ISSN: 2414-1895 DOI: 10.6919/ICJE.202208_8(8).0130

Challenges and Countermeasures of Methane Control in China's Oil and Gas Industry

Jiayi Ding

Experimental High School Attached to Beijing Normal University, Beijing, 100032, China

*E-mail: djy15117989002@163.com

Abstract

Methane, the main component of natural gas, is a major Greenhouse Gas (GHG) causing global warming. One of its main emissions sources is the oil and gas industry. China is one of the world's largest oil and gas producers and consumers. By reviewing previous findings on this topic and interviewing experts in the sector, this paper finds that the actual methane emissions situation in China cannot be fully reflected from the current publications. Meanwhile, a majority of China's oil and gas companies have not published their specific methane mitigation plan yet. Finally, technologies related to methane mitigation are not well-developed yet in China either. This paper seeks to provide some specific and effective suggestions to reduce methane emissions in China, including strengthening the national regulation and updating the national emission inventories, developing ambitious and feasible action plans at the company level, actively engaging in international cooperation of low-carbon technology development, and cultivating public awareness on methane issues.

Keywords

Global Warming; Methane Emission; Action Plan; Cultivating Public Awareness.

1. Introduction

Methane is the second most significant Greenhouse Gas (GHG), contributing to about 16% of the total GHG emissions[1]. Within twenty years, the Global Warming Potential of methane will be 84 times higher than that of carbon dioxide (IPCC, 2014). Currently, methane is responsible for 25% of warming from the preindustrial era to the present-day[2]. Therefore, reducing methane emissions is an effective measure to slow down global warming in the short term. The emissions of the energy sector mainly come from the oil and gas industry, especially from the production and transportation of natural gas. Natural gas is primarily methane, which is colorless and odorless so its leakage and vent are nearly undetectable unless using professional devices. The difficulty in detection has resulted in methane emissions issue has been neglected for many years. Until recently, the public found that this issue is severe.

2. Literature Review

In the past decade, methane mitigation in the world's oil and gas industry has been widely recognized as the low-hanging fruit to immediately slow the rate of global warming, even in a decarbonizing global energy market[3]. A considerable amount of literature has been published on methane emissions from the oil and gas industry.

The major points of view of the literature were summarized in this study:

(1) Natural gas could play an important role in the global energy transition, but the methane emissions issue has dramatically damaged its decarbonizing value[4]. (2) In major powers' respective net-

ISSN: 2414-1895 DOI: 10.6919/ICJE.202208_8(8).0130

zero/carbon-neutrality targets- China, EU, and the U.S., methane emissions from the oil and gas industry is an important pillar. (3) Methane emissions studies in China just emerged after the carbon neutrality target was announced by Xi Jinping in September 2020, most studies are preliminary compared with the peer studies in the EU and U.S.

3. Methodology

Literary sources were accessed through the use of Google Scholar and China National Knowledge Infrastructure databases. Furthermore, the expert interview was applied in this study, playing an important role in the obtainment of insightful knowledge. The government's reports and specific laws were mentioned to compare the policies between China's oil and gas industry and that of other developed countries in Europe and the U.S. At last, there is a case study about measures taken by BP to analyze actions taken by IOCs[5].

From the comparison from various perspectives, it can be concluded that public awareness, government policies, and companies management - including new technologies investments - should be improved, which form the three sections of my thesis argument.

4. Research Finding and Analysis

4.1 Methane Regulations Made by the Chinese Government

Given the very limited public data of methane emissions in China [6], a senior expert from the National Center for Climate Change Strategy and International Cooperation (NCSC) was interviewed by this study. He introduced that the major challenge for the Chinese government and the Chinese oil and gas industry to tackle the methane emissions issue is to update the national methane emissions accounting inventory and reporting methodology. As he explained, the current methane emissions accounting inventory and reporting methodology was imported from Canada in the 1990s; therefore, the inventory and methodology cannot accurately reflect the real methane emissions of emitters such as oil and gas companies. Given this status quo, it could partially explain why the Chinese government has not announced any specific methane emissions targets yet – inventory and methodology, which are the foundation of methane emission accounting and reporting, should be fully updated in order to obtain accurate emissions data before any target is raised.

Based on the findings, this study strongly suggests the Chinese government put forward actions mentioned below:

(1) The government has to clearly put forward its methane emissions control and management levels by measures such as updating methane emissions accounting inventory and reporting methodology. To achieve this goal, the government should incorporate methane emissions reduction goals into the national climate objectives and the 14th Five-Year Plan (FYP). Then, the government should issue a feasible action plan for methane emission reduction to the oil and gas industry. If the central government can publish a national methane target, it will effectively promote the mitigation. The central government and local governments should also put forward more clear medium and short-term emission reduction targets and financial support including tax refund carbon credit.

(2) Government needs to establish a regulatory framework for methane emission in the oil and gas industry.

4.2 Methane Mitigation of the Chinese Oil and Gas Companies

Few articles discussed about the performance of Chinese oil and gas companies in methane mitigation, so this study has investigated this question by checking the annual reports and ESG reports (some companies called it sustainability report) of the big 3 oils, i.e. China National Petroleum Corporate (CNPC), China Petroleum and Chemical Corporate (Sinopec) and China National Offshore Oil Corporate (CNOOC) [6] [7] [8].

When comparing the big 3 with each other, it is obvious that CNPC's methane management performance is more advanced than the other two. Although CNPC is leading the methane mitigation

ISSN: 2414-1895 DOI: 10.6919/ICJE.202208_8(8).0130

action in the Chinese oil and gas industry, compared with its international peer, e.g. bp company, CNPC has not reached the standard yet. For example, bp aims to install methane measurement at all their existing major oil and gas processing sites by 2023, and then drive a 50% reduction in methane intensity. Bp also committed to influence its joint ventures to set their own methane intensity targets of 0.2%, i.e. a target that was very close to net zero. The action plan and target of bp is clearly very ambitious, none of any Chinese oil companies have reached this level yet.

