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POLICY BRIEF

How far should the new EU Methane Strategy go?

By Maria Olczak and Andris Piebalgs, Florence School of Regulation

Highlights

- The decarbonisation of the EU economy requires immediate action to avoid methane emissions. Methane is a potent greenhouse gas (GHG), but if captured, it provides economic value to energy production.
- The EU efforts to decarbonise its energy system have so far mostly been concentrated on CO2 emissions mitigation. The Regulation (EU) 2018/1999 on the Governance of the Energy Union requires the European Commission to propose the EU strategic plan for methane, which will become an integral part of the EU long-term climate strategy.
- Methane emissions accounted for 11% of total EU GHG emissions in 2016 with agriculture, waste and energy sectors as the major sources. Since the mid-1990s methane emissions have been decreasing, partly due to the adoption of the first EU methane strategy published in 1996. However, the 1996 strategy was not a complete success, since it failed to bring about the expected level of emission cuts.
- Based on the analysis of lessons learned, the authors propose that the new EU methane strategy should adopt a new approach based on:
  - a more transparent framework at international, EU and national levels;
  - better coordination of policy measures targeting emissions in agriculture, waste and energy sectors, given that captured methane is a source of energy;
  - setting a EU methane intensity target, which could be included in the revised EU climate pledge – Nationally Determined Contribution – which needs to be submitted by 2025;
  - cooperation with key EU gas suppliers to obtain accurate estimates of gas industry emissions across the entire gas supply chain. It is important that these data are aggregated not only at a corporate, but also a national level to ensure that national policies and regulations are based on accurate methane estimates.

Introduction

Methane is the simplest hydrocarbon, composed of one atom of carbon and four atoms of hydrogen. When captured, it can be used as a fuel: methane is the primary component of natural gas, utilised primarily to heat homes, generate electricity and run vehicles. It can also be used as a chemical feedstock for the production of a broad range of products such as plastic, fabrics and fertilisers[1]. Its versatility, price and relatively low emission intensity makes natural gas a crucial component of the EU energy mix. Currently, it accounts for almost a quarter of the EU's final energy consumption[2].

Methane is released into the atmosphere by both natural sources (i.e. wetlands, oceans, volcanoes) and human activity. Such anthropogenic sources account for 50-60% of all methane emissions and include agriculture, the energy sector (mainly oil and gas supply chains), waste, and the burning of biomass and biofuel[3]. There are many reasons why we should minimise these man-made methane emissions as soon as possible.

When released into the atmosphere, methane negatively affects the environment, human health and safety. Methane is the second most important anthropogenic greenhouse gas (GHG), although it remains in the atmosphere for a relatively short time of 12 years. It is estimated that it is 34 times more potent than CO2 over a 100-year period and 87 times over a 20-year period[4]. As a result, methane emissions mitigation would have an immediate impact on climate change. It has been estimated that by 2030 the additional methane emission reductions will close up to one third (15-33%) of the emission gap between the commitments submitted by the parties to the Paris Agreement in their Nationally Determined Contributions (NDCs) and the emission trajectories necessary for achieving the 2-degree Celsius target by the year 2100[5].

Moreover, methane is also a precursor to ground-level ozone formation (a major component of smog), contributing to respiratory problems and premature deaths. When leaked into densely populated areas, methane can jeopardise worker safety and, in particular cases, lead to explosions[6].

Apart from environmental and safety concerns regarding methane emissions, there is also an economic aspect. In contrast to other GHGs, methane can be transformed into usable energy and therefore contribute to an increased energy supply. As long as the value of methane and the energy generated from it is higher than the cost of the technology used to capture it, reducing methane emissions is not only beneficial for the environment, but could also bring

1 R. K. Lattanzio et al., Methane: An Introduction to Emission Sources and Reduction Strategies, Congressional Research Service Report, 2016, pp. 1-3.

2 In 2016, natural gas was the second biggest source of energy in the EU with 22.1% share in the structure of final energy consumption. Source: Eurostat (consulted on 22/02/2019).

