



**Introducing the SIRCA  
Experimental Economics Lab  
– Electricity, Water, Mergers  
Policy, Renewable Energy**

Karel Nolles  
Director, SEE Lab


Macquarie University - 29<sup>th</sup> Sept 2006



### What am I talking about today ?

- Who is SIRCA and the SEELab ?
- What are some of the projects we're now working on ?
- Reviewing two recent papers
  - MRET information rule change
  - Impact of method of value induction in regulatory market


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### About SIRCA

- Not for profit company established by consortium of 28 universities, founded in 1994.
- SIRCA's principal activity - sharing of infrastructure across industry and academia. Super computing power; skilled research and programming personnel; creation and maintenance of market databases
- Operates AC3 super computer facility - part funded from \$5M infrastructure grant in 2001.
  - Exchange Data (inc NEMMCO)
  - Reuters Data
  - Services to Academics, Finance sector participants & Consultants
    - EG: RASP Products (of substantial cross subsidy), Reuters Interface
  - \$1.6M grant in August 2005 to continue Infrastructure Development
- Approx 30 full time staff
  - Plus associated post-grad students / academic visitors


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### SIRCA Experimental Economics Lab

- Taking the “sharing the infrastructure” into experimental economics and behavioural finance
  - Exist to support researchers – be it consultants, academics or government to undertake experimental research.
- SEE Lab has dedicated core team (9 people), and draws on the SIRCA IT team as required.
  - Dr Brian Scott - assists with experimental design and specification work.
  - Software development team
- Provides lab management systems and control software for labs with CSIRO/ANU, University of Canberra, and the Q2074 Lab at UNSW. Negotiations proceeding at a number of other campuses.

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### About us

- Karel Nolles
  - Director, SIRCA SEE Lab (2006 - )
  - Senior Research Fellow, UNSW FCE / CEEM (2004-5)
  - Manager Environmental Markets, Australian Financial Markets Association (2000-04)
    - AFMA is the peak industry body representing the OTC markets
    - Dealer accreditation and training, Standardised documentation, market data
  - EPA Primary Issuance, Basslink Southward IRR
- SIRCA
- ICES-GMU – Visiting Research Fellow – 2002, 2004


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- ICES GMU
  - Research Partner Lab
  - Steve Rassenti
  - Dave Porter
  - Vernon Smith



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## Brian Scott

- Professor (Senior Lecturer) at Uni of Alabama Birmingham
- Visit scientist with CSIRO SE
- Experimental economics, applied to:
  - Nitrogen removal from managed wetlands
  - Experimental testbedding of appropriate market designs

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## Some things we are working on

- Policy maker education
  - With Dr Andy Reeson – CSIRO SE
- CSIRO Landscape Auctions
- Electricity Markets
  - Education tools
  - Capacity Markets Investigation
- Merger Policy
  - AGL/Alinta with Allen Consulting
- Water
- Enviro Markets

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## Policy workshops

- With Andy Reeson, Dave Porter and Stephen Rassenti
- Workshops aimed at giving govt policy makers a “hands on” feel of different markets.
- Set of teaching tools developed with funding by ASX and AFMA

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## Posted Offer (posting)

Auction No. = 1. Remaining = 91  
Status: **In Posting offers period**

About Me...  
Who am I?  
Paul Keating (Participant 10)  
My Bank Balance: **\$200.00**  
Number of Units held: 5

Unit Value Information

Num. Units Held	Marginal Value
0	N/A
1	\$0.00
2	\$2.50
3	\$4.50
4	\$6.50
5	\$8.50
6	\$10.50
7	\$12.50
8	\$14.50
9	\$16.50
10 or more	\$20.00
11 or more	\$20.00

Send Offer to Sell  
Offer Price: Offer Qty:  
No: 1

My Offers

Offer	Price	Qty
P10 Offers 1 @ \$50.00	\$50.00	1
P10 Offers 1 @ \$50.00	\$50.00	1
P10 Offers 1 @ \$49.00	\$49.00	1
P10 Offers 1 @ \$48.00	\$48.00	1
P10 Offers 1 @ \$47.00	\$47.00	1

Last Price Traded: **NO TRADE**

## Posted Offer (buying)

Auction No. = 1 Buying. Remaining = 7  
Status: **In Buying period**

About Me...  
Who am I?  
Jimmy Barnes (Participant 7)  
My Bank Balance: **\$130.00**  
Number of Units held: 9

