Helping Texas Emerge from *The Big Chill* Stronger and Better Prepared

Proposal for an Independent Task Force

February 19, 2021

As Texas emerges from *The Big Chill*, it seems the only truly renewable resources are opinions! If our heat, refrigerator and lights could run on opinions, we'd never run out of free energy. As with all calamities of this magnitude, there are a suite of natural and human contributions that converged to create a systemwide failure. Rather than expend more energy on finger wagging, we would be better served to ask what we can do to improve the situation now, and in the future.

The near term is happening in real time, and there are many individual heroes doing their jobs and offering helping hands to those in need. In the longer-term there will be a spectrum of actions that together can address most of the issues, and likely not require overreaction, major government intervention, or excessive taxpayer-funded expenditures.

To understand what these actions should be, the Governor should appoint an ***Independent Task Force*** (ITF) to assess what happened in Texas during The Big Chill. The ITF would determine circumstances leading to the event and the response, examine the electricity system, identify root causes, and make recommendations.

The ITF should comprise thoughtful, objective individuals representing impacted and engaged stakeholders including policy makers, regulators, local governments, grid operators, the broad energy industry, academics, research organizations and the public. The ITF should set ground rules for civility and non-partisan participation; how to approach the problem; be given a budget and full access to the data they need; focus on practical solutions so as not to wander off into esoteric hinterlands; and set a near-term deadline for completion and concrete recommendations.

The focus of the ITF should be a practical, scenario-based cost/benefit analysis of future options. Scenarios should represent a reasonable range of future energy demand/climate possibilities and levels of appropriate risk and "insurance" against failure. Among other things, the ITF should address the pros and cons of an isolated grid (ERCOT); capacity vs. energy market approaches; scenarios for reliability and durability of infrastructure in extreme cold and extreme heat; how to assure that Texas is prepared; risk/reward; who actually pays; and various structures for assessing costs.

Of secondary interest would be a comparison to what happened in California during extreme heat in the summer of 2000. There are similarities and differences, and understanding these would be helpful.

The Bureau of Economic Geology at the University of Texas at Austin has expertise in many of these areas, works with many of the impacted sectors, and has a century-long reputation as a respected, practical, non-partisan voice. We stand ready to help at the pleasure of the Governor.

