



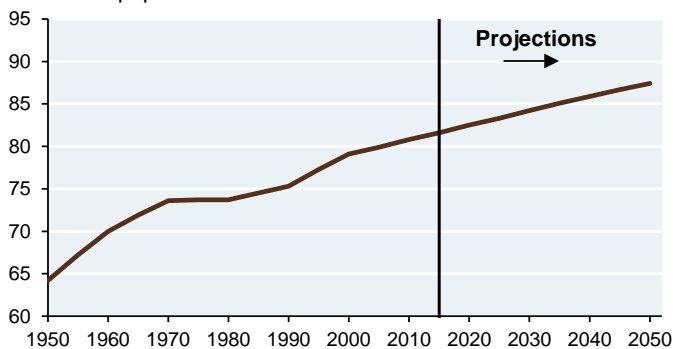
[5] Maybe the Constitutional framers were right about the Electoral College: who feeds and powers an increasingly urbanized world?

After the 2016 Presidential election, California Senator Boxer proposed a bill to abolish the Electoral College. In February 2018, a group led by litigator David Boies filed lawsuits in four states alleging that the way electors are allocated violates First Amendment rights. They're far from the first; over 700 proposals have been introduced in Congress to reform or eliminate the Electoral College over the last 200 years. In fact, there have been more proposals for Constitutional amendments on changing the Electoral College than on any other subject. As an alternative, opponents of the current approach often prefer a system that awards the Presidency to the candidate winning the popular vote, or a system that allocates electors proportionally within all states²². Everyone is entitled to their views, but I think the system works well as it is, partly due to the interconnection between **food, energy, national security and urbanization**. In this final section of our annual energy paper, I explain why.

Despite the mobility that modern telecommunications allow, US citizens continue to flock to the nation's cities. As shown below, US urbanization rates have been climbing steadily since the 1960's and are projected to keep rising. **Unsurprisingly, 21st century cities are massive consumers of food and energy.** A 2016 paper on urban food consumption puts in plain terms what the consequences are: "Modern cities neither supply their bulk resource needs, nor have the capacity to assimilate their wastes within their borders, which given the predominance of urban economies characterized by linear flows (material needs imported, waste produced exported), has left them physically reliant on their hinterlands and beyond"²³. When comparing across countries, **US cities rank near the top in terms of their ecological footprints per person from food and energy consumption.**

Living for the city: US urbanization trends

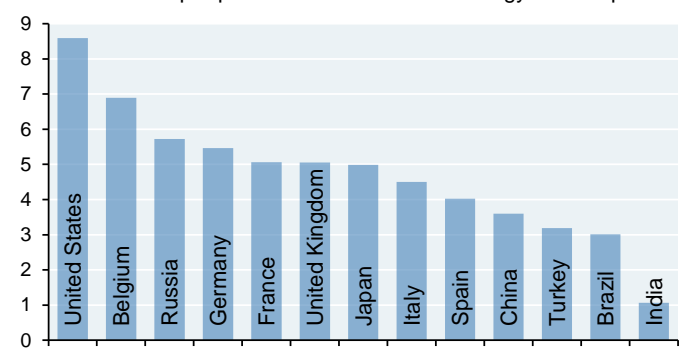
% of total population



Source: World Bank World Development Indicators. 2015, forecast to 2050.

Ecological footprint by country

Hectares of land per person based on food & energy consumption



Source: Global Footprint Network, 2013.

²² Constitutional rules allocate electors to states based on the number of their Representatives and Senators. The Constitution does *not* mandate the winner-take-all approach used by most states when allocating these electors to political parties; that decision is up to the states themselves.

Presidential candidates that **won the popular vote and lost the election**: Andrew Jackson (1824, to John Quincy Adams); Samuel Tilden (1876, to Rutherford B. Hayes); Grover Cleveland (1888, to Benjamin Harrison); Al Gore (2000, to George W. Bush); Hillary Clinton (2016, to Donald J. Trump). Some scholars believe this list should also include Richard Nixon in 1960 (who lost to John F. Kennedy), due to errant estimates of votes in Alabama.

²³ "Surveying the Environmental Footprint of Urban Food Consumption", B. Goldstein et al, Technical University of Denmark, Journal of Industrial Ecology, 2016.

