

NATURAL GAS

Production - Treatments

Transport - End uses

OBJECTIVES

To provide knowledge of the techniques involved in natural gas production, processing and transport as well as its valorization.

On completion of the course, the participants know the:

- natural gas characteristics, the principle of gas production and the on field processing operations
- transport and storage techniques and their specific constraints
- techniques of natural gas valorization
- main economic factors of the natural gas chain.

COURSE CONTENT

NATURAL GASES: TYPES, CHARACTERISTICS AND PRODUCTION TECHNIQUES

0.75 day

Types and characteristics of natural gas fields. Production techniques.

Different types of natural gases (condensate, wet or dry gas) and characterization parameters (CGR, Bg, B'g, ...).

Constitution of natural gas well effluent (**composition, impurity content,...**), properties and **specific dangers**.

Case of gases associated with crude oils: recovery techniques, characteristics, composition and end uses.

END USES OF NATURAL GASES - MAIN QUALITY STANDARDS

0.25 day

End uses of natural gases: fuel (domestic and industrial uses), conversion into other energy types (electricity production and cogeneration), automotive fuel (Natural Gas for Vehicles - NGV and conversion into liquid automotive fuels GTL), chemical valorization, ...

Quality requirements for commercial natural gases and associated products (ethane, LPG, condensates). Examples of **quality standards**.

NATURAL GASES PROCESSING

2 days

Dehydration: water removal.

Problems linked to water presence in natural gases: hydrate formation, corrosion, ...

Use of **inhibition techniques** by glycols (MEG and DEG) and alcohol (Methanol) injection.

Dehydration techniques: absorption by chemical solvents (TEG), adsorption on molecular sieves.

Examples of Process Flow Diagrams and typical operating conditions.

Sweetening: sour components removal

Problems generated by the acid components (H_2S and CO_2): **corrosion**, effect on quality and valorization, **toxicity, pollution**, ...

Sweetening techniques: chemical and physical absorption by chemical solvents (MEA, DEA, TAME, MDEA,...), and adsorption on molecular sieves.

Conversion of H_2S : sulfur production (CLAUS process) and tail gas processing.

Examples of Process Flow Diagrams and typical operating conditions.

Hydrocarbon liquid extraction: condensates removal

Problems linked to the presence of condensates in natural gases: **condensation in the export pipes** and the distribution network and inherent difficulties and risks.

Different processes for liquid extraction: cold absorption by solvents, external refrigeration, Joule-Thomson expansion, use of a Turbo-Expander.

Examples of Process Flow Diagrams and typical operating conditions.

Examples of natural gas processing plants. Different possible options and complementary treatments:

Different options for the development of gas fields: onshore or offshore processing, single-phase or multiphase export pipes (sea lines), "Wet" or "Dry" development.

Examples of Block Flow Diagrams. Sequence of the different treatment processes.

Complementary treatments: mercury removal, conversion or adsorption of Mercaptans (RSH), ...

TRANSPORT AND STORAGE OF NATURAL GAS IN LIQUID PHASE - LNG OPTION

1 day

Economical advantage of the transport in liquid state and associated constraints. Development of the LNG option.

Different **liquefaction processes:** principle, typical operating conditions and technological particularities.

LNG storage tanks: Single Containment, Double Containment, Full Containment, Membrane, ...

LNG transport: types of LNG carriers (MOSS spheres, Membrane, ...) and characteristics of the export and receiving terminals.

LNG regasification techniques at the receival terminals, options for refrigeration duty recovery.

TRANSPORT AND STORAGE OF NATURAL GAS IN GAS PHASE

0.5 day

Gas pipes: characteristics, capacities, equipment, recompression units, operating conditions and specific constraints.

Underground storage of natural gas (old reservoirs, aquifers, salt domes, ...) and treatment requirements at storage outlet.

NATURAL GAS ECONOMICS

0.5 day

Resources, production and markets: distribution of the reserves, emerging and declining production areas, regionalization of the gas trade.

Natural Gas marketing: competition of other energy sources and consequences on gas contracts (prices and duration), cost of transport and its impact on the structure of the gas chain (project financing).

Future of the Natural Gas: rapid expansion thanks to environmental advantages of the gas (Kyoto agreement), to the liberalization of the energy trade markets on the main consumption areas, to the improvement of electricity production technology, to the monetizing of the resources and to the emergence of the LNG industry.

▲ Who should attend?

Anyone looking for technical information on natural gas from upstream to downstream excluding distribution.

▲ Duration

5 days

▲ Dates & Location

July 6-10, 2009
Rueil-Malmaison

▲ Tuition Fees

€ excl. tax 2,140

▲ Lecturers from

- IFP Training
- INDUSTRY

Ref. **PROD / NATGAS**