Measure Twice: Sizing Europe's Natural Gas Crisis

Doomberg
Apr 14

"*It's clearly a budget. It's got a lot of numbers in it.*" – George W. Bush

Numbers can be confusing, but numbers without proper context can be downright befuddling. In measuring anything, the unit of measurement is as important as the number itself – units are meant to anchor the mind to a useful reference point. As a measure of time, for example, "score" doesn't mean much until one performs the mental trick of converting scores into years (there are 20 years in a score), and only then does Abraham Lincoln's famous phrase "*four score and seven years ago*" make sense.

To the unscrupulous marketer, selecting the unit of measurement can be an opportunity to manipulate. A small radio station might brag about "***50,000 milliwatts of power,***" or an environmental group might warn about "***300 parts per billion***" of a contaminate in the soil, the former sounding more impressive than 50 watts and the latter more ominous than 0.3 parts per million. A classic example of such can be spotted in the reporting done on oil spills. The ***universal*** unit of measure for oil is a barrel, but there are 42 gallons in a barrel of oil, and 42 is a much bigger number than 1. Guess which unit is almost always used in reporting on spills? We're certainly not here to minimize such accidents, but notice how *History.com* describes the famous Exxon Valdez disaster (emphasis added throughout):

> "*The Exxon Valdez oil spill was a manmade disaster that occurred when Exxon Valdez, an oil tanker owned by the Exxon Shipping Company,* ***spilled 11 million gallons of crude oil*** *into Alaska's Prince William Sound on March 24, 1989.*"

Exxon Valdez | photo source: NOAA.gov

Confusion is amplified when there ***isn't*** a universal unit of measure, and no commodity suffers more from a bewildering array of seemingly disconnected measurement units than natural gas. The price of natural gas in the US is quoted in dollars per million British thermal units (BTU). In Europe, it is priced in Euros per megawatt-hour (MWh). Production might be quoted as billion cubic feet per day (bcf/d), billion cubic meters per day (bcm/d), or million metric tonnes per year. Given the prominent place natural gas occupies in the current news cycle, such unit heterogeneity does the public a disservice.

