Electricity Industry Restructuring and its implementation in Australia

Iain MacGill, Research Coordinator, CEEM
Energy Law, University of Sydney Faculty of Law
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CEEM established …

– *to formalise* growing interest + interactions between UNSW researchers in Engineering, Commerce + Economics, Arts + Social Sciences, Science, AGSM, IES…

– *through Research Centre* undertaking research in interdisciplinary design, analysis + performance monitoring of energy + environmental markets, associated policy frameworks

– *in areas of*

  ▪ Physical energy markets (with an initial focus on ancillary services, spot market + network services for electricity + gas)
  ▪ Energy-related derivative markets (financial + environmental including interactions between derivative and physical markets)
  ▪ Policy frameworks and instruments in energy and environment
  ▪ Experimental market platforms and AI ‘intelligent agent’ techniques to aid in market design
  ▪ Economic valuation methodologies

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

- The process of electricity industry restructuring
- Implementation of restructuring in Australia
- Restructuring & environmental outcomes to date
- Future directions
- Conclusions
Stationary energy sector conversion chain

Primary energy forms: coal, gas, nuclear, renewable

The electricity supply industry:
- Generation
- Transmission
- Distribution

The natural gas supply industry:
- Treatment
- Transmission
- Distribution

End-use options, eg: efficiency, cogeneration, solar

Energy losses & external impacts

End-use equipment delivering energy services: light, heat, motive power

Energy industry restructuring and its implementation in Australia
Key issues for the electricity industry

- Key component of stationary energy sector
  - High quality secondary energy form
    - Expensive to make but flexible to transport + use
  - Competes with other energy sources to deliver end-use services
  - …yet also relies on these other sources

- Significant externalities:
  - Environmental
    - eg Australian EI responsible for 35% of GHG emissions
  - Social (an “essential good”)

- Is an infrastructure industry
  - *(Definition: essential elements forming the basis of a system)*
    - Essential – product or service can’t be produced without it
    - Natural monopoly elements – certainly in physical networks

- Specific physical properties
The electricity industry is different…

Cars
- Can be touched, seen, & stored, last for years
- Consumer choice promotes competition:
  - Each consumer can buy a specific car
  - Each manufacturer can control product quality
- Spatial separation of buyer & seller not a serious issue

Electricity
- Intermediate energy form: invisible, ephemeral, fungible
- Consumer receives mixed flow of energy from all stations:
  - A consumer can’t choose a power station
  - Power station can’t control quality of delivered energy
- Location matters because of network losses & constraints

Bilateral trade works well:
- Can use normal commercial framework although cars have infrastructure + externality issues that still have to be addressed

Bilateral trade doesn’t work well:
- Must design & implement appropriate decision making framework to manage EI characteristics, infrastructure + externality issues
Decision making

- A **decision** is the commitment to irrevocably allocate valuable resources *with consequences*. **Decision making** is the **cognitive process** of selecting a course of action from among multiple alternatives. (Wikipedia.org)

- Decision-making framework
  - What objectives
  - What decisions (*available choices*)
  - How are they taken (*process*)
  - Who takes them (*individuals, groups – always challenging*)

- Good decision making likely to require
  - Well informed decision makers
  - With a good process that includes all stakeholders
  - Autonomy for the decision maker (*decision theirs to make*)
  - …but also accountability

- For electricity, a likely continuum between centralised (government) and decentralised (commercial) frameworks
Electricity industry objectives

- Economic: minimum cost / maximum benefit
- Security: reliable supply to consumers
- Environmental management

- Maximise overall benefits of trade (IBOT)
  - Starting point is desired energy services
  - Seek most efficient way to meet these
Processes: single decision maker eg. vertically integrated electricity supply utility

- Britain, New Zealand, Australia, etc:
  - Statutory authority supervised by a Minister
  - Decision making political, “behind closed doors”:
    - Politicians negotiate tradeoffs

- USA:
  - Regulated private monopoly (in most cases)
  - Regulatory commission & formal public hearings
Centralised (monopoly) decision making

