Environmental Policy Research Centre

Forschungsstelle für Umweltpolitik

Renewable energy policies and feed-in tariffs – The Malaysia proposal and international best practise

David Jacobs

Distinguished Visitor under Brain Gain Malaysia

Executive talk, KeTTHA, 24 November 2010

Institute of Energy Policy and Research (IEPRe)

A new Institute delivering policy research on the energy industry focusing on Technical, Economics and Financial Analysis

IEPRe was officially launched on 11th August 2009 by Y.A. Bhg. Datin Paduka Seri Rosmah Mansor.

Brain Gain Programme

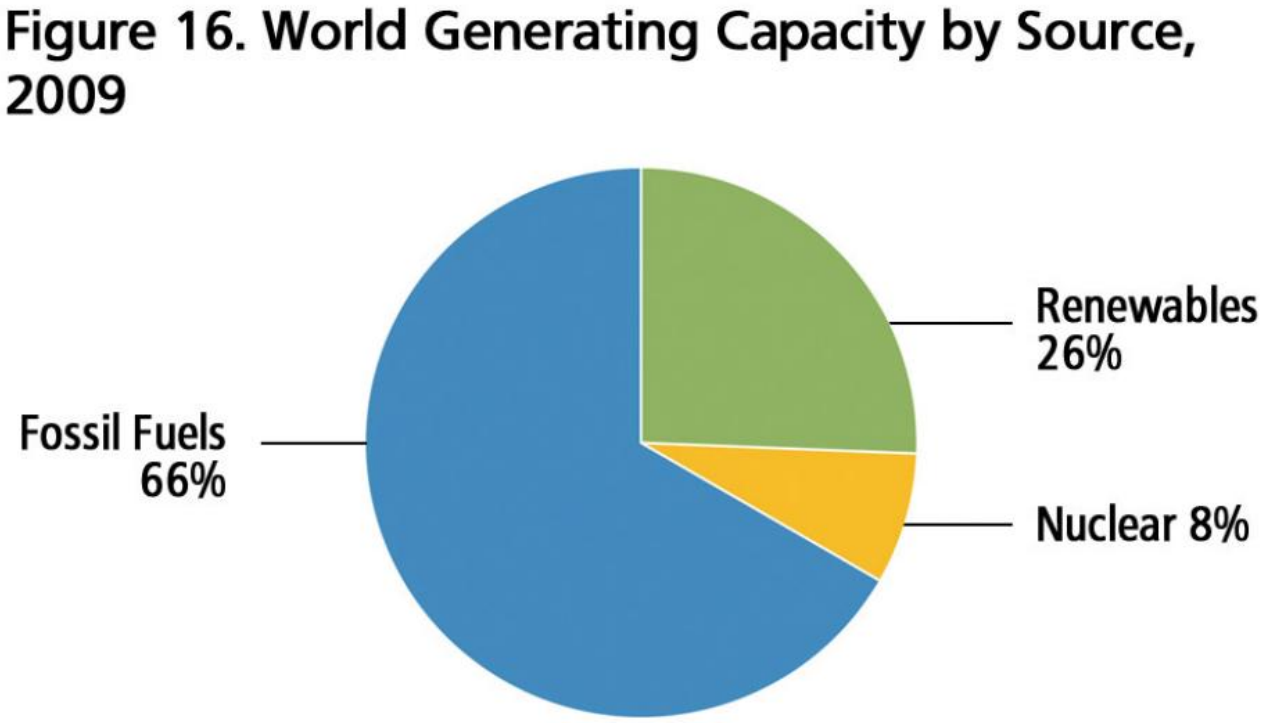
Brain Gain Programme : Promotion and Development of Local Team for Renewable Energy Growth in Malaysia by Mr. David Jerome Pascal Jacobs - Environmental Policy Research Centre, Berlin, Germany
Funded by Ministry of Science, Technology and Innovation (MOSTI)
15th October 2010 – 30th November 2010

Question:

"Can renewables replace large-scale conventional power generation plants or will this remain a small niche market?"

International market development of renewables

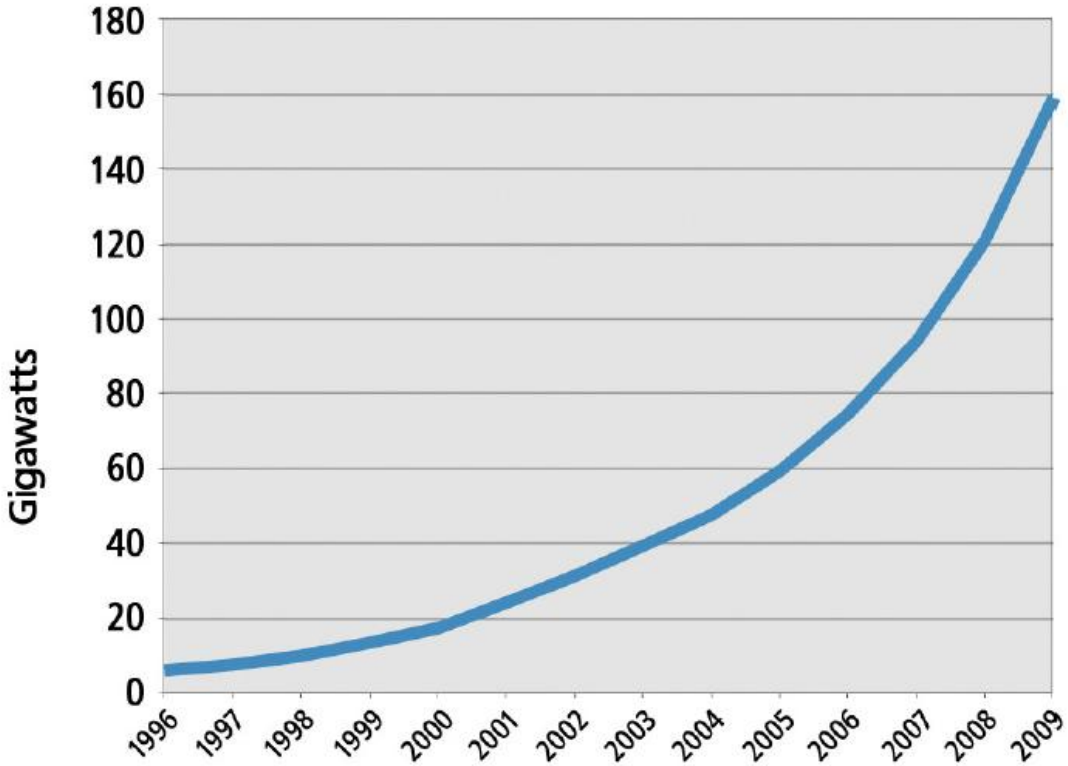
The share of renewables world-wide



Source: REN 21 (2010)

