



# Emissions of Greenhouse Gases in the Agriculture Sector



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# At a Glance

The agriculture sector emits greenhouse gases (GHGs) through its two main activities: producing crops and managing livestock (including poultry). The sector is the nation's leading source of emissions of GHGs other than carbon dioxide (CO<sub>2</sub>). The accumulation of GHGs in the atmosphere contributes to climate change, which affects the economy and the federal budget.

This is the fourth in a series of reports from the Congressional Budget Office on GHG emissions in various sectors of the economy. It provides an overview of the main components of GHG emissions from agriculture, recent trends in those emissions, and projections of future emissions.

- **Agriculture accounts for about 10 percent of total U.S. GHG emissions (measured by their capacity to trap atmospheric heat), including nearly half of the nation's total non-CO<sub>2</sub> emissions.** Agricultural GHG emissions are mainly nitrous oxide and methane, which, per ton emitted, are much more potent than CO<sub>2</sub> in trapping atmospheric heat. Agriculture accounts for nearly all U.S. emissions of nitrous oxide and almost half of emitted methane.
- **About half of agricultural GHG emissions are from crop production; nearly all of the rest come from livestock.** The sector's nitrous oxide emissions mainly come from fertilizers used to produce crops. Most of its methane emissions are from livestock operations, particularly from collecting and storing manure and from the digestive emissions of cattle.
- **Agricultural GHG emissions have increased much less than agricultural production has in the past 25 years.** Those emissions have increased by about 7 percent since 1990 (mostly from greater livestock emissions), whereas milk production and harvests of field crops have both increased by more than 50 percent, on average, and meat production has increased by about 75 percent. The much larger increase in agricultural production compared with the rise in the sector's GHG emissions can be attributed to advances in agricultural technologies and in livestock breeding, nutrition, and health.
- **CBO projects that in the coming decades, GHG emissions from agriculture will increase by about a quarter of a percent each year.** Actual GHG emissions will vary depending on whether future demand for U.S. agricultural production is greater or less than projected and on the pace at which agricultural technologies that would reduce emissions are developed and adopted.

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# Contents

<b>Comparison of Greenhouse Gas Emissions From Agriculture and Other Sectors</b>	2
Non–Carbon Dioxide Emissions From Agriculture and Other Sectors	3
Nitrous Oxide and Methane Emissions From Agriculture	4
<b>Sources of Emissions From Agriculture</b>	5
Emissions From Crop Production	6
Emissions From Livestock Operations	7
Emissions From Cattle	8
Emissions From Fuel Combustion	9
Geographic Distribution of Emissions	10
<b>Trends in Emissions From Agriculture</b>	11
Trends in the Main Components of Emissions From Agriculture	12
Trends in Emissions From Crop Production	13
Trends in Emissions From Livestock Operations	14
<b>Projected Emissions From Agriculture</b>	15
Factors Affecting Future Emissions From Agriculture	15
Comparison of Projected Emissions From Agriculture and Other Sectors	16
<b>Appendix: Data Sources for Figures</b>	21
<b>About This Document</b>	24

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# Notes About This Report

For this report, the Congressional Budget Office used data and adapted figures from various sources. Those sources are cited in the appendix.

Numbers in the text and figures may not add up to totals because of rounding.

Although the term “livestock” does not typically refer to poultry—meaning only cattle, sheep, horses, goats, and other domestic animals raised or used on farms—CBO’s use of that term includes poultry unless the report indicates otherwise.

Throughout this report, CBO’s projections of emissions of greenhouse gases from agriculture and other economic sectors do not incorporate the effects of the 2025 reconciliation act (Public Law 119-21), which became law on July 4, 2025.

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# Emissions of Greenhouse Gases in the Agriculture Sector

The accumulation of greenhouse gases (GHGs) in the atmosphere—carbon dioxide (CO<sub>2</sub>), methane, nitrous oxide, and other gases—contributes to climate change. Climate change imposes costs on countries around the globe, including the United States. It also increases the risk of several adverse effects, economic and otherwise, including slower growth of gross domestic product, property damage from flooding and higher sea levels, and damage to ecosystems that provide food, medicines, and clean air and water.<sup>1</sup>

CO<sub>2</sub> is the most common GHG, accounting for about 80 percent of total U.S. GHG emissions, according to the Environmental Protection Agency.<sup>2</sup> The remaining 20 percent are non-CO<sub>2</sub> gases, and nearly half of those emissions are from the agriculture sector. The sector emits mainly nitrous oxide and methane in roughly equal amounts in CO<sub>2</sub> equivalent units (that is, the amount of CO<sub>2</sub> that would, over a century, trap the same amount of heat in the atmosphere).<sup>3</sup>

Almost all the sector's nitrous oxide emissions are from excess fertilizer nitrogen that is not absorbed by plants. Most of its methane emissions come from cattle as they digest and, to a lesser degree, from the decomposition of manure from livestock (including—throughout this report—poultry). All told, the agriculture sector is responsible for about 10 percent of GHG emissions (measured by their capacity to trap atmospheric heat) in the United States.

Agricultural activity and its associated GHG emissions are widely dispersed geographically, although they are more concentrated in the Midwest than in most other parts of the country. That dispersal has implications for how those emissions might be managed but otherwise has no implications for their effect on the climate because GHG emissions ultimately mix uniformly in the Earth's atmosphere.

In this report, the Congressional Budget Office provides an overview of GHG emissions from the agriculture sector and the sources of those emissions.<sup>4</sup> The report examines the factors underlying the relative stability of emissions in recent decades and provides projections of agricultural emissions in the decades ahead. The report is the most recent in a series of CBO studies that examine GHG emissions released from broad sectors of the U.S. economy—manufacturing, transportation, and electric power.<sup>5</sup> The reports are part of CBO's continuing efforts to promote an understanding of its work and to enhance the transparency and credibility of its analysis.

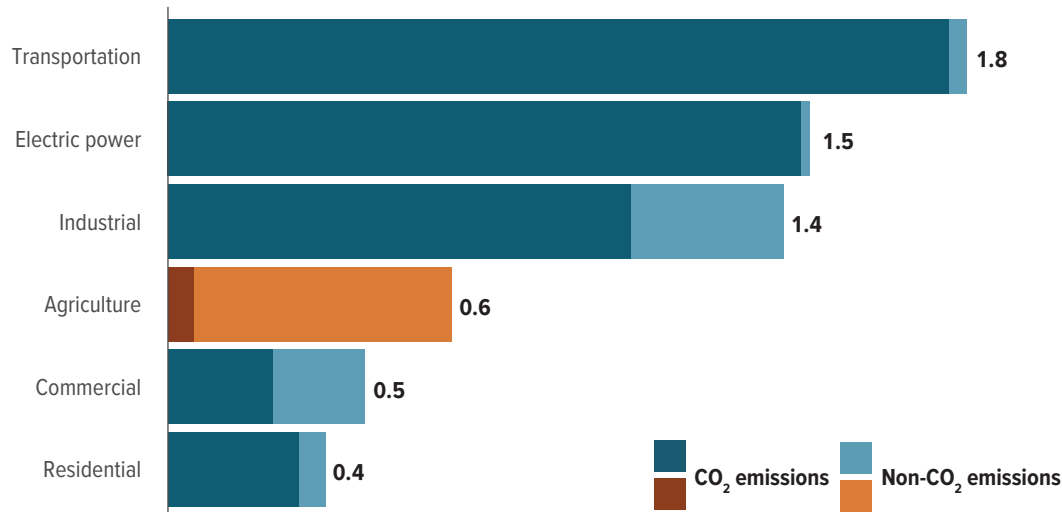
## Comparison of Greenhouse Gas Emissions From Agriculture and Other Sectors

Agriculture is the fourth-largest GHG-emitting sector in the United States, behind transportation, electric power, and the industrial sector. (That ranking reflects the allocation of emissions from producing electricity to the electric power sector rather than to the sectors in which the electricity is used.) In those other sectors, more than 90 percent of the collective GHG emissions are CO<sub>2</sub>, which largely comes from the combustion of fossil fuels to produce energy. But nearly all emissions from agriculture (92 percent) are nitrous oxide or methane, which mainly come from cultivating crops (primarily through crop fertilization) and managing livestock (raising livestock and collecting and storing animal manure).

The United States emitted an estimated 6.2 billion metric tons of GHGs in 2024.<sup>6</sup> Most of those emissions were CO<sub>2</sub> released mainly by burning fossil fuels to produce energy. The rest were nitrous oxide, methane, and other (mainly fluorinated) gases. Although those gases are released in smaller quantities than CO<sub>2</sub> and break down more quickly than it does, they are more potent than CO<sub>2</sub> in terms of their ability to trap atmospheric heat: about 28 times more potent for methane, about 270 times for nitrous oxide, and several thousand times for fluorinated gases.<sup>7</sup> Measured in CO<sub>2</sub> equivalent units, about 20 percent of U.S. GHG emissions are non-CO<sub>2</sub> gases.

### GHG Emissions, by Economic Sector, 2024

Billions of metric tons of CO<sub>2</sub> equivalent units



CBO estimates that agriculture accounted for 0.6 billion metric tons of emissions in 2024—about 10 percent of all GHG emissions that year. Nearly all agricultural emissions were non-CO<sub>2</sub> GHGs and were from activities unrelated to energy use. Emissions in other sectors were predominantly CO<sub>2</sub> released from burning fossil fuels to produce energy.



