STATE OF CONNECTICUT

PUBLIC UTILITIES REGULATORY AUTHORITY

DEEP AND PURA JOINT PROCEEDING	:	DOCKET NO. 19-06-29
ON THE VALUE OF DISTRIBUTED	:	
ENERGY RESOURCES	:	September 18, 2019

JOINT COMMENTS OF CONNECTICUT FUND FOR THE ENVIRONMENT, E4THEFUTURE, NORTHEAST CLEAN ENERGY COUNCIL, NORTHEAST ENERGY EFFICIENCY PARTNERSHIPS, AND ACADIA CENTER

IN RESPONSE TO

DRAFT STUDY OUTLINE AND NOTICE OF REQUEST FOR WRITTEN COMMENTS

These comments are provided by the organizations identified below (collectively, "Joint Commenters") in response to the request of the Connecticut Department of Energy and Environmental Protection ("DEEP") and the Public Utility Regulatory Authority ("PURA") for comment on the draft study outline for valuing DERs in Docket 19-06-29.Our comments respond to each section of the draft study outline, followed by suggestions for use cases.

Connecticut Fund for the Environment: Connecticut Fund for the Environment (CFE) is a non-profit environmental organization with over 5,000 members statewide. The mission of CFE, and its bi-state program Save the Sound, is to protect and improve the land, air, and water of Connecticut and Long Island Sound. We use legal and scientific expertise and bring people together to achieve results that benefit our environment for current and future generations.

E4TheFuture: E4TheFuture is a non-profit organization that promotes residential clean energy and sustainable resource solutions to advance climate protection and economic fairness by influencing federal, state and local policies, and by helping to build a resilient and vibrant energy efficiency and clean energy sector. E4 was previously named Conservation Services Group (CSG) and ran the NYSERDA residential programs, as well as in 25 other states, for many years

Northeast Clean Energy Council: NECEC is a clean energy business, policy, and innovation organization whose mission is to create a world-class clean energy hub in the Northeast, delivering global impact with economic, energy and environmental solutions. NECEC is the only organization in the Northeast that covers all of the clean energy market segments, representing the business perspectives of investors and clean energy companies across every stage of development. NECEC members span the broad spectrum of the clean energy industry, including energy efficiency, wind, solar, energy storage, microgrids, fuel cells, and advanced and "smart" technologies. Many of our members are operating and investing in Connecticut, and more are interested in doing so.

Northeast Energy Efficiency Partnerships: NEEP was founded in 1996 as a non-profit accelerating energy efficiency in the Northeast and Mid-Atlantic states. Today, it is one of six Regional Energy Efficiency Organizations (REEOs) funded, in part, by US Department of Energy to support state efficiency policies and programs. NEEP's mission is to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities. With the goal to assist the region's leaders to reduce building sector energy consumption three percent per year and carbon emissions 40 percent by 2030, our vision is that the region's homes, buildings, and communities will be transformed into efficient affordable, low-carbon, resilient places to live, work, and play.

Acadia Center: Acadia Center is a nonprofit research and advocacy organization committed to advancing the clean energy future. Acadia Center works to build clean, low carbon, and consumer friendly economies.

Comments on Outline *Introduction*

1. DEEP/PURA should proceed from a common statutory definition of distributed energy resources ("DERs").

The Introduction should be clear on the scope of the study and the definition of DERs. Specifically, Connecticut General Statute § 16-1 (49) provides:

> *"Distributed energy resource" means any (A) customer-side distributed resource or grid-side distributed resource that generates electricity from a Class I renewable energy source or Class III source, and (B) customer-side distributed resource that reduces demand for electricity through conservation and load management, energy storage system which is located on the customer-side of the meter or is connected to the distribution system or microgrid.*

In this proceeding, DEEP/PURA should apply the statutory definition to embrace all DERs, including those on the demand and supply side, and those that are sited behind or in front of the customer meter or a point of common connection with the utility grid. The first key definitional characteristic for DERs, therefore, is where they are located on the grid. Second, they are defined as resources—services or technologies that serve to meet one or more of the required functions for operating and maintaining a secure, reliable, and affordable electricity grid. It is identifying those functions, and potential functions, and the value thereof, that should be focus of this proceeding. Per the definition above, the study should encompass the broader set of DERs, including behind-the-meter conservation, load management and microgrids. This treatment is consistent with mainstream definitions of DERs, including other states (NY, MA) and US DOE.

