Electric Power Industry

Team XXXXX:

Names of team members omitted on purpose

Georgia State University

Objectives

- Electricity quick Facts
- Brief History of Electricity in US
- Industry Analysis
- Firm Analysis: Georgia Power
  - A Coal Perspective
- Macroeconomic Issues
- Look to the Future
- Conclusion
- Q & A

Electricity

- **A $200+ Billion Industry**
- **Most prevalent form of energy on Earth**
- **Lifeblood of the US Economy**
- **Controllable and Convenient**
- **Unparalleled Versatility, But:**

Cannot be Stored: Must be Produced exactly when needed to meet demand.

- World's most unique Commodity

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Quick History of the Electric Power Industry

- Knowledge dates back to ancient Greece
- Powers harnessed by Edison.
  - 1879 Incandescent light bulb
  - 1882 Pearl Street Station, Direct Current (DC)
- 1886 Tesla develops Alternate Current (AC)
- 1893 Westinghouse introduces the transformer
  - (AC) Became universal standard for transmission
  - Freedom to put plant anywhere
  - The Seed of Economic Growth
- Today the Electric Power Industry represents nearly 2% of US total GDP

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Industry Analysis

A. Market Structure

B. Size of Industry Relative to Economy.

C. Demand factors.

- Developing Nations
- Scope of Change
- World Demand

A. Market Structure

Last Major Regulated Energy Industry

- **First viewed as “Natural Monopoly”**
- **Crash of 29 reveled vulnerability of over leveraged producers**
- **Cry for regulation**
- **Today over 2,200 power generating plants with combined retail revenues of $80 billion.**
- **Highly concentrated (50 firms generate 85% of revenues)**
- **Major players (Southern Company, Duke Power, Excelon, American Electric Power, and Consolidated Edison of New York).**
- **Over 2,000 government-owned electric power companies**

B. Size of industry relative to economy

- In 1977, one dollar spent on energy supported $9.50 of Gross Domestic Product (GDP).
- Today one dollar spent on energy yields $14 of GDP (adjusted for inflation).

Period	2006	IV 05	I 06	II 06	III 06	IV 06
GDP	13253	12730.5	13008.4	13197.3	13322.6	13487.2
Electricity	212	219.9	206.2	206.9	216.6	218.3
Percent	1.60	1.73	1.59	1.57	1.63	1.62

*Fueling our Future/World Climate Report
"Energy Reality Will Constrain Kyoto Policies"
By Mark P. Mills

Developing Nations Appetite for Energy

Returns to Scale

CRS

DRS

China, India
IRS

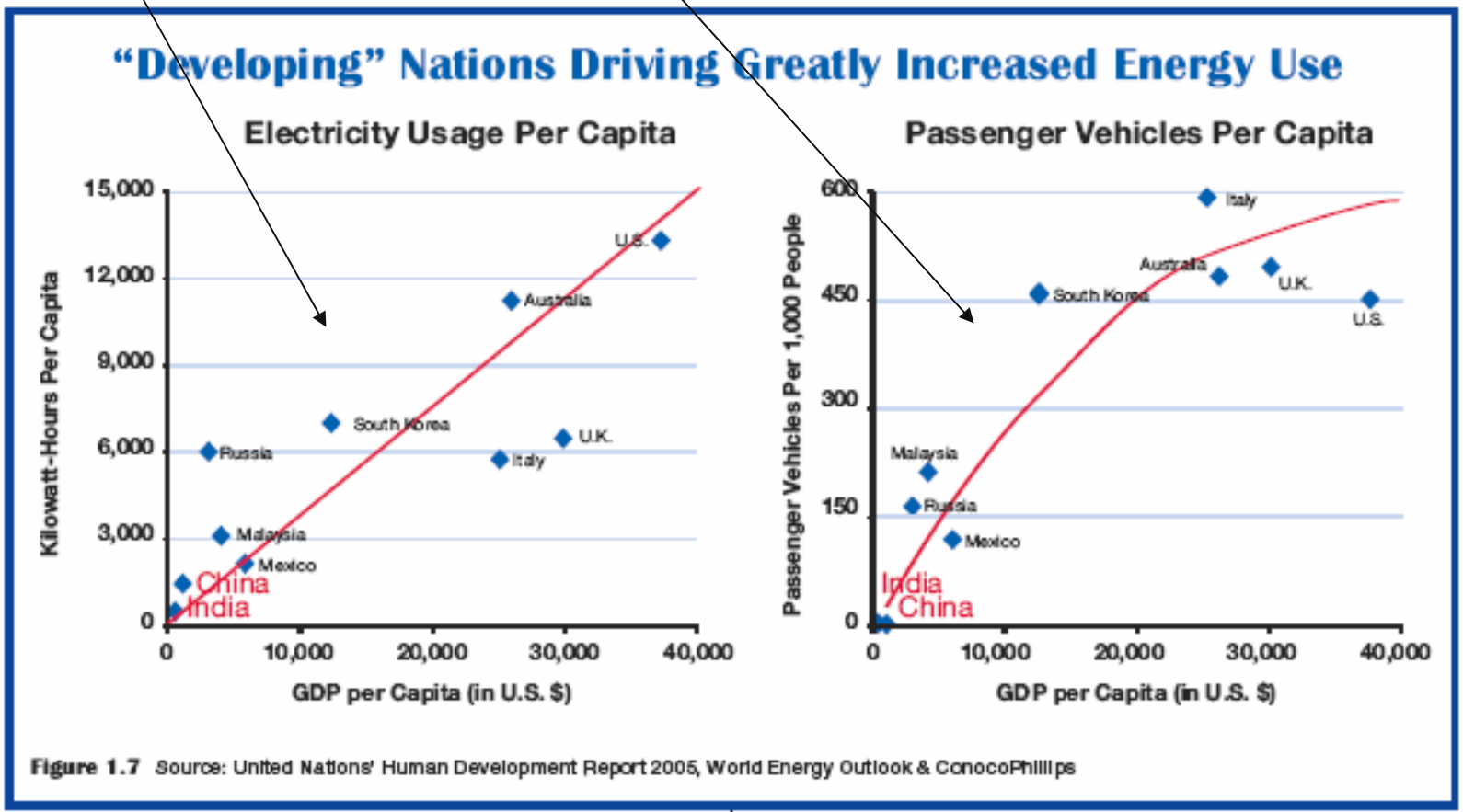


Figure 1.7 Source: United Nations' Human Development Report 2005, World Energy Outlook & ConocoPhillips

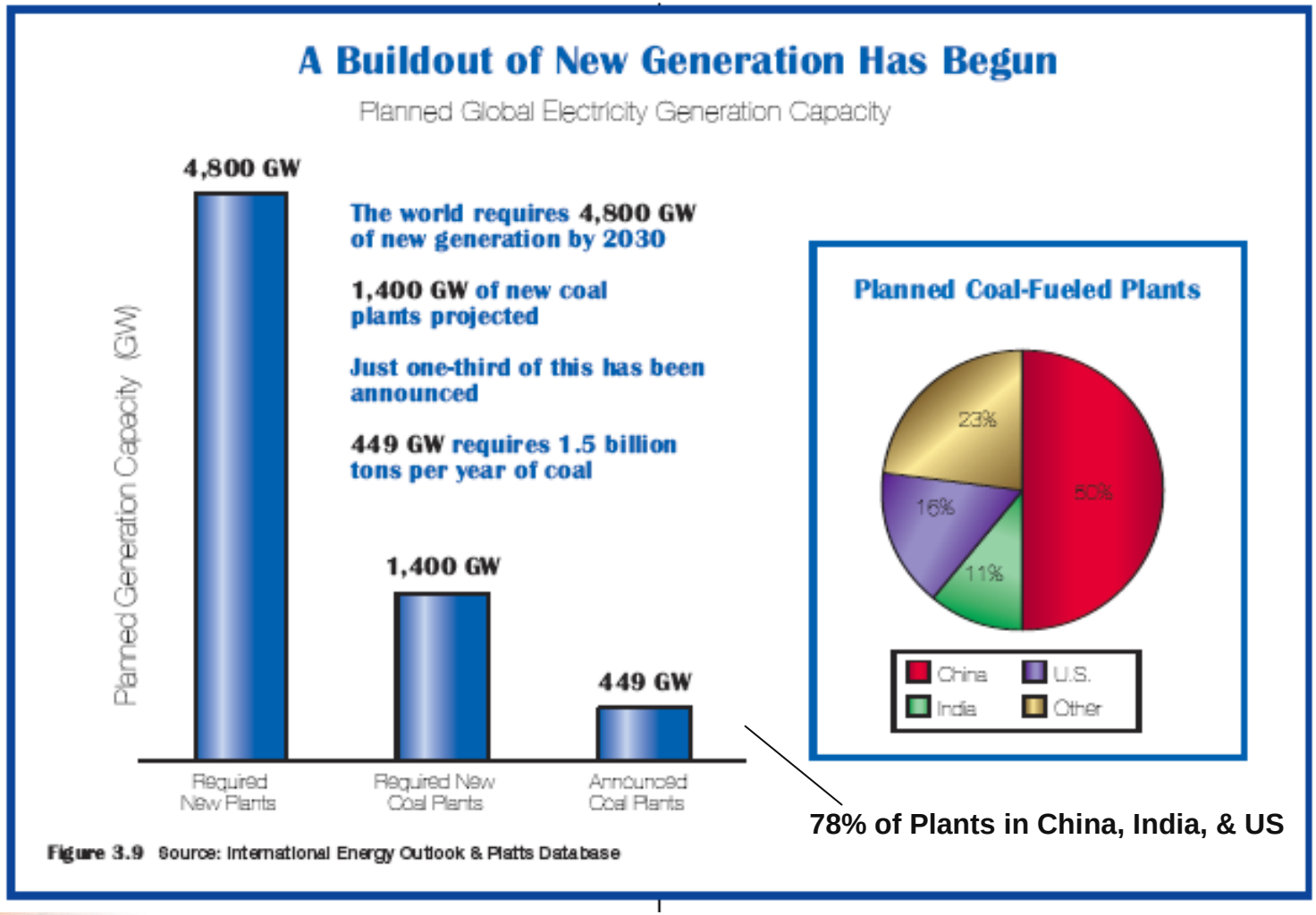
One Country's Scale of Change

The Unprecedented Scale of Change in China

Social Structure	Characteristics and Change
Population	• 1.3 billion people • 280 million children under 14 years old • 761 million people in the labor force • 343 million males available for military service
Industrialization	• With less than 4% of global GDP, China uses 30% of the world's iron, 27% of steel and 40% of cement. China's demand for copper has depleted worldwide reserves. • China has **1.5 million** industrial units, which employ over **122 million** people. China has 82,000 mining corporations and 1.3 million manufacturers. • China is by far the largest industrializing nation in the world. Energy demand in industrializing countries grows faster than the economy as a whole due to disproportionate growth in energy intensive industries such as petrochemicals, heavy machinery and transportation.
Urbanization	• Over the period 1990–2003, the urban population of China increased from 302 million to 524 million, an increase of 74%. • About 10 million rural Chinese migrate to urban areas each year. • China has more than 100 cities with a population exceeding 1 million.
Modernization	• From 24 million private vehicles in 2003, China is projected to have 130 million by 2020 and plans to build 80,000 km of freeways. • According to the Chinese Academy of Social Sciences, about 50% of all urban households now meet the definition of middle class. • The rate of illiteracy in China reportedly dropped from 10.4% in 1990 to 2.4% in 2003. The proportion of university graduates increased 3.5 times over the same period.

