



Centre for Energy and  
Environmental Markets

UNSW  
THE UNIVERSITY OF NEW SOUTH WALES  
SYDNEY • AUSTRALIA



# **CEEM's interdisciplinary research into energy and environmental markets**

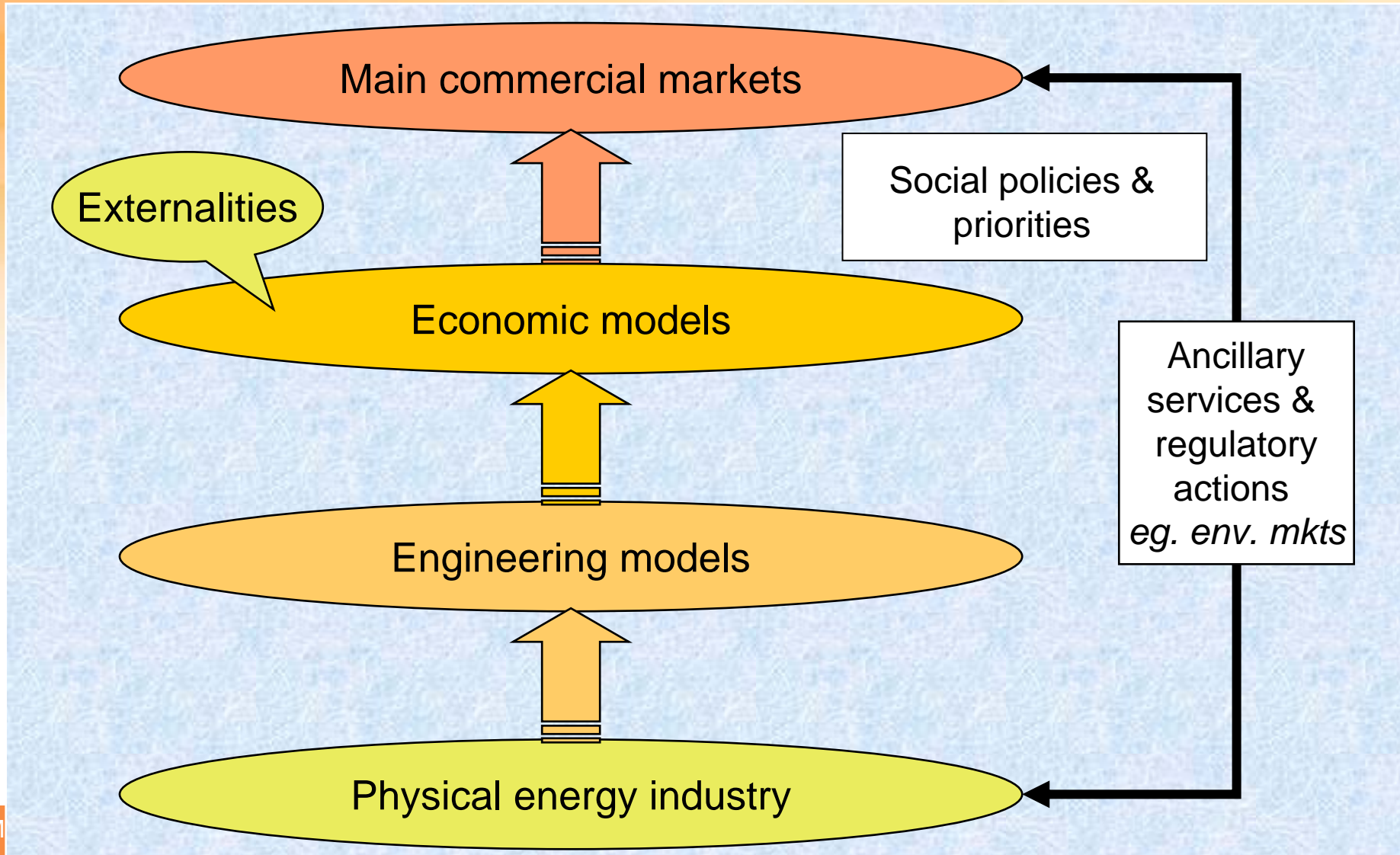
***Mini-conference on Environmental Networking***  
**UNSW, December 2005**

**Iain MacGill**

# CEEM established ...

- *to formalise* growing shared research interests + interactions between UNSW researchers in Engineering, Commerce + Economics, AGSM, FASS, IES + more....
  - via participation in external centres, ARC grants, co-supervision, teaching...
- *through UNSW Centre* aiming to provide Australian research leadership in interdisciplinary design, analysis + performance monitoring of energy + environmental markets, associated policy frameworks
- *in the areas of*
  - Physical energy markets
  - Related environmental markets
  - Related energy and environmental derivative markets
  - *Policy frameworks and instruments in energy and environment*
  - **Tools** - economic valuation methodologies, simulation, surveying, *mathematical analysis, Experimental Economics market platforms, AI 'intelligent agent' techniques* to aid in market design

