# The Business of Energy Efficiency

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# Making Market Mechanisms Work for Energy Efficiency

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# The answer up front

- **Q How do we make market-based mechanisms work for Energy Efficiency?**

- **A** We **can't be sure yet, however likely to require:**
  - *Appropriate energy policy context – get restructuring right*
  - *Appropriate energy efficiency (EE) policy context – need support from regulatory measures setting minimum acceptable standards*
  - *real and significant impacts on energy prices*
  - *…and for Energy Efficiency Certificate Trading (EECT), lots of design choices to get right*

# Market-based trading mechanisms for EE…

- work by changing the supply or demand for EE through
  - Information
  - Direct regulation
  - **Prices**
- **Price based** mechanisms change *effective price* for decision makers of undertaking EE options
  - Take advantage of existing competitive pressures by adding financial motivation for EE (eg. via taxes, subsidies etc)
  - These decision makers are often (but certainly not always) well placed to respond optimally to this price signal
- **Trading** via permits or credits offers even greater flexibility
  - Decision makers can act directly, or *buy* EE action from others who have more cost-effective options

# Changing the *price* of EE can be achieved…

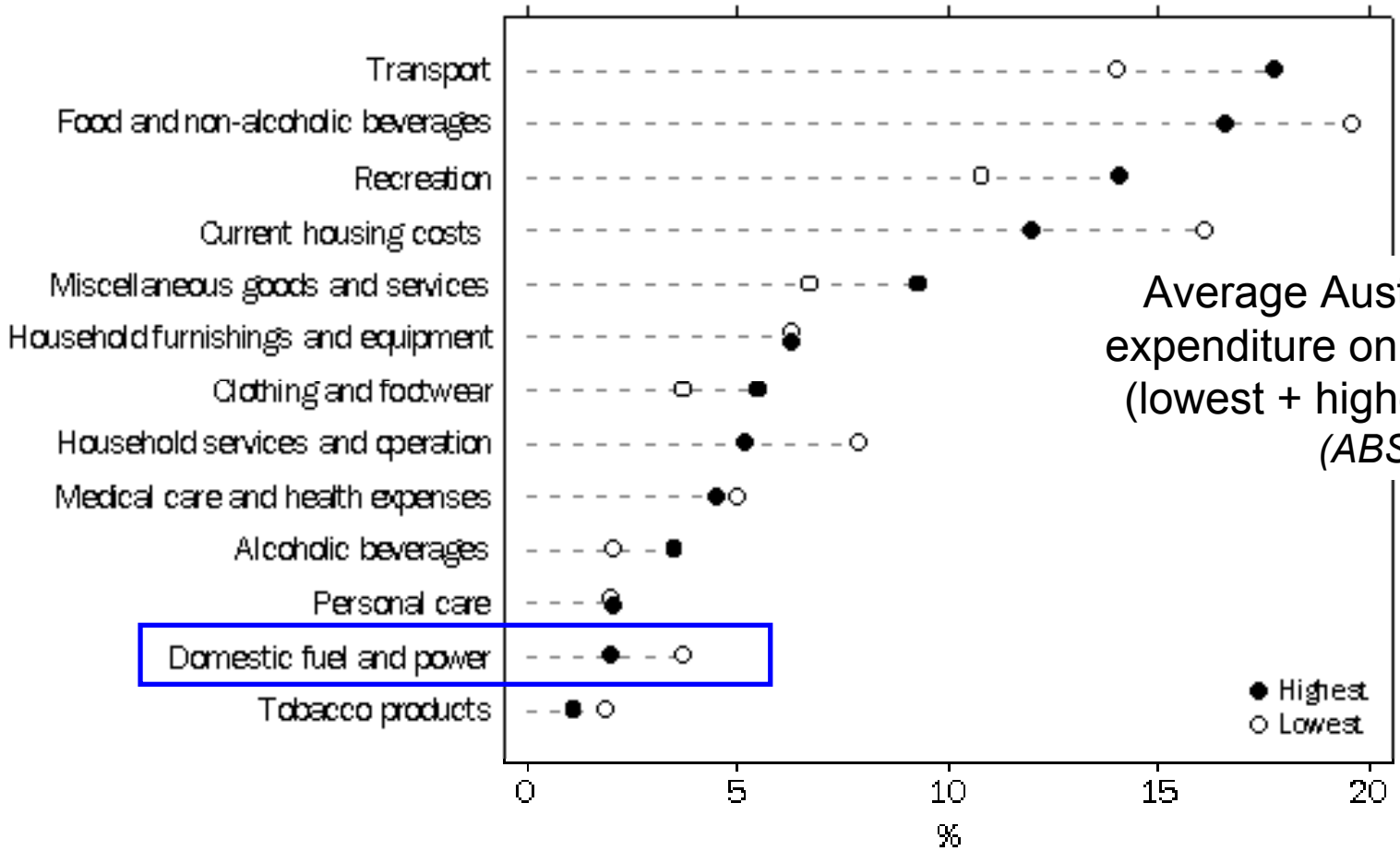
- *Indirectly* through changing energy prices
  - Driven by energy taxes, **market design** etc
  - Even more indirectly via environmental instruments such as greenhouse **Emission Trading Schemes (ETS)**
- *Directly* through approaches that price EE
  - Reduced supply costs – eg. MEPS regulation
  - Increased demand – eg. **EE Certificate Trading (EECT)**

