

**Maryland Power Plant Research Program**  
**100% Study, Working Group Meeting**  
**August 25, 2021**  
**Notes**

Presenters

- Fred Kelley, Power Plant Research Program
- Kevin Porter & Rebecca Widiss, Exeter Associates, Inc.
- Aditya Choukulkar & Brianna Cote, Vibrant Clean Energy

Participants

- Abigail Sztein, American Forest and Paper Association
- Alex Pavlak, Future of Energy Initiative
- Amanda Best, Maryland Public Service Commission
- Andrew Gohn, American Clean Power Association
- Andrew Kays, Northeast Maryland Waste Disposal Authority
- Anne Grealy, FirstEnergy
- Bill Fields, Maryland Office of People's Counsel
- Bob Reeping, FirstEnergy
- Bob Sadzinski, Maryland Department of Natural Resources
- Babatunde Idrisu, Maryland Energy Administration
- Brian George, Electric Power Supply Association
- Bruce Burcat, Mid-Atlantic Renewable Energy Council
- Caitlin McDonough, Harris Jones & Malone, LLC (PJM Power Providers Association)
- Cassie Shirk, Maryland Department of Agriculture
- Chris Beck, Maryland Department of the Environment
- Chris Ercoli, Brookfield Renewables
- Christine Csizmadia, Nuclear Energy Institute
- Colby Ferguson, Maryland Farm Bureau
- Devon Dodson, Maryland Department of the Environment
- Eric Bannerman, Prince George's County Office of Central Services
- Felicia Bellows, Competitive Power Ventures
- Janet Christensen-Lewis, Kent Conservation and Preservation Alliance
- Jennifer Aiosa, Baltimore County Office of the County Executive
- Joey Chen, Maryland Public Service Commission
- John Quinn, BGE
- Julian Silk, Adjunct Professor
- Kathleen Robertson, Sol Systems
- Matt Litchfield, Competitive Power Ventures
- Maurice Simpson, Exelon Corp.
- Ryan Opsal, Maryland Energy Administration
- Sharon Theodore, Electric Power Supply Association
- Stu Widom, PJM
- Travis Kavulla, NRG Energy
- Matt Hoyt, Exeter Associates, Inc.
- Unidentified Call-in Users

## Agenda with Notes

### Study Overview – Fred Kelley, PPRP

- The process will take place over the next year and will be iterative.
- The role of the workgroup is to provide feedback on the studied scenarios, sensitivities, etc.

### Workplan & Schedule – Rebecca Widiss & Kevin Porter, Exeter Associates

- There are three initial scenarios: Base case with the current 50% Maryland RPS, 100% RPS by 2040, and 100% clean energy by 2040. The sensitivity scenarios identified are just initial ideas; the working group will have an opportunity to provide feedback after the initial models are complete.
- Question:
  - *Alex Pavlak:* Are we talking about 100% renewables, 100% RPS, or 100% clean energy? Every project needs a boundary. What are we studying as part of this effort?
    - *Kevin Porter:* 100% RPS based on the CEJA of 2019, assuming ramp up in 5% increments from 2030-2040. All the eligibility requirements in the current Maryland statute will be carried over. We are aware of possible sensitivity that looks at 100% of renewables inside Maryland, or related.
  - *Alex Pavlak:* Regards this as a fundamental issue; the challenge will be looking at 100% renewables inside Maryland, or if other states take action, then high levels of renewables in PJM. Perhaps we should ask the General Assembly to clarify their intent. Assuming CEJA is the boundary of the study, that limits what the study looks at. Because Maryland accounts for ~7% of electricity sales in PJM, meeting a 100% RPS in Maryland with eligibility from resources in and outside of PJM is relatively easy. It requires fundamental assumptions about what everyone else in the PJM system is doing. This is not something we should gloss over.
    - *Kevin Porter:* One sensitivity is to look at 100% renewables physically inside Maryland. Another possible sensitivity is a high renewables requirement in PJM more broadly. For purposes of determining a starting place, though, we're assuming CEJA and ramping up for the RPS part of the study.
- Question:
  - *Janet Christensen-Lewis:* When assessing cost-benefits, will you look at the impact on consumer rates?
    - *Rebecca Widiss:* We have done so in past RPS studies. We will likely do so by extrapolating from the models. We will check and make sure this is considered as part of the study.

