Welcome to Columbus !!

- Largest Metropolitan City in Ohio
- Home of The Ohio State University, Columbus Blue Jackets, Columbus Crew and Columbus Clippers
- State Capital
- Great restaurants

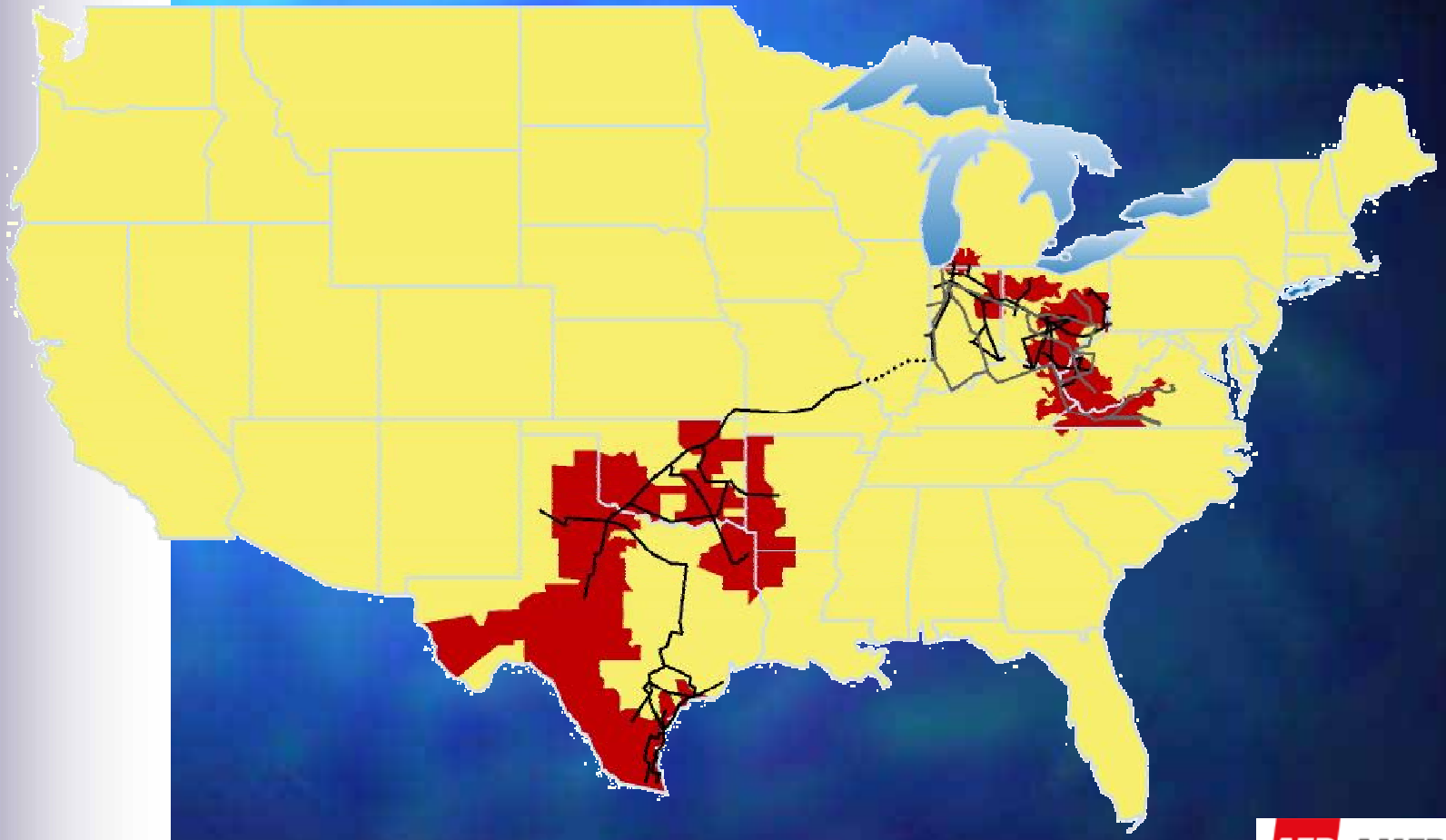
AEP Facts

- U.S. Electric Sales (2005) - 214 million MWH
- Revenue - $12.1B; Income - $1.03B
- Coal-fired Capacity ~ 25,000 MW
- Gas-fired Capacity ~ 8,000 MW
- Annual Coal Use ~ 80 million tons
- 2006 Construction CapEx ~ $3.7B
- Celebrate our 100th Anniversary – Dec ‘06

AEP AMERICAN ELECTRIC POWER

AEP: America's Energy Partner®

AEP Service Territory



AEP AMERICAN ELECTRIC POWER

AEP: America's Energy Partner®

The Future of New Generation – Key Questions

- What will the Utility Industry Build?
- How will it Perform?
  - Efficiency
  - Reliability
  - Environmental ‘Footprint’
- What will it cost ?

What are the Options?

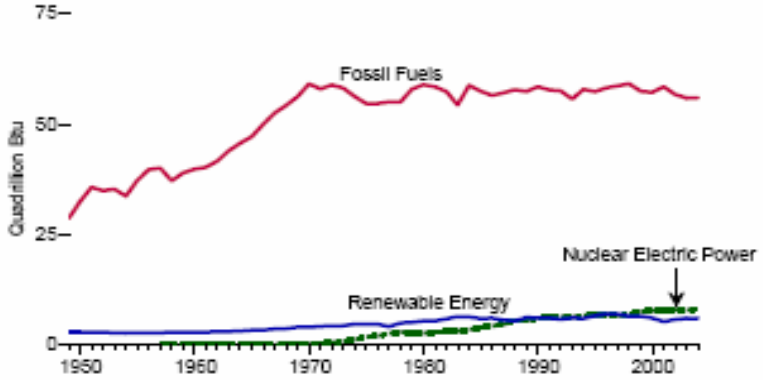
- Natural gas combustion turbines in both Simple Cycle (CTs) and Combined Cycle
  - Low Emissions / Low CapEx / High O&M
- Solid Fuel (Bit/PRB/Lignite + Waste fuels + Petcoke + Tires + ?????
- Renewables (Wind, Bio-fuel combustion or gasification, solar)
- Nuclear
- Storage (Pumped Hydro, Battery, Compressed Air)

The Answer Is?