# Driving EE through Energy Prices

- Relationship between energy prices and EE related decision making complex
  - Do energy costs matter to many end-users?
    - Large cost-effective yet untapped EE potential suggests not
  - ***If they do,*** many complications
    - End-user final energy costs = $\frac{\text{energy services X } \mathbf{\text{energy costs}}}{\mathbf{\text{energy efficiency}}}$
    - Lack of information and capacity to act
    - Short-term *behavioural* vs longer-term *investment* changes
    - Expectations of where prices are going into the future
  - ***And regardless***
    - What other EE policies may become possible with higher prices?

# Some energy users don't pay much

- For many businesses, and in residential sector, stationary energy typically < 5% of total expenditure




Average Australian domestic expenditure on different services (lowest + highest income grps) *(ABS, 2001)*

# Other energy users pay a considerable amount

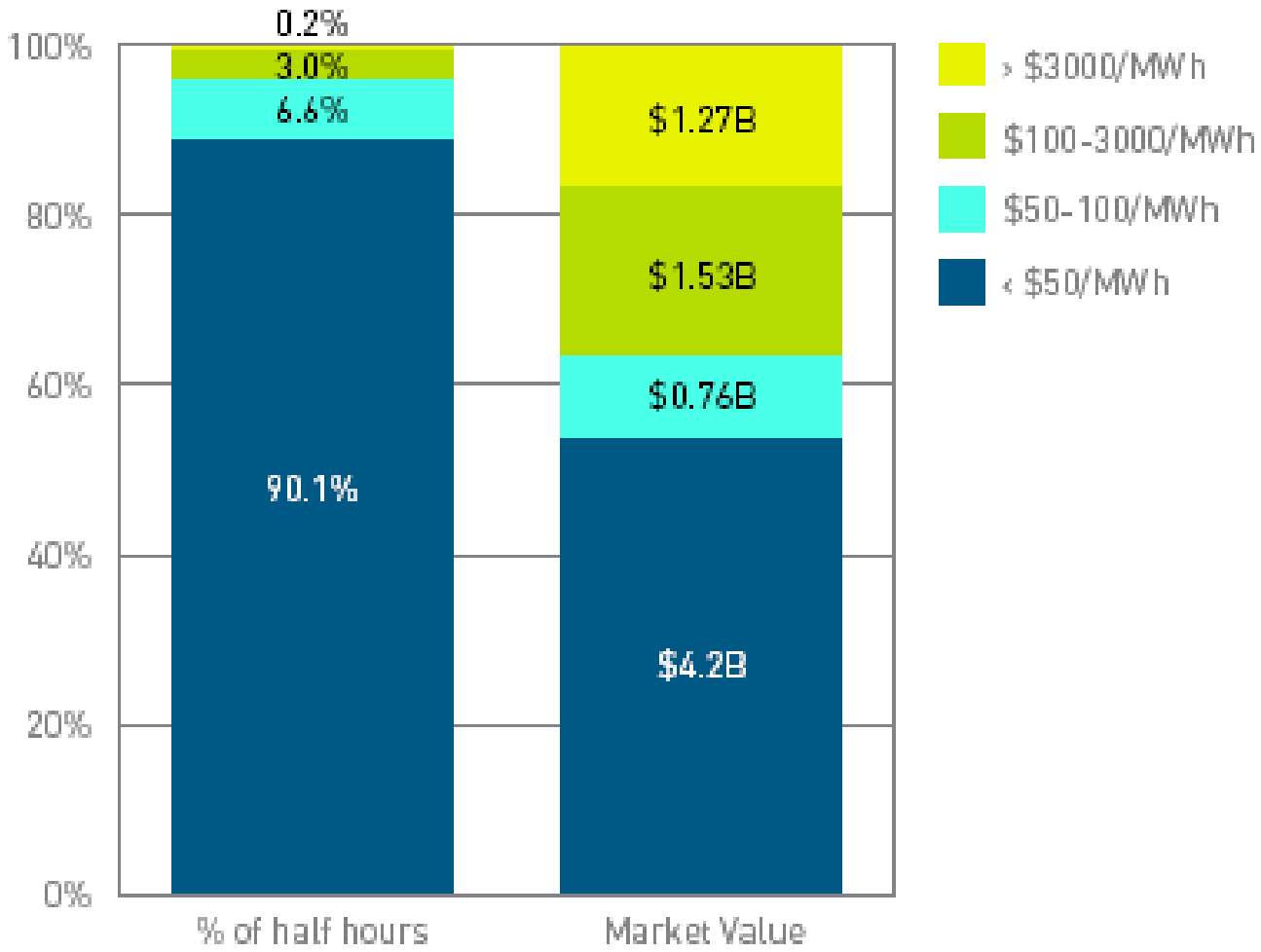
Average expenditure on energy for some energy intensive Australian industries
*(Aust. Energy White Paper, 2004)*

