

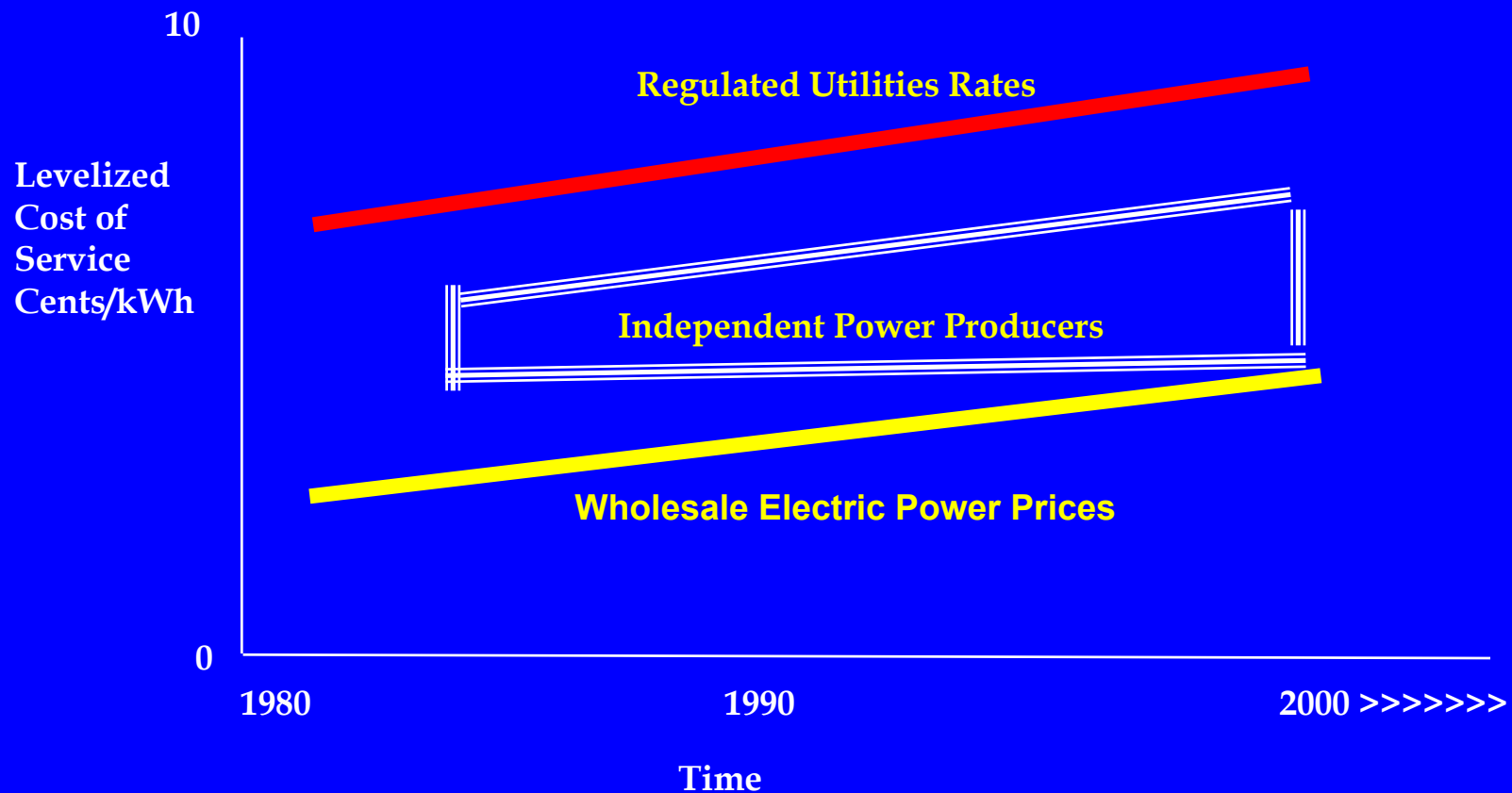
***ESD 126 Energy Systems and
Economic Development***