(1) Develop methane mitigation strategy and action plans in line with the national carbon neutrality target. The strategy and action plans should be neither too ambitious such as completely stop any oil and gas energy investments in a short term, nor too conservative. The top management team should identify clearly the risks and opportunities, in both near- and long-term, of developing the strategy and action plans.

(2) Engage in the technology development of methane emissions monitoring and reduction, as well as deploying effective technologies and devices over their operating sites.

4.3 Methane Technology Development in China

As mentioned above, there are about 20 papers discussing methane emissions reduction in China, whereas none of them introduced any methane detection or reduction technologies that are developed by Chinese scholars or companies. These papers have introduced many fascinating technologies that were developed in the EU and the U.S. This is perhaps because climate actions started earlier in the EU and the U.S., and many international innovative enterprises have been developing methane management and detection technologies and instruments for years. Take the GHGsat, a Canadian company, for example. GHGSat uses satellite technology to search for and monitor emissions at the facility level, which can help the public to find out emissions in remote areas [9]. Similarly, another methane technology company Qnergy uses instrument air to replace methane emissions from pneumatic devices, a global-widely used device (OGCI, 2021).

Given the situation introduced above, here are the proposed suggestions on technological innovation by this study:

(1) It is significant for China to carry out international technological cooperation on the methane issue. Previous experience has proved that introducing and re-innovating technologies from abroad is a feasible and effective approach to accelerate the development of certain technologies.

(2) It is also necessary for China to learn from the example of international low-carbon investment funds, such as the OGCI Climate Investments fund. This study suggests establishing more energy technology R&D funds in China to support the technology R&D and operation of domestic innovative enterprises.

4.4 Public Awareness on Methane Should Be Raised

During this study, it was found that there was not much news on the topic of methane in China so the civic awareness on this issue is far from enough. Therefore, the study strongly suggests China focus on raising the public's awareness on this issue. To be better catch the public's attention on the issue, suggestions are given below:

(1) Traditional media can be supplemented with new media, including WeChat and Microblog, to participate in the publicity of methane emissions reduction in the oil and gas industry.

(2) Technologies can be used to visualize the climate-damaging leaks found within local communities aiming to attract the public. This approach was utilized by the EDF. It collaborated with Google Earth Outreach and applied Google Street View cars and methane sensors to detect emissions in cities (EDF, 2021). With the intuitive pictures taken by the technologies, the public can better understand how this issue is connected to themselves.

(3) Various neighborhood committees in China should be the direct agency to help the citizens understand the significance of the issue by holding lectures and public forums in schools to educate students or plastering posters on the streets.

ISSN: 2414-1895 DOI: 10.6919/ICJE.202208_8(8).0130

5. Conclusion

This study indicates that in order to reduce methane emissions in China's oil and gas industry, the government could strengthen the national policies and update the national emission inventories. Going forward, oil and gas companies should develop ambitious and realizable plans. Not only should low-carbon technologies be used to reduce methane emissions, but the public should also made aware of this serious issue.

There are several limitations to this study. First, this study's arguments are mainly based on the self-reporting of companies. Issues may not always be accurately reflected and resolutions may be somewhat embellished in the companies' reports. Furthermore, most authors of the previous studies were from the oil and gas companies, or at least had close connections with the companies, so the reports may have been biased. Moreover, the in-depth knowledge about this industry was gained by interviewing "insiders", i.e. two experts. Since the author of this study is not from the oil and gas industry and there are no other published resources to confirm the insiders' statements, the analysis section in this study may be limited, and the argument might be lack of credibility.

Despite the limitations, the insights gained from this study may be of assistance to China's future actions on the methane emissions issue. With a more comprehensive understanding of the methane emissions issue, China's oil and gas industry can lay a solid foundation to achieve Net-zero carbon emissions by 2060.

References

[1] Victor D.G., Zhou D., Ahmed E.H.M., et al. IPCC Climate change 2014 Mitigation of Climate Change[C]. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. 2014; 01:111-150.

[2] EDF calculation based on IPCC AR5 WG1, Chapter 8 [R/OL] http://www.ipcc.ch/report/ar5/index.shtml.

[3] International Energy Agency. Methane Tracker,2021. https://www.iea.org/reports/methane- tracker-2021 IEA. 2016. Methane – The Low-Hanging Fruit of Emissions Reduction.

[4] IPCC. Climate change 2014 synthesis report [R / OL]. [2020- 06-29]. https://www.ipcc.ch/site/ assets/ uploads/2018/02/ SYR_AR5_FINAL_full.pdf.

[5] BP. BP sets ambition for net zero by 2050, fundamentally changing organization to deliver [R/OL]. (2020-02-12).

[6] CNPC. Environmental protection bulletin 2019 [R / OL]. http://www.cnpc.com.cn/cnpc/hsebg/202006/ 18ec8763f181464b87efb6e63fc31413/files/f740d5cb9b4c42c4b06471fc7ccfcb89.pdf.

[7] Sinopec. Communication on progress for sustainable development 2019 [R/OL]. http://www. sinopecgroup.com/group/Resource/Pdf/SustainReport2019.pdf.

[8] CNOOC. Sustainable development report 2019 [R / OL]. https://www.cnooc.com.cn/attach/ 0/2003311 054338353.pdf.

[9] Oil and Gas Climate Initiative. (2022). GHGSat – Global methane detection at facility level. https://www. ogci.com/climate-investments/investment-portfolio/ghgsat/ghgsat-global-methane-detection-at-facility-level/.