Written Testimony of Robert Bryce[1]
Before the Committee on Energy and Natural Resources
United States Senate
"To examine the causes, outlook, and implications of domestic and international energy price trends."
November 16, 2021

Good morning. Thank you, Mr. Chairman. I am grateful for the opportunity to testify again before this committee.

With all due respect, legislators and policymakers in Washington need a big dose of energy realism and an even bigger dose of energy humanism.

The causes and implications of soaring global energy prices are clear.

Europe provides a case study for what not to do. Millions of Europeans are facing the prospect of a cold winter without enough affordable energy to heat their homes. In September, a study done by the European Trade Union Confederation, which represents 45 million members, found that "15% of the EU's working poor – the equivalent of 2,713,578 people – lacks enough money to turn on the heating."[2] In addition, fertilizer plants and steel mills are closing their doors because of high energy prices.[3]

These price spikes are the result of several factors. The first and most important is underinvestment in hydrocarbon production, which is largely a consequence of aggressive decarbonization and "Environmental, Social, and Governance" or ESG policies.

Second, Europe has overinvested in weather-dependent renewables which left it vulnerable to a prolonged wind drought that has crippled the region's electric and gas utilities.[4]

Third, Europe has reduced its energy security because it is shuttering its coal and nuclear power plants.[5]

Finally, the region's over-reliance on imported energy – and Russian gas, in particular – has made it vulnerable to dramatic prices swings and potentially long-term supply shortages.[6]

The implications of Europe's price spikes include soaring inflation, deindustrialization, and increasing energy burdens on consumers, especially the working poor.[7] The knock-on effects could last for months, or even years.

Nitrogen-based fertilizer made from hydrocarbons is, as author Alex Epstein has aptly put it, the "food of food."[8]

But fertilizer plants across Europe – in the U.K., Netherlands, Germany, Italy, Belgium, France Spain, Lithuania, and Ukraine – are shutting down because of high natural gas prices.[9] Similar fertilizer and urea shortages and price spikes are occurring across Asia, which is threatening both the agriculture and transportation sectors.[10] These shortages and price increases will mean less food production, and therefore, higher food prices, which will spark more inflation.[11]

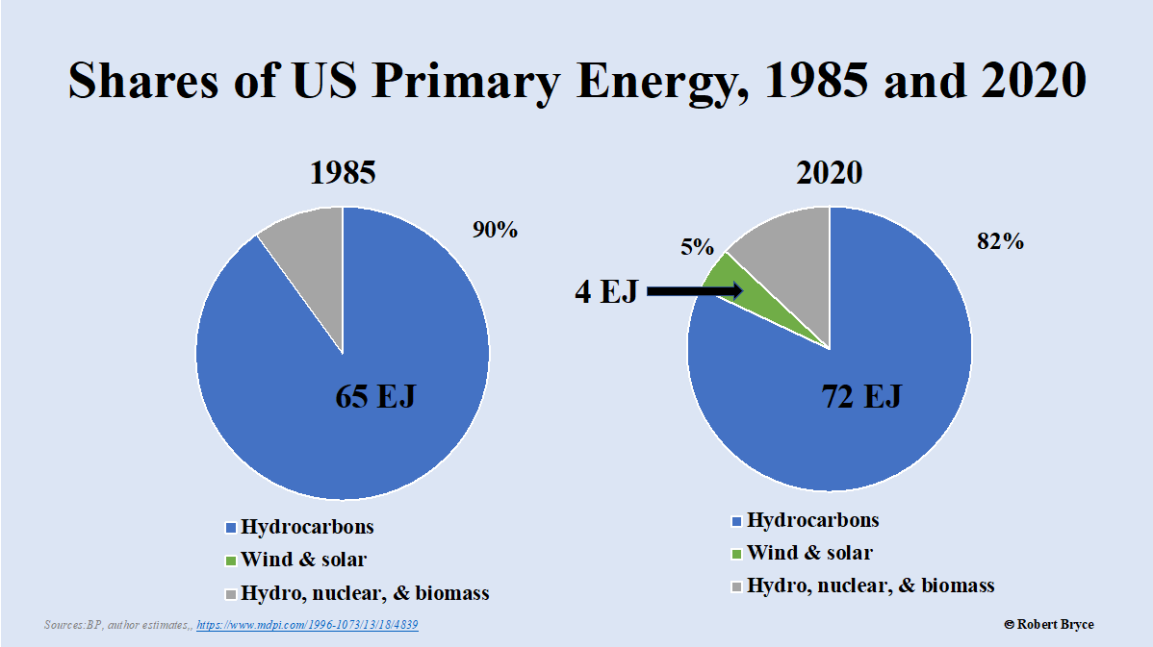
Let me be clear: The United States must not emulate Europe's disastrous blueprint.

