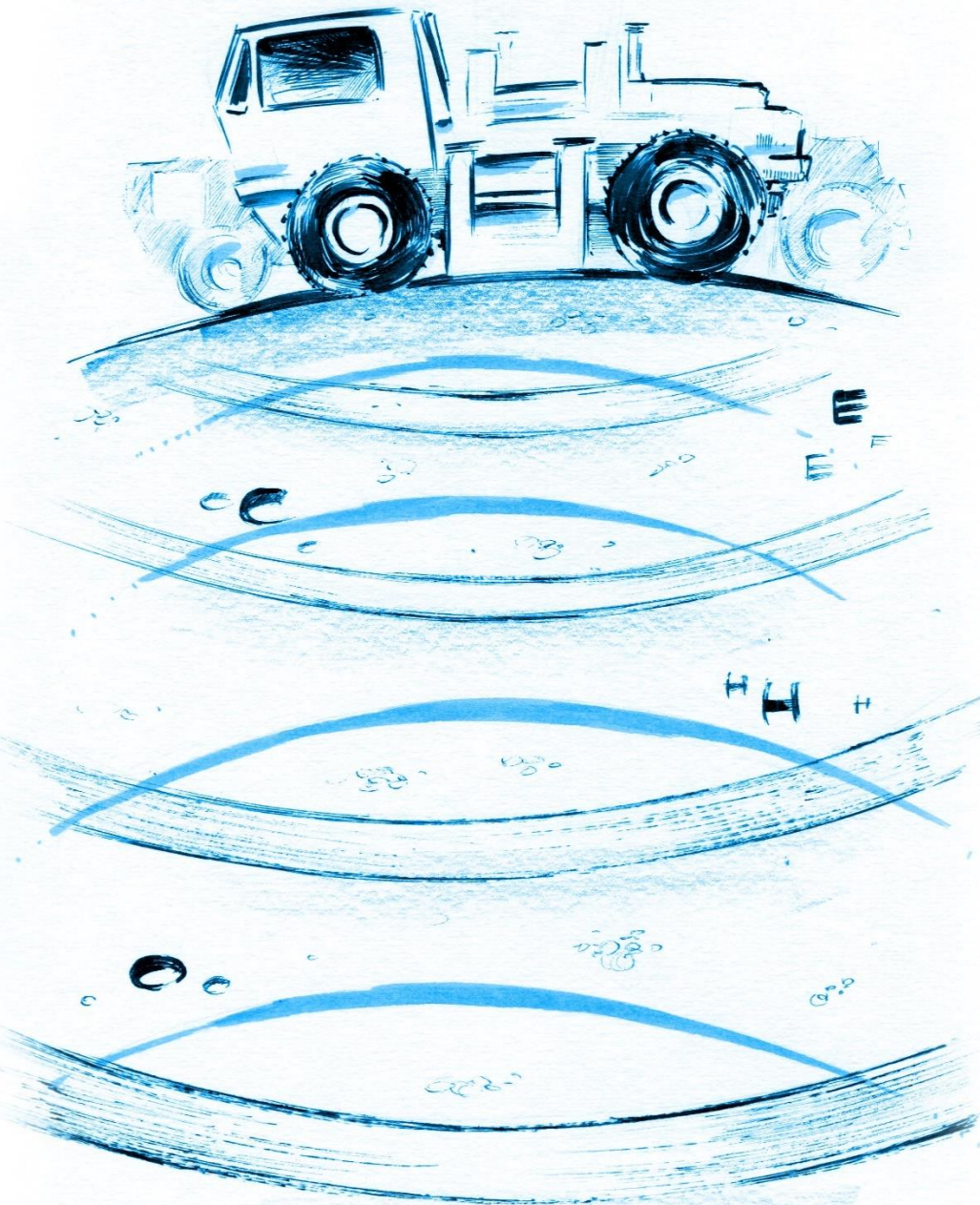


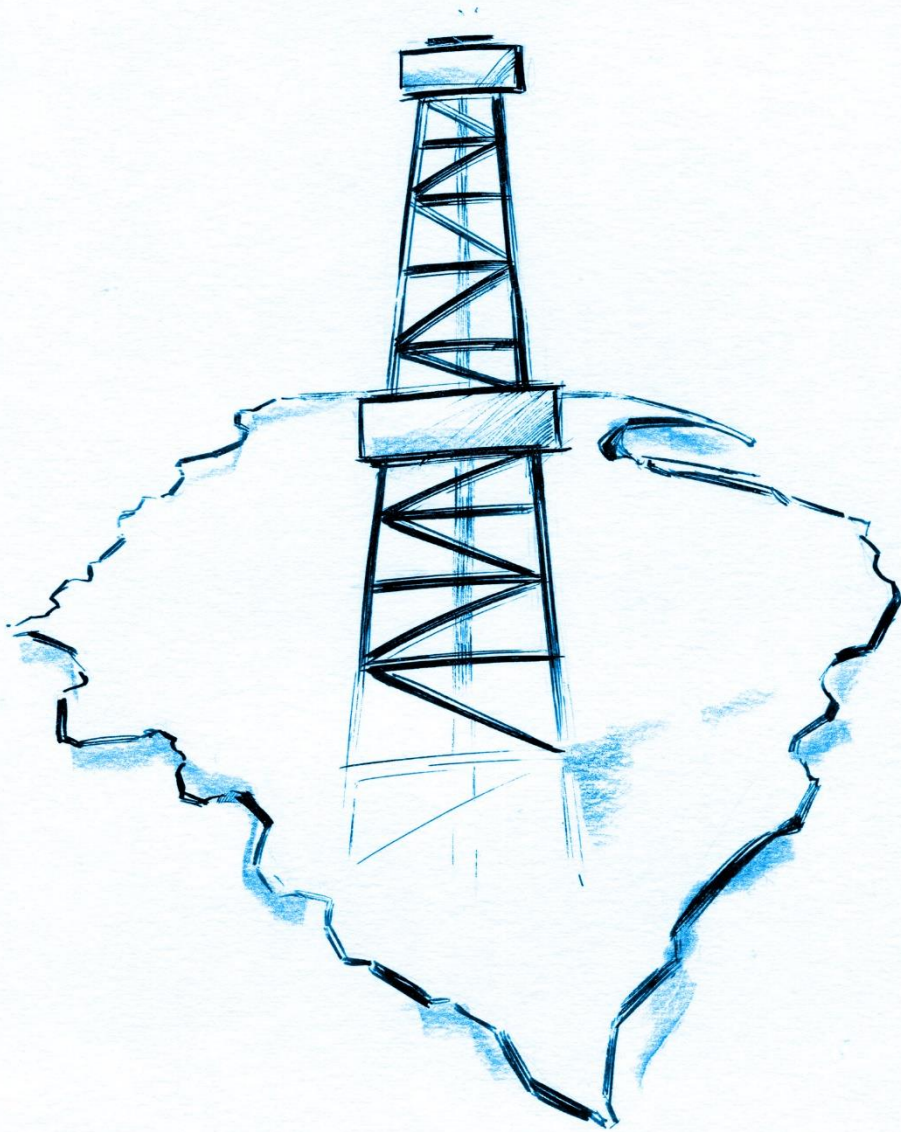
PGNiG and natural gas



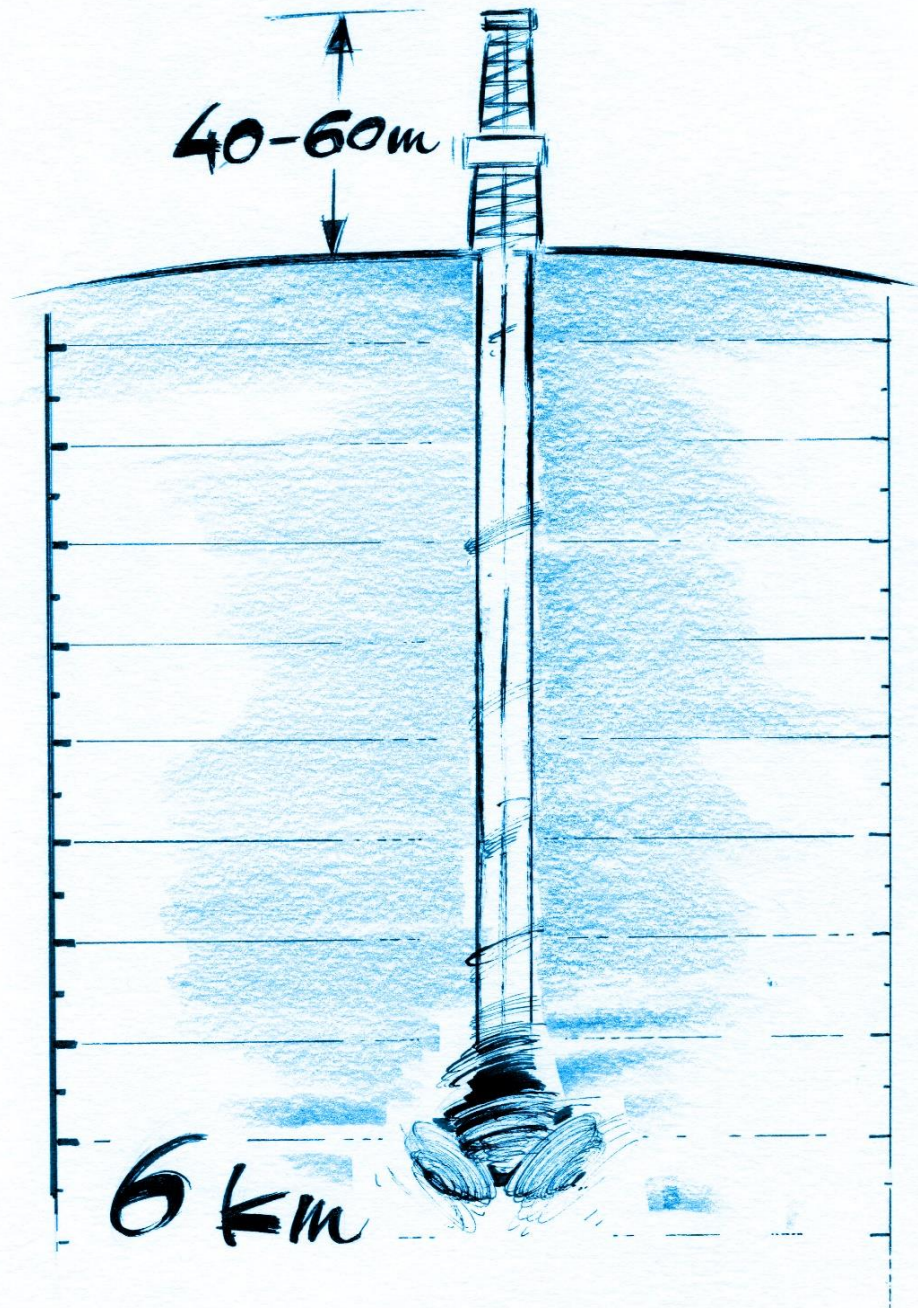
Natural gas was created from the remnants of plants and animals that lived on Earth millions of years ago. Specific conditions led to their exposure to bacteria, what transformed them into hydrocarbons. Hydrocarbons are found at various depths underground.



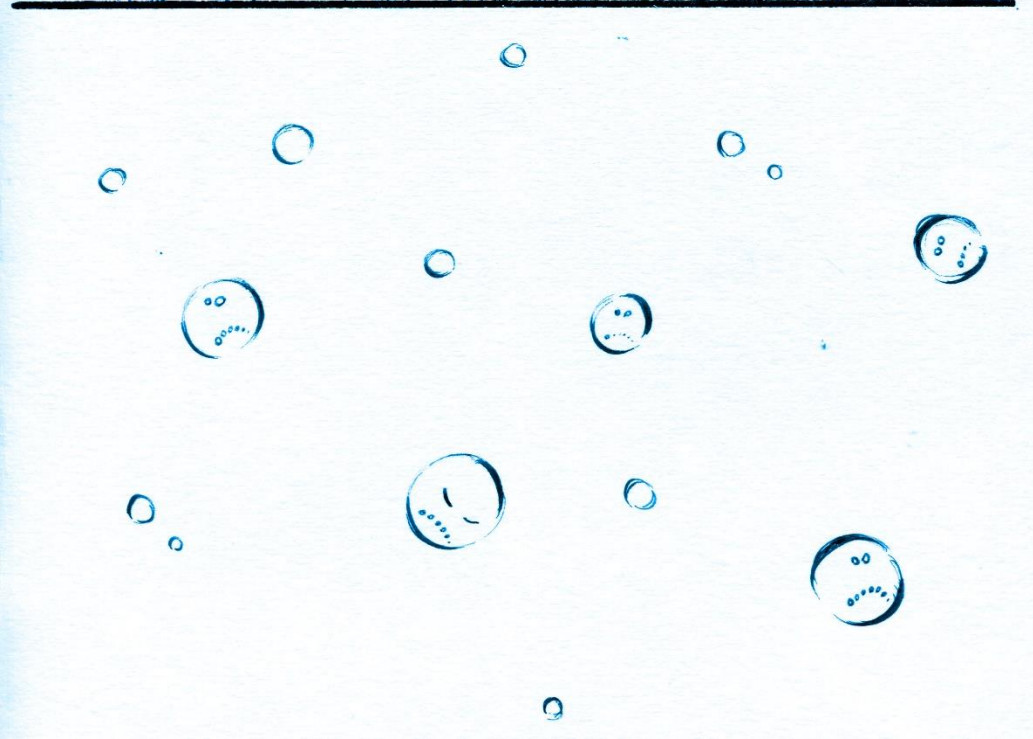
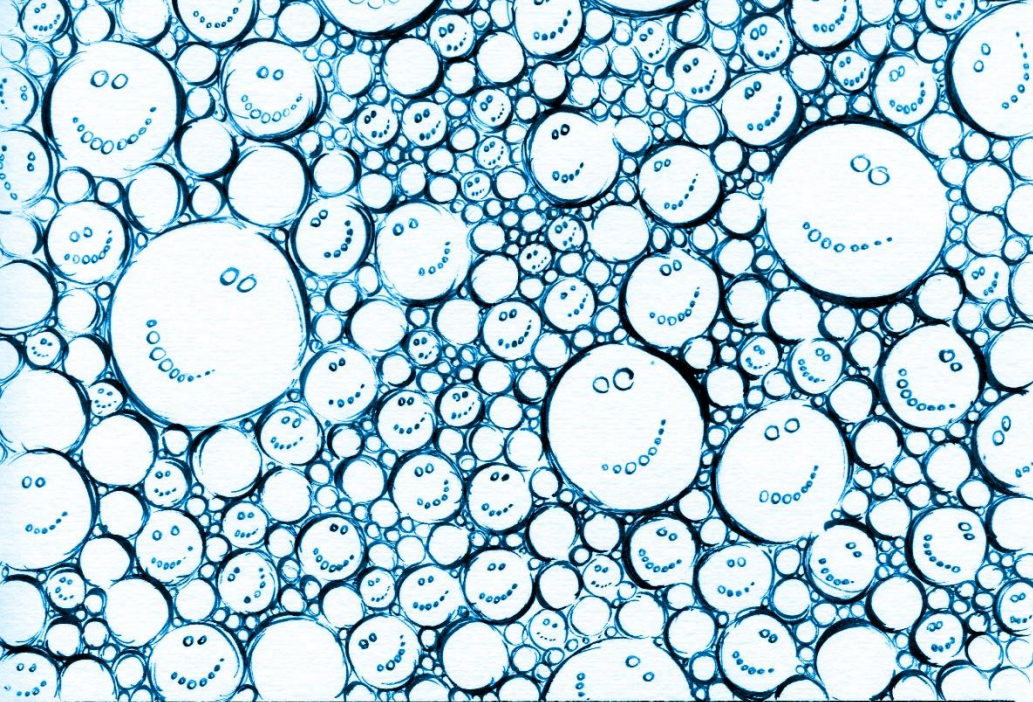
Geophysicists are using seismic surveys to look for places where natural gas could potentially occur. They use for this, among others, special vibrator trucks - vehicles that generate vibrations. An acoustic wave sent deep into the earth returns to the surface - and the signals are collected by special sensors on the surface, so-called geophones, which then transfer data to computers. This is similar to ultrasound medical imaging. An image showing construction of underground layers is created. Geologists can predict the places for drilling based on results of this survey.



