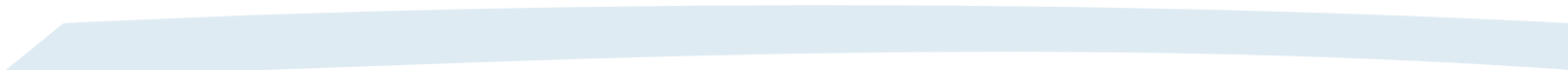




Sustainable Energy Policy: The World Chooses Liberalization

A light blue decorative bar with a slight gradient, positioned below the title.

Tom Flaherty

Branko Terzic

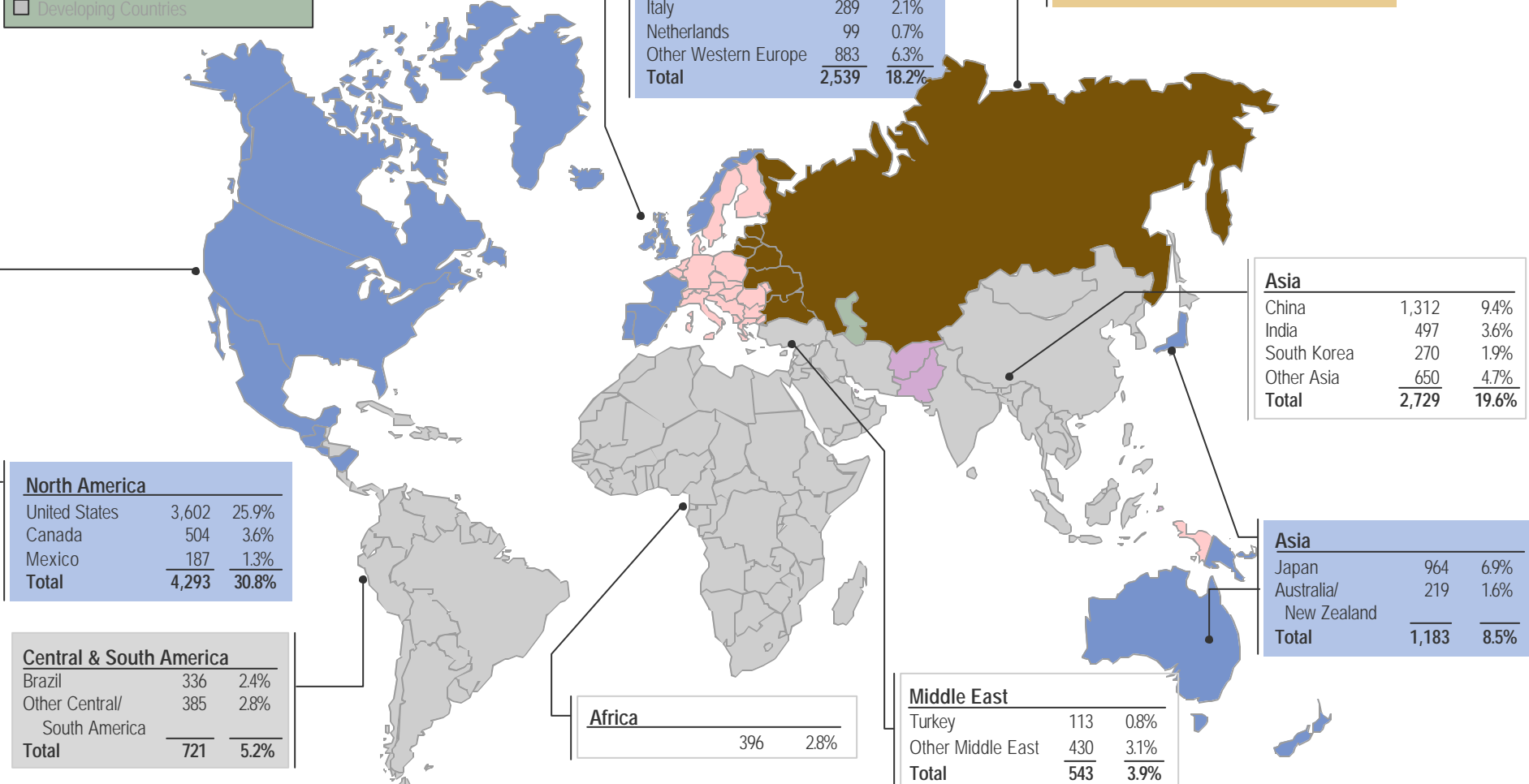
Deloitte

World Net Electricity Consumption by Region (2001)

Billion kWh and % of Global

Legend

- Industrialized Countries
- Eastern Europe/Former Soviet Union
- Developing Countries



Western Europe

United Kingdom	346	2.5%
France	415	3.0%
Germany	507	3.6%
Italy	289	2.1%
Netherlands	99	0.7%
Other Western Europe	883	6.3%
Total	2,539	18.2%

Eastern Europe/Former Soviet Union

Former Soviet Union	1,135	8.1%
Eastern Europe	393	2.8%
Total	1,528	10.9%

North America

United States	3,602	25.9%
Canada	504	3.6%
Mexico	187	1.3%
Total	4,293	30.8%

Asia

China	1,312	9.4%
India	497	3.6%
South Korea	270	1.9%
Other Asia	650	4.7%
Total	2,729	19.6%

Central & South America

Brazil	336	2.4%
Other Central/ South America	385	2.8%
Total	721	5.2%

Africa

Total	396	2.8%
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Asia

Japan	964	6.9%
Australia/ New Zealand	219	1.6%
Total	1,183	8.5%

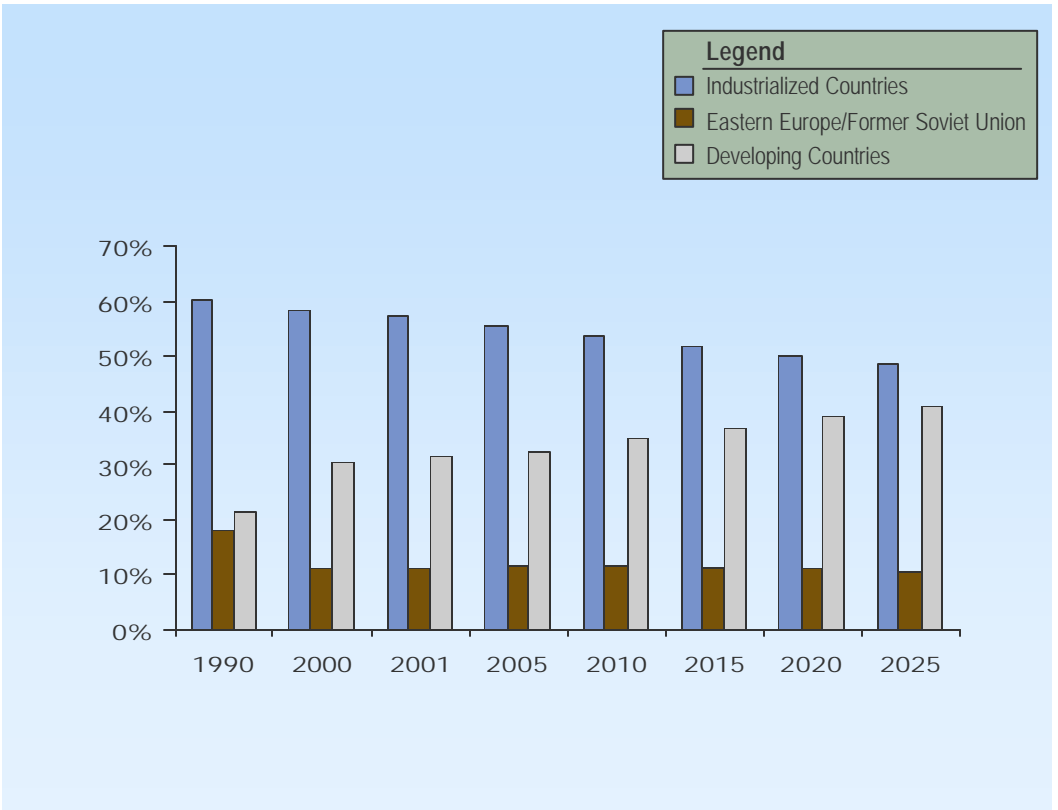
Middle East

Turkey	113	0.8%
Other Middle East	430	3.1%
Total	543	3.9%

Source: EIA International Energy Outlook 2003

Global Electricity Consumption – Trends and Projections (1990-2025)

