marcogaz

TECHNICAL ASSOCIATION
OF THE EUROPEAN GAS INDUSTRY

ANNUAL REPORT
2022 - 2023

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ABOUT MARCOGAZ

Founded in 1968, MARCOGAZ is the technical association of the European gas industry. It represents 28 member organisations from 20 countries. Its mission encompasses monitoring and policy advisory activities related to European technical regulation, standardisation and certification with respect to the safety and integrity of gas systems and equipment, rational use of energy as well as environment, health and safety issues. It is registered in Brussels under number BE0877 785 464.

DISCLAIMER

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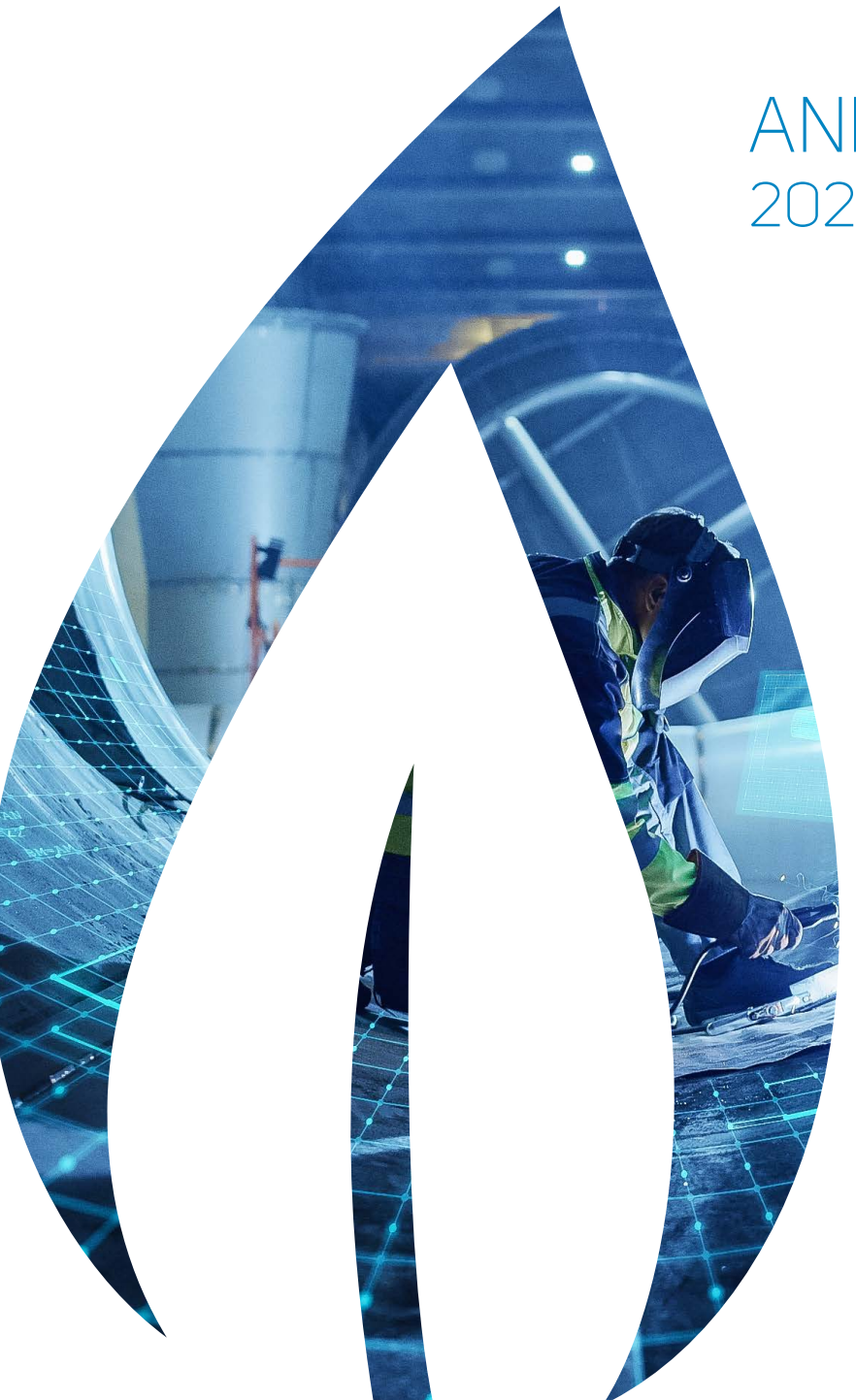

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PRESIDENT'S MESSAGE

Liam Nolan
MARCOGAZ President

> **“MARCOGAZ remains steadfast in its mission to lead the gas industry towards sustainability and decarbonisation. In these transformative times, we are committed to advancing the industry, serving our members and partners, and contributing to a better energy future.”**

MARCOGAZ is steady in its commitment to actively promote the decarbonisation of the gas industry in Europe. Our dedication is firmly aligned with the 2050 net-zero goals outlined in the 2015 Paris Agreement, closely harmonising with the European Union's climate objectives, particularly the European Green Deal. Additionally, we embrace the United Nations Sustainable Development Goals, particularly Goal No. 7, ensuring universal access to clean energy.

Our central objective is to accelerate the transition of Europe's gas industry towards carbon-neutral gas systems, which involves meticulous pursuit of essential legislation, aiming for a 55% reduction in emissions by 2030 and ultimately reaching the paramount goal of net-zero emissions by 2050.

MARCOGAZ takes pride in its crucial role, providing indispensable technical guidance and nurturing strong relationships with European members and industry partners. We actively shape the evolving gas industry standards, adapting to the growing integration of renewable and low-carbon gases.

With the dedicated support of our members, we have forged robust collaborations with key energy sector stakeholders (including the European Commission and other relevant EU institutions) on energy legislation. Our partnerships extend globally to valuable bodies such as the United Nations Economic Commission for Europe (UNECE), the Energy Community, the International Gas Union (IGU) and the European Committee for Standardization (CEN). Furthermore, we actively participate in numerous innovative renewable gas projects. These global alliances drive our mission to expedite sustainable energy goals and achieve global gas system decarbonisation.

In recent years, MARCOGAZ has undergone transformation, fortified by strategic initiatives aimed at amplifying our influence within the dynamic energy landscape, strengthening our internal structure, enhancing MARCOGAZ's visibility, expanding our membership and fostering the development of renewable gases.

Collaborating with our esteemed members, partners, regional and international stakeholders, MARCOGAZ maintains its firm dedication to conducting vital technical work that plays a central role in shaping effective standards and legislation, guided by the requisite technical expertise. Through collective effort and ongoing technical dialogue, MARCOGAZ is resolute in its ability to make significant contributions towards the development of a decarbonised and integrated energy system.

MARCOGAZ remains steadfast in its mission to lead the gas industry towards sustainability and decarbonisation. In these transformative times, we are committed to advancing the industry, serving our members and partners, and contributing to a better energy future. Together, we will persistently work towards shared objectives, recognising that the energy transition demands cooperation, innovation and unwavering dedication. We extend our heartfelt appreciation for your continued support as we embark on this significant journey.

VICE-PRESIDENT'S MESSAGE

Alexander Schwanzer
MARCOGAZ Vice-President

> “We have a duty to make the most of our existing infrastructure, the responsibility to keep energy affordable and the opportunity to propel the energy transition to new heights.”

As the Vice-President of MARCOGAZ, a Board Member and now also a dedicated member of the organising committee for the upcoming 6th European Gas Technology Conference 2024 (EGATEC 2024), I feel privileged to underline the association's commitment to an independent and sustainable energy supply, driven by the urgent need to diversify the energy market to meet our ever-growing demands while nurturing the environment, which serves as the bedrock of our lives and the legacy that we leave for future generations.

Our motivation is not rooted merely in hope but in the tangible technical possibilities that empower Europe to assume a leadership role in the energy landscape. Europe is now using the potential of technologies like electrolysis and pyrolysis, producing Hydrogen and Bio-Methane, and leveraging underground storage facilities for CO_2 and H_2. Additionally, Europe is re-imagining the use of natural gas in innovative ways.

It is evident that gas plays a pivotal role in decarbonising the energy system, complementing renewable sources like wind, solar and hydropower. However, to truly unlock the potential of this transition, legal certainty, guaranteed by the Commission for at least two decades, is essential to provide the investment security that our system operators require. This foundation will not only drive the transformation but also create entirely new industries, generating thousands of new jobs and fostering a robust economy.

As we venture into this transformative era, we must maximise the efficiency of our new techniques to ensure stable quantities and affordable prices for consumers. The understanding of what is required to decarbonise the gas system guides our path forward. We have a duty to make the most of our existing infrastructure, the responsibility to keep energy affordable and the opportunity to propel the energy transition to new heights.

The bar has been set and I extend a heartfelt appeal to all industry stakeholders to join MARCOGAZ in the coming decades as we strive to shape our energy portfolio for the betterment of posterity.

I am also thrilled to mention that, in tandem with the forthcoming EGATEC 2024 in Hamburg, OVGW is eager to express its intent to start organizing EGATEC 2026 in Vienna immediately following the 2024 edition. We believe that such collaborative efforts will further solidify our commitment to advancing the gas industry's sustainable future.

I personally look forward to our continued journey towards a more diversified, sustainable and prosperous energy landscape.

SECRETARY GENERAL'S MESSAGE

Manuel Coxe
MARCOGAZ Secretary General

> We are ready to successfully continue our path, with our sights firmly set on the decarbonisation of the gas system, thanks to continued collaboration and the sharing of technical information and skills.

It has again been an extraordinarily fulfilling experience to serve as Secretary General of an association with a rich history spanning over five decades. It has been an honour to devote myself to supporting the interests of MARCOGAZ's outstanding members.

MARCOGAZ embarked on considerable developments in 2022 and 2023 in response to the growing need for accessible and efficient energy. During this time, MARCOGAZ merged the Standing Committee Gas Utilisation and the Standing Committee New Gases to perform their tasks jointly in better technical cooperation. We also formed two new Working Groups. First, the Working Group Energy Efficiency – under the umbrella of the new joint Standing Committee Gas Utilisation & New Gases – solely dedicated to the ways in which the efficient use of energy contributes to more security of supply, reduces consumption and energy costs and reduces the potential impact on the climate. Secondly, the Working Group H_2, $BioCH_4$ and SNG initiated its activities in 2023 to conduct technical studies on the creation and upgrading of renewable gases. These critical additions demonstrate our unwavering commitment to being a part of the expected net-zero solution and leveraging our members' aggregate knowledge for the benefit of industry.

As the recognised technical authority in the European gas sector, MARCOGAZ actively participates in high-level talks. This includes our engagement in forums such as the European Gas Regulatory Forum (Madrid Forum), the European Energy Infrastructure Forum (Copenhagen Forum), collaboration with several European Commission Task Forces and our participation in the European Commission Clean Hydrogen Alliance. We are equally dedicated to modifying gas sector standards and expanding technical research to accommodate increasing amounts of new gases in the gas infrastructure.

With the constant support of our President, Vice-President and Executive Board members, MARCOGAZ will continue to give essential technical insights while increasing its visibility and legitimacy. To achieve this goal, MARCOGAZ has an internal platform that allows members to share technical information and knowledge as well as communication campaigns and dissemination products that are being developed.

We are grateful for our members' and partners' considerable contributions in 2022 and 2023, particularly their focused efforts to minimise methane emissions and advance renewable gas technologies. We are ready to successfully continue our path, with our sights firmly set on the decarbonisation of the gas system, thanks to continued collaboration and the sharing of technical information and skills.

I want to express my heartfelt gratitude to all our members for their continuous support and for generously donating their time and talent to help our association achieve its goals.

1. ABOUT MARCOGAZ

MARCOGAZ is the Technical Association of the European Gas Industry.

By providing the industry with science-based insights, MARCOGAZ plays a unique role in the European natural gas market. The needs of our members guide the work done at MARCOGAZ. The activity is based on the exchange of relevant technical data to support the sustainable growth of the gas industry and European policymaking. In a nutshell, MARCOGAZ offers its members technical insights on infrastructure, end use and sustainability for natural gas systems and novel gases, such as hydrogen, biomethane and low-carbon gases.

MARCOGAZ strengthened it decarbonisation-focused strategy in 2022 and 2023 in accordance with environmental commitments and international agreements, such as the Paris Agreement, the European Union's climate target goals supported by the European Green Deal, and the most recent RePowerEU. MARCOGAZ is eager to contribute to the solution and encourages collaboration with other organisations that represent the European or global gas sector or manufacturers as they see the potential of renewable gases in the transition to net-zero.

In response to the evolving landscape in which there has been an urgent shift towards the integration of the energy system, MARCOGAZ's work to conduct technical assessments on the adaptation level that gas operators will face as well as on how to ensure resilience for the industry, both Standing Committee New Gases and the Standing Committee Gas Utilisation combined their efforts by operating together.

