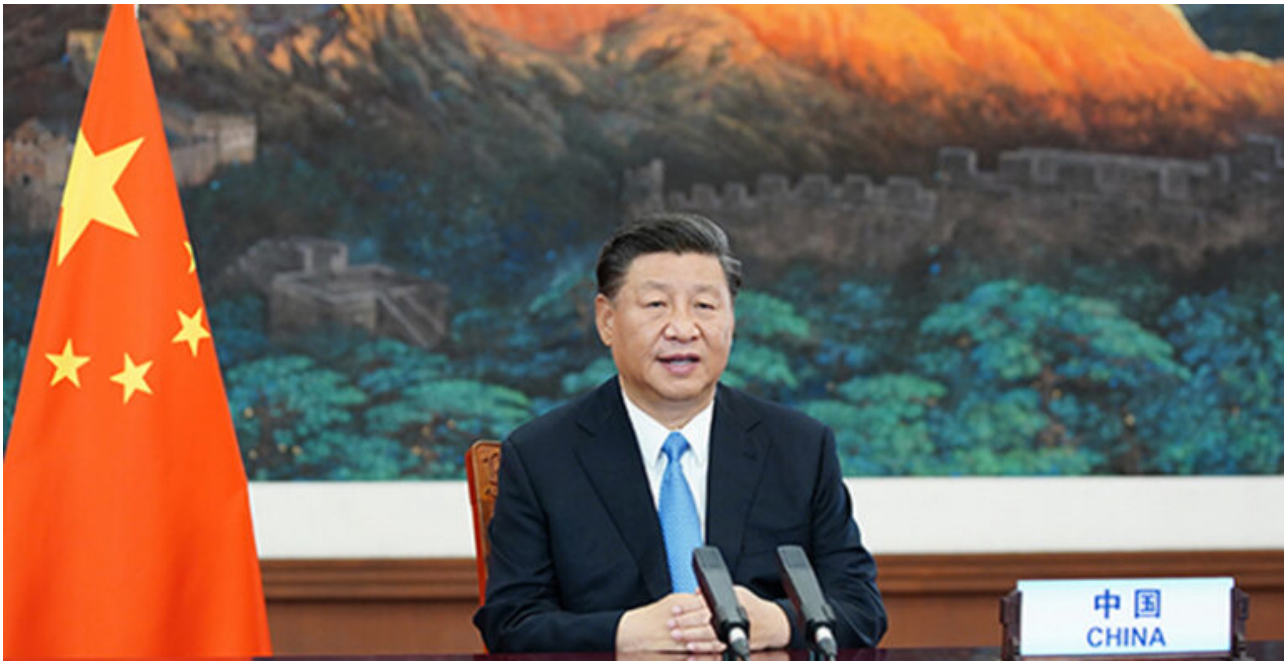
How China Plans to Become Carbon-Neutral by 2060



China’s industrialization has occurred at a breathtaking pace, lifting hundreds of millions out of poverty and transforming the country into the world’s factory floor. That’s also made it the biggest emitter of carbon dioxide, the main greenhouse gas driving climate change. The most-populous nation has set itself the ambitious goal of becoming carbon-neutral by 2060, a challenging target given it hasn’t even reached its emissions peak. To get there, President Xi Jinping wants to transition away from an economy reliant on coal and other fossil fuels by switching to renewable energy and developing new technology to capture emissions.

1. What is carbon neutral?

It means cutting as much of your carbon dioxide emissions as possible and then offsetting what you can’t eliminate. For a country, this could mean switching to renewable energy such as solar power instead of coal and investing in projects that absorb carbon dioxide, such as reforestation. Carbon neutral has become a goal of companies and countries alike to address

public concerns about the impact emissions have on the climate.

2. What is China’s goal?

Even though China is the world’s second-largest economy, it’s still classified as a developing nation and hasn’t reached its emissions peak. That’s forecast to come by 2030, with Xi committing to carbon neutrality by 2060, 10 years after the U.S. deadline set by President Joe Biden. If China pulls it off, it would be the fastest decline from peak emissions among major economies, speedier than Europe’s goal of 70 years and the US target of 40 years. China’s plan, which the country’s climate envoy said includes all greenhouse gases and not just carbon dioxide, would boost global efforts to limit the rise in temperatures and potentially give it greater sway in global matters.

