The Outlook for Energy

Presentation to the Sunshine Rotary Club
Baton Rouge, Louisiana

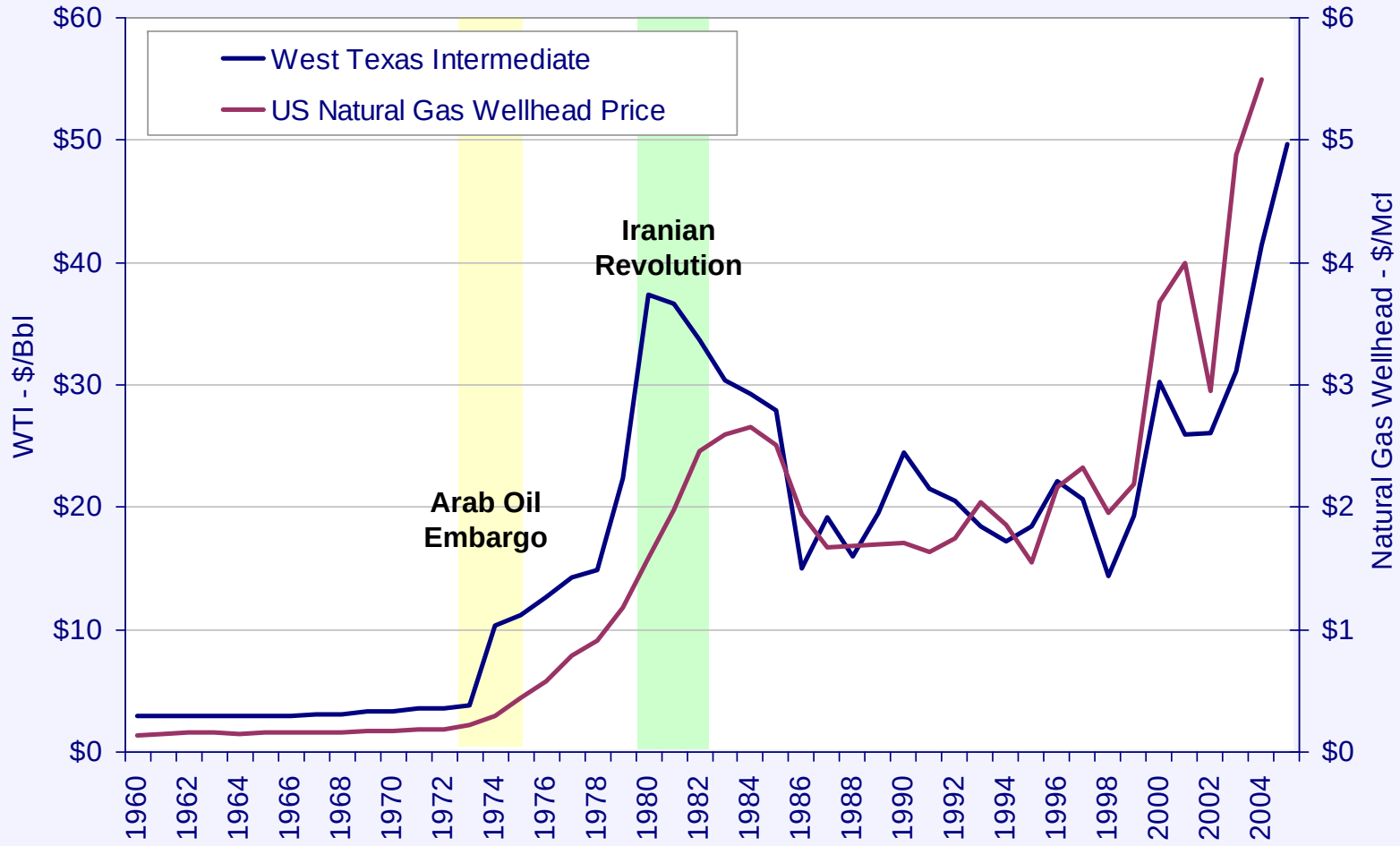
April 28, 2005

David E. Dismukes
Center for Energy Studies
Louisiana State University

Center for
Energy Studies

Past and Current Crises

Crises of the past rooted in geopolitical strife and regulatory confusion.



Source: Federal Reserve Bank of St. Louis

Past and Current Crises

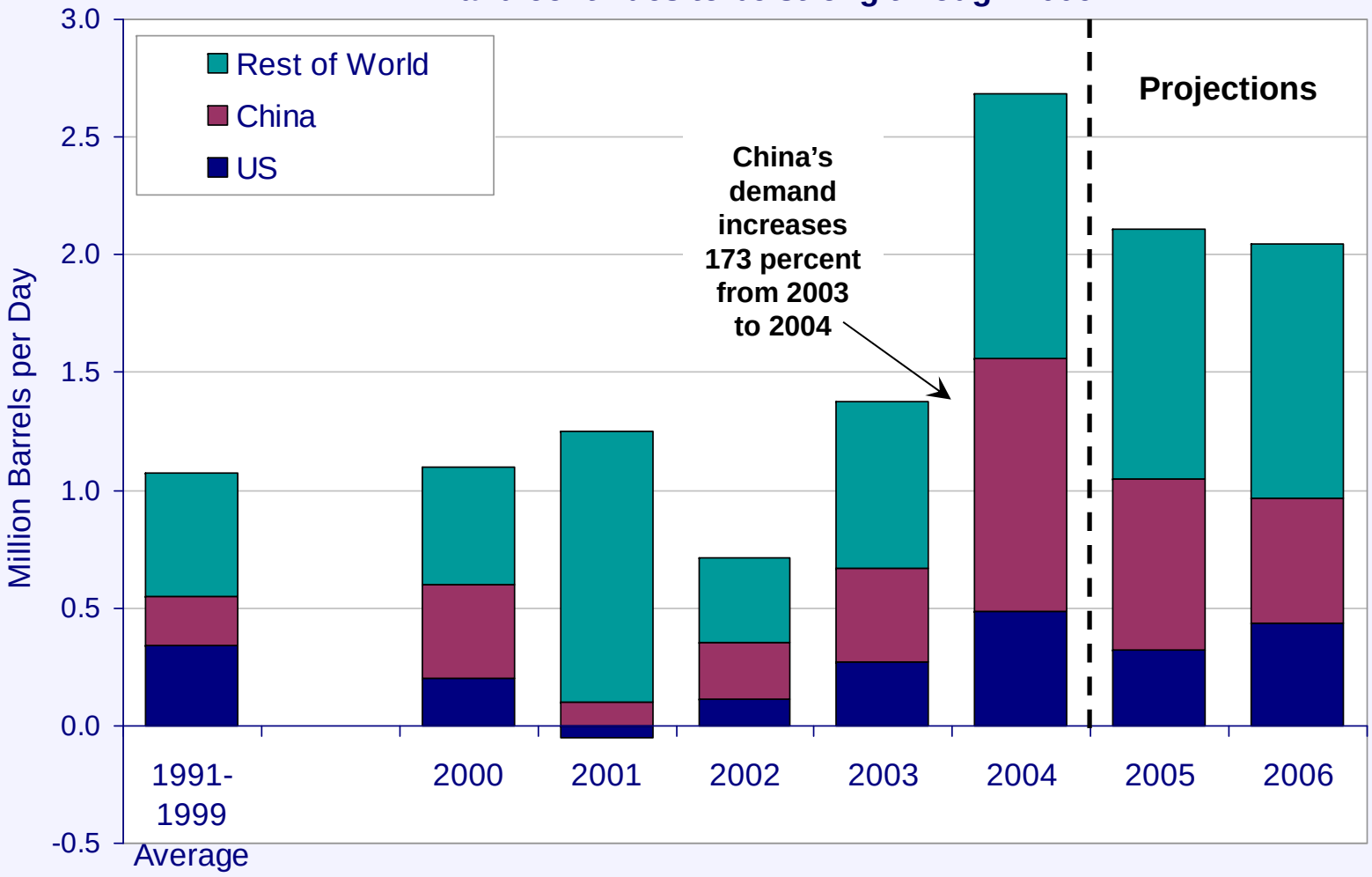
While geopolitical issues are aggravating today's energy markets, the fundamental source of the problem is clearly rooted in economic fundamentals.

- **Most basic energy markets are global, and prices are driven by what goes on in global markets.**
  - **Capital is mobile across the globe for energy production decisions.**
  - **Production and output are global in destination markets.**
  - **Prices are traded on recognized hubs, and through recognized institutions, throughout the globe.**
  - **While natural gas has been primarily continental, the development of LNG is pushing these markets towards globalization as well.**

Center for
Energy Studies

World Oil Demand

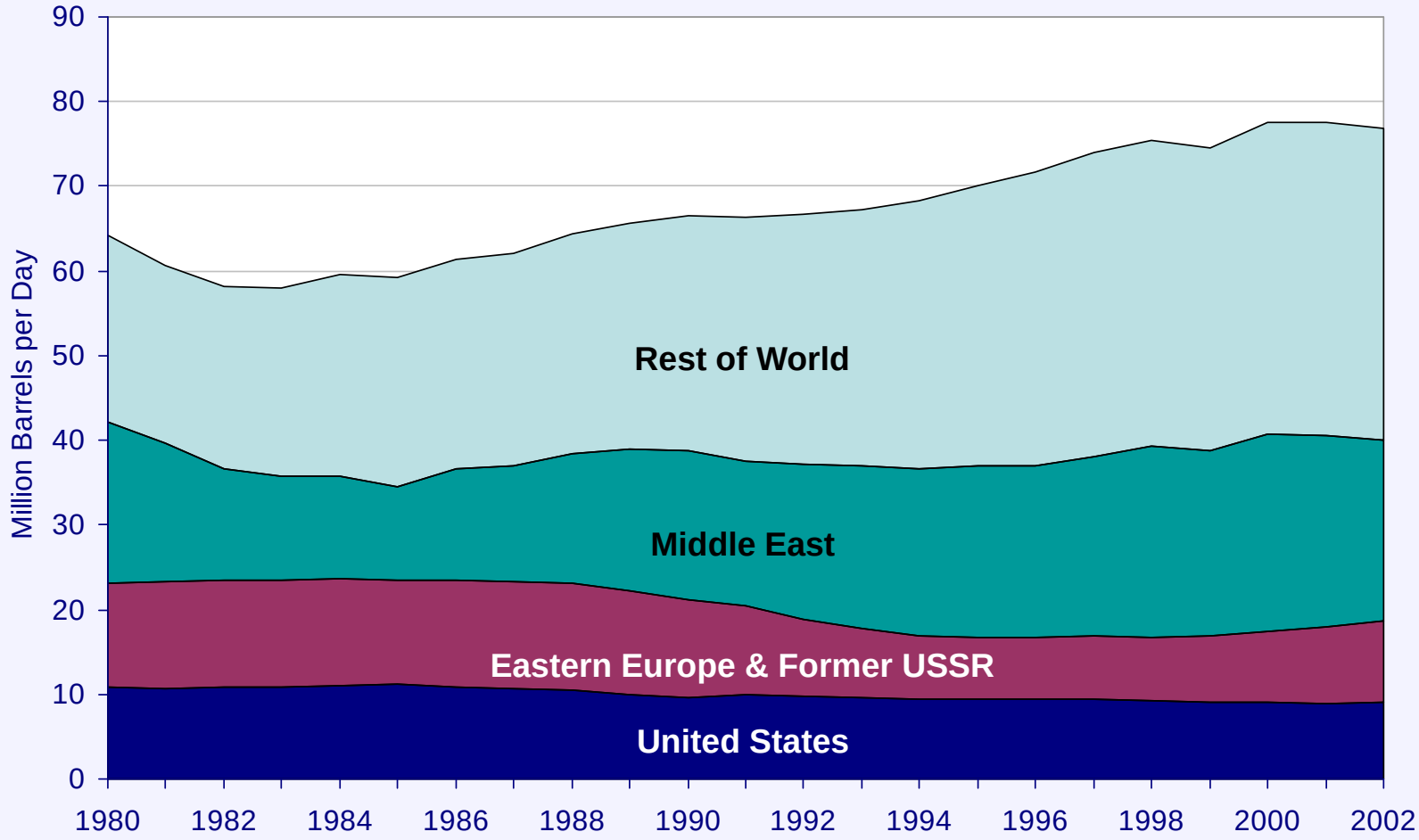
World oil demand growth currently surging at relatively high rates and continues to be strong through 2006