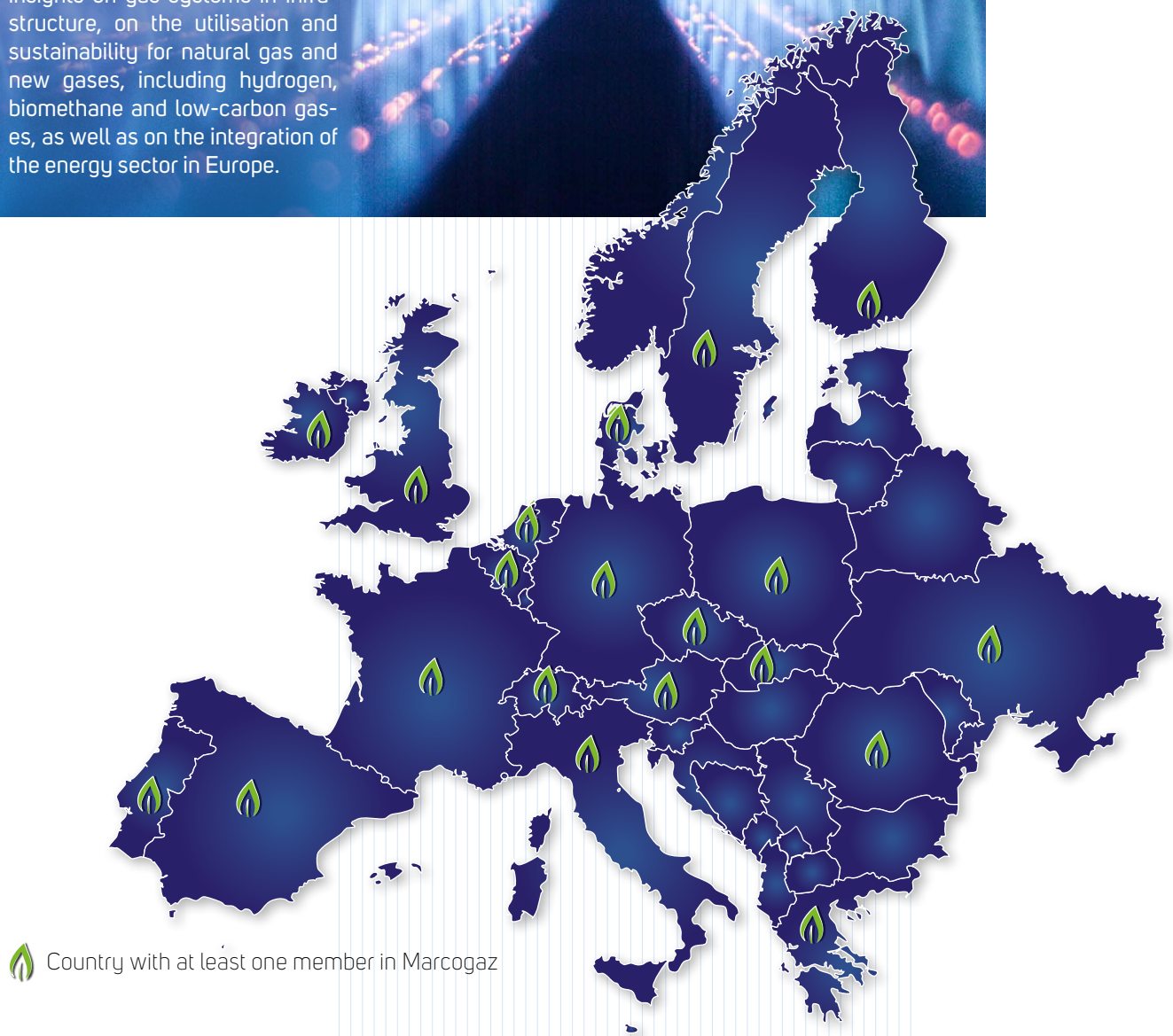
Regarding sustainability, the safety and integrity of gas systems, and energy efficiency, MARCOGAZ is dedicated to technically supporting, observing and providing advice on issues linked to European regulation, standardisation and certification. As the go-to organisation for the European gas sector for technical evaluation in the midstream and downstream gas systems in the last few decades, MARCOGAZ has contributed distinctive technical insights to support policymaking and technological advancement. We create factual insights that serve as the foundation for reliable standards, laws and regulations across Europe. To ensure the highest gas quality under the toughest safety and environmental standards, we collaborate with authorities and stakeholders.

MARCOGAZ devotes a lot of effort to technological advancements that will enable the integration of the renewable and low-carbon gases into energy systems. In order to cope with increasing greenhouse gas emissions, the reduction of carbon dioxide and methane emissions is essential. Biomethane, biogas, hydrogen and synthetic methane are examples of renewable gases that will aid in the shift to a cleaner energy source. However, the current gas networks and their operators will be impacted by this paradigm shift and the technical work of MARCOGAZ will play a key role to help the industry cope with the energy transition's objectives.

2. VISION AND MISSION

MARCOGAZ is the reference association of the gas industry for technical assessment in the midstream and downstream gas systems. We deliver factual insights, used as the basis for establishing trusted regulations, standardisation and legislation in Europe.

MARCOGAZ provides technical insights on gas systems in infrastructure, on the utilisation and sustainability for natural gas and new gases, including hydrogen, biomethane and low-carbon gases, as well as on the integration of the energy sector in Europe.



Country with at least one member in Marcogaz

3. INTERNAL ORGANISATION

3.1. GENERAL ASSEMBLY

Each member of MARCOGAZ has a seat and a vote in the General Assembly, regardless of the type of membership. MARCOGAZ's General Assembly meets at least once per year and consists of all members of MARCOGAZ — national delegations representing gas industry companies and associations as well as member organisations.

The General Assembly held a meeting in June 2022, where, among other subjects, President Liam Nolan and Vice-President Alexander Schwanzer were elected. The following General Assembly met in June 2023.

3.2. EXECUTIVE BOARD

MARCOGAZ's Executive Board comprises senior executives from Charter Members and the Chairs of the Standing Committees. The Board must convene at least twice per year, but the usual practice is to convene four times per year. During meetings, Board Members approve technical documents, define and adopt policy positions, strategy priorities and key objectives. The Executive Board also ensures coherence on internal and external activities and decides on priorities to optimise the use of available resources.

3.3. MEMBERSHIP

3.3.1. Benefits of Membership

Membership of MARCOGAZ offers a multitude of valuable benefits to organisations within the European gas industry.

At the core of MARCOGAZ's mission is the delivery of technical studies and factual insights on a wide range of topics relevant to its members. These insights are based on comprehensive technical data collected by both the Secretariat and Working Groups. The association's Standing Committees and Working Groups actively prepare and publish technical reports covering critical areas such as methane emissions, hydrogen and natural gas mixtures, liquefied natural gas as a transport fuel, energy labelling, renewable gas injection, and the adaptation of gas appliances to meet carbon-neutral objectives. The members benefit from the abovementioned knowledge sharing.

Beyond knowledge sharing, MARCOGAZ plays a pivotal role in technically supporting policymaking. For decades, the association has provided unique technical expertise to support policy development and technological advancements in the midstream and downstream gas systems. MARCOGAZ's factual insights serve as the foundation for trusted regulations, standardisation and legislation within Europe. We collaborate closely with stakeholders and authorities to ensure the highest gas quality standards and environmental safety standards. The members are involved in interaction with policymakers and stakeholders, adding value for their organisations and local memberships as well.

Membership of MARCOGAZ offers organisations the opportunity to actively participate and represent their interests in the European gas industry. Compliant with EU energy, gas and sustainability regulations and standards, members can contribute their expertise and ideas to the association's Standing Committees and Working Groups, where technical work is shaped by the collective knowledge of companies and associations from 20 European countries.

By being part of MARCOGAZ, members position themselves at the forefront of the energy industry. MARCOGAZ represents its members' interests within the industry, actively contributing to EU policy making, and technically supporting the transition of the gas industry towards net-zero ambitions.

Effective communication is a hallmark of MARCOGAZ's work. We facilitate robust communication among our members as well as between the association and its partners and stakeholders. The technical expertise provided by MARCOGAZ experts is instrumental in conveying the gas industry's position in Europe, enhancing the visibility of both the association and its members.

Furthermore, MARCOGAZ fosters a vibrant networking environment. In recent years, MARCOGAZ has welcomed new members, including TSOs and DSOs, and forged partnerships while expanding dialogues with European institutions and stakeholders in the gas sector and beyond. MARCOGAZ's commitment to exchanging technical expertise and sharing knowledge across the sector underscores its dedication to members' growth and success.

In addition to these benefits, MARCOGAZ offers practical tools to streamline operations. MARCOGAZ's internal EU Energy Policy Tracker provides easy access to relevant legislation, ensuring that members stay informed and compliant. Through the MARCOGAZ Intranet Hub, members gain access to an Internal Library containing a wealth of technical resources tailored to their specific fields and energy interests.

In sum, MARCOGAZ membership empowers organisations in the European gas industry to stay informed, technically support policy developments, network with industry leaders and access essential resources.

3.3.2. Types of Membership

MARCOGAZ extends a warm invitation to a diverse range of organisations, all of which share a common interest in the world of natural gas and nonconventional gases. The membership structure is designed to accommodate various entities, ensuring that everyone can benefit from the collective expertise and collaborative efforts.

Category A: Charter Members
Charter Members represent their respective nations in the gas industry. Each country is represented by one Charter Member, which is typically a National Gas Association or, in cases where such an association does not exist, a leading Gas Company within that country. These members play a pivotal role in shaping the direction of MARCOGAZ and contribute significantly to its mission.

Category B: Corporate Members
For companies with a vested interest in the Natural Gas & New Gases Industry, the Corporate Membership category provides a perfect opportunity for engagement. Whether it is a well-established gas player or an up-and-coming entity, becoming a Corporate Member opens doors to getting involved in MARCOGAZ's dynamic activities. This category serves as a platform for industry players to collaborate, learn and drive innovation in the gas sector.

Category C: Associated Members
MARCOGAZ's reach extends beyond national boundaries, and European and international organisations/associations can play an important role as Associated Members. These entities share a keen interest in the evolution of the gas business on a European and/or a global scale. Their perspectives and contributions enrich MARCOGAZ's internal discussions and initiatives, fostering a more comprehensive understanding of the challenges and opportunities within the industry.

Membership of MARCOGAZ offers a unique opportunity to connect with like-minded organisations, access valuable insights and resources, and actively participate in shaping the future of the gas industry. We are united by our commitment to advancing the gas sector and we invite all eligible legal entities, regardless of their size or location, to explore the benefits of joining our diverse community.

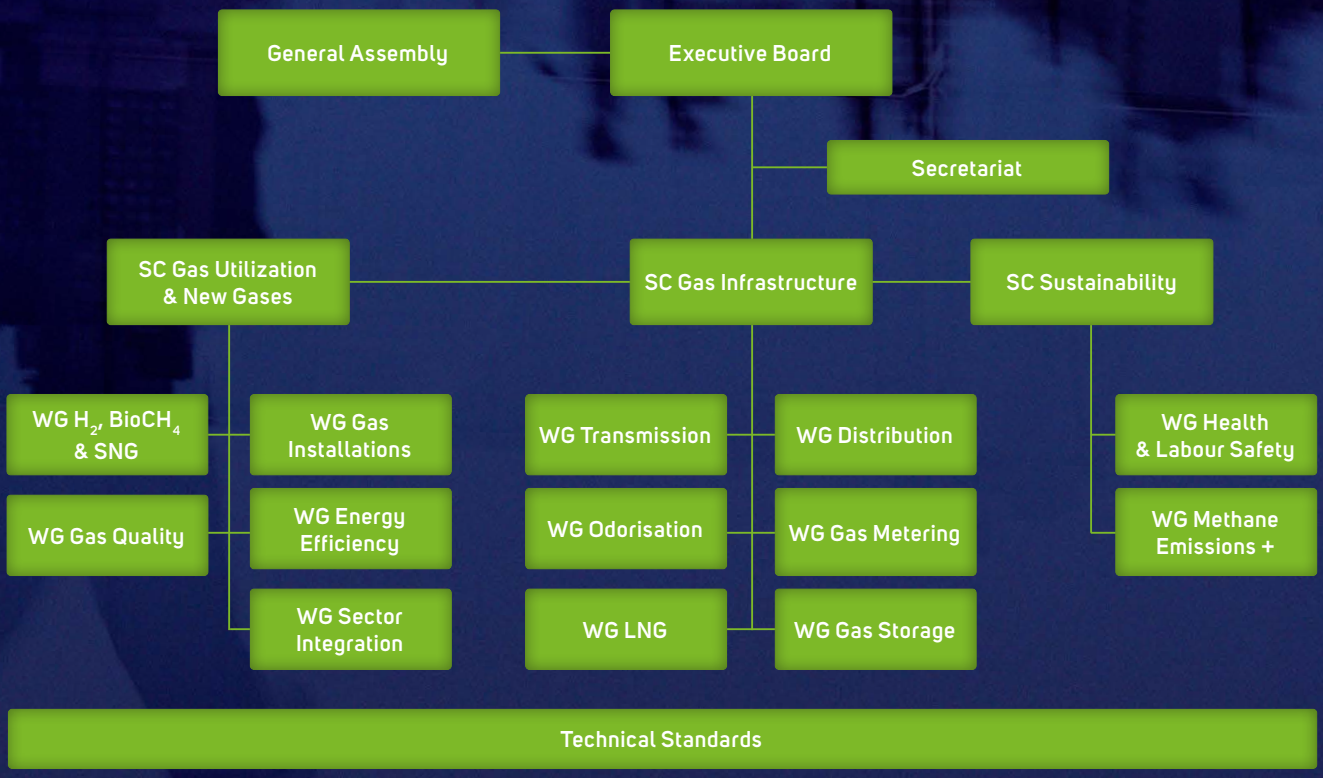
3.3.3. Our Members

MARCOGAZ's broad membership is composed of National Gas Associations, Transmission System Operators (TSOs), Distribution System Operators (DSOs), end users and gas research associations. In early 2023, we welcomed Energinet (Danish electricity and gas transmission system operator) as a new member.