# The energy industry – models for understanding



# Institutional models for research together...

- Discipline
  - Body of knowledge characterised by an accepted content and learning
- Cross-disciplinary research involves investigators from different disciplines
  - Multidisciplinary
    - coordinated efforts of several disciplines to achieve common goal.. largely collaborative rather than integrated
  - Interdisciplinary
    - integration of several disciplines creating unified outcome substantial enough to develop new discipline. Collaboration in designing new approaches and analysis combining methods and concepts from different disciplines... investigators work from each of their respective disciplinary perspectives.
  - Transdisciplinary
    - development and application of shared, integrative conceptual framework. Instead of working in parallel, investigators collaborate across all levels
      - » (Stony Brook University, *Multidisciplinary Working Groups*, 2005)



# UNSW Research Centres

- UNSW Program Centres
- UNSW Community Centres
- UNSW Research Institutes
- Commonwealth/State Funded Centres
- **UNSW Research Centres**
  - are established within the University to undertake research and they recognise an established area of research strength, or an emerging area of research strength, at UNSW.
  - will not normally be established within single school or replicate functions of existing schools or faculties, *i.e.* are not a means to set up an activity that could be a normal part of a school's/faculty's activities.
  - generally have an interdisciplinary/multidisciplinary focus and involve significant collaboration within UNSW, nationally and internationally.
  - may also be established as focal points for research-related entrepreneurial activities involving skills, expertise and personnel, which cut across school/faculty structures.
  - UNSW has the sole governance responsibility for UNSW Research Centres.
    - » UNSW Centres Policy: Establishment, Management and Review of Centres and Institutes



# UNSW Research Centres

Australian Human Rights Centre  
Australian Scholarly Editions Centre  
Baker & McKenzie Cyberspace Law and Policy Centre  
Bioengineering Centre  
Centre for Accounting & Assurance Services Research  
Centre for Advanced Macromolecular Design  
Centre for Applied Economic Research  
Centre for Applied Marketing  
Centre for Clinical Governance Research in Health  
The Center for Simulation and Modelling of Particulate Systems  
Centre for Contemporary Art and Politics  
Centre for Electrochemical & Minerals Processing  
Centre for Environmental Modelling and Prediction  
Centre for Energy and Environmental Markets  
Centre for European Studies  
Centre for Gender-Related Violence Studies  
Centre for Health Informatics  
Centre for Interactive Cinema  
Centre for Marine Biofouling and Bio-Innovation  
Centre for Materials Research in Energy Conversion  
Centre for Pensions and Superannuation  
Centre for Refugee Research  
Centre for a Sustainable Built Environment  
Centre for Gene Function Analysis  
European Law Centre  
Gifted Education Research, Resource and Information Centre  
Gilbert and Tobin Centre for Public Law  
Indigenous Law Centre  
Industrial Relations Research Centre  
Injury Risk Management Research Centre  
Korea-Australia Research Centre  
Research Centre for Primary Health Care and Equity  
Research Centre for the Study of Ageing and Retirement  
Social Policy Research Centre  
UNESCO Centre for Membrane Science and Technology  
UNSW Centre for Water and Waste Technology

Centre for Health Assets Australasia  
Centre for Remote Sensing and Geographic Information Systems  
Centre for South Pacific Studies  
Centre for Vascular Research  
Energy Research, Development and Information Centre

# A government role in energy?

- Possible *energy* market failures:
  - Monopolies
    - *Generally concentrated supply-side*
  - Public Goods
    - *Essential services, contribution to growth*
  - Incomplete markets
    - *Electricity networks are shared - require high levels of coordination*
  - Information failures
    - *Under-utilised energy efficiency options*
  - The "Business Cycle"
    - *Capital intensive, long-lived investments*
  - **Externalities**
    - *Climate change, energy security, social impacts*

# Australia's energy industry policy drivers

- Economic
  - Energy's role in economic development
  - Maintaining the value of Australian energy exports
  - ***Continuing market-based industry restructuring***
- Energy security
  - Short-term: maintaining secure operation
  - Longer-term: investment to ensure future secure operation
- Environmental
  - Australian electricity industry responsible for 1/3 of national greenhouse emissions, and has high emissions growth



# Energy market restructuring

*The last two decades have seen worldwide efforts, and considerable progress in Australia, to restructure energy markets for reasons including*

- Improve economic efficiency by introducing competition & facilitating new entry
- Enhance accountability to end-users & society through 'customer choice'
- Implement a market-based approach to social & environmental externalities
- Release government funds by asset sales

