

Gasification as a Strategic Energy and Environmental Option

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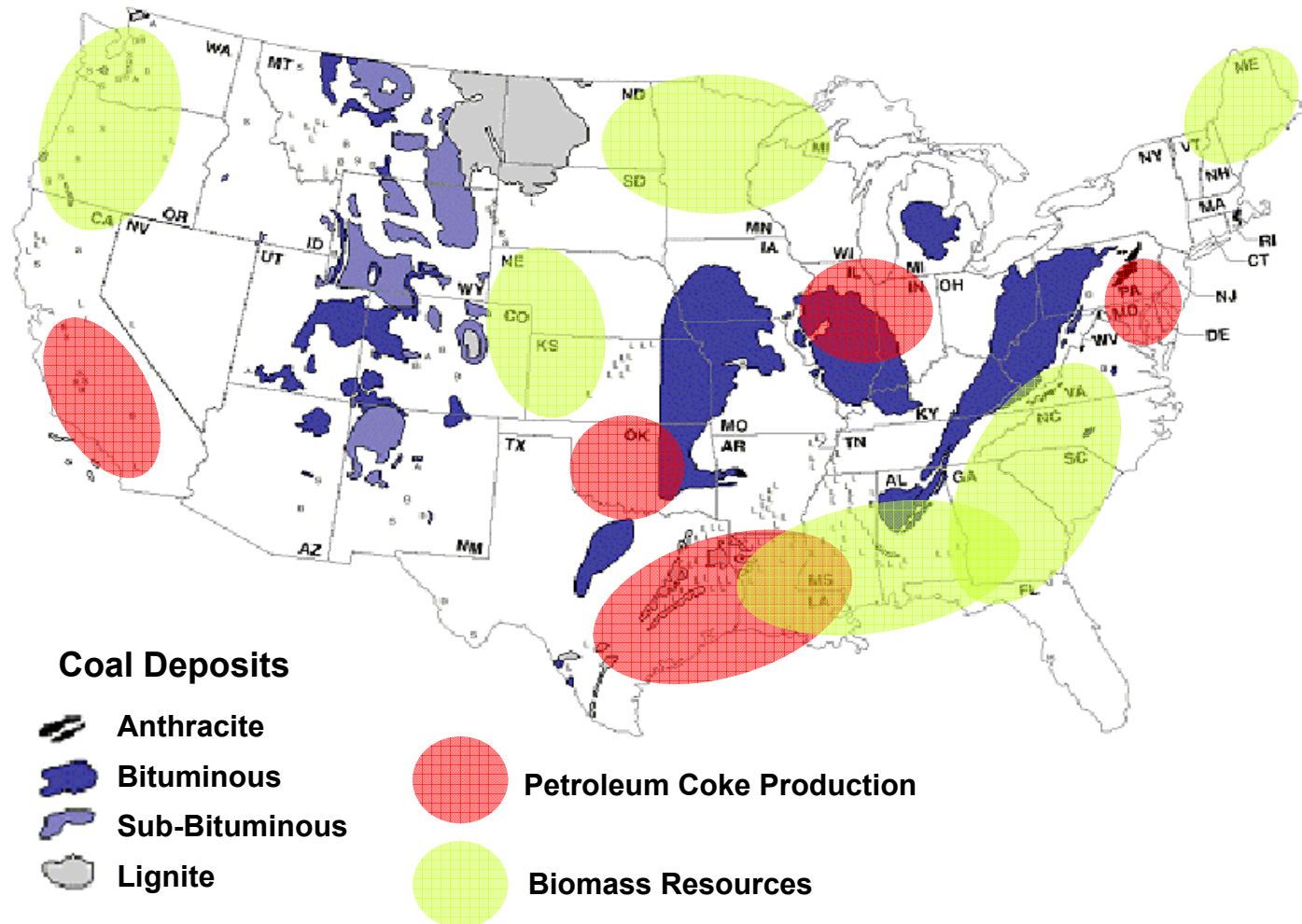
Presentation Overview