## VCE Model – Brianna Cote & Aditya Choukulkar, VCE

- Intention is to apply the WIS:dom P model, which is a capacity and production cost model.
- Question:
  - *Erica Bannerman*: How is utility-scale defined by generation capacity?
    - *Aditya Choukulkar*: Utility scale is anything connected to 69-kV transmission or above. When it's not clear, VCE relies on size of the system to determine whether it's utility scale or distributed generation.
- Question:
  - *Julian Silk*: How are microgrids considered?
    - *Aditya Choukulkar*: VCE can tweak the distribution system optimization to make the model think of it as microgrids.
- Question:
  - *Alex Pavlak*: How are the system models validated? Will the VCE model be applied to actual load to assess accuracy? In looking at other models, my belief is that they are validated to a level usually associated with engineering models.
    - *Aditya Choukulkar*: We validate every aspect of the model. VCE validates production against actual wind production, for example. Every modeling exercise starts with a validation as well; VCE starts by recreating 2020 with existing generation and transmission as it was then. Every model has to first recreate the starting period. After that, it marches forward.
  - *Alex Pavlak*: Please share validation documentation.
    - *Aditya Choukulkar*: We will send validation details to the group. VCE's models have to satisfy not only load requirements, but also load following and ensure no loss of load.
- Question:
  - *Janet Christensen-Lewis*: What other land use applications are considered?
    - *Brianna Cote*: VCE can provide a list.
    - *Aditya Choukulkar*: Other examples include set-back considerations, slope, radar areas, etc. The model is generally conservative when looking at what areas are leftover.
- Question:
  - *Fred Kelley*: Is there anything removed that is particular to Maryland (in terms of land)?
    - *Brianna Cote*: As of now, no. It's just a broader list.
- Question:
  - *Janet Christensen-Lewis*: I'm particularly interested in local zoning ordinances.

- *Brianna Cote*: Those are accounted for, to some extent, by examining population. But VCE can account for additional criteria.
- Question:
  - *Julian Silk*: Is there an option to consider the effect of drought on hydroelectric production?
    - *Aditya Choukulkar*: Precipitation is one of the factors taken into consideration and is used as part of the hydro model.
    - *Brianna Cote*: VCE also uses annual production profiles that account for real-time grid response to various conditions.
- Question:
  - *Jen Aiosa*: Is there potential to consider things like avoiding “prime forests” or “farmland.” Can the work group recommend scenarios that look at the impacts of excluding certain land types? This would facilitate conversations about where we do or do not want to build energy resources to meet Maryland’s energy goals.
    - *Kevin Porter*: PPRP does have a Smart DG tool that screens sites for possible wind and solar projects. There is certainly some overlap for what’s in there and what’s in VCE’s model. We will make sure they’re in sync. What we can do is come back and show to working group where projects might be sited for purposes of commentary. Note, again, that we’re limited in terms of the number of scenarios we can run. Our focus is on the feasibility of meeting the 100% RPS. We recognize that land use is a pivotal issue. But siting will be out of scope to some extent.
    - *Aditya Choukulkar*: Forest land is removed from possible siting, but agricultural land may need to be reviewed. It’s possible to account for a variety of potential constraints as provided.
- Question:
  - *Joey Chen*: Do the transmission line rating and losses take into account PJM’s regional-level transmission line planning? (To the extent that there are projects that would improve efficiency).
    - *Aditya Choukulkar*: VCE uses average line ratings from IEEE standards. It is not fine-tuned for PJM specifically. What PJM is doing might already account for some transmission. We ensure that we don’t exceed design constraints, though.
  - *Fred Kelley*: How does the model account for the expansion of PJM’s transmission system?
    - *Aditya Choukulkar*: The model does account for expansion, but it’s not calibrated specifically to PJM. Any expansion will be treated the same.
    - *Kevin Porter*: What I hear being asked is: are we going to incorporate the latest PJM-planned upgrades from the PJM RTEP process? The answer is yes. It would be the baseline upgrades in the RTEP, not the economical efficiency upgrades that should be modeled, right? (Question to Fred and Joey)