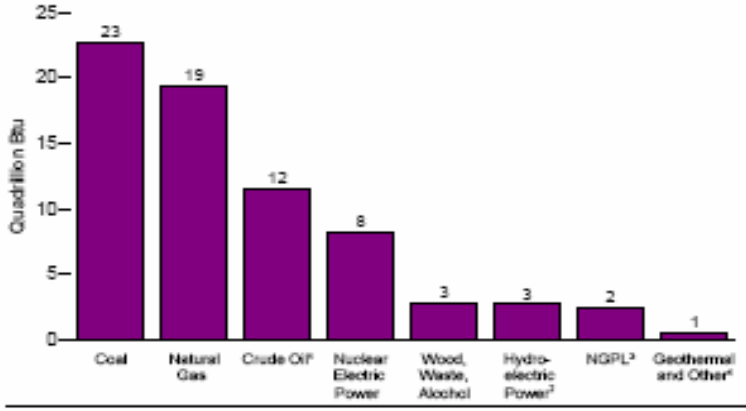
- All of the above will serve a particular niche market with Coal, NG and Nuclear providing the vast majority of our needs
- Cost of Fuel + Environmental Permitting + Electric Grid Demands will establish the mix of generation technologies used
- The Price of Electricity will rise – substantially over the next 7-10 years!!

Figure 1.2 Energy Production by Source

By Fossil Fuels, Nuclear Electric Power, and Renewable Energy, 1949-2004

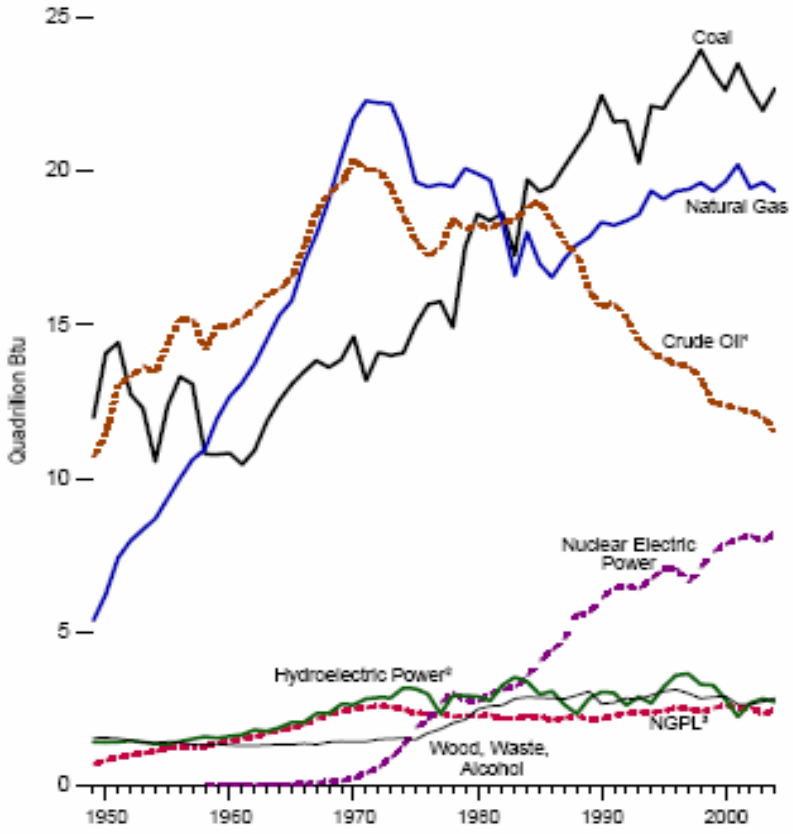


By Source, 2004



[1] Includes lease condensate.
[2] Conventional hydroelectric power.
[3] Natural gas plant liquids.