### Non-Carbon Dioxide Emissions From Agriculture and Other Sectors

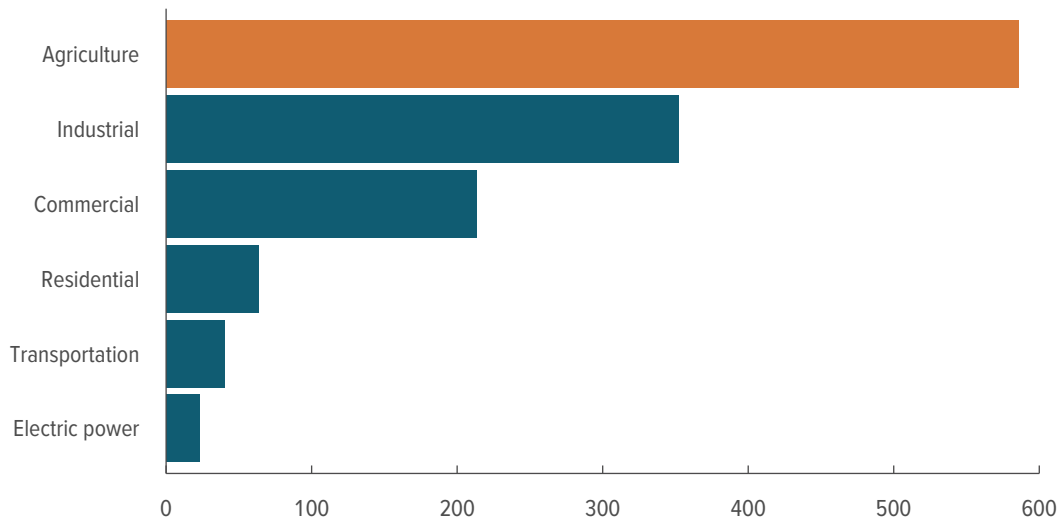
All the non-CO<sub>2</sub> emissions from agriculture—and most non-CO<sub>2</sub> emissions from other sectors—are in the form of methane or nitrous oxide. Measured in CO<sub>2</sub> equivalent units, agricultural emissions accounted for almost half of the 1.3 billion metric tons of non-CO<sub>2</sub> emissions in the United States in 2024. Emissions from agriculture exceeded the combined non-CO<sub>2</sub> emissions from the next two largest emitters, the industrial and commercial sectors.

Leading sources of methane emissions in the United States include livestock, oil and gas production, and decomposition of waste in landfills. Most nitrous oxide emissions are from agriculture—fertilizing crops and collecting and storing manure from livestock. Much of the rest comes from treating wastewater. Almost twice as much methane, measured in CO<sub>2</sub> equivalent units, is released each year in the United States as nitrous oxide. Together, those gases account for 83 percent of all non-CO<sub>2</sub> GHG emissions in the United States.

The remaining 17 percent of non-CO<sub>2</sub> emissions are fluorinated gases—potent GHGs with global warming potentials that are thousands of times greater than equivalent amounts of CO<sub>2</sub> and that are mostly used in refrigeration and aerosols. Agriculture is not a sectoral source of fluorinated gases.

#### GHG Emissions Other Than Carbon Dioxide, by Economic Sector, 2024

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units



The agriculture sector accounts for a small share of total GHG emissions but is the largest source of non-CO<sub>2</sub> emissions in the United States. In CO<sub>2</sub> equivalent units, nearly 600 MMT of non-CO<sub>2</sub> emissions (or about 45 percent of the total) were from agriculture in 2024.

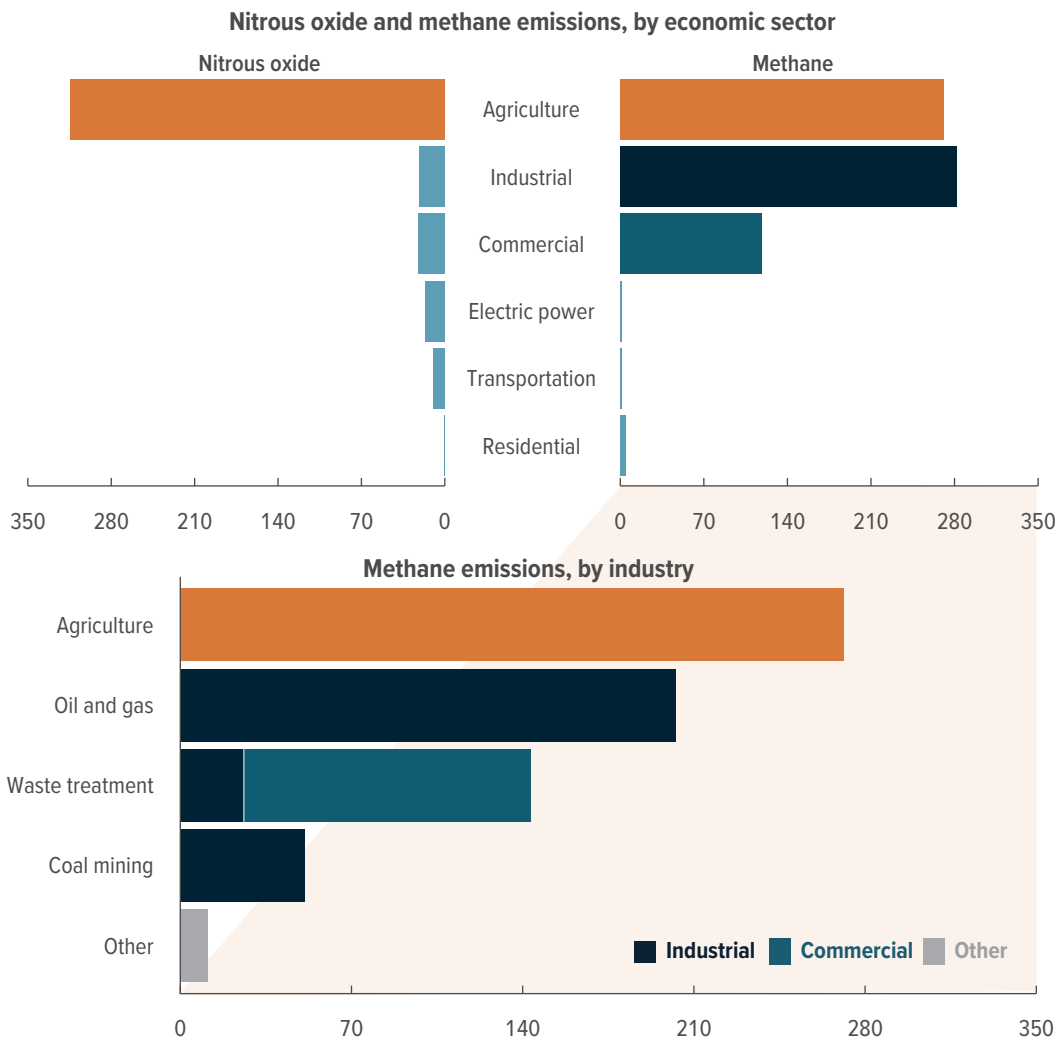
### Nitrous Oxide and Methane Emissions From Agriculture

The agriculture sector is the largest source of nitrous oxide emissions and the second-largest source of methane emissions in the United States. In 2024, agriculture accounted for more than 4 times as much emitted nitrous oxide as all other sectors combined, and over 10 times as much as the next largest sector.

But the agriculture sector is not the only leading source of methane emissions: In 2024, it emitted slightly less methane than the industrial sector. Together, those two sectors produced over 80 percent of all methane emitted in the United States. Among individual industries, however, agriculture was the single leading source of methane emissions, ahead of the oil and gas, waste treatment, and coal mining industries.

### Nitrous Oxide and Methane Emissions, by Economic Sector, and Methane Emissions, by Industry, 2024

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units



In 2024, agriculture accounted for about 315 MMT (or more than 80 percent) of total nitrous oxide emissions in the United States, in CO<sub>2</sub> equivalent units. The sector also accounted for about 270 MMT (or about 40 percent) of emitted methane.

Agriculture released about 35 percent more methane than the oil and gas industry did and about twice as much as the waste treatment industry. (The “Other” category includes certain emissions from fossil fuel combustion, some of which are from industrial and commercial sources.)



## Sources of Emissions From Agriculture

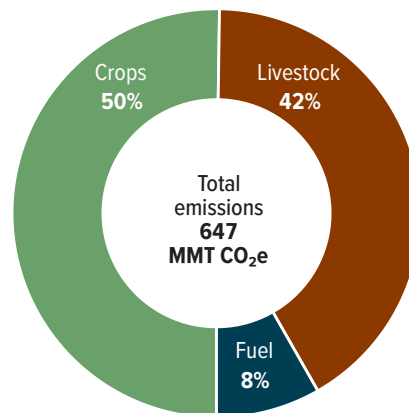
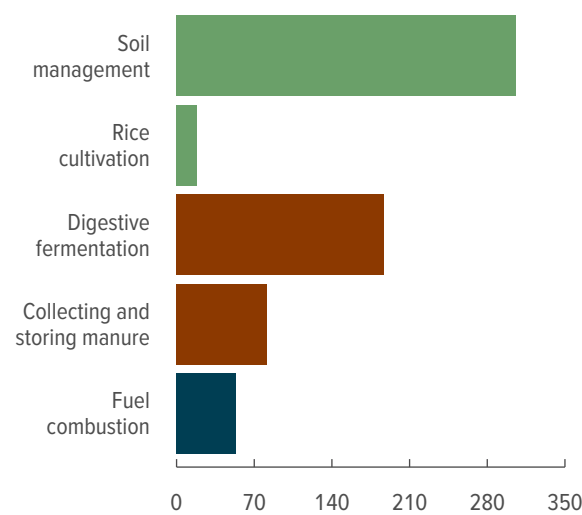
Nearly all the agriculture sector’s GHG emissions—almost 650 million metric tons in 2024—come from two main activities: crop production and livestock operations. Those activities accounted for nearly equal amounts of emissions in 2024 and together represented 92 percent of the sector’s GHG emissions. The use of fossil fuels to power agricultural machinery and facilities accounted for the remaining 8 percent of emissions.