3 P. Balcombe, Understanding and reducing methane emissions from natural gas supply chains, in: Oxford Institute of Energy Studies (OIES) Forum, issue 116, September 2018, pp. 9-12.

4 Methane is one of the Short-lived Climate Pollutants. The other SLCPs include hydrofluorocarbons (HFCs), black carbon, and tropospheric ozone. For more information see: http://www.worldbank.org.

5 R. Van Dingenen et al., Global trends of methane emissions and their impacts on ozone concentrations, Joint Research Centre report, 2018, p. 51.

6 J. Pham-Lê, Explosion à Paris : le récit d'une journée dramatique, *Le Parisien*, 12 January 2019.

in concrete revenue[7]. All these reasons have led to the adoption of regulation aimed at reducing methane emissions in several countries such as the US, Canada, Norway, and Russia. Despite the adoption of the first EU Methane Strategy in 1996, the issue of methane emissions is not directly regulated at EU level, yet the ambitious decarbonisation agenda may trigger significant changes in this respect.

The aim of this paper is to examine the effectiveness of past efforts to mitigate methane emissions in the EU that encompass all major sources: agriculture, waste and energy. The paper is structured as follows: Section 1 provides background on key trends and sources of methane emissions in the EU. Section 2 analyses the first EU Methane Strategy adopted in 1996; in particular, it focuses on the pros and cons of the adopted approach. In Section 3, the authors present the major facets of the new approach required to address methane emissions in a low-carbon economy. The final section draws some conclusions.

Methane Emissions in the EU

Methane emissions accounted for 11% of total EU-28 GHG emissions in 2016. They have been declining (-37% since 1990) to 457 million tonnes CO2 equivalents in 2016, mainly due to reductions in coal mining and anaerobic waste[8]. It should be noted that the rate of decline in the EU has been much less in the last 15 years[9]. From a global perspective, the relative contribution of Europe to the global emissions declined from 11% in 1990 to 6.4% in 2012, and is forecast to stabilize around 3-5% in 2030-2050[10].

Currently, agriculture is the main source of emissions (237 MtCO2eq), followed by waste management (124 MtCO2eq) and energy (85 MtCO2eq). The majority of agricultural methane emissions arises from enteric fermentation (fermentation within the digestive systems of animals, mainly ruminants such as cattle and sheep) and manure management. Landfills, where the anaerobic decomposition of organic waste generates landfill gas (a mix of carbon dioxide and methane) are the key source of methane emissions from the waste sector. In fact, emissions from enteric fermentation and anaerobic waste accounted for almost 60% of EU methane emissions in 2016[11].

The last category are methane emissions in the energy sector, of which over 80% constitute fugitive emissions from from the mining and handling of coal and from the production, transport and distribution of natural gas (26 and 25 MtCO2eq, respectively). It could be expected that in the next few years, with the decrease in coal use for power generation in the EU and the predicted increase in the EU's demand for gas up to 2030, the EU natural gas sector will become the energy sector's key source of methane emissions.

There are a few peculiarities and uncertainties concerning the emissions in the natural gas sector[12]. Firstly, although GHG emissions occur across the entire gas supply chain, the majority of them

7 K. Ross, T. Damassa, E. Northrop, A. Light, D. Waskow, T. Fransen, and A. Tankou, Strengthening Nationally Determined Contributions to Catalyze Actions That Reduce Short-Lived Climate Pollutants. Working Paper. World Resources Institute, 2018.

8 Annual European Union greenhouse gas inventory 1990–2016 and inventory report 2018. Submission to the UNFCCC Secretariat. 27 May 2018, pp. 87-88.