- **Risks**
  - Low efficiency
  - Low innovation
  - Stakeholder capture

- **Process issues**
  - Transparency
  - Stakeholder consultation processes
  - Separation of powers between those who make the rules, put them into operation and judge them
Centralised planning: eg. EC NSW

- Generation planning, investment and operation all undertaken by Electricity Commission of NSW
- NSW elec. consumption +9% / year in 1960-70s, +6% / year up to early 1980s, then 3% / year (excluding Al smelters)
- In 1984
  - NSW system has 10,000MW of coal plant, 320MW of gas turbines, 3000MW of Hydro
  - 2640MW Bayswater under construction + due on-line 1985-6, 1320MW Mt Piper committed + due 1992-3, 660MW Tallawarra C announced
  - Projected reserve margin >60% for rest of decade and beyond…
  - Agreements in place for greater coordinated development between Vic, NSW and SA
Commission of Inquiry into Electricity generation planning in NSW - 1985

- Tasked to examine and report on:
  - Recommended generation plan including size, type, location and timing of future projects
  - Appropriateness of current procedures + gen. planning
  - Guidelines for appropriate allocation of coal resources
Commission findings – generation plan

- Require better tactical + strategic planning
- Options for deferring new baseload investment proposed by ECNSW
  - more focus on value of >interconnection with Vic than ECNSW presently gives it
  - more gas turbines rather than base-load coal will save $$ (approx. 300MW of peaking per 600MW of base)
  - Explore dry cooling options, CCGT, load management
  - Need better + more transparent forecasting process
Commission findings - process

- NSW gen planning suffers from procedural problems as well as lack of consultation with public in industry which is totally funded by consumers.
- Gen. projects large scale + lead times makes it difficult to exercise adequate political control.
- Without clearly laid down guideliness + external scrutiny, large technological organisations often develop monopolistic practices + internal culture remote from broader social + political concerns.
- Such organisations can inefficiently allocate societal wealth: *excess capacity will cost NSW several $billions*.
- Need clearly articulated understanding of longer-term objectives, well resourced independent agency with overview role, formal public processes with high transparency.
The NSW situation in 2004

Existing NSW plant mix is still biased towards base-load generation + adequate for present demand despite no significant new plants since Mt Piper

IES “Optimal plant mix” for NSW (IES 2004 report to IPART)
Processes - Markets

- A **market** is a mechanism which allows people to **trade**, normally governed by the theory of **supply and demand**, so allocating resources through a **price mechanism** and **bid and ask** matching so that those willing to pay a price for something meet those willing to sell for it. (Wikipedia.org)

- **In essence, another possible framework for decision-making**
Electricity industry restructuring objectives

- Improve economic efficiency by facilitating competition & new entry, which assumes:
  - Effective markets & sound legal & policy frameworks

- Enhance accountability to end-users & society through ‘customer choice’, which assumes:
  - End-users become active participants in the industry
  - End-users are independent agents who make “informed” decisions & efficiently manage the associated risks:

- Implement a market-based approach to social & environmental externalities:
  - Assumes political will to regulate non-monetarv impacts

- Release government funds by asset sales:
  - Creates a moral hazard for politicians
The electricity industry restructuring process: *diversifying decisions, broadening options, spreading risks*

<table>
<thead>
<tr>
<th>Issue</th>
<th>Transition</th>
<th>Key challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural disaggregation</td>
<td><em>From</em> monopoly <em>To</em> competing firms <em>Plus</em> system operator(s)</td>
<td>Cultural change; Adequate competition; Accountability</td>
</tr>
<tr>
<td>Commercial Decision-making framework</td>
<td><em>From</em> cost recovery <em>To</em> market prices</td>
<td>Market power; Market design fidelity; Accountability</td>
</tr>
<tr>
<td>Regulatory Decision-making (economic)</td>
<td><em>From</em> rate of return <em>To</em> Incentive Regulation</td>
<td>Multiple objectives; Measuring outcomes; Accountability</td>
</tr>
<tr>
<td>Regulatory Decision-making (environmental)</td>
<td><em>From</em> direct cost <em>To</em> full costs</td>
<td>Variable RE energy flows End-user participation; Accountability</td>
</tr>
</tbody>
</table>
Where competition may be introduced? (IEA, 2002)