3. What needs to be done?

China has to find replacements for the fossil fuels that have powered its economy and rapid urbanization. A key early step was taken in July when China opened the world’s largest carbon trading market, creating a framework for how emissions are priced and regulated in the country. It’s already pushing the expansion of electric vehicles and automation while investing in nuclear power, which doesn’t emit greenhouse gases. There is more spending on research into technologies such as storage batteries and using hydrogen as a fuel to complement low-emissions energy sources. The government will have develop more wind and solar power projects so that coal-fired plants play a smaller role in generating electricity. Local authorities have been told to develop regional plans to lower emissions and some have already taken measures to curb what they perceive as wasteful uses of electricity, such as Bitcoin mining.

The ruling Communist Party of China has an overarching goal of

creating a “great modern socialist country” to ensure a prosperous life for its citizens. That’s a mantra that has required continuous economic growth and led to increased pollution. Breaking the link between growth and emissions will require policies that take aim at fossil fuels and encourage development of renewable energy. Monetary policy will need to be adjusted if the transition causes inflationary pressure. Beijing will also need to support vulnerable sectors and regional economies during the decarbonization process. For example, the coal industry in Shanxi contributes 20% of the province’s revenue, according to PingAn Securities chief economist Zhong Zhengsheng.

5. What will be the economic impact?

Services and high-technology will have to boost their contribution to the economy, a move that could unleash investment demand of as much as 300 trillion yuan ($46.3 trillion), according to the People’s Bank of China. The central bank has said a big chunk of the funds will come from market investors but a policy framework encouraging private investment will be important. That is in addition to cleaner air, improved road safety and prevention of potential climate damage that the World Bank said could be worth 3.5% of gross domestic product by 2030. Such benefits have to be weighed against the impact on ordinary Chinese people of an economic restructuring that phases out jobs in carbon-emitting sectors, with the coal mining and processing industry employing 3.5 million workers alone.

6. Who are the biggest losers?

China’s 2,200 electricity utilities powered by fossil fuels, a group that accounts for almost half of the carbon China spews into the atmosphere and 14% of the world’s total, are among the first to feel the impact through the country’s carbon market. Power is one of the eight industries that account for nearly 90% of its carbon emissions, a group that also includes

steel, construction materials and transport, according to a report by China International Capital Corp. Eliminating their dependence on fossil fuels will require a move to cleaner sources such as wind and solar and spending on mitigation measures or carbon offsets. Regional Chinese economies that rely heavily on fossil fuel production, such as Shanxi and Inner Mongolia provinces, will also be affected.

7. Who stands to benefit?

Electric-vehicle makers are one of the high-profile beneficiaries of China's plan thanks to government subsidies. Beijing has set a target of having new-energy vehicles account for 20% of sales by 2025 compared with 6% in 2020. Utilities that make the shift to renewable sources will also benefit, along with providers of services such as emission measurement and carbon trading, according to Nannan Kou, head of China research for BloombergNEF. Other winners could include makers of photovoltaic systems, recycling firms and producers of new materials and non-ferrous metals for electric vehicle assembly.

8. What role will the central bank play?

China's goal of carbon neutrality is shared across China's key institutions and is a top priority for the PBOC. The central bank removed so-called clean-coal projects from its definitions of green bonds while pledging to revamp tools so it can offer cheap funds for banks to encourage more environmentally focused loans. Regulators also plan to adjust the rules on capital adequacy and how it counts green assets. At the end of March, China's outstanding green loans stood at 14 trillion yuan, an amount set to expand at a rapid pace.

9. Will private banks play a role?

Banks will need to change who they lend to and balance how their loans mesh with Beijing's climate ambitions. The high capital cost of building power plants, steel mills and

factories mean companies in those sectors often carry significant financing needs and any rapid change could affect their ability to manage credit risks, according to Zhou Xuedong, executive vice president at National Development Bank and a former senior PBOC official. He said a climate-change stress test for financial institutions will be necessary.

This story has been published from a wire agency feed without modifications to the text.