9 R. Van Dingenen et al., *op. cit.*, p. 8.

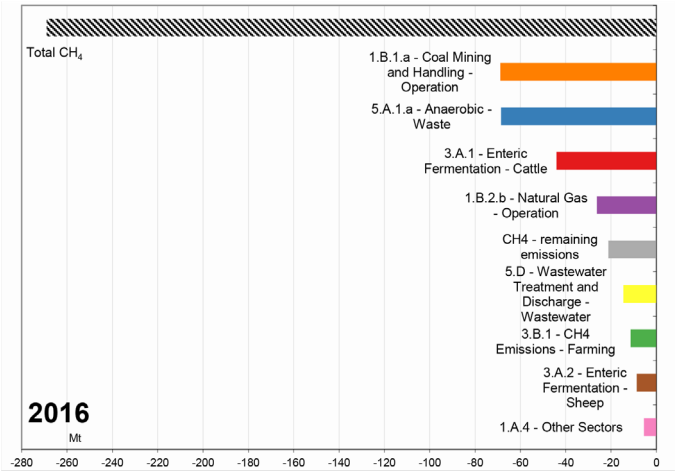
10 *Ibid.*, p. 58.

11 Annual European Union greenhouse gas inventory 1990–2016, op. cit., pp. 87-88.

12 B. Borisov, Is there a need for more regulation? Pinpointing Issues and Identifying Tools, presented at the FSR Policy Workshop 'Towards "Net Zero" Methane Emissions in the Gas Sector – Challenges and Opportunities' on 15 October 2018 in Florence.

(around 75%) originate from upstream activities. Natural gas transmission, storage and LNG facilities cause roughly 10% of emissions, whereas distribution is responsible for around 5%. Secondly, the bulk of the EU natural gas chain GHGs emissions originates from outside the EU. This is because almost three quarters of gas consumed in the EU is imported, which places the EU consumers at the end of a complex supply chain located mostly beyond the EU Member States' borders. Thirdly, distribution is the largest source of methane emissions produced within the EU, accounting for over 50% of emissions, followed by transmission and storage (around 20%), and upstream (around 18%), which will gradually diminish with declining domestic gas production.

Figure 1. Absolute change of CH4 emissions by large key source categories 1990 to 2016 in CO2 equivalents (Mt) for EU-28 and Iceland. Source: Annual European Union greenhouse gas inventory 1990–2016 and inventory report 2018. Submission to the UNFCCC Secretariat. 27 May 2018, p. 88.



Note: Other is calculated by subtracting the presented categories from the sector total

The EU's long-term climate strategy proposed by the EU Commission in November 2018 does not address the issue of methane emissions. However, the strategy's accompanying document sheds more light on methane mitigation and identifies three priority sectors in this respect: agriculture, waste and energy[13]. Among the proposed solutions is the use of anaerobic digestion to produce biogas and biomethane from agricultural waste, which would effectively create symbiosis between the agriculture and gas sectors.

In the energy sector, the document predicts that the reduction in fossil fuel consumption and the decline in associated emissions from fossil fuel extraction and distribution will be the key driver for methane emissions abatement. At the same time, the document maintains that gas transmission and distribution networks will continue to play a significant role in a low-carbon economy, as they will be used to transport green and low carbon gases, i.e. biogas and e-gas (Power-to-X). One should note that the substitution of fossil gas with renewable gas(es) does not address the problem if the (bio or synthetic) methane continues to leak from the gas infrastructure.

The Regulation (EU) 2018/1999 on the Governance of the Energy Union[14] requires the European Commission to propose a strategic plan for methane, which will become an integral part of the EU's long-term strategy. Moreover, Article 16 of the regulation specifies that the strategy should take into account the objectives of a circular economy. The Governance Regulation does not specify when the strategy needs to be published, yet the Commission has

13 In-depth analysis in support of the Commission Communication COM (2018) 773 A Clean Planet for all. A European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy. Brussels, 28 November 2018, (pp. 173-174). Available at: https://ec.europa.eu.

14 Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council.

already announced that it will come up with the proposal in 2020/2021[15].

It should be noted that the initial proposal of the Governance Regulation, presented by the EU Commission on 30 November 2016 as a part of the Clean Energy Package, did not include any reference to the methane strategy[16]. The commitment to proposing such a strategy has been added by the European Parliament[17]. The Commission accepted it would analyse methane emissions in the context of the EU's long-term strategy, but with the preservation of its right of initiative[18].