Soil management—mainly crop fertilization, which adds nitrogen compounds to soils to encourage plant growth—is the largest source of agricultural emissions and accounts for nearly all crop-related emissions, mostly in the form of nitrous oxide. Rice cultivation, when it is carried out in flooded fields, produces methane, which also contributes to crop-related GHG emissions.

More than two-thirds of GHG emissions from livestock operations are caused by the digestive process in cattle and other livestock. Digestive fermentation—often referred to as enteric fermentation, the microbial breakdown of food in some animals’ digestive systems—produces methane. The remaining livestock-related emissions are from collecting and storing manure.

### Sources of GHG Emissions From Agriculture, 2024

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units (CO<sub>2</sub>e)



Emissions from crop production accounted for about half of all GHG emissions in the agriculture sector in 2024. Nearly all those emissions came from crop fertilization and other soil management processes.

Emissions from livestock operations accounted for about 270 MMT of CO<sub>2</sub>e. Emissions from digestive fermentation were about twice those from collecting and storing manure.

### Emissions From Crop Production

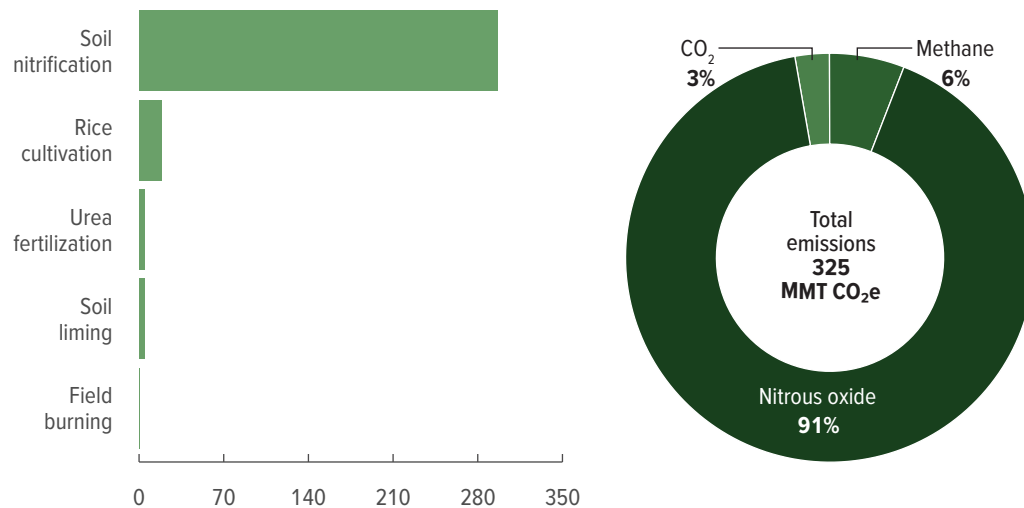
Over 90 percent of crop-related GHG emissions—including those attributable to feed crops for animals and grasslands where livestock graze—are caused by the nitrification and subsequent denitrification of soils. That is the process by which nitrogen in fertilizers—if not absorbed by growing plants—is converted to nitrous oxide in the presence of soil moisture and emitted into the atmosphere. Soil nitrification accounts for about 75 percent of all U.S. emissions of nitrous oxide, and corn—the most widely planted U.S. crop—accounts for more than half of the nitrous oxide emissions from agriculture (about twice its share of planted acreage).<sup>8</sup>

In 2024, 6 percent of crop-related GHG emissions were methane, mostly from rice cultivation in flooded fields: Microorganisms in the flooded soil produce methane as they break down organic plant matter in the absence of oxygen. Emissions from rice cultivation are largely confined to California, Texas, and rice-producing states bordering the lower Mississippi River.<sup>9</sup>

The remaining crop-related emissions, about 3 percent, were CO<sub>2</sub> from other soil management activities—urea fertilization (another method of boosting soil nitrogen) and liming (which enhances crop growth by reducing soil acidity)—and a small amount of GHGs from burning crop residues left behind after harvest.

### GHG Emissions From Crop Production, 2024

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units (CO<sub>2</sub>e)



Nearly all the agriculture sector’s crop-related GHG emissions are nitrous oxide from crop fertilization. Cultivating rice produces methane, and urea fertilization and liming produce some CO<sub>2</sub>. Field burning produces nitrous oxide and methane.

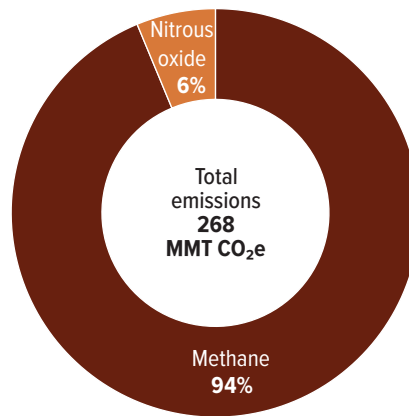
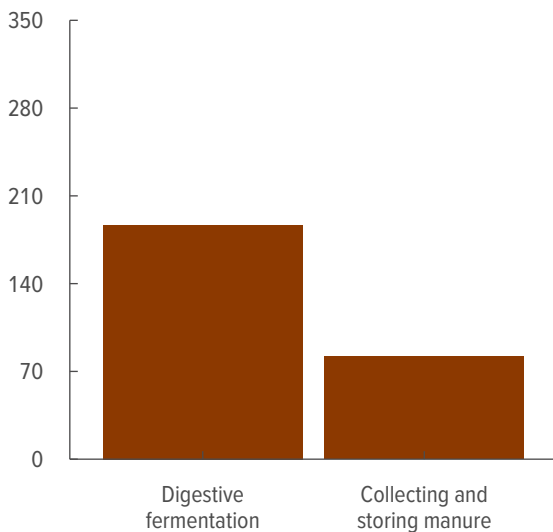
### Emissions From Livestock Operations

Nearly all GHG emissions from livestock operations are methane. Those emissions mainly come from ruminant animals, mostly cattle, whose digestive systems differ from those of other animals, allowing them to thrive on cellulosic plant material such as hay and silage. The digestive process in swine—pigs and hogs—also produces methane but in much smaller quantities. Digestive fermentation is the main source of livestock emissions.

The other source, collecting and storing manure, is responsible for about 30 percent of the total. Manure from all types of livestock—both ruminant and nonruminant—produces methane and some nitrous oxide as it decomposes. The quantity of each gas depends on how the manure is treated, stored, and transported. In lagoon storage—most widely practiced at large dairy and hog farms—liquid manure is collected from livestock barns in slurry channels and conveyed by gravity to specially constructed storage ponds. Anaerobic conditions in those ponds generate abundant methane. Dry storage of manure, a method better suited to poultry farms and beef cattle feedlots because they produce drier manure, yields fewer GHG emissions and less methane but relatively more nitrous oxide. (With either method, when stored manure is used as a fertilizer on crops, the nitrous oxide released is counted as emissions from crop production, not from collecting and storing manure.)

### GHG Emissions From Livestock Operations, 2024

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units (CO<sub>2</sub>e)



Digestive fermentation accounted for about 185 MMT of CO<sub>2</sub>e (or about 70 percent of total emissions from livestock) in 2024. Because digestive emissions are methane, that gas accounted for almost 95 percent of all livestock-related GHG emissions. The remaining methane was produced by collecting and storing manure. Some nitrous oxide is emitted when manure decomposes in air.

## Emissions From Cattle

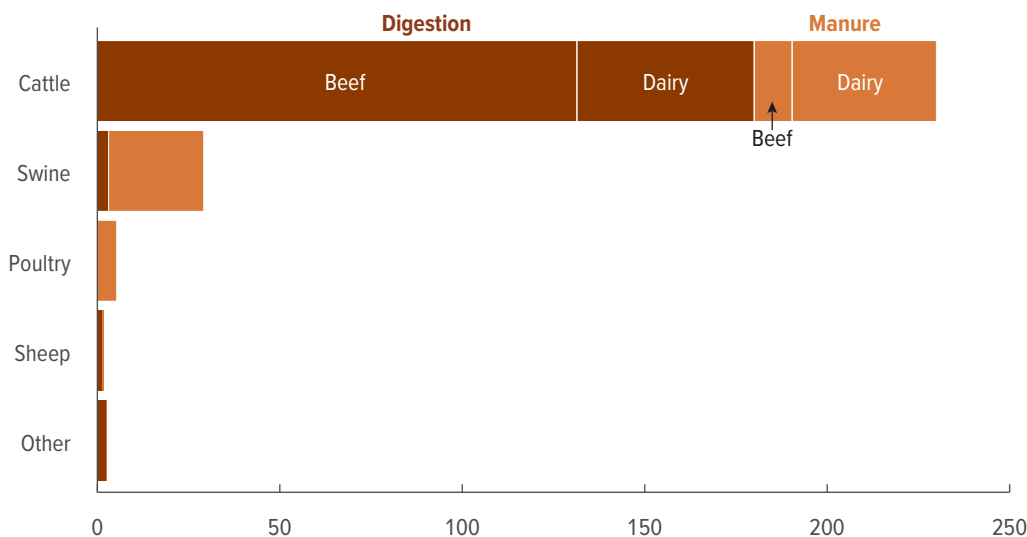
Cattle accounted for about 35 percent of all agricultural GHG emissions in 2024, more than any other livestock. Measured in CO<sub>2</sub> equivalent units, annual GHG emissions from a typical head of cattle (that is, one animal) can be more than half that of an average automobile.<sup>10</sup> Cattle, unlike most other farm animals, are ruminants with a digestive process that produces substantial amounts of methane. And as large animals, they consume large quantities of feed. Those factors, and the large numbers of cattle in the United States, make cattle the nation's leading source of emissions from both digestion and manure.

