Centre for Energy and Environmental Markets

UNSW THE UNIVERSITY OF NEW SOUTH WALES SYDNEY • AUSTRALIA



Market based schemes to drive energy efficiency

Presented by
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Centre for Energy and Environmental Markets

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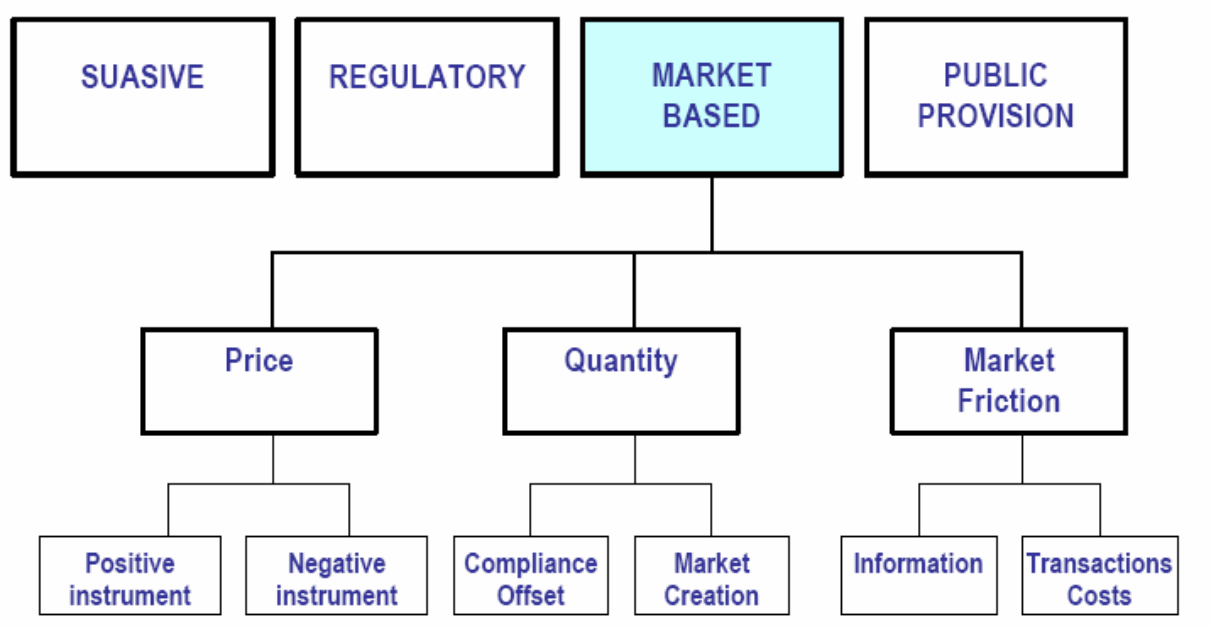
CEEM

- *A formal collaboration between the* **Faculties of Engineering, Business (Economics and Management),** also Arts and Social Sciences, Science, Law
- *through a UNSW Centre* aiming to provide Australian research leadership in interdisciplinary analysis + design of energy and environmental markets
- *focussing in the areas* of
  - Energy markets within restructured electricity industries: including the successful integration of new energy technology options
  - Related environmental markets: emissions trading, renewable obligations, energy efficiency trading, Greenpower…
  - Wider technology assessment and deployment, regulatory and policy, and social decision making frameworks and innovation for achieving overall energy objectives

Some current CEEM research efforts

- Facilitating wind integration in the NEM
  - 2 strands: forecasting and control of wind energy, and market design
- Renewable energy policy support options in restructured industries
  - Expanded eRET, feed-in tariff options, wider policy support
- Modelling participant behaviour in electricity markets
  - Interactions between spot and derivative markets
- Emissions Trading Schemes + options for Australia
  - Experimental economics studies on market design, CPRS assessment
- Technology assessment for sustainable energy policy frameworks
  - Energy efficiency, gas and cogeneration, renewables, CCS, nuclear options
- **Economic modelling of Distributed Energy**
- **Energy efficiency policy – focus on market-based mechanisms but also including non-market options**
- Policy frameworks for technology innovation
  - Emerging renewables, Carbon Capture + Storage (CCS)

Key policy options for energy efficiency



(BDA, *Market-based instrument decision support tool*, 2008)

Possible strengths of Market-Based Instruments

- *Suasive approaches* : provision of information
  - Limits to what Codes of Practices, guidelines, R&D can achieve alone
- *Public provision* of services: public goods difficult or uneconomic to manage by private sector
  - Limits given the important role of private sector in most economic sectors
- *Regulatory approaches:* penalise non-compliance with standards, licensing
  - can promote inefficiency, inhibit innovation because usually imposes uniform requirements while key decision makers have different capabilities, costs & benefits
- *Market-based instruments* : incentivise change via mkt signals
  - Price; Subsidies, grants, taxes, tax concessions, other payments
  - Quantity; market creation, offsets schemes
  - Market Friction; accreditation, labelling
  - *Encourage those who can most cost effectively improve outcomes to do so.*

(Adapted from BDA, 2008)

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Potential advantages wrt energy efficiency

- Reasons to be skeptical about voluntary restraint and govts' ability to cost-effectively regulate decisions directly
- A good fit with restructured energy industries – the key sector in any effective response
- Market-based environmental markets can
  - Take advantage of existing competitive pressures on participants
  - Offer considerable flexibility in how they respond: Regulators 'set (target) and forget' by transferring decisions making & risks to 'better' informed parties
  - avoid perverse interactions b/n different policy measures (price impacts 'stack up')
  - ***Considerable design flexibility for policy makers***

Potential challenges wrt energy efficiency

- Share many of usual policy challenges with any regulatory approach + potentially add new ones
  - Novel – learning likely required + mistakes will be made: do we have time?
  - Key decision making is investment: have to establish 'markets' that drive this appropriately
  - Inevitable complexity in attempting to match commercial market with physical actions that reduce emissions
  - Potential loss of control on decision making might see adverse impacts with other policy objectives….
  - ***These are designer markets:*** *Greatest competitive advantage for participants may lie in gaming rules and especially the rule design process*

The question.. and a possible answer up front

- **Q** How can we make market-based mechanisms that drive appropriate levels of Energy Efficiency?

- **A** We can't be sure yet, however likely to require:
  - *Appropriate energy policy context – get energy market design and restructuring right –* ***prices probably will have to rise***
  - *Appropriate energy efficiency (EE) policy context – a mix of information, regulatory and more directly market based mechanisms*
  - *Any Market-based trading mechanisms such as Energy Efficiency Certificate Trading (EECT) / White Certificates has to be very carefully designed*

Energy efficiency is…

- Only one of a range of possible means to an end
  - of delivering desired end-use energy services
- which is, itself, difficult to define
  - energy service needs versus wants, and their changes over time and with 'progress'
- + driven by diverse, sometimes conflicting objectives
  - affordability of an essential public good, energy security + increasingly environmental impacts
- that aren't fully represented in existing energy mkts
  - economic, social + environmental externalities
- which also exhibit other potential mkt failures
  - monopolies, information failures, incomplete mkts etc…
- **Nevertheless**, EE almost certainly one of our best options in meeting all these objectives (eg. IEA, Energy Technology Perspectives, 2008)

Energy efficiency itself is…

- Hard to define in a meaningful way
  - since primary objective is to maximise societal benefits delivered by chosen mix of energy services against costs incurred delivering these
- since EE is only part of this
  - level of end-use energy services delivered per unit of energy consumed
- and there is great emphasis on 'cost-effective' EE
  - Private benefits derived from chosen energy services c.f. private costs – *energy + associated end-use equipment*
- EE can be even harder to measure
  - Bottom-up (technical) precise but incomplete – what of consumption?
  - Top-down (aggregate) measures multiple factors– what is EE?
  - All technologies + processes **are** energy technologies + processes => *EE is always relative to what would have happened otherwise*

Energy efficiency

- Technical concept
  - Energy efficiency is the relative thrift or extravagance with which energy inputs are used to provide goods or services. Increases in energy efficiency take place when either energy inputs are reduced for a given level of service or there are increased or enhanced services for a given amount of energy inputs.