1. Drivers

2. Gasification Opportunities & Challenges

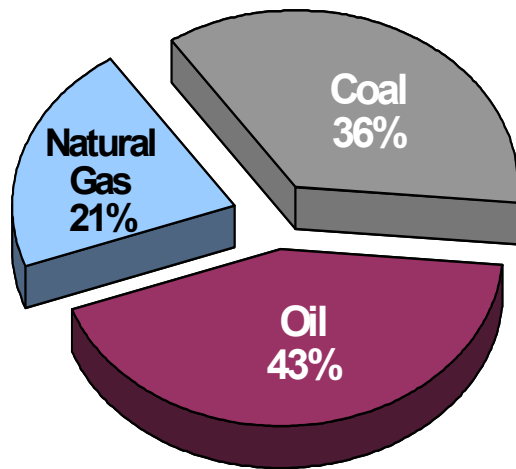
3. Deployment Incentives

U.S. Coal, Pet-Coke, Biomass Resources



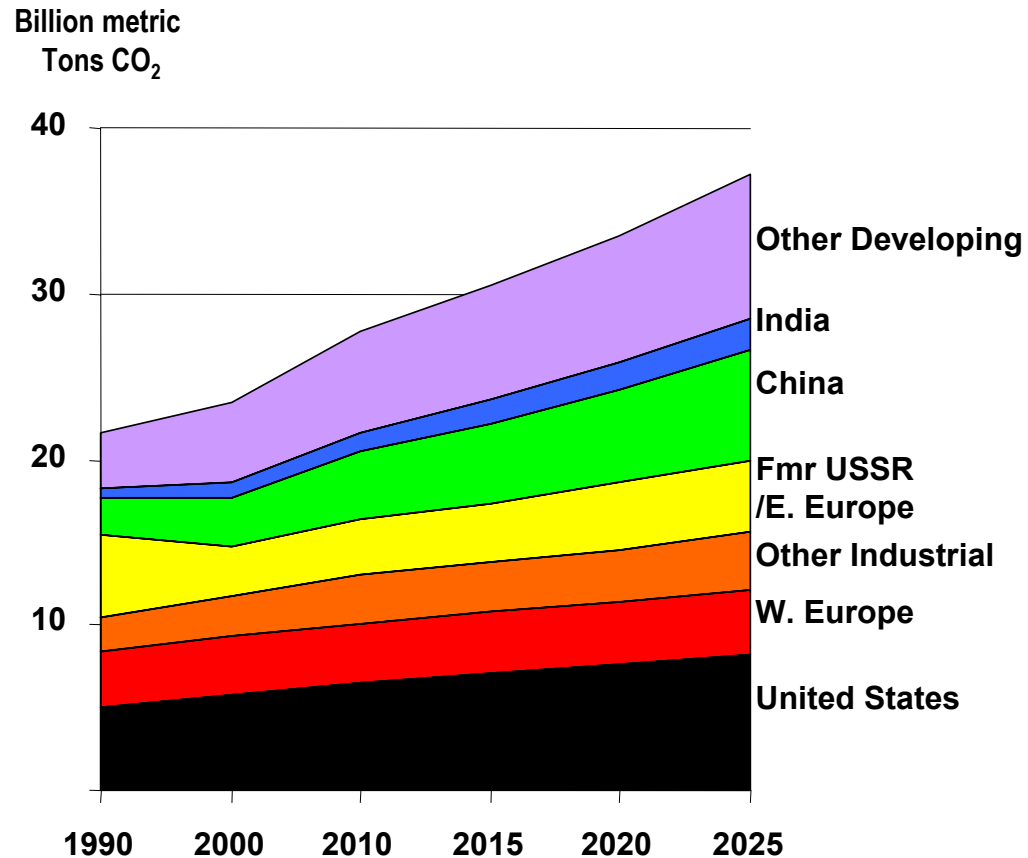
Global Climate Change Challenge

2004 U.S. CO₂ Emissions By Fuel Source



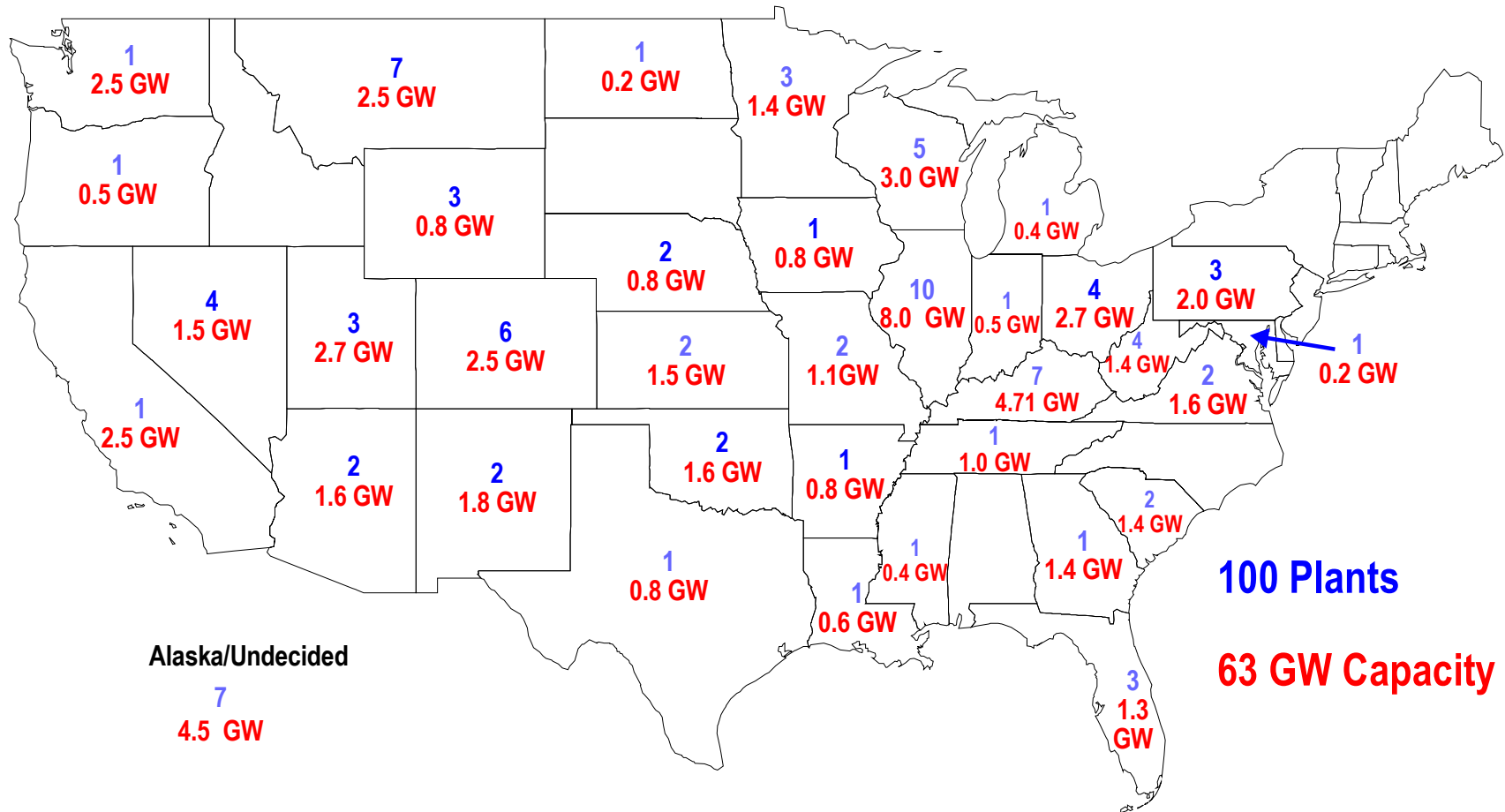
5.8 billion metric tons CO₂

World CO₂ Emissions



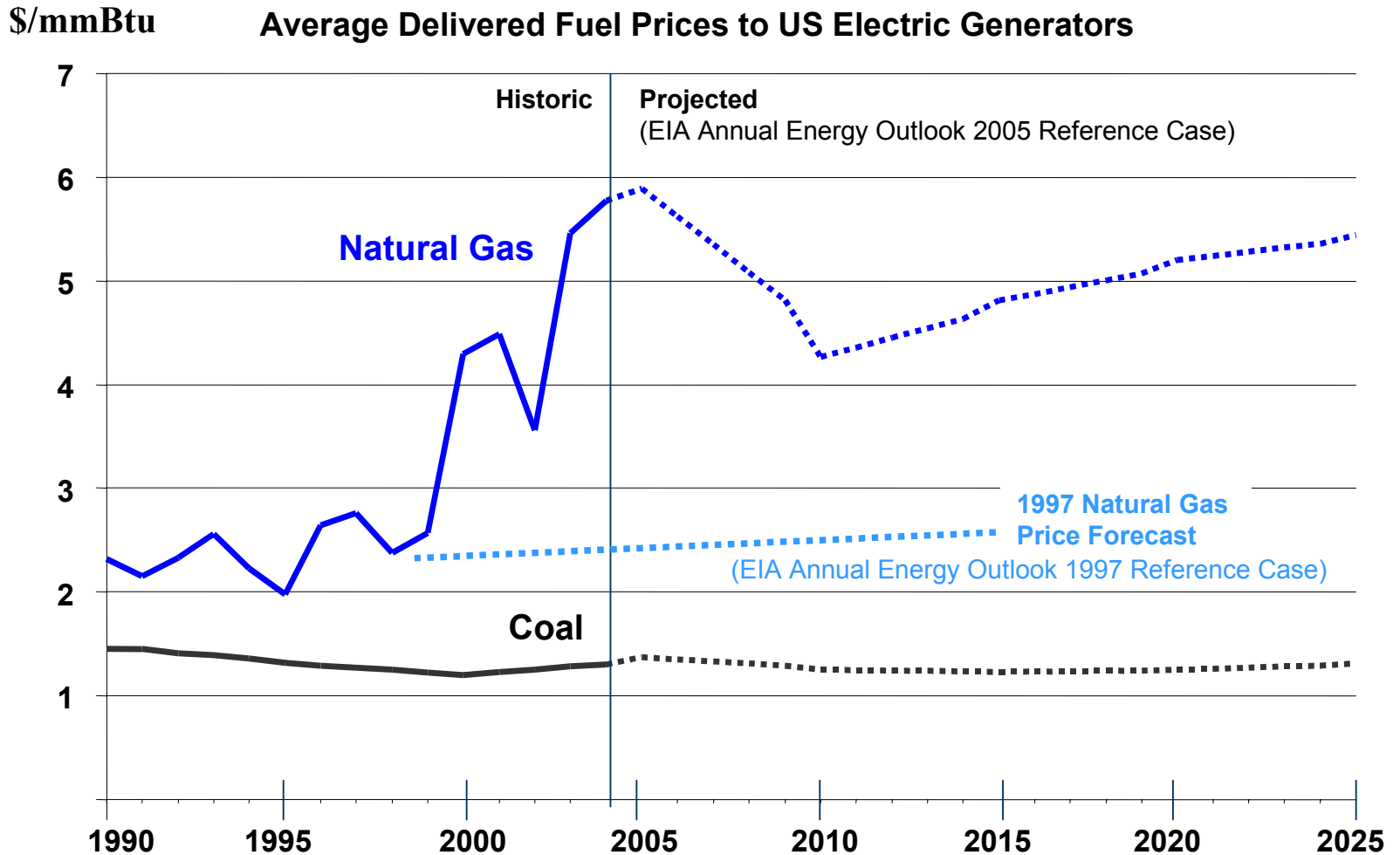
Source: EIA, International Energy Outlook 2004.