- *Fred Kelley*: Whatever is reasonable should be used, as long as it accommodates PJM transmission planning. Certainly, there would be more model specificity tied to the RTEP process.
- *Joey Chen*: Not sure about whether to include economic efficiency projects. In the broader scheme, I want to account for PJM transmission build-out.
- *Aditya Choukulkar*: The model can account for any planned transmission upgrades. In its default state, it evaluates transmission in every investment period based on planned generation. It assesses whether to build generation in a more optimal location or closer to load. The model is co-optimizing a variety of impacts. All transmission is modeled as new build (which is a conservative approach).

### Assumptions and Key Inputs – Kevin Porter, Exeter Associates

- One goal of the meeting is to run these assumptions by the group and get feedback about their applicability.
- Exeter will take comments until September 8.
- Question:
  - *Chris Ercoli*: I want to confirm that the existing target is actually 52.5%—Tier 2 is separate, not included.
    - *Kevin Porter*: We were actually not sure.
    - *Andrew Gohn & Chris Ercoli*: I can confirm that it's 52.5%.
- Question:
  - *Julian Silk*: How does storage work in the model? (Question asked before the call)
    - *Aditya Choukulkar*: The model optimizes storage for its capacity and energy. It models charging and discharging. The model co-optimizes on these considerations.
    - *Brianna Cole*: VCE doesn't assume a storage duration—it lets the model decide which duration is best.
- Question:
  - *Alex Pavlak*: Why NREL data instead of using EIA data? I think the NREL data is optimistic.
    - *Kevin Porter*: We've heard the opposite—that the NREL data is a little conservative. The NREL numbers appear reasonable to us.
    - *Brianna Cole*: VCE has used EIA numbers for a past study. Those costs are not drastically different. The numbers are in the ballpark of each other.
- Question:
  - *Janet Christensen-Lewis*: Which costing are you using from the NREL report? There are capex and overnight costs which also depend on what division you're in.

- *Brianna Cole*: VCE assumes a certain class for resources with the aim for a middle range. For solar, for example, there isn't variation between classes. VCE uses overnight capital costs.
- Question:
  - *Chris Beck*: The GGRA calls for a minimum 40% reduction, and Maryland's proposed plan will amount to a 50% reduction. I would prefer to use 50% as the assumption (as is consistent with other studies).
  - *Kevin Porter (to VCE)*: Can we represent this as a binding constraint (instead of non-binding)?
    - *Brianna Cole*: Yes.
- Question:
  - *Julian Silk*: What percent of energy is met by Calvert Cliffs in the model runs?
    - *Kevin Porter*: We have not yet run the reference case and do not yet know.
  - *Alex Pavlak*: In terms of basic feasibility, we're not giving enough attention to nuclear power. We need a 100% scenario with small modular reactors (using international numbers for cost). These scenarios could account for SMR compatibility with intermittent resources.
    - *Kevin Porter*: SMRs are eligible within the CARES Act. We will run the model and see what results come back in terms of SMR deployment. We can consider an all-nuclear scenario. Note, again, that the budget supports a limited number of scenarios.
- Question:
  - *Janet Christensen-Lewis*: There are many things that are technically feasible, but their actual implementation in the future is less clear than what the model may indicate. There should be feasibility considerations.
    - *Kevin Porter*: Okay.

#### Next Steps – Fred Kelley, PPRP

- Question:
  - *Joey Chen*: Is the solar carve-out based on the RPS statute? (Slide 39)
    - *Kevin Porter*: The numbers here are based on the bill from this past 2021 session, not the CEJA.
- Question:
  - *Alex Pavlak*: What's the ratio of scenarios between the 100% RPS and 100% clean energy scenarios?
    - *Kevin Porter*: It's not determined. We will come back to the group with sensitivity scenarios, but the two are linked and scenarios will likely need to overlap.