

Electrification and urbanisation will drive growth in copper



The long-term growth drivers of copper

The green transformation will electrify the global economy as cars go electric and more homes in colder areas will switch from natural gas as heating source to that of air to water heat pumps. In warmer parts of the world we will continue to see an acceleration in air conditioners to cool homes. The main usage of refined copper is for electrical applications, but it is also used in housing (pipes and fittings), cars, telecommunication and industrial machines. Copper has the second highest thermal conductivity at room temperature among pure metals and is thus the preferred metal used in electrical applications. As the world electrifies in the name of the green transformation and rapid urbanization continues in Asia, Africa, and South America, copper will continue to enjoy strong annual growth rates.

How to get exposure to copper?

Copper has been rebranded as a *green metal* because of its importance for the green transformation and investors are increasingly asking us how to invest in copper. The most direct way is of course to invest in high grade copper futures on COMEX (part of CME Group) with the current active contract being the Mar 2022 contract (Saxo ticker: HGH2), but the contract has a contract value of around \$106,537 at current level making it inaccessible to most retail investors. One could also invest through CFD on futures (Saxo ticker on the Mar 2022 is COPPERUSMAR22) where the investor could buy 100 pounds of copper instead of 25,000 pounds in the futures reducing the contract size to \$425. However, getting exposure through CFDs and futures the investor must regularly roll the contract to the next active contract, and the investor could also incur financing cost increasing the drag on performance. The chart below shows the continuous futures contract on high grade copper since 2002.

Few miners offer pure exposure to copper

Another way to get exposure to copper that removes the difficulties of rolling futures or CFD contracts is to invest in mining companies that extract or refine copper. The table below shows 16 mining companies with exposure to copper with Codelco, the largest copper producer in the world, absent from the list as the Chilean miner is only listed in Chile and thus not investable for our clients. The copper mining industry has delivered a median total return in USD of 132.6% over the past five years beating the global equity up 105% in the same period. The rising copper prices the past year driven by investors positioning themselves in *green metals* (defined as metals that will play a key role in the green transformation) which in turn has pushed up revenue in the industry by almost 40%. Sell-side analysts are generally bullish on copper miners with a median upside of 16% from current levels. In our view investors should select one or two copper miners to get

exposure and avoid the ETFs on the industry as they are too broad-based and lack the pure exposure profile needed to play the copper market.

As the table also show, there is no such thing as pure exposure to copper except for futures, options and CFDs on the underlying copper. The miner with the highest revenue exposure to copper is Antofagasta with 84.8% revenue share from copper extraction and refining. Most copper miners also extract gold and silver as part of their copper operations. Out of the 16 copper miners in our list, only 6 of these miners have more than 50% of revenue coming from copper extraction and refining.

Outlook and risks

High grade copper futures have been range trading for more than half a year as slowing demand out of China due to a slowdown in housing construction has weighed on the demand side. On the positive side inventories have been tight in copper which has helped support the copper price and the global pipeline of new copper mines, but also potential tax charges in Chile and Peru (roughly around 40% of global supply) could negative impact supply and keep copper prices high. The annualized growth rate in global refined copper demand has been around 3% in the period 2009-2020.

China has for many years been the key driver of demand growth for copper, but going forward electrification (electric vehicles and air-to-water heat pumps and urbanization in India will begin to play a bigger marginal role on demand creating a more steady and diversified demand picture. In 2022, demand outside China will be driven by construction, grid infrastructure, and transport. Another risk to copper demand is significantly higher interest rates next year as that would curtail growth in construction which is interest rate sensitive.

La Cop26 di Glasgow: le linee guida per i Paesi del Mediterraneo



Roudi Baroudi: un appuntamento fondamentale per definire strategie politiche economiche efficaci a contrastare il cambiamento climatico.

Il noto esperto a livello internazionale in campo energetico Roudi Baroudi, pone in evidenza una riflessione in concomitanza con l'imminente arrivo della conferenza sul cambiamento climatico delle Nazioni Unite (COP26) che si terrà quest'anno a Glasgow.

Baroudi definisce questo appuntamento memorabile e storico in particolare per i paesi del bacino del Mar Mediterraneo,

Italia compresa. Fa osservare che l'aumento delle temperature e la crisi climatica globale è in atto e gli eventi dell'estate 2021 ne sono la testimonianza reale.

Il fenomeno degli incendi, per esempio, si manifesta con dimensioni e intensità insolite rispetto al passato ed anche nel caso di attività dolosa l'aridità circostante e le alte temperature hanno favorito la propagazione violenta nelle aree colpite generando numerose morti, danni alle proprietà e distruzioni dei terreni agricoli coltivati. In casi come quello della Turchia seguiti da forti inondazioni dovute a piogge torrenziali dopo pochi giorni.

Questi fenomeni non sono più eventi sporadici localizzati in determinate aree, ma costituiscono una vera e propria testimonianza della catastrofe climatica in atto.

Questo ci impone di moltiplicare gli sforzi e sperare di poter invertire la tendenza prima che raggiunga un punto di non ritorno. Se non andremo in questa direzione, continua Baroudi: "la nostra specie dovrà affrontare un futuro sempre più complesso con più incendi, innalzamento del livello del mare, accelerazione dell'acidificazione degli oceani, calo degli stock ittici, tempeste più violente, siccità più lunghe e intense, raccolti compromessi, milioni di rifugiati climatici e fame di massa".

Svariati paesi del Mediterraneo, specialmente appartenenti ad Asia ed Africa hanno già situazioni complesse dal punto di vista territoriale per via della posizione geografica (Sud Italia incluso), inoltre i paesi con meno disponibilità economica fanno ancora molta fatica nella conversione ad impianti con minor impatto ambientale.

Nonostante questo scenario apocalittico, incalza Baroudi, non tutto è perduto. L'Unione europea ha compiuto progressi importanti rispetto alla maggior parte del resto del mondo e sta adottando delle politiche più stringenti sulle emissioni.

Anche gli Stati Uniti stanno intensificando i propri sforzi dopo quattro anni di cambio rotta sotto l'amministrazione Trump. In tutto il mondo, finalmente, si sta avendo maggiore consapevolezza del problema in maniera più trasversale dal pubblico al privato.

Alla COP26, i leader ed i referenti politici dei paesi partecipanti dovrebbero lavorare costruttivamente ed ascoltare scienziati ed attivisti che chiedono un'azione più rapida ed efficace, inclusa una maggiore assistenza finanziaria per aiutare i paesi meno fortunati a unirsi seriamente alla lotta per il cambiamento climatico.