Source: Energy Information Administration

Center for
Energy Studies

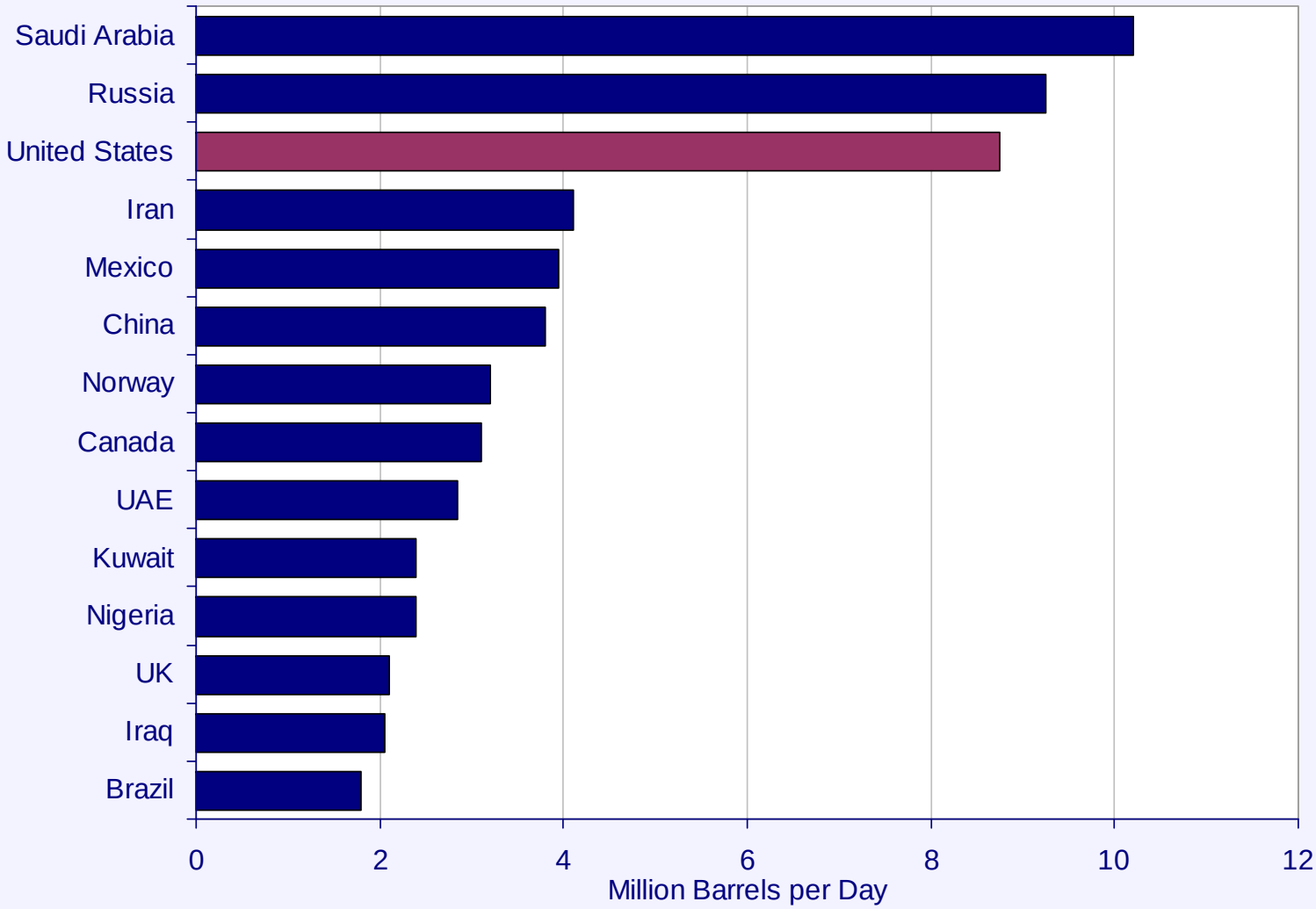
World Oil Production
1980-2002



Source: Energy Information Administration

Center for
Energy Studies

Rank Order of World's Largest Oil Producers 2004

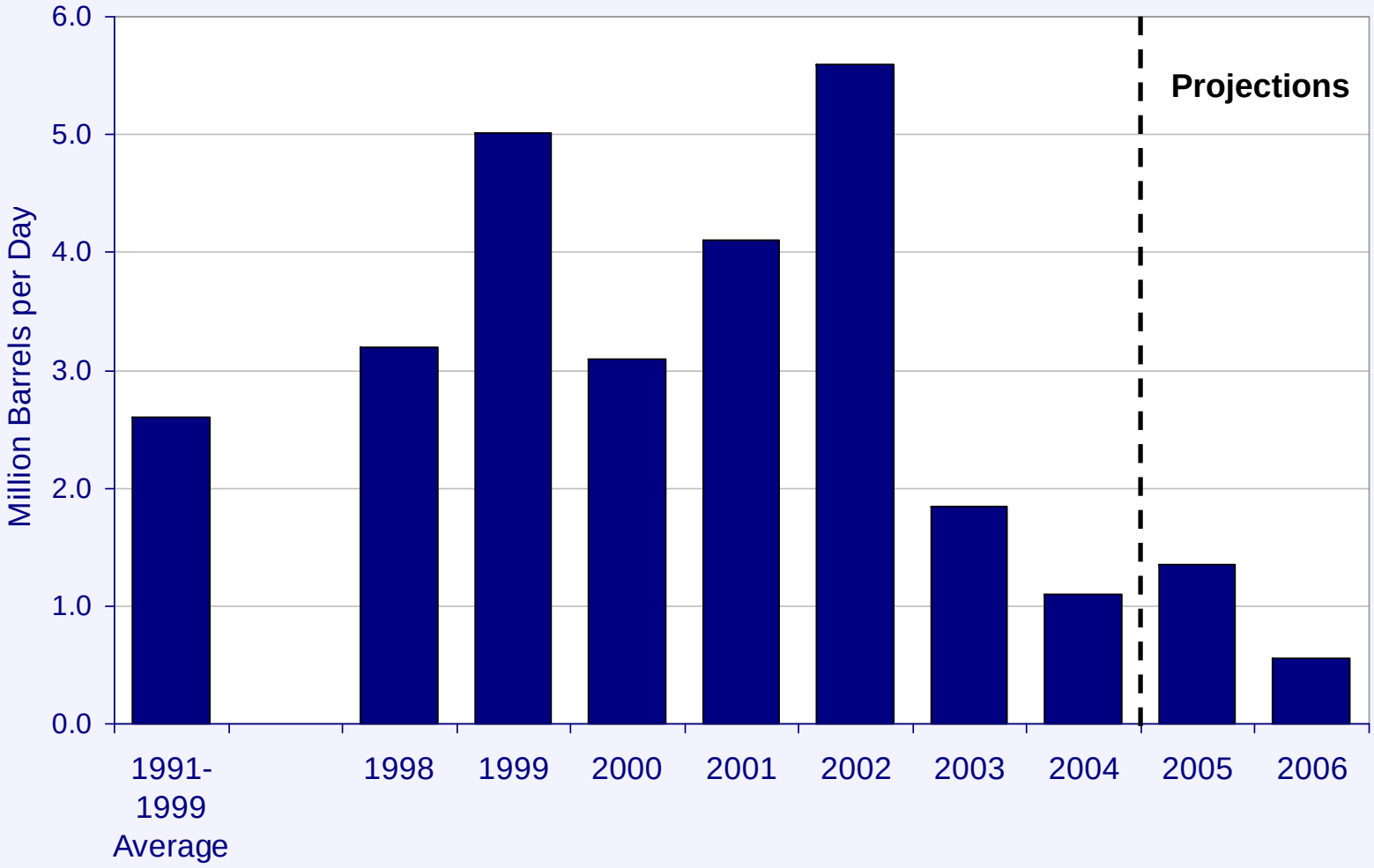


Source: Energy Information Administration

Center for
Energy Studies

World Oil Spare Production Capacity

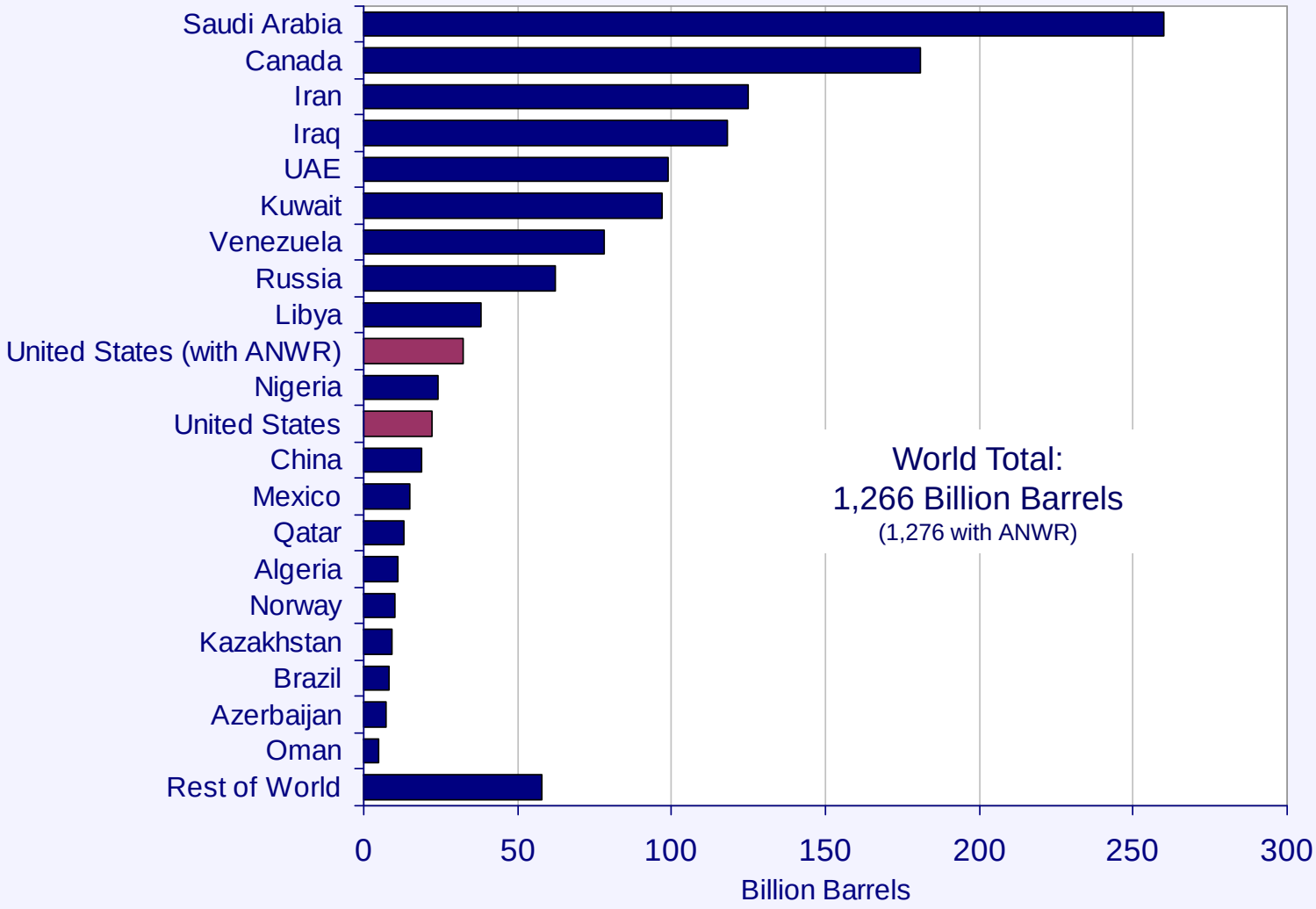
Spare capacity hit its lowest level in 30 years in 2004 and remains fairly low



Source: Energy Information Administration

Center for
Energy Studies

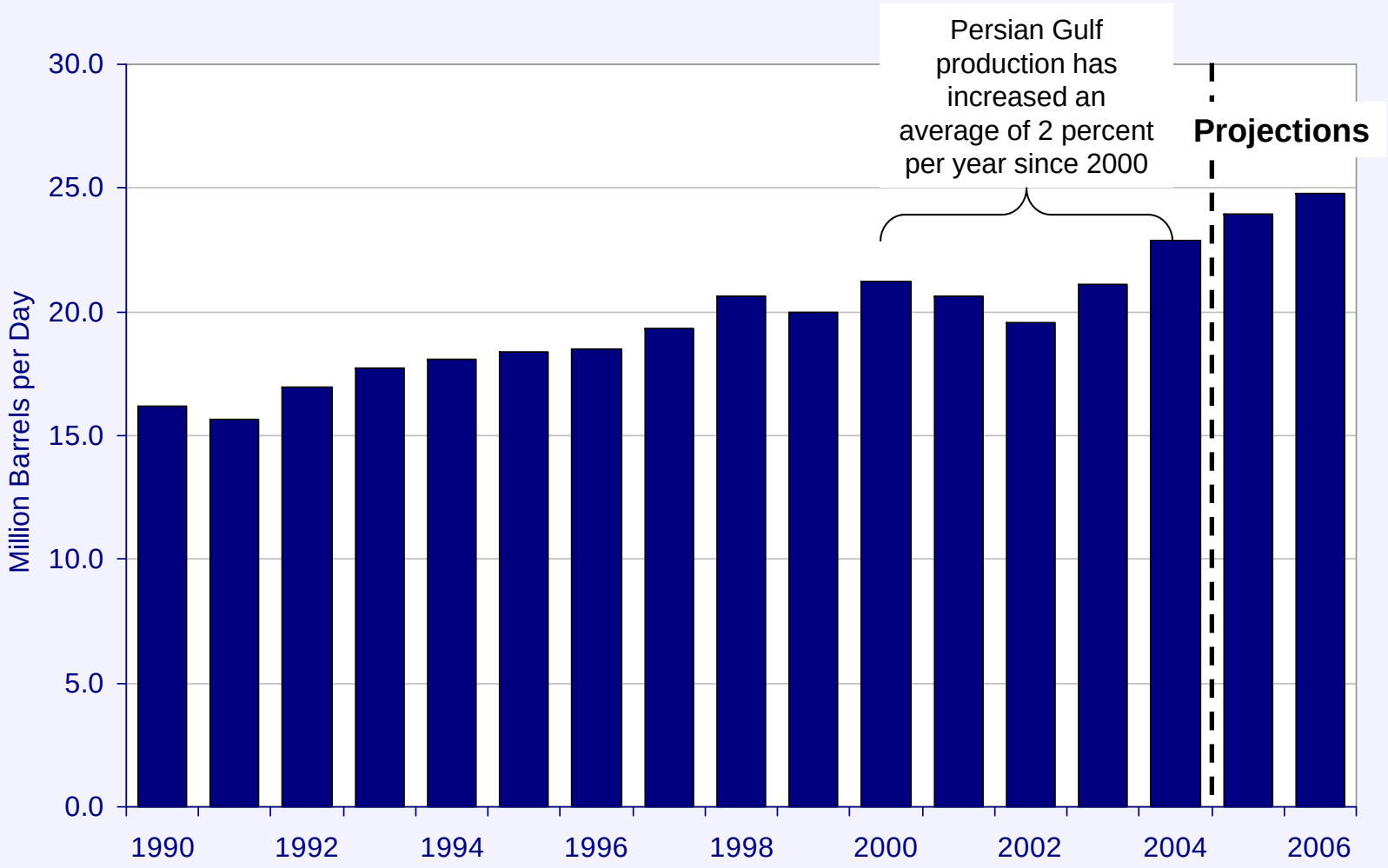
World Oil Reserves by Country
As of January 1, 2004