### Table 1

**Functional Structure of the ESI**

<table>
<thead>
<tr>
<th>Function</th>
<th>Key Economic Characteristics</th>
<th>Implications</th>
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</thead>
<tbody>
<tr>
<td><strong>Generation</strong></td>
<td>• Limited scale economies at plant level</td>
<td>Potentially competitive</td>
</tr>
<tr>
<td></td>
<td>• Co-ordination economies at system level</td>
<td></td>
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<td></td>
<td>• Complementarity with transmission</td>
<td></td>
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<tr>
<td><strong>Transmission</strong></td>
<td>• Network externalities</td>
<td>• Investment incentives need special attention</td>
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<tr>
<td></td>
<td>• In general not a natural monopoly</td>
<td>• One grid but possibly several owners</td>
</tr>
<tr>
<td></td>
<td>• Large sunk costs</td>
<td></td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>• Often a natural monopoly</td>
<td>No competition</td>
</tr>
<tr>
<td></td>
<td>• Large sunk costs</td>
<td></td>
</tr>
<tr>
<td><strong>System Operation</strong></td>
<td>• Monopoly (due to technical constraints)</td>
<td>No competition</td>
</tr>
<tr>
<td><strong>End user Supply</strong></td>
<td>• Limited scale economies</td>
<td>Potentially competitive</td>
</tr>
<tr>
<td></td>
<td>• No special features</td>
<td></td>
</tr>
<tr>
<td>Related Services:</td>
<td>• Power Exchanges</td>
<td>Potentially competitive</td>
</tr>
<tr>
<td></td>
<td>• Financial Contracts</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Construction and maintenance of assets</td>
<td></td>
</tr>
</tbody>
</table>
Can energy markets solve all our challenges?

- 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
Trading in electricity: an abstraction from reality

- **Physical electricity industry (equipment; centralised; concrete)**
  - **Engineering models (equipment; centralised; abstract)**
  - **Economic models (humans; centralised; abstract)**
  - **Main commercial markets (humans; decentralised; abstract)**
  - **Externalities**

- **Ancillary services & Regulatory actions (centralised)**

**Policy & regulatory context**
Decentralised (economic optimisation)

- **Spot market energy traded as a commodity:**
  - Energy (that meets QOS criteria) traded at spot prices in successive short spot market intervals

- **Financial instruments:**
  - Related to future spot market prices:
    - Convey expectations of future spot market behaviour
    - Allow risk management

- **Ancillary services:**
  - Resources that maintain quality of supply
Ideal market clearing process
(single auction or many bilateral trades)

- Market clearing price
- Market clearing quantity
- 'revealed preference' demand curve
- 'revealed preference' supply curve
- Consumers' surplus
- Suppliers' surplus
There are potentially many markets...

- Electricity Spot Market
- Derivatives Markets
- Gas & Other Fuel Markets
- Renewable Energy Market

Energy industry restructuring and its implementation in Australia

2% target for retailers or $40/MWh penalty by 2010

Reform Objectives

- Restructuring government-owned utilities
- Removing barriers to inter-state and intra-state trade of energy
- Establishing a transparent, wholesale spot market for electricity to enable competition among generators and retailers in the eastern states
- Establishing open access to electricity networks and third-party access to natural gas networks, and economic regulation of transmission and distribution networks to ensure efficient and transparent pricing of network services
- Enabling customer choice down to the smallest retail customer
- Achieving competitive neutrality in relation to fuel sources, between incumbents and new entrants and between government-owned and privately-owned businesses
The terminology of restructuring

- Is this process
  - Market reform
  - Deregulation
  - Restructuring
  - Liberalisation
  - Privatisation
NEM development milestones

1991, Australian Government Industry Commission initiated restructuring electricity industry (estimated benefit in order of $6 billion); National Grid Management Council (NGMC) was established in July.

