STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter, on the Commission's own motion, regarding the regulatory reviews, revisions, determinations, and approvals necessary DTE ELECTRIC COMPANY to fully comply with Public Act 295 of 2008. _____/	Case No. U-18232

DIRECT TESTIMONY AND EXHIBITS OF JOHN RICHTER

On Behalf of

Great Lakes Renewable Energy Association

April 28, 2020

I. QUALIFICATIONS

Q. Please state your name and business address.

A. My name is John Richter, and I have no business address, because I am retired.

Q. Who are you representing, and what is your title and role there?

A. I'm representing The Great Lakes Renewable Energy Association (GLREA). I am on the Board of Directors. I am also the Policy Analyst.

Q. Who is the GLREA?

A. The GLREA is a 501(c)(3) (non-profit) corporation based in Michigan. Our Mission Statement is to "Promote the Use of Renewable Energy in Michigan and in the Great Lakes Region, By Empowering Our Members and the Public Through Advocacy, Education and Strategic Collaboration". And our vision statement is: "We believe that current and emerging clean, renewable energy solutions can provide 100% of the electrical energy demand in the Great Lakes Region. Furthermore, we believe that increasing development and access to clean, renewable energy that is locally produced, operated and utilized, supports economic development, creates new good paying jobs and is essential to supporting healthier, more resilient communities that advance climate justice.

Q. Please describe your educational background.

A. I received a Bachelor of Science degree in Computer Engineering, with a minor in Economics, from Oakland University in 1982. I did some graduate work in software engineering at both Oakland University, and University of Detroit, Mercy. I did some alternative energy coursework at Oakland Community College. I received a Master of Science in Renewable Energy from Murdoch University, in Perth, Australia in 2009.

Q. Please describe your relevant business experience.

A. At Frontier Communications, I was the Senior Manager of Hardware Integration. In this role, I performed RFPs and RFQs, set up the criteria for evaluating the responses, engaged in purchase negotiations, and performed project management for equipment installation, testing, and turn-up. I had a $25M capital budget for equipment purchases. I also created the Company's capacity forecasting model, and did NPV analysis to determine which equipment sites should be closed and consolidated. I was promoted to Director, Product Platform Development, where I again did RFPs and equipment selection. As a Sr. Product Development Manager at Global Crossing, I created new business processes in support of new product launches.

During 2002, I consulted on renewable energy policy for the GLREA. In that role, I did a presentation to Michigan legislators and staff on policies to incentivize renewable energy deployments. I was one of three invited presenters to the Northeast and Midwest Caucus meeting on a national RPS at the U.S. Capitol Building. And I was a member of the MPSC Collaborative on Renewable Energy. Under contract with American Council for an Energy Efficient Economy, I wrote a white paper on energy efficiency policy, which was presented to the Governor of Michigan. I was also featured in the PBS documentary film, *Michigan's Green Energy Economy.*

In 2010 and 2011, I was an adjunct instructor at Macomb Community College, teaching a course on solar energy.

Q. Are you sponsoring an exhibit with your direct testimony?

A. Yes. I am sponsoring:

Exhibit	Description
GLREA-1 (JR-1)	Resume of John Richter
GLREA-2 (JR-2)	Illustrative comparison of a 100% Wind REP to a 100% Solar REP
GLREA-3 (JR-3)	Adjusted Summary of selected RFP bids

Q. Were these exhibits prepared by you or at your direction?

A. Yes.

Q. Have you previously presented testimony before the Michigan Public Service Commission ("MPSC" or the "Commission")?

A. Yes, in the following cases:

- U-18091, DTE Energy PURPA case (remand)
- U-20162, DTE Energy rate case
- U-20165, Consumers Energy IRP case
- U-20359, Indiana Michigan Power rate case
- U-20471, DTE Energy IRP
- U-20561, DTE Energy rate case

Q. What is the purpose of your direct testimony?

A. To identify, describe, and quantify what I believe to be flaws in DTE's financial analysis of the RFP bids. I also provide an alternative (and I believe, more accurate) analysis of selected bids, clearly showing that the two proposed company-owned wind projects are not economically competitive with at least five of the proposed solar PPA projects.

Q. DTE filed their Renewable Energy Plan (REP) in U-18232 back in March of 2018 (more than two years ago). What findings did the Commission make in not fully approving DTE's REP in their order dated July 18, 2019?

A. The Commission approved some of the facilities, but did not find that the other proposed facilities were cost effective - citing DTE's lack of analysis of alternatives to company-owned wind facilities:

> "The Commission agrees with the ALJ that DTE Electric has not sufficiently supported its entire plan to rely exclusively on company-owned generation assets, and to limit participation in the company's RFP to build-transfer contracts only."[1]

> "DTE Electric is correct that MCL 460.1001 and MCL 460.1022 do not explicitly require a utility to include alternatives to company-owned generation in its REPs. However, the Commission is required to determine whether a plan is "prudent" or cost effective and the Commission finds that in this instance, where the Commission is not convinced by the record that the later planned wind projects are cost effective, an analysis of alternatives like third-party PPAs would have proven helpful in coming to a determination… DTE Electric did not present an analysis of alternatives and, as the ALJ pointed out, did not adequately explain why it failed to consider any option other than company-owned generation. See, PFD, pp. 34-37. This is particularly troubling given past Commission reports that demonstrate that, since 2009, "for each year in which there were both company-owned projects and purchased power agreements, the weighted average cost of the purchased power agreements was lower than the company-owned projects in that respective year." MPSC, Report on the Implementation and Cost Effectiveness of the PA 295 Renewable Energy Standard, February 15" Page 24 U-18232 2017, p. 19.3"[2]

[1] Commission order dated July 18, 2019, p 21

[2] *Ibid*, p 23

Q. How did the Commission's order dated July 18, 2019 address the facilities DTE proposed in the REP, which the Commission did *not* approve?