Figure 1.8

World New Generation Capacity



Firm Analysis –Georgia Power

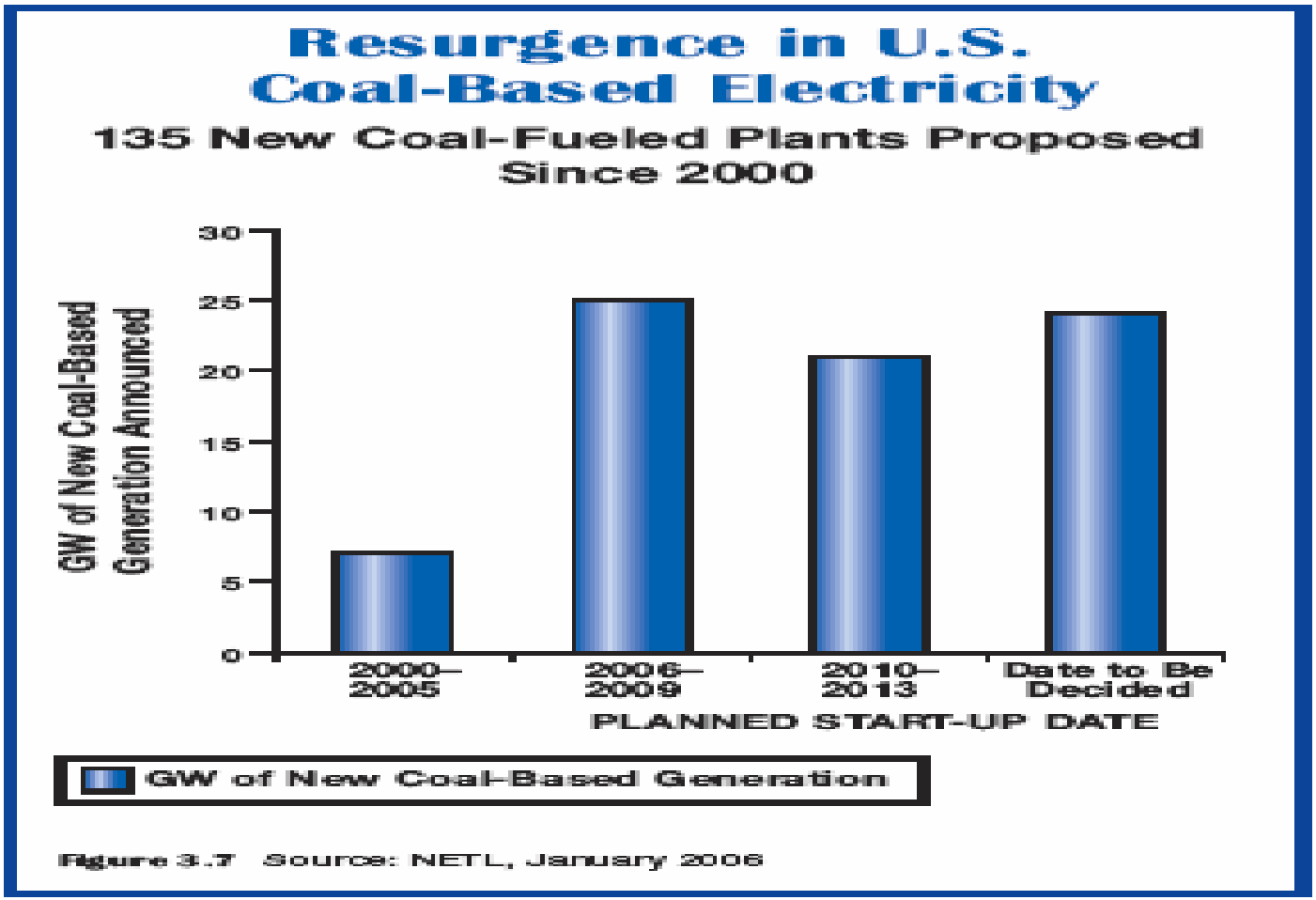
A Coal Perspective

Coal Produced Electricity is a Dirty Business

- Largest Consumer Coal in Nation
- Largest single Producer of Electricity in Nation
- Coal : 80% of Georgia Powers kW Capacity

- Yet Georgia Power has a stellar reputation in the Business Community with Southern Style Values, Unquestionable Trust, Superior Performance, Diversity, Stewardship, & Total Commitment to Community, Employees & Customers

If Fact: Coals Reputation has Improved Significantly in US.



How Did Coal Get So Sexy?

ANSWER:

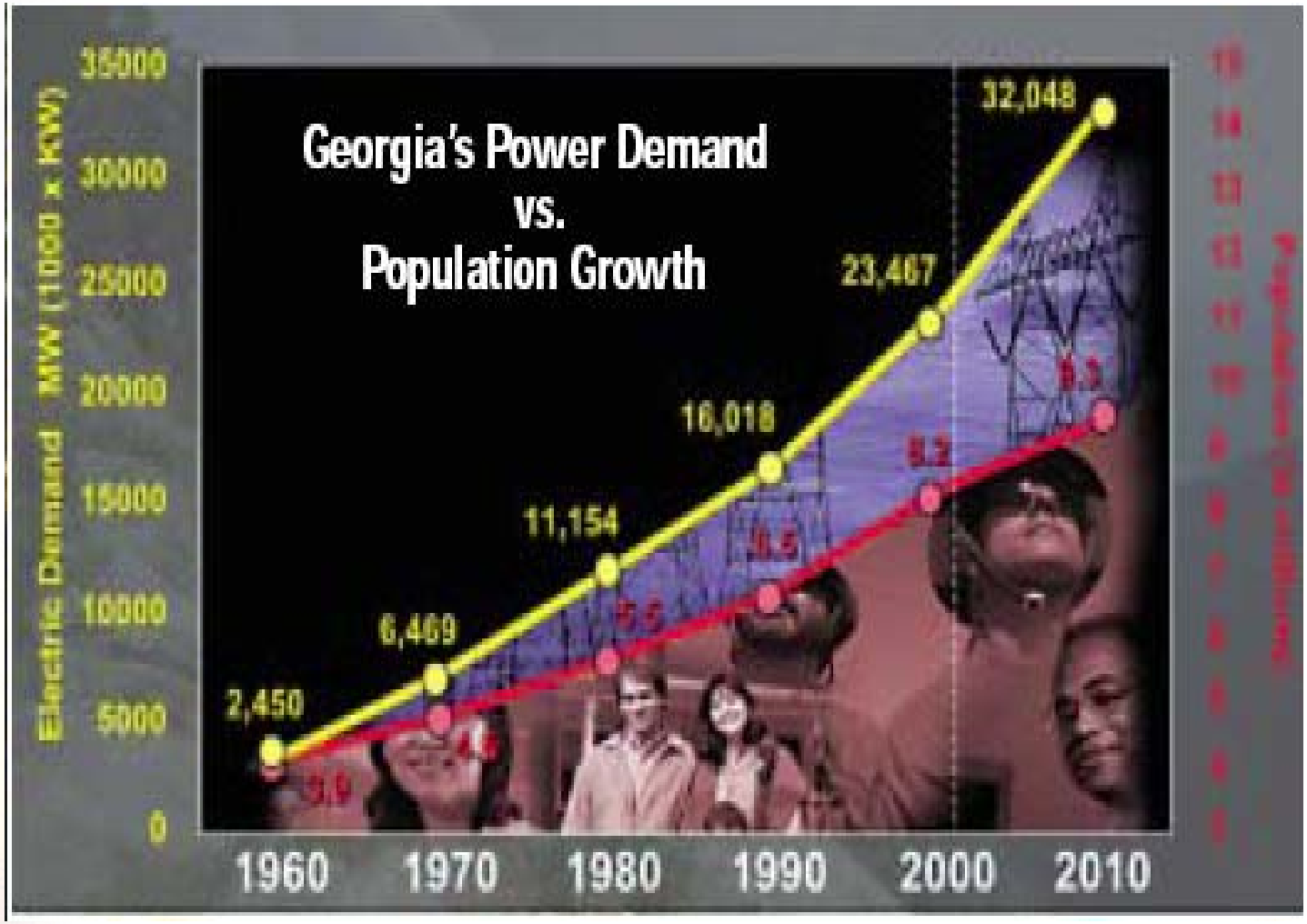
- Ecological Forces
- Political Forces
- Global Forces
- Patriotic forces

Firm Analysis

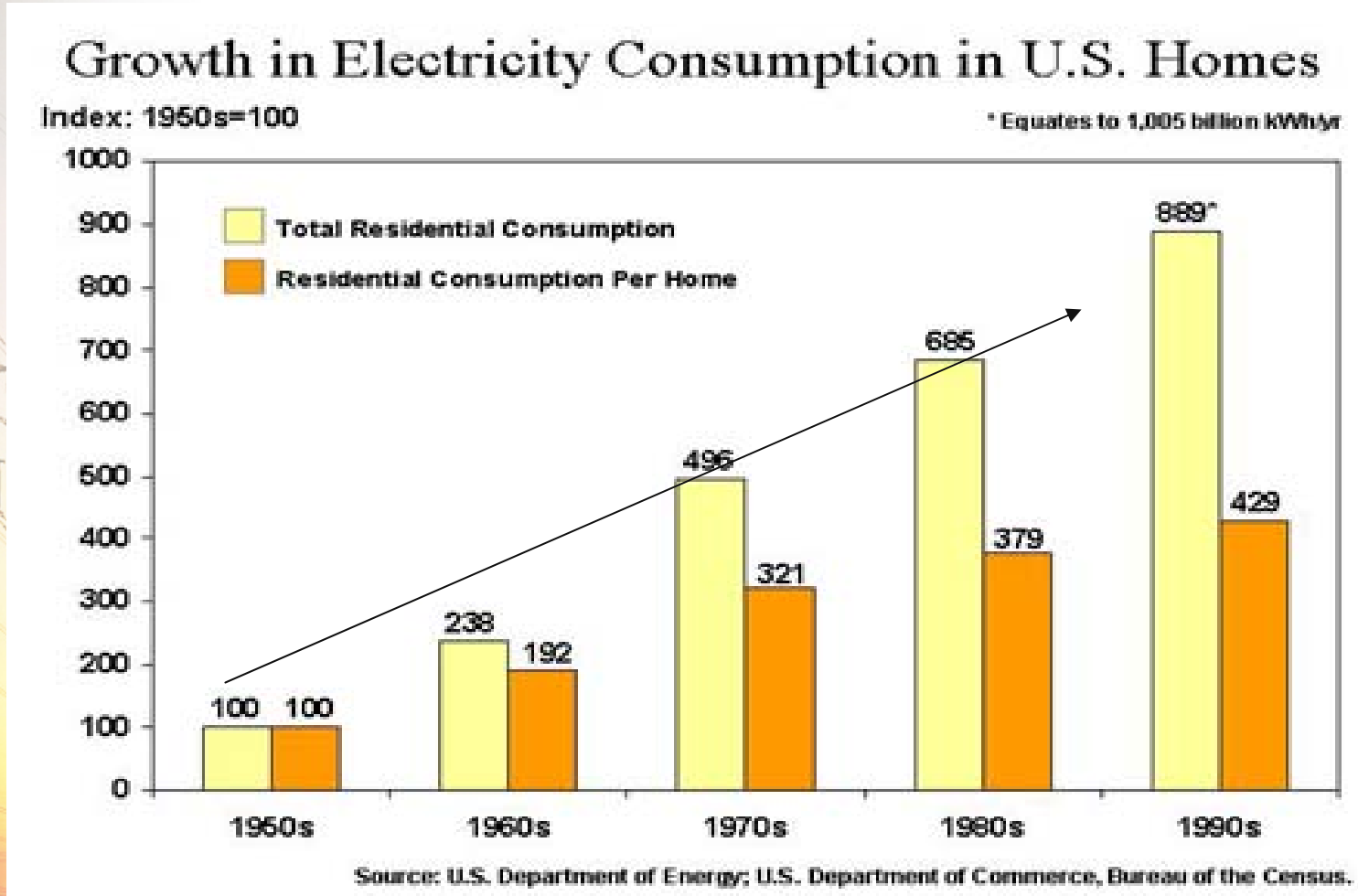
- Demand Factors
  - Population Growth
  - Residential Demand
  - Commercial Demand
- Production and Cost Issues
  - Generation
  - Distribution & Transmission
  - Comparative
- Market Power & Pricing
- Marketing: Selling Value