Electricity Consumption As % of Total World Electricity
(% of Global Throughput)⁽¹⁾

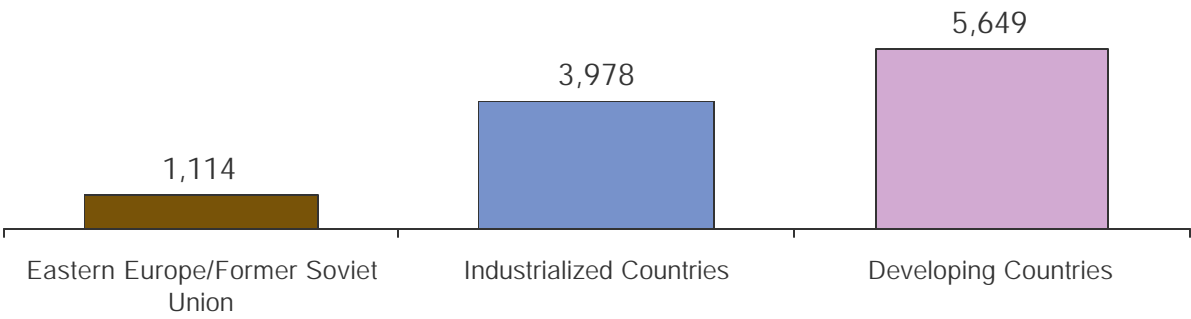


- In the short- to medium-term, the majority of the world’s electricity will continue to be consumed within a small number of industrialized countries
- In the longer-term, this predominance will moderate with developing countries providing the source for the most rapid consumption growth

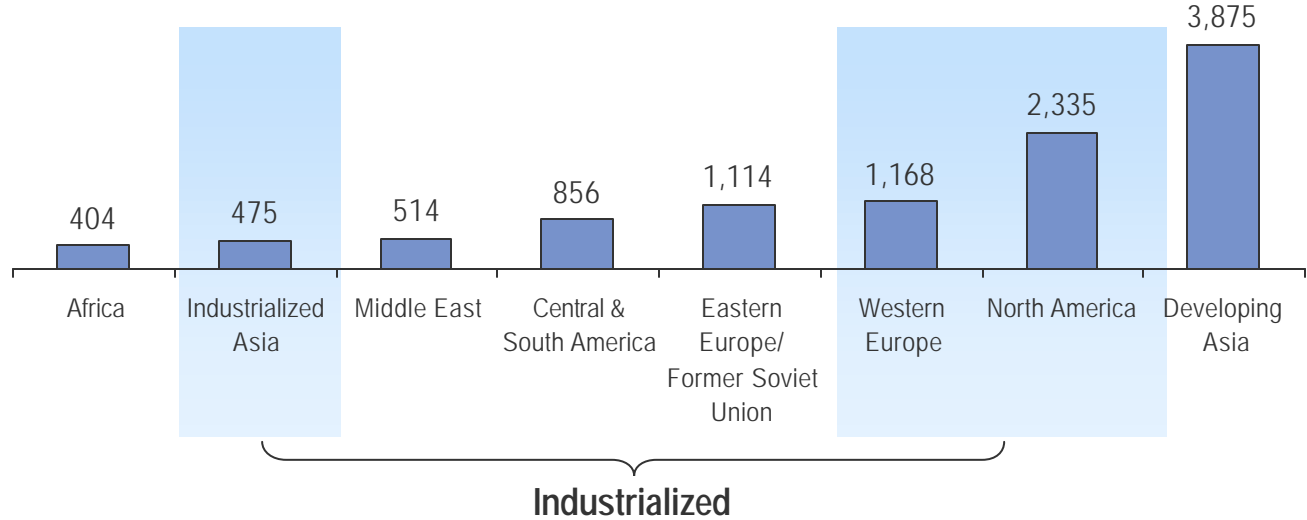
⁽¹⁾**Industrialized countries include:** United States, Canada, Mexico, United Kingdom, France, Germany , Italy, Netherlands,Western Europe, Japan, Australia, New Zealand
Developing countries include: China, India, South Korea, Other Asia, Turkey, Other Middle East, Africa, Brazil, Other Central/South America

Total Projected Throughput Increases in Billion kWh (2001-2025)

By Economy Type



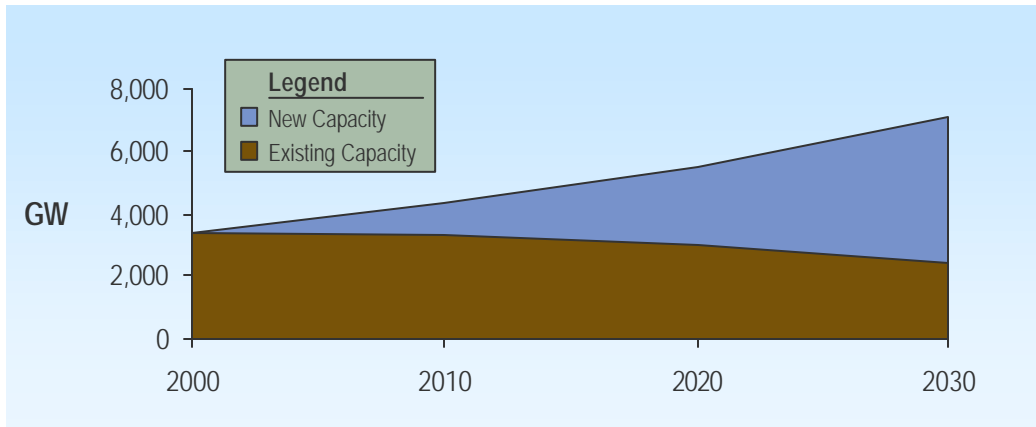
By Region



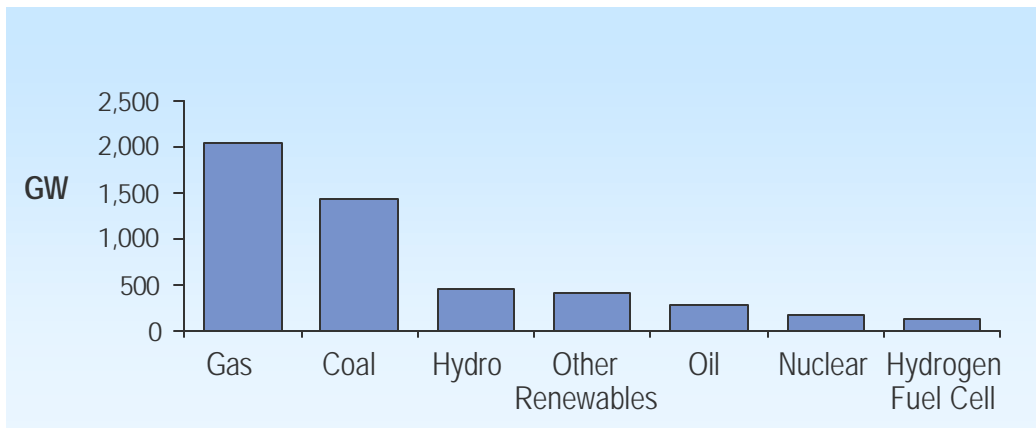
Although growth rates in energy consumption in industrialized countries are lower than developing and transitional countries, total increases in consumption through 2025 in industrialized countries will maintain an overall pace with developing regions.