New Coal Power Plant Development

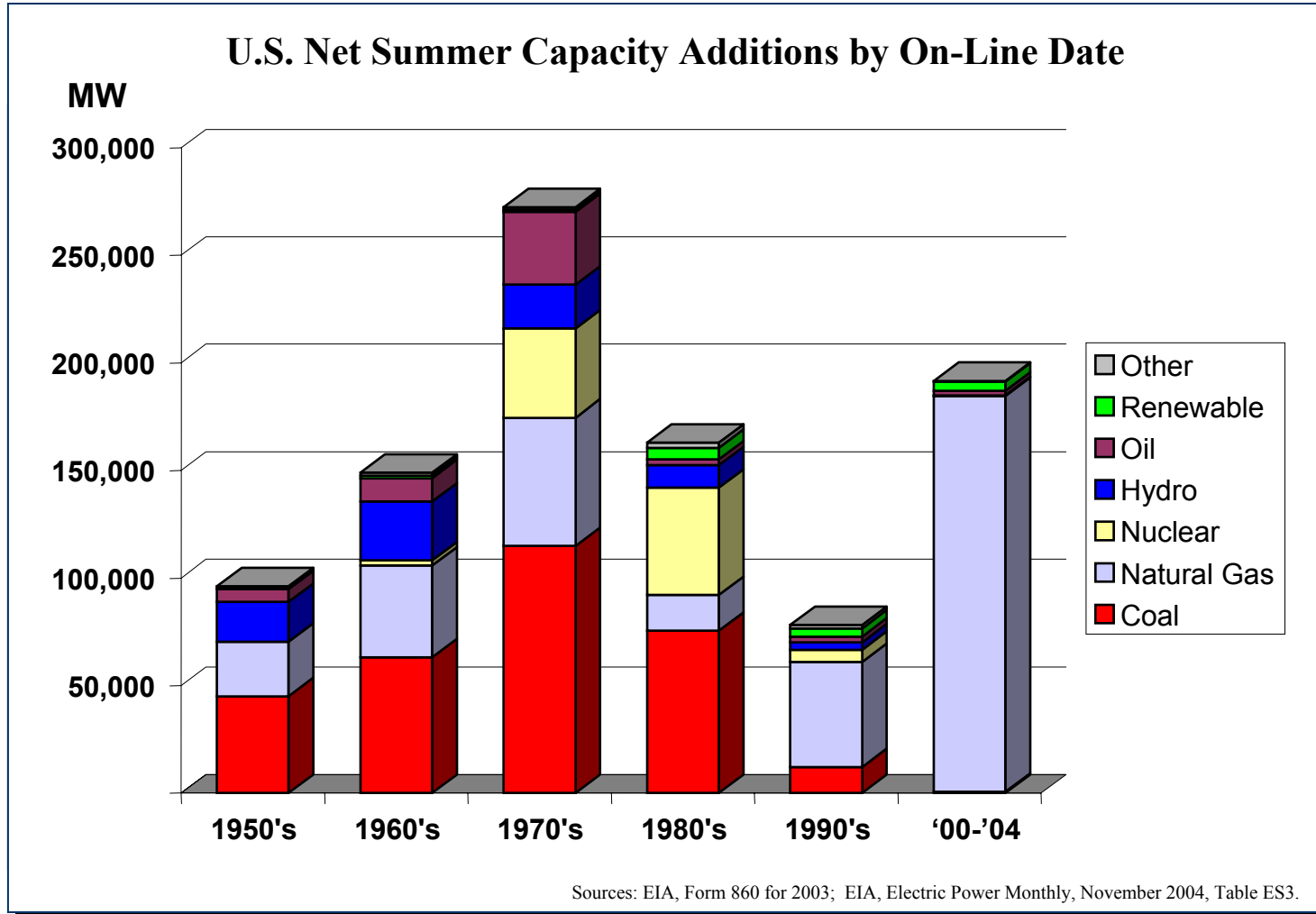


Source: NETL, Tracking New Coal-fired Power Plants, September 2004.

