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The problem with biofuels as a response to the Gulf energy supply shock

How they threaten food supplies and forests, and what to do about it

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Summary

- The ongoing conflict between the US and Iran and the effective closure of the Strait of Hormuz to shipping have caused a global energy 'shock', with Asian economies particularly exposed to higher fuel prices and supply insecurity as a result.
- Biofuels are being promoted as a swift and easy way to increase domestic energy security in response to this shock. Major economies including Brazil, India, Indonesia and the US are rapidly advancing new policies to increase the share of biofuels in transport fuels. Global production of biofuels is now expected to be 68 per cent higher in 2030 than in 2025.
- However, production on this scale risks intensifying competition for land and agricultural outputs, contributing to food insecurity and threatening biodiversity. Our analysis shows that the changes to biofuel mandates announced by various governments since the beginning of the Gulf energy crisis could require around 36 million hectares of additional land to be used for biofuel production globally – an area the size of Germany. This pressure will likely lead to further deforestation in ecologically sensitive regions of the world.
- Biofuels must therefore be treated by policymakers as a targeted transitional measure to help bridge the current crisis, rather than a permanent solution to the problem of energy security.
- An accelerated and largely uncoordinated policy push for biofuels – combined with reduced fertilizer availability due to conflict and El Niño-related impacts on agriculture – would likely rely heavily on food crops such as palm oil, soy, maize or rice as feedstocks. Growing biofuel demand could push up the prices of key crops and products like corn and vegetable oils, worsening food security risks in 2026 and beyond.
- Higher shares of biofuel can help reduce exposure to oil price shocks and import dependency (e.g. for existing vehicle fleets and hard-to-electrify sectors such as heavy goods transport). However, if biofuel expansion is not managed carefully, it will increase long-term pressure on land. Pressures on forests and ecosystems like those described above will be difficult – perhaps even impossible – to reverse.
- To reduce negative impacts on land, forests and food supplies, policymakers must avoid measures that stimulate demand for biofuels unless robust safeguards are in place. National biofuel mandates and bioeconomy strategies need to be designed to include stronger deforestation protections, clearer land-use limits and improved feedstock sustainability criteria. The latter should prioritize waste- and residue-based fuels, advanced second-generation biofuels and low-impact feedstocks (such as those produced sustainably on degraded land).

- The role of biofuels in the fuel mix should be reassessed once immediate pressures on energy security ease and rolled back if environmental impacts become too severe, especially given that higher biofuel mandates often depend on government subsidies or other policy measures that may impose unnecessary costs relative to their benefits.
- Alternatives are likely to be more cost-effective and yield better long-term results. In many transport sectors, especially passenger transport, energy efficiency measures and demand reduction, decarbonization of electricity generation and electrification offer long-term energy security with less risk of capital expenditure becoming 'stranded'.
- Meanwhile, in terms of land use, agroforestry and integrated approaches can increase biomass and land productivity while protecting biodiversity and avoiding large-scale monoculture expansion.

Introduction

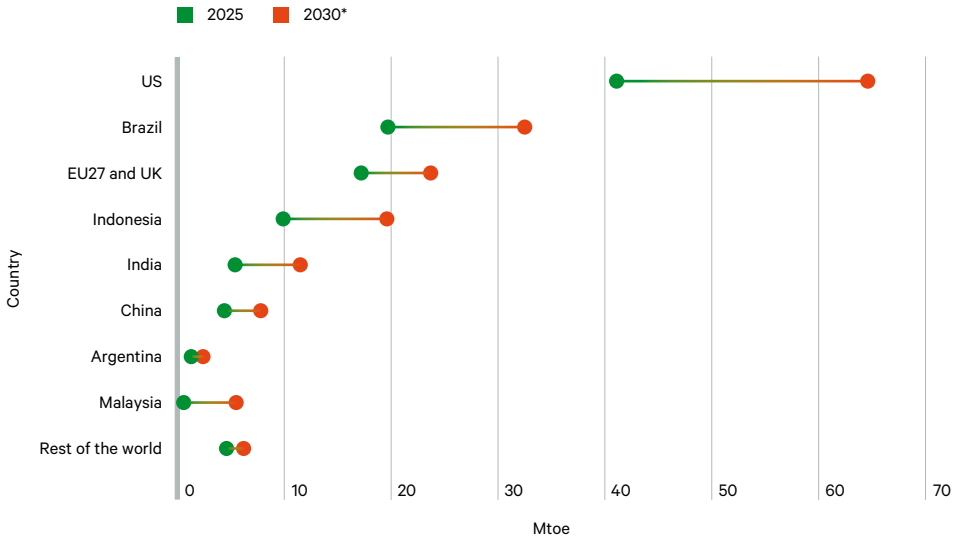
As the conflict between the US and Iran remains unresolved and passage through the Strait of Hormuz restricted, interest in, and demand for, alternatives to the oil supplied by Gulf countries continue to grow. The search for alternative fuels has led to a renewed focus on biofuels as a potential replacement for oil. Profit margins for ethanol and biodiesel producers have improved in the short-term as governments across the world are increasing the share of biofuels in their fuel mix for transport in response to constraints on oil supplies. However, our analysis shows that this expansion of biofuels could have potentially significant negative implications for global food security and land use.

Brazil, China, the EU, India, Indonesia, the US and others have all recently proposed new, higher 'blending mandates' for biofuels – national regulations that require fuel suppliers to mix a minimum percentage of biofuels (such as ethanol or biodiesel) with conventional petroleum-based fuels. Based on these new policies, global biofuel production is expected to rise from around 105 million tonnes of oil equivalent (mtoe) in 2025 to 176 mtoe in 2030 (Figure 1) – an increase of 68 per cent.[1]

Fulfilling the extra demand over such a relatively short timeframe will create significant pressures on land and agricultural inputs that are also required for food production, potentially risking deforestation in ecologically sensitive regions to open up land for agricultural use. Competition for land could also lead to a reduction in food crop outputs and increased insecurity of food supplies.

1 Sandford, C., Malins, C. and Phillips, J. (2024), *Diverted harvest: Environmental Risk From Growth In International Biofuel Demand*, Cerulogy, November 2024, https://uploads.transportenvironment.org/production/files/Cerulogy_Diverted-harvest_November_2024.pdf; Suzan, S. and Gambini, R. (2026), *Seeds of crisis*, briefing, Transport & Environment, 4 June 2026, https://www.transportenvironment.org/articles/seeds-of-crisis.

