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August 21, 2019

Ms. Barbara Kunkel
Executive Secretary
Michigan Public Service Commission
7109 W. Saginaw Highway
P.O. Box 30221
Lansing, MI 48909

Re: **MPSC Case No. U-20471**

Dear Ms. Kunkel:

Attached for electronic filing in the above-referenced matter, please find the Direct Testimony, Exhibits, and Proof of Service on behalf of Energy Michigan, Inc. Thank you for your assistance in this matter.

Very truly yours,

VARNUM

Timothy J. Lundgren

TJL/sej
Enclosures
c. ALJ
All parties of record.

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STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

*****

In the matter of the application of DTE Electric Company for approval of its Integrated Resource Plan pursuant to MCL 460.6t, and for other relief.	))))))	**Case No. U-20471**

DIRECT TESTIMONY & EXHIBITS OF

ALEXANDER J. ZAKEM

ON BEHALF OF

ENERGY MICHIGAN, INC.

Q. Please state your name and business address.

A. My name is Alexander J. Zakem and my business address is 46180 Concord, Plymouth, Michigan 48170.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of Energy Michigan, Inc. ("Energy Michigan").

Q. Please state your professional experience.

A. Since January of 2004, I have been an independent consultant providing services to various clients, including members of Energy Michigan.

From March 2002 to December 2003, I was Vice President of Operations for Quest Energy, an alternative energy supplier in Michigan. My responsibilities included the overall direction and management of Quest's power supply to its retail customers. This included power supply planning, development of customized products, negotiation with suppliers, planning and acquiring transmission rights, and scheduling and delivery of power. It also included managing risk with respect to market price movements and variation of customer loads.

Prior to joining Quest, I was employed by Detroit Edison from 1977 to 2001, where from 1998 to 2001 I was the Director of Power Sourcing and Reliability, responsible for purchases and sales of power for mid-term and long-term periods, planning for

generation capacity and purchase power needs, strategy for and acquisition of transmission rights, and related support for regulatory proceedings.

Additional experience, qualifications, and publications are provided in Exhibit EM-1 (AJZ-1).

Q. Have you testified as an expert witness in prior proceedings?

A. Yes. I have testified as an expert witness in several proceedings before the Michigan Public Service Commission ("Commission"), on topics such as standby rates, retail rates and regulations, recovery and allocation of costs and revenues, and the effects of rate restructuring. I have also testified before the Federal Energy Regulatory Commission ("FERC"). Case citations are provided in Exhibit EM-1 (AJZ-1). In addition, I have participated in various Commission-sponsored workshops and stakeholder working groups.

Q. Are you sponsoring any exhibits?

A. Yes. I am sponsoring the following exhibits:

- Exhibit EM-1 (AJZ-1): Qualifications
- Exhibit EM-2 (AJZ-2): Inefficient Use of CIL
- Exhibit EM-3 (AJZ-3): Improvements in the Use of CIL
- Exhibit EM-4 (AJZ-4): Efficient Use of CIL

Q. What is the purpose of your testimony?

A. This proceeding reviews and assesses DTE Electric's ("DTE's) Integrated Resource Plan ("IRP"). I am responding to DTE's portrayal of an Effective Capacity Import Limit ("ECIL") that limits imports of capacity from outside of Michigan. I am also responding to the Commission's concern about increasing the ability to import capacity. On behalf of Energy Michigan, I am proposing a method to increase the ECIL, which would allow both DTE and the Commission additional flexibility in creating and assessing an IRP.

Q. What is the relevance of DTE's ECIL to the IRP?

A. In this IRP proceeding, the Commission is examining the amounts and types of potential resources that would be needed over the next several years. DTE posits a very low "limit" on the amount of importable resources, which DTE calls the "Effective Capacity Import Limit," or ECIL. However, the actual physical capability of the transmission system to import resources into a zone – which is termed the Capacity Import Limit ("CIL") into the zone – as determined by the Midcontinent Independent System Operator ("MISO"), is much greater than the ECIL. Energy Michigan is proposing an option to increase Michigan's ability to import capacity from out of state to meet the MISO resource adequacy standard.

Q. What is the Commission's concern about imports as it relates to integrated planning?

In its initial Statewide Energy Assessment dated July 1, 2019 ("SEA"), the Commission recommended a closer examination of the ability to locate resources out of Michigan and import their capacity and energy benefits.

> **Integrated electricity system planning** – The Commission recommends Michigan electric utilities and electric transmission owners better integrate the planning processes for electric generation, distribution, and transmission to optimize system reliability improvements and ensure a holistic review of alternatives. In the near term, this should include examining options to increase Michigan's ability to import additional electric generation capacity from out of state, thereby providing additional reliability and resiliency amidst a major shift in our power supplies.[1]

Q. How does DTE's ECIL relate to the IRP?

A. Given the manner in which DTE defines the ECIL, DTE is concerned that the amount of "imported" capacity for meeting MISO's reliability requirements is small. DTE witness Mr. Shawn D. Burgdorf states:

> " . . the actual amount of capacity that a LRZ [Local Resource Zone] can import can be constrained further than the CIL resulting in an effective CIL (ECIL), which is calculated by the following formula: ECIL = PRMR – LCR. This ensures that sufficient existing resources are committed, if available, in each LRZ to reliably serve load." [2]

Mr. Burgdorf goes on to explain:

> The Zone 7 ECIL is expected to be 164 MW (ECIL = PRMR – LCR = 21,976 – 21,812 = 164 MW using MISO preliminary PRA data published 3/22/19) for Planning Year (PY) 2019/20. This means that for PRA purposes only 164 MW can be imported from outside LRZ7 to meet PRMR requirements without violating the LCR constraint.[3]

Q. What are the benefits of increasing Michigan's ability to import capacity from out of state, or the costs of not increasing such ability?

[1] "Michigan Statewide Energy Assessment, Initial Report," Michigan Public Service Commission, July 1, 2019, page iii. Emphasis added. https://www.michigan.gov/documents/mpsc/Sea_Initial_Report_with_Appendices_070119_659452_7.pdf

[2] DTE Direct Testimony of Mr. Shawn D. Burgdorf, page 7 line 25 to page 8 line 3.

[3] Mr. Burgdorf Direct Testimony, page 8, lines 13-17.

A. To be clear, I am not proposing to increase the physical limit, which is the CIL, or to promote resources located outside of Michigan. It is MISO's responsibility to determine the physical limit and the Commission's responsibility to assess DTE's proposed IRP. I am proposing to increase the usable CIL, the portion determined by MISO's rule that can be used to satisfy MISO's resource adequacy standard. DTE has labeled this portion the ECIL.

The CIL for Zone 7 Michigan Lower Peninsula is 3,211 MW. The average CIL for MISO's ten zones is 4,210 MW, and the median is 3,773 MW. So Michigan has an appreciable amount of import capability and is not an "island" by any means. However, under the current rules of the MISO tariff, to be explained later, only a small part of the CIL physical limit of 3,211 MW – 164 MW, as DTE has stated – is usable when satisfying the MISO reliability obligations for the zone. I am proposing to increase the usable portion of the CIL, which would allow Michigan to import more resources from out of state in the process of satisfying MISO's reliability obligations. The obvious benefit of increasing the usable limit is opportunity – opportunity to choose among and draw from a wider selection of resources.

However, the most valuable benefit of increasing the usable limit is the avoidance of higher costs if the usable limit is too low. For the 2019-2020 Planning Year, the capacity price as determined by the MISO auction was $2.99 per MW-year for all zones except Zone 7, which was $24.30 per MW-year, eight times the price in all the other nine zones. That difference in price translates into about $170 million more that MISO charges to the

loads of Michigan suppliers.[4] At the same time, MISO pays the owner of resources $170 million more; so while a supplier who serves load and owns resources may be financially neutral, not all suppliers have completely balanced load and resources.

It is quite possible for the usable portion of the CIL to go to zero under MISO rules, even though the physical CIL is still 3,211 MW. In this situation, MISO would set the price of capacity in the zone at the Cost of New Entry ("CONE")[5], which for Zone 7 is $243.37 per MW-day – ten times the Zone 7 price and 80 times the price in other zones – which translates into $1.9 billion for Zone 7 load. Again, MISO pays owners of resources the same price.

Q. DTE connects the capacity price of CONE to charges to customers. How does this work?

A. DTE states:

> . . . if the Zone 7 auction clearing price is CONE (cost of new entry) due to insufficient resources to meet the LCR, customers may be subject to a Zonal Deliverability Charge. This charge occurs when there is a difference in the auction clearing price between the MISO zone where the resource is located and the zone in which the LSE is located.[6]

This explanation is somewhat of a shorthand that works if both the speaker and the listener are using the same jargon. Yet there is more to understand. First, MISO collects a Zonal Delivery Charge from the LSE, not from retail customers. Second, a Zonal

[4] ($24.30 – 2.99) x 365 x 21,976 MW = $170 million.

[5] See also Mr. Burgdorf Direct Testimony, page 8, lines 5-9.

[6] Mr. Burgdorf Direct Testimony, page 9, lines 5-9. Emphasis added.

Delivery Charge applies only to an LSE that has submitted a Fixed Resource Adequacy Plan. Third, the charge applies only if the zone where the resource is located has a lower MISO auction clearing capacity price than the zone where the load is located. This short discussion points out that for the purpose of explaining and supporting Energy Michigan's proposal herein, it is essential to understand that MISO's detailed rules affect how an LSE satisfies MISO's resource adequacy capacity requirement, and I will be explaining those ways throughout my testimony.

Since DTE has a Power Supply Cost Recovery ("PSCR") mechanism, retail customers typically end up paying for all MISO charges to DTE. Avoiding the capacity price of CONE could save retail customers money. Decreasing the Local Capacity Requirement through the proposal that I will explain later, increases the ECIL and reduces the chances that retail customers will end up paying a CONE price for capacity.

Q. What is the consequence of the way that MISO currently determines the ECIL

The consequence of the way that MISO currently determines the ECIL – the usable portion of the CIL – is that in the setting of MISO capacity prices to incentivize construction of new resources,[7] Michigan could end up with more resources inside Zone 7 than are actually needed for reliability, considering that the physical import limit, the CIL, would still be 3,211 while the MISO price is signaling to build more since the

[7] The FERC ordered MISO to submit tariff rules to include "locational pricing and locational market rules that provide incentives for market participants to obtain sufficient local resources to ensure reliability." *Midwest Indep. Trans. Sys. Operator, Inc.*, 131 FERC ¶ 61,228 at P 24 (2020), cited in Docket No. ER13-2298, Motion for Leave to Answer and Answer of the Midcontinent Independent System Operator, Inc., October 4, 2013, page 7.

usable portion of the CIL is low or zero. As will be explained, Energy Michigan's proposal would increase the usable portion of the CIL by 1,430 MW, which at a nominal investment of $600 per kW, would avoid overbuilding and excessive investment of about $850 million.

Substantial price separation among zones has happened in the past. For the Planning Year 2015-2016, Zone 4 price was $150 per MW-day, while the other zones were all less than $4 per MW-day. That event was the subject of complaints by several parties to the FERC.[8]

Q. What is your perspective on the concept of an ECIL?

A. The concept is valid, although the shorthand label "ECIL" can be misleading. At any operational moment including the time of the MISO peak, the amount of power that can flow into a zone is the MISO CIL – the physical Capacity Import Limit – not the ECIL. The CIL for Zone 7 Lower Michigan is 3,211 MW, but the ECIL is only 164 MW. This is a significant difference, as I will explain later. Yet in concept, DTE has recognized one of the inconsistencies of the current MISO resource adequacy construction, and I agree with that recognition.