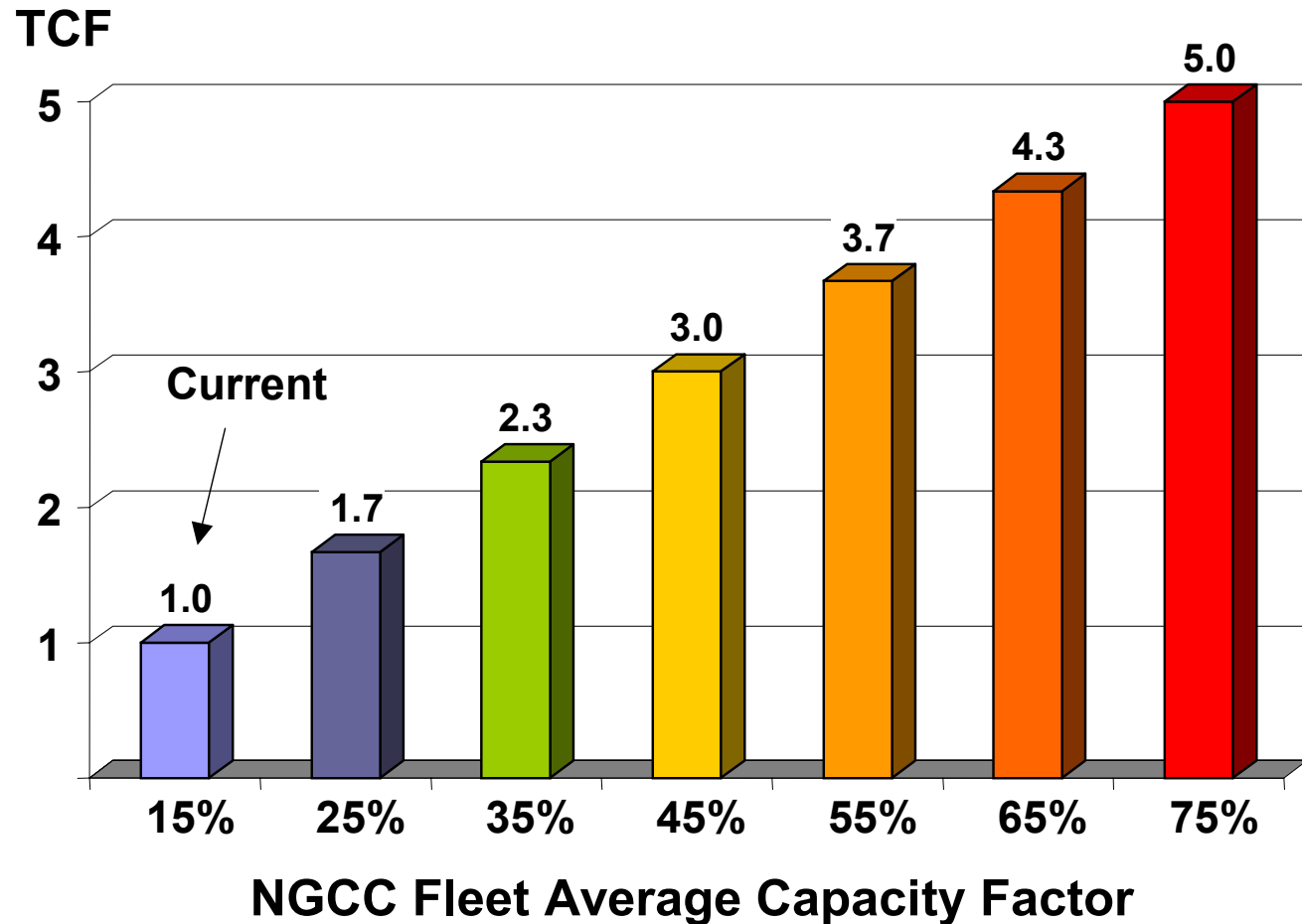
Natural Gas Price Outlook



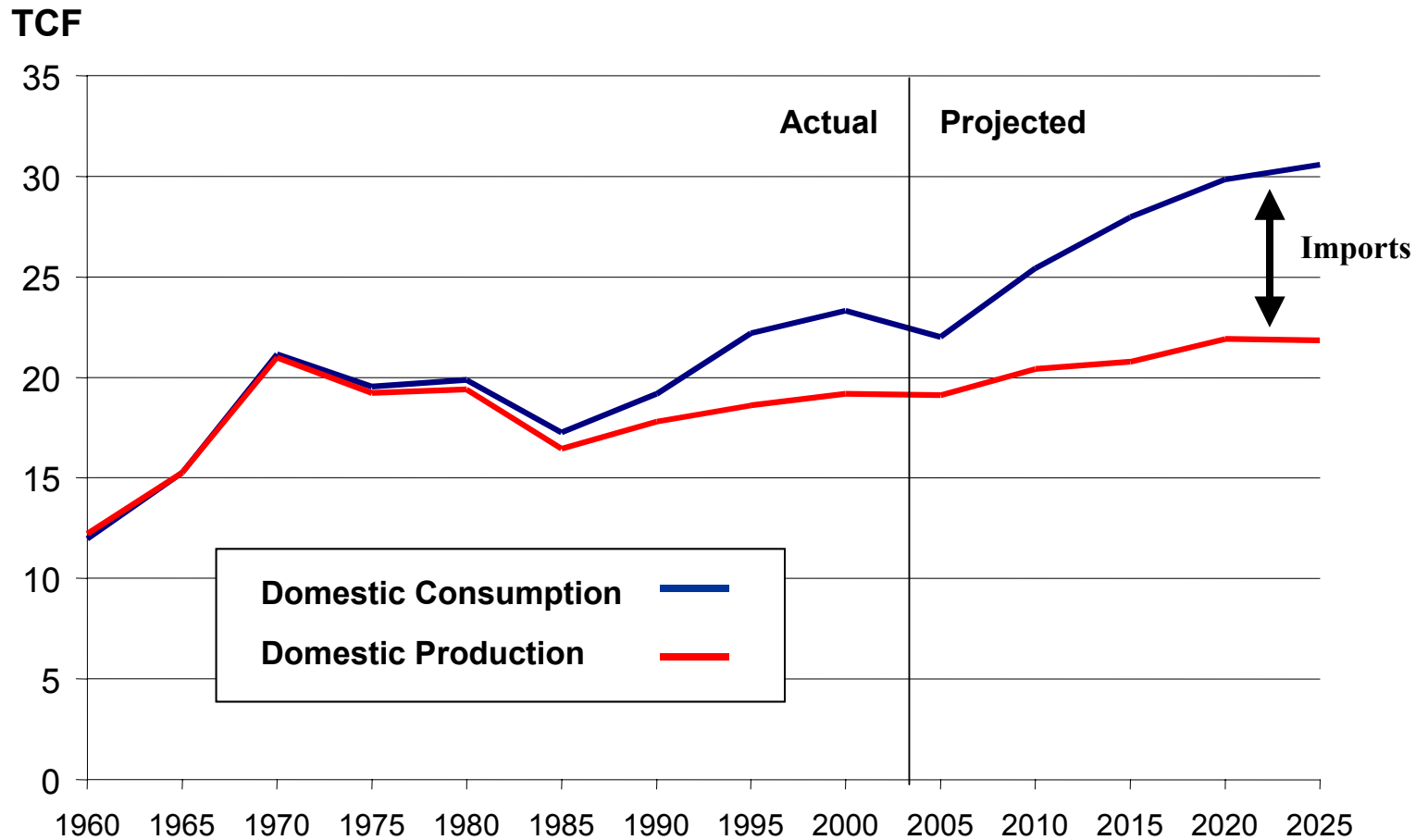
96% of Capacity Built Since 2000 Natural Gas



TCF Demand from NGCC Fleet

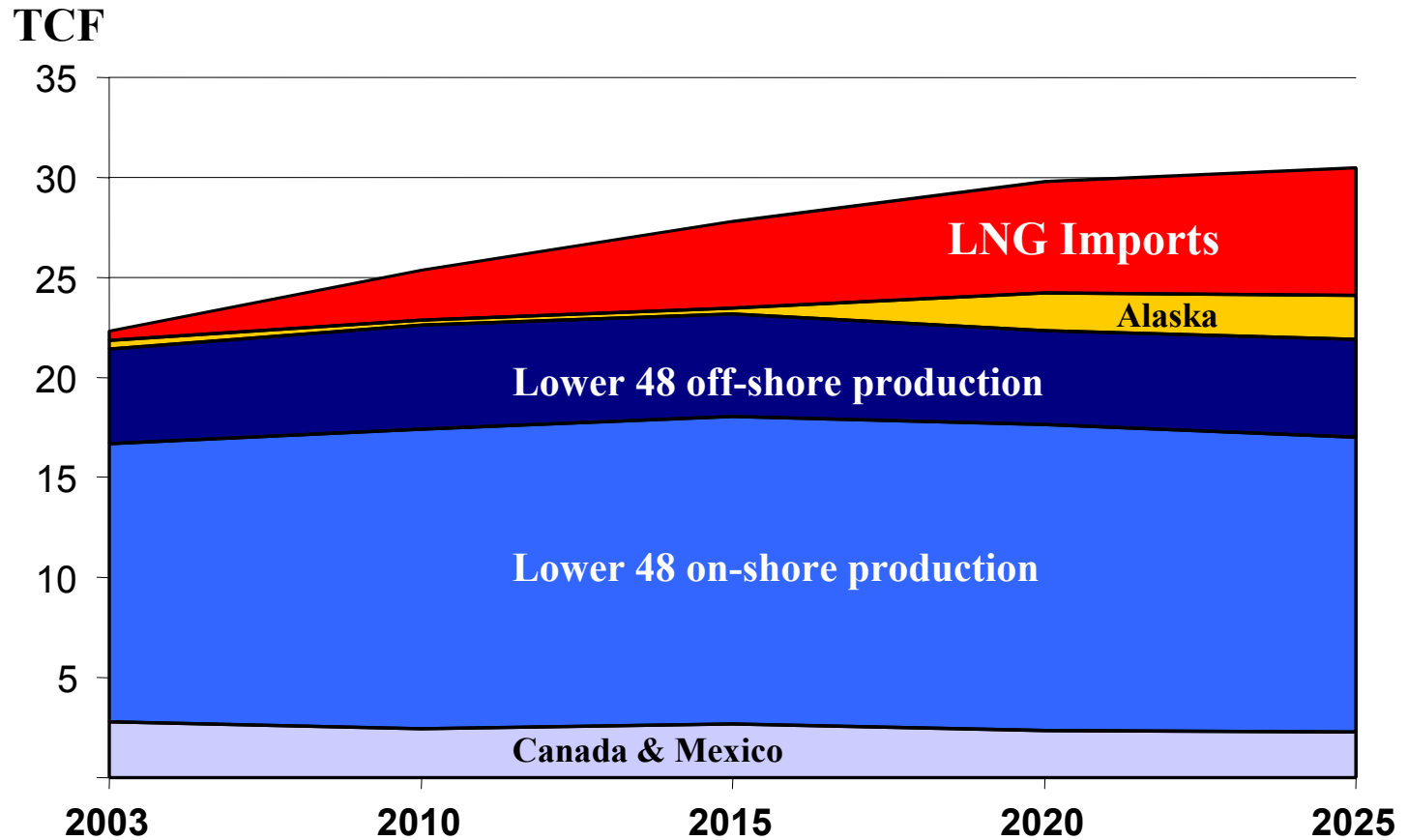


Natural Gas Challenge



Sources: Historic data: EIA, Annual Energy Review 2003, Table 6-1; Projections: EIA, Annual Energy Outlook 2005, Table A-14.

