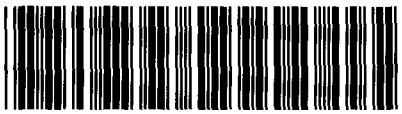

Control Number: 48539

Item Number: 25

Addendum StartPage: 0

PROJECT NO. 48539

REVIEW OF THE INCLUSION OF MARGINAL LOSSES IN SECURITY-CONSTRAINED ECONOMIC DISPATCH	§ § § §	**PUBLIC UTILITY COMMISSION OF TEXAS**

COMMENTS OF THE SOLAR ENERGY INDUSTRIES ASSOCIATION AND THE TEXAS SOLAR POWER ASSOCIATION

The Texas Solar Power Association ("TSPA") and Solar Energy Industries Association ("SEIA")[1] jointly file these comments in response to questions the Public Utility Commission of Texas ("Commission" or "PUCT") published in the Texas Register on August 24, 2018.[2]

TSPA is a statewide industry trade association that promotes the development of solar electric generation. Our member companies invest in the development of solar photovoltaic products and projects in Texas, serving customers in both wholesale and retail markets. Our membership includes manufacturers, large-scale power plant developers, residential and commercial rooftop integrators, and other companies in Texas participating across the full solar photovoltaic supply chain.

SEIA is the national trade association of the solar energy industry. Through advocacy and education, SEIA and its members are building a strong solar industry to power America. As the voice of the industry, SEIA works to make solar a mainstream and significant energy source by expanding markets, removing market barriers, strengthening the industry, and educating the public on the benefits of solar energy. SEIA represents solar companies across a variety of solar energy

---

1 The comments contained in this filing represent the position of SEIA as an organization, but do not necessarily reflect the views of any particular member with respect to any issue.

2 43 TexReg 5602-5603 (Aug. 24, 2018).

technologies, including photovoltaic ("PV"), solar water heating, and concentrating solar power ("CSP").

DISCUSSION

Based on ERCOT forecasts, utility-scale solar is expected to be the largest contributor to new ERCOT capacity over the next 15 years. The "Current Trends" scenario in the upcoming Long Term System Assessment ("LTSA") report forecasts that 14,400 MW of new utility-scale solar generation will be installed in ERCOT over the next 10 years.[3] These results, while still preliminary, are in line with ERCOT's 2016 LTSA[4] as well as other independent consulting analyses and project the installation of significantly more solar generation in the next 10-15 years than any other generation resource. While such analyses are not determinative, they demonstrate that PV is among the most cost-competitive and best-fit resources to meet ERCOT's growing electric needs.

The ERCOT analysis submitted on June 29 examining the inclusion of marginal losses in Security-Constrained Economic Dispatch (SCED) affirms our previously stated concerns about the expected costs and impacts of this proposal. This proposal does not appear to solve any particular market problem identified by the Commission or stakeholders. While it is appropriate to consider market changes that have the potential to improve economic efficiency, ERCOT's base case analysis estimates only $11.4 million in annual production cost savings across the wholesale market in the one year studied, with the savings ranging from $13.4 million if the price of natural gas declines relative to the base case, to an increase in production cost of $0.9 million if the price

---

[3] ERCOT, 2018 LTSA Update, Regional Planning Group Meeting, April 24, 2018 (available at http://www.ercot.com/content/wcm/key_documents_lists/138684/2018_LTSA_Update_April_RPG.pptx).

[4] ERCOT, 2016 Long-Term System Assessment for the ERCOT Region (Dec. 26, 2016) at 45 (available at http://www.ercot.com/content/wcm/lists/89476/2016_Long_Term_System_Assessment_for_the_ERCOT_Region.pdf).

of natural gas increases relative to the base case.[5] Put another way, the production cost savings ERCOT projected for a single year were 0.12% in its base case, and ranged from a high of 0.18% if the price of natural gas declined from the base case to a low of (0.001)% if the price of natural gas were to rise. ERCOT's results are similar to the results found by the Brattle Group, which estimated a production cost savings of only $8.6 million in the year studied.[6] These are very small potential savings which stand in sharp contrast to the expected impact to generators.