As of 31 December 2023, MARCOGAZ had a total of 29 members spanning 20 European countries. Members of MARCOGAZ have a strong interest in and carry out work related to European gas industry markets.

3.4. STRUCTURE

MARCOGAZ's technical expertise is developed across three Standing Committees — Gas Utilisation & New Gases (jointly), Gas Infrastructure and Sustainability — composed of industry executives and high-level experts. In response to the EU transition to net-zero, MARCOGAZ created the new Working Group Energy Efficiency and started the activities of the Working Group on generation of hydrogen, biomethane and synthetic methane.



The official addresses and the premises of the Secretariat are based in Rue Belliard 40, inside the European Quarter in Brussels.

3.5. SECRETARIAT

MARCOGAZ's Secretariat implements the decisions of the Executive Board in a variety of functions, including general administration concerning the different Working Groups and Standing Committees, policy strategy and technical guidance. Handling internal and external communication activities and the organisation of events, the Secretariat is also responsible for the coordination of virtual and cross-sectional forums, notably 'Marcostat' and the 'Technical Standardisation' forum. The Secretariat plays an important role, smoothly executing essential tasks that contribute to the progress of the association at Executive Board, Standing Committee and Working Group levels.

3.5.1. Marcostat Forum

Marcostat is a virtual group of contact points established to promptly meet the data needs of Working Groups and technical projects. Its purpose is to streamline data collection, improve data quality and ensure representation among targeted data providers. In the Marcostat operational set-up, each country designates one person responsible for reporting back to the Secretariat, based on its requests, in a timely manner.

The Marcostat Forum is composed of a single point of contact from countries where MARCOGAZ has membership. It is a platform where these members meet to exchange experience regarding data collection. The exchange of information permits the members to learn based on the complex procedures followed by each country and get updated about the results of previous calls and upcoming calls for data collection.

MARCOGAZ's primary activity as a technical association is to deliver technical studies and factual positions on various topics of interest to its members. Many of these deliverables rely on technical data collected by the Secretariat and by the Working Groups. The creation of 'Marcostat' has played a vital role in making the production of technical works more efficient.

3.5.2. Technical Standardisation Forum

MARCOGAZ appoints the representative of each relevant field of activity to serve as Liaison between the association and the European and international standardisation organisations. MARCOGAZ has a long history of participating in technical standardisation work and strongly supports the European Committee for Standardization (CEN) and the International Organization for Standardization (ISO). As an industry association, MARCOGAZ has a formal agreement with CEN and holds consultative positions in certain Technical Committees (TCs). The aim of the Standardisation Liaison is therefore to boost MARCOGAZ's contributions to and collaboration with standardisation bodies.

The Standardisation Forum is composed of experts from Standing Committees and Working Groups who are appointed to liaise with CEN and ISO. It is a platform where these members meet to exchange experience regarding the status quo of standards in the field of energy and discuss relevant technical topics that require the revision of existing standards or the development of new ones, notably regarding the emerging gases.

MARCOGAZ's technical expertise and outputs are highly respected. In some instances, the association's technical work forms the basis of discussions within CEN TCs and Working Groups (WGs) when creating or revising technical standards. To better monitor important technical discussions in the gas industry and fulfill its role as a key technical stakeholder, MARCOGAZ recognised the need for reorganisation of its internal processes. The aim is to improve the efficiency of internal reporting and enhance its representation and participation across various CEN groups.

4. TECHNICAL ACTIVITY

4.1. STANDING COMMITTEE GAS INFRASTRUCTURE

Anne Sophie Decaux
Chair of Standing Committee Gas Infrastructure

The Standing Committee Gas Infrastructure (SCGI) is responsible for conducting technical assessments of all gas systems and equipment. These encompass various assets used by the gas industry to safely deliver gas to customers. The SCGI's scope covers the entire life cycle of gas installations, from their initial design and engineering phase to eventual decommissioning, often after decades of service. This includes overseeing construction, operation, maintenance and equipment replacement activities.

The Committee focuses on addressing matters where third-party activities could potentially impact the safety and integrity of the gas network. Additionally, the SCGI strives to ensure that the gas network minimises its impact on the surrounding communities and environment.

Furthermore, the SCGI actively monitors and contributes to standardisation efforts related to gas infrastructure. The CEN Technical Committee Gas Infrastructure (CEN/TC234) and its sub-groups play a crucial role in the SCGI's work by ensuring that the European gas network consistently employs the latest techniques and practices across the entire midstream and downstream value chain.

Moreover, the Committee takes the lead in coordinating efforts to assess the technical suitability of new gases, such as hydrogen, biogas and syngas, for integration into gas networks. These efforts align with and support the European Commission's ambitions for energy transition.

4.1.1. Working Group Distribution

The Working Group Distribution is dedicated to enhancing the technical efficiency, safety and integrity of distribution network installations, which include pressure reducing stations, metering stations, valve stations, main lines, service lines, injection stations and blending stations.

A significant portion of the distribution network is situated in densely populated areas, such as capital cities, necessitating a heightened emphasis on safety. Near to residential and commercial areas, the risk factor increases, demanding continuous monitoring for potential threats and the implementation of mitigation measures, including the utilisation of specialised detection equipment. Recognising the paramount importance of operational safety, the MARCOGAZ Gas Distribution Working Group actively engages in pertinent processes within the European standardisation organisation(CEN). Their efforts focus on establishing the technical requirements and functionalities outlined in EN 12007 to ensure the secure distribution of gas across Europe.

The Working Group consistently reports on incident prevention and emergency preparedness, drawing from disturbances that have occurred within the distribution sector. By learning from past experiences, the group is committed to continually enhancing the safety and efficiency of distribution activities.

In collaboration with MARCOGAZ Members, the Working Group Distribution diligently monitors emerging technologies and participates in cutting-edge innovative projects aimed at identifying technical solutions capable of addressing major challenges. These challenges include preventing third-party damage, reducing methane emissions, and continuously advancing in safety, efficiency and sustainability. The group also reviews technical standards, operational procedures and assesses in-

jection and blending processes and worked on the EGAS B report, which is designed to highlight the dedication of gas distributors, showcasing their commitment to transparency by providing detailed accident data. The report underscores ongoing efforts to minimize accidents and facilitates the exchange of valuable insights and best practices among industry peers.

4.1.2. Working Group Liquefied Natural Gas

Liquefied Natural Gas (LNG) serves various purposes, including vaporised injection into high-pressure transmission gas networks, and as a fuel source for vessels, trains and trucks. It presents an efficient solution for transporting significant amounts of energy over extensive distances without requiring high pressure. To ensure the continued progress of LNG's development, shipping and storage, the MARCOGAZ Working Group LNG closely monitors standardisation activities related to crucial LNG operations. Furthermore, the group actively collects and disseminates data, information and technical insights concerning the application of LNG across different end-use sectors.

Among the activities of the WG, there are also applications to the transportation sectors. The group's reports delve into LNG's potential to mitigate greenhouse gas emissions within this sector, which contributes to roughly one-third of global greenhouse gas (GHG) emissions. Additionally, the Working Group investigates the role of LNG terminals for future gases (liquid hydrogen, ammonia, methanol).

4.1.3. Working Group Gas Metering

The measurement of gas is significant for end users, industry and the economy, contributing to a more equitable market with enhanced competition, as outlined in the Measurement Instruments Directive (2014/32/EU). Positioned at both the entry and exit points of the network, meters indicate the flow of gas moving through the grid, tracking its ingress and egress from installations. Their primary function is to quantify and display the volume or mass of gas that traverses the pipelines, necessitating the conversion of volume units into energy units. The Working Group is dedicated to addressing the technical intricacies of this conversion process.

Furthermore, the Working Group places considerable emphasis on identifying potential operational constraints that could impede the gas flow, as well as implementing routine maintenance practices to mitigate such constraints.

The introduction of new gases like biomethane or hydrogen into the gas network introduces added complexity due to variations in the calorific value of these gases, which fluctuates with the blending or substitution of natural gas. Consequently, the technical activities of the Working Group delve into assessing how these new gases impact the operational efficiency and precision of metering across the entire gas value chain. The WG Gas Metering also addresses topics related to CO_2.

To enhance consumption efficiency through intelligent gas grids, the Working Group Metering continually assesses the performance and potential deployment of smart meters in different European locations.

4.1.4. Working Group Odorisation

The Working Group Odorisation primarily focuses on the technical aspects of adding odorants to transported and distributed gases, a critical safety requirement. Periodically, the Working Group conducts surveys among its members to monitor the regulatory framework for odorisation, collect operational data and assess various technical methods used for this process. It also keeps a close watch on how odorisation affects interoperability across networks and provides technical insights on international documents.

This Working Group also investigates the effects of introducing new gases, such as biomethane, hydrogen and synthetic gases, into the gas network on odorisation practices. Regarding safety standards, the Working Group Odorisation offers technical and environmental solutions concerning the odorisation process for both natural and new gases. Given that the presence of additional components in new gases can create chemical interferences that potentially mask the odorant, the Working Group strives to establish a common understanding and identify critical technical questions to address this issue.

4.1.5. Working Group Gas Storage

The Working Group Gas Storage focuses on producing technical work related to the safety and reliability of storage activities, gas quality standards and the storage of new gases, among other topics.

In Europe, underground storage operations are subject to strict regulation under the SEVESO III Directive (2012/18/EU) to prevent major accidents. The Working Group conducts benchmarking assessments to evaluate the implementation of the SEVESO III Directive. One of the primary challenges faced by Underground Gas Storage (UGS) operators is to ensure the integrity and compactness of their facilities. To address this challenge, the industry actively contributes to the development of specific standards (EN 1918), with the Working Group playing an active role in standardisation processes.

Another important aspect of the group's responsibilities is to examine the environmental impact of storage activities and their surroundings. Experts regularly address issues such as the solidity of underground facilities, subsurface installations and the management of well integrity.

Additionally, the Working Group provides technical insights to support industry-wide initiatives aimed at enhancing knowledge and sharing experiences regarding the potential impact of new gases on the integrity of storage facilities.

4.1.6. Working Group Transmission Pipelines

The Working Group Transmission Pipelines assesses the technical operational safety and integrity of gas transmission pipelines, particularly those susceptible to potential third-party interference. Third-party interferences are the leading cause of damage to underground installations, necessitating continuous monitoring of potential threats and hazards. The group develops guidelines for managing third-party interactions and scrutinises common practices related to external corrosion on high-pressure transmission lines.

The technical scope of the Working Group encompasses the entire life cycle of gas transmission infrastructure, from the planning phase to the decommissioning phase. Additionally, the group explores the injection of new gases into the existing natural gas transmission grid, emphasising technical parameters and local regulatory approvals; and the CO_2 transport.

The Working Group actively participates in standardisation activities, including European standards like EN 1594, and quality systems such as the Safety Management System (SMS). By supporting CEN standardisation efforts, the group contributes to enhancing the clarity of system operations, including defining functional requirements such as maximum operating pressure. Beyond standardisation, the group also keeps a close eye on emerging technologies and actively promotes innovation to enhance safety and efficiency, ensuring the uninterrupted supply and sustainable operation of assets.