Policy Process Part II

***Competition, How did we get
there?***

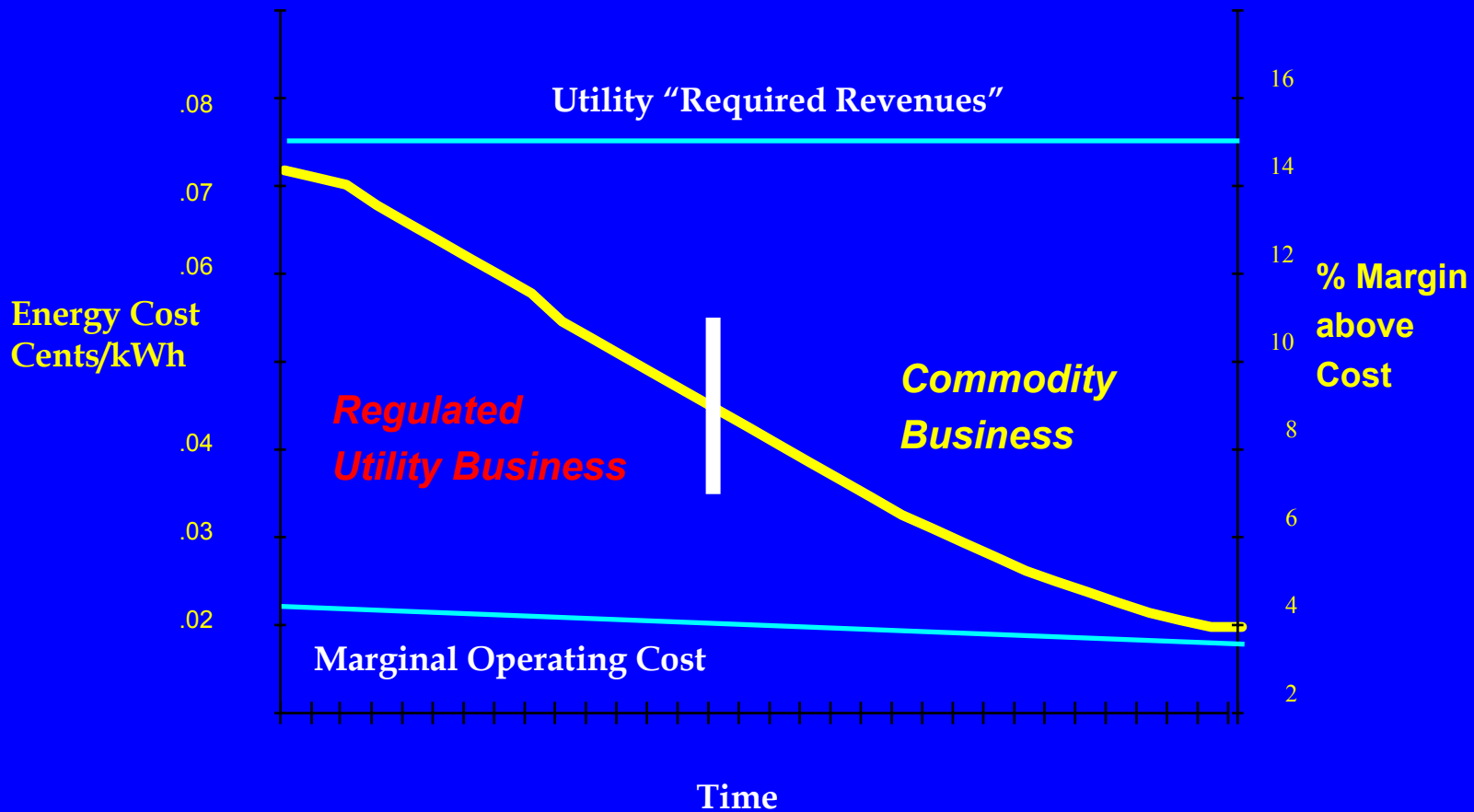
The Gaps in Today's Costs

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Enter Competition: The Slippery Slope

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Background: how did we get here?

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- ***Cost Structures Changed***
 - “The Forecast is Always WRONG” F.C.Schweppe
- ***Required Programs Introduced***
 - IPP Purchases
 - Demand Side Management
- ***Technology Changed***
 - Generating (bigger is not better)
 - Communications and Control
- ***The Business Environment Changed***
 - US Competitive Position for Heavy Industry
 - Worldwide Recession
- ***Result = Customers want Reduced Costs***

The Economic Forces at Work

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-
- ***Fuel Prices ... What ever happened to:***
 - \$50/bbl oil?
 - Nuclear energy too cheap to meter?
 - Gas too valuable to burn?
 - ***Controlled Economies and Central Planning***
 - The Former Soviet Union
 - Centrally Planned Economies in Asia and Latin America
 - ***Role of International Agencies and International Finance***
 - The World Bank, InterAmerican Bank, Asian Development Bank ...
 - The City, Wall Street ...

