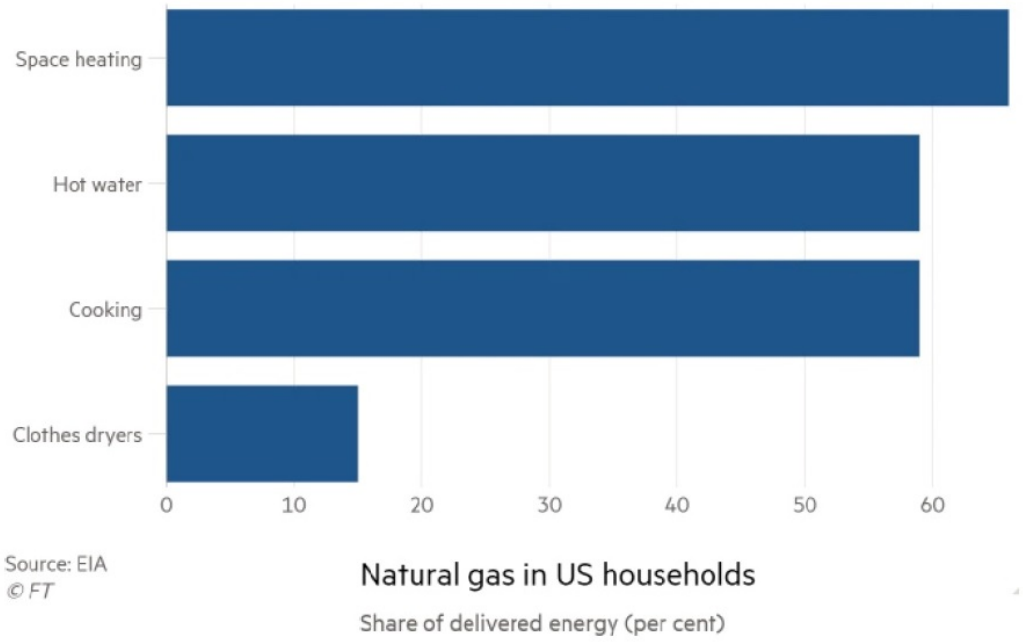
Natural Gas Revisited (Again)

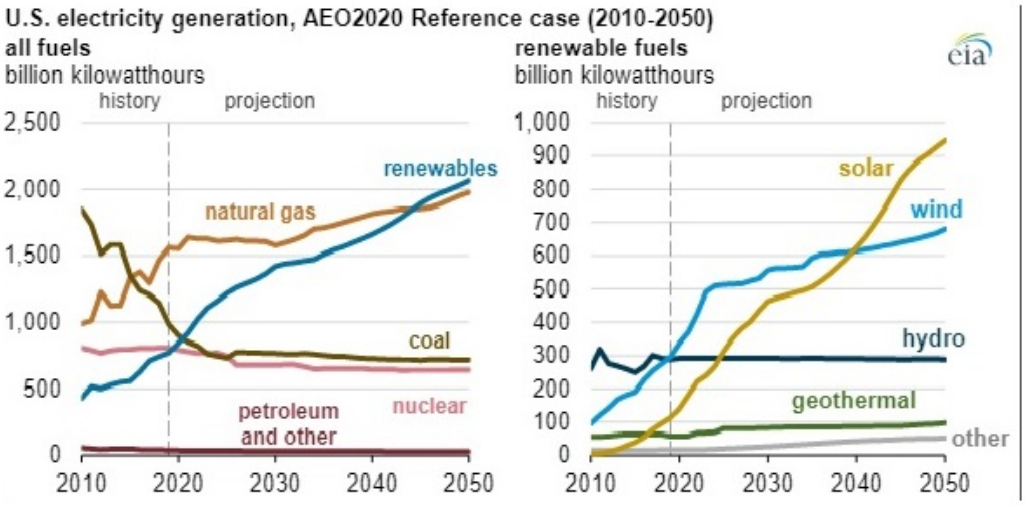
I haven't taken an extended look at the many ins and outs of natural gas for a good long while. It's a bloody **big** topic. But let me preface this by first quoting Amory Lovins, the maestro of the "soft energy path." I heard him speak at an event over ten years ago. What he said then still reverberates in my psyche: "The 'renewables revolution' has been won. Sorry if you missed it." There is no doubt, at this late date, that solar and wind and the array of other modern renewables, along with energy efficiency, sustainable mobility, and other clean tech are well and truly burgeoning. The numbers don't lie.