| Industry | Energy costs as a proportion of production costs % |
|---|---|
| Aluminium smelting | 20 |
| Paper manufacturing | 20 |
| Chlor/Alkali production | 20 |
| Brick manufacturing | 18 |
| Steel production | 11 |
| Nickel production | 10 |
| Copper/Uranium production | 10 |
| Gold production | 8 |
| Cement production | 7 |

# Real energy costs vary by time….

EE at times of high market prices can be very valuable

Wholesale prices in the Australian NEM *(Aust. Energy White Paper, 2004)*



# and location

2-3 times more value and assets in Tx and Dx than in generation

The Electricity Industry value chain
*(Bach Consulting, 2003)*

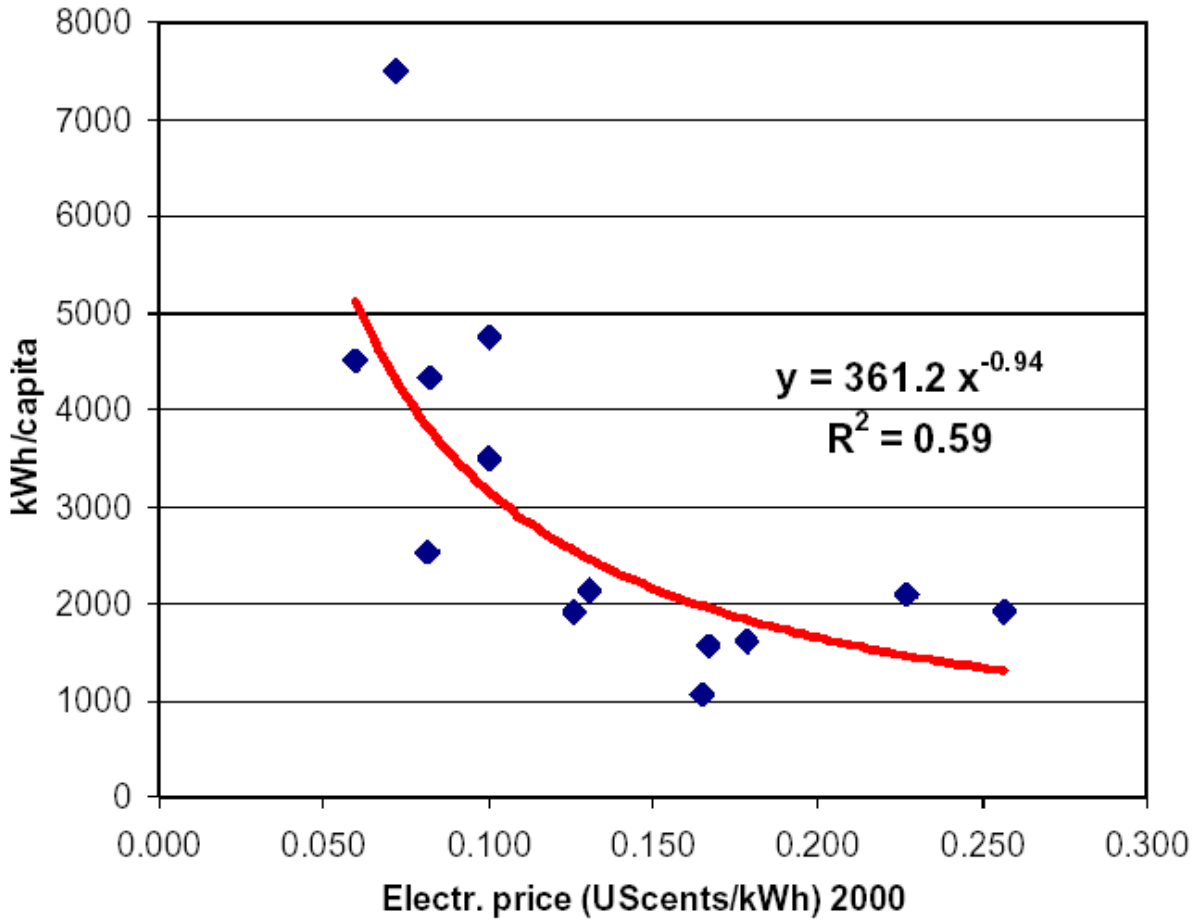

| | | | | | | Totals |
|---|---|---|---|---|---|---|
| Value Added | $2b | $3b | $2b | $5b | $1b | $13b |
| Assets (Depreciated Value) | $2b | $10b* | $6b | $26b | $3b | $47b |

# and nearly all end-users are in retail market

- Participants in wholesale markets:
  - Mostly large, with electricity as core business
- Participants in retail markets:
  - Mostly small, without electricity as core business
  - Don't see price and location signals directly
  - Multiple decision makers with split incentives (eg. tenants vs landlords vs property developers) and limited options
  - Retailers are energy sales agents, not energy service providers

# Still, evidence that energy costs + EE related for users

Per-capita electricity consumption vs price for some IEA countries *(Hass, 2004)*



# Some possible policy conclusions on energy prices

- Given energy's vital *economic*, *social* and *environmental* roles, low energy prices are a policy choice
  - even if the chosen policy is not to have a policy
- Many energy users
  - In dysfunctional retail markets
