EEnergy Informer

The International Energy Newsletter

August 2022

In this issue

EEnergy Informer
August 2022
Vol. 32, No 8

ISSN: 1084-0419
http://www.eenergyinformer.com

Subscription options/prices on last page

Ukraine Stalemate Aggravates Energy Security Concerns

Expect 2022 to be more eventful than anything experienced in recent memory

Whatever **Vladimir Putin's** intentions were in invading **Ukraine**, he has unleashed misery, turmoil, uncertainty, higher fuel, food and commodity prices across the globe. While the 2020-21 period was unprecedented with the spread of **Covid-19** shrinking economic activity, depressing energy demand and causing supply chain disruptions, 2022 is likely to register a strong rebound in energy demand accompanied by sharp spikes in energy and commodity prices. It remains to be seen if higher prices will eventually depress demand and/or result in higher inflation, higher interest rates possibly leading to a global recession. There are already troubling signs in a number of major economies including the US with the financial markets reacting to the market turmoil and uncertainties.

No end in sight for the war in Ukraine

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As noted by the BP's chief economist **Spencer Dale** in its recently released **Statistical Review of World Energy,** (following article) "The challenges and uncertainties facing the global energy system are at their greatest for almost 50 years" – and Putin is single-handedly responsible for the global mayhem. The situation is dire across Europe, notably in countries heavily dependent on Russian gas.

The most pronounced impact of the war has been, and will continue to be, a gradual realignment of trade in fossil fuels in the European economies away from Russia to other, more secure and less autocratic sources – the options are limited.

The second significant impact is a shift towards more **liquified natural gas** (LNG) imports in the near future, reducing Europe's reliance on Russian gas supplied through fixed pipelines.

The third major trend, too slow to be perceptible at first, is likely to be the increased appeal of renewable energy resources since they are plentiful and domestic, providing a measure of supply security not offered by fossil fuels – and immune from their inherent price volatilities.

The last trend also happens to deliver longer term rewards in the form of reduced **carbon emissions** – a bonus compared to fossil fuels. Renewables will become more valuable as the dangers of climate change become more pronounced.

As one astute observer recently pointed out to your editor, every now and then we need someone like Putin to shake things up and force the complacent politicians to realize the folly of their long-held beliefs, such as the logic of **Germany**'s overwhelming reliance on Russian gas, or the **NATO** alliance being caught off-guard and unprepared. The list goes on. On a positive note, Putin forced **Finland** and **Sweden**, long sitting on the fence, to decide whose side they want to be on.

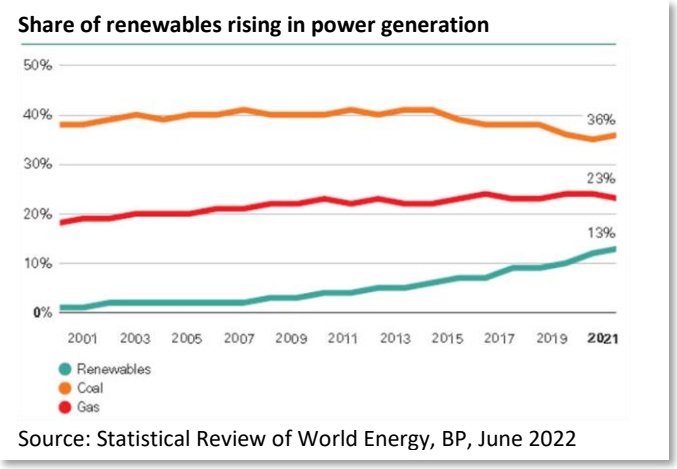
If useful lessons are learned and wise decisions are made and implemented, Putin will not only be defeated, but would have caused some good to rise from the ashes of the devastation he has brought to Ukraine and the global economy. ■

Prepare For More Energy Turbulence

Challenges and uncertainties at their greatest for almost 50 years

Staring in 1952, BP has been publishing its **Statistical Review of World Energy**. The 71st edition of this annual report released in late June is especially timely as it captures the impacts of the global pandemic affecting energy consumption and greenhouse gas emissions in 2000-1 but not the impact of the ongoing war in **Ukraine**, which will be captured in the next year's edition. In the report's introduction, **Spencer Dale** says, "The challenges and uncertainties facing the global energy system are at their greatest for almost 50 years, since the time of the last great energy shocks of the 1970s." He adds,

> "Most immediate is the impact of the terrible events taking place in **Ukraine**…. The war also threatens to lead to shortages in food and energy…. From an energy perspective, the growing shortages and increasing prices highlight the continuing importance of energy 'security' and 'affordability' alongside 'lower



Source: Statistical Review of World Energy, BP, June 2022

carbon' when addressing the energy trilemma."

The global pandemic was unusual but only temporary; the impact of the war is likely to be longer lasting.

> "This year's data show a sharp bounce back in global primary energy in 2021, increasing by almost 6% and more than reversing the sharp fall in energy consumption in 2020 as much of the world locked down. Primary energy use in 2021 is estimated to be more than 1% above its 2019 level."

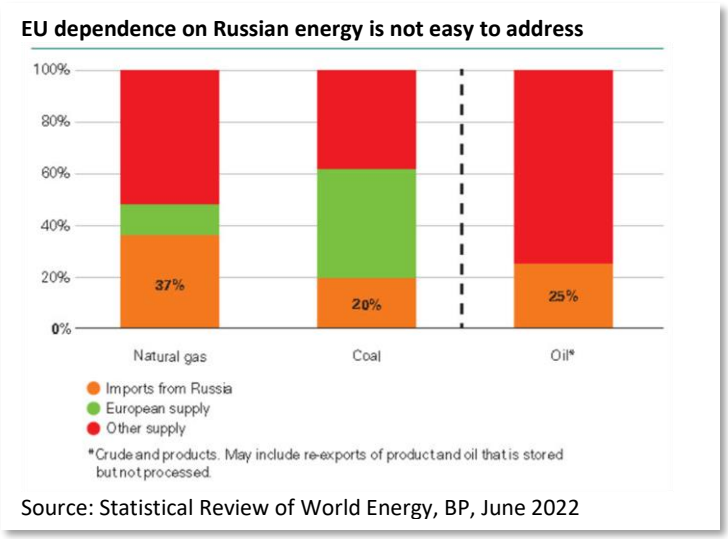
The fast rebound, enabled by massive government interventions, especially in the US and Europe, is now feeding the rising inflation, supply shortages and high commodity prices. Dale says,

> "In many ways, this sharp rebound in energy demand is a sign of global success, driven by a rapid recovery in economic activity …"

> "But it also highlights that the pronounced dip in **carbon emissions** in 2020 was only temporary: carbon equivalent emissions from energy (including methane), industrial processes, and flaring increased by 5.7% last year."

The bad news on emissions is somewhat tampered by the inexorable rise of renewables on massive global scale (visual on page 2) despite recent price rises and supply chain issues.

> "Encouragingly, renewable energy, led by **wind** and **solar** power, continued to grow strongly and now accounts for 13% of total power generation. Renewable generation increased by almost 17% in 2021 and accounted for over half of the increase in global power generation over the past two years."