According to ERCOT's estimates, generators located in the North and West Zones would see an annual reduction of $512.6 million in revenue ($331.9 and $180.7 million respectively) while generators in the Houston and South Zones would see an increase of $303.2 million in revenues ($216.4 and $86.8 million respectively).[7] A transition from average to marginal losses would penalize the development of new utility-scale solar generation in areas in Texas with the best solar resource.[8] According to ERCOT's latest Seasonal Assessment of Resource Adequacy, 82% of operational solar resources are located in the West Zone,[9] and both ERCOT's study and the Brattle Group study confirm that implementing marginal transmission losses in energy pricing would adversely affect generation resources in this zone.[10] While the areas of best solar irradiance are located in West Texas, solar generation is not necessarily confined to the West Zone. Texas has a strong solar resource throughout the state, and solar power plants are inherently modular

---

5 *Project to Assess Price-Formation Rules in ERCOT's Energy-Only Market*, Project 47199, ERCOT Studies on Benefits of Real-Time Co-optimization and Marginal Losses, Attachment B, at 2 (ERCOT Study).

6 The Brattle Group, *Impacts of Marginal Loss Implementation in ERCOT*, filed in Project No. 47199, *Project to Assess Price Formation Rules in ERCOT's Energy-Only Market,* Item 30 at 11 (Oct. 12, 2017) (hereinafter "Brattle Group Study").

7 ERCOT Study at 3.

8 See National Renewable Energy Labs, Geospacial Data Science, Solar Maps, Texas (accessible at https://www.nrel.gov/gis/solar.html.

9 ERCOT Seasonal Assessment of Resource Adequacy (October-November 2018), Fall Capacities (Sept. 6, 2018) (available at http://www.ercot.com/content/wcm/lists/143976/SARA-FinalFall2018.xlsx).

10 ERCOT Study at 3; Brattle Group Study at 16; see also Questions on ERCOT ML Study 09022018a at 1 (Sept. 5, 2018) (available at http://www.ercot.com/content/wcm/key_documents_lists/160763/Questions_on_ERCOT_ML_study_09052018a.docx).

with significant siting flexibility. According to ERCOT's September Generator Interconnection Status Report, there are more than 30,000 MW of solar in development in ERCOT across more than 60 counties and all load zones.[11] That said, there are limits to how much capacity can be sited near population centers, and privileging Houston generation may disadvantage economic development opportunities for communities in rural west and north Texas. Regardless, the transition to marginal losses would not reward PV for locating closer to load generally, but only reward generation based on its location relative to the "center of load" reference bus.

That said, there are limits to how much capacity can be sited near population centers, and only 4% of the solar capacity with a full interconnection agreement complete or underway is located in the Houston load zone.[12] Creating new incentives for Houston generation by including marginal transmission losses in energy pricing can be expected to disadvantage economic development opportunities for communities in rural west and north Texas, will fail to reward PV for locating closer to load generally, and only reward PV if it locates closer to the "center of load" reference bus in the Houston load zone.

Marginal losses implementation has little economic benefit if its impacts are considered over a single year,[13] but large adverse impacts when studied over a longer term, and in both instances, with costs borne disproportionately by west and north zone generators.[14]

---

11 ERCOT Generator Interconnection Status Report (September 2018) (available at http://www.ercot.com/content/wcm/lists/143978/GIS_Report__September_2018.xlsx).

12 *Id.*

13 *Project to Assess Price-Formation Rules in ERCOT's Energy-Only Market*, Project No. 47199, ERCOT Study of the Operational Improvements and Other Benefits Associated with the Implementation of Real-Time Co-Optimization of Energy and Ancillary Services, Attachment A and Potomac Economics Simulation of Real-Time Co-Optimization of Energy and Ancillary Services for Operating Year 2017 (June 29, 2018)

14 PA Consulting, *The Long-Term Impact of Marginal Losses on Teas Electric Retail Customers,* April 2018 (hereinafter "PA Consulting Report"), filed in *Project to Assess Price-Formation Rules in ERCOT's Energy-Only Market*, Project No. 47199 (hereinafter "Project 47199"), Item 93 (April 20, 2018).