Copying Europe's energy policies would reduce economic growth and impose regressive energy taxes on America's poor and middle class at the very same time that millions of American households are having trouble paying their utility bills. According to the Energy Information Administration, nearly one-third of U.S. households, "reported facing a challenge in paying energy bills or sustaining adequate heating and cooling in their homes in 2015."[12]

We desperately need *energy realism.*

Energy analyst Art Berman is correct: Energy is the economy.[13] Hydrocarbons now provide 82% of our energy and about 60% of our electricity.[14] As shown in Figure 1, the U.S. now gets 18 times as much primary energy from hydrocarbons as it does from wind and solar *combined*.[15]

Figure 1



The myriad claims being made by climate activists, politicians, and elite academics that we can run our economy solely on wind, solar, and a few dollops of hydro have no basis in physics, history, or math. Indeed, the scenarios put forward by leading academics who have made such claims have been roundly debunked.[16]

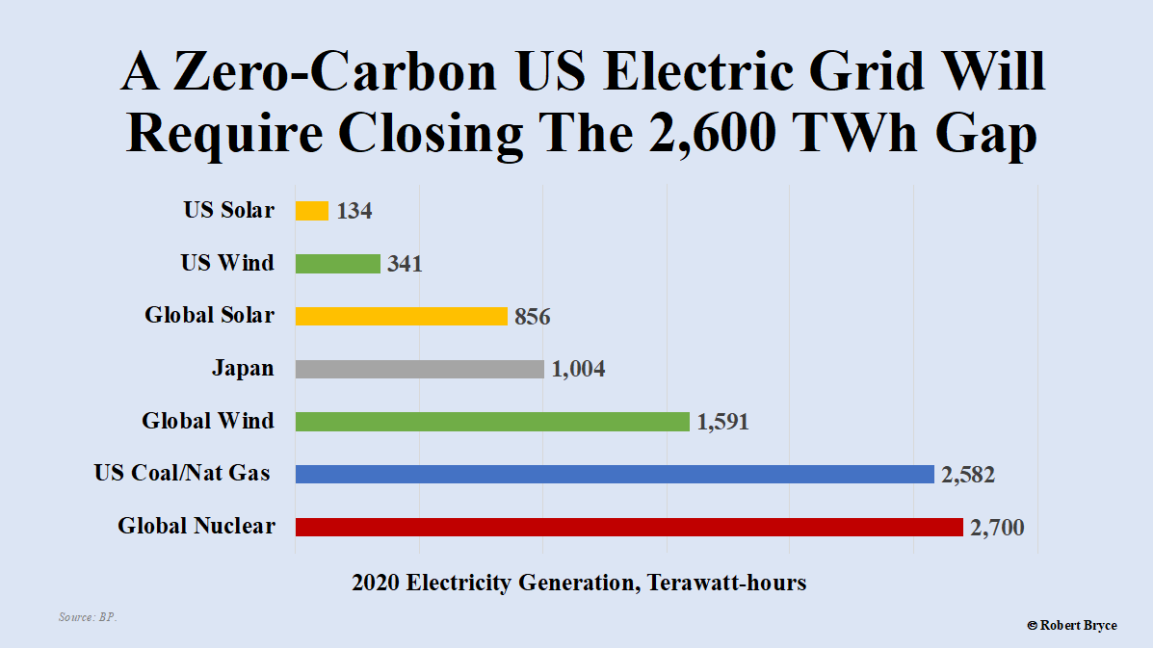
Furthermore, claims that we can convert our energy and power systems quickly are not supported by the facts. As energy analyst Vaclav Smil has noted, "energy transitions are protracted affairs: large-scale energy conversions are still dominated by prime movers and processes invented during the 1880s...or during the 1930s...and no techniques currently under development can rival any of those conversions during the coming two or three decades."[17]

Energy realism requires that legislators and policymakers understand the staggering scale of the decarbonization challenge. In April, the White House said that President Biden's goal is to "create a carbon pollution-free power sector by 2035."[18]

But there is no evidence that such a goal can be achieved, particularly in such a short amount of time. In 2020, about 2,600 terawatt-hours of electricity was generated from coal and natural gas in the U.S.[19] For comparison, that is nearly

equal to the output of *all of the nuclear power plants on the planet*. Put another way, it is roughly equal to three times the output of all global solar or nearly two times the output of all of the wind turbines in the world. It is simply not credible to claim that the United States could build that much new nuclear, or solar, or wind capacity, and do so in just 14 years.

Figure 2



Wherever renewables have been ramped up, as in Europe and California, energy prices have soared. Proof of that can be found in Germany, which now has some of the world's highest electricity prices.

