

***“Hedging our Bets:
New Technologies in a World
of Uncertainty”***

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Main Points

- IEA and renewables
- Investing against insecurity
- Threats and responses
- Renewables progress
- So, what would it cost?
- My complaint about “cost”
- Conclusions



International Energy Agency

- IEA established in 1974 in response to energy crisis, within the framework of the OECD
- 26 member countries, plus the European Union
- Basic aims:
 - maintain and improve energy security
 - promote rational energy policies in a global context
 - improve the world's energy supply and demand structure by developing alternative energy sources and increasing efficiency
 - assist in the integration of energy and environmental policies



IEA 2003 Ministerial Communiqué

“We particularly commit ourselves to enhance the role of renewables and other lower carbon-emitting sources of energy in the energy mix, and work to shape a future where basic energy services will be available to an increasing number of the world’s citizens.”



Investing against insecurity



Investing against insecurity

Type	Cost	Developing Countries
Spare Tire	~ .5%	< .5%
Health Insurance	2 - 4%	mostly no
Life Insurance	1 - 2%	mostly no
Oil Security	?	no



Threats and responses

Risk =

Consequences X Threats X Vulnerabilities

- Arnold B. Baker

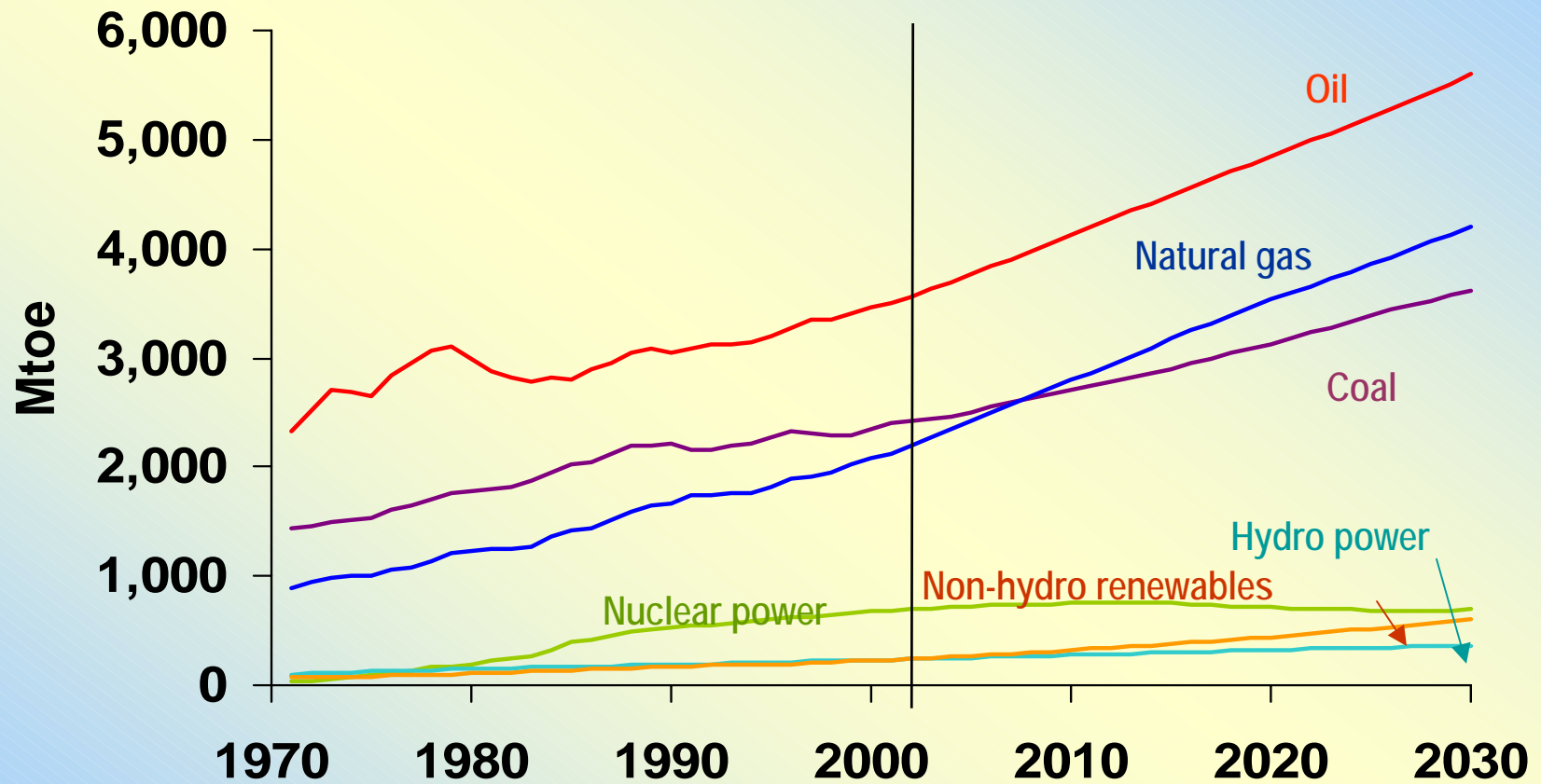


Risk =

- **Supply availability –**
 - military conflict
 - competition for resources
- **Environment**
 - carbon, but more
- **Economy**
 - fuel cost volatility
- **Society**
 - access; conflict?



World Primary Energy Demand

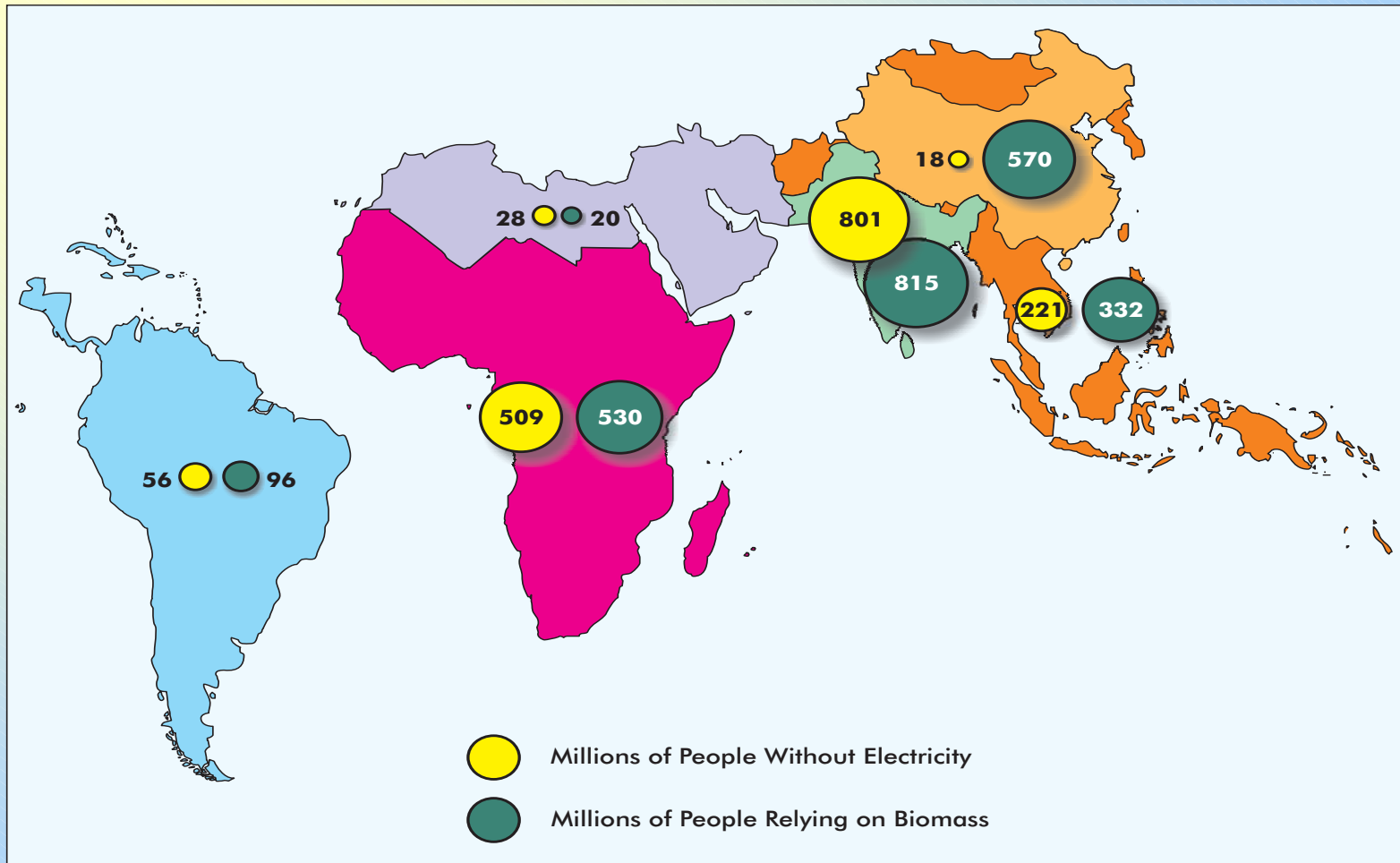


THIS IS UNSUSTAINABLE !!