Georgia's Population

A Growing Need for Energy Production

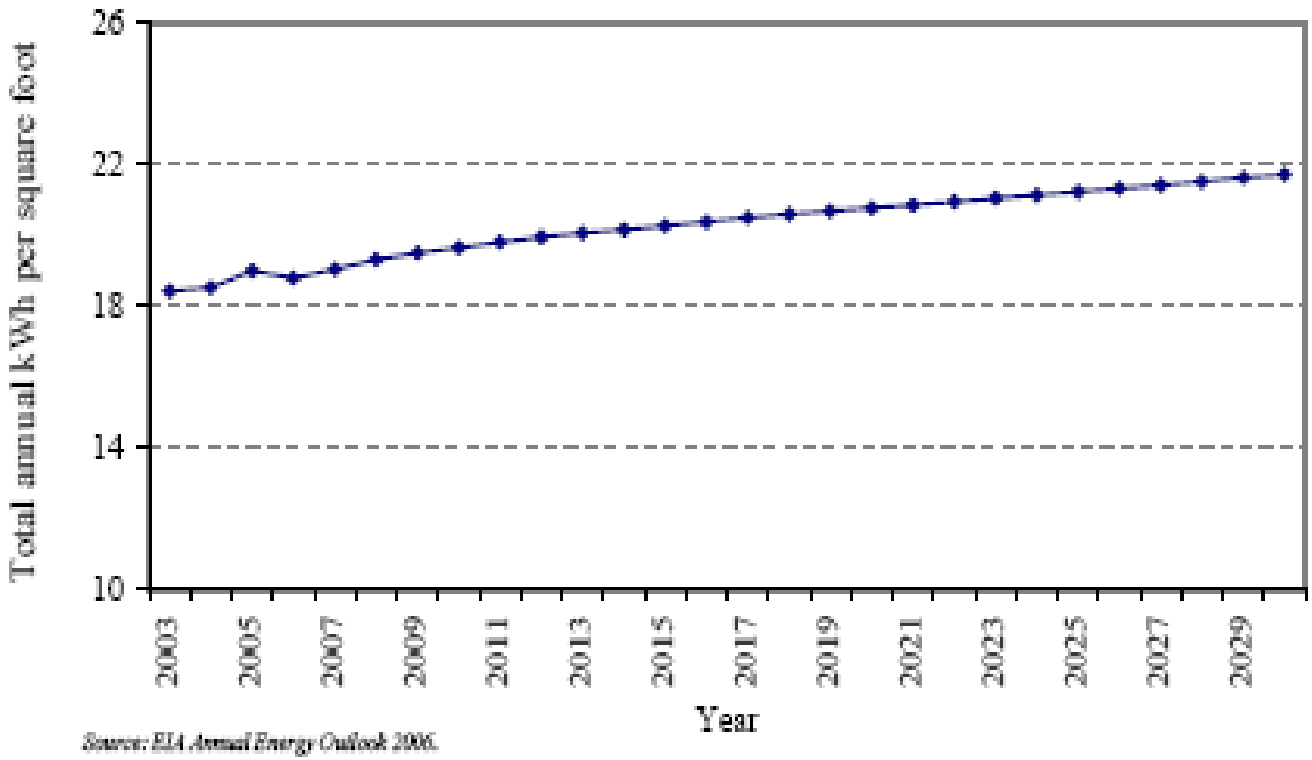


Residential Demand



Commercial Demand

Figure 3-1
Commercial Electricity Use Per Square Foot of Capacity



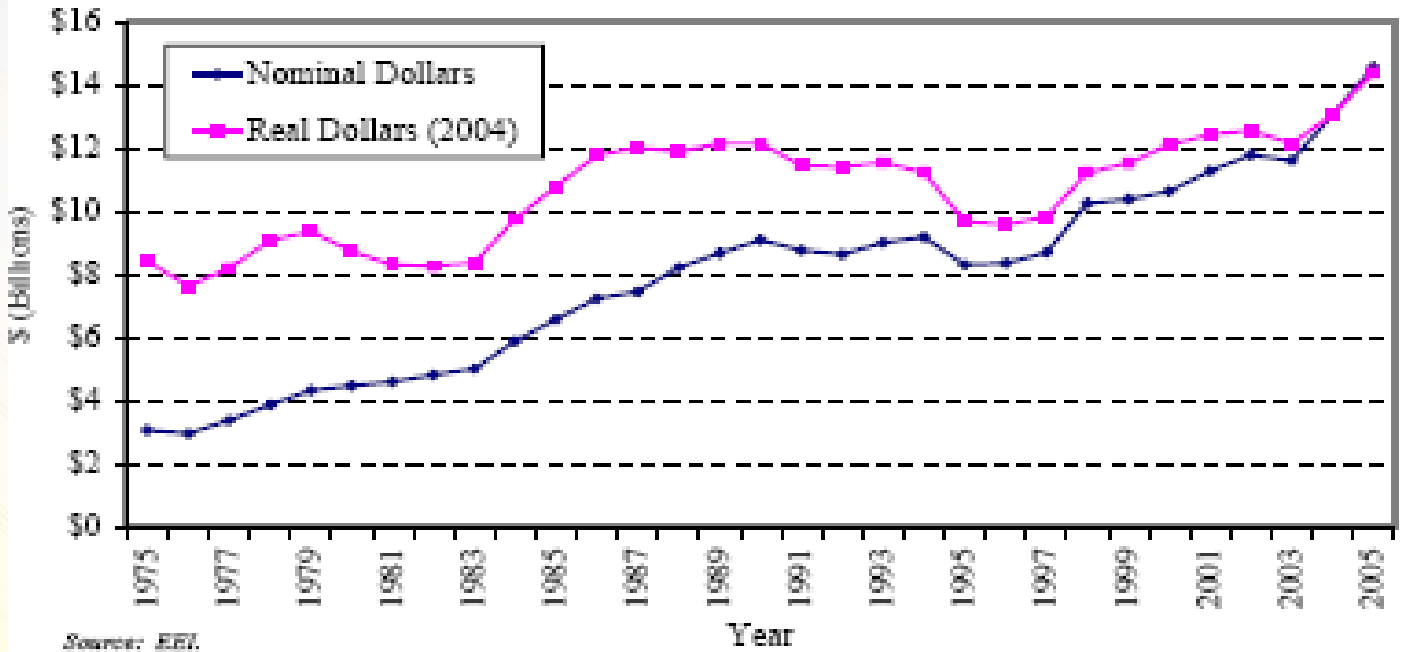
Source: EIA Annual Energy Outlook 2006.

Georgia Powers Generating Plants

- Fossil 14
- Hydro 20
- Nuclear 2

Distribution Costs

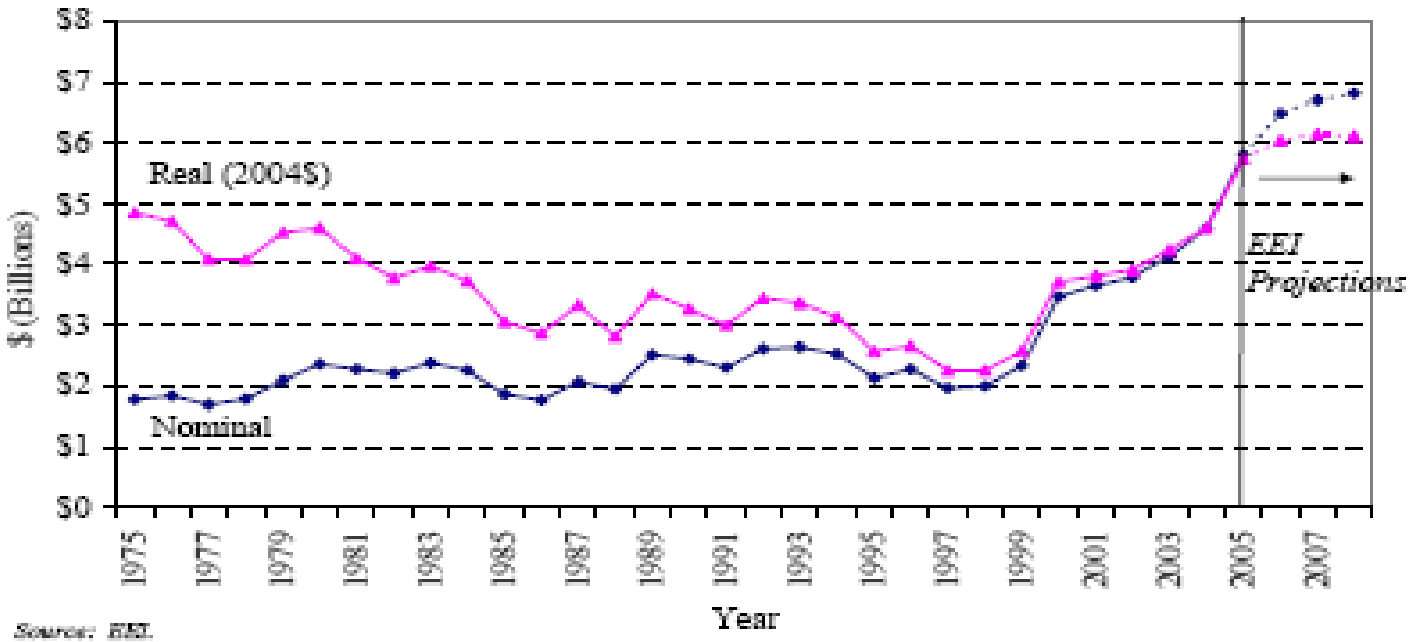
Figure 6-1
Construction Expenditures for Distribution
By Investor-Owned Electric Utilities



Source: EEI.

Transmission Cost

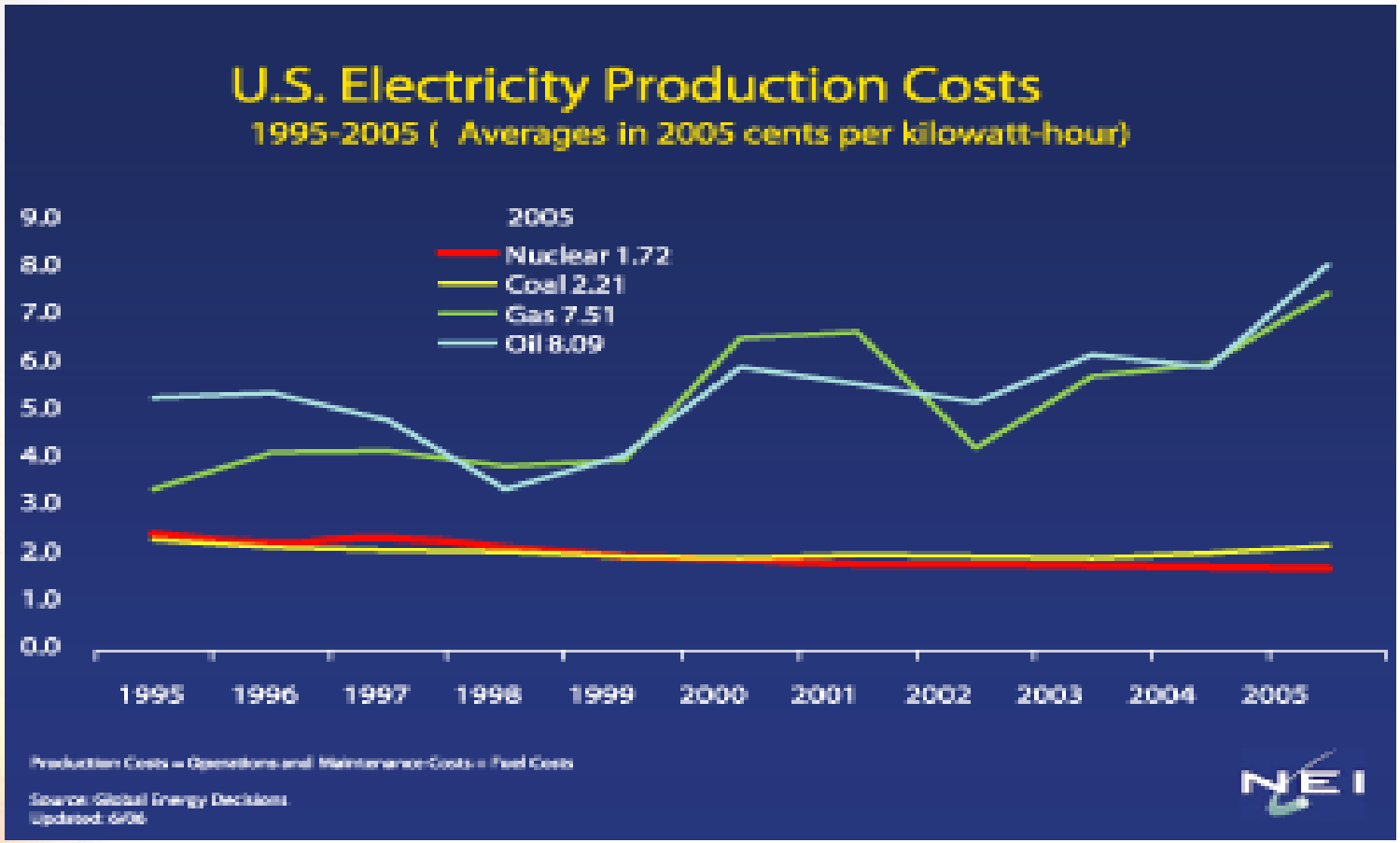
Figure 5-3
Construction Expenditures for Transmission
By Investor-Owned Electric Utilities



Source: EEI.