Source: Oil and Gas Journal

Center for
Energy Studies

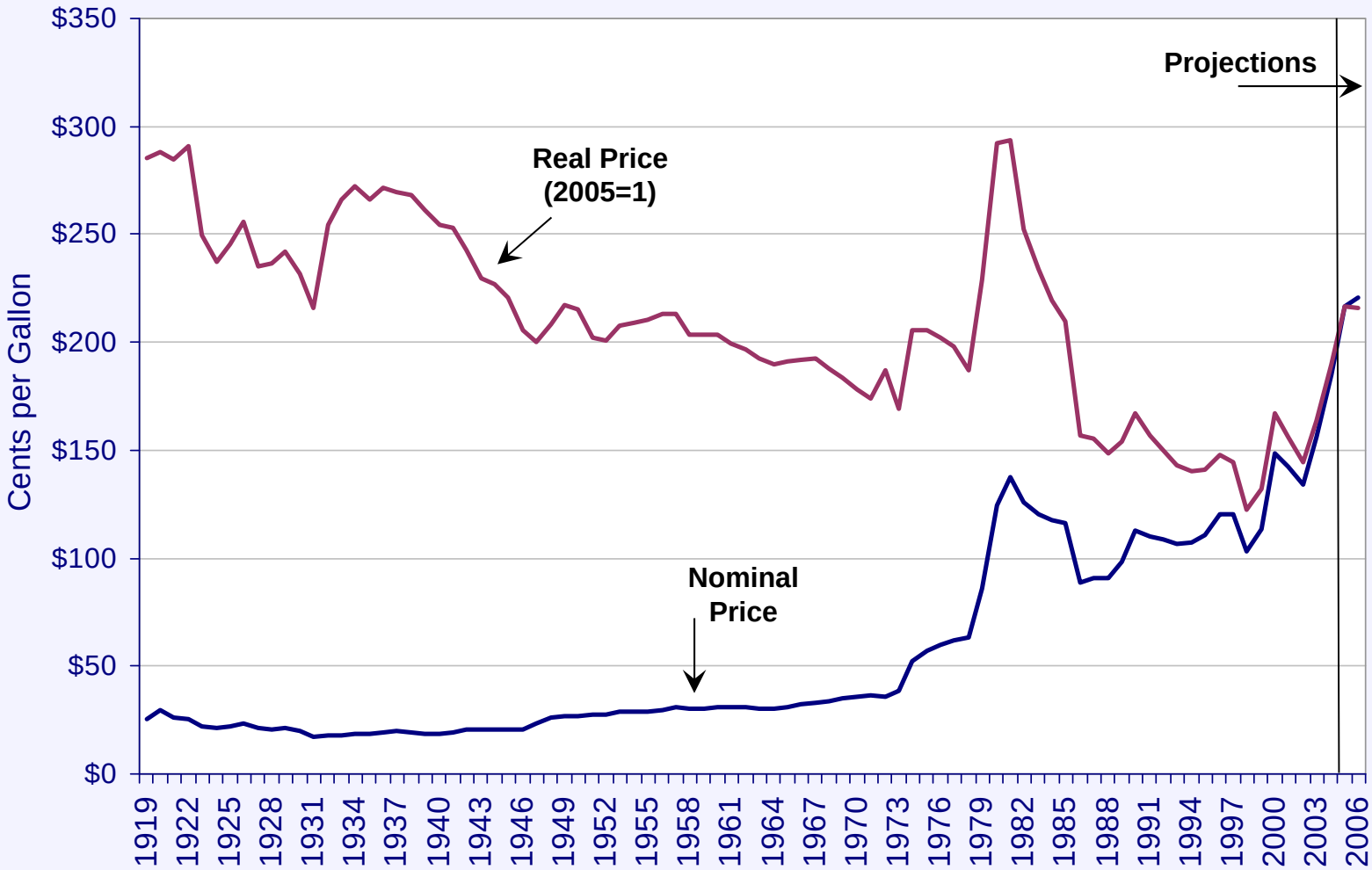
Persian Gulf Oil Production



Source: Energy Information Administration

Center for
Energy Studies

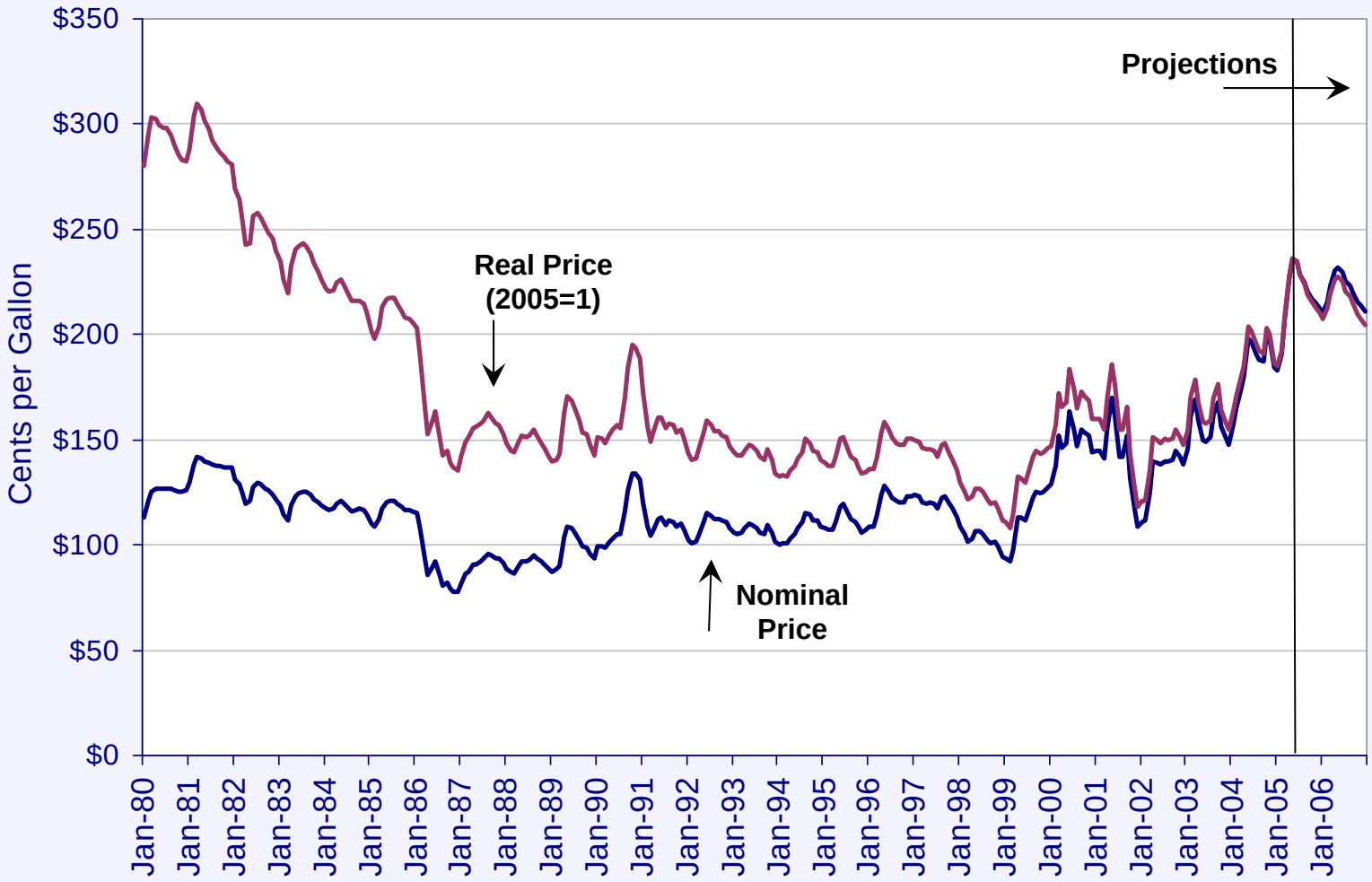
Are Things as Bad as They Seem?
Real Gasoline Pump Price, Annual Average 1919-2006



Source: Energy Information Administration

Center for
Energy Studies

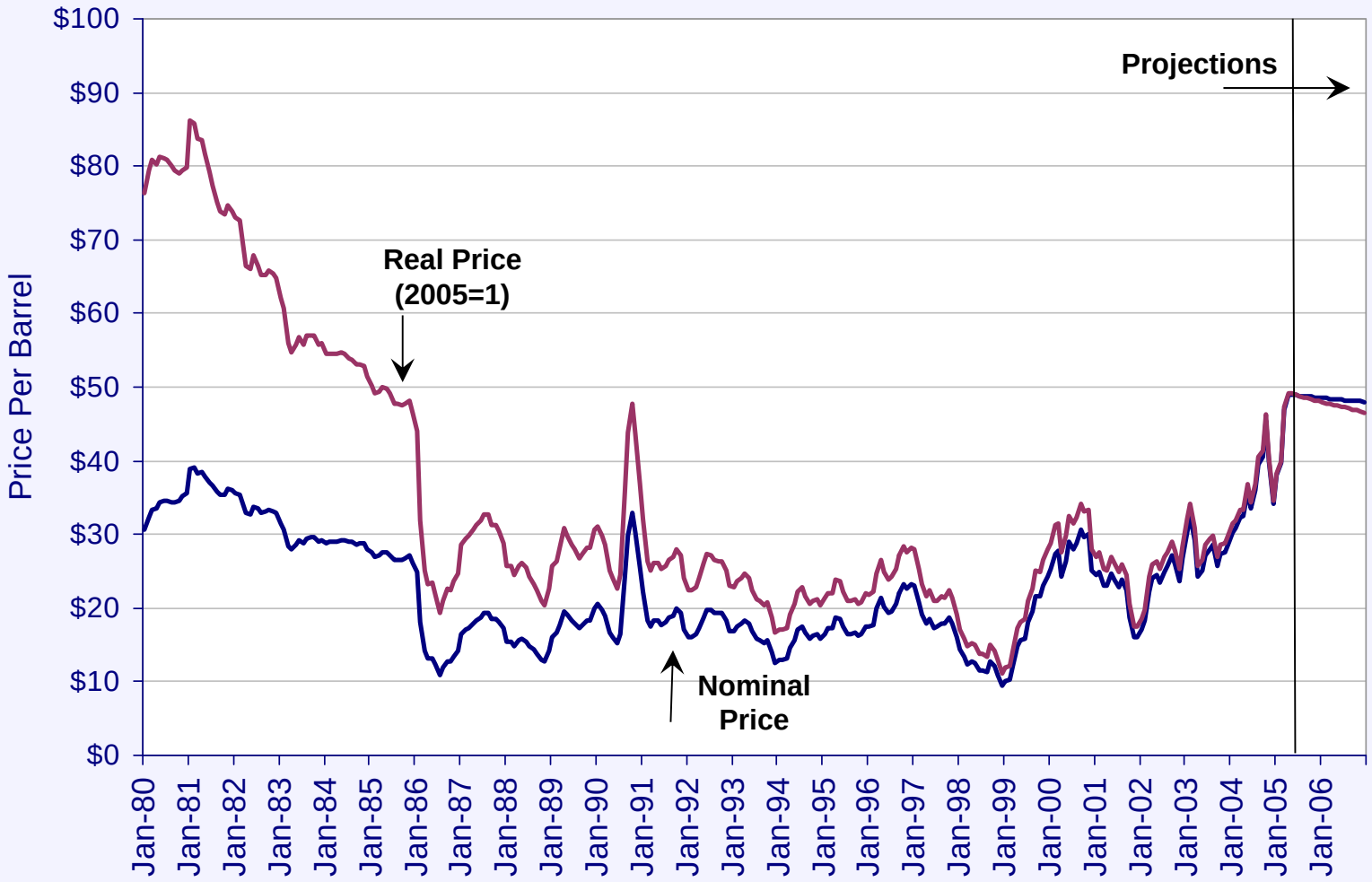
Are Things as Bad as They Seem?
Regular Gasoline Prices, Nominal and Real