  - Unlikely to be motivated by small price increases – *price based mechanisms add financial incentive to decision makers already ignoring cost effective EE options*
  - Even when motivated, may be poorly equipped to take action through poor understanding, and limited options

**=> wider policy framework is required to help these users to act**

*"Price based mechanisms, in general, will not address the information and consumer related barriers to 'EE investment – here regulatory solutions tend to be more effective" (UK Energy Saving Trust, 2002)*

# Emissions trading schemes and EE

- ETS works by
  - Governments set an emissions target (total tCO2-e/year)
  - Major emitters require permits for each tCO2-e they release – price depends on target and cheapest abatement options amongst emitters

- In theory, EE offers some of economy's lowest abatement costs + should do well within ETS schemes, **however**,
  - Scheme *design* + *implementation* can make other options more attractive
    - 'baseline and credit' schemes *(eg. NSW Benchmarks)* can be *designed* to value just about anything –eg. EE vs. 'abatement' from Qld coal power stations
  - EE options generally smaller and more diffuse → higher transaction costs
  - Many users not trading directly, impacted only via impacts on energy **pricing**
    - These impacts an outcome of scheme design + implementation
    - ETS unlikely to drive major changes for small users with low energy costs
    - ***ETS objective is to minimise costs of meeting emissions targets***

# How ETS design & implementation impact energy prices

- Scheme design
  - ***'cap + trade'*** based on physical measurable emissions **or** *'baseline + credit':* issues re made-up BAU baselines, associated measurement, assumptions and moral hazards

