Communication from Public

Name:	kelly kilishek
Date Submitted:	09/10/2022 06:52 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Please Los Angeles show the rest of this world that adopting a plant based treaty is where it all begins to acquire world peace. This earth will never have peace until we show love, care and respect to all sentient beings that share this earth with us.

Communication from Public

Name: Spoon
Date Submitted: 09/10/2022 07:58 AM
Council File No: 22-0002-S118
Comments for Public Posting: Joining the plant-based treaty will put Los Angeles on the map as a pioneer and leader willing to put its money where its mouth is. San Diego has adopted plant-based strategies in its climate action plan, as of last month. It is time for San Diego's "big sister" to do likewise. L.A. is already known as being a vegan hotspot with amazing plant-based cuisine. Lean into this reputation for progress, futurism, and vision. Don't be afraid. This is a wonderful opportunity. I believe in you.

Communication from Public

Name:	Zombor Berezvai
Date Submitted:	09/10/2022 08:18 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Endorsing the Plant Based Treaty is a fascinating opportunity to show the right way to several other cities within the US and in the rest of the world. I'm very proud of your devotion.

Communication from Public

Name:
Date Submitted: 09/10/2022 08:40 AM
Council File No: 22-0002-S118
Comments for Public Posting: Please endorse the Plant Based Treaty: for human health and nutrition, for animal welfare, for environment health. Let LA be the example for other cities to follow!

Communication from Public

Name:	Anita Krajnc
Date Submitted:	09/09/2022 08:50 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Dear Council Members and LA city civil service, The Plant Based Treaty alongside the Fossil Fuel Non Proliferation Treaty (which LA endorsed a couple of years ago) are essential to avoiding a worsening climate crisis and climate catastrophe. Food emissions account for a third of greenhouse gases. Also switching to plant based food would free up land to reforest the earth. George Monbiot's book Regenesis makes it clear we need to end animal farming now to avoid a climate cataclysm, biodiversity decline, protect our water and stop ocean dead zones. We need strong leadership from LA and California and the US for the world to stop business as usual (which is accelerating emissions of GHGs). We must prevent runaway climate change. We can do it! Si se puede! Kind regards, Anita Krajnc Global Coordinator, Plant Based Treaty

Communication from Public

Name:	Amrish Pandya
Date Submitted:	09/09/2022 10:44 AM
Council File No:	22-0002-S118
Comments for Public Posting:	When LA sets the fashion, the rest of the World follows. It's vital that LA sets a fashion worth following for once.

Communication from Public

Name:	Cayla Wood
Date Submitted:	09/09/2022 11:50 AM
Council File No:	22-0002-S118
Comments for Public Posting:	I'm very glad that to see that the treaty was signed. I offer my full support and congratulate the city of LA moving towards a more sustainable and ethical way of life.

Communication from Public

Name: Anastasia Stepanova
Date Submitted: 09/09/2022 04:48 PM
Council File No: 22-0002-S118
Comments for Public Posting: I am strongly in favor of the Plant based treaty and I hope that the LA council will endorse it.

Communication from Public

Name:	Dorothy Hutchins
Date Submitted:	09/10/2022 12:07 AM
Council File No:	22-0002-S118
Comments for Public Posting:	It will be a historical day for Los Angeles to take positive climate action and endorse the Plant Based Treaty. It is time for everyone to heed the wake up call to give up eating animal products and not harming our animal friends in general. Let us live in a world where all creatures can roam freely without fear. Love is the only solution.

Communication from Public

Name:	Susan Sterling
Date Submitted:	09/10/2022 12:24 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Yes! We need the Plant Based Treaty, for the environment, for the animals and for our health. Los Angeles will show the world its forward thinking and will always be known as the first to make this incredible step for the environment. Proud of you Los Angeles

Communication from Public

Name:	David edward Smailes
Date Submitted:	09/10/2022 12:26 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Be a trend setter by showing the majority of the world how we REALLY should be tackling climate change (not the pathetic "turn off taps whilst brushing teeth, etc, etc " baby-steps).

Communication from Public

Name: Kathleen Hogan
Date Submitted: 09/10/2022 12:26 AM
Council File No: 22-0002-S118
Comments for Public Posting: Speaking points Even if we ended all fossil fuels today, our food system alone would heat the planet by more than 1.5C warming, therefore it is important to tackle all sources of greenhouse gas emissions. Plant Based Treaty complements LA's Green New Deal which is deeply rooted in social justice. Promoting plant-based food will help improve the health and well-being of LA residents. LA is the third biggest city in the world measured by economy size and is a member of C40 Cities. LA will have global influence and inspire cities worldwide to take action on plant-based food solutions to the climate crisis. A plant-based food strategy will boost LA's pledge to bring 100% renewable energy to the city by 2045, bringing even bigger cuts to greenhouse gas emissions. In 2021, the US launched a Global Methane Pledge and a plant-based food strategy will help deliver the methane cuts critical to stabilizing global temperature rises. A third of human-caused methane emissions come from meat, dairy and eggs. LA has signed the C40 Good Food Accelerator and has pledged to work with citizens to achieve a 'Planetary Health Diet' by 2030, with balanced and nutritious food. Endorsing the Plant Based Treaty and developing a plant-based food strategy is a logical next step. The Plant Based Treaty resolution follows the scientific consensus and the conclusions reached by multiple IPCC Assessment reports that a vegan diet is optimal for the planet. Plant-based food solutions offer hope that consumption-based greenhouse gas emissions can be cut in order to limit global warming to 1.5C. Animal agriculture is the leading cause of deforestation and shifting to plant-based diets will allow us to rewild and restore land and draw down carbon from the atmosphere. Scientists Warning Foundation, which represents over 15,000 scientists in 184 countries says, "The world needs a Plant Based Treaty for a scientifically valid approach to a sustainable and biologically diverse future."

Communication from Public

Name:	Kabir Baidhya
Date Submitted:	09/10/2022 12:30 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Moving towards a global vegan shift and Plant based food systems is the only real solution to climate crisis now. Animal Agriculture and livestock farming is the one major cause of greenhouse gas emissions and global warming and there's no denying that. It's about time we made this into the mainstream agenda. Please stop beating around the bush and focus on the real thing before it's too late. We don't have Planet B. Read some of the scientific facts here: - https://www.unep.org/news-and-stories/story/methane-emissions-are-driving-climate-change-heres-how-reduce-them - https://climatehealers.org/the-science/positioning-papers/ - https://academic.oup.com/af/article/9/1/69/5173494#198780013 Be Vegan. Make Peace.

Communication from Public

Name:	Dave Edwards
Date Submitted:	09/10/2022 12:31 AM
Council File No:	22-0002-S118
Comments for Public Posting:	We MUST act Now ! Meat and dairy are not just killing us & animals in the hospitals & slaughterhouses today, but will end the reign of this planet very, very soon if nothing is done, Urgently.

Communication from Public

Name:	Nicola
Date Submitted:	09/10/2022 12:43 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Please take positive climate action and endorse the Plant Based Treaty! ??????

Communication from Public

Name:	Biz
Date Submitted:	09/10/2022 12:52 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Great news!!

Communication from Public

Name:	Francesca Cresta
Date Submitted:	09/10/2022 12:54 AM
Council File No:	22-0002-S118
Comments for Public Posting:	I think it is time for LA to endorse a plant based treaty, to be a frontrunner and create a precedent. the first of many.

Communication from Public

Name:	Wendy Smitj
Date Submitted:	09/10/2022 01:25 AM
Council File No:	22-0002-S118
Comments for Public Posting:	Dear Council Members, I urge you to support the Plant Based Treaty. As a C40 City, please take the lead. By supporting the Plant Based Treaty, you will send the positive, powerful message that what we eat has a crucial effect on planetary health Thank you!

Communication from Public

Name:	Stephanie Burton
Date Submitted:	09/10/2022 01:51 AM
Council File No:	22-0002-S118
Comments for Public Posting:	It's so great to see Los Angeles leading the way towards responsible climate action by endorsing the Plant Based Treaty. As such an influential city globally, I know that seeing Los Angeles recognising this vital step towards limiting greenhouse gas emissions will enable other, perhaps less confident, towns and cities to also follow suit.

Communication from Public

Name:	Simone Moraes
Date Submitted:	09/10/2022 02:02 AM
Council File No:	22-0002-S118
Comments for Public Posting:	I strongly supported the decision for a plant base treaty and congratulate the city of Los Angeles for such an intelligent way of tackling climate change and being a beacon for other countries to follow. Kind regards, Simone

Communication from Public

Name:	Lynne Brislane
Date Submitted:	09/10/2022 02:14 AM
Council File No:	22-0002-S118
Comments for Public Posting:	The changes that can be made in Los Angeles will have positive global implications. Please support the Plant Based Treaty as leaders of change. Thank you.