Source: Energy Information Administration

Center for
Energy Studies

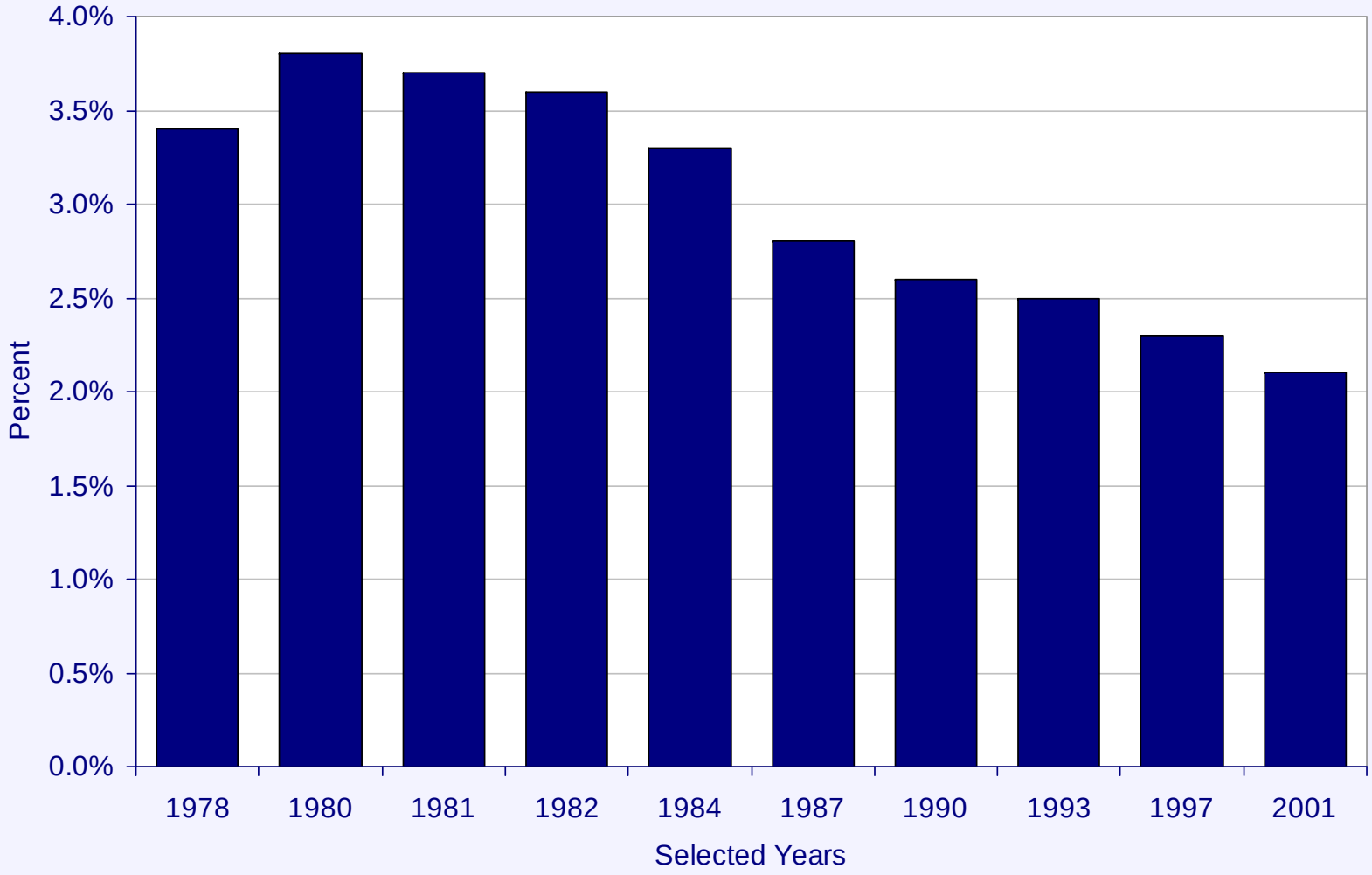
Are Things as Bad as They Seem?
Imported Crude Oil Prices, Nominal and Real



Source: Energy Information Administration

Center for
Energy Studies

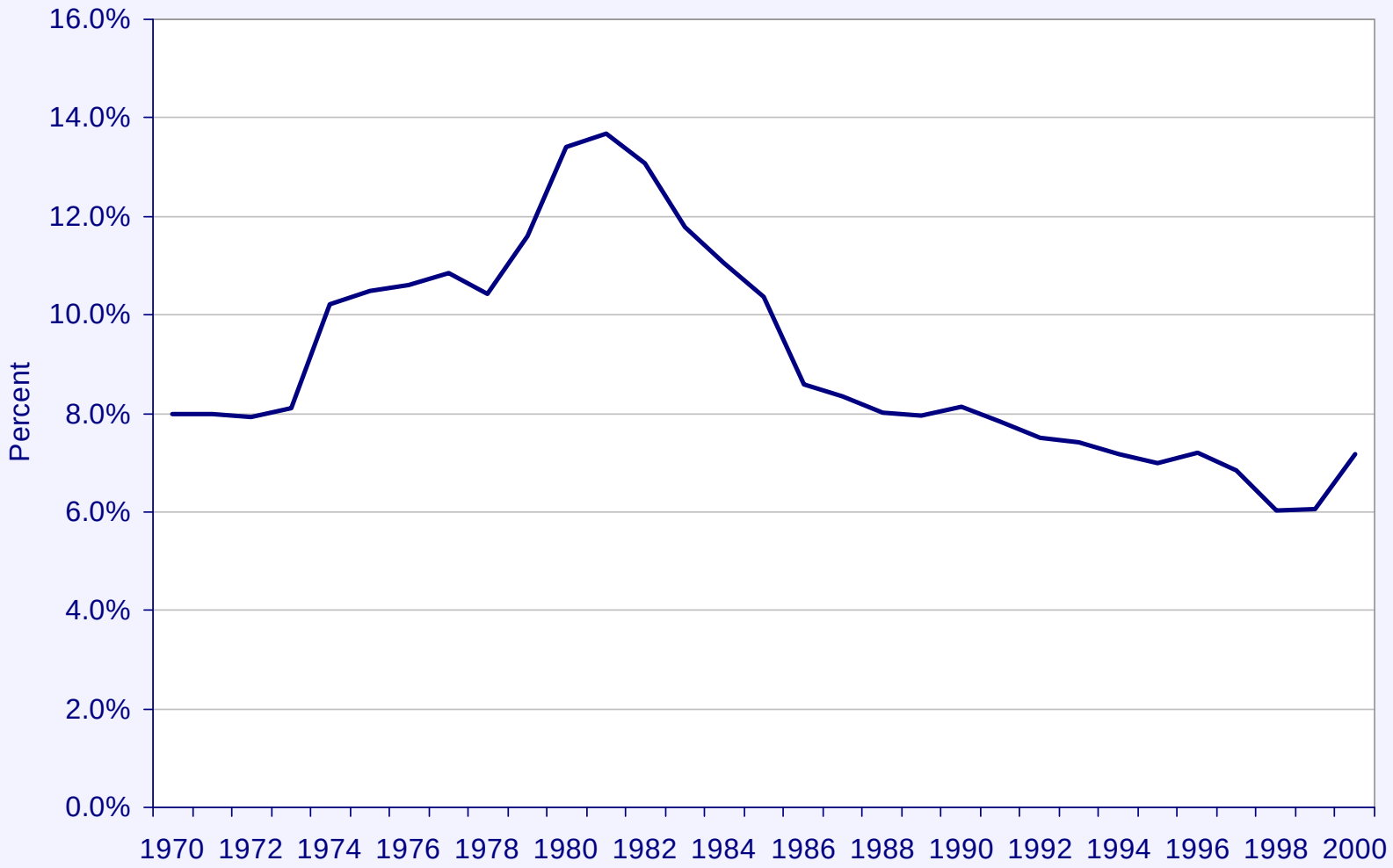
US Household Energy Expenditure as a Percent of Real Disposable Personal Income



Source: Energy Information Administration; and Bureau of Economic Analysis, US Department of Commerce

Center for
Energy Studies

US Energy Expenditures as a Percent of GDP (1970-2000)



Source: Energy Information Administration; and Bureau of Economic Analysis, US Department of Commerce

What are the Solutions?

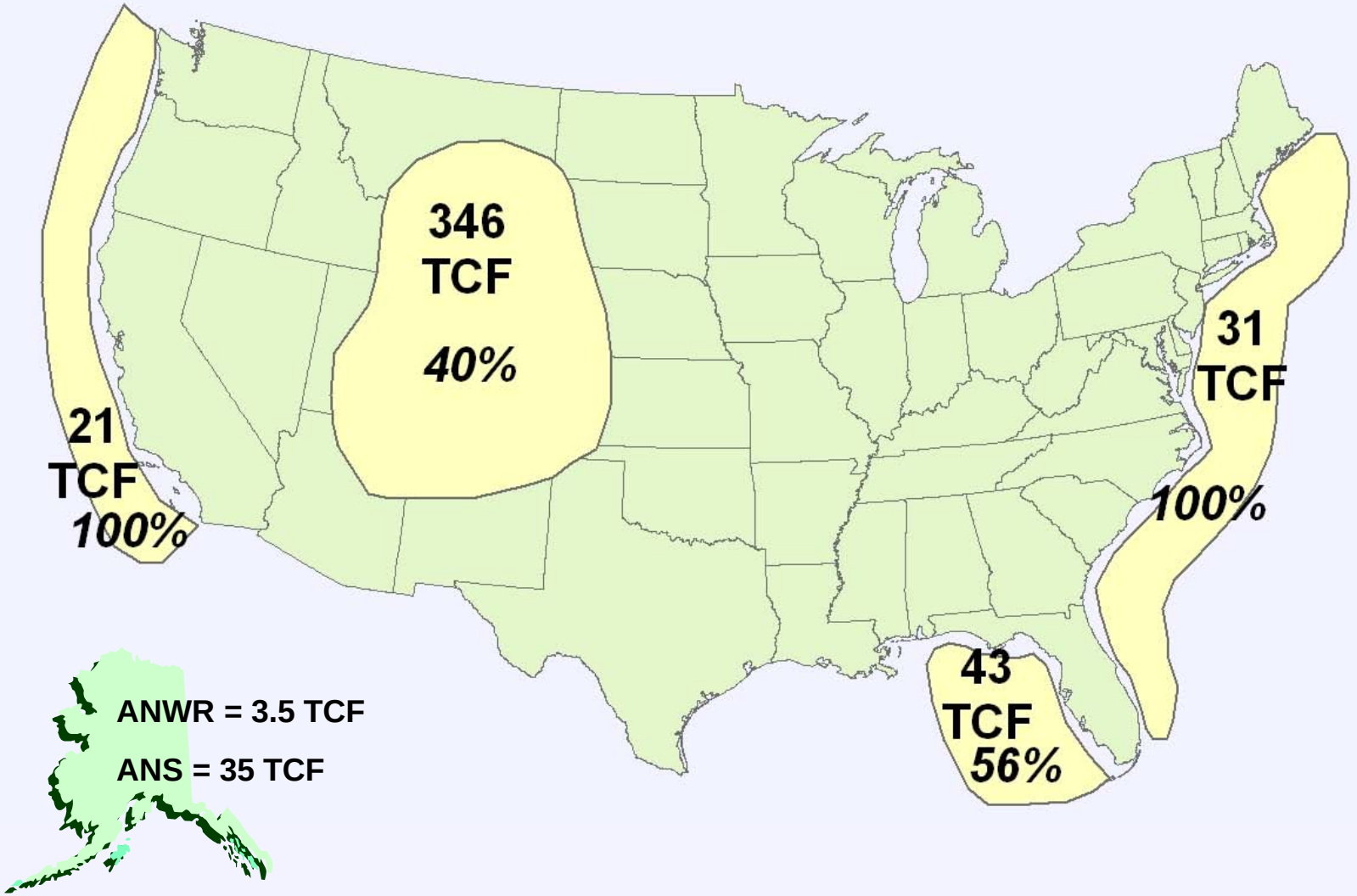
1. Increase domestic production capabilities – but recognizing that we will NEVER be energy independent.

