A key challenge in doing effective electric grid research and education is lack of common access by researchers and educators to realistic electric grid models, scenarios, and datasets. Industry often has these models and data, yet because of legitimate considerations much of this information cannot be effectively shared. Over the last few years this need is being addressed through research funded primarily by the US APRA-E on the development of large-scale, realistic, and now highly detailed synthetic electric grids. This talk covers some of the recent developments in this exciting field, including the creation, validation, and application of these grids. Results are demonstrated utilizing synthetic electric grids with many thousands of buses in application areas including transient stability, geomagnetic disturbance analysis, visualization, and coupled infrastructure simulations. The talk also considers how synthetic grids can be used to demonstrate problems faced by industry, helping to develop new solutions to the large-scale, realistic problems faced by industry.