International Competition equals Global Markets

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- ***Energy, even electricity, is part of a global market***
 - Basic fuels -- Gas, Coal, Oil
 - Expertise in construction and Operations
- ***Competitive pricing is critical***
 - Protection of markets, at best, is unpopular
 - Dumping or predatory pricing is either illegal or unacceptable
- ***Technology is global***

Local Competition

- *New technologies against the old*
 - Combined Cycle v. Single Cycle
 - Smaller v. larger units
 - (Dis)economies of scale
- *New institutions against the old*
 - Private against public
 - Regulated against unregulated
- *Increased efficiency of both*
 - Engineering and
 - Economics

Corporate Strategic Forces at Work

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- *Internal Restructuring*
 - Frequent Event ...?
 - Splitting of Generation, Transmission and Distribution
- *Diversification*
 - National through Mergers and Acquisitions
 - International through Acquisitions
 - Southern Company (and everyone else) in UK
 - The UK in the US (NGC and Scottish Power)
 - Everybody in Latin America,
 - International through Operating Agreements
 - Malaysia
 - Philippines
 - India
 - ...

The Results: International Competition in Energy Supplies

- *The Business: Commodities*
- *The Margins:*
- *The Competition*
 - Inter source
 - Gas and Electricity
 - Intra source
 - Efficient use of economically attractive resources
 - Gas
 - Coal
 - ? Nuclear
 - ? Renewables

The Early Path to Restructuring

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- *1978: Public Utilities Regulatory Policy Act (PURPA)*
- *1992: Energy Policy Act (EPAAct)*
 - Amendments to the Federal Power Act Section 211
- *1993: FERC NOI 93-19 on Transmission Pricing*
 - Asked the Questions
- *April 1994: CPUC and I.94-04-032*
 - Supplier Choice in 1996 for Large Customers
 - The Options: UK Model or the Open Market Model
- *March 1995: The answer from CPUC*
 - UK PoolCo
- *September 1995: Memorandum of Understanding*

Where are we today

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-
- *FERC Order No. 888 and 889 (April 1996)*
 - Created structure for Open Access Transmission Tariffs (OATTs) that all entities had to file
 - *FERC Order No. 2000 (2000)*
 - Required the creation of Regional Transmission Organizations (RTOs)
 - Defined the minimum characteristics
 - Required that all utilities and previously accepted Independent System Operators (ISOs) respond

FERC 2000 Minimum Characteristics

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- *Independence from Market Participants*
 - *Appropriate Scope and Regional Configuration*
 - *Operational Authority for all Transmission Facilities under RTO Control*
 - *Exclusive Authority to Maintain Short-term Reliability*

FERC 2000 Mimimum RTO Functions

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- *Tariff Administration and Design*
 - *Congestion Management*
 - *Parallel Path Flow*
 - *Ancillary Services*
 - *OASIS and Total Transmission Capability (TTC)
and Available Transmission Capability (ATC)*
 - *Planning and Expansion*
 - *Interregional Coordination*