The First EU Methane Strategy. Not a Complete Success

In the early 1990s, climate change was recognized as one of the key challenges for global policy thinking and making. The 1993 Fifth Action Programme for the Environment identified the combat against climate change as one of the key environmental practices to be undertaken by the European Community (the predecessor of the European Union)[19]. The Community officially joined the United Nations Framework Convention on Climate Change (UNFCCC) at the end of 1993. One year later, in December 1994, the representatives of 12 MSs who were gathered at the Environment Council asked the Commission "to submit as soon as possible a strategy to reduce GHGs other than CO2, in particular methane and nitrous oxide"[20].

The Commission put forward the "Strategy paper for reducing methane emissions" in November 1996, almost one year later than intended[21]. The strategy identified agriculture, waste and energy as the most promising sectors and proposed a set of policy measures targeting the emissions from the abovementioned sources separately[22].

In the agricultural sector, the Commission suggested measures in two areas: animal manure manage-

15 S. Moser, presented at the FSR Policy Workshop 'Towards "Net Zero" Methane Emissions in the Gas Sector – Challenges and Opportunities' on 15 October 2018 in Florence.

16 Proposal for a regulation of the European Parliament and of the Council on the Governance of the Energy Union, amending Directive 94/22/EC, Directive 98/70/EC, Directive 2009/31/EC, Regulation (EC) No 663/2009, Regulation (EC) No 715/2009, Directive 2009/73/EC, Council Directive 2009/119/EC, Directive 2010/31/EU, Directive 2012/27/EU, Directive 2013/30/EU and Council Directive (EU) 2015/652 and repealing Regulation (EU) No 525/2013.

17 European Parliament legislative resolution of 13 November 2018 on the proposal for a regulation of the European Parliament and of the Council on the Governance of the Energy Union, amending Directive 94/22/EC, Directive 98/70/EC, Directive 2009/31/EC, Regulation (EC) No 663/2009, Regulation (EC) No 715/2009, Directive 2009/73/EC, Council Directive 2009/119/EC, Directive 2010/31/EU, Directive 2012/27/EU, Directive 2013/30/EU and Council Directive (EU) 2015/652 and repealing Regulation (EU) No 525/2013 (COM(2016)0759 – C8-0497/2016 – 2016/0375(COD)) (Ordinary legislative procedure: first reading). See also: http://www.michele-rivasi.eu (consulted on 27/02/2019).

18 Debate at the European Parliament on 12 November 2018, Strasbourg. Available at: http://www.europarl.europa.eu

19 "Towards Sustainability. A European Community programme of policy and action in relation to the environment and sustainable development". No C 138/5, 17 May 1993. Available at: http://ec.europa.eu/environment.

20 Community strategy to reduce CO2 emissions and to improve energy efficiency, including CO2/energy tax – Council conclusions. 1817th Council meeting – Environment, Brussels, 15-16 December 1994.

21 Communication from the Commission of the European Communities (COM(95) 624), Progress Report on implementation of the European Community Programme of Policy and Action in relation to the environment and sustainable development "towards sustainability". Brussels, 10.01.1996. Available at: http://ec.europa.eu/environment.

22 All anthropogenic methane emissions were estimated at 22.8 Mt in 1990 with agriculture, waste and energy identified as the key sources responsible for 44.7%, 31.5% and 23% respectively.

ment and enteric fermentation. The use of anaerobic digesters or covered lagoons, combined with energy use or flaring, was identified as a key measure for reducing methane emissions from animal manure. The EU executive suggested implementing these policy measures in two steps: firstly, the launch of demonstration programmes at EU, national, regional and local levels; secondly, the introduction of an obligation to install such recovery and use systems at the EU level. On the other hand, the proposed measures regarding emissions from enteric fermentation were limited to promotion of research and further incentives to develop viable policies for reducing methane emissions.

In the waste sector, the key proposal included the adoption of EU legislation requiring the installation of methane recovery and use systems at new and existing landfills. Other suggested actions included measures aimed at the minimization, separate collection and material recovery of organic waste. Moreover, the Commission proposed the use of economic incentives to promote recycled products, both at national and EU levels.