I programmi che i paesi del Mediterraneo porteranno a Glasgow saranno cruciali perché, nonostante la situazione in atto, la maggior parte di questi stati ha un vantaggio territoriale: ampi spazi e condizioni quasi ideali per le turbine eoliche offshore. Uno studio recente, che utilizza una varietà di tecnologie per elaborare dati previsionali, stima il potenziale combinato di energia eolica di tutti i 23 paesi euro mediterranei (in modo alquanto prudente) a quasi 1,5 milioni di megawatt. Si consideri che l'intera industria nucleare mondiale ha una capacità di circa 400.000 MW, ovvero meno di un terzo di quella che il Mediterraneo potrebbe produrre solamente con impianti eolici. Senza calcolare l'impiego di altre tecnologie: l'idrocinetica sia fluviale che marina (onde e maree), geotermica (on e offshore) e solare (200.000-300.000 MW).

Questa strategia darebbe una propulsione allo sviluppo di molti paesi che oggi hanno uno scarso accesso all'energia elettrica a prezzi accessibili, inoltre l'indotto relativo alle costruzioni degli impianti darebbe nuovi posti di lavoro oltre a molteplici benefici: la possibilità di sostituire i vecchi impianti di produzione più inquinanti, ridurre gradualmente l'importazione di carburanti fossili, rivendere nella rete l'eccesso di produzione energetica ed investire il ricavato in infrastrutture, politiche sociali o ulteriori

impianti green.

Uno sviluppo omogeneo delle rinnovabili favorirebbe la transizione progressiva dai combustibili fossili, riducendo le emissioni di carbonio che causano il cambiamento climatico e quindi facendo gli interessi di tutti, ovunque.

Queste proiezioni positive non si avvereranno mai per osmosi. Molti paesi nel Mediterraneo hanno bisogno di assistenza finanziaria e tecnica per mettere in pratica i progetti di conversione. L'accordo di Parigi includeva impegni economici da parte degli stati più ricchi per finanziare i paesi più bisognosi, ma molti governi non hanno rispettato l'accordo. Questo è controproducente, proprio come la mancata distribuzione del vaccino contro il COVID ai paesi del Sud del mondo, un errore imperdonabile che non solo determina la morte di persone innocenti, ma crea anche terreno fertile per nuove varianti del virus. Se la transizione verso un'energia più pulita creasse difficoltà alle popolazioni già svantaggiate, potrebbe venire a mancare il sostegno popolare verso questo percorso, con conseguenze terribili per tutti noi. Se lasciato incontrollato, il cambiamento climatico potrebbe provocare morte e distruzione ovunque creando flussi migratori ingestibili.

Roudi Baroudi conclude esortando la COP26 a produrre nuovi programmi di finanziamento da parte dei paesi ricchi verso quelli più poveri senza creare situazioni di assistenzialismo. Ci sono moltissime risorse a disposizione e c'è poco tempo per agire, quindi gli stati finanziatori non possono permettersi di sbagliare. I prestiti agevolati andranno messi a disposizione per i paesi più virtuosi che garantiranno la finalizzazione dei progetti. L'unico modo per farlo è articolare una strategia coerente per eseguire progetti rilevanti e fattibili con tempi e budget ben definiti. In particolare, i governi regionali devono dissipare i timori giustificati che, i fondi destinati ai progetti per le energie rinnovabili o ad altri strumenti di de carbonizzazione,

andranno invece a riempire le tasche di funzionari locali corrotti.

Queste sono le linee guida che deve seguire quest'anno la conferenza di Glasgow. La lotta ai cambiamenti climatici è ampiamente considerata come la sfida più importante che la nostra specie abbia mai affrontato e la capacità della regione di proteggersi e di esercitare il proprio peso sarà in bilico alla COP26. I paesi che si presentano con piani ben sviluppati per progetti concreti avranno la strada spianata per varie forme di finanziamento. Coloro che non lo faranno saranno inevitabilmente tagliati fuori.

What green artificial intelligence needs



Long before the real-world effects of climate change became so abundantly obvious, the data painted a bleak picture – in painful detail – of the scale of the problem. For decades, carefully collected data on weather patterns and sea temperatures were fed into models that analysed, predicted, and explained the effects of human activities on our climate. And now that we know the alarming answer, one of the biggest questions we face in the next few decades is how data-driven approaches can be used to overcome the climate crisis.

Data and technologies like artificial intelligence (AI) are

expected to play a very large role. But that will happen only if we make major changes in data management. We will need to move away from the commercial proprietary models that currently predominate in large developed economies. While the digital world might seem like a climate-friendly world (it is better to Zoom to work than to drive there), digital and Internet activity already accounts for around 3.7% of total greenhouse-gas (GHG) emissions, which is about the same as air travel. In the United States, data centres account for around 2% of total electricity use.

The figures for AI are much worse. According to one estimate, the process of training a machine-learning algorithm emits a staggering 626,000lb (284,000kg) of carbon dioxide – five times the lifetime fuel use of the average car, and 60 times more than a transatlantic flight. With the rapid growth of AI, these emissions are expected to rise sharply. And Blockchain, the technology behind Bitcoin, is perhaps the worst offender of all. On its own, Bitcoin mining (the computing process used to verify transactions) leaves a carbon footprint roughly equivalent to that of New Zealand.

Fortunately, there are also many ways that AI can be used to cut CO2 emissions, with the biggest opportunities in buildings, electricity, transport, and farming. The electricity sector, which accounts for around one-third of GHG emissions, advanced the furthest. The relatively small cohort of big companies that dominate the sector have recognised that AI is particularly useful for optimising electricity grids, which have complex inputs – including the intermittent contribution of renewables like wind power – and complex usage patterns. Similarly, one of Google DeepMind's AI projects aims to improve the prediction of wind patterns and thus the usability of wind power, enabling "optimal hourly delivery commitments to the power grid a full day in advance."

Using similar techniques, AI can also help to anticipate vehicle traffic flows or bring greater precision to agricultural management, such as by predicting weather patterns or pest infestations.

But Big Tech itself has been slow to engage seriously with the climate crisis. For example, Apple, under pressure to keep delivering new generations of iPhones or iPads, used to be notoriously uninterested in environmental issues, even though it – like other hardware firms – contributes heavily to the problem of e-waste. Facebook, too, was long silent on the issue, before creating an online Climate Science Information Center late last year. And until the launch of the \$10bn Bezos Earth Fund in 2020, Amazon and its leadership also was missing in action. These recent developments are welcome, but what took so long?

