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Written testimony

NEW BILL TITLE:

Sustainable Energy Portfolio Standard

NEW GOAL:

Net-zero, energy independent Maryland (no date)

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Where's the Vision for Maryland Net-Zero?

In 2022, the Maryland General Assembly passed the Climate Solutions Now Act, committing the state to "net-zero by 2045." It sounds firm, righteous, and vaguely scientific. But what does it mean exactly?

"Net-zero," as defined by the International Panel on Climate Change, is a global emissions concept. It balances greenhouse gas emissions and removals across the entire planet. This makes good sense on a planetary scale, or perhaps on an island with no imports/exports. But Maryland is neither.

Maryland imports roughly 40 percent of its electricity from the PJM regional grid. So, what does "net-zero" mean here? Zero emissions from generators inside the state, while importing power from fossil plants next door? Or zero emissions from the energy that Maryland actually consumes, wherever it is made? The law does not say. This ambiguity is not clever; it is fatal. An fuzzy goal guarantees confused analysis and fantasy schedules.

A sound goal, aligned with the IPCC definition, would be something like this***: a sustainable, net-zero, electricity-independent Maryland***. No date yet. Dates are cheap; systems are not. If Maryland built such a system and it would be compatible with global net-zero. Anything less is accounting theater.

So what does a reliable net-zero system look like?

Maryland has already paid for three 100% studies. All three failed in the same instructive ways. They assumed electricity could be imported and exported across political boundaries at historical prices, forever. Two of them relied on average renewable production rather than hourly dispatch. Wind never goes to zero in those models. None grappled honestly with intermittency and whole-system reliability.

The result is complexity without wisdom, and models that flatter intermittent renewables.

Maryland needs is a professional engineering concept study, a big-picture sketch done by people who understand how power systems work, who have built things before, and who are not emotionally attached to particular solutions. Such a study would not design the system; it would define its structure. It would tell us how much wind, solar, nuclear, and storage are necessary if we insist on reliability. Even simple back-of-the-envelope and spreadsheet models, using historical hourly data, tell a more consistent story.

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PV generation paired with four-hour storage can economically and reliably supply about 15 percent of system energy by smoothing daily ups and downs. Wind helps only when fossil fuels dominate the grid but adds little value to a system that is already clean. The fatal limit for renewables is not ideology; it is intermittency cost and weather.

Every few years, usually in December, the system encounters a Dunkelflaute—an energy drought lasting a week or two, with little wind and little sun. Designing a 100% renewables system that survives those events without blackouts drives costs to five or ten times that of today's fossil system.

These conclusions are unlikely to change with more elaborate modeling. We now have historical wind and solar data going back to 1940, consistent cost databases, and decades of grid experience. Concept models assume perfect transmission and closed system boundaries because we are defining generation technology proportions, limits, boundaries, cost and weather sensitivity, not pouring concrete.

Which brings us to the big picture vision.

A sustainable, net-zero, electricity-independent system would look roughly like this: about 15 percent solar, some form of storage, the remaining 85 percent nuclear. Offshore wind would be politely thanked for its interim service and dismissed. Baseload nuclear does the heavy lifting.

Powering Maryland at today's energy consumption levels would require roughly a dozen large (GW scale) nuclear reactors. The state currently has two. America would need on the order of a thousand; it has ninety-four. This assumes no growth in demand.

Over half of those 1,000 new nuclear plants would be located along US coastlines because that is the economical way to get enough environmentally acceptable cooling.

The near-term policy implications are uncomfortable but obvious:

- Preserve existing power plant sites like Brandon Shores.
- Replace coal with natural gas under transitional ownership structures such as a States owned Power Authority.
- As nuclear technology matures and exclusion zones shrink, convert those gas plants to nuclear.
- And invite data centers—those ravenous, reliability-obsessed creatures—to build their own nuclear plants along the Chesapeake Bay. Nuclear costs more than natural gas today, but data centers can afford the premium and the first-mover risk. In return, they get power they own, control, and can count on—while lowering overall system costs for themselves and the commercial grid.

Maryland does not lack ambition or stubborn persistence. But we are not learning and adapting to new knowledge. Until the State creates a sound vision of the big picture, decides what sustainable net-zero systems actually look like, it will continue mistaking motion for progress.

Dr. Alex Pavlak is a PhD Professional Engineer, Severna Park resident, and the chair of the Future of Energy Initiative, whose mission is to facilitate the development of sustainable, affordable clean energy systems.