At the same time, "ECIL" is not a term defined by MISO, it is not a physical limit but rather a creation of the MISO tariff rather than MISO statistical analysis or power flow

[8] See FERC Docket Nos: Public Citizen, Inc. EL15-70; Illinois Attorney General EL15-71; Southwest Electric Cooperative, Inc. EL15-72; Illinois Industrial Energy Consumers EL 15-82.

modeling, and it is not static – the tariff provisions leading to DTE's ECIL have been changed before and they can be changed again.

What DTE has labeled "ECIL" is a the result of a determination, according to the rules of the MISO tariff, of the quantity, location, and prices of resources that are supposed to clear in the MISO annual Planning Resource Auction ("PRA"). Instead of "ECIL," a more meaningful description of the concept would be "the portion of a zone's physical Capacity Import Limit that can be used to satisfy MISO's resource adequacy standard." I will use the shorthand "ECIL" at times during this testimony to show the connection to DTE's testimony.

In this proceeding, Energy Michigan will show that the "usable portion" of the CIL as determined by MISO's current method contains errors and inconsistencies, and Energy Michigan will propose a remedy that will significantly increase the amount of capacity that can be imported to Michigan to satisfy MISO's resource adequacy standard.

Q. Would you outline your testimony?

A. To understand the limitations imposed by the ECIL concept, it is necessary to understand the MISO resource adequacy standard. DTE addresses that in Mr. Burgdorf's direct testimony, pages 5-8. I will first explain some additional aspects of the MISO resource adequacy standard in order to establish an understandable basis for my proposal to increase the ECIL.

My testimony will cover the following:

A. ***Explain Incomplete and Inefficient Use of CIL***: To show that Michigan's Lower Peninsula, Zone 7, is comparatively disadvantaged by MISO's rules because only 5% of the physical CIL for Zone 7 can be used to satisfy the Planning Reserve Margin Requirement ("PRMR") obligation for the zone. I will illustrate how much capacity external to a zone that MISO currently allows to meet the PRMR for the zone.

B. ***MISO LCR Construction***: To show how MISO currently determines how much capacity must be within a MISO zone – the Local Clearing Requirement ("LCR"). This determination is a construction in the MISO Module E-1 tariff, not a physical or engineering modeling determination. As such, it can be changed without affecting MISO's reliability modeling.

C. ***Deficiencies of Current LCR Method:*** To point out errors and inconsistencies resulting from MISO's current construction of LCR. Again, the determination of LCR is a creation of the tariff, not a fact. The rules for LCR have changed over time, reflecting that the determination of LCR depends on the judgement of MISO and MISO stakeholders, which rules have led to the current contradictions.

D. ***Proposed Solution:*** To propose a method of determining LCR such that significantly greater amount of MISO's physical limit on transmission into a zone – the CIL – is usable in satisfying the zone's PRMR, for all zones. The method

eliminates the current errors and contradictions, without changing the way MISO performs its statistical analyses and power flow modeling..

E. ***Recommendation for Action:*** To recommend to the MPSC action steps to implement the proposed method.

A. Incomplete and Inefficient Use of CIL

Q. What does "Capacity Import Limit" mean for a zone in MISO?

A. MISO defines CIL as:

> ***Capacity Import Limit (CIL):*** The amount of Planning Resources in MWs for an LRZ determined by the Transmission Provider that can be reliably imported into that LRZ. [9]

MISO determines the CIL for each zone by power flow modeling, as explained in its "Planning Year 2019-2020 Loss of Load Expectation Study Report." [10] I am not critiquing MISO's determination of CIL or other elements of its statistical and power flow modeling. I will be critiquing how some of those elements are put together in the MISO tariff in the determination of a zone's Local Clearing Requirement.

Module E of the MISO tariff uses the CIL for a zone as part of a calculation of the zone's Local Clearing Requirement, defined as:

[9] MISO Module A – Common Tariff Provisions, Definitions. https://cdn.misoenergy.org/Module%20A108022.pdf

[10] MISO, "Planning Year 2019-2020 Loss of Load Expectation Study Report." https://cdn.misoenergy.org/2019%20LOLE%20Study%20Report285051.pdf

> ***Local Clearing Requirement (LCR):*** The minimum amount of Unforced Capacity for an LRZ that is required to meet its LOLE while fully using the Zonal Import Ability for such LRZ and accounting for controllable exports. [11]

where Zonal Import Ability is defined as:

> ***Zonal Import Ability***: The ability of an LRZ to import capacity from areas outside of that LRZ. Equal to an LRZ's base interchange plus the LRZ's incremental ability to import generation. [12]

Q. How do these concepts relate to Michigan?

A. MISO's Zone 7 encompasses the Michigan Lower Peninsula. MISO's Zone 2 encompasses the Upper Peninsula and part of eastern Wisconsin. For the MISO Planning Year 2019-2020, The CIL and ZIA for Zone 7 is 3,211 MW. [13] (For simplicity in this discussion, since the ZIA equals the CIL for Michigan zones, I will use CIL.) However, only 164 MWs of capacity – about 5% – were able to be imported to Zone 7 for satisfying the zone's PRMR due to the way the MISO tariff defines the Local Capacity Requirement, as I will explain in Section B. DTE states similarly: " . . . for PRA purposes only 164 MW can be imported from outside LRZ 7 to meet PRMR requirements without violating the LCR constraint."[14]

[11] MISO Module A – Common Tariff Provisions, Definitions. Emphasis added.

[12] MISO Module A – Common Tariff Provisions, Definitions.

[13] MISO "2019/2020 Planning Resource Auction (PRA) Results," May 8, 2019, page 7. https://cdn.misoenergy.org/20190322%20RASC%20Item%2003%20Final%20PRA%20Preliminary%20Data329890.pdf

[14] Mr. Burgdorf Direct Testimony, page 8, line 15-17. Emphasis added.

Note that the 164 MW is not a physical limit. Operationally, Zone 7 can import 3,211 MW of power flow. The 164 MW is a simply a creation of the rules in the MISO tariff regarding the location, quantity, and price of resources that can clear in the annual MISO PRA.

Despite the tariff definition specifying that the LCR should be set while "fully using" the CIL, the tariff does not allow the full use of the CIL in satisfying PRMR obligations. Thus, the MISO tariff, in its specifications of the capacity obligation of a zone – the PRMR – incompletely and inefficiently uses the actual physical transmission capability for importing capacity into the zone, the CIL.

Q. Is Michigan Zone 7 the only zone in MISO that is affected?

A. No, all zones are affected, but Michigan is affected the most. Exhibit EM-2 (AJZ-2) displays, for each of the 10 MISO zones, the percentage of CIL that is usable to satisfy MISO's PRMR obligation for the zone, under current MISO rules. That is, the percentage of ECIL compared to the physical CIL. All zones are well under 100%.

Michigan Zone 7 is the lowest, at only 5%, and the MI/WI Zone 2 is about 22%. Michigan Zone 7 at 5% is an obvious "outlier" among the zones, being disadvantaged by the MISO rules to a much greater degree than any of the other zones.

Exhibit EM-2 (AJZ-2) illustrates that the way the MISO tariff allows the CIL to be used in satisfying resource adequacy obligations does not fully and efficiently use all the CIL

that is physically capable of importing capacity. The underlying cause is how the MISO tariff determines LCR (Local Capacity Requirement), which I will explain following.

B. MISO LCR Construction

Q. How does MISO determine the LCR (Local Capacity Requirement) for a zone?

A. To understand how the LCR is determined, we must first understand the resource adequacy requirements and standard. Although DTE speaks to this briefly,[15] a more detailed description is needed to understand later how and why the current ECIL method is faulty. Exhibit EM-3 (AJZ-3), page 2, illustrates how MISO determines the resource adequacy standard.

In brief, the intent of the resource adequacy requirements is to ensure that there are adequate Planning Resources available to enable Load Serving Entities ("LSEs") to reliably serve load. [16] The word "reliably" indicates a standard. The standard MISO uses is the "one day in 10 years" standard, which has been a common reliability standard in the electric industry for many years.[17] MISO defines:

> ***Loss of Load Expectation (LOLE):*** The sum of the loss of Load probability for the integrated daily peak Hour for each Day of the year. The requirement is set such that the loss of Load is no greater than 0.1 day in one (1) year. [18]

[15] Mr. Burgdorf Direct Testimony, page 7.

[16] MISO Module A – Common Tariff Provisions, Definitions, "Resource Adequacy Requirements (RAR)."

[17] See also Mr. Burgdorf Direct Testimony, page 6, lines 2-7.

[18] MISO Module A – Common Tariff Provisions, Definitions.

To clarify, "loss of load" means insufficient resources in a particular hour to meet all firm load. "One day in 10 years" does not mean one event of loss of load in 10 years, but rather 24 hours in which a loss of load occurs over a period of 10 years (87,600 hours) in statistical modeling.

The outcome of the resource adequacy requirement is the specification of a quantity of resources greater than the forecast peak load, to allow for variation in the peak load and for outages or other variation in generation. That additional quantity is termed the Planning Reserve Margin ("PRM") and is usually expressed in percent, as a percent of the forecast peak. The PRM that MISO uses accounts for the amount of capacity after forced outages are removed from the resource portfolio, and is termed Unforced Capacity PRM, or PRM UCAP. For the Planning year 2019-2010, MISO set the PRM UCAP at 7.9%.

Q. How is the PRM UCP applied?

A. The PRM UCAP of 7.9% is applied uniformly to all LSEs, all zones, and to MISO as a whole, to the forecasts of the LSEs and Zones and all of MISO at the MISO peak hour. That is the resource adequacy standard. Very briefly, each LSE forecasts the load it expects to have at the time of the MISO peak hour, and then all the LSE forecasts are added up to get the MISO forecast peak. The PRM is added to the MISO forecast peak, and the result is the PRMR (Planning Reserve Margin Requirement) for all of MISO, which is expressed in MW.

It is important to note that the PRM % applies to the MISO annual peak, not to the sum of the individual peaks of the LSEs, which may occur at different hours. The standard applies to MISO as a whole. Not every LSE reaches its annual peak at the time of the MISO annual peak; however, the total of the LSEs' loads at any hour other than the MISO peak hour by definition is less than the MISO peak hour.

Exhibit EM-3 (AJZ-3), page 2, illustrates how MISO determines the resource adequacy standard. For Planning Year 2019-2020, the MISO peak forecast including transmission losses was 124,878 MW. The PRM UCAP of 7.9% was added to this, resulting in the MISO PRMR of 134,743 MW. Again, the forecast – and the standard – are set at the MISO annual peak hour.

Q. How are the PRMRs for individual LSEs set?

A. The PRMR for an individual LSE is set by adding the PRM UCAP to the LSE's forecast at the time of the MISO annual peak hour. DTE similarly notes that the LSE forecast is "coincident with the MISO's peak demand."[19] The same PRM UCAP of 7.9% applies to every LSE. This is illustrated in Exhibit EM-3 (AJZ-3), page 3, diagram 1 on the left side. Since the MISO annual peak forecast is the sum of all of the LSE forecast loads at the time of the MISO peak hour, all of the LSE PRMRs sum up to the MISO PRMR.

Q. Is a PRMR obligation set for a zone?

[19] Mr. Burgdorf Direct Testimony, page 6, lines 13-14.

A. While a "zone" by itself, being a geographic area, does not have an obligation to pay for capacity, the concept of a PRMR for a zone is used in the MISO tariff. The PRMR for a zone is simply the PRMR for each LSE in the zone added up – or equivalently, the forecasts of the LSEs in the zone at the time of the MISO annual peak hour added up, then the PRM UCAP applied to the total for the zone. This is illustrated in Exhibit EM-3 (AJZ-3), page 3, diagram 2 on the right side.

