



Australian & New Zealand Energy Strategies - Implications for Renewable Energy & Energy Efficiency

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Outline

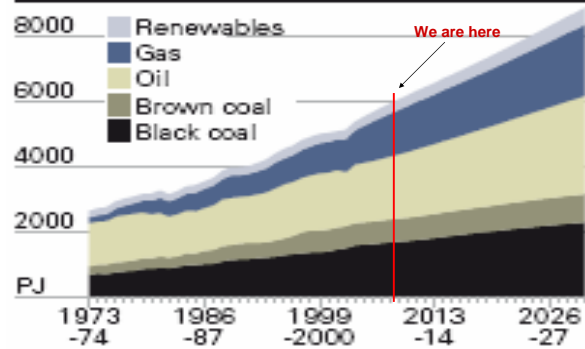
- Energy Use and Trends in Australia & New Zealand
- Current Energy Policies in Australia & New Zealand
- Australian Energy Efficiency & Renewable Energy Strategies
- Discussion



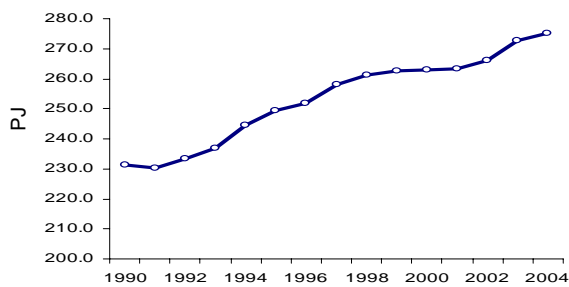
Australia

Energy Use and Trends

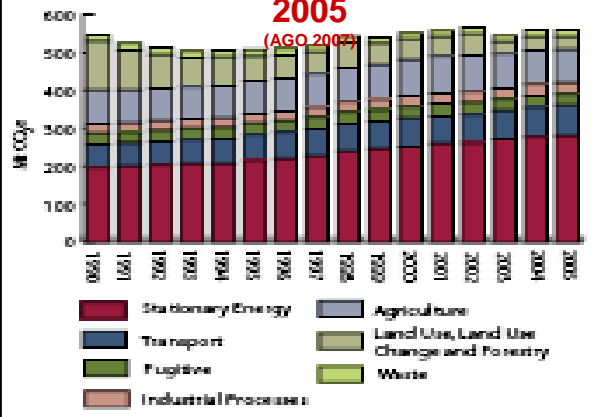
Primary energy consumption, by fuel (ABARE, 2005)



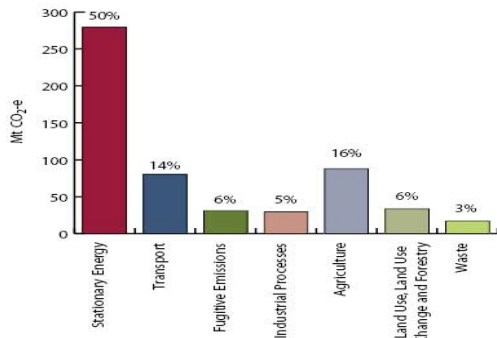
Energy Consumed per Capita Australia (ABARE, 2005)



Australian CO₂eq Emissions 1990-2005 (AGO 2007)

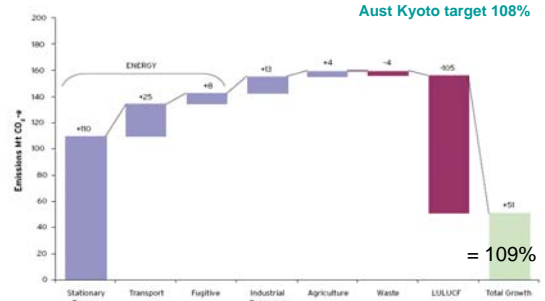


% Sectoral Contributions 2005 (AGO 2007)

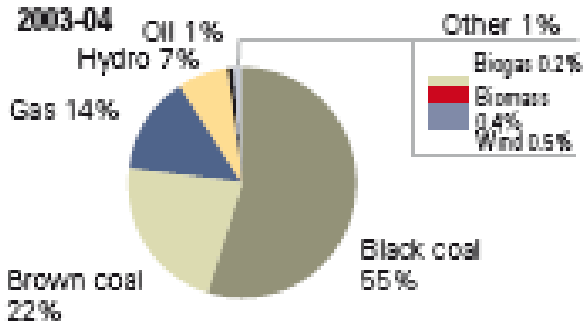


Projected Emissions 1990-2010 (AGO, 2007)