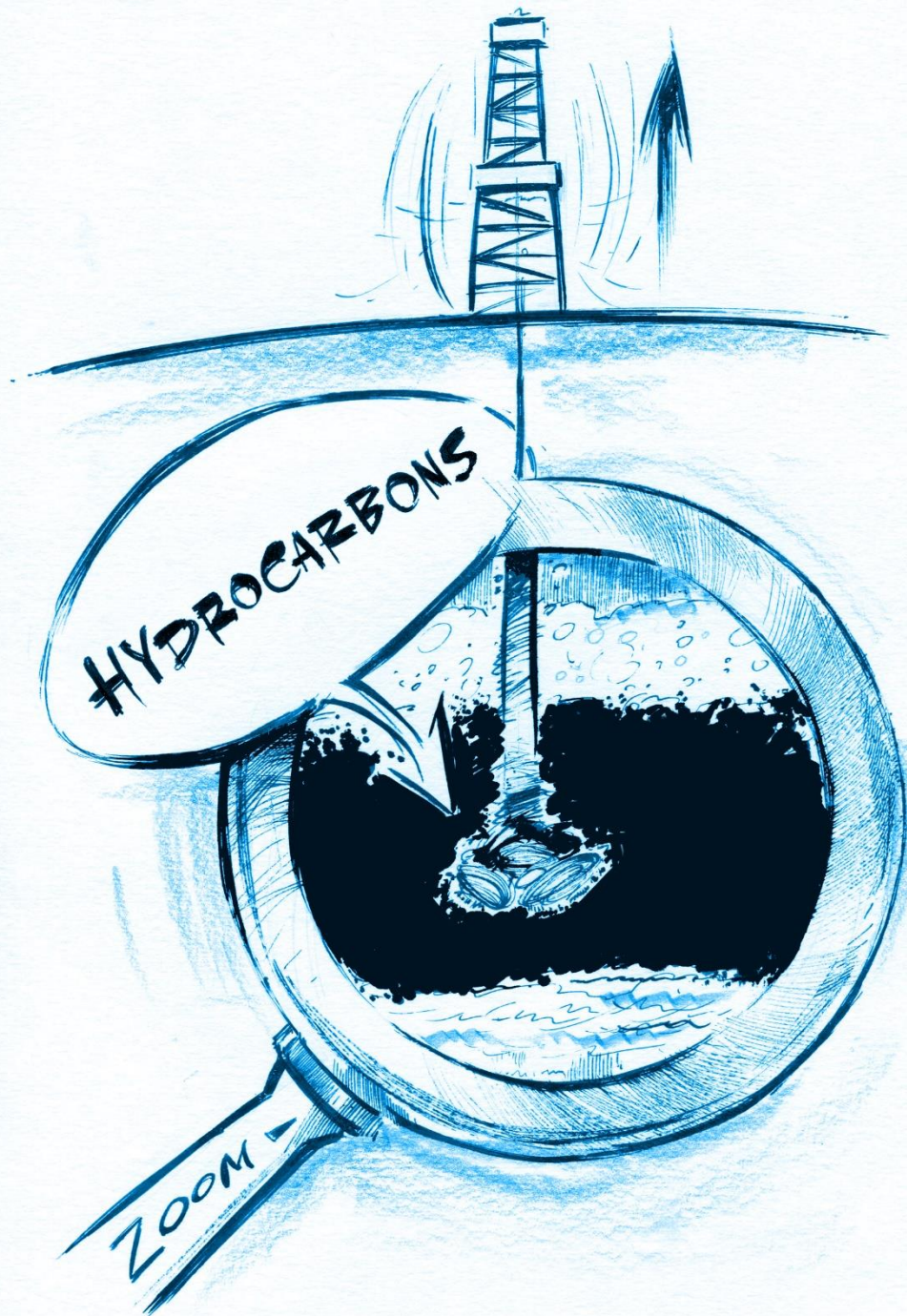
In Poland, PGNiG produces annually about 3.8 billion cubic meters of natural gas from domestic deposits. It is explored and produced in south-eastern and western Poland. Crude oil is another a product of the extraction.



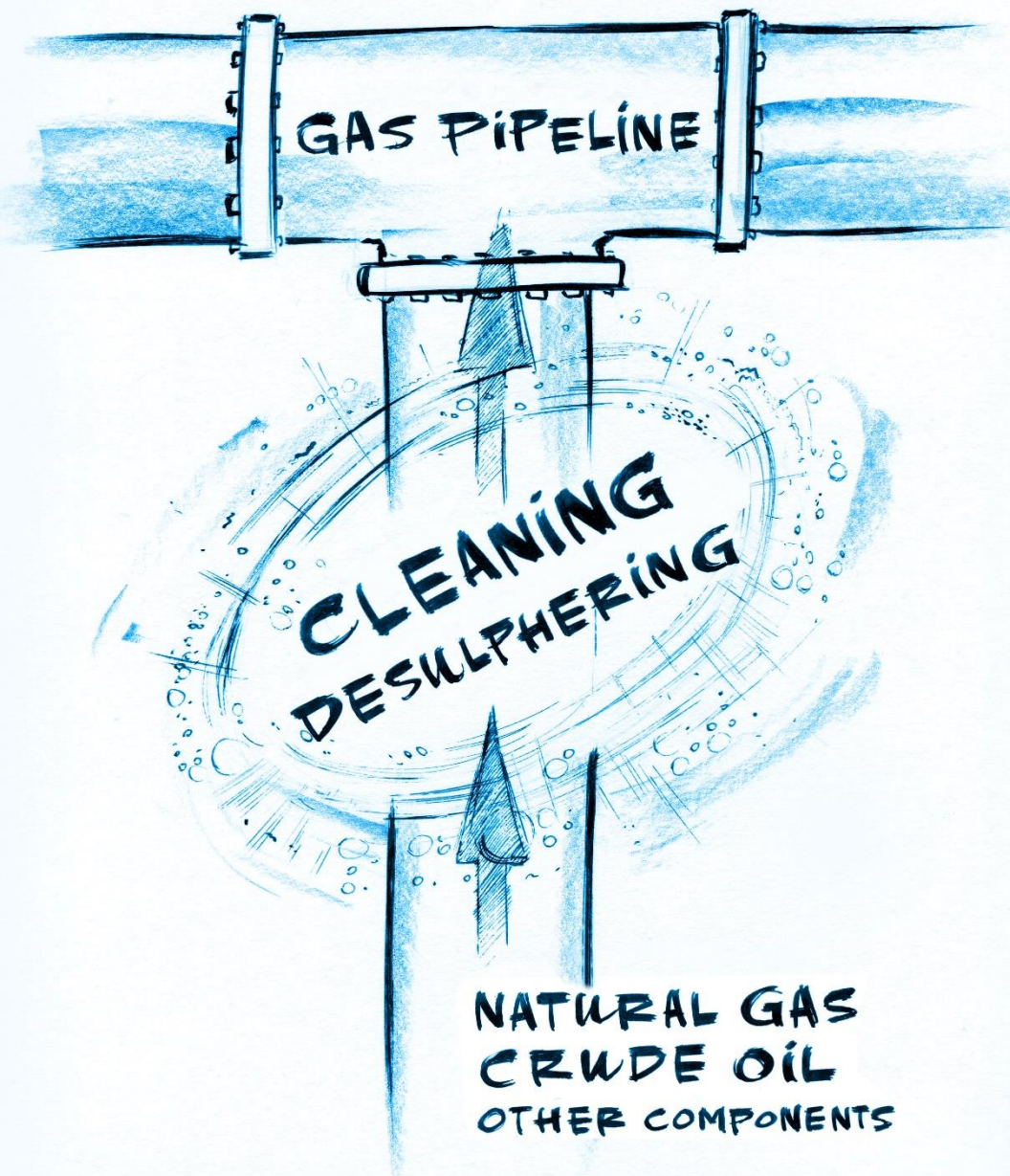
After the drilling locations have been selected by geologists - based on geophysical data - drilling is carried out. We reach the deposits by drilling holes in the ground. A characteristic drilling rig is visible on the surface, its height above the ground can reach from 40 to 60 meters. Depending on the depth of the deposit, wells in Poland reach a depth of several hundred meters to even 6 kilometers.