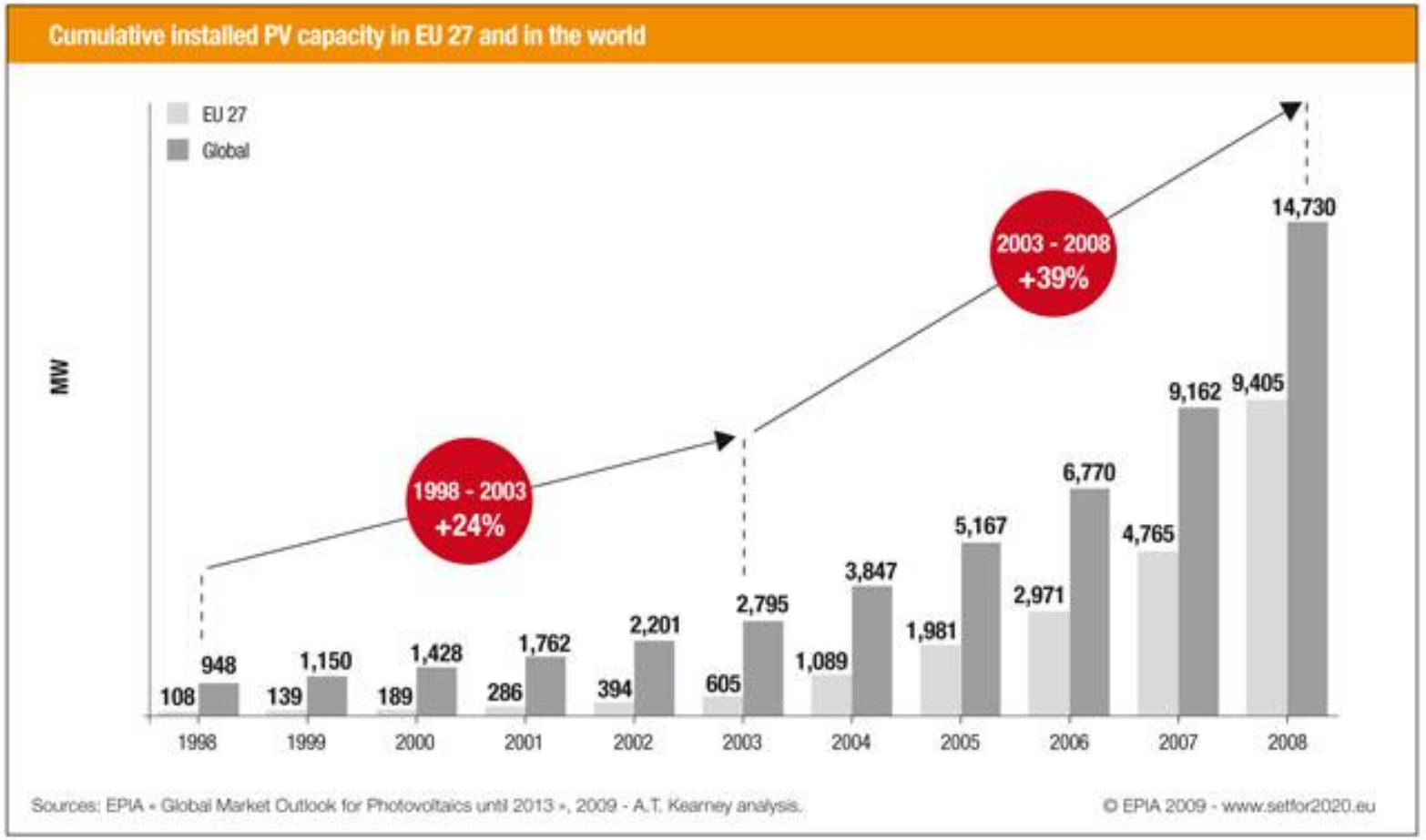
Wind power market growth

Figure 5. Wind Power, Existing World Capacity, 1996–2009



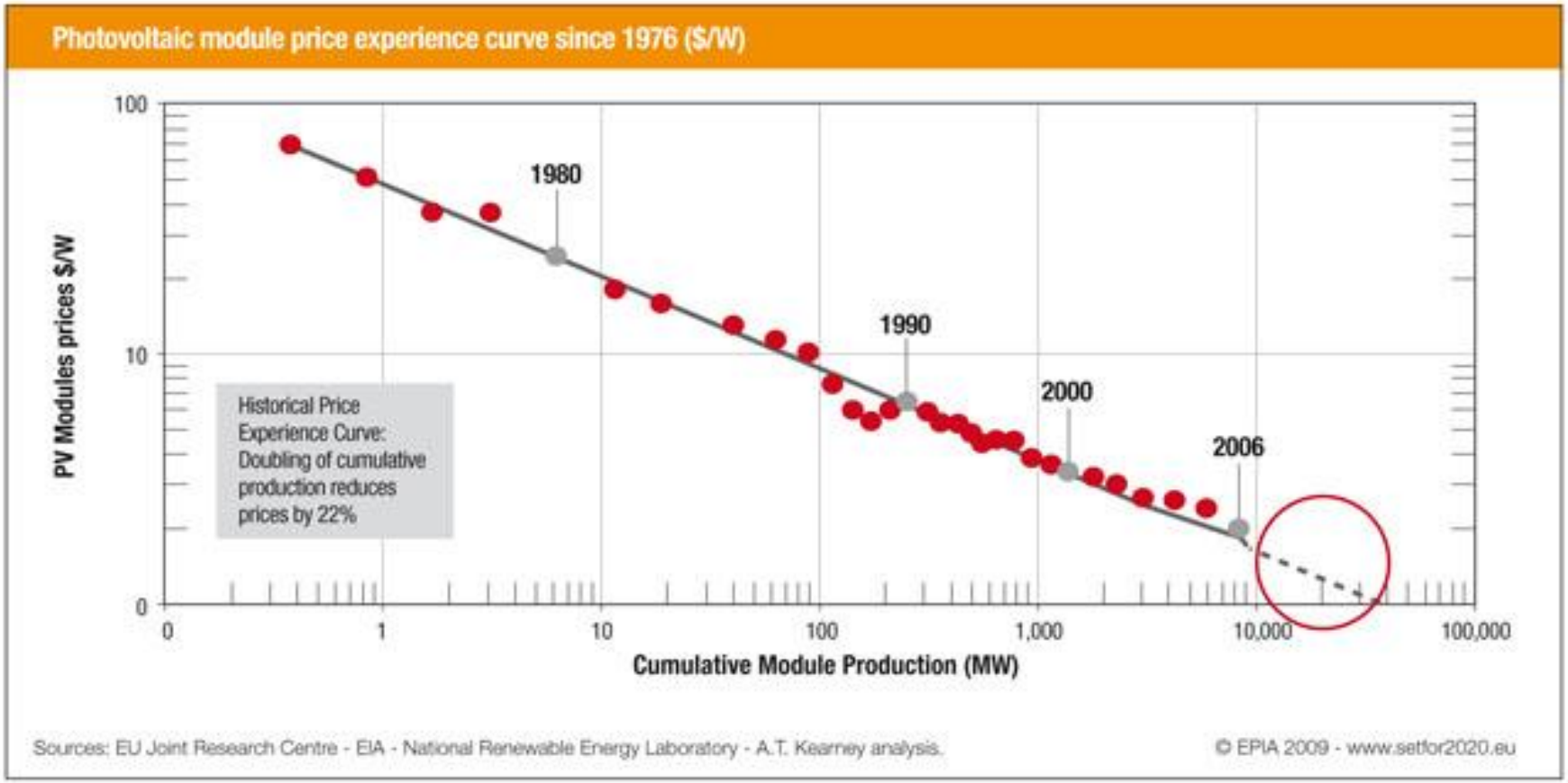
Source: REN21 2010

PV market growth



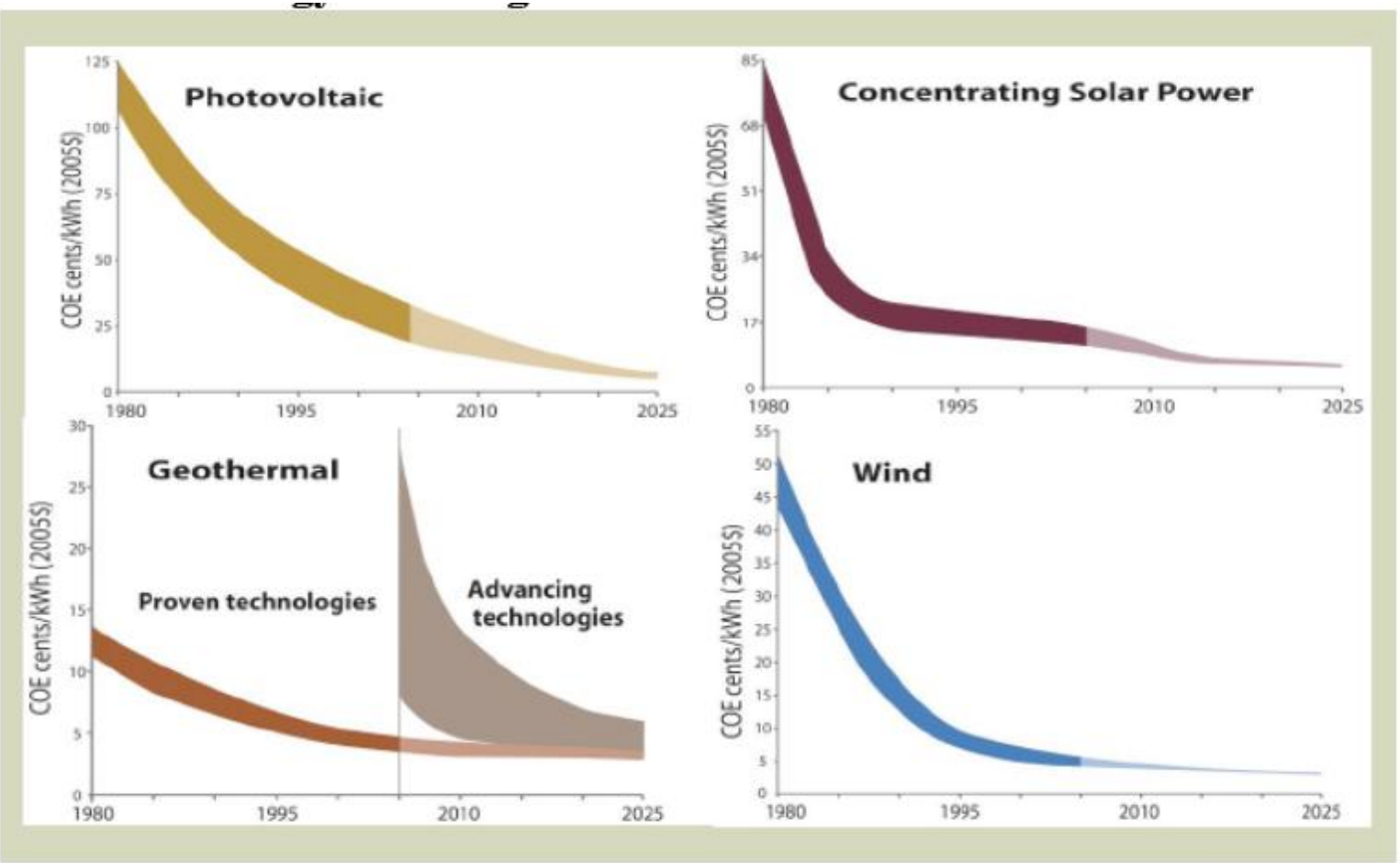
Source: EPIA 2009

PV cost development



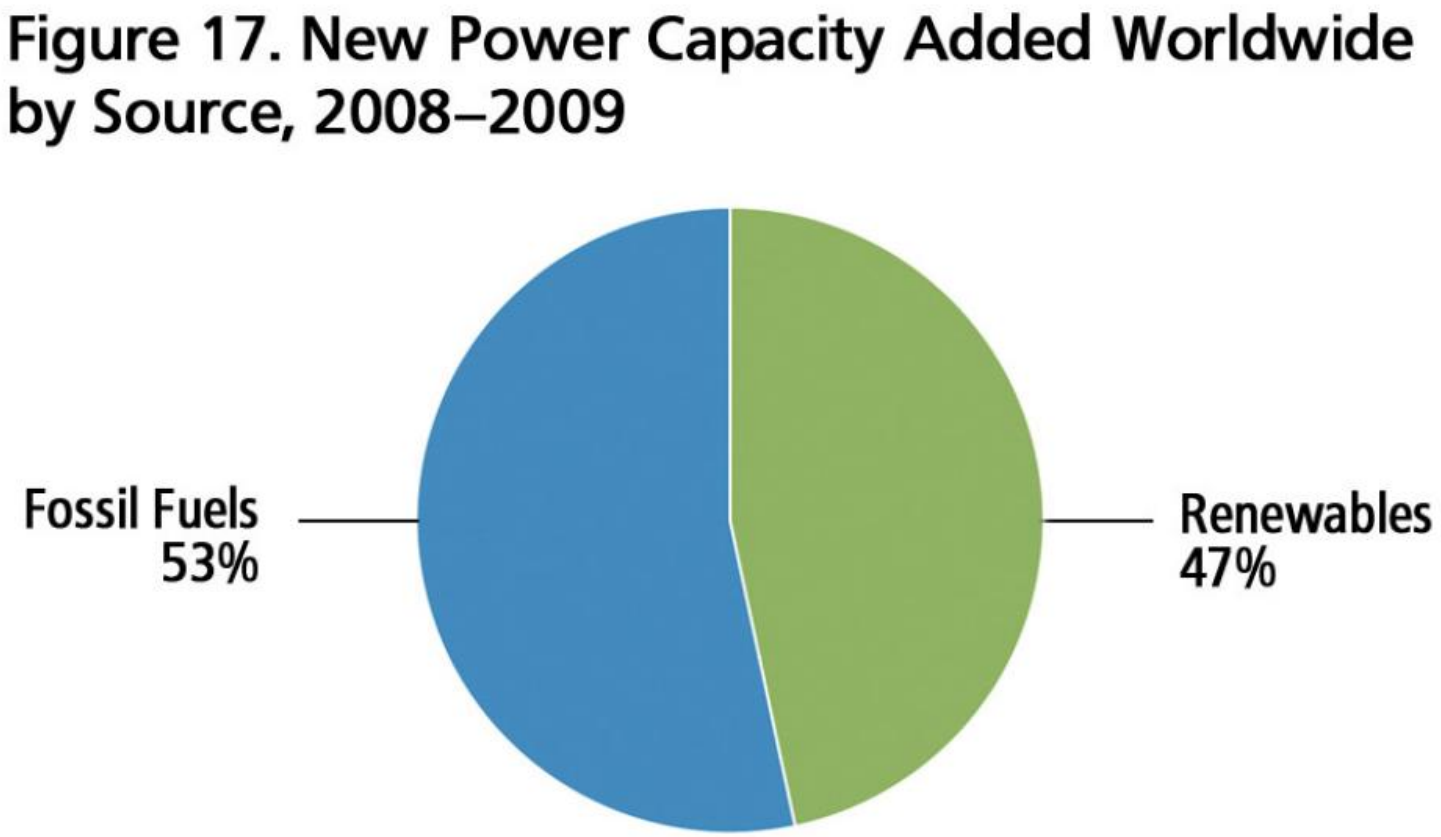
Source: EPIA 2009

Renewable energy learning curve



Source: Cooper 2010

