

Just How Enormous Is the "Enormous" U.S. Gas Resource? Implications for Future Supply*

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Abstract

With the increasing development of unconventional gas resources in general and shale gas resources in particular, the U.S. is now said to have “ENORMOUS” gas resources. These resources are perceived to create new opportunities for energy policy, particularly a massive increase in the use of natural gas to generate electricity and a substantial replacement of gasoline by natural gas in the transportation sector.

However, just how enormous is the allegedly “ENORMOUS” resource? This paper examines both the currently known and the range of estimated potential U.S. gas resources by type: conventional, transitional, and unconventional.

Conventional natural gas resources provide nearly 75% of the known contiguous U.S. gas resource of 1290 Tcf. More than 90% of this known conventional resource has already been produced. Conventional production has declined 60% from its 1972 peak and will continue to decline.

Transitional gas resources include self-sourced, deep and ultradeep, and deepwater gas resources. Although deep and deepwater resources were earlier thought to have great potential, known transitional gas resources are not even 5% of total known gas resources. Transitional production peaked in 2003 and is currently declining rapidly.

The case for enormous U.S. gas resources thus rests solely on the shoulders of unconventional gas. Unconventional gas (tight sandstones, coalbed methane, and shale gas) now provide over half of U.S. gas production. Unconventional gas reserve additions continue to outstrip unconventional gas production by wide margins.

Like conventional gas resources, unconventional gas resources are concentrated. However, unconventional resources are concentrated in major and mega plays, instead of giant and large fields.

Whether or not the U.S. has enormous gas resources, sufficient to provide for expanded gas demand for fifty years or more, depends solely on how many mega (30 Tcf plus) unconventional plays exist. At best, there will be only two each CBM and tight sandstone marginally mega plays. The number and maximum size of the shale gas mega plays will thus determine the ultimate gas resource of the U.S. The viability of various energy policy options thus depends on the timely and accurate assessment of the potential of the largest shale plays.

JUST HOW ENORMOUS IS THE “ENORMOUS” U.S. GAS RESOURCE?

Implications for Future Supply

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AN UNFAMILIAR CONCEPT

- The idea of enormous U.S. gas resources is now commonplace
- Until 2008, “Enormous” was not a familiar concept
- A dramatic reversal from the constant spectre of depletion

KNOWN AND ESTIMATED RESOURCES

- **Proved (EIA) - 237.0 TCF**
- **Probable (PGC mean) - 418.8**
- **Possible (PGC mean) - 744.9**
- **Speculative (PGC mean) - 428.9**
- **Total 1829.6**

HIGHLY CONCENTRATED POTENTIAL

- **Shale gas megaplays (6)- 444.4**
- **Tight SS megaplays (5) - 209.4**
- **CBM megaplays (2) - 29.0**
- **All other plays - 480.9**

- **Total Probable & Possible - 1163.7**

**WHAT CHARACTERISTIC IS
ALWAYS ASSOCIATED WITH A
VERY LARGE PLAY AREA?**

HETEROGENEITY!