2. Increase fuel diversity through market based approaches – coal, nuclear, renewables.

3. Increase energy efficiency through market based mechanisms
   a. households
   b. businesses
   c. industry

Center for
Energy Studies

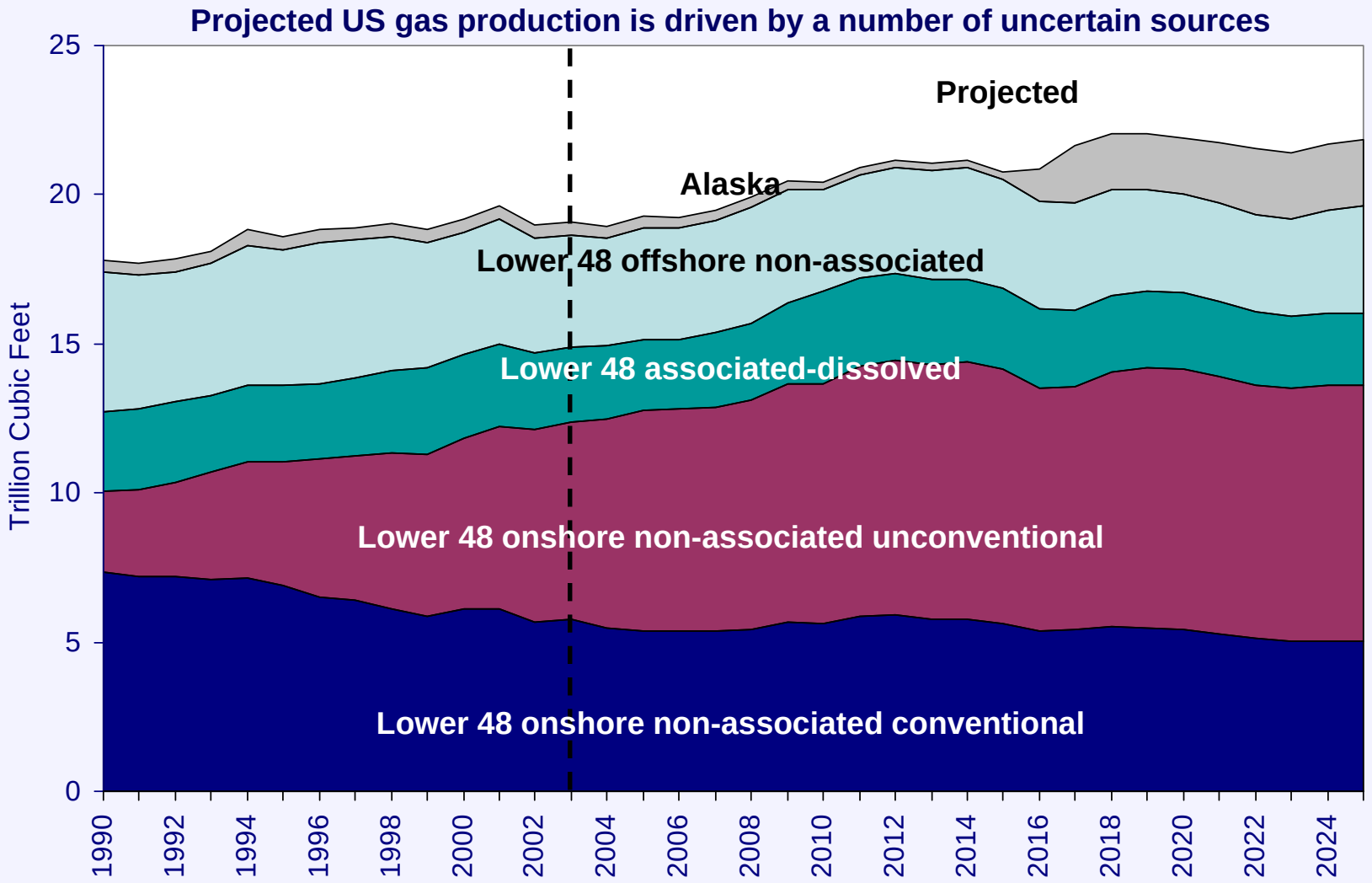
Resource Estimates – Restricted Areas Estimated Percentage Restricted



Source: Natural Gas: Can We Produce Enough?" Independent Petroleum Association of America, website: http://www.ipaa.org/govtrelations/factsheets/NaturalGasProdEnough.asp.

Center for
Energy Studies

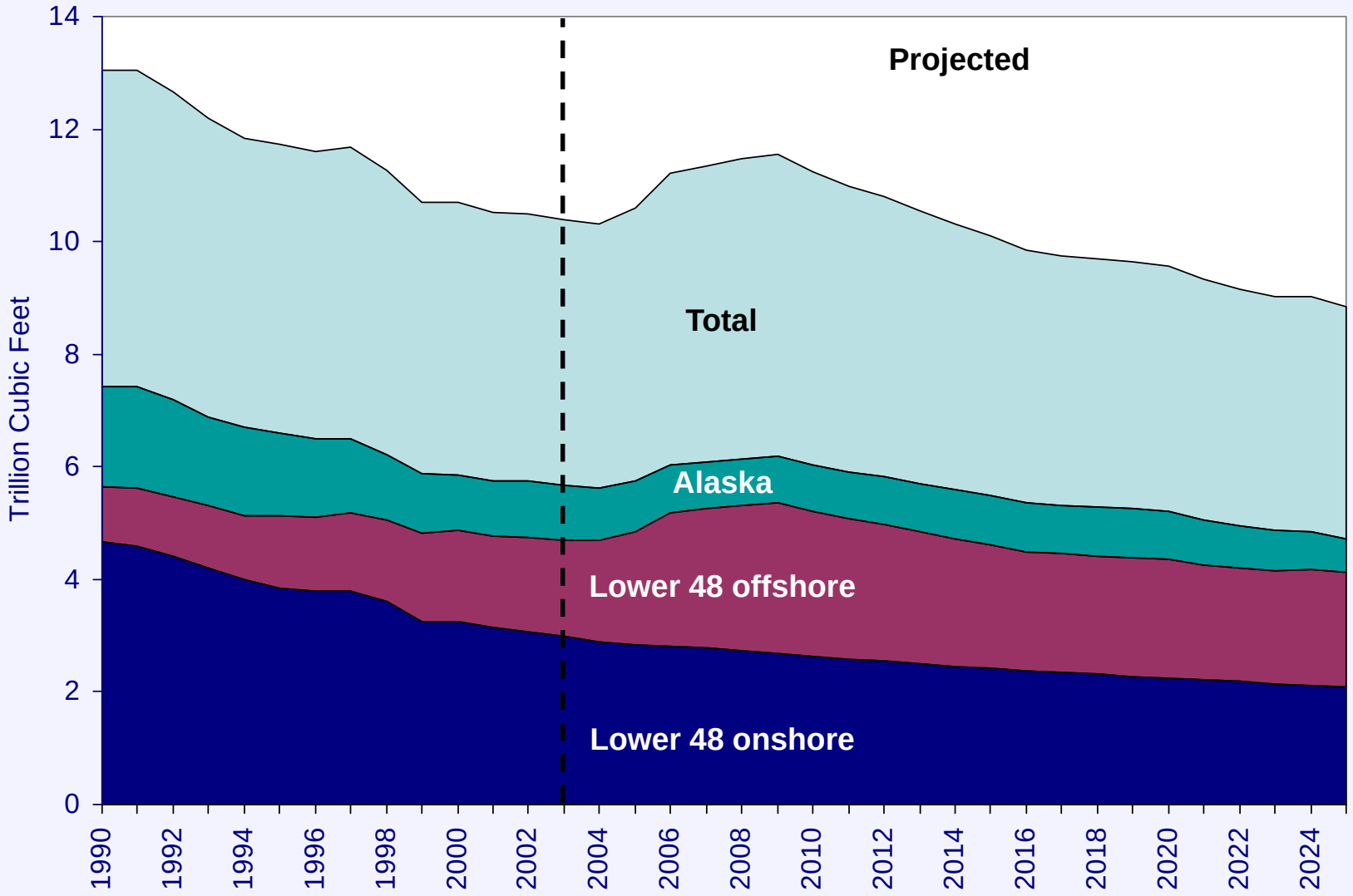
US Natural Gas Production by Source 1990-2025



Source: Energy Information Administration

Center for
Energy Studies

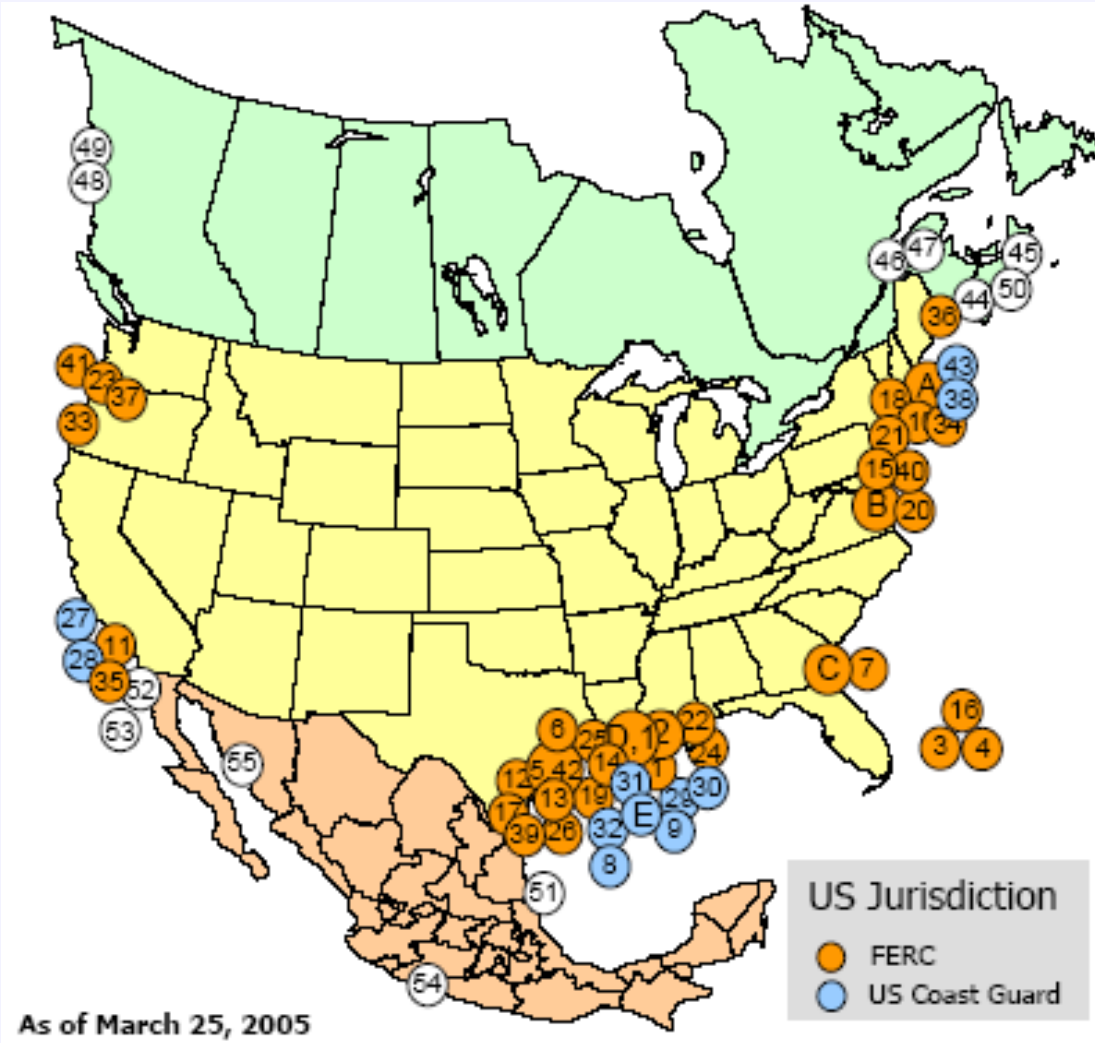
US Crude Oil Production by Source
1990-2025



Source: Energy Information Administration

Center for Energy Studies

Existing and Proposed LNG Terminals



As of March 25, 2005

* US pipeline approved; LNG terminal pending in Bahamas
** These projects have been approved by the Mexican and Canadian authorities

CONSTRUCTED
A. Everett, MA : 1.035 Bcfd (Tractebel - DOMAC)
B. Cove Point, MD : 1.0 Bcfd (Dominion - Cove Point LNG)
C. Elba Island, GA : 0.68 Bcfd (El Paso - Southern LNG)
D. Lake Charles, LA : 1.0 Bcfd (Southern Union - Trunkline LNG)
E. Gulf of Mexico: 0.5 Bcfd, (Gulf Gateway Energy Bridge - Excelerate Energy)

APPROVED BY FERC
1. Lake Charles, LA: 1.1 Bcfd (Southern Union - Trunkline LNG)
2. Hackberry, LA : 1.5 Bcfd, (Sempra Energy)
3. Bahamas : 0.84 Bcfd, (AES Ocean Express)*
4. Bahamas : 0.83 Bcfd, (Calypso Tractebel)*
5. Freeport, TX : 1.5 Bcfd, (Cheniere/Freeport LNG Dev.)
6. Sabine, LA : 2.6 Bcfd (Cheniere LNG)
7. Elba Island, GA: 0.54 Bcfd (El Paso - Southern LNG)

APPROVED BY MARAD/COAST GUARD
8. Port Pelican: 1.6 Bcfd, (Chevron Texaco)
9. Louisiana Offshore : 1.0 Bcfd (Gulf Landing - Shell)

PROPOSED TO FERC
10. Fall River, MA : 0.8 Bcfd, (Weaver's Cove Energy/Hess LNG)
11. Long Beach, CA : 0.7 Bcfd, (Mitsubishi/ConocoPhillips - Sound Energy Solutions)
12. Corpus Christi, TX : 2.6 Bcfd, (Cheniere LNG)
13. Corpus Christi, TX : 1.0 Bcfd (Vista Del Sol - ExxonMobil)
14. Sabine, TX : 1.0 Bcfd (Golden Pass - ExxonMobil)
15. Logan Township, NJ : 1.2 Bcfd (Crown Landing LNG - BP)
16. Bahamas : 0.5 Bcfd, (Seafarer - El Paso/FPL)
17. Corpus Christi, TX: 1.0 Bcfd (Ingleside Energy - Occidental Energy Ventures)
18. Providence, RI : 0.5 Bcfd (Keyspan & BG LNG)
19. Port Arthur, TX: 1.5 Bcfd (Sempra)
20. Cove Point, MD : 0.8 Bcfd (Dominion)
21. LI Sound, NY: 1.0 Bcfd (Broadwater Energy - TransCanada/Shell)
22. Pascagoula, MS: 1.0 Bcfd (Gulf LNG Energy LLC)
23. Bradwood, OR: 1.0 Bcfd (Northern Star LNG - Northern Star Natural Gas LLC)
24. Pascagoula, MS: 1.3 Bcfd (Casotte Landing - ChevronTexaco)
25. Cameron, LA: 3.3 Bcfd (Creole Trail LNG - Cheniere LNG)
26. Port Lavaca, TX: 1.0 Bcfd (Calhoun LNG - Gulf Coast LNG Partners)