Investment in renewables



Source: REN21 2010

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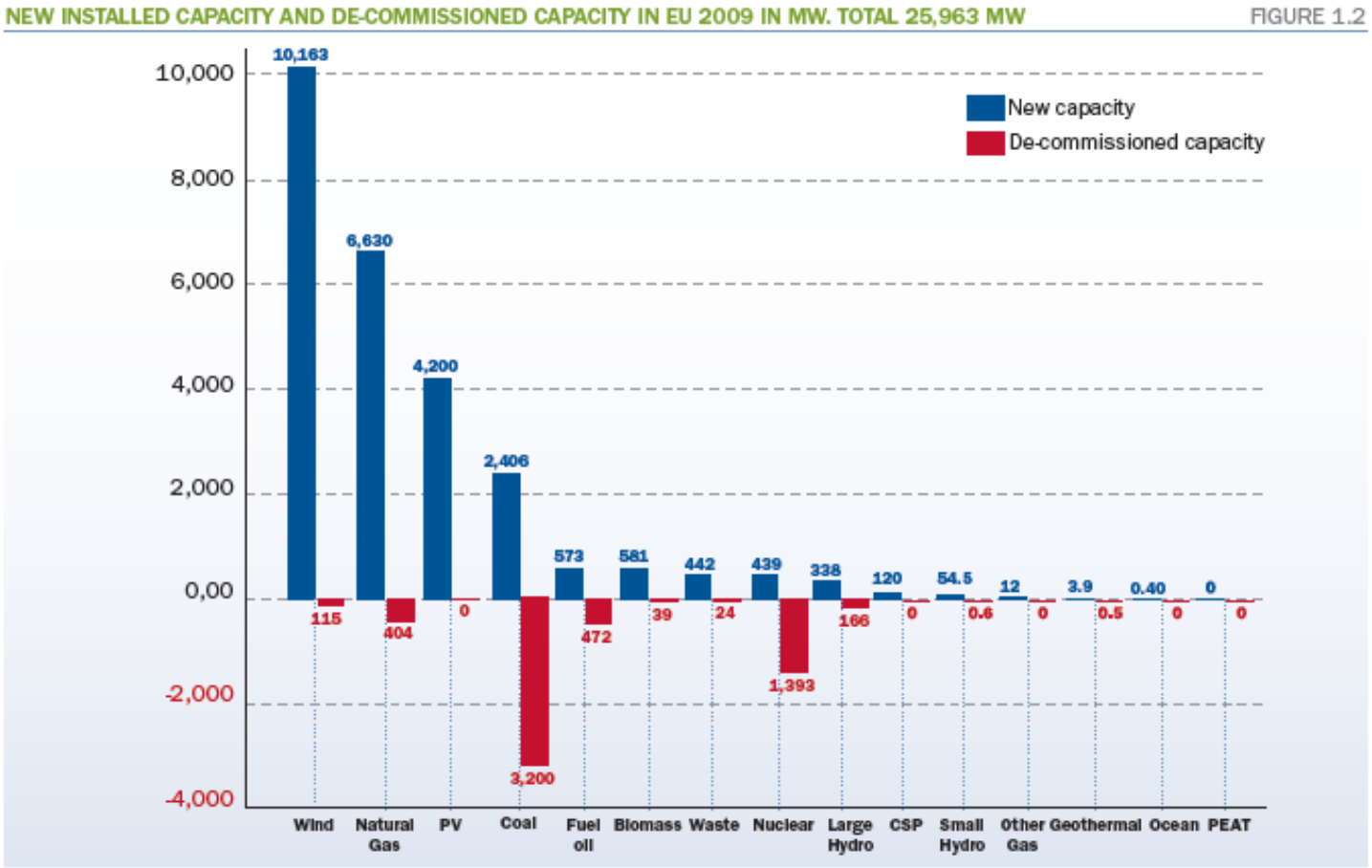
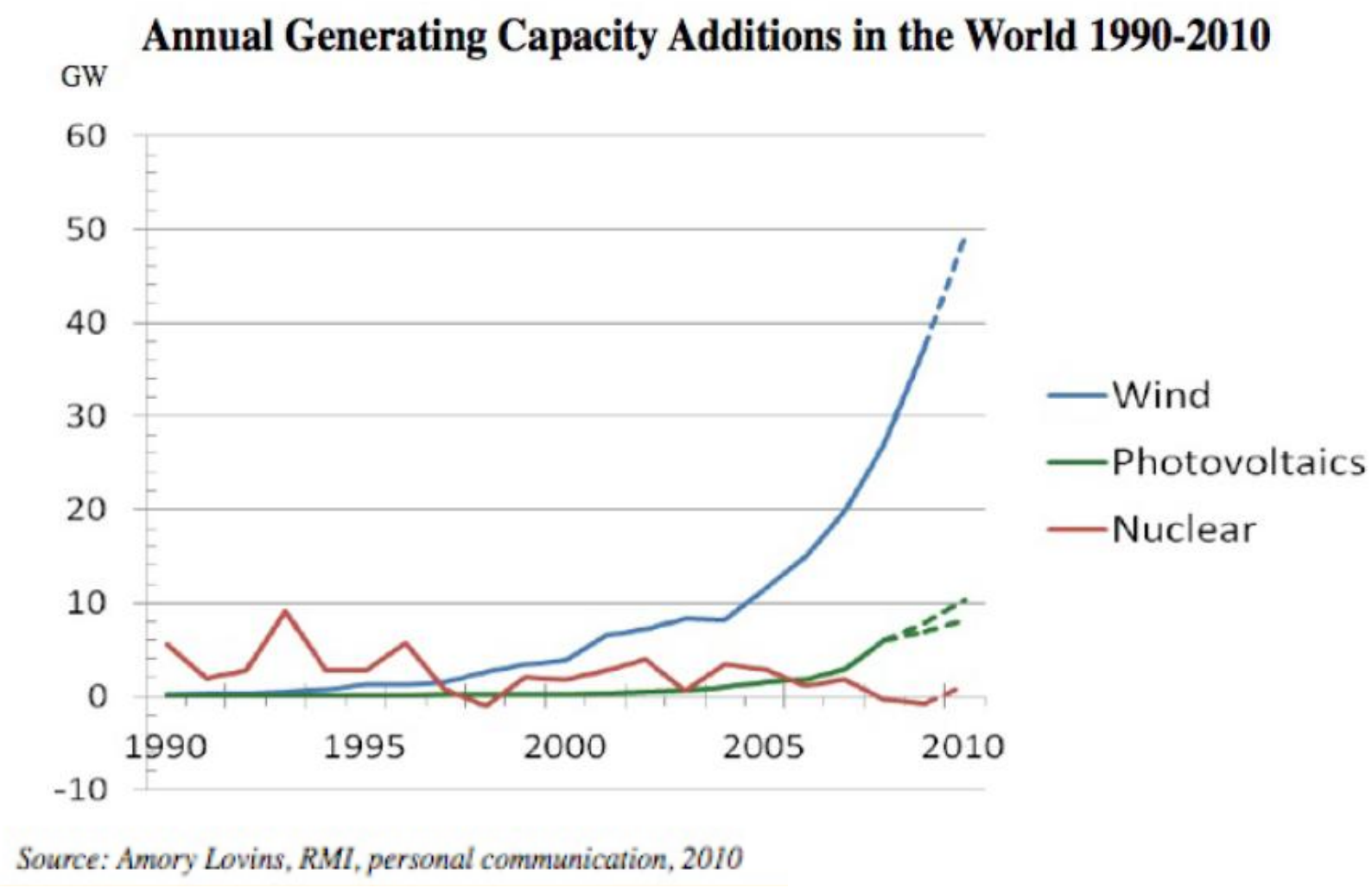


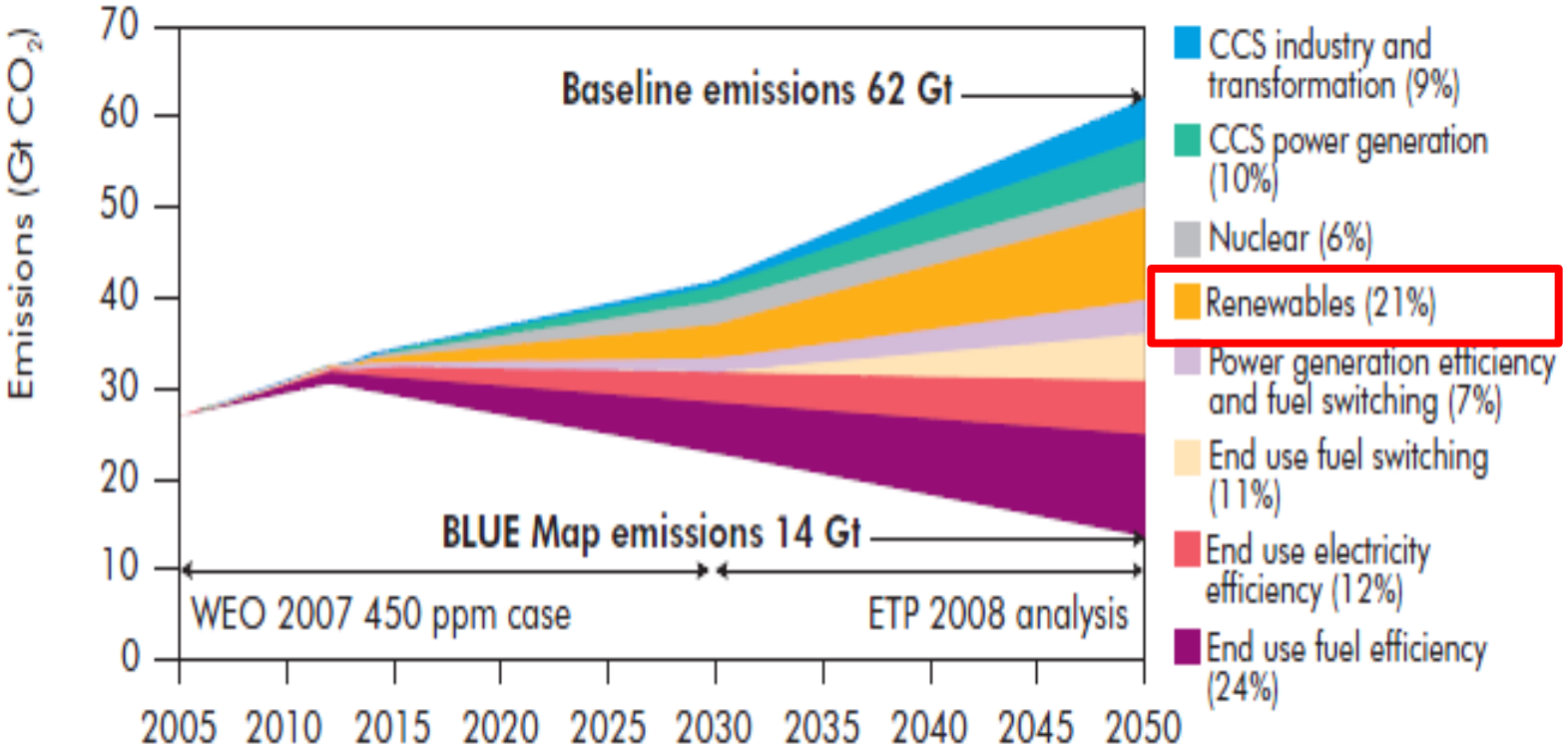
Source: EWEA 2010

Investment in renewables



Importance of RE

Figure ES.2 ▶ Comparison of the *World Energy Outlook 2007* 450 ppm case and the BLUE Map scenario, 2005-2050