2. DEEP/PURA should adopt and apply a common framework for establishing values for distributed energy resources.

The Introduction should set forth a process for articulating principles and policies using a common framework to guide DER deployment, adoption, and operation in Connecticut. Such articulation of principles and policies is critical in defining and valuing DERs as resources so that DEEP, PURA and other stakeholders can understand what the DER does and what it is worth—functions and value. A common framework for assessing the value of DERs can allow for adaptability and expanded application, even if initial valuation efforts focus on a limited set or subset of resources. Starting with valuation of behind-the-meter distributed generation is the most common approach, but such efforts should be undertaken with a view toward expanding the valuation effort to other DERs. This should include not only storage, CHP and behind-the-meter ("BTM") fuel cells, as the Draft Study Outline includes, but also energy efficiency (including heat pumps), demand response, electric vehicles, front-of-the-meter ("FTM") fuel cells and others. This Study provides a clear opportunity to use a common framework for conducting benefit-cost analysis for a full range of DERs (including incorporating existing cost-effectiveness practices; e.g., for energy efficiency). This would help to streamline the DEEP/PURA and stakeholder review process and ensure consistent treatment across a range of resources.[1]

Use of a common benefit-cost analysis ("BCA") framework is critically important because DERs are increasingly being deployed and operating in combination systems – see for example the newly published report by Regulatory Assistance Project: *Capturing More Value from Combinations of PV and Other DERs (August 2019)*. Multi-resource valuation is also essential for supporting grid architecture approaches like microgrids. Further, absent a clear articulation and common understanding of relevant and applicable policy objectives, it is perhaps premature to narrowly define use cases.

Comments on Outline Section: *State DER Program and Policy Principles*

The Joint Commenters recommend that the section on 'State DER Program and Policy Principles' should follow the Introduction and precede the section on 'Value of DER Analysis', as the former should set the framework and principles by which the latter section addresses technical application of the framework.

We commend DEEP/PURA for recognizing in the Introduction the need to first 'define DER program and policy principles to ensure DER programs align with each other and Connecticut's overall policy objectives.' While the Connecticut Global Warming Solutions Act ("GWSA") is identified as a driving policy along with other various key policies, this section of the outline appears to identify specific DER policies that risks presupposing the goals and objectives before discerning the potential values and benefits of the DERs being studied. As such, it risks narrowing the scope of the VDER study. The overall objective of the VDER Study is to quantify and analyze the full range of potential costs and benefits of DER deployment in order to have the a key set of data that will inform all stakeholders in developing future Connecticut policy..

We recommend that DEEP/PURA, with input from stakeholders, develop a written inventory of the state's applicable policies to document and review the purpose and goal of DER investments. This exercise can then help to identify relevant impacts to account for, including both utility and non-utility system impacts. While the proposed Study outline seeks input on specific impacts, we recommend a careful and systematic review of relevant policies to guide stakeholder input and to allow for a comprehensive review to inform the relevance of system, societal and participant impacts.[2] Specifically, we recommend that DEEP/PURA use the National Standard Practice Manual for Assessing Cost-Effectiveness of Efficiency Resources ("NSPM-EE"), which provides a set of high level valuation

[1] DEEP began a process in 2018 to review the state's cost-effectiveness analysis approach for energy efficiency using the framework provided by the National Standard Practice Manual [National Efficiency Screening Project, 2017]. See CT DEEP presentation at https://www.ct.gov/deep/lib/deep/energy/conserloadmgmt/deep_overview_for_reviewing_c&lm_plan_cost-effectiveness_testing-meeting.pdf.