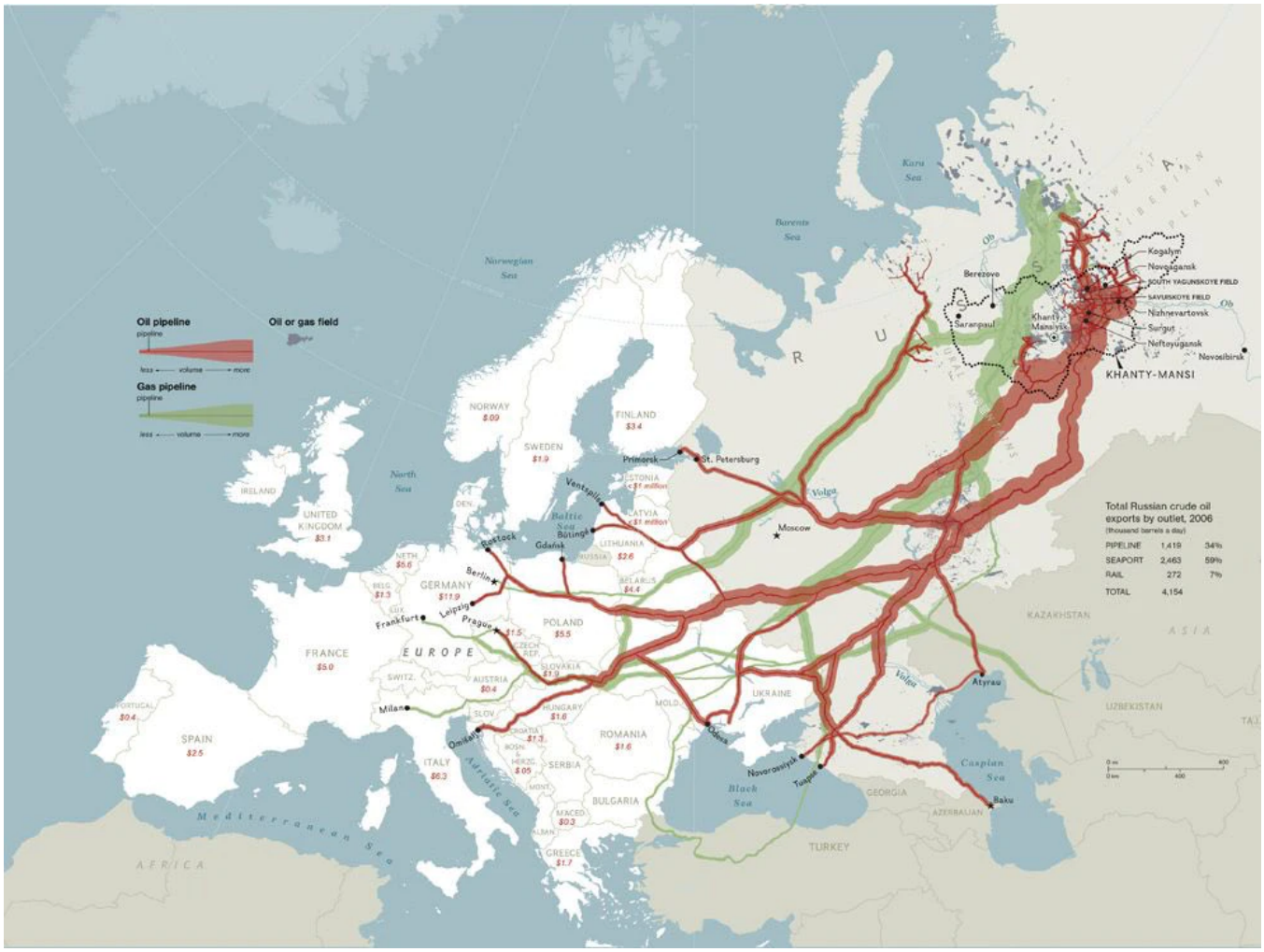
We've never been afraid to be the one in the audience to raise a hand and ask the clarifying question – the reward of understanding usually outweighs the risk of embarrassment – and we are the first to admit framing the European natural gas crisis to a consistent reference point is challenging. It is also essential if you want to grasp the magnitude of the issue and the viability of proposed solutions.

In this analysis, we'll align the natural gas flows presented to a consistent measurement of billion cubic feet per day (bcf/d). Apologies to our non-US Doomers, but US supply will likely play a key role in weaning Europe off Russian supply, so we're aligning to the unit you'll likely see referenced regularly in the coming months.

Have a scratch pad nearby, but if we've done our job well you won't need it.

