



METHANE
GUIDING
PRINCIPLES

Methane Guiding Principles Signatory Reporting

ENN Energy

December 17th 2021





COMPANY : **ENN ENERGY HOLDINGS LIMITED**

YEAR OF JOINING METHANE GUIDING PRINCIPLES : **March 2021**

SENIOR REPRESENTATIVE: **Chief Financial Officer, Mr. Andrew, Liu Jianfeng**



Principle One: Continually reduce methane emissions

- Please state what specific activities or projects your company has undertaken to reduce methane emissions. Please refer to the previous year's annual MGP reporting where applicable to refer to intended activity. Link to sustainability report where relevant to provide further detail.
- Describe how the reduction was achieved including description of the asset type, technology type, timeframe. What was the end result?
- Provide data to support your description e.g. the actual amount of emissions reduction achieved, or the reduction in methane intensity.

2021 completed activity	2022 intended activity
<p>ENN Energy, as one of the largest city gas operators nationwide, has been fully aware of the challenges of methane emission reduction and has responded to it proactively. We have included methane emission reduction as an important part to achieve carbon neutrality goal by 2050, as highlighted in our 2050 net-zero roadmap released in 2021.</p> <p>ENN Energy established a Methane Emission Management Working Group since becoming a signatory of Methane Guiding Principles (MGP). Members from pipelinen network operation, technology and ESG departments were engaged to join the working group and responsible for methane emission source identification, calculate emission data, formulate emission management action plans, implement emission reduction actions, set up emission reduction targets, report emission status, etc. In 2021, emission reductions actions were methodically undertaken in our city gas business scenarios (also considered as emission scenarios) as follows:</p> <ul style="list-style-type: none"> • Stations: we applied advanced technologies and devices such as the Pan-Tilt-Zoom (PTZ) laser methane monitoring system with Internet of Things (IoT) to monitor and alert emissions in real-time, boil off gas devices to recover residual gas, and crane arm and interlocking devices to replace unloading hoses to reduce methane leakage. By the end of the December 17th 2021, ENN Energy had invested RMB 14million in installing 70+ PTZ 	<p>In 2022, we aim to improve methane emission management in four main dimensions: 1) adaptation of advanced methane emission mitigation practices and 2) promotion of existing methane emission management measures, and 3) improvement of current methane management system; 4) improvement of on-site operation specification and providing training to employees:</p> <ul style="list-style-type: none"> • Continue to cooperate with eco-partners to adopt and use advanced and effective methane emission mitigation measures. Particularly, we will contribute to relative studies organised by China Oil and Gas Methane Alliance (COGMA), and have more communications with alliance members. • Explore the technology of hydrogen blending in gas pipelines, and evaluate the feasibility in terms of methane emission mitigation in city-gas projects. • For methane emission data, we aim to use actual monitoring to replace data estimation measures, and aim to adopt 1-2 new technologies/devices for improving methane data reliability in 2022. • The PTZ laser methane monitoring system (pilot projects were launched in 2021, see p.12 of ENN Energy Decarbonisation Action 2030 for further details) will be introduced to all existing stations, and the design, construction and operation standards for new projects will also incorporate with PTZ laser methane monitoring system in system-



laser methane monitoring systems which covered 60+ stations. The BOG system had also recovered 34million m³ natural gas in the year 2020 (data of recovered natural gas in 2021 will be calculated by the end of the year and disclosed afterwards).

- Pipeline: we organised leakage detection campaign for pipelines aged more than 20 years, and repaired all pipelines with potential risks. For those pipelines aged less than 20 years, corrosion inspection campaign was undertaken to evaluate and repair pipeline with poor performance.
- For end users: we provided indoor security check and gas safety inspection services twice a year to household users, and monthly security check for commercial and industrial customers. We also introduced alarm and automatic cut-off valve leakage devices to them to avoid fugitive emission.
- Transportation: the residual gas recovery devices were equipped to reduce residual gas emissions when loading and unloading; routine upgrade and maintenance were also conducted for old vehicles to mitigate fugitive emission; initiated a research to develop real-time monitoring and early warning technology of pressure rise and release of LNG storage tanks with an equipment manufacturer, and with such technology, the early warning rise before tank pressure rises causing automatic venting from safety valve, thus driver can correct his/her operation behaviour immediately.

related technologies, measures and regulations.

- We aim to gradually establish a performance appraisal and salary incentive mechanism relating to methane emission reduction. In addition, we will introduce a reporting, review, and continuous improvement methane emission management system to review and upgrade methane emission management policies.
- We intend to optimise on-site operation regulations, procedures, and standards, and provide technical training for on-site operators to improve their operating skills to mitigate emission.

ENN Energy is also going to initiate pilot projects which will incorporate a comprehensive methane management scheme, which include standards and guidance related to methane data collection, data analysis, calculation, reporting and disclosure, and if possible, data verification. It is expected that by pilot projects, the integrated methane management solution for our company can be established and be applied in our all-city gas projects afterwards.

