

Consideration of Comments on Survey for Time Error Correction

The TLR Drafting Team thanks all commenters who submitted comments on the Time Error Correction Survey. The survey was posted for a 30-day public comment period from September 12, 2008 through October 13, 2008. There were 40 sets of comments, including comments from more than 60 different people from approximately 60 companies representing 8 of the 10 Industry Segments as shown in the table on the following pages.

If you feel that your comment has been overlooked, please let us know immediately. Our goal is to give every comment serious consideration in this process!

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The Industry Segments are:

- 1 — Transmission Owners
- 2 — RTOs, ISOs
- 3 — Load-serving Entities
- 4 — Transmission-dependent Utilities
- 5 — Electric Generators
- 6 — Electricity Brokers, Aggregators, and Marketers
- 7 — Large Electricity End Users
- 8 — Small Electricity End Users
- 9 — Federal, State, Provincial Regulatory or other Government Entities
- 10 — Regional Reliability Organizations, Regional Entities

Commenter		Organization	Industry Segment											
			1	2	3	4	5	6	7	8	9	10		
1.	James Graham	Empire District Electric Company												
2.	William Ackerman	IEEE, Consulting Engineer												
3.	Larry Akens	Tennessee Valley Authority	x		x		x					x		
4.	Ben Byman	Weyerhaeuser								x		x		
5.	Albert DiCaprio	PJM		x										
6.	Chris Scanlon	Exelon	x		x		x	x						
7.	Kent Saathoff	ERCOT		x										
8.	Howard F. Illian	Energy Mark, Inc.									x			
9.	Larry Larson	Otter Tail Power Company	x											
10.	Jeff Hackman	Ameren	x		x		x	x						
11.	Jim Griffith (Southern Co.)	SERC OC Standards Review Group	x		x		x							
Additional Member		Additional Organization	Region		Segment Selection									
1.	Roman Carter	Southern Co.	SERC		1, 3, 5									

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Commenter		Organization			Industry Segment											
					1	2	3	4	5	6	7	8	9	10		
2.	Jim Case	Entergy Services, Inc.	SERC	1, 3, 5												
3.	George Carruba	East kentucky Power Cooperative	SERC	1, 3, 5												
4.	Gerald Beckerle	Ameren	SERC	1												
5.	Brett Koelsch	Progress Energy	SERC	1, 3, 5												
6.	Steve Corbin	Southern Sub-region RC	SERC	10												
7.	John Rembold	Southern Illinois Power Cooperative	SERC	1, 3, 5												
8.	Richard McCall	North Carolina Electric Membership Corp.	SERC	3, 4, 5												
9.	Jason Marshall	Midwest ISO	SERC	2												
10.	Danny Dees	Municipal Electric Authority of GA	SERC	1, 3, 5												
11.	Dan Jewell	Louisiana Generating, LLC	SERC	1, 3, 4, 5												
12.	Tim Hattaway	Powersouth Energy Cooperative	SERC	5, 1, 3, 4												
13.	Steven Gaynier	Cogentrix Energy	SERC	5												
14.	Billy Wadsworth	GA Systems Operations Corp.	SERC	1, 3, 5												
15.	Larry Akens	Tennessee Valley Authority	SERC	1, 3, 5, 9												
16.	Raymond Vice	Southern Co.	SERC	1, 3, 5												
17.	Chris Bolick	Associated Electric Cooperative, Inc.	SERC	1, 3, 5												
18.	Carter Edge	SERC Reliability Corp.	SERC	10												
19.	John Troha	SERC Reliability Corp.	SERC	10												
12.	Edward Bedder	Orange and Rockland Utilities Inc.			x		x									
13.	Burl E Rudder	TVA			x		x		x						x	
14.	Ron Gunderson	NPPD			x		x		x							
15.	Clint Burrow	Great River Energy			x		x		x							
16.	S. Tom Abrams	Santee Cooper			x		x		x						x	
Additional Member Additional Organization Region Segment Selection																
1.	Glenn E. Stephens		SERC	1, 3, 5, 9												
2.	Rene' L. Free		SERC	1, 3, 5, 9												
3.	Wayne Ahl		SERC	1, 3, 5, 9												
17.	Steve Haun	Lincoln Electric System			x		x		x	x						
18.	Dave Folk	FirstEnergy			x		x		x	x						
Additional Member Additional Organization Region Segment Selection																
1.	Doug Hohlbaugh	FirstEnergy	RFC	1, 3, 5, 6												
2.	Tom Burgess	FirstEnergy	RFC	1, 3, 5, 6												

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Commenter		Organization		Industry Segment																
				1	2	3	4	5	6	7	8	9	10							
3.	Jerry Sanicky	FirstEnergy	RFC	1																
4.	Larry Hartley	FirstEnergy	RFC	5, 6																
19.	Jay Campbell	Sierra Pacific Power Co.			x			x		x										
20.	Dan Haynes	ITC Transco			x															
21.	Sam Holeman	Duke Energy Corporation			x			x		x										
22.	Alan Gale	City of Tallahassee								x										
23.	Greg Rowland	Duke Energy			x			x		x										
24.	Will Franklin (Entergy)	Entergy System Planning & Operations (SPO) (Generation & Marketing)									x									
Additional Member		Additional Organization	Region	Segment Selection																
1.	Al Ralston	Entergy SPO	SERC	6																
25.	Harvie Beavers	Piney Creek LP								x										
26.	Karl Bryan	US Army Corps of Engineers								x										
27.	Dale Wadding and Warren Schaefer	Dairyland Power Cooperative			x			x		x										
28.	Stephen Joseph	TECO			x			x		x		x								
29.	Brett Koelsch (Progress Energy Carolinas)	Progress Energy, Carolinas			x			x		x										
30.	Brent Ingebrigtsen (E ON U.S.)	E.ON U.S.			x			x		x		x								
31.	Alice Druffel	Xcel Energy			x			x		x		x								
32.	Brady Baker	City of Greenfield						x	x											
33.	Clark	PNM Power Operations			x			x		x										
34.	Robert Matthey	Ohio Valley Electric Corporation			x					x										
35.	Edward J Davis	Entergy Services, Inc			x															
36.	Dan Rochester	Independent Electricity System Operator							x											
37.	Bill Herbsleb (PJM RTO)	PJM RTO							x											