The promise of 'green' hydrogen

By Thomas Koch Blank/ Stockholm

While we already have mature technologies that can replace fossil fuels in many parts of our economy, there are areas where eliminating carbon pollution will be much more difficult. Steel, shipping, aviation, and trucking, for

example, account for a combined 40% of our global carbon footprint and are on track to consume two times the remaining carbon budget for staying below 1.5C of warming.

Fortunately, “green” hydrogen – H2 produced through electrolysis using renewable energy – holds enormous promise for these sectors. Through various applications, this tiny molecule can provide the heat, reduction properties, fuel, and other services needed to replace fossil fuels. In fact, given the technical challenge of getting these “hard-to-abate” sectors to a state of carbon neutrality, hitting 2050 net-zero targets without it would be virtually impossible.

H2 uptake can serve other objectives beyond decarbonisation. For example, hydrogen’s ability to substitute for natural gas in many applications allows for a degree of energy independence and reduced reliance on liquefied natural gas or pipeline imports from Russia. And while renewables like solar and wind are limited by the extent of electrical grids, hydrogen can be transported by pipeline or potentially by ship. That means it could become an exportable renewable-energy source, eventually replacing petroleum as the main global energy commodity.

H2 uptake is starting from vastly differing points, depending on the market. In Europe and Southeast Asia, political and market incentives are already fully aligned for the deployment of H2 infrastructure. But in large oil- and gas-exporting economies, the incentives are often conflicting. Notably, there is significant misalignment in the United States, where natural gas fulfils all the political priorities that hydrogen can provide for other markets.

As a crucial element in achieving 2050 net-zero targets, hydrogen production, storage, and transport represents a multi-trillion-dollar opportunity, not only for energy incumbents but also for investors. While hydrogen is currently more expensive (per unit of energy delivered) than competing options such as fossil fuels, the scaling up of electrolyser production is driving down costs. Within the next decade, we can expect H2 to reach break-even points with fossil fuels

across different applications, after which hydrogen uptake will bring cost savings.

Green hydrogen is particularly attractive for developing economies. There is a strong geographical overlap between countries and regions with the lowest production cost for renewable energy and those with lower per capita GDP. These countries thus could secure a global competitive advantage by becoming hydrogen producers and exporters. Doing so would also help them attract zero-carbon heavy industry, such as fertiliser manufacturing or hydrogen-based direct reduction steelmaking. And, of course, the development of these sectors would lead to significant job creation.

H2 is also attractive for wealthy industrialised countries, which currently lead the world in the manufacture of hydrogen electrolysers. However, if the recent history of the photovoltaic (solar panel) industry is any guide, wealthy countries may need stronger industrial policies to ensure that production does not migrate to China and other regions.

There is more work to do before hydrogen can realise its full decarbonisation potential. As matters stand, green hydrogen represents a very small portion of existing hydrogen production. Instead, most hydrogen is “gray,” because it is made using fossil fuels through a steam methane reforming (SMR) process. Though there is potential to capture and store some of the associated carbon dioxide emissions to make a slightly cleaner fossil-based “blue” hydrogen, this option would not be emissions-free. H2 therefore has a complex CO2 footprint, for now.

Furthermore, for hydrogen to deliver on its promise, the decarbonisation of electric grids must happen in parallel. But as with electric vehicles (EVs), we cannot wait for a 100% clean grid to begin deploying electrolysers; we must start now.

This is not as financially risky as it sounds. There will undeniably be a threshold where green hydrogen becomes the lowest-cost source of hydrogen generally. Notably, the US Department of Energy’s recently announced goal of reducing the

cost of “clean hydrogen” to $1 per kilogram is nearly impossible to achieve with hydrogen produced through the SMR process at sustainable price levels for natural gas. That means US policy is already aligned behind green hydrogen.

Nonetheless, using green hydrogen to decarbonise heavy industry will demand a truly awesome amount of electricity. Producing the necessary volume of hydrogen would almost double total current global electricity generation. The only way to meet this demand is to build renewable energy even faster.

That, in turn, will lead to critical infrastructure-design questions, such as whether to prioritise H2 pipelines or power lines. And the growth of this sector will have many regulatory implications. To ensure a rapid build-out of hydrogen infrastructure, it will be important to enable monetisation, create rate structures to encourage capital-expenditure deferral, and provide system-wide planning across infrastructure types.

