Norwegian gas is used in Europe to diversify supply sources and considered to be alternative to Russian gas, while Norway is deeply developing the domestic market and new areas of gas use.

Norway is a major oil and gas producer. Norwegian gas is often considered as alternative to Russian gas: East European governments frequently use it to diversify sources of gas supply. One example is the famous Independence Floating Storage and Regasification Unit for gas supplies to Lithuania. These high-profile geopolitical processes leave unnoticed a vigorous activity of Norwegian government for domestic LNG market development.

Along with Russia, Norway is a new entrant in LNG market, but this country develops the internal market and new segments of its application (e.g., bunkering of LNG vessels). Norway has become an absolute global leader in this area: as of 2017, about half of more than 100 LNG-fuelled vessels all over the world are accounted for by this country; and the Norwegian LNG-fuelled fleet includes ferries, patrol vessels, tug boats, tankers, and platform supply vessels.

Norway has long been actively supporting the LNG use as bunker fuel: as early as in 2000, the world’s first LNG-fuelled Glutra car-and-passenger ferry began to operate. Refuelling of the ferry tanks takes about two hours and occurs every four to five days at the time the vessel is moored for night and there are no passengers on board. The appropriate infrastructure for vessels refuelling was built at the major ports in Norway; its development was fairly balanced: following the scaling up of LNG use at sea, infrastructure for LNG use onshore was established almost immediately. Eventually, filling stations for auto trucks, vessel bunkering facilities (bunker ships for refuelling at sea and onshore refuelling facilities), and satellite storage facilities were built. LNG plants and terminals also sell LNG in small lots thus delivering transhipment services to refuelling vessels and trucks. Most infrastructure facilities are owned by the Gasnor Company (a subsidiary of Shell) that distributes gas in Norway.

As for LNG production, the best known and large is the Hammerfest plant with a capacity of 4.3 million tons per year; gas to this plant is supplied from the field with the fabulous name Snow White (Snøhvit). There are also plants with fewer productivity: Risavika (0.3 MM tons per year), Snurrevarden (0.02 MM tons per year), Kollsnes 1 (0.04 MM tons per year), Kollsnes 2 (0.08 MM tons per year), etc.

Norwegian companies from the low-tonnage LNG segment are however striving to diversify LNG sources to ensure reliable gas supply to consumers. For example, in winter 2017-2018 a contract was signed between the owner of the second LNG plant in Risavika (Skangas Company) and the Grain LNG terminal in the UK. It is noteworthy that small liquefied-gas carriers from the Skangas fleet will be used for LNG shipment; for this purpose, reconstruction of the Grain LNG terminal will be carried out to make possible filling the liquefied-gas carriers having tonnage up to 20000 cubic meters. One of the reasons for signing of this contract is the increase in demand for low-tonnage LNG. The increased use of low-tonnage liquefied-gas carriers will improve their economic efficiency and reduce the cost of low-tonnage LNG distribution.

“Carrot and stick” for the sake of emission control

Experience of Norway in LNG use promotion is rather interesting; it is a good example of “carrot and stick” principle within the framework of governmental obligations for NOx control (nitrogen oxides — NO, NO2 — cause smog and acid rains, and can adversely affect human health).

In accordance with the 1999 Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-level Ozone (part of the Convention on Long-Range Transboundary Air Pollution), Norway committed to reduce NOx emissions by 30% against the 1990 base year level by the end of 2010. To achieve this goal, a NOx tax (about $2.6 per kilogram of emissions as of 2017) has been applied since 2007 reaching energy plants with an aggregate installed capacity exceeding 750 kW, engines, boilers and turbines with an aggregate installed capacity exceeding 10 MW, as well as ground-based and sea-based flare facilities.
There is, however, a second option to avoid tax: about 950 enterprises have voluntarily signed the Environmental Agreement on NOx and instead of the tax they pay fees (from $0.5 to $1.3 per kilogram of emissions) to the specialized NOx Fund, which contributes significantly to the reduction of emissions: in 2015 the country already reached the national goal set for 2020. Total fees paid to the NOx Fund for the period 2008-2016 amounted to about $900 million, and approximately 70% of them were from oil and gas enterprises.

In addition to fees reduced compared to the tax, companies-signatories to the Agreement can be awarded a grant from the Fund for up to 80% of investments in NOx reduction projects (among them are installation of LNG-fuelled engines on vessels and building infrastructure for LNG bunkering). Support is provided individually to each project on the basis of expected annual reduction in harmful emissions; in order to ensure the required level of emission reductions, its amount is periodically reviewed and, since 2015, makes about $45 per kilogram for LNG-fuelled vessels. In the period from 2008 to March 31, 2017, the NOx Fund supported total of 69 projects (from $ 0.5 million to $ 13 million for each, an average of approximately $ 4.5 million); 37 of them are already implemented. The total amount of grants awarded for LNG-fuelled vessels made about $ 320 million, while the reduction in NOx emissions compared to traditional fuels was 7658 tons.

Consequently, Norway has now become the world leader in LNG use in shipping. This resulted from the use of mechanism that allows companies to choose “a carrot” (payment of lower-than-tax contributions to the Fund, as well as the possibility of obtaining up to 80% of investments for upgrading and building new ships, creating an infrastructure) instead of “a stick” (emission tax). A very impressive experience!

**Outlook for LNG in the Russian Arctic**

In 2017, Sergei Donskoi, the RF Minister of Natural Resources and Maritime Board under RF Government launched the Green Shipping initiative in the Russian Arctic. For the success of this initiative, R&D works are carried out, and political will is needed to start transition to LNG. Russia’s ambitions in the Arctic are very large, and we should expect modernization of the Arctic fleet in the coming years that provides a good chance of switching to LNG use.

International cooperation in the field of low-tonnage LNG can play a major role in reducing energy risks of energy supply to consumers who have chosen this new type of energy. The low-tonnage LNG infrastructure available in Norway at the Russian border can act as a reserve supplier for LNG shipping to consumers and for bunkering vessels.

Russia would be worth actively implementing the Norway’s experience in LNG use for population and industrial projects power supply in Arctic, including growth of bunkering in the coastal areas and vessels conversion to gas fuel.