Communication from Public

Name: cc king
Date Submitted: 09/10/2022 02:41 AM
Council File No: 22-0002-S118
Comments for Public Posting: It’s time for Los Angeles to take positive climate action and endorse the Plant Based Treaty.

Communication from Public

Name:	Julie Dixon
Date Submitted:	09/10/2022 02:47 AM
Council File No:	22-0002-S118
Comments for Public Posting:	I thank the honorable council men and women of Los Angeles for your consideration of this important petition and urge you to endorse it. The world needs wise, commanding and immediate leadership at this critical time and endorsement of the treaty by California, with its global reputation as a green, progressive and prosperous State will help accelerate the necessary move to a plant based food system to return our planet to one with a future habitable for humans. The science and wisdom is now overwhelmingly strong in supporting an end to animal agriculture as a means of quickly restoring peace and calm to our planet. Your endorsement will send a strong signal worldwide motivating other communities to act while we still have time. Please be the courageous local government leaders the world so urgently needs and longs for.

Communication from Public

Name:

Date Submitted: 09/10/2022 02:57 AM

Council File No: 22-0002-S118

Comments for Public Posting: stop buying animal products, get rid of subsidies for animal products and livestock feed, invest in plant-based alternatives, divest your pention plans from animal products, animal feed, and fossil fuels. Do it before it's too late.

What We Choose to Eat Impacts the Planet: Science-Based FAQs and Tips

Table of Contents

Overview

Raising animals for human consumption is the single largest driver of deforestation [1], habitat destruction [2], and species extinction [3] in the world. A plant-based diet is healthy [4–17], requires less greenhouse gas emissions [4–11,18–36], less land [6,8–11,30,31,33,34,36–40], less cropland [9,31,37,39], less water [6,8–11,31,33,34,38,40,41], less energy [8,10,30,41], less fertilizer [9,41], less pesticide [41], less water pollution [6,30,31,42–44] , less air pollution [45–49] , costs less money [7,24,50,51], can feed more people [39,52], reduces exposure to toxic pollutants [53–58] , advances environmental justice [45,59–63] , protects biodiversity [2,3,35,38,64], reduces pandemic risk [65–67], has more climate change mitigation potential than other strategies [18,19,22,23,32,38,39,68–72], is one of the best climate adaptation measures we can take to reduce our vulnerability to the effects of climate change [73,74], and will be unavoidable to keep global warming to below 1.5 degrees [4,18–23,25–27,36], meet food demand in 2050 without deforestation [37,38], and stabilize biosphere integrity, freshwater use, and nitrogen flows [38] .

Strategy co-benefits for environmental justice

- Black and African Americans are more exposed to fine particulate matter pollution (PM2.5) than white Americans yet are least responsible for it. This pollution is responsible for the majority of deaths from environmental causes in the United States and agriculture is the second leading emitter, with animal agriculture specifically making up the majority of agriculture related deaths [59] . According to one study, "No regulations address the agrochemical content of feedyard particulate matter emissions." … "Open-air beef cattle feedyards may collectively represent one of the largest unconstrained and unrecognized sources of pesticide, antimicrobial, and endocrine-disrupting chemical emissions on earth" [75]. Eighty-three percent of agriculture air-quality related deaths could be avoided annually if the United States adopted a vegan diet [45]. When looking at the number of deaths caused for every dollar of economic value generated, animal production was the worst performing sector. Crop production performed almost three times better [76]. Transitioning to a plant-based diet has become more prevalent recently, especially among communities of color. According to surveys, a higher percentage of non-white Americans are voluntarily reducing their meat consumption compared to white Americans [77], while black Americans are over twice as likely to be strict vegetarian or vegan than the general American population [78]. Lower income Americans tend to be vegetarian or vegan more than higher income Americans. [79]
- Concentrated animal feeding operations are disproportionately located near communities of color [60–63], leading to residents suffering from increased air pollution [46], respiratory illness [47–49], water contamination [42–44], mental health issues [47,80], and elevated blood pressure [81].

Reducing human exposure to toxic compounds through food

A study funded by the U.S Environmental Protection Agency for the purpose of examining behaviors that influence human exposure to environmental chemicals found that "a diet high in fish and animal products results in greater exposure to persistent organic compounds and metals than does a plant-based diet because these compounds bioaccumulate up the food chain" [53]. Unfortunately, this problem is made worse the better we get at recycling our food waste (e.g. composting and anaerobic digestion). Pathogens can be killed with the high temperatures of proper handling, but persistent organic pollutants and heavy metals can persist in the final product, and if used in agricultural soils, can be taken up again by the food system and accumulate [82].

Why should I care about climate change?

Climate change is projected to reduce food availability, force hundreds of millions of people into poverty and kill off the coral reefs [83] , which support 25% of life in the ocean [84] . Hundreds of thousands of people will die annually between 2030 and 2050 [73,85] and millions will die annually by the end of the century (conservative estimates are over 9 million per year) [73] if we don't do something. Although emissions were lower in 2020 due to pandemic-related lockdowns, reductions were still not enough to prevent CO2 concentrations from rising, and methane emissions increased more than any year in history due more to livestock than oil and gas [86]. Even the pledges made by many nations, including the United States, are insufficient [87,88] and many nations including the United States are struggling to meet even their own pledges according to one source [89]. By 2033 we will have used up the carbon budget to prevent climate change if we continue business as usual [90]. This deadline was reiterated at a United Nations General Assembly High-level meeting [91]. The IPCC's latest assessment states, "If current pledges for 2030 are achieved but no more, researchers find very few (if any) ways to reduce emissions after 2030 sufficiently quickly to limit warming to 1.5°C" [87].

Climate change and climate adaptation

Not only can diet change reduce emissions, but it can also make us less vulnerable to the effects of climate change. Taken directly from the IPCC, "Dietary change in regions with excess consumption of calories and animal-sourced foods to a higher share of plant-based foods with greater dietary diversity and reduced consumption of animal-sourced foods and unhealthy foods (as defined by scientific panels such as EAT-Lancet), has both mitigation and adaptation benefits"… "background climate-related disease burden of a population is often the best single indicator of vulnerability to climate change" … "cardiovascular diseases [CVD] comprised the

largest proportion of climate-sensitive diseases" … "Climate change affects the risk of CVD through high temperatures and extreme heat" … "Unbalanced diets, such as diets low in fruits and vegetables and high in red and processed meat, are the number one risk factor for mortality globally and in most regions" ... "Reduction of red meat consumption reduces the risk of cardiovascular disease and colorectal cancer; and the consumption of more fruits and vegetables can reduce the risk of cardiovascular disease, type II diabetes, cancer, and all causes of mortality" … "Globally, it is estimated that transitioning to more plant-based diets - in line with WHO recommendations on healthy eating - could reduce global mortality by 6–10% [8.1 million per year] and food-related greenhouse gas emissions by 29–70% [3.3–8.0 GtCO2-eq] by 2050" [73] with the vegan diets showing the most reductions [32]. That's most of the conservative estimate of people that will die from climate change and most of food's emissions. In the United States, a vegan diet would reduce food-related greenhouse gas emissions by 78% (570 MtCO2-eq yr-1) and avoid over 460,000 deaths per year [7].

Climate change and land use

The emission reduction estimates mentioned above are likely to be conservative because the researchers "did not account for the beneficial impacts of dietary change on land use through avoided deforestation" [7]. Taken from the IPCC, "When the transition to a low-meat diet reduces the agricultural area required, land is abandoned, and the re-growing vegetation can take up carbon until a new equilibrium is reached. This is known as the land-sparing effect." [32] This effect can be substantial. The IPCC mentions one study, stating "By avoiding meat from producers with above-median GHG emissions and halving animal-product intake, consumption change could free-up 21 million km2 of agricultural land and reduce GHG emissions by nearly 5 GtCO2-eq yr–1 or up to 10.4 GtCO2-eq yr–1 when vegetation carbon uptake is considered on the previously agricultural land (Poore and Nemecek 2018, 2019)" [32] . This same study showed that a vegan diet had the highest mitigation potential of up to 14.7 GtCO2-eq yr–1 [31], which would make our food system carbon negative for over a century [92]. The United States could reduce their total emissions from all sectors of the economy by 24% (1,630 Mt CO2e yr-1) by switching to a vegan diet [92]. According to lead author, Joseph Poore, "For a typical average consumer, diet change isn't just the single biggest way to reduce your greenhouse gas emissions, it's the single biggest way to reduce your land use, your impact on biodiversity, the nitrogen and phosphorous pollution caused by your food, the acid rain, the water use" … "Put simply, avoiding meat and dairy products are probably the single biggest way to reduce your impact on the planet" [72]. Another study calculated the "GHG costs of dairy and beef about 3–4 times higher than previous estimates by the UN Food and Agriculture Organization" [28]. The IPCC itself says that diet change is not only one of "the most economically attractive" options we have [40], but "reduction of excess meat (and dairy) consumption is amongst the most effective measures to mitigate GHG emissions, with a high potential for environment, health, food security, biodiversity, and animal welfare co-benefits" [40].

