

ADAPT - PORTOVAYA GAS TREATMENT PLANT



Challenge

The Portovaya gas treatment plant is the largest silica gel gas processing plant ever constructed. The facility is located at the Portovaya compression station near Vyborg in Russia and feeds the 1,200 km Nord Stream subsea pipeline across the Baltic Sea to Germany for gas supply to Western Europe, including the United Kingdom.

As the owners of the plant, Gazprom, needed to use a technology that could process 170 million m³/d of natural gas to meet water and hydrocarbon dew point specifications.

DNV signed a major basic engineering contract with Siirtec Nigi S.p.A., an engineering, procurement and construction company based in Milan to undertake the largest Advanced Adsorption Process Technology (ADAPT) contract that DNV had secured at the time.



Expertise Provided

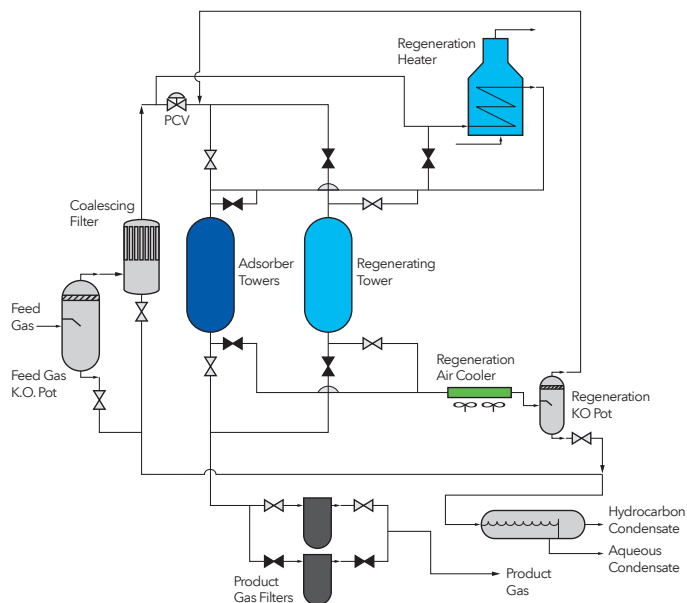
DNV provided key services on this large project which includes 4 adsorption trains each with 5 adsorber vessels.

The services included:

- Basic Process Design Package
- Specialist process support during HAZOP
- Specialist process support during detailed design review
- Adsorber vessel internal lining inspection
- On site support during adsorbent bed loading
- Commissioning support
- Ongoing operational support

ADAPT Process Overview

DNV has over forty years experience of researching and utilising adsorption technologies. Adsorption is a non-destructive, regenerable process that utilises the affinity of materials such as silica gel and molecular sieves to selectively remove species (i.e. hydrocarbons, water, methanol, sulphur species and carbon dioxide) from high pressure gases. Regeneration of the saturated beds is usually achieved by heating (referred to as TSA or Temperature Swing Adsorption) although pressure reduction or a combination of both can also be used.



Outcome and Benefit

ADAPT is a globally recognised technology and provides many benefits to clients. For the Portovaya gas treatment plant, key benefits included:

- Reduced Capex and Opex
- Attainment of stringent dewpoint specifications for submarine pipeline
- Ambient temperature processing
- Low pressure drop
- Dry bed process eliminating liquid entrainment risk
- Flexible and simple plant operation
- Follow-up specialist support

ADAPT History and Operating Experience

DNV determined the fundamental performance data for silica gel and molecular sieve materials using pilot plant facilities. The ADAPT software design models were developed using data from a matrix of tests using different temperatures, pressures and gas composition conditions and calibrated using operational plant data.

1970's

- Early Research + Development
- Upgrading of British Gas LNG Peak Shavers

1980's

- Heavy hydrocarbon removal Research + Development
- Upgrading of British Gas Easington

1990's

- Continued Research + Development
- Design of British Gas Barrow North
- Third Party Design (Norg & Grijskerk)

2000's

- End of Research + Development
- Continued Licensing Successes

2010's

- Growing demand for adsorption plants
- Largest adsorption plants built (Portovaya and Kazatchiya)

2020's

- Interest in adsorption plants for dehydration of carbon dioxide and hydrogen