Equally, a move to H2 will accelerate the obsolescence of many fossil fuel-based assets. For these large volumes of stranded assets not to produce negative side effects, they will need to be repurposed or helped into early retirement with various financial incentives.

One high-potential area for repurposing infrastructure is in natural-gas pipeline networks, which, in some cases, can be retrofitted to allow for hydrogen transport. Some thermal power plants can also potentially be repurposed; but, here, the end-to-end efficiency of power-to-hydrogen-to-power is low, so the profitable use cases are limited. For the steel industry, the picture is grimmer, as existing blast furnace capacity may need to be replaced with direct reduction. Similarly, gasoline and diesel fuelling infrastructure will need to be replaced. But the future of such infrastructure is already in doubt, owing to the growing market for battery EVs.

Hydrogen brings enormous opportunities but also a daunting scaling challenge. Globally, the industry currently has the capacity to produce only around one gigawatt of hydrogen electrolysers each year, whereas, according to the

International Energy Agency’s analysis on what a 1.5C pathway requires, green hydrogen production will need to grow 1,000-fold from today to 2030.

There are actions that can and must be taken to meet this challenge. First, we need policies to ensure stable demand at scale, so that electrolysis makers can leap-frog into industrialised manufacturing. Second, governments must provide subsidies to cover the initial “green premium” until learning-curve effects take over. And, finally, we must address the tension between current asset locations and the places with the lowest-cost clean-sheet footprint for decarbonised industries.

Backed by direct and indirect political priorities, hydrogen markets have already gained momentum and crossed the point of no return. As such, they are quickly bringing cleaner industry and a decarbonised economy within striking distance. – Project Syndicate

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Why an Electric Car Battery Is So Expensive, For Now

At Tesla Inc.’s ballyhooed Battery Day event last year, CEO Elon Musk set himself an ambitious target: to produce a $25,000 electric vehicle by 2023. Hitting that sticker price — about $15,000 cheaper than the company’s least expensive model today — is seen as critical to deliver a true, mass-market product. Getting there means finding new savings on technology — most critically the batteries that can make up a third of an EV’s cost — without compromising safety. Alongside Musk, traditional automaking giants including Toyota Motor Co. and Volkswagen AG are pouring tens of billions of dollars into the race.

1. Why are EV batteries so expensive?

Largely because of what goes in them. An EV uses the same rechargeable lithium-ion batteries that are in your laptop or mobile phone, they’re just much bigger — cells grouped in packs resembling big suitcases — to enable them to deliver far more energy. The priciest component in each battery cell is the cathode, one of the two electrodes that store and release electricity. The materials needed in cathodes to pack in more energy are often expensive: metals like cobalt, nickel,

lithium and manganese. They need to be mined, processed and converted into high-purity chemical compounds.

2. How much are we talking?

At current rates and pack sizes, the average battery cost for a typical EV works out to about $6,300. Battery pack prices have come down a lot – 89% over the past decade, according to BloombergNEF. But the industry average price of $137 per kilowatt hour (from about $1,191 in 2010) is still above the $100 threshold at which the cost should match a car with an internal-combustion engine. Costs aren't expected to keep falling as quickly, and rising raw materials prices haven't helped. Still, lithium-ion packs are on track to drop to $92 per kWh by 2024, according to BNEF forecasts, and $58 per kwh by 2030.

Greedy for Gigawatts

EVs are going to be the driving force for lithium-ion battery demand

Source: BloombergNEF Long-Term Electric Vehicle Outlook, June 2021

3. How will the batteries get cheaper?

A major focus for manufacturers is on the priciest commodities, and particularly cobalt. One option is to substitute the metal with nickel, which is cheaper and holds more energy. Doing so requires safety adjustments, however, as cobalt's advantage is that it doesn't overheat or catch fire easily. Another move has been to use alternatives that don't contain cobalt at all, like low-cost lithium iron phosphate cells, once derided for poorer performance but winning a revival as design changes deliver improvements. Simplifying

battery pack design, and using a standard product for a range of vehicles — rather than a pack tailored to each model — will deliver additional savings.

