

Value chain methane emissions from natural gas imports in Europe

The European Union consumed 527 bcm of natural gas in 2017. While part of it was produced within those borders, nearly 80% was imported from other countries. The methane emissions of imported natural gas varies greatly across countries and companies. This paper aims at presenting some estimates of the methane emissions of the gas imported to the EU. Two different methods and data sources have been used:

- The first method is derived from national inventories of the different countries
- The second method is based on value chain emissions factors available in existing literature.

The two methods were compared to the methane emissions from the natural gas value chain occurring within EU borders, represented by the orange box in the following graph.

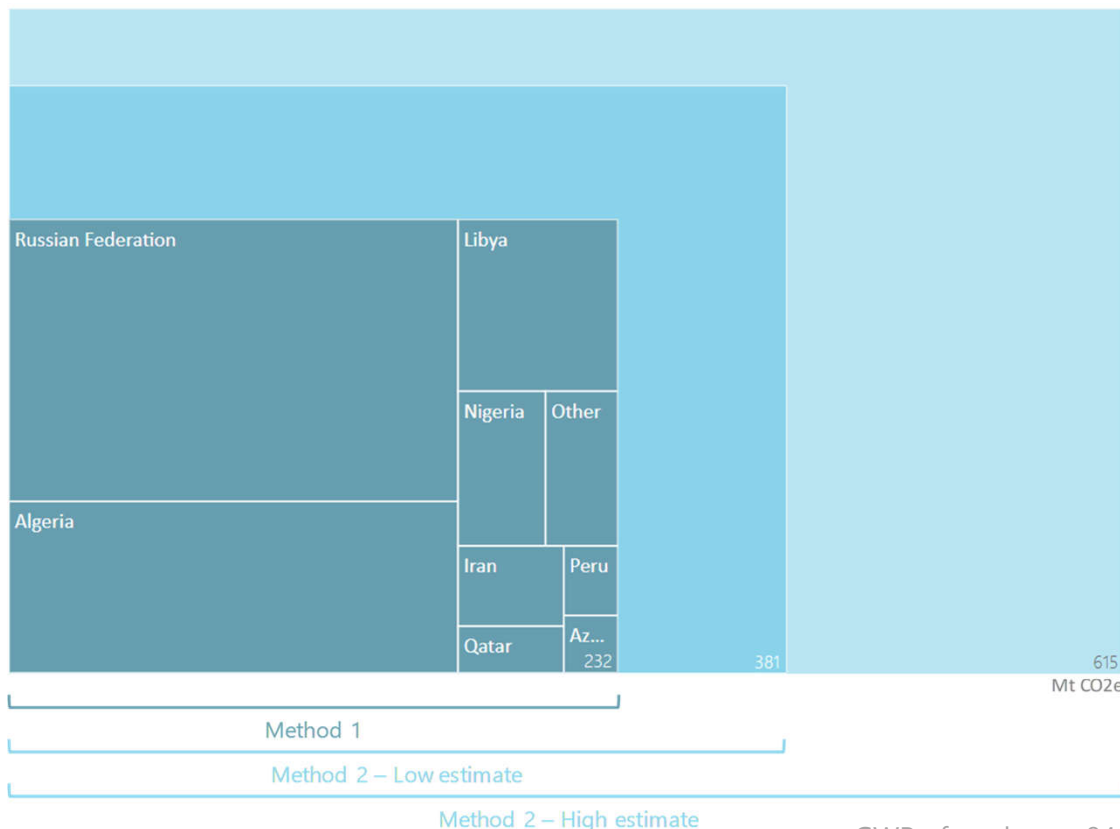
Estimated methane emissions within EU borders

76 Mt CO_{2e}



Estimated methane emissions from imported natural gas and LNG

232 – 615 Mt CO_{2e}



Even according to the most conservative estimate, less than a quarter of methane emissions from natural gas consumed in the EU occurs within its borders. It is thus important to tackle natural gas from a value chain perspective, driving the demand for low emissions natural gas in exporting countries. This strategy could indirectly transform the natural gas value chain and demand patterns outside the continent.

Method and data source - 1

The first emissions estimation method is based on existing country emissions estimates. When available, recent official national inventories were used, but in a few cases, IEA methane tracker estimates filled UNFCCC data gaps. Upstream emissions¹ of a country were attributed to the European gas value chain based on the share of gas exported to the EU. (For example, 52% of the gas produced in Algeria is exported to the EU. As a result, 52% of the upstream emissions of the country were accounted). Transmission emissions from countries hosting natural gas pipelines to the EU were also taken into account. Using this method, it was estimated that 232 Mt CO_{2e} were emitted across the gas value chain to Europe. Emissions occurring within European borders were also estimated based on UNFCCC data and include upstream as well as downstream emissions.

¹ Production, processing and transmission



Method 1



European Union

Method and data source - 2

A number of studies have demonstrated that (i) existing national inventories present an important uncertainty and are often underestimated, and (ii) that the so called “super emitters” play a significant role in the total emission pattern.

As a result, in addition to the first method presented, a second estimation method was developed based on some of the most recent research work. The Balcombe et al.^{1,2} publications estimate value chain emission using probabilistic emissions model for a variety of technological supply chain scenarios. Mean estimates for conventional production, excluding emission from distribution, were combined with natural gas and LNG importing data from BP’s Energy Outlook. This made it possible to derive total estimates of the emissions of the gas imported to the EU.

¹ For Pipeline transmission: Balcombe P, Brandon NP, Hawkes AD. Characterising the distribution of methane and carbon dioxide emissions from the natural gas supply chain, *Journal of Cleaner Production* (2017)

² For LNG: Balcombe P et al. Methane and CO₂ emissions from the natural gas supply chain, Sustainable Gas Institute. Imperial College of London (2015)

The combination of the two methods gives a better picture of methane emissions from natural gas imports to the EU across the entire value chain. The differences between the two methods reflects the current uncertainty levels in the methane emission estimates.



Method 2



Major gas imports in the EU based BP’s Energy Outlook 2017 (in bcm)