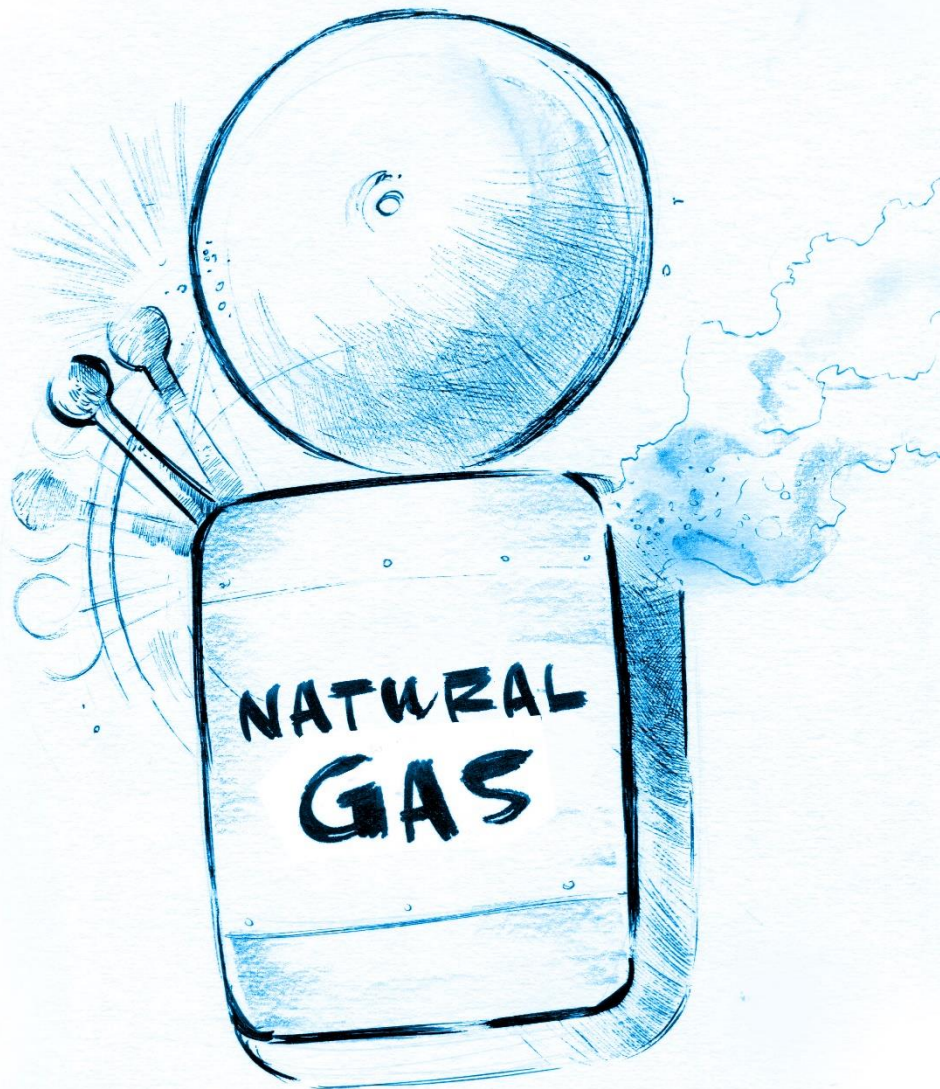
Gas and oil deposits are not found in underground formations of caves or lakes. Hydrocarbons are found in microscopic space in rocks, the so-called pores that can be compared to a sponge or pumice stone. The higher the porosity of the rock, the more gas there is in the rock. The higher the rock's permeability, the easier it is to bring hydrocarbons to the surface.



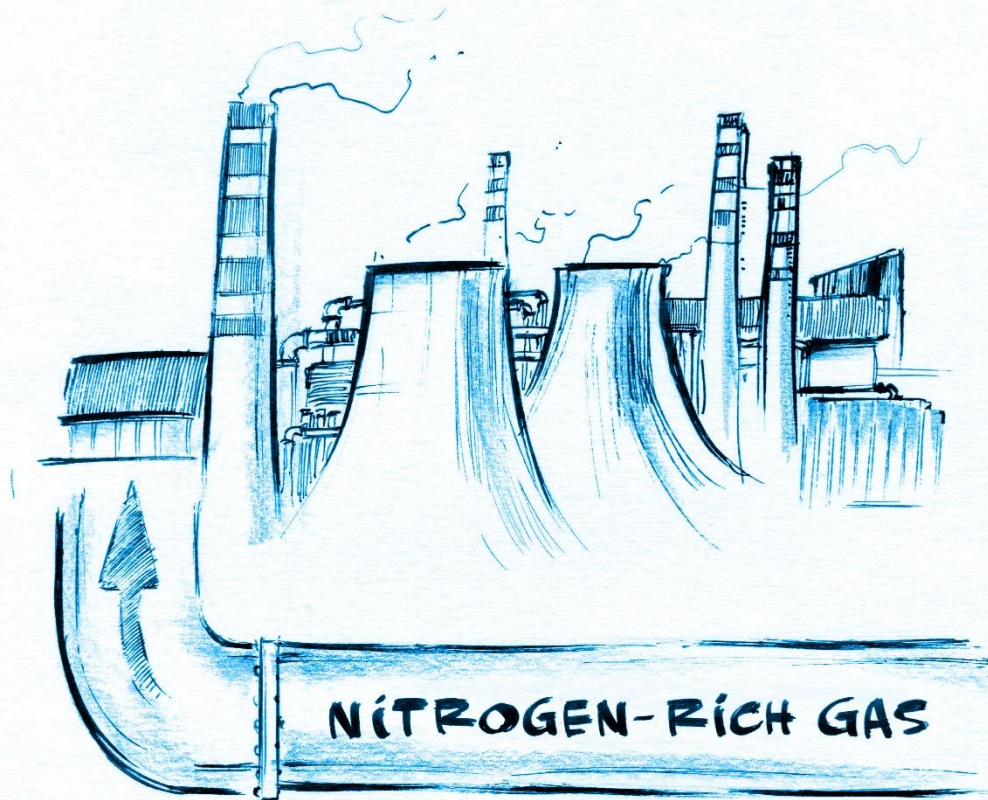
If a deposit is discovered, after a number of studies and tests, its size is estimated. A visible sign of reaching gas is the so-called flare, a flame of burning gas seen above ground.



