System of Systems Engineering Collaborators Information Exchange (SoSECIE)

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Tilting at Windmills: Drivers, Risk, Opportunity, Resilience, and the 2021 Texas Electricity Grid Failure

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Abstract

To put it very simply, but not at all clearly, the 2021 Texas electricity grid failure was both caused by and not caused by the use of renewable energy. In 2020, 46 percent of Texas's energy was generated by natural gas, coal 18 percent, nuclear 11 percent, and renewables wind power 23 percent, and solar 2 percent. During the winter months when power demand is lowest, renewables can rise to up to 55%. When the historic winter storms hit, the biggest problem was the lack of winterization of all types of generation systems and supporting infrastructure. All the of the systems failed to various degrees. So why weren't these systems winterized? Mostly it was a lack of incentives. The government provided no financial incentives and did not mandate winterization. These winter storms were once in a century event, and companies could not make a business case with reasonable ROI to winterize. Companies that did manage to operate sold power and gas for up to 400% more than normal due to the lack of supply and increased demand. So, there was a built-in disincentive to not invest. What happened was a complex system of systems failure the size and scale of Texas and to explain it all would require a book. This paper will look at the risks, opportunities, and drivers of Texas electric grid, what caused it to fail, and incentives to succeed in the future. We will also examine incentive systems gone wrong such as the Cobra Effect.

Biography

Matthew Hause is a Principal at SSI, a co-chair of the UAF group, the UAF INCOSE representative and a member of the OMG SysML specification team. He has been developing multi-national complex systems for almost 40 years as a systems and software engineer. He worked in the power systems industry for 20 years, then transitioned to command-and-control systems, process control, communications, SCADA, distributed control, Military systems, and many other areas of technical and real-time systems. His role at SSI includes mentoring, sales presentations, standards development, presentations at conferences, specification of the UAF profile and developing and presenting training courses. He has authored over 100 technical papers on MBSE, SoS, UAF/UPDM, etc.