Q. Would you summarize how MISO applies the resource adequacy standard to determine the PRMR values for LSEs, zones, and MISO as a whole?

A. To determine the PRMR values for LSEs, zones, and MISO as a whole, MISO:

a. MISO applies the same MISO wide reserve margin, PRM %, of 7.9% to all LSEs, zones, and MISO as a whole.

b. MISO applies the same PRM %, to the forecasts at the time of the MISO peak, for all LSEs, zones, and MISO as a whole.

Exhibit EM-3 (AJZ-3), page 4, illustrates the application schematically.

Q. Once the PRM UCAP is set for MISO and for all the LSEs, how is the Local Clearing Requirement for a zone determined?

A. Unlike the PRM UCAP and the PRMRs for MISO and all the LSEs, the LCR for a zone is not determined directly via statistical analysis or power flow modeling. Rather, the MISO tariff determines the LCR for a zone, putting together elements that come out of modeling. Exhibit EM-3 (AJZ-3), page 5, shows the process.

First, the forecast for the zone at the time of the MISO annual peak is not used. Instead, a forecast for the separate annual peak hour for the zone is used. The zonal peak could be at a different day and/or time versus the MISO peak. On Exhibit EM-3, page 5, the forecast zonal peak demand for Zone 7 is 21,350 MW, shown in the blue column. The forecast zone load at the time of the MISO peak, 20,367 MW, is not used.

Second, PRM for the zone is calculated from modeling under the assumption or boundary condition that the zone is isolated, with no import capability. Because there are relatively fewer and relatively larger generation resources in the zone compared to the zonal peak, versus resources in all of MISO, the PRM % for the zone is in general much larger than the PRM % for MISO in total.[20] For Zone 7, the zonal PRM is 17.2%, compared to the MISO PRM of 7.9%, also shown in the blue column. The zonal forecast plus the zonal PRM results in the Local Resource Requirement ("LRR"), shown as 25,023 MW.

Third, under the rationale that the LRR assumes no import ability, but actually there is a CIL of 3,211 for the zone – yellow column – the CIL is subtracted from the LRR to give the LCR – the Local Clearing Requirement for Zone 7, representing by MISO's rationale the number of MW that should be in the zone, given the transmission constraint of 3,211 MW of CIL, to meet the MISO resource adequacy standard. This is the pink column denoting LCR for Zone 7 of 21,812 MW.

[20] See Exhibit EM-4 (AJZ-4) , page 2, column F.

Q. How do the factors affecting the LCR for the zone differ from the factors used in the MISO resource adequacy standard?

A. Three factors affecting the determination of the LCR are different:

(1) separate and independent zonal peaks are used, rather than the LSE and zone loads coincident with the MISO annual peak;

(2) a zonal PRM is calculated using not just actual transmission constraints but instead assuming that the zone is completely isolated; and

(3) capacity imports via the CIL, which are coming from resources in the rest of MISO that require a MISO PRM UCAP of 7.9%, are used to offset a zonal PRMR based on a zonal PRM of 17.2%.

These differences lead to inconsistencies between the MISO resource adequacy standard and the degree of reliability implied by the zonal LCRs.

C. Deficiencies of Current LCR Method

Q. What do you mean by inconsistencies?

A. I will give three examples. The first is on Exhibit EM-3 (AJZ-3), page 6. Similar to assuming a boundary condition for the zone that the zone is isolated (meaning zero CIL), suppose the transmission system can import <u>all</u> the capacity needed to meet the zonal PRMR – that is, <u>what if CIL = PRMR</u>, which is 21,976 for Zone 7.

In this situation, as page 6 illustrates, the CIL of 21,976 is subtracted from the LRR of 25,023, resulting in an LCR of 3,047 MW. Thus, even if Zone 7 can <u>import all of its</u>

required capacity, satisfying the Zone 7 PRMR all with imports, the MISO tariff would dictate that an additional 3,047 MW would still need to be located within the zone. This does not make any sense, and is inconsistent with the resource adequacy standard that the PRMR represents the capacity obligation that satisfies the resource adequacy standard which is 21,976 MW.

Q. And the second example?

A. Page 7 of Exhibit EM-3 (AJZ-3) shows the second example. In the annual Planning Resource Auction, Zone 7 was able to use only 164 MW of the 3,211 MW of CIL to fulfill the PRMR of LSEs in Zone 7. The "usable CIL," or ECIL, of 164 MW, shown in the box on the left, is the difference between the PRMR of 21,976 and the LCR of 21,812 MW. The auction results in the box on the right illustrates that only 164 MW of capacity were imported.

The usable CIL, or ECIL, of 164 MW is not a physical limit. It is a creation of the MISO tariff. The CIL itself at 3,211 is the physical limit as determined by MISO's modeling. Zone 7 can import 3,211 MW of power flow and at the time of the MISO peak 3,211 MW can flow into Zone 7, but under the MISO LCR method Zone 7 can get credit for only 164 MW in satisfying its PRMR capacity obligation for the zone

Further, the small usable CIL of 164 MW out of 3,211 MW severely decreased competition for the in-zone capacity to fill Zone 7's LCR. In addition to resources

offered into the auction at zero dollars, only 283 MW remained in the zone, competing for 32 MW additional resources required for the LCR, as page 5 shows.

The 32 MW set the zonal clearing price of $24.30 per MW-day, compared to the clearing price of $2.99 for the other zones in MISO. This means that there were other resources in MISO at $2.99 that could have been used in Zone 7 if the usable CIL were greater. I note that the auction "conduct threshold" for Zone 7 was $24.34, only 4 cents higher than the clearing price. "Conduct threshold" is the price below which MISO assumes that no market manipulation is occurring.

Q. Could the usable CIL be greater?

A. Yes, the usable CIL, that is, the ECIL, would be greater if the LCR were lower, and in the next section will explain a proposal that reduces the LCR by making the determination of the LCR consistent with MISO's resource adequacy standard. If a low ECIL reduces potential options in the IRP, increasing the ECIL may allow more options.

Q. And the third example?

A. Exhibit EM-3 (AJZ-3), page 8, shows the third example. Here, suppose the result of the LRR isolated zone calculation is that the PRM% for the *zone* is the same as the PRM% for *MISO as a whole*, 7.9%, and also the CIL is the same as the PRMR. Thus this situation is identical to the situation that creates the MISO wide PRMR%: no transmission constraints and all of MISO's resources in one portfolio. One would expect, in this situation, that a requirement for additional resources in the zone – the LCR – could

be none other than zero, because the MISO resource adequacy standard is perfectly satisfied. However, in this situation, the LRR (blue column) would be the zonal peak of 21,350 MW plus 7.9%, equaling 23,037 MW, and the subtracting the CIL would result in an LCR of 1,061 MW. In effect, if the conditions were to duplicate the situation of the MISO PRMR obligation – no transmission constraints and MISO-wide portfolio of resources -- the current LCR method would still require an additional 1,061 MW.

This indicates that the reliability standard implied by the current LCR method results in a higher (stricter) overall standard than that of the MISO resource adequacy standard. The reason is that each zone is being considered separately and independently via a separate zonal peak, rather than as a component of the MISO annual peak. The MISO resource adequacy standard has clearly and always been "1 day in 10 years" for serving the MISO peak. The current LCR method breaks the total MISO area into 10 pieces, and bases the LCR calculation on a "1 day in 10 years" standard for each piece. The current LCR method starts with separate and independent zonal peaks and separate and independent zonal PRMs, and thus overstates the amount of capacity needed to meet the MISO resource adequacy standard with MISO as a unified and aggregated system. In essence, the current LCR method is a device to mitigate transmission constraints among artificial geographic sectors, the zones.

Q. What are the underlying causes of the inconsistencies exhibited by the current MISO calculation of LCR?

A. There are two factors underlying the inconsistencies:

1. ***PRM% Mismatch -- MISO vs. Zone:*** To serve 1 MW of forecast in the zone, 1.079 MW of imports are needed, or equivalently 1.172 MW of local zone resources.

   However, under the current LCR method, 1.172 MW of imports – more than the correct 1.079 – are required to offset 1 MW of forecast in the zone. This error understates the MW value of imports.

2. ***MISO Aggregated vs. Zones Separately:*** The current LCR method is based on an independent and non-diversified resource adequacy requirement for each zonal peak separately, while the MISO resource adequacy standard is based on a requirement applied to all of MISO at the same MISO single peak hour.

   Using the separate zonal peaks results in an LCR method that is stricter than the MISO resource adequacy standard and contradicts the standard if the same conditions are applied to both the LCR method and the MISO standard.

Exhibit EM-3 (AJZ-3), page 9, summarizes the examples of inconsistencies and underlying causes in the current MISO LCR method, discussed above.

Q. How can the error and inconsistencies in the current MISO LCR method be eliminated?

A. As shown on Exhibit EM-3 (AJZ-3), page 10, summarizing the proposed improvement, there are three objectives for an improved LCR method. The inconsistencies resulting from the present method of determined LCR can be eliminated by an improvement that:

a. uses the full capability of the CIL in fulfilling the zonal PRMR,

b. supports the MISO resource adequacy standard, and

c. still recognizes that resources uses within a zone may require a separate PRM %.

Q. What is your proposal?

A. Exhibit EM-3 (AJZ-3) page 10 shows my proposal. The proposal has two components, and sets the LCR in two steps:

First, a portion equal to the CIL (3,211 MW for Zone 7) of the zonal PRMR can be imported, using the MISO PRM %. The zonal PRMR is the PRMR set by the MISO method, using the forecast at the time of the MISO peak.

Second, the remaining portion of the PRMR for the zone is supplied from local resources using the zonal PRM%.

Exhibit EM-3 (AJZ-3), page 11, a schematic of the proposal, illustrates how the imports and in-zone resources combine to determine how much capacity must be located with the zone, the LCR.

Q. Would you give an example for Zone 7?

A. Exhibit EM-3 (AJZ-3), page 10, shows an example for Zone 7. The PRMR for Zone 7 is 21,976 MW. Of this, in step 1, up to 3,211 can be imported, leaving 18,765 MW.

Second, the remaining 18,765 MW of PRMR includes a MISO PRM %. This has to be changed to a zonal PRM %. This is done by backing out the MISO PRM % to get to the underlying forecast number, then adding in the zonal PRM %:

LCR = [18,765 / 1.079] x 1.172 = 20,282 MW.

So Zone 7 can import up to 3,211 MW, and must have resources of 20,282 MW within the zone.

The proposed LCR of 20,382 MW is a decrease of 1,430 MW compared to the current LCR method with an LCR of 21,812 MW. Correspondingly, the usable portion of the CIL – the new ECIL – increases by 1,430 MW from 164 MW to 1,594 MW.

Q. What if, for example, only 1,000 MW of imports to Zone 7 clear in the MISO auction?

A. The LCR would remain the same at 20,282 MW. As noted previously, the physical CIL (Capacity Import Limit) is still 3,211 MW, and consequently 3,211 MW of power flow can be imported into Zone 7 at the time of the MISO annual peak hour to meet the MISO resource adequacy standard, regardless of what has cleared for which zones in the auction.

For resource adequacy purposes, who owns which resources where does not affect reliability and does not affect the MISO auction clearing price. MISO uses all resources in aggregate to serve all load in aggregate. MISO does not use a particular owner's resources to serve that particular owner's load. Thus, capacity is not actually being "imported" in a casual meaning. Rather, the purpose of the current LCR method and the MISO annual auction is to provide price signals for where additional capacity might be needed.

