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Down To Earth

FORTNIGHTLY ON POLITICS OF DEVELOPMENT, ENVIRONMENT AND HEALTH

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NATIONAL POLLUTION CONTROL DAY SPECIAL

THE (H)EAT IS ON

Can we reduce carbon footprint of our diet?

ONE YEAR OF COVID-19

2021 will also be turbulent

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FARMERS' PROTEST

A historic harvest, and yet on the streets for a fair deal

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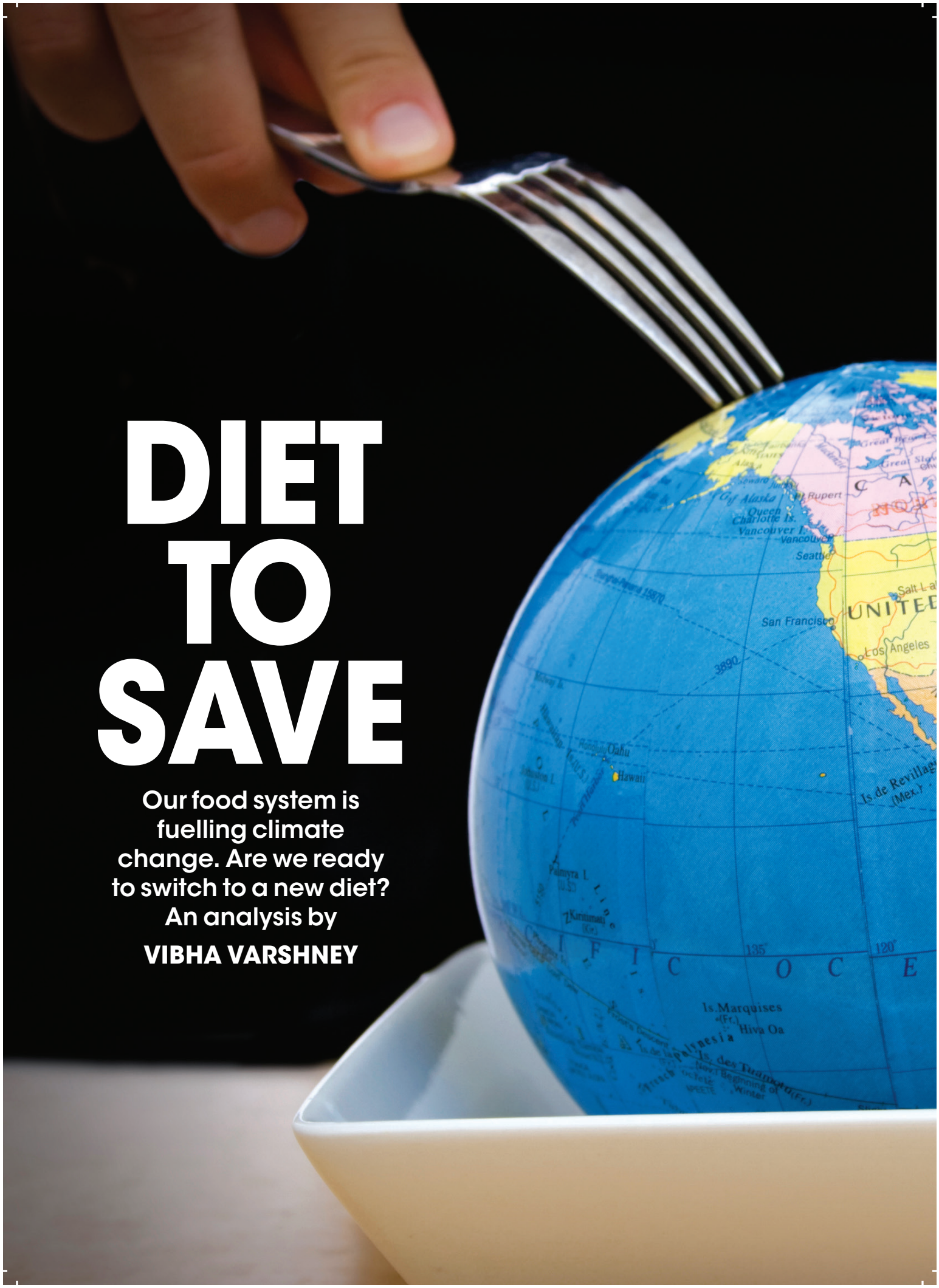


DIET TO SAVE

Our food system is fuelling climate change. Are we ready to switch to a new diet? An analysis by

VIBHA VARSHNEY

By now, you probably have started planning for the final day of the tumultuous year. Whether you hope to gather with a bevy of friends for a traditional New Year's Eve celebration or are preparing an intimate evening, pay close attention to the party table—what you serve, consume and waste. For the choices you make today will have greater implications not only on your well-being in future but also on the planet's health.

A growing body of scientific evidence suggests our dietary habits are putting way too much pressure on the environment. In September 2020, the United Nations Environment Programme (UNEP) along with three international organisations, WWF, EAT and Climate Focus, released a report that says the largest production line of the world—which involves everything from growing and harvesting crops to processing, transporting, marketing, consumption and disposal of food and related items—that sustains 7.8 billion people, accounts for about a quarter (21 to 37 per cent) of the greenhouse gases emitted every year due to human activities.