Isn't reducing fossil fuel enough to address climate change?

Even if we eliminate fossil fuel use entirely, it still won't be enough. Future projections show that the food sector alone will use up the entire emissions budget we have left. A shift toward more plant based diets will be critical to get the total emission reductions we need [4,18–23,25–27,36,87]. Below are example quotes from several studies:

- "Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets" [19].
- "Our results demonstrate substantial carbon opportunity costs incurred by resource-intensive diets, comparable to the remaining carbon budget to 1.5 °C" [27]
- "Immediate and substantial reductions in wasted food and meat and dairy intake, are imperative to mitigating catastrophic climate change" [22]
- "GHG emissions cannot be sufficiently mitigated without dietary changes towards more plant-based diets" [18]

The IPCC states, "All pathways that limit global warming to 1.5°C with limited or no overshoot project the use of carbon dioxide removal (CDR)" [87]. In other words, we are so late in addressing climate change that reducing emissions alone is no longer enough; we must now also remove greenhouse gases that we already put up. The IPCC goes on to say, "Most least-cost mitigation pathways to limit peak or end-of-century warming to 1.5°C make use of carbon dioxide removal (CDR), predominantly employing significant levels of bioenergy with carbon capture and storage (BECCS) and/or afforestation and reforestation (AR)", however, "pursuing such large-scale changes in land use would pose significant food supply, environmental and governance challenges … particularly if synergies between land uses, the relevance of dietary changes for reducing land demand, and co-benefits with other sustainable development objectives are not fully recognized" [87] . The IPCC later stated, "Shifting diets, and reducing food waste could enhance efficiencies and reduce agricultural land needs, and are therefore critical for enabling supply-side measures such as reforestation, restoration." … "Animal protein requires more land than vegetable protein, so switching consumption from animal to vegetable proteins could reduce the pressure on land resources and potentially enable additional mitigation through expansion of natural ecosystems, storing carbon while supporting biodiversity, or reforestation to sequester carbon and enhance wood supply capacity for the production of biobased products substituting fossil fuels" [40].

Isn't soy destroying the rainforest too?

Soy production does play a role in deforestation, however, 77% of soy is grown to feed livestock (e.g. chicken, pigs, fish, cows), 13% to soybean oil, 3% to industrial uses, and less than 7% is used to make food for human consumption such as edamame beans, tofu, soymilk, soy sauce, or tempeh. [93] Eating animals is the single largest driver of deforestation [1], habitat destruction [2], and species extinction [3] in the world.

Isn't palm oil destroying the rainforest too?

Palm oil production does play role in deforestation, however, beef was responsible for over 4 times as much deforestation than palm oil.[1,94] Eating animals is the single largest driver of deforestation [1], habitat destruction [2], and species extinction [3] in the world.

Won't a plant-based diet require more crop land?

A plant-based diet uses less cropland [9,31,37,39] and can free up all pasture land. Most crops produced in the United States are directed to animal feed. [52] One report estimated a vegan diet uses 13% less cropland globally, and 50% less cropland in the United States [92].

Won't a plant-based diet require more GMOs?

"Most of the GMO crops grown in the United States are used for animal food" and "more than 95% of animals used for meat and dairy in the United States eat GMO crops." [95]

Wont a plant-based diet require more pesticides?

A plant-based diet requires fewer pesticides than an animal based diet [41]. One study found beef required as much as 10 times more pesticide than kidney beans per unit of protein [96]

Don't almonds require a lot of water?

Almond milk requires less water than cow's milk [31]. Almonds themselves use 41% less water than beef while chicken and eggs require 72% less water than almonds according to a study in California [41]. This same study looked at real world diets showing that people in California who ate fewer animal products required 4 times less water than a diet higher in animal products while

still consuming twice the number of almonds per week. These diets also required less pesticides.[41] The majority of the world's almonds are grown in California where droughts have been an issue, however more of California's water is used to grow cattle feed than to grow almonds [97]. Almonds produce at least 105 times fewer emissions than poultry or eggs according to a 2017 meta-analysis [30] ; and a 2018 meta-analysis showed nut trees could actually be carbon negative because trees pull CO2 from the air and sequester it into the soil [31]. A 2019 meta-analysis gave an environmental ranking for each food averaging five impacts including greenhouse gas emissions, water use, land use, and two forms of nutrient pollution, showing that nuts performed better than chicken and about the same with eggs [6]. One study on planetary boundaries measured which environmental limits are we most in danger of crossing. Water use was one of the limits studied, however the study concluded that we were not yet in danger of crossing the water use boundary. The boundaries that we were most in danger of crossing or have already crossed were biosphere integrity, biogeochemical flows (e.g. nutrient pollution), land system-change, and climate change [98]. If more ranking weight were given to those impacts, then almonds would outperform even eggs. On a side note, the most consumed nuts are peanuts which require less water than chicken and eggs [31].

What about avocados?

Avocados require less greenhouse gas emissions than animal based products [99]. Although avocados do require more water than many other fruits, it still uses less water than animal products [41,100].

What about fish?

Both farmed and wild caught fish require more greenhouse gas emissions than plant based alternatives [30,31]. Wild fish cannot sustainably supply current demands (figure 19) [101]. Farmed fish require feed, just like livestock. Only "19% of protein and 10% of calories in feed for aquatic species are ultimately made available in the human food supply" [102], making aquaculture production no more efficient than livestock. [102] Shifts to pescatarian diets will increase the existing competition for land resources, particularly in low and medium income countries, with negative impacts on food security [73]. Other facts about fish to consider:

- Most ocean plastic in the Great Pacific Garbage patch is from the fishing industry. [103]
- "The most common way people in the U.S. are exposed to mercury is by eating fish" – US EPA [104]
- Mercury levels in fish found by the FDA [105]

- United States imports nearly 80 percent of its seafood [106]
- 11 percent of total U.S. seafood imports were derived from illegal, unreported, and unregulated fishing, according to 2021 report by the U.S. International Trade Commission [107]
- Desired nutrients in fish, like Omega 3 and iodine, can be obtained from plant-based alternatives. Iodine can be obtained from plant sources such as iodized salt. Omega-3 can be obtained from plant sources such ground flaxseed, ground chia seed, or algae-based Omega-3 EPA/DHA supplements

Isn't a plant-based diet more expensive?

A plant-based diet in the United States is 34% cheaper [50]. The United States could also save an additional $248 billion by 2050 from avoided healthcare costs [7], $40 billion in avoided climate change damages [7], and $38 billion per year in avoided animal product farm subsidies [51]. Oakland Unified School District saved $42,000 a year by increasing the amount of plant based food [108]. University of North Texas was able to reduce costs and increase sales with their all vegan café, benefiting both the students and the campus [109].

What about cell-based meat?

Cell-based meat is actual meat grown artificially from cells. Since cell-based meat has not yet been commercialized (as of 2021), existing research about its production is based on a few anticipatory life cycle assessments which assumed hypothetical inputs, production processes, and technological advances. For example, LCAs assumed that the cell-based meat would be grown without fetal bovine serum [110]. Although some news reports claim some companies are currently trying to work on it, further technological developments will be required to remove all animal-based inputs including fetal bovine serum. Assuming they do this, current predictions show that cell-based meats will have lower emissions than beef but may not have lower emissions than other animal products like chicken [110]. However, one report predicts that if greater than 30% of process energy is sourced from sustainable sources like wind and solar, the emissions impact should outperform all animal products [111]. This is in line with the United States' current goal to achieve 100% pollution-free electricity by 2035 to meet climate change goals [112].

What about plant-based "mimic" meat analogues?

Unlike tofu or bean burgers, these "mimic" meat analogous are designed to mimic the taste and texture of meat; products like Beyond Burger and Impossible Burger. A 2020 meta-analysis of 187 studies found that "mimic" meats required less water, land, and emissions than all farmed animal products including farmed fish, despite high electricity use, but slightly more emissions than wild tuna and insects. Tofu, peas, and pulses required less emissions than all animal products including insects and wild tuna [110]. Other factors to keep in mind when considering tuna or insects:

Tuna:

- "The most common way people in the U.S. are exposed to mercury is by eating fish" – US EPA [104]
- "Baked cod, pan cooked ground beef, pan cooked liver (beef/calf), and canned tuna were the foods with the highest heavy metal concentrations." – 2021 study using US FDA data. [82]
- EPA and FDA both say to limit tuna intake because of the mercury content, especially for children and breast feeding mothers. [113]
- Tuna has more mercury than most fish because they are large predatory animals [105]
- 11 percent of total U.S. seafood imports were derived from illegal, unreported, and unregulated fishing, according to 2021 report by the U.S. International Trade Commission [107]
- United States imports nearly 80 percent of its seafood [106]
- Desired nutrients in fish, like Omega 3 and iodine, can be obtained from plant-based alternatives without the danger of mercury exposure. Omega-3 can be obtained from plant sources like ground flaxseed, ground chia seed, fortified nut milks, and algae-based Omega 3 EPA/DHA supplements. Iodine can be obtained from plant sourced condiments like iodized salt and kelp granules.