Source: IEA *World Energy Outlook 2002*



Map of Global Energy Poverty

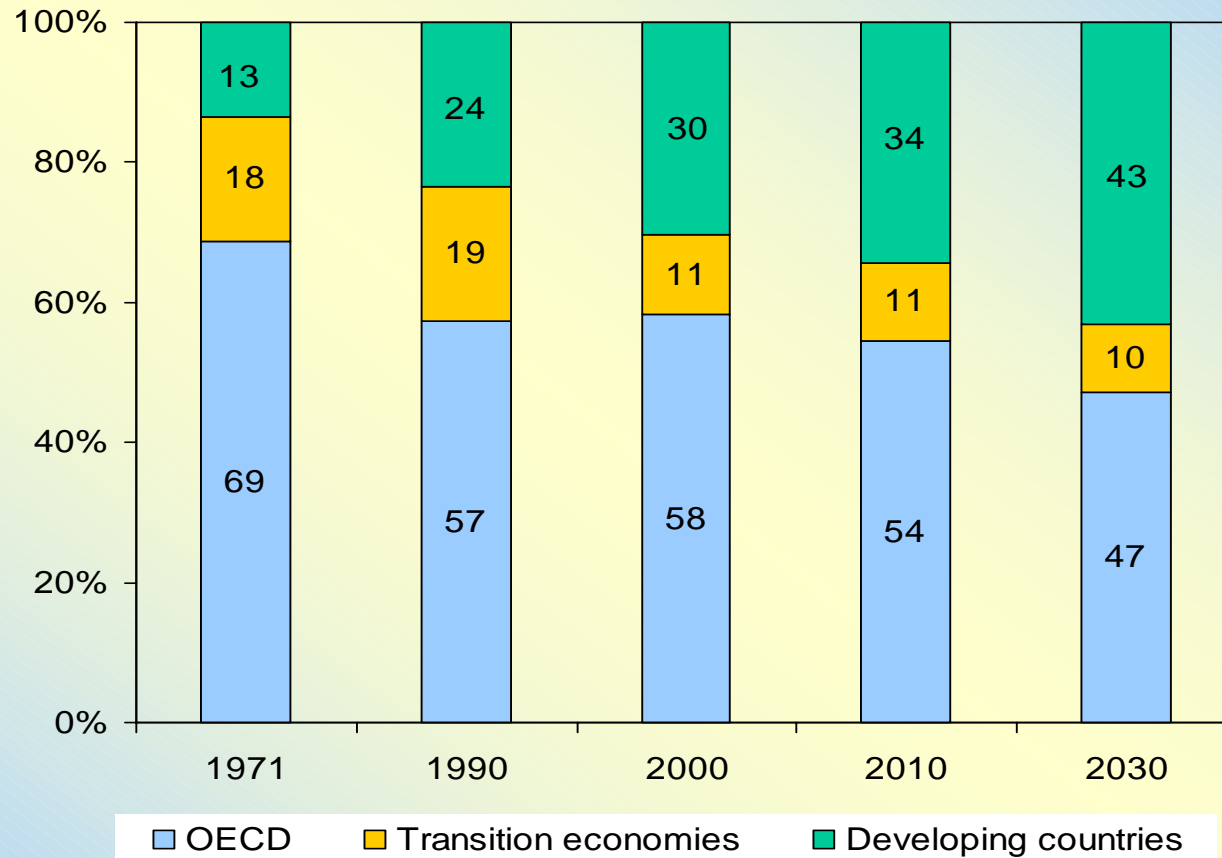


**1.6 billion people have no access to electricity,
80% of them in South Asia and sub-Saharan Africa**

Source: IEA *World Energy Outlook 2002*



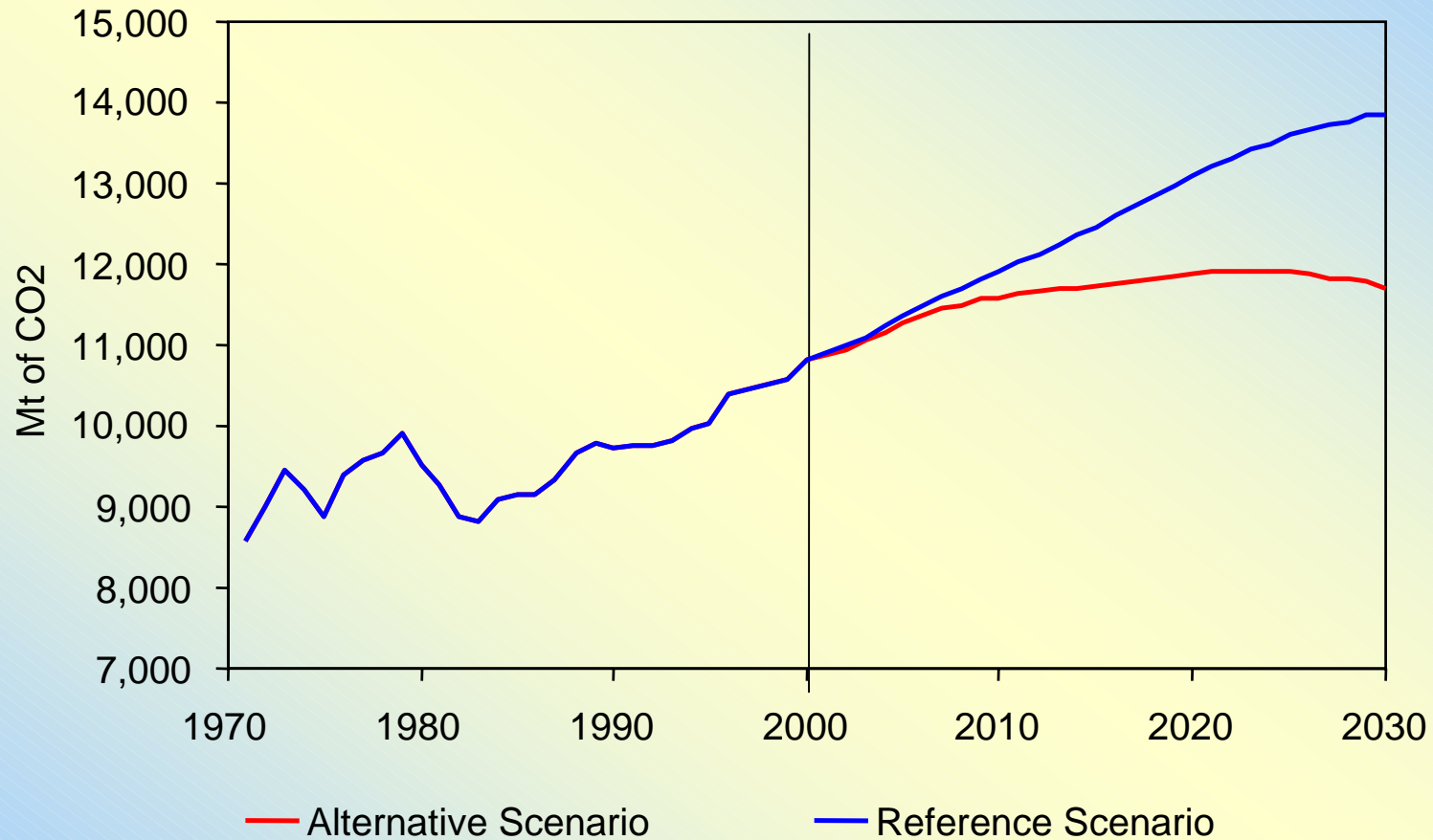
Regional Shares in World Primary Energy Demand