    => 'cap + trade' preferable, also better market liquidity, fairer permit allocation, greater credibility + reliability (AGO, 2002), chosen for EU ETS
  - **Permit allocation**– grandfathering (or 'credit' baselines) reduces price impacts, or gives windfalls to large polluters
    - *idea that allocation only an equity issue is based on ideal mkts, therefore false*
  - **Coverage** – eg. exclusion of energy intensive users removes those decision makers most likely to respond to price signals
    - Also, practical difficulties + potential moral hazards in other approaches like 'world best practice' as suggested by CoAG (2002)

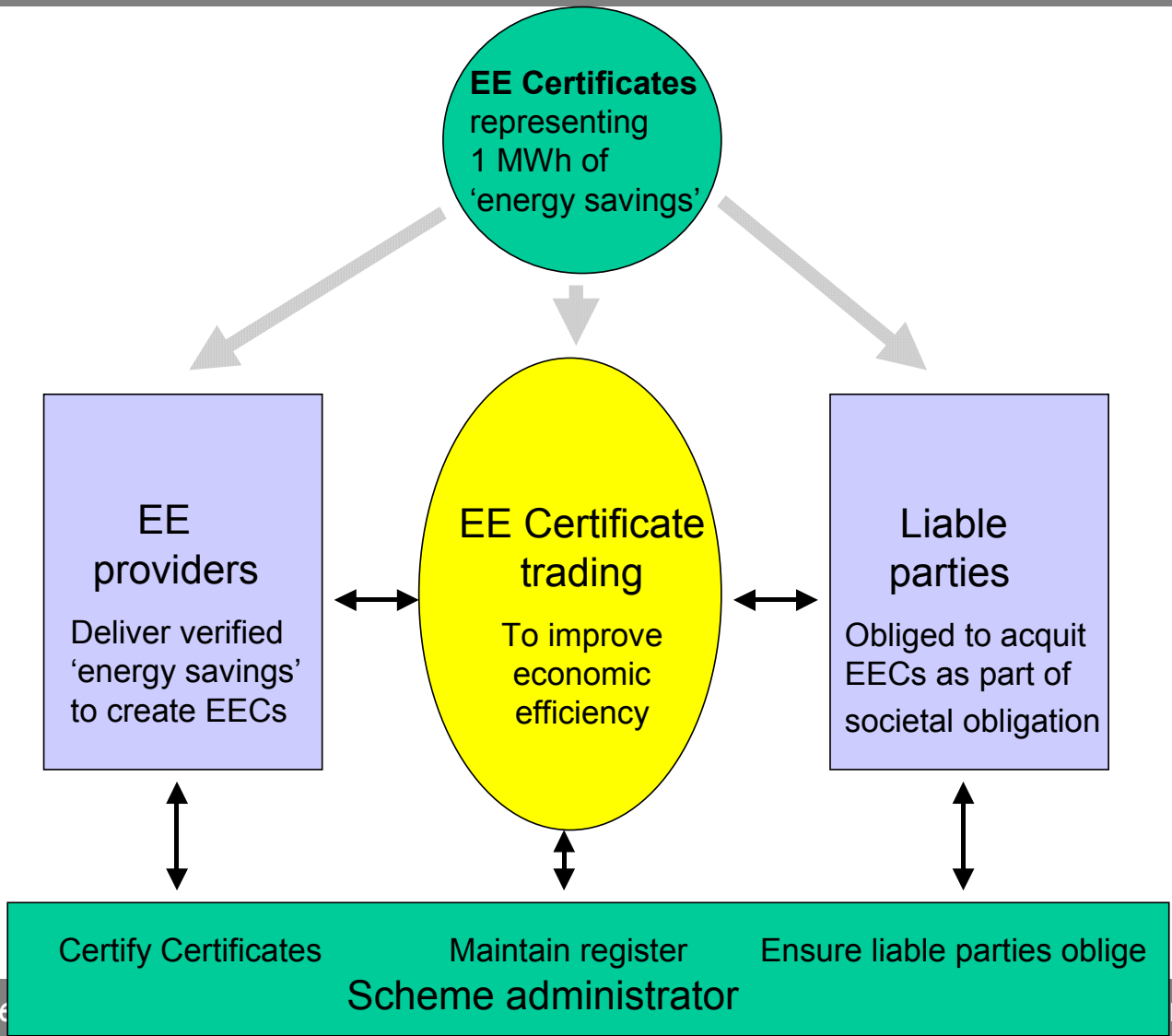
      ***=> ETS should cover all combustion related emissions (AGO, 2002)***
- Scheme settings – modest targets likely to mean modest impacts

