



EYE ON ENERGY

G. Allen Brooks

Allen Brooks is Managing Director of energy services investment firm PPHB in Houston. His fortnightly newsletter, *Energy Musings* (formerly *Musings from the Oil Patch*), is among the most widely read in the industry.



ELECTRIFY EVERYTHING – BUT AT WHAT COST?

THE TRANSITION TO CARBON-FREE RENEWABLE ENERGY WILL TAKE A LOT LONGER AND COST A LOT MORE THAN PEOPLE THINK.

Energy growth is directly linked to well-being and prosperity across the globe. Meeting growing energy demand in a safe and environmentally responsible manner is a challenge for the energy industry as well as governments. Complicating the challenge is avoiding climate damage from the emissions released by burning fossil fuels.

Energy markets, companies and regulators wrestle with policies to address these demands. Delivering clean energy efficiently and at low-cost appears simple on paper, but difficult in practice. “Electrify everything” is touted as the answer.

Over the decades, fossil fuels have delivered significant improvements in global living standards. Between 1900 and 2020, life expectancy increased by 41.2 years, from

32.0 to 73.2 years, a 129 percent increase. This is an amazing achievement, especially when we realize the improvement was faster over the past 70 years than during the first 50 years of the last century.

Equally impressive has been the improvement in global economic wellbeing. In 2010, measured by 1990 Purchasing Power Parity (PPP) dollars that eliminate the differences in price levels between countries,

world GDP per capita had increased more than sixfold since 1900. The improvement was led by sevenfold gains in North America and Western Europe while Latin America matched the worldwide rate.

Southeast Asia’s improvement trailed slightly while Africa seriously lagged the world’s growth, and it remains the least economically developed continent as well as the most energy challenged. These trends have continued throughout the last decade.

TARGETING FOSSIL FUELS

Over the past twenty years, a view crystallized that improving life spans and living standards depends on cleaner energy.

The recent U.S. heat waves sparked pleas from governors and power companies for consumers to conserve electricity. In California, owners of electric vehicles were asked not to charge them until after 9 p.m. when energy consumption drops. Rolling blackouts were instituted in the Pacific Northwest as heat and wildfires cut energy supplies. Warnings have been issued elsewhere in the U.S.

According to Fatih Birol, head of the International Energy Agency (IEA), this requires more renewables. "The golden era for coal is over," he proclaimed. Unstated is that this means oil and natural gas as well.

Despite two decades of being targeted by environmentalists, these fuels have yet to go away. According to BP Statistics, in 2020 coal accounted for 27 percent of global primary energy use – a share that did not change from 2019 despite the global economic collapse from COVID-19 that crushed energy demand. Oil's share was 31 percent while natural gas was 25 percent.

All told, fossil fuels accounted for 83 percent of primary energy use in 2020, and

the current economic rebound is boosting the near-term outlook for fossil fuels.

Although killing coal remains a primary goal of environmentalists, the reality is that renewables have yet to demonstrate the ability to provide electricity consistently. The congratulatory press releases of renewables' success ignore that the achievements are sporadic and brief. We know wind doesn't always blow and the sun doesn't always shine, but at times these renewables can deliver huge amounts of power – so much so that they force other energy sources off the grid.

The issue becomes how to deliver electricity when renewables are unavailable.

Grids must turn to fossil fuels to meet that demand because their power is "dispatchable" – able to be produced on command.

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LESSONS FROM EUROPE

The power situation in Europe – Germany, in particular – has been especially difficult this year. Renewables' share of electricity in Germany for the first half of 2021 dropped to 43 percent from 50 percent a year ago. To

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The big question for coal is what happens to longer term forecasts. Wood Mackenzie says coal's end is not in sight, even by 2050, although it expects demand to begin declining in the 2030s. The IEA said it expects coal use in 2025 to be flat with its projected 2021 consumption level. The projection assumes strong coal consumption growth in China, India and Southeast Asia offsetting declines in the U.S. and Europe. Support for these assumptions is growing daily.

replace the missing power, especially from wind, utilities in Germany restarted four large coal-fired power plants.

