USDA United States Department of Agriculture
Foreign Agricultural Service

GAIN Global Agricultural Information Network

Voluntary Report – Voluntary - Public Distribution **Date:** March 28, 2024

Report Number: CH2024-0046

Report Name: Climate Reports Highlight Agriculture

Country: China - People's Republic of

Post: Beijing

Report Category: Climate Change/Global Warming/Food Security, Trade Policy Monitoring, Agricultural Situation

Prepared By: FAS China Staff

Approved By: Adam Branson

Report Highlights:

On December 29, 2023, the People's Republic of China (PRC) submitted two major reports related to climate change to the United Nations Framework Convention on Climate Change (UNFCCC): the Fourth National Communication on Climate Change (NC4) and the Third Biennial Update Report on Climate Change (BUR3). The reports summarize PRC climate change policy, actions, impacts, and progress achieved during the 13th Five-Year Plan (FYP) period (2016-2020). Substantial sections of the reports focus on agriculture and include climate related information dating back to 2017 and 2018.

Summary

On December 29, 2023, the PRC submitted The People's Republic of China Fourth National Communication on Climate Change (link in English) and The People's Republic of China Third Biennial Update Report on Climate Change (link in English) to the UNFCCC.

The NC4 includes information related to national circumstances and institutional arrangements, the 2017 national greenhouse gas (GHG) inventory, climate change impact and adaptation, climate change mitigation policies and actions, finance, technology, and capacity-building needs, as well as climate change research and climate system observations. The BUR3 includes the 2018 national greenhouse gas inventory, details on PRC mitigation policies and actions as of 2020, and a quantitative analysis of emission reduction effects. Both reports are extensive.

Readers are encouraged to view the source material for a detailed analysis and assessment of how agriculture in China contributes to and is impacted by climate change. For additional information on agriculture and climate in China, please see GAIN report Agricultural Climate Goals and Policy Overview.

NC4 Report

According to the NC4 report, "Climate change is affecting agricultural production systems, crop growth and yields, and plant pests and diseases through changes in sunshine duration, temperature, precipitation, and extreme weather events." The report highlights both methane (CH_4) and nitrous oxide (N_2O) as the main GHG emissions in the agricultural sector and ranks agriculture as the third largest contributor to CO_2 emissions (6.4 percent) after energy (78 percent) and industrial processes (14.1 percent).

Specifically, the report notes that agricultural emissions include "CH_4 emissions from enteric fermentation, CH_4 and N_2O emissions from manure management, CH_4 emissions from rice cultivation, N_2O emissions from agricultural soils, and CH_4 and N_2O emissions from field burning of agricultural residues. To be more specific, the NGI2017 reports CH_4 emissions from enteric fermentation in 12 types of livestock, including beef cattle, dairy cattle, goats, and sheep, etc. CH_4 and N_2O emissions from the management of manure of 14 types of livestock, including dairy cattle, beef cattle, goats, sheep, swine, and poultry, etc. CH_4 emissions from single-rice, double-rice, and winter-flooding rice cultivation; and direct emissions of N_2O from 11 types of agricultural soils, including year-round upland excluding vegetables, rice fields with different cropping regimes, vegetable fields, orchards, tea gardens, and grazing pasture, and indirect emissions of N_2O from nitrogen deposition, leaching and run-off."

Chapter 2 of the report provides a stark assessment of the impacts of climate change on China's agricultural sector. The report highlights that "Changes in climate elements, especially temperature, caused by climate change, have significant impacts on cropping systems" and that "Meteorological disasters that affect agriculture, including drought, floods, and extreme heat events, are increasing in both frequency and intensity."

On the vulnerability of China's crops, the report states that as "average temperatures during crop growth periods are expected to increase; crop growth periods will become shorter; most crop production zones will move northward." It goes on to note that "In China, it is anticipated that the frequency of outbreaks of the majority of crop diseases and pests, the areas they affect, and the harm they cause will all rise" and that "The CO_2 fertilization effect cannot completely offset the negative impact of climate change on grain yields. Global warming will reduce the amount of protein in grains."

BUR3 Report

According to the BUR3 report, in 2018, China's total GHG emissions (with Land Use, Land-Use Change and Forestry (LULUCF)) were approximately 11,779 million ton (Mt) of carbon dioxide equivalent (Mt CO_2 eq), of which CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 accounted for 81.1 percent, 11.4 percent, 5.0 percent, 1.6 percent, 0.2 percent and 0.6 percent respectively.