PROPOSED TO MARAD/COAST GUARD
27. California Offshore: 1.5 Bcfd (Cabrillo Port - BHP Billiton)
28. So. California Offshore : 0.5 Bcfd, (Crystal Energy)
29. Louisiana Offshore : 1.0 Bcfd (Main Pass McMoRan Exp.)
30. Gulf of Mexico: 1.0 Bcfd (Compass Port - ConocoPhillips)
31. Gulf of Mexico: 2.8 Bcfd (Pearl Crossing - ExxonMobil)
32. Gulf of Mexico: 1.5 Bcfd (Beacon Port Clean Energy Terminal - ConocoPhillips)

POTENTIAL SITES IDENTIFIED BY PROJECT SPONSORS
33. Coos Bay, OR: 0.13 Bcfd, (Energy Projects Development)
34. Somerset, MA: 0.65 Bcfd (Somerset LNG)
35. California - Offshore: 0.75 Bcfd, (Chevron Texaco)
36. Pleasant Point, ME : 0.5 Bcf/d (Quoddy Bay, LLC)
37. St. Helens, OR: 0.7 Bcfd (Port Westward LNG LLC)
38. Offshore Boston, MA: 0.8 Bcfd (Northeast Gateway - Excelerate Energy)
39. Galveston, TX: 1.2 Bcfd (Pelican Island - BP)
40. Philadelphia, PA: 0.6 Bcfd (Freedom Energy Center - PGW)
41. Astoria, OR: 1.0 Bcfd (Skipanon LNG - Calpine)
42. Freeport, TX: 1.5 Bcfd, (Cheniere/Freeport LNG Dev. - Expansion)
43. Offshore Boston, MA: 0.4 Bcfd (Neptune LNG - Tractebel)

CANADIAN APPROVED AND POTENTIAL TERMINALS
44. St. John, NB : 1.0 Bcfd, (Canaport - Irving Oil)
45. Point Tupper, NS 1.0 Bcf/d (Bear Head LNG - Anadarko)
46. Quebec City, QC : 0.5 Bcfd (Project Rabaska - Enbridge/Gaz Met/Gaz de France)
47. Rivière-du- Loup, QC: 0.5 Bcfd (Cacouna Energy - TransCanada/PetroCanada)
48. Kitimat, BC: 0.61 Bcfd (Galveston LNG)
49. Prince Rupert, BC: 0.30 Bcfd (WestPac Terminals)
50. Goldboro, NS 1.0 Bcfd (Keltic Petrochemicals)

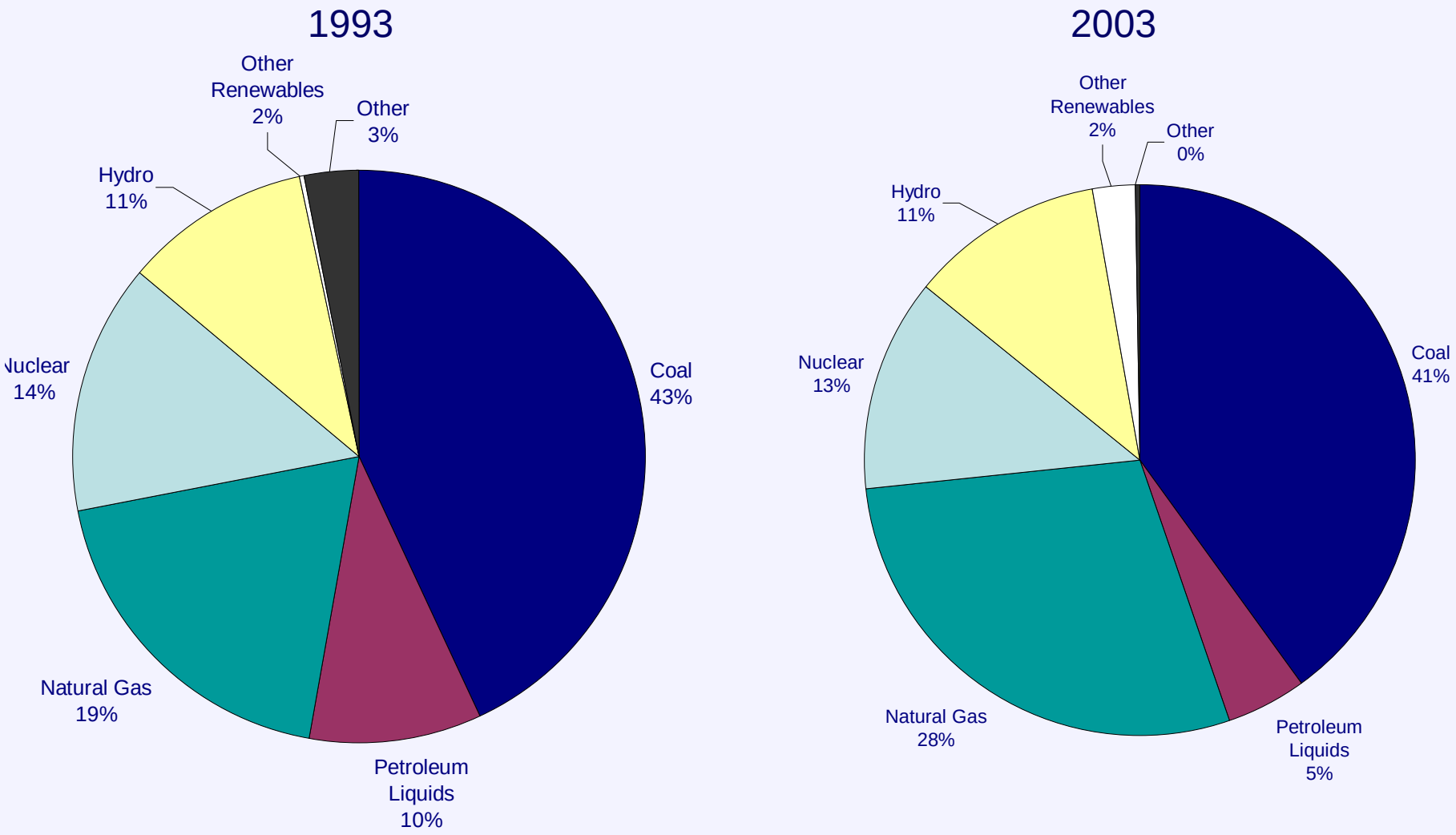
MEXICAN APPROVED AND POTENTIAL TERMINALS
51. Altamira, Tamulipas : 0.7 Bcfd, (Shell/Total/Mitsui)**
52. Baja California, MX : 1.0 Bcfd, (Sempra & Shell)**
53. Baja California - Offshore : 1.4 Bcfd, (Chevron Texaco)
54. Lázaro Cárdenas, MX : 0.5 Bcfd (Tractebel/Repsol)
55. Puerto Libertad, MX: 1.3 Bcfd (Sonora Pacific LNG)

Source: Federal Energy Regulatory Commission

Center for
Energy Studies

US Electric Generation Capacity by Fuel Type
1993 and 2003

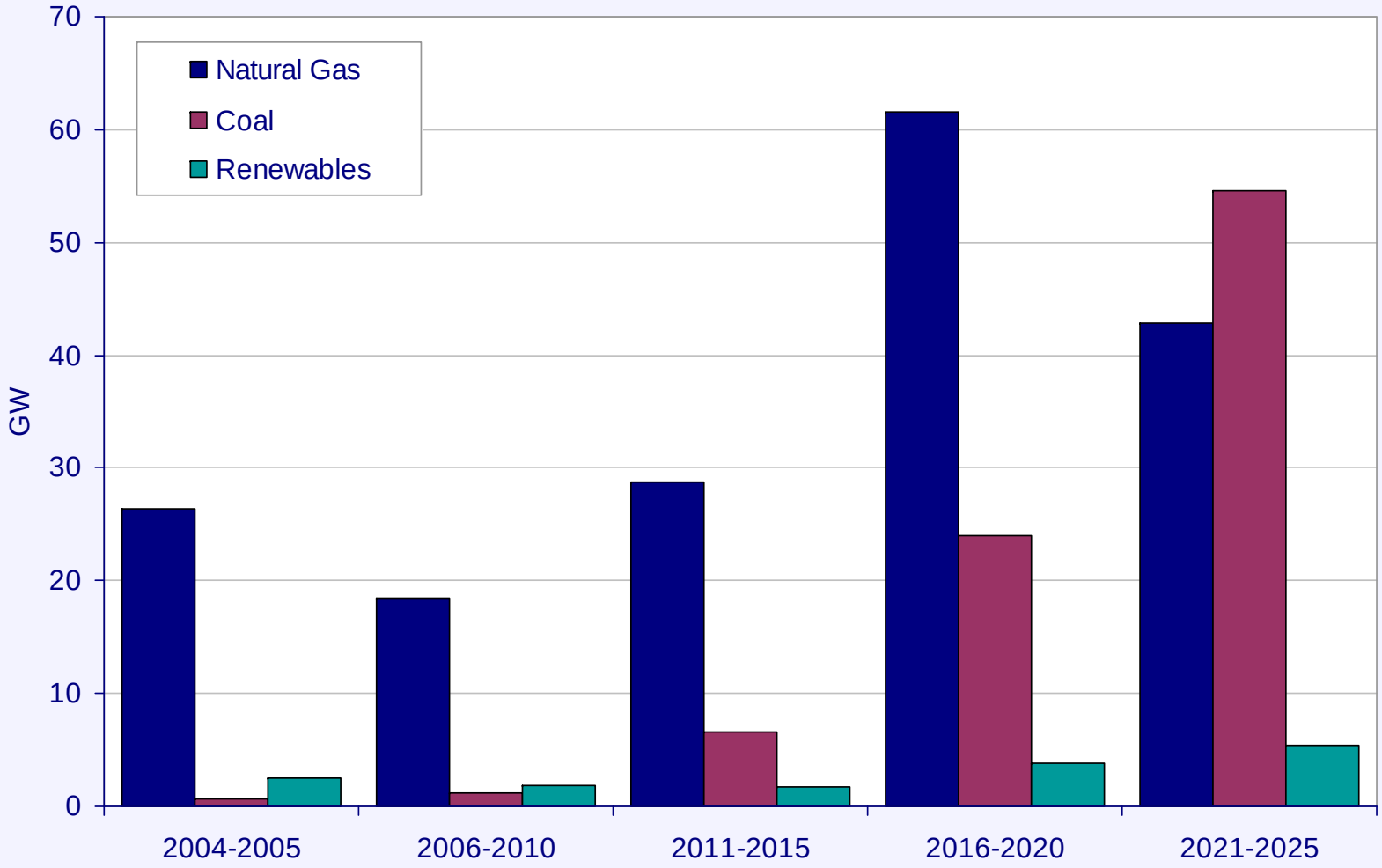
Generation shares have moved significantly to natural gas



Source: Energy Information Administration

Center for
Energy Studies

Electricity Generation Capacity Additions by Fuel Type, (2004-2025)