***International Electric
Consumption***

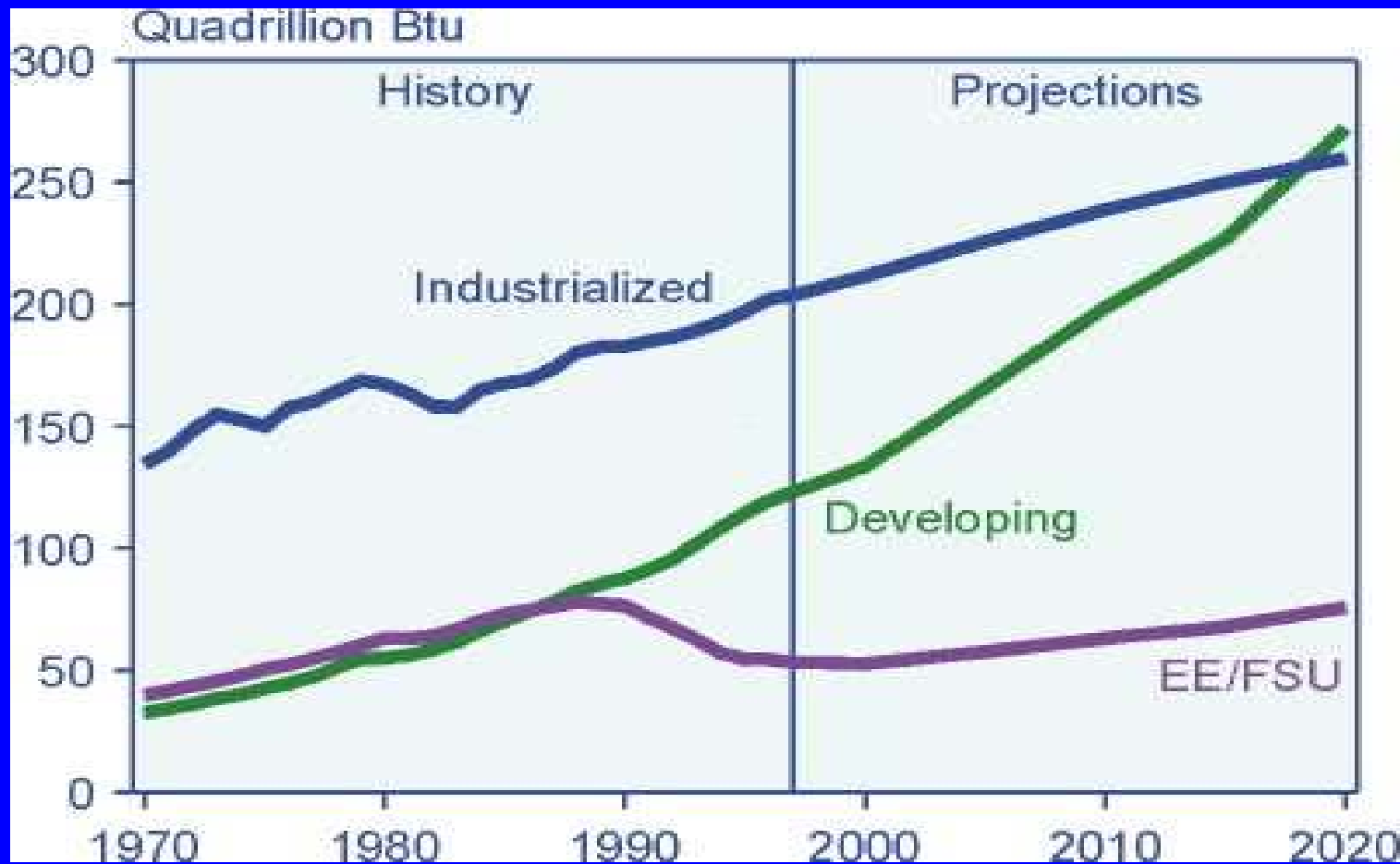
World Energy Consumption

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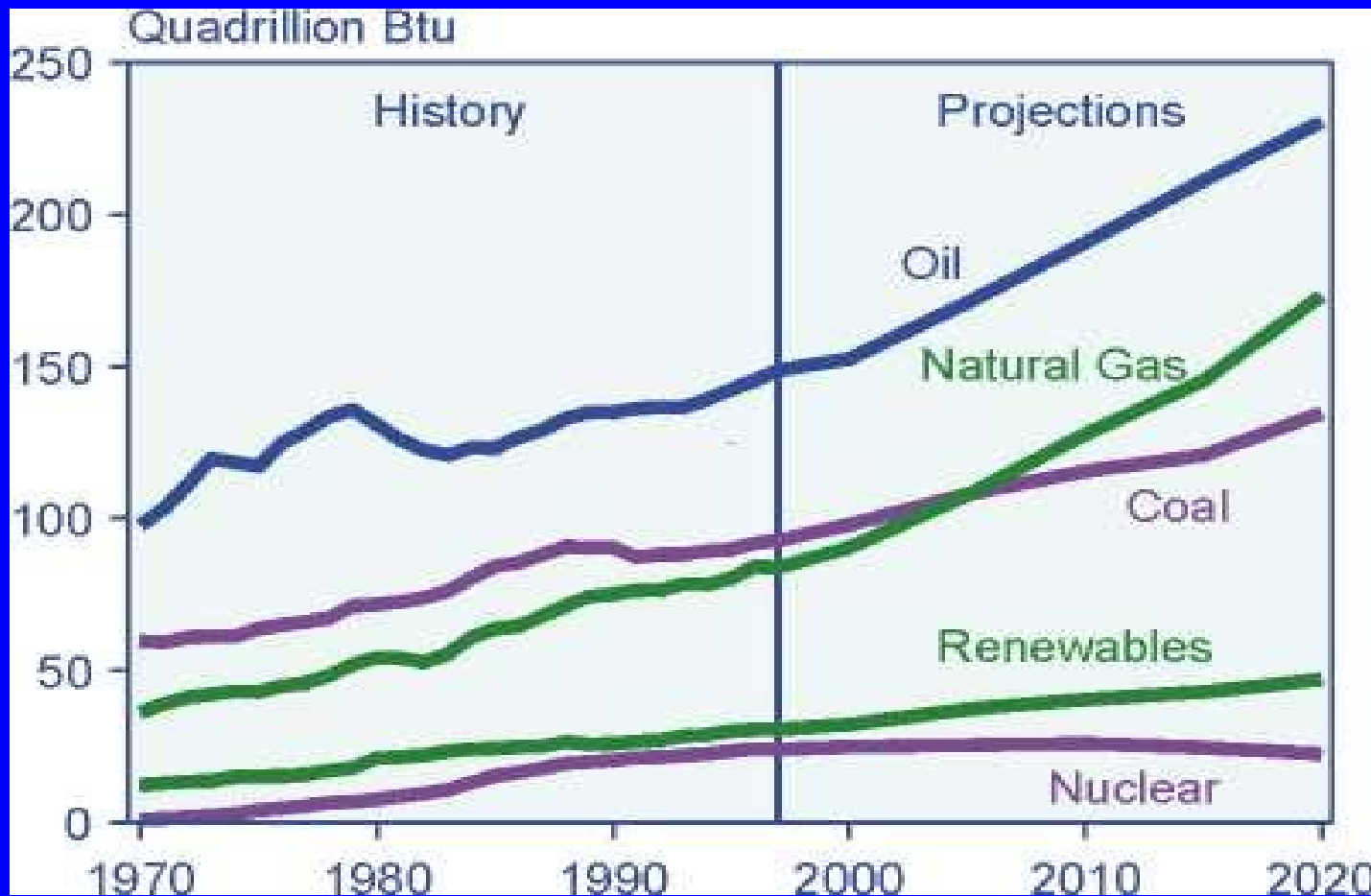


