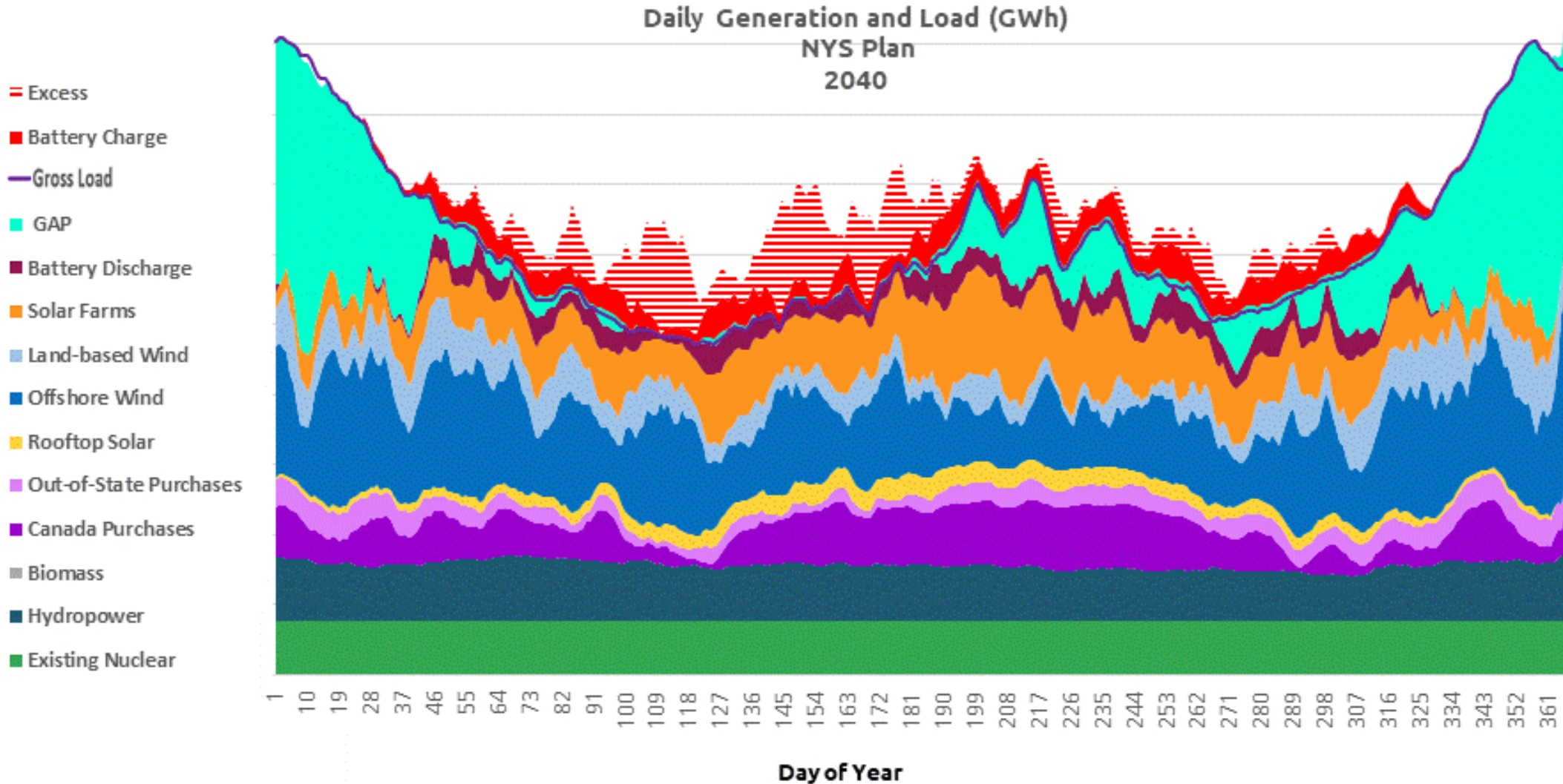


Len Rodberg Comments for Nuclear Symposium (slides attached)