    (US EIA, 2002)

- Broader energy service related concept….

Market-based approaches for driving EE…

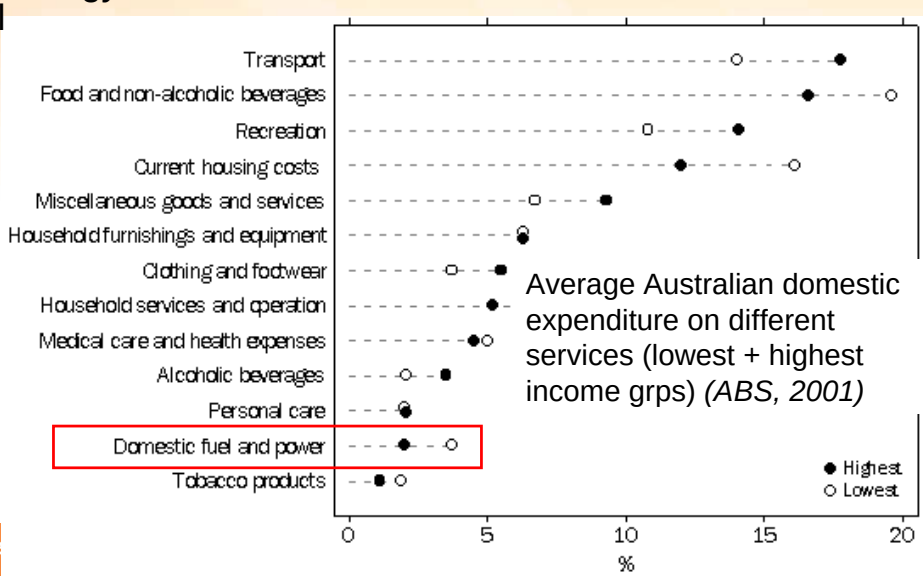
- work by changing supply or demand for EE through information, regulation and **prices**
- **Price based** mechanisms change *effective price* for decision makers of undertaking EE options
- Either **indirectly** through changing energy prices
  - driven by energy taxes, mkt design
  - even more indirectly via environmental instruments such as Emission Trading Schemes (ETS)
- or directly through approaches that price EE
  - reduce supply costs of EE – eg. regulatory impacts on building + appliance EE innovation, R&D tax incentives
  - increase demand benefits of EE – eg. tax credits
  - mandating increased demand to increase value of EE + allow trading **Energy Efficiency Certificate Trading (EECT) / White Certificates**

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* elasticities
    - Expectations of where prices are going
  - ***And regardless***
    - What other EE policies may become possible with higher prices?

Many energy users don't pay much

- For many Australian businesses + in residential sector, stationary energy typically < 5% of total expenditure
- Even for most energy intensive Australian industries, energy costs approx. 20% of production costs
- Share of stationary energy costs for residential budgets in IEA countries fell 20-50% from early 80's to late 90's. Similar experience for most industries (IEA, 2005)
- *But this now appears to be changing*

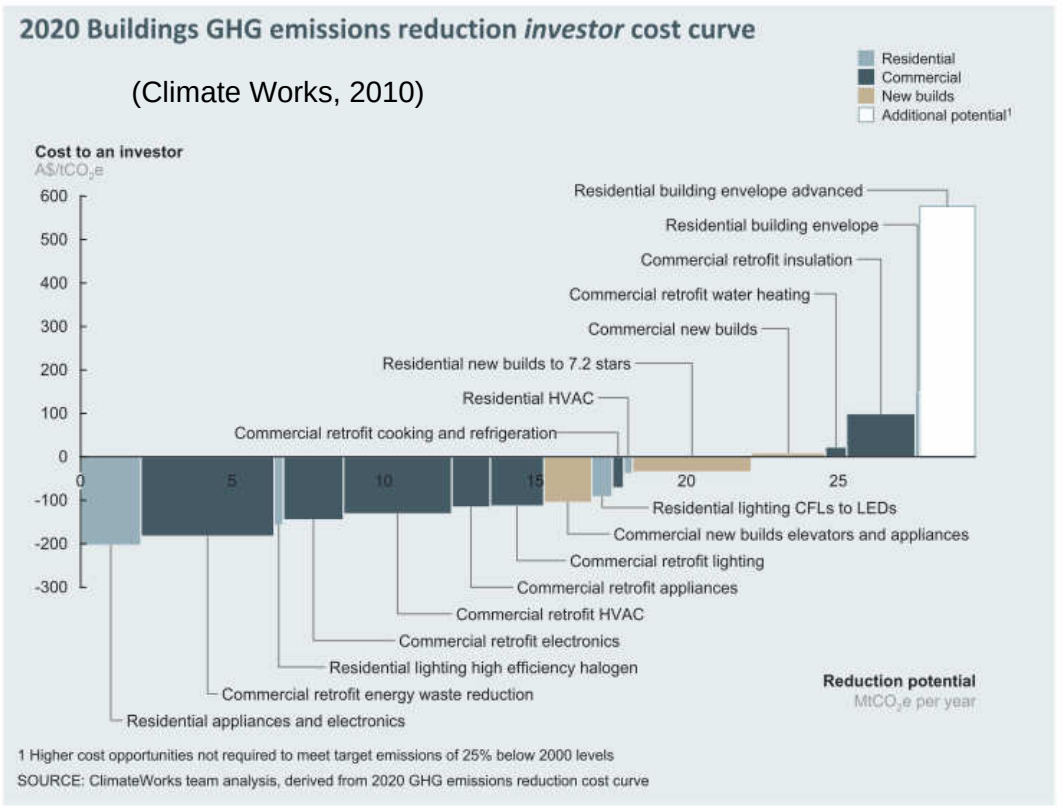


Average Australian domestic expenditure on different services (lowest + highest income grps) *(ABS, 2001)*

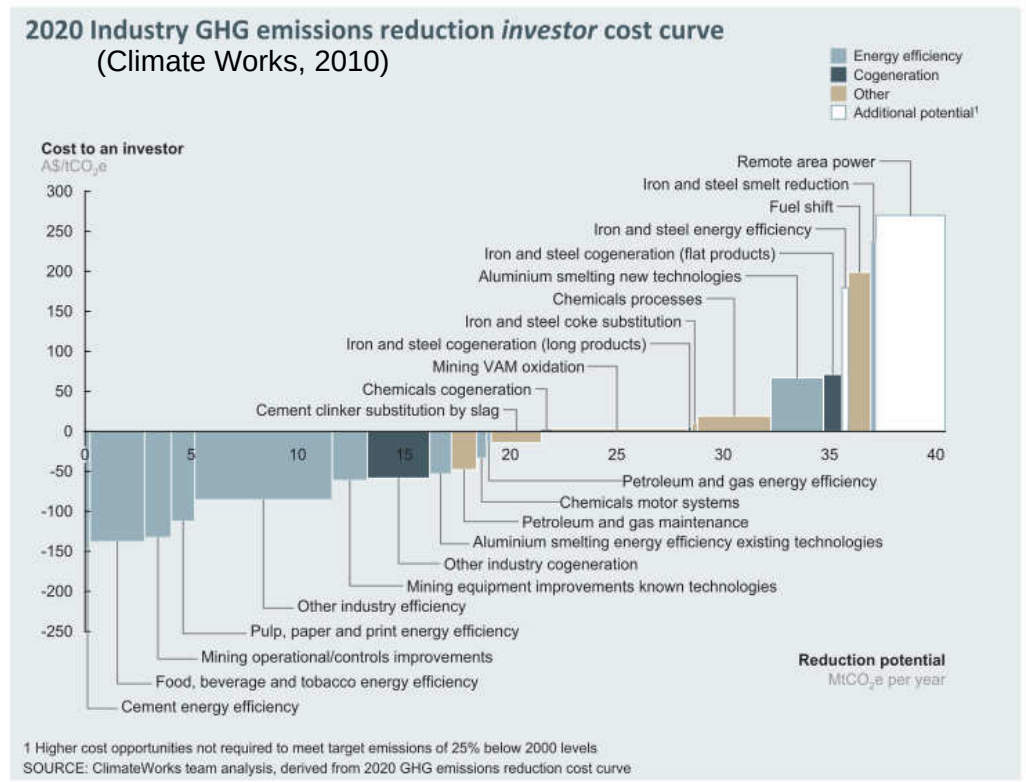
and nearly all are in retail markets

- 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 energy's time + locational price signals directly
  - Multiple decision makers with split incentives + only limited options
  - Retailers / suppliers / LSEs are often energy sales agents, not energy service providers