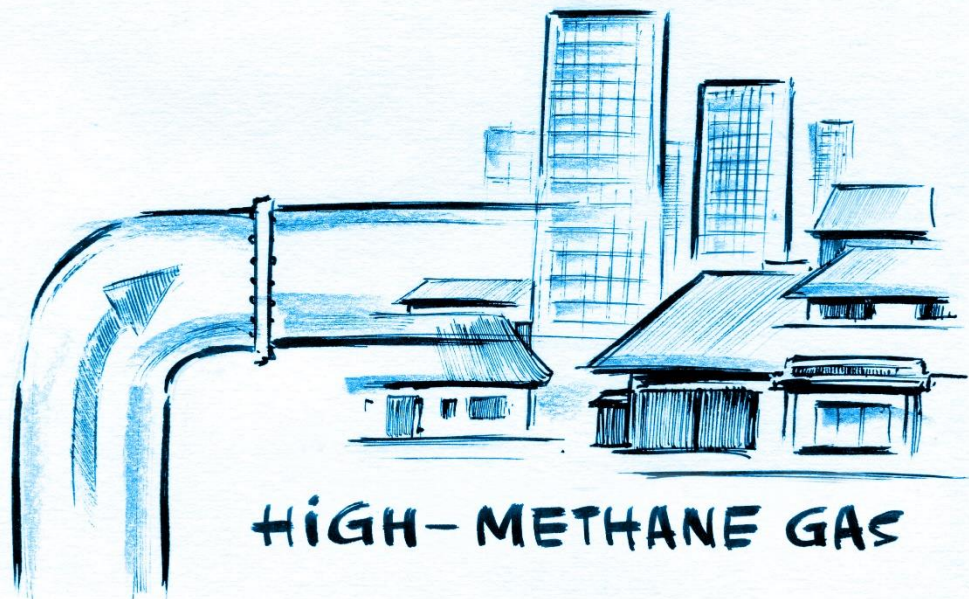
After reaching the deposit and conducting tests, the deposit is developed and exploited. The gas is vented to the surface in a controlled manner. Natural gas (if required) is cleaned, so it obtains parameters enabling it to enter the gas pipeline network.

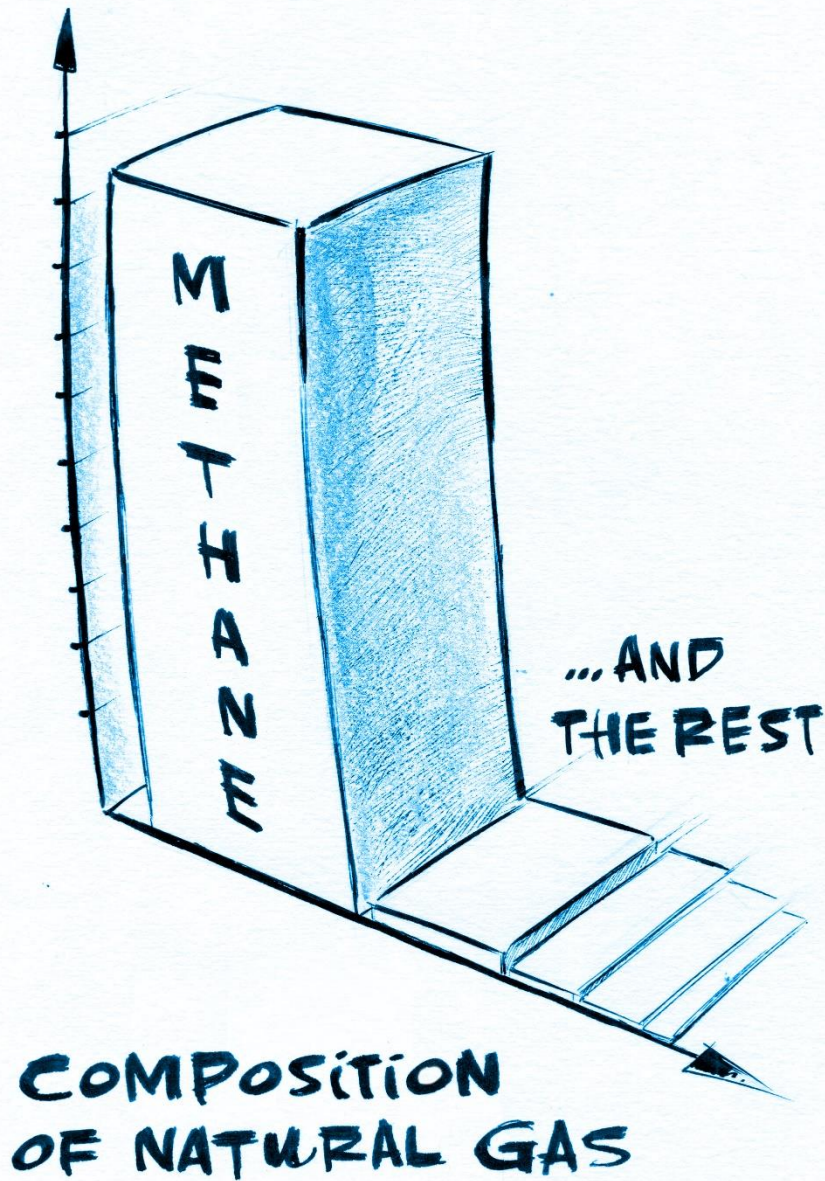


Natural gas has no smell and is transparent. It is subject to the odorization process. It is given a specific scent, which is perceptible in the event of a gas leak and increases the safety of its use.



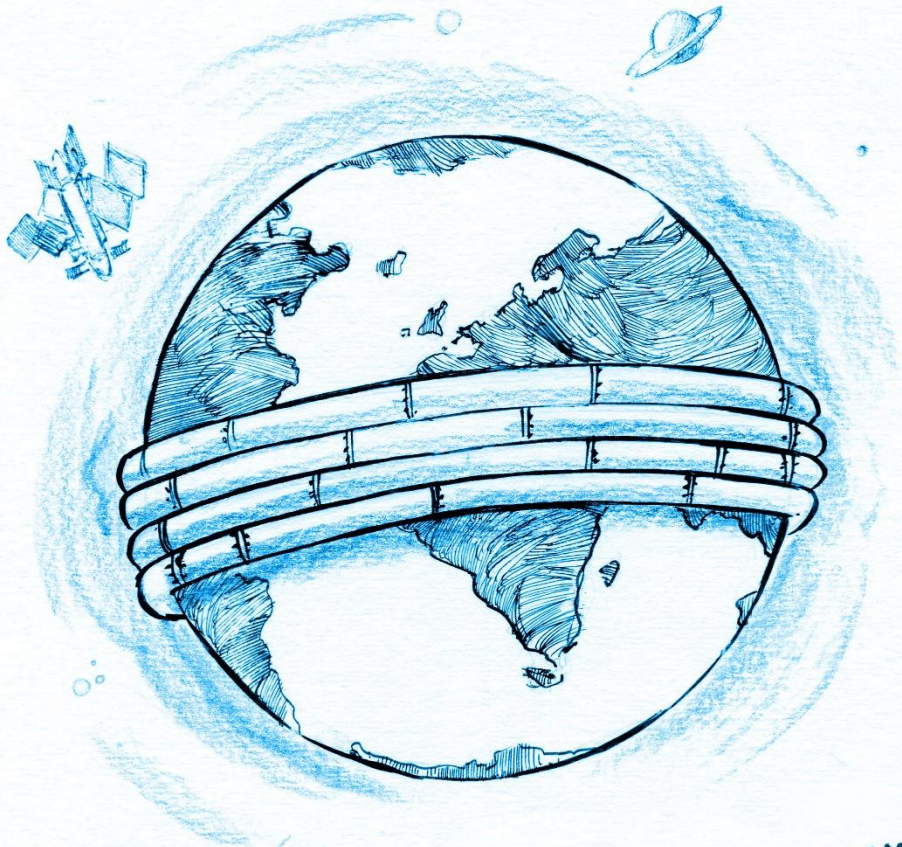
Gas deposits in Poland occur in the form of "pure" methane or as nitrogen-rich deposits. CHP plants use nitrogen-rich gas. The gas supply network, which is connected to households, is filled with high-methane gas. It comes there directly from deposits where there is no nitrogen, or after being purified.





