

The Role of LNG in Meeting North America's Energy Needs

U.S. Department of Transportation
LNG Community Awareness Workshop
Washington, DC

Hal Chappelle
on behalf of the National Petroleum Council
February 2, 2005



NPC Study: Comprehensive North American Picture

National Petroleum Council

- Federally chartered, privately funded advisory committee
- Sole purpose is to advise and make recommendations to the Secretary of Energy
- Operates under Federal Advisory Committee Act
- Council comprised of ~175 members
- Study effort comprised Canada and US participants in supply, demand, and infrastructure

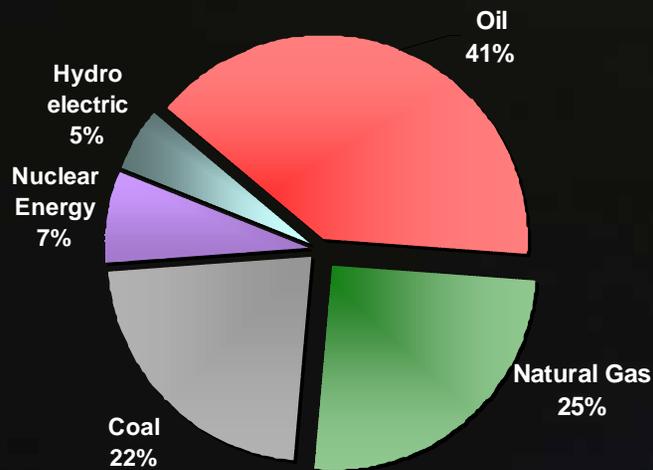
Secretary Abraham, March 2002

“Examine the potential implications of new supplies, new technologies, new perceptions of risk, and other evolving market conditions that may affect the potential for natural gas demand, supplies, and delivery through 2025 ... provide insights on energy market dynamics, including price volatility and future fuel choice, and an outlook on the longer-term sustainability of natural gas supplies ... advice on actions that can be taken by industry and Government to increase the productivity and efficiency of North American natural gas markets and to ensure adequate and reliable supplies of energy for consumers.”

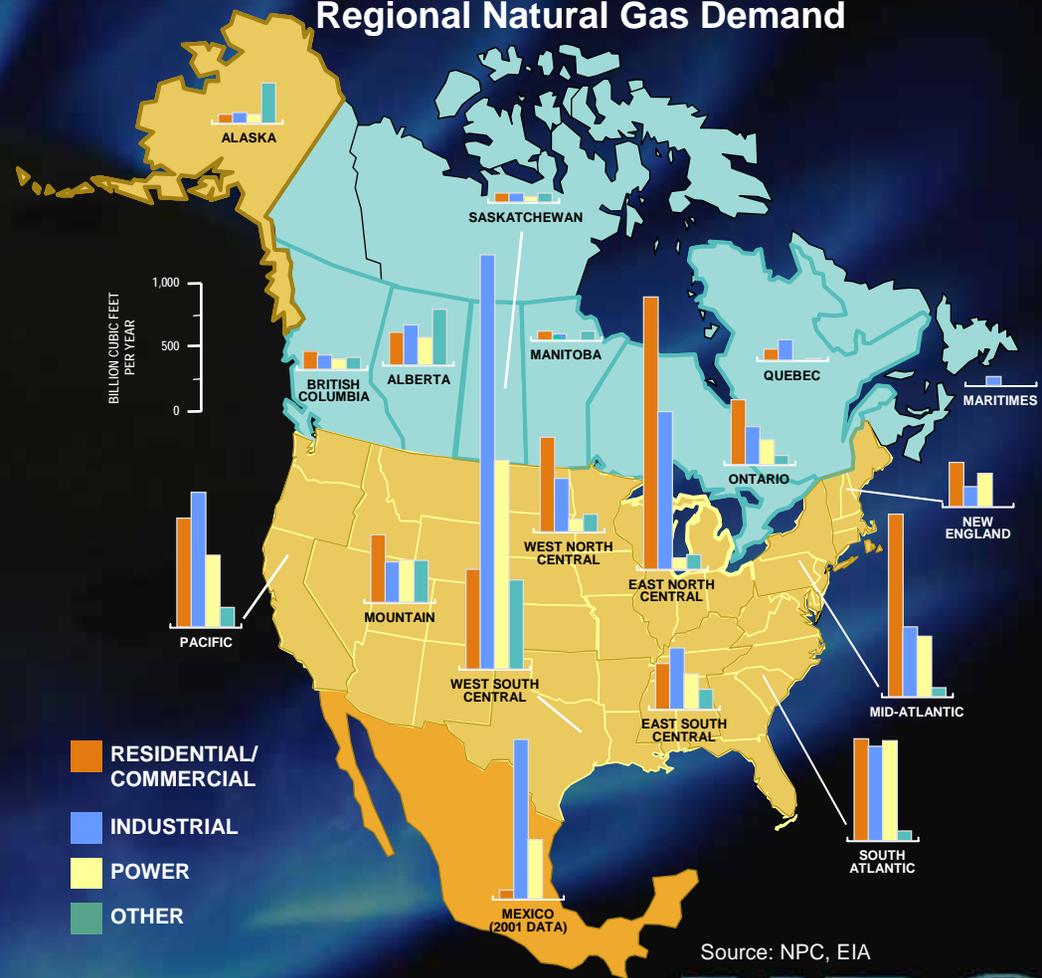
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Role of Natural Gas in North America

Primary Energy Demand



Regional Natural Gas Demand



Source: NPC, EIA

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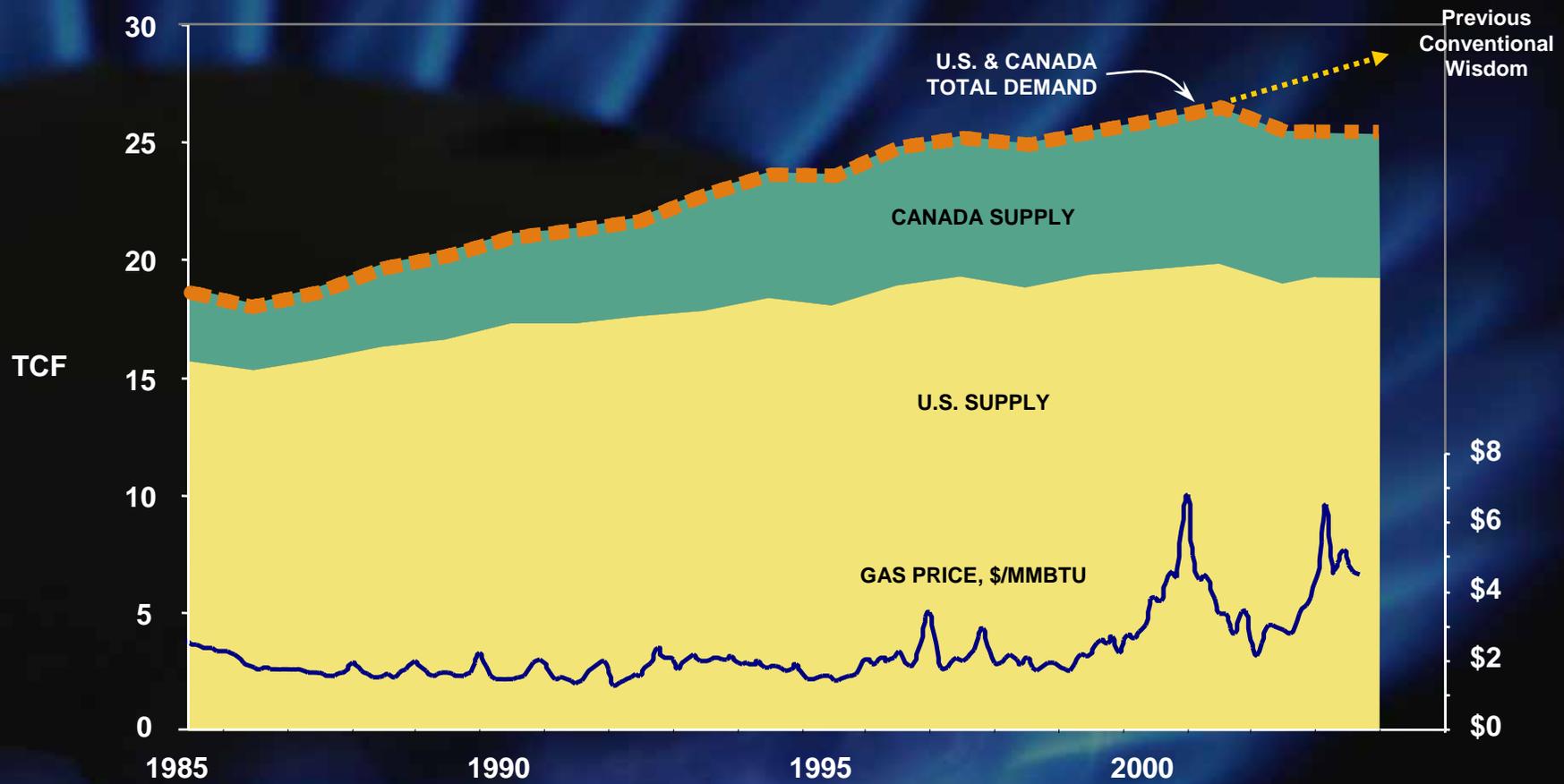
North America Pipeline Infrastructure



