

# EIA's Natural Gas Outlook Through 2025

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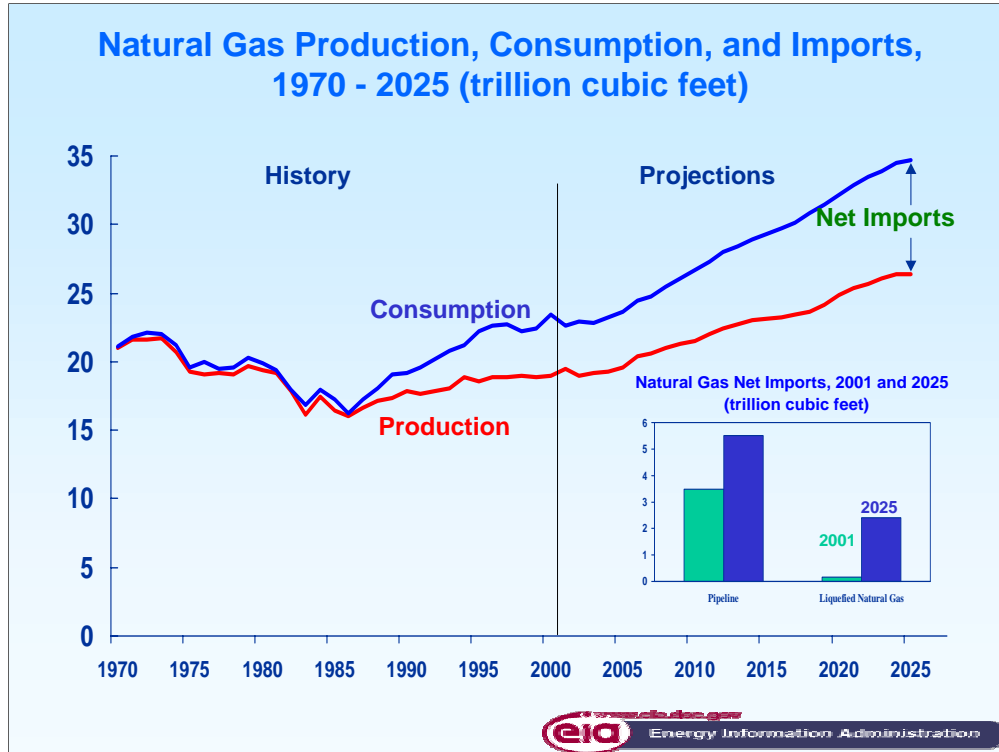
This morning I'm going to talk about EIA's short-term and mid-term natural gas outlook. How much are we going to use? Where's it going to come from? How much will it cost?

These projections are from the reference case from the *Analysis of S.139, the Climate Stewardship Act of 2003*, issued on July 3. The projections focus on domestic energy consumption, supply, and prices. They are the product of the Energy Information Administration, an independent analytical and statistical agency within the U.S. Department of Energy. We do not speak for any particular point of view on energy policy, and our views should not be construed as representing those of the Department or the Administration.

Assumptions are critical to any forecast. The projections are not statements of what *will* happen but of what *might* happen, given certain assumptions. The reference case projections are business-as-usual forecasts, given known technology and technological trends, demographic trends, and current laws and regulations.

EIA does not propose, advocate, or speculate on changes in laws and regulations. So, one of our key assumptions is that all current laws and regulations remain as enacted. For the mid-term forecast, that means, for example, that provisions in the current House and Senate energy bills, such as an Alaska gas pipeline tax credit, are not included in this forecast.

Let's start with an overview of the forecast.