Big Tech's belated response reflects the deeper problem with using AI to help the world get to net-zero emissions. There is a wealth of data – the fuel that powers all AI systems – about what is happening in energy grids, buildings, and transportation systems, but it is almost all proprietary and jealously guarded within companies. To make the most of this critical resource – such as by training new generations of AI – these data sets will need to be opened up, standardised, and shared.

Work on this is already underway. The C40 Knowledge Hub offers an interactive dashboard to track global emissions; NGOs like Carbon Tracker use satellite data to map coal emissions; and the Icebreaker One project aims to help investors track the full carbon impact of their decisions. But these initiatives are still small-scale, fragmented, and limited by the data that are available.

Freeing up much more data ultimately will require an act of political will. With local or regional "data commons," AIs could be commissioned to help whole cities or countries cut their emissions. As a widely circulated 2019 paper by David Rolnick of the University of Pennsylvania and 21 other machine-learning experts demonstrates, there is no shortage of ideas for how this technology can be brought to bear.

But that brings us to a second major challenge: Who will own or govern these data and algorithms? Right now, no one has a good, complete answer. Over the next decade, we will need to

devise new and different kinds of data trusts to curate and share data in a variety of contexts.

For example, in sectors like transport and energy, public-private partnerships (for example, to gather “smart-meter” data) are probably the best approach, whereas in areas like research, purely public bodies will be more appropriate. The lack of such institutions is one reason why so many “smart-city” projects fail. Whether it is Google’s Sidewalk Labs in Toronto or Replica in Portland, they are unable to persuade the public that they are trustworthy.

We will also need new rules of the road. One option is to make data sharing a default condition for securing an operating license. Private entities that provide electricity, oversee 5G networks, use city streets (such as ride-hailing companies), or seek local planning permission would be required to provide relevant data in a suitably standardised, anonymised, and machine-readable form.

These are just a few of the structural changes that are needed to get the tech sector on the right side of the fight against climate change. The failure to mobilise the power of AI reflects both the dominance of data-harvesting business models and a deep imbalance in our public institutional structures. The European Union, for example, has major financial agencies like the European Investment Bank but no comparable institutions that specialise in orchestrating the flow of data and knowledge. We have the International Monetary Fund and the World Bank, but no equivalent World Data Fund.

This problem is not insoluble. But first, it must be acknowledged and taken seriously. Perhaps then a tiny fraction of the massive financing being channelled into green investments will be directed toward funding the basic data and knowledge plumbing that we so urgently need. – Project Syndicate

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Clean Energy Has Won the Economic Race



For decades, spectacularly inaccurate forecasts have underestimated the potential of clean energy, buying time for the fossil-fuel industry. But as two new analyses from authoritative institutions show, renewables have already convinced the market and are now poised for exponential growth.

DENVER – For decades, we at the Rocky Mountain Institute (now RMI) have argued that the transition to clean energy will cost less and proceed faster than governments, firms, and many analysts expect. In recent years, this outlook has been fully vindicated: costs of renewables have consistently fallen faster than expected, while deployment has proceeded more rapidly than predicted, thereby reducing costs even further.

Thanks to this virtuous cycle, renewables have broken through. And now, new analyses from two authoritative research institutions have added to the mountain of data showing that a rapid clean-energy transition is the least expensive path forward.

Policymakers, business leaders, and financial institutions urgently need to consider the promising implications of this development. With the United Nations Climate Change Conference (COP26) in Glasgow fast approaching, it is imperative that world leaders recognize that achieving the Paris climate agreement's 1.5° Celsius warming target is not about making sacrifices; it is about seizing opportunities. The negotiation process must be reframed so that it is less about burden-sharing and more about a lucrative race to deploy cleaner, cheaper energy technologies.

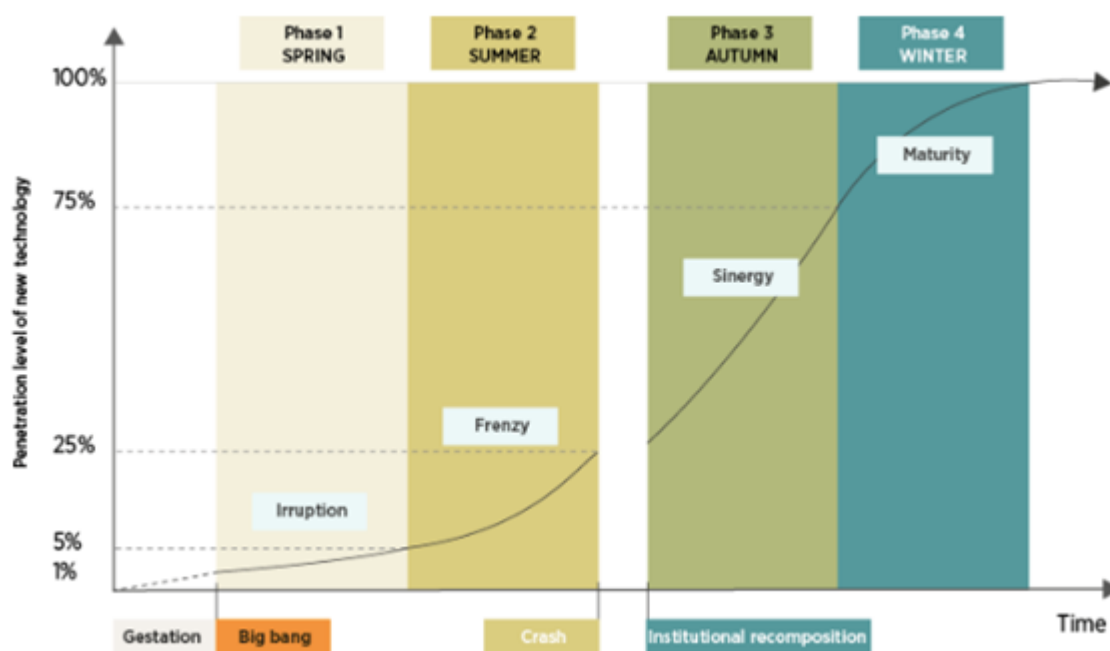
With the world already suffering from climate-driven extreme weather events, a rapid clean-energy transition also has the virtue of being the safest route ahead. If we fail at this historic task, we risk not only wasting trillions of dollars but also pushing civilization further down a dangerous and potentially catastrophic path of climate change.

One can only guess why forecasters have, for decades, underestimated the falling costs and accelerating pace of deployment for renewables. But the results are clear: bad predictions have underwritten trillions of dollars of investment in energy infrastructure that is not only more expensive but also more damaging to human society and all life on the planet.

