

The Economic Benefits of Renewables: Avoided GDP Losses, Energy Security and Risk Mitigation

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Zukunft Braucht Sicherheit

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SPRU Energy Group

U-Sussex, UK

- **SPRU: One of the oldest & largest institutes for science & technology policy studies**
 - 50 faculty, 70 Ph.D. / 50 MSc students
- **Energy Group Focus:**
 - Transition to low carbon, sustainable energy economy for the UK



Renewables Provide *Micro* and *Macro* Economic Benefits

- ***Micro*: Renewables reduce generating cost by mitigating financial risk**
 - e.g.: Risk of future fossil volatility
 - Individual investors can hedge, but not society
- ***Macro* Benefits- Energy Security: Oil/Gas volatility hurts GDP growth**
 - Cannot be effectively hedged
 - Renewables can *reduce* this risk

Macroeconomic Consequences of Fossil Price Risk: A major cost

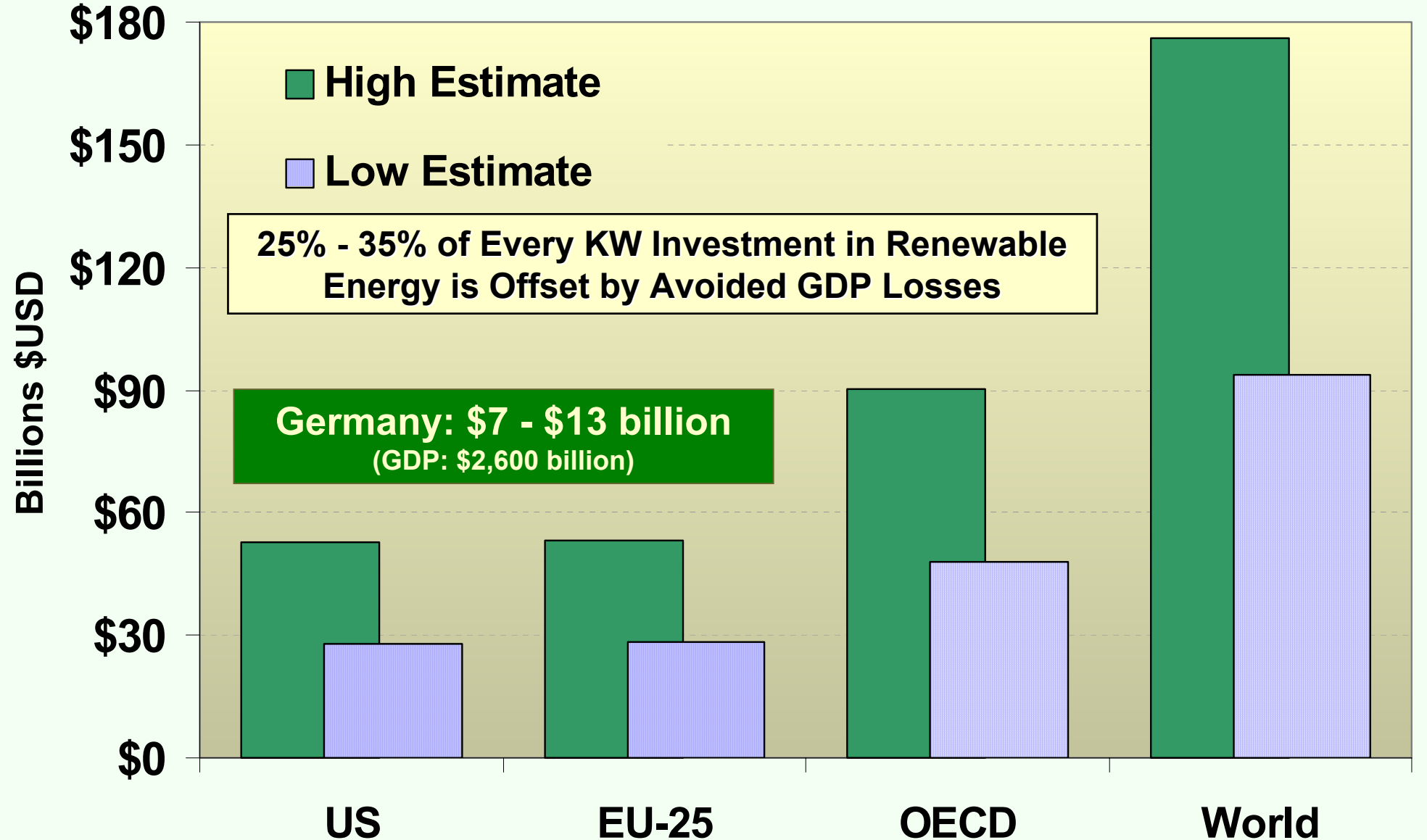
- **Fossil volatility hurts employment & GDP growth in oil consuming & producing nations**
 - Widely accepted in academic literature and the press
- **Macroeconomic cost of 2000-04 oil spikes in EU = €400 Billion**
 - Exceeds total estimated renewables investment needed to meet 2020 / 20% EU targets