Between 2000 and 2017, Germany spent about $222 billion on renewable energy subsidies as part of its efforts to slash its greenhouse-gas emissions. Germany has pledged to slash those emissions by 40% compared to 1990 levels, by 2020, and by 95% by 2050.[20] The total cost of the *Energiewende* could total more than $500 billion by 2025, and that figure only accounts for the investment needed in the electricity sector.[21] Despite the massive costs, in 2017, Germany's greenhouse gas emissions were at roughly the same level as they were in 2009. In 2018, the German government was forced to admit that it would not meet its 2020 emission-reduction targets.[22]

A 2020 report found that electricity in Germany was "on average 163% more expensive than in other countries, according to the analysis which included 135 countries...The electricity price for consumers in Germany was 32.10 Euro cents per kilowatt-hour, while average international prices were only 12.22 Euro cents."[23] This winter, Germany's electricity prices are expected to go even higher.[24]

Energy realism requires that legislators and policymakers look at California's disastrous energy policies. In the words of energy analyst, Mark Nelson, California's electricity prices are "absolutely exploding" – this in a state that has the highest poverty rate, and largest Latino population, in America.[25]

Between 2011 and 2020, the state's electricity prices jumped by about 39%, which was roughly seven times as fast as the increases in the rest of the country.[26] Last year, alone electricity prices in the state jumped by 7.5%.[27] Making matters worse, California's electricity rates will go even higher over the next few years. In a report issued in May, the California Public Utility Commission warned that the state's energy costs are growing far faster than the rate of inflation, and that "energy bills will become less affordable over time."[28]

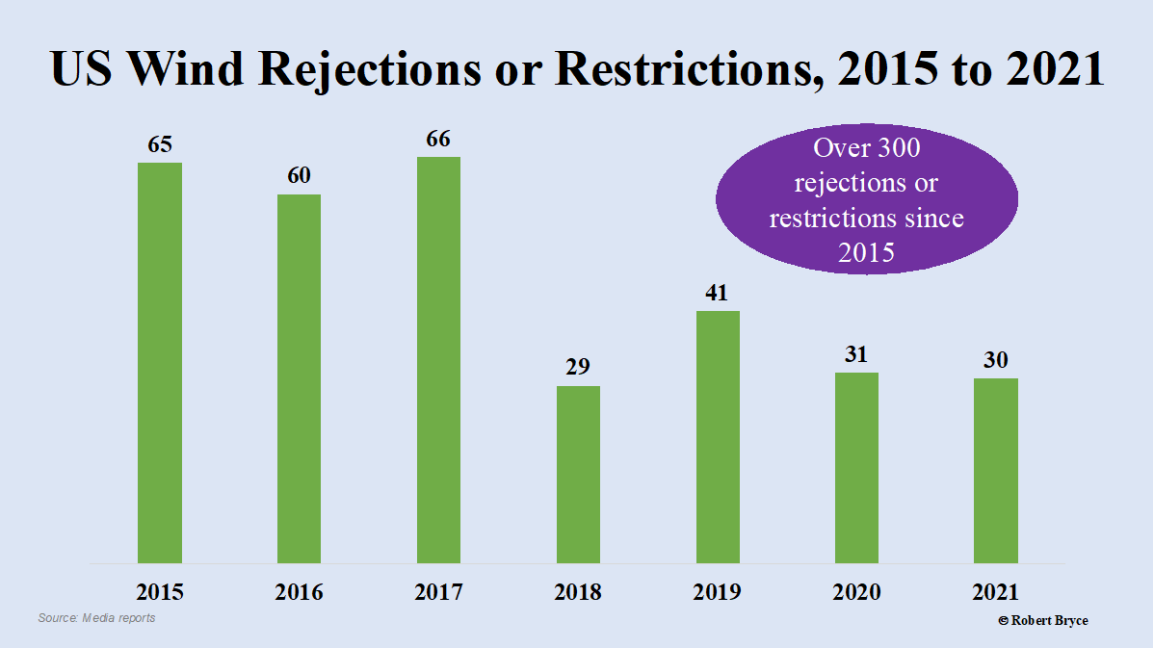
What's driving up prices? The CPUC says that "electrification goals and wildlife mitigation plans are among the near-term needs...that place upward pressure on rates and bills." The report projected that residents living in hotter regions (that is, those who can't afford to live close to the coast) and get their electricity from San Diego Gas & Electric, could see their monthly power bills increase by 47% between now and 2030. When future gasoline-price increases are included, overall energy costs for that same consumer are projected to increase by 60%. Furthermore, the CPUC expects residential ratepayers in SDG&E's service territory will be paying close to 45 cents per kilowatt-hour by 2030. For reference, that is more than three times the 2020 nationwide average residential price of 13.2 cents per kilowatt-hour.