A. Given DTE's limited analysis and failure to demonstrate cost-effectiveness, the Commission deferred the decision to DTE's upcoming IRP case:

> "…the Commission defers a final determination on the proposed renewable generation assets not qualifying for the full PTC until the Commission issues a final order in DTE Electric's IRP proceeding, Case No. U-20471. By statute, the IRP is intended to be a comprehensive look at supply-side resources needed to meet a utility's additional generation capacity needs. See, MCL 460.6t(1)(f)."[3]

Q. Did DTE's analysis in the IRP case convince the Commission that their supply-side proposals were reasonable and prudent?

A. No, DTE failed in their second attempt to gain approval of company-owned wind facilities. The Commission did not find DTE's analysis of any supply-side options persuasive at all:

> "Additionally, certain fundamental flaws in the IRP as filed meant that the intended examination of new supply-side resources was not possible… Because of the significant deficiencies in the record, including a starting point that included a range of non-approved and non-optimized resources and the failure to issue a request for proposals (RFP) for supply-side resource additions, the Commission is recommending the removal of all supply-side resource additions from the plan, and expresses its intent to review these proposals as part of an accelerated renewable energy plan (REP) amendment proceeding"[4]

[3] Commission order dated July 18, 2019, p 25

[4] U-20471 *et al*, Commission order dated February 20, 2020, p 13

Q. Does the company's March 31, 2020 amended filing in the instant case make a third attempt at trying to justify company-owned wind facilities?

A. Yes. The amended REP proposes an additional 225 MW company-owned wind facility to come online in 2021. It proposes a 75 MW 3rd-party-owned solar facility in 2021, and a 50 MW 3rd party-owned solar facility in 2022.[5] Therefore, 64% of the nameplate capacity proposed in this amended REP (225 MW / (225+75+50) MW) is still company-owned wind.

Q. Does the Company benefit from owning the generation facilities used to comply with the Renewable Energy Standard (RPS)?

A. Yes. The statute explicitly allows the company to recover "Financing costs attributable to capital, operating, and maintenance costs of capital facilities associated with renewable energy systems".[6]

Q. What kind of solution to RPS compliance would generate the greatest profit for the utility?

A. Whatever solution requires the greatest capital investment, while providing the least capacity to the grid. More capital investment in the REP-required facilities yields profit directly. A lower capacity contribution from the REP facilities means that additional generating assets or demand-side measures will be necessary in the rest of DTE's network. This means that the Company may invest more in non-renewable facilities to meet their system and reserve capacity needs under MISO requirements, earning them additional profit.

[5] Direct testimony of D. B. Hardwood, p DBH-20, and exhibits B-28 (lines 1 & 3) and B-29 (line 20).

[6] MCL 460.1047 (2)

Q. What ownership model and technology would meet those criteria?

A. It appears that DTE only considered utility-scale wind and utility-scale solar in this process; their two RFPs were technology-specific. To provide a given number of RECs, a wind system will provide less capacity, and therefore offer more opportunity for company profit than a solar system. Therefore, an REP of 100% company-owned wind would likely maximize the company's profit potential, which is exactly what they proposed in their initial REP. In this REP, the company is proposing another 225 MW of company-owned wind.

Q. Could DTE earn a profit by entering into PPAs with 3rd parties?

A. Yes, the statute allows opportunity. Consumers Energy was awarded a "Financial Compensation Mechanism" (FCM) in their IRP case (U-20165), as part of a settlement agreement.[7] DTE could have applied for an FCM, allowing it to profit from PPAs; DTE chose not to, while the company has continued to pursue approval for predominately company-owned facilities.

Q. How does an REP using wind facilities provide less capacity than an REP using solar facilities?

A. A wind-based REP will provide less capacity to the grid's resource adequacy than a solar-based REP for two separate, but multiplicative reasons.

First, the REP must be designed to generate a specific number of RECs to meet the RPS requirement. With the exception of some incentive RECs (gained for using Michigan inputs or "advanced technologies"), the RECs generated are equal to the MWh of energy generated. Therefore, the amount of nameplate MW that an REP requires to generate a

[7] U-20165, Order dated June 7, 2019, exhibit A, p 9

given number of RECs or MWh depends on the ratio of the nameplate capacity (MW) to the total annual output (MWh/year); this is the "capacity factor". The capacity factor for wind is higher than solar; DTE used 31.3% for wind and 23.5% for solar.[8] So it takes fewer MW of wind facilities than solar facilities to produce the same number of RECs. Suppose, for illustration purposes, that a utility needed to generate 6M RECs/year. It could do so with 6M/(24*365*.313) = 2,188 MW of wind, or 6M/(24*365*.235) = 2,915 MW of solar. It takes (2915 MW – 2188 MW) / 2915 MW = 25% less MW of wind than solar to meet the REC requirement. Other things being equal, fewer MW of nameplate capacity will provide less capacity to the grid.