We now face what may be our last chance to correct for decades of missed opportunities. Either we will continue to waste trillions more on a system that is killing us, or we will move rapidly to the cheaper, cleaner, more advanced energy solutions of the future.

New studies have shed light on how a rapid clean-energy transition would work. In the International Renewable Energy Agency (IRENA) report *The Renewable Spring*, lead author Kingsmill Bond shows that renewables are following the same exponential growth curve as past technology revolutions, hewing to predictable and well-understood patterns.

Accordingly, Bond notes that the energy transition will continue to attract capital and build its own momentum. But this process can and should be supported to ensure that it proceeds as quickly as possible. Policymakers who want to drive change must create an enabling environment for the optimal flow of capital. Bond clearly lays out the sequence of steps that this process entails.



Examining past energy revolutions reveals several important insights. First, capital is attracted to technological disruptions, and tends to flow to the areas of growth and opportunity associated with the start of these revolutions. As a result, once a new set of technologies passes its gestation period, capital becomes widely available. Second, financial markets draw forward change. As capital moves, it speeds up the process of change by allocating new capital to growth industries, and by withdrawing it from those in decline.

The current signals from financial markets show that we are in the first phase of a predictable energy transition, with spectacular outperformance by new energy sectors and the de-rating of the fossil-fuel sector. This is the point where wise policymakers can step in to establish the necessary institutional framework to accelerate the energy transition and realize the economic benefits of building local clean-energy supply chains. As we can see from market trends highlighted in the IRENA report, the shift is already well underway.

Figure 7: Performance of clean energy and fossil energy stocks in 2020



Source: Carbon Tracker based on Carlota Perez

Reinforcing the findings from the IRENA report, a recent analysis from the Institute for New Economic Thinking (INET) at the Oxford Martin School shows that a rapid transition to clean energy solutions will save trillions of dollars, in addition to keeping the world aligned with the Paris agreement's 1.5°C goal. A slower deployment path would be financially costlier than a faster one and would incur significantly higher climate costs from avoidable disasters and deteriorating living conditions.

Owing to the power of exponential growth, an accelerated path

for renewables is eminently achievable. The INET Oxford report finds that if the deployment of solar, wind, batteries, and hydrogen electrolyzers continues to follow exponential growth trends for another decade, the world will be on track to achieve net-zero-emissions energy generation within 25 years.

In its own coverage of the report, *Bloomberg News* suggests as a “conservative estimate” that a rapid clean-energy transition would save \$26 trillion compared with continuing with today’s energy system. After all, the more solar and wind power we build, the greater the price reductions for those technologies.

Moreover, in his own response to the INET Oxford study, Bill McKibben of 350.org points out that the cost of fossil fuels will not fall, and that any technological learning curve advantage for oil and gas will be offset by the fact that the world’s easy-access reserves have already been exploited. Hence, he warns that precisely because solar and wind will save consumers money, the fossil-fuel industry will continue to try to slow down the transition in order to mitigate its own losses.

We must not allow any further delay. As we approach COP26, it is essential that world leaders understand that we already have cleaner, cheaper energy solutions ready to deploy now. Hitting our 1.5°C target is not about making sacrifices; it is about seizing opportunities. If we get to work now, we can save trillions of dollars and avert the climate devastation that otherwise will be visited upon our children and grandchildren.

Environmental threats are the 'greatest challenge to human rights': UN



The UN rights chief has said the “triple planetary crises” of climate change, pollution, and nature loss represented the biggest threat to human rights globally, at the opening yesterday of a month-long session set to prioritise environmental issues.

“The interlinked crises of pollution, climate change and biodiversity act as threat multipliers, amplifying conflicts, tensions and structural inequalities, and forcing people into increasingly vulnerable situations,” Michelle Bachelet told the opening of the 48th session of the UN Human Rights Council in Geneva.

“As these environmental threats intensify, they will constitute the single greatest challenge to human rights of our era,” she added.

The former Chilean president said the threats were already “directly and severely impacting a broad range of rights, including the rights to adequate food, water, education,

housing, health, development, and even life itself”.

She said environmental damage usually hurt the poorest people and nations the most, as they often have the least capacity to respond.

Bachelet referred to recent “extreme and murderous” climate events such as floods in Germany and California’s wildfires.

She also said drought was potentially forcing millions of people into misery, hunger and displacement.

Bachelet said that addressing the environmental crisis was “a humanitarian imperative, a human rights imperative, a peace-building imperative and a development imperative. It is also doable”.

She said spending to revive economies in the wake of the coronavirus (Covid-19) pandemic could be focused on environmentally-friendly projects, but “this is a shift that unfortunately is not being consistently and robustly undertaken”.

She also said that countries had “consistently failed to fund and implement” commitments made under the Paris climate accords.

“We must set the bar higher – indeed, our common future depends on it,” she added.

Her remarks come at the opening session of the September 13 to October 8 session of the Human Rights Council, where climate change themes were expected to be central, alongside debates on alleged rights violations in Afghanistan, Myanmar, and Tigray, Ethiopia.

In the same speech, she voiced alarm at attacks on indigenous people in Brazil by illegal miners in the Amazon.

Geneva-based diplomats told Reuters that two new resolutions on the environment were expected, including one that would create a new Special Rapporteur on Climate Change and another that would create a new right to a safe, clean, healthy and sustainable environment.

Yesterday Germany’s Foreign Minister Heiko Maas voiced support for the first idea, which has not yet been formally submitted in draft form.

"Climate change affects virtually all human rights," he said. Marc Limon of the Universal Rights Group think-tank said the Council's recognition of the right to a healthy environment would be "good news".

"It would empower individuals to protect the environment and fight climate change," he said.

During her address, Bachelet said that at the 12-day COP26 climate talks in Glasgow, set to begin on October 31, her office would push for more ambitious, rights-based commitments.

She added that in many regions, environmental human rights defenders were threatened, harassed and killed, often with complete impunity.

She said economic shifts triggered by the Covid-19 pandemic had apparently prompted increased exploitation of mineral resources, forests and land, with indigenous peoples particularly at risk.

"In Brazil, I am alarmed by recent attacks against members of the Yanomami and Munduruku peoples by illegal miners in the Amazon," she said.

In her opening global update, Bachelet touched on the human rights situations in several countries, including Chad, the Central African Republic, Haiti, India, Mali and Tunisia.

On China, she said no progress had been made in her years-long efforts to seek "meaningful access" to Xinjiang.

"In the meantime, my office is finalising its assessment of the available information on allegations of serious human rights violations in that region, with a view to making it public," she said.