1993, National Competition Act 1993 (Hilmer Report)


1996, established regulatory regimes for transmission, distribution, retail licensing, safety and environmental performance

1996, National Electricity (South Australia) Act 1996

May 4, 1997, NEM stage 1, NSW, VIC, ACT, SA

Dec 13, 1998, NEM commenced operation

Jan 18, 1998, QLD connected to NEM

1994-1995 VIC, disaggregation and privatization of generation, distribution and retail sectors

1993-1998 SA, disaggregation and privatization of generation and retail sectors

Oct. 1994, VICPOOL

May 10, 1996, NSW wholesale market

1995-1996 NSW, disaggregation of generation and merger of distribution and retail sectors

1997-1995 QLD, disaggregation and privatization of generation and retail sectors

May 1996, NECA and NEMMCO were founded

Energy industry restructuring and its implementation in Australia
Scope of the NEM

- Queensland
- New South Wales & ACT
- Victoria
- South Australia
- Tasmania (on connection to the mainland)

NEM regions are indicated, and their boundaries need not be on state borders (e.g. two regions in NSW)
Key NEM features

- **NEM covers all participating states:**
  - A multi-region pool with intra-regional loss factors
  - Ancillary services, spot market & projections
  - Auctions of inter-regional settlement residues
  - Operated by NEMMCO (owned by states)

- **Compulsory participants in NEM:**
  - All dispatchable generators & links > 30 MW
  - Network service providers & retailers

- **Contestable consumers may buy from NEM**
Energy industry restructuring and its implementation in Australia

Electricity industry structure in SE Australia

**Generation Sector:**
- Gen 1
- Gen 2
- Gen 3
- Gen X

**Multi-region National Electricity Market (NEM):**

**Transmission Sector:**
- NSW
- Victoria
- South Aust.
- Queensland
- & possibly Tasmania

**Distribution Sector:**
- Distributor 1
- Distributor 2
- Distributor Y

**Retail Sector:**
- Retailer 1
- Retailer 2
- Retailer Z

**Financial instrument & REC (emission) trading**

**Retail Markets**

{End-use sectors:
- Embedded generators
- Contestable end-users
- Franchise End-users
- End-use Equipment & Distributed resources

**End-use sector**

**Electricity**

**Electricity**

**Network access**

**Intentions offers & payments**

**Intentions bids & payments**
National Electricity Market market regions
(Securing Australia’s Energy Future, 2004)

- Directlink DC link, currently MNSP
- Murraylink DC link, now regulated, formerly MNSP
- Basslink DC link MNSP (2006?)
  600MW short term rating (north)
Managing supply-demand balance in NEM

Spot market forecast & derivative markets

Increasing uncertainty

Commercial issues

Physical issues

Supply/demand projections & FCAS derivative markets

Spot market for period t

Spot market for period t+1

Frequency control ancillary service markets for period t

FCAS markets for period t+1

Time
Statement of opportunities (SOO) is intended to inform generation and network investment decisions (10 year horizon, yearly update)

MT Projection of System Adequacy (PASA) is intended to inform near-term reliability assessment and reserve trader processes (2 year horizon, weekly update)
Key derivative markets

- **Forward contracts (futures)**
  - Expected spot price for a defined load shape & period (e.g., flat annual demand)
  - Either OTC or exchange traded

- **Call options**
  - ‘Insurance’ against unexpectedly high spot market prices

- **Renewable energy certificates**
  - Available to qualifying generators
  - Increasing to 9,500 GWH pa at 2010 then cont. to 2020
2003 Load duration curves for NEM states (NEMMCO SOO documents, 2004)
Typical NEM Supply Curves

(Delta Electricity, 2003)
Weekly avg. NEM spot prices since market inception (NECA, 05Q1 Stats, 2005)
Running weekly accumulation of (336) RRP\$s & cumulative price threshold (CPT) (NECA, 05Q1Stats, 2005)

S10,000/MWH price cap reduced if CPT is reached
Distribution of NEM spot prices & revenues
Flat contract prices, Q1 2005
(NECA, 05Q1 Statistics, 2005)
D-cyphaTrade exchange-traded call options for NSW peak period (www.d-cyphatrade.com.au)
Price history for NEM & its precursors
(Business Council of Australia, 2000)

* Three month moving averages. For years prior to market operation the prices are the result of dividing generation revenues by energy produced.