Robust, Interconnected Market

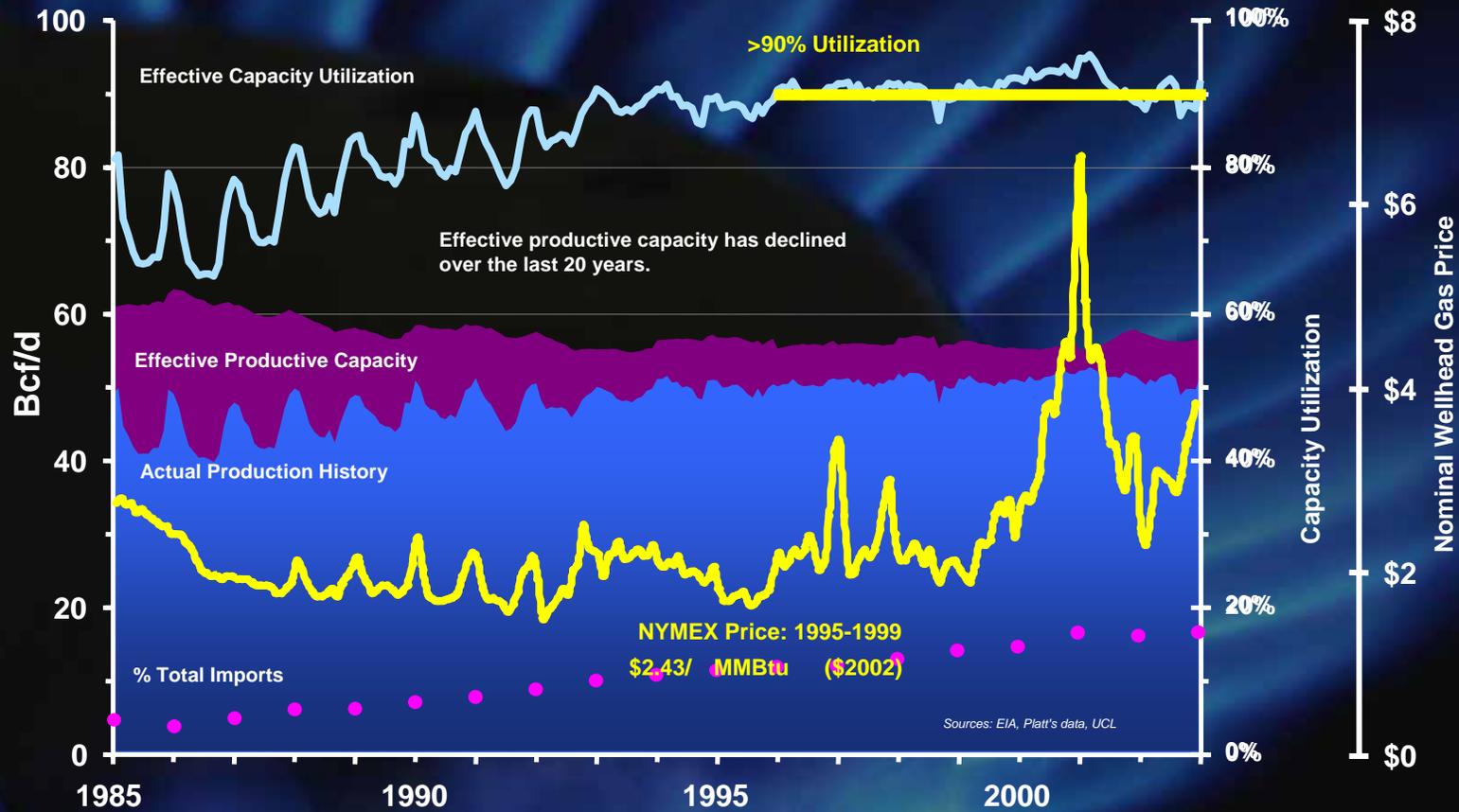
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Dramatic Change in the Gas Picture



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Tightening Supply & Demand



What the NPC Study Says ...

- North America has embraced the economic & environmental benefits of natural gas, particularly for power generation
- Domestic supply is growing slower than our ability to consume gas
- Tight supply/demand balance has fostered persistent higher prices
- At risk: industrial base, consumer costs, environmental goals
- Future must incorporate actions by both consumers and suppliers
- LNG is a logical, effective component in the portfolio of solutions for our society's energy needs

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Another View

- "... the rise in the long term supply price of natural gas appears related primarily to supply and demand in North America ..."
- "... high prices are one of the major obstacles to the growth of the U.S. economy ..."
- "The recent shift in expectations ... has been substantial enough and persistent enough to influence business investment decisions, especially for facilities that require large quantities of natural gas ..."
- "Canada, which has recently supplied a sixth of our consumption, has little capacity to significantly expand its exports ..."
- "Without the flexibility such [LNG] facilities impart, imbalances in supply and demand must inevitably engender price volatility ... a major expansion of U.S. import capability appears to be under way ... bod[ing] well for widespread natural gas availability in North America in the next decade and beyond. The near term, however, is apt to continue to be challenging ..."



