FEEDING QUALITY FORUM

What To Do About Evolving Demands

Kim Stackhouse-Lawson, PhD

AgNext

Sustainable Solutions for Animal Agriculture

Vision: Animal agriculture is a sustainable component of our global food system by providing economic, social and environmental benefits to Colorado, the Nation, and the world.

Mission: Identify and scale innovation that fosters the health of animals and ecosystems to promote profitable industries that support vibrant communities.

Phased Cluster Hires DRAFT

First Cluster Hire – Clinical Sciences and Animal Sciences already committed - 2021

- Population Health (2 position)
    - Disease Epidemiologist
- Systems Modeling (1 position)
- Feedlot Specialist (1 position)

Second Cluster Hire – 2022

- Dairy Specialist (1 position)
- Rangeland Scientist (1 position)
- Cow Calf Population Health Management Specialist (1 position)
- Animal Agriculture Law and Policy Specialist (1 position)

Third Cluster Hire – 2023

- Environmental Impact Scientist (1 position)
- Emerging Agriculture Technology Scientist (1 position)
- Grazing System Specialist (1 position)
- Nutritional Epidemiologist (1 position)
- Emerging Infectious Disease Specialist (1 position)

711 Ranch
James Henderson
CEO

Beatty Canyon Ranch
Steve Wooten
President, CEO

Beef Marketing Group
John Butler
CEO

Brackett Ranches
Kim Brackett
CEO

Five Rivers
Mike Thoren
President, CEO

Veterinary Research & Consulting, LLC
Tom Portillo
Partner

Harper Livestock
Mike Harper
President, CEO

JBS USA
Cameron Bruett
Head of Corporate Affairs and Chief Sustainability Officer

LeValley Ranches
Robbie LeValley
CFO

Kraft Family Dairies
Mary Kraft
CFO

Safeway/Albertsons
Cathy East
Vice President Procurement Meat/Seafood/Deli

Veterinary Research & Consulting, LLC
Del Miles
Founder


LIVE
Science


people
profit
survivability
eco-friendly
adaptability
efficiency
viability
long
regeneration
long-term
business
stewardship
resilience
people
sustainable
health
operational
nature
endurance
thinking
future
environmental
social
human
needs
strategic
common
competitiveness
responsibility
value
green
creation
renewal
inclusive
corporate
planet
life
profitability
development
economic
resources
correctness
impact
growth
ecological
enduring

Animal and climate activists blockade McDonald's distribution centers across England

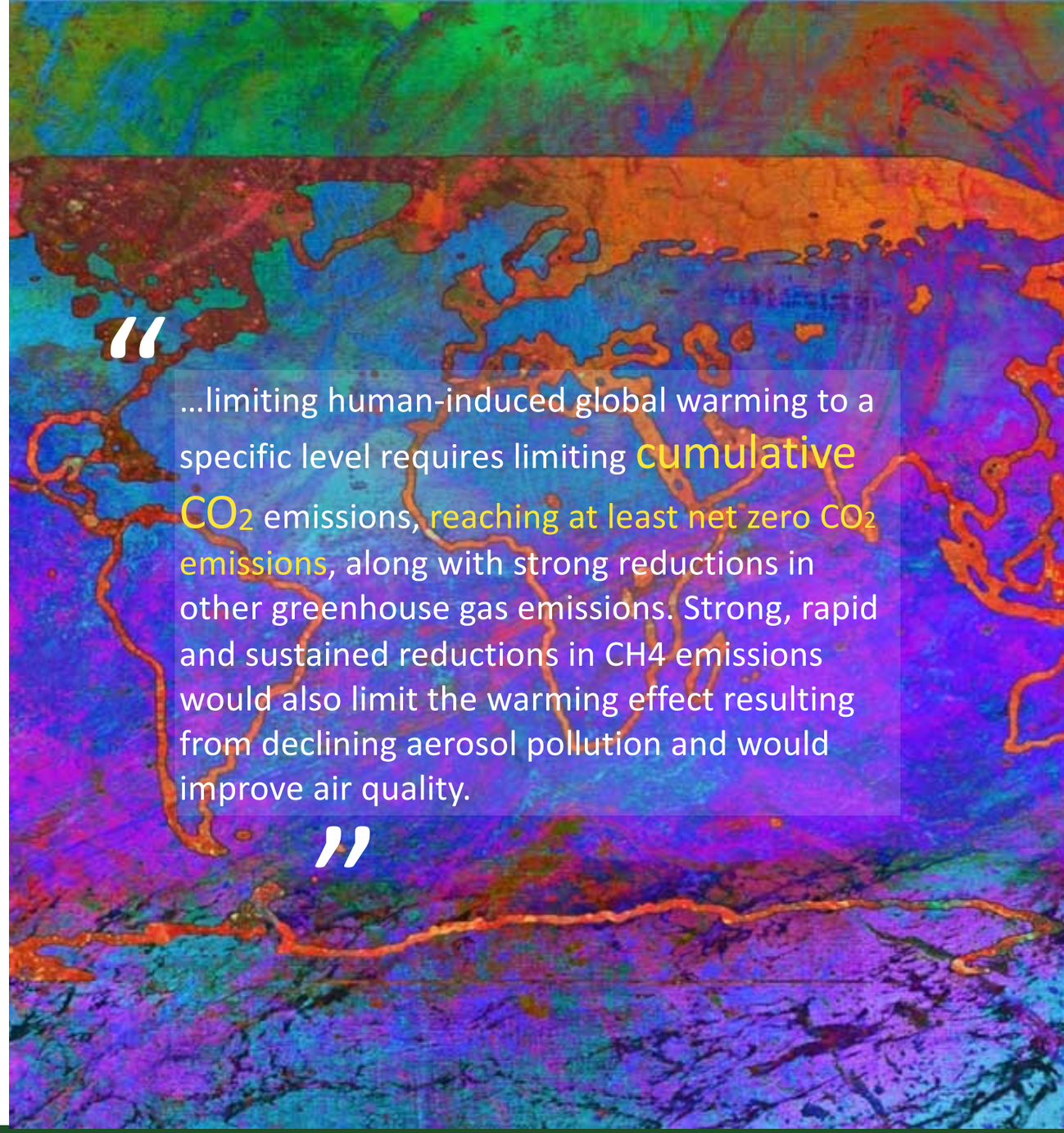
By Eoin McSweeney, CNN
Updated 8:39 AM EDT, Sat May 22, 2021

Courtesy Animal Rebellion

Protesters blockaded four McDonald's sites across England Saturday demanding the fast-food chain switches to plant-based products by 2025.

The New IPCC AR6 Report

- Near term 1.5 to 2 °C warming unavoidable.
- Many climate impacts also now irreversible.
- "Net zero" goals cited by many misinterpret the IPCC.
- "Cumulative CO2" is a very specific term of art.
- Methane reductions are seen more as a way of offsetting reduced cooling by sulfate aerosols (fossil fuel reductions coincide with reductions in sulfate aerosols).



Narrative Driving The Perception

1

cows are worse than cars

2

meat and poultry destroys the planet

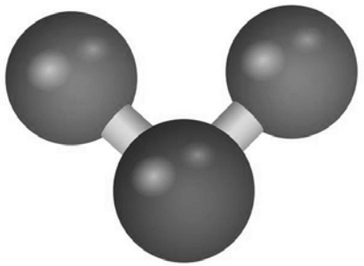
3

we should just eat what the animals eat

4

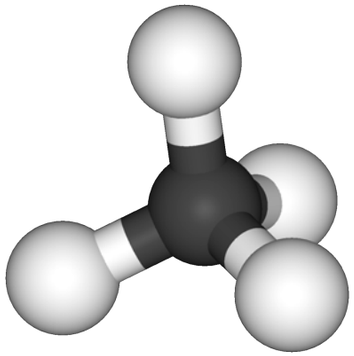
meat-free diets are the only solution

The Global Warming Potential (GWP) was developed to allow comparisons of the global warming impacts of different gases. Specifically, it is a measure of how much energy the emissions of 1 ton of a gas will absorb over a given period of time, relative to the emissions of 1 ton of carbon dioxide (CO_2).



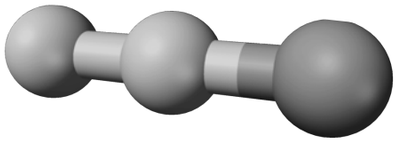
Carbon dioxide (CO_2)

CO_2, by definition, has **a GWP of 1** regardless of the time period used, because it is the gas being used as the reference. CO_2 remains in the climate system for a very long time: CO_2 emissions cause increases in atmospheric concentrations of CO_2 that will last thousands of years.



Methane (CH_4)

Methane (CH_4) is estimated to have a **GWP of 28–36** over 100 years. CH_4 emitted today lasts about a decade on average. CH_4 absorbs more energy than CO_2. The net effect of the shorter lifetime and higher energy absorption is reflected in the GWP. The CH_4 GWP also accounts for some indirect effects, such as the fact that CH_4 is a precursor to ozone, and ozone is itself a GHG.