Oil-GDP Effect: % GDP Change for Oil-Price Doubling

Importers		Exporters	
Country	GDP Elasticity	Country	GDP Elasticity
Taiwan	-8.4%	Indonesia	-4.3%
Hong Kong	-6.5%	Malaysia	-5.6%
Japan	-5.8%	Norway	5.1%
South Korea	-8.7%		
Philippines	-3.6%		
Singapore	-4.2%		
Thailand	-8.4%		
France	-9.8%		
Germany	-8.1%		
Greece	-2.4%		
U.K.	-3.8%		
Average	-6.3%	Average	-1.6%

Source: Paul Leibey, IEA/ASEAN Workshop, April 2004

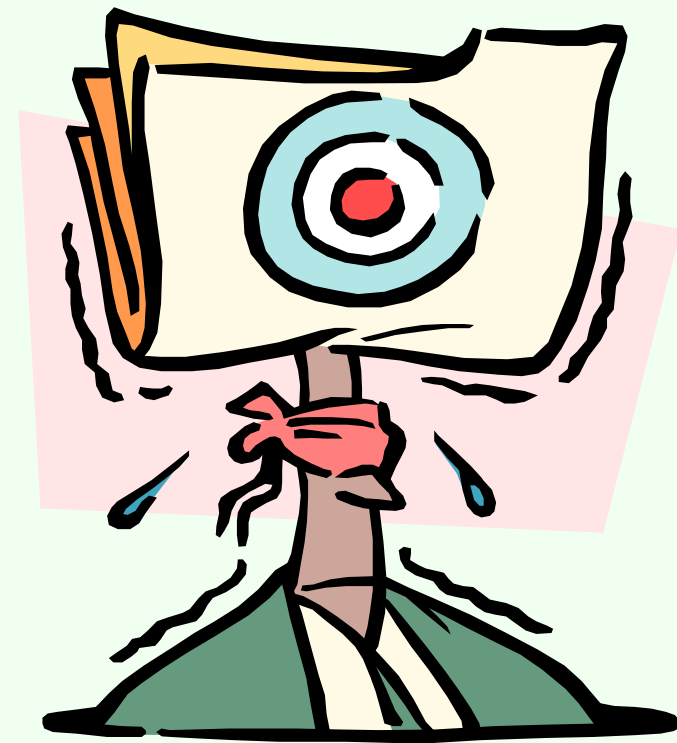
Avoided GDP Loss for 10% Increase in Renewables Electric Generation Share



Source: Awerbuch-Sauter, 2005

What's the "Catch?"