Source: 2003 EIA International Energy Outlook

World Installed Electricity Capacity



World Electricity Generation Capacity Additions 2000-2030

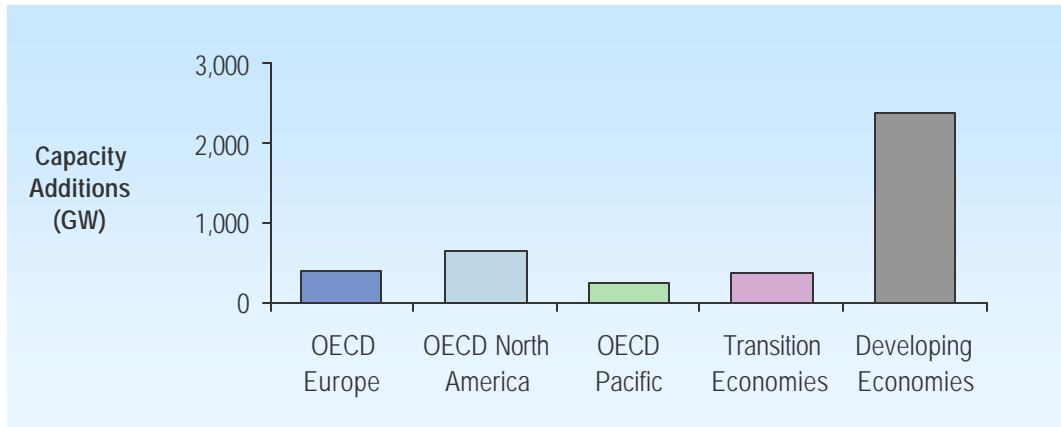


Implications

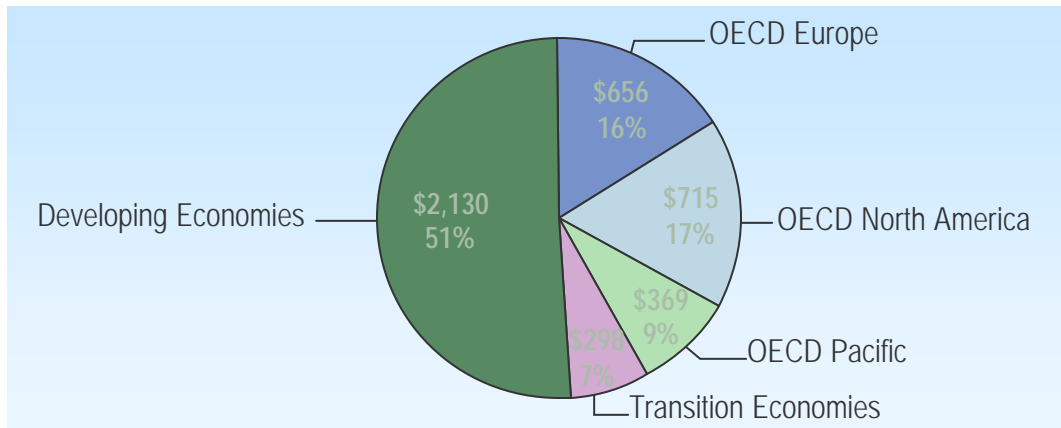
- World installed generation capacity is expected to double over the next 30 years to keep pace with anticipated consumption increases
- The bulk of capacity additions will come from traditional fossil sources (gas & coal)
- Growth in renewable generation will be largely driven by regulatory incentives and technology economics

Global Electricity Capacity – New Capacity Additions by Region (2000-2030)

Additional New Capacity Through 2030*



Cumulative Investment in New Generation (\$ Billion)



Implications

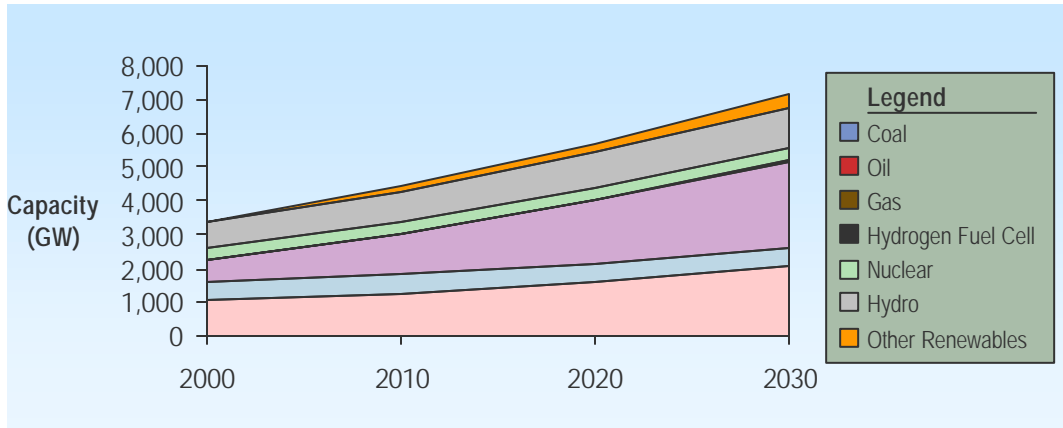
- More than 1/2 of global capacity additions and capital investment over next 30 years will be in transition and developing economies
- More new capacity will be added in OECD Europe, North America, and Pacific over the next 30 years than currently exists
- Total investment and capacity additions will exceed \$4 trillion

Source: IEA World Energy Outlook 2002

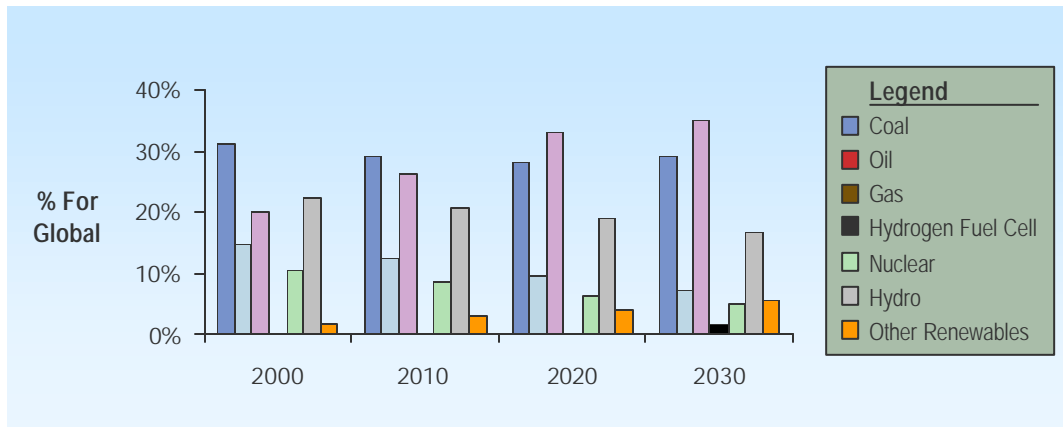
*Gross capacity additions – some additions will replace retired generation capacity

Global Electricity Capacity – Generation Capacity by Fuel Type (2000-2030)

Global Generation Capacity by Fuel Type (2000-2030)



Global Capacity % by Fuel Type (2000-2030)