In the energy sector, due to the projected decline in coal production, the EU recommended MSs encourage the application of the best available technologies to those coal mines with expected life-times extending beyond a certain period (e.g. 10 years). Concerning methane emissions from the natural gas sector, the proposed measures were two-fold: setting-up an EU minimum leakages standard to encourage the replacement of less efficient parts of the transmission and distribution pipelines, and increasing the control frequency of pipelines at a national level.

The 1996 EU Methane strategy failed to bring about the expected results. The Commission forecast that the implementation of suggested policy measures would result in a 30% reduction in 2005 and 41% in 2010 with regard to 1990 levels. In reality, the methane emissions declined by 30% between 1990 and 2010, and only a portion of the methane emissions abatement can be attributed to the dedicated EU policies. Emission cuts in the coal mining sector, the second largest source of methane emissions decline (-38Mt CO2 equivalents or -86% between 1990 and 2010 within the EU-15), was mainly the result of a dramatic decline in mining activity. Similarly, the emissions from enteric fermentation diminished due to a lower number of cattle and sheep (-17% below 1990 levels in 2010)[23]. In the following paragraphs, the authors will analyse which measures proposed by the European Commission were successful and which failed to bring about the expected results.

On a positive note, the EU legislation addressing emissions in waste sector proved to be successful and brought about the largest reductions (-51,5 Mt CO2 equivalents or -33%), despite falling short of the targets set by the Commission[24]. Directive 1999/31/EC on the landfill of waste (also referred to as the Landfill Directive) required the MSs to minimize the amount of biodegradable waste disposed untreated in landfills and to install landfill gas recovery at all new sites[25]. Moreover, the non-binding Guidance on Landfill Gas Control provided clarity on landfill gas management and established the key criteria for the collection, treatment and use of landfill gas[26]. In particular, the Guidance suggested that the captured methane could be injected into the gas mains, and thence used to generate electricity and heat

23 Annual European Union greenhouse gas inventory 1990–2010 and inventory report 2012. Submission to the UNFCCC Secretariat, 27 May 2012.

24 The EU Commission expected the decrease in methane emissions by 45% in 2005 and 60% in 2010 in waste sector.

25 Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste. Official Journal L 182, 16/07/1999 P. 0001 – 0019.

26 Guidance on the Landfill Gas Control requirements of the Landfill Directive, approved following the Technical Adaptation Committee meeting on 17 December 2013.

Table 1. The change in methane emissions 1990-2010 – own elaboration. Data source: Source: Annual European Union greenhouse gas inventory 1990–2010 and inventory report 2012. Submission to the UNFCCC Secretariat. 27 May 2012. Change in CH4 emissions for each sector 1990-2010 (EEA member countries), retrieved from: https://www.eea.europa.eu

	AGRICULTURE	WASTE	ENERGY
Actions proposed by the 1996 Strategy paper for reducing methane emissions	**Enteric fermentation:** Promotion of research and incentives to elaborate policy tools (EU and national level)	**General measures:** Promotion of measures aimed at minimising organic waste generation and recycling (All levels – EU, national, regional and local)	**Mining:** Encourage application of best available recovery techniques in coal mines (EU and national level)
	Animal manure: Use of anaerobic digesters or covered lagoons (with energy use or flaring) in 2 steps: 1st step: demonstration (all lev-els – EU, national, regional and local) 2nd step: obligation (EU level)	**Landfill gas recovery at existing and new land-fills:** EU legislation **Energy production from land-fill gas:** Incentives (EU and national level)	**Gas pipeline leakage:** Set minimum leakage standard at EU level; Increase control frequency of pipelines at national level
Expected CH4 reductions by sector (1990-2005) and (1990-2010)	-24% (2005) -34% (2010)	-45% (2005) -60% (2010)	-24% (2005) -34% (2010)
Reductions achieved by the in EU-15, percentage change (1990-2010)	**Total: -20%** Enteric fermentation (cattle, sheep): -12% Manure management: -0.2%	**Total: -33%** Managed waste disposal on land: -42% Wastewater handling:-20%	**Total: -54%** Coal mining: -86% Natural gas: -28%

or utilized directly as a fuel. Recently, the Circular Economy Package brought some changes to the Landfill Directive, and methane has been recognized as an alternative feedstock for plastics production[27].