Source: Bardak (extracted from NEMMCO data and Annual Reports)
Australian Electricity Industry Value Chain

(Bach Consulting, Report to NEMMCO on Risk Management in the NEM, 2003)
NEM Ownership – Private and Government

State And Private Asset Ownership In The National Electricity Market

<table>
<thead>
<tr>
<th>Category</th>
<th>Energy Providers</th>
<th>Generators</th>
<th>Transmission</th>
<th>Distribution</th>
<th>Retail</th>
</tr>
</thead>
<tbody>
<tr>
<td>% State owned</td>
<td>Few</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
<td>60%</td>
</tr>
<tr>
<td>Value of Assets</td>
<td>$7b</td>
<td>$4b</td>
<td>$18.2b</td>
<td>$1.8b</td>
<td></td>
</tr>
<tr>
<td>% Private Owned</td>
<td>Most</td>
<td>30%</td>
<td>30%</td>
<td>30%</td>
<td>40%</td>
</tr>
<tr>
<td>Value of Assets</td>
<td>$3b</td>
<td>$2b</td>
<td>$7.8</td>
<td>$1.2b</td>
<td></td>
</tr>
</tbody>
</table>

State Owned Enterprises = $31b (69%)
Private = $14b (31%)

(Bach Consulting, Report to NEMMCO on Risk Management in the NEM, 2003)
Energy industry restructuring and its implementation in Australia

NEM Regulation… as it was

National Electricity Law

NECA

National Electricity Code

NEMMCO

NEM participants:
* Generators
* Retailers
* Direct customers
* Network service providers

National Electricity Tribunal

RP & CCP

ACCC

Dispute resolution

ASIC

State Regulation
So, what’s next?
Security outcomes from 2004 SOO (NEMMCO, 2004)

<table>
<thead>
<tr>
<th>Table 1 Minimum Reserve Level Changes from 2003 SOO (MW)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Queensland</strong></td>
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<tr>
<td>SOO 2004</td>
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<td>SOO 2003</td>
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<tr>
<td>Change</td>
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</tbody>
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<table>
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<tr>
<th>Table 5 Projected Low Reserve Conditions</th>
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</thead>
<tbody>
<tr>
<td><strong>LRC Point</strong></td>
</tr>
<tr>
<td>Queensland</td>
</tr>
<tr>
<td>New South Wales</td>
</tr>
<tr>
<td>Victoria/South Australia (combined)</td>
</tr>
<tr>
<td></td>
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<tr>
<td>Tasmania</td>
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</table>
Energy industry restructuring and its implementation in Australia

NEMMCO Statement of Opportunities, 2004

• reserve capacity support from the Snowy Hydro Scheme and Queensland provide additional available capacity in 2006/07 and 2007/08

• In 2008/09, New South Wales experiences deficits, even though Queensland has additional available capacity. This is due to interconnector transfer limits from Queensland

• In 2008/09, New South Wales cannot source additional capacity from Snowy, as Victoria and South Australia are already experiencing deficits

• From 2005/06 onwards, following commissioning of Basslink, there is an additional available capacity of 600 MW to the Victoria and South Australia region

• An LRC point occurs in the following year (2006/07), when the Extra Capacity for Reliability is 321 MW

• In 2006/07 and 2007/08, reserve support from Snowy, New South Wales and Queensland is limited by the capability of the Snowy to Victoria interconnector
Projected emissions from Stationary Energy sector, 1990-2020

Australia has the world’s highest per-capita greenhouse gas emissions
(Aust. Institute, 2002)

Getting it wrong? – the NEM & climate change

- Aust. National Electricity Code doesn’t include specific environmental objectives
- However, expectation by some that Aust. Electricity Industry restructuring would help (14 MtCO2 reduction from BAU in 2010):
  (Commonwealth Govt, Climate Change: 2nd Communication to IPCC, 1997)
  - Efficient competition in supply by cogen + renews
  - More sensible patterns of energy use through incentives for investment in EE
  - Greater penetration of natural gas
What actually happened?