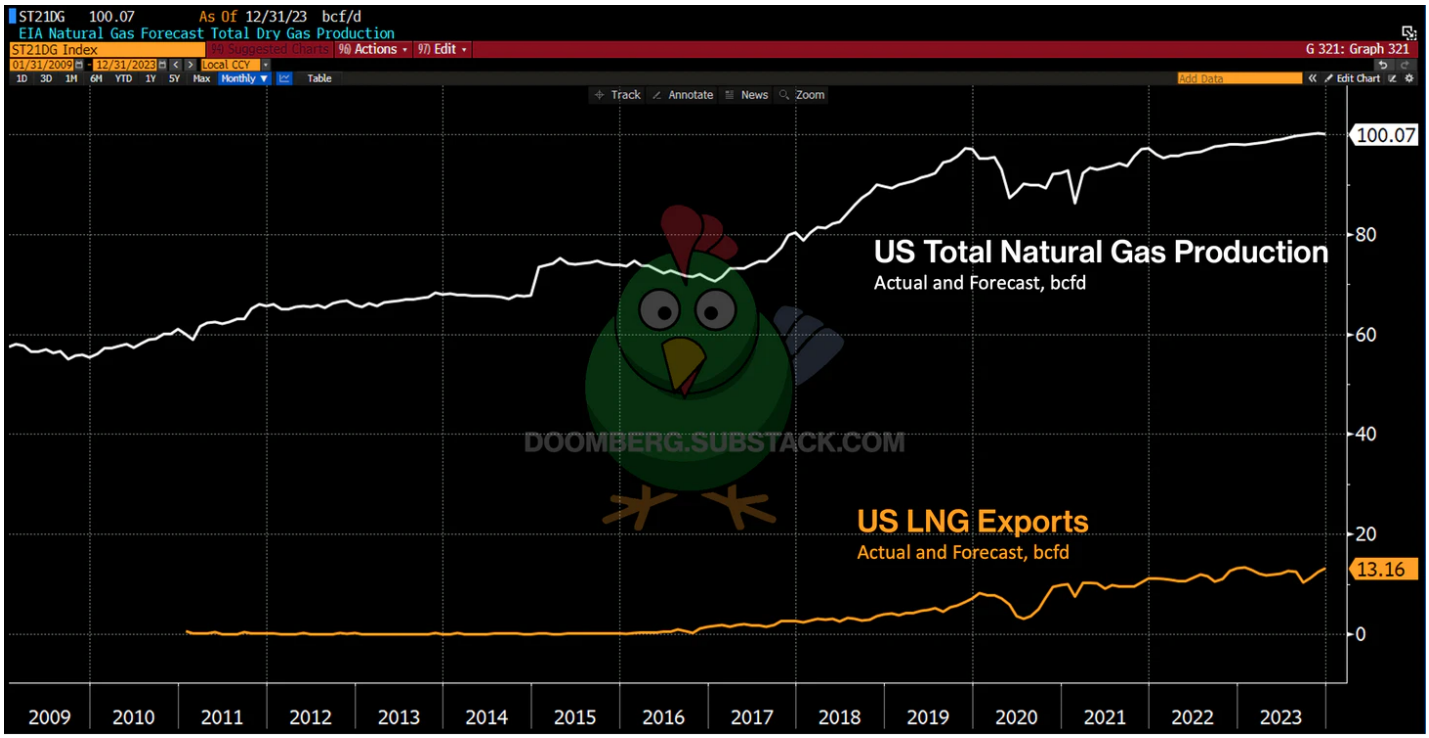
The Gap & What Might Fill It

How much gas does Europe buy from Russia? Most estimates peg the ***annual*** amount to about 155 billion cubic meters. There are 35.3 cubic feet in a cubic meter, and there are 365 days in a year, thus ***Europe has a 15 bcf/d gap*** to fill by turning off the Russian spigot [(155 x 35.3)/365 = 15 bcf/d].



Pipeline map | image credit: National Geographic

Thanks to the shale revolution, the US now produces approximately 96 bcf/d of natural gas. Of that amount, nearly ***12 bcf/d is exported*** via newly constructed LNG terminals. Said another way, Europe's Russian natural gas imports represent the equivalent of ***125% of the entire current US LNG export capacity***. This is a significant number.



Until recently, the US had six major LNG export facilities running at or above nameplate capacity. On March 1, 2022, Venture Global LNG's Calcasieu Pass facility in Louisiana shipped its first product, establishing a seventh hub. That project will continue to build out more trains, while Golden Pass, a 70:30 joint venture between QatarEnergy and ExxonMobil, is slated to come online in 2024. In all, these projects should add approximately ***3.2 bcf/d*** of additional export capacity by 2025. There are several other projects at various stages of development, and assuming price differentials between the US and the rest of the world remain elevated, it is safe to assume these will eventually get built. Critically (and finally!), the industry is experiencing a newly warmed reception from the Biden administration:

> "*Industry executives in recent weeks described a* ***shift in tone from policymakers as the White House*** *scrambles to boost LNG shipments to European allies. Several U.S. LNG developers also pointed to an uptick in commercial talks over long-term contracts traditionally used to secure financing. The counterparties included European buyers* ***that had shied away from deals for U.S. shale gas over climate concerns*** *in recent years and buyers in Asia that face increased competition for supplies.*"

While the US is a major global producer of LNG, it is hardly the lone player of size. Qatar and Australia produce similar quantities, and together the "big three" have more than half the global market share. Naturally, the soaring price of LNG is triggering a substantial global supply response. In addition to US growth plans, Qatar is making bold bets with plans to increase its LNG export capacity from approximately ***11 bcf/d*** to ***17 bcf/d*** in the coming years.