Source: Statistical Review of World Energy, BP, June 2022

BP, not unlike other energy majors wants to be seen as part of the solution, rather than the problem. Dale says,

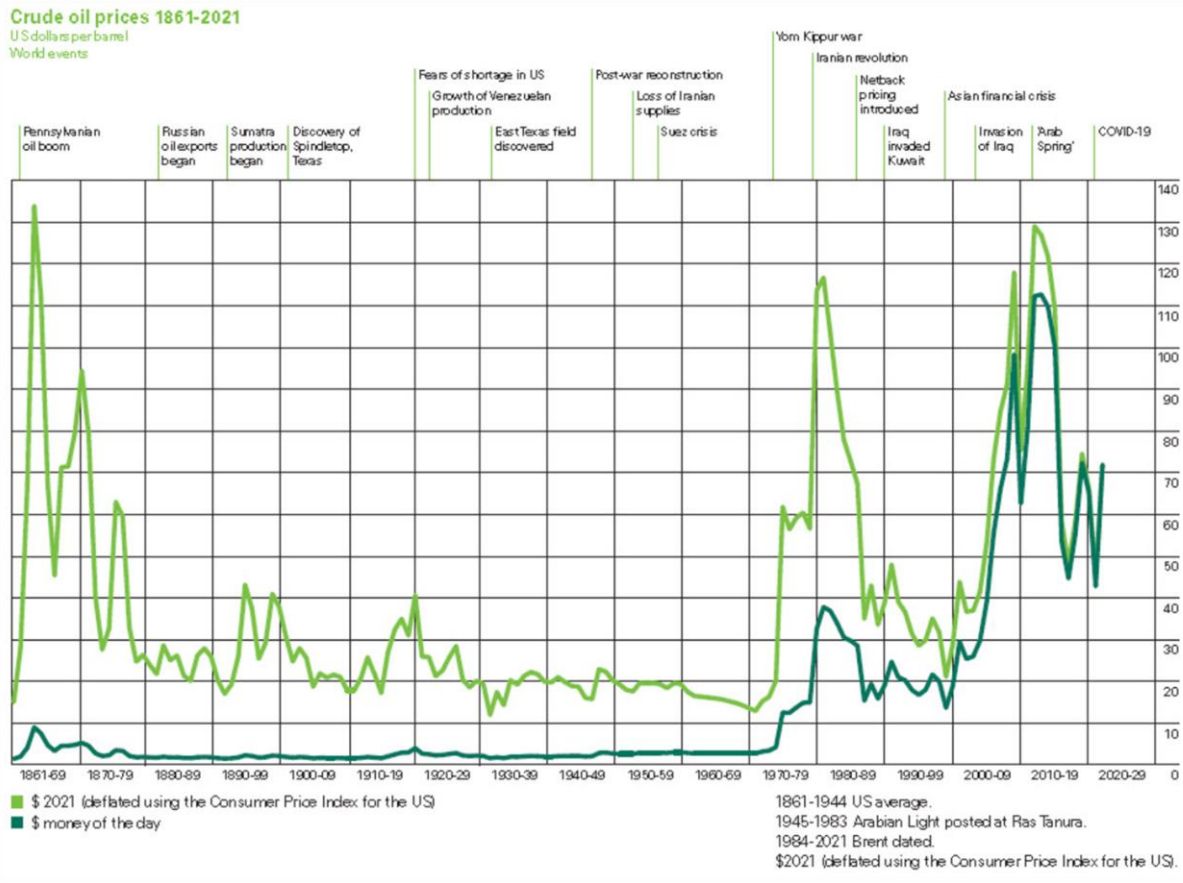
"The low-carbon energy sources and technologies needed to achieve a fast and deep decarbonization exist today – wind and solar power, biofuels, blue and green hydrogen, CCUS (carbon capture, use and storage), and carbon dioxide removals. The challenge is to apply them at unprecedented pace and scale."

This editor, as well as many other observers, are anxiously waiting for BPs next report, which will capture the initial impacts of the war in Ukraine on global energy prices and markets.

Without doubt, 2022 will go down as one of the most eventful years in the annals of energy history with unprecedented high prices and the beginning of massive shifts to new and more secure energy resources. While not much can be changed in the short-run, everything can be changed over the longer-term, and we are beginning to see some of the attempts already. One danger, of course, is that in the haste to react to the crisis, some poor decisions are bound to be made, which will complicate things in the longer-term – say

switching from Russian natural gas to LNG imports – which may become stranded investments once the current crisis is over. Or over-reliance on solar PV panels imported from China (article on page 5).

Oil prices have spiked and exhibit high level of volatility



Source: Statistical Review of World Energy, BP, June 2022

One would hope that European politicians will take concrete and lasting steps towards moving away from over-reliance on Russian supplied fossil fuels. As illustrated on the visual on page 3, it won't be easy, fast or cheap. There are, however, hopeful signs that this is already happening and will bear fruits in a few years.

The other takeaway from BP's latest report, and many others like it, is that fossil fuels, regardless of the source, tend to exhibit price volatility – evident from the historical patterns for oil (visual above), and more recently also in natural gas and coal. This, plus the fact that all are responsible for the warming climate suggests that the sooner we move away from them the better.

Oil majors such as BP, of course, do not wish to see their main source of profits to go away anytime soon. Different oil majors are taking different approaches to gradually diversify since they see the longer-term trends as inevitable. At the same time, with the current high oil and gas prices and demand for more supplies, it is hard to see any moving away from their core business. The war in Ukraine has definitely put climate action on the back burner, and that is unfortunate. ■

https://www.bp.com/content/dam/bp/business-sites/en/global/corporate/pdfs/energy-economics/statistical-review/bp-stats-review-2022-full-report.pdf

Germany To Pivot Away From Russian Fossil Fuels

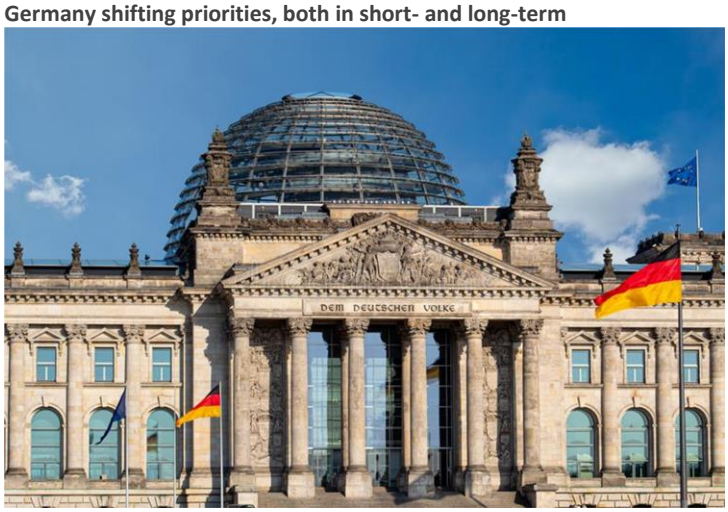
Painful compromises are needed to avoid curtailments in winter

Realizing their vulnerabilities, German lawmakers in early July approved a major package of reforms aimed at boosting the production of renewable power, as Chancellor **Olaf Scholz** warned that the country has "… for too long relied on energy supplies from Russia." Germany has already reduced its energy imports from Russia in recent months with the aim to end the purchase of Russian coal and oil this year, and of natural gas by 2024. Scholz said that the war in Ukraine is another reason for Europe's biggest economy to double down on its efforts to expand the use of renewable energy.

In the short-run, however, the law introduces a mechanism for sharing limited gas supplies with the aim to distribute the pain of the expected spikes in gas prices among all sectors of the economy. Large gas burning utilities such as **Uniper**, for example, may have to be protected against insolvency. The contingencies to be considered are imminent and serious. The laws introduced by Chancellor Olaf Scholz's government allows Berlin to intervene when energy firms run into trouble. In early July, the French government announced plans to nationalize it national utility, **Électricité de France (EDF)**, partially in response to the Ukraine crisis. It won't be the last.

Moreover, if gas supplies get tight during the coming months – as expected – and needs to be taken away from gas-burning power plants and redirected to critical manufacturing industries or retail customers, the law would allow a number of coal-fired plants – previously earmarked for closure – to generate electricity.

Germany shifting priorities, both in short- and long-term



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In the longer term, renewables will get a boost with the aim to put Germany on track to climate neutrality by 2045 as it weans itself off Russian fossil fuels over time. The new compromise says that greenhouse-gas neutrality of the power supply is to be reached "after the completion of the coal exit."

Originally Germany had set 2038 as the target for coal exit. In 2021, the target was moved forward to 2030. The Ukraine war, however, has changed all – certainly for the next few years. At their recent summit in **Madrid**, the G7 agreed to decarbonize their power systems by 2035, and that may slip.