4.2. STANDING COMMITTEE SUSTAINABILITY

Jose Miguel Tudela
Chair of Standing Committee Sustainability

The Standing Committee Sustainability (SCS) takes responsibility for addressing and delivering on multifaceted aspects concerning the sustainability of the gas supply chain. This Committee encompasses topics that either presently impact or have the potential to affect safety, well-being, climate and the environment. Furthermore, it diligently anticipates and identifies key challenges within the realm of sustainability.

The SCS incorporates the integration of new gases into its work plan, shaping content with a keen awareness of how these gases will influence the overall sustainability of the network. In this endeavour, the SCS gathers industry data and perspectives related to environmental concerns, health and safety matters, as well as data pertaining to methane emissions and emerging gases. These efforts are geared toward supporting research initiatives and policy proposals, thereby contributing significantly to addressing sustainability challenges that may impact the functioning and operations of gas supply and utilisation facilities.

The SCS has demonstrated significant activity in the domain of emissions, with a particular focus on methane emissions. Moreover, the Committee plays a pivotal role in supporting the Industrial Emissions Directive Article 13 Forum and actively contributes to the development and review of best reference available techniques (BREF) pertinent to the gas sector. Also, since late 2023, the Standing Committee works on the SCOPE 3 project, whose goal is to harmonise TSOs and DSOs on Scope 3 emissions: Define applicable categories, establish calculation/reporting standards and set criteria for emission reduction targets.

4.2.1 Working Group Methane Emissions +

Gas installations release methane for various reasons and the industry has undertaken actions over many decades to reduce these emissions, primarily for safety-related concerns. In response to growing environmental apprehensions, the gas sector continues to develop measures aimed at further curbing methane discharges.

The gas industry is firmly committed to expediting the reduction of methane emissions and aligning with the European Union's ambitious targets, aiming for a 55% decrease in greenhouse gas emissions by 2030 and ultimate climate neutrality by 2050.

MARCOGAZ is internationally recognised as a technical authority, acknowledged by esteemed organisations such as the European Commission, the United Nations, OGMP 2.0 and Methane Guiding Principles. It plays an active role in identifying and categorising methane emissions from diverse sources.

To reflect its expanded scope beyond methane emissions alone, within MARCOGAZ, the Working Group Methane Emissions + has adopted the '+' symbol to signify its broader focus on various gases relevant to the EU's decarbonisation priorities. This group has devised a 'bottom-up' methodology for quantifying methane emissions, currently undergoing translation into a CEN Technical Specification by the pertinent CEN working group (CEN/TC234/WG14). Once this methodology attains technical standard status, the industry will be equipped to provide authoritative figures to governing bodies.

This Working Group is vigorously involved in shaping a robust Measurement, Reporting and Verification (MRV) system in the EU, ensuring that it is both well-structured and fit for purpose. Furthermore, the Working Group Methane Emissions + offers unwavering support for industry-wide endeavours related to reducing emissions, including the establishment of reduction targets at the industry level. With the Working Group's technical guidance, MARCOGAZ fosters innovation and oversees technological solutions for detecting, quantifying, reporting and mitigating emissions stemming from Transmission, Storage, LNG and Distribution activities.

4.2.2 Working Group Health & Labour Safety

Safety is an absolute imperative at every stage of the gas supply chain, serving as an essential prerequisite for seamless operations. The gas industry holds a crucial responsibility for ensuring the highest standards of health and safety, not only for its employees but also for contractors. The Working Group Health & Labour Safety focuses its efforts on the midstream and downstream sectors, addressing various facets like construction projects, operational activities, maintenance, procurement and emergency preparedness.

Through its dedicated Working Group Health & Labour Safety, MARCOGAZ actively monitors and enhances the safety and well-being of workers by consistently identifying common areas of concern. The group compiles data on accidents, facilitating the exchange of experiences and statistics. Recognising the uniqueness of each accident or incident, MARCOGAZ identifies recurring patterns to enhance preventive measures. A critical aspect of reducing accidents or incidents is the thorough analysis of what transpired and the identification of root causes. Technical solutions are thoroughly deliberated and often emerge as best practices, endorsed by experts.

The group also assesses existing operational procedures, equipment and safety protocols established for natural gas applications. It examines their suitability for accommodating new gases and responds to requests for modifications or replacements when necessary. The Working Group puts forward alternative solutions that prioritise the safety of workers responsible for handling installations associated with new gases, all while adhering to relevant legislation. Additionally, the Working Group engages in benchmarking exercises, comparing health and labour safety regulations and industry practices, culminating in the development of technical guidance for MARCOGAZ Members.

4.3 STANDING COMMITTEE GAS UTILISATION & NEW GASES

Kris de Wit **Frank Graf**

co-Chairs of Standing Committee
Gas Utilisation & New Gases

In 2022, MARCOGAZ witnessed the convergence of two pivotal Standing Committees, the Standing Committee Gas Utilisation (SCGU) and the Standing Committee New Gases (SCH2+), marking a significant milestone in the pursuit of sustainable energy solutions. This union forged a powerful alliance with a shared mission to drive Europe's energy sector towards decarbonisation while bolstering the use of renewable energy sources.

Under this merged banner, the joint Standing Committee now works diligently to promote a holistic approach to energy transformation. The SCGU's commitment to enhancing energy efficiency and reducing emissions through efficient gas appliances fits together with SCH2+'s dedication to exploring new gases, such as hydrogen, biomethane and syngas. Together, they aim to implement the European Hydrogen Strategy and develop technical expertise in areas spanning gas transmission and distribution systems, storage, environmental considerations and safety standards. Crucially, the Committee serves as a bridge between end users and the gas industry, championing the quality of gas for efficient appliance operation, as well as interoperability, competition and supply security. This collaborative endeavour extends its reach beyond energy utilisation to encompass various sectors, including heating, cooling, transport and power production.

Furthermore, the joint SCGU&H_2+ facilitates cooperation with external initiatives, forging partnerships that enrich knowledge and advance the development of new gases activities. With their collective expertise and determination, the Committee stands at the forefront of Europe's journey towards a greener, more sustainable energy future.

4.3.1 Working Group Energy Efficiency

Efficient energy use is of paramount importance for all end-use sectors due to its multifaceted benefits, including enhancing supply security, facilitating the transition to renewable energy sources, cutting energy consumption and costs, reducing societal expenses and mitigating the environmental impact. This commitment to energy efficiency has prompted the European Commission to craft a robust regulatory framework aimed at enhancing energy efficiency across various domains. These regulatory measures undergo periodic reviews and modifications, which frequently influence the utilisation of gas. Moreover, national rules and regulations exert a significant influence on the incorporation of natural and renewable gases within their respective contexts, such as thermal regulations for buildings and industrial facilities.

MARCOGAZ maintains a vigilant stance in monitoring the development of new or amended regulatory measures that bear relevance to its domain. The association's experts diligently assess the equitable treatment of gas utilisation and formulate well-informed position papers directed towards pertinent stakeholders. These positions are collaboratively constructed in conjunction with other pertinent associations, fostering knowledge exchange and cooperation on these intricate technical matters.

MARCOGAZ's scrutiny encompasses natural gas and renewable gases, includes prevailing regulations that directly impact systems and foundational components, as well as their revisions and preparatory studies like the Primary Energy Factor (PEF) study conducted by Trinomics for the European

Commission (passing over June 2022 to February 2023) and Material Efficiency initiatives, along with their potential implications for standards. Additionally, MARCOGAZ experts keenly observe the evolving implementation of the gas system across various energy sectors within EU Member States.

4.3.2 Working Group Gas Quality

Gas quality encompasses a broad array of parameters crucial for the safe and efficient transmission, storage, distribution and utilisation of gas in Europe. The source of the gas can significantly influence its calorific value (energy content), the Wobbe Index (a combustion quality indicator) and the presence of additional components like carbon dioxide (CO_2), hydrocarbons, water vapor (H_2O), sulphur and more.

MARCOGAZ's Working Group on Gas Quality is dedicated to devising operational solutions for monitoring gas quality. Once gas enters the European market, its quality must undergo thorough analysis and, if necessary, adjustments to ensure full compliance with European standards (EN 16726).

As the prominence of new gases, such as biomethane, continues to grow in tandem with the expansion of efforts to decarbonise the gas sector across Europe, the injection of these gases into the gas network leads to changes in gas quality. It therefore becomes essential to guarantee compatibility between the quality of new gases and that of natural gas. In this regard, the Working Group conducts in-depth analyses of gas quality shifts resulting from the injection of renewable and low-carbon gases. Simultaneously, it actively participates in standardisation processes and engages in technical studies that explore the acceptable range of new gases within the European gas grid.

Moreover, the Working Group extends technical support to industry initiatives collaborating with the European Committee for Standardization (CEN) in the development of gas quality standards. This cooperative effort ensures effective coordination and widespread acceptance among stakeholders.

4.3.3 Working H_2, BioCH_4 and SNG

The adoption of new gases is imperative for the decarbonisation of the energy sector and, by extension, for the gas supply in Europe. Consequently, the widespread acceptance of renewable and low-carbon gases represents a primary challenge for the gas industry in the forthcoming decades.

Recognising the pivotal role of generating and upgrading new gases to facilitate their broader utilisation, MARCOGAZ has taken the initiative to establish a fresh Working Group, aptly named 'H_2, BioCH_4 and SNG'.

The primary objective of this new Working Group focusses on enhancing MARCOGAZ's knowledge base concerning the production and enhancement of new gases, encompassing hydrogen (derived from biomass, power-to-gas and natural gas), biogas (including biomethane, augmentation gas and biogas grids), synthetic natural gas (generated thermochemically from biomass and through power-to-gas processes) as well as CO_2 management.

The Working Group's scope of activities encompasses the compilation and analysis of technical insights into generation and upgrading processes and innovative concepts. Additionally, it conducts surveys concerning national action plans, projects and production potential. Consequently, the primary output of this Working Group is the dissemination of

information and data pertaining to the gas quality attributes of new gases. This includes tracing components from diverse sources and different production methods, as well as critical process parameters such as plant sizes, efficiency, emissions and production costs.

4.3.4 Working Group Gas Installations

The Working Group primarily focuses on domestic and small commercial gas installations, encompassing appliances and equipment situated at the terminal points of the gas distribution system. Gas installations must adhere to technical, safety and environmental regulations. From a technical perspective, these installations must operate with high levels of efficiency and reliability. MARCOGAZ's Working Group Gas Installations fosters the exchange of technical expertise and knowledge on various subjects, including the selection of suitable materials, inspection and maintenance procedures, and operational proficiency.

The Working Group takes a proactive stance in technically supporting the continual enhancement of safe and efficient gas usage across diverse appliances and systems, bolstering safety for customers.

Furthermore, the Working Group Gas Installations is instrumental in developing the EGAS C reporting system for European gas safety installations. This initiative aims to facilitate better communication regarding the safety performance of gas installations. The Working Group actively engages in data collection processes, including incidents, injuries and fatalities related to domestic, residential, commercial and tertiary installations. Statistical analysis of this data informs the technical work, yielding trends, conclusions and recommendations. Moreover, experts within the group exchange perspectives on research projects initiated by MARCOGAZ members and evaluate the potential applications of their findings.

In 2023, new subjects emerged within the discussion purview, notably concerning the maintenance of appliances with a particular emphasis on potential methane emissions during operation. Additionally, there were exchanges centered on NG/H_2 blends, encompassing safety considerations, diverse national strategies within Europe, and experimental endeavors. Regarding external liaisons, this Working Group (WG) maintains connections with the WG Heating of EUROGAS, primarily addressing Energy Performance of Buildings Directive and Eco Design matters, alongside collaboration with the European Committee for Standardization (CEN) on gas appliances and test gases.

4.3.5 Working Group Sector Integration

Energy transition needs the integration of energy systems, involving the coordinated planning and operation of the entire energy landscape. This encompasses various energy carriers, such as electricity and low-carbon gas, as well as the associated infrastructure and consumption sectors.

Regrettably, the current design of the energy system compartmentalises electricity and gas networks, managing them independently. This siloed approach obstructs progress towards a climate-neutral economy and results in significant technical and economic inefficiencies. It also leads to substantial heat wastage and diminished energy efficiency. The Working Group Sector Integration is dedicated to championing the utilisation of both electricity and low-carbon gas systems, with the overarching goal of enhancing the efficiency, flexibility and stability of the entire energy ecosystem. This involves identifying hybrid end-use solutions that harness both electricity and gas, optimising overall energy efficiency. The Working Group actively engages in tangible initiatives and programmes aimed at ensuring the sustainable, safe and efficient development of integrated electricity and gas systems, including natural gas, hydrogen, biomethane and other renewable and low-carbon gases.