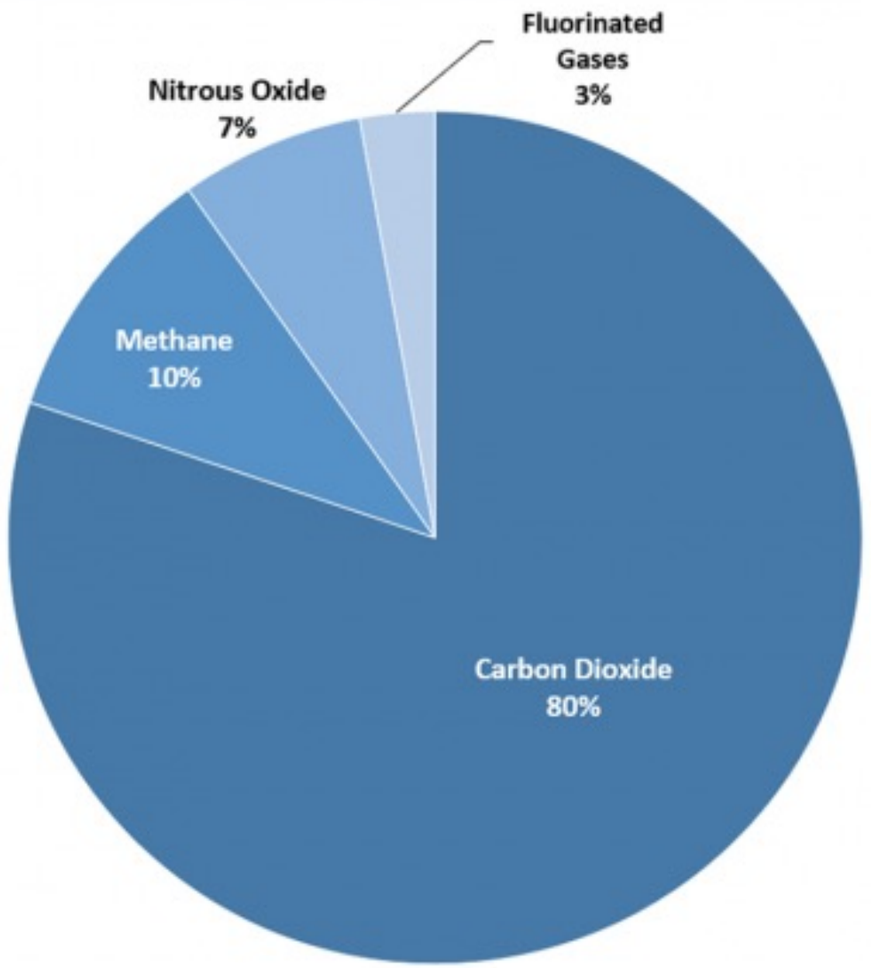


Nitrous Oxide (N_2O)

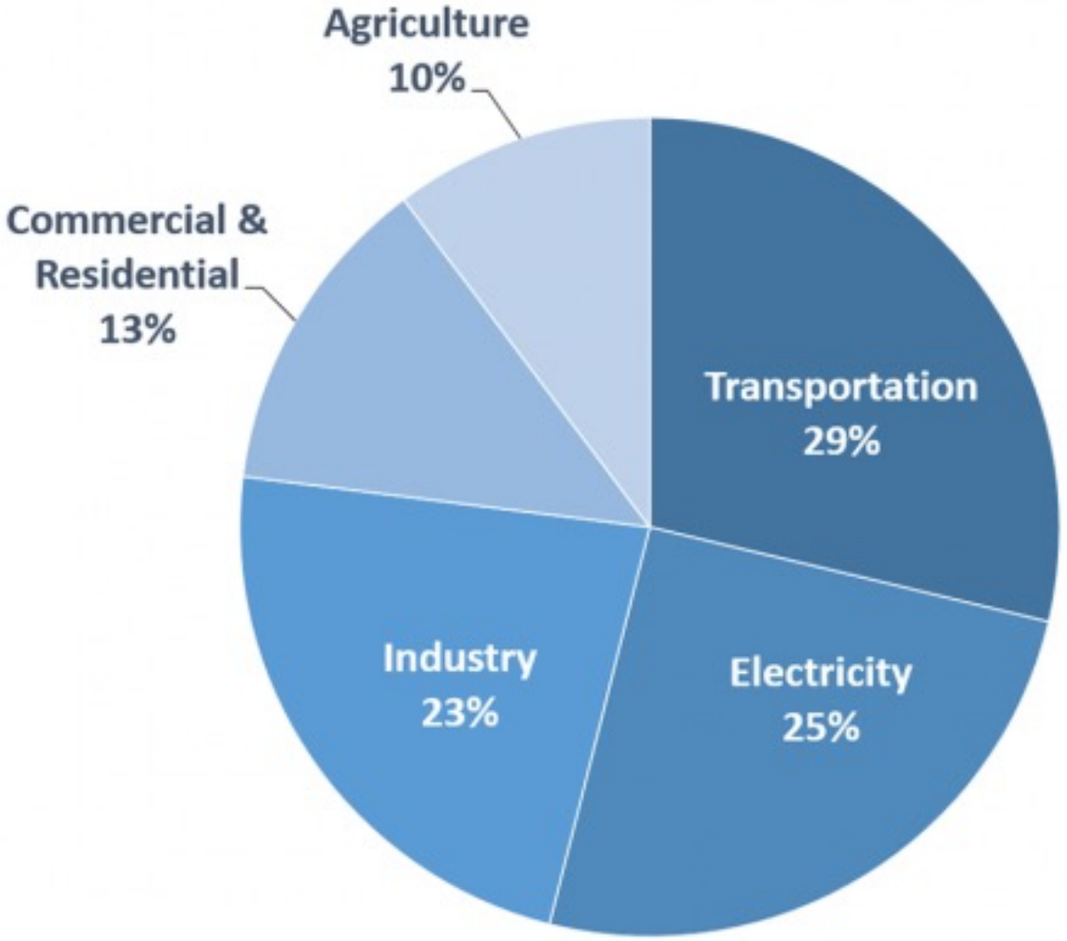
Nitrous Oxide (N_2O) has a **GWP 265–298** times that of CO_2 for a 100-year timescale. N_2O emitted today remains in the atmosphere for more than 100 years, on average.

Source: US EPA

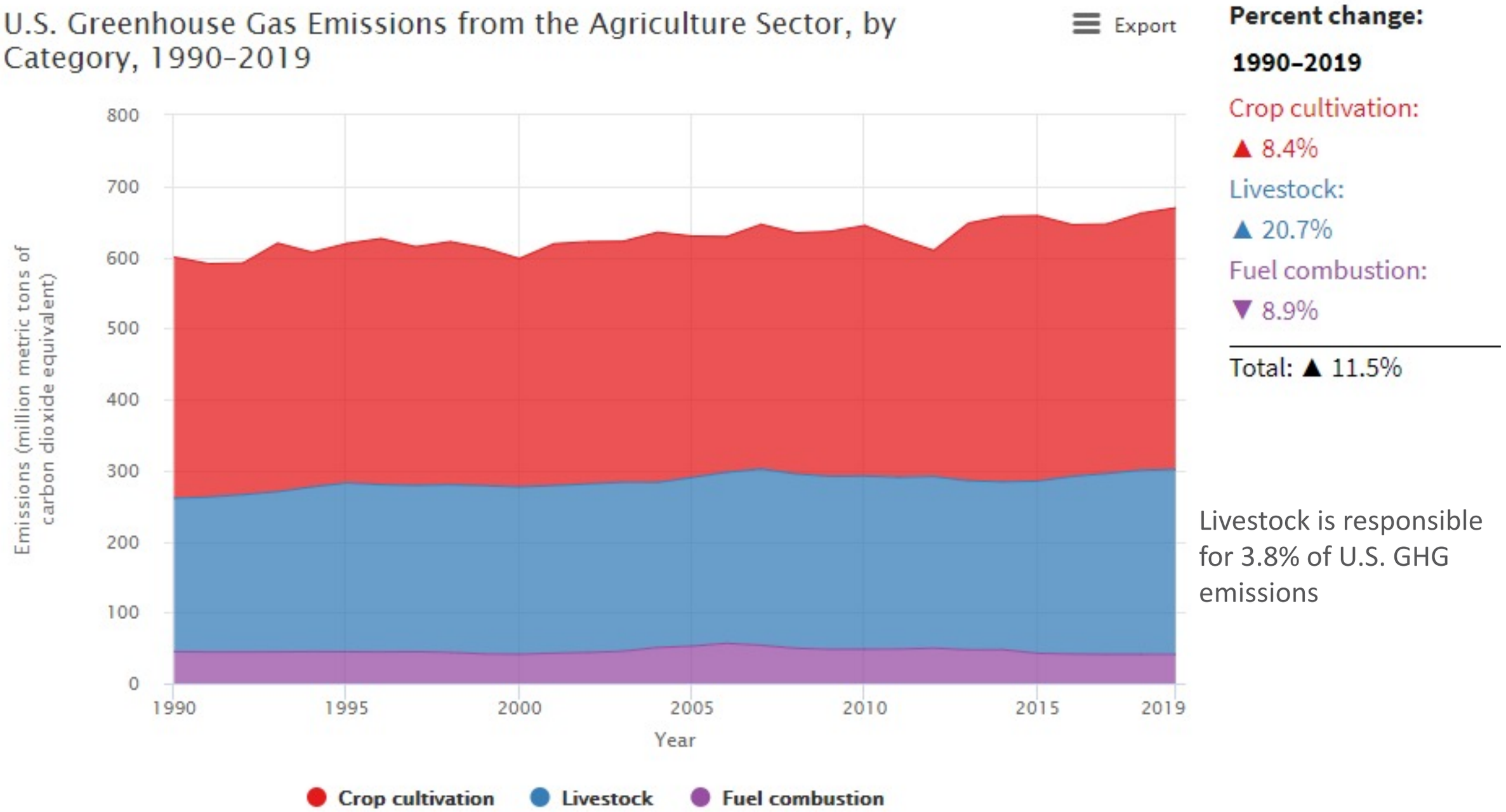
Overview of U.S. Greenhouse Gas Emissions in 2019