Insects:

- A 2021 systematic review looking at consumer acceptance of alternative proteins found "acceptance of insects is lowest, followed by acceptance of cultured meat. Pulses and plant-based alternative proteins have the highest acceptance level." [114]

COVID and future pandemics

Not only did people who follow a plant-based diet show 73% lower odds of moderate-to-severe COVID-19 severity [65], reducing consumption of animal protein can reduce risk from new pandemics in the future [66,67]. This is because most infectious diseases in people come from animals [115] and increasing demand for animal products has increased the risk [116–118].

Can’t I just buy local meat?

Transportation only makes up 4-6% of food’s overall emissions impact [119–121] and just 1% for red meat [120]. Packaging, transport, and retail combined still contribute less than 10% of beef’s emissions [31]. International transport make up only 3% of emissions from food [122] . Shifting one day a week from red meat to plant-based food achieves more emissions reduction that buying all locally sourced food [120].

Can’t I just buy organic?

Organic animal products cause more emissions and require more land than conventional animal products [30]. Although there can be some benefits to organic plant-based farming, transitioning to a fully organic food system without causing deforestation is only feasible without meat [37].

Can’t I just buy grass fed beef?

Grass-fed beef causes more emissions, more water pollution, and requires more land [30]. If scaled up and promoted, US grown grass fed beef may only meet 27% of current beef demand [123], potentially increasing demand for imports of grass fed beef that may have come from previously cleared rainforest. This same study concluded, “only reductions in beef consumption can guarantee reductions in the environmental impact of US food systems” [123]. Currently, most “grass fed” beef labeled “product of USA” is imported.

What about holistic/regeneratively grazed beef?

Summary

Compared to conventional beef, utilizing certain practices, under certain limited circumstances, can help lower emissions from beef, however:

- Emissions reductions are either modest, will happen anyways with diet change, or are largely the result of practices that can be applied to plant agriculture without livestock.
- Reductions are time limited, after which, emissions from beef systems will be worse than before.

- Not scalable / uses more land / only works on degraded land (options are limited; degraded cropland competes with other crops which just pushes the problem somewhere else)
- Still relies on external inputs not counted (e.g. feed or compost from offsite) which pushes the problem somewhere else.
- A plant-based food system reduces more emissions and can sequester more carbon.
- Customers may get confused and choose not to reduce their beef consumption.

"Better management of grass-fed livestock, while worthwhile in and of itself, does not offer a significant solution to climate change as only under very specific conditions can they help sequester carbon. This sequestering of carbon is even then small, time-limited, reversible and substantially outweighed by the greenhouse gas emissions these grazing animals generate" - collaboration between the University of Oxford, the Swedish University of Agricultural Sciences (SLU) and Wageningen University and Research (WUR) [124].

Carbon sequestration accounting (by date):

- A 2022 meta-analysis of 22 studies found holistic management had no effect on soil carbon or animal productivity and that "Claims about increased production and climate resilience with HM [Holistic Management] are unfounded based on farm-scale studies." [125]
- A 2021 meta-analysis of 91 publications shows removing cows from the land entirely enhanced plant production and soil carbon storage across grassland worldwide [126].
- A 2020 meta-analysis of 287 papers found "the grazing impacts on the 15 soil properties had no significant changes over the last two decades" [127].
- A 2020 meta-analysis of 57 studies found that for the USA, Integrated Field Management and Intensive Rotational Grazing reduced emissions from extensive beef, but still resulted in more emissions per unit of beef on average compared to conventional beef. (Figure 4b) [128]. There were a few US farms that claimed net negative emissions, however:
    - Roundtree et al (2016) Emission reductions were due largely to reducing the cattle heard by 60%. A reduction in cattle would happen anyway in a transition to a plant-based food system. This farm also supplied half of their feed from off site, thus bringing in nutrients and carbon to the land but at the cost of land elsewhere. One can bring nutrients into plant-based agriculture land as well. The study also monitored results for only two years.
    - DeLonge et al (2013) Switched from using a livestock manure slurry (an emitter) to a compost operation mixing manure and plant waste diverted from a landfill and applied the compost to the land. The reductions were largely due to offsets from avoided emissions from the manure slurry as well as avoided methane emissions at the landfill. A plant-based food system would avoid emissions from manure slurries as well because manure slurries wouldn't exist, and composting plant material diverted from a landfill can be done in a plant-based food system. Applying this compost to land can sequester carbon without livestock.

    - Ryals & Silver (2013) Got their reductions by bringing in composted green waste from offsite (i.e. yard trimmings and food waste) and applying it to the land. This could be done in plant-based agriculture without livestock.
    - Drinkwater et al (1998) Doubled rates of carbon sequestration, but it was because they decided to grow legumes on the land instead of just cattle feed. Planting legumes also reduced pesticide use. Planting legumes will happen anyways with diet change. Legumes tend to be the main ingredient in plant-based meat alternatives due it's high protein content, and are even categorized as a "protein food" along with meat in the US dietary guidelines. [129]

  The meta-analysis concluded, "growth in beef demand will likely more than offset GHG emissions reductions and lead to further warming unless there is also reduced beef consumption." [128]
- A 2019 meta-analysis of 63 studies reported heavy grazing reduced soil carbon compared to moderate and light grazing. Impacts by moderate and light grazing on soil carbon was not statistically significant. The main reason for the reductions was because they decided to have fewer cows on the land. This would happen anyway with diet change. [130]
- A 2018 meta-analysis of 83 studies reported "grazing (below the carrying capacity of the systems) results in a decrease in SOC storage" [131].
- A 2018 meta-analysis of 64 publications found rotational grazing showed a 25% greater carbon soil storage than continuous grazing. "rotational grazing had greater SOC than continuous grazing and was not different from no grazing". This implies that this improved grazing strategy would be no different at sequestering carbon than a plant based food system where there is no grazing; the benefits here would be similar [132].
- A 2017 synthesis report of 126 publications showed an average sequestration of .28 Mg C ha-1 yr-1 from "improved grazing". It should be noted that most studies in the synthesis report on improved grazing management showed a loss of soil carbon, suggesting "a small number of studies offset small declines in other studies". The largest sequestration gain in soil found in the United States for improved grazing practices was 1.1 Mg C ha−1 yr−1 [133]. This data point was found to be mistakenly reported twice and double counted, skewing the averages. The author and publication have been notified. Furthermore, the 1.1 Mg figure does not include carbon stored above ground in the vegetation nor the roots. According to the study, "When the soil and plant components were combined for C and N accounting, statistically significant differences across grazing treatments were no longer evident," [134]. The lead author of the synthesis report, Richard Conant, confirmed via email that "we didn't gather data on vegetation C from any of the studies".
- A 2017 meta-analysis of 75 studies found "Holistic Planned Grazing does not improve production" [135]

Carbon sequestration as a percentage

- A 2017 literature review from a collaboration between Oxford, the Swedish University of Agricultural Sciences (SLU) and Wageningen University and Research (WUR) found

certain practices under certain limited conditions could reduce emissions from the grazing sector by 20-60% [124]

- In 2020, a single publication studying the White Oak Pastures farm reported a sequestration of 2.29 Mg C ha−1 yr−1, resulting in 66% [136] less emissions than conventional beef, however:
    - Reduced number of cows. They reduced their cow per acre by 60% compared to conventional. This would happen anyways with diet change.
    - Relied on inputs not counted. Chicken and hog feed (mostly corn and soy) and hay were brought in from off-site. These additional nutrients enriched the land through compost or manure, but at the cost of land elsewhere which was not counted. This was no small amount since most of the animal products produced from the farm came from hogs and chicken, not cattle. As a comparison, another study showed compost alone, applied to a corn field rotating with tomatoes (with no livestock) resulted in 1.15 Mg C ha-1 yr-1 over 19 years sequestered [137]. Another study showed adding compost to a system with moderate spring grazing resulted in 1.58 Mg C ha−1 yr−1 over 10 years / .84 Mg C ha-1 yr-1 over 30 years sequestered compared to moderate spring grazing without compost, implying that the sequestration was more the result of applying compost to the land, rather than the cows themselves [138].
    - Legumes were planted on site which has the unique ability to fix nitrogen in the soil and increase soil carbon [139]. Planting legumes will happen automatically with diet change. A 2017 study showed planting legumes can sequester .66 Mg C ha-1 yr-1. [133] . One 2015 study showed that under proper targeting, legume sowing has the potential to sequester .35 Mg C ha-1yr-1 for North America [140]. A 2014 study showed farming practices like fertilizing crops based on soil tests and rotating cereals with legumes could make wheat production carbon negative [141].
    - Nut bearing trees were planted on site. Nut trees will be planted with diet change anyways. Trees can sequester carbon on their own in plant-based agriculture without livestock. Plant trees is just a good idea in general. You can even do it in croplands. According to a 2017 study, 22% of US croplands were suitable for alley cropping of trees, which could sequester 1.2 Mg C ha-1 yr-1 without livestock present [142]. A 2018 meta-analysis shows nut trees were carbon negative [31].
    - Relied on degraded cropland (competes with other crops)**.** This study started out on degraded cropland. Several studies that argue in favor of improved grazing are based on converting degraded cropland to grazing land, but that would put crops out of production and since demand for food is increasing [143], that would only create demand to grow those crops somewhere else. In other words, you may improve land in one place but at the cost of destroying land somewhere else, so you're not solving the problem, you're just moving the problem somewhere else.
    - They "Rested" the land, meaning they prevented cows from grazing on the land for periods of time. This would happen anyways with diet change, i.e. more land would be rested. A 2020 study showed abandoning agricultural land could sequester 0.43 Mg C ha-1 yr-1 over 60 years [144]. A 2017 study concluded that