According to the BUR3, in 2018, China's GHG emissions from agriculture were 793 Mt CO_2 eq, about 4.5 percent lower than the 830 Mt CO_2 eq reported in 2014. Regarding the composition of gases, CH_4 emissions were 23.846 Mt[1], of which 45.5 percent were from enteric fermentation, 14.5 percent were from manure management, 39.1 percent were from rice cultivation, 0.9 percent were from field burning of agricultural residues. N_2O emissions were 0.943 Mt, of which agricultural soils emissions for 76.4 percent, manure management 23 percent, and field burning of agricultural residues 0.6 percent. There are minor changes from the GHG emissions in 2014.

According to BUR3, China's CH_4 emissions in 2018 were 64,113 Mt, of which 23,846 Mt were from agriculture, accounting for 37.2 percent of China's total CH_4 emissions in 2018. China's N_2O emissions in 2018 were 1.915 Mt, of which 0.943 Mt were from agriculture, accounting for 49.2 percent of China's total N_2O emissions in 2018. For additional information on China's methane emissions management and control, please see GAIN report Agriculture a Key Area Under PRC Methane Emissions Plan | CH2023-0161.

Table 1. China: GHG Emissions and Removals in 2018 (Mt CO_2 eq)

	CO_2	CH_4	N_2O	HFCs	PFCs	SF_6	Total
Energy	9,426	602	127				10,155
Industrial processes	1,466	0	137	189	22	73	1,887
Agriculture		501	292				793
LULUCF	-1,340	84	0				-1,257
Waste	3	160	37				200
Total (without LULUCF)	10,896	1,263	593	189	22	73	13,035
Total (with LULUCF)	9,555	1,346	594	189	22	73	11,779

Notes: Shaded cells do not require entries. 0 indicates that the value is less than 0.5 Mt CO_2 eq.
Due to rounding, the aggregation of various items may be slightly different from the total.

[1] The Global Warming Potential (GWP) value for methane is 21, and nitrous oxide is 310.

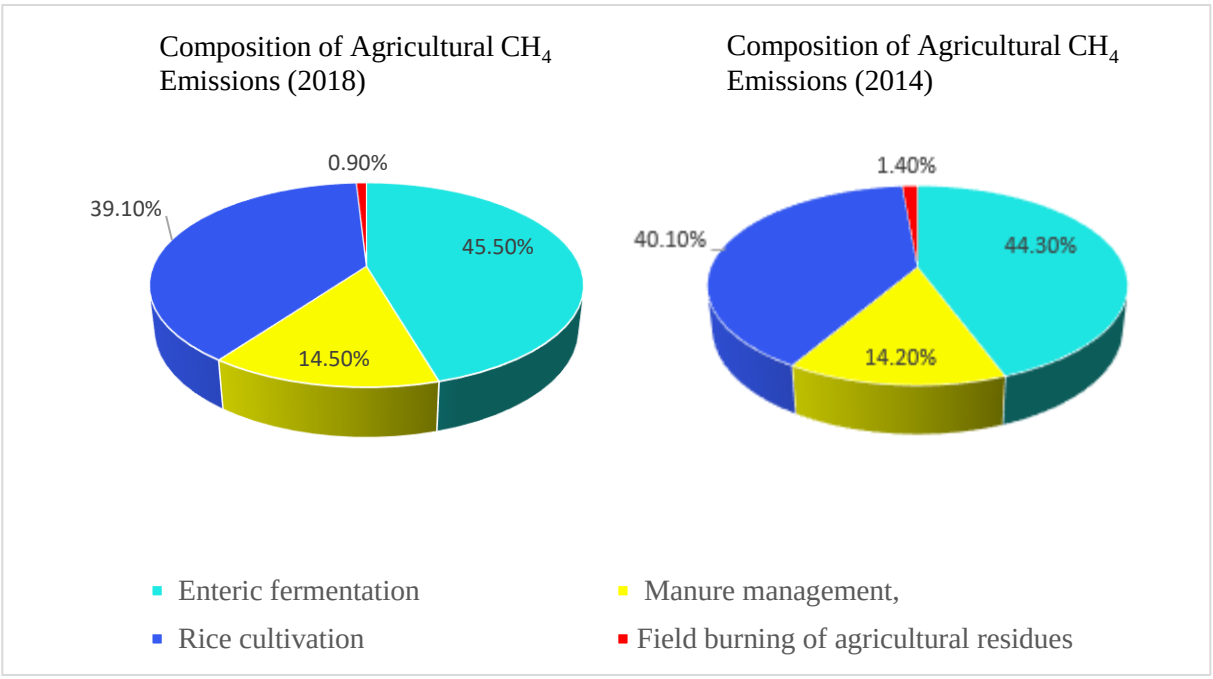
Table 2. China: CO_2, CH_4 and N_2O Emissions and Removals in 2018 (kt)