Sources of U.S. Greenhouse Gas Emissions in 2019

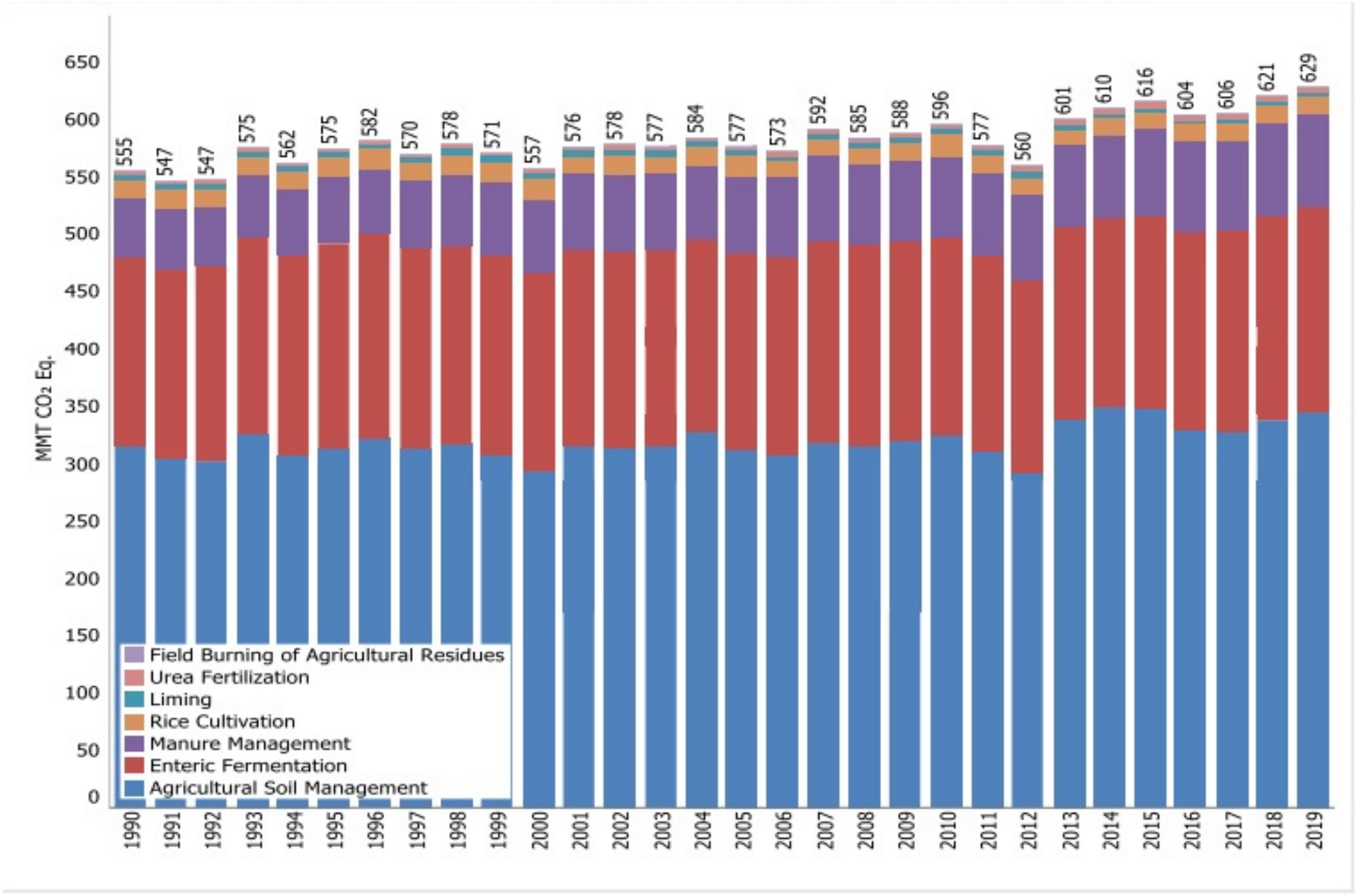


Source: US EPA (2021). Inventory of U.S. GHG emissions and sinks: 1990-2019



Livestock is responsible for 3.8% of U.S. GHG emissions

Figure 5-2: Trends in Agriculture Chapter Greenhouse Gas Emission Sources



Between 1990 and 2019:

CO_2 increased 9.9%

CH_4 increased 17.5%

N_2O increased 10.4%

Source: US EPA (2021). Inventory of U.S. GHG emissions and sinks: 1990-2019: Chapter 5 Agriculture

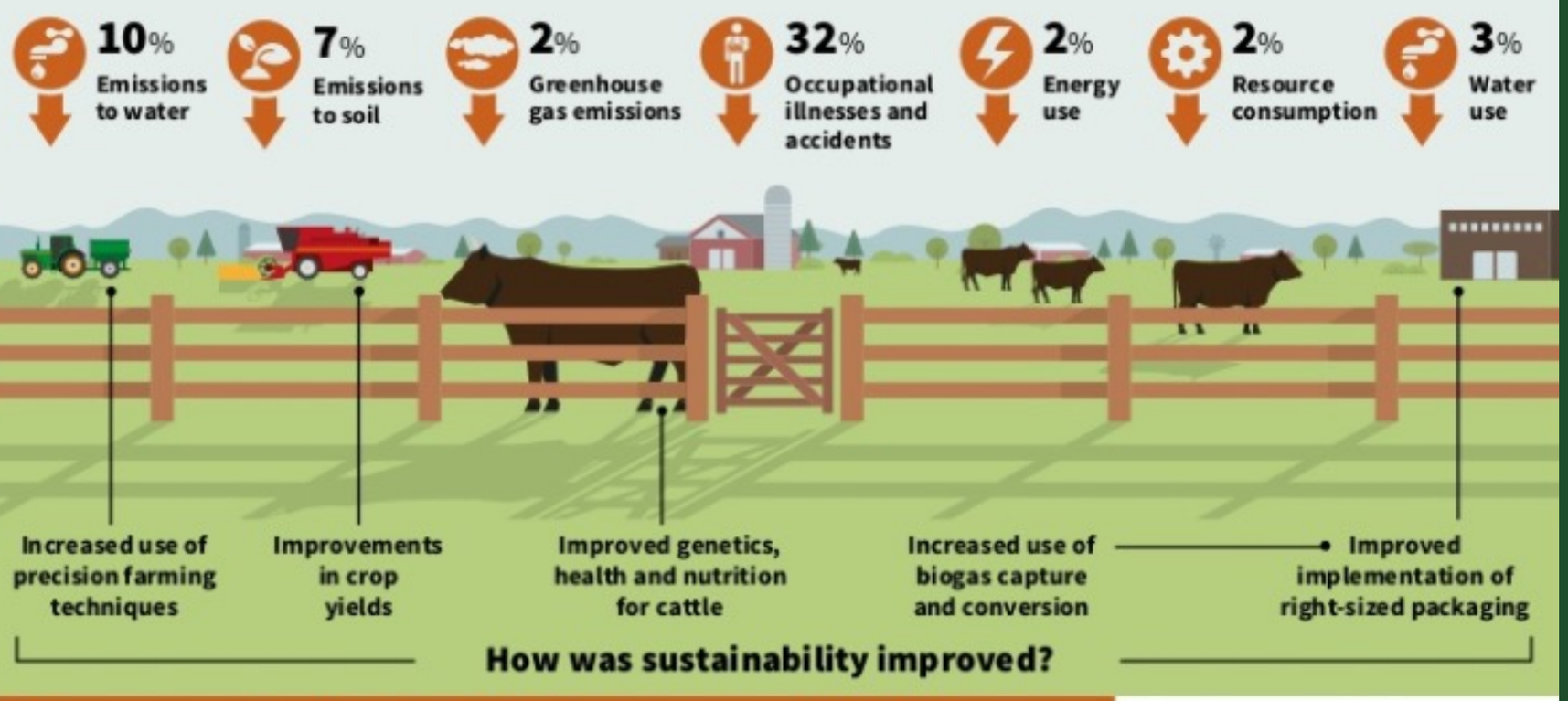
Image: agri-footprint.com

Total emissions are not the same as footprints

LCA methodology provides a much more comprehensive and complete picture of impact

Allows us to understand unintended consequences

The Beef Checkoff Program launched a comprehensive lifecycle assessment to quantify and benchmark environmental, social and economic aspects of beef industry sustainability from 2005 - 2011. Improvements included:



Future opportunities to further increase sustainability:

Source: Beef Industry Sustainability Lifecycle Assessment, funded by the beef checkoff

Committed to a journey of continuous improvement

BEEF

Funded by the Beef Checkoff.