62% of the increase in world demand between 2000 and 2030 comes from developing countries, especially in Asia



OECD CO₂ Emissions



Emissions in the Alternative Scenario stabilise towards the end of the projection period

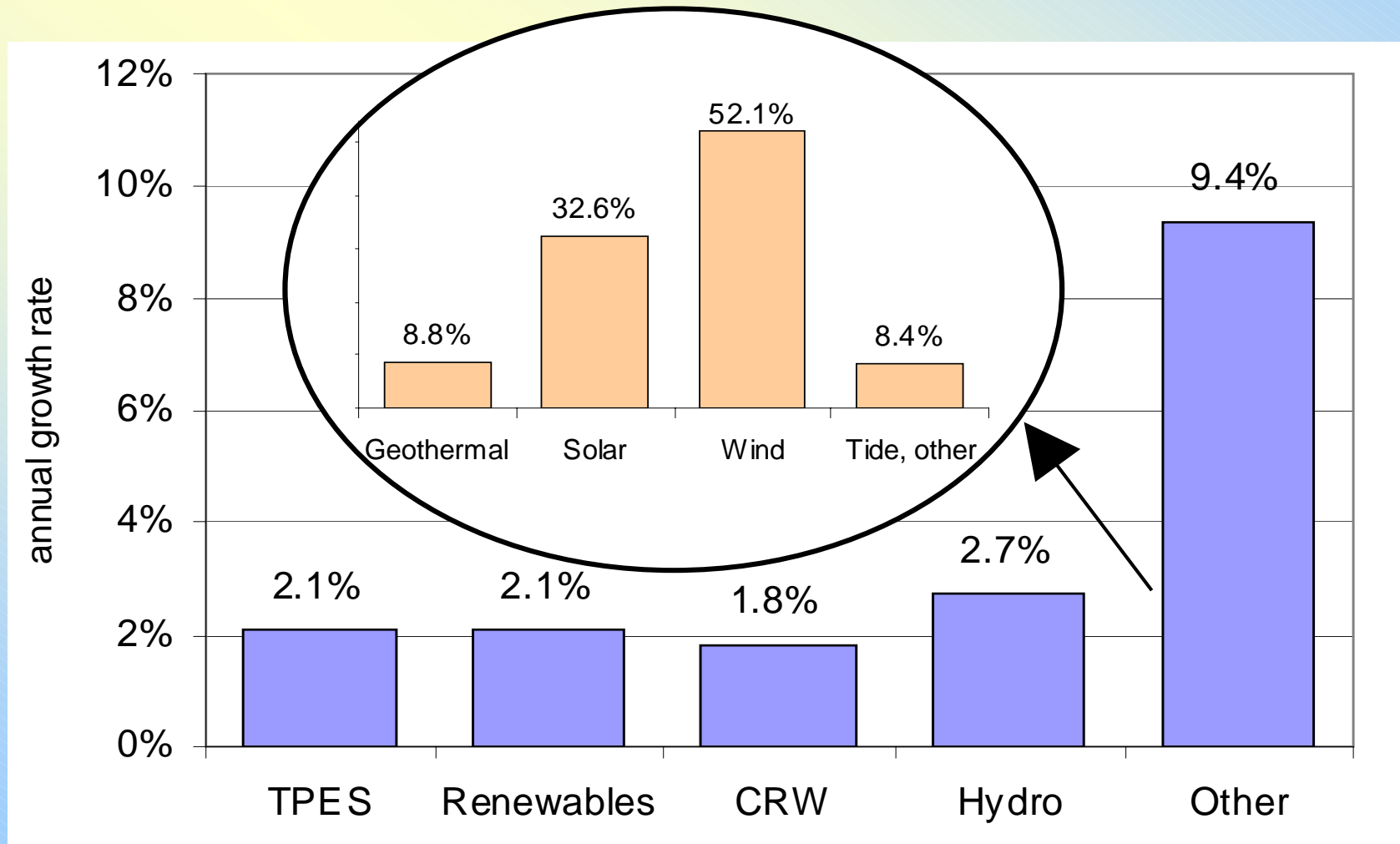
Source: IEA *World Energy Outlook 2002*



Renewables progress



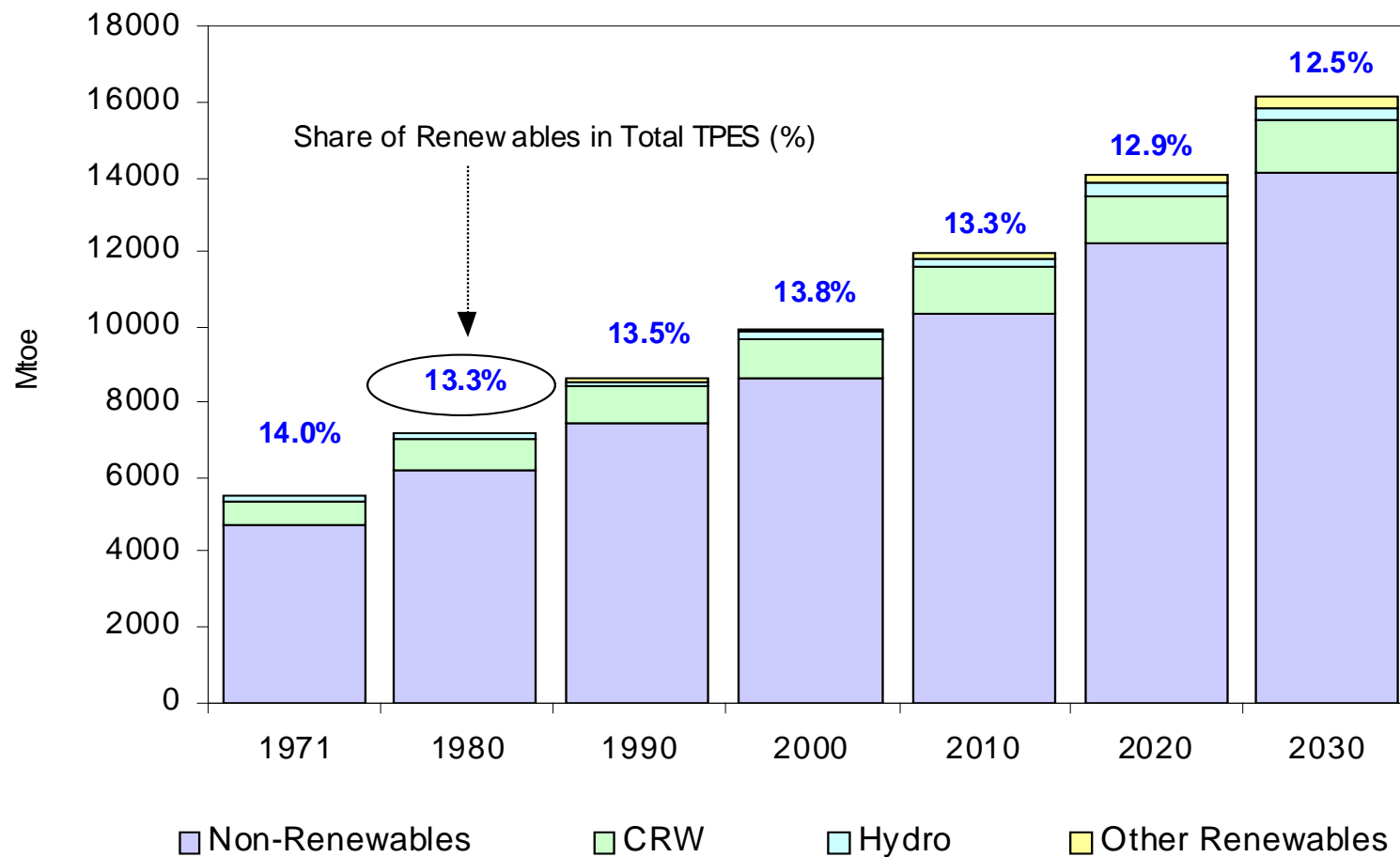
Annual Growth of Renewables Supply from 1971 to 2000