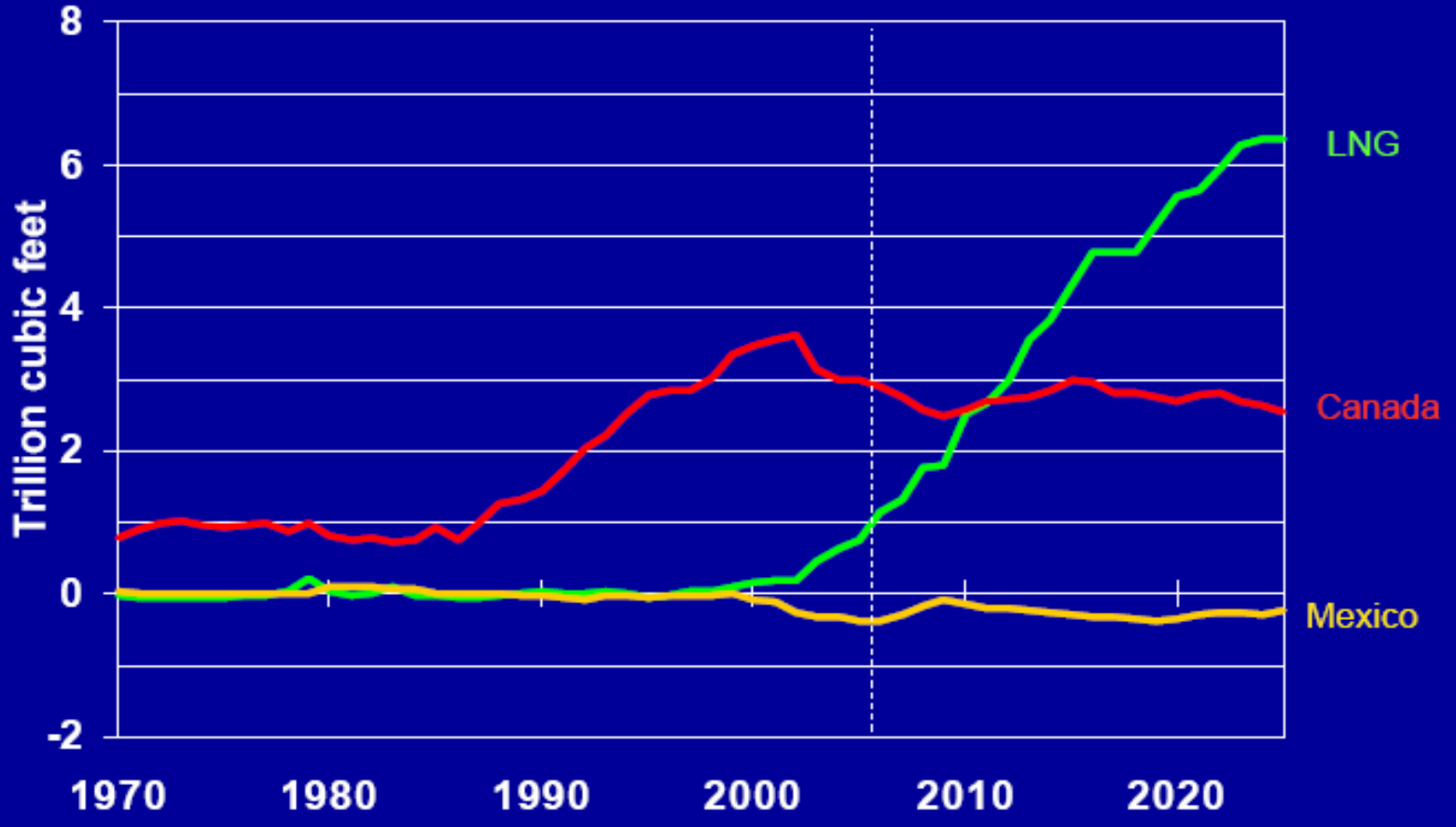
By Major Source, 1949-2004

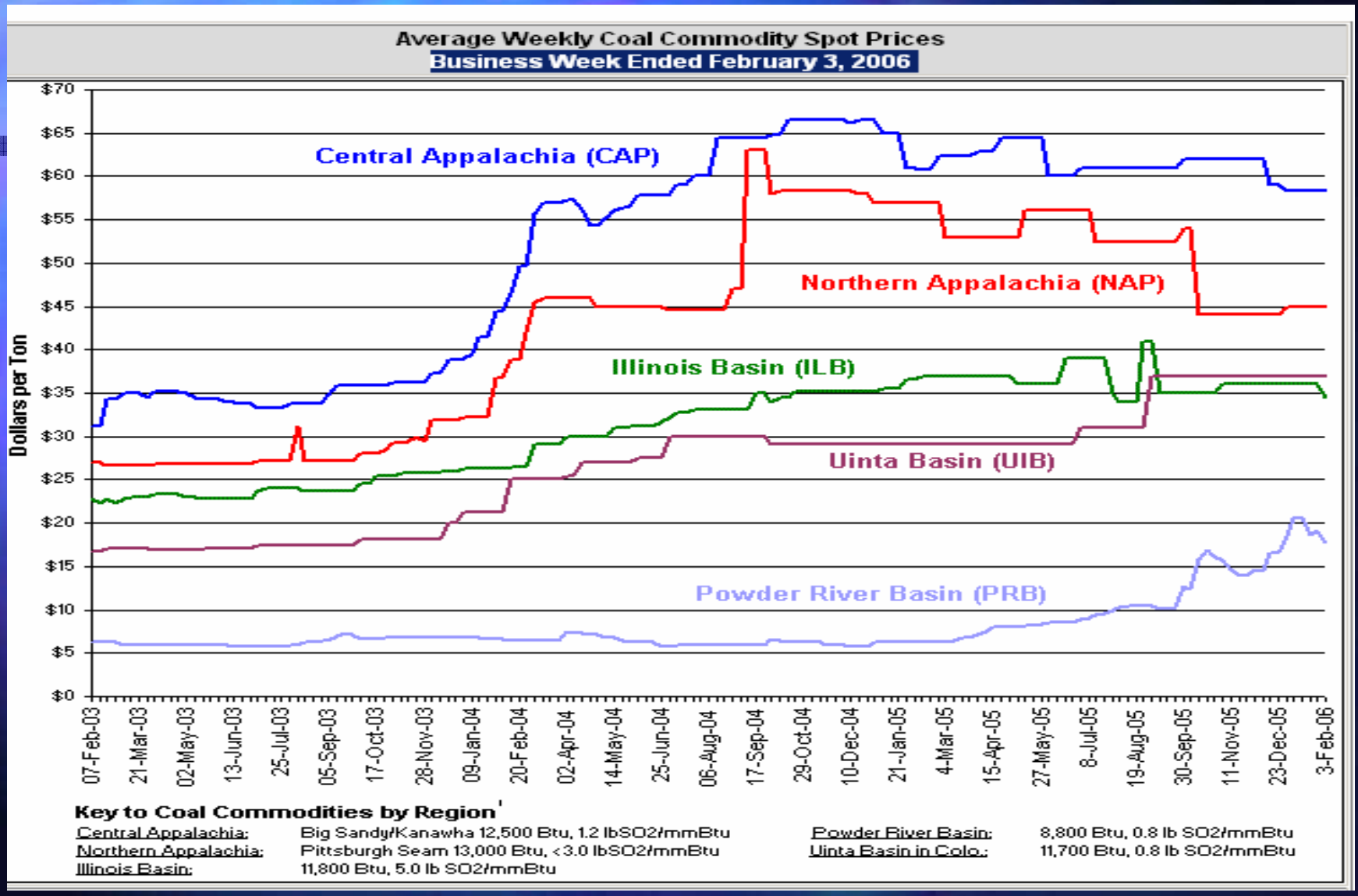


[4] Solar and wind.
Note: Because vertical scales differ, graphs should not be compared.
Source: Table 1.2.

