

# PPHB



## Energy Musings

Insights into the Energy Industry



Allen Brooks, Managing Director

*Energy Musings* contains articles and analyses dealing with important issues and developments within the energy industry, including historical perspective, with potentially significant implications for executives planning their companies' future. While published every two weeks, events and travel may alter that schedule. I welcome your comments and observations. Allen Brooks

May 3, 2022

### Dominion's Huge Offshore Wind Farm Gets Pushback

The largest U.S. offshore wind farm by a utility is planned off Virginia. Its cost rose \$2 billion to \$9.8 billion. With rampant inflation, many customers are concerned about future cost increases.

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### Battle Over EVs, Emissions, And Mining

Elon Musk has dominated the news with his Twitter takeover. His concern over lithium for Tesla's batteries reflects a key challenge for the EV industry. Volvo's EV emissions study is alarming.

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### Coal Makes Comeback Upsetting Green Agenda

Almost daily there are announcements of new or reactivated coal-fired power plants and new coal mines, as utilities around the world are resorting to the dirty fuel because of the high price of gas.

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**An Alternative Supply Option For Europe's Natural Gas Problem**

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## Dominion’s Huge Offshore Wind Farm Gets Pushback

Utility company Dominion Energy, Inc., which provides electricity in three states (Virginia, North Carolina, and South Carolina) and natural gas in 10 states across the U.S., is planning to build the nation’s largest offshore wind farm. Coastal Virginia Offshore Wind (CVOW) will have 176 turbines, each rated at 14.7 megawatts (MW) of generating capacity, creating a wind farm with a nameplate capacity of 2,587 MW. The turbines will be positioned on a federal lease the company holds located 27 miles off the coast of Virginia Beach, Virginia.

For nearly two years, Dominion Energy has been operating two 6-MW offshore wind turbines in a test operation to gather intelligence about offshore Virginia wind for planning the company’s much larger wind farm. This first federal offshore wind farm (Block Island Offshore Wind Farm, the nation’s first offshore wind farm, is in Rhode Island state waters) is scheduled to begin construction in 2024 and be operational in 2026 at a cost of \$9.8 billion. The cost estimate jumped last fall by \$2 billion from the initial projection. Many observers were shocked at the magnitude of the increase, and Virginia customers are concerned the cost may increase further driving electricity bills higher than presently projected.

The two test wind turbines are smaller than those planned for CVOW. They stand 600 feet tall, while the 176 new ones will rise a third higher at 800 feet. They will be positioned sufficiently far offshore that they will not be visible from the shore, a major objection of coastal residents for nearly every offshore wind farm project along the East Coast. These turbines are being used to shore up Dominion’s credentials as an “acknowledged leader in the development of offshore wind in the United States.”

**Exhibit 1. Dominion’s Offshore Wind Farm Well Removed From Coastal Objections**



Source: Dominion Energy

Last November, Dominion filed for approval and certification of CVOW and Rider Offshore Wind, the actual operator of the offshore wind generating assets and interconnector transmission lines that will provide the electricity to the company's subsidiary, Virginia Electric and Power Company, with the Virginia State Corporation Commission (SCC) that regulates electricity providers in the state. The 11-volume filing contained detailed information about the project including the details about its construction, as well as its compliance with prevailing Virginia regulations and the economic benefits of the project. Much of the information delivered was done through testimony of company employees with responsibility for the specific areas. There were also many exhibits in the filing supporting the testimony. Not surprisingly, the financial terms of the supplier contracts were blacked out or discussed in sections of the filing labeled "Extraordinarily Sensitive Material" and not available for the public to see. Of course, it is exactly the information we want to see.

What we know with certainty is that the key contracts for the equipment – provision of the turbines and towers – have a fixed price, although they contain steel price index adjustment clauses, but the pertinent details are redacted. Since we have information about foreign currency hedging arrangements Dominion has executed to shield the project's cost from foreign currency fluctuations, we can begin to zero in on rough estimates of the cost of certain components.

CVOW has Euro and Danish kroner exposure to the tune of €2.876 (\$3.399) billion and Kr 3,895 (\$622) million in costs for equipment and services. If we use the total of these foreign currency exposures (equipment is being purchased from Siemens Gamesa, a European company), each of the 176 turbines has an associated cost of \$22.8 million. That amounts to approximately \$4.0 billion, or 41% of the estimated total expense for building the wind farm. That figure does not include the installation cost, as Dominion is building an offshore vessel capable of installing the wind turbines and which will be Jones Act compliant, meaning it must be U.S. owned, built, and staffed with Americans. The vessel will cost \$500 million, and it will use cranes purchased from Huisman of the Netherlands. We have seen nothing that indicates the vessel cost is part of CVOW, only the installation costs are in the remaining 59% of the project estimated cost.

Substantial sums of money will be spent on the cables that gather the power generated offshore and transmit it to shore facilities. The power will go through a new coastal right-of-way agreed among Dominion, the U.S. Navy, and the City of Norfolk, and which will connect with newly configured overhead transmission lines to take the power inland. This equipment and construction expense is part of the remaining 59% of the \$9.8 billion estimated cost of the project. There is a contingency reserve of \$500 million in the total \$9.8 billion cost estimate.

On March 25th, the SCC held a hearing about the proposed plan. Witnesses representing the company and organizations with interests in the project testified. The witness transcripts and supporting written testimony were made public. Uniform concern was expressed about the project's dramatic cost last fall, such that all interveners want heightened SCC monitoring of the project's progress. The question was how frequently the project should be reviewed and how much additional cost could be allowed before the SCC should reconsider the project's approval.

These concerns were presented within the framework of the Virginia Clean Economy Act (VCEA) that was enacted into law in April 2020 by the Democrat controlled legislature and signed into law by the Democrat governor. This legislation incorporated clean energy directions that were in Virginia's then-Governor Ralph Northam's Executive Order Forty-Three issued in 2019. His order came after extensive stakeholder input and incorporated environmental justice concepts related to the Democrat Party's Green New Deal. The VCEA legislation, while different from Rhode Island's legislative rewrite of its Public Utility Commission renewable energy rules that facilitated the construction of the Block Island Offshore Wind farm, essentially accomplished the same result

by adopting a key policy. Both states outlawed the use of cost/benefit analysis of renewable energy projects. Renewable energy projects are to be evaluated on a different basis than other electricity generation sources.

The key requirements of VCEA are: 1) it requires 100% clean energy by 2050; 2) utilities must procure 3,100 MW of new energy storage by 2035; 3) at least 35% of the new storage MWs must be procured from third parties; 4) behind-the-meter storage must equal 10% of the 2035 storage target; and 5) the SCC must implement, by January 1, 2021, interim targets, programmatic support, and planning reforms germane to the 2035 energy storage target.

As part of the 100% clean energy by 2050 requirement, the legislation establishes a state renewable portfolio standard (RPS) that would apply to Appalachian Power by 2045 and to Dominion Energy Virginia by 2050, with specific targets for energy storage, solar, and wind power. It additionally requires that nearly all coal-fired power plants be closed by the end of 2024. The RPS is applicable to every form of renewable energy.

The legislation contained many specific mandates for each of the power companies operating in Virginia. For example, for Dominion, the VCEA requires the company to petition the SCC for approval to acquire 16,100 MW of capacity from solar or wind resources. Included in that target, Dominion must include 1,100 MW of solar generation from projects of up to 3 MW in size, and 5,200 MW of offshore wind generation. CVOW would represent almost half of the required offshore wind supply target.

Because of VCEA, there is little that those concerned about CVOW can do other than urge the SCC to closely monitor the project's pace of development and its cost. However, the testimony of Scott Norwood representing the Attorney General of Virginia, who represents the interests of the public, contained other criticisms.

Norwood, a Texas based utility consultant, reached three important conclusions from studying Dominion's filing. Those conclusions were:

1. The \$9.8 billion CVOW Project is not needed to serve the Company's system capacity requirement through at least 2035;
2. the capital costs are approximately 2 to 3 times the cost of solar resources; and
3. VEPCO's [Dominion] forecasted economic benefits of the Project are based on a cost/benefit analysis ("CBA") that overstates the benefits, which remain within the margin of error for a 34-year forecast of utility system costs.

Based on his conclusions, and considering VCEA's public interest declaration of offshore wind and the specific mandates for Dominion, Norwood recommended the following actions:

In consideration of the high fixed cost of the CVOW Project and the significant risks posed to customers, if approved, Mr. Norwood recommends that VEPCO be required to file periodic status reports, similar to the requirement for the Virginia City Hybrid Energy Center, that address the performance and cost of the Project through the construction period and for at least the first year of commercial operations.