Secondly, and even more significantly, solar energy production is much better correlated with demand than wind. Because Michigan (and the MISO grid in general) experiences peak demand in the summer, solar generation coincides with demand much more closely than wind generation. In recognition of this correlation, MISO awards a higher Effective Load Carrying Capacity (ELCC) to solar facilities than wind facilities. This means that a given number of MW of solar will provide more capacity to the grid than the same number of MW of wind. In their recent IRP, DTE used an ELCC of 11.4% for wind.[9] Also in the IRP, the ELCC for solar was contested, but all parties (including DTE) used values far greater than 11.4%. The ALJ recommended adopting the figure of 65.8% for a single-axis tracking solar facility, based on testimony of witness Lucas.[10] I agree, and used that figure in my calculations. But by anyone's figures, a MW of solar provides more capacity to

[8] Exhibit B-5, p 1, rows 5 & 7, column d

[9] U-20471, V3, p 412, line 5 (witness Mikulan)

[10] U-20471, PFD dated December 23, 2019, p. 140-1

MISO resource adequacy than a MW of wind does.

Q. Is DTE's financial analysis of the proposals in the REP based on sound assumptions?

A. No. DTE's analysis contains at least three flaws, each of which create an unjustified bias towards company-owned wind facilities. Each of these flaws individually is so material in magnitude that correcting the flaw would shift the outcome of the economic analysis to favor certain solar PPA proposals, rather than the proposed company-owned wind projects. The impact of the three flaws together is egregious.

Q. What flaws you find in the economic analysis?

A. There are three significant flaws, each of which I will discuss in more detail further in my testimony.

1. The company assigned no value to the capacity that wind and solar REP facilities provide to the grid, evaluating only the cost of energy, and not the cost of capacity. This significantly favors wind facilities, which provide materially less capacity to the grid than solar facilities. As a result, more ratepayer funds will be needed for capacity measures (supply side or demand side) in the future, than would be needed if the higher capacity solar technology were selected. The impact of this flaw is material, and it improperly favors wind facilities over solar facilities. It also inflates the LCOE figures, which may be used for the calculation of the cost of compliance.
2. The company used a 35-year lifetime for wind facilities, which is unreasonable, and materially longer than the industry standard lifetime of 20 years. This artificially reduces the LCOE for the wind proposals, and exposes ratepayers to

the risk of expensive repairs or replacement sooner than this analysis predicts. The impact of this flaw is material, and improperly favors company-owned wind facilities over solar facilities. It has no impact on wind PPAs or solar proposals.

3. To compare proposals of unequal duration, the company assumed the purchase of both renewable energy and capacity at future prices far higher than prices today. Because the PPAs have shorter durations (20-25 years) than the unsupported company assumption of a 35-year lifetime for a company-owned wind facility, this approach improperly and materially favors company-owned assets over PPAs. This approach skews the proposal evaluation process towards more expensive company-owned facilities, increasing the cost to ratepayers. The impact of this flaw is material, and improperly favors company-owned facilities over PPAs.

Q. What dollar value did DTE assign to the capacity REP facilities provide to the grid, when comparing the various proposals from their RFP?

A. As far as I can tell, zero. DTE computed the Levelized Cost of Energy (LCOE) for each proposal and compared them. They also considered a variety of non-price factors. But I see no mention of the value of the capacity that the system provides.

Q. What dollar value did DTE assign to capacity in their IRP (case U-20471)?

A. DTE used four different prices: $0/MW, a variable value from a PACE forecast, full Cost of New Entry (CONE), and half of CONE.[11]

[11] U-20471, V3, p 359, lines 8-12

Q. Is $0/MW a reasonable price to assume for capacity?

A. No. Excess capacity is nearly always worth something; for example, it can be sold at the MISO Planning Resource Auction (PRA). But if the company needs capacity, it has more value than the historical auction prices. In their last IRP (U-20471), DTE requested approval of expenditures for EWR, CVR, and DR, all of which would provide capacity, or reduce the need for capacity. So, capacity has some positive value to DTE.

Q. Is the value of capacity material to the comparison of wind and solar project economics?

A. Yes. I computed the value of capacity of both wind and solar facilities using DTE's figures for capacity factors. At 100% of CONE, the value of capacity provided by a solar facility is $28.45/MWh, while the capacity value of a wind facility is only $3.80/MWh, a difference of $24.65/MWh.[12] This difference is wholly determined by the capacity factor and ELCC each technology provides. For a similar and independent analysis, consider the testimony of Consumers Energy Witness Troyer in their PURPA case.[13] Mr. Troyer calculated (using PURPA rates at that time) that a hypothetical 1 MW wind farm would earn a capacity payment of $70,253/year, and generate 1489 MWh/year, which yields a capacity rate of ($70,253/yr / 1489 MWh/yr) = $47.18/MWh. He added this value to the $52.51/MWh energy rate to get the total rate of $99.69/MWh.

Even at 50% of CONE, the difference in my calculated capacity value for solar vs. wind is $12.32/MWh. If this difference was applied to the LCOE costs in the "Summary of RFP Results - 2021" table in Exhibit B-28, the proposed self-build of the Meridian Wind

[12] Exhibit GLREA-JR2, row 10

[13] U-20165, V8 p 1248, line 10

Park (line 1) and the other wind project (line 2) would no longer appear competitive with most of the solar PPA projects listed.

In a fair computation of LCOE, the capacity value generated by each project would be *subtracted* from their LCOE. Perhaps it should be subtracted from the cost of compliance as well, since the grid is getting the benefit of this capacity, and the value added to the company's PSCR, similar to a capacity purchase.

