.00	8.25	9.00	17.84	-9.73	27.58	0.30	-0.16	0.46
2016	67	0	609.50	0.00	8.73	0.00	614.48	0.00	614.48	10.24	0.00	10.24
2017	54	1	660.07	11.00	13.03	11.00	611.11	-11.36	622.48	10.19	-0.19	10.37
2018	82	0	1343.50	0.00	16.65	0.00	1345.35	0.00	1345.35	22.42	0.00	22.42
2019	90	0	1506.00	0.00	16.59	0.00	1428.92	0.00	1428.92	23.82	0.00	23.82
2020	32	0	535.00	0.00	16.75	0.00	531.24	0.00	531.24	8.85	0.00	8.85

EI = Eastern Interconnection

Time Error Correction Data for EI



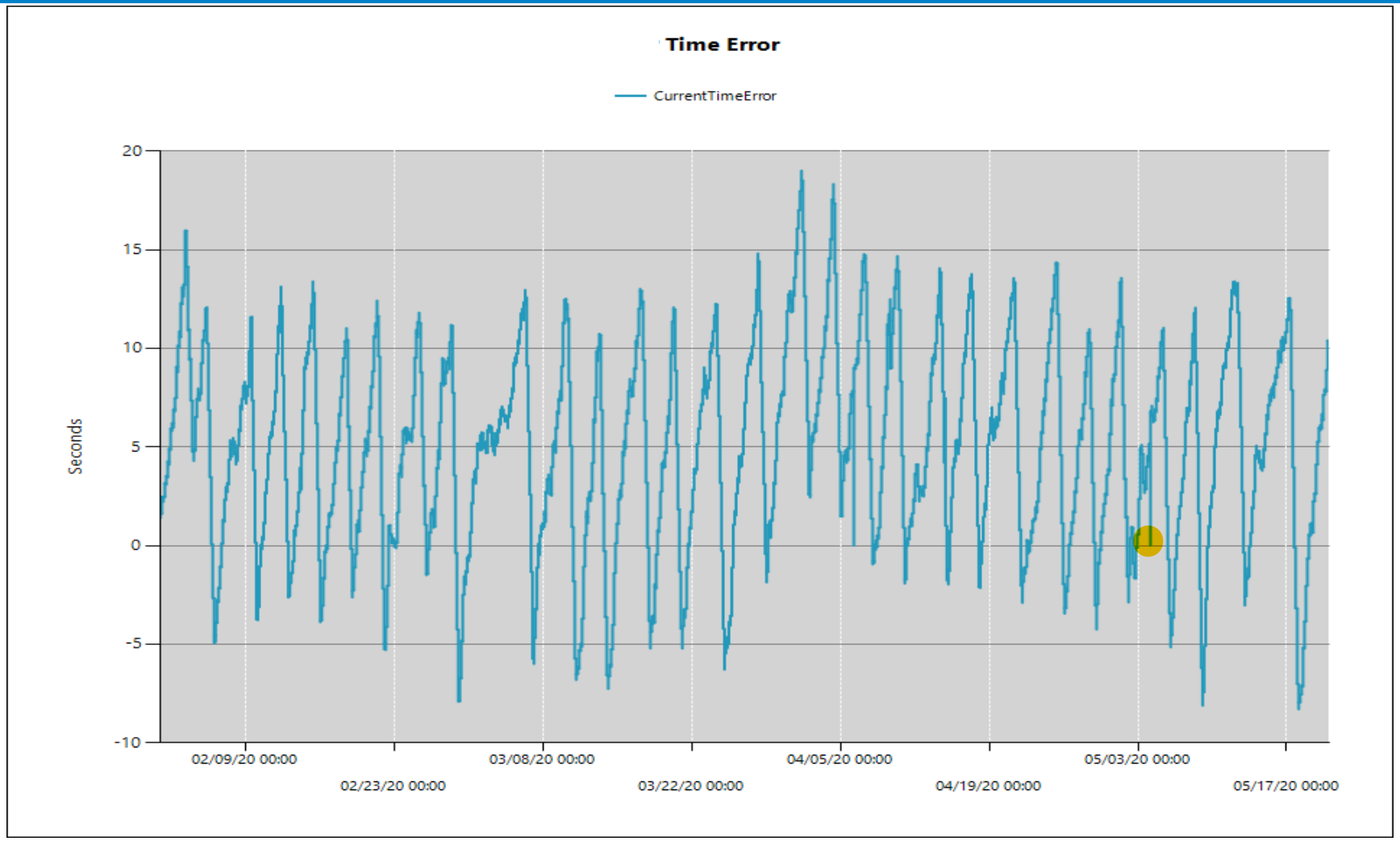
EI = Eastern Interconnection

Analysis of TEC Data in the EI

- During the period of 2013-2015, the need for TEC was negligible; i.e. < 1 minute/year
- Beginning in 2016, there was an uptick in TECs coincident with a +50 MW unilateral inadvertent payback schedule (MISO) around the clock
- As of May 4, 2020, the inadvertent has been paid back
  - Eliminating the payback schedule has:
    - *Not* eliminated the need for TECs
    - Elongated the time between TECs; i.e. from once every 3 days to once every 3-1/2 to 4 days

TEC = Time Error Correction

Time Error Accumulation (EI)



EI = Eastern Interconnection

TEC Retirement Impact Analysis

Benefits

- Increased reliability of the Bulk Electric System

Explanation:

- Scheduled TECs move the system away from the 60 Hz placing the initial system in a compromised state
- Additional changes to frequency following system events increase the risk of system perturbations and the likelihood of cascading outages

Risks

- Decreased accuracy of time on electromechanical devices and analog clocks

Risk is minimized due to:

- Daylight Savings Time (DST) is prevalent in the Eastern Interconnection requiring clocks to be reset twice a year
- Added risk due to eliminating TEC is the time error that would accumulate between clock resets

TEC = Time Error Correction

Conclusion

- With the elimination of the inadvertent payback schedule:
  - Time error continues to accumulate in the EI
    - Rate: ~20 seconds every 3-4 days
    - Root cause unknown
  - Implementation of NERC standards* should be sufficient to maintain 60 Hz
- Data does not support the retirement of TEC in the EI at this time

* NERC standards include: BAL-001: Real Power Balancing Control Performance and BAL-003: Frequency Response and Frequency Bias Setting

Projected Impact of DERs on TEC

- DER impact on TEC is expected to be minimal
  - DERs are digital
  - DERs don't need a time signal
  - Similar to other load variations, DERs would not necessarily increase or reduce the need for TEC

Recommendations?

- *Group discussion*

Questions

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