Rights groups believe at least 1mn Uyghurs and other mostly Muslim minorities have been incarcerated in camps in the northwestern region, where China is also accused of forcibly sterilising women and imposing forced labour.

Beijing has strongly denied the allegations and says training programmes, work schemes and better education have helped stamp out extremism in the region.

Decisions made by the Council's 47 members are not legally

binding but carry political weight.

The Reality of Climate Financial Risk



Those who argue that climate change has little to do with macroprudential risk management are offering a counsel of despair. If the 2008 global financial crisis revealed anything, it is that regulation matters, even if it isn't always politically popular or easily optimized.

LAUSANNE, SWITZERLAND – In a recent commentary, John H. Cochrane, a senior fellow at the Hoover Institution, argues that “climate financial risk” is a fallacy. His eye-catching premise is that climate change doesn't pose a threat to the global financial system, because it – and the phase-out of fossil fuels that is needed to address it – are developments that everyone already knows are underway. He sees climate-related financial regulation as a Trojan horse for an otherwise unpopular political agenda.

We disagree. For starters, one should acknowledge the context in which regulation emerges. With respect to climate policy, the Intergovernmental Panel on Climate Change has set the stage with its sixth assessment report, which concludes with a high degree of certainty that the Earth's climate is changing, and that human activities are the cause. Ecologist William Ripple, the co-author of another recent study of planetary "vital signs," goes further: "There is growing evidence we are getting close to or have already gone beyond tipping points associated with important parts of the Earth system."

Unlike the 2008 global financial crisis – when banks that took excessive risks were bailed out, and global financial regulation was overhauled in light of our new understanding about interdependent financial markets – unmitigated climate change will lead to a crisis with irreversible outcomes.

The question, as Cochrane puts it, is whether climate-related financial regulation can do anything to help us avoid such outcomes. Although the answer is complex and currently incomplete, we would argue that it can. Financial regulation to mitigate climate risk is indeed worth pursuing, because the stakes are too high to let the perfect become the enemy of the good.

Consider some of the arguments about systemic financial risk and extreme climate events. First, we are told that the risk of "stranded assets" – particularly fossil-fuel assets – will become a fact of life, to be borne only by investors. Here, Cochrane points out, correctly, that fossil-fuel investments have always been risky. But can we reasonably say that the prevalence of this energy source should be left to market players alone, or that only investors will bear the costs?

Though per capita fossil-fuel consumption in countries such as the United States and the United Kingdom has declined since 1990, total consumption has grown dramatically elsewhere, rising by 50% globally over the last 40 years. In 2020, China

and India were the planet's two largest coal-energy producers, relying on coal for 61% and 71% of their electricity, respectively. Their economies, and those of many other developing countries, simply would not sustain a precipitous reduction in fossil-fuel energy.

Cochrane also suggests that there is no scientifically validated possibility that extreme climate events will cause systemic financial crises over the next decade, and that regulators are therefore stymied from assessing the risks on financial institutions' balance sheets over a five- or ten-year horizon. But the sheer scale of the challenge should make us reconsider the temporal dimensions of regulation.

If temperature increases are to be kept within 2° Celsius of pre-industrial levels this century, about 80% of all coal, one-third of all oil, and half of all gas reserves must be left unburned. All of the Arctic's oil and the remainder of Canada's oil sands – the world's largest deposit of crude oil – must be left in the ground, starting almost immediately.

Finally, it is said that the technocratic regulation of climate investments cannot protect us against un-modeled tipping points. But this view simply ignores the extensive literature in climate economics. In this field, the work of Nobel laureate economist William Nordhaus is widely referenced. His Dynamic Integrated Climate-Economy (DICE) model has influenced many scientists' and economists' own modeling of tipping points, and the US government already relies on these "integrated assessment models" to formulate policy and calculate the "social cost of carbon."

This interdependency between economics, policy, politics, public opinion, and regulation should be familiar from the crash of 2008. The dangerous over-leveraging that generated that crisis was an open secret; but those in a position, politically and culturally, to do something about it were willing to deny the systemic risk it posed. One can find the

same denialism in the climate debate. According to the Center for American Progress, 139 members of the current US Congress (109 representatives and 30 senators; a majority of the Republican caucus) “have made recent statements casting doubt on the clear, established scientific consensus that the world is warming – and that human activity is to blame.”

Cochrane makes an eloquent case for why policymakers should focus on creating coherent, scientifically valid policy responses to climate change and financial systemic risk separately, rather than pursuing climate financial regulation. But this isn't an either/or choice. We need both kinds of policies, and we need coordination between the two domains.

We therefore should welcome the approach being taken by US Secretary of the Treasury Janet Yellen's Financial Stability Oversight Council, which has brought together leading regulators and tasked them with preventing a repeat of the 2008 Wall Street meltdown. Yellen has said she will use this multi-regulator body as her principal tool to assess climate risks and develop the disclosure policies needed to shift to a low-carbon economy.

Counterintuitive though it may be, climate-related financial regulation could usher in a new form of political accountability, by putting governments and individuals (elected and unelected) on the hook for their decisions. Such accountability was notably absent before and during the 2008 crisis. With political will, serious thinking about regulating climate financial risk could open up a fruitful debate for similar action on all neglected policy fronts.

Surging wind industry faces its own green dilemma: landfills



Siemens launches first recyclable wind turbine blade

- **Anti-wind groups use dumping of blades as rallying issue**
- **Industry calls for EU landfill ban**

Wind turbines have become a vital source of global green energy but their makers increasingly face an environmental conundrum of their own: how to recycle them.

The European Union's share of electricity from wind power has grown from less than 1% in 2000, when the continent began to curb planet-heating fossil fuels, to more than 16% today.

As the first wave of windmills reach the end of their lives, tens of thousands of blades are being stacked and buried in landfill sites where they will take centuries to decompose.

Spanish turbine maker Siemens Gamesa this week launched what it called a "game changer" – the first recyclable blades, which use a technology that allows their carbon and glass fibres to be reused in products like screen monitors or car

parts.

"We have reached a major milestone in a society that puts care for the environment at its heart," said Andreas Nauen, chief executive of Siemens Gamesa, which expects the blades to become the industry standard.

Europe is the world's second largest producer of wind-generated electricity, making up about 30% of the global capacity, compared to China's 39%, according to the Global Wind Energy Council, an industry trade association.

Wind Europe, a Brussels-based trade association which promotes the use of wind power in Europe, expects 52,000 blades a year to need disposal by 2030, up from about 1,000 today.