Q. Was the facility lifetime used to compute the LCOE and to compare the RFP bids reasonable?

A. No. DTE assumed an economic lifetime of 35 years for both the wind and solar systems. This is not a reasonable economic lifetime for a wind system. Wind turbines are generally given a useful life of 20, or perhaps 25 years, though experience is showing this forecast to be optimistic. DTE provided no justification for using an unreasonable 35-year lifetime for a wind farm. Consider the following sources:

> NREL: "The table below gives ranges on useful life of several technologies estimated by interviewing NREL experts who have been working with the technologies and also by performing a literature search… Wind – 20 yr"[14]
>
> "This design service life is usually 20 or 25 years, provided the specified maintenance is completed, regular inspections and testing are performed, and faults are immediately rectified."[15]
>
> "The design life of a wind turbine is often said to be around 20 years. In practice it is frequently observed that components in a turbine fail earlier and must be replaced before the stated lifetime."[16]

[14] "Energy Analysis – Useful Life", *NREL*, accessed at: https://www.nrel.gov/analysis/tech-footprint.html, on 4/25/2020

[15] "How to extend the lifetime of wind turbines", *Renewable Energy World*, published 9/20/2019, accessed at: https://www.renewableenergyworld.com/2019/09/20/how-to-extend-the-lifetime-of-wind-turbines/, on 4/25/2020

[16] Maria Sandström, Hólmfríður Haraldsdóttir, "Lifetime analysis of a Wind Turbine Component", accessed at:

> "The design life of a good quality modern wind turbine is 20 years. Depending on how windy and turbulent the site is, the turbine could last for 25 years or even longer, though as with anything mechanical, the maintenance costs will increase as it gets older. It is unlikely that a wind turbine would last longer than this because they are subjected to quite extreme loads throughout their lives."[17]
>
> "The analysis of almost 3,000 onshore wind turbines — the biggest study of its kind — warns that they will continue to generate electricity effectively for just 12 to 15 years.
>
> The wind energy industry and the Government base all their calculations on turbines enjoying a lifespan of 20 to 25 years.
>
> The study estimates that routine wear and tear will more than double the cost of electricity being produced by wind farms in the next decade."[18]

Note that the economic lifetime of the facility is not an issue for a PPA; the bidder assumes the financial risk of future failures and repairs. In reality, ratepayers are less exposed with a PPA with an independent entity than they are with a company-owned facility.

Q. How did assuming an unreasonably long lifetime effect the analysis?

A. By imprudently assuming that the wind turbines will last longer than is likely, DTE's analysis is unreasonable and makes the LCOE for company-owned wind facilities appear lower than it is likely to be. To compute LCOE, the total costs are divided by the total energy produced *over the lifetime of the facility*. Assuming constant energy production each year, the LCOE is inversely proportional to the lifetime used in the analysis. The capital cost portion of the LCOE of a wind facility assumed to have a 20-year lifetime

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https://www.greenbyte.com/fileadmin/documents/Lifetime_Analysis_of_a_Wind_Turbine_Component.pdf, on 4/25/2020, p 6

[17] "How long does a wind turbine last", *Renewables First*, accessed at: https://www.renewablesfirst.co.uk/windpower/windpower-learning-centre/how-long-do-wind-turbines-installations-last/, on 4/25/2020

[18] "Wind farm turbines wear sooner than expected, says study", *The Telegraph*, accessed at: https://www.telegraph.co.uk/news/earth/energy/windpower/9770837/Wind-farm-turbines-wear-sooner-than-expected-says-study.html, on 4/25/2020

would be (35-20)/20 = 75% higher than the capital cost portion of the LCOE of the same wind facility assumed to have a 35-year lifetime! The impact this flawed analysis assumption is material.

Consider the impact of the lifetime on the LCOE of the proposed Meridian Wind Park. The proposed system is 225 MW, at in initial capital cost of $1,477/kW, for an initial cost of (225 MW)*($1,477/kW)(1000 kW/MW) = $332,325,000. With an assumed capacity factor of 31.3%, it is projected to produce (225 MW)*(24 hours/day)*(365 days/year)*(31.3%) = 616,923 MWh/year. The impact of the initial capital cost to the LCOE is either:

- $332,325,000 / (616,923 MWh/year * 35 years) = $15.39/MWh

Or

- $332,325,000 / (616,923 MWh/year * 20 years) = $26.93/MWh

Note that $15.39 + 75% = $26.93. The difference is ($15.39/MWh) – (26.93/MWh) = $11.54/MWh, which is larger than the difference in LCOE between DTE's proposed wind farm and many of the solar PPAs. Adding the cost of financing would increase the impact of the lifetime even more.

Therefore, the LCOE values in exhibits B-28, B-29, and B-30 for wind projects with a "Structure" of 'Self' or 'BTA' (columns "g", "h", and "i") should be regarded as invalid or bogus.

Q. Is 35 years a reasonable lifetime for a solar facility?

A. Maybe. NREL gives a range of 25-40 years for the lifetime of a solar system.[19] In their

[19] Energy Analysis – Useful Life", *National Renewable Energy laboratories,* accessed at:

Annual Technology Baseline (ABT) NREL uses 30 years.[20] Note that the economic lifetime of the facility is not an issue for a PPA; the bidder assumes the financial risk of future failures and repairs. Ratepayers are not exposed.