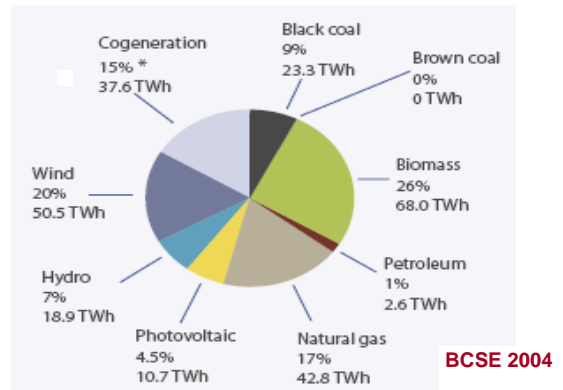
Figure 2: Change in emissions by sector: 1990 to 2008-12



Stationary Energy Sector – primary energy use (ABARE, 2005)



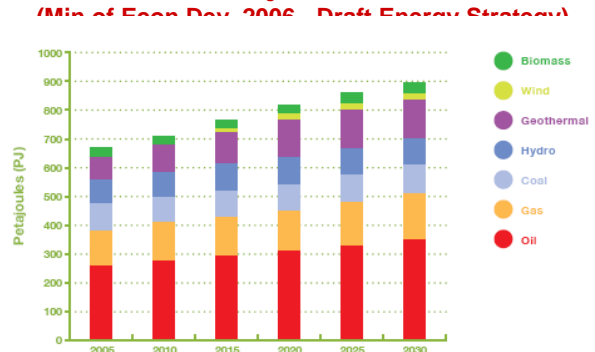
A Possible Future Electricity Scenario 2030

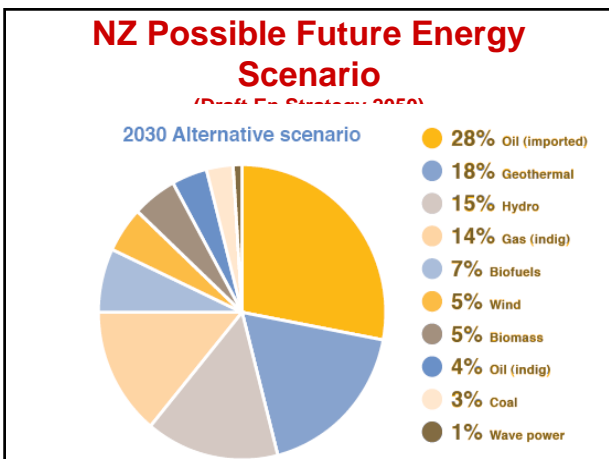
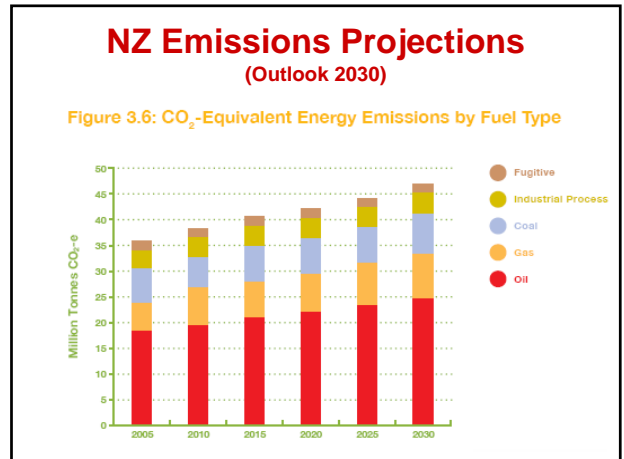
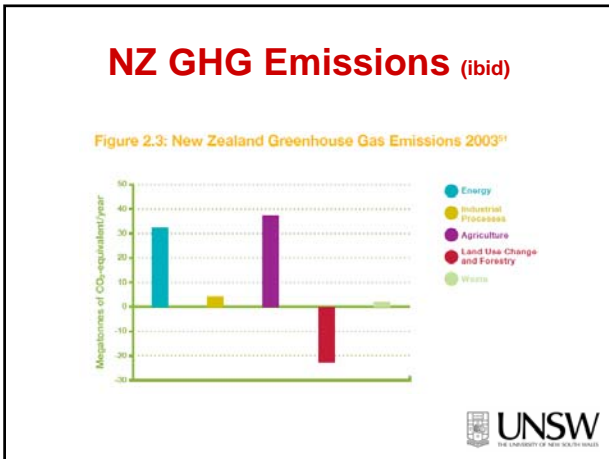
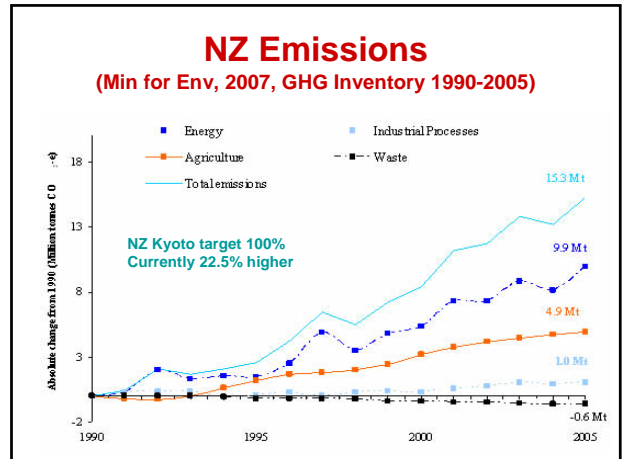
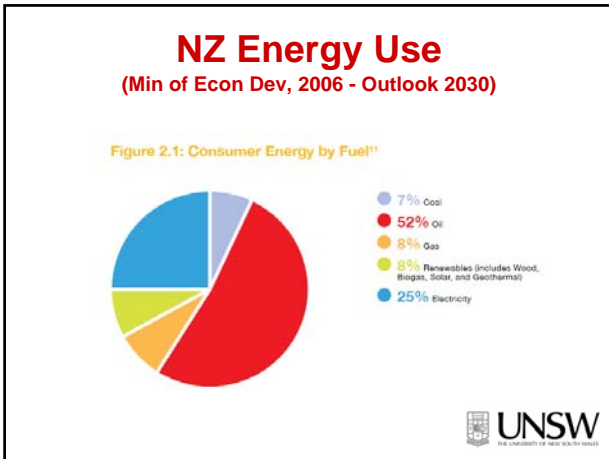