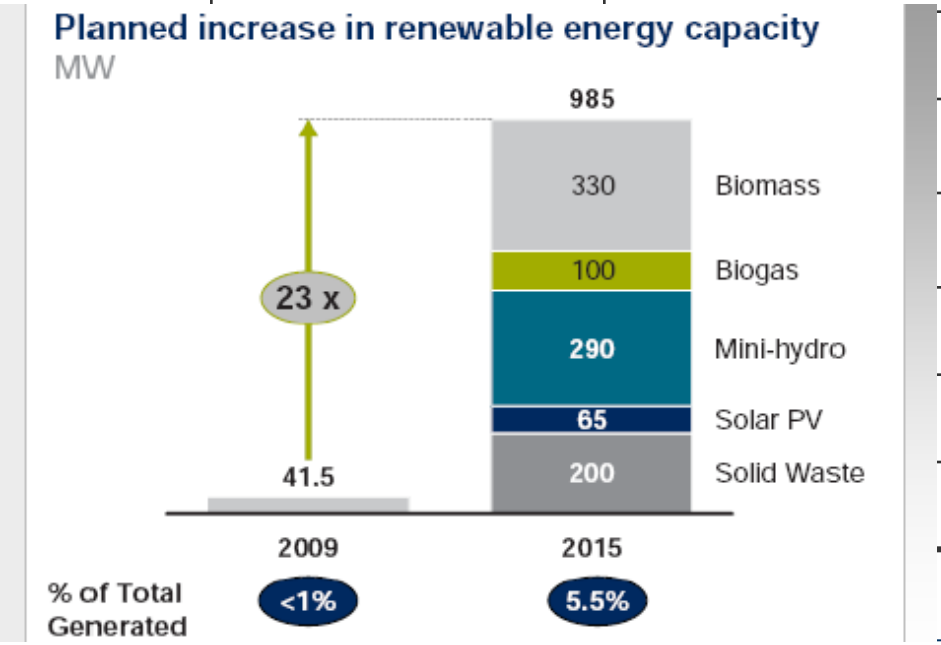
Source: International Energy Agency, Energy Technology Perspectives, 2008, www.iea.org

International policies and proposals for Malaysia

Targets in comparison

- 85 countries in the world with targets for renewables!
- Majority (45!) in developing countries and emerging economies!

Country	Status Quo	Short-term
Malaysia	**<1% in 2009**	**5.5% by 2015**



Source: KeTTHA 2010

Targets in comparison

- 85 countries in the world with targets for renewables!
- Majority (45!) in developing countries and emerging economies!

Country	Status Quo	Short-term
Malaysia	**<1% in 2009**	**5.5% by 2015**
China	8% in 2009	15% by 2020 (final energy consumption)
Egypt	13% in 2007	20% by 2020 (incl. 12% wind)
Ecuador	45% in 2009	90% by 2020
Spain	29% in 2009	40% by 2020
Germany	16% in 2009	35% by 2020 (80% by 2050)
Singapore	<1% in 2009	???

Source: Kettha 2010; REN21 2010, and laws from other countries

Renewable electricity projections:

- IEA: 50% of electricity by 2050 (IEA 2008)
- EREC/Greenpeace: 80 of energy by 2050

(EREC/Greenpeace 2010).

Feed-in tariffs world-wide (end of 2009)

European Union	Non-EU Europe and Middle East	Africa	Americas	Asia and Australasia
Austria, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, France, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia Lithuania, Luxembourg Malta, Netherlands Portugal, Slovak Republic, Slovenia, Spain, United Kingdom	Croatia Israel Macedonia Serbia Switzerland Turkey Ukraine	Algeria Kenya Mauritius South Africa Tanzania Uganda	Argentina Canada* Ecuador Nicaragua United States* Dominican Rep. Honduras Peru	Australia* China India* Mongolia Pakistan Philippines South Korea Sri Lanka Taiwan Thailand

Source: REN21 2010

Feed-in tariffs

- Purchase obligation
- Fixed price/tariff for each technology (administration)
- Long payment duration

FIT rates in comparison – RM-Sen/kWh

	Malaysia (2011)	Taiwan (2009)	Germany (2010)	Kenya (2008)	Ontario (2008)	Ecuador (2007)
Biogas	**28-35**					
Biomass	**27-35**					
Small hydro	**23-24**					
Solar PV	**85-178**					

FIT rates in comparison – RM-Sen/kWh

	Malaysia (2011)	Taiwan (2009)	Germany (2010)	Kenya (2008)	Ontario (2008)	Ecuador (2007)
Biogas	**28-35**	21	34-50	22	30-59	30
Biomass	**27-35**	21	34-50	22	39-42	30
Small hydro	**23-24**	21	27-54	25-37	37-40	16-18
Solar PV	**85-178**	112-130	103-142	**---**	193-	162

Eligible RE Sources/Technology

- Assessment of resource availability
- 4 main types of RE sources / technology for initial stage:

Biogas | Biomass | Small hydropower | Solar PV

- List can be expanded later to include other sources / technology
- Up to 30MW (or higher if approved by Minister)
- Maximum share of TNB: 49%

Source: MBIPV, KeTTHA

Potential conflicts: Utility vs. small IPPs

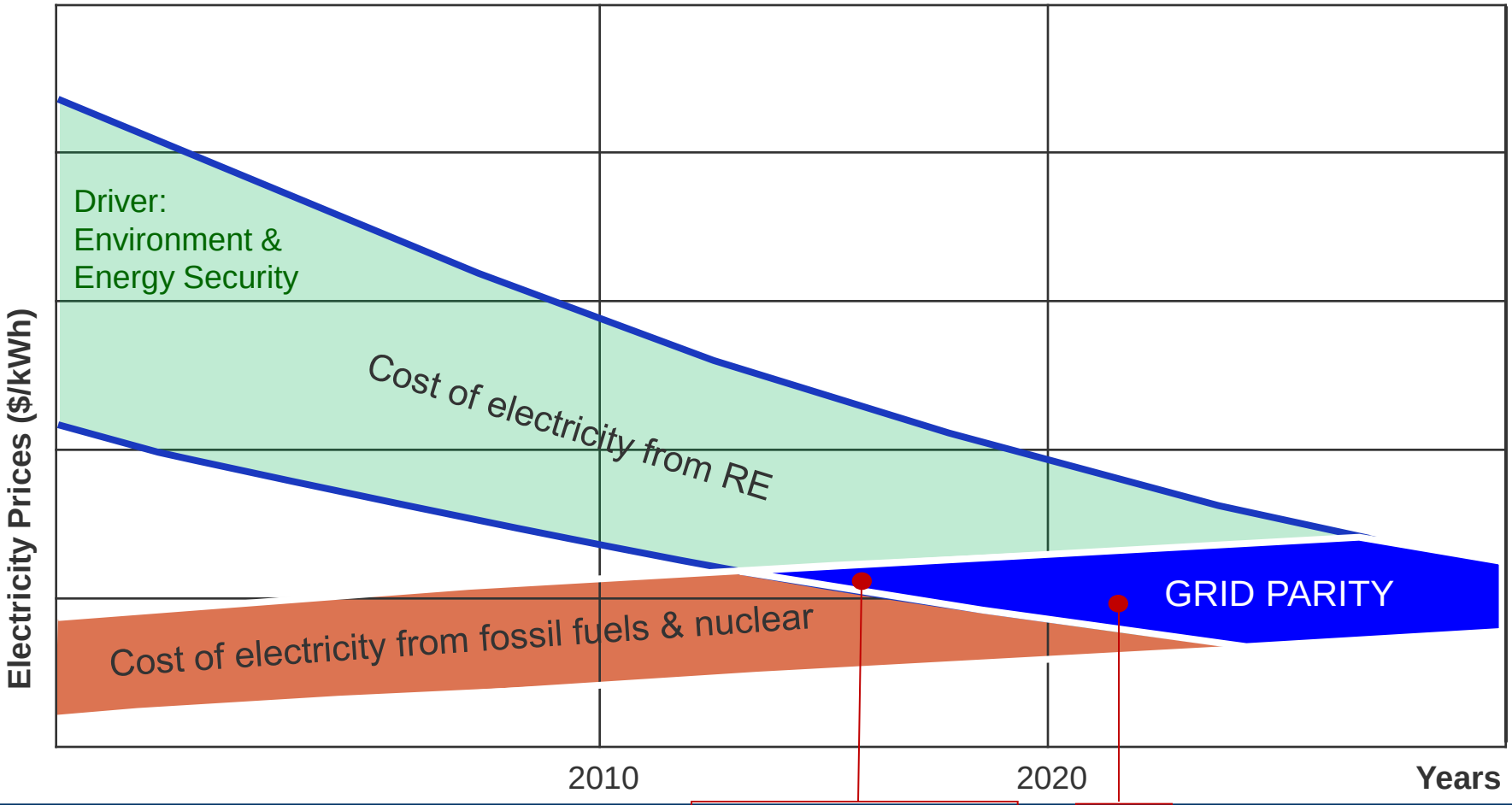
- Grid connection
  - Which connection point? Nearest linear distance…
  - Disclosure of information by utility?
  - Metering point?

- Administrative procedure
  - Defined maximum lead times (system study, grid connection)
  - Number of institutions involved?

Question:

"How long do we have to support renewable energy technologies and when will we reach grid parity"?

