

IIFP SCHOOL

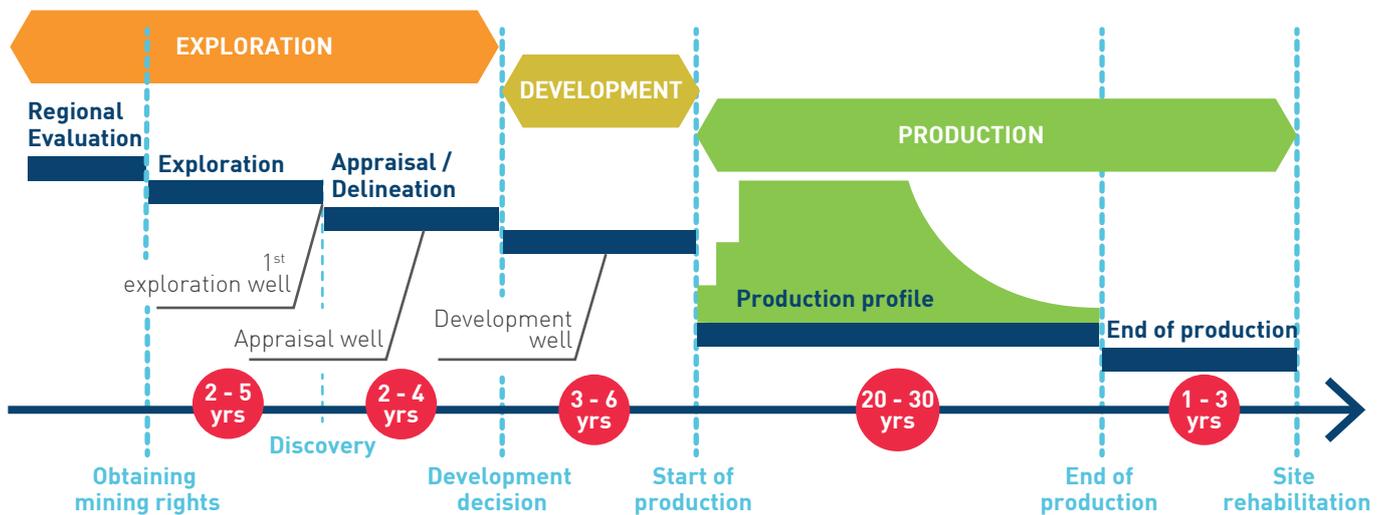
THE GRADUATE SCHOOL FOR ENERGY AND TRANSPORTATION PROFESSIONS



Why and how do they decide to drill a well in a given area?

The life cycle of a hydrocarbon field is very long (several decades). The decision to drill the first well is taken at the end of an initial assessment step called the **exploration phase**. This generally lasts several years and depends on the geological complexity of the studied area. It starts with a first **regional evaluation** of the sedimentary basin and may lead to the selection of an interest zone. This zone may then be chosen for mining rights.

THE EXPLORATION - PRODUCTION CYCLE



THE INDUSTRIAL PROCESS

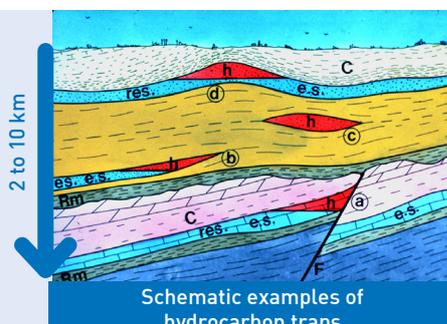
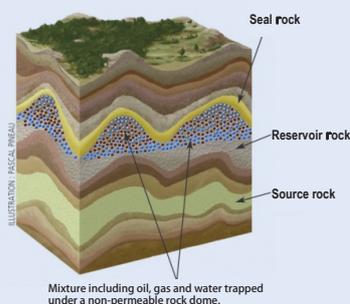
This industrial process starts from the geological idea or concept and ends with the first exploration well. It can last many years (up to 5 years and even more).

Exploration begins with the identification of indicators which allow us to assume where the oil or gas is and to estimate its volume. Geologists and geophysicists collaborate on this highly economically challenging investigation, which goes from the surface down to the subsurface.

The target of the exploration well to be drilled is determined through analysis of data acquired during previous study/evaluation phases (outcrops, data from previous wells drilled in the neighborhood, old seismic data or new data, ...).

Interpretation of these data enable the targets, called "prospects" or "structures", which are all unique, to be identified (or not).

Drilling a well is the only way to verify the ideas or concepts generated by data interpretation.



Different types of wells

There are 3 types of wells depending on the maturity level of the Exploration – Production activity of the area.

1

DIFFERENT TYPES OF WELLS

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Exploration wells: An exploration well may become a discovery well if a hydrocarbon reservoir is discovered. It is a means to:

- ascertain the presence of hydrocarbons,
- recover data/information in order to determine the nature of the geological layers and the fluid contained in the rock,
- acquire preliminary data concerning the area of interest (initial pressure, temperature, permeability, productivity ...),
- decide whether to abandon the field or to continue drilling additional wells (appraisal wells) necessary to acquire new data in order to make a final decision.

At the end of the exploration activity, the well is most often abandoned: it is plugged with cement. If it is a discovery well, other appraisal wells may be drilled. If a decision is made to develop the discovery, production wells are then drilled.



Cores taken in the target zones of the well only



Cuttings of drilled rock, continuously analyzed

CHANCES OF SUCCESS* OF EXPLORATION WELLS

*The success means the discovery of a significant amount of hydrocarbon

- New areas (with no previous exploration): 10 to 20%,
- Geologically known areas: 20 to 30%,
- Areas close to production zones: around 60%.

2

APPRAISAL (EVALUATION) WELLS

Before considering production, the profitability of the field has to be estimated. The volume of recoverable reserves and production conditions can be estimated by drilling appraisal wells in order to delineate the field. Multidisciplinary teams composed of geologists, geophysicists, architects, drillers, producers and reservoir engineers have to study the results of the prospection phase.

The appraisal well is a means to:

- specify information from the exploration well in order to obtain the characteristics of the formations (permeability, heterogeneity, fractures, reservoir boundaries ...) and to determine the extent and volume of the reservoir,
- evaluate the size/extension of the discovery,
- estimate the potential production and take the decision whether to develop the field or not.

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3

DEVELOPMENT (PRODUCTION) WELLS

The field development phase requires equipment to be installed: production drilling named development well, production installation, equipment for treatment, metering and export of the fluid produced.

The development well is therefore drilled as defined in the field's development plan. It enables production to be adapted according to the number of wells and the technology used.