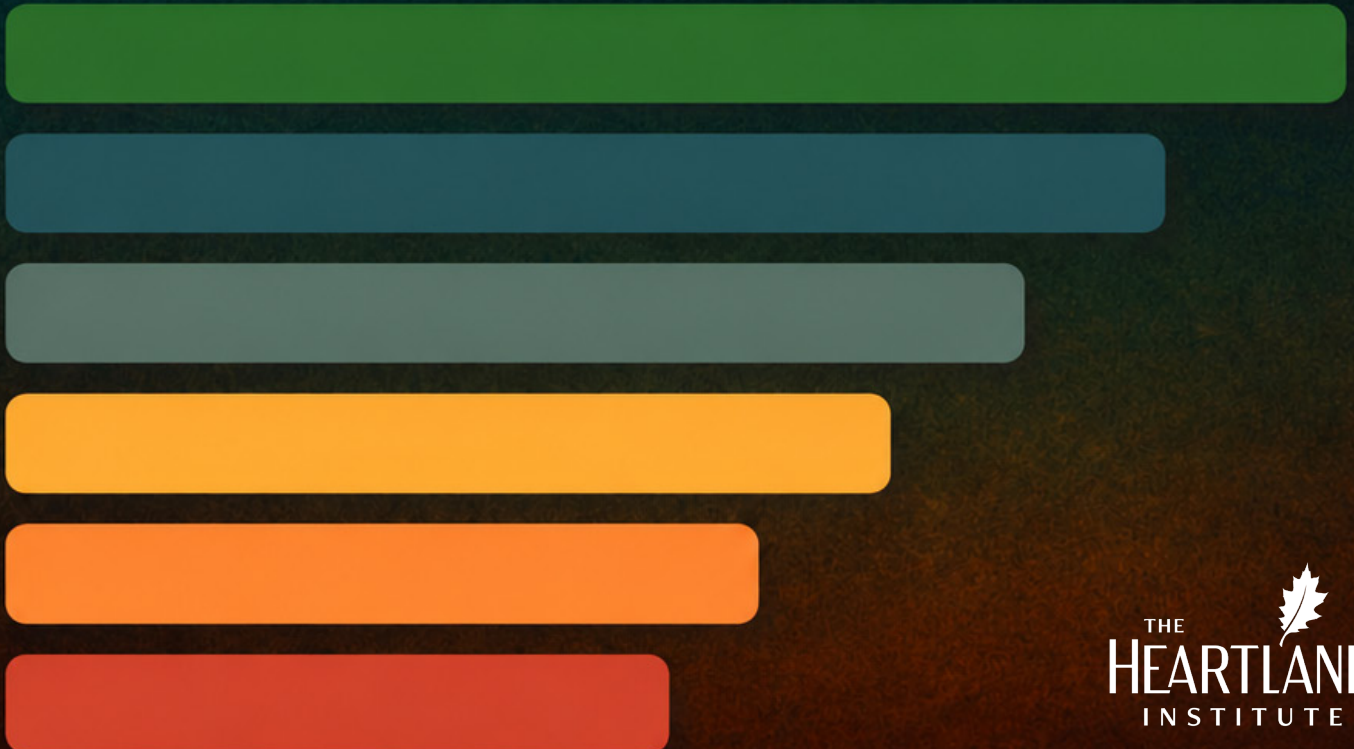




AUSTRIA ENERGY POLICY

A Roadmap to Affordable,
Reliable, Clean Electricity





James Taylor is President of The Heartland Institute, a national nonprofit research organization founded in 1984 to advance the power of free markets over central bureaucratic planning. The Economist calls Heartland “one of America’s most prominent conservative and libertarian think tanks” and “the world’s most prominent think tank supporting skepticism about man-made climate change.”

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visit our website at Heartland.org.**

1933 N. Meacham Road, Suite 550, Schaumburg, IL, 60173

POLICY STUDY

AUSTRIA ENERGY POLICY

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Executive Summary

Austrian energy policy is imposing high costs on businesses and consumers, which is reducing Austrian living standards. Fortunately, the poor political choices that are causing such harms can be corrected by prioritizing affordable and reliable energy sources.

As an added benefit, the energy sources that are most affordable and reliable are also the most environmentally friendly. Under a wise energy policy, Austrian environmental quality will increase alongside Austrian living standards.

Electricity prices in Austria are among the most expensive in the world. Among the world's 212 nations, Austria has the 13th most expensive electricity (<https://worldpopulationreview.com/country-rankings/cost-of-electricity-by-country>).

High electricity prices place Austrian households and businesses at a substantial competitive disadvantage in relation to other nations. Austrian electricity prices are nearly double US electricity prices and four times as expensive as Chinese electricity prices. Austrian businesses and industry cannot compete on the world stage when forced to absorb substantially higher operating costs in the form of extremely high electricity prices. That is a substantial factor in the recent stagnation of the Austrian industrial sector.