Source: International Energy Agency (IEA)



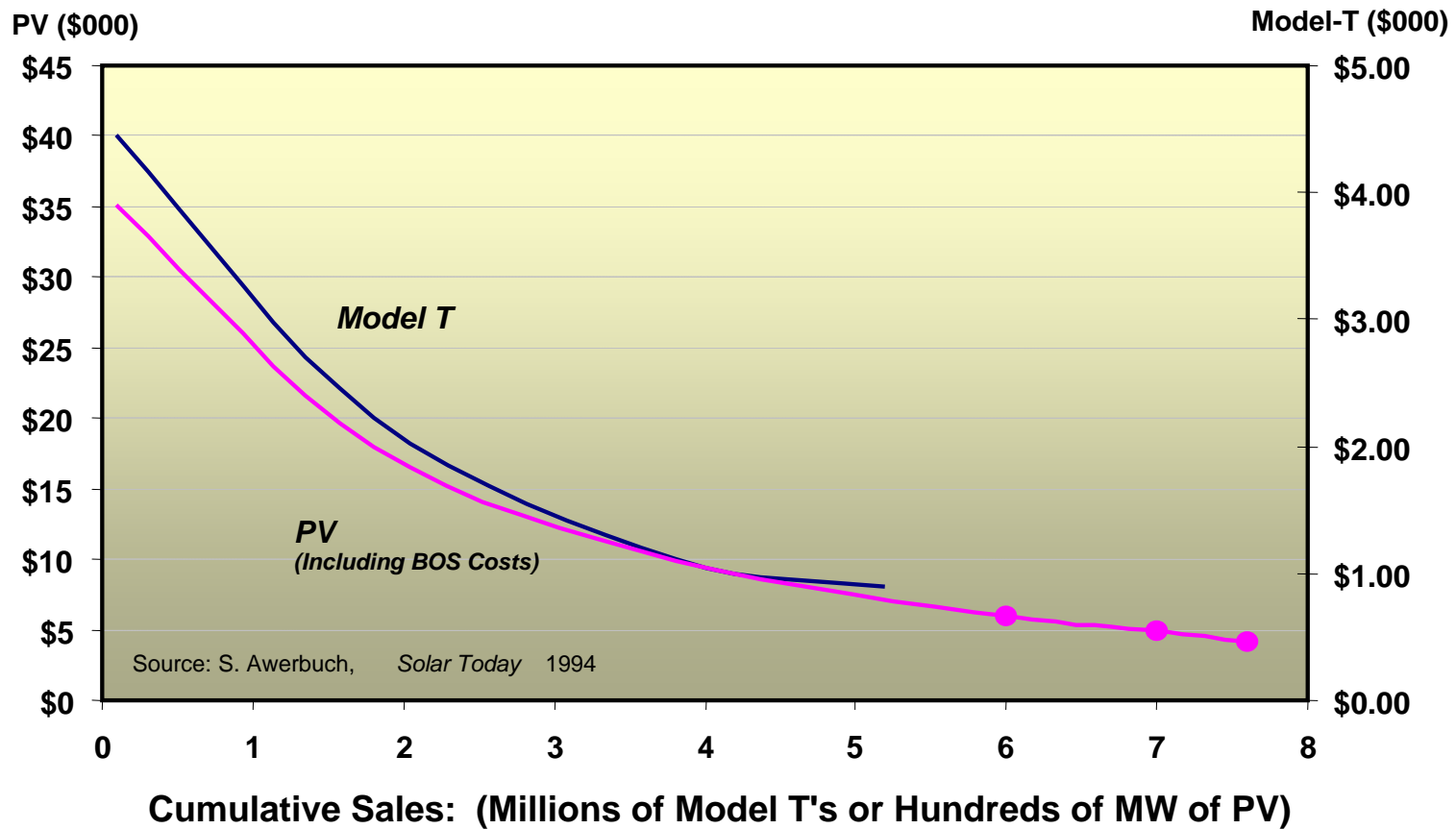
World Primary Energy Supply - Current Policies -