U.S. Incremental Natural Gas Supply—LNG Imports

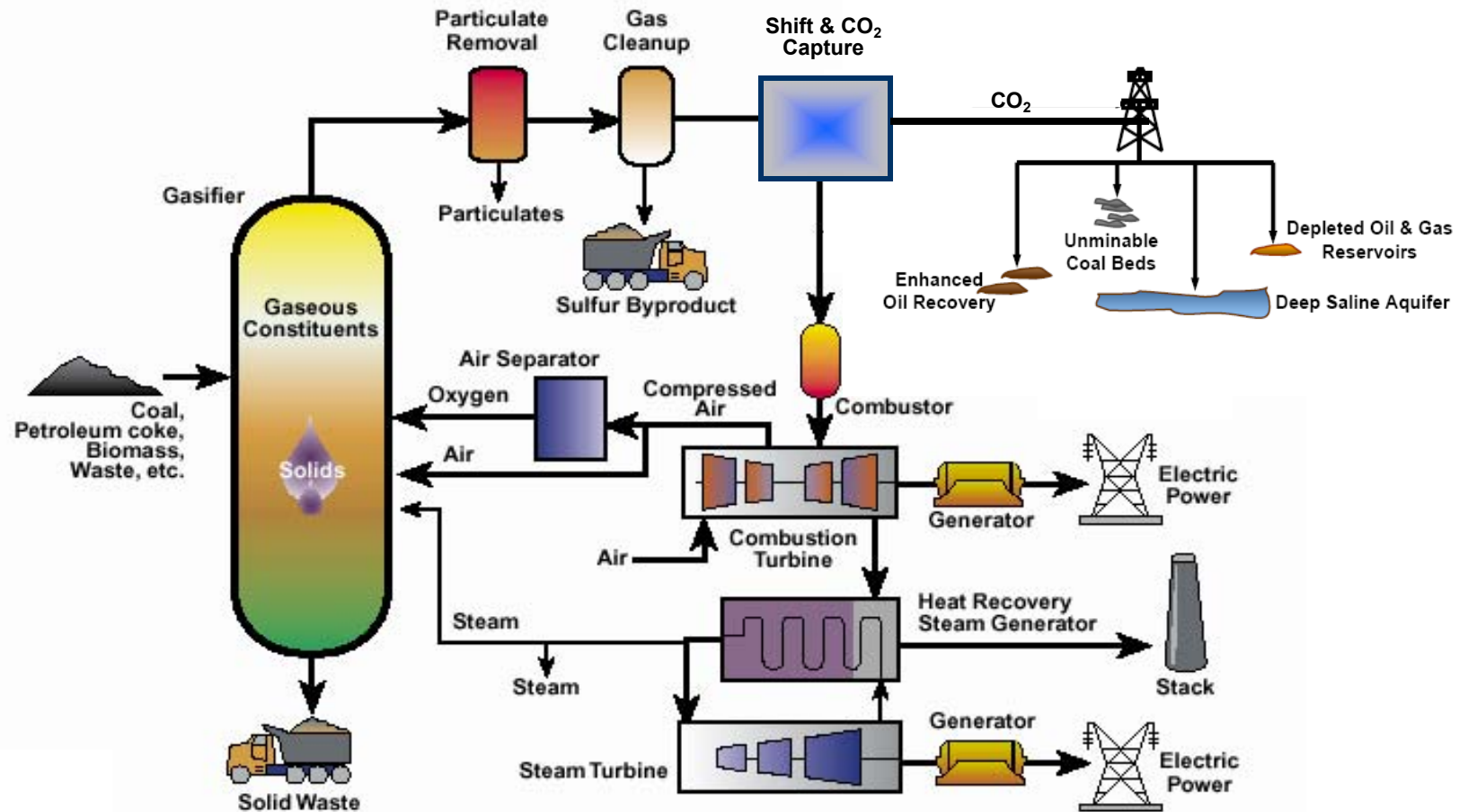


Source EIA, Annual Energy Outlook 2005

Energy Policy Implications

- **Coal is most plentiful U.S. fossil resource**
 - Energy security, independence, and affordability
 - Significant environmental concerns, including carbon emissions
 - Continued & expanded coal use is a given—how it is used is not
- **Global climate change poses serious energy challenge**
 - Need to deploy technologies that can address CO₂
 - U.S. technology leadership for global progress
- **Natural gas is not panacea to solve energy/environmental problems**
 - Rapid demand growth
 - Future supply uncertainty
 - High prices and volatility
- **New thinking and approaches are needed--Gasification**