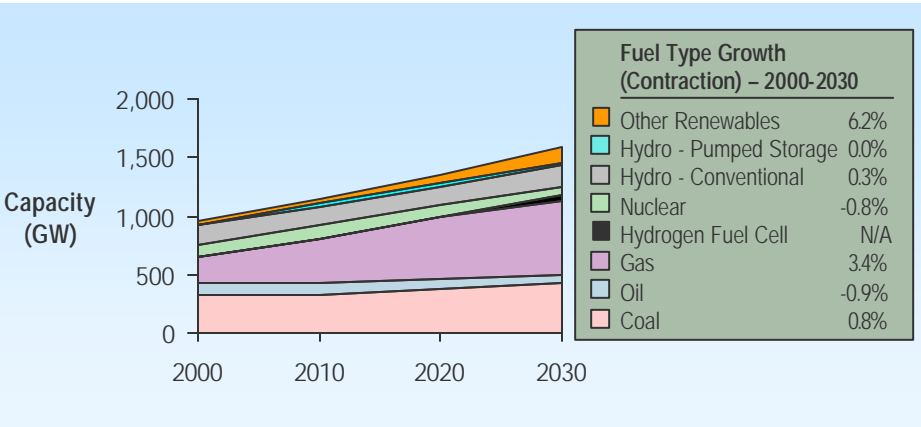


Growth

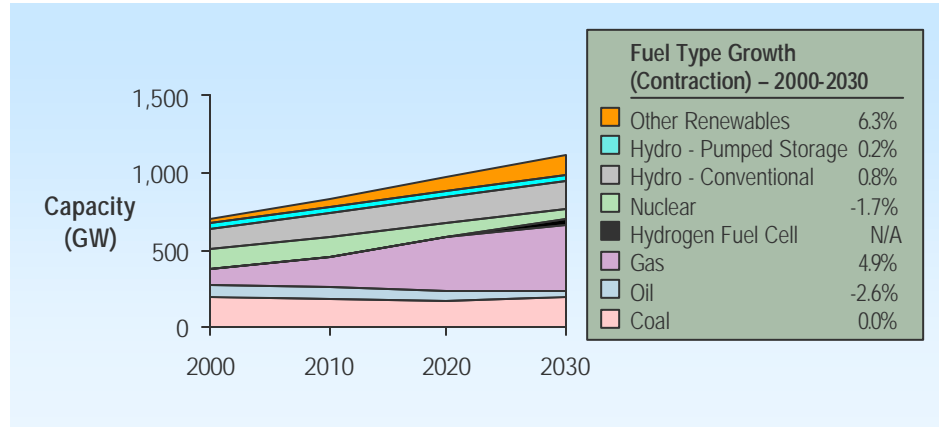
- Long-term annualized capacity growth rates by fuel type are:
 - Coal 2.2%
 - Oil 0.1%
 - Gas 4.3%
 - Nuclear 0%
 - Hydro 1.5%
 - Other Renewables 6.5%
 - Wind 9.1%
- Although “cleaner” fuel types such as gas and renewables are expected to experience more rapid growth, fossil fuels will still be relied upon heavily
- Growth in hydro generation is limited by finite siting potential and environmental issues

OECD Generating Capacity by Fuel Type

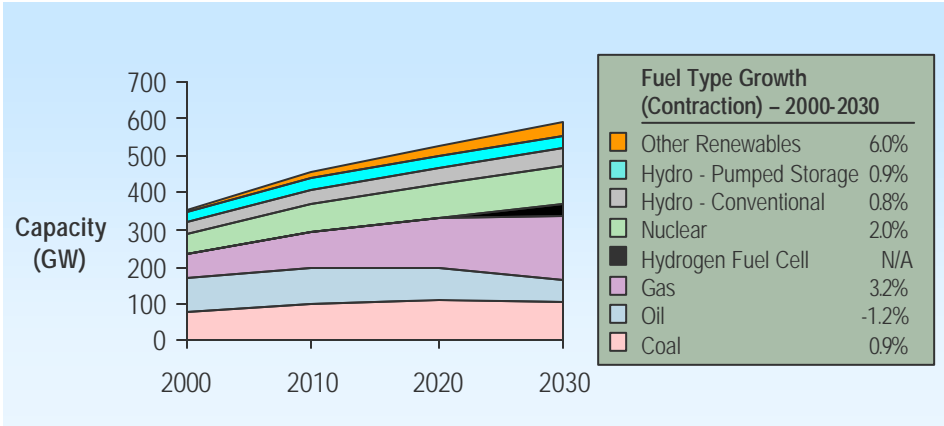
OECD North America



OECD Europe



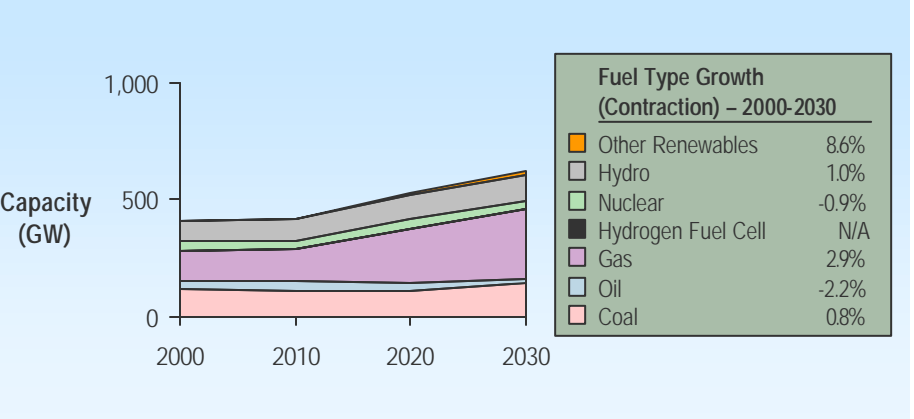
OECD Asia



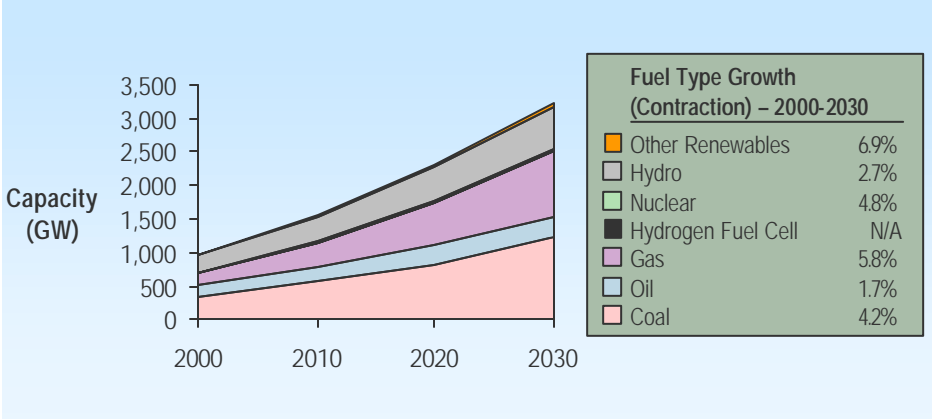
- OECD North America will add the greatest capacity (about 650 GW) over the next 30 years, with most new capacity from gas
- OECD Europe will add about 400 GW of capacity, primarily from gas
- OECD Asia will trail, with about 250 GW of new capacity

Transition and Developing Economy Capacity by Fuel Type (2000-2030)

Transition Economies*



Developing Economies



- Transition economies (the former Soviet Union and Eastern Europe) will experience moderate electric capacity growth, led by gas
- Developing economies will experience substantial electric capacity growth, primarily from coal, gas and hydro generation

Source: IEA World Energy Outlook 2002

Western European Power Generation Highlights

European Union

Market directive requires that:

- 26.48% of electricity sales in member countries be open to competition beginning in February 1999
- This percentage increased to 28% in February 2000, and to 33% in 2003

Norway

- Almost all power generation is hydro
- Market liberalization began in 1991
- In 1999, over U.S. \$3 billion of municipally-owned generation facilities were sold to investor-owned generation companies
- Integration with Sweden and Finland through Nordpool