Grid Parity



Source: BP, REC

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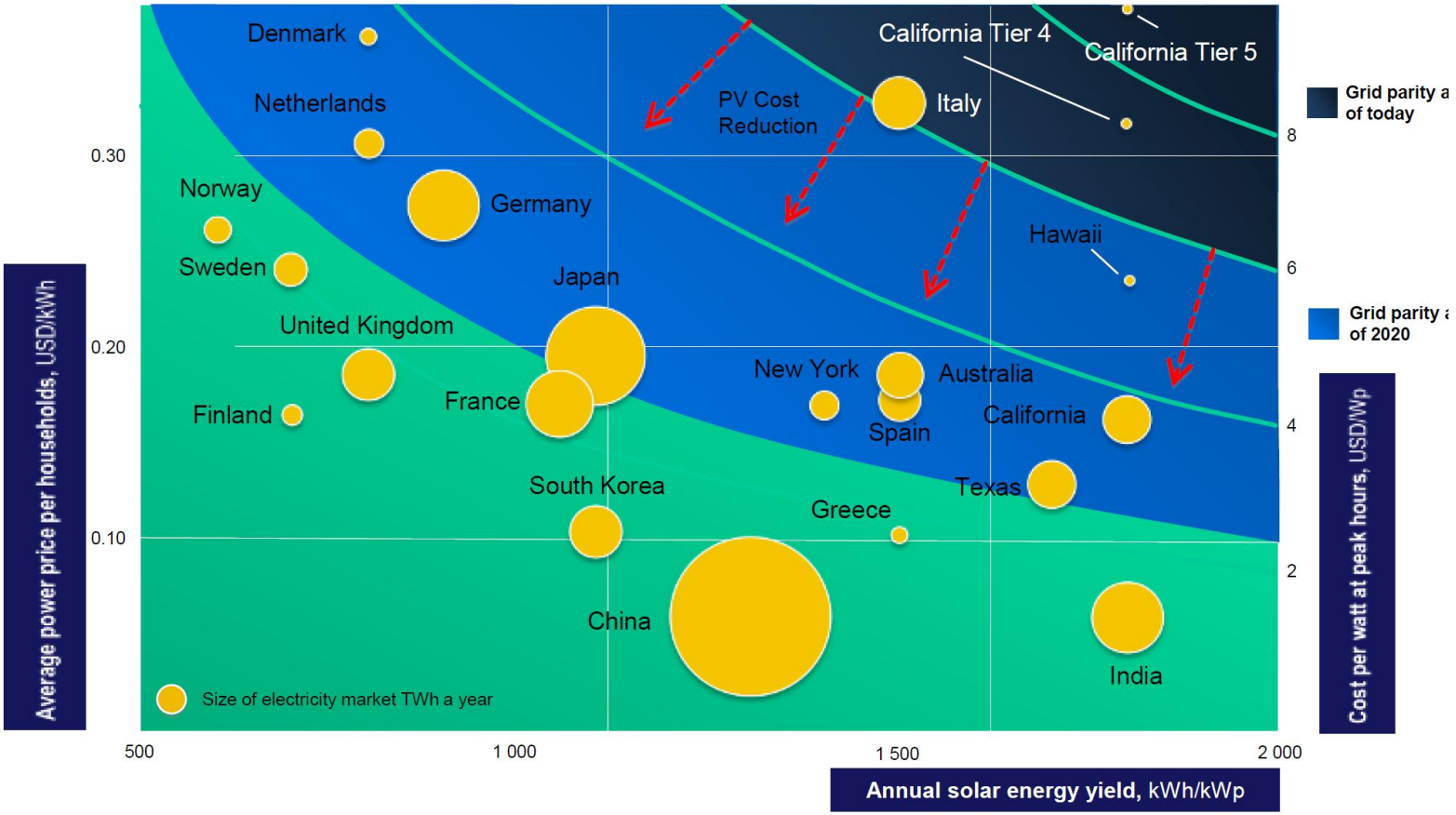
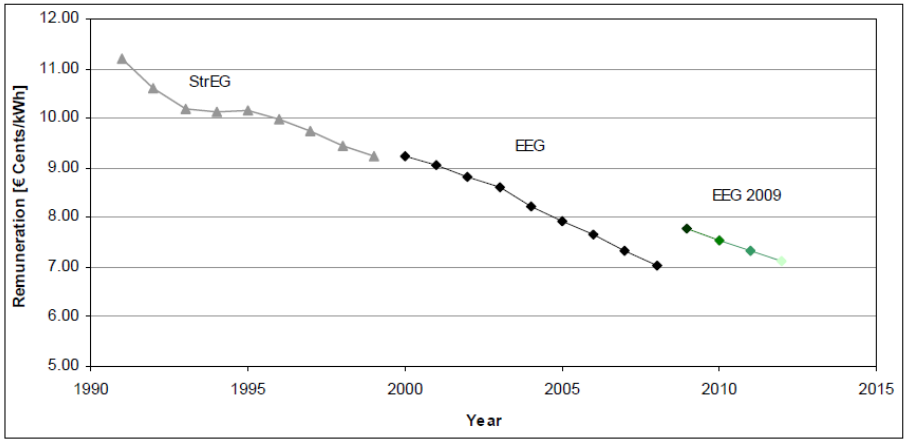
Grid Parity



ource: Eurostat; PV Policy group; PG&E; CIA country files; Public policy Institute New York; McKinsey&Company

Tariff degression

- Tariff degression (automatic, annual reduction); because of technological learning, economies of scale, rationalization, innovation pressure
- Effects only new capacity, i.e. tariff for "old" plants remains stable over long period of time
- Most countries only use it for solar PV (Italy, Spain)



Source: Klein et al. 2008

Tariff degression

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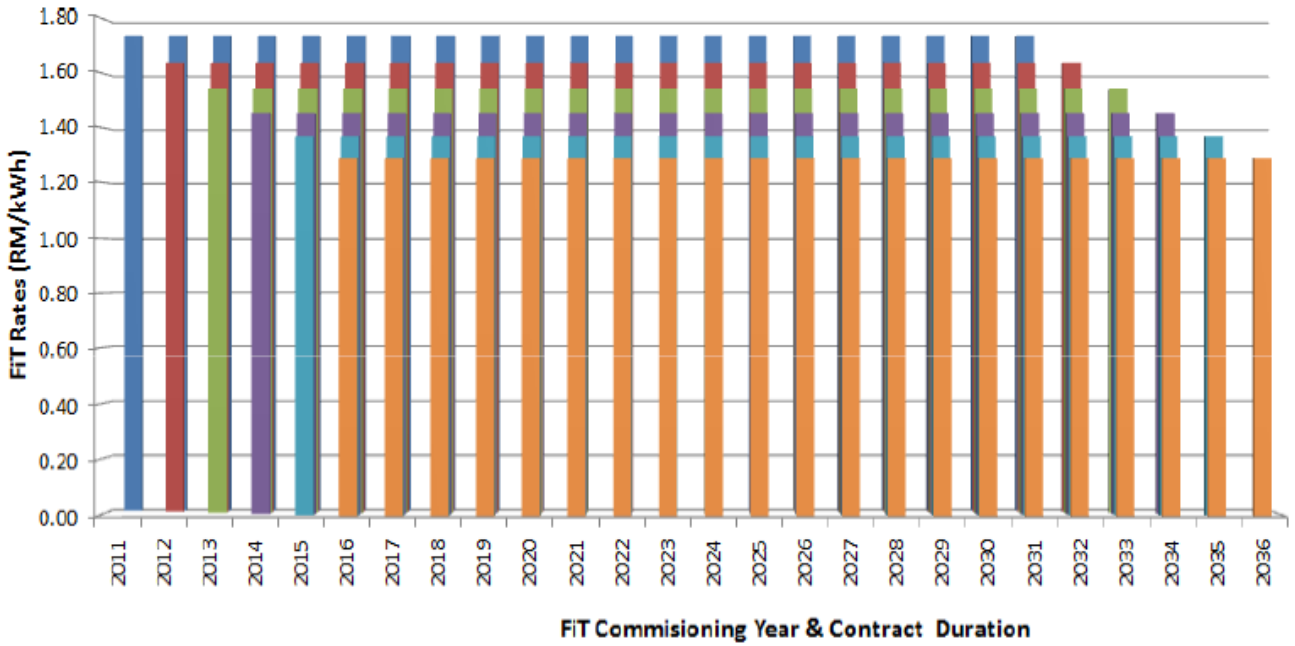


Source: MBIPV 2010

Tariff degression in Malaysia

Technology	*annual degression rate*
Solar PV	8.0%
Biomass	0.5 %
Biogas	0.5 %
Small hydro	0 %

Source: Kettha 2010

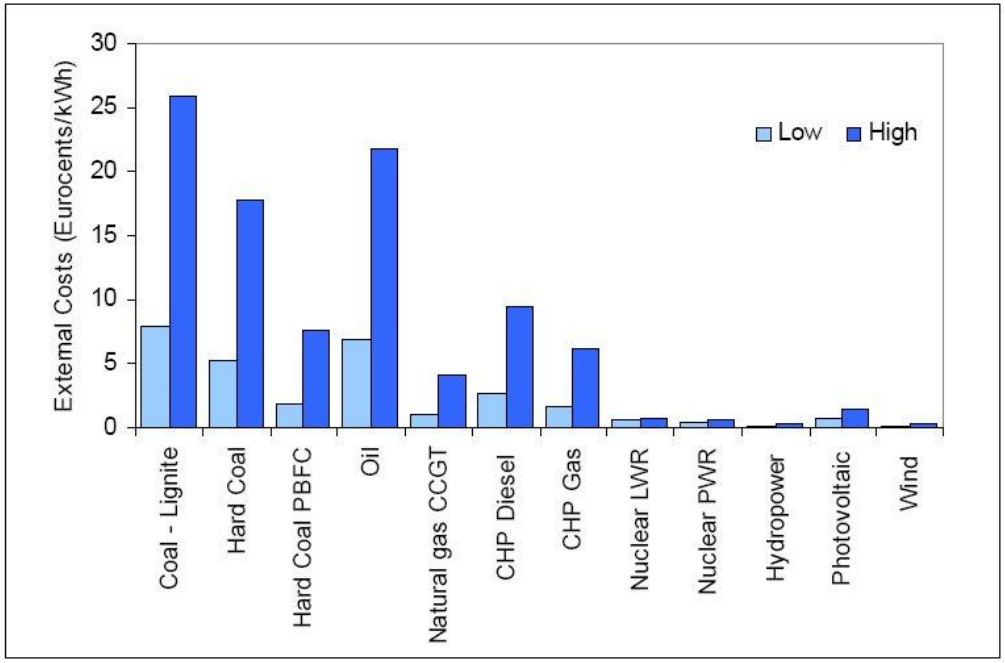
Tariff degression - Germany

- Germany implemented tariff degression for all technologies
- Tariff degression rates in Germany (2009)

Renewable energy technology	Annual degression rate
Hydropower (more than 5 MW)	1 percent
Landfill gas	1.5 percent
Sewage treatment gas	1.5 percent
Mine gas	1.5 percent
Biomass	1 percent
Geothermal	1 percent
Wind power offshore	5 percent (from 2015 onwards)
Wind power onshore	1 percent
Solar PV	8-10 percent