Figure 1. Global biofuel production is expected to increase significantly by 2030, led by the US, Brazil and Indonesia



Source: Based on data from Suzan, S. and Gambini, R. (2026), *Seeds of crisis*, briefing, Transport & Environment,4 June 2026, https://www.transportenvironment.org/articles/seeds-of-crisis.

* Note: 2030 projected demand based on announced targets up to May 2026.

The biofuel industry has used the Gulf energy shock as an opportunity, presenting biofuels as an answer to oil-price volatility and dependence on imported fossil fuels. In the US, for example, the Renewable Fuels Association explicitly linked instability in the Middle East and rising oil prices to its renewed call for nationwide, year-round sales of E15 fuel (a blend containing 15 per cent ethanol).[2]

The US biofuel industry is not only shaping domestic policy, but also affecting trade politics and policy debates abroad, including in the EU and the UK. Recent reports suggest that US biofuel interests have used the increased worldwide focus on energy security to advance both domestic and international policy goals, including by lobbying for the increased use of crop-based fuels, mandates for higher blending levels and increased access to foreign clean-fuel markets for US biofuel producers.[3]

While energy security and prices are naturally a concern for many governments, uncoordinated short-term policy responses to increase biofuel production often carry risks – from food insecurity and increased consumer costs, to land degradation and deforestation – and can prove to be inefficient uses of natural and fiscal capital. In the short term, policy responses may send a price signal to crop producers to sell-down stocks, increase output and divert crops from food to feedstocks. Over time, market signals may weaken and lead to demands for governments to subsidize

2 Renewable Fuels Association (2026), 'RFA: Middle East uncertainty shows need for year-round E15', news release, 2 March 2026, https://ethanolrfa.org/media-and-news/category/news-releases/article/2026/03/rfa-middle-east-uncertainty-shows-need-for-year-round-e15.
3 Savage, S. and Satoh, R. (2026), 'UK ministers changed stance on biofuels after officials' US lobbying tour', *Financial Times*, 6 July 2026, https://www.ft.com/content/d4b53746-0e71-4443-a9c7-83b1052a4058; Lecca, T. (2026), 'Biofuel lobbies crank up efforts to change EU green jet fuel regs', E&E News, 31 March 2026, https://www.eenews.net/articles/biofuel-lobbies-crank-up-efforts-to-change-eu-green-jet-fuel-regs.

production, as rising input costs and feedstock drawdowns erode the profit margins of producers. Such subsidies would risk diverting resources away from other public-spending priorities that could support sustainable economic growth and have broader social benefits.

These policies are also counterintuitive as, by 2025, electrification of transport and the expansion of renewables had already reduced demand for petrol and diesel – particularly in Europe, China and other fast-growing electric vehicle (EV) markets. EV sales in emerging markets outside China also grew significantly, by around 80 per cent over that year, with Brazil, India, Mexico and southeast Asia registering particularly rapid growth.[4]

Large-scale public capital expenditure on biofuel projects would be better spent supporting the long-term transition to electrification.

Biofuels make little sense as a fuel for passenger transport, as biofuel-powered combustion vehicles remain exposed to crop, fertilizer and fuel volatility.[5] Biofuels can serve a purpose as transitional or 'drop-in' fuels for heavy trucks where batteries face weight and range limits.[6] But for consumers, EVs are a more cost-effective option for light-duty transport than advanced ethanol or biodiesel: running costs for EVs are often around 40–50 per cent lower, because battery-powered EVs use around 70 per cent less energy per kilometre than comparable petrol cars.

Yet the Gulf oil shock has changed the policy calculus for governments, which are increasingly treating biofuels as a rapid and politically expedient way to reduce exposure to oil imports and fuel-price volatility. The result is a potential divergence between long-term trends in favour of transport decarbonization and electrification and short-term energy-security responses that are pushing countries back towards the use of crop-based liquid fuels.

In markets already expanding renewable electricity sources and electrifying road transport, large-scale public capital expenditure on biofuel projects would be better spent supporting this long-term transition to electrification. At the same time, any pro-biofuel policy support and signals must avoid exacerbating pressures on food security and incentivizing land-use conversion.

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4 IEA (2026), *Global EV Outlook 2026: Electric vehicle charging*, report, Paris: International Energy Agency, https://www.iea.org/reports/global-ev-outlook-2026/electric-vehicle-charging-chap-6-and-10.
5 Ibid.
6 Vishnuram, P. et al. (2025), 'A critical review on alternative fuels for road transportation: Pollution mitigation, environment and economic perspective', *Energy Strategy Reviews*, 61 (101894), https://doi.org/10.1016/j.esr.2025.101894; Kennedy, K. and Feldmann, J. (2023), 'Decarbonizing Freight: Opportunities and Obstacles for Clean Fuels', World Resources Institute, 18 September 2023, https://www.wri.org/insights/decarbonizing-freight-clean-fuels.

How policies on biofuels are changing as concerns over energy security increase

In 2026, as oil prices rose and concerns over fuel-supply disruptions intensified, governments have moved rapidly to strengthen domestic biofuel blending mandates and expand their biofuel production capacity. As a result, biofuels have gained renewed political momentum as a substitute for imported fossil fuels, particularly in those transport sectors still dependent on liquid fuels. However, the speed of the policy shift has also created significant risks: sustainability safeguards, land-use planning, feedstock traceability and food-security considerations are increasingly being treated as secondary to immediate energy security objectives.

Some of the most notable developments have been in the US, Brazil, Indonesia, the EU and India, although other countries – particularly in southeast Asia – have also made important changes to their biofuel mandates.