- **Adding Wind/RE Enhances Energy Security**
 - Helps avoid sizeable GDP losses
- **But Doesn't it Raise Generating Cost?**
- **Risk-adjusted cost of wind and other RETs is lower than gas**



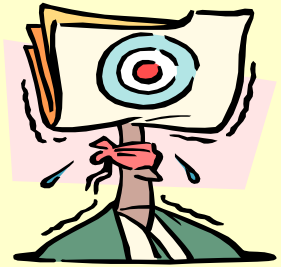
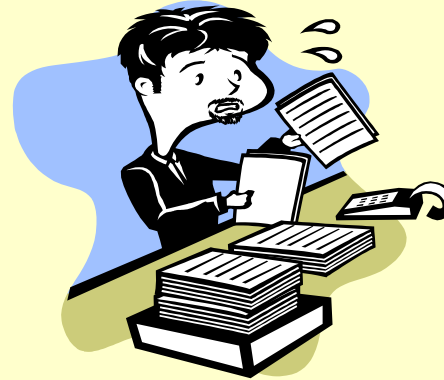
MICRO (MARKET) BENEFITS

**Valuing Energy Technologies
Necessarily Involves an
Assessment of Financial Risk**

Market Risk Affects KWH Cost Estimates

- Risk affects *value* and economic *expectations*
 - Gas: like variable rate mortgage

GAS = 4¢/kWh?



Wind = 5¢?... 6¢...?

