

## **Reducing Greenhouse Gas Emissions in the Agricultural Sector of Taiwan**

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The greenhouse gas emissions of the agricultural sector in Taiwan have been declining yearly since 1990. The details of the principal cause were that Taiwan's participation in the World Trade Organization (WTO), as well as the trade and economic liberalization, had negative impacts on domestic agricultural production, leading to reduction in cultivated area and livestock and poultry. In addition, the three-stage livestock manure treatment, and promoting the implementation of rationalized fertilization also contributed to the reduction of greenhouse gases. After 1996, foot-and-mouth disease caused a significant reduction in the number of livestock, therefore greenhouse gas emissions from poultry declined continuously for two years.

Based on the source of greenhouse gas emissions in the agricultural sector in 2014, agricultural soils (49.1%) accounted for the largest share of greenhouse gas emissions. According to the industrial classification, the survey showed that about 71% of the greenhouse gas emissions were from farming and 29% from animal husbandry. According to the classification of greenhouse gases, the emissions of various gases were in the following order: nitrous oxide (N<sub>2</sub>O) accounted for 51.8%, methane (CH<sub>4</sub>) accounted for 46.7%, carbon dioxide (CO<sub>2</sub>) accounted for 1.5%.

According to the estimation of carbon content variation for the item of "forest land remaining forest land", the results showed that the amount of change in carbon content was almost stable each year from 1990 to 2014. These results were mainly due to the land use change of forestry and deforestation that have been regulated in the "Regional Plan Act", and the "Forestry Act" in Taiwan. Moreover, since the natural forest preservation order was implemented since 1992, the situations of land use change from forest to other land uses were rare. Thus, there were minor changes in the environment of forest. In 1991, 2001 and 2009, due to forest-fires, typhoons and other major disasters, there were higher losses of carbon storage of biomass and lower carbon removals in these three years, but otherwise were stable.

In order to manage agricultural greenhouse gas reduction and food security, the policies

provided by the Taiwan government in recent years included promoting organic agriculture, eco-friendly agriculture, rational use of fertilizers, three-stage livestock manure treatment, and etc. These policies were aimed at reducing greenhouse gas emissions per unit of agricultural production. The COA adopted the statistical methodology, which was geared to international standards, and following the “2006 IPCC Guidelines for National Greenhouse Gas Inventories” to calculate greenhouse gas emissions and carbon sinks for agriculture (including forestry) sector by using the agriculture statistics data of Taiwan, and the emission factors were based on localization data. The results showed that the emissions of carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) were 5,537 kilotonnes of CO<sub>2</sub> equivalent, and the carbon uptake was 21,477 kilotonnes of CO<sub>2</sub> equivalent in the forestry sector. Comparing to 2005, the CO<sub>2</sub> equivalent emissions were reduced by 24%.

The COA noted that unavoidably agricultural production activities will produce greenhouse gases, and from the historical data, it can be seen that the greenhouse gas emissions of the agricultural sector in Taiwan have been declining yearly since 1990. In addition to Taiwan’s participation in the WTO, and the trade and economic liberalization, which were affecting the domestic agricultural production, and resulting in reduction of cultivated area and livestock and poultry. The implementation of eco-friendly policies would also be promoting to the reduction of greenhouse gases.

In light of the increasing emphasis on environmental issues internationally, it has become an important issue how to attend simultaneously to environmental ecology and agricultural development. In response to requests of the “United Nations Framework Convention on Climate Change (UNFCCC)”, and “Paris Agreement”, and according to regulations of the “Greenhouse Gas Reduction and Management Act” in Taiwan, the COA complied with the “2016 Taiwan Greenhouse Gas Inventory” prepared by the Environmental Protection Administration (EPA) as the basis for greenhouse gas management.

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