Comparative Production Cost

It's all relative



Market Power & Pricing

- Market power is a big issue in the utility industry.

- The ability of a power generation company, using one or more of its plants, to significantly increase market price without fear of lost market share, is in constant focus.

- Utility companies are constantly under scrutiny for pricing tactics.

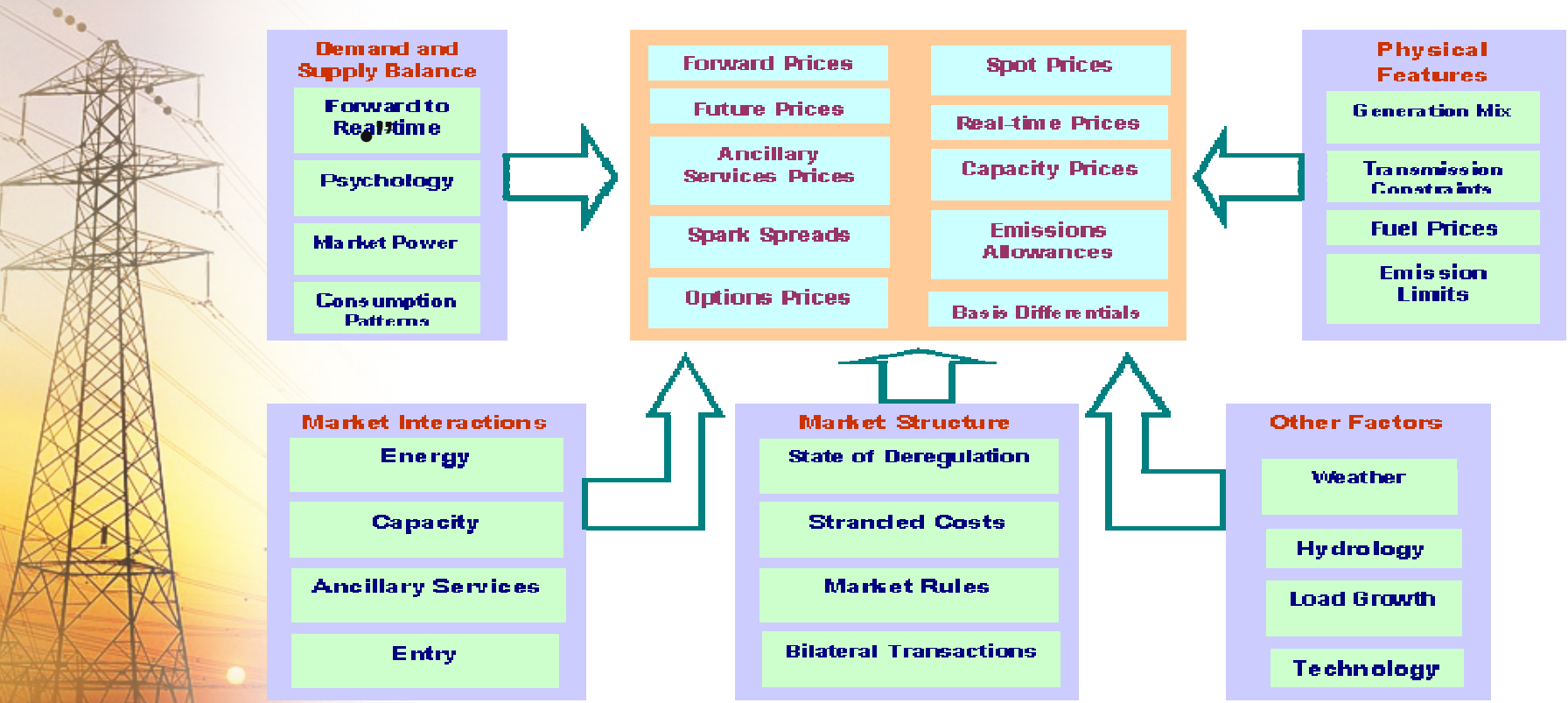
Market Power

Be careful what you wish for?

- Constant government scrutiny
- Constant public scrutiny for pricing policies

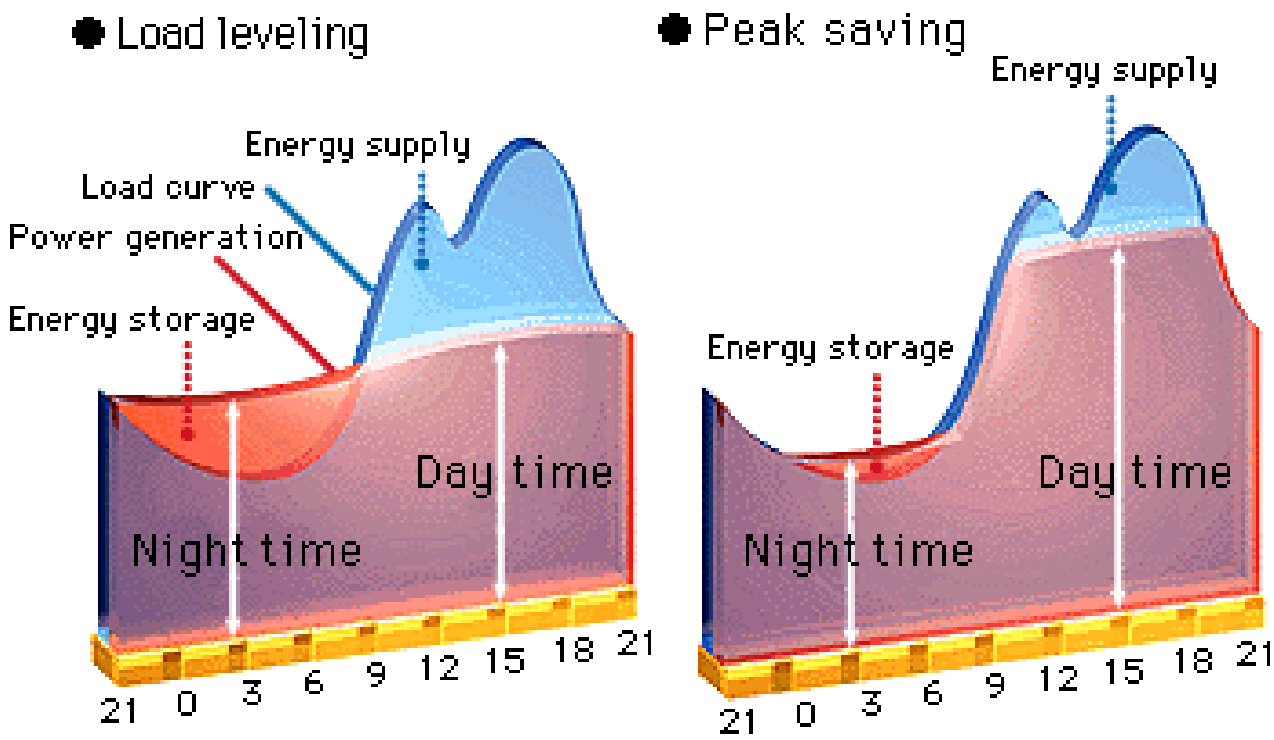
Argument made for " Perfect Market"

- market influences to dynamic for market power.



Demand Response

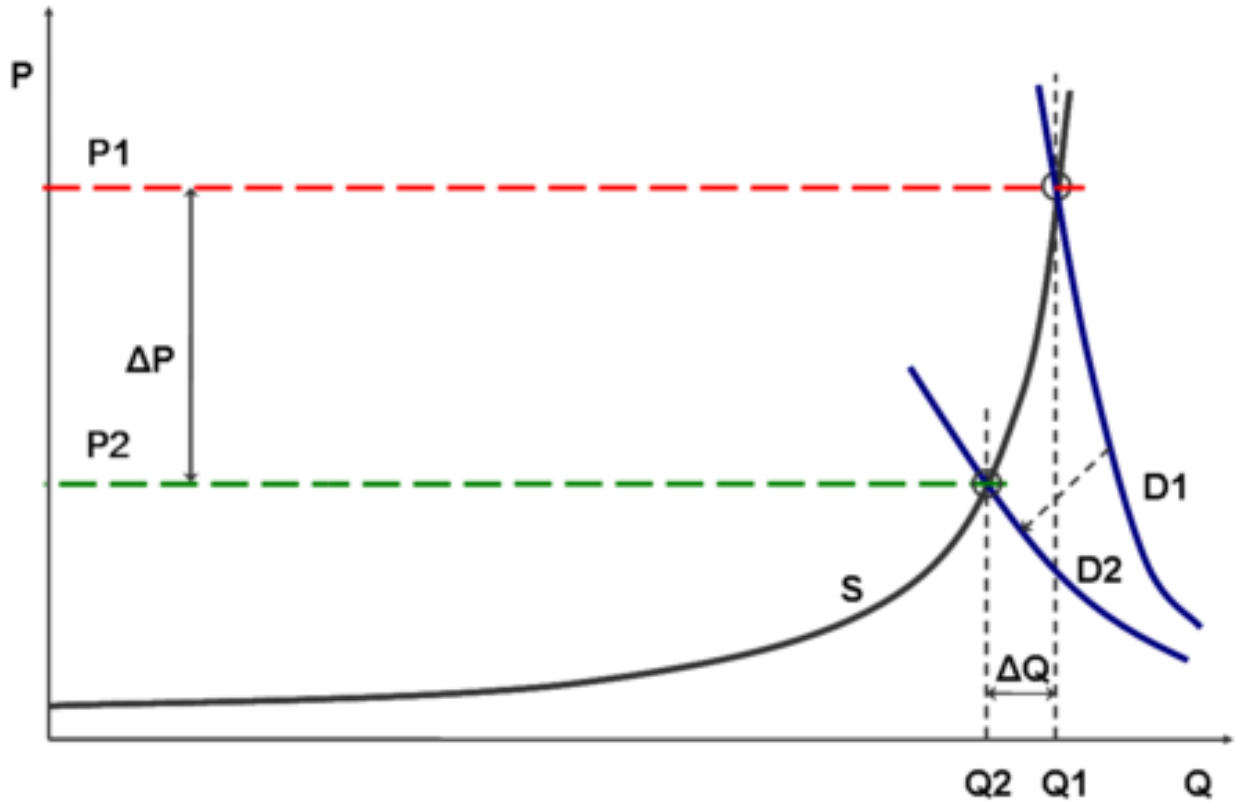
Electric power demand



Electricity cannot be stored therefore it can only respond to demand surges. This characteristic makes the product extremely price sensitive to slight shifts in demand curve.