Unit Value Information

Num. Units Held	Marginal Value
0	N/A
1	\$0.00
2	\$2.00
3	\$4.00
4	\$6.00
5	\$8.00
6	\$10.00
7	\$12.00
8	\$14.00
9	\$16.00
10 or more	\$20.00
11 or more	\$20.00

Accept Lowest Offer  
Last Price Traded: **\$22.00**  
I am Finished

My Offers

Offer	Price	Qty
P10 Offers 1 @ \$48.00	\$48.00	1
P10 Offers 1 @ \$47.00	\$47.00	1
P10 Offers 1 @ \$46.00	\$46.00	1
P10 Offers 1 @ \$45.00	\$45.00	1
P10 Offers 1 @ \$44.00	\$44.00	1
P10 Offers 1 @ \$43.00	\$43.00	1
P10 Offers 1 @ \$42.00	\$42.00	1
P10 Offers 1 @ \$41.00	\$41.00	1
P10 Offers 1 @ \$40.00	\$40.00	1
P10 Offers 1 @ \$39.00	\$39.00	1
P10 Offers 1 @ \$38.00	\$38.00	1
P10 Offers 1 @ \$37.00	\$37.00	1
P10 Offers 1 @ \$36.00	\$36.00	1
P10 Offers 1 @ \$35.00	\$35.00	1
P10 Offers 1 @ \$34.00	\$34.00	1
P10 Offers 1 @ \$33.00	\$33.00	1
P10 Offers 1 @ \$32.00	\$32.00	1

Trades Completed

- Bought 1 unit @ \$22.00 Profit = \$7.00
- Bought 1 unit @ \$11.00 Profit = \$1.00
- Bought 1 unit @ \$11.00 Profit = \$1.00
- Bought 1 unit @ \$11.00 Profit = \$1.00

## “Over the counter” - bilateral

Period 1. Remaining = 70

About Me...  
Who am I?  
Paul Keating (Participant 2)  
My Bank Balance: **\$200.00**  
Number of Units held: 5

Unit Value Information

Num. Units Held	Marginal Value
0	N/A
1	\$0.00
2	\$2.00
3	\$4.00
4	\$6.00
5	\$8.00
6	\$10.00
7	\$12.00
8	\$14.00
9	\$16.00
10	\$18.00
11 or more	\$20.00

Send Offer to Buy  
Offer Price: Offer Qty:  
22 1

Send Bid to Buy  
Bid Price: Bid Qty:  
Enter Price: 1

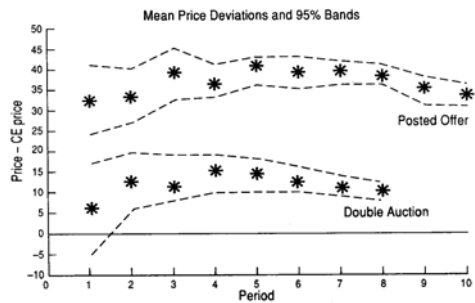
Bids & Offers

Offer	Price	Qty
P10 Offers 1 @ \$33.00	\$33.00	1

Trades Completed

- Bought 1 unit @ \$11.00 Profit = \$1.00
- Bought 1 unit @ \$11.00 Profit = \$1.00
- Bought 1 unit @ \$11.00 Profit = \$1.00
- Bought 1 unit @ \$11.00 Profit = \$1.00

## Other experiment results



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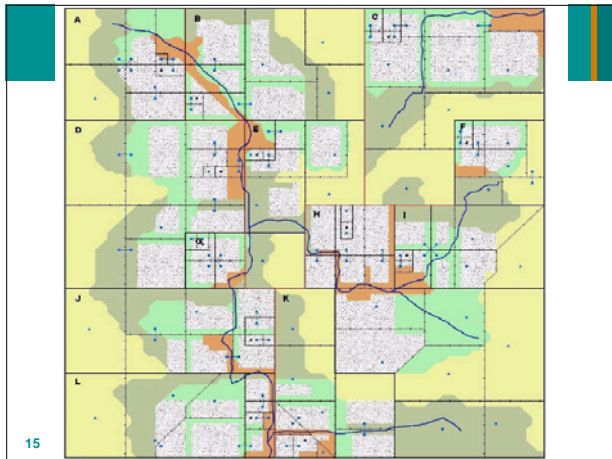
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## LandScape Auctions