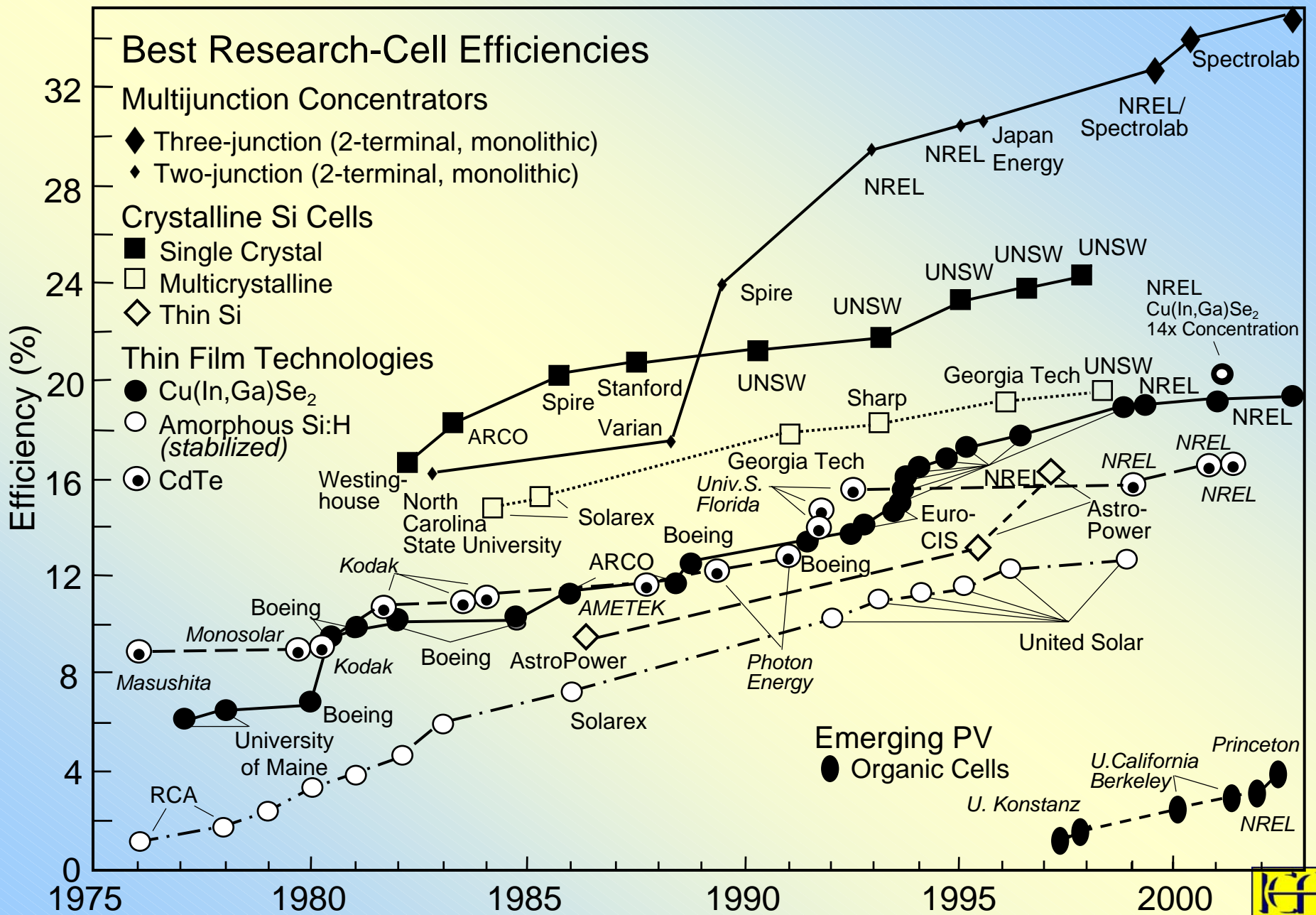


Source: IEA *World Energy Outlook 2002*



Learning Curves: PV and Model-T Ford

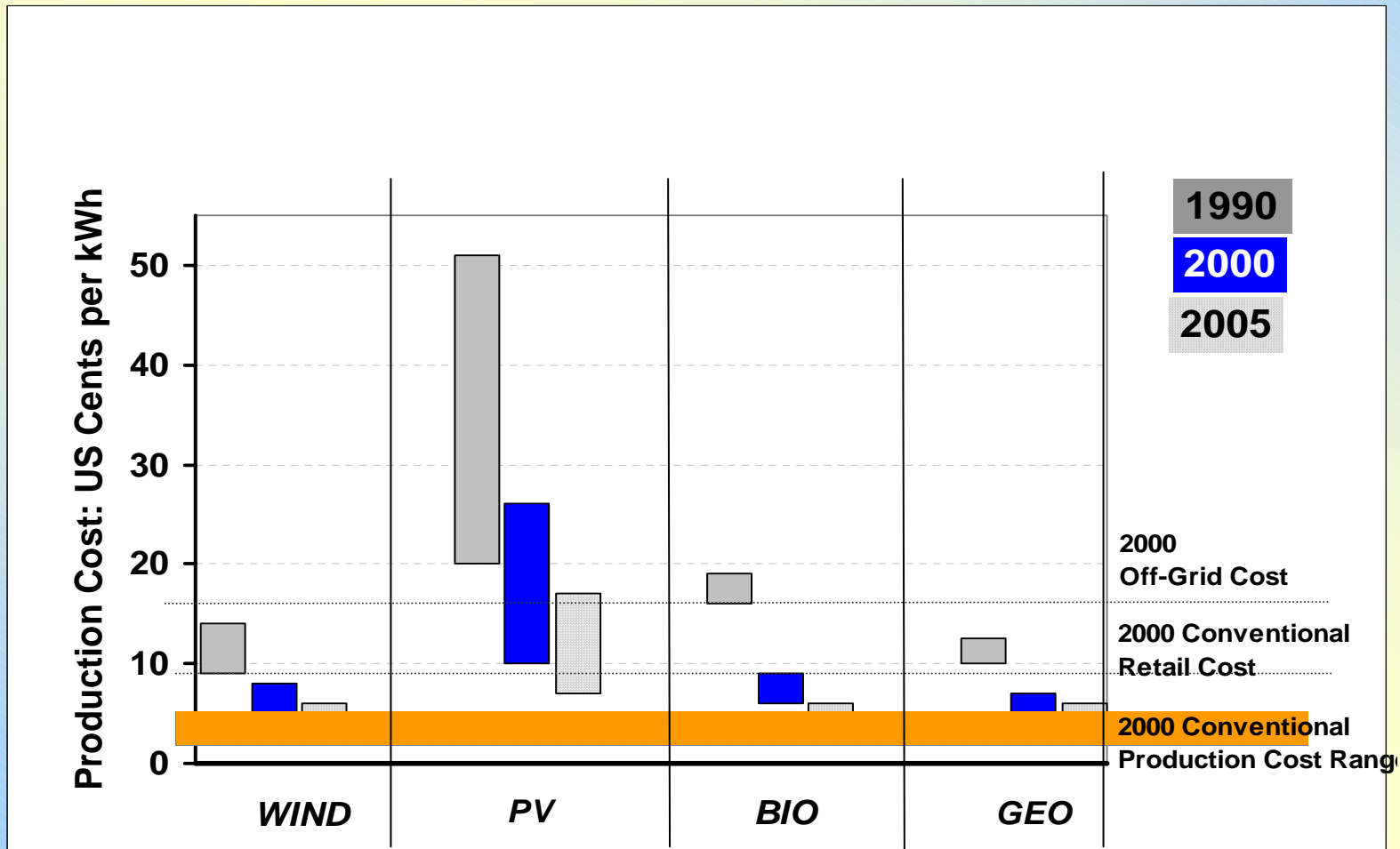




Source: Tom Surek at NREL



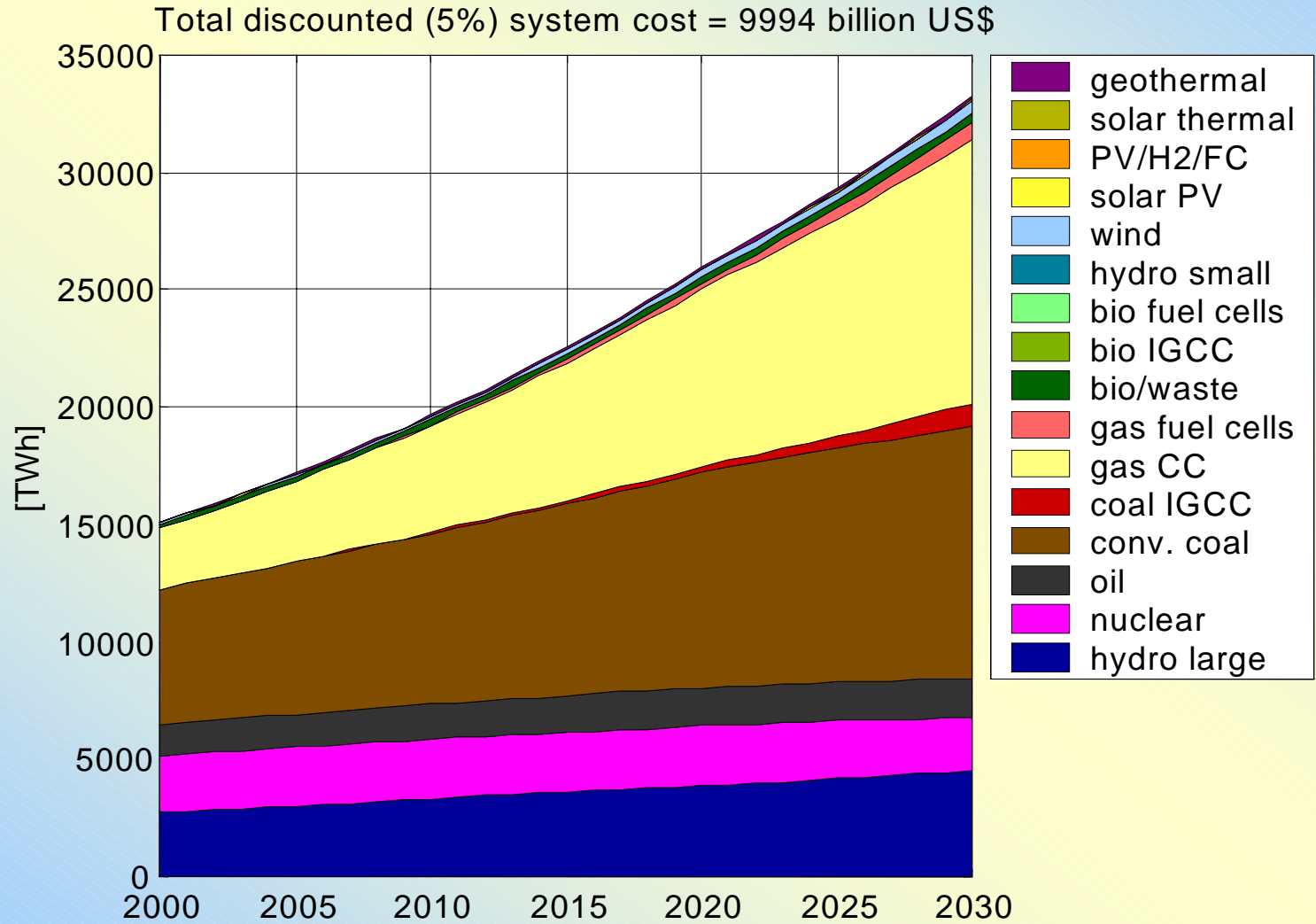
Production Cost Ranges for Conventional & Renewable Resources: 1990, 2000 and 2005



So, how much would it cost?