Pricing Consideration

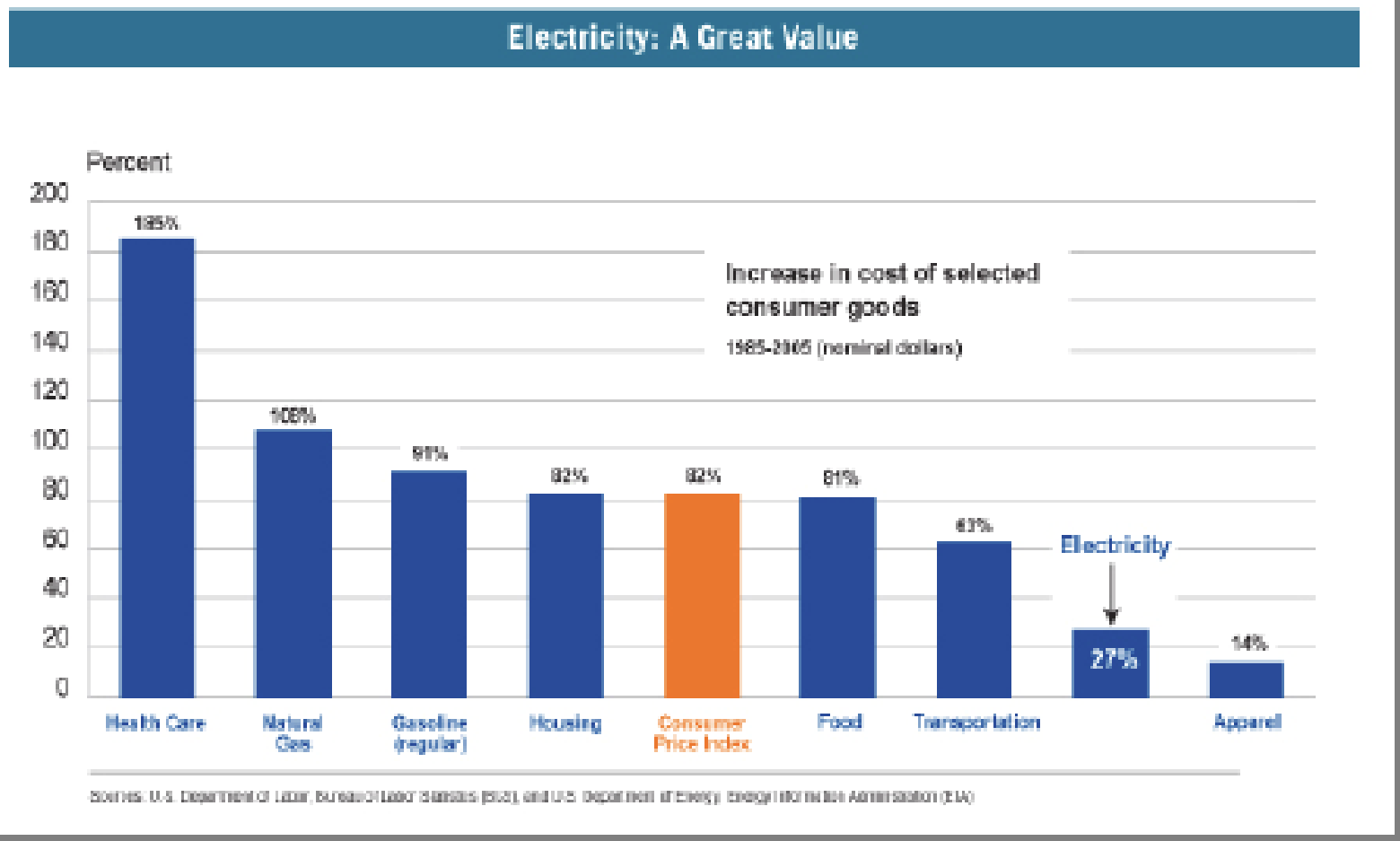
Demand response (managing price through demand)



Effect on pricing: During peak, demand is most inelastic. With a very small shift in the demand curve, pricing responds substantially. This pricing opportunity cannot be overlooked.

Selling Value

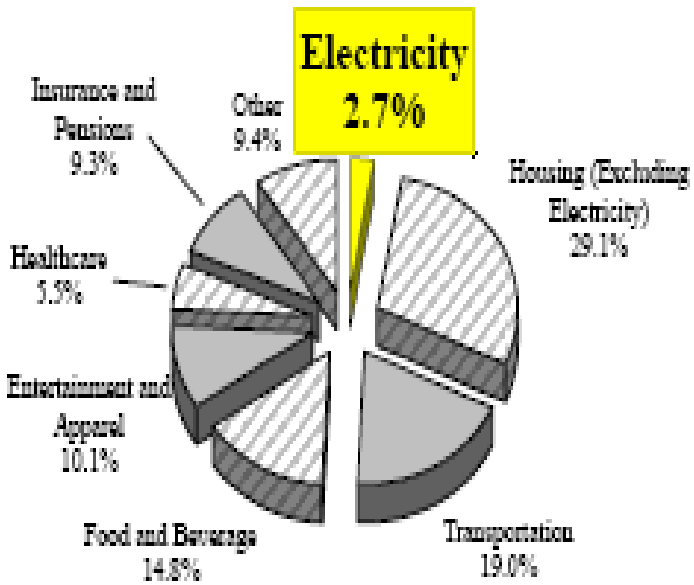
Consumer Goods comparison



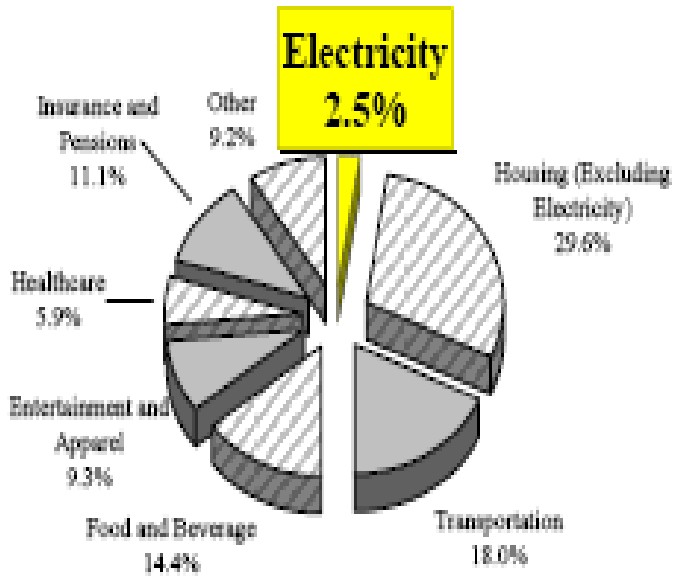
Value Now!

At Today's Electricity Prices, Electricity's Share of the Household Budget Is Smaller Than It Was 10 Years Ago.

Average Household Expenditures in 1994



Average Household Expenditures in 2004

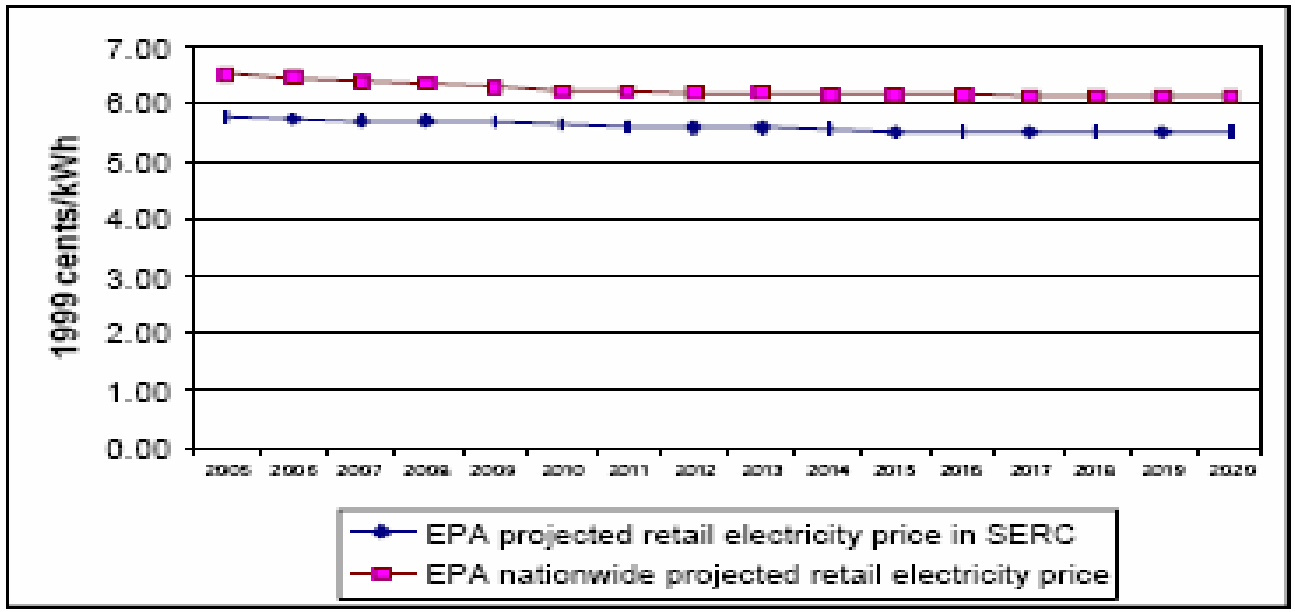


Source: Bureau of Labor Statistics

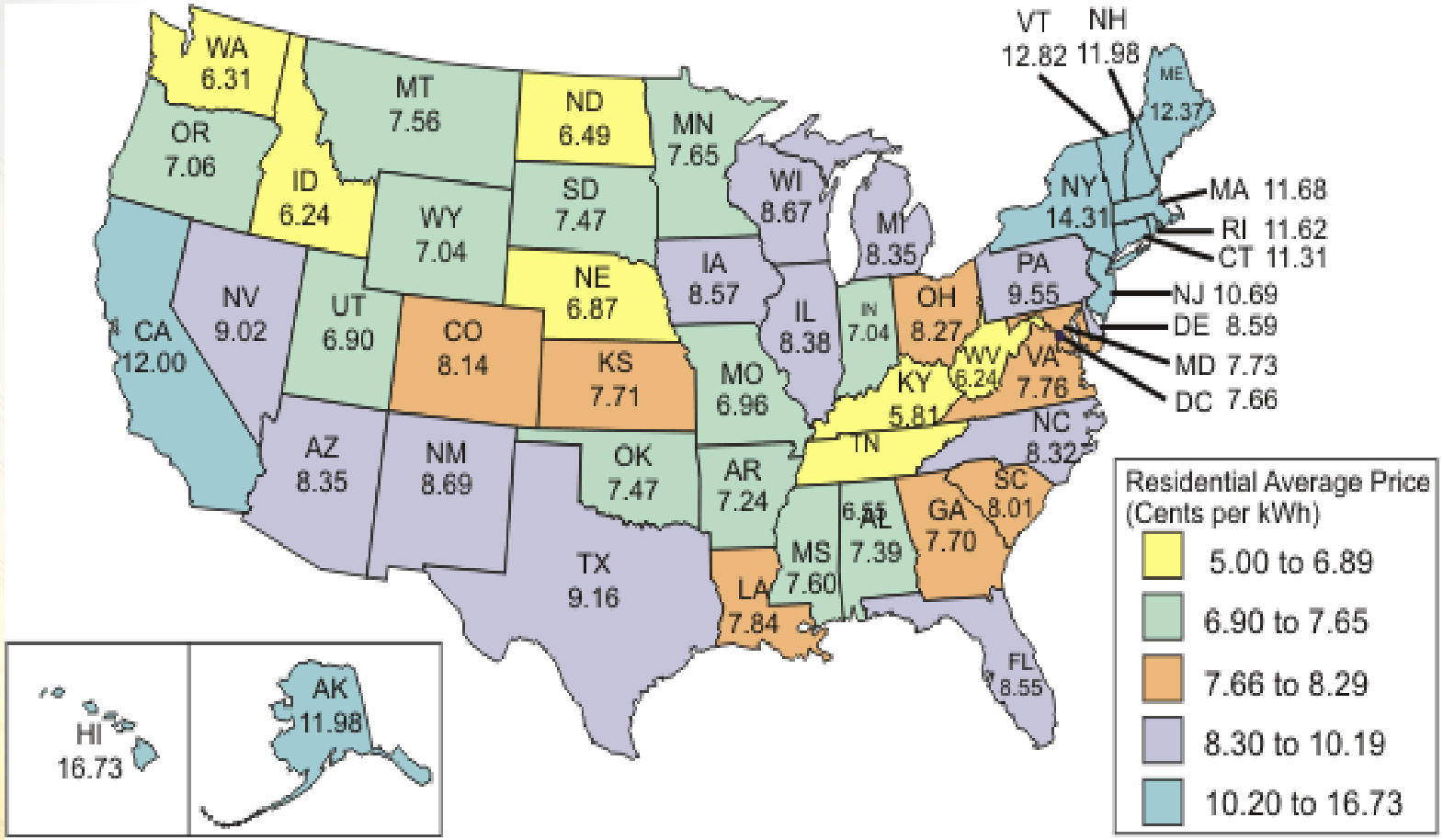
And into the Future!

