

# CLEAR SIGNALS FOR LNG ROBUST, GUIDED RADAR SENSORS ENSURE MEASUREMENT ACCURACY IN LNG PRODUCTION

Compared to pipeline gas, liquefied gases such as LNG or LPG can be transported much more flexibly and often have a higher commercial value. A good example of this can be found in the Russian Portovaya Bay, the starting point of the Nord Stream Pipeline, where natural gas will be processed and loaded directly onto ships in cryogenic liquid form. Once the new natural gas liquefaction plant is completed, guided radar sensors from Vega will make a significant contribution to safe and efficient production there.



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## Trends toward more flexibility

LNG processes are among the most challenging in the process industry. A single plant can produce from 40,000 to 8 million tons annually. Processing facilities can range from small-scale to world-scale. Two trends are becoming apparent in liquefaction plants. First: The future can swim. LNG plants are increasingly being designed as “floating facilities” (FLNG). Gigantic floating liquefaction plants, sometimes as big as several football pitches, can produce LNG exactly where natural gas is available, without first having to transport the gas ashore through expensive pipelines. The industry is thus achieving an unprecedented level of flexibility and “service quality”. True to the motto: We come to you and deliver “to your door.”

Second: Large-scale natural gas liquefaction plants need staying power and the willingness to make large investments. Current projects are therefore increasingly moving away from the huge

dimensions the growth market demanded in the past. Medium-size projects are becoming more and more the thing. These allow project duration and financial investment to be scaled and closely matched to demand. Production can thus be profitable even in regions with smaller gas reserves. And such facilities can be expanded later with comparatively little effort to meet increased demand. Because, expanding an existing facility is faster and easier than starting from scratch somewhere else. An additional compressor train or turbine or cold box, i.e. the cryogenic chamber where natural gas is cooled down to minus 162° C, requires relatively little bureaucratic red tape.

## All-round reliability with a complete measuring point

The Linde Group delivers comprehensive turnkey solutions for the LNG processes in the plants of its customers. Just as comprehensive are the level measurement solutions Vega creates for these same processes. A complete measuring system consisting of bypass tube and sensor offers much more than just the sum of its parts. It includes an instrumentation concept tailored to the process and rounded off by comprehensive engineering and support services. The ready-to-install sensors, which come with customized features, documentation and the required test certificates – all from a single source – are a building block Linde can rely on. Using Vegaflex 86 guided radar sensors, most of which come already fitted in bypass tubes, and Vegaswing 66 for point level detection, means considerable savings. These result from simplified planning, fast “Plug & Play” installation and reduced maintenance requirements, among other things. Having no mechanical moving parts, Vegaflexbypass measuring systems operate wear free and require almost no servicing. Besides pre-assembly and adaptation to existing plant conditions, the scope

## STANDARDS AT THE HIGHEST LEVEL

Whether large, mid-sized, small or floating LNG plant: the oil and gas industry has to balance the issues of cost pressure and environmental awareness in its efforts to meet the growing demand for energy. The engineering division of Linde AG in Munich has the required know-how, from A to Z, for plants of all sizes – including turnkey solutions. On the Russian Baltic Sea coast, the company is now licensing a medium-sized plant complex for the production, storage and transport of liquefied natural gas (mid-scale LNG) with an annual LNG production capacity of 1.5 million tonnes. It's a challenging project for the manufacturer due to the extremely tight delivery deadlines. The future of this market will be oriented around scalability, speed and project competence. The Portovaya project is thus the ideal opportunity to further standardize proprietary liquefaction technologies for this scale of operation. Linde will once again use its patented, multi-stage natural gas liquefaction process to help medium-sized plants achieve world-class performance, especially in terms of energy efficiency.

of delivery even includes detailed parameterization, such as false signal suppression. Only SIL functionalities, as required by law, have to be calibrated live on site with the original medium that will later be measured.



Figure 1: LNG is the big trend: Linde is building a medium-sized natural gas liquefaction plant with a capacity of 1.5 million tonnes of LNG near the Russian Baltic Sea town of Portovaya (Symbolfoto; Linde AG).

