Can small nuclear reactors really help the climate?

Much of the world has been turning away from nuclear power, with its ageing plants, legacy of meltdowns and radioactive waste. But some governments, big companies and billionaires including Bill Gates and Warren Buffett are convinced the technology can help save the planet.

Unlike wind and solar sources, nuclear power can be switched on and off at any time, and without the planet-warming emissions produced by gas and coal.

Investments of hundreds of millions of dollars are going toward a new generation of so-called small modular reactors (SMRs), which ultimately could provide a safe and nimble source of carbon-free energy – if they can overcome challenges related to economics, safety and public opinion.

HOW SMALL IS SMALL?

Of the more than 70 such reactors that the International Atomic Energy Agency lists as in some stage of design or development, the smallest are less than 5m in diameter and 10m in height. (The plant that would be built to operate the reactor would be bigger, of course.)

SMRs typically have less than 300 megawatts of generating capacity, about a third of that of existing reactors. The “M” in SMR – modular – means these reactors can largely be built in factories and shipped in standardised parts for assembly on-site. That means shorter construction times and greater flexibility to expand to meet demand.

WHY AREN’T TRADITIONAL NUCLEAR PLANTS ENOUGH?

Since the Fukushima Dai-ichi meltdowns in Japan in 2011, there has been a dearth of investor interest in building expensive new plants, with China, Russia and India as notable exceptions.

Instead, utilities have gravitated toward carbon-intensive coal and gas plants to supplement less reliable solar and wind resources. That has led climate advocates such as James Hansen, one of the first scientists to publicly warn about the danger of global warming, to call for more nuclear energy.

DO SMRS ALREADY EXIST?

The only ones currently in commercial operation are two 35-megawatt units on a floating power plant deployed by Russia in the Arctic in 2020. China expects to begin trials in 2026 on an SMR being built near an existing power plant on Hainan island.

The first commercial SMR project in the US, planned for the site of the Idaho National Laboratory, will consist of six reactors capable of producing a combined 462 megawatts. It’s supposed to be operational by the end of this decade.

ARE THEY SAFE?

Proponents say SMRs will be safer than earlier generations of nuclear power plants.

The basic idea remains the same – splitting atoms to release energy, a process known as nuclear fission, that heats water to produce steam that spins turbines to make electricity. About half of the SMR models under development use water as a coolant, as most currently operating reactors do.

Explosions at Fukushima and at Three Mile Island in the US in 1979 were caused by heat from exposed fuel rods splitting the hydrogen from the steam used to cool the reactor.

Some SMR designs, by contrast, use molten salt and metals as coolants. SMR designs also integrate new kinds of fuel and backup emergency systems that should reduce the likelihood of meltdowns.

On the other hand, smaller reactors would ideally be located closer to population centers, increasing the possible danger from an accident. And like their larger brethren, SMRs produce radioactive waste that must be stored safely for centuries.

WHAT ARE THE ECONOMIC CHALLENGES?

Cost competitiveness is an uphill climb. US manufacturer NuScale Power, to cite one example, is aiming for an SMR that can sell power for US$55 per megawatt-hour.

Yet wind power in much of the world is now about US$44 a megawatt-hour, solar is US$50, and in some regions, renewable

energy will be below US$20 a megawatt-hour by the end of the decade, according to BloombergNEF.

A 2020 study by professors at the University of British Columbia found that on a lifetime basis, the cost of electricity produced by SMRs could be 10 times greater than the cost of electricity produced by diesel fuel.

The economics might be more favorable when considering SMRs as alternatives to large-scale batteries to serve as at-the-ready backups for solar and wind power when the sun isn’t shining or the wind isn’t blowing.

WHO’S INVESTING IN SMRS?

Electricite de France, China National Nuclear, Japan’s Toshiba and Russia’s Rosatom are pushing SMR designs, as is NuScale. Gates and Buffett have teamed up to build and test a reactor at an abandoned coal plant in Wyoming.