and don't seem to act on cost-effective options

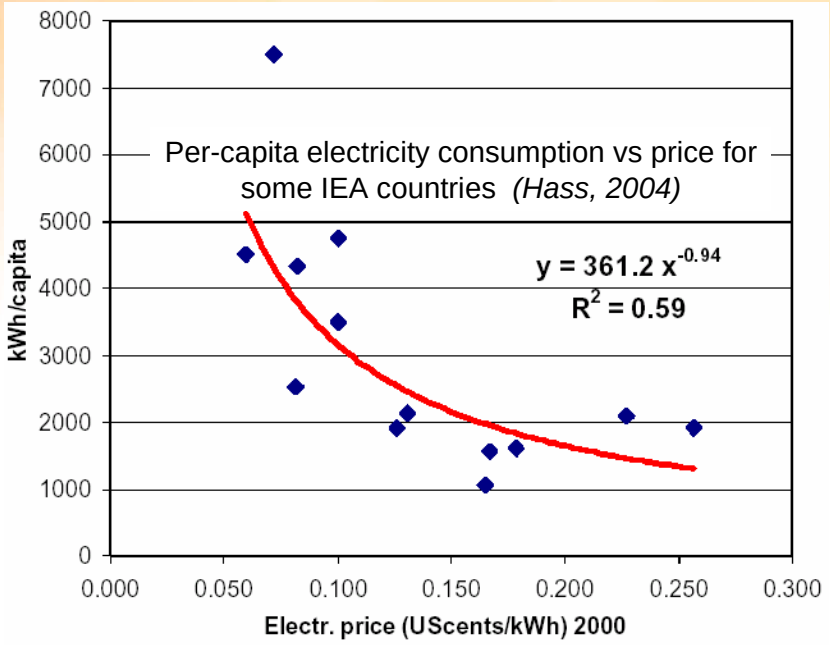


…even industry (although issues with such estimates)

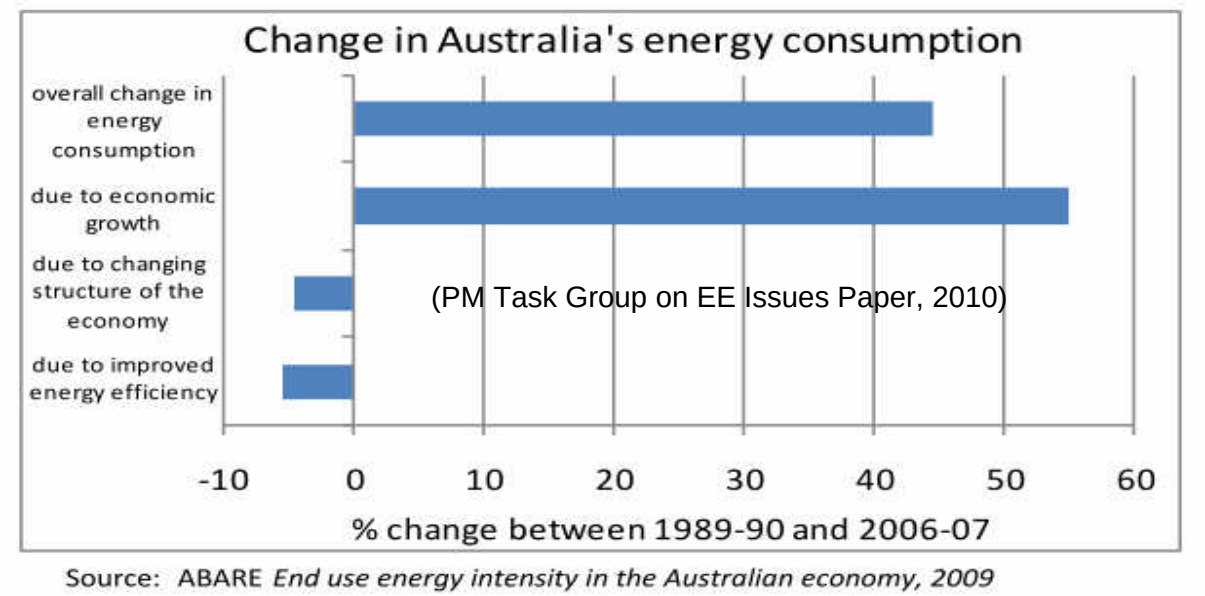


Still, clear that energy costs + EE related

- Getting prices right likely necessary but, alone, insufficient to achieve optimal levels of EE
- *Caveat: relationships b/n EE + consumption are complex*



Can be difficult to extract EE from other factors in energy consumption



(PM Task Group on EE Issues Paper, 2010)

Source: ABARE *End use energy intensity in the Australian economy, 2009*

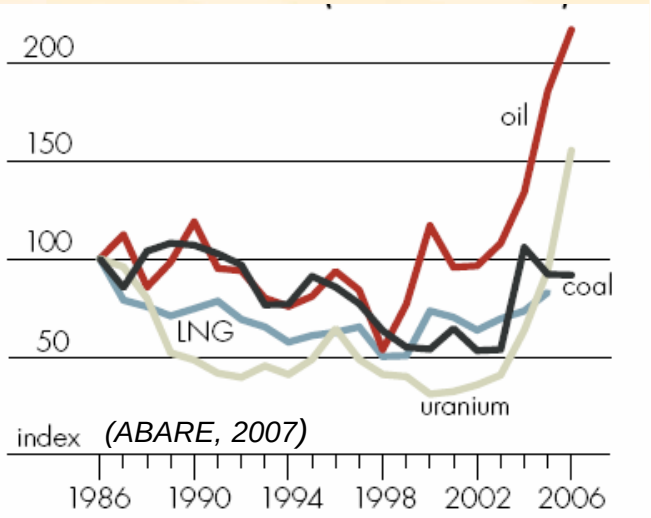
Some policy conclusions on EE + energy prices

- Given energy's vital *economic*, *social* and *environmental* roles, low energy prices are a policy choice
  - even if chosen policy is no policy, or to keep prices down…
    - European Commission - "more needs to be done to ensure real and effective competition" yet "well aware of the dilemma of increased consumption resulting from lower prices caused by the greater efficiency secured by introducing market forces" EE Green Paper, 2005
- + have serious implications for EE + wider energy objectives *energy security + environmental impacts driven by consumption*
- However, many energy users
  - In dysfunctional retail markets, unlikely to be motivated by small price increases (already ignoring cost-effective EE options), even when motivated, may be poorly equipped to take action

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

Putting a price on carbon

- Energy highly valuable so already a price on carbon
  - Production costs, royalties, economic rents… also subsidies
  - *Many costs/benefits are externalities unless addressed by govt*
- Greenhouse emissions the latest externality
  - Underlying prices wrt CO2 variable but generally low
  - US$60/Barrel oil => ~400kgCO2 = ~$150/tCO2
  - US$50/t Coal => ~2.5tCO2 = ~$20/tCO2
  - US$3/GJ Gas => ~50kgCO2 = ~$60/tCO2
- Adding a greenhouse 'cost' on Carbon to reflect its env. costs changes prices
  - *Eg. US$50/tCO2 emitted => oil +33%, coal +250%, gas +80%*