This means, our food system is as polluting as sectors like electricity and heat production (which accounts for 25 per cent of greenhouse gases emitted) and industry (21 per cent), and are more polluting than transportation (14 per cent) and buildings and energy use (16 per cent). (See 'A quiet disrupter', *p*31)

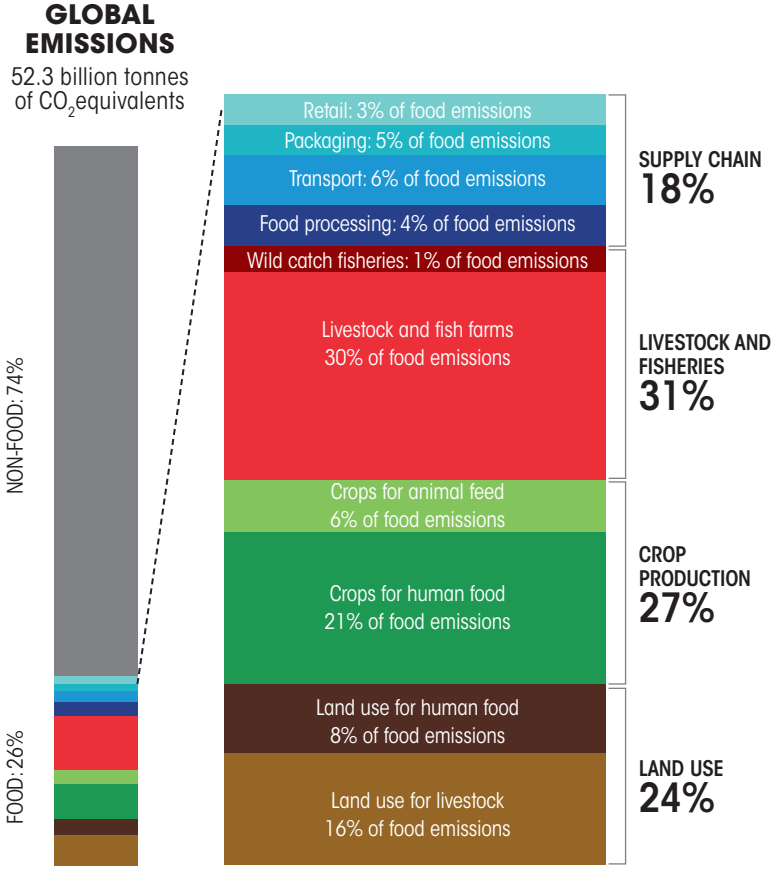
Now, try to gauge the additional emissions as we churn out more to feed 10 billion mouths by 2050. Researchers from the UK and USA recently created an experimental model to estimate emissions from food production. They created a climate utopian condition in which all sources of greenhouse gases other than food production were halted; it was a world completely shifted to renewable energy, electric vehicles, sustainable buildings and non-polluting manufacturing. The food system alone contributed enough greenhouse gases to heat up the planet above the 1.5°C target under the Paris Agreement sometime between 2051 and 2063, they note in the November 2020 issue of journal *Science*.

This may come as a surprise to those who think of plants as carbon sinks. It is true that plants remove carbon dioxide from the atmosphere through photosynthesis. But they release large amounts of carbon dioxide when decompose. Then there are several other stages in a food system directly or indirectly responsible for carbon emissions. For instance, felling forests to make way for farms and pastures removes a major carbon sink and thus indirectly contributes to emission load in the atmosphere. Running farm machinery on fossil fuels and manufacturing of agrochemicals and fertilisers too emit greenhouse gases. Even cattle burps release methane, which is a far more potent greenhouse gas than carbon dioxide.

The September 2020 assessment by UNEP says reducing land-use change and conversion of natural habitats alone could lower emissions by 4.6 gigatonnes of carbon dioxide equivalents ($GtCO_2e$) a year. Reducing food loss and waste, which accounts for 8 per cent of anthropogenic emissions, could lower the emission load by 4.5 $GtCO_2e$. Improving production methods and reducing methane

A quiet disrupter

Food system is one of the major drivers for global greenhouse gas emissions, accounting for one-quarter of total emissions



Source: Bending the Curve: The Restorative Power of Planet-Based Diets, a report by WWF, published in October 2020

from livestock could lower emissions by up to 1.44 GtCO2e. A massive 8 GtCO2e of emission reduction could be achieved by including a higher proportion of plant-based foods in the diet than animal-based foods.

But the authors of *Science* study say global warming cannot be limited to 1.5°C just by employing any one of the emission reduction strategies. They recommend a dramatic food transformation in addition to a complete transition away from fossil fuels to avert harmful impacts of climate change.

The onus is now on the food plate. Unfortunately, unlike other emission-intensive sectors where cleaner and viable alternatives are available for switching to low-carbon energy—electricity can be sourced from photovoltaic systems instead of coal-based power plants; one can use electric vehicles instead of diesel cars—the ways to decarbonise food are less clear. Carbon emissions are integral to the biological system. Besides, one cannot just stop eating.

Since 2018, scientists from world over have been working overtime to understand the unexplored links between food systems, human health and climate change, and figure out how and where this essential element of life has gone awry.

