Reducing methane emissions to recover gas: a new challenge for the industry
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RIEnergia, no. 281, November 2, 2022

The issue of methane emissions is currently at the center of a unusual alignment, with three completely independent dynamics interacting:

- the central role of natural gas in decarbonizing energy supply during the transition to a fair and sustainable economy;
- the evolving regulatory framework to support the achievement of climate change mitigation goals which requires particular attention to be paid to methane emissions;
- the uncertainties about the actual availability of natural gas in our markets, as a result of the complicated geopolitical scenario following Russia's invasion of Ukraine.

Long story short: we need methane and we will need it more and more to increase the resilience and independence of our energy system, we must work to reduce emissions while respecting the various packages of measures adopted internationally to reduce climate change. A commitment that, on the other hand, is also convenient for us, because less emissions means more gas in the network, with investments that pay for themselves in a very short time. Never like now being virtuous is convenient. Never before have companies been led to wonder about how to reduce their emissions. And it is a collective commitment, which involves the whole of society. But let's go in order.

The issue of the centrality of the natural gas supply chain for the achievement of the decarbonisation goals was addressed in the interview with Assorisorse President Luigi Ciarrocchi published in *RIEnergia* a few weeks ago: decarbonisation goals cannot be achieved without switching to natural gas, which plays and will play even more in the future a pivotal role in the energy transition process, as well as being indispensable to ensuring the energy security of national systems. Not surprisingly, natural gas has recently been included within the European taxonomy of private investments that can play a role in green transition activities and contribute to climate change mitigation. In terms of emissions, natural gas is responsible for about 23% of CO2 emissions from world *fuel combustion* compared to about 32% from oil and 45% from coal, representing, among traditional sources, the one with the lowest emission impact. Specifically, in the electricity sector, where gas plants benefit from better efficiency than other thermal power plants, about 23% of total emissions are attributed to gas, compared to around 75% of coal: if natural gas replaced coal in electricity generation, greenhouse gas (GHG) emissions would be halved worldwide.

From a regulatory perspective, there are important references that need to be looked at. We can start with the Paris Agreement, a landmark, legally binding international treaty, adopted by 196 parties at COP 21 in Paris on December 12, 2015, and entered into force on November 4, 2016. Its goal is to limit global warming well below 2°C, preferably to 1.5°C, with respect to pre-industrial levels. To achieve this long-term temperature goal, countries aim to peak GHG emissions as soon as possible to achieve a climate-neutral world by mid-century.

Following the Paris Agreement, in 2019 the EU launched the European Green Deal, a package of strategic initiatives with the ultimate goal of achieving climate neutrality by 2050. For implementing the European Green Deal, the European Commission has then adopted the "Fit for 55" climate package, with the aim of reducing GHG emissions in the EU by at least 55% by 2030, compared to

1990 levels. This triggers a legal obligation to achieve climate neutrality by 2050. The package consists of a series of proposals to review climate, energy and transport legislation and to implement new legislative initiatives to align EU legislation with its climate goals.

Methane emissions account for 10% of GHG emissions in the European Union, but play a key role in the possibility of achieving the objectives of reducing climate change, since methane has a climate-altering power of 25-80 times higher than CO2, depending on the time horizon considered (100 or 20 years respectively). It is because for this relevance of methane gas that US President Joe Biden and European Commission President Ursula Von der Leyen promoted the launch of the Global Methane Pledge (GMP) at COP 26 in Glasgow in November 2021. GMP participants have made a voluntary commitment to contribute to the reduction of methane emissions by at least 30% by 2030, compared to 2020 values. Participants also committed to adopt best practices and technologies to improve the accuracy, transparency, consistency and completeness of the reported emissions, an essential element without which any commitment made has a very limited value.

Where to start to effectively reduce methane emissions? Certainly from the energy sector, which although responsible for "only" 18% of anthropogenic methane emissions, is the one on which it is easier to act for the reduction. Hence, immediately after the COP26 in Glasgow, the European Commission published on 15/12/2021 a draft of the *European Regulation on the reduction of methane emissions in the energy sector*. The proposed regulation aims to support a wide dissemination of a robust MRV (monitoring, report and verification) standard on methane emissions in the energy sector, to include a legislative obligation at European level for the adoption of LDAR techniques (*leak detection and repair*) and to strongly limit emissions for venting and flaring. The impact of the regulation will be substantial and there are many comments made on the first formulation and which will have to be implemented in order to arrive at an effective formulation, which takes into account the specific needs of the various industries and which also expresses some key concepts such as the prioritization of interventions or the non-materiality of certain issues.

These priorities are also considered in the most recent package of measures introduced by the EU - REPowerEU - which is aimed at stepping up the fight against climate change, raise the bar on some strategic objectives, and quickly achieving independence from Russian gas.

What is happening in Ukraine and the sabotage of the Nord Stream and Nord Stream 2 gas pipelines are critical events that remind everyone of the importance of diversifying supply sources, as well as of the need to diversify production by integrating the various supply chains in order to have a more resilient system. 2022 is a year in which various initiatives related to natural gas have flourished, mainly - but not only - in the form of LNG. For all terminals in operation, import capacity enhancement initiatives are underway and many new projects have been launched in *fast-track* mode. Therefore natural gas, in its various forms, is not only a key source in which to continue investing during the so-called energy transition in order to achieve climate change reduction goals, but it is a fundamental element for our energy independence.