- Project with Andy Reeson & Stuart Whitten (CSIRO SE)
- Building on work previously done by Andy & Stuart with team at Griffith University

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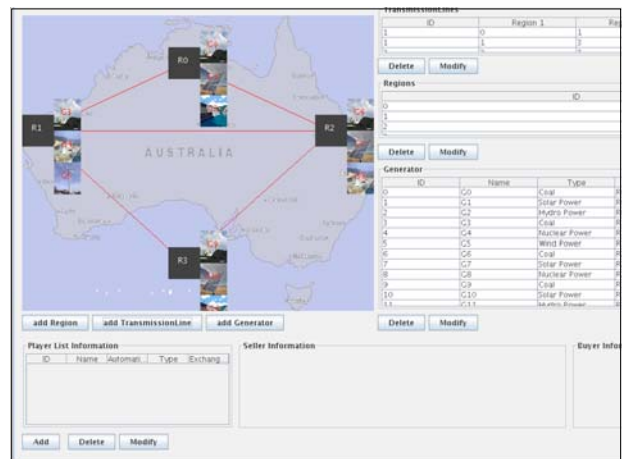
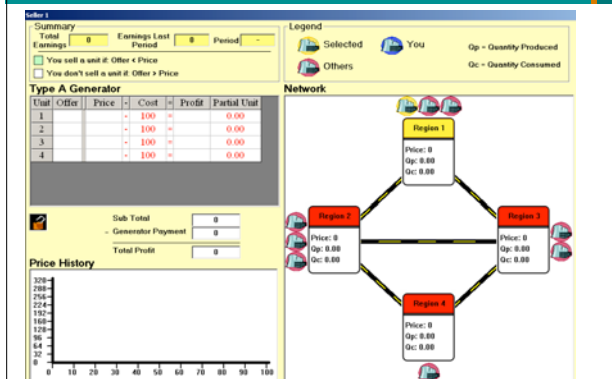
## Electricity Market Projects

- Two projects: "Simple" and "Capacity"
  - Stephen Rassenti, Hugh Outhred, Vernon Smith, Karel Nolles.
- Simple is to develop a demonstration electricity market for teaching / demonstration purposes. (\$20k)
- Capacity is a consulting project for MISO (\$500k)

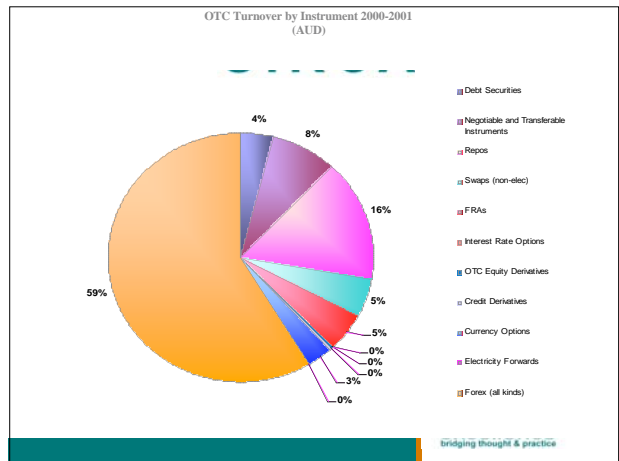
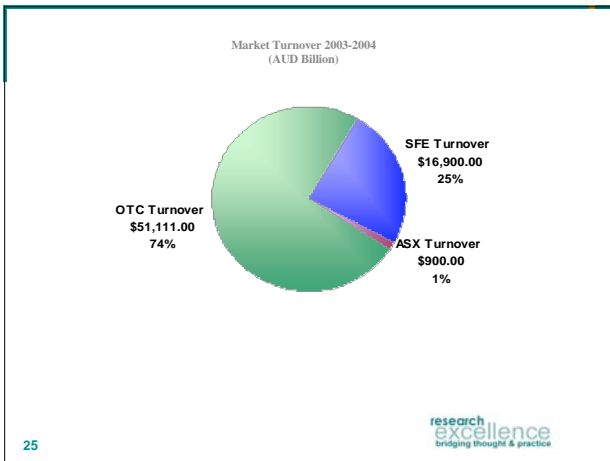
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## Electricity Market