Extremely high electricity costs are not an accident, but are instead the result of disastrous political choices. Net-zero carbon dioxide policies force out the most affordable energy sources and replace them with substantially more expensive and less reliable 'renewable' power.

Just as poor political choices have imposed extremely high electricity costs on Austrian households, wise political choices can restore affordable, reliable, environmentally sound electricity generation.

This paper examines the composition and oversight of the Austrian electrical grid, the reasons Austrian electricity prices are so expensive, and the best policy prescriptions to restore affordable energy.

Fortunately, as documented in this paper, the same power sources that are the most affordable and reliable are also best for the environment. When competing power sources are properly assessed in a full-spectrum environmental analysis rather than merely carbon dioxide emissions, it is clear that the most environmentally friendly power sources are not politically mandated 'renewable' sources.

The Global Electricity Mix and Austria

The **global** electricity mix can be divided into four categories:

- The “fossil fuels” coal and natural gas produce a combined 58 percent of global electricity. (https://en.wikipedia.org/wiki/List_of_countries_by_electricity_production)
- Emissions-free and baseload-capable nuclear and hydro power produce a combined 23 percent.
- Intermittent wind and solar power produce a combined 14 percent.
- Miscellaneous sources such as oil, biomass, and geothermal produce a combined 5 percent.

Although each of nuclear, hydro, wind, and solar generate no air emissions during the power generation process itself (while nevertheless generating substantial emissions in the mining of rare minerals, the processing of rare earth minerals, and the construction of power-generating equipment), climate activists favor wind and solar while vehemently opposing nuclear and hydro.

Most nations generate far less than the global average 14 percent of electricity from wind and solar power. European nations with strict net-zero policies are the primary force lifting wind and solar to 14 percent of the global electricity mix.

Solar (13 percent) and wind (12 percent) comprise 25 percent of the Austrian electricity mix. Of the world’s 212 nations, only 18 utilize a higher percentage of wind and solar power than Austria. Most of the nations with a higher percentage of wind and solar power are also European nations.



High electricity prices place Austrian households and businesses at a substantial competitive disadvantage in relation to other nations. Austrian electricity prices are nearly double US electricity prices and quadruple Chinese electricity prices.

Austrian Electricity Prices Compared to Other Nations

At 34 U.S. cents per kilowatt hour (c/kwh), Austria has the 13th-highest electricity prices in the world. (<https://worldpopulationreview.com/country-rankings/cost-of-electricity-by-country>) Four of the nations with higher-priced electricity pay higher prices because they are small nations isolated from fuel sources or lacking in power generation (Bermuda, Cayman Islands, Liechtenstein, and the Bahamas). Among more “typical” nations, Austria has the 9th-highest electricity prices in the world.

High electricity prices place Austrian households and businesses at a substantial competitive disadvantage in relation to other nations. Austrian electricity prices are nearly double US electricity prices and quadruple Chinese electricity prices.

By the Numbers: Fuel Mix and Prices

The correlation between the Austria's high percentage of wind and solar generation and its high electricity prices is not accidental. Throughout the world, nations with high wind and solar percentages also have disproportionately high electricity prices. (https://en.wikipedia.org/wiki/List_of_countries_by_electricity_production)(<https://worldpopulationreview.com/country-rankings/cost-of-electricity-by-country>).

For example, all 13 nations generating at least one-third of their power from wind and solar have electricity prices among the highest 31 nations in the world. Accordingly, all of the top 13 wind and solar nations have electricity prices within the world's top 15 percent of nations ranked by expensiveness.

Distortions Hide Even Higher Wind and Solar Costs

Climate activists often claim wind and solar are “already cheaper than fossil fuels.” That is a false statement. Power providers may sometimes be able to purchase wind and solar power for less than conventional power, but that is only:

- after heavy subsidies are applied to wind and solar,
- after ignoring huge structural costs imposed on the grid by wind and solar (such as very expensive specialized new transmission lines necessary to transport wind and solar power),
- after assigning to conventional energy sources the costs that wind and solar impose on those conventional energy sources by requiring conventional baseload energy sources to still cycle in the background – without selling any power – in order for the grid to be prepared for dips in wind and solar output,

- during limited and unpredictable times when there is abundant wind and sunshine, and
- when laws and regulations require power providers to prioritize purchasing wind and solar over conventional energy sources.

Full-System Levelized Cost of Electricity

Taking into account all of the subsidies, impositions, and hidden costs of various energy sources, energy economists have documented the full-system levelized cost of electricity (<https://www.sciencedirect.com/science/article/abs/pii/S0360544222018035>). This is the true cost of powering the grid with various sources of power.