The regulatory uncertainty that adoption of the marginal losses proposal would cause to the wholesale market also would adversely impact investment in new generation in the state at the very time that the Commission is looking at ways to encourage the development of additional generation resources in ERCOT. Barring a significant improvement in economic efficiency or operational effectiveness, a stable regulatory environment is preferable for investment certainty.

1. What are the benefits of implementing the use of marginal transmission losses rather than average transmission losses in the Electric Reliability Council of Texas' (ERCOT) Security-Constrained Economic Dispatch (SCED) over the long term?

Over the long term, ERCOT would realize more benefits from maintaining its current use of average transmission losses to recover the cost of transmission losses than switching to the use of marginal losses. The PA Consulting Group conducted a long-term (20-year) study investigating the impact of marginal losses in ERCOT and found that the long-term costs associated with implementing marginal losses greatly outweigh any near-term benefit.[15] Over the long run, PA Consulting found that Texas consumers and industry would experience $4.6 billion in **increased energy costs** if ERCOT implemented marginal losses.[16] In addition, the Texas economy would experience **$7.1 billion in reduced economic output** and the **loss of 29,000 full time employees** ("FTEs") in the ERCOT region.[17]

In theory, using marginal losses to recover the cost of transmission losses is designed to improve the efficiency of a wholesale power market by increasing the dispatch of generators located closer to load centers. Marginal losses penalizes generators based on how far away they are from the center of load in the market. Their electricity is valued less than electricity produced by generators located closer to the center of load for the market – even if the generators are located

---

15 *Id.*

16 *Id.* at 5 and 14-21.

17 *Id.*

close to other load (i.e., generators located near Dallas will not benefit from their proximity to load; only generators located near Houston will see an advantage from their proximity to the "center of the load."). As PA Consulting observed, "In a traditional power system based exclusively on thermal generation resources, this improvement in *physical* efficiency can improve *economic* efficiency by reducing the overall system cost to produce electricity, since less electricity needs to be produced to meet demand.[18]

However, due to the significant investments that private capital has made in Texas, ERCOT no longer receives electricity solely from thermal resources. According to ERCOT's estimates, approximately 17.5% of the energy consumed in ERCOT in 2017 was from non-thermal generation resources.[19] While energy from solar generation resources represented less than 1% of the total energy consumed in 2017, as discussed above, ERCOT's forecast is for significant growth of solar generation, and the percentage of energy consumed in ERCOT generated by non-thermal resources is expected to increase. Solar resources are different from thermal generation in that the marginal cost of producing electricity from solar generation is close to zero, whereas the marginal costs of thermal resources are much higher due to fuel and other operating costs.[20] As a result, the normal market conditions for evaluating the impact of implementing marginal losses are not applicable to ERCOT.

As PA Consulting observed in its report, the ERCOT market also is unique since the best renewable generation potential is located within the western and northern portions of the State, whereas most of the electricity demand is concentrated in regions farther east and south.[21]

---

18 See PA Consulting Report at 7-9.

19 ERCOT Quick Facts, accessible at http://www.ercot.com/content/wcm/lists/144926/ERCOT_Quick_Facts_8818.pdf.

20 PA Consulting Report at 6.

21 *Id.*

As shown by PA Consulting's study, any short-term efficiencies that might be achieved as a result of the re-dispatch of thermal generation pale in comparison to the additional costs customers would be bear over the long term if the Commission would to require ERCOT to implement marginal losses. In other words, a focus on optimizing *physical* efficiency in the near term in ERCOT is not the same as optimizing *economic* efficiency for Texas customers in the long-run.

PA Consulting found that the implementation of marginal losses would alter future power generation investment decisions.[22] Because the implementation of marginal losses would financially penalize resources farther from the "center of the load," it would decrease the development and overall electricity production of zero marginal cost renewable resources on the system. In turn, some additional thermal generation would be needed on the system to meet future customer demand.[23] As these resources have higher marginal costs than renewable generation, implementing marginal losses and increasing the use of thermal generation would increase system production and energy costs over the long run. This indicates a less optimal *economic* outcome for electricity customers in ERCOT.