Cattle outnumber all other types of livestock except poultry. According to a recent survey, the United States has about 90 million head of cattle, 75 million swine, and 5 million sheep and lambs.<sup>11</sup> Poultry, at 2.4 billion birds—with chickens accounting for about 95 percent of that total—outnumber cattle by a factor of almost 30, but their manure produces only about one-tenth the total emissions (mainly because a head of cattle can weigh several hundred times more than a chicken). Cattle outnumber swine by less than 20 percent but produce almost double the GHGs from manure, in part because cattle are much heavier animals.

Dairy cattle produce fewer GHGs in total than beef cattle do but more GHGs per head. The caloric requirements, and thus the digestive emissions, of dairy cattle are higher. In addition, their manure is much more emissions-intensive, reflecting differences not only in feeding but in water consumption and in how the manure is managed: Dairy cattle are often kept in barns, where wet manure must be actively managed and can produce large quantities of methane in storage lagoons. By contrast, beef cattle, whether grazed in open fields or feedlots, typically produce a drier, less emissions-intensive manure that, in feedlots, can be collected periodically into a storage facility for distribution as fertilizer.

### GHG Emissions, by Type of Livestock, 2024

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units (CO<sub>2</sub>e)



In the United States, cattle accounted for about 230 MMT of CO<sub>2</sub>e in 2024, amounting to about 85 percent of GHG emissions from livestock. Most of the digestive emissions were from beef cattle, whereas most manure emissions were from dairy cattle. (Only swine produce comparable amounts of GHGs from manure.) All told, beef cattle accounted for about 140 MMT of CO<sub>2</sub>e—about 60 percent of emissions from cattle.

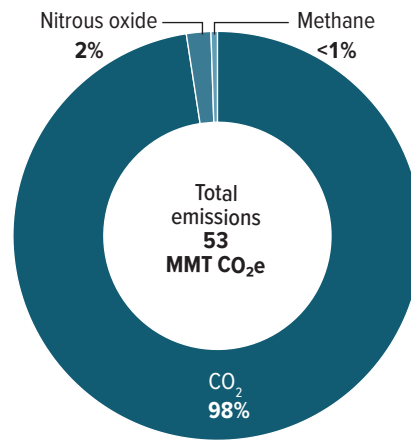
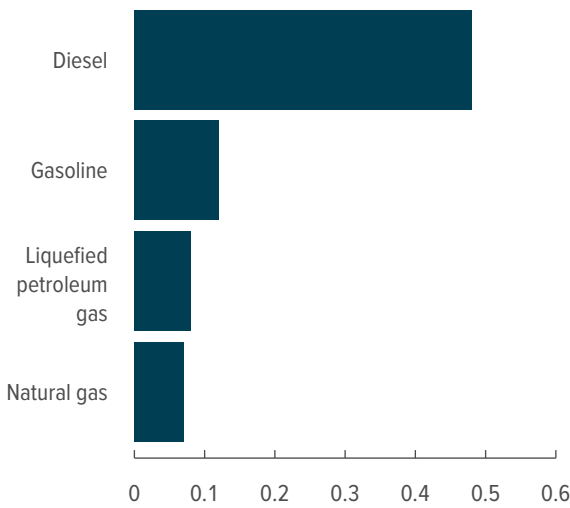
### Emissions From Fuel Combustion

As in other sectors of the economy, producers in the agriculture sector use fossil fuels to operate vehicles, machinery, and other equipment. However, unlike in other sectors, fuel combustion accounted for a relatively small share, just 8 percent, of the agriculture sector’s GHG emissions in 2024. Much of the CO<sub>2</sub> emitted by fuel combustion in the agriculture sector is from the gasoline and diesel fuels used in farm vehicles—pickup trucks, tractors, and combines—and in other farm equipment, such as irrigation systems. The rest is from using liquefied petroleum gas or natural gas in stationary equipment, mainly for heating and cooling. Diesel fuel accounted for about two-thirds of on-farm fuel combustion, a share that has grown over recent decades as farm vehicles and equipment have become less reliant on gasoline.

### Fossil Fuel Use and GHG Emissions From Fuel Combustion in Agriculture, 2024

Quadrillion British thermal units

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units (CO<sub>2</sub>e)



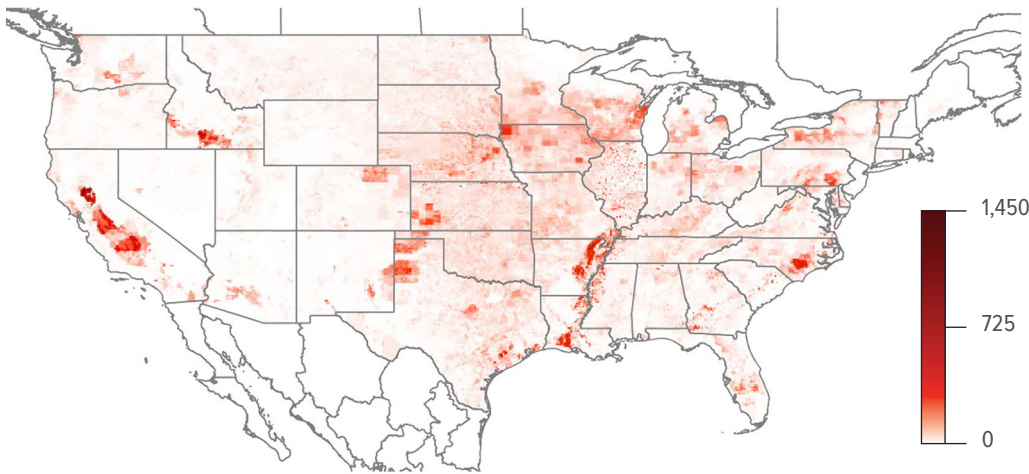
In the agriculture sector, as in other sectors, emissions from burning fossil fuels are largely CO<sub>2</sub>. Nitrous oxide is produced by catalytic converters used in fuel combustion to control other pollutants, and fuels contain trace amounts of methane.

### Geographic Distribution of Emissions

Although GHG emissions from agriculture are concentrated in some regions of the country, they occur everywhere that livestock are managed or crops are produced and thus are widely distributed in those regions. That contrasts with emissions from the electric power and industrial sectors, for example, which come from relatively few, large sources. Moreover, agricultural emissions come from diverse farm operations and are not uniformly regulated—unlike emissions in the transportation and electric power sectors, which rely on a few core technologies, all subject to emissions regulations.

### Geographic Distribution of Methane Emissions From Agriculture, 2020

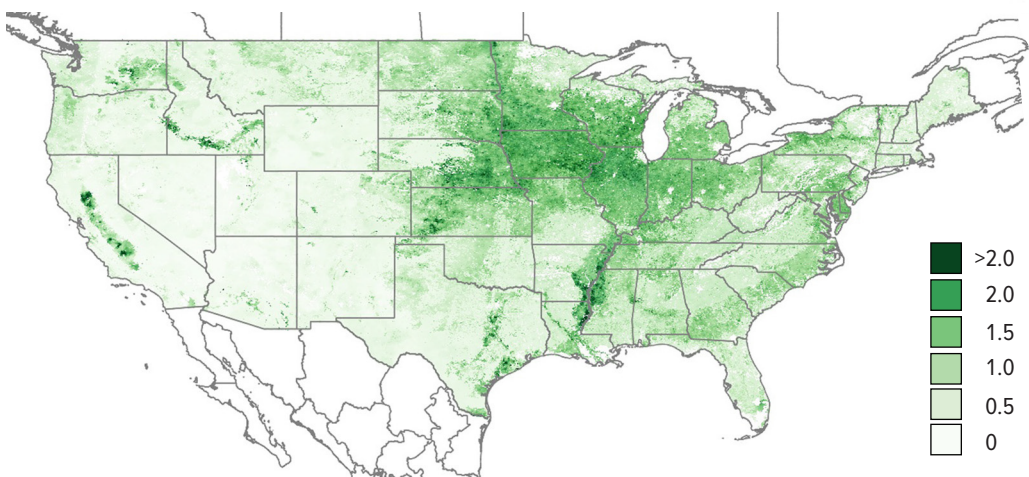
Metric tons of CO<sub>2</sub> equivalent units per square mile



Methane emissions in the agriculture sector are most concentrated in areas with the most livestock, particularly dairy-producing regions in the upper Midwest and the Central Valley of California and in areas where poultry and swine operations are located. Rice cultivation—in California, Texas, and states along the lower Mississippi River—also produces methane.

### Geographic Distribution of Nitrous Oxide Emissions From Agriculture, 2020

Metric tons of CO<sub>2</sub> equivalent units per square mile



Agricultural emissions of nitrous oxide are mostly produced by fertilizers applied to crops. Those emissions are concentrated in the upper Midwest, along the Mississippi River, and in agricultural regions in the West and along the Atlantic coast.

