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Engineering opposition to SB53

SB53 profoundly conflicts with best practices for engineering development. It does not have a sound purpose. It emphasizes market-based development when best practice is rational planning. It ignores risk. It ignores constraints imposed by the fact that Maryland is part of the PJM system.

The goal is poorly chosen. §7-702(A) (1) states "THE STATE SEEKS TO BE A NATIONAL LEADER IN PROMOTING ELECTRICITY GENERATION THAT EMITS ZERO GREENHOUSE GAS EMISSIONS…" While all clean systems require clean generation, some generators are more useful than others as a component of a reliable system. A better goal is *"Reliable affordable electric power systems with zero GHG emissions."*

Market-based development is naïve. SB53 justifies market-based development to eliminate carbon emissions by the fact that competitive markets have proven effective in driving costs out of the electricity sector. The logical flaw is that intermittent generators are not fungible (interchangeable) with legacy fossil fuel plants. Unlike independent legacy generators, all the wind and solar production on the whole system can go to zero at the same time. Integration is far more complex than simply swapping wind/solar for a dirty generator. To maintain reliability, intermittent generators impose out-of-market costs (transmission, storage, idle backup capacity, sophisticated power management) on the whole system. These costs become large at higher penetration. Whole system design is more fundamental than market design; the professional sequence is to first design the system to perform the desired function (reliable zero GHG), then design a market to provide appropriate incentives.

SB53 ignores risk. Market-based development is useful when the goal is unclear. Software development and human interface problems often have fuzzy goals where it is useful to get early prototypes in front of the customer to discover what the customer really wants. Such market methods (called agile engineering) are useful with inexpensive products and short product cycles because it is easy to fix mistakes (why we have so many versions of Windows). But with electric power, expensive components and long product cycles make it difficult to recover from serious mistakes. Germany today illustrates this risk. Citizens are rebelling at high electricity prices, they refuse additional investment, development stalls and the country becomes stuck with an expensive dirty electrical system for a long time.

Given a clear goal, the proven low-risk methodology is **rational design.** The first step is to create "architectural sketches" to define feasibility. Achieving zero GHG with nuclear is simple because nuclear generators are fungible with legacy generators. The empirical evidence is compelling: all 8 of the largest clean grids in the world are powered by some combination of nuclear and hydro; both France and Ontario have successfully transitioned from high carbon to low carbon using nuclear. In contrast there is no competent evidence of wind and solar as a dominant component of a zero GHG system. Problems with the California and Texas grids demonstrate that we are not yet able to value the reliability of systems with even modest amounts of intermittent generation. The experience of others shows that the simple low-risk solution for Maryland is to do whatever it takes to build new nuclear at Calvert Cliffs.

SB53 ignores PJM constraints – Maryland is part of the 13 State PJM system. The benefit is that PJM, subject to federal regulation (FERC), manages a wholesale market and reliably balances load with capacity resources outside of Maryland. One difficulty is that non-coastal PJM States oppose a system wide zero GHG goal. Another difficulty is that FERC will prevent Maryland from disrupting the system or imposing out-of-market costs on other PJM States (the origins of MOPR).

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