Findings on Natural Gas Supply

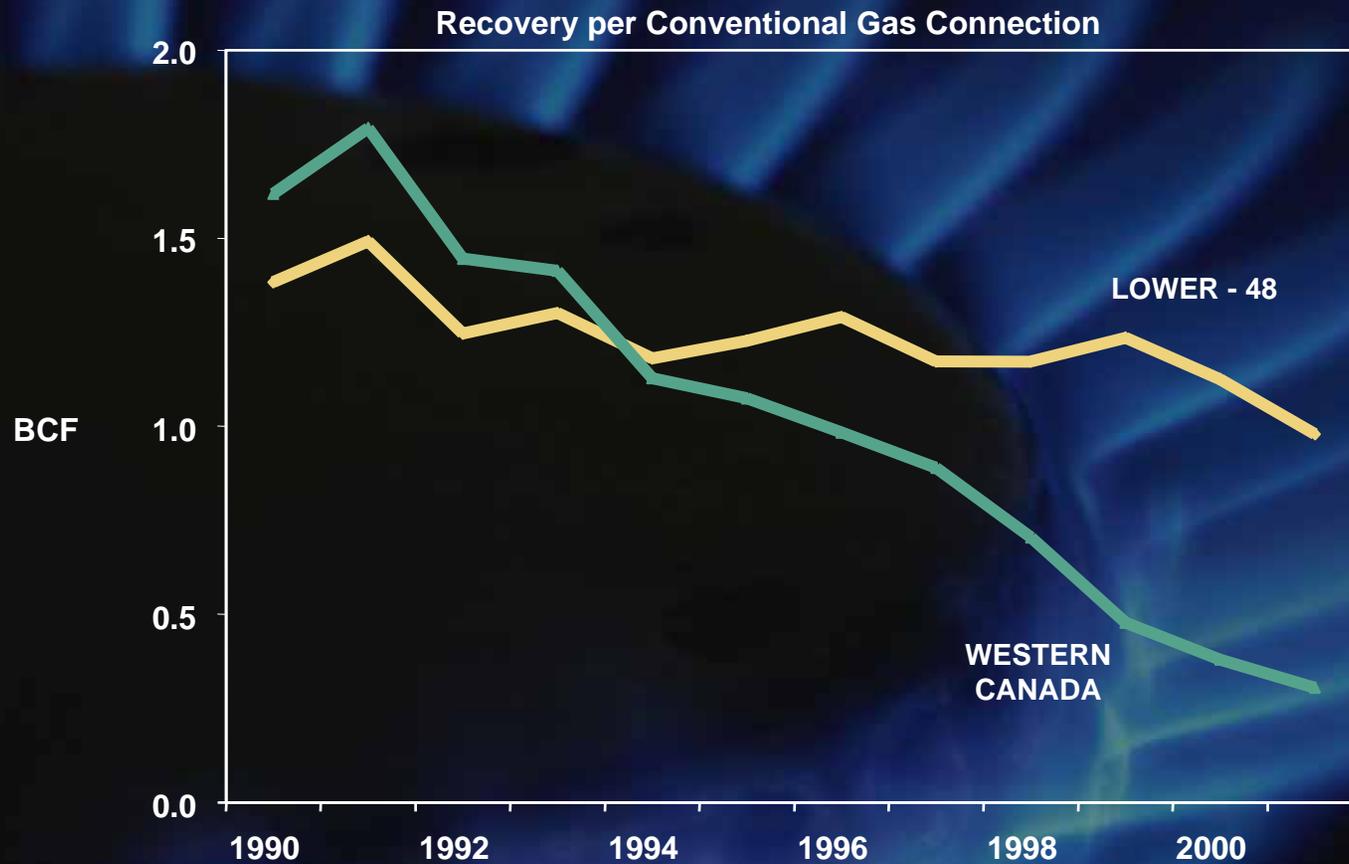
Traditional North American producing areas will provide 75% of long-term U.S. gas needs, but will be unable to meet projected demand

Increased access to U.S. resources (excluding designated wilderness areas and national parks) could save consumers \$300 billion in natural gas costs over the next 20 years

New, large-scale resources such as LNG and Arctic gas are available and could meet 20-25% of demand, but are higher-cost, have longer lead times, and face major barriers to development

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North America Well Recoveries

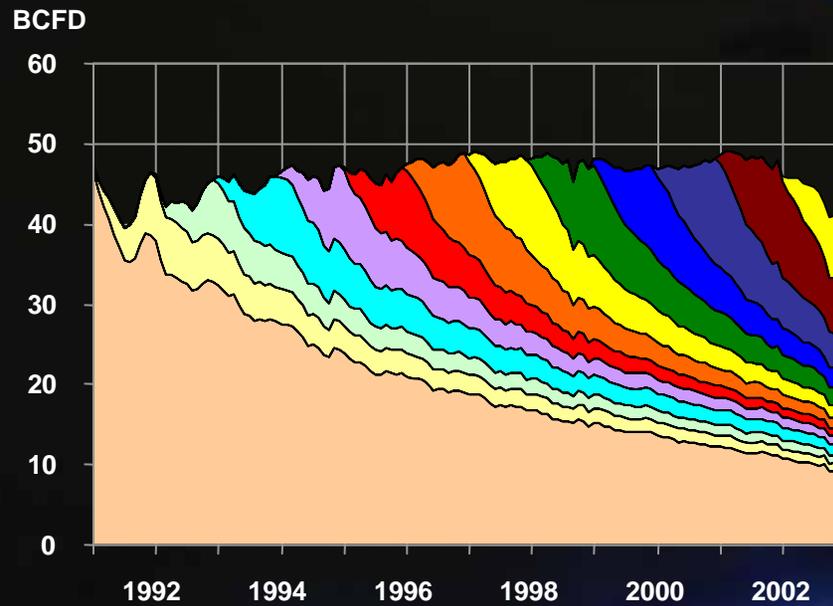


Production Confirms a Maturing Resource Base

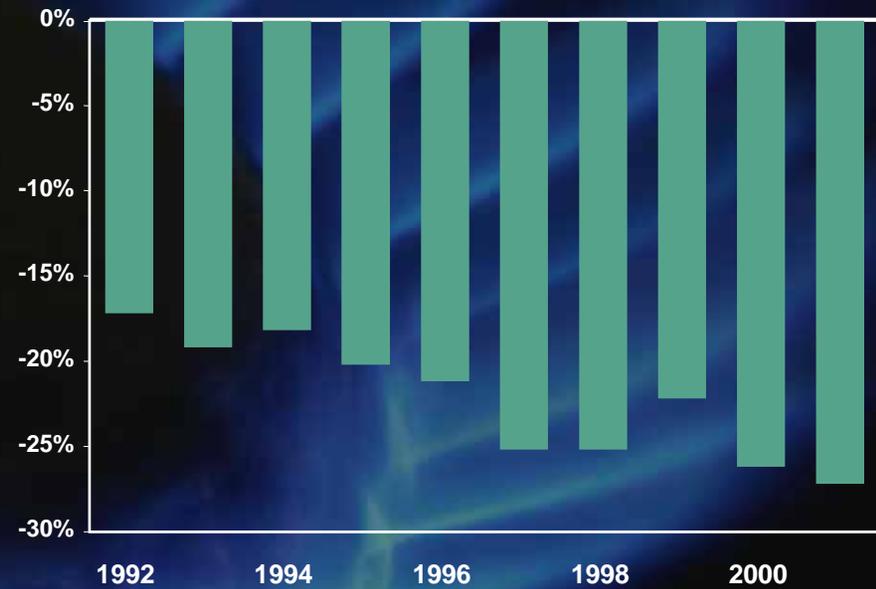
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Mature Resource Base

