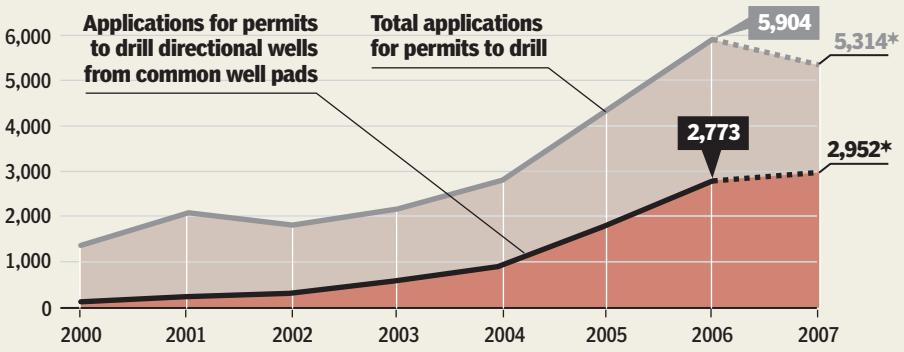
Reducing the drilling footprint

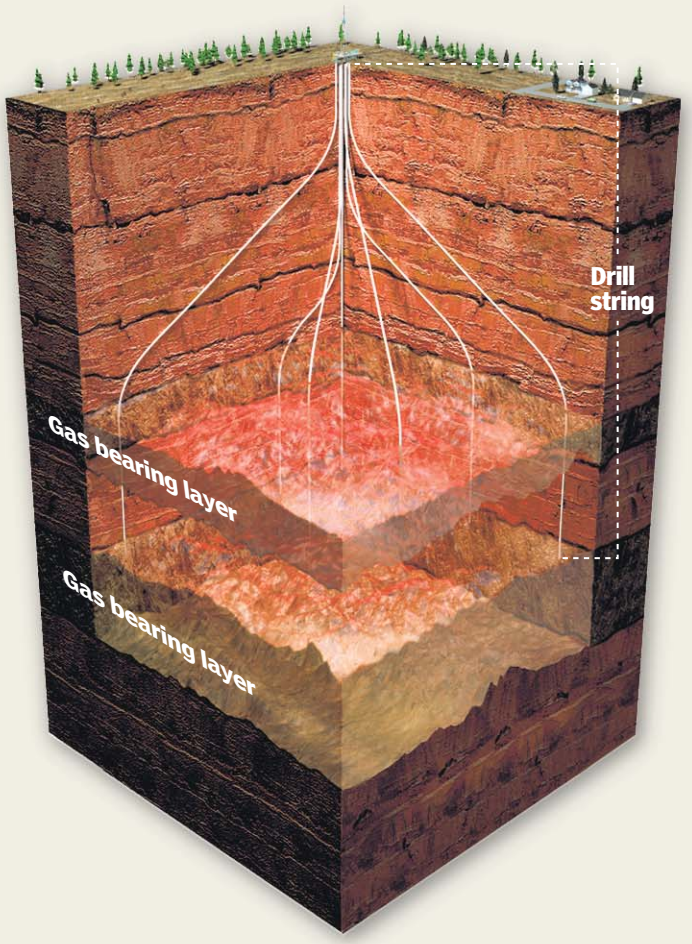
Rapid technological improvements now enable companies to make greater use of "directional drilling," a technique that allows many wells to be drilled from a single location, instead of creating a new well pad for each well.

Advantages

- Large drill rigs don't have to be moved to new sites as often.
- Less land is disturbed and ground cover is preserved with fewer well pads. The clustered wells mean fewer obstacles for wildlife.
- Drillers can reach a greater cross section of the gas formation, drawing out more gas than otherwise.
- Drillers can reach gas reserves that may be otherwise off-limits due to urban development, lakes or because the area is environmentally sensitive.
- In some cases, such as near plateaus, it enables drillers to bore through far less rock than if they drilled straight down from the top of a plateau.



* As of Nov. 5, 2007
Source: Colorado Oil and Gas Conservation Commission



HOW IT WORKS

Big drilling companies increasingly use directional drilling in Colorado. EnCana Corp., one of the biggest players, uses directional drills at 95 percent of its wells, drilling four to six wells from each pad. Another company, Williams, drills up to 22 wells on a single pad.

Drillers create an "S-curve," in which the hole is drilled straight down, then curves, then goes straight down again. The bottom of the hole can end up 2,000 to 3,000 feet away – horizontally – from where the top of the hole is drilled. EnCana has, in some cases, drilled holes 4,000 feet from where the drilling was started.

Steerable motor systems

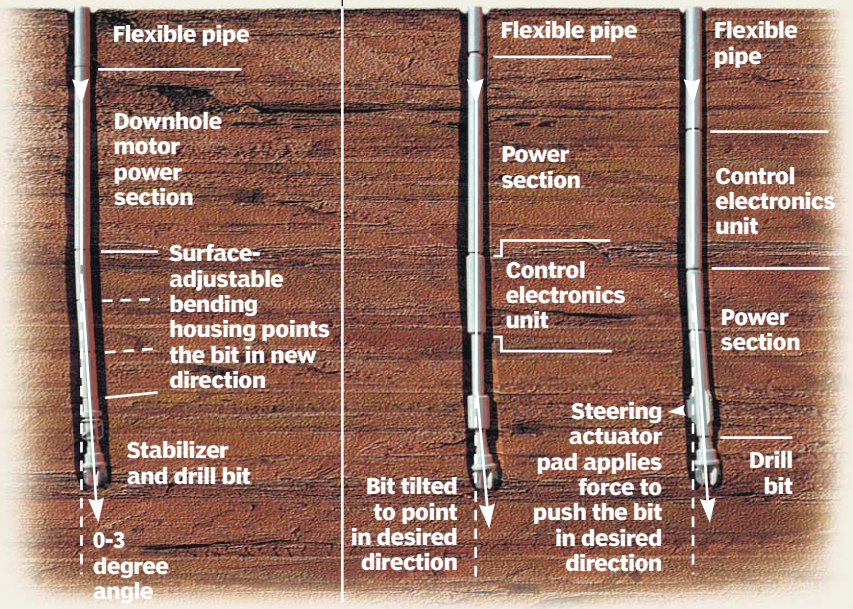
Drilling fluid is pumped through downhole motors to generate force at the bit while the drill string remains stationary. The motor is angled relative to the drill string to initiate a change in direction. This system has many drawbacks but is cost-effective and remains the most widely used method of directional drilling.

Rotary steerable systems

This newer technology has the advantage of being less complicated, more compact and offering fewer downhole challenges to overcome. Force is delivered to the drill bit in a controlled direction while the entire drill string rotates.

In **point-the-bit systems**, the bit is tilted relative to the rest of the tool to achieve the desired trajectory.

Push-the-bit systems apply force against the side of the borehole to achieve the desired trajectory.



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