Today in Europe there are questions about the real availability of the *commodity* in our markets, the price has risen to unprecedented levels and there is the need to plan extraordinary measures to reduce consumption. The reduction in the flow of gas imported from Russia increases the attention to domestic gas resources, from the exploitation of which derive not only positive economic effects for the sector and the State coffers, but also environmental benefits in terms of lower emissions compared to imported methane from abroad. Natural gas, in fact, is now a global *commodity*, with large quantities of methane being transported over long distances via pipelines and LNG carriers. The commercial advantage of this availability is evident, but the environmental impact associated with this market must be taken into account, and specifically, the footprint of the compressor stations

along the export pipelines and the cryogenic supply chain necessary for the transportation as LNG. It is evident that the use of "zero km" resources would allow a potential reduction of the environmental costs associated to their transport, as well as avoid the industrial cost due to the construction of infrastructure for import. In this regard, all the initiatives aimed at increasing the production of the domestic fields already in production as well as the new ones discovered in the middle and upper Adriatic can be very beneficial.

With a series of actions aimed at optimizing existing mining rights, production could increase in a few years from 3.3 billion m3 in 2021 to around 6 billion m3 per year by 2025 and over 7 in subsequent years, avoiding the scenario of a further rapid decline in production that would occur in the absence of suitable investments. Billions of additional cubic meters of natural gas could be placed on our market, associated with overall emissions that are 20-30% lower than that imported, with peaks of up to 50% depending on supplies.

This is by no means a negligible volume that should be considered together with the additional gas recovered. UNFCCC data estimate natural gas emissions caused by the Energy sector to be 129 billion cubic meters per year. The IEA estimates arrive at an overall figure that is higher by 70%, equal to 221 billion cubic meters per year. The difference between the two estimates is very significant (which reminds us of the importance of improving our overall ability to estimate and report emissions through a shared and transparent system), but even more significant is the magnitude of these estimates. These extremely significant numbers are between double and triple the current total natural gas consumption of Italy. Volumes of gas that could be recovered and put on the market. IEA estimates that 71% of methane emissions could be recovered and that as much as 41% of emissions could be recovered at no cost, since the value of the gas would repay the investments necessary for its recovery, even with commodity prices lower than the recent peaks.

What is the Italian industry doing?

The effort that the gas industry is making, at the level of the supply chain and at a global level, is exactly to prevent losses of methane into the atmosphere along the gas route, from the well to the final user, and avoiding eroding the environmental advantage of natural gas compared to other fossil fuels. In Italy we have long been engaged in voluntary actions and initiatives and our operators play a proactive role in the main international partnerships on the issue of methane emissions. All methane emissions are monitored and quantified according to international best practices and standards and further mitigation actions are being identified in order to ensure a reduction in line with the objectives recently launched as part of the *Global Methane Pledge* above mentioned.

Maximum in this sense is the commitment of Assorisorse, which consists of about one hundred companies dedicated to enhancing natural resources through sharing intellectual skills on technological innovation and circular economy, aiming at the decarbonisation of industrial processes and at promoting an environmental, economic and social sustainability. Part of Confindustria and the *UN Global Compact*, the Association focuses its activities on various topics of interest, studied in depth by specific task forces: national resources, circular economy, hydrogen supply chain, CCUS (*Carbon Capture, Utilization and Storage*), critical minerals, sustainability of the energy supply chain and methane emissions.

The task force on methane emissions recently published the *white paper* "The commitment of the Italian industry for the reduction of methane emissions", a document that was presented at the 50th edition of the Gastech conference, held in Milan in September 2022. The task force is attended by thirteen leading companies representing the entire industrial chain**. These are operators,

technology suppliers, designers, builders, inspection, testing and certification bodies and consulting firms.

The document reviews the various technologies and solutions available at the level of design, implementation and management in order to reduce methane emissions and to be able to quantify them accurately. A number of technologies developed by the members of the Association are also illustrated and application examples are described, so that no operator has to "reinvent the wheel", but can instead derive the maximum benefit from the many successful experiences already accumulated at the country system level. The technologies discussed are often technologies that we might define common sense technologies, whose adoption by all operators on a global scale would be sufficient to rapidly bring tangible results. The report is very pragmatic and aims to provide with a range of possible solutions with proven effectiveness. Innovative technologies in which investments are being made are also described, with special reference to the issue of quantifying emissions and reconciling emission estimates at plant level (*bottom-up*) with those measured at site level (*top-down*).

The Italian system has been committed for a long time to the issue of abating methane emissions and significant results are already being recorded, with goals being achieved by some of the main operators years in advance, thanks to the support of the entire Italian industrial chain. The particular situation we are experiencing makes it further necessary for everyone to make further efforts, also with the aim of placing on the market new quantities of methane that would otherwise be dispersed, heavily impacting on the environment. The classic two birds with one stone.

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*** The Task Force is attended by representatives and experts from Baker Hughes, Bonatti, DG Impianti, Energean, Eni, Gruppo Gas Plus, Hera Group, Maurel et Prom, Pansoinco, RINA, Schneider Electric, Shell and Snam.*