The report also makes clear that soaring energy prices in the state are creating social equity and energy justice concerns. It notes that to avoid paying more for electricity, residents will need to make big investments in all-electric homes and electric vehicles. But "in order to avoid large increases in energy bills, customers will need to adopt technologies that require large up-front investments. In the absence of subsidies and low-cost financing options, *this could create equity concerns for low- to moderate-income households and exacerbate existing disparities in electricity affordability.*" (Emphasis added.)[29]

More realism: all across the country, communities are rejecting renewable projects. Since 2015, more than 300 communities from Maine to Hawaii have rejected wind projects. In Democratic states such as New York, California, and Vermont, local opposition makes building new wind projects nearly impossible. Figure 3 shows the number of wind energy rejections by year since 2015. For more on this, see my recent *Forbes* article: "Here's The List Of 317 Wind Energy Rejections The Sierra Club Doesn't Want You to See."[30] As John Riggi, a town councilman in Yates, NY – who has been fighting a proposed 200-megawatt wind project for seven years – told me, his community and others "are fighting to keep our lands free from environmentally destructive, culture killing and unwanted industrial renewable energy projects."

Riggi and other rural Americans are fighting wind projects because they don't want to see the red-blinking lights atop those 50- or 60-story-high wind turbines, all night, every night, for the rest of their lives. They are also concerned – and rightly so – about ruined viewsheds, the deleterious health effects of noise from the enormous turbines, sleep disturbance, and potential decrease in their property values.[31]

Figure 3



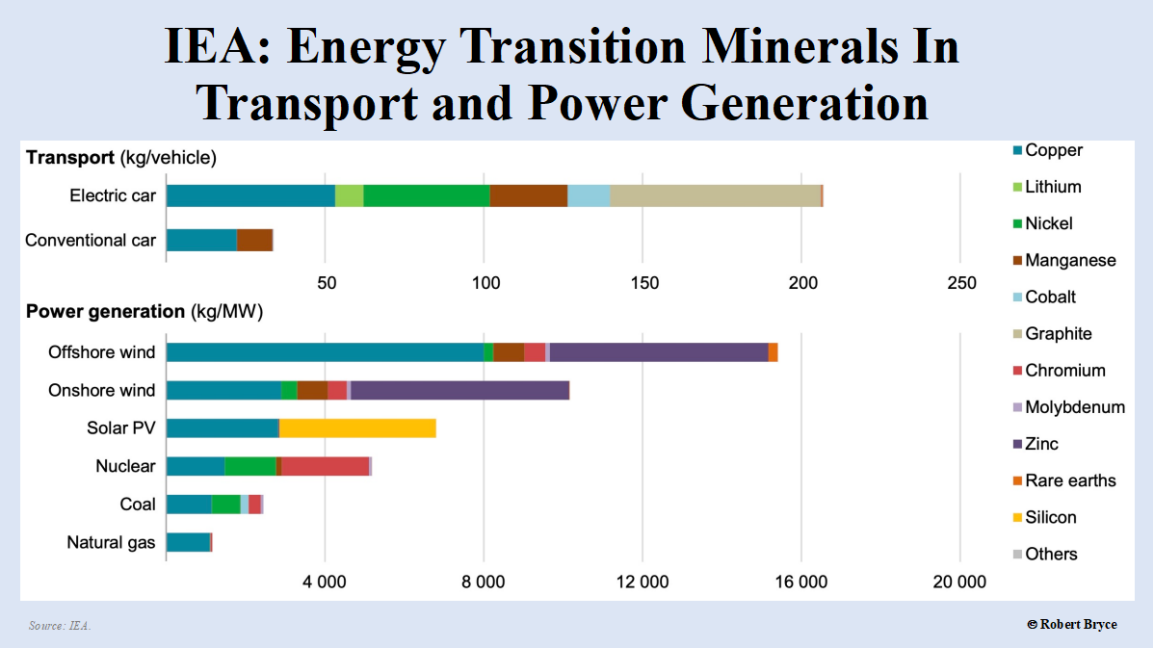
More realism: converting our energy and power systems to renewables will cost American taxpayers trillions of dollars. In 2019, consulting firm Wood Mackenzie

estimated that converting the U.S. grid to run solely on renewables *would cost a staggering $4.5 trillion.* In its analysis, Wood Mackenzie noted that that sum is "nearly as much as what the country has spent, since 2001, on the war on terror. From a budgetary perspective, the cost is staggering at US$35,000 per household – nearly US$2,000 per year if assuming a 20-year plan."[32]

Those numbers make a mockery of the claims made by climate activists about their desire for energy justice and a "just energy transition."[33]