**WHAT DOES HETEROGENEITY
MEAN FOR RESOURCE
ESTIMATES?**

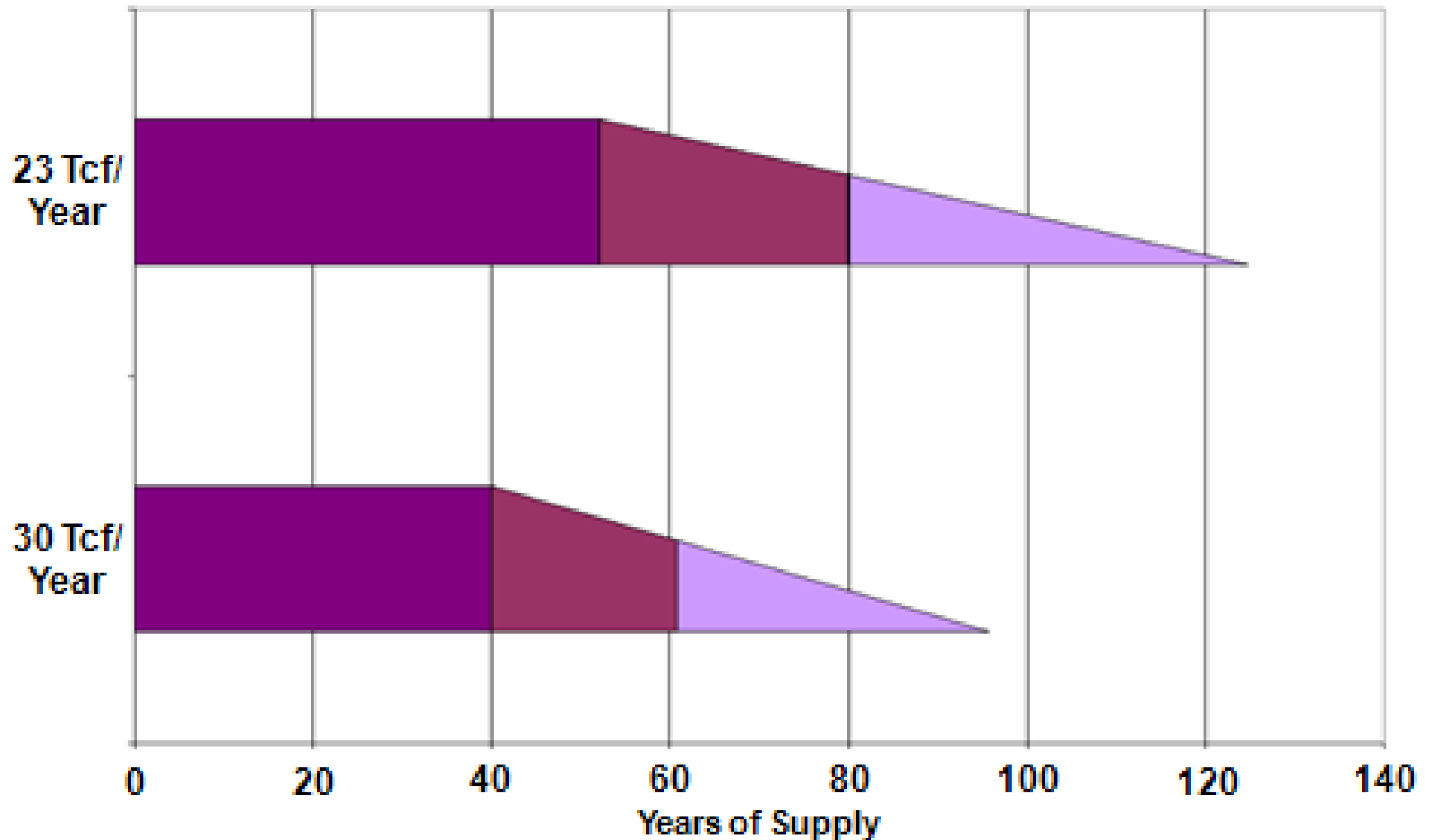
UNCERTAINTY!