Germany

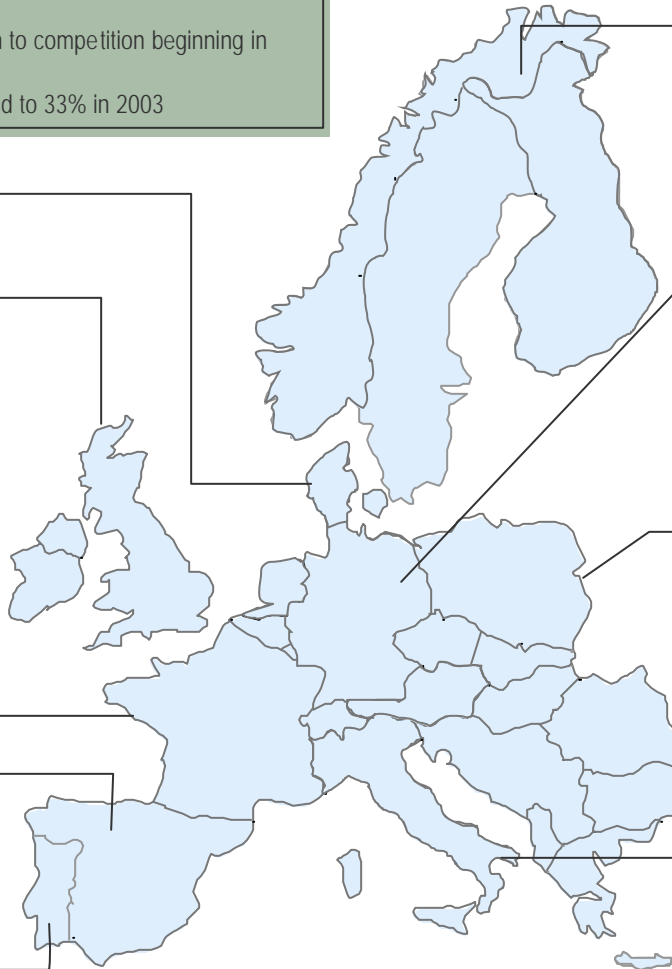
- Europe's largest electricity market
- 66% of generation is fossil; 29% is nuclear
- Market liberalization began in May 1998
- Industrial power prices have dropped 30% since April 1998
- Highly fragmented market with over 900 utilities; significant M&A activity is anticipated
- New power exchanges are planned for Frankfurt, Hanover, Dusseldorf, Leipzig and Berlin

Poland

- Polish electric industry reorganized into generation, transmission and distribution subsectors
- Approximately 12 large power stations exist; eight are state-owned, and the remaining four are owned by joint-stock companies
- Approximately 19 cogen facilities exist; all are owned by joint-stock companies
- Transmission system owned and operated by Polish Power Grid Company (PPGC)
- Distribution system is owned by 33 different companies

Italy

- In February 1999, Italy complied with the EU market directive by issuing a decree ending ENEL's monopoly
- Under current laws, IPPs can sell directly to industrial customers
- State-owned ENEL owns the majority of Italy's generating capacity, as well as 100% of transmission and 93% of distribution



Denmark

- 20% of generation is wind-powered
- Significant taxation on pollution technologies

U.K.

- Electric privatization and liberalization began in early 1990s
- 80% of generation is fossil
- Four major generation companies supply the national grid
- Electricity generation is competitive; transmission and distribution are monopolies
- Nine regional distribution companies
- National Grid is sole transmission provider
- Twenty-nine licensed energy suppliers

France

- Europe's second-largest electricity market
- 80% of generation is nuclear
- Dominated by state-owned monopolist Electricite de France
- Market remains largely closed to competition despite EU directive requiring increasing market liberalization
- EU antitrust bodies are examining the EdF monopoly

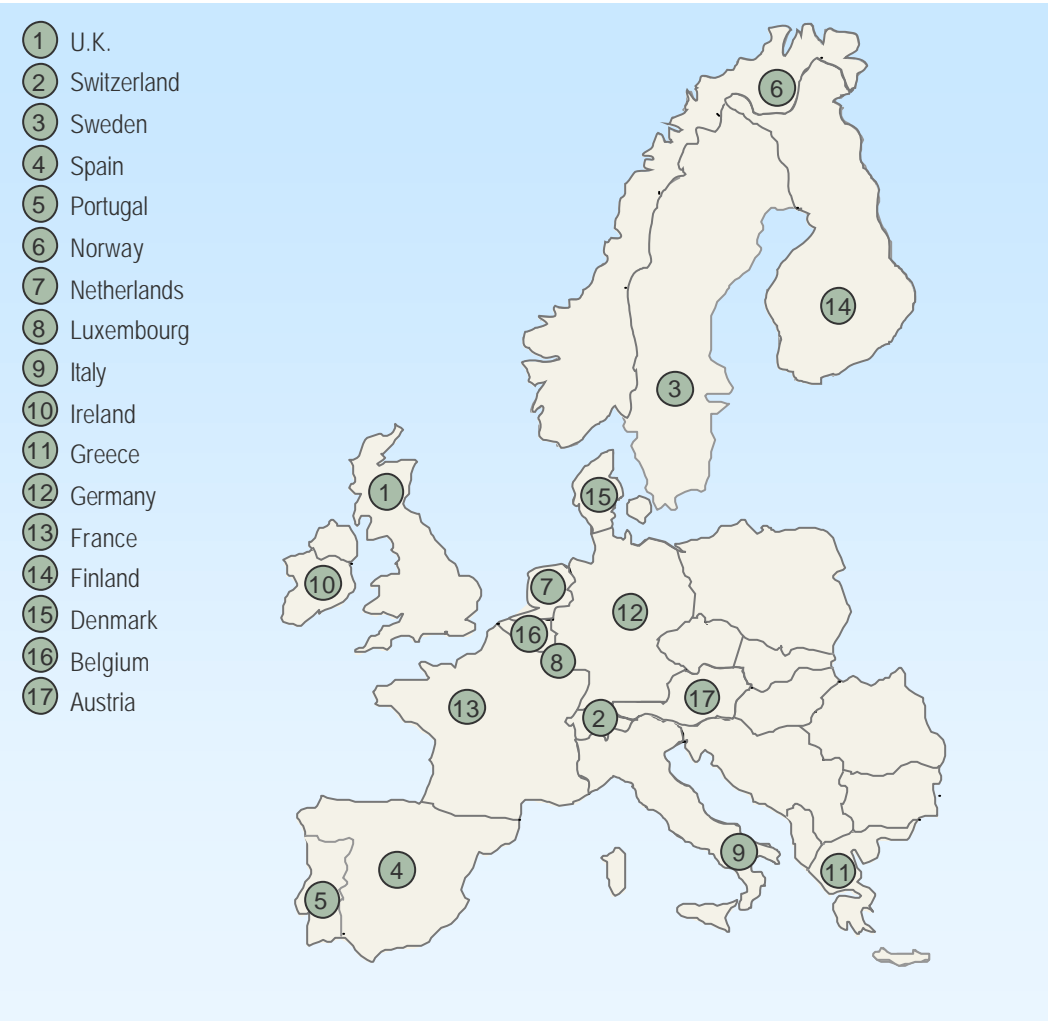
Spain

- Europe's fifth-largest electricity market
- Privatizing ahead of schedule mandated by EU
- Over 33% of electricity sales are open to competition
- Endesa (formerly state owned) is the largest producer, with 47% of generation