[2] See CT DEEP presentation that includes (at slide 23) an inventory of applicable CT policies, and associated relevant impacts, that was developed to help inform cost-effectiveness analysis of energy efficiency at https://www.ct.gov/deep/lib/deep/energy/conserloadmgmt/deep_overview_for_reviewing_c&lm_plan_cost-effectiveness_testing-meeting.pdf

principles for cost-effectiveness analysis, including ensuring alignment with state policies and symmetry in the treatment of relevant costs and benefits, as shown in Table 1.[3]

Table 1. Universal Principles

Efficiency as a Resource	EE [and other DERs] is one of many resources that can be deployed to meet customers' needs, and therefore should be compared with other energy resources (both supply-side and demand-side) in a consistent and comprehensive manner.
Policy Goals	A jurisdiction's primary cost-effectiveness test should account for its energy and other applicable policy goals and objectives. These goals and objectives may be articulated in legislation, commission orders, regulations, advisory board decisions, guidelines, etc., and are often dynamic and evolving.
Hard-to-Quantify Impacts	Cost-effectiveness practices should account for all relevant, substantive impacts (as identified based on policy goals,) even those that are difficult to quantify and monetize. Using best-available information, proxies, alternative thresholds, or qualitative considerations to approximate hard-to-monetize impacts is preferable to assuming those costs and benefits do not exist or have no value.
Symmetry	Cost-effectiveness practices should be symmetrical, where both costs and benefits are included for each relevant type of impact.
Forward-Looking Analysis	Analysis of the impacts of resource investments should be forward-looking, capturing the difference between costs and benefits that would occur over the life of the subject resources as compared to the costs and benefits that would occur absent the resource investments.
Transparency	Cost-effectiveness practices should be completely transparent, and should fully document all relevant inputs, assumptions, methodologies, and results.

Note. Adapted from *NSPM for Assessing Cost-Effectiveness of Energy Efficiency Resources*, Table ES-1 at viii. National Efficiency Screening Project (May 18, 2017).

The purpose and value of using a common framework are as follows:

a. Valuation is about recognizing not only which costs and benefits arise from the installation and operation of DERs, but also which costs and benefits the state of Connecticut prioritizes, which it seeks to increase or reduce, and how the valuation methods address uncertainty.

b. Prioritization in turn requires a clear and transparent statement of policy objectives. DEEP/PURA should answer several key questions:
   - Why does Connecticut want to encourage DERs?
   - What does Connecticut want to avoid when DERs are deployed?
   - What major assumptions about DERs and DER costs and benefits are critical?
   - What technical, economic, and societal changes will impact policy positions?

c. Striking the right balance of simplicity and accuracy is particularly important in designing programs that will be attractive to the developers and customers that will

[3] The National Standard Practice Manual for Assessing Cost-Effectiveness of Efficiency Resources ("NSPM-EE") was published in 2017, and while it focuses on energy efficiency, its universal principles apply to all DERs. A project is actively underway to develop an NSPM for DERs (forthcoming 2020) – see https://nationalefficiencyscreening.org/the-national-standard-practice-manual-for-ders/

ultimately be bringing DERs onto the grid and is one of the key lessons from New York's VDER proceedings. The study results can be used to inform which types of programs are likely to help maximize benefits to all customers (e.g., programs targeted at peak load reductions, programs targeted at increasing utilization of renewables, etc.).

d. Generally, the more CT-specific the study can be in its modeling, the more meaningful it will be and the better it can inform the design of CT-specific programs. The study should be performed with a dynamic view of various production needs and cost impacts and benefits over the useful life of the DER. Developing a long-term view of CT-specific costs (which may also have a regional component given that CT is part of the ISO-NE market) will enable the study to provide a long-term view of cost-effective DER deployment as well.

In addition to the overarching principles provided in Table 1 above, and as a complement to the DER Program and Policy Principles provided in the Draft Study Outline, the Joint Commenters recommend the following considerations to guide the valuation study within the context of clearly articulated policy goals:

- The electricity system in Connecticut should strive for the deployment and use of the truly least-cost resources. True least cost means lowest economic, environmental, and societal cost, over both the short- and long-term. True least cost cannot be assessed without assessing all system costs and benefits and relevant non-systems impacts, even while recognizing that absolute precision may not be possible at this time. Should certain impacts be identified as relevant to state policies but difficult to quantify, it should be remembered that failing to set a value effectively assigns a value of zero.

- DERs can offer significant economic value from a societal perspective and can offer direct bill savings and system cost savings over the short and long term, to user/installers, the grid, and society at large. These economic benefits include not just the energy and capacity value of generation, in itself or in avoiding the costs associated with operating existing resources, but also the economic value of avoided transmission and distribution costs, ancillary services, and local energy system resilience, among others.