World Energy Consumption by Region

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World Energy Consumption by Fuel Type *ESD 126*

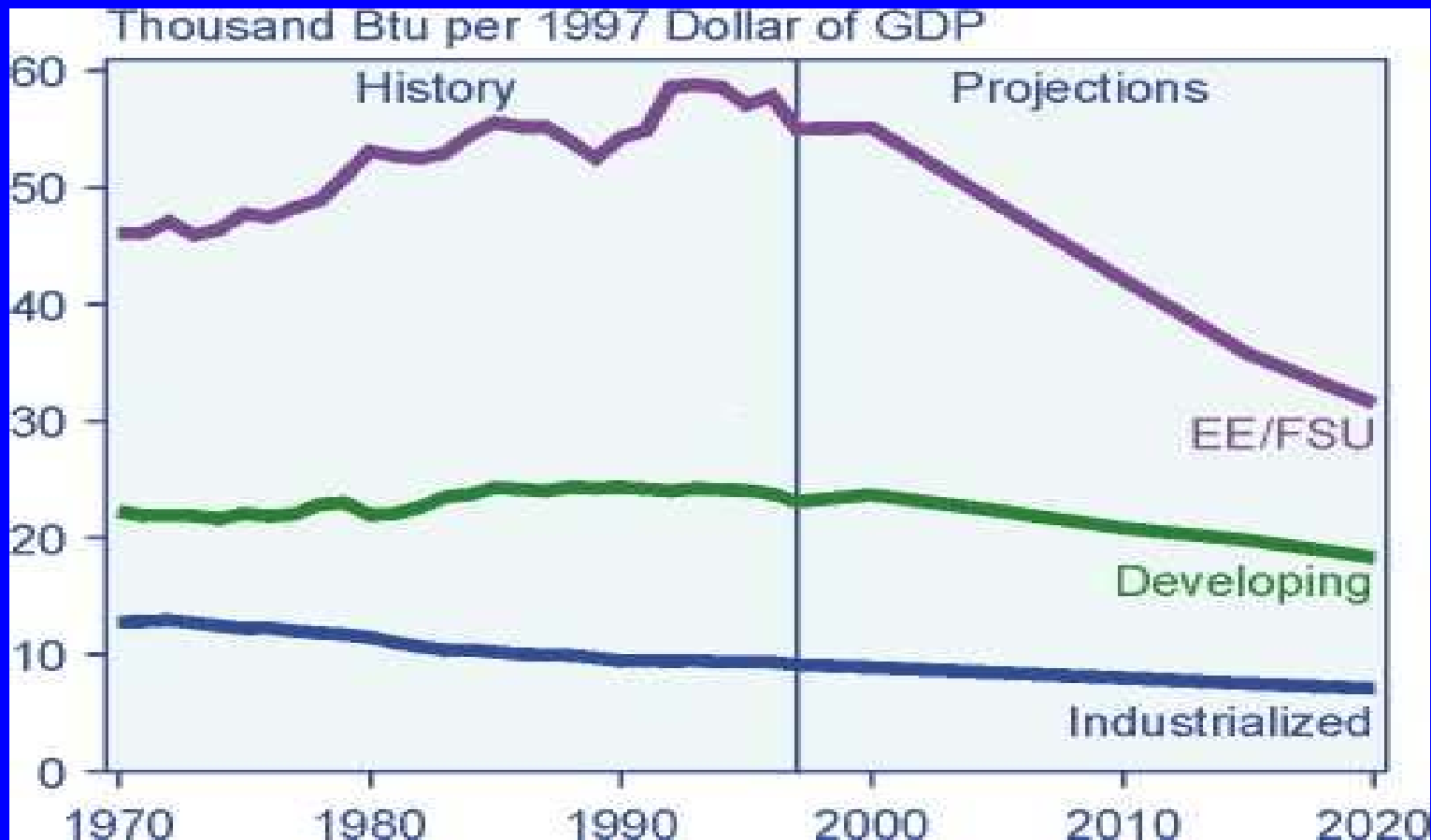