The company's economic analysis of CVOW concluded that its total Levelized Cost of Energy (LCOE) was within the required range of the Virginia regulations. This requirement is spelled out in the following language from the regulations:

...the project's projected total levelized cost of energy, including any tax credit, on a cost per megawatt hour basis, inclusive of the costs of transmission and distribution facilities associated with the facility's interconnection, does not exceed 1.4 times the comparable cost, on an unweighted average basis, of a conventional simple cycle combustion turbine generating facility as estimated by the U.S. Energy Information Administration [EIA] in its Annual Energy Outlook 2019;

To define that comparable cost target, a Dominion official presented the following table from the EIA. Using the LCOE including the tax credit for a simple cycle combustion turbine of \$89.30, the 1.4 multiple yields a maximum LCOE price per megawatt-hour (MWh) of \$125.02. Dominion Energy said its estimate of the LCOE for CVOW is \$73/MWh in 2018\$ and \$87/MWh in 2027\$. Those costs are well within the maximum. However, Norwood pointed out that CVOW is 1.5 times the cost of solar power, which Dominion is also required to contract. Furthermore, he said, "This cost is more than recent public cost estimates for a new nuclear plant..."

**Exhibit 2. The Cost Bogy CVOW Must Meet For Approval**

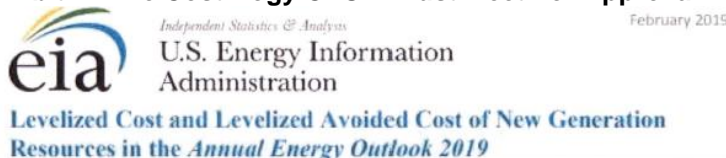


Table 1b. Estimated levelized cost of electricity (unweighted average) for new generation resources entering service in 2023 (2018 \$/MWh)

Plant type	Capacity factor (%)	Levelized capital cost	Levelized fixed O&M	Levelized variable O&M	Levelized transmission cost	Total system LCOE	Levelized tax credit <sup>1</sup>	Total LCOE including tax credit
<b>Dispatchable technologies</b>								
Coal with 30% CCS <sup>2</sup>	85	61.3	9.7	32.2	1.1	104.3	NA	104.3
Coal with 90% CCS <sup>2</sup>	85	50.2	11.2	36.0	1.1	98.6	NA	98.6
Conventional CC	87	9.3	1.5	34.4	1.1	46.3	NA	46.3
Advanced CC	87	7.3	1.4	31.5	1.1	41.2	NA	41.2
Advanced CC with CCS	87	19.4	4.5	42.5	1.1	67.5	NA	67.5
Conventional CT	30	28.7	6.9	50.5	3.2	89.3	NA	89.3
Advanced CT	30	17.6	2.7	54.2	3.2	77.7	NA	77.7
Advanced nuclear	90	53.8	13.1	9.5	1.0	77.5	NA	77.5
Geothermal	90	26.7	12.9	0.0	1.4	41.0	-2.7	38.3
Biomass	83	36.3	15.7	39.0	1.2	92.2	NA	92.2
<b>Non-dispatchable technologies</b>								
Wind, onshore	41	39.8	13.7	0.0	2.5	55.9	-6.1	49.8
Wind, offshore	45	107.7	20.3	0.0	2.3	130.4	-12.9	117.5
Solar PV <sup>3</sup>	29	47.8	8.9	0.0	3.4	60.0	-14.3	45.7
Solar thermal	25	119.6	33.3	0.0	4.2	157.1	-35.9	121.2
Hydroelectric <sup>4</sup>	75	29.9	6.2	1.4	1.6	39.1	NA	39.1

<sup>1</sup>The tax credit component is based on targeted federal tax credits such as the PTC or ITC available for some technologies. It reflects tax credits available only for plants entering service in 2023 and the substantial phase out of both the PTC and ITC as scheduled under current law. Technologies not eligible for PTC or ITC are indicated as NA or not available. The results are based on a regional model, and state or local incentives are not included in LCOE calculations. See text box on page 2 for details on how the tax credits are represented in the model.

<sup>2</sup>Because the New Source Performance Standard (NSPS) under Section 111(b) of the Clean Air Act requires conventional coal plants to be built with CCS to meet specific CO2 emission standards, EIA modeled two levels of CCS removal: 30%, which meets the NSPS, and 90%, which exceeds the NSPS but may be seen as a build option in some scenarios. The coal plant with 30% CCS is assumed to incur a three-percentage-point increase to its cost of capital to represent the risk associated with higher emissions.

<sup>3</sup>Costs are expressed in terms of net AC power available to the grid for the installed capacity.

<sup>4</sup>As modeled, EIA assumes that hydroelectric generation has seasonal storage so that it can be dispatched within a season, but overall operation is limited by resources available by site and season.

CCS=carbon capture and sequestration. CC=combined-cycle (natural gas). CT=combustion turbine. PV=photovoltaic. Source: U.S. Energy Information Administration, Annual Energy Outlook 2019

Source: EIA

Another criticism of the filing was the inclusion of \$9/MWh in the LCOE calculation for the sale of RECs (Renewable Energy Certificates). These certificates are created when renewable energy is sold, and they can be utilized by polluting companies to meet their emission reduction commitments. RECs are sold at market values, so establishing a future price is somewhat speculative. Dominion counters that within the 25-year life of the wind farm and with no RECs, the LCOE rises to \$100/MWh, but still below the \$125/MWh price cap.

Another issue with the economics of CVOW is that it is expected to provide a \$2.5 billion cumulative net present value (NPV) benefit for customers. The calculation reflects the company's estimate of a \$3.2 billion benefit from the Social Cost of Carbon. The net benefit total appears to show a negative NPV benefit of CVOW for customers that is offset by the huge carbon credit. This is at the heart of the Virginia Attorney General's critique of the project.

Testimony was recently filed dealing with the claims that CVOW will create jobs and tax growth. The SCC said Dominion relied on a "stale" study and did not account for the impact of its Virginia customers bearing the full cost of the project. SCC found in its analysis that the project has economic costs in the loss of 1,100 jobs in the first five rate-years of CVOW. It also said the new investment stimulated by CVOW will occur in industries located in the Hampton Roads area, which SCC termed "speculative."

Dominion's initial defense is that VCEA does not allow consideration of such a cost/benefit analysis. The company also said it relied on a study but did not have to prepare one. Also, the use of cost data from the U.K. was appropriate because the U.S. had no such data because our industry is immature. Besides, that U.K. data does not mean it was unreliable when used in the analysis. Lastly, Dominion criticized the SCC's view that a rate increase will cause Virginia residents to reduce spending on other items as "overly simplified" because people might reduce their savings instead. People are always having to make choices about how they spend their incomes. When power costs become a decision about lights versus food or rent, you have defined "energy poverty." Based on the most recent U.S. Census data, Virginia had the tenth lowest poverty rate of all the states at 10.6% of its population living below the national poverty line. We suspect the state income total is skewed by Northern Virginia, which is the suburb of Washington, D.C. When one looks at the poverty rate in many Virginia cities outside of the northern region, there were rates 1.5-4.0 times the state average rate. Ratepayers in these cities are ones who could easily fall into energy poverty, if not already there. In fact, the state's capital, Richmond, where Dominion is headquartered, has a poverty rate 2.5 times the state average.

Customers are concerned with the offshore wind project's impact on their electricity bills. Dominion provided an analysis of the impact on customer bills beginning after September 1, 2022. The monthly bill of a customer using 1,000 kilowatt-hours (kWh) of electricity will increase by only \$1.45, or up 1.1%, during summer months. In the other base months, the increase is a few pennies more, but still only a 1.1% hike. That percentage increase is consistent across most classes of monthly power users, but it does rise to 1.1% in the summer and 1.3% in base months for the largest power users.

**Exhibit 3. How CVOW Will Impact Dominion Customer Electricity Bills**

VIRGINIA ELECTRIC AND POWER COMPANY  
TYPICAL BILLS - RESIDENTIAL - SCHEDULE 1

SUMMER MONTHS

KWH	EFFECTIVE FOR USAGE ON AND AFTER 9/1/2022				EFFECTIVE FOR USAGE ON AND AFTER 9/1/2022				DIFFERENCE	PERCENT DIFFERENCE
	BASIC RATE #	APPLICABLE NON-FUEL RIDERS##	FUEL *	TOTAL BILL	BASIC RATE #	APPLICABLE NON-FUEL RIDERS##	FUEL*	TOTAL BILL		
500	\$40.34	\$18.32	\$10.22	\$68.88	\$40.34	\$19.04	\$10.22	\$69.60	\$0.72	1.0%
750	\$56.29	\$27.47	\$15.34	\$99.10	\$56.29	\$28.56	\$15.34	\$100.19	\$1.09	1.1%
1,000	\$74.14	\$36.68	\$20.45	\$131.27	\$74.14	\$38.13	\$20.45	\$132.72	\$1.45	1.1%
1,500	\$110.82	\$54.97	\$30.67	\$196.46	\$110.82	\$57.14	\$30.67	\$198.63	\$2.17	1.1%
2,000	\$147.50	\$73.27	\$40.90	\$261.67	\$147.50	\$76.17	\$40.90	\$264.57	\$2.90	1.1%
2,500	\$184.18	\$91.64	\$51.12	\$326.94	\$184.18	\$95.26	\$51.12	\$330.56	\$3.62	1.1%
3,000	\$220.86	\$109.95	\$61.34	\$392.15	\$220.86	\$114.29	\$61.34	\$396.40	\$4.34	1.1%
5,000	\$367.59	\$183.27	\$102.24	\$653.10	\$367.59	\$190.51	\$102.24	\$660.34	\$7.24	1.1%