The US is leading the push towards more expansionary policies. Roughly 40 per cent of US corn demand already comes from ethanol producers. In March 2026, the Environmental Protection Agency finalized the 'Set 2' Renewable Fuel Standard rule,[7] setting record targets for 2026 and 2027. The rule envisages a 60 per cent increase in biodiesel and renewable diesel production, while also removing restrictions on the sale of E10, a fuel containing 10 per cent ethanol. The Renewable Fuel Standard decision was welcomed by agricultural and biofuel interests as a measure to strengthen 'American energy' and increase demand for domestically produced corn and soybean oil. Other US policy reforms include the elimination of EV credits, which has reduced the uptake of EVs.[8]

Brazil is the world's second largest producer of ethanol and the third largest producer of biodiesel, making it one of the most advanced biofuel economies. It has some of the world's highest government-mandated biofuel blending requirements, at 30 per cent for ethanol and 15 per cent for biodiesel.[9] In response to rising fuel prices, an increase in share of ethanol blends in petrol to 32 per cent and tax exemptions for biodiesel producers are reportedly being considered. Under the Fuel of the Future Law, a technical subcommittee is also exploring the feasibility of increasing ethanol blending mandates further still, to 35 per cent for ethanol and to 20–25 per cent for biodiesel.[10]

Unlike some other major producers, Brazil has an abundance of degraded land that can support biofuel production without additional clearances. The Brazilian National Biofuel Policy (RenovaBio) incentivizes biofuel production on previously degraded lands through voluntary market credits which disallow production

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7 Argus Media (2026), 'US mandates record-high biofuel use: Update', 27 March 2026, https://www.argusmedia.com/en/news-and-insights/latest-market-news/2807277-us-mandates-record-high-biofuel-use-update.
8 Benjamin, B./Bloomberg via *Financial Post* (2026), 'Electric vehicle outlook sinks after US withdraws policy support', 16 June 2026, https://financialpost.com/commodities/energy/electric-vehicles/electric-vehicle-outlook-sinks-us-withdraws-support.
9 *The Economist* (2026), 'Brazil has a secret weapon against oil shocks', 26 March 2026, https://www.economist.com/the-americas/2026/03/26/brazil-has-a-secret-weapon-against-oil-shocks.
10 Ibid.; and Krueger, E. (2025), 'Brazil Launches New Subcommittee In Support Of Efforts To Increase Ethanol, Biodiesel Blend Levels', *Ethanol Producer Magazine*, 19 November 2025, https://ethanolproducer.com/articles/brazil-launches-new-subcommittee-in-support-of-efforts-to-increase-ethanol-biodiesel-blend-levels.

in areas where there has been suppression of native vegetation.[11] Additionally, RenovAgro provides credit to farmers recovering degraded pastures and shifting them into productive integrated cropland-livestock-forestry systems, allowing biofuel feedstock producers to scale up production without clearing new land.[12]

In **Indonesia**, the government is changing its blending mandate from B40 (a 40 per cent biodiesel blend) to B50 palm oil-based biodiesel (a 50 per cent blend) from 1 July 2026 as part of a new energy security strategy.[13] This change reverses a previous decision to postpone an increase to B50, which was described at the time as a responsible approach that prioritized sustainable long-term implementation.[14] While accelerated implementation of B50 could reduce diesel imports, it will likely also substantially increase domestic demand for palm oil and require a major expansion of biodiesel production capacity. In February 2026, Indonesia confirmed a ban on exports of crude palm oil mill effluent and crude used cooking oil to secure supplies of domestic feedstocks for the biofuel industry.[15] There are also export opportunity costs when palm oil is diverted from high-value international markets to domestic production.[16]

The EU is much more dependent on imports than other major biofuel markets, with EU-produced fuels and feedstocks amounting to only 40 per cent of all biomass feedstock used inside the bloc.[17] In April 2026, the EU announced that it is considering increasing the limit on blending ratios from E10 to E20, but no policy decision has yet been made.[18] The Renewable Energy Directive (RED III)[19] caps the contribution of food and feed crop-based biofuels like ethanol to national renewable transport targets, though many member states have the potential to add production capacity under the cap. Any additional ethanol beyond the RED III cap would need to be advanced or waste-based biofuels. Separately, as some member states are discontinuing the double-counting of certain waste-based biofuels towards compliance targets under RED III, demand for first-generation, crop-based biofuels is expected to rise within the existing cap.[20]

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11 Ministry of Mines and Energy of Brazil (2026), 'RenovaBio (English)', updated 3 July 2026, https://www.gov.br/mme/pt-br/assuntos/secretarias/petroleo-gas-natural-e-biocombustiveis/renovabio-1/renovabio-ingles.
12 Climate Action Tracker (undated), 'Brazil: policies & action', updated 30 June 2026, https://climateactiontracker.org/countries/brazil/policies-action.
13 Reuters (2026), 'Indonesia says B50 biodiesel plan to boost palm oil use, cut fuel imports', 9 July 2026, https://www.reuters.com/business/energy/indonesia-says-b50-biodiesel-plan-boost-palm-oil-use-cut-fuel-imports-2026-07-09.
14 Judijanto, L. (2026), 'Indonesia's mandatory B50 biodiesel policy postponement in 2026: a prudent strategic decision or policy setback? A review', *European Journal of Innovative Studies and Sustainability*, 2 (1), pp. 208–28, https://doi.org/10.59324/ejiss.2026.2(1).14.
15 Ng, R. (2026), 'Indonesia restricts crude palm oil exports of waste', Fastmarkets, 23 February 2026, https://www.fastmarkets.com/insights/indonesia-restricts-crude-palm-oil-exports-waste.
16 Fitrady, A., Cahyaningsih, A. and Nugrahaningsih, F. (2026), 'At what cost? Economic and fiscal trade-offs of Indonesia's biodiesel program', *Energy Policy*, 212 (115134), https://doi.org/10.1016/j.enpol.2026.115134.
17 Gimbert, Y., Mathieu, L., Keynes, A. and Suzan, S. (2025), *Biofuels in cars: A dead end for Europe*, report, Transport & Environment, 27 November 2025, https://uploads.transportenvironment.org/production/files/2025_11_TE_biofuels_in_cars_report.pdf.
18 ePURE (2026), 'The EU and E20: European Commission confirms important role of higher ethanol blends in de-fossilising road transport, securing energy supply', press release, 24 April 2026, https://www.epure.org/press-release/the-eu-and-e20-european-commission-confirms-important-role-of-higher-ethanol-blends-in-de-fossilising-road-transport-securing-energy-supply.
19 European Union (2023), 'Directive (EU) 2023/2413 of the European Parliament and of the Council of 18 October 2023 amending Directive (EU) 2018/2001, Regulation (EU) 2018/1999 and Directive 98/70/EC as regards the promotion of energy from renewable sources, and repealing Council Directive (EU) 2015/652 ('RED III')', https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023L2413.
20 Agriculture Market Monitoring System (2026), 'AMIS market monitor – No. 139, June 2026', https://www.amis-outlook.org/market-monitor.