Rolls-Royce Holdings raised £455 million (US$608 million) to fund the development of SMRs, with almost half of the financing coming from the UK government. The Canadian and US governments have also offered hundreds of millions of dollars in subsidies to kick-start the SMR industry.

Where is the money? Climate finance shortfall threatens global warming goals

Rich nations under pressure to deliver unmet $100-billion pledge

* More ambitious climate plans hinge on international funding

* Eyes on U.S. to boost finance at U.N. gathering next week

KUALA LUMPUR/BARCELONA, Sept 16 (Thomson Reuters Foundation) – F or a storm-prone developing country like the Philippines, receiving international funding to protect its people from wild weather and adopt clean energy is not only an issue of global justice – the money is essential to deliver on its climate plan.

Without promised support, many vulnerable poorer nations – battered by the economic impacts of COVID-19 and surging climate disasters – say they simply cannot take more aggressive action to cut planet-heating emissions or adapt to a warmer world.

The Philippines, for example, has pledged to reduce its emissions 75% below business-as-usual levels by 2030.

But only about 3 percentage points of that commitment can be delivered with its own resources, its national climate plan says. The rest will require international finance to make sectors like farming, industry, transport and energy greener.

“Environmental groups say our (target) is unambitious because it’s highly conditional. What they don’t see, however, is what we submitted is what is doable for the Philippines,” said Paola Alvarez, a spokesperson at the Department of Finance.

“Our economy is not doing well because of the pandemic and we have back-to-back typhoons every now and then,” which means national resources need to be prioritised for social programmes, she told the Thomson Reuters Foundation.

As leaders prepare to attend the United Nations General Assembly in New York next week, wealthy nations are coming under ever-greater pressure to deliver on an unmet pledge, made in 2009, to channel $100 billion a year to poor countries

to tackle climate change.

With budgets worldwide squeezed by the COVID-19 crisis and U.N. climate talks postponed for a year, the original 2020 deadline to meet the goal was likely missed, analysts have said.

But as November's COP26 climate summit approaches fast, time is running out to convince developing countries – both big and small emitters – that any efforts at home to raise their climate game will be met with solid financial backing, analysts say.

Alden Meyer, a senior associate in Washington for think-tank E3G, focused on accelerating a low-carbon transition, said the $100-billion promise is well below what is actually needed by emerging economies to mount an adequate response.

But delivering on it is key to spurring them on, he added.

Right now, they can say, "the developed countries aren't doing what they said they would do in terms of support, so why should we ramp up ambition (to cut emissions)?" Meyer said.

Government officials in India – the world's fourth-biggest emitter of planet-heating gases – have said, for example, that any further commitment to reduce its carbon footprint will depend on funding from rich countries.

National pledges to cut emissions so far are inadequate to keep global temperature rise to "well below" 2 degrees Celsius above preindustrial times, and ideally to 1.5C, as about 195 countries committed to under the 2015 Paris Agreement.

The U.N. climate science panel warned in a report in August that global warming is dangerously close to spiralling out of control and will bring climate disruption globally for decades to come, in wealthy countries as well as poor ones.

'BARE MINIMUM'

Some big greenhouse gas emitters, including China, Russia and India, have yet to submit more ambitious plans to the United Nations, as they committed to do by 2020 under the Paris pact.

But of the roughly 110 plans delivered by other countries ahead of an adjusted U.N. deadline in July, nearly all hinge on one key condition: money.

According to the World Resources Institute (WRI), a U.S.-based think-tank that tracks national climate pledges, “well over half” of those updated emissions goals include actions that can only happen with the support of international finance.

“This underscores why it’s so critical for developed countries to deliver on their $100-billion pledge. It’s the bare minimum,” said Taryn Fransen, a climate policy expert at WRI.

In the latest submissions, a growing number of developing nations have stepped up with emissions goals they can implement on their own, she added, including Argentina, Chile and Colombia, which have dropped requests for support entirely.