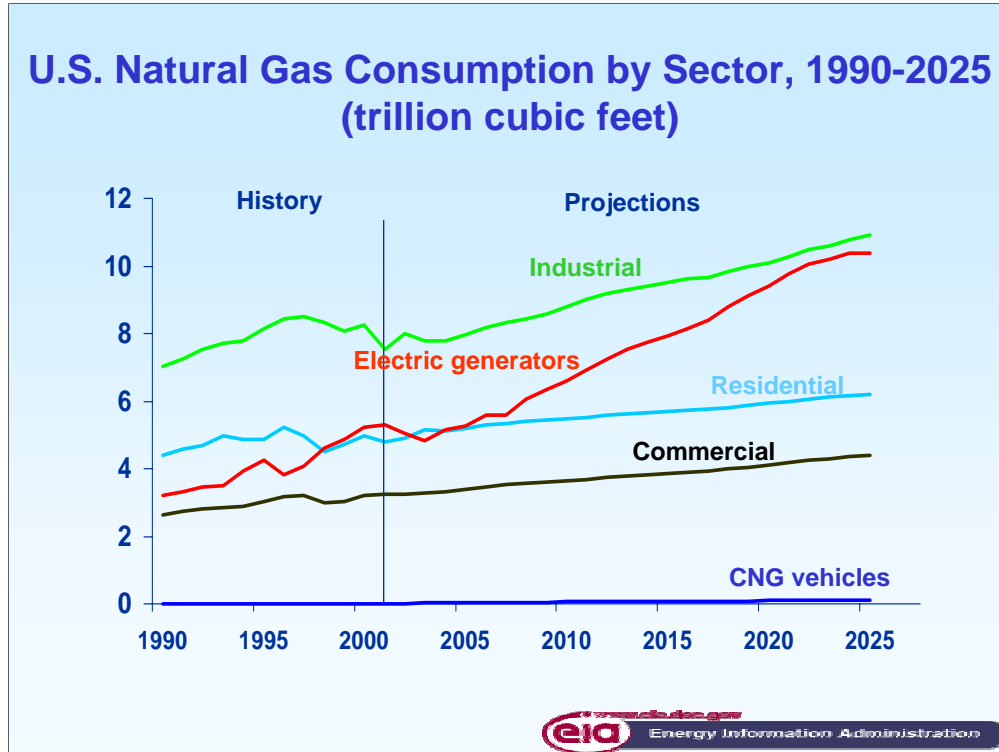


By 2025 total natural gas consumption is expected to increase to almost 35 Tcf or 26 percent of U.S. delivered energy consumption.

Domestic gas production is expected to increase more slowly than consumption over the forecast, rising from 19.5 Tcf in 2001 to 26.4 Tcf in 2025. Growing production reflects increasing natural gas demand and is supported by rising wellhead gas prices, relatively abundant gas resources, and improvements in technologies, particularly for unconventional gas. In this forecast, economic conditions allow an Alaskan pipeline to begin moving gas to the lower 48 States in 2020. The national average wellhead price is projected to reach \$3.95/Mcf in 2001 dollars by 2025.

The difference between consumption and production is made up by increasing use of imports throughout the forecast, particularly from liquefied natural gas (LNG), with a 2.1 Tcf increase expected over 2001 levels. By 2025 we expect expansion at three of the four existing terminals and construction of new LNG terminals in the Bahamas, on the Eastern Gulf Coast, and in Baja California, Mexico.

I'll spend the rest of my talk looking at consumption, production, imports, and prices in more detail—starting with consumption.