"The public want to be reassured that wind energy is fully sustainable and fully circular," said WindEurope's chief executive, Giles Dickson, describing Siemens Gamesa's new recyclable blade as a "significant breakthrough".

While wind turbine blades are not especially toxic, the resulting landfill, if improperly handled, may contribute to dangerous environmental impacts, including the pollution of land and waterways.

All forms of energy have some environmental cost but renewables, almost by definition, cause less damage to the planet, said Martin Gerhardt, Siemens Gamesa's offshore wind chief.

"If you look at oil wells and the spills or if you consider methane leaks, compared to the fossil industries, wind is the lesser problem," he said.

Wind power is one of the cleanest forms of energy, with a carbon footprint 99% lower than coal and 75% less than solar, according to a study by Bernstein Research, a US-based research and brokerage firm.

Its emissions come mainly from the production of iron and steel used in turbines and concrete for windmill foundations.

If these were mitigated by techniques such as carbon capture and storage – where carbon dioxide is buried underground – "you'd be able to cut out the carbon footprint completely," said Deepa Venkateswaran, the study's author.

The growing mountains of waste created by old blades has become a rallying point for groups opposed to wind turbines, which they also say are noisy and spoil the countryside.

But landfill is likely to remain the preferred disposal option because it is the cheapest, said Eric Waeyenbergh, advocacy manager at Geocycle, a sustainable waste management firm.

“If you just throw it in the landfill, this is the cheapest price you can have when you’re dismantling the windmill. And that’s a problem because there’s no mandatory recycling or recovery obligation,” he said.

Geocycle and WindEurope are lobbying for landfills to be banned across Europe where only four countries – Austria, Germany, the Netherlands and Finland – have outlawed the landfilling of composite materials, such as wind turbine blades.

Geocycle co-runs a cement kiln in Germany, with building industry giant Lafarge, which is partly fuelled by burning thousands of tonnes of old wind turbines, which create less carbon dioxide than fossil fuels.

Recyclable blades can also be ground up for use in products such as rearview car mirrors and insulation panels, or heat-treated to create materials for roof light panels and gutters. However, industry groups say these techniques are not currently available at commercial scale or at a price that would make them viable alternatives to landfill.

David Romero Vindel, co-founder of Reciclalia, which cuts and shreds turbine blades for recycling as carbon fibre yarn and fabric, said a landfill ban would help his firm.

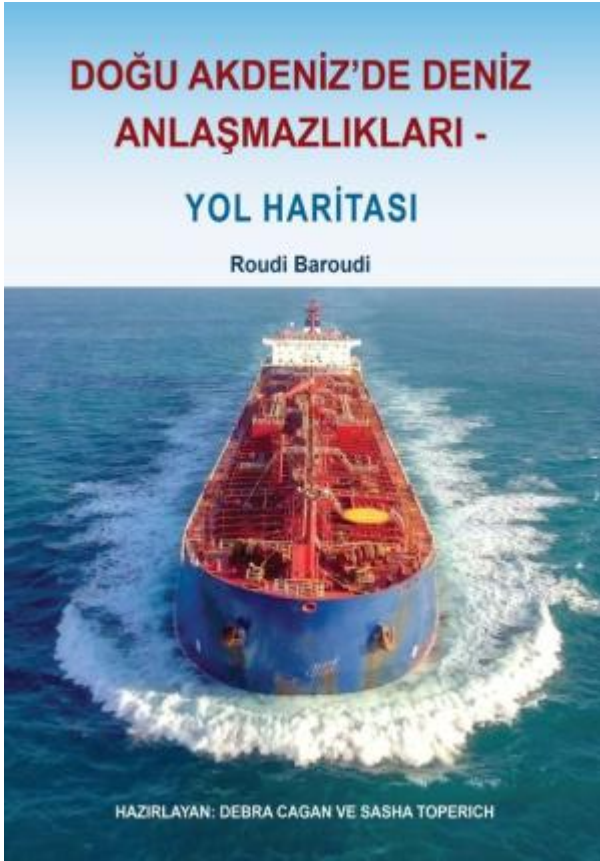
“We need the EU to push the sector in this direction of recycling,” he said.

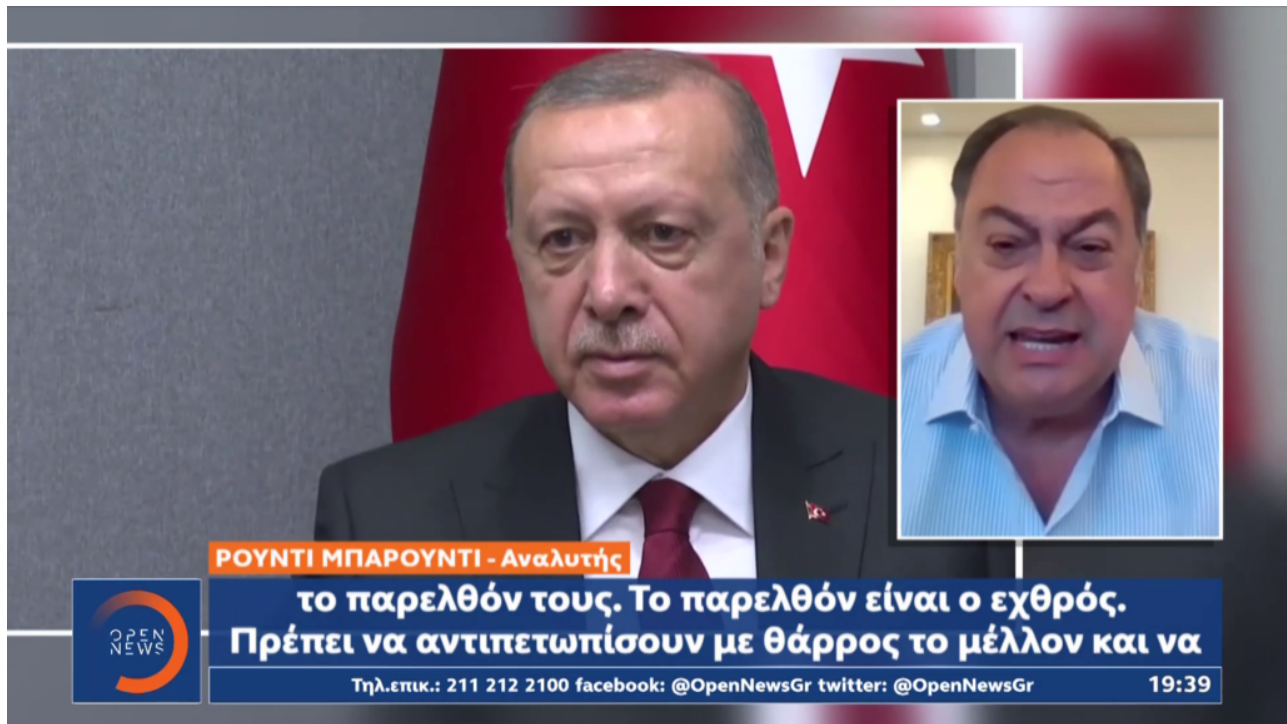
Vivian Loonela, a spokeswoman for the European Commission said it will review its landfill policies in 2024.