World Energy Consumption Shares by Fuel Type *ESD 126*



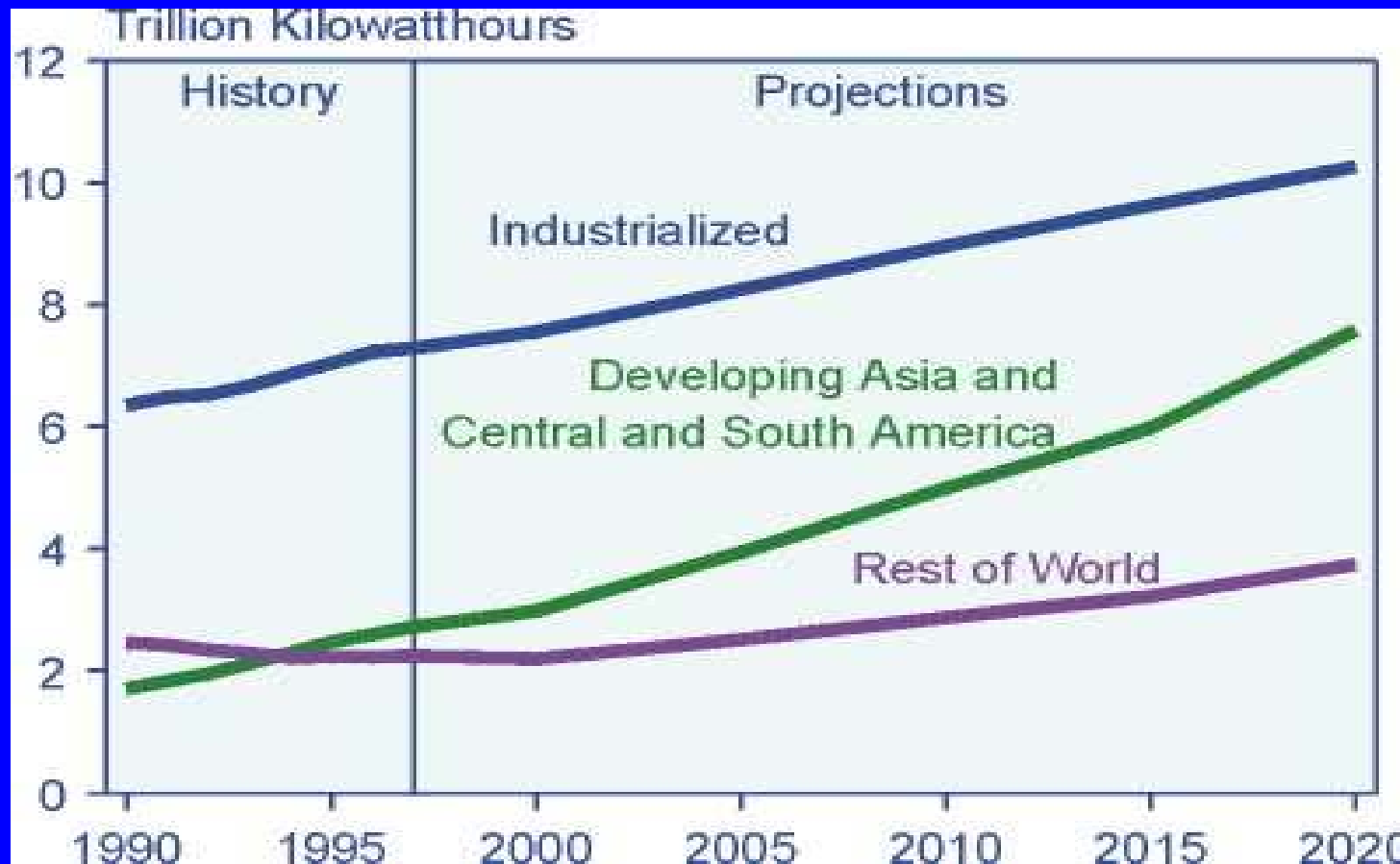
World Energy Intensity by Region

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World Net Electric Consumption by Region