Emissions trading schemes and EE

- In theory, EE offers some of the lowest abatement costs + should do well within ETS schemes
- *Some argument that ETS means very limited energy efficiency policy is even required*
- **however**,
  - EE options often small + diffuse → higher transaction costs
  - Many users impacted only via impacts on energy **pricing**
    - Price impacts an outcome of scheme design + implementation *targets, permit allocation, coverage, market power…*
    - Will many consumers respond to price increases given issues in responding to currently cost-effective options?
  - *and ETS objective is to minimise costs of meeting emissions targets*

5.7. Energy efficiency targets and schemes

National or sectoral energy efficiency targets or schemes are often cited as a means of achieving greater energy efficiency across the economy. However, such targets or schemes are unlikely to be complementary to the ETS as – in a more targeted way than the expanded national RET – they require a certain part of the abatement task set by the ETS to be achieved through energy efficiency. This limits the ability of those subject to the ETS to choose where it is most cost effective for abatement to occur.

› Energy efficiency targets could potentially be contemplated as a means of achieving abatement in a sector, or part of a sector, not covered by the ETS. However, this would just be one of a range of options to be considered.

Such targets or schemes will be superseded by the ETS. They risk interfering with the price signal arising from the carbon market and will bias the choice of abatement measures towards energy efficiency and away from other abatement options such as renewable energy. Additional measures that address energy efficiency can only lower the cost of abatement by addressing market failures relating to energy efficiency, such as information failures (as discussed below).

Some states have begun implementing energy efficienct targets and credit trading schemes, and there is a risk that these schemes will complicate and undermine the introduction of the ETS.

Maintaining these schemes also impose significant compliance costs on industry, in addition to those impose through the ETS.

As part of its proposed National Climate Change Compact, the Review proposes that the Commonwealth, State and Territory governments agree to abolish any existing energy efficiency targets or schemes and to agree that primary responsibility for mitigation policy should rest with the Commonwealth (see Chapter 3).

(Wilkins Review, 2008)

Regulatory schemes like renewable energy targets and white certificate schemes are understandably attractive to State and Territory governments as they can often be implemented at a relatively low budgetary cost. However, as is discussed in more detail in Chapter 4, regulation can come at a very high economic cost – that is, when the impacts on the economy as a whole (such as compliance cost, the cost of resources being diverted to lower value uses) are taken into account.

The continued proliferation of such schemes has the potential to interfere with the efficient functioning of the ETS. Investors' confidence in the scheme as an indicator of the value of carbon will be undermined if there are strong perceptions they may be forced into taking a range of abatement activities that are of a different type at a higher cost than they would otherwise.

Value of EE can be changed *directly* …

- reduce supply costs of EE
  - Building + appliance EE regulation shown to reduce costs of EE through innovation + scale-up
- increase demand benefits of EE
  - Eg. tax credits that can be carefully targeted towards EE
- Baseline and Credit emissions trading with EE included
- Energy Efficiency Certificate Trading (EECT) / (WC)
- *Such approaches **may***
  - allow us to avoid policy challenges of 'higher energy prices'
    - provide separate cashflow directly targeted towards EE
  - drive energy user decision making better
    - focused incentives for those ready, willing + able to act with EE an investment opportunity rather than cost of doing business

Designing tradeable Market-Based Instruments

- Trading markets require
  - Tradeable fungible commodity
    - permits, allowances (cap and trade); certificates, credits (baseline and credit) of commodity (eg. tCO2-e, 'saved MWh')
  - Buyers
    - Government (eg. tenders), mandated parties (eg. emissions trading), voluntary (eg. green consumers)
  - Sellers
    - Voluntary participants motivated by profitable opportunities ('baseline and credit')
    - Governments (eg. permit auctions) or obliged buyers with excess

Some key design issues

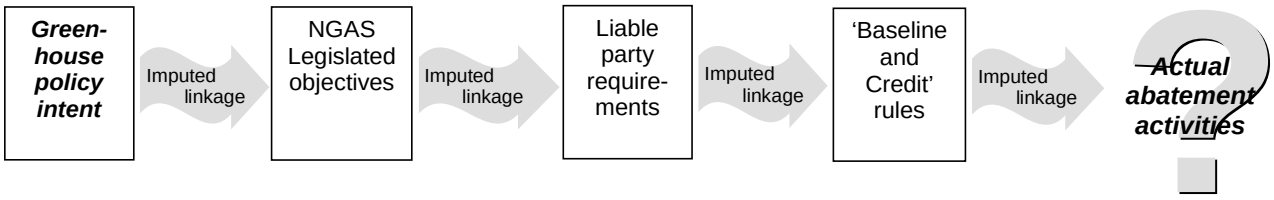
- Targets
  - Energy consumption (MWh), energy savings from BAU (MWh 'saved'), GHG reductions from BAU (tCO2 'abated')
- Scope
  - EE only, or a range of abatement options
  - Activities: industrial facilities ⇔ buildings⇔ appliances, Investment ⇔ behavioural changes
- Measurement + verification
  -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

Example: B&C emissions trading that includes EE: the NSW Greenhouse Scheme

- Policy intent
  - "reduce greenhouse gas emissions associated with the production and use of electricity..."
    (Overview to the Electricity Supply Amendment Bill, 2002)
- Implementation
  - State 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

Environmental effectiveness?

- Highly abstracted design
  - major separation b/n policy objectives + commercial arrangements + physical outcomes
- Very wide scope
  - Adds complexity, dilutes accountability
  - Risks creating a 'market for lemons'



Testing additionality - NGAS

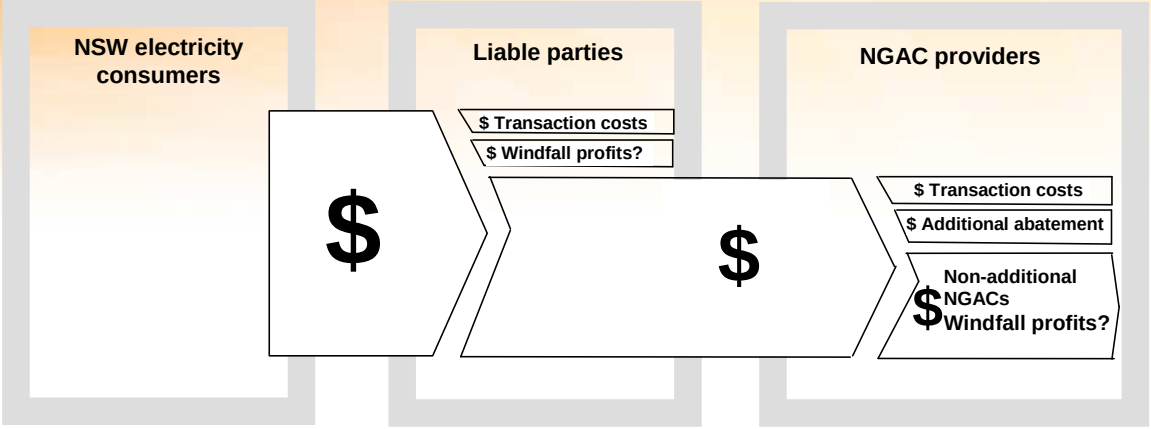
- Scheme doesn't formally assess additionality
- Some other assessments (MacGill, Passey and Nolles, 2005)
  - Over 95% of 2003 NGACs from installations built prior to scheme start
  - Scenario analysis suggests additionality over scheme life may also be low

Some potential scenarios of non-additionality for NSW GAS

Scenario mix	½ policy overlap + 60% BAU plant	½ policy overlap + 90% BAU plant	policy overlap + 60% BAU plant	policy overlap + 90% BAU plant
6 million non-additional NGACs from existing projects	62%	65%	75%	78%
6.6 million non-additional NGACs from existing projects	67%	70%	79%	82%
7.5 million non-additional NGACs from existing projects	72%	75%	85%	88%

Efficiency + equity?