New Zealand

Energy Use and Trends

NZ Primary Energy Use & Projections (Mix of Econ Dev, 2006, Draft Energy Strategy)





UNSW
THE UNIVERSITY OF NEW SOUTH WALES

Sustainable Energy Policy

Australia

Energy White Paper – 2004

(Aust Gov, 2004)

- Coal selected as key energy source
- Removal of diesel excise (~40%) for power generation, heating & industrial uses
- Low emission technology fund -\$500m
 - Large projects (eg. geo-sequestration, MW scale solar systems)
- Renewable energy - \$200m (to sort out “problems”)
 - Solar cities trials
 - Wind forecasting
 - Energy storage
 - Commercialisation
 - No change to MRET target (too expensive, too few tech benefit)
- Energy Efficiency
 - Information
 - Audits of large companies
 - MEPS and other standards

Australia Pacific Partnership on Clean Development and Climate (AP6)

(Aust Gov, 2005)

- *“Create a voluntary, non-legally binding framework for international cooperation to facilitate the development, diffusion, deployment and transfer of existing, emerging and longer term cost-effective, cleaner, more efficient technologies and practices among the Partners”*
- United States, Australia, Japan, South Korea, China and India
 - 50% world’s population, GDP, energy consumption and ghg emissions
 - 4 largest coal producers - China, US, India and Australia
 - 2 largest coal importers - Japan and Korea
 - All in the world’s top ten coal consuming countries
- Public-Private sector taskforces:
 - (1) cleaner fossil energy; (2) **renewable energy and distributed generation**; (3) power generation and transmission; (4) steel; (5) aluminium; (6) cement; (7) coal mining; (8) buildings and appliances

Comparison of Kyoto & AP6

- Australian Prime Minister, John Howard: “The fairness and effectiveness of this proposal will be superior to the Kyoto Protocol.”
- AP6 intended to complement not replace Kyoto
- AP6 - no binding emissions targets
- Kyoto - binding targets for developed countries & growing market for CDM (av 150-250 MtCO₂ by 2010) ~ €1-1.8b funds to developing countries
- Little agreed funding for AP6 to date is (A\$100m)
- ABARE’s scenarios of possible AP6 outcomes all see global emissions more than doubling to 2050
- Different implications for US & Australia than other 4 members who all ratified Kyoto