Q. Does it matter if the lifetime used is unlikely, as long as the same lifetime is used for every RFP proposal?

A. Yes, it matters a great deal. The reasonable lifetime for a solar facility is longer than the reasonable lifetime of a wind facility. As cited above, the NREL uses 20 years for the lifetime of a wind system, and 30 years for the lifetime of a solar system when computing LCOE. Comparing a LCOE computed using the same lifetime for both types of systems is not reasonable. This distortion will make the wind systems look less expensive than they actually will be, to the determinant of the ratepayers and the principle of cost-effective economic efficiency.

Q. Is DTE's approach in adjusting the LCOE of PPA projects justified?

A. No. DTE assumed that all company-owned (exhibit B-28, B-29, and B3, column "d – Structure" = 'self' or 'BTA') projects would last 35 years. Since the PPAs submitted were for contract durations of 20 or 25 years, DTE assumed that they would have to purchase energy and capacity for years 21-35, or 26-35, for all PPAs. This assumption is flawed for two reasons:

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https://www.nrel.gov/analysis/tech-footprint.html, on 4/25/2020

[20] "Annual Technology Baseline: Electricity – Utility-Scale Solar", *National Renewable Energy Laboratories*, accessed at: https://atb.nrel.gov/electricity/2019/index.html?t=su, on 4/25/2020

1. As I've already discussed, the wind projects should have a lifetime of 20 years. Therefore, the adjustment is unnecessary for comparing 20-year PPAs to company-owned wind projects.

2. It makes no sense to charge PPA projects for buying capacity after they expire, when DTE's analysis assigned zero value to the capacity they generate in the first place.

Q. If an adjustment is needed on PPA's LCOE due to their duration, is the adjustment approach DTE used justified?

A. No. DTE used a future cost of solar or wind, based on some projections from PACE. There is no reason why the output of a solar installation needs to be replaced with energy from another solar installation, or that the energy from a wind installation needs to be replaced with energy from a wind installation. The technology-matching assumption is unnecessary and unjustified. If future purchases of energy and RECs was required, they could be purchased from the lowest-cost qualifying source.

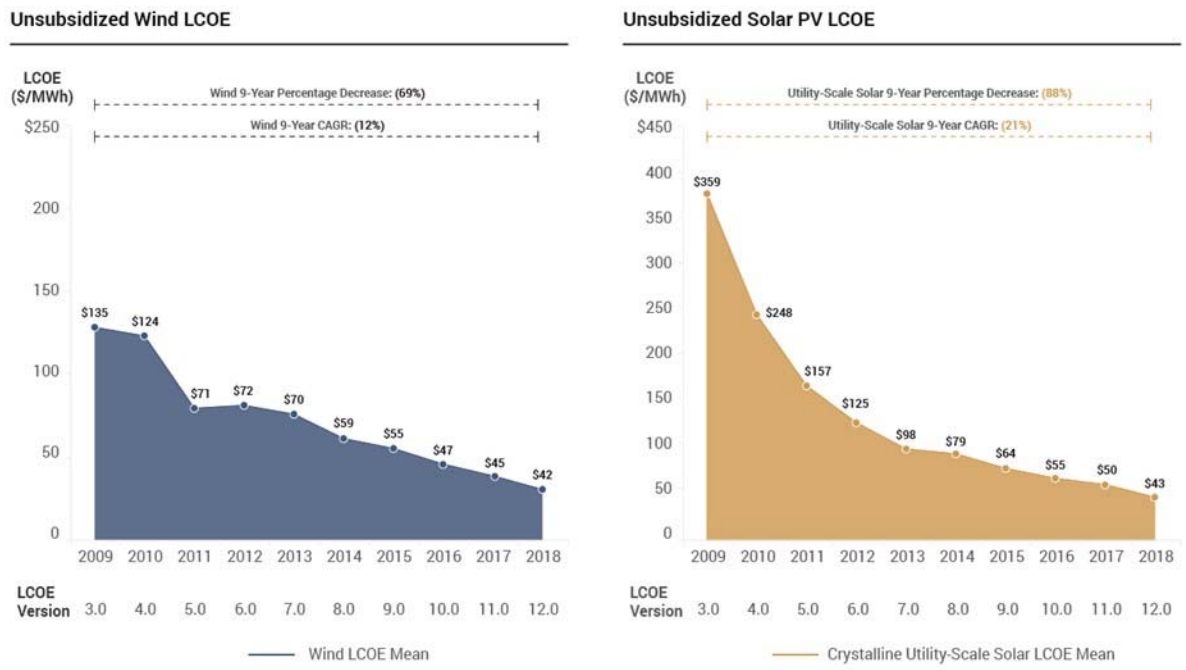
Q. If an adjustment is needed on PPA's LCOE due to their duration, is the future energy pricing used by DTE justified?

A. No. The LCOE for both wind and solar have been declining for decades. Aside from the impact of the phase-out of certain tax credits, there is no reason to think they will go up. For example, the ITC for solar will drop from the current (2020) rate of 26% to 10%. But this cannot increase the LCOE by more than (26% - 10%) = 16%. The impact will, in fact, be less than that, since not all of the costs of a solar plant are capital costs, which get the tax credit; O&M costs do not get the tax credit.

The price forecasts from PACE show extreme increases. For example, reading the graph in exhibit B-23, page 1, the PACE "reference case 1" price of solar energy increases from a 2020 price ~$35/MWh, to ~$110/MWh in 2055 (35 years from now). That's an increase of (110 – 35)/35 = 214%!