But honouring the $100-billion annual commitment – which covers the five years until 2025, when a new yet-to-be-negotiated goal is set to kick in – is key to fostering trust within the global climate talks and facilitating a faster green transition, she stressed.

The latest available figures from the Organisation for Economic Co-operation and Development show that in 2018, a little under $80 billion was delivered to vulnerable countries.

An analysis by aid charity Oxfam last year put the real figure – when counting only grants and not loans that have to be paid back – much lower, at $19 billion-$22.5 billion.

Meanwhile, the 46 least-developed countries between 2014 and

2018 received just $5.9 billion in total for adaptation, a level that would cover less than 3% of the funds they need this decade, found a July study from the International Institute for Environment and Development.

U.S. FALLS SHORT

Climate and development experts argue industrialised countries built their prosperity by burning fossil fuels, making them responsible for a large part of the losses happening in countries on the frontlines of worsening floods, droughts, storms and rising seas, many of them in the southern hemisphere.

A 2020 study in The Lancet Planetary Health journal estimated that, as of 2015, nations in the Global North were responsible for 92% of carbon emissions beyond safe levels for the planet, while the Global South accounted for just 8%.

Diann Black-Layne from the Caribbean nation of Antigua and Barbuda, which is battling sea level rise and more frequent hurricanes, said climate action for developing countries "has to be conditional, because we can't get the money".

Black-Layne, lead climate negotiator for the 39-member Alliance of Small Island States, questioned why wealthy governments continued to fund the fossil fuel industry while failing to meet their $100-billion-a-year pledge.

"That money is available," she said. "There is no shortage of money to get us to the 1.5C (temperature goal)."

Ahead of the COP26 summit, which starts on Oct. 31, host nation Britain has tasked Germany and Canada with coming up with a delivery plan for the elusive $100 billion a year, but observers believe that is unlikely to land until next month.

A major question is whether U.S. President Joe Biden will unveil a bigger U.S. finance commitment at the U.N. General

Assembly next week, as concerns grow that the world's biggest economy is failing to cough up its fair share.

At an April summit he hosted, Biden said the United States would double its climate finance to about $5.7 billion a year by 2024 – but that level is still seen by many climate finance experts as far below what it owes to developing countries.

A recent analysis from the Overseas Development Institute said the United States should be stumping up more than $43 billion a year based on cumulative carbon emissions, gross national income and population size.

It called the United States the biggest offender among 23 donor states in terms of falling short of its responsibilities.

On Wednesday, the European Union pledged to boost the $25 billion per year it provides in climate funding to poorer countries by 4 billion euros ($4.7 billion) through 2027, and called on the United States to step up too.

Laurence Tubiana, CEO of the European Climate Foundation and a key broker of the Paris Agreement, said this week that "serious pledges" were now needed from Washington given that some European nations had already raised their commitments.

"The U.S. must step up solidarity," she said, adding she understood Washington was working hard to do so. ($1 = 0.8462 euros) (Reporting by Beh Lih Yi @behlihyi and Megan Rowling; Editing by Laurie Goering. Please credit the Thomson Reuters Foundation, the charitable arm of Thomson Reuters, that covers the lives of people around the world who struggle to live freely or fairly. Visit news.trust.org)

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 fossile, 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

• *Geoff Mulgan, a former chief executive of NESTA, is Professor of Collective Intelligence, Public Policy and Social Innovation at University College London and the author of* Big Mind: How Collective Intelligence Can Change Our World.

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.