Non internalised external costs

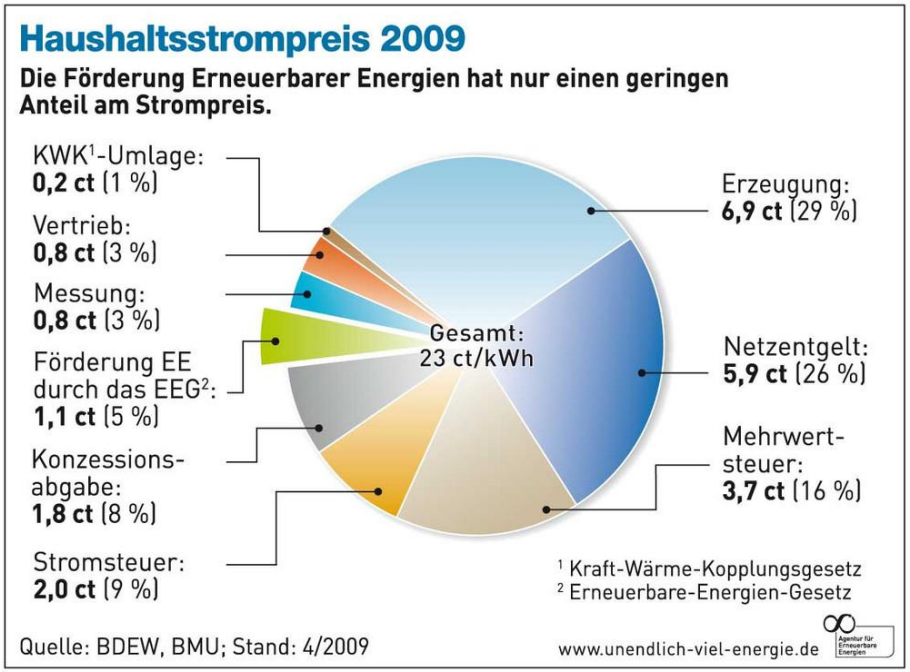
- Not all costs are passed to the final consumer
- External costs for different power generation sources (EU 2005)

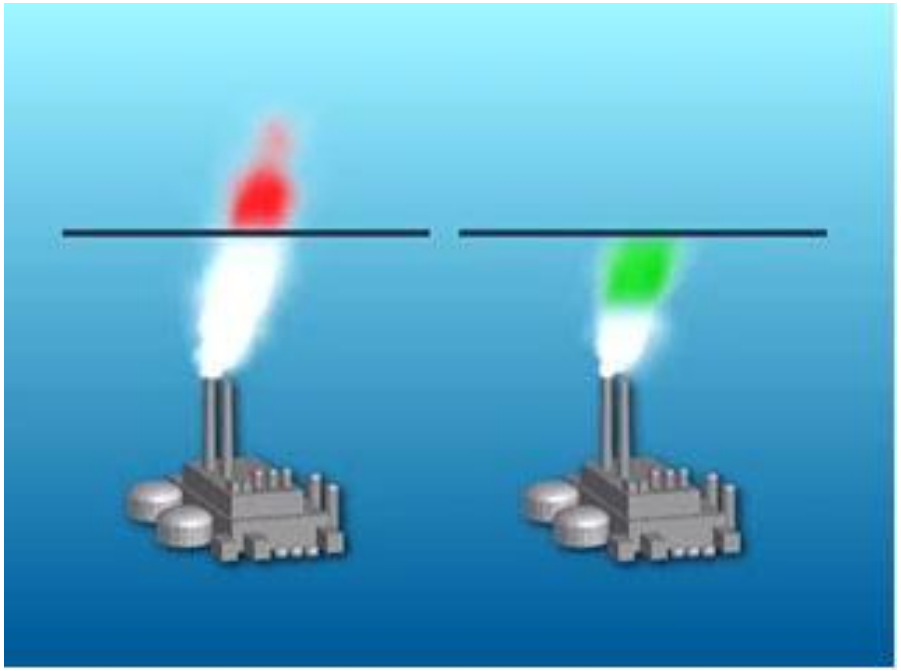


Source: http://www.eea.europa.eu/data-and-maps/indicators/en35-external-costs-of-electricity-production-1

Internalising external costs

- Quantity or price based solutions
  - Price: Taxes or levies
  - Quantity: Emission trading schemes



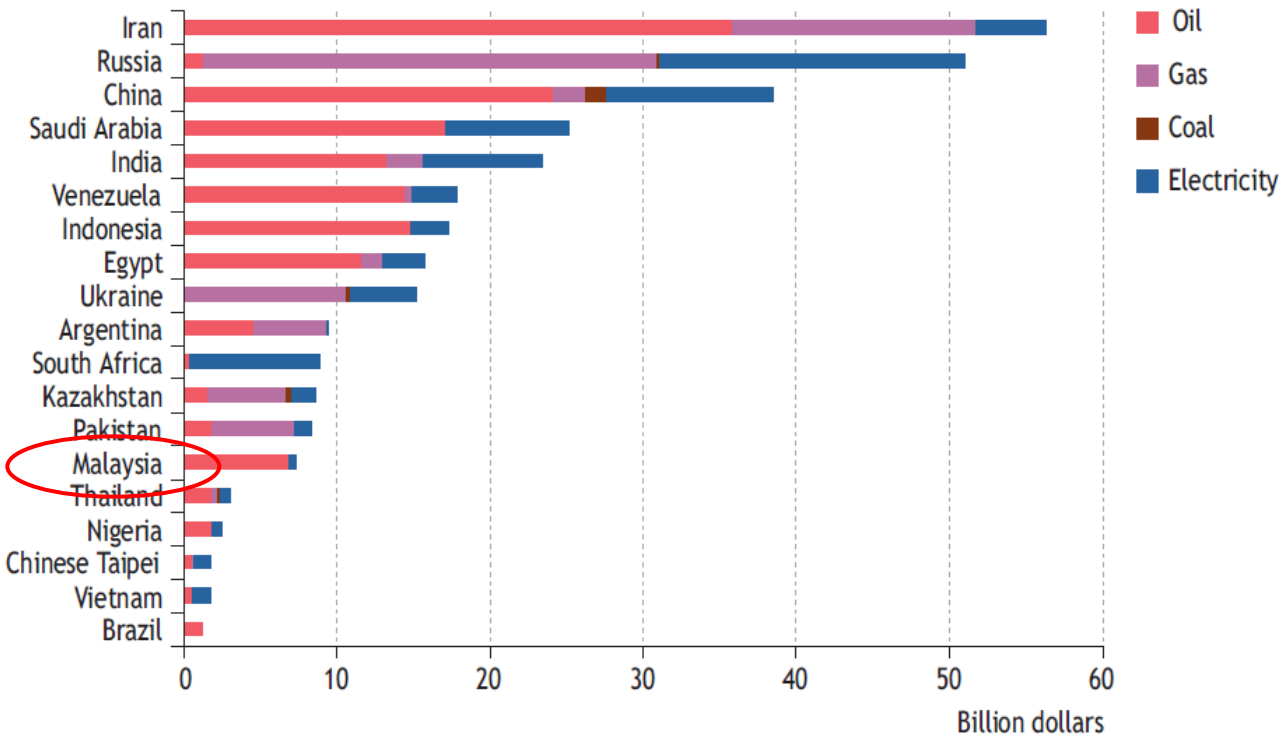


Removing subsidies

- Subsidies for conventional energy sources
  - $310 billion (2007) in 20 largest non-OECD countries
  - Reduced responsiveness of final consumers
  - Market barrier for renewable energy sources and energy efficiency measures

Removing subsidies

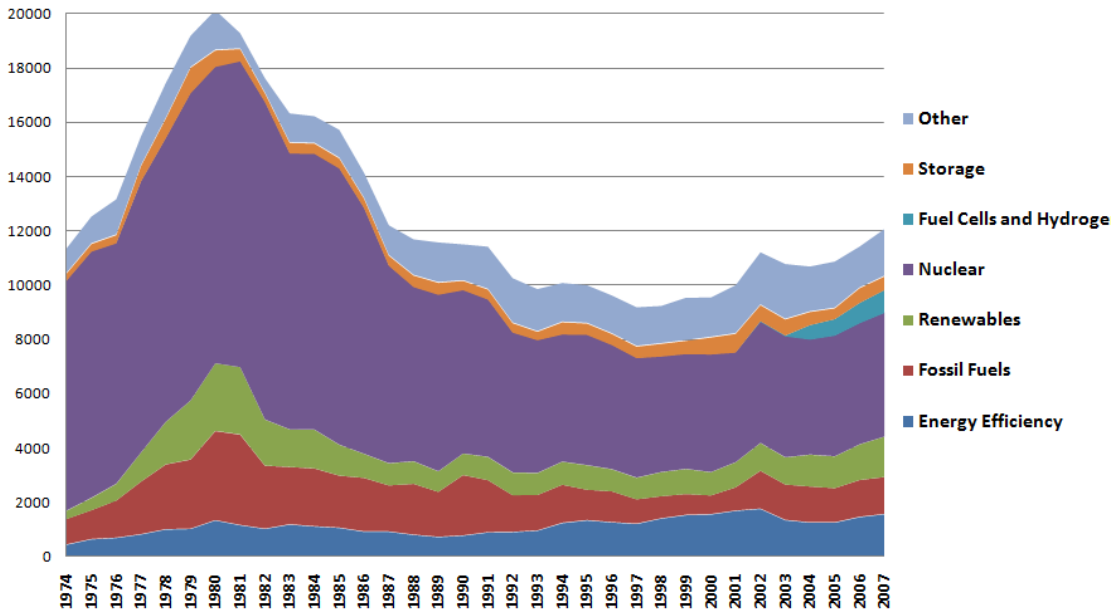
Figure 1.1 • Energy subsidies by fuel in non-OECD countries, 2007



IEA WEO 2008

Increasing R&D spendings

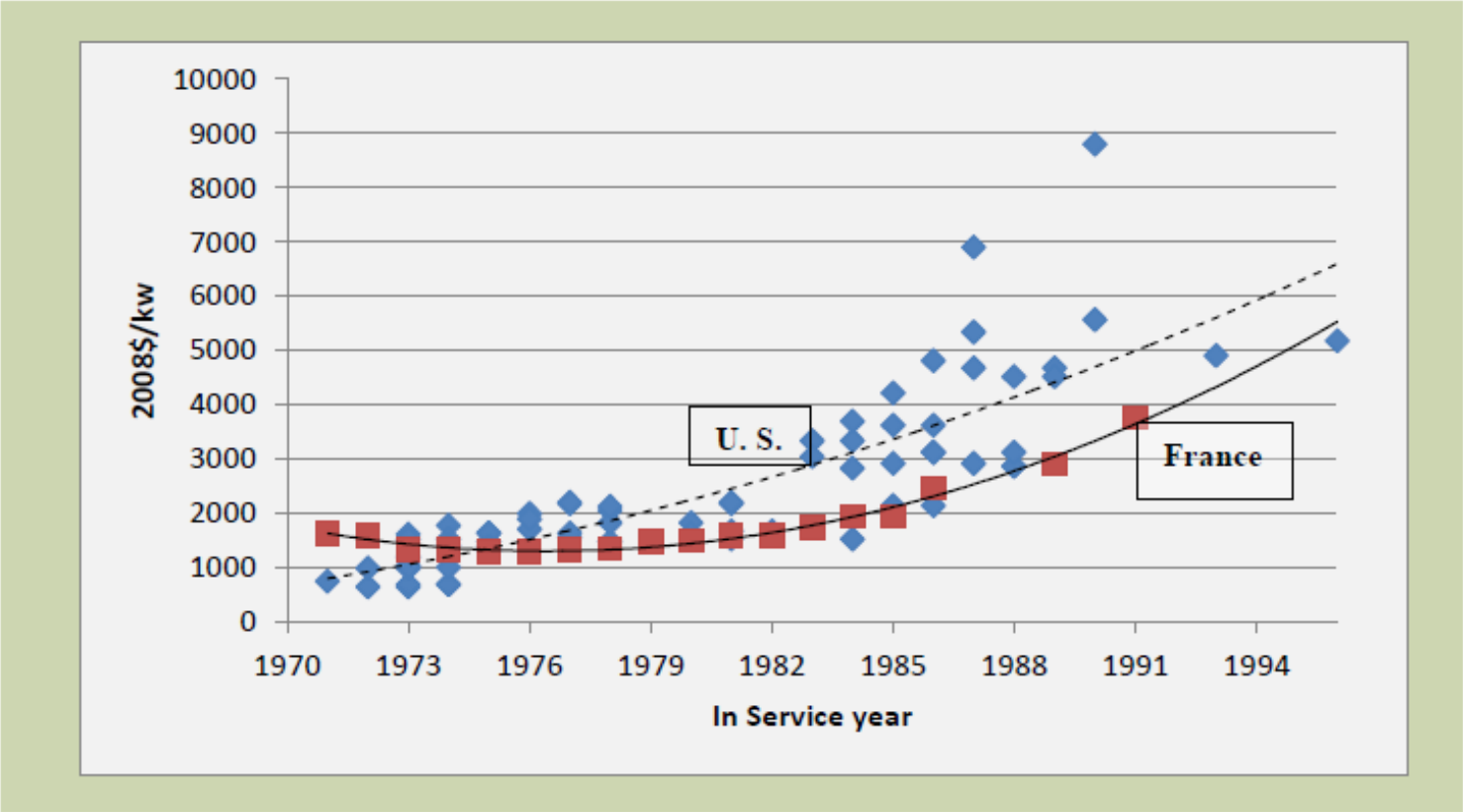
- Support for fossil fuels and nuclear power still exceeds renewable support
- Global Energy R&D expenditures (1974-2007 – million US dollar)