Ownership is not relevant to MISO's resource adequacy standard. For example, if LSE A in Zone 7 owns 6,000 MW in Zone 5 and LSE B in Zone 5 owns 6,000 MW in Zone 7, that situation is completely valid – both in the MISO auction and operationally – even if the CIL – the physical import limit – in each zone is less than 6,000. LSE A and LSE B may say they are "importing" capacity, but to MISO there is no physical importing.

In assessing the IRP, the Commission may find it useful to distinguish between the ECIL as representing financial risk of not satisfying MISO's resource adequacy requirements and the physical CIL as representing reliability risk. Increasing the ECIL can reduce financial risk without affecting reliability risk.

Q. Does your proposal eliminate the inconsistencies that you have discussed previously?

A. The proposed method is consistent with the MISO resource adequacy standard because it is based on the resource adequacy standard. When the conditions match the conditions of the resource adequacy standard, the results are the same: if a zone has the same PRM% as the MISO-wide PRM% and there are no transmission constraints into the zone (that is, the CIL = the PRMR) then the Local Capacity Requirement is zero, as it should be. Another way of looking at this is if a zone can import all its capacity requirements to meet MISO's resource adequacy obligations (PRMR), then there is no need for "local" capacity within the zone. The current LCR method does not produce either of these outcomes, but rather requires additional capacity beyond that needed to meet the MISO PRMR obligations.

Q. What is the effect of the proposal on the issue you discussed previously, the percent of CIL usable to satisfy the MISO PRMR for a zone?

A. Exhibit EM-4 (AJZ-4), page 1, shows the results. Under the proposal, compared to the current LCR method, the percent of CIL that can be used to satisfy the MISO PRMR – that is, the new ECIL – for a zone increases for all zones. The Michigan zones – Zone 7 for Lower Peninsula and Zone 2 for Upper Peninsula and east Wisconsin – are significantly improved. Although they are still less than other zones, they no longer appear as outliers. The new, higher ECIL may provide DTE and the Commission options for imports that would not be feasible under the current ECIL.

Where the usable CIL is somewhat less than 100%, the underlying cause is the PRM% for the zone being greater than the MISO PRM%. Under the proposal, if the PRM% for

the zone is the same as the PRM% for MISO, then the usable portion of the CIL would be equal to 100% of the CIL, as one would expect.[21] This is not true with the current LCR method. In my opinion, MISO resource adequacy is better served by recognizing that there are transmission constraints into a zone, Constraints imply that the portfolio of resources within a zone that cannot be substituted for via capacity imports may require a higher reserve margin – determined from MISO modeling – than that required for MISO as a whole. Such recognition and requirement has to be designed in a reasonable and realistic way, a way that is consistent with the MISO resource adequacy standard.

E. Recommendation for Action

Q. How can your proposal be put into place?

A. My proposal would revise the MISO Module E-1 tariff to change the way that the Local Clearing Requirement for a zone is determined. Nothing would be changed in the way MISO performs its statistical analysis or power flow modeling. Nothing would be changed in the way Load Serving Entities and Electric Distribution Companies submit forecast data to MISO. Nothing would be changed in the way PRMR obligations are determined for LSEs. Nothing would be changed in the options that LSEs have for meeting their PRMR obligations.

Q. What are the options for LSEs to meet their PRMR obligations?

A. The MISO tariff lists four options:

[21] Usable CIL = PRMR – LCR.
Proposed LCR = (PRMR – CIL) * (zone PRM% / MISO PRM%).
If zone PRM% = MISO PRM%, then zone PRM%/MISO PRM% = 1
So Usable CIL = PRMR – (PRMR – CIL) * 1 = PRMR – PRMR + CIL = CIL
Therefore, Usable CIL = CIL. I.e., 100% of CIL.

LSEs will meet their PRMR by:
(i) submitting a Fixed Resource Adequacy Plan;
(ii) Self-Scheduling ZRCs;
(iii) purchasing ZRCs through the Planning Resource Auction process; and/or
(iv) paying the Capacity Deficiency Charge.[22]

MISO charges for load and pays for resources. These are separate transactions, although they may be offset financially on the MISO bill. "Self-Scheduling" means offering in resources to the auction at a zero price and taking whatever price that the auction determines. "Purchasing ZRCs" through the auction is a jargon term meaning the LSE is being charged for more MW of load than the MW of resources the LSE is offering to sell into the auction. ZRCs – capacity resources – are not actually "purchased" in the auction.

Q. What is your recommendations to the Commission?

A change is needed in the MISO tariff. Since the FERC approves MISO tariffs, a filing to the FERC is needed and subsequent approval by the FERC is needed. If the FERC were to approve the LCR method proposed herein, Zone 7 Michigan Lower Peninsula would increase its ability to import capacity to satisfy MISO resource adequacy obligations from 164 MW to 1,594 MW, as shown on Exhibit EM-4 (AJZ-4), page 2, columns D and I. This is an increase of 1,430 MW. This increase could affect the Commission's assessment of workable options in the IRP.

State regulators have been active participants and the development of resource adequacy rules. The Organization of MISO States and MISO jointly conduct an annual survey on resource adequacy. The MISO tariff defers to state regulatory and legal actions in several

[22] MISO Module E-1, Section 69A.

places, giving weight to the views of state regulators regarding resource adequacy and the effect of MISO rules on the states. Examples of priority in the MISO tariff are:

> Nothing in this Module E-1 affects existing state jurisdiction over the construction of additional capacity or the authority of states to set and enforce compliance with standards for adequacy.[23]
>
> . . . if a state regulatory body establishes a PRM for its regulated entities that is higher or lower than the PRM determined by the Transmission Provider, then the state-established PRM will apply to the Coincident Peak Demand [*note: this is the LSE forecast at time of MISO peak*] of LSEs under that state's jurisdiction.[24]

Consequently, the Commission is well positioned to lead the effort to take the issues explained herein to MISO and to the FERC and has a basis in the MISO tariff to do so.

Q. Has Module E-1 ever been revised to change the way that the Local Clearing Requirement for a zone is determined?

A. Yes. MISO filed a request in the FERC Docket No. ER13-2298 on August 30, 2013, to change the forecast for determining the LCR from the MISO annual peak time to the individual zonal peak times. The FERC approved the request on October 29, 2013. Other parties addressed some of the issues discussed above, but the FERC ruled the issues "beyond the scope" of the proceeding.

Q. Does that complete your direct testimony?

A. Yes, it does.

15284240_2

[23] MISO Module E-1, Section 68A. Emphasis added.

[24] MISO Module E-1, Section 68A.1. Emphasis added. Insertion added.

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

*****

In the matter of the application of DTE Electric Company for approval of its Integrated Resource Plan pursuant to MCL 460.6t, and for other relief.	))))))	**Case No. U-20471**

EXHIBITS OF

ALEXANDER J. ZAKEM

ON BEHALF OF

ENERGY MICHIGAN, INC.

ALEXANDER J. ZAKEM

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CONSULTANT – MERCHANT ENERGY AND UTILITY REGULATION

Provides strategies and technical expertise on competitive market issues, transmission issues, state and federal regulatory issues involving the electricity business, and associated legal filings. Scope includes the Midwest ISO Energy Market and Resource Adequacy, FERC proceedings on transmission and market tariffs, state rules for competitive supply, and negotiation of settlements.

PRIOR POSITIONS: Quest Energy, LLC – a subsidiary of Integrys Energy Services

Vice President, Operations **March 2002 to December 2003**

Responsible for the planning, acquisition, scheduling, and delivery of annual power supply and transmission, to serve competitive retail electric customers.

- ***Power Planning*** -- Designed and negotiated customized long-term power contracts, to reduce power costs and exposure to spot energy prices.

- ***Transmission*** -- Revamped transmission strategy to reduce transmission costs.

- ***Load Forecasting*** -- Instituted formal short-term forecasting process, including weather normalization.

- ***Risk Management*** -- Developed summer supply strategy including call options to minimize physical supply risk at least cost. Instituted probabilistic assessment of forecast uncertainty to minimize transmission imbalance costs.

- ***Contract Management*** – Negotiated and recovered liquidated damages for power supply contracts. Included cost of transmission losses into customer contracts.

- ***Operations Capability*** -- Expanded the Operations staff. Oversaw daily activity in spot market purchases. Instituted back-up capability, including equipment and processes, enabling the company to schedule and deliver virtually all power during the August 2003 blackout in the Midwest.

PRIOR POSITONS : DTE Energy / Detroit Edison — 1977 to 2001

Director, Power Sourcing and Reliability **May 1998 to April 2001**

Director of group responsible for monthly, annual, and long-term purchases and sales of power for Detroit Edison, including procuring power for the summer peak season.

- ***Planning*** -- Planned summer power requirements for Detroit Edison, including mix of generation, option contracts, hub purchases, load management, and transmission, which balanced and optimized physical risk and financial risk.

- ***Contract Management*** – Established decision, review, and approval process for evaluation and execution of power transactions, including mark-to-market valuation.

- ***Execution*** -- Executed summer plans, contracting annually for purchased power and transmission services. Directed negotiations for customized structured contracts to provide the company with increased operating flexibility, dispatch price choices, and delivery reliability.

- ***Risk Management*** – Developed an optimizing algorithm using load shapes to minimize corporate exposure to volatile power prices. Developed a hedging strategy to fit power purchases to the corporation's risk tolerance level.

- ***Acquisitions*** -- Team leader for acquisition of new peakers.

- ***Settlements*** -- Negotiated and settled liquidated damages claims.

Relevant prior positions within Detroit Edison

Position	***Organization***	***Time Period***
Director, Special Projects	**Customer Energy Solutions**	**Apr 97 to May 98**

Leader of several special projects involving the transformation of the corporation's merchant energy functions into competitive business units, including merger explorations and the start up of DTE Energy Trading (DTE's power marketing affiliate).

Directed filings to the Federal Energy Regulatory Commission to establish DTE Energy Trading as a power marketer and to gain authority for sales, brokering, and code of conduct. The FERC used DTE's flexible utility/affiliate code of conduct as precedent for rulings for other power marketers.

Director, Risk Management **Huron Energy (temp affiliate)** **Jan 97 to Apr 97**

Leader of team responsible for competitive pricing of wholesale structured contracts and for acquiring risk management hardware and software to support risk management policy. Prepared Board resolutions to implement risk management policy.

Director, Contract Development **Customer Energy Solutions** **Jan 96 to Dec 96**

Leader of team that formulated a business strategy for the corporation in competitive power marketing. Team leader on project evaluating an existing steam and electricity contract, recommending and gaining Board approval for revamping the corporation's Thermal Energy business and strategy.

Project Director **Executive Council Staff & Corporate Strategy Group** **Jan 91 to Dec 95**

Project leader for competitive studies, including business risk, generation pooling, and project financing in the merchant generation industry. Team member and/or team leader for analyses of merger and acquisition opportunities

Special Assignment **Executive Council Staff** **Mar 90 to Dec 90**

Special assignment related to long-term industry strategies and mergers and acquisitions.

Pricing Analyst **Marketing / Rate** **Aug 82 to Mar 90**

Developed, negotiated, and implemented an innovative standby service tariff. Testified as an expert witness in regulatory proceedings and in state legislative hearings.

Engineer **Resource Planning** **Aug 79 to Dec 81**

Member of the company's electric load forecasting team, responsible for SE Michigan energy and peak demand forecasting, and for risk analysis. Developed the company's first residential end-use forecast model.

PRIOR POSITIONS: <u>Prior to DTE Energy</u>

Lear Siegler Corporation, ACTS Computing division, systems analyst and programmer from January 1973 to July 1977.