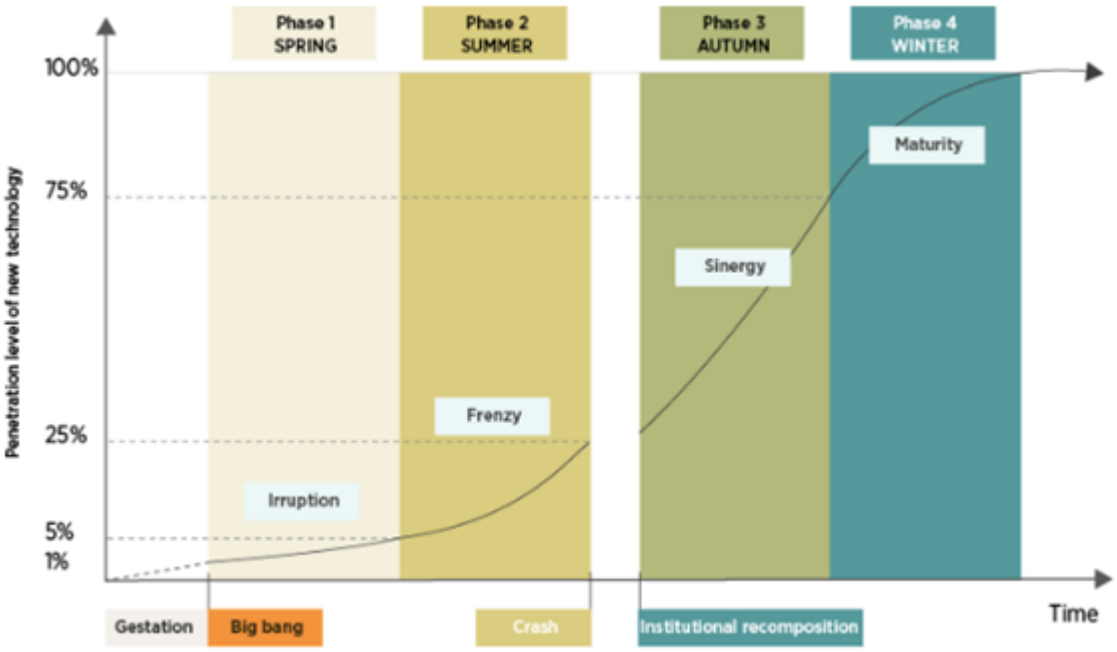
One can only guess why forecasters have, for decades, underestimated the falling costs and accelerating pace of deployment for renewables. But the results are clear: bad predictions have underwritten trillions of dollars of investment in energy infrastructure that is not only more expensive but also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

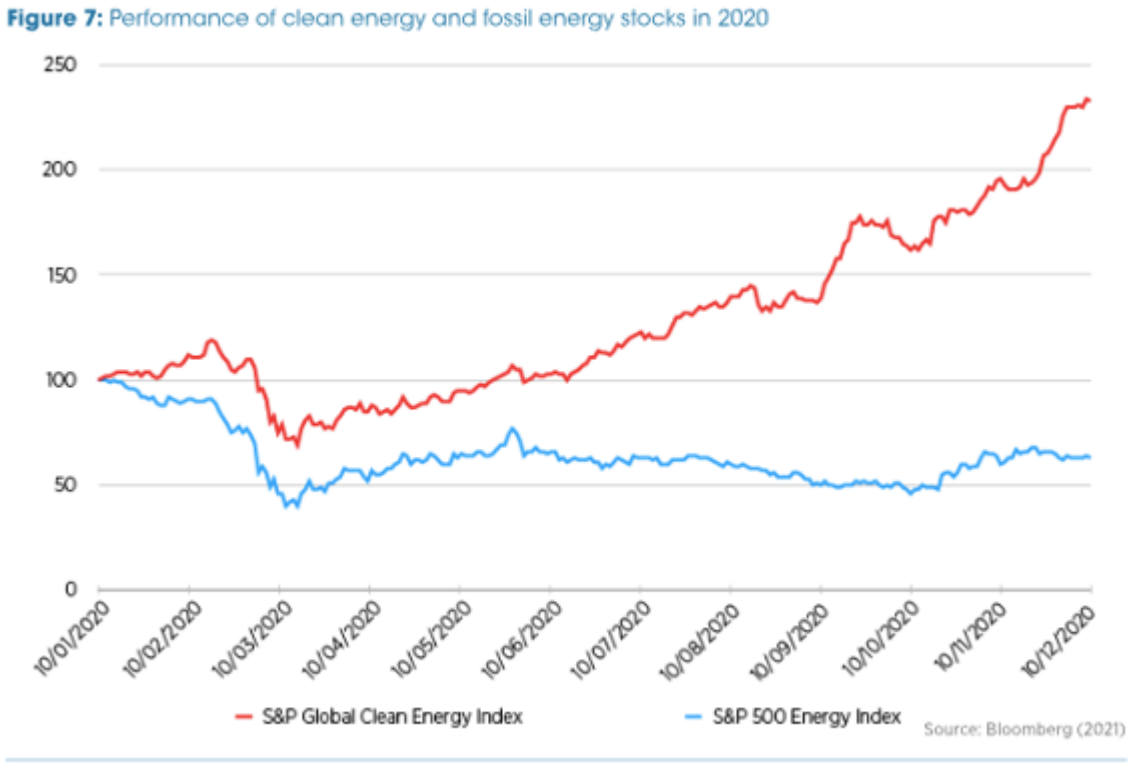
Accordingly, Bond notes that the energy transition will continue to attract capital and build its own momentum. But this process can and should be supported to ensure that it proceeds as quickly as possible. Policymakers who want to drive change must create an enabling environment for the optimal flow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