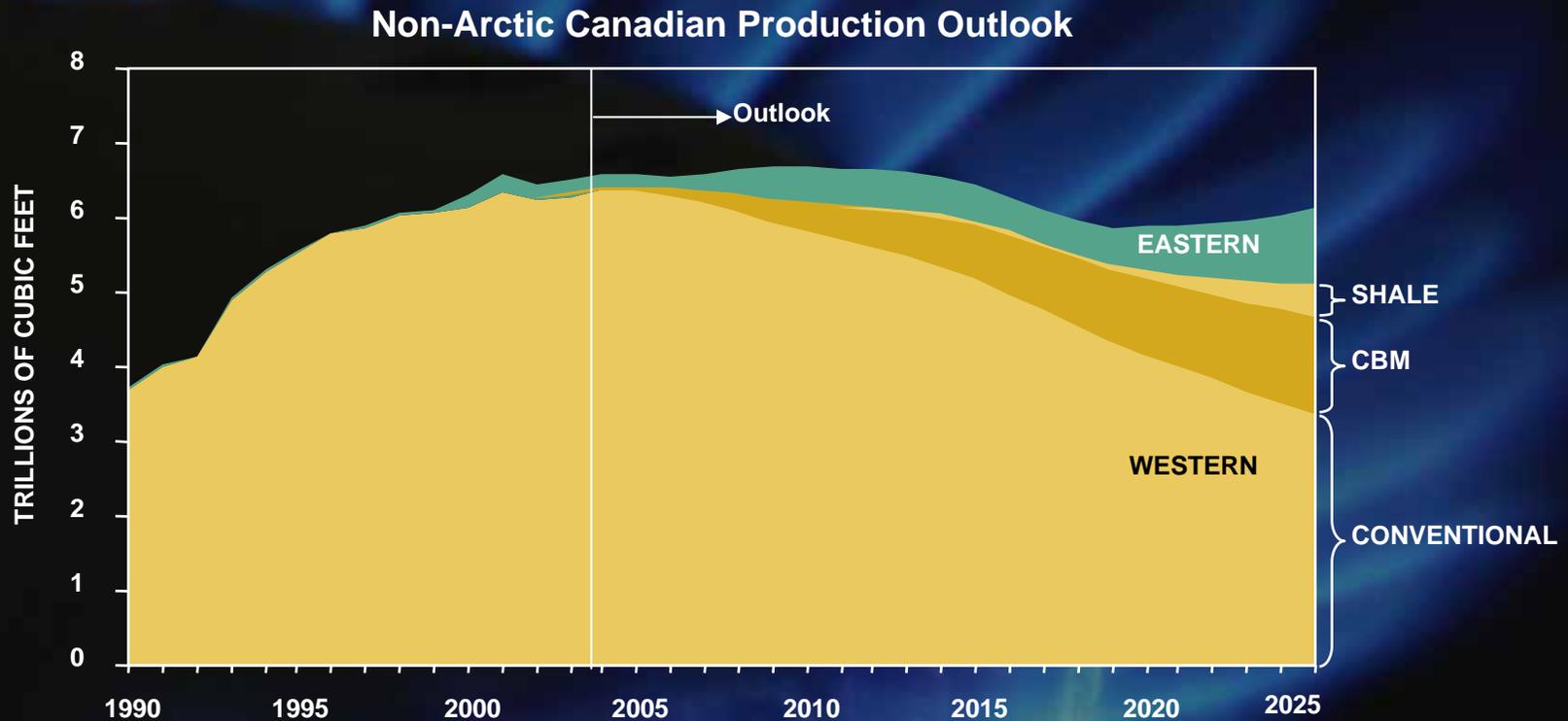
Lower - 48 Wet Gas Production from Gas Wells,
by Year of Production Start