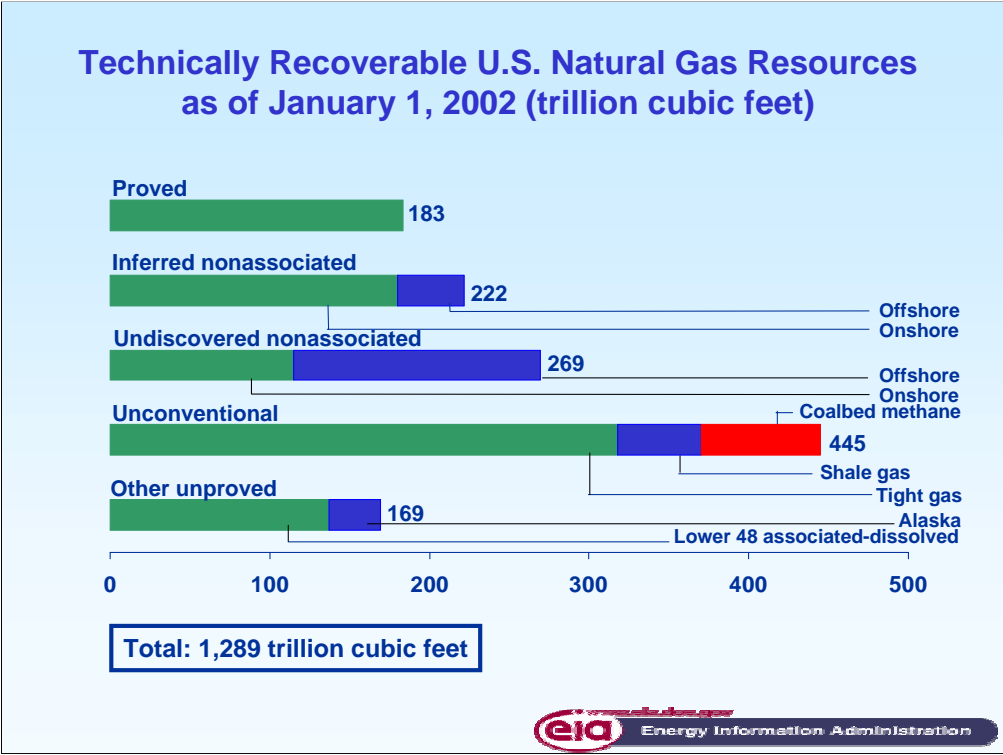
U.S. natural gas consumption is expected to increase by 1.8 percent annually from 2001 through 2025, to nearly 35 trillion cubic feet (Tcf). Gas consumption by electric generators is expected to nearly double over the forecast, from 5.3 trillion cubic feet in 2001 to 10.4 trillion cubic feet in 2025. Demand by electricity generators is expected to account for 30 percent of total natural gas consumption in 2025.

Most new electricity generation capacity is expected to be fueled by natural gas, so natural gas consumption in the electricity generation sector is projected to grow rapidly throughout the forecast as electricity consumption increases. Although average coal prices to electricity generators are projected to fall throughout the forecast, natural-gas-fired generators are expected to have advantages over coal-fired generators, including lower capital costs, higher fuel efficiency, shorter construction lead times, and lower emissions.

Historically the industrial sector, excluding lease and plant fuel, is the largest gas-consuming sector, with significant amounts of gas used in the bulk chemical and refining sectors. Industrial consumption is expected to increase by 3.4 Tcf over the forecast, driven primarily by macroeconomic growth. The chemical and metal durables sectors show the largest growth.

Combined consumption in the residential and commercial sectors is projected to increase by 2.5 Tcf from 2001 to 2025, driven by increasing population, healthy economic growth, and slowly rising prices in real terms. Natural gas remains the overwhelming choice for home heating throughout the forecast period, with the number of natural gas furnaces rising nearly 18 million.

Now let's move from the demand side to the supply side.



The estimate of total technically recoverable natural gas resources as of January 1, 2002, that was used in developing our forecast is 1,289 Tcf. One way of looking at this is that we could produce almost 30 Tcf a year for the next 43 years, before we'd run out. These resource assessments come primarily from the U.S. Geological Survey for onshore regions and by the Mineral Management Service for the offshore.