Economists first analyzed the comparative costs of competing electricity sources in Texas, USA, which is ideally suited for wind and solar. Texas is a very southerly location with few clouds and abundant sunshine. Also, western Texas is carpeted with massive wind turbine developments to take advantage of the consistently windy conditions.

Even in this paradise for wind and solar generation, wind and solar are strikingly inefficient and more expensive than conventional energy sources. In Texas, the full-system levelized cost of wind power is more than seven times the cost of natural gas power. Solar power is more than 10 times the cost of natural gas.

Economists next analyzed the comparative costs of competing electricity sources in Germany, which is representative of the generating conditions in much of Europe and Austria. In Germany, the full-system levelized cost of wind power is more than 13 times the cost of natural gas power. Solar power is nearly 40 times the cost of natural gas power.

The data are clear – whether in Europe, America, or virtually anywhere else, adding wind and solar to the electricity mix imposes dramatically higher prices on electricity consumers. Austria is no exception.

How the Austrian Energy Mix Has Changed in Recent Years

The percentage of Austrian electricity generated by wind and solar has doubled since 2020 and tripled since 2014. (<https://ourworldindata.org/profile/energy/austria>)

The increase in wind and solar generation is directly reflected in skyrocketing Austrian electricity prices. Since 2020, Austrian electricity prices have risen 40 percent. Since 2014, Austrian electricity prices have risen more than 50 percent.

Wind and Solar Impose Unique Environmental Harms

Austrians rightly expect strong environmental stewardship. Clean air, clean water, open spaces, and species protections are important components of power generation and usage.

Every type of power source has its own unique environmental impact. It is important to focus on each power source's full environmental impact rather than just a single component of environmental impact, such as just air pollution, just

land destruction, just species impacts, or just water and soil pollution. Every type of power source has its own unique environmental impact. It is important to focus on each power source's full environmental impact rather than just a single component of environmental impact, such as just air pollution, just land destruction, just species impacts, or just water and soil pollution.

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Emissions/air pollution. Nuclear, hydro, wind, and solar emit no carbon dioxide or traditionally defined pollutants during power generation. Coal and biomass produce significant emissions, though substantially less than in years and decades past. Natural gas produces some emissions but is relatively clean-burning. Natural gas emissions are closer to zero than they are to the emissions of coal and biomass.

A scale of 0 to 10, with 0 being no emissions, yields the following emissions/air pollution scores:

Nuclear	0
Hydro	0
Wind	0
Solar	0
Natural Gas	2
Coal	7
Biomass	7

Land conservation. Wind and solar power pose unique threats to open spaces and species protection. It requires approximately 60 square miles of solar panels to generate the same amount of power as a conventional power plant ([https://medium.com/@alkidel/the-land-footprint-of-solar-and-nuclear-and-wind-power-b4a8b2c42ba9#:~:text=Photovoltaic%20\(PV\)%20solar%20farms%20have,\(the%20equivalent%20wind%20farm\).](https://medium.com/@alkidel/the-land-footprint-of-solar-and-nuclear-and-wind-power-b4a8b2c42ba9#:~:text=Photovoltaic%20(PV)%20solar%20farms%20have,(the%20equivalent%20wind%20farm).)). It requires approximately 320 square miles of wind turbines to do the same ([https://medium.com/@alkidel/the-land-footprint-of-solar-and-nuclear-and-wind-power-b4a8b2c42ba9#:~:text=Like%20solar%2C%20because%20of%20wind,much%20bigger%20than%20Paris\)!](https://medium.com/@alkidel/the-land-footprint-of-solar-and-nuclear-and-wind-power-b4a8b2c42ba9#:~:text=Like%20solar%2C%20because%20of%20wind,much%20bigger%20than%20Paris)!)). Large-scale power production from wind and solar accordingly require substantial ecological damage and impact.

To put the land disruption of wind and solar power in perspective, scientists at Harvard University published a peer-reviewed study showing that meeting America's electricity usage solely with wind power would require covering fully one-third of America's landmass with wind turbines (<https://seas.harvard.edu/news/2018/10/large-scale-wind-power-would-require-more-land-and-cause-more-environmental-impact>). That would be absolutely catastrophic to open spaces, undeveloped lands, and native ecosystems.

Moreover, wind and solar power generation are often most efficient far away from urban centers and frequently require extensive networks of transmission wires to deliver wind and solar power to urban areas. Those networks of transmission wires further degrade and destroy open spaces.