According to data from *S&P Global*, total LNG exports amounted to approximately 377 million metric tonnes in 2021. To convert this into our bcf/d framework, there are 48.7 billion cubic feet in a million metric tonnes and still 365 days in a year, making the global LNG export market approximately ***50 bcf/d*** across all sources [(377 x 48.7)/365 = 50 bcf/d].

At a rate of 15 bcf/d, Europe relies on Russia for the equivalent of ***30% of the entire global LNG export market.*** Given the price elasticity of demand for natural gas, and the fact that countries like Japan, South Korea, China, and India depend heavily on LNG imports to meet their energy needs, the nature of the challenge facing Europe becomes clearer.

LNG carrier | Photo credit: Wojciech Wrzesien/Shutterstock

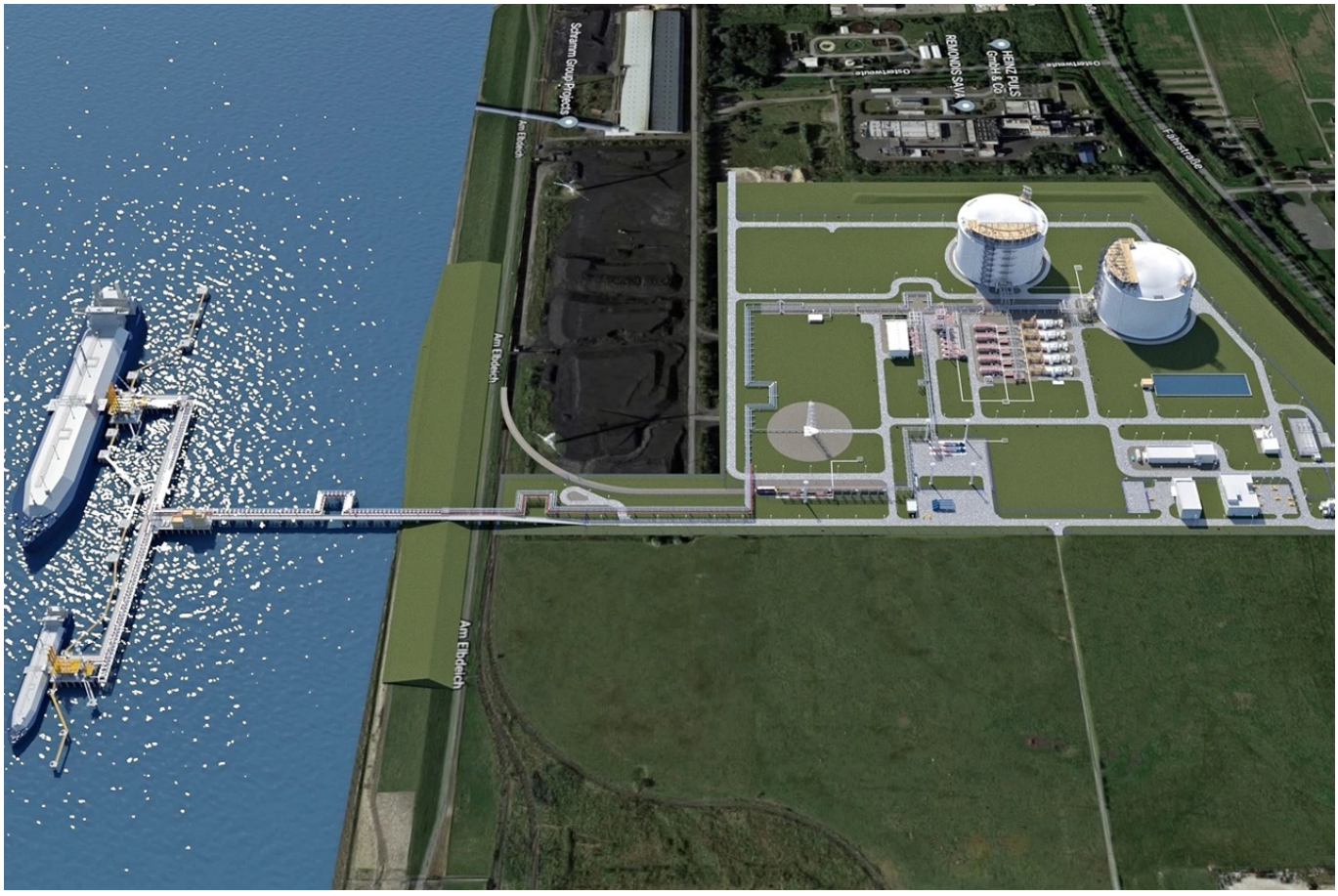
The Access Issues Facing Alternative Supply