EDUCATION: M. A. in mathematics, University of Michigan, 1972
B. S. in mathematics, University of Michigan, 1968

MILITARY: U. S. Army, September 1968 to June 1970.
Viet Nam service from June 1969 to June 1970.
Honorably discharged.

PROFESSIONAL: Member, Engineering Society of Detroit (1979-present)

PUBLICATIONS & PAPERS:

- "Competition and Survival in the Electric Generation Market," published in *Public Utilities Fortnightly*, December 1, 1991.
- "Measuring and Pricing Standby Service," presented at the Electric Power Research Institute's "Innovations in Pricing and Planning" conference, May 3, 1990.
- "Assessing the Benefits of Interruptible Electric Service," presented at the 1989 Michigan Energy Conference, October 3, 1989.
- "Principles of Standby Service," published in *Public Utilities Fortnightly*, November 24, 1988.
- "Progress in Conservation," a satirical commentary published in *Public Utilities Fortnightly*, October 27, 1988.
- "Comparing Utility Rates," published in *Public Utilities Fortnightly*, November 13, 1986.
- "Uncertainty in Load Forecasting," with co-author John Sangregorio, published in *Approaches to Load Forecasting*, Electric Power Research Institute, July 1982.

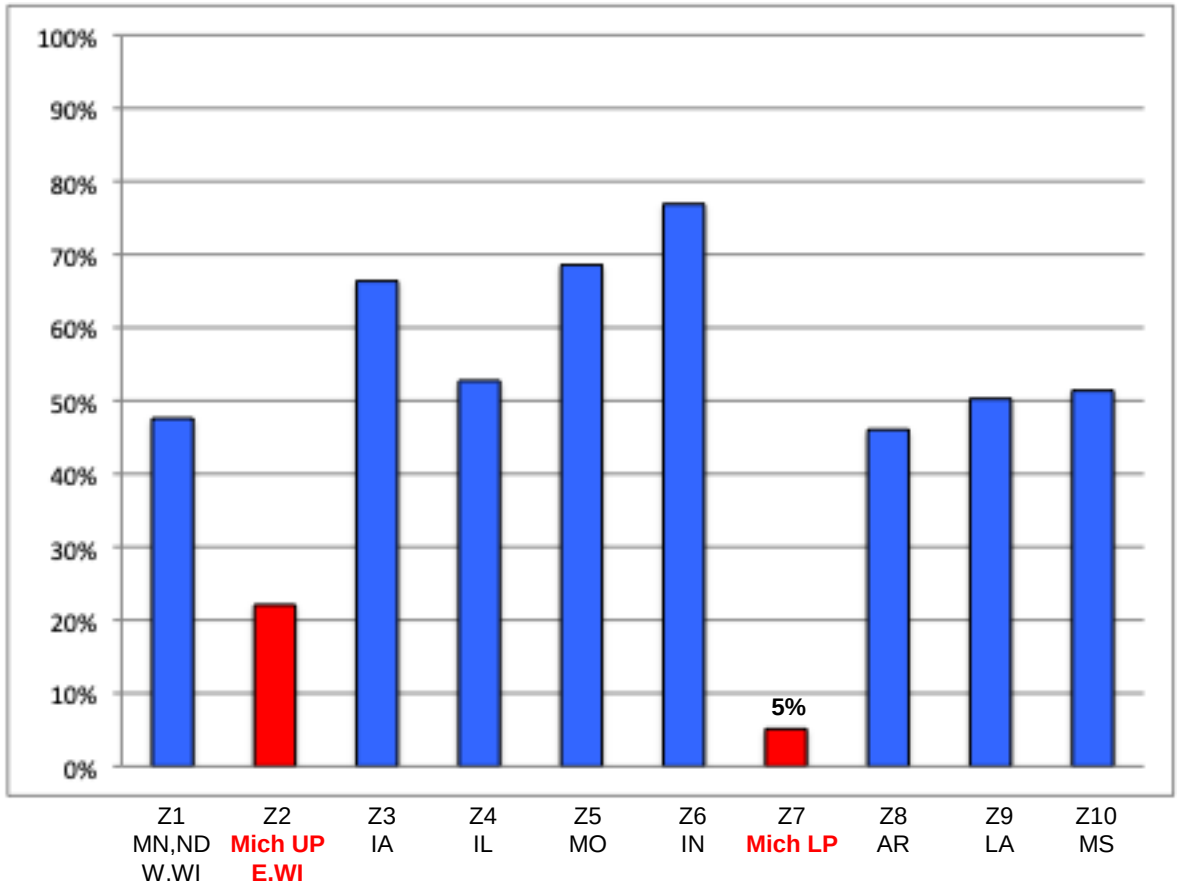
PREVIOUS TESTIMONY:

- Michigan Public Service Commission, U-20162
- Michigan Public Service Commission, U-20134
- Michigan Public Service Commission, U-18248
- Michigan Public Service Commission, U-18239
- Michigan Public Service Commission, U-18014
- Michigan Public Service Commission, U-17990
- Michigan Public Service Commission, U-17767
- Michigan Public Service Commission, U-17735
- Michigan Public Service Commission, U-17689
- Michigan Public Service Commission, U-17688
- Michigan Public Service Commission, U-17429
- Michigan Public Service Commission, U-17087
- Michigan Public Service Commission, U-17032
- Michigan Public Service Commission, U-16794
- Michigan Public Service Commission, U-16566
- Michigan Public Service Commission, U-16472
- Michigan Public Service Commission, U-16191
- Michigan Public Service Commission, U-15768.
- Michigan Public Service Commission, U-15744.
- Federal Energy Regulatory Commission, Docket No. EL04-135 & related dockets.
- Michigan Public Service Commission, U-12489.
- Michigan Public Service Commission, U-8871.
- Michigan Public Service Commission, U-8110 part 2.
- Michigan Public Service Commission, U-8110, part 1.
- Michigan Public Service Commission, U-7930 rehearing.
- Michigan Public Service Commission, U-7930.

Inefficient Use Of CIL

Only a fraction of a zone's physical Capacity Import Limit (CIL) can be used for meeting a zone's Planning Reserve Margin Requirement (PRMR), under MISO's current rules.

Chart 1. % CIL Usable to Satisfy MISO PRMR – MISO Current Rules *



* *See Exhibit EM-4 (AJZ-4), page 2 for table of values.*
- *% = ECIL / CIL*

Observations

- 100% of CIL is available at the time of the MISO forecast peak – the specified time for determining PRMR obligations.
- But the current LCR process does not allow any zone to use 100% of its CIL to satisfy MISO's PRMR.
- Zone 7 Michigan Lower Peninsula is an outlier among the zones. Michigan is disadvantaged by the current LCR process.

ENERGY MI

Improvements in the Use of CIL in MISO's Resource Adequacy Standard

ENERGY MI

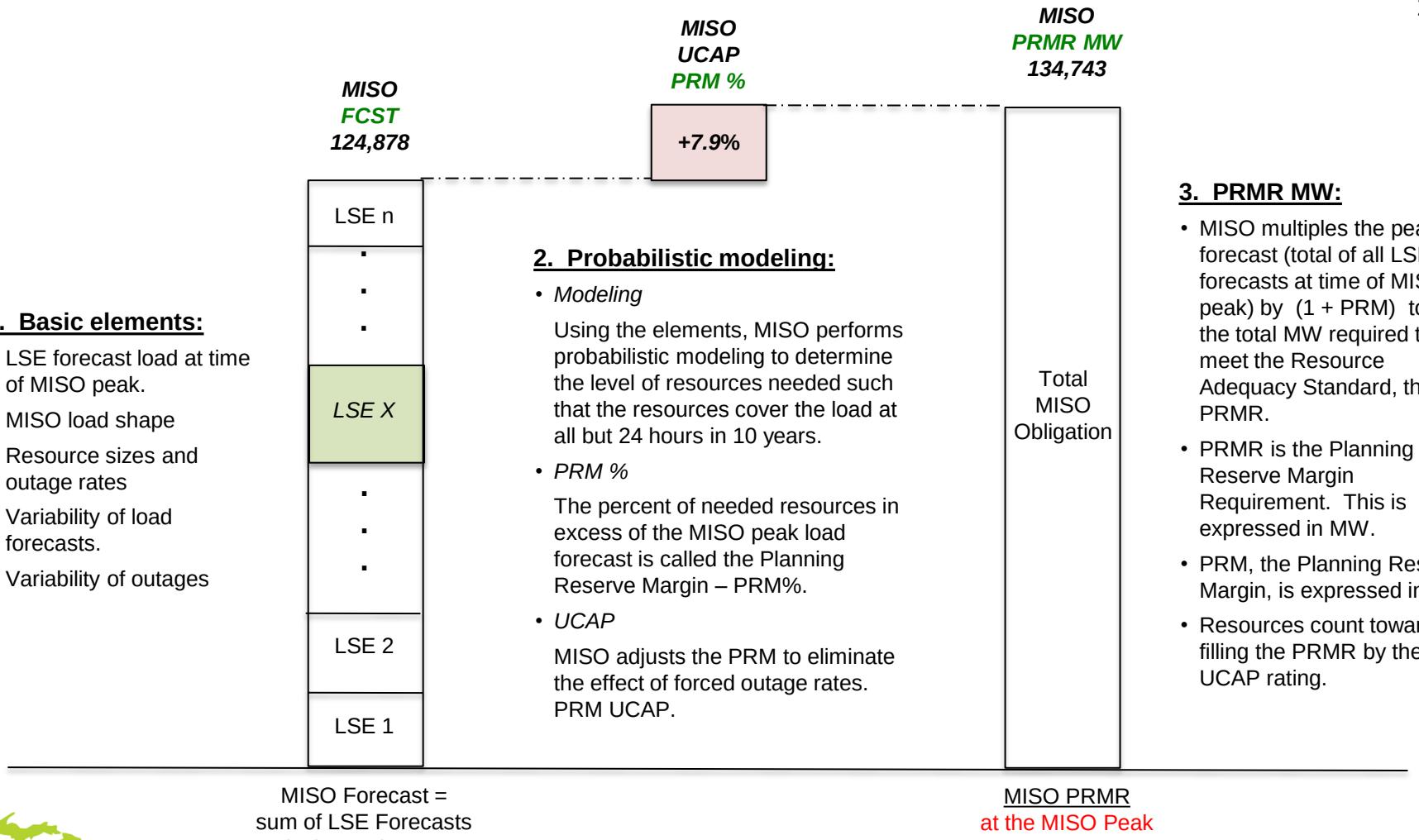
20 August 2019

MISO: Resource Adequacy Standard

The MISO Resource Adequacy Standard (Planning Reserve Margin Requirement – PRMR MW) consists of:

(1) the MISO forecast at time of MISO peak (which is the sum of all LSE forecasts at the time of MISO peak), plus

(2) the Planning Reserve Margin % determined statistically for "loss of load" of 24 hours in 10 years, adjusted for UCAP (unforced capacity).



1. Basic elements:

- LSE forecast load at time of MISO peak.
- MISO load shape
- Resource sizes and outage rates
- Variability of load forecasts.
- Variability of outages

2. Probabilistic modeling:

- *Modeling*

  Using the elements, MISO performs probabilistic modeling to determine the level of resources needed such that the resources cover the load at all but 24 hours in 10 years.

- *PRM %*

  The percent of needed resources in excess of the MISO peak load forecast is called the Planning Reserve Margin – PRM%.

- *UCAP*

  MISO adjusts the PRM to eliminate the effect of forced outage rates. PRM UCAP.

3. PRMR MW:

- MISO multiples the peak forecast (total of all LSE forecasts at time of MISO peak) by (1 + PRM) to get the total MW required to meet the Resource Adequacy Standard, the PRMR.
- PRMR is the Planning Reserve Margin Requirement. This is expressed in MW.
- PRM, the Planning Reserve Margin, is expressed in %.
- Resources count toward filling the PRMR by their UCAP rating.