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Commenter		Organization	Industry Segment										
			1	2	3	4	5	6	7	8	9	10	
38.	Michael K. Wilkerson (NIPSCO)	NERC Compliance	x		x		x						
39.	Ken McIntyre	ERCOT ISO		x									
40.	Dan Rochester	IESO		x									

Consideration of Comments on Survey for Time Error Correction

1. Are there any technical reasons to continue Time Error Corrections? If so what are they?

8 out of 39 (21%) said there were technical reasons to continue TECs.

30 out of 39 (77%) said there were not technical reasons to continue TECs.

1 out of 39 (2%) expressed no preference.

Top issues: Metering pumps, traffic lights, clocks and other devices (unspecified), concern with inadvertent. Suggest that a field test be implemented to resolve these concerns.

Organization	Question 1:	Question 1 Comments:
Empire District Electric Company		<p>"Had the Time Error Correction not been in effect, and the target frequency set at 60Hz, it is likely that those same frequency errors would not have resulted in FTL Low exceedances. In other words, it is believed that FTL Low exceedances could have been reduced by approximately 43% if Time Error Correction had not been in effect." This statement bothers me. "it is believed" tells me that the author has not done the required research to validate his argument and has not considered the effect on the end user. The author has also not validated the need does not exist anymore. I believe that there are still a large number of synchronous devices in service. It is obvious the author is looking for a cost cutting measure but has not evaluated the cost to the consumer or identified a benefit to the end user. As a regulated industry our mandate and responsibility is to the customer not necessarily the shareholder.</p>
<p>Response: The BAC SDT thanks you for your comment. The only way to confirm that the elimination of Time Error Corrections would reduce number of FTL Low events would be through a field test. Those who have studied frequency behavior on the interconnections believe that the data shows the elimination of Time Error Correction frequency offsets would improve reliability due to the reduction in the number of FTL Low events. Significant efforts have been made by both the NERC RS and the BAC SDT to identify any remaining synchronous devices on the interconnections that would be detrimentally affected by the elimination of Time Error Correction. Our future course of action should be based on further investigation of the need for Time Error Correction. The BAC SDT is in favor of performing a field test to answer this question once and for all.</p>		
IEEE, Consulting Engineer	Yes	<p>(1) A specific amount of energy must be used to bring a generator up to synchronous speed. Essentially, this energy is in the form of rotational inertia. The interconnection bias is a measure of the amount of energy stored in the rotating components. The 2007 Eastern Interconnection bias was approximately 6800 MW/.1</p>

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Organization	Question 1:	Question 1 Comments:
		<p>Hz.; or 680 MW/.01 Hz. Another way of looking at this is that if the average frequency is allowed to decline to 59.98 Hz, some entity (or all entities) have extracted 1320 MW-seconds of rotational energy from the system. Likewise, if the average frequency is 60.02 Hz, some or all of the entities have added 1320 MW-seconds of energy to the system. In order to maintain some equity, a mechanism, such as time error correction, is required to achieve an average long-term frequency of 60.00 Hz for the interconnection. (2) Inadvertent interchange correction is a basic requirement of the interconnection. There must be some mechanism to insure, over some period of time, that the average frequency is 60.00 Hz. Otherwise, a bias will develop in inadvertent interchange. (All interchange, including inadvertent, is metered in MWH. Granted, MW-seconds don't seem like a great deal, but with the size of interchange transactions taking place these days, MW-seconds can add up to MWH in a short period.) Time error corrections are the only explicit mechanism we have to maintain an average frequency of 60 Hz over an extended period. If time error corrections are discontinued, what will be substituted to maintain the average frequency at 60 Hz?</p>
<p>Response: The BAC SDT thanks you for your comments. 1) Bias is an estimate of the frequency response. Frequency Response is the amount of additional steady state energy that is injected into the system by generators or withdrawn by loads as steady state frequency changes. The energy represented by the rotational inertia is the transient energy stored and used by the system to maintain the resource and load balance as the interconnection frequency changes to a new steady state balanced condition. Since Interconnections consist of multiple Balancing Authority Areas and Time Error Correction does not ensure that the Balancing Authority that over-generated to create fast time error will under-generate by that same amount during Time Error Correction thereby recouping their costs, equity is not affected when frequency is not maintained by Time Error Correction. However, there may be some loss in reliability because the system was designed to operate at 60 Hz and deviations from 60 Hz move the system closer to high or low frequency failure points. 2) There is no reliability need to maintain an interconnection at an average frequency of 60 Hz. There is only a need to keep the instantaneous frequency close to 60 Hz. This is why Time Error Correction can be detrimental to reliability. When frequency is intentionally moved away from 60 Hz to correct time error, it is moved closer to either the high frequency or low frequency failure point. The reliability objective is not to have an average frequency of 60 Hz, but to limit the instantaneous deviation from 60 Hz. Finally, there are other methods that impact reliability less than Time Error Corrections and can be used to offset the bias in inadvertent interchange caused by operation at other than 60 Hz,</p>		
Tennessee Valley Authority	No	<p>TVA is not aware of any technical reasons to continue time error correction. Time error correction is a NAESB business practice and TVA recognizes the elimination of time error correction implementation would have to be coordinated with NAESB. NERC Reliability Standard, BAL-004, address the offset (+/- .02 hertz) used by the electric utility when time error correction is implemented.</p>