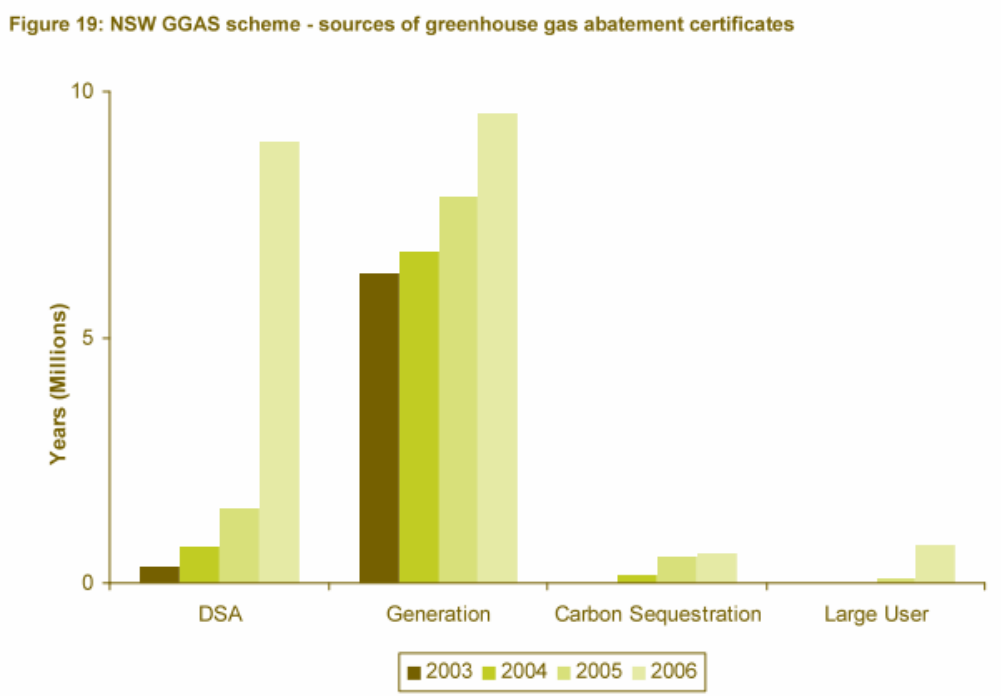
- Efficiency generally low when environmental effectiveness low
  - especially when high transaction costs + windfall profits
- Equity often threatened when environmental effectiveness low
  - Potential that some key stakeholders have captured the policy process



- **What next?** NSW Govt. has announced Scheme will end in 2010, transition arrangements being determined

Early performance …. (ERAA Submission to PM Task Group, 2010)

What happened with Demand Side Abatement in 2006?

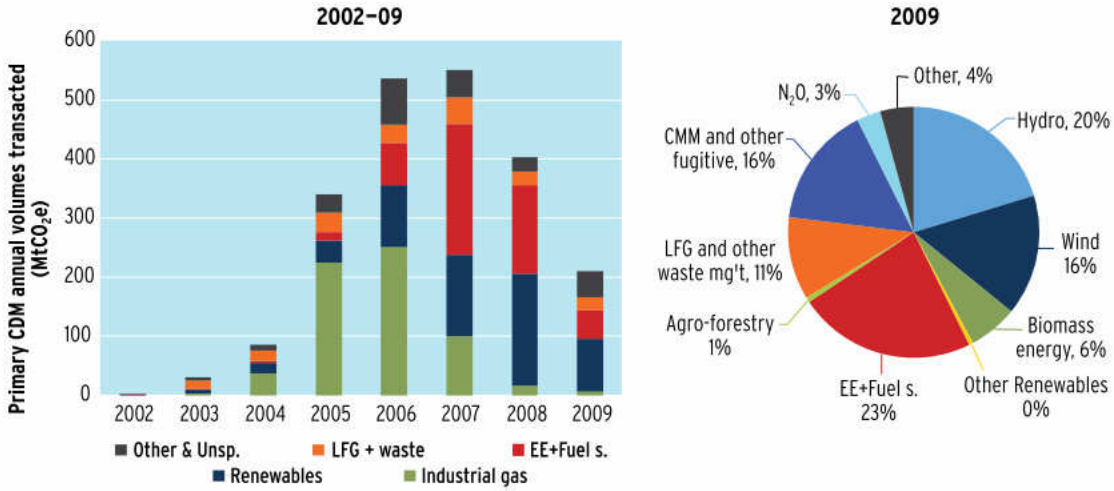


The CDM – project based emissions reductions in the developing world under the Kyoto Protocol

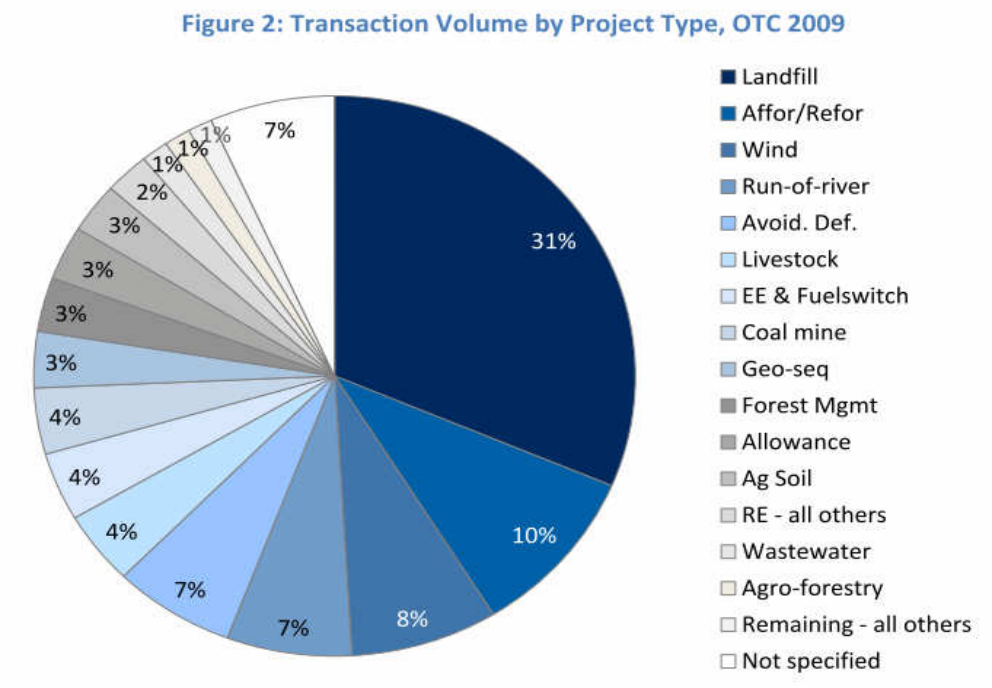
Currently a modest role for EE

(World Bank, *State of the Carbon Market*, 2010)

