

There is no doubt that the oil and gas industry in west Texas over the last 100 years has contributed to the development of the towns in this region and has made major contributions to the energy availability and security of the United States. With new technologies the Permian Basin continues to be a major producer. However, this form of energy (fossil fuels) significantly contributes large amounts of CO₂, methane and other volatile organic compounds (VOCs) released into the atmosphere at all phases, i.e., recovery, transport, refinement and the byproducts of the use of these fuels. In addition to some health risks associated with operations, it is confidently hypothesized (based on data derived from multiple investigators) that the addition of CO₂ to the atmosphere at current rates is driving changes in our climate, and may, or has already increased severe weather events. These events are costing the American people billions of dollars. Climate change is not a new phenomenon. Climate has been changing throughout the history of the planet. In the past 500 million years the biota on the planet have experienced 5 major extinctions all of which have rapid climate change as a causative component, the operative word is RAPID, which is often not emphasized or left out of conversation about climate. These observed changes have motivated governments and the people of primarily developed countries to seek alternative energies to ameliorate the effects of fossil fuels. I think it is prudent of the United States to develop these alternate energy sources with the result to diversify our energy portfolio, not eliminating any one form of energy, but not making any one form of energy excessively important. This is the most strategic way to protect the energy grid and is a good strategic move in a hostile world.

The Permian Basin primarily known for supplying a major portion of America's energy, will remain so in this new paradigm that is emerging for at least the next 50 years. It is no secret that West Texas is also an ideal environment for the production of alternative energy, i.e., solar, wind energy and hydrogen fuels. I believe if rational and cooperative investment in the development of all forms of alternative energy will not only diversify our energy portfolio, but continue the long tradition of west Texas as the major source for America's energy needs. I think to develop a sustainable energy plan for the future in this region and to maintain its value to our energy needs, I would recommend the following;

- 1) In a partnership with industry and government we need to continue to invest in developing technologies that will ameliorate the large amounts of CO₂, methane and other volatile organic compounds (VOCs) released into the atmosphere at all phases of oil and gas production, i.e., recovery, transport, refinement and use. Industry and Academic are already engaged in efforts to remediate some of the environmental issues, e.g., Carbon Capture Utilization and Sequestration (CCUS), hydrogen fuels and fuel cell technology Industry is also partnering with academics to explore ways of cleaning produced water to minimize the need for injection wells and minimize low grade earthquake damage. All of these efforts by industry and academics needs to be consistently invested as long as fossil fuels remain the primary energy source (See Figures 1 and 2)
- 2) Because of the nature of rise and fall of the price of a barrel of oil many towns in west Texas that are only dependent on this industry take on characteristics of a boom-and-bust economy, and woefully lag behind communities in other parts of Texas and the United States that have a more diverse and reliable tax base. This also leads to a large number of

itinerant workers living in temporary housing (trailer parks, RVs and “man camps”) many of which are not regulated for disposal of human waste and are hosted on dusty, barren lots. These are reminiscent of the workers camps associated with coal mining in the early part of the 20th century. Itinerant workers and their families change the effectiveness of funding that was intended for the more permanent population with regard to education, health and welfare. Investment should not be primarily focused on the oil and gas industry. Many companies have been effective yielding large profits for their investors, but focus the investment on creating permanent infrastructure in the communities of the Permian Basin, improving schools, roads, creating parks and walkable communities, supporting a variety of programs to enhance entertainment in these communities and e.g., summer programs to help children be more successful in school and specialized programs for immigrants families. Industry operations should be relegated exclusively beyond the borders of the town. This would be for aesthetic, health, and safety reasons.

- 3) There should be investment in providing help to these communities to better zone and plan their rural communities to be more beautiful and pleasant communities to live in, this often attracts other businesses and people to become permanent residents in the community.
- 4) Provide funding to communities to seek out other energy industries or tangential industries to diversify the jobs available in the region. This would ameliorate the effects of the oil and gas boom and bust cycles. This will also diversify the skills of their work force and may attract unrelated industries to the area in which the workers skills are transferable, further diversifying and stabilizing the communities tax base.

It is not the companies that need your help or attention they have comfortably made significant amounts of money. Although these companies have supported many, if not all of the families in a direct or indirect way, very few have reinvested in the communities at a level that makes these communities aesthetically pleasing, safe and healthy environments for the people that support those industries.

Michael S. Zavada, PhD

2/17/2023

I would like to thank Drs. Robert Trentham (Petroleum geologist), Miles Henderson (Environmental Geologist and Sumit Verma (Geophysicist) for their thoughtful input into this discussion.

