

**Figure S1**. Distribution of global greenhouse gas emissions by sector.



**Figure S2**. Methanogenesis and methanotrophy pathways versus nitrogen metabolism. (**A**) Cluster of methanogens species. (**B**) Metabolic pathways in biological systems, with a highlight on the methanogenesis, methanotrophy (thick lines on the left side of the panel B) and nitrogen metabolism (thick lines surrounded by a dash square at the upper right side of panel B). This pathways was obtained from the Kyoto Encyclopedia of Genes and Genomes (KEGG, [https://www.genome.jp/pathway/map01100+M00052](https://www.genome.jp/pathway/map01100%2BM00052), accessed on December 9, 2022).