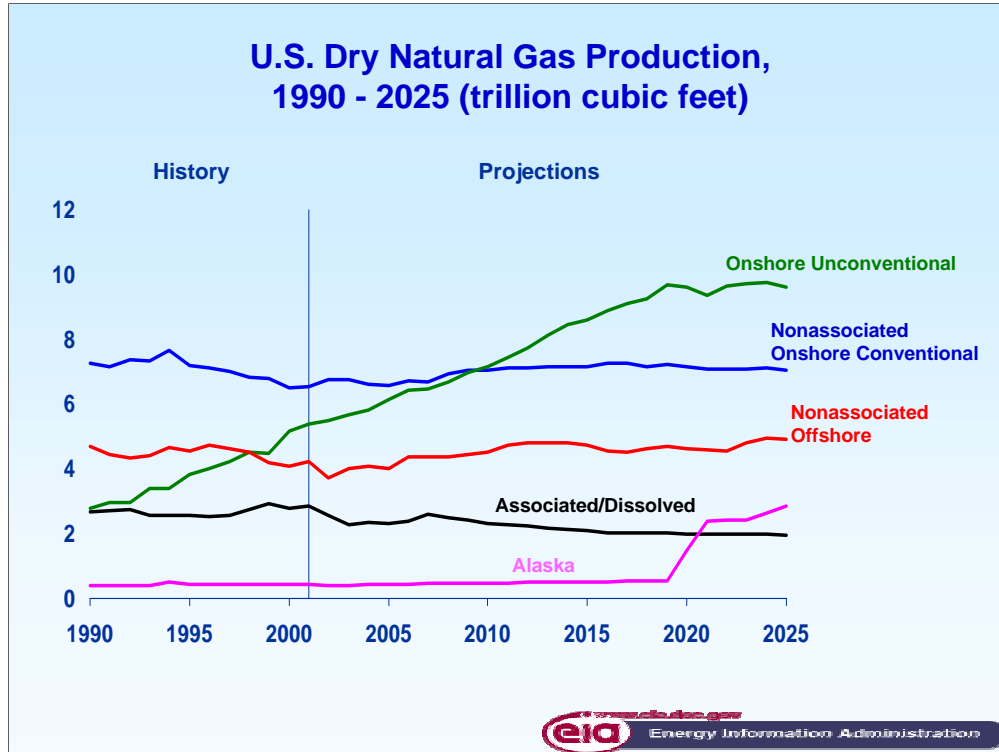
We had 183 Tcf of proved reserves in the beginning of 2002. That is, gas from known reservoirs, where wells have been drilled and production rates have been demonstrated.

Inferred reserves (at 222 Tcf) are also in known reservoirs, but data are insufficient as to the certainty of recovery. 81 percent of inferred reserves are in onshore reservoirs.

Undiscovered nonassociated conventional resources, based on regional geologic formations and their propensity to hold producible natural gas, are the least certain at 269 Tcf. More than half of these are in the offshore.

The largest category is unconventional resources with 445 Tcf, with most of that from tight sandstones at 71 percent. Other unconventional natural gas resources include gas shales and coalbed methane.

Other unproved natural gas resources include gas in Alaska (32 trillion cubic feet) and associated-dissolved natural gas in lower 48 crude oil reservoirs (137 trillion cubic feet).



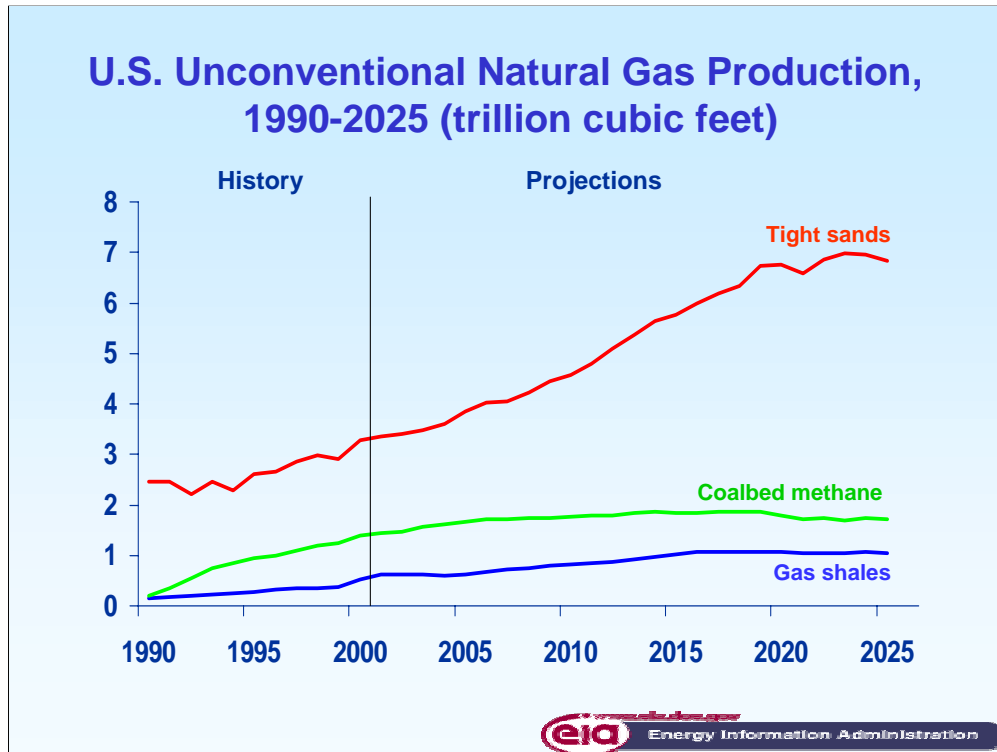
Domestic gas production is expected to increase from 19.4 Tcf in 2001 to 26.4 Tcf in 2025. Increased U.S. natural gas production comes primarily from unconventional sources and from Alaska.