Net US Gas Imports, 1970 – 2025

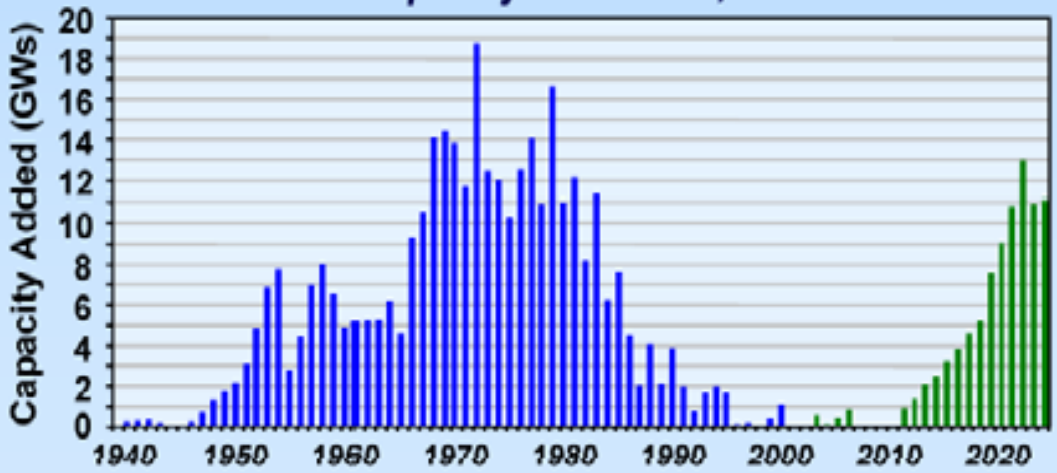
EIA-AEO 2005




Average Weekly Coal Commodity Spot Prices
Business Week Ended February 3, 2006
Dollars per Ton
$70
$65
$60
$55
$50
$45
$40
$35
$30
$25
$20
$15
$10
$5
$0
Central Appalachia (CAP)
Northern Appalachia (NAP)
Illinois Basin (ILB)
Uinta Basin (UIB)
Powder River Basin (PRB)
07-Feb-03
21-Mar-03
02-May-03
13-Jun-03
25-Jul-03
05-Sep-03
17-Oct-03
28-Nov-03
09-Jan-04
20-Feb-04
02-Apr-04
14-May-04
25-Jun-04
06-Aug-04
17-Sep-04
29-Oct-04
10-Dec-04
21-Jan-05
4-Mar-05
15-Apr-05
27-May-05
8-Jul-05
19-Aug-05
30-Sep-05
11-Nov-05
23-Dec-05
3-Feb-06
Key to Coal Commodities by Region
Central Appalachia: Big Sandy/Kanawha 12,500 Btu, 1.2 lbSO2/mmBtu
Northern Appalachia: Pittsburgh Seam 13,000 Btu, <3.0 lbSO2/mmBtu
Illinois Basin: 11,800 Btu, 5.0 lb SO2/mmBtu
Powder River Basin: 8,800 Btu, 0.8 lb SO2/mmBtu
Uinta Basin in Colo.: 11,700 Btu, 0.8 lb SO2/mmBtu