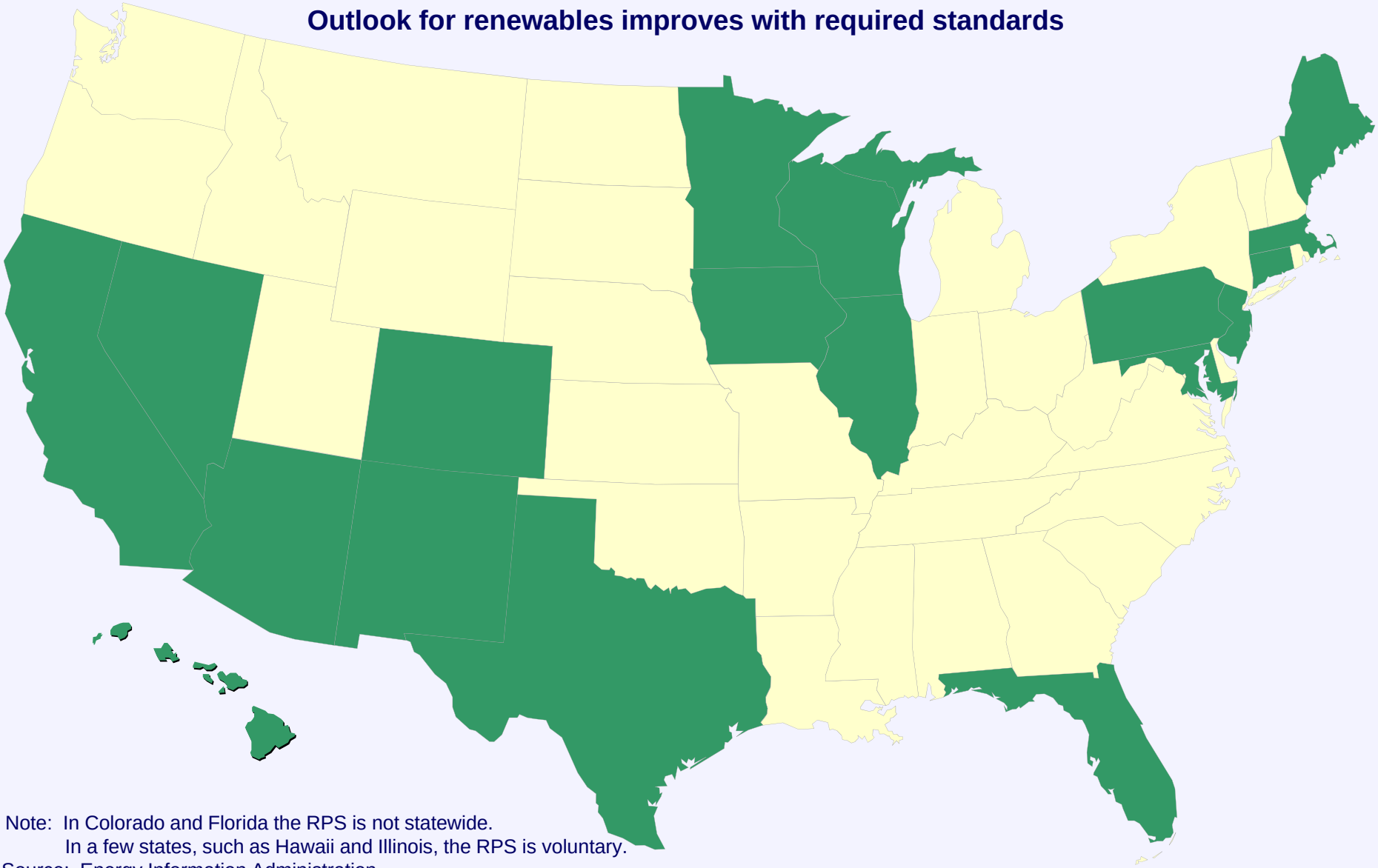


Note: Includes combined heat and power.
Source: Energy Information Administration

Center for
Energy Studies

States with Renewable Portfolio Standards and State Mandates, 2004

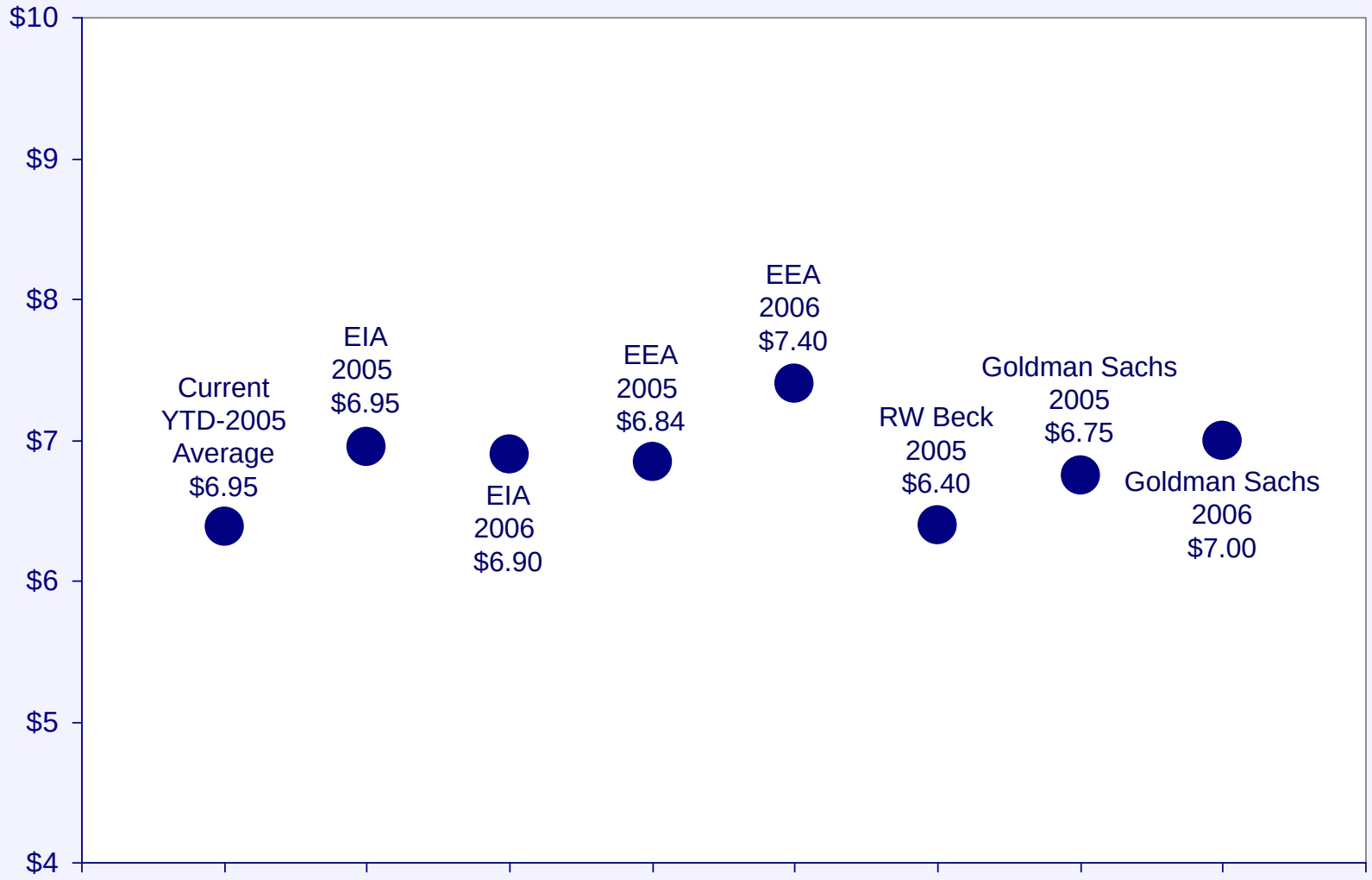
Outlook for renewables improves with required standards



Note: In Colorado and Florida the RPS is not statewide.
In a few states, such as Hawaii and Illinois, the RPS is voluntary.
Source: Energy Information Administration