"simply ending the land use is sufficient for forests to recover" [145]. A 2022 study found that "old forests continue to sequester carbon and fix nitrogen" [146] Other studies show habitat can be restored by removing livestock [147,148].
    - White Oak Pastures is selling their ground beef for $8.99/lb. Regular ground beef is $4.38/lb. Since it's not scalable (see below), this option will always be just a luxury item for those who can afford it, and not a true solution for everyone. Popular plant based mimic beef alternatives that are designed to mimic the taste and texture of beef, have been known to sell for as little as $6.80/lb. A 28oz can of baked beans is $2.18.
    - A note on White Oak Pastures: Several news articles came out claiming that Savory's method was carbon negative, citing a White Oak Pastures study in 2019. However, this study was not peer-reviewed and left out several key factors. The next year, a peer-reviewed study came out on White Oak Pastures showing only 66% less emissions than conventional methods (instead of the carbon negative claim as before) and required 2.5 times more land than conventional [136]. Even though the leading author of the first White Oak Pastures study was involved in this second peer-reviewed study, White Oak Pastures themselves still advertises their beef as "carbon negative" on their website and links to the initial study with no mention of the second peer-reviewed study.
- A 2019 meta-analysis showed legumes had 97% less emissions than red meat per serving [6]
- A 2017 study shows beans have 99% less emissions than conventional beef in the United States per unit of protein [149].
- A 2018 study showed a vegan diet reduces emissions (carbon opportunity cost plus production emissions) by 80% [28].

Total carbon potential

- Total Global Carbon Potential:
    - Sanderman et al (2017) shows carbon lost from grazing lands from human activity is 82.13 Gt CO2e [150].
    - Hayek et al (2020) shows a global shift to plant based diets by 2050 could lead to a sequestration of 547 GtCO2e [27].
- Total Global/North American Carbon potential per year:
    - A 2017 literature review [124] found:
        - Improved grazing management could sequester:
            - Globally: Between 0.295 – 0.8 Gt CO2e yr-1
    - One 2017 study [142] showed
        - Optimal grazing intensity:
            - Globally: 0.148 GtCO2e yr-1
            - North America: 0.01373 GtCO2e yr-1
        - Legume sowing:
            - Globally: 0.147 GtCO2e yr-1
            - North America: 0.01379 GtCO2e yr-1

- IPCC report on maximum potential, Fig TS.5 [32] shows:
  - Maximum biophysical potential of soil carbon sequestration from grazing lands:
    - Globally: 2.56 Gt CO2e yr -1
  - Maximum mitigation potential for diet change:
    - Globally: 8 Gt CO2e yr-1 (with an additional potential 2.1 – 2.8 Gt CO2e yr-1 through avoided deforestation)

  Note: Median value for diet change was greater than maximum value for grazing land. The vegan diet had the highest reduction potential of 8 Gt CO2e yr-1.
- A 2021 study [68] found:
  - Grazing Optimization:
    - United States: .244 Gt CO2e yr-1
- A 2016 study [7] found:
  - A vegan diet:
    - United States: .570 Gt CO2e yr-1
- A 2018 meta-analysis [31] found that:
  - A plant-based diet could reduce emissions by:
    - Globally: 14.7 Gt CO2e yr-1
    - North America: 1.63 Gt CO2e yr-1

  Note: This meta-analysis included emissions reductions from land no longer required due to diet change "as natural vegetation reestablishes and soil carbon re-accumulates". This meta-analysis looked at 38,700 farms and found the best production system for growing beef was still worse than the worst production system for plant-based alternatives. They also found that our entire agriculture sector could be a net sink due to carbon sequestration if we all adopted a vegan diet.[31]

Requires more land/ not scalable

Grass-fed beef requires 25% more land than conventional [30] (see video) and could only meet 27% of current beef demand [123]. The White Oak Pastures showed that their regenerative beef requires 2.5 times more land than conventional beef [136]. In contrast, switching from conventional beef to beans would free up 42% of cropland [149]. Taking these findings into account, holistic methods may require twice as much land as grass-finished, implying it might supply 13.5% of current US beef demand. However, only 27% of current pastureland is said to be degraded [124]. Another study showed that changes in grazing management would only sequester carbon on 22% of grazing lands in North America [140]. Since holistic methods rely on already degraded land for their emissions reductions, if you don't want to compete with other crops or require more land, then this method would be limited to degraded pastureland, implying it could supply no more than 7% of current US beef demand (.27*.27). Currently, grass fed beef make up about 8% of beef today (1 gram out of 13 grams), and only 2% of protein world-wide [124]. Holistic methods cannot supply enough animal protein to meet current demand, much less future demand without "catastrophic land use change and other environmental damage" [124]. A 2020 meta-analysis of 109 studies found that grazing cattle reduces the abundance and diversity of wildlife compared to

removing livestock and allowing the land to rewild [151]. An IPCC 2022 report found that shifting to more plant-based diets can reduce agricultural land needs and are therefore critical to reforestation and restoration (page TS-86) [40].

Time limited

Sequestration in soils can reach a saturation point where the soil can no longer absorb new carbon.[152–154] after which emissions are worse than before. Time limits range from 30-70 years [124], with one recent study showing sequestration may have peaked at 13 years [136]. As an example, 3 US studies reported a decrease in emissions (-15%[155], -16%[156], -66%[136]) but not counting sequestration would make these farms emit more (+30%[155] , +37%[156] , +44%[136]) than conventional beef. This implies that setting up this type of food system will create more emissions in the long run.

A note about Alan Savory

There was a lot of press around Alan Savory. He claimed holistic, regenerative grazing techniques was the answer to climate change. However,

- A review done the year after his talk "could find no peer-reviewed studies that show that this management approach is superior to conventional grazing systems in outcomes." [157]
- A researcher at Chalmers University in 2016 wrote a review of Alan Savory's claims stating that "no review study has been able to demonstrate that holistic grazing is superior to conventional or continuous grazing" and that the claimed benefits of the method appear to be "exaggerated and/or lack scientific support" [158].
- A collaboration between the University of Oxford, the Swedish University of Agricultural Sciences (SLU) and Wageningen University and Research (WUR) , in their report in 2017 said "that the extremely ambitious claims that proponents of Savory's methods make are dangerously misleading" [124].

But I heard grasslands store more carbon than forests

Dr. Frank Mitloehner at The Irish Farmers Association said, "grasslands can capture as much carbon as forests can.", referencing a study by Benjamin Houlton, PhD. UC Davis [159]. However, Dr. Houlton was talking about trees being vulnerable to forest fires in a future with climate change if we don't do something. He said "in a stable climate, trees store more carbon than grasslands" [160] In the situation of a devastating fire, trees naturally have more carbon to burn than grasslands because they start out with more carbon to begin with. Since trees can store and release more carbon, the trick then is to have forests, but to not let our forests go up in flames. Old growth forests and large old trees are critical organisms connecting ecosystems and human health and continue to sequester carbon [146].

But I heard cows can use land unsuited for crops

There was a lot of news around a study that looked at the "carrying capacity" of different diets [161]. Keep in mind, the scope of this study was only to estimate the maximum amount of land we could put into food production for each diet scenario, not what the environmental impacts would be of those diets, or what is needed for our population. Even so, in the abstract of this study it says carrying capacity is highest for the vegetarian diet (no meat), meaning a diet without meat scored better than all other diets. Also, this study says the vegan diet still uses the least amount of total land (see fig 2) as well as the least amount of cropland (see figure 4) and can still feed 2.4 times the population (table 4).

What many news headlines pointed out was that an omnivore diet was better for the environment than a vegan diet and referenced this study. A scenario where we eat some animal products (OMNI 40) could feed 2.6 times the population, where a vegan diet could feed 2.4 times the population according to this study, which is what these news headlines were referring to. Keep in mind that the OMNI 40 diet still requires Americans to remove most of the meat from their diet, and both of these diets provide more than enough food to feed the population into the future. One study projects US population will peak in 2062 at 1.2 times the population and fall to 1.1 by 2100. They predict a further reduction in population growth if education attainment and contraceptive needs are met [162].