BASE MONTHS

KWH	EFFECTIVE FOR USAGE ON AND AFTER 9/1/2022				EFFECTIVE FOR USAGE ON AND AFTER 9/1/2022				DIFFERENCE	PERCENT DIFFERENCE
	BASIC RATE #	APPLICABLE NON-FUEL RIDERS##	FUEL *	TOTAL BILL	BASIC RATE #	APPLICABLE NON-FUEL RIDERS##	FUEL*	TOTAL BILL		
500	\$40.34	\$18.32	\$10.22	\$68.88	\$40.34	\$19.04	\$10.22	\$69.60	\$0.72	1.0%
750	\$56.29	\$27.47	\$15.34	\$99.10	\$56.29	\$28.56	\$15.34	\$100.19	\$1.09	1.1%
1,000	\$69.75	\$36.68	\$20.45	\$126.88	\$69.75	\$38.13	\$20.45	\$128.33	\$1.45	1.1%
1,500	\$95.45	\$54.97	\$30.67	\$181.09	\$95.45	\$57.14	\$30.67	\$183.26	\$2.17	1.2%
2,000	\$121.14	\$73.27	\$40.90	\$235.31	\$121.14	\$76.17	\$40.90	\$238.21	\$2.90	1.2%
2,500	\$146.84	\$91.64	\$51.12	\$289.60	\$146.84	\$95.26	\$51.12	\$293.22	\$3.62	1.3%
3,000	\$172.53	\$109.95	\$61.34	\$343.82	\$172.53	\$114.29	\$61.34	\$348.16	\$4.34	1.3%
5,000	\$275.32	\$183.27	\$102.24	\$560.83	\$275.32	\$190.51	\$102.24	\$568.07	\$7.24	1.3%

# Basic rate includes base distribution, generation and embedded transmission rates.  
## Reflects current and pending applicable non-base rate riders to be effective September 1, 2022 without proposed Rider OSW change.  
### Reflects current and pending applicable non-base rate riders to be effective September 1, 2022 with proposed Rider OSW change.  
\* Reflects total current fuel level of \$0.020448 per kWh.

Source: Dominion Energy

What was also disclosed in the filing was that the monthly increase could rise to \$20 by 2027. While the Virginia Attorney General targeted that potential price hike, Dominion countered that this estimated increase assumes the construction of a second wind farm of roughly equal size, as envisioned in the VCEA mandate. The second wind farm has an estimated price tag of \$11 billion, but the estimate is only a placeholder since no plans have been prepared.

A witness for the Sierra Club concluded that the CVOW plan does not meet the diversity, equity and inclusion targets outlined in state law. Therefore, he recommended that SCC should direct Dominion to file a new economic plan delineating a clearer vision, identifying specific metrics to be tracked, and how the social targets will be met.

Charlottesville-based Clean Virginia filed testimony arguing that given Dominion’s limited experience in developing offshore wind, if the project’s costs exceed the \$9.8 billion estimate the company and not the customers should be at financial risk. Another party concerned about the cost of CVOW was retailer Walmart. It submitted a letter commenting that it is supportive of renewable energy but was concerned about the wind farm’s cost. Walmart wants the SCC to put measures in place to protect customers from possible project cost overruns. Given the magnitude of overall inflation, let alone the explosion in the cost of raw materials needed for wind turbines, these concerns over further project cost inflation are valid.

CVOW still needs approval from the SCC, which will hold hearings starting May 16<sup>th</sup>. Public comment is open until then. The SCC’s decision on whether to approve the project and allow the

cost of it to be recovered from ratepayers is due by August 5. Dominion's project has a timetable that does not allow for any extended delays or major plan revisions. It met the Fall 2021 filing target date and is counting on the SCC approval by the due date. It assumes the Bureau of Ocean Energy Management (BOEM) will give final federal government approval to the project by June 2023 that would allow onshore construction work to begin during Q3 2023. Late in 2023 is the estimated delivery date for the offshore wind turbine construction vessel currently under construction. Offshore construction is targeted to begin in Q2 2024 with completion in late 2026 to be followed immediately by the start of electricity generation or in early 2027. This project is certainly one to be monitored for implications for other major offshore wind projects being developed along the East Coast.

## Battle Over EVs, Emissions, And Mining

Tesla just reported its financial results for the first quarter of 2022. Net earnings were seven-times greater than the year-ago quarter, as automotive revenues rose 87%. Regulatory credits increased 31% year over year to \$679 million, but the real eyeopener was the 132% increase in automotive gross profit, reaching \$5.5 billion. This increase was driven by a 635 basis points increase in automotive's gross profit margin, climbing from 26.5% in Q1 2021 to 32.9% this quarter.

The combination of an increase in the average selling price, along with more units delivered and a small reduction in the cost of those vehicles is what drove the profitability increase. Tesla's "strong" earnings performance that beat Wall Street analyst estimates handily – \$3.22 vs. \$2.26 analyst average according to FactSet – received less attention than expected because CEO Elon Musk's then-ongoing battle with Twitter was dominating the news.

In the electric vehicle (EV) space, Musk has been making some interesting comments germane to the industry's future. He has highlighted the inflation in raw material costs and the need for EV companies to be more aggressive in securing its future material supplies. While all materials are facing supply challenges, driving up prices, Musk's primary concern is the supply of lithium.

Early in April, Musk tweeted that Tesla might get into lithium mining and refining directly and at scale because the cost of this critical metal has gotten to "insane" levels. He tweeted the history of lithium prices since 2012 (below), reflecting a 17.5-times increase with 2022 prices touching \$78,032 per ton. In another tweet, Musk pointed out that lithium is not rare in the Earth's crust, but the "pace of extraction/refinement is slow."



**Exhibit 4. Soaring Lithium Prices Unnerving EV Industry**



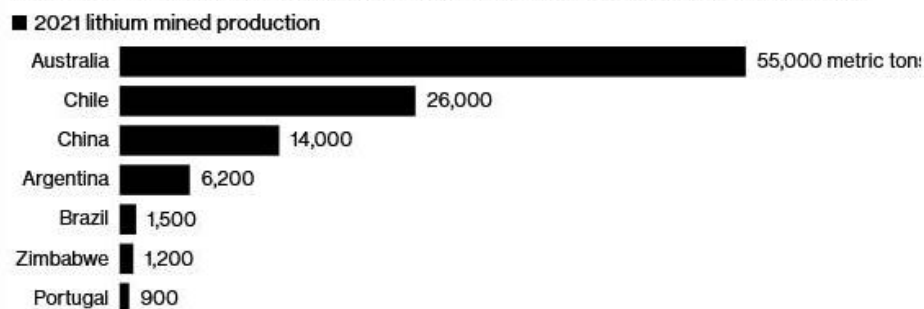
Source: *Twitter*

While lithium is prevalent around the world, it is mined in only a handful of countries, and the refining is limited to fewer countries. The chart below shows lithium mined by the leading countries. Australia is the world’s largest lithium supplier, with Chile and China in second and third places. Some of the large mines in Australia and elsewhere have partial Chinese ownership, which would change the country output rankings if production were based on ownership.

**Exhibit 5. Few Producers Of Lithium Is A Problem**

**A Handful Suppliers**

Lithium mined production concentrates in a few major producing countries



Source: USGS  
Note: Data on the United States is not available as it withheld its lithium production number.

Source: *Bloomberg*

The chart below from *Bloomberg NEF* shows a ranking of countries by their lithium mining output as well as their lithium refining capacity, which is equally critical. The chart also shows their estimate of ranking shifts by 2025. By mineral output and refining, China is the dominant country. It is also the number one country in lithium demand, reflecting its large EV and electronics industries. There is little in either this chart or the prior one to suggest that any country will displace China's lithium industry dominance in the foreseeable future. With global demand for lithium escalating along with the transition to a green economy, the availability of lithium is likely to become a restraining factor in the transition.