## Trends in Emissions From Agriculture

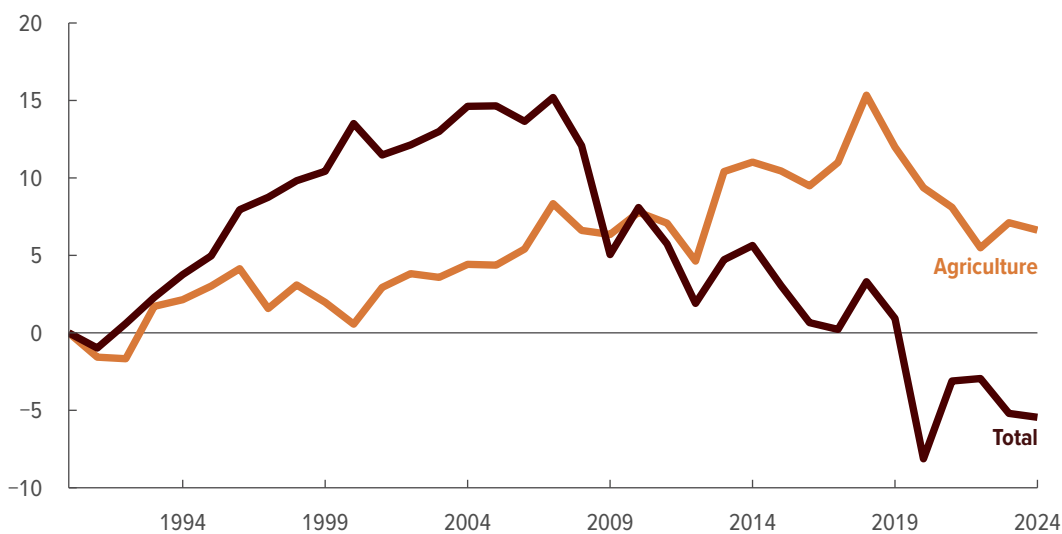
In recent decades, GHG emissions from agriculture have trended modestly upward, whereas total GHG emissions have been more variable. Before peaking in 2007, total U.S. GHG emissions had been growing about 75 percent more rapidly than agricultural emissions. But since 2007, total emissions have declined by 18 percent—largely reflecting lower emissions from the electric power sector—compared with just 2 percent for emissions from agriculture.

Although GHG emissions from agriculture have increased modestly since 1990, agricultural production has increased substantially over that time. (Agricultural emissions decreased from 2019 to 2022 because of smaller herd sizes in years of drought and reduced fertilizer use as a result of higher prices in response to supply-chain disruptions.)<sup>12</sup> Milk production and field crop harvests have increased by more than 50 percent since 1990, for example, and meat production has increased by about 75 percent. Those increases reflect gains in crop yields per acre, animal size and weight, and milk production per cow.<sup>13</sup> The value of the sector's output also increased by about 50 percent in inflation-adjusted terms.<sup>14</sup> Thus, the agriculture sector's emissions intensity—its emissions per inflation-adjusted dollar of production—has declined by about 30 percent since 1990.<sup>15</sup>

That divergence—the substantial increase in the sector's output compared to its modestly higher GHG emissions—is attributable to a variety of innovations that have increased crop yields and livestock production. For example, advances in breeding have made crops and livestock more resistant to heat and disease and crops more drought resistant, and new technologies have allowed the quantity, content, and timing of feed and fertilizer to be more precisely managed. As a result of such advances, fewer resources are needed to produce a given amount of agricultural output.

### Change in GHG Emissions From Agriculture and in Total GHG Emissions in Relation to Amounts in 1990

Percent



Agricultural emissions have increased since 1990, although the amount of growth has been small: Emissions in 2024 were about 7 percent higher than in 1990. Economywide emissions peaked at 15 percent above their 1990 level, but—led by the electric power and, to a lesser extent, transportation sectors—those emissions have trended downward since 2007 and are now about 5 percent lower than in 1990.

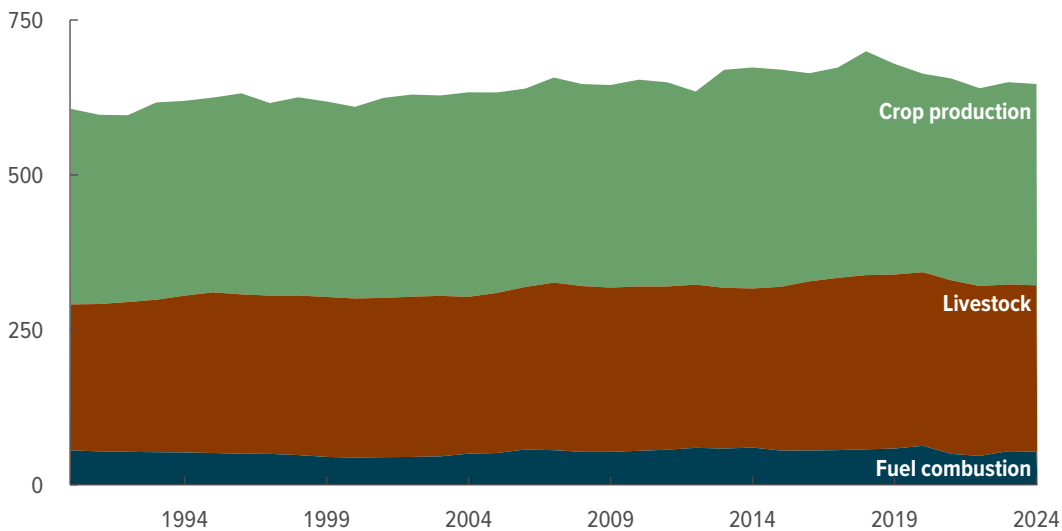
### Trends in the Main Components of Emissions From Agriculture

The composition of agricultural emissions has been relatively stable over the past three decades. In 1990, emissions from crop production—mainly nitrous oxide—accounted for about 50 percent of the sector’s total emissions measured in CO<sub>2</sub> equivalent units. Livestock accounted for about 40 percent, mostly in the form of methane, and fuel combustion made up the remaining 10 percent, mostly as CO<sub>2</sub>.

Since 1990, crop- and livestock-related emissions have increased slightly despite a substantial increase in agricultural output, leaving the respective shares of emissions nearly unchanged. Emissions from fuel combustion have decreased by 4 percent in the agriculture sector as the energy efficiency of tractors, trucks, heating equipment, and other farm equipment has improved. The share of agricultural emissions attributable to fuel combustion has been small, so the decrease in fuel emissions has had only a minor effect on overall emissions in the sector.

### Sources of Emissions From Agriculture

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units (CO<sub>2</sub>e)



Overall emissions from agriculture have increased by 40 MMT of CO<sub>2</sub>e (or by 7 percent) since 1990. Most of that growth reflects an increase of 33 MMT of CO<sub>2</sub>e (or 14 percent) from livestock operations. Emissions from crop production and from fuel combustion have changed little.

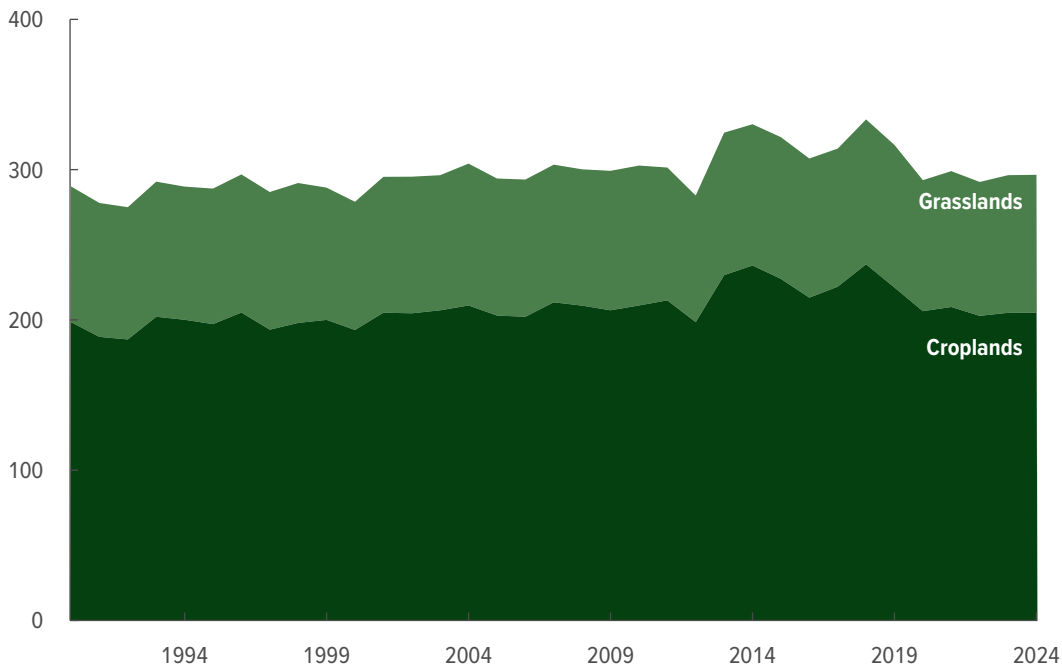
### Trends in Emissions From Crop Production

Agricultural lands comprise croplands and grasslands (where farm animals graze). Annual emissions of nitrous oxide from both types of agricultural soils have been largely stable since 1990, as have the number of acres planted with crops. That stability is noteworthy because U.S. crop production has increased substantially: Total production of corn, soybeans, and wheat (the three largest crops) increased by two-thirds from 1990 to 2024.<sup>16</sup> Yet emissions from croplands were essentially flat over that period because of large gains in agricultural productivity. Per-acre yields of corn, soybeans, and wheat, for instance, increased over the period by 47 percent, 41 percent, and 27 percent, respectively.<sup>17</sup>

Less nitrous oxide is emitted from grasslands than from croplands because not all grasslands are actively managed. In some parts of the country, animals are grazed on native grasslands or rangelands that are not typically fertilized or seeded. Grasslands account for significant portions of agricultural lands in the western United States, whereas croplands are largely concentrated in the Midwest. In total, grasslands account for about twice as much acreage as croplands do, a ratio that has been largely stable in recent decades.<sup>18</sup>

### Nitrous Oxide Emissions From Agricultural Lands

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units



About 200 MMT of nitrous oxide (in CO<sub>2</sub> equivalent units) originate from U.S. croplands each year. That amounts to about 70 percent of total GHG emissions from agricultural lands, although croplands account for only about one-third of agricultural land area. (Those ratios have changed little since 1990.) Because of differences in agricultural practices, nearly five times more nitrous oxide is emitted per acre of cropland than of grassland.