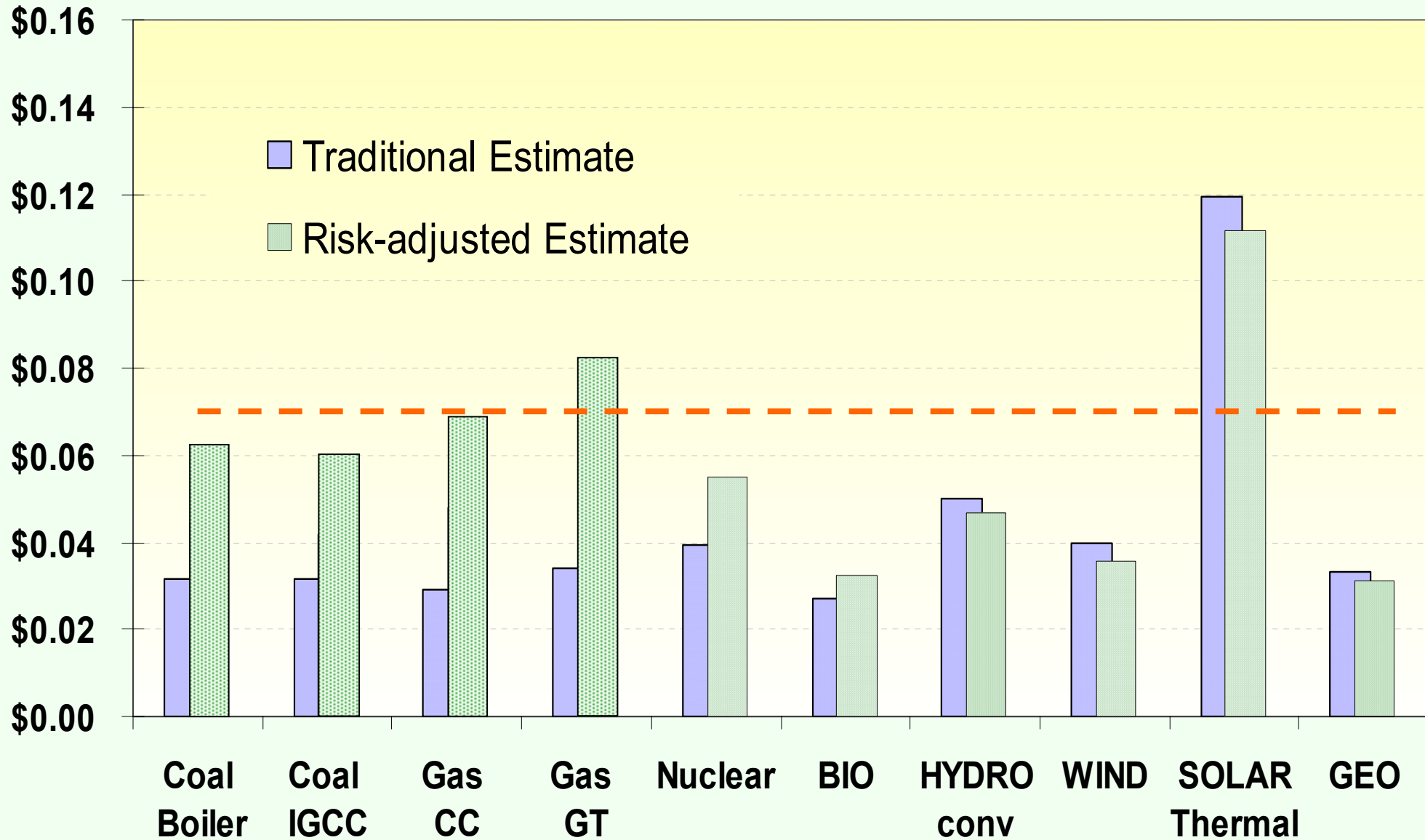
- Engineering kWh cost estimates

ignore risk – have no economic interpretation

- Use cost models developed with the Model-T FORD
- Should carry no weight in policy making

**Talking about kWh cost without also talking