FIGURE 12
Primary CDM sectors[77]
Source: World Bank



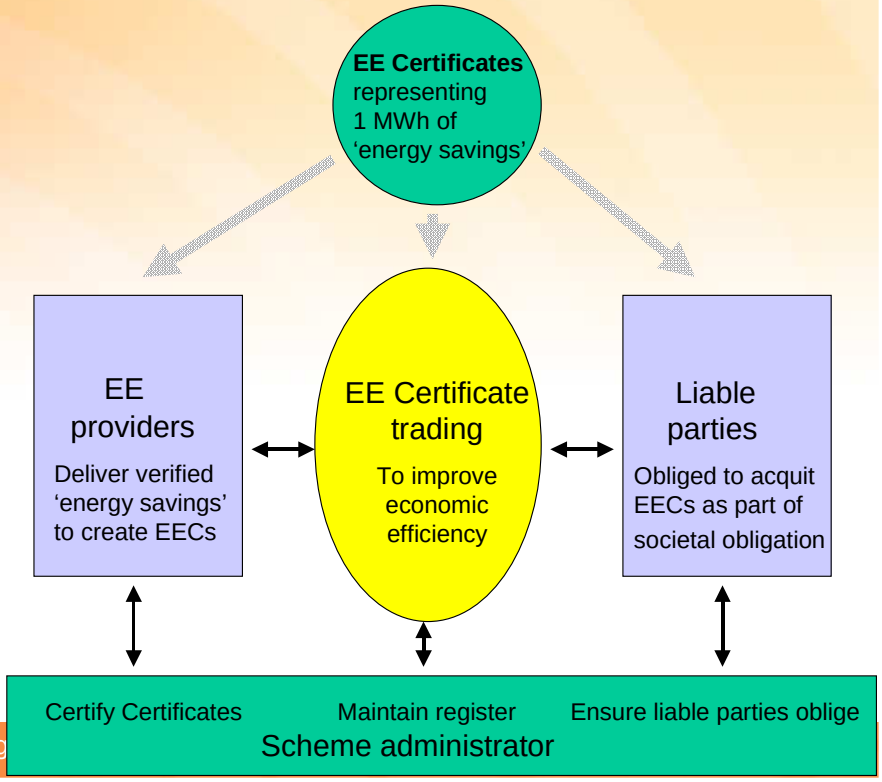
Voluntary markets – a modest role for EE



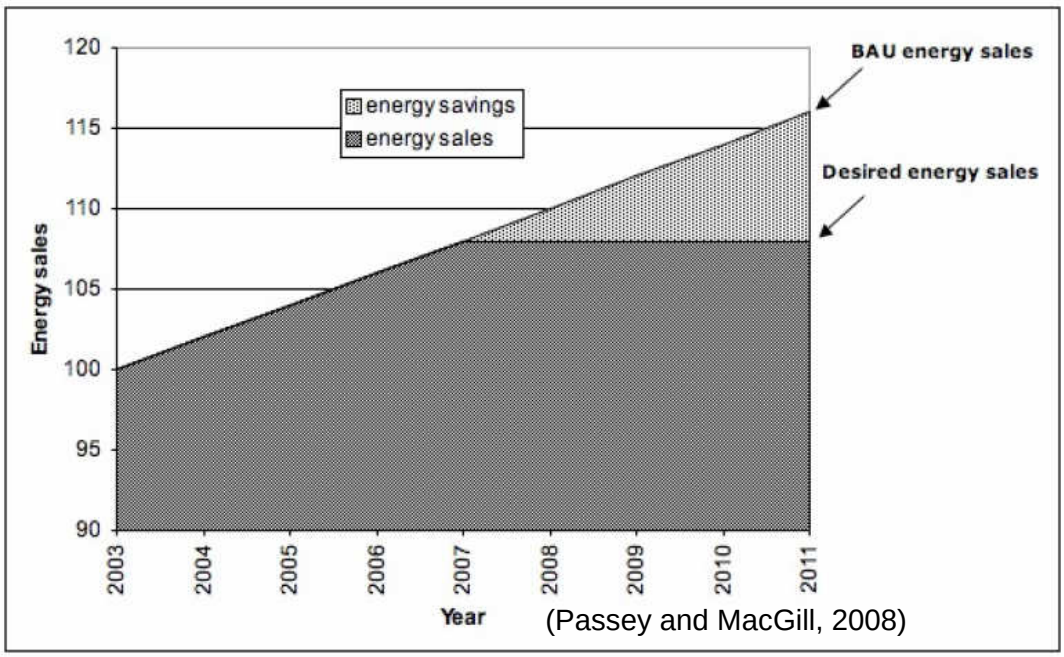
(Ecosystem Marketplace/NCF, *State of the Voluntary Carbon Market*, 2010)

EECT – a 'designer' market

- **EU:**
  UK (both B&C
  EEC and
  cap&trade CERT)
  Italy
  France
  Denmark
- **Australia:**
  NSW
  Victoria
  South Australia



In theory, B&C and Cap&Trade can be equivalent



(Passey and MacGill, 2008)

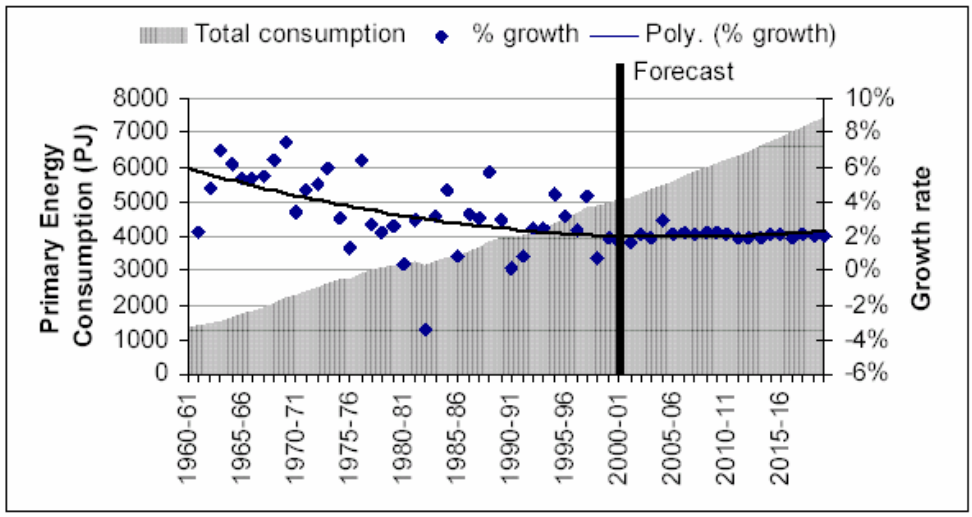
Figure 1 Illustrative diagram comparing EECT, NEST and TEST schemes

Targets

- Environmental + energy security imperatives more about emissions than intensities like energy/$GDP or technical EE improvements
- Modest short-term targets based on energy savings from BAU projections may be hard to make meaningful (eg. proposed EU 1%EE/yr):
  targets can get lost in variability due to other factors

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

(ACIL Tasman, 2003)



Scope, measurement + verification

- Increasing scope can increase efficiency but fungibility issues
  - Are Compact Lights directly fungible with cavity insulation?
- Additionality is hard to assess but it matters
  - Establishing baselines difficult (+ prone to errors, moral hazards) b/c have to estimate what would happen in absence of EECT
  - *Alternative*: simple requirement to *"reduce, or increase the efficiency of, their consumption of electricity"* **eg. NSW Scheme**
    - No test of additionality, yet many BAU reasons why these occur *Such an approach attracts participants doing something anyway*
- Trading means risks of 'market for lemons'
  - Genuine projects have to compete with any free-riders
- Complexity a challenge
  - verification vs transaction costs *particularly if require additionality*

Example - EE and BAU progress

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

- An argument for EECT with deemed certificates for computers to reward decision makers for choosing the energy efficient laptop?

Example: the difficulties with baselines & verification

- ***Orica*** in the NSW Scheme
  - Commissioned ChlorAlkali plants in Vic + NSW in 1998 to replace existing 1940s technology in use on site;
    New NSW plant completed September 2002
  - Successfully applied for accreditation under DSA rule
- SEDA Lighting Upgrade Project
  - Eligible for estimated 15000 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.