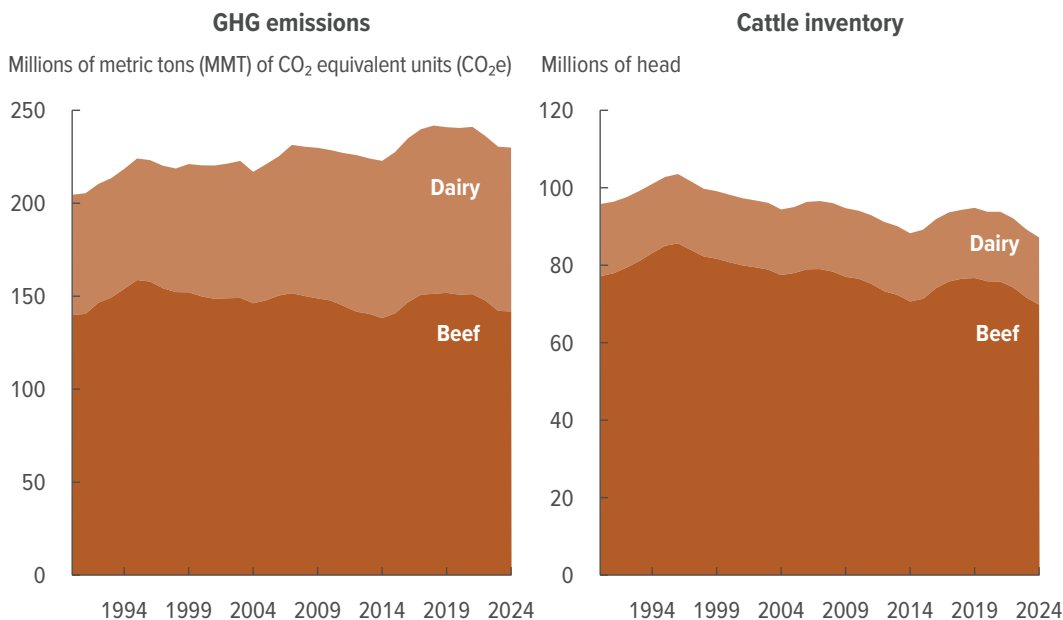
### Trends in Emissions From Livestock Operations

Since 1990, GHG emissions from cattle—currently representing about 85 percent of total livestock emissions—have increased by 12 percent in aggregate: 1 percent for beef cattle and 36 percent for dairy cattle.<sup>19</sup> Those increases are surpassed, however, by corresponding increases in beef and milk production, up 19 percent and 53 percent, respectively, since 1990.<sup>20</sup>

Those increases in output have occurred despite a decline in cattle inventories: The number of beef cattle on U.S. farms has declined by 10 percent since 1990, and the number of dairy cattle by 7 percent.<sup>21</sup> The gains in productivity are attributable to factors such as selective breeding, improved nutrition and feeding, and changes in farm practices relating to living conditions and milking operations. Beef cattle weigh, on average, about 25 percent more now than they did in 1990.<sup>22</sup> A typical dairy cow now produces about 65 percent more milk than in 1990—about 2,800 gallons per cow in 2024, compared with about 1,700 gallons in 1990.<sup>23</sup>

The increase in emissions from cattle since 1990, about 10 times greater from dairy cattle than from beef cattle, largely reflects the increased use of lagoon storage for manure on dairy farms. Lagoon storage has several advantages—lower costs when used for large cattle operations, reduced nitrogen runoff, and (when the lagoon is covered) odor control and the recapture of nutrients—but produces more CO<sub>2</sub> equivalent units of GHG emissions than dry storage does.

### GHG Emissions From Cattle and the U.S. Cattle Inventory



Emissions from cattle have increased modestly since 1990—by about 25 MMT of CO<sub>2</sub>e. Most of the increase is attributable to dairy cattle. Cattle account for over 75 percent of the increase in emissions from all livestock operations over that period. Emissions from cattle have increased despite declines in cattle inventories since the mid-1990s.

## Projected Emissions From Agriculture

In light of current technologies and the expectation that U.S. agricultural production will continue to grow modestly, CBO projects that GHG emissions from agriculture will continue to slowly increase in the coming decades, at about the same rate as observed since 1990.<sup>24</sup> (In this report, CBO’s projections of GHG emissions from agriculture and other economic sectors do not incorporate the effects of the 2025 reconciliation act, Public Law 119-21, which became law on July 4, 2025.) Actual emissions will vary depending on whether future demand for U.S. agricultural production is greater or less than projected and on the rate at which agricultural technologies that would reduce emissions are developed and adopted. The projected gradual increase in emissions from agriculture contrasts with projected decreases in emissions in the transportation and electric power sectors.

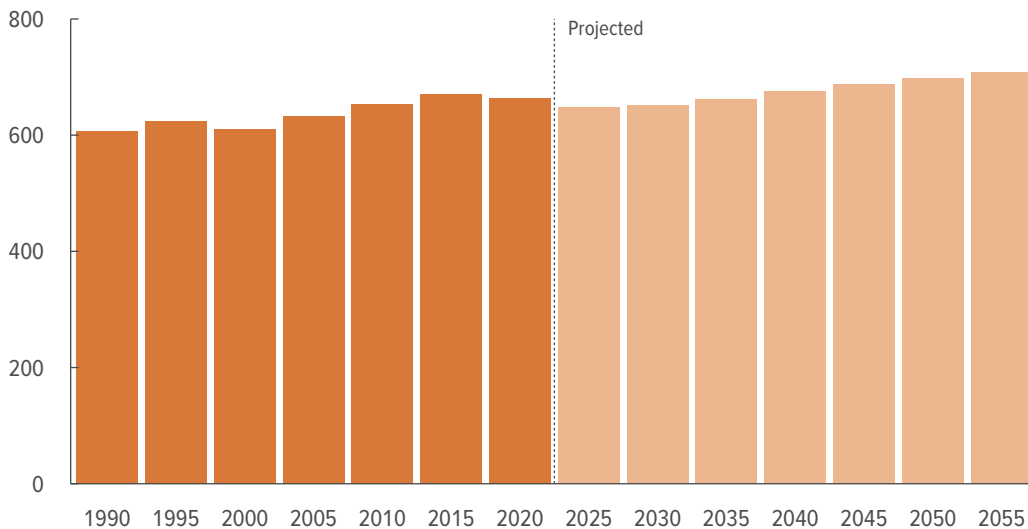
### Factors Affecting Future Emissions From Agriculture

CBO projects that GHG emissions from agriculture will grow by about a quarter of a percent per year over the next three decades, to about 700 million metric tons of CO<sub>2</sub> equivalent units in 2055. That projection incorporates incremental improvements in existing technologies (although not the development of new technologies for reducing emissions) and continued moderate growth in U.S. agricultural production. Corn and beef production, for example, are projected to increase by about 0.5 percent and 0.3 percent per year, respectively, over the next 10 years.<sup>25</sup> The projected rate of increase in GHG emissions from agriculture is about the same as the rate observed from 1990 to 2024.

Future emissions could be higher or lower than projected if the demand for U.S. agricultural production grows more rapidly or slowly than expected or if existing agricultural technologies improve at a faster or slower rate than projected. Future emissions would be lower if emissions-reducing agricultural technologies currently in development were successfully introduced and adopted widely. But it is uncertain how rapidly that would occur or how effective the new technologies would be.

### Historical and Projected GHG Emissions From Agriculture

Millions of metric tons of CO<sub>2</sub> equivalent units



GHG emissions in the agriculture sector have slowly increased since 1990. CBO projects that, barring the development and adoption of emissions-reducing technologies, those emissions will continue to increase at about the same rate through 2055. (CBO’s projections do not incorporate the effects of the 2025 reconciliation act.)

### Comparison of Projected Emissions From Agriculture and Other Sectors

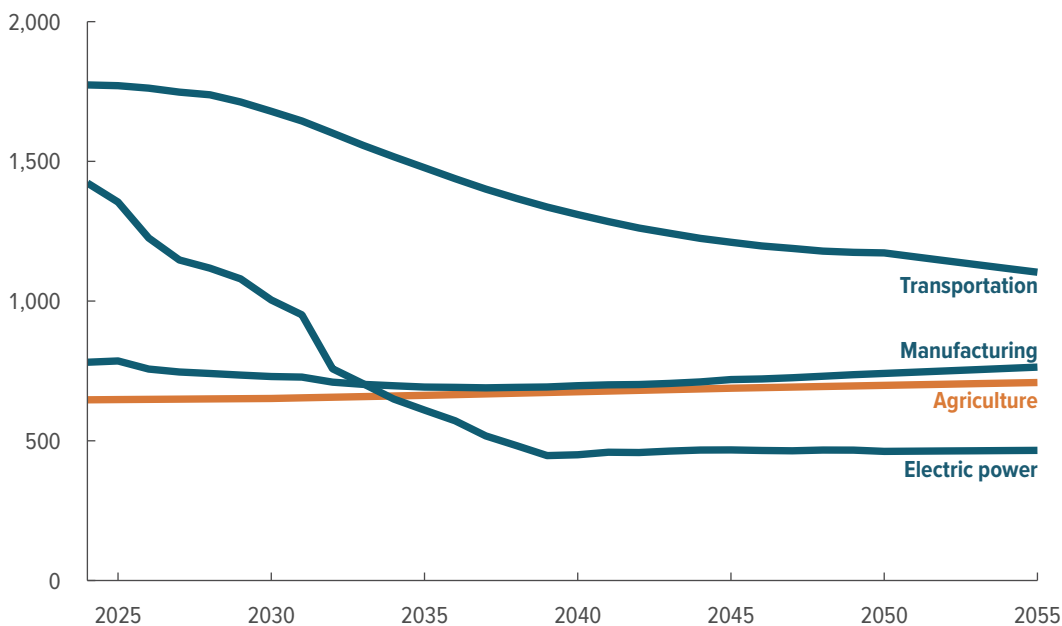
CBO's projections of slowly increasing GHG emissions from agriculture over the next three decades can be compared with projected emissions from the other broad areas of the economy that the agency has analyzed—namely, electric power, transportation, and manufacturing.<sup>26</sup> Emissions in the electric power sector are projected to decline markedly as low-carbon sources—wind and solar power, improved natural gas generation, and, possibly, nuclear power—continue to replace coal and older natural gas-fired power plants. Transportation emissions are also projected to decline as electric and hybrid vehicles gradually displace higher-emitting vehicles. GHG emissions from manufacturing, which account for about half of emissions in the industrial sector, are projected to decline through 2037 and to slowly increase thereafter. (None of those projections incorporate the effects of the 2025 reconciliation act.)