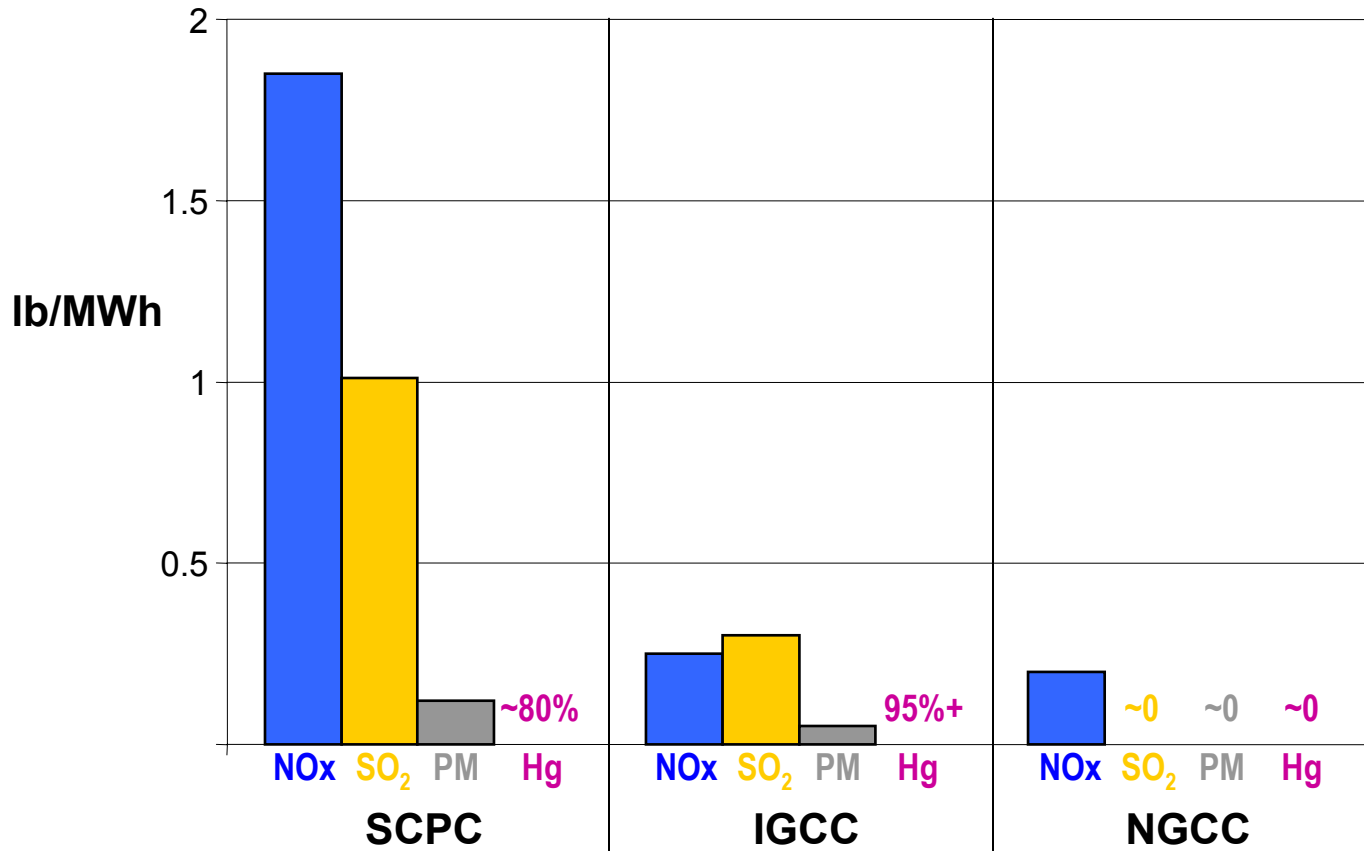
IGCC Technology



Source: NETL

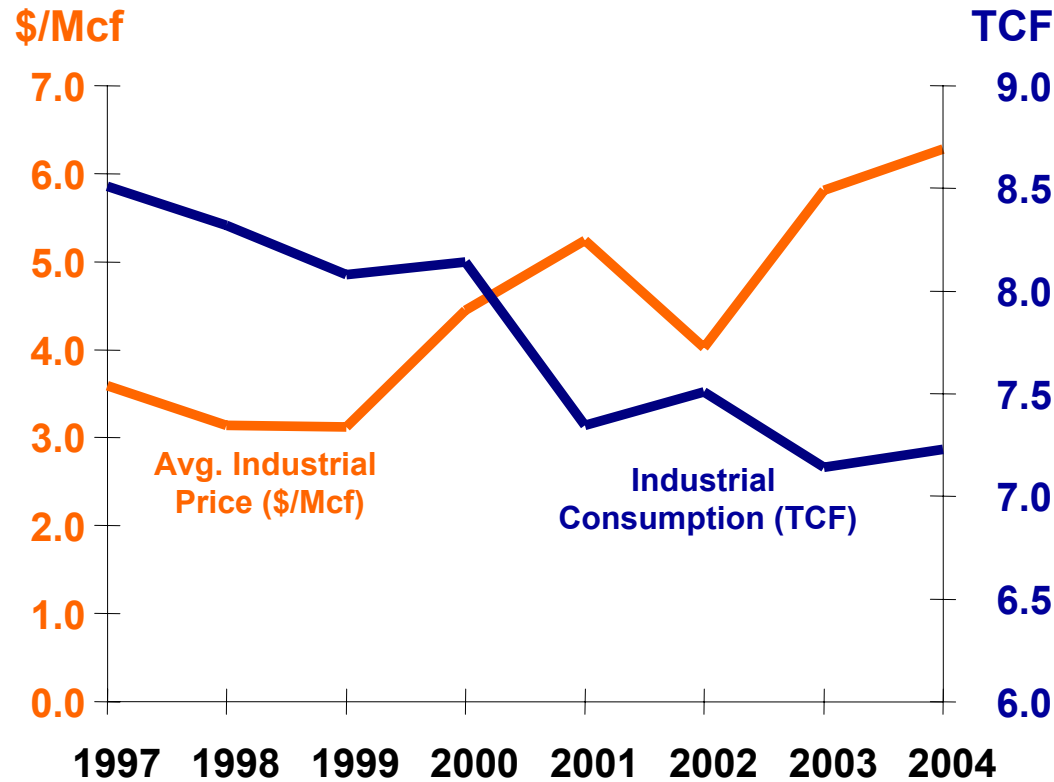
Gasification Offers Clean Alternative

Estimated New Plant Emissions Performance



Industry Needs Gasification Option to Stay in U.S.


Industrial Natural Gas Prices & Consumption



- **Chemical industry:** \$50 billion in business lost to foreign competition and 90,000 jobs cut since 2000
- **Fertilizer industry:** 11 plants, representing 21% of U.S. capacity closed, only 50% of remaining capacity operating, several major fertilizer producers filed for bankruptcy.

Gasification Deployment Challenges

- **Environmental Groups**
- **State Regulators**
- **Coal Companies**
- **Generating Companies**
- **Technology Vendors**
- **Bankers**



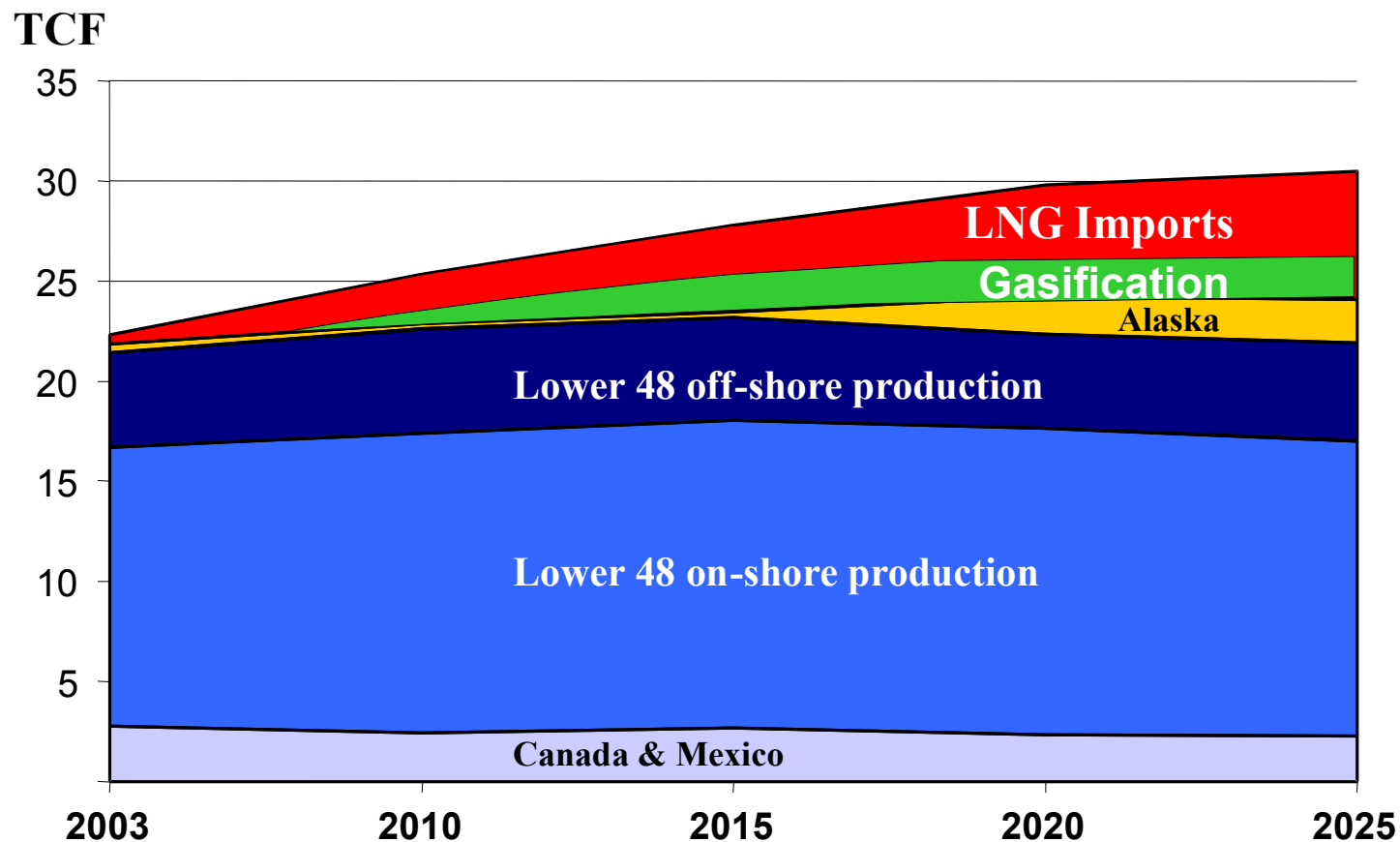
*Too much risk for
merchant financing –
financing requires strong
credit and backup
protections*