# The value of EE can be changed *directly* via…

- Reduced EE supply costs
  - eg. via learning and scale with MEPS + mandatory Building Rating Schemes
    - *These measures shown to drive down costs of better EE options*
- Increased EE demand
  - eg. **EE Certificate Trading (EECT)**

……. These approaches can let policy makers target EE better than via energy prices, but many possible pitfalls with EECT

# EECT – a 'designer' market



# Some key design issues

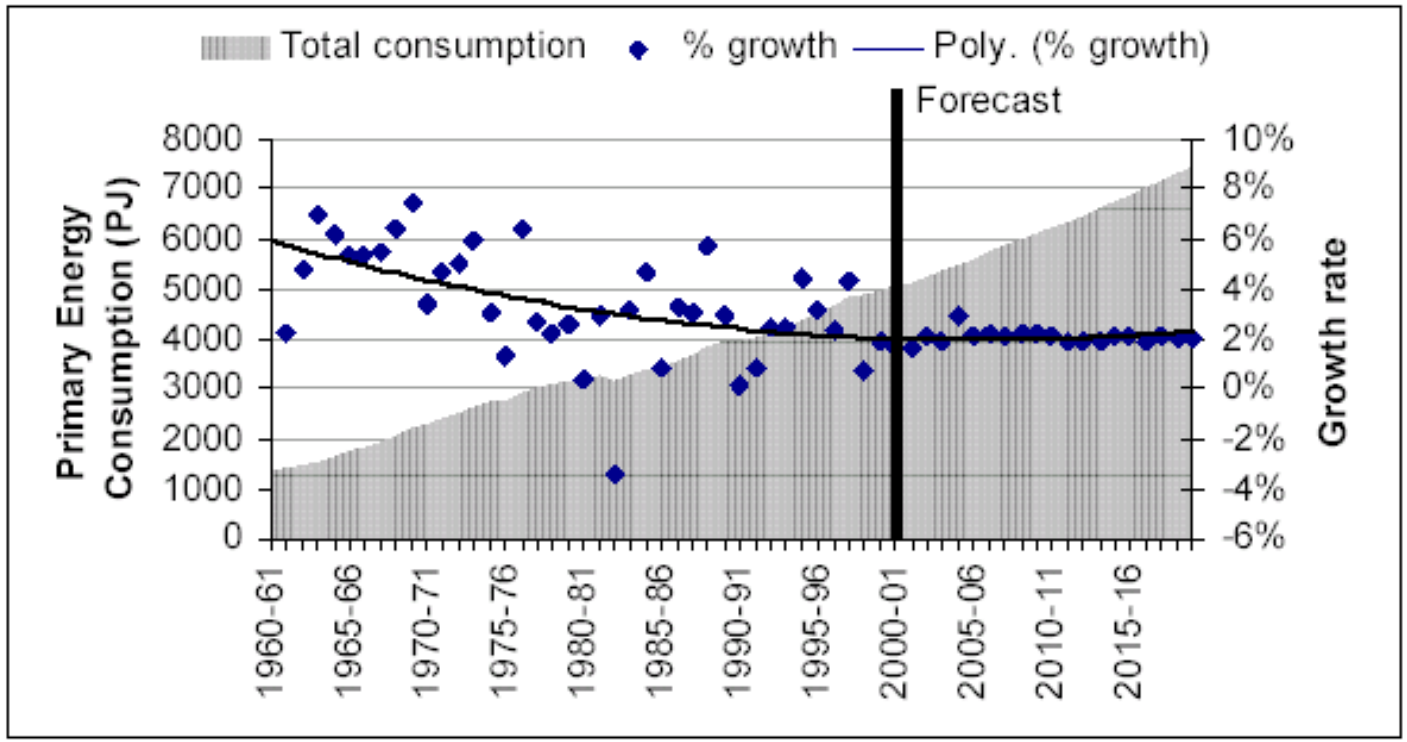
- Targets
  - Energy consumption (MWh), energy savings from BAU (MWh 'saved'), GHG reductions from BAU (tCO2 'abated')
- Scope
  - EE only, or a range of abatement options on supply-side
  - Activities: industrial projects, buildings, appliances; investment, behavioural changes
- Measurement + verification
  - Additionality beyond BAU or just reductions in energy use
  - Reporting, transparency + auditing – complexity of arrangements