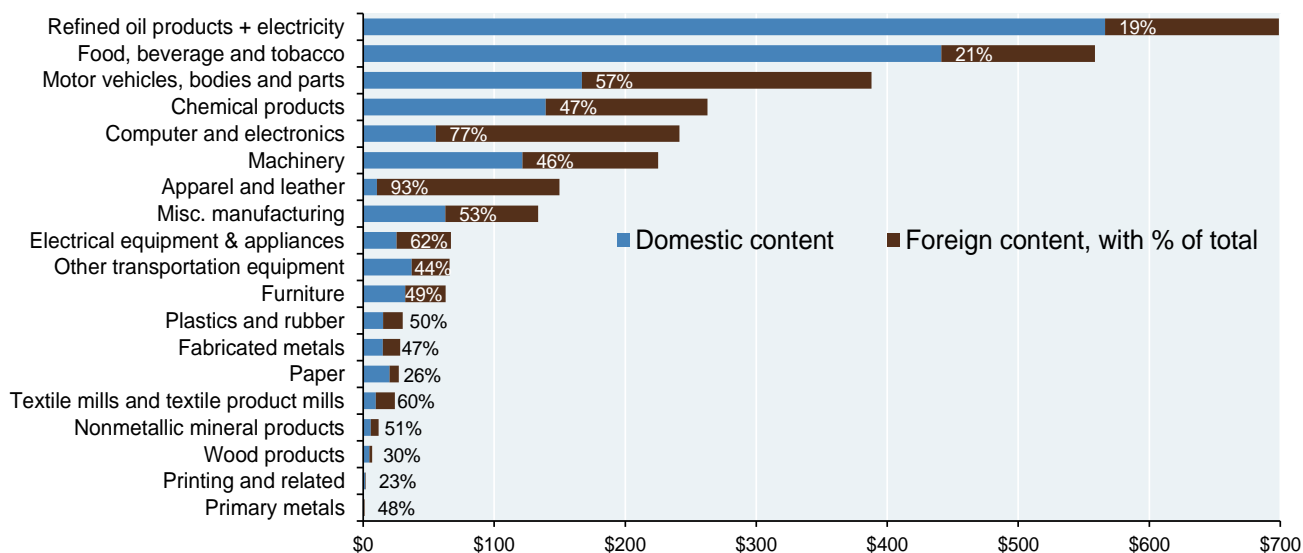


Next step: how reliant is the US on imported vs domestically produced food and energy? Using data from the Department of Commerce, the US Energy Information Administration and BP's Annual Statistical Review of World Energy, we were able to determine three things, illustrated in the chart:

- Food products and oil products are the **two largest** sectors of manufactured goods in the US
- ~80% of US food and oil products are sourced **domestically**, with the rest being imported
- The percentage of food and oil products sourced domestically is much higher than for all other sectors, whose domestic content is generally below 50%

So, **in plain language**, the US relies extensively on its non-urban regions to provide massive amounts of food and energy to sustain its growing urban centers, and to a degree that sets food and energy apart from other sectors of the economy.

Food and oil products: the largest sectors of the US economy, and the ones most reliant on domestic production
Domestic demand for manufactured goods and electricity, billions of dollars



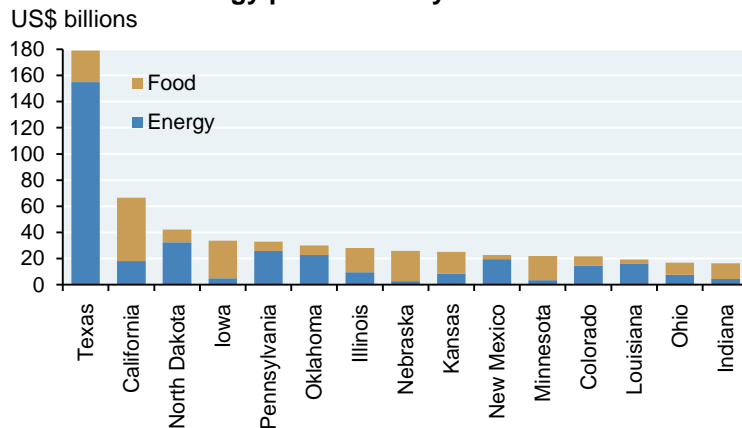
Source: Dept of Commerce, BEA, BP, EIA, JPMAM. Calendar years 2012-2016. Refined oil products = \$536 bn, electricity = \$163 bn. Refined oil product values based on \$74.6 per barrel (WTI crude plus Gulf Coast PADD 3 refining margin as of Feb 27, 2018) and 7.1 bn barrels per year of refined oil products consumption. Electricity value based on \$35 per MWh of wholesale electricity prices.



If that's the case, where does all the domestically produced US food and energy come from?

Mostly from Texas, California, the Midwest and the Rockies.

US food and energy production by state



Source: BP, EIA, USDA, JPMAM. 2017.

- Food based on farm receipts for meats, crops, seeds and related products
- Energy based on coal, natural gas and oil production; electricity generation from nuclear, hydroelectric, wind, solar, geothermal and biomass; and biofuels production

If you're interested...some details on US food and energy production by state

Food: In 2017, the US ranked #2 out of 113 countries in the Economist's Global Food Security Index. This high ranking reflects bountiful food production in seven states that account for almost 50% of total US food production: California, Iowa, Texas, Nebraska, Illinois, Minnesota and Kansas.