Average projected kWh per cent price through 2020

Projected Retail Electricity Prices in Georgia under Clear Skies (2005-2020)



Georgia average cent per kWh Price
The Best Value in the South

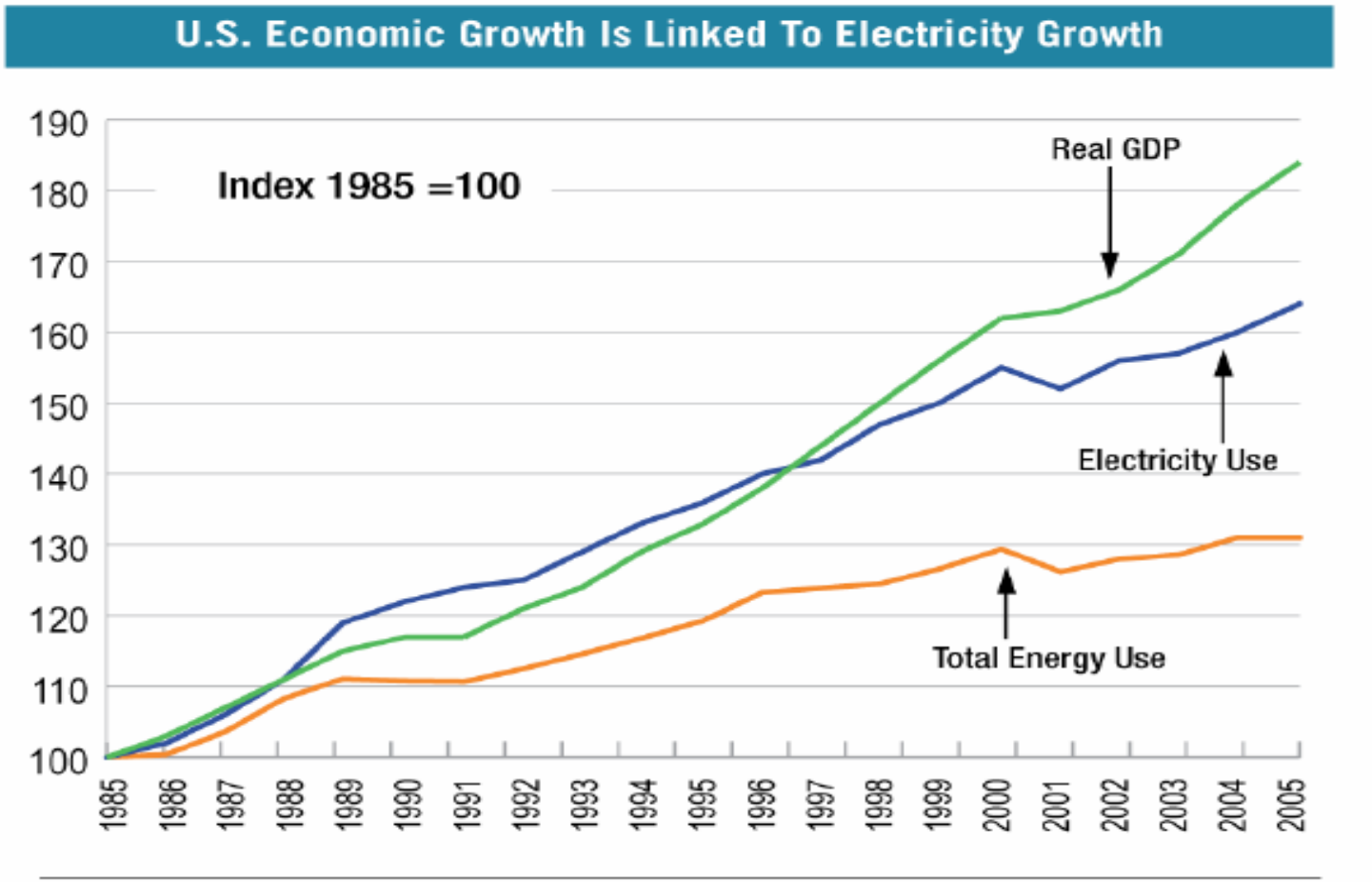


Source: Energy Information Administration, Form EIA-861, "Annual Electric Power Industry Report."

Macroeconomic Environment

- Electricity & the GDP
- Job Creation
- Unemployment
- Interest Rates
- World GDP
- Declining World Oil production
- Global Demand for Electricity

Electricity & Economic Growth



Coals Role in the GDP

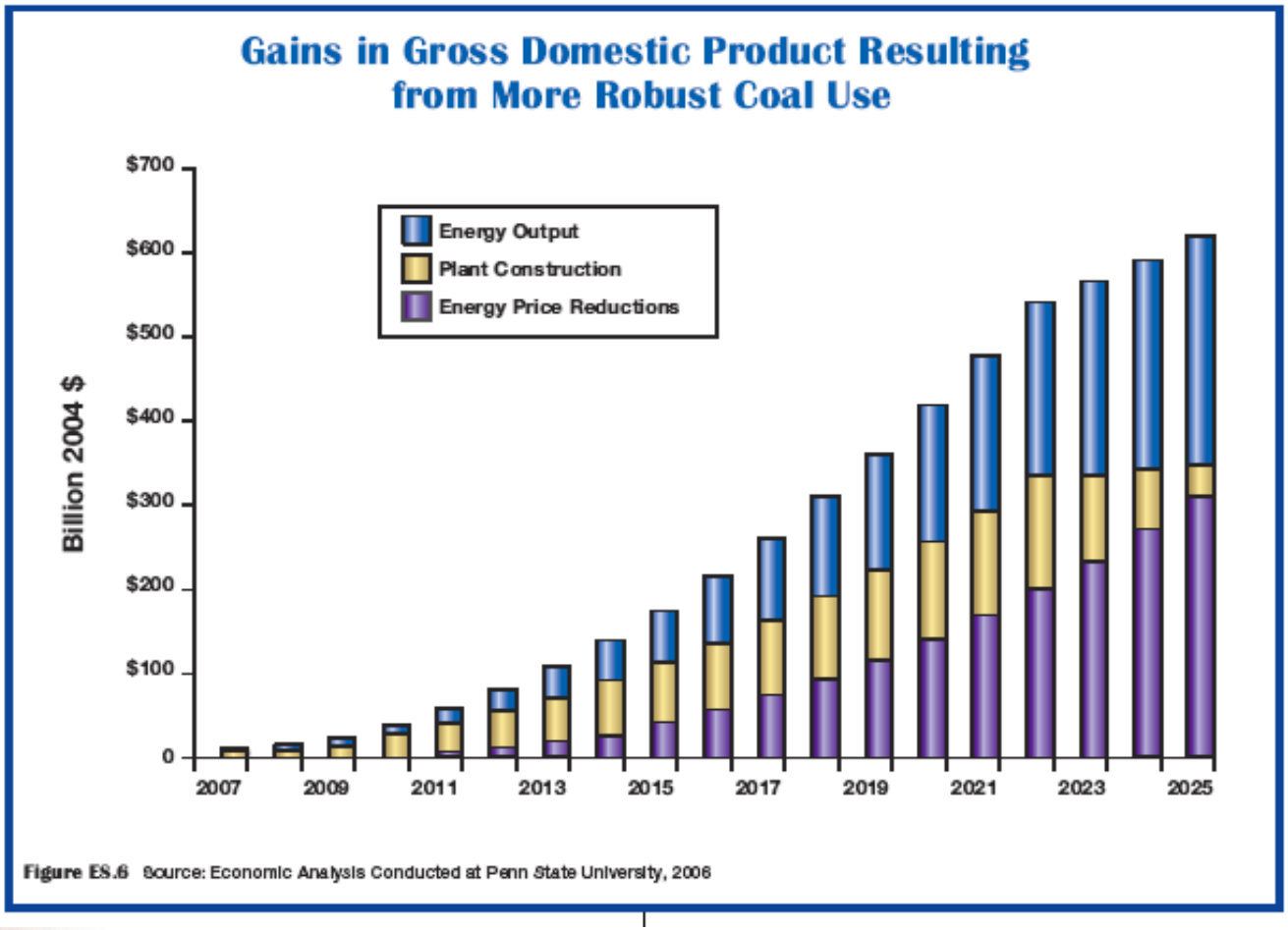


Figure ES.6 Source: Economic Analysis Conducted at Penn State University, 2006

Job Creation

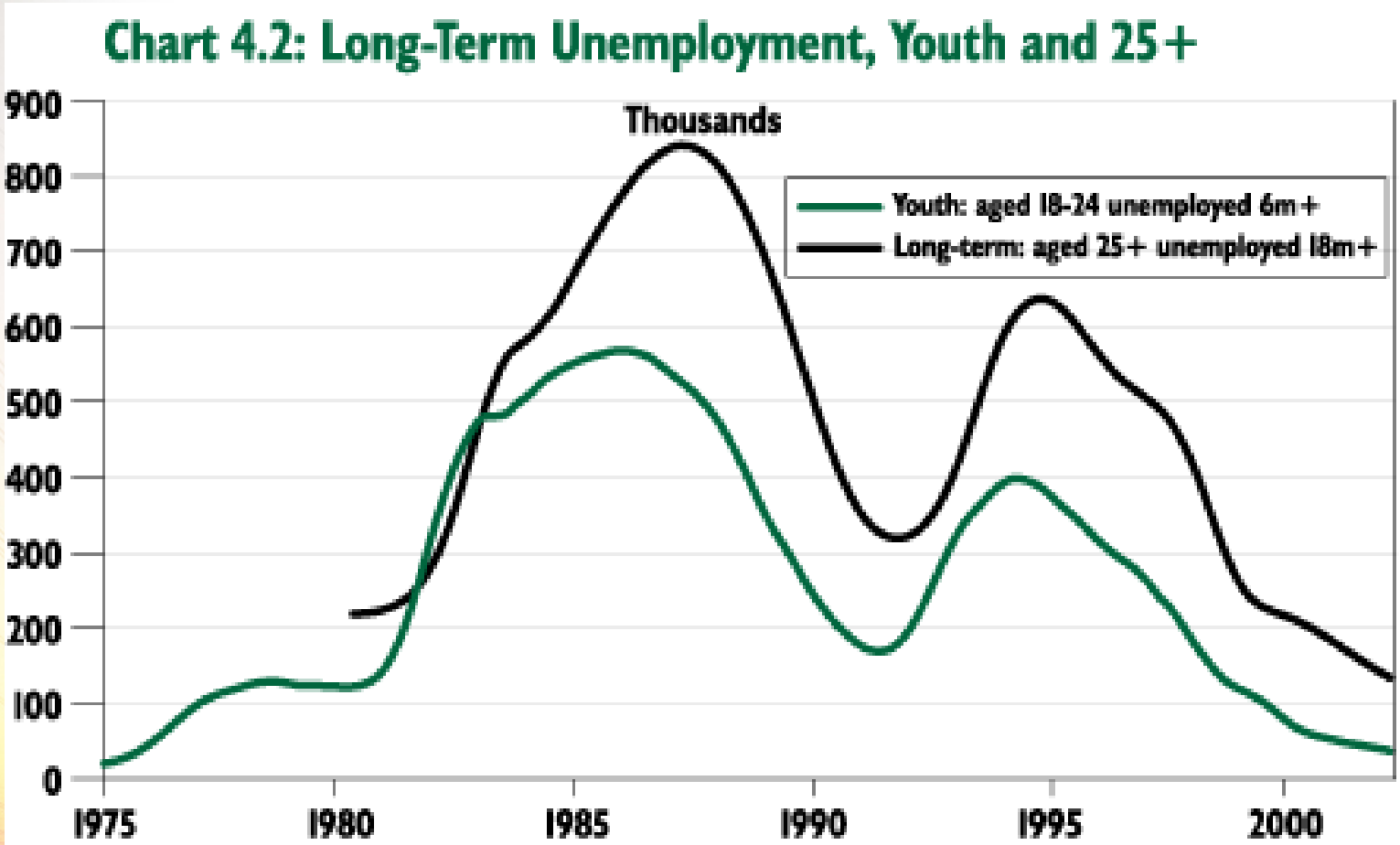
Impacts on Gross Domestic Product and Employment