Unlike in agriculture and manufacturing, lower-emitting technologies have been developed in the electric power and transportation sectors in response to federal and state policies aimed at reducing emissions and increasing energy efficiency. In manufacturing, most environmental regulations govern hazardous and “criteria” pollutants, not GHGs or energy efficiency.<sup>27</sup> And, except in a few states, most agricultural emissions are not regulated.<sup>28</sup> Even so, some recent agricultural innovations—additives to cattle feed, fertilizers that are effective in smaller quantities, and lower-methane rice varieties—have been developed to reduce GHG emissions by limiting nonessential microbial and biological activity. If successfully commercialized and adopted, the new technologies could reduce those emissions substantially below their projected level.

The federal government administers several conservation programs that encourage or incentivize the adoption of such technologies. Those programs include the Environmental Quality Incentives Program, which offers farmers financial and technical assistance in reducing their methane and nitrous oxide emissions, and the Conservation Stewardship Program, which pays farmers who adopt or maintain practices that reduce fertilizer use.

### Projected GHG Emissions in Economic Sectors Analyzed by CBO

Millions of metric tons (MMT) of CO<sub>2</sub> equivalent units (CO<sub>2</sub>e)



In CBO's projections, GHG emissions from agriculture increase by about 60 MMT of CO<sub>2</sub>e over the next 30 years. Those from manufacturing begin rising in the late 2030s but are about 20 MMT lower in 2055 than in 2024. GHG emissions in the transportation and electric power sectors are projected to decrease by 670 MMT and more than 900 MMT, respectively. (None of those projections incorporate the effects of the 2025 reconciliation act.)

1. Congressional Budget Office, *The Risks of Climate Change to the United States in the 21st Century* (December 2024), [www.cbo.gov/publication/60845](http://www.cbo.gov/publication/60845).
2. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.
3. GHGs differ in their contribution to warming per physical unit of gas. For simplicity, they are often measured in metric tons of CO<sub>2</sub> equivalent units—quantities of emissions that, over a period of years (usually a century), contribute to the greenhouse effect by as much as a metric ton of CO<sub>2</sub>. For more information, see Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.
4. In this report, CBO excludes naturally occurring GHGs emitted from different types of lands—for example, methane emitted from wetlands or nitrous oxide released when forests burn. The report also excludes GHGs released when land is converted from one use to another—for example, CO<sub>2</sub> that is released when forested land is cleared for housing or agriculture. CBO estimates that in 2024, carbon sequestered from planting and growing crops amounted to the equivalent of about 30 million metric tons of CO<sub>2</sub>. But that was offset by about 35 million metric tons of GHGs released when other lands were converted to crop cultivation. All told, agricultural GHG emissions excluded from this report amount to about 50 million metric tons (in CO<sub>2</sub> equivalent units), about 45 million metric tons of which are emissions from grasslands.
5. Congressional Budget Office, *Emissions of Greenhouse Gases in the Manufacturing Sector* (February 2024), [www.cbo.gov/publication/59695](http://www.cbo.gov/publication/59695), *Emissions of Carbon Dioxide in the Transportation Sector* (December 2022), [www.cbo.gov/publication/58566](http://www.cbo.gov/publication/58566), and *Emissions of Carbon Dioxide in the Electric Power Sector* (December 2022), [www.cbo.gov/publication/58419](http://www.cbo.gov/publication/58419).
6. CBO’s estimate relies on data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.
7. Those comparisons reflect the global warming potential of the GHGs over 100 years. For example, even though methane remains in the atmosphere for about 12 years and CO<sub>2</sub> remains there for hundreds of years, one ton of methane traps about 28 times more atmospheric heat when averaged over a century than one ton of CO<sub>2</sub> does. (The trapped heat is absorbed into oceans, surface ice, and other elements of the climate system.) See Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), Table 1-2, <https://tinyurl.com/478hs687>.
8. For data about soil nitrification and nitrous oxide emissions, see Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>. For corn’s share of nitrous oxide emissions, see Chaoqun Lu and others, “Century-Long Changes and Drivers of Soil Nitrous Oxide (N<sub>2</sub>O) Emissions Across the Contiguous United States,” *Global Change Biology*, vol. 28, no. 7 (April 2022), pp. 2505–2524, <http://doi.org/10.1111/gcb.16061>.
9. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.
10. One cow is estimated to release, on average, about 220 pounds of methane a year, equal to about 2.8 metric tons of CO<sub>2</sub> equivalent units; see Amy Quinton, “Cows and Climate Change: Making Cattle More Sustainable,” University of California, Davis (June 27, 2019), [www.ucdavis.edu/food/news/making-cattle-more-sustainable](http://www.ucdavis.edu/food/news/making-cattle-more-sustainable). A typical passenger vehicle is estimated to release about 4.6 metric tons of CO<sub>2</sub> per year; see Environmental Protection Agency, “Greenhouse Gas Emissions From a Typical Passenger Vehicle” (June 12, 2025), <https://tinyurl.com/2pr9x6ku>.
11. National Agricultural Statistics Service, *2022 Census of Agriculture*, AC-22-A-51 (February 2024), [www.nass.usda.gov/AgCensus](http://www.nass.usda.gov/AgCensus).

12. Jennifer Kee, Lila Cardell, and Jacob Abrehe Zereyesus, “Global Fertilizer Market Challenged by Russia’s Invasion of Ukraine,” *Amber Waves* (Department of Agriculture, Economic Research Service, September 18, 2023), <https://tinyurl.com/3ru4f297>; David Rodziewicz, Jacob Dice, and Courtney Cowley, *Drought and Cattle: Implications for Ranchers*, Research Working Paper 23-06 (Federal Reserve Bank of Kansas City, June 2023), <https://tinyurl.com/4w3cbnp9>. National Oceanic and Atmospheric Administration, “Record Drought Gripped Much of the U.S. in 2022” (January 10, 2023), <https://tinyurl.com/mtw9u5yj>; National Agricultural Statistics Service, *Cattle* (January 31, 2022), <https://tinyurl.com/y32w4xcv>; and National Oceanic and Atmospheric Administration, National Integrated Drought Information System, “2020 Drought Update: A Look at Drought Across the United States in 15 Maps” (August 27, 2020), <https://tinyurl.com/uydedfjh>.
13. Calculations by CBO made on the basis of data from National Agricultural Statistics Service, *Crop Production Historical Track Records* (various years), <https://tinyurl.com/3wumvfd5>, *Agricultural Statistics* (various years), <https://tinyurl.com/mr2xkhp6>, “Quick Stats” (various years), [www.nass.usda.gov/Quick\\_Stats](http://www.nass.usda.gov/Quick_Stats); and Department of Agriculture, Economic Research Service, “Supply and Utilization of Milk in All Products (Monthly and Annual)” (July 15, 2025) and “Milk: Supply and Utilization of All Dairy Products (1970–2010)” (May 13, 2022), both of which are available at Department of Agriculture, “Dairy Data,” [www.ers.usda.gov/data-products/dairy-data](http://www.ers.usda.gov/data-products/dairy-data).
14. Department of Agriculture, Economic Research Service, “Agricultural Productivity in the United States” (January 5, 2025), “Table 1. Indices of Farm Outputs, Inputs, and Total Factor Productivity for the United States, 1948–2021,” <https://tinyurl.com/yck9kbaa>.
15. CBO’s calculation of emissions intensity is based on information from two sources. The first is Federal Reserve Bank of St. Louis, “Farm Output (A2000C1A027NBEA)” (October 2, 2024), <https://tinyurl.com/5n94te6n>. The most recent year for which data are available from that source is 2023. The second source is Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.
16. National Agricultural Statistics Service, “Quick Stats” (accessed February 24, 2025), [www.nass.usda.gov/Quick\\_Stats](http://www.nass.usda.gov/Quick_Stats).
17. CBO’s calculations comparing average yields for the 1990–1994 and 2020–2024 periods rely on data from National Agricultural Statistics Service, *Crop Production Historical Track Records* (April 2025), <https://tinyurl.com/ybfxkj2z>.
18. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.
19. CBO’s calculations of increases in GHG emissions from cattle are based on data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.
20. National Agricultural Statistics Service, *Livestock Slaughter Annual Summary* (March 1991 and April 2025), <https://usda.library.cornell.edu/concern/publications/r207tp32d>; Department of Agriculture, Economic Research Service, “Supply and Utilization of Milk in All Products (Monthly and Annual)” (July 15, 2025) and “Milk: Supply and Utilization of All Dairy Products (1970–2010)” (May 13, 2022), both of which are available at Department of Agriculture, “Dairy Data,” [www.ers.usda.gov/data-products/dairy-data](http://www.ers.usda.gov/data-products/dairy-data).
21. CBO’s calculations of declines in cattle are based on data from Russell Knight and Hannah Taylor, “Cattle and Cow Inventories, 1970–2023” (Department of Agriculture, Economic Research Service, August 2023), <https://tinyurl.com/53u73vxn>; and National Agricultural Statistics Service, *Cattle* (January 31, 2022), <https://tinyurl.com/y32w4xcv>. For data used in estimating shares of dairy and beef cattle, see Department of Agriculture, *U.S. Agriculture and Forestry: Greenhouse Gas Inventory, 1990–2018*, Technical Bulletin 1957 (January 2022), Table A-2, <https://tinyurl.com/3h277s26>.