One might argue that we could send the extra food to other countries, feeding more people. But the extra food would be animal products that increase emissions, and climate change is predicted to kill millions more people per year [73]. Compounded by the fact that climate change cannot be avoided without reducing animal product consumption, especially the very products this extra land would produce (red meat and dairy) [4,18–23,25–27,36], increasing cattle production would kill more people than it would feed. We have less than 10 years to address climate change before we leave the fate of humanity to a coin toss [90]. Other studies have also shown that we can feed more people on a vegan diet than the current diet [39,52].

More details on projection estimates:

- OMNI 40 could feed 2.6 times the population of the US (754,744,865). A vegan diet could feed 2.4 times the population (736,185,565). That is a difference of 18,559,300.
- Cardiovascular disease killed 18,562,510 people globally in 2019. Climate change is predicted to kill over 9,000,000 additional people per year globally by 2100 [73].
- The US census bureau projects US population in the year 2060 to be 404,483,000 at a .4% population growth rate [163] . 2010 population was 309,321,666 [164]. The UN projects to the year 2100 for the United States (433,854,000 (medium variant)) with a slower growth rate of .22% in the year 2100 (2060 population estimate was 391,495,000) [165].

What if we rear livestock on only grassland, crop waste, food waste, and other byproducts?

A 2017 meta-analysis shows “using agricultural wastes and byproducts as animal feeds could reduce the environmental impacts of livestock production by 20%”. The analysis also showed that plant based foods have 80-99% less emissions than animal based foods [30]. Even if it were sustainable, it’s still not scalable. A 2018 study showed that by using up all the grassland, crop wastes and food waste for livestock feed would only satisfy a maximum of 37% of current US supply of animal products [166]. Crop waste, food waste, and other byproducts can be utilized as nutrients for growing plant-based foods as well.

But I heard removing animals would only reduce emissions by 2 or 3%?

The Cattlemen’s Beef Board on their website [167] points to a study that claims removing animals from US agriculture would only reduce total emissions by 2.6% [168]. However, several research groups have published responses voicing concerns about this paper calling the scenario “unrealistic”. [169–171] For example, the study assumes farmers will just keep growing animal feed without animals to eat it and expect humans to eat all of it, implying famers wouldn’t change what crops they grow and people would double their calorie intake! Obviously, this is absurd. When confronted, the authors said their study was “not intended to relate to studied vegetarian or vegan diets” [172].

The website also claims that beef production “is responsible for only 3.3% of greenhouse gas emissions in the U.S.” referring to a study that did not compare diets, was funded by the beef industry, and was initiated, co-authored, and data obtained and provided by the National Cattlemen's Beef Association [173] whose job is to “promote beef’s image and defend beef’s freedom to operate to enhance consumer, influencer and stakeholder trust in beef” [174]. The data was not peer-reviewed. This presents a conflict of interest. Furthermore, the website’s footnotes were either broken links, go to other beef industry websites, and/or were opinion blogs. By contrast, a different study that was co-authored by a vegan food company representative found that a global phaseout of animal agriculture could offset 68% of world CO2 emissions [175]. Although this study was peer-reviewed, it too presents a potential conflict of interest. It is possible that some studies with conflicts of interest can still provide sound science, however because of these conflicts, neither of these studies are considered nor referenced anywhere else in this document.

BeefResearch.org, which is run by the Cattlemen's Beef Board and National Cattlemen's Beef Association, which are both funded by the beef checkoff program, says on their website, "According to the U.S. Environmental Protection Agency (EPA), beef cattle production was responsible for 1.9% of total U.S. GHG emissions" [176] and refers to an EPA site [177]. This EPA site does not compare different diets and is not a life cycle assessment; nor was it meant to be. Let's consider the following simple calculation using EPA data:

- EPA's estimate for total emissions (5,769 MMT CO2E) [177],
- EPA's WARM model estimates for beef (30.09 MTCO2E/Short Ton) [178] [see organic materials chapters] which uses a GWP of 25 for methane [see background chapters] based on IPCC AR4 estimates
- USDA's consumption estimates (55.4 lbs of beef per person) [179].

This makes beef at least 4.75% of total emissions. Note: EPA's WARM model does factor in changes in forest or soil carbon storage due to other human behavior changes such as composting and AD [178] [see organic materials chapters], as well as source reduction of wood and paper products [178] [see background chapters], but it does not do this for source reduction of food [178] which was used for the above calculation [see organic materials chapters, Exhibit 1-9]. They just left it blank. So this is an extremely conservative estimate for beef's emissions.

Sometimes people refer to an EPA chart showing agriculture is only 10% of emissions [180]. Again, this 10% figure is not a comparison of different diets, not a life cycle assessment, and does not include land use change. EPA reports on land use change, but does so separately and therefore is not included in the "agriculture 10%" estimate. Taken from EPA's supporting documentation: "Additional CO2, CH4 and N2O fluxes from agriculture-related land-use and land-use conversion activities, such as cultivation of cropland, grassland fires, aquaculture, and conversion of forest land to cropland, are presented in the Land Use, Land-Use Change, and Forestry (LULUCF) chapter." [177] [chapter 5, first paragraph]. Because plant-based diets require less land, EPA could use their own data along with well-established land use requirements for foods, and estimate land use change emissions.

EPA has never done a life cycle analysis to estimate what the emissions reductions would be from diet change. Furthermore, multiple studies have suggested that EPA is underestimating methane emissions from animal agriculture [181,182].

The UN Food and Agriculture Organization estimates livestock is responsible for 14.5% of global emissions [183]. Although this estimate does include land use change, it does not include carbon opportunity cost of abandoned land. One study found "global-average GHG costs of dairy and beef are about 3–4 times higher than previous estimates by the UN Food and Agriculture Organization" and that the emissions impact from a person's diet was equivalent to GHG's typically assigned to a person's overall consumption of all goods, including energy consumption [28]. These researchers also put together a short paper that helps explain the study and the carbon opportunity cost concept in more simple terms [184].

One 2018 peer-reviewed meta-analysis of 570 studies estimates that the United States could reduce their total emissions by 24% with a plant-based diet [31,72]. This meta-analysis had no conflicts of interest.

Is being 100% plant-based healthy?

The world's largest organization of nutrition and dietetics practitioners, the Academy of Nutrition and Dietetics, says that appropriately planned vegan diets are healthful, nutritionally adequate, and are appropriate for all stages of the life cycle, including pregnancy, lactation, infancy, childhood, adolescence, older adulthood, and for athletes [13]. Other organizations include the US Dietary Guidelines Advisory Committee [12], the British Dietetic Association [185], and the Dietitians of Canada [186].

If we change to more plant-based diets, won't we waste more food?

Although fruit and vegetable waste would increase with a change to a vegan diet, animal product waste would decrease, and emissions overall would decrease. Vegetable proteins (tofu, peas, nuts, grains, soymilk, beans, and other pulses) not only have fewer emissions but are also wasted less than animal proteins due to their longer shelf life. A sensitivity analysis showed that the emissions from consumer food waste due to a change to a vegan diet would reduce, meaning that the emissions reduction from changing from animal to vegetable protein more than offsets the added emissions from the additional fruits and vegetables [31].

The largest share of food waste today is fruits and vegetables, but the largest share of environmental burden of food waste today still comes from animal products. A 2021 US EPA report stated, "Animal products have an outsized contribution to the environmental footprint of U.S. FLW [Food Loss and Waste], representing the greatest use of resources (land, water, fertilizer, energy) and GHG emissions among categories of FLW, but a relatively small share of FLW" [187] .

In addition to direct food waste, when we grow food to feed livestock instead of feeding humans directly, we end up with less food for humans overall. This can also be considered a waste. A 2018 metanalysis showed that "meat, aquaculture, eggs, and dairy use ~83% of the world's farmland and contribute 56-58% of food's different emissions, despite providing only 37% of our protein and 18% of our calories" [31]. One study found that "the opportunity cost of animal based diets exceeds all food losses" and "Replacing all animal-based items in the US diet with plant-based alternatives will add enough food to feed, in full, 350 million additional people" [39] Another study found "More than half of crop production by mass in the United States is directed to animal feed" and that "US croplands feed 5.4 people per hectare but could feed 16.1 people per hectare" [52].