The most important component of natural gas is methane. Example composition of high-methane natural gas:


- methane (CH₄) approx. 97.8%
- ethane, propane, butane approx. 1%
- nitrogen (N₂) approx. 1%
- carbon dioxide (CO₂) and other ingredients 0.2%



OVER 180 THOUSAND KM!
IT IS 4X AROUND THE EARTH

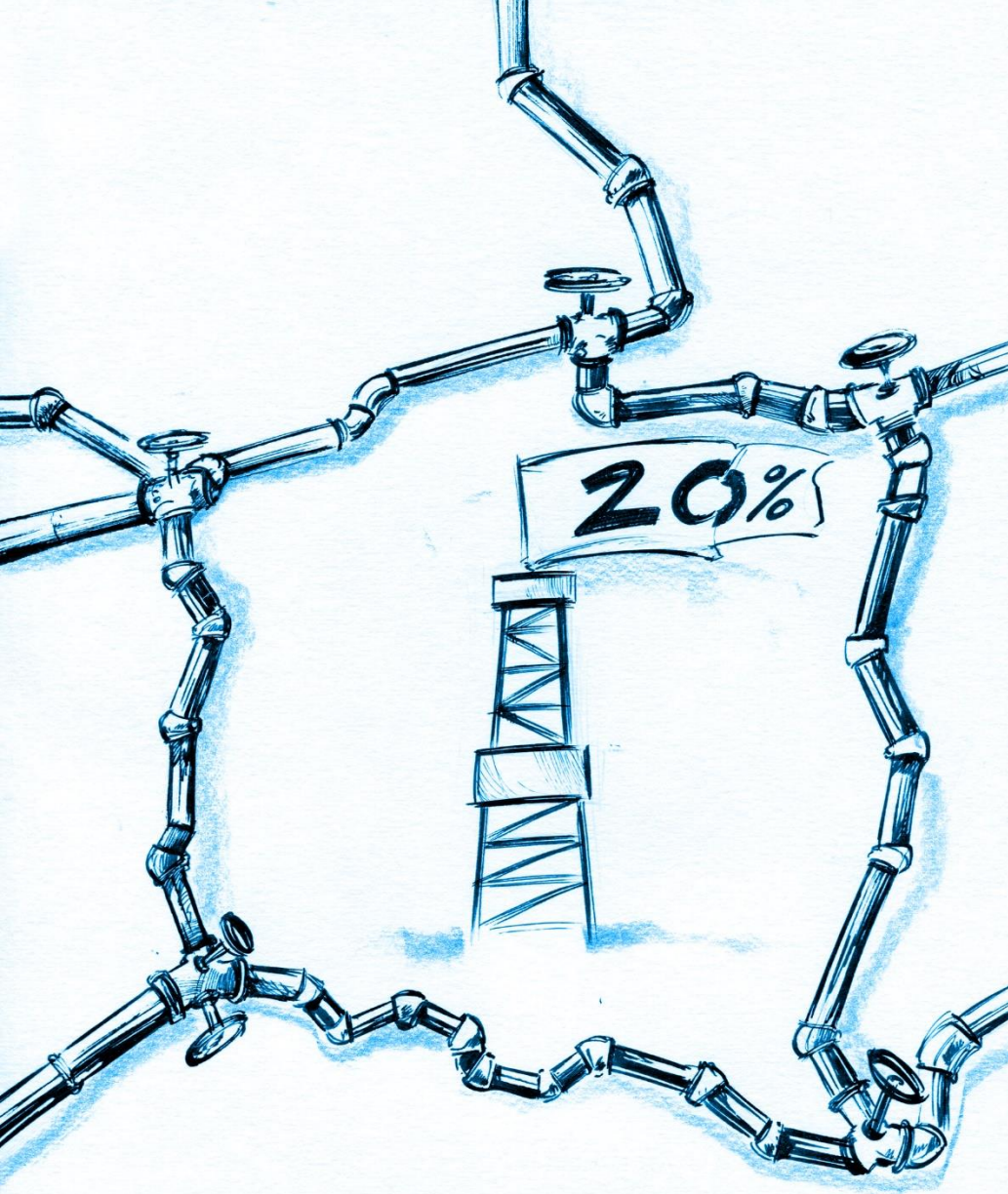
Natural gas is transported through a network of transmission gas pipelines (large diameter pipes) and a network of distribution gas pipelines (smaller diameter pipes) supplying gas directly to consumers. The distribution gas pipeline network in Poland is over 180 thousand km long and is constantly growing.

LET'S
TWIST
OFF!