about risk is like watching a movie.....
With the sound turned off!**

Traditional and Risk-Adjusted Cost-of-Electricity Estimates: Historic Fossil Price Risk



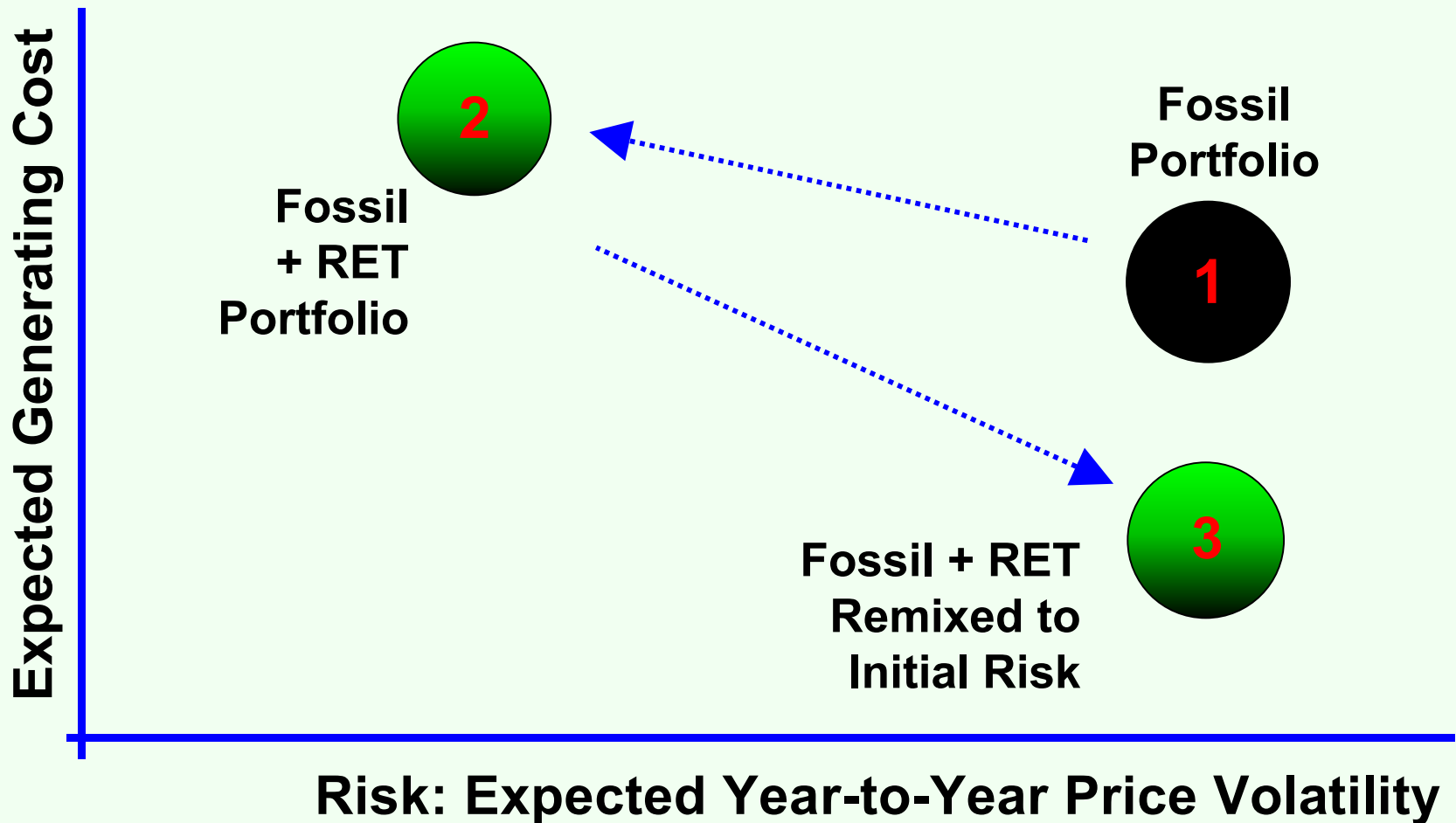
Policymakers: Take a Cue From Financial Investors