Source: IEA WEO 2008

Overnight cost of nuclear

EXHIBIT ES-1: OVERNIGHT COSTS OF PRESSURIZED WATER REACTORS (2008$)

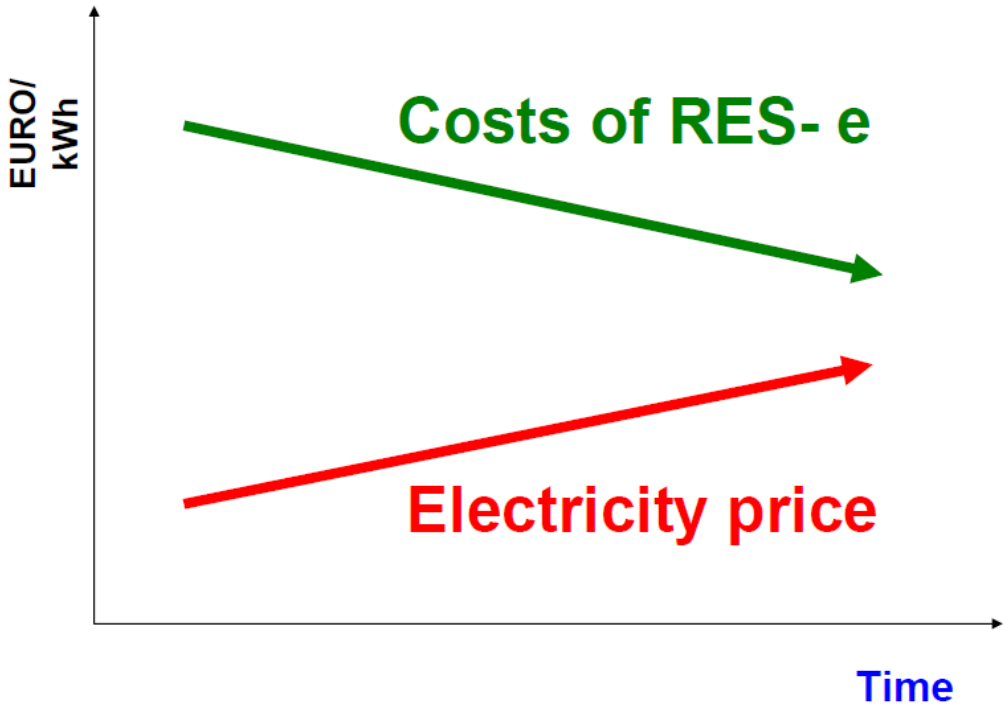


Source: Cooper, 2009a, database, updated; Grubler, 209.

Expected cabon price in IEA BLUE Map scenario:

USD / t CO_2	2020	2030	2050
OECD	50	110	175
Non-OECD	0	65	175

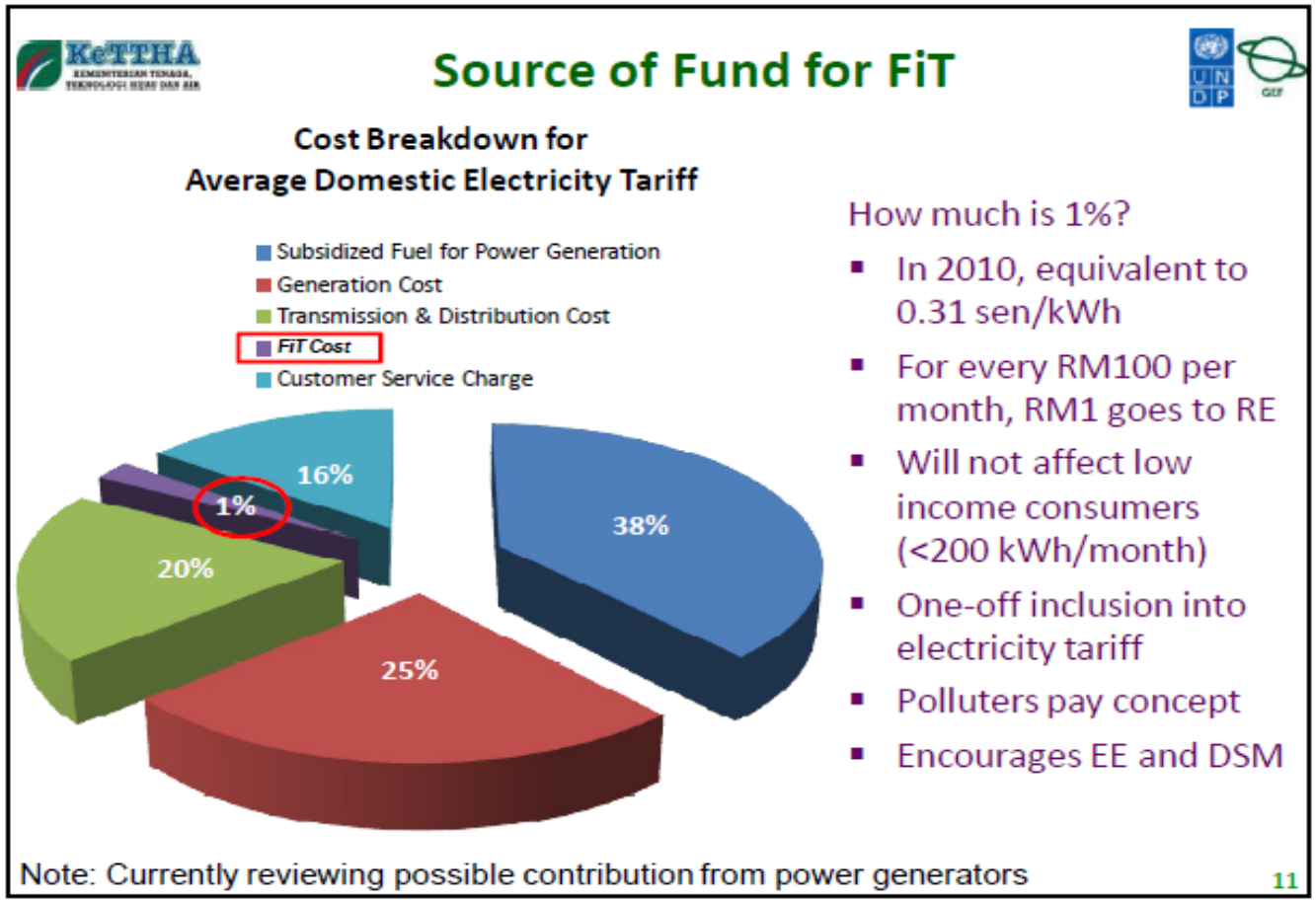
Closing the gap



Question:

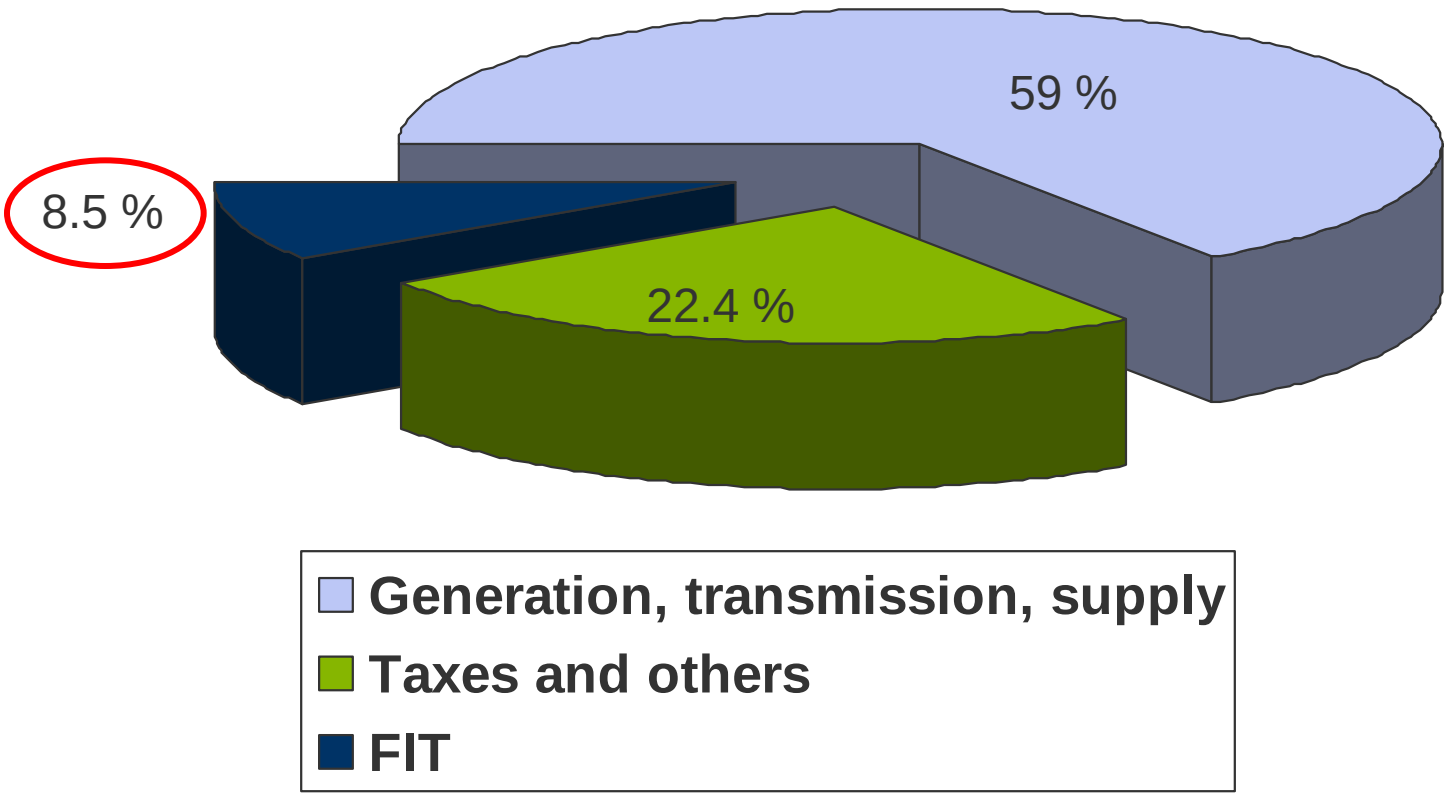
"Increasing the electricity tariff is a very sensitive issue. What other financing option exist"?

