The Lifespan of a Well

Today, the average life of a natural gas and oil well is 20 to 30 years, although technology is emerging that may enable the industry to find new ways to extend the life of wells – perhaps by as much as 10 to 20 additional years by refracing a well multiple times.

The production phase is the longest phase in the life of a well. Initially, activity is high with frequent visits by staff and trucks hauling equipment and produced oil. After this initial period, the activity is reduced significantly. Staff and trucks visit the well for periodic maintenance, operations inspections, liquids hauling from storage tanks on the well sites and production monitoring. New technology is enabling operators to install remote production monitoring systems, which reduce activity at the well site.

Geology

There are many steps in the natural gas production process that occur long before you walk into your home and turn on the lights.

The process begins with geological surveys to examine the earth’s surface and determine areas where natural gas deposits might exist. Through the use of these geological surveys, as well as mapping of the surface and subsurface characteristics, geologists determine which areas are most likely to contain a natural gas deposit. Areas where large deposits of natural gas exist are called fields or reservoirs.

Additional tests, such as seismic exploration, help geoscientists learn more about the area below the surface and determine if natural resources can be efficiently produced from the basin. Sometimes, a well is drilled to explore the land further and gain a better understanding of the layers below the earth’s surface to determine whether it is possible to produce natural gas from a particular area in the basin.

Land

In the development phase, the area is assessed to ensure the company develops a plan that fully utilizes the area’s potential, but minimizes the impact to the environment. The company collaborates with surface owners of the land where the drilling will likely occur to reach a fair agreement on how the natural gas will be developed. This agreement process increases understanding of the drilling process, while allowing the company to hear and address concerns.

Additionally, environmental scientists study the native plant and animal species to mitigate potential impacts and conserve habitat diversity. With this knowledge, the company can identify the best way to reduce the impact of operations on the surrounding areas. In many cases, the company will install automated well-monitoring systems to minimize the number of vehicles and site visits necessary for a project.

Determining the exact area where a well will be drilled depends on a number of issues, including the structure of the surrounding area and the estimated size of the natural gas reservoir.
Drilling

The drilling process is how natural gas is brought to the surface of the earth from an underground rock formation that holds it. Rock formations that store natural gas are referred to as reservoirs or fields.

Natural gas companies use both conventional and new-technology drilling rigs to improve drilling efficiencies, minimize surface impacts, mitigate noise and reduce emissions. Rotary drills have a rotating bit on the end of the drill pipe that bores into the many layers of the earth. The team lines the hole with casing and cements the casing into place to maintain the integrity of the well and to protect shallow groundwater aquifers, which typically lie between 200 to 800 feet below the surface and are thousands of feet above the targeted formations.

Drilling a well is a 24-hour-a-day operation and many methods are used to aid the process, including fit-for-purpose rigs that allow for a smaller footprint for multiple wells. Electromagnetic directional and downhole pressure tools are used to improve the drilling process. To increase the efficiency at which a drill operates, companies often use a polycrystalline diamond cutter (PDC) drill bit. A PDC bit also reduces the number of drilling days and decreases the overall costs. Once a drill reaches total depth, a series of tests determine reservoir quality and geological zones to determine the steps needed to complete in the well.

Completion

The completion process includes installing equipment to facilitate the flow of natural gas out of the well. Each well contains one or more geological zones of interest. To release the flow of natural gas to the surface, each zone must be fracture stimulated or “fraced.”

This process also increases the natural gas production of the well. After fracturing, a crew runs tubing into the wells to enhance production by creating a more efficient path for natural gas to travel to the surface. The natural gas flow is controlled by a series of valves and instruments at the top of the well. Take a closer look encana.com/hydraulicfracturing

Production

In the case of a natural gas well, when the gas rises through the tubing and is produced through the wellhead, it goes through a primary separation stage to remove liquids at or near the wellsite. The natural gas is measured and then sent via pipeline to compressor stations, where any additional accumulated liquids are removed and the natural gas is compressed. The compressor stations deliver natural gas to a processing facility that separates it into its components, which are primarily methane, ethane, propane and butane.

Any produced liquids (oil) are separated from the natural gas at the wellsite and is stored in tanks on or near the wellhead. After sufficient volumes have accumulated, the liquids are collected by truck and taken to a refinery where it is separated into its constituent hydrocarbons. Additional processing then takes place to create products we use each day, including gasoline and plastic.

After the natural gas is processed, where does it go?

Pipeline

After natural gas is extracted, it is important that these resources move quickly to the regions where they are needed. Often, this means the natural gas must travel long distances from where they are produced to where they are used. This requires a complex and extensive transportation system. Natural gas is transported through pipelines that are designed specifically to move them safely.

Now that the natural gas has been transported, what happens to the land where the drilling occurred?

Reclamation

Natural gas companies strive to minimize their environmental footprint, constructing drilling pads to be as small as possible. Once the well is producing, drilling equipment is removed, the pad is re-contoured and the area is returned to its prior condition. Reseeding may occur at the request of the landowner or by regulatory standards.