- DERs can also offer important environmental benefits through substitution of fossil fuel-based generation and through reduction in fossil emissions. Sited and operating near the loads they serve, DERs can have added environmental benefits that accrue as a result of avoided system losses. These benefits are especially important when DERs operate to avoid inefficient generation and use in economically- and environmentally-disadvantaged communities.

- DERs can also support societal objectives like employment, local economic development benefits, and increased property values. There is no practical difference between citizens of Connecticut and customers of EDCs, so DER societal impacts are a proper consideration in DER valuation.

- Reduced use of existing incumbent generation and infrastructure resources is a natural consequence of technological and structural transformation of the energy sector. This does not mean that the value of DERs should be decremented by stranded costs or lost revenues. Such an approach rewards uneconomic decisions, distorts valuation of new investment opportunities, and retards energy sector transformation toward reliance on more efficient, resilient, and socially just energy services solutions.

- Many energy resources are long-lived and impact more than just the customer that uses them. Objective and meaningful evaluation of DERs means that both short- and long-term impacts should be considered, and that discount rates applied to long-term valuation should reflect the kinds of resources under consideration. Greenhouse gas impacts valuation, for example, should be based on societal discount rates.

- Valuation must take proper account of opportunity costs and the dynamic and cybernetic impacts of DER market development. Valuation which reduces the economic benefits of DER investments limits the realization of supply-chain efficiencies that market growth induces. DER market growth is often the best marketing for DER adoption.

- Valuation should be seen as a continuous-improvement exercise, just like ratemaking. Values that cannot be precisely quantified with certainty today can be better defined as processes improve and experience grows. There are many well-established analytical methods for accounting for uncertainty. DEEP/PURA should not be adopting positions that pit the perfect as the enemy of the good.

Comments on Outline Section: *Value of DER Analysis*

Key considerations for modeling analysis that DEEP/PURA should internalize in the DER valuation framework and methodologies include:

1. Most states and jurisdictions start with a clear articulation of fundamental benefit-cost analysis principles. These principles are "fundamental" if they apply and are applied to all DERs under consideration. Uniform application of analysis principles also facilitates comparison of relative impacts of disparate resources and evaluation of resources deployed in combination.

2. As already explained, articulation of policy preferences is key to establishing the valuation framework and to addressing less-than-precise valuation estimates.

3. Regardless of the DER under consideration, DEEP/PURA should establish and adopt a primary cost-effectiveness test for DERs. Secondary cost-effectiveness tests should also be established and adopted to refine and inform valuation.

4. Valuation analysis must differentiate between cost-effectiveness and cost-shifting. Failure to analyze these impacts separately can make analysis results difficult to interpret and misleading. Cost-effectiveness testing answers the question about the relationship between costs and benefits over the analysis period. Because DERs can be quite long-lived, there may be timing and distributional differences between costs and benefits. Cost-shifting analysis reveals those differences.

5. Costs and benefits should be evaluated over the lifetime of the resources. Long-term impacts should be appropriately discounted in order to support levelized cost comparisons. The terms "equity" and "affordability" must be used with precision to describe and characterize DERs fairly and fully. Many of today's "cheap" resources could leave future citizens to deal with significant climate impacts and immature DER markets, while also imposing increased adverse health burdens, and the costs associated with them, on communities. Likewise, current costs and distributional impacts must be fully accounted for—in terms of economic, environmental, and societal impacts.

6. In assessing impacts, it is vital to identify who is impacted. Explicit characterization of disparate and similar impacts on utilities, customers, participants, and third parties is essential.

7. Value is often impacted by revenue streams other than those directly related to utility rates and tariffs. For example, distribution and generation may earn and attract federal revenue stream value through investment tax credits. These revenue streams must be individually characterized as part of the valuation framework and methodologies.

8. DERs that are capable of generation or energy discharge result in two-way flows of energy on the grid. These should be evaluated under a utility cost test as well as the primary cost-effectiveness test and the societal cost test.