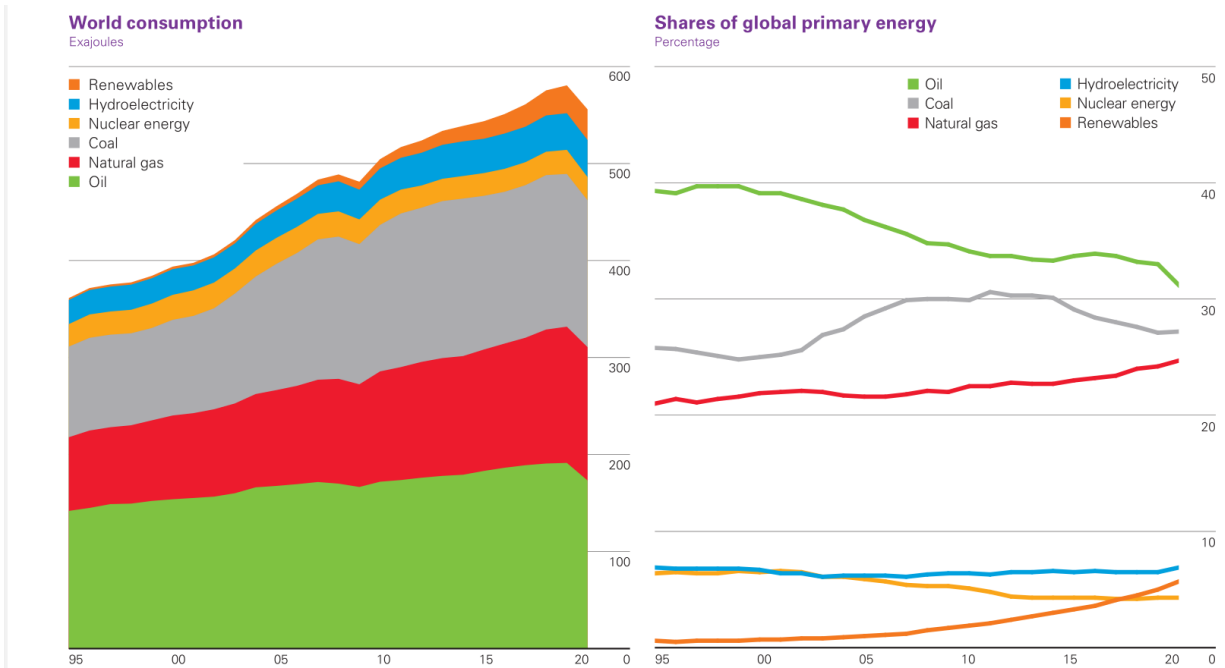


Figure 1. Showing the world consumption of energy sources and the percentage shares of global primary energy for years 1995-2020.

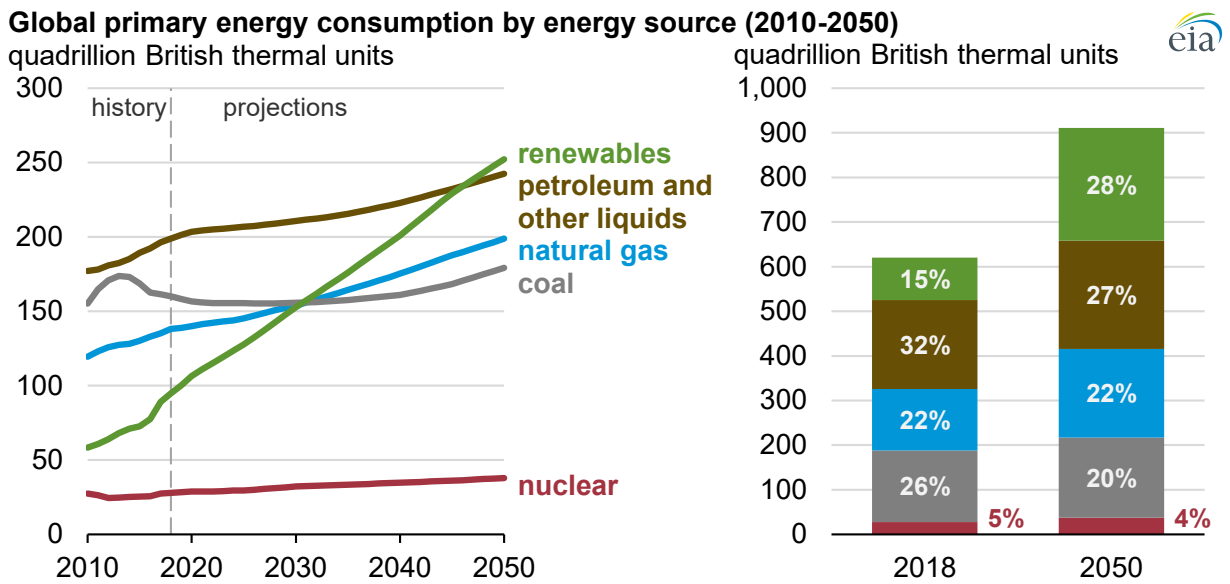


Figure 2 Consumption by energy source.