Climate Change Policy

(Australian Govt, July 2007)

- reducing domestic emissions at least economic cost;
- developing key low emissions technologies, improving energy efficiency & supporting households & communities to reduce emissions;
- supporting world class climate science & adapting to the impacts of unavoidable climate change;
- pursuing effective international responses to climate change that involve all major emitters, & that reflect our domestic policies



2007 – Election Year Promises

- Nuclear review & funding
- Cap & Trade emissions trading by 2012
 - Joint with NZ likely
- Increased PV funding (\$4/W -> \$8)
- OK to previously cancelled wind project
- Solar water heater grants (\$1000)
- School “green” vouchers



Sustainable Energy Policy

New Zealand

NZ Energy Strategy to 2050

(Dec 2006)

- Resilient, low carbon transport
 - Security of electricity supply
 - Low emissions power and heat
 - Using energy more efficiently
 - Sustainable technologies and innovation
 - Affordability and wellbeing
-
- Links to previous National Energy Efficiency & Conservation Strategy



NZ Energy Efficiency Opportunities

- Building insulation, esp pre 1978 homes (900,000)
 - Comfort levels low, health impacts
 - grants
- Appliance efficiency (energy ratings, MEPS)
- Replacement of electric heaters with heat pumps
- Solar & heat pump water heaters
- EE lighting
- Business audits
- Conversion from electric to gas appliances
- Cogeneration



NZ Renewables Opportunities

- Energy Resource Roadmap
- Emissions Trading
- More wind (170 MW from 2500 MW potential) & geothermal
- Mandatory biofuels (from current 65M litre by 2012 voluntary target)
- Solar water heaters (\$500 rebate)
- Marine RE (wave, tidal)



NZ Transport

- BAU 35% inc in oil use by 2030
- Alternative fuels
 - Electric vehicles
 - Biofuels
- Vehicle efficiency
- More efficient modes (eg. sea transport)



Possible Future Energy Sector Emissions

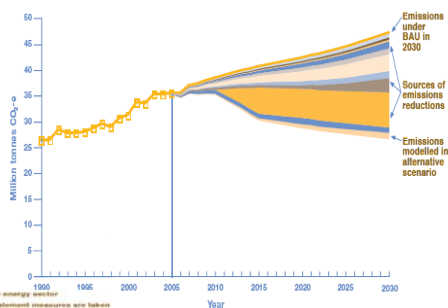
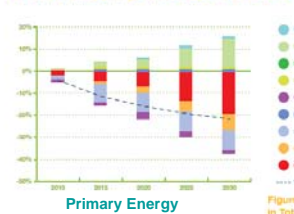
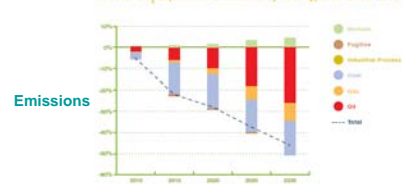


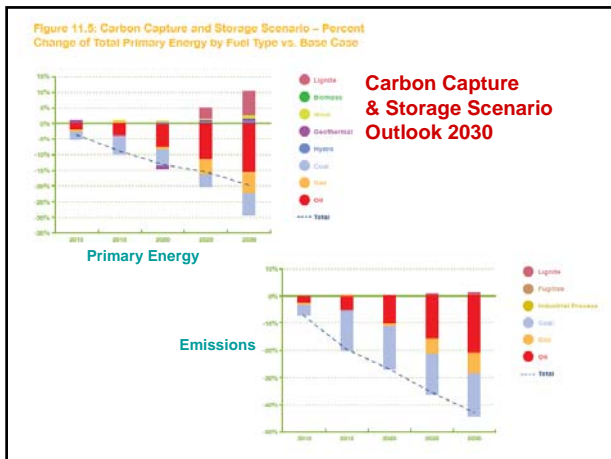
Figure 11.1: Renewables Scenario – Percent Change of Total Primary Energy by Fuel Type vs. Base Case