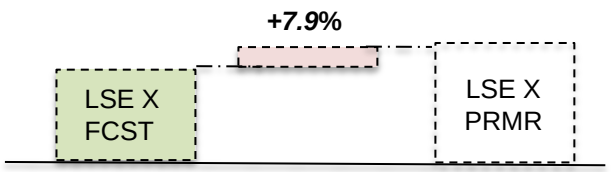
ENERGY MI

MISO Resource Adequacy Standard – applied to LSEs

LSE PRMR: Once the MISO PRM % is calculated, it is applied to each LSE's forecast at time of MISO peak to determine that LSE's PRMR.

Zone PRMR: Add up the PRMRs of the LSEs in the zone.

1. LSE PRMR – defined at time of MISO peak

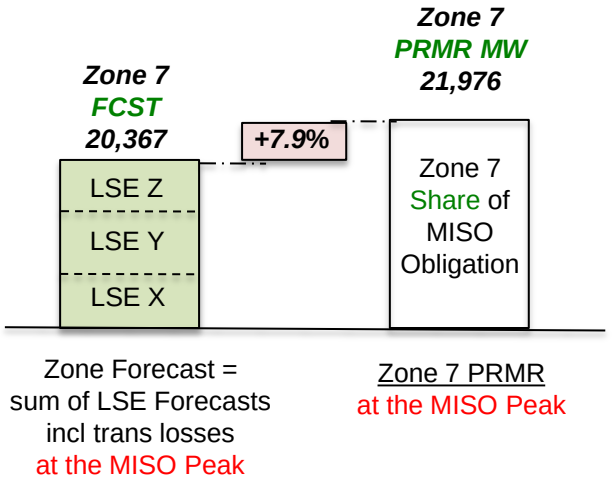


2. Zonal Share of MISO RA Standard: Add up the LSEs

The zonal share of the MISO Resource Adequacy Standard (PRMR for the zone) simply adds up the PRMRs of each LSE in the zone.

(1) the zonal forecast at time of MISO peak (the sum of all LSE forecasts in the zone at time of MISO peak), plus

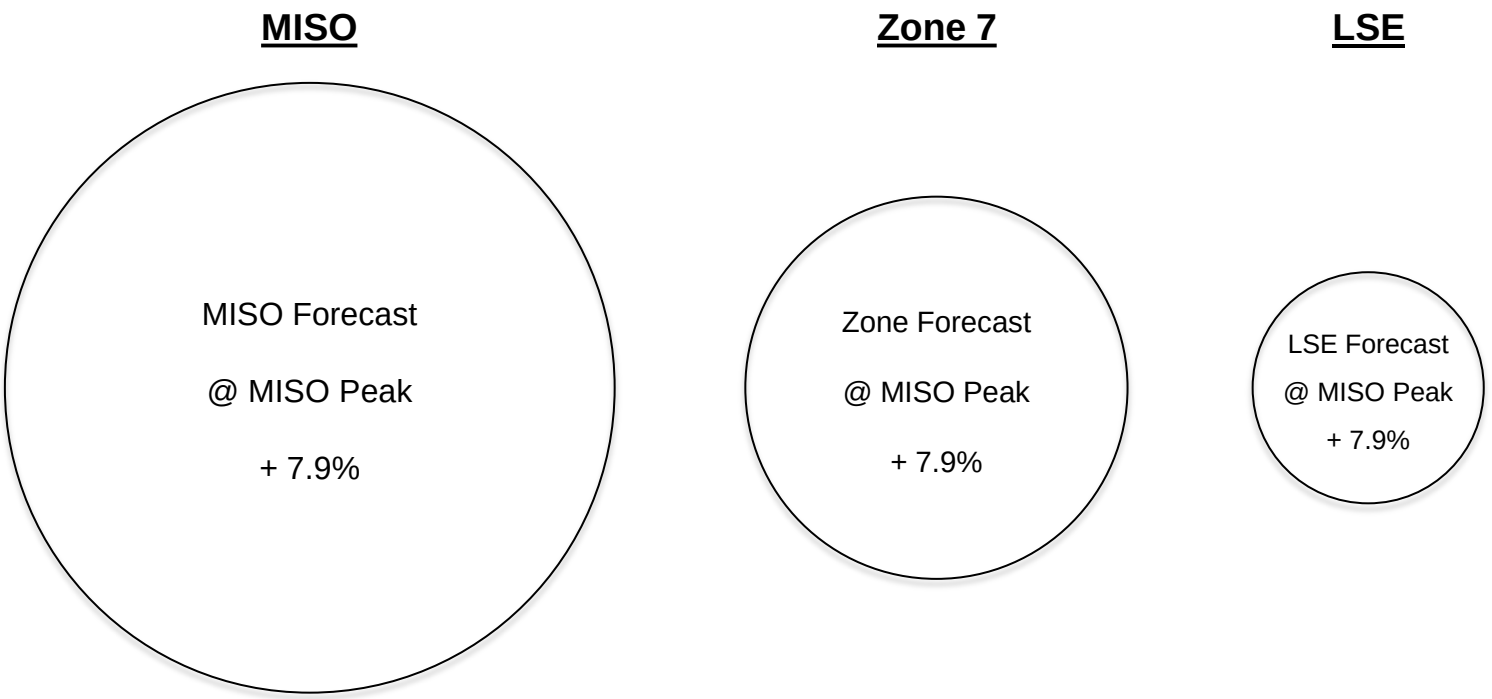
(2) the PRM% as determined for MISO.



Uniform Application of MISO Resource Adequacy Standard

Forecasts: MISO uses the forecasts at the time of the MISO peak for all.

PRM %: MISO applies the same PRM % of 7.9% to all.



	MISO	Zone 7	LSE
Forecast @ MISO Peak:	124,878 MW	20,367 MW	x,xxx MW
x MISO PRM %:	x 1.079	x 1.079	x 1.079
= PRMR MW:	= 134,743 MW	= 21,976 MW	= y,yyy MW

Sources:

- MISO, "Final PRA Preliminary Data," March 2019, 2019-2020 PRA, page 4. https://cdn.misoenergy.org/20190322%20RASC%20Item%2003%20Final%20PRA%20Preliminary%20Data329890.pdf
- MISO, "2019/2020 Planning Resource Auction (PRA) Results," Resource Adequacy Subcommittee, May 8, 2019, page 7. https://cdn.misoenergy.org/20190508%20RASC%20Item%2003a%20PRA%20Detailed%20Results341844.pdf

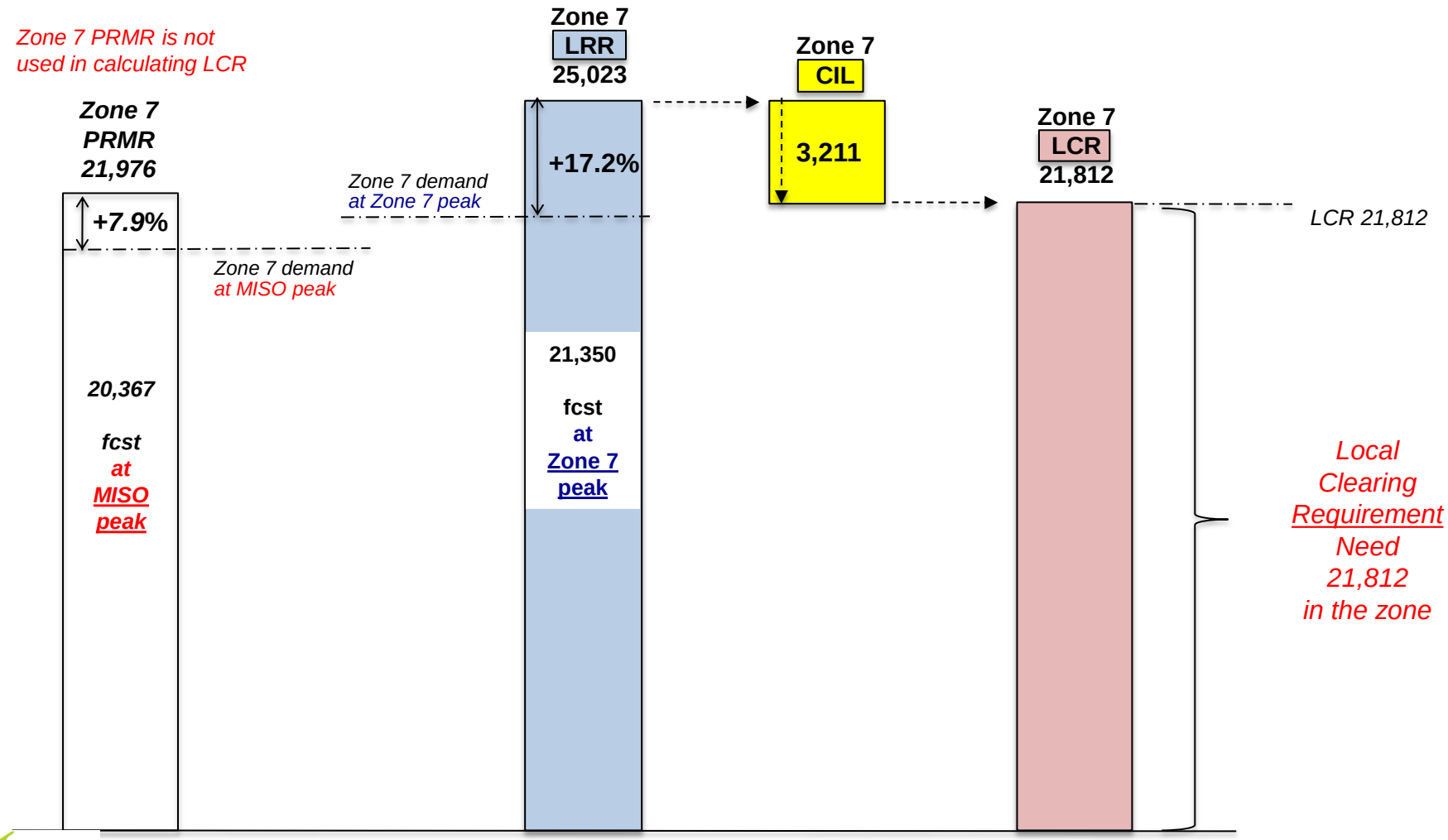
ENERGY MI

MISO: How LCR Is Calculated at Present

(1) Figure how much is needed for 1-day-in-10-year reliability for the zonal peak if isolated *(Local Reliability Requirement* LRR).

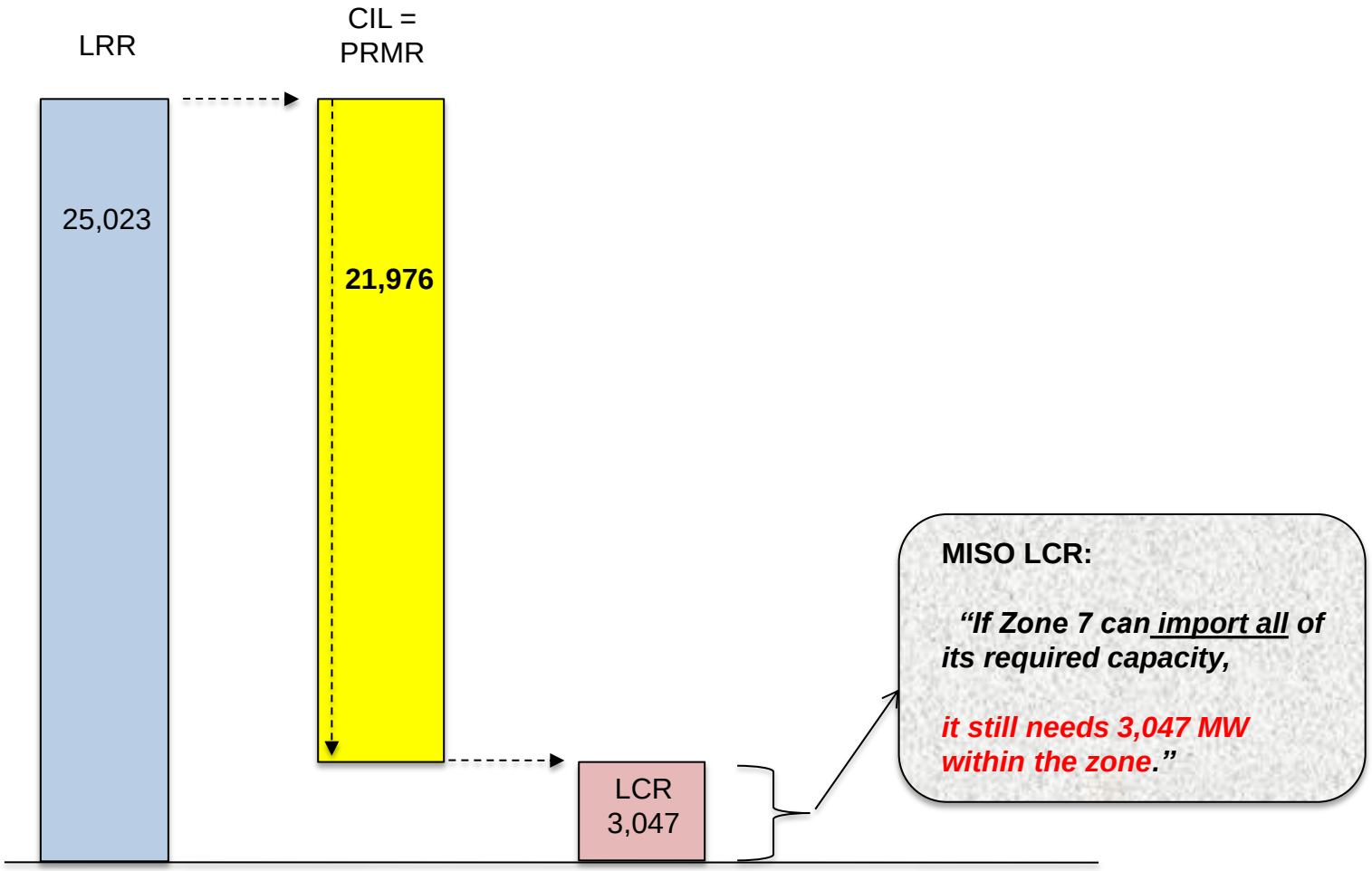
(2) Then subtract the import limit (*Capacity Import Limit* CIL).

(3) That's what is needed within the zone (*Local Clearing Requirement* LCR).



Example I – Excessive LCR even with CIL sufficient to meet PRMR.

What if the transmission system can import *all* the capacity needed to meet the zonal PRMR -- that is, what if CIL = PRMR = 21,976?



LRR	-	CIL	=	LCR
25,023	-	21,976	=	3,047

Example II – Inadequate use of CIL in filling the zonal PRMR from the Auction

Auction result: Zone 7 uses only 164 MW of 3,211 MW of CIL to fulfill the PRMR of LSEs in the zone.

Usable CIL "ECIL"

Zone 7	MW
PRMR	21,976
LCR	21,812
Usable CIL "ECIL"	164

Auction	Offers	Cleared
Offers @ $0	21,780	21,780
Offers @ > $0	283	32
Import	--	164
PRMR		21,976

Observations

- External resources were available at $2.99 per MW-day.
- But only 164 MW out of 3,211 MW of import capacity could be used for fulfilling the zonal PRMR of 21,976 MW because of the way the LCR is determined at present.

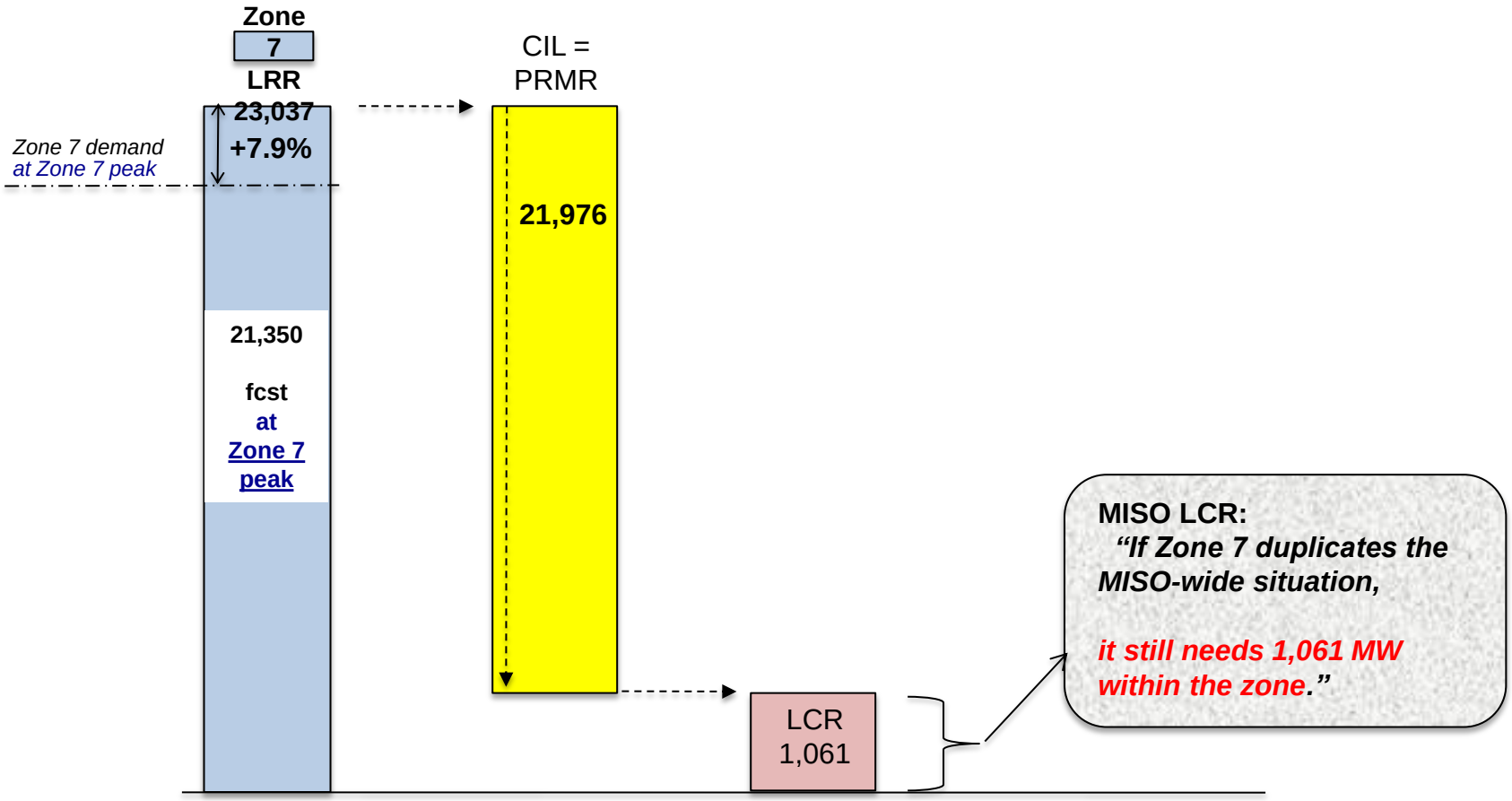
Reduced Competition

The 32 MW needed for LCR (out of only 283 MW offered) set the zonal price of $24.30 per MW-day.

Example III – Capacity requirements above that required by the Resource Adequacy Standard.

What if there were no transmission constraints into the zone and the MISO portfolio of resources were available – same situation as for MISO wide resource adequacy standard:

- the zonal PRM% were the same as the MISO PRM% -- 7.9% for both, and
- the transmission system can import *all* the capacity needed to meet the zonal PRMR -- that is, what if CIL = PRMR = 21,976?



LRR	-	CIL	=	LCR
23,037	-	21,976	=	1,061

Inconsistencies & Underlying Causes

The way the LCR is calculated currently results in several inconsistencies between the MISO Resource Adequacy Standard and the amount of MWs prescribed for the LCR.

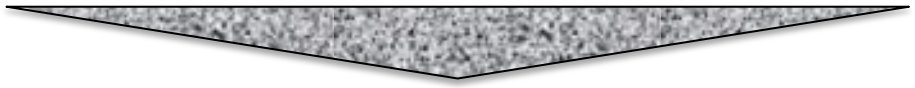
These inconsistencies are seen best at boundary conditions applied to the LCR calculation.

Examples

I. Excessive LCR even with Capacity Import Limit sufficient to meet zonal PRMR.

II. Inadequate use of CIL in filling the zonal PRMR from the Auction.

III. Capacity requirements above that required by the Resource Adequacy Standard.



Underlying Causes: The inconsistencies are due to either or both of two factors:

A. ***PRM % Mismatch -- MISO vs. Zone:*** To serve 1 MW of forecast in the zone, 1.079 MW of imports are needed, *or* 1.172 MW of local zone resources. However, under the current LCR method 1.172 MW of imports are required to offset 1 MW of forecast in the zone.

This error understates the MW value of imports.

B. ***MISO Aggregated vs. Zones Separately:*** The LCR is based on an independent and non-diversified RA requirement for each zonal peak separately, while the MISO Resource Adequacy Standard is based on a requirement applied to all of MISO at the same MISO single peak time.

Using the separate zonal peaks results in an LCR method that is stricter than the MISO Resource Adequacy Standard and contradicts the Standard if the same conditions are applied to both the LCR method and the MISO Standard.

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Proposed Improvement in LCR Method that Eliminates Inconsistencies

The inconsistencies resulting from the present method of determining LCR can be eliminated by an improvement that

(a) uses the full capability of the CIL in fulfilling the zonal PRMR,

(b) supports the MISO Resource Adequacy Standard, and

(c) still recognizes that resources used within a zone may require a separate PRM%.

Principle

- *3,211 MW of the zonal PRMR can be imported, according to the CIL, using the MISO PRM% -- 7.9%.*
- *The remaining portion of the PRMR is supplied from local resources using the zonal PRM%. – 17.2%*

Process

Set the LCR by two steps:

Step A. Subtract the CIL from the PRMR:
A = PRMR – CIL

CIL MW can be imported , and so is credited considering a MISO PRM %.

Step B. Take the forecast represented by A, by dividing A by the MISO PRM %, and multiply by the zonal PRM%:
B = [A / MISO PRM%] x Zone PRM%

The remaining zonal forecast at time of MISO peak not covered by A is supplied by local sources, and so requires the zonal PRM%.

Then set LCR = B

Example

Example for Zone 7

Step A. A = [PRMR - CIL] = [21,976 - 3,211] = 18,765 MW

Step B. B = [A / 1.079] x 1.172

= [18,765 / 1.079] x 1.172 = 20,382

LCR = 20,382 MW by improved method *(present method results in 21,812)*

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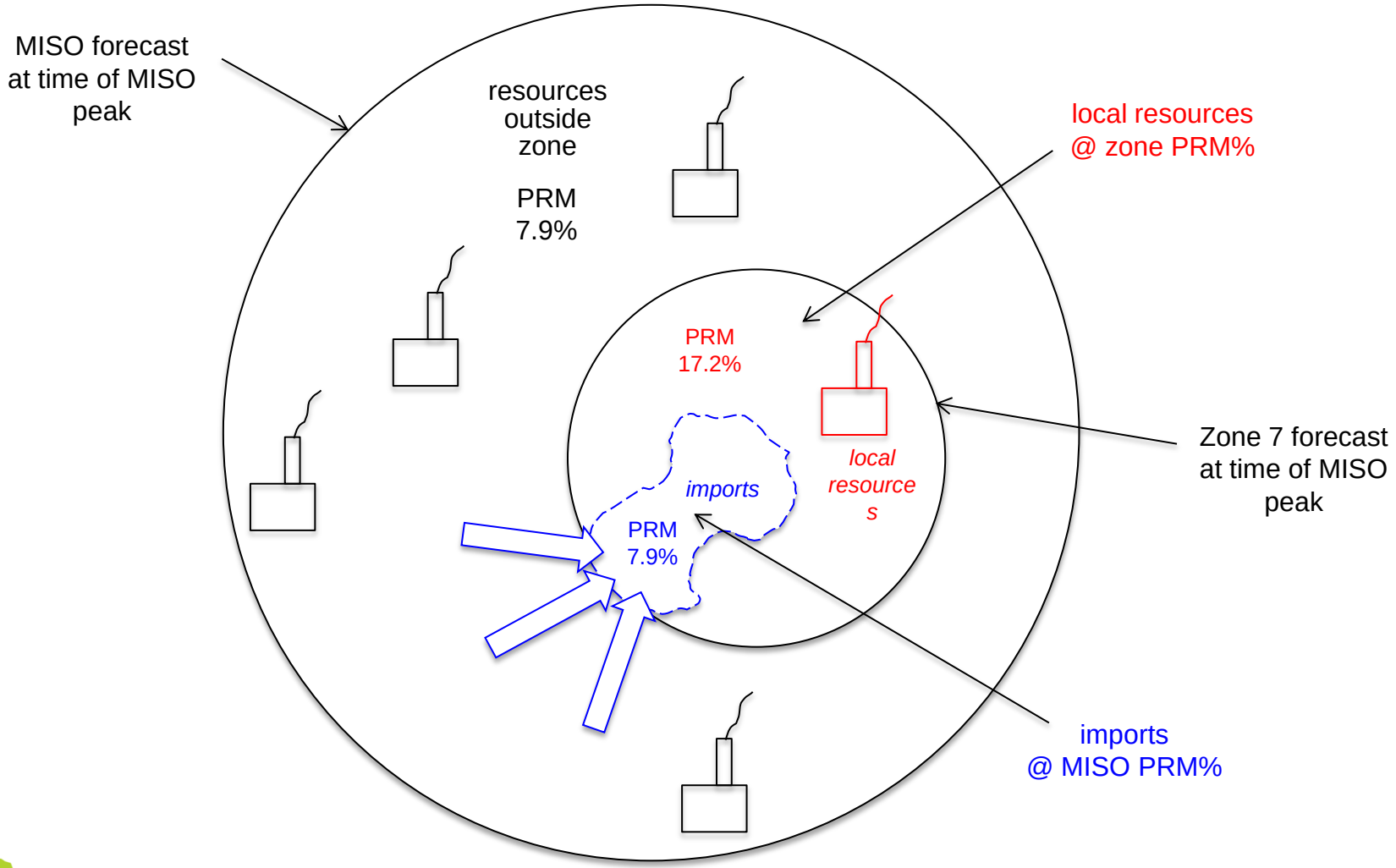
Proposed Improvement in LCR Method

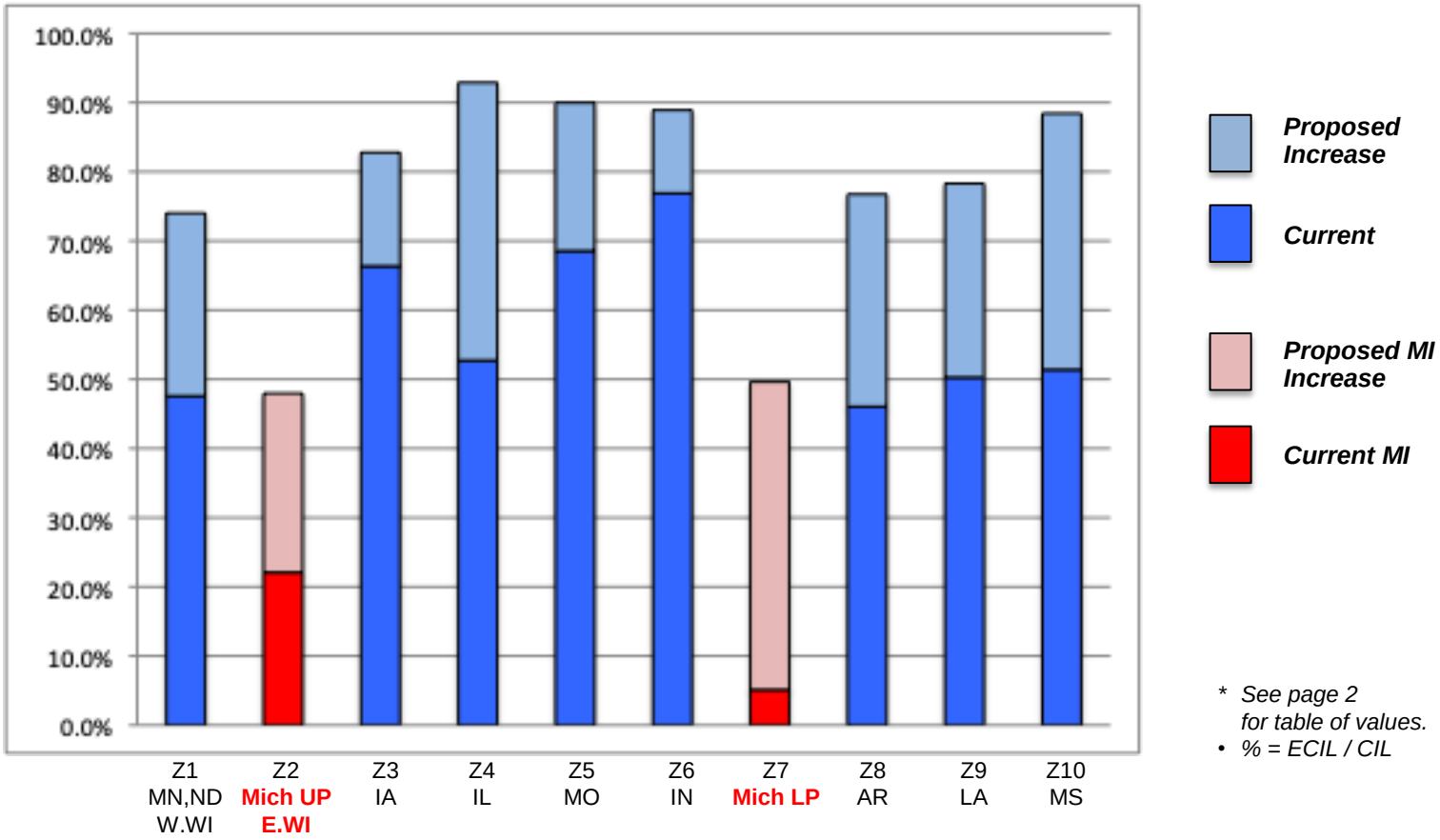
- All forecasts at time of MISO peak to match the MISO resource adequacy standard.
- Imports to zone quantified first and require MISO PRM% 7.9%.
- Balance of zone forecast covered by local resources at the zone PRM % 17.2%.
  Balance at zone PRM% quantifies the proposed new "LCR."



More Efficient Use Of CIL

The proposed method for determining LCR results in an increase in the portion of a zone's physical Capacity Import Limit (CIL) that can be used for meeting a zone's Planning Reserve Margin Requirement (PRMR).

Chart 2. % CIL Usable to Satisfy MISO PRMR – Proposed *



* *See page 2 for table of values.*
- *% = ECIL / CIL*

Observations

- 100% of CIL is available at the time of the MISO forecast peak – the specified time for determining PRMR obligations.
- The proposed LCR method increases the amount of CIL that can be used to meet a zone's PRMR.
- Zone 7 Michigan Lower Peninsula is still lower than other zones, but no longer an obvious outlier.

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Table of Values
for Exhibit EM-2 and Exhibit EM-4

		A	B	C	D	E	F	G	H	I	J	K
					= A - B	= D/C		=(A-C)	=G - B	= A - G	= I - D	= H - C
								x (H/1.079)				
										New ECIL		
					Old ECIL					Proposed		
					Current	%	From MISO	New		Usable CIL	Change	
			Current		Usable =	Current	Zonal	Proposed	Change	= PRMR -	in	Change
	Zone	PRMR	LCR	CIL	PRMR-LCR	Usable CIL	PRM%	LCR	in LCR	New LCR	Usable CIL	%Usable
	Z1	18,374.9	16,588.7	3,754	1,786.2	47.6%	1.151	15,597	-992	2,778	992	26.4%
	Z2	13,449.9	13,071.5	1,714	378.4	22.1%	1.161	12,628	-444	822	444	25.9%
	Z3	9,882.0	7,960.2	2,896	1,921.8	66.4%	1.156	7,485	-476	2,397	476	16.4%
	Z4	9,792.3	6,222.1	6,771	3,570.2	52.7%	1.251	3,503	-2,719	6,289	2,719	40.2%
	Z4	8,297.1	4,860.1	5,013	3,437.0	68.6%	1.244	3,786	-1,074	4,511	1,074	21.4%
	Z6	18,659.8	13,226.1	7,067	5,433.7	76.9%	1.152	12,377	-849	6,283	849	12.0%
	Z7	21,976.0	21,811.6	3,211	164.4	5.1%	1.172	20,382	-1,429	1,594	1,429	44.5%
	Z8	8,073.5	6,116.3	4,250	1,957.2	46.1%	1.358	4,812	-1,304	3,261	1,304	30.7%
	Z9	21,350.2	19,525.2	3,631	1,825.0	50.3%	1.127	18,507	-1,018	2,843	1,018	28.0%
	Z10	4,997.3	3,048.8	3,792	1,948.5	51.4%	1.472	1,644	-1,404	3,353	1,404	37.0%

Sources:

- MISO, “Final PRA Preliminary Data,” March 2019, 2019-2020 PRA, page 4. https://cdn.misoenergy.org/20190322%20RASC%20Item%2003%20Final%20PRA%20Preliminary%20Data329890.pdf
- MISO, “2019/2020 Planning Resource Auction (PRA) Results,” Resource Adequacy Subcommittee, May 8, 2019, page 7. https://cdn.misoenergy.org/20190508%20RASC%20Item%2003a%20PRA%20Detailed%20Results341844.pdf

ENERGY MI

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

****

In the matter of the Application of DTE ELECTRIC COMPANY for approval of its Integrated Resource Plan pursuant to MCL 460.6t, and for other relief.	)))))	Case No. U-20471

PROOF OF SERVICE

STATE OF MICHIGAN)
) ss.
COUNTY OF INGHAM)

Sarah E. Jackinchuk, the undersigned, being first duly sworn, deposes and says that she is a Legal Secretary at Varnum LLP and that on the 21st day of August, 2019 she served a copy of the Energy Michigan Inc.'s Direct Testimony, Exhibits and Proof of Service upon those individuals listed on the attached Service List via email at their last known addresses.

Sarah E. Jackinchuk

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DN: CN = sejackinchuk
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