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Organization	Question 1:	Question 1 Comments:
Response: The BAC SDT thanks you for your comment.		
Weyerhaeuser	Yes	Metering pumps that are not on electric drives. The measurement from motor driven consistency transmitters used in the pulp and paper industry might be effected (I'm not 100% sure on this application, but have made inquiries), over time the measured tons of stock into tanks, etc. would be in error - quality &/or inventory accounting issues could result.
Response: The BAC SDT thanks you for your comment. On a process that is measured over very long time intervals (a week) the magnitude of the average error associated with Time Error Correction is approximately 4 mHz as compared to 60 Hz scheduled frequency. This error would be on average 0.00007 or 0.007 %. We are unaware of any process that would be significantly affected by an error of this magnitude. On the other hand, if the process operates over shorter time intervals, there is no assurance that Time Error Correction would be applied during the process, or even that the change caused by applying Time Error Correction would not be more detrimental to the process than uncorrected frequency. In this later case, the error caused by Time Error Correction could be as large as 5 times the error caused by no Time Error Correction, 0.033%. This is still a very small error.		
PJM	No	I have no knowledge of any specific problems, but there have been anecdotal suggestions of:- Traffic lights that are synchronized to system frequency. Thus not correcting frequency could impact local traffic in such areas.- Also some electrical processes that use frequency synchronized controllers.
Response: The BAC SDT thanks you for your comment. If all lights use the same time control mechanism, then any error should propagate to all of them, so the only problem would be if they changed their patterns throughout the day (i.e., longer green during rush hour) – then they would need to be recalibrated when error got too large. To put this into perspective, the change would be about 5 to 6 seconds per day. If there were two systems that used different coordinated control mechanisms (i.e., so all the lights on the street turn green at the same time), one system could get out of synch with the other. In either case, this error should be significantly smaller than errors caused when electrical outages are restored.		
Exelon	No	
ERCOT	No	
Energy Mark, Inc.	No	

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Organization	Question 1:	Question 1 Comments:
Otter Tail Power Company	No	It would be all right to continue TE monitoring only as we move away from corrections.
Response: The BAC SDT thanks you for your comment.		
Ameren	No	
SERC OC Standards Review Group	No	The SERC OC Standards Review Group is not aware of any technical reasons to continue time error correction. Time error correction is a NAESB business practice and the SERC OC Standard Review Group recognizes the elimination of time error correction implementation would have to be coordinated with NAESB. NERC Reliability Standard, BAL-004, addresses the offset (+/- .02 hertz) used by the electric utility industry when time error correction is implemented.
Response: The BAC SDT thanks you for your comment. The BAC SDT is coordinating its efforts with NAESB.		
Orange and Rockland Utilities Inc.	No	
TVA	No	
NPPD	No	This should have been eliminated a long time ago.
Response: The BAC SDT thanks you for your comment.		
Great River Energy	No	
Santee Cooper	No	

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Organization	Question 1:	Question 1 Comments:
Lincoln Electric System	No	
FirstEnergy	No	While we agree with the technical reasons cited, we are concerned about eliminating time error correction without the reliability-based controls that address the underlying frequency control problem that has apparently worsened in recent years and apparently isn't adequately addressed by the current suite of control performance standards.
<p>Response: The BAC SDT thanks you for your comment. Performing Time Error Corrections does not address the root cause of the underlying frequency control issue. The BAC SDT has discussed this issue, and notes that other teams will be determining what actions should be taken, if any, to address any underlying frequency control problems.</p>		
Sierra Pacific Power Co.	Yes	From a pure reliability perspective, time error in the WECC is not symmetrical. Meaning while integrated frequency error during the morning load ramp is not necessarily balanced/canceled during the evening load down-ramp. The SDT will have to somehow address whether long-term time error (over a period of days and months) will become excessive. From purely an economical viewpoint, positive time error means some entities have a positive inadvertent, with the associated (large?) cost. How does the SDT propose to manage primary and secondary inadvertent?
<p>Response: The BAC SDT thanks you for your comment. There is no reliability impact from having a large accumulation of time error. The BAC SDT has discussed the inadvertent issue but has not concluded what actions should be taken, if any, to address this issue.</p>		
ITC Transco	No	
Duke Energy Corporation	Yes	Accumulated time error is an indication of aggregate load/interchange/generation balance issues. It is a lagging metric for problems with BA ACE management. Inadvertent interchange is a similar lagging indicator. Increasing time error and increasing aggregate inadvertent interchange are symptoms of decreasing Operator/BA discipline around load/interchange/generation balance in a real time perspective. I realize that the initial objective of TEC is probably obsolete, but that has not been the focus of time error correction for at least the last 20 years. Just like large/growing inadvertent interchange is not a good thing, neither is increasing time error.