A CRACK IN THE PLATE

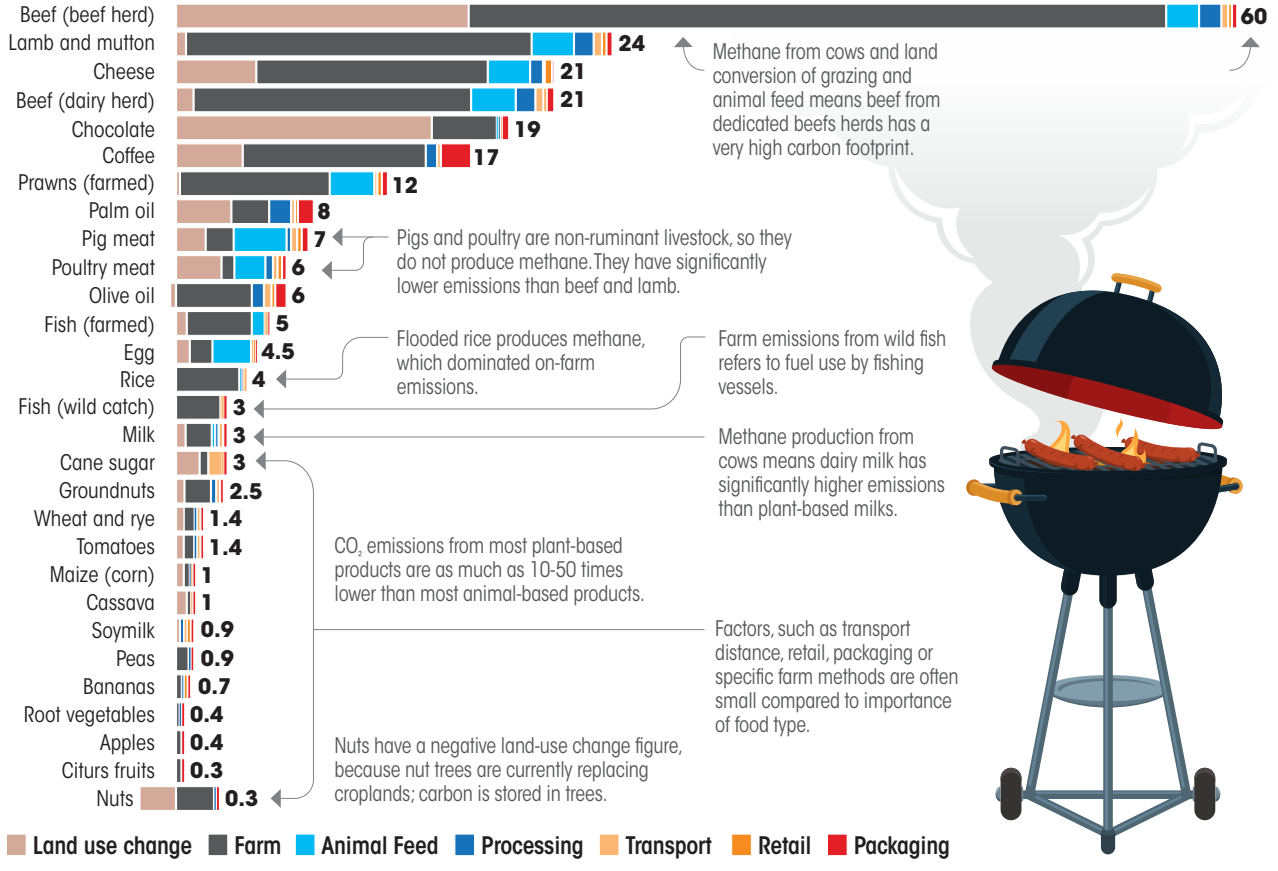
Some 200 years ago, English economist and demographer Thomas Robert Malthus predicted that population growth will always outrun the food supply. The modern food system has proved him wrong; it has managed to keep pace with the exploding population; famine has ended in much of the world. Between the 1960s and 2010s, the global population rose by 142 per cent, whereas cereal yields increased by 193 per cent and calorie production by 217 per cent, says a report in journal *Global Sustainability* in April 2019. Yet neo-Malthusians spot worrying signs; hunger, malnutrition and diseases continue to haunt us.

"More than 820 million people have insufficient food and many more consume low-quality diets that cause micronutrient deficiencies and contribute to a substantial rise in the incidence of diet-related obesity and diet-related non-communicable diseases, including coronary heart disease, stroke, and diabetes," says a report, "Food in the Anthropocene", published in February 2019, by the EAT-Lancet Commission on Food, Planet, Health. The commission brought together 37 leading scientists from worldwide to answer one question: Can we feed a future population of 10 billion people a healthy diet within planetary boundaries?

The commission has set global targets for food systems that are environmentally sustainable and benefit human health. Since all of the 14GtCO_2e from the food system cannot be eliminated by 2050, as it is intrinsic to the biological processes in plants

Know your food-print

Greenhouse gas emissions per kilogramme of food product (in $kgCO_2e$)



Note: Greenhouse gas emissions are given as global average values based on data across 38,700 commercially viable farms in 119 countries; Data source: Poore and Nemeck (2018), Reducing food's environmental impacts through producers and consumers, published in *Science;* OurWorldinData.org

and animals, the commission has set the planetary boundary for food production emissions, or carbon budget, at a maximum of $5GtCO_2e$. The remaining 9Gt would need to be mitigated through activities like shifting diets, changes in production practices, decarbonising food value chain and reducing food loss and waste. However, no combination of improved productivity and reduced waste is sufficient t o b ring greenhouse gas emissions within the planetary boundary under the "business as usual" dietary scenario. The commission has thus proposed the first g lobal d iet, Planetary Health Diet, which could reduce urban emissions by 60 per cent in 10 years.

This diet is based on healthy and sustainable ingredients produced within planetary boundaries and adaptable to local contexts. It discourages over-consumption of any food to the extent that it impacts biodiversity, environment and human health, and proposes a shift to more plant-based diets and reduce consumption of meat-based diets (see 'A win-win serving', *p*34).

"Transformation to healthy diets by 2050 will require substantial dietary shifts. Global consumption of fruits, vegetables, nuts and legumes will have to double, and consumption of foods such as red meat and sugar will have to be reduced by more than 50 per cent," writes Walter Willett, professor at the Harvard T H Chan School of Public Health, who is also the first author in the EAT-Lancet report. Since the report, several organisations have come forward to explore the potential of planet-based diets and recommend how it can be implemented.

EQUITY BACK ON THE TABLE

In July 2020, EAT published a report which says some countries are more responsible for the emissions from the food system; most of these are in G20 bloc. The study, "Diets for a Better Future", has calculated the food-print of each G20 country and found that the bloc, representing 10 per cent of the countries and 64 per cent of the global population, accounts for 75 per cent of the global food-emissions. EAT says increasing consumption of fruits, vegetables, legumes and nuts and lowering consumption of meat and dairy that goes beyond current national dietary guidelines (NDGs) would reduce the G20 food-print to 40 per cent of the carbon budget for food. However, NDGs of G20 countries will have to be ambitious enough to free up part of the carbon budget for food to create space for poor countries so that they improve diets and increase their consumption of animal-source foods to tackle undernutrition without further destroying the planet.

A similar report by WWF in October 2020 also highlights that global cooperation would be imperative to ensure a healthy population in a healthy planet. For instance, Malawi has to increase its consumption of dairy, fish, and fruits and vegetables to reduce the prevalence of under-five overweight and under-five wasting, says the report that analysed food consumption patterns in 147 countries and six regions and NDGs of 75 countries. This would lead to an increase in per capita emissions by 30 per cent. This can be compensated by countries like Sweden, Australia, Argentina, Brazil and France who need to reduce food-emissions. Sweden's per capita food-emissions are over double Malawi's. To reduce it by 50 per cent, Sweden would need to reduce consumption of red meat by 90 per cent and dairy by 69 per cent, notes the report "Bending the Curve: Restorative Power of Planet-Based Diets".