Year	Changes in GDP Billions of 2004 Dollars				Changes in Employment (Annual Jobs Created)			
	Lower Energy Prices	Plant Cons.	Energy Output	Total GDP Gains	Lower Energy Prices	Plant Cons.	Energy Output	Total Jobs
2006	0	0	0	0	0	0	0	0
2007	0	2.3	0	2.3	0	6,296	0	6,296
2008	0	6.3	0	6.3	0	17,314	0	17,314
2009	0	12.0	0	12.0	0	33,054	0	33,054
2010	2.3	19.5	3.6	25.4	10,153	53,517	2,670	66,339
2011	6.5	26.3	9.8	42.6	27,766	72,405	7,343	107,514
2012	12.5	33.2	18.5	64.2	52,619	91,293	14,019	157,931
2013	20.7	40.1	29.6	90.4	85,005	110,181	22,698	217,884
2014	31.0	46.9	42.6	120.6	124,833	129,069	33,379	287,281
2015	43.7	53.8	57.8	155.3	171,876	147,958	46,063	365,897
2016	58.8	60.7	75.1	194.6	226,251	166,846	60,750	453,846
2017	76.6	67.5	94.1	238.2	288,964	185,734	77,439	552,137
2018	97.0	74.4	115.5	286.9	359,390	204,622	96,131	660,144
2019	119.9	81.3	137.7	338.9	437,068	223,511	116,826	777,405
2020	145.7	88.2	160.8	394.6	521,584	242,399	139,524	903,507
2021	174.5	95.0	184.2	453.7	613,753	261,287	164,225	1,039,264
2022	206.3	101.9	207.4	515.6	713,273	280,175	190,928	1,184,376
2023	241.4	79.0	230.4	550.8	820,519	217,214	219,634	1,257,368
2024	279.6	54.4	252.4	586.4	934,010	149,532	250,342	1,333,884
2025	322.0	28.0	273.0	623.1	1,056,719	77,127	283,054	1,416,900

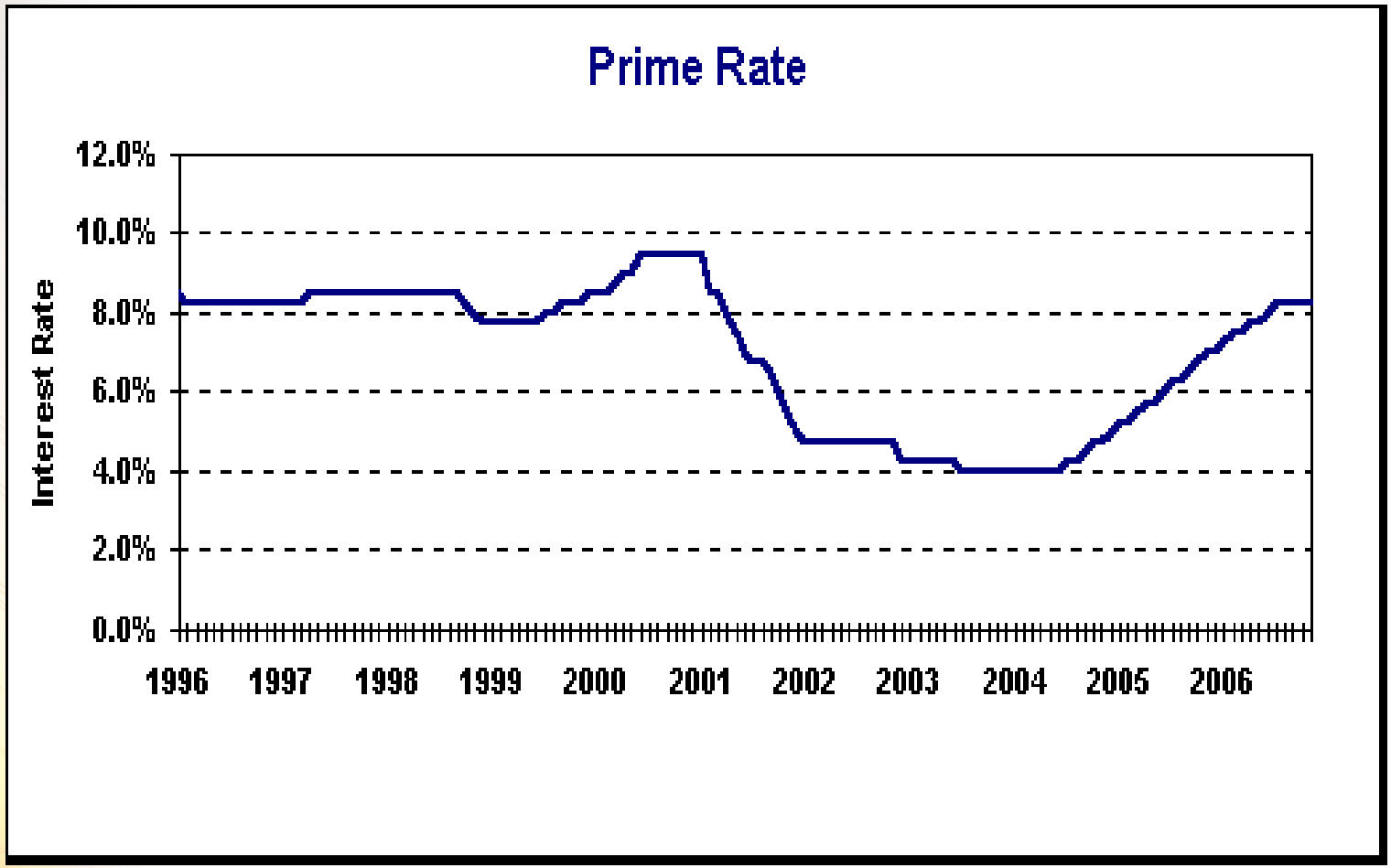
Figure 8.4 Source: Economic Analysis Conducted at Penn State University, 2006

Long term Unemployment

Under Control

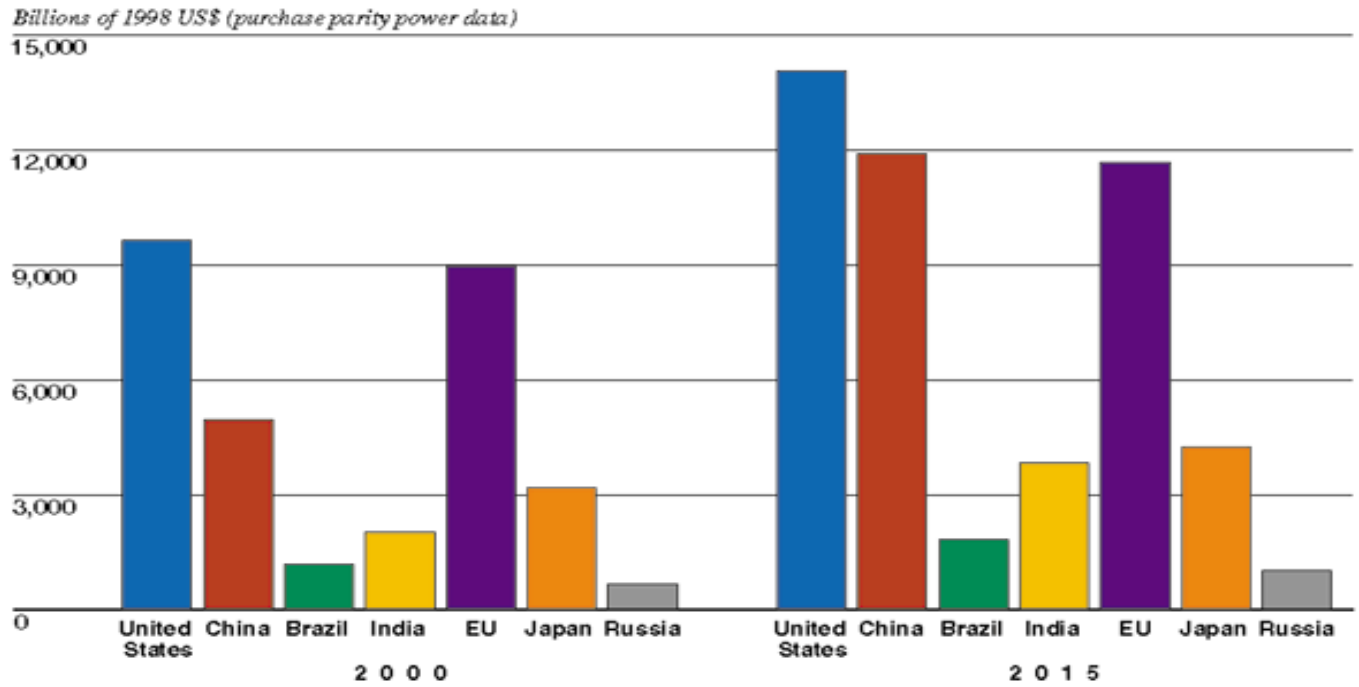


Stable Interest Rates



World Productivity Equals Demand

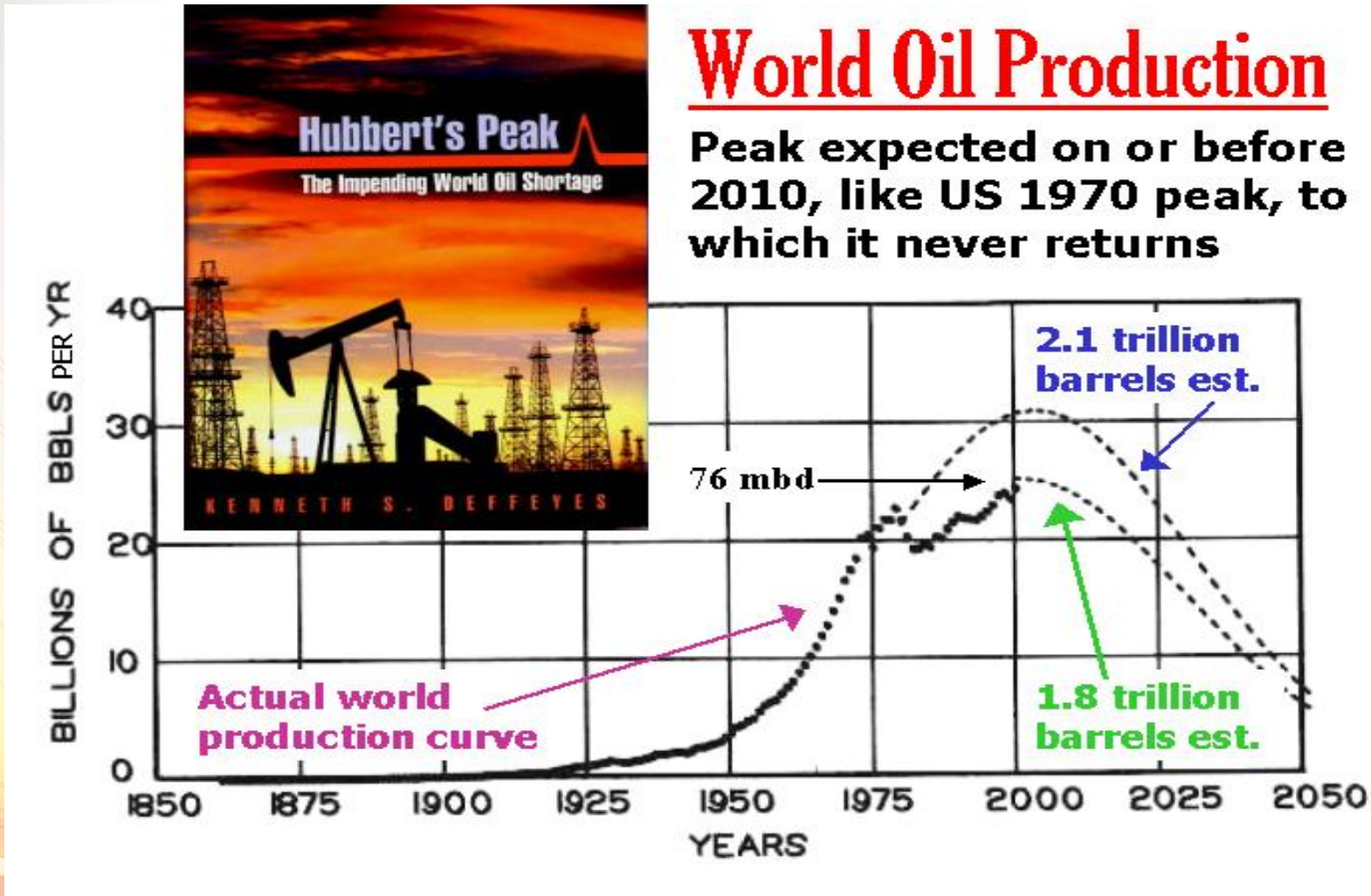
GDP by Major Countries and the EU: 2000 and 2015