First and largest of-its-kind, conducted by the beef check-off

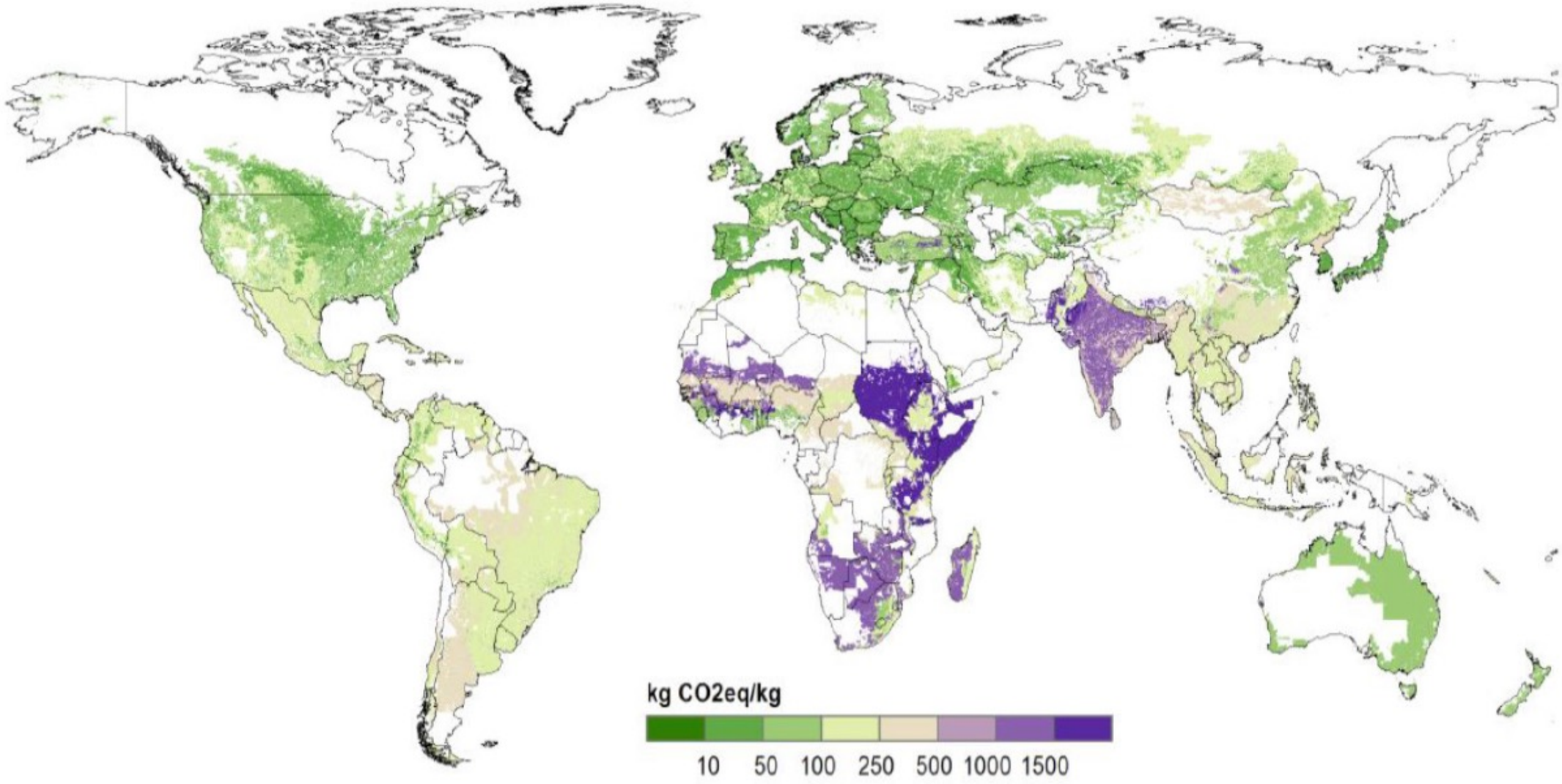
1. Validated whole systems models in beef systems: MARC and combined pre and post farm data

2. Continue to update with regional data and more detailed production data compared to NAHMS

3. Aligned to other proteins methodology

This work is important because it evaluates emissions on a product basis and allows and improvement comparison overtime

Global beef production footprints



Source: UN FAO

Livestock allow us to produce food on land unsuitable for cultivation, while enhancing ecosystems

Rangeland’s store 20% of the globes soil organic carbon

The most important thing we can do for soil organic C in rangelands is to:

1. Preserve rangelands (avoid conversion)
2. Restore cultivated and degraded lands
3. Practice adaptive livestock management
    - This does not consider benefits of other ecosystems services (wildlife habitat, water storage capacity, etc.), rural community well-being and rural economies

Source: Sanderson et. al, 2020. Cattle, conservation and carbon in the western Great Plains. Journal of Soil and Water Conservation

How Beef Production Impacts Soil C

- Cycles nutrients back to the soil
- Proper grazing management can protect and restore C on degraded land
- Inclusion on highly productive forages (legumes often included) may help improve soil C
- Inclusion of deep-rooted plants within forage mixtures may help store C deeper into the soil profile

Meat and poultry have an impact, but also provide benefits to the ecosystem and for rural communities

Feed GHG sources and sinks

- Total feed consumed to produce 1 kg CW of beef is 22 kg DM, 74% consumed in the cow-calf phase
- Total consumption consists of 82% forage, 11% grain and 7% byproduct and waste product feeds
  - *This indicates that 10–15% of the feed consumed in beef production comes from sources that might be available for human consumption.*

Feed used in animal production is not easily consumed by humans and has a different nutrient value, cattle are upcyclers

Source: Rotz et.al, 2019. Agricultural Systems 1369:1-13.

Meat-free diets are not the solution

If every American went vegan, we'd reduce U.S. greenhouse gas emissions 2.6% (which is 0.36% of global emissions)

"Overall, the removal of animals resulted in diets that are nonviable in supporting the nutritional needs of the U.S. population."

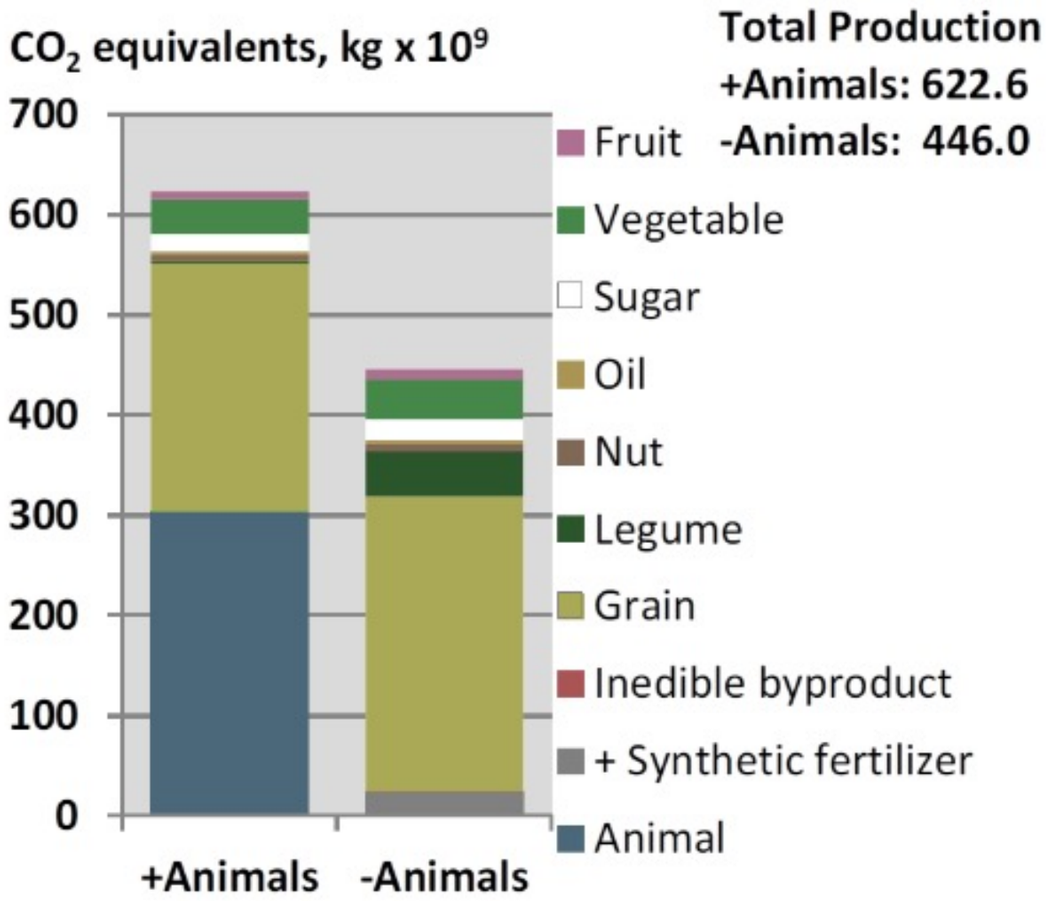
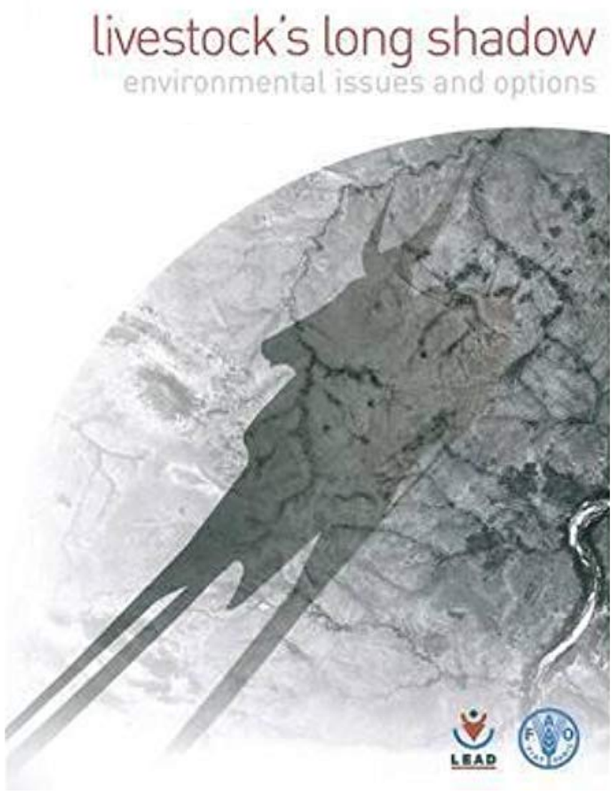


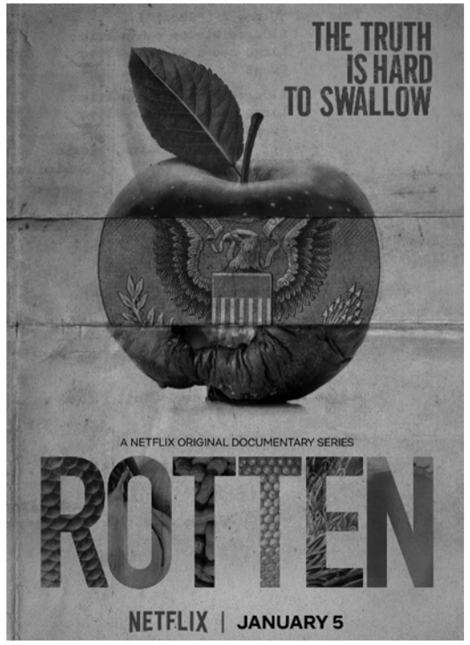
Fig. 5. GHG emissions associated with food production in a system representative of the current United States and a modeled system in which animal-derived food inputs are eliminated.