# Targets

- Environmental imperative about absolute emissions, not intensities like energy/GDP or technical EE improvements
- Modest short-term targets based on energy savings from BAU projections (eg. 1% NEET) may be hard to make meaningful: *neat targets can get lost in variability arising from other factors*

Annual variation in % growth in Australian primary energy consumption over the last four decades

(ACIL Tasman, 2003)



# Scope

- For emissions credit schemes, EE's ability to compete against other abatement options depends on rules
  - eg. EE (DSA) in NSW benchmarks competing with pre-existing landfill and coal seam gas plants, Qld CCGT + coal plant
- For EE trading
  - Is industrial EE really tradeable (fungible) with residential EE?
  - Is wall insulation really fungible with CFLs?

*NSW Greenhouse Gas Abatement Scheme – Report to the Minister*, June 2004

| Rule | Registered |
|---|---|
| Demand Side Abatement – 2003 Vintage | 345,141 |
| Generation – 2003 Vintage | 6,317,853 |
| **Total for 2003** | **6,662,994** |
| Demand Side Abatement – 2004 Vintage | 25,905 |
| Generation – 2004 Vintage | 954,278 |
| **Total for 2004** | **980,183** |
| **Total – all vintages** | **7,643,177** |

# Measurement + verification

- Additionality hard to assess but matters
  - Establishing baselines difficult (+ prone to errors + moral hazards) b/c have to estimate what would happen in absence of EECT
- *Possible alternative*: simple requirement to *"reduce, or increase the efficiency of, their consumption of electricity"* eg. NSW Benchmarks Scheme
  - No test of additionality, yet many BAU reasons why such reductions or efficiency improvements occur

  ⇒Effectiveness requires target well beyond BAU, must accept free-riders

=> Scheme effectiveness likely to require additionality

- Eg.CDM (Kyoto + EU ETS) additionality test for first projects
  - "without the ability to register under the CDM, the proposed project activity would be unlikely to occur" *CDM Executive Board*

- Trading means risks of 'market for lemons'
  - Genuine projects have to compete with all the free-riders
- Complexity a challenge – rigour of verification vs transaction costs

# Examples for the NSW Scheme

- ***Baselines***
  - ***Example:*** *Orica* in the NSW Scheme
    - Commissioned construction of ChlorAlkali plants in Vic + NSW in 1998 to replace existing 1940s technology;
    - Successfully applied for accreditation under DSA rule + will earn estimated 250,000 NGACs (= perhaps $2m)
  - ***Overall*** *for the NSW scheme,*
    - Almost 6X more NGACS created in 2003 than required for 2003 target – very little of this 'abatement' additional (ie. driven by introduction of the NSW Greenhouse scheme)
- ***Complexity***
  - ***SEDA*** Lighting Upgrade Project
    - Eligible for estimated 15,000 NGACS (perhaps $120k)
    - However, initial costs for SEDA of application, pre-accreditation audit = $10k + requires annual report confirming SEDA inspection of stores for 10 years confirming that units still installed + fully operational and that layout of stores + their use has not materially changed, possible spot audits too

# Ways forward for market-based trading for EE

- Get the wider energy policy context right
  - Retail energy market restructuring to date has not delivered for EE
- Get the wider EE policy context right
  - Regulatory policies the most important – regulating minimum acceptable performance for equipment, buildings and processes has low transaction costs, avoids motivation problems + can be set to minimise life-cycle costs
- Price mechanisms not the highest priority, but useful role
  - Rethink required on desirability of low energy prices
  - ETS alone unlikely to drive EE for many energy users
  - For EECT
    - **Reduce complexity** by restricting scope, using measurable targets
    - **Get baselines right** - restrict scope of activities to what can be shown to be largely additional, fungible, measurable + verifiable, baselines must be regularly updated to drive progress, exclude free-riding off other policies
    - **Ensure transparency** - for learning, and stakeholder confidence… public has 'rights' with schemes that gives their money to participants; moral hazards to negotiate for policy makers

# For more information…..

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