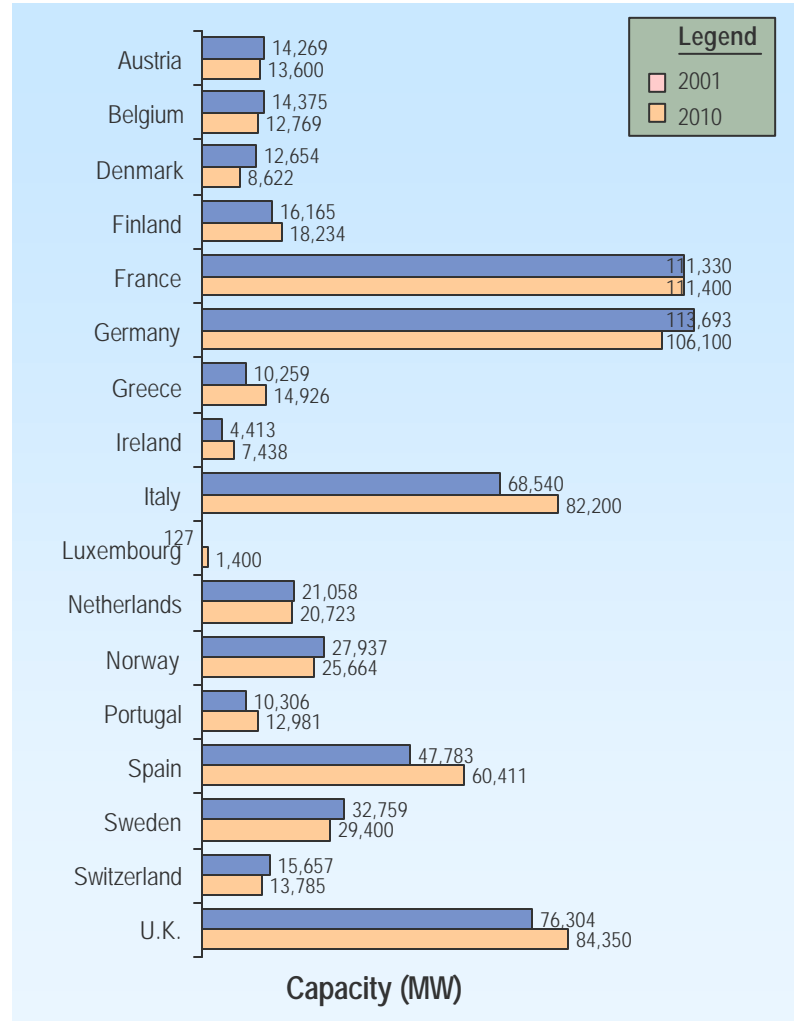
Portugal

- 50% of generation is hydro
- Electricidade de Portugal (EDP) (formerly state owned) generates, transmits and distributes electric power in Portugal

2001 Generation Capacity by Country (MW)

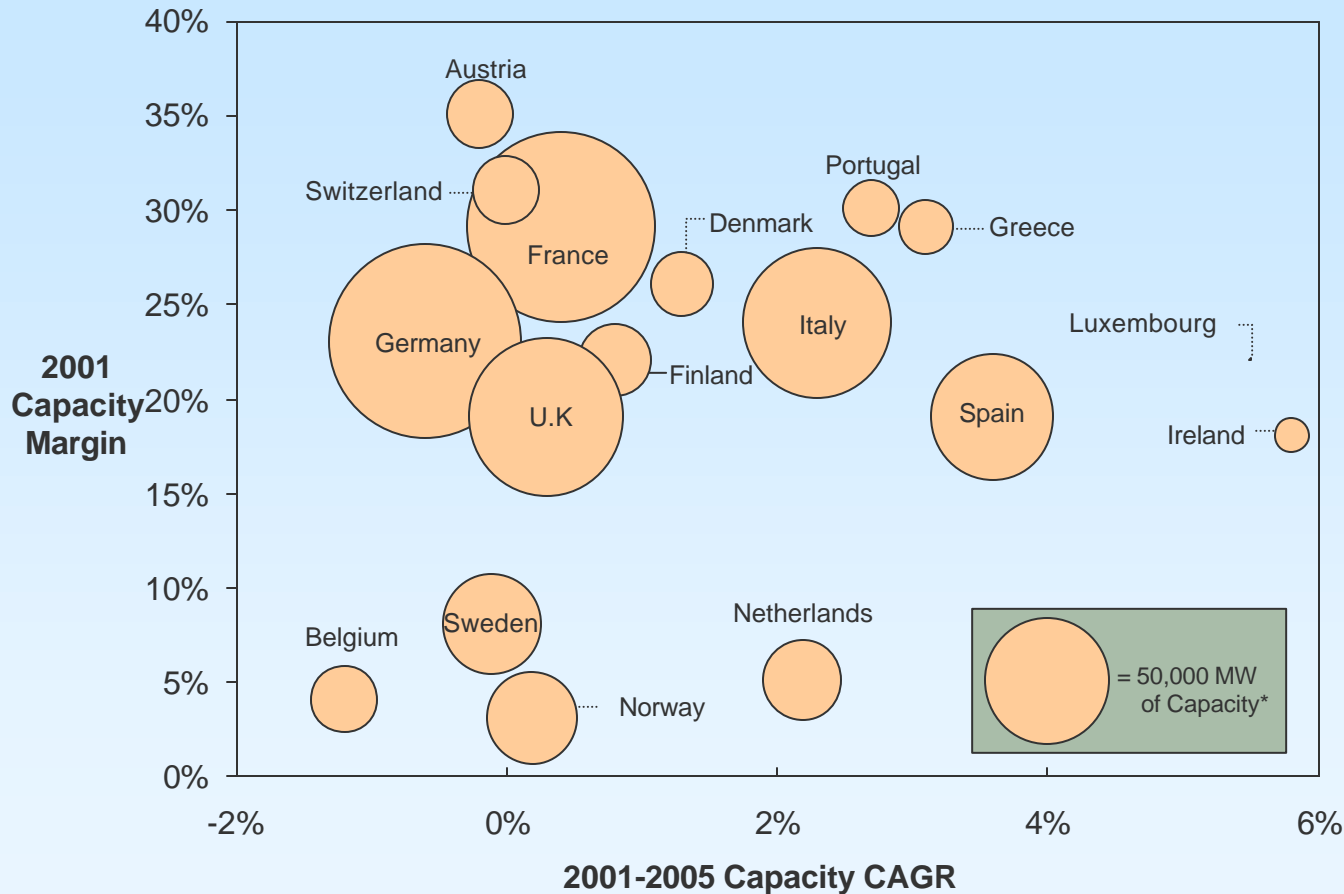


2001 and 2010 Generation Capacity



Source: EIA World Electric Database for 2001 Data; Eurelectric Statistics and Prospects for the European Electricity Sector (2000-2020) for 2010 Data

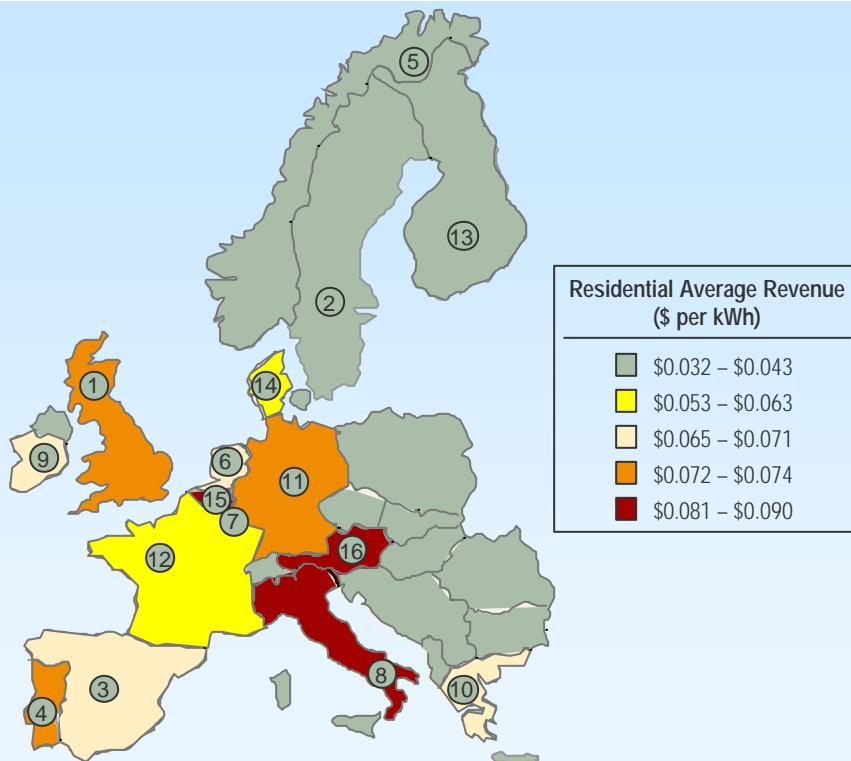
Western Europe Generating Capacity and Capacity Margins by Country (2001)