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World Net Electricity Consumption by Region, 1990-2020

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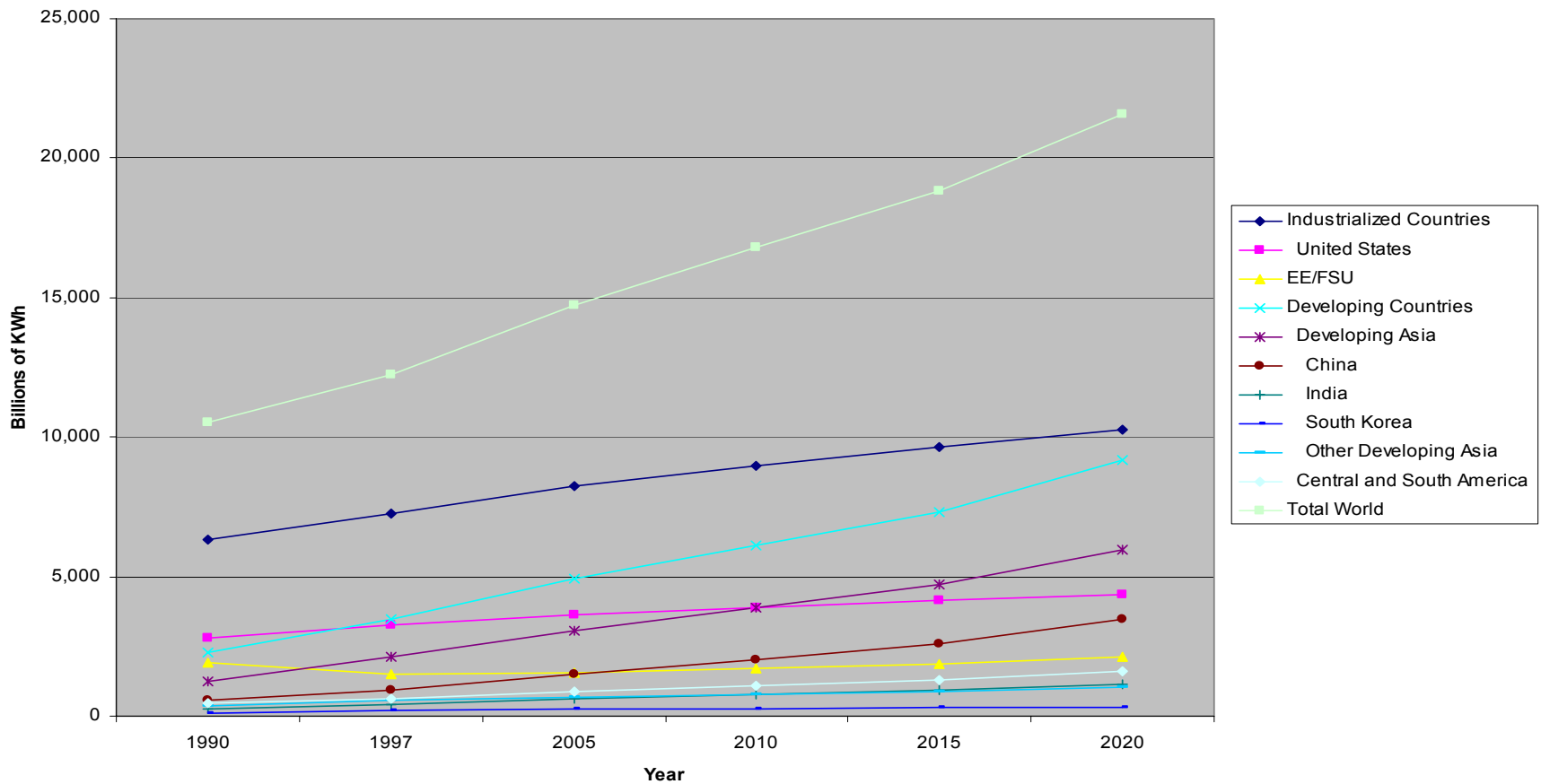
(Billion Kilowatt hours)

Region	History		Projections				Average Annual Percent
	1990	1997	2005	2010	2015	2020	
Industrialized Countries	6,353	7,287	8,252	8,960	9,628	10,255	1.5
United States	2,817	3,279	3,647	3,909	4,155	4,350	1.2
EE/FSU	1,906	1,484	1,550	1,720	1,873	2,115	1.6
Developing Countries	2,265	3,489	4,911	6,145	7,328	9,203	4.3
Developing Asia	1,260	2,103	3,071	3,899	4,707	5,957	4.6
China	551	956	1,521	2,045	2,588	3,450	5.7
India	257	397	626	788	937	1,154	4.7
South Korea	95	197	234	269	299	337	2.4
Other Developing Asia	357	552	690	796	883	1,016	2.7
Central and South America	448	624	875	1,092	1,272	1,619	4.2
Total World	10,524	12,260	14,713	16,826	18,828	21,574	2.5

Note: EE/FSU = Eastern Europe and the former Soviet Union.