4. What about fire risks?

Lithium-ion batteries, whether used in grid-sized storage facilities, cars or devices like smartphones, can catch fire if they've been manufactured poorly, damaged in an accident, or the software that runs them hasn't been designed properly. Incidents remain rare, but garner huge scrutiny in what remains a developing sector. A decision in August by General Motors Co. to carry out a $1.8 billion recall of more than 100,000 Chevrolet Bolt models as a result of battery defects underscored the seriousness. Blazes or overheating incidents this year also impacted major energy storage projects in Australia and California. And the fires aren't easy to extinguish; it took firefighters four hours and took more than 30,000 gallons (113,560 liters) of water to douse a Tesla Model S after a fatal crash in Texas. Tesla insists that incidents involving electric models garner undue attention. According to its 2020 Impact Report, cars with internal-combustion engines (ICE) catch fire at a "vastly" higher rate. From 2012 to 2020 there was about one Tesla fire for every 205 million miles (330 million kilometers) traveled, compared to a fire every 19 million miles for ICE vehicles, the EV pioneer said.

5. Who are the biggest manufacturers?

Asia dominates manufacturing of lithium-ion cells, accounting for more than 80% of existing capacity. The Chinese company Contemporary Amperex Technology Co. Ltd. (CATL) shipped the highest volume in 2020, capturing almost a quarter of the market. By September this year it had extended its lead to 30%, followed by South Korea-based LG Energy Solution and Japan's Panasonic Corp. Tesla and Panasonic's joint venture is

the biggest battery producer in the U.S. Emerging producers include Northvolt AB in Sweden, founded by former Tesla executives, and Gotion High-tech Co. in China.

6. Are the batteries all the same?

They have the same basic components: two electrodes — a cathode and an anode — and an electrolyte that helps shuttle the charge between them. But there are differences in the materials used, and that's key to the amount of energy they hold. Grid-storage systems or vehicles traveling short distances can use cheaper and less powerful cathode chemistry that combines lithium, iron and phosphate. For higher-performance vehicles, automakers favor more energy-dense materials, such as lithium-nickel-manganese-cobalt oxide or lithium-nickel-cobalt-aluminum oxide. Further refinements are seeking to improve range — how far a vehicle can travel before recharging — as well as charging speed.

7. So China's in pole position?

Yes, in almost every aspect. China is responsible for about 80% of the chemical refining that converts lithium, cobalt and other raw materials into battery ingredients, though the metals themselves are largely mined in Australia, the Democratic Republic of Congo and Chile. China also dominates processing capacity across four key battery components (cathodes, anodes, electrolyte solutions and separators), with more than half of the world's commissioned capacity for each, BNEF data shows. The nation faces a challenge when it comes to advanced semiconductor design and software, components that are increasingly important as cars become more intelligent. Less than 5% of automotive chips are made in China, according to the China Association of Automobile Manufacturers.

8. Is cost the only hurdle?

There’s still an issue with driving range. While the most-expensive EVs can travel 400 miles or more before a top up, consumers considering mainstream models remain anxious about how often they’ll need to recharge. Automakers and governments have become directly involved in the roll-out of public recharging infrastructure for drivers on the road. However, most recharging is expected to take place at home, and that means another cost for consumers. While the average price of a home-charging kit has fallen 18% since 2017 to about $650, some top-of-the-line bi-directional chargers (which let you send energy from the vehicle to the home or grid), cost more than $6,000. Installation costs in the U.S. can run from as little as $400 to more than $3,300.

9. What’s around the corner?

Most keenly anticipated is the arrival of solid-state batteries, which promise a huge performance upgrade by replacing the flammable liquids that enable charging and discharging with ceramic, glass or polymers. QuantumScape Corp. says it has innovations in that field to increase a car’s range by as much as 50% and the technology could be deployed in vehicles at dealerships as soon as 2026. Another industry focus is modifying anodes — typically made using graphite — to add more silicon, or by using lithium metal. That would likely make it viable to power smaller aircraft. Storing renewable power with utility-scale batteries for days or weeks, rather than hours at present, is also a key challenge. Form Energy Inc. is developing iron-air batteries that it says could enable entirely carbon-free grids. CATL and others are also working on plans to substitute lithium, or combine it with, far cheaper sodium-ion technology for some niche applications.