	UK (CERT)	Italy	France	Denmark	Flemish region (BE)
Current target	Carbon: 185 $MtCO_2$ lifetime in 2012	Primary energy: at least 22.4 Mtoe (~260 TWh) to be saved between 2005 and 2012 of which 6 Mtoe (~70 TWh) to be saved in 2012 only	Final energy: 54 TWh lifetime discounted	Final energy: 2.95 PJ (~0.82 TWh) annual (as of 2010: 5.4 PJ/year =1.5 TWh/year)	Primary energy: 0.58 TWh for 2008 (annual)
Current phase	2008–2012	2005–2012 (annual targets)	Mid-2006 to mid-2009	2006–2013 (annual targets)	2003 (annual targets)
Annual end-use energy savings (TWh)[a]	3.5 [b]	4.5 [c]	1.3 [d]		
Sectoral coverage for eligible projects	Residential consumers only	All consumers	All except ETS	All except transport	Residential and non-energy intensive industry and service
Restrictions on compliance	40% from 'priority group' (50% in EEC)	50% from reduction in own energy sector (applied until January 2008)			
Obliged parties	Electricity and gas suppliers above 50,000 residential customers	Electricity and gas distributors above 50,000 customers	Suppliers of electricity, natural gas, heat, cold and above 0.4 TWh/year sales, LPG above 0.1 TWh yearly sales and all heating fuel suppliers	Electricity, gas and heat distributors	Electricity distributors; Separate targets for residential and non-residential (2008 on)
Eligible parties for savings accreditation	Gas and electricity suppliers only can achieve accredited savings	ESCOs, energy efficiency installers, private and public enterprises with an energy manager, non-obliged gas and electricity distributors	Any economic actor but restriction on non obligated parties	Obliged distributors and daughter companies	Electricity distributors only
Certification size; discount factor; explicit cost recovery	N/A certification; No discount factor in CERT; No explicit cost recovery	1 toe; No discount factor; 100 Euro/toe cost recovery until 2008. As of 2009 cost recovery depends on energy sale price variation	Min. 1 GWh certification application threshold; 4% discount factor except for first year.; No effective cost recovery [e]	N/A; First year savings only count; Cost recovery	N/A; First year savings only; Cost recovery determined based on annual action plans for compliance
Trading	Energy savings can be traded only between obligated parties	Certificate trade; Spot market sessions; OTC trading	Certificate trade, only OTC trading	No trading, no certificates	No trading
Penalty	Penalty can be as high as 10% of the supplier's turnover but takes into account the size of the underperformance	Fixed by the Regulator taking into account, inter alia, the actual possibility to meet the target, the magnitude of the non-compliance, the state of affairs of the non-compliant party	0.02 Euro/kWh cumac	Penalty exists, not fixed	0.01 Euro/kWh

P. Bertoldi et al. / Energy Policy 38 (2010) 1455–1469

Italy 2005–2007

		Savings (toe)[a]	No. of installations [b]
1	CFL[c]	1,036,360	20,761,940
2	Low-flow shower heads (residential)	195,404	9,474,586
3	Substitution of mercury vapour lamps with high-pressure sodium lamps in public lighting	116,412	422,621 lamps
4	DH systems [d]	73,767	
5	Low-flow faucets in residential	66,303	16,215,760
6	Solar collectors	54,855	229,419 m^2
7	Domestic appliances class A [e]	21,190	839,169
8	Double glazing	12,272	221,441 m^2
9	Luminosity regulators in public lighting	11,140	22,888,678 W of lamps regulated
10	Small-scale cogeneration	8150	

UK 2005–2008 (total activity in the period)

		Savings (fuel-standardised GWh)	No. of installations
1	Cavity wall insulation	76,654	1,760,828
2	Loft insulation (virgin)	31,267	493,515
3	CFL	21,911	101,876,023
4	Loft insulation (top-up)	18,824	1,286,787
5	DIY loft insulation	9073	799,573
6	All boilers	7837	2,082,812
7	Fuel switching	4462	78,010
8	iDTV	3471	9,450,182
9	Solid wall insulation	2250	41,410
10	Standby savers	2005	2,943,384

France 2006–2009

		Savings (GWh cumac) [f]	No. of installations [g]
1	Individual condensing boiler	14,670	137,000
2	Individual high performance boiler	8346	180,000
3	Collective heating condensing boiler	4629	43,000
4	Air–air heat pump	4499	43,000
5	Roof insulation	3782	2,842,000
6	Acotherm labeled windows or equivalent	2999	1,363,000
7	Air–water heat pump	2608	20,000
8	Variable speed drive	2152	*Not estimated*
9	Collective heating high performance boiler	1760	37,000
10	Detached firewood heating appliance	1695	32,000

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Table 3
Cost estimates in comparison with electricity and gas prices.
Source: For residential gas and electricity prices Eurostat (2009).

UK	Electricity cost of conserved energy (Euro/kWh) EEC-2	**0.023**
	Electricity price (Euro/kWh without taxes) in 2008	0.1394
	Gas cost of conserved energy (Euro/kWh) EEC-2	**0.007**
	Gas price(Euro/kWh without taxes) in 2008	0.037
France	Cost of conserved energy upper bound based on the non-compliance penalty (Euro/kWh cumac) 2006–2009	**0.02**
	Cost of conserved energy lower bound based on the average price of certificates traded by the end of first period (Euro/kWh cumac) 2006–2009	**0.003**
	Electricity price (Euro/kWh without taxes) in 2008	0.094
	Gas price (Euro/kWh without taxes) in 2008	0.044
Italy	Electricity cost of conserved energy (certificate prices) (Euro/kWh) 2006–2007	**0.027**
	Electricity price (Euro/kWh without taxes) in 2007	0.166
	Gas cost of conserved energy (certificate prices) (Euro/kWh) 2006–2007	**0.026**
	Gas price (Euro/kWh without taxes) in 2008	0.043

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NSW EES (www.ipart.nsw.gov.au)

- Recognised Energy Savings Activities (RESAs) are specific activities implemented by an Energy Saver that increase the efficiency of electricity consumption or reduce electricity consumption, without negative effects on production or service levels, by:
  - modifying End-User Equipment or usage of End-User Equipment
  - replacing End-User Equipment with other Equipment that consume less electricity;
  - installing New End-User Equipment that consumes less electricity than other End-User Equipment of the same type, function, output or service; or
  - removing End-User Equipment that results in reduced electricity consumption, where there is no negative effect on production or service levels.

- The ESS Rule recognises three different methods for claiming the energy savings from RESAs. Applicants should carefully consider the most appropriate methodology to suit the circumstances of their particular project, as below:
  - the Project Impact Assessment Method (PIAM) is a calculation method best suited to discrete RESAs where the overall reduction in electricity use is a small proportion of total site use.
  - the Metered Baseline Method provides calculation methodologies for use where the RESA(s) materially reduce the electricity consumption of a whole site, or discrete part of a site, and the energy savings can be determined by reference to a site baseline. This method can be used for buildings with a NABERS rating.
  - the Deemed Energy Savings Method provides calculation methodologies for use where the RESA(s) involve installing or replacing a range of common End User Equipment types. Under these methodologies, the energy savings are deemed (i.e. the lifetime savings are created upfront).

EES performance

(www.ipart.nsw.gov.au, 2010)

Energy Savings Scheme target

Year	Effective scheme target (% of annual NSW electricity sales)	Retailer compliance obligation (% of annual liable electricity sales)
2009 (half year from 1 July)	0.4%	0.5%
2010	1.2%	1.5%
2011	2.0%	2.5%
2012	2.8%	3.5%
2013	3.6%	4.5%
2014–2020	4.0%	5.0%

Registry statistics

Table 1 Certificates created as at 31 May 2010

Rule group	Certificates
Generation Rule	71,924,524
DSA Rule	30,273,328
Carbon Sequestration Rule	2,627,934
Large User Rule	5,025,124
GGAS Total	**109,850,910**
Energy Savings Scheme	379,525
ESS Total	**379,525**

Table 2 Current accreditations as at 31 May 2010

Rule group	Accreditations
Generation Rule	137
DSA Rule[a]	60
Carbon Sequestration Rule	7
Large User Rule	10
GGAS Total	**214**
Energy Savings Scheme	47
ESS Total	**47**

Note: Accreditation totals include multiple projects

a DSA Rule accreditations for energy efficiency projects will be cancelled once all compliance obligations have been met.