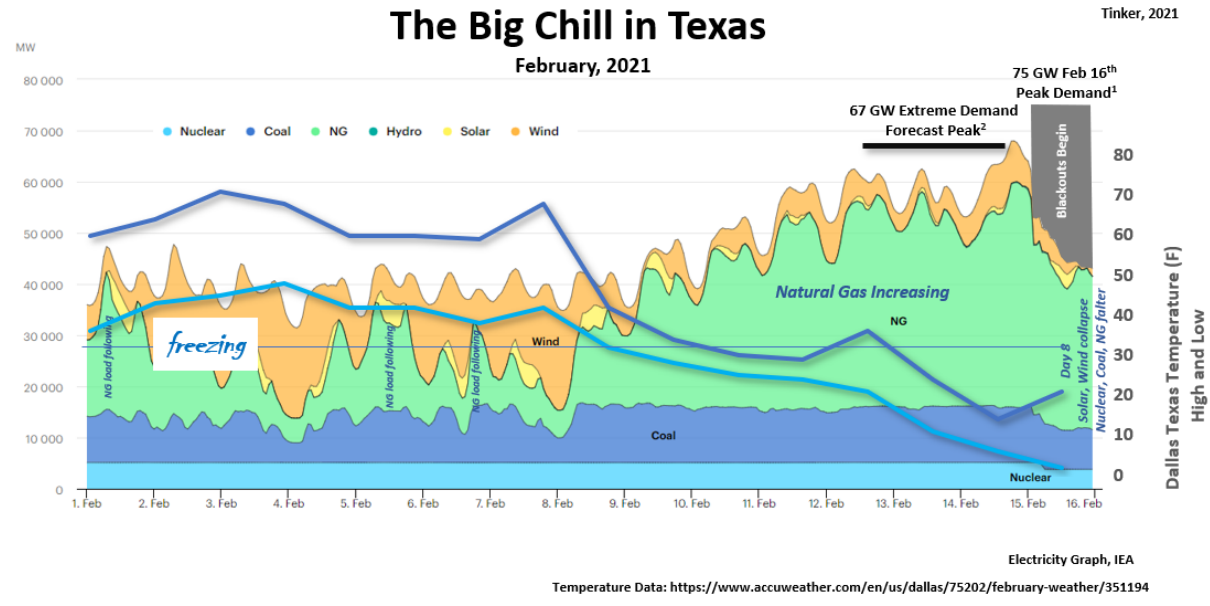
Dr. Scott W. Tinker

Director, Bureau of Economic Geology & State Geologist of Texas
Professor, Allday Endowed Chair**,** UT Austin

Background

Electricity demand in Texas is lower in the winter than the summer (air conditioning). The state has a generating capacity of ~ 67 GW in the winter and a peak capacity of ~ 86 GW in the summer. Wind quality and solar capacity in Texas are always lower in the winter (less wind and less sun), so this is a logical time for scheduled maintenance. This also means wind are solar not available if needed for high energy demand events, like the Big Chill, and as such ERCOT cannot rely on them for real-time balancing.

The fuel generation mix leading into, and in the initial days of, the Big Chill is shown below. On Feb 8th as temperatures fell, demand began to rise for heating and more. As temperatures continued to fall, so did wind and solar, and dispatchable natural gas played a gowing role. By Feb 15th energy *demand* on the state's primary electric grid had surged to ~ 71 GW (71,000 MW). Wind and solar essentially went away, some coal and nuclear went offline owing to issues related to freezing, and natural gas could not sustain, owing to supply constraints and infrastructure issues. Statewide outages became extensive. Feb 17th and 18th (not pictured) look much like Feb 16th and by Feb 19th demand began to decline as temperature warmed, power plants came back on line, and electrcity was restored for most.



[1] U.S. Energy Information Administration ERCOT demand forecast peak of 75 GW

[2] North American Electric Reliability Corp. predicted winter extreme weather event demand peak in ERCOT

Electricity Market

Capacity markets are used in some wholesale electricity markets. Operators are paid to have capacity available to meet peak electricity demand. Capacity is not electricity, but instead the ability to produce electricity when called upon. Capacity market payments cover some of the fixed costs of building and maintaining generating resources. Everyone pays for this excess capacity. Experts are debating the role of capacity markets as the generation mix evolves to larger amounts of renewable and storage resources. By contrast, generators in energy-only electricity markets, like the one used in Texas (ERCOT), rely on energy market price spikes during periods of shortage to cover their fixed costs. Energy market prices have been undercut the last decade as wind and more recently solar resources are added to the market and benefit from federal tax credits, local tax credits, and municipals and coops signing long-term power purchase agreements (PPAs).

Climate Future

Cold-proof natural gas, wind and other infrastructure is more common in northern climates, but retrofitting infrastructure in Texas—from homes, to turbines and solar panels, to oil and gas production and distribution facilities—would be expensive. On the other hand, the possibility of more severe weather events means that we should at minimum consider a broader range of reasonable future climate scenarios. The key is to understand the ambient temperatures that the system is designed for, and consider the probabilities of extreme events in the future (e.g. hurricanes, heat waves, deep freezes and the like). If these probabilities are higher than what we have currently designed for, some preventive/resilience investment may be warranted (probability x cost).

ERCOT and the Electricity Fuel Mix

ERCOT is its own grid and as such has limited connection to outside states. There are pros and cons to this. Owing to a variety of policy and market forces, the fuel mix in Texas has evolved in the past 15 years with a major decrease in coal and increase in wind. Natural gas, coal, nuclear and hydro are dispatchable, meaning they can be reliably turned on and off to meet demand, except when frozen, or in the case of hydro, and water cooling for thermal, during drought. Solar and wind are intermittent (non-dispatchable) meaning they are only there when windy or sunny, and not frozen or covered in snow. They require backup from batteries or power plants that can be called on to respond quickly when the sun and wind go away daily, and for longer periods of time. Natural gas plants are best able to do this.