While not related to the closure of the Strait of Hormuz, long-term binding targets for aviation fuels require significant increases in blending ratios of sustainable aviation fuels (SAFs) with kerosene, increasing the share of SAFs from a 2 per cent minimum in 2025 to 70 per cent in 2050.[21] This policy is designed to avoid an expansion in the use of first-generation biofuels. A rising synthetic-fuel sub-mandate – reaching 35 per cent by 2050 – means biofuels from used oils and fats or from biowastes and residues can supply, at most, half of the SAF requirement by then. The remainder will have to come from synthetic fuels. In April 2026, the European Commission also adopted a draft regulation that updates the methodology and data used to determine which biofuels are at high risk of causing indirect land-use change. If approved, the new rules would require feedstocks deemed 'high-risk' – which would include soybeans – to be phased out by 2030.[22]

Biofuels have long been a key component of **India**'s energy strategy. A National Policy on Biofuels was released in 2018. It set blending targets for ethanol and biodiesel at 20 per cent and 5 per cent respectively by 2030.[23] The policy was amended in 2022 to bring forward the blending target of 20 per cent bioethanol in petrol to 2025–26.[24] Additional feedstocks were also permitted to be used for the production of biofuels and maize has since become India's leading feedstock for ethanol. India has also allocated an extra 5.2 million tonnes of rice to ethanol production, using excess rice stocks that have built up over nearly two years of export restrictions. Most recently, in June 2026, as a response to the oil crisis, the Indian government has cleared the regulatory framework for the use of a 100 per cent ethanol fuel (E100).[25]

Countries elsewhere are also raising biodiesel targets in response to high oil prices and energy-security concerns. For example, in **Malaysia**, the government has begun to increase the national biodiesel blend from B10 towards B15, starting at B12 from 1 June 2026. It is also planning phased infrastructure upgrades to support future B20 and B30 blending in selected areas,[26] while studying the feasibility of B50 blends.[27] **Thailand** has also shifted its policy in 2026, moving back towards a 7 per cent biodiesel blend, having previously cut its blending mandate to 5 per cent during a period of high palm oil prices. The Thai government is also expanding the availability of B20 for transport and industrial users to lower fuel costs and support domestic palm growers.

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21 European Commission, Directorate-General for Mobility and Transport (undated), 'ReFuelEU aviation', https://transport.ec.europa.eu/transport-modes/air/environment/refueleu-aviation_en.
22 US Department of Agriculture Foreign Agricultural Service (2026), 'European Union: European Union to phase out the use of soy-based biofuels', GAIN report, 27 April 2026, https://www.fas.usda.gov/data/gain/2026/04/european-union-european-union-phase-out-use-soy-based-biofuels.
23 Moorhouse, J. and Gupta, A. (2024), 'India could triple its biofuel use and accelerate global deployment', commentary, International Energy Agency, 7 February 2024, https://www.iea.org/commentaries/india-could-triple-its-biofuel-use-and-accelerate-global-deployment.
24 International Energy Agency (2023), 'India: National policy on biofuels (2022 amendment)', updated 1 February 2023, https://www.iea.org/policies/17006-national-policy-on-biofuels-2022-amendment.
25 ETEnergyWorld (2026), 'Gadkari says he has approved E100 fuel regulations, clears path for ethanol-only vehicles in India', *The Economic Times*, 14 June 2026, https://energy.economictimes.indiatimes.com/news/oil-and-gas/india-approves-e100-fuel-regulations-paving-the-way-for-ethanol-only-vehicles/131716353.
26 *The Star* (2026), 'B15 implementation in Peninsular Malaysia will not affect palm oil exports', 25 May 2026, https://www.thestar.com.my/business/business-news/2026/05/25/b15-implementation-in-peninsular-malaysia-will-not-affect-palm-oil-exports.
27 Quantum Commodity Intelligence (2026), 'Malaysia to study B50 feasibility amid high upgrade costs', 23 June 2026, https://www.qcintel.com/biofuels/article/malaysia-to-study-b50-feasibility-amid-high-upgrade-costs-67356.html.

What the push for biofuels could mean for food supplies

Despite direct disruptions to agricultural production and trade from the Gulf region having limited global impacts, prolonged disruption in the Strait of Hormuz – which persists at the time of writing, despite the June 2026 Islamabad Memorandum framework agreement between the US and Iran[28] – could have significant consequences for global food security.

In a May 2026 base-case scenario, in which passage through the strait became possible in July and traffic returned to normal by December, food commodity prices were expected to rise by only 3 per cent this year[29] due to plentiful recent grain production across the world. (In reality, by July, prices for grains and oilseeds were already averaging 7 per cent higher than in February.)[30] However, an alternative scenario in which the blockade continued beyond July and was combined with El Niño-related disruptions[31] to agriculture could lead to up to an additional 70 million people facing acute hunger and food insecurity by 2028, according to the World Bank.[32]

Prolonged disruption in the Strait of Hormuz could have significant consequences for global food security.

Energy prices influence agricultural markets through energy-intensive agricultural inputs (machinery and transport fuels, fertilizers and pesticides) and biofuel production. Brent crude oil prices spiked from $72 per barrel the day before the war broke out to $138 in April. In the first 150 days following the outbreak of war, prices averaged $99 per barrel, compared with $66 per barrel over the previous 150 days.[33] Beyond price effects, fertilizer supply chains have also been significantly disrupted, due to concentrated production in the Middle East: approximately 30 per cent of global crude oil and fertilizer trade transits the Strait of Hormuz.[34]