Unconventional gas production increases by 4.2 Tcf over the forecast period—more than any other source, largely because of expanded tight sands gas production in the Rocky Mountain region. Annual production from unconventional sources is expected to account for 36 percent of production in 2025, more than any other source, compared to 28 percent today.

Alaska natural gas production begins flowing to the Lower-48 States in 2020 along a pipeline through Canada, reaching 4.5 bcf per day in 2021, with further expansion beginning in 2025. Alaska also continues to provide for consumption in the State itself and for LNG exports to Japan. In 2025, total Alaskan gas production is projected to be 2.9 Tcf.

Non-associated offshore production adds 710 Bcf, with increased drilling activity in deep waters; however, its share of total U.S. production declines from 22 percent in 2001 to 19 percent by 2025. Conventional onshore non-associated production increases by 500 bcf over the forecast, driven by technological improvements and rising natural gas prices.

Associated dissolved production declines by 900 Bcf, consistent with a projected decline in crude oil production. Lower 48 associated-dissolved natural gas is projected to account for 7 percent of U.S. natural gas production in 2025, compared with 15 percent in 2001.

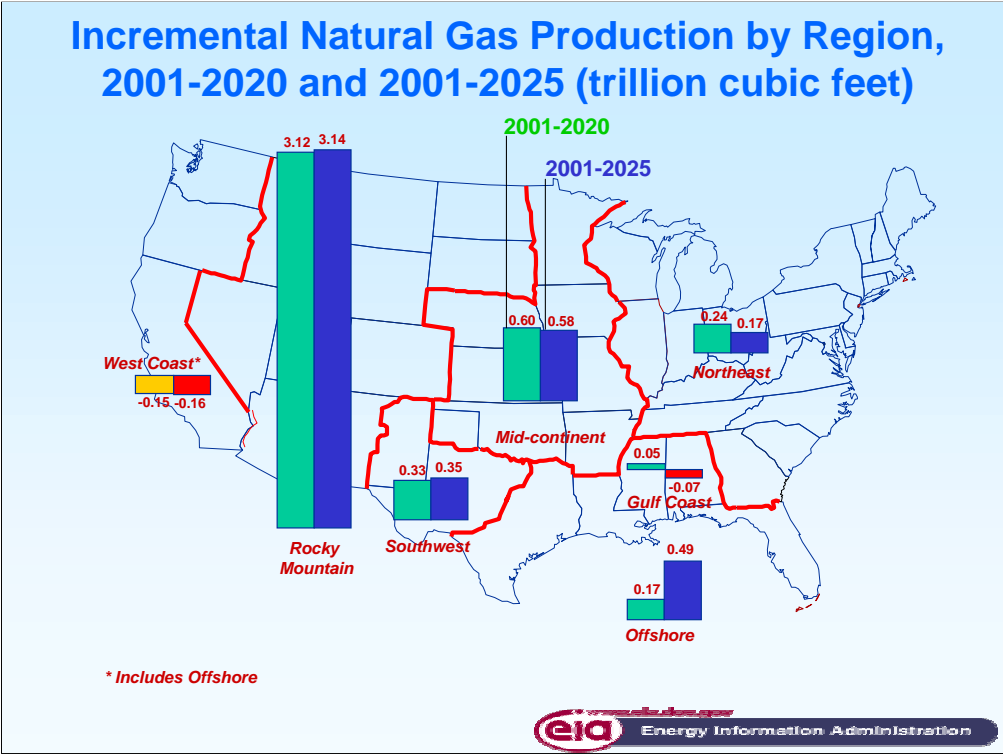


Since the largest growth in is unconventional gas, let's look at that a bit more carefully. Although unconventional gas resources are abundant, they are generally more costly to produce than conventional resources. Their exploitation was boosted in the late 1980s and early 1990s with the successful implementation of tax incentives designed to encourage their development.