Bankers

National Gasification Strategy

- **1.5 TCF/yr equivalent—comparable to Alaska Gas Pipeline**
- **Domestic coal & gas resources**
- **Electric power & industrial gasification**
- **Federal loan guarantees**
 - Lower cost of capital
 - Lower energy costs
 - Low federal budget scoring
- **Carbon capture and storage demonstration projects**

Gasification—Domestic Supply Option



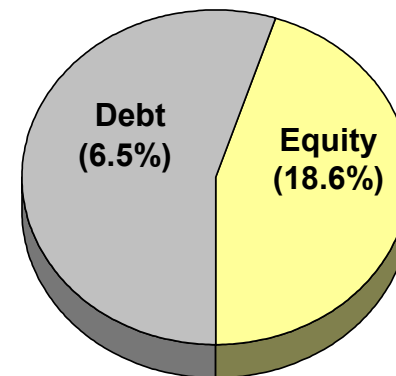
Lower Cost of Capital

- Lower interest rate
 - 5.5% vs. 6.5%
- Higher leverage
 - 80% vs. 55% debt

→ Lower cost of capital

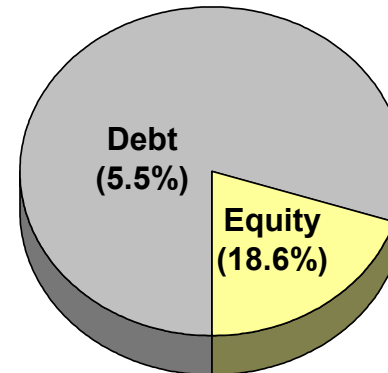
→ Lower cost of energy

Traditional Utility Financing



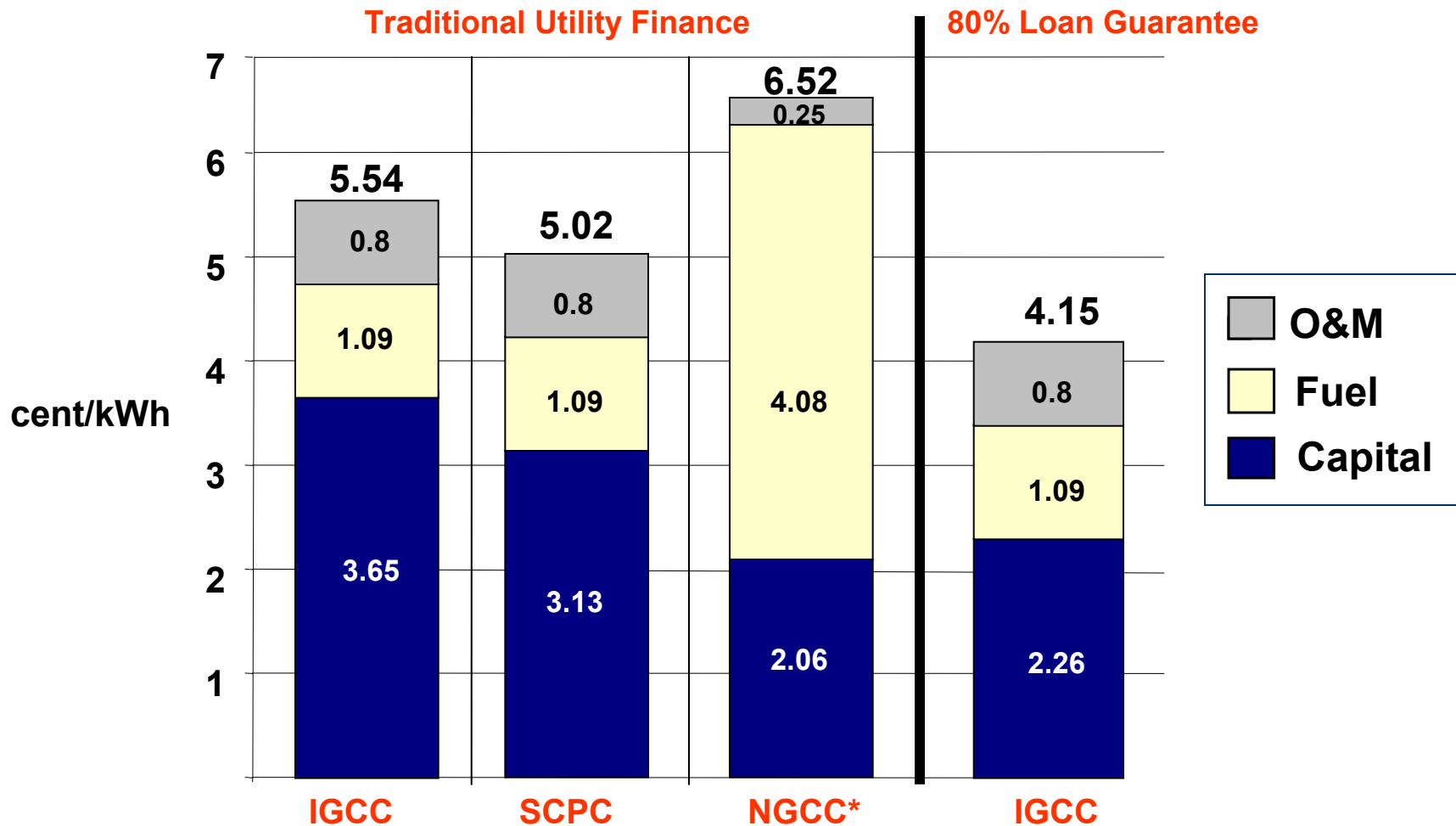
11.9%

80% Loan Guarantee Financing

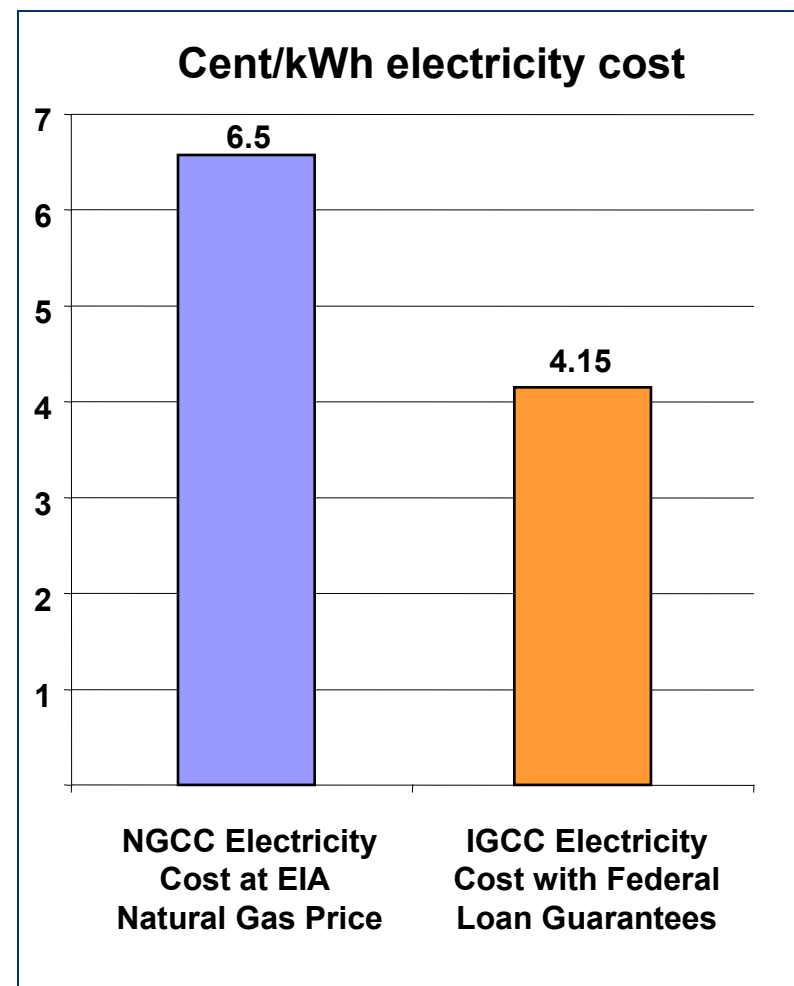
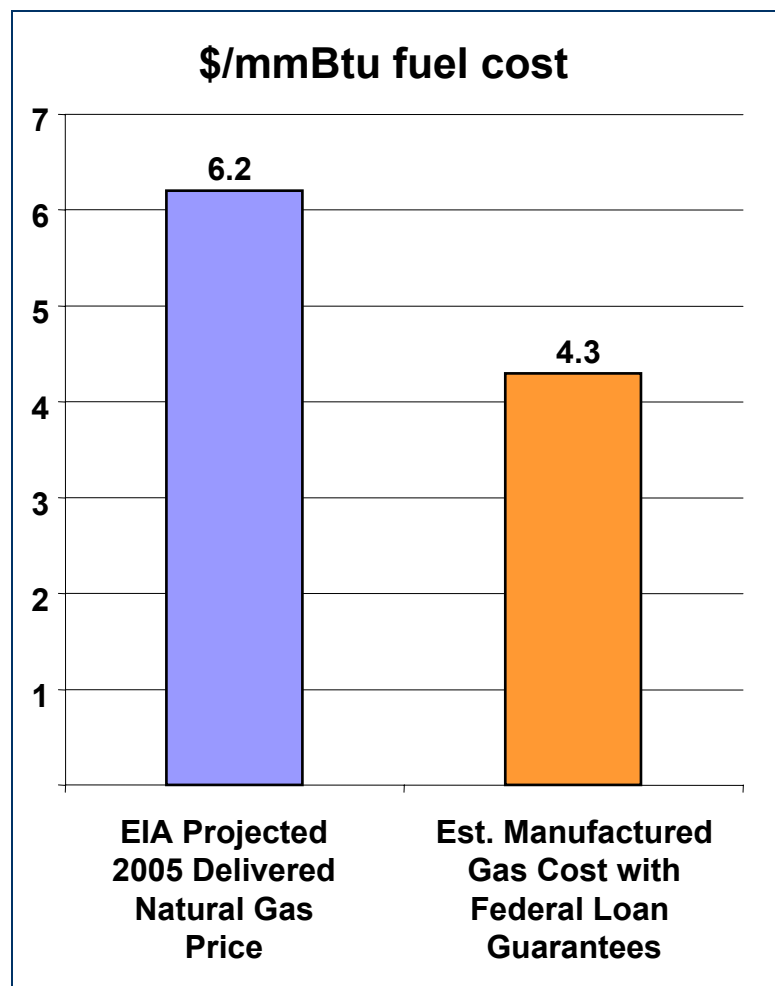