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.

How to Avert a Global Climate

Catastrophe

Sep 23, 2021OMAR RAZZAZ

Current global efforts to raise awareness and nudge and shame policymakers are necessary but not sufficient to prevent an existential climate crisis. Addressing the problem more effectively requires international governance arrangements that amount to a new social contract on global public goods.

AMMAN – The hottest day on record in Jordan since 1960 was a staggering 49.3° Celsius, (120.7° Fahrenheit) in July 2018, one month after I became prime minister. Jordan is not unique: heat waves have been causing record-high temperatures in countries from Canada to Australia in recent years. The effects of climate change (including increased frequency and severity of floods, hurricanes, and droughts), while felt locally, demand a global response, which should set binding targets that take into account countries' contributions to the problem and to the solution.

Jordan has been actively pursuing policies and programs to reduce carbon-dioxide emissions. Over the past 15 years, Jordan's annual emissions per capita fell from 3.5 tons to 2.5

tons. But Jordan, like the vast majority of countries, accounts for a negligible share of global CO_2 emissions – just 0.04% annually. So even if Jordan was to turn its whole economy green overnight, it would hardly make a dent. This does not absolve us of responsibility, but we cannot overlook the fact that emissions are concentrated: the top 20 emitters account for almost 80% of the annual total, with the United States and China alone accounting for 38%.

In many countries, the ramifications of climate change for water supply have been staggering. In the case of Jordan, it made an already tight constraint much more acute. Rainfall was previously the savior for rural communities that engaged in seasonal rainfed agriculture and herding on semi-arid land. Over the last decade, however, a steady decline in average annual rainfall and an increase in the frequency and severity of droughts have undermined these modes of agriculture, deepening the socioeconomic divide between rural and urban areas.

Jordan is by no means unique: the World Health Organization estimates that half of the world's population will be living in water-stressed areas by 2025. In essence, what was previously a regional challenge has now become a serious global governance issue with environmental, political, and economic ramifications.

More broadly, other manifestations of climate change, and the lack of an internationally coordinated response to them – not to mention to additional threats such as the COVID-19 pandemic – suggest that something is seriously wrong at the global level. According to the recent sober assessment by the United Nations Intergovernmental Panel on Climate Change, the world will not meet the 2015 Paris climate agreement goal of limiting global warming to well below 2°C unless it makes huge additional cuts in CO_2 emissions.

Quite simply, the results of the world's climate efforts are

dangerously inadequate. According to the Climate Action Tracker, current policies put the world on course to be an alarming 2.7-3.1°C warmer by 2100, relative to pre-industrial levels. Yes, many emerging green technologies are promising and should be supported. But in the absence of a global approach, these innovations risk merely redistributing the impact of climate change among countries and regions.

