



UNSW SCHOOL OF ELECTRICAL ENGINEERING + TELECOMMUNICATIONS  
***ELECTRICITY RESTRUCTURING GROUP***

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## **UNSW Power Systems Seminar Program**

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# **Energy efficiency certificate trading and the NSW Greenhouse Benchmarks**

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# Presentation outline

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- The role of EE in effective, efficient GHG action
- The challenge of EE policy measures
  - Dealing with market failure in demand-side decisions
- Energy efficiency certificate trading schemes
  - Design – ‘baseline and credit’
  - Challenges – *proving additionality*
- EECT and economy-wide GHG emissions trading
  - ‘Cap and trade’ **vs** ‘baseline and credit’
- EECT within the NSW Greenhouse Benchmarks



# Energy efficiency

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- Demand-side actions have key role in any environmentally effective, economically efficient policy response to climate change
- Energy efficiency
  - Some of the most cost-effective GHG emissions reductions available IPCC (2001) *Third Assessment Report*
  - Other benefits including energy security, job creation



## EE and policy

- EE requires policy intervention
  - Some of its benefits are market ‘externalities’
  - Clear evidence of market failure
    - “Numerous studies indicate up to 20% potential energy savings (on average) with efficiency measures that deliver at least 20% internal rate of return” (SEDA)
    - ‘Transaction costs’ don’t invalidate case for market failure *if* there are effective and efficient policy means to address it  
=> a role for regulation that reduces transaction costs
- Widespread and growing EE policy measures
  - 200 new policies and measures amongst IEA countries in yr 2000 alone addressing energy-related emissions – many relate to EE IEA (2002) *Dealing with Climate Change*



# Effective, efficient EE policies

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- Market failure is an opportunity
  - Strictly cost-effective measures are *Win-Win / No regrets*
- ...yet a challenge
  - Decision makers on the demand-side won't even act to save themselves money
- Why?
  - Complexity: behaviour, equipment, infrastructure
  - Many decision makers and roles
  - Poor information and knowledge
  - Little incentive given low energy costs and other priorities



# Market based EE policies

- Electricity industry restructuring
  - Market-based competition might enable and focus decision-makers, *however*  
Lower prices, mainly supply-side restructuring to date
- Market-based EE mechanisms
  - Possible economic benefits over ‘command + control’
  - Growing interest and efforts worldwide  
*eg. Energy Efficiency Certificate Trading (EECT)*



# Energy efficiency certificate trading

- EE certificates representing measured and verified 'energy savings' (MWh) from EE
- Legal obligation on some group of parties that they regularly acquit certificates as part of societal obligations (voluntary schemes possible too)
- Other parties who create certificates through 'energy savings' actions
- Trading between these parties



# EECT potential

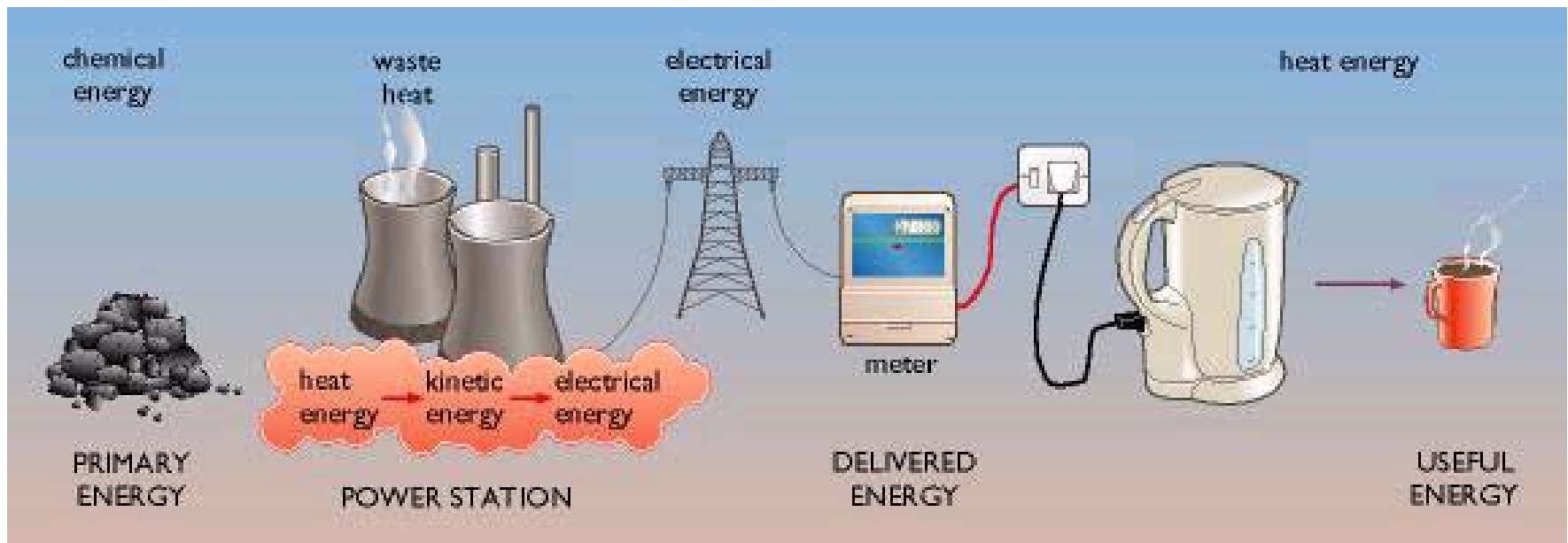
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- Strengths
  - Focus on delivery of ‘measurable’ EE outcomes
  - Might ‘reach’ across wide range of decision makers who have possible EE options
- Challenges
  - Merely another financial incentive to decision makers who already ignore cost-effective EE options
  - Possible transaction costs
  - Some decision makers need targeted help
  - **Additionality**