Germany wants to reach 80% renewables power by 2030 for climate protection reasons. The government-proposed expansion targets aim to double the country's onshore wind capacity to 115 GW, with 30 GW of offshore wind and 215 GW of solar by the same date. The immediate situation is indeed dire as Russia curtailed gas deliveries for mid-summer maintenance. Some in Germany are not sure that deliveries will resume or the "maintenance" will take longer, possibly a lot longer as Russia increasingly weaponizes energy exports to punish the West.

Ironically, reduced dependence on Russian fossil fuels means that Germany – not unlike many other economies – will become increasingly dependent on **China** for a range of critical components and products, most notably solar PV panels.

According to the **International Energy Agency** (IEA), the supply of solar panels — key to Germany's green energy transition — is increasingly concentrated in China, which currently accounts for more than 80% in all the key manufacturing stages of solar supply chain. For some photovoltaic (PV) components China's share is expected to rise to 95% in the coming years. IEA's executive director, **Fatih Birol** pointed out that while "China has been instrumental in bringing down costs worldwide for solar PV … the level of geographical concentration in global supply chains also poses potential challenges that governments need to address."

Speaking of China and supply vulnerabilities, **Taiwan** is the world's single biggest manufacturer of sophisticated chips used in computers, mobile phones and everything else. Should Taiwan's supply chain be disrupted – for whatever reason – there will be a global shortage of chips the likes of which we have never seen. Security of supply and vulnerabilities of relying on a few big suppliers are pervasive.■

Frustrating Biden, The Supreme Court Defangs The EPA

The highest court is as divided as the country

At the end of June, following its controversial decision on abortion, the **US Supreme Court** in a 6-3 decision sharply curtailed the **Environmental Protection Agency**'s (EPA) ability to regulate **greenhouse gas** (GHG) emissions from coal fired power plants. The ruling makes it much harder for **President Biden** to achieve his goal of cutting America's GHGs in half by the end of the decade – a tall order that is now totally out of reach.

The court's 3 liberal justices accused the majority of stripping the EPA of "the power to respond to the most pressing environmental challenge of our time."

In a dissenting statement, Justice **Kagan** wrote that the court had substituted its own policy judgment for that of a highly polarized and divided Congress.

> "Whatever else this court may know about, it does not have a clue about how to address climate change. And let's say the obvious: The stakes here are high. Yet the court today prevents congressionally authorized agency action to curb power plants' carbon dioxide emissions."

She did not mince any words when she said,

> "The court appoints itself — instead of Congress or the expert agency — the decision maker on climate policy. I cannot think of many things more frightening."

Divided high court, as the country

https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcR24pdhly22eQog-klcSgSV-IThjiTiMQMlng&usqp=CAU

The environmental community was even more adamant and outraged. One critic said, “Make no mistake on this dark day, this (ruling) will kill people,” and wreck the planet. If the US cannot curb its own emissions how can it encourage or expect others to do the same?

Three things were notable about the decision:

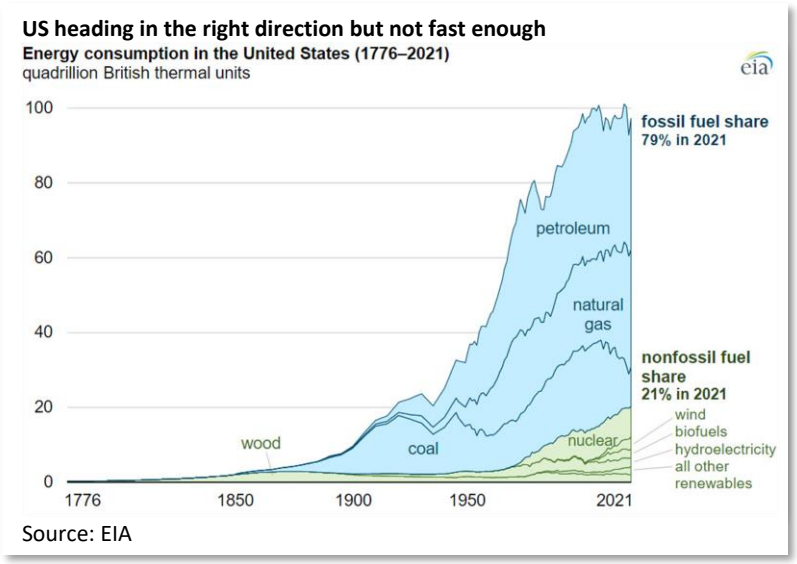
- First, the nation’s highest court did *not* have to take on this particular case, but it *chose* to rule on it. That says a lot in itself.
- Second, the technical language used to justify its decision was that limiting GHG emissions is a big issue to be decided by the Congress, not the EPA. Fine, but at a time when the US Congress is highly polarized and divided as is the country, asking Congress to decide is tantamount to no decision at all. The majority must have known what they were doing.
- Third, the court has given ample ammunition to those who want to take government agencies to court for regulating anything and everything they don’t like.

A frustrated Biden, said the ruling was “another devastating decision that aims to take our country backwards.” This editor cannot disagree. ■

Are We Moving Forward Or Backward On Climate?

The war in Ukraine has forced many countries to go backwards

The short answer is that it is a mixed bag. In some areas and some places, there are genuine and serious attempts to decarbonize the economy and move towards a more sustainable energy future while in other places the opposite is happening – and the war in **Ukraine** is usually mentioned among the reason for going backwards. Nowhere is this more pronounced than in **Australia**, a resource-rich, export-dominated economy. In early July ***Reuters*** reported that Australia’s mining and energy exports are forecast to climb 3% to a record $286 billion between now and June 2023, pushed by strong coal and natural gas demand and high prices. The value of Australia’s LNG exports are projected to rise 19% even as volumes drop 3%. Likewise, the exports of thermal coal used in power generation are expected to rise 15%.



Source: EIA

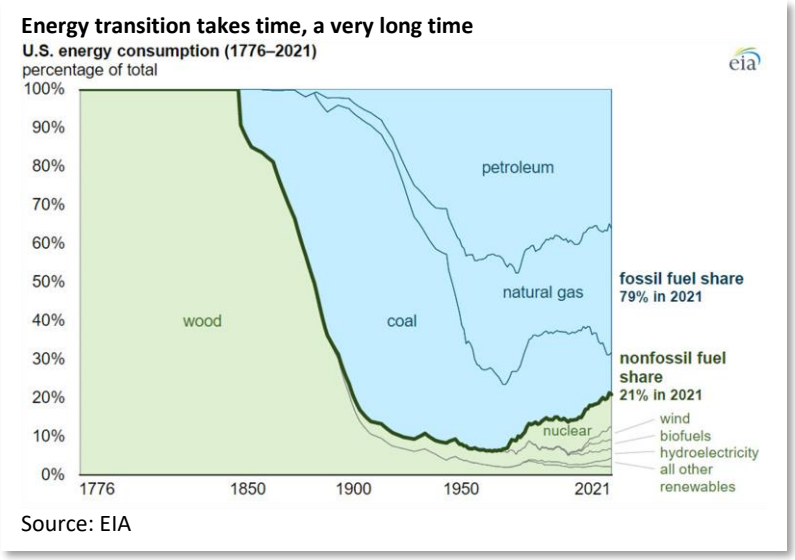
Here is a prosperous country enjoying high standards of living partly due to the strength of its coal and gas exports. It also happens to be the world’s driest continent – notwithstanding major floods affecting its eastern seaboard – which is likely to get drier as it gets warmer. In May 2022 Australians elected **Anthony Albanese** who replaced the former fossil-fuel loving Premier **Scott Morrison**. As the preceding paragraph suggests, even with a new government in Canberra it will be business-as-usual.

The same, you might say, is happening in the US especially after the **US Supreme Court's** recent decision (preceding article) making it so much harder for **President Biden** to make any headway on his ambitious target to reduce US carbon emissions in half by 2030.

In early July, the **Energy Information Administration** (EIA) reported that fossil fuels accounted for 79% of the 97 quadrillion British thermal units (quads) of primary energy consumed in the US in 2021. What's more, consumption grew by 4 quads, the largest annual increase on record after falling by 7 quads in 2020 due to the pandemic.