- Instead, now projected to increase 0.1MtCO2 above BAU (CoAG, 2002)
  - Low cost of coal fired generation in Australia
  - Current failure to price greenhouse emissions
  - Excess electricity capacity that has depressed prices
  - Relatively immature and inflexible gas market
  - Reduced emphasis on EE from lower prices
  - Market design and regulation that favours incumbents (eg. advantages coal against new entrants like DG)
  - Supply-side orientation of reforms to date
COAG Response to Parer Review
(Ministerial Council on Energy Communique, 1/8/03)

- Recommends the establishment of:
  - A single energy market governance body
  - A new national legislative framework
  - Two new statutory commissions from 1/7/04:
    (electricity (& later gas) wholesale market & transmission)
      - Rule making & market development, replacing NECA
    - Australian Energy Regulator (AER)
      - Wholesale market & transmission regulation & possibly distribution & retail; partly taking over ACCC role

- Undertake comprehensive transmission review & consider national planning function
COAG Response to Parer Review, ctd
(Ministerial Council on Energy Communique, 1/8/03)

- Examine options to enhance user participation, including interval metering
- Respond to current Productivity Commission review of National Gas Access Regime
- Review upstream gas arrangements
- Address greenhouse emissions from energy sector on a national basis with an Emissions Trading System
# MCE program summary (12/03)

<table>
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</thead>
<tbody>
<tr>
<td>1. Governance &amp; Institutions [SA]</td>
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<tr>
<td>Inter-Governmental Agreement</td>
<td>MCE note framework</td>
<td>SCO draft IGA</td>
<td>MCE approve IGA</td>
<td>CoAG endorse IGA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Legislation</td>
<td>MCE consider legislative models</td>
<td>MCE finalise legislative framework. SCO develop draft bills</td>
<td>MCE approve bills. Bills introduced in parliaments</td>
<td>Legislation enacted</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Establish AEMC &amp; AER</td>
<td>SCO draft structure &amp; operations paper</td>
<td>MCE endorse structure &amp; operations paper</td>
<td>Commissioners selected</td>
<td>Operations commence</td>
<td>Transfer gas transmission*</td>
<td></td>
</tr>
<tr>
<td>MOU between ACCC-AEMC-AER</td>
<td>SCO draft framework</td>
<td>SCO develop MOU</td>
<td>MCE finalise negotiation &amp; approve MOU</td>
<td>MOU implemented</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NECA &amp; NGPAC Transition</td>
<td>SCO draft transition paper</td>
<td>SCO endorse transition plan</td>
<td></td>
<td>NECA dissolved</td>
<td>NGPAC dissolved (subject to PC gas review)</td>
<td></td>
</tr>
<tr>
<td>Subsume NEMMF into MCE</td>
<td>SCO review NEMMF work program</td>
<td>NEMMF work program continues under SCO/MCE</td>
<td></td>
<td>NEMMF dissolved</td>
<td></td>
<td></td>
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<tr>
<td>2. Economic Regulation [Vic]</td>
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<tr>
<td>Energy Access</td>
<td></td>
<td>SCO draft issues paper on national approach</td>
<td>MCE endorse preferred approach</td>
<td>SCO develop national approach (subject to MCE decision and consideration of PC gas review)</td>
<td>MCE agree national structure</td>
<td></td>
</tr>
<tr>
<td>Distribution &amp; Retail</td>
<td>MCE agree policy &amp; timing</td>
<td>SCO develop framework paper</td>
<td>MCE endorse framework paper</td>
<td>SCO develop detailed national structure</td>
<td>MCE agree national structure</td>
<td></td>
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</tbody>
</table>