# EECT and additionality

- How do you measure, verify and hence certify ‘energy savings’ arising from increased EE?  
*Consumption = energy services X efficiency of delivery*



Open University (2003) T206 Course



# Energy savings - behaviour + technology



“The Green Building Partnership (for 60L) ..created a unique Green Lease to put the onus on the tenants to operate efficiently within their space and maximise the environmental benefits of the building...

Such actions described in the lease include choosing efficient lighting, turning off appliances, using photocopiers that reuse paper, and utilising the recycling facilities.”

([www.60Lgreenbuilding.com](http://www.60Lgreenbuilding.com))



## EECT and baselines

- Can be very difficult to separate EE impact on energy consumption (and actions to drive energy savings)
  - Measuring energy savings requires view of what would have happened otherwise
    - Rewarding decision makers for doing something differently to how they otherwise might have, but hadn't actually yet, done
    - Requires an estimation of BAU behaviour of all potential participants
- => considerable *abstraction* is required



## EECT – estimating BAU behaviour

- Technical progress in EE of equipment
- Impacts of other policy measures
  - Clearly related *eg. MEPS*
  - Related *eg. hidden subsidies for reverse-cycle air conditioning*
  - Seemingly unrelated, yet with significant impacts
- External factors *eg. the weather*
- Many other possible influences - behavioural changes, new priorities, new technologies

## EE and BAU progress – an example

- How to influence decision makers choosing a new computer to include EE concerns?

### Dell™ Dimension™ 8250



Intel® Pentium® 4 Processor 2.53GHz

From: **A\$2,399**  
(Price includes GST & Delivery)

### Dell™ Inspiron™ 8200



Mobile Intel® Pentium® 4 Processor  
at 2.2GHz-M featuring Intel®  
Speedstep® technology

From: **A\$3,899**  
(Price includes GST & Delivery)

- Might we need a scheme to reward decision makers for choosing the energy efficient laptop?



# The effectiveness of EECT

- Scheme depends on measurable, verifiable and hence certifiable 'energy savings' from EE
- Trading adds to challenge: A 'market for lemons'
  - If buyers can't verify quality then sellers of 'lemons' encouraged to enter market
    - =>Buyers won't pay high prices actually required for good products
    - =>Good products penalised, poor products subsidised
  - Buyers due to legislated obligations not interested in quality beyond certification
    - => Seek lowest cost products and problem gets worse



## EECT schemes to date

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- UK and Italian schemes now underway
  - Limited scope, cautious introduction
- The NSW Benchmarks Scheme
  - Most ‘ambitious’ EECT scheme yet implemented
  - Integrated within even more ‘ambitious’ economy-wide ‘baseline and credit’ emissions reductions trading scheme



# EECT + GHG emissions trading

- Growing interest in Australia + worldwide
  - “Introduce an economy wide emissions trading system” CoAG (2002) *Energy Market Review*
    - Possible economic advantages in letting market find lowest cost options for emissions reductions across DSA, generation and sequestration
- However
  - “In addition to a national emissions trading system, there is likely to be a need for supplementary measures that address market impediments and aim... to promote abatement and innovation in those areas of the economy that an emissions trading system would have trouble reaching”  
AGO (2002) *Submission to CoAG.*





## Possible implementations

- Subsume EECT within economy wide 'baseline + credit' trading  
*eg. NSW Greenhouse Benchmarks Scheme*  
*However*
  - Fungibility
    - Renewables comparable to DSA to sequestration?
  - A supplementary measure?
    - Provides a means, but how effective a motivation
- Keep as a separate trading scheme
  - How to reconcile with other emissions activities?