SA REES (www.escosa.sa.gov.au)

- **REES Targets**
  - While all energy retailers are bound by the Regulations, a retailer will only be obliged to meet REES targets if its customer numbers exceed a threshold level set by the Minister. For 2009, 2010 and 2011, the customer threshold number has been set at 5,000 customers for each licence held.
  - The Minister must fix an overall annual greenhouse gas reduction target to be achieved by obliged retailers though the provision of energy efficiency activities to South Australian households. For 2009, 2010 and 2011, the annual greenhouse gas reduction targets (expressed in tonnes of carbon dioxide equivalent) are: 155,000 235,000 255,000
- The REES objectives are intended to be achieved in two main ways.
  - **Energy Audits**
  - Energy audits will be available for low-income households, to help assess current energy use practices, compare them to energy efficient practices and identify practical ways to be more energy efficient at home. For 2009, 2010 and 2011, the annual energy audit targets (numbers of households) are: 3,000 5,000
  - **Energy Efficiency Activities**
  - Greenhouse gas reduction activities will be available for all South Australian households. Householders will be able to take up incentives offered by any retailer, not just their own, for the installation of various pre-approved energy efficiency activities, such as the installation of Compact Fluorescent Lamps (CFLs), low-flow showerheads and ceiling insulation. The full list of approved energy efficiency activities is available in the Gazettal notice of 30 October 2008.
  - The Minister for Energy has set a proportion of greenhouse gas reduction activities required to be undertaken in low-income households.

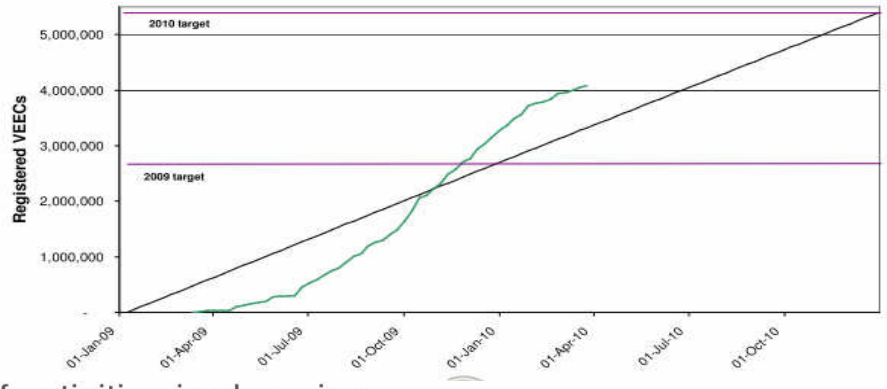
In reviewing existing activities, and in considering adding new activities, ESCOSA should have regard to the following key principles:

- Flexibility – a range of different energy efficiency activities should be available for implementation.
- Additionality – activities should encourage energy savings which are additional to that which would otherwise be achieved under current and planned regulatory requirements; and/or which is otherwise occurring through BAU or consumer behaviour. This includes consideration of what barriers or market failures prevent further uptake of the activity.
- Verifiability – potential energy and greenhouse savings from an activity should be robustly determined and verifiable, based on sound research applicable to SA climate
- Consistency of the saving - there should be a high level of confidence that the estimated savings could be achieved in the majority of circumstances. For example, the activity does not predominantly rely on variable human behaviour or accurate use by the household; hardware is likely to remain in place; or implementation is the subject of defined standards which underpin quality assurance and consistency of performance.
- Penetration potential – the activity should be technically capable of broad iimplementation and uptake by households within SA
- Accessible and practical – the activity should be accessible in the market and able to be practically and relatively easily implemented in the residential sector.
- Cost effectiveness – benefits from the activity should be capable of cost effectively contributing to achievement of greenhouse gas reduction targets for South Australia (cost per tonne saved). Costs includes consideration of hardware and installation costs; program or administration costs in delivering the activity to households; the type level of incentive likely to be required to encourage uptake; and access to government or other rebates to reduce costs. Savings include direct financial savings from reduced energy use and associated financial savings, such as water savings from water efficient showerheads.
- Other schemes – ESCOSA should have regard to activities and specifications eligible in similar schemes in other state jurisdictions, striving for consistency wherever achievable and appropriate to allow synergies for participants operating in multiple jurisdictions.

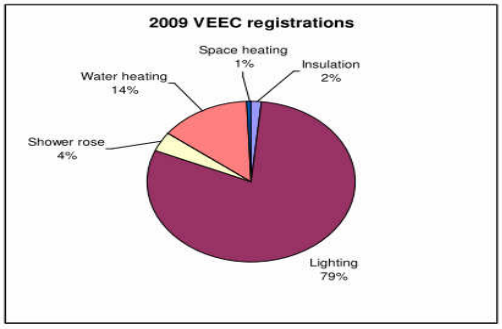
Victorian VEET (www.vic.gov.au)

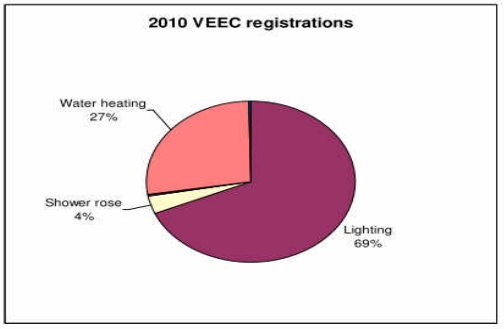
- **Scheme for residential sector**
- **Categories of prescribed activities**
  - *Six categories of activities are specified as prescribed activities in the VEET Regulations:*
  - Water heating - decommissioning of low efficiency water heating products and the installation of high efficiency water heating products. This category also includes the installation of solar pre-heaters or solar retrofit kits.
  - Space heating - decommissioning of low efficiency ducted heating products and the installation of high efficiency ducted heating products, and the installation of high efficiency space heating products.
  - Space conditioning - installation of insulation, thermally efficient windows and weather sealing products.
  - Lighting – installation of low energy lamps.
  - Shower rose - decommissioning of non-low flow shower rose and the installation of low flow shower rose.
  - Refrigerators/freezers – purchase or high efficiency refrigerator or freezer (refrigerator purchase) and destruction of pre-1996 refrigerator or freezer (refrigerator destruction)

- Over 4 Million Certificates Registered
- Activities conducted in ~ 450,000 households
- Relatively low rate of complaints (~100)



- Mix of activities is changing





Some lessons for market-based instruments

- Potential advantages in restructured energy industries but mixed success so far wrt effectiveness, efficiency + equity
- Offer great flexibility to market 'designers' **however**
  - Hard to predict performance of designs
  - Poor design choices can greatly impact effectiveness + efficiency
- Rigorous + transparent design process required with stakeholder management
  - Incumbency, information asymmetry + potential gaming of design
- Interactions between measures may reduce effectiveness
  - economy-wide schemes will have many interactions
- Need transparent, liquid + efficient mkts for price discovery + risk management
  - derivative markets have the most vital role in bridging short to longer term decision making

Some possible policy conclusions for EE

- Get the wider energy policy context right
  - Retail energy market restructuring is not delivering for EE
  - Rethink required on desirability of low energy prices – adversely impacts EE + key wider energy objectives
- Get the wider EE policy context right
  - Important limits to what price-based mechanisms alone can achieve
  - Market mechanisms rely on regulatory measures to set minimum acceptable performance, frontier measures to push the envelope
- For EECT
  - Reduce complexity by restricting scope, measurable targets
  - Get baselines right - restrict scope of activities to what can be shown to be largely additional, fungible, measurable + verifiable
  - 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

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Thank you… and *questions*

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