As ERCOT found in its study, the generators that would benefit from the implementation of marginal losses in ERCOT likely would only be those generators located within the Houston and Coastal weather zones and, on a short-run basis, the production cost savings would be approximately ~$11 million (or 0.12% of the annual ERCOT production costs), whereas the annual financial impact to generators in the North and West Zones would be a reduction of $512.6 million in revenue.[24]

---

22 PA Consulting Report at 14-15.
23 *Id.* at 14-15.
24 ERCOT Study at 3.

2. Are the benefits identified in response to Question 1 sufficient to justify the near term costs to the market as a whole? Please consider individual stakeholder implementation costs as well as the costs to ERCOT identified in its study.

No. The benefits are far outweighed by both the near-term costs to other market participants and the long-term impact to resource adequacy in ERCOT. As identified in ERCOT's analysis, the production cost savings are an order of magnitude lower than the loss in revenue experienced by generators not in the Houston area.[25] This near-term impact is significant and may encourage additional retirements in the non-Houston zones. In addition, this change reduces the incentive to add more solar generation in ERCOT by penalizing solar located in other parts of Texas. This is exactly the wrong signal to be sending when customers in the Permian Basin, for example, are investing in solar generation resources to support their local operations in the face of transmission limitations.[26] Moreover, ERCOT has identified solar generation in its 2016 LTSA and in the latest modeling for their draft 2018 LTSA as playing a vital role in meeting resource adequacy needs over the next 15 years. By reducing revenues for existing and future solar generation outside of the Houston Zone, this proposal risks future resource adequacy.

3. What are the effects on retail customers and the retail market from the implementation of marginal transmission losses?

As noted above, this change may reduce production costs approximately $11 million (or 0.12%) in the near term, but retail electric rates are unlikely to fully reflect any reduction. In its study, ERCOT noted that there are a number of variables which make forecasting the impact of implementing marginal losses on retail customers speculative at best.[27] Not only is the amount of

---

25 *Id.*

26 *See, e.g.,* Betsy Lillian, "Solar to Power Oil Refinery Facilities in Texas." *Solar Industry* July 19, 2018 (available at https://solarindustrymag.com/solar-to-power-oil-refinery-facilities-in-texas/).

27 ERCOT Study at 4-5. It should be noted that ERCOT suggested that retail prices in Houston could rise if the price of natural gas declined from current levels – a perverse result when the current market structure would encourage those savings to benefit retail customers. See ERCOT Study at 4.

potential savings in one year minimal, but there is no way to estimate the impact the re-allocation of over-collections of marginal losses would have on retail customers when this issue is entirely unresolved.

Over the long term, PA Consulting estimated that retail customers would experience a $4.6 billion increase in energy costs.[28]

4. **The ERCOT study of using marginal transmission losses instead of average transmission losses in SCED simulated one year. How would cumulative, multi-year impacts of using marginal transmission losses be different, if at all?**

As described above in response to Question 1, PA Consulting conducted a 20-year study on the impact of marginal losses on the ERCOT market. While PA Consulting's report indicates that the implementation of marginal losses would lead to some near-term benefit in production cost savings, over the long-term, PA Consulting found that Texas consumers and industry would experience **$4.6 billion in increased energy costs** if ERCOT implemented marginal losses.[29] In addition, PA Consulting found that the Texas economy would experience **$7.1 billion in reduced economic output** and the **loss of 29,000 full time employees** ("FTEs") in the ERCOT region.[30]

The higher levels of low marginal cost renewable generation forecasted under the current market structure reduce ERCOT's reliance on more expensive thermal generators in most years of the study period, which significantly decreases total system production costs by decreasing fuel and variable operations and maintenance costs of generators on the ERCOT system. This also leads to lower wholesale prices in ERCOT under the current market structure of average losses, which leads to lower total energy costs in ERCOT inclusive of transmission losses.