9. Rate impacts should be evaluated, but not as an incremental cost or benefit. As explained in the NSPM-EE, rate impacts from lost revenues, for example, "are caused by the need to recover existing costs over fewer sales. These existing costs that would be recovered through rate increases are not caused by the efficiency resources themselves, they are caused by historical investments in supply-side resources that become fixed costs. In economic terms, these existing fixed costs are referred to as "sunk" costs. In economic theory, sunk costs should not be considered when assessing future investments because they are incurred regardless of whether the future investment is undertaken. . . . Any rate increase caused by lost revenues would be a result of recovering those existing fixed costs over fewer sales, not as a result of incurring new costs."[4] As previously stated, evaluation of distributional impacts should be separate from cost-effectiveness evaluation.

10 Uses of DER valuation, both planned and potential, should be characterized as part of the valuation process. DER valuation can inform rate setting, resource planning, and many aspects of energy policy development and implementation. We concur with DEEP's stated high-level objective that DER valuation should support maximization of the societal and electric system benefits of DER deployment and operation.

Resources to Support Quantification of Impacts:

As DEEP/PURA consider the range of costs and benefits of DERs with a focus on those that align with their policy goals, there are many sources that can provide helpful information, whether values, methodologies and/or tools. The list of resources provided herein largely apply to energy efficiency given the years of experience studying efficiency programs impacts – however, much of this information can apply to other DERs. This is not an exhaustive list as it centers on the range of impacts provided in the Study Outline. We encourage DEEP/PURA and stakeholders in this process to identify additional resources relevant to quantifying the value of DERs.

See also the Database of State Efficiency Screening Practices which provides more detail on how other states value impacts in cost-effectiveness testing.[5]

Distribution System Benefits: DERs provide distribution system benefits by reducing demand on the transmission and distribution systems from fossil fuel generation resources though localized energy

[4] NSPM-EE, Appendix C, at pp. 122-123.
[5] Available at https://nationalefficiencyscreening.org/state-database-dsesp/.

resources. This improves reliability of the distribution system, reduces customer costs, and avoids capital investments in transmission and distribution infrastructure.

- The Avoided Energy Supply Components (AESC) in New England (Synapse Energy Economics, 2018) projects avoided costs resulting from energy efficiency through 2035, available from a 2018 study that was sponsored by a group representing all of the major electric and gas utilities, regulators and advocates in New England. It provides a projection of the value of reliability, avoided T&D costs, emissions of CO2, and other fuels.
- Non-Wires Alternatives: Case Studies from Leading U.S. Projects (SEPA, 2018)

The Value Proposition for Cost-Effective, Demand Responsive-Enabling, Nonresidential Lighting System Retrofits in California Buildings (California Energy Commission, 2019)

- On **Risk and Reliability:**
  - Avoided Energy Supply Components in New England: 2018 Report (Synapse Energy Economics et al, 2018)
  - Estimating the Value of Lost Load (London Economics International, LLC, 2013)
  - Valuing Lost Load: How the Economics Have Changed (Bodell, 2017)
  - The Role of Energy Efficiency in a Distributed Energy Future (ACEEE, 2018)

Macroeconomic benefits: Macroeconomic benefits include market system benefits and impacts that more broadly impact GDP and economic performance, such as job creation. Macroeconomics can include the direct and indirect economic effects of DERs. It is important to consider how the macro level impacts intersect with micro (decision-making) and meso (sectoral) level impacts.

- The Illinois Stakeholder Advisory Group (IL SAG) includes a non-energy impacts working group which is discussing valuation methodologies for non-energy, including macroeconomic, impacts. In 2019, they aim to publish a report following discussion of the planned job methodology for economic impact studies, and review and discussion of preliminary research results for the Ameren Illinois and ComEd evaluators 2018 non-energy impacts studies and economic impact studies.
- ACEEE State Policy Toolkit: Guidance on Measuring the Economic Development Benefits of Energy Efficiency (ACEEE, March 2019)
- Clean Energy Jobs America report (E2, 2019)

Resilience: Resilience identifies the ability to recover quickly during and/or after a difficult time. DERs provide resilience impacts by enabling a distribution system to withstand or recover from extreme weather events by deploying energy efficiency, microgrids, solar PV, energy storage, and other DER technology. This can include avoided restoration costs by preventing power disruption and quickly restoring power when an outage does occur.

- The Value of Resilience for DERs: An Overview of Current Analytical Practices (NARUC, 2019)
- Quantifying and Monetizing Renewable Energy Resiliency (NREL, 2018)

Health Benefits: DERs have a direct impact on health by lowering energy waste levels and the need to burn fossil fuels, which reduces criteria air pollutants and greenhouse gas emissions. This then reduces health impacts from pollution, including improving air quality, avoiding illnesses and premature death, and helping to mitigate climate change.