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Organization	Question 1:	Question 1 Comments:
<p>Response: The BAC SDT thanks you for your comment. The BAC SDT agrees that accumulated time error and increasing inadvertent balances are symptoms of other problems. The BAC SDT agrees that it is still appropriate to measure time error to keep track of balancing and metering issues, but that time error may not need to be corrected.</p>		
City of Tallahassee	No	
Duke Energy	Yes	<p>We believe that monitoring and maintaining relative time is a fundamental component of good system operations ? if for no other reason than it is a signal to the operators that we expect and demand discipline in what we do. Elimination of TEC would send a signal to the operators that performance expectations are being lowered; ultimately there is no actionable consequence to accumulated poor control ? which is peeling away a layer of needed discipline. We should be concerned about the increasing inadvertent interchange balances and increasing TECs from a root cause perspective. It is related to balancing authority ability to manage load/interchange/generation balance (ACE management). Also, we have a concern that this TEC white paper is biased towards discontinuing TEC. It is heavy on the advantages of discontinuing TEC, with minimal consideration given to the opposing view.</p>
<p>Response: The BAC SDT thanks you for your comment. The BAC SDT agrees that accumulated time error and increasing inadvertent balances are symptoms of other problems. The BAC SDT agrees that it is still appropriate to measure time error to keep track of balancing and metering issues, but that time error may not need to be corrected.</p>		
Entergy System Planning & Operations (SPO) (Generation & Marketing)	No	
Piney Creek LP	No	

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Organization	Question 1:	Question 1 Comments:
US Army Corps of Engineers	No	
Dairyland Power Cooperative	Yes	Many electrical devices (clocks and other time dependent equipment) are still dependent upon electrical system frequency averaging near 60.00 Hz over a period of time.
<p>Response: The BAC SDT thanks you for your comment. Efforts have been made by both the NERC RS and the BAC SDT to identify any synchronous devices on the interconnections that would be detrimentally affected by the elimination of Time Error Correction. The BAC SDT is in favor of performing a field test to answer this question once and for all.</p>		
TECO	No	
Progress Energy, Carolinas	No	PEC is not aware of any technical reasons to continue Time Error Corrections.
<p>Response: The BAC SDT thanks you for your comment.</p>		
E.ON U.S.	No	E.ON U.S. believes that time error correction is no longer needed. E.ON notes that more frequency excursions occur during periods of time error correction as pointed out by the Reliability-based Control Standard Drafting Team. Time standards are no longer based on synchronous motor clocks and CPS/BAAL performance standards include bounds on standard deviation of interconnection frequency. These other standards require measurement of frequency control without the need of a time error correction.
<p>Response: The BAC SDT thanks you for your comment.</p>		
Xcel Energy	No	
City of Greenfield	No	

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Organization	Question 1:	Question 1 Comments:
PNM Power Operations	Yes	More of an Equitable Solution: Keep TE Correction, but only BA's with the correct sign of Accumulation Inadvertent Balance Participate, i.e., Slow Error, BA's with Negative Accumulation, Fast Error, BA's with Positive Accumulation.
<p>Response: The BAC SDT thanks you for your comment. Unfortunately, unilateral actions taken to control to a different scheduled frequency or unilateral interchange schedules have been shown to be detrimental to our ability to measure control performance and move us further away rather than closer to finding solutions to the underlying reliability problems.</p>		
Ohio Valley Electric Corporation	No	
Entergy Services, Inc	No	Entergy agrees with the SERC comments. The SERC OC Standards Review Group is not aware of any technical reasons to continue time error correction. Time error correction is a NAESB business practice and the SERC OC Standard Review Group recognizes the elimination of time error correction implementation would have to be coordinated with NAESB. NERC Reliability Standard, BAL-004, addresses the offset (+/- .02 hertz) used by the electric utility industry when time error correction is implemented.
<p>Response: The BAC SDT thanks you for your comment.</p>		
Independent Electricity System Operator	No	
PJM RTO	Yes	Only as a remnant hard coded item coded in EMS systems and time error tracking are designed to track small amounts of frequency error seconds may need long lead to correct or simply reset the accumulations of time error.
<p>Response: The BAC SDT thanks you for your comment. The issue of how large a time error can be managed by current technology will be investigated as part of any solution developed.</p>		

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Organization	Question 1:	Question 1 Comments:
NERC Compliance	No	
ERCOT ISO	No	No technical reasons for ERCOT ISO to continue
Response: The BAC SDT thanks you for your comment.		

Consideration of Comments on Survey for Time Error Correction

2. Do you agree there are technical reasons to discontinue Time Error Corrections? If not, why?

30 out of 39 (77%) agreed there were technical reasons to discontinue TECs.

7 out of 39 (18%) disagreed that there were technical reasons to discontinue TECs.

2 out of 39 (5%) expressed no preference.

Top issues: Risk is low, invalid reasoning.