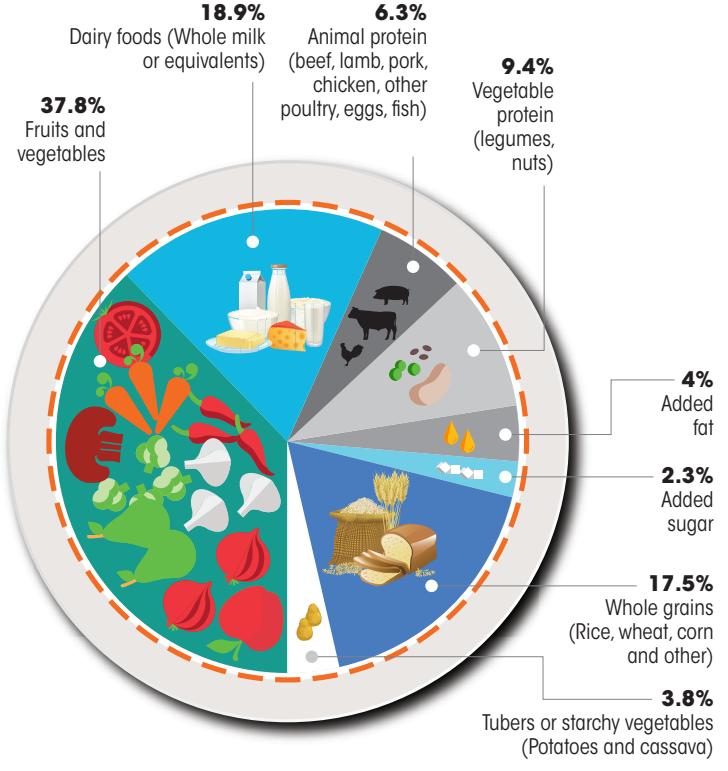
Both the reports, however, highlight that NDGs are not aligned with those of a healthy diet and most countries are not ambitious enough to bring food systems within planetary boundaries. While the EAT-Lancet Commission says countries will have to make an effort to mitigate the 9GtCO_2e emissions outside the carbon budget for food, the WWF report says current NDGs would help reduce it only by 1Gt. "Dietary changes take place at the local level, so it is important to translate the global agenda into actionable national-level analysis," says Brent Loken, WWF's Global Food Lead Scientist and lead author of the report.

Working on NDGs now is crucial as over 100 countries have developed or are developing their guidelines. "So far some countries have taken the first step towards this [including planet-based diet in NDGs]. We need to identify champion countries where governments are supporting to make this change. When countries see that other countries are doing it, they would be willing to make this change," says Loken.

A win-win serving

The proposed Planetary Health Diet could reduce urban emissions by 60% in just 10 years

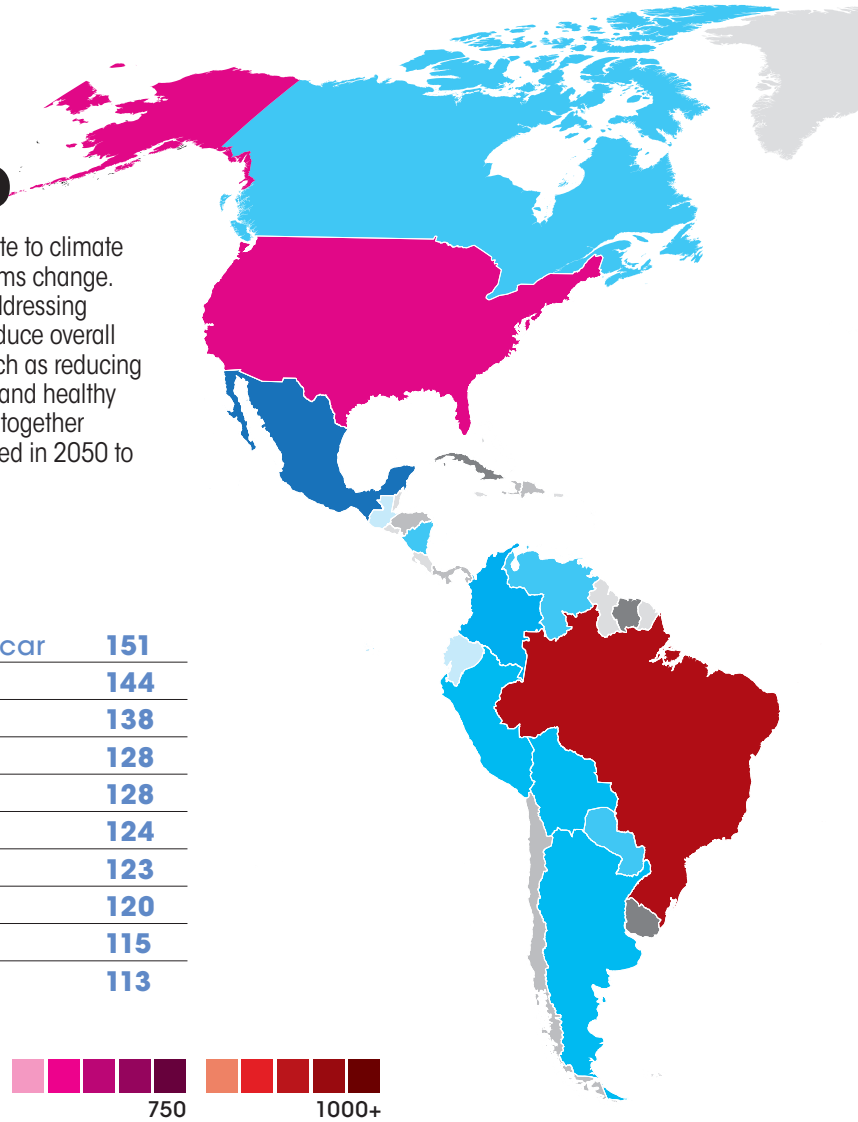
00 Per cent macronutrient intake in g/day



Source: EAT-Lancet Commission

RELUCTANT WORLD

In most countries there is a great potential to contribute to climate change mitigation and adaptation through food systems change. Globally, food production-level measures, including addressing land-use change and agricultural emissions, could reduce overall emissions by 7.2 $GtCO_2e$ per year while measures such as reducing food loss and waste and shifting towards sustainable and healthy diets could reduce emissions by 1.8 $GtCO_2e$ per year, together contributing about 20% of the global mitigation needed in 2050 to deliver on the 1.5°C target under Paris Agreement.