*This assumes all livestock in the U.S. would disappear

Source: White and Hall, 2017. Proc. Natl. Acad. Sci. 114: E10301–E10308

PERCEPTION





REALITY

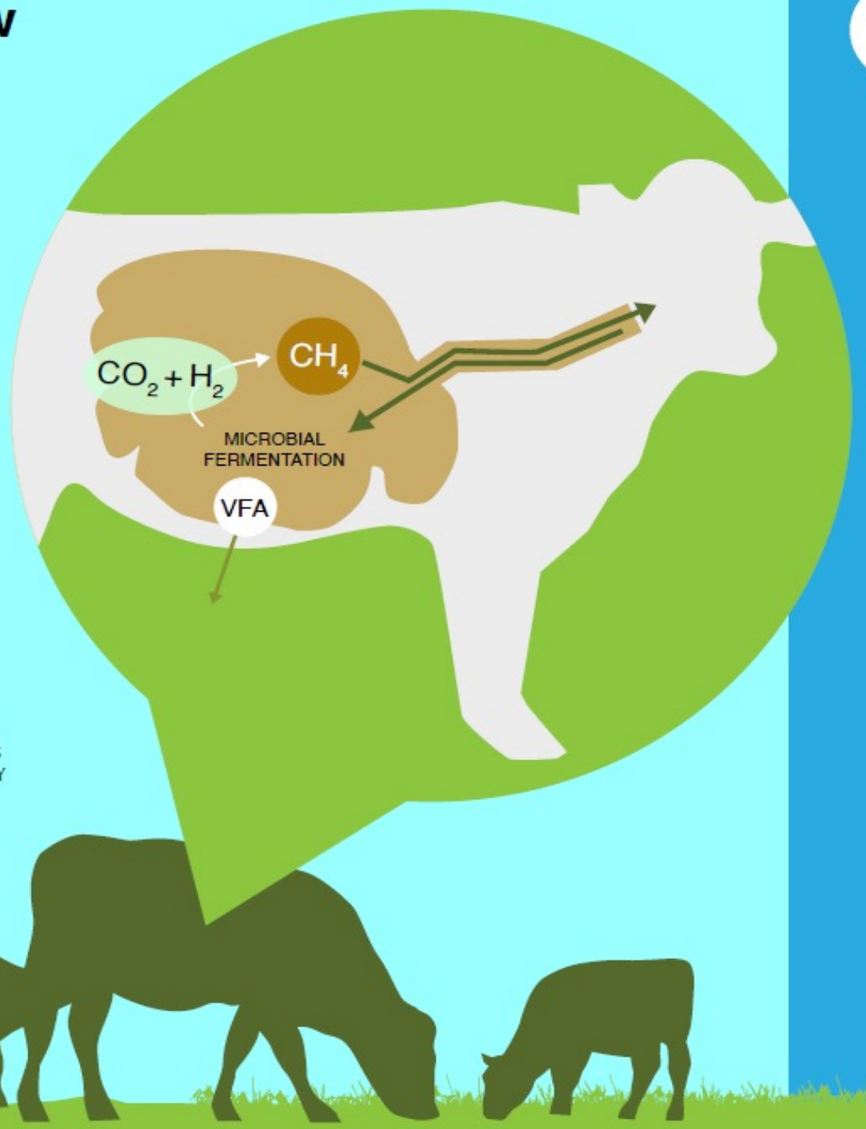
With 2.2 billion more mouths to feed by 2050, experts estimate **food production must grow by 70%**

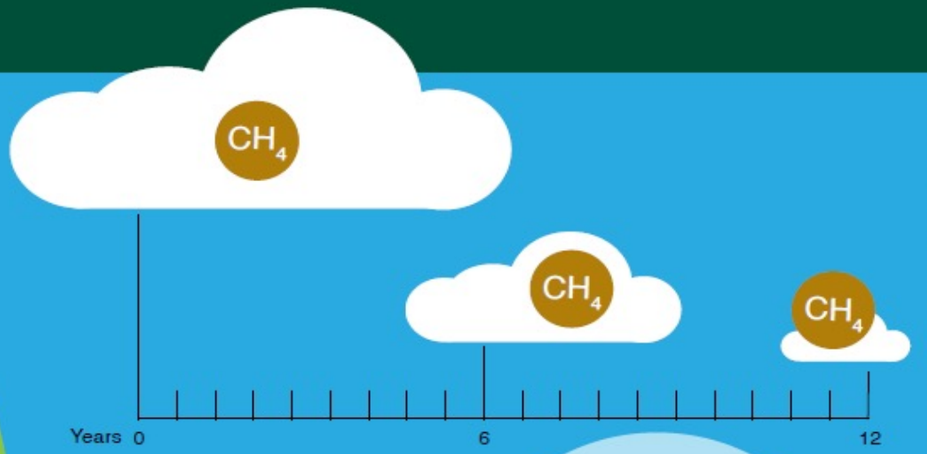
METHANE IN THE CARBON CYCLE

Carbon in cow

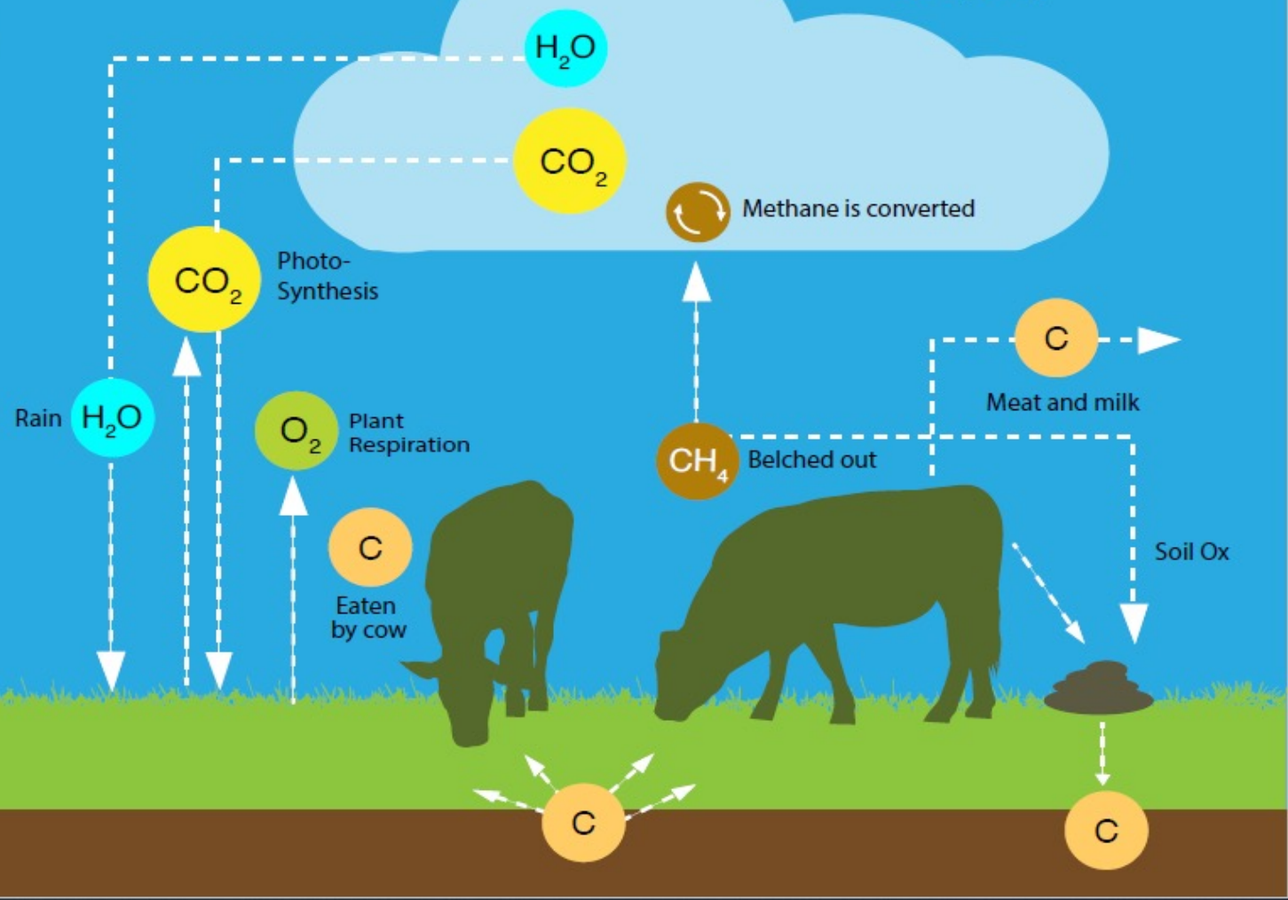
Enteric methane is a natural by-product of ruminal fermentation in reticulo-rumen and hindgut and is essential for normal rumen functioning. During the process of microbial fermentation, volatile fatty acids are produced and used to meet the metabolic needs of the animal. Carbon dioxide and H2 that are produced during this process are then converted into CH4 by rumen methanogens and eructated into the atmosphere.