Renewables Scenario Outlook 2030

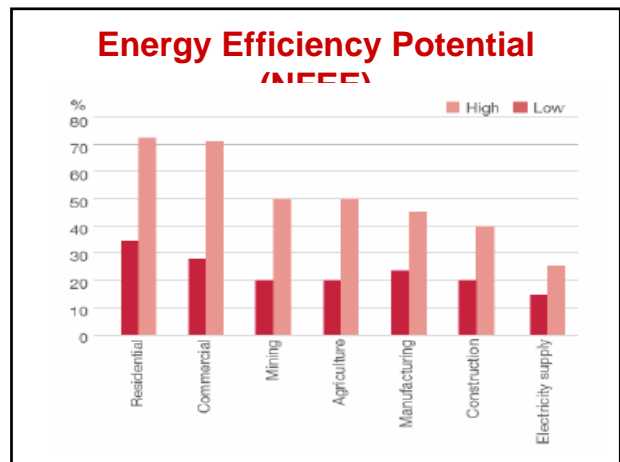
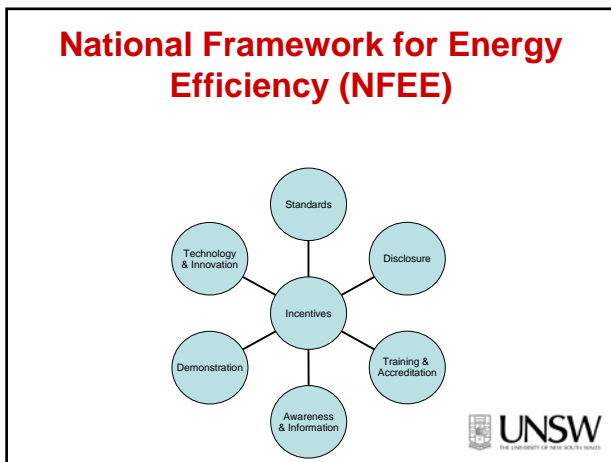
Figure 11.4: Renewables Scenario – Percent Change in Total CO₂-Equivalent Emissions by Fuel Type vs. Base Case





Energy Efficiency

Australian Programs



- ### NFEE – Stage 1 Outcomes (IEES 2007)
- MEPS new homes/building **✓ STATE**
 - Mandatory performance disclosure homes & buildings **X ACT**
 - Energy efficiency opportunities **? Reporting only**
 - Training and accreditation **X Some trade**
 - Government energy efficiency **X**
 - Appliance MEPS **✓ BUT SLOW**
 - Capacity building **?**
 - Consumer awareness **X**
 - Finance sector awareness **?**
- UNSW

Market based mechanisms

Australian Programs

Programs

- MRET (Australia wide, Commonwealth Govt, trades in RECs)
 - State RE targets
- GGAS (NSW, NSW Govt, NGACs)
- QGS (QLD, QLD Govt, trades in GECs)
- GreenPower (Australia wide, all Govts, trades in GPRs)



Certificates Registered by June 06 (BCSE, 2006a)

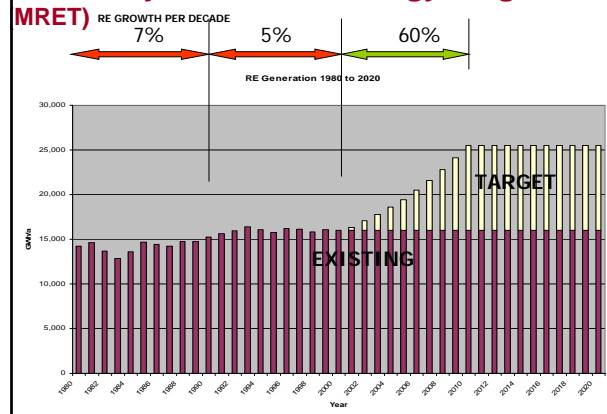
Total Registered Certificates	Certificates Created 2001 to 2006	2006 Contract Price (Jun 06)	Value of Certificates \$ mil.
Renewable Energy Certificates	16,900,000	\$20.50	346.5
NSW Greenhouse Abatement Certificates	26,256,000	\$15.15	397.8
Qld Gas Electricity Certificates	4,500,000	\$16.00	72.0
			816.3



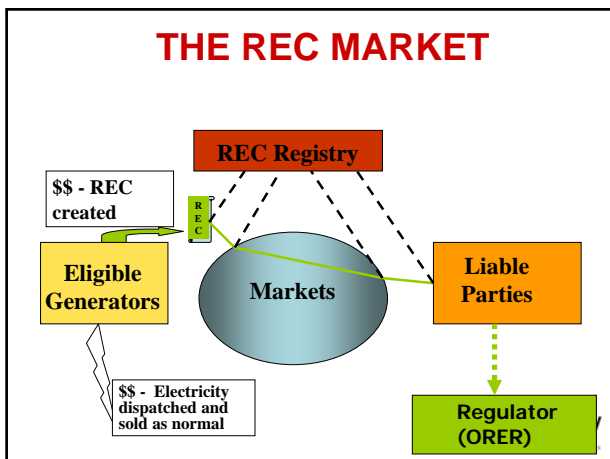
Mandatory Renewable Energy Target (MRET)