Lower - 48 Decline Rate From Existing Wells



Outlook for Canadian Gas Supplies

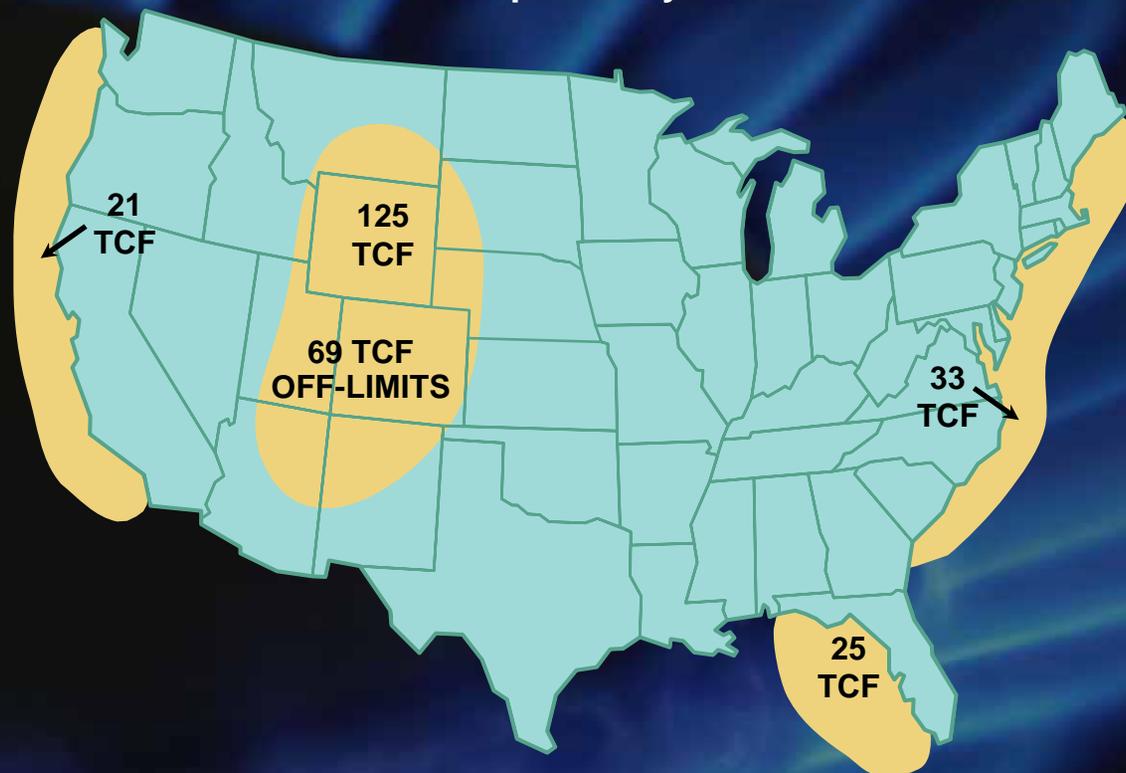


Canada Production Plateauing

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Access: A Key Issue

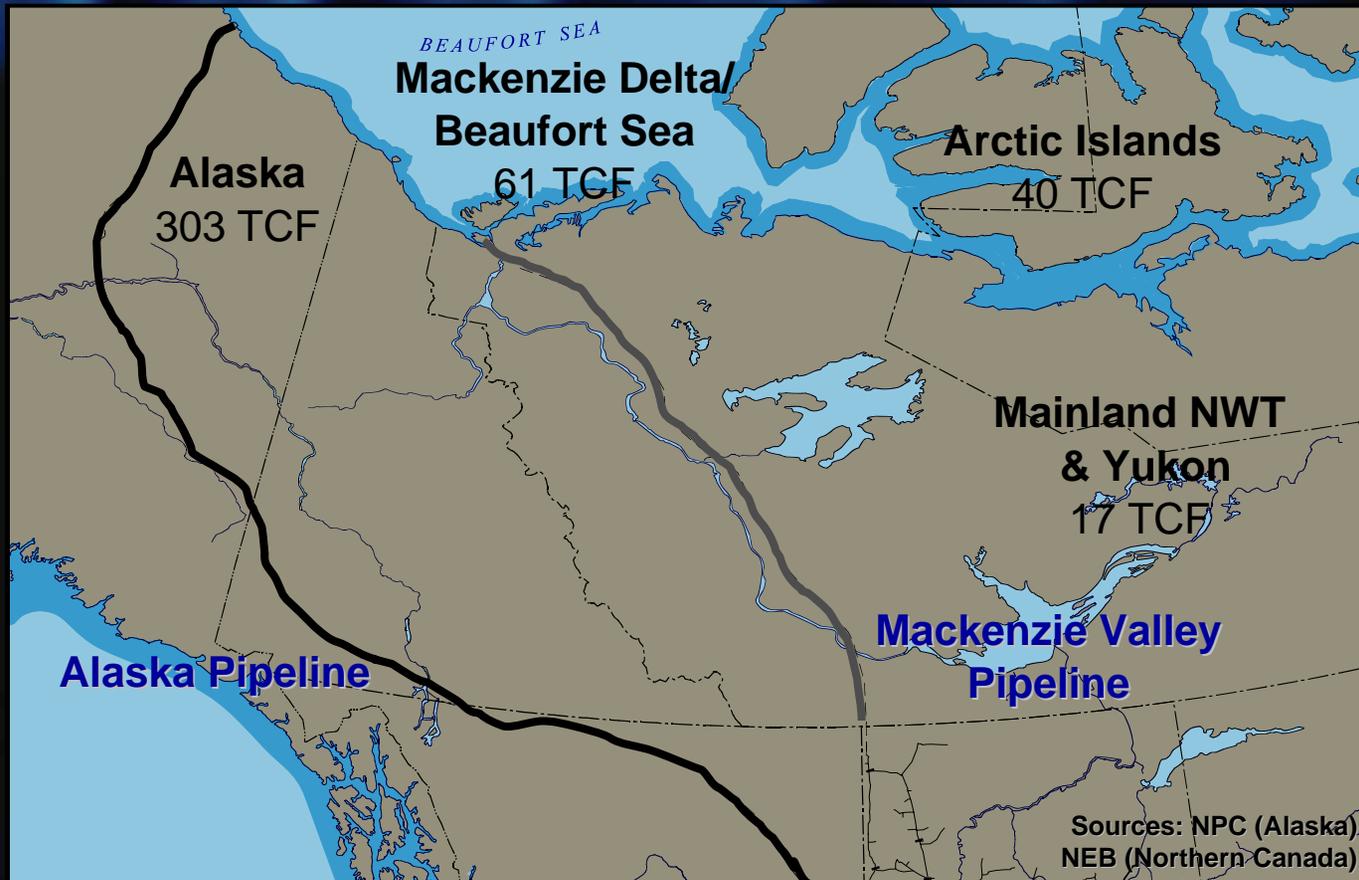
Technical Resource Impacted by Access Restrictions



U.S. Resources Are Not Fully Utilized

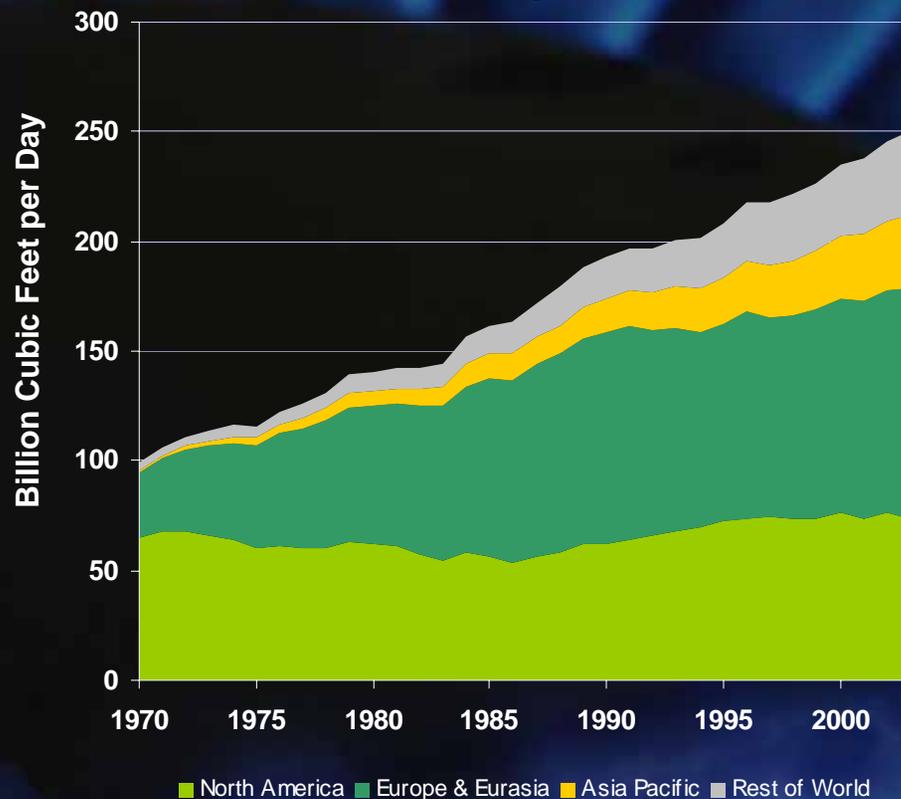
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Arctic: Large Resources, Long Lead Times



Global Natural Gas: Vast Resources

Consumption

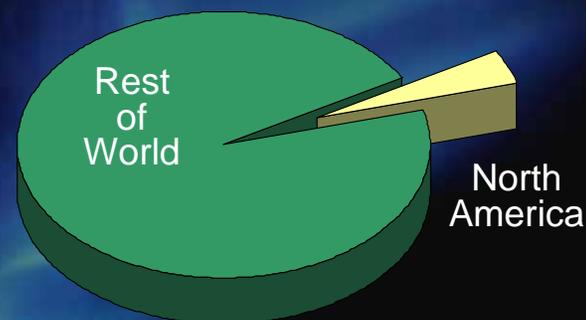


Source: BP Statistical Review

Global Growth in Gas

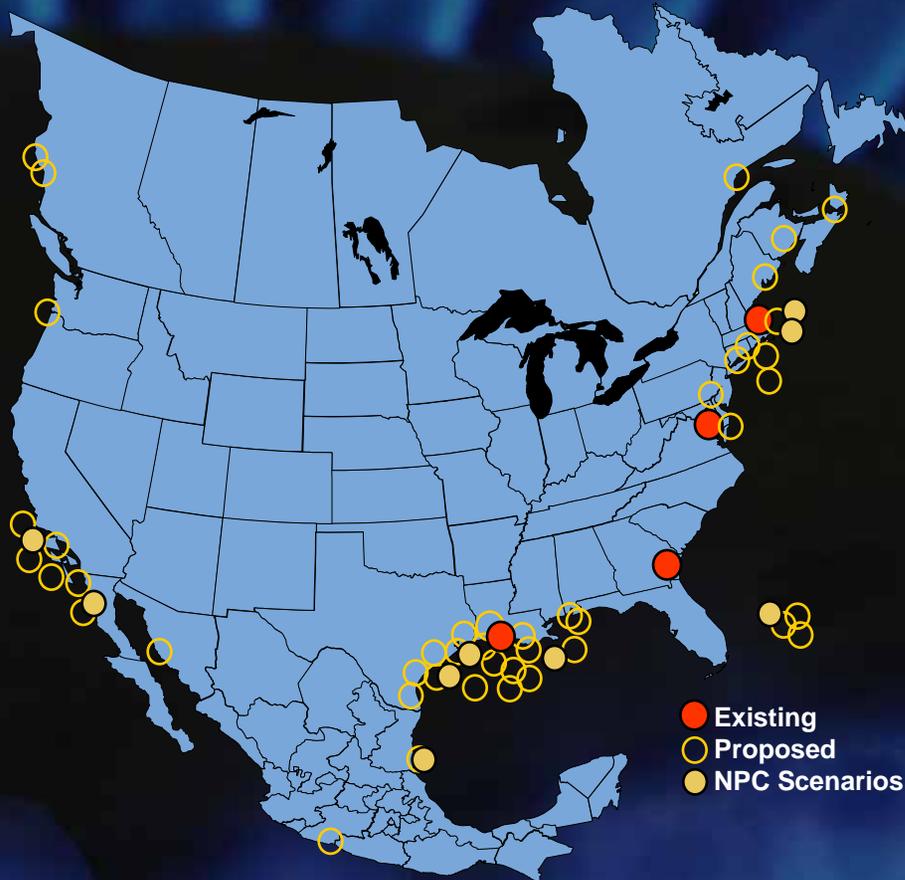
- Economic Growth and Technology Advancements
- Environmental Priorities: Cleanest-Burning Hydrocarbon
- Stranded/Wasted Natural Gas: Bringing Resources to Market