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28 Libman, L. (2026), 'The U.S.–Iran MOU and the future of maritime shipping through the Strait of Hormuz', Lawfare Media, 13 July 2026, https://www.lawfaremedia.org/article/the-u.s.-iran-mou-and-the-future-of-maritime-shipping-through-the-strait-of-hormuz.
29 World Food Programme (2026), 'Middle East crisis – update: Prices & currencies (May 2026)', 17 May 2026, https://reliefweb.int/report/world/middle-east-crisis-update-prices-currencies-may-2026.
30 International Grains Council (2026), 'Grains and Oilseeds Index (GOI)', https://www.igc.int/en/markets/marketinfo-goi.aspx (accessed 26 Aug. 2026).
31 'El Niño' is the warm phase of the El Niño–Southern Oscillation, a natural climate pattern that shifts global weather patterns and increases the risks of floods, droughts, storms, fires and heatwaves, thereby affecting agriculture and food security globally. See World Food Programme (2026), 'What is El Niño, how does it affect hunger and how does WFP respond?', 5 August 2026, https://www.wfp.org/stories/what-el-nino-how-does-it-affect-hunger-and-how-does-wfp-respond.
32 World Bank (2026), *Global Economic Prospects June 2026*, report, https://www.worldbank.org/en/publication/global-economic-prospects.
33 Calculated from US Energy Information Administration (2026), 'Crude Oil Prices: Brent – Europe [DCOILBRENTEU]', FRED, Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org/series/DCOILBRENTEU (accessed 25 Aug. 2026).
34 Torero Cullen, M. (2026), 'The Clock is Ticking: Fertilizer, Food, and the Fragility of Global Agriculture', article, Council on Foreign Relations, 3 June 2026, https://www.cfr.org/articles/the-clock-is-ticking-fertilizer-food-and-the-fragility-of-global-agriculture.

Most of the price effects from energy on agricultural markets come from agricultural inputs, but biofuels also play an important role.[35] This role is expanding as the war goes on. As oil prices have risen, biofuels have become more competitive on cost – in the short-term – in comparison with petroleum fuels. Policy changes targeted at energy security have also incentivized domestic energy production to reduce fossil fuel dependencies in the transport sector.

By prioritizing energy prices and energy security in the short term, some policy responses may be trading off against increased food insecurity in the medium term. As biofuel output increases, so do competition and prices for agricultural inputs and staple commodities that can have a dual purpose as feedstocks and foodstuffs. (Examples include maize, rice, wheat, sugar cane, oilseeds and vegetable oils.)

In this context, any additional shock – such as extreme weather disrupting harvests, droughts affecting water levels and limiting passage through other maritime chokepoints like the Panama Canal (where daily vessel transits are already being restricted),[36] and disputes blocking transit through other chokepoints, such as Bab el-Mandeb (which is looking increasingly likely) – could severely affect food prices and worsen food security.

Without adequate consideration of direct and knock-on effects to food security, higher blending mandates risk creating artificial scarcity of the inputs essential for food production. One recent analysis identified that around 5 per cent of fertilizer nutrients are already being diverted towards fuel production.[37] If higher biofuel blending mandates accelerate this trend, fertilizers could become less available and less affordable for food producers.

The prospect of a strong to very strong El Niño in 2026/27 will make the situation worse,[38] as it would raise the risk of drought, heat, flooding and pasture stress. El Niño-induced droughts can lead to the loss of food crops – which would be particularly damaging in areas where agriculture is rainfed, and in low-income and import-dependent countries that are already food insecure.[39]

Projected El Niño conditions and drought risks in southeast Asia are already being linked to a reduction in crop outputs from palm oil. For example, Indonesia's crude palm oil production could fall by 2 million tonnes this year compared to 2025 levels – a reduction which has been attributed to El Niño-induced dry weather and high fertilizer prices.[40] The government has responded with plans

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35 OECD (2026), 'The impact of the conflict in the Middle East on agricultural markets', working paper, Paris: OECD Publishing, https://www.oecd.org/en/publications/the-impact-of-the-conflict-in-the-middle-east-on-agricultural-markets_3324cfee-en.html.
36 Moreno, E. (2026), 'Panama Canal to cap daily transits, anticipating severe El Niño', Reuters, 20 August 2026, https://www.reuters.com/business/environment/panama-canal-cap-daily-transits-anticipating-severe-el-nio-2026-08-20; Saunokonoko, M. with Agence France-Presse (2026), 'Panama canal traffic to be cut again as drought from El Niño worsens', *Guardian*, 15 September 2026, https://www.theguardian.com/world/2026/sep/15/panama-canal-traffic-cut-trade-drought-el-nino.
37 Suzan and Gambini (2026), *Seeds of crisis*, p. 10.
38 World Meteorological Organization (2026), 'El Niño set to become very strong, raising risks of extreme weather into 2027', press release, 3 September 2026, https://wmo.int/news/media-centre/el-nino-set-become-very-strong-raising-risks-of-extreme-weather-2027.
39 Parsons, S. (2026), 'How Might a 'Super El Niño' Affect Food, Forests and Water?', World Resources Institute, 3 June 2026 (updated 7 July 2026), https://www.wri.org/insights/super-el-nino-impacts-explained.
40 *The Star* (2026), 'Indonesia 2026 crude palm oil output to fall due to El Nino, high fertiliser prices, association says', 29 April 2026, https://www.thestar.com.my/business/business-news/2026/04/29/indonesia-2026-crude-palm-oil-output-to-fall-due-to-el-nino-high-fertiliser-prices-association-says.

to centralize control over palm oil exports and could introduce export bans to support domestic energy supplies,[41] which would have adverse secondary effects for food security in countries like India that rely heavily on imports of Indonesian palm oil.

What the push for biofuels could mean for forests and land use

Prior to the US–Iran conflict, global biofuel production was projected to increase moderately over the next decade by between 0.9 per cent and 1.4 per cent per year.[42] The vast majority of that growth in biofuel demand (80 per cent) was expected to come from emerging economies such as Brazil, India (both ethanol) and Indonesia (biodiesel).[43] However, based on new policies and blending mandates announced since the beginning of the war, some projections now show global biofuel production rising by 11 per cent annually between 2025 and 2030.[44]

The speed at which biofuel mandates are being increased in response to the fuel crisis creates significant risks, as demand for feedstocks may rise faster than environmental safeguards, certification systems, land-use planning and enforcement mechanisms can be implemented.

If the increased biofuel mandates proposed in response to the Hormuz crisis are fully implemented, the amount of land required by 2030 could more than double, with 36 million hectares being added – similar in size to Germany.