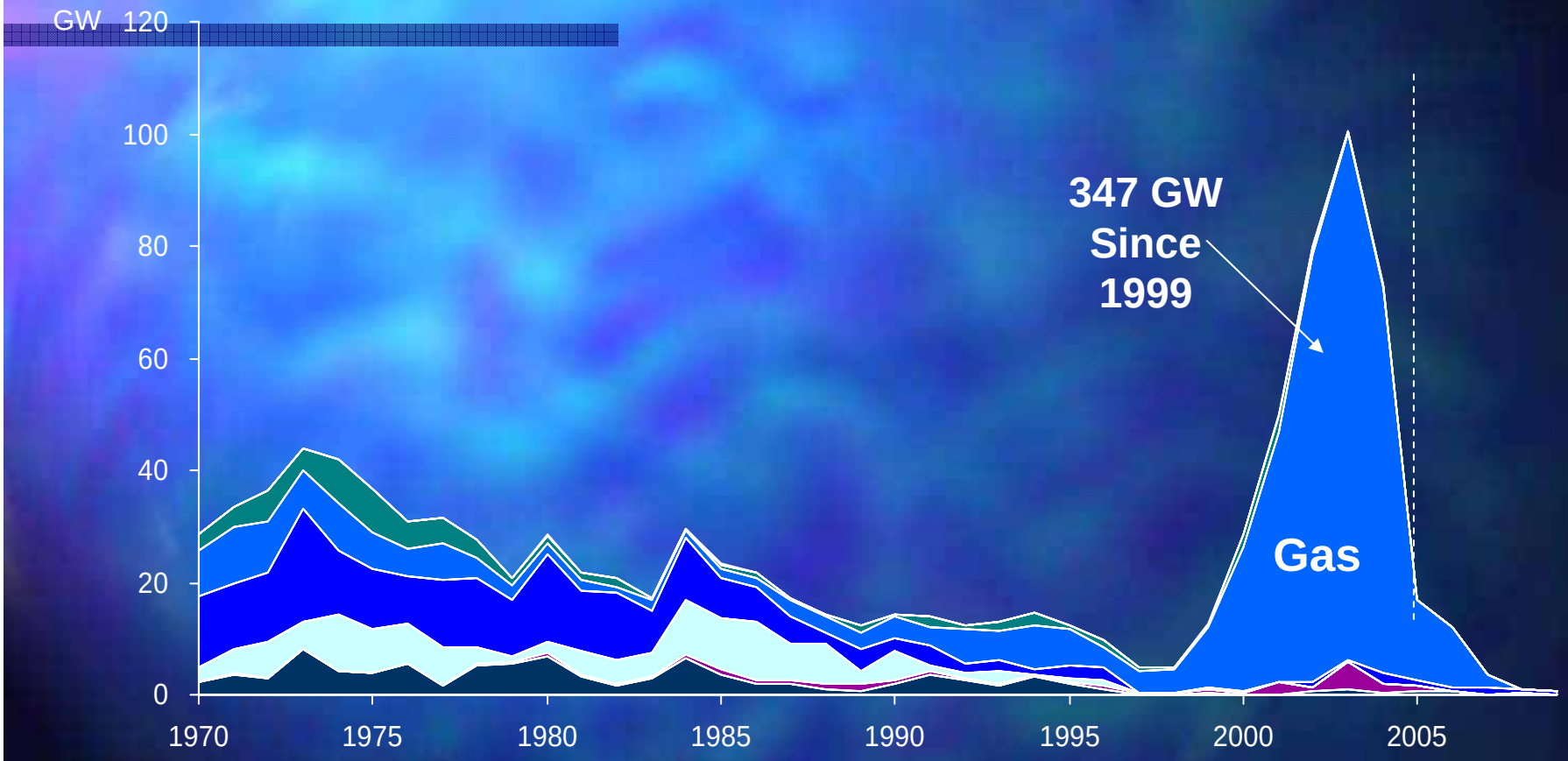
- Construction has not kept pace with growth
  - 70% load growth in past 25 years
  - Lagging investment in generation and transmission infrastructure
- Existing plants are approaching their operating limits
  - Nuclear: 1990, 66% capacity factor 2004, 91% capacity factor
  - Coal : 1990, 59% capacity factor 2004 74% capacity factor
- Demand expected to grow another 20% over next 10 years
  - U.S. set new record for power demand week ending Jul. 23, 2005

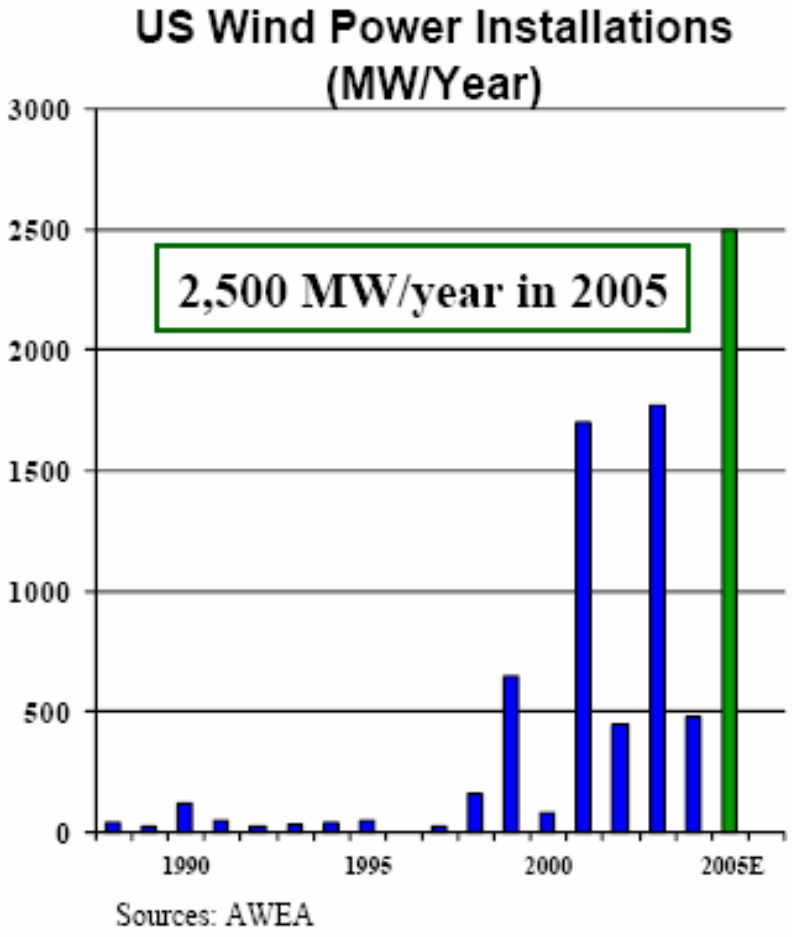
U.S. Coal Capacity Additions, 1940 – 2025