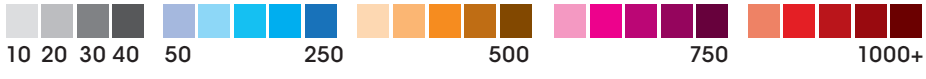


Who emits how much

Sudan	2,665
Brazil	1,675
China	1,182
India	1,160
Indonesia	945
United States	632
Pakistan	229
Myanmar	212
Vietnam	180
New Zealand	158

Madagascar	151
Peru	144
Argentina	138
Ethiopia	128
Nigeria	128
Bolivia	124
Japan	123
Laos	120
Germany	115
Hungary	113

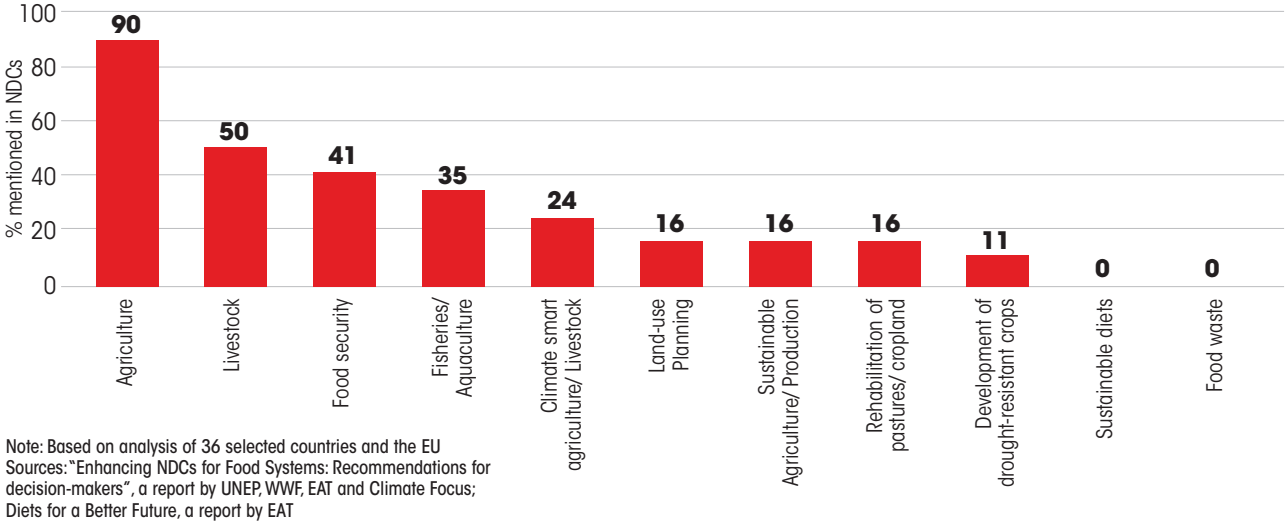
Total food system emissions (in Mt CO_2)



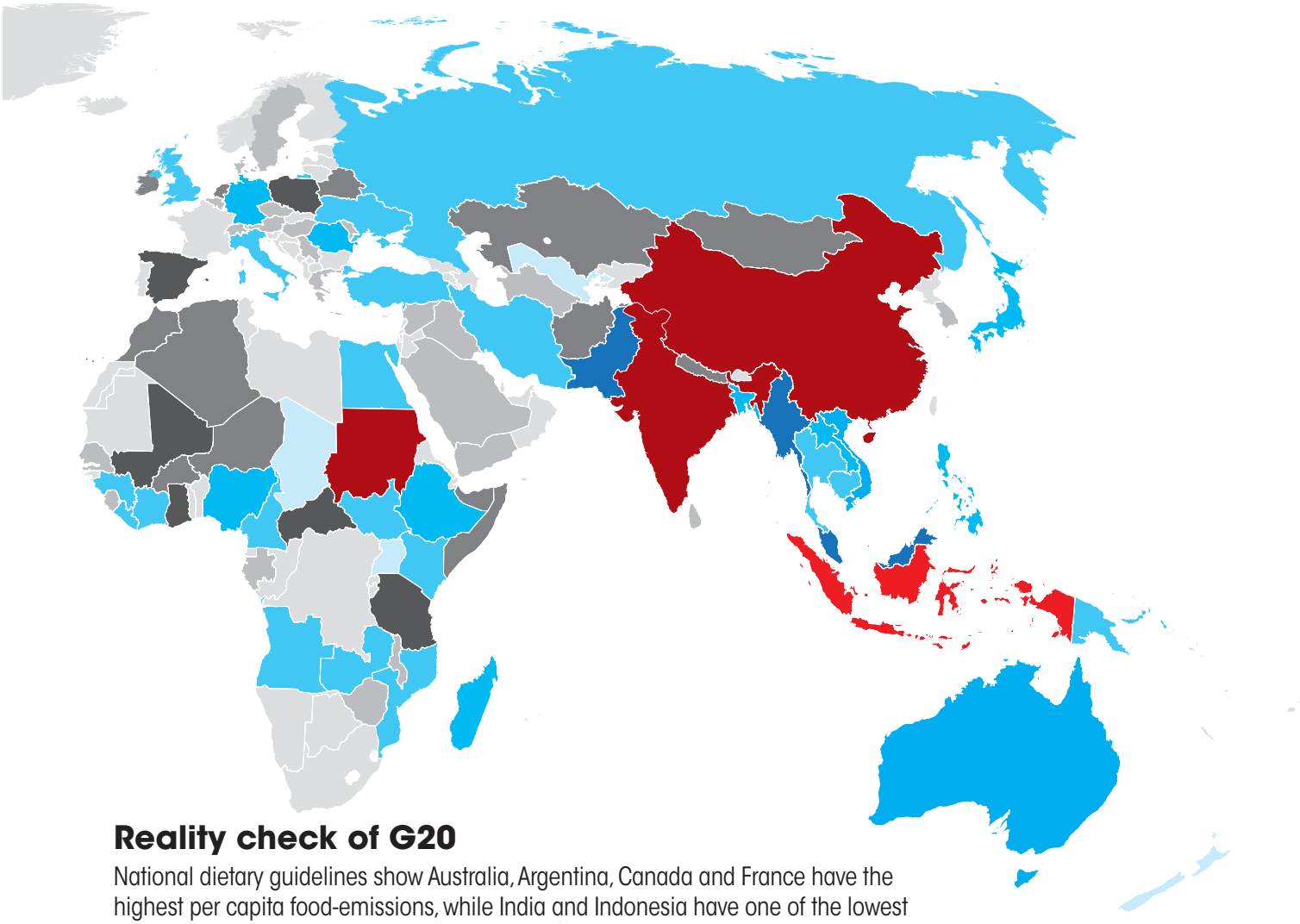
Note: Emissions only from cropland, livestock, deforestation and food loss and waste; represents five-year average between 2013 and 2017