“The recycling of (windmill) composite fraction remains a challenge due to the low value of the recycled product and the relatively small amount of waste (produced), which does not stimulate the recycling markets,” she said.

– Thomson Reuters Foundation

SEMINAL BOOK ON SETTTLING MEDITERRANEAN BORDER DISPUTES NOW AVAILABLE IN TURKISH





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Study stresses diplomacy, international law as pathways to energy boom and regional stability

Washington D.C. – 27th July 2021

WASHINGTON, D.C.: A highly influential book about maritime boundary disputes in the Eastern Mediterranean has been translated into Turkish, its publisher announced on Monday, spreading its message of peaceful dialogue to a key audience in a region poised for offshore energy riches.

The Transatlantic Leadership Network said it hoped the Turkish translation of author Roudi Baroudi's "Maritime Disputes in the Eastern Mediterranean: The Way Forward" would be just as well-received as its Arabic, French, Greek, and original English versions. The book, distributed by the Brookings Institution Press, co-edited by Debra Cagan and Sasha Toperich has been hailed by a wide variety of academics, diplomats, and other experts.

Baroudi's study emphasizes the paucity of settled maritime boundaries in the region, how crucial these are to the safe and effective exploitation of offshore energy resources, and the proven avenues available for dispute resolution. He

explains the purpose and ever-increasing applicability of the United Nations Convention on the Law of the Sea (UNCLOS), the use of legal and diplomatic creativity to circumnavigate mistrust, and the power of shared interest to foment some form of cooperation, even if indirect.

Given recent history, the subject matter could be neither more relevant, nor more timely. Enormous quantities of natural gas have been discovered off the coasts of several East Med countries in the past few years, but thus far the only ones to make real development progress have been Egypt, Israel, and, to a lesser extent, Cyprus. Baroudi's book stresses that the only thing these countries have in common is that their shared maritime boundaries are not in dispute, which has enabled them to attract the necessary investment to the areas in question.

The problems involved – and the solutions on offer – relate to several points of friction across the region, including (to note but a few) a years-long US mediation effort to resolve the maritime boundary between Israel and Lebanon; decades-old tensions between Greece and Turkey, especially over Castelorizo, a Greek-ruled island just 2 kilometers off Turkey's Mediterranean coast; and multiple side-effects of the division – and partial occupation by Turkish troops – of Cyprus.

Maritime Disputes in the Eastern Mediterranean: The Way Forward" examines these and other complexities of the regional situation, and the several analyses reach a single conclusion: for each of the region's countries, the only viable option is to trust in the rules and processes of UNCLOS, engage in bi- and/or multilateral dialogues with its neighbors, and start reaping the rewards of this emerging energy hub.

Baroudi's background consists of more than four decades in the energy sector, during which time he has helped design policy for companies, governments, and multilateral institutions, including the European Commission, the World Bank, U.S. Exim

Bank and the International Monetary Fund. His areas of expertise range from oil and gas, petrochemicals, power, energy security, and energy-sector reform to environmental impacts and protections, carbon trading, privatization, and infrastructure. This book was his latest as being author and co-author of several studies and his next – a study of the region's Blue Economy prospects in the post-carbon era – is expected to come out in the first half of 2022. He currently serves as CEO of Energy and Environment Holding, an independent consultancy based in Doha, Qatar.

Economics needs a climate revolution



By Tom Brookes And Gernot Wagner/ Brussels/New York

- There is no excuse for continuing to adhere to an intellectual paradigm that has served us so badly for so long

Nowhere are the limitations of neoclassical economic thinking – the DNA of economics as it is currently taught and practised – more apparent than in the face of the climate crisis. While there are fresh ideas and models emerging, the old orthodoxy remains deeply entrenched. Change cannot come fast enough.

The economics discipline has failed to understand the climate crisis – let alone provide effective policy solutions for it – because most economists tend to divide problems into small, manageable pieces. Rational people, they are wont to say, think at the margin. What matters is not the average or totality of one's actions but rather the very next step, weighed against the immediate alternatives.

Such thinking is indeed rational for small discrete problems. Compartmentalisation is necessary for managing competing demands on one's time and attention. But marginal thinking is inadequate for an all-consuming problem touching every aspect of society.

Economists also tend to equate rationality with precision. The discipline's power over public discourse and policymaking lies in its implicit claim that those who cannot compute precise benefits and costs are somehow irrational. This allows economists – and their models – to ignore pervasive climate risks and uncertainties, including the possibility of climatic tipping points and societal responses to them. And when one considers economists' fixation with equilibrium models, the mismatch between the climate challenge and the discipline's current tools becomes too glaring to ignore.

Yes, a return to equilibrium – getting “back to normal” – is an all-too-human preference. But it is precisely the opposite of what is needed – rapidly phasing out fossil fuels – to stabilise the world's climate.

These limitations are reflected in benefit-cost analyses of cutting emissions of carbon dioxide and other greenhouse gases. The traditional thinking suggests a go-slow path for cutting CO₂. The logic seems compelling: the cost of damage caused by climate change, after all, is incurred in the future, while the costs of climate action occur today. The

Nobel prize-winning verdict is that we should delay necessary investment in a low-carbon economy to avoid hurting the current high-carbon economy.

To be clear, a lot of new thinking has gone into showing that even this conventional logic would call for significantly more climate action now, because the costs are often overestimated while the potential (even if uncertain) benefits are underestimated. The young researchers advancing this work must walk a near-impossible tightrope, because they cannot publish what they believe to be their best work (based on the most defensible assumptions) without invoking the outmoded neoclassical model to demonstrate the validity of new ideas.

The very structure of academic economics all but guarantees that marginal thinking continues to dominate. The most effective way to introduce new ideas into the peer-reviewed academic literature is to follow something akin to an 80/20-rule: stick to the established script for the most part; but try to push the envelope by probing one dubious assumption at a time. Needless to say, this makes it extremely difficult to change the overall frame of reference, even when those who helped establish the standard view are looking well beyond it themselves.