On the other hand, the measures proposed to minimize emissions in agriculture, mainly animal manure management, were unsuccessful owing to a number of reasons. First, the proposed measures were concentrated on reducing methane emissions, neglecting opportunities stemming from the use of captured gas. The strategy overlooked the potential of producing renewable gas from organic waste originating from sectors such as agriculture and waste. Biogas can be used on site or can be purified and upgraded to biomethane. This can then be injected into the gas networks to reach a broad range of consumers, improving the economic rationale of anaerobic digesters. Secondly, the EU legislation did not sufficiently address the economic and non-economic barriers related to the functioning of anaerobic digesters. The obligation to install recovery and use systems in animal farms was not implemented. Moreover, the support systems for biogas/biomethane production were developed in several MSs

27 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, A European Strategy for Plastics in a Circular Economy. COM (2018) 28 final. Brussels, 16.01.2018.

with differing effects, and non-economic issues such as grid barriers (e.g. gas quality), administrative and social acceptance barriers were not sufficiently addressed at the EU level. This led to sluggish development of the biogas market in the EU: in 2010, there were roughly 10,500 biogas plants in Europe and the production of biomethane was marginal (752 GWh in 2011)[28].

Similarly, the Strategy failed to address the methane emissions in the natural gas sector. The suggested EU minimum leakages standard (350m3/km/year) was mostly based on the experience in France. The Strategy did not take into account the key attributes of methane emissions from the natural gas sector: the uncertainty of methane emissions calculations, the lack of coherent measurement methodologies (top-down vs bottom-up) and lack of unified reporting standards, leading to the absence of accurate inventories at national and corporate levels[29]. Moreover, there was no mention of the role of super-emitters, nor of the variability of methane emissions, which depend on various factors such as reservoir type, location in the supply chain, size of industry; and the heterogeneity of abatement costs. The insufficient data on methane emissions affected the choice of policy tools to address this challenge, making the use of market-based policy options (taxes, tradable performance standard) and leakage standards rather limited.

The main focus of criticism is the fact that the Commission did not take the opportunity to decrease the uncertainty of data on methane emissions nor propose a harmonization of methane emissions measurement, reporting and verification standards in the EU. This is the very first step towards limiting methane emissions, which would be much more efficient if implemented at the EU level, rather than left to the Member States.

New Approach Needed for a Low Carbon Economy

The Governance Regulation calls the EU Commission to propose a new EU Methane Strategy instead of updating the 1996 Methane Strategy. This could be explained by a number of factors. Firstly, the challenge is no longer just to reverse the upward trend in EU methane emissions, but to decarbonise the EU economy by 2050, and thus to reduce the emissions to a minimum in the course of the next three decades. Secondly, the adoption of the Circular Economy Package puts more emphasize on the efficient use of resources and the minimization of waste, and thereby creates more incentives to use waste to generate energy. Last but not least, the increase in natural gas imports to the EU requires the European Commission to tackle the emissions occurring along the entirety of natural gas supply chains, both within the EU and beyond the borders of MSs.

For those reasons, the authors suggest that the new EU methane strategy should embrace the following elements:

1. **Transparency First.** The availability of correct and transparent data on methane emissions is an absolute requirement and should precede the setting up of any standards or targets. A lot of work remains to be done in this respect. The recent study on methane leaks from the US oil and natural gas supply chain found that the real emissions were around 60% higher than the inventory estimate adopted by the US Environmental Protection Agency (EPA).[30]

28 European Biogas Association (EBA), Statistical report 2017, pp. 1 – 10.

29 C. Munnings, A. Krupnick, Comparing Policies to Reduce Methane Emissions in the Natural Gas Sector, Resources for the Future Report, July 2017.

30 R. A. Alvarez, Assessment of methane emissions from the U.S. oil and gas supply chain. Science, 13 July 2018: Vol. 361, Issue 6398, pp. 186-188.