Countries yet to wake up

While the nationally determined contributions (NDCs) to combat climate change of most countries mention agriculture, few talk about reducing emissions from food waste and loss and sustainable diets

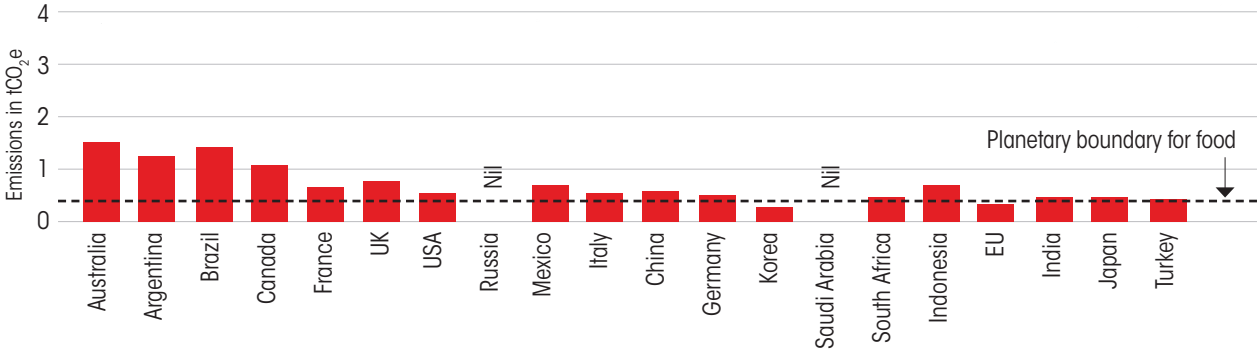


Note: Based on analysis of 36 selected countries and the EU
Sources: "Enhancing NDCs for Food Systems: Recommendations for decision-makers", a report by UNEP, WWF, EAT and Climate Focus; Diets for a Better Future, a report by EAT

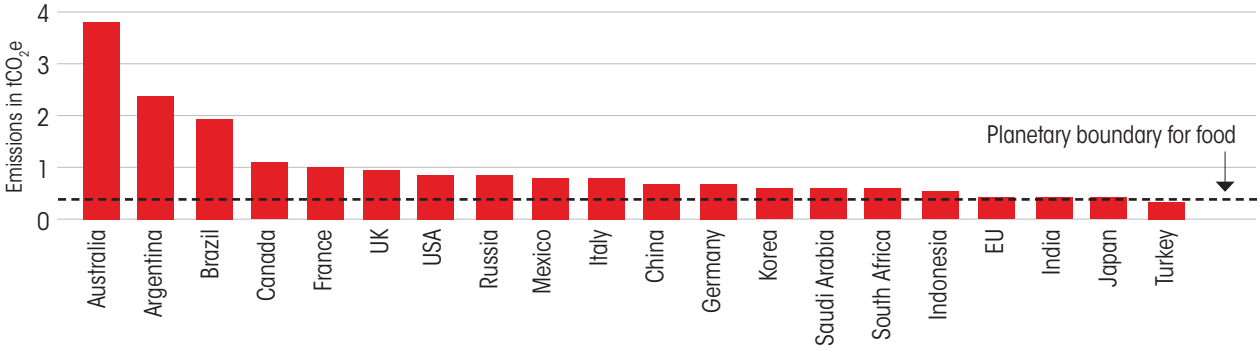


Reality check of G20

National dietary guidelines show Australia, Argentina, Canada and France have the highest per capita food-emissions, while India and Indonesia have one of the lowest



As per current consumption pattern, per capita emissions in India, Indonesia are almost within planetary boundary