### Exhibit 6. The World Of Lithium Supply And Processing And Its Future

Country	2020 rank	Raw material	Cell & component	Environ.	RII	Demand	2025 rank	Raw material	Cell & component	Environ.	RII	Demand
China	1	1	1	16	11	1	1	1	1	15(▲1)	11	1
Japan	2	12	2	6	7	6	2	8(▲4)	3(▼1)	7(▼1)	7	8(▼2)
S. Korea	3	17	2	9	5	2	8(▼5)	16(▲1)	2	13(▼4)	5	9(▼7)
Canada	4	4	10	4	10	11	5(▼1)	3(▲1)	12(▼2)	4	10	6(▲5)
Germany	4	17	6	12	2	2	6(▼2)	22(▼5)	6	9(▲3)	2	3(▼1)
U.S.	6	15	4	13	6	2	3(▲3)	13(▲2)	3(▲1)	7(▲6)	6	2
U.K.	7	17	6	9	4	6	8(▼1)	17	8(▼2)	10(▼1)	4	4(▲2)
Finland	8	11	13	5	3	13	7(▲1)	10(▲1)	8(▲5)	6(▼1)	3	17(▼4)
France	8	17	13	1	9	5	10(▼2)	17	12(▲1)	1	9	5
Sweden	10	22	13	3	1	8	4(▲6)	17(▲5)	7(▲6)	3	1	7(▲1)
Australia	11	2	13	21	12	8	11	2	12(▲1)	19(▲2)	12	11(▼3)
Brazil	12	3	13	2	24	23	12	7(▼4)	18(▼5)	2	24	15(▲8)
Poland	12	22	5	11	13	14	13(▼1)	22	5	12(▼1)	13	19(▼5)
Hungary	12	22	6	8	14	15	15(▼3)	22	8(▼2)	11(▼3)	14	18(▼3)
Czech Rep.	15	17	10	17	8	17	16(▼1)	17	12(▼2)	17	8	21(▼4)
India	16	9	13	19	18	11	16	13(▼4)	18(▼5)	21(▼2)	18	10(▲1)
Chile	17	6	13	18	16	20	14(▲3)	4(▲2)	12(▲1)	15(▲3)	16	23(▼3)
Vietnam	18	16	6	22	20	10	23(▼5)	17(▼1)	12(▼6)	23(▼1)	20	12(▼2)
S. Africa	19	5	13	23	17	19	20(▼1)	4(▲1)	18(▼5)	19(▲4)	17	22(▼2)
Argentina	20	12	13	6	22	24	16(▲4)	8(▲4)	18(▼5)	5(▲1)	22	25(▼1)
Indonesia	21	7	13	25	21	15	20(▲1)	4(▲3)	18(▼5)	24(▲1)	21	13(▲2)
Mexico	22	12	13	15	19	22	16(▲6)	12	18(▼5)	13(▲2)	19	16(▲8)
Thailand	23	22	10	19	15	17	22(▲1)	22	8(▲2)	21(▼2)	15	20(▼3)
D.R.C.	24	8	13	14	25	24	25(▼1)	10(▼2)	18(▼5)	18(▼4)	25	24
Philippines	25	9	13	24	23	20	24(▲1)	13(▼4)	18(▼5)	25(▼1)	23	14(▲6)

Source: BloombergNEF. Note: "Environ." is environmental. "RII" is regulations, infrastructure and innovation. Red represents countries in the Asia-Pacific region, teal countries in Europe and Africa, and blue countries in the Americas. The symbol represents if country has moved up or down the rankings in comparison to its 2020 score, green represents up and red represents down. The number shows the number of places the country has moved

Source: Bloomberg

Recently, Tesla raised prices across all its models. The percentage increases ranged widely, likely reflecting the amounts of raw materials and semiconductors needed in building the vehicle. In Tesla's earnings call with investors and analysts, Musk addressed the price hikes.

Actually, on the price increase front, I should mention that it may seem like maybe we're being unreasonable about increasing the prices of our vehicles given that we had record profitability this quarter. But the waitlist for our vehicles is quite long and some of the vehicles that people order, the waitlist extends into next year. So, our prices of vehicles ordered now are really anticipating supplier and logistics cost growth that we're aware of and believe will happen over the next six to 12 months. So that's why we have the price increases today because a car ordered today will arrive, in some cases, a year from now.

Preemptive price hikes are factoring in the trends in raw material costs and other input prices. Tesla CFO Zachary Kirkhorn said on the same call, addressing Musk's price hike comments, "If that growth in cost is not materialized, we actually may slightly reduce prices." Our betting is that if Tesla's delivery backlog continues to stretch out for a year, there will not be major price reductions. As Musk put it, Tesla has a supply challenge, not a demand shortage.

Suddenly, we are seeing traditional auto manufacturers announcing long-term raw material supply contracts that are designed to put to rest investor fears that company business strategies involving billions of dollars in capital investments to facilitate the EV transition could be derailed by a lack of key materials, especially those needed in the batteries that are critical to the shift.

The focus on batteries and the minerals required is heightening the appreciation for the cost inflation these materials are inflicting on the green energy revolution. Rare earth minerals, and particularly lithium, are key to every clean energy technology. These cost increases are impacting the profitability of wind turbine manufacturers, as we have discussed. Those cost pressures are not going away, and in some cases, managements are suggesting they are getting worse.

Richard Adkerson, CEO of Freeport-McMoRan Copper & Gold Inc., told *CNBC* recently that with a known mineral deposit, it takes 5-10 years to open a new mine. We know the International Energy Agency (IEA) said in its report last year on critical minerals for the green energy transition that new mines take on average 16 years to come into production. Energy consultant Wood Mackenzie said that for EVs to account for two-thirds of all new car purchases in 2030, only eight years away, dozens of new mines will be needed. These are telling facts about the limitations of the rare earth and other key green energy minerals to expand its supply chain rapidly to meet current growth projections. In other words, it is best to discount forecasts.

A 2020 World Bank study focused on the mineral intensity of the clean energy transition. The report commented on the clean energy technologies being significantly more material intensive than traditional fossil fuel-based energy supply systems. But the report went on to state:

Despite the higher mineral intensity of renewable energy technologies, the scale of associated greenhouse gas emissions is a fraction of that of fossil fuel technologies. However, the carbon and material footprints cannot be overlooked.

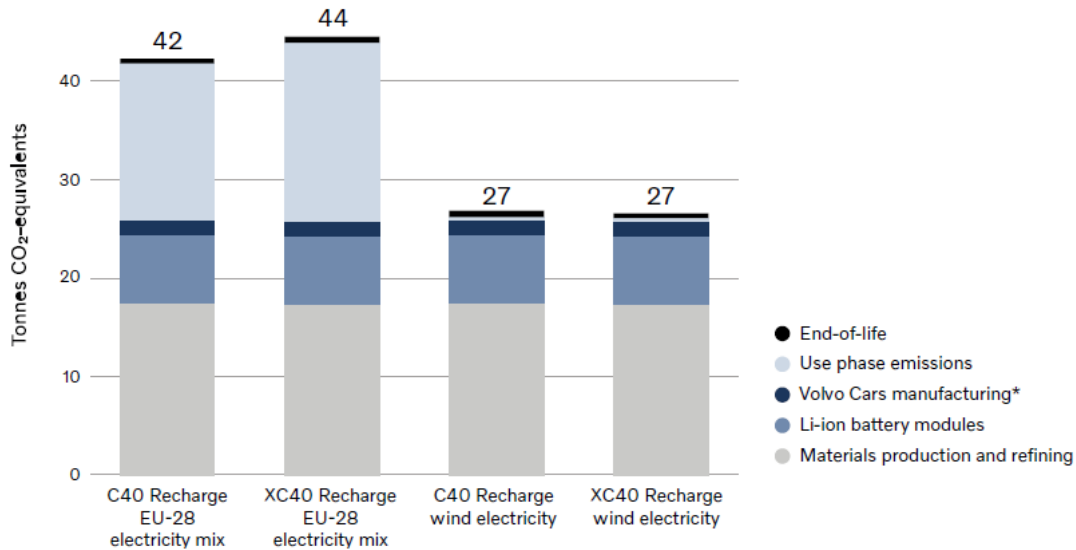
The study focused on future mineral demand under different green energy scenarios. It stated: "Emissions from the production and operation of renewable energy and storage technologies are just 6 percent of coal and gas generation under a 2DS [IEA's 2-degree C emissions scenario]." While the World Bank and International Monetary Fund (IMF) studies were conducted by economists, we were intrigued to learn of a study on lifecycle emissions from an EV versus an internal combustion engine (ICE) vehicle conducted by a manufacturer. There have been numerous studies done on this topic over the past five years often coming to conflicting conclusions. This study involved automobile manufacturer Volvo and identical models except for their power trains built in the same factory. This is essentially a "like vs. like" comparison.

The results of the study were reported in various EV-related media. The nature of the reports was interesting, as most media focused on the entire lifecycle emissions. Only a couple focused on the manufacturing carbon emissions footprint comparison. Volvo Cars has been owned by the Chinese auto manufacturer Zhejiang Geely Holding Group since 2010. The company's plan is to sell only fully electric cars by 2030. It is also working to reach full climate neutrality across its entire value chain by 2040. In the near-term, it wants to reduce its carbon footprint per average vehicle by 40% between 2018 and 2025. It is also committed to communicating its

improvements, including disclosing the carbon footprint of all new models. That commitment prompted the release of this report late last year.

In 2020, Volvo Cars had introduced its XC40 Recharge fully electric vehicle along with its XC40 ICE vehicle. In October 2021, the company began building its C40 Recharge, its second fully electric model, and the first model that is only available in a fully electric version. The XC40 Recharge and the C40 Recharge had similar carbon footprints when powered with wind energy, but the C40 Recharge was 5% better when the two vehicles were charged with the European Union’s (EU-28) electricity mix. Volvo Cars attributed the improved performance to “better aerodynamic properties” – primarily a slightly lower roof line.