- Commenced 1 April 2001
- **NOT** 2% - 9500 GWh additional RE by 2010, maintained to 2020
- 1 renewable energy certificate (REC) for each MWh generated
- Electricity retailers & large users purchase certificates (or generate their own) according to their annual %
- Penalty of \$40/MWh for non-compliance
- Estimated cost of compliance ~1.3 to 2.5% by 2010

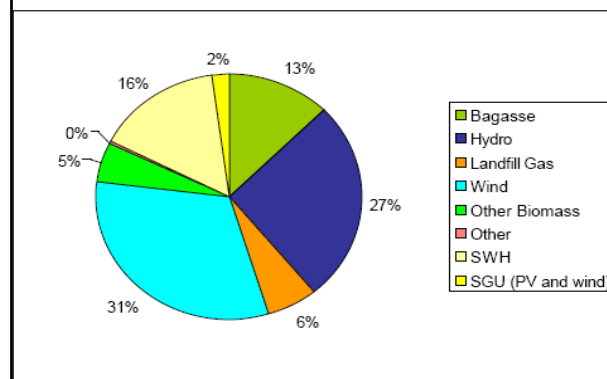
Mandatory Renewable Energy Target (MRET)



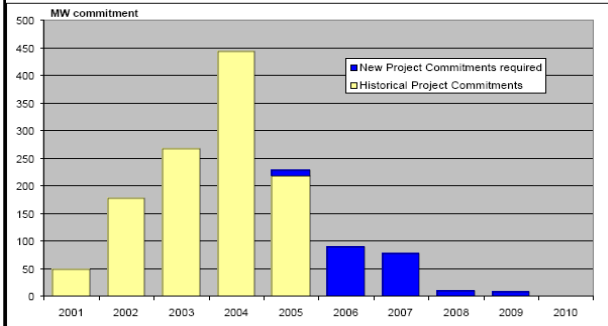
THE REC MARKET



Projected 2020 MRET Mix (BCSE)



New Projects Required (BCSE)



Implications of MRET

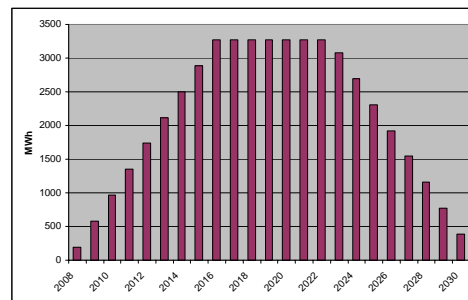
- First longer term RE market based policy in Australia
- MRET moved the focus from research to deployment
- Combined objectives:
 - Industry development
 - \$2B projected to be invested
 - Emissions reduction
- Supply side focus
- Fixed target gives no incentive for demand management
- Large increase in electricity usage since 1997 has reduced impact from projected 2% increase in RE to around 1%
- Sustainability issues have arisen:
 - biomass sources, native forest products, wind farm siting
- Major beneficiaries have been wind, solar water heaters and existing hydro

VRET

- Victorian target with similar structure and operation to MRET & no double counting
- Target of additional 3274 GWh Victorian based RE generation by 2016 (~10% RE)
- Solar water heating excluded
- Must be located in Vic
- Post 2007 installations or upgrade only
- \$43/MWh penalty

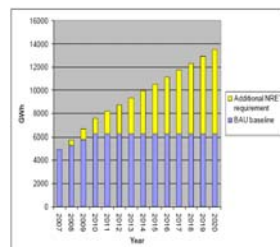


VRET Annual Targets



- NSW target from 2008 with similar structure and operation to MRET, VRET & no double counting
- Target of 10% elect by 2010 (additional 1317 GWh) and 15% by 2020 (7250 GWh) maintained to 2030
- Trade exposed, electricity intensive industries exempt
- Generators can be anywhere in the NEM, but use must be in NSW
- No shw, \$43 penalty, 15 years per generator
- ~30c/household/week 2008-2030

NRET



Emissions Trading Models

- Cap and trade schemes
 - binding cap on emission permits for participants who then surrender permits equal to their emissions. Permits can be traded and acquire value because of the cap. Ideally, the value of traded permits = marginal cost (among all participants) of physically reducing emissions.
- Baseline and credit schemes
 - 'baseline' emissions set for each participant. Credits given to participants if actual emissions are lower than baseline projections. Credits may be sold to participants who exceed their baseline projections. Since the baseline will never occur in practice, and it is difficult to validate.