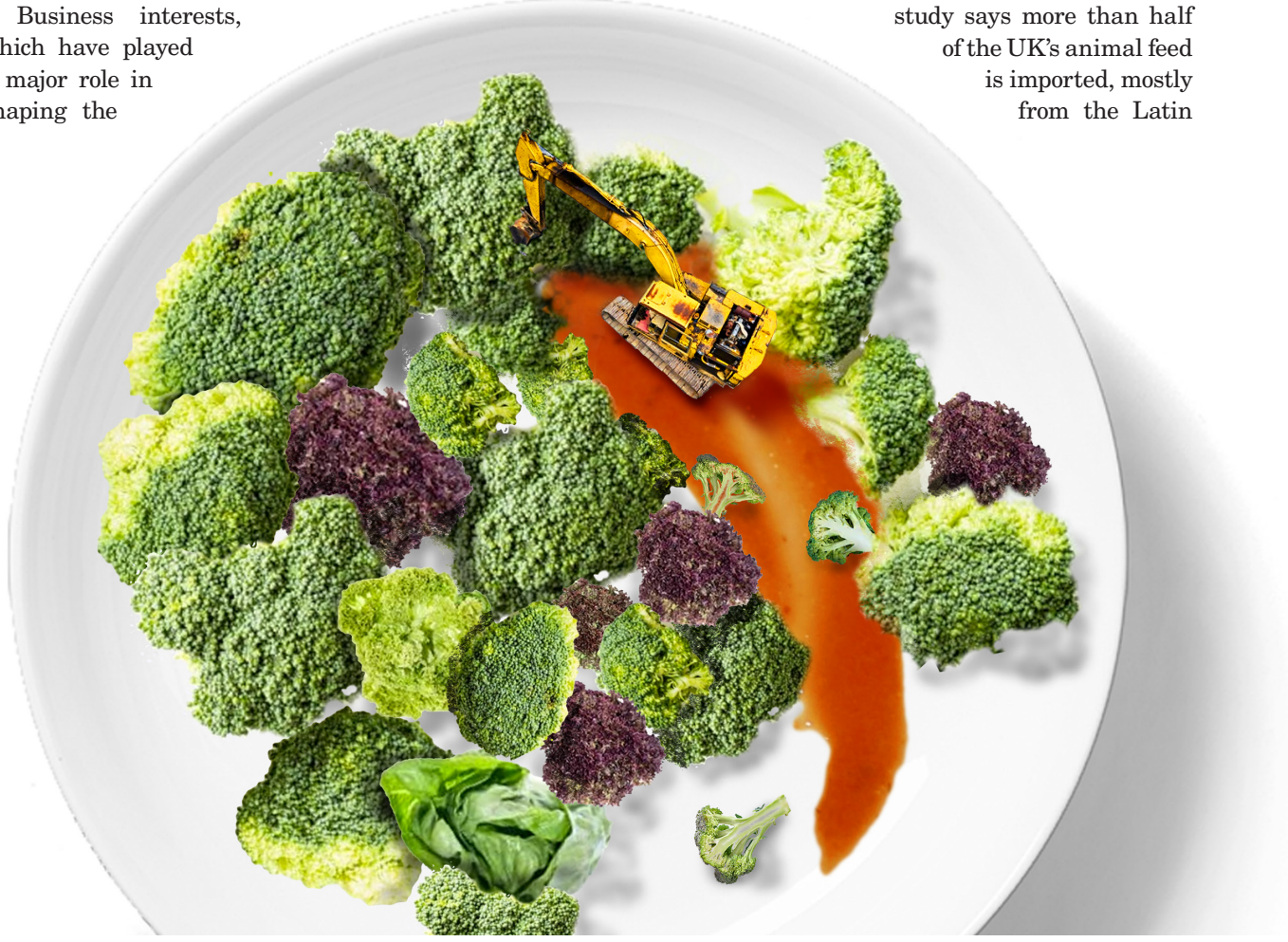


Up for second helping

Industry ready to cash in on the new diet and derail the purpose

INTRODUCING ANY changes in the food system is not an easy task. There are fears that the planet-based diets might end up being too expensive. Researchers used retail prices of 744 food items from 2011 in 159 countries, and found that the most affordable EAT-Lancet diet costs US $2·84 per day, of which the largest share was the cost of fruits and vegetables (31·2 per cent), followed by legumes and nuts (18·7 per cent), meat, eggs and fish (15·2 per cent) and dairy (13·2 per cent). This diet costs a small fraction of average incomes in high-income countries but is not affordable for the world's poor. In fact, the cost of an EAT-Lancet diet exceeds household per capita income for 1·58 billion people, notes the study published in *The Lancet Global Health* on January 1, 2020.

Business interests, which have played a major role in shaping the modern industrial food system, too can make the transition difficult. In November 2020, the Danish government decided to promote vegetarian foods for two days every week and limiting lamb and beef to just once a week in state canteens as part of its efforts to reduce diet-related footprint and meet its new targets to reduce emissions by 70 per cent by 2030. But it had to roll back the order after a backlash from trade unions. The Danish food industry claims the country's food products are among the most climate-efficient in the world and government's rules would lead them to be substituted with products flown in from abroad, which would add to the food carbon footprint. However, studies say locally reared meat can have high emissions if the livestock are fed on imported grain. A 2016 study says more than half of the UK's animal feed is imported, mostly from the Latin



America. Imported feed can have a very high carbon footprint if it is linked to felling of rainforests that act as huge carbon sinks.

The other country facing such opposition is USA, which is in the process of developing new dietary guidelines. Its approval process is being derailed by the sugar and meat industry. The food industry demonstrated its strength after the release of the study by EAT-Lancet Commission too. An analysis of tweets, published in *The Lancet*, shows the twitter handle #yes2meat became the term against the commission in the four months following the release of the study.

RISE OF MOCK MEATS

The meat industry's concern is not only from people giving up meat but also from the rise of an alternate industry which is using the trend towards plant-based foods to promote ultra-processed foods like mock meats, fake dairy, fake eggs and also lab-grown meat. Since plant-based foods produced in bulk are cheaper, multinational giants have realised that adding value to cheap raw materials (such as protein extracts, starches and oils) through ultra-processing has large profit margins. Unilever offers nearly 1,300 vegan products in Europe. The company acquired fake meat company The Vegetarian Butcher in 2018 to cash in on the global plant-based meat market that is growing at a compound annual growth rate of 15.8 per cent, set to reach $35.4 billion by 2027. On October 23, the European Parliament voted to allow producers of meatless foodstuffs to continue calling them "sausages" and "burgers" if they desire, rejecting a demand by the meat industry that names (steak, sausage, escalope, burger and hamburger) used for meat products and preparations should be reserved for products containing meat so that consumers do not get confused and end up buying vegetarian food.

Frédéric Leroy, professor of food science and biotechnology, Vrije Universiteit, Brussels, says conflict of interest is rampant in this push towards planetary diet. The players that call for this shift include a variety of public-private partnerships with large business platforms, such as the World Business Council for Sustainable Development, FReSH initiative, Natural Capital Coalition and We Mean Business, backed by oil companies, large investors, Silicon Valley companies and food corporations.