Industry Growth Trend Not Seen in 50 Years

US CAPACITY ADDITIONS

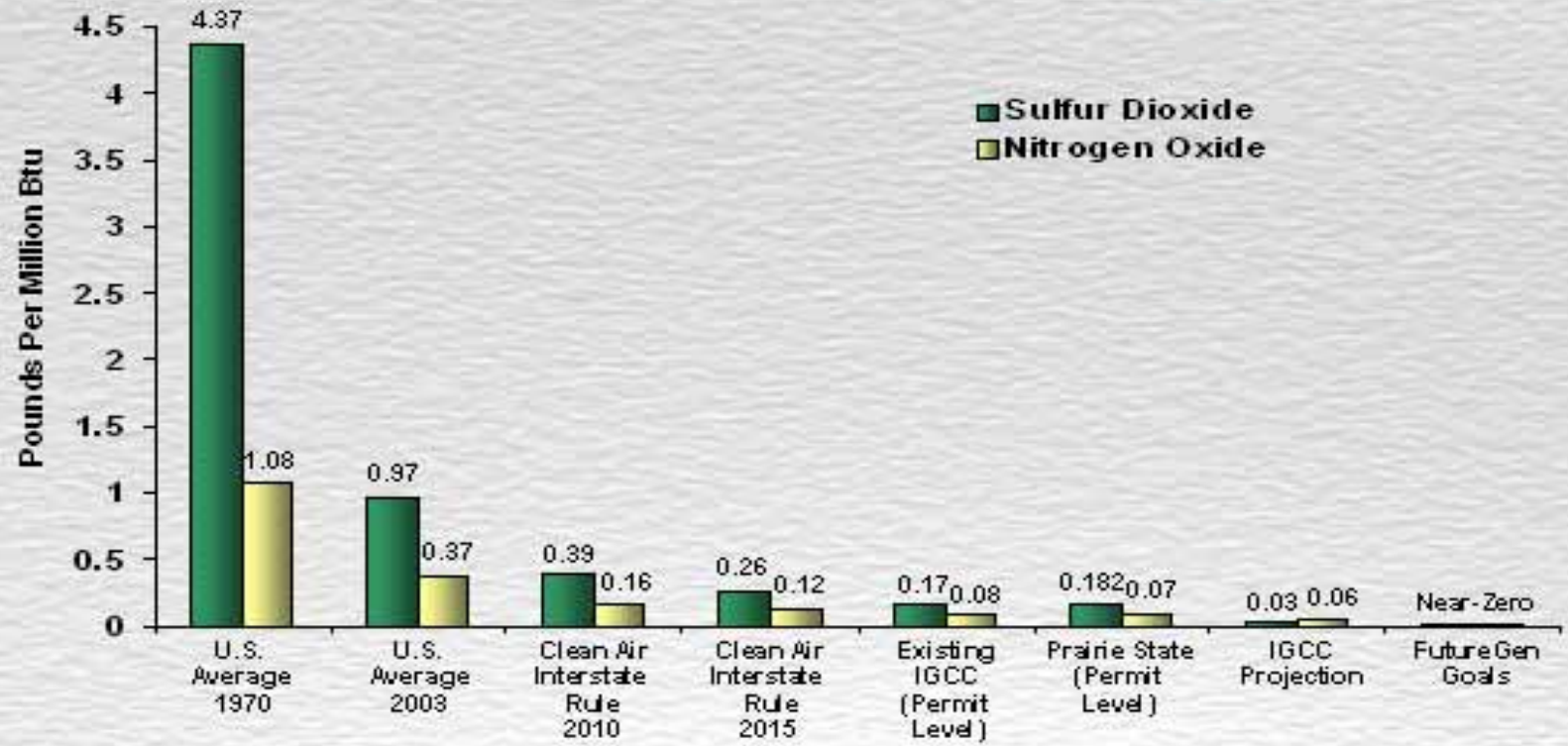




7,000 MW Installed Base in US
48,000 MW Installed Base Worldwide
Plus Hydro, Geo, CSP and Biomass