- The larger European markets (France, Germany, U.K. and Italy) currently have oversupply of electricity generation
- Countries with excess supply will become electricity exporters to countries with potential internal electricity shortages, such as Sweden and Norway

Western Europe Industrial Average Revenue per kWh by Country

1	U.K.	\$0.072
2	Sweden	\$0.038
3	Spain	\$0.069
4	Portugal	\$0.074
5	Norway	\$0.032
6	Netherlands	\$0.068
7	Luxembourg	\$0.060
8	Italy	\$0.090
9	Ireland	\$0.071
10	Greece	\$0.065
11	Germany	\$0.073
12	France	\$0.063
13	Finland	\$0.043
14	Denmark	\$0.053
15	Belgium	\$0.081
16	Austria	\$0.083



- Of the five EU countries with the greatest generation capacity (France, Germany, U.K., Italy, and Spain), all except France have industrial electric prices at or above the EU median
- Lowest cost electric providers are Scandinavian countries (Denmark, Finland, Sweden, Norway)

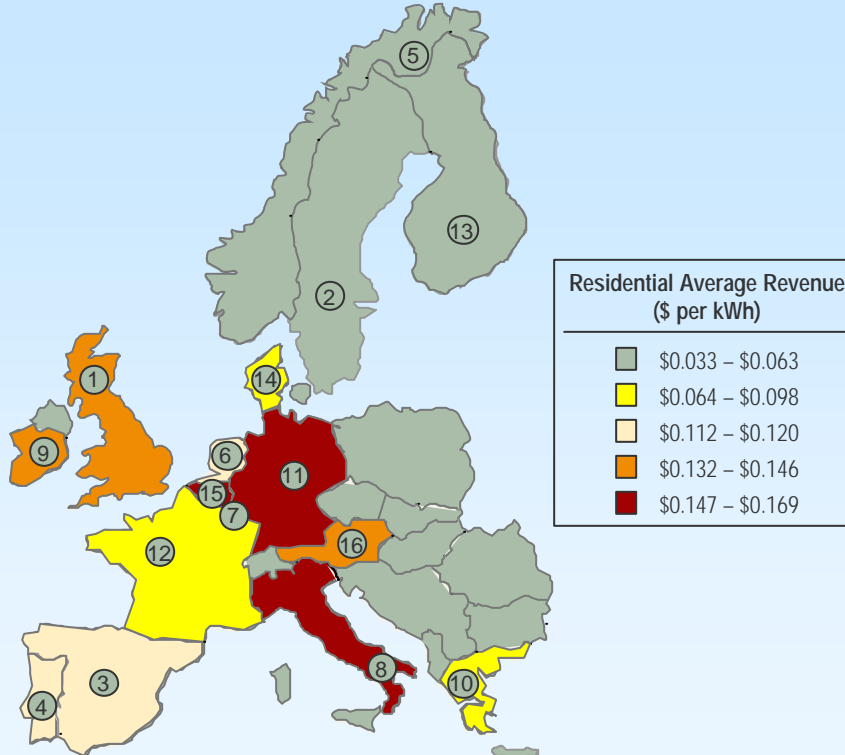
Average Prices (\$/kWh)

Italy	\$0.090
Austria	\$0.083
Belgium	\$0.081
Portugal	\$0.074
Germany	\$0.073
U.K.	\$0.072
Ireland	\$0.071
Spain	\$0.069
Netherlands	\$0.068
Greece	\$0.065
France	\$0.063
Luxembourg	\$0.060
Denmark	\$0.053
Finland	\$0.043
Sweden	\$0.038
Norway	\$0.032

Western Europe – Average Electricity Prices by Country (Commercial)

Western Europe Commercial Average Revenue per kWh by Country

①	U.K.	\$0.132
②	Sweden	\$0.061
③	Spain	\$0.112
④	Portugal	\$0.120
⑤	Norway	\$0.053
⑥	Netherlands	\$0.116
⑦	Luxembourg	\$0.150
⑧	Italy	\$0.147
⑨	Ireland	\$0.145
⑩	Greece	\$0.095
⑪	Germany	\$0.154
⑫	France	\$0.098
⑬	Finland	\$0.063
⑭	Denmark	\$0.064
⑮	Belgium	\$0.169
⑯	Austria	\$0.146



Average Prices (\$/kWh)

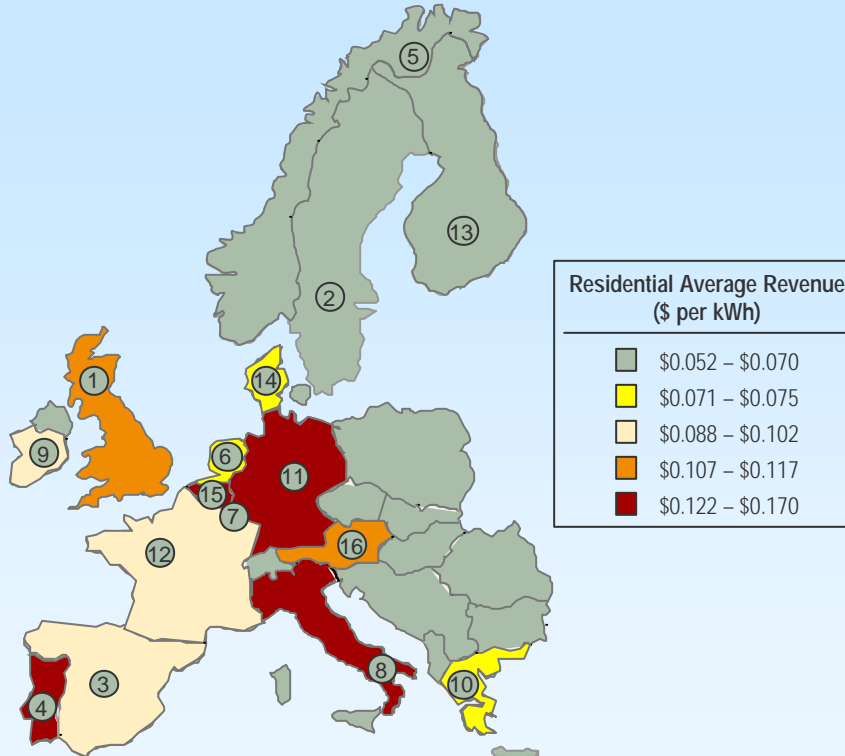
Belgium	\$0.169
Germany	\$0.154
Luxembourg	\$0.150
Italy	\$0.147
Austria	\$0.146
Ireland	\$0.145
U.K.	\$0.132
Portugal	\$0.120
Netherlands	\$0.116
Spain	\$0.112
France	\$0.098
Greece	\$0.095
Denmark	\$0.064
Finland	\$0.063
Sweden	\$0.061
Norway	\$0.053

- Germany and Italy have some of the highest commercial electricity prices in Europe
- Scandinavian countries are lowest cost electric providers

Western Europe – Average Electricity Prices by Country (Residential)

Western Europe Residential Average Revenue per kWh by Country

1	U.K.	\$0.107
2	Sweden	\$0.070
3	Spain	\$0.095
4	Portugal	\$0.122
5	Norway	\$0.052
6	Netherlands	\$0.075
7	Luxembourg	\$0.117
8	Italy	\$0.170
9	Ireland	\$0.088
10	Greece	\$0.072
11	Germany	\$0.122
12	France	\$0.102
13	Finland	\$0.062
14	Denmark	\$0.071
15	Belgium	\$0.126
16	Austria	\$0.110



Average Prices (\$/kWh)

Italy	\$0.170
Belgium	\$0.126
Portugal	\$0.122
Germany	\$0.122
Luxembourg	\$0.117
Austria	\$0.110
U.K.	\$0.107
France	\$0.102
Spain	\$0.095
Ireland	\$0.088
Netherlands	\$0.075
Greece	\$0.072
Denmark	\$0.071
Sweden	\$0.070
Finland	\$0.062
Norway	\$0.052

- Italy and Germany have some of the highest residential prices in Europe
- Scandinavian countries are low cost electric providers

The Problem: Need for energy ...