The Group's activities focused on sector integration are geared towards discovering technical remedies to elevate energy efficiency and bolster energy supply security, with a specific focus on gaseous fuels. Furthermore, the Group assesses the feasibility of using renewable and low-carbon fuels in situations where direct heating or electrification is not viable. Additionally, the Group explores power-to-gas systems to facilitate the transport and storage of energy in gaseous fuel form.

5. TECHNICAL REPORTS AND PUBLICATIONS

5.1. INTRODUCTION

MARCOGAZ Standing Committees and Working Groups have continued their initiatives, producing insightful technical reports on crucial issues concerning gas infrastructure, utilisation, sustainability and integration of new gases between 2022 and 2023. Some of the key focus areas include transmission and distribution, storage, hydrogen readiness, gas quality, energy efficiency and methane emissions.

Interested readers can access these comprehensive technical reports on MARCOGAZ's official website at: https://www.marcogaz.org/knowledge-hub/#-publications.

The subsequent sections of this chapter provide detailed insights into the specific technical reports prepared by each Standing Committee.

5.2. STANDING COMMITTEE GAS INFRASTRUCTURE

Readiness of Gas Infrastructure Operators to Safely Cope with Renewable Gases Including Hydrogen

The publication entitled 'Readiness of Gas Infrastructure Operators to Safely Cope with Renewable Gases Including Hydrogen' [1] released by the MARCOGAZ Standing Committee Gas Infrastructure in January 2022, underscores the imminent influence of the energy transition on the natural gas sector. Anticipating the prevalence of renewable gases, particularly hydrogen, in the medium to long term, the paper emphasises the critical role of infrastructure operators in fostering an integrated energy market. In this evolving landscape, encompassing electricity, various forms of gas (natural and renewables gases including hydrogen) and heat systems, the paper highlights the enduring significance of gas infrastructure facilities in facilitating seamless gas transmission from suppliers to end users. Stressing the vital aspect of safety management, the publication specifically focuses on affirming the competence of natural gas infrastructure operators to ensure the safe handling of all gases, including hydrogen, underlining the need for meticulous examination and preparation of related technical aspects prior to widespread adoption.

Gas Distribution Performance Indicators Report 2011-2019

The 'Gas Distribution Performance Indicators Report 2011-2019' [2], which was published by the MARCOGAZ Working Group Distribution within the Standing Committee Gas Infrastructure in February 2022, presents the outcomes of a pioneering project initiated by MARCOGAZ to establish a standardised set of performance indicators for Distribution System Operators (DSOs) on a pan-European scale. Reflecting the heightened interest of the European Commission and regulators in delineating such metrics, particularly focusing on aspects like service quality and enabling DSO benchmarking across Europe, the report sheds light on the shared emphasis placed by all distributors on safety, quality and security of supply indicators, showcasing their effective management of these critical aspects. While acknowledging variations linked to the historical development of networks, the study highlights the comparability of quality levels among different countries. By analysing the results of the defined performance indicators in key areas, the report offers a comprehensive overview of how DSOs address their primary challenges, including safety, supply continuity, service quality and market facilitation.

Biomethane Acceptance in Underground Gas Storage Facilities

The MARCOGAZ publication entitled 'Biomethane Acceptance in Underground Gas Storage Facilities' [3], which was released in February 2022, emphasises the crucial role of Underground Gas Storage facilities (UGS) in the EU's energy landscape, specifically in accommodating the evolving gas composition due to the integration of renewable fuel gases. The paper provides insights into the feasibility of storing renewable gases in UGS facilities, focusing on the significance of meeting specific gas quality standards. Key definitions from EN ISO 14532 are utilised to clarify terms such as biogas, biomethane and anaerobic digestion. Additionally, the report discusses the implications of trace components and oxygen (O_2) content, presenting an inclusive perspective on biomethane integration into the gas transport grid and various forms of underground gas storage facilities.

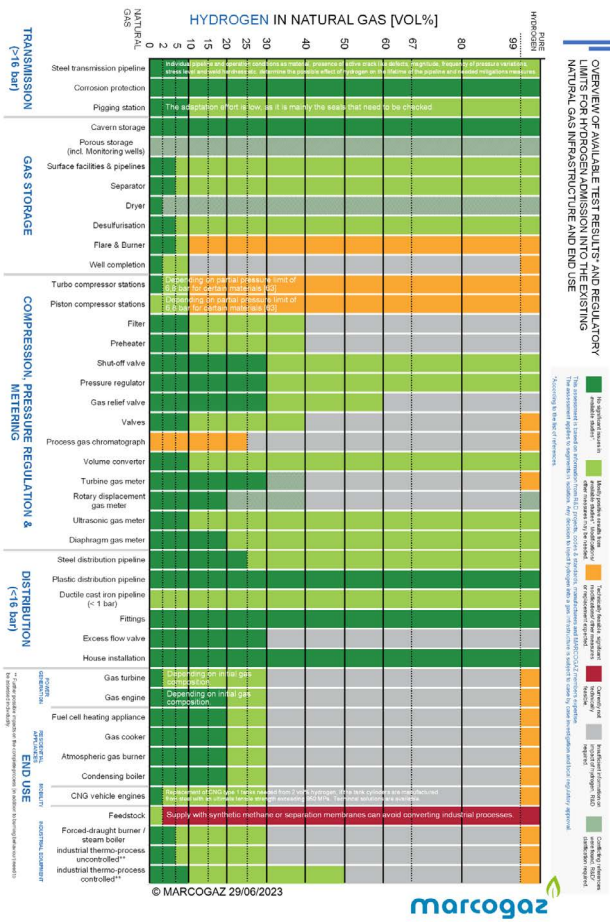
Gas Transmission Pipeline Safety

The MARCOGAZ publication entitled 'Gas Transmission Pipeline Safety' [4], which was issued in May 2023, highlights the European gas transmission network's safety protocols and sustainable practices, emphasising the operators' commitment to maintaining pipeline integrity and ensuring uninterrupted gas supplies across the continent. With an evolving energy landscape integrating renewable fuels, the paper underscores the enduring importance of pipeline infrastructure in facilitating efficient energy transmission. By prioritising high-quality

technical specifications, stringent safety management systems and proactive incident prevention measures, pipeline operators demonstrate their dedication to robust safety standards and effective incident management protocols to safeguard public safety.

MARCOGAZ H_2 Infographic 2023 Version

The 'MARCOGAZ H_2 Infographic 2023 Version' [5], which was published in October 2023 as part of the work of the publication entitled 'Cost Estimation of Hydrogen Admission into Existing Natural Gas Infrastructure and End Use' (to be further elaborated under section 9.2.1. TF Hydrogen), represents an updated iteration of the initial 2019 MARCOGAZ infographic. Initially introduced to evaluate the compatibility of gas infrastructure and end-use equipment with hydrogen-natural gas (H_2-NG) mixtures along the gas midstream and downstream value chain, the 2023 version signifies the continued expansion of industry and academic interest in H_2-NG mixtures, particularly those containing up to 30 vol.-% hydrogen. Building on the progress made since the initial release, the updated infographic incorporates the latest advancements and insights garnered from ongoing research and developments in natural gas transmission and distribution systems, encompassing underground storage, gas pressure regulation, metering and end-use equipment, with valuable contributions from industry operators and experts.



Methodology to estimate cost of hydrogen admission into the existing natural gas infrastructure and end use

The publication entitled 'Methodology to Estimate Cost of Hydrogen Admission into the Existing Natural Gas Infrastructure and End Use' [6] released by MARCOGAZ in October 2023 also as part of the comprehensive work on the 'Cost Estimation of Hydrogen Admission into Existing Natural Gas Infrastructure and End Use' addresses the pressing need for incorporating renewable gases, particularly hydrogen (H_2), in the European gas industry to achieve climate neutrality by 2050. Recognising the complexities involved in this energy transition, MARCOGAZ endeavours to provide a clear methodology for estimating the costs linked to the integration of hydrogen into the existing natural gas infrastructure and end-use equipment at both national and regional levels. While presenting average European values as benchmarks for stakeholders without localised data, the report underscores the significance of understanding potential regional variations from the European average, considering the unique characteristics of specific areas or countries.

The report's focal point lies in elucidating the methodological framework for cost estimation, refraining from providing specific cost figures but rather presenting assumptions regarding the technical feasibility of necessary transformations.

5.2.1. TF Hydrogen

Cost Estimation of Hydrogen Admission into Existing Natural Gas Infrastructure and End-Use

The November 2023 release of MARCOGAZ's 'Cost Estimation of Hydrogen Admission into Existing Natural Gas Infrastructure and End-Use' [7] marks the culmination of an extensive collaborative effort from the MARCOGAZ Task Force Hydrogen. With a focus on achieving Europe's climate neutrality targets by 2050, the study meticulously evaluates the feasibility and cost implications of integrating hydrogen (H_2) into the existing European gas infrastructure. Utilising data contributions from key European gas operators and stakeholders, the report thoroughly examines five critical sectors, providing comprehensive insights into the suitability of existing infrastructure for various H_2 concentrations, ranging from 2 to 100 vol.-%. The study highlights the need for tailored mitigation measures and associated costs to ensure the safe integration of H_2 mixtures. An infographic visually illustrates the study's findings, emphasising the flexibility of the natural gas system in accommodating H_2 blending.

Notably, the study's cost analysis reveals that adaptation costs remain within feasible margins, with the adaptation cost for pure H_2 ranging from less than 20% to 41% of CAPEX for newly build H_2 infrastructure, considering different operational scenarios. While the study emphasises the need for careful interpretation of these findings at the national level, it serves as a crucial roadmap for policymakers, industry stakeholders and researchers seeking to navigate the complex landscape of hydrogen integration within the European energy sector.

5.3. STANDING COMMITTEE SUSTAINABILITY

Impact of hydrogen on works in confined spaces

The publication entitled 'Impact of Hydrogen on Works in Confined Spaces' [8] released by the MARCOGAZ Working Group Health & Labour Safety highlights the potential risks associated with gaseous hydrogen in confined work areas. It stresses the need for cautious entry into such spaces, encouraging the exploration of non-entry work practices wherever possible. The report underlines that hydrogen accumulation in confined spaces, owing to its low density, poses heightened risks compared to natural gas. However, it emphasises that the health risks linked to hydrogen are similar to those of natural gas, with no significant critical hazards identified. While the document does not replace existing international and national regulations governing confined space work, it serves to raise awareness about the specific hazards of hydrogen in these environments. It emphasises the importance of adhering to any relevant national occupational health and safety regulations as they take precedence over the information provided in the report.

A Methane Target for Midstream Gas Industry

The publication entitled 'A Methane Target for Midstream Gas Industry' [9] issued by the MARCOGAZ Working Group Methane Emissions+ within the Standing Committee Sustainability in March 2023 serves to provide crucial estimates that can serve as benchmarks for the European gas industry, facilitating the establishment of a comprehensive reduction target for methane emissions. The report's analysis draws upon information gathered from a comprehensive questionnaire distributed among various industry stakeholders, including MARCOGAZ, OGMP 2.0 members, GIE, ENTSOG, GERG and Eurogas, highlighting the collaborative efforts undertaken to ensure comprehensive data collection. While the initial scope of the analysis encompassed both midstream and downstream activities, the report pri-

marily focuses on midstream activities, reflecting the constraints associated with data representativeness from downstream activities. Drawing upon the valuable insights gathered from 30 midstream companies across 17 European countries, the publication serves as a critical resource for guiding targeted methane emission reduction strategies within the European gas industry, fostering a collective commitment towards achieving sustainable and environmentally responsible industry practices.

Mine Dust and Black Powder

The MARCOGAZ Working Group Health & Labour Safety, within the Standing Committee Sustainability, released the technical publication entitled 'Mine Dust and Black Powder' [10] in June 2023, shedding light on the significance of these contaminants in natural gas transport pipelines. Mine dust, a residue often found in pipelines historically used for coke oven gas transportation, comprises various harmful elements such as toxic cyanides, thiocyanates, rust, sand and clay. Conversely, black powder, formed from the interaction of iron with sulfur and/or oxygen, consists of corrosion products like iron sulphides, rust as well as elements such as sand, clay and elemental sulfur. Referred to as black dust at times, this publication critically examines the associated risks and proposes effective mitigating measures concerning the presence of mine dust and black powder, providing crucial insights for ensuring the safety and integrity of natural gas transport pipelines.

Industrial Emissions Directive revision (IED) Position paper

The 'Industrial Emissions Directive (IED) Position Paper' [11] by the MARCOGAZ Working Group Methane Emissions+ emphasises the significance of the IED revision in controlling industrial emissions and promoting the adoption of Best Available Techniques (BAT) and emerging technologies. The paper offers strategic recommendations, including the need for a proportional approach for industries to meet emission limits, technically supporting for individual assessments and the maintenance of existing emission values until updated directives are released. It also stresses the importance of pragmatic implementation of emerging techniques based on their maturity levels. The paper supports specific clauses from the European Parliament mandate, emphasising the practical implications of the forthcoming directive within the gas infrastructure sector. The position paper was released in October 2023 while the revision of the IED was still ongoing.