Another quote from Lovins is that most people don't really care where their energy comes from, they just "want hot showers, cold beer, comfort, mobility, illumination."

This brings us to natural gas. When you take a shower, do you think about what's heating the water? I do. It turns out, you may not be surprised to learn, that nearly 60% of that hot water, in the US, overall, is being heated by natural gas.



For cooking, as you can see, we're today also highly dependent on gas, and for space heating, even more so. And that cold beer? Your refrigerator runs on electric power and, as of today, the preponderance of our electricity is being generated by gas.



Is that going to change? Yes, as Amory Lovins told us way back when, and as all the indicators, including the conservative estimates of the Energy Information Administration of the US Department of Energy report. Renewables in power are going to eclipse fossil fuels and nuclear and may well do so at an accelerated pace. And not just in the US but across the globe. That is what more and more utilities and investors think and what environmentalists have been pushing for decades. (See also *The Great Transition* from the legendary Lester Brown, as well as data and analysis from IRENA, IEA, BNEF, and REN21, among others.) "The

'renewables revolution' has been won."

Meanwhile, the rapid diminishment of coal in US power over the past ten years, replaced to a large extent by gas, has meant lower carbon dioxide emissions. Wind, solar, and much greater efficiencies in industry and domestic energy use, as well as in transportation, have all been important factors, but the single-biggest driver, has been fuel switching in the power sector from coal to gas, accounting for 33% of the emissions reduction. **Yes**, there are leaks from getting gas out of the ground, transporting it, and processing it, especially as the industry has been accelerating so rapidly due to hydraulic fracturing ("fracking") and horizontal drilling of shale gas deposits. That is why we have such a high volume of "fugitive emissions" of natural gas, and those emissions have been boosting, no surprise, the greenhouse gas footprint of gas. It's a critical concern – without question – and I will return to it, but for the moment I want to continue to look at some more of the positives.

Yet-another aspect of the value of gas can be seen in the deployment of combined heat and power (CHP) installations. CHP is sometimes also known as cogeneration. There are more than 4½ thousand of these facilities across the US, with more than 80 gigawatts of capacity. (See the breakdown here.) These smaller power plants are highly efficient, much more than the big thermal power plants that generally are only about 33% efficient. That's right, in most power production, two thirds of the energy going in is lost to heat going out. Rejected energy! But CHP plants can reach 90% efficiency. That's about what the plant at NYU, where I teach, can do.

There is another, pretty critical aspect to CHP: It is resilient. When the big grid goes down, most often because of weather, CHP plants are still up and running. They are a "distributed energy resource" (DER), not dependent on massive transmission and distribution systems which too often fail. NYU's plant, famously, was a beacon in the aftermath of Superstorm Sandy.

Distributed natural gas generation (DNGG) technologies have been having a growth spurt. These types of facilities are expected to have 18 GW of new capacity installation every year by 2028, generating $6 billion in annual revenue.

For surface transportation, gas-powered vehicles are demonstrably cleaner than diesel or gasoline for a range of air pollutants. There is a great deal of promise in these vehicles, particularly for heavy duty transport. Both NGV America and NGVA Europe promote the relative value for both of a reduction of criteria air pollutants and greenhouse gases.

Another key factor in the equation is price. Natural gas is, at least according to the American Gas Association, more affordable for the average consumer. This is attributable, in no small degree, to the enormous success that fracking has had in releasing hitherto difficult-to-access gas deposits, largely trapped in shale rock formations. Fracking, along with horizontal drilling, the other-indispensable technology in this approach to mining natural gas and oil, has proven to be the key to catalyzing the "shale boom." (If you haven't taken the time yet to see exactly how the process works, please watch the video here.)

The boom has lowered prices for natural gas to bargain basement levels, benefiting consumers and industry. There is, for instance, a multi-billion dollar plastics factory that is being built in Western Pennsylvania. There are 5,000 construction workers at the site now. Its reason to be is that it can capitalize on the low prices generated by the shale boom. Other big facilities like this are being built or on the drawing boards around the world.

Are there negative concerns about natural gas? You bet! Some of them, believe it or not, are subject to considerable amelioration. Others, perhaps, are not so easily resolved. I want to get at these questions in a subsequent post, coming soon. Stay tuned.