The world needs more electricity not less in the 21st century. Total and percent of energy mix increases. Use in developed countries increases (because of the Internet.) Four billion people in developing countries still have no access to affordable energy but will need more than developed countries by 2020.

The solution - appropriate government policy:

Sustainable energy development will be:

- private sector led,
- market driven,
- government enabled.

Electricity - 20th Century benefits for many:

- CATO: Progress in 20th century due to medicine, electric power, microchip
- FED : Electricity, #1 of top ten inventions & discovery of modern times

yet

- Worldwatch: 4 billion people have no access to convenient energy services

Top Ten Inventions & Discoveries of Modern Times

- 1 electricity 1873
- 2 microprocessor 1971
- 3 computer 1946
- 4 DNA 1953
- 5 telephone 1876
- 6 automobile 1886
- 7 internet 1991
- 8 television 1926
- 9 refrigeration 1913 (electric)
- 10 airplane 1903
- 11 Gillette Mach 3 safety razor 1998
- other 9 all require electricity
- 1998 Annual report Federal Bank of Dallas from Dr Ken Lay

Energy drivers in developed countries:

- +economic growth
- +quality of life
- +declining prices
- +new end uses
- + - E-commerce

Energy needs in underdeveloped world:

- Basic electrification, lighting, motors
- Improve quality of life: refrigeration, HVAC
- Water, sewer, medical care
- Tesla's goal: be free of manual labor
- Economic, productivity, health, communications

The solution:

- New Private Power Investment
- Privatization of existing infrastructure
- Mix of central and distributed power
- Local specialization

“World Energy Investment Outlook”

- Published by International Energy Agency
- 2002-2030
- Assumes base case 2002, no new environmental policy
- www.iea.org/books

World investment requirements:

- Total \$16 Trillion
- Which is about 1% of the total GDP of the world during this period.
- Most of this investment is expected to come from private capital.
- Most of this investment is needed in **DEVELOPED** countries

World investment requirements (cont'd):

- Of total \$16 Trillion
- \$10 trillion is for electricity sector
- Of which \$5.3 Trillion is for Transmission and Distribution
- In “liberalized” markets this means, at a minimum, \$5.3 trillion will be subject to direct regulation

Claude Mandil – IEA Exec. Dir.

- “..it will not be easy to attract investment most needed in grids, a regulated business”
- Investors “..will need good confidence regulators will provide adequate returns in the long period.”

November 12, 2003 at Johns Hopkins University The Paul A. Nitze School of Advanced and International studies

The policy:

- private capital
- competitive markets
- progressive regulation

An International Consensus:

- World Bank: “..market structure, competition, and regulation”
- World Energy Council: “..liberalization, competition,..empowerment of consumers”
- International Energy Agency: “competitive and liberalized markets”

Private capital can successfully provide “public services”:

- US initial choice
- UK recent experience
- World Wide privatization

The US Experience:

- Initial model in US except for major hydroelectric multiple use facilities (TVA)
- Over 100 years experience regulating investor Owned Utilities
- By 1980's among lowest cost (maybe not lowest rates) electric system in world
- Competitive reliability, technology but not leading edge
- 100 year old Cost of service, profit measuring model

UK Reform -

“private investment” model:

- privatize and restructure electric industry at same time
- generation companies with national pool
- unbundling of rates, marketing of electricity
- adopts “price cap” model after Professor Stephen Littlechild’s paper
- remarkable efficiency gains, but also remarkable profits
- labor institutes “windfall” profits tax
- however market still competitive as regulators learn

Privatization success:

- 62 developing countries some private participation in electric
- WB says 74 electric distribution systems privatized since 1972
- Energy loses decrease
- customers per employee increase price decreases

South America adopts private capital model:

- Australia - price caps, single regulator, national electricity pool May'97
- Chile privatizes and leads first round investment in Argentina with pension funds
- Argentina- price caps, small regulatory agency, national electricity pool
- Brazil privatizes
- Mexico announces it will allow private investment in new facilities

Competitive Markets in Electricity? (Cantor, Stelzer, Hogan)

- power generation not a natural monopoly
- competition among power suppliers
- transmission and distribution as regulated common carriers
- customer choice
- facilitate new technologies such as distributed generation

US:

- PURPA 1978 introduced concept of non-utility generation
- FERC orders transmission access as conditions of mergers or requests for market based pricing
- Energy Policy Act 1992 Congress mandates open access
- FERC Orders 888 and 2000 establish Regional Transmission Organizations
- learning from Gas Decontrol Act of 1985
- savings estimated at \$30 Billion
- typical 10-15% in residential

UK:

- privatization of electric, gas, water, telephone sectors
- restructuring of electric sector, gencos, transcos, discos
- efficiency gains from privatization
- cost decreases in production
- OECD reports productivity +70%

European Community

“liberalization”:

- Electricity Directive adopted 1996 covers generation, transmission and distribution
- new generation tendering procedures,
- Transmission: negotiated, regulated third party access or a single buyer
- 6 year gradual opening of end use markets
- “competition is introduced or enhanced in markets thanks to the removal of monopolies”

Key to lower energy costs is government policy:

- Clarify policy objectives
- Establish adequate competition
- Create non-discriminatory and transparent regulation for the residual monopoly

Ms. Nemat Tallat Shafik, World Bank:

- “healthy market criteria: secure legal framework, sound regulation, efficient banking, basic fundamentals to reduce risk perception.”

Clear energy policy objectives:

- to seek efficiency
- to have supply reliability
- to sustain environmental programs
- to provide consensus level of social subsidy
- to remove energy subsidies

“Energy reform” World Bank:

- Corporatization
- Divestiture & unbundling
- Establishing regulation
- Corporate restructure
- private concessions for “greenfield”
- privatization of existing
- retail competition

International Energy Agency:

- World Energy Outlook 1999 Insights
“Looking at energy Subsidies: getting the Prices Right” (IEA November 1999)
- “removing energy subsidies would support the three principal aims of sustainable development: social welfare, environmental protection and economic growth.”

Ada Karina Izaguirre, World Bank:

- Writing in Note 54 of World Bank's "Public Policy for the private sector"
- "The most successful countries have been those that have found the political will to abandon a long history of subsidized tariffs and to establish regulatory frameworks that offer credible commitments to investors"

Regulatory practices based on law:

- need for more electricity
- met by private capital
- which needs stable regulation
- which depends on solid legal basis
- which is established by government policy

Gerard Mestrallet (4/6/99):

- CEO, Vivendi electric & water Senegal Morocco
- Discussing experience in developing countries “good regulatory system was a necessary factor for success.” called for World Bank to help train regulators

Capital attractive regulatory characteristics:

- transparent process - how did this order come about
- timely- bad order preferable to no order
- balanced- public perception that interest were fairly represented
- review available - for legal merits and process
- stable- orders expected to stand, principles evenly applied
- independent- enough to gain public confidence

Mirant:

- “the regulatory structure is the main factor to determine how attractive that country is to outside investment capital”
- “..in Europe the regulations are there - but the regulatory structure needed to carry them out is NOT there”

Natural capitalism:

- Chapter 13 Sub-section on Regulatory failures
- “Some regulation inadvertently produces the opposite of the intended results.”
- Paul Hawken, Amory Lovins, L. Hunter Lovins

World Energy Council Statement 2000 - Still Valid:

- Energy For Tomorrow's World - Acting Now
- Draft December 1, 1999
- www.worldenergy.org

Summation:

- The world needs more energy, electricity not less
- private capital is available
- attracting private capital requires good regulatory policy
- policy direction needs to be clear
- laws must create reasonable regulation

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