5.4. STANDING COMMITTEE GAS UTILISATION & NEW GASES

Readiness of Gas Infrastructure Operators to Safely Cope with Renewable Gases Including Hydrogen

The publication entitled 'Readiness of Gas Infrastructure Operators to Safely Cope with Renewable Gases Including Hydrogen' [12], which was issued by the MARCOGAZ Standing Committee Gas Utilisation & New Gases in January 2022, delves into the profound impact of the energy transition on the natural gas industry. Anticipating the prevalence of renewable gases, particularly hydrogen, in the medium to long term, the paper highlights the pivotal role of infrastructure operators in fostering an integrated energy market where various energy sources, such as electricity, methane, renewables and hydrogen, collectively contribute to the energy landscape. Emphasising the enduring significance of gas infrastructure facilities in facilitating gas transportation from suppliers to end users, the publication underscores the crucial need for these operators to prioritise safety management as a key competence, applicable not only to traditional natural gas but also to emerging gases like hydrogen. With a focus on ensuring the continued safety and reliability of gas infrastructure, the paper serves as a critical resource for guiding effective safety practices and protocols, enabling operators to adapt seamlessly to the evolving energy landscape and meet the demands of the energy transition.

Hydrogen quality for blending with natural gas

The publication entitled 'Hydrogen Quality for Blending with Natural Gas' [13] released by the MARCOGAZ Standing Committee Gas Utilisation & New Gases in June 2022 is a pivotal contribution to the overarching mission of decarbonising the gas grid and achieving climate neutrality. In light of the significant role that hydrogen plays in the EU's decarbonisation strategy and its potential as a storage solution for intermittent renewable energy, the publication underlines the critical importance of ensuring the quality of hydrogen intended for blending with natural gas or biomethane. Conducting a comprehensive review of existing standards and national specifications for natural gas, biomethane and pure hydrogen quality, the technical assessment provides essential recommendations aimed at facilitating the seamless integration of hydrogen within the existing gas infrastructure. By emphasising the significance of maintaining stringent quality standards for hydrogen, the publication serves as a valuable resource for promoting the effective and sustainable adoption of hydrogen as an integral component of the EU's decarbonisation efforts.

Pan-European 'boiler ban' in 2029: another way is possible and preferable

MARCOGAZ's publication entitled 'Pan-European 'boiler ban' in 2029: another way is possible and preferable' [14] scrutinises the implications of the proposed revision of the Ecodesign Regulation (EU) 813/2013, which plans to ban standalone boilers from September 1st, 2029. While supporting decarbonisation goals outlined in the Fit for 55 and RE-PowerEU packages, the publication calls for a more nuanced and balanced approach to ensure affordable and sustainable heating solutions. By highlighting technical complexities and questioning the effectiveness of the proposed ban, MARCOGAZ aims to encourage a comprehensive reconsideration of the regulatory strategy, aligning with broader European decarbonisation objectives.

6. RESPONSES TO EU CONSULTATIONS

6.1. PROPOSAL FOR A REGULATION ON METHANE EMISSIONS REDUCTION IN THE ENERGY SECTOR

In response to the European Commission's Proposal for a Regulation on methane emissions reduction in the energy sector, ENTSOG, Eurogas, GERG, GIE and MARCOGAZ express their commitment to contributing to emissions reduction efforts in this publication of April 2022 [15]. They emphasise the need for proportionality in implementing measures, avoiding costly actions with minimal mitigation impact and allowing flexibility for cost-effective approaches. They recommend aligning the Monitoring, Reporting and Verification (MRV) system with the ambitious OGMP 2.0 reporting standard while refraining from mandating site-level methodologies and technologies until maturity. The organisations propose standardisation through CEN for quantification, reporting and comparison methods. They support the use of "quantification" rather than "measurements" and suggest minimising duplications by aligning new reporting obligations with existing ones. Verifier and inspection requirements should align with current practices and incentives for non-regulated operators should be ensured. Efficient methane emission mitigation plans, adaptable Leak Detection and Repair (LDAR) practices and well-defined repair intervals are recommended. The prohibition of venting/routine flaring is supported, but implementation lead times and exemptions based on emissions materiality are deemed essential. The definition of inactive wells should be refined, excluding permanently plugged wells. Lastly, the responsibility for methane emissions data quality occurring outside the EU should remain with the exporter rather than being imposed on EU importers.

6.2.
ACTION PLAN ON ACCELERATED ROLL-OUT OF HEAT PUMPS ACROSS THE EU

The European Commission's initiative to try and remove current obstacles and restrictions for a quicker roll-out of heat pumps throughout the EU is welcomed by MARCOGAZ in this response of August 2023 [16] because of their high efficiency and use of cost-free renewable energy, which has the potential to significantly contribute to the CO_2 emission and fossil fuel import reduction targets.

However, any effort to hasten the roll-out of heat pumps should consider the challenges that must be solved, particularly given the vast number of older buildings. Instead of choosing a top-down single heating technology approach, MARCOGAZ thinks that concentrating on decarbonising heating from the bottom up will enable considerably faster CO_2 emission and fossil fuel import reductions while still meeting the same targets.

7. COMMUNICATIONS

Communication activities are vital to enhance the connections and trust with the membership and external stakeholders. It is an essential approach to present the result of valuable technical work to a wider audience and create impact. Over the last few years, MARCOGAZ has developed a new visual identity built on a strong core of elements, reflecting its vision, mission and values.

This commitment to communicate with the industry, professionals and stakeholders goes hand in hand with MARCOGAZ's step forward, embracing a vision carved out by the targets provided in the European Green Deal and the pathway to achieve the 2050 net-zero emissions goal. Ever since MARCOGAZ has been an active player in the digital domain, our association has been growing and defining an online identity, alongside our membership and other stakeholders, including Eurogas, Gas Infrastructure Europe (GIE), ENTSOG, GERG, ERIG, International Gas Union and many others.

MARCOGAZ follows a strategic communications plan intended to keep the membership involved and engaged with internal activities and communicate with external stakeholders about the latest technical publications, including related guidance and attendance at European and international events. Part of our communications plan includes regular distribution of content on social media. Our publications are often of a technical nature, a strong reflection of our core business. MARCOGAZ also uses email marketing campaigns with internal and external newsletters. The Secretariat is also engaged in developing video campaigns as a meaningful way of presenting the association's history and its work to a wider audience, thus maintaining its reputation as a trustworthy entity.

7.1. CORPORATE IMAGE

MARCOGAZ's corporate image is a representation of its commitment to the evolving landscape of the gas industry and the urgently needed shift towards decarbonisation. Rooted in two primary colours, ocean blue and vegetal green, the colours used generally by MARCOGAZ symbolize the environmental consciousness inherent in its work. The fusion of these mirrors the organisation's dedication to sustainable practices and the transition to renewable gases. White and dark blue serve as complementary secondary colours, adding depth and sophistication to the overall visual identity. The typography employed in the MARCOGAZ logo echoes the intricate pathways of gas pipelines, offering a subtle nod to the core of their industry. The incorporation of a small green flame not only pays homage to the conventional representation of gas but also underscores the association's commitment to renewable energy sources. In 2023, MARCOGAZ celebrated its 55th anniversary by adaptating its logo throughout the year.

7.2. WEBSITE AND SOCIAL MEDIA

The association uses its website (www.marcogaz.org) as its main platform to publish its technical work and to host all the information required to understand the role of the association and how it functions. In 2021, MARCOGAZ activated social media channels, namely LinkedIn and Twitter. Indicators on social media since then have been positive, with an organically growing audience, mirroring stakeholder engagement and interest towards the research carried out by MARCOGAZ. MARCOGAZ's social media channels are used to raise awareness about the association's technical work and to communicate about MARCOGAZ's activities, events, key meetings and news, thus connecting with the industry audience.

7.3. MARCOGAZ TECH FORUM

To generate discussion with external experts, MARCOGAZ developed a new concept entitled 'MARCOGAZ Tech Forum', which implies the organisation of physical events or webinars to present and discuss technical subjects of interest and to increase the visibility of the work of the committees and Working Groups.

8. EVENTS

8.1. EGATEC 2022

EGATEC 2022, held on June 14th-15th in Hamburg and organised by MARCOGAZ and GERG, brought together key players in the European gas sector. Hosted by DVGW and supported by ERIG, the conference provided a crucial platform for discussing challenges and opportunities in the energy transition and decarbonisation efforts. Addressing topics like the role of gas in future energy systems, carbon neutrality, hydrogen infrastructure and EU climate goals, EGATEC 2022 fostered impactful conversations at the forefront of the gas industry's evolution.

8.2.
55TH MARCOGAZ ANNIVERSARY CONFERENCE

On June 22, 2023, MARCOGAZ celebrated its 55 years with an Anniversary Conference held in Brussels. The event, attended by industry leaders, experts and stakeholders, served as a platform for insightful discussions, sharing cutting-edge innovations and charting the future course of sustainable energy focusing on the central role of gas infrastructure in the ambitious task of decarbonising the gas system. With over five decades of expertise, MARCOGAZ reaffirmed its commitment to driving positive change in the energy landscape, emphasizing the crucial role that gas infrastructure plays in the ongoing efforts to achieve a more environmentally friendly and decarbonized gas sector.

8.3. EUROPEAN COMMISSION'S FORUMS

8.3.1. Gas Regulatory Forum (Madrid Forum)

MARCOGAZ has been actively participating in the Madrid Forums organised by the European Commission, where key stakeholders gather to discuss the development and decarbonisation of the EU gas market. MARCOGAZ contributes to crucial conversations alongside national regulatory authorities, governments, the European Commission and various industry players. These forums, held once to twice a year in Madrid, serve as a vital platform for shaping the future of the European gas market and fostering collaboration across the energy sector.

8.3.2. Citizen's Forum

MARCOGAZ actively engages in the Citizen's Forum (Dublin Forum), organised annually by the Commission. This forum addresses the concerns and interests of citizens, NGOs, businesses and policymakers in the aftermath of the energy crisis. Focusing on energy consumer issues, including their role, opportunities and risks in the future electricity market design, the event provides a platform for meaningful discussions. Co-organised with the Commission for Regulation of Utilities (CRU), Ireland's independent energy and water regulator, the Dublin Forum facilitates collaboration and dialogue on crucial aspects of energy policy and market dynamics.

8.3.3. Carbon Capture Utilisation and Storage Forum (CCUS Forum)

MARCOGAZ is actively involved in the Carbon Capture, Utilisation and Storage Forum (CCUS Forum), an annual gathering organised by the Commission since its establishment in 2021. This forum serves as a crucial platform for representatives from EU institutions, EU countries and third countries, NGOs, business leaders and academia to collaboratively address and promote the deployment of CCUS technologies. By participating in these discussions, MARCOGAZ contributes to shaping the direction and

policies surrounding carbon capture, and storage, fostering cooperation among diverse stakeholders in the pursuit of sustainable and innovative solutions for the future.