# Market design for energy industry restructuring

- An appropriate balance and compatibility between:
  - Centralised decision-making
    - From the short term (engineering) to the long term (policy)
  - Decentralised decision-making (commercial)
    - Operation and investment decisions
- Equal consideration for all system resources
  - Foster competition: don't favour incumbent technologies + participants against 'new entrants' - eg. Demand-side options, renewable generation
- Allocate costs + benefits to participants as appropriate to extent possible
  - Commercialise industry objectives – **eg. internalise externalities**
- Support appropriate innovation to meet emerging challenges + change
  - Focus on dynamic efficiency issues*
  - Technical or productive: reduce costs of production
  - Allocative: most appropriate choices b/n supply + demand options
  - **Dynamic:** support innovation + response to change
    - new technologies, social expectations, environmental impacts
- Careful consideration of interactions with other related markets

# Some CEEM research efforts

- An appropriate balance and compatibility between:
  - Centralised decision-making and decentralised decision-making (commercial)
    - **Interactions between spot, forward and ancillary service markets; AGSM/CEEM ARC project on participant behaviour in electricity markets, Experimental Economics collaborations with GMU, CSIRO..., 'intelligent agent' market simulation....**
- Equal consideration for all system resources
  - **AGO project on facilitating wind integration in the NEM, CEEM collaborations with BCSE on retail market design + demand-side options...**
- Allocate costs + benefits to participants as appropriate to extent possible
  - **Economic valuation methodologies, ANSTO collaboration on tracking water flows, assessment of international and NSW ETS, design of proposed multi-state ETS**
- Support appropriate innovation to meet emerging challenges + change
  - **Renewable energy policy – analysis of policy options, Experimental Economics analysis of MRET, innovation drivers in ETS**
- Careful consideration of interactions with other related markets
  - **Experimental economics work, analysis of interactions between EU ETS + energy markets**



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## Welcome

The Centre for Energy and Environmental Markets (CEEM) at the University of New South Wales undertakes interdisciplinary research in the design, analysis and performance of energy and environmental markets and their associated policy frameworks.

The University has formally established CEEM, under the joint leadership of the Faculties of Engineering, and Commerce and Economics.

This website includes details on CEEM research programs and partners, seminars and publications.

### Are you looking to register for experiments?

All CEEM's experimental economics work is hosted [here](#)

### Subscribe

Would you like to receive email updates from CEEM with announcements of events and newly posted papers? We expect that these emails will average one or two a month. Your email address will not be released to any other party. If you'd like to sign up please [email](#) with a one line message:  
Done

### Research Funding

4. CEEM is undertaking analysis of the interrelationship between PV output and residential load at the Newington Olympic Village, as well as any correlation with NEM prices, for the NSW Department of Planning.

3. CEEM has exchanged contracts with the Australian Greenhouse Office for funding of *Facilitating the uptake of stochastic renewable energy resources in the Australian National Electricity Market: Wind Energy*, \$660,000 over three years.

2. The ASX has just awarded CEEM and the CSIRO Division of Sustainable Ecosystems \$15,000 to develop experimental economics tools to demonstrate how markets for environmental products work. CEEM and CSIRO will be running a series of one day workshops for policy makers using these tools later in the year.

1. CEEM is embarking on a three year collaborative project with ANSTO that uses naturally occurring radioisotopes to track subterranean water movement.

### Updates

22 Nov 2005 - as well as the presentations from CEEM's Inaugural Annual Conference, presentations from a range of workshops associated with the conference, as well as from a number of other local and international events including a Masterclass workshop are available [here](#). A paper by Karel Nolles is available [here](#).

13 Oct 2005 - as well as a new [paper](#) and three new [presentations](#), the presentations from the recent workshop on State-based options to support renewables are available [here](#)

4 Oct 2005 - The complete presentations from the two short courses "Fundamentals of the Australian Competitive Electricity Industry" and the "Restructured Electricity Industry" are available [here](#).



Some thoughts on *en...*

EN: The Environmental Network - Mozilla Firefox

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http://www.en.unsw.edu.au/


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The EN Project The EN Tools



what motivates you?  
the en enables you to get involved in discussing and addressing environmental issues of importance with other likeminded individuals & groups.

where do you go for more information?  
the en is a centralised area for discussion, collaboration and access to up to date information.

how do you get involved?  
create an account & login to the en to establish or join existing discussion groups in your areas of interest.

your world, your network.

LOGIN to the en

UserName: iainmacgill

Password: \*\*\*\*\*

Login

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[» EN QuickStart Guide \(PDF\)](#)

**Become an EN Member**

To become an EN Member, simply select *Become a Member* in the Login box to the right. Membership is available to researchers, teachers, post-graduate students, government agencies, non-government organisations, consultants and other practitioners in the environmental field. Simply enter your details, agree to the terms and conditions and submit your request. A *trial account* is available if you wish to trial the EN before joining.

**EN: Environmental Network**

When you really think about it, our environment is really just one enormous network - a network of all

**EN: A Discussion Forum and Area for Online Networking**

The EN Discussion Forum primarily facilitates

Latest EN News

[» EN Mini-conference](#)

[» Water Research @ UNSW Researchers Symposium](#)



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Thankyou... and *questions*

*Many of our publications are available at:*

[www.ceem.unsw.edu.au](http://www.ceem.unsw.edu.au)