# New Directions for International Energy and Environmental Research

Miranda A. Schreurs

Freie Universität Berlin

# Energy Challenges

- Large share of the global population still without basic access to electricity
- Growing population, growing demand
- IPCC, need to reduce ghg emissions by 80+% of 1990 levels by 2050
- Instability in energy prices
- Conflicts over energy resources

# New Energy Technologies

e.g.

- Fuel cells
- Hydrogen fuels
- Biofuels (esp. new generation)
- Renewables (large-scale wind, photovoltaic)
- Nuclear (controversial)
- Nanomaterials
- Smart transportation
- Green buildings

# Unanticipated Consequences??

- Biofuels---international food security
- Batteries—international waste
- Hydrogen fuels--??safety
- Nanomaterials??
- Nuclear??

# International Energy Security and

- economic security,
- International/national security
- environmental security
- human security

# *New energy structures*

- green transport infrastructures and hubs (high speed rail, more efficient linking of rail, road, and airline movement of goods, clean car infrastructure)

- regional economic hubs that are more effectively linked and reduce the need to transport goods and people long distances using existing means of transportation

# International Supersmart Grids

- international green supersmart grids
- 100% renewables

# New Energy Governance

- Energy planning has been based largely on national policy
- Will need to move towards greater regional and international cooperation in research and policy
- Integrated regional and international planning

# *International public acceptance, values related to new energies*

How accepting is the population of carbon capture and sequestration?

What is the difference between public's perceived costs of developing various forms of energy versus reality?

Is the population willing to pay for different technologies (e.g. the development of renewable energy in Northern Africa in order to make possible the development of a European renewable electricity grid system? CCS?)

What shapes their opinions?

# *public knowledge about energy*

What is the difference between public perceptions of costs, threats, and opportunities of various energy forms compared with scientific or economic understanding of these concepts?

What is the public attitude about nanomaterials? What is their understanding of risks related to nanotechnologies? Is the population aware that nanomaterials are used for the development of better performing engines?

# *Policies and programs*.

There is a need to improve our understanding of the effectiveness of various policies and measures that can foster new technologies and energy forms and promote changes in energy behaviour.

# Policy/market effectiveness

- To what extent does the market (prices) determine energy behaviour?
- When should the market be relied up, when should policies and measures be introduced?

# Policy Instruments and Measures

- Which mix of policies produces the best results?
- What is the effectiveness of feed-in-tariffs, white certificate systems, green certificate systems, and energy labelling for promoting renewable energies and energy efficiency?
- How effective are various measures at reducing ghg emissions?
- What policies and programs have been most effective in informing citizens of energy questions?

# Energy efficiency and institutions

Different systems employ different policy approaches to promote energy efficiency improvements, such as Japan's top runner approach, California's SB 375, the EU's emission trading system

- What is the full range of options that are being employed, debated, accepted, and rejected in different parts of the world and why?  What works best and why?

# Vertical and horizontal structures of governance, R&D

How can jurisdictions change institutional structures and decision making processes to better meet the challenges of providing a secure and clean energy supply for the future?

Need to develop more effective channels of communication and coordination among various levels of government and regions in energy governance and energy R&D

# Need for Global Energy Data

- best practice and worst practice technologies at the local, regional and national levels
- effectiveness of various policies and measures
- Data on energy and risks, energy and security

# Need for International Inter-disciplinarity!

- Energy engineers
- Environmental science experts
- International security experts
- Sociologists
- Policy experts