The model of climate change politics tends to allow a few transnational firms shape planetary regulations in their favour. Food companies like Mondelez International are happy to "talk the talk" of reducing emissions even as they are major users of cash crops, produced at the expense of environmental diversity. "If we take previous climate change policies as a warning, we have international treaties on strategies like phasing out filament light-bulbs to persuade individuals that their actions and tiny influence on emissions is significant. Plant-based meat is performing a similar role and is likewise, a complete distraction from both climate and biodiversity issues," explains Martin Cohen, social scientist and visiting research fellow in philosophy, University of Hertfordshire, UK.

What is of concern here is that mock meat is not healthy. It is ultra-processed and contains a large number of ingredients and additives. For example, Impossible Burger, which is said to have a carbon footprint 89 per cent smaller than that of a beef burger, is made of soybean and potato protein mixed with heme (an iron-containing molecule) from genetically engineered yeast for flavour. It also has coconut and sunflower oil along with methylcellulose and food starch. Being ultra-processed, mock meat burger is not only unhealthy but contains genetically engineered ingredients, which could be of concern to those who want to eat good food. Around 94 per cent of soybean cultivated in the US is genetically modified and the jury is still out on the safety of such food. What's worse, despite being made from cheap raw material, mock meat burgers are more expensive than the real meat ones. Then why should people shift to mock meat?

"This is a complicated question without simple answers," says Walter Willett, professor at the Harvard T H Chan School of

Public Health, US. "While it is healthier and more sustainable to consume some of these mock meats than to consume grain-fed beef or pigs, it would be best to consume healthy traditional plant foods. Still, if some people are willing to take the first step, that is better than taking no step at all," he says.

Experts raise other concerns too. This trend is likely to shift power away from traditional farms and local markets towards biotech companies and multinationals. "It amplifies production practices that are unsustainable (extractive monoculture cropping driven by chemical fertilisers obtained from fossil fuels, soil depletion, biodiversity destruction, to name some)," says Leroy. Efforts to reduce food-emissions could also inadvertently help justify globalisation of food trade which might not only impact traditional diets but also harm a country's food security in the long term. The WWF report says as increased consumption of plant-based foods could lead to biodiversity loss due to additional demands on land, countries may import food from less biodiversity-rich regions than depending on domestic production. Their contention is that emissions from transport are negligible in the food system emissions.

However, this is not true for every kind of food and eating locally grown food makes more sense when it comes to fresh food. Paul Behrens, assistant professor in environmental change at Leiden University, The Netherlands, says, some countries are able to grow food with a lower carbon footprint than others because of their climate. "Importing food could significantly impact a country's self-reliance and policies to support this should be on a case-by-case basis and developed thoughtfully. In general, it would be good to see more self-reliance via regenerative agriculture, and less via industrialised food systems," he adds.

There are also fears that this focus on planet-based diets might prompt other emitters to shirk responsibility and put the onus of reducing emissions on the individual. "This will not work as individuals are unable to exercise power-of-choice because of the environment in which they are in (for instance, the food is not available or prices are too high)," says Tim Benton, research director, emerging risks at the Royal Institute of International Affairs, Chatham House, UK. But individuals can change things by making the issue political: demanding that healthy and sustainable diets be made available at an affordable price and making politicians shift subsidies in the right direction, develop infrastructure for fruits and vegetables rather than grains and livestock, he adds.

THERE'S STILL HOPE

Despite multiple problems, experts see the coming year as a game-changer. For instance, adaptation and mitigation strategies linked to the food system are not included in the Nationally Determined Contributions (NDCs)—steps that countries take to reduce national emissions and adapt to the impacts of climate change. Countries have to start resubmitting their NDCs next year in line with the Paris Agreement. While the deadline for the tipping point was 2020, only 18 countries have managed to reduce emissions. At present, only some countries mention the agriculture sector in their NDCs but most have not set targets in relation to other stages of the food system, such as food

loss and waste reduction and sustainable diets (see 'Reluctant world', *p*36). Discussions are also picking pace as 2021 is the mid-term of the UN Decade of Action on Nutrition (2016-2025) and a UN Food Systems Summit is planned in September or October to set global commitments to transform food system. At the summit, the UN hopes to maximise the co-benefits of a food systems approach to help achieve the 2030 Sustainable Development Goals and meet the challenges of climate change.

Other options include curtailing subsidies on bad food, write Nita Forouhi and Nigel Unwin of Medical Research Council Epidemiology Unit, University of Cambridge School of Clinical Medicine, UK, in an article published in *The Lancet* on April 3. "There are options for speeding up a social tipping point towards plant-based diets in high-income nations, such as investments in the plant-based agricultural sector and removal of subsidies for animal agriculture which incentivises environmental damage. Policy options, such as a tax on meat or penalties for supermarket food waste are already being experimented with the latter to good effect, says Paul Behrens, assistant professor in environmental change at Leiden University, The Netherlands.

According to a 2019 report, "Exponential Roadmap", which provides 36 solutions to halve emissions by 2030, nature-based solutions, from forest protection, grazing management and fertiliser management, can help achieve the target, while reforestation, biochar and improved agricultural practices have the potential to store up to 9.1 $GtCO_2e$ annually, eventually storing 225 $GtCO_2e$ by the end of the century.

While analysing the consumption patterns of G20 countries, EAT says adoption of the NDGs of Indonesia and India would keep global food-emissions within the boundary. But this does not mean all is well with these countries; the success is because of high prevalence of undernutrition in the regions.

N Raghuram, president of Sustainable India Trust, an environmental organisation based in Delhi, and chair of the International Nitrogen Initiative, says India's food-emissions come from reasons, such as the shift from legume-cereal rotations or mixed cropping that fixed natural nitrogen from air and minimal dependence on fertilisers to almost exclusive dependence on fertilisers, use of fossil fuels in farm machinery. The shift occurred during the Green and White revolutions to make the country self-sustainable in food and milk. As a result, farmers today do not get enough manure for their fields nor get enough grass or feed for their livestock and depend on the market to buy those. The country can curb its food-emissions by restoring this lost link between animal and crop farming and match the best aspects of traditional and modern agriculture, Raghuram explains.

One day the world will be without poverty, hunger, and malnutrition, but the question is when do we achieve it and at what cost. DTE

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