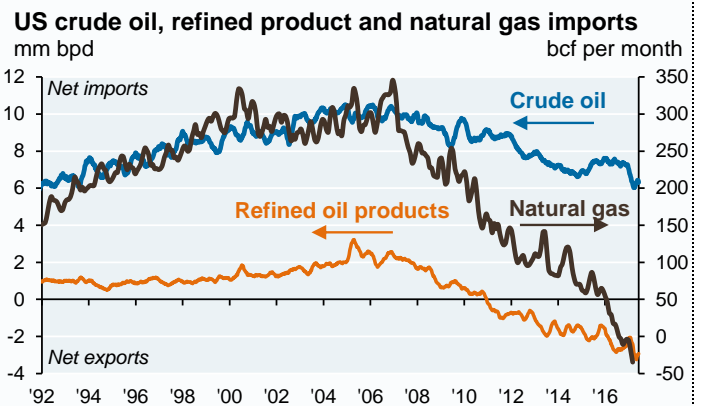
Energy

Natural gas. While the US is still a net importer of crude oil, it is a natural gas net exporter. As discussed in the Executive Summary, energy agencies project that natural gas will supply the greatest amount of energy in the decades ahead to meet growing demand (including any new electricity demand resulting from electric cars). Proven US natural gas reserves are concentrated in six states: Texas, Pennsylvania, West Virginia, Oklahoma, Ohio and Louisiana.

Oil. Texas accounts for half of US production; the largest 6 other oil production states are North Dakota, New Mexico, Oklahoma, California, Alaska and Louisiana.

Coal production is concentrated in Wyoming, West Virginia, Pennsylvania and Kentucky. Wyoming's production in value terms is diminished by the lower energy content of its subbituminous coal.

Other. Illinois and Pennsylvania generate the most nuclear power, with 12 other states not far behind; Washington and Oregon are notable producers and exporters of hydroelectric power; Texas, Iowa, Oklahoma and Kansas are the four largest wind-generation states; Iowa, Nebraska and Illinois lead in terms of ethanol production; and California generates roughly half the nation's solar and geothermal power. In value terms, natural gas, oil and coal accounted for 85% of US energy production in 2016.



Source: Energy Information Administration, JPMAM. February 2018.



Now to the crux of the issue: what political power should be vested in these food and energy centers? While their population densities are lower than in the cities, they provide the life blood to cities for their survival. Without them, cities would not be able to grow as they have, and/or the US would be highly reliant on geopolitically insecure and costlier imports of food and energy, and be exposed to volatile weather, environmental and exchange rate conditions out of its control.

Let's put the current Electoral College approach aside for a moment, and instead allocate the 538 electors to US states based on their **food & energy production** and based on their **population**, equally weighting both factors. The table shows the change in each state's electors using this revised approach. Texas, the Midwest and the Rockies gain electors, while East Coast states and Michigan lose them.

Reimagining the Electoral College: allocation of electors based on both food and energy production and population

Largest increases in electors			
State	Current	Revised	Increase
1 Texas	38	81	43
2 North Dakota	3	14	11
3 Iowa	6	13	7
4 Oklahoma	7	13	6
5 Nebraska	5	10	5
6 Kansas	6	10	4
7 New Mexico	5	9	4
8 Wyoming	3	6	3
9 Colorado	9	12	3
10 Alaska	3	5	2
11 Louisiana	8	10	2
12 South Dakota	3	5	2

Largest declines in electors			
State	Current	Revised	Decline
1 New York	29	19	(10)
2 Florida	29	20	(9)
3 New Jersey	14	8	(6)
4 Massachusetts	11	6	(5)
5 Michigan	16	12	(4)
6 Virginia	13	9	(4)
7 Maryland	10	6	(4)
8 Georgia	16	12	(4)
9 Tennessee	11	7	(4)
10 Connecticut	7	3	(4)
11 South Carolina	9	6	(3)
12 Nevada	6	3	(3)

Sources: USDA, EIA, BP, JPMAM. 2017.

Allocation of electors based 50% on food & energy production, and 50% on population. Food and energy based on production of crude oil, coal and natural gas; electricity generation from wind, solar, nuclear, hydropower, geothermal and biomass; biofuels production; and agricultural output from meats, crops, seeds and related products.

This approach might seem extreme, and that's because it is. However, it highlights something about the Electoral College that maybe the framers of the Constitution anticipated: a country's whose political system stands the test of time might need to distribute political power mostly based on population, but also based on each state's contribution to growth, security and geopolitical independence, and based on the environmental burden that it bears to support the rest of the country²⁴. With that in mind, the current Electoral College is already achieving that delicate balance, and is best left alone, just the way it is.²⁵

²⁴ While New York has banned hydraulic fracturing, **New York has no problem relying on the hydraulically-fractured natural gas that it imports from Ohio and Pennsylvania.** New York generated 40% of its electricity from natural gas in 2015, a figure that will almost certainly rise if the Indian Point nuclear plant is shut down.

²⁵ **And in all likelihood, that's the way it will stay.** A constitutional amendment to abolish the Electoral College would require a two thirds vote in the House and the Senate, **and** ratification by at least 38 state legislatures.

While there is **opposition** to the Electoral College among political science and law professors, there are also scholars that **defend** it. Examples include Constitutional Scholar Allen Guelzo who wrote on the subject after the 2016 election, and Richard A. Posner, identified by *The Journal of Legal Studies* as the most cited legal scholar of the 20th century (see source citations on page 34).



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