The area used globally for growing biofuel feedstocks in 2023 was around 32 million hectares. Around 20 million hectares are already expected to be added to this total by 2030 – an area the size of Uganda.[45] However, if the increased biofuel mandates proposed in response to the Hormuz crisis are fully implemented, the amount of land required by 2030 could more than double, with 36 million hectares being added – similar in size to Germany (Figure 2).[46]

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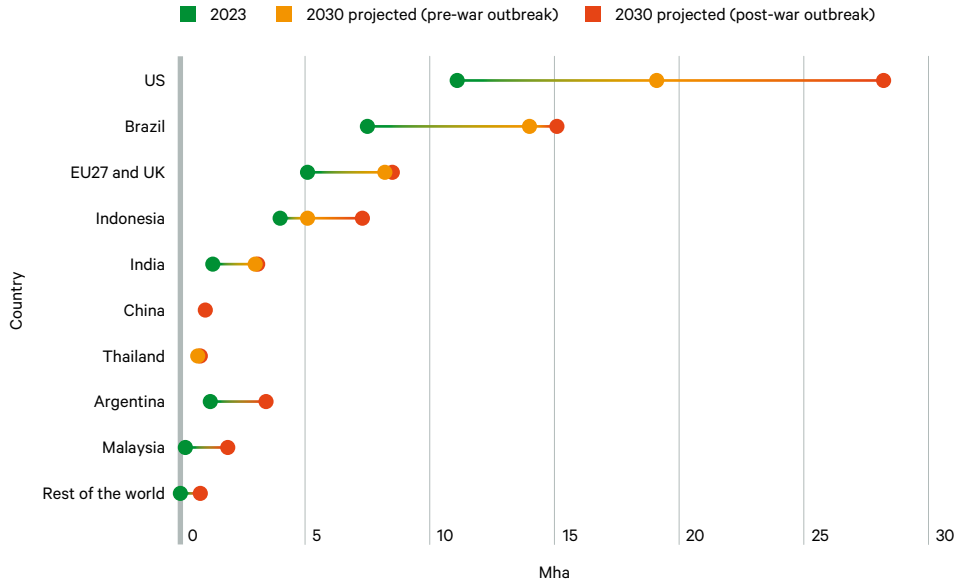
41 US Department of Agriculture, Foreign Agricultural Service (2026), 'Indonesia Centralizes Palm Oil Exports', GAIN Report ID2026-0024, 18 June 2026, https://www.fas.usda.gov/data/gain/2026/06/indonesia-indonesia-centralizes-palm-oil-exports.
42 OECD/Food and Agriculture Organization of the United Nations (2025), *OECD-FAO agricultural outlook 2025–2034*, Paris: OECD Publishing/Rome: FAO, https://doi.org/10.1787/601276cd-en; OECD/Food and Agriculture Organization of the United Nations (2026), *OECD-FAO agricultural outlook 2026–2035*, Paris: OECD Publishing/Rome: FAO, https://doi.org/10.1787/47874669-en.
43 OECD/Food and Agriculture Organization of the United Nations (2026), *OECD-FAO agricultural outlook 2026–2035*.
44 Suzan and Gambini (2026), *Seeds of crisis*.
45 Sandford, Malins and Phillips (2024), *Diverted harvest*.
46 Calculated from Transport & Environment mtoe projections in Suzan and Gambini (2026), *Seeds of crisis*, using per-country yields (toe/ha) imputed for the additional production volumes, and data from major producer countries in Sandford, Malins and Phillips (2024), *Diverted harvest*.

The most consequential mandates are being proposed in major biofuel-producing countries, notably Brazil, India, Indonesia and the US. If these expanded mandates result in additional lands being brought into production, both those lands and existing agricultural land will be farmed more intensively. Indonesia, in particular, risks further deforestation if the area of feedstock plantations was to expand, either directly or indirectly, by displacing existing agricultural production.[47]

Figure 2. Additional post-war demand for biofuels could lead to significantly more land being allocated to production



Source: Sandford, C., Malins, C. and Phillips, J. (2024), *Diverted harvest: Environmental Risk From Growth In International Biofuel Demand*, Cerulogy, November 2024, https://uploads.transportenvironment.org/production/files/Cerulogy_Diverted-harvest_November_2024.pdf for 2023 data and pre-war projections to 2030; 2030 post-war projections: authors' calculations based on data from above; and Suzan, S. and Gambini, R. (2026), *Seeds of crisis*, briefing, Transport & Environment, 4 June 2026, https://www.transportenvironment.org/articles/seeds-of-crisis.

Note: The post-war projections for 2030 are based on mandates announced to May 2026, as compiled by Transport & Environment. The increase in land area since the war began was calculated by: 1) calculating the marginal yield (tonnes of oil equivalent per hectare) of the expanded land area projected pre-war for each major-producer country; and 2) dividing the post-war expansion in fuel production by these per-country yields. (Figures for Malaysia assume the same yield as Indonesia due to a lack of available data.)

47 Bulolo, C. (2024), 'Will Indonesia's biodiesel push put its climate goals at risk?', Dialogue Earth, 24 October 2024, https://dialogue.earth/en/energy/will-indonesias-biodiesel-push-put-its-climate-goals-at-risk.

Under the right conditions, properly managed bioenergy feedstocks planted on degraded land (which is a possibility in Brazil) or intercropping (meaning a mixture of crops from different species being grown in the same area) can reduce or reverse land degradation, improve soil fertility and increase soil organic carbon stocks. However, production of feedstocks for first-generation biofuels tends to have net negative consequences for land degradation, food security and water use.[48]

With crop yields under threat from both constraints on fertilizer availability and potential El Niño-related disruptions to production in southern Africa, South Asia (monsoon failure is a particular concern for India) and parts of East Asia,[49] the land use requirements for fulfilling these expanded biofuel mandates could potentially become even greater.

Meeting the need for energy security while protecting food supplies and preventing deforestation

As governments grapple with the effects of the US–Iran conflict and the subsequent fuel crisis, they are increasingly turning to biofuels as a potential solution to the problem of energy security. However, a push for biofuels to replace the demand for Gulf oil could have significant negative, longer-term consequences for food security, land use and deforestation. Policymakers from energy, agriculture, transport, environment and trade ministries in the most affected countries must therefore coordinate to avoid such scenarios and to encourage more resource-efficient energy use.