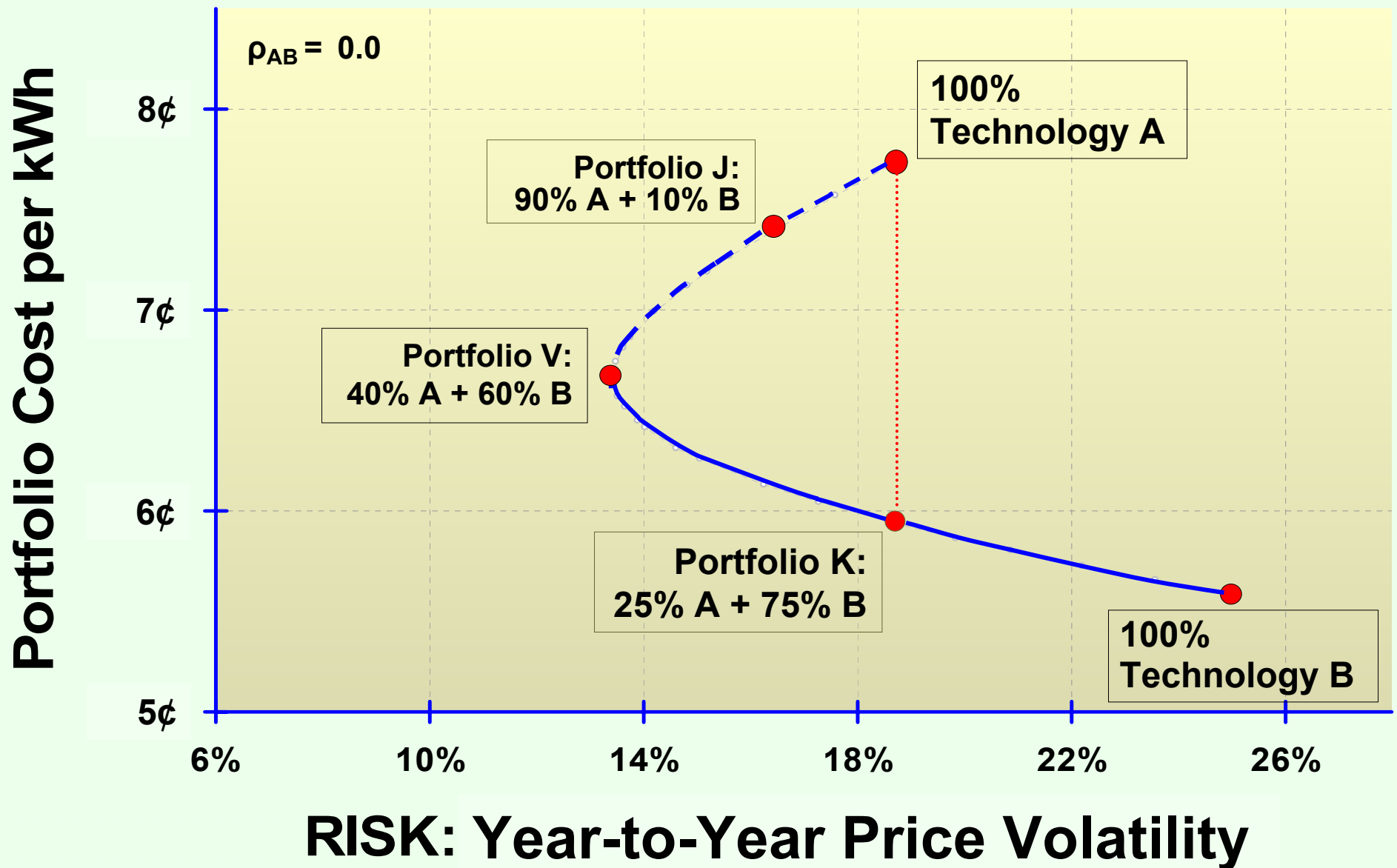
- **Are used to dealing with risk**
 - No one can predict stock markets or fossil prices
- **Investors hold efficient, diversified, balanced portfolios** - best hedge against uncertain future
- **Is gas cheaper than RE?..... it matters little because:**
 - Even if true, picture could change dramatically
 - RE *reduces* portfolio cost-risk– even if it costs more
- **RE question not if – but only how much**
 - Relative cost dictates make-up of optimized mix