The Reference Shelf

- Electric vehicle sales should increase sharply in the next few years and account for 16% of regular car sales by 2025, BNEF forecasts.
- These are the Nobel Prize winning scientists who pioneered the lithium-ion battery.
- Bloomberg News examines how the U.S. is falling behind as the EV battery soars.
- More QuickTakes on the road to driverless cars, the broader trend toward electrification, greener hydrogen and electric airplanes.
- Bloomberg Opinion's Anjani Trivedi explains how new power packs will require new supply chains.
- Bill Gates discusses the electrification of transportation in this blog post.
- A TOPLive Q&A with Carnegie Mellon University professor Venkat Viswanathan on the future of batteries.

— With assistance by Chunying Zhang

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.

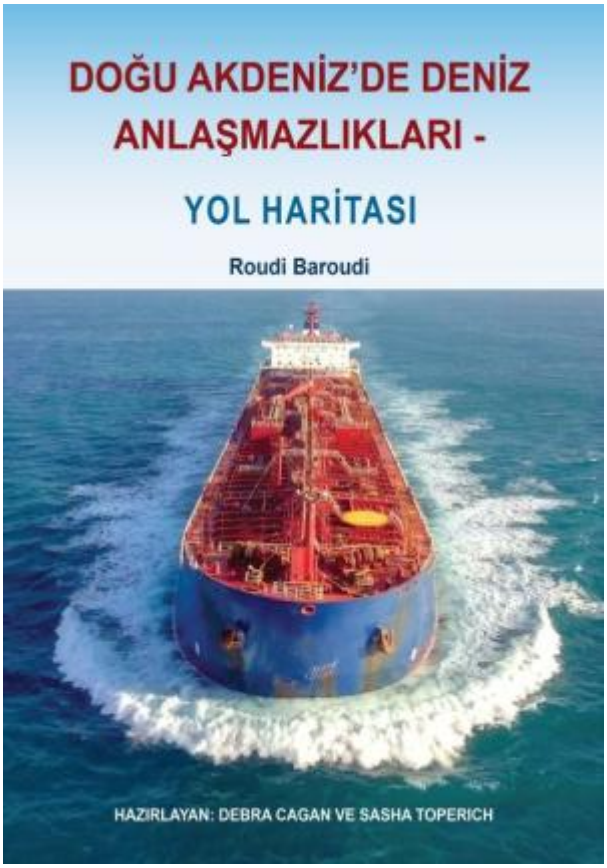
“We need the EU to push the sector in this direction of recycling,” he said.

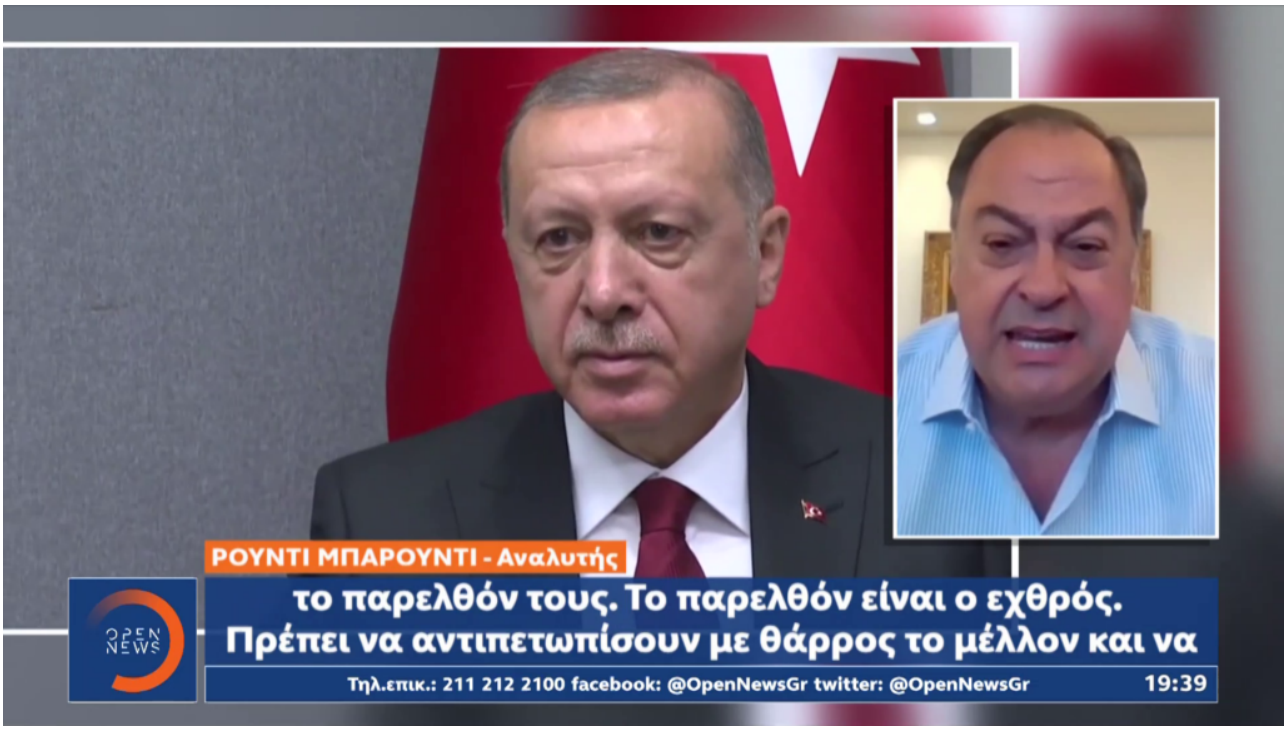
Vivian Loonela, a spokeswoman for the European Commission said it will review its landfill policies in 2024.