Unconventional gas comes from three sources tight sandstone formations, coalbed methane, and gas gas shales. Growth in gas production from tight sandstones is expected to more than double over the forecast from 3.3 tcf in 2001 to 6.8 tcf in 2025. More than 80 percent of the increase in unconventional gas production comes from the tight sands. About half of the proved reserves of tight sands gas are located in the Rocky Mountains. Significant quantities of tight sands proved reserves exist in all other regions, except the West Coast

Gas shale production increases by more than 10 percent over the forecast to more than 1 tcf in 2025. Most of the gas shales are located in the Eastern United States. Coalbed methane production is expected to increase by 7 percent to 1.4 tcf. About three-quarters of the coalbed methane reserves are located in the Rocky Mountains.

Now, let's look at production growth on a regional basis.



The Rocky Mountain region, with the majority of the unconventional production, shows the greatest increase in production due to improved technologies and the availability of abundant resources. Over the forecast the Rocky Mountain region goes from the third highest to the highest producing region.

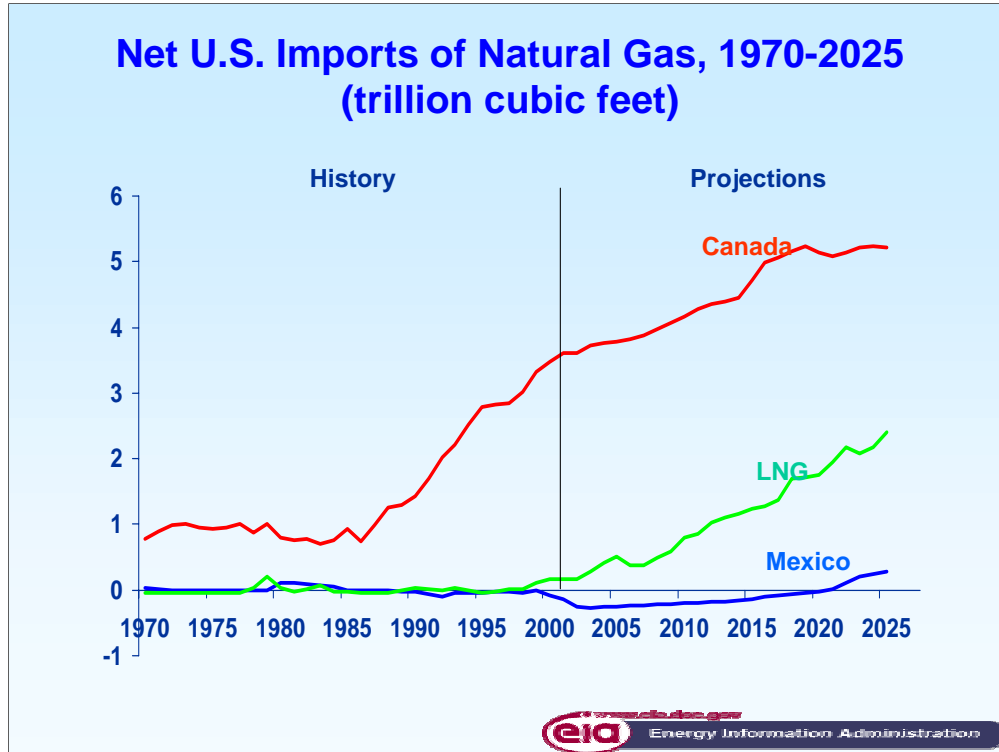
The highest producing region until 2014 is the Gulf offshore. At first deepwater production is expected to offset the decline in production from shallow fields. Discoveries of large ultra-deep fields in the Gulf of Mexico may temporarily interrupt the declining trend after that. But compared to 2001, production in 2025 is up by only about half a Tcf. The onshore Gulf Coast region is the second or third highest producing region throughout the forecast, but over the forecast it actually declines.