**Exhibit 7. How Volvo’s EV Models Carbon Footprints Compare**



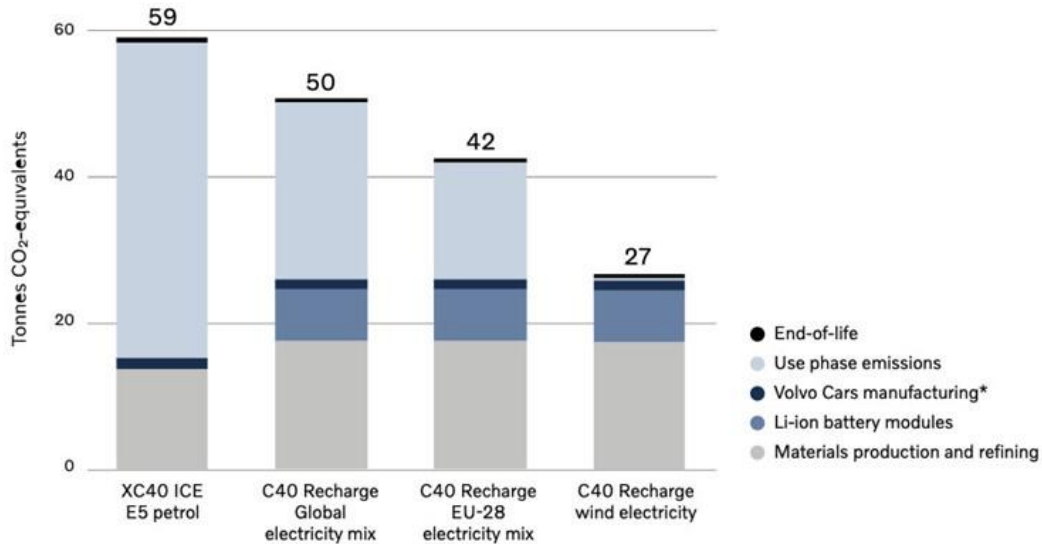
\* Volvo Cars manufacturing includes both factories as well as inbound and outbound logistics.

Figure i. Carbon footprint for C40 Recharge and XC40 Recharge, with different electricity mixes. Results are shown in tonnes CO<sub>2</sub>-equivalents per functional unit (200,000km total distance, rounded values).

Source: Volvo Cars

The more interesting comparison is between the C40 and the XC40 ICE. When the respective vehicles roll off the assembly line, the C40 has generated 70% more carbon emissions than the XC40 ICE, largely due to the lithium-ion battery. When one examines the chart below and the two columns on the left, the emissions for the C40, excluding the battery, are greater than those of the XC40 ICE. That is because more aluminum is used in the C40 version to help offset the extra weight of the battery. According to the study, production of the aluminum and battery each contributed 30% of the total carbon emissions of the C40.

**Exhibit 8. Building An EV Creates More Emissions Than An ICE Vehicle**



\*Volvo Cars manufacturing includes both factories as well as inbound and outbound logistics.

Figure 5. Carbon footprint for C40 Recharge and XC40 ICE with different electricity mixes used for the C40 Recharge. Results are shown in tonnes CO<sub>2</sub>-equivalents per functional unit (200,000km total distance, rounded values).

Source: Volvo Cars

While the study limited the mileage driven to 200,000 kilometers (124,300 miles), over the entire timeframe of production and driving, the C40 releases about 15% less carbon than its ICE counterpart. Some EV media suggested that the mileage limit should have been greater, which would have enabled the C40 to outperform the XC40 ICE by a greater margin. Volvo Cars suggested that the greater outperformance would come with a greening of the electricity mix. The reality is that the mileage represents roughly 10-12 years of driving for the average owner. That time brackets the 11-year-plus average age of vehicles in the U.S. and elsewhere.

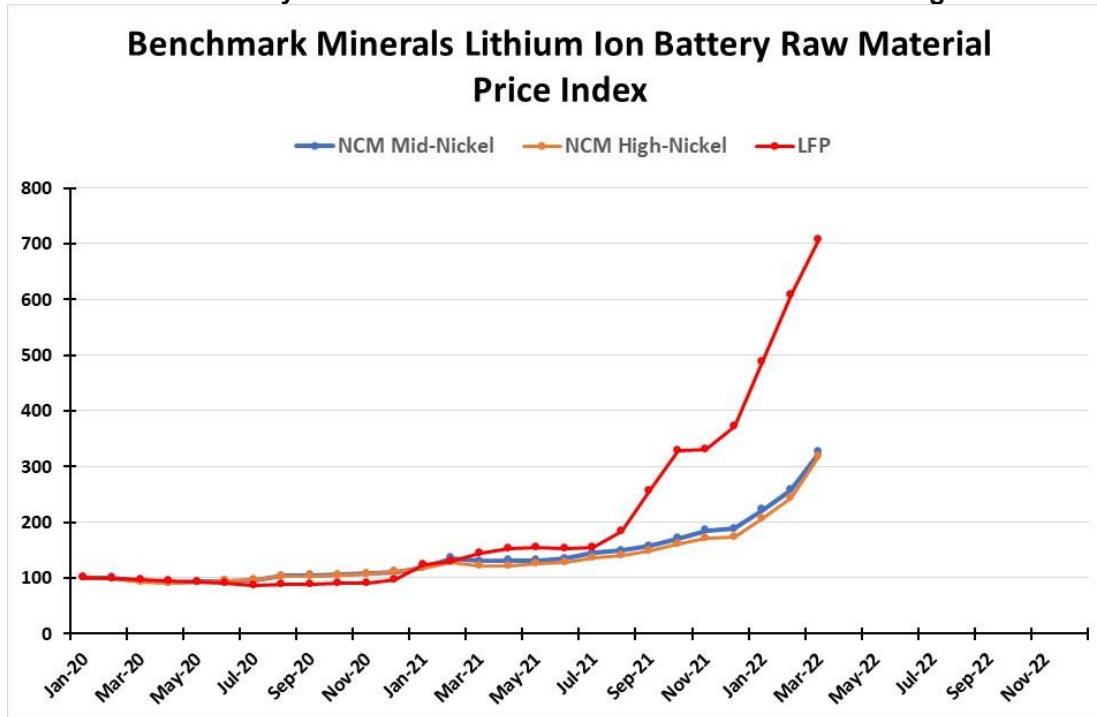
Amidst the turmoil over clean energy mineral prices and Musk’s comments about Tesla getting into mining, we were struck by an *electrek.co* article analyzing Tesla’s comments about batteries. Tesla disclosed that nearly half of all its vehicles produced in 1Q 2022 were using cobalt-free iron phosphate batteries. They are using Lithium Iron Phosphate (LFP) batteries instead. This fit with Tesla’s plan to shift to LFP batteries to overcome nickel and cobalt supply problems Musk has spoken of in the past. LFP batteries are cheaper and safer because they do not use nickel or cobalt, but they have less energy density, meaning they are less efficient and have shorter ranges. LFPs continue to improve in these areas, so, for low-end and shorter-range EVs they are an option. That frees up production capacity for battery cells with more energy-density chemistries for longer-range EVs.

Tesla executives said that with more energy efficient motors, they can still achieve the range certifications of the Environmental Protection Agency (EPA) for their vehicles using LFP batteries and at presumably at a lower total vehicle cost. On the Tesla earnings call, Drew Baglino, Tesla’s SVP of engineering, made the following comments about the company’s switch in battery chemistry.

“I’ll take the LFP question. Like it says so in our letter, but half of our products were LFP last quarter, which shows how quickly we were able to respond. But honestly, it wasn’t because of a raw material shortage. It just seemed like the right thing to do. We could change our cathode chemistry. And there’s more to be done on the cathode side and we are actively pursuing it to give us substitution flexibility in response to market conditions between the other cathodes that are out there that can be competitive in our vehicle. There are many options.”

It is a good thing there are “many options.” The consulting firm Benchmark Minerals has just introduced a lithium-ion battery raw material price index. We show their data in the chart below. Given Tesla’s comments about shifting battery chemistry and the need to remain flexible about future shifts, note what has happened to the price index for LFP. Is any of the price spike in the LFP index attributable to Tesla’s move? If so, will the price spike drive Tesla to make another shift in battery chemistry, or are the economics of this battery chemistry shift behind Musk’s comments about the lithium supply chain?