---

28 PA Consulting Report at 5 and 14-21.
29 PA Consulting Report at 5 and 14-21.
30 *Id.*

5. What costs would be incurred by market participants if marginal losses were implemented in the ERCOT market? Please provide an estimate of the costs that would be incurred by your company or companies or customers represented by your organization. Please describe the elements of those costs.

The Brattle Group Study, Commissioned by TSPA and SEIA member First Solar, along with other parties, and submitted by those parties in Project No. 47199, details costs generators would incur if the Commission implemented marginal losses in ERCOT.[31] While some of the data from that analysis includes competitive information that remains confidential, the results of their modeling indicate that existing solar generation owners would lose $5.7 million in revenues, or 0.2% of total revenues in ERCOT.[32] In a market as ruthlessly efficient as ERCOT, and with extremely narrow margins to attract financial support for new generation capacity, this anticipated reduction in revenue opportunity likely would affect the timing and amount of new solar capacity additions.

6. How would a decision to use marginal transmission losses affect your company's market systems?

A decision to use marginal losses in ERCOT would require member companies to include this change, including the complexities of identifying the "center of load", and expected payments returned to generators if any, into their financial models as they consider whether to develop projects in ERCOT. These changes would increase uncertainty in a market that already is inherently uncertain, and likely dampen appetite for further investment.

---

31 The Brattle Group, *Impacts of Marginal Loss Implementation in ERCOT*, filed in Project No. 47199, *Project to Assess Price Formation Rules in ERCOT's Energy-Only Market,* Item 30 at 11 (Oct. 12, 2017) (hereinafter "Brattle Group Study").

32 Brattle Group Report at 14.

7. How would a decision to use marginal transmission losses affect your company's internal operations?

As noted in ERCOT's analysis, due to solar's extremely low marginal cost, our members' operations in terms of solar dispatch would not change. This is an important point that again raises questions about the value of this proposal which changes little in regards to ERCOT's dispatch but does result in a transfer of wealth from generators in rural areas of the state to generators located in the Houston & Coastal weather zones.

8. What are the effects on reliability on the ERCOT grid of using marginal transmission losses instead of average transmission losses in SCED?

Generally speaking, a transition from average to marginal transmission losses will do little to change dispatch within ERCOT in the near term, so this transition is unlikely to affect reliability over that period. However, planning for reliability is a long-term process, and if this change encouraged the development of any new generation capacity, which is speculative, such new generation capacity would be in the Houston and Coastal weather zones by depressing new project development in more rural areas and reducing thermal generation from those same areas. To the extent that the Houston and Coastal weather zones are more susceptible to extreme weather events, particularly hurricanes, that could harm operational capabilities of thermal units, this change would reduce system reliability.

9 What effects, if any, would marginal transmission losses have on grid hardening and resilience?

SEIA and TSPA have no comment on this item at this time.

10. What effects would the use of marginal transmission losses in SCED have on grid reliability in regions of the ERCOT grid where non-synchronous generation is more prevalent?

SEIA and TSPA have no comment on this item at this time.

11. How would a decision to implement marginal transmission losses affect investment in new generation resources in ERCOT over the next five years, the next 10 years, and in the years beyond 10 years?

PA Consulting's and Brattle Group's analyses demonstrate that the implementation of marginal losses to recover transmission losses would discourage further development of renewable resources in the geographic areas of the state best suited for such development.[33] This reduction of the development of zero marginal cost solar generation logically could lead to increased dispatch of existing generation near Houston and potentially the development of gas-fired generation near Houston, both of which would cause ERCOT customers to pay a higher marginal cost of energy. In the end, ERCOT customers would pay more for their electricity than they would have if ERCOT continued to recover transmission costs through the current methodology.[34]

As discussed in responses to other answers, changing from an average to marginal losses dispatch mechanism would reduce investor appetite in new generation in ERCOT. Due to the complexities of implementing marginal losses, including the development of a methodology to calculate the "center of load", determining how and to whom to re-allocate overcharges, and any unforeseen consequences, it is very difficult to quantify this impact.

12. How would the implementation of marginal transmission losses affect the composition of the generation fleet in ERCOT?