In addition to the stratospheric – and highly regressive – costs of such an effort, attempting to convert our energy and power systems to renewables will also make the US reliant on China, which has a stranglehold on the critical minerals market. China controls the supply of neodymium, dysprosium, and other rare earth elements that are needed in electric vehicles and other "green" technologies. Figures 4 and 5 below include screenshots from a recent report by the International Energy Agency which show the resource intensity of alternative energy technologies as well as China's dominance of the critical minerals processing sector.[34]

Figure 4

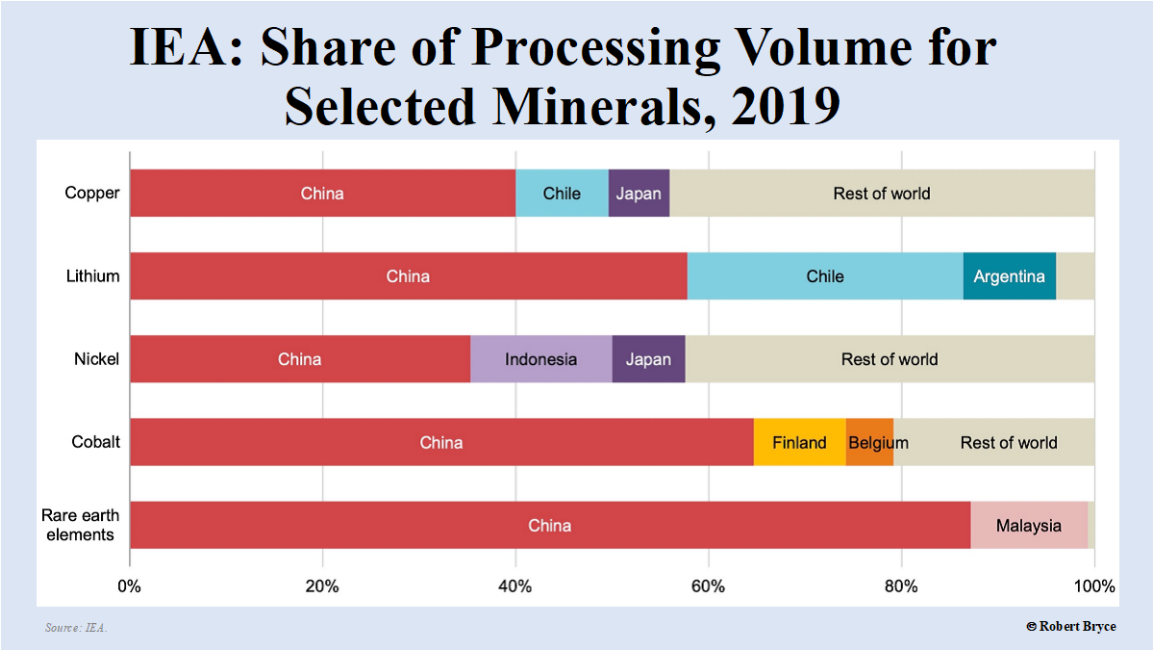


In the report, the IEA notes that over 90% of all EVs sold use permanent management synchronous motors thanks to their efficiency, compactness, and

power density. But those motors need for "neodymium, praseodymium, dysprosium, and terbium – upwards of 1 kilogram per motor – raises concerns given the geographical concentration of raw material and processing in China."[35]

Figure 5 shows China's near-total dominance of the market for cobalt and rare earth elements. The IEA also reports that the production of lithium, a key ingredient in batteries, "is highly concentrated in a small number of regions, with China accounting for 60% of global production."[36]

Figure 5



In addition to the need to ramp up the production of cobalt and rare earths, a push to increase the use of renewables will require staggering increases in global mining to produce megatons of copper, zinc, lithium, and other elements. In turn, all of that mining will require enormous amounts of diesel fuel and other hydrocarbons.

Energy realism requires policymakers to acknowledge the land-use conflicts that are limiting the expansion of the bulk power transmission system that would be needed to move renewable energy from rural regions to distant cities. The National Renewable Energy Laboratory has estimated that achieving a 90% penetration of renewables on the grid would require the construction of hundreds of thousands of miles of new high-voltage transmission lines. But the November 2 referendum in

Maine showed, yet again, that Americans don't want those massive overhead cables cutting through their neighborhoods and forests.[37]

Energy realism requires policymakers to understand the deadly impact that large-scale renewable projects are having on American wildlife. A 2013 study published in *Wildlife Society Bulletin* estimated that in 2012 alone wind turbines killed about 888,000 bats and 573,000 birds, including 83,000 raptors. When that study was done, the U.S. had about 60,000 megawatts of wind capacity. Today, the industry has more than twice that amount. Therefore, the wind industry's impact has undoubtedly become even more deadly on our avian populations and could be killing as many as 1 million birds, including tens of thousands of raptors per year.