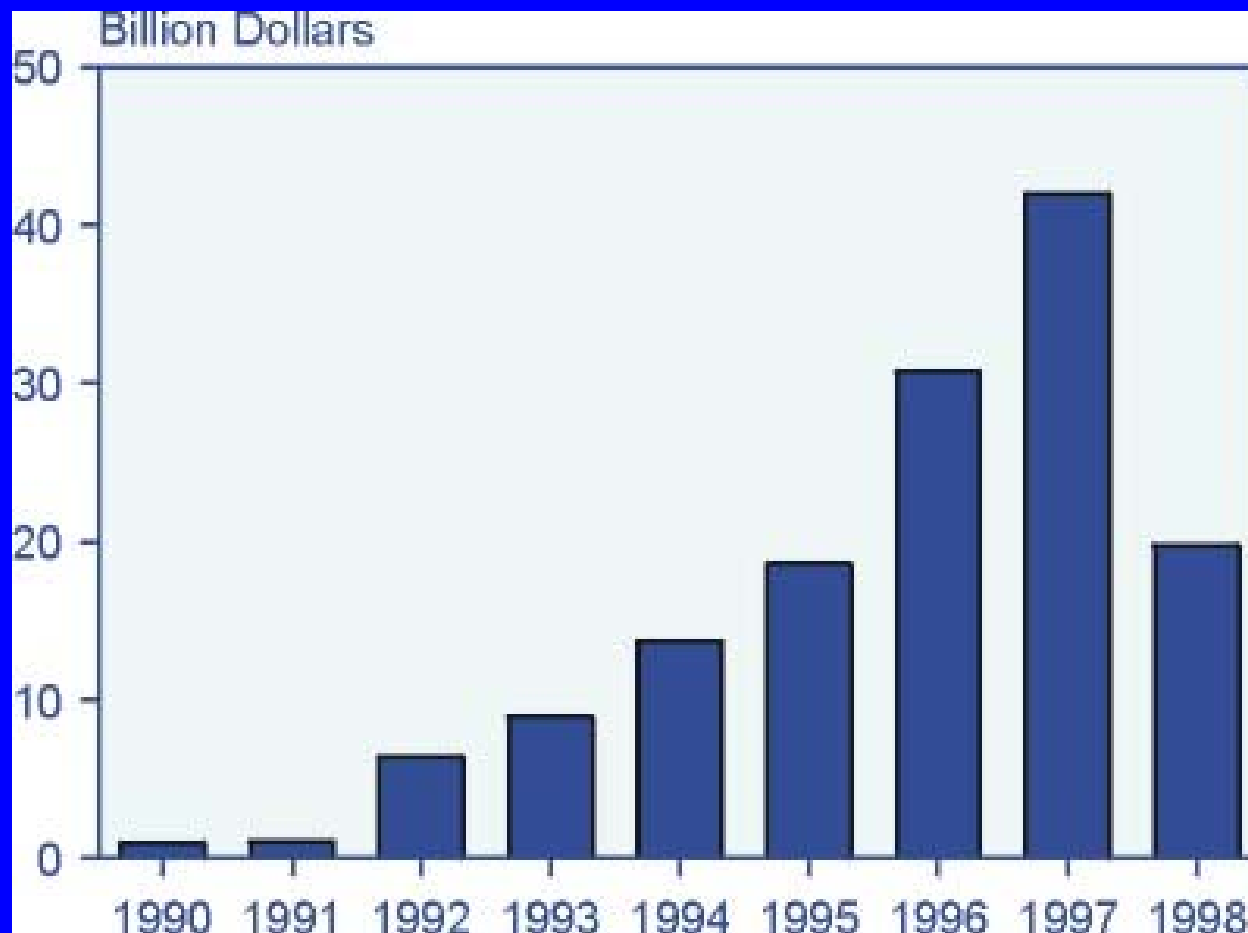
Sources: **History:** Energy Information Administration (EIA), *International Energy Annual 1997*, DOE/EIA-0219(97) (Washington, DC, April 1999). **Projections:** EIA, World Energy Projection System (2000).

Electrical Consumption by *ESD 126* Region



Investment in Electricity Projects in Developing Countries with Private Participation, 1990-1998

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Natural Gas Use for Electricity Generation by Region, 1985-2020

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