Raising awareness and nudging (and shaming) policymakers is necessary, but not sufficient to avert what UN Secretary-General António Guterres has referred to as a "climate catastrophe." Climate-change mitigation must be pursued as a global public good. The problem is that such goods are plagued by collective-action problems, because the costs tend to be spatially and temporally concentrated while the benefits are diffuse. These difficulties can be tackled only by global governance structures that reduce the cost of collective action, internalize externalities, and counter short-term biases in decision-making.

To address climate change more effectively, we need global governance arrangements that amount to a new global social contract. Existing international governance structures can serve as a foundation for these new institutions, but will need to be amended and supplemented to address specific problems related to public goods and collective action.

For starters, we need a governance structure whose jurisdiction is limited to global public goods that cannot be provided adequately at the national level. Nation-states would be free to opt in and opt out, with the benefits of opting in outweighing those of opting out. Decisions would be taken on a majoritarian basis, with no single country having veto power. There would also be an appeals and adjudication process that allows decisions to be challenged.

Second, a custodial entity would keep track of global natural wealth accounts to address intergenerational equity issues.

This entity should be able to place items on the global governance institution’s agenda and to appeal decisions.

Lastly, a regime of incentives and disincentives would aim to preserve nature and biodiversity and tax those who consume it, taking wealth and income disparities across countries into account.

Establishing global governance mechanisms that focus on the public-goods and collective-action challenges of climate change will not be easy. Concerns and fears related to a “democratic deficit” and the need to protect national sovereignty are legitimate, and cannot simply be brushed aside.

Nevertheless, we are not starting from scratch. The World Trade Organization provides an example of a strong and successful global governance structure with binding rules. It is thus both ironic and sad that the WTO has failed to incorporate trade-related environmental and human-rights issues into its regulations in order to ensure a level international playing field. After all, with its sanctioning authority, the WTO is best positioned to link issues such as greenhouse-gas emissions and labor rights to trade rules.

Jordan cannot successfully tackle today’s global climate challenges on its own. Nor can the Middle East, owing to regional conflicts and rivalries. Now that the world has become a village, the task facing the region is instead to agree with other countries – our fellow villagers – on how to mitigate our own excesses and avert an existential threat. This can be achieved only by finding suitable ways to hold ourselves and each other accountable. The solution lies in establishing a global governance system that is based on the nation-state but has the capacity to sanction harmful behavior.

Some might regard the idea of creating such a structure as

far-fetched. But unless we do, there is scant hope of preventing the climate crisis – already apparent in Jordan and around the world – from continuing to destroy countless lives and livelihoods.

OMAR RAZZAZ

Writing for PS since **2021**
1 Commentary

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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.

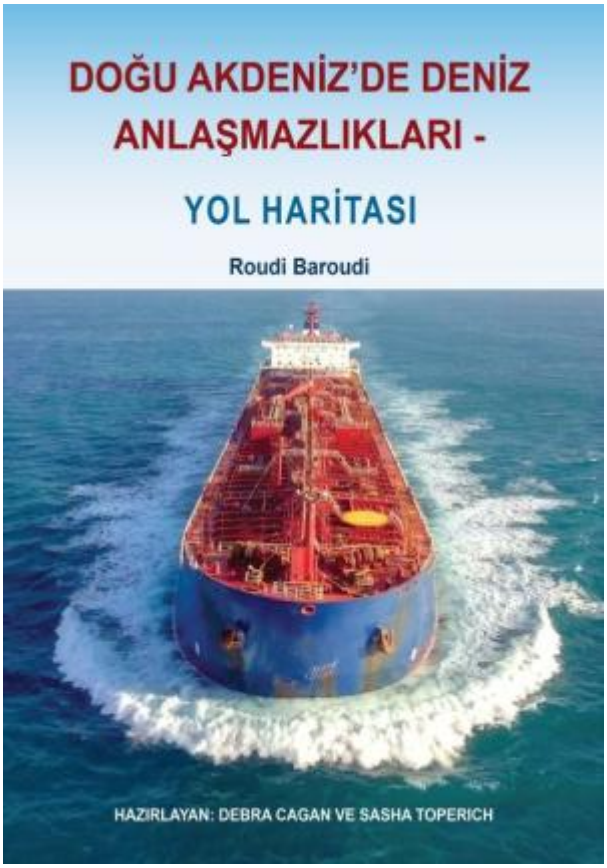
“We need the EU to push the sector in this direction of recycling,” he said.