FIT financing in Malaysia



Source: Kettha 2010

FIT financing in Germany



Additional funding options for the FIT in Malaysia

- Higher increase of the electricity price (2-5 percent)
- Carbon tax for conventional power generation?
- Income from exported fossil fuels?

Costs and benefits of renewable energy support

How to convince the public?

- Renewable energy sources will be the future: Malaysia want to become a regional leader (and not miss the train…)
- 1 percent tariff increase: "cost of one cup of tea" (?) (you can help protect the global climate)
- Point at the positive macro-economic effects
  - Job creation
  - Stabilization of energy prices in the future
  - Democratization of energy system

Costs and benefits of FIT in Malaysia (estimates MBIPV)

Potential Impact of National RE Policy by Year 2020

- Minimum **RM 2.1 billion savings of external cost** to mitigate CO2 emissions (total 42 million tonnes avoided from 2011 to 2020, on the basis of RM 50 per tonne of external cost);
- Minimum **RM 19 billion of loan values** for RE projects, which will provide local banks with new sources of revenues (at 80% debt financing for RE projects);
- Minimum **RM 70 billion of RE business revenues** generated from RE power plants operation, which can generate **tax income of minimum RM 1.75 billion to Government** (on basis of 10% profit value where income tax is 25% on profit);
- Minimum **52,000 jobs created** to construct, operate and maintain RE power plants (on the basis of 15-30 job per MW).

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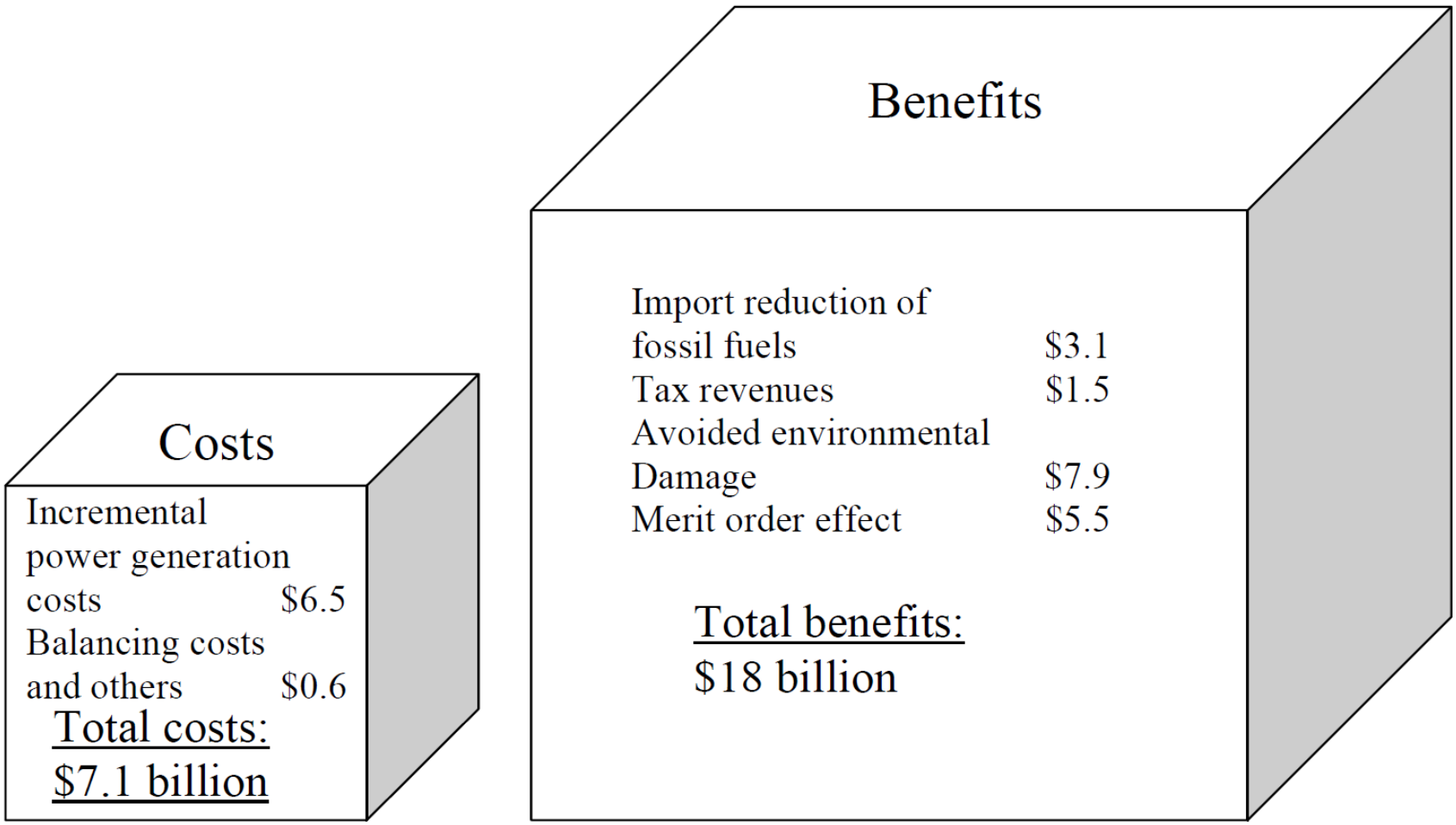
Source: Kettha 2010

FIT costs and benefits, Germany (2009)



Question:

"What further research needs to be done"?

Potential Research on Renewable Energy

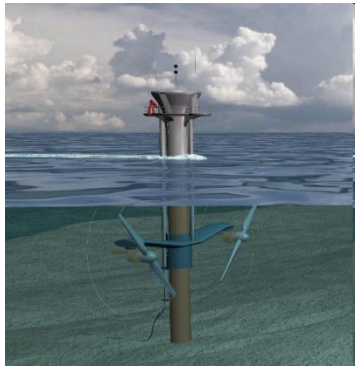
Top priorities (2010-2012)

- **Assessment of renewable energy potential in Malaysia (focus on biomass, biogas, solar, mini-hydro, municipal solid waste)**

Wind?

Wind offshore?

Tidal?



Geothermal?

Potential Research on Renewable Energy

Top priorities (2010-2012)

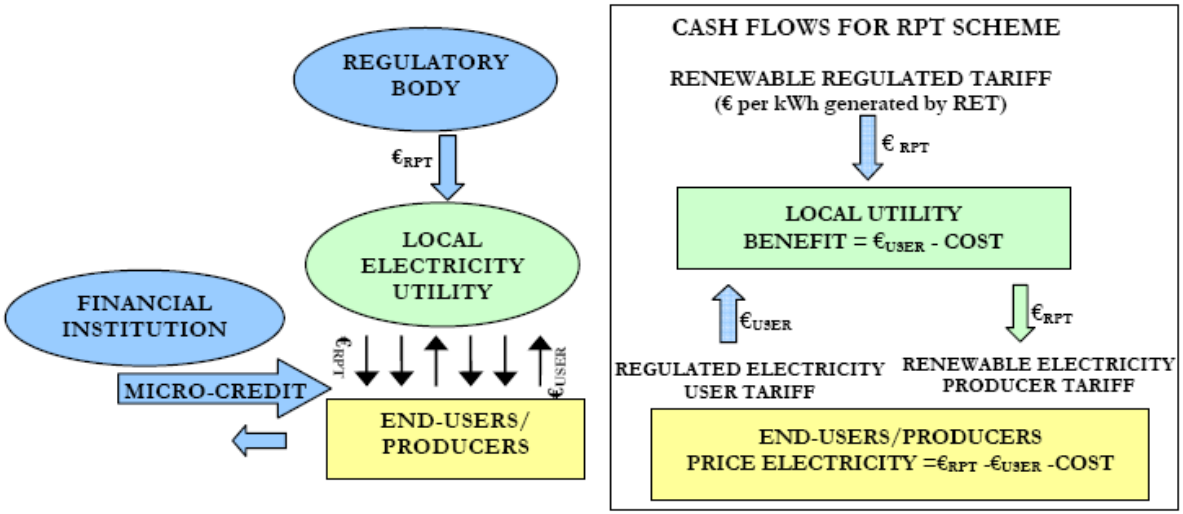
- **Impact of renewable energy deployment on the national electricity grid**
- **Elaboration of national grid extension plan to take the future growth in the renewable energy sector into account**

Potential Research on Renewable Energy

Top priorities (2010-2012)

- **Alternative financing mechanisms for renewable energy sources in off-grid areas**

Figure IX. RPT tariff for independent renewable producers/users.



Source: M. Moner (JRC), P. Llamas (ARE).

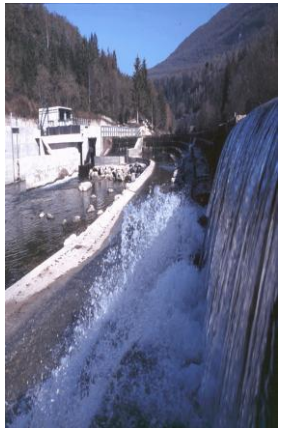
Potential Research on Renewable Energy

Beyond (2012-2014)

- **Calculation of generation costs for different renewable energy sources eligible under the feed-in tariff mechanism**
- **Analysis of macro-economic benefits of renewable energy support**
- **Interdependencies of renewable energy support programs and strategies for liberalizing power markets (unbundling, IPPs, etc).**

Thank you for your attention!

David Jacobs
Environmental Policy Research Centre
david.jacobs@gmx.de
http://www.fu-berlin.de/ffu/



References for nuclear slides

Cost increase of nuclear power plants:

•Finland:

http://www.nytimes.com/2009/05/29/business/energy-environment/29nuke.html

•Similar assessment have been made for new nuclear plants in the UK

http://business.timesonline.co.uk/tol/business/industry_sectors/utilities/article3872870.ece

Cost development of nuclear power plants (1970s-2009)

Study of Cooper (2010)

http://www.vermontlaw.edu/Documents/IEE/20100909_cooperStudy.pdf