The plants are operating in “spinning mode,” meaning they operate but do not put power into the grid until needed. Since the plants generate little revenue yet sustain high operating and fuel costs, they need subsidies. What an ironic shift, as these coal-fired power plants at one time produced the cheapest electricity in Germany and without subsidies!

What has happened with coal in Europe and especially in Germany so far this year foretells a potentially different outlook than that suggested by the IEA's Birol. In its 2020 coal report, the IEA wrote: “The rebound of electricity demand in Europe in 2021 will put a temporary brake on the structural decline of coal. Higher natural gas prices for power generation in the U.S. could make annual coal demand increase for the first time since 2013.”

Both statements are proving accurate and run counter to the popular narrative of the end of coal. Argus Research projects Germany's coal-fired power will increase by 35 percent in the first half of 2021 compared to last year. Moreover, energy consultant Wood Mackenzie points out that seaborne thermal coal import shipments, which by weight fell 11 percent last year, are projected to increase by six percent this year and another three percent in 2022.

The growing subsidies for renewable power in Germany and now the need to subsidize coal-fired plants to ensure grid stability are weighing on consumers. According to *Statista*, in 2020 Germany had the most expensive wholesale power in Europe at 36 cents per kilowatt-hour (kWh), followed by Denmark at 33 cents/kWh, another country heavily dependent on renewable power. The U.K., which is aggressively installing onshore and offshore wind turbines, ranks seventh at 26 cents/kWh while the U.S. was 19th with a power price 21 cents/kWh lower than Germany's price. In other words, U.S.

consumers paid less than half what German consumers paid for energy!

Handelsblatt, a German business daily, reports that electricity bills for German industrial companies have doubled from March 2020 to June 2021 – from €35/MW-hour (\$41.50) to €70/MW-hour (\$83.02). Those prices were not expected for at least another five years.

COAL'S RESURGENCE

The IEA's 2020 coal report projected a 2.6 percent increase in global coal use this year, driven by an 8.2 percent rise in China's consumption. The demand increase so far this year will boost that growth rate. So far, the demand increase is stressing supply, resulting in coal prices in Europe and Australia soaring to decade-high levels. Global coal supplies have been impacted by the shuttering of mines as coal-fired power plants closed. Now that coal prices are up, mine operators are discussing reopening closed mines.

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China leads the list of countries planning new coal plants, according to think-tank *Carbon Tracker*. China has 368 coal-fired power plants in its pipeline with 187 gigawatts of generating capacity. That will increase China's coal-fired generating capacity by nearly 20 percent and comes despite a pledge by President Xi Jinping that China will become carbon-neutral by 2060.

India, the world's second-largest coal consumer, has 92 plants lined up with about 60 gigawatts of generating capacity. Other Southeast Asia countries with large numbers

of planned new coal-fired power plants include Indonesia with

107, Vietnam with 41 and Japan with 14.

A recent report by *Global Energy Monitor* says 432 new coal mines are under construction that will add 2.28 billion tons of annual output. China alone is building mines with 452 million tons of annual production capacity or more than a quarter of the world total. Along with Australia, India and Russia, they account for three-quarters of the new capacity. According to the report's lead author, “Coal producers' plans to expand capacity 30 percent by 2030 would be a leap backward.”

Getting rid of coal is proving more difficult than expected. One forecast says for the world to reach net zero by 2050, coal-generated power needs to fall by 14 percent per year from now until then. That is unlikely to happen. But if it did, what will be the cost to decarbonize the world's economy? The IMF says it will cost 1-3 percent of global GDP, or \$1.5-\$4.0 trillion a year.

PAYING THE PIPER

Electrifying everything is a simple plan. Executing it is the challenge, especially given the limitations of today's clean energy sources and technologies. Globally, the policy results in at least a 50 percent increase in electricity consumption by 2040. Electrifying the vehicle fleet will add another 12-14 percent to global demand.

Given the low-capacity ratings for wind and solar energy, the investment necessary to build the required generation capacity will be huge, which will further act to keep fossil fuels in the mix. As power costs rise in lockstep with renewable fuel growth, the transition to a fully electrified world will be expensive.

Already, we see people balking at their electric bills. Will they welcome news their power costs will be soaring and soon? The struggle to electrify everything is just beginning, and it will be contentious.

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