Renewable generation, mostly from wind and solar, rose somewhat from 11.5 quads (equivalent) in 2020 to 12.2 quads in 2021 but was partially offset by a decline in hydroelectricity generation as parts of the Western US suffer from a prolonged drought. **Nuclear** generation, another carbon free source of energy, totaled 8.2 quads (equivalent), the lowest level since 2012.

Not unlike many major economies, **petroleum** has been the most-consumed primary energy source in the US since surpassing coal in 1950 (visual). While it remains less than its 2005 peak, it still accounted for 35 quads in 2021 followed by **natural gas** at 31.3 quads.



Source: EIA

Consumption of the dirtiest fuel, coal, increased to 10.5 quads in 2021, the first annual *increase* since 2013. US coal consumption has fallen by more than half since it peaked in 2005 and is expected to resume its decline once the energy markets settle and current high prices subside, whenever that may be.

Similar patterns are observed in many parts of the world, including **Germany**, Europe's largest economy, which is moving away from one evil – Russian gas – to another – coal-fired electricity generation. The energy price increases and security of supply issues are forcing many countries to make similarly bad choices – at least in the short term.

It is unfortunate as it sets back any hope of meeting the goals of the **2015 Paris Climate Accord** anytime soon. The delegates heading to the **United Nations Conference of the Parties** (COP27) in Sharm El Sheikh in November, won't have much to cheer about. Higher energy, food and commodity prices, widespread famine, more extreme weather events, and rising global temperatures will dominate debates with fewer good options.

In particular many developing African countries, which are suffering from the impact of climate change without contributing to it, will be asking for financial aid to feed their populations and deal with the worst impacts of a warming climate. Few would be keen to talk about reducing greenhouse gas emissions. It may be a spectacle to avoid. ■

You Can Get Sued For Greenwashing, No Kidding

False claims and misleading promises can backfire

According to ***The Wall Street Journal***, in the past few years, over 5,000 major global companies have signed up with the **United Nations' Race to Zero campaign**, pledging to purchase clean energy and take other measures to help eliminate or offset the greenhouse gases they generate. In the mean time some 370 companies have joined **RE100** (for 100% Renewable Energy), a group whose members have pledged to be 100% powered by renewable energy by 2050. The companies include not only HighTech giants but also industrial giants such as **General Motors** and **Maersk**, the biggest global container shipping company.

Is KLM greenwashing?

The message one often hears from these companies tends to be reassuring. Your editor feels less guilty to hear that **United Airlines** aims to be net zero carbon by mid-century. But how realistic are these targets? What are these companies actually doing today to change what they do or how they do it. In the case of United Airlines, the only visible change is an effort to recycle the waste – collecting and recycling paper cups and aluminum cans.

In early July, environmental activists sued the Dutch subsidiary of **Air France KLM group** over an advertising campaign they allege breaches European consumer law by misleading the public over how sustainable its flights actually are. It may be the first greenwashing lawsuit, but certainly not the last. As reported by the ***Reuters***, (6 July 2022) "Campaigners have launched hundreds of climate change-related suits against companies, governments and authorities to try to accelerate the world's shift to a low-carbon economy and fight an escalating climate crisis."

The Dutch campaigners, **Fossielvrij NL**, filed the lawsuit alleging **greenwashing** in the District Court of Amsterdam. They want to stop KLM's **'Fly Responsibly'** adverts, alleging they violate the EU's Unfair Consumer Practices Directive by giving the false impression that the flights will *not* exacerbate the climate crisis.

KLM, which says it has invested millions of euros in a more sustainable fleet and is working *towards* the goal of reaching net zero carbon emissions by 2050, met with the group but failed to persuade them not to file the publicity damaging lawsuit. In a prepared statement, KLM said,

> "It would certainly not be in our interests to misinform our customers. It's our responsibility to make future travel as sustainable as possible. We believe that our communications comply with the applicable legislation and regulations."

With climate change in the headlines every day – unprecedented floods in **Australia**, melting glaciers in **Italy**, prolonged droughts in America's **Southwest** – a frustrated public is desperately trying new ways of forcing governments, the financial community and corporations to take decisive and immediate action. KLM finds itself in the unenviable position to explain that it is *not* engaged in greenwashing. As noted by ***Reuters***, with the "rising tide of climate litigation" expect many more. ■

https://www.reuters.com/business/aerospace-defense/dutch-airline-klm-sued-over-greenwashing-ads-2022-07-06/

EU Bans New ICE Sales In 2035

The age of gasoline- and diesel-powered cars is coming to an end

At their latest summit in late June, EU member states agreed to end the sale of new fossil fueled passenger cars in 2035 while compromising on the EU's **emission trading scheme** (ETS) as well as establishing a **Social Climate Fund** to cushion the impacts of a new price on CO2 in the transport and heating sector and for investments in more efficient buildings and lower-emission mobility. The agreed proposals now have to be negotiated at the **European Parliament** before they can be implemented by member states.

Time to move on to electric

It took a lot of arm twisting among the 27 energy and environment ministers to come to an agreement, with **Italy, Portugal, Slovakia, Bulgaria** and **Romania** pleading for the ban on the **internal combustion engines** (ICEs) to be delayed to 2040. **Germany** added another complication by introducing the option that e-fuel driven cars should be considered possible in the climate-neutral 2035 car fleet. It is never easy when there are 27 member states with diverging views, but at the end, a compromise was reached:

Convert to electric?

"The EU Member States have voted by an overwhelming majority that from 2035 only cars and light commercial vehicles that do not emit CO2 will be registered."

The fate of ICEs is equally sealed in the **UK, California** and an increasing number of other cities, states and countries that have already announced similar bans or are contemplating it, generally by 2030-35. ■

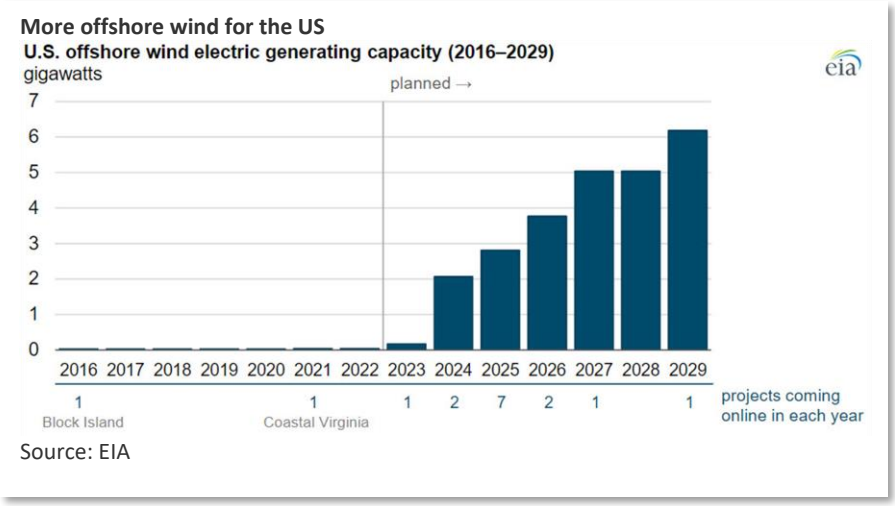
Offshore Wind Had Its Best Year In 2021

The share of new offshore wind to reach 30% by 2031

In early July, the **Global Wind Energy Council** (GWEC) released ***Global Offshore Wind Report*** where it said that the offshore wind industry had its "best-ever year" in 2021 with 21.1GW of new capacity connected to the grid, bringing the global capacity to 56 GW. Moreover, the GWEC said 260 GW of new offshore wind capacity could be added in 2022-2030, bringing the total global offshore wind installations by the end of the decade to a stunning 316 GW. The report forecasts that Asia will replace Europe as the world's largest offshore wind market in 2022 with annual installations expected to reach 54.9 GW in 2031. At this growth rate, the offshore wind share of new global wind installations is expected to reach 30% by 2031, up from 23% in 2021.