The enormous amount of power transmission lines necessary for transporting wind and solar power to far-away population centers creates additional direct harms on otherwise undeveloped or minimally developed lands. Faulty or disrupted power lines are frequently the cause of major wildfires. Power transmission lines were the culprit in deadly and massively destructive fires recently in California, the Texas Panhandle, and the Hawaiian island of



Wind and solar power pose unique threats to open spaces and species protection. It requires approximately 60 square miles of solar panels to generate the same amount of power as a conventional power plant. It requires approximately 320 square miles of wind turbines to do the same. Large-scale power production from wind and solar accordingly require substantial ecological damage and impact.

Maui. The more power transmission lines that are necessary to deliver distant wind and solar power, the greater the likelihood of future catastrophic fires.

Hydro entails transforming river and stream environments to lake and pond environments. That is disruptive to existing ecosystems, though for land conservation purposes the end result is trading a river environment for a lake environment.

Coal mines can be fairly significant in size and disruption. Coal is typically delivered to power plants via existing railroads.

Natural gas is produced on a very small wellhead footprint. Natural gas is typically delivered to power plants via underground pipelines. A small portion of natural gas pipelines are above ground.

Biomass entails cultivating significant amounts of land for biomass fuel. This is somewhat mitigated when the fuel stocks are grown specifically for the purpose of cultivation.

A scale of 0 to 10, with 0 being the least disruptive and 10 being the most disruptive, yields the following land conservation scores:

Natural Gas	1
Hydro	2
Nuclear	2
Coal	4
Biomass	5
Solar	6
Wind	10

Direct animal kills. Land degradation directly harms species and ecosystems. Some forms of power generation additionally harm species and ecosystems through high numbers of direct kills. Peer-reviewed studies find wind turbines and solar power equipment in the United States kill more than 1 million birds and bats, including many protected and endangered species, each year (<https://wildlife.onlinelibrary.wiley.com/doi/abs/10.1002/wsb.260>). Also, the construction and operation of offshore wind power projects is directly correlated with whale and dolphin beachings and high mortality events (<https://>

www.caesarrodney.org/energy-updates2/Offshore-Wind-is-Killing-Whales.htm). More wind and solar power will drive those direct-kill numbers even higher.

Hydro dams will negatively impact ecosystems during construction. Also, hydro dams have significant impacts on salmon and other fish species. This is somewhat mitigated by positive impacts for other species.

A scale of 0 to 10, with 0 entailing little or no direct animal kills, yields the following scores:

Natural Gas	0
Nuclear	1
Coal	2
Hydro	3
Biomass	5
Solar	5
Wind	7

Soil and water pollution and impacts. All power generation sources have impacts that degrade soil and water. Some are far more damaging than others.

Construction of a hydroelectric dam will flood existing land and may impede fish migration. However, those harms may be largely balanced by the benefits to many plants and animals from the creation of a new pond or lake.

The environmental impacts of coal mining are becoming smaller all the time, especially with the requirement that the land affected by a coal mine must be restored to its pre-mining condition after completion of mining. Still, mining itself substantially degrades the land during mining operations and can lead to additional issues of air and water pollution.

Uranium mining faces similar environmental obstacles as coal mining, though much less uranium than coal is required to power a full-scale power plant.

With recent advances in hydraulic fracturing and directional drilling, natural gas production requires a very small footprint to produce prodigious amounts of natural gas.

Biomass requires the destruction of forests or the development of previously undeveloped lands to produce the biological material necessary to fuel biomass facilities.

Wind and solar equipment requires the mining, refining, and utilization of substantial amounts of toxic metals and rare-earth minerals. Rare-earth mining and the refining of rare-earth minerals are among the most environmentally destructive practices on the planet, typically resulting in widespread and heavily toxic pollution of soil and water (<https://hir.harvard.edu/not-so-green-technology-the-complicated-legacy-of-rare-earth-mining/>).

A scale of 0 to 10, with 0 being minimally damaging, yields the following soil and water pollution scores:

Natural Gas	1
Hydro	2
Nuclear	2
Coal	4
Biomass	4
Solar	7
Wind	7

Total environmental impact. Adding together the four environmental impact scores above yields the following total environmental impact scores, with lower total scores equating to less environmental harm:

Natural Gas	4
Nuclear	5
Hydro	7
Coal	17
Solar	18
Biomass	21
Wind	24

Converted to a 0-to-10 scale consistent with the “affordable” and “reliable” factors, here are the comparable “clean” scores, with lower scores equating to less environmental harm:

Natural Gas	1
Nuclear	1
Hydro	2
Coal	5
Solar	5
Biomass	6
Wind	7

Conclusion

Austrian energy policy is imposing high costs on businesses and consumers, which is reducing Austrian living standards. Fortunately, the poor political choices that are causing such harms can be corrected by prioritizing affordable and reliable energy sources.

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1933 North Meacham Road, Suite 550
Arlington Heights, IL 60004

Heartland.org

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or call (312) 377-4000.