Aside from securing commercial agreements for alternative supply, there is also the issue of whether Europe has the capacity to accept more LNG imports. Regasification requires specialized import terminals and pipelines to distribute the gas, both of which seem to be in short supply. Here are two quotes from a Reuters story published prior to Russia's invasion of Ukraine:

> "*This means most of Europe's LNG terminals **are operating at full capacity**, especially in north-west Europe, where they feed large economies Britain, France and Germany, raising the question of how much more LNG can be processed.*
>
> "*Spain has the continent's biggest capacity, with six terminals, while Germany has none. The utilisation rate for the Spanish terminals was just 45% in January, data and analytics firm Kpler said.*

> *'**The problem with Spain is that it has limited pipeline connections with the rest of Europe** with only one pipeline that could take gas from Spain to France and so capacity is restricted somewhat,' Laura Page, senior LNG analyst at Kpler said."*

Germany recently announced its intention to build several new LNG import facilities, and three projects are progressing at an accelerated pace. A terminal in Brunsbuettel is slated to process ***0.8 bcf/d***, a project at Dow's Stade site will handle ***1.3 bcf/d***, and a previously-shelved ***1.0 bcf/d*** project in Wilhelmshaven has been resuscitated and accelerated. Although these projects will offset 20% of Europe's reliance on Russian supply, they ***will not be operational until the 2025-2026 timeframe***.



Planned terminal in Brunsbuettel | Photo credit: RWE

Irina Slav recently summarized the European Commission's preliminary strategy in a three-part series of articles on her Substack, the first of which can be found here. The plan calls for an increase in LNG imports of 50 bcm per year, which approximates ***5 bcf/d, or roughly one-third of the current amount supplied by Russia.*** Given enough time, the infrastructure needed to accomplish this objective can be built and the task is reasonable, but again, we're talking years and not months here.

The plan also calls for the construction of more renewable energy projects, the burning of more coal and heavy fuel oil (although the EU's dependence on Russia for these materials calls into question the wisdom and viability of this approach), developing of more biogas, and implementing a significant energy conservation drive. Here, the plan feels long on ambition and short on details, except for the whole "using less" part.

We close with something that is frustratingly absent from Europe's current thinking (at least at the continent level): a nuclear energy renaissance. According to an admittedly ambitious plan from RePlanet called *Switch Off Putin: Ukraine Energy Solidarity Plan*, by simply arresting and reversing the nuclear phase-out underway in Germany, Sweden, and Belgium, Europe can offset ***1.4 bcf/d*** of Russian gas (or approximately 10% of the gap). Further, by implementing emergency funding to substantially improve the performance of France's existing nuclear fleet, another ***2.5 bcf/d*** can be offset (approximately 17% of the gap). Although France and the UK have recently announced major nuclear power expansion plans, Germany is still resisting, and its final three nuclear power plants are scheduled for permanent closure by the end of this year. One wonders how much pain Germans will have to suffer before this nonsensical policy stance is reversed. We suspect we won't have to wait long to find out.

Alas, putting these components into consistent terms is like turning the focus on a microscope. Once you get it right, the nature of the subject is revealed. Global natural gas flows are a complicated business but some simple themes from this exercise demand recognition: global export capacity is at full throttle, meaningful additional capacity won't come online for another 2-3 years, and Europe's import capacity is equally tight.

Europe's plans may alleviate some of the shortfall, but the continent needs to face the reality of belt-tightening on the demand side. Barring that, go nuclear!