* MCE denotes MCE decision point.
<table>
<thead>
<tr>
<th>Projects</th>
<th>Q4/03</th>
<th>Q1/04</th>
<th>Q2/04</th>
<th>Q3/04</th>
<th>Q4/04</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Electricity Transmission [Qld]</td>
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</tr>
<tr>
<td>Transmission Regulatory Reform</td>
<td>MCE endorse policy framework</td>
<td></td>
<td>Commission study on regional boundaries. Commence agreed code changes</td>
<td>MCE consider boundary report. Remove market biases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Transmission Planning</td>
<td></td>
<td></td>
<td>NEMMCO commence scoping ANTSS.</td>
<td>MCE finalise new planning process</td>
<td>First ANTS produced</td>
<td></td>
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<tr>
<td>4. User Participation [Tas]</td>
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<tr>
<td>o Demand side response</td>
<td>SCO develop issues paper</td>
<td></td>
<td>SCO prepare draft report</td>
<td>MCE approve user policy</td>
<td></td>
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<tr>
<td>o Interval metering</td>
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<td>o Full Retail Contestability</td>
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<td>5. Gas Market Development [NT]</td>
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<tr>
<td>MCMPR Upstream Issues</td>
<td>Advice requested from MCMPR</td>
<td></td>
<td>MCMPR review unpurchased areas for 3rd party access</td>
<td>MCE respond to MCMPR review</td>
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<tr>
<td>PC Gas Access Review</td>
<td>PC issue draft report</td>
<td></td>
<td>PC issue final report</td>
<td>SCO draft response to report</td>
<td>MCE respond to PC review</td>
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<td>6. Program Coordination [C’with]</td>
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<tr>
<td>Market Consultation</td>
<td>MCE endorse consultation plan</td>
<td></td>
<td>Market consultation (as above)</td>
<td>Consultation continues, as appropriate</td>
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</table>

*Denotes stakeholder consultation*

*MCE denotes MCE decision point*
Governance & institutions in Australia:— as seen by Allens Arthur Robinson, December 03

Energy industry participants and end users

Two State and one Commonwealth appointed members

Australian Energy Market Commission (AEMC)

[Electricity & gas market development and code changes]

Ministerial Council on Energy (MCE)

[Electricity & gas market policy]

reporting power of direction

ACCC

[Competition regulation and code change authorisation/approval under Trade Practices Act]

Two State appointed commissioners

Australian Energy Regulator (AER)

[Electricity & gas market regulation: electricity wholesale market and gas & electricity transmission. Distribution & retail regulation in 2006 (other than retail pricing)]

NEMMCO

Other market operators, eg. VENCorp
Conclusions - energy sector decisions

- **Long-term infrastructure choices:**
  - Asset lives of 50 years or more

- **Large externalities (impacts on non-participants):**
  - Climate change (fossil fuels)
  - Nuclear fuel cycle risks (nuclear power)
  - Various adverse impacts (renewable energy forms)

- **Difficult to quantify risks:**
  - Low probability, high impact
  - Non-stationary (history may not be a good predictor)

- **Can be classified as ‘social experiments’:**
  - Should only be undertaken with informed consent
Conclusions - restructuring

- A restructured EI is a “designer” industry:
  - Industry-specific laws, codes, markets
- Mix of technical, economic & policy issues:
  - Physical behaviour continuous & cooperative
  - Commercial behaviour individual & competitive
- Restructuring is still a learning situation:
  - Some disasters & no complete successes
  - Some difficult issues, eg:
    - Network services; ancillary services; retail markets
  - Current COAG / MCE process very important
Conclusions – market design for the EI

- A transparent process that includes all stakeholders
- An appropriate balance and compatibility between:
  - Centralised decision-making - short term (engineering) to long term (policy)
  - Decentralised decision-making (commercial) - operation and investment
- Equal consideration for all system resources
  - Foster competition: don’t favour incumbent technologies + participants against ‘new entrants’ - eg. Demand-side options, distributed generation
- 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

- Allocate costs + benefits to participants as appropriate to extent possible
  - Commercialise industry objectives – eg. internalise externalities
Conclusions from the Australian experience

- Successful electricity restructuring requires:
  - Care in developing & maintaining consensus
  - A high level of professionalism in key roles
  - Extensive peer-review, auditing & testing of market design
    - Experimental economic techniques used to test design

- Also requires a coherent implementation:
  - Decision making & risk management framework:
    - Technical, commercial, social & environmental risks
  - A mix of engineering & commercial techniques, recognising strengths & weaknesses of each
  - Able to work successfully with a weak network, weather-sensitive demand & a growing level of renewable energy
Many of our publications are available at www.ceem.unsw.edu.au