In the meantime, the **Energy Information Administration** (EIA) expects developers to install more than 6 GW of offshore wind capacity over the next 7 years at sites mostly along the eastern US seaboard

including projects off the coasts of New Jersey, Maryland, and Virginia, as well as on Lake Erie. By contrast, as of March 2022, there were more than 135 GW of onshore wind in the US with plans to add another 21 GW by 2026.



Source: EIA

US is a latecomer to offshore wind with the first project, a 30 MW installation in 2016 off the coast of Rhode Island. Since then, a handful of additional projects have been completed with many more expected.

Offshore wind turbines tend to operate at a higher capacity factor than onshore wind because of stronger and less variable wind speeds. Moreover, offshore wind is typically closer to major population centers, which tend to be along the coast. However, offshore wind is more expensive to install and maintain than land-based systems.

Siting offshore wind requires a lease from the US Department of the Interior's Bureau of Ocean Energy Management (BOEM), which has held lease sales at several sites on the eastern seaboard since 2013. Acquiring a lease is a necessary first step in developing an offshore wind project to be followed by construction and transmission interconnection.

For the first half of 2022 BOEM has auctioned 6 leases in New York, 2 in the Carolinas as well as plans to auction lease sites off the coast of California later this year.■

Solar + Battery Bundle At No Upfront Cost?

Retailers are experimenting with new bundled products

Retailers in **Australia**, which already boasts the highest number of rooftop solar installations per capita in the world are pushing ahead with more innovative products that are likely to result in even more solar customers. Fierce competition among the retailers and *gentailers* in a crowded market is pushing the players to find new ways to attract and retain sticky customers. Similar trends, however, are appearing in places like Hawaii (article on page 16) and California even in the absence of retail competition.

As reported in the 4 July 2022 issue of ***One Step Off the Grid***, one of the country's biggest gentailers, **EnergyAustralia** is offering a new home solar and storage plan, which includes installation and management of the system at *no up-front cost*. No, that's not a type, zero up-front cost. Not surprisingly EnergyAustralia says it has seen a "significant monthly increase" in inquires including a "staggering 95% uptick" over the past 4 weeks. It should not come as a surprise.

The company started with small trials of the product in September 2021, the success of which prompted it to offer it to customers in New South Wales and in other markets. The **Solar Home Bundle** is a 7-year scheme where the customer pays a fixed usage rate for electricity – generated from the rooftop panels or the grid – in return for allowing the installation of solar panels, inverter and 10.1 kWh battery at no cost to customers. At the end of the 7-year period, ownership of the entire system is transferred to the customer. It's hard to believe but it is apparently true.

Add a battery to the solar and no up-front cost

What explains EnergyAustralia's generosity? Using smart software, the gentailer can optimize the household's power supply from the grid, solar panels and/or the battery, which can also be used to help support the grid as needed, usually after the sun sets. According to EnergyAustralia's chief customer officer, **Mark Brownfield,**

> "We believe the Solar Home Bundle changes the landscape for people wanting to enter the renewable energy market now. It puts transitioning to a solar and battery system in the home, within reach."
>
> "Australians have for some time faced a significant barrier to their renewable energy aspirations – buying solar and batteries outright has been cost-prohibitive, not to mention confusing for many.
>
> "Our customers have told us this is a terrific initiative …."

As usual, there is always a catch. Applications for the Solar Home Bundle must meet certain eligibility criteria and the household must be "suitable" for solar and battery storage.

The reality is that increasing numbers of customers – specially the more affluent ones with bigger detached roofs – are going solar, and many pairing them with batteries while many low-income customers cannot afford such an investment. Schemes such as this addresses the equity issue.

Even more important is that the excess solar exported to the grid during the mid-day sunny hours is worse than worthless since many networks are already flooded with utility-scale solar. But if the excess solar can be stored in a battery and discharged after the sun has gone down, then it becomes highly coveted. Finally, in markets with competitive retail, turning customers into sticky ones is a big plus, which explains the 7-year contract. Even after that, if the experience has been positive, the customer is less likely to switch. There is usually a logic to the madness. ■

https://onestepoffthegrid.com.au/zero-cost-up-front-home-solar-and-battery-offered-to-meet-staggering-demand/

x

The Future Of Distribution Networks

Electrification of transport and heating requires investment in poles and wires

In a timely blog posted on 27 June 2022, **Meredith Fowlie**, a professor at **Univ. of California, Berkeley Energy Institute** points out that "The local power lines and substations that deliver electricity to our homes and businesses may seem dull and pedestrian. But this infrastructure has a critical role to play in the clean energy transition. If electric vehicles (EVs) and building electrification drive electricity demand peaks into uncharted territory, system upgrades will be needed." She adds," How many, and at what cost, has been impossible to assess given a dearth of data."

Poles and wires: It's not just for the birds

Source: https://energyathaas.wordpress.com/2022/06/27/what-will-electrification-cost-the-distribution-system/

Referring to the research by **Elmallah, Brockway, and Callaway** (EBC) who examined circuit-level data on load hosting capacity with neighborhood-specific estimates of the load increases for one large investor-owned utility, **Pacific Gas & Electric Company** (PG&E), one can see what happens at the local distribution level "… as more electric cars and electric heating appliances plug into the grid." It is not an academic question and as she points out billions of dollars of investment will be required to maintain, upgrade and modernize the network – depending on how well or poorly this growth is managed.

The 3 researchers considered each of PG&Es more than 3,000 feeders to determine "… the capacity for local distribution infrastructure to absorb electrification-induced load increases. Given how hard it is to predict when/where people will charge their EVs, or how fast the residential electrification situation will actually unfold." EBC considered a range of scenarios while Fowlie highlights a few of their major conclusions in her blog post, highlighted (and edited) below.

First: EVs drive the pace of distribution system upgrades

Fowlie points out that California's EV targets assume that PG&E territory reaches 3.1 million EVs by 2030 and 12.5 million by 2050. As a point of reference, PG&E's service territory covers roughly half of California – so as a rough guess, one can double these numbers to get a sense of how many EVs may be on the roads in the state by 2030 and 2050, and the demand they will impose on the network.

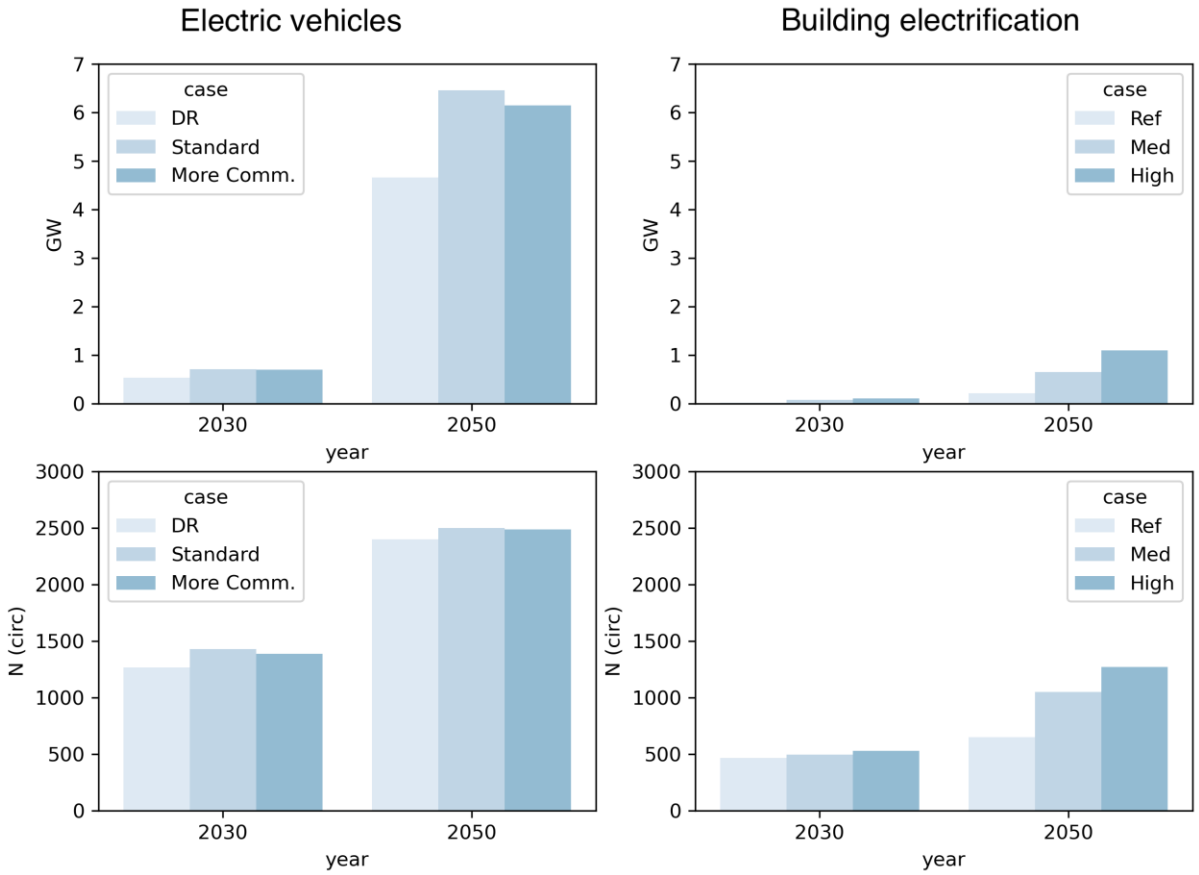
Fowlie estimates "… that we will need between 95 and 260 feeder upgrades *per year* between now and 2030. That's about triple the pace of projects that PG&E has planned for through 2025." Again, one should roughly double the number for California as a whole.