This discrepancy can be explained by the fact that the existing inventory methods do not take into account emissions occurring during abnormal operating conditions. Similar findings were presented in a study assessing the livestock emissions factors used in the inventories of livestock methane emissions in the US.[31] The uncertainty and the knowledge gap regarding the measurement of methane emissions remains a significant challenge which should be addressed at the EU level. The EU Commission should drive the implementation of a harmonized EU-wide set of rules on detection, measurement, verification and reporting of data on methane emissions. It is within the EU's interests, as one of the largest gas importers, to promote the transparency framework at an international level. The EU Commission should also monitor international developments such as the Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories[32].

2. **Integrated Approach.** Under the new strategy, methane should be recognised not only as a pollutant, but also as a source of low carbon energy. The strategy could combine the sectoral measures to decrease methane emissions from the agriculture, waste, and energy sectors. The organic waste from the agriculture and waste sectors can be utilized to produce biogas and biomethane, increasing the supply of controllable renewable energy. This trend is accelerating across Europe. Over the course of the last few years, France has witnessed a steep increase in the production of biogas and biomethane. In 2018, there were 685 biogas plants operating, including 76 biogas upgrading facilities, which injected 714 GWh of biomethane into the gas network[33]. The first quantities of biomethane were injected in 2011 and just in the period from 2017 to 2018 volumes increased by 76% (from 406 GWh in 2017 to 714 GWh in 2018). According to 2016 data, the majority of biogas facilities operated on landfill waste and agricultural substrates, accounting for 40% and 38% of the total number of biogas plants respectively[34]. Such a substantial increase would not be possible without dedicated political and economic support. As of the early 2000s a Feed-in Tariff became the primary support scheme for biogas production in France. In 2017, the FiT varied from 46 to 139 EUR/MWh (99 EUR/MWh on average) depending on the size of production facility and the type of substrate used[35]. Moreover, the 2015 National Renewable Energy Action Plan introduced a target of 10% as the share by renewable gas of total gas consumption in 2020. This 10% objective was then translated into specific sectoral targets and the objective for biomethane injection (1,7 TWh in 2018 and 8 TWh in 2023) was also established[36]. The coordination of sectoral policies at the EU level requires a more integrated governance structure. With this in mind, DG Energy seems

31 J. Wolf et al., Revised methane emissions factors and spatially distributed annual carbon fluxes for global livestock. Carbon Balance and Management 2017 12:16. Published on 29 September 2017.

32 For more information see: https://www.ipcc.ch (consulted on 27/02/2019).

33 GRDF et al., Panorama du gaz renouvelable au 31 décembre 2018. Retrieved from: https://www.actu-environnement.com

34 European Biogas Association (EBA), Statistical report 2017, pp. 64 – 72.

35 GRDF et al., Panorama du gaz renouvelable, *op. cit.*

36 National Renewable Energy Action Plan : Loi no 2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte. Retrieved from: https://www.legifrance.gouv.fr. Pluriannual Energy Programme (fr Programmation pluriannuelle de l'énergie – PPE) : Décret no 2016-1442 du 27 octobre 2016 relatif à la programmation pluriannuelle de l'énergie. Retrieved from: https://www.legifrance.gouv.fr.

to be best placed to supervise this portfolio, as it is also responsible for the coordination of National Energy and Climate Plans (NECPs) submitted by MSs. However, it is of utmost importance to take into account the position of the European Parliament and the Council during the preparations of the new strategy.