College of Agriculture and Natural Resources
MICHIGAN STATE UNIVERSITY





Over 9-12 years, CH4 is broken down into CO2 and H2O by OH- radicals in the atmosphere. Current GWP metrics, however, treat this short-lived pollutant as a stock GHG, eg. CO2, and may be overstating the benefits of reducing emissions as any warming due to methane is dependent on the emissions of that decade and not cumulative emissions to that point (Allen et al., 2018).



Rethinking methane from animal agriculture

Liu et al. 2021 *CABI Agric Biosci*

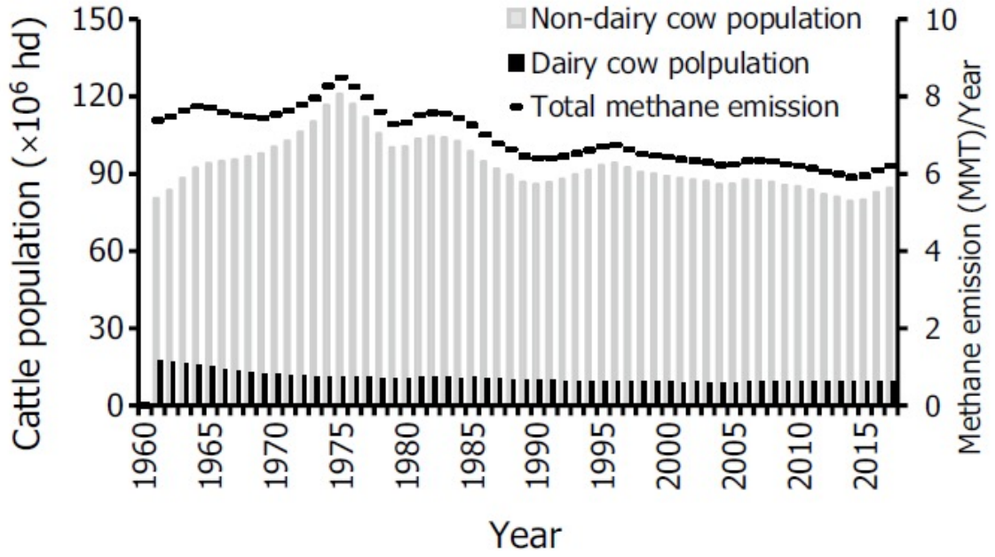


Fig. 2 U.S. non-dairy (i.e., beef) and dairy cattle population between 1961 and 2017. Hollow columns represent non-dairy cow population; solid columns represent dairy cow population; dashed lines represent total methane emission

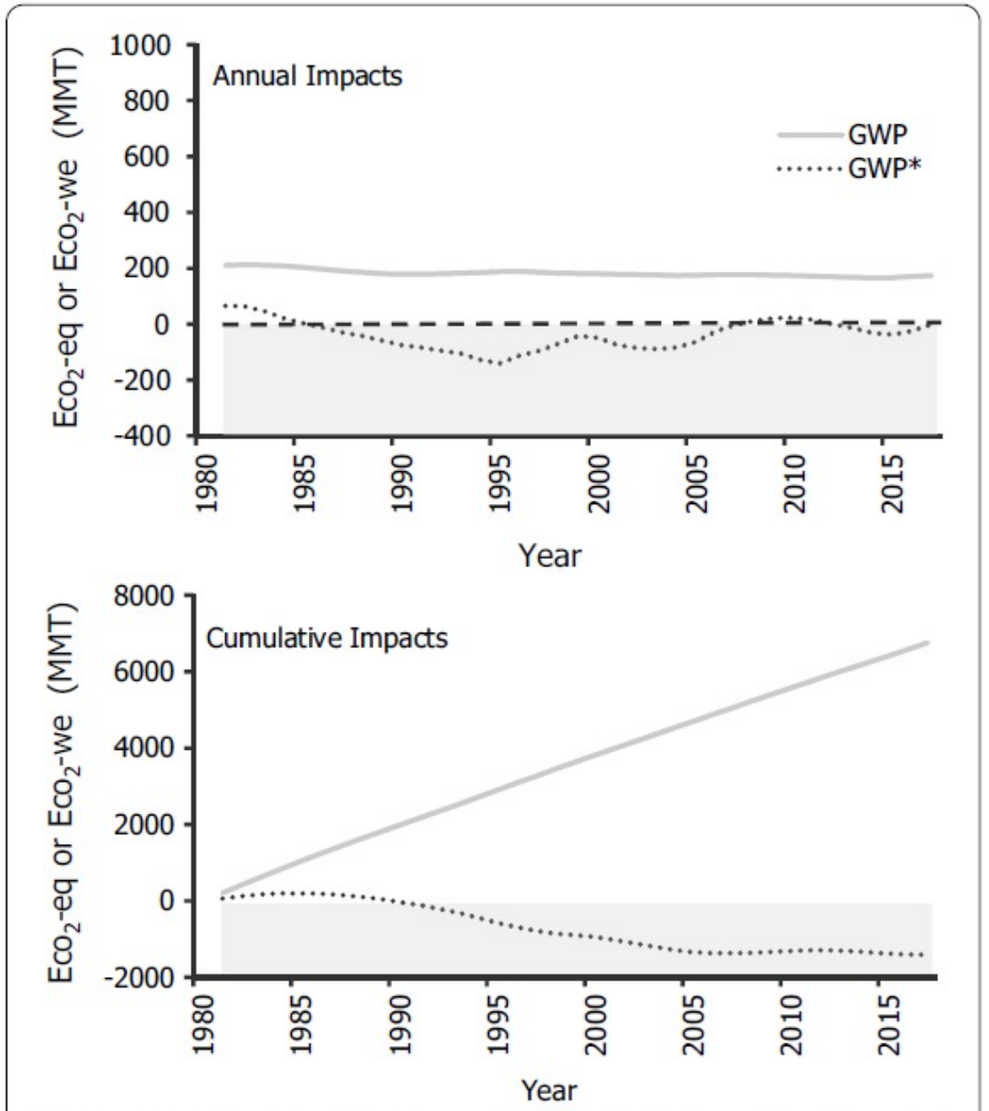


Fig. 3 Climate impacts of the methane from U.S. non-dairy (i.e., beef) and dairy cattle production. Solid line represents GWP results and dashed line represents GWP* results

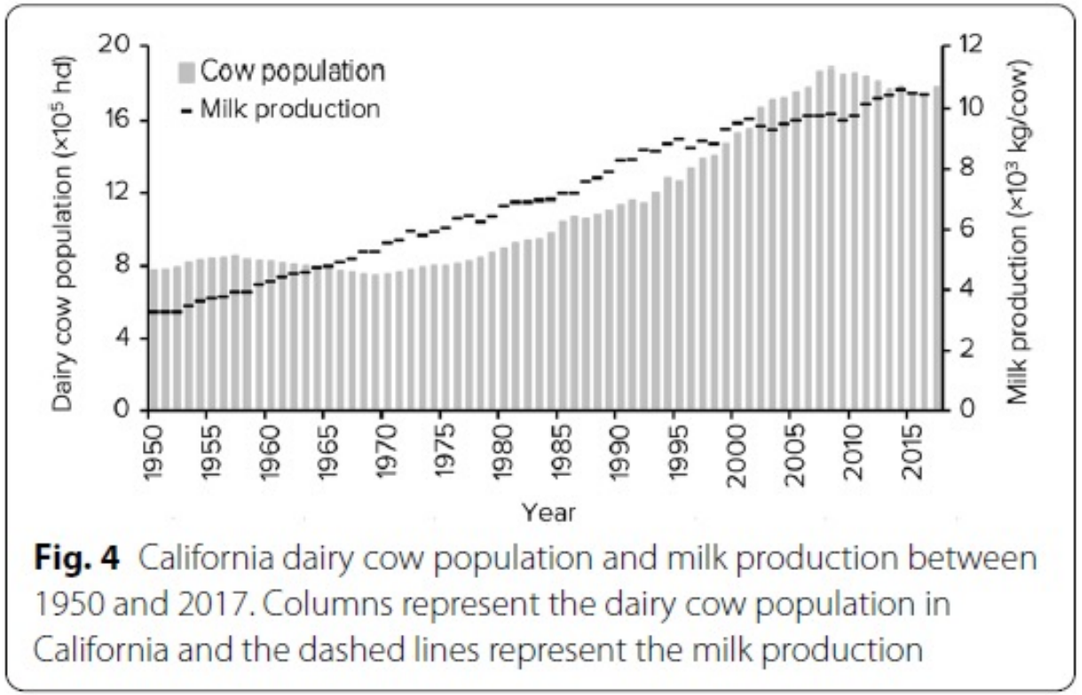


Fig. 4 California dairy cow population and milk production between 1950 and 2017. Columns represent the dairy cow population in California and the dashed lines represent the milk production

Assumes climate impacts from methane

If accepted this will change U.S. and global emissions and LCA findings related to contributions of CH_4