22. Department of Agriculture, Economic Research Service, “Meat Statistics Tables, Historical” (July 29, 2025), available at Department of Agriculture, “Livestock and Meat Domestic Data,” [www.ers.usda.gov/data-products/livestock-and-meat-domestic-data](http://www.ers.usda.gov/data-products/livestock-and-meat-domestic-data).
23. National Agricultural Statistics Service, *Milk Production* (December 13, 1991 and June 22, 2025), <https://tinyurl.com/34mw454b>. CBO converted pounds of milk to gallons using 8.6 pounds per gallon.
24. CBO’s projections of agricultural emissions in this report are based on the output of a pair of simulation models, FASOMGHG and GLOBIOM, used by the Environmental Protection Agency (EPA) and other government agencies and research organizations to project future emissions on the basis of expectations about future consumer demand, prices, macroeconomic conditions, and other factors. The models project agricultural supply and the GHG emissions associated with that production. CBO developed projected values through 2050 as averages of simulation results published by EPA. Values for 2055 are CBO’s linear extrapolation from values for 2050. See Environmental Protection Agency, *Greenhouse Gas Mitigation Potential in the U.S. Forestry and Agriculture Sector*, EPA 430-R-23-004 (March 2024), <https://tinyurl.com/3r9zxd5>.
25. Erik Dohlman, James Hansen, and William Chambers, *USDA Agricultural Projections to 2034*, OCE-2025-1 (Department of Agriculture, Economic Research Service, February 2025), Tables 6 and 19, <https://tinyurl.com/5dxwmpu8>.
26. CBO’s projections of GHG emissions in the electric power, transportation, and manufacturing sectors exclude non-CO<sub>2</sub> emissions, which amount to about 3 percent of each sector’s total GHG emissions.
27. The Clean Air Act (42 U.S.C. §§ 7401–7671q) regulates “major source” manufacturing emissions of hazardous and criteria pollutants and requires EPA to set national health-based standards (based on specified scientific criteria) for the latter—ozone, particulates, carbon monoxide, nitrogen dioxide, sulfur dioxide, and lead. Since 2011, certain large emitters seeking to modify or expand their facilities have been subject to GHG regulations as well.
28. Several U.S. states currently regulate or monitor agricultural emissions in some way. For efforts in California, see California Department of Food and Agriculture, “Enteric Methane Emission Reduction Programs” (accessed June 6, 2025), [www.cdfa.ca.gov/oe/efi/enteric](http://www.cdfa.ca.gov/oe/efi/enteric). For efforts in Colorado, see Parts A and B of “Colorado Greenhouse Gas Reporting and Emission Reduction Requirements,” 5 Colo. Code. Regs. 1001-26 §§ A, B (2024), <https://tinyurl.com/4mxyfxa3>. For efforts in New York, see The New York State Climate Leadership and Community Protection Act, S. 6599, 2019 Leg., Reg. Sess. (N.Y. 2019), <https://tinyurl.com/4m8b5t7n>. And for efforts in Vermont, see Vermont Agency of Natural Resources, Climate Action Office, “Greenhouse Gas Inventory” (accessed June 6, 2025), <https://tinyurl.com/4zmk4jyt>.



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# Appendix: Data Sources for Figures

## **GHG Emissions, by Economic Sector, 2024**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.

## **GHG Emissions Other Than Carbon Dioxide, by Economic Sector, 2024**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.

## **Nitrous Oxide and Methane Emissions, by Economic Sector, and Methane Emissions, by Industry, 2024**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.

## **Sources of GHG Emissions From Agriculture, 2024**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.

## **GHG Emissions From Crop Production, 2024**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.

## **GHG Emissions From Livestock Operations, 2024**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.

## **GHG Emissions, by Type of Livestock, 2024**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>.

## **Fossil Fuel Use and GHG Emissions From Fuel Combustion in Agriculture, 2024**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>; and Department of Agriculture, *U.S. Agriculture and Forestry: Greenhouse Gas Inventory, 1990–2018*, Technical Bulletin 1957 (January 2022), <https://tinyurl.com/3h277s26>.

### Geographic Distribution of Methane Emissions From Agriculture, 2020

Congressional Budget Office, using data from Joannes D. Maasakkers and others, “A Gridded Inventory of Annual 2012–2018 U.S. Anthropogenic Methane Emissions,” *Environmental Science and Technology*, vol. 57, no. 43, pp. 16276–16288, <https://doi.org/10.1021/acs.est.3c05138>.

The map has been updated with more recent data from Environmental Protection Agency, “U.S. Gridded Methane Emissions” (November 22, 2024), <https://tinyurl.com/3nsfmnrz>. The map omits data about emissions in Alaska and Hawaii. Because the geographic distributions of methane and nitrous oxide emissions from agriculture are largely stable over time, the geographic sources of those emissions in 2024 are expected to differ little from those in 2020.

### Geographic Distribution of Nitrous Oxide Emissions From Agriculture, 2020

Congressional Budget Office, using data provided to CBO by the Department of Agriculture.

The map reflects information in Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), Figures 5-5 and 5-6,

<https://tinyurl.com/478hs687>; the map thus omits data about emissions in Alaska and Hawaii.

Because the geographic distributions of methane and nitrous oxide emissions from agriculture are largely stable over time, the geographic sources of those emissions in 2024 are expected to differ little from those in 2020.

### Change in GHG Emissions From Agriculture and in Total GHG Emissions in Relation to Amounts in 1990

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory*

*of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025),

<https://tinyurl.com/478hs687>, and *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022*, EPA 430-R-24-004 (April 2024), <https://tinyurl.com/4asxc69z>.

### Sources of Emissions From Agriculture

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory*

*of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025),

<https://tinyurl.com/478hs687>, and *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022*, EPA 430-R-24-004 (April 2024), <https://tinyurl.com/4asxc69z>.

### Nitrous Oxide Emissions From Agricultural Lands

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory*

*of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025),

<https://tinyurl.com/478hs687>, and *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022*, EPA 430-R-24-004 (April 2024), <https://tinyurl.com/4asxc69z>.

### GHG Emissions From Cattle and the U.S. Cattle Inventory

Data about emissions from cattle: Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*,

EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>, and *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022*, EPA 430-R-24-004 (April 2024), <https://tinyurl.com/4asxc69z>.

Data about the U.S. cattle inventory: Congressional Budget Office, using data from Russell Knight and Hannah Taylor, “Cattle and Cow Inventories, 1970–2023” (Department of Agriculture,

Economic Research Service, August 2023), <https://tinyurl.com/53u73vxn>. (Data tables are available at <https://tinyurl.com/mrxpnzyf>.) Data for estimated shares of dairy and beef cattle:

Congressional Budget Office, using data from Department of Agriculture, *U.S. Agriculture and Forestry: Greenhouse Gas Inventory, 1990–2018*, Technical Bulletin 1957 (January 2022), Table A-2,

<https://tinyurl.com/3h277s26>.

### **Historical and Projected GHG Emissions From Agriculture**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2022*, EPA 430-R-24-004 (April 2024), <https://tinyurl.com/4asxc69z>, and *Greenhouse Gas Mitigation Potential in the U.S. Forestry and Agriculture Sector*, EPA 430-R-23-004 (March 2024), <https://tinyurl.com/3r9zxd5>.

### **Projected GHG Emissions in Economic Sectors Analyzed by CBO**

Congressional Budget Office, using data from Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2023*, EPA 430-R-25-003 (2025), <https://tinyurl.com/478hs687>; Energy Information Administration, *Annual Energy Outlook 2025* (April 2025) [www.eia.gov/outlooks/aeo/](http://www.eia.gov/outlooks/aeo/); and Environmental Protection Agency, *Greenhouse Gas Mitigation Potential in the U.S. Forestry and Agriculture Sector*, EPA 430-R-23-004 (March 2024), <https://tinyurl.com/3r9zxd5>.

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# About This Document

This report was prepared to enhance the transparency of the work of the Congressional Budget Office. CBO maintains a 10-year benchmark projection of annual greenhouse gas (GHG) emissions in the United States. That projection is used to estimate how the federal budget would be affected by changes to policies related to GHG emissions, such as setting a price on those emissions. This is the fourth in a series of reports covering the four largest sectors producing GHG emissions. (The other reports covered the manufacturing, transportation, and electric power sectors.) In keeping with CBO's mandate to provide objective, impartial analysis, the report makes no recommendations.

David Austin and Ron Gecan prepared the report with guidance from Nicholas Chase and Joseph Kile. Tiffany Arthur, Erich Dvorak, Michael Falkenheim, Ann E. Futrell, Erik O'Donoghue, Asha Saavoss, and Robert Sunshine (a consultant to CBO) offered comments. Caroline Nielsen fact-checked the report. Kenneth Austin Castellanos and Evan Herrnstadt provided technical assistance.

Megan Stubbs of the Congressional Research Service commented on an earlier draft. The assistance of external reviewers implies no responsibility for the final product; that responsibility rests solely with CBO.

Jeffrey Kling reviewed the report, Scott Craver edited it, and R. L. Rebach created the graphics, illustrated the cover, and prepared the text for publication. The report is available at [www.cbo.gov/publications/61467](http://www.cbo.gov/publications/61467).

CBO seeks feedback to make its work as useful as possible. Please send comments to [communications@cbo.gov](mailto:communications@cbo.gov).



Phillip L. Swagel  
Director  
August 2025