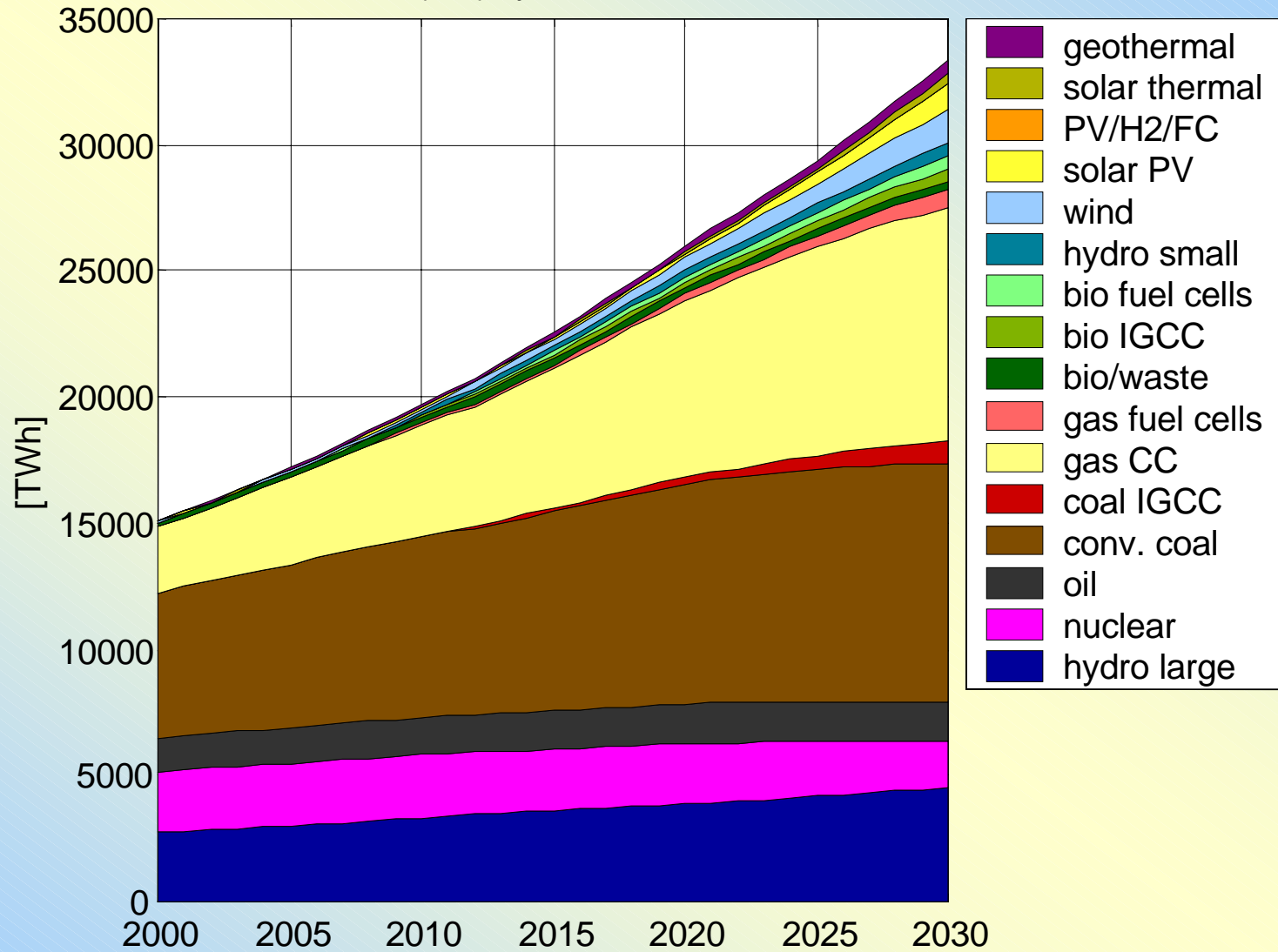
G8 Renewable Energy Task Force



Global



Total discounted (5%) system cost = 9837 billion US\$



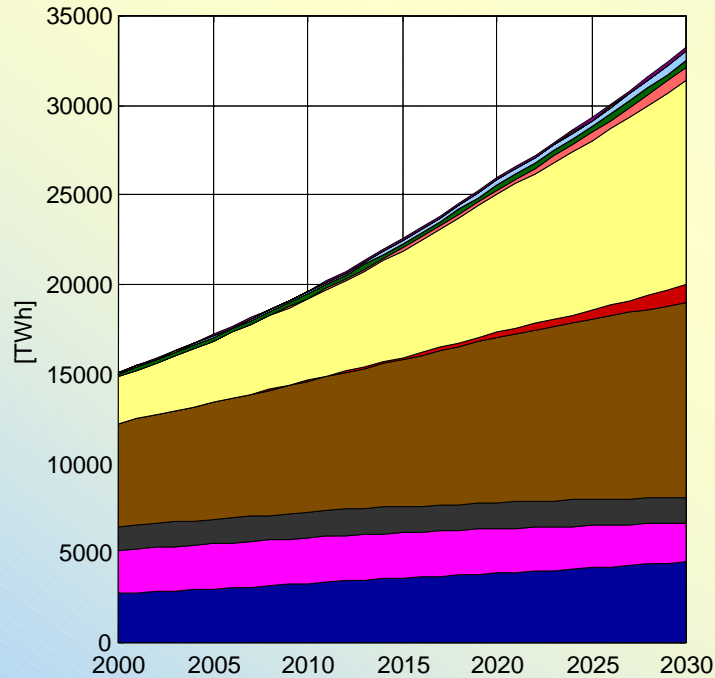
Global



Accelerated Renewables Initiative: Technology Scenarios

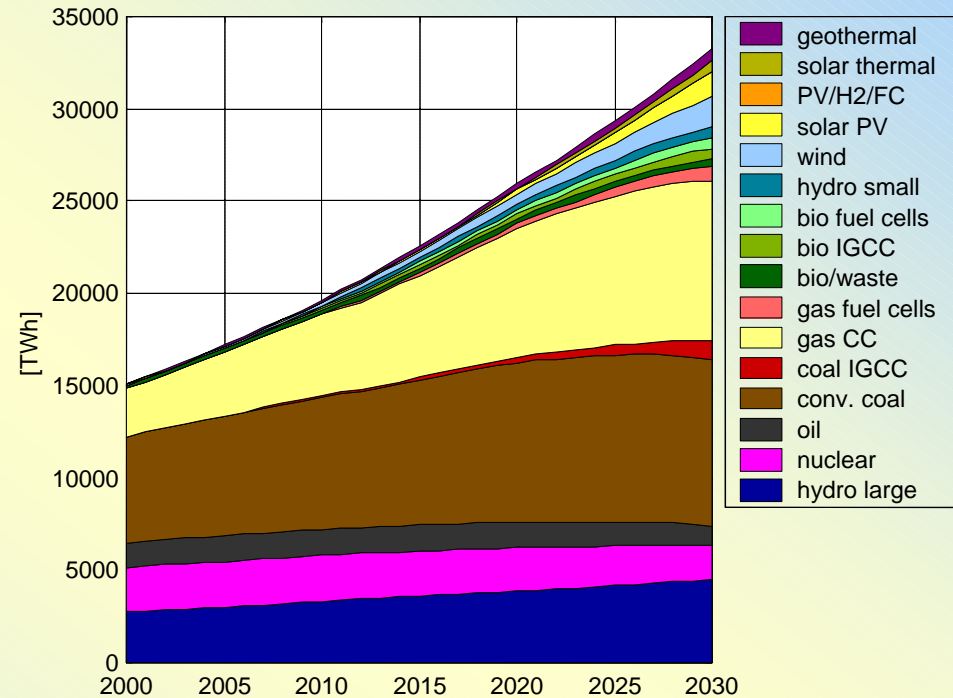
Preliminary Results from SIMULI Model (Mattsson & Wene, 2001)

Total discounted (5%) system cost = 9994 billion US\$



Business as Usual
(consistent with
World Energy Outlook
Reference Scenario)

