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NY Climate Action Council Draft Scoping Plan

Comments of Herb Schrayshuen

Herb Schrayshuen is an electric power engineer located in the Syracuse area. He offers the following background and comments for consideration by the Climate Action Council (CAC) in the development of its final Scoping Plan.

The CAC Draft Scoping Plan briefly mentions various technical challenges related to intermittent renewable resources. Typically, the Draft Scoping Plan's remarks focus on the intermittent nature of the output of these resources due to wind or solar energy source variability. The CAC draft scoping plan does not offer enough information to address the seriousness of the demonstrated risk to resilience and reliability related to an already identified systemic reliability issue related to renewable resource control systems performance.

Recommendation: A more detailed technical investigation should be added to the draft scoping plan to address the reliability risks introduced by current technology renewable resource inverter control systems. The CAC's scoping plan must recognize that its heavy dependence on renewable resources will involve significant changes to power system generating device control systems. That acknowledgement can start with identifying the documented and known control system related risks along with the current lack of knowledge on how to mitigate the control system related reliability risk. The reliability risk will be intensified through the Draft Plan's proposed expansive application of current technology inverter-based systems unless addressed. **A literature review which includes the work of NERC and others in this field would be a good start for inclusion in the final CAC Scoping Plan document. There should then be recognition of the issue and specific proposed actions to mitigate the known systemic reliability risk in the CAC's final Scoping Plan.**

Demonstrated Reliability and Resilience Risk of current inverter-based control systems

The performance and resilience risks are amply demonstrated in the numerous events analysis reports by the North American Electric Reliability Corporation (NERC)¹.

For example, I call to the CAC's attention the most recent NERC Events Analysis report issued this month, in April 2022, regarding multiple Solar PV disturbances in the California ISO operating area during June, July, and August of 2021. The report identifies only the most recent in a long series of renewable resource related performance shortfalls during routine system disturbance events². Note that there have been numerous other similar events analyzed by NERC in prior periods.

NERC analyzed the four 2021 disturbances. They involved widespread and substantial reductions of solar photovoltaic (PV) resource output after what should have been routine tripping and recovery of power system elements through protection system operation. In aggregate the during the four events more than 2,300 MW of capacity we lost post disturbance. NERC has characterized these renewable control systems limitations as systemic reliability issues. The key findings and recommendations are made available to industry stakeholders and policy makers (such as the CAC) by NERC for increased awareness and for further action, as a step toward assuring that a continued workable system evolves from the public policy processes such as the Climate Action goals.

¹ NERC is the regulatory authority certified by the Federal Energy Regulatory Commission, to create track power system performance, provides resource adequacy assessments and create and enforce mandatory reliability performance standards for power systems. (www.NERC.com)

² Other major NERC Events Analysis Reports can be found at : <https://www.nerc.com/pa/rrm/ea/Pages/Major-Event-Reports.aspx>. Many of these reports involve renewable resources controls and operating parameter limitations.

I call the CAC’s attention to this line of work for inclusion and consideration in its final Scoping Plan. This is a reliability risk that must be addressed in New York if the decarbonization plan is to be successful. The ongoing widespread reduction of solar PV resources, following what should be routine power system disturbance events, continues to be a notable unresolved reliability risk to the power system performance. This is particularly concerning when combined with the reported additional simultaneous loss of distributed renewable generating resources on the distribution system (DER) as shown in the report. Both utility scale and DER PV solar are key technologies proposed in the draft CAC Scoping Plan.

The most recent NERC report contains the analysis of four recent Bulk Power System Disturbances resulting in widespread reductions of solar PV output that occurred in the California Independent System Operator (CAISO) footprint between June and August of 2021. The report identifies both utility scale and DER renewable resource losses as shown in the table below. These loss of renewable generating resources occur because the inverter systems are typically employing grid following (not grid forming) control systems³. There are other renewables/inverter controls related issues such as inconsistent data, unvalidated models & protection settings, all of which are recognized by NERC with recommendations for remediation under development.

While the draft scoping plan briefly mentions smart inverters (page 161), this reference is not adequate to create an actionable plan to deal with this issue. Smarter inverters can be programmed to be smart, but that takes knowledge and acceptance of what the control programs should be telling the inverters to do when the power delivery system is disturbed.

The most recent NERC event analysis report on this topic may be found at this link:

https://www.nerc.com/pa/rrm/ea/Documents/NERC_2021_California_Solar_PV_Disturbances_Report.pdf

A summary of the reliability and resilience impacts of the four most recent disturbance events analyzed by NERC in its report is tabulated here:

Table ES.1: Overview of Disturbances		
Disturbance and Name	Initiating Fault Event	Description of Resource Loss*
June 24, 2021 "Victorville"	Phase-to-Phase Fault on 500 kV Line	Loss of 765 MW of solar PV resources (27 facilities) Loss of 145 MW of DERs
July 4, 2021 "Tumbleweed"	Phase-to-Phase Fault on 500 kV Line	Loss of 605 MW of solar PV resources (33 facilities) Loss of 125 MW at natural gas facility Loss of 46 MW of DERs
July 28, 2021 "Windhub"	Single-Line-to-Ground Fault on 500 kV Circuit Breaker	Loss of 511 MW of solar PV resources (27 facilities) Loss of 46 MW of DERs
August 25, 2021 "Lytle Creek Fire"	Phase-to-Phase Fault on 500 kV Line	Loss of 583 MW of solar PV resources (30 facilities) Loss of 212 MW at natural gas facility Loss of 91 MW at a different natural gas facility

The loss of output from both utility scale and DER resources as tabulated above is a significant indicator of the reliability and resilience consequences from renewables dependence if not addressed.

³ For more detail on grid following vs. grid forming inverters see the following ESIG report: "Grid-Forming Technology in Energy Systems Integration" Link: <https://www.esig.energy/wp-content/uploads/2022/03/ESIG-GFM-report-2022.pdf>

A comprehensive table of mitigating actions in the disturbance area and the status of those actions begins in Chapter 5 on page 30. The appendices provide detail review of performance on a plant-by-plant basis. The CAC is invited to review this material in detail noting which actions might be applicable in New York.

Conclusion

The final Climate Action Council Scoping Plan needs to similarly consider the state of knowledge and related activity in New York regarding the changes needed in inverter-based resource control systems. This is a well-documented but unresolved problem in many areas of the country. The speed at which it is going to be remediated is unknown. For the New York Climate Action Plan to be successful, the final version of the Scoping Plan needs to devote some significant attention to this topic.

In my opinion this issue deserves the CAC members attention and action in the final Scoping Plan. The success of the decarbonization plan as proposed depends on it . The issue should not simply be delegated to the NYISO, the NYPSC and the DPS staff without CAC direction through its final Scoping Plan.

Thank you for your thoughtful attention, consideration and hopefully amendment to the Draft Scoping Plan to deal with this important technical impediment to achieving the New York legislature’s environmental and power system reliability goals. Without your attention and action, this reliability risk may go unaddressed, to the long-term detriment of New York’s electricity customers.

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Comments were summarized and delivered verbally at the Public Hearing on the CAC Draft Scoping Plan in Syracuse, NY