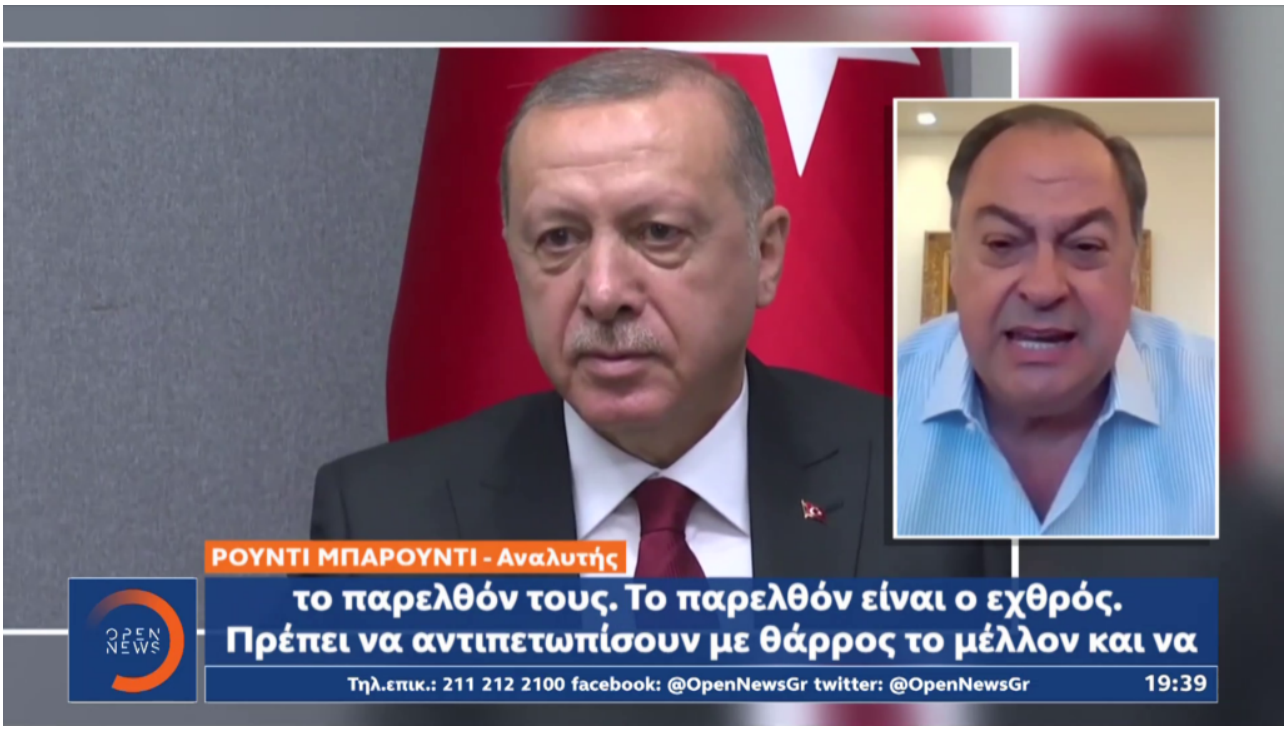
Vivian Loonela, a spokeswoman for the European Commission said it will review its landfill policies in 2024.

“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 SETTLING MEDITERRANEAN BORDER DISPUTES NOW AVAILABLE IN TURKISH





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 Castellorizo, 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.