Among the avian casualties are Bald and Golden Eagles. In 2013, the U.S. Fish and Wildlife Service issued a report which found that the confirmed number of eagles killed by wind turbines had killed 85 eagles over the previous six years and that figure was "an absolute minimum." That same year, the Fish and Wildlife Service has also determined that "there are no conservation measures that have been scientifically shown to reduce eagle disturbance and blade-strike mortality at wind projects."[38]

Bats are important pollinators and insectivores. In 2016, two scientists from the U.S. Geological Survey, Thomas J. O'Shea and Paul M. Cryan, published a paper that found wind turbines are the largest cause of mass bat mortality, and exceed the toll taken by white-nose syndrome, a fungal disease that afflicts bats.[39] In a discussion of the paper, Cryan said that the wind industry's toll on bat populations could have long-term negative effects. "Bats are long-lived and very slow reproducers," he said. "Their populations rely on very high adult survival rates. That means their populations recover from big losses very slowly."[40]

Given the negative impact that wind turbines have on our wildlife, American taxpayers should not be subsidizing the slaughter.[41]

According to data from the U.S. Treasury, the wind industry will collect some $3.1 billion this year in the form of the production tax credit and a total of some $33.7 billion between 2020 and 2029. Furthermore, the tax incentives given to the wind industry are larger than those given to any other segment of the energy business.[42]

In summary, garroting the domestic hydrocarbon sector by killing pipelines, imposing taxes on methane, banning natural gas, halting drilling on federal lands and waters, attempting to "electrify everything," subsidizing electric vehicles for

the rich, and never-ending, multi-billion-dollar tax breaks for Big Wind and Big Solar, will not solve global climate change.[43]

Instead, it will turbocharge inflation, which is already at a 31-year high, imperil America's energy security, and impose regressive taxes on the working poor and middle class.[44]

Our economy runs on coal, natural gas, propane, diesel, jet fuel, and gasoline, and that will be true for decades to come.

Staking the future of the United States economy, as Europe has done, on weather-dependent renewables and imported energy amounts to *unilateral energy disarmament* that will hurt the American working class and benefit Russia, China, and OPEC.[45]

Who will stand up for rural America and against the landscape-destroying sprawl of wind and solar projects?

Who will speak against the federally subsidized slaughter of our birds and bats by the wind industry?

Expensive energy is the enemy of the poor. Who in the Senate will stand up for the poor?

Who in Congress will stand up for the affordability, resilience, and reliability of our electric grid, which is being undermined by the senseless rush to renewables?[46]

Where are the pro-nuclear, pro-energy realists?[47]

Where I must ask, are the energy humanists?

Thank you.

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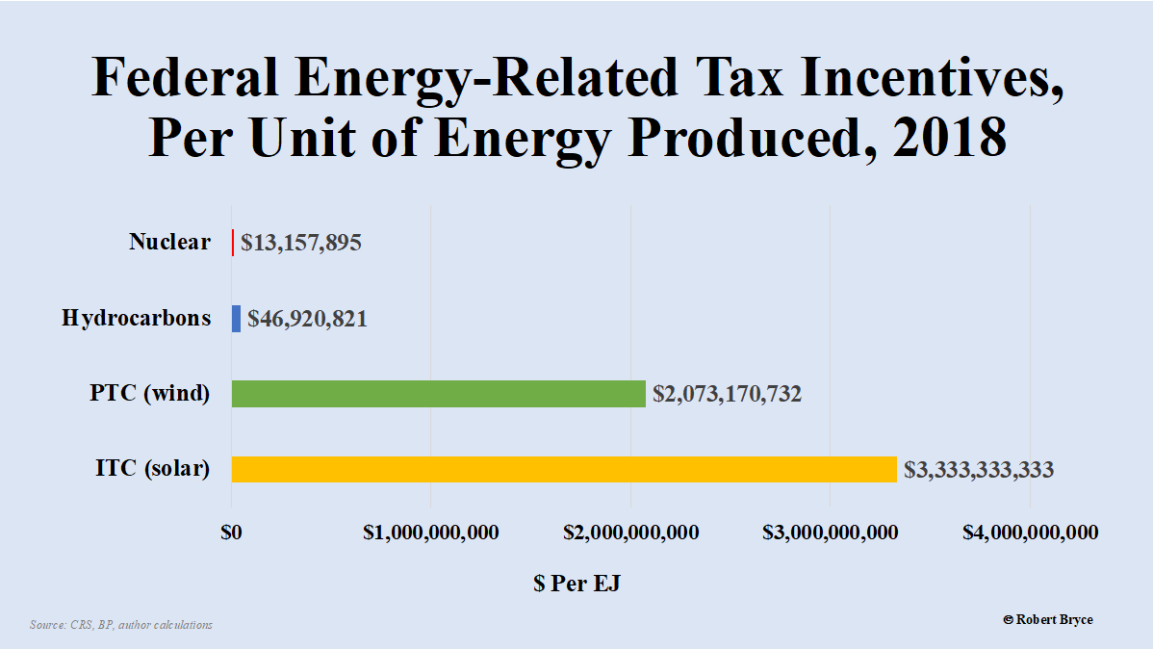
[1] Author, journalist, film producer, and host of the Power Hungry Podcast. Bryce's latest book is *A Question of Power: Electricity and the Wealth of Nations*. His new documentary is *Juice: How Electricity Explains the World.* See: RobertBryce.com and on Twitter, @pwrhungry

