Agriculture plays a critical role in limiting the impact of climate change

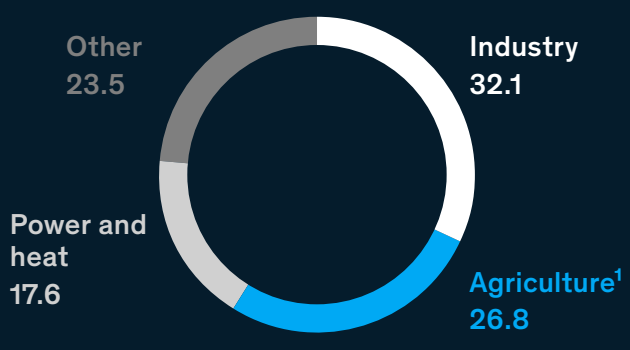
The agriculture sector accounts for a **large, growing, and impactful** share of global greenhouse gas (GHG) emissions.

Agriculture is ...

... larger than you think

Agriculture is one of the highest-emitting sectors.

Total GHG emissions by sector, % (20-year AR5 GWP values)



[1] Including forestry, land use, fertilizer production, and electricity used in agriculture.

Cattle and dairy alone emit enough GHGs to put them on par with the highest-emitting nations.

2016 GHG emissions by country (top three GHGs), $GtCO_2e$[2] (20-year AR5 GWP values)

[2] Gigatonnes of equivalent carbon dioxide.

Major contributors to agriculture emissions include:

... growing faster than you realize

Demand for agricultural production over the next 30 years will likely be shaped by two primary factors:

Population reaching

~10 billion

Per capita food consumption growth of

8–12%

As a result, agriculture emissions are likely to increase

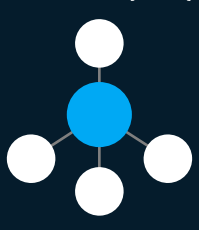
15–20% by 2050[3]

[3] Assuming current levels of production efficiency.

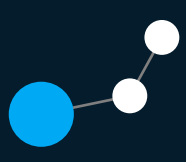
... responsible for highly impactful emissions

Agriculture is a major emitter of

Methane (CH_4)

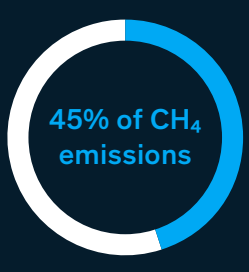


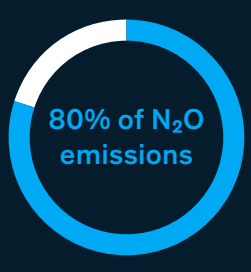
Nitrous oxide (N_2O)



Methane is the second-largest contributor to climate change.

Agriculture accounts for



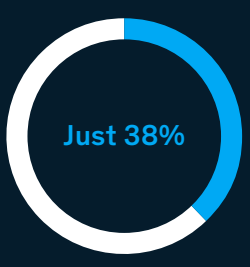


CH_4 is 84× more powerful than CO_2 in forcing temperature increases over a span of 20 years.

N_2O is 264× more powerful than CO_2 in forcing temperature increases over a span of 20 years.

... challenging to address

Policy makers are not focused on agriculture emissions.



of agriculture emissions are covered in nationally determined contributions (NDCs) under the Paris Agreement.[4]

[4] Analysis based on 46 countries (with the European Union counted as one country), which contribute 90 percent of global agricultural emissions.

Billions of people need to change their behavior.

Average global consumption of red meat is

3×

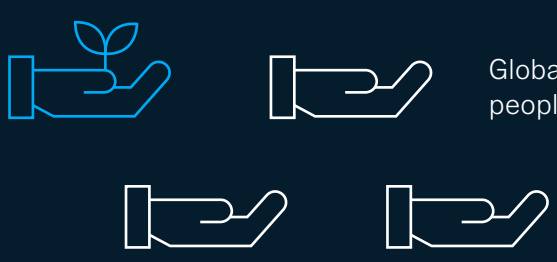
the recommended level.

Almost

1/3

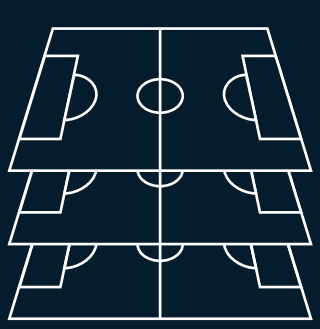
of all food produced in the world is wasted.

There are billions of farmers to engage.



Globally, one in four people are farmers.

New farm practices and technologies need to reach small-scale farms around the world.



75% of farms are smaller than three soccer fields.

All told, reducing agriculture emissions will require changing how we farm, what we eat, and how we manage our forests and natural carbon sinks.

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Sources: "Understanding global warming potentials," Environmental Protection Agency, epa.gov; *Climate change 2013: The physical science basis*, Intergovernmental Panel on Climate Change, 2013, ipcc.ch; *Fifth assessment report*, Intergovernmental Panel on Climate Change, ipcc.ch; Rita Strohmaier et al., *The agriculture sectors in the intended nationally determined contributions: Analysis*, Food and Agriculture Organization of the United Nations, 2016, fao.org; Dave Reay et al., "Global agriculture and nitrous oxide emissions," *Nature Climate Change*, May 2012, Volume 2, pp. 410–16; "Growing at a slower pace, world population is expected to reach 9.7 billion in 2050 and could peak at nearly 11 billion around 2100," United Nations, June 17, 2019, un.org; FAOSTAT, Food and Agriculture Organization of the United Nations, September 13, 2019, fao.org; Sarah Lowder, Jakob Skoet, Terri Raney, "The number, size, and distribution of farms, smallholder farms, and family farms worldwide," *World Development*, 2016, Volume 87, pp. 16–29; *CO_2 emissions from fuel combustion 2018*, IEA, 2018, oecd-ilibrary.org; "Emissions of CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 (Edition 2018)," IEA CO_2 emissions from fuel combustion statistics, accessed September 16, 2019, oecd-ilibrary.org; R.A. Houghton, Alexandar Nassikas, "Global and regional fluxes of carbon from land use and land cover change 1850–2015," *Global Biogeochemical Cycles*, 2017, Volume 31, Number 3, pp. 456–72; *Special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems (SR2)*, IPCC, 2017, ipcc.ch; McKinsey analysis

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