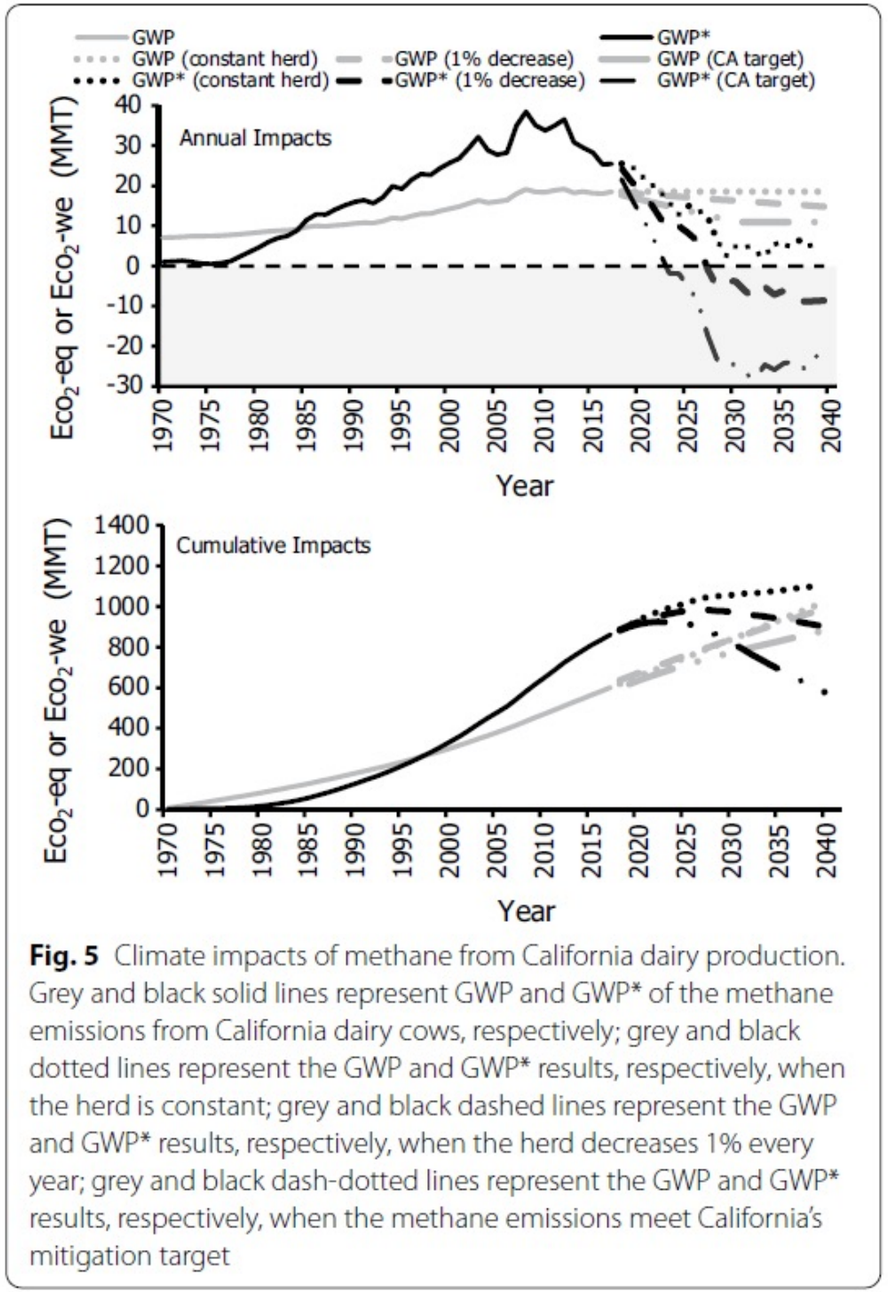


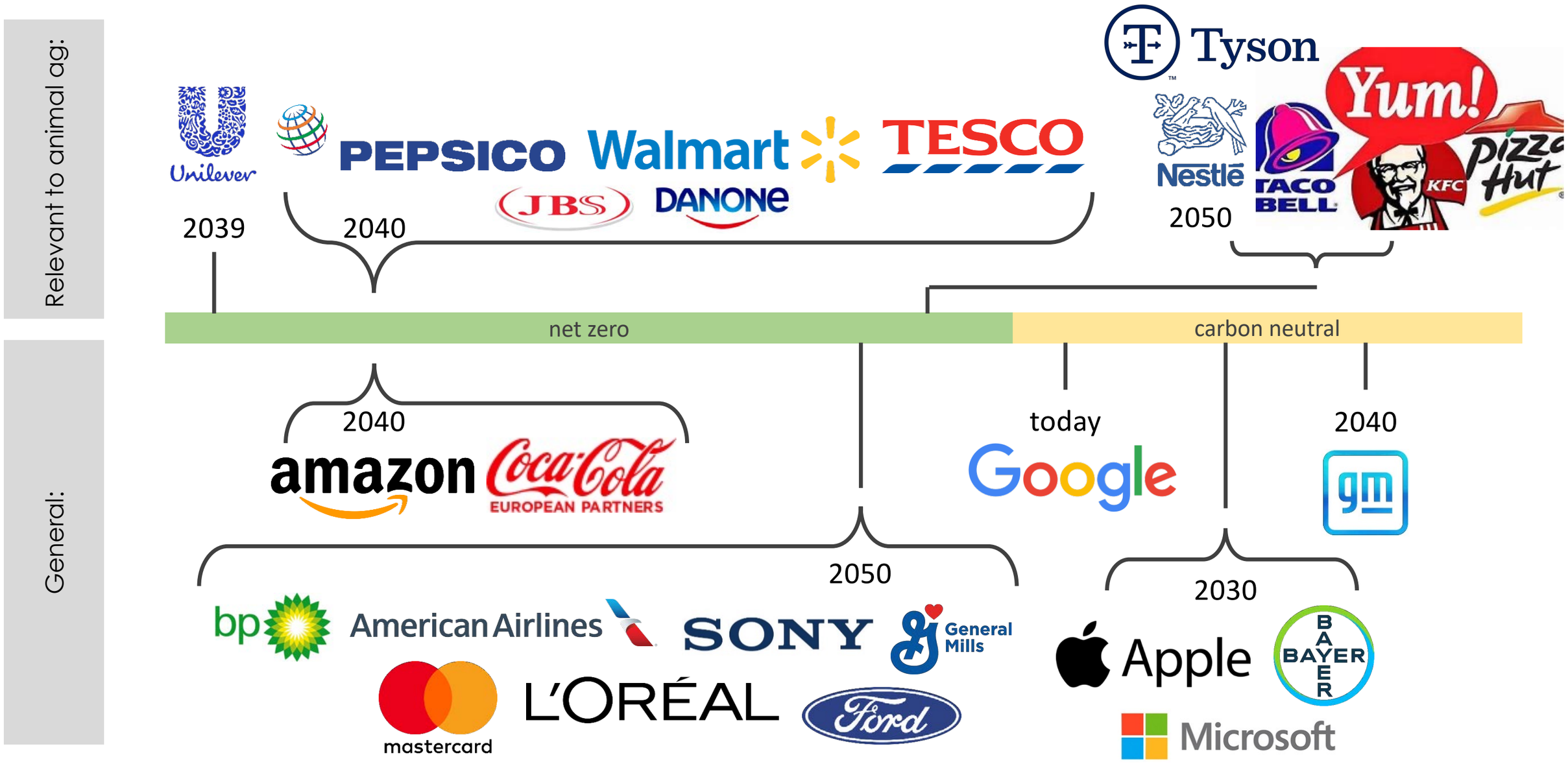
Fig. 5 Climate impacts of methane from California dairy production. Grey and black solid lines represent GWP and GWP* of the methane emissions from California dairy cows, respectively; grey and black dotted lines represent the GWP and GWP* results, respectively, when the herd is constant; grey and black dashed lines represent the GWP and GWP* results, respectively, when the herd decreases 1% every year; grey and black dash-dotted lines represent the GWP and GWP* results, respectively, when the methane emissions meet California's mitigation target

Source: Liu et al. 2021 *CABI Agric Biosci*

Biden's Executive Action: *Biden-Harris Administration Commits on Climate Change – Creating Jobs, Building Infrastructure, and Delivering Environmental Justice*

- Issue of National Security
- NetZero economy by 2050
  - Carbon pollution-free power sector by 2035
  - 30 by 30 program, conserving 30% of lands and oceans by 2030
- *"Across the country, farmers and ranchers are taking action to protect natural resources, and the Administration's Methane Reduction Strategy provides additional voluntary actions producers can take to cut methane emissions. USDA will help producers implement these strategies, including methane capture technologies like anaerobic digesters and biogas systems, which create jobs and allow producers to tap into a $3 billion market for renewable energy. Since 2009, USDA has provided $62 million in support for 93 methane digester projects across the United States." – Tom Vilsack*
- *"Part of our efforts will focus on enhancing climate-smart agricultural practices, the development of biofuels, carbon capture and sequestration, better forest management, and reforestation." – Tom Vilsack*

Current Company Commitments



Carbon neutral: refers to having a net-zero carbon footprint

Climate neutral: Climate neutral refers to the emission and mitigation of *all* greenhouse gases – not just carbon.

When a company commits to Net Zero, it often includes its entire value chain and they rarely know how or have plans to achieve the goal.

Sustainability Program Established

JBS conducts a corporate materiality assessment and baseline emission assessment in 2015.

Tyson conducts a corporate materiality assessment and baseline emission assessment in 2016.

Cargill conducts a corporate materiality assessment and baseline emission assessment in 2017.

Tyson refocused climate goals based on SBTi initiatives in 2018.

Future Goals

2025 Goals: Cargill aims to reduce scope 1 and 2 emissions by 10% against 2017 levels. Cargill also hopes to implement water stewardship at all 81 facilities. JBS aims to eliminate all amazon deforestation in their supply chain.

2030 Goals: Tyson has a goal of reducing GHG emissions 30% by 2030. Cargill has a goal of reducing GHG emissions from their global supply chains by 30% per measured ton of product. Cargill also has a goal of restoring 600 billion liters of water in priority watersheds and reduce % million kg of water pollutants. JBS plans to reach 60% renewable energy usage and reduce scope 1 and 2 emissions by 30%. JBS also has goals of reducing water use intensity by 15%. JBS also has a goal of a 30% improvement in the Global Safety Index.

Beyond 2030: Tyson has committed to achieving net zero GHG emissions by 2050. Cargill hopes to have new R&D strategies and technology by 2040 or 2050 based on research grants and studies being conducted now. JBS has committed to achieving net zero GHG emissions by 2040.