[2] https://apnews.com/article/europe-business-european-union-9c05bbfdb8074262e1e10cb62da24560
[3] https://www.reuters.com/article/cf-inds-operations/cf-industries-halts-operations-at-uk-facilities-on-higher-gas-prices-idUSKBN2GB2CO
[4] https://www.wsj.com/articles/energy-prices-in-europe-hit-records-after-wind-stops-blowing-11631528258
[5] https://www.wsj.com/articles/the-u-k-ditched-coal-and-left-itself-with-a-new-set-of-challenges-11635073201
[6] Russian exports of natural gas to Europe have been sporadic. On October 30, flows of Russian gas on the Yamal-Europe pipeline fell to zero, a move that resulted in gas flowing east, from Germany to Poland. See: https://oilprice.com/Energy/Natural-Gas/Europes-Gas-Prices-Soar-Again-On-Lower-Russian-Supply.html
As *Oil Price* reported, "consumers and industries are left at the mercy of the weather, hoping for a mild winter to avoid further tightening of the already tight European gas market." See: https://oilprice.com/Energy/Natural-Gas/Natural-Gas-Prices-Could-Soar-Even-Higher-As-Europe-Braces-For-A-Cold-Winter.html
On November 6, according to Reuters, "Gas flows through the Yamal-Europe pipeline westbound into Germany have stopped again and are flowing in the opposite direction back towards Russia... In the past week benchmark European gas futures rose as much as 23% due to the halting of westward flows." See: https://www.reuters.com/business/energy/russian-gas-flows-via-yamal-europe-pipeline-germany-halted-again-2021-11-06/
See also: https://www.forbes.com/sites/arielcohen/2021/10/14/europes-self-inflicted-energy-crisis/?sh=558fa442af3a
[7] In September, the European Trade Union Confederation estimated that due to soaring energy prices, some 15% of the EU's working poor - the equivalent of 2,713,578 people - lacks enough money to turn on the heating." See: https://apnews.com/article/europe-business-european-union-9c05bbfdb8074262e1e10cb62da24560
[8] https://industrialprogress.com/fossil-fuels-are-the-food-of-food/
[9] https://www.thenationalnews.com/world/uk-news/2021/09/17/running-out-of-energy-supply-fears-grow-as-uk-fertiliser-plants-close/
See also:
https://www.gasworld.com/basf-becomes-latest-to-curtail-fertiliser-production/2021817.article
Note in the last article, the report states: "In almost all of these instances, either an end-of-year timeline or no estimate at all has been given for the resumption of these plants."
[10] https://www.wsj.com/articles/chinas-coal-shortage-threatens-farmers-in-india-and-truckers-in-south-korea-11636635601
[11] https://im-reg.onecount.net/onecount/redirects/index.php?action=get-tokens&js=1&sid=&return=https%3A%2F%2Fwww.farmprogress.com%2Ffertilizer%2Fglobal-fertilizer-crisis-may-push-food-prices-higher&sid=cbs976g6oli951pt8d8ffd5t04
[12] https://www.eia.gov/todayinenergy/detail.php?id=37072
[13] https://www.artberman.com/2020/09/03/stop-expecting-oil-and-the-economy-to-recover/
[14] The primary energy share data is from the BP Statistical Review of World Energy 2021. Electricity data is EIA: https://www.eia.gov/tools/faqs/faq.php?id=427&t=3
[15] BP Statistical Review of World Energy 2021.
[16] https://www.nationalreview.com/2017/06/renewable-energy-national-academy-sciences-christopher-t-m-clack-refutes-mark-jacobson/