## The Mandatory Renewable Energy Target Market

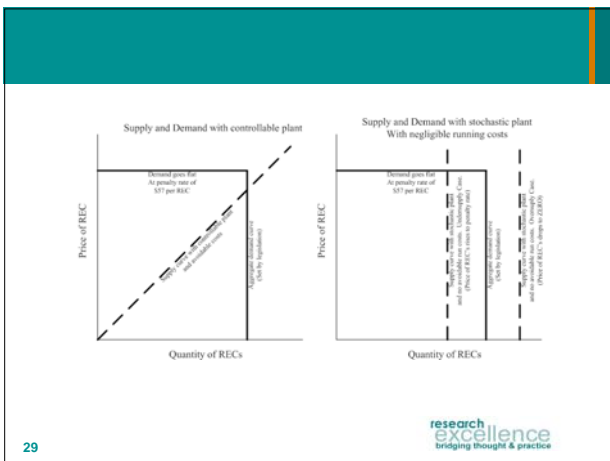
- Small of scale but interesting of nature
- Recently encountered significant market reversal.
- Still by volume the largest environmental market in Australia.
- Gross Turnover grows to around 4% of the physical electricity market.
- 4% of 0.35% is around 0.01% total (cash).
- Reviewed by Govt committee, report tabled early 2004. Various recommendations made wrt changing market architecture.
  - Mostly not yet implemented, although agreed.

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## MRET Market Design

- Similar to UK ROC and the Texas REC schemes.
- Electricity retailers are held liable to secure RECs
- Renewable generators can produce RECs
- Banking
- Bilateral OTC trading, with some brokers
- RECs can be created from electricity at any time before the end of the scheme....
  - Only become visible in registry after creation
  - Information problem exists

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## MRET Market - Retailer

Today's Date and Days until end of year  
Today is: 21 January 2001  
There are 349 Days to Accrual date

My Cash Balance: **\$2,594,925.00**

About Me...  
Plant Portfolio Logged in as participant 100

Year	My Target	All Target	Units in Market
2000	75	200	118
2001	276	1,300	103
2002	460	1,800	
2003	650	2,000	
2004	850	2,400	
2005	1,100	3,000	
2006	1,400	3,600	
2007	1,700	4,200	
2008	2,000	4,800	
2009	2,375	5,400	
2010	2,375	6,000	
2011	2,375	6,600	
2012	2,375	7,200	
2013	2,375	7,800	
2014	2,375	8,400	

Individuals TARGET - Number of units 'Y00' need by need for Jan  
Estimated requirement = 275

Your target to END of experiment  
Your target over ALL remaining years = 22,725

Send Offer to Sell  
Offer Price: Offer Qty  
Enter Price: 20  
Send Offer to Sell

Send Bid to Buy  
Bid Price: Bid Qty  
33 20  
Send Bid to Buy

Total Future Demand - All Participants: **90,900 units**  
Total Units in market from all participants: **133 units**  
Units in my account: **0 units**

NO TRADE

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## MRET Experiment - Example Screen

Today's Date and Days until end of year  
Today is: 29 March 2009  
There are 272 Days to Acceptal date

**Supplier G1**  
My Cash Balance: \$326,370.00  
Cost is \$10.00 per MWh

James Herold is Logged in as participant G1

**Production Status**  
**RUNNING**  
Create Date: 1/3  
STOP  
Create

**Market Data**

Year	All Target	Units in Market
2008	286	14
2009	1,100	1,100
2010	1,800	1,800
2011	2,400	2,400
2012	3,000	3,000
2013	3,600	3,600
2014	4,200	4,200
2015	4,800	4,800
2016	5,400	5,400
2017	6,000	6,000
2018	6,600	6,600
2019	7,200	7,200
2020	7,800	7,800
2021	8,400	8,400
2022	9,000	9,000
2023	9,600	9,600
2024	10,200	10,200
2025	10,800	10,800
2026	11,400	11,400
2027	12,000	12,000
2028	12,600	12,600
2029	13,200	13,200
2030	13,800	13,800

**Send Offer to Sell**  
Offer Price: 24 Offer Qty: 10  
Send Offer to Sell

**Send Bid to Buy**  
Bid Price: Bid Qty: 10  
Send Bid to Buy

**NO TRADE**

**Blids To Buy Currently in Market**  
25Mar09 01 Offers for 10 @ \$14.00 each = (\$140.00)  
26Mar09 02 Offers for 10 @ \$13.00 each = (\$130.00)