Organization	Question 2:	Question 2 Comments:
Empire District Electric Company	No	
Consulting Engineer	No	There is no other mechanism that can be used to explicitly maintain an average interconnection frequency of 60 Hz. Saying that time error corrections increase the probability of CPS violations is not a valid technical reason. If CPS violations are a problem, then the CPS requirements should be looked at. If time error corrections cause an increase in system costs because of the need for tighter controls, this is a cost of insuring the stability of the interconnection.
<p>Response: The BAC SDT thanks you for your comment. Average frequency is not the problem, instantaneous frequency is. The problem is not with CPS1, the problem is with frequency excursions as measured by BAAL.</p>		
Tennessee Valley Authority	Yes	Yes, work performed by the NERC Reliability-Based Control Standard Drafting Team (RBCSDT) has shown that significantly more frequency excursions occur during periods when time error correction is implemented. For the Eastern Interconnection the vast majority of time error corrections are fast. During time error correction, when the Eastern Interconnection is operated at 59.98 hertz, the inability of generators to meet interchange schedules especially during on- and off-peak transition hours, results in frequency deviations equal to or less than 59.95 hertz.
<p>Response: The BAC SDT thanks you for your comment.</p>		

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Organization	Question 2:	Question 2 Comments:
Weyerhaeuser	No	While your paper shows there were more frequency excursions during TEC periods, it doesn't indicate there were any reduction in very serious events. Would the 0.05HZ have helped prevent an outage, break-up, etc. in any of the studied cases?
<p>Response: The BAC SDT thanks you for your comment. It is very difficult to estimate what would have happened had a different method of operation been in effect. The best we can do under these circumstances is to estimate how the reliability risks change.</p>		
PJM	Yes	Time Error Corrections are run to correct past conditions and are independent of current system conditions. Thus correcting the system for fast time (by causing the system to under generate) during periods when the load is increasing places the entire system at risk. Some of the most risky frequency related conditions seem to occur during morning pick ups when fast time error corrections are being run.
<p>Response: The BAC SDT thanks you for your comment.</p>		
Exelon	Yes	
ERCOT	Yes	
Energy Mark, Inc.	Yes	
Otter Tail Power Company	Yes	
Ameren	Yes	
SERC OC Standards Review Group	Yes	Yes, work performed by the NERC Reliability-Based Control Standard Drafting Team (RBCSDT) has shown that significantly more frequency excursions occur during periods when time error corrections are being implemented. For the Eastern Interconnection, the vast majority of time error corrections are fast. When the Eastern Interconnection is operated at 59.98 hertz to correct for fast time and generators are unable to meet interchange schedules, particularly during on-peak and off-peak transition hours, frequency deviations often

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Organization	Question 2:	Question 2 Comments:
		occur that cause frequency to decline to 59.95 hertz or less.
Response: The BAC SDT thanks you for your comment.		
Orange and Rockland Utilities Inc.	Yes	
TVA	Yes	Cost and Reliability
Response: The BAC SDT thanks you for your comment.		
NPPD	Yes	
Great River Energy	Yes	
Santee Cooper	Yes	
Lincoln Electric System	Yes	
FirstEnergy	Yes	We agree with the reasons given but have concerns as to why time error has been so difficult to control over the last several years. While TEC, per se, is not a reliability attribute, the underlying frequency control factors that prompt the need to implement TEC certainly are reliability attributes that we believe strongly should be addressed. We believe it is necessary to determine the possible underlying cause such as entities who do not or fail to participate in time corrections and frequency control per-s?, inaccuracy in energy schedules accounting and implementation, a trend for energy producers that are off schedule more than on schedule, energy markets rules as constructed today, etc. Once these underlying causes are well understood, then the appropriate reliability-based controls can be designed to better manage frequency control.

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Organization	Question 2:	Question 2 Comments:
Response: The BAC SDT thanks you for your comment.		
Sierra Pacific Power Co.	No	See previous comment.
Response: The BAC SDT thanks you for your comment. There is no reliability effect from having a large time error. The BAC SDT has discussed the inadvertent issue but has not concluded what actions should be taken, if any, to address this issue.		
ITC Transco	Yes	
Duke Energy Corporation	No	For the same reasons as stated in the prior answer. If our only concern was with the synchronous motor clock deal, I would agree to discontinue, but I think that accumulated time error is a proxy (one of many) for System Operator load/interchange/generation management discipline. An increasing time error equates to decreasing discipline.
Response: The BAC SDT thanks you for your comment. The BAC SDT agrees that accumulated time error and increasing inadvertent balances are symptoms of other problems. The BAC SDT agrees that it is still appropriate to measure time error to keep track of balancing and metering issues, but that time error may not need to be corrected.		
City of Tallahassee	Yes	
Duke Energy	Yes	The work on the draft Reliability-based Control Standard includes targeted research supporting that sustained operation below 59.95 Hz on the Eastern Interconnection is not an acceptable state when considering the probability of other contingencies occurring on the system. Of the 3,285 or so clock-minutes that the Eastern Interconnection has dropped below 59.95 Hz since July 2005, roughly 1475 clock-minutes (45%) were attributed to excursions that would not have gone below 59.95 Hz had we not been under fast TEC at 59.98 Hz. We do not believe fast TECs cause frequency excursions, rather frequency excursions during fast TECs will typically be 0.02 Hz worse than they otherwise could have been. This is typically seen when we allow a TEC to overlap the on/off-peak schedule transition in the morning or evening. Though we believe there are benefits as described in our response to question 1, we also recognize that fast TECs in the Eastern Interconnection place the system in a vulnerable state 0.02 Hz closer to under-frequency load shedding. Our