Second: Distribution system upgrades cost real $$$

Fowlie writes that "… upgrade requirements in PG&E territory will add up to approximately $1 billion between now and 2030" and probably close to $5 billion by 2050. That, of course, is music to the ears of **investor-owned utilities** (IOUs), who like nothing more than adding more to their asset base on which they can earn an allowed rate-of-return.

How, when, and where EVs are charged matters

Notes: Upgrade needs for PG&E distribution circuits through 2030 and 2050, respectively. There are 3043 circuits in total. The DR/Standard/More Commercial EV scenarios assume coordinated night-time residential charging; 67% access to residential charging; 50% access to residential charging, respectively. The demand response (DR) EV scenario smooths residential nighttime charging from 10pm to 5am.



Source: https://energyathaas.wordpress.com/2022/06/27/what-will-electrification-cost-the-distribution-system/

Third: Commercial EV charging holds promise

According to Fowlie "… dialing up the share of EV charging that happens at commercial locations does not increase distribution grid costs. You can see this by comparing the upgrade numbers across the "standard" scenario – where 67% of EV drivers are assumed to have access to home charging – and the "more commercial" scenario where 50% of drivers have access to at-home charging." She writes,

> "This (result) surprised me because it's assumed that charging at commercial locations will happen during the day, whereas residential charging happens at night. I had thought that daytime charging would be more constrained because it's more likely to coincide with peak loads. But these data suggest there's some excess capacity on commercial circuits."

What can be done to alleviate the impact of these new and growing loads on the distribution network? Will ***rooftop solar come to the rescue?*** Could more rooftop solar reduce the need for distribution cost upgrades?

The simple answer is that "…more residential PV without storage has limited impact on system upgrade needs."

> "This is not surprising given that much of the heating load and residential EV charging is assumed to happen at night. Distributed solar *plus storage* could reduce the need for distribution system upgrades."

More important, Fowlie adds,

> "But could it really make sense to invest in distributed batteries to charge our EV batteries? Back-of-the-envelope calculations say no – probably better to bite the system upgrade bullet so that we can plug our EVs into the grid."

What else can be done? Will **Smart EV charging come to the rescue?** "The researchers consider a stylized **demand response** (DR) scenario that evenly distributes at-home vehicle charging between the evening hours of 10 pm and 5 am. They find that this kind of coordination reduces upgrade requirements and associated costs. Could costs be further reduced with more targeted demand response programs?"

> "The answer is almost certainly yes. Remember that distribution system costs are no higher when EV's plug into commercial circuits during the day (versus residential circuits at night). A big advantage of daytime charging is that it can be coordinated to soak up solar PV production (and low wholesale prices). Smart coordination of commercial/at-work charging could deliver bigger system-wide cost savings."

Fowlie's insights based on the research by Elmallah, Brockway, and Callaway is revealing. It suggests that the added strain that can be expected to be inflicted on the local distribution networks across the globe as electrification of transport, heating and everything else gains momentum over the years is significant.

Will PVs charge EVs?

Research by others suggests that, all else being equal, profit-motivated IOUs have perverse incentives to over-invest in upgrades and – if allowed by hapless regulators – prefer sub-optimal charging patters by EV drivers since this increases the need for network upgrades, which means they will end up with even more assets in their regulated ratebase.

There is a lot at stake and this editor's view is that the IOUs will get more of what they want if the regulators are not alert and vigilant. Given the asymmetry of resources between the two, the chances are that the former will prevail. ■

Fowlie, Meredith, "What Will Electrification Cost (the Distribution System)?", *Energy Institute Blog,* UC Berkeley, June 27, 2022, https://energyathaas.wordpress.com/2022/06/27/what-will-electrification-cost-the-distribution-system/

Hawaii Says Goodbye To Coal

Fossil-fuel based Aloha State is going 100% renewable

For most visitors, Hawaii is where you go to relax, honeymoon and get away from it all. For Hawaiians, it is home with all its warts and blemishes including high prices – including electricity prices. The state used to be nearly 100% dependent on imported oil and diesel for power generation until 1980s when it began importing coal. In 2015, the **Aloha State** passed a bill with the goal of becoming 100% renewable by 2045 – the first state in the US to do so. It is also a leader in rooftop solar installations, twice the US average. Despite the lofty goals and the progress, it remains the most petroleum-dependent state in America.

Hawaii's last coal-fired plant to close in Sept 2022

Source: *EcoNet News*, 30 June 2022

As reported in the 30 June 2022 issue of ***EcoNet News***, in September Hawaii will shut down its last coal burning power plant, the **Kapolei station** on the island of Oahu (photo). It will be partially replaced with the nearby **Kapolei Energy Storage facility**. A 185 MW/565 MWh battery energy storage system (ESS), among the largest in the world, is being built by **Tesla** in record time. It consists of 158 Tesla Megapacks, which are being shipped to Oahu and assembled in time for the coal plant's closure.

The state's main utility, **Hawaiian Electric Co** (HECO) is also racing to build or acquire more renewable capacity as fast as it can including utility-scale solar (photo), distributed solar, wind biomass and biofuels. It has issued a number of **Request for Proposals** (RFPs), to bring more renewable capacity online to ramp down the use of imported oil and to replace fossil fuel generation on Oahu and the neighboring islands.

In the most populous island of Oahu, HECO is seeking up to 500 MW of renewables by 2029 and an additional 200 MW by 2033. For Maui, at least 40 MW of firm capacity by 2027. Thus far, it has managed 600 MW of solar and 3 GWh of storage to be in service by 2024.

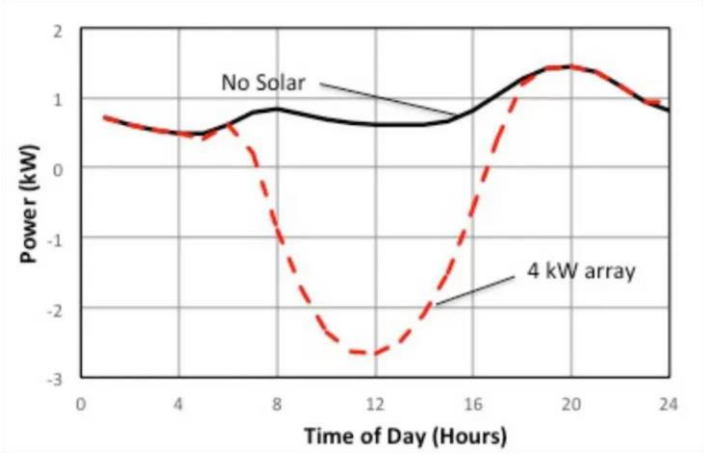
Looks more benign than a coal-fired plant

Source: *EcoNet News*, 30 June 2022

But that is not enough. To get to the 100% renewable target by 2045, more renewables, utility-scale as well as distributed will be needed. Given its year-round sunny climate and high retail rates, rooftop solar looks promising.