8.3.4. Hydrogen Forum

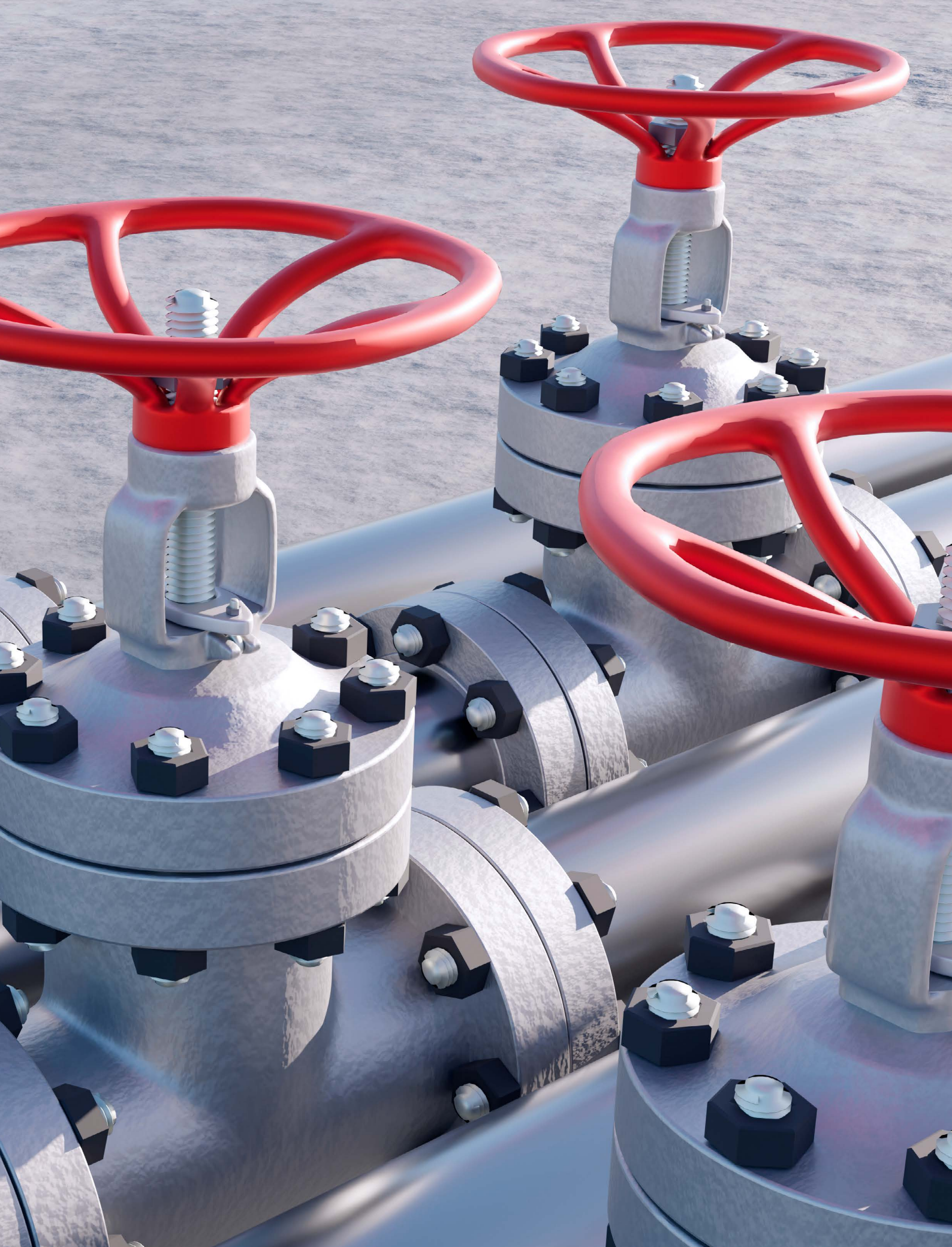
MARCOGAZ attends the Hydrogen Forum organised by the Clean Hydrogen Alliance. The alliance's Permit Working Group, in which MARCOGAZ actively participates, recently presented a comprehensive report highlighting barriers to the provision of permits for hydrogen projects. This report goes beyond mere identification, delving into good and bad practices while providing valuable policy recommendations. Through its involvement in this dynamic forum, MARCOGAZ contributes to shaping the regulatory landscape and overcoming challenges to advance the development and deployment of hydrogen projects for a sustainable energy future.

8.3.5. Infrastructure Forum

MARCOGAZ is actively engaged in the Infrastructure Forum, known as the Copenhagen Forum, organised annually by the European Commission in collaboration with the Danish Ministry of Climate, Energy and Utilities. This forum serves as a vital platform bringing together a diverse range of stakeholders, including representatives of EU institutions, transmission system operators, project promoters, regulators, energy companies, NGOs, civil society and the financing community. The discussions focus on addressing the challenges of Europe's energy infrastructure to foster a well-functioning internal energy market. Through its participation, MARCOGAZ contributes to shaping the strategies and policies that are essential for advancing the efficiency and resilience of Europe's energy infrastructure.

8.4.
MARCOGAZ AS A PARTNER IN RELEVANT ENERGY-RELATED EVENTS

MARCOGAZ is actively immersed in the dynamic landscape of energy-related events, participating in key gatherings across Europe and around the globe. From the cutting-edge discussions at Gas-Tech to the forward-looking insights shared at the World Hydrogen Congress, MARCOGAZ remains at the forefront of the industry's most significant forums. Engaging with events like Flame and the Green Hydrogen Summit, MARCOGAZ not only stays informed about the latest advancements but also contributes its expertise to shape the future of energy. This commitment to participation underscores MARCOGAZ's dedication to staying abreast of emerging trends and fostering collaborative efforts within the ever-evolving energy sector.



9. STAKEHOLDER ENGAGEMENTS

In the course of 2022 and 2023, MARCOGAZ welcomed new members and partners while expanding its dialogue with stakeholders in the gas sector and beyond. Dedicated to expanding technical dialogue with stakeholders in the European and international gas industry, MARCOGAZ engaged with various partners across the sector with a view to exchanging technical expertise and sharing knowledge.

9.1. BIOSTAR2C

MARCOGAZ stands in support of the EU-funded BIOSTAR2C project, recognizing the potential of renewable gases, particularly biomethane, as a key energy source in shaping a sustainable, low-carbon future. As highlighted by the CEN Technical Committee 408, the development of specifications for biomethane (EN 16723-1 for injection into natural gas grids and EN 16723-2 for transport fuel) is crucial, yet the lack of harmonized and validated test methods has posed significant barriers to its widespread integration into gas networks and vehicles. The BIOSTAR2C project, an initiative aimed at overcoming these hurdles, is dedicated to streamlining biomethane introduction into gas networks and vehicles, optimizing injection costs and bolstering confidence in investments related to biomethane production and utilization. By aligning its efforts with the Biomethane Industrial Partnership's ambitious goal of achieving an annual production and utilization of 35 billion cubic meters of biomethane by 2030, the project plays an important role in advancing the regulatory framework for greening the gas grid, ultimately contributing to the achievement of the ambitious targets set out in the Green Deal and the effective implementation of RED II. Through collaboration with CEN TC 408, its extensive stakeholder community, and DG Energy, MARCOGAZ remains committed to fostering a conducive environment for the advancement of the biomethane industry, ensuring the seamless alignment of standards with the evolving needs of producers, transporters and end users, thus paving the way for a greener and more sustainable energy landscape.

9.2. CLEAN HYDROGEN PARTNERSHIP

MARCOGAZ has been an integral part of the Clean Hydrogen Partnership Joint Undertaking Stakeholders Group since its inception, playing a vital role in providing comprehensive insights and guidance on various technical issues and specific inquiries pertaining to the domain of the Clean Hydrogen Joint Undertaking (JU). Established as an official advisory body, the Stakeholders Group serves as a platform for consulting stakeholders from across the entire value chain, ensuring the representation of diverse perspectives within the scope of the Clean Hydrogen JU's activities. The stakeholders' group remains inclusive, welcoming participation from both public and private stakeholders, organised groups and international interest groups from EU Member States, associated countries and beyond. Acknowledging the significance of fostering collaboration and knowledge sharing across the sector, MARCOGAZ has consistently contributed to the advancement of the Clean Hydrogen JU's objectives, contributing to the effective integration of clean hydrogen across the European Union. MARCOGAZ's Secretary General Manuel Coxe was appointed Vice-Chairman of the Stakeholders Group in October 2023, further reinforcing the association's commitment to driving the Clean Hydrogen Partnership's mission forward. The Stakeholders Group convenes biannually, serving as a critical forum for meaningful discussions and strategic collaborations, thereby fostering the continued advancement of clean hydrogen initiatives at a European level.

9.3. EASEE-GAS

MARCOGAZ maintained its continued cooperation with EASEE – Gas, the European Association for the Streamlining of Energy Exchange – in the course of 2020 and 2021, participating in the Advisory Panel.

Experts from MARCOGAZ were involved in the design of the EASEE – Gas Common Business Practices (CBP) on hydrogen. This CBP defines

MARCOGAZ PARTNERS

CEN – European Committee for Standardization
ehi – association of the European Heating Industry
FARECOGAZ
ISO
ehpa – european heat pump association
METHANE GUIDING PRINCIPLES
Clean Hydrogen Partnership
Gas Infrastructure Europe
entsog – european network of transmission system operators for gas
OIML
COGEN EUROPE
GIIGNL
ETSI – World Class Standards
SIGTTO
EASEE-gas – Streamlining the gas business
Hydrogen Europe
EURAMET
teppfa
EBA European Biogas Association
IGU – International Gas Union – Union Internationale du Gaz
European Commission
UNECE
EGIG
International Association of Oil & Gas Producers
European Parliament
WELMEC

the recommended quality specification for hydrogen (non-blended with natural gas) flowing through dedicated systems. In other words, it focuses on the networks that were originally designed and used for natural gas transmission and, after a safety and reliability assessment, were found to be suited for conveying hydrogen and for newly built hydrogen pipeline systems. The CBP is valid for both the entry as well as the exit points of these dedicated systems.

9.4. EMPIR

MARCOGAZ Working Group Gas Metering continued to follow the ongoing technical research within the framework of the 'NewGasMet' project coordinated by the European Metrology Programme for Innovation and Research (EMPIR) and the activities at the CEN Technical Committee on Gas Meters.

The overall objective of the project is to increase knowledge about the accuracy and durability of commercially available gas meters after exposure to renewable gases. This should lead to the improvement of existing meter designs and flow calibration standards. MARCOGAZ's engagement with the 'NewGasMet' project aims to contribute to the revision of standards and to ensure that outputs from the project are communicated quickly to those who develop and revise the standards and who will use the outputs in a form that can be incorporated into standards.

9.5. ENERGY COMMUNITY

MARCOGAZ and the Energy Community have a long-standing partnership in technical matters related to gas, particularly in the reduction and mitigation of methane emissions. The guidelines and assessment methodologies that MARCOGAZ prepared on the topic reporting, verification, mitigation and reduction of methane emissions have become a technical reference for the related activities of the Energy Community.

MARCOGAZ organised, in cooperation with GIE and the Energy Community, a total of seven webinars (Monthly Methane Mondays) in 2023. The webinars improved gas stakeholders' knowledge about the importance of tackling methane leakage by the gas industry and best practices in their assessment, measurement and reporting, as well as reduction.

In addition to Monthly Methane Mondays, MARCOGAZ and the Energy Community Secretariat held a meeting in December 2022 to strengthen their partnership, especially in the context of the war in Ukraine.

9.6. ENTSOG ADVISORY PANEL FOR FUTURE GAS GRIDS

Since its inception in late 2020, MARCOGAZ has been an active participant in the ENTSOG Advisory Panel for Future Gas Grids. The Advisory Panel aims to ensure transparency and coordination across the entire value chain and support gas Transmission System Operators (TSOs) and stakeholders in identifying practical challenges and solutions for the transition of gas grids. These challenges and solutions may include retrofitting and repurposing the existing gas infrastructure, development of an EU Hydrogen backbone, analysis on the role of blending and work on an EU-wide approach for CO_2 infrastructure. MARCOGAZ is represented by its Secretary General at the Advisory Panel meetings, which took place four times in 2023.

9.7. EURAMET

MARCOGAZ is proud to collaborate and partner with EURAMET, the European Association of National Metrology Institutes, on various metering-related matters. Committed to fostering the development and dissemination of a comprehensive, cost-effective and globally competitive measurement infrastructure for Europe, EURAMET serves as the Regional Metrology Organisation (RMO) of Europe,

coordinating the collaborative efforts of National Metrology Institutes (NMIs) and Designated Institutes (DIs) across the continent.

By aligning its efforts with EURAMET, MARCOGAZ actively contributes to the advancement of research in metrology, ensuring the traceability of measurements to the International System of Units (SI) and promoting the international recognition of national measurement standards and Calibration and Measurement Capabilities (CMC). Through various research programmes, including the European Metrology Research Programmes (EMRP and EMPIR) and the European Partnership on Metrology, EURAMET continues to foster meaningful collaborations between European NMIs, industry partners and academic institutions, thereby reinforcing its dedication to advancing the European measurement infrastructure. With a shared objective of engaging key stakeholders and prioritazing investments in the European measurement infrastructure, MARCOGAZ remains committed to strengthening its partnership with EURAMET, facilitating a comprehensive understanding of stakeholder needs and market trends while maximizing the impact of their collaborative efforts in the field of metrology.

9.8. EUROPEAN CLEAN HYDROGEN ALLIANCE (ECH2A)

MARCOGAZ was invited to be part of a restricted group of representatives in the European Clean Hydrogen Alliance Roundtable Transmission and Distribution.

MARCOGAZ participated in several CEO and high-level Sherpa meetings of the European Clean Hydrogen Alliance (ECH2A) Transmission and Distribution Round Table and exchanged views with partners from the industry on technical opportunities and challenges relating to the transmission and distribution of hydrogen through the existing gas infrastructure.

Set up in July 2020, ECH2A is part of EU efforts to ensure industrial leadership and to accelerate the decarbonisation of industry in line with its climate change objectives. Six roundtables cover the entire value chain of hydrogen from production to transmission, distribution and end use. The alliance supports the large-scale deployment of clean hydrogen technologies by 2030 by bringing together renewable and low-carbon hydrogen production, demand in industry, mobility and other sectors, and hydrogen transmission and distribution.