Center for
Energy Studies

Short Term Outlook
Henry Hub Natural Gas Spot Price



Source: Energy Information Administration; and various trade press

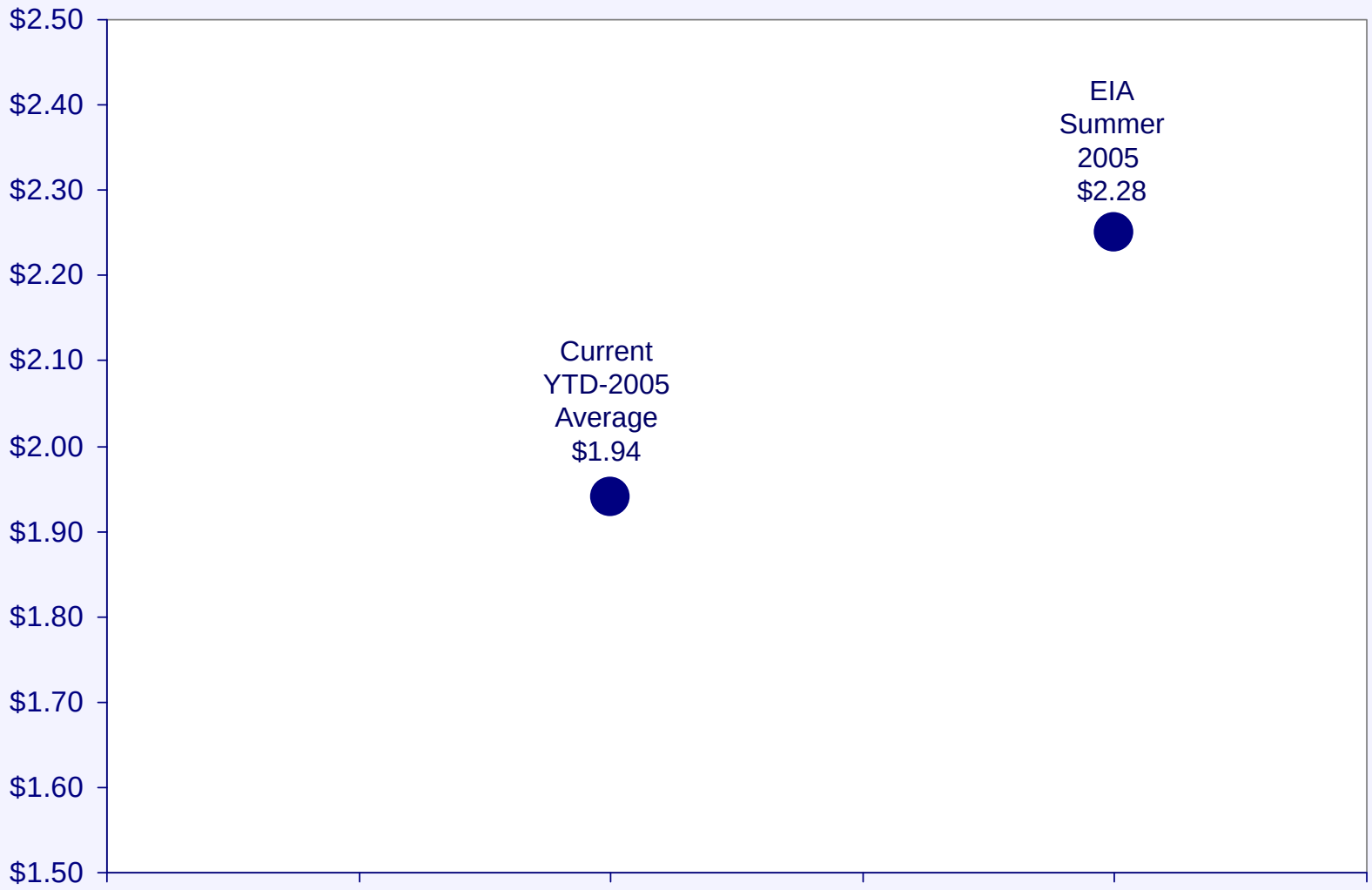
Center for
Energy Studies

Short Term Outlook
WTI Crude Oil Price

Source: Energy Information Administration; and various trade press

Center for
Energy Studies

Short Term Outlook
Gasoline Prices

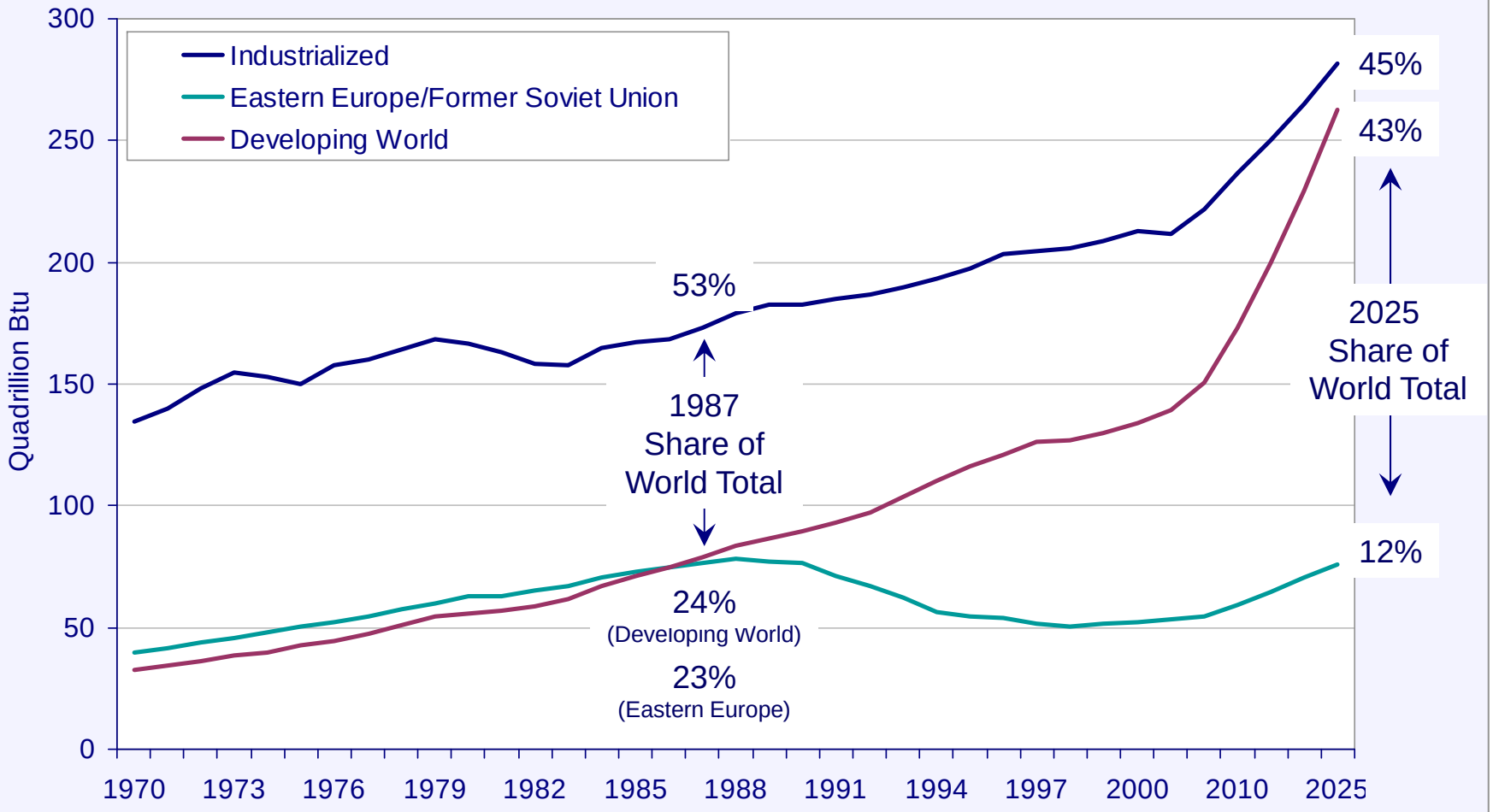


Source: Energy Information Administration; and various trade press

Center for
Energy Studies

World Marketed Energy Consumption by Region 1970-2025

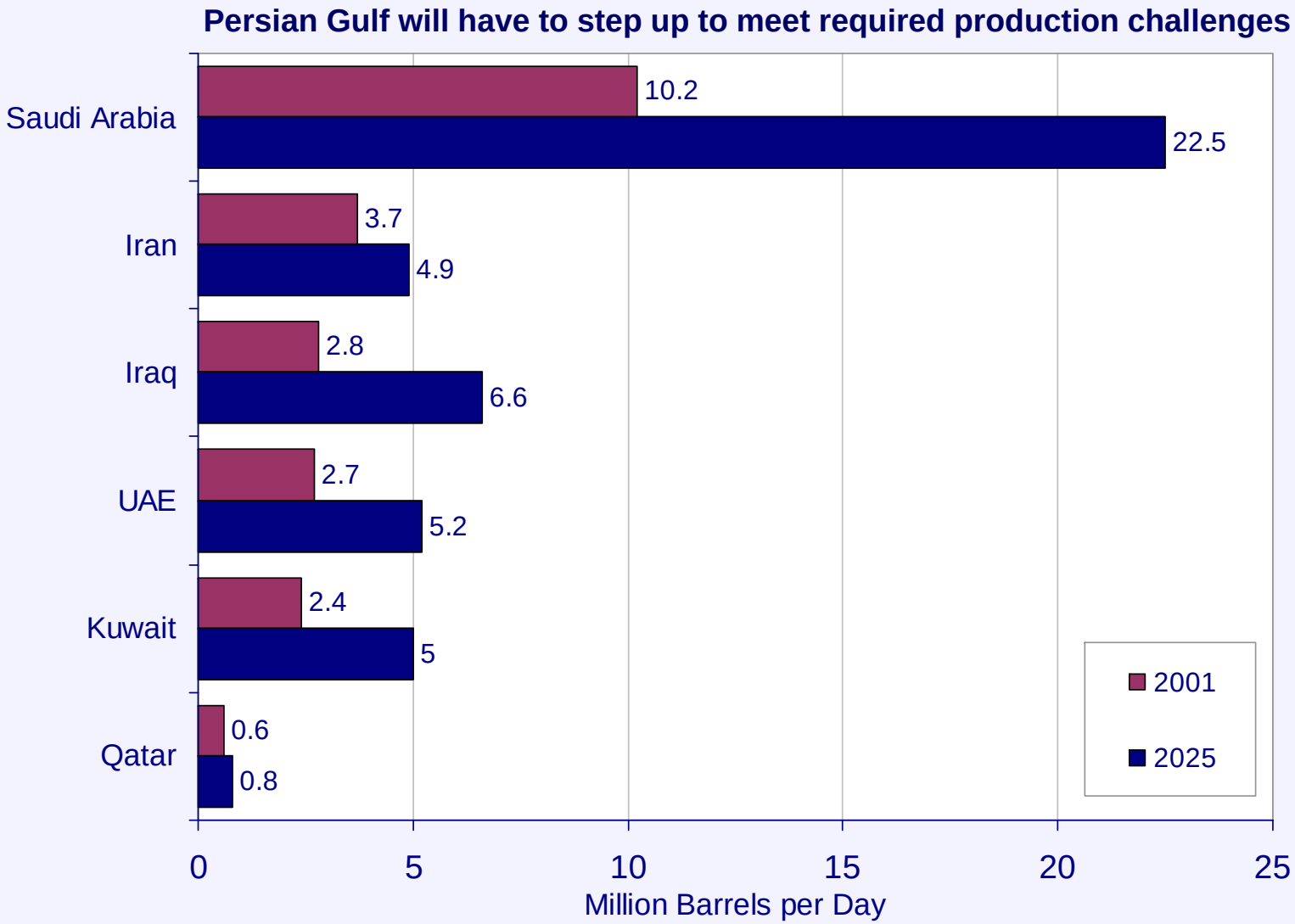
Long run sees significant increase in usage for developing world



Source: Energy Information Administration

Center for
Energy Studies

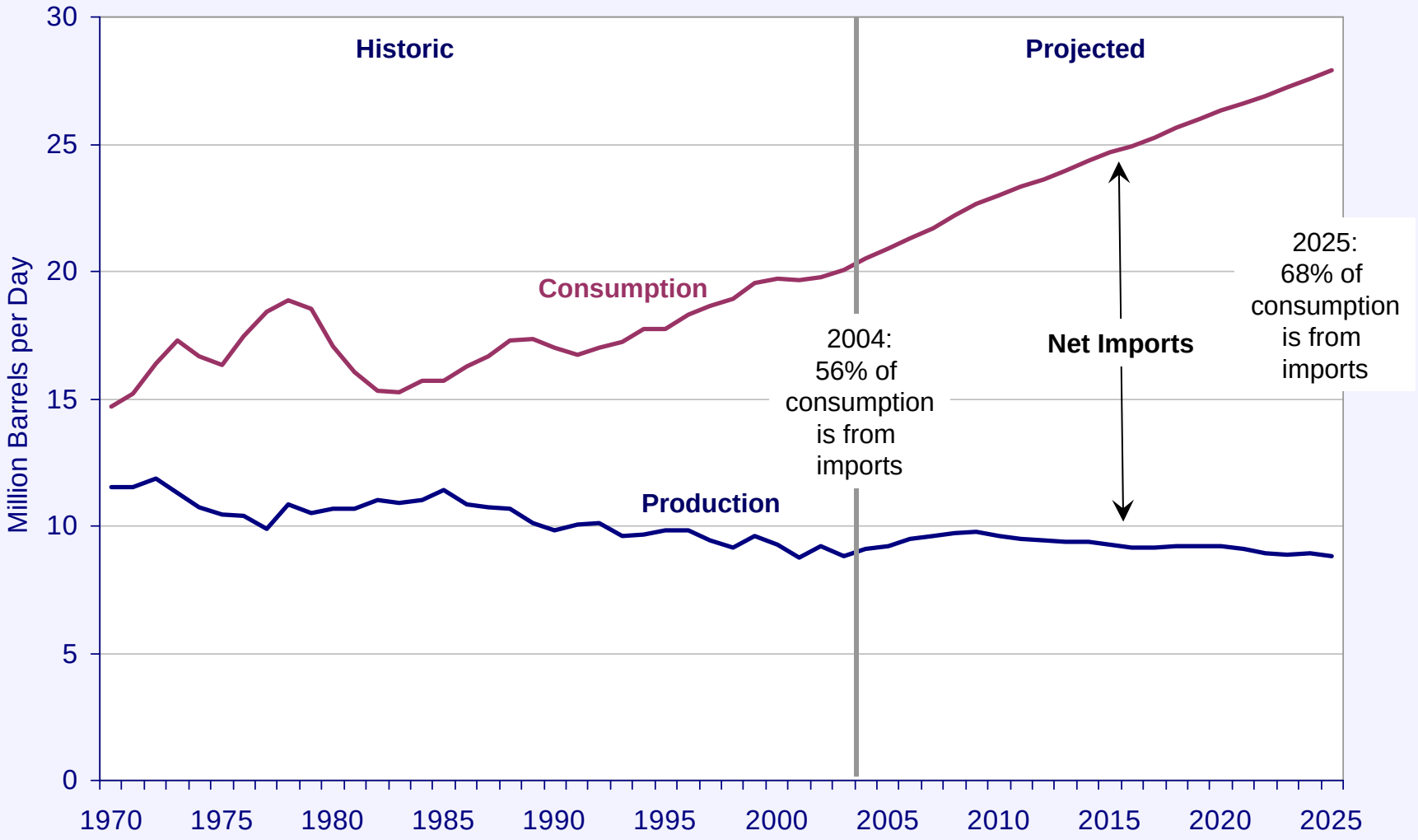
Persian Gulf Oil Productive Capacity by Country 2001 and 2025



Source: Oil and Gas Journal

Center for
Energy Studies

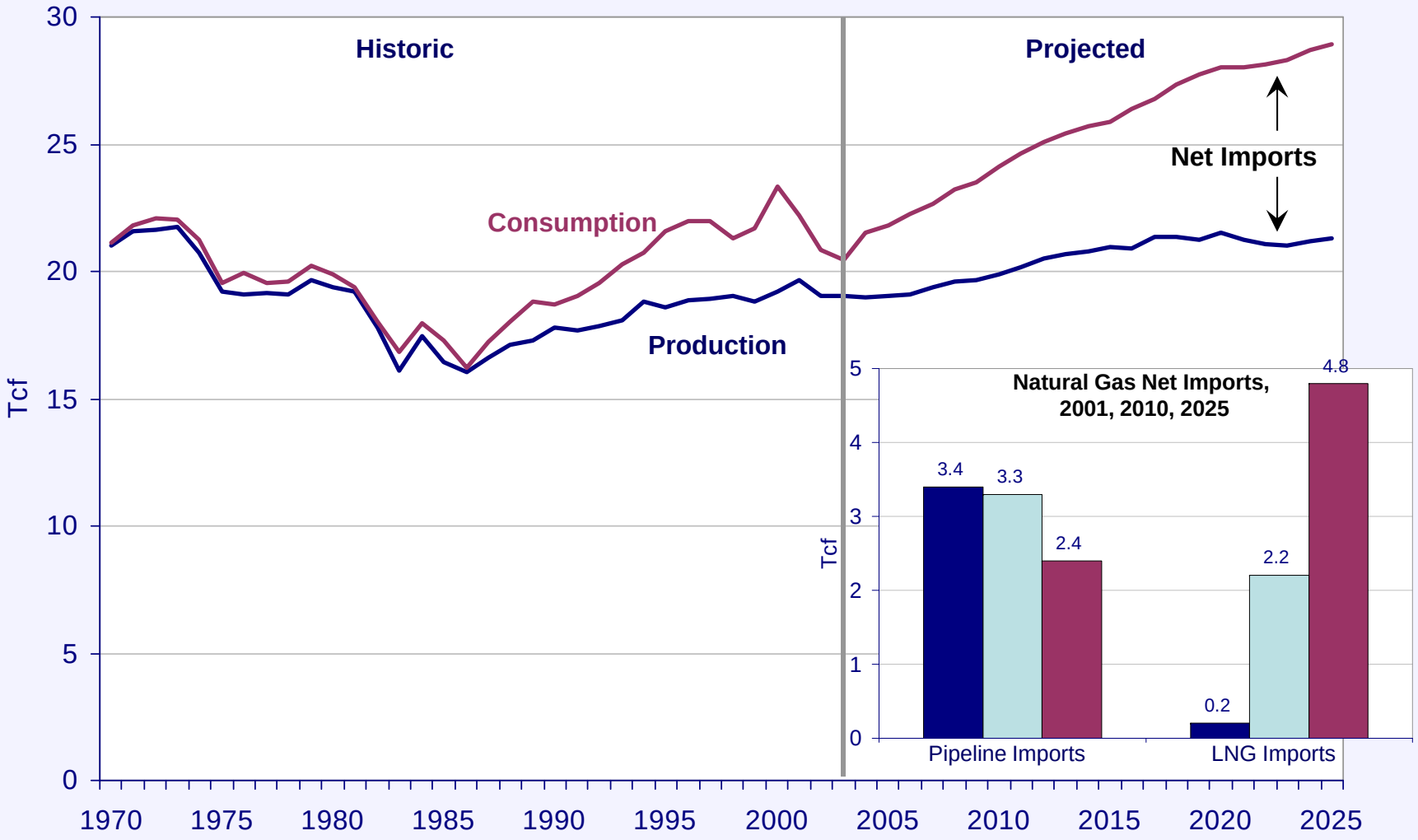
Crude Oil Production, Consumption and Imports (1970-2025)



Source: Energy Information Administration, Department of Energy

Center for
Energy Studies

Natural Gas Production, Consumption and Imports (1970-2025)



Source: Energy Information Administration, Department of Energy

Center for
Energy Studies

Conclusions

- Continued high prices in near term
- Developed world will rely on imports more heavily
- Continued demand will put increased pressure on global energy markets
- US dependence on foreign energy will increase
- Overall problem in real terms is not severe but we are nearing the pressure point

Center for
Energy Studies

Questions, Comments, & Discussion

dismukes@lsu.edu

www.enrg.lsu.edu