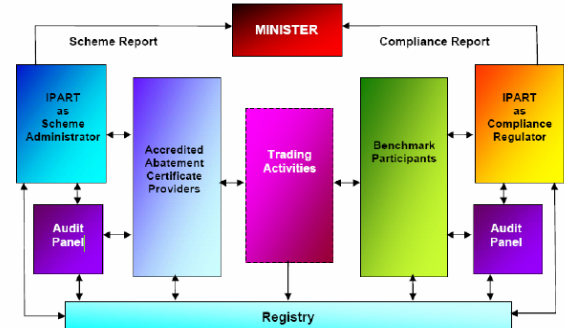


NSW Greenhouse Gas Abatement Scheme

- baseline & credit provisions to encourage emissions reduction against the pool average
- Aims to lower per capita emissions from 8.65 to 7.27t by 2007 then held to 2020, perhaps extended coverage
- allows low emission generation, energy efficiency, forestry based sequestration and on-site emissions reduction to create tradable certificates (NGACs) for use by electricity retailers, large users and scheduled generators
- Penalty \$11/t CO₂
- Sources – 34% landfill gas, 26% coal mine gas, 17% natural gas, 9% coal, 5% on-site generation, 2% residential EE, 2% hydro
- PV, SWH, Cogen & EE must be in NSW



NSW GGAS (IPART, 2005)



QLD Gas Scheme

- 13% gas target for Qld retailers by 2020
- \$11/GWh penalty indexed from 2005
- Large electricity users exempt
- Natural gas, coal seam gas, liquefied petroleum gas, waste gas from petroleum refining in Qld
- GECs must be created by end of year following generation



GreenPower

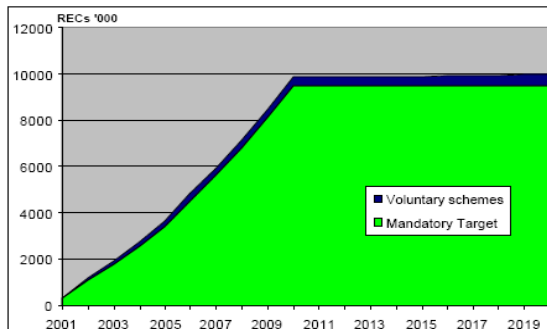


EnergyAustralia's Singleton PV power station

- Voluntary
 - New NSW customers default 10% GP
- Post 1997 generation
- 380,000 customers, 63% commercial
- 1000 GWh per year



Green Power Significance (BCSE)



Issues arising with Market Mechanisms

- Can be capacity (MW, MWh) or %
- Technology specific or neutral
 - If neutral may favour 1 or 2 mature technologies
- Can be staged to facilitate industry expansion
 - Early project advantage
 - Need for time limit on project eligibility
- Can create ceilings
- Need transparent compliance & disclosure mechanisms
 - Issue with MRET hydro baseline



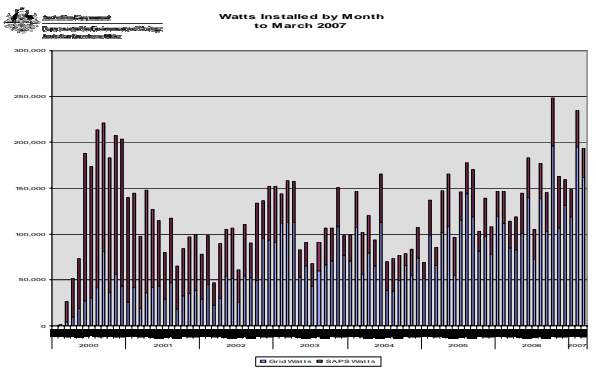
Capital Cost Subsidy Programs

Australian Programs

PV Rebate Programme (PVRP)

- 2000 - 2010
- Rebates on PV capital costs for householders or community building owners
- Rebate now \$8/Wp capped at \$8,000
- 8000 systems, using 10 MWp of PV, have been installed to date
- 60% grid connected