Total discounted (5%) system cost = 9837 billion US\$



Alternative Technology
Scenario for the Accelerating
Renewables Initiative



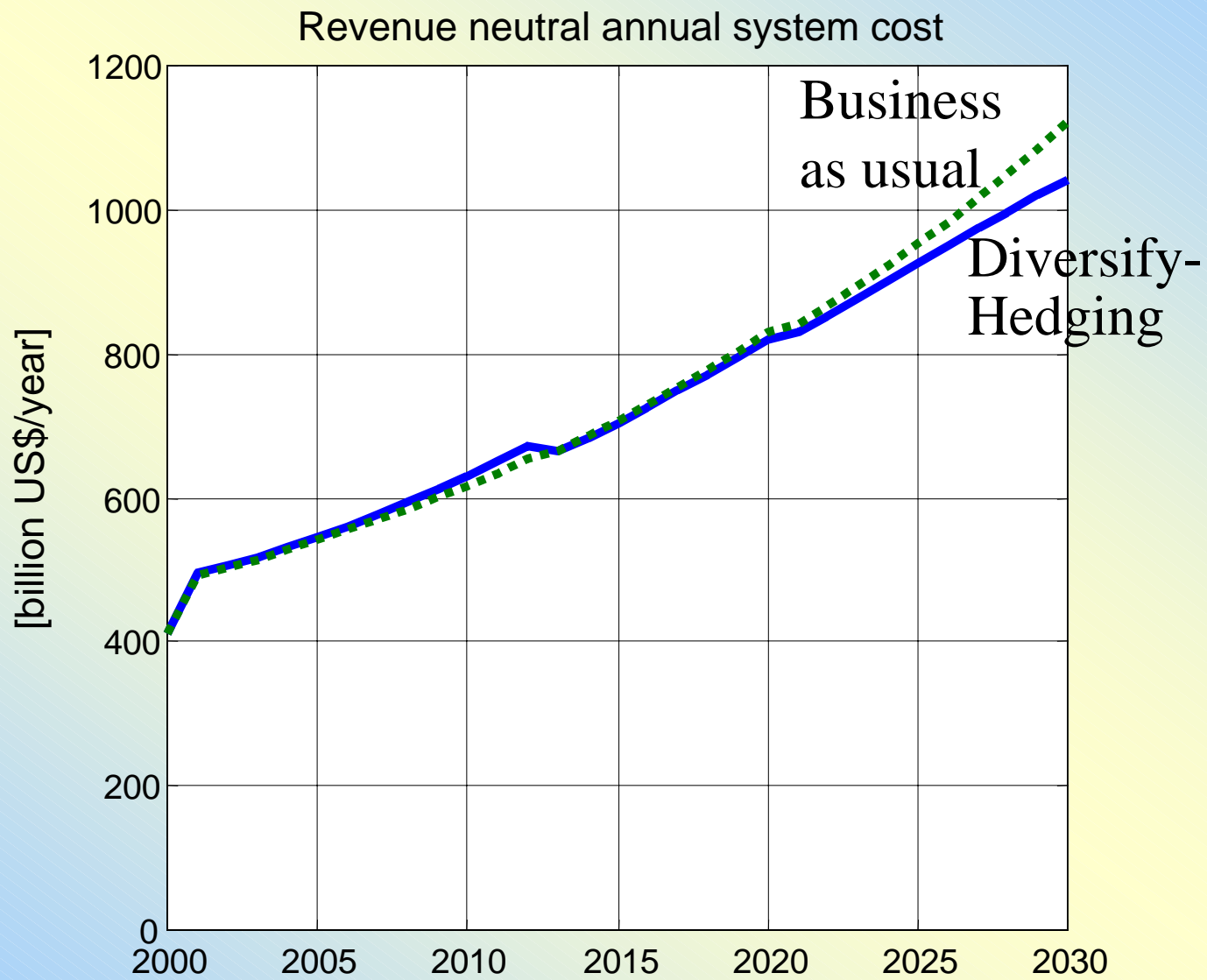


Figure SPA6. Diversify-Renewables versus BAU



My complaint against “cost”



Comparing Costs...today

Conventional /KWh

- based on project cost and promised fuel price
- historic subsidies are embedded and assumed

Renewables /KWh

- based on project costs, affected by incentives
- new subsidies are visible and controversial



Comparing Costs...emerging

Conventional /KWh

- based on project cost and promised fuel price
- historic subsidies embedded and assumed
- add large carbon costs

Renewables /KWh

- based on project costs, affected by incentives
- subsidies visible and controversial
- add few environmental costs



Comparing Costs...comprehensively

Conventional / KWh

- based on project cost and promised fuel price
- eliminate subsidies

- add large environmental costs

- fuel volatility costs
- fuel supply security cost
- lost jobs benefits
- penalty for narrowing portfolio

Renewables / KWh

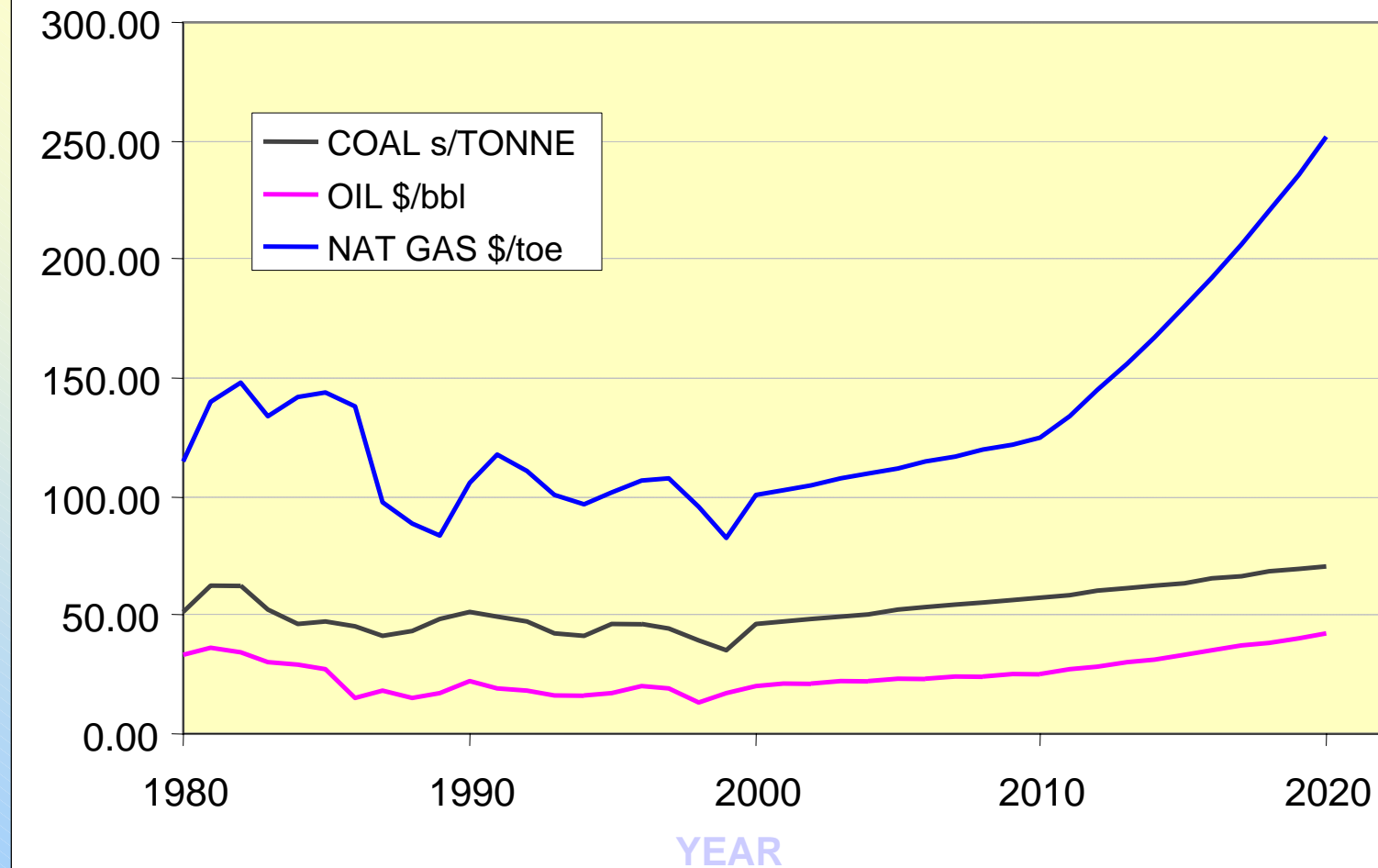
- based on project costs, affected by incentives
- eliminate subsidies