Reserves



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LNG: Access to World Resources



Source: NPC, September 2003;
FERC, August 2004

NPC Outlook for LNG

- World market growth has fostered efficiency, safety, and cost-competitiveness
- LNG likely to grow to 14%-17% of gas supply from present 2%
- Expansions of existing terminals likely
- 7-9 new terminals likely, more possible
- Public opposition and/or permitting delays could reduce number of terminals

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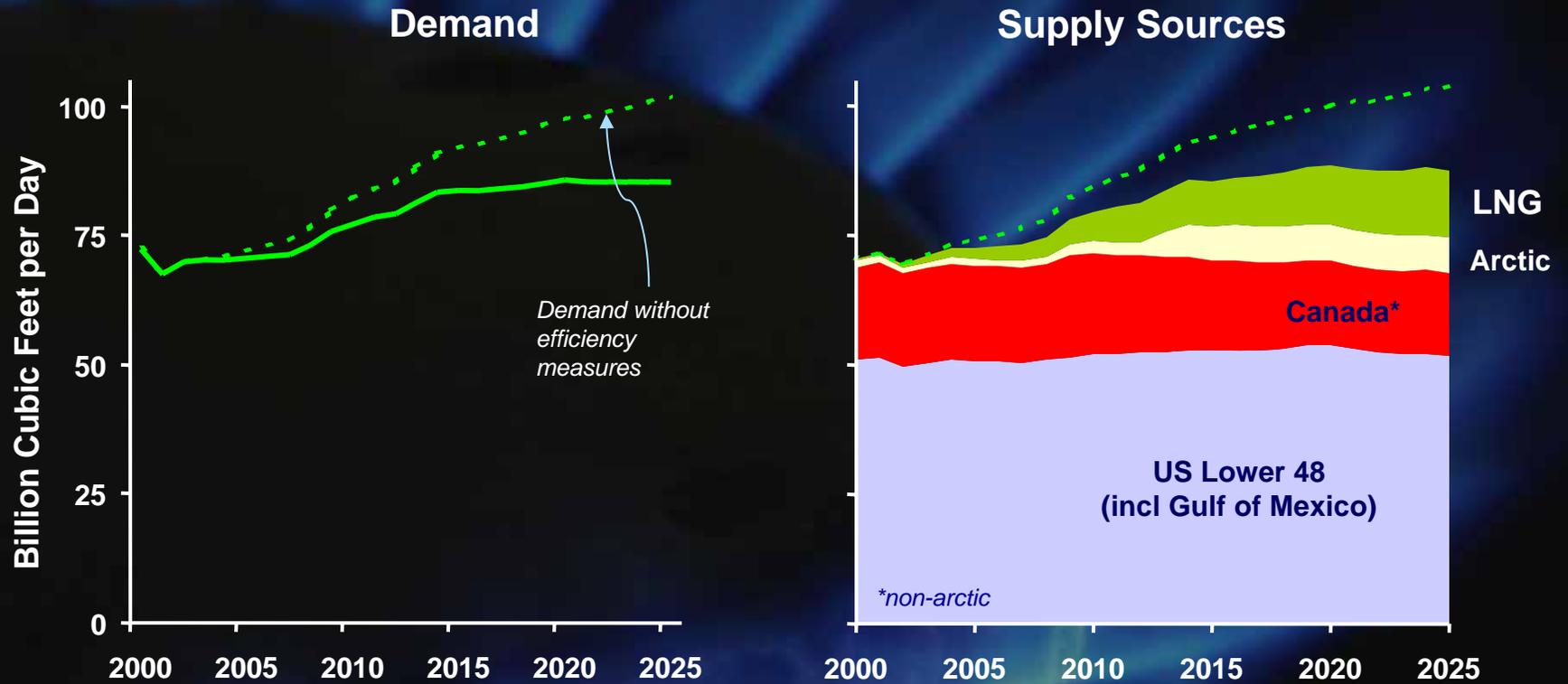
Findings on Natural Gas Demand

Greater energy efficiency and conservation are vital near-term and long-term mechanisms for moderating price levels and reducing volatility

Power generators and industrial consumers are more dependent on gas-fired equipment and less able to respond to higher gas prices by utilizing alternate sources of energy

Gas consumption will grow, but such growth will be moderated as the most price-sensitive industries become less competitive, causing some industries and associated jobs to relocate outside North America

Effect of Efficiency on Supply/Demand Balance



The NPC's "Balanced Future" scenario illustrates the potential impacts of energy efficiency