Our paper recommends the following responses:

Policy recommendations

Implement measures to curb energy demand in the immediate term, particularly those aimed at increasing energy efficiency. Instead of trying to meet demand by increasing biofuel use, governments can target reductions in demand. Energy efficiency measures recommended by the IEA include incentivizing the use of public transport and car sharing, and encouraging people to avoid non-essential travel. Measures like these can help to cut oil-fuel demand quickly without reducing productivity or increasing pressure on food-crop production, forests or land.[50]

Avoid locking in large-scale, crop-based biofuel systems that incentivize land-use conversion. Decarbonization of grids through renewables and electrification should remain the priority policy for road transport where it is economically and technically feasible, while biofuel use should be targeted

48 Calvin, K. et al. (2021), 'Bioenergy for climate change mitigation: scale and sustainability', *GCB Bioenergy*, 13 (9), pp. 1346–71, https://onlinelibrary.wiley.com/doi/10.1111/gcbb.12863.
49 World Bank (2026), 'Food & Nutrition Security update', briefing, June 2026, https://www.worldbank.org/en/topic/agriculture/brief/food-security-update.
50 International Energy Agency (2022), *A 10-Point Plan to Cut Oil Use*, report, Paris: IEA, https://www.iea.org/reports/a-10-point-plan-to-cut-oil-use.

to sectors without viable market-ready alternatives (such as heavy goods transport). Measures should also be time-limited and governed by strict sustainability safeguards.

Prioritize food production over biofuels to protect the food security of the most vulnerable populations. New energy security strategies should classify biofuels by both their food-security risk and their impacts on sustainability, rather than treating those risks as a single category. Biofuel mandates should be adjusted accordingly. Existing legislation excluding certain food crops from use in biofuel production is key and should remain in place.[51]

Apply a 'productivity and circularity first' approach before further raising biofuel mandates. Increases in the share of biofuels in the fuel mix should be approved by governments only where there is credible evidence that additional demand can be met through higher yields on existing and degraded land, waste- and residue-based fuels, advanced second-generation biofuels, or other, low-impact feedstocks (e.g. sugar cane bagasse or palm oil mill effluent). This approach could also include prioritizing fuels made from hydrotreated vegetable oil – a paraffinic renewable diesel that can be produced from waste oils, animal fats or used cooking oil. Such fuels generally have lower land-use implications than crop-based biofuels.

Share information on best practices and lessons learned. Countries with long-standing biofuel experience, particularly Brazil, have developed extensive policy and market systems around ethanol and biodiesel, and are well placed to assist others with nascent biofuel industries. However, biomass resources, agricultural systems, ecosystems, water constraints and land-use pressures vary between countries, meaning that approaches that have worked in one context may not deliver the same results in another. Information exchanges should therefore focus on identifying transferable principles rather than whole-country models. Examples of such principles include, among others, sustainability safeguards, feedstock traceability, productivity improvements and clear limits on land conversion.

Align national bioeconomy and circular economy strategies, particularly in situations where rising demand for biomass for energy is combined with limited supplies of agricultural and forestry residues. Policymakers must ensure resource-efficient use of bioresources. Biomass should be prioritized for higher-value economic uses such as food, feed and materials first ahead of energy.[52] Maximizing the use of residues, wastes and byproducts would embed circularity in bioeconomy planning, while reducing pressure on land, forests and food systems.

Increase coordination between departments when updating existing bioeconomy strategies. Bringing together ministries responsible for energy, agriculture, environment, trade, industry and food security would help break

51 Suzan and Gambini (2026), *Seeds of crisis*.
52 Metabolic Institute and Stichting Probos (2026), *Maximizing the carbon storage potential of wood: Redirecting And Cascading EU27+UK Wood Flows*, report, Amsterdam: Metabolic Institute, https://www.metabolic.nl/publications/maximizing-the-carbon-storage-potential-of-wood-report.

down policy silos and ensure that bioenergy development does not undermine food systems, forests or ecosystem protection.[53]

Add binding land-use 'guardrails' on the use of biofuels to national bioeconomy strategies. Such provisions are largely missing from existing strategies. Guardrails should include clear limits on the share of biofuel demand to be met through land expansion. The International Advisory Council on Global Bioeconomy could facilitate a common approach to developing rules to prevent the conversion of forests, peatlands, savannahs and other high-biodiversity ecosystems into plantations.

Identify early signs of staple crop decline and risks to national and regional food supply before harvests. National agriculture ministries and international agencies such as FAO must improve real-time understanding of planting decisions, harvest forecasts and demand expectations in response to input- and commodity-market and weather-related disruptions. The market-monitoring and rapid-response functions of the Agricultural Market Information System must be fully resourced to improve market intelligence and coordination across major producers, with an increased focus placed on integrating these systems with existing food-security early warning systems. Coordination should be expanded to include other multilateral forums, ensuring that policy-driven import restrictions on biofuels do not adversely affect supply shocks for food security elsewhere.

Plan land use at the landscape level. The most suitable option in any given landscape will depend on many factors, such as the size of landholdings, access to resources and acceptance by landholders and local communities.[54] Agroforestry – a landscape management system where trees are intentionally integrated with agricultural crops – is one of the most feasible bioeconomy options across multiple dimensions. While agroforestry will not remove all risks associated with biofuel expansion, it can form part of a more sustainable bioeconomy strategy by improving land productivity and maintaining biodiversity. The environmental, social and economic benefits are well documented and involve relatively few trade-offs compared with monoculture crop plantations.[55] Agroforestry can help reverse the usual pattern of land-use change by bringing trees and forest functions into cropland, rather than replacing forests with crop production. As such, it can help make biofuel and wider bioeconomy pathways less harmful by reducing reliance on large-scale monoculture expansion.