**Exhibit 9. How Battery Chemistries And Raw Material Prices Are Trending**



Source: Benchmark Minerals, PPHB

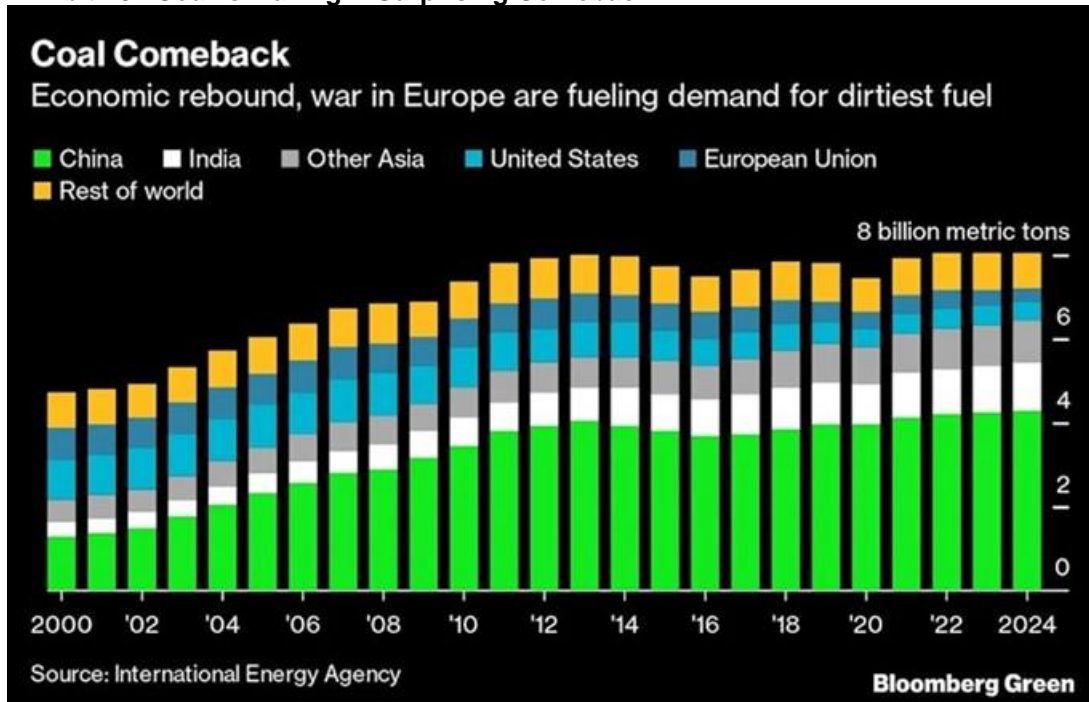
The EV industry is being driven by subsidies and first-mover buyers. Tesla’s battery chemistry moves, along with its model mix shift, suggests the EV competitive marketplace will become more intense as raw material costs continue to escalate and governments push EV sales. The Volvo Cars study raises an interesting question: If there is a huge push for EVs, will we see a sharp increase in carbon emissions when the exact opposite is anticipated by environmentalists? How will governments react? Exploding costs and escalating emissions are the antithesis of what the clean energy transition claims to be all about. Who will become the “bad guy” in that scenario?

## Coal Makes Comeback Upsetting Green Agenda

Climate activists are likely choking on the latest global coal data and outlooks. Coal has made a strong comeback in response to last year’s woeful performance by renewables in Europe, a colder winter in the Northern Hemisphere, and now a war between Russia and Ukraine. The latter has forced countries, not only in Europe, but elsewhere, to cut their use of Russian fossil fuels. They are finding the reduction more difficult than they thought – inflicting greater sacrifices on their citizens. Citizens are not only facing higher utility bills, but businesses and industries are forced to adjust or shut down in response to high energy prices. It is not a pretty picture, and the outlook calls for more chaos.

*Bloomberg* showed a chart from the International Energy Agency (IEA) with coal consumption by major users from 2000-2021, including projections to 2024. While the IEA forecast calls for greater coal consumption in 2022, the following two years remain at that level. A 2020 forecast had predicted a rise in coal consumption in 2021 but underestimated the magnitude of the increase. That forecast also suggested a plateau in coal consumption for the following two years. Clearly that projection proved conservative. We wonder whether this new forecast will also fall short given the reactivations of previously closed coal plants across Europe and the planned increase in coal’s use across China, India, and Southeast Asia.

**Exhibit 10. Coal Is Making A Surprising Comeback**



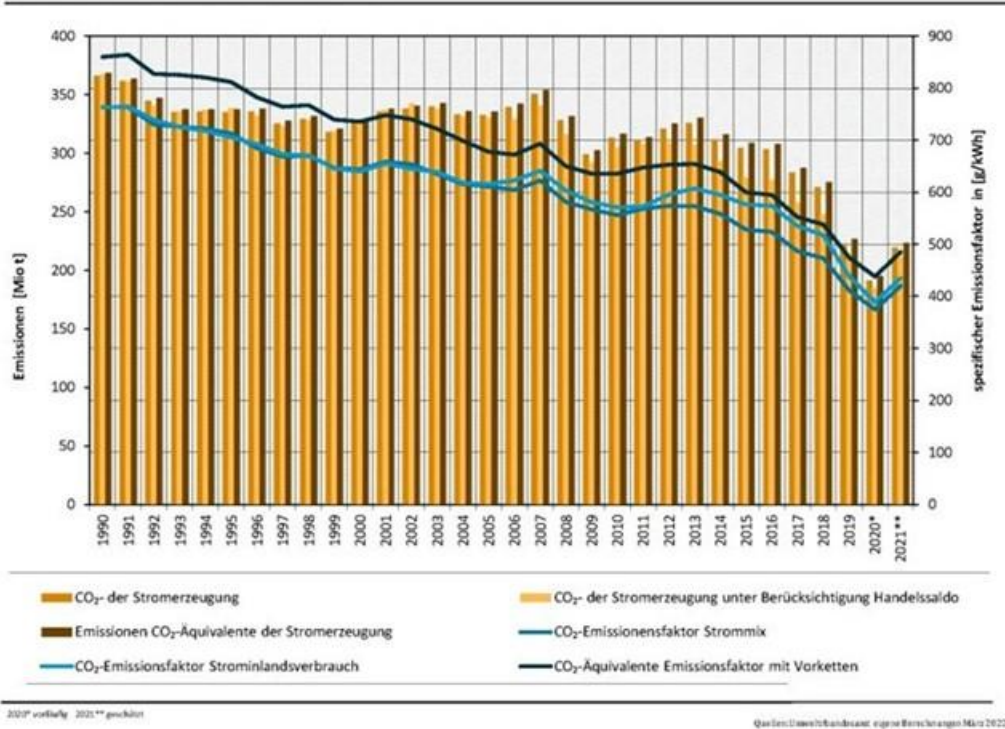
Source: *Bloomberg*

From 2016, coal consumption in China, India, and Other Asia grew, while usage in the United States and Europe contracted. The Rest of the World use contracted, expanded, contracted again, and is forecast to expand once again. Overall, in 2022, world coal consumption should match the level of 2013, but likely go higher in subsequent years.

Increased coal use is playing havoc with climate change. The chart below shows CO<sub>2</sub> emissions from electricity generation in Europe since 1990, the base year for measurement for many countries. As seen, 2021's emissions increased, and with the current energy crisis striking across the continent, emissions continue to rise as more coal-fired power plants are brought back into operation to replace Russian natural gas supplies that are being ditched by European electricity companies. In addition, the high cost of natural gas has prompted utilities to shift to coal-fired power to offset the inflationary pressures racing through economies.

**Exhibit 11. Emissions Rising With Increased Coal Usage In Europe**

Entwicklung der spezifischen Emissionen des deutschen Strommix 1990-2020 und erste Schätzungen 2021 im Vergleich zu Emissionen der Stromerzeugung



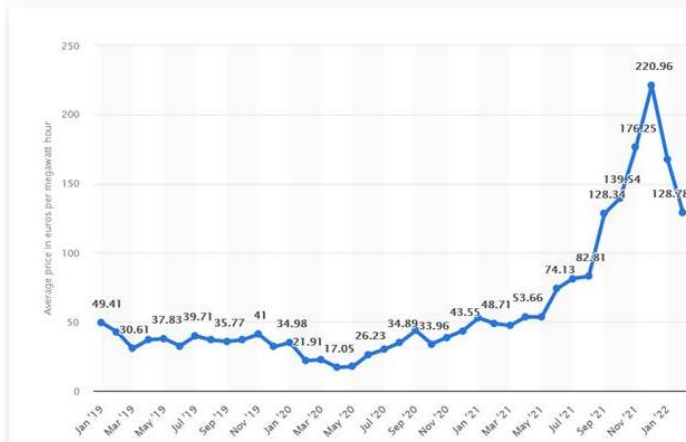
Source: *Umweltbundesamt – UBA, Staffan Reveman*

The chart below shows what has happened to wholesale electricity prices in Germany since the beginning of 2019. The energy and natural gas crisis that exploded during the second half of 2021 appears to have subsided based on the average January and February 2022 prices. Some of the year-end price jump was fostered by a rush by utilities to secure fuel supplies as they looked toward the possibility of an outbreak in hostilities between Russia and Ukraine. Since the Russian invasion did not happen until near the end of February, any price increase created by the hostility was muted in calculating that month's average price. The price decline was further driven by a warmer than normal winter that spared gas demand, as well as by aggressive moves to boost liquefied natural gas (LNG) imports to Europe.