How diet change addresses federal government priorities

Transitioning our nation to a plant-based food system would help to address:

- EPA's 2022-2026 strategic plan priorities [188] to "tackle the climate crisis"[4–11,18–36], "advance environmental justice" [45,59–63], "ensure clean and healthy air for all communities" [45–49], and to "ensure clean and safe water for all communities"[6,30,31,42–44]
- EPA directing people to the IPCC's recommendations to reduce emissions from agriculture which include "dietary change" [189],
- EPA's definitions for "Environmentally Preferable Purchasing" [190] and "Sustainable Management of Food" [191],
- EPA-funded research to examine behaviors that influence human exposure to environmental chemicals [53],
- EPA's Summary of Guidance for sustainable purchasing [192] includes guidance from sources such as Practice Greenhealth [193] and the Responsible Purchasing Network [194] that encourage purchasing of more plant-based food while purchasing less meat and dairy.
- United States pledge to cut methane emissions [195] as livestock is the main contributor [177],
- Executive Order 14057 Sec. 208(b) [196],
- US Dietary Guidelines Advisory Committee findings on sustainability[8],
- USDA findings on climate change and diet [5],
- US Department of Health and Human Services guidance [197],
- Center for Disease Control and Prevention guidance [198],
- The current Administration's main priorities to control the COVID-19 pandemic [65–67], provide economic relief [7,24,50,51] and health care [4–15].

More Details

- EPA ORD Report, From Farm to Kitchen: The Environmental Impacts of US Food Waste [187] :
    - *"Many of the studies presented in this report compared a variety of strategies—including closing yield gaps, increasing resource efficiency, dietary shifts, and reducing FLW—finding that only in combinations could these strategies achieve a sustainable agricultural future"* [187]
    - *Key finding: "Among food categories, animal products require the most land, water, fertilizer, and energy and emit the most GHGs per unit of food."* [187]
    - *Key Finding: "Animal products have an outsized contribution to the environmental footprint of U.S. FLW[Food Loss and Waste], representing the greatest use of resources (land, water, fertilizer, energy) and GHG emissions among categories of FLW, but a relatively small share of FLW."* [187]
    - *"Even if fossil fuel emissions were halted, current trends in the food system would prevent the achievement of [1.5 degrees of warming]"* [187]

- Executive Order 14057 (Dec, 2021) – Sec 208(b): “The Chair of CEQ shall consider establishing Federal food procurement policies to reduce associated greenhouse gas emissions and drive sustainability in the Federal food supply chain” [196]
- The United States pledge to cut methane emissions. President Biden stated, “it amounts to half the warming we are experiencing today, just methane” [195]. The largest source of methane emissions in the United States is from livestock according to the EPA.[177] Plant based diet changes would help achieve this goal.
- EPA’s Sustainable Management of Food Program’s definition of Sustainable Management of Food includes “Sales” and “consumption”. [191]
- EPA’s Final Guidance on Environmentally Preferable Purchasing defines “Environmentally Preferable” as "products or services that have a lesser or reduced effect on human health and the environment when compared with competing products or services that serve the same purpose," - Implementing Instructions for Executive Order 13693. This includes raw materials. [190]
- EPA’s website “Sources of Greenhouse Gas Emissions” [189] section on “Reducing Emissions from Agriculture” states, “For a more comprehensive list of options and a detailed assessment of how each option affects different gases, see Chapter 11 of the Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change “ [189] That report’s Chapter 11 executive summary states "changes in human diet can have significant impact on GHG emissions". Chapter 11.4.3 states, "GHG emissions may be reduced through changes in food demand without jeopardizing health and well-being by ... changing diets towards less GHG-intensive food, e. g., substitution of animal products with plant-based food" [152]
- EPA currently encourages activities to address food waste such as anaerobic digestion (AD) [199], and composting[200]. These processes “will only be feasible and safe as long as the food waste is uncontaminated with other materials and toxicants, or the contaminants are destroyed by treatment. When contaminated food enters as feedstock for composting or anaerobic digestion and the residuals are used in agricultural soils, the contaminants can be taken up again by the food system and accumulate”. Pathogens can be killed with high temperatures, but persistent organic pollutants and heavy metals can persist in the final products [82]. One strategy to address this issue was found by a study funded by the U.S Environmental Protection Agency for the purpose of examining behaviors that influence human exposure to environmental chemicals. The researchers found that a diet high in fish and animal products results in greater exposure to persistent organic compounds and metals than does a plant-based diet because these compounds bioaccumulate in animal tissue. The strategy they recommend to reduce intake of persistent organic pollutants and metals is to consume less animal foods (meat, dairy, and fish) [53].

Why is our government not saying anything about this?

The Dietary Guidelines Advisory Committee (DGAC) was established jointly by the Secretaries of the U.S. Department of Health and Human Services (HHS) and the U.S. Department of Agriculture. In the committee's own words, "the major findings regarding sustainable diets where that a diet higher in plant-based foods, such as vegetables, fruits, whole grains, legumes, nuts, and seeds, and lower in calories and animal-based foods is more health promoting and is associated with less environmental impact than is the current U.S. diet." [8] The USDA and HHS, however, chose not to take action on the findings because they believed they were not the right agency to give recommendations based on environmental protection (Letter from Tom Vilsack, Secretary of Agriculture and Sylvia Burwell, Secretary of Health and Human Services) [201]. Regardless, USDA staff still put out a report as far back as 2012 on USDA's website stating that "Consuming fewer livestock products can reduce emissions" [5]. Six months later, the same authors published a report with even bolder messaging: "Agricultural production and GHG mitigation goals cannot be reached simultaneously, even if optimistic technological advances are attained. However, healthier human diets would allow sufficient decreases in agricultural production to meet GHG mitigation goals." [36]

Tips for universities/dining services

- Simply increasing plant-based items offered increased plant-based meal sales. Doubling the proportion of vegetarian meals on the menu from 25 to 50% (e.g., from 1 in 4 to 2 in 4 options) increased vegetarian meal sales (and decreased meat meal sales) by 14.9 and 14.5 percentage points in the observational study (2 cafeterias) and by 7.8 percentage points in the experimental study (1 cafeteria), equivalent to proportional increases in vegetarian meal sales of 61.8%, 78.8%, and 40.8%, respectively [202].
- Making the veggie dish the default instead of the meat-based dish at conferences increased veggie dish consumption [203].
- Just as satisfying if you replace two thirds of the meat with beans [204].
- Three interventions reducing the portion size of meat servings reduced meat consumption in randomized trials. "Three interventions providing meat alternatives with supporting educational material were associated with reduced meat demand in pre-post design studies. Three of four interventions altering the sensory properties (e.g. visual presentation) of meat or meat alternatives at point of purchase reduced meat demand in randomized trials. Four interventions repositioning meat products to be less prominent at point of purchase were associated with lower meat demand, but only two such interventions reached statistical significance" [205].
- "Providing information on the environmental impact of meat consumption may reduce consumption, with 10 of 11 estimates suggesting reduced consumption". "consumers tend to be unaware of the environmental impact of the production of meat ". "Individuals consider meat reduction to be one of the least effective methods for

alleviating climate change when compared to other options (such as driving cars less), despite shifting to a plant-based diet being one of the highest impact actions that can be taken by an individual to reduce emissions" [206].

- Indulgent vegetable names increased vegetable consumption. [207]
- Foodprint seminar. Students were estimated to have significantly decreased their dietary carbon footprint by 14% [208].
- Interventions appealing to animal welfare consistently reduced meat consumption [209].
- 50-minute lecture on how food choices affect climate change, along with information about the health benefits of reduced meat consumption reduced meat purchases and increased purchases of plant-based alternatives [210]
- Student purchase of meat products declined after being assigned a philosophy article on the ethics of eating meat [211].
- "Self-monitoring interventions and individual lifestyle counselling led to, or were associated with reduced meat consumption" [212]
- Diners who received the menu with the plant-based dishes in a vegetarian section were 56 percent less likely to order those dishes, implying vegetarian items should be spread throughout the menu instead of given their own section on the menu [213].
- A sign that said "Most people here choose to eat vegetables with their lunch" increased sales of meals with vegetables [214].

Tips for grocery/convenience stores

- In-person nutrition education on the nutrient composition of food purchases through talking with customers and signage resulted in greater purchasing of fruit and dark-green/yellow vegetables [215].
- Discounting fruits and vegetables led to increased purchasing and intake [216].
- Healthy samples (Studies 1–2) or samples framed as healthy (Study 3) increase healthy purchases [217].
- A supermarket discount intervention led to increases in purchases and intakes of F&V [218]
- Convenience store consumer demand for fresh fruits and vegetables in low-income communities was sufficient to cover direct operating costs of a produce case, but requires commitment of daily maintenance. 15 min of daily maintenance. High in demand were: granny smith apples, red delicious apples, bananas, green bell peppers, cabbages, collard greens, red seedless grapes, iceberg lettuce, mangos, mustard greens, yellow onions, oranges, Anjou pears, 10-poundbag, potatoes, and yams [219].
- Recipe samples, produce offered at check-out end caps, recipe signage and social marketing were effective in improving fruit and vegetable intake in rural communities [220].