Principle Two:

Advance strong performance across the gas supply chain

Please include answers to the following questions:

1. Did you participate in any methane research or plan to do so?
 2. Did you conduct any outreach on methane management?
- Describe what action you have taken to engage industry players across the value chain to better understand how to achieve robust methane emissions management. Outreach activity could include training sessions, participation in webinars, influencing of NOJV partners, or publication of guidance. Activity could also include commercial incentives or engagement with investors to drive better performance by others.
 - Provide details of any outcomes that resulted from your action.

2021 completed activity	2022 intended activity
<p>We promoted methane management of upstream natural gas suppliers by requiring some overseas LNG suppliers to provide carbon-neutral label. In addition, as one of the founding members of China Oil and Gas Methane Alliance (COGMA), we were working with PetroChina, Sinopec, CNOOC and State Pipeline Corporation to promote stronger management of methane in China’s oil and gas value chain.</p> <p>Upstream service providers were also asked to regulate their methane management. For example, the Zhoushan LNG Terminal was required to conduct carbon auditing and methane management in accordance with international standards in 2021. Meanwhile, we advocated the use of residual methane recovery devices at LNG terminals located in coastal area of China, to promote methane management across the supply chain.</p> <p>ENN Energy, together with China Gas Association, initiated research on hydrogen blending, a technology to reduce methane emissions and end-user carbon emissions.</p> <p>ENN Energy, together with our MGP partner Beijing Gas, initiated the “Methane Emission Control Initiative of China’s City Gas Enterprises”, which encourages city gas enterprises in China together to realise a nationwide methane emission reduction. 10 city gas companies in China participated the event, and signed the commitment. More information can be found in relative news report. Additionally, ENN</p>	<p>To closely cooperate with peers, suppliers, users, and the community and promote methane emission management, ENN Energy is going to have frequent communication with the value chain. We will be deeply involved in industrial research related to methane emission reduction with members from COGMA.</p> <p>At the same time, we are going to hold webinars with other city gas enterprises to share research information and jointly develop standardised methane management guidance, methane emission calculation tools for city gas business. Educations of methane emission management for related parties will also be proposed, through which we believe the supply chain can jointly work to form unified methane management awareness.</p> <p>Upstream suppliers, LNG supplier specifically, will be encouraged to acquire carbon-neutral label thus ensuring all ENN Energy’s purchased LNG is sourced from companies with strict methane management, and encouraging more upstream suppliers to adopt stringent methane management.</p>





Energy participated in a terminology translation webinar held to translate and standardise methane-related terminology used in Chinese, in accordance with the Methane Emission Glossary.

Moreover, our communications with stakeholders on methane management had been improved by including certain methane-related questions in the ESG stakeholder engagement questionnaire.



Principle Three: Improve accuracy of methane emissions data

- Describe action taken to improve methane emissions data collection methodologies. This could be application of new technology at an operated site(s), investment and participation in R&D initiatives, development of monitoring/modelling software, or support to research that improves the accuracy of the quantification of methane emissions.
- Where new technology /software has been piloted or adopted, it is helpful to describe how it works, the reasons it was selected, and how it was deployed. Any data that can be shared to demonstrate improvements is useful.
- How these new methods/technologies has been adopted into your accounting process if at all.

2021 completed activity	2022 intended activity
<p>The PTZ laser methane monitoring system, which is piloted at our city gas stations, is one of the advanced monitoring systems that ENN Energy adopted to improve methane emission data collection. The system has a probe with 150m detection radius to detect methane and can exclude interference from other gases. The integrated camera and laser head devices of the system could pre-set point cruise and can conduct 7*24 hours monitoring covering the entire station. Online network and IoT technology are part of the system and were used to connect all equipment to tackle limitations of terrain and station facilities layout.</p> <p>PSIganesi, the natural gas pipeline network simulation technology, is also used to simplify the operation and management of complex pipeline networks and perform real-time online monitoring and calculation of gas flow pressure, flow rate and other pipeline network data. The collected data was imported into a built-in GIS system that can visualise key parameters of simulation calculations, and thus identify utilisation rate of pipeline network under different scenarios and calculate potential methane leaks and related volume. In this way is supports operators to continuously optimise network operations and reduce methane emissions.</p> <p>For more information, please refer to p.20-p.23 of ENN Energy's Decarbonisation Action 2030</p>	<p>ENN Energy plans to equip all its stations with PTZ laser methane monitoring system by the end of 2022. The completed coverage of PTZ laser methane monitoring system is going to support an accurate methane emission data collection. We also intend to develop a data collection and calculation framework based on the PTZ laser methane monitoring system and the PSIganesi network simulation system.</p> <p>To further promote direct monitoring to replace emission data estimation and improve accuracy of methane emission data, we will increase capex for purchasing direct monitoring equipment. We aim to conduct methane data metering and validation through pilot projects in collaboration with our peers.</p>



Principle Four:

Advocate sound policy and regulations on methane emissions

Advocacy consists of active participation in legal consultation processes, external policy statements, and direct engagement with government

- Consider providing details on the region or regulation involved, how you undertook your advocacy, others involved, and the outcome.