- add few environmental costs

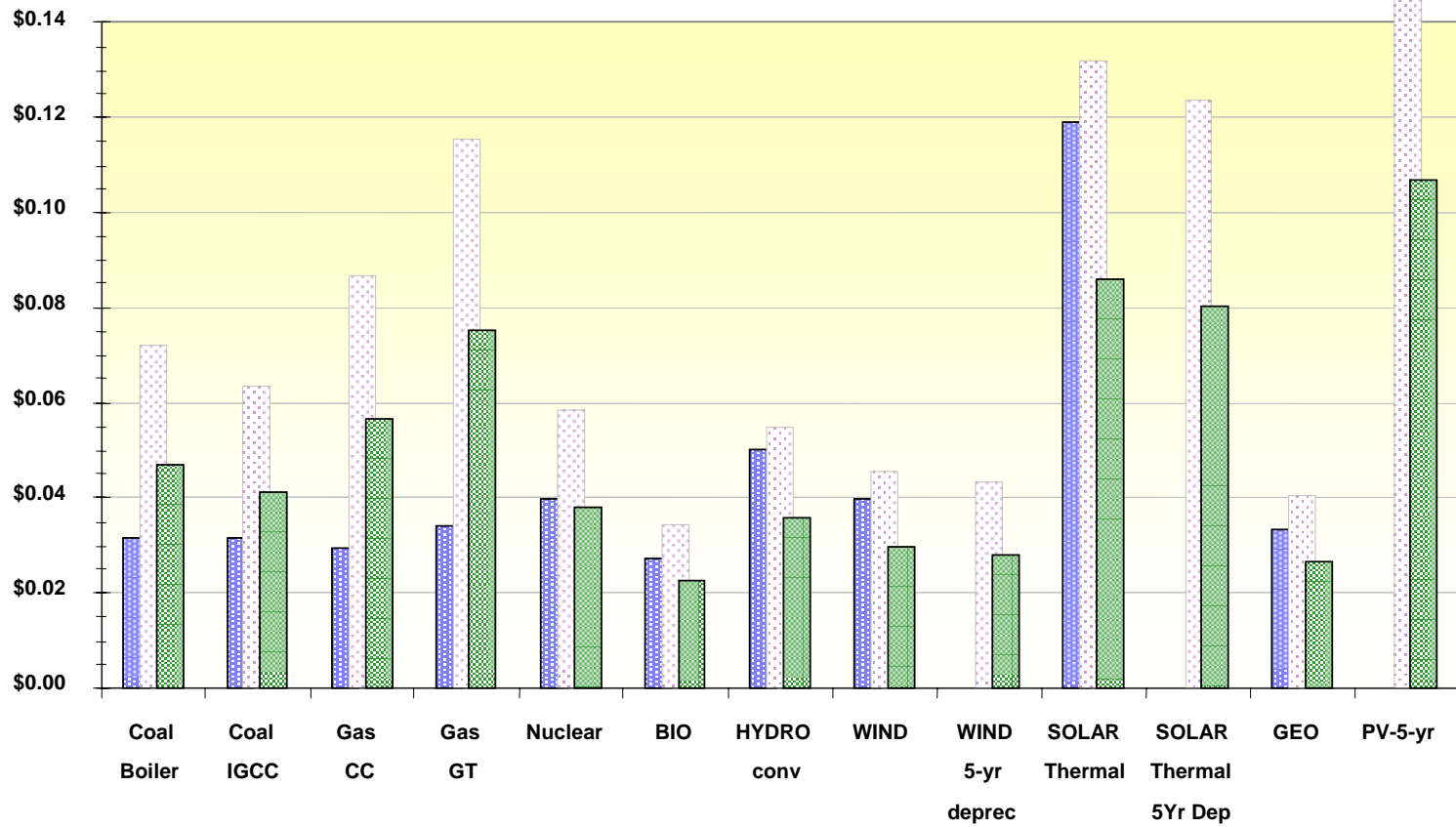
- fuel volatility reduction benefit
- no fuel supply security costs
- many new jobs benefits
- large portfolio diversification benefit



Europe Fossil Prices (WEO price assumptions)



Levelized Market-Based Electricity Cost and Price Estimates - "Spot" Fuel -



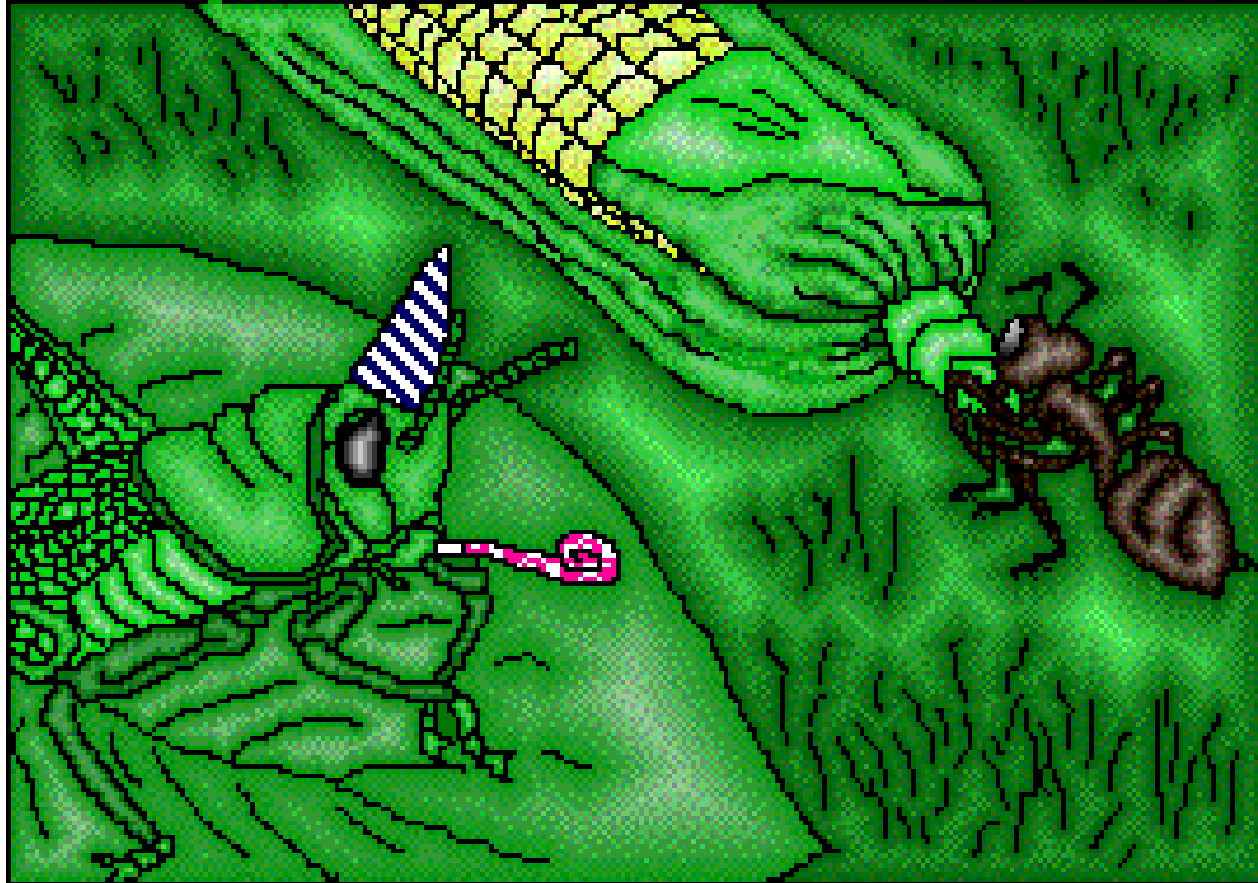
Investing against insecurity

“The development of an energy technology with very uncertain returns may not constitute a risky project. If it will have a high payoff under just those conditions when the rest of the economy will do poorly, it will reduce the overall variability of national income and therefore will reduce risk. Such an investment has the characteristics of insurance.”

- Robert C. Lind (1982) “Discounting for Time and Risk in Energy Policy”, p.15.



The Message



- **Is it prudent to accelerate investment in renewables, given the risks and uncertainties of our fossil fuel future?**

- **Can we afford not to?**



Contact us

- www.iea.org
- www.iea.org/techno/renew/index.htm
- www.trecnet.org
- <http://www.iea.org/stats/files/renewables.htm>

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