Panel on System-Level Challenges of Decarbonization

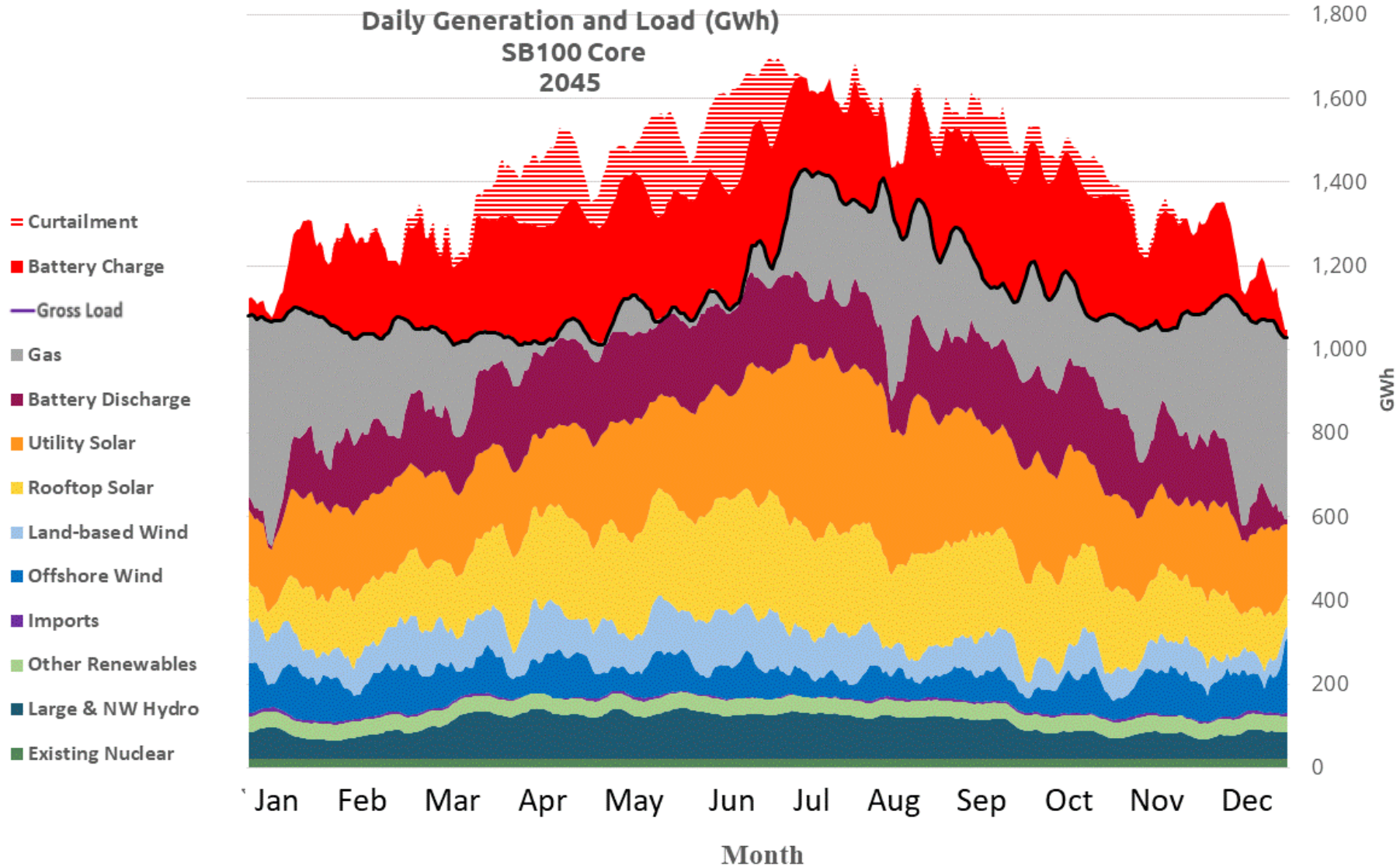
- 1. We should be using models that embody all important features of the energy sources:** A number of states, as well as countries including Germany and others, are planning to use solar and wind, backed up by batteries, as their main power source. They are supported by energy planners who use models (especially what are termed linear programming models) that misrepresent how these sources work. They obscure the fact that these sources are time-dependent, intermittent, and non-dispatchable. The models treat them as if they were always available, firm sources, which they are not.
- 2. 100%-renewable plans leave a giant gap between the grid's demand and the supply. It has to be filled by a firm, dispatchable emission-free resource:** I have applied an hourly dispatch model to the all-renewable plans that New York and California have developed. This shows clearly and transparently the true behavior of these sources on the grid. They leave a large gap between the demand placed on the grid and what they are able to supply. This gap appears not only during multi-day "dunkelflaute" conditions, when the skies are overcast and there is little wind. The gap appears nearly every night, especially in the winter, when the grid is dependent on the wind and batteries alone and the batteries are never fully charged. The result is the burning of gas, as shown in this graph.
- 3. Using nuclear power as the dispatchable emission-free resource as well as for baseload power will provide a reliable, affordable, and sustainable grid:** In the face of the constantly varying demand on the grid and these inflexible resources, a decarbonized grid needs clean reliable baseload, always-on power along with a flexible, dispatchable resource to fill the gap. The most cost-effective and environmentally-protective approach is to use baseload nuclear power as the backbone of the grid, replacing at least 80% of currently-planned utility-scale solar and wind, along with a flexible nuclear plant like the Terrapower Sodium reactor with integrated thermal storage. Such a combination can supply the reliable, affordable, and sustainable power we will need.
- 4. Trying to electrify everything will not work. Using carbon-neutral synthetic hydrocarbons created with nuclear power is a far more practical and affordable way to decarbonize:** Ultimately, attempting to electrify all the ways we currently use fossil fuels fails to take into account the difficulty of persuading every end user, homeowner, and automobile owner to invest in electrifying those end uses. The mineral requirements alone for such a transformation make it unrealistic. Instead, we should be developing systems that have already been demonstrated to use nuclear energy to produce carbon-neutral hydrocarbons from seawater and other natural carbon sources. Such synthetic fuels can replace the fossil hydrocarbons we burn today without requiring the investment of trillions of dollars to electrify every current use of these essential fuels.
- 5. Conclusion:** The electric grid, where most of the focus is today, is responsible for only a small fraction of the greenhouse gases we emit today. The elimination of fossil fuels from the other sectors of our economy is much more difficult and, in my view, can only be achieved by replacing the fuels we burn there, not through expecting end-user consumer choice to achieve the decarbonization we need. And nuclear fission can provide the heat and electricity we need to create these flexible, transportable, energy-dense fuels for the future.

New York's Plan in 2040 according to the Climate Action Council*



* 7-day average smoothing

California's Current Plan for 2045*



* 7-day average smoothing