Hawaii was inundated with rooftop solar leading to a virtual moratorium in 2015 and revisions to the state's **net energy metering** (NEM) laws. Utilities complained that they could not handle more rooftop solar, which was flooding the local distribution network during sunny hours of the day (visual) and draining much needed revenues from HECO. A new way had to be found to make it a win-win for both the utility and the customers. The obvious solution was to pair solar with batteries.

Solar customer's load profile exhibits the "Duck Curve" phenomenon
Below, a "typical" customer with 4 kW solar array



https://535485.smushcdn.com/698061/wp-content/uploads/2022/07/McCormickChart3.jpg?lossy=1&strip=1&webp=1
Source: Renew Economy, 7 July 2022

As reported in the 30 June 2022 issue of ***EcoNet News***, in 2021, HECO offered $850/kW for a 10-year commitment to solar customers with batteries if they agreed to discharge at peak times but got little uptake. Earlier this year, with the consent of the **Hawaii Public Utilities Commission** (HPUC), HECO introduced **solar-plus battery scheme** with a peak capacity payment of $5 per kW per month and an export credit for power flowing from the batteries to the grid at *full* retail rate between 6-8 pm when the network needs it the most. This new **export credit** scheme rewards solar customers with batteries who can support the grid rather than forcing the utility to buy the excess solar when they don't need it during the mid-day hours. It is a win-win and is expected to attract more participation since increasingly customers pair solar with storage anyway. It resembles the EnergyAustralia's offer (article on page 11).

Other states with high rooftop solar penetration such as California, should emulate Hawaii's solar-plus-battery scheme by turning the mid-day solar – considered a nuisance – into a valuable product by incentivizing the discharging of the batteries after the sun has set. It is a classic case of turning lemons into lemonade. ■

Growing Population Exacerbating Pressure On The Environment

Sub-Saharan Africa is the increased population growth is highest through 2050

On 11 July, the **World Population Day**, the **United Nations** reported that **India** will surpass **China** as the world's most populous country in 2023 with each counting more than 1.4 billion residents. It warned that high fertility in developing countries would challenge economic growth. According to the UN's latest projections the world's population will top 8 billion before the end of the year, grow to 8.5 billion in 2030, and 10.4 billion in 2100. The pace of mortality has slowed even faster than the fall in birth rates.

A good diplomat, UN Secretary-General **António Guterres** put a positive spin on the numbers. "This is an occasion to celebrate our diversity, recognize our common humanity, and marvel at advancements in health that have extended lifespans and dramatically reduced maternal and child mortality rates." A growing population, he failed to mention, exacerbates many challenges facing global economies, especially in developing countries with rapid population growth.

The good news, to the extent that there are any these days, is that world's population is growing at its *slowest* pace since 1950, having fallen below 1% in 2020. In 2021, the average fertility of the world's population stood at 2.3 births per woman over a lifetime, having fallen from about 5 births in 1950. Global fertility is projected to decline further to 2.1 births per woman by 2050.

More people, more pressure on the environment

Source: Reuters

Looking at where the rapid growth is taking place, the United Nations said more than half of the projected increase in the global population up to 2050 will be concentrated in the following 8 countries

- Congo
- Egypt
- Ethiopia
- India
- Nigeria
- Pakistan
- The Philippines
- Tanzania.

None are particularly successful in meeting their citizens' current basic needs or have the infrastructure or the political institutions to look after their growing populations. Countries of sub-Saharan Africa are expected to contribute more than half of the increase anticipated growth through 2050. The UN did not dwell on how these countries, some already near breaking point, will manage to provide basic services, food, energy, housing, education, medical care, jobs, etc.

At the same time the UN report notes that the population of 61 countries – mostly advanced economies with high standards of living – is projected to *decrease* by 1% or more between 2022 and 2050, driven by a fall in fertility. This – needless to say – will further widen the gulf between the rich and the not so rich economies, resulting in mass migration and potential conflict. If you think that the situation is dire today it will get worse.

Nigeria with a population of 195 million, for example, has 12,522 MW of installed electric generating capacity, roughly 4,000 MW of which is available for operation on most days. **Belgium**, a country of 11.5 million, by contrast, has 24 GW of installed capacity.

Population, as **Guterres** points out, can be a source of strength, including a bigger labor force. But many of the fastest growing regions of the world are struggling with their existing population, let alone a bigger one. Water and food scarcity, a chronic problem, is likely to get worse leading to political turmoil and stability – as recently happened in **Sri Lanka**

Speaking from his comfortable office at the UN's headquarters in New York City, Mr. Guterres can make grand pronouncements on the World Population Day. But when he goes to Sharm el-Sheikh in Egypt in November for the COP27, he will be reminded that all is not rosy, especially when it comes to climate change.■

Utilities Moving Towards Bidirectional Flows

EVs and batteries offer an underutilized win-win solution

The days when utilities delivered the kWhs through their generation and delivery network to end customers is being challenged by increasing numbers of *prosumers* and *prosumagers* who are now feeding the network in the opposite direction at times when they have more distributed generation than demand. As more consumers add batteries and/or acquire **electric vehicles** (EVs), the concept of **consumer-to-grid**, especially **vehicle-to-grid** (V2G), rather than grid-to-consumer or grid-to-vehicle (G2V), is getting traction. Add smart software and **artificial intelligence** (AI), and the challenges of managing bidirectional flows becomes less daunting.

In June 2022, amidst warnings that the California's grid may run short on supplies, **Tesla** and **Pacific Gas & Electric Company** (PG&E) launched a pilot program to encourage customers with **Tesla Powerwall** home energy storage battery packs to join forces allowing them to be utilized as a **virtual power plant** when the grid is stressed, which is during the 4-9 pm when solar generation falls.

There are an estimated 25,000 Powerwall customers in the PG&E service area and if a good number participate, that will quickly add up to a lot of underutilized storage capacity that sits idle. **Drew Baglino**, Tesla's SVP of powertrain and energy engineering, said, "Enabling Powerwall customers to support the grid and their community is a necessary and important part of accelerating the transition to sustainable energy," adding, "We seek to partner with utilities and regulators everywhere to unlock the full potential of storage to bring more renewable, resilient, and less costly electricity to everyone."

Tesla and PG&E to aggregate and deploy the underutilized batteries

Source: Tesla

According to PG&E in the two weeks following the announcement, more than 3,000 customers expressed interest in participating with 1,500 officially enrolled in the pilot program. While it is a small percentage of the total, it is encouraging.

As reported in ***Green Car Reports***, participating customers will form a "distributed" battery that can store excess energy during periods of low electricity demand, and discharge it back into the grid during periods of high demand. It's among PG&E's **Emergency Load Reduction Program** (ELRP), a 5-year pilot program launched in 2021.

Participating customers' Powerwall batteries, which will be directed by PG&E to discharge during the high-demand hours of 4-9 pm will receive $2.00 for every kwh of electricity discharged during these hours. With residential rates in the 32 cents/kwh range, customers, even the more affluent ones who tend to own Powerwalls, have strong incentives to participate. They can still keep sufficient reserves in the batteries in case of a power outage. The scheme has some similarities to those in Australia (page 11) and Hawaii (page 16).

While in its infancy, schemes such as Powerwall aggregation as well as V2G initiatives are likely to play an increasing role in balancing supply and demand as the percentage of renewable generation and the number of households with EVs rises. California plans to end the sale of most new **internal combustion engines** (ICEs) by 2035. This will add substantial stress to the fragile grid – especially if EV charging is not properly managed.

https://www.greencarreports.com/news/1136434_thousands-tesla-powerwalls-back-up-grid-virtual-power-plant

EEnergy Informer In The News

Selected articles from the ***EEnergy Informer*** are regularly reprinted in other publications including in ***Renew Economy***, Australia, ***Energy Spectrum***, UK, ***Vector*** and ***Energize*** in So. Africa, ***CA Current*** in California and ***CleanTechnica*** and ***The Energy Central***, among others in the US. The following articles or references appeared last month in other publications.