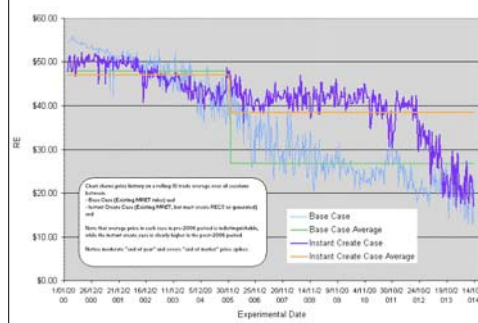
**Blids To Sell Currently in Market**  
27Mar09 01 Bids for 10 @ \$22.00 each = (\$220.00)  
28Mar09 04 Bids for 10 @ \$21.00 each = (\$210.00)

Total Future Demand: All Participants: 91,200 units  
Total Units in Market Now: all participants: 49 units  
Units in my account: 12 MWh  
Units in my account: 30 units

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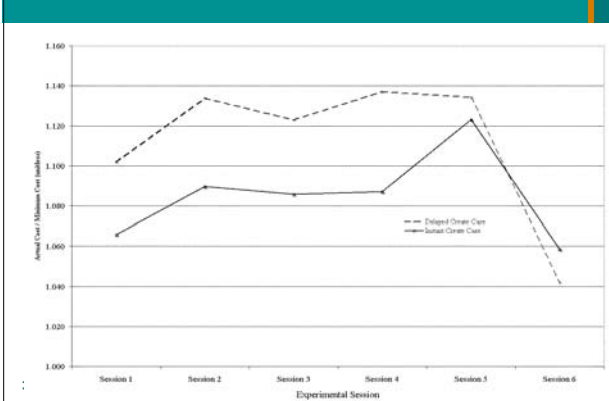
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## MRET - Aggregate Results - all sessions Rolling 10 Trade Price Averages



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## Cost minimising market ??



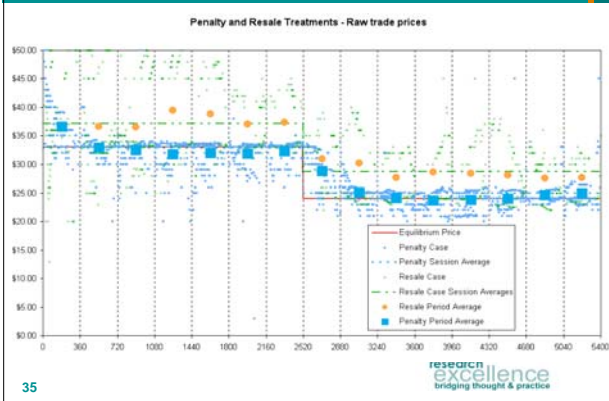
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## Penalty or Resale ??

- Both approaches used for Regulatory Markets
- Does it matter ?
- In straight financial incentive terms, no.
- But in behavioural terms ???

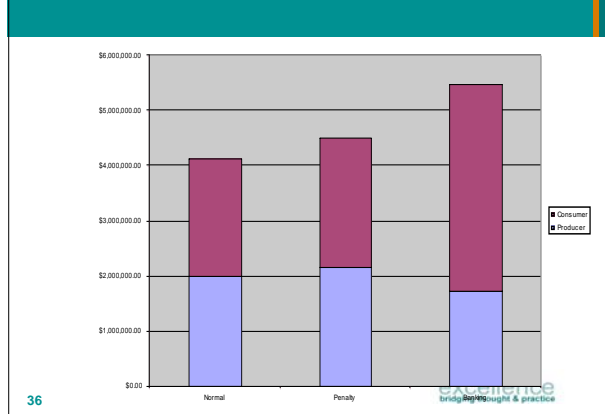
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## Impact of Resale or Penalty



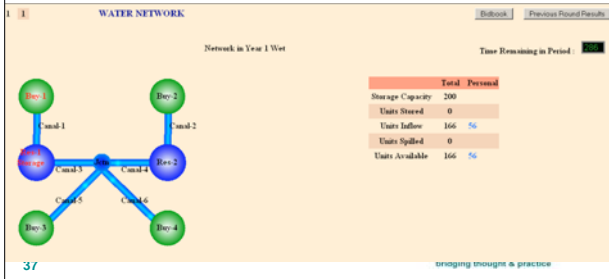
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## Normal, Penalty, Penalty with Banking



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## Water Market



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