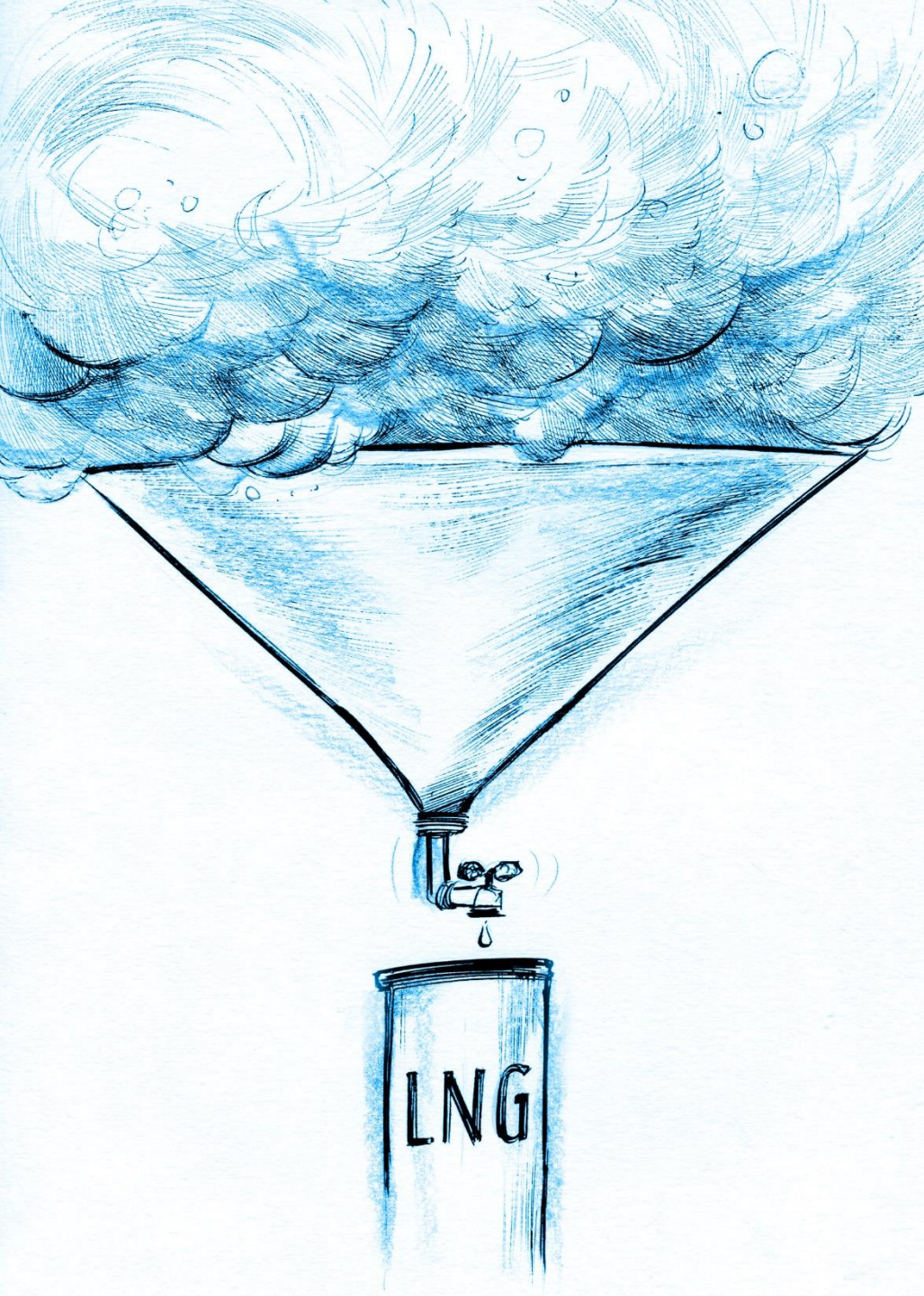


GAS SUPPLIES
STORED FOR
FALL AND WINTER

Gas reserves are stored in storage facilities for the event of a sudden increase in gas demand - e.g. as a result of a colder winter or a failure of transmission gas pipelines. Gas storage facilities are created in depleted natural gas deposits or in caverns - underground salt deposits, which are flushed with water to obtain empty chambers, i.e. caverns. Natural gas is pumped into storage in spring and summer, when it is less needed for heating, and used it - if necessary - in autumn and winter.



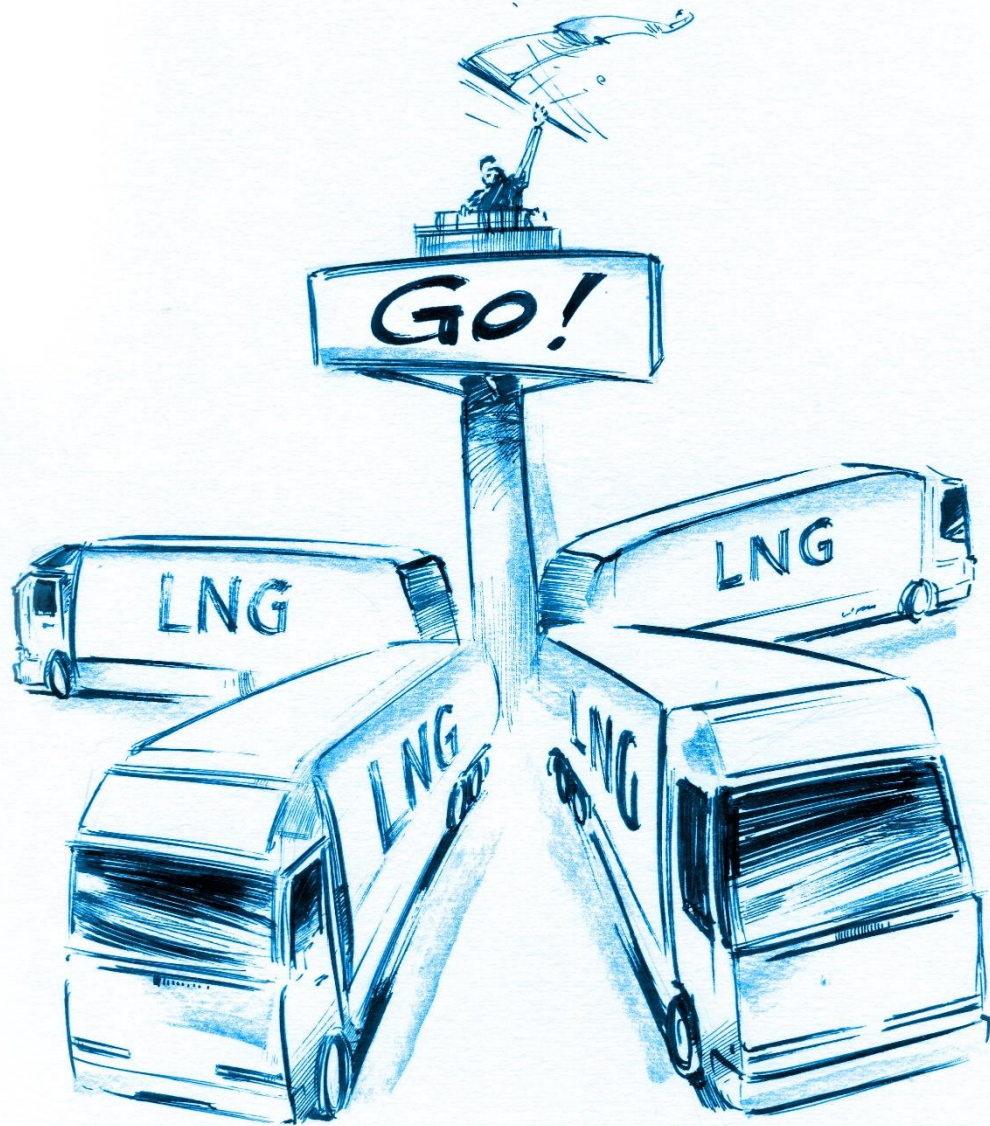
Poland consumes 18 billion cubic meters of natural gas per year. Domestic production covers around 20% of demand. Therefore, to meet demand, most of the gas is imported from abroad. Gas is imported from Russia (via gas pipeline), Qatar, USA and Norway (in the form of LNG).



Natural gas shrinks 600 times at -162 degrees Celsius. It's like reducing a blown beach ball to the size of a ping-pong ball. After cooling, the gas takes a liquefied form (liquid state). LNG (liquefied natural gas) is produced. Thanks to this, it is possible to transport it over long distances using special ships - the so-called LNG or methane carriers.



LNG carriers from various directions come to the terminal in Świnoujście, where the liquefied gas is unloaded and heated in special installations. It regains its volatile state and original volume, and then goes to the gas pipeline network.



Part of the liquefied gas from LNG carriers remains in its liquid state and is loaded onto tanker trucks, which then deliver LNG to the farthest corners of Poland - to customers who need gas in this form or wherever there is no access to the nationwide network of gas pipelines. Then, using regasification stations - operating similarly to the LNG terminal, but on a smaller scale - gas is delivered to customers.