Q. What is the historical trend in the cost of solar energy and wind energy?

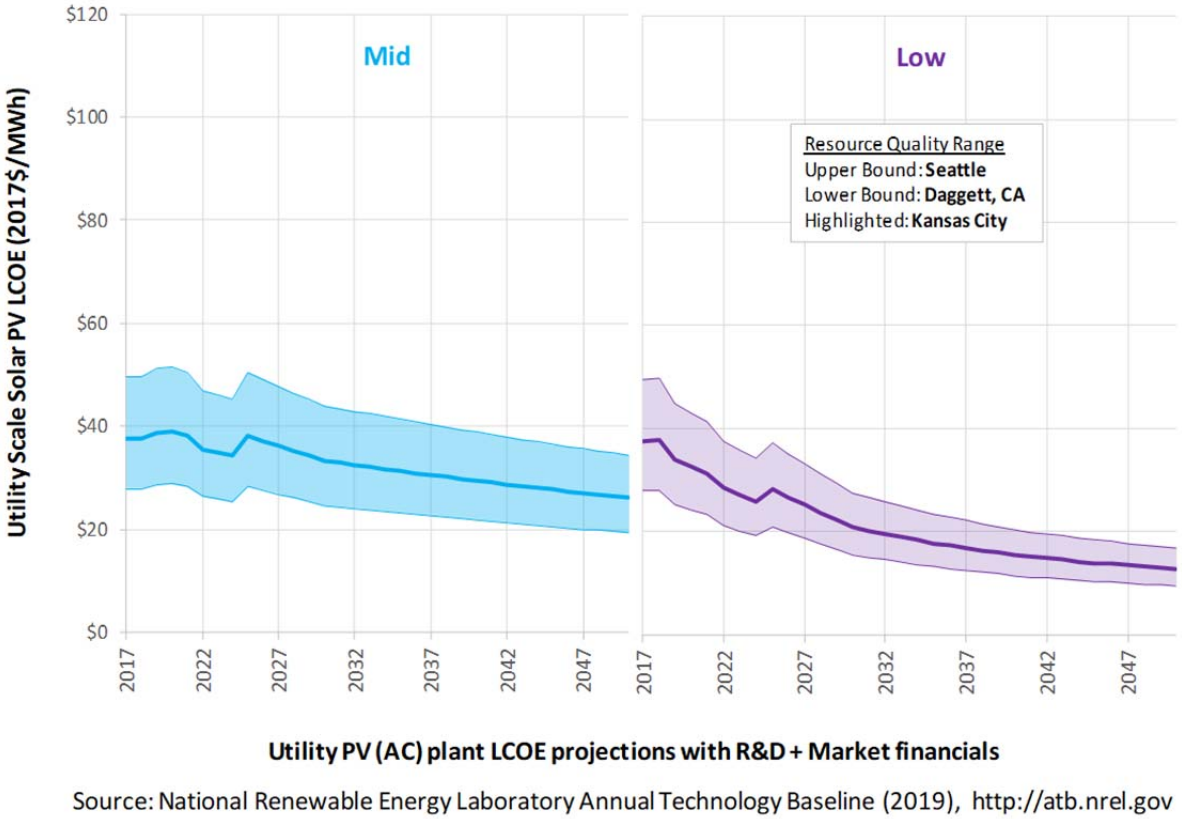
A. Down, repeatedly down. Here's a pair of graphs from Lazard[21], showing the steady decline in the LCOE of both wind and solar. There is no sign of any change in direction!



[21] "Levelized unsubsidized cost of utility-scale solar is now as low as $36/MWh, Lazard report finds", *Solar Business Hub*, November 20, 2018, accessed at: https://solarbusinesshub.com/2018/11/20/levelized-unsubsidized-cost-of-utility-scale-solar-is-now-as-low-as-36-mwh/ on 4/26/2020

Q. But that's the past. What will the future hold for the LCOE of renewable energy?

A. NREL provides this projection for the future LCOE for solar.[22] NREL provides three versions of these graphs, but in all cases, the trend continues down, it does not go up!



Q. How should projects with different durations be compared?

A. Ideally, they'd have the same duration. If DTE had used the industry-standard 20-year lifetime for wind facilities, it would have directly matched the 20-year PPAs. DTE could have asked bidders to provide 20-year PPAs and 30-year PPAs for the same projects. The 20-year PPA pricing could have then been directly compared to the company-owned wind

[22] "Annual Technology Baseline: Electricity", *National Renewable Laboratories*, accessed at: https://atb.nrel.gov/electricity/2019/index.html?t=su on 4/26/2020

projects, and the 30-year PPAs directly compared to company-owned solar projects. They chose not to request that.

Absent that simple approach, a reasonable future cost of renewable energy (but not capacity) should be added to the PPAs in the out-years.

Q. In exhibits 28, 29, and 30, DTE made adjustments to the bid prices, based on "estimated contractual exception adjustments (column "h"). Was this reasonable?

A. I simply don't know. My use of these figures does not imply approval of these adjustments.

Q. Should the Commission approve DTE's amended REP as submitted?

A. No. This is DTE's third attempt to justify overpriced company-owned wind facilities, which generate a substantial and near-guaranteed profit for DTE. DTE's financial analysis of the RPF bids in this amended REP is fatally flawed. DTE failed to consider the very significant value of capacity that the REP facilities will provide to the grid, which reduces the need for other capacity measures (supply side or demand side). DTE ignored industry standards and used an unreasonable and highly imprudent lifetime of 35 years for wind facilities in its analysis of the bids. And DTE used unreasonable adjustments to PPA bid prices to adjust for project durations.