3. **Emission Target.** So far, a few international oil and gas companies have led the way by undertaking initiatives aimed at minimising methane leaks from their operations. The Oil and Gas Climate Initiative (OGCI), encompassing 13 international oil and gas companies, recently set a target for reducing the collective average methane intensity of its upstream operations to below 0.25% by 2025 with the ambition of achieving 0.20%, compared to the 0.32% baseline in 2017. The achievement of a 0.25% target is expected to bring collective emissions reductions of 350,000 tonnes of methane annually[37]. Moreover, the OGCI has at its disposal an investment fund – OGCI Climate Investments – worth more than USD 1bn, to support the development, deployment and scale-up of low emissions technology and business models. It remains disputable whether the industry initiatives are ambitious enough; however, national governments should enhance those efforts. In the new strategy for methane, the EU Commission could put forward for consideration a EU-wide target specifying the annual reduction in overall EU methane emissions encompassing emissions from the key sectors of agriculture, waste and energy. The EU-wide methane intensity objective could be announced after the first global stock take, which will take place in 2023, as a way to strengthen the EU climate pledge. All the parties to the Paris Agreement are expected to submit revised (and more ambitious) climate pledges by 2025[38] and every five years thereafter. The analysis of the first round of Nationally Determined Contributions (NDCs) shows that the potential of limiting short-lived climate pollutants such as methane is still overlooked, since only 9 out of 174 submitted NDCs included SLCP-specific policies and emission reduction targets[39]. Moreover, the recent IPCC report found that "global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate[40]." In other words, staying at or below the 1.5°C Paris Agreement target requires drastic cuts in GHG emissions within the next 12 years (-45% below 2010 levels by 2030) and reaching net zero by 2050. The EU commitment to reducing its methane emissions, which is likely to bring about results in a relatively short time, could send an important signal to the international audience that the European Union is committed to achieving the Paris Agreement objectives.

4. **International Dimension**. Any EU initiative aimed at limiting methane emissions would be far more successful if other countries and international companies follow suit. Some countries have already adopted dedicated policies and regulations on methane emissions. Moreover, the US, Canada and Mexico signed a joint declaration and committed to reducing methane emissions from the oil and gas sector

37 See: https://oilandgasclimateinitiative.com (consulted on 18/03/2019).

38 For more information see: https://unfccc.int (consulted on 20/03/2019).

39 K. Ross et al., Strengthening Nationally Determined Contributions to Catalyze Actions That Reduce Short-Lived Climate Pollutants. Working Paper. World Resources Institute, 2018.

40 An IPCC special report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Summary for the Policymakers. October 2018. p. 6.

by 40% to 45% below 2012 levels by 2025[41]. The EU should cooperate with other countries, especially the biggest European gas suppliers, to improve transparency by ensuring data collection and the adoption of harmonized data collection methodology. The EU could foster cooperation within the existing multilateral fora such as the Global Methane Initiative and the Climate and Clean Air Coalition. Similarly, it could also propose strengthening bilateral cooperation on methane emissions with its key gas suppliers. The oil and gas companies are already providing data on a corporate basis, but more efforts are needed to obtain accurate estimates of gas industry emissions at a national level, since any regulations or policies will be adopted by national policy-makers. More accurate data are the basis for the choice of the most suitable policy and regulatory tools, and should take into account the emissions across the entire gas value chain, both pipeline and LNG[42].

Conclusions

This paper has analysed the impact of the 1996 Strategy paper for reducing methane emissions on the mitigation of methane emissions in the EU. The first EU methane strategy contributed to this objective, but cannot be perceived as being a complete success in that it failed to achieve the reduction targets specified in the document. Moreover, a significant part of the abated emissions cannot be attributed to the policy measures proposed by the European Commission in the Strategy. They are a result of the cuts in mining activities and a reduction in the number of cattle in the EU.

The Governance Regulation requests the European Commission propose a strategic plan for methane as an integral part of the EU's long-term strategy. The Commission intends to publish the proposal in the early 2020s. The authors believe that the new methane emissions strategy should build upon the lessons learned, and should benefit from recent research which has brought significant developments in terms of closing the knowledge gap and decreasing the uncertainty related to the methane emissions detection, measurement and impact on the environment.

The new approach should include increased transparency of data on methane emissions, integration between polluting sectors to ensure that captured methane is transformed into usable energy, inclusion of methane-intensity target in the revised EU NDC, and better coordination with other countries (particularly key European gas suppliers) in terms of ensuring data collection and the adoption of harmonized data collection methodology at a national level.

41 See: https://pm.gc.ca (consulted on 14/03/19).

42 J. Stern, Narratives for Natural Gas in Decarbonising European Energy Markets, OIES Paper: NG 141, February 2019.

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Florence School of Regulation
Robert Schuman Centre
for Advanced Studies

European University Institute
Via Boccaccio, 121
50133 Florence
Italy

Contact:
email: fsr@eui.eu website: fsr.eui.eu

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