**Exhibit 12. Gas Prices Soared At Year-End In Response To Market Forces**

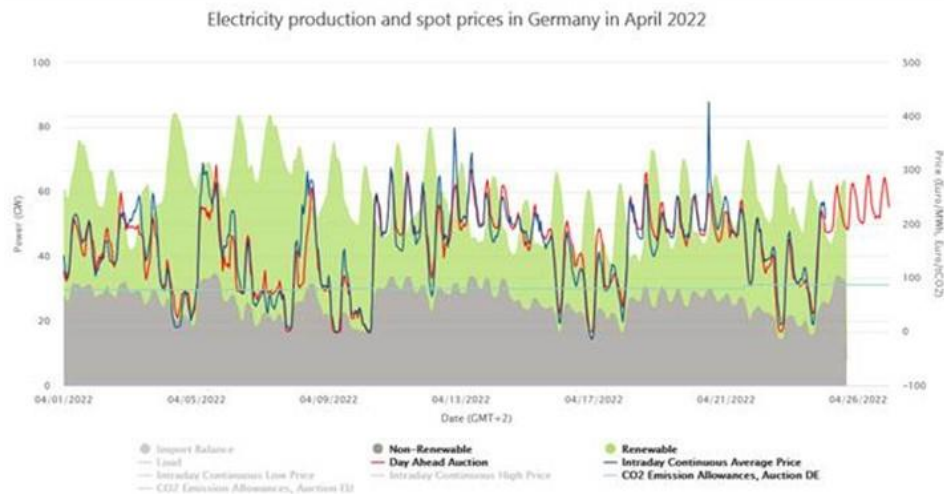
(in euros per megawatt hour)



Source: Statista.com

As hostilities have continued, with little hope for a ceasefire soon, European governments have imposed more sanctions on Russia and have taken actions to mitigate the financial pain on their residents. Europeans are reducing their energy consumption to offset high prices, and governments are granting tax relief to further help. Yet, the economic toll continues rising. Germany’s electricity prices remain elevated, as shown in the accompanying chart of hourly electricity use and prices during April. The chart shows the conundrum in managing electricity generation – its impact on spot prices. When renewables’ contribution to total power supply is up, spot prices decline, and vice versa. However, there have been only a few days when power prices have fallen substantially below €100 (\$105) per megawatt-hour (MWh). There have been some brief spikes when the spot price soared near or above €400 (\$420)/MWh. For most of the first three weeks in April, spot prices (shown by the blue line) have been in the €150-€200 (\$158-\$210)/MWh range, basically in line with the February average wholesale price shown in the previous chart.

**Exhibit 13. How Germany’s Electricity Market Was Working In April**



Source: energy-charts.info

The financial cost of the energy crisis in Germany is growing by the day. A recent survey by Ifo Institute and published by the *Augsburger Allgemeine* newspaper reported that 36% of the 1,100 companies questioned want to reduce investments due to rising energy prices. A quarter of the companies expect a second half of 2022 price shock from higher utility bills. Ten percent of the firms said they were considering giving up energy-intensive businesses entirely, with 14% considering layoffs to offset rising power costs. Germany's annual inflation rate reached a 40-year high in March, much like what happened in the U.S. The price outlook is not promising, as almost 90% of the companies said they would probably have to raise prices to counter soaring costs. Three-quarters of the companies plan to step up their energy-efficiency investments.

With China announcing plans to boost coal production capacity by 300 million tons in 2022, the future fuel mix there will reflect more coal-fired output, despite the country being a leading investor in wind and solar power. China's planned coal capacity increase is the equivalent of 7% of 2021's output of 4.1 billion tons that had grown by 5.7% above 2020's depressed production.

According to Li Shuo, a senior global policy advisor for Greenpeace, "This mentality of ensuring energy security has become dominant, trumping carbon neutrality." When energy security becomes paramount, climate change and green energy get kicked to the back of the line, a view supported by Shuo's comment: "We are moving into a relatively unfavorable time period for climate action in China." That sentiment can be echoed across the world. Keeping people alive, warm, and fed, as well as employed, is taking precedent over green energy, because governments and the public are rightly more concerned with surviving the near-term than fearing long-term climate problems that might never happen. For climate activists such as Barack Obama and John Kerry who hand-wring over rising CO<sub>2</sub> volumes and the impact on our climate and rising sea levels, their purchases of multi-million-dollar waterfront mansions makes clear their hypocrisy toward climate change. For them, it is to follow what I do, not what I say, if you want to truly know how concerned I am about climate change.

## Thoughts On Various Energy Topics

### An Alternative Supply Option For Europe's Natural Gas Problem

As the debate over how, how quickly, and by how much Europe might be able to reduce its dependency on Russian coal, oil, and natural gas supplies, we saw people asking about supply from Africa. In fact, a new study from the African Energy Chamber (AEC) suggested the continent could boost its LNG exports to 60 million tons per year (MMTpa) by 2025 and approve an additional 74 MMTpa by 2030. In 2021, Africa shipped 53 billion cubic meters (Bcm) of gas, or 38 MMTpa, up from 40 Bcm or 28.7 MMTpa of LNG the prior year. The AEC estimates translate into 83.7 Bcm and 103.2 Bcm, significant potential supplies.

A 2021 report from the Gas Exporting Countries Forum (GECF) said that Africa accounts for 11% of global LNG exports. The continent's LNG exports have increased by more than 5 MMTpa in the last five years. The GECF expects Africa to commission 26 MMTpa of new LNG capacity between 2021 and 2027, representing about 17% of global capacity additions expected during that time. Much of the growth will come from facilities in new LNG exporting nations such as Mozambique, Tanzania, Mauritania, and Djibouti.

Last year, Africa exported nearly 105 Bcm of gas, with 80% coming from three countries – Algeria, Nigeria, and Egypt. Both Egypt and Nigeria will be increasing their LNG exporting capacity this year, but Algeria's exports, primarily via pipelines to Europe, will likely decline as it can no longer use the 12 Bcm GME pipeline due to the conflict between Morocco and Algeria. It

will only be able to rely on the 8 Bcm Medgaz pipeline for exports to Spain. Therefore, AEC sees reduced gas exports from Algeria in 2022.

Is it time to reconsider the Trans-African gas pipeline to get more gas to Europe? This line was initially proposed in the 1970s, but it was not until 2002 that Nigerian National Petroleum Corporation (NNPC) and Algeria’s state oil company, Sonatrach, signed a memorandum of understanding for the pipeline. This led to an engineering review, completed in 2006, that found the pipeline “technically and economically feasible and reliable.” The line’s route, shown below, would stretch from the Warri region of Nigeria, through Niger, and then through much of Algeria’s desert, ending at the Hassi R’Mel pipeline hub, which would then move the gas to Europe via existing export pipelines. About 60% of the line’s 2,565-mile distance would be in Algeria, with roughly 20% in each of Nigeria and Niger. The line will carry 2.9 Billion cubic feet per day of gas.

Exhibit 14. Potential Trans-African Gas Pipeline



Source: Wikipedia

While various political groups in Africa have expressed opposition, the growing need for Europe to diversify its energy supplies opens the possibility for a revival of this pipeline project. It would certainly create large numbers of jobs, besides opening possibilities for offshoot lines to African areas suffering from a lack of energy.

## Presidential Climate Envoy John Kerry And Natural Gas

John Kerry, President Joe Biden's climate envoy, is the latest government official to deliver conflicting messages about energy. As *The Wall Street Journal* pointed out, in January, Kerry told the U.S. Chamber of Commerce that he could fathom keeping natural gas in a cleaner energy mix as a "bridge fuel" from traditional fossil fuels to a renewables-heavy future. He made some other points that have come back to bite him. He told the meeting, "If you can capture 100% [of emissions] and it makes it affordable, that's wonderful. But we're not doing that." In his mind, carbon capture is the technology the natural gas industry needs to be investing in, which it is, but we guess maybe Kerry does not know, or it is not fast enough for him.

Kerry's message to the Chamber of Commerce members was: "Let me be factual, above all, but let me also be blunt and hopefully motivating. We're in trouble, I hope everybody understands that. Not trouble we can't get out of, but we're not on a good track." What he really wants is more renewable energy investments. He bemoaned the lack of investment, saying: "Many countries — most countries — have the ability to deploy very significant additional amounts of renewables, and they're not doing it." Do economics or energy security have anything to do with the slow pace of renewable energy? The International Energy Agency (IEA) projects renewables accounting for 90% of new power capacity additions globally from 2022 onward.

Thus, when Kerry threatened a "death sentence" for natural gas, it raised questions about what he really wants. According to Kerry, in comments to *Bloomberg TV*, "We have to put the industry on notice: You've got six years, eight years, no more than 10 years or so, within which you've got to come up with a means by which you're going to capture [emissions], and if you're not capturing, then we have to deploy alternative sources of energy."

Kerry went on to state: "No one should make it easy for the gas interest to be building out 30- to 40-year infrastructure, which we're then stuck with, and you know the fight will be 'well we can't close these because of the employment, because of the investors, et cetera.'" So, should we only be building natural gas infrastructure with a life of 10-years or less? Lots of luck convincing people there is a financial case for such investments.

The industry and academic research are advancing carbon capture technology. However, most of the new efforts are exploratory, as the technology needs to be economically and technically feasible before corporations will invest billions of dollars. Proving the technology will likely not be on a pace or scale Kerry says is necessary. But what does Kerry know about technological trends? Meanwhile, the administration that employs him is actively working to limit the growth opportunities for traditional fossil fuels. By issuing a 'death sentence' for natural gas and its required infrastructure investments, he is hobbling the industry's growth. In turn, it will hurt those who have limited or no access to power. It will make the efforts of European countries to get out from under the dominance of Russian fossil fuels, a goal of the Biden administration, even more difficult.