Consider the case of Kenneth J Arrow, who shared a Nobel Prize in Economic Sciences in 1972 for showing how marginal actions taken by self-interested individuals can improve societal welfare. That pioneering work cemented economists' equilibrium thinking. But Arrow lived for another 45 years, and he spent that time moving past his earlier work. In the 1980s, for example, he was instrumental in founding the Santa Fe Institute, which is dedicated to what has since become known as complexity science – an attempt to move beyond the equilibrium mindset he had helped establish.

Because equilibrium thinking underpins the traditional climate-economic models that were developed in the 1990s, these models assume that there are tradeoffs between climate action and economic growth. They imagine a world where the economy simply glides along a Panglossian path of progress.

Climate policy might still be worthwhile, but only if we are willing to accept costs that will throw the economy off its chosen path.

Against the backdrop of this traditional view, recent pronouncements by the International Monetary Fund and the International Energy Agency are nothing short of revolutionary. Both institutions have now concluded that ambitious climate action leads to higher growth and more jobs even in the near term.

The logic is straightforward: climate policies create many more jobs in clean-energy sectors than are lost in fossil-fuel sectors, reminding us that investment is the flipside of cost. That is why the proposal for a \$2 trillion infrastructure package in the United States could be expected to spur higher net economic activity and employment. Perhaps more surprising is the finding that carbon pricing alone appears to reduce emissions without hurting jobs or overall economic growth. The problem with carbon taxes or emissions trading is that real-world policies are not reducing emissions fast enough and therefore will need to be buttressed by regulation.

There is no excuse for continuing to adhere to an intellectual paradigm that has served us so badly for so long. The standard models have been used to reject policies that would have helped turn the tide many years ago, back when the climate crisis still could have been addressed with marginal changes to the existing economic system. Now, we no longer have the luxury of being able to settle for incremental change.

The good news is that rapid change is happening on the political front, owing not least to the shrinking cost of climate action. The bad news is that the framework of neoclassical economics is still blocking progress. The discipline is long overdue for its own tipping point towards new modes of thinking commensurate with the climate challenge.

– Project Syndicate

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Why hybrid cars are popular in an increasingly electric world



By Kyle Stock Bloomberg

Confession: I'm an auto writer and I drive one of the world's most boring vehicles.

It's a minivan and a hybrid, though not a particularly robust one.

The 2018 Chrysler Pacifica manages just 30 miles on a charge.

Did I mention it's white?

While my Tesla-driving neighbour may snicker, my dad-math is simple and sanguine: my crew seldom rolls more than 20 miles in a day.

Even with a standard outlet, we can fully recharge the Pacifica's meagre battery overnight and start again the next day, cruising on the electric motor on the eight-mile soccer commute or the 12-mile Home Depot lap.

On the rare road trip, we burn some fossils.

All told, we buy gas about four times a year.

Electric vehicles are killing the gas-powered car – even faster than expected – but they are also running roughshod over hybrid vehicles like mine, their cranky older siblings.

In America, sales of fully electric vehicles eclipsed those of plug-in hybrids four years ago and have steadily pulled away since.

Americans bought four EVs for every hybrid in the first quarter of this year.

In Asia, hybrids lost the lead to EVs almost six years ago and the gap is far wider.

I get it, no one wants to do dad-math while they're standing on the sales lot.

With a purchase that big, the heart wants what the heart wants – namely something new and exciting.

A hybrid, increasingly, is a flip phone in an iPhone world.

Here's the thing, though: hybrids are bonkers good these days.

The nice thing about writing about the auto industry is that I get to drive a lot of different vehicles – “press cars” in the industry lexicon.

The first-hand experience is helpful when interviewing auto executives, and one of the best ways to stay familiar with what they're making.

Lately, my driveway has been a parade of excellent hybrids.

Right now, it's a Toyota Highlander that is steadily posting 35 miles to a gallon.

Before that, there was the Hyundai Sonata, Kia Sorento and a sublime BMW 530e.

Some, like my Pacifica, can be plugged in and charged, but many generate their electricity exclusively by dragging off the car's momentum when it slows.

In the industry argot, the former are plug-in hybrid electric

vehicles, or PHEVs, and the latter are hybrid electric vehicles, or HEVs. Their much cooler, electric-only cousins are known as battery electric vehicles, or BEVs.

Nothing with an “H” in the acronym carries any gravity in the Tesla-sphere, but they all quietly nudged the needle on carbon emissions.

And they’re all a little more fun to zip around in than their combustion cousins.

The standout of late was the Toyota RAV4 Prime, which goes for 42 miles before the spark plugs flare up and the tiny explosions start.

That’s top of the hybrid class these days, and more than enough for the average US commute.

And on a road-trip, it entirely cancels out the biggest EV bugaboo: range anxiety.

The combustion engine on a car like the RAV4 Prime is like a standby package of hot dogs at a barbecue or a well-rested starting pitcher sitting in the bullpen.

Don’t think of it as a gas vehicle with a trickle of electrons, but as an EV with a robust Plan B.

True, it lacks the tech smugness of a silent, sentient Tesla, but the tradeoff is pretty good.

And I’m not the only one who thinks so – the rigs are selling like ice cream at the beach, according to Samantha Groot, Toyota general manager of vehicle marketing.

In the first quarter of this year, nearly one in four vehicles Toyota sold in the US was some form of hybrid, up from 12% a year earlier.

Honda is part of the acceleration, as well.

The share of customers buying its hybrid CR-V SUV surged 10-fold this spring.

Zombies With Batteries In Europe, the Middle East and Africa, more stringent emissions thresholds in the first quarter boosted plug-in hybrid sales ahead of purely electric vehicles for the first time in nearly three years, according to BloombergNEF.

In America, EVs stayed far ahead in that period, but there’s

some evidence the chimera vehicles gained back some ground in the second quarter.

Combination gas and electric vehicles accounted for 6% of US vehicle registrations in April, more than double the share of fully electric rigs, according to IHS Markit.

This isn't coming from Gen Z early adopters.

The new wave of hybrid buyers tend to be older, and many of them live in the South and Midwest, according to IHS.

In short: it's regular old car people making slightly more pragmatic (and greener) decisions.

Tesla surely doesn't care, but rest assured this stat isn't lost on other auto executives.

In the race to EV supremacy, the slow lane will be stacked with better and better hybrids.

So don't pour one out for the Prius just yet.

It's still doing just fine, and is increasingly in good company.

Just this week, Ferrari unveiled its second plug-in hybrid.

It's a lot like my minivan, save for the 205 miles-per-hour bit.