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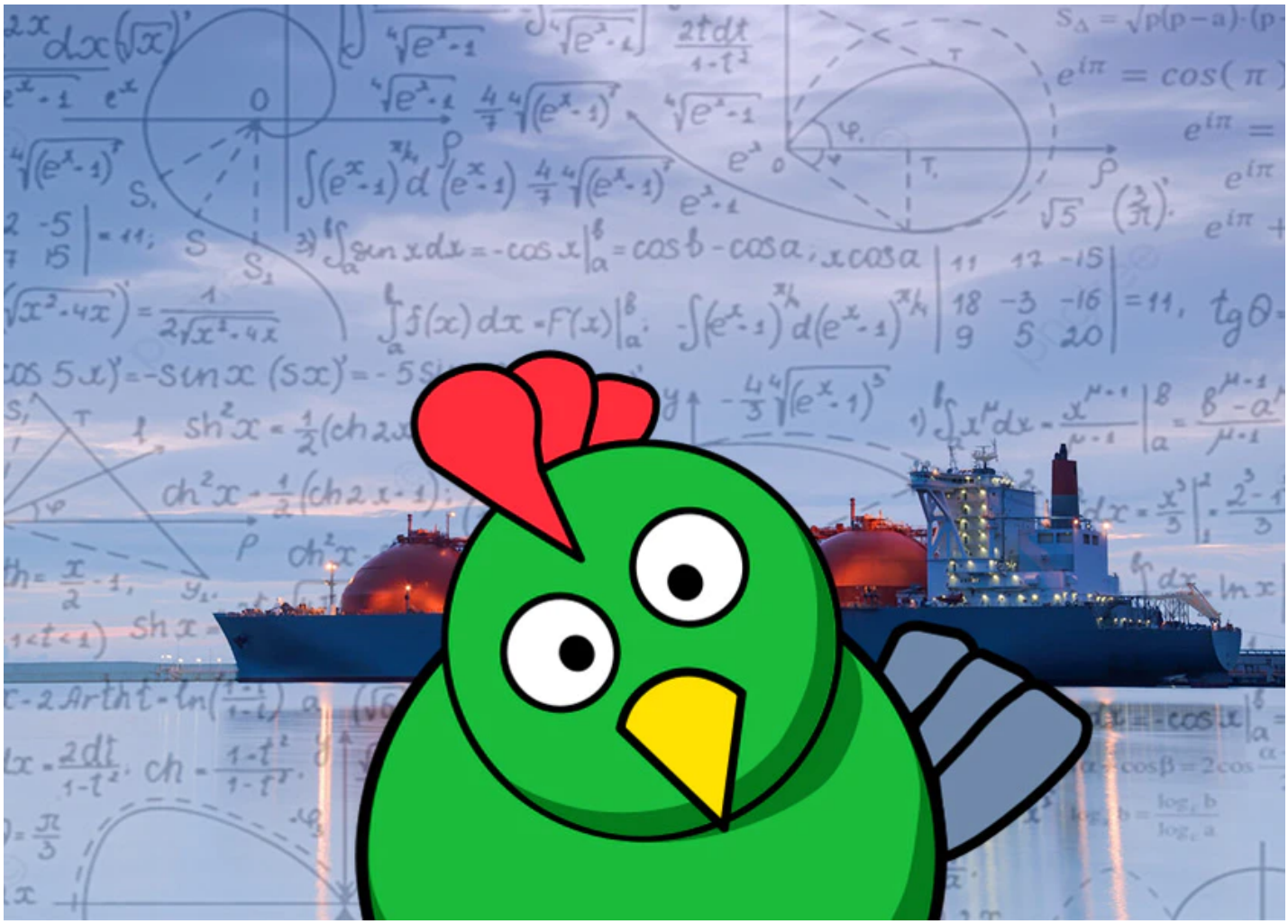

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Jim Ball Apr 22

Great article! It's been a great year of articles. Wish I could follow you behind the paywall, but I'm trying to live on Social Security. I'm hoping to still follow you on Twitter, Decouple Media, Wealthion... You're a great teacher. I taught for a while in an energy management program at a community college, and struggled to get folks to understand the difference between KW and KWH. The level of energy illiteracy in our country is scary. Keep up the good work!

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Great stuff, love the clarity, lucidity. Cheers 💚🥃

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