# EECT within ET – The key challenge

- ‘Emissions credits’ **vs** ‘emissions’ trading
- Climate change driven by emissions, **not** emissions reductions from BAU  
=> objective is to cap emissions
  - Requires ‘cap and trade’
    - “It is clear that a mandatory ‘cap and trade’ system lends itself to much lower levels of monitoring and verification cost than ...trade in project-based ‘abatement credits defined against a BAU baseline”  
(AGO, 2002, CoAG Submission)
  - *However*, EECT has to be ‘baseline and credit’ with savings from hypothetical BAU emissions



# NSW Greenhouse Benchmarks Scheme





# NSW Greenhouse Benchmarks Scheme

- Policy intent
  - “reduce greenhouse gas emissions associated with the production and use of electricity and to encourage participation in activities to offset the production of greenhouse gas emissions.”  
(Overview to the Electricity Supply Amendment Bill, 2002)
- Implementation
  - Per-capita greenhouse gas emissions targets for the NSW Electricity Industry via Retailer Licence Conditions (NSW Electricity Supply Act, 1995)
  - Baseline+credit ‘emissions reductions’ trading



## NSW Scheme – Design (since Jan 2003)

- ‘NSW Greenhouse gas abatement certificates’ (NGACS) representing measured and verified abatement (tonnesCO<sub>2</sub>-e)
- Legislated NSW retailer obligations to annually acquit NGACs equivalent to ‘their’ contribution to ‘excess’ state emissions above target
- Accredited providers create NGACs via
  - ‘new’ low-emission generation within the NEM
  - Demand Side Abatement (DSA) activities in NSW
  - Carbon-sequestration projects in NSW
- Trading between retailers and providers



# NSW Scheme – DSAbatement

- DSA activities reduce GHG emissions compared with emissions without the project
  - Modifying installations resulting in reduced elec. consumption compared to what otherwise would have been the case
  - Replacing installations with other installations that consume less electricity
  - Substituting other sources of energy for electricity (or vice versa)
  - On-site generation

(MEU, 2003, *Greenhouse gas benchmark Rule (DSA) No. 3*)



# NSW Scheme – DSA principles

- **Additionality**
  - “as far as possible, rules crafted to ensure that only abatement measures that go beyond ‘business as usual’ are rewarded.. In practice, determining what is truly additional and what would have occurred in any event is often difficult.”
- **Rigor**
  - “claimed reductions in elec. consumption.. should be accurately estimated and verified”
- **Simplicity**
  - “rules will be crafted to be as simple as possible, without making unreasonable sacrifices ..wrt.. additionality and rigor”  
(MEU, 2002, *DSA methodology options paper*)



# NSW Scheme – DSA rules on NGACs

- Project impact assessment
  - “Engineering assessment” of process using “reasonable assumptions” with abatement baselined from existing, default or “best available” comparison
- Metered baseline method
  - Measurement of energy consumption ‘before’ and after DSA activity (fixed, per unit of output or normalised)
- Default abatement factors
  - ‘Default’ baseline (consumption and lifetime) for common appliances and equipment
- Generation method





# NSW Scheme - Challenges

- Verification arrangements still being finalised...

*however*

Possible issues with

- Fungibility of DSA with ‘low-emission’ generation + sequestration
- Verified ‘additionality’ of DSA activities
  - Project impact, metered baseline, default factor
  - Double-counting across policy measures
  - Credit for early action
- The question is one of ‘moral hazard’



## Challenges - fungibility

- Possible economic efficiency advantages (lowest cost abatement options are taken)

*However*

- High efficiency elec. motors fungible with tree planting?
- Abstractions and assumptions in methodologies for calculating emissions abatement from different activities define 'costs'

*NSW Scheme initially proposed that 'new' low-emission generation was any post-1997 plant anywhere in NEM*

*Can DSA compete with Pelican Point CCGT?*

***The price of carbon can be whatever its designed to be***



# Challenges – DSA baselines

- Project impact assessment
  - proved ‘additionality’ beyond BAU technical progress, other possible policy measures, investment?
- Metered baseline method
  - What other possible factors than NSW Benchmarks Scheme might drive reduced energy consumption?
  - Why does ‘Increased Output’ > ‘Increased Energy use’ entitle you to create NGACs

# Challenges – default abatement factors

A common approach for reducing transaction costs + effort for large numbers of small installations, *however...*

- What equipment counts? - clothes dryers.. thankfully not A/C



**NGACS** →



- What is equipment baseline?



**NGACS** →



- How to ensure installations 'remain in service' for default lifetime?