[17] https://home.cc.umanitoba.ca/~vsmil/pdf_pubs/oecd.pdf
[18] https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/
[19] BP Statistical Review of World Energy 2021.
[20] https://www.nytimes.com/2017/10/07/business/energy-environment/german-renewable-energy.html
[21] https://www.cleanenergywire.org/factsheets/how-much-does-germanys-energy-transition-cost
[22] https://www.reuters.com/article/us-germany-politics/german-coalition-negotiators-agree-to-scrap-2020-climate-target-sources-idUSKBN1EX0OU
[23] http://www.xinhuanet.com/english/2020-09/21/c_139385790.htm
[24] https://www.bloomberg.com/news/articles/2021-08-25/german-power-market-set-for-highest-winter-prices-in-20-years
[25] https://www.realclearenergy.org/articles/2021/06/24/blackouts_loom_in_california_as_electricity_prices_are_absolutely_exploding_782903.html
[26] https://environmentalprogress.org/california
[27] https://www.realclearenergy.org/articles/2021/06/24/blackouts_loom_in_california_as_electricity_prices_are_absolutely_exploding_782903.html
[28] https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/office-of-governmental-affairs-division/reports/2021/senate-bill-695-report-2021-and-en-banc-whitepaper_final_04302021.pdf, 5.
[29] https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/office-of-governmental-affairs-division/reports/2021/senate-bill-695-report-2021-and-en-banc-whitepaper_final_04302021.pdf, 8.
[30] https://www.forbes.com/sites/robertbryce/2021/09/26/heres-the-list-of-317-wind-energy-rejections-the-sierra-club-doesnt-want-you-to-see/?sh=2f92e1115bad
[31] For an in-depth discussion of these issues, see my April 2021 report, "Not In Our Backyard," https://files.americanexperiment.org/wp-content/uploads/2021/04/Not-in-Our-Backyard-Robert-Bryce.pdf
For property values, see: https://blogs.lse.ac.uk/politicsandpolicy/gone-with-the-wind/
[32] https://www.woodmac.com/news/feature/deep-decarbonisation-the-multi-trillion-dollar-question/
[33] https://rmi.org/spotlight-a-just-energy-transition/
[34] https://iea.blob.core.windows.net/assets/24d5dfbb-a77a-4647-abcc-667867207f74/TheRoleofCriticalMineralsinCleanEnergyTransitions.pdf
[35] Ibid., 108.
[36] Ibid, 133.
[37] https://www.forbes.com/sites/robertbryce/2021/11/05/maine-voters-rejection-of-transmission-line-shows-again-how--land-use-conflicts-are-halting--renewable-expansion/?sh=6db6183768e8
[38] https://www.wsj.com/articles/SB10001424052702303342104579099060830782406
[39] https://www.researchgate.net/publication/291184714_Multiple_mortality_events_in_bats_A_global_review
[40] https://www.scientificamerican.com/article/bat-killings-by-wind-energy-turbines-continue/

[41] https://www.forbes.com/sites/robertbryce/2020/05/15/subsidizing-the-slaughter-big-wind-kills-another-bald-eagle-gets-more-federal-subsidies/?sh=5d3b648b25e2
[42] https://home.treasury.gov/system/files/131/Tax-Expenditures-2021.xlsx
[43] The tax incentives for wind and solar are far greater on a per-unit of energy produced basis than what is given to hydrocarbons and nuclear. As I reported last year in *Forbes*, federal tax incentives for solar are about 250 times as great per unit of energy as what is given to nuclear. See: https://www.forbes.com/sites/robertbryce/2021/12/27/why-is-solar-energy-getting-250-times-more-in-federal-tax-credits-than-nuclear/?sh=4f161f5e21cf
The graphic below illustrates the enormous disparity in tax incentives.



[44] https://www.wsj.com/articles/us-inflation-consumer-price-index-october-2021-11636491959
[45] https://www.zerohedge.com/energy/green-energy-bubble-unrealistic-expectations
[46] Please see my October 27, 2021 testimony in front of the Senate Subcommittee on Government Operations & Border Management for more on this: https://www.hsgac.senate.gov/imo/media/doc/TESTIMONY%20-%20GOVOPS%20-%20OCT27%20-%20BRYCE.pdf
[47] This is the sixth time I have testified before Congress. I will reiterate here the same points I have been making for more than a decade about the need to increase our use of nuclear energy. When I testified before this committee in 2019, I said: "there is no reasonable or affordable pathway to decarbonization of the global electricity business that does not include large-scale deployment of nuclear energy. If the US wants to foster the innovation needed to sustain growth in nuclear-energy technology, Republicans and Democrats will have to forge significant, long-term commitments toward that goal." See: https://www.energy.senate.gov/services/files/78AC03A6-098A-45EE-84AF-A075670B62E6

I made a similar point earlier this year in testimony before the House Select Committee on the Climate Crisis. At that June 30 hearing, I said: "if this committee is serious about reducing greenhouse gas emissions while assuring societal resilience and the reliability of the electric grid,

it should be laser-focused on keeping all of our existing nuclear plants open and operating for as long as possible...If policymakers want to decarbonize our transportation system while enhancing the resilience of our society, the best option would be to have a grid that is heavily reliant on nuclear energy." See: https://docs.house.gov/meetings/CN/CN00/20210630/112853/HHRG-117-CN00-Wstate-BryceR-20210630.pdf