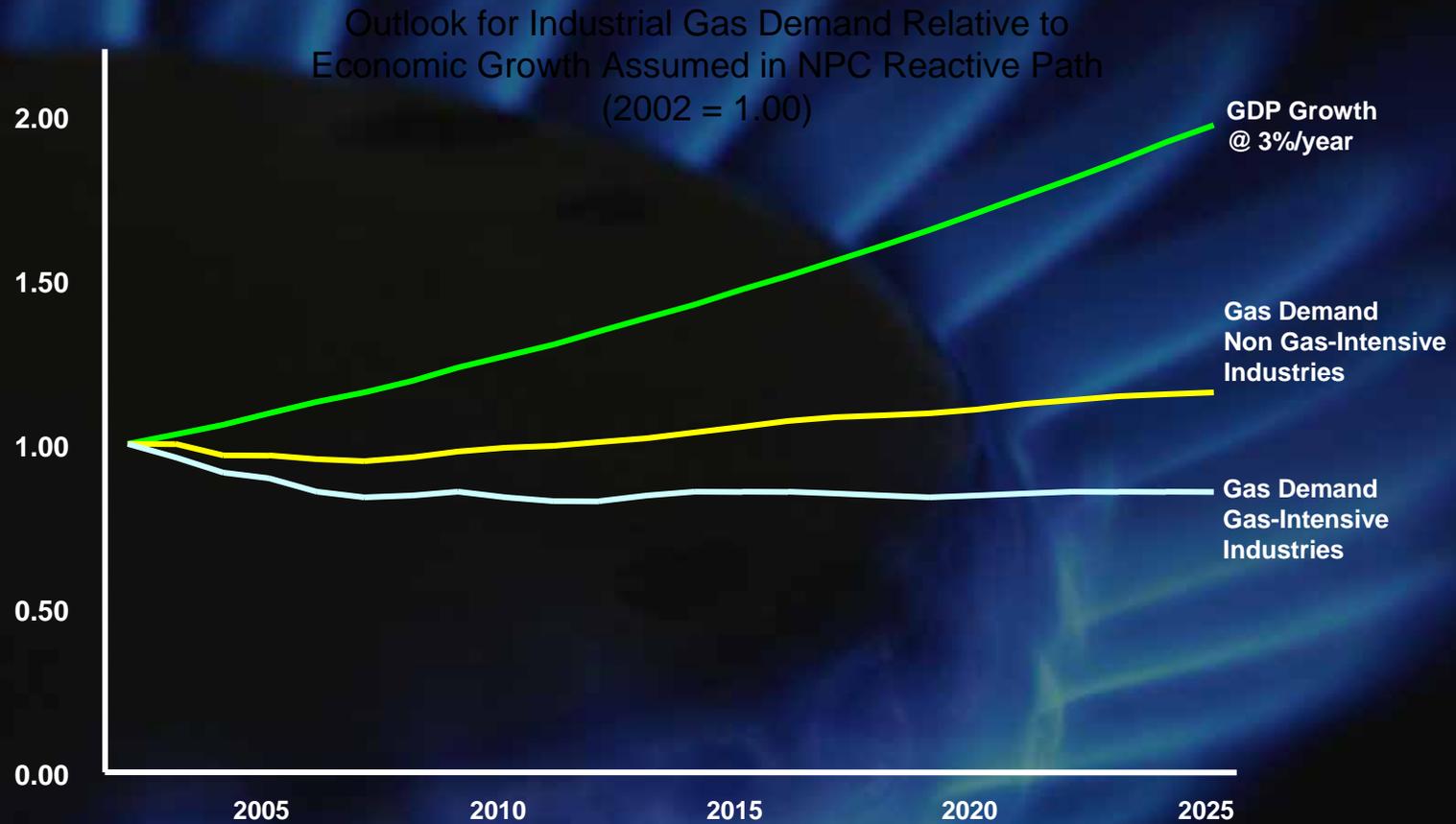
Impact of Natural Gas on Industries

- **North American industries heavily reliant on natural gas**
 - environmental preference ... air quality, ease of permitting
 - economic preference ... historic low costs, technologic advantages
 - US, Canada petrochemicals >65% gas-based ... Europe, Asia <15%
- **Competition in global marketplace for industrial capacity and related jobs**
- **Economic threat: permanent loss of capacity and related jobs**

Output of Top Ten Chemical Producing Countries



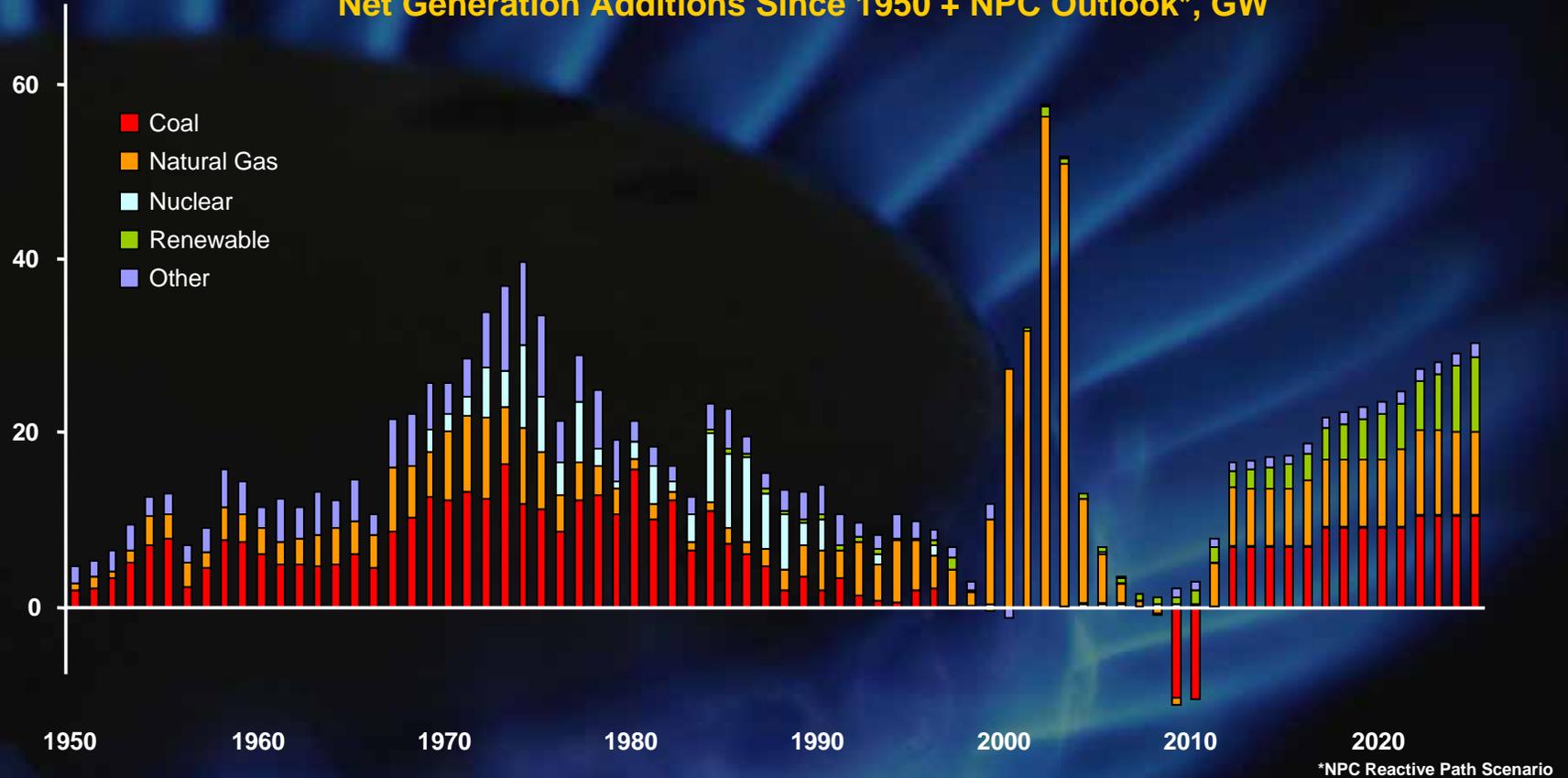
Outlook for Industrial Consumers



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Power Generation: Dramatic Change