- Public Health Benefits per kWh of Energy Efficiency and Renewable Energy (EPA, 2019)
- Environmental Benefits Mapping and Analysis Program - Community Edition (BenMAP-CE) (EPA, 2019)

- CO-Benefits Risk Assessment (COBRA) Health Impacts Screening and Mapping Tool (EPA, 2018)

Non-emissions Environmental Benefits: Non-emissions environmental benefits include outdoor air quality, water quality, land use, and wildlife. Deploying DERs reduces criteria air pollutants and greenhouse gas emissions, which have local and regional effects on air, water, and land uses, and can strengthen the health of ecosystems.

- Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy (EPA, 2018)
- The Climate and air quality benefits of wind and solar power in the United States (LBL, 2018)
- AVoided Emissions and geneRation Tool (AVERT) (EPA, 2018)
- State and Utility Pollution Reduction Calculator Version 2(SUPR 2) (ACEEE, 2016)

Other studies with information on multiple societal impacts:

- Quantifying the Multiple Benefits of Energy Efficiency and Renewable Energy (EPA, 2018)
- Capturing More Value From Combinations of PV and Other Distributed Energy Resources (RAP, 2019)
- Non-Energy Impacts Approaches and Values: an Examination of the Northeast, Mid-Atlantic, and Beyond (NEEP, 2017)
- BCA for DER (Synapse 2014)
- Massachusetts Special and Cross-Sector Study (NMR Group, Inc., 2011)
- Program Administrators of Massachusetts Non-Energy Impact Framework Study Report (Tetra Tech, 2018)
- Analysis of the Public Health Impacts of the Regional Greenhouse Gas Initiative, 2009-2014 (Abt Associates, 2018)

Other impacts: Other DER impacts, the values of which have not been extensively researched but are relevant to resource valuation, include: energy security, equity, affordability, and impacts on other fuels. While these impacts may be harder to quantify, they exist and should not be excluded from the study. There are methods for including hard to quantify impacts, such as the establishment of an "adder." Adders are typically used to describe a factor applied to quantify impacts for various reasons, such as cases where the impact is difficult or costly to monetize, as well as when it is convenient to bundle multiple impacts into one factor.

Recommendations on Use Cases

Use cases should consider both residential and C&I examples, and a mix of DERs that we see increasingly being integrated or combined in homes and buildings, such as energy efficiency, demand response, rooftop PV and storage. Because energy storage is an emerging area of technology and potential deployment, we identify a set of use case considerations for DEEP/PURA.

BTM and FTM storage are important use cases to study and have been shown in other states to have a large amount of cost-effective storage potential. BTM and FTM storage are also likely to be used and dispatched differently based on the type of meter they're behind (BTM) or whether they're paired with solar as well (BTM and FTM). Therefore, in order to get meaningful results, the study should also include:

1. Residential BTM storage

2. Residential BTM solar+storage
3. C&I BTM storage
4. C&I BTM solar+storage
5. FTM storage (merchant)
6. FTM solar+storage (merchant)
7. FTM storage used at utility substations (e.g., as a NWA asset)

- For storage resources, the study should consider various duration lengths (e.g., 1, 2, 4, and 8 hours) to determine the ability of various dispatch durations to maximize cost savings.
- For the C&I use cases, the study should choose a 'representative' commercial and industrial customer/load profile to model, and should describe how differences in load profile among C&I customers would lead to different findings/outcomes.
- For grid-connected storage resources, the study should look at options for integrating excess generation from offshore wind resources to maximize the benefit of the state's investment in offshore wind, and an analysis of what the state's least-cost options are to achieve this.

We appreciate the opportunity to provide these comments in an effort to ensure a robust and comprehensive valuation analysis.

Respectfully submitted,

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CERTIFICATE OF SERVICE

I hereby certify that on this day, the foregoing document was filed with the Public Utilities Regulatory Authority, and copies of the foregoing were served upon each person designated on the Authority's official service list in this proceeding in accordance with R.C.S.A. § 16-1-15.

Dated: September 18, 2019

Respectfully submitted,

/s/ Charles J. Rothenberger

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