The Path to Zero Emissions from Coal-Fueled Generating Plants

Emissions from Coal-Fueled Generating Plants

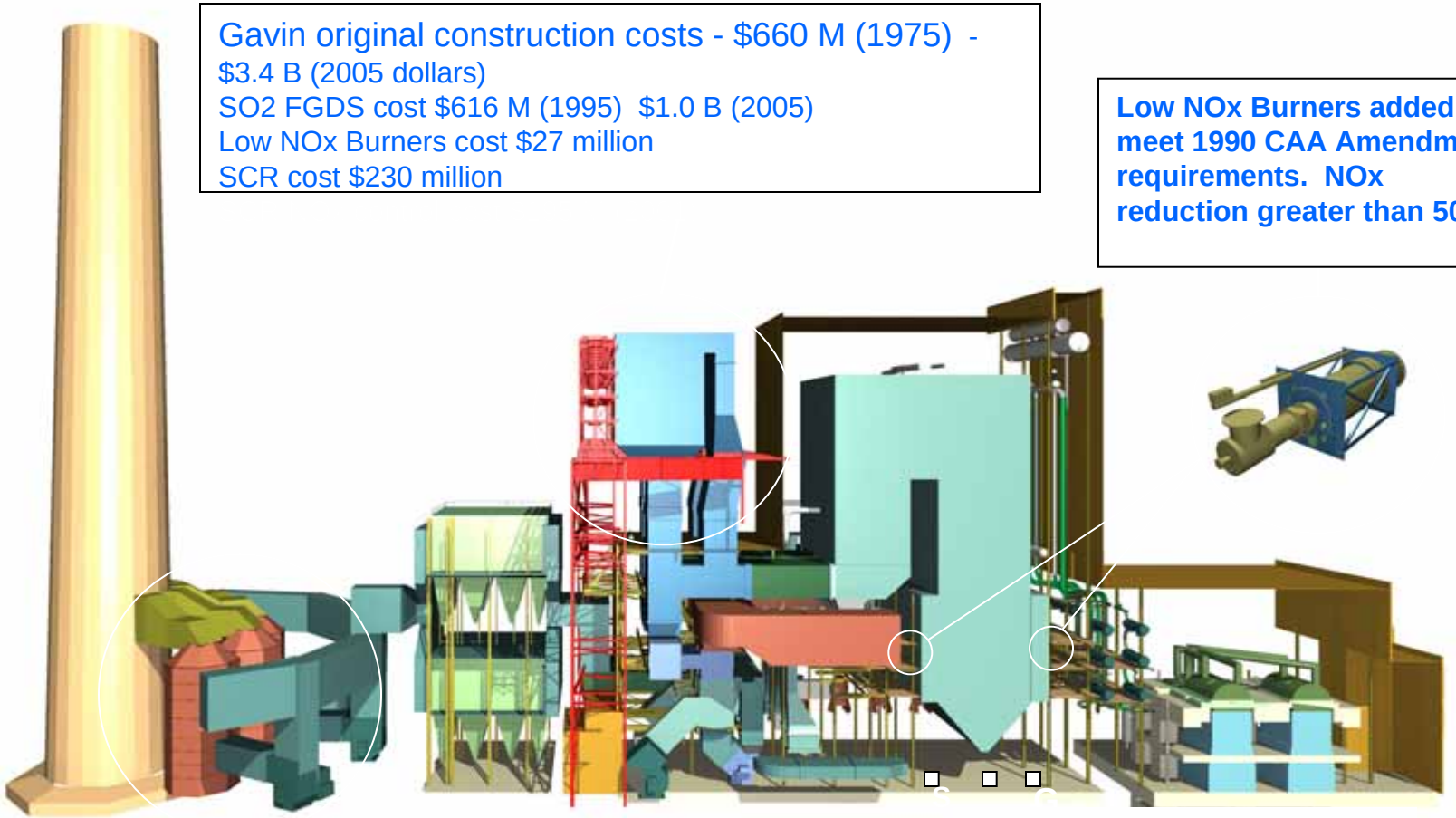


Peabody

Source: EPA's Clean Air Markets database; Energy Information Administration 2004 Annual Energy Outlook; GE Energy; SFA Pacific.

Gavin original construction costs - $660 M (1975) - $3.4 B (2005 dollars)
SO2 FGDS cost $616 M (1995) $1.0 B (2005)
Low NOx Burners cost $27 million
SCR cost $230 million

Low NOx Burners added to meet 1990 CAA Amendment requirements. NOx reduction greater than 50 %



SO2 Scrubbers added to meet 1990 CAA Amendment requirements. SO2 reduction greater than 90%

Solid Fuel Plant for Today

- Flexible Coal based fuel source with blending for PRB + Bituminous
- High Efficiency: HR < 9000 Btu/kwh
  - USC Steam cycles : 3800psi/1100F/1100F
- Small Enviro Footprint:
  - SO2 < 0.1 #/mmBtu; NOx < 0.06 #/mmBtu
  - PM < 0.02 #/mmBtu; No SO3 plumes/low HAP
  - Lower CO2 through efficiency + Cap/Sequest