2021 completed activity	2022 intended activity
<p>ENN Energy is one of the founding members of COGMA, an organisation that aims to standardise and regulate domestic methane emission calculation and reporting. Founding of the alliance was also recorded as a milestone in Responding to Climate Change: China's Policies and Actions published by the State Council.</p> <p>The alliance divided its member into different groups to investigate and develop domestic methane emission management, methane emission calculation and methane emission reduction standards, which consequently would be proposed to the Chinese government. ENN Energy is involved in the city gas working group under the alliance and would contribute to city gas methane management standards investigation and consultation.</p>	<p>Participating in the joint member research of COGMA, ENN Energy will have more active involvement in methane emission control investigations, organise information sharing between members and be prepared to document the output, thus formulating and providing consultation materials for policy making processes of Chinese government.</p>



Principle Five: Increase transparency

Please include answers to the following question:

1. Are you participating in OGMP 2.0 or do you intend to do so? If you are participating in OGMP 2.0 you may provide a link to the website.
 - Describe what activity you have carried out e.g. providing information in relevant external reports on methane emissions data, methodologies, and progress and challenges in methane emissions management.
 - If you have contributed towards the standardisation of comparable external methane reporting describe the activity you have taken.

2021 completed activity	2022 intended activity
<p>ENN Energy had not participated in OGMP 2.0 yet, but we have a plan to do so after we have established a methane management scheme strictly in accordance with OGMP 2.0.</p> <p>In October 2021, ENN Energy published its Decarbonisation Action2030, which ENN’s approach to reducing methane emission and improving transparency against. Additionally, the report describes the challenges in methane emission management, the challenge to quantify emission data through measurement rather than assumption, and the challenge to develop effective emission reduction measures.</p> <p>More related information can be found in ENN Energy’s Decarbonisation Action 2030.</p>	<p>ENN Energy will collect methane emission data in 2022, and disclose relative data in accordance with international standards in 2023, steadily increasing reporting transparency thereafter.</p>



Methane Emissions

<p>Do you report absolute methane emissions within your sustainability report? <i>If so provide link.</i></p>	<p>ENN Energy disclosed methane emissions caused by third-party damages on pipeline as part of its scope1 carbon emissions in 2020 ESG Report, the estimated volume of emissions was around 86,495.2m³.</p>
<p>Do you report a methane intensity within your sustainability report? <i>If so provide link.</i></p>	<p>There was no disclosed methane intensity within our ESG report, but ENN has internally calculated a methane emission intensity.</p>
<p>What are your organisation's total absolute methane emissions? Provide a figure in tonnes. Provide latest data publicly available.</p>	<p>The total absolute methane emissions was 62,051.7 tonnes (because of complexity of emission caused by third-party damages, we used a standardised density 0.7174kg/m³ to convert volume to weight).</p>
<p>State your methodology.</p>	<p>Onsite detection with estimation</p>
<p>State your reporting boundary.</p>	<p>ENN Energy and its subsidiaries</p>
<p>What are your organisation's methane intensity? Provide latest data publicly available.</p>	<p>The emission intensity was 3.94*10⁻⁶ m³ methane emission/m³ retail gas sold. This intensity is an internally calculated number that has not been published.</p>
<p>State your methodology.</p>	<p>Dividing the estimated methane emission volume in 2020 (86,495.2m³) by total retail gas sold in 2020 (21,953 million m³).</p>
<p>State your reporting boundary.</p>	<p>ENN Energy and its subsidiaries</p>
<p>Do you have a methane emission target? If yes, please state what it is, including the boundaries and methodology. If no, are you developing such a target? Please state your intended timeline.</p>	<p>ENN Energy is committed to work together with COGMA members to achieve the common goal of "striving to reduce the average methane intensity during natural gas production to below 0.25% by 2025, which is close to the performance of leading players in the world, and making efforts to reach world-class level by 2035".</p>

Commentary

Use this space to provide any general context or statements around the information and data provided.

ENN Energy is now making great effort to catch up with the most advanced international methane emission control and data management. We identified that the comprehensiveness of a company's methane emission data collection, data calculation, data report and data verification can contribute to a complete methane management scheme. Therefore, the pilot projects to incorporate all mentioned factors will be the starting point to benchmark international advanced practices.

Meanwhile, the investigations for domestic methane management studies held by COGMA found that international methane emission reporting standards and guidance may not be completely suitable for Chinese gas enterprises. Therefore, it is also ENN Energy's determination to co-develop the domestic methane emission reporting standards and guidance with members from COGMA. Regarding the international standards and guidance, we believe the development of Chinese methane emission reporting standards and guidance can reach a consensus with the international one, and objectively reflect Chinese methane emission status.