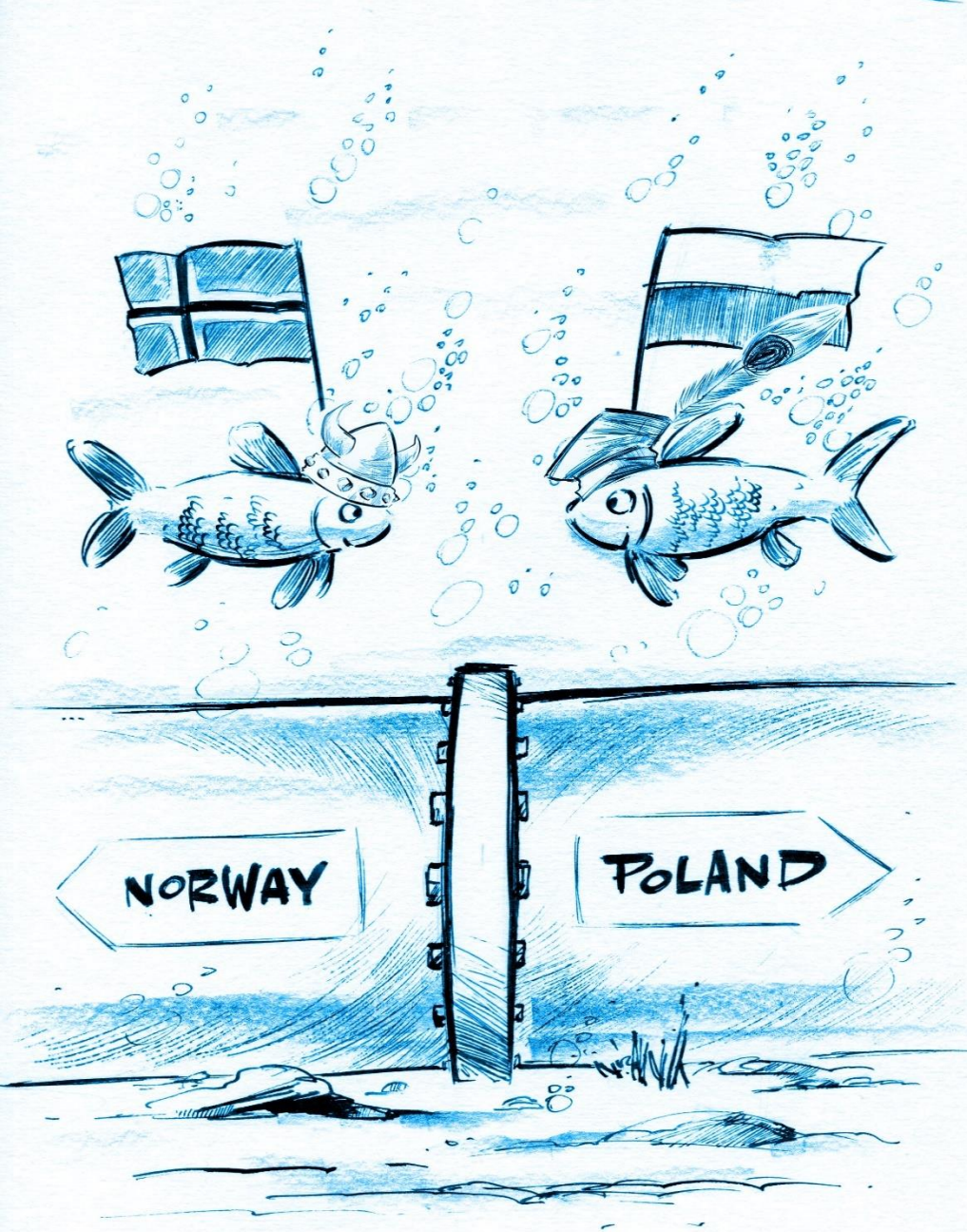
One tanker truck can transport 20 tons of LNG, which after regasification gives about 27 thousand cubic meters of gas. Assuming that the average monthly gas consumption of a Polish household only for cooking on a stove is about 10 cubic meters, the entire tanker truck would be enough for over 220 years. The load of one LNG carrier would be enough for 24 days of heating all Polish single-family homes equipped with gas stoves or for 3 months of cooking dinner on all gas stoves in Poland or for a year of preparing meals on over a million gas stoves or provides an annual heating supply for 56,000 single-family homes equipped with gas stoves.



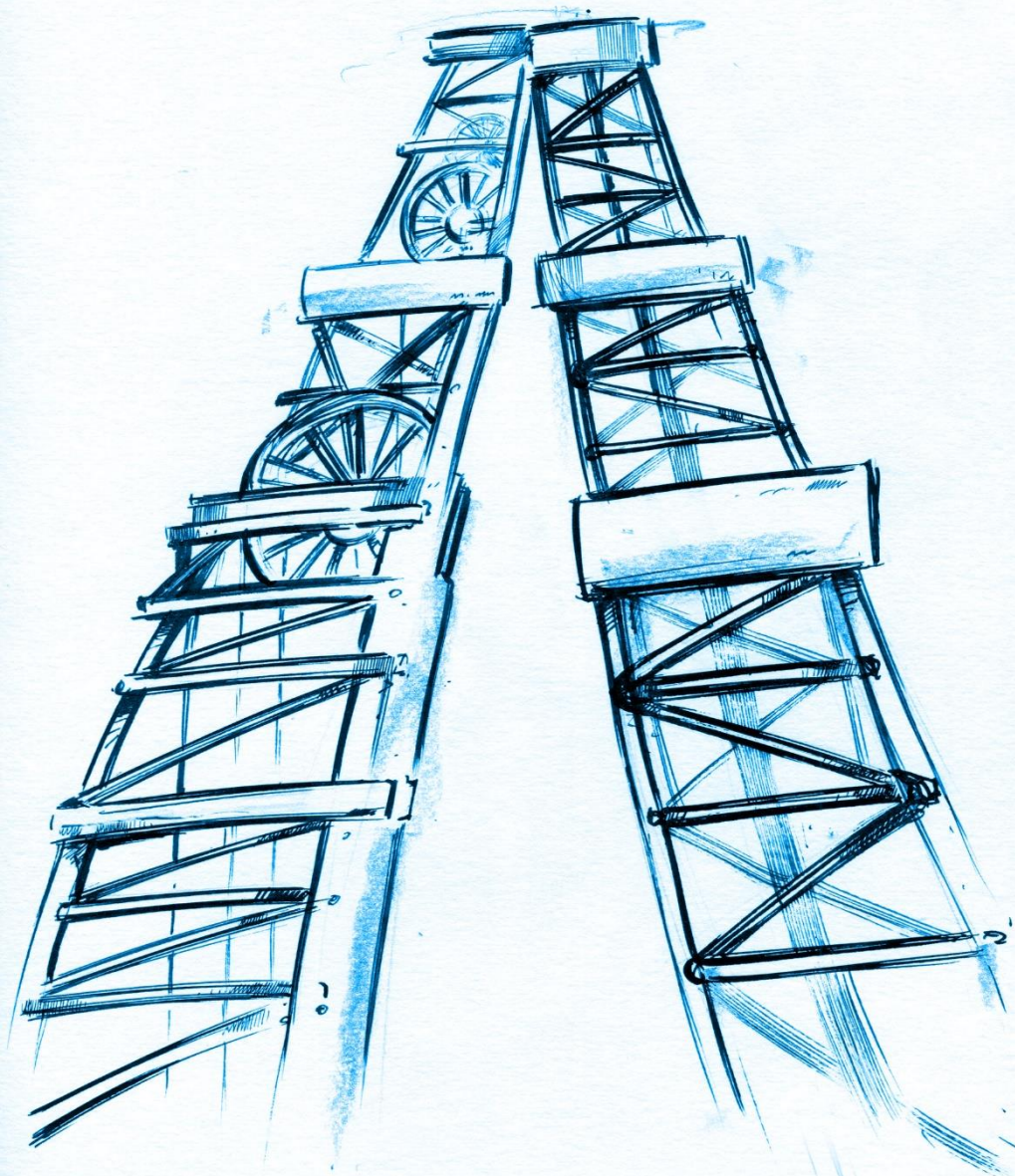
Gas in liquefied form, as well as compressed natural gas (CNG) can be used to power buses, trucks, garbage trucks and passenger cars. There are more and more CNG and LNG buses on the streets of Polish cities. Their number has already exceeded 400 and is still growing. Natural gas powered vehicles emit much less pollution than, for example, those fueled by diesel.



Gas from PGNiG reaches around 7 million customers. The number includes mainly individual recipients - households, but also institutions, schools, kindergartens, nurseries, small and medium-sized enterprises and large production plants (e.g. steel mills, glassworks, refineries, ceramic and chemical plants, nitrogen fertilizer plants, plants food, agricultural - e.g. greenhouses).



In addition to domestic production and imports, PGNiG produces natural gas from deposits in Norway under the seabed of the North, Norwegian and Barents seas. From 2022, it will reach Poland via the Baltic Pipe gas pipeline, which will connect Norwegian deposits via Denmark with the Polish coast.



PGNiG also wants to extract gas from coal seams in the future - the *Geo-Metan* program serves this purpose. If methane is extracted from coal before the start of the mine's operation, we will receive an additional domestic source of natural gas, the methane threat in the mines will be reduced - coal miners will be able to work in safer conditions, and less harmful methane will reach the atmosphere.



PGNiG produces natural gas in Pakistan. The natural gas produced is sold locally. Soon PGNiG will start the process of hydrocarbon exploration in the United Arab Emirates.