PV Rebate Program



Renewable Remote Power Generation Programme (RRPGP)

- 2000 – 2010
- RE use off-grid, fringe of grid & mini-grids to displace fossil fuels
- Grants up to 50% of RE capital cost
- Sub-programmes:
 - Bushlight - for small remote aboriginal communities, incl. training and awareness
 - RESLab - RE systems test centre, Murdoch Uni
 - Training & accreditation

Remote Power Stations



Solar System's 220 kWp concentrator system (Pitjantjatjara, SA)



Mawson, wind project, Antarctica (Powercorp)

Bushlight



Grant Wallace cleans the solar panels at House 5 at Corkwood Bore

Issues arising with capital cost subsidies

- Can create markets when up front costs high
- Need to be long term, not stop-start to encourage manufacturing, sales & services packages, financing
- Can reduce incentives to reduce prices, although increased sales should streamline supply & costs
- Marketing needed but can lead to oversubscription
- Need to ensure quality of products & services
- Best with utility cooperation
- Need to find a way of weaning off subsidy



R&D Support

Australia

Renewable Energy Development Initiative (REDI)

- Launched 2005 - \$100M over 7 years as competitive grants to Australian industry to support RE technology:
 - early-stage commercialisation
 - research and development
 - technology diffusion
 - proof-of-concept activities
- Projects must demonstrate strong commercial and emissions-reduction potential



Low Emissions Technology and Abatement (LETA) Fund

- \$26.9M to reduce greenhouse gas emissions over the longer term for:
 - identification and implementation of cost effective abatement opportunities
 - uptake of small scale low emission technologies in business, industry and local communities
- Support for RE via an industry development sub-programme available to State and Territory Governments and RE industry associations



Advanced Electricity Storage Technologies

- \$20.4M to:
 - overcome barriers to RE and other intermittent energy sources
 - demonstrate world-leading electricity storage technologies
 - develop creative solutions that benefit both electricity storage and RE industries
- includes batteries, electro-mechanical, thermal and chemical storage



Other Strategies

Australia

Solar Cities

- \$75M over 5 years
- solar, energy efficiency, smart metering
- Adelaide, Townsville, Blacktown, Alice Springs
- Others?



Cities for Climate Protection

- 220 Councils
- Part of International program
- Local ghg action plans for Council & community
- Large \$ savings as well



Building Standards

- NSW BASIX
 - choice of energy & water options to meet target reductions
 - Insulation, shw, PV, water tanks
 - Target of 40% less ghg
- ACT HERS
 - Must show energy rating when sold
- NABERS environmental rating
 - Energy, water, transport, materials, waste
- Green Star office ratings
- Energy Smart buildings
- Govt buildings



Discussion

Key Issues

- Electricity
 - Aust 90% FF
 - NZ 70% RE
- Transport
 - Aust 14% of emissions
 - NZ 52%
- Kyoto
 - Australia out
 - NZ in
- Common
 - Emissions increasing
 - Difficult task to reach Kyoto targets & long term reductions



Status of Australian Sustainable Energy Policy

- No clear long term GHG target or strategy
 - No Energy Efficiency targets, R&D, incentives
 - MRET only mandatory measure but fully committed & not to be continued
- Emissions trading by 2012 – no target yet
- Not ratifying Kyoto but committed to 108% ghg reduction target
 - can only reach this through use of reduced land clearing (NZ also)
 - Policy focus on separate AP6 voluntary agreements
- Technology focus on carbon sequestration & nuclear
 - Some solar support, but worried about wind & bioenergy
- Continued increase in emissions, especially from electricity

BCSE Recommendations (2007)

- 60% increase in MRET – increasing the 2010 target from 9,500 GWh to 15,500 GWh
- More stringent and extensive minimum energy efficiency measures for appliances and buildings
- Significant extension and expansion of the NSW greenhouse abatement scheme by 6 mt/a in 2010
- Extension and expansion of the Queensland Gas Scheme to effectively double its current contribution by 2010
- Clean energy fund of ~\$1500 million to fund the deployment of clean energy technologies



Market Challenges

- Energy industry restructuring => competition => lower energy prices
- Evolving community and market expectations for social and environmental accountability
- Rapid technical innovation in a range of energy conversion technologies, particularly small scale distributed electricity
- Consumers interested in end-use services not energy
- Property rights for RE forms not be well-defined, eg. solar access



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