Environment and territory

Impacts on air

The extreme flexibility of natural gas makes it one of the fuels easier to use, whereas the low content of pollutants makes it an environmentally friendly fuel. During combustion natural gas produces carbon dioxide and nitrogen oxides (NOX), albeit to a lesser degree than other fuels.

Moreover, coal and oil by-products also produce sulphur oxides and sulphur dioxide (SO_2), two pollutants toxic for mankind and the atmosphere. Sometimes the natural gas can be burnt with coal or oil (co-firing): this process can significantly reduce the emissions of SO_2 e NOX. Cogeneration allows to consume 25% less of energy as compared to a traditional plant and to reduce by 1% the emissions of SO_2 and by 50% NOX emissions, as compared to a coal or oil-based plant, even if it makes use of anti-pollution equipment.

As regards carbon dioxide in particular, the International Energy Agency (IEA) assessed that, if the same amount of energy is produced, carbon dioxide emissions caused by the combustion of natural gas are smaller by 25% and 40% as compared to those produced by the combustion of oil and coal by-products.

Finally, methane presents the advantage of being virtually “invisible” both during ground transport and when it is distributed in cities (it travels through underground pipes and only pumping stations are at ground level), a feature only few other energy sources share.

Moreover, since it is gaseous at room temperature (20°C), should any leak occur during transport, it disperses into the air, does not dirty, or pollute waters or the soil.

Natural gas can damage the environment if it is dispersed in its natural state because it is one of the greenhouse gases. In other words, after reaching the top layers of the atmosphere, it stops and stays there for many years, contributing to the formation of a gas layer that prevents the solar heat reflected by the earth’s surface from being dispersed and leads to global warming (i.e. the greenhouse effect).

Therefore leaks of natural gas during its transportation should be reduced to a minimum or eliminated: not only is it a waste of a precious resource, but there is also the risk of contributing to a potentially dangerous phenomenon for mankind.

Gas flaring and gas venting

In an oil field, oil is almost always associated with a certain quantity of natural gas: newer oil wells are equipped for the recovery of both oil well gas and crude oil and hence the gas is an additional resource of the oilfield. However, the recovery of this gas presumes that there are the transportation infrastructures required to move it to the points of consumption: these infrastructures, which are both costly and often difficult to implement, are not finalised when the quantity of gas recovered from the oilfield as a “secondary” product is limited, since the potential revenue would not cover their cost. Hence the problem arises of what to do with the associated gas.

The term gas flaring indicates the combustion of gas (without energy recovery) in an open flame that burns unceasingly at the top of flare stacks in oil production sites. This practice has resulted in the burning of large quantities of gas with the consequent production of huge amounts of carbon dioxide together with sulphur dioxide and nitrous oxide, which have contributed substantially to atmospheric pollution. In order to better understand the scale of the problem, it is sufficient to observe nocturnal images of Earth from space: the gas flaring activity in regions corresponding to the major petroleum-producing areas are a proof that cannot go unnoticed! Consider that in Italy today (where the practice of gas flaring is limited not only because there are fewer oil fields respect to gas fields, but also because Italy attempts to use all the natural gas produced) one million tonnes of carbon dioxide are produced every year as a result of gas flaring, while in Nigeria, where this practice is still greatly utilised, hundreds of millions of tonnes are produced!

Besides the practice of gas flaring, there is also that of gas venting. Gas venting is the discharge of unburned gases into the atmosphere, often carried out in order to maintain safe conditions during the different phases of the treatment process. During venting operations methane, carbon dioxide, volatile organic compounds, sulphur compounds and gas impurities are released. In many cases gases that are being vented could be burnt rather than dispersed into the

atmosphere; this would partially reduce the environmental impact in terms of greenhouse gases, because the gases would be oxidised to form carbon dioxide, which has a global warming potential 21 times lower than methane.
Currently, the above-mentioned practices are subject to strong restrictions, both for economic (the gas produced could be sold and consumed rather than wasted!) but especially for environmental reasons. Under the Kyoto Protocol, there are incentives for the construction of plants that have minimum environmental impact and which, at the same time, do not waste precious resources. In more developed countries, this practice has been almost totally abandoned because it is a waste of an important resource and the infrastructures required to utilise the gas in situ are not difficult to implement. On the contrary, in many developing countries the gas is often not required at the production site and the costs of transportation are very high. For this reason, there are incentives to implement practices that are more feasible and less costly such as, for example, natural gas reinjection into the reservoir to increase its pressure and consequently its efficiency, small-scale natural gas liquefaction plants on the production site, the generation of electricity in situ, the distribution of natural gas to neighbouring urban areas, its use for transportation, etc. while costly operations, such as the construction of pipelines, are carried out only when the natural gas extracted justifies the high costs.