UN SDG Commitments

Company	UN Sustainable Development Goal Commitments
Tyson	
Cargill	
JBS	

McDonalds, Target, The Nature Conservancy, Cargill

- 5-year, $8.5 million project to increase C sequestration across 100,000 acres of row crops and feed production across Nebraska
- Includes ecosystems services market consortium pilot program
- Additional $4.4 million to scale adoption of regenerative agriculture

The Nature Conservancy
Protecting nature. Preserving life.

Cargill™

target

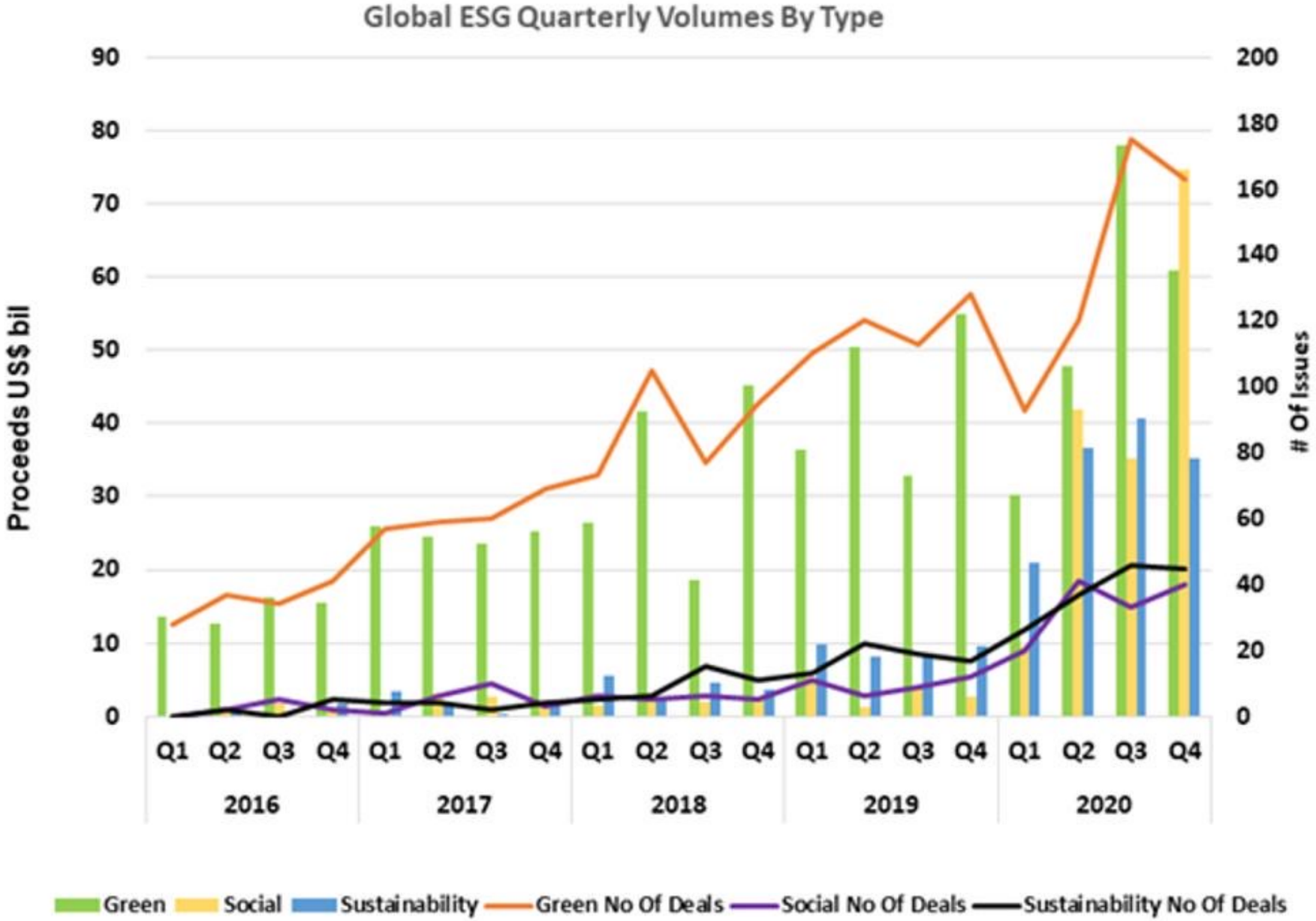
75%

Of millennials believe their investments can influence climate change

84%

Of millennials believe their investments can help lift people out of poverty

Source: Credit Suisse, Making an Impact: Earing Returns on Sustainable Terms

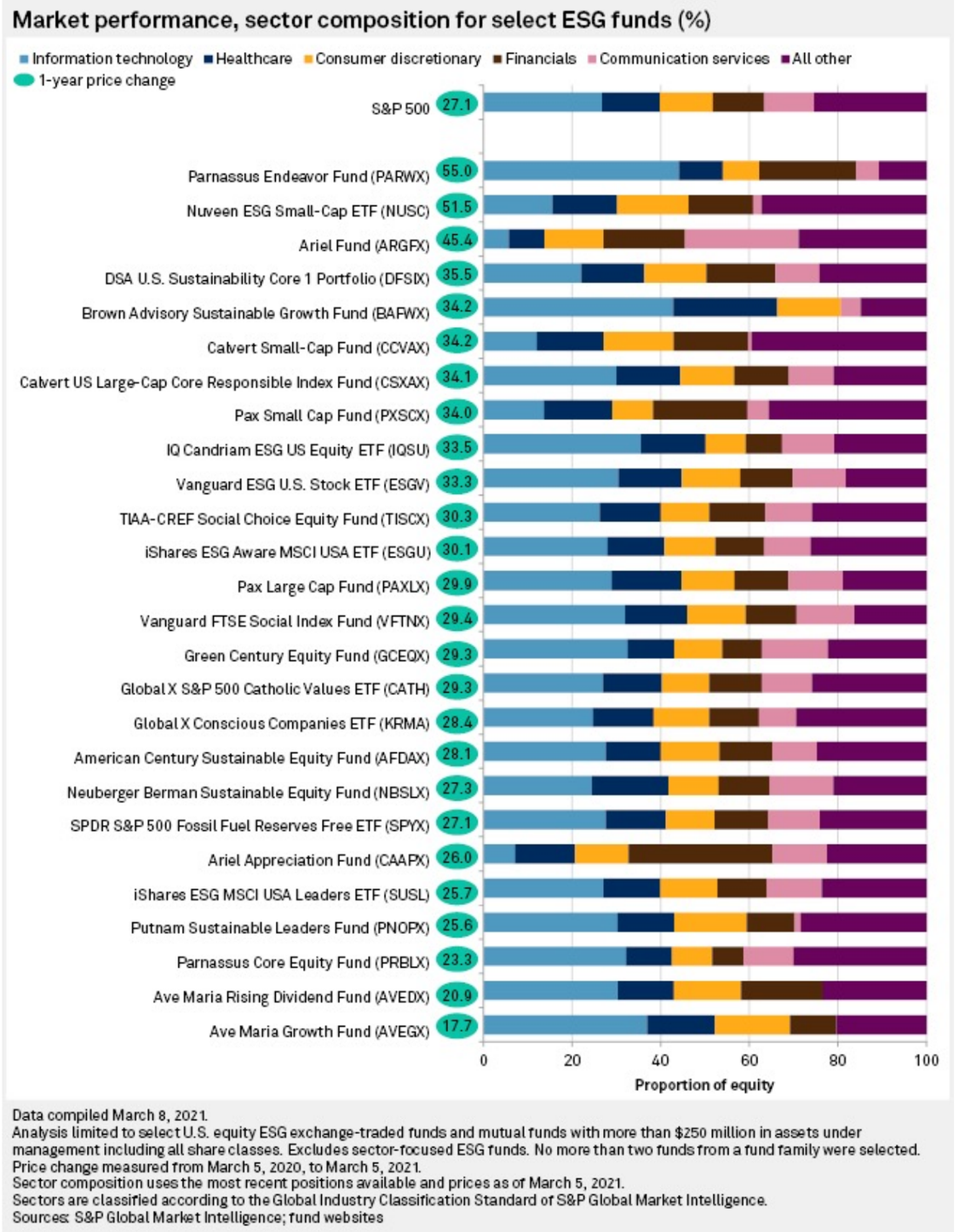


Source: Forbes

ESG funds beat out S&P 500 in 1st year of COVID-19; how 1 fund shot to the top

S&P Global Market Intelligence analyzed 26 ESG exchange-traded funds and mutual funds with more than $250 million in assets under management. We found that from March 5, 2020 — the month that the World Health Organization officially declared COVID-19 a pandemic — to March 5, 2021, 19 of those funds performed better than the S&P 500. Those outperformers rose between 27.3% and 55% over that period. In comparison, the S&P 500 increased 27.1%.

"The creation of sustainable index investments has enabled a massive acceleration of capital towards companies better prepared to address climate risk," Fink wrote. "As more and more investors choose to tilt their investments towards sustainability-focused companies, the tectonic shift we are seeing will accelerate further. And because this will have such a dramatic impact on how capital is allocated, every management team and board will need to consider how this will impact their company's stock."



In Summary

- Climate will be the most important sustainability metric for the next 4 years
  - Total methane emissions are increasing
  - GWP* has been acknowledged, but this will not change the importance of methane mitigation
- The impact of beef on climate is measured and reported differently and is complex
- Behind in research, we don't have a good "start here" for the supply chain
- Corporate programs (including retail and food service) have matured beyond the industry approach
  - Significant supply-chain expectations
- Sustainability (social, economic, environmental) will be an expectation moving into the future

A shift in strategy is needed from defensive to proactive where we come together to address the greatest challenge of our time.

We must demonstrate credibility to connect emotionally.

Thank you

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Colorado State University