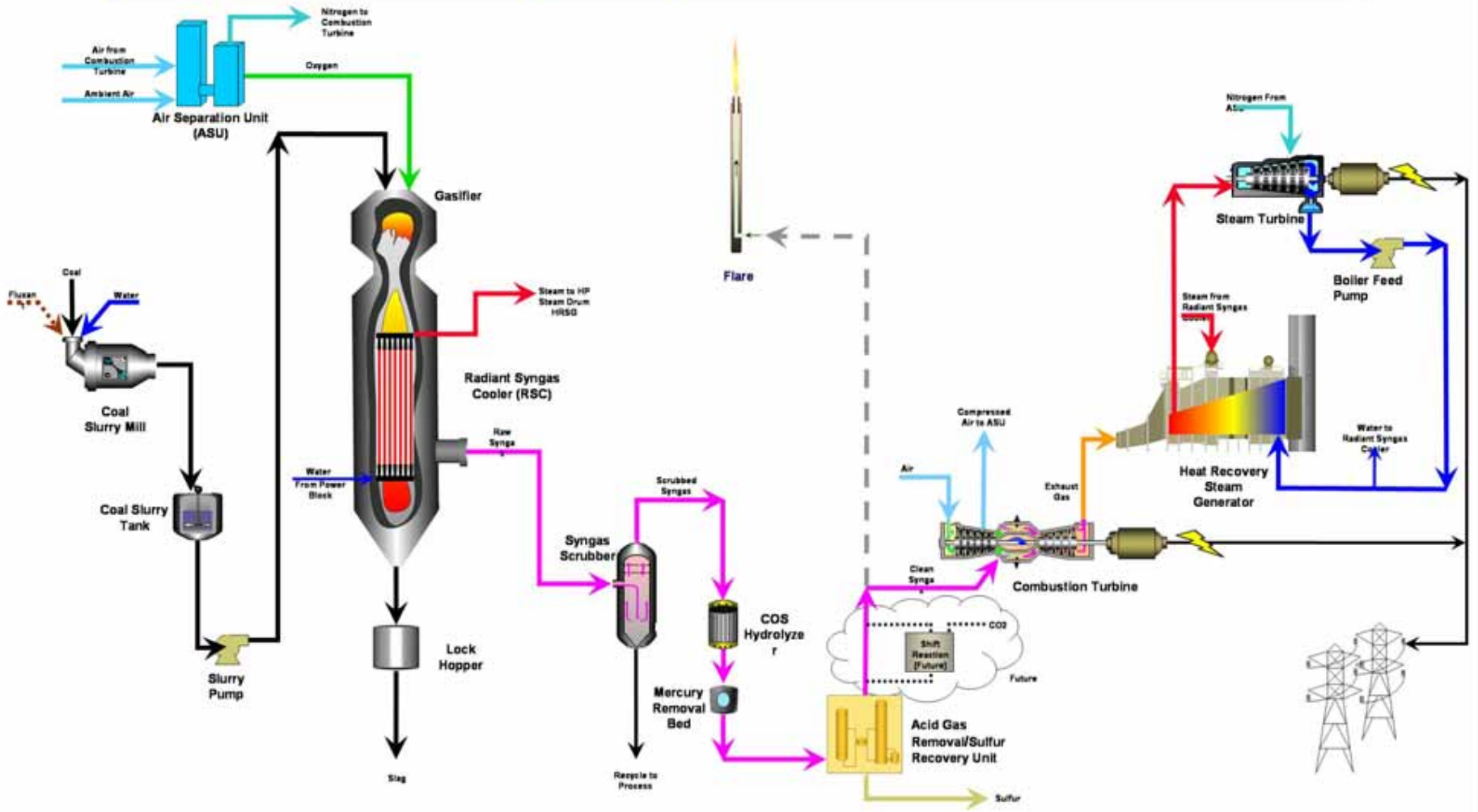
Emission Control Technologies

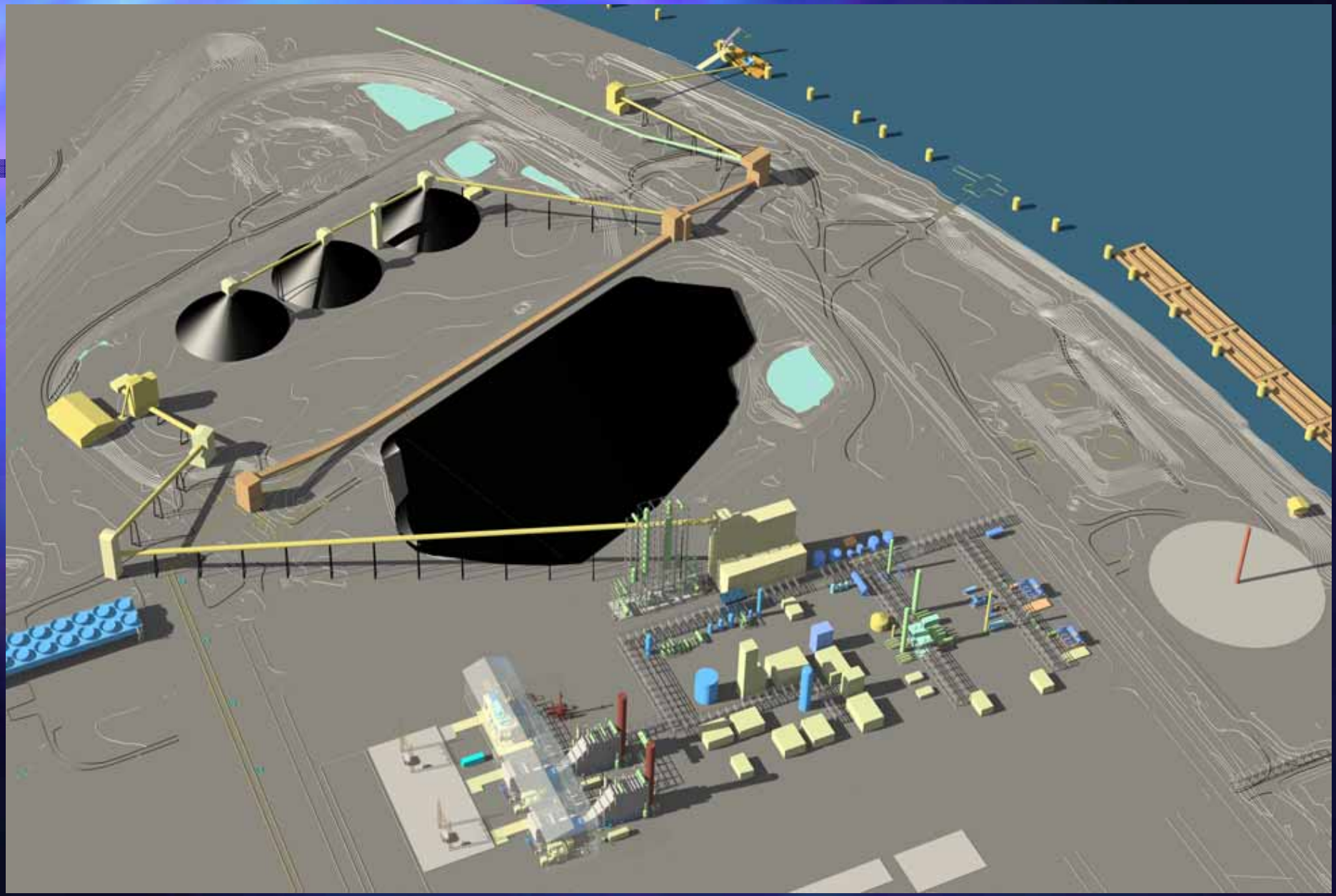
- PRB = LNB+OFA/SCR/DFGD/ACI/FF
- Bituminous/Lignite = LNB/SCR/EPS/WFGDS/WESP(option)
- Waste fuels = CFB/SNCR/DFGD/ACI/FF

NEW UNIT COST = $1500 – 2300/KW !!!!

COE @ BusBar = 5 to 8 cents/kwh!!!

AEP INTEGRATED GASIFICATION COMBINED CYCLE (IGCC) CONFIGURATION





Design it Safe, Keep it Safe!

- Thoughtful, careful design must be at the core of any new or upgraded APC equipment
- Must consider ergonomics in design including egress and component access
- Electrical design must allow safe access to critical monitor points – separation of HV components
- Clearance process must be clear and logical
- Reliability will be a ‘compliance’ issue - CAM.

HUMOR SLIDE

MISTAKES

It Could Be that the Purpose of Your Life Is
Only to Serve as a Warning to Others.

HUMOR SLIDE