The Mid-continent region grows at about the same rate as the total Lower 48 production, generally maintaining its regional share.

The Southwest region is one of only two regions that does not show a decline in production toward the end of the forecast. Much of the increase in production is due to advances in technologies that improve the ability to develop resources from gas shales and deep conventional fields, greater than 10,000 feet.

The Northeast continues to be the second lowest producing region throughout the forecast and is not expected to add significant production. The West Coast including the offshore is one of two regions that shows a decline.

Now, let's look at the other source of supply, which is imports.



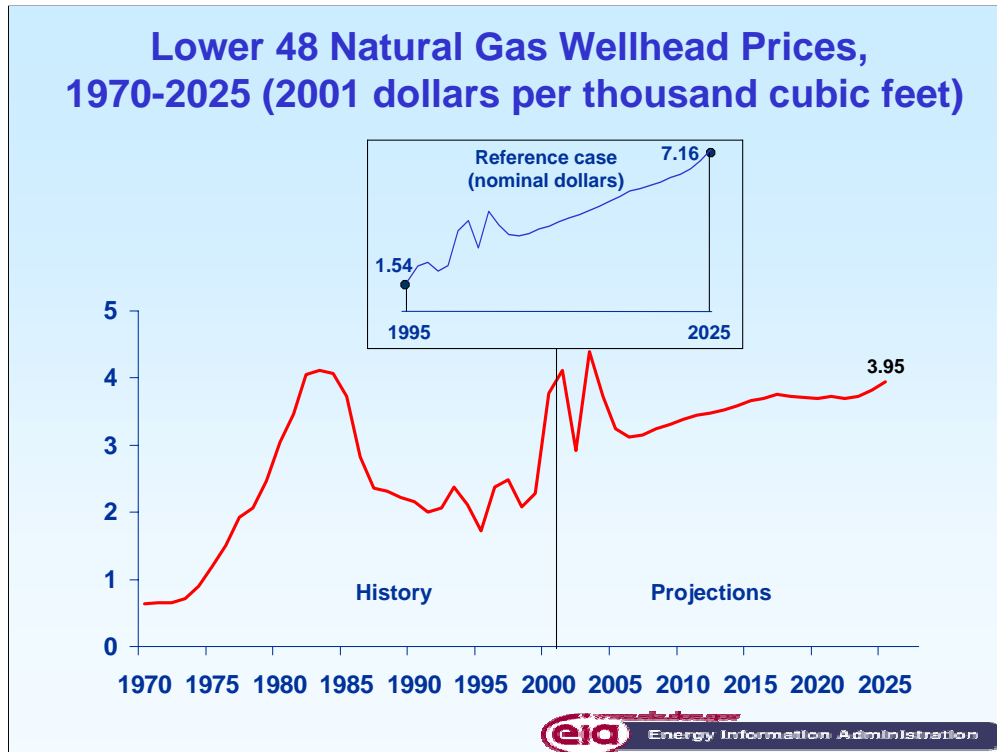
Net imports of natural gas, primarily from Canada, are projected to increase from 3.7 trillion cubic feet in 2001 to 7.9 trillion cubic feet in 2025. Imports contributed 16 percent to total natural gas supply in 2001, compared to 23 percent in 2025.

More than half of the increase in U.S. imports is expected to come from LNG. Much of the increase comes from expansion at existing sites, but additional facilities are also built to serve Florida and the Eastern Gulf Coast. The new LNG facilities are expected to have a combined gas delivery rate of 2.3 billion cubic feet per day. By 2025, LNG imports are expected to equal to 7 percent of total U.S. gas supply.

Growth in pipeline imports from Canada partly depends on the completion of the MacKenzie Delta pipeline, which is expected to be completed in 2015 and expanded in 2022. The initial full flow rate into Alberta is assumed to be 1.5 Bcf per day. Additional imports will come from the Scotian Shelf in the offshore Atlantic. The forecast of Canadian imports largely depends on the ability of Canadian producers to economically produce and market their untapped unconventional resources, particularly coalbed methane. Net imports from Canada are projected to provide 15 percent of total U.S. supply in 2025, about the same as in 2001.

