GLOBAL METHANE ASSESSMENT FINDINGS FOR THE AGRICULTURAL SECTOR

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INTRODUCTION: GLOBAL METHANE ASSESSMENT

Reducing methane emissions by 45% means

0.3°C warming avoided by 2040

Preventing every year:

- 255,000 deaths from respiratory and cardiovascular diseases
- 26 million tonnes of staple crop losses
- 775,000 asthma-related hospital visits
- 73 billion lost work hours to heat exposure

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INTRODUCTION: METHANE & LIVESTOCK

Within agriculture, livestock holds 5-42 Mt/yr abatement potential at avg cost ~$10-30/tCO2e-GWP100
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SOURCES OF METHANE

- Northern Africa
- Equatorial & S Africa
- South Asia
- China
- North America
- Brazil
- Rest of Latin America
- Europe
- Central Asia
- Middle East
- Russia
- Oil and Gas, 83 MT
- Coal Mining, 42 MT
- Rice Cultivation, 30 MT
- Enteric Fermentation and Manure, 110 MT
- Landfills and Waste, 67 MT

Figure 2.6 Estimated annual sectoral methane emissions by region and global sector totals, excluding Oceania, 2017, million tonnes

Source: Saunois et al. (2020).

2.1.3 ESTIMATING EMISSIONS USING TOP-DOWN METHODS FROM OBSERVED METHANE AMOUNTS

To evaluate bottom-up inventories and obtain a good quantitative understanding of methane sources and sinks, it is critical to monitor and quantify historic and current methane amounts. This section gives a brief description of the different ways of measuring methane amounts and producing emissions estimates, and Table A4 in the Annex gives a summary of each measurement technique available as well as its advantages and disadvantages. Ground-based measurements, ice core data, observations from aircraft, forward and inverse modelling and satellite data are all discussed. Results from such top-down methods generally compare reasonably well with bottom-up estimates such as those shown in Table 2.1 (Jackson et al. 2020; Saunois et al. 2020).


Ground-based data is highly accurate and now fairly common. The first accurate in situ measurements of methane were made in 1978 (Blake et al. 1982). In 1983, measurement stations from the National Oceanic and Atmospheric Administration (NOAA/ESRL) and Advanced Global Atmospheric Gases Experiment (AGAGE) (Prinn et al., 2000) had global coverage. As shown in Figure 1.1a, these networks show the amount of methane and its change over time. The latter is proportional to the imbalance between emission sources and sinks. The globally averaged amount, for example, stabilized at approximately 1770 parts per billion (ppb) around the year 2000, indicating that at that time sources and sinks were equal (Figure 1.1).

To extend the record of methane amounts back in time before ground-based measurements became available, several studies (Bock et al. 2010) have investigated ice core data, which provide insights into past atmospheric methane concentrations.
**AGRICULTURAL SECTOR**

| **Improve animal health and husbandry:** reduce enteric fermentation in cattle, sheep and other ruminants through: feed changes and supplements; selective breeding to improve productivity and animal health/fertility |
| **Livestock manure management:** treatment in biogas digesters; decreased manure storage time; improve manure storage covering; improve housing systems and bedding; manure acidification. |
| **Rice paddies:** improved water management or alternate flooding/drainage wetland rice; direct wet seeding; phosphogypsum and sulphate addition to inhibit methanogenesis; composting rice straw; use of alternative hybrids species. |
| **Agricultural crop residues:** prevent burning of agricultural crop residues. |
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Available At: http://shindellgroup.rc.duke.edu/apps/methane/