Here is some advice: Think before you speak. The Biden administration seems to have a serious shortcoming in mastering this admonition.

## Wind Energy Is Having A Rough Go Of It

For those of us who follow the energy sector closely, including renewable energy, it is not hard to conclude that wind energy is having a particularly bad stretch of news and legal outcomes. The most recent event was a wind turbine fire in a remote area of the Fens, also known as the Fenlands in eastern England. This is a 1,500 square mile region that was naturally marshy, but once drained now supports extensive agriculture for all of England.

The picture below shows the wind turbine ablaze on Sunday evening, April 24th. Multiple firefighting departments responded to the alarm at about 6 pm. A fire department spokesperson said the fire involved the motor and blades, but no action was taken. One responding fire department remained, assumed responsibility that the fire not spread before turning the clean up over to the wind turbine company. This was only the latest of numerous recent wind turbine fires and failures. We don't know why the sudden rash of turbine accidents is happening, but they keep showing up in our news sources. Is it because even a small percentage of accidents in a growing population of wind turbines means more fires and failures?

### Exhibit 15. Wind Turbine Fire In Thorney, England



Source: photo by Terry Harris, [news@wind-watch.org](mailto:news@wind-watch.org)

Potentially more significant was the recent revelation that three wind farms in Germany experienced cyberattacks and were shut down. It is believed these hacks were done by parties sympathetic to Russia in its war with Ukraine. In one case, Conti, a ransomware group that had declared its support for Russia, claimed responsibility for the attack. Matthias Brandt, a director of Deutsche Windtechnik, commented that "We need high IT security standards" because the growing renewables sector will become a bigger target for hackers. This is wind stillness in a more sinister and potentially disruptive way.

Then there is the issue of wind turbine noise, especially at night, that disrupts neighbors' lives. In Australia, there was a recent supreme court ruling that forced a wind farm to shut down at night to eliminate the noise that was preventing neighbors from enjoying restful nights. The wind farm

developer was also ordered to pay the neighbors millions of dollars in compensation for the harm it has caused.

Wind farms being penalized are not new. However, the extent and brazenness of one developer is. The U.S. event involved ESI Energy, a subsidiary of NextEra Energy, the nation's largest renewables operator. And it is not the first time the company has been found to have violated federal laws.

ESI was fined and placed on five-year probation under the Migratory Bird Treaty Act for the 136 documented deaths of golden eagles due to blunt force trauma by wind turbine blades. The deaths occurred at wind farms in Wyoming and New Mexico where ESI had not applied for necessary permits. NextEra was fined \$1.8 million and must pay \$6.2 million in restitution. It also must implement an Eagle Management Plan to minimize additional eagle deaths and injuries. Such a plan can require an investment of up to \$27 million for compensatory mitigation according to the U.S. Department of Justice (DOJ).

Based on comments from the DOJ and NextEra officials, there is not much love lost between the parties. Edward Grace, assistant director of the U.S. Fish and Wildlife Service Assistant Office of Law Enforcement, said the settlement holds ESI accountable for "years of unwillingness to work collaboratively" with the agency and for "their blatant disregard of wildlife laws."

In defending its actions, NextEra criticized the DOJ's enforcement of the Migratory Bird Treaty Act. It said the agency "has sought to criminalize unavoidable accidents." Rebecca Kujawa, CEO of NextEra Energy Resources, said, "The reality is building any structure, driving any vehicle, or flying any airplane carries with it a possibility that accidental eagle and other bird collisions may occur as a result of that activity." NextEra believes the treaty covers only "intentional" acts, not "accidental" ones. We were surprised she did not mention the canard of how many birds are killed by domestic cats each year. Those killed are small birds for which nature produces large populations because many of them do die accidental deaths. But we are talking about large and rare (often legally protected species) birds.

An environmental and energy attorney said this settlement highlights a broken system for enforcing the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act, which NextEra is also alleged to have violated. Many wind developers fail to obtain eagle "take permits." Because of its size and wind energy market share, NextEra was a likely target of DOJ enforcement efforts. The attorney said many companies would rather "roll the dice on potential enforcement actions" than undertake the costly and time-consuming process of obtaining and complying with the take permits.

Given all these issues, it was not surprising that regulators and the public are beginning to fight approvals of wind farms. In fact, it only took 30 seconds for the Ohio Power Siting Board to deny approval for the Republic Wind Farm, a 50-turbine wind farm in Seneca and Sandusky Counties, southeast of Toledo, which would have produced 200 megawatts of electricity that could power roughly 62,000 homes per year.

Chris Aichholz, a member of the citizen-led Seneca County Anti-Wind Union, told *The Washington Times*, "We had as many as six projects being proposed at once here. It was going to completely change the entire landscape of our area." As *The Washington Times* article pointed out, the Ohio rejection is the latest in a string of wind projects that have been rejected.

Our friend, journalist Robert Bryce, maintains a list showing over 300 wind projects that have been rejected or restricted by regulators or the public since 2015. There have been about 24

significant solar projects from 2017 to 2021 that have suffered similar fates. While there is no compilation of cancelled fossil fuel projects, there is no shortage of coal- or natural gas-fired power plants, pipelines, and transmission lines that have been rejected by government officials or local voters. The Not-In-My-Back-Yard mentality is disrupting the existing fossil fuel energy industry, but it is also harming the energy transition to renewables.

## Financial Problems For Wind OEMs Worse Than Thought

In the last *Energy Musings*, we wrote about the financial problems of the wind industry as raw material cost inflation and supply chain disruptions are impacting the market. That article was the second time we addressed the financial struggles of wind original equipment manufacturers (OEM). Earlier, we had highlighted the problems of these companies as they reported their 2021 fourth quarter financial results. We now have the recent financial results from two OEMs for 1Q 2022 and they were worse than expected.

GE Renewables segment of General Electric Company reported a 12% decline in sales compared to the year-ago quarter, a drop of nearly \$500 million. The division's operating loss grew by \$200 million from the 2021 quarter's loss to a negative \$434 million.

The troubled wind turbine manufacturer Siemens Gamesa confirmed a €309 (\$326) million loss in its 2022 fiscal first quarter that ended December 31, 2021. It also adjusted earnings guidance for FY2022, which previously pointed to a slim positive operating margin. Now, the estimated revenue decline has widened from -7% to -2% to -9% to -2%. The guidance for earnings before interest and taxes (EBIT) has also deteriorated, going from +1% to +4% margins to now -4% to +1%. Siemens Gamesa had changed CEOs late last year and has been undergoing a strategic business review, so the deteriorating financial results are not a complete surprise. As a result, we expect moves to cut costs further, while also attempting to raise prices to offset raw material and logistics inflation, a low order rate, and supply chain disruptions.

Another dilemma European wind OEMs face besides inflation and supply chain issues is the targeting of its market by Chinese wind equipment manufacturers. As we wrote in the last issue, Spanish global utility company Iberdrola has been discussing deals with Chinese OEMs. We are now seeing more articles outlining the targeting of the global wind market by Chinese OEMs. The rise in renewable energy power purchase agreement (PPA) prices, reported by *LevelTen Energy* that we wrote about in our last issue, looks to be continuing with little relief in sight. The key assumption about renewable energy, which has driven the huge investment flows into the sector, of an ever-continuing decline in prices, has been upended. The reality that renewables do not produce cheap power is becoming clearer. The ramifications are yet to arrive.

## A Win For Fossil Fuels

Keep it in the ground! No more fossil fuels! Climate Emergency! These are the slogans climate activists use at their rallies. They are employing every lever imaginable to undermine funding for fossil fuels, regardless of whether there are alternative energy sources available, while also ignoring the benefits fossil fuels have delivered and continue to deliver for the world's population. Thus, it was interesting seeing the results of shareholder resolutions at major bank annual meetings designed to force them to stop lending to oil and gas companies.

The results of the votes were reported by *Climatewire*, as cited by Stephen Hayward of the *Power Line* blog.

Climate-concerned investors were drubbed yesterday in their first bid to push Wall Street banks to end financial support for new fossil fuel development.

Activist shareholder groups filed climate resolutions this year at six of the largest U.S. investment banks. The resolutions call on the firms to back their long-term climate commitments with policies that would ensure they do not contribute to the expansion of the fossil fuel industry.

Three of the banks — Wells Fargo & Co., Bank of America Corp. and Citigroup Inc. — held their annual shareholder meetings yesterday, giving investors the chance to weigh in. Just under 13 percent of shareholders backed the fossil fuel-related resolution at Citigroup, while 11 percent supported the proposal at both Wells Fargo and Bank of America.

According to Hayward, proxy advisers Glass Lewis and Institutional Shareholder Services (ISS) had recommended to their institutional clients that they vote against the resolutions. Sounds like the climate activists have much more work to do.

**Contact PPHB:**

**1885 St. James Place, Suite 900**

**Houston, Texas 77056**

**Main Tel: (713) 621-8100**

**Main Fax: (713) 621-8166**

**[www.pphb.com](http://www.pphb.com)**

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