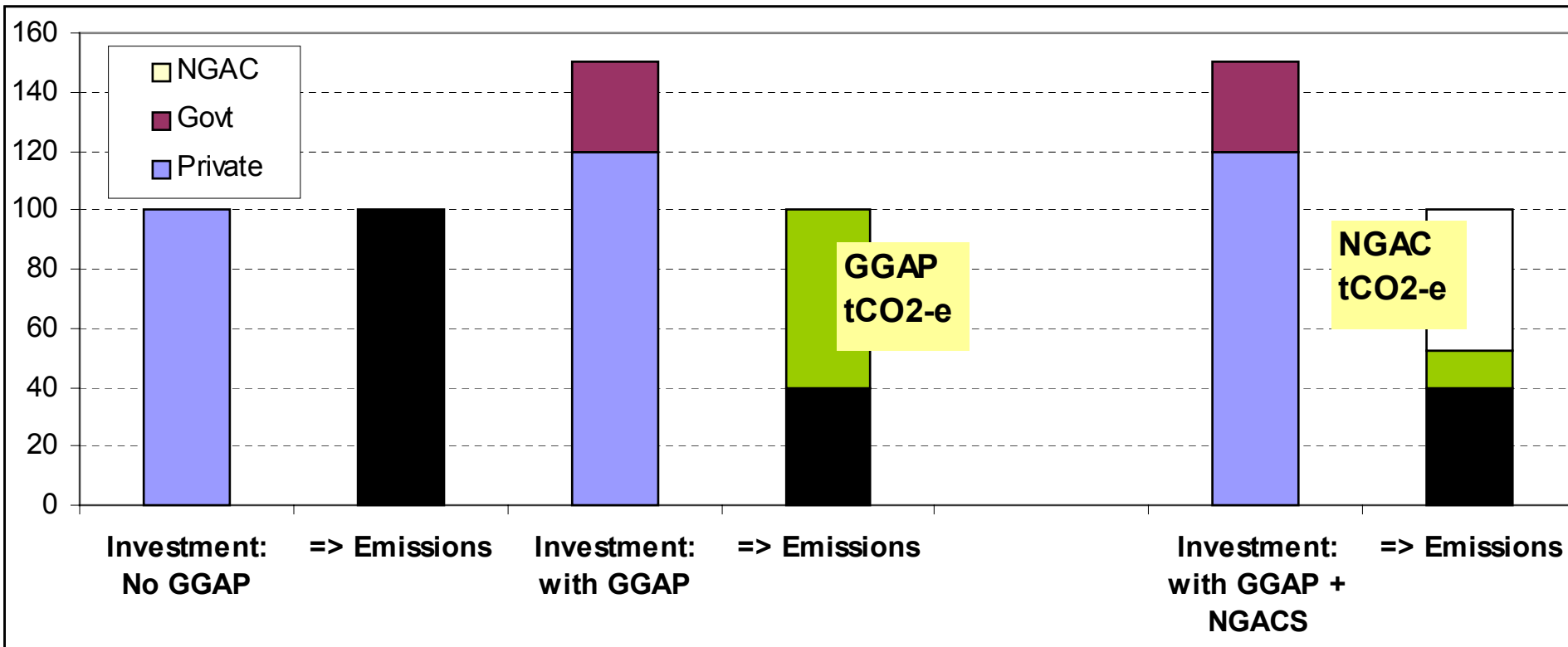


# Challenges – double counting policies

- Federal Mandatory Renewable Energy Target
  - RECs obligation for retailer's NSW electricity sales can be counted against NGACs requirement
- Federal GGAP
  - Provides top-up funding to projects that will reduce GHG emissions (KPI is avoided tCO<sub>2</sub>-e/\$)
  - GGAP projects can earn DSA NGACs for *emissions reductions X proportion of private \$*
- Other possible policy measures...



# NSW Scheme – GGAP vs DSA





## Challenges – credit for early action

- Want to reward early (voluntary) movers for leading the way
  - => NSW scheme allows NGACS from earlier ESF (DSA) activities

### *However*

- Earlier scheme allowed unverifiable ESF  
*eg. Deemed emissions reductions from retailer spending on advertisements promoting EE*
- These activities are now being given financial value



# Conclusions

- EE deserves and will need policy support
  - EECT would seem to show some potential
- However*
- Serious challenges including additionality, trading
  - Likely a poor fit within ‘cap and trade’ emissions trading
- Possible ways forward
  - Good reasons not to implement policies that don’t actually drive change
  - Careful cautious implementation of EECT required
  - Don’t neglect other EE approaches – esp. regulation that targets infrastructure and reduces transaction costs