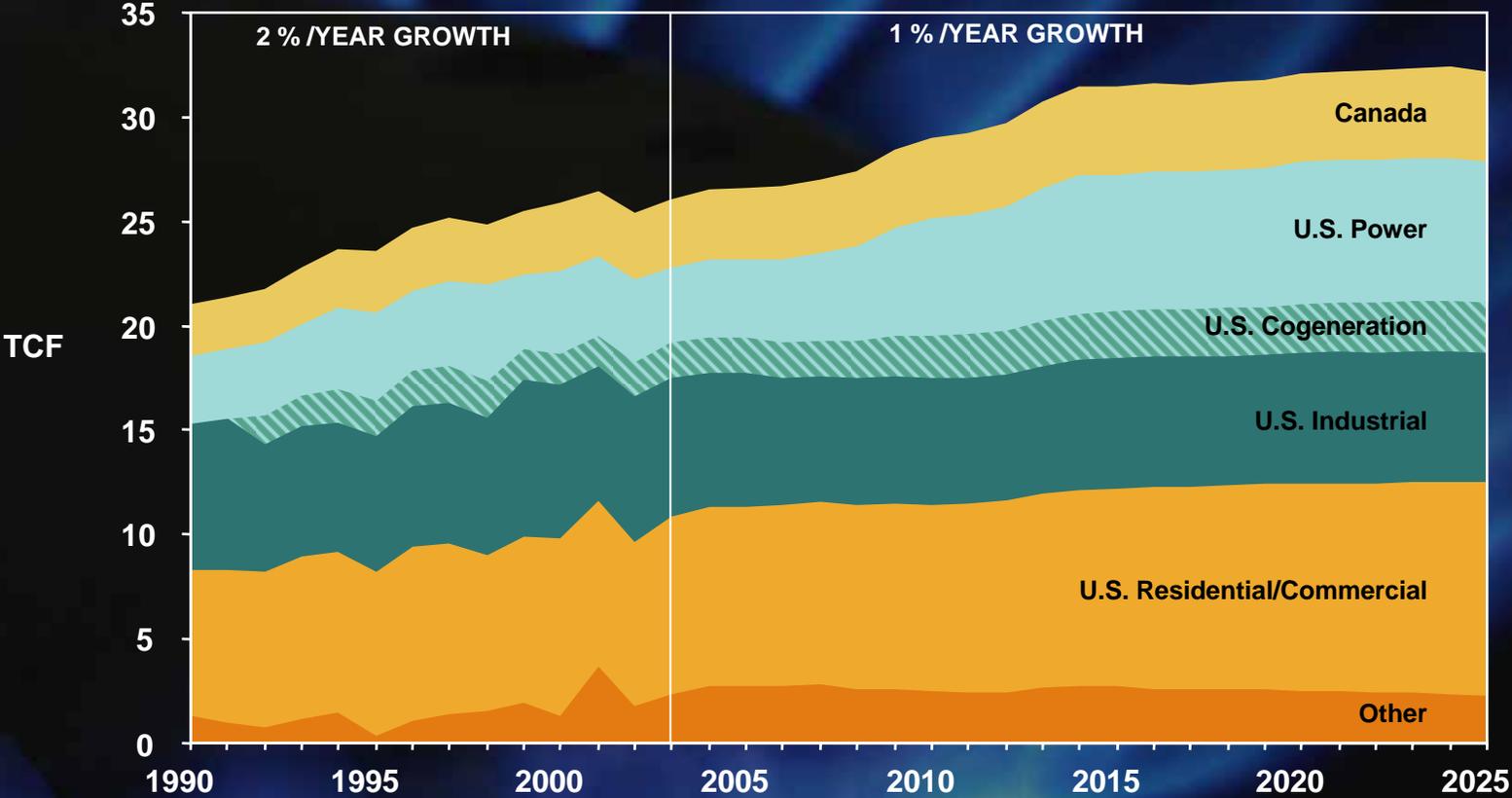
Net Generation Additions Since 1950 + NPC Outlook*, GW



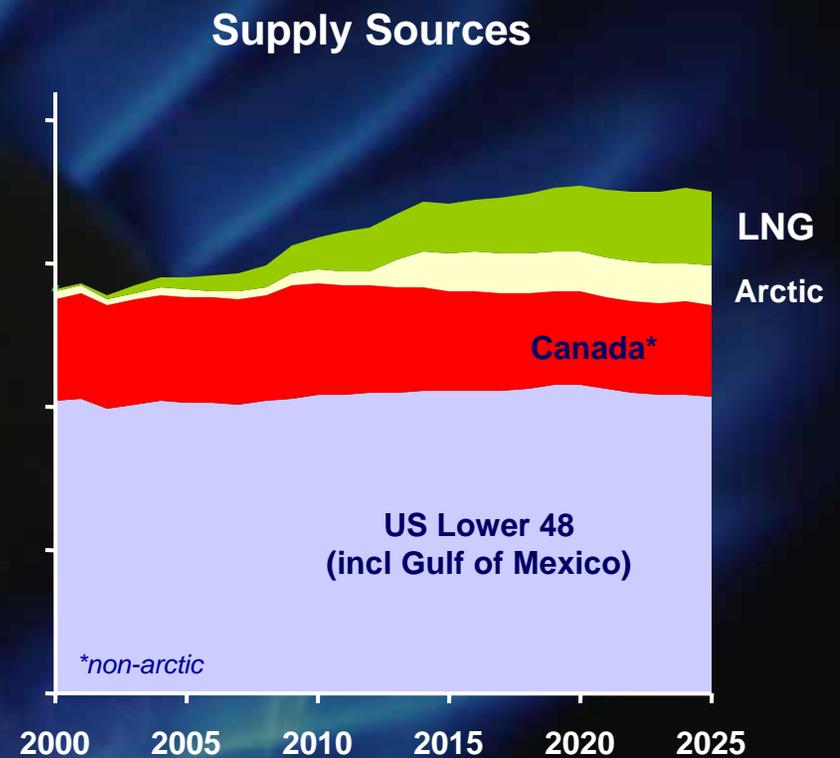
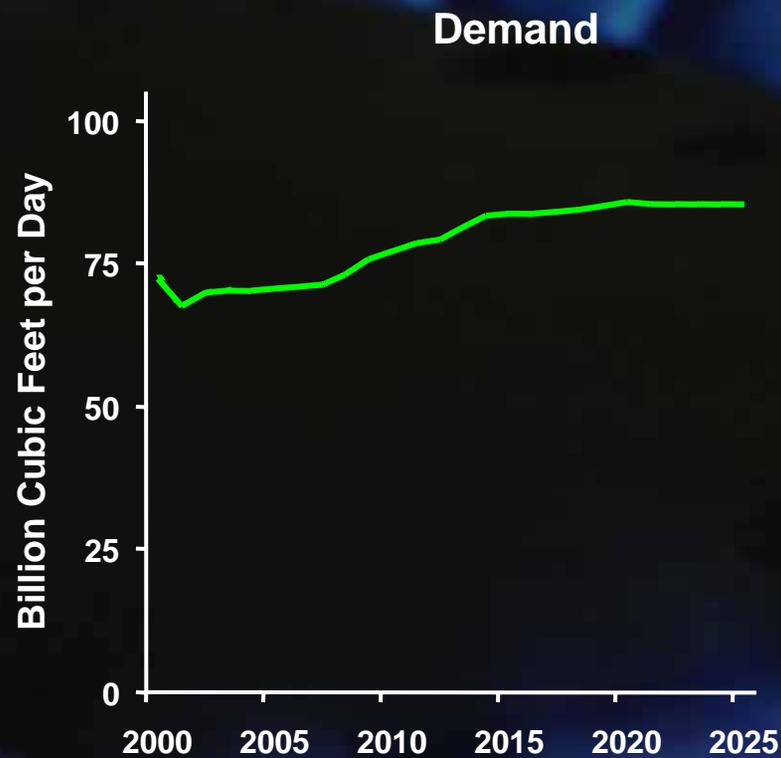
Power Generation Relies on Balanced Fuel Mix

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Overall Demand Growth Will Likely Moderate, While the Power Sector Drives Growth



A Balanced Portfolio of Actions by Consumers, Suppliers, and Infrastructure Providers Will Include LNG



Summary

- LNG plays an important role today, both for reliability on a broad national basis, and for base supplies regionally
- The NPC found that LNG will be an important component of a balanced portfolio of actions to meet North American natural gas needs in the future
- Vast world natural gas resources could enable LNG to play a larger role in future supply than envisioned in the NPC scenarios, if demand is greater or other supply sources less reliable and/or cost-effective

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Action Needed

Demand

Flexibility & Efficiency

Encourage increased efficiency and conservation through market-oriented initiatives and consumer education.

Increase industrial and power generation capability to utilize alternate fuels.

Supply

Diversity

Increase access and reduce permitting impediments to Lower-48 natural gas resource development

Enabling Legislation for an Alaska gas pipeline.

Process LNG project permit applications within one year.

Infrastructure

Sustain & Expand

Provide consistent cost-recovery and contracting environment, remove regulatory barriers to long-term capacity contracting

Permit projects within a one-year period utilizing a "Joint Agency Review Process"

Markets

Efficiency

Improve transparency of price reporting.

Expand and enhance natural gas market data collection and reporting.

Policy in All Areas Affects Natural Gas Consumers

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