Q. How could we adjust the data provided to correct for these flaws?

A. It's difficult to do so accurately. I have created a spreadsheet [exhibit GLREA-3 (JR3)], titled "Adjusted Summary of selected RFP bids" for selected projects from exhibits B28 and B29 with my adjustments. I selected the two company-owned wind-farms under

consideration for service in 2021, and the five solar PPA projects being considered for service in 2021 or 2022. For each project, I made the following adjustments to the LCOE, in new columns (labeled "k" and "l"):

1. For each wind project (regardless of ownership), I subtracted $3.80 from the lower bound of the LCOE range (DTE's column h), representing the value of capacity that the project would provide to the grid at 100% of CONE.
2. For each wind project (regardless of ownership), I subtracted $1.90 from the upper bound of the LCOE range, representing the value of capacity that the project would provide to the grid at 50% of CONE.
3. For each solar project (regardless of ownership), I subtracted $28.45 from the lower bound of the LCOE range, representing the value of capacity that the project would provide to the grid at 100% of CONE.
4. For each solar project (regardless of ownership), I subtracted $14.22 from the upper bound of the LCOE range, representing the value of capacity that the project would provide to the grid at 50% of CONE.
5. For each company-owned wind project, I added $11.54 to both the upper and lower bound of the LCOE range, correcting the under-estimate created by using an unjustified 35-year lifetime instead of a 20-year lifetime.

DTE does not provide the durations of the PPA bids (20 or 25 years), so I have no way to know which are which, or how to adjust them fairly. I made no adjustments for PPA durations.

Rather than try to adjust company-owned solar proposals for their lifetime being longer than the PPAs, I simply excluded them from my table. They are not necessary to my purpose in building this exhibit, which is to show that the two proposed company-owned wind projects are not cost-effective.

As you can see from the adjusted LCOE ranges in columns "k", and "l", all five solar PPAs have dramatically better economics than either of the proposed company-owned wind projects.[23] In my analysis, the upper bound of the adjusted LCOE price range for all of five of the selected solar projects is lower than the lower bound of the adjusted LCOE price range of both company-owned wind projects. The proposed company-owned wind projects are simply not cost effective.

(a)	(b)	(c)	(d)	(k)	(l)
Project #	Tech	MW (AC)	Structure	Adjusted LCOE lower bound ($/MWh)	Adjusted LCOE upper bound ($/MWh)
1	Wind	225	Self	$ 53.74	$ 59.44
2	Wind	150	BTA	$ 64.74	$ 70.44
3	Solar	75	PPA	$ 18.55	$ 35.78
14	Solar	125	PPA	$ 15.55	$ 32.78
16	Solar	200	PPA	$ 15.55	$ 32.78
27	Solar	200	PPA	$ 18.55	$ 35.78
33	Solar	50	PPA	$ 20.55	$ 37.78

[23] Exhibit GLREA-JR3, selected columns

Q. How should the Commission address DTE's repeated failure to provide a reasonable and prudent analysis of prospective facilities?

A. GLREA and its members seek relief from DTE's repeated imprudent and self-serving supply-side proposals. The requirements of PA 295 must be met, and we cannot afford further delays. The Commission should not approve the company's proposed self-build of the Meridian Wind Park, nor the wind facility identified in Exhibit B-5, row 2 with a BTA, due to the multiple flaws in DTE's analysis. Instead, the Commission should direct the company to select from the solar PPA bids, which will provide lower lifetime costs to ratepayers. Of course, DTE has the opportunity to provide a sound analysis in some future filing, but the better solution is to resolve these issues in this case.

Q. Does that conclude your testimony?

A. Yes.

John Richter

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Bingham Farms, MI 48025

EDUCATION

Murdoch University, Perth, Australia – January 2009
M.S. in Renewable Energy

Oakland Community College, Rochester Hills, Michigan – 1991
Alternative Energy Technologies (Solar, Wind, Biomass)

Oakland University, Rochester, Michigan
B.S. Engineering, minor in Economics - 1982

RENEWABLE ENERGY EXPERIENCE

Adjunct Instructor, Macomb Community College (2009 – 2010)
Online / classroom hybrid course including labs.
Grant-funded curriculum development and classroom instruction in solar energy.

President, Great Lakes Renewable Energy Association (2002 – 2003)
Non-profit administration focused on financial planning, fundraising & recruitment. Staffing, budget, and strategic planning.

Policy Analyst, Great Lakes Renewable Energy Association
Developed position papers on policy initiatives. One of three invited presenters to the Northeast and Midwest Caucus meeting on a national RPS. Presented: *Wind Power and Distributed Generation* to U.S. Congressional Staffers at the U.S. Capitol Building. Member of the MPSC collaborative on renewable energy and the Michigan Wind Working Group of the DOE's *Wind Powering America* program.

Renewable Energy Consultant

American Green Careers
Project management and meeting facilitation for a team of independent contractors for the start-up of a proprietary school green jobs training program.

Great Lakes Renewable Energy Association
Researched, developed, and presented policy recommendations: *Opportunities for Renewable Energy Deployment* to Michigan legislators and staff.