Strengthen national-level certification and traceability systems to help ensure that higher biofuel demand does not translate into renewed land conversion. Certification can play a key role to screen out high-risk land conversion. Strong certification schemes can provide evidence that feedstocks are not produced on recently deforested land, peatlands, wetlands or other high-carbon and high-biodiversity areas. Malaysia's palm oil certification and traceability scheme,

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53 Barrie, J. and Kettunen, M. (2023), 'Improving policy coherence: bioeconomy, circular economy and sustainable trade', Chatham House circulareconomy.earth, 8 December 2023, https://circulareconomy.earth/publications/improving-policy-coherence-bioeconomy-circular-economy-and-sustainable-trade.
54 King, R. et al. (2023), *The emerging global crisis of land use: How rising competition for land threatens international and environmental stability, and how the risks can be mitigated*, Report, London: Royal Institute of International Affairs, https://doi.org/10.55317/9781784135430.
55 United Nations Environment Programme Copenhagen Climate Centre (2025), *The Climate Technology Progress Report 2025: Advancing Biobased Technologies in the Bioeconomy*, report, Copenhagen: UNEP, https://unepccc.org/wp-content/uploads/2025/10/the-climate-technology-progress-report-2025.pdf.

for example, has helped improve oversight of production practices and reduce land-use risks by making producers' participation mandatory and providing support for smallholders to comply with sustainability standards.[56] Such systems will need to be further upgraded to deal with rising pressure to increase biofuel mandates in response to the current fuel crisis.

Ensure that standards and certification processes differentiate between feedstocks for biofuels. Better criteria are needed to distinguish between residues and primary biomass resources. High-value biomass should not be reclassified as 'residue' simply to meet biofuel demand. Waste- and residue-based feedstocks should not be treated the same as crop-based fuels with higher land-use risks. However, while waste and residues should be prioritized, they cannot be treated as unlimited resources. The International Sustainability & Carbon Certification system (ISCC), for example, has developed certification approaches which can be expanded on.[57] The inclusion of land-use-change accounting in certification requires further work. One solution to the problem of indirect land-use change (ILUC) would be for certification to go beyond farm-level compliance and adopt so-called 'landscape approaches' (meaning place-based frameworks that manage land to balance competing social, economic and environmental demands) – an example being agroforestry practices (see above). These approaches can better account for ILUC and displacement effects. Certification and assurance systems for agroforestry and wider landscape approaches should make greater use of new technologies, including satellite monitoring, geospatial land-use planning and digital traceability systems.

Require parties to the Convention on Biological Diversity (CBD) to assess biofuel and wider bioeconomy policies within their National Biodiversity Strategies and Action Plans. Assessments should include the impacts of biofuels on forests, peatlands, food security, water use and ILUC. In 2012, the CBD Conference of the Parties (COP) recognized the need to 'promote the positive and minimize the negative impacts of biofuel production and its use on biodiversity and the livelihoods of indigenous and local communities'.[58] CBD COP 17, due to be held in Armenia in October 2026, should treat this rapid expansion of biofuel mandates as an emerging land-use and biodiversity risk. Under the Kunming-Montreal Global Biodiversity Framework adopted at CBD COP 15, member states committed to identifying and eliminating, phasing out or reforming incentives – including subsidies – that are harmful for biodiversity by 2025, while expanding positive incentives for the conservation and sustainable use of biodiversity.[59] Parties to the CBD must ensure that any policy support for increased biofuel production is consistent with this target.

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56 Yap, P. et al. (2021), 'Malaysian Sustainable Palm Oil (MSPO) Certification Progress for Independent Smallholders in Malaysia', *IOP Conference Series: Earth and Environmental Science*, 736 (1), https://doi.org/10.1088/1755-1315/736/1/012071; Aziz, N. F., Chamhuri, N. and Batt, P. J. (2021), 'Barriers and Benefits Arising from the Adoption of Sustainable Certification for Smallholder Oil Palm Producers in Malaysia: A Systematic Review of Literature', *Sustainability*, 13 (18), https://doi.org/10.3390/su131810009.
57 International Sustainability & Carbon Certification (2025), 'Certified low ILUC biofuel: a solution for degraded land', 18 February 2025, https://www.iscc-system.org/news/certified-low-iluc-biofuel-a-solution-for-degraded-land.
58 Secretariat of the Convention on Biological Diversity (2012), 'COP Decisions: Integration of biofuels into the programme of work on agricultural biodiversity', 4 January 2012, https://www.cbd.int/agro/biofuels/decisions.shtml.
59 Secretariat of the Convention on Biological Diversity, Kunming-Montreal Global Biodiversity Framework (undated), 'Target 18: Reduce Harmful Incentives by at Least $500 Billion per Year, and Scale Up Positive Incentives for Biodiversity', https://www.cbd.int/gbf/targets/18.

Develop clear guidance on sustainable biomass use to help ensure that biofuel expansion does not undermine biodiversity targets, ecosystem restoration or anti-deforestation commitments. Such guidance would help countries to align their energy-security responses with the Kunming-Montreal Global Biodiversity Framework, and prevent short-term oil-crisis measures from locking-in long-term pressure on land and ecosystems.

Include long-term structural incentives in policy frameworks to guarantee product origins and prevent fraudulent activities from driving up deforestation and unsustainable land-use changes. Improvements to technical trade codes providing more granular understanding of biofuel supply chains could support this by strengthening supply-chain transparency. The EU has developed one of the most advanced policy frameworks for addressing the land-use impacts of biofuels, particularly through its rules on ILUC. RED III places limits on biofuels with high land-use risks, bioliquids and biomass fuels, and seeks to phase out support for feedstocks associated with expansion into high-carbon land (notably including palm oil and soybeans). RED III will be supported by the EU Deforestation Regulation (EUDR), which requires due diligence and traceability for deforestation-risk commodities and their derivatives. The EUDR is due to come into force at the end of 2026.

Renew cooperation between governments, producer countries and industry on the development of robust ILUC accounting, traceability and deforestation-free requirements. The current energy crisis and renewed push for biofuel mandates underline why such methodologies and policies matter. If energy shocks encourage countries to expand crop-based biofuels quickly, these measures become essential to prevent policies aimed at improving energy security from shifting environmental costs onto forests, peatlands, food systems and biodiversity. Criteria within these requirements should be made more practical, transparent and implementable by setting clearer, more consistent rules on what counts as forest loss, targeting verification efforts by supply-chain risk, and reducing the reporting burdens faced by smallholders.

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Patrick Schröder is a senior research fellow in the Environment and Society Centre at Chatham House. He is a coordinating lead author for both the *IPCC Assessment Report 7 (WG III – Mitigation)* and the UN *Global Environment Outlook 7*. Patrick is also a member of the International Science Council Expert Group on Plastic Pollution.

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Cover image: An aerial view of land cleared for replanting with oil palm trees in Negeri Sembilan, Malaysia, 28 June 2026.

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