Mexico is projected to go from a net importer of U.S. natural gas to a net exporter in 2021, as another LNG facility begins operating in Baja California, Mexico, in 2021, predominantly serving the California market. By 2025, the United States is expected to import about 290 billion cubic feet of natural gas from Mexico per year.



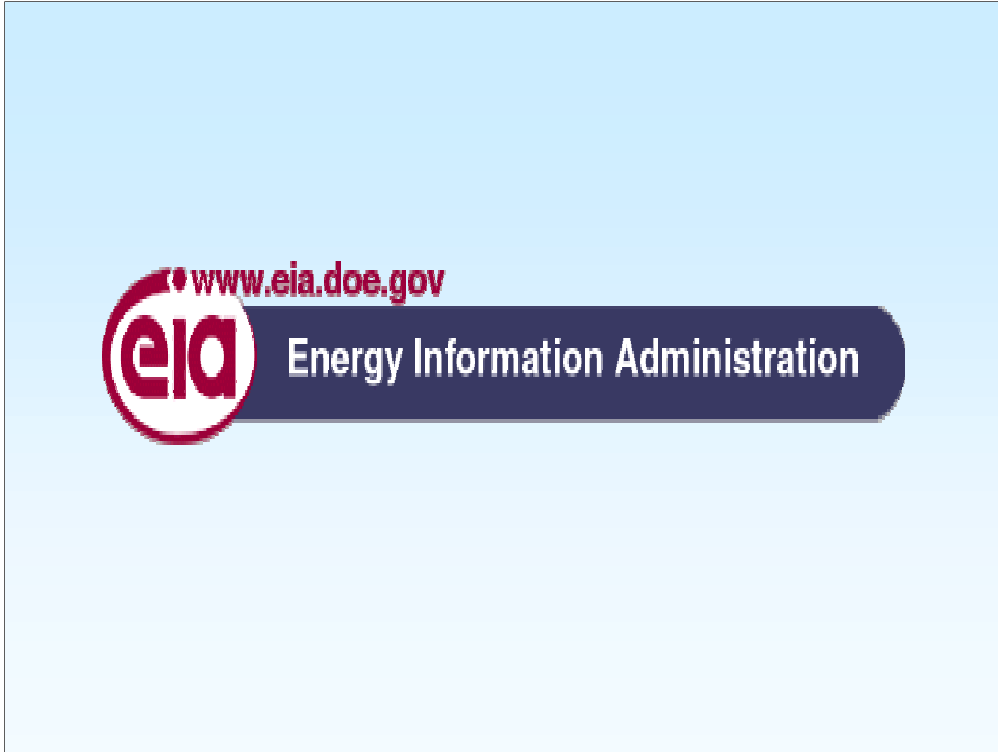


All these supply and demand forecasts depend on particular price forecasts. I've told you what the end point is. Let's look at the trajectory.

Natural gas wellhead prices are projected to decline from their current high levels, falling to just over \$3 per thousand cubic feet in 2006 due to robust drilling. Over the forecast, gas prices are projected to move higher, reaching \$3.95 per mcf by 2025 or 31 percent higher than the average of the last 5 years. In nominal dollars, this is equivalent to about \$7.20 per mcf.

Natural gas wellhead prices are projected to move higher as technology improvements and new supply sources prove unable to completely offset the effects of resource depletion and increased demand.

Prices are projected to increase in an uneven fashion as major new, large-volume supply projects temporarily depress prices when initially brought online. These include deep and ultra-deep offshore projects in the Gulf of Mexico, liquefied natural gas facilities, the MacKenzie Delta pipeline in Canada, and an Alaskan natural gas pipeline.



In summary, the projections indicate that more than 11 tcf of new supplies will be needed by 2025. At a wellhead price of \$3.95 per mcf in 2001 dollars, LNG imports and Alaskan production are expected to provide important new sources of supply, while unconventional and Canadian gas production continue to increase.