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Organization	Question 2:	Question 2 Comments:
		alternate proposal in question 3 would mitigate some of that vulnerability.
Response: The BAC SDT thanks you for your comment.		
Entergy System Planning & Operations (SPO) (Generation & Marketing)	Yes	Intentionally operating off of desired frequency in order to correct a statistic introduces operations of the system closer to actuating and design limits (i.e. - reduction of margin). Additionally, the effects on components designed to operate at 60 Hz has not been fully researched when the actual operating setpoint is changed up or down from 60 Hz.
Response: The BAC SDT thanks you for your comment.		
Piney Creek LP	Yes	Total error per annum is much less then the time it takes to correct same; counter productive.
Response: The BAC SDT thanks you for your comment. The BAC SDT agrees that Time Error Corrections are not 100% efficient.		
US Army Corps of Engineers	Yes	
Dairyland Power Cooperative	No	Running slightly slow on frequency does not cause much of a risk of use of UFLS load shed relays as the first block is 59.3 HZ. It only moves us 2.8% closer to the trip point.
Response: The BAC SDT thanks you for your comment. The BAC SDT agrees that Time Error Correction only moves us 2.9% closer to a 59.3 Hz trip point. However, the first trip point for the Eastern Interconnection is at 59.82 Hz, not 59.3 Hz, and therefore, Time Error Correction moves the Eastern Interconnection over 11% closer to the first trip point. The BAC SDT believes that this additional risk is not being off-set by any additional benefit from performing Time Error Correction.		

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Organization	Question 2:	Question 2 Comments:
TECO	Yes	
Progress Energy, Carolinas	Yes	<p>PEC recognizes that the NERC Balancing Authority Controls Standard Drafting Team issued a white paper in the Fall of 2008 stating that "The current Time Error Correction method of using a 20mHz offset of scheduled frequency increases the probability that frequency excursions below 59.95Hz or above 60.05Hz will occur on the interconnection be effectively and intentionally moving the target frequency closer to one of those limits. Therefore, Time Error Correction as currently performed is detrimental to reliability." and "The elimination of the current Time Error Correction procedure would improve reliability as measured by the variability of interconnection frequency. Based on study data from July 2005 through April 2008, approximately 43% of the Frequency Trigger Limit (FTL) Low exceedances occurred during Time Error Corrections where target frequency had been offset to 59.98Hz and the frequency error did not exceed -0.05Hz. Had the Time Error Correction not been in effect, and the target frequency set at 60Hz, it is likely that those same frequency errors would not have resulted in FTL Low exceedances. In other words, it is believed that FTL Low exceedances could be reduced by approximately 43% if Time Error Correction was discontinued. In another study, analysis of Eastern Interconnection data for calendar year 2006 shows that, assuming identical control, elimination of Time Error Corrections would have reduced the total number of frequency excursions from 2,535 to 1,797, or 29.11%. For low-time error corrections, 1,582 excursions reduced to 877 (44.56%); for high-time Error Corrections, 953 excursions reduced to 920 (3.46%)."Based on this data PEC recognizes that there may be technical reasons to discontinue Time Error Corrections.</p>
<p>Response: The BAC SDT thanks you for your comment.</p>		
E.ON U.S.		
Xcel Energy		
City of Greenfield	Yes	
PNM Power Operations	No	<p>Cannot see why AGC programs cannot be programmed for Suggested method as noted in Comments Question 1. We are a sophisticated industry with a lot of smart engineers.</p>

Consideration of Comments on Survey for Time Error Correction

Organization	Question 2:	Question 2 Comments:
<p>Response: The BAC SDT thanks you for your comment. Unfortunately, unilateral actions taken to control to a different scheduled frequency or unilateral interchange schedules have been shown to be detrimental to our ability to measure control performance and move us further away rather than closer to finding solutions to the underlying reliability problems.</p>		
Ohio Valley Electric Corporation	Yes	
Entergy Services, Inc	Yes	<p>Entergy agrees with the SERC comments. Yes, work performed by the NERC Reliability-Based Control Standard Drafting Team (RBCSDT) has shown that significantly more frequency excursions occur during periods when time error corrections are being implemented. For the Eastern Interconnection, the vast majority of time error corrections are fast. When the Eastern Interconnection is operated at 59.98 hertz to correct for fast time and generators are unable to meet interchange schedules, particularly during on-peak and off-peak transition hours, frequency deviations often occur that cause frequency to decline to 59.95 hertz or less.</p>
<p>Response: The BAC SDT thanks you for your comment.</p>		
Independent Electricity System Operator	Yes	
PJM RTO	Yes	
NERC Compliance	Yes	
ERCOT ISO	Yes	

Consideration of Comments on Survey for Time Error Correction

3. Do you have any alternate proposals for Time Error Correction?

14 out of 39 (36%) indicated they had alternate proposals for TIME ERROR CORRECTION.

24 out of 39 (62%) indicated they did not have alternate proposals for TIME ERROR CORRECTION.

1 out of 39 (2%) expressed no preference.

Top suggestions: WATEC, smaller offsets, focus on control, eliminate on-peak/off-peak products, work on inadvertent payback, do a field test with steps of greater accumulated error.