Renewables Help the Generating Mix

They Affect Portfolio Cost *and* Risk

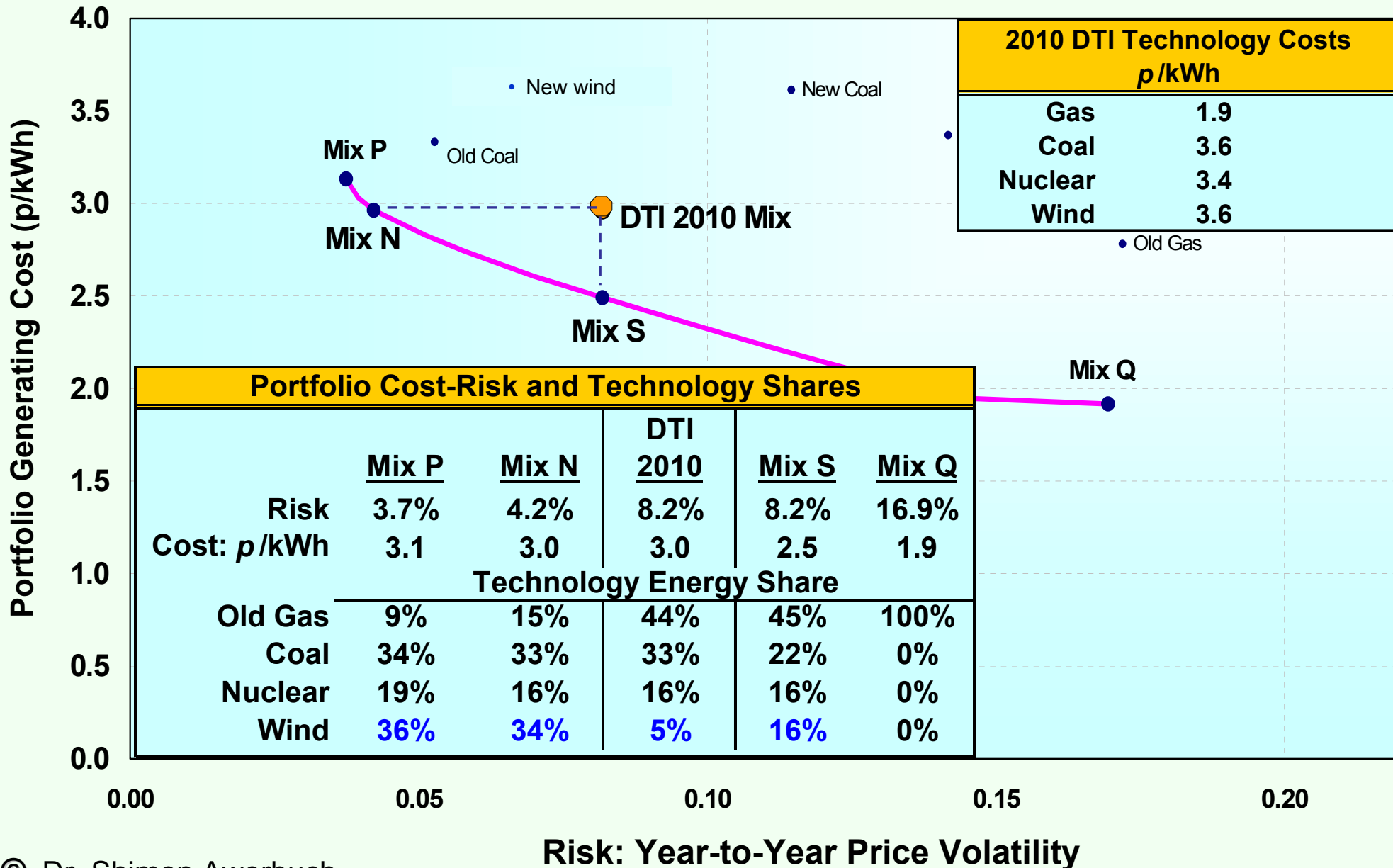


The Portfolio Effect: The Only 'Free Lunch' in Economics



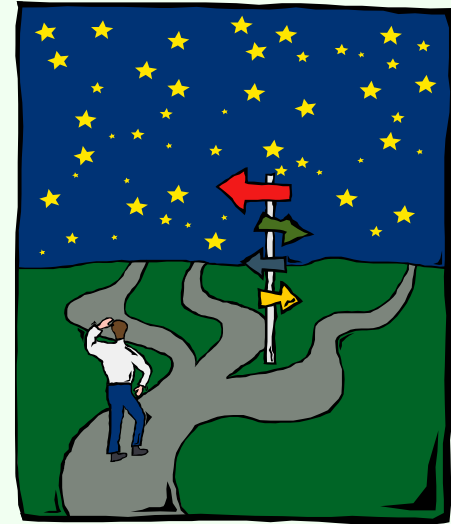
2010 UK Portfolio Optimization

- Adding Wind Does Not Raise Cost -

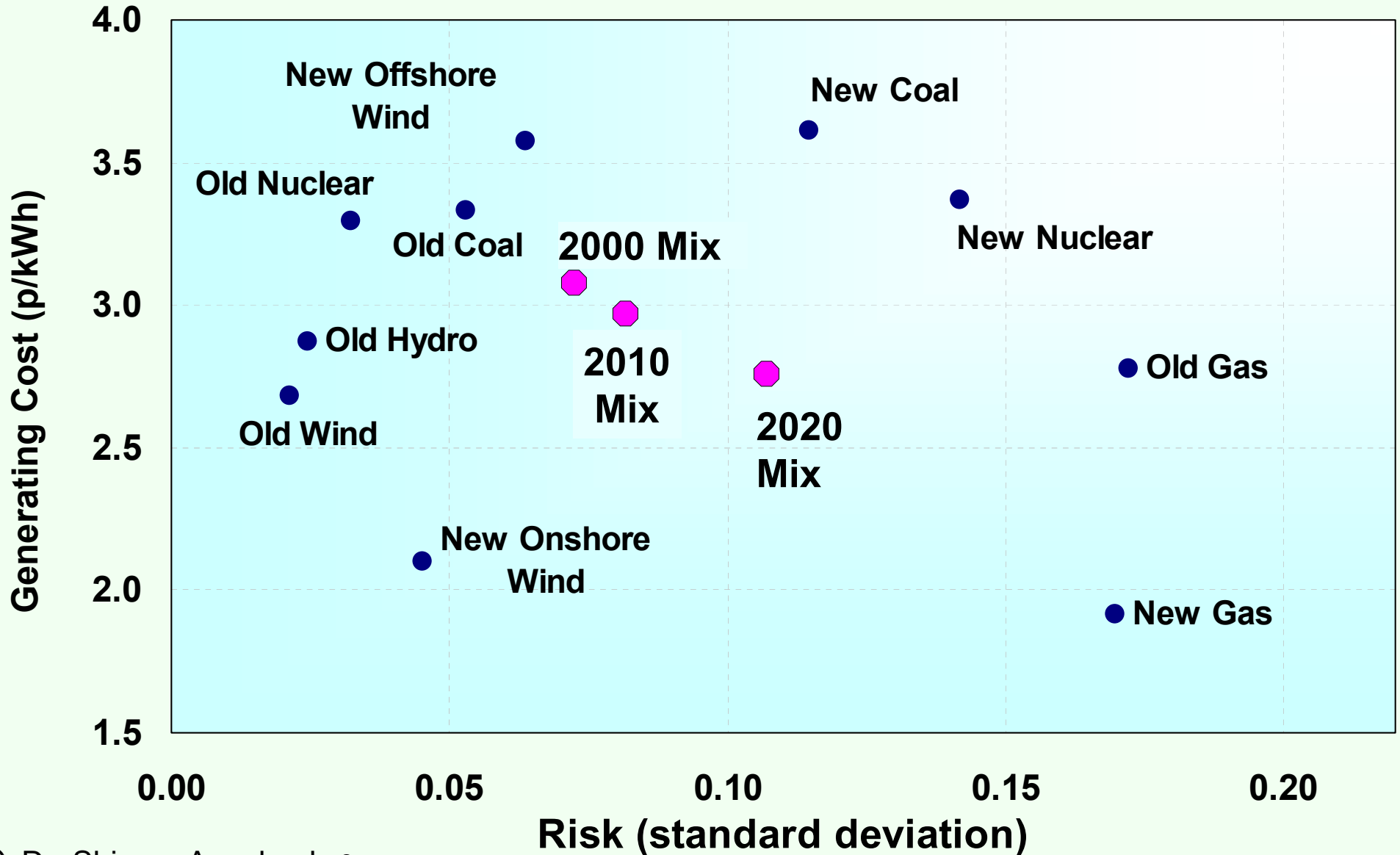


Energy Security: A Powerful Joint Benefit of Optimized Generating Mixes

- Energy security concerns focus on catastrophic supply interruptions
- Exposure to fossil volatility: more powerful *market-based* security concept
- **Optimized** generating mixes:
 - Minimize generating cost
 - Minimize exposure to Oil/Gas-GDP induced macro-economic losses
- **Energy Security costs less**
 - Like *quality* in manufacturing



DTI's Projected UK Generating Mixes : Increased Risk - Reduced *Security*



Benefits of Wind/RE in Germany

- **Produce Sizeable Portfolio Benefits**
 - *Reduce* generating cost
- **Reduce Market Power**
 - Help open markets & *unlock* benefits of liberalization
- **Promote energy security**
 - Mitigate oil/gas-GDP losses
- **Provide *Counter-cyclical* Benefits**
 - “National insurance” (R.C. Lind & J.K. Arrow, 1984)
 - Payoff occurs when economy is doing poorly

Energy security is reduced when nations hold inefficient portfolios that are needlessly exposed to fossil risk

THANK YOU

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