"New MIT report says decarbonization needs renewables plus storage" appeared in the 12 July 2022 issue of ***Energize*** at
https://www.energize.co.za/article/new-mit-report-road-decarbonisation-renewables-plus-storage

Dr. Sioshansi was quoted in the 25 June 2022 issue of ***The Economist*** Technical Quarterly on The Energy Transition:

> "Demand management is a breakthrough long discussed and just as long deferred. Utilities that were heavily regulated monopolies or both saw little reason to 'modify, adjust, manage, shape, shift or shed customers' demand,' Fereidoon Sioshansi writes in a recent book, Variable Generation, Flexible Demand. They just added capacity and passed on the costs. Providing customers with price signals did not live up to the promise market-minded reformers imagined for it. …"
>
> "Acknowledging this is the key to the strategy Mr. Sioshansi champions: "we need to automate things, essentially bypassing customers." New DER-enabled (distributed energy resources) smart grids are an excellent way of doing this."

The Economist Technical Quarterly on The Energy Transition available at

https://www.economist.com/technology-quarterly/2022/06/23/getting-the-most-out-of-tomorrows-grid-requires-digitisation-and-demand-response

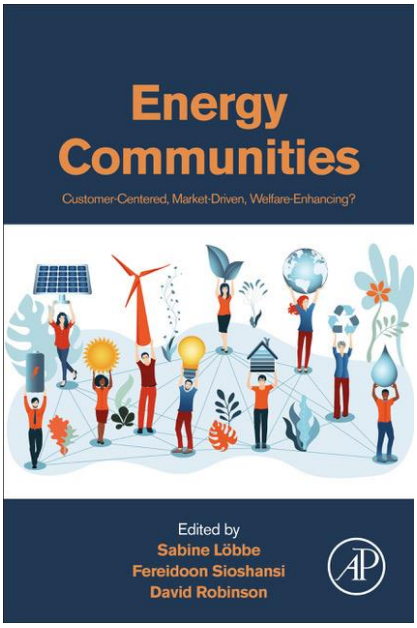
Dr. Sioshansi contributed a chapter (#24, The Emerging Demand-side Paradigm in the Power Sector) to **The handbook of energy transition** available at
https://www.routledge.com/Routledge-Handbook-of-Energy-Transitions/Araujo/p/book/9781032023502■

New Book In Print

Energy Communities: Customer-centered, market-driven, welfare-enhancing?

Edited by Sabine Löbbe, Fereidoon Sioshansi & David Robinson
Academic Press, July 2022
Paperback, 514 pages
$165
ISBN: 9780323911351
Available from Elsevier at
https://www.elsevier.com/books/energy-communities/lobbe/978-0-323-91135-1

Summary description



In the power sector, distributed as well as renewable energy sources are gaining market share. Simultaneously, the role of the end customer is changing from passive "load" to be served to one of an active participant in the market. By producing, storing and managing energy on their premises, citizens can start to assume responsibility for balancing the energy system. Energy communities may be an important means to support this process. This book explores whether and how energy communities can be part of the solution, serving to integrate customers as active participants in future electricity markets.

The book

- Explores whether and how different kinds of energy communities contribute to the transition towards distributed energy systems;
- Describes how policy, market and regulatory frameworks need to be adjusted;
- Describes the appeal of energy communities to energy customers and identifies their economic, ecological, emotional and social benefits;
- Examines enabling technologies and community design in the power or heating market or involving sector coupling; and
- Explores how energy communities can turn into promising business models for different actors along the value chain. ■

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EEnergy Informer

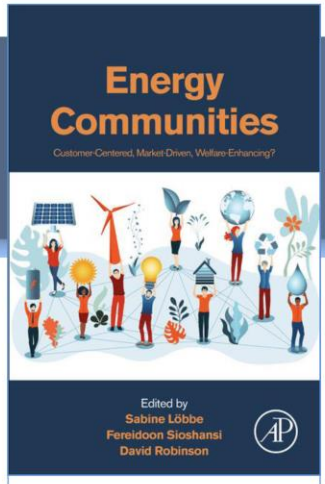
Copyright © 2022
August 2022, Vol. 32, No. 8
ISSN: 1084-0419

http://www.eenergyinformer.com

EEnergy Informer is an independent newsletter providing news, analysis, and commentary on the global electric power sector.
For all inquiries contact
Fereidoon P. Sioshansi, PhD
Editor and Publisher
1925 Nero Court
Walnut Creek, CA 94598, USA
Tel: +1-925-256-1484
Mobile: +1-650-207-4902
e-mail: EEInformer@aol.com

Published monthly in electronic format.
Annual subscription rates in USD:

Regular	$450
Discounted	$300
Limited site license	$900
Unlimited site license	$1,800



Energy Communities

Customer-centered, market-driven, welfare-enhancing?

Edited by Sabine Löbbe, Fereidoon Sioshansi & David Robinson

ISBN: 978-0-32-391135-1
EDITION: 1
PUB DATE: July 2022
LIST PRICE: $165.00
FORMAT: Paperback
TRIM: 7.5w x 9.25h
PAGES: 514.

Technology providers in BTM services, building energy management, P2P trading; regulators, policy makers, researchers, power system professionals in generation and distribution, academics

SHELVING CLASSIFICATIONS: Energy Policy, Business and Economics

BISAC CODES: KNB, RND

THEMA CLASSIFICATION: THEMAKNB; THEMARND

AUTHORS DISCOUNT: 30% using the code

DESCRIPTION

Energy Communities explores core potential systemic benefits and costs in engaging consumers into communities, particularly relating to energy transition. The book evaluates the conditions under which energy communities might be regarded as customer-centered, market-driven and welfare-enhancing. The book also reviews the issue of prevalence and sustainability of energy communities and whether these features are likely to change as opportunities for distributed energy grow. Sections cover the identification of welfare considerations for citizens and for society on a local and national level, and from social, economic and ecological perspectives, while also considering different community designs and evolving business models.

WHAT AND WHY OF ENERGY COMMUNITIES

In the power sector, distributed as well as renewable energy sources are gaining market share. Simultaneously, the role of the end customer is changing from passive "load" to be served to one of an active participant in the market. By producing, storing, and managing energy on their premises, citizens can start to assume responsibility for balancing the energy system. Energy communities may be an important means to support this process. This book explores whether and how energy communities can be part of the solution, serving to integrate customers as active participants in future electricity markets.

KEY FEATURES

- Explores whether and how different kinds of energy communities contribute to the transition towards distributed energy systems;
- Describes how policy, market and regulatory frameworks need to be adjusted;
- Describes the appeal of energy communities to energy customers and identifies their economic, ecological, emotional, and social benefits;
- Examines enabling technologies and community design in the power or heating market or involving sector coupling; and
- Explores how energy communities can turn into promising business models for different actors along the value chain.

"How do public policies and regulation consider the case of energy communities, their various forms, and the different services that they deliver? Are communities a new type of player in the energy sector, or another supplier, or a collective consumer, or a kind of integrated utility? Are consumers themselves the genuine nature of communities, or only the ones served by those? How should network monopolies, and their regulated metering and settlement processes treat and bill the communities and their members? The chapters of this book address many of these questions and more."

Jean-Michel Glachant
Director of Florence School of Regulation, Florence, Italy

"This book contains a compendium of fascinating responses to the question of whether 'energy communities' are citizen-centered, market-driven and welfare-enhancing Flexible demand has to assume a more prominent role in balancing supply and demand."

Bruce Mountain
Director, Energy Policy Center, Univ. of Victoria, Melbourne, Australia

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Energy Communities
Edited by Sabine Löbbe , Fereidoon Sioshansi & David Robinson

Table of Contents