Organization	Question 3:	Question 3 Comments:
Empire District Electric Company	No	
Consulting Engineer	No	Time error correction is 'tried and true', everybody understands the mechanism, and if something is working well, the only justification for replacing it is because there is a better mechanism. I can't think of an alternate that would be anywhere near as simple and easy to implement. (My memory goes back to a couple of papers published by N. Cohn in the 1970's that developed a set of fantastically complex equations that tried to identify the utility(s) in the interconnection that create the most inadvertent due to frequency errors.)
Response: The BAC SDT thanks you for your comment.		
Tennessee Valley Authority	Yes	The Western Interconnection utilizes Western Area Time Error Correction (WATEC) which is an automatic unilateral correction every hour based on the Balancing Authority's last hour inadvertent and the time error of the Western Interconnection. Whereas one could make the observation this process is focused on inadvertent, it does reduce the number of manual time error corrections the Western Interconnection performs as compared to the Eastern Interconnection.
Response: The BAC SDT thanks you for your comment. The BAC SDT will be investigating WATEC as one of the possible		

Consideration of Comments on Survey for Time Error Correction

Organization	Question 3:	Question 3 Comments:
alternatives to Time Error Correction and Inadvertent Payback.		
Weyerhaeuser	Yes	Can the same function be accomplished with either smaller TEC deviations and/or better response to events causing the errors in the first place.
Response: The BAC SDT thanks you for your comment. One alternative to Time Error Correction that the BAC SDT is evaluating is the use of a smaller frequency offset.		
PJM	Yes	Time Error Corrections (as well as Inadvertent Interchange Corrections) are not needed for reliability, and they can be better handled by introducing two changes:1. Eliminating On-Peak and Off-Peak as defined periods (thus forcing each hour to be handled and paid for independent of an arbitrary period of time). The current definitions of On-Peak and Off-Peak result in the creation of On-Peak and Off-Peak pricing products. The large difference in those products create the conditions for the poor control during the transitions from Off-Peak to On-Peak (and vice versa). Eliminating these conditions will help improve frequency performance.2. Introduce hourly payments for Inadvertent Interchange. This will eliminate the temptation to take advantage of the interconnection for monetary gains. This change while not a NERC function (more in the area of FERC/NAESB) it could be supported by NERC. This too could help reduce time error.
Response: The BAC SDT thanks you for your comment. Product definitions and pricing issues are outside the scope of the Drafting Team's mandate.		
Exelon	No	
ERCOT	No	
Energy Mark, Inc.	No	I do not have an alternative proposal for time error correction. However, I believe that there may be good reliability reasons to have a scheduled frequency different from 60 Hz. Such an offset would tend to correct time error but would not be implemented for that purpose.
Response: The BAC SDT thanks you for your comment. The BAC SDT will evaluate the concept of utilizing a scheduled frequency other than 60Hz in future discussions.		

Consideration of Comments on Survey for Time Error Correction

Organization	Question 3:	Question 3 Comments:
Otter Tail Power Company	No	
Ameren	No	
SERC OC Standards Review Group	Yes	The SERC OC Standards Review Group would want to investigate the Western Area Time Error Correction (WATEC) process if a consensus by the industry on eliminating Time Error Corrections cannot be obtained. WATEC is an automatic unilateral correction system that updates every hour based on each Balancing Authority's last hour inadvertent value and the time error of the Western Interconnection. Although the WATEC process is focused on inadvertent, it does reduce the number of manual time error corrections the Western Interconnection performs as compared to the Eastern Interconnection. SERC recognizes that the WECC has been successful in reducing time error corrections with the WATEC process; however implementing a similar system in the Eastern Interconnection would prove to be very expensive.
Response: The BAC SDT thanks you for your comment.		
Orange and Rockland Utilities Inc.	No	
TVA	No	
NPPD	No	
Great River Energy	No	
Santee Cooper	No	Do not believe anything is needed toward Time Error Correction.
Response: The BAC SDT thanks you for your comment.		

Consideration of Comments on Survey for Time Error Correction

Organization	Question 3:	Question 3 Comments:
Lincoln Electric System	No	
FirstEnergy	Yes	<p>If Time Error Correction is stopped, then we recommend that Time Error not be maintained as an indicator of average frequency. We feel this may lead to a desire to have some sort of correction. We believe it is better to track the average frequency or average frequency error over a specific time period provided a method for identifying and correcting the specific cause or causes of the error are also identified. If there is no anticipation of correcting the causes, then no tracking of these variables should be done. While we understand that this may be good for study, we are concerned that it will lead to confusion in the long run. Perhaps the best solutions are found in improved control of energy schedules including enhancing the market practices governing them and the tightening of the bounds of frequency regulation including enhancing the governing market practices.</p>
<p>Response: The BAC SDT thanks you for your comment. It has been demonstrated that the best way to track frequency error is to track time error. Tracking frequency error directly is not as accurate a measure as using time error to tracking frequency error. The BACSDT will evaluate the use of this value and determine if it or other methods of evaluation (e.g., accumulated time error per week) should be mandated as requirements.</p>		
Sierra Pacific Power Co.	Yes	TO manage the long-term build-up of inadvertent, the SDT needs to created a payback standard.
<p>Response: The BAC SDT thanks you for your comment.</p>		
ITC Transco	Yes	Require entities to have NIST time servers, or GPS signals.
<p>Response: The BAC SDT thanks you for your comment.</p>		
Duke Energy Corporation	Yes	<ol style="list-style-type: none"> 1. limit the TEC correction periods to avoid known periods of interconnection load/interchange/generation balance challenges 2. set the schedule frequency targets to 59.99 and 60.01