“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.

Rolls-Royce, Shell Deepen Sustainable Jet-Fuel Partnership

Rolls-Royce Holdings Plc and Royal Dutch Shell Plc said they'll deepen their cooperation on sustainable aviation fuels as part of the push to achieve net-zero carbon emissions.

At the heart of the agreement are plans to explore opportunities for bringing 100% SAF to certification, the companies said Wednesday. Such fuels can currently be blended with kerosene in concentrations of no more than 50%.

Airlines are counting on SAF to reduce carbon emissions in the years before electric- and hydrogen-based propulsion systems become widely available, most likely after 2035. Progress has been hampered by regulatory hurdles and a lack of supply both of biofuels and their synthetic equivalents, which has pushed prices significantly beyond those for traditional jet fuel.

The collaboration will also aim to develop new innovations, with SAF expected to have a role powering hybrid-electric versions of flying taxis currently in the final stages of development as well as jetliners and corporate aircraft, Rolls-Royce Chief Technology Officer Paul Stein said.

“The investments that are going to be required to scale up sustainable aviation fuels are measured in billions,” Stein said in an interview following the announcement. For energy companies, “before they invest their dollars in SAF-plants they need comfort that the market will be there and customers will buy the fuel.”

The agreement deepens an existing partnership between the companies in alternative fuels. Shell will supply sustainable aviation fuels to Rolls-Royce as the company aims to test engines like Ultrafan to demonstrate they are 100% SAF compatible. Shell is also the exclusive supplier for Rolls-Royce’s new SAFinity service allowing business travelers to take carbon-neutral flights, while the firms will also look at opportunities to co-operate in shipping and rail.

The key to moving forward with sustainable fuels is getting regulation in place to mandate their use, said Stein. The U.S. favors subsidizing the fuel at source, which is “not incompatible” with the European approach, he added.

In April, Shell announced an investment in sustainable-fuels technology company LanzaJet, adding to a string of deals meant to position the oil giant for the energy transition. Rolls-Royce in turn plans to make all of its in-production civil aircraft engines compatible with burning 100% SAF by 2023.

How biofuels cut emissions:

The carbon dioxide absorbed by plants during the growth of biomass is roughly equal to the amount produced when the fuel is burned, making SAF approximately carbon-neutral over its life cycle. However, CO2 released during the production and transport of SAF means the reduction in emissions is about 80% compared with fossil fuels. Feedstocks for biofuel also include spent cooking oil, waste gases and agricultural residues.

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

• *Tom Brookes is Executive Director of Strategic Communications at the European Climate Foundation. Gernot Wagner is Clinical Associate Professor of Environmental Studies at New York University.*

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.