PA Consulting's study showed that implementing marginal transmission losses would change future generation investment.[35] Over the 20-year study period, approximately 800 MW less of solar capacity would be installed due to the implementation of marginal losses than under the current market structure.[36] Today, solar power generation has installation and operational costs

---

33 PA Consulting Report at 5-6; Brattle Group Report at 12.
34 PA Consulting Report at 5 and 14-21.
35 PA Consulting Report at 14-15.
36 PA Consulting at 14-15.

that already are well below the cost of new combustion turbines and combined cycle units. While the implementation of marginal losses would not change that fact, it would put a thumb on the scale that, at a minimum would delay the installation of that new PV capacity as a result of increased uncertainty and difficulties in financing new projects, and potentially also reduce the development of this on-peak generation resource.

13. **Assuming the Commission decided to go forward with implementation of marginal transmission losses, what are the key issues related to determining the appropriate treatment and allocation of the marginal transmission loss surplus revenues?**

SEIA and TSPA have no comment on this item at this time.

14. **Does the ERCOT analysis of the benefits of including marginal transmission losses in SCED accurately measure such benefits? Are potential costs to the market or to market participants adequately accounted for?**

SEIA and TSPA have no comment on this item at this time.

15. **What ERCOT operational changes would need to be made that are not considered in ERCOT's studies?**

SEIA and TSPA have no comment on this item at this time.

16. **Would the use of marginal transmission losses in SCED change the ERCOT transmission planning process and transmission build-out?**

SEIA and TSPA have no comment on this item at this time.

17. **Assuming that the implementation of marginal transmission losses results in the location of generation closer to load, what advantages and disadvantages would there be during an emergency event or a market restart to having generation located closer to load?**

It is not clear that the implementation of marginal transmission losses would actually result in the location of generation closer to load. As the Brattle Group study showed, the result may merely be that existing resources located closer to Houston are dispatched more.[37] SEIA and TSPA remain skeptical that a shift from average to marginal transmission losses would result in the

[37] Brattle Group Study at 11-12.

location of meaningful amounts of generation closer to the "center of load" in ERCOT. It is important to note that, based on ERCOT's analysis, there would in fact be a disincentive to locate generation near the load centers outside of the Houston and Coastal weather zones due to the reduction in generator revenues in load centers including the Dallas Fort Worth area, San Antonio, and Austin. The net result is that the implementation of marginal losses would leave ERCOT with less on-peak solar generation capacity and little to no increase in resources located closer to Houston than otherwise would develop under the current market structure to address emergency events or a market restart.

18. What effects, if any, would the implementation of marginal transmission losses have on the Congestion Revenue Rights (CRR) market?

SEIA and TSPA have no comment on this item at this time.

19. How should the commission direct ERCOT to implement marginal transmission losses in a way that mitigates any deleterious effects on the CRR market?

SEIA and TSPA have no comment on this item at this time.

20. Does your assessment of the incorporation of marginal transmission losses change based on the timeline of implementation?

No. Our assessment of this proposal is based on its overall impact rather than the timeline for implementation.

21. What are the effects of implementing both Real Time Co-optimization (RTC) and marginal transmission losses on reliability and price formation?

SEIA and TSPA have no comment on this item at this time.

22. Are there any synergies that may result from contemporaneous adoption of both RTC and marginal transmission losses?

SEIA and TSPA have no comment on this item at this time.

23. What are the effects on retail customers and the retail market from the implementation of both RTC and marginal transmission losses?

SEIA and TSPA have no comment on this item at this time.

CONCLUSION

TSPA and SEIA appreciate the opportunity to address these important issues and we look forward to engaging further in this project.

Respectfully submitted,

TEXAS SOLAR POWER ASSOCIATION

By:

Charlie Hemmeline
Executive Director
Email: Charlie@txsolarpower.org
Phone: 512-593-2015
P.O. Box 1485
Austin, TX 78767

Michael J. Jewell
Jewell & Associates, PLLC
State Bar No. 10665175
506 West 7th Street, Suite 1
Austin, TX 78701
(512) 423-4065
(512) 236-5170 (FAX)

ATTORNEY FOR THE SOLAR ENERGY INDUSTRIES ASSOCIATION