- Lower prices increased sales of healthy foods. Women prioritize health over cost more so than men, suggesting efforts aimed to increase the perceived value of health over cost should be tailored towards men [221].
- Employee training including education on the health and financial benefits of fruits and vegetables, food demos, recipe cards, in-store announcements, and buffet bar with ready to eat fruit and vegetables in Latino food stores resulted in a self-reported increased intake of fruits and vegetables [222].
- Healthy recipes, in-store displays, bag stuffers, staff can explain and recommend healthy items, signage on windows, service counters, registers, and at point-of-purchase in stores in rural communities showed significant improvements in reported healthiness of purchases [223].
- Recreation center and corner store nutrition promotion and education using point-of purchase materials such as posters and flyers in stores and interactive sessions such as taste test (e.g. trail mix, peanut butter/banana/raisin roll-ups) and cooking demonstrations reduced overweight or obesity among already overweight low-income African American youth living in an environment where healthful foods are less available [224].
- Placement of fruits/vegetables near the front of corner stores increased purchase of produce by customers using WIC [225].
- Discount coupons and education about healthy food consumption encouraged low-income families to purchase healthier food in Alabama [226]
- Increased social media exposure increased daily fruit intake in low-income African American neighborhoods in Baltimore [227].
- Placing low-cost fruit and vegetables packs at checkout end-caps - and suggesting to shoppers to consider purchasing them increased overall and SNAP program sales. Last minute purchases of fruits and vegetables at checkout may help families use up remaining assistance benefit balances [228].
- A combination of a floor arrow saying "This way to healthy food", a sign that read "Only a few left in Stock!", and mixing healthy granola bars in with candy bars resulted in an increase in sales of apples, oranges, bananas, and granola bars in convenience stores in rural central North Carolina [229].
- Urban farm/corner store collaboration in low-income urban setting sold 86% of all items delivered, store owner and farmer made profit and decided to continue the program after the trial was concluded. Exterior sign stating that it carried fresh produce from the farm, shelf labels, recipe cards, produce tasting event, refrigerated display, promotion by local neighborhood and business associations at meetings and in newsletters to local residents; and selecting a store that was relatively isolated from other food retailers were factors in its success [230].
- Recipe cards influenced desire to purchase fruits and vegetables by rural residents of high-obesity Kentucky counties. Trial did a combination of discounts, recipe cards and samples, signage, fruit and vegetables moved to the front of the store, and advertising [231].
- Offering smaller portions of meat resulted in a reduction in the volume of meat sold [232].
- Eco labels increased eco-friendly consumption by 5% [233].

- Sign at entrance saying "*For a healthy diet, try to buy at least five fruits and vegetables*. *Food is Good Medicine*." increase sales of healthy foods and fresh produce [234].
- 150% higher odds of purchasing produce at stores participating in intervention implemented in rural Native community [235]. Stores engaged in activities such as:
    - Basket of bananas or apples at the register counter
    - Price by individual piece
    - Signs that direct customers to the health zone area (candy aisle is a suggested place to put up directions to the store's fresh fruit)
    - Create a special health display at the end of the aisle or so that customers see it upon first entering the store
    - Recipe cards
    - Signs that advertise the store is participating in healthy initiative
    - Community board for flyers will encourage community members to see the store as an active part of their community
    - Replace cigarette and soda signs with healthy signs
    - Make WIC and snap signs more prominent
    - Paint mural on side of store
    - Arrange parking lot to provide space for popup markets.
    - Small signs placed directly under the item on the shelf
    - Posters encouraging consumption of fruit and vegetables
    - Volunteer party to help the store rearrange
    - Displays
    - Kick-off party with live music, interviews with media, cooking demos, recipe contests.
    - Local advertising
    - Food demos and taste tests
    - Prescription vouchers for fruit and vegetables from medical providers

Tips for the home

- Add more vegetables to soups, stews, casseroles, stir-fries, and other dishes.
- Keep raw, cut-up vegetables, hummus, fruit, and trail mix handy for quick snacks.
- Save time by cooking frozen vegetables and potatoes in a microwave.
- Add dark leafy greens to salads and smoothies.
- Use beans or peas in salads (e.g., kidney or garbanzo beans), soups (e.g., split peas or lentils), and side dishes (e.g., baked beans or pinto beans).
- Stock up on frozen or low sodium canned vegetables for quick and easy cooking.
- Buy vegetables and fruit in season when they cost less and are likely to be at peak flavor.
- Buy easy to prepare vegetables like pre-washed salad greens and carrots.

- Slowly switch out meat for plant-based proteins like beans, lentils, peas, tempeh, or tofu. Start small with partial substitutions and work your way up.
- Instead of cow's milk, try B12/Vitamin D/Calcium fortified plant-based milks.
- Instead of scrambled eggs, try scrambled tofu with nutritional yeast.
- When eating out, choose the vegan option.
- For those that wish to be 100% plant based, make sure to get all the nutrients you need. You will need to take a B12 supplement. Examples of nutrition resources and guides for vegans include: veganhealth.org, theveganrd.com, pcrm.org, nutritionfacts.org

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Communication from Public

Name:	Herberts
Date Submitted:	09/10/2022 03:01 AM
Council File No:	22-0002-S118
Comments for Public Posting:	It is important to acknowledge that food plays a large role in green house emotions, and we should reduce animal based product consumption and subsidies when possible.

Communication from Public

Name:
Date Submitted: 09/10/2022 03:05 AM
Council File No: 22-0002-S118
Comments for Public Posting: Endorse the plant based treaty. TO SAVE THE PLANET. EVERY TOWN,CITY AROUND THE WORLD MUST ENDORSE THE PLANT BASED TREATY.

Communication from Public

Name:	massimiliano cenci
Date Submitted:	09/10/2022 03:06 AM
Council File No:	22-0002-S118
Comments for Public Posting:	On September 6, 2022, Councilmember Koretz introduced the Resolution that requests that the City of Los Angeles formally endorse that the "Federal Legislation program includes SUPPORT and enter into a Plant Based Treaty making a plant-based approach to food and food purchasing a centerpiece of its greenhouse gas emissions policy." I hope You'll asgree and take action! Sincerely, M. Cenci - Italy

Communication from Public

Name: Kevin Walsh
Date Submitted: 09/10/2022 03:22 AM
Council File No: 22-0002-S118
Comments for Public Posting: I fully support the plant based Treaty suggestion.

Communication from Public

Name: Susan chapman
Date Submitted: 09/10/2022 04:56 AM
Council File No: 22-0002-S118
Comments for Public Posting: Given our Global Incineration Event we must all call RIGHT NOW for reduction in dangerous greenhouse gases before total collapse of systems and the escalating uninhabitability of our home planet. Now very much on the cards thanks to deadly energy lies for the last 50 years as Mother Nature is sacrificed. Pakistan will not be the last country to demand reparation from high carbon emitters. Planet Earth has become a crime scene but most people do not understand the overwhelming scale of destruction thanks to cretinous disrespect for our life support systems from international leaders. What a total disgrace that those 21 young people in the US demanding climate justice have been denied court action for seven years. Our Climate Genocide Act Now group in the UK has also been fobbed off by 13 police stations 20.11.19 (anniversary of the Nuremberg Trials). The media tells lies which are NOT COUNTERED by leading politicians. A grave outcome for humanity stares us in the face. Those demanding action by (sometimes suicidal) acts of great sacrifice are criminalised, gas-lit, shamed, humiliated, disregarded. We are all in great and accelerating danger. A Public Information Programme (a Dunkirk response) is badly overdue. Disgusting that Sir Patrick Vallance's climate presentation about the terrifying prospects we face as a civilisation was ONLY ATTENDED by 5% of our UK representatives. Governance is so far criminally complicit with the gas-chambering of our home planet. Our infant species needs to Salvage and Survive. This will include decarbonisation at speed and scale; Project Drawdown is overdue and the education, incentivisation and motivation for All Hands on Deck needs to be implemented without further delay.

Communication from Public

Name:	Andrew Wright
Date Submitted:	09/10/2022 05:05 AM
Council File No:	22-0002-S118
Comments for Public Posting:	I fully support the Plant Based Treaty as it is critical to the health of our planet.

Communication from Public

Name:	Paul Hostler
Date Submitted:	09/10/2022 05:05 AM
Council File No:	22-0002-S118
Comments for Public Posting:	I commend the Plant Based Treaty as a win-win policy for the environment, for human health and for animals. I became vegan twenty six years ago and can say it's the best decision I've ever made.

Communication from Public

Name:
Date Submitted: 09/10/2022 05:19 AM
Council File No: 22-0002-S118
Comments for Public Posting: i have signed the plant based treaty as an individual already and believe LA should support this treaty as a vital step in halting and reversing climate change and protecting humans and non humans alike

Communication from Public

Name:	Lucia
Date Submitted:	09/10/2022 05:26 AM
Council File No:	22-0002-S118
Comments for Public Posting:	A plant-based approach to food and food purchasing, is the only way to fight efficiently against greenhouse gas emissions and animal's abuse and cruelty. The future of next generations depends on these measures The earth can not way any longer for us to wake up. The moment to act it's NOW.