UNCERTAINTY IN ESTIMATION

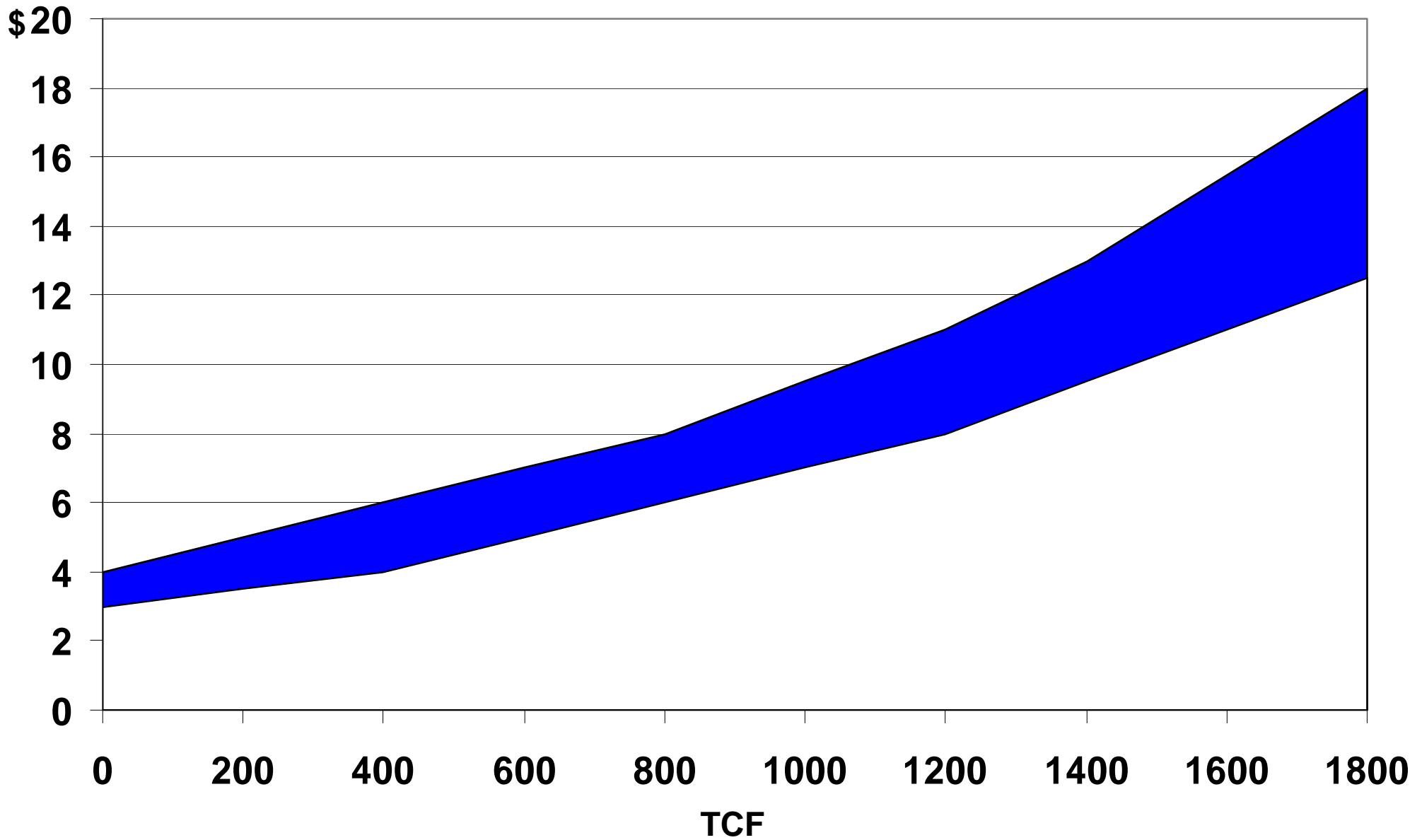
- **Approximate remaining resources:**

1190 – 1830 – 2885 TCF

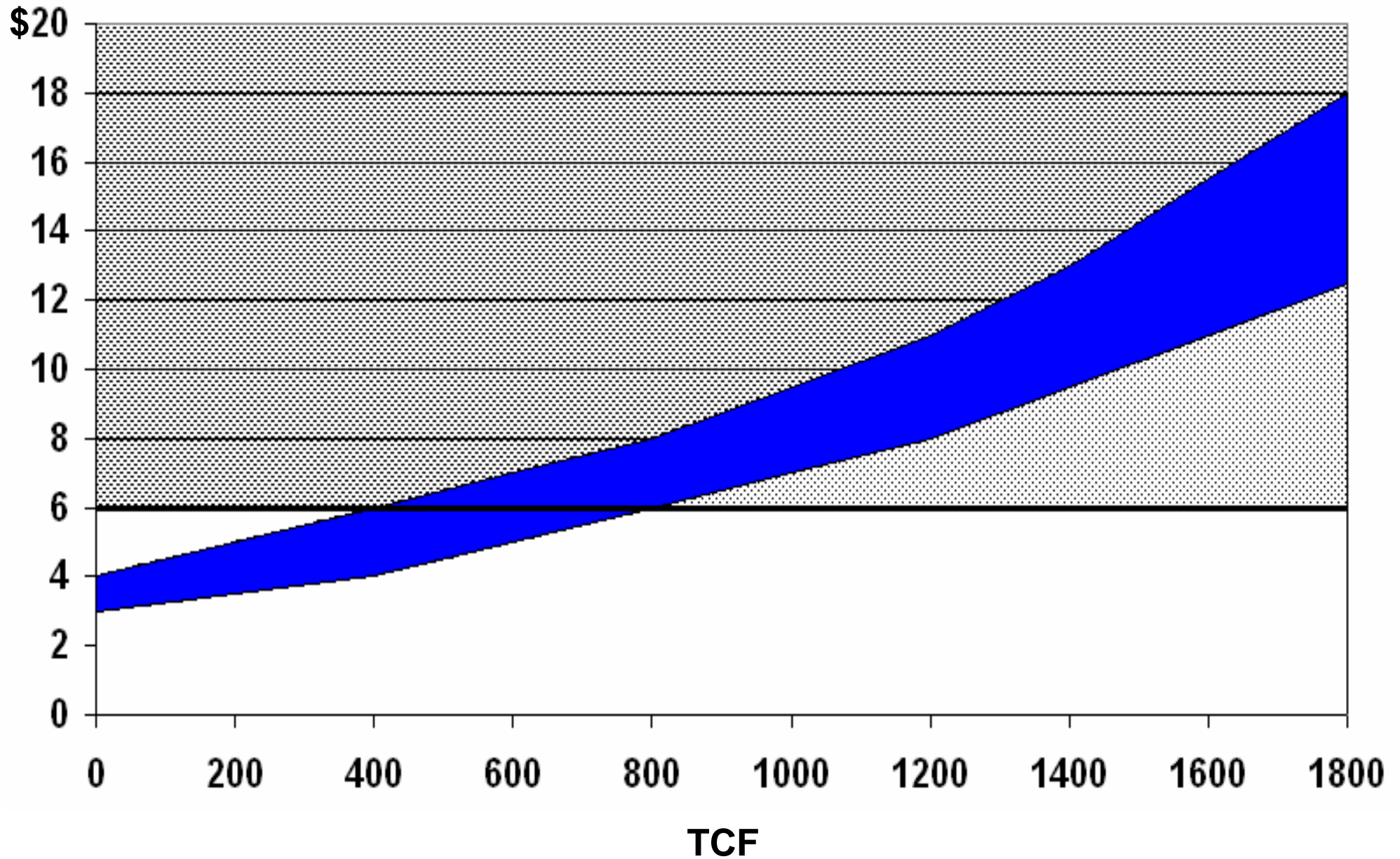
IMPLICATIONS FOR FUTURE SUPPLY



RESOURCE COST CURVE



ZONE OF IGNORANCE



KEY CONCLUSIONS

- **High confidence of enormous U.S. gas resources**
- **Range is uncertain, likely 1200-1600 TCF**
- **A few decades needed to reduce this uncertainty significantly**

POLICY IMPLICATIONS

- **Guarantee supply continuity**
- **Expand current markets**
- **Pursue new markets**

POLICY IMPLICATIONS (2)

- **LNG unnecessary for next twenty years**
- **Arctic gas ditto**
- **Gas exports to eastern Canada?**