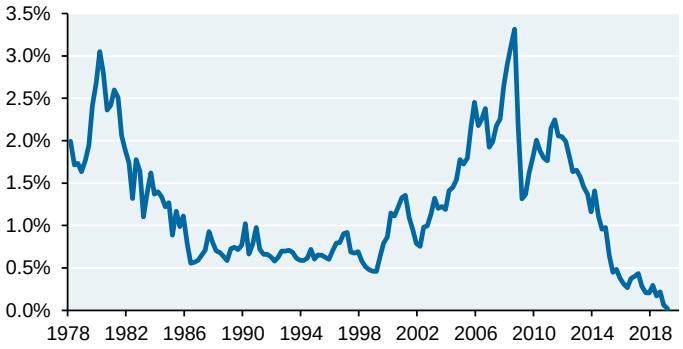
Cold Turkey: a quick comment on Presidential candidate proposals for an immediate nationwide ban on hydraulic fracturing[1]

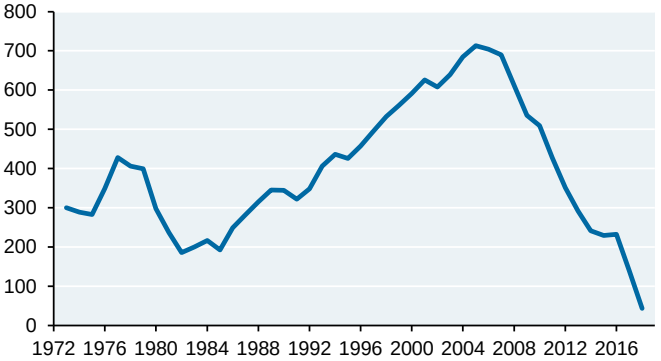
A leading Presidential candidate has called for an immediate nationwide ban on hydraulic fracturing "everywhere". Who said it matters less than what it may mean. The United States has undergone an energy boom recently which has finally erased the long-standing US net energy deficit (first two charts). This outcome is mostly the consequence of **hydraulic fracturing**. As shown in the 3rd chart, hydraulic fracturing now accounts for 60%-80% of US oil, natural gas and natural gas liquid (NGL) production. Furthermore, domestically produced oil and gas derived from hydraulic fracturing accounts for an enormous 40% of total US primary energy consumption (4th chart).

US net energy deficit, in dollar terms
Energy imports - energy exports, % of GDP



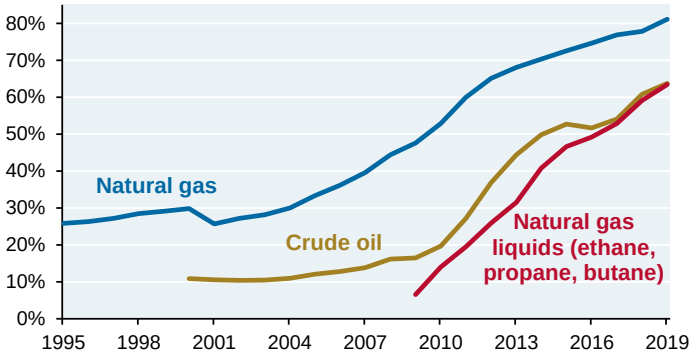
Source: Bureau of Economic Analysis, Haver Analytics, JPMAM. Q1 2019.

US net energy deficit, in energy terms
Net imports of oil, natural gas and coal in million tonnes of oil equiv.



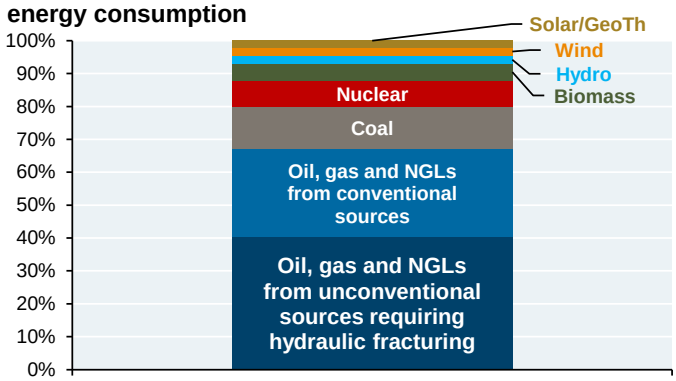
Source: EIA, JPMAM. 2019.