Source and sink categories	CO_2	CH_4	N_2O
Total (without LULUCF)	10,895,866	60,132	1,914
Total (with LULUCF)	9,555,394	64,113	1,915
1. Energy	9,426,194	28,658	411
– Fuel combustion	9,426,194	1,658	411
♦Energy industries	4,403,326	102	291
♦Manufacturing industries and construction	3,344,336	292	75
♦Transport	982,028	129	23
♦Other sectors	696,505	1,135	22
– Fugitive emissions		27,001	
♦Solid fuels		25,122	
♦Oil and natural gas		1,879	
2. Industrial Processes	1,466,252	5	441
– Mineral industry	991,360		
– Chemical industry	290,576		441
– Metal industry	181,670	5	NO
– Non-energy products from fuels and solvent use	2,645		
– Consumption of halocarbons and SF_6			
3. Agriculture		23,846	943
– Enteric fermentation		10,841	
– Manure management		3,461	217
– Rice cultivation		9,329	
– Agricultural soils			720
– Field burning of agricultural residues		216	6
4. LULUCF	-1,340,473	3,981	1
– Forest land	-965,792	1	0
– Cropland	-78,100	IE	IE
– Grassland	-101,752	1	1
Source and sink categories	**CO_2**	**CH_4**	**N_2O**
– Wetlands	-86,417	3,980	NE
– Settlements	-918		
– Other land	1,095		

– Harvested wood products	-108,590		
5. Waste	3,420	7,622	119
– Landfill		4,686	
– Biological treatment		27	2
– Wastewater treatment		2,908	113
– Incineration	3,420	1	4
6. Memo items			
– International aviation	46,834	0	1
– International navigation	33,298	3	1
– CO_2 emissions from biomass	316,584		

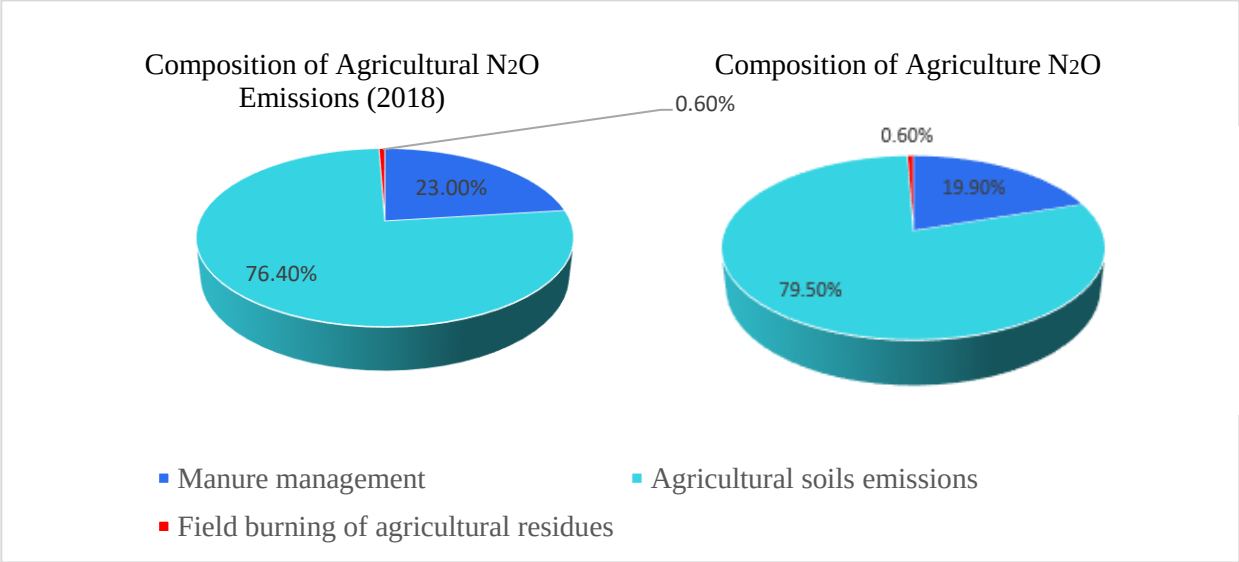
Notes: Shaded cells do not require entries. 0 indicates that the value is less than 0.5 kt. NE (not estimated) indicates emissions and removals of existing source are not estimated, IE (included elsewhere) indicates the emission source is estimated and included in other sub-categories, and NO (not occurred) indicates the emission source doesn't exist. Due to rounding, the aggregation of various items may have slight differences with the total. Memo Items are not counted in the total emissions.

Figure 1: China: Agricultural CH_4 Emissions Composition in 2018 and 2014



(Source: China's BUR3 and BUR2)

Figure 2: China: Agricultural N_2O Emissions Composition in 2018 and 2014



(Source: BUR3 and BUR2)

Attachments:

No Attachments.