8.1%

New Plant Cost of Energy Comparison

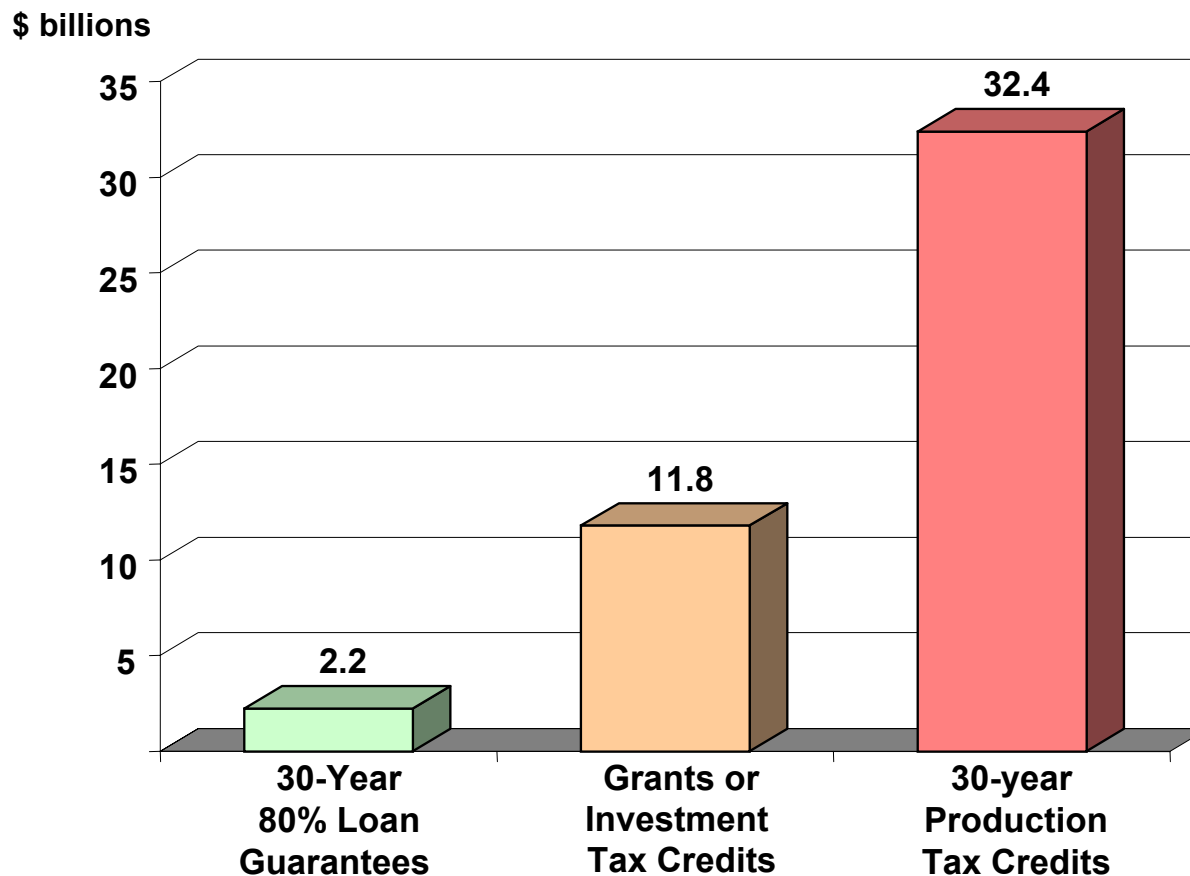


Lower Fuel & Electricity Prices



Federal Budget Cost

NPV federal budget cost of equivalent incentives to support gasification equal to 1.5 TCF



Deployment Challenges Met

- ✓ **Access to capital** → **80% federal loan guarantee**
- ✓ **High capital costs** → **38% lower cost of capital**
- ✓ **Higher energy/fuel costs** → **20-25% cost reduction**
- ✓ **Operating uncertainty** → **Funded reserves**
- ✓ **Federal budget impact** → **Credit enhancements**
- ✓ **Climate concerns** → **Commercial CCS demonstration**

Washington Politics

- **Senate Energy Committee (Domenici)**
- **Administration**
- **Environmental Groups**
- **Industrial Gas Users**
- **Electric Industry**
- **Coal Industry**
- **State Governors**