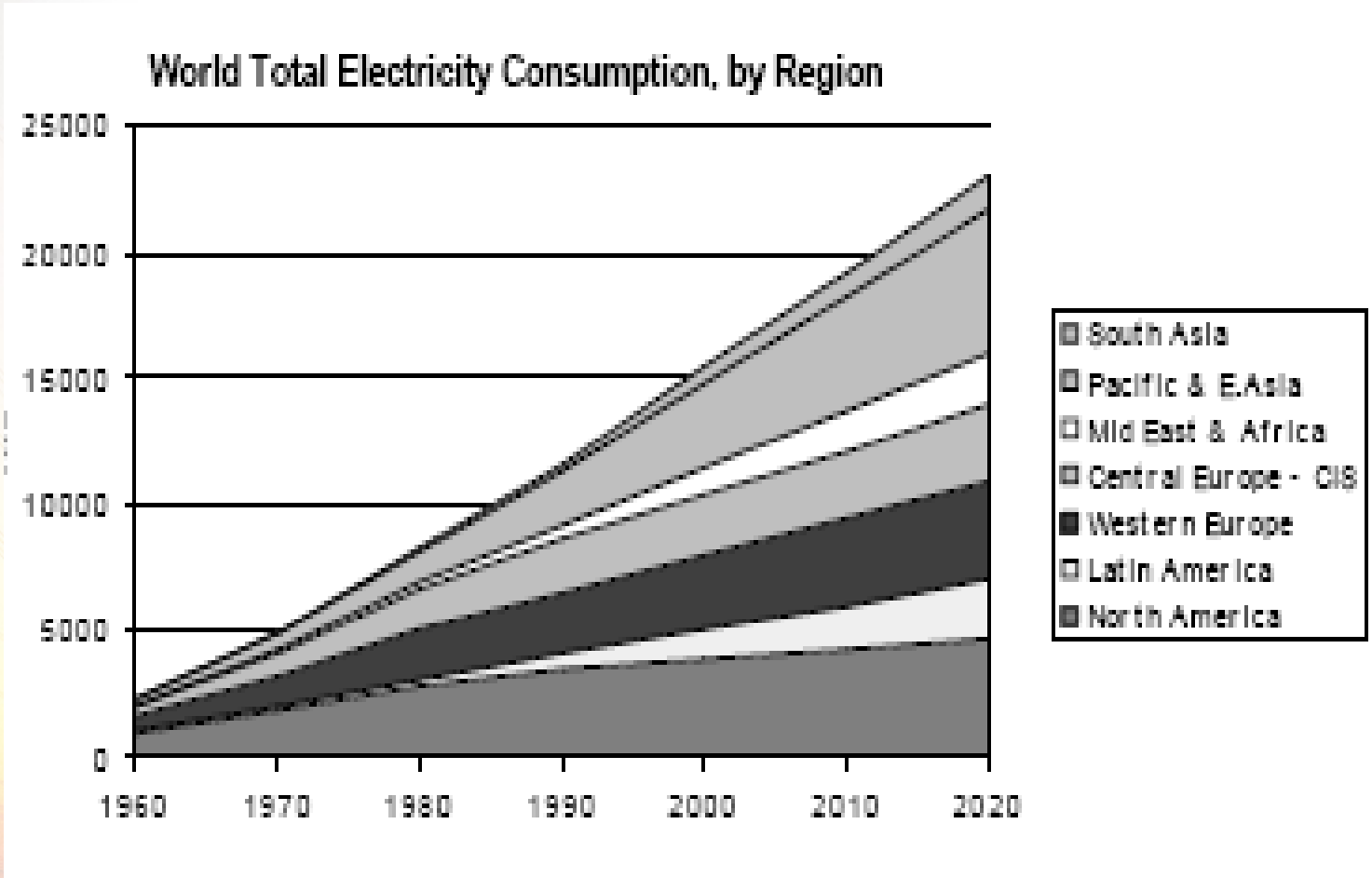
Source: CIA's Long-Term Growth Model.

DI Design Center 375954AI 10-00

Who will fill the void?



World Demand strong for Electricity

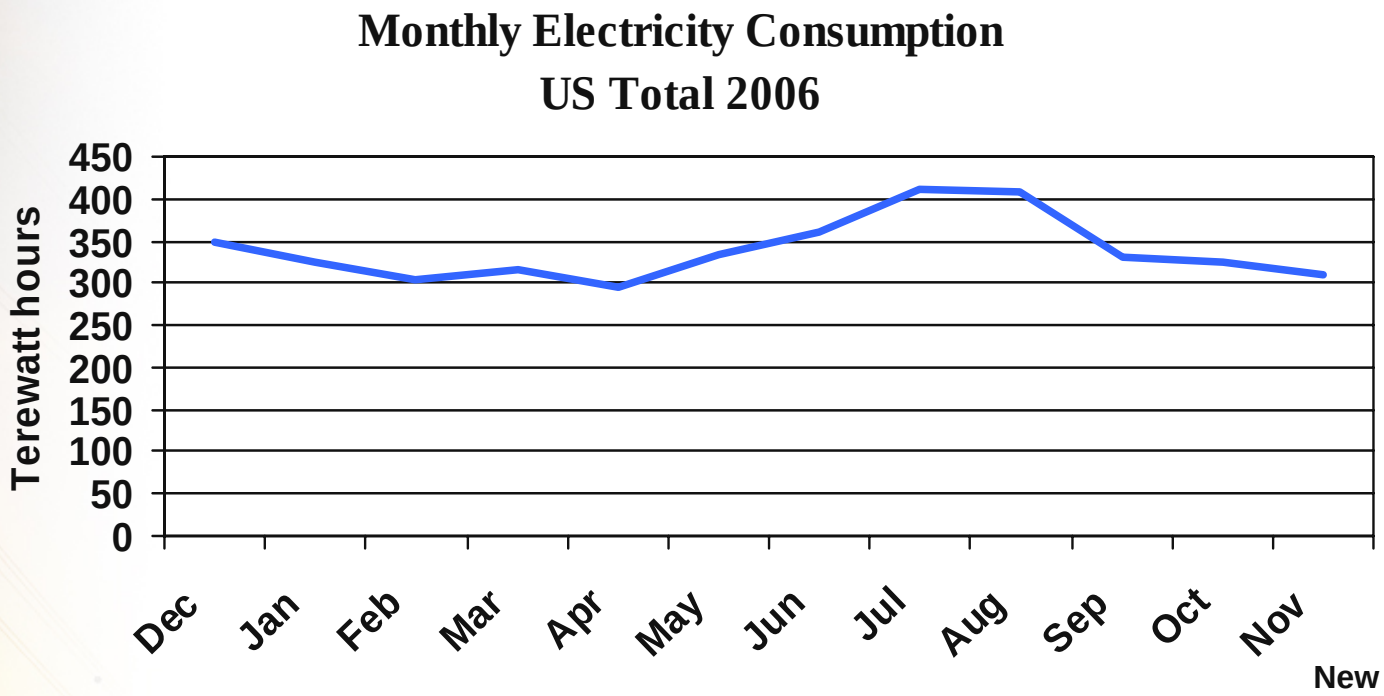


Looking to the Future

Reducing Production Costs

- Regulation: Rates set by state agencies
  - Limit ability to recoup investments
- Demand Response
  - Single most effective control of cost going forward
  - Strategic Deployment of Capital
  - Idle Capacity: Cash Drain
- Alternative Energy Sources
  - Alleviate peak demand

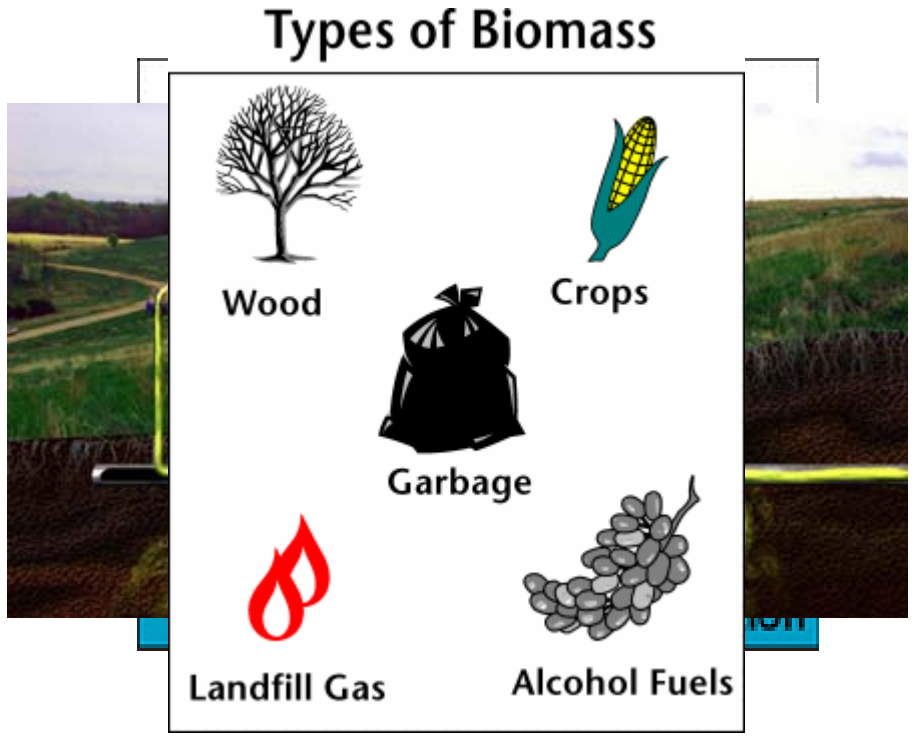
Reducing Production Costs



New Plant?

Alternative Energy Resources

- Geothermal
- Tidal Power
- Wave Power
- Landfill Gas
- Biomass



Conclusion

Future Bright for Georgia Power & Electricity

With the following Assumptions:

- **US GDP Growth Continues**
- **Abundant Coal availability**
- **Technology Advances Keep Pace with Demand**
- **Spending Continues on R&D & Clean Coal Technologies**
- **Developing Nations Continue to Consume Disproportionately**

TEAM BLUE THUNDER

- William Mitchell
- Manuel Escribano
- Keith Foxx
- Eric Sundby