Photo: ©The Linde Group

## Documentation included

When designing LNG facilities, the top priority is to make sure all system components have sufficient robustness and performance reserves. Only in this way are the sensors able to reliably monitor the complex processes the media are put through. The core task hasn't changed much in spite of all the technical advances over the last few decades. Yet in terms of efficiency and process reliability, today's measuring systems are almost unrecognizable. On their journey to the LNG construction site, the ordered level sensors are accompanied by a thick bundle of papers. The aim is to comply with the strict legal regulations and the often even stricter country-specific requirements of the end customers. Besides production acceptance tests, the focus is on numerous certificates and licenses.



Figure 2: Well packed and ready to travel: guided radar sensors of type Vegaflex 86 and vibrating level switches of type Vegaswing 66 awaiting transport to the LNG construction site in the Russian Baltic Sea bay of Portovaya.

## The challenge of short-track projects

The Portovaya project is a so-called "short-track" project. "The entire plant is being built in an unusually short time," explains

Business Development Manager Sebastian Harbig, who is responsible for Global Projects at VEGA. "Delivery time was therefore a major criterion in awarding the contract." This is not the first time that VEGA has supported the EPC specialist (Engineering, Procurement & Construction) in medium-sized or large projects. VEGA is responsible for the complete, ready-to-install measuring point, the customer-specific documentation as well as all necessary certificates. Especially for international projects, delivery from a single source is an advantage that has multiplication potential. Because, a project like the one in Portovaya involves Linde teams, locations and suppliers all over the world. The work across borders has to function like a well-oiled machine, with every gear wheel syncing perfectly with all the others. Any delay can cause multiple delays downstream.

## Two for all levels

Machines in an LNG plant, especially those used in the liquefaction process, are exposed to extreme operating conditions. Between start-up and full operation of the cryogenic processes, the temperature expansion of the equipment is immense. The components are subject to extreme loads and even small changes in the composition of the processed natural gas can significantly reduce the overall service life of a machine. The mid-scale plant now being built in the Russian Baltic bay liquefies gas from the compressor station that has been operating there since 2010. The process for converting natural gas into LNG is based on three steps: pre-treatment, compression and cooling including liquefaction. Because natural gas contains impurities such as water, mercury or corrosive components that can freeze during the compression phase, it has to be pre-treated. The methane is allowed to enter the liquefaction trains of the LNG plant only in a highly concentrated form. In the various storage and process vessels, only two sensor types monitor the widely different media during the entire production process. These range from dry natural gas, condensed hydrocarbons and cold flare gas to ethane, LNG, hydrocarbons, fuel gas and wastewater.

## Plant profile

- 1.5 million tonnes of LNG per year: This corresponds to approx. 0.5% of the world's annual needs.
- Medium-sized facility with the dimensions of "several football pitches"
- Patented, energy-efficient technology from Linde
- Complete solutions for level measurement with Vegaflex 86, mostly in bypass tubes, and Vegaswing 66

## Maximum performance, minimal loss

Consistently high quality is essential for LNG processes. In today's competitive environment, industry must strike a balance between cost pressure and environmental awareness. But when it comes to quality: no compromises. Efficiency and plant availability, which are significantly improved through standardization in all areas of the plant, including instrumentation, guarantee high quality and a real cost advantage. Guided radar sensors are especially suitable here, as they can reliably withstand extreme pressure and temperature conditions. And vibrating level switches, with their compact design and millimetre accuracy, are also just the thing for many applications in the LNG plant.

## Communication that counts

Vega's Global Projects Team, to which Sebastian Harbig also belongs, has developed into an experienced partner for worldwide plant projects with extensive knowledge of the critically important interfaces. To be able to supply customers in the best possible way, it is always important to provide detailed solutions that are far removed from "daily business." Optimal technology, as the project in Portovaya shows, can only be the basis on which to build. The actual task includes much, much more: working out the technical details, making quotations as well as communicating regularly with the client. And it does not end with setup and commissioning, but continues throughout the entire life cycle of the instruments, ensuring their availability and efficiency.



Figure 3: Guided radar sensors of type Vegaflex 86 measure robustly and independently of the medium. This makes them suitable for almost all substances and measuring tasks in the LNG process and increases the degree of standardization.

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