Percentage of US oil and gas production derived from hydraulic fracturing



Source: EIA, US Department of Energy, JPMAM. 2019.

Hydraulic fracturing accounts for 40% of all US primary energy consumption



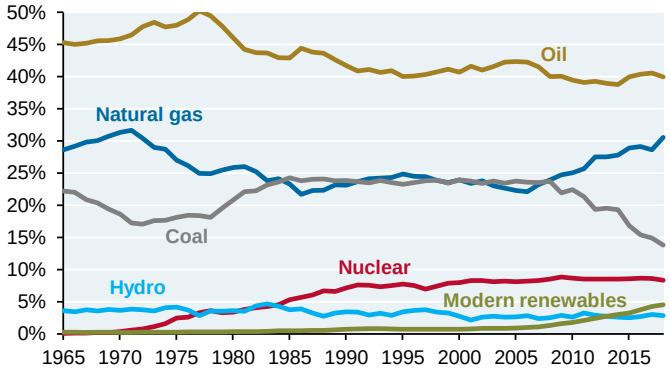
Source: EIA, BP, Society of Petroleum Engineers, S&P Platts, JPMAM. 2018.

I have written on risks and rewards of hydraulic fracturing before: how the US is practically the only country engaged in it, with the exception of minor amounts in Canada, China and Argentina; on risks from a small subset of shallower wells drilled in a few states from 1,000-2,000 feet (rather than the typical range of 4,000-12,000 feet), which could increase aquifer risks; on how flowback/produced water from fracturing can contain toxic amounts of lead, arsenic, barium, chromium, uranium, radium, radon and benzene; on exponential growth in water usage in the Permian Basin; on risks around well integrity and contamination from groundwater handling; and how the EPA's own Advisory Board questioned conclusions in the EPA's 2016 hydraulic fracturing report which found little evidence of systemic impacts on drinking water.

[1] One can be concerned about ramifications of such a ban while still being alarmed at **Trump's** "War on Science", which we wrote about **here**, and which continued this week with rollback of Federal oversight of US waterways.

Even so, it seems that many of these issues can be addressed through regulation and oversight, rather than via an outright ban. Hydraulic fracturing and wastewater handling is much less complex than other industrial and energy processes such as crude oil refining and nuclear power. While US renewable power generation is growing, the pace is not fast enough to abandon fractured natural gas and oil given US goals of decommissioning aging coal and nuclear power plants, and reducing reliance on foreign oil. Natural gas is a critical complement to intermittent renewable energy in the absence of a nationwide electricity grid[2] and cheap energy storage[3]. **Have proponents of an immediate "cold turkey" ban on 40% of the US energy supply thought through possible consequences for growth, employment, energy prices, energy independence, the dollar, geopolitical/military risks and productivity?** For a variety of economic and geological reasons the US energy boom will not last for decades, but the consequences of bringing it to an abrupt end are almost certainly not well understood.

US sources of primary energy consumption



Source: BP Statistical Review of World Energy. 2019.

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[2] **I wonder what Senator Warren would say to her neighbors in New Hampshire about their decision to prevent grid upgrades and renewable energy projects from happening.** The proposed 1 GW Northern Pass transmission line connecting Hydro-Quebec to Southern New England was supported by Massachusetts regulators and its Department of Energy Resources to reduce reliance on fossil fuels and increase renewable energy (hydro) use.

However, a New Hampshire siting committee unanimously rejected the proposal since it worried that the 192-mile transmission line would disrupt streets and harm tourism. Concessions by the Northern Pass group to bury 52 miles of the route and set aside 5,000 acres of preservation and recreation land were insufficient to change the outcome. In July 2019, the New Hampshire Supreme Court rejected and killed the proposal. The non-profit grid regulator ISO New England warned last year that the region's power system may soon be unable to meet electricity demand and maintain reliability without some degree of emergency actions such as rolling blackouts and controlled outages.

[3] The US generates over 4 billion MWh of electricity each year, but only has around 1,500 MWh of utility-scale energy **storage**. Pumped-storage hydropower in geological reservoirs accounts for 95% of storage capacity.