9.9. EUROPEAN COMMITTEE FOR STANDARDISATION (CEN)

Standardisation is an essential part of the entire gas value chain and, as the technical association of the European gas industry, MARCOGAZ has actively contributed to the standardisation processes of the gas industry. Continued cooperation with CEN has featured important technical guidelines and reports that MARCOGAZ has produced over the years.

MARCOGAZ's involvement in the technical discussions regarding the standardisation processes of the gas industry in topics related to methane emissions, gas quality, hydrogen/natural gas systems, biomethane injection, was maintained without interruption in 2020 and 2021. The experts from MARCOGAZ's Working Group Gas Quality participated in the CEN Sector Forum Gas Pre-normative study of H-gas quality parameters. This study provided the technical basis for the revision of the gas quality standard, a process in which MARCOGAZ has been actively engaged.

Moreover, the bottom-up methodology that MARCOGAZ developed for the quantification of the methane emissions was considered for translation by the CEN Working Group on methane emissions into a CEN Technical Specification. Regarding hydrogen, MARCOGAZ also provides technical support for the pre-normative research and standardisation activities on hydrogen/natural gas mixtures and power-to-hydrogen processes.

Furthermore, MARCOGAZ continued to participate in the ongoing gas quality standardisation activity at CEN's Working Group Domestic Central Heating Boilers Using Gaseous Fuels and the CEN standard on the forced draught burners for gaseous fuels.

9.10. GAS DISTRIBUTORS FOR SUSTAINABILITY (GD4S)

In July 2021, MARCOGAZ and Gas Distributors for Sustainability (GD4S) took the first step to establish dialogue on a sustainability charter and road map along with other stakeholders in the European gas industry. The Sustainability Charter features the shared commitments of the gas associations and distributors that contribute to meeting the goals of the European Green Deal by 2050 and the Sustainable Development Goals (SDGs). The commitments are separated into material topics on Environment, Social and Governance (ESG) aspects. MARCOGAZ provided feedback regarding the sustainability commitments under the environmental topic of the charter. The feedback was considered for adoption by the GD4S and included in the agenda for future deliberations on the commitments.

9.11. GIIGNL

MARCOGAZ actively participates and partners with GIIGNL, the International Group of Liquefied Natural Gas Importers, in matters related to Liquefied Natural Gas (LNG). Dedicated to promoting the development of various activities related to LNG, including procurement, importation, processing, transportation, handling and re-gasification, GIIGNL serves as a vital platform for the exchange of valuable information and experiences among its 85 members. With a global focus, GIIGNL brings together a diverse array of companies engaged in LNG import and re-gasification terminal operations worldwide. By providing its members with comprehensive insights into the current economic landscape of the LNG industry as well as the latest technological advancements, operational best practices and safety measures, GIIGNL facilitates the enhancement of operational efficiency, the implementation of diversified contractual techniques and the advocacy of industry positions within international agencies. Recognising the importance of shared knowledge and collaborative efforts in the LNG sector, MARCOGAZ continues to actively engage with GIIGNL, contributing to the collective advancement of industry best practices and fostering a more resilient and efficient LNG market globally.

9.12. INTERNATIONAL GAS UNION (IGU)

The International Gas Union (IGU), a worldwide non-profit organisation, advocates gas as an integral part of a sustainable global energy system and promotes the political, technical and economic progress of the gas industry.

MARCOGAZ, an associate partner of IGU, had been maintaining dialogue with IGU on various platforms. In 2022 and 2023, the organisations strengthened their partnership and expanded the scope of the dialogue with a view to mutually benefiting from technical expertise and competence. The production of new gases as well as the potential use of these gases in end-use sectors in pure form or in mixtures with natural gas is the focus of technical dialogue as MARCOGAZ contributes to the committees and task forces at IGU.

9.13. OIML

MARCOGAZ actively participates and partners with the International Organization of Legal Metrology (OIML) in matters concerning metering and

legal metrology. As an esteemed intergovernmental treaty organisation, OIML plays a crucial role in developing model regulations, standards and related documents intended for use by legal metrology authorities and industry stakeholders. By providing mutual recognition systems that effectively reduce trade barriers and associated costs within a global market, OIML significantly contributes to the facilitation of international trade. Recognising the importance of representing the interests of the legal metrology community within various international organisations and forums focused on metrology, standardisation, testing, certification, and accreditation, OIML serves as a vital advocate for the advancement and standardisation of measurement practices globally. Additionally, OIML fosters a culture of knowledge exchange and competency enhancement within the legal metrology community worldwide, promoting collaboration with other prominent metrology bodies to emphasise the invaluable role of a robust legal metrology infrastructure in fostering the growth and sustainability of a modern economy. By actively engaging with OIML, MARCOGAZ remains committed to supporting and adhering to internationally recognised standards and best practices in metering, thereby contributing to the development of a more cohesive and efficient global regulatory framework for metrology.

9.14. PRIME MOVERS' GROUP ON GAS QUALITY AND HANDLING

The technical contribution of MARCOGAZ to the Prime Movers' Group on Gas Quality and Handling, which brought together European actors across the gas value chain and was facilitated by gas transmission and distribution system operators, was appreciated by all stakeholders who actively participated in the group. During a series of meetings that had been held since September 2020 until it was wound up in 2022, the experts laid out scenarios for innovative and cost-efficient ways to handle gas quality in fluctuating blends. Discussions over pure hydrogen grids as part of the future gas system also featured.

MARCOGAZ's contribution has been an added value to the analysis of the Prime Movers Group. The group's work was supported by MARCOGAZ experts on gas quality, sector integration and hydrogen handling. Among the different technical material supplied is the MARCOGAZ publication entitled 'Overview of test results and regulatory limits for hydrogen admission into existing natural gas infrastructure and end use' [17]. The infographic prepared as part of this report identifies gaps in knowledge and areas where research and development (R&D) is required to remove barriers limiting hydrogen take-up in the supply chain and enabling new applications for hydrogen and hydrogen/natural gas mixtures.

9.15. READY4H2

Ready4H2 is a project launched by gas associations and gas system distributors (DSOs) from 13 countries in Europe with a view to combining hydrogen expertise and experiences across the European DSOs and creating a common European understanding of how the DSOs and distribution networks can facilitate the injection for hydrogen producers and deliver hydrogen to consumers.

Since the conceptualisation phase of the project, MARCOGAZ has been involved and mobilised its resources to share its technical experience and know-how with all the other partners. Believing in the potential of DSOs to unlock hydrogen development in Europe, MARCOGAZ capitalised on its decades of experience of working with DSOs around Europe to deliver the commitments of the Ready4H2 project.

9.16. SAFE HYDROGEN INJECTION MODELLING AND MANAGEMENT FOR EUROPEAN NETWORK RESILIENCE (SHIMMER)

MARCOGAZ actively supports the SHIMMER project, an initiative within the Clean Hydrogen Partnership aimed at facilitating the safe and efficient

integration of hydrogen into existing natural gas networks. With a focus on addressing technical and regulatory gaps, the project aims to provide comprehensive assessments of European gas transmission and distribution infrastructure, highlighting material readiness and management practices necessary for the successful integration of hydrogen blends. Through its participation in the SHIMMER project, MARCOGAZ contributes to the development of best practice guidelines and technologies essential for ensuring the secure and effective management of hydrogen within the natural gas infrastructure, thus advancing the transition towards a sustainable low-carbon economy.

9.17. TESTING HYDROGEN ADMIXTURE FOR GAS APPLIANCES (THYGA)

MARCOGAZ continued to provide support for the Testing Hydrogen Admixtures for Gas Appliances (THyGA) project as a member of its advisory panel in 2020 and 2021. The project, coordinated by GERG, kicked off in 2020 and received funding from the EU's Research and Innovation programme Horizon 2020 under the Fuel Cell and Hydrogen Joint Undertaking (FCH JU). The main goal of the three-year project is to facilitate the adoption of hydrogen and natural gas blends by closing knowledge gaps regarding technical impacts on residential and commercial gas appliances. Project partners work on the identification and recommendation of appropriate codes and standards that should be adapted to respond to needs. In accordance with the project outcomes, a strategy for addressing the challenges for new and existing appliances will be adopted.

9.18. THOTH2 PROJECT

MARCOGAZ is a proud supporter of the EU-funded THOTH$_2$ project, which aims to facilitate the integration of green hydrogen (H_2) into existing gas infrastructure. By focusing on the coexistence of new H_2 mixtures with current gas systems, the project addresses crucial normative and technological challenges, particularly related to testing protocols for hydrogen-natural gas (H_2NG) blends. Through the development of specialised methodologies and testing procedures for various measurement devices, including gas meters and quality analysers, THOTH$_2$ strives to provide valuable insights for international standard bodies, gas operators, device manufacturers and calibration service providers. This initiative, coordinated by SNAM (Italian transmission, storage and regasification leading company) and involving 14 partners from across Europe, underscores MARCOGAZ's commitment to advancing sustainable energy solutions within the EU.

9.19. UNITED NATIONS ECONOMIC COMMISSION FOR EUROPE (UNECE)

MARCOGAZ had been cooperating with the United Nations Economic Commission for Europe (UNECE) in the reduction and mitigation of methane emissions, providing technical support for the relevant initiatives. With the recently strengthened dialogue, UNECE and MARCOGAZ agreed to expand technical dialogue to hydrogen and its deployment as well as guarantees of origin for new gases. In 2023, MARCOGAZ became a member of UNECE's Hydrogen Task Force.

MARCOGAZ participated in the Committee Bureau of the United Nations Economic Commission for Europe (UNECE) Committee on Sustainable Energy (CSE), which consists of a group of experts preparing the UNECE sustainable energy subprogramme.

9.20. UNITED NATIONS ENERGY COMPACTS

In September 2021, MARCOGAZ developed two energy compacts, which were included in the Energy Compacts of the United Nations Energy as part of the High-Level Dialogue on Energy organised during the 76th Session of the United Nations General Assembly. In 2022 and 2023, the Energy Compacts of UN Energy were updated with the last developments of MARCOGAZ activities referring to net-zero targets.

MARCOGAZ's Energy Compact highlights the association's commitments to the energy transition and climate neutrality. With a view to executing those commitments, MARCOGAZ works to expand cooperation with European and global partners by exchanging knowledge and technical expertise on the decarbonised midstream and downstream gas network. The association maintains continued technical evaluation of the technology readiness level of the existing gas infrastructure for new gases at different concentrations in the grid, 100% decarbonised network and impact on end-use gas appliances. To achieve the stated goals and targets, the Energy Compact notes that collecting data on the generation of new gases, sector integration projects, power-to-gas installations to create road maps for greater integration of renewables and the role of gas infrastructure is at the core of the overall activities.

The catalogue of the Green Hydrogen Compact includes the commitments and targets of countries, companies and associations on the development and take-up of green hydrogen. In its compact, MARCOGAZ elaborates on the solutions that the association encounters in its endeavour to promote and support the development of green hydrogen and the challenges that it encounters. Evaluation of the technical readiness of the existing gas network and providing a technical basis for the standards, regulations and safety-related processes are an essential part of the solutions that MARCOGAZ develops for the green hydrogen injection into the gas system at different concentrations.

9.21. WELMEC

MARCOGAZ proudly partners with WELMEC, the European Cooperation in Legal Metrology, a regional organisation comprising national authorities responsible for legal metrology in the EU and European Free Trade Area (EFTA) countries. Recognising the significance of fostering cooperation and establishing a common understanding to support the implementation of the European regulatory framework on metrology, MARCOGAZ actively engages with WELMEC to reduce trade barriers and promote the free movement of measuring instruments across the region. Notably, MARCOGAZ participated in the 4th Annual Meeting of WELMEC in May 2023, where stakeholders convened to address critical issues in legal metrology and discuss key developments in the field. As WELMEC continues to play a pivotal role in shaping European policies and legislation concerning market surveillance, mutual recognition and units of measurement, MARCOGAZ remains committed to contributing to the organisation's mission and initiatives. Through its collaboration with WELMEC, MARCOGAZ reinforces its dedication to promoting best practices in legal metrology, supporting European regulatory harmonisation and facilitating the exchange of vital information and knowledge among stakeholders within the industry.

EGATEC2024

The 6th European Gas Technology Conference

A flagship event in 2024

EGATEC is organised by MARCOGAZ and GERG in co-ordination with the DVGW Kongress. The conference brings together high-level representatives from the European gas industry, universities, companies and many other stakeholders. It provides a platform to exchange knowledge and experiences on the challenges and opportunities that the energy transition and decarbonisation efforts associated with such a shift deliver for the gas industry.

EGATEC 2024 considers and discusses new strategies and innovative ideas to facilitate the gas industry's contribution to net-zero goals and upscaling state-of- the-art technologies, including new gases and power-to-gas.

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ANNEX

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