Consideration of Comments on Survey for Time Error Correction

Organization	Question 3:	Question 3 Comments:
		3. encourage better BA ACE management and lower inadvertent interchange accumulation.
<p>Response: The BAC SDT thanks you for your comments. Creating periods during which Time Error Corrections are not allowed is an approach that may be considered if Time Error Corrections continue. One change to Time Error Correction that the BAC SDT is evaluating is the use of a smaller frequency offset. The BACSDT is also considering how to encourage better BA ACE management and lower inadvertent interchange accumulation.</p>		
City of Tallahassee	No	If we stop Time Error Correction, why do we still need to monitor Time Error? Why not just use Frequency Error? This would eliminate the need to manually adjust Time Error when reconnecting to the interconnect following a system separation.
<p>Response: The BAC SDT thanks you for your comment. It has been demonstrated that the best way to track frequency error is to track time error. Tracking frequency error directly is not as accurate a measure as using time error to tracking frequency error.</p>		
Duke Energy	Yes	As an industry we need to figure out how to balance the competing interests that create time error in the first place. Once we address the root causes, then it would make more sense to do away with TEC. In the interim, we would support a more conservative value being used for scheduled frequency, such as a 0.01 Hz offset from 60 Hz rather than 0.02 Hz, and avoiding known problem times when ACE management is most likely to be an issue across an Interconnection. We would also be supportive of allowing more time-error to accumulate before calling for a TEC.
<p>Response: The BAC SDT thanks you for your comments. One change to Time Error Correction that the BAC SDT is evaluating is the use of a smaller frequency offset.</p>		
Entergy System Planning & Operations (SPO) (Generation & Marketing)	No	TEC should be eliminated unless a technical reason is identified. The continued measurement of TE can still be useful to determine trends on the interconnects and as a basis for the industry taking compensatory measures.
<p>Response: The BAC SDT thanks you for your comments.</p>		

Consideration of Comments on Survey for Time Error Correction

Organization	Question 3:	Question 3 Comments:
Piney Creek LP	No	
US Army Corps of Engineers	No	
Dairyland Power Cooperative	Yes	Electrical system frequency control is an indication of how well entities within an Interconnection are balancing load and generation over a period of time. If time error corrections are increasing in number and/or duration, and predominantly in the same direction (i.e. fast), something must be causing this degradation of power quality. Efforts should be directed towards determining the cause of the load/generation unbalance rather than eliminating the indicator of this control problem.
Response: The BAC SDT thanks you for your comments.		
TECO	No	
Progress Energy, Carolinas	No	
E.ON U.S.		
Xcel Energy	No	
City of Greenfield	No	
PNM Power Operations	Yes	See Answer Question 1.

Consideration of Comments on Survey for Time Error Correction

Organization	Question 3:	Question 3 Comments:
<p>Response: The BAC SDT thanks you for your comments. Unfortunately, unilateral actions taken to control to a different scheduled frequency or unilateral interchange schedules have been shown to be detrimental to our ability to measure control performance and move us further away rather than closer to finding solutions to the underlying reliability problems.</p>		
Ohio Valley Electric Corporation	No	
Entergy Services, Inc	Yes	<p>Entergy agrees with the SERC comments. The SERC OC Standards Review Group would want to investigate the Western Area Time Error Correction (WATEC) process if a consensus by the industry on eliminating Time Error Corrections cannot be obtained. WATEC is an automatic unilateral correction system that updates every hour based on each Balancing Authority's last hour inadvertent value and the time error of the Western Interconnection. Although the WATEC process is focused on inadvertent, it does reduce the number of manual time error corrections the Western Interconnection performs as compared to the Eastern Interconnection. SERC recognizes that the WECC has been successful in reducing time error corrections with the WATEC process; however implementing a similar system in the Eastern Interconnection would prove to be very expensive. Under Item 3 — Continue Time Error Correction, the second sentence of Disadvantage No. 1 needs to be clarified. What would be the reasons to offset scheduled frequency? Who would have the responsibility for determining if and when scheduled frequency should be offset? How will chronic frequency errors be defined? When the issue of eliminating Time Error Correction has been proposed in the past, NERC has referred to a requirement by DOE that NERC is responsible for maintaining correct time. Is this a mandated requirement? If so, is it still valid?</p>
<p>Response: The BAC SDT thanks you for your comments. The BAC SDT will be investigating WATEC as one of the possible alternatives to Time Error Correction and Inadvertent Payback. The BAC SDT investigated the “requirement by DOE” by talking to NERC Staff and others. No requirement could be identified.</p>		
Independent Electricity System Operator	Yes	<p>There is a concern for losing a level of co-ordination among Balancing Authorities and Reliability Coordinators. The Time Error Correction process prompts operators to review current deviation with respect to other areas. No other process accomplishes this and RCIS does not accurately publish real-time deviations. While the discreet value of the Interconnection Time Deviation is not going to be tracked for the purposes of initiating a Frequency Offset, the differences in this deviation from one Balancing Authority to another is still important. The NERC conference call initiated by MISO RC is a means for coordinating all members in the</p>

Consideration of Comments on Survey for Time Error Correction

Organization	Question 3:	Question 3 Comments:
		interconnection and focuses these groups on accumulated frequency deviation. Differences between Balancing Authorities and Reliability Coordinators could indicate underlying problems with frequency monitoring or hardware related issues. If Time Error Corrections were to be discontinued, there would still need to be a coordinated effort among affected parties to review on a regular basis frequency deviations.
<p>Response: The BAC SDT thanks you for your comments. The BACSDT agrees that if Time Error Corrections were to be discontinued, there would still need to be a coordinated effort among affected parties to review on a regular basis frequency deviations.</p>		
PJM RTO	Yes	Should there be insufficient input from the manufacturing side or any time control process such as traffic management which is dependant on accurate AC based frequency - we may be able to discover this by broadening the error range in steps such as 30 seconds increments to ensure there is not material impact which was not considered.
<p>Response: The BAC SDT thanks you for your comments. This alternative has been discussed by the BAC SDT.</p>		
NERC Compliance	No	
ERCOT ISO	No	