Midwest Education Connection Network (MECNet) / Urban Options
Developed K-12 educational materials: *Michigan's Renewable Energy and Efficiency Success Stories*. This complemented materials from NEED.

American Council for an Energy Efficient Economy (ACEEE)
Researched and authored *Michigan's Current Energy Situation* section of an energy efficiency white paper for the State Governor.

Speaker
Scores of speaking engagements at conferences, community colleges, and community groups for two decades, including:

- American Solar Energy Society; *Making the Benefits of RE Real,* and *World Oil Depletion and Its Implications for U.S. Energy Policy*
- Pierce Cedar Creek RE Conference - Keynote speaker: *RE Cornucopia*
- PBS Documentary: *Michigan's Green Energy Economy*

Contributing Writer
Home Power Magazine, The Rock River Times, ReNews, Energy Paths, Energy Times

TELECOM EXPERIENCE

Century Link Communications *(formerly Level-3, Global Crossing, Frontier, and Allnet),* Southeastern Michigan – September 1987 to March 2002, December 2002 – May 2018

Sr. Software Architect

Design and specify software changes to meet program objectives.

- Define project scope, deliverables, schedule and budget.
- Develop software specifications.

Sr. Product Development Manager

Plan, direct, and coordinate all work activities to build new services on-time and within budget.

- Create cross-functional project teams with members from various departments; build team commitment to project objectives.
- Define project scope, deliverables, schedule and budget.
- Create or update business processes to support new products.
- Develop software specifications.

Director, Product Platform Development

Responsible for the selection, purchase, project management, installation, integration, and operation of multi-million dollar real-time call processing systems.

- Performed vendor/product evaluation, purchase negotiations and installation project management.
- Managed staff of 23 Software Engineers developing real-time call processing software and integrating purchased systems.

Senior Manager of Hardware Integration

Responsible for evaluation, selection, engineering, purchase, and installation of all switching equipment and Digital Cross-connect Systems (DCS).

- Planned and managed annual capital budget in excess of $25M.
- Negotiated pricing and payment terms, installation schedules, and acceptance testing procedures.
- Created network traffic forecasting model for budgetary and capacity planning. Selected sites to close for economic efficiency.
- Provided Project Management of equipment purchases, moves, and installs to facilitate consolidation of four acquired carrier switching networks into one fully integrated network.

Exhibit GLREA-2 (JR-2)
Illustrative comparison of a 100% Wind REP to a 100% Solar REP

Cost of New Entry (CONE) ($/kW) 89
source: U-20417, V3 p 579 (witness Mikulan)

System Type	Capacity Factor (1)	MWh/year per MW(ac)	MISO ELCC (2)	Capacity Value at 50% of CONE ($/MWh)	Capacity Value at 100% of CONE ($/MWh)
Solar (2)	23.5%	2059	65.8%	$ 14.22	$ 28.45
Wind (1)	31.3%	2742	11.7%	$ 1.90	$ 3.80
Solar capacity value-add (vs. wind)				**$ 12.32**	**$ 24.65**

Sources:
(1) Capacity Factors
Meridian Wind Park capacity factor Exhibit B-5, pg 1, row 5, column d
Solar PPA capacity factor Exhibit B-5, pg 1, row 7, column d
(3) MISO ELCC values
Wind ELCC U-20471, V3, p 412, line 5 (witness Mikulan)
Solar ELCC for single-axis tracking U-20471, PFD p. 142

Exhibit GLREA-3
Adjusted Summary of selected RFP bids

	Lower-bound Adjustments ($/MWh)	Upper-bound Adjustments ($/MWh)
Wind capacity value	$ (3.80)	$ (1.10)
Solar capacity value	$ (28.45)	$ (14.22)
Wind lifetime	$ 11.54	$ 11.54

			(a)	(b)	(c)	(d)	(e)	(h - 1)	(h - 2)	GLREA adjusted values (k)	GLREA adjusted values (l)
From Exhibit	Line No.	Project #		Technology	MW (AC)	Structure	COD	LCOE Range (w/contract adjust) lower-bound ($/MWh)	LCOE Range (w/contract adjust) upper-bound ($/MWh)	Adjusted LCOE lower bound ($/MWh)	Adjusted LCOE upper bound ($/MWh)
B-28	1	1		Wind	225	Self	2021	46	49	$ 53.74	$ 59.44
B-28	2	2		Wind	150	BTA	2021	57	60	$ 64.74	$ 70.44
B-28	3	3		Solar	75	PPA	2021	47	50	$ 18.55	$ 35.78
B-29	1	14		Solar	125	PPA	2022	44	47	$ 15.55	$ 32.78
B-29	3	16		Solar	200	PPA	2022	44	47	$ 15.55	$ 32.78
B-29	14	27		Solar	200	PPA	2022	47	50	$ 18.55	$ 35.78
B-29	20	33		Solar	50	PPA	2022	49	52	$ 20.55	$ 37.78

STATE OF MICHIGAN

BEFORE THE MICHIGAN PUBLIC SERVICE COMMISSION

In the matter, on the Commission's own motion regarding the regulatory reviews, revisions, determinations, and/or approvals necessary for **DTE Electric Company** to fully comply with Public Act 295 of 2008.
_____/

Case No. **U-18232**

ELECTRONIC SERVICE LIST

On April 28, 2020, an electronic copy of the **Testimony